

5620 SAM R12.0 Fundamentals

Student Guide

TOS36033_V4.0-SG Edition 1

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Welcome to 5620 SAM

R12.0 Fundamentals

1. Product Overview
 1. 5620 SAM Overview
 2. 5620 SAM Modularity
 3. 5620 SAM Features Overview
2. System Overview
 1. System Architecture
 2. Launch the SAM GUI Client
 3. SAM GUI Client Components
 4. SAM GUI Client Windows and Forms Components and Management
 5. Finding Information in SAM GUI Client
 6. SAM GUI Client Workspaces
3. Network Management
 1. Node Preparation for SAM Discovery
 2. Network Element Discovery
 3. Equipment Management
 4. Equipment Inventory
 5. Topology Map Components and Management
 6. Topology Map Info Tables
 7. Flat Maps
 8. User Activity
4. Fault Management
 1. Alarm Status and Severity
 2. Dynamic Alarm List
 3. Alarm Information Form
 4. Alarm Correlation, Affecting and Aggregated Alarms
 5. Alarm Management tools
 6. Object Life Cycle State
 7. Historical Alarms
 8. Fault Management Web Application Overview
5. Performance Management
 1. 5620 SAM Statistics Overview
 2. Performance Statistics



5620 SAM

R12.0 Fundamentals

Upon completion of this course, you should be able to:

- List the 5620 SAM functions and main features
- Identify the components of the 5620 SAM management system
- Identify the elements 5620 SAM GUI
- Identify the 5620 SAM Web Applications and their function
- Use the 5620 SAM navigation tree views to perform equipment management operations
- Discover network element (NE) devices on 5620 SAM
- Use 5620 SAM topology maps to manage the network and display the status of network devices and services
- Generate file inventory lists for a managed device or for the entire network
- Use the 5620 SAM to identify alarms rose against equipment and services, alarm types, severity, status and correlation details
- Manage the User activity logs to view information about the actions performed by each 5620 SAM clients
- Use the dynamic alarm list to filter and search for alarms, display correlated alarms, view alarm history and open alarm information details
- Identify the views available in the Fault Management Web Application and their function
- Identify the 5620 SAM statistics collection capabilities
- Use the 5620 SAM to collect, display, and save to a file scheduled and on-demand performance statistics in tabular or graphical forms for selected objects

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Section 1
Product Overview

Module 1 5620 SAM Overview

TOS36033_V4.0-SG-R12.0-Ed1 Module 1.1 Edition 3

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Upon completion of this module, you will be able to:

- Identify the Alcatel-Lucent Management Architecture elements including the 5620 SAM
- Identify the Alcatel-Lucent devices for which the 5620 SAM is the management solution
- Describe the general characteristics and function of the 5620 SAM
- List the types of platforms can be present in a 5620 SAM Release deployment and describe the overall characteristics and functions of each platform
- Identify the operating system support for 5620 SAM platforms
- Describe the general characteristics of 5620 SAM redundancy

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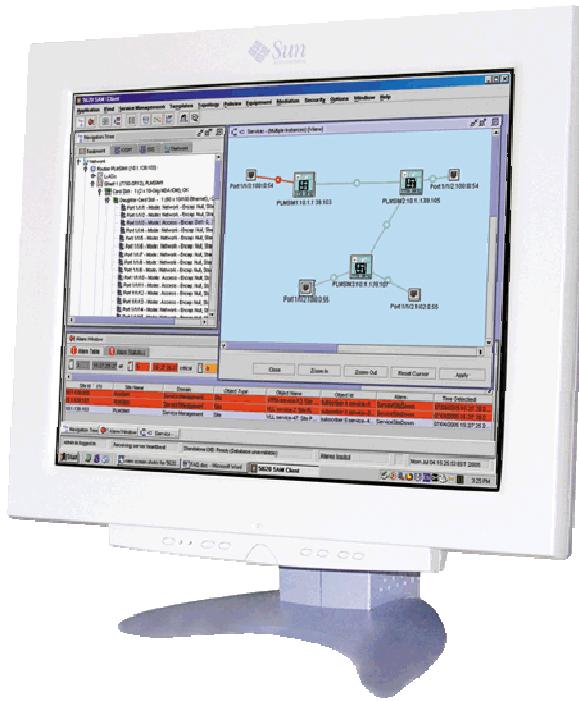


	Page
1 Course Introduction	7
1.1 Welcome to 5620 Service Aware Manager (SAM) Fundamentals	8
1.2 Course Objectives	9
1.3 Target Audience	11
1.4 Alcatel-Lucent University Training	12
2 Alcatel-Lucent IP/MPLS Management Solution	13
2.1 Alcatel-Lucent IP/MPLS Management Strategy	14
2.2 Alcatel-Lucent IP/MPLS Management architecture	15
2.3 Alcatel-Lucent IP/MPLS management	16
3 - 5620 SAM Product Overview	17
3.1 - 5620 Service Aware Manager (SAM)	18
3.2 5620 SAM Platform Types	20
3.2.1 SAM Main Server	21
3.2.2 SAM Database	22
3.2.3 SAM GUI Client	23
3.2.4 SAM Client Delegate Server	24
3.2.5 SAM Auxiliary Server	25
3.3 OS requirements for 5620 SAM platforms	27
3.4 Redundancy	28
3.5 IPMP	29
3.6 Redundancy and 5620 SAM Auxiliary Servers	30
Questions	31
Answers	32
Module Summary	33

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1 Course Introduction

1.1 Welcome to 5620 Service Aware Manager (SAM) Fundamentals



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1 · 1 · 8
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5620 SAM - R12.0 Fundamentals

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The 5620 SAM R10.0 Fundamentals course provides hands-on foundations for using SAM to:

- perform network equipment management, monitoring and supervision
- identify alarms rose against equipment and services
- obtain details about alarm types, severity, status and correlation
- perform scheduled and on-demand equipment configuration backups and software upgrades
- collect, display and save performance statistics in tabular or graphical forms for selected objects

1.2 Course Objectives



Upon completion of this course, student will be able to:

- List the 5620 SAM functions and main features
- Identify the components of the 5620 SAM management system
- Identify the elements of the 5620 SAM GUI
- Describe the GUI workspace customization capabilities and identify the workspace elements that can be customized
- Use the 5620 SAM navigation tree views to perform equipment management operations
- Discover network element (NE) devices on 5620 SAM
- Use 5620 SAM topology maps to manage the network and display the status of network devices and services
- Manage the User activity logs to view information about the actions performed by each 5620 SAM client
- Generate file inventory lists for a managed device or for the entire network
- Use the 5620 SAM to identify alarms raised against equipment, services, alarm types, severity, status and correlation details

Course objectives listed above.



Upon completion of this course, student will be able to:

- Use the dynamic alarm list to filter and search for alarms, display correlated alarms, view alarm history and open alarm information details
- Identify the 5620 SAM statistics collection capabilities
- Use the 5620 SAM to collect, display and save to a file performance statistics in tabular or graphical forms for selected objects

1 · 1 · 10

Product Overview - 5620 SAM Overview
5620 SAM - R12.0 Fundamentals

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Course objectives listed continued above.

1.3 Target Audience

This course is targeted to the following audiences:

- Customer's technical personnel using the 5620 SAM 12.0 to monitor the network, reporting alarms, monitor network element's performance and maintain the service provider network
- Any other customer's technical personnel willing to take other course(s) of any the following ALUniv training paths:
 - IP Network Services Management Training
 - IP Network Report and Analysis Training
 - IP/Ethernet Mobile Backhaul (with 5620 SAM)
 - IP/MPLS in Industries and Government (with 5620 SAM)
 - Long Term Evolution (Level 5)
 - LTE Core Network Operation Center Engineer
 - LTE Radio O&M Engineer
 - LTE Radio Servers & Information System Network Administrator (with SAM option)
 - Small Cell Solution Maintenance Engineer
 - 1830 Photonic Service Switch (PSS) - DWDM (managed with 5620 SAM)
- Internal Alcatel-Lucent employees aiming to learn the basic operation capabilities and management capabilities of the 5620 SAM 12.0

1 · 1 · 11

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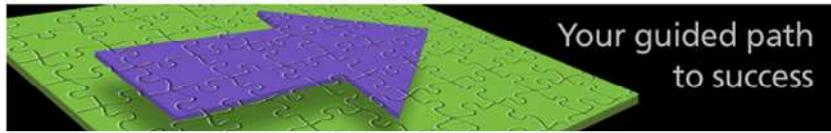
Course objectives continued listed above.

1.4 Alcatel-Lucent University Training

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1 · 1 · 12

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2 Alcatel-Lucent IP/MPLS Management Solution

2.1 Alcatel-Lucent IP/MPLS Management Strategy



1 · 1 · 14

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Network Layer : Management Strategy Starts In The Node

- Service awareness built in the nodes
- Service richness
- Subscriber control flexibility
- OAM test richness leadership
- Use reliable SNMP management framework, not push/poll CLI
- Rich and configurable alarm/event notification

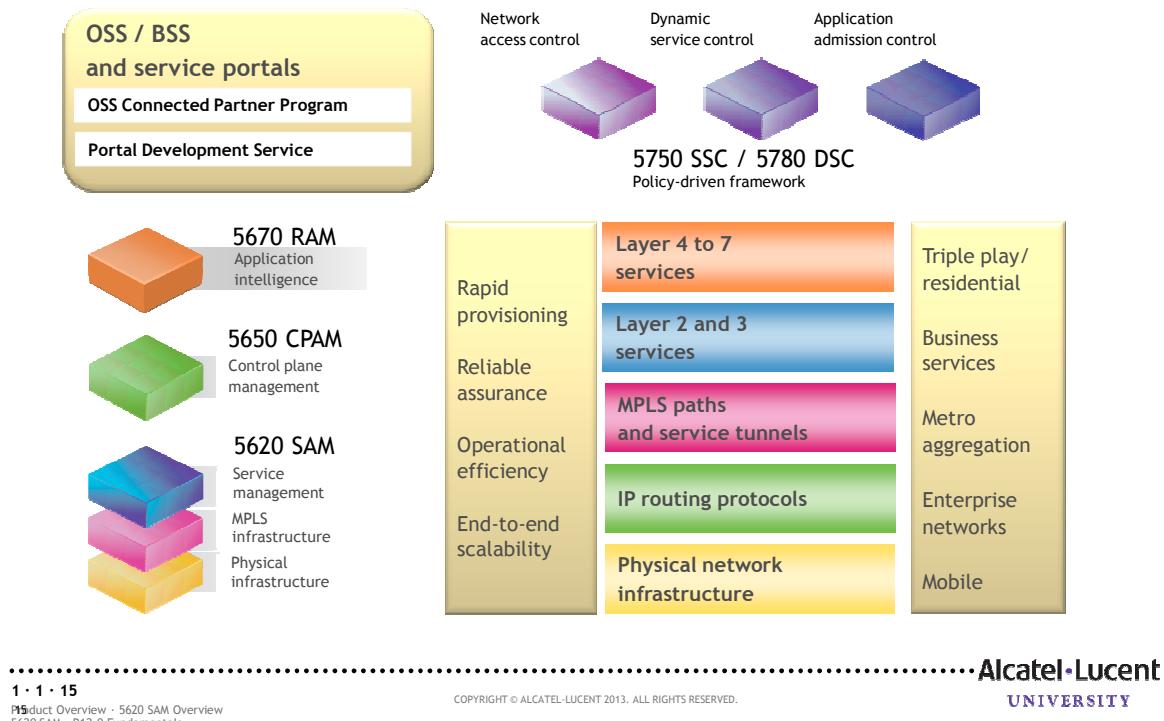
Network Management Layer with the following functions

- with service aware EMS
- Control Plane assurance
- Reporting and analysis
- Subscriber, Network & service control

OSS/BSS Layer:

- Enabling application Introduction agility,
- Reduced modeling complexity,
- facilitates service oriented operators

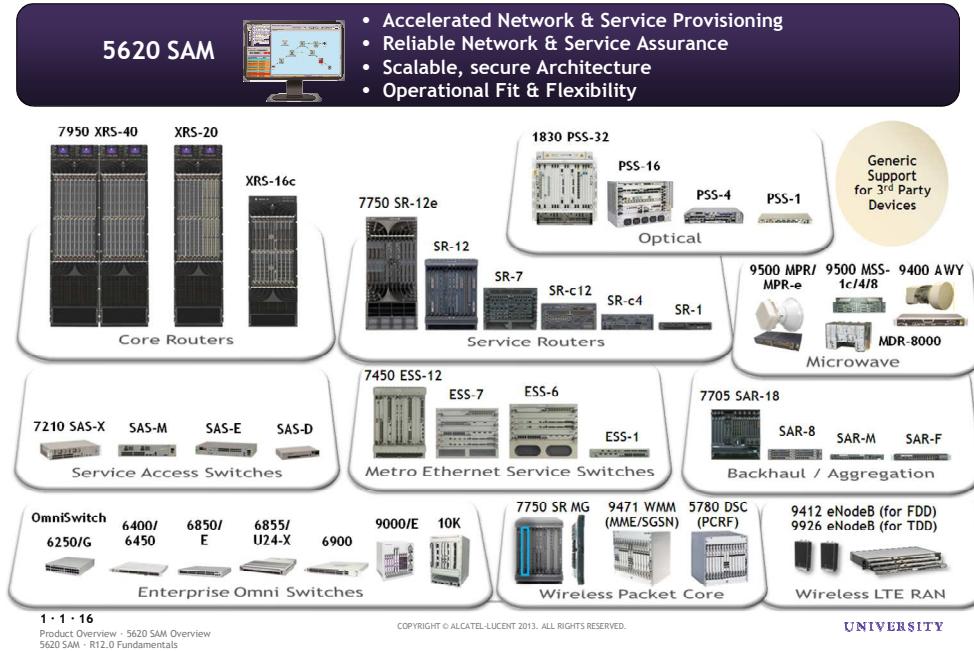
2.2 Alcatel-Lucent IP/MPLS Management architecture



This picture depicts the Alcatel-Lucent Management Architecture

- **5620 SAM (Service Aware Manager)** : The 5620 SAM enables operational efficiency for IP/MPLS networks by providing comprehensive element, network, service-aware and application-aware management capabilities in one unified platform.
- **5650 CPAM (Control Plane Assurance Manager)**
The 5650 CPAM is a route and path analytics tool that is tightly integrated with the 5620 SAM to provide highly effective control plane assurance for Interior Gateway Protocol (IGP) and Border Gateway Protocol (BGP) routing, Multi-Protocol Label Switching (MPLS), multicast, and layer 2 and layer 3 services.
- **5670 RAM (Reporting and Analysis Manager)**
The 5670 RAM gives service providers the query and analysis capabilities they need to explore IP/MPLS traffic flows, application usage trends, and application performance. With this approach, service providers can ensure a positive customer experience, sustained revenue growth and operational flexibility while increasing profits.
- **5750 SSC (Subscriber Services Controller)**
The Alcatel-Lucent 5750 SSC is a flexible, modular and pre-integrated subscriber and policy management solution. As the controller for residential broadband services, the 5750 SSC enables service providers to deliver innovative services such as enhanced high-speed Internet, bandwidth on-demand, metered services, IPTV, video on-demand and VoIP to their existing customer base, as well as to attract new customers. It plays a key role in three key areas of residential service delivery: network access control, dynamic service control and service admission control.
- A web-based application, the Service Portal features a lightweight, framework architecture, enabling rapid, cost-effective implementation. The framework-based design also makes the Service Portal easy-to-use and allows the application to be tailored to the exact needs of customers by using their particular predefined rules, network architecture and live-network information. Such an exceptional operational fit preserves investment in existing service architectures, processes, systems and workflows while streamlining operations.
- The Service Portal can support an operator's in-house OSS applications as well as third-party OSS solutions.

2.3 Alcatel-Lucent IP/MPLS management



The 5620 SAM is the Management solution for

- Core routers with the 7950 XRS family (eXtensible Routing System): core router for the 100G era and beyond
- Service routers with the 7750 SR family (Service Router)
- Optical Network element with the 1830 PSS Family (Photonic Service Switch)
- Microware equipment with 9x00 MPR/MSS family (Microwave Packet Radio/ Multi Service Switch)
- Service access Switches with the 720 SAS family (Service Access Switch)
- Metro Ethernet Service Switches with 7450 ESS family (Ethernet Service switch)
- Backhaul and Aggregation equipment the the 7705 SAR family (Service Access Router)
- Enterprise Switches with OS family (Omni Switch)
- Wireless Packet Core including the 7750 SR MG (Media Gateway) 9471 WMM (acting as MME/SGSN) and 5780 DSC
- Wireless LTE RAN with the various eNodeB

3 - 5620 SAM Product Overview

3.1 - 5620 Service Aware Manager (SAM)

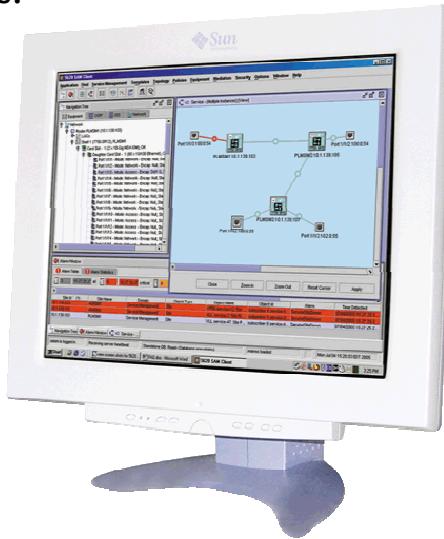
Supports IP/MPLS based network convergence by providing subscriber services over a common infrastructure

Extensive use of open standards, such as:

- SOAP (Simple Object Access Protocol)
- XML (Extensible Markup Language)
- Java

Enables network management at the service and customer levels

Extensive fault management and troubleshooting tools



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1 · 1 · 18
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5620 SAM - R12.0 Fundamentals

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The 5620 SAM supports IP/MPLS-based network convergence by providing subscriber services such as VLL, VPLS, VPRN, IES, and VLAN over a common network infrastructure. The 5620 SAM allows network operators to manage their networks at the service, customer, and subscriber levels.

The 5620 SAM software architecture is built on industry standards including open standards such as SOAP and XML, the Java and J2EE framework, multi-tier layering, and web service interfaces. This use of standard interfaces allows the 5620 SAM to integrate with other network management systems such as the 5620 NM and the 5750 SSC, to add management of IP/MPLS and metro Ethernet services to multi-service networks.

Benefits

Open standards, and the multi-tier and web service models provide many benefits.

- Open standards are widely used. Their inclusion in 5620 SAM promotes interoperability with other systems. The large industry knowledge base of developers also means that more resources are available to create new services
- The multi-tier model packages functionality in separate, well-defined elements that can be coded quickly, easily maintained, and combined with different vendor product components. The scope of system changes are contained within components, which provides flexibility for future growth. To improve performance and scalability, different components can be spread over multiple processors or duplicated for multiprocessor execution.
- Web services are created when applications export their XML interfaces over the web, which allow remote components, including web portals, to access the services. The XML access to 5620 SAM functionality allows third-party vendors to create customized windows into 5620 SAM services.

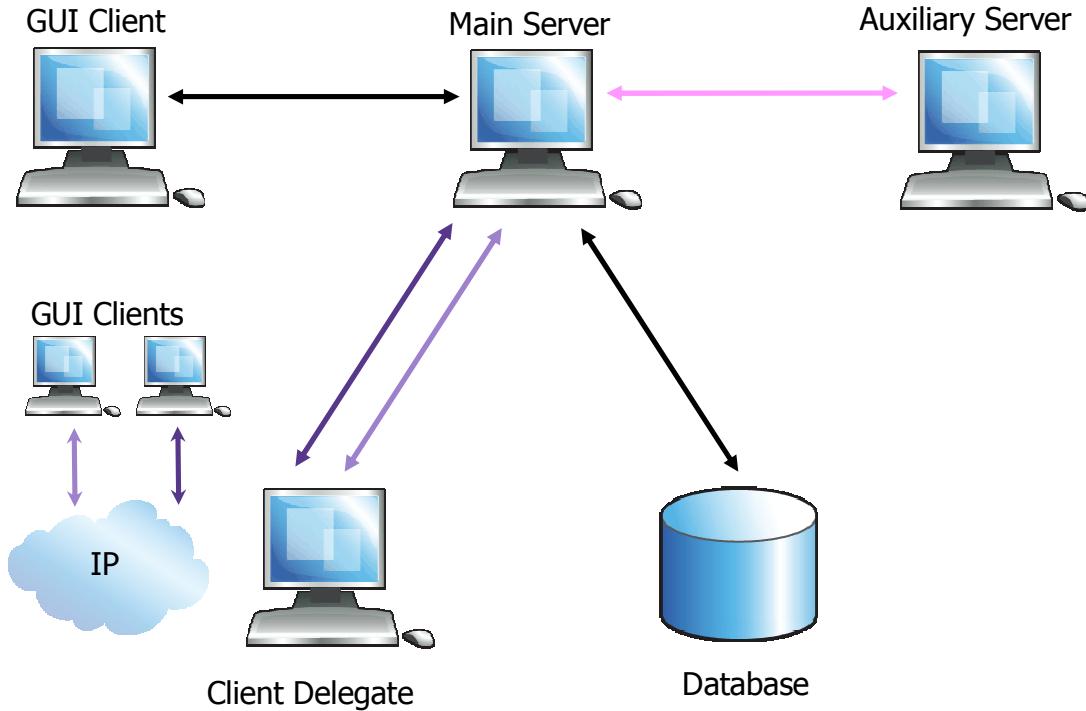
3.1 - 5620 Service Aware Manager (SAM) [cont.]

Network Management Capabilities

The 5620 SAM network manager provides flexible network access, thereby allowing users to interact with the network on a service or subscriber basis, or at the level of individual devices. The ability of the 5620 SAM to link subscribers, customers, services, equipment, and faults allows efficient management of complex networks by simplifying daily operations.

The 5620 SAM provides this flexible capability by creating a data model of the network with relationships between subscribers, services, and equipment. The server collects data and traps from managed devices, and can correlate the data to allow billing, performance monitoring, troubleshooting, and inventory and alarm reporting at the service or subscriber level. The server also deploys user commands to the network, and performs autonomous functions such as node discovery and backups.

3.2 5620 SAM Platform Types



1 · 1 · 20

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Five types of platforms can be present in a 5620 SAM Release deployment:

- 5620 SAM Main Server
- 5620 SAM Database
- 5620 SAM Graphic User Interface (GUI) Client workstation(s)
- 5620 SAM Client Delegate workstation(s)
- 5620 SAM Auxiliary Server (Statistics Collector and Call Trace Collector)

5620 SAM supports co-location of the 5620 SAM Server and 5620 SAM Database software on a single workstation.

5620 SAM also supports a distributed deployment, whereby the 5620 SAM Server and the 5620 SAM Database software components are installed on two different workstations.

5620 SAM supports the distribution of statistics collection and the collection of call trace information. A 5620 SAM Auxiliary can be configured for statistics collection or for call trace collection. It cannot be configured to perform both functions.

5620 SAM supports redundancy of the 5620 SAM Server, 5620 SAM Database, and 5620 SAM Auxiliary workstations. This can be achieved with the 5620 SAM Server and Database being in a collocated or distributed configuration. The 5620 SAM Auxiliary can also be installed in a redundant configuration, but cannot be collocated on the same workstation with a 5620 SAM Server or 5620 SAM Database.

A 5620 SAM Auxiliary Statistics Collector must be installed on an independent workstation to reduce the burden of statistics handling from the 5620 SAM Server. The 5620 SAM Auxiliary Statistics Collector workstation can only be configured in a 5620 SAM distributed deployment.

A 5620 SAM Auxiliary Call Trace Collector must be installed on an independent workstation to collect the call trace information from eNodeB network elements.

3.2.1 SAM Main Server



5620 SAM Main Server

- Java-based network management processing engine
- Includes:
 - application server
 - web server
 - protocol stack
 - database adaptor
- Supported on Solaris and RHEL

1 · 1 · 21

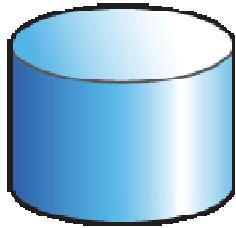
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The **5620 SAM Main Server** is a network management processing engine, which is written in Java and runs on the Solaris platforms. The server includes several third-party components, such as an application server, web server, protocol stack set, and database adaptor.

The 5620 SAM Main Server functionality can be distributed across multiple physical platforms in a standalone or redundant 5620 SAM configuration. The 5620 SAM Main Server in a cluster is the network-management engine that processes GUI and OSS client requests and monitors the network elements.



5620 SAM database

- Customized Oracle database
- Provides persistent storage of network data
- Supported on Solaris and RHEL

The **5620 SAM Database** is a customized Oracle relational database that provides persistent storage for the network data.

5620 SAM Release supports a distributed deployment, whereby the 5620 SAM Main Server and the 5620 SAM Database software components are installed on two different Solaris workstations. In such case, the database must run on the same platform as the 5620 SAM Main Server software.

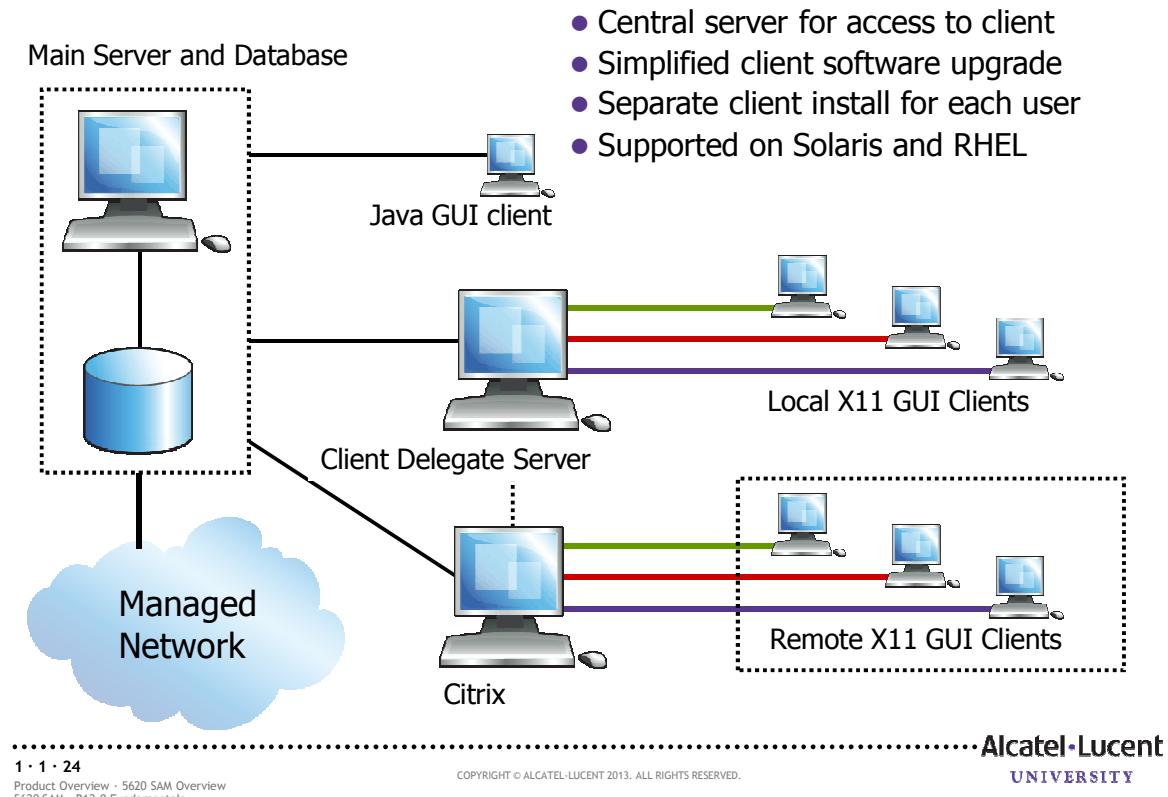


- Java-based client that provides a graphical interface for network operators
- May be installed on workstations running different operating systems from the 5620 SAM Main Server and 5620 SAM Database
- Supported on Solaris, RHEL, and Windows

The **5620 SAM GUI Client Workstation (s)** is a Java-based client that provides a graphical interface for network operators.

The 5620 SAM GUI Client software may be installed on workstations running different operating systems from the 5620 SAM Main Server and 5620 SAM Database. For example, the 5620 SAM Main Server, 5620 SAM Auxiliary and 5620 SAM Database software can be installed on Solaris or RHEL workstations while the 5620 SAM Clients are installed on a Windows platform. The 5620 SAM Client can be installed on Solaris, RHEL, or Windows.

3.2.4 SAM Client Delegate Server

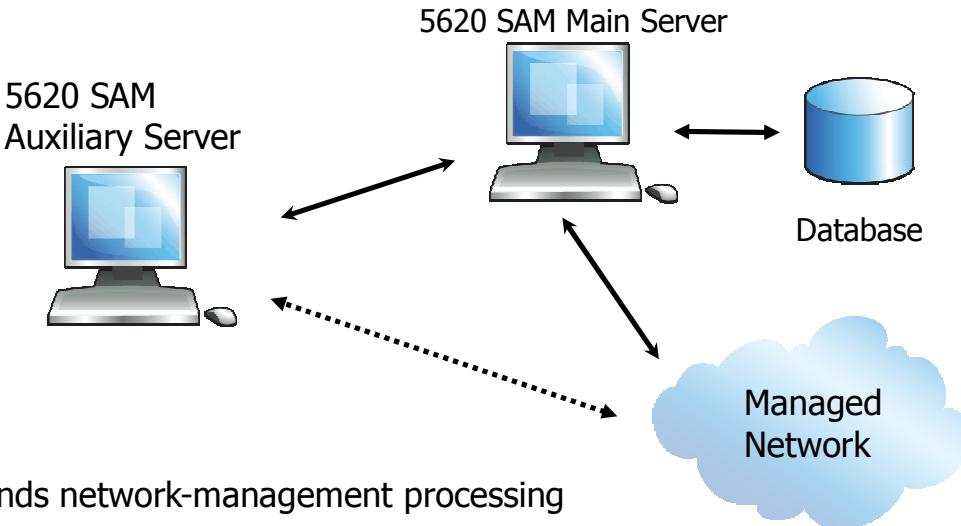


The 5620 SAM supports the use of one or more **client delegate servers** in the management network. A 5620 SAM client delegate server supports simultaneous 5620 SAM client GUI sessions using one client software installation. A client delegate server can host local and remote user sessions, and supports the use of a third-party remote access tool such as a Citrix access gateway.

A 5620 SAM client GUI session that is opened through a client delegate server is functionally the same as a single-user client session. The client delegate server locally stores the files that are unique to each user session, such as the client logs and GUI preference files, using a directory structure that includes the UNIX username.

A 5620 SAM main server monitors the registered client delegate servers and displays information about them in the GUI. To register a client delegate server, you specify the client delegate server IP address during main server installation or configuration.

3.2.5 SAM Auxiliary Server



- extends network-management processing
- currently used for statistics collection and Service Test Manager (STM)
- 5620 SAM Server Cluster — Main and Auxiliary Server together
- supported on Solaris and RHEL

The 5620 SAM Auxiliary Server collects and processes performance and accounting statistics. This option enables customers to reduce the load of statistics collection from the 5620 SAM Main Server while allowing for increased statistics collection capabilities. A 5620 SAM Auxiliary Server should be used when statistics collection is expected to exceed the capacity of the 5620 SAM Main Server.



Technical Reference

See **5620 SAM Planning Guide** for scalability details of the 5620 SAM Main Server and dimensioning of the 5620 SAM Auxiliary Server.

The 5620 SAM Main Server directs the operation of the 5620 SAM Auxiliary and distributes the processing load to them as required. This distributed functionality is invisible to 5620 SAM GUI and OSS clients because they interact only with the 5620 SAM Main Server.

The 5620 SAM Main Server sends new or updated operating information, for example, the 5620 SAM license capacity, redundancy status, and database credentials, to each auxiliary server as the information becomes available.

The 5620 SAM Main Server and the 5620 SAM Auxiliary Server must maintain consistent and accurate time. It is encouraged to use an NTP (Network Time Protocol) service to achieve this. An alarm will be raised if the times are not within 30 seconds. Variations in time can cause the system to stop collecting statistics prematurely.

In networks where 5620 SAM Auxiliary Servers are not configured, the 5620 SAM Main Server handles the statistics collection. In networks where the 5620 SAM Auxiliary is configured, the 5620 SAM Main Server will never collect statistics - regardless of the availability of the 5620 SAM Auxiliary Servers. At least one 5620 SAM Auxiliary Servers must be available for statistics collection to occur.

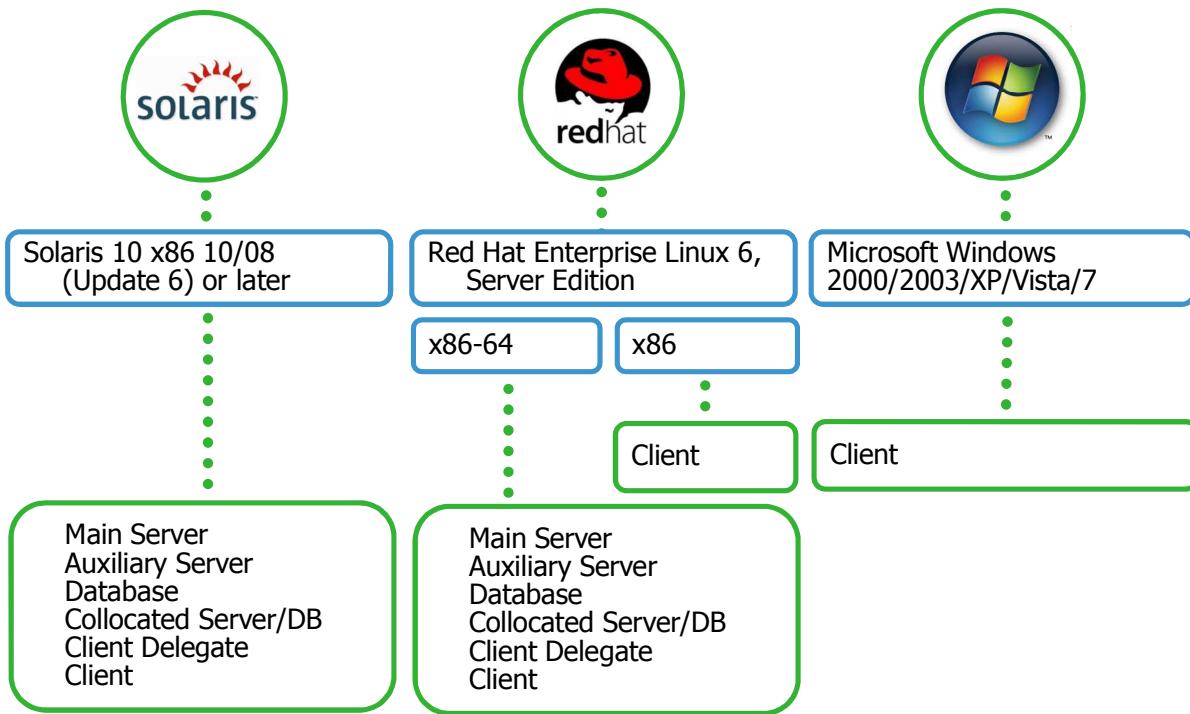
3.2.5 SAM Auxiliary Server [cont.]

The 5620 SAM Auxiliary is only supported with a distributed 5620 SAM Main Server and 5620 SAM Database.

5620 SAM Auxiliary Server: In a 5620 SAM system that is deployed using distributed server architecture, a server instance on a dedicated station that accepts processing requests from, and is directed by, a 5620 SAM main server. A main server and one or more auxiliary servers that are in communication are collectively called a 5620 SAM server cluster.

5620 SAM Main Server: A server instance in the 5620 SAM distributed server architecture that directs one or more 5620 SAM auxiliary servers and interacts with 5620 SAM clients. The term is meaningful only in the context of a distributed 5620 SAM server deployment; the term 5620 SAM server applies to a single server instance in a non-distributed 5620 SAM deployment. A main server and one or more auxiliary servers that are in communication are collectively called a 5620 SAM server cluster.

3.3 OS requirements for 5620 SAM platforms



1 · 1 · 27

Product Overview - 5620 SAM Overview
5620 SAM - R12.0 Fundamentals

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The **Solaris** support of 5620 SAM is applicable to specific x86 AMD and Intel platforms provided by Oracle and HP only. Some systems may require specific versions of the Solaris OS. The Solaris operating system must be installed in 64-bit mode on workstations that will contain the 5620 SAM Server, 5620 SAM Auxiliary, 5620 SAM Database, 5620 SAM Client Delegate, or 5620 SAM Client software. 32-bit mode is not supported.

The **Red Hat Linux** support of 5620 SAM is applicable to specific x86 Intel platforms provided by Oracle and HP only where some systems may require specific updates of the RHEL OS. See Red Hat's Hardware Certification list on their website. 5620 SAM does not necessarily support all functionality provided in RHEL 6 (for example LVM). The RHEL operating system must be installed in 64-bit mode on workstations that will contain the 5620 SAM Server, 5620 SAM Auxiliary, 5620 SAM Database or 5620 SAM Client Delegate software. 32-bit mode is not supported.

The **Windows** operating system is only supported for 5620 SAM Clients. The following 32-bit versions of Windows are supported:

- Windows 2000
- Windows 2003
- Windows XP Professional Edition
- Windows Vista Business/Enterprise and Ultimate
- Windows 7 Professional

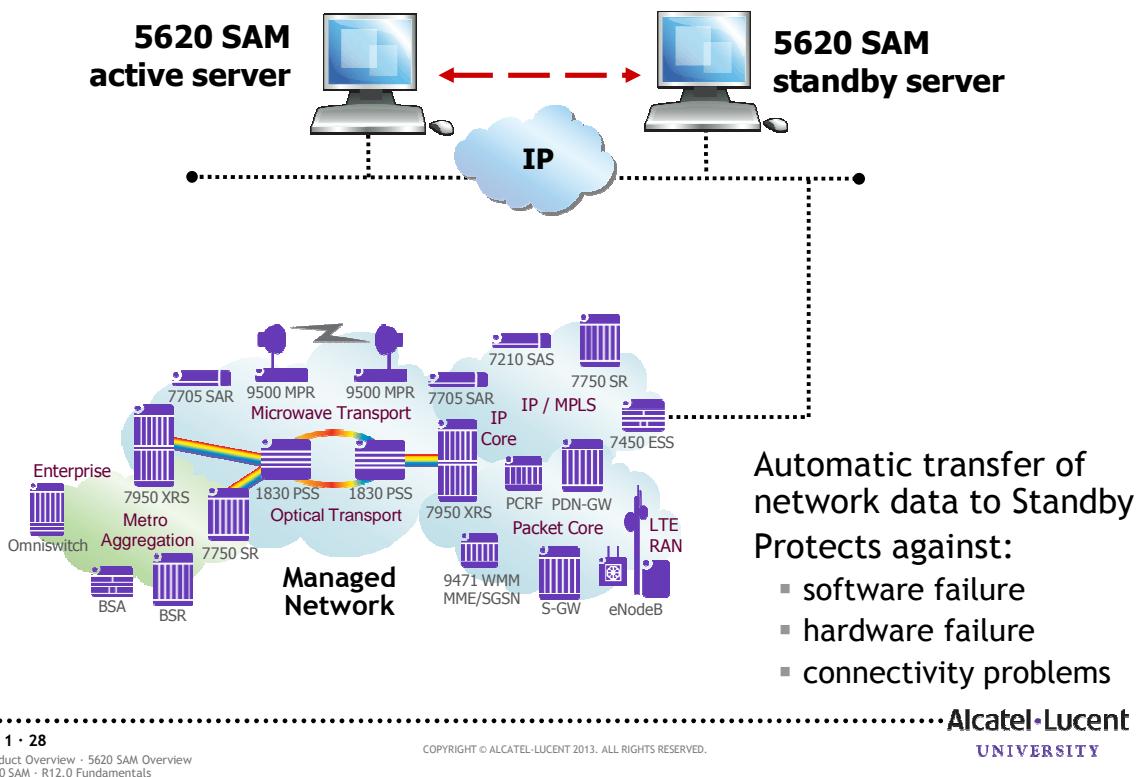
The following 64-bit versions of Microsoft Windows are supported: Windows 7 Professional.

Technical Reference

See **5620 SAM Planning Guide** for more information on supported platforms.



3.4 Redundancy

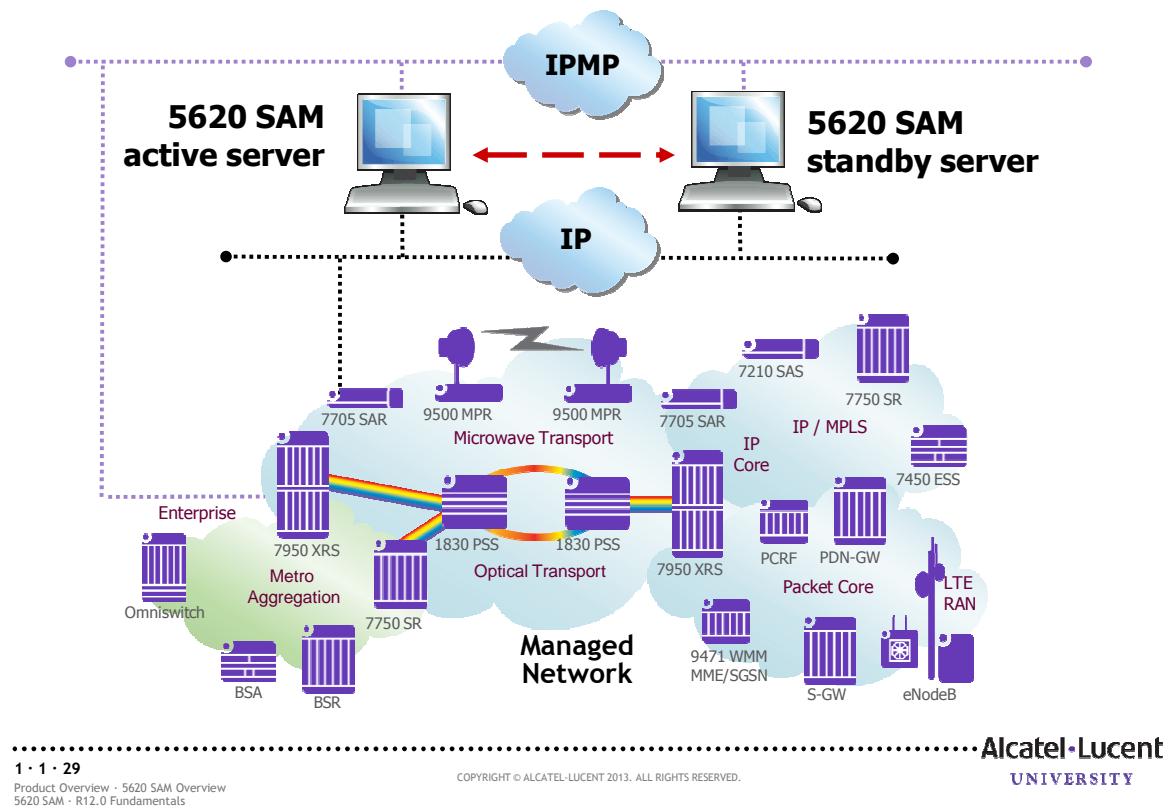


High Availability (Redundancy)

Fault tolerance is important in carrier networks to provide the reliability expected by customers and to maintain system availability even under failure conditions. This is achieved on the 5620 SAM using software and hardware redundancy. The 5620 SAM duplicates both server and database hardware and software and monitors active and backup components to ensure automatic recovery from failure.

The 5620 SAM protects the server from any point of failure in the server or database software or the server and database hardware platform, and from connectivity problems that isolate a server from the network. Duplication of the network connection to the 5620 SAM Main Server can also be achieved using the in-band and out-of-band management connections to protect against problems in the link between the server and the managed network

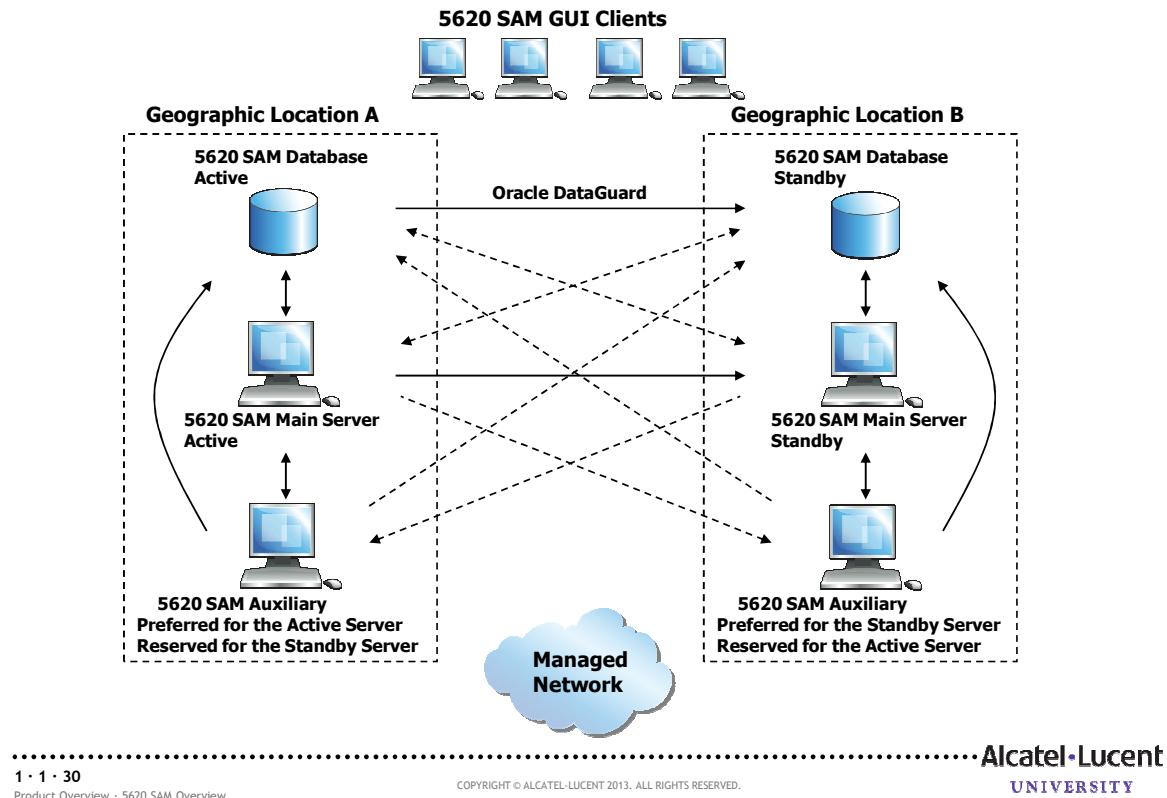
3.5 IPMP



IP Multipathing (IPMP) allows you to combine two or more physical network interfaces into an IPMP group. Each physical network interface in the IPMP group uses a designated IP address for failure testing. This IP link is periodically used to send an ICMP echo request to a target system. If there is no response within a predefined number of attempts, the link is considered down. The IPMP configuration initiates a failover of all application IP addresses currently configured on that physical interface to another physical interface within the IPMP group.

The IPMP failover process is transparent to the Telnet or SSH session. The 5620 SAM supports IPMP links between the primary/auxiliary servers and the managed NEs.

3.6 Redundancy and 5620 SAM Auxiliary Servers



1 · 1 · 30

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5620 SAM - R12.0 Fundamentals

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In customer networks where the statistics collection requirements exceed the scalability capabilities of a 5620 SAM Main Server, a 5620 SAM Auxiliary Server can be used. As with other high availability components, 5620 SAM Auxiliary can be configured to be redundant. Each 5620 SAM Main Server can be configured to have one preferred and one reserved 5620 SAM Auxiliary.

In the figure above, there are 2 workstations that are configured as 5620 SAM Auxiliary Servers. The role of the 5620 SAM Auxiliary is dependant and configured on the 5620 SAM Main Server that is active. In both geographic locations, the 5620 SAM Main Server would consider the 5620 SAM Auxiliary in its geographic location to be the preferred. The 5620 SAM Auxiliary in the opposite geographic location would be considered to be reserved. In the this scenario, if the 5620 SAM Auxiliary for the active 5620 SAM Main Server were to no longer be available, the active 5620 SAM Main Server would use the reserved 5620 SAM Auxiliary in the opposite geographic location to collect statistics.

Questions



1 · 1 · 31
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5620 SAM - R12.0 Fundamentals

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1. Which of the following statements is true?
 - a. The 5620 SAM supports IP/MPLS-based network convergence by providing subscriber services such as VLL, VPLS, VPRN, IES and VLAN over a common network infrastructure.
 - b. The 5620 SAM software architecture is built on industry standards such as SOAP and XML which promote interoperability with other systems.
 - c. The 5620 SAM provides flexible network access, thereby allowing users to interact with the network on a service or subscriber basis, or at the individual device level.
 - d. The 5620 SAM uses proprietary software architecture intended for configuration management of Alcatel-Lucent IP products exclusively.
2. Which of the following is considered a Generic NE?
 - a. SunBlade 1500
 - b. Alcatel-Lucent 7670 Router Switching Platform
 - c. Alcatel-Lucent 7470 Multi-Service Platform
 - d. Alcatel-Lucent 7750 Service Router
3. The 5620SAM protects the server from any point of failure in the server or database software or the server and database hardware platform, and from connectivity problems that isolate the server from the network.
 - a. True
 - b. False

Answers



1. Which of the following statements is true?
 - a. The 5620 SAM supports IP/MPLS-based network convergence by providing subscriber services such as VLL, VPLS, VPRN, IES and VLAN over a common network infrastructure. ✓
 - b. The 5620 SAM software architecture is built on industry standards such as SOAP and XML which promote interoperability with other systems. ✓
 - c. The 5620 SAM provides flexible network access, thereby allowing users to interact with the network on a service or subscriber basis, or at the individual device level. ✓
 - d. The 5620 SAM uses proprietary software architecture intended for configuration management of Alcatel-Lucent IP products exclusively.
2. Which of the following is considered a Generic NE?
 - a. SunBlade 1500 ✓
 - b. Alcatel-Lucent 7670 Router Switching Platform ✓
 - c. Alcatel-Lucent 7470 Multi-Service Platform ✓
 - d. Alcatel-Lucent 7750 Service Router
3. The 5620SAM protects the server from any point of failure in the server or database software or the server and database hardware platform, and from connectivity problems that isolate the server from the network.
 - a. True ✓
 - b. False



This module covered:

- Introduction to the TOS36033 SAM Fundamentals course
- The Alcatel-Lucent Management Architecture elements including the 5620 SAM
- The Alcatel-Lucent devices for which the 5620 SAM is the management solution
- The general characteristics and function of the 5620 SAM
- The types of platforms can be present in a 5620 SAM Release deployment and describe the overall characteristics and functions of each platform
- The operating system support for 5620 SAM platforms
- The general characteristics of 5620 SAM redundancy



End of module
5620 SAM Overview

1 · 1 · 34

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5620 SAM · R12.0 Fundamentals

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Section 1
Product Overview

Module 2 5620 SAM Modularity

TOS36033_V4.0-SG-R12.0-Ed1 Module 1.2 Edition 2

5620 SAM
R12.0 Fundamentals
TOS36033_V4.0-SG Edition 1

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1.0	2011-04-20	GARCIA LOZANO, René	TOS36033_V1.0 – SAM 9.0 (R1 update)
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2.1	2012-08-18	GARCIA LOZANO, René	TOS36033_V2.1 – SAM 10.0 (R1 vILT conversion)
2.2	2012-10-08	LOLLIERIC, Pascal	TOS36033_V2.2 – SAM 10.0 (R5 update)
2.3	2012-10-30	GARCIA LOZANO, René	TOS36033_V2.3 – SAM 10.0 (MyPLE and WBT)
3.0	2013-06-24	GARCIA LOZANO, René	TOS36033_V3.0 – SAM 11.0 (update)
4.0	2014-02-22	GARCIA LOZANO, René	TOS36033_V4.0 – SAM 12.0 (update)



Upon completion of this module, you should be able to:

- List the SAM Modules and packages
- Describe the function of each SAM Module, Web application and package
- Identify the procedure to launch the 5620 SAM Web Applications
- Identify the SAM Modules enabled on a 5620 SAM server

1 · 2 · 3

Product Overview - 5620 SAM Modularity
5620 SAM · R12.0 Fundamentals

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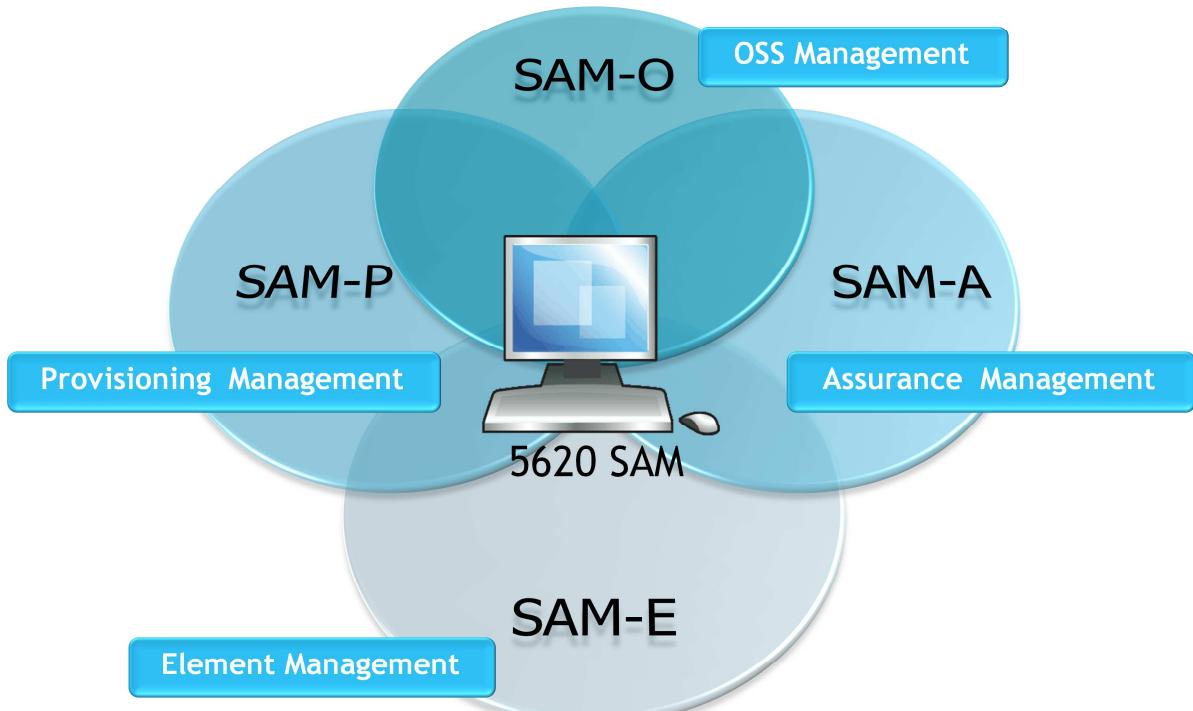


	Page
1 SAM Modularity	7
1.1 SAM Modularity Overview	8
1.2 License Key File	9
1.3 SAM-E (Element Management)	10
1.4 SAM-P (Provisioning Management)	11
1.5 SAM-A (Assurance Management)	12
1.6 SAM-O (Operating Support System OSS Interface)	13
2 Web Applications and Packages	14
2.1 Web Applications Overview	15
2.2 Launch Web Applications	16
2.3 Wireless Supervision Web Application	17
2.4 Fault Management Web Application	19
2.5 Equipment View Web Application	20
2.6 Mobile Services Package	21
Questions	23
Answers	24
Module Summary	25

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1 SAM Modularity

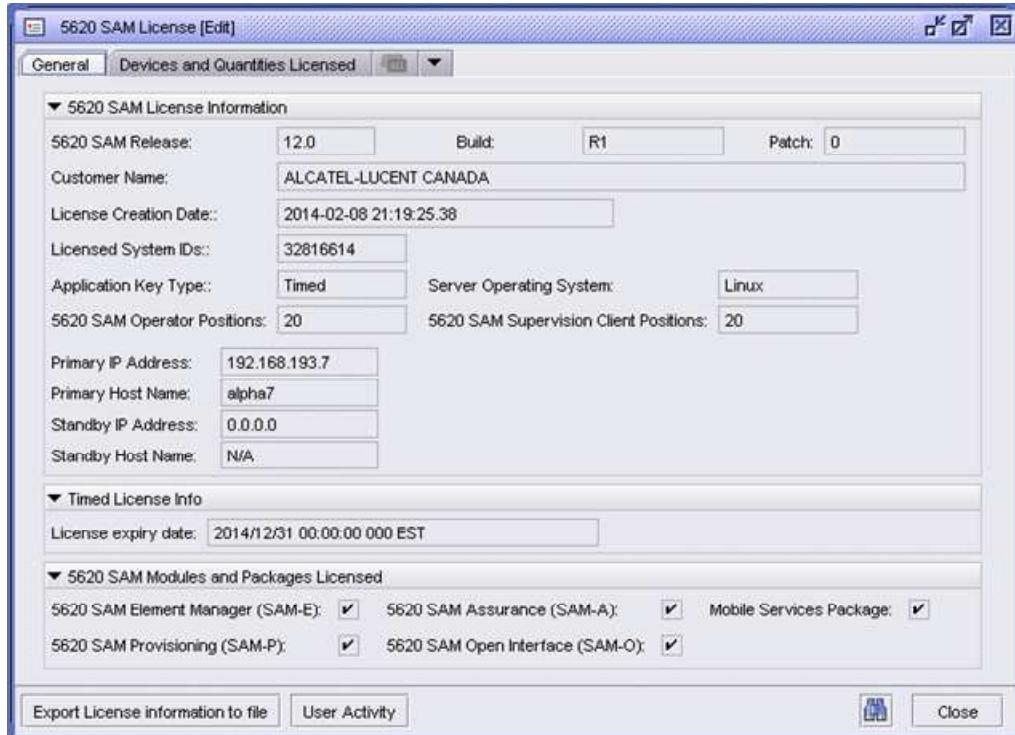
1.1 SAM Modularity Overview



The 5620 SAM functions are provided by the following software modules that are enabled or disabled using the 5620 SAM license file:

- 5620 SAM-A – for OAM tools, service assurance functions, fault correlation using alarms, topology views, and statistics management
- 5620 SAM-E – for device mediation, equipment navigation and management, security, CLI access, backup and restore, alarm management, real-time equipment statistics, and inventory and reporting
- 5620 SAM-O – for the 3GPP and XML open interfaces
- 5620 SAM-P – for service provisioning, templates, and management of network customers, subscribers, tunnels, paths, and policies
- Mobile Services Package – for LTE functions

1.2 License Key File



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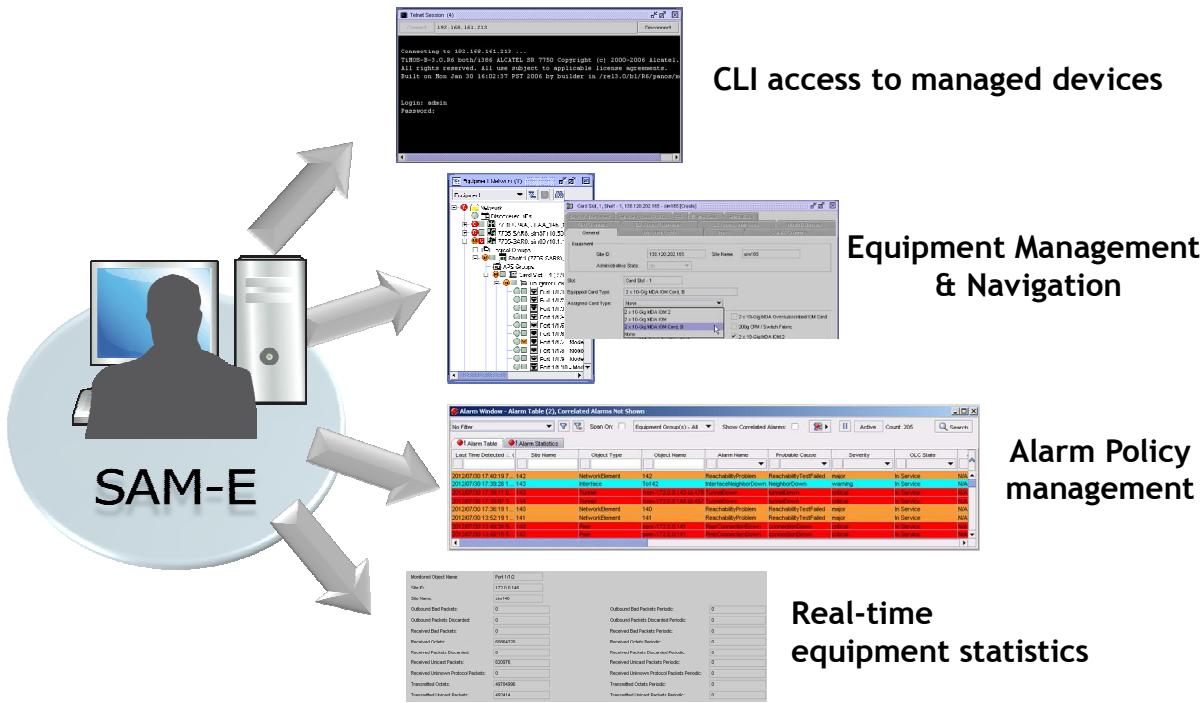
1 · 2 · 9
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5620 SAM - R12.0 Fundamentals

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Alcatel-Lucent supports 5620 SAM license generation using the UUID or host ID as the system ID of an x86-based station, or the host ID as the system ID of a SPARC-based station.

1.3 SAM-E (Element Management)



1 · 2 · 10
 Product Overview - 5620 SAM Modularity
 5620 SAM - R12.0 Fundamentals

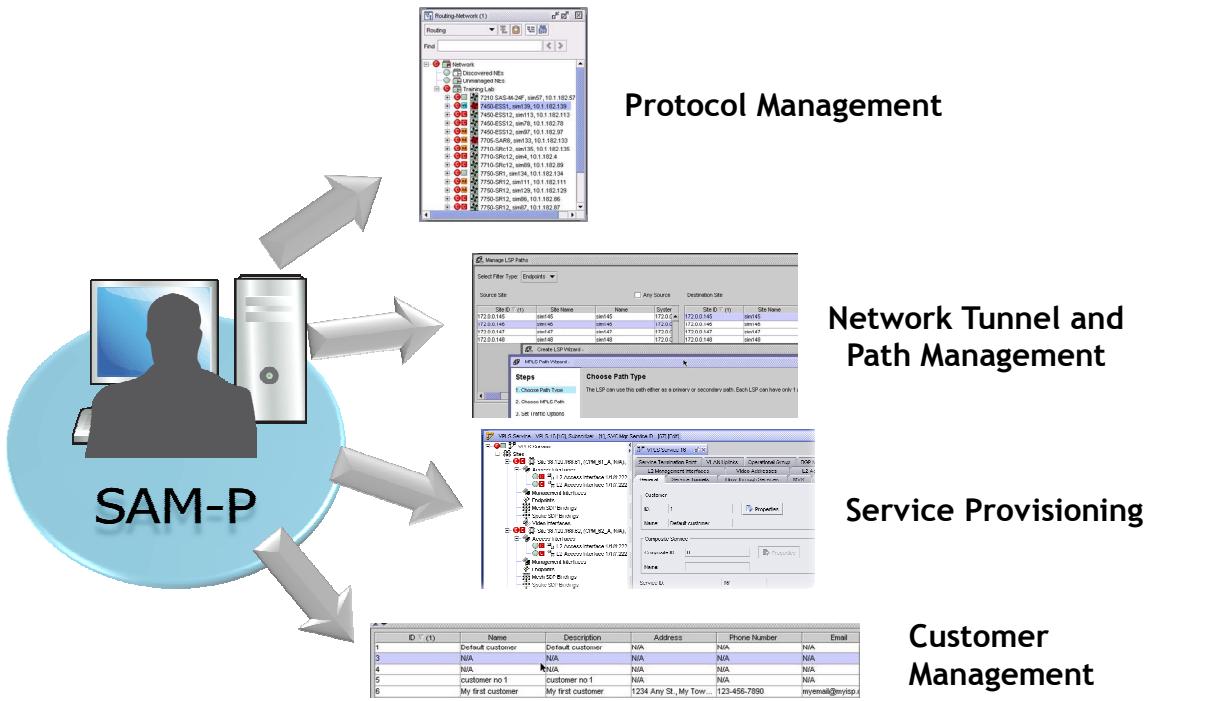
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The SAM-E module is the basic component of the 5620 SAM and is required for all other modules to function. The SAM-E module provides:

- CLI access to managed devices
- device mediation, equipment management and navigation
- alarm policy management
- real-time equipment statistics
- security
- backup and restore, and
- inventory and reporting

1.4 SAM-P (Provisioning Management)



1 · 2 · 11
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 5620 SAM - R12.0 Fundamentals

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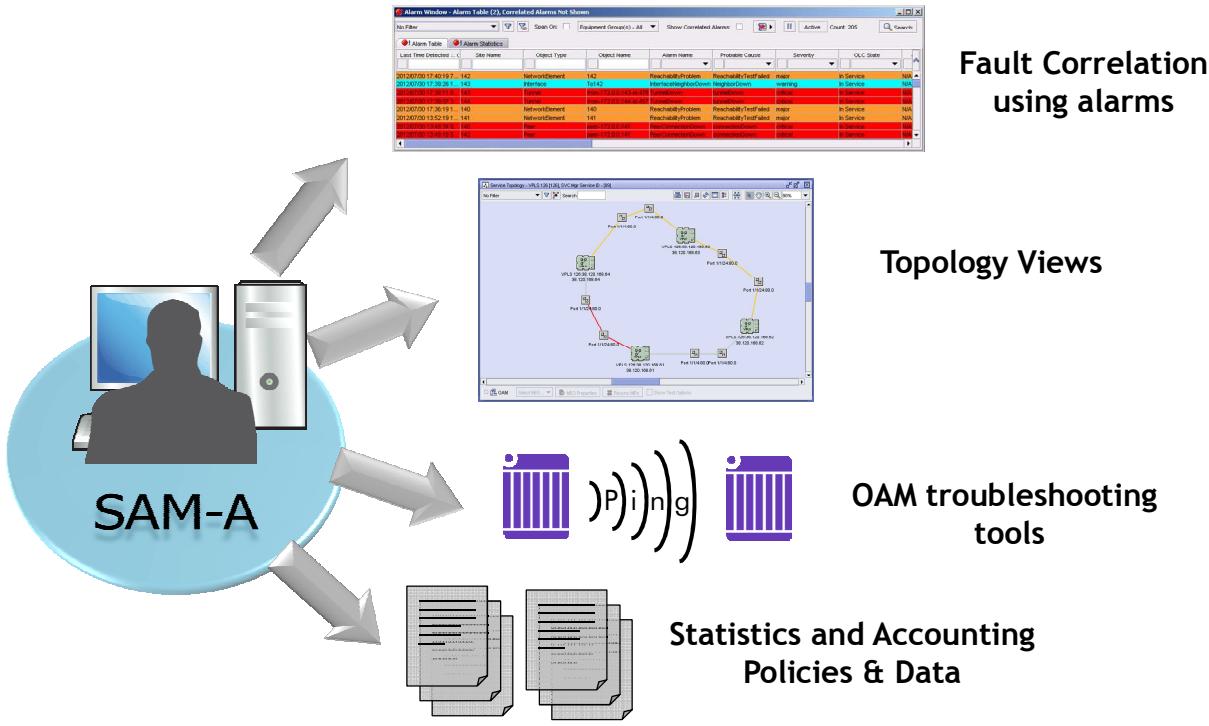
The SAM-P module is an optional component of the 5620 SAM and provides functions that deal with service provisioning.

Functions

The SAM-P module provides:

- network protocol configuration and management
- network tunnel and path management
- subscriber management
- policy management, and
- templates

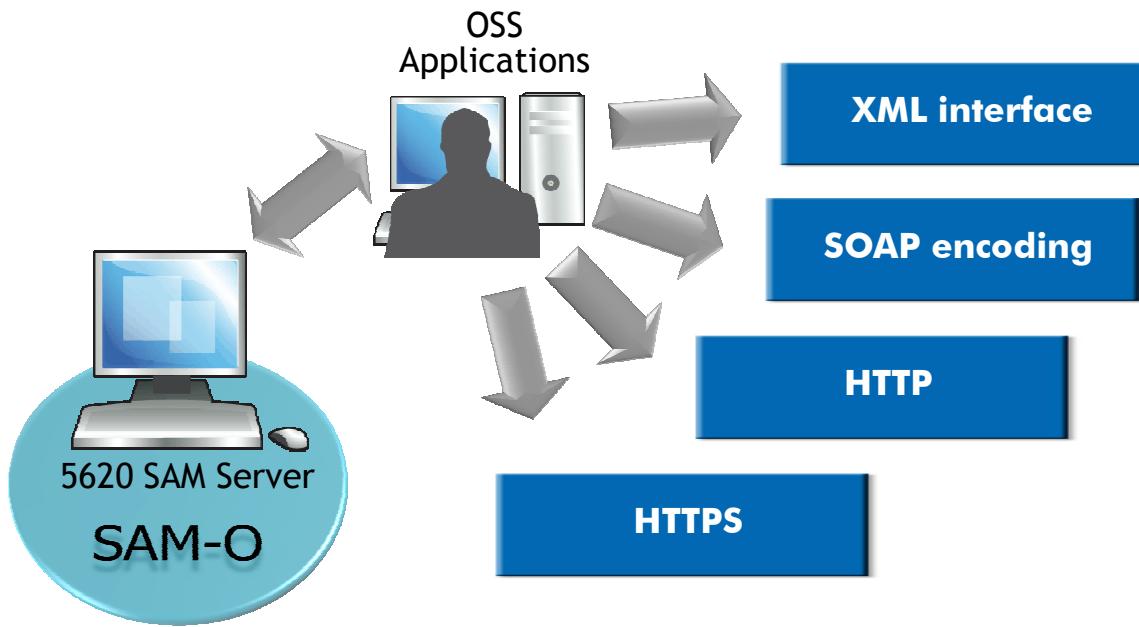
1.5 SAM-A (Assurance Management)



The SAM-A module is an optional module of the 5620 SAM and provides service assurance functions. The SAM-A module provides the following functions:

- topology views
- fault correlation using alarms
- OAM tools
- statistics policies and data, and
- accounting policies and data

1.6 SAM-O (Operating Support System OSS Interface)



1 · 2 · 13

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5620 SAM - R12.0 Fundamentals

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The 5620 SAM-O is a 5620 SAM module that provides an XML interface to the 5620 SAM through which an OSS client application can perform the following tasks:

- configure or retrieve 5620 SAM network management information
- manipulate managed objects
- receive event notifications from the 5620 SAM server using a persistent or non-persistent JMS connection

A 5620 SAM-O client sends an **XML-encoded, SOAP-enabled message** to a port on the **HTTP** or **HTTPS** server that runs on a 5620 SAM main server. The default HTTP port for incoming messages is 8080. An XML application at port 8080 parses the SOAP XML message and sends the request to the 5620 SAM.

5620 SAM-O client

The 5620 SAM-O client implementation can range from a CLI to a third-party application. The format for the client user interface varies with the function of the client application; for example, rolling up statistics into a third-party billing application. The 5620 SAM-O clients function the same way regardless of the front-end implementation: XML scripts are posted to the 5620 SAM server using an HTTP client.

2 Web Applications and Packages

2.1 Web Applications Overview



New visualization approaches, heuristics and analytics techniques

The latest advancements in web software technology

**5620 SAM
Web Applications**

External to the 5620 SAM GUI client and do not require a local client installation

1 · 2 · 15
Product Overview - 5620 SAM Modularity
5620 SAM - R12.0 Fundamentals

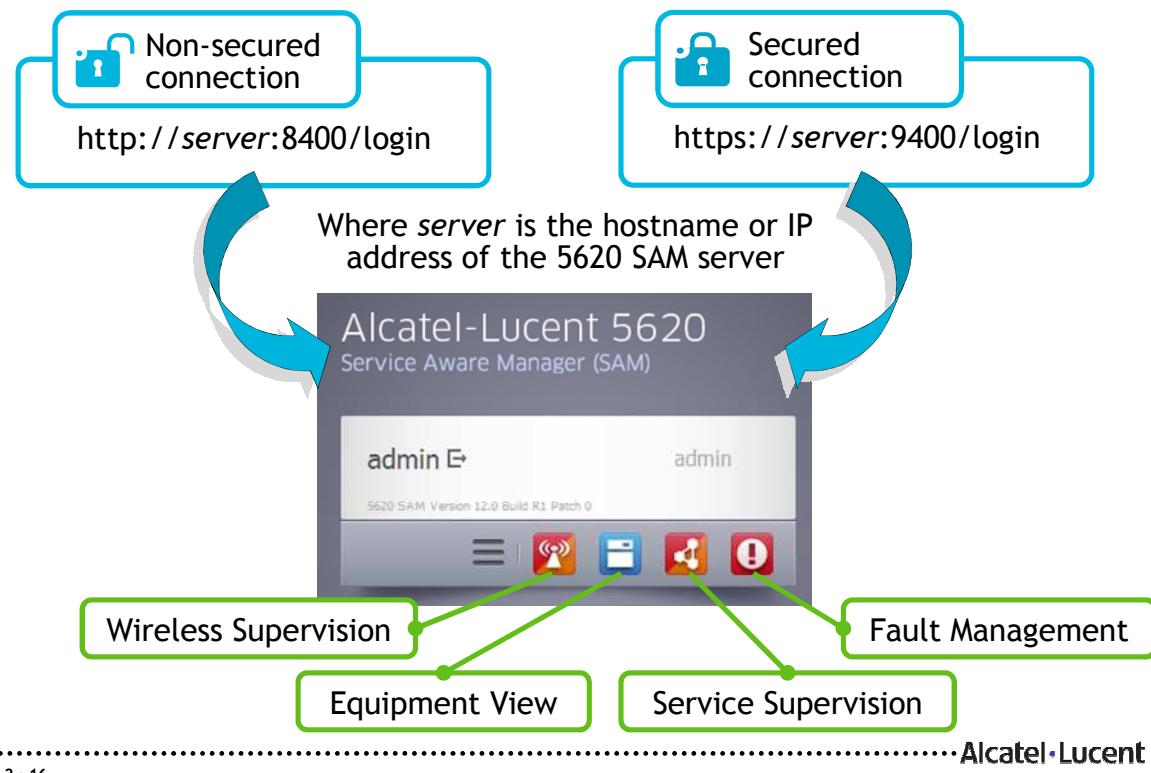
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Alcatel-Lucent has been exploring and prototyping new visualization approaches, heuristics and analytics techniques with the 5620 SAM over a comprehensive study, with the addition of incorporating the latest advancements in web software technology. The end result is a new breed of web applications for the 5620 SAM that will enable operations to examine the wealth of their network and service infrastructure data.

The 5620 SAM web applications are external to the 5620 SAM GUI client and do not require a local client installation.

2.2 Launch Web Applications



1 · 2 · 16
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5620 SAM - R12.0 Fundamentals

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Entering the following URLs in a compatible web browser provide access to the launch panel, from which all supported web applications can be launched.

For a non-secured connection:

<http://server:8400/login>

For a secured connection:

<https://server:9400/login>

Where *server* is the hostname or IP address of the 5620 SAM server (active or standby)

Access to the web applications is controlled through 5620 SAM user groups. The default admin user group can access all 5620 SAM web applications.

Upon providing the valid 5620 SAM credentials at the login page, the Web application launch panel provides access to the following applications:

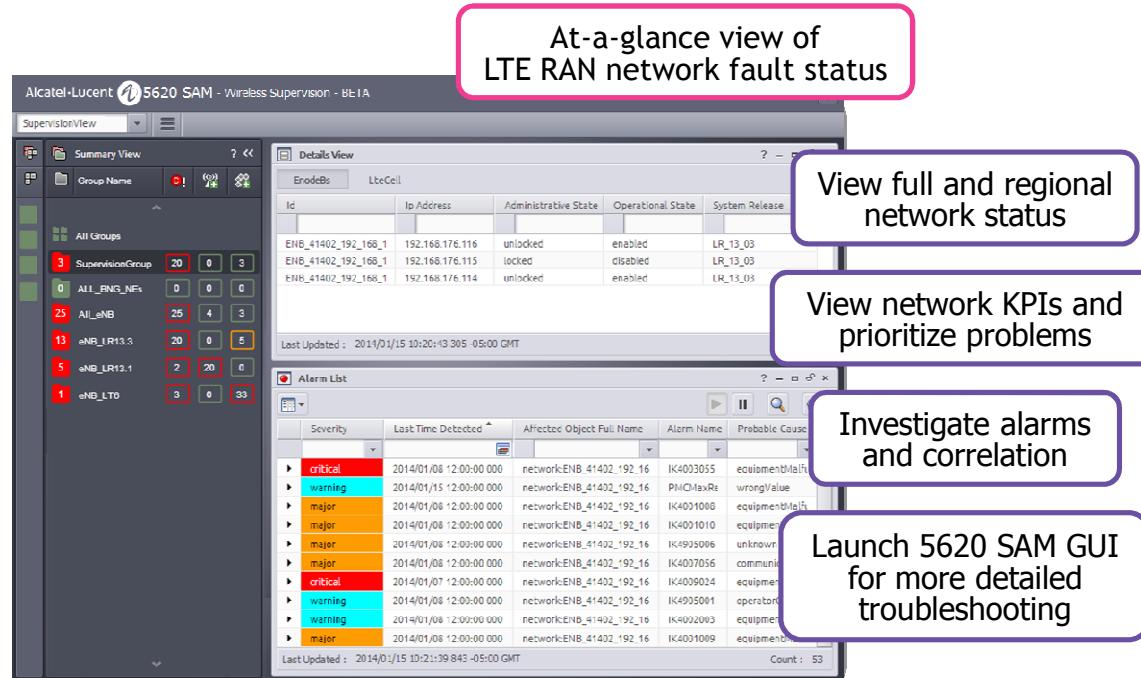
- Wireless Supervision
- Equipment View
- Service Supervision
- Fault Management



Technical Reference

See *Alcatel-Lucent 5620 SAM User Guide - 5620 SAM web applications section* for more information, including browser compatibility.

2.3 Wireless Supervision Web Application



The 5620 SAM Wireless Supervision web application provides an at-a-glance view of LTE RAN network fault status in a dynamic web-based GUI.

Operators can perform the following tasks using the Wireless Supervision web application:

- view full and regional network status quickly and efficiently
- view network KPIs and prioritize network problems accordingly
- investigate network alarms and view fault correlation
- perform alarm management tasks such as alarm acknowledgement and clearing
- launch the 5620 SAM GUI to perform more detailed troubleshooting tasks such as eNodeB and cell reset
- drill down to eNodeBs and LTE cells for more detailed status information

2.3 Wireless Supervision Web Application [cont.]

It can be launched from:

Web applications launch panel

Direct URL

SAM GUI Client

Application → Wireless Supervision

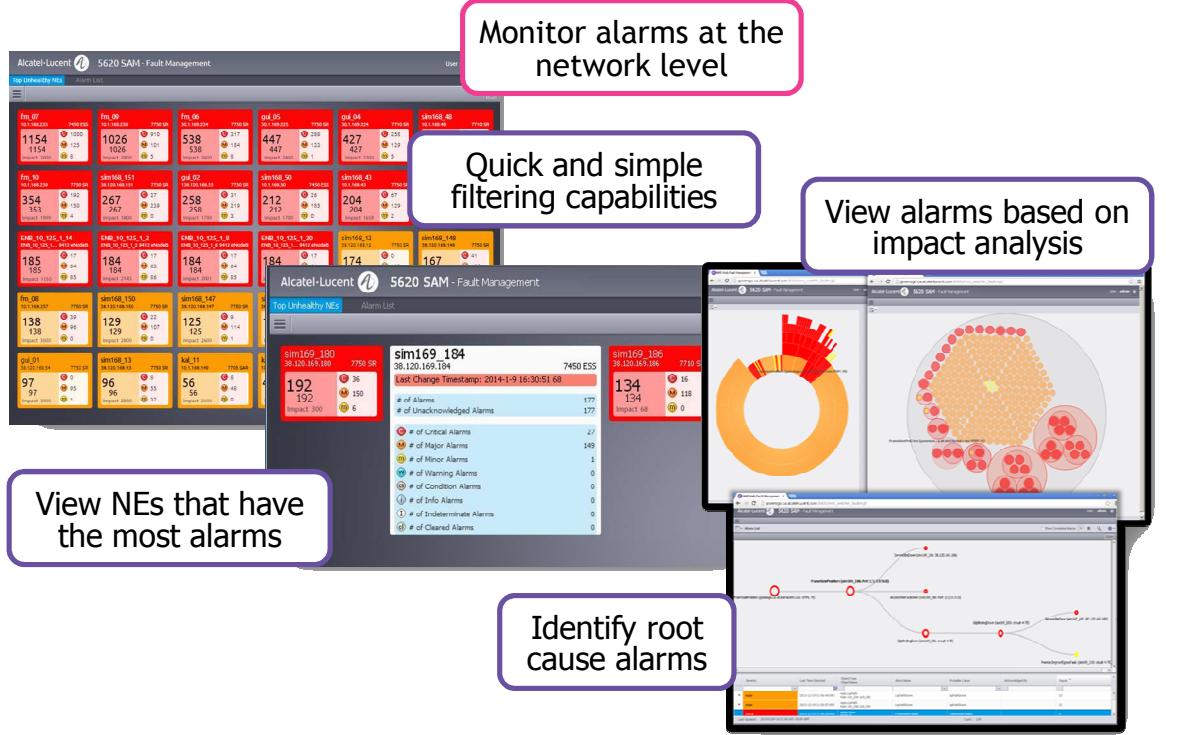
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1 · 2 · 18
Product Overview - 5620 SAM Modularity
5620 SAM - R12.0 Fundamentals

The 5620 SAM Wireless Supervision web can be launched from:

- The Web Applications Launch Panel
- The direct URLs
 - For a non-secured connection:
<http://server:8400/WirelessSupervision>
 - For a secured connection:
<https://server:9400/WirelessSupervision>
- the 5620 SAM client GUI - by specifying a browser path and choosing Application→Wireless Supervision

2.4 Fault Management Web Application



1 · 2 · 19
 Product Overview - 5620 SAM Modularity
 5620 SAM - R12.0 Fundamentals

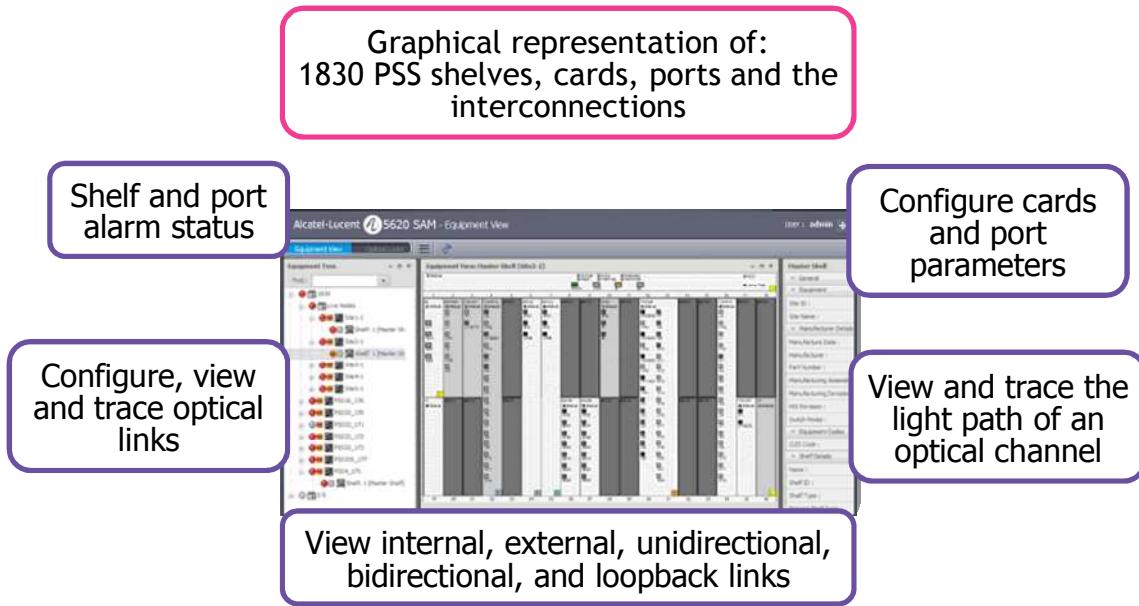
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The Fault Management web application allows operators to at a glance:

- monitor alarms at the network level
 - using a list with quick and simple filtering capabilities
 - based on NEs that have the most alarms, using an NE-based view
- view alarms based on an impact analysis of the alarms and identify alarms at the root cause

2.5 Equipment View Web Application



1 · 2 · 20
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5620 SAM - R12.0 Fundamentals

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The Equipment View web application provides a graphical representation of the 1830 PSS shelves, cards, ports and the interconnections.

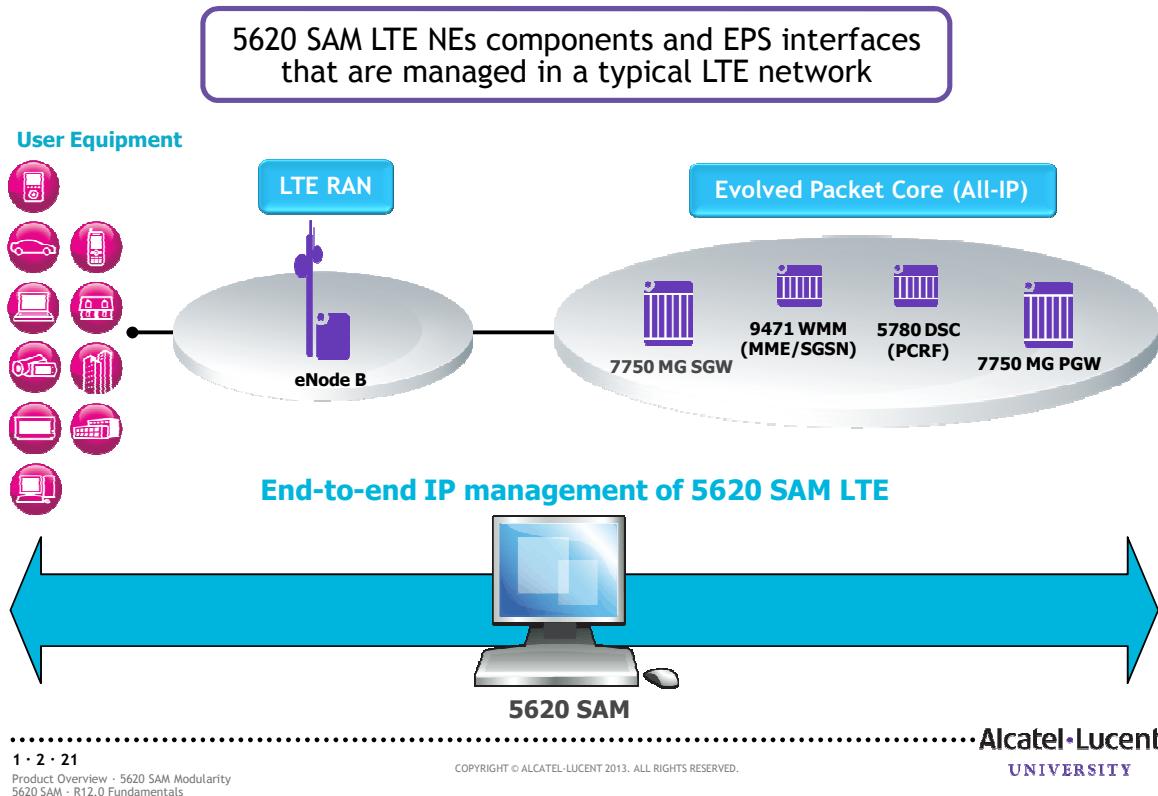
Operators can use the Equipment View to:

- view shelf and port alarm status
- configure cards
- configure port parameters
- configure, view, and trace optical links between ports on cards that are on the current shelf or those on other shelves
- view internal, external, unidirectional, bidirectional, and loopback links
- view and trace the light path of an optical channel by highlighting the ports, optical links, and implicit connections that the path traverses

The 5620 SAM Equipment View displays the following panels:

- Equipment tree - On the left hand side
- Shelf view/optical link view - In the middle
- Configuration form - On the right hand side

2.6 Mobile Services Package



The 5620 SAM LTE (Long Term Evolution) NE management solution focuses on the equipment, configuration, fault, and state management of the ePC (Evolved Packet Core) NEs, LTE interfaces, and mobile services that are used for mobile backhaul.

The 5620 SAM LTE NE management solution also supports the correlation of the LTE interfaces and mobile services with the underlying network transport layer to provide enhanced multi-layer monitoring and troubleshooting capabilities.

The 5620 SAM LTE NE management solution is comprised of the following components:

- 5620 SAM
- 5620 SAM LTE ePC
 - 7750 MG SGW
 - 7750 MG PGW
 - 9471 WMM
 - 5780 DSC
- 5620 SAM LTE RAN (also known as the eUTRAN)
 - eNodeB

The LTE RAN is the next generation of wireless broadband technology as outlined by the 3GPP and is the radio access component of the LTE solution. The eNodeB is the key NE of the LTE RAN and is the physical radio link between UE and the LTE ePC network. The eNodeB provides functions that include radio resource management, interfaces between eNodeB devices and to ePC devices, IP header compression, and bearer level control. The 5620 SAM is the OAM system that manages the eNodeB.

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Questions



1 · 2 · 23
Product Overview - 5620 SAM Modularity
5620 SAM - R12.0 Fundamentals

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1. The 5620 SAM-E is the base component of the 5620 SAM software.
 - a. True
 - b. False

2. Network protocol configuration and management is provided by which of the 5620 SAM software components?
 - a. 5620 SAM-E
 - b. 5620 SAM-P
 - c. 5620 SAM-A
 - d. 5620 SAM-O
 - e. 5620 SAM-S
 - f. 5620 SAM LTE

3. The 5620 SAM-A component of the 5620 SAM software provides which of the following functions?
 - a. Topology views
 - b. OAM troubleshooting tools
 - c. Statistics and accounting policies and data
 - d. All of the above

4. The 5620 SAM-O component of the 5620 SAM software provides open systems interface to the 5620 SAM managed network?
 - a. True
 - b. False

Answers



1. The 5620 SAM-E is the base component of the 5620 SAM software.
 - a. **True ✓**
 - b. False

2. Network protocol configuration and management is provided by which of the 5620 SAM software components?
 - a. 5620 SAM-E
 - b. **5620 SAM-P ✓**
 - c. 5620 SAM-A
 - d. 5620 SAM-O
 - e. 5620 SAM-S
 - f. 5620 SAM LTE

3. The 5620 SAM-A component of the 5620 SAM software provides which of the following functions?
 - a. Topology views
 - b. OAM troubleshooting tools
 - c. Statistics and accounting policies and data
 - d. **All of the above ✓**

4. The 5620 SAM-O component of the 5620 SAM software provides open systems interface to the 5620 SAM managed network?
 - a. **True ✓**
 - b. False



This module covered:

- the SAM Modules and packages
- the function of each SAM Module, Web application and package
- the procedure to launch the 5620 SAM Web Applications
- the SAM Modules enabled on a 5620 SAM server



End of module
5620 SAM Modularity

1 · 2 · 26

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5620 SAM · R12.0 Fundamentals

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Section 1
Product Overview

Module 3 5620 SAM Features Overview

TOS36033_V4.0-SG-R12.0-Ed1 Module 1.3 Edition 3

5620 SAM
R12.0 Fundamentals
TOS36033_V4.0-SG Edition 1

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1.0	2011-04-20	GARCIA LOZANO, René	TOS36033_V1.0 – SAM 9.0 (R1 update)
1.1	2011-10-28	GARCIA LOZANO, René	TOS36033_V1.5 – SAM 9.0 (R5 update)
2.0	2012-03-30	LOLLIERIC, Pascal	TOS36033_V2.0 – SAM 10.0 (R1 update)
2.1	2012-08-18	GARCIA LOZANO, René	TOS36033_V2.1 – SAM 10.0 (R1 vILT conversion)
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2.3	2012-10-30	GARCIA LOZANO, René	TOS36033_V2.3 – SAM 10.0 (MyPLE and WBT)
2.4	2013-06-20	GARCIA LOZANO, René	TOS36033_V3.0 – SAM 11.0 (update)
3.0	2014-07-17	GARCIA LOZANO, René	TOS36033_V3.0 – SAM 12.0 (update)



Upon completion of this module, you should be able to:

- Identify the main features of the Alcatel-Lucent 5620 SAM

1 · 3 · 3

Product Overview · 5620 SAM Features Overview
5620 SAM · R12.0 Fundamentals

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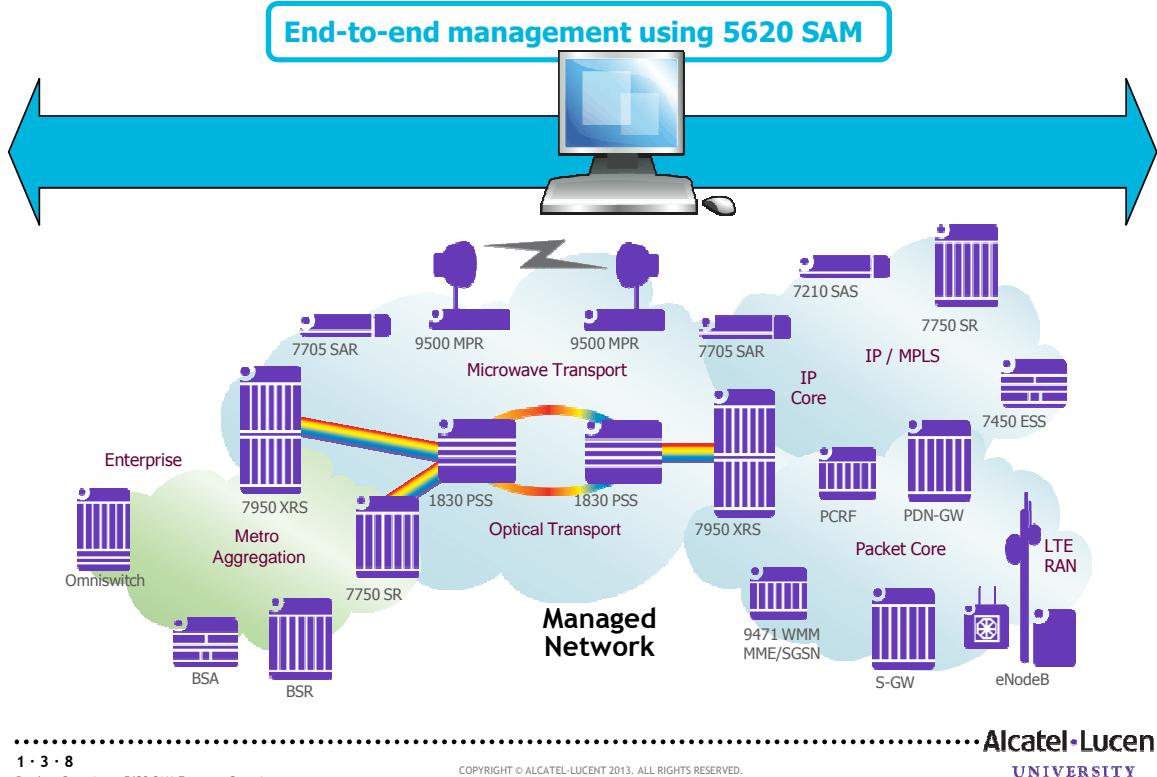


	Page
1 - 5620 SAM Features	7
1.1 Integration and Control	8
1.2 Equipment Management	10
1.3 In-band and Out-band Management	11
1.4 Generic Network Elements	12
1.5 Script Management	13
1.6 Fault Management	14
1.7 Configuration Management	15
1.8 Service Topology Maps	16
1.9 Service Templates	17
1.10 Velocity GUI Builder	18
1.11 Policy Management	19
1.12 Accounting and Performance	20
1.13 Diagnostics	21
1.14 Diagnostics	22
1.15 Service Test Manager	23
1.16 Access Management	24
1.17 Scope of Command	25
1.18 Span of Control	26
1.19 SAM Database Security	27
1.20 NE Database Security	28
1.21 NE Software Upgrade	29
1.22 Help System	30
1.23 – 5650 Control Plane Assurance Manager (CPAM)	31

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1 - 5620 SAM Features

1.1 Integration and Control



1 · 3 · 8

Product Overview - 5620 SAM Features Overview
5620 SAM - R12.0 Fundamentals

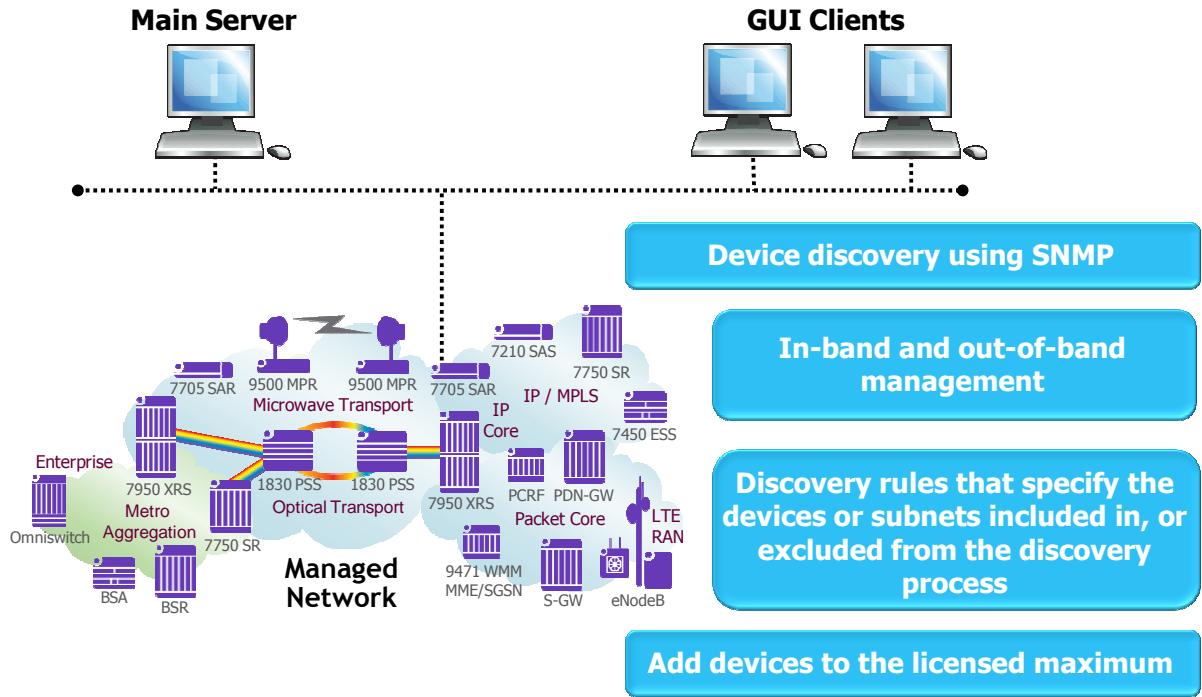
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The 5620 SAM is the Alcatel-Lucent end-to-end management solution for:

- IP/MPLS- Service routers with the 7750 SR family (Service Router), service access switches with the 7210 SAS family (Service Access Switch), metro Ethernet service switches with 7450 ESS family (Ethernet Service switch), and backhaul and aggregation equipment the 7705 SAR family (Service Access Router)
- IP Core - the 7950 XRS family (eXtensible Routing System): core router for the 100G era and beyond
- Optical Transport - with the 1830 PSS Family (Photonic Service Switch)
- Microwave Transport - with 9x00 MPR/MSS family (Microwave Packet Radio/ Multi Service Switch)
- Wireless Packet Core - including the 7750 SR MG (Media Gateway) 9471 WMM (acting as MME/SGSN) and 5780 DSC
- Wireless LTE RAN - with the various eNodeB
- Metro Aggregation - Enterprise Switches with OS family (Omni Switch)

1.1 Integration and Control [cont.]



1 - 3 - 9

Product Overview - 5620 SAM Features Overview
5620 SAM - R12.0 Fundamentals

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The 5620 SAM simplifies network provisioning by allowing you to discover devices and reconcile them to the 5620 SAM database for management. Network element discovery is executed using SNMP. During the discovery process, the 5620 SAM scans the network for devices according to user-defined IP addresses or IP address ranges.

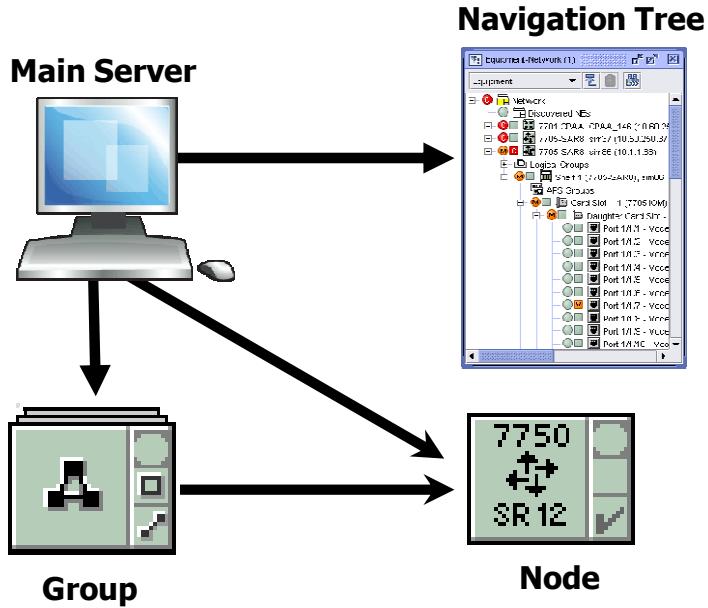
Note

The network devices discovered by the 5620 SAM must be licensed products and fall within the license maximum for the device. Consult your Alcatel-Lucent support representative to verify or obtain device license information.

When the IP address used to discover the device is the system IP address, also known as the system ID, management is considered **in-band**. When the IP address used to discover the device is the IP address of the device management port, management is considered **out-of-band**.

When a device is discovered, the 5620 SAM sets the device in a managed state and reconciles device elements into the 5620 SAM database. To discover devices, you use the Discovery Manager to create one or more discovery rules, choose a discovery rule, and scan the network as specified by the rule. Discovery rules contain rule elements. Rule elements specify which devices or subnets are to be included in or excluded from the discovery process. A discovery rule can contain more than one rule element. For example, you can configure one rule element to discover a subnet, and configure another rule element to exclude specific IP addresses from the subnet.

1.2 Equipment Management



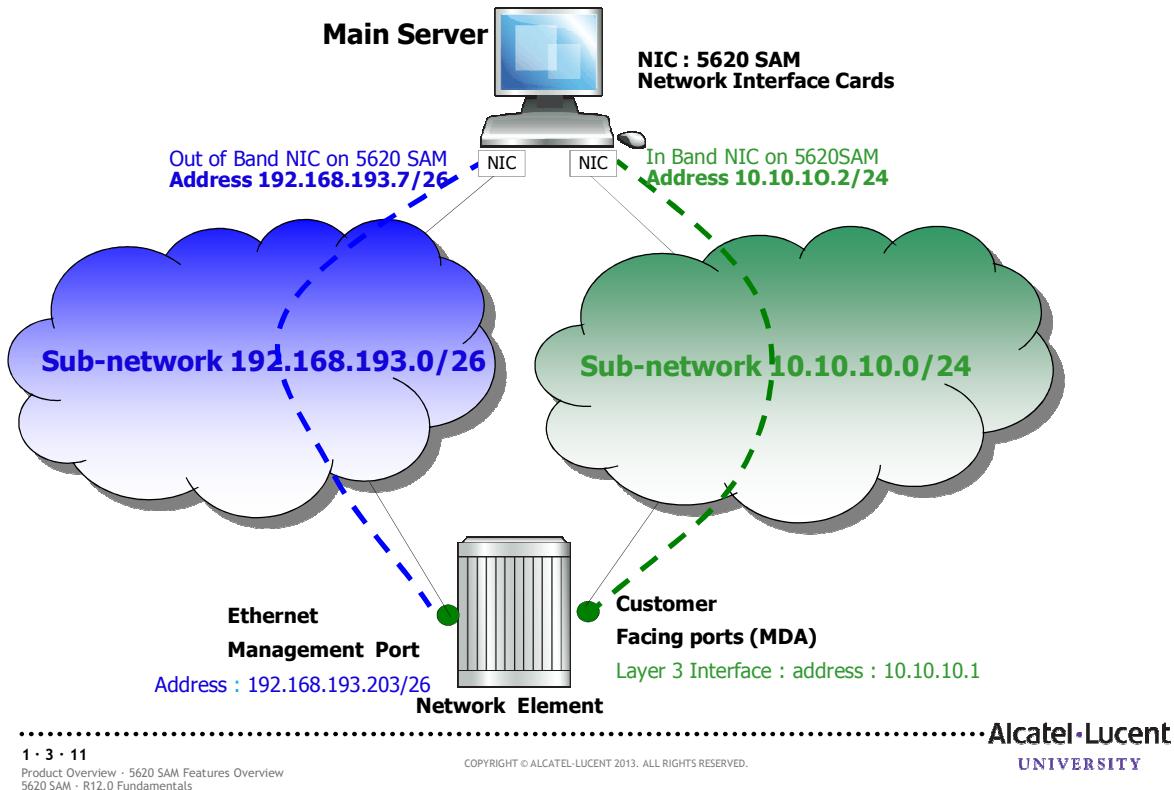
Physical equipment is:

- discovered and the 5620 SAM database is initially populated
- resynchronized with the 5620 SAM database and the content of the database is matched with the content of the physical device database, and
- configured when clients send requests to add new equipment or change existing equipment

The server makes the appropriate changes to the data model and deploys the updates on the relevant nodes. For example, when a card is added to a node, the server data model is updated, and the card configuration commands are sent to the node.

Network configuration is supported for Multi-protocol Label Switching (MPLS), Label Switched Paths (LSPs), and service tunnels, as well as routing protocols such as Routing Information Protocol (RIP), Border Gateway Protocol (BGP), and Intermediate System to Intermediate System (IS-IS). These configurations are requested by clients and deployed to the network. New nodes can be discovered by a user request or automatically through server polls. When a new node is discovered, it is added to the data model and set to a managed state.

1.3 In-band and Out-band Management



The 5620 SAM supports **in-band** and **out-of-band** management of devices.

When you configure **in-band** management only, management traffic between the 5620 SAM and a device is transmitted through any port that is configured for network access, but not the management port. Using in-band management, the 5620 SAM sends management traffic to the system IP address of the device, or to an optional L3 management interface.

When you configure **out-of-band** management only, management traffic between the 5620 SAM and a device is transmitted through the management port of the device. Using out-of-band management, the 5620 SAM sends management traffic to the management IP address of the device.

When you configure a device for **in-band** and **out-of-band** management, one method provides **redundancy** for the other. If the IP addresses are the same, redundancy is not supported. Redundancy is not supported on the OmniSwitch.

To enable **in-band** management of a device, you must manually configure a **second trap destination** and **trap log** on the device.

The **type of management** is determined **during device discovery**. When the device is discovered using its management IP address, management is out of band. When the device is discovered using its system IP address or an L3 interface IP address, management is in band.

This page depicts a configuration with in-band and out of band management. The out of band management allows a ping from the 5620 SAM to the management IP address of the router (192.168.193.203/26).

The in-band connection sends management packets to the router via a MDA port.

1.4 Generic Network Elements

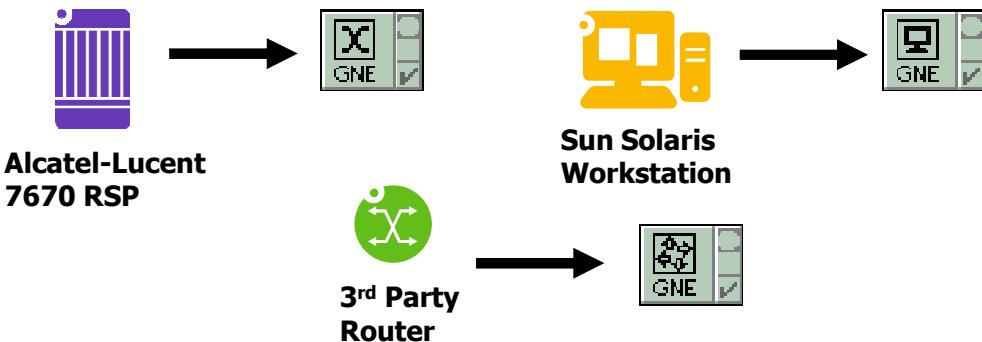
Licensed SNMP-manageable devices that are not managed by the 5620 SAM

Limited monitoring capability

Telnet, FTP, SSH, CLI and scripting possible

GNE topology icons to identify different types of GNEs

GNE functionality controlled by application license key



1 · 3 · 12

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5620 SAM - R12.0 Fundamentals

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The 5620 SAM allows network designers to monitor Alcatel-Lucent licensed devices that are not managed by the 5620 SAM, but support SNMPv2, or later. These devices are referred to as generic network elements or GNEs. The 5620 SAM provides the following subset of capabilities for GNEs:

- plot the GNE on the topology map
- create physical links to the device
- monitor the device status (up or down)
- monitor the alarm status
- perform direct cut-through for telnet/ SSH
- send CLI scripts to the GNE

The 5620 SAM uses different GNE topology icons that the operator can select to identify the types of GNEs; for example, server, switch, multiplexor, router, wireless).

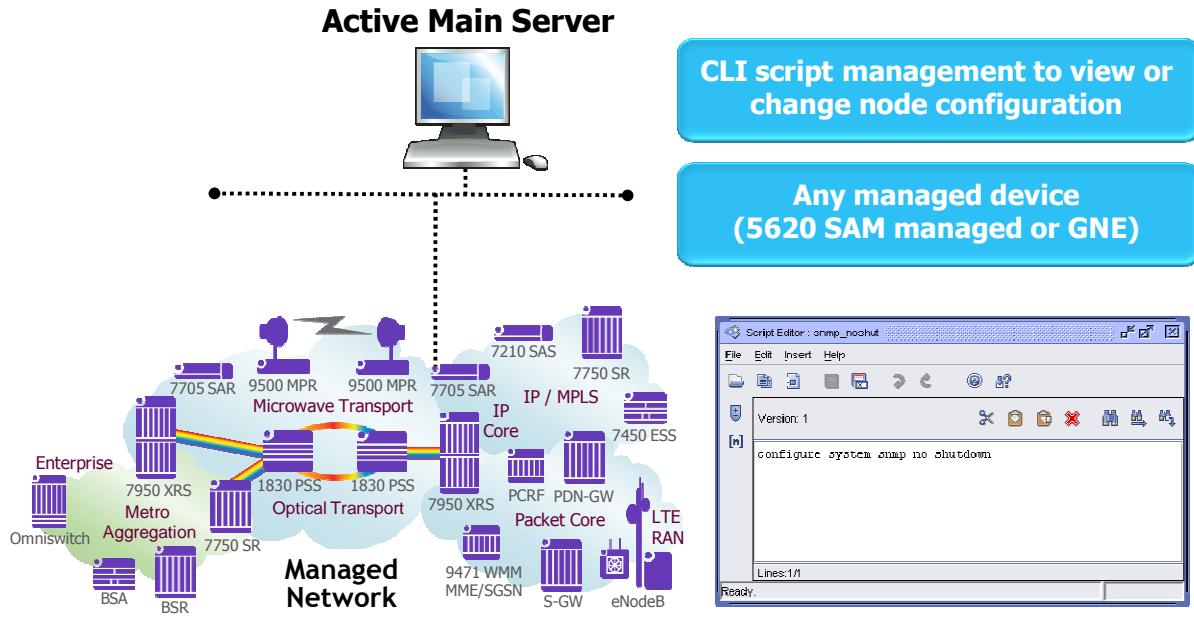
The following devices are examples of GNEs:

- Sun Solaris workstation
- Alcatel-Lucent 7670 RSP
- Cisco router
- Juniper router

There are three (3) main steps to discover then manage a Generic NE:

- create a Generic NE Profile for each device to be managed
- create a Mediation Security Policy for the specific nodes to be managed, and
- create a Discovery Rule that will be used to discover the node(s)

1.5 Script Management



1 · 3 · 13

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5620 SAM - R12.0 Fundamentals

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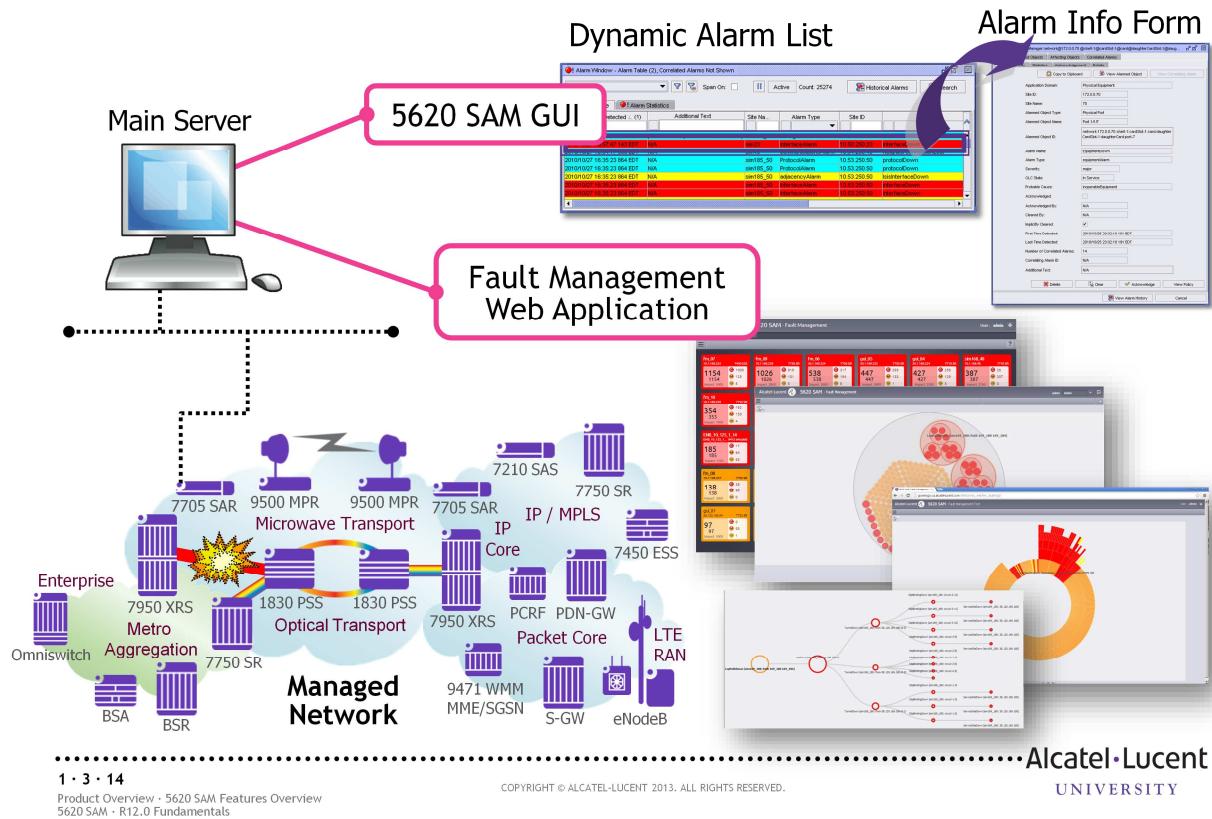
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Script management allows network operations staff to configure selected network devices and view configuration information through CLI command scripts. Script management can be used to:

- create, configure, and test script instances to manage Alcatel and generic NEs
- view and compare versions of CLI command scripts
- preview scripts
- start and stop the execution of scripts associated with managed NEs, and
- view, compare, and store the results of executions of individual and multiple script instances

Access to the script manager is controlled by user account privileges. Users with admin privileges can create, modify, delete, and execute scripts. Users with script execution privileges can view and run scripts, view and save results, configure script targets, and view historical results.

1.6 Fault Management

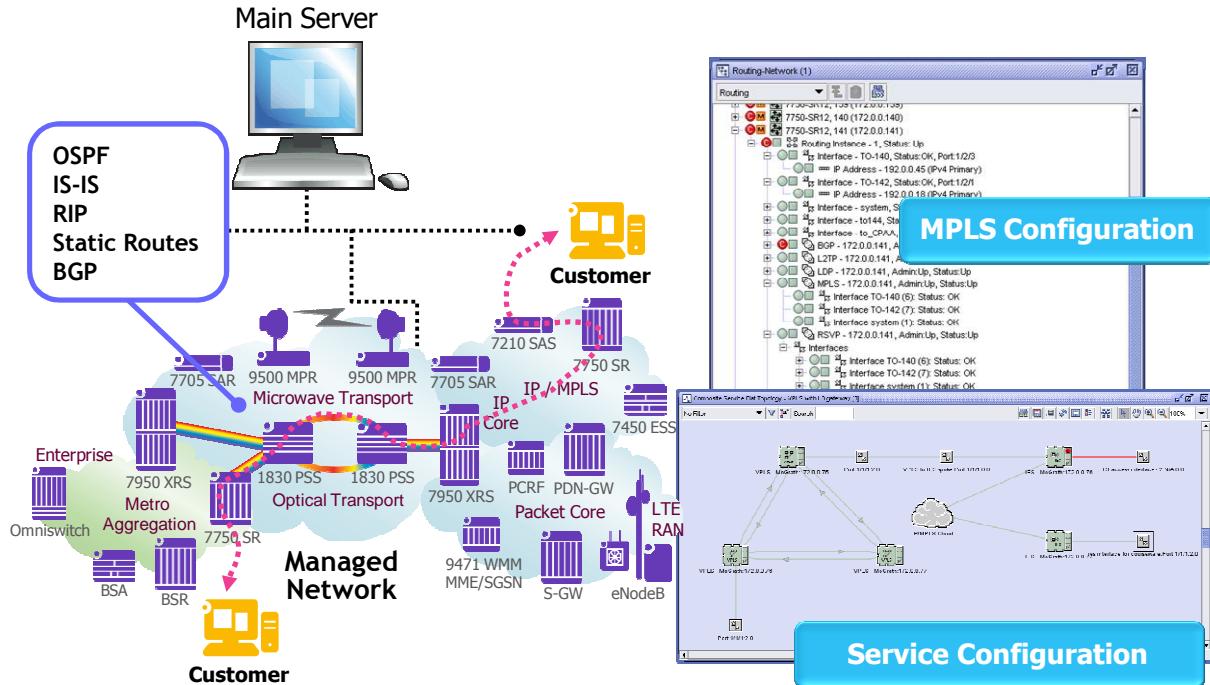


Fault management occurs in response to traps triggered in the managed network. SNMP traps are sent to the 5620 SAM Main Server, which converts them to status updates and alarms against the appropriate equipment and services. Traps include hardware faults on equipment. Traps may be sent for many reasons; for example, managed device configuration or operational state changes, or security breach attempts. These traps are passed to clients immediately if they have registered for a JMS event channel, or later when a client polls the server.

The fault management system provides:

- conversion of SNMP traps of device events to many X.733-ISO Standard alarm fields (Critical, Major, Minor, Warning, Intermediate, Cleared) impact analysis and correlation of alarms to equipment and service-affecting faults updated operational status of equipment, services, and interfaces in near-real-time from the network device resources
- alarm policy control by network administrators so the administrators can determine how to handle individual incoming alarms and how alarm logs are created and stored
- point-and-click alarm management from both the dynamic alarm list and from equipment and services configured on the 5620 SAM GUI
- the Fault Management Web Application visualization approaches make it clear where the root-cause of a problem resides
- operator notes and acknowledgement to track the work undertaken to fix the problem that caused the alarm, and
- correlated data in a historical alarm database to provide trend analysis and records

1.7 Configuration Management



1 · 3 · 15
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The network management capabilities of the 5620 SAM allow network operations staff to provision the Internal Gateway Protocols (IGP), including: static routes, RIP, Open Shortest path First v2 (OSPFv2), OSPFv3 and IS-IS, as well as the BGP (Border Gateway Protocol) used for L3 VPN (VPRN) services. The MPLS network can then be tracked for performance monitoring, billing, inventory, reporting, and alarms. Network Operations staff can track the managed network data from SNMP traps, billing and traffic analysis data, and SNMP MIB performance data. The data is rolled-up and correlated using the data model and business logic on the server.

MPLS Management

The MPLS management capabilities of the 5620 SAM allow network operations staff to provision the MPLS network including: static and dynamic Label Switched Paths (LSPs) to support services for subscribers. The MPLS network can then be tracked for performance monitoring, billing, inventory, reporting, and alarms.

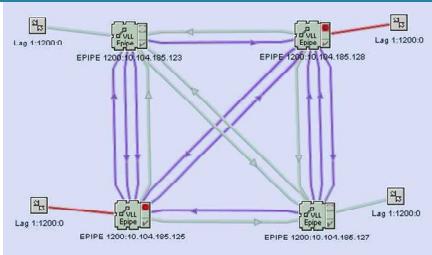
Service Management

The service management capabilities of the 5620 SAM allow network operations staff to provision VLL, VPLS, IES, VPRN, or VLAN services for subscribers. These service networks can then be tracked for performance monitoring, billing, inventory, reporting, and alarms. Network Operations staff can track the managed network data from SNMP traps, billing and traffic analysis data, and SNMP MIB performance data. The data is rolled-up and correlated using the data model and business logic on the server.

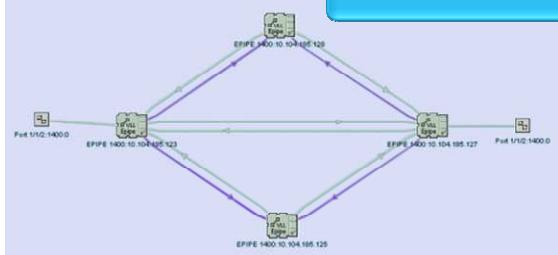
1.8 Service Topology Maps

Troubleshooting using services topology maps

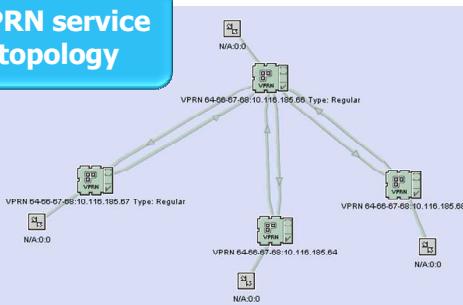
VLL switching with MC-LAG redundancy



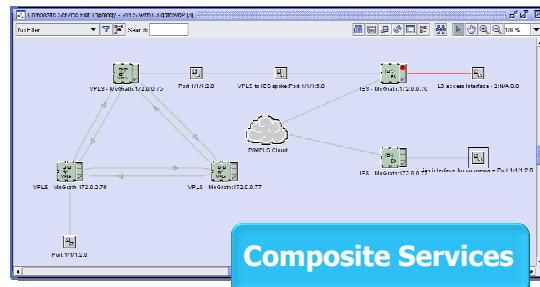
Multiple path VLL



VPRN service topology



Composite Services



1 · 3 · 16

Product Overview - 5620 SAM Features Overview
5620 SAM - R12.0 Fundamentals

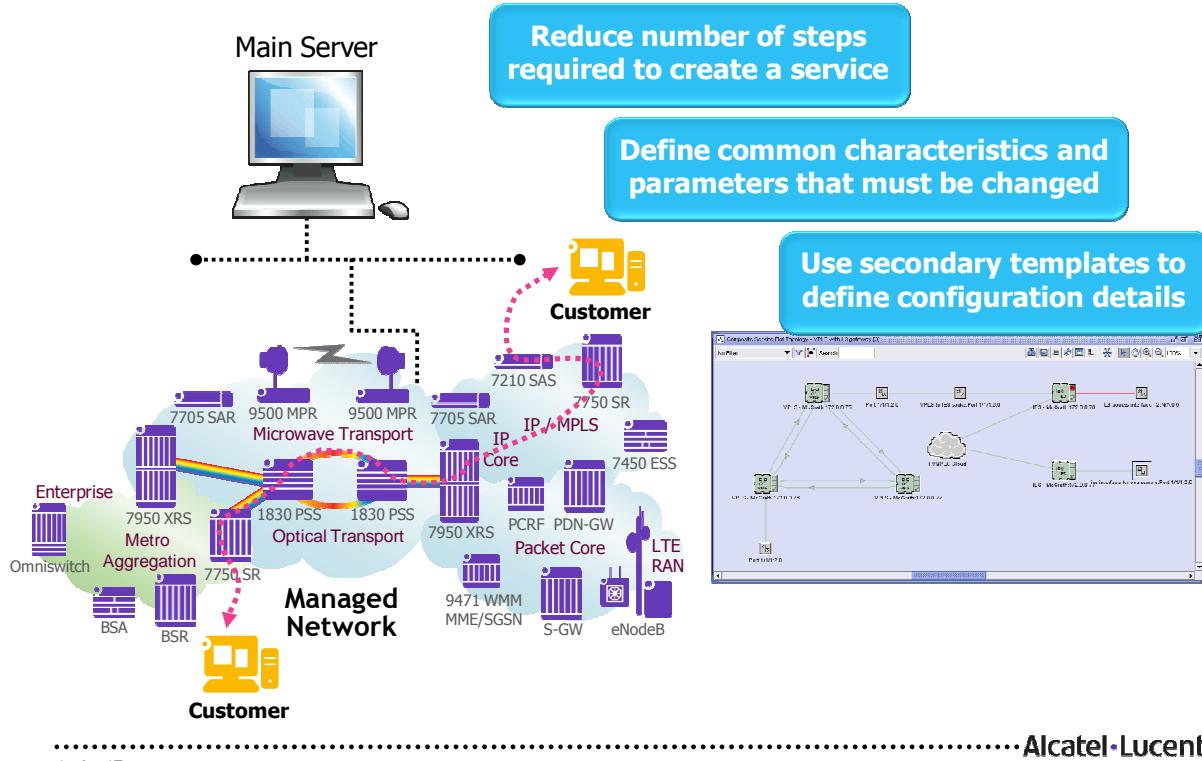
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Several network topology maps are available on the 5620 SAM. Examples are showing on this picture with layer 2 and Layer 3, point to point or point to multi point services.

Each map displays network objects and information, and provides contextual menus to open forms that display additional information. These maps may be used by the operators to have a global view on the services and to help them solving problems in the network.

1.9 Service Templates



1 · 3 · 17
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 5620 SAM - R12.0 Fundamentals

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The template management components of the 5620 SAM allow users to develop, manage, and execute customized provisioning actions to simplify the operation of their 5620 SAM network. The 5620 SAM templates use a common infrastructure with the template feature set providing additional capabilities for service and tunnel provisioning primarily, and support for some equipment.

A template is an object managed by the 5620 SAM that is used as a starting point for configuring complex managed objects such as services and tunnels. Templates allow users to define common characteristics that can be shared by multiple managed objects by associating them with a template instance at creation time.

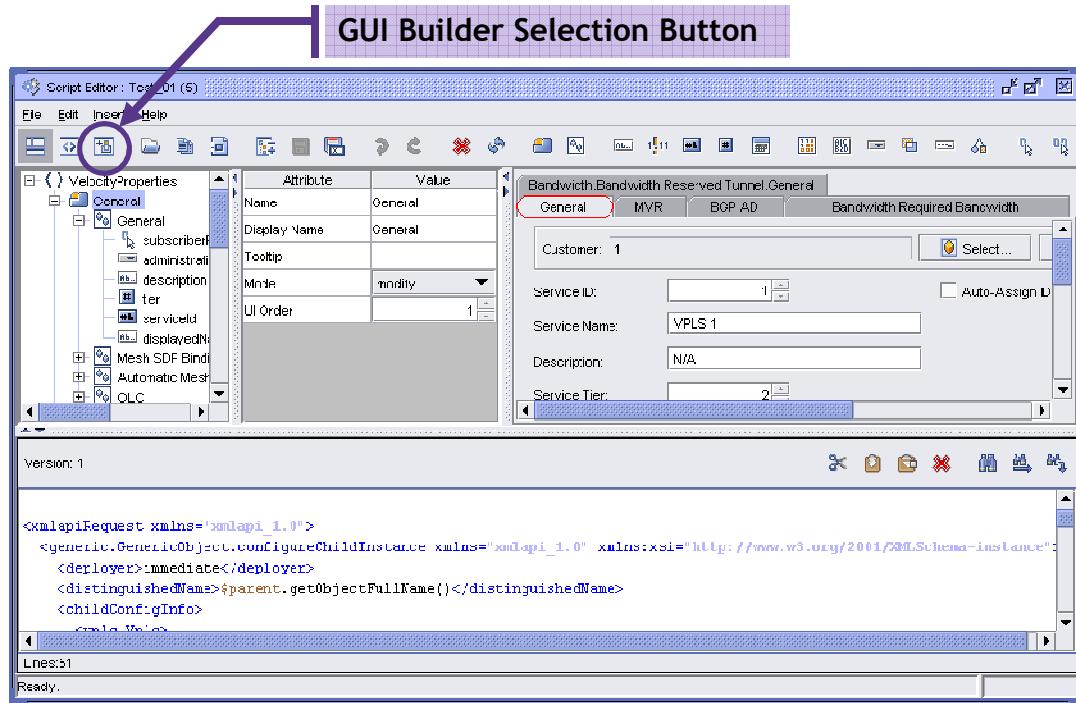
Template management is divided into two functional areas:

- service templates
- tunnel templates

You can use service templates to facilitate service creation, including the service itself and sub-components such as service sites, access interfaces, and SDP binding

You can use tunnel templates to facilitate LSP and SDP tunnel creation. Tunnel types include dynamic LSPs, LSP paths, P2MP dynamic LSPs, and service tunnels.

1.10 Velocity GUI Builder



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1 · 3 · 18
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5620 SAM - R12.0 Fundamentals

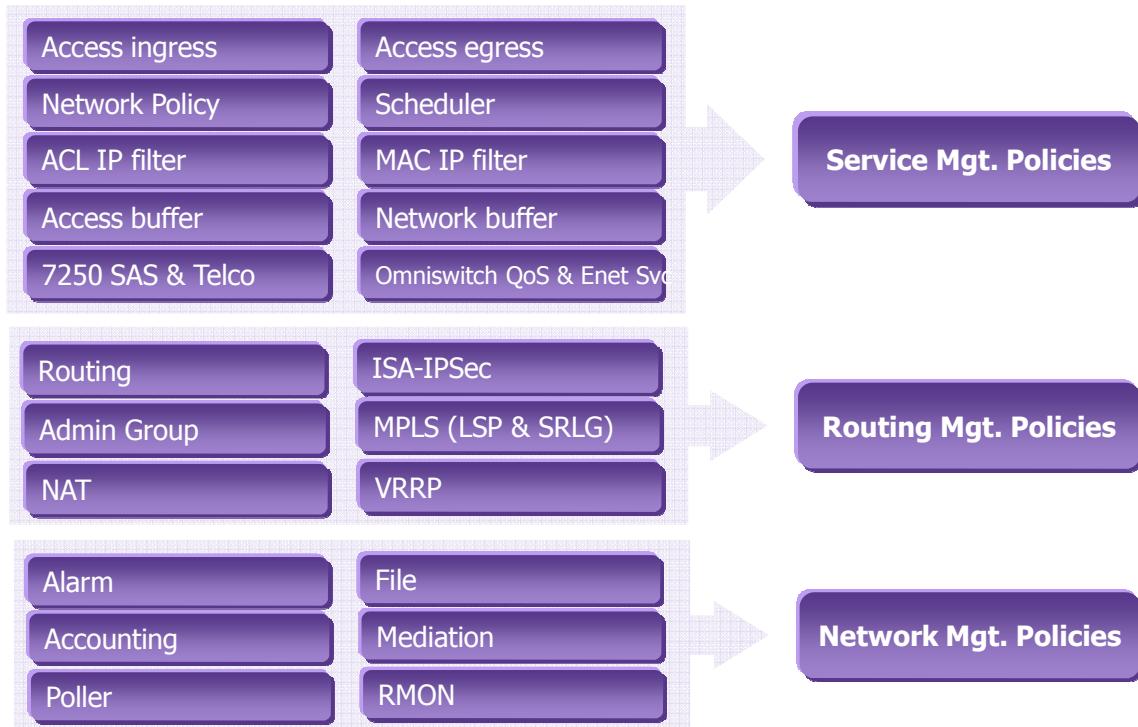
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The Velocity GUI Builder allows users to easily create the XML content for the velocity properties. It allows the user to specify all property types and configure them through a GUI. The builder is opened through the script editor, and can be used to create or edit the velocity properties, or test the generated UI. Under the versions tab of a script, select “Add” to create the script. A button is available in the script editor to launch the GUI builder.

As part of the Service Templates capabilities of the 5620 SAM Release 6.0, the GUI Builder allows GUI based locking, default setting and bounds setting extends ‘service template’ philosophy to general templates.

It provides support for output format scripts greatly improving the potential look and feel of customer scripts.

1.11 Policy Management



1 - 3 - 19

Product Overview - 5620 SAM Features Overview
5620 SAM - R12.0 Fundamentals

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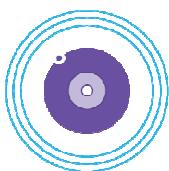
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The 5620 SAM provides the capability for extensive policy management grouped into three main groups:

- Service management
- Routing management
- Network management

These policies are applicable to managed nodes that include:

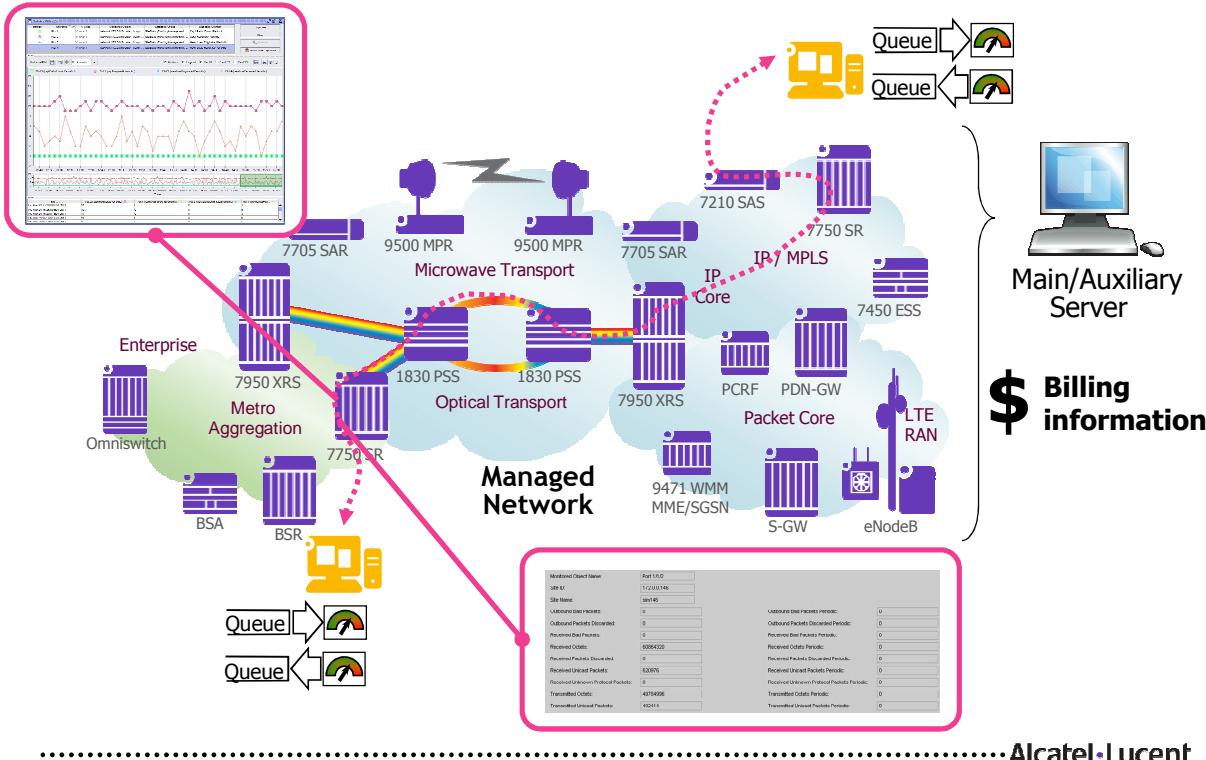
- 7x50 SR-OS nodes including; 7750 SR, 7450 ESS, 7705 SAR and 7210 SAS
- 7250 SAS and Telco
- Omniswitch QoS
- Omniswitch Ethernet services



Technical Reference

See **5620 SAM User Guide** for more information on policy management.

1.12 Accounting and Performance



1 · 3 · 20
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5620 SAM - R12.0 Fundamentals

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The 5620 SAM provides the capability to monitor services and resources using performance monitoring statistics, alarms, and diagnostic and troubleshooting tools.

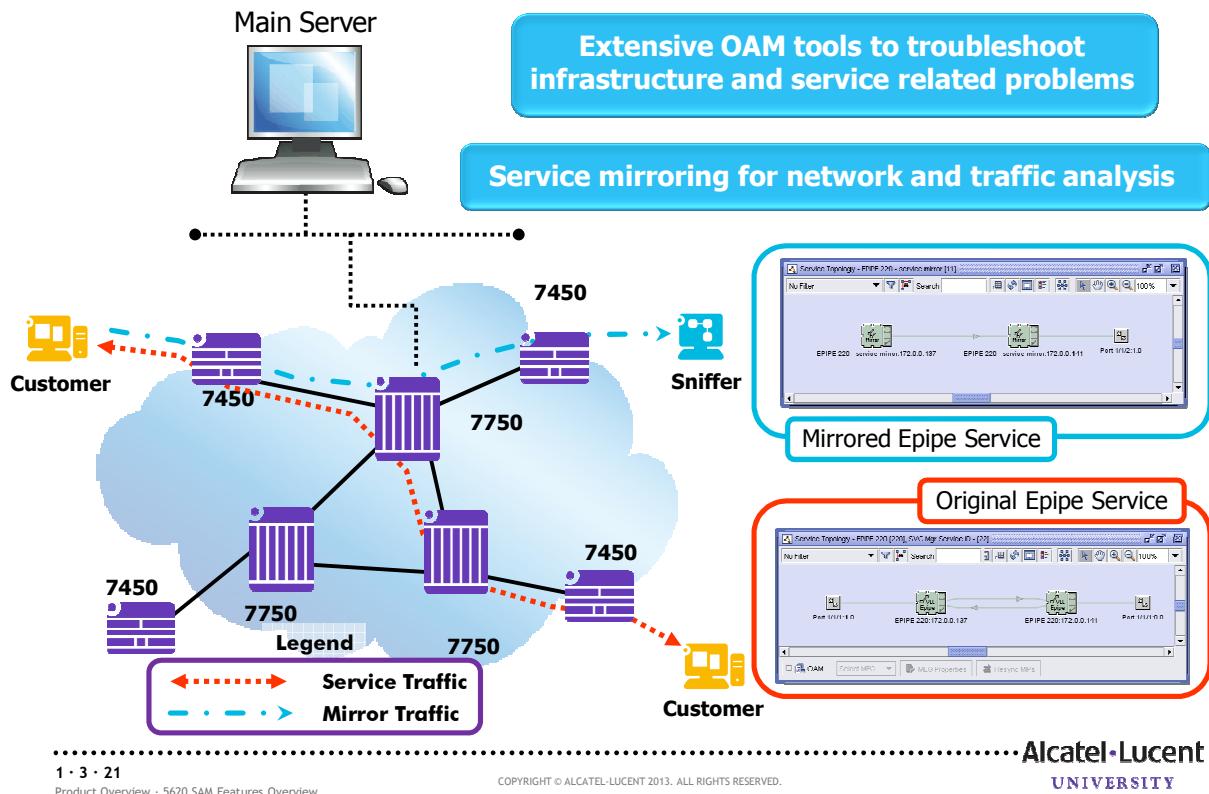
Performance monitoring and accounting statistics collection are performed on the 5620 SAM using service- and equipment-related statistics counters from the managed devices. There are two types of statistics collected:

- accounting statistics for SAPs (Service Access Points), SDPs (Service Distribution Paths) and network ports which can be used for billing and traffic-analysis purposes, and
- network object performance statistics, for control plane, data forwarding plane, and device utilization statistics

Performance statistics are collected regularly by server polls of the managed devices. Changes to network performance statistics, which are in MIB format on the managed devices, are uploaded to the server using SNMP.

Accounting statistics for billing records and traffic analysis are generated and stored on the managed devices. They are collected and transferred to the 5620 SAM Main/Auxiliary Server using FTP or Secure Copy Protocol (SCP).

1.13 Diagnostics

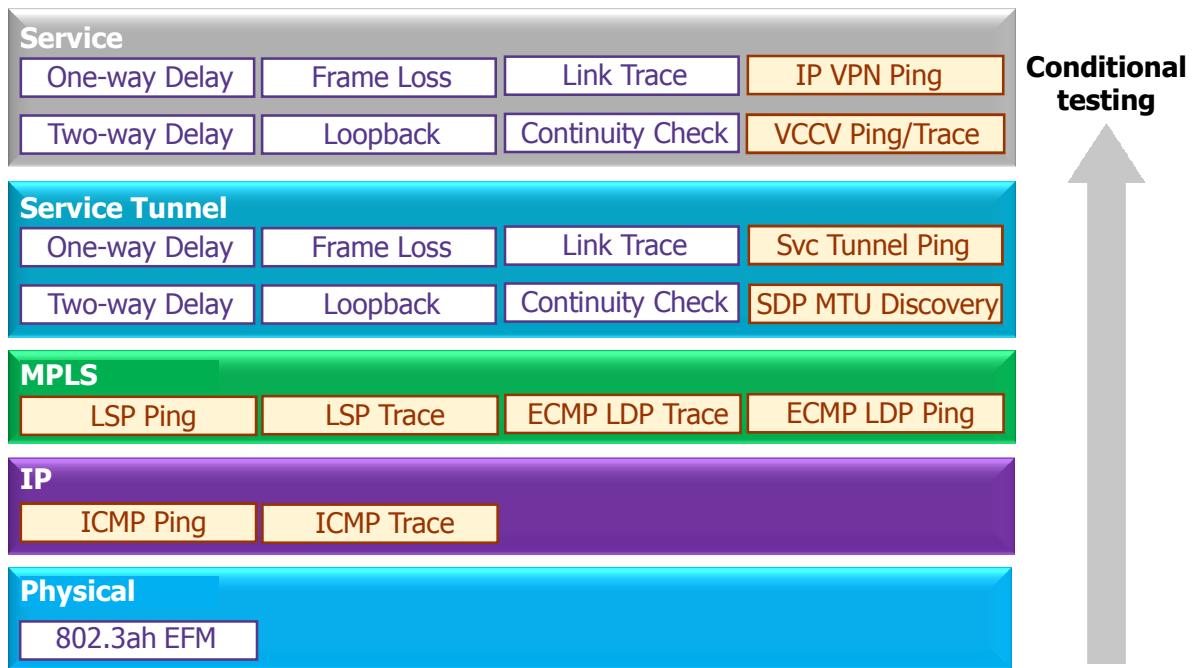


The 5620 SAM diagnostic tools include MAC ping, VCCV ping for VLL services, DNS ping for name resolution, LSP ping and traceroute, and VPRN

ping. Performing service and service-transport connectivity tests during service creation can ensure correct function at service activation time. Ping tests against management IP addresses indicate managed-device availability

In a mirror service, packets from one or more sources are forwarded to their normal destinations and a copy of the entire packet, or a specified portion of the packet, is sent to the mirror destination. The mirrored packet can be viewed using a packet-decoding device, typically called a sniffer, that is attached to the destination port.

1.14 Diagnostics



1 · 3 · 22

Product Overview - 5620 SAM Features Overview
5620 SAM - R12.0 Fundamentals

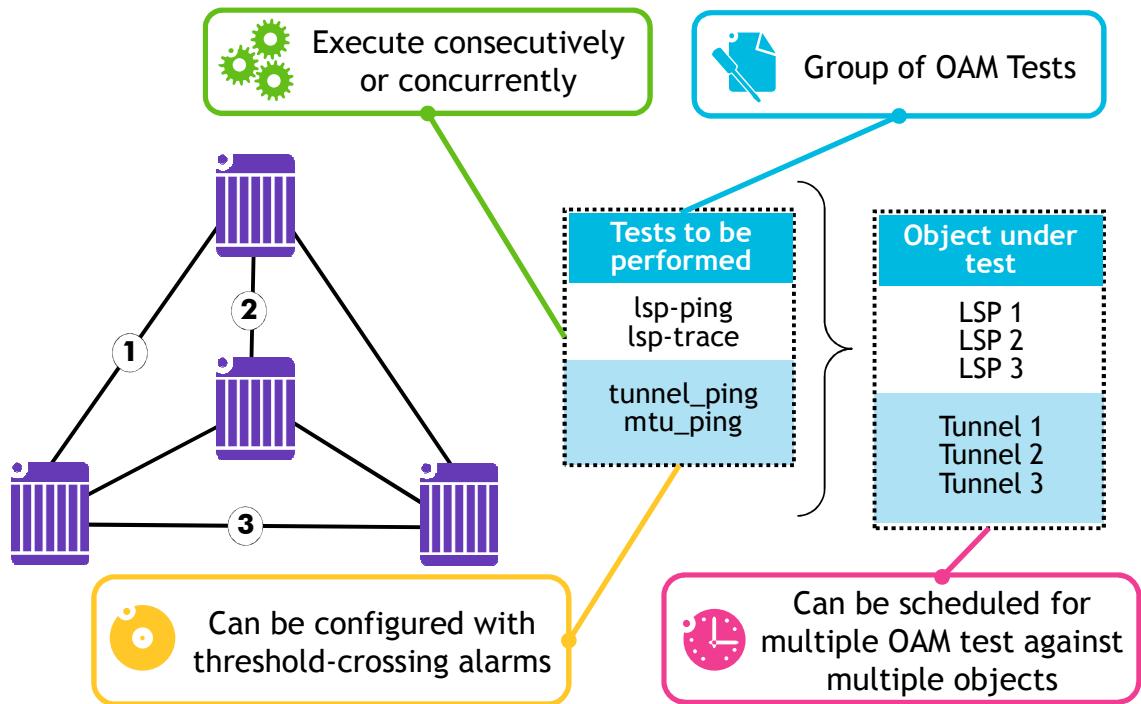
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5620 SAM Provides a comprehensive set of OAM tests for both Ethernet and IP/MPLS technologies.

The test execution is reduced through conditional testing - failed tests in lower layers will auto-trigger tests in higher layers.

1.15 Service Test Manager



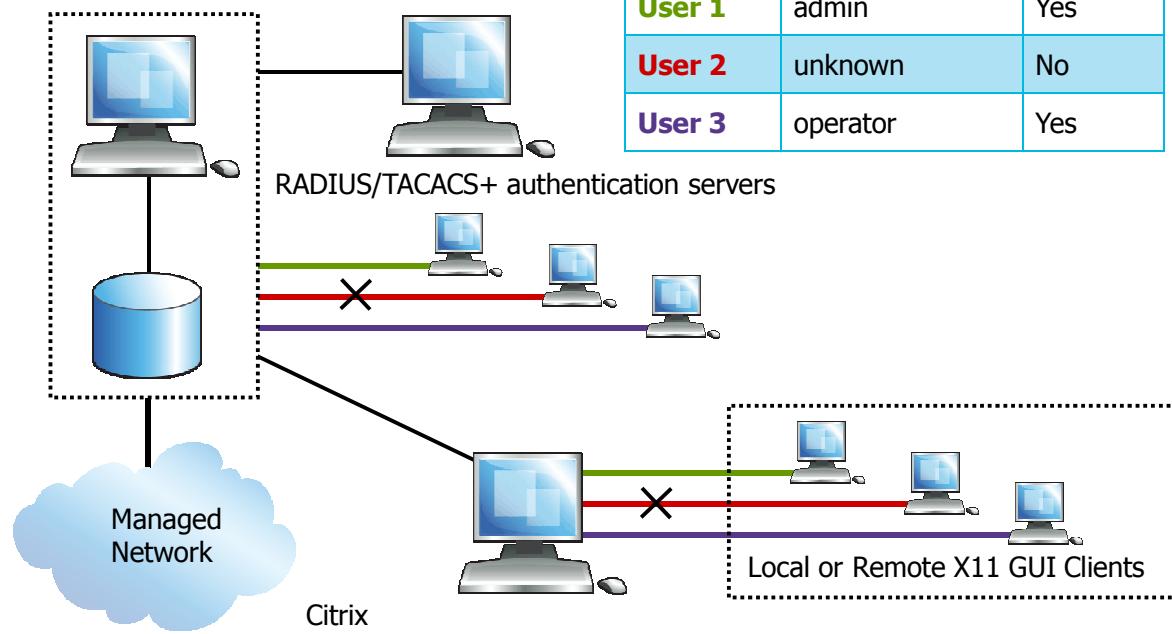
The 5620 SAM service test manager (STM) provides the ability to group various OAM tests into test suites for network troubleshooting and for verifying compliance with SLAs. You can schedule the execution of a test suite to provide continual performance feedback, or run a test suite on demand to investigate service issues. The test results are logged for monitoring and trend analysis.

The grouping of tests into a test suite allows a 5620 SAM operator to use one schedule for the periodic execution of multiple OAM diagnostics against multiple network objects; for example, services, NEs, or transport components. An operator can choose to include existing tests, use the 5620 SAM to generate the tests that comprise a test suite, or both. Groups of tests in a suite can be configured to execute sequentially or concurrently. In addition, you can configure a test suite as an OAM validation test to verify the operational status of a service.

You can configure threshold-crossing parameters to generate alarms when rising or falling threshold values are reached due to the reach, latency, or jitter issues discovered by the OAM tests.

1.16 Access Management

Main Server and Database



1 · 3 · 24

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The 5620 SAM provides for data protection through various means, one of which is access management.

Network operations staff is provided access to the 5620 SAM database through the GUI. However, users must be successfully authenticated. Authentication is performed at login which the system can be configured to perform locally or through TACACS+ or RADIUS servers available within the network. Users are then assigned permissions based upon the profile which determines the functions which may or may not be executed.

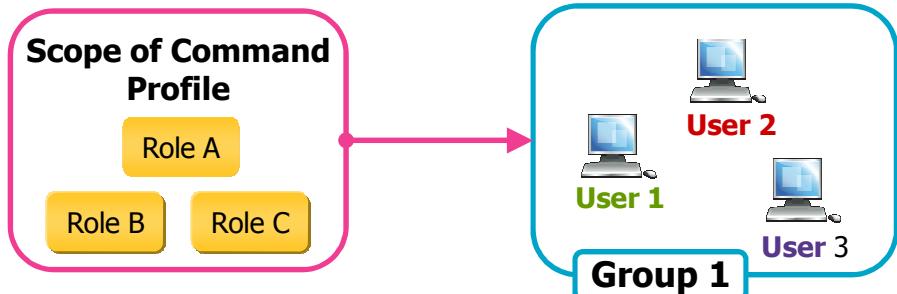
A default user named **admin** with the password **5620Sam!** is provided with the initial installation.

Site Access Management

The 5620 SAM can also be used to manage access to each of the network devices individually or through templates whose configuration can be propagated to one or more of the network elements. This enables system administrators to configure the console, telnet and snmp user access and their permissions through the 5620 SAM GUI.

1.17 Scope of Command

A scope of command profile contains one or more configurable roles



Profile is subsequently applied to a user group

Each user in the group inherits the access rights specified in the scope of command profile

Scope of command defines what the user is allowed to do

1 • 3 • 25

Product Overview - 5620 SAM Features Overview
5620 SAM - R12.0 Fundamentals

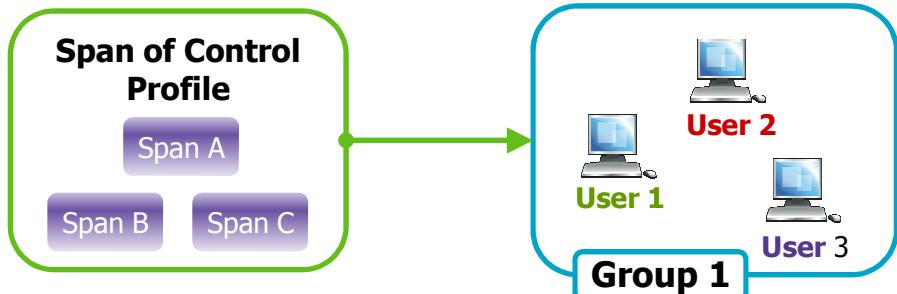
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The scope of command for a user defines what the user is allowed to do; it is a collection of one or more configurable roles, or sets of permissions. As shown in the figure above, a scope of command profile contains one or more roles, and the profile is subsequently applied to a user group. Each user in the group inherits the access rights specified in the scope of command profile.

1.18 Span of Control

A span of control profile is a collection of one or more spans



A Span Profile is associated with a user group

System Administrators can create an original span, or copy an existing span and modify associated objects to create a new span

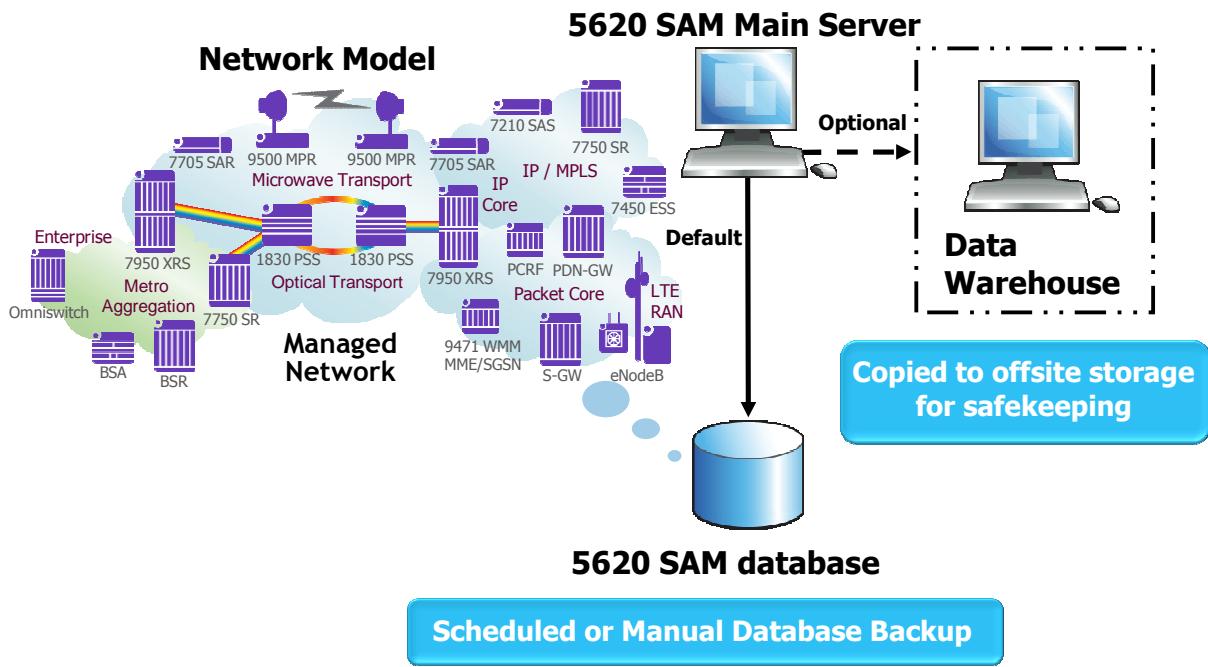
A span is a list of the objects over which the user has control

The span of control for a user is a list of the objects over which the user has control, for example, a grouping of NEs or services.

Spans are specified in span of control profiles that are associated with user groups.

System Administrators can create an original span, or copy an existing span and modify the list of associated objects to create a new span.

1.19 SAM Database Security



Scheduled or Manual Database Backup

1 · 3 · 27

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5620 SAM - R12.0 Fundamentals

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Database Management

To ensure against data loss, backups of managed device files, including the 5620 SAM database and individual routers, can be scheduled or performed manually through the intervention of network operations staff.

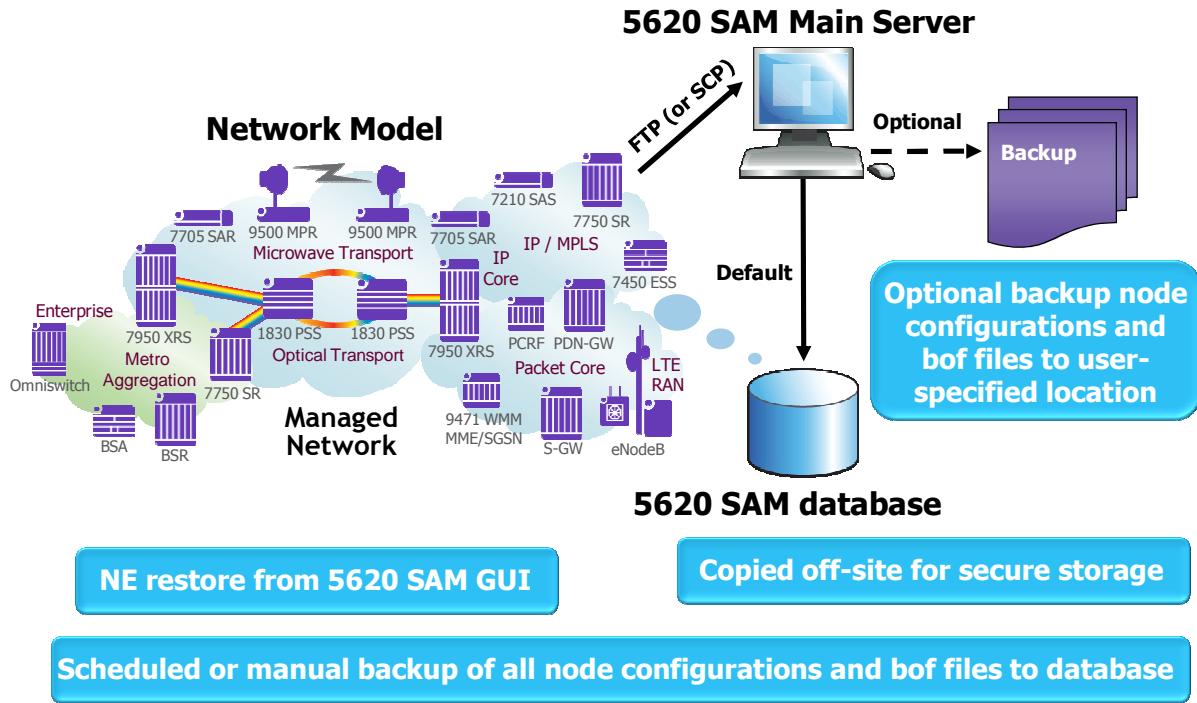
Backups are performed when the server copies files from the managed devices to a remote location using **FTP** or **Secure Copy Protocol (SCP)**.

Note

A remote location is any mounted partition or file system to which the 5620 SAM has access (i.e. U:\ drive).



1.20 NE Database Security



1 · 3 · 28
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Network Element (NE) Database Management

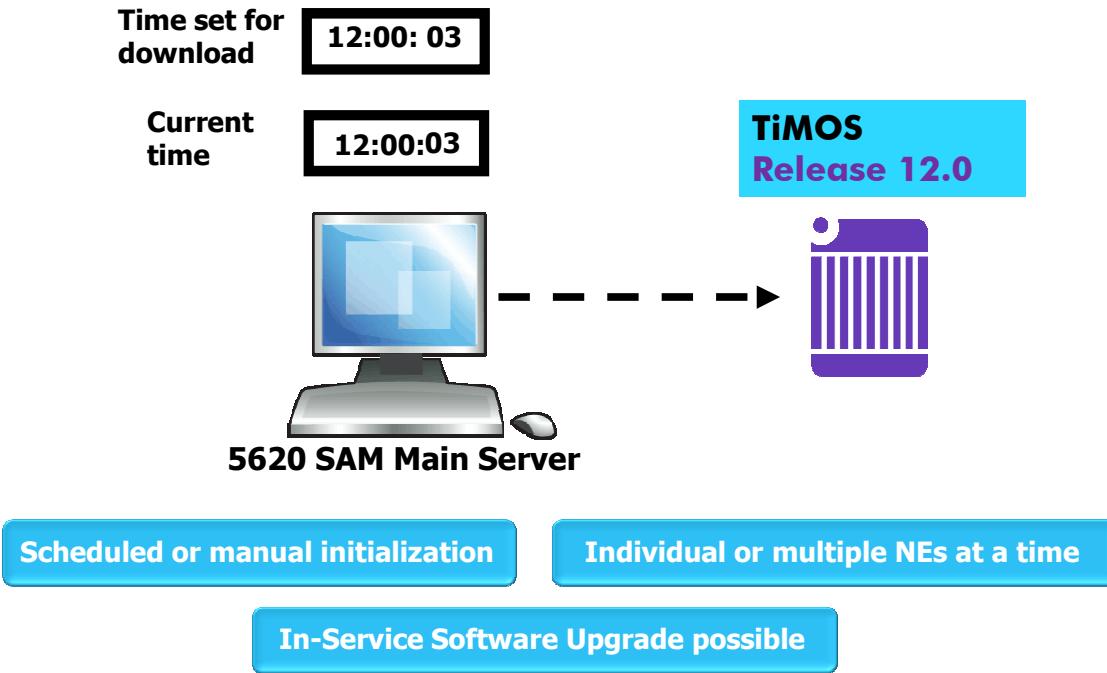
A major concern for network providers is disaster recovery: what happens when nodes or network configurations are destroyed? Network element configuration backup procedures form a large portion of a carrier's ability to restore services with minimal disruption to service in the case of a disaster.

The 5620 SAM allows the network operator or administrator the ability to create a regular schedule to backup node element configuration files, and/ or bof files, as well as initiating a manual backup of these files, as required. When initiated, the config and/ or bof files are copied to the 5620 SAM Main Server through FTP or SCP. The files can then be transferred to an off-site data storage facility for a higher degree of risk management for disaster recovery.

The 5620 SAM will also permit the network operator or administrator the ability to restore a node as long as IP connectivity exists between the 5620 SAM Main Server and network element and the configuration and/ or bof file are visible to the operator or administrator.

In redundant configurations, you have the option to configure the requirement for the 5620 SAM Main Servers to create a backup file of 5620 SAM-managed SR OS nodes. A text file stores the configuration information in a user-specified location.

1.21 NE Software Upgrade



1 - 3 - 29
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 5620 SAM - R12.0 Fundamentals

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When a new device software version is available, the 5620 SAM can be used to perform an on-demand NE software upgrade or schedule one using a software upgrade policy. Multiple software upgrade policies can be created and configured which can then be assigned to multiple NEs. A software upgrade policy cannot be deleted once it has been assigned to an NE.

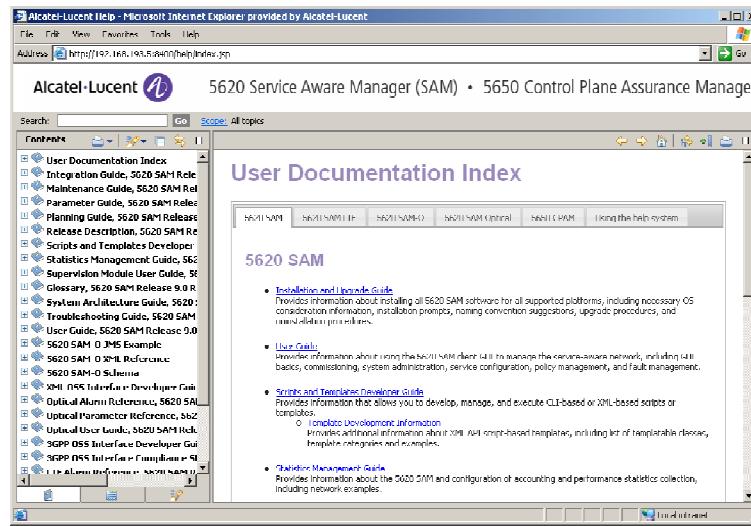
During a software upgrade, the 5620 SAM performs checks to ensure that the new software is compatible with the device type and that the required files are present. The 5620 SAM does not initiate a device software upgrade unless the necessary conditions are in place. A software upgrade can be rolled back to the previous version in the event of an upgrade failure.

An in-service software upgrade performed on a device allows a managed device to provide uninterrupted service during the upgrade process. A device software upgrade requires a CPM restart, which causes temporary device down time. When a device has dual CPMs, however, one CPM can remain active while the other restarts with the upgraded software. These alternate CPM restarts mean that the device remains in service during the upgrade. If an upgrade on a CPM fails, the CPM reports a failed state and raises an alarm. In-service software upgrades for devices are restricted to maintenance software releases.

The 5620 SAM can be configured to activate the new software image immediately after transferring it to an NE, or transfer the files only and manually activate the software image later, as might be required for a scheduled upgrade of multiple NEs performed during off-hours when fewer staff are available to monitor the upgrades.

1.22 Help System

- Delivered with the 5620 SAM product and accessible by choosing **Help→User Documentation** from the client GUI
- Provides a summary of and links to all 5620 SAM customer documents
- On-product customer documentation delivered in HTML and PDF



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1 • 3 • 30

Product Overview - 5620 SAM Features Overview
5620 SAM - R12.0 Fundamentals

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The 5620 SAM on-product customer documentation is delivered in HTML and PDF. Choose **Help→User Documentation** from the 5620 SAM client GUI to open the help system in a web browser.

The help system opens to the User Documentation Index, which provides a summary of and links to all 5620 SAM customer documents.

Click on the Using the help system tab on the User Documentation Index page to find usage tips for navigating and searching within the on-product customer documentation.

The 5620 SAM customer documentation is also available on the web for download in PDF format from the Alcatel-Lucent Customer Support Center: <http://www.alcatel-lucent.com/myaccess>.

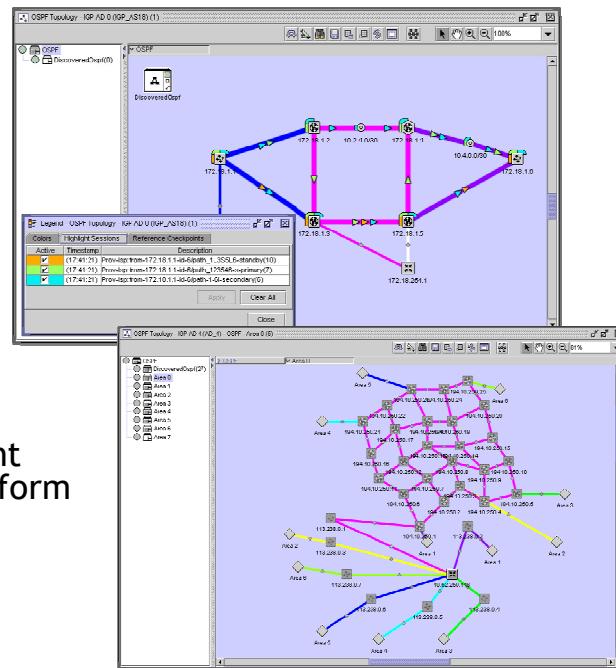
In addition to the 5620 SAM documentation suite guides available in the Help System, Release Notices and other documents not delivered on-product are posted to this site.

Note

If you are a new user and require access to this service, please contact your Alcatel-Lucent support representative.



1.23 – 5650 Control Plane Assurance Manager (CPAM)



IP/MPLS control plane management solution enabling operators to perform

- Network planning
- Network operation
- Network troubleshooting
- Network restoration
- Proactive assurance

1 · 3 · 31
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 5620 SAM - R12.0 Fundamentals

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The 5650 CPAM provides real-time control IGP topology capture, inspection, visualization, and troubleshooting. The 5650 CPAM is integrated with the 5620 SAM, which allows the 5650 CPAM to cohesively tie routing layer information to infrastructure, such as network routes, service tunnels, LSPs, edge-to-edge service layer connectivity, and rich OAM test management. The holistic approach to control plane management offered by the 5650 CPAM and the 5620 SAM supports the following operational activities:

- **Network Planning** - Planning activities are optimized with real-time topology and strong linkages between services and infrastructure layers in the 5620 SAM GUI and 5620 SAM-O OSS interfaces.
- **Network Operations** - Real-time topology and multi-layer highlighting allows you to rapidly assess the state of services, tunnels, and routing on the IGP and IP/MPLS maps.
- **Network Troubleshooting** - Historical OAM trace, SPF and RSVP path, and checkpoints allow you to rapidly detect and resolve service level issues whose root cause is in the IP or MPLS layers.
- **Network Restoration** - Checkpoints and real-time views of IP/MPLS and service and tunnel infrastructure allow you to restore and plan networks.
- **Proactive Assurance** - 5650 CPAM alarms, network route and tunnel inspection lists, validation functions, checkpoints, and multi-layer views allow you to detect routing faults.

The 5650 CPAM consists of:

- **7701 CPAA (Control Plane Assurance Appliance) Route Analyzer** - rack-mounted and provides and analysis and distributed computing platform.
- **5650 CPAM Route Controller** - a java application running on a Solaris platform that is able to retrieve data from the Route Analyzers.

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Questions



1 · 3 · 33

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1. Which of the following is considered a Generic NE?
 - a. SunBlade 1500
 - b. Alcatel-Lucent 7670 Router Switching Platform
 - c. Alcatel-Lucent 7470 Multi-Service Platform
 - d. Alcatel-Lucent 7750 Service Router

2. The 5620SAM protects the server from any point of failure in the server or database software or the server and database hardware platform, and from connectivity problems that isolate the server from the network.
 - a. True
 - b. False

Answers



1. Which of the following is considered a Generic NE?
 - a. **SunBlade 1500 ✓**
 - b. **Alcatel-Lucent 7670 Router Switching Platform ✓**
 - c. **Alcatel-Lucent 7470 Multi-Service Platform ✓**
 - d. Alcatel-Lucent 7750 Service Router

2. The 5620SAM protects the server from any point of failure in the server or database software or the server and database hardware platform, and from connectivity problems that isolate the server from the network.
 - a. **True ✓**
 - b. False



This module covered:

- The main features of the Alcatel-Lucent 5620 SAM

1 · 3 · 35

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End of module
5620 SAM Features Overview

1 • 3 • 36

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Section 2
System Overview

Module 1 **System Architecture**

TOS36033_V4.0-SG-R12.0-Ed1 Module 2.1 Edition 2

5620 SAM
R12.0 Fundamentals
TOS36033_V4.0-SG Edition 1

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Edition	Date	Author	Remarks
1.0	2011-04-20	GARCIA LOZANO, René	TOS36033_V1.0 – SAM 9.0 (R1 update)
1.1	2011-10-28	GARCIA LOZANO, René	TOS36033_V1.5 – SAM 9.0 (R5 update)
2.0	2012-03-30	LOLLIERIC, Pascal	TOS36033_V2.0 – SAM 10.0 (R1 update)
2.1	2012-08-18	GARCIA LOZANO, René	TOS36033_V2.1 – SAM 10.0 (R1 vILT conversion)
2.2	2012-10-08	LOLLIERIC, Pascal	TOS36033_V2.2 – SAM 10.0 (R5 update)
3.0	2013-07-19	GARCIA LOZANO, René	TOS36033_V3.0 – SAM 11.0 (Update)



Upon completion of this module, you should be able to:

- List the components of the 5620 SAM management system
- Identify how the 5620 SAM components are layered in a multi-tier model
- Identify the available 5620 SAM Server and Database Pair Configurations
- Describe the distributed server architecture across auxiliary servers
- Explain the interfaces between each of the SAM components
- Describe the security measures of the 5620 SAM

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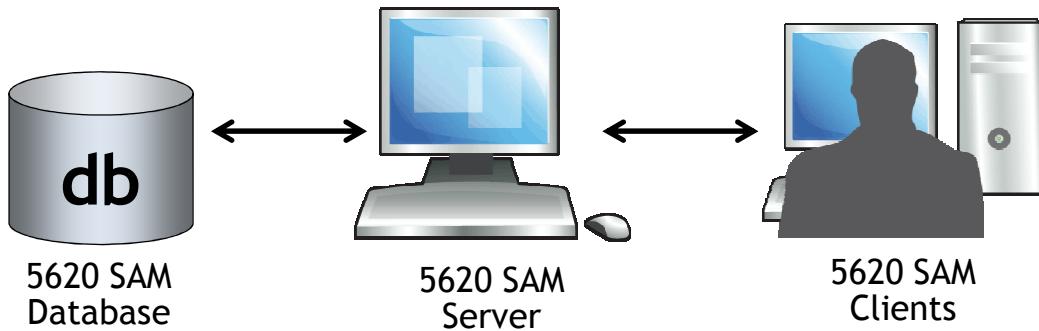


	Page
1 -5620 SAM Main Components	7
1.1 -5620 SAM Main Components Overview	8
1.1.1 SAM Server	9
1.1.1.1 SAM Server Virtualization	10
1.1.2 5620 SAM Database	11
1.1.3 5620 SAM Database	12
2 Multi Tier Model	13
2.1 Multi-tier Model Overview	14
2.1.1 Resource Layer	15
2.1.2 Integration Layer	16
2.1.3 Business Layer	17
2.1.4 Presentation Layer	18
2.1.5 Client Layer	19
2.2 Server Data Model	20
3 -5620 SAM Main Components Architecture	22
3.1 5620 SAM Server and Database Pair Configurations	23
3.2 Database Writes Overview	24
3.3 Distributed Server Architecture	25
3.3.1 Auxiliary Servers	26
3.3.2 Redundant 5620 SAM System	27
4 -5620 SAM System Interfaces and Security	28
4.1 Interfaces	29
4.1.1 Server and Managed Devices	30
4.1.2 Server and Clients	31
4.1.3 Server and Database	33
4.1.4 Main Server and Auxiliary Servers	34
4.2 Security	35
4.2.1 Session Management	36
4.3 Session and Network Transport Levels Security	37
4.3.1 Server and Clients	38
4.3.2 Database Sessions	39
4.3.3 Server and Managed Devices	40
4.3.4 Firewall Support	41

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1 5620 SAM Main Components

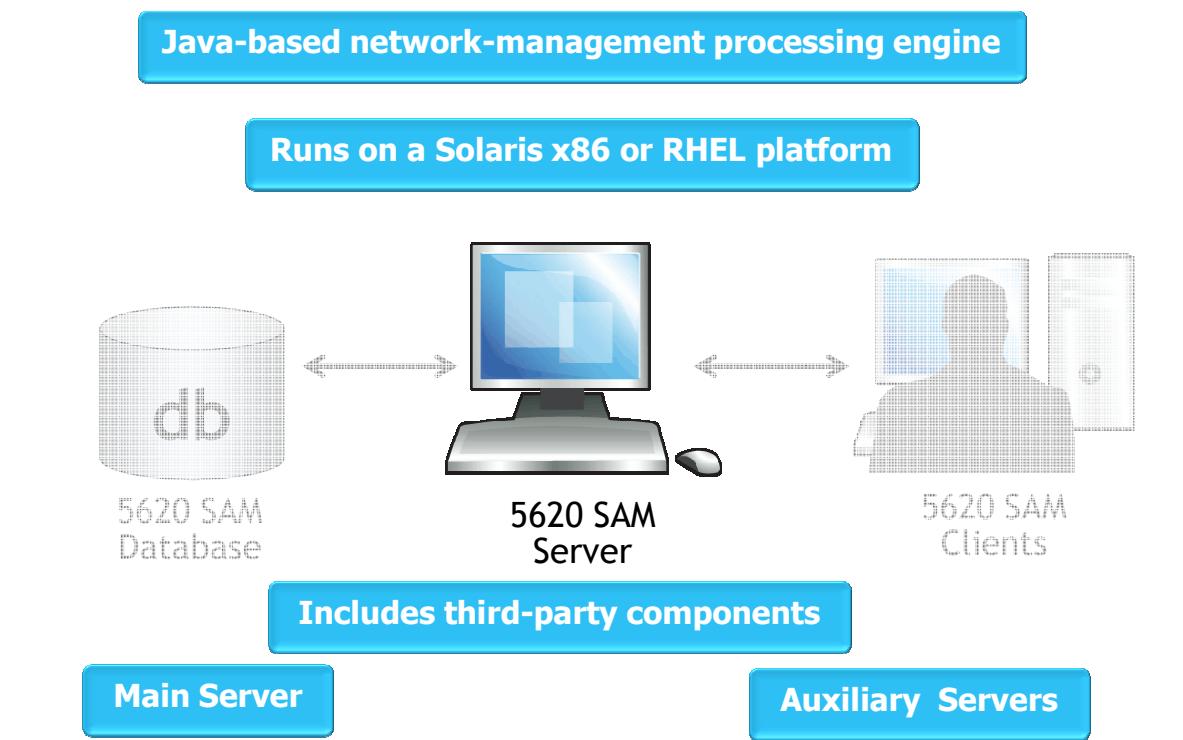
1.1 -5620 SAM Main Components Overview



The three main components of 5620 SAM are:

- 5620 SAM Server
- 5620 SAM Database
- 5620 SAM Clients

1.1.1 SAM Server

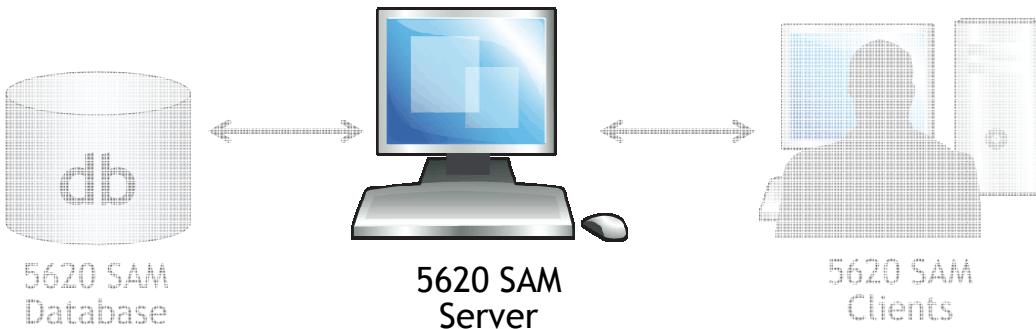


The 5620 SAM Server is a Java-based network-management processing engine that runs on a Solaris x86 or RHEL (Red Hat Enterprise Linux) platform. A 5620 SAM server includes third-party components such as an application server, JMS (Java Message Service) server, web server, protocol stack set, and database adapter. Server functions can be concentrated on one physical platform, called a main server. Some server functions can be distributed across multiple dedicated stations called auxiliary servers.

1.1.1.1 SAM Server Virtualization

Virtualized server

Supported using VMware vSphere and RHEL KVM hypervisors

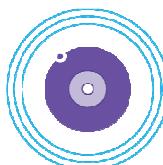


Reduced OPEX

Generic solutions for redundancy and backup/restore

The 5620 SAM virtualized server deployment enables NMS or IT administrators to easily integrate the 5620 SAM into their standardized environment, reducing OPEX and taking advantage of generic solutions for redundancy and backup/restore. Leverage existing IT technologies such as SAN capabilities for data replication, as well as hypervisor monitoring and maintenance tools.

The 5620 SAM supports service virtualization options using VMware vSphere and Linux KVM hypervisors. All other forms of virtualization or virtualization products are not supported.

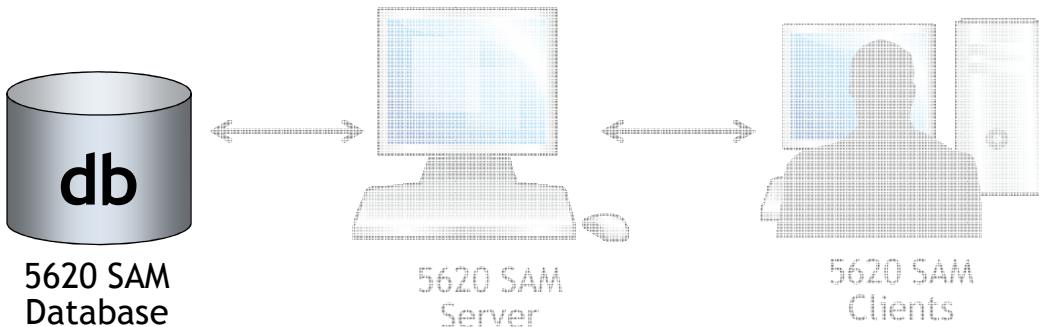


Technical Reference

For more information on virtualization requirements see **Alcatel-Lucent 5620 SAM Planning Guide**. **Hardware platform and resource requirements using Virtualization** section.

1.1.2 5620 SAM Database

Customized Oracle relational database



Can run on the same station as the main server or on a different station

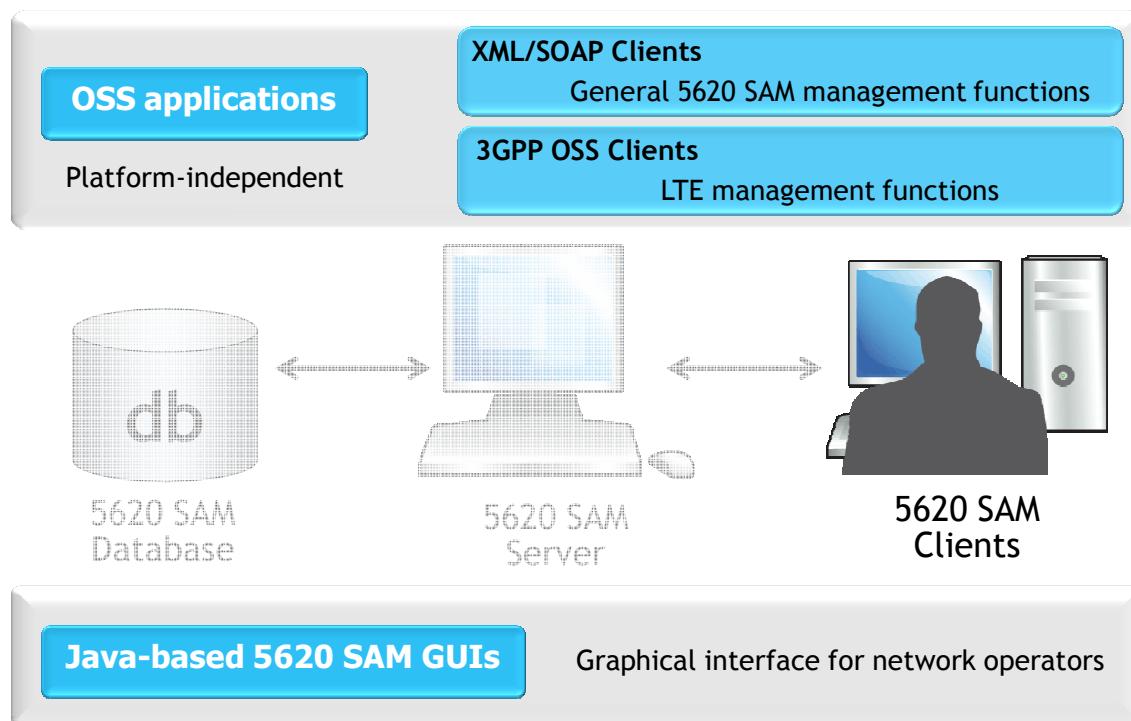
2 · 1 · 11
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The 5620 SAM Database is a customized Oracle relational database that provides persistent storage for the network data. The database usually can run on the same station as a 5620 SAM main server, or on a different station.

1.1.3 5620 SAM Database



2 · 1 · 12
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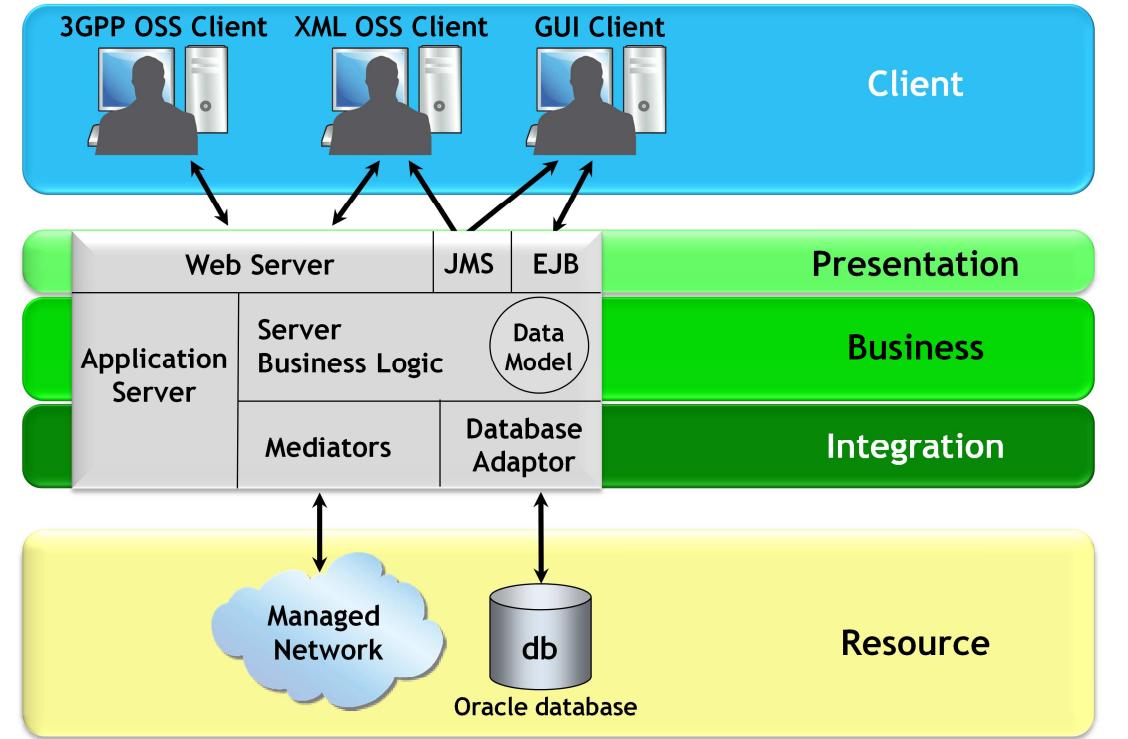
The 5620 SAM Clients are Java-based 5620 SAM GUIs or OSS applications. The 5620 SAM GUI clients provide a graphical interface for network operators. See the 5620 SAM Planning Guide relevant to the SAM release and revision for a list of the supported GUI client platforms.

Platform-independent OSS clients can run on any platform, because they exchange platform-neutral messages with a 5620 SAM main server. The 5620 SAM supports the following kinds of OSS clients:

- XML/SOAP (Extensible Markup Language/Simple Object Access Protocol) clients that use the XML OSS interface to perform general 5620 SAM management functions.
- 3GPP OSS (3rd Generation Partnership Project) clients that use either a CORBA-based or XML/SOAP-based 3GPP OSS interface to perform LTE management functions.

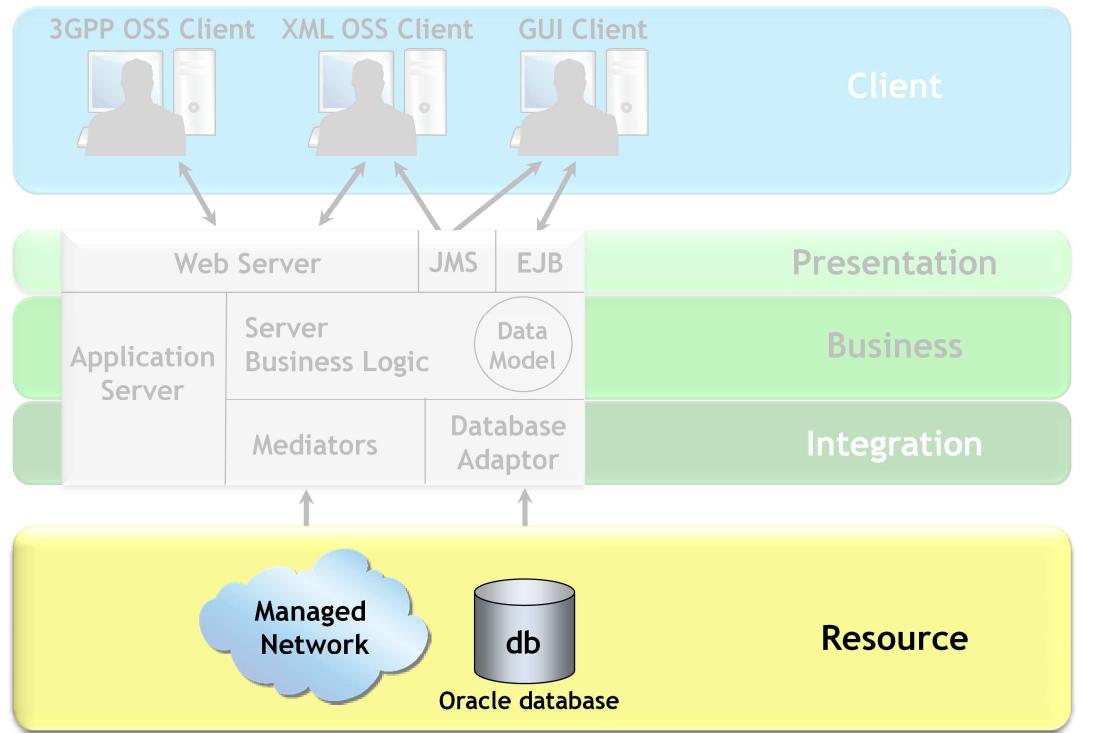
2 Multi Tier Model

2.1 Multi-tier Model Overview



The main 5620 SAM components are layered in a multi-tier framework. These components are built using Alcatel-Lucent and non-Alcatel-Lucent software.

2.1.1 Resource Layer



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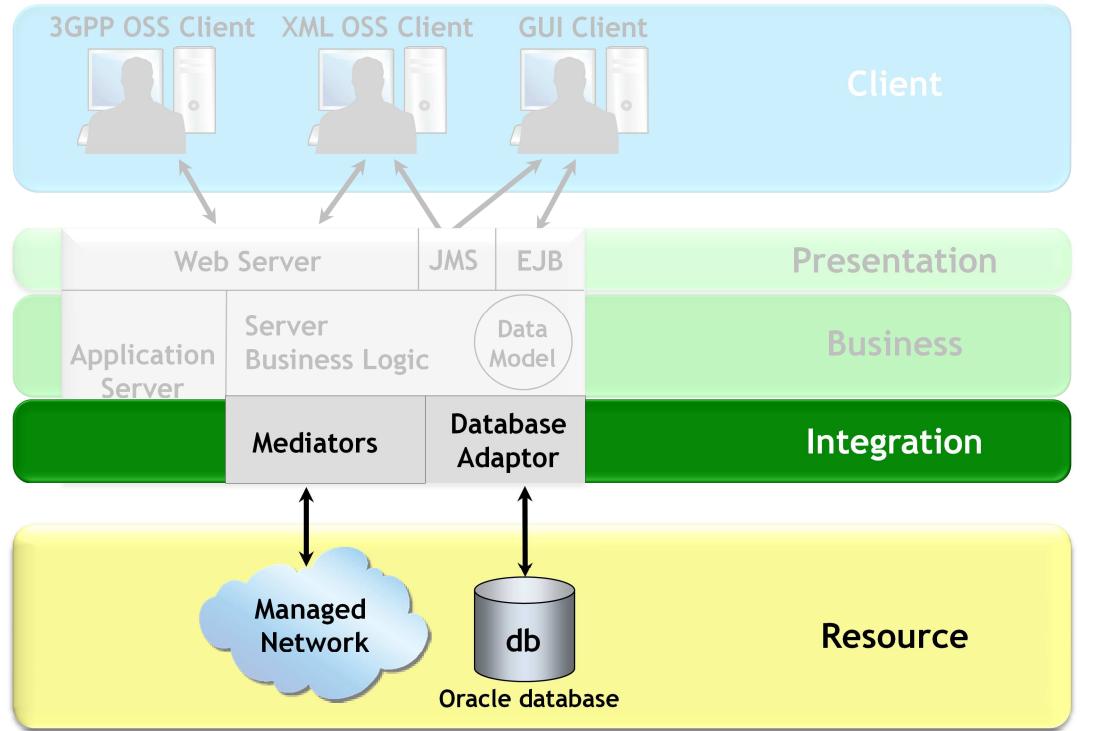
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The Resource layer describes external or legacy systems, which include the network of managed devices and the Oracle database. Managed devices are the resources that can be configured, controlled, and monitored by the 5620 SAM. The Oracle database contains the persistent storage for the data model, with data such as device configurations and statistics, as well as information about customer connections and services.

2.1.2 Integration Layer



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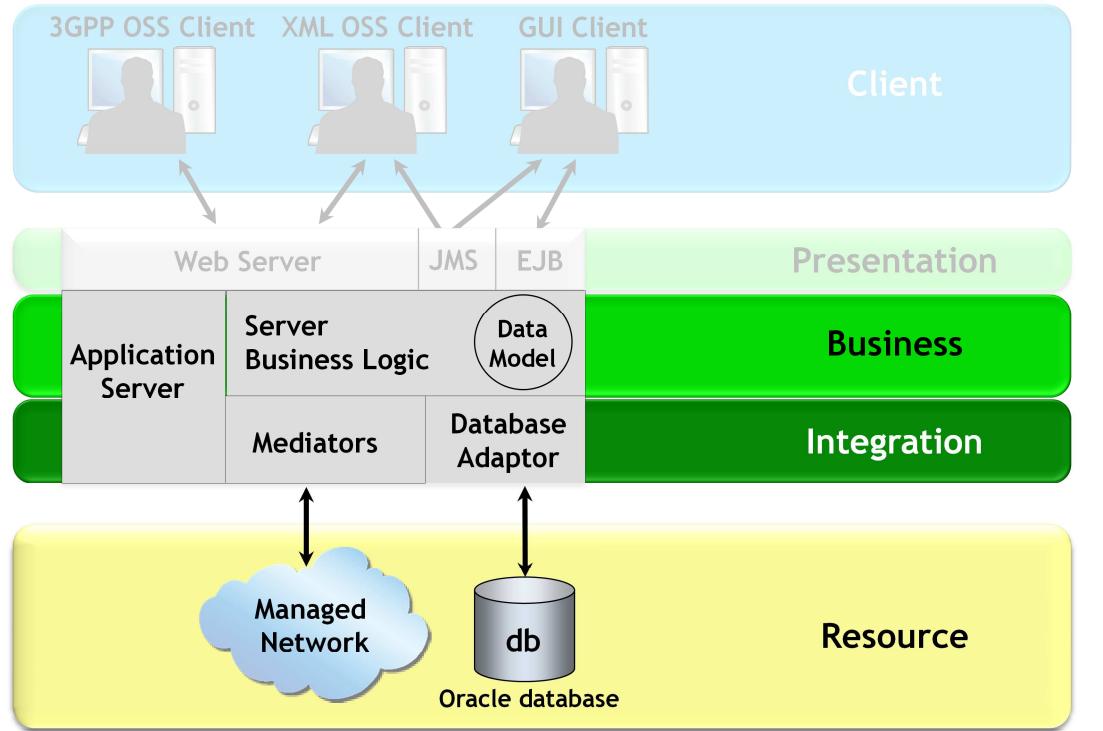
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The Integration layer buffers resource-layer entities from the business layer. This layer contains the mediators, which communicate with equipment in the managed network, and the database adapter. The mediator components translate messages from the business layer into the SNMP (Simple Network Management Protocol), FTP (File Transfer Protocol), secure FTP, and CLI messages that are sent to the managed network. Messages that are received from the network are processed by the mediator components and passed to the business layer. The integration layer also contains the database adapter that decouples the Oracle database from the business logic. The database adapter code translates business logic requests into JDBC (Java Database Connectivity) commands, and translates JDBC responses into the Java business model.

2.1.3 Business Layer



2 · 1 · 17

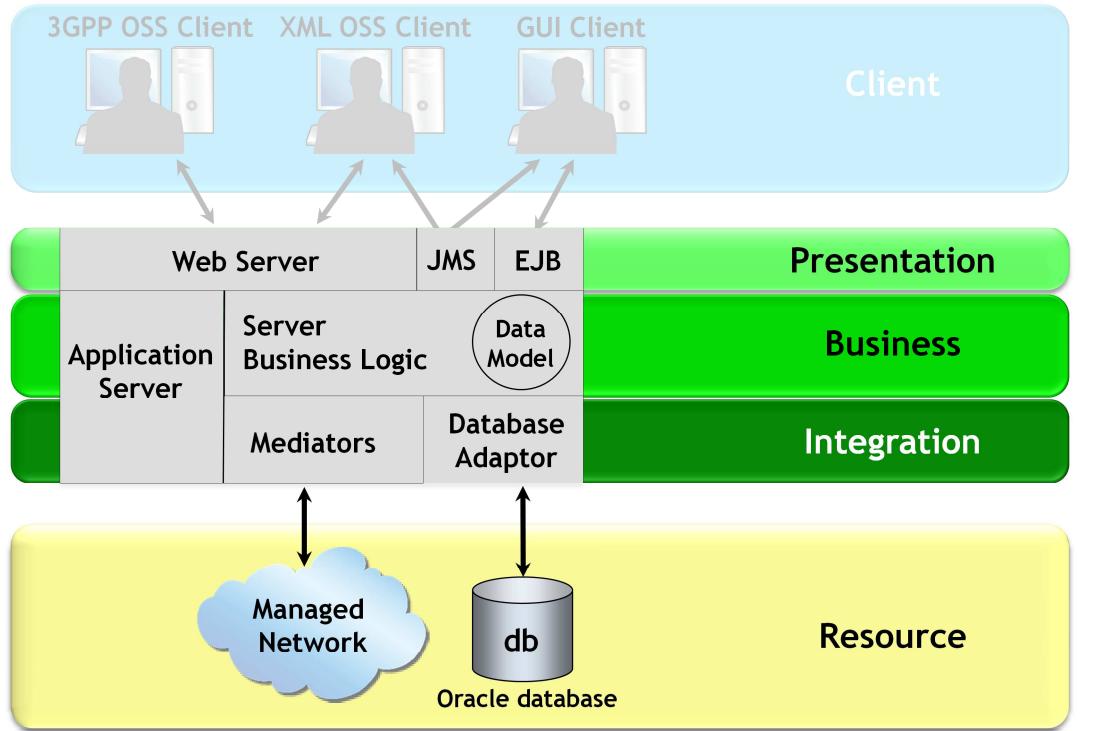
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The **Business layer** contains the Java application logic and data model that drive 5620 SAM functions. The business logic processes input from client requests, managed network traps, and internal server events, and performs the appropriate actions on the managed network, clients, and internal data model. The server data model maintains information about network objects and their relationships. To support the business layer, an application server provides J2EE (Java 2 Platform Enterprise Edition) services.

2.1.4 Presentation Layer



2 · 1 · 18

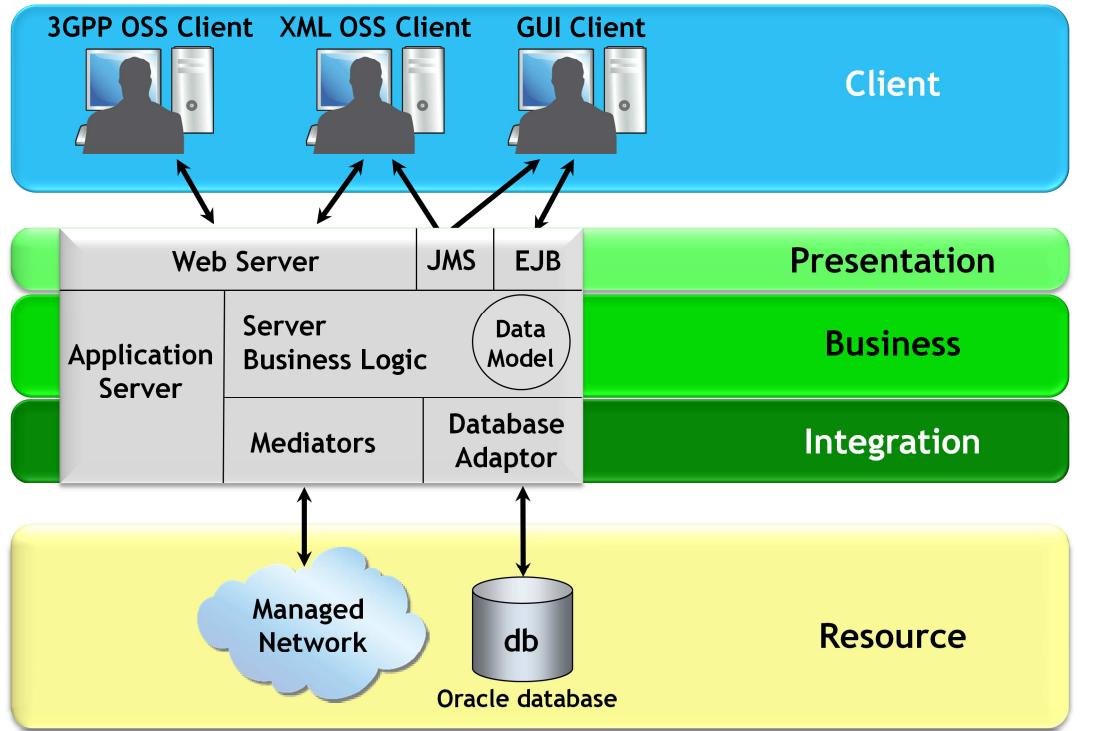
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The **Presentation layer** buffers the application logic from the client layer. This layer contains several components. The web server receives SOAP/XML messages from OSS clients and passes them to the business layer. The third-party application server handles EJB (Enterprise Java Beans) method invocations received from the 5620 SAM GUI clients on the network and returns the responses generated by the business-layer logic. The application server also forwards JMS asynchronous messages from the business layer to 5620 SAM clients for event notification.

2.1.5 Client Layer



2 · 1 · 19

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The Client layer comprises the OSS, web-based, and 5620 SAM GUI clients. The 5620 SAM GUI client installation package contains a Java virtual machine and Java GUI components that send EJB remote method invocations to the 5620 SAM server. The OSS clients send XML/SOAP or CORBA messages to the 5620 SAM server. The web-based clients use JNLP (Java Network Launching Protocol) for portal interfaces.

2.2 Server Data Model

The server data model is the framework for service-level functions. It represents the physical and logical elements of the network, such as equipment, customers, services, accounting data, and network performance statistics. The model also describes the relationships between these entities, thereby allowing users to perform network operations at the service level or customer level. This ability to associate entities in the network provides enhanced service capabilities and is crucial for managing complex multiservice networks.

The data model representation of the current state of the managed network is stored in the Oracle database. Changes to the model that are triggered from the network include event and data notifications such as network device fault traps or state changes. These updates are applied to the model, stored in the database, and reported to the client interfaces. Changes to the model that are triggered from clients include configuration or provisioning changes. These changes are applied to the model, stored in the database, and deployed to the network when appropriate.



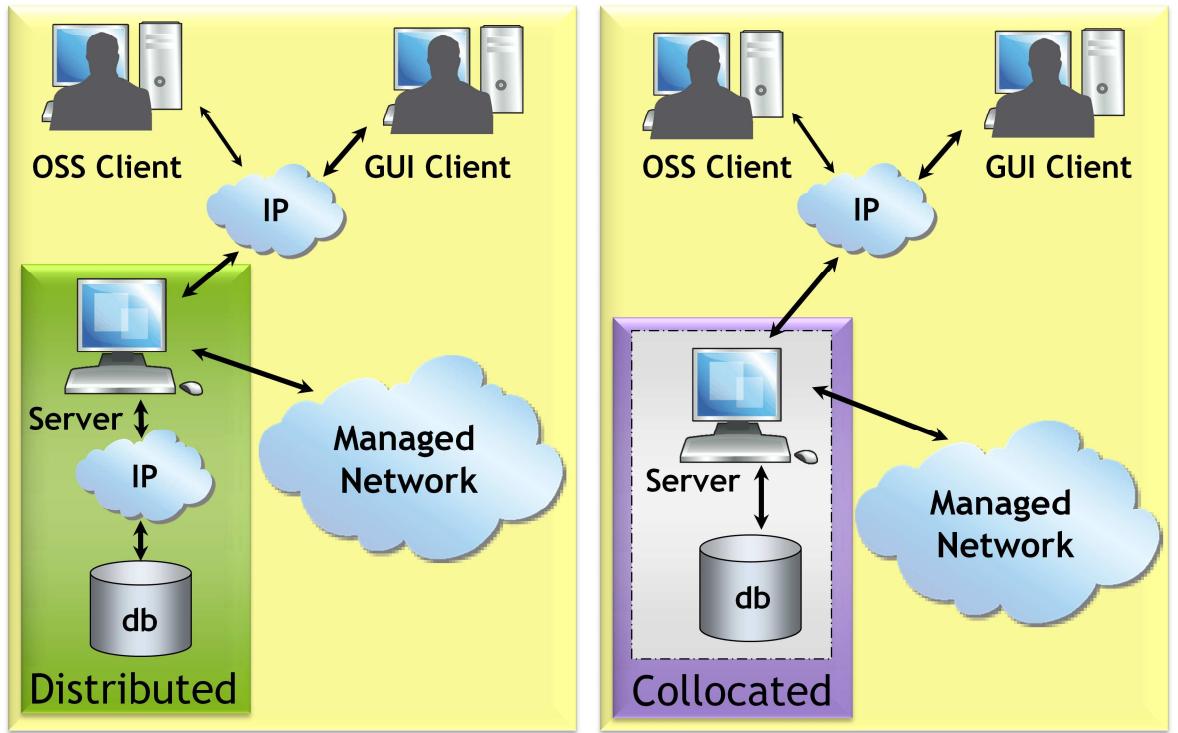
What tier 5620 SAM five-layer multi-tier model describes external systems, such include the network of managed devices and the Oracle database?

- a. Client Layer
- b. Presentation Layer
- c. Business Layer
- d. Resource Layer

Choose the correct answer for the knowledge verification question above.

3 -5620 SAM Main Components Architecture

3.1 5620 SAM Server and Database Pair Configurations



2 · 1 · 23
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A 5620 SAM server and database pair can be installed:

- in a collocated configuration, where the 5620 SAM Server and the 5620 SAM Database are installed on the same supported, Solaris based workstation
- in a distributed configuration, where the 5620 SAM server and 5620 SAM database are installed on different workstations

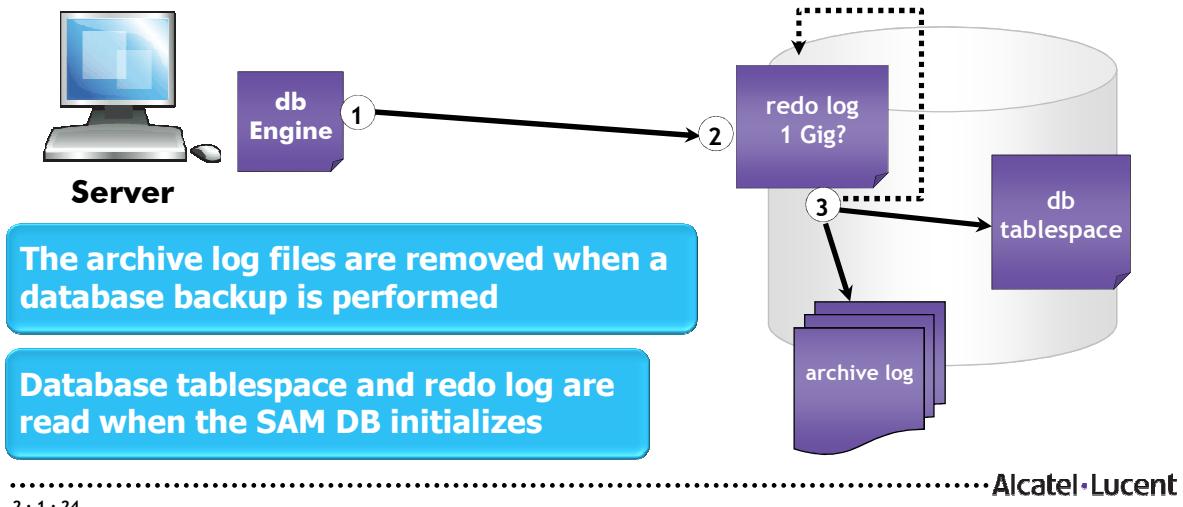


Technical Reference

*For more information on the minimum hardware requirements see **Alcatel-Lucent 5620 SAM Planning Guide**.*

3.2 Database Writes Overview

- ① database write sent to primary database from active server
- ② directed to redo log becoming persistent record
- ③ full redo log, sent to database tablespace and archive log



When an event is to be written to the SAM database, the Server Business Logic directs the message to the database engine.

The database engine sends the message to the *redo log* file, making it a persistent entry of the SAM database. Once 1 GByte of information has been written to the redo log, the contents of that file are written to the database tablespace. At the same time, the log file is written to the archive log file and a new redo log file is automatically opened; only one redo log file exists at any time. Archive log files are stored until a database backup is performed at which time they are removed.

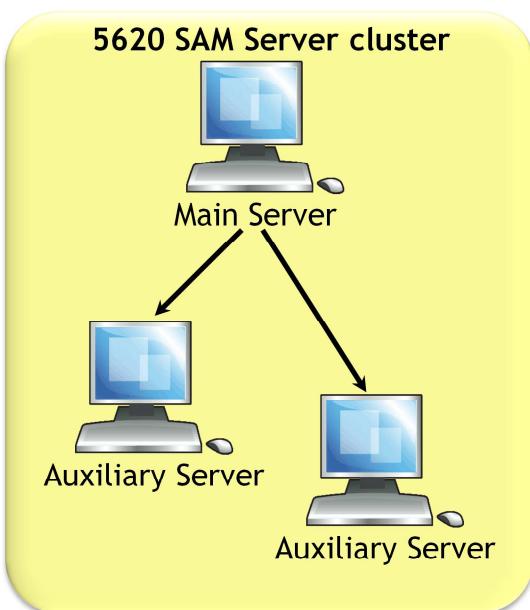
When the SAM database initializes, the database tablespace is read as well as the redo log file. Therefore, if the SAM database is power cycled, there is no loss of data.

Importance of Persistence

Persistence specifies whether the system will preserve system indexes when a save command is executed. During a subsequent boot, the index file is read along with the configuration file. Indexes uniquely identify objects in the router (ie Interfaces, LSPs) and are used by SNMP tools (ie MIB Browsers, the SAM database) to identify these objects. When configuration changes on a device are saved, a corresponding index file (.ndx extension) is created.

During a reboot of the network element, the configuration file is compared to the index file to ensure that indexes remain the same, thus establishing a persistent index. This reduces the number of resynchronizations between the 5620 SAM and the affected network element.

3.3 Distributed Server Architecture



5620 SAM server functions can be distributed across multiple physical platforms

A main server and one or more auxiliary servers define a 5620 SAM server cluster

Main Server

Processes SAM Client requests

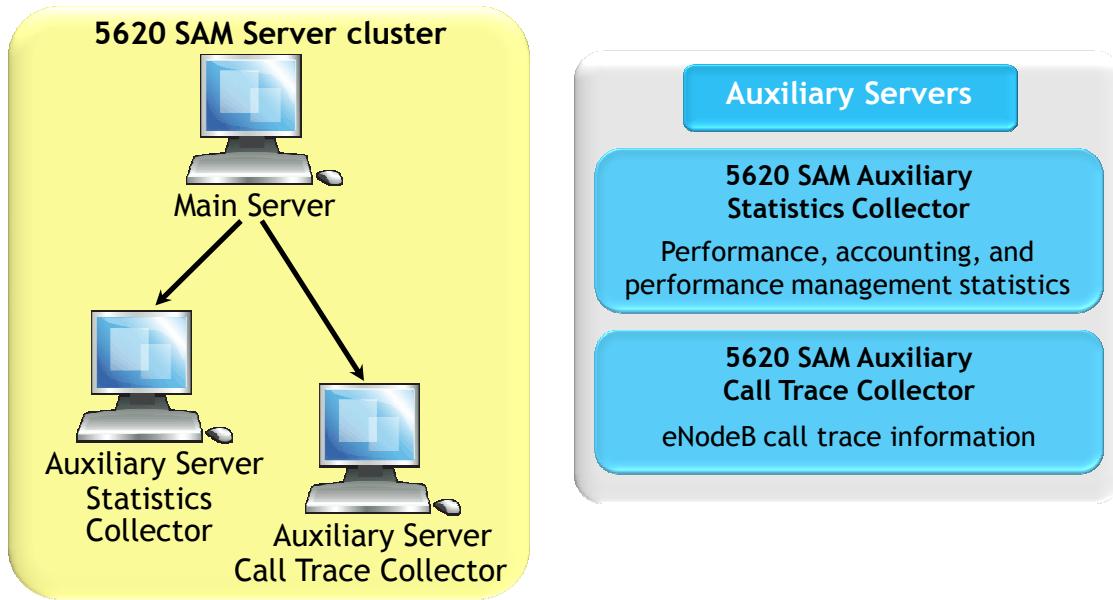
Monitors the NEs

Directs the operation and distributes processing load to Auxiliary Servers

The 5620 SAM server functions can be distributed across multiple physical platforms in a standalone or redundant 5620 SAM configuration. A main server and one or more auxiliary servers in the same 5620 SAM domain define a 5620 SAM server cluster.

The main server in a cluster is the network-management engine that processes GUI and OSS client requests and monitors the network elements. It also directs the operation of the auxiliary servers and distributes the processing load to them as required. This distributed framework is invisible to 5620 SAM GUI and OSS clients, because they interact only with the main server.

3.3.1 Auxiliary Servers



Main and auxiliary servers store information in the same 5620 SAM DB

In a 5620 SAM system that is deployed using distributed server architecture, two types of Auxiliary Servers can be configured: 5620 SAM Auxiliary Statistics Collector and 5620 SAM Auxiliary Call Trace Collector. Main and auxiliary servers store information in the same 5620 SAM database.

In customer networks where the statistics collection requirements exceed the scalability capabilities of a 5620 SAM Server, 5620 SAM Auxiliary Statistics Collector workstations can be used to reduce the burden of statistics handling from the 5620 SAM Server. This type of Auxiliary server collects and processes performance, accounting, and performance management statistics, for increased statistics collection capabilities.

Note

The 5620 SAM Auxiliary Statistics Collector workstation can only be configured in a 5620 SAM Server and Database distributed deployment.

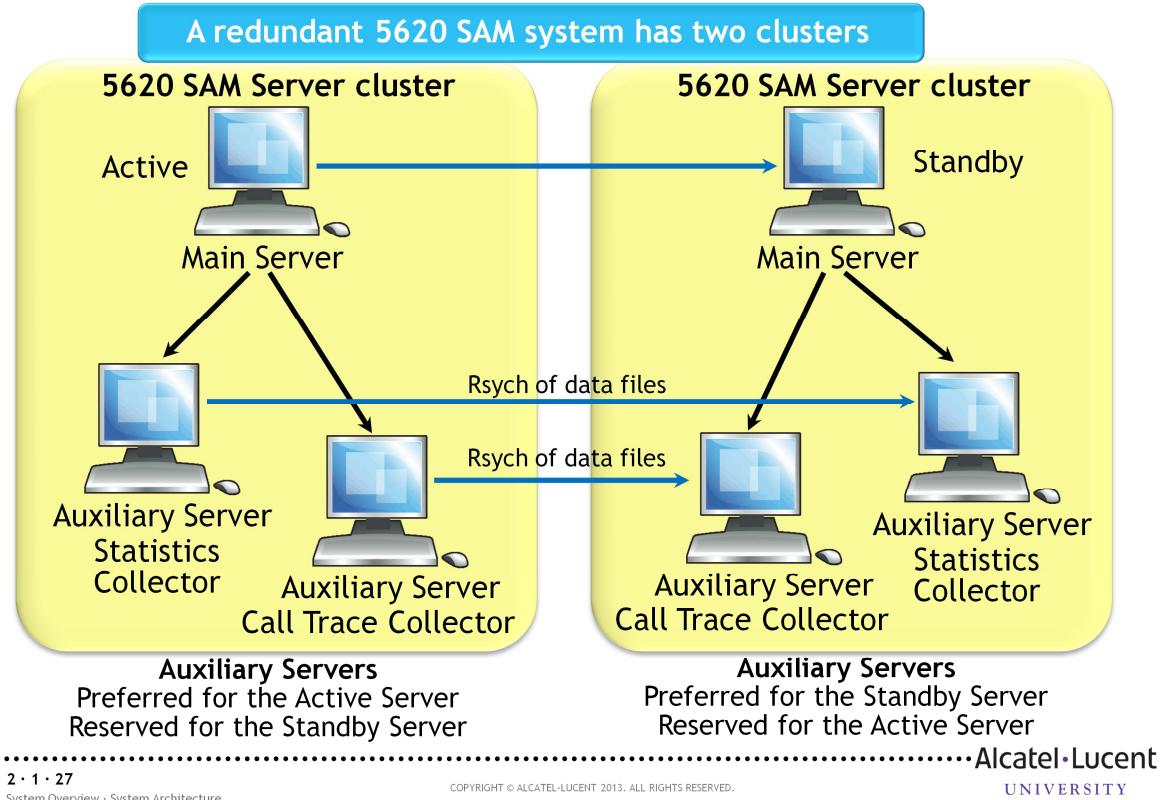
Technical Reference

See Alcatel-Lucent 5620 SAM Planning Guide for scalability details of the 5620 SAM Server and dimensioning of the 5620 SAM Auxiliary Statistics Collector workstation.

Contact your Alcatel-Lucent representative for more information on hardware planning requirements and scalability limits.

In customer networks where Call Trace information is being collected from eNodeB network elements, a 5620 SAM Auxiliary Call Trace Collector must be used. This type of 5620 SAM Auxiliary collects call trace and debug trace information from the eNodeB network elements. The 5620 SAM Auxiliary Call Trace Collector is supported with both a collocated 5620 SAM Server and 5620 SAM Database, and with a distributed 5620 SAM Server and 5620 SAM Database.

3.3.2 Redundant 5620 SAM System



A redundant 5620 SAM system has two clusters—one for each main server (active and standby).

As with other high availability components, the 5620 SAM Auxiliary Statistics Collector and the 5620 SAM Auxiliary Call Trace Collector can be configured to be redundant. The Auxiliary Call Trace Collector workstations can be installed in a redundant pair. Up to two Auxiliary Call Trace Collector redundant pairs can be installed.

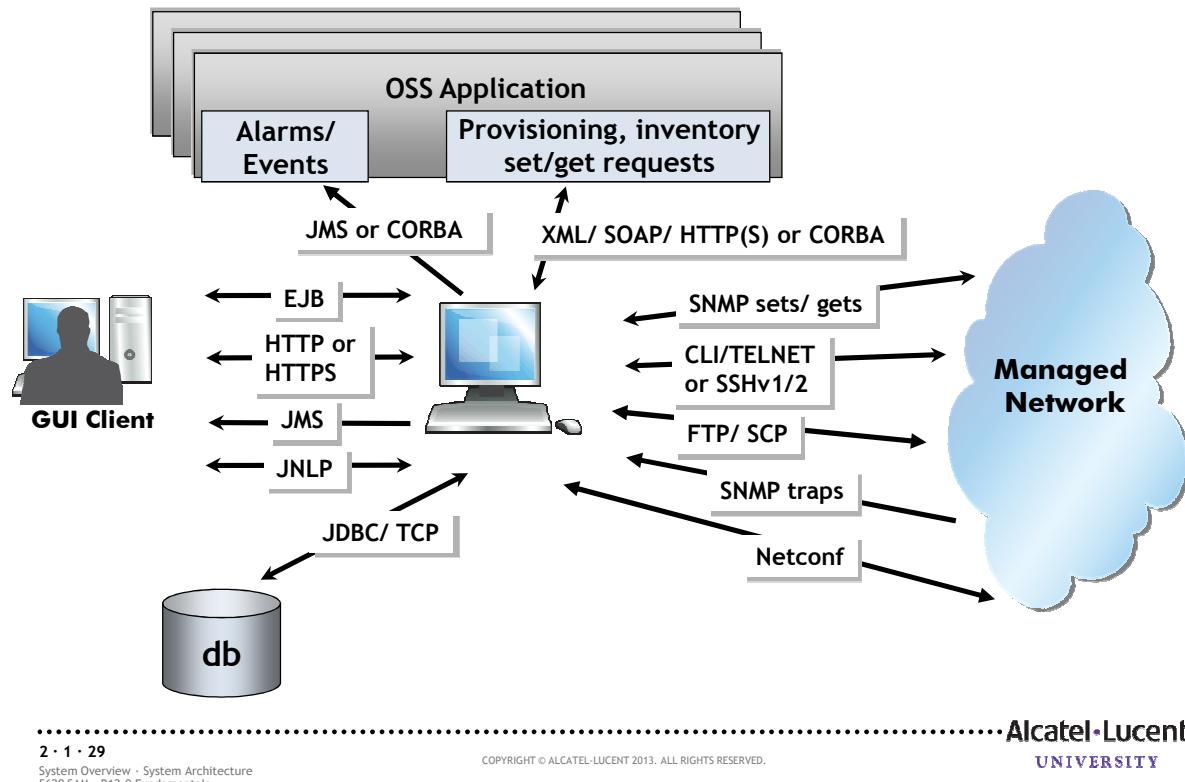
Each Auxiliary Server is configured as a preferred for the 5620 SAM Active Server and as a reserved for the 5620 SAM Standby Server. The collected information is synchronized between the Preferred and Reserved Auxiliary Servers.

Only one of the redundant Auxiliary Servers will collect information from the network elements at any given time, and information is synchronized between the Preferred and Reserved servers.

The auxiliary servers are members of only the cluster that contains the current primary main server. When the main servers change roles, for example, after a server activity switch, the auxiliary servers leave the current cluster and join the one that contains the new primary main server.

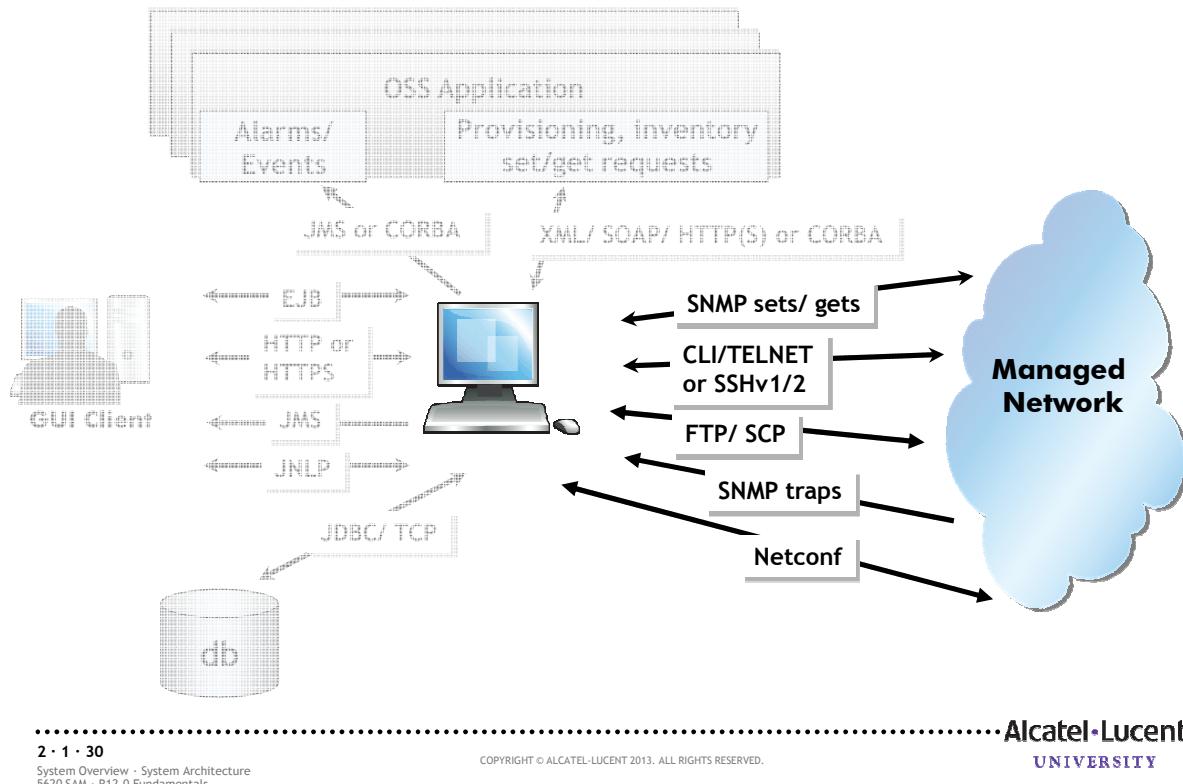
4 5620 SAM System Interfaces and Security

4.1 Interfaces



The 5620 SAM interfaces use industry-standard protocols to communicate between the server and managed network devices, the server and clients, and the server and database as shown in the figure above.

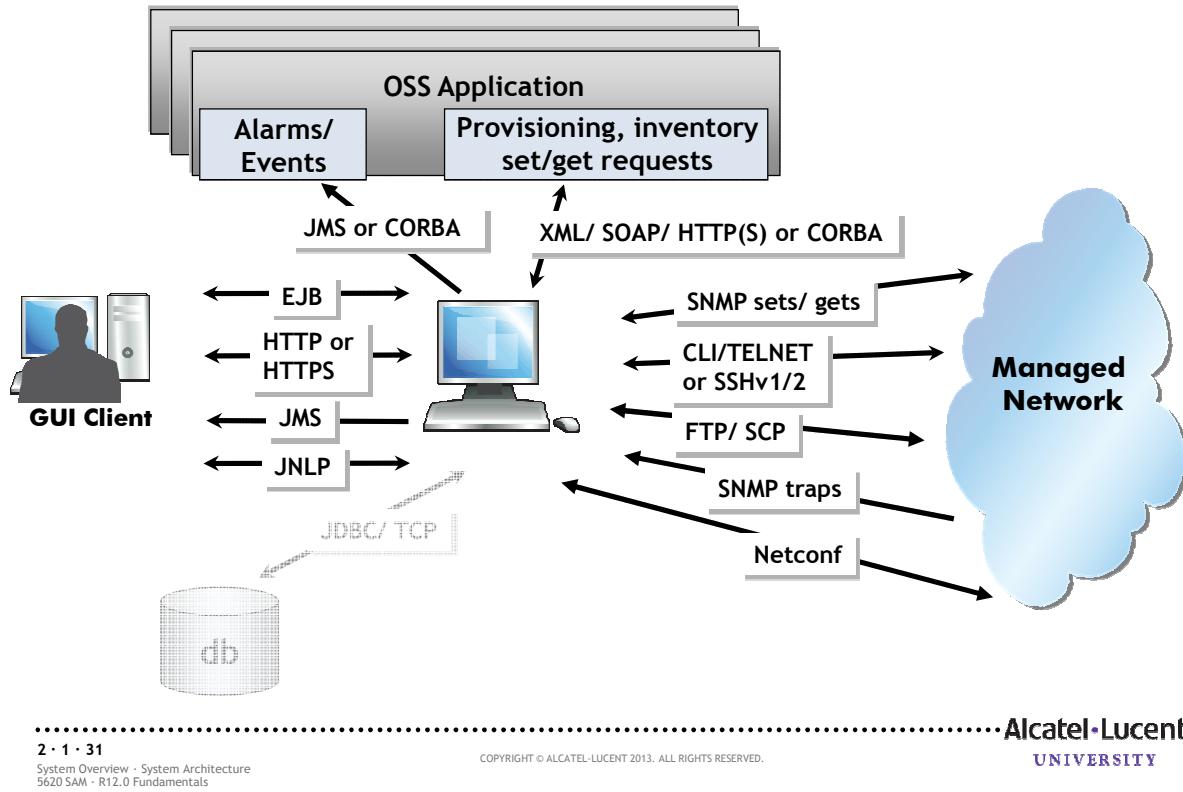
4.1.1 Server and Managed Devices



The 5620 SAM server sends messages to the managed network in the form of SNMP sets and gets, CLI commands (over Telnet or SSH), JDBC JMS messages, FTP or SCP (Secure Copy Protocol) and Netconf (Network Configuration Protocol) commands.

- SNMP is used by the server to monitor and manage network performance and find network problems by polling MIB (Management Information Base) performance data stored on the managed devices. The server also deploys configuration changes to the managed devices using SNMP. The managed devices use asynchronous SNMP messages, called traps, to notify the 5620 SAM server about device events.
- CLI is a command line interface that is accessible using Telnet or SSHv1 or v2. The commands are used to control node configurations and perform troubleshooting functions on network devices. Clients with the appropriate privileges can access the CLI by sending messages to the 5620 SAM server, which serves as an intermediary between the network devices and clients.
- FTP and SCP are application layer protocols for securely transferring files between machines. These protocols are used when the 5620 SAM backs up managed device configuration data, collects accounting statistics from the devices, and downloads software from the servers to devices.
- Network Configuration Protocol or Netconf is used to provide configuration management support for the eNodeB, and to discover and manage a 9471 WMM (Wireless Mobility Manager) with the 5620 SAM.
- JMS is a subscription service for clients that want to receive event and alarm messages about the state of the managed network.

4.1.2 Server and Clients



2 · 1 · 31

System Overview - System Architecture
5620 SAM - R12.0 Fundamentals

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Client interfaces provide access to the 5620 SAM main server and to the managed network. Clients send requests to the 5620 SAM main server to view and change data objects in the data model and to perform network operations. An XML OSS client uses XML/SOAP messages, and a 3GPP OSS client uses CORBA (Common Object Request Broker Architecture)- or XML/SOAP-based IRPs (Integration Reference Points). Each type of client can communicate over HTTP or HTTPS. A GUI client uses Java session bean invocations.

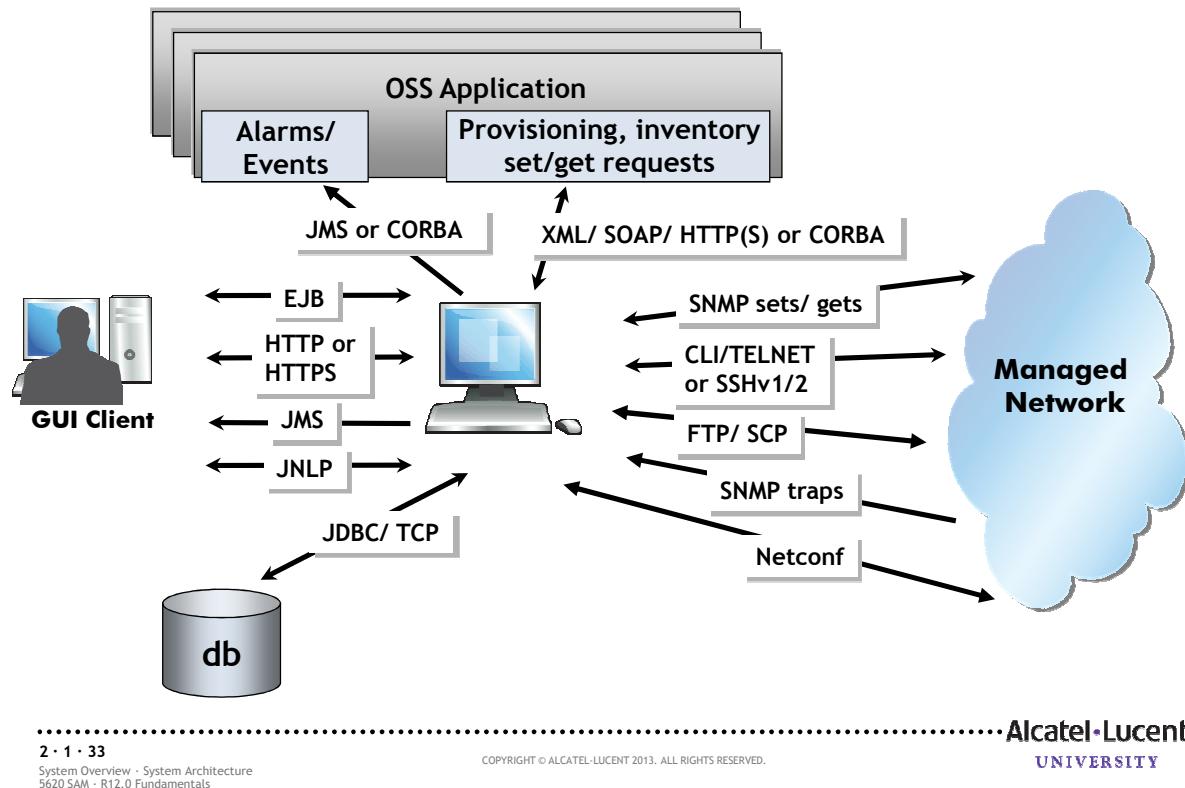
A 5620 SAM main server communicates with clients in the following ways:

- XML OSS client software developers create requests for processing by the 5620 SAM main server. Schema files provide the XML interface definitions for data objects. The schema files package related domain objects together, and describe the attributes and methods of each object. The JMS interface is also available for XML messaging. See the 5620 SAM XML OSS Interface Developer Guide for more information about the contents of the schema files and the messaging between XML OSS clients and a 5620 SAM main server.
- 3GPP OSS client software developers create CORBA or SOAP/XML requests for processing by the 5620 SAM main server. IRPs provide the interface definitions for data objects. See the 5620 SAM 3GPP OSS Interface Developer Guide for more information about the messaging between 3GPP OSS clients and a 5620 SAM main server.
- The 5620 SAM GUI clients send requests to the server EJB session beans using Java RMI (Remote Method Invocation).
- The 5620 SAM GUI auto-client update function uses HTTP or HTTPS for client software updates and file downloads.
- The 5620 SAM Supervision web portal uses HTTP or HTTPS for communication.
- The JMS and the XML publisher service run on the same physical station as a main server, but in separate JVMs. This reduces the stack size for a processing thread, and supports multiple simultaneous client connections.

4.1.2 Server and Clients [cont.]

- The 5620 SAM GUI and OSS clients use JMS channels to receive real-time network event information from the server. Clients must register a subscription or durable subscription using object messaging to set up a JMS channel. The received event types include:
 - managed network alarm notifications
 - managed network configuration changes
 - server activity-switch notifications
 - 5620 SAM database connectivity errors
- A web-based 5620 SAM GUI communicates through a web browser using JNLP (Java Network Launching Protocol)

4.1.3 Server and Database



A 5620 SAM main server communicates with a 5620 SAM database using a JDBC (Java Database Connectivity) session over TCP. JDBC is a Java API (Application Programming Interface) for interworking with SQL (Structured Query Language) relational databases.

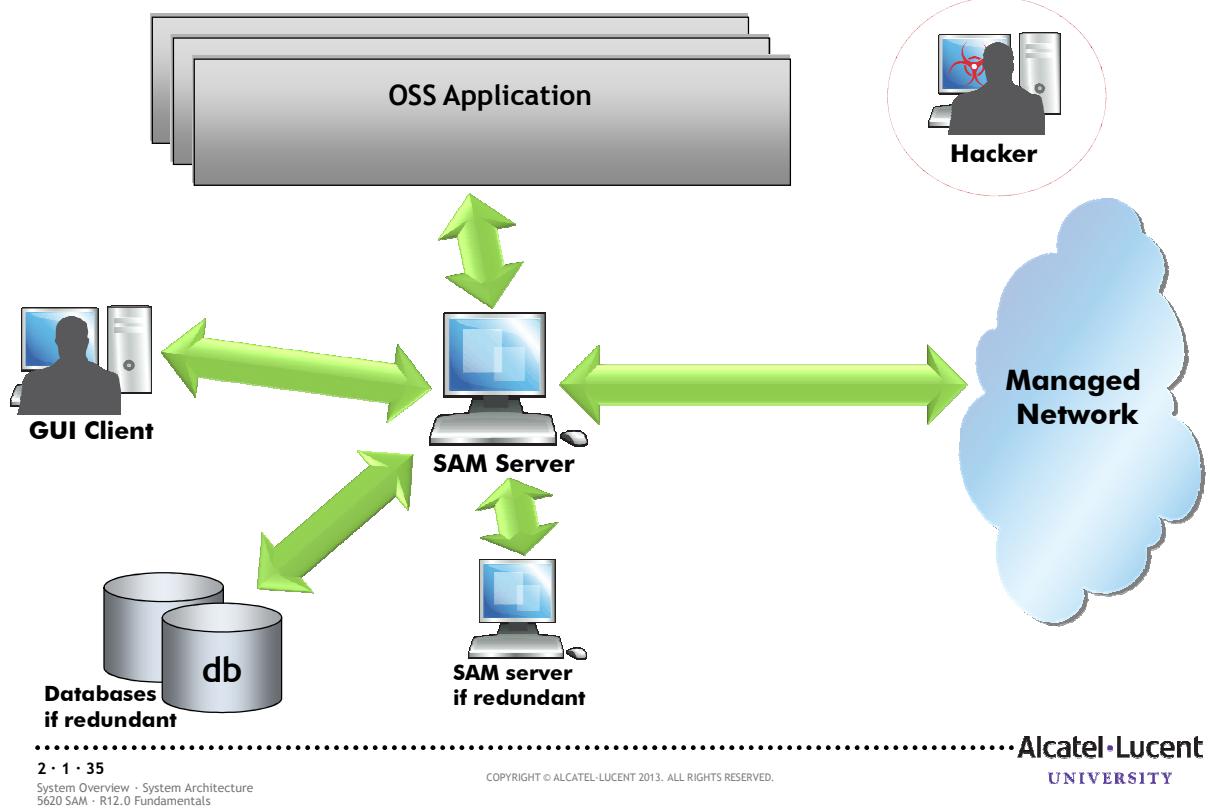
4.1.4 Main Server and Auxiliary Servers

Each 5620 SAM main server includes a mechanism for sending requests to auxiliary servers. A main-server functional area that uses this mechanism, for example, a statistics-collection scheduler, performs load balancing to equally distribute the requests among the available auxiliary servers. An auxiliary server notifies the main server after it finishes processing a request. If the main server fails to send a request or all available auxiliary servers are unresponsive to a request, the main server raises an alarm, for example, MissedStatsCollection.

5620 SAM and External Systems

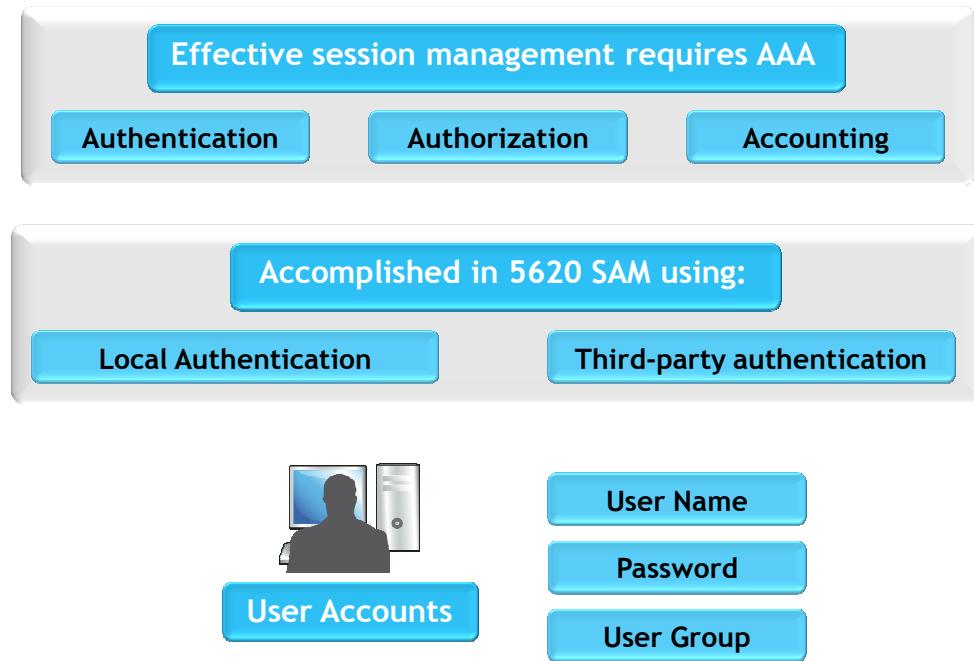
The 5620 SAM can be integrated with an external network- management system such as the 5620 NM (Network Manager). During 5620 SAM client installation, you can configure navigation from an external system for additional network-monitoring capability. See the 5620 SAM Integration Guide for more information.

4.2 Security



In a distributed system such as the 5620 SAM, security is required not only at the session management level, but also at the network transport layer, because messages sent over a network can be intercepted and forged. To begin a user session, a client must provide user identification and a password to access the 5620 SAM menus and functions. These and subsequent messages are also protected at the network transport level. The diagram above shows the 5620 SAM components and the security at the session and network transport levels.

4.2.1 Session Management



Effective session management requires authentication, authorization, and accounting (AAA) functionality:

Authentication is the verification of a user identification and password.

Authorization is the assignment of different levels of access permissions to users.

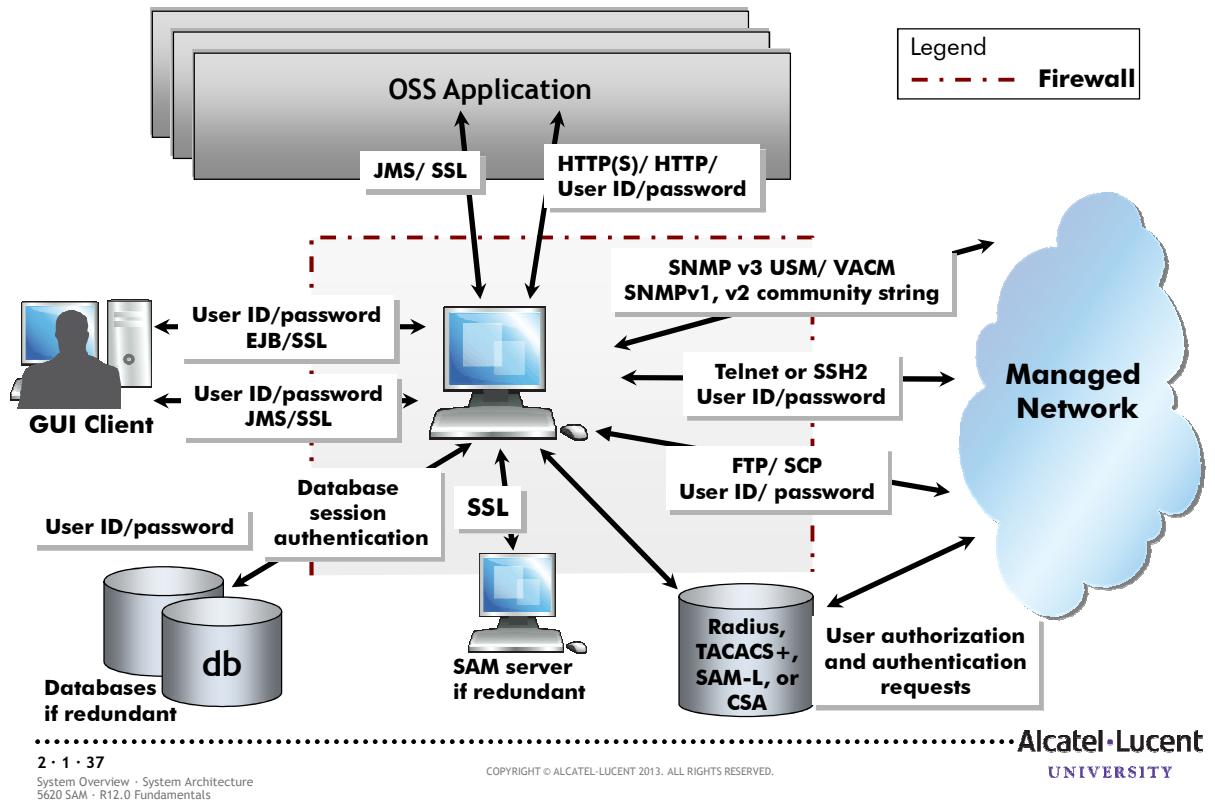
Accounting is the recording of user actions.

These three functions can be accomplished on the 5620 SAM by using the local security capability on the 5620 SAM server, or with a third-party authentication server. A combination of local and third-party mechanisms can also be used to provide backup authorization.

- Local authentication on the 5620 SAM server is provided with a local database of users and a local security scheme to verify logon attempts and assign permission levels for command execution.
- Third-party authentication servers supported are RADIUS (Remote Authentication Dial-In User Service), TACACS+ (Terminal Access Controller Access Control System), SAM-L (Security Assertion Markup Language), and CSA (Convergent Security Asset). These products run on their own platforms, with their own user lists and administration process.

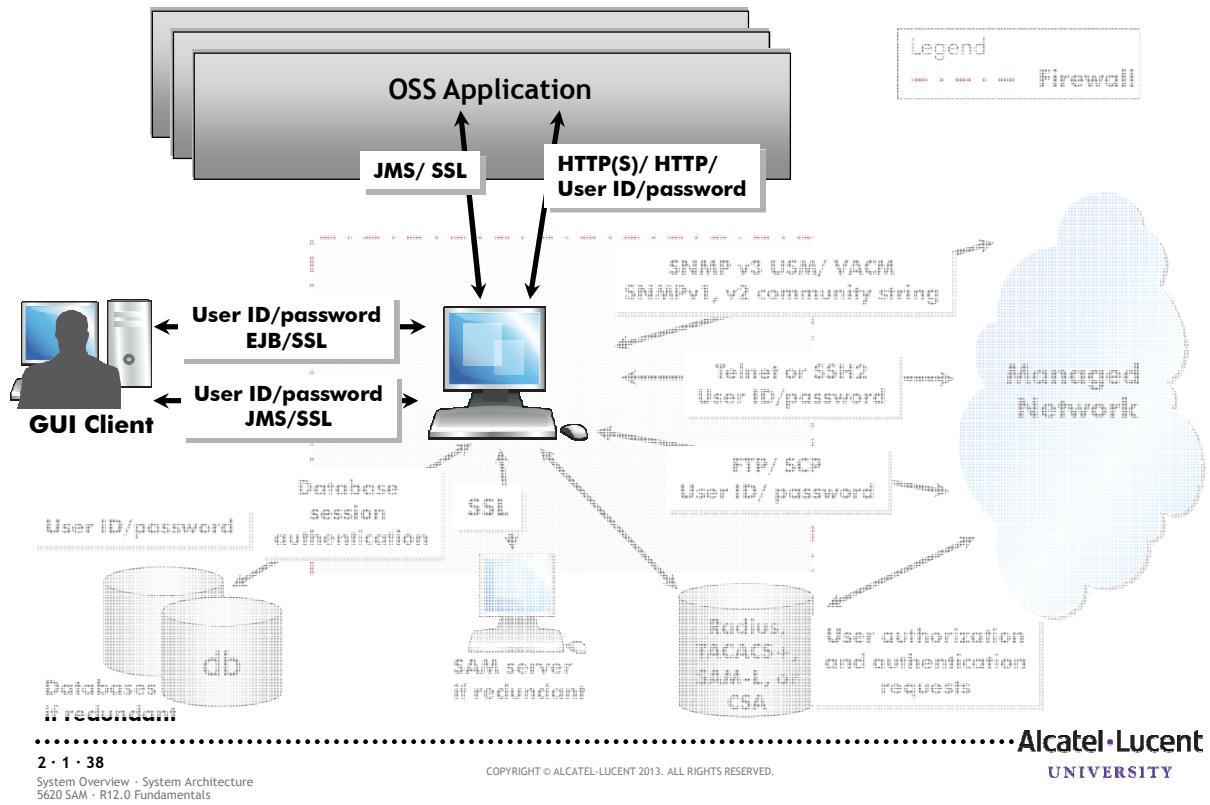
User accounts are created on the 5620 SAM and consist of a user name and password, plus an associated user group. User groups are used to assign and control authorization levels for each user, and to control the extent of access to such areas as subscribers, services, or faults. The system administrator can also limit the type of user access per managed device; for example, allowing FTP access but denying console, telnet, or SNMP access.

4.3 Session and Network Transport Levels Security



The diagram above shows the 5620 SAM components and the security at the session and network transport levels.

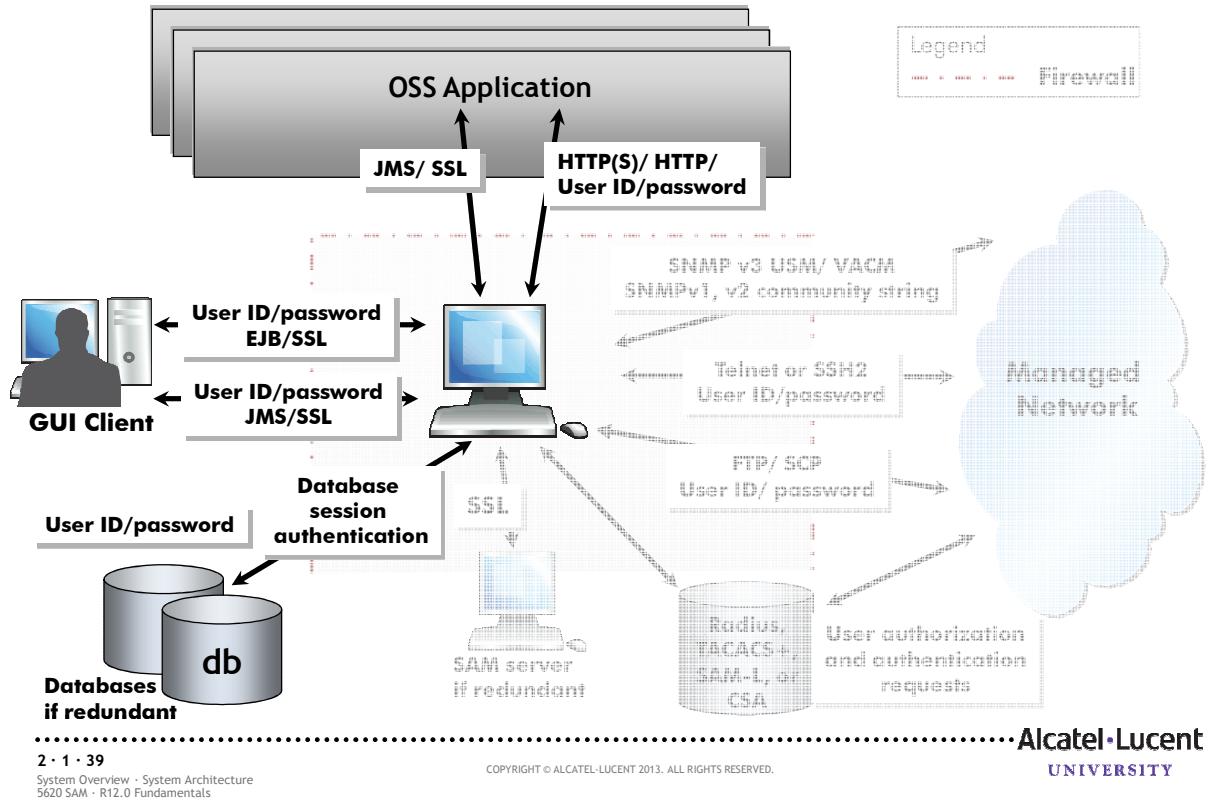
4.3.1 Server and Clients



All client session types have username and password protection. Network communication between the 5620 SAM server and clients is carried out using XML/SOAP, EJB, or JMS messages.

- The 5620 SAM client GUI EJB sessions are protected by the username and password for the session using an SSL (Secure Socket Layer) connection.
- Each OSS client message is individually authenticated using cached information from an authorization server. The OSS clients have two options for message security. When HTTPS is used to transport XML/SOAP messages, messages are protected by an SSL connection. The less-secure HTTP can also be used.
- Both OSS and GUI clients use JMS, which is protected by SSL.
- In a redundant configuration, the secondary 5620 SAM server acts as a client of the primary server, which is protected by SSL.

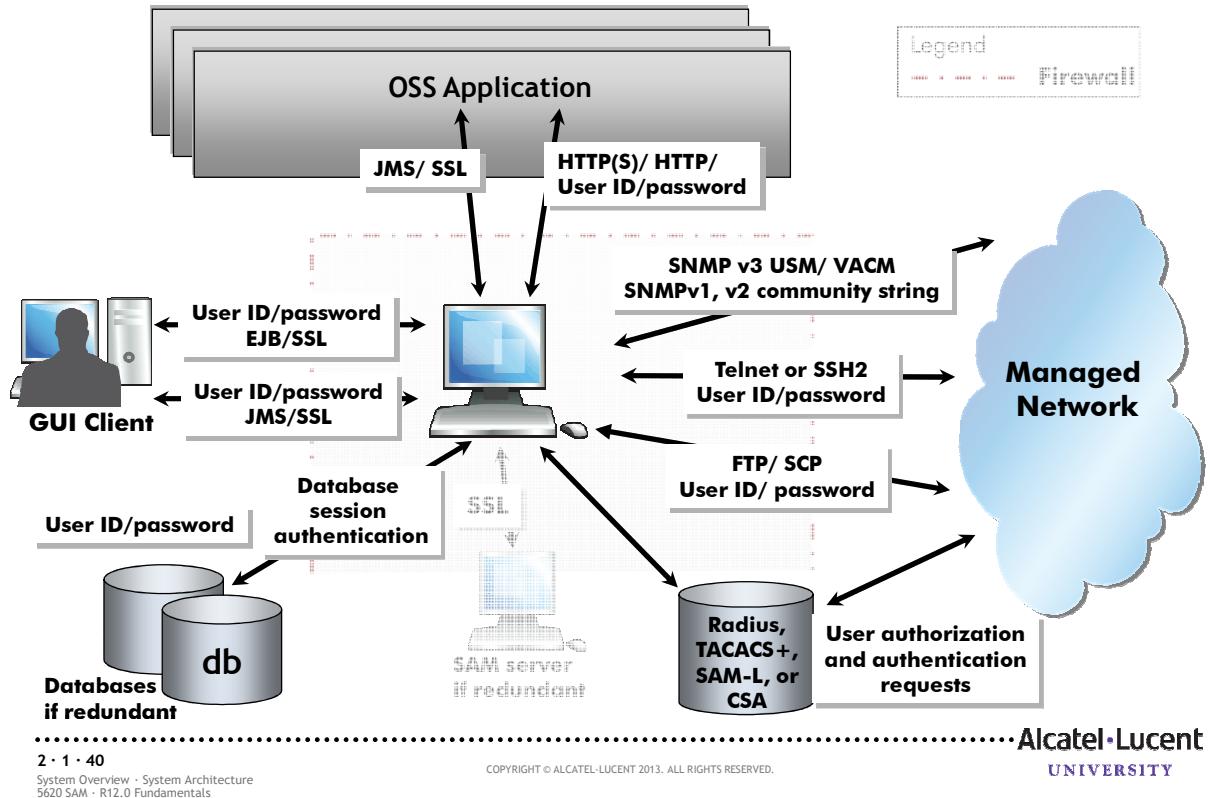
4.3.2 Database Sessions



The database is accessible through a connection from the server, which is protected by a user ID and password. After each database update in response to a client request, the client activity log records the request details, which include the name of the associated 5620 SAM user.

Secure communication between the 5620 SAM server and the underlying Oracle database is available through IP-address validation. During installation or upgrade of the 5620 SAM server, the administrator can enable authentication.

4.3.3 Server and Managed Devices

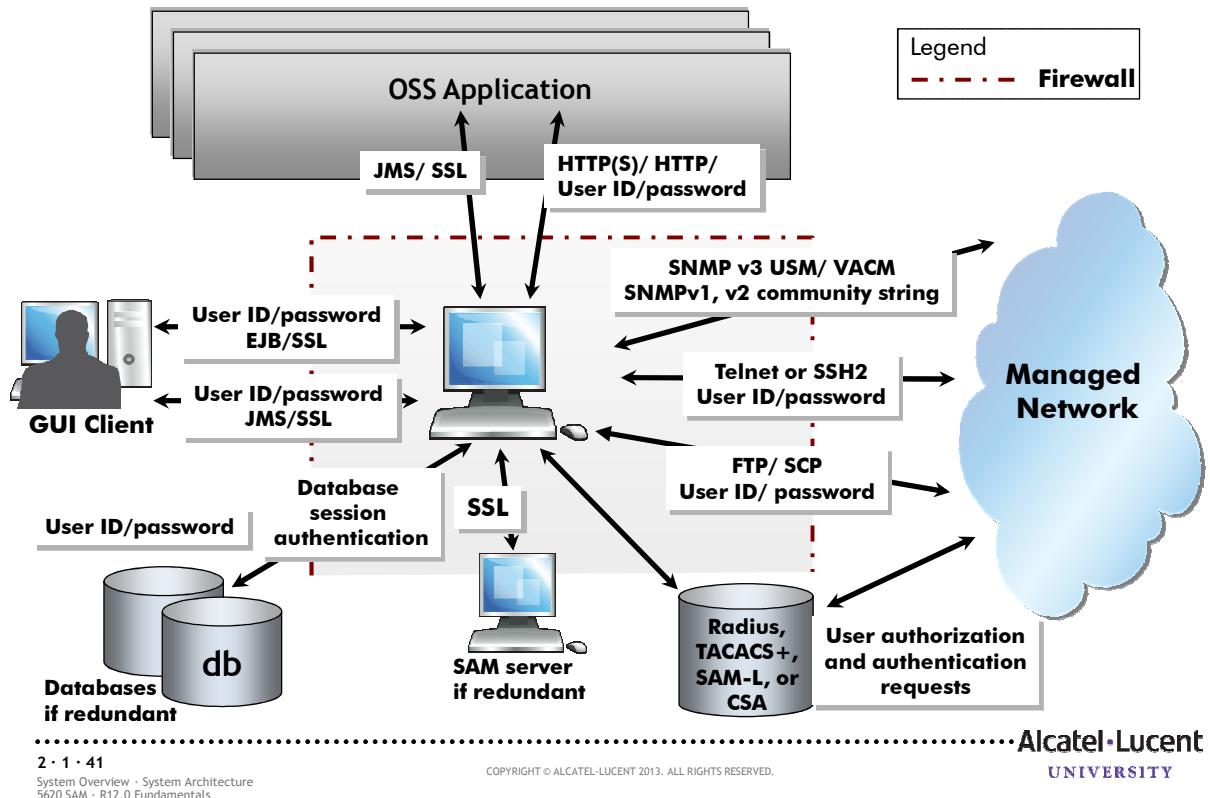


The 5620 SAM server runs CLI, FTP, SFTP and SCP commands on managed devices. Messages from devices are in SNMP, CLI (over Telnet or SSHv1 or v2), or FTP or SCP format. When SNMPv3 is used, then Secure Hash algorithm (SHA) or Message Digest 5 (MD5) authentication values are placed in messages and checked against a key shared by server and device to prevent tampering. Security is provided by SSH in CLI commands.

SNMPv3 message authentication and authorization is handled by USM (User State Migration) and VACM (View-based Access Cluster Manager) mechanisms to define users and user authorization permissions. Older SNMP versions are authenticated with community string identifiers. Every SNMP message is individually authenticated.

Clients can also run these commands by issuing requests to the server. The authentication, authorization, and accounting function required for security is achieved using the local security databases on managed devices, or with a third-party authentication service such as RADIUS or TACACS+.

4.3.4 Firewall Support



The 5620 SAM supports firewalls on all the server interfaces, that is, between the server and clients, and between the server and managed network. See the **5620 SAM Planning Guide** for firewall and reserved port information.



Interfaces

What type of messages does the 5620 SAM server uses to monitor and manage network performance and find network problems by polling MIB performance data stored on the managed devices?

- a. JMS
- b. SNMP traps
- c. XML
- d. FTP

Choose the correct answer for the knowledge verification question above.



How to do it

Instructor DEMO how to view information about the installed 5620 SAM system configuration including:

- whether redundancy is enabled in the 5620 SAM management domain
- the IP addresses, host names, and statuses of the 5620 SAM main servers
- the IP addresses, host names, database names, and instance names of the 5620 SAM databases



Lab Exercises

View 5620 SAM Installed System Configuration



Time allowed:

2 · 1 · 43

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Your instructor may perform the above mentioned demonstrations using the 5620 SAM GUI.

In addition, your instructor will point out the appropriate lab module containing the above mentioned hands-on lab exercises, and will indicate the time allowed to perform these hands-on exercises.

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1. The Business Layer of the 5620 SAM five-layer multi-tier model is in charge of physical and logical representation of the elements of the network, such as equipment, subscribers, customers, services, accounting data, and network performance statistics. True or False?
 - a. True
 - b. False

2. The 5620 SAM server uses JMS messages to monitor and manage network performance and find network problems by polling MIB performance data stored on the managed devices. True or False?
 - a. True
 - b. False

3. The 5620 SAM Java GUI and 5620 SAM-O OSS clients use JMS to receive real-time network event and alarm information from the SAM server. True or False?
 - a. True
 - b. False

Answers



1. The Business Layer of the 5620 SAM five-layer multi-tier model is in charge of physical and logical representation of the elements of the network, such as equipment, subscribers, customers, services, accounting data, and network performance statistics. True or False?
 - a. **True ✓**
 - b. **False**

2. The 5620 SAM server uses JMS messages to monitor and manage network performance and find network problems by polling MIB performance data stored on the managed devices. True or False?
 - a. **True**
 - b. **False ✓**

3. The 5620 SAM Java GUI and 5620 SAM-O OSS clients use JMS to receive real-time network event and alarm information from the SAM server. True or False?
 - a. **True ✓**
 - b. **False**



This module covered:

- Components of the 5620 SAM management system
- The layered multi-tier model of 5620 SAM components
- The available 5620 SAM Server and Database Pair Configurations
- The distributed server architecture across auxiliary servers
- The interfaces between each of the SAM components
- Security measures of the 5620 SAM



End of module
System Architecture

2 · 1 · 48
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Section 2
System Overview

Module 2 Launch the SAM GUI Client

TOS36033_V4.0-SG-R12.0-Ed1 Module 2.2 Edition 2

5620 SAM
R12.0 Fundamentals
TOS36033_V4.0-SG Edition 1

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1.0	2011-04-20	GARCIA LOZANO, René	TOS36033_V1.0 – SAM 9.0 (R1 update)
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2.0	2012-03-30	LOLLIERIC, Pascal	TOS36033_V2.0 – SAM 10.0 (R1 update)
2.1	2012-08-18	GARCIA LOZANO, René	TOS36033_V2.1 – SAM 10.0 (R1 vILT conversion)
2.2	2012-10-08	LOLLIERIC, Pascal	TOS36033_V2.2 – SAM 10.0 (R5 update)
2.3	2012-10-30	GARCIA LOZANO, René	TOS36033_V2.3 – SAM 10.0 (MyPLE and WBT)
3.0	2013-07-19	GARCIA LOZANO, René	TOS36033_V3.0 – SAM 11.0 (Update)



Upon completion of this module, you should be able to:

- Describe the process to launch the 5620 SAM GUI Client using:
 - a desktop icon
 - a web browser
 - CLI
- Identify the indicators displayed when secure communication between the 5620 SAM server and 5620 SAM clients (OSS and UI) is enabled using SSL
- Identify an auto-detection of GUI client's release mismatch with the server's release and describe the characteristics of an automatic GUI Client Update

2 · 2 · 3

System Overview · Launch the SAM GUI Client
5620 SAM · R12.0 Fundamentals

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	Page
1 Launching the 5620 SAM GUI Client	7
1.1 Launching the 5620 SAM GUI Client Overview	8
1.2 Using a Desktop Icon	9
1.3 Using a Web Browser	10
1.3.1 Using a Web Browser – SSL enabled	11
1.4 Using CLI	12
1.5 SAM Login Window	13
1.6 SSL Enabled Indicators	14
1.7 Client Software Update	15

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1 Launching the 5620 SAM GUI Client

1.1 Launching the 5620 SAM GUI Client Overview

Provides access to the 5620 SAM main server and to the managed network



5620 SAM GUI Client

GUI Client launch

Desktop Icon

Web Browser

CLI

Supported on Unix and Microsoft Windows platforms

A valid 5620 SAM user account is required to start a GUI client session

2 · 2 · 8

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The 5620 SAM GUI clients provide a graphical interface for network operators. The SAM GUI Client is a Java-based interface that provides access to the 5620 SAM main server and to the managed network. The GUI Client send requests to the 5620 SAM main server to view and change data objects in the data model and to perform network operations.

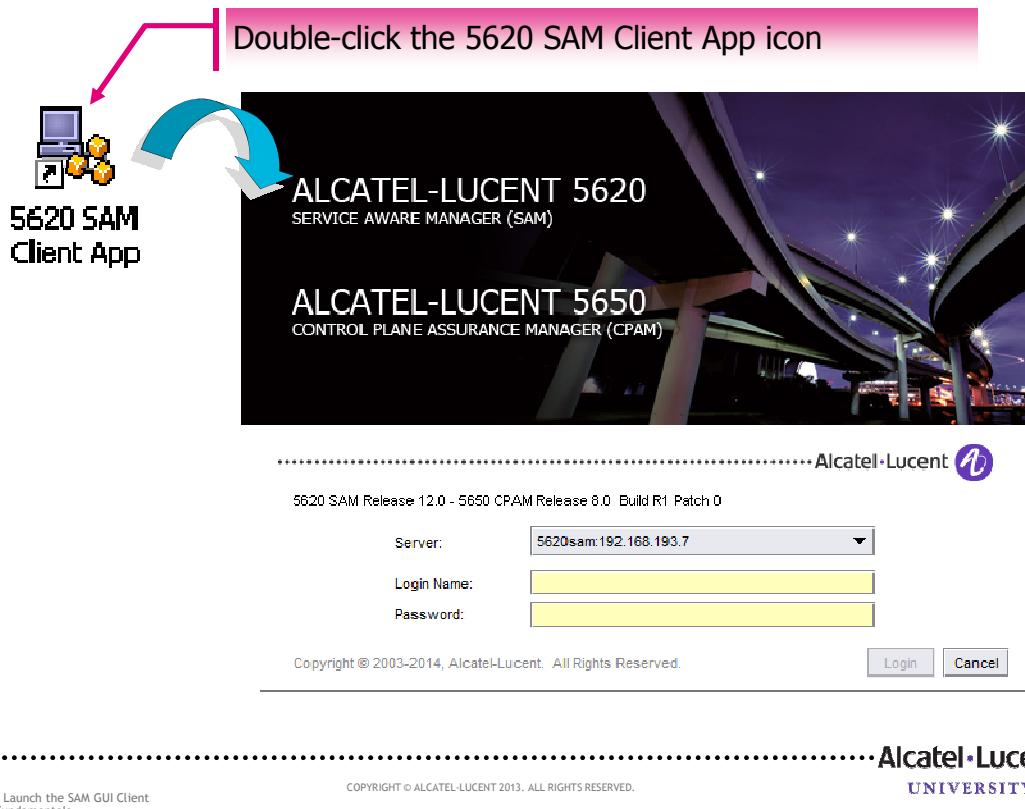
The 5620 SAM GUI client operation is supported on Unix and Microsoft Windows platforms.

The 5620 SAM GUI client can be launched:

- using a desktop shortcut icon created during the client software installation
- using a web browser
- or, using a command-line interface (CLI) from a Solaris machine

A valid 5620 SAM user account is required to start a 5620 SAM GUI client session.

1.2 Using a Desktop Icon



2 · 2 · 9
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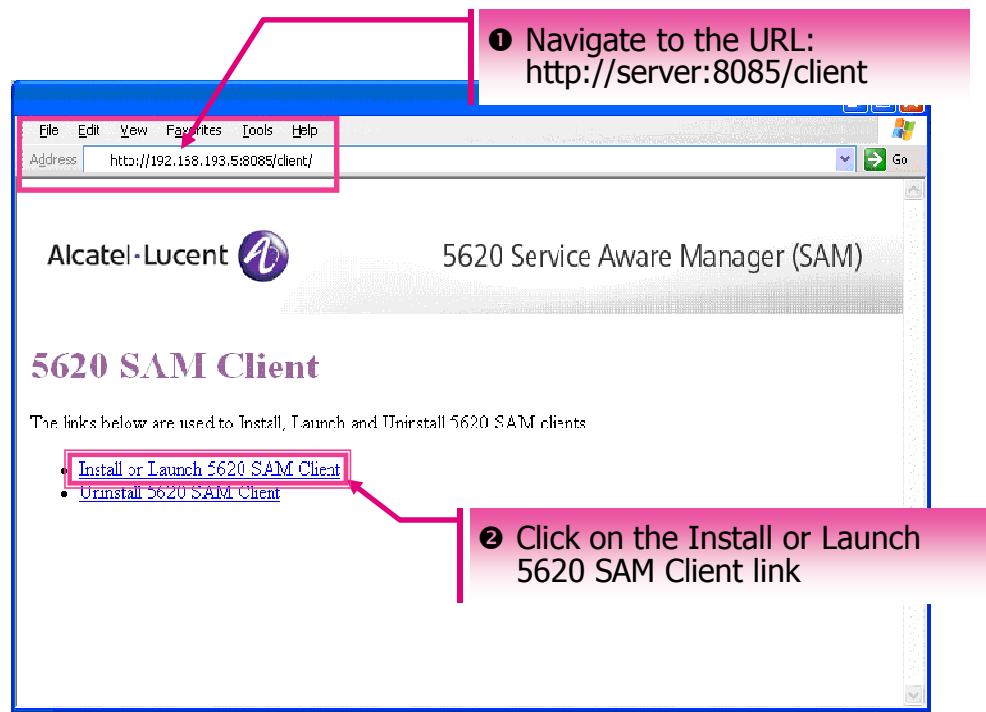
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To start the 5620 SAM client GUI using a desktop icon:

1. Double-click on the shortcut icon that was created on your desktop when the software was installed. The 5620 SAM login window appears.
2. Enter the appropriate **Login Name** and **Password**, and click on the **Login** button.

The 5620 SAM client GUI opens.

1.3 Using a Web Browser



2 · 2 · 10
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To start the 5620 SAM client GUI using a web browser:

1. Open the web browser on the 5620 SAM main server and Navigate to the following URL:
<http://server:8085/client>
where **server** is the IP address or **hostname** of the 5620 SAM main server

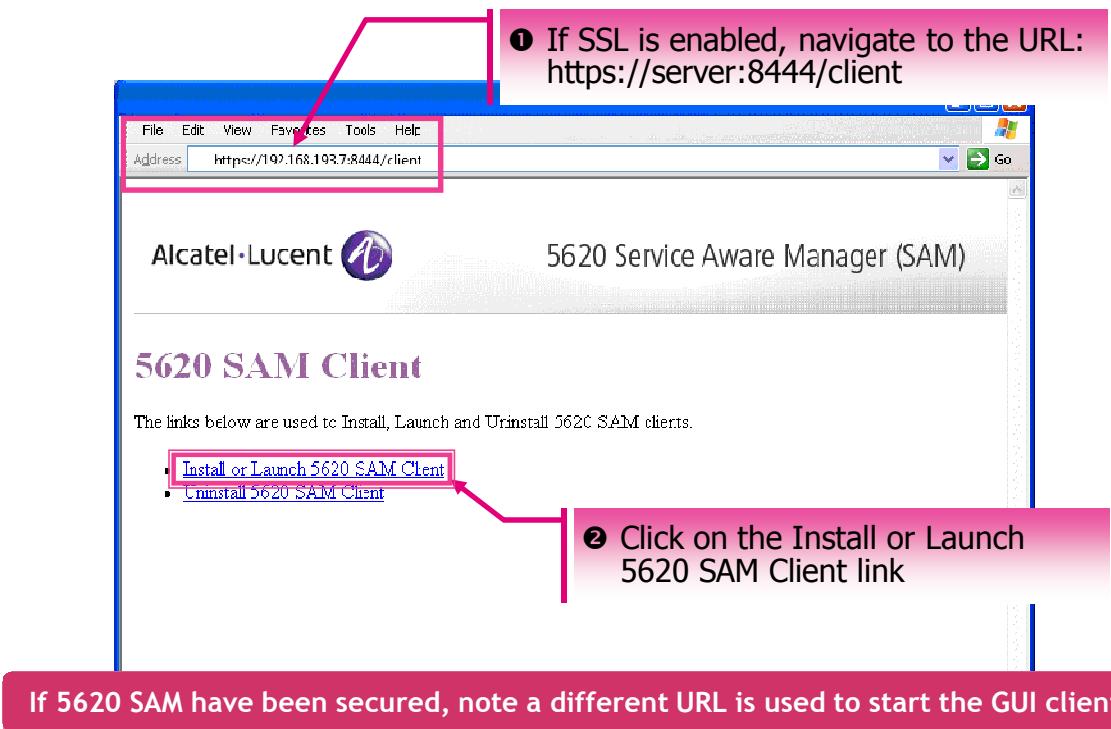
The web browser opens the 5620 SAM Client welcome page shown in the figure above.

2. Click on the **Install or Launch 5620 SAM Client** link.

If you did not use a web browser to install the client, a form opens and prompts you for the client installation location. Use the form to specify the client installation directory, for example, C:\5620sam\client.

The 5620 SAM login window appears.

1.3.1 Using a Web Browser – SSL enabled



2 · 2 · 11
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5620 SAM communications between the 5620 SAM server and 5620 SAM clients can be secured using Secure Sockets Layer (SSL) encryption.

If SSL is enabled, to start the 5620 SAM client GUI using a web browser:

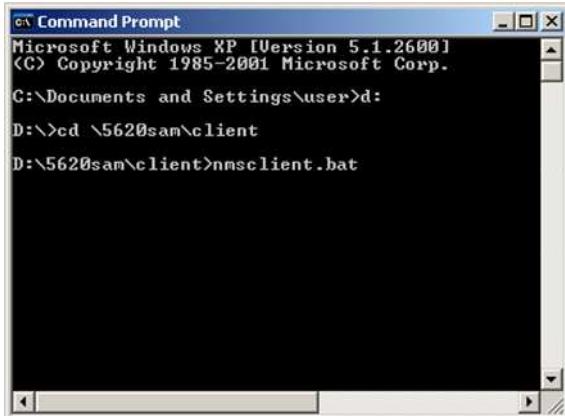
1. Open the web browser on the 5620 SAM main server and Navigate to the following URL:
<https://server:8444/client>
where **server** is the IP address or hostname of the 5620 SAM main server, and 8444 is the port when SSL is enabled.

Once the web browser displays the 5620 SAM Client welcome page, follow the previously described instructions to launch the GUI.

1.4 Using CLI

CLI allows operators to specify one or more client startup options

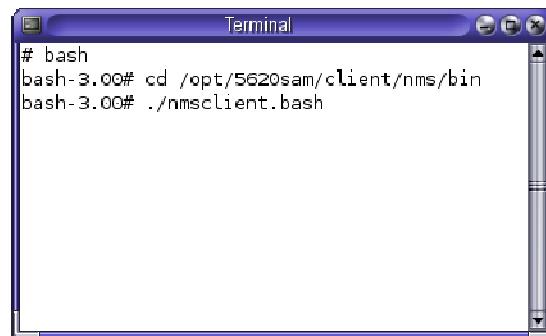
Windows



```
Microsoft Windows XP [Version 5.1.2600]
(C) Copyright 1985-2001 Microsoft Corp.

C:\Documents and Settings\user>d:
D:>cd \5620sam\client
D:\5620sam\client>nmsclient.bat
```

Solaris



```
# bash
bash-3.00# cd /opt/5620sam/client/nms/bin
bash-3.00# ./nmsclient.bash
```

See Alcatel-Lucent 5620 SAM User Guide - 5620 SAM GUI startup procedures for a listing of startup options

Using a CLI to start the client GUI allows operators to specify one or more client startup options.

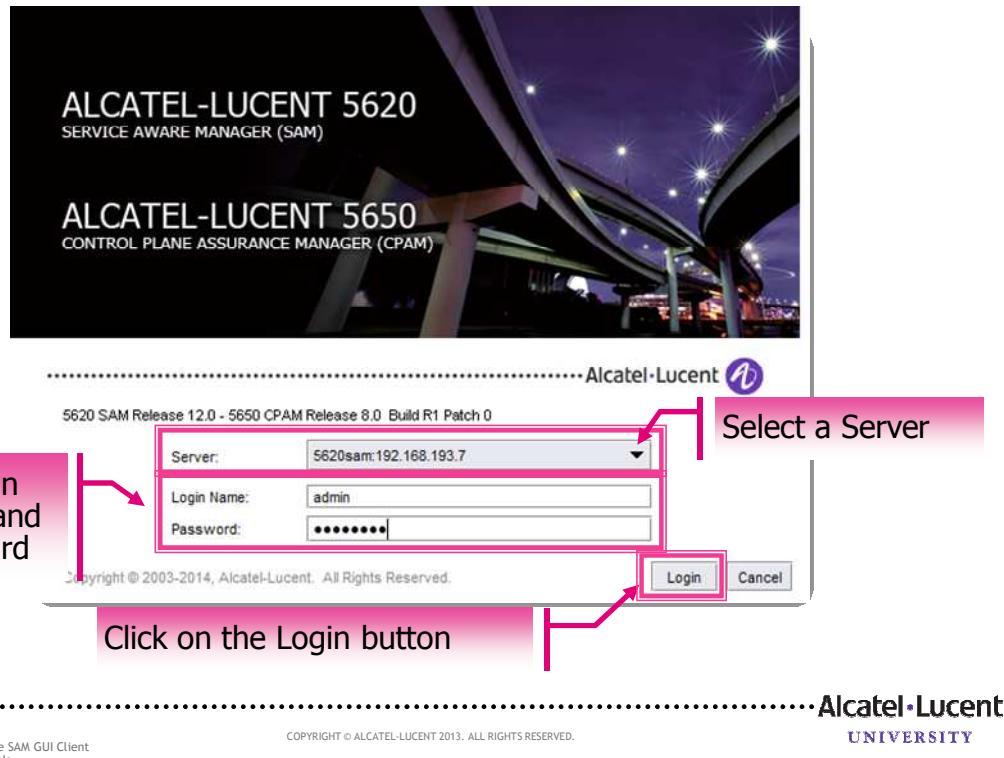
To start the 5620 SAM client GUI from a Windows machine using a CLI:

1. Open a command window. At the CLI prompt navigate to the 5620 SAM client installation drive and directory, entering the commands:
`<drive id> ↵`
`cd /<sam client directory>/nms/bin ↵`
 where: `<drive id>` is the drive on which the 5620 SAM client is installed, for example, D:
`<sam client directory>` is the 5620 SAM client installation location, typically `\5620sam\client`
2. At the CLI prompt, start the 5620 SAM client by typing `nmsclient.bat ↵`. The 5620 SAM login window appears. Alternatively, at the CLI prompt operators can start the 5620 SAM client using one or more startup options. For example, to force a client update, enter: `nmsclient.bat update ↵`
 See Alcatel-Lucent 5620 SAM User Guide - 5620 SAM GUI startup procedures for a complete listing of 5620 SAM client startup options for Windows

To start the 5620 SAM client GUI from a Solaris machine using a CLI:

1. Open a bash console window on the client station. At the CLI prompt to navigate to the 5620 SAM client installation directory, entering the command: `/<sam client directory>/nms/bin ↵`
 where: `<sam client directory>` is the 5620 SAM client installation location, typically `/opt/5620sam/client`
2. Start the 5620 SAM client by typing `./nmsclient.bash ↵`. The 5620 SAM login window appears. Alternatively, at the CLI prompt operators can start the 5620 SAM client using one or more startup options. See Alcatel-Lucent 5620 SAM User Guide - 5620 SAM GUI startup procedures for a complete listing of 5620 SAM client startup options for Solaris

1.5 SAM Login Window



The SAM login window allows to enter the SAM user account credentials in order to establish a session and access the SAM GUI.

5620 SAM user accounts consist of a user name, password, and an associated user group and scope of command.

On the SAM Login Window the user name is used as the login name. All client sessions are protected by the username and password for the session. Use the login name and password provided by the system administrator.

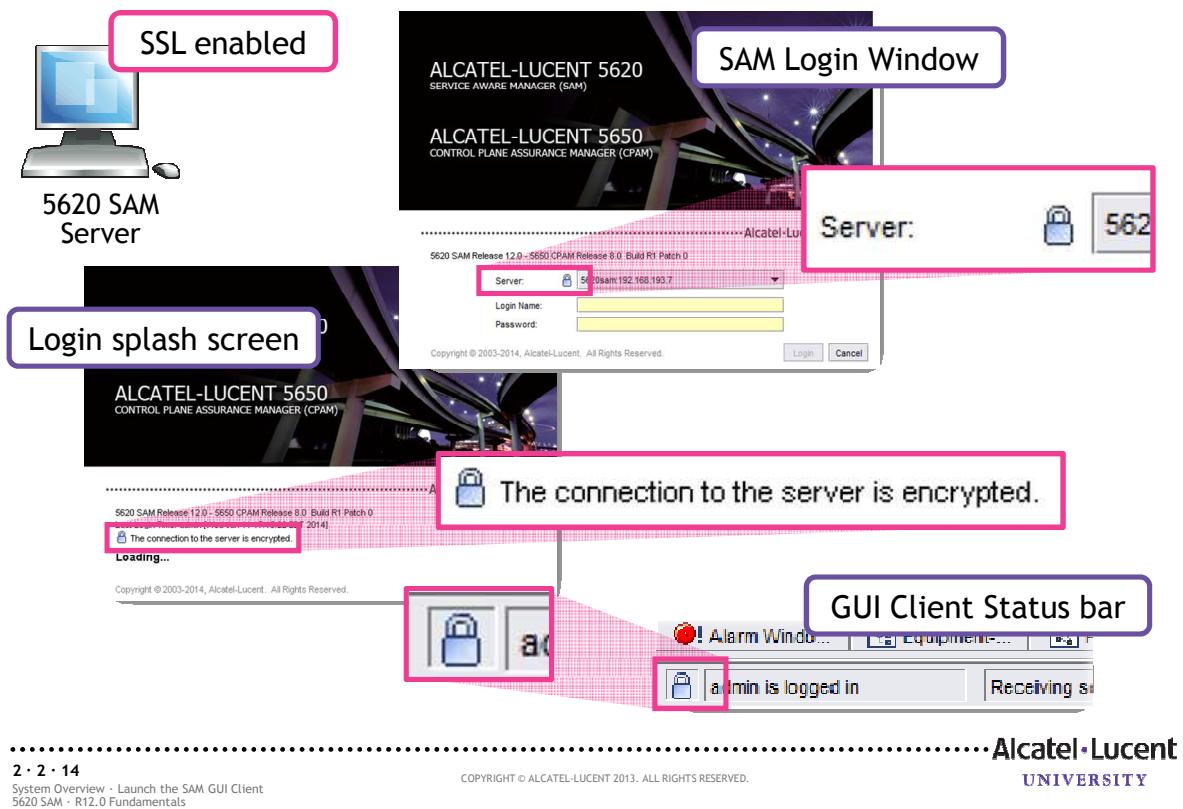
The user that starts a 5620 SAM Windows client must be one of the following:

- the user that installed the client software
- a user with sufficient permissions on the client files and directories, such as a local administrator

The user that starts a 5620 SAM in Solaris must be an user that has read, write, and execute permissions on the client files and directories.

When a system administrator has configured the client to support the multiple server option, operators can use the SAM Login form for selecting the one server to establish the session with from the multiple servers displayed in the **Server** drop-down list. If the multiple server option has not been configured, the **Server** parameter in SAM Login window displays only the server configured during the client installation process.

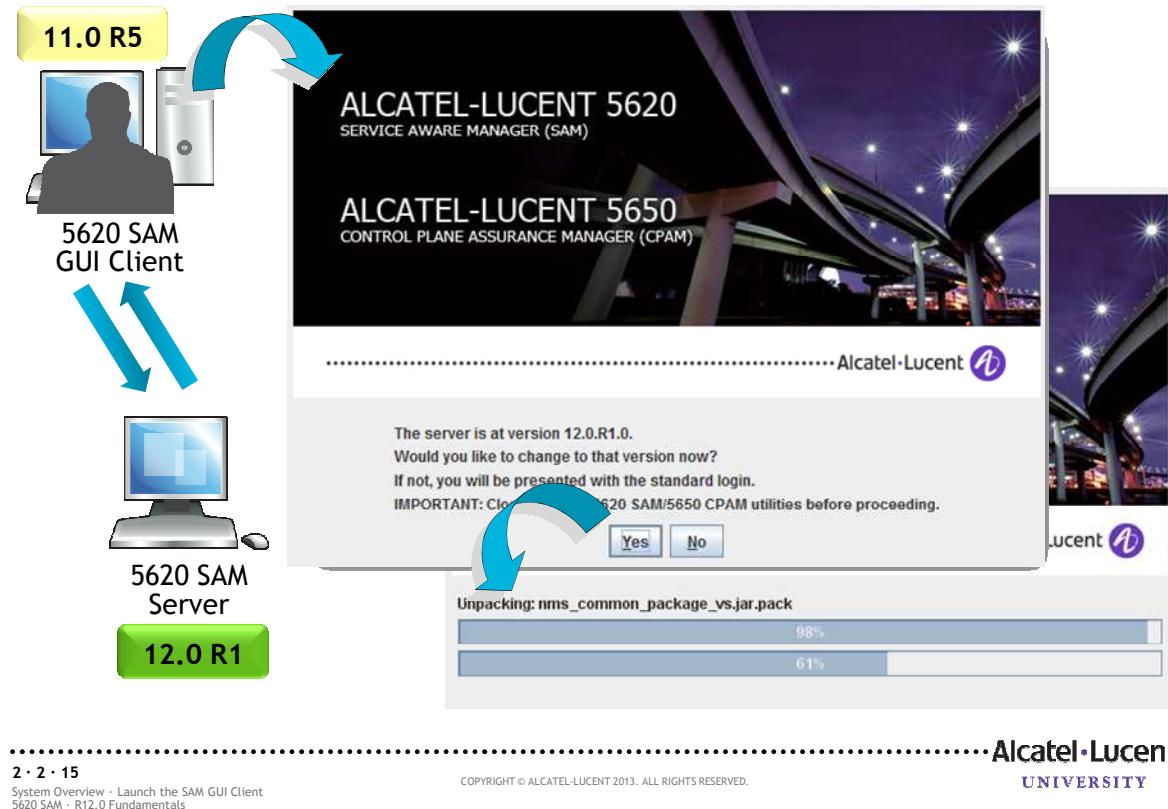
1.6 SSL Enabled Indicators



The 5620 SAM system administrators can configure SSL for secure communication between the 5620 SAM server and 5620 SAM clients (OSS and UI).

If SSL is enabled, the 5620 SAM client login window displays a padlock icon besides the Server drop-down menu. The SAM Login splash screen displays the SSL indicator padlock icon along with the legend “The Connection to the server is encrypted”. And when the SAM GUI client opens, the bottom left corner of the Status Bar also displays the SSL indicator besides the user account currently logged in.

1.7 Client Software Update



2 · 2 · 15
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During startup, the client software checks for available updates on a 5620 SAM main server. If a configuration change is available, the client automatically applies it.

After a 5620 SAM main server is upgraded, a GUI client that connects to the server automatically detects the release mismatch and attempts an upgrade to the server release level. If a client software upgrade is available, the client displays a window indicating the release mismatch and applies the upgrade in response to a user prompt.

During a client software upgrade, a 5620 SAM client downloads and installs only the files required for the upgrade. The upgrade process removes previously downloaded local 5620 SAM files that are not required by the updated client software.

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Questions



2 · 2 · 17

System Overview - Launch the SAM GUI Client
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1. The command “./nmsclient.bash” is used to start the 5620 SAM client GUI from a RHEL machine using a CLI. True or False?
 - a. True ✓
 - b. False
2. If SSL encryption IS NOT enabled in the SAM server, the 5620 SAM GUI client can be launched using a web browser by navigating to the URL “<http://server:8085/client>” where *server* is the IP address or hostname of the 5620 SAM main server. True or False ?
 - a. True ✓
 - b. False
3. If SSL encryption IS enabled in the SAM server, the 5620 SAM GUI client can be launched using a web browser by navigating to the URL “<https://server:8085/client>” where *server* is the IP address or hostname of the 5620 SAM main server. True or False ?
 - a. True
 - b. False ✓

Answers



1. The command “./nmsclient.bash” is used to start the 5620 SAM client GUI from a RHEL machine using a CLI. True or False?
 - a. True ✓
 - b. False
2. If SSL encryption IS NOT enabled in the SAM server, the 5620 SAM GUI client can be launched using a web browser by navigating to the URL “<http://server:8085/client>” where *server* is the IP address or hostname of the 5620 SAM main server. True or False ?
 - a. True ✓
 - b. False
3. If SSL encryption IS enabled in the SAM server, the 5620 SAM GUI client can be launched using a web browser by navigating to the URL “<https://server:8085/client>” where *server* is the IP address or hostname of the 5620 SAM main server. True or False ?
 - a. True
 - b. False ✓



This module covered:

- The process to launch the 5620 SAM GUI Client using:
 - a desktop icon
 - a web browser
 - CLI
- The Indicators displayed when secure communication between the 5620 SAM server and 5620 SAM clients (OSS and UI) is enabled using SSL
- The auto-detection of GUI client's release mismatch with the server's release and the characteristics of an automatic GUI Client Update



End of module
Launch the SAM GUI Client

2 · 2 · 20

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Section 2
System Overview

Module 3 SAM GUI Client Components

TOS36033_V4.0-SG-R12.0-Ed1 Module 2.3 Edition 2

5620 SAM
R12.0 Fundamentals
TOS36033_V4.0-SG Edition 1

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1.1	2011-10-28	GARCIA LOZANO, René	TOS36033_V1.5 – SAM 9.0 (R5 update)
2.0	2012-03-30	LOLLIERIC, Pascal	TOS36033_V2.0 – SAM 10.0 (R1 update)
2.1	2012-08-18	GARCIA LOZANO, René	TOS36033_V2.1 – SAM 10.0 (R1 vILT conversion)
2.2	2012-10-08	LOLLIERIC, Pascal	TOS36033_V2.2 – SAM 10.0 (R5 update)
2.3	2012-10-30	GARCIA LOZANO, René	TOS36033_V2.3 – SAM 10.0 (MyPLE and WBT)
3.0	2013-06-27	GARCIA LOZANO, René	TOS36033_V3.0 – SAM 11.0 (update)



Upon completion of this module, you should be able to:

- Describe the characteristics and functionality of the 5620 SAM GUI
- Identify the main GUI Client components
- List the overall functions of each of the main GUI components

2 · 3 · 3

System Overview · SAM GUI Client Components
5620 SAM · R12.0 Fundamentals

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	Page
1 5620 SAM GUI Client Description	7
2 GUI Components	8
Knowledge Verification – GUI Components	9
2.1 Menu Bar - GUI Menus	10
2.2 Menu Bar – Workspace Selector	11
2.3 Tool Bar	12
2.3.1 Customizing the Tool Bar	13
Knowledge Verification – GUI Components	14
2.4 Working Panel	15
2.4.1 Customizing Working Panel Windows Layout	16
2.5 Task Bar	17
2.6 Status Bar	18
Questions	19
Answers	20
Module Summary	21

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1 5620 SAM GUI Client Description

5620 SAM Graphical User Interface
Java-based technology runs on Client machines



5620 SAM
GUI Client

Used to provide FCAPS



2 • 3 • 7

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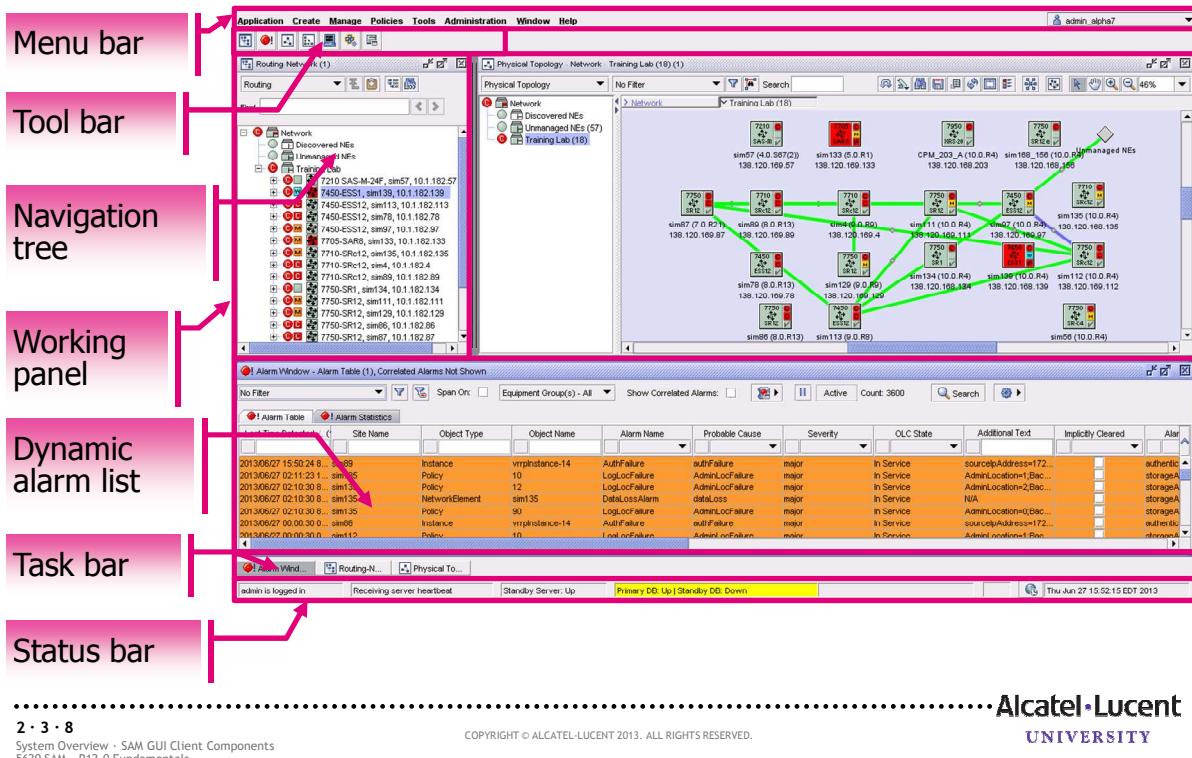
The 5620 SAM GUI on a 5620 SAM client station allows an NOC operator to perform network management functions.

The GUI and the network management components use a Java-based technology that provides distributed, secure, and scalable applications. This architecture allows for scaling and fair load balancing, which improves performance. GUIs run on client machines to provide access to the database and the network elements through the SAM Server. GUIs do not have direct access to the database or the network elements.

The GUI is used to provide Fault, Configuration, Administration, Performance, and Security functionality. 5620 SAM operators can:

- display equipment and alarm status
- configure and manage network management applications
- simplify the administration and execution of equipment, service, and subscriber using wizard-like configuration forms instead of the Command Line Interface (CLI)
- configure, manage, and monitor Service Level Agreements (SLAs) and equipment using performance counters, and
- create and manage security policies for access to the routers and for operations using the 5620 SAM

2 GUI Components



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2 · 3 · 8

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There are seven (7) basic components to the 5620 SAM GUI workspace. They are the:

- **Menu Bar** - used to execute 5620 SAM tasks
- **Tool Bar** - provides shortcuts for Menu functions
- **Working Panel** - displays drawings and configuration forms. On the GUIs working panel by default, the navigation tree window appears at the left side, the alarm window at the bottom, and the physical topology map is at the right side
- **Navigation Tree Window** - displays all 5620 SAM managed equipment, services, and protocols that are configured on the NE (including an OSPF view and an IS-IS view)
- **Dynamic Alarms List** - displays incoming events and alarms
- **Task Bar** - used to track all currently opened windows of the client session.
- **Status Bar** - displays user account, date, redundancy, alarm-related object, propagation, and connection status information.

Using the Menus, the Toolbar, or Shortcuts:

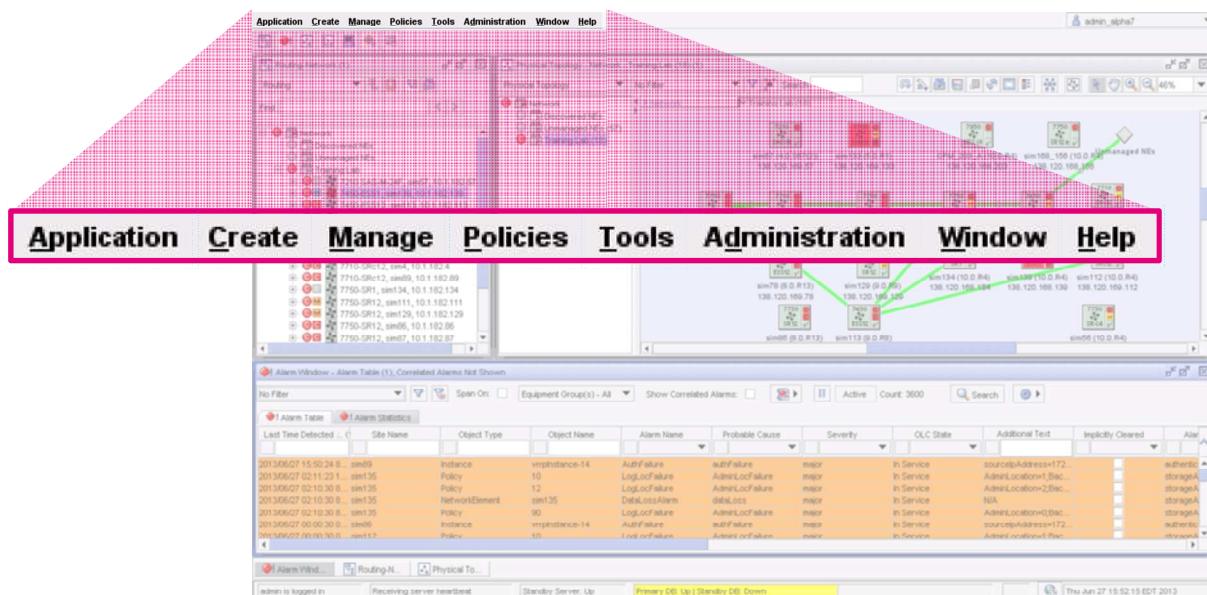
1. Open the 5620 SAM GUI.
2. Choose a menu:
 - From the drop down submenu options under each top-level menu. An applicable shortcut icon for that menu function is shown next to the options text.
 - From the menu equivalent in the Toolbar. Scrolling over the icons will display their function.
 - By typing the appropriate ALT+Key shortcut. For example, ALT+P opens the policies menu.
 - The underlined letter indicates the shortcut action.



Which are the 3 windows that appear opened by default on the 5620 SAM GUI Working Pane?

- a. Equipment properties window
- b. Dynamic alarm list
- c. Physical topology map
- d. Navigation tree
- e. Equipment properties window

2.1 Menu Bar - GUI Menus



2 • 3 • 10

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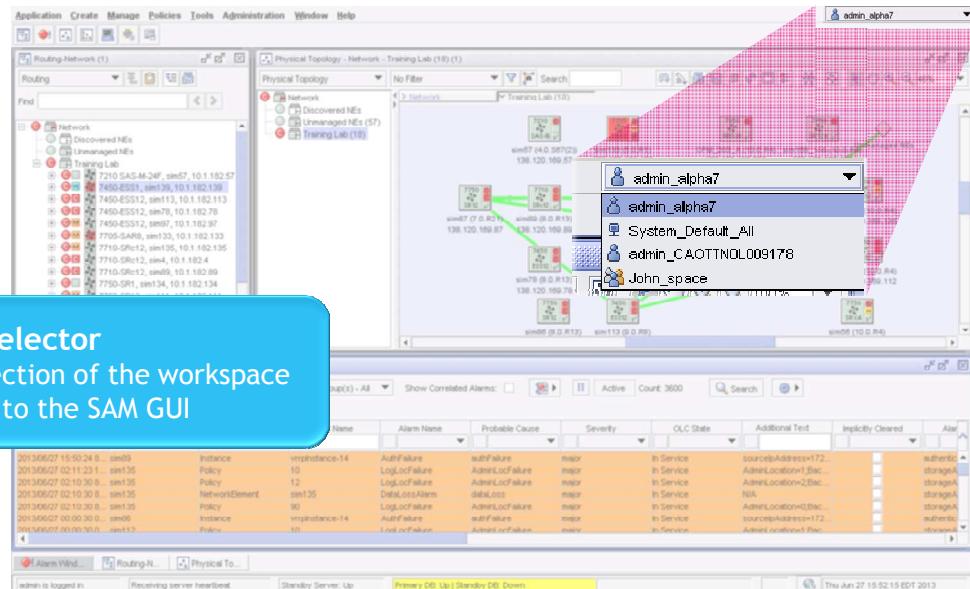
Menu Item	Function
Application - Submenus	<ul style="list-style-type: none"> Display maps and views of the network Set user preferences Shut down the 5620 SAM GUI
Create - Submenus	<ul style="list-style-type: none"> Create services with the option of using service templates which automate the specification of provisioning of complex managed object Create groups of nodes and display physical links
Manage - Submenus	<ul style="list-style-type: none"> Manage services, LSPs, service tunnels, customers Manage maps and views of the network, including a subscriber view of services used by the customer Configure and manage routers
Policies - Submenus	<ul style="list-style-type: none"> Configure and manage policies related to alarm handling, quality of service, routing protocols, schedules, Access Control Lists (ACLs), services and statistics
Tools - Submenus	<ul style="list-style-type: none"> Numerous functions, including launching a Telnet or SSH2 session with selected network equipment, with the option to configure routers via SSH or Telnet
Administration - Submenus	<ul style="list-style-type: none"> Configure and manage discovery of network objects. Configure and manage users and access
Window - Submenus	<ul style="list-style-type: none"> Manage how forms are displayed in the working pane
Help - Submenus	<ul style="list-style-type: none"> Show SAM and CPAM License information and user documentation



Note

Icons appearing next to submenu items indicate that a shortcut exists on the Tool Bar for that function.

2.2 Menu Bar – Workspace Selector



Workspace Selector

Allows the selection of the workspace that is applied to the SAM GUI

Operators can apply GUI workspaces according to their roles and responsibilities

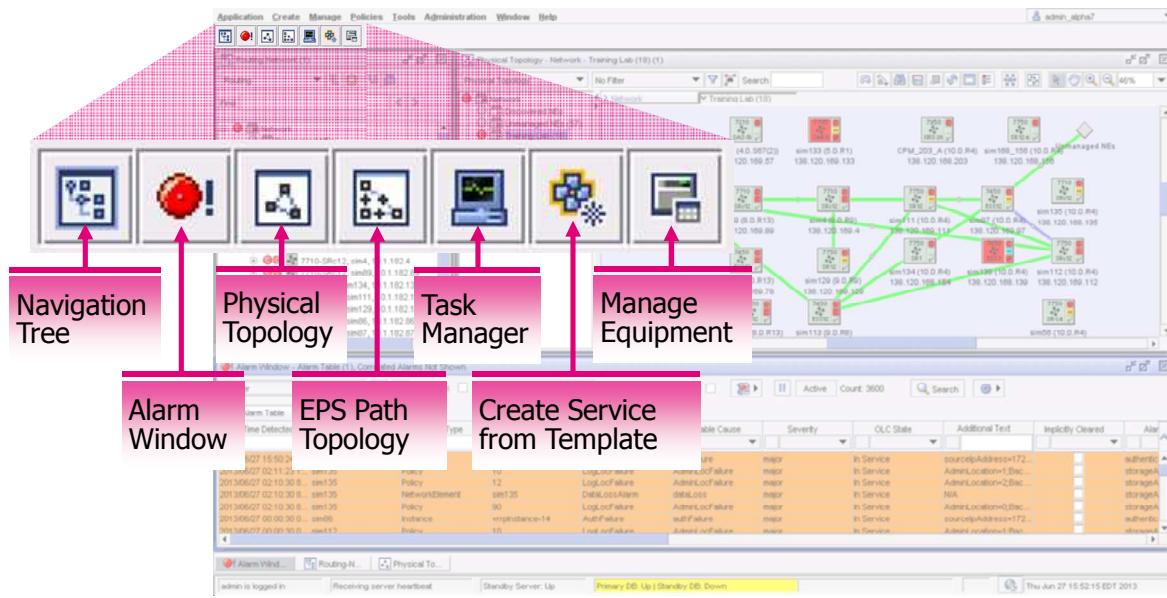
On the top right corner of the main menu bar of the 5620 SAM GUI is located the workspace selector.

This workspace selector drop-down menu allows SAM users the selection of the workspace that is applied to the SAM GUI.

As of release 11.0 the 5620 SAM provides System Administrators the ability to customize the menus, toolbars, tree labels, topology icon labels and window layout selections on the 5620 SAM GUI.

Using the workspace selector, SAM Operators can apply customized GUI workspaces created according to their roles and responsibilities.

2.3 Tool Bar



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2 • 3 • 12

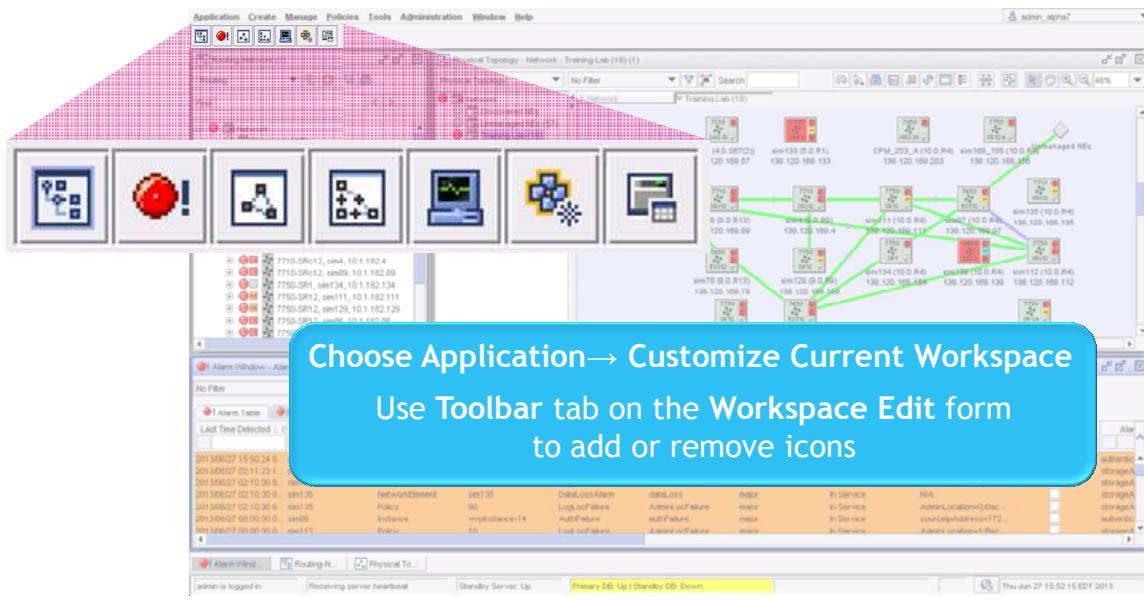
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The toolbar provides shortcut icons that represent a subset of the main menu functions and can be customized on a per-session, per-user basis. Each toolbar icon is identified by a tool tip that is displayed when the mouse pointer moves over the icon.

The image shows the icons displayed by default on the 5620 SAM GUI Toolbar when choosing the System_Default_All workspace.

2.3.1 Customizing the Tool Bar



Tool bar can be customized by editing or creating a workspace

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The SAM GUI tool bar can be customized by editing a workspace, or by creating a new workspace. To customize the toolbar on the current workspace, choose Customize Current Workspace from the main menu.



Note

If the currently logged in user does not have permissions to customize the current workspace, the Customize Current Workspace option is greyed out.

As a result, in order to customize the tool bar choose Application→Manage Workspaces from main menu, the Manage Workspaces form opens. To edit an existing workspace double click on a workspace entry from the list in the Manage Workspaces. Or, to create a new customized workspace click on the Create button.

Use the Toolbar tab on the Workspace Edit form to add or remove icons representing menu or menu items to the toolbar.

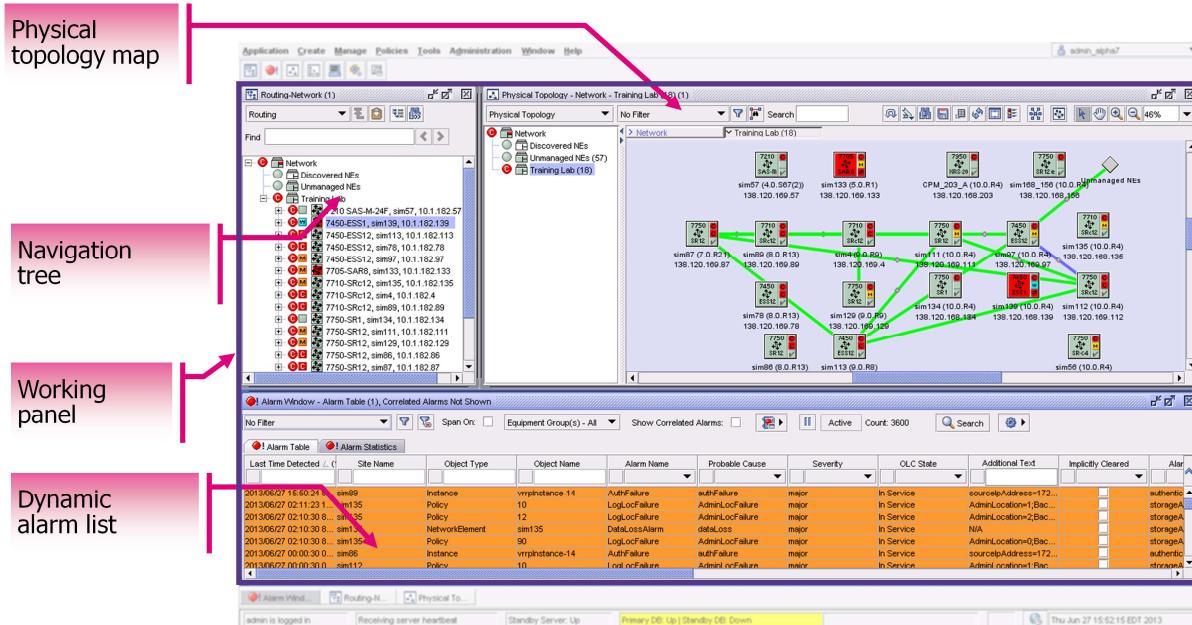


Which of the following is NOT a characteristic of the 5620 GUI Tool Bar?

- a. It is used to track all currently opened windows of the client session.
- b. It provides shortcut icons that represent a subset of the main menu functions.
- c. It can be customized by editing or creating a workspace.
- d. Each toolbar icon is identified by a tool tip that is displayed when the mouse pointer moves over the icon.

Choose the correct answer for the knowledge verification question above.

2.4 Working Panel



2 • 3 • 15

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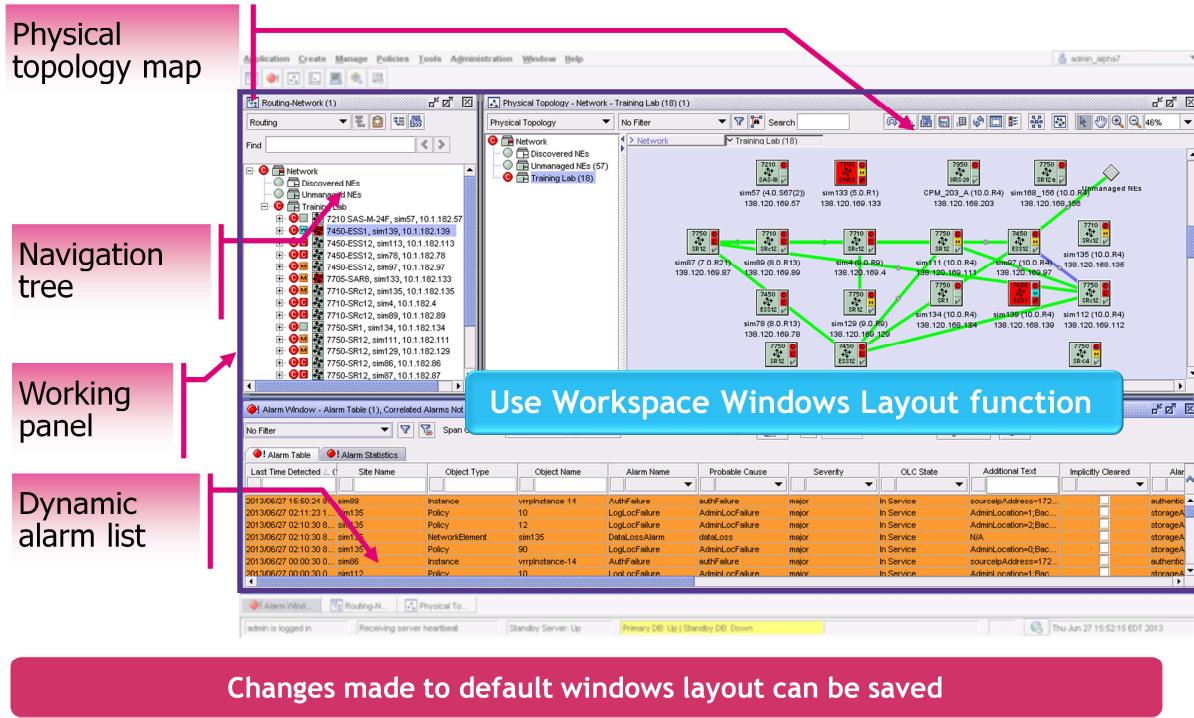
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The Working Panel displays drawings and configuration forms.

On the GUIs working panel by default, the navigation tree window appears at the left side, the dynamic alarm list window at the bottom, and the physical topology map is at the right side.

2.4.1 Customizing Working Panel Windows Layout



2 • 3 • 16

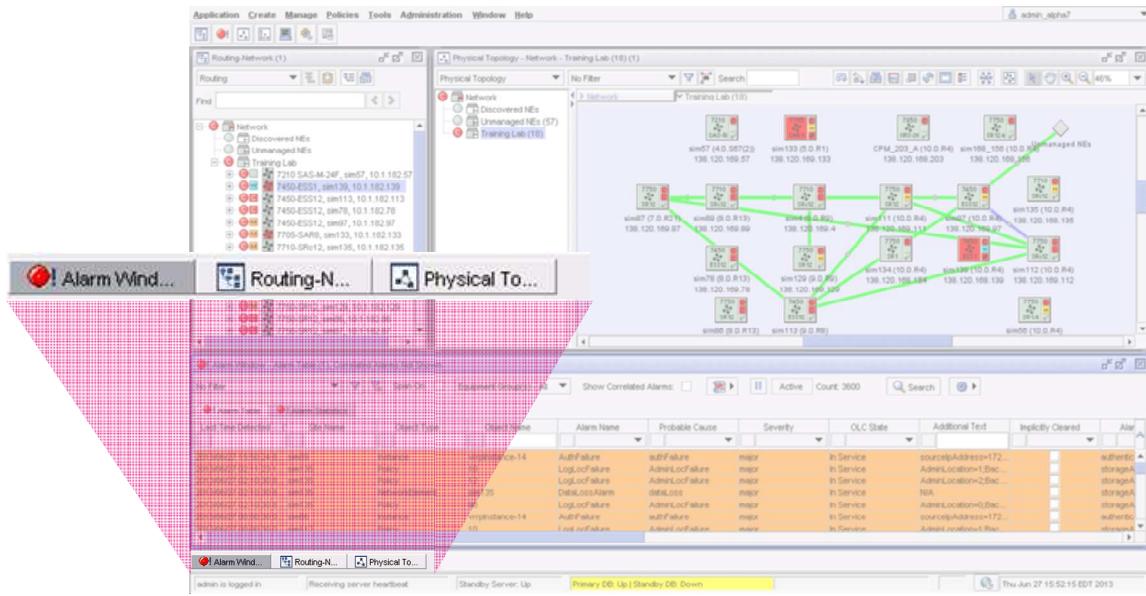
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The 5620 SAM allows operators to save changes made to the position, size, and state preference of default windows. Use the Workspace window layout function to save changes made to the navigation tree, the topology window, and the main menu toolbar.

2.5 Task Bar



Track and manage windows currently opened on the GUI client session

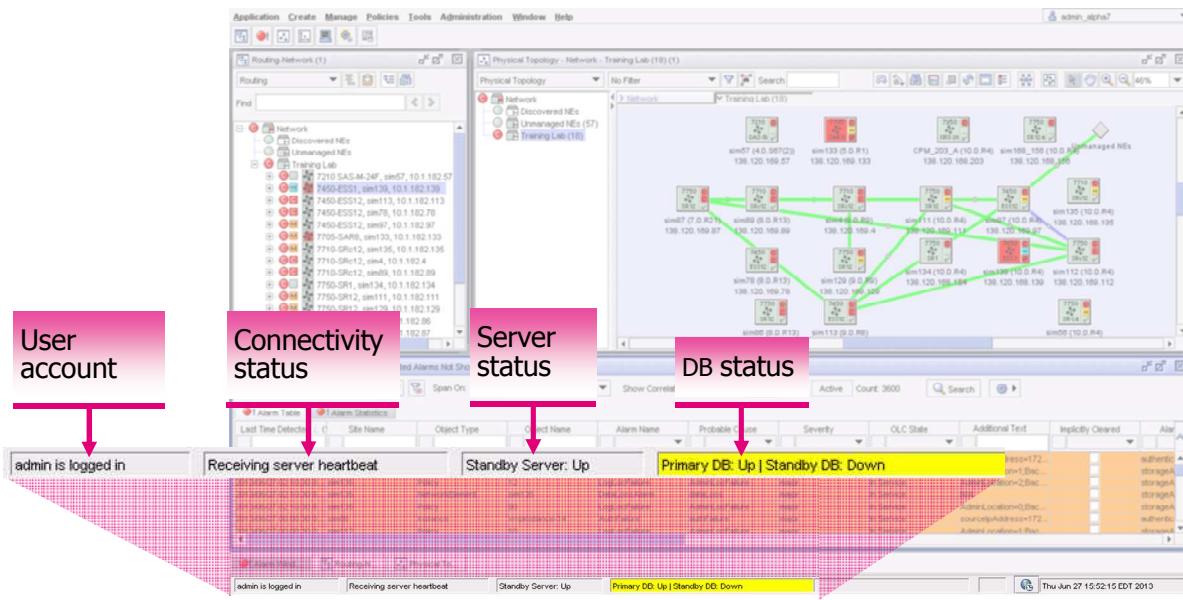
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The Task Bar located under the Working Panel is used to track and manage windows currently opened on the GUI client session. The Task Bar displays one button per each of the configuration forms and windows opened in the GUI. Clicking on a task bar button brings the represented form or window to the GUIs foreground.

2.6 Status Bar



Indication displayed when maximum number of alarms for the system reached

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The Status Bar located at the bottom of the GUI Client displays user account, connectivity status, system information status (including redundancy status), and the date information.

The left corner of the status bar displays the user account currently logged in to the GUI session.

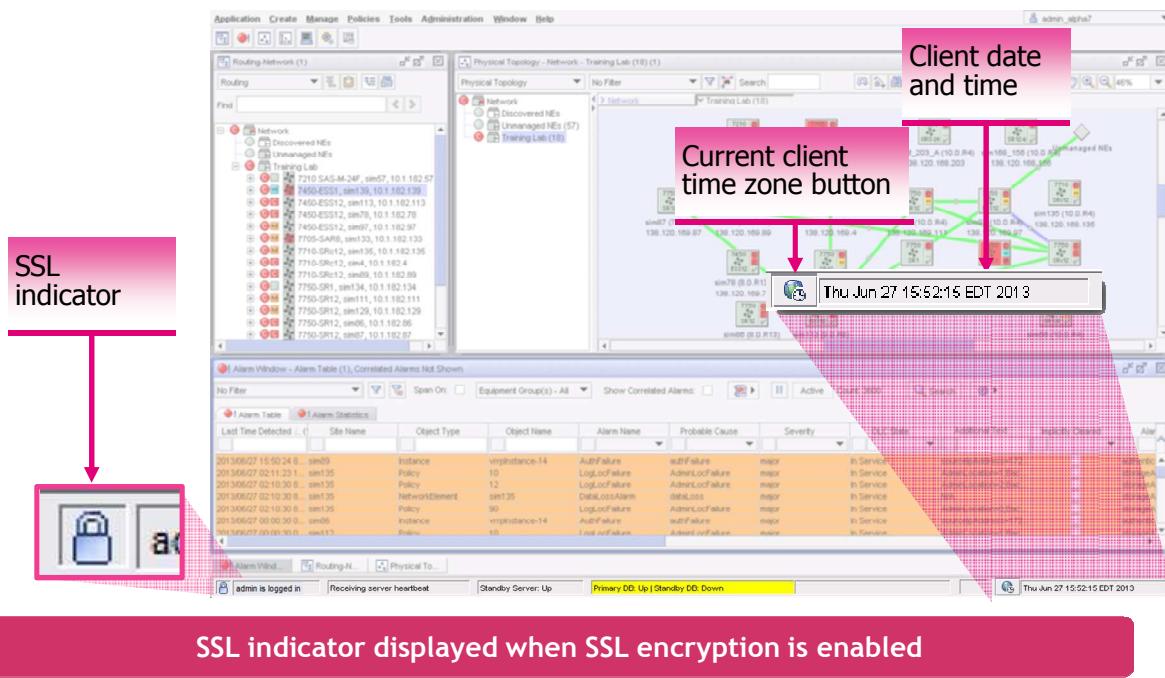
Connectivity status, displays information about receiving server heartbeat network connectivity between both the primary and standby servers and the GUI client.

The system information status displayed in the status bar includes, server status and DB status. The image shows an example displaying Standby Server and Standby DB status indicators in the 5620 SAM client GUI status bar. Note that the background of the database section of the status bar is yellow or red when there is a problem with a database service. The status bar text indicates the database service status.

The DB information in the status bar also displays the reinstatement status. The Standby Re-instantiation State changes from In Progress to Success when reinstatement is complete.

In addition, the 5620 SAM client GUI status bar displays an indication when the maximum number of alarms for the system is reached. If the outstanding alarm count reaches 50 000, the status bar displays "Max alarm count exceeded".

2.6 Status Bar [cont.]



SSL indicator displayed when SSL encryption is enabled

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2 • 3 • 19
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The current client time zone button, displayed in the status bar is used to specify which time zone the 5620 SAM client will use currently. Right corner of the status bar displays the GUI Client current date and time information.

When Secure Sockets Layer (SSL) encryption is enabled for secure communication between the 5620 SAM server and 5620 SAM clients (OSS and UI), the bottom left corner of the status bar displays the SSL indicator (a padlock icon) besides the user account currently logged in.

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1. The Navigation tree, physical topology map and dynamic alarm list are the 3 windows that appear opened by default on the 5620 SAM GUI Working Panel. True or False?
 - a. True
 - b. False
2. Changes to the equipment and service properties window preferences are changes to the GUI components preferences that an user can save using the customize GUI workspace function to use instead of the defaults. True or False?
 - a. True
 - b. False
3. Changes to the toolbar preferences, and changes made to the position, size, and state preference of default windows in the working panel are changes to the GUI components preferences that an user can save using the customize GUI workspace function to use instead of the defaults. True or False?
 - a. True
 - b. False
4. The 5620 GUI Tool Bar is used to track all currently opened windows of the client session. True or False?
 - a. True.
 - b. False
5. The 5620 GUI Tool Bar provides shortcut icons that represent a subset of the main menu functions, and can be customized on a per-session, per-user basis by creating or editing a GUI workspace
 - a. True
 - b. False

Answers



1. The Navigation tree, physical topology map and dynamic alarm list are the 3 windows that appear opened by default on the 5620 SAM GUI Working Panel. True or False?
 - a. True ✓
 - b. False
2. Changes to the equipment and service properties window preferences are changes to the GUI components preferences that an user can save using the customize GUI workspace function to use instead of the defaults. True or False?
 - a. True
 - b. False ✓
3. Changes to the toolbar preferences, and changes made to the position, size, and state preference of default windows in the working panel are changes to the GUI components preferences that an user can save using the customize GUI workspace function to use instead of the defaults. True or False?
 - a. True ✓
 - b. False
4. The 5620 GUI Tool Bar is used to track all currently opened windows of the client session. True or False?
 - a. True.
 - b. False ✓
5. The 5620 GUI Tool Bar provides shortcut icons that represent a subset of the main menu functions, and can be customized on a per-session, per-user basis by creating or editing a GUI workspace
 - a. True ✓
 - b. False



This module covered:

- The characteristics and functionality of the 5620 SAM GUI
- The main GUI Client components
- The overall functions of each of the main GUI components

2 · 3 · 23

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End of module
SAM GUI Client Components

2 · 3 · 24

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Section 2
System Overview

Module 4 **SAM GUI Client Windows and Forms Components and Management**

TOS36033_V4.0-SG-R12.0-Ed1 Module 2.4 Edition 2

5620 SAM
R12.0 Fundamentals
TOS36033_V4.0-SG Edition 1

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2.1	2012-08-18	GARCIA LOZANO, René	TOS36033_V2.1 – SAM 10.0 (R1 vILT conversion)
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Upon completion of this module, you should be able to:

- List the options available in the 5620 SAM for GUI windows management
 - Identify the characteristics and possible applications of external windows
- Describe the characteristics and function of the contextual menus for a GUI object
- Identify the 5620 SAM GUI form types, its function and components
- Identify the options to manage tabs, and the available tab indicators on 5620 SAM Forms
- Describe the capabilities available for lists on 5620 SAM windows and forms
- Identify the list form elements, list inventory options and list search and filtering functions

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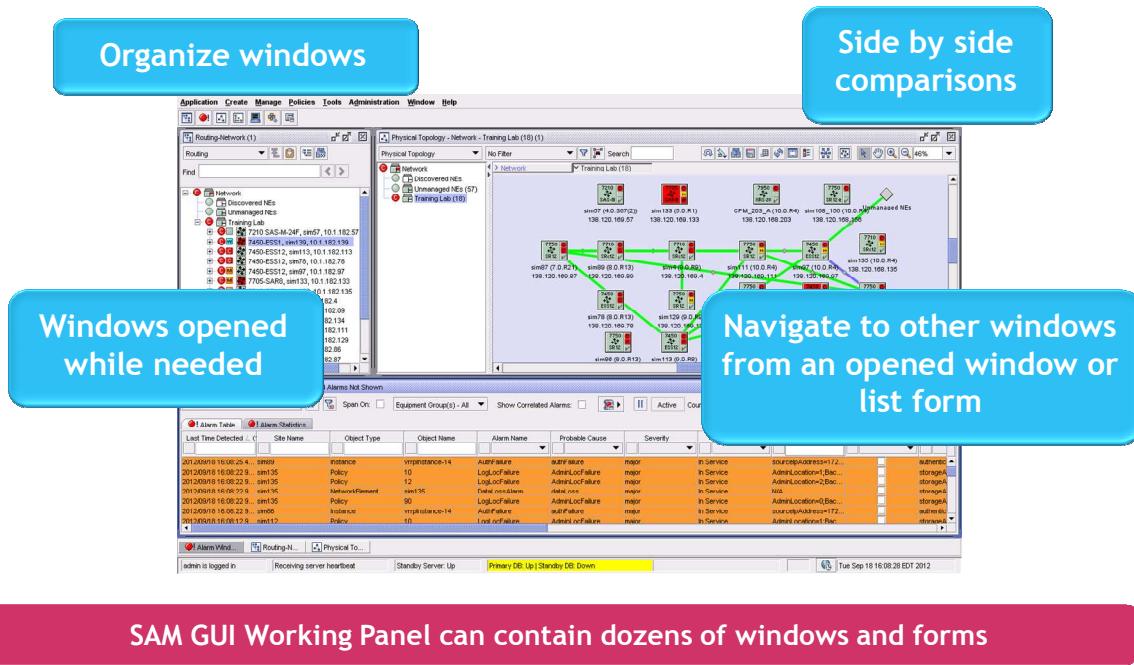


	Page
1 5620 SAM GUI Windows Management	7
1.1 5620 SAM GUI Windows Management Overview	8
1.2 Windows Management Options	9
1.3 Windows Management Workflow	10
1.4 Manipulating Windows	11
1.5 Window Tiling	12
1.6 Window Tiling	13
1.7 Window Menu Options	14
2 External Windows	15
2.1 External Windows Overview	16
2.2 External Window Characteristics	17
3 Contextual Menu	19
3.1 Contextual Menu Overview	20
4 - 5620 SAM GUI Form Types and Components	21
4.1 GUI Forms Overview	22
4.2 Configuration Form	23
4.3 Properties Form	25
4.3.1 Opening a Properties Form	26
4.3.2 Properties Form Identifier Link	27
4.4 Collapsible Panels	28
4.5 Resizing a Form Window	29
4.6 Step Form	30
5 Tabs on 5620 SAM Forms	31
5.1 Tabs on 5620 SAM Forms Overview	32
5.2 Custom Tab Display	33
5.3 Indicators on Tabs	34
6 Lists on 5620 SAM Windows and Forms	35
6.1 Lists on 5620 SAM Windows and Forms Overview	36
6.2 List Form Elements – Column Heading	37
6.3 Contextual Inventory Menu	38
6.4 Search and Filtering Functions	39
6.5 Dynamic Alarm List	40

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1 5620 SAM GUI Windows Management

1.1 5620 SAM GUI Windows Management Overview



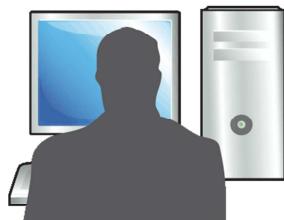
SAM GUI Working Panel can contain dozens of windows and forms

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The 5620 SAM GUI working panel can contain dozens of configuration forms, drawings, maps, and displays. With window management, the SAM operator can:

- organize windows according to operator preference
- keep windows open until they are needed
- perform side by side comparisons of data on different forms, and
- navigate quickly to other open windows using a numbered list, which is ordered according to the time that the window was opened

1.2 Windows Management Options



5620 SAM
GUI Client

Windows Management Options

Move, size, maximize, minimize or close

Bring to the foreground

Tile windows

Move to external windows

Use GUI object's contextual menu for
opening additional windows and forms

2 · 4 · 9

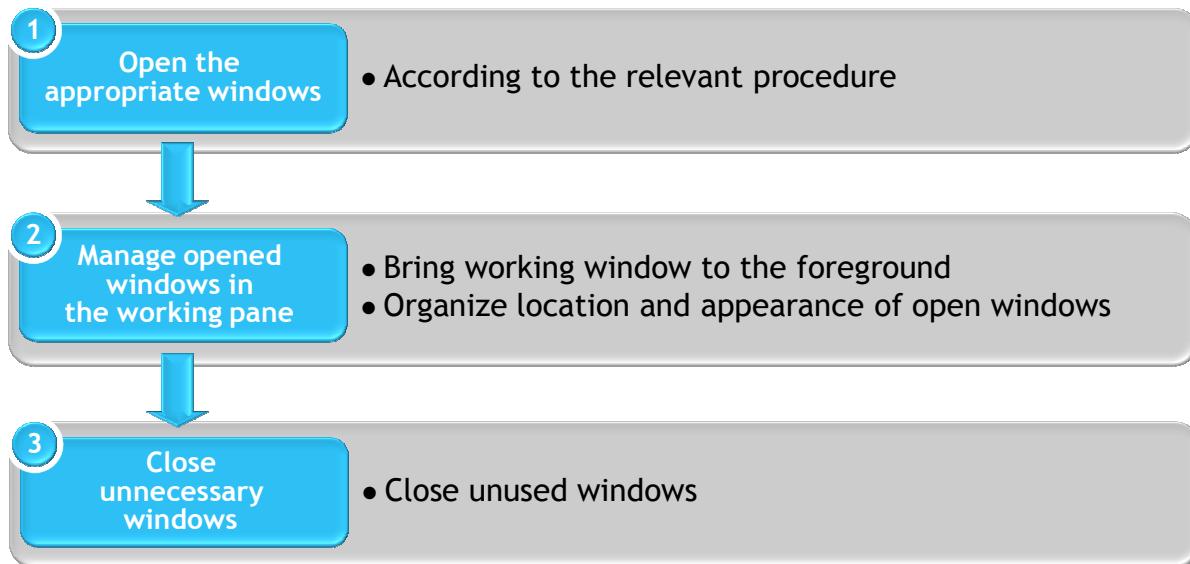
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5620 SAM GUI uses floating windows that the operator can manage by moving, sizing, maximizing, minimizing, closing, bringing to the foreground, tiling windows or exporting to an external window to provide the optimal working space for performing a task.

The user can also open additional windows and forms relevant to a GUI object using the contextual menu.

1.3 Windows Management Workflow



2 · 4 · 10

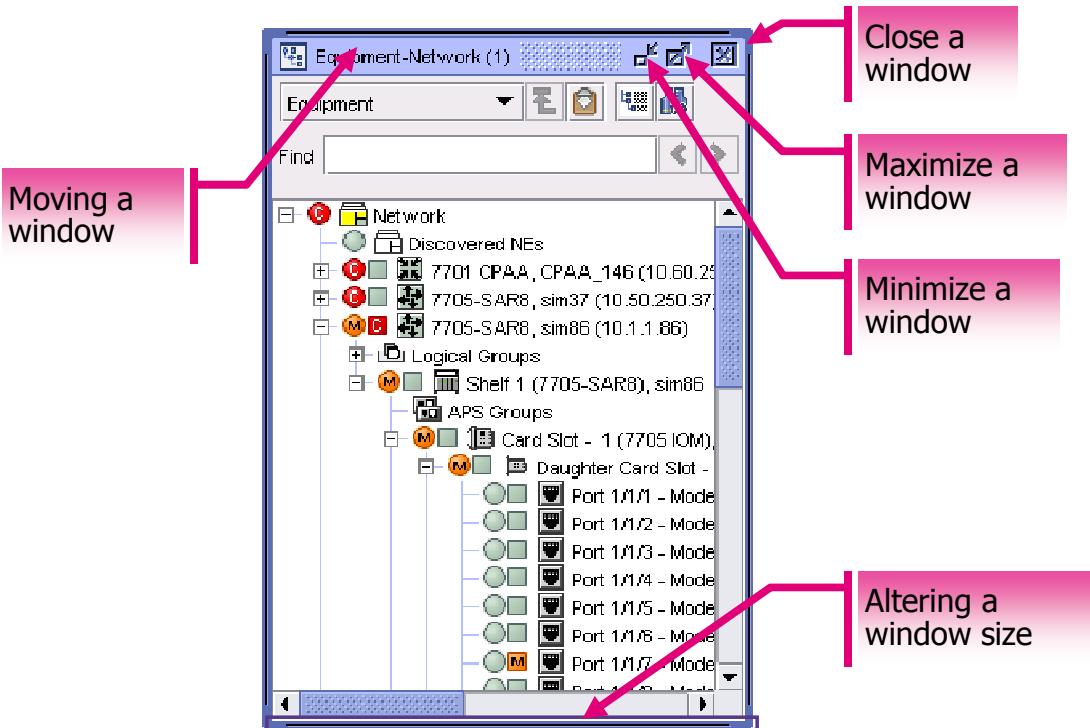
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The following workflow outlines the high-level steps necessary to manage 5620 SAM windows.

1. Open the appropriate windows according to the relevant procedure for the tasks to be performed.
2. Manage the open windows in the working panel to maximize operator effectiveness and efficiency.
 - Bring the window on which you want to work to the foreground.
 - Organize the location and appearance of open windows.
3. Close unnecessary windows to clear the window panel.

1.4 Manipulating Windows



2 · 4 · 11

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All 5620 SAM floating windows are displayed in a working panel on the GUI, to the right of the navigation tree. Each newly opened window appears in the foreground. The previously opened window is placed in the background.

5620 SAM allows manipulation of GUI windows that the operator can move, size, close, and bring to the foreground to provide the optimal working space for performing a task.

The image above displays the window buttons to perform such actions.

Minimizing, Maximizing and Closing a Window

By clicking on the icons in the upper right corner of a window, it can be minimized, maximized or closed.

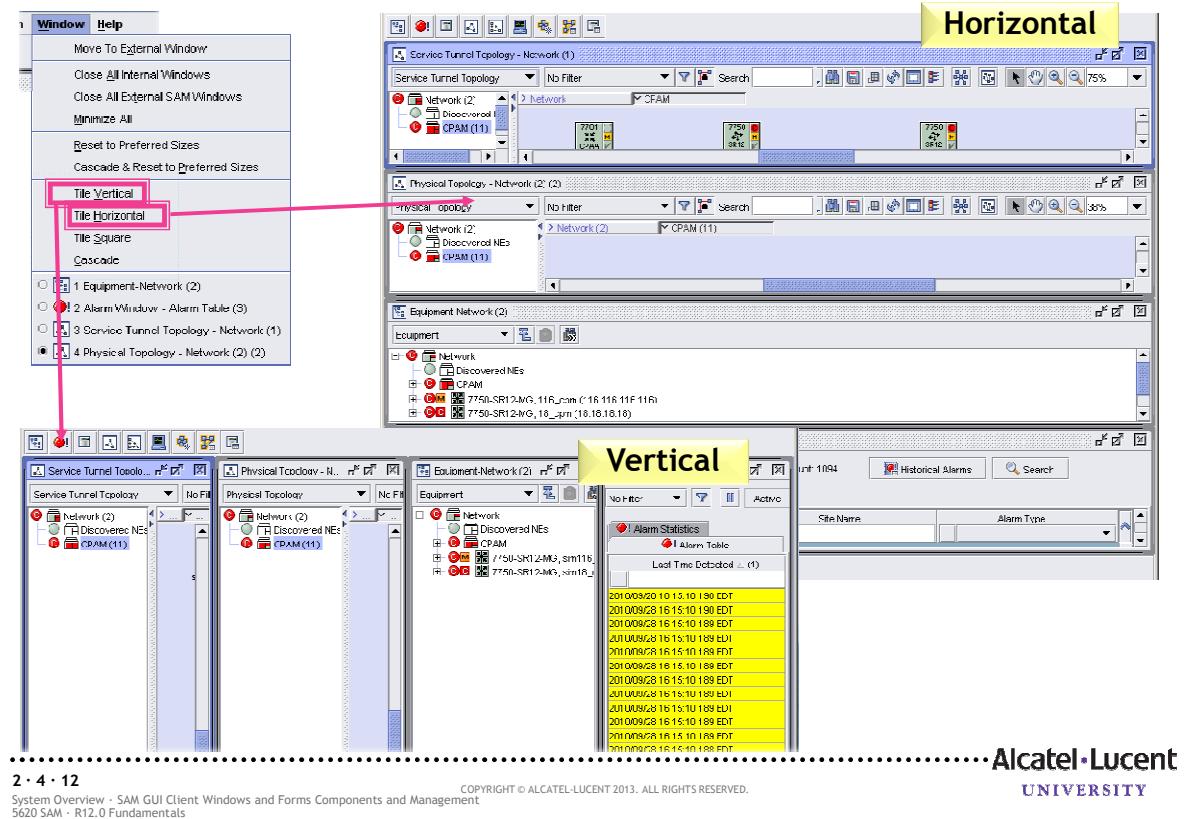
Window Size Alteration

By placing the cursor at any border of a window until the symbol shown above appears, its size can be altered vertically or horizontally by dragging the cursor up, down, right or left.

Moving a Window

In order to move a window, place the mouse cursor in the area indicated in the above diagram “Moving a window”, and while holding the left mouse button down, the window can be dragged to the appropriate location on the screen.

1.5 Window Tiling

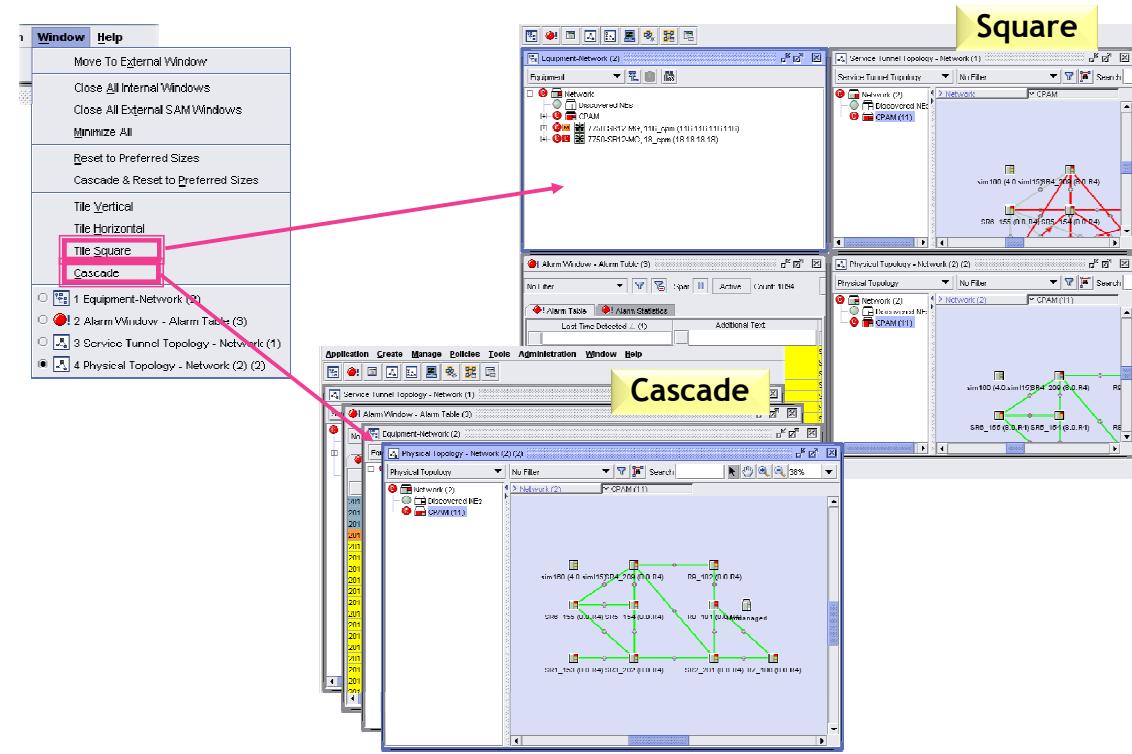


Window Tiling allows users to organize the GUI session to promote efficient workflow and quick access to the necessary information. From the **Window** menu in the 5620 SAM GUI Menu Bar the operator can select one of 4 options for windows tiling:

- Vertical tiling
- Horizontal tiling
- Square tiling, or
- Cascade Tiling

As shown in the figure above, by selecting Vertical tiling opened forms are displayed beside each other. By selecting Horizontal tiling the opened forms are displayed above each other.

1.6 Window Tiling



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2 • 4 • 13

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5620 SAM - R12.0 Fundamentals

As shown in the figure above, by selecting Square tiling opened forms are displayed beside and above each other to fill the GUI workspace. And by selecting Cascade tiling opened forms are displayed overlapping in the top left area of the GUI with the form that is farthest to the right in the foreground.

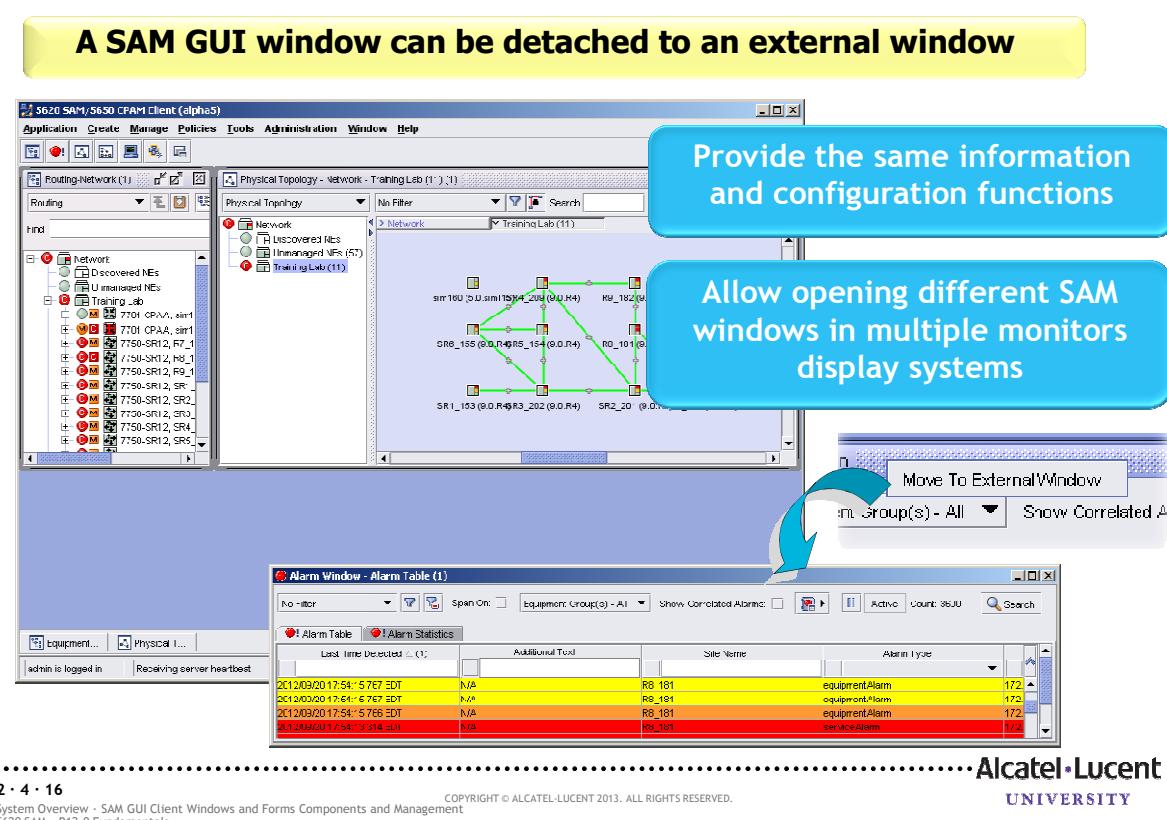
1.7 Window Menu Options

The **Window** menu in the 5620 SAM GUI Menu Bar also displays the following options for window management:

Menu option	Function
Move to External Window	Detach the selected form to an external window
Close All Internal Windows	Close all open forms
Close All External Windows	Close all opened external forms
Minimize All	Reduce all forms to icons with a truncated titlebar title on the taskbar
Reset to Preferred Size	Reset the foreground position and default size of the forms that open by default when the client GUI was launched
Cascade & Reset to Preferred Size	Reset the form in the foreground to the default size and cascade.
Tile Vertical	Opened forms are displayed beside each other
Tile Horizontal	Opened forms are displayed above each other
Tile Square	Opened forms are displayed beside and above each other to fill the GUI workspace
Tile Cascade	Opened forms are displayed overlapping in the top left area of the GUI with the form that is farthest to the right in the foreground

2 External Windows

2.1 External Windows Overview



A window in the GUI can be detached to an external window which can be used outside the GUI. To detach a GUI window to an external window, select the window and choose **Move To External Window** from the **Window** menu in the 5620 SAM GUI Menu Bar. Alternatively, right-click on the GUI window title bar and choose **Move To External Window** from the menu that is displayed.

An external window provides the same configuration and information functionality even when it has been detached outside the GUI. Any information displayed and configuration changes performed on an external window are still related to the SAM Server in the same manner as before the window was detached from the GUI. External windows allow opening different SAM windows in multiple monitors display systems.

External windows are JAVA technology based objects managed by the operating system rather than the 5620 SAM. They maintain the window icon that is used within the GUI and are placed into a group of open 5620 SAM windows on the operating system task bar. Any windows launched from an external window appear as separate external windows.

The 5620 SAM GUI task bar does not display external windows. However, external windows can be viewed and brought to the front using **Window** menu in the 5620 SAM GUI Menu Bar. The Window menu also contains options to **Close All Internal Windows** or **Close All External SAM Windows**.

2.2 External Window Characteristics

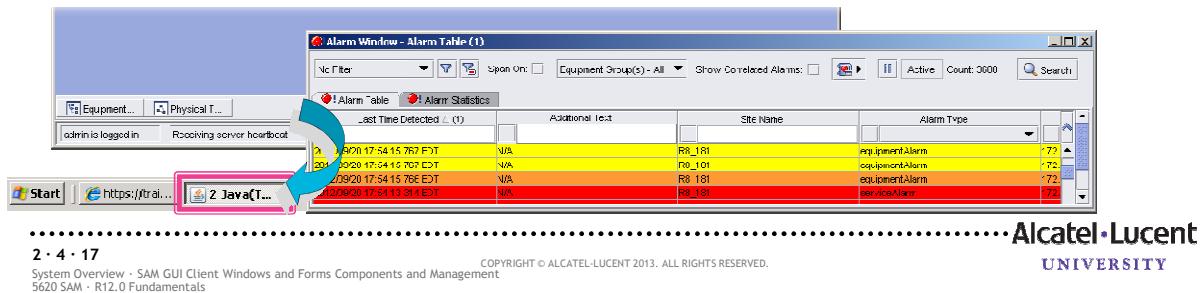
Not shown on SAM GUI task bar

Windows launched from an external window open as separate external windows

External windows cannot be moved back to the SAM GUI

Detached window managed by operating system

Window menu in the SAM GUI Menu Bar can bring external windows to the front



The selected window is detached as an external window. For this lab example, the second copy of the Dynamic Alrm list form is detached as an external window.

Note the following about the Dynamic Alarm List detached as external window:

- 5620 SAM GUI task bar does not display anymore the copy of the Dynamic Alarm List which has been detached as external window
- The detached external window is now managed by the operating system rather than the 5620 SAM GUI. External windows are placed into a group of open 5620 SAM windows on the operating system task bar [as shown in the figure above]
- Alarms in the detached Dynamic Alarm List are still being updated. That is because, any information displayed and/or configuration changes performed on an external window are still related to the SAM Server in the same manner as before the window was detached from the GUI.
- In multiple monitors display systems, an external windows can be moved and/or maximized on a separate monitor. For instance, allowing operators to have the SAM GUI opened on one screen and a detached Dynamic Alarm List on a separate screen.
- Any windows launched from an external window appear as separate external windows. For instance, double-clicking on an alarm listed on a detached Dynamic Alarm List will open the related Alarm Info form as a separate external window.
- From the 5620 SAM GUI:
 - External windows can be viewed and brought to the front using **Window** menu in the Menu Bar.
 - The Window menu contains an option to **Close All External SAM Windows**
- An external window cannot be moved back into the 5620 SAM GUI. The operator must close the external window and re-open it in the SAM GUI.

Knowledge Verification - GUI Window Management



Which of the following statements is FALSE about an external window?

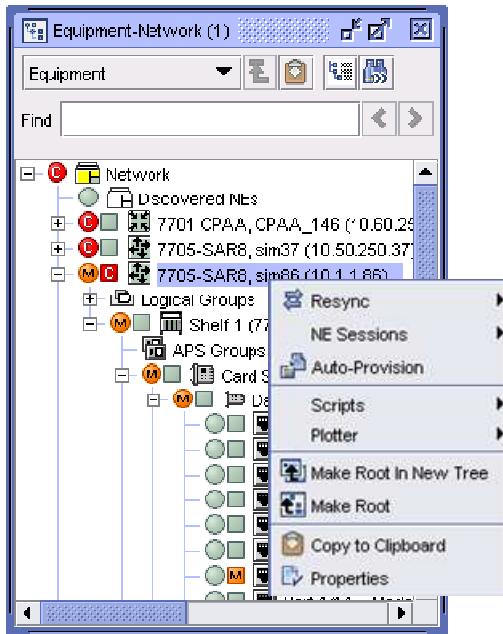
- a. It can be brought to the front using Window menu in the 5620 SAM GUI Menu Bar.
- b. Information displayed and configuration changes may not be linked to the SAM server.
- c. Windows launched from an external window open as separate external windows.
- d. It is managed by the operating system rather than the 5620 SAM GUI task bar.

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Choose the correct answer for the knowledge verification question above.

3 Contextual Menu

3.1 Contextual Menu Overview



Contextual menu presents options available for the selected object

Selecting an available option will open the appropriate window or configuration form

2 · 4 · 20

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A contextual menu allows network operators to select appropriate options available to an object in the SAM GUI.

To display the contextual menu:

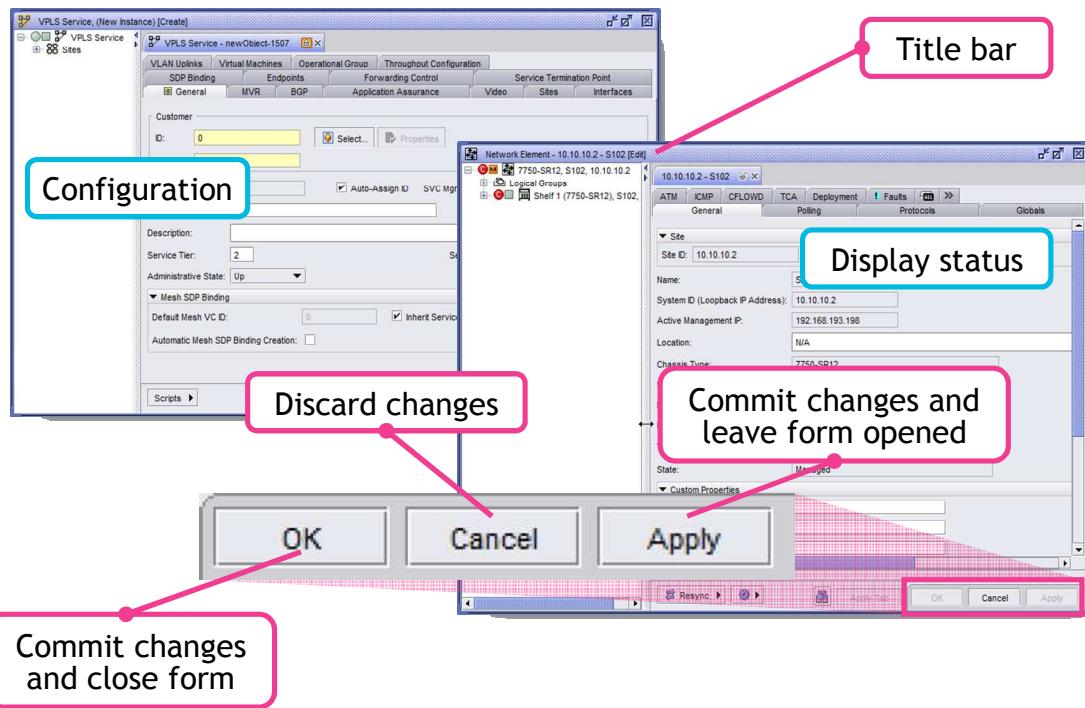
Select on an applicable object on the GUI.

Right-clicking on the object displays a contextual menu which presents the options available to that specific object.

The operator can select an available option from the contextual menu, as a result the appropriate window or configuration form appears on the GUI.

4 - 5620 SAM GUI Form Types and Components

4.1 GUI Forms Overview



2 • 4 • 22

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5620 SAM forms are used to:

- configure device and 5620 SAM parameters
- display the status of an object
- perform FCAPS (fault, configuration, accounting, performance, and security) operations

A form can be displayed anywhere in the GUI. A newly opened form is displayed in the foreground.

Each form has a title bar that displays the form name, and if applicable object information. The displayed object name is the name specified during object creation. If the object is not named, a default name is used.

The 5620 SAM GUI Task Bar displays one button per each of the forms and windows opened in the GUI, even minimized windows. When the user hovers the pointer over an button in the task bar, a tool tip displays the form's title as displayed in title bar information.

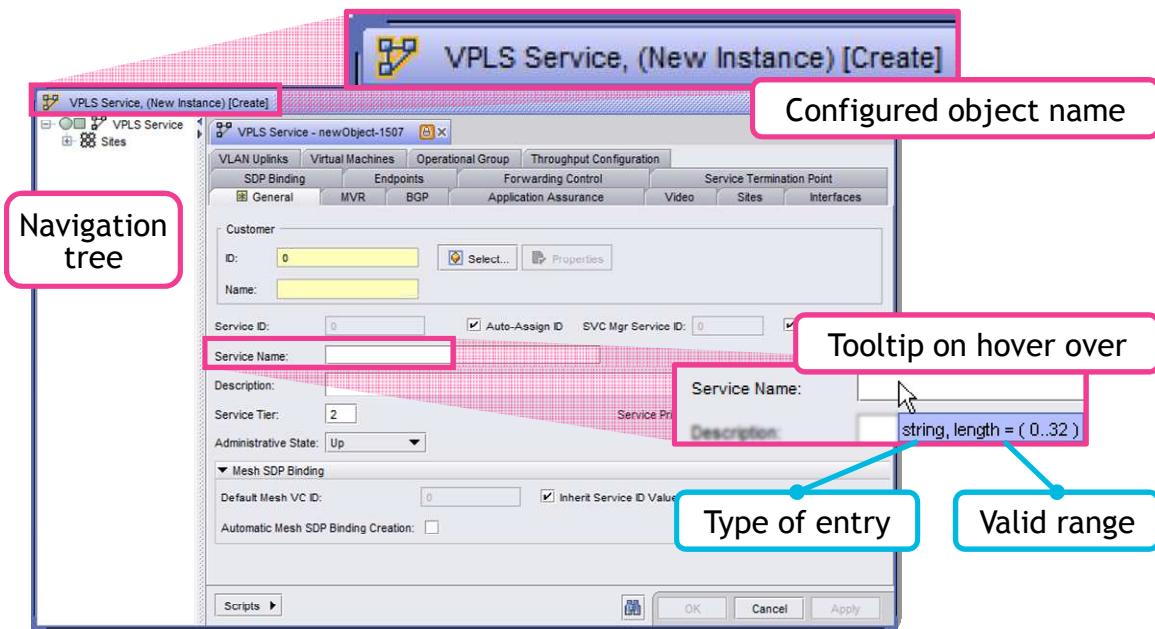
Most forms in the 5620 SAM GUI display in the bottom-left corner the Apply, Cancel, and OK buttons.

Clicking on the Cancel button shuts the window and any changes to the form are discarded.

Click on the Apply button to commit the changes to the form, and leaving the form opened.

Click on the OK button to commit the changes to the form, and to close the form.

4.2 Configuration Form



2 · 4 · 23
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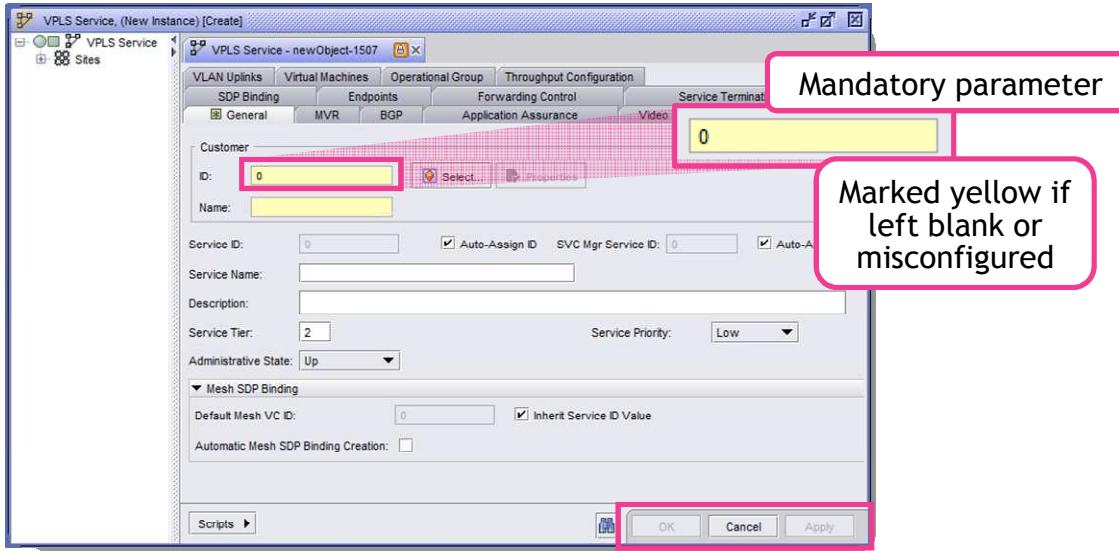
A configuration form allows operators to enter or select parameters for the configuration an object.

The title bar of a configuration form displays the form name, typically the name of the object to be configured and if applicable the site or parent object information. The title bar displays the legend [Create] in configuration form is used to create a brand new object.

When the operator hovers the pointer over a configuration parameter field, a tooltip display the type of entry required for the parameter (for instance, text string or numeric), followed by the valid range applicable to the parameter.

Some configuration forms present a navigation tree on the left side of form. This navigation tree can be used to create components of the configured object in the same form (e.g. create a VPLS site for a VPLS service), and to display components previously configured for the object in a single view.

4.2 Configuration Form [cont.]



OK and Apply buttons disabled if a mandatory field is left blank or misconfigured

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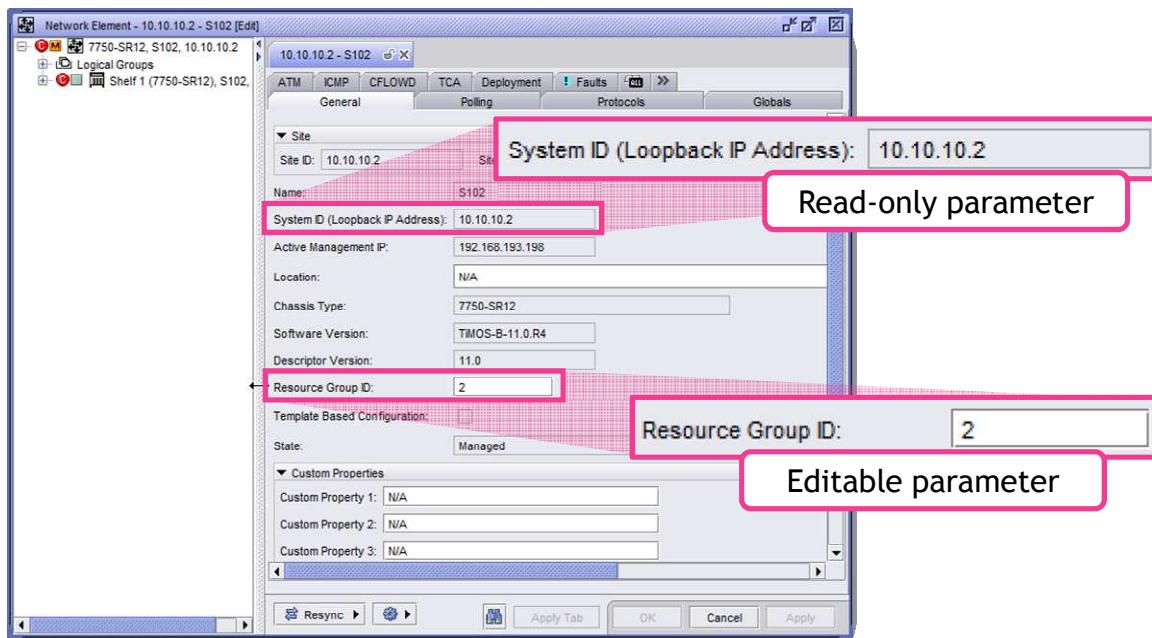
In configuration forms parameter fields marked in yellow indicate that the parameter is mandatory for the configuration, or that a mandatory parameter has either been configured in the incorrect format or with a value that is not within the valid applicable range for the parameter.



Note

The OK and Apply buttons in a configuration form are disabled if a mandatory field is left blank or configured in an incorrect format or range, even if other values have been changed on the form. When the mandatory field is updated, the OK and Apply buttons are enabled.

4.3 Properties Form



If a parameter is modified on the form, the OK and Apply buttons are enabled

A properties form displays the parameters configured for an object.

The properties form may display read-only parameters that were configured during the initial creation of the object and that cannot be modified or edited. Read-only parameters are dimmed on the form.

Selected parameters on the properties form can be modified or edited, depending on the object type. The OK and Apply buttons in a properties form are disabled when the form opens. If a parameter is modified on the form, the OK and Apply buttons are enabled.

4.3.1 Opening a Properties Form

Multiple ways to open a Properties form, including:

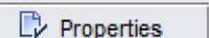
Navigation tree or map

Right-click on an object and select



List form

Select a listed object and click on



Alarm info form

Click on

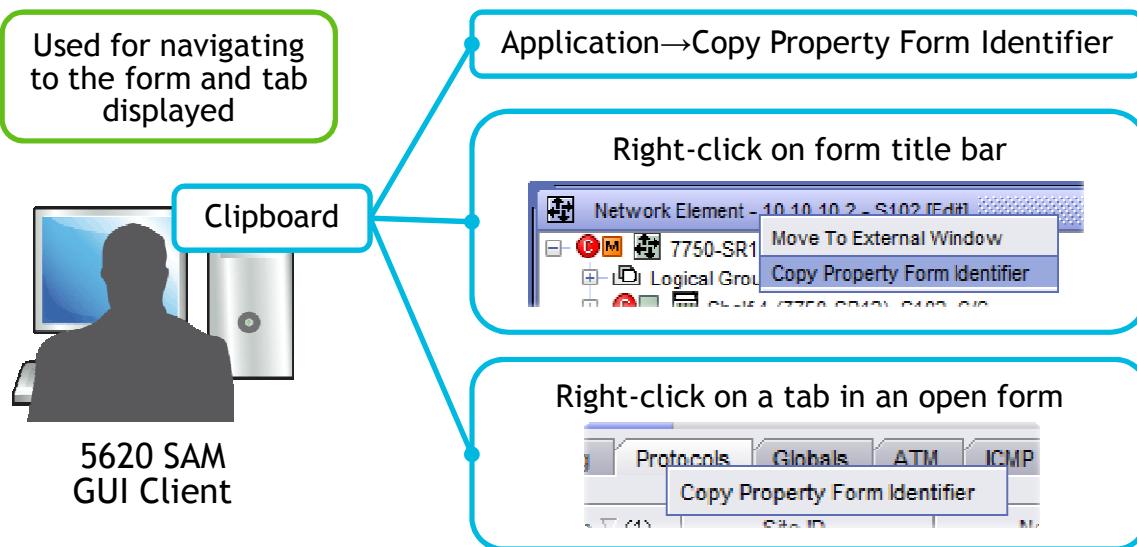


There are multiple ways to open a properties form in the 5620 SAM GUI, some of them include:

- Right clicking on an object in the navigation tree or in a map and choosing Properties from the contextual menu
- Selecting an object on a list form and clicking on the Properties button
- Clicking on the View Alarmed Object button on an Alarm info form

4.3.2 Properties Form Identifier Link

Unique internal address 5620 SAM assigns to a form



Applicable only to property, alarms and statistic forms

Each GUI properties form has an identifier link which is an unique internal address that the 5620 SAM assigns to a form or window. A property form identifier link can be used for navigating to the form it identifies, including a particular tab displayed on the form. An identifier link can be send to other SAM operators using the SAM GUI text message functionality.

Operators can use the 5620 SAM clipboard to save and copy property form identifier links. There are three possible methods to copy to the 5620 SAM clipboard the property form identifier link for an opened form:

- Choosing Application→Copy Property Form Identifier from the 5620 SAM main menu.
- Right-clicking on the open property form titlebar and choosing the Copy Property Form Identifier function from the contextual menu.
- Right-click on any tab in an open property form and choose the Copy Property Form Identifier function.

Note – The Copy Property Form Identifier is applicable only to property, alarms and statistic forms.

4.4 Collapsible Panels

In Properties and Configuration forms

Parameters are grouped in panels that can be collapsed or expanded

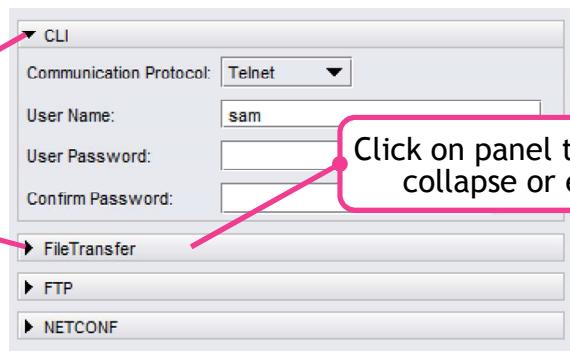
Right-click on a tab title to collapse or expand all panels in the tab



Expanded

Collapsed

Click on panel title bar to collapse or expand



The state of collapsible panels is retained when a form closes

2 · 4 · 28

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In properties forms and configuration forms, groups of parameters belonging to a common domain are contained in panels that can be collapsed to hide areas that are not of interest to the specific user or expanded to display all areas in a form.

To collapse or expand a panel, click on the title bar of the panel. In the title bar of the panel, a down pointing arrow indicates the panel is expanded, and a left pointing arrow is displayed when the panel is collapsed.

Operators can collapse or expand all of the panels on a tab by right-clicking on the tab title and then choosing the Collapse All Panels or Expand All Panels option.

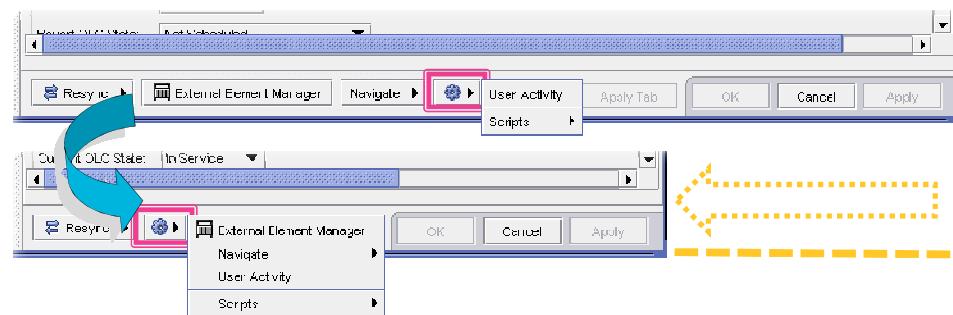
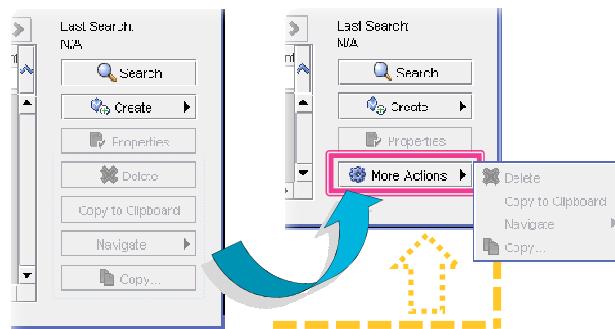
When a configuration or properties form closes, the current state of the collapsible panels is saved for that object type. When an user re-opens the configuration or properties form, the last saved state of the panels is displayed.

4.5 Resizing a Form Window

Buttons may appear on:

- right panel of list forms
- bottom of configuration forms

When resizing a form some buttons may not be visible.
Affected buttons become menu items on More Actions button



Buttons that do not fit are available by clicking on the More Actions button

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2 • 4 • 29

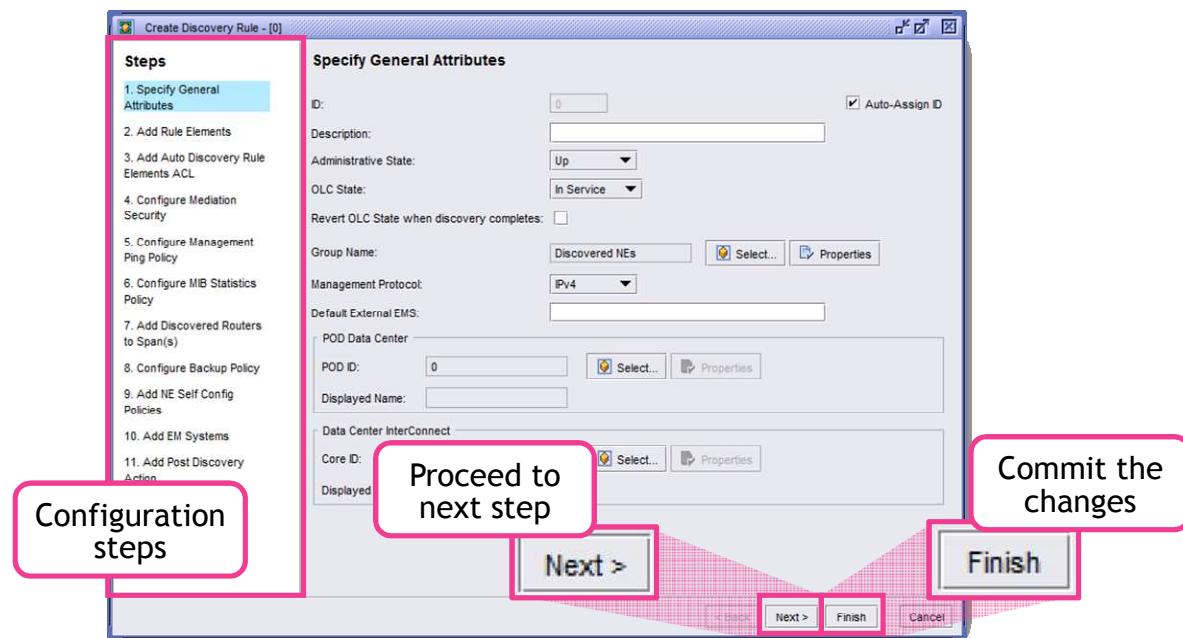
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Several buttons may appear on the right panel of list forms, and at the bottom of the 5620 SAM configuration and properties forms.

Buttons that do not fit on the form view are available as a menu item when you click on the More Actions button. In addition as of SAM R11.0, when a window form is resized some of the buttons may not be visible. The affected buttons become menu items when you click on the More Actions button.

4.6 Step Form



Some steps may open a new form. Complete new form to return to previous form

Some forms that are part of a configuration or provisioning procedure may lead the operator through configuration activities presented in a series of windows, each of which represents a step in the configuration process. Such a form is called a step form.

Operators must click on the Next button to proceed to the next step window.

The figure on the slide shows the first step in a step form sequence. When the configuration sequence is complete, the operator must click on the Finish button to commit the changes. Each step must be performed to complete the configuration activity.

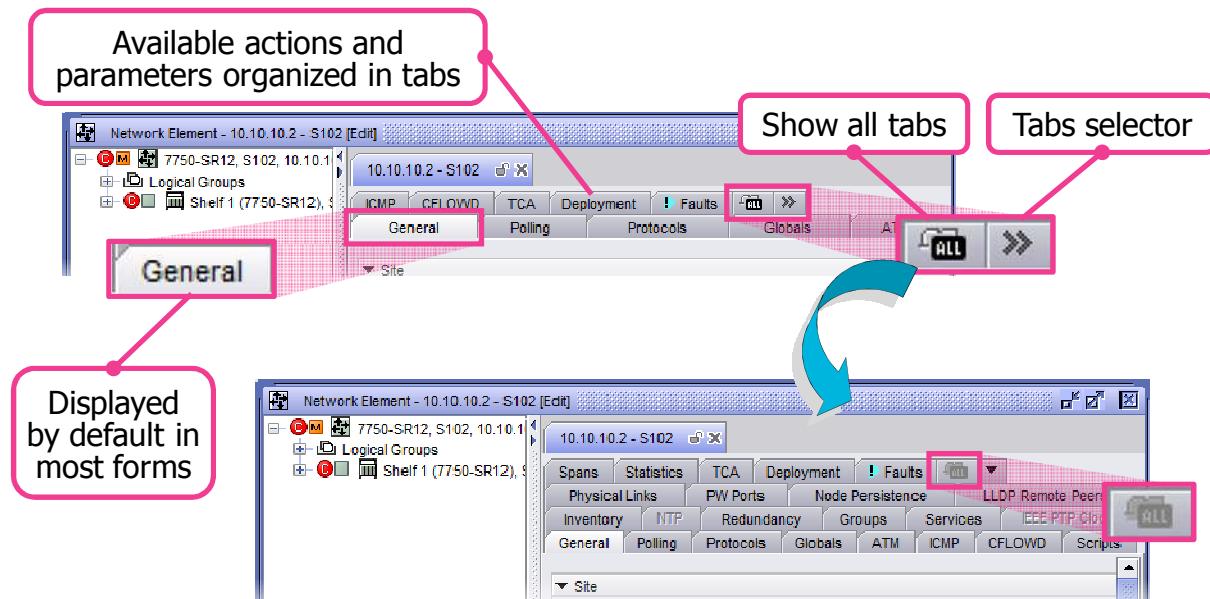


Note

Some steps may open a new step form. The operator must complete the steps in the new form before you can return to the previous form. After you click on the Finish button, the previous form reappears.

5 Tabs on 5620 SAM Forms

5.1 Tabs on 5620 SAM Forms Overview



Tabs displayed using the Show All Tabs button are hidden again when form reopens

2 • 4 • 32
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In properties forms, configuration forms and other windows and forms in the SAM GUI, all possible actions and parameters available using the form are organized in different tabs. As a result, some forms may contain multiple tabs depending on the complexity of the object the form represents.

In most multiple tab forms, the General tab is displayed by default.

In order to simplify the 5620 SAM GUI view, some forms open by default with hidden tabs. Operators can display selected hidden tabs or all tabs while the form is open by clicking on the tab selector or the **Show All Tabs** button.

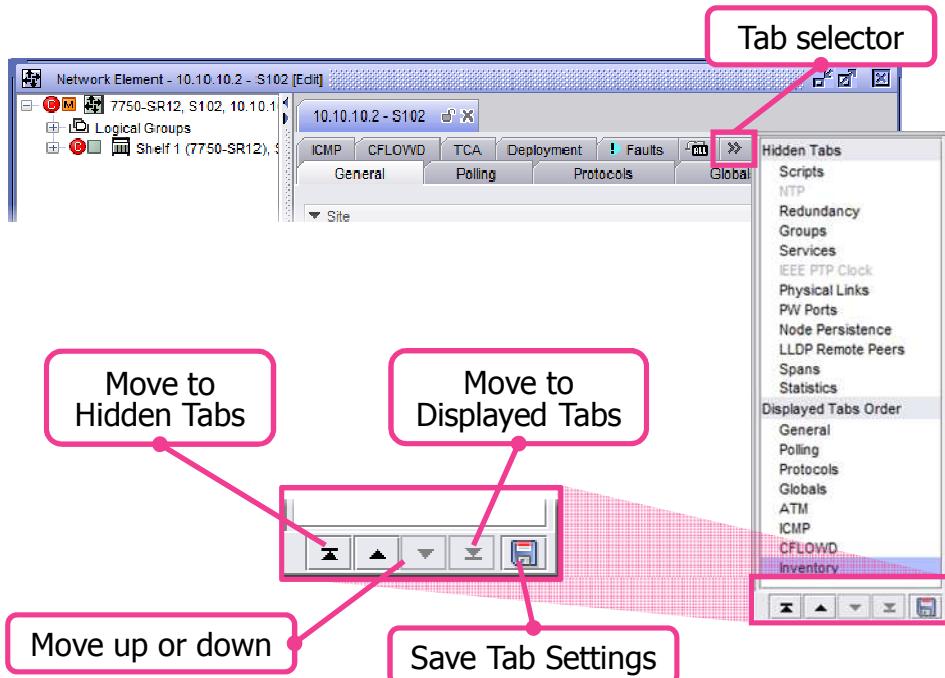
To temporarily display all hidden tabs, click on the **Show All Tabs** button on the right side of the form. The form displays all available tabs. In this case, as well as in cases where there are no available tabs hidden in the form, the **Show All Tabs** button is disabled.



Note

Tabs that are displayed this way are hidden again when the form is closed and reopened.

5.2 Custom Tab Display



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2 • 4 • 33

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Using the Tab selector button, operators can customize the display of tabs on configuration forms, and save the tab display preferences.

Each 5620 SAM operator can display, hide, or arrange the sequence of tabs on a configuration form to customize which tabs are visible for a specific object type according to their operational requirements.

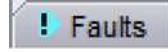
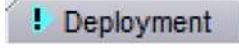
Custom settings for tabs on configuration forms are saved as user preferences. These preferences are not affected by a change of workspaces.

Note

A system administrator can configure the default behavior for custom tab configuration from the System Preferences form. See the 5620 SAM System Administrator Guide for more details.

5.3 Indicators on Tabs

Activity in progress or required attention

 General	Mandatory field requires data or contains incorrect format or range						
 Faults	Alarm raised against the object or a related object						
 Deployment	<p>Configuration change is not fully deployed to the NE</p> <p>Beside a parameter for which a deployment is:</p> <table border="0"> <tr> <td>High Bandwidth Source: </td> <td></td> <td></td> </tr> <tr> <td></td> <td>In progress</td> <td>Has failed</td> </tr> </table>	High Bandwidth Source: 				In progress	Has failed
High Bandwidth Source: 							
	In progress	Has failed					

2 • 4 • 34

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Indicators on tabs inform operators of activity that is in progress or requires attention, and can appear and disappear depending on the activity that is occurring in the 5620 SAM.

A yellow asterisk on a tab or panel title in a configuration form indicates that a mandatory field required data, contains an incorrect data format, or has been configured outside the available range.

A blue warning indicator appears on the Faults tab when the 5620 SAM has raised alarms against the object or a related object.

A blue warning indicator appears on the Deployment tab when a configuration change is not fully deployed to an NE. In addition, a deployment icon appears beside all of the parameters on an object properties form for which a deployment is in progress (yellow icon) or has failed (red icon).

6 Lists on 5620 SAM Windows and Forms

6.1 Lists on 5620 SAM Windows and Forms Overview

Many of the 5620 SAM windows and forms are lists of objects

generate inventories of the listed data

reorganize information from most to least important

Site ID	Site Name	Name	System Description	System ID (Loopback IP Address)
38.120.185.100	7750-100	7750-100	N/A	38.120.185.100
38.120.185.194	CPAA_194	CPAA_194	N/A	38.120.185.194
38.120.185.195	CPAA_195	CPAA_195	N/A	38.120.185.195
38.120.185.101	sim101	sim101	N/A	38.120.185.101
38.120.185.102	sim102	sim102	N/A	38.120.185.102
38.120.185.103	sim103	sim103	N/A	38.120.185.103
38.120.185.104	sim104	sim104	N/A	38.120.185.104
38.120.185.105	sim105	sim105	N/A	38.120.185.105
38.120.185.106	sim106	sim106	N/A	38.120.185.106
38.120.185.107	sim107	sim107	N/A	38.120.185.107
38.120.185.108	sim108	sim108	N/A	38.120.185.108
38.120.185.109	sim109	sim109	N/A	38.120.185.109
38.120.185.07	sim07	sim07	N/A	38.120.185.07

remove columns of data that are not of interest

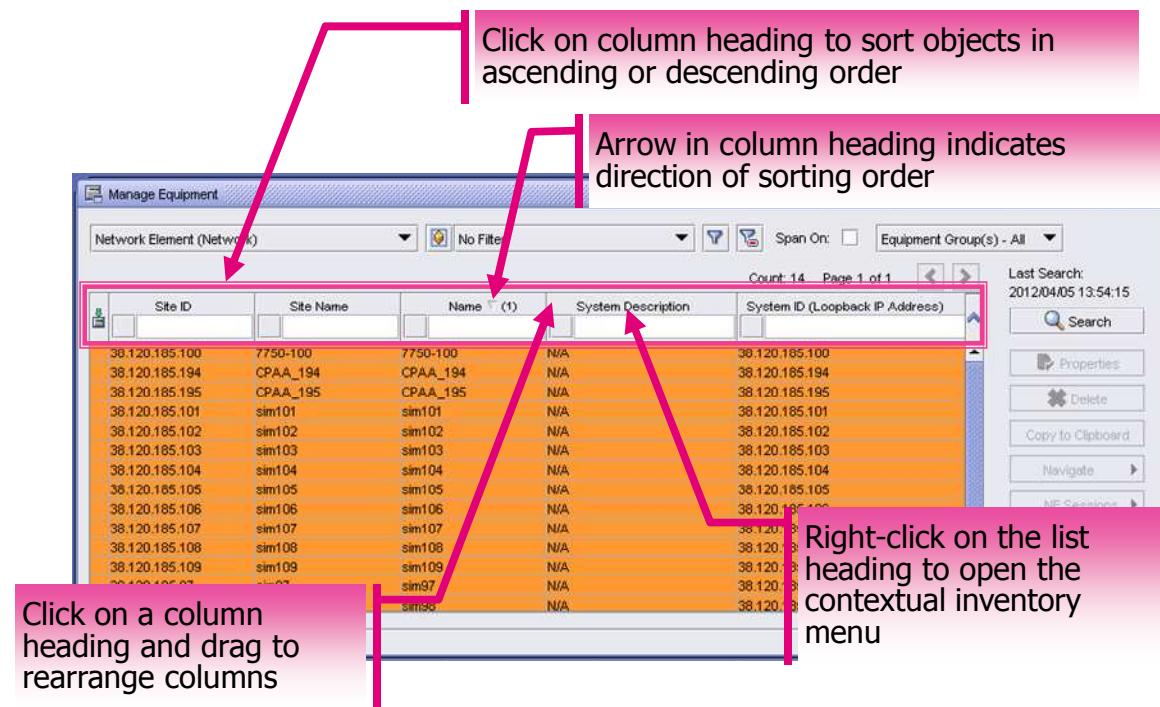
sort listed information in ascending or descending order

Many of the 5620 SAM windows and forms are lists of network objects. For example, lists of ports from the equipment window, displaying all the ports on a specific card.

Most lists, allow operators to:

- generate inventories of the listed data
- reorganize the information from most important to least important
- remove columns of data that are not of interest
- sort listed information in ascending or descending order

6.2 List Form Elements – Column Heading

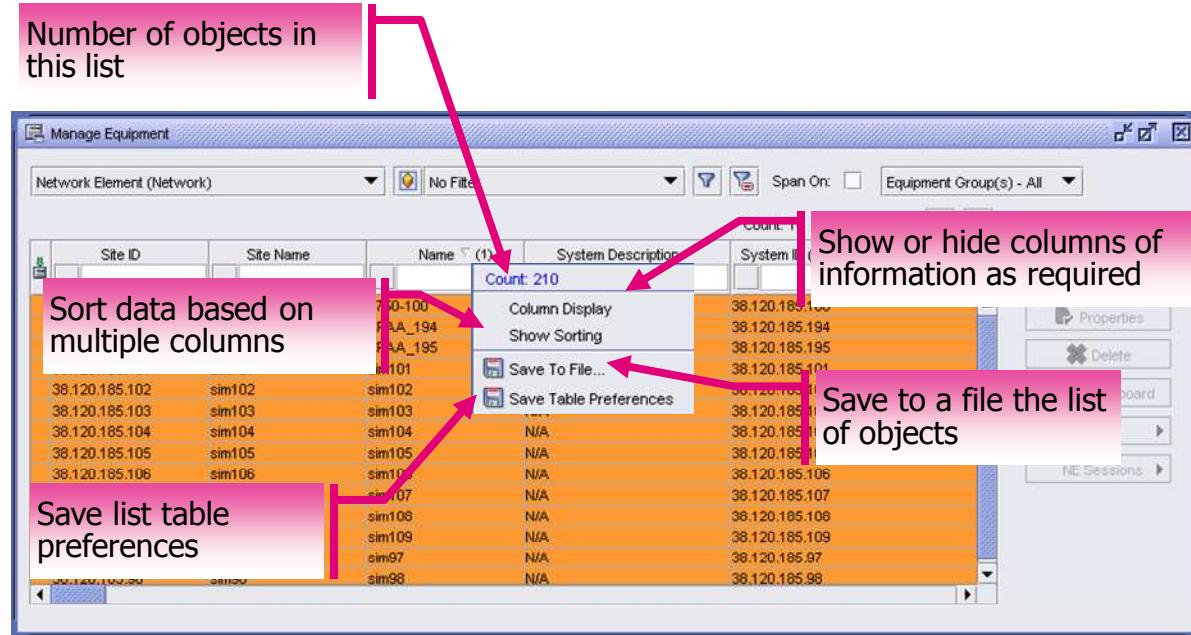


Use the column headings on most 5620 SAM list forms to perform the following actions:

- reorganize the information, click on a column and drag the column to the right or left and drop the column in the appropriate location.
- sort in ascending or descending order, click on the column heading. The arrow direction changes, indicating the order in which the data is sorted.
- navigate quickly through a long sorted list, type a letter to move directly to the first item in the list that starts with that letter.

The figure above shows the major elements of a 5620 SAM list form.

6.3 Contextual Inventory Menu



2 · 4 · 38
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 5620 SAM · R12.0 Fundamentals

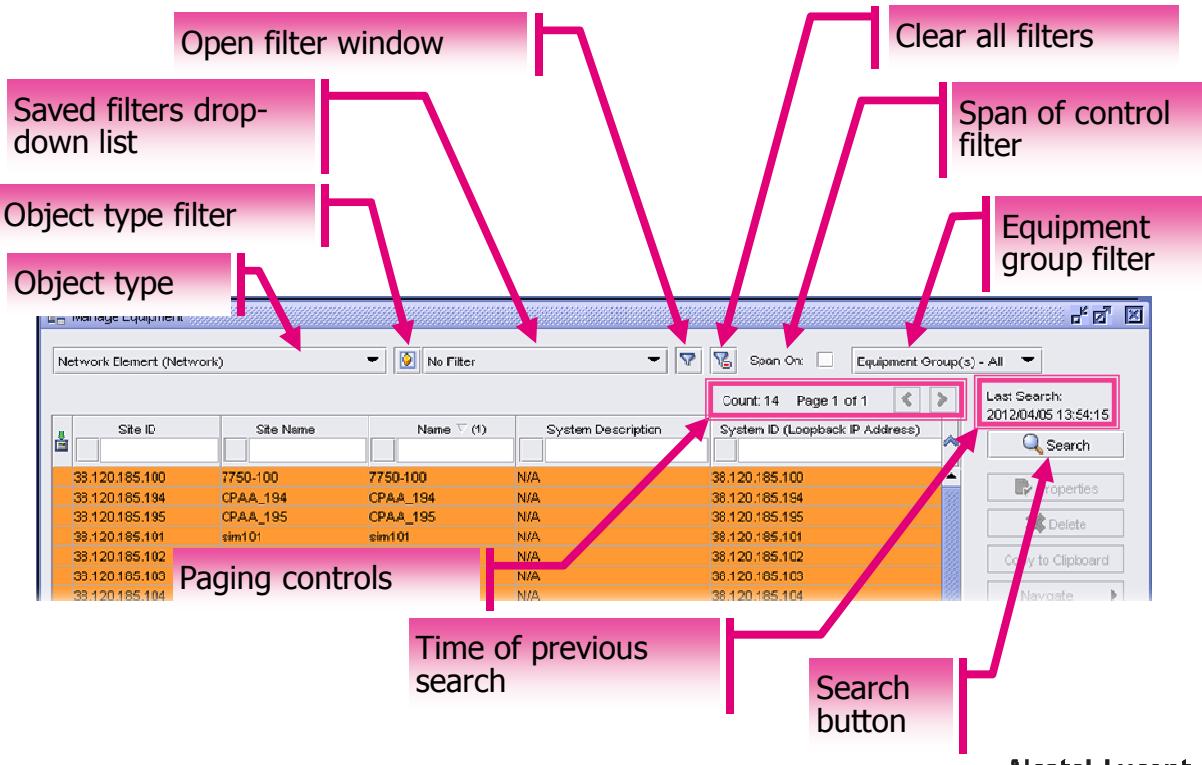
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Right-click on the list heading to open the contextual inventory menu which allows to perform the following actions:

- generate an inventory of data, the **Count** indicates the number of objects in the list.
- remove list columns by choosing **Column Display** and using the **Column Display** window to choose the columns to be removed from the table. The selected columns disappear from the display.
- determine the sort order of how listed information is displayed. **Show sorting** allows operators to choose the one or more properties from the Available for Sorting panel to sort data on ascending or descending order based on one or multiple columns.
- save to a file a copy of listed information, including inventory of objects. The saved information may be used for record keeping, inventory management or processing by another application. The listed information can be saved to file in the following formats:
 - HyperText Markup Language (HTML) file format
 - Comma-separated values (CSV) file format
- save results list preferences. When similar searches on similar objects are performed, the output of the list is organized according to the saved preferences.

The figure above shows the elements of the contextual inventory menu.

6.4 Search and Filtering Functions



2 • 4 • 39
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The 5620 SAM list form allows operators to search for objects in the list. Most SAM list forms are not self-populated by default and display the legend “Click on the Search button” when first opened. The operator must click on the **Search** button to populate the list performing a search and to refresh the listed items. The time of previous search displays the date and time at which the last search was performed. As shown in the figure above.

After performing a search, a list form enables operators to manage the results, for example, view or edit object information, or delete objects.

The figure above shows a filterable list form that displays the following listed items:

- number of returned search items
- time of the most recent search
- filter controls for refining the list of returned search items
- paging controls for browsing through multiple pages of returned search items

When the number of search results exceeds the allowed limit, the 5620 SAM displays a dialog box that indicates the number of results returned. Filter options can be used to refine the search criteria and limit the search results.

A search returns one page of results at a time. The number of items per page can be configured on the User Preferences form. The paging controls on a list form become active when the number of items returned exceeds the page limit. These controls can be used to move sequentially through the pages of listed information or jump directly to a specific page.

The 5620 SAM allows to save and reuse multiple search filters in list forms and maps. Only the saved filters of the current object type and ancestor types are available. An advanced filter form can be used to refine the search criteria using literal values, and different kinds of operators, such as arithmetic and Boolean.

6.5 Dynamic Alarm List

Alarm Counter

Alarm details

Alarm Table

Alarm Statistics

Alarm Counter

Alarm details

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The Dynamic Alarm List is a particular example of a SAM List form. It provides the network operator information relating to outstanding alarms in the network which is displayed under the **Alarm Table** and **Alarm Statistics** tabs.

Unlike other SAM list forms, the Dynamic Alarm List is dynamically updated to display alarms raised against managed objects.

Alarm Table - provides the network operator or administrator with a count and list of the total number of outstanding alarms in the network.

Alarm Statistics - provides the network operator or administrator with the number of acknowledged and unacknowledged outstanding alarms displayed by alarm severity.

Alarms are reported in accordance with the ITU-T X.733 method of reporting which includes alarm classification and its associated color coding which will be discussed in a later module.

Knowledge Verification - GUI Window Management



Which of the following statements is FALSE about 5620 SAM list forms?

- a. List forms allow operators to generate inventories of the listed data.
- b. List forms provide search and filtering mechanisms to limit the amount of listed information.
- c. List forms allow rearranging columns and removing columns of data that are not of interest.
- d. All list forms automatically self-populate and self-update to always display the most recent information in the list.

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Choose the correct answer for the knowledge verification question above.

Questions



2 · 4 · 42

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5620 SAM · R12.0 Fundamentals

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1. Information displayed on an external window and configuration changes made on it may not be linked to the SAM server. True or False? (Choose all that apply)
 - a. True
 - b. False
1. An External window is managed by the operating system rather than the 5620 SAM GUI task bar but can be brought to the front using Window menu in the 5620 SAM GUI Menu Bar. True or False?
 - a. True
 - b. False
2. 5620 SAM list forms allow operators to generate inventories of the listed data, and provide search and filtering mechanisms to limit the amount of listed information. True or False?
 - a. True
 - b. False
3. All 5620 SAM list forms automatically self-populate and self-update to always display the most recent information in the list. True or False?
 - a. True
 - b. False
4. On a 5620 SAM list form when the Span On filter parameter is enabled, the objects displayed in the list are limited to those on the Edit Access span of the user. True or False?
 - a. True
 - b. False

Answers



1. Information displayed on an external window and configuration changes made on it may not be linked to the SAM server. True or False? (Choose all that apply)
 - a. True
 - b. False ✓
2. An External window is managed by the operating system rather than the 5620 SAM GUI task bar but can be brought to the front using Window menu in the 5620 SAM GUI Menu Bar. True or False?
 - a. True ✓
 - b. False
3. 5620 SAM list forms allow operators to generate inventories of the listed data, and provide search and filtering mechanisms to limit the amount of listed information. True or False?
 - a. True ✓
 - b. False
4. All 5620 SAM list forms automatically self-populate and self-update to always display the most recent information in the list. True or False?
 - a. True
 - b. False ✓
5. On a 5620 SAM list form when the Span On filter parameter is enabled, the objects displayed in the list are limited to those on the Edit Access span of the user. True or False?
 - a. True ✓
 - b. False

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This module covered:

- The options available in the 5620 SAM for GUI windows management
 - Identify the characteristics and possible applications of external windows
- Characteristics and function of the contextual menus for a GUI object
- The 5620 SAM GUI form types, its function and components
- The options to manage tabs, and the available tab indicators on 5620 SAM Forms
- Capabilities available for lists on 5620 SAM windows and forms
- List form elements, list inventory options and list search and filtering functions



End of module

SAM GUI Client Windows and Forms Components and Management

2 · 4 · 46

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Section 2 System Overview

Module 5 Finding Information in SAM GUI Client

TOS36033_V4.0-SG-R12.0-Ed1 Module 2.5 Edition 1

5620 SAM
R12.0 Fundamentals
TOS36033_V4.0-SG Edition 1

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2.3	2012-10-30	GARCIA LOZANO, René	TOS36033_V2.3 – SAM 10.0 (MyPLE and WBT)
3.0	2013-06-20	GARCIA LOZANO, René	TOS36033_V3.0 – SAM 11.0 (update)
4.0	2014-05-26	GARCIA LOZANO, René	TOS36033_V4.0 – SAM 12.0 (update)



Upon completion of this module, you should be able to:

- Identify the high-level steps necessary to find information in the 5620 SAM GUI:
 - contained in list forms using:
 - Simple search - using the column heading
 - Advanced search - using filters
 - Topology Group filters
 - displayed in Navigation tree using the find function
 - by locating an attribute or parameter in a configuration form

2 · 5 · 3

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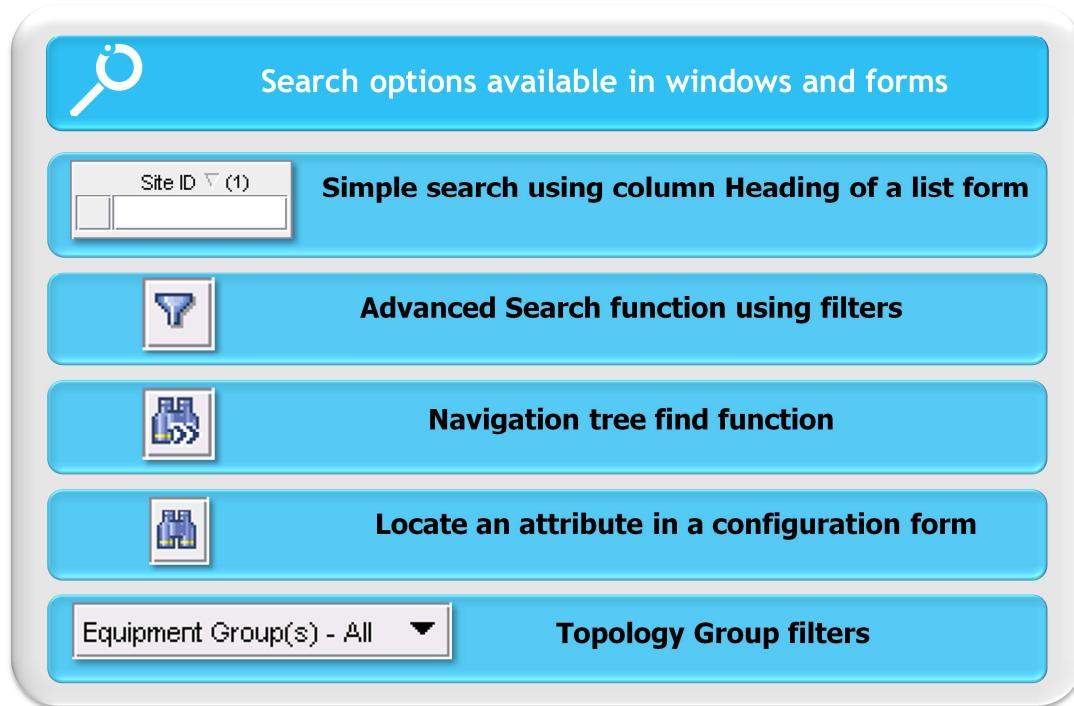


	Page
1 Finding Information in Windows and Forms	7
1.1 Finding Information – Options Overview	8
2 Finding Information in List Forms	9
2.1 Search Using Column Heading of a List Form	10
2.1.1 Configuring a Column Heading Filter Criteria	11
2.2 Advanced Search Function Using Filters	12
2.2.1 Defining an Advanced Search Filter Criteria	13
2.3 Topology Group Filters	14
3 Finding Information in the Navigation Tree	15
3.1 Navigation Tree Find Function	16
4 Finding Attributes and Parameters in Forms	17
4.1 Locate an Attribute or Parameter in a Form	18

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1 Finding Information in Windows and Forms

1.1 Finding Information – Options Overview



2 · 5 · 8

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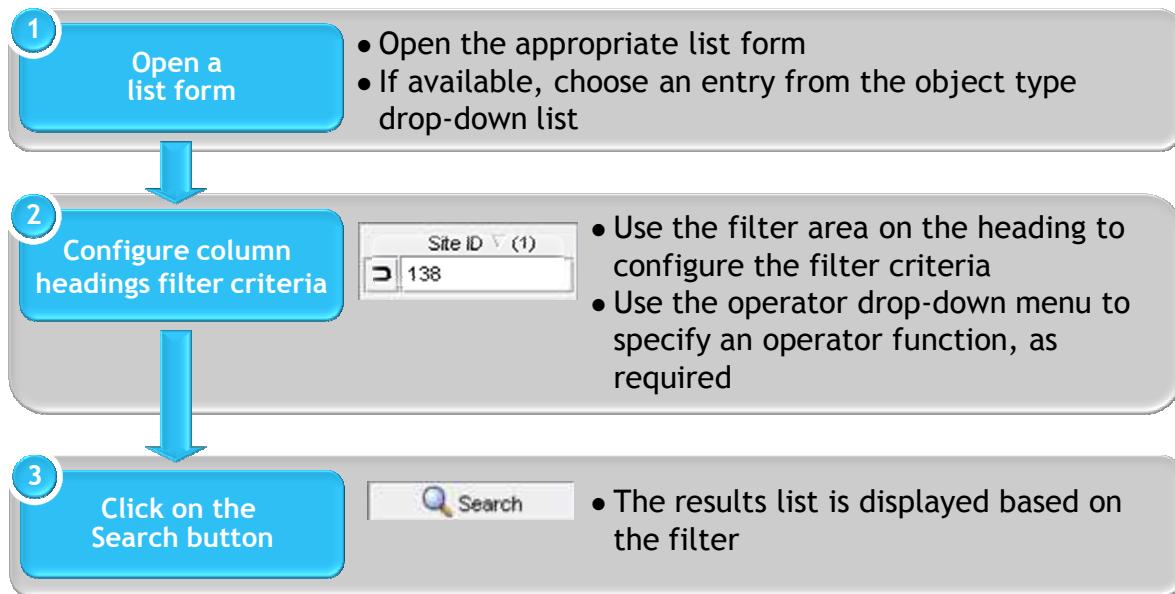
The 5620 SAM offers multiple ways to find information of interest using search options available in GUI windows and forms:

- Simple search using the column heading of a list form
- Advanced Search function using filters
- With the navigation tree
- Locate an attribute in a configuration form: useful function when the forms include multiple tabs containing large numbers of parameters
- Topology Group filters: this function is used to limit the research domain to a hierarchical group created for the physical topology map.

The workflow for each of these search methods is detailed on the next pages.

2 Finding Information in List Forms

2.1 Search Using Column Heading of a List Form



Manage the information displayed on a list form by refining the list of items

2 · 5 · 10

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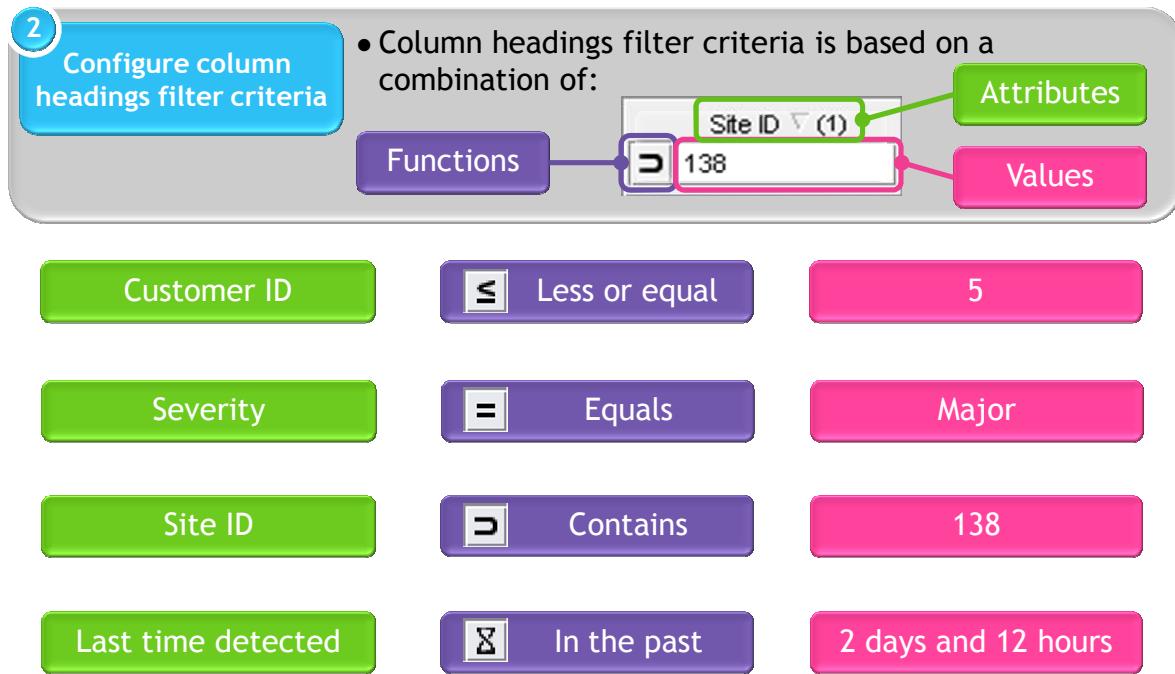
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To manage the information displayed on a list form operators can use the form's column headings to refine the list of items.

The following workflow outlines the high-level steps necessary to perform a search on list forms using the column headings:

1. Open the appropriate list form. If available, choose an entry from the object type drop-down list
2. Configure the column headings filter criteria. Use the filter area on the heading of a column of interest to configure the filter criteria. Use the operator drop-down menu to specify an operator function, as required
3. Click on the Search button to perform the search. The results list is refreshed displaying items based on the filter criteria.

2.1.1 Configuring a Column Heading Filter Criteria



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In order to configure a column heading filter criteria, operators must note that the filter criteria is based on a combination of: attributes, operator functions, and values.

When searching for objects with a numeric ID value, the criteria can include function operators such as ON LESS THAN, LESS OR EQUAL, EQUALS, GREATER OR EQUAL, GREATER THAN, or NOT EQUAL .

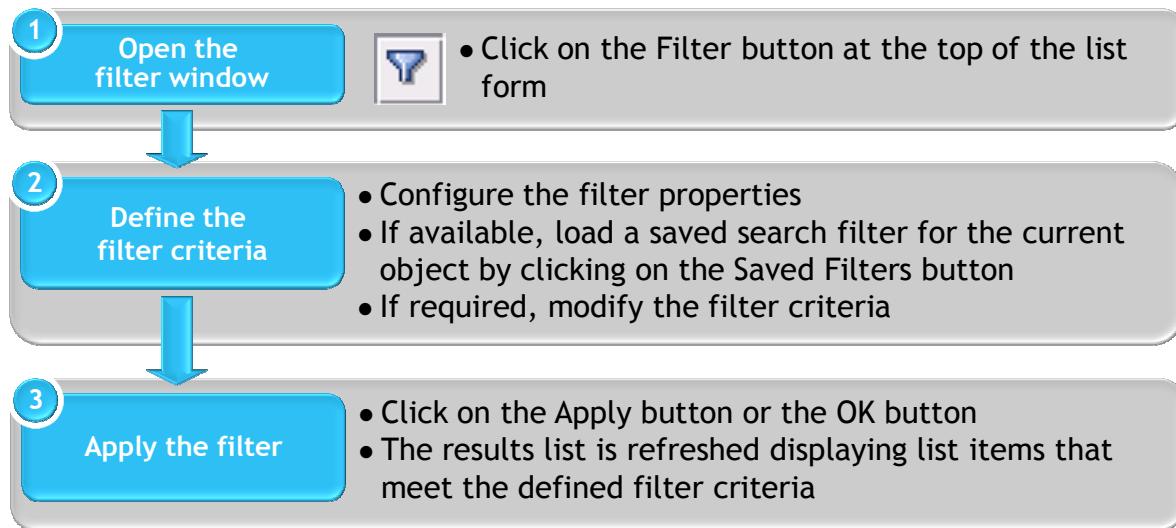
For text-type parameters, the criteria can include operator functions such as EQUALS, CONTAINS, DOES NOT CONTAIN, NOT EQUAL, IS BLANK or WILDCARD. Consider the following:

- Filters can be based on letters, numbers, and special characters.
- Search filters are typically case-insensitive; a search on 'ABC' and 'abc' returns the same list. WILDCARD searches, however, are case-sensitive.

For timestamp fields, such as Last Time Detected field in the Alarm Window, the search criteria can include special function operators such as IN THE PAST, which returns only items that have a time stamp between the specified time and the present.

2.2 Advanced Search Function Using Filters

Advanced search that use multiple criteria to obtain more precise results



Column headings filter areas are disabled if a filter is applied using the filter window

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Operators can perform advanced searches that use multiple criteria to obtain more precise results.

The following workflow outlines the high-level steps necessary to perform an advanced search using filters:

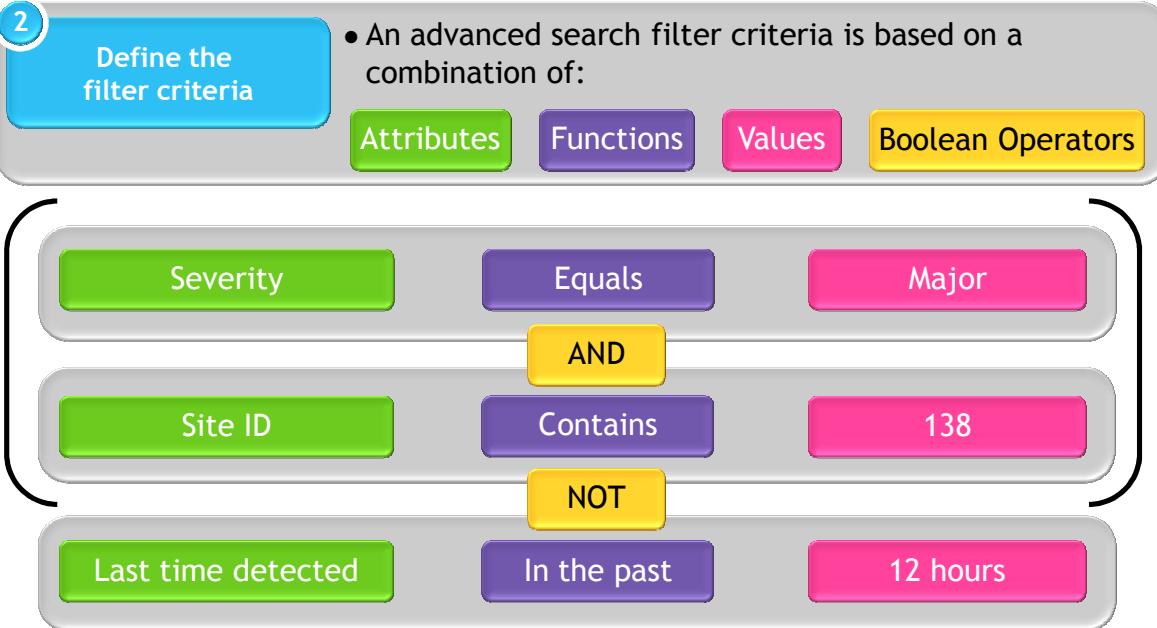
1. Open the filter window by clicking on the Filter button at the top of the list form.
2. Define the filter criteria. Configure the filter properties. Or, if available, load a previously saved search filter for the current object by clicking on the Saved Filters button. All the properties of the filter window are replaced with the contents of the saved filter. If required, operators may modify the saved filter criteria.
3. Apply the filter. Click on the Apply button or the OK button. The results list is refreshed displaying list items that meet the defined filter criteria.

Note

The filter areas of the column headings in a List Form are disabled if a filter is applied using the filter window, if the filter window is open, or if a saved filter was loaded using the saved filters drop-down list.



2.2.1 Defining an Advanced Search Filter Criteria



Boolean operators are used to limit and expand searches to the criteria

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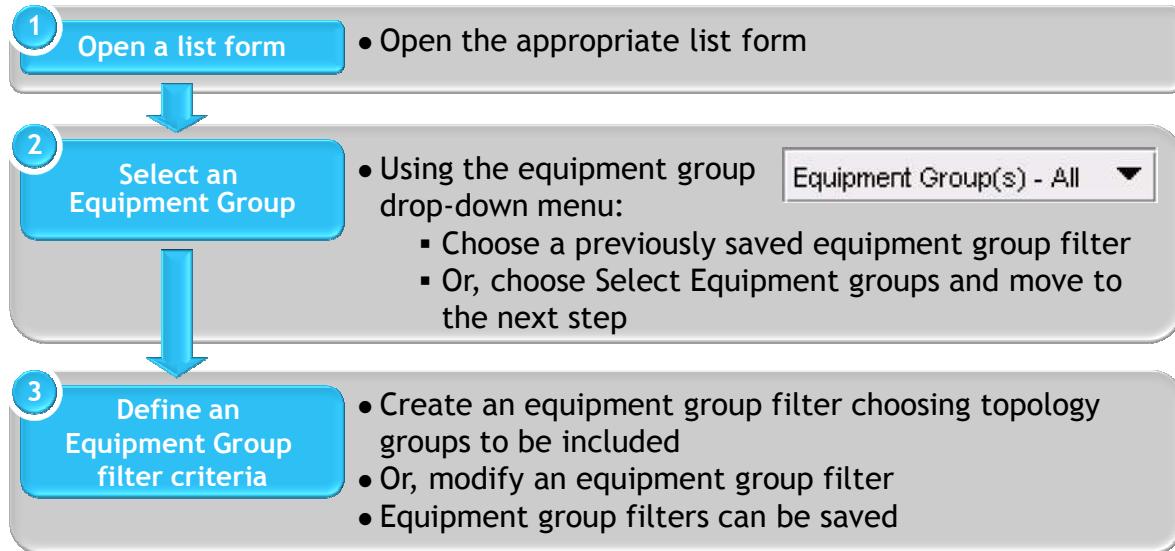
In order to perform an advanced search, the filter criteria definition is based on a combination of: attributes, operator functions, values, and Boolean operators.

In addition to attributes, functions and values, Boolean operators are used to limit and expand searches to the criteria that are specified in the search expressions. Boolean operators can be nested to combine several search expressions into one search expression.

For example, an operator can perform an advanced search defining a filter criteria to limit the alarms listed on the dynamic alarm window to those of major severity detected from sites containing 138 on the site ID, but excluding those received over the last 12 hours.

2.3 Topology Group Filters

Create search filters based on pre-existing topology groups



Equipment group filters can return up to 12 000 elements

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The equipment group filters allow operators to search globally for new alarms, historical alarms, managed equipment objects, and managed service objects by equipment that is organized by topology group.

The following workflow outlines the high-level steps necessary to locate an attribute in a configuration form:

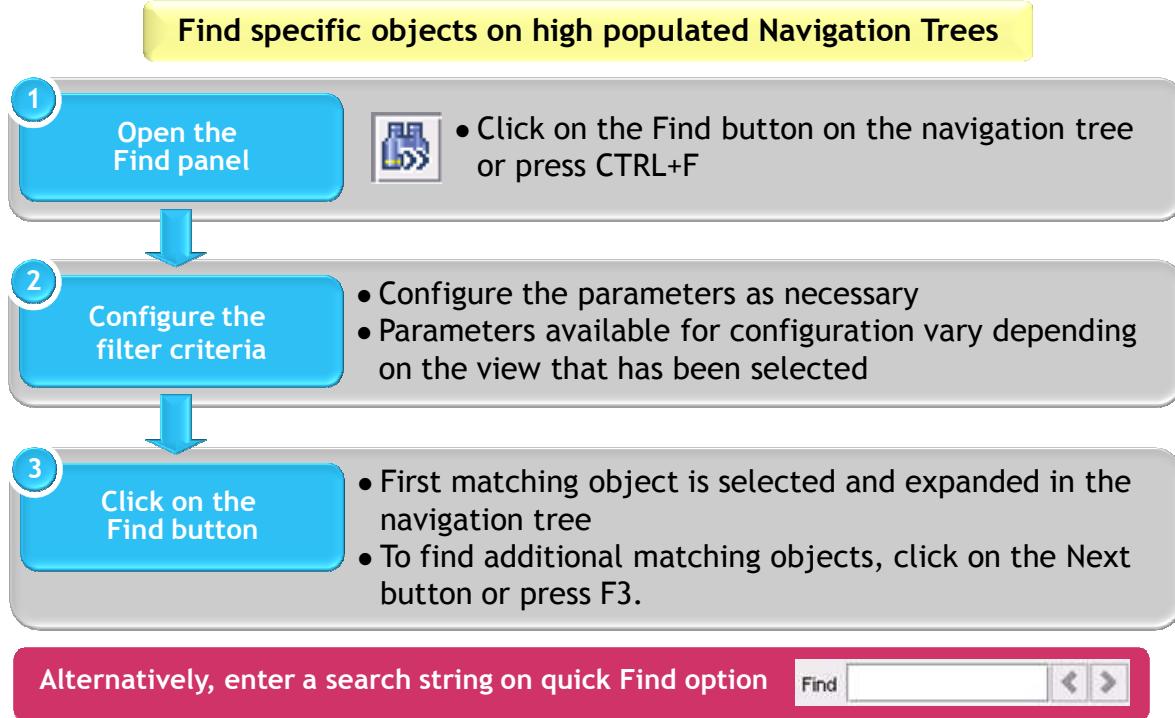
1. Open the appropriate list form. If available, choose an entry from the object type drop-down list
2. Select an Equipment Group. Using the form's equipment group drop-down menu, perform one of the following:
 - a. Choose a previously configured and saved equipment group filter. The results list is displayed based on the selected equipment group filter and any additional filters that are applied to the list.
 - b. Or, choose Select Equipment groups to open the Select Equipment Groups form and move to the next step to define an equipment group filter criteria.
3. Define an Equipment Group filter criteria. An equipment group filter is created by choosing existing topology groups. On the Select Equipment Groups form perform one of the following:
 - a. Create an equipment group filter choosing the topology groups that need to be included in the filter. To include data from nodes that are in equipment subgroups in the equipment group filter, select the Include contained Equipment Groups check box.
 - b. Modify a previously saved equipment group filter, use the Save Filter button to open the Save Filter form, selecting a filter and click on the Load button. The selected filter is displayed in the Select Equipment Groups form. Modify the filter as required.

Equipment group filters can be saved for future use. The filter name assigned to a saved filter is added to the equipment group drop-down list.

Equipment group filters can return up to 12 000 elements. If the limit is exceeded, the user is prompted to modify the filter to reduce the number of elements within the limit. Additionally, if you choose an equipment group filter that includes a topology group that has been modified since the filter was applied, an icon appears beside the equipment group filter drop-down list prompting you to press the Search button to update the filter.

3 Finding Information in the Navigation Tree

3.1 Navigation Tree Find Function



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The operator can use the navigation tree to find function to search for specific objects on high populated trees. These objects include nodes, shelves, ports, and more.

The following workflow outlines the high-level steps necessary to perform a search for specific objects in the navigation tree:

1. Click on the Find button on the navigation tree or press CTRL+F with the Navigation Tree window selected on the GUI. The Find panel opens.
2. Configure the parameters as necessary. The parameters that are available for configuration vary depending on the view that has been selected.

Examples:

- With The Routing View:
 - Site Id, Site Name, management IP address, Routing Instance ID
 - OSPFv2 area Id, OSPFv2 Interface Id, ...
 - Static route destination ...
- With the Equipment View:
 - Site Id, Site Name, Management IP address
 - Shelf Number, Card slot Number, Daughter Card Slot Number, Port Number..

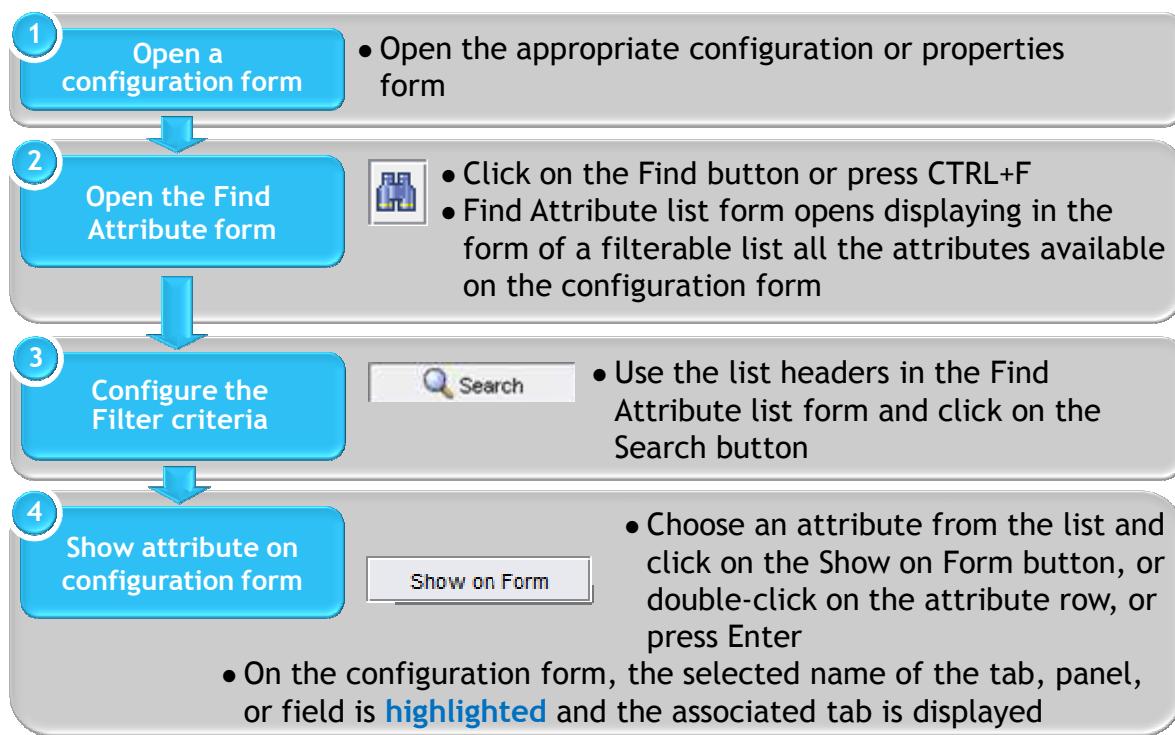
3. Click on the Find button or press Enter. The first matching object is selected and expanded in the navigation tree.

To find additional matching objects, click on the Next button or press F3. The next matching object is selected and expanded in the navigation tree. To return to the previous matching object in the navigation tree, click on the Previous button or press Shift+F3

Alternatively, operators may also use the Navigation Tree quick Find option by entering a search string. for example, a number, an IP address, a name, a software version, or any attribute that has been defined in the label.

4 Finding Attributes and Parameters in Forms

4.1 Locate an Attribute or Parameter in a Form



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In order to find parameters in a configuration or properties form that may have multiple tabs containing large numbers of parameters, the forms display a find button.

The following workflow outlines the high-level steps necessary to locate an attribute in a configuration form:

1. Open the appropriate configuration or properties form. For example, open the Dynamic LSP properties form to check the configuration of a dynamic LSP.
2. Open the Find Attribute list form. Click on the Find button (shown in the figure above) or press CTRL+F with the configuration form selected on the GUI. The Find Attribute list form opens displaying in the form of a filterable list all the attributes available on the configuration form.
3. Configure the filter criteria using the list headers in the Find Attribute list form and click on the Search button. For example, using the Find Attribute list form for the Dynamic LSP properties form search for parameters containing “Fast reroute”.
4. Show attribute on configuration form. Choose an attribute from the list and perform one of the following:
 - a. click on the Show on Form button
 - b. double-click on the attribute row
 - c. press Enter

On the configuration form, the selected name of the tab, panel, or field is highlighted and the associated tab is displayed



Note

For configuration forms that can display multiple objects simultaneously, such as the service configuration forms, the search is performed only on the selected object.

Questions



2 · 5 · 19

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1. In order to find information on a list form, the column heading filter criteria is based on a combination of attributes, functions, and values. True or false?
 - a. True
 - b. False

2. When using the Find (Binoculars icon) button to locate an attribute in a configuration form, what is the expected result is that the first matching object will be selected and expanded in the navigation tree. True or False?
 - a. True
 - b. False

Answers



1. In order to find information on a list form, the column heading filter criteria is based on a combination of attributes, functions, and values. True or false?
 - a. True ✓
 - b. False

2. When using the Find (Binoculars icon) button to locate an attribute in a configuration form, what is the expected result is that the first matching object will be selected and expanded in the navigation tree. True or False?
 - a. True
 - b. False ✓



This module covered:

- the high-level steps necessary to find information in the 5620 SAM GUI:
 - contained in list forms using:
 - Simple search - using the column heading
 - Advanced search - using filters
 - Topology Group filters
 - displayed in Navigation tree using the find function
 - by locating an attribute or parameter in a configuration form



End of module
Finding Information in SAM GUI Client

2 · 5 · 22

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Section 2
System Overview

Module 6 SAM GUI Client Workspaces

TOS36033_V4.0-SG-R12.0-Ed1 Module 2.6 Edition 2

5620 SAM
R12.0 Fundamentals
TOS36033_V4.0-SG Edition 1

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Document History			
Edition	Date	Author	Remarks
1.0	2013-06-20	GARCIA LOZANO, René	TOS36033_V3.0 – SAM 11.0 (update)
2.0	2014-06-03	GARCIA LOZANO, René	TOS36033_V4.0 – SAM 12.0 (update)



Upon completion of this module, you should be able to:

- Describe the 5620 SAM GUI workspace customization capabilities
- Identify the workspace elements that can be customized
- Identify the location and function of the workspace selector
- Identify the characteristics of the scopes available for workspace creation
- Describe the workflow customization options
- List the steps to customize a workspace
- Identify the customizing options available for each workspace element

2 · 6 · 3

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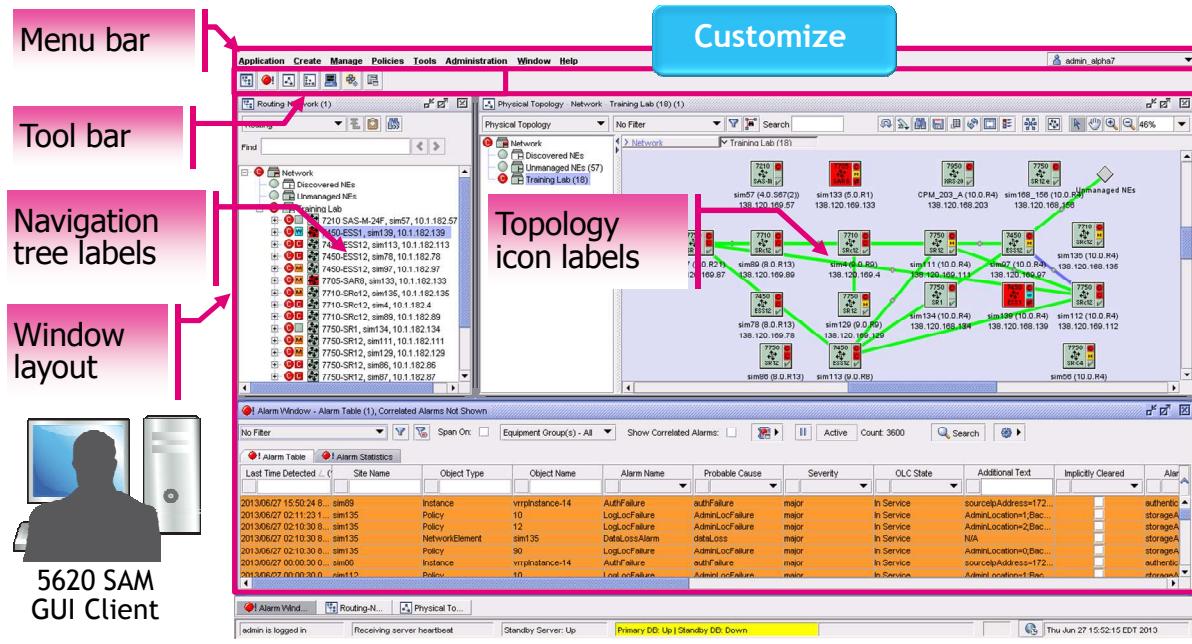
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	Page
1 5620 SAM GUI Workspace Customization Overview	7
1.1 Workspace Selector	8
1.2 Workspace Scope	9
2 GUI Workspace Customization	10
2.1 GUI Workspace Customization Overview	11
2.1.1 Workspaces Assigned to User Groups	12
2.2 GUI Workspace Customization Workflow	13
2.3 Menu Bar Customization	14
2.4 Tool Bar Customization	15
2.5 Navigation Tree Labels Customization	16
2.6 Topology Icon Labels Customization	17
2.7 Window Layout Customization	18
How To Do It and Exercises	19
Questions	21
Answers	22
Module summary	23

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1 5620 SAM GUI Workspace Customization Overview



Apply customized GUI workspaces created according to roles and responsibilities

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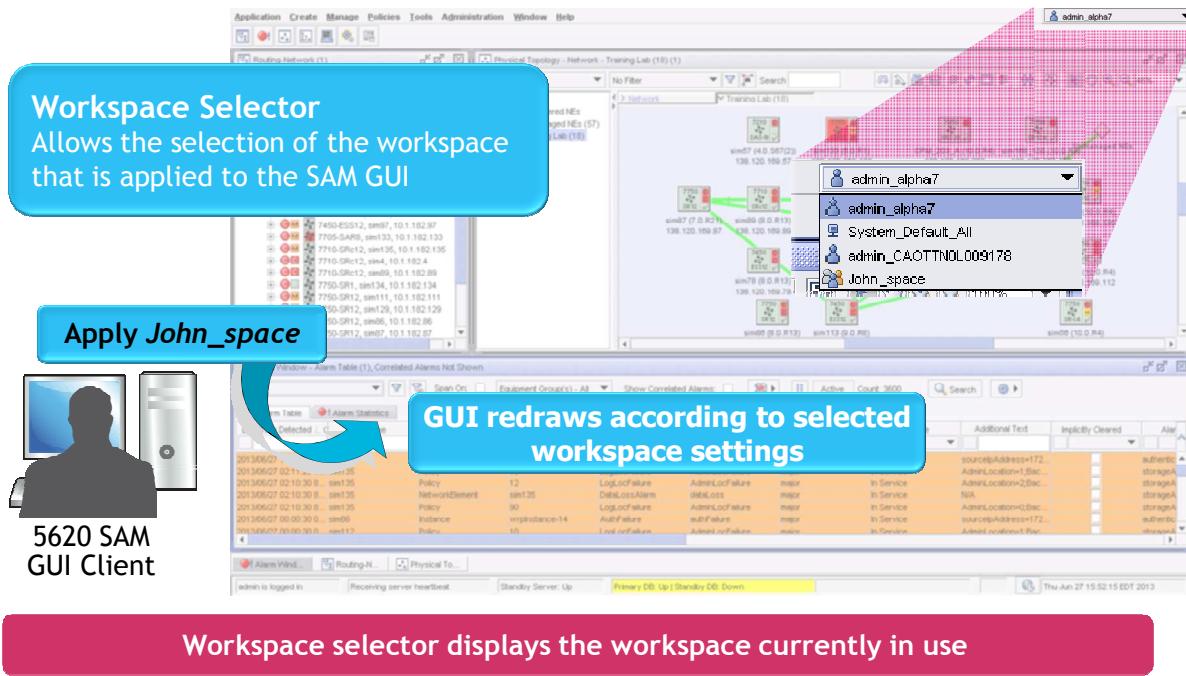
As of release 11.0 the 5620 SAM provides system administrators and operators the ability to customize the menus, toolbars, tree labels, topology icon labels and window layout selections on the 5620 SAM GUI. SAM System Administrators are now able to create custom workspace layouts by:

- adding, removing, relocating, renaming menu items and toolbar buttons
- selecting the attributes and attribute order for the tree and topology map labels
- customizing the window layout applied when the GUI session starts

SAM Operators can apply customized GUI workspaces created according to their roles and responsibilities.

Users can also import and export customized workspaces using the 5620 SAM GUI.

1.1 Workspace Selector



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The workspace selector is located on the top right corner of the main menu bar of the 5620 SAM GUI.

This workspace selector drop-down menu allows SAM users the selection of the workspace that is applied to the SAM GUI. Upon selection of a workspace from the selector, the 5620 SAM GUI redraws the menu bar, toolbar, closes all alarm, tree, map windows and opens the alarm, tree, and map windows according to the settings for the selected workspace layout.

After the selection of a workspace from the selector drop-down menu, the workspace selector displays the workspace currently in use.

1.2 Workspace Scope



Public scope



Visible to all users on the same server

Private scope



Visible only to user that has created the workspace



System_Default_All

- Created by default
- Read Only Scope
- Contains all the system default workspace settings

Customized workspaces can be created with a public or a private scope that indicates the ownership of the customized workspace.

A public workspace is visible to all users on the same server.

A private workspace is visible only to user that has created the workspace.

An icon in the workspace selector identifies the scope of a workspace.

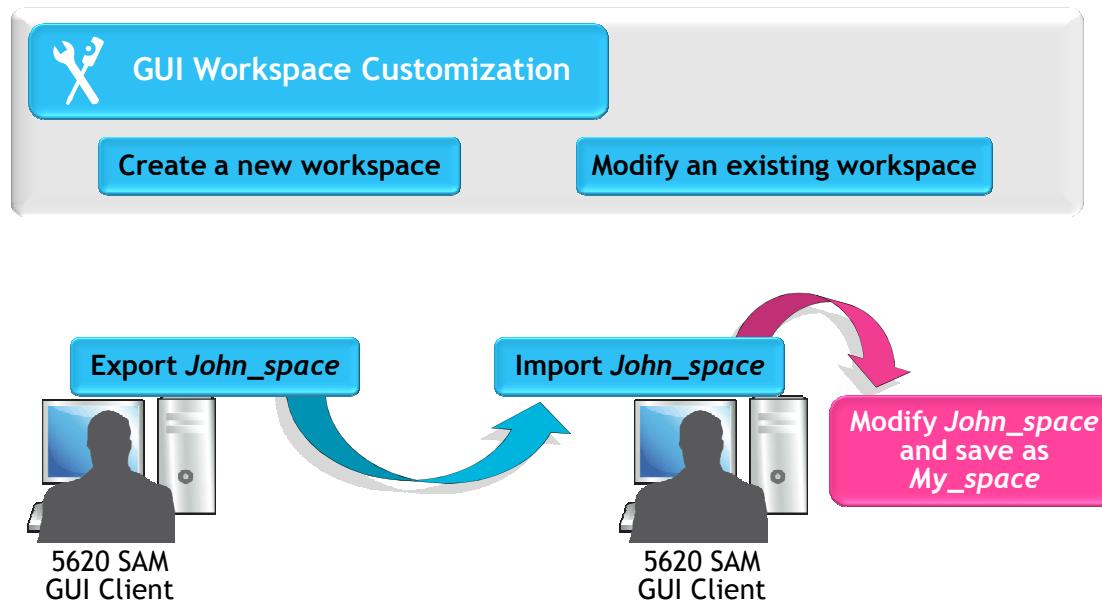
Note

The 5620 SAM creates by default a System_Default_All workspace with a Read Only scope. This workspace contains all the system default workspace settings and cannot be modified. It is identified by a special icon.



2 GUI Workspace Customization

2.1 GUI Workspace Customization Overview



To limit creation of public workspaces use scope of command roles and permissions

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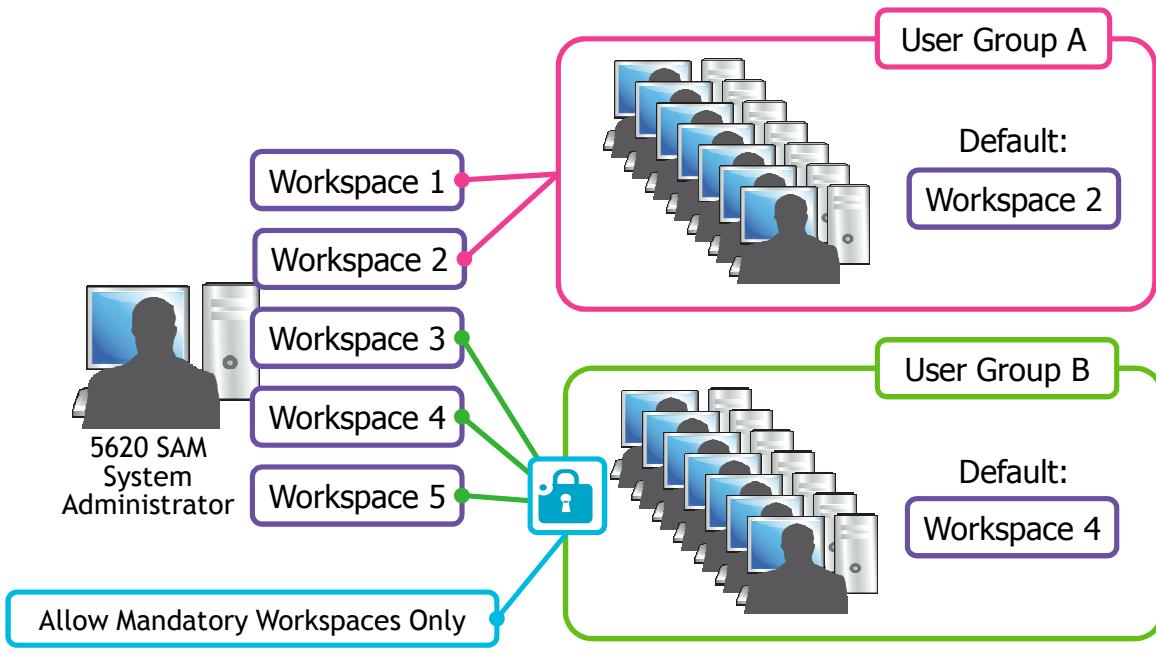
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System administrators and operators can customize the 5620 SAM GUI Workspace by creating a new workspace or by modifying an existing one.

A user can export a workspace to another user, and the receiving user can import it and customize it as their own workspace and set it to private.

To allow management of public workspaces visible to all users on the same server, SAM System Administrators can use the scope of command roles and permissions in order to limit users the option to set a private workspace to public. Users could still generate their own private workspaces.

2.1.1 Workspaces Assigned to User Groups



Any existing user-defined workspaces are deleted when Allow Mandatory Workspaces Only used

System administrators can create a custom workspace or a set of custom workspaces and add them to user groups according to the specific requirements and needs of users within the group. This allows the simplification of the SAM GUI view by displaying only functions that are applicable to the roles and responsibilities of users in the group.

System administrators can also assign a default workspace for a user group. As a result, the selected customized GUI workspace view will appear by default each time a member of the group opens the 5620 SAM client.

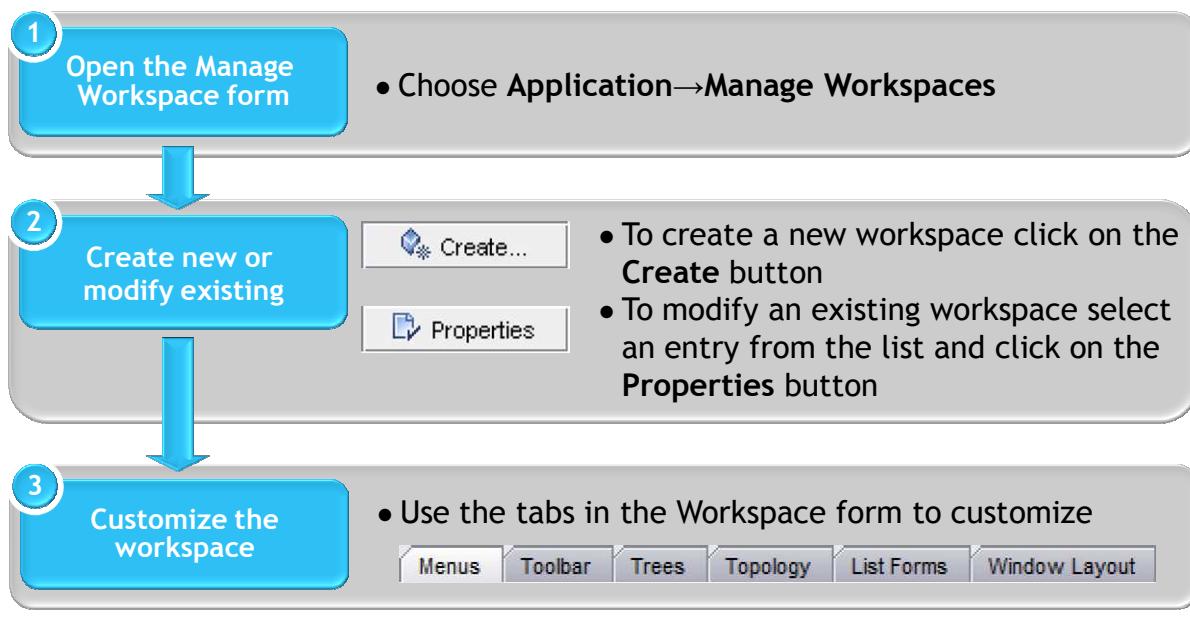
The 5620 SAM even allows system administrators to restrict all users in a user group to a defined set of workspaces only. When a system administrator selects the Allow Mandatory Workspaces Only function for a user group, the Add button on the User Preferences Workspaces form will be disabled for all users in the group and the users cannot change the list of workspaces on their User Preferences form. However, each user in the group can still change the order that the workspaces appear in the workspace selector and set any workspace as the default workspace.



Note

Any existing user-defined workspaces in the User Preferences form are deleted when the Allow Mandatory Workspaces Only check box is selected by the Administrator.

2.2 GUI Workspace Customization Workflow



Name and Description parameters identify a customized GUI workspace

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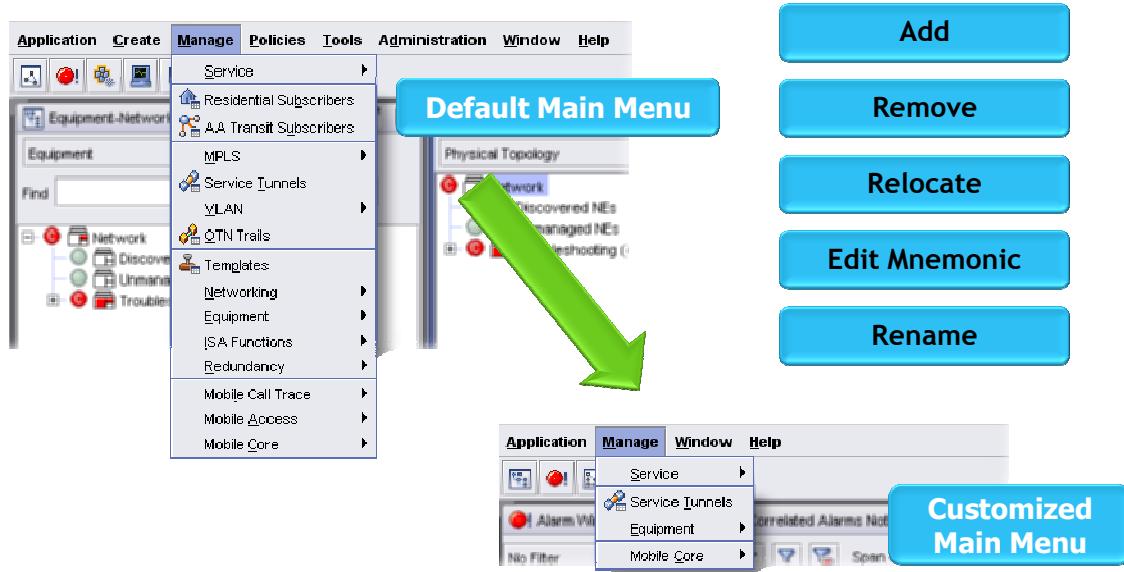
To customize the workspace operators must use the Manage Workspace Form.

The following workflow outlines the high-level steps necessary to create a new workspace or modify an existing one:

1. Open Manage Workspace form. Choose Application→Manage Workspaces from the 5620 SAM main menu.
2. Create new or modify existing workspace. To create a new workspace click on the Create button, the **Workspace (New Instance) [Create]** form opens. To modify an existing workspace select an entry from the list and click on the Properties button, the **Workspace (Name) [Edit]** form opens .
3. Customize the workspace. In the **Workspace [Create]** form or in the **Workspace [Edit]** form use the **Menus**, **Toolbar**, **Tree**, **Topology**, and/or **Window Layout** tabs to customize the workspace as required.

Use the **Name** and **Description** parameter to identify customized GUI workspaces. If applicable use the **Scope** parameter to assign a scope to the customized workspace. Click **OK** or **Apply** to save the changes.

2.3 Menu Bar Customization



2 · 6 · 14
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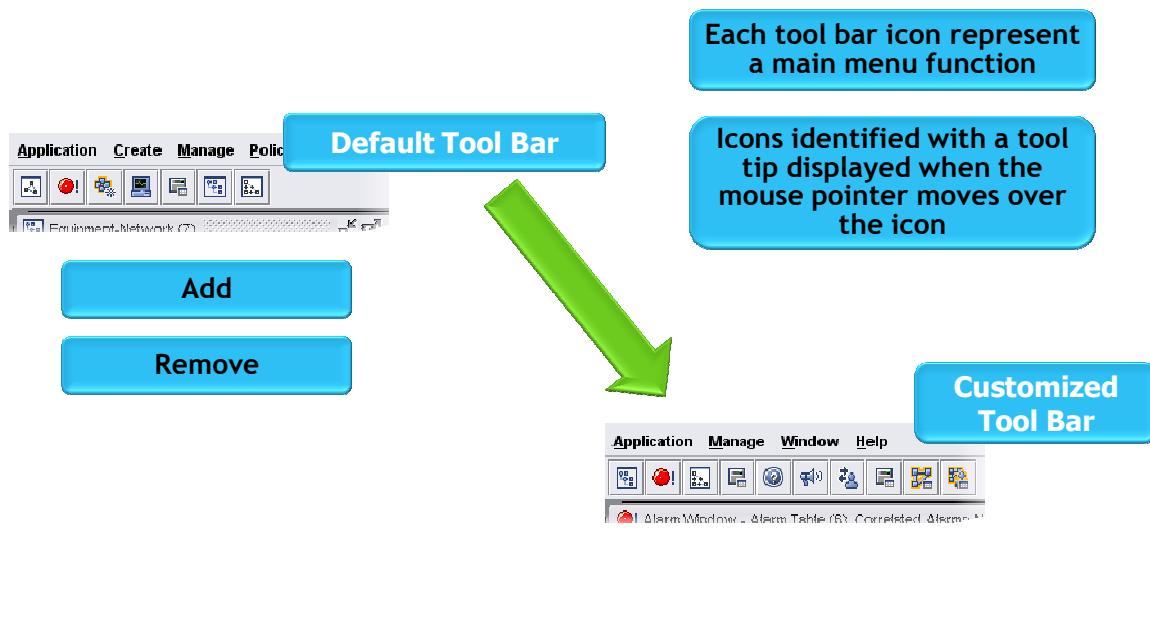
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GUI Workspaces allows the customization of preferences for the GUI menu bar by adding, removing, relocating, editing Mnemonic, renaming menu items.

The image above shows the default main menu view, and an example of the main menu view on a customized workspace.

2.4 Tool Bar Customization



Allows one-click access to most commonly used menu functions

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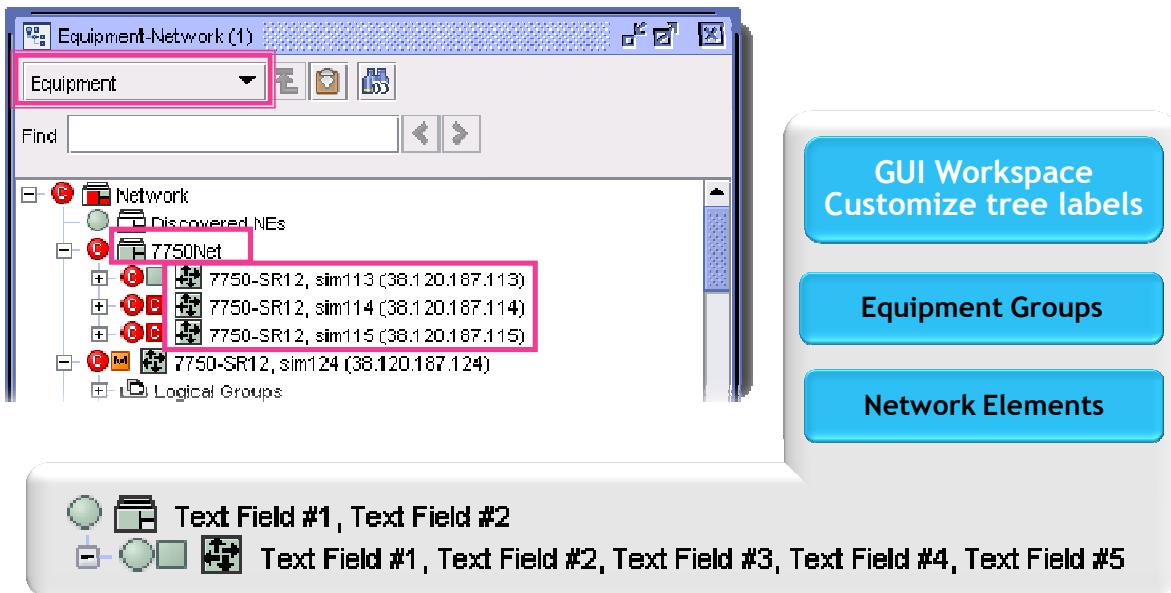
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GUI Workspaces allows the customization of preferences for the tool bar to meet the user's operational requirements. Icons in the toolbar represent a subset of the main menu functions. Each toolbar icon is identified by a tool tip that is displayed when the mouse pointer moves over the icon.

Operators can add icons or remove icons from the 5620 SAM GUI tool bar in order to have available at one-click the most commonly used menu functions.

The image above shows the default main menu view, and an example the main menu view for a customized workspace.

2.5 Navigation Tree Labels Customization

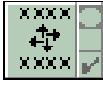


GUI workspaces allow customizing the tree labels of Equipment Groups and Network Elements for the Equipment view and the Routing view of the Navigation Tree.

For Equipment Group labels, operators can customize up to two field texts. And for Network Element labels, operators can customize up to five field texts (if applicable).

2.6 Topology Icon Labels Customization

Topology icon labels



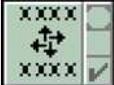
xxxx - *Text Field #1*
xxxx - *Text Field #2*



EPIPE 1003:10.10.10.4

Customize map icon labels text fields

Icon label customization supported for:



Network Element



Service Site



Service Access Point



Subscriber Interface



CPAM Routers



CPAM Subnets



CPAM Simulated Routers



CPAM Simulated Subnets

Available label customization options vary depending on the object type selected

GUI workspaces allows operators to customize the topology map icon labels, which are descriptive labels added by default to each topology map icon.

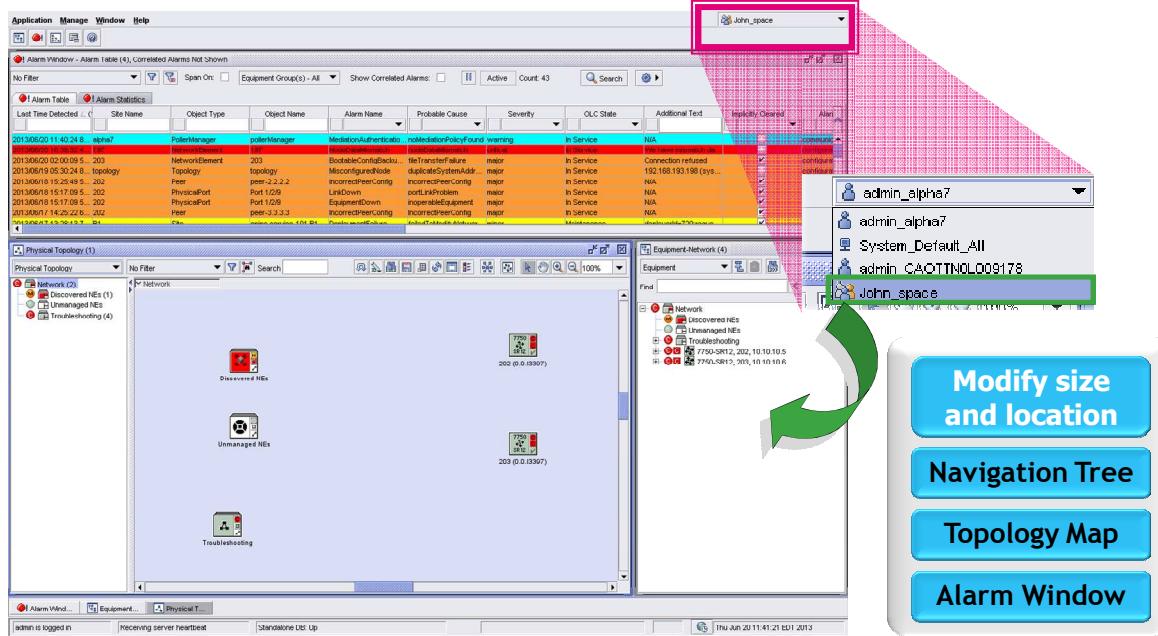
Operators can customize the Text Field #1 and Text Field #2 to identify the information to display in each map icon label.

Icon labels can be customized for the following object types:

- Network Element
- Service Site
- Service Access Point
- Subscriber interface
- CPAM Routers
- CPAM Subnets
- CPAM Simulated Routers
- CPAM Simulated Subnets

The available options for label customization vary depending on the object type selected.

2.7 Window Layout Customization

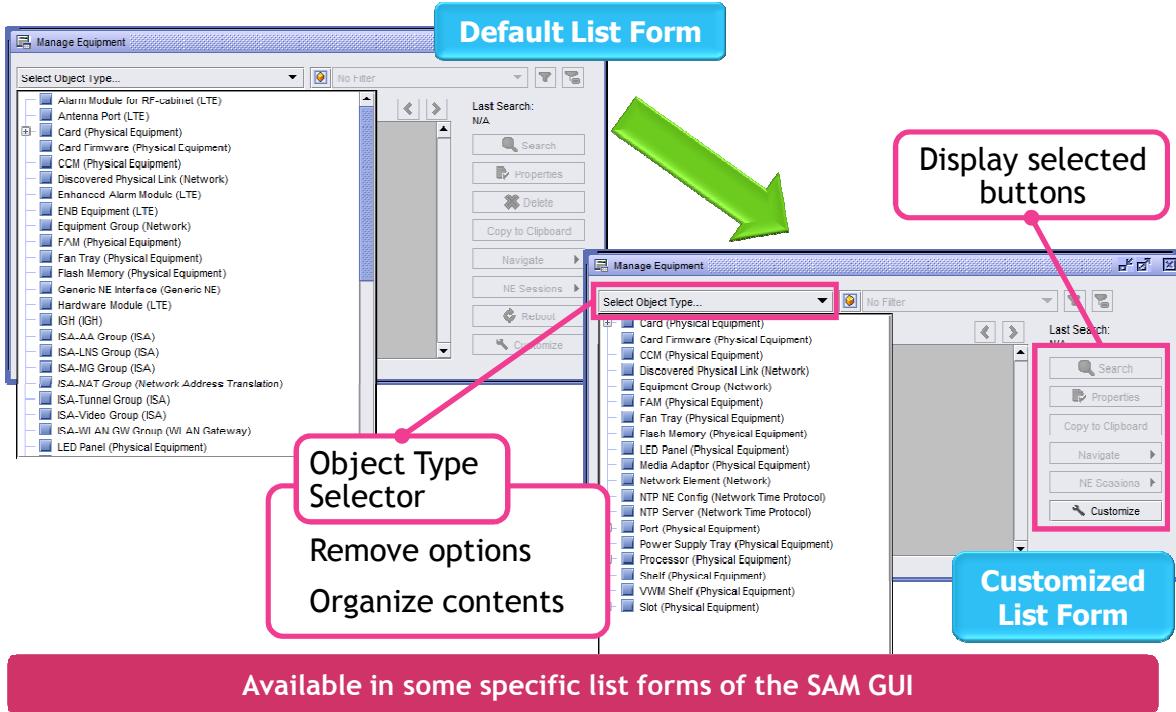


Alarm, tree, and map windows open according to the workspace window layout

GUI workspaces allows operators to modify the size and location of the Navigation Tree, Topology Map, and Dynamic Alarm window in the GUI Client.

Upon choosing from the workspace selector a workspace with a customized window layout, the 5620 SAM closes all alarm, tree, map windows and opens the alarm, tree, and map windows according to the applied workspace's window layout.

2.8 List Forms Customization

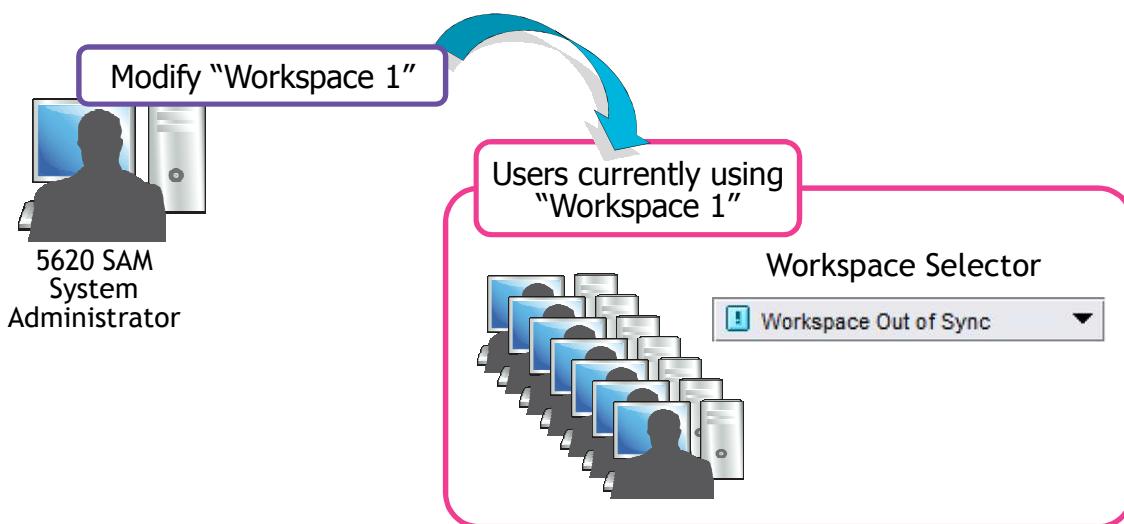


GUI workspaces allow customizing the options available in the object types selector drop-down menu and the buttons displayed in some specific list forms of the SAM GUI (E.g. the Manage Equipment list form, shown in the figure).

Operators and system administrators can remove unused or unneeded types of objects, and organize the contents of the object type selector drop-down menu. They can also select which buttons are displayed on the list form by removing any unnecessary buttons according to the user needs.

The example shows a customized Manage Equipment form that presents a reduced list of available object types in the selector drop-down menu, and in which the buttons Delete and Reboot are not displayed.

2.9 Workspace Currently in Use Modified



Select the current workspace from workspace selector to apply modified settings

When an operator or the system administrator modifies and saves the changes to a workspace currently in use, the workspace selector displays Workspace Out of Sync for all users who have a client session opened and are currently using the modified workspace.

Select the current workspace from the workspace selector drop-down menu to apply the modified settings.

How To Do It and Exercises



How to do it

Instructor DEMO how to:

- Create a new workspace
- Modify an existing workspace
- Customize a workspace
- Identify difference between a workspace created with a public or private scope
- Add workspaces to the workspace selector



Lab Exercises

Create a Workspace

Customize a Workspace

Add Workspace to Workspace Selector

Change the Current Workspace

Set the Default Workspace



Time allowed:

2 · 6 · 21

System Overview · SAM GUI Client Workspaces
5620 SAM · R12.0 Fundamentals

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Your instructor may perform the above mentioned demonstrations using the 5620 SAM GUI.

In addition, your instructor will point out the appropriate lab module containing the above mentioned hands-on lab exercises, and will indicate the time allowed to perform these hands-on exercises.

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2 · 6 · 23

System Overview - SAM GUI Client Workspaces
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1. The 5620 SAM support customizing the Menu Bar, the Topology bar, Tree and Topology Map icons, and Window layout using GUI Workspace function. True or false? (Select all that apply)
 - a. True
 - b. False
2. The workspace selector is a drop-down menu allows SAM users the selection of the topology group that is applied to the physical topology map. True or false?
 - a. True
 - b. False
3. Upon the selection of a workspace from the selector drop-down menu, the 5620 SAM GUI redraws the menu bar, toolbar, closes all alarm, tree, map windows according to the settings for the selected workspace layout, and the workspace selector displays the workspace currently in use. True or false?
 - a. True
 - b. False

Answers



1. The 5620 SAM support customizing the Menu Bar, the Topology bar, Tree and Topology Map icons, and Window layout using GUI Workspace function. True or false? (Select all that apply)
 - a. True ✓
 - b. False
2. The workspace selector is a drop-down menu allows SAM users the selection of the topology group that is applied to the physical topology map. True or false?
 - a. True
 - b. False ✓
3. Upon the selection of a workspace from the selector drop-down menu, the 5620 SAM GUI redraws the menu bar, toolbar, closes all alarm, tree, map windows according to the settings for the selected workspace layout, and the workspace selector displays the workspace currently in use. True or false?
 - a. True ✓
 - b. False



This module covered:

- The 5620 SAM GUI workspace customization capabilities
- The workspace elements that can be customized
- Location and function of the workspace selector
- Characteristics of the scopes available for workspace creation
- The workflow customization options and the steps to customize a workspace
- The customizing options available for each workspace element

2 · 6 · 25

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End of module
SAM GUI Client Workspaces

2 · 6 · 26

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Section 3
Network Management

Module 1

Node Preparation for SAM Discovery

TOS36033_V4.0-SG-R12.0-Ed1 Module 3.1 Edition 1

5620 SAM
R12.0 Fundamentals
TOS36033_V4.0-SG Edition 1

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1.0	2011-04-20	GARCIA LOZANO, René	TOS36033_V1.0 – SAM 9.0 (R1 update)
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2.0	2012-03-30	LOLLIERIC, Pascal	TOS36033_V2.0 – SAM 10.0 (R1 update)
2.1	2012-08-18	GARCIA LOZANO, René	TOS36033_V2.1 – SAM 10.0 (R1 vILT conversion)
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3.1	2014-05-26	GARCIA LOZANO, René	TOS36033_V3.0 Ed.2 – SAM 11.0 (update)



Upon completion of this module, you should be able to:

- Identify the mechanisms used for the communication between the 5620 SAM server and Network Devices
- Describe the Simple Network Management Protocol used for NE discovery, its components and security models
- Identify the commissioning preconfiguration an NE requires before the 5620 SAM can manage it

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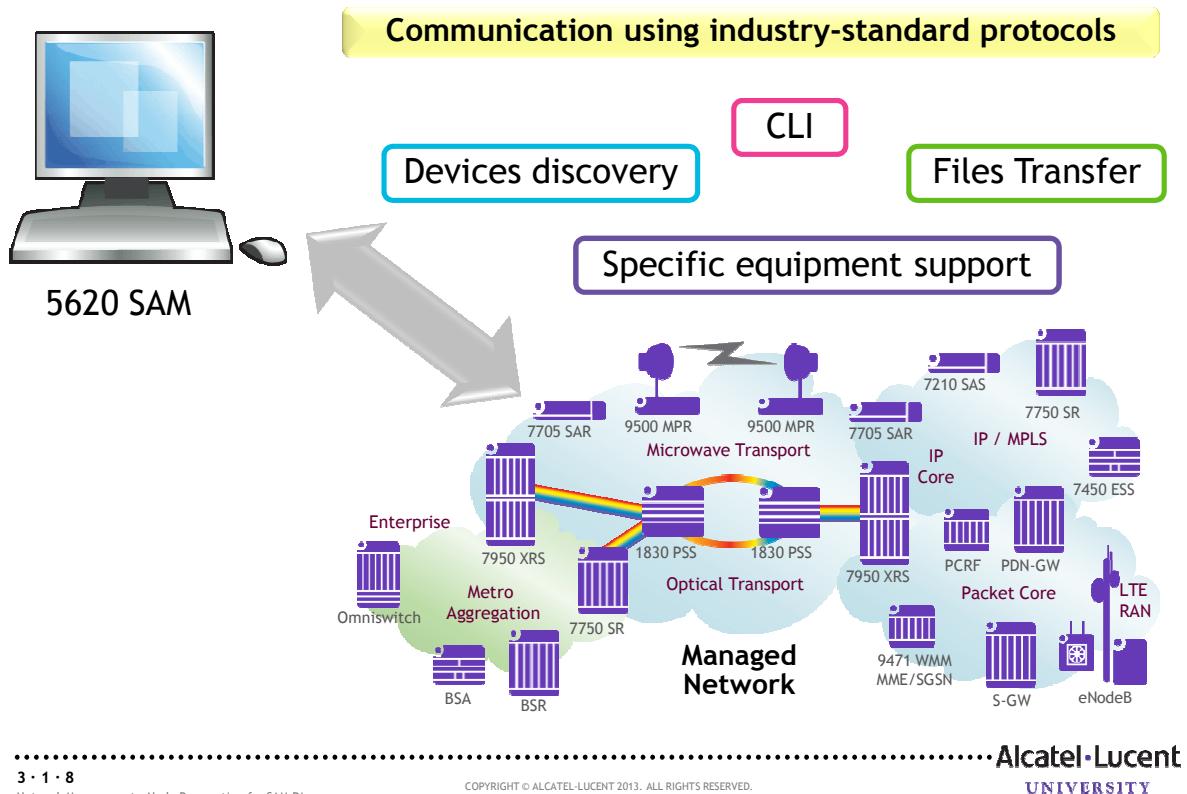


	Page
1 Communication with Network Devices Overview	7
1.1 – 5620 SAM Communication with Network Devices	8
1.1.1 – Communication – Devices Discovery and Events	9
1.1.2 – Communication – CLI Commands	10
1.1.3 – Communication – Files Transfer	11
1.1.1 – Communication – Specific Equipment Support	12
Knowledge Verification – Network Element Discovery	13
2 Simple Network Management Protocol (SNMP)	14
2.1 SNMP Overview	15
2.1.1 SNMP Components	16
2.2 SNMP Implementation – 5620 SAM Example	17
2.3 SNMP Security Model	18
2.3.1 SNMPv1/v2c and SNMPv3	19
2 Device Preparation for SAM Discovery	20
2.1 Device Configuration for Discovery	21
2.1.1 SNMP Device Preconfiguration – SNMPv2	22
2.1.2 SNMP Device Preconfiguration – SNMPv3	23
2.2 Additional Device Configuration for Discovery	24
Knowledge Verification – Network Element Discovery	25
Questions	27
Answers	28
Module Summary	29

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1 Communication with Network Devices Overview

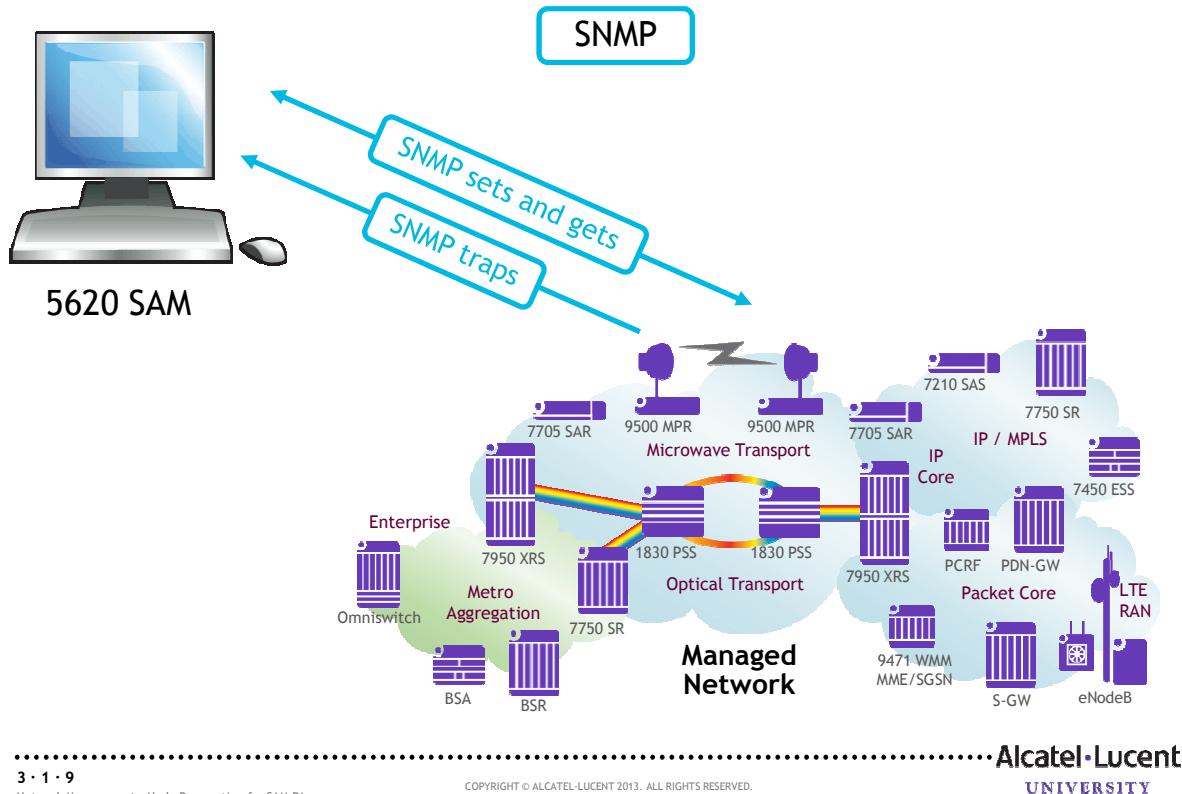
1.1 – 5620 SAM Communication with Network Devices



The 5620 SAM uses industry-standard protocols for the communication between the server and **Network Devices** of **NEs** in the managed network. The communication with NEs includes:

- devices discovery
- command line interface or CLI commands
- files transfer
- configuration management for specific equipment support

1.1.1 – Communication – Devices Discovery and Events



3 · 1 · 9

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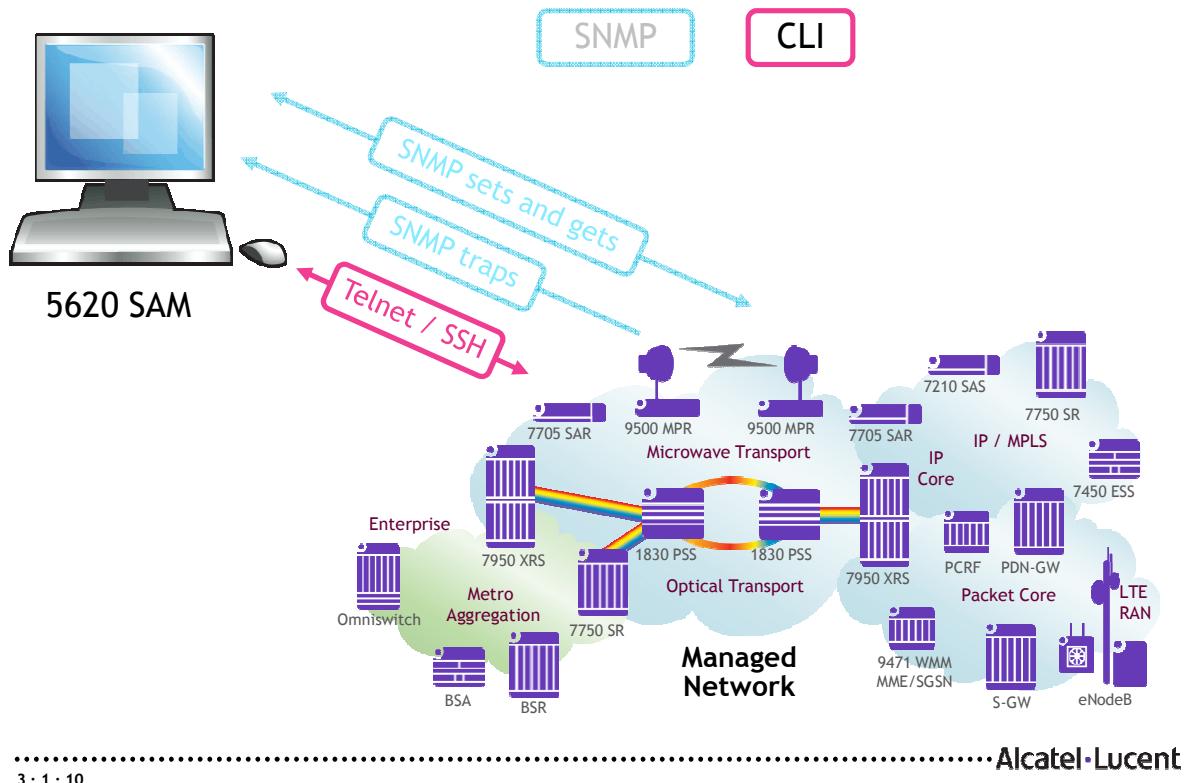
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The **Simple Network Management Protocol (SNMP)** is used to discover NEs. The 5620 SAM server exchanges messages with the NEs in the form of **SNMP sets and gets** which are used for polling MIB (Management Information Base) performance data stored on the managed devices. The server uses the polled information to reconcile the NE's properties with the contents of the 5620 SAM database. The server also uses SNMP to deploy configuration changes to the managed devices.

The 5620 SAM server receives asynchronous SNMP messages, called **SNMP traps**, that managed devices use to notify the 5620 SAM server about device events. The 5620 SAM would process and convert these received SNMP traps to alarms as applicable.

1.1.2 – Communication – CLI Commands



3 · 1 · 10

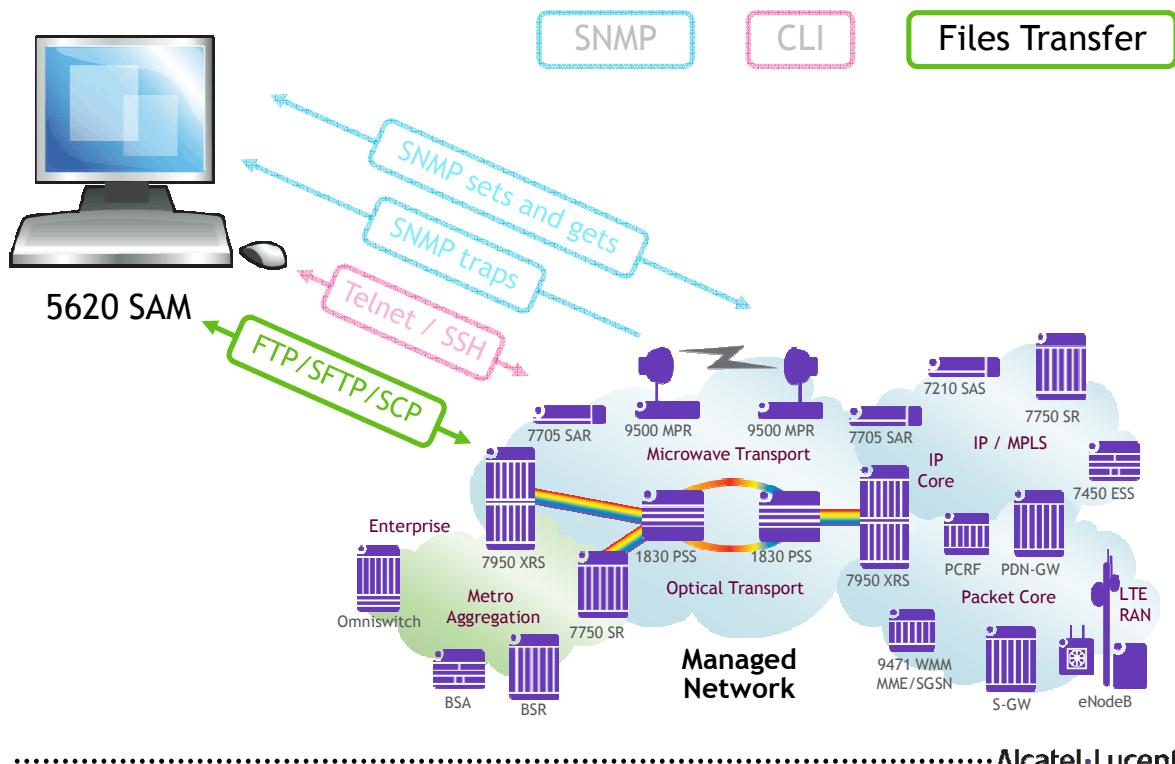
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The 5620 SAM server uses **Telnet** or **SSHv1** or **v2** to send **command line interface** or **CLI commands** that are used for controlling node configurations and performing troubleshooting functions on network devices.

1.1.3 – Communication – Files Transfer



3 · 1 · 11

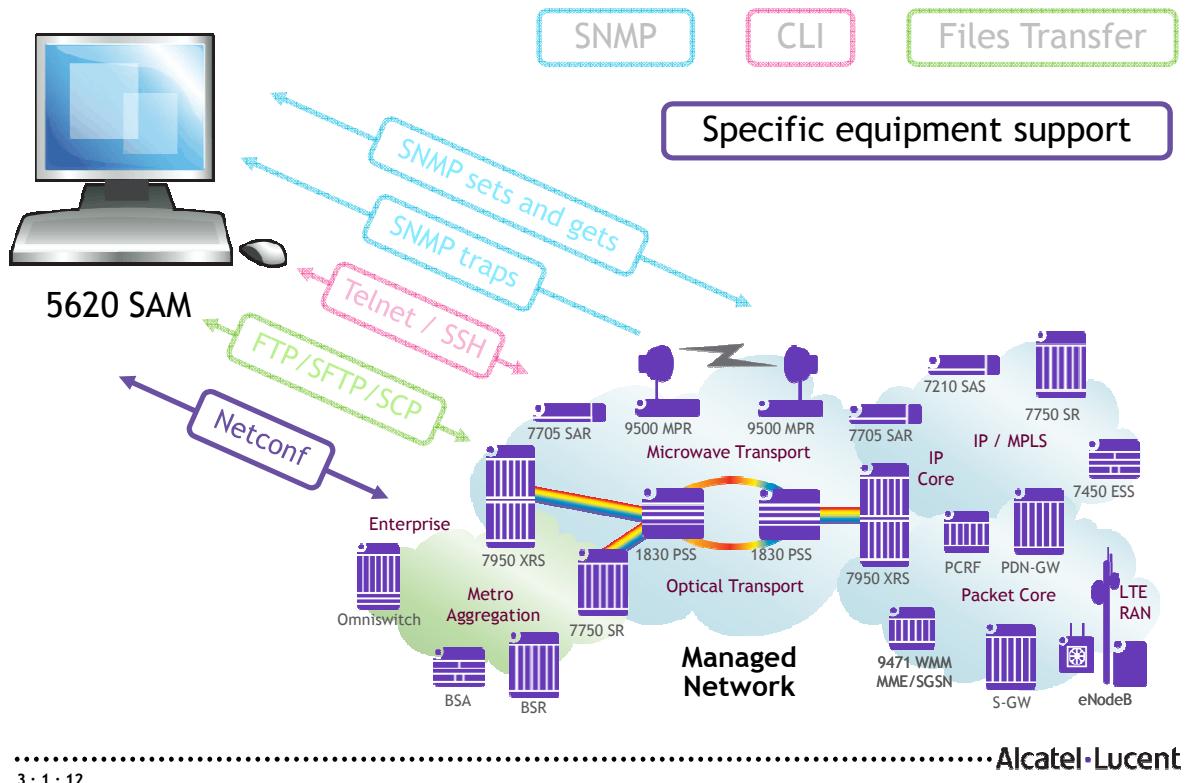
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FTP, SFTP and SCP protocols are used for securely transferring files when the 5620 SAM backs up managed device configuration data, collects accounting statistics from the devices, and downloads software from the servers to devices.

1.1.1 – Communication – Specific Equipment Support



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The 5620 SAM uses the **Network Configuration Protocol** or **Netconf** to provide configuration management support for the eNodeB, and to discover and manage a 9471 WMM (Wireless Mobility Manager).



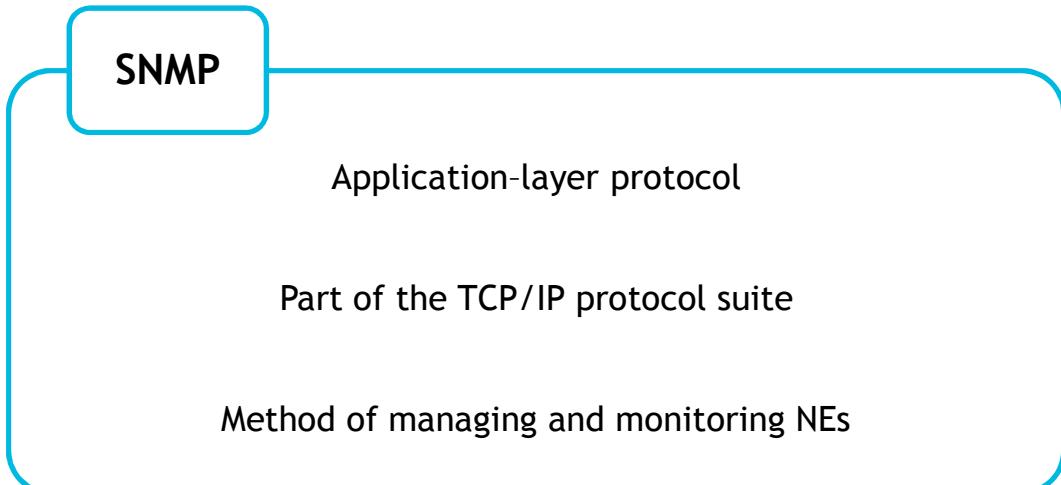
Which protocol does the 5620 SAM use to discover NEs by exchanging sets and gets messages used for polling MIB performance data stored on the managed devices?

- a. FTP
- b. SSH
- c. Telnet
- d. SNMP

Choose the correct answer for the knowledge verification question above.

2 Simple Network Management Protocol (SNMP)

2.1 SNMP Overview

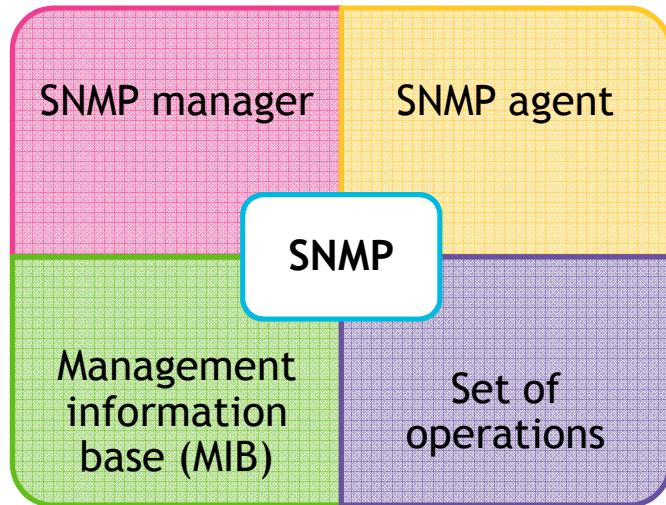


Alcatel-Lucent NEs support all standard SNMP versions: SNMPv1, SNMPv2c, and SNMPv3

The Simple Network Management Protocol (SNMP) is an application-layer protocol designed to facilitate the exchange of management information between network devices. SNMP is a part of the Transmission Control Protocol/Internet Protocol (TCP/IP) protocol suite, and is used as a method of managing and monitoring network elements, such as the 5620 SAM.

The Alcatel-Lucent network elements support all the standard SNMP versions: SNMPv1, SNMPv2c, and SNMPv3.

2.1.1 SNMP Components



3 · 1 · 16

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An SNMP implementation consists of an SNMP manager, an SNMP agent, a simple set of operations, and a management information base.

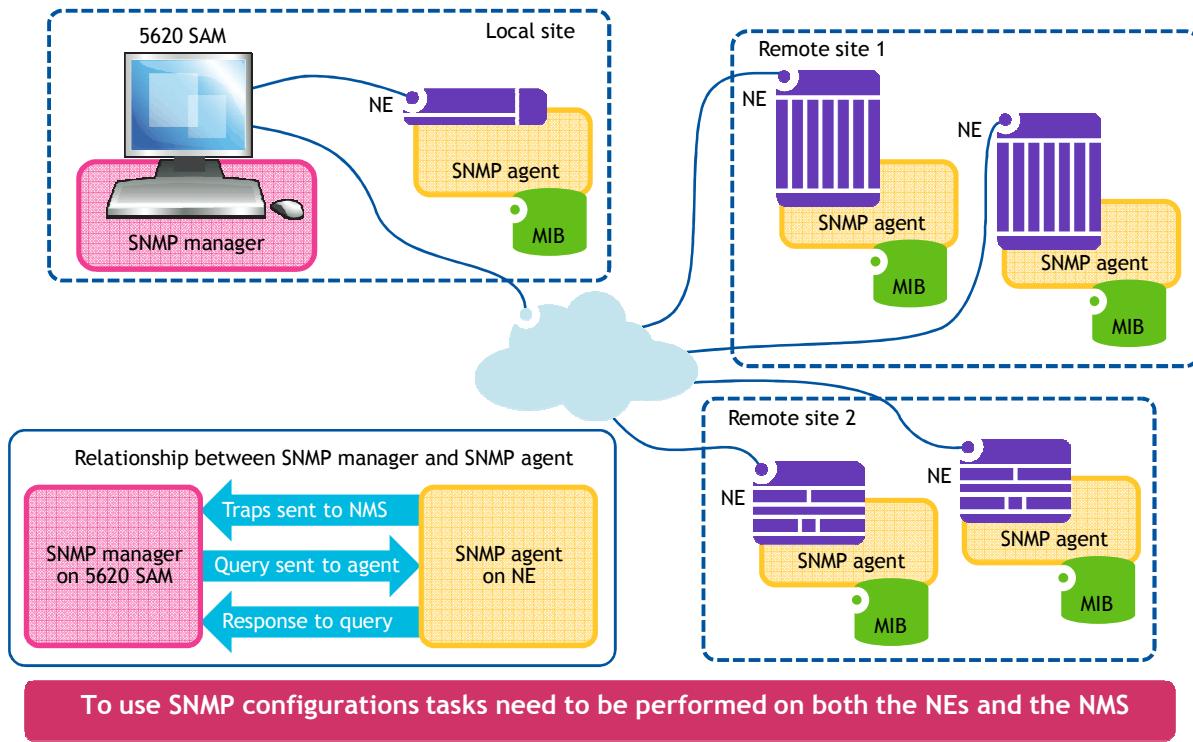
The SNMP manager runs on a Network management station (NMS), such as the Alcatel-Lucent 5620 SAM, and polls and receives traps from agents on network elements in the network.

The SNMP agent runs on network elements and provides information to the SNMP manager by tracking operational parameters of the network element. The agent allows unidirectional (read-only) or bidirectional (read and write) access to node-specific information.

The SNMP set of operations and the information collected by these operations give the NMS the ability to change the state of SNMP-based network elements. Using SNMP operations, the NMS can query and send requests to SNMP agents, set variables in agents, get responses from agents, and acknowledge asynchronous events (known as traps) from agents.

The Management Information Base (MIB) is a database of managed objects that the SNMP agent tracks, and defines all the variables that SNMP is capable of reading or setting. The SNMP agent maintains the MIB.

2.2 SNMP Implementation – 5620 SAM Example



3 · 1 · 17

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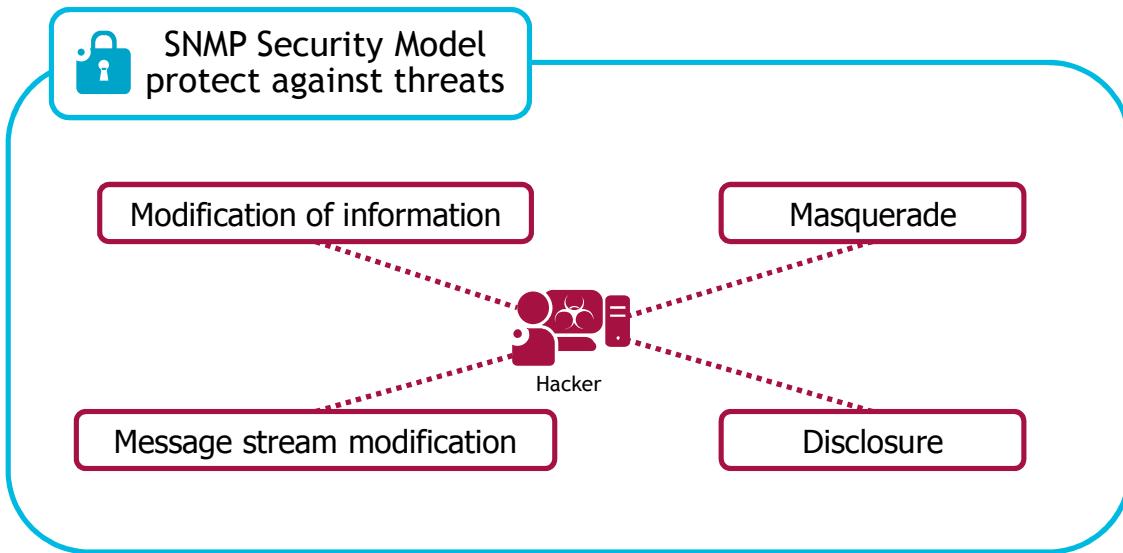
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This diagram shows an SNMP implementation example, where the 5620 SAM acts as the SNMP manager. SNMP can be used to manage network elements collocated with the NMS, as well as remote network elements. The Alcatel-Lucent network elements are supplied with built-in SNMP agents.

In this SNMP scenario, the NMS queries the status of each network element interface, and the SNMP agent returns responses to queries. When the SNMP agent notices that an event has happened, it can send a trap to the NMS, where it is handled appropriately.

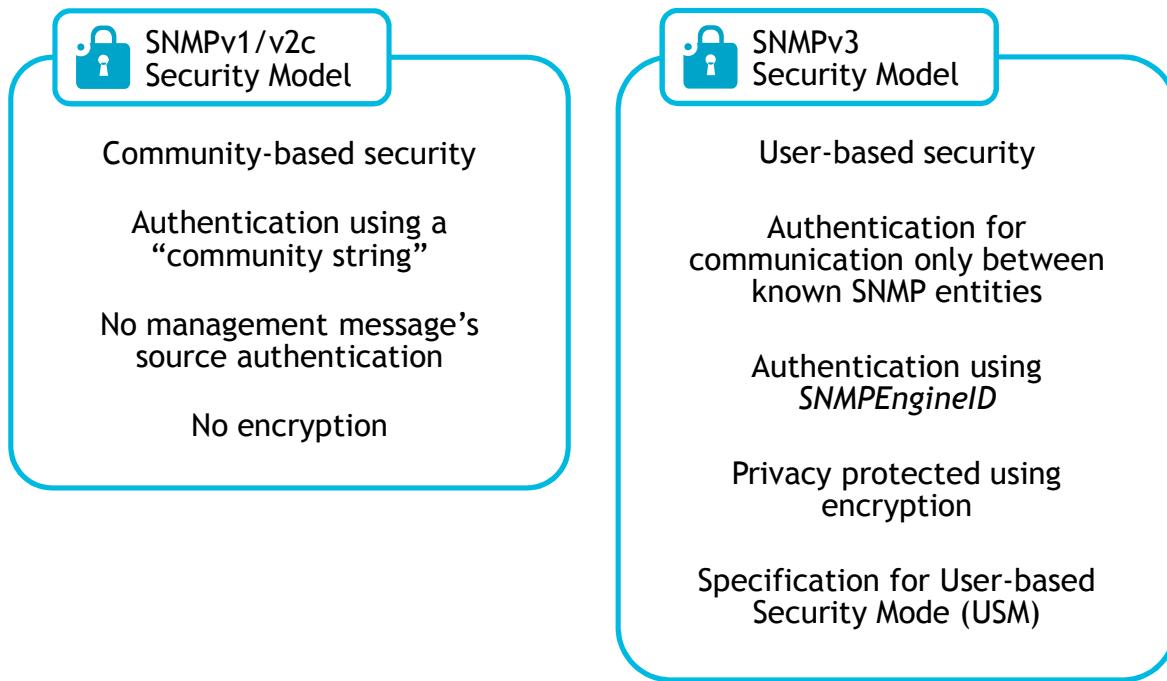
In order to be able to use SNMP in a network, configurations tasks need to be performed on both the network elements and the NMSs.



SNMP Security models are meant to protect against the principal threats of:

- modification of information - the danger that some unauthorized entity may alter in-transit SNMP messages generated on behalf of an authorized user in such a way as to effect unauthorized management operations, including falsifying the value of an object.
- masquerade - the danger that management operations not authorized for some user may be attempted by assuming the identity of another user that has the appropriate authorizations.
- message stream modification - the danger that messages may be maliciously re-ordered, delayed or replayed to an extent which is greater than can occur through the natural operation of a subnetwork service, in order to effect unauthorized management operations.
- and, disclosure -the danger of eavesdropping on the exchanges between SNMP engines.

2.3.1 SNMPv1/v2c and SNMPv3



The security model for both SNMPv1 and SNMPv2c (Community-Based Simple Network Management Protocol version 2), involves an authentication of clients that is performed using a “community string”. The community string is used as a type of password which is transmitted in clear text. This SNMPv1/v2c community-based security scheme has the limitations that it can neither authenticate the source of a management message nor provide encryption.

The security model for SNMPv3 is a user-based security scheme offering both strong authentication and data encryption for privacy. It supports verification of the of SNMP entities’ identity on whose behalf a received SNMP message claims to have been generated, allowing to facilitate communication only between known SNMP entities. Each SNMP entity has an unique identifier called the *SNMPEngineID*, and SNMP communication is possible only if an SNMP entity knows the identity of its peer. Traps and Notifications are exceptions to this rule. The SNMPv3 security model protects privacy with cryptographic security to prevent snooping by an unauthorized source. It allows the specification for User-based Security Mode (USM) with three available mechanisms for authentication and privacy:

Communication without authentication and privacy (NoAuthNoPriv).

Communication with authentication and without privacy (AuthNoPriv).

Communication with authentication and privacy (AuthPriv).

It allows the definition of the View-based Access Control Model (VACM) which determines whether a given entity is allowed access to a particular MIB object to perform specific functions and operates at the protocol data unit (PDU) level.

2 Device Preparation for SAM Discovery

2.1 Device Configuration for Discovery



Device preconfiguration

Configure IP address

SNMP

Enable SNMP

Persistent SNMP indexes

SNMP packet size 9216

SNMP security model configuration

A device requires commissioning preconfiguration before the 5620 SAM can manage it

3 · 1 · 21

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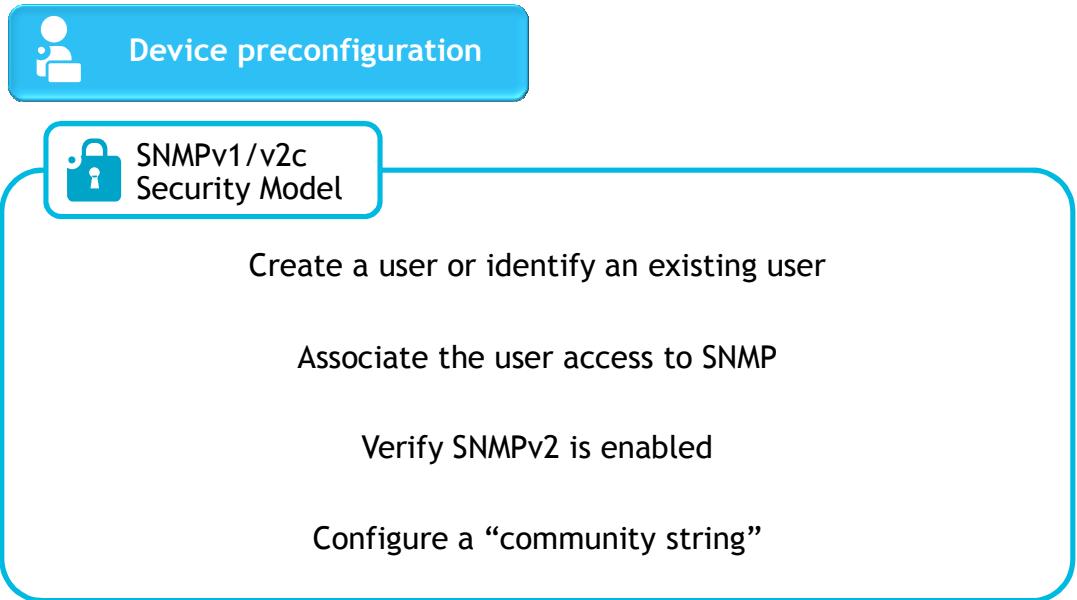
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An Alcatel-Lucent device, Telco device, or generic NE requires commissioning preconfiguration before the 5620 SAM can manage it. When this preconfiguration is complete, the 5620 SAM can discover the device.

Preconfiguration involves using a CLI to configure an IP address for SAM discovery, and to enable and configure SNMP on the device. That includes ensuring the device uses persistent SNMP indexes, configuring the SNMP packet size to 9216, and the SNMP security model configuration.

2.1.1 SNMP Device Preconfiguration – SNMPv2



See *Alcatel-Lucent 5620 SAM User Guide - Device Commissioning and management*

The security model for both SNMPv1 and SNMPv2c is commonly referred to as simply SNMPv2 within the configuration context in some Alcatel-Lucent equipment.

Depending on the Alcatel-Lucent device to be managed, preconfiguration for SAM discovery and management using SNMPv2 may involve some or all of the following tasks:

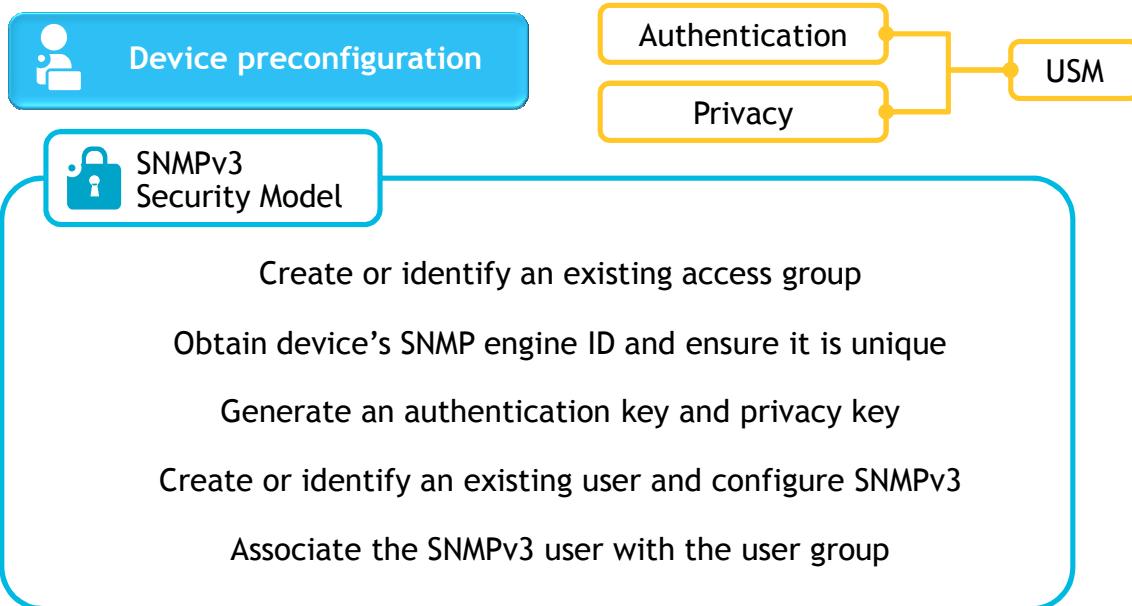
- Creation of an user or identification of an existing user to be used
- Association of the user access to SNMPv2
- Verification to ensure SNMPv2 is the enabled SNMP security model
- Configuration of an SNMP community string which must match the community string configured in the 5620 SAM for the device discovery and management



Technical Reference

*For more information on how to commission devices for SAM Management see **Alcatel-Lucent 5620 SAM User Guide - Device Commissioning and management - Device commissioning procedures**.*

2.1.2 SNMP Device Preconfiguration – SNMPv3



See Alcatel-Lucent 5620 SAM User Guide - Device Discovery Overview

3 · 1 · 23
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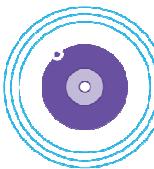
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Device commissioning preconfiguration is required in order to implement authentication and data encryption for privacy according to the selected SNMPv3 User-based Security Mode (USM) for 5620 discovery and management.

Depending on the Alcatel-Lucent device to be managed, preconfiguration to use SNMPv3 may involve some or all of the following tasks:

- Creation of a read-write-notify access group, or identification of an existing access group, for general SNMP mediation. Keep in mind that when using SNMPv3 the access granted is restricted to the scope of the configured users and groups.
- Obtain the SNMP engine ID of the device and ensure that each device to be discovered and managed using SNMPv3 has an unique engine ID.
- Generate an MD5 or SHA authentication key, and DES privacy keys, using the password2key utility on a 5620 SAM client or server station.
- Creation of an user, or identification of an existing user, to be used that must match the SNMPv3 user defined on the 5620 SAM. User configuration should include the authentication and privacy keys generated for the device's SNMP engine ID.
- Association of the SNMPv3 user with the access group.



Technical Reference

For more information on how to commission devices for SAM discovery using SNMPv3 see **Alcatel-Lucent 5620 SAM User Guide - Device Discovery Overview**.

2.2 Additional Device Configuration for Discovery



Device preconfiguration

Depending on the type of device

Enable Telnet, FTP or SSH2

Enable FTP and SNMP user access

Enable hash encryption

Configure source for SNMP traps

Configure static routes to the 5620 SAM network management domain

See *Alcatel-Lucent 5620 SAM User Guide - Device commissioning and management*

3 · 1 · 24

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Depending on the type of device, preconfiguration could also include as required one or more of the following tasks:

- Enabling Telnet, FTP or SSH2 on the device
- Enabling console, FTP, and SNMP access for the appropriate user account on the device
- Enabling hash encryption for passwords and authentication keys
- configuring the source for 5620 SAM SNMP traps
- configuring static routes from the device to the 5620 SAM network management domain
- creating at least one user on the device with SNMP access

See “Alcatel-Lucent 5620 SAM User Guide - Device commissioning and management” for detailed information on device commissioning preconfiguration, including a workflow to commission and manage devices, and device specific commissioning procedures.



What version of SNMP provides verification of the entities' identity on whose behalf a received SNMP message claims to have been generated?

- a. SNMPv1
- b. SNMPv2c
- c. SNMPv3
- d. Authentication is not provided on any SNMP version

Choose the correct answer for the knowledge verification question above.

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Questions



3 · 1 · 27

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1. The 5620 SAM use FTP to discover NEs by exchanging sets and gets messages used for polling MIB performance data stored on the managed devices. True or false?
 - a. True
 - b. False
2. The 5620 SAM support SSH and Telnet protocols to send CLI commands that are used for controlling node configurations and performing troubleshooting functions on network devices. True or false?
 - a. True
 - b. False
3. SNMPv3 provides verification of the entities' identity on whose behalf a received SNMP message claims to have been generated. True or false?
 - a. True
 - b. False

Answers



1. The 5620 SAM use FTP to discover NEs by exchanging sets and gets messages used for polling MIB performance data stored on the managed devices. True or false?
 - a. True
 - b. **False ✓**
2. The 5620 SAM support SSH and Telnet protocols to send CLI commands that are used for controlling node configurations and performing troubleshooting functions on network devices. True or false?
 - a. **True ✓**
 - b. False
3. SNMPv3 provides verification of the entities' identity on whose behalf a received SNMP message claims to have been generated. True or false?
 - a. **True ✓**
 - b. False



This module covered:

- The mechanisms used for the communication between the 5620 SAM server and Network Devices
- The Simple Network Management Protocol used for NE discovery, its components and security models
- The commissioning preconfiguration an NE requires before the 5620 SAM can manage it



End of module
Node Preparation for SAM Discovery

3 · 1 · 30

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Section 3
Network Management

Module 2 Network Element Discovery

TOS36033_V4.0-SG-R12.0-Ed1 Module 3.2 Edition 3

5620 SAM
R12.0 Fundamentals
TOS36033_V4.0-SG Edition 1

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3.0	2013-06-20	GARCIA LOZANO, René	TOS36033_V3.0 – SAM 11.0 (update)



Upon completion of this module, you should be able to:

- List the steps involved in the Network Element discovery process
- Identify the function of a Mediation Policy and the parameters involved in configuring it
- Identify the function of a Discovery Rule and the parameters involved in configuring it

3 · 2 · 3

Network Management · Network Element Discovery
5620 SAM · R12.0 Fundamentals

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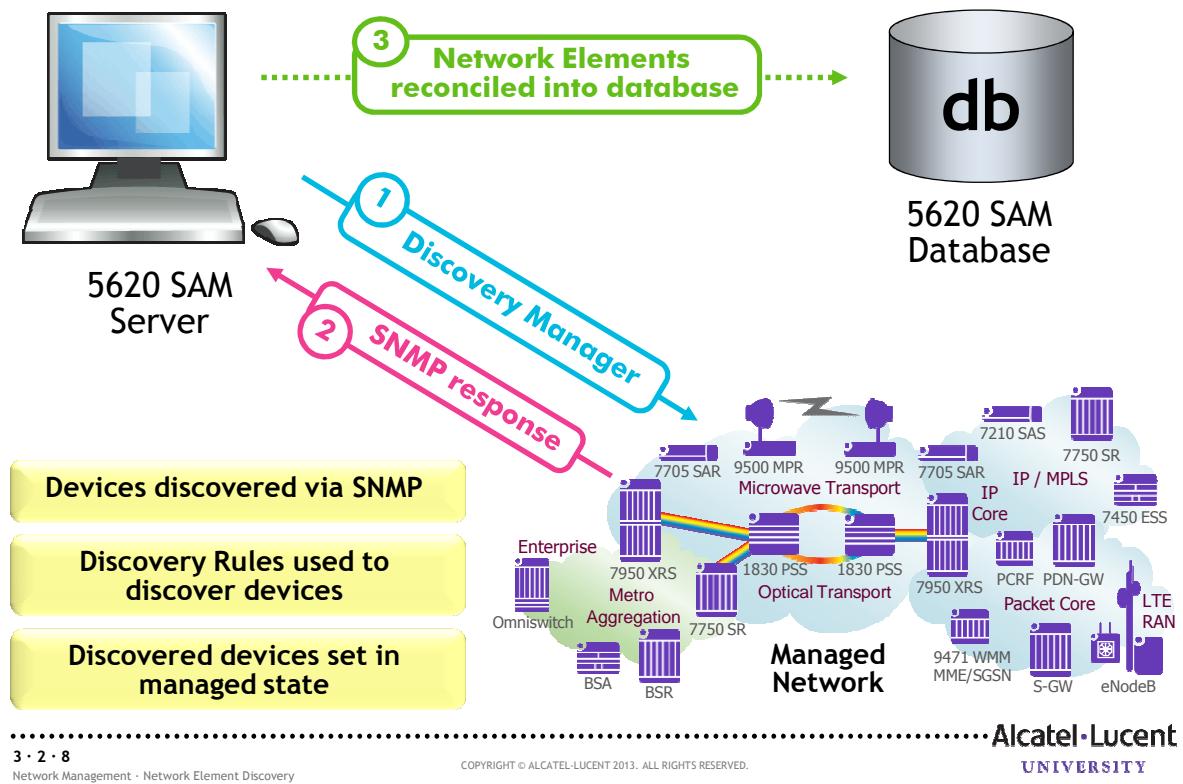


	Page
1 Network Element Discovery	7
1.1 – 5620 SAM Network Element Discovery Process	8
1.2 Network Element Discovery Workflow	9
1.3 Verification of Device Configuration for Discovery	10
1.4 Mediation Policy Configuration	11
1.4.1 Mediation Security Policy	12
1.5 Discovery Rules	15
1.5.1 In-Band and Out-of-Band Management	17
1.6 Manage Discovered NEs	18
1.6.1 Device Management State	19
1.6.1.1 Suspend State	21
1.7 SNMP Streaming	24
How To Do It and Exercises	26
Questions	27
Answers	28
Module Summary	29

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1 Network Element Discovery

1.1 – 5620 SAM Network Element Discovery Process



The 5620 SAM simplifies network provisioning by **discovering Network Elements or NEs** and **reconciling their properties with the contents of the 5620 SAM database**.

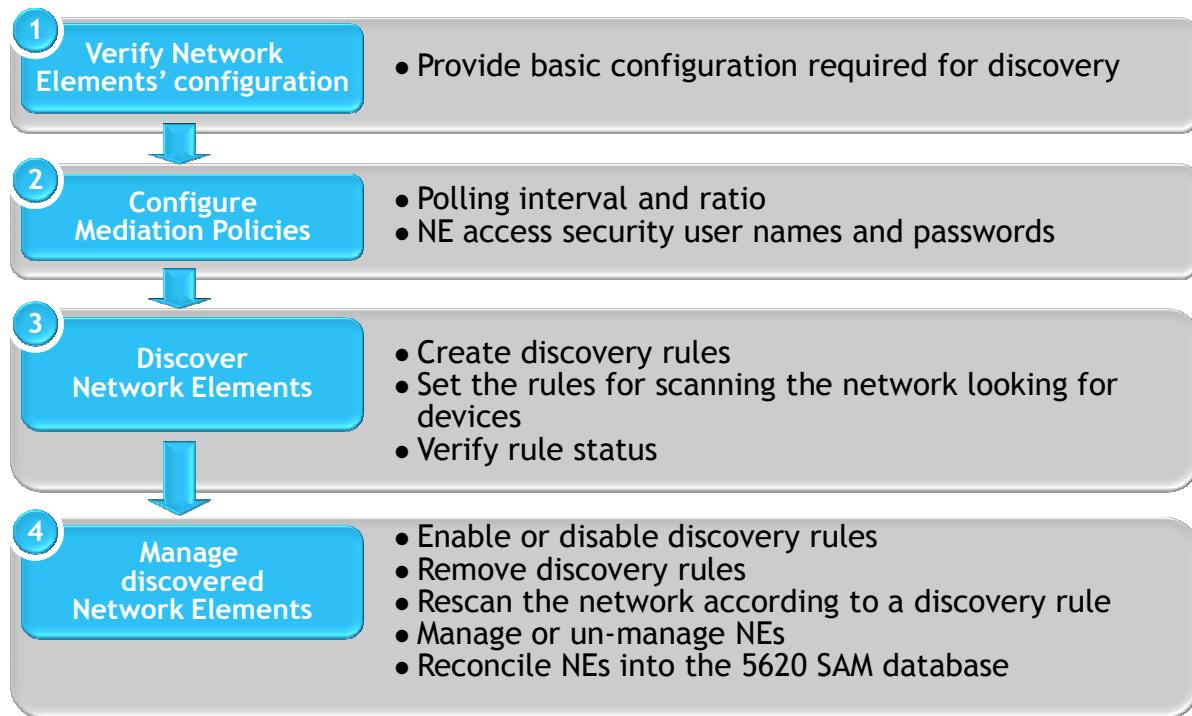
The 5620 SAM discovers NEs using the **Simple Network Management Protocol (SNMP)**.

During the discovery process, the 5620 SAM uses the discovery manager information configured in discovery rules to scan the network for devices according to user-specified IP addresses or IP address ranges.

Devices in the network corresponding to the specified IP addresses or IP addresses range respond using **SNMP**.

After the 5620 SAM discovers a device, it sets the device state to **Managed** and adds or reconciles the device properties to the 5620 SAM database contents. The discovered NE or NEs become part of the **SAM Managed Network**.

1.2 Network Element Discovery Workflow



3 · 2 · 9

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The following workflow outlines the high-level steps necessary to discover network elements.

1. **Configure Network Element** using CLI verify that the basic configuration required for discovery has been provided
2. **Configure Mediation Policies**
3. **Discover Routers**
 - Create discovery rules
 - Discover devices by scanning the network according to discovery rules
 - Set discovered device in a managed state
 - Reconcile device elements into the 5620 SAM database
 - Check discovery, management, and reconciliation status of the devices
4. **Manage Router Discovery.**
 - Edit discovery rules
 - Add or edit rule elements
 - Enable or disable discovery rules
 - Remove discovery rules
 - Rescan the network according to a discovery rule
 - Manage or unmanage devices
 - Reconcile device elements into the 5620 SAM database

1.3 Verification of Device Configuration for Discovery

1

Verify Network Elements' configuration

Depending on the type of device

IP address for SAM discovery

SNMP enabled and configured

CLI protocol

File transfer protocol

Netconf (for eNodeB and 9471 WMM)

Keep track of user and passwords used on the NE as they must match in 5620 SAM

An Alcatel-Lucent device, Telco device, or generic NE requires commissioning preconfiguration before the 5620 SAM can manage it. Before attempting to discover a device by the 5620 SAM, operators must verify the preconfiguration is complete.

Depending on the type of device, verification involve using a CLI to ensure some or all of the following preconfiguration tasks have been performed (as required):

- An IP address has been assigned or identified for SAM discovery
- SNMP is enabled and configured on the device. That includes verifying the appropriate SNMP security model is configured. If applicable, ensuring the device uses persistent SNMP indexes, and configuring the SNMP packet size to 9216.
- The protocol that will be used to connect to the device using the CLI is enabled. Options are Telnet or SSH.
- The protocol that will be used for file transfers between the managed device and the 5620 SAM is enabled. Options are FTP, SFTP or SCP.

Note

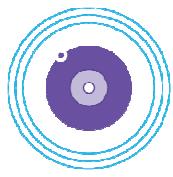
Keep track of the user and passwords used for CLI and file transfer in the NE as they must match the configuration used for SAM discovery and management.



- Netconf parameters are configured for the eNodeB and the 9471 Wireless Mobility Manager (WMM).

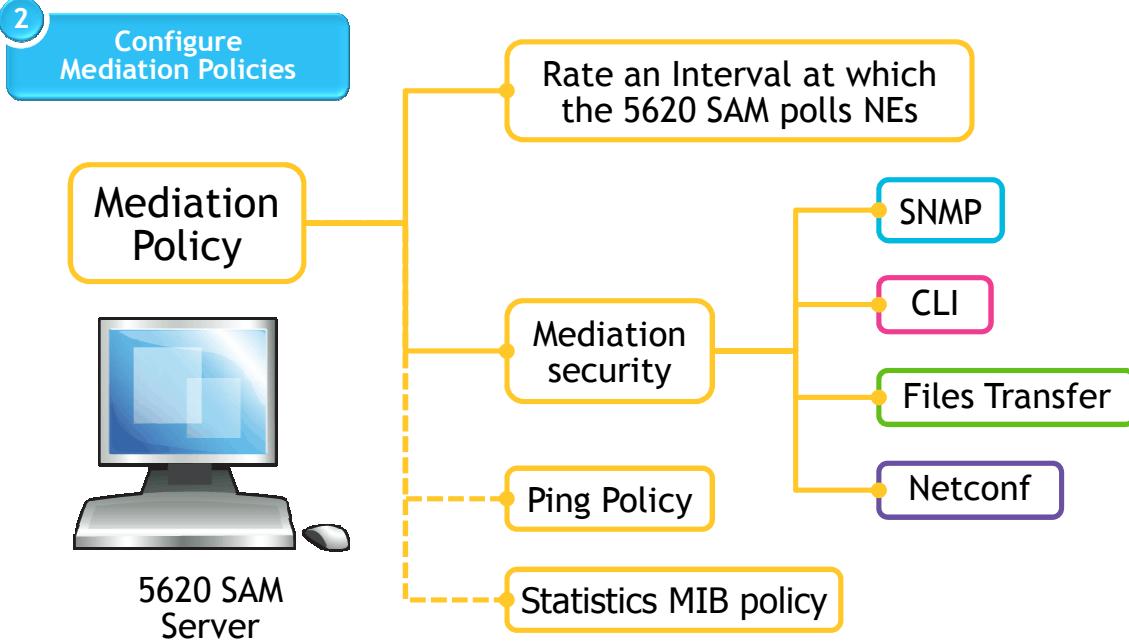
Technical Reference

See **5620 SAM User Guide - Device commissioning and management** for detailed information on device commissioning preconfiguration, including a workflow to commission and manage devices, and device specific commissioning procedures.



See the **5620 SAM LTE ePC User Guide and 5620 SAM LTE RAN User Guide** for information about how to configure the Netconf parameters for the eNodeB and the 9471 WMM.

1.4 Mediation Policy Configuration



User and passwords in a mediation policy must match the ones configured on the devices

A 5620 SAM mediation policy defines the regular rate and interval at which the 5620 SAM polls NEs for SNMP management information base (MIB) configuration changes. Including the possibility to configure MIB polling intervals for different managed devices, as required.

A 5620 SAM mediation policy is linked to the configured mediation security parameters that the SAM will use to:

- exchange SNMP messages with NEs according to the SNMP version used
- connect to the device for sending command line interface or CLI commands
- transfer files between the managed device and the 5620 SAM
- communicate specifically with the eNodeB and the 9471 WMM using NETCONF



Note

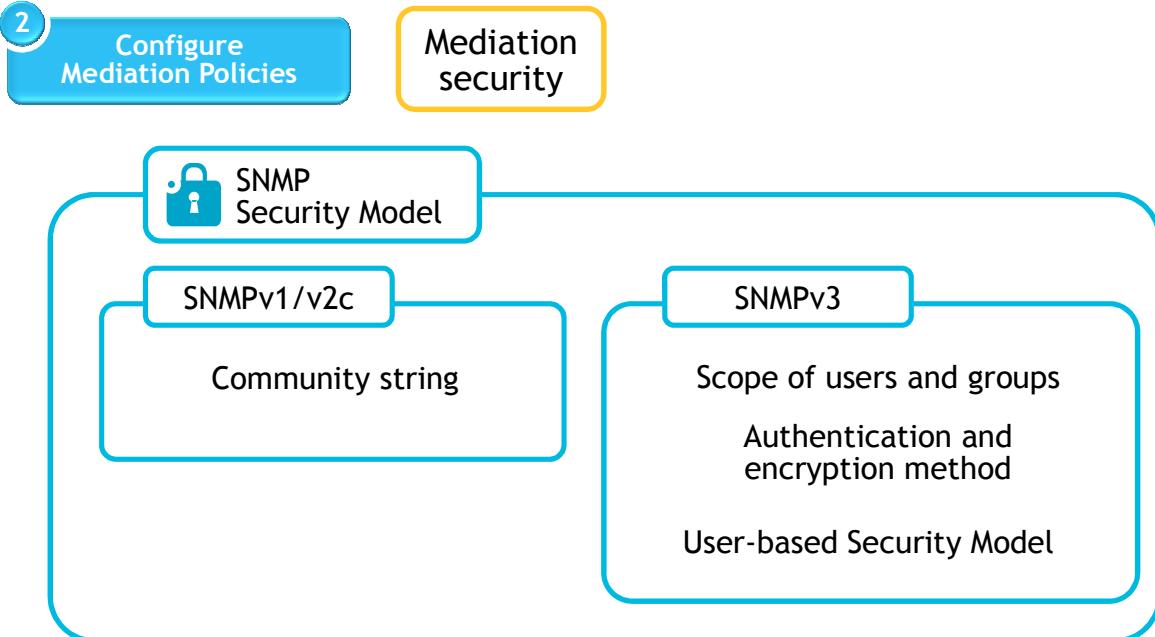
In order to ensure proper communication between the 5620 SAM and the managed NEs, the user and passwords defined in a mediation policy must match the ones configured on the devices.

Optionally, the mediation policy form allows operators to create new or modify existing Ping Policies and Statistics MIB Policies as required, which can be assigned to a discovery rule instead of the default policies configured in the 5620 SAM.

A Ping policy defines how the management IP addresses of devices are checked using a ping.

A Statistics MIB policy determines how often the 5620 SAM polls the managed device MIBs for statistics.

1.4.1 Mediation Security Policy



User and passwords in a mediation policy must match the ones configured on the devices

During the configuration of a mediation policy, the Security Model parameter specifies which version of SNMP should be used, depending on the network security requirements.

For SNMPv1 and SNMPv2c, the mediation policy is configured with an SNMP community string that matches the community string specified during the device preconfiguration.

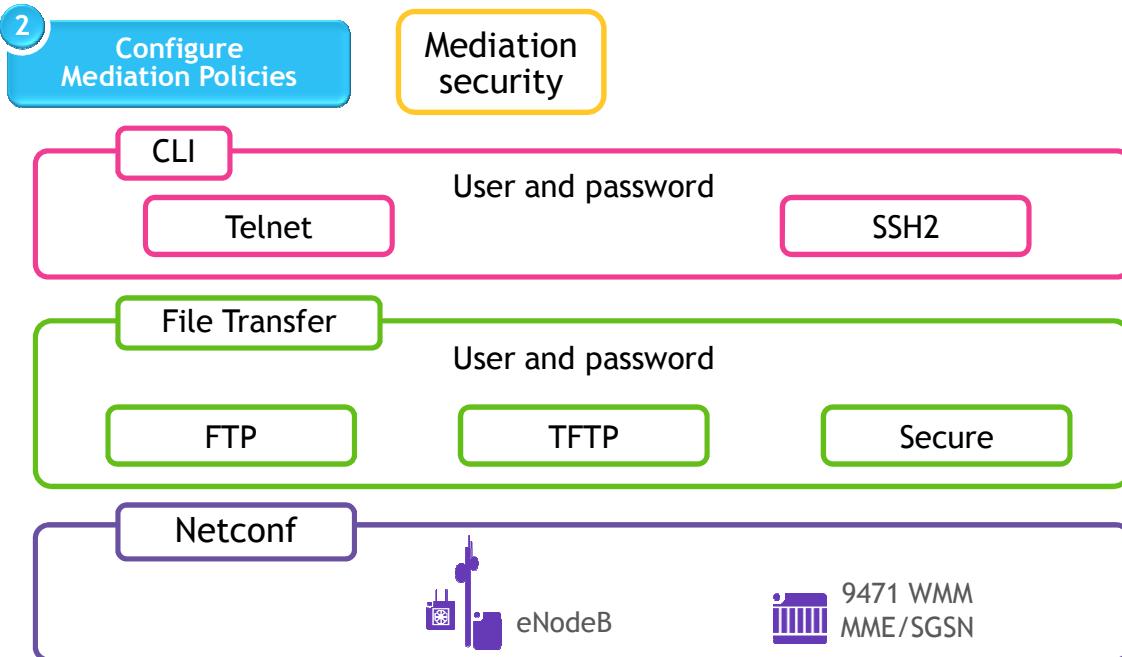
SNMPv3 provides user-based security. The access granted is restricted to the scope of the configured users and groups. SNMPv3 requires that an authentication and encryption method such as SSH is assigned to each user for validation by the NE. SNMPv3 authentication and encryption enable an NE to validate the system that issues an SNMP message and to determine whether another system has tampered with the message.

When using SNMPv3, the system administrator or operator must preconfigure the 5620 SAM server and the managed devices. A mediation policy must be created ensuring that the following are configured:

- Security Model is SNMPv3 USM (User-based Security Model)
- SNMP User Name is the same as the user name created using CLI, which is also the name of the 5620 SAM NE user configuration created to use SNMPv3

SNMPv3 trap forwarding occurs automatically when the 5620 SAM discovers a device with a username that matches the SNMP v3 USM username specified in the 5620 SAM mediation policy.

1.4.1 Mediation Security Policy [cont.]



The mediation policy must be configured to specify the protocol that will be used to connect to the device using the CLI. The options are Telnet or SSH2. On either case, an user name and password must be configured.

The mediation police must also be configured to specify the protocol that is used for file transfers between the managed device and the 5620 SAM. For FTP, an user name and password must be configured.

If the File transfer type parameter is set to Secure, the Communication Protocol parameter must be set to SSH2. The User Name and User Password parameters must be the user name and password of the SSH server.

SSH is a protocol that provides secure file transfer and file system access between the 5620 SAM, and managed NEs. SSH version 2, or SSH2, is enabled by default on many devices.

When SSH2 for CLI sessions is enabled in the mediation policy of an SSH2-capable device:

- SSH2 is used instead of Telnet for each CLI session
- SSH2 is used instead of Telnet for each script execution session
- SCP is used instead of FTP for backups, restores, software upgrades, and statistics collection.

The NETCONF panel in the mediation policy allows to configure the NETCONF parameters intended for mediation policies created specifically for 5620 SAM communication with eNodeB devices, or for 5620 SAM communication with the Alcatel-Lucent 9471 Wireless Mobility Manager (MME).

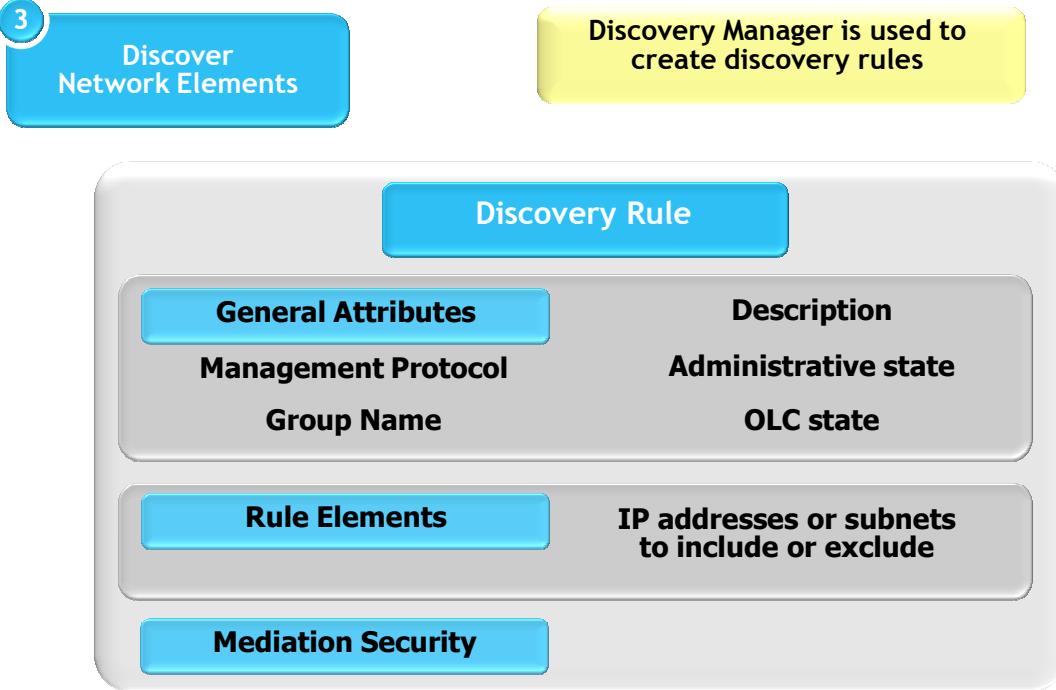


During which step of the NE Discovery workflow an operator will configure on the 5620 SAM the CLI and FTP user and password that will be used to access the discovered NE?

- a. Configure Network Elements.
- b. Configure Mediation Policy.
- c. Discover NEs.
- d. Manage discovered NEs.

Choose the correct answer for the knowledge verification question above.

1.5 Discovery Rules



3 · 2 · 15

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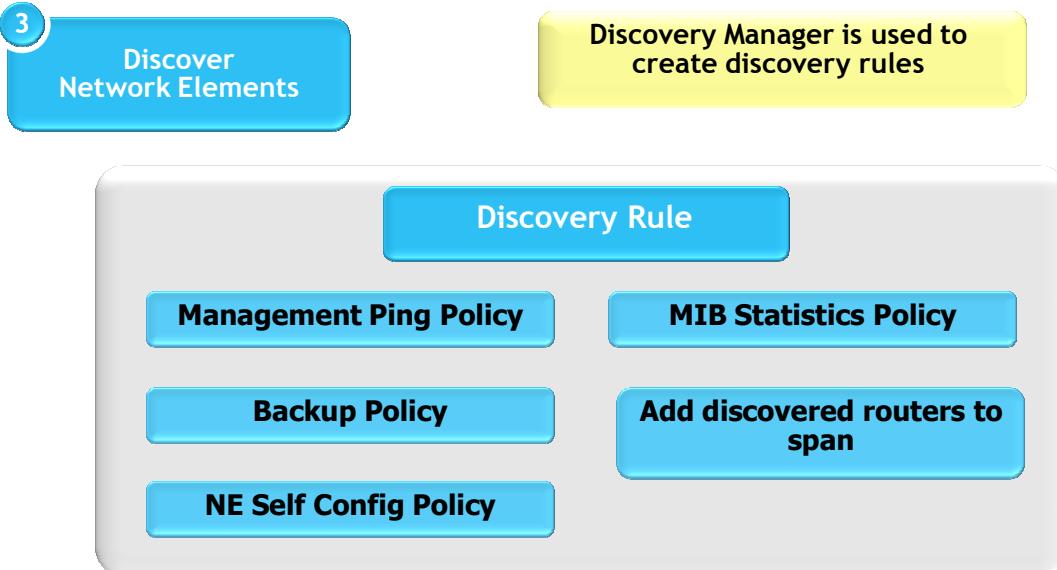
To discover one or more devices, SAM operator use the 5620 SAM **Discovery Manager** to create **discovery rules** and scan the network as specified by the rules.

A Discovery Rule creation involves the configuration of General Attributes, including a description for the rule, whether the rule is administratively enabled, selecting a Management Protocol which specifies the format of the IP addresses used for discovery purposes (either IPv4 or IPv6), the topology group into which newly discovered Network Elements are placed, the initial Object Life Cycle (OLC) state of an NE after the 5620 SAM successfully discovers the NE, and whether the NE changes OLC state to either the In Service mode or the Maintenance mode after the NE has been discovered and fully resynchronized.

Discovery rules contain rule elements that specify which devices or subnets are to be included in or excluded from the discovery process. A discovery rule can contain multiple rule elements. For example, operators can configure one rule element to discover a subnet and another to exclude specific IP addresses from the subnet.

The Discovery rule allows to choose Mediation Security policies to be used for communication with each Site in the IP range. Independent mediation policies can be chosen for read access, write access and trap access.

1.5 Discovery Rules [cont.]



3 · 2 · 16

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A Discovery Rule allows also to select:

Management Ping Policy, used for availability checking with each Site in the IP range. Independent ping policies can be assigned for out-of-band management interface ping, in-band management interface ping and standby CPM ping.

MIB Statistics Policy, used for collecting polled MIB statistics.

Backup Policy, allowing to choose a policy to be used for NE backup.

A discovery rule also provides options to:

Add discovered routers to a specified span.

Add an NE Self Config Policy that the 5620 SAM uses to provide pre-provisioning support that is specific to the eNodeB

1.5.1 In-Band and Out-of-Band Management

3

Discover
Network Elements

In-Band Management

System IP address is used to discover a device

Out-of-Band Management

Management IP address is used to discover a device

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When the IP address used to discover a device is the system IP address, also called the system ID, management is considered **in-band**. When the IP address used to discover the device is the management IP address of the device management port, management is considered **out-of-band**.

1.6 Manage Discovered NEs

4

Manage discovered Network Elements

Discovered devices are set to managed state and device's properties are added to the 5620 SAM database

Discovered NE Management

Edit discovery rules

Rescan the network

Enable or disable discovery rules

Remove discovery rules

Reconcile devices into the 5620 SAM database

Manage or unmanage devices

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After the 5620 SAM discovers a device, it sets the device state to Managed and adds the device properties to the 5620 SAM database.

The 5620 offers several options to manage discovered NEs allowing operators to:

- Edit discovery rules when new devices are added to, or removed from the network. If required, operators can use the discovery manager to rescan the network as specified by the discovery rules.
- Enable or disable discovery rules. When a discovery rule is enabled, the network is scanned according to the discovery rule when the discovery rule is saved or rescanned. The network is also scanned according to the discovery rule as specified by the Discovery Rule Scan Interval parameter in the Mediation form. If your discovery rule is disabled, the network is not scanned as specified by these conditions.
- Remove discovery rules. When an operator deletes a discovery rule, only the rule is removed; the devices discovered using the rule are not removed from the 5620 SAM
- Manage or unmanage devices. Using the 5620 SAM to unmanage a device excludes the device from the managed network, but a reference to the device remains in the 5620 SAM discovery system. The unmanage function may be used for unusual conditions such as when the 5620 SAM requires a complete refresh of NE data because of data corruption.

Warning: Unmanaging a device results in a loss of management data for the selected device, which includes, but is not limited to: object names and descriptions, statistics, alarms, physical links, policies, script results, scheduled activities, and/or NE backups

- Delete devices. Caution: Deleting a device results in the complete loss of management data for the device and completely removes the device from the managed network.
- Reconcile device elements into the 5620 SAM database. The Resync contextual menu option for an object specifies that SNMP MIB and CLI information bases for the object are reread to resynchronize them with the 5620 SAM database.

When you return a suspended device to the managed state, the 5620 SAM redisCOVERS the device to capture events such as device reboots or software release changes, and initiates a full device resynchronization based on the response to a trap sequence ID check.

1.6.1 Device Management State

4

Manage discovered Network Elements

Icons represent managed devices in the topology map

Managed Device Icon within



Topology Group as specified in Discovery rule

OR



Default Discovered NEs group

To move devices from Discovered NEs group, double-click group icon and drag-and-drop

3 · 2 · 19

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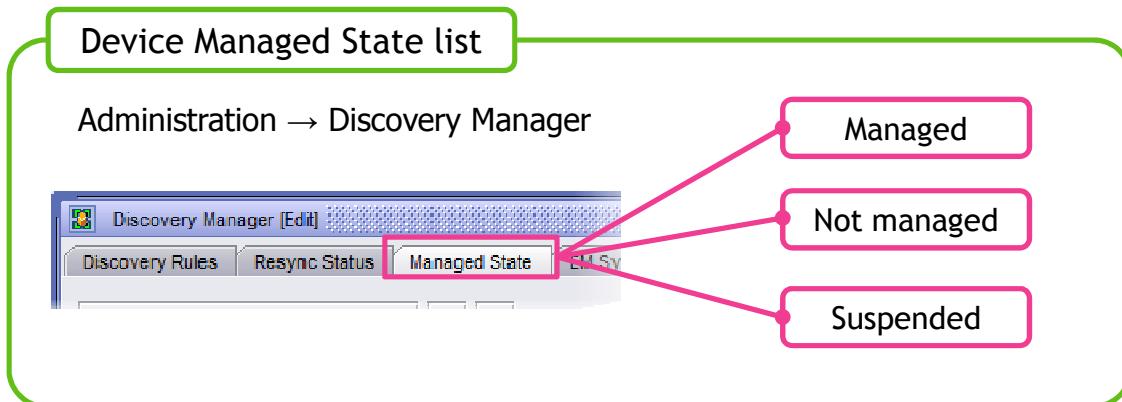
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Icons representing newly discovered managed devices are displayed in the topology map either within the selected topology group in the discovery rule, or if a topology group is not specified in the discovery rule, within the default **Discovered NEs** group.

In order to move a device displayed in the default Discovered NEs group, double-click on the Discovered NEs group icon. The Discovered NEs window opens with the list of discovered nodes. Select the discovered network node(s) from the list and drag-and-drop the listing into the appropriate group.

1.6.1 Device Management State [cont.]

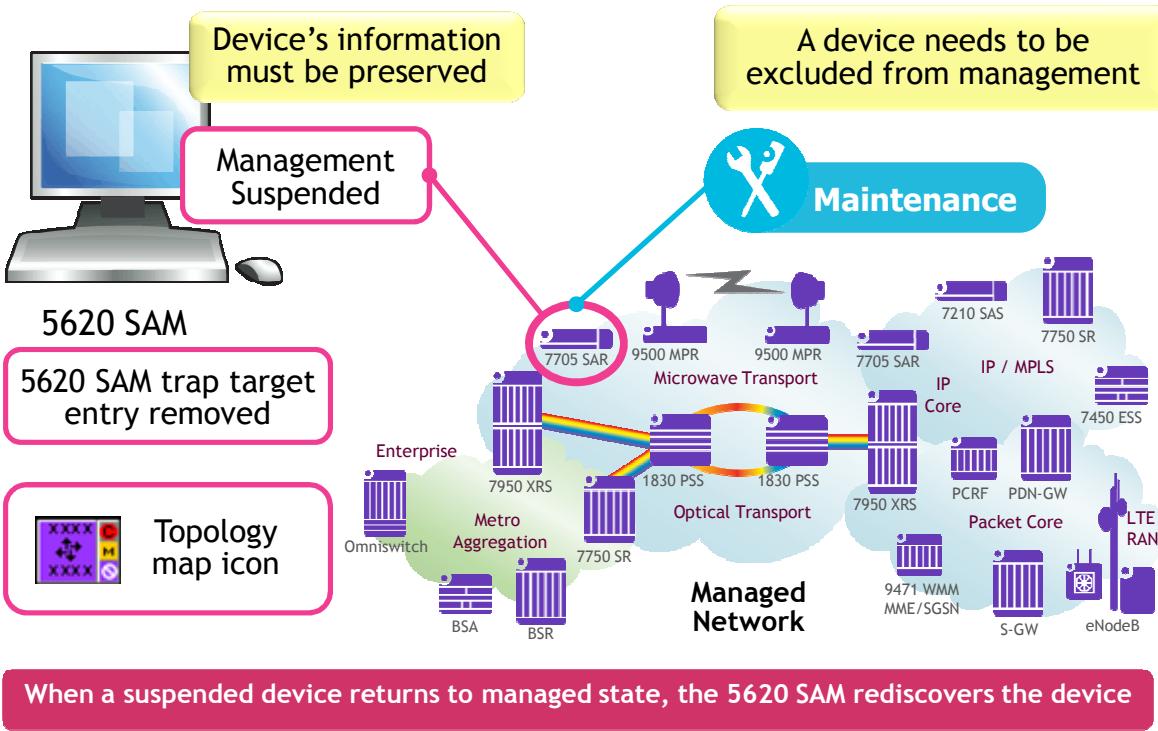


5620 SAM operators can verify the management state of discovered devices in the GUI by choosing Administration→Discovery Manager from the 5620 SAM main menu, the Discovery Manager form opens. Click on the Managed State tab to display a list of the management state for discovered devices. Operators may apply filters as required to the list in order narrow down the list entries and verify the management state of specific devices.

A device can be in one of the following management states:

- managed—the 5620 SAM manages the device
- not managed—an operator has unmanaged the formerly managed device; the management information is removed from the 5620 SAM database
- suspended—an operator has suspended management of the device

1.6.1.1 Suspend State



As of SAM R12.0, the manage “suspend” state has been introduced for cases when a device needs to be excluded from 5620 SAM management, but the 5620 SAM information about the device needs to be preserved. As opposed to unmanaging a device which results in a loss of management data for the selected device.

For example, during a maintenance period that may generate an exceptional number of SNMP traps, operators can use a GUI or OSS client to suspend the management of the device.

When the management state of a device is changed to suspended, the 5620 SAM removes the 5620 SAM trap target entries from the device configuration. In other words, the manage suspend state is very similar to the state when NE is not reachable by the 5620 SAM (the NE agent or management connection is shutdown). The main difference in case of suspended state is that the disconnection with NE agent is originated and controlled by the 5620 SAM.

Caution – When the management of a device is suspended, the 5620 SAM raises a critical alarm against the device.

In the 5620 SAM topology map, a suspended device is represented with a purple icon.

When a suspended device returns to a managed state, the 5620 SAM rediscovers the device to capture events such as device reboots or software release changes, and initiates a full device resynchronization based on the response to a trap sequence ID check.

1.6.1.1 Suspend State [cont.]

Operations blocked when Management Suspended

- SNMP deployment and trap handling
- NETCONF deployments and event subscriptions
- Statistics collection
- Automated FTP and file transfers
- Client configuration of device parameters
- 5620 SAM initiated scheduled and periodic operations

When a device is set to a management suspended state, the following operations are subsequently blocked:

- SNMP deployment and trap handling; all traps from the device are dropped
- NETCONF deployments and event subscriptions
- statistics collection
- automated FTP and other file transfers
- GUI or OSS client configuration of device parameters; a configuration attempt results in a failed deployment
- scheduled and periodic operations that the 5620 SAM initiates, such as the following:
 - connectivity checks
 - resynchronizations
 - device configuration backups
 - device software upgrades
 - OAM test and test suite execution

1.6.1.1 Suspend State [cont.]

5620 SAM operations that can be performed on a Suspended device

Open a CLI session

Execute CLI scripts

Open an FTP session

Configure 5620 SAM parameters that affect the device management but are not deployed

When a suspended device returns to managed state, the 5620 SAM checks the device

3 · 2 · 23

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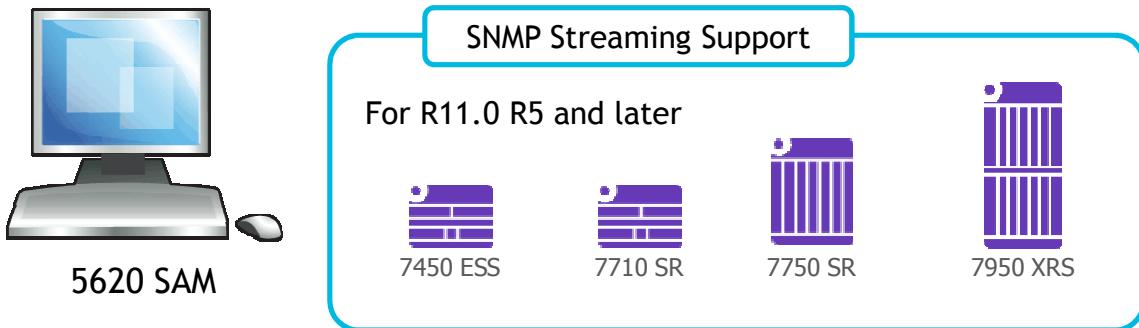
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Operators can use the 5620 SAM to perform the following on a suspended device:

- open a Telnet or SSH CLI session
- execute CLI scripts
- open an FTP session
- configure 5620 SAM parameters that affect the device management but are not deployed, such as the in-band or out-of-band management preferences

Note — When a suspended device is returned to managed state, the 5620 SAM also checks the device management parameters to adapt to a switch from one type of management to another, for example, from in-band to out-of-band.

1.7 SNMP Streaming



Facilitates the bulk transfer of MIB-based configuration data

May reduce the time required for large data transfers in a high-latency network

Upon discovery, 5620 SAM GUI can be used to control NE's SNMP streaming configuration

The 5620 SAM supports the use of SNMP streaming for MIB-based configuration data transfers on Release 11.0 R5 and later 7450 ESS, 7710 SR, 7750 SR, or 7950 XRS. During the initial discovery of such devices the 5620 SAM enables SNMP streaming on the device, if it is not currently enabled.

SNMP streaming facilitates the bulk transfer of MIB-based configuration data using a streaming mechanism. SNMP streaming may substantially reduce the time required for large data transfers operations, such as NE discovery and object resynchronization, in a high-latency network.

Upon discovery and management of a Release 11.0 R5 and later 7450 ESS, 7710 SR, 7750 SR, or 7950 XRS, the 5620 SAM GUI can be used to control whether an NE uses SNMP streaming for configuration data transfers to the 5620 SAM by enabling or disabling SNMP streaming on an NE.

Note - To enable or disable SNMP streaming on an NE using the SAM GUI, open the NE properties form. Click on the Polling tab, and the Management sub-tab. Configure the Enable SNMP Streaming parameter as required.



During which step of the NE Discovery workflow an operator will configure on the 5620 SAM the IP address, addresses or IP address ranges that it will use to scan the network looking for devices?

- a. Configure Network Elements.
- b. Configure Mediation Policy.
- c. Discover NEs.
- d. Manage discovered NEs.

Choose the correct answer for the knowledge verification question above.

How To Do It and Exercises



How to do it

Instructor DEMO how to:

- Verify NEs basic configuration to enable the 5620 SAM to discover and manage them
- View the Mediation Policy information
- View the Discovery rule information
- View managed devices



Lab Exercises

Basic Network Device Configuration Lab

Network Devices Discovery – Mediation Policy

Network Devices Discovery – Discovery Rule

Create a Discovery Rule

Discover NEs

Verify NEs discovery



Time allowed:

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Your instructor may perform the above mentioned demonstrations using the 5620 SAM GUI.

In addition, your instructor will point out the appropriate lab module containing the above mentioned hands-on lab exercises, and will indicate the time allowed to perform these hands-on exercises.

Questions



3 · 2 · 27

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1. During the Configuration of Mediation Policy step of the NE Discovery workflow an operator will configure on the 5620 SAM the CLI and FTP user and password that will be used to access the discovered NE. True or false?
 - a. True
 - b. False
2. During the configuration of a Discovery Rule step of the NE Discovery workflow an operator will configure on the 5620 SAM the IP address, addresses or IP address ranges that it will use to scan the network looking for devices. True or false?
 - a. True
 - b. False

Answers



1. During the Configuration of Mediation Policy step of the NE Discovery workflow an operator will configure on the 5620 SAM the CLI and FTP user and password that will be used to access the discovered NE. True or false?
 - a. True ✓
 - b. False
2. During the configuration of a Discovery Rule step of the NE Discovery workflow an operator will configure on the 5620 SAM the IP address, addresses or IP address ranges that it will use to scan the network looking for devices. True or false?
 - a. True ✓
 - b. False



This module covered:

- The steps involved in the Network Element discovery process
- The function of a Mediation Policy and the parameters involved in configuring it
- The function of a Discovery Rule and the parameters involved in configuring it



End of module
Network Element Discovery

3 · 2 · 30

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Section 3
Network Management

Module 3
Equipment Management

TOS36033_V4.0-SG-R12.0-Ed1 Module 3.3 Edition 2

5620 SAM
R12.0 Fundamentals
TOS36033_V4.0-SG Edition 1

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Document History			
Edition	Date	Author	Remarks
1.0	2011-04-20	GARCIA LOZANO, René	TOS36033_V1.0 – SAM 9.0 (R1 update)
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2.1	2012-08-18	GARCIA LOZANO, René	TOS36033_V2.1 – SAM 10.0 (R1 vILT conversion)
2.2	2012-10-08	LOLLIERIC, Pascal	TOS36033_V2.2 – SAM 10.0 (R5 update)
2.3	2012-10-30	GARCIA LOZANO, René	TOS36033_V2.3 – SAM 10.0 (MyPLE and WBT)
3.0	2013-07-19	GARCIA LOZANO, René	TOS36033_V3.0 – SAM 11.0 (update)



Upon completion of this module, you should be able to:

- Describe the function of the Navigation Tree for equipment management
- Identify the Navigation tree elements and its function
- List the Navigation tree views and identify the equipment management functions available from each view
- Identify the Navigation tree management options

3 · 3 · 3

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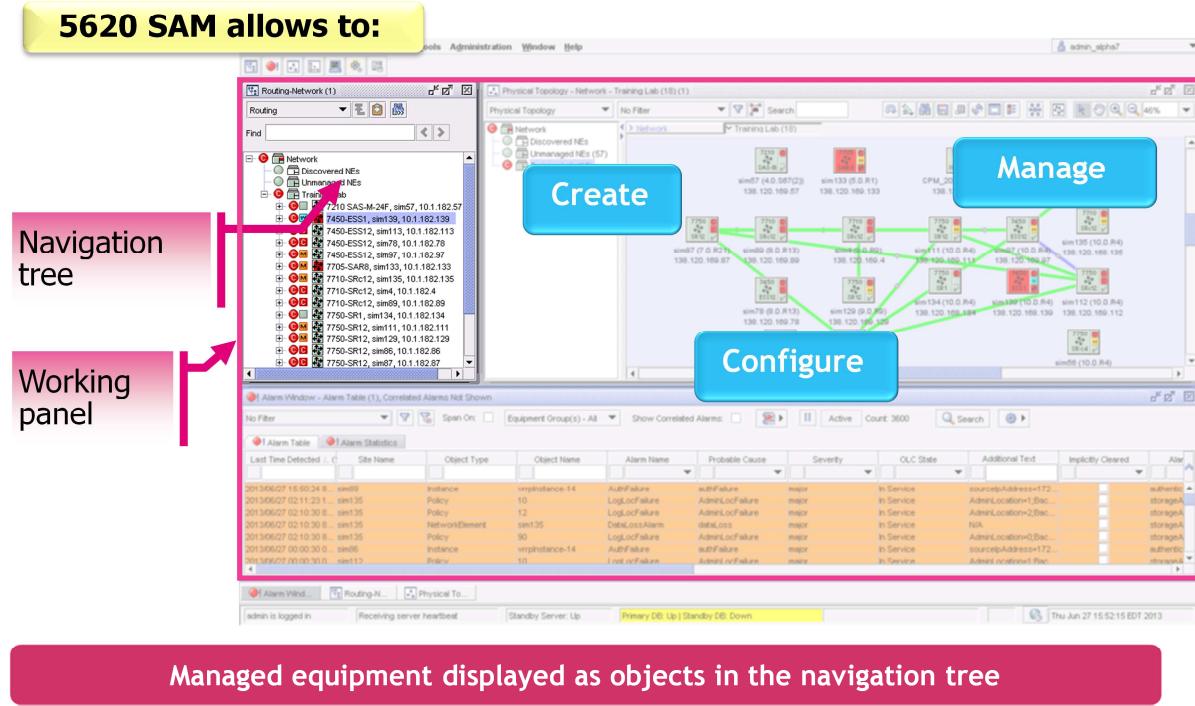


	Page
1 Equipment Management Using Navigation Tree	7
1.1 Working Panel	8
1.2 Navigation Tree Overview	9
1.3 Navigation Tree Elements	10
2 Navigation Tree Views	12
2.1 Equipment View	13
2.1.1 Equipment View Objects	14
2.2 Routing View	15
2.3 OSPF and IS-IS Views	16
2.4 Ring Group View	17
Knowledge Verification - Navigation Tree	18
3 Navigation Tree Management Options	19
3.1 Contextual Menus	20
3.2 Using the Navigation Tree Tool Bar	21
3.3 Finding Objects on Navigation Trees	22
3.4 Customizing the Navigation Tree Labels	23
3.5 Compare Equipment Configuration Side by Side	24
Knowledge Verification - Equipment Management	25
Knowledge Verification - Equipment Management	26
How To Do It and Exercises	27
Questions	29
Answers	30
Module Summary	31

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1 Equipment Management Using Navigation Tree

1.1 Working Panel



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3 • 3 • 8

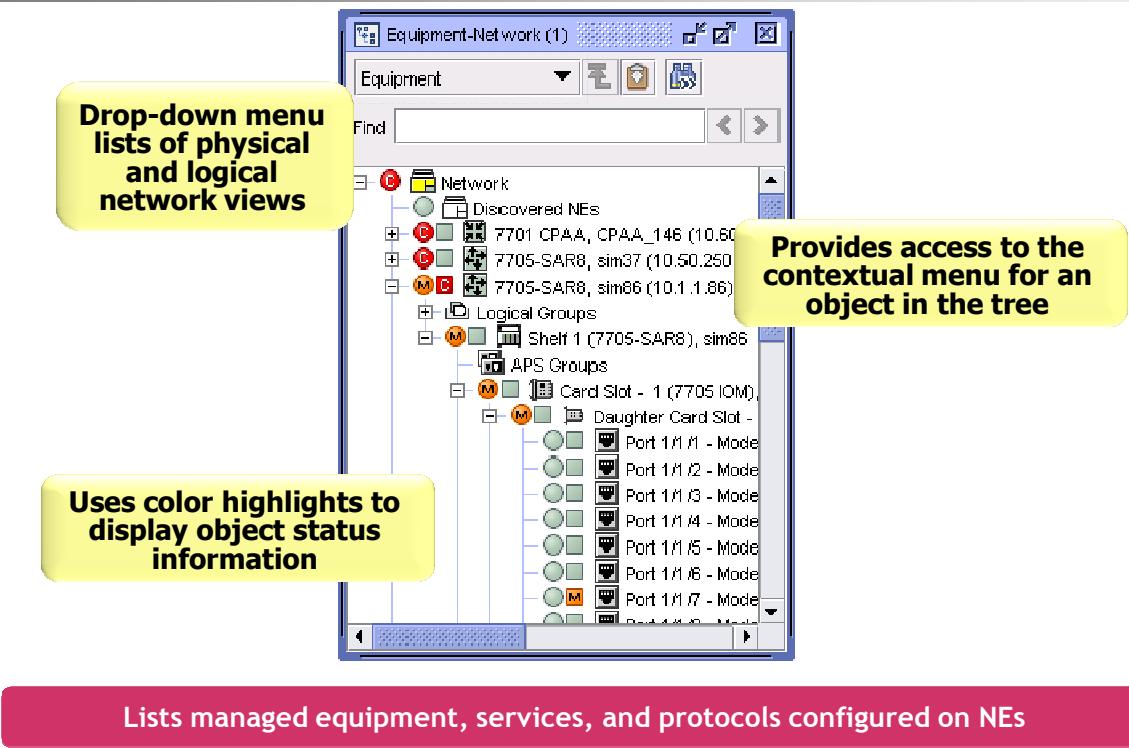
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The 5620 SAM is used to create, configure, and manage a device with the various children objects required to be part of a network. Equipment such as the routers, which are at the top of the hierarchy, have properties that are configured using the CLI and discovered when the 5620 SAM discovery process is run. After the device is discovered, it becomes managed by SAM and is displayed for equipment management on the GUI as an object in the **navigation tree**

On the GUIs working panel by default, the navigation tree window appears at the left side.

1.2 Navigation Tree Overview



The navigation tree lists the managed equipment, services, and protocols that are configured on the NE. The navigation tree includes a view selector located on the navigation tree toolbar. The view selector is a **drop-down menu** that lists the physical and logical network views that are available.

The navigation tree is accessible from the main window, configuration forms, and maps.

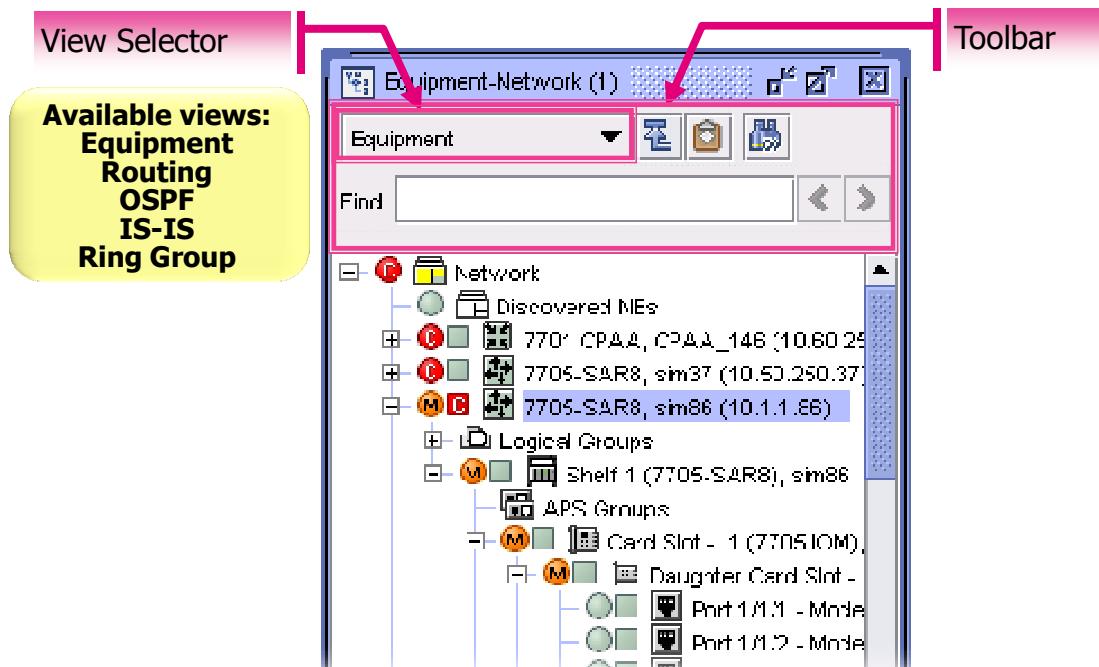
The navigation tree **uses color highlights to display object status information** such as the current alarm level and the aggregated alarm status. The operational and administrative states of an object are displayed in text form beside the object icon, as are the object type and description.

You can choose the following views:

- Equipment
- OSPF
- IS-IS
- Routing
- Ring Group

The navigation tree provides access to the contextual menu allowing network operators to select appropriate options available to that object listed in the tree.

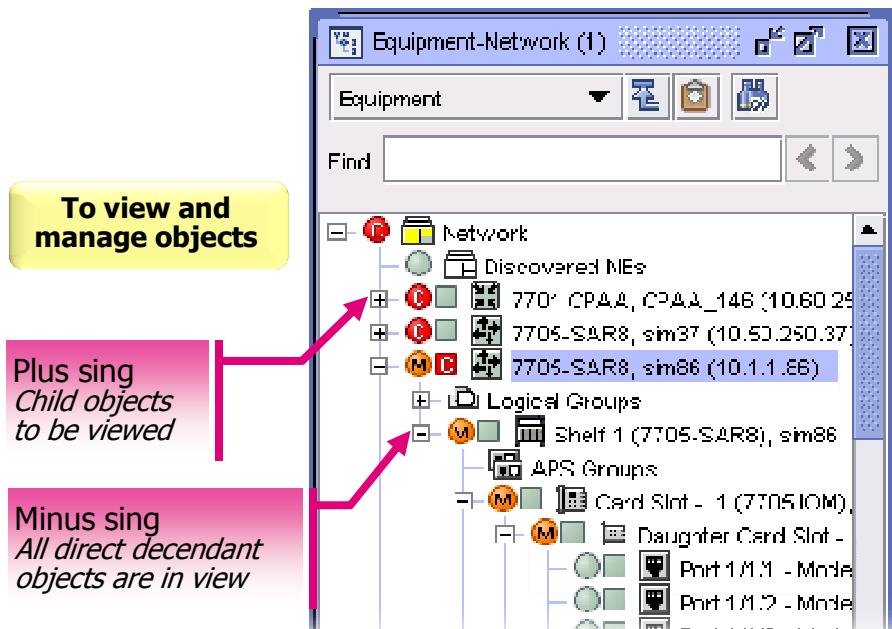
1.3 Navigation Tree Elements



The Navigation Tree elements include a Tool bar which consists of:

- “**Make Root At Top Level**” button restores the navigation tree to the default root.
- “**Copy to Clipboard**” button copies the identifier of one or more 5620 SAM objects to the Clipboard window. Network operators could use an object identifier copied to Clipboard window to paste it into another application, to click on it and select the View Object button for opening the object properties form, or to send it to another SAM user using the GUI’s text message tool.
- “**Find**” button opens the Find panel to configure search parameters as necessary. The parameters that are available for configuration vary depending on the view that has been selected.
- “**Quick Find**” option, as of SAM 10.0 R5 allows operators to enter a search string or any attribute that has been defined in the label. By pressing Enter, the first matching object is selected and expanded in the navigation tree.
- **View Selector.** Allows operators to choose the Navigation Tree view. is a drop-down menu that lists the physical and logical network views that are available in the Navigation Tree. The available options are:
 - Equipment—displays the physical objects that the 5620 SAM manages
 - OSPF—displays the OSPF objects in the network
 - IS-IS—displays the ISIS objects in the network
 - Routing—displays the device routing instances and child objects such as the network interfaces and the configured protocols
 - Ring Group—displays the ring group objects that the 5620 SAM manages

1.3 Navigation Tree Elements [cont.]



3 · 3 · 11

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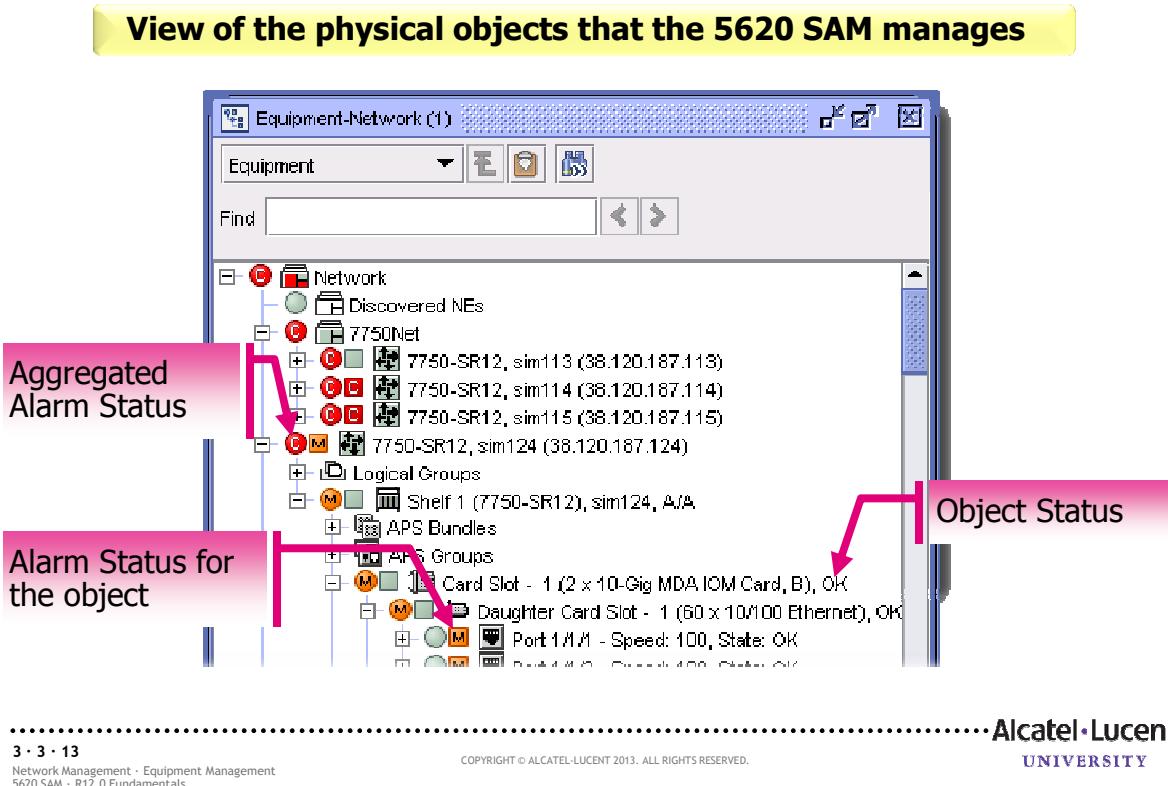
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The operator can use the following methods to view and manage objects in the 5620 SAM navigation tree:

- A plus sign indicates there are child objects to be viewed in the tree. Double-click on an object, click on the plus sign, or press the + key when the object is selected to open the object and to reveal the child objects.
- A minus sign indicates all direct descendant objects are in view. Click on the minus sign or press the - key when the object is selected to close the object and to hide the child objects.
- Select an object and use the arrow keys to navigate the object hierarchy. In the Equipment view, for example, operators can navigate from the device to the ports and channels.
- When operators double-click on an object that has no child objects, the object properties form opens.
- Right-click on an object to open the contextual menu and choose a function. The menu options are specific to the object type.

2 Navigation Tree Views

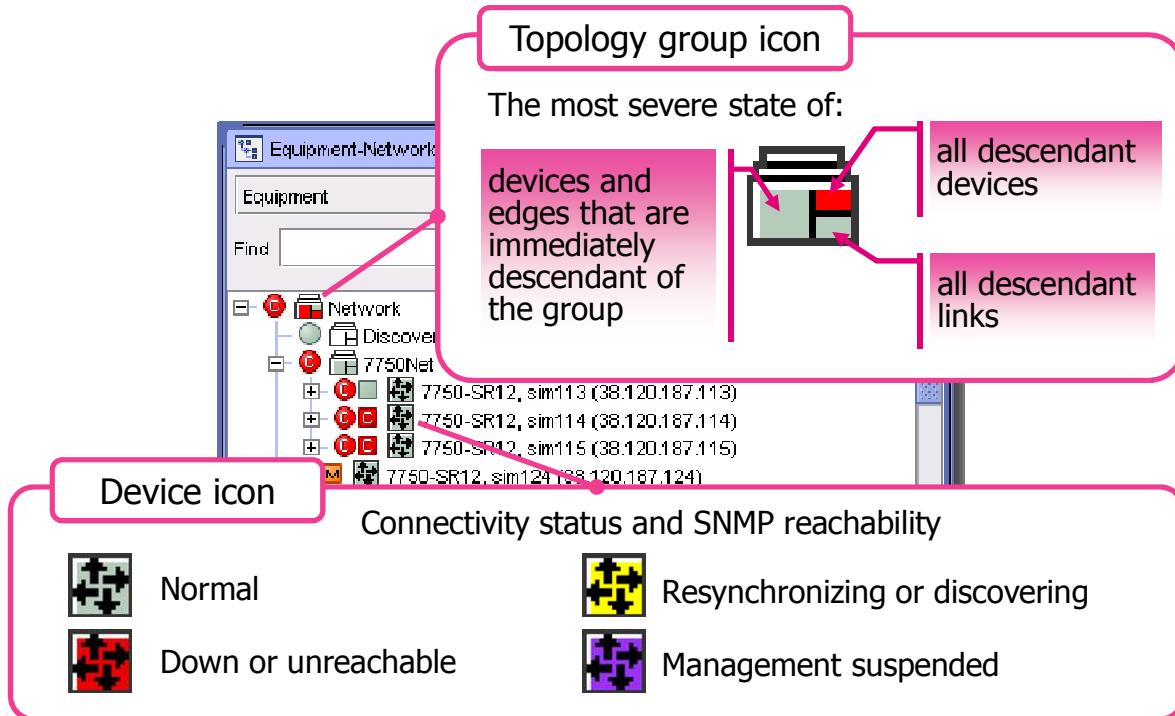
2.1 Equipment View



The Equipment view displays the physical objects that the 5620 SAM manages. It enables the network operator to configure and display the hardware configuration and status of the managed nodes. Other functions; such as CCAG (Cross Connect aggregate Groups), APS (Automatic Protection Services) and LAGs (Link Aggregate Groups) are configured and monitored through this tree.

The figure above shows some of the navigation tree objects that you can manage using the Equipment view.

2.1.1 Equipment View Icons



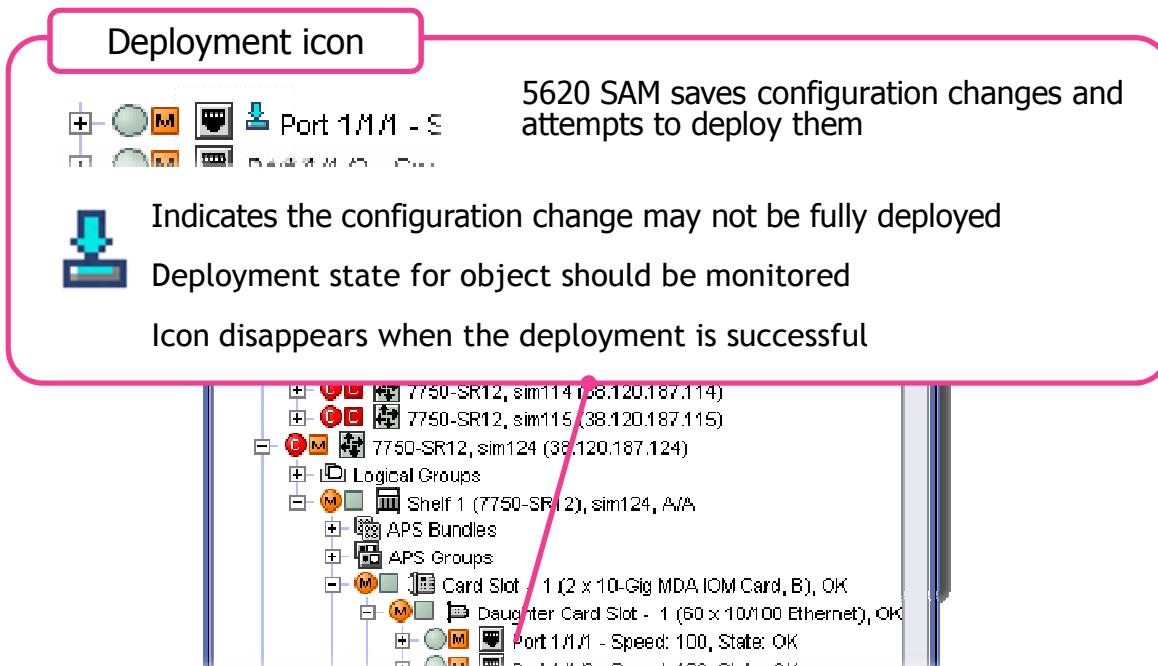
The topology group icons in the navigation tree are divided into three sections, each of which display the most severe state of:

- All descendant devices, in the top right square.
- All descendant links, in the bottom right square.
- Devices and edges that are immediately descendant of the group, left section of the icon.

The background color of device icons in the navigation tree represent connectivity status and SNMP reachability:

- Green - normal
- Red - down or unreachable
- Yellow - resynchronizing or discovering
- Purple - management suspended

2.1.2 Deployment Icon



The deployment icon appears in the navigation tree beside an object.

When an object is configured using the 5620 SAM GUI or the 5620 SAM OSS, the 5620 SAM saves the configuration and attempts to deploy the changes to the network.

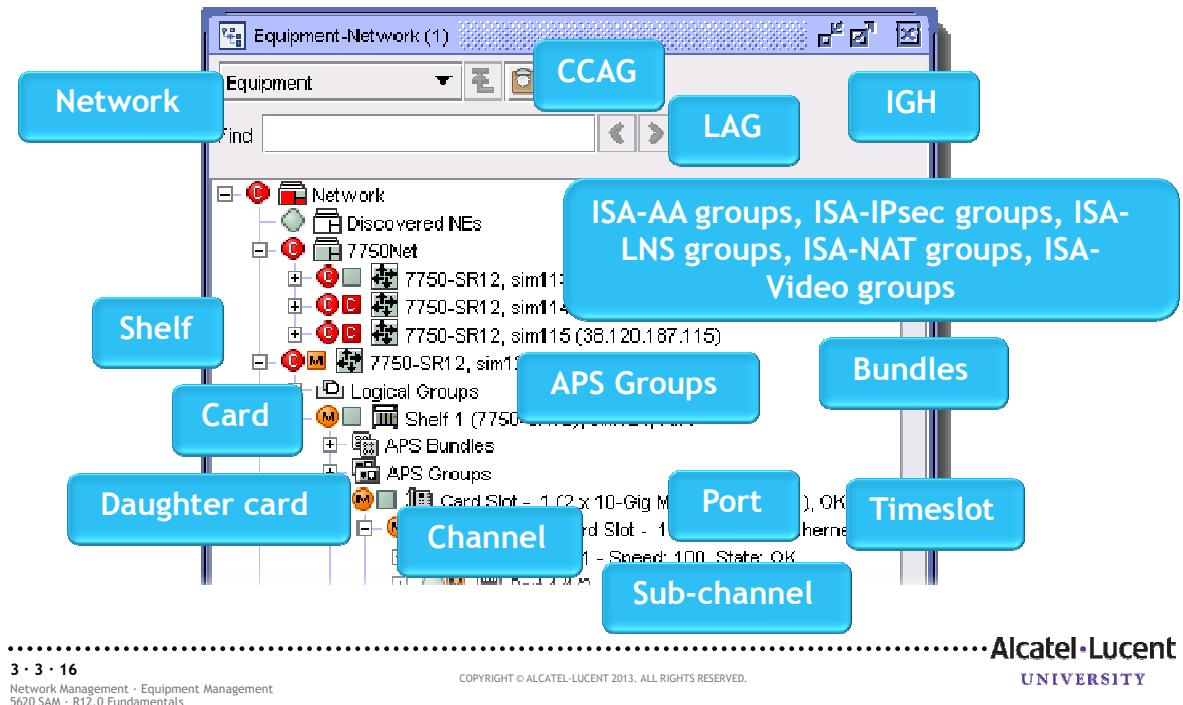
This blue deployment icon indicates that although the parameter values are changed on the configuration forms, the configuration change may not be fully deployed to the NE either because the deployment is in progress, or because the deployment has failed.

The icon provides 5620 SAM operators with an indication that the deployment state for object should be monitored. The Deployment tab on the object's properties forms notifies of configuration changes that are not fully deployed to the NE. The parameter that was unsuccessfully deployed is listed, along with the old value and the new value.

The icon disappears when the deployment is successful.

2.1.3 Equipment View Objects

Equipment view allows to create and manage:



5620 SAM navigation tree object descriptions - equipment view :

- **Network** : contains the routers, devices, and topology groups, including the default Discovered NEs and Unmanaged NEs topology groups
- **Router, device, topology group** : The second level in the hierarchy
- **CCAG, ISA-AA groups, ISA-Tunnel groups, ISA-LNS groups, ISA-NAT groups, ISA-Video groups, LAG, IGH, shelf** : The third level in the hierarchy
- **APS groups**: Located under the shelf object; contain the APS groups for a device
- **Card** Located under the shelf object Daughter card A child object of the card object
- **Bundles** A child object of the daughter-card object; a group of DS0 channels on a SONET- or TDM-capable daughter card
- **Port** A child object of the daughter-card object
- **Channel, sub-channel, timeslot** Child objects of the port object Fans Located under the shelf object Power Supplies Located under the shelf object

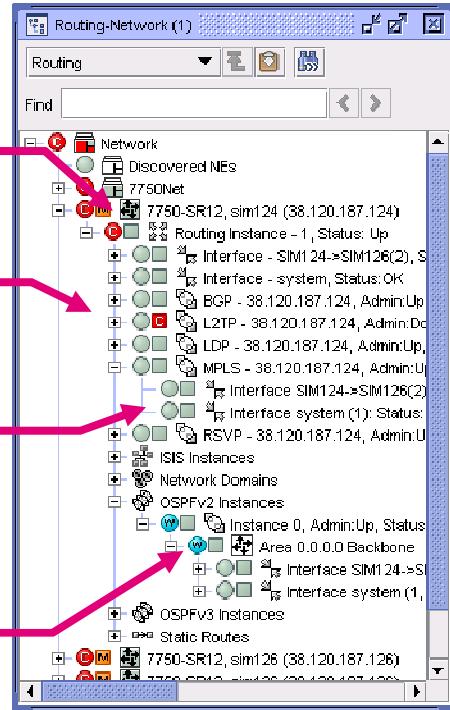
2.2 Routing View

Configure routers to support routing protocols

View enabled protocols and their configuration details

View assigned layer 3 interfaces
Associated with a physical port to routers

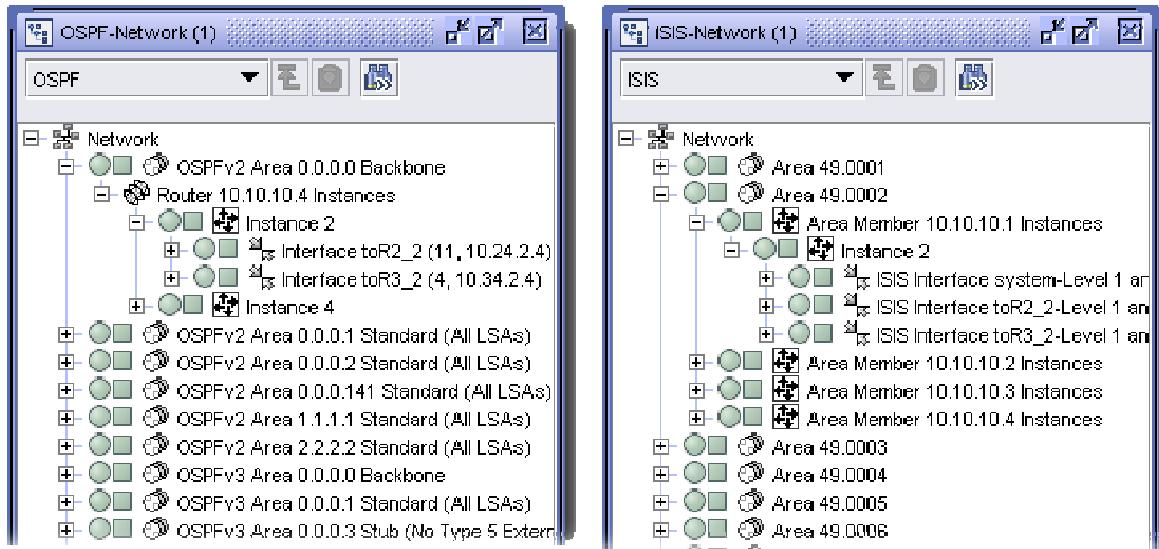
View assigned areas



The 5620 SAM allows you to view and configure the routing and forwarding parameters on NEs. You can use the Routing view in the **5620 SAM GUI navigation tree** to manage these functions on each managed NE.

2.3 OSPF and IS-IS Views

Configure, manage and display the configuration and status of OSPF objects or ISIS objects



3 · 3 · 18

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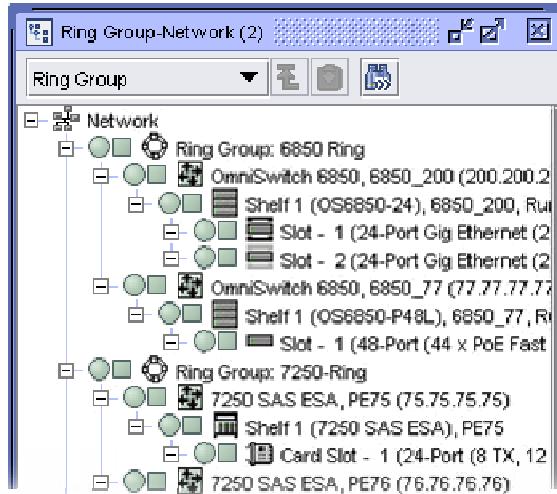
The OSPF view displays the configuration and status of the OSPF objects (v2 and v3, if enabled) in the network.

The IS-IS view displays the IS-IS objects in the network displays the configuration and status of the IS-IS in the network

The OSPF and, IS-IS views in the 5620 SAM GUI navigation tree allow operators to view and configure parameters that set and manage the device routing protocol support.

2.4 Ring Group View

Configure, manage and display the configuration and status of VLAN or VPLS ring groups



The 5620 SAM Ring Group view allows operator to create and manage VLAN or VPLS ring groups. The objects in the Ring Group view of the navigation tree include:

- Network
- Ring Group
- Device in ring group

Knowledge Verification - Navigation Tree



Which of the following is NOT a function of the 5620 SAM GUI Navigation Tree?

- a. Displays the a graphical map containing icons that represent the SAM managed network objects
- b. Provides access to the contextual menu for an object to create, configure, and manage specific parameters for the object and child objects
- c. Uses color highlights to display object status information such as the current alarm level and the aggregated alarm status
- d. Displays the operational and administrative states of an object in text form beside the object icon

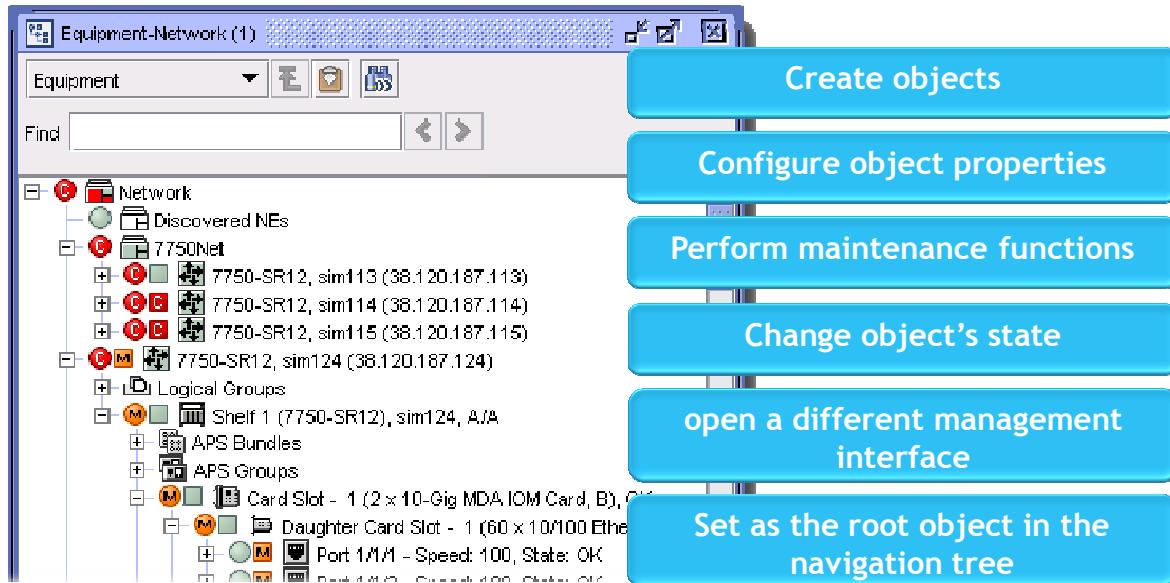
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Choose the correct answer for the knowledge verification question above.

3 Navigation Tree Management Options

3.1 Contextual Menus

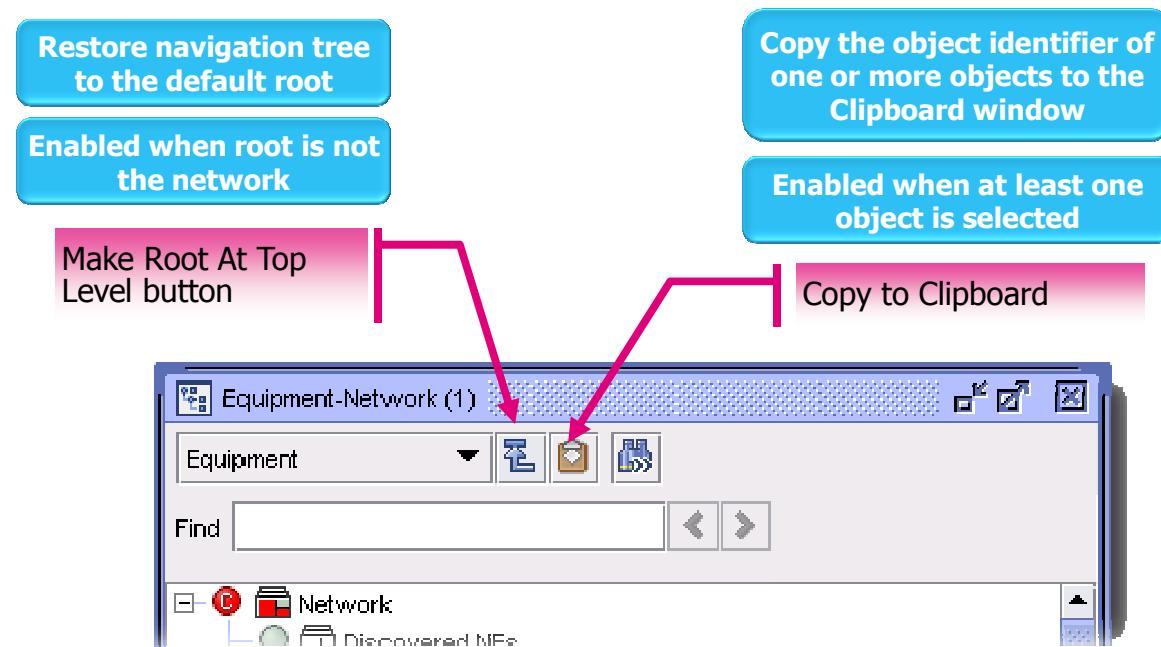
Contextual menus for the navigation tree allows to:



Each object in the 5620 SAM navigation tree has a contextual menu that opens when the operator right-clicks on the object. Operators can use the contextual menus to do the following:

- create objects
- configure object properties
- perform maintenance functions
- change the state of objects
- open a different management interface, for example, a CLI
- designate an object as the root object in the navigation tree

3.2 Using the Navigation Tree Tool Bar



3 · 3 · 23
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The navigation tree toolbar consists of the Make Root At Top Level button, the Copy to Clipboard button, Tree Label Preferences button, the Find button and quick find option. The figure above shows the navigation tree toolbar.

Make Root At Top Level button

The Make Root At Top Level button restores the navigation tree to the default root. For example, in the equipment view, if you redefine the root of the tree as a card and click on the Make Root At Top Level button, the navigation tree refreshes with the default root, which is the network. The Make Root At Top Level button is enabled only when the root is not the network. The Make Root At Top Level button is available only for the equipment view.

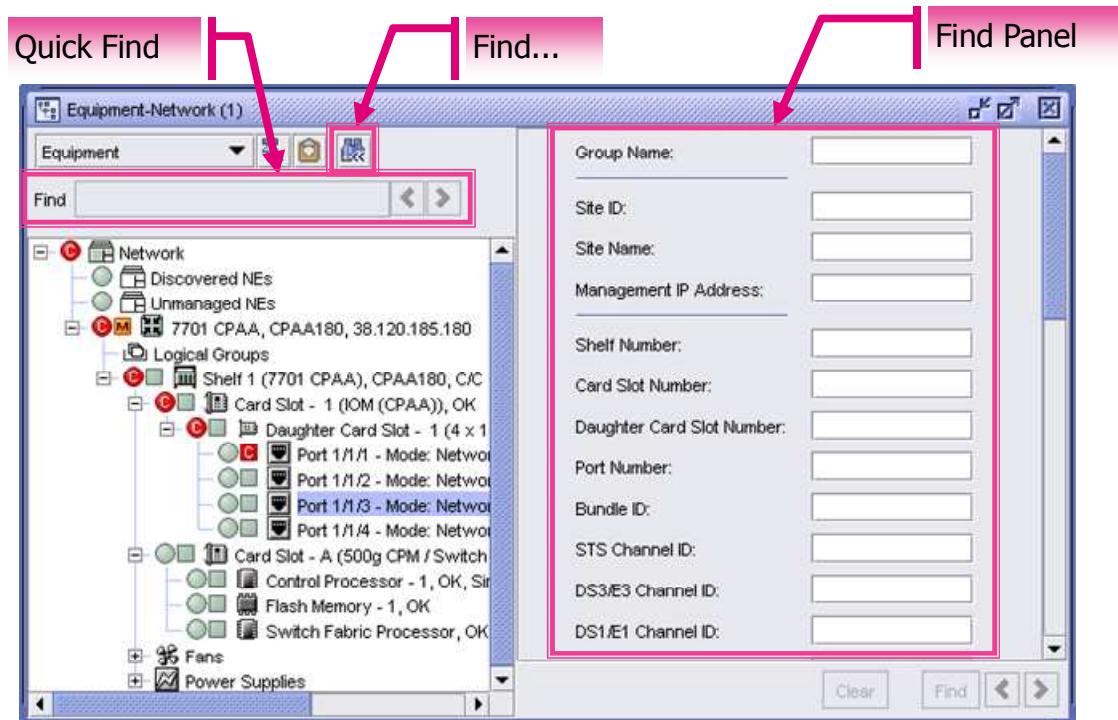
In addition, the navigation tree contextual menus provide Make Root and Make Root In New Tree menu options that allow operators to redefine the root of the tree. These menu options, along with the Make Root At Top Level button, help orient users in densely populated navigation trees. The menu options are available only for the equipment view.

Copy to Clipboard button and Clipboard window

Using the Copy to Clipboard button, operators can copy the object identifier of one or more objects managed by the 5620 SAM to the Clipboard window. Open the Clipboard window to view and retrieve the object identifier. The Clipboard window is available from the 5620 SAM Application menu. An operator can use an object identifier copied to Clipboard window to paste it into another application (such as a spreadsheet), to click on it and select the View Object button for opening the object properties form, or to send it to another SAM user using the GUI's text message tool. Each object identifier copied to the Clipboard window is delimited by a colon (:)

The Copy to Clipboard button is enabled when at least one object is selected on the navigation tree.

3.3 Finding Objects on Navigation Trees



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Operators can use the Find button search for specific objects in the navigation tree. These objects include nodes, shelves, ports, and more.

Click on the Find... button on the navigation tree or press CTRL+F. The Find panel opens allowing operators to configure the search parameters as necessary. The parameters that are available for configuration vary depending on the view that has been selected.

To perform the search click on the Find button on the Find panel or press Enter.

The first matching object is selected and expanded in the navigation tree.

If the search provides multiple results, operators can find additional matching objects by clicking on the Next button or press F3. The next matching object is selected and expanded in the navigation tree.

3.4 Customizing the Navigation Tree Labels

Customize tree labels for Equipment view and Routing view

GUI Workspace Customize tree labels

Equipment Groups

Network Elements

Text Field #1, Text Field #2

Text Field #1, Text Field #2, Text Field #3, Text Field #4, Text Field #5

Manage Workspaces form's Tree tab allows restoring label text to default values

Tree label text fields are assigned by default to each type of object in the Navigation Tree.

The 5620 SAM GUI allows operators to customize the Navigation Tree labels for the Equipment view and the Routing view. As of R11.0, the GUI Workspace function is used for customizing tree labels of Equipment Groups and Network Elements.

For Equipment Group labels, operators can customize up to two field texts. And for Network Element labels, operators can customize up to five field texts (if applicable).

In order to customize the tree labels, operators must create or edit a GUI Workspace from the Manage Workspaces form's Tree tab.

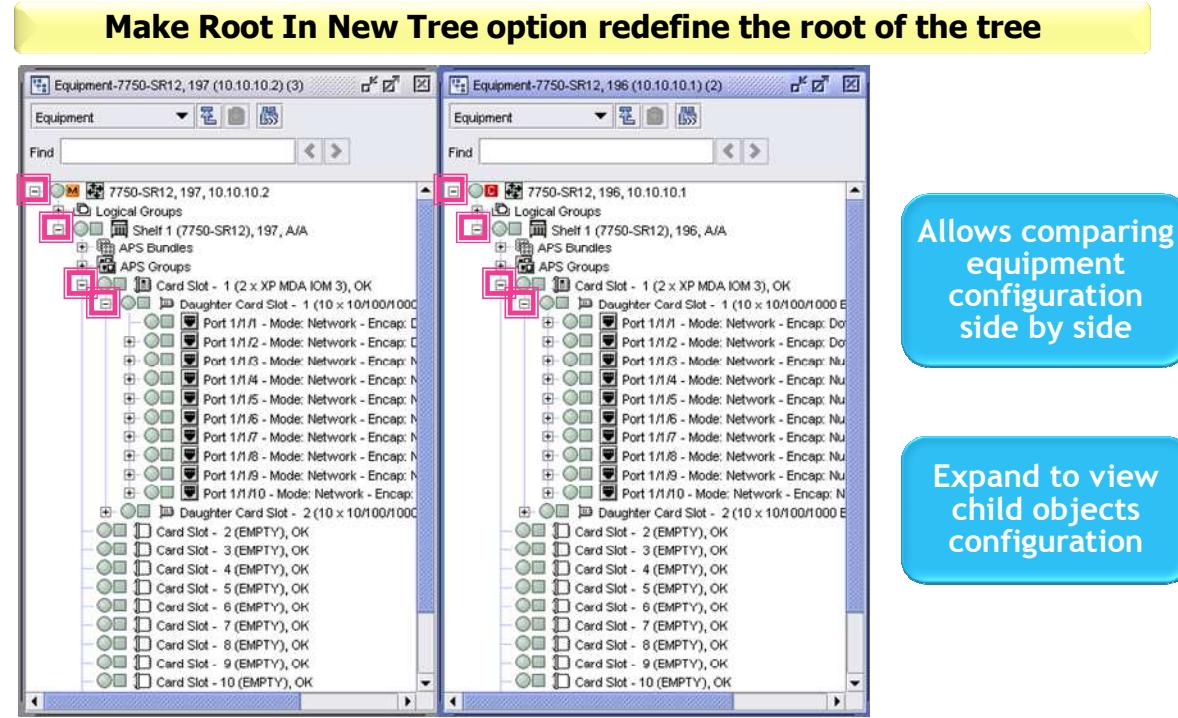
The Manage Workspaces form's Tree tab also allows restoring all tree label text to the default values using the Restore Default button.

Note

Customized labels cannot be specified for the Unmanaged NEs, the Discovered NEs, or the Network groups.



3.5 Compare Equipment Configuration Side by Side



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The Make Root In New Tree contextual menu option allow operators to redefine the root of the tree. This option is available in the Equipment view of the Navigation tree.

For instance, by making two different NEs root in a new tree operators can compare side by side the equipment configuration of the two NEs. Each new tree allows expanding the NEs objects to reveal the child objects configuration.

After the comparison, operators may close the new navigation tree windows opened, or use the Make Root At Top Level button to restore the navigation tree to the default root, which is the network.

Knowledge Verification - Equipment Management



Which Navigation Tree view displays the hardware configuration and status of physical objects and child objects that the 5620 SAM manages allowing operators to perform configuration such as CCAG, APS and LAGs on managed nodes?

- a. Equipment view
- b. OSPF view
- c. IS-IS view
- d. Routing view
- e. Ring Group view

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Choose the correct answer for the knowledge verification question above.

Knowledge Verification - Equipment Management



Which Navigation Tree view displays the device routing instances and child objects such as the network interfaces and the configured protocols, including MPLS, LDP, BGP, RSVP?

- a. Equipment view
- b. OSPF view
- c. IS-IS view
- d. Routing view
- e. Ring Group view

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Choose the correct answer for the knowledge verification question above.



How to do it

Instructor DEMO how to:

- Find specific objects in the navigation tree
- Simplify the view in densely populated in the navigation trees
- Locate attributes on configuration forms
- Customize the Navigation Tree labels
- Compare equipment configuration side by side



Lab Exercises

Find an Object in the Navigation Tree

Make an Object Root in the Navigation Tree

Locate Attributes on Configuration Forms

Customize the Navigation Tree labels

Compare Equipment Configuration Side by Side



Time allowed:

3 · 3 · 29

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Your instructor may perform the above mentioned demonstrations using the 5620 SAM GUI.

In addition, your instructor will point out the appropriate lab module containing the above mentioned hands-on lab exercises, and will indicate the time allowed to perform these hands-on exercises.

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Questions



1. A function of the 5620 SAM GUI Navigation Tree is to display a graphical map containing icons that represent the SAM managed network objects. True or false? (Choose all that apply)
 - a. True
 - b. False
2. Functions of the 5620 SAM GUI Navigation Tree include providing access to the contextual menu for an object to create, configure, and manage specific parameters for the object and child objects, and using color highlights to display object status information such as the current alarm level and the aggregated alarm status. True or false?
 - a. True
 - b. False
3. The Routing View in the Navigation Tree displays the hardware configuration and status of physical objects and child objects that the 5620 SAM manages allowing operators to perform configuration such as CCAG, APS and LAGs on managed nodes?
 - a. True
 - b. False
4. The Routing View in the Navigation Tree view displays the device routing instances and child objects such as the network interfaces and the configured protocols, including MPLS, LDP, BGP, RSVP?
 - a. True
 - b. False

Answers



1. A function of the 5620 SAM GUI Navigation Tree is to display a graphical map containing icons that represent the SAM managed network objects. True or false? (Choose all that apply)
 - a. True
 - b. **False ✓**
2. Functions of the 5620 SAM GUI Navigation Tree include providing access to the contextual menu for an object to create, configure, and manage specific parameters for the object and child objects, and using color highlights to display object status information such as the current alarm level and the aggregated alarm status. True or false?
 - a. **True ✓**
 - b. False
3. The Routing View in the Navigation Tree displays the hardware configuration and status of physical objects and child objects that the 5620 SAM manages allowing operators to perform configuration such as CCAG, APS and LAGs on managed nodes?
 - a. True
 - b. **False ✓**
4. The Routing View in the Navigation Tree view displays the device routing instances and child objects such as the network interfaces and the configured protocols, including MPLS, LDP, BGP, RSVP?
 - a. **True ✓**
 - b. False



This module covered:

- The function of the Navigation Tree for equipment management
- The Navigation tree elements and its function
- The Navigation tree views and the equipment management functions available from each view
- The Navigation tree management options

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End of module
Equipment Management

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Section 3
Network Management

Module 4 Equipment Inventory

TOS36033_V4.0-SG-R12.0-Ed1 Module 3.4 Edition 2

5620 SAM
R12.0 Fundamentals
TOS36033_V4.0-SG Edition 1

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1.0	2011-04-20	GARCIA LOZANO, René	TOS36033_V1.0 – SAM 9.0 (R1 update)
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3.0	2013-06-20	GARCIA LOZANO, René	TOS36033_V3.0 – SAM 11.0 (update)



Upon completion of this module, you should be able to:

- Describe the SAM capabilities to create and save an inventory list for elements in a managed Network Element device
- Describe the SAM capabilities to create and save an inventory list for elements in all Network Element devices in the managed network
- Identify the formats available for saving inventory lists

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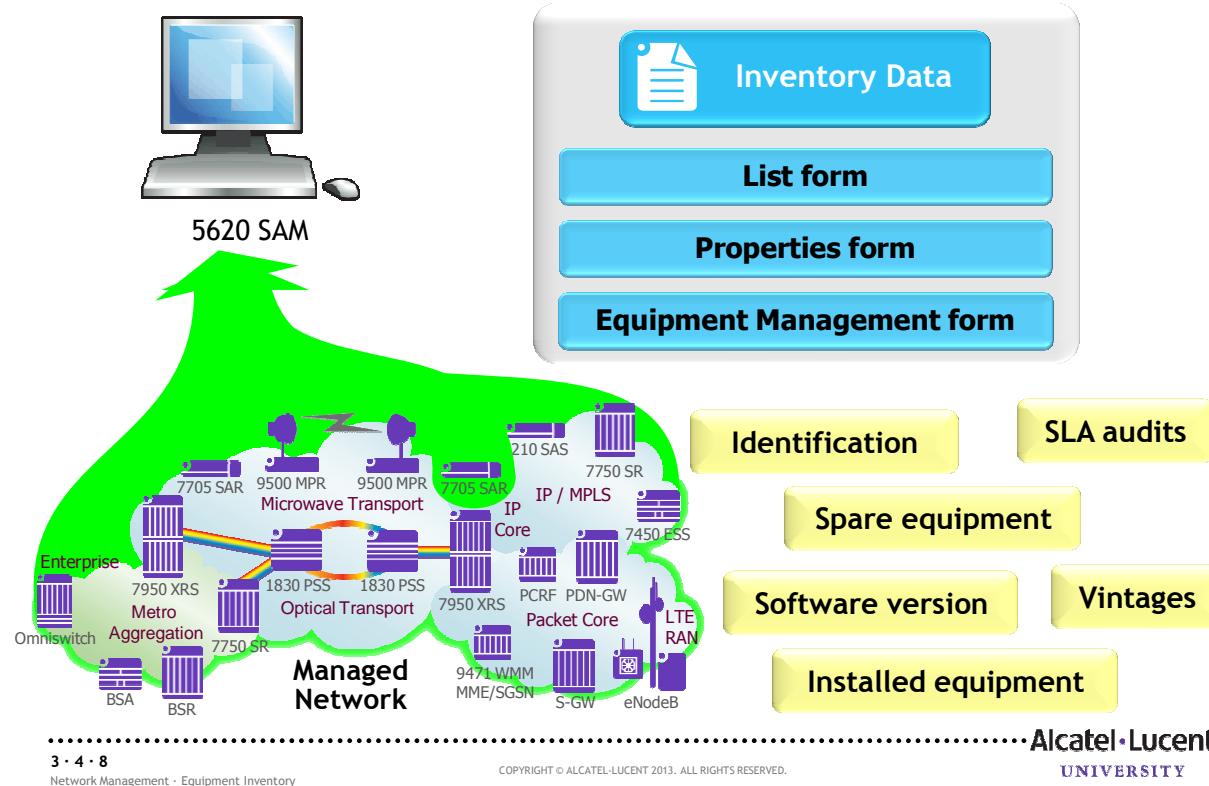


	Page
1 Equipment Inventory using 5620 SAM	7
1.1 Equipment Inventory Overview	8
1.2 Inventory List for a Managed Device	9
1.3 Inventory List for the Entire Managed Network	10
1.4 Inventory List Forms	11
1.5 Saved Inventory List in CSV Format	12
1.6 Saved Inventory List in HTML Format	13
How To Do It and Exercises	14

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1 Equipment Inventory using 5620 SAM

1.1 Equipment Inventory Overview



The 5620 SAM client GUI provides operators with multiple ways of generating inventory data about managed devices and the managed network.

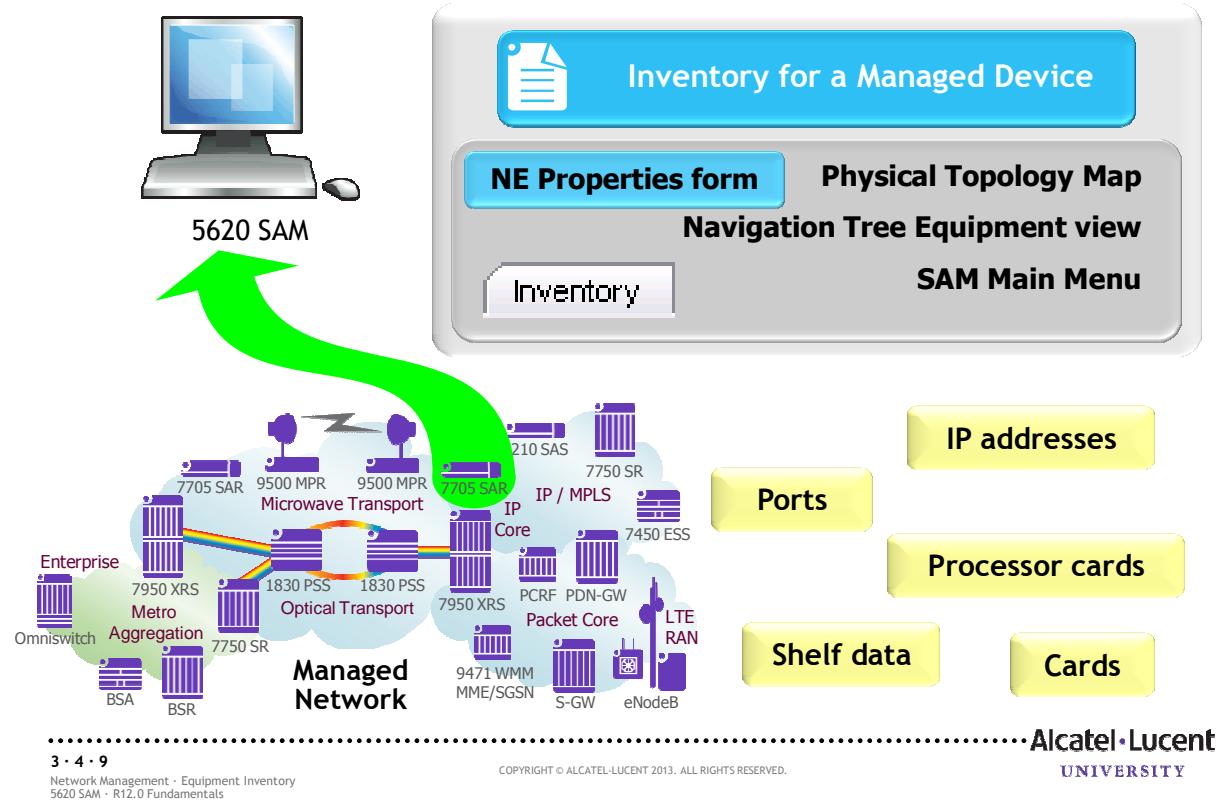
The GUI client's list, properties, and equipment management forms can be used to generate inventories for:

- required data for SLA audits
- equipment, such as cards, needed for sparing
- installed and in-operation equipment
- vintages, CLEI codes (or common language equipment identifier codes), and identifications
- equipment's software versions, such as card software version

The 5620 SAM GUI allows operators to generate inventory data based on:

- the entire managed network, which includes all 5620 SAM-managed devices
- a managed device

1.2 Inventory List for a Managed Device



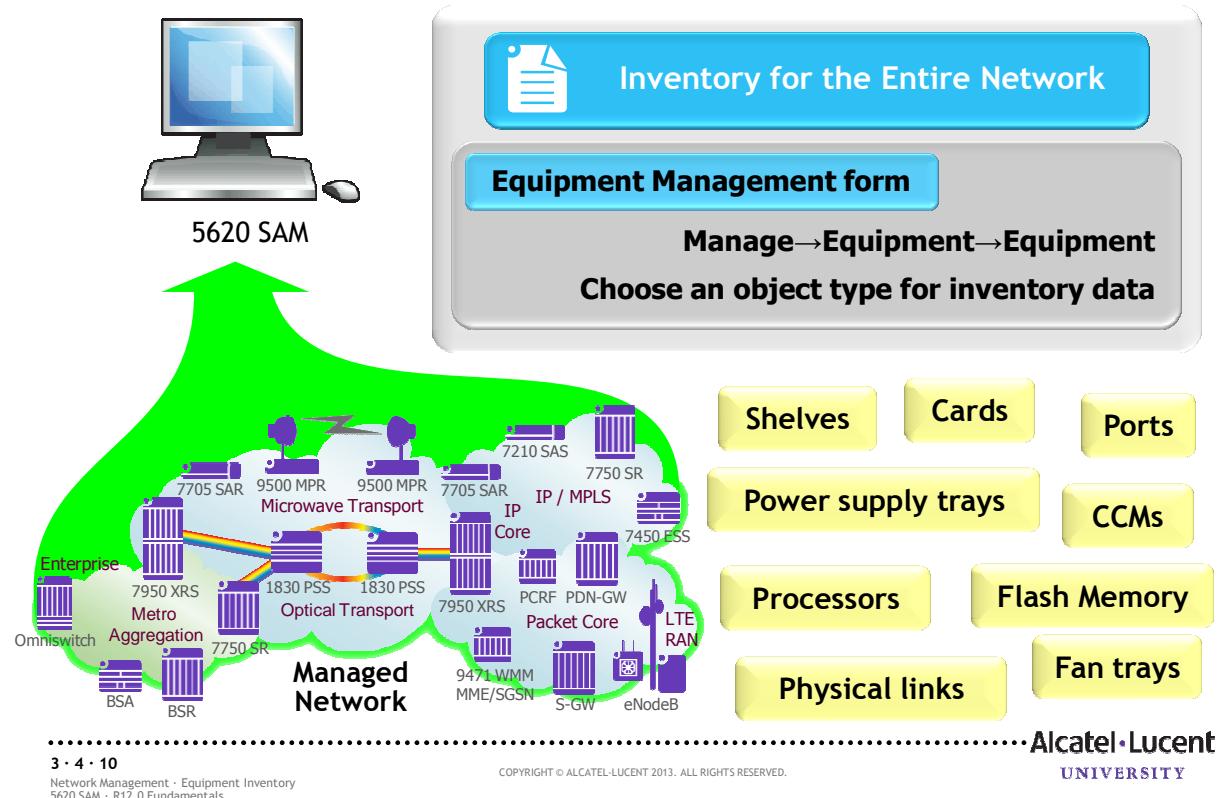
The 5620 SAM GUI client allows operators to generate inventory lists for a managed device using the Network Element's Properties form.

A network element's Properties form can be opened using one of the following methods:

- From the Physical Topology map, double-click on a network element's icon, or right-click and choose Properties from the contextual menu.
- From the Navigation Tree Equipment view, right-click on a network element and choose Properties from the contextual menu.
- From the 5620 SAM main menu, choose Manage→Equipment→Equipment. The Manage Equipment form opens, choose a Network Element (Network) from the object drop-down list and click on the Search button. The list form displays the results of the inventory search. Choose an NE from the list and click on the Properties button.

The network element's Properties form displays an Inventory tab that allows operators to generate the inventory lists for the managed device. The object drop-down list on the Inventory tab displays the available inventory data list that can be generated for the device. The inventory options that appear on object drop-down list vary, depending on the device type and version. Some of these options may include cards, ports, processor cards, IP addresses, or shelf data for the managed device

1.3 Inventory List for the Entire Managed Network



The 5620 SAM GUI client allows operators to generate inventory lists for all devices in the entire managed network using the Equipment Management form.

The Equipment Management form can be opened choosing Manage→Equipment→Equipment from the by 5620 SAM main menu. The form displays an object drop-down menu that allows operators to choose the type of inventory data that will be listed.

Generation of inventory lists for the entire network can take several minutes to complete depending on the number of managed devices in the network.

The 5620 SAM allows to generate inventory lists for the entire network for object types that include all managed:

- CCMs
- cards
- fan trays
- flash memory
- physical links
- ports
- power supply trays
- processors
- shelves

1.4 Inventory List Forms

Right-click on the list heading to display the contextual inventory menu

Not all columns in the inventory lists are applicable to all equipment types

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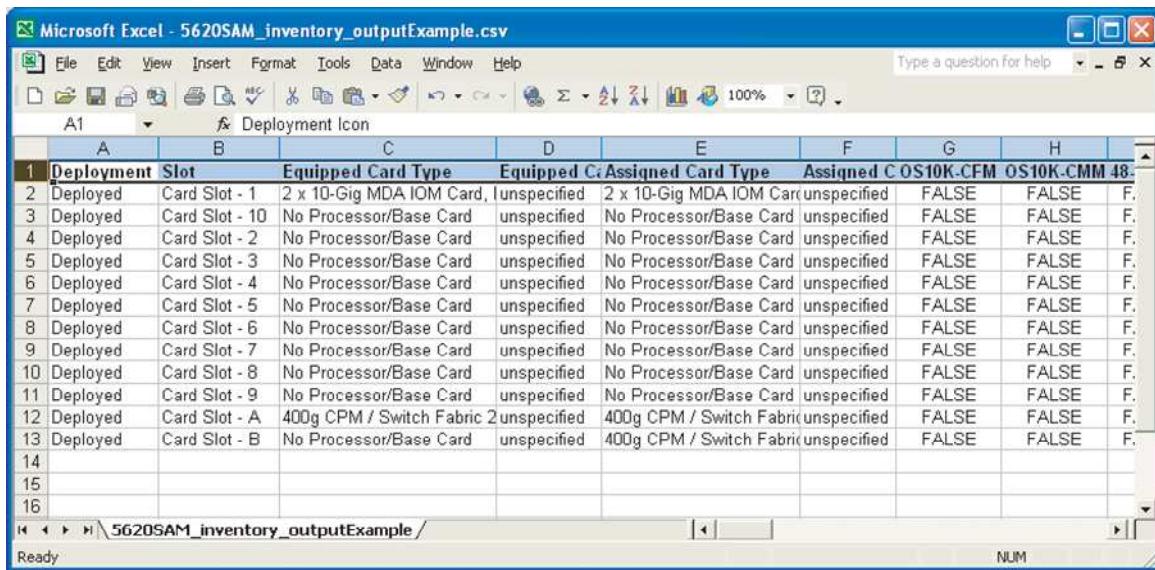
The 5620 SAM GUI client presents equipment inventories for a managed device or for the entire network in list forms. The image above presents an example of an inventory list of port types for a managed device.

Right-clicking on the list heading displays the contextual inventory menu that allows operators to:

- View the total number of objects included in the inventory list
- Remove columns displayed in the inventory list
- Determine the sort order of how listed inventory information is displayed
- Save to a file a copy the inventory listed information. The saved information may be used for record keeping, inventory management or processing by another application. The listed information can be saved to file in the following formats:
 - HyperText Markup Language (HTML) file format
 - Comma-separated values (CSV) file format

Note that not all columns in the inventory lists are applicable to all equipment types. For example, not all card types have an associated CLEI code. In situations such as this, the inventory list displays "N/A" in the column.

1.5 Saved Inventory List in CSV Format



	A	B	C	D	E	F	G	H
1	Deployment	Slot	Equipped Card Type	Equipped Card Type	Assigned Card Type	Assigned Card Type	OS10K-CFM	OS10K-CMM 48
2	Deployed	Card Slot - 1	2 x 10-Gig MDA IOM Card, Unspecified	2 x 10-Gig MDA IOM Card, Unspecified	No Processor/Base Card	No Processor/Base Card	FALSE	FALSE
3	Deployed	Card Slot - 10	No Processor/Base Card	Unspecified	No Processor/Base Card	Unspecified	FALSE	FALSE
4	Deployed	Card Slot - 2	No Processor/Base Card	Unspecified	No Processor/Base Card	Unspecified	FALSE	FALSE
5	Deployed	Card Slot - 3	No Processor/Base Card	Unspecified	No Processor/Base Card	Unspecified	FALSE	FALSE
6	Deployed	Card Slot - 4	No Processor/Base Card	Unspecified	No Processor/Base Card	Unspecified	FALSE	FALSE
7	Deployed	Card Slot - 5	No Processor/Base Card	Unspecified	No Processor/Base Card	Unspecified	FALSE	FALSE
8	Deployed	Card Slot - 6	No Processor/Base Card	Unspecified	No Processor/Base Card	Unspecified	FALSE	FALSE
9	Deployed	Card Slot - 7	No Processor/Base Card	Unspecified	No Processor/Base Card	Unspecified	FALSE	FALSE
10	Deployed	Card Slot - 8	No Processor/Base Card	Unspecified	No Processor/Base Card	Unspecified	FALSE	FALSE
11	Deployed	Card Slot - 9	No Processor/Base Card	Unspecified	No Processor/Base Card	Unspecified	FALSE	FALSE
12	Deployed	Card Slot - A	400g CPM / Switch Fabric	2	400g CPM / Switch Fabric	Unspecified	FALSE	FALSE
13	Deployed	Card Slot - B	No Processor/Base Card	Unspecified	400g CPM / Switch Fabric	Unspecified	FALSE	FALSE
14								
15								
16								

Operators can use the saved file for further processing on another platform; for example, as input to a back-office parts management system. The figure above shows the output of an inventory list saved in CSV format.

1.6 Saved Inventory List in HTML Format

Deployment Icon	Slot	Equipped Card Type	Equipped Card Sub Type	Assigned Card Type	Assigned Card Sub Type	OS10K-CFM Supported Card Types	OS10K-CMM Supported Card Types	48-Port C Support
Deployed	Card Slot - 1	2 x 10-Gig MDA IOM Card, B	unspecified	2 x 10-Gig MDA IOM Card, B	unspecified	false	false	false
Deployed	Card Slot - 10	No Processor/Base Card	unspecified	No Processor/Base Card	unspecified	false	false	false
Deployed	Card Slot - 2	No Processor/Base Card	unspecified	No Processor/Base Card	unspecified	false	false	false
Deployed	Card Slot - 3	No Processor/Base Card	unspecified	No Processor/Base Card	unspecified	false	false	false
Deployed	Card Slot - 4	No Processor/Base Card	unspecified	No Processor/Base Card	unspecified	false	false	false

The figure above shows an example of the output of an inventory list saved in HTML format.

How To Do It and Exercises



How to do it

Instructor DEMO how to:

- Generate an inventory lists for a managed device
- Generate an inventory for the entire network
- Save inventories to a file



Lab Exercises

Create and save an Inventory of Port Types for a Device

Create and save an Inventory of Card types for the Entire Network



Time allowed:

3 · 4 · 14

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Your instructor may perform the above mentioned demonstrations using the 5620 SAM GUI.

In addition, your instructor will point out the appropriate lab module containing the above mentioned hands-on lab exercises, and will indicate the time allowed to perform these hands-on exercises.

Questions



3 • 4 • 15

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1. The 5620 SAM GUI allows saving to a file inventory lists. Which of the following is a file format that the 5620 SAM GUI allows to save inventories to? (Choose all that apply)
 - a. HyperText Markup Language HTML (*.htm, *.html)
 - b. Plain text (*.txt)
 - c. Portable Network Graphics PNG (*.png)
 - d. comma-separated values CSV (*.csv)

2. The 5620 SAM GUI allows to gather an inventory data list about ports for the entire network, or only for a managed device. True or False?
 - a. True
 - b. False

Answers



1. The 5620 SAM GUI allows saving to a file inventory lists. Which of the following is a file format that the 5620 SAM GUI allows to save inventories to? (Choose all that apply)
 - a. HyperText Markup Language HTML (*.htm, *.html) ✓
 - b. Plain text (*.txt)
 - c. Portable Network Graphics PNG (*.png)
 - d. comma-separated values CSV (*.csv) ✓

2. The 5620 SAM GUI allows to gather an inventory data list about ports for the entire network, or only for a managed device. True or False?
 - a. True ✓
 - b. False



This module covered:

- The SAM capabilities to create and save an inventory list for elements in a managed Network Element device
- The SAM capabilities to create and save an inventory list for elements in all Network Element devices in the managed network
- The formats available for saving inventory lists



End of module Equipment Inventory

3 · 4 · 18

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Section 3
Network Management

Module 5

Topology Map Components and Management

TOS36033_V4.0-SG-R12.0-Ed1 Module 3.5 Edition 2

5620 SAM
R12.0 Fundamentals
TOS36033_V4.0-SG Edition 1

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Upon completion of this module, you should be able to:

- List the map window components and identify the function of each component
- List the network topology maps available in SAM
- Describe the topology map management options
- Identify the icons displayed on the map and the object's status they represent
- Describe the topology group functions and identify the topology group management capabilities
- Identify the characteristics of SAM Service Topology Maps

3 · 5 · 3

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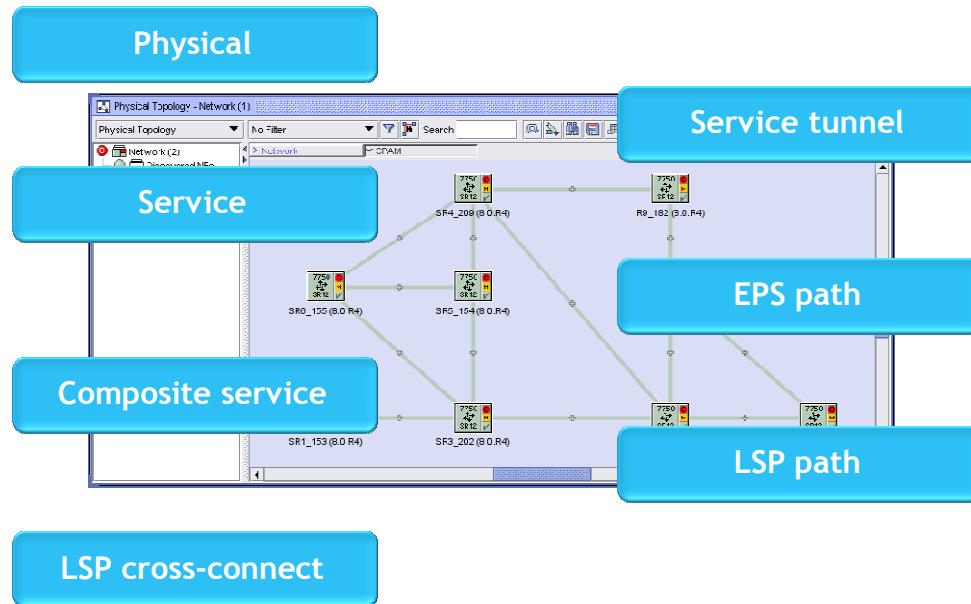


	Page
1 Network Topology Maps	7
1.1 Network Topology Maps Overview	8
1.2 Map Window Components	10
1.2.1 Topology Map Tool Bar	11
1.2.2 Map Navigation Tree	13
1.2.3 -5620 SAM Map Objects Definitions	14
Knowledge Verification - Topology Maps	15
2 Topology Maps Management	16
2.1 Topology Groups	17
2.1.1 Opening and Populating Topology Groups	18
2.2 Topology Map Icons and Status	19
2.3 Customizing the Topology Map Icon Labels	22
2.4 Map Background Image	23
2.5 Save Map View and Save Full Map	24
2.6 Pan and Zooming	25
2.7 Service Topology Map View	26
Knowledge Verification - Topology Maps	27
How To Do It and Exercises	28
Questions	29
Answers	30
Module Summary	31

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1 Network Topology Maps

1.1 Network Topology Maps Overview



3 · 5 · 8

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The following 5620 SAM network topology maps are available:

- Physical
- service tunnel
- Service
- EPS path
- composite service
- LSP path
- LSP cross-connect

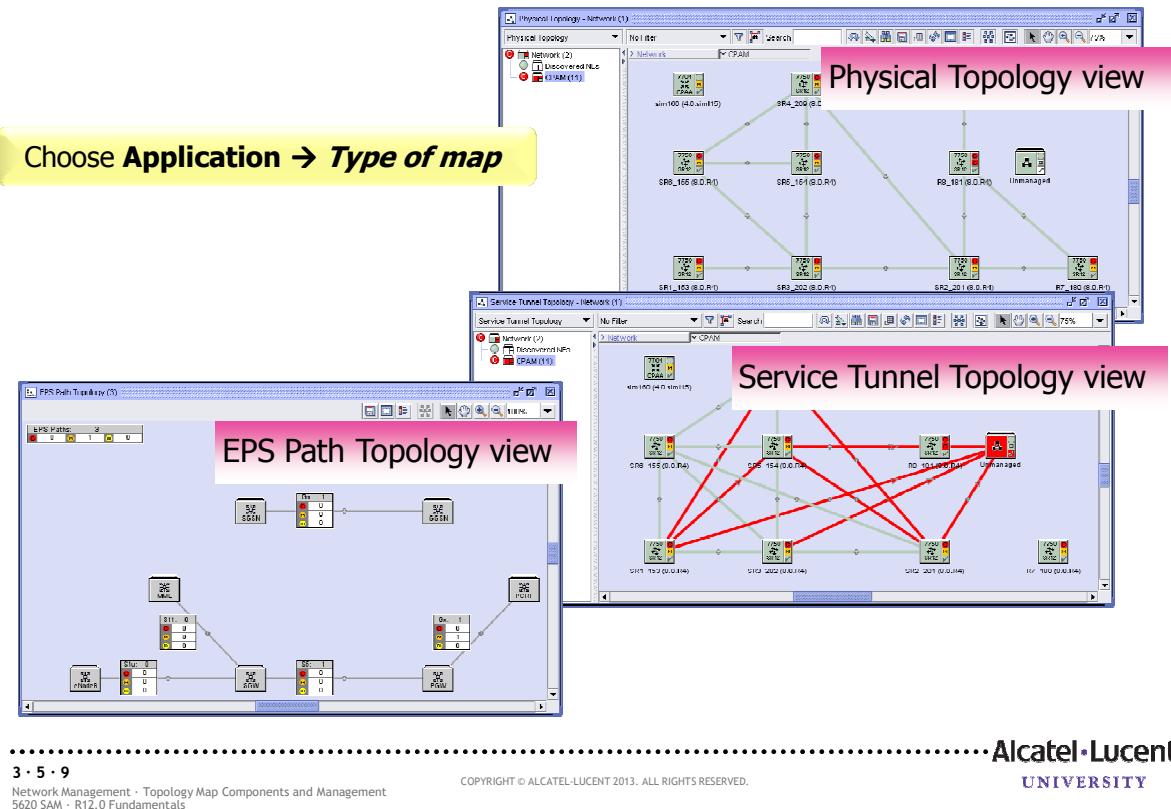
Example : The physical topology map is used to view and manage Layer 1 objects, including the logical grouping of devices

To open a map from the 5620 SAM main menu

1. Choose Application from the 5620 SAM main menu.
2. Choose a type of map to view from the menu options:
 - Physical Topology to view Layer 1 network connectivity
 - Service Tunnel Topology to view service tunnels
 - Flat Maps→Physical Topology
 - Flat Maps→Service Tunnel Topology
 - EPS Path Topology

The maps visually display network information, and provide contextual menus and submenus to launch windows which display additional information.

1.1 Network Topology Maps Overview [cont.]



The following 5620 SAM network topology maps are available:

- Physical
- service tunnel
- Service
- EPS path
- composite service
- LSP path
- LSP cross-connect

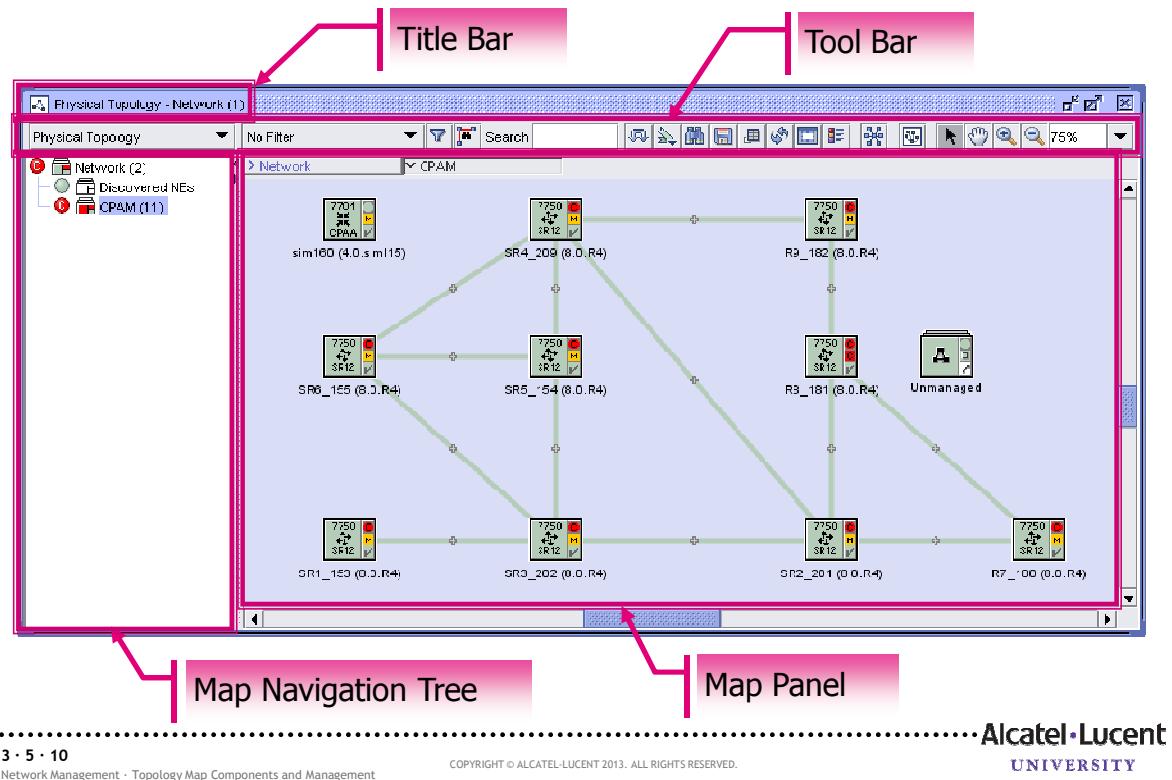
Example : The physical topology map is used to view and manage Layer 1 objects, including the logical grouping of devices

To open a map from the 5620 SAM main menu

1. Choose Application from the 5620 SAM main menu.
2. Choose a type of map to view from the menu options:
 - Physical Topology to view Layer 1 network connectivity
 - Service Tunnel Topology to view service tunnels
 - Flat Maps→Physical Topology
 - Flat Maps→Service Tunnel Topology
 - EPS Path Topology

The maps visually display network information, and provide contextual menus and submenus to launch windows which display additional information.

1.2 Map Window Components



The map window includes the following:

- a title bar
- a map panel that displays the network objects
- a map navigation tree that lists the topology groups
- a toolbar, which consists of a view selector, saved filter selector, quick-search field, and buttons that perform various functions

The title bar of the map window displays the following information:

- map type, for example, Physical Topology
- path from the network root to the currently displayed topology group; each step in the path is called a breadcrumb
- map number, for example, the first or the tenth map opened

1.2.1 Topology Map Tool Bar



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The map toolbar allows operators to manage a 5620 SAM map view. The toolbar is above the map panel in the map window. The figure above shows the drop-down menus, filter and search components displayed in the map toolbar.

Map type selector

Drop-down menu that lists the map view options that you can choose to specify the view. The map type selector offers the following views:

- Physical Topology
- Service Tunnel Topology

Saved filter selector

Drop-down menu that lists the saved filters for the map view. When a saved map filter is selected from the drop-down menu, the 5620 SAM applies the filter and the map view is refreshed to display only the map objects specified in the filter. The saved filter selector displays the filter name.

When a not previously saved filter is applied using the New filter button, the saved filter selector displays "Filter applied".

To clear search filters, choose No Filter from the saved filters drop-down list..

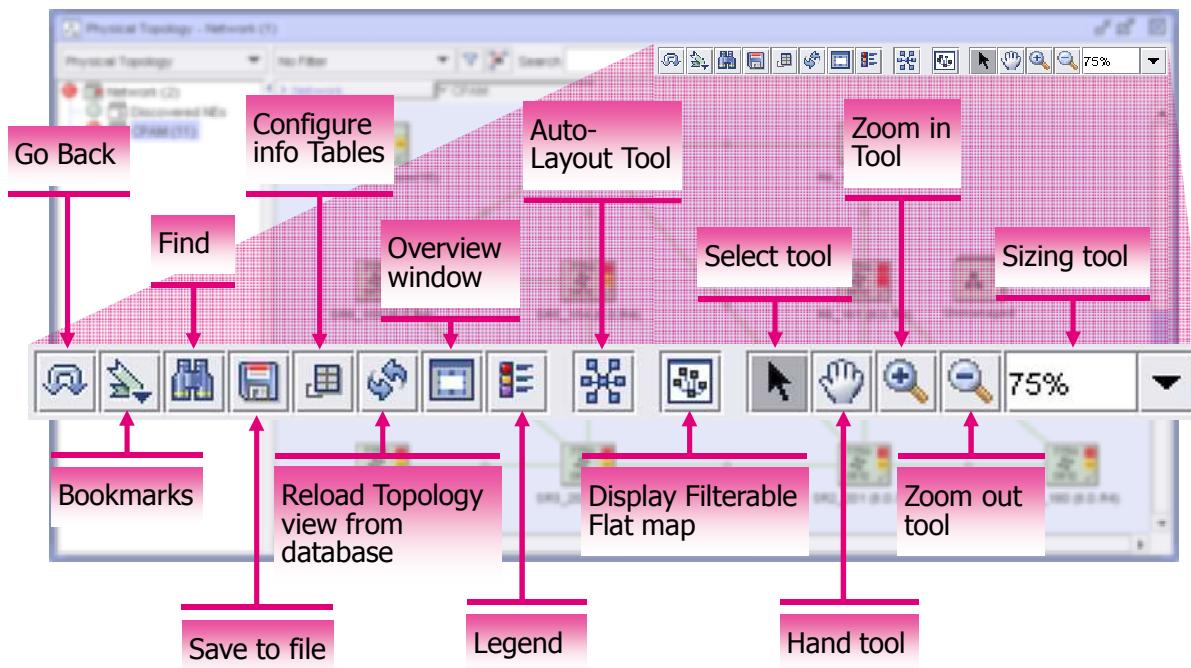
New filter button

Click on the New filter button to apply one or more object filters to a map view, narrowing the range of objects that are displayed. A filter can be created based on a combination of search criteria.

When a filter is applied to a map, only the objects that the filter returns are displayed, with the following exceptions:

- if one link endpoint is displayed, the other endpoint is also displayed, even if the filter excludes it
- if a filter does not include a link filter, only the links between the returned NEs are displayed.

1.2.1 Topology Map Tool Bar [cont.]



The map toolbar allows operators to manage a 5620 SAM map view. The toolbar is above the map panel in the map window. The figure above shows the shortcut icons displayed in the map toolbar.

Go Back button

Click on the Go Back button to navigate between previously viewed topology groups. For example, if the operator is viewing Router Group 1 then view Router Group 2, click on the Go Back button to return to Router Group 1. The Go Back button only functions in one map type; both previously viewed topology groups must be the same map type.

Bookmark button

Bookmarks are used to create shortcuts to frequently visited locations on a map. Click on the Bookmark button and choose to add a bookmark or manage existing bookmarks.

Find button

Click on the Find button to search for network objects on a map. The operator can choose to search for specific vertices or edges. A list form opens that allows operators to configure specific criteria to filter the results of a search.

When the network object is found, the map navigation tree displays the topology group that contains the object. If necessary, the 5620 SAM scrolls to the part of the map where the object is located.

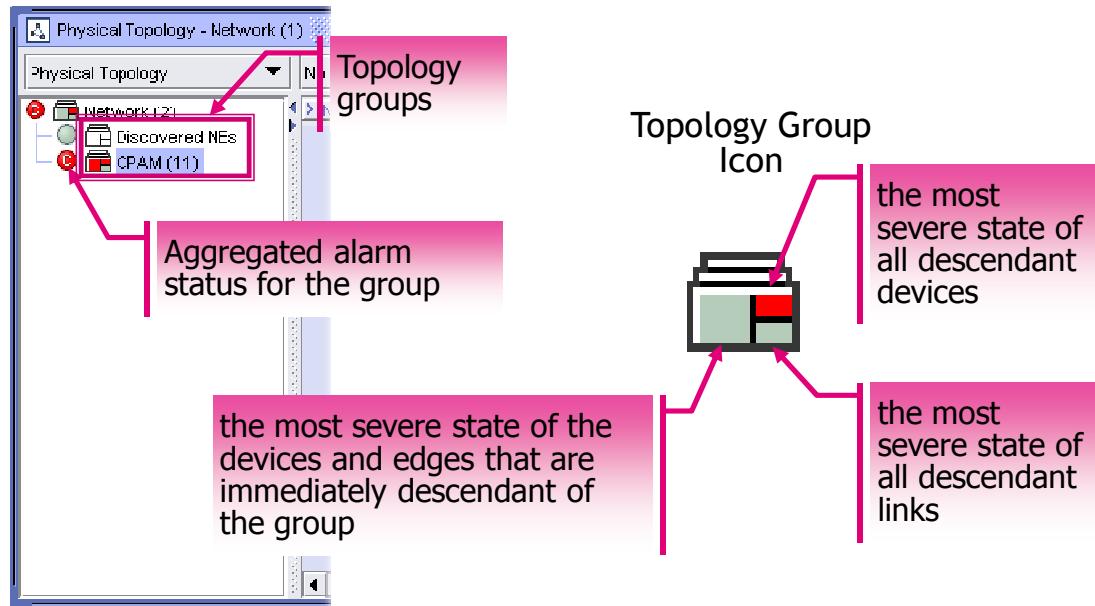
Save To File button

Click on the Save To File button to save the map view or the full map. Operators can choose the location to save the map image and the file type.

Global Info Tables button

Click on the Global Info Tables button to create information table configurations, apply information table configurations globally, or turn the global information table option off.

1.2.2 Map Navigation Tree



Available for the Physical Map and the Service Tunnel Map

The following network topology maps display a map navigation tree:

- physical map
- service tunnel map

The 5620 SAM operator can use the map navigation tree:

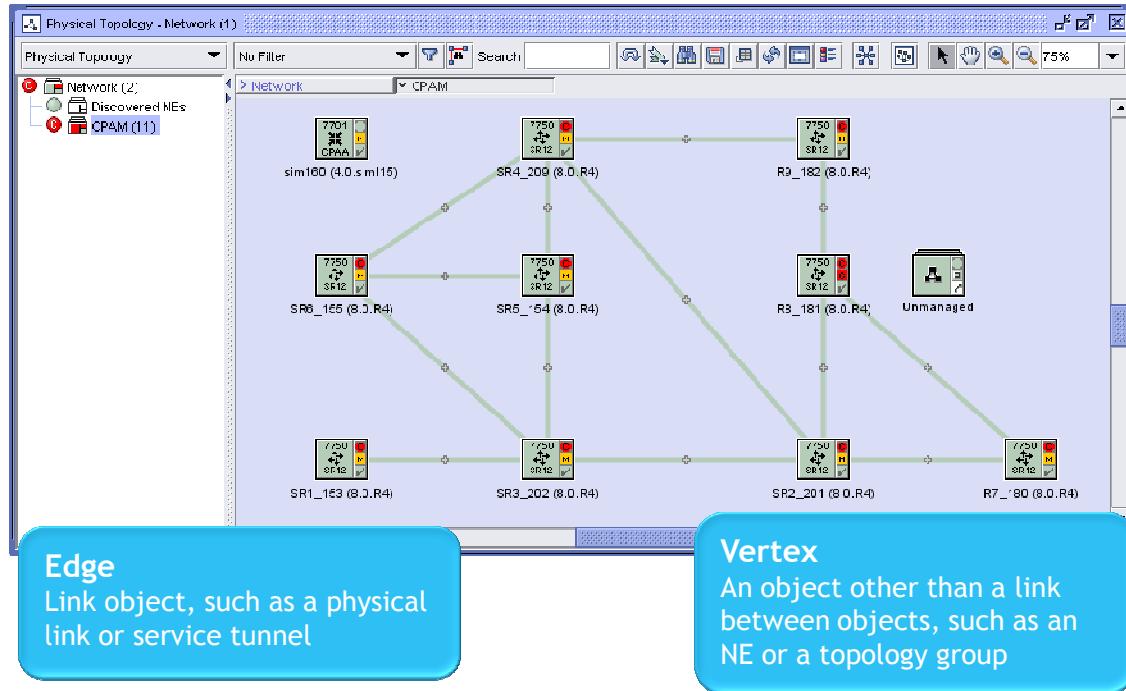
- for non-linear navigation to any topology group on the map
- to display the topology group hierarchy starting from the entire network

The map navigation tree displays:

- topology groups, including group names
- status of the topology groups - The circle icon to the left of the topology group icon represents the aggregated alarm status for the group. It represents the most serious alarm against descendant device.

As shown in the figure above, the topology group icon is divided into three sections. The top right square represents the most severe state of all descendant devices. The bottom right square represents the most severe state of all descendant links. The background section of the topology group icon represents the most severe state of the devices and edges that are immediately descendant of the group.

1.2.3 -5620 SAM Map Objects Definitions



In the context of a 5620 SAM map, a link object, such as a physical link or service tunnel, is called an edge. An object other than a link between objects, such as an NE or a topology group, is called a vertex.

Knowledge Verification - Topology Maps



Which following is NOT a network topology map available on the 5620 SAM?

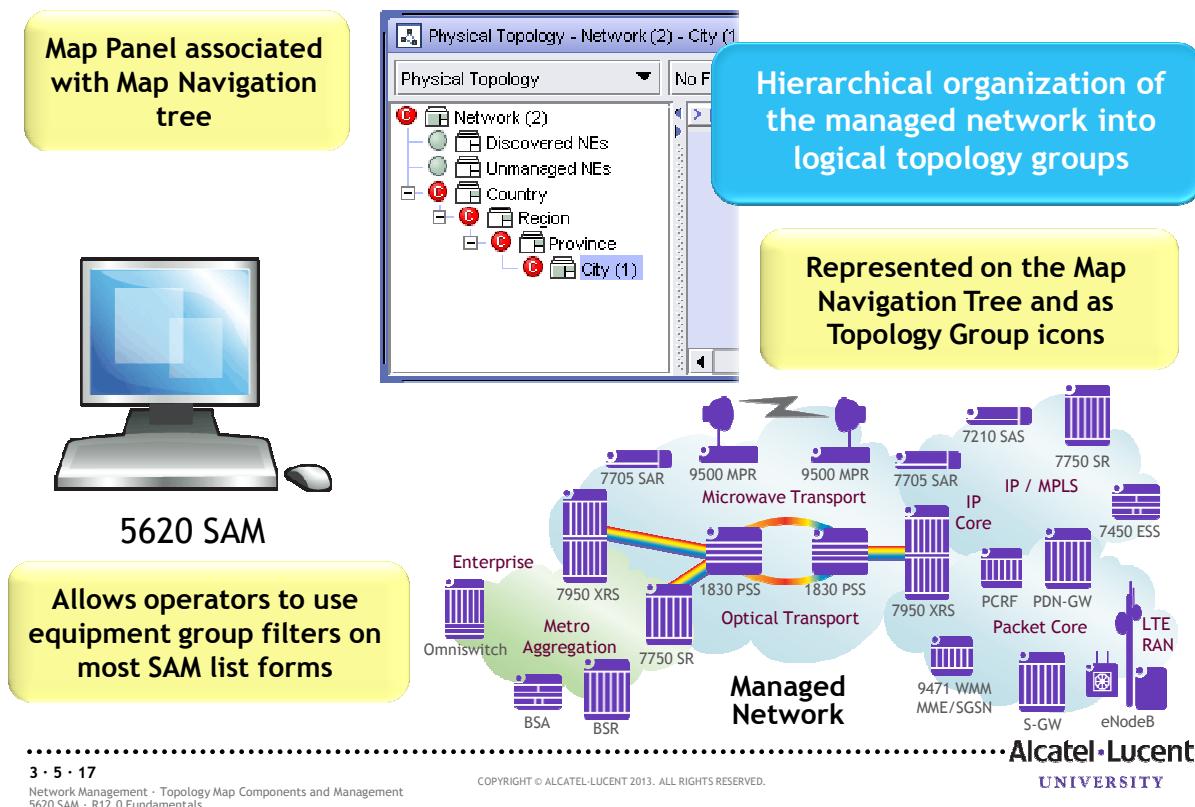
- a. Physical topology
- b. Service Tunnel topology
- c. Ring Group Topology
- d. Evolved Packet Switching (EPS) Path Topology

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Choose the correct answer for the knowledge verification question above.

2 Topology Maps Management

2.1 Topology Groups



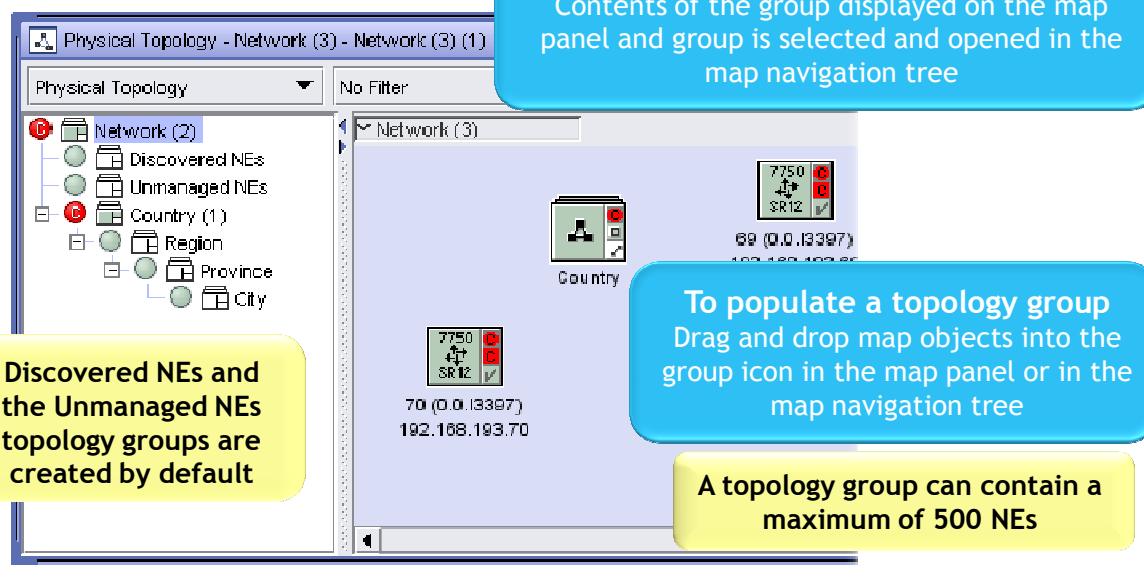
The 5620 SAM allows network administrators to create a hierarchical organization of the managed network into logical topology groups. Topology groups are represented by group icons in topology maps in the map panel and in the form of a tree on the map navigation tree, as shown in the figure above. Additional topology groups can be created using the Copy button on the topology group properties form.

The map panel is associated logically with the map navigation tree. As the user navigates through the topology groups in the map navigation tree, the contents displayed on the map panel change. The topology group that is selected in the map navigation tree is the group that is displayed on the map panel.

In addition, the Equipment view of the GUI Navigation Tree also presents devices organized according to the created topology groups. A topology group that contains one or more child topology groups has a + key to the left of the topology group in both, the Map Navigation Tree and the Equipment view of the GUI Navigation Tree.

Topology groups allows 5620 SAM operators to use equipment group filters to search globally for new alarms, historical alarms, managed equipment objects, and managed service objects by equipment that is organized by topology group. Most SAM list forms allow the use of a equipment group filter by choosing existing topology groups.

2.1.1 Opening and Populating Topology Groups



Alcatel-Lucent recommends a maximum of 10 000 topology groups per system for optimal performance

When SAM operators double-click on a topology group icon on the map panel, the contents of the group are displayed on the map panel and the group is selected and opened in the map navigation tree. In contrast when double-clicking on other map objects, such as routers or links, their property form opens. Right-clicking on any map object, including topology group icons, will display a contextual menu.

The Discovered NEs and the Unmanaged NEs topology groups are created by default. The Discovered NEs topology group contains the discovered devices. The Unmanaged NEs topology group contains unmanaged NEs that have been added to the network. SAM allows to create new topology groups and move devices to them using the topology maps.

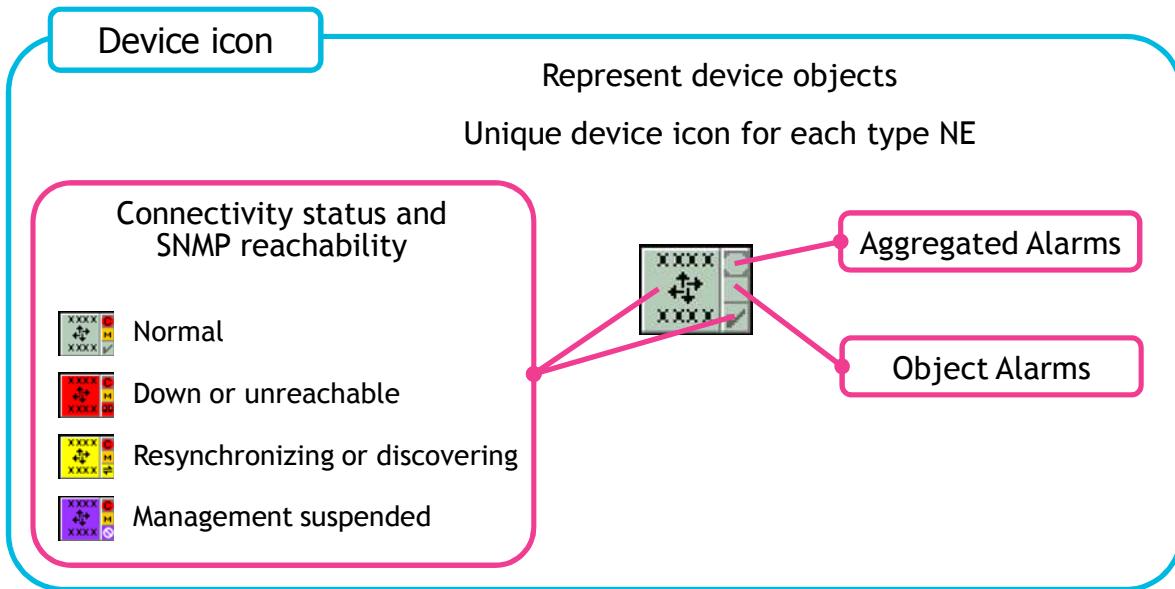
To populate a topology group, SAM users with Topology Management privileges can from the topology map drag and drop map objects into the group icon in the map panel or in the map navigation tree, or from the map panel to the map navigation tree.

Although there is no limit to the number of topology groups, Alcatel-Lucent recommends a maximum of 10 000 topology groups per system for optimal performance. Each topology group can contain a maximum of 500 objects. Network elements and immediate child groups are considered objects in a topology group. A bracketed number is displayed beside the name of each topology group in the navigation tree. This number indicates the current number of objects in the group.

By default, users can move map objects and change the layout of the objects on the map, however the changes are not saved to the database when the map is closed. The ability to save changes to the layout of topology maps is controlled by scope of command roles and access permissions. Permissions are set by SAM network administrators using 5620 SAM security configuration forms.

2.2 Topology Map Icons and Status

Contents displayed in the Map panel change as user navigates through topology groups



3 · 5 · 19
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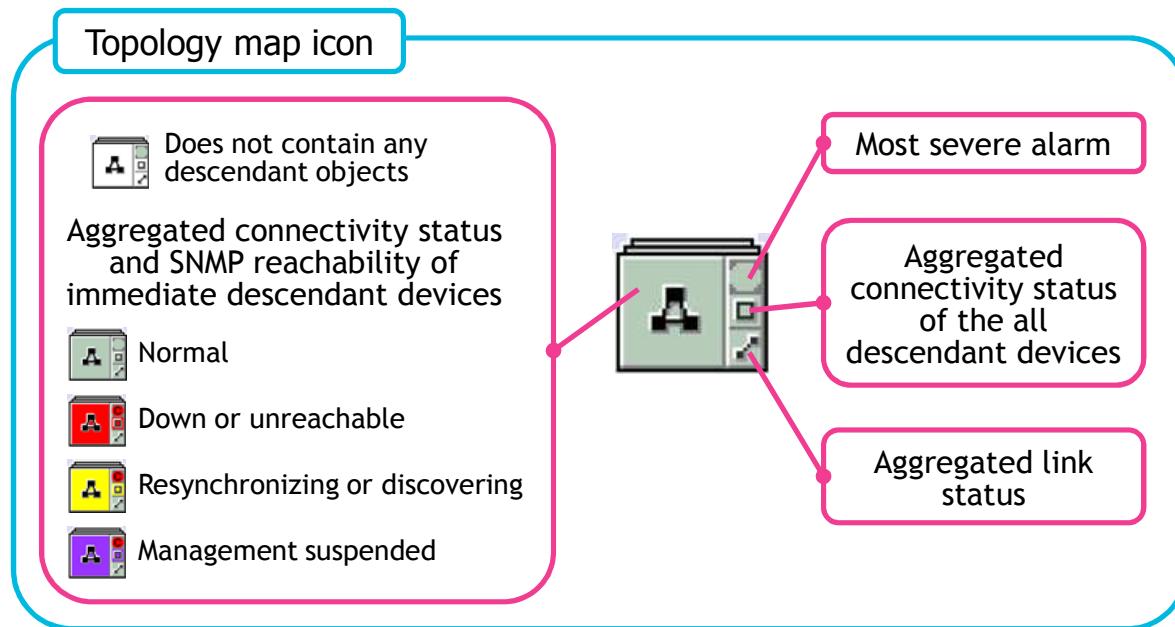
The contents displayed in the map panel change as the user navigates through the topology groups in the map navigation tree or by double-clicking on a topology group icon.

Device icons or NE icons in the topology map represent device objects. The 5620 SAM has an unique device icon for each type of NE it manages. The background color and the bottom right square of device icons in the 5620 SAM network topology maps represent connectivity status and SNMP reachability:

- Light gray - normal
- Red - down or unreachable
- Yellow - resynchronizing or discovering
- Purple - management suspended

Device icons display two alarm status boxes along the right hand side of each icon. The top right square represents the Aggregated alarms status. The middle right square represents object alarms status.

2.2 Topology Map Icons and Status [cont.]



Discovered NEs and Unmanaged Nes groups created by default. Cannot be deleted

Topology group icons in the map have the following characteristics:

- The background color white indicates that the topology group does not contain any descendant objects.
- If a group is populated, the background color of the topology group icon indicates the aggregated connectivity status of the immediate descendant devices in the group:
 - Light gray - normal
 - Red - down or unreachable
 - Yellow - resynchronizing or discovering
 - Purple - management suspended
- The top right square of the topology group icon displays the color and icon of the most severe alarm on any of the devices in the group.
- The middle right square of a topology group icon indicates the aggregated connectivity status of the all descendant devices in the group.
- The bottom right square color indicates the aggregated link status of the links in the group.

Note

The Discovered NEs and Unmanaged NEs topology groups are created by default. These two groups and their relative icons cannot be deleted from the map.



Physical Topology Map Links

The following apply to link objects in the physical topology map:

- The following colors indicate link status:
- Red—the link has failed
- Light gray—the link is in service
- Green—the link is new
- Blue—the link is in standby or backup mode
- Dark gray—the link is unknown
- Purple—the link is being diagnosed
- Magenta—the link carries hidden links
- Yellow—the LAG link is degraded (one or more links in the LAG have failed)

For aggregated 1+1 HSB microwave radio links on a 7705 SAR, the following colors indicate link status:

- Red—the MW radio link is down
- Blue—the MW radio link is up
- Yellow—the MW radio link has a problem

For expanded, unidirectional 1+1 HSB microwave radio links on a 7705 SAR, the following colors indicate link status:

- Red—the unidirectional radio link has a problem and the MW radio link is down
- Green—the MW radio link is in service
- Blue—the MW radio link is in standby mode
- Yellow—the unidirectional radio link has a problem but the MW radio link is up

2.3 Customizing the Topology Map Icon Labels

Topology map icon default label

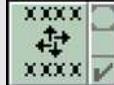


EPIPE 1003:10.10.10.4

Customize topology map labels

Create or edit GUI Workspace

Icon label customization supported for:

 Network Element	 Service Site	 Service Access Point	 Subscriber Interface
 CPAM Routers	 CPAM Subnets	 CPAM Simulated Routers	 CPAM Simulated Subnets

Manage Workspaces form's Topology tab allows restoring icon label to default values

Topology map icons include a descriptive label by default. For example, the label on a service site icon on the Service Topology map includes the service name and the IP address of the device.

The 5620 SAM GUI allows operators to customize the topology map icon labels. As of R11.0, the GUI Workspace function is used for customizing labels for the topology map icons for a workspace.

In order to customize the topology map icon labels, operators must create or edit a GUI Workspace from the Manage Workspaces form's Topology tab. Operators can customize the Text Field #1 and Text Field #2 to identify the information to display in each map icon label.

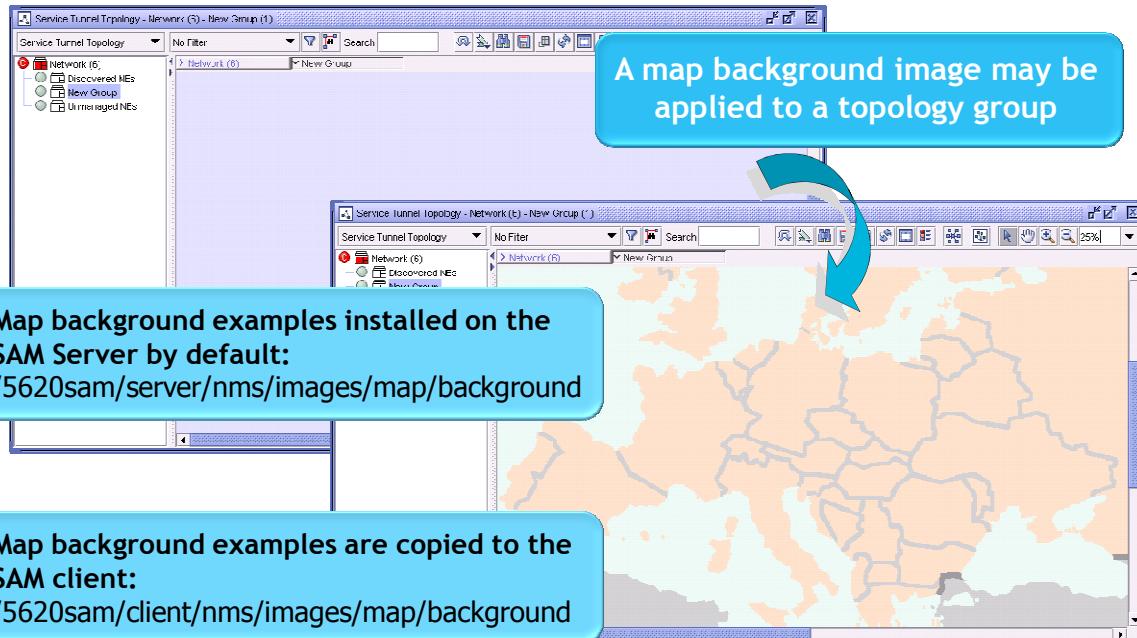
Icon labels can be customized for the following object types:

- Network Element
- Service Site
- Service Access Point
- Subscriber interface
- CPAM Routers
- CPAM Subnets
- CPAM Simulated Routers
- CPAM Simulated Subnets

The available options for label customization vary depending on the object type selected.

The Manage Workspaces form's Topology tab also allows restoring all topology map icon labels to the default values by choosing the Default option using the Text Field #1 drop-down menu.

2.4 Map Background Image



5620 SAM adding new background map images to the directory

3 · 5 · 23
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The 5620 SAM allows to display a map background image for a topology group over which map network elements can be overlaid. The 5620 SAM provides some background image examples which are installed on the SAM server by default under:

</5620sam/server/nms/images/map/background>

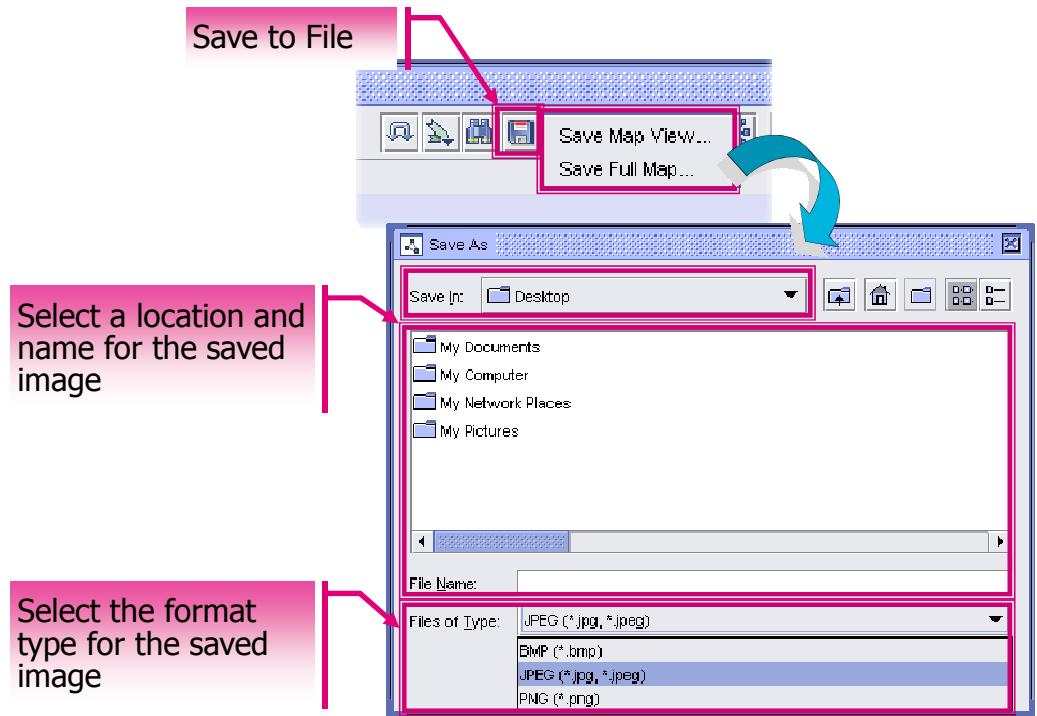
5620 SAM also allows network administrators to add new map image to the directory. In order to add new map images ensure that:

- the image file type is GIF
- the size is a maximum of 2000 × 2000 pixels

Map background images available in the server are copied to the client during the client installation and/or client upgrade process

- Image examples in the client machine are located by default under
</5620sam/client/nms/images/map/background>

2.5 Save Map View and Save Full Map



3 · 5 · 24

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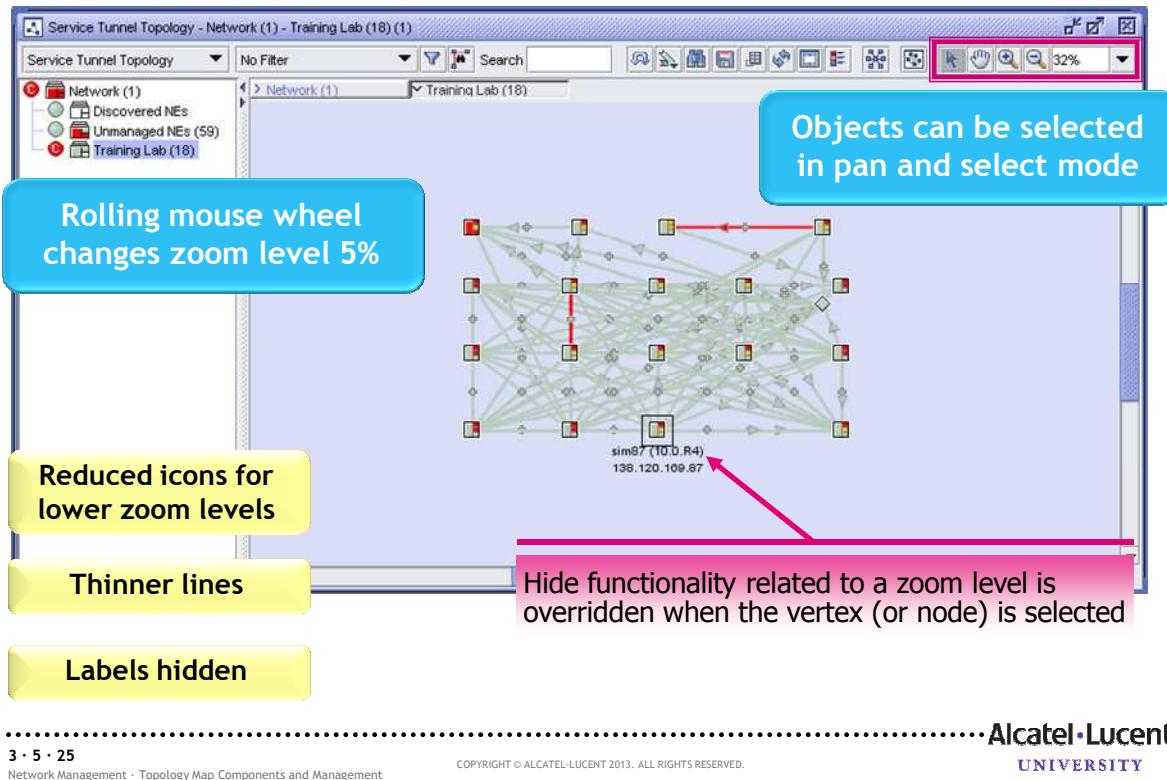
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As of SAM 6.0, all topology maps have been updated to include a Snapshot button allowing to save a graphical snapshot of the entire map, or viewed portion of the map.

The **Save to file** button functions as a pop-up menu allowing selection of one of the following:

- **Save Map View** - produces a snapshot of the viewed portion of the map
- **Save Full Map** - produces a snapshot of entire map area
- The user can select the location for the snapshot image and the file type.
- The map snapshot can be saved to file in the following formats:
 - Bitmap Image (BMP) file format
 - Joint Photographic Experts Group (JPEG) file format
 - Portable Network Graphics (PNG) file format

2.6 Pan and Zooming



All topology maps provide the following pan and zooming functionality:

- Mouse wheel zooming - rolling the mouse wheel changes the zoom level in increments of 5% to minimum or maximum zoom level.
- When in pan mode dragging the mouse results in map panning, when in select mode the dragging the mouse results in the multi-select rectangle.
- Objects can be selected in both pan and select mode. In pan mode the cursor will change to the selection cursor if over a vertex (node).
- Zoom + - modes are still present and function as they did and are provided in case user doesn't have mouse wheel capability
- As of SAM 6.0, to reduce map clutter at lower zoom levels all topology maps have been enhanced to provide the following functionality:
 - Two icons have been provided for each vertex, a normal and a reduced size one.
 - The link widths are drawn thinner when the zoom level is below the zoom threshold.
 - The labels on the map are hidden if the zoom level drops below the hide threshold.
 - The hide functionality is overridden when the vertex is selected and the label will be displayed.

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2.7 Service Topology Map View

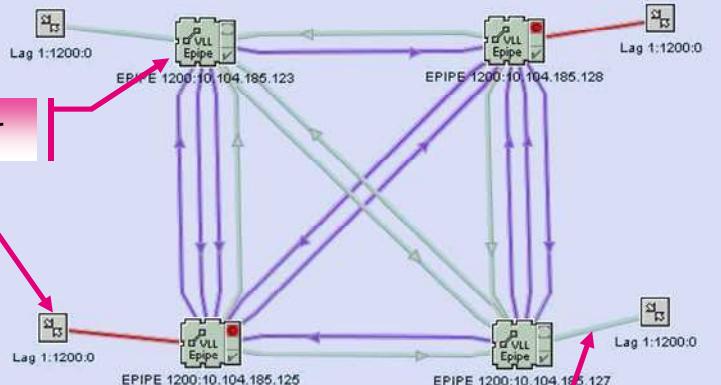
Available from the **Manage → Services** window

Displays the state of a given service

Link groups between routers represent service tunnels

Managed Router

Managed access interface



Link Group

Displayed red when at least one link in the link group is down

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3 · 5 · 26

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A service topology map view is available on the 5620 SAM from the **Manage → Services** window.

- A service topology map displays the state of a given service.
- Icons in the service path topology map represent routers.
- Link groups between routers represent service tunnels.
- When a link group is red, at least one link in the link group is down.
- For link groups between managed routers, right click on the link group icon to list and edit service tunnels in the link group.
- For link groups between managed and unmanaged routers, right click on the link group icon to launch contextual menus and submenus which allow you to launch additional information windows for the service tunnel, including the Properties window.
- The service map that appears displays all routers for the service.
- Right click on the router to launch contextual menus and submenus for the service. In this context, the symbol and color in the top left corner of the managed router icon represent the most severe alarm on the router.
- The symbol and color in the bottom right corner represent the status of the communications between the router and the 5620 SAM.
- Link groups between routers represent service circuits. Link groups between router icons and ports represent the binding of an access port or interface to a service.
- Right click on the link group icon to launch contextual menus and submenus.
- Right clicking anywhere on the service map launches contextual menus and submenus for all the sites for the service.

Knowledge Verification - Topology Maps



Which following characteristics is FALSE for the 5620 SAM Service Topology map?

- a. Displays icons for all 5620 SAM managed nodes in addition to the routers on the service
- b. Displays link groups between routers that represent service tunnels
- c. Icons and links in the map are color coded to represent the state of the service
- d. A link group is displayed red when at least one link in the link group is down

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Choose the correct answer for the knowledge verification question above.

How To Do It and Exercises



How to do it

Instructor DEMO how to:

- Identify the components of a Map Window
- Create and manage topology groups
- Customizing the topology map icon labels



Lab Exercises

Create Topology Groups

Apply a Map Background Image

Customize the GUI Workspace Topology Map Icon Labels



Time allowed:

3 · 5 · 28

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Your instructor may perform the above mentioned demonstrations using the 5620 SAM GUI.

In addition, your instructor will point out the appropriate lab module containing the above mentioned hands-on lab exercises, and will indicate the time allowed to perform these hands-on exercises.

Questions



3 · 5 · 29

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1. Physical topology, Service Tunnel topology, and Evolved Packet Switching (EPS) Path topology map are network topology maps available on the 5620 SAM. True or false?
 - a. True
 - b. False
2. A 5620 SAM Service Topology map displays one icon for each of the NEs discovered in the 5620 SAM managed network. True or false?
 - a. True
 - b. False
3. A 5620 SAM Service Topology map displays link groups between routers that represent service tunnels, and icons and links in the map are color coded to represent the state of the service. True or false?
 - a. True
 - b. False

1. In a 5620 SAM topology map, a link group is displayed red when at least one link in the link group is down. True or false?
 - a. True
 - b. False

Answers



1. Physical topology, Service Tunnel topology, and Evolved Packet Switching (EPS) Path topology map are network topology maps available on the 5620 SAM. True or false?
 - a. True ✓
 - b. False
2. A 5620 SAM Service Topology map displays one icon for each of the NEs discovered in the 5620 SAM managed network. True or false?
 - a. True
 - b. False ✓
3. A 5620 SAM Service Topology map displays link groups between routers that represent service tunnels, and icons and links in the map are color coded to represent the state of the service. True or false?
 - a. True ✓
 - b. False
1. In a 5620 SAM topology map, a link group is displayed red when at least one link in the link group is down. True or false?
 - a. True ✓
 - b. False



This module covered:

- Map window components and identify the function of each component
- Network topology maps available in SAM
- Topology map management options
- The icons displayed on the map and the object's status they represent
- Topology group functions and the topology group management capabilities
- Characteristics of SAM Service Topology Maps



End of module
Topology Map Components and Management

3 · 5 · 32

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Section 3
Network Management

Module 6 Topology Map Info Tables

TOS36033_V4.0-SG-R12.0-Ed1 Module 3.6 Edition 2

5620 SAM
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Document History			
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1.0	2011-04-20	GARCIA LOZANO, René	TOS36033_V1.0 – SAM 9.0 (R1 update)
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3.0	2013-06-20	GARCIA LOZANO, René	TOS36033_V3.0 – SAM 11.0 (update)



Upon completion of this module, you should be able to:

- Describe the characteristics and function of info tables in SAM topology maps
- List the steps involved in creating and configuring an info table to show customized information for objects in topology maps
- Identify the options available to display or hide info tables

3 · 6 · 3

Network Management · Topology Map Info Tables
5620 SAM · R12.0 Fundamentals

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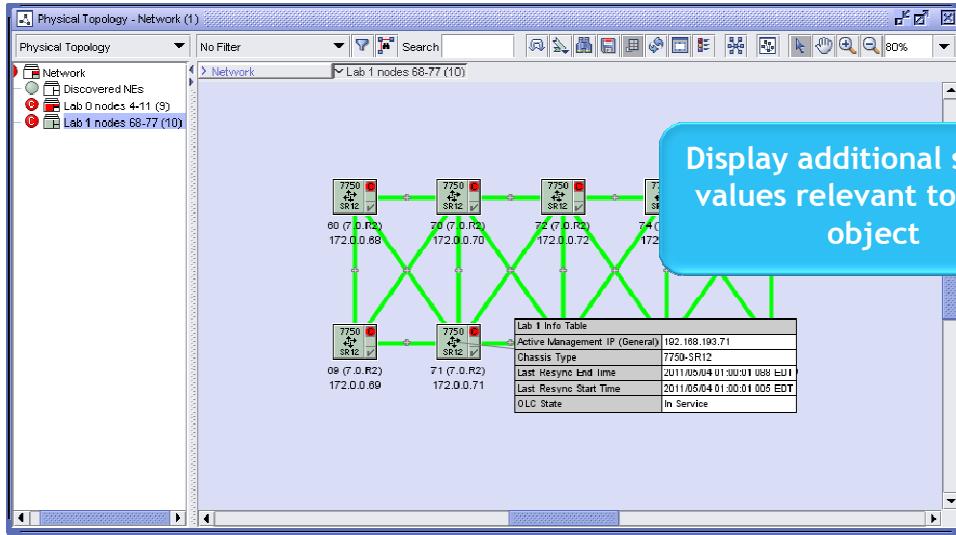


	Page
1 Topology Map Info Tables	7
1.1 Info Tables Overview	8
1.1.1 Info Tables Types	9
1.2 Info Table Configuration Workflow	10
1.3 Global Info Tables	11
1.4 Multiple Info Tables	12
1.5 Selected Info Tables	13
1.6 Map Highlight Info Tables	14
How To Do It and Exercises	15
Questions	16
Answers	17

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1 Topology Map Info Tables

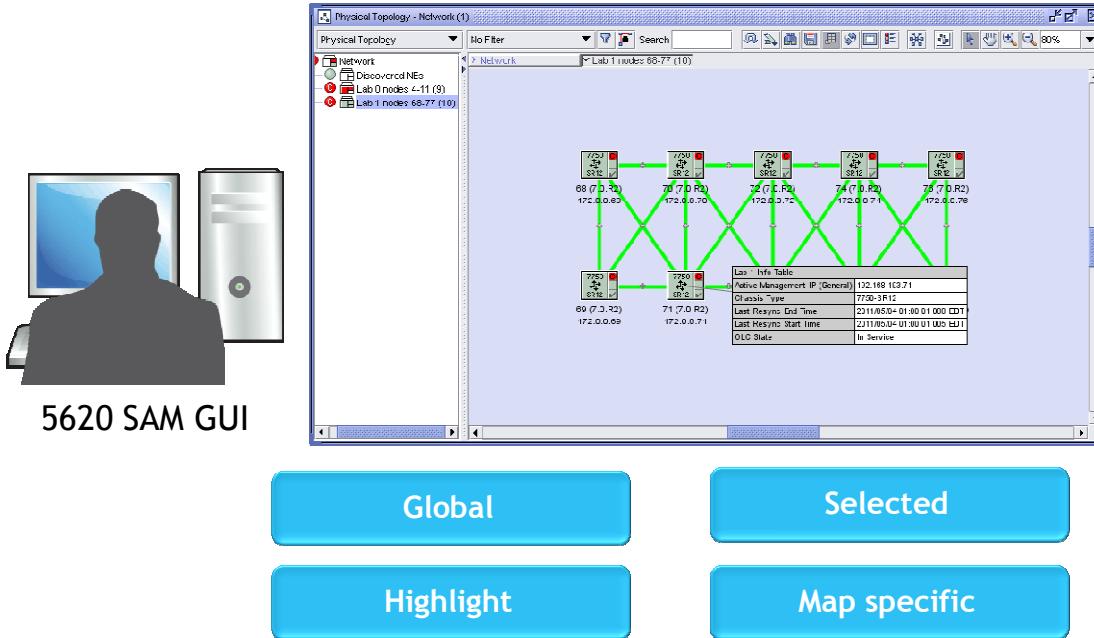
1.1 Info Tables Overview



Display additional specific values relevant to a map object

The 5620 SAM GUI allows operators to configure information tables that are displayed beside map objects. An information table contains specific values, such as an NE chassis type, software descriptor, and system address. Information tables are displayed beside each map object to which the configuration applies. Operators can move an information table by drag and dropping the table on topology maps, however the new table location is not saved with the map.

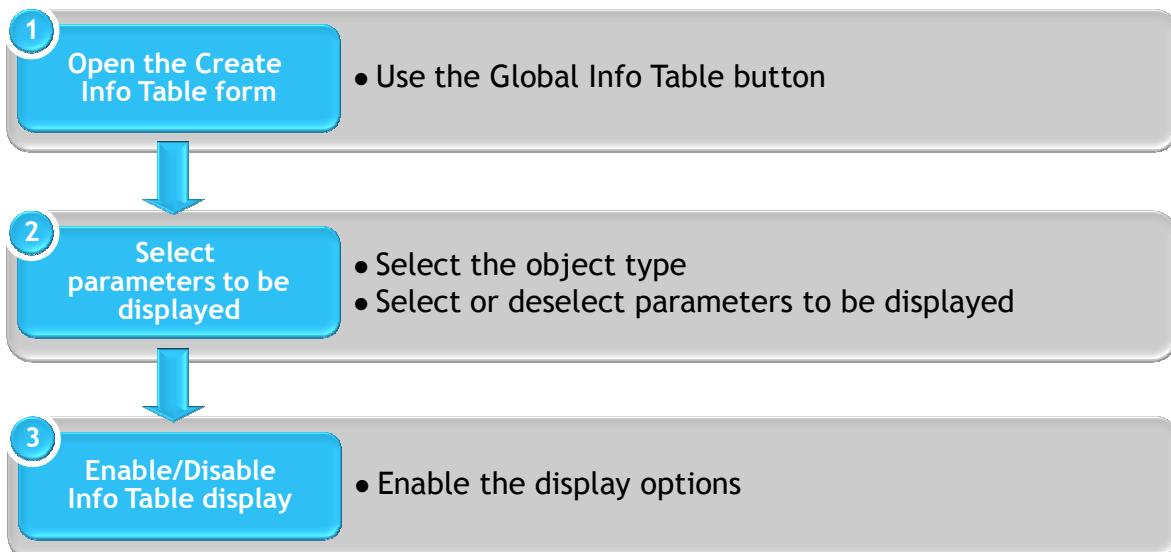
1.1.1 Info Tables Types



The following types of information tables can be applied to map objects:

- global—available for all map types
- selected—available for all map types
- highlight—available for maps that support the highlight function
- others that are specific to a map type

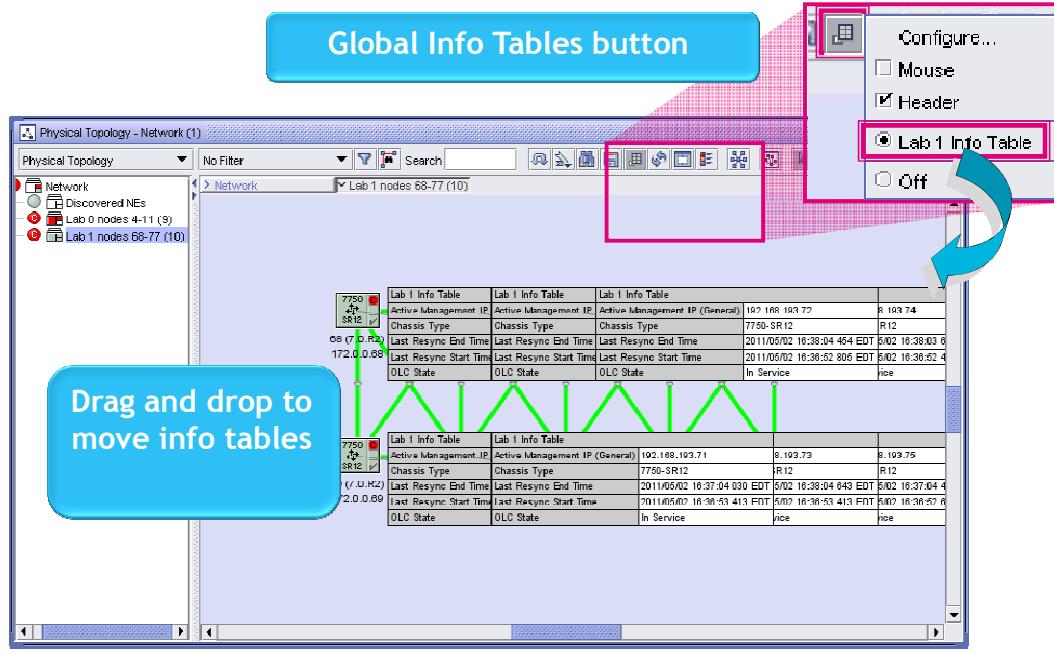
1.2 Info Table Configuration Workflow



The following workflow outlines the high-level steps necessary to configure a 5620 SAM info table for a topology map.

1. Open the Create Info Table form, use the Global Info Table button, select the Configure menu item and click on the Create button
2. Select parameters to be displayed
 - Select the object type from the list of map objects available for the opened map
 - For each map object type, click on the associated check box to select or deselect the parameters to be displayed
3. Enable or disable the Info Table display by choosing one of the available display options

1.3 Global Info Tables



The new location of a moved info table is not saved with the map

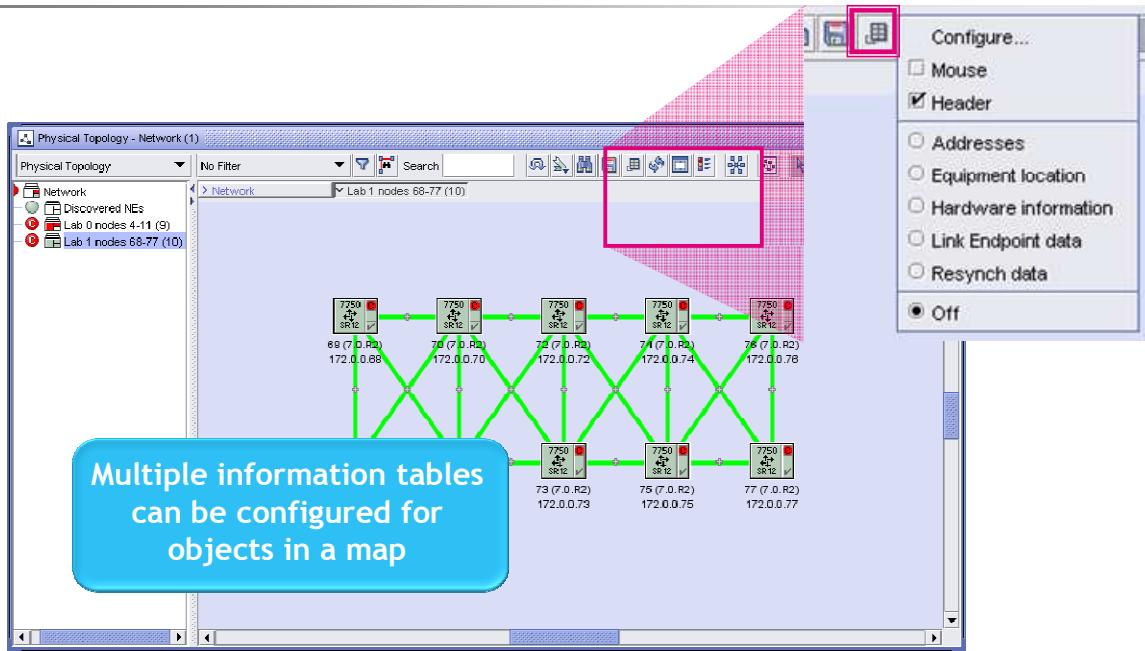
3 · 6 · 11

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When one or more information table configurations are available for a map type, you can apply an information table configuration to all map objects using the Global Info Tables button. You can also use this button to turn the global information table configuration off. The figure on the slide shows a map view with an information table configuration applied to all map objects. Operators can move an information table by drag and dropping the table on topology maps, however the new table location is not saved with the map.

1.4 Multiple Info Tables

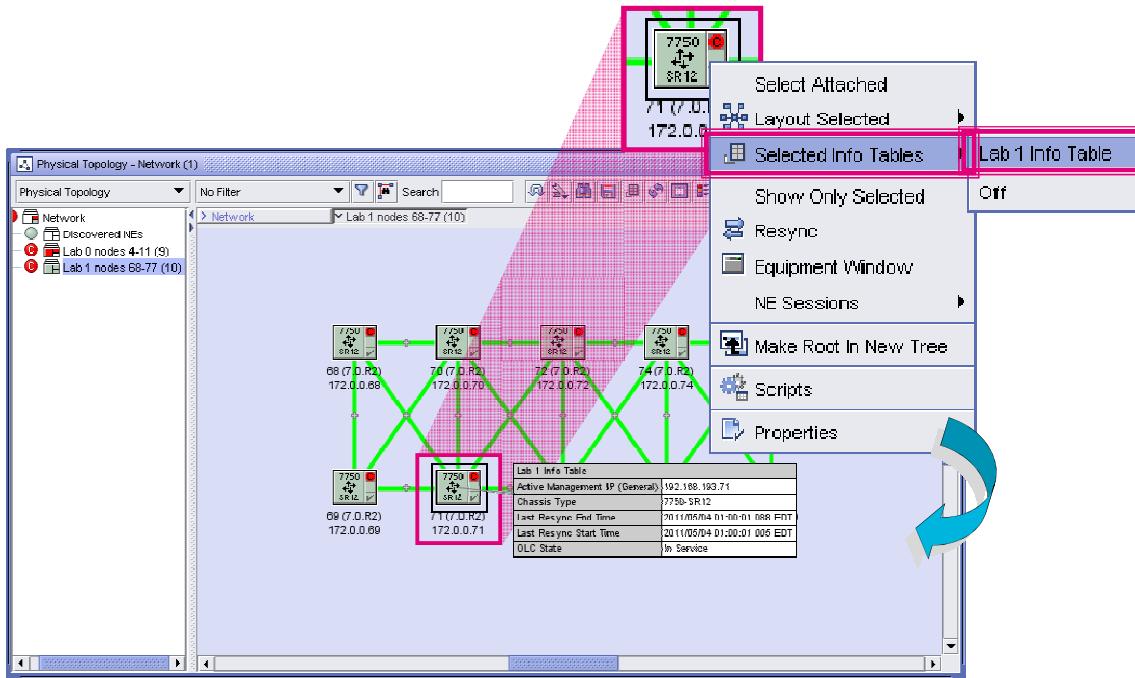


Only one information table is displayed at a time on the map

Multiple information tables can be applied to map objects, but only one is displayed at a time on the map.

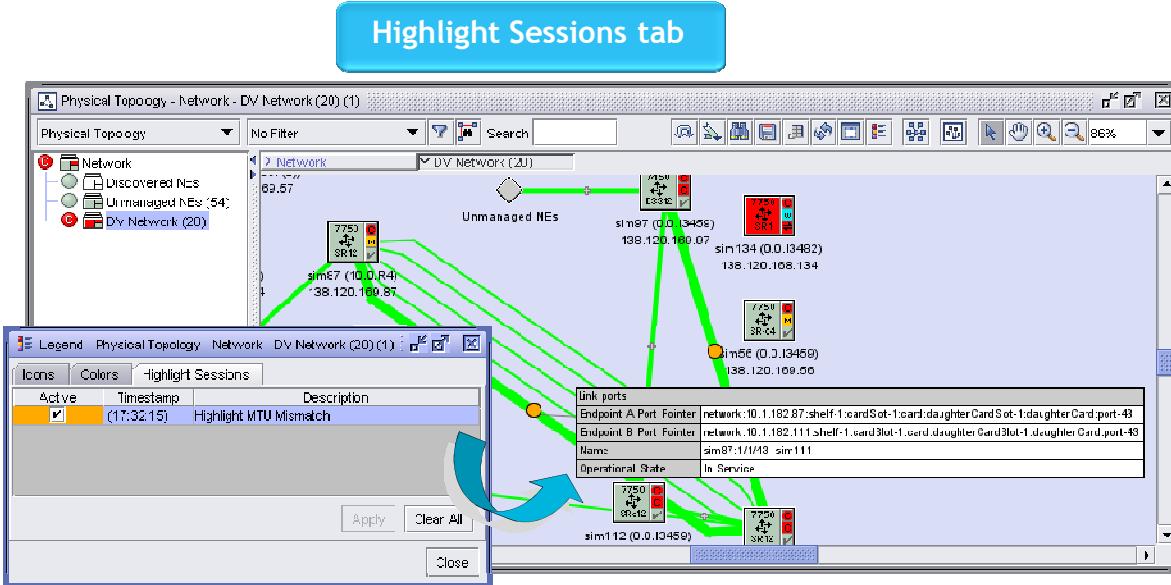
As of SAM 10.0 R5 Tab indicators appear on the information table to indicate that multiple information tables apply to the map object. Operators can cycle through the applied information tables by clicking on the information table and pressing the Tab key.

1.5 Selected Info Tables



The 5620 SAM allows operators to apply an information table configuration to one map object or a selected group of map objects by right-clicking on the object or selected group. Operators can also use this contextual menu to turn the selected information table configuration off.

1.6 Map Highlight Info Tables



Information table is displayed only for the highlighted objects

On a map that supports the highlight function, operators can apply an information table configuration to a map highlight by right-clicking on an existing highlight session from the Highlight Sessions tab of the Legend-topology form. You can also use this contextual menu to turn the highlight information table configuration off. See Procedure 5-18 for more information about how to use the Map Highlight Info Tables feature.

How To Do It and Exercises



How to do it

Instructor DEMO how to:

Display additional information using Info Tables



Lab Exercises

Configure Info Tables - Network Element

Display Info Tables - Network Element / Mouse Over Network Element / Selected Network Element

Modify Info Table Configuration – Link Information

Display Info Tables – Mouse Over Link



Time allowed:

3 · 6 · 15

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Your instructor may perform the above mentioned demonstrations using the 5620 SAM GUI.

In addition, your instructor will point out the appropriate lab module containing the above mentioned hands-on lab exercises, and will indicate the time allowed to perform these hands-on exercises.

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Questions



3 · 6 · 17

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1. Multiple information tables can be applied to map objects, but only one is displayed at a time. True or false?
 - a. True
 - b. False
2. Information tables can be configured to display during a mouse-over operation, and are displayed beside each map object to which the selected configuration applies. True or false?
 - a. True
 - b. False
3. Information tables can be applied to all map objects, including link groups or topology groups. True or false?
 - a. True
 - b. False
4. An information table can display on the map specific values for a map objects, such as an NE chassis type, software descriptor, and system address. True or false?
 - a. True
 - b. False

Answers



1. Multiple information tables can be applied to map objects, but only one is displayed at a time. True or false?
 - a. True ✓
 - b. False
2. Information tables can be configured to display during a mouse-over operation, and are displayed beside each map object to which the selected configuration applies. True or false?
 - a. True ✓
 - b. False
3. Information tables can be applied to all map objects, including link groups or topology groups. True or false?
 - a. True
 - b. False ✓
4. An information table can display on the map specific values for a map objects, such as an NE chassis type, software descriptor, and system address. True or false?
 - a. True ✓
 - b. False



This module covered:

- Characteristics and function of info tables in SAM topology maps
- The steps involved in creating and configuring an info table to show customized information for objects in topology maps
- Options available to display or hide info tables



End of module Topology Map Info Tables

3 · 6 · 20

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Section 3
Network Management

Module 7 Flat Maps

TOS36033_V4.0-SG-R12.0-Ed1 Module 3.7 Edition 2

5620 SAM
R12.0 Fundamentals
TOS36033_V4.0-SG Edition 1

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2.1	2012-08-18	GARCIA LOZANO, René	TOS36033_V2.1 – SAM 10.0 (R1 vILT conversion)
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2.3	2012-10-30	GARCIA LOZANO, René	TOS36033_V2.3 – SAM 10.0 (MyPLE and WBT)
3.0	2013-07-02	GARCIA LOZANO, René	TOS36033_V3.0 – SAM 11.0 (update)



Upon completion of this module, you should be able to:

- Describe the characteristics and function of flat maps
- Identify the use of flat maps to display a large number of network objects and link groups on a single map, regardless of the configured topology grouping hierarchy
- Identify the workflow and options available to open a flat map

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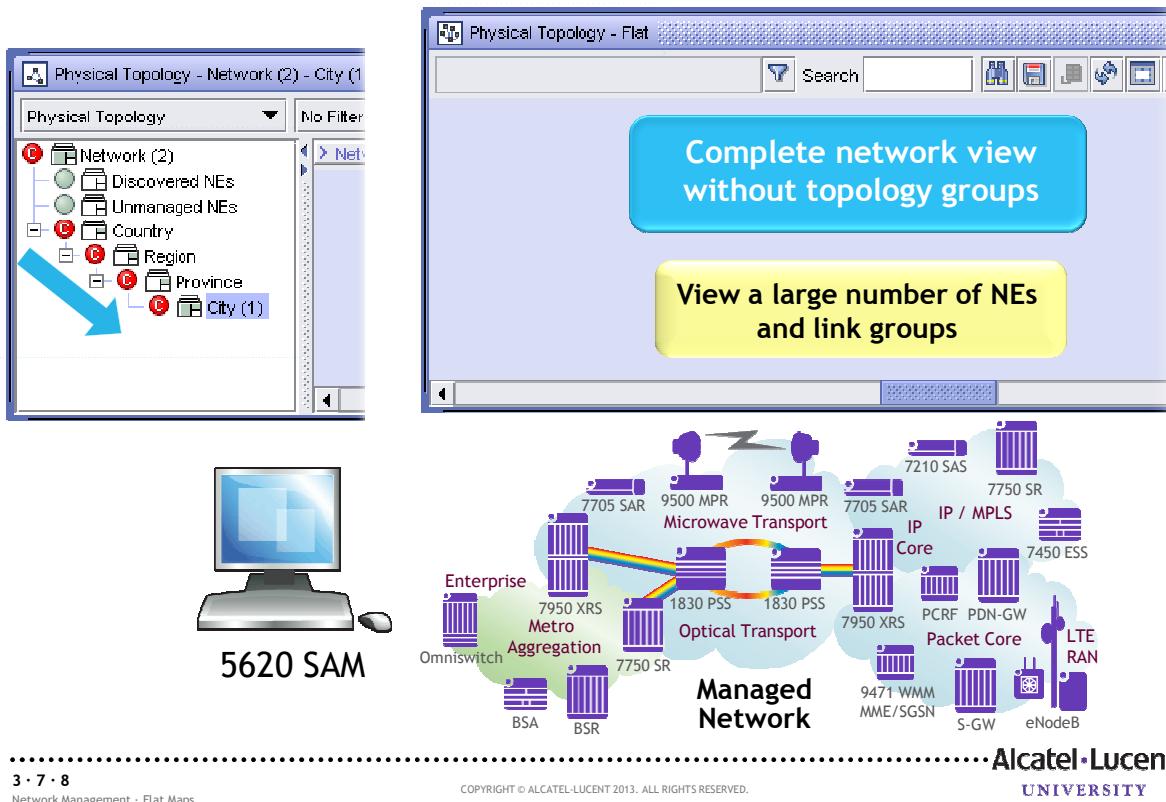


	Page
1 Flat Maps	7
1.1 Flat Maps Overview	8
1.1.1 Flat Maps Overview	9
1.2 Opening a Flat Map Workflow	10
1.3 Opening a Flat Map	11
1.4 Flat Map Topology View	13
How to do it	14
Questions	15
Answers	16
Module Summary	17

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1 Flat Maps

1.1 Flat Maps Overview



3 · 7 · 8
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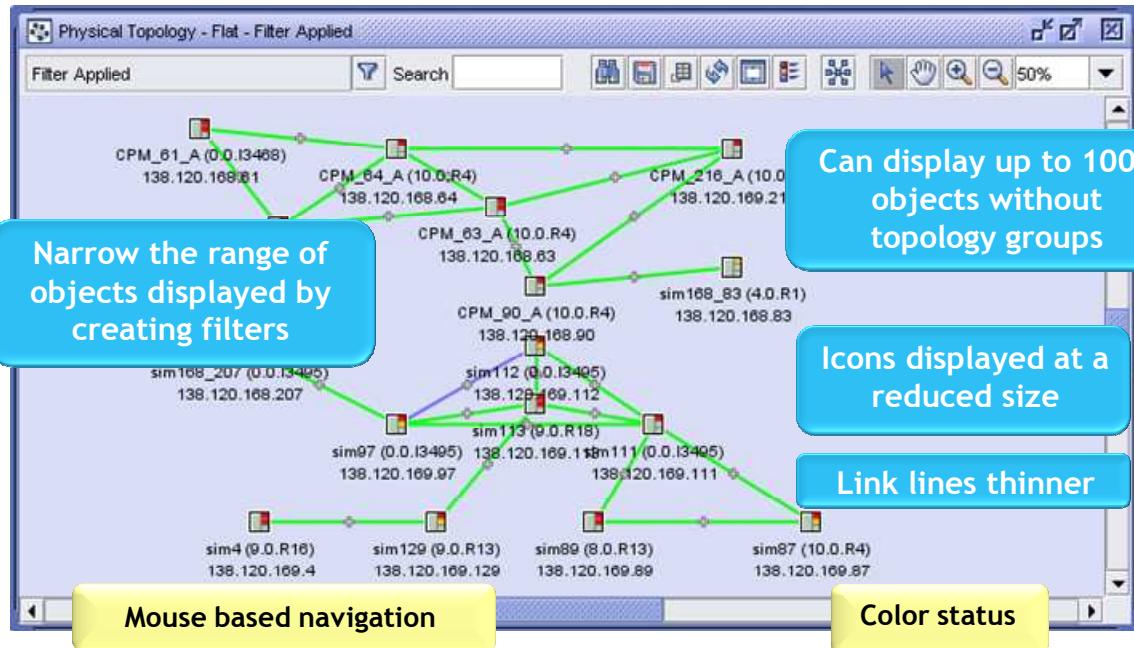
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The 5620 SAM maps can be used to provide a view of the network from different perspectives for monitoring and troubleshooting activities. The 5620 SAM allows network administrators to create a hierarchical organization of the managed network's physical topology into logical topology groups. The map navigation tree displays the topology groups and is associated logically with the map panel. As the user navigates through the topology groups in the map navigation tree, the contents displayed on the map panel change to show only those network elements contained on the topology group.

Depending on the monitoring and troubleshooting requirements, operators may need to view network elements and interfaces for a specific customer or service displayed on a single map. Such network elements and interfaces could be contained in different topology groups.

The 5620 SAM flat maps provide a complete network view without topology groups. This allows network operators to view a large number of network objects and link groups on a single map regardless of the logical topology groups they have been assigned to.

1.1.1 Flat Maps Overview



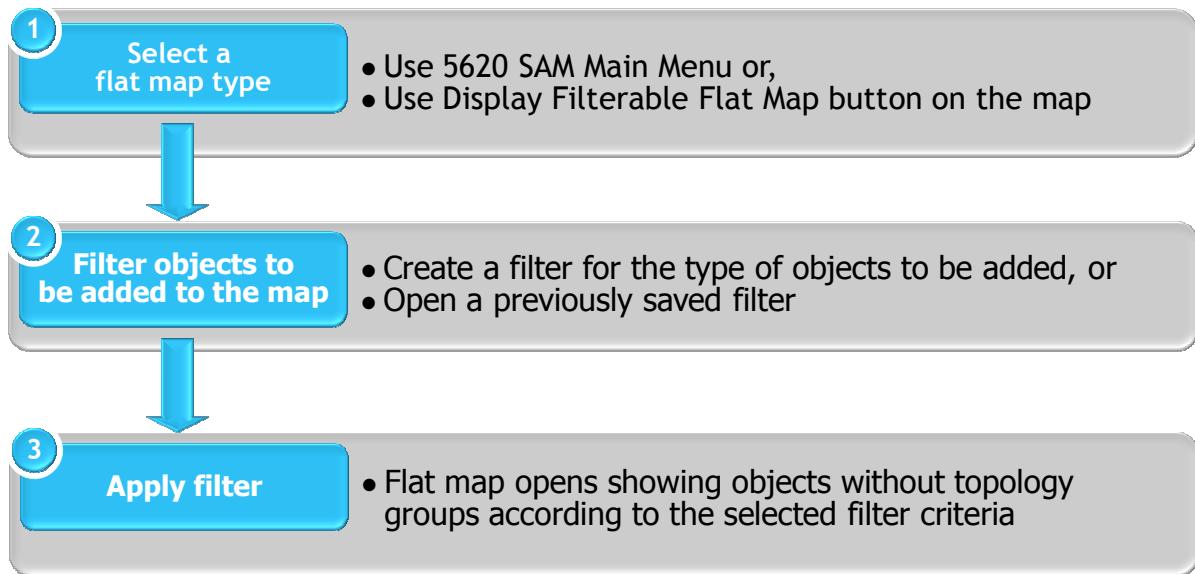
The following characteristics must be noted about flat maps:

- A flat map can display up to 1000 objects on a single map view without topology groups.
- The 5620 SAM operator can narrow the range of objects that are displayed by creating and saving filters and filter definition trees.
- Object icons are displayed at a reduced size
- Link lines are thinner

A flat map provides similar navigation and functionality to other 5620 SAM topology maps such as:

- all mouse based navigation supported
- zooming and panning
- NE and link status color
- Search
- filtering

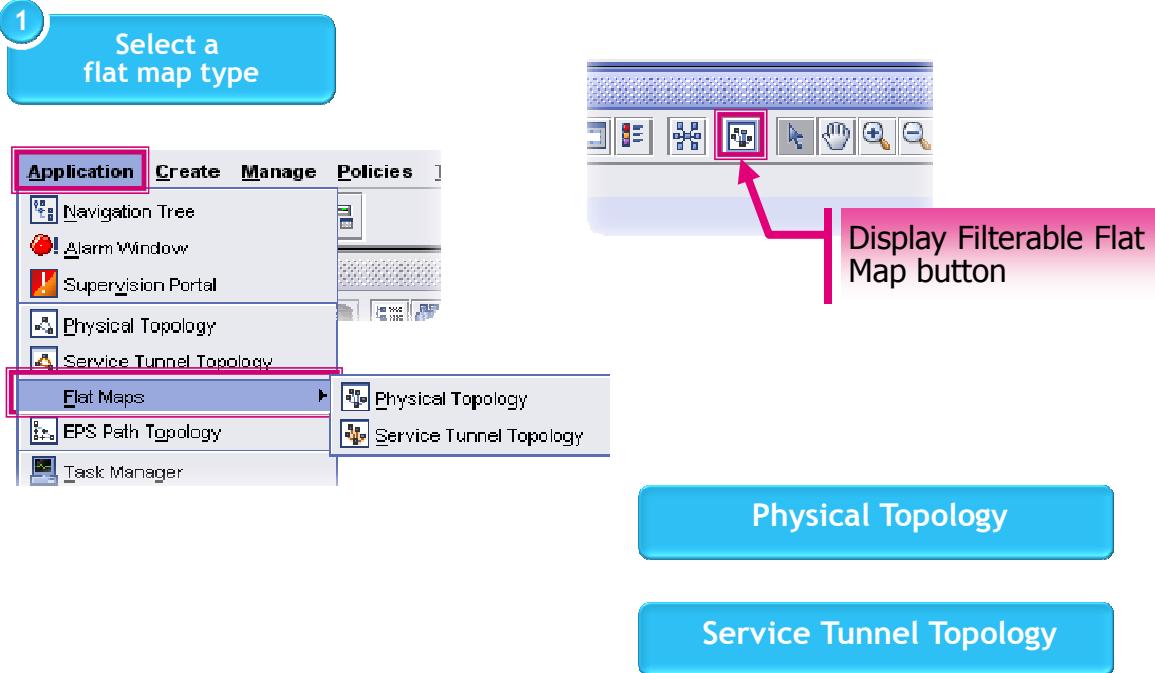
1.2 Opening a Flat Map Workflow



The workflow above outlines the high-level steps necessary to open a flat map.

1. **Select a flat map type** using the 5620 SAM Main Menu or the Display Filterable Flat Map button on the appropriate map.
2. **Filter objects to be added to the map** using the Topology Filter form to create a filter for the type of objects to be added to the flat map, or to open a previously saved filter.
3. **Apply the filter.** The requested flat map opens showing the network objects and link groups without topology groups according to the selected filter criteria.

1.3 Opening a Flat Map



In order to open a flat map, operators may click on the Display Filterable Flat Map button located in the map window tool bar to display a flat map of the current topology map view. Alternatively, a flat map can also be opened by choosing Application—Flat Maps from the 5620 SAM main menu.

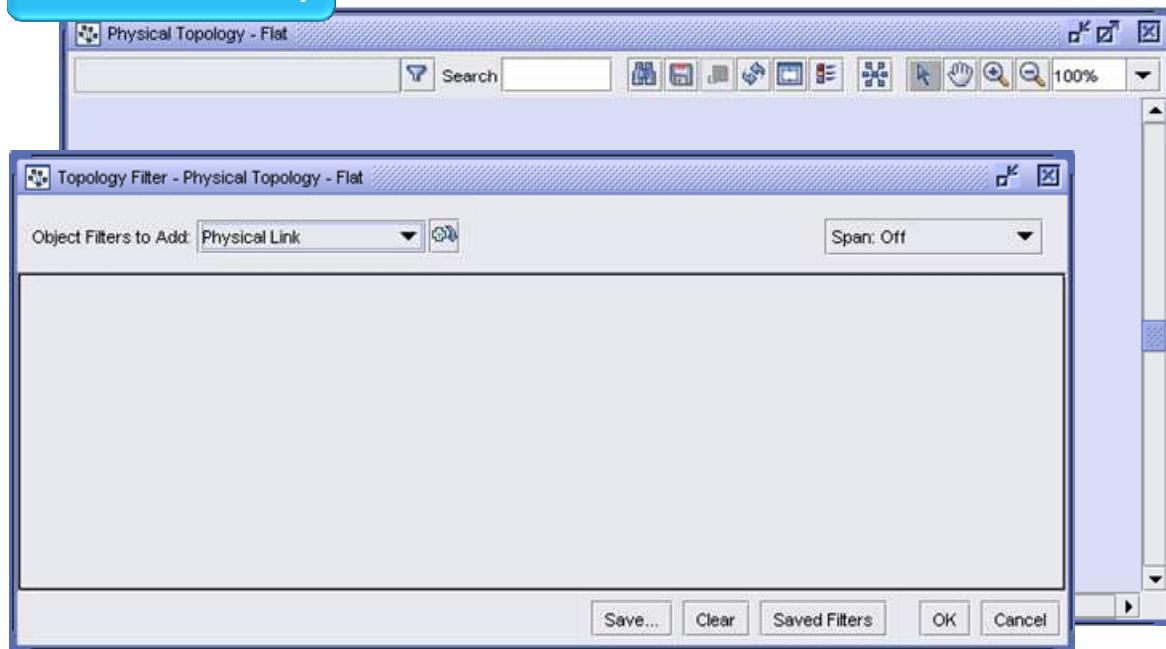
The following flat map types are available:

- Physical Topology
- Service Tunnel Topology

1.3 Opening a Flat Map [cont.]

2

Filter objects to be added to the map



3 · 7 · 12
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An empty flat map for the selected topology map will open in the background.

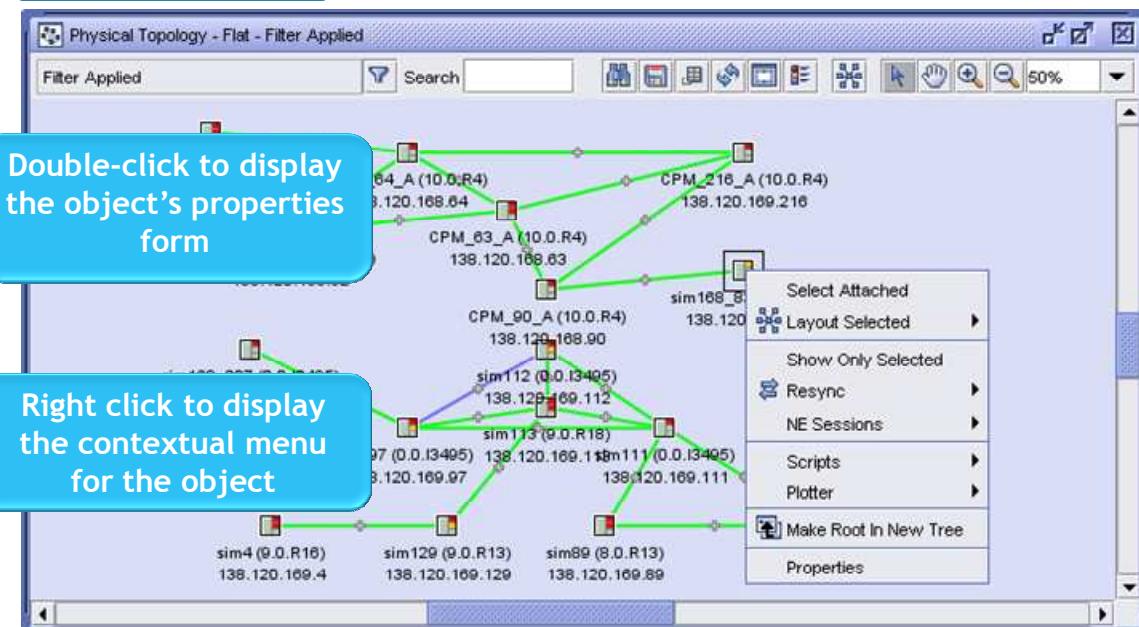
A Topology Filter form for the selected flat map type appears in the foreground. The Topology filter form allows SAM operators to:

- Create a filter for the type of objects to be added to the flat map
- Save a configured filter
- Or, open a previously saved filter

1.4 Flat Map Topology View

3

Apply filter



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The 5620 SAM displays the flat map requested showing the network objects and link groups according to the selected filter criteria and without topology groups. Object icons in a flat map are displayed at a reduced size and link lines are thinner.

The 5620 SAM operator can right-click on an object in the flat map to display the contextual menu for the object. Double-clicking on a NE in the flat map displays the object's properties form which allows operators to view or configure the NE parameters.



How to do it

Instructor DEMO how to:

Open a Flat Map for the complete network view

Open a Flat Map with selected network elements

Your instructor may perform the above mentioned demonstrations using the 5620 SAM GUI.

In addition, your instructor will point out the appropriate lab module containing the above mentioned hands-on lab exercises, and will indicate the time allowed to perform these hands-on exercises.

Questions



3 · 7 · 15
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1. A flat map is used to view a large number of network objects and link groups on a single map, regardless of the configured topology grouping hierarchy, and it can display up to 1000 objects. True or false?
 - a. True
 - b. False
2. Flat maps do not support zooming or searching functions, and object icons in a flat map can be displayed at a reduced size, or at a large size. True or false?
 - a. True
 - b. False
1. Flat maps do not support the function of double-clicking on an map icon to display the object's properties form. True or false?
 - a. True
 - b. False

Answers



1. A flat map is used to view a large number of network objects and link groups on a single map, regardless of the configured topology grouping hierarchy, and it can display up to 1000 objects. True or false?
 - a. True ✓
 - b. False
2. Flat maps do not support zooming or searching functions, and object icons in a flat map can be displayed at a reduced size, or at a large size. True or false?
 - a. True
 - b. False ✓
1. Flat maps do not support the function of double-clicking on an map icon to display the object's properties form. True or false?
 - a. True
 - b. False ✓



This module covered:

- Characteristics of flat maps
- The use of flat maps to display a large number of network objects and link groups on a single map, regardless of the configured topology grouping hierarchy
- The workflow and options available to open a flat a map



End of module Flat Maps

3 · 7 · 18
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Section 3
Network Management

Module 8 User Activity

TOS36033_V4.0-SG-R12.0-Ed1 Module 3.8 Edition 2

5620 SAM
R12.0 Fundamentals
TOS36033_V4.0-SG Edition 1

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2.0	2013-07-19	GARCIA LOZANO, René	TOS36033_V3.0 – SAM 11.0 (update)



Upon completion of this module, you should be able to:

- Identify the 5620 SAM user activity logging capabilities
- Describe the advantages and troubleshooting applications of the 5620 SAM user activity logging capabilities
- List the main logs that the 5620 SAM uses for keeping track of user activity
- Identify the characteristics of user activity log records and session log records
- Identify the characteristics and applications of the 5620 SAM GUI client User Activity form
- Identify 5620 SAM GUI direct navigation capabilities supported in the use of user activity logging information

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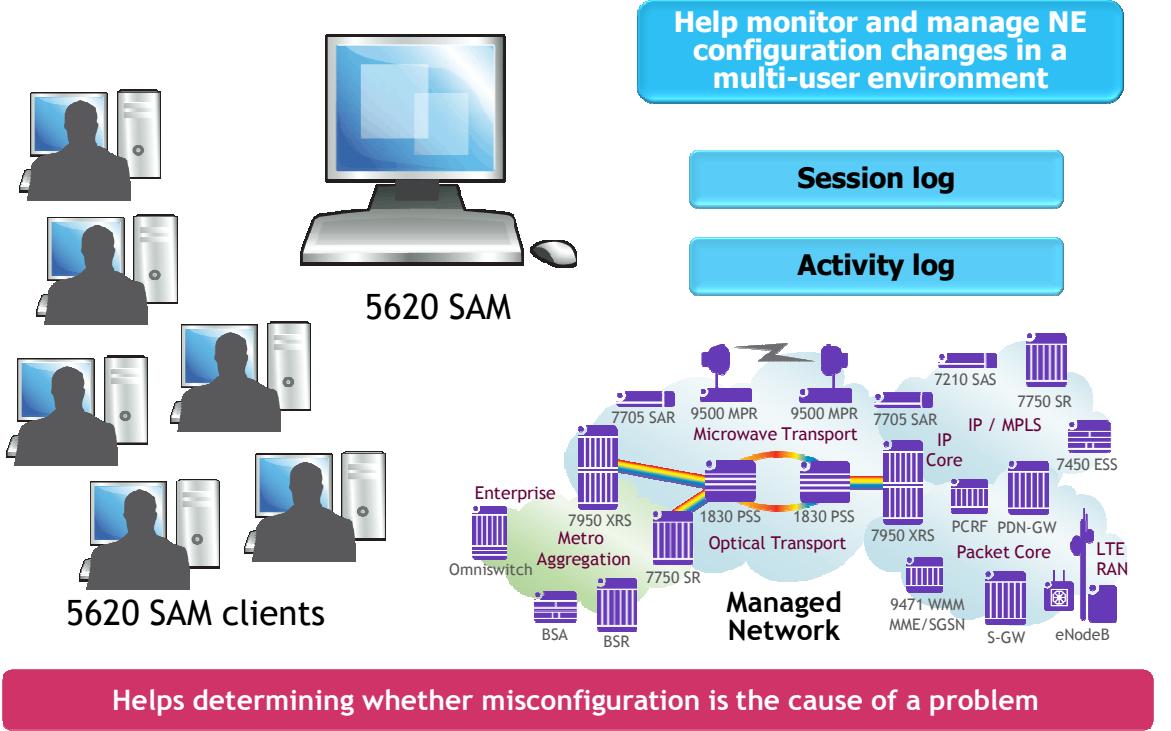


	Page
1 User Activity	7
1.1 User Activity Logging Overview	8
1.2 User Activity Log	9
1.2.1 Activity Types and Sub types	10
1.3 Session Log	11
1.4 User Activity Form	12
1.5 GUI Navigation	14
Questions	15
Answers	16
Module Summary	17

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1 User Activity

1.1 User Activity Logging Overview



User activity logging is a powerful and useful tool that help operators and administrators monitor and manage NE configuration changes in a multi-user environment. The 5620 SAM logs each GUI and OSS user action, such as a system access attempt or the configuration of an object, in the 5620 SAM database.

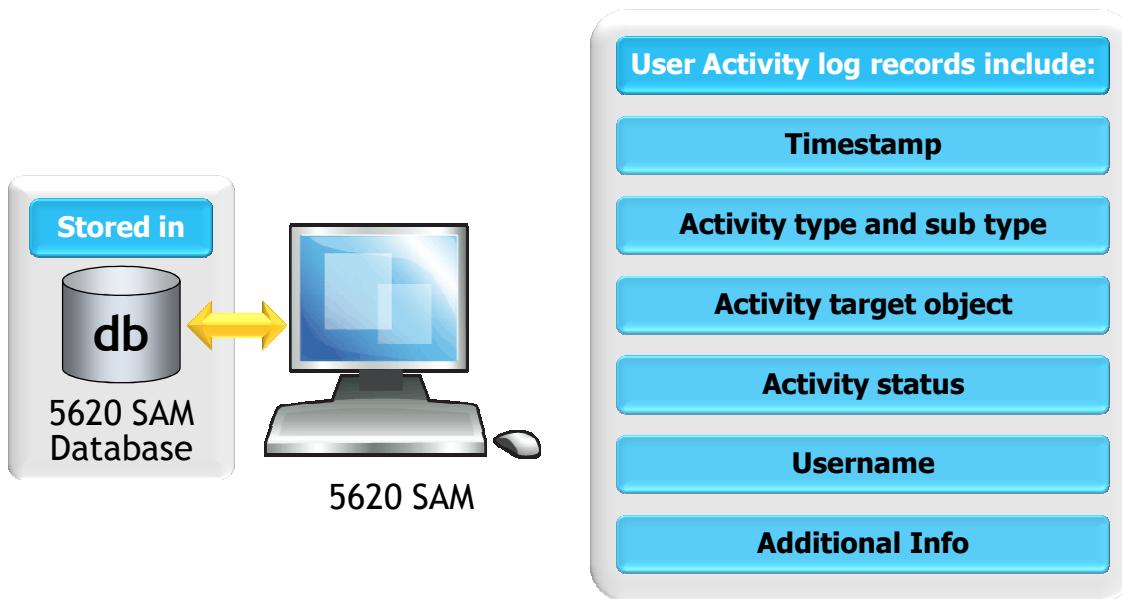
There are two main logs that the 5620 SAM uses for keeping track of user activity: session logs, and activity logs. Session logs track the system access activities.

Activity logs track the changes made to the managed network.

User activity logging is a valuable troubleshooting tool to help operators and administrators quickly determine whether misconfiguration is the root cause of a network problem. For example, if a port unexpectedly fails, a 5620 operator can do one of the following:

- opening the port properties form and clicking on the User Activity button to view the recent user activity associated with the port
- opening the User Activity form, filtering the list by object type or name, and then verifying the associated user activities

1.2 User Activity Log



The 5620 SAM database keeps in the user activity log records for each 5620 SAM GUI and OSS user action. The information in a user activity log record includes:

- Timestamp
- Activity type and sub type
- Activity target object, including the site mane and site ID, if applicable, and the object name, ID and object type
- Activity status, which could be Failure, Success, or Timeout
- Username, which is the 5620 SAM user name that originated the action
- Additional Info, which is information such as old and new parameter values after a modification

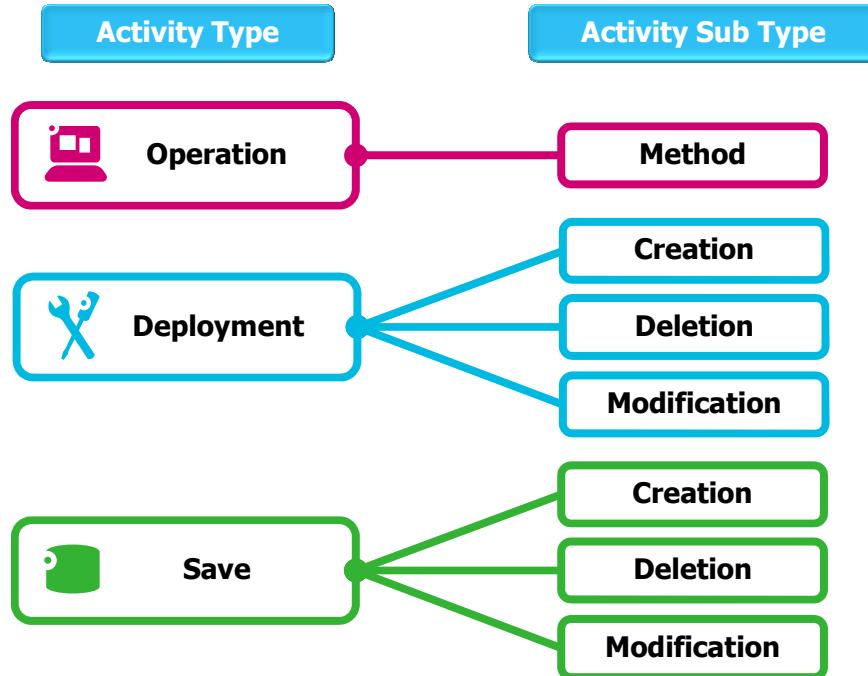
If applicable, a log entry may also contain the XML 5620 SAM object class descriptor and activity details in XML request format.



Note

To view general user activity log entries in the GUI, or retrieve the entries using the 5620 SAM-O, a 5620 SAM user account that has the Administrator or 5620 SAM Management and Operations scope of command role is required.

1.2.1 Activity Types and Sub types



For each activity log record, the activity type describe the general type of activity which could be one of the following:

Operation, a request for the 5620 SAM

Deployment, a change that is deployed to an NE

Save, a change to a 5620 SAM database object

If the activity results in an NE configuration change, a Deployment entry is logged. If the deployed information differs from the information that the 5620 SAM saves to the database, a Save entry is logged.

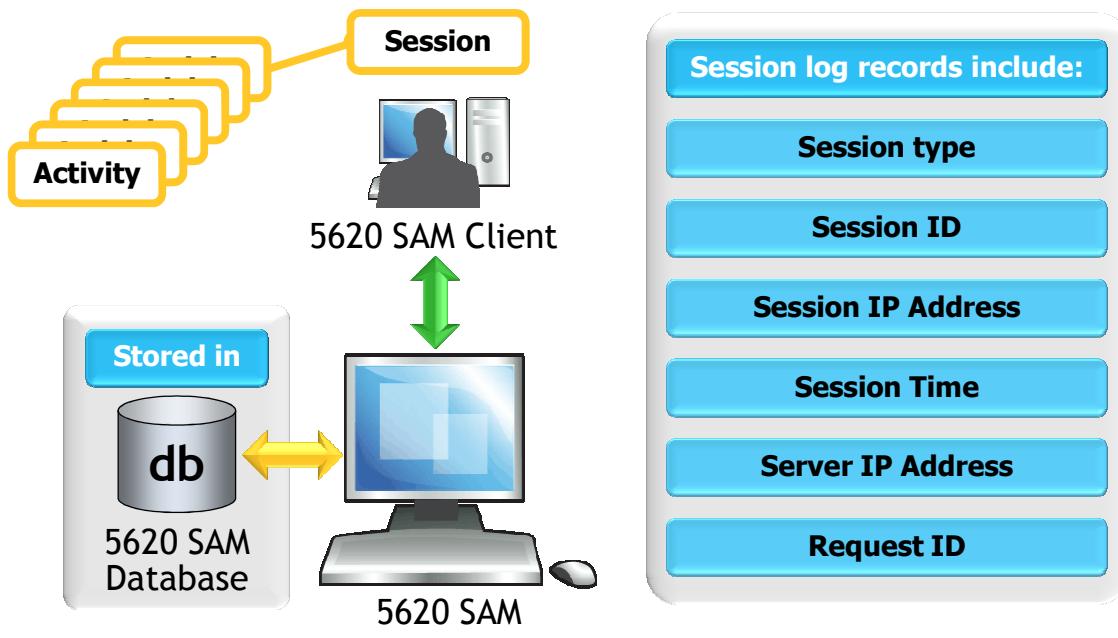
Each activity type has a number of activity sub types associated. The figure above and the following lines present the activity types and describe the associated sub types.

Operation type is associated with the Method activity sub type, which is the name of the invoked method

Deployment type is associated with the activity sub types for NE Object: Creation, Deletion, and Modification

Save type is associated with the activity sub types for 5620 SAM database object: Creation, Deletion and Modification.

1.3 Session Log



For each session log there could be multiple activity log entries associated

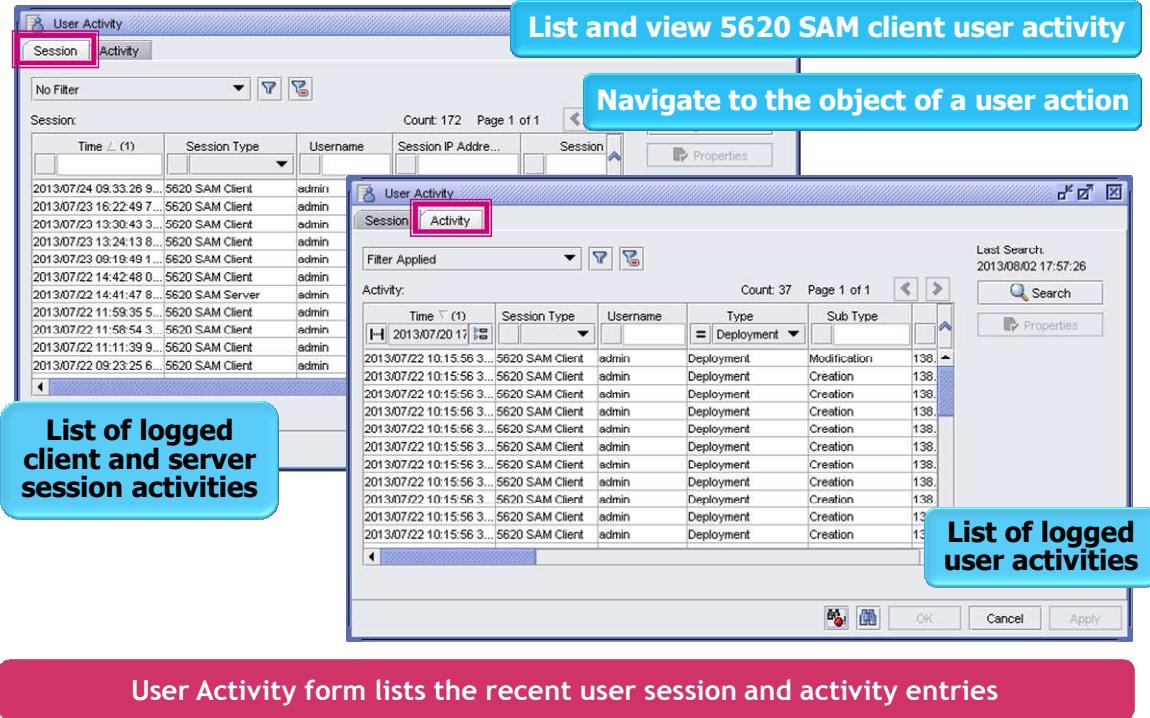
Each 5620 SAM GUI client, 5620 SAM-O JMS client, or XML API request creates a 5620 SAM client session. The 5620 SAM database keeps in the session log records for each 5620 SAM client session.

The information in a session log record includes:

- Session Type. Descriptor of the type of session, which could be GUI, JMS, or OSS
- Session ID. Client session identifier
- Session IP Address. Client IP address
- Session Time. Client session start time
- Server IP Address. IP address of 5620 SAM main server that reports the activity
- Request ID. Identifier assigned to the request, which is unique to a session

For each session log request ID there could be multiple activity log entries associated. For example, the creation of a discovery rule that has multiple rule elements creates one log entry for each rule element. You can use the request ID to sort and correlate the multiple log entries associated with a single client operation.

1.4 User Activity Form



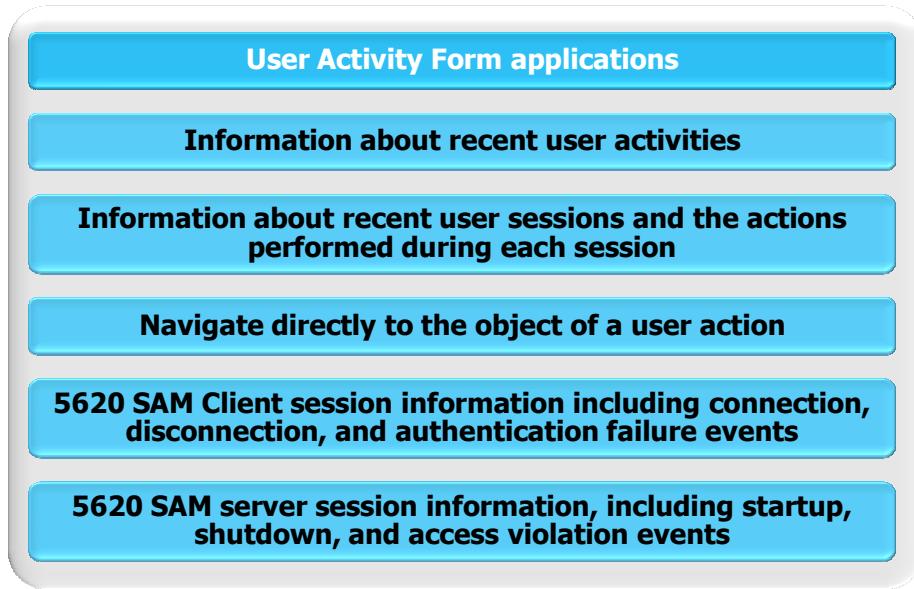
The 5620 SAM User Activity form allows an operator with the appropriate privilege level to list and view the 5620 SAM GUI and OSS client user activity, and to navigate directly to the object of a user action.

The User Activity form contains two tabs, Activity and Session. The Activity tab displays a filterable list of the logged user activities. The Session tab displays a filterable list of the logged client and server session activities. Client session activities include connection, disconnection, and access violation. Server session activities include startup and shutdown.

The properties form of a client connection log record lists the activities performed by the user during the client session.

The User Activity form lists the recent user session and activity entries; older entries are purged according to configurable storage criteria.

1.4 User Activity Form [cont.]



Operators can use the User Activity form to do the following:

- List and view information about recent user activities.
- List and view information about recent user sessions and the actions performed during each session.
- Navigate directly to the object of a user action.
- View 5620 SAM client session information that includes connection, disconnection, and authentication failure events.
- View 5620 SAM server session information, that includes startup, shutdown, and access violation events.

1.5 GUI Navigation

Direct Navigation between

An activity record and the associated session record



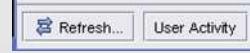
An activity record and the activity target object

View Object

An object properties form and the associated user activities list form



the 5620 task manager and the associated user activities list form



The 5620 SAM GUI allows direct navigation between the following objects:

- an activity record and the associated session record, using the session tab
- an activity record and the activity target object, using the View Object button
- an object properties form and the associated user activities list form, using the User Activity button
- the 5620 SAM Task Manager and the associated user activities list form, using the User Activity button

How To Do It and Exercises



How to do it

Instructor DEMO how to:

Open on the 5620 SAM GUI a list of logged sessions

Open on the 5620 SAM GUI a list of logged user activities

Filter logged activities performed during a session

Filter all logged activities performed by a user



Lab Exercises

User Activity – Session

User Activity – Activity

Filter Logged Activities Performed During a Session

Filter Logged Activities Performed by an User

Navigation from “Session” to “Activity”

Navigation from “Activity” to “Session”

Navigation from “Activity” to “Object”

Navigation from “Object” to “Activity”

Navigation from Task manager to User Activity



Time allowed:

3 · 8 · 15
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Your instructor may perform the above mentioned demonstrations using the 5620 SAM GUI.

In addition, your instructor will point out the appropriate lab module containing the above mentioned hands-on lab exercises, and will indicate the time allowed to perform these hands-on exercises.

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Questions



3 · 8 · 17
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1. Activity log records are stored in the 5620 SAM database, and are purged from the 5620 SAM database when the associated session terminates. True or false?
 - a. True
 - b. False
2. An activity log record contains information target object, including object name, ID and object type, and each log record contains status information which could be Failure, Success, or Timeout. True or false?
 - a. True
 - b. False
3. A “Save” activity type is logged when a change that is deployed to an NE. True or false?
 - a. True
 - b. False
4. Each 5620 SAM GUI client, 5620 SAM-O JMS client, or XML API request creates a 5620 SAM client session that is logged, and a session log record contains information about the client session identifier, and the client IP address. True or false?
 - a. True
 - b. False

Answers



1. Activity log records are stored in the 5620 SAM database, and are purged from the 5620 SAM database when the associated session terminates. True or false?
 - a. True
 - b. **False ✓**
2. An activity log record contains information target object, including object name, ID and object type, and each log record contains status information which could be Failure, Success, or Timeout. True or false?
 - a. **True ✓**
 - b. False
3. A “Save” activity type is logged when a change that is deployed to an NE. True or false?
 - a. True
 - b. **False ✓**
4. Each 5620 SAM GUI client, 5620 SAM-O JMS client, or XML API request creates a 5620 SAM client session that is logged, and a session log record contains information about the client session identifier, and the client IP address. True or false?
 - a. **True ✓**
 - b. False



This module covered:

- The 5620 SAM user activity logging capabilities
- Advantages and troubleshooting applications of the 5620 SAM user activity logging capabilities
- The main logs that the 5620 SAM uses for keeping track of user activity
- Characteristics of user activity log records and session log records
- Characteristics and applications of the 5620 SAM GUI client User Activity form
- The 5620 SAM GUI direct navigation capabilities supported in the use of user activity logging information



End of module
User Activity

3 · 8 · 20

Network Management · User Activity
5620 SAM · R12.0 Fundamentals

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Section 4
Fault Management

Module 1
Alarm Status and Severity

TOS36033_V4.0-SG-R12.0-Ed1 Module 4.1 Edition 2

5620 SAM
R12.0 Fundamentals
TOS36033_V4.0-SG Edition 1

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1.0	2011-04-20	GARCIA LOZANO, René	TOS36033_V1.0 – SAM 9.0 (R1 update)
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2.1	2012-08-18	GARCIA LOZANO, René	TOS36033_V2.1 – SAM 10.0 (R1 vILT conversion)
2.2	2012-10-08	LOLLIERIC, Pascal	TOS36033_V2.2 – SAM 10.0 (R5 update)
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3.0	2013-06-06	GARCIA LOZANO, René	TOS36033_V3.0 – SAM 11.0 (update)



Upon completion of this module, you should be able to:

- List the 5620 SAM fault management capabilities using alarm functionalities
- Identify the GUI elements that indicate alarm status and severity
- Identify the color code used to represent alarm severity in the GUI
- Identify the indicators for alarm status on topology map icons and faults tab on an object's properties form

4 · 1 · 3

Fault Management - Alarm Status and Severity
5620 SAM · R12.0 Fundamentals

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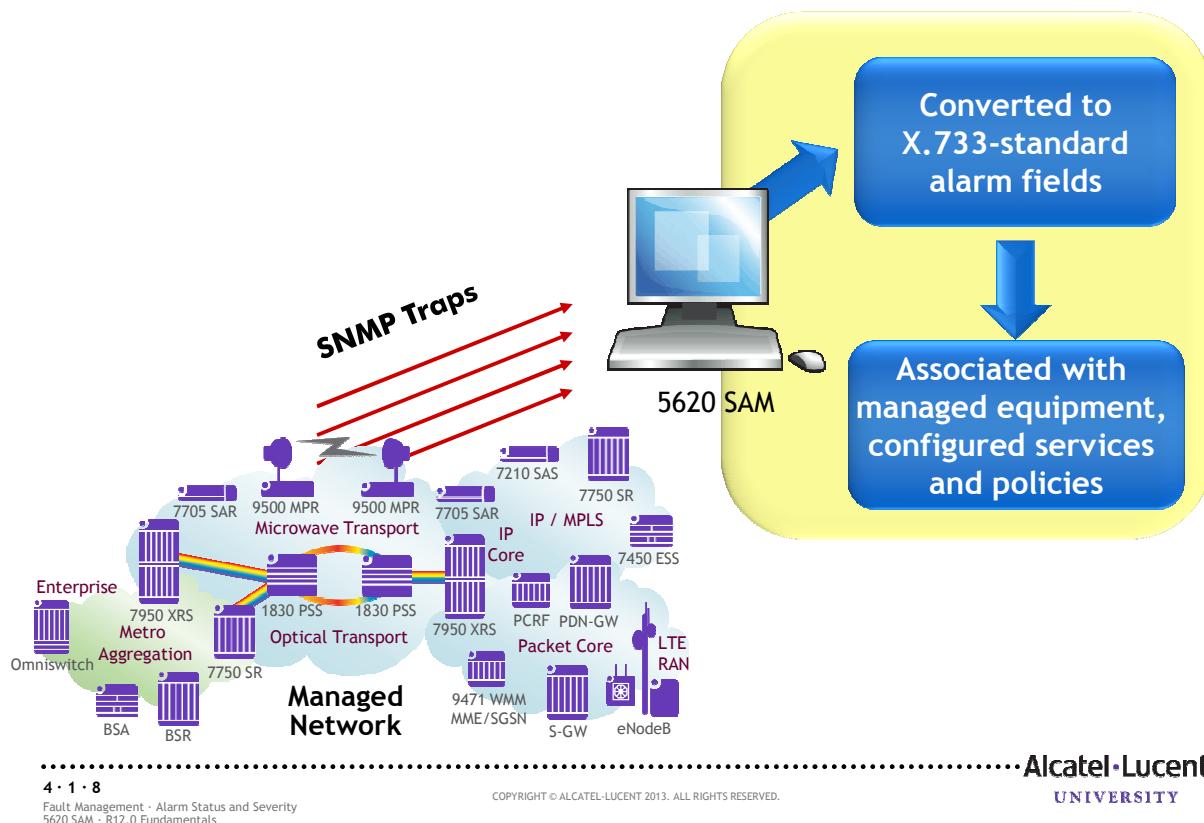


	Page
1 Alarm Generation and Fault Management	7
1.1 5620 SAM Alarm Generation	8
1.2 Fault Management Using Alarms - Overview	9
Knowledge Verification - Alarm Generation	10
2 Alarm Information Status and Severity	11
2.1 Alarm Status	12
2.2 Alarm Severity	13
2.2.1 Severity Color Code	14
Knowledge Verification - Alarm Severity	16
3 Alarm Status Display	17
3.1 Topology Maps	18
3.2 Navigation Tree	20
3.3 Faults Tab on Object Properties Form	22
Knowledge Verification - Alarm Status	23
How To Do It and Exercises	24
Questions	25
Answers	26
Module Summary	27

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1 Alarm Generation and Fault Management

1.1 5620 SAM Alarm Generation



4 · 1 · 8

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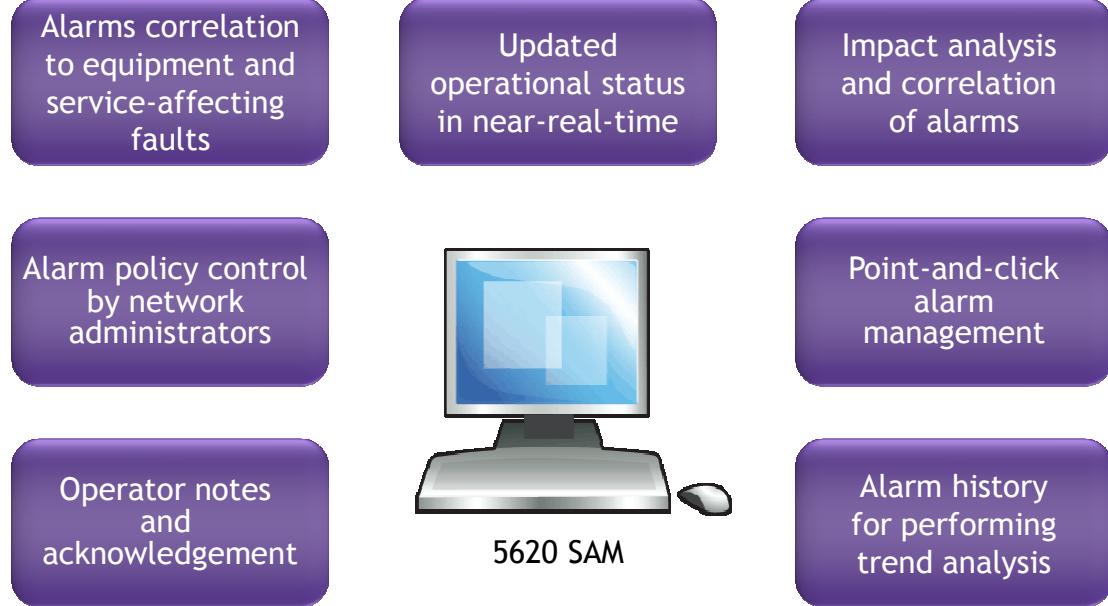
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When a fault or event occurs, Network Element send a notification to the network operator using the protocol SNMP (Simple Network Management Protocol).

The 5620 SAM receives the SNMP traps and converts these traps to Alarms using X.733 Standard (ITU Standard).

The SAM alarms generated are associated with the managed equipment, configured services and policies.

1.2 Fault Management Using Alarms - Overview



4 · 1 · 9

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The 5620 SAM fault management system provides:

- the conversion of SNMP traps from NEs to alarms using the X.733 standard
- the **correlation of alarms with equipment- and service-affecting faults updates to the managed-object operational status in near-real-time**, allowing operators to **perform impact analysis**
- **alarm policy control** that allows a network administrator to specify how to process alarms and how to create and store the alarm logs
- **point-and-click alarm management** using the 5620 SAM GUI dynamic alarm list and object properties forms
- the ability to log the actions taken to correct the associated fault by adding notes to the alarm
- and **alarm history for performing trend analysis**

Knowledge Verification - Alarm Generation



What protocol do Network Elements use for notifying faults or events to the 5620 SAM for alarm generation?

- a. File Transfer Protocol (FTP)
- b. Simple Network Management Protocol (SNMP)
- c. Secure File Transfer Protocol (SFTP)
- d. Hypertext Transfer Protocol (HTTP)

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Choose the correct answer for the knowledge verification question above.

2 Alarm Information Status and Severity

2.1 Alarm Status

Alarm status for the network indicated in:

The screenshot displays the Alcatel-Lucent 5620 SAM interface with three main components highlighted:

- Navigation Tree:** Shows the hierarchical structure of the network, including Equipment, Network, and Logical Groups.
- Dynamic Alarm List:** A table showing a list of alarms with columns for Alarm ID, Object Type, Object Name, Alarm Name, Probable Cause, Severity, and DLC State.
- Topology Maps:** A graphical representation of the network topology, showing nodes and their connections.

Annotations on the interface:

- Navigation Tree:** A blue box labeled "Navigation Tree" pointing to the left pane.
- Dynamic Alarm List:** A blue box labeled "Dynamic Alarm List" pointing to the bottom-left pane.
- Topology Maps:** A blue box labeled "Topology Maps" pointing to the top-right pane.
- Faults tab on Properties form:** A blue box labeled "Faults tab on Properties form" pointing to the bottom-right pane.

Alarm ID	Object Type	Object Name	Alarm Name	Probable Cause	Severity	DLC State	
2011/10/20 18:20:45 3...	Interface	Int55	OppositeInterfaceDown	OppositeInterfaceDown	warning	In Service	N/A
2011/10/20 18:20:45 3...	Interface	Int140	OppositeInterfaceDown	OppositeInterfaceDown	warning	In Service	N/A
2011/10/20 18:20:45 3...	Interface	Int55	Int55Down	Int55Down	critical	In Service	N/A
2011/10/20 14:32:41 3...	Software Upgrade Ma...	node5	SoftwareUpgradeFailure	SoftwareUpgradeFailure	major	In Service	lost
2011/10/20 11:50:17 0...	Flash Memory	flashMemory-23	DiskCapacityProblem	DiskCapacityProblem	minor	In Service	hard
2011/10/20 11:08:01 0...	node5	node5	LinkDown	LinkDown	critical	In Service	N/A
2011/10/20 11:08:01 0...	Site Sync	sync	AltTimingReferencesN...	AltTimingReferencesN...	minor	In Service	N/A
2011/10/20 11:00:00 0...	Site Sync	sync	BITSIdQualified	BITSIdQualified	minor	In Service	N/A

2.2 Alarm Severity

5620 SAM uses internal rules to determine the severity level of the alarm

The screenshot shows the Alcatel-Lucent 5620 SAM software interface. On the left is a navigation tree titled 'Equipment-Network (1)'. It includes sections for 'Equipment', 'Network', 'Logical Groups', 'APG Groups', and 'Card SSM - (7705 ICM)'. Under 'Card SSM - (7705 ICM)', there are 'Daughter Card Slot -' and 'Port 14.2 Model'. The 'Port 14.2 Model' section is expanded, showing multiple port icons. On the right, an 'Alarm Window - Alarm Table (1), Correlated Alarms Not Shown' window is open. The window has tabs for 'Alarm Tools' and 'Alarm Statistics'. The 'Alarm Statistics' tab is selected, showing a table with the following data:

Last Time Detected	Site Name	Object Type	Object Name	Alarm Name	Probable Cause	Severity	OLC State
2014/02/20 18:20:45.5...	137	Interface	ll138	ObjectInterfaceDown	ObjectInterfaceDown	warning	In Service
2014/02/20 18:20:45.5...	137	Interface	fc-140	ObjectInterfaceDown	ObjectInterfaceDown	warning	In Service
2014/02/20 18:20:45.5...	137	Interface	ll139	ObjectInterfaceDown	ObjectInterfaceDown	critical	In Service
2014/02/20 14:32:41.4...	node5	Software License Ma...	node5	SoftwareLicenseFailed	fileTransferFailure	major	In Service
2014/02/20 11:50:17.6...	node5	Flash Memory	flashMemory-2/0	DiskCapacityProblem	DiskCapacityProblem	major	In Service
2014/02/20 11:20:38.0...	node5	Fibre	1370	LinkDown	LinkDown	critical	In Service
2014/02/20 11:20:39.0...	node5	Site Sync	sync	AllTimingPerformanceL...	allTimingPerformanceL...	major	In Service
2014/02/20 11:20:39.0...	node5	Site Sync	sync	bitSynchronizationL...	bitSynchronizationL...	major	In Service

Colors correspond to alarm severity as defined by the ITU-T X.733 standard

Severity alarm color code consistently throughout the GUI

The 5620 SAM GUI uses color to indicate alarm severity. The color code is used consistently throughout the GUI, for example, in the navigation tree, dynamic alarm list, and topology maps.

The table above depicts the default 5620 SAM alarm color.

2.2.1 Severity Color Code

Default color	Alarm Severity
Red	Critical – Service-affecting fault / Requires immediate attention
Orange	Major - Possibly service affecting / Requires attention ASAP
Yellow	Minor - Non service affecting / Requires attention when possible
Cyan	Warning – Could potentially affect service / Requires investigation
Mocha	Condition
Green	Cleared – Alarm no longer current regardless of the previous state
White	Indeterminate – 5620 SAM is determining the severity level
Light blue	Info - Information only / Does not signify a fault condition

The table on the slide depicts the default 5620 SAM alarm color, the alarm severity description and the recommended corrective actions for each severity level.

2.2.1 Severity Color Code [cont.]

The table below describes the alarm severity description and the recommended corrective actions for each severity level:

Alarm Severity	Description
Critical	A severe service-affecting fault has occurred, and corrective action should be taken immediately. For example, the failure of a managed object may result in a significant disruption or complete loss of service due to a device failure.
Major	The event or condition reported is causing a degradation of service and corrective action should be taken as soon as possible. For example, a major alarm may be raised if the capacity of a managed object is affected, which may result in degradation or interruption of service.
Minor	The event or condition reported is caused by a fault, which is not currently affecting essential network operation. The problem should be investigated to determine whether corrective action is required to prevent a more serious service-affecting condition.
Warning	The reporting device detected a condition that could potentially impede service, even though no significant service disruption has occurred. The problem should be investigated to determine whether further action is required before the condition escalates.
Condition	-
Cleared	The alarm, regardless of the previous state, is cleared and is no longer current. Typically, a cleared alarm is removed from the list of active alarms to the history log.
Indeterminate	5620 SAM is using internal rules to determine the severity level of the alarm. For example, when a disk full alarm is raised, the alarm is indeterminate while the 5620 SAM determines whether the alarm should be minor, major, or critical, depending on the remaining disk capacity. When an alarm has its severity changed to indeterminate based on existing rules, the 5620 SAM reverts the alarm severity back to its initial rule.
Info	The alarm reports information only and does not signify a fault condition.

Knowledge Verification - Alarm Severity



Which of the following statements is false about alarm severity on the 5620 SAM?

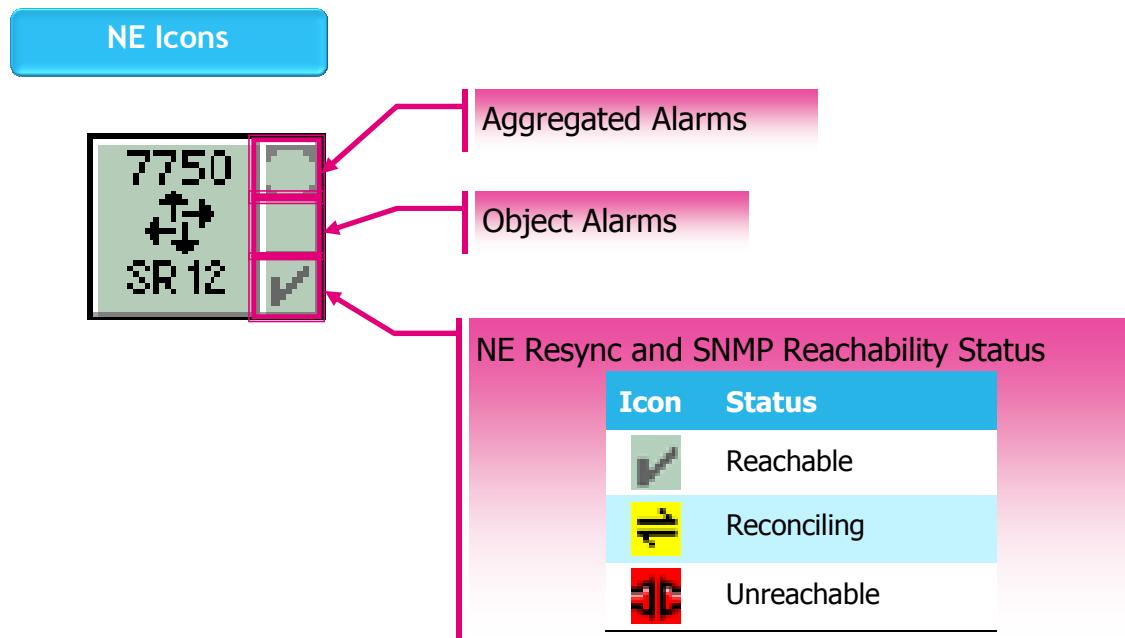
- a. 5620 SAM uses internal rules to determine the severity level of an alarm.
- b. Colors correspond to alarm severity as defined by the ITU-T X.733 standard.
- c. Alarm severity color code is used in the navigation tree, dynamic alarm list, and topology maps.
- d. Color used to represent a Major alarm severity may change on different SAM GUI components.

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Choose the correct answer for the knowledge verification question above.

3 Alarm Status Display

3.1 Topology Maps



The 5620 SAM topology maps display the alarm and status information on the topology-map icons.

NE Icons

Each NE managed by the 5620 SAM has a unique icon. The image above shows the alarm and status information on NE icons. There are three (3) alarm and status boxes along the side of each icon (from top to bottom):

- **Aggregated alarms** status. Alarm severity indicated by the color and the letter for the highest severity alarm being declared for that equipment.
- **Object alarms** status. Alarm severity indicated by the color and the letter for the highest severity alarm being declared for an object on the NE.
- **NE resync and SNMP reachability status**. Indicate the resync status of the node which is related to the SNMP connectivity between the node and the 5620 SAM. The color and icon itself is directly related to Connectivity status (see table above for the icons):
 - **Reachable** - SNMP connectivity between the node and the 5620 SAM is good.
 - **Reconciling** - Database transfer in progress.
 - **Unreachable** - SNMP connectivity between the node and the 5620 SAM is down. This may be an indication of a network failure, as well as a resync failure.

3.1 Topology Maps [cont.]

Group Icons



Aggregated alarm status for nodes contained in the group

4 · 1 · 19

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5620 SAM - R12.0 Fundamentals

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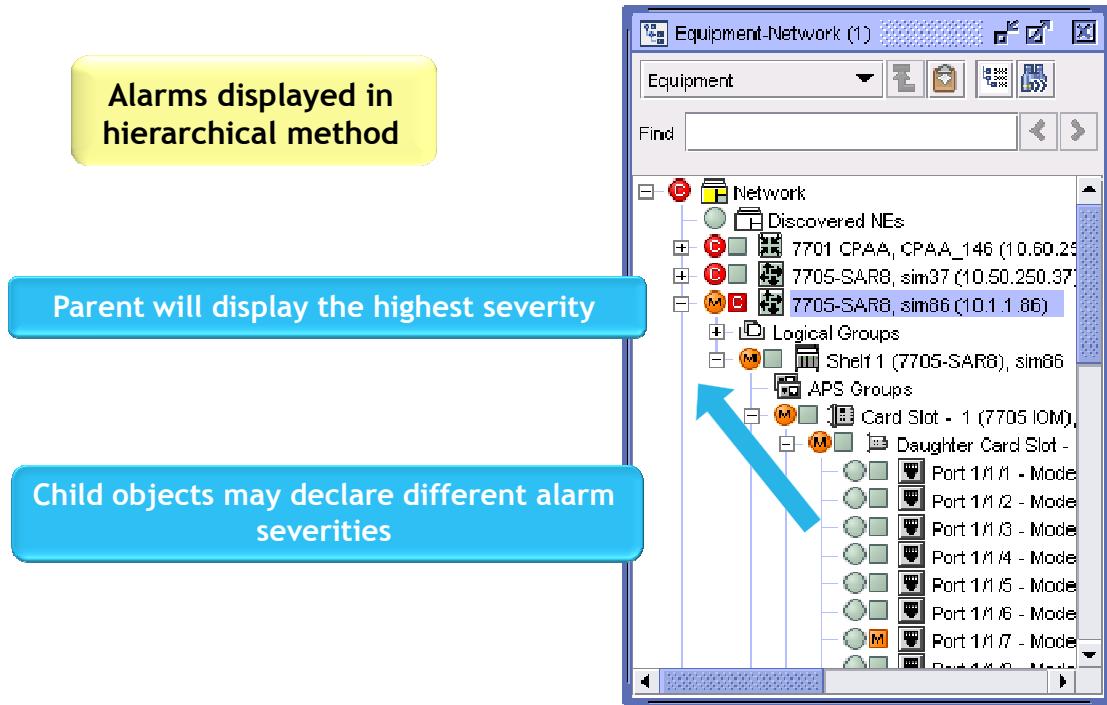
NE Group Icons

Network operators have the ability to create groups of NEs for a hierarchical organization and an easier navigation throughout the topology maps.

The NE group icon is shown on the image above. There are three (3) alarm and status boxes along the side of each icon which provide aggregated alarm status for nodes contained in that group (from top to bottom):

- **Highest severity contained alarms** - Alarms within the group are reported to the highest level of each node and aggregated within the group. The highest severity alarm will be reported, indicated by the appropriate letter/color in the upper right hand block.
- **Highest severity contained status** - Indicates the status of the SNMP connectivity to the nodes within the group. The status will be declared by color in the center block.
- **Highest severity edge status** - Represents the highest severity alarm status for the physical links within a group. This requires that the physical links between nodes be created.

3.2 Navigation Tree



The **Navigation Tree** can also be used to determine alarm status within the network. In the Navigation Tree, alarms are displayed in a hierarchical method whereby a child reports an alarm condition to its parent (the next higher level). This is repeated up the navigation tree to the next higher level until it reaches the top of the tree. Several child objects may declare different alarm severities to their parent, at which point the parent will display the highest severity and report it to the next higher level.

3.2 Navigation Tree [cont.]

Aggregated Alarms - Alarms exist in child objects

Object Alarms - specific object that has declared the alarm condition

Warning
If alarms are cleared manually the color in the navigation tree returns to green even if the operational status is still down

4 · 1 · 21

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In the **Navigation Tree** alarms are declared either as **Object** alarms or **Aggregate** alarms.

- **Object alarms** are declared in the square box that appears next to objects in the Navigation tree. This indicates the specific object that has declared the alarm condition.
- **Aggregate alarms** are declared in the circle that appears next to objects in the Navigation tree. This indicates alarms exist in child objects. Alarm severity indicated by the color and the letter for the highest severity alarm in child objects.



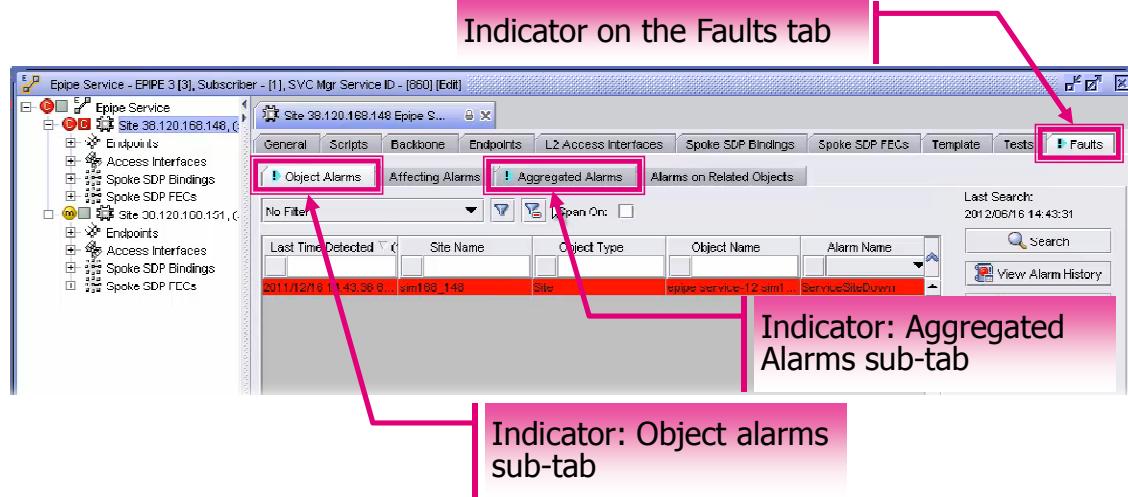
Note

*An aggregated alarm may not appear in the selected view from the navigation tree. For example, with the **Equipment** drop-down menu selected, a critical alarm aggregated against the device object may appear. However, no object below the device object has a critical alarm. That is because the critical alarm is aggregated from the network view of the router. The alarm is based on the entire object, but the equipment view shows a subset of the entire object.*

*The navigation tree is a filter for different views of information. Change the view on the drop-down menu, for example, from **Equipment** to **Routing**. The aggregated alarm on the child object may be visible from the new view.*

3.3 Faults Tab on Object Properties Form

Object Properties Form - Faults Tab



As of R10.0 R1 when one or more alarms are raised against a specific object or related object, an indicator appears on the Faults tab of the object properties form. The indicator does not represent the severity of the alarm, only that an alarm exists.

- Prior to the introduction of this feature, the user had to check on the Fault tab and sub-tabs and press search to know if there is a fault on an Object.
- Solution is based on polling info on a predetermined interval of 30 s
- To click on **Search** can speed up the process
- If we remove the alarm in the sub-tab (example Object alarms) or if the alarms are cleared, the icon on the sub-tab will be removed after the polling interval or after pressing the search button
- If all alarms are removed from all sub-tabs, the icon is also removed from the fault tab.

Knowledge Verification - Alarm Status



Which of the following main components of the 5620 SAM GUI does not display incoming alarm status from Network Elements?

- a. the dynamic alarm list
- b. the navigation tree
- c. the status bar
- d. the physical topology map

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Choose the correct answer for the knowledge verification question above.

How To Do It and Exercises



How to do it

Instructor DEMO how to:

Use the topology map to view alarm information

Use the navigation tree to view alarm information



Lab Exercises

Configure Audible Alarms

View Alarm Information - Using Topology Maps

View Alarm Information - Using Navigation Tree



Time allowed:

4 · 1 · 24

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Your instructor may perform the above mentioned demonstrations using the 5620 SAM GUI.

In addition, your instructor will point out the appropriate lab module containing the above mentioned hands-on lab exercises, and will indicate the time allowed to perform these hands-on exercises.

Questions



4 · 1 · 25

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1. Secure File Transfer Protocol (SFTP) is the protocol that Network Elements use for notifying faults or events to the 5620 SAM for alarm generation. True or False?
 - a. True
 - b. False
1. The physical topology map, and the GUI status bar display incoming alarm status from Network Elements. True or false?
 - a. True
 - b. False
2. The dynamic alarm list, and the navigation tree display incoming alarm status from Network Elements. True or false?
 - a. True
 - b. False
3. 5620 SAM uses internal rules to determine the severity level of an alarm, and the colors used in the GUI correspond to alarm severity as defined by the ITU-T X.733 standard. True or false?
 - a. True
 - b. False
4. Alarm severity color code is used in the navigation tree, dynamic alarm list, and topology maps, but the color used to represent a Major alarm severity may change on different SAM GUI components. True or false?
 - a. True
 - b. False

Answers



1. Secure File Transfer Protocol (SFTP) is the protocol that Network Elements use for notifying faults or events to the 5620 SAM for alarm generation. True or False?
 - a. True
 - b. **False ✓**
1. The physical topology map, and the GUI status bar display incoming alarm status from Network Elements. True or false?
 - a. True
 - b. **False ✓**
2. The dynamic alarm list, and the navigation tree display incoming alarm status from Network Elements. True or false?
 - a. **True ✓**
 - b. False
3. 5620 SAM uses internal rules to determine the severity level of an alarm, and the colors used in the GUI correspond to alarm severity as defined by the ITU-T X.733 standard. True or false?
 - a. **True ✓**
 - b. False
4. Alarm severity color code is used in the navigation tree, dynamic alarm list, and topology maps, but the color used to represent a Major alarm severity may change on different SAM GUI components. True or false?
 - a. True
 - b. **False ✓**



This module covered:

- The 5620 SAM fault management capabilities using alarm functionalities
- GUI elements that indicate alarm status and severity
- Color code used to represent alarm severity in the GUI
- The indicators for alarm status on topology map icons and faults tab on an object's properties form



End of module
Alarm Status and Severity

4 · 1 · 28

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Section 4
Fault Management

Module 2
Dynamic Alarm List

TOS36033_V4.0-SG-R12.0-Ed1 Module 4.2 Edition 1

5620 SAM
R12.0 Fundamentals
TOS36033_V4.0-SG Edition 1

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3.0	2013-06-20	GARCIA LOZANO, René	TOS36033_V3.0 – SAM 11.0 (update)



Upon completion of this module, you should be able to:

- Identify the function and characteristics of the Dynamic Alarm List window
- List the Dynamic Alarm List elements and the function of each element
- Identify the filtering options available for the alarm table
- Identify the alarm statistics and monitored flag functions available on the list
- Identify the alarm management options available when selecting one or multiple alarms from the dynamic alarm list

4 · 2 · 3

Fault Management · Dynamic Alarm List
5620 SAM · R12.0 Fundamentals

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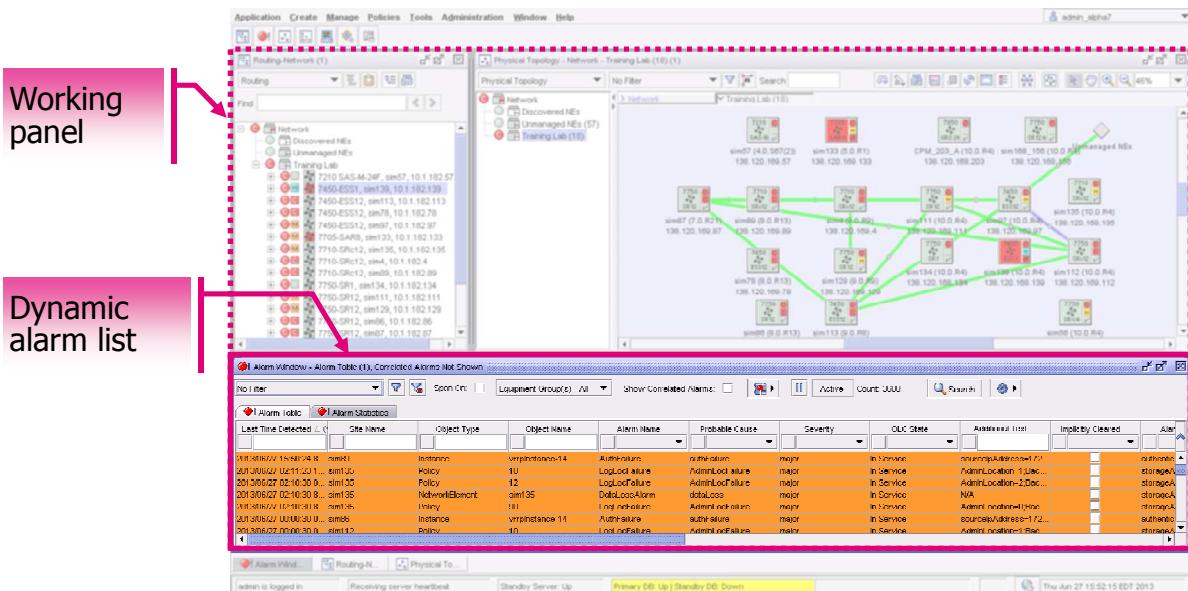


	Page
1 Dynamic Alarm List	7
1.1 Dynamic Alarm List in Alarm Window	8
1.2 Dynamic Alarm List Components	10
1.2.1 Monitoring Alarm Flags	11
1.2.2 Alarm Window – Network Alarm Statistics	12
1.3 Alarm Window – Dynamic Alarm List Filter Management	13
1.4 Alarm Management	14
Knowledge Verification - Dynamic Alarm List	15
Questions	16
Answers	17
Module Summary	18

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1 Dynamic Alarm List

1.1 Dynamic Alarm List in Alarm Window



Changes to the dynamic alarm window position, size and state can be saved

4 · 2 · 8
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The Alarm window containing the dynamic alarm list is one of the three windows displayed by default on the 5620 SAM GUI's working panel, the other two default windows are the navigation tree and the physical topology map.

On the GUI's working panel by default the dynamic alarm list window appears at the bottom.

The 5620 SAM allows operators to save changes made to the position, size, and state preference of default windows, including the dynamic alarm list window. Use the Workspace window layout function to save changes made to the navigation tree, the topology window, the Alarm Window, and the main menu toolbar..

1.1 Dynamic Alarm List in Alarm Window [cont.]

Monitor incoming faults

Keep track of outstanding and session alarms

Last Time Detected	Site Name	Object Type	Object Name	Alarm Name	Probable Cause	Severity	OLC State
2012/04/05 13:12:00 9...	sim100	Peer	peer-00.120.105.109	PeerConnectionDown	connectionDown	critical	In Service
2012/04/05 13:11:16 9...	sim100	Peer	peer-38.121.185.105	PeerConnectionDown	connectionDown	critical	In Service
2012/04/05 14:43:49 3...	CPAA_195	PhysicalPort	Port1/0/1	EquipmentDown	inoperableEquipment	major	In Service
2012/04/05 08:05:27 0...	sim106	NetworkElement	sim'06	BootableConfigBackup...	fileTransferFailure	major	In Service

Access alarm history

Outstanding alarms are listed as soon as the GUI session starts

The Alarm Window contains information relating to outstanding alarms in the network which is displayed under the **Alarm Table** and **Alarm Statistics** tabs.

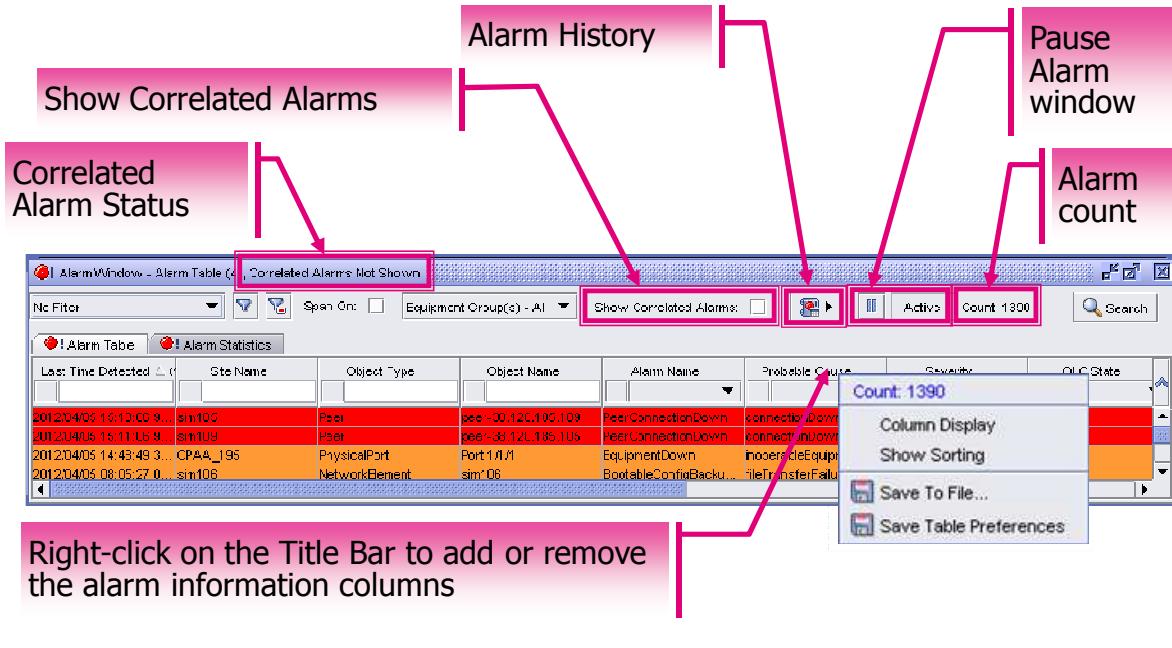
In the alarm window, the **Alarm Table** tab is opened by default displaying the dynamic alarm list.

The **Dynamic Alarm List** allows network operators to monitor incoming faults from the NEs and 5620 SAM software. The dynamic alarm list provides a mechanism to keep track of outstanding alarms as well as session alarms; that is, alarms that occur from the time that they have logged into the 5620 SAM.

Outstanding alarms are listed as soon as the network operator starts a session.

Unlike other SAM list forms, the Dynamic Alarm List is dynamically updated to display alarms raised against managed objects.

1.2 Dynamic Alarm List Components



Column display and sorting changes saved on per-user, per-workstation basis

The figure above shows some of the elements that make the Dynamic Alarm List different to any other SAM list form:

- **Correlated Alarm Status** displayed on the window title bar
- **Show Correlated alarms** specifies whether correlated alarms are displayed in the alarm window
- **Alarm History** icon allows displaying a snapshot of current and historical alarms for the selected alarm or alarms.
- **Pause Alarm Window** icon allows to pause the dynamic alarm list to prevent the list from scrolling automatically. When paused the icon box changes to red and the text changes to **Paused**.
- **Alarm Count** displays the total count of alarms currently displayed in the list.

The alarm information presented is configurable by right-clicking on the **Alarm Table Title Bar** (as shown above) and selecting, or deselecting the appropriate box next to the information item. These changes will revert to the default settings unless the network operator commits them to the database. To save modifications, select **Save Table Preferences** from the drop down menu. Note that these changes are saved on a per-user, per-workstation basis.

1.2.1 Monitoring Alarm Flags

Monitoring Flag panel

Number of alarms detected since the flag was reset

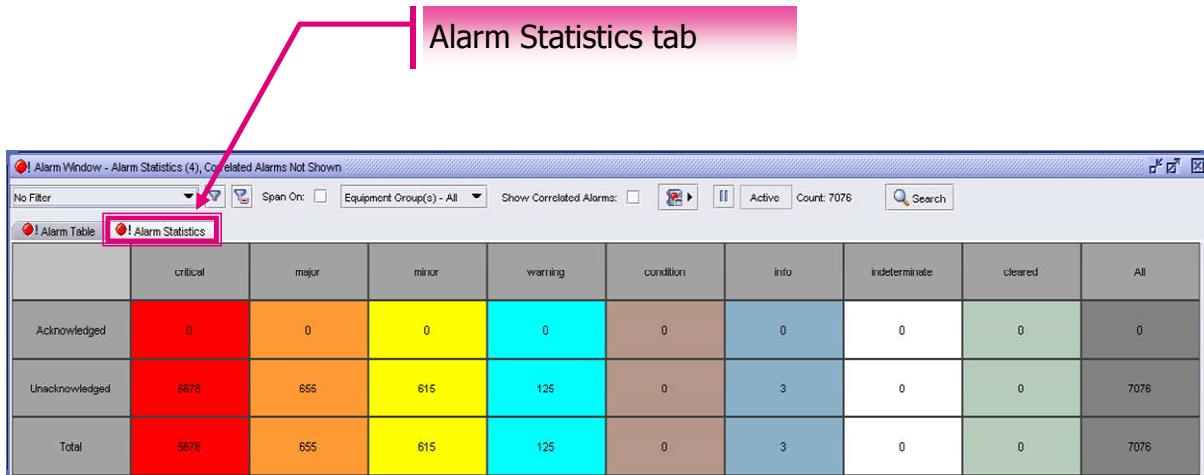
Alarm flags are color-coded by severity

Displays the time the last alarm for that severity was detected

Panel shown or hide using the User Preferences form

The Monitoring Flag panel under the Alarm Table tab indicates the number of alarms, color-coded by severity, that have been detected since the flag was reset. The time the last alarm for that severity was detected is also displayed. You can show or hide alarm flags the Monitoring Flag panel using the User Preferences form

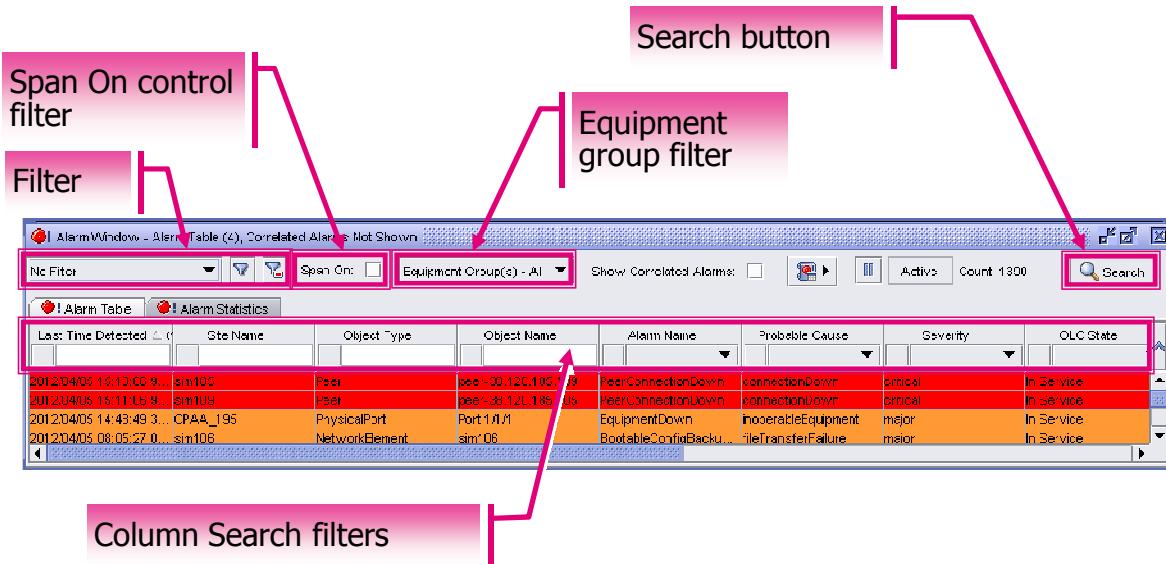
1.2.2 Alarm Window – Network Alarm Statistics



Number of network alarms sorted in columns by acknowledged/unacknowledged status and alarm severity

The Alarm Statistics table lists the number of network alarms sorted in columns by acknowledged and unacknowledged status, and then by the number of critical, major, minor, warning, condition, info, indeterminate, and cleared alarms.

1.3 Alarm Window – Dynamic Alarm List Filter Management



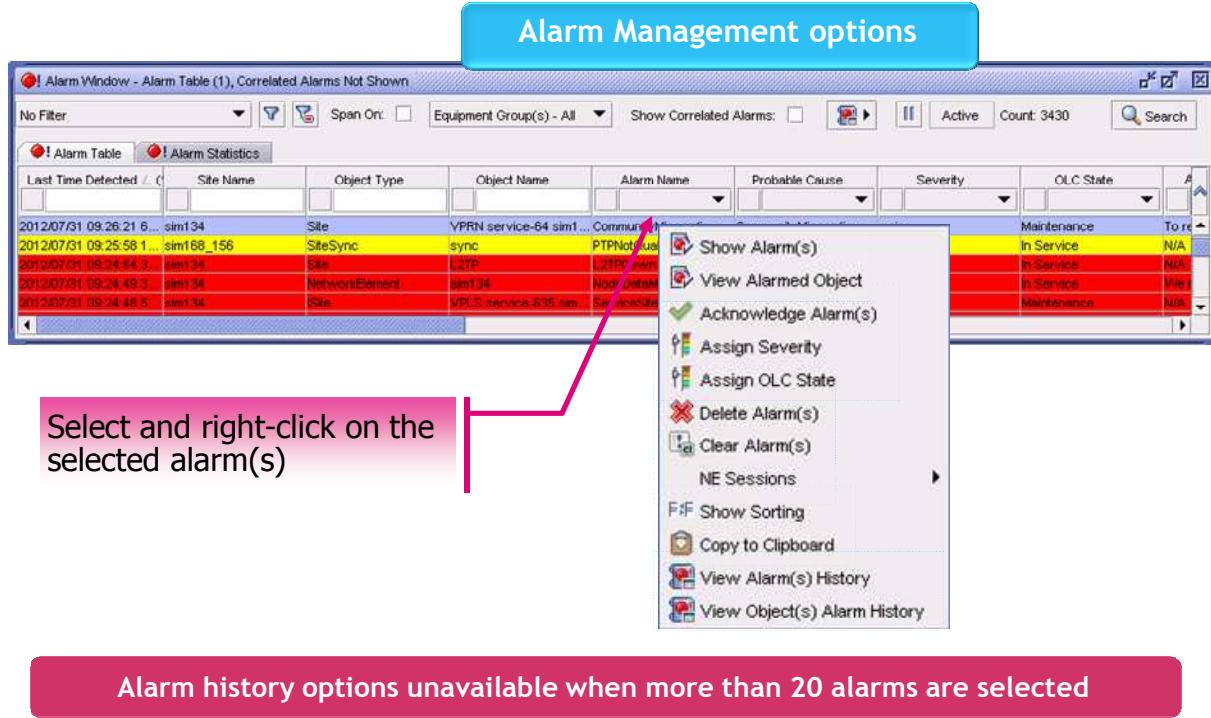
Similar to other SAM list forms, the Dynamic Alarm List allows operators to create, save and select saved filters to view specific network alarms in the list.

An operator can save multiple filters and view the alarm information by opening up to 6 alarm windows. The name of the filter appears in the alarm window title of each alarm window that is open.

The Dynamic Alarm list also allows operators to filter the listed alarms using:

- **Span On control filter** limits the objects that the list form displays based on the user span of control. When the parameter is enabled, the displayed objects are limited to the Edit Access span objects. The parameter setting overrides, on the current form only, the global span of control filter setting on the User Preferences form.
- **Equipment group filter** limits the listed to those declared against equipment that is organized within a topology group. The equipment group filter is created by choosing existing topology groups. Equipment Group filters can be saved, modified, or deleted.

1.4 Alarm Management



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Right-click on one or more alarms in the list. A contextual menu opens with the following alarm management options:

- **Show Alarm(s)** to view the Alarm Info form for each selected alarm (see next page)
- **Show Affected Object** to display the configuration or **property form** for the object or objects against which the alarm or alarms is raised
- **Acknowledge Alarm(s)** to open the alarm acknowledgement form for the alarm or alarms. Enter acknowledgement text, if required, and click on the OK button. Confirm the action. The acknowledgement information is added to the alarm info form, and any acknowledgement text is added to the Notes tab. The Acknowledged By column in the Alarm table indicates the user who acknowledges the alarm.
- **Assign Severity** to change the severity policy of the alarm using the Assigned severity parameter. Click on the OK button. Confirm the action
- **Assign the OLC State** to the alarm : described later in this module
- **Delete Alarm(s)** to delete an alarm or alarms. Confirm the action to delete the alarm or alarms. The alarm or alarms are deleted and added to the alarm history database log as an alarm history record, if configured.
- **Clear Alarm(s)** to clear the alarm or alarms. Confirm the action to clear the alarm or alarms. The alarm or alarms are cleared and added to the alarm history database log as an alarm history record, if configured.
- **Show Sorting** to determine the sort order of how alarm information is displayed:
 - Use the left, right, up, and down arrows to resequence the alarm fields as required.
 - Click on the Sort Ascending and Sort Descending buttons to specify the order of displayed alarms.
 - Click on the Close button to return to the dynamic alarm list.
- **Copy to Clipboard** to copy the alarm information to the clipboard buffer.
- **View Alarm(s) History**
- **View Object(s) Alarm History**

Knowledge Verification - Alarm Generation



Which of the following statements is false about the dynamic alarm list?

- a. It displays a list of outstanding alarms as soon as the network operator starts a session.
- b. Similar to any other SAM list form, the contents of the dynamic alarm list are only updated when clicking on the Search button.
- c. The alarm information columns that are displayed on the list are configurable by right-clicking on the Alarm Table Title Bar.
- d. A filter may be applied to display alarm information only for a selected number of managed objects.

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Choose the correct answer for the knowledge verification question above.

Questions



4 · 2 · 16
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1. The dynamic alarm list displays a list of outstanding alarms as soon as the network operator starts a session, but similar to any other SAM list form, the contents of the dynamic alarm list need to be updated by clicking on the Search button. True or false?
 - a. True
 - b. False
2. In the dynamic alarm list the alarm information columns that are displayed on the list are configurable by right-clicking on the Alarm Table Title Bar, and a filter may be applied to display alarm information only for a selected number of managed objects. True or false?
 - a. True
 - b. False
3. The Monitoring Flag panel under the Alarm Table tab indicates the number of alarms that have been detected since the flag was reset, color-coded by severity, and It displays the time the last alarm for that severity was detected. True or false?
 - a. True
 - b. False
4. The Monitoring Flag panel under the Alarm Table tab is sorted in columns by acknowledged and unacknowledged status, and it displays the time the first an alarm for that severity has been detected since the flag was reset. True or false?
 - a. True
 - b. False

Answers



1. The dynamic alarm list displays a list of outstanding alarms as soon as the network operator starts a session, but similar to any other SAM list form, the contents of the dynamic alarm list need to be updated by clicking on the Search button. True or false?
 - a. True
 - b. False ✓
2. In the dynamic alarm list the alarm information columns that are displayed on the list are configurable by right-clicking on the Alarm Table Title Bar, and a filter may be applied to display alarm information only for a selected number of managed objects. True or false?
 - a. True ✓
 - b. False
3. The Monitoring Flag panel under the Alarm Table tab indicates the number of alarms that have been detected since the flag was reset, color-coded by severity, and It displays the time the last alarm for that severity was detected. True or false?
 - a. True ✓
 - b. False
4. The Monitoring Flag panel under the Alarm Table tab is sorted in columns by acknowledged and unacknowledged status, and it displays the time the first an alarm for that severity has been detected since the flag was reset. True or false?
 - a. True
 - b. False ✓



This module covered:

- The function and characteristics of the Dynamic Alarm List window
- Dynamic Alarm List elements and the function of each element
- Filtering options available for the alarm table
- Alarm statistics and monitored flag functions available on the list
- The alarm management options available when selecting one or multiple alarms from the dynamic alarm list



End of module
Dynamic Alarm List

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4 · 2 · 19
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5620 SAM · R12.0 Fundamentals

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Section 4
Fault Management

Module 3
Alarm Information Form

TOS36033_V4.0-SG-R12.0-Ed1 Module 4.3 Edition 2

5620 SAM
R12.0 Fundamentals
TOS36033_V4.0-SG Edition 1

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Upon completion of this module, you should be able to:

- Identify the alarm information details available on an Alarm Info form
- Identify the location of records about the current and previous alarm severity for an alarm available on the form
- View alarm statistics, and alarm acknowledgement options for an alarm
- View details about the raising and clearing conditions, and remedial actions for an alarm
- Identify the technical reference documentation available for finding alarm information and for using alarm information to troubleshoot the managed network
- Identify the use and capabilities of the additional text parameter for the alarm information

4 · 3 · 3

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5620 SAM · R12.0 Fundamentals

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	Page
1 Alarm Information	7
1.1 Alarm Info Form	8
1.2 Opening an Alarm Info Form	9
1.3 Alarm Info Form Tabs	10
1.3.1 Alarm Info Tab	11
1.3.2 Alarm Severity Tab	12
1.3.3 Alarm Statistics Tab	13
1.3.4 Alarm Acknowledgement Tab	14
1.3.5 Alarm Details Tab	15
2 Technical Reference	16
2.1 Alarm Information on 5620 SAM Documentation	17
2.2 Alarm Entry on 5620 SAM Alarm Reference	18
How To Do It and Exercises	19
Questions	20
Answers	21

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1 Alarm Information

1.1 Alarm Info Form

Presents the information related to an alarm received from an NE

Detailed alarm information can help determining the probable cause or root cause of a problem

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The **Alarm Info** form is the mechanism 5620 SAM uses to present all the detailed information related to an alarm received from a network component. A network operator can use this detailed information about the alarm to determine the probable cause or root cause of the problem.

1.2 Opening an Alarm Info Form

The screenshot shows two windows side-by-side. The top window is titled 'Dynamic Alarm List' and displays a table of alarms. A yellow callout box with the text 'Double-click' points to the table. The bottom window is titled 'Object Properties Form - Faults Tab' and shows a tree view of network objects on the left and a list of alarms on the right. A yellow callout box with the text 'or select and right-click on the selected alarm(s)' points to the alarm list. Both windows have a standard Windows-style interface with toolbars and status bars.

Dynamic Alarm List

Object Properties Form - Faults Tab

Double-click

or select and right-click on the selected alarm(s)

An Alarm info form can be opened by double clicking on an entry in the Dynamic Alarm List, in the Faults tab of an object properties form, or in the Current and Historical Alarm Snapshot list.

1.3 Alarm Info Form Tabs

Alarm tab
Contains 5 tabs with alarm detailed information:

- Info**
- Severity**
- Statistics**
- Acknowledgement**
- Details**

Affected Objects tab

Affecting Objects tab

Correlated Alarms tab

The following information is displayed on an **Alarm Info** form.

- **Alarm tab:** contains alarm information that includes the object, severity, statistics, and acknowledgement status. The Alarm tab contains 5 tabs:
 - Info
 - Severity
 - Statistics
 - Acknowledgment
 - Details
- **Affected Objects tab:** contains a list of objects that are affected by the alarm. All alarms list the affected objects, even when correlation alarm suppression is enabled.
- **Affecting Objects tab:** contains a list of objects that directly affect the object in alarm.
- **Correlated Alarms tab:** contains a list of correlated alarms. Correlated alarms are raised against other objects that are dependent on the alarmed object.

1.3.1 Alarm Info Tab

4 · 3 · 11

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The Alarm Info tab contains the following details about the alarm:

- Domain, Site ID and name
- Alarmed Object type, name and ID
- Alarm name, type and related policy
- Severity
- OLC State
- Probable cause
- Acknowledge status
- Cleared status
- First and last time detected
- Number of correlated alarms and correlated alarm ID
- Additional text

The Alarm Info tab also contains buttons to:

- Copy alarm information to the SAM clipboard
- View the alarm object properties form
- View the related alarm policy
- View alarm history
- Acknowledge, clear or delete the alarm

1.3.2 Alarm Severity Tab

Severity

Current, previous, original and highest severity

(Client time) Last time records

(NE time) Last time records

The screenshot shows the 'Severity' tab of the Alcatel-Lucent Fault Management - Alarm Information Form. The tab displays the following information:

- Current Severity: major
- Previous Severity: indeterminate
- Original Severity: major
- Highest Severity: major

Below this, there are sections for 'Last Time Records' under both 'Client Time' and 'NE Time', each listing six fields: Last Time Severity Changed, Last Time Cleared, Last Time Promoted, Last Time Demoted, Last Time Escalated, and Last Time De-escalated, all of which are marked as 'N/A'.

At the bottom of the tab, there are several buttons: Delete, Clear, Acknowledge, View Policy, View Alarm History, and Cancel.

4 · 3 · 12

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The Alarm Severity tab contains the following details about the alarm:

- Current Severity
- Previous Severity
- Original Severity
- Highest Severity
- (Client time) and (NE Time) Last Time Records:
 - Severity Changed
 - Cleared
 - Promoted
 - Demoted
 - Escalated
 - De-escalated

1.3.3 Alarm Statistics Tab

Statistics

Frequency

Number of occurrences

Number of occurrences since acknowledged

Number of occurrences since cleared

Frequency: 0

Number Of Occurrences: 4

Number Of Occurrences Since Clear: 4

Number Of Occurrences Since Acknowledged: 0

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The Alarm Statistics tab contains the following details about the alarm:

- Frequency - Number of instances of the alarm occurred during the configured interval value in the specific alarm policy for the type of alarm that is being viewed.
- Number of occurrences - This number is increased as each new instance of the alarm is raised
- Number of occurrences since acknowledged - This number is increased as each new instance of the alarm is raised since the last time this type of alarm was acknowledged
- Number of occurrences since cleared - This number is increased as each new instance of the alarm is raised since the last time this type of alarm was cleared.

1.3.4 Alarm Acknowledgement Tab

Acknowledgement

Acknowledgement Info

Urgency

Acknowledgement Notes

4 · 3 · 14

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The Alarm Acknowledgement tab contains the following details about the alarm:

- Acknowledgement Info
 - Acknowledged by
 - Last Time Acknowledged
 - Previously Acknowledged
- Urgency
- Acknowledgement Notes

1.3.5 Alarm Details Tab

4 · 3 · 15

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The Alarm Details tab contains the following details about the alarm:

- Alarm description
- Raising condition
- Clearing condition
- Remedial action

2 Technical Reference

2.1 Alarm Information on 5620 SAM Documentation



Technical Reference

See the **5620 SAM Alarm Reference** for a list of all alarms that the 5620 SAM can raise. The reference is organized by network element type.

See the **5620 SAM Troubleshooting Guide** for information about using alarm information to troubleshoot the managed network.

4 · 3 · 17

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The **5620 SAM Alarm Reference** lists and describes each alarm that the 5620 SAM can raise. The alarms are organized in chapters by device type. An alarm that applies to multiple devices has multiple entries in this guide; each entry for such an alarm varies only by the applicable major NE release information, which depends on the device type.



Note

5620 SAM Alarm Reference, Chapter 33 - Unspecified Alarm. This chapter lists alarms that have no NE type specified. The alarms listed in this chapter may apply to one or more NE types, however, this information is not specified in the 5620 SAM alarm schema. Associating alarms with specific NE types is an ongoing Alcatel-Lucent effort.

See the **5620 SAM Troubleshooting Guide** for information about using alarm information to troubleshoot the managed network. This guide includes task-based procedures and user documentation to help resolve issues in the managed and management networks and to identify the root cause and plan corrective action for alarm conditions on a network object or customer service.

2.2 Alarm Entry on 5620 SAM Alarm Reference

Alarm Reference entry example

Table 15-153 GroupInterfaceDown		
Alarm Name and Type	Attributes	Applicable major NE releases
Package: Maps to a package in 5620 SAM-O XML Reference	Alarm Name: GroupInterfaceDown (441) Type: GroupInterfaceAlarm (44) Package: service Raised on class: service.GroupInterface	Attributes Severity: critical Implicitly cleared: true Default probable cause: interfaceDown (32)
Alarm Description	Description: The alarm is raised when the 5620 SAM detects that a group interface is operationally down. The alarm clears when the group interface is operationally up.	
Raising condition: ('operationalState' NOT EQUAL 'Up')		Logical statement that describes the Internal SAM parameter values that initiate the raising of the alarm
Clearing condition: ('operationalState' EQUAL 'Up')		Logical statement that describes the Internal SAM parameter values that initiate the clearing of the alarm
Remedial action: Check the configuration and the underlying physical interface.		Recommendation to clear the alarm

The figure above displays an Alarm Reference entry example. Each alarm entry in this guide contains the following information:

- Name – the alarm name, and the alarm name ID in parentheses
- Type – the alarm type, and the type ID in parentheses
- Package – the containing package of the alarm, which maps to a package in the 5620 SAM-O XML Reference
- Raised on class – the package and object class in package.class format
- Severity – the alarm default severity level
- Implicitly cleared – whether the alarm automatically clears when the clearing alarm condition is true
- Default probable cause – the typical probable cause of the alarm, and the probable cause ID in parentheses
- Applicable major NE releases – the major device releases against which the alarm can be raised; the releases are applicable to the device specified in the chapter title
- Description – the alarm description
- Raising condition – a logical statement that describes the internal 5620 SAM parameter values that initiate the raising of the alarm
- Clearing condition – a logical statement that describes the internal 5620 SAM parameter values that initiate the clearing of the alarm
- Remedial action – a statement or series of steps recommended by Alcatel-Lucent as the fault clearance procedure for the alarm

3 Additional Text

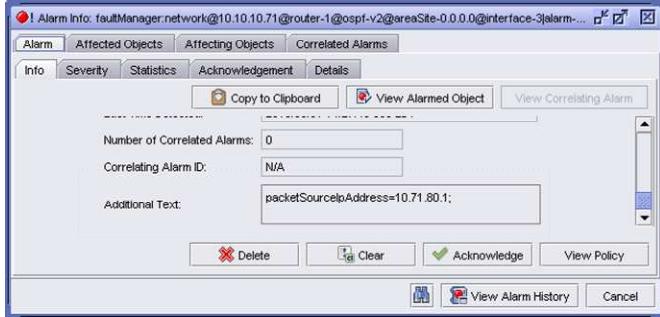
3.1 Additional Text Overview

Info - Additional Text

Additional information about the alarm

Informational details on the error condition and remedial action for the alarm

Supports configuration of additional text policies to display specific information about an alarmed object



Dynamic Alarm List

site	Additional Text	Implic
N/A	packetSourceIpAddre...	N/A
N/A	packetSourceIpAddre...	N/A
EquipmentLabel=Port ...	EquipmentLabel=Port ...	N/A
EquipmentLabel=Port ...	EquipmentLabel=Port ...	N/A
N/A	N/A	N/A

The additional text parameter displayed in the Alarm Info tab of the Alarm Info form specifies additional information about the alarm, such as troubleshooting information. The additional text field may provide more informational details on the error condition and remedial action for the alarm.

The 5620 SAM also supports the configuration of additional text policies to display specific information about an alarmed object on the Alarm Info form and in the additional text column of the dynamic alarm list.

3.2 Additional Text Policies



Additional Text Policy

Key attribute details of objects in the alarm info

Use case examples

Alarms on shelf, card or port to include NE's name

Each service component to include the composite service name and ID

Ports to include the chassis type

SAPs, sites, services to include the service description

Include information for

Itself

Children

Association

Peers



Additional Text Find icon is available on object properties forms to ease the configuration process for additional text policies for the object

4 · 3 · 21

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5620 SAM · R12.0 Fundamentals

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The configuration of additional text policies can save the operator time by having key attribute details of objects in the alarm info for each alarm. For example, use cases include:

- An operator would like to see the network element name to be included in all alarms raised on the shelf, card or ports
- If a network has composite services, an operator would like alarms raised on each service component to include the composite service name and ID.
- An operator would like alarms raised on ports to include the chassis type.
- An operator would like alarms raised on SAPs, sites, services to include the service description.

The Additional Text information on the Alarm Info form and in the additional text column of the dynamic alarm list includes information for the following objects based on configured policies:

- Itsself. The type of object from which the attribute was selected.
- Its Children. Object types that are contained by the source; for example, children for a service include the site and access interface.
- Its Association. Dynamic relationships between object types that are not related hierarchically. For example, access interfaces and ports, LAGs and ports, and composite services and their components along with various types of services. Associations are calculated based on the context of the managed network. Associations change as the network topology changes. Use the summary tool to display the current associations for an object type.
- Its Peers. A peer is an object type that is contained by the same generic abstract class as the source. For example, peers of a VPLS are VPRN, IES, VLL-EPIPE, VLL-CPIPE, and mirror services. These peers are contained by the generic "service" abstract class.

In order to ease the configuration process for additional text policies, as of SAM R11.0 the Additional Text find icon is available on object properties forms providing direct access to a list form with the attributes for which additional text policies could be configured for the object.

How To Do It and Exercises



How to do it

Instructor DEMO how to:

Open an Alarm Info form for viewing alarm details

View and alarm entry in the **5620 SAM Alarm Reference**

4 · 3 · 22

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Your instructor may perform the above mentioned demonstrations using the 5620 SAM GUI.

In addition, your instructor will point out the appropriate lab module containing the above mentioned hands-on lab exercises, and will indicate the time allowed to perform these hands-on exercises.

Questions



4 • 3 • 23

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1. The Info tab in the Alarm Info form contains details about the raising condition, clearing condition and remedial action?
 - a. True
 - b. False
2. The Info tab in the Alarm Info form contains details about the alarmed object type, name, object's ID, alarm name, type and related policy?
 - a. True
 - b. False
3. The Statistics tab in the Alarm Info form contains details about the alarm frequency, number of occurrences, number of occurrences since acknowledged, and number of occurrences since cleared?
 - a. True
 - b. False

Answers



1. The Info tab in the Alarm Info form contains details about the raising condition, clearing condition and remedial action?
 - a. True
 - b. False ✓
2. The Info tab in the Alarm Info form contains details about the alarmed object type, name, object's ID, alarm name, type and related policy?
 - a. True ✓
 - b. False
3. The Statistics tab in the Alarm Info form contains details about the alarm frequency, number of occurrences, number of occurrences since acknowledged, and number of occurrences since cleared?
 - a. True ✓
 - b. False



This module covered:

- The alarm information details available on an Alarm Info form
- Location of:
 - records about the current and previous alarm severity for an alarm available on the form
 - alarm statistics, and alarm acknowledgement options for an alarm
 - details about the raising and clearing conditions, and remedial actions for an alarm
- The technical reference documentation available for finding alarm information and for using alarm information to troubleshoot the managed network
- The use and capabilities of the additional text parameter for the alarm information

4 · 3 · 25

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End of module Alarm Information Form

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Section 4
Fault Management

Module 4
Alarm Correlation, Affecting and Aggregated Alarms

TOS36033_V4.0-SG-R12.0-Ed1 Module 4.4 Edition 1

5620 SAM
R12.0 Fundamentals
TOS36033_V4.0-SG Edition 1

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3.0	2013-06-20	GARCIA LOZANO, René	TOS36033_V3.0 – SAM 11.0 (update)



Upon completion of this module, you should be able to:

- Describe the concept of 5620 SAM alarm correlation
- Identify the 5620 SAM alarm correlation model
- Identify the definitions of aggregated alarms, affected objects and affecting objects
- Describe the concepts of implicitly cleared and correlated alarms

4 · 4 · 3

Fault Management - Alarm Correlation, Affecting and Aggregated Alarms
5620 SAM · R12.0 Fundamentals

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	Page
1 Correlated Alarms	7
1.1 Correlated Alarms Overview	8
1.2 Alarm Correlation Model	9
1.3 Alarm Correlation in 5620 SAM	10
1.4 Alarm Correlation Definitions	11
1.4.1 Affecting Alarms and Aggregated Alarms	12
1.5 Alarm Correlation Example – Access Port Fault	13
1.6 Alarm Correlation Example – Network Port Fault	14
1.7 Implicitly Cleared and Correlated Alarms	15
How To Do It and Exercises	16
Questions	17
Answers	18

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1 Correlated Alarms

1.1 Correlated Alarms Overview



Fault condition on a parent object causes an alarm condition on child objects



Correlate Alarms

Affected parent object's alarm info includes correlated alarms

When the alarm affecting parent object clears, correlated alarms also clear

SAM allows to suppress the display of correlated alarms in the Dynamic Alarm List

Correlation alarm suppression in Dynamic Alarm List is enabled by default

4 · 4 · 8

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Alarms raised against a network object are propagated to objects at higher levels in the managed object hierarchy, they are referred to as **correlated alarms**.

The 5620 SAM raises a **correlated alarm** when a fault condition on one object (parent object) causes fault conditions on another object or on many other objects (child object or objects). When alarms are correlated, the alarms will appear in multiple places.

For example, when a port goes down, an alarm is raised against the port which is in the affected object, and any service that uses the port generates an alarm.

Nearly all object's **Properties** forms contain a **Faults** tab, which lists alarms affecting the object including information for the affected object and the correlated alarms.

When the event that triggers an affected-object alarm is corrected and the alarm clears, the correlated alarms also clear. If a correlated alarm does not clear after the affected-object alarm clears, the source of the correlated alarm is an event other than the trigger event. In this case, the alarm correlation is removed and the alarm is displayed in the dynamic alarm list.

The 5620 SAM allows operators and network administrators to suppress the display of correlated alarms in the dynamic alarm list, reducing the number of listed alarms. Correlation alarm suppression is enabled by default in the dynamic alarm list.



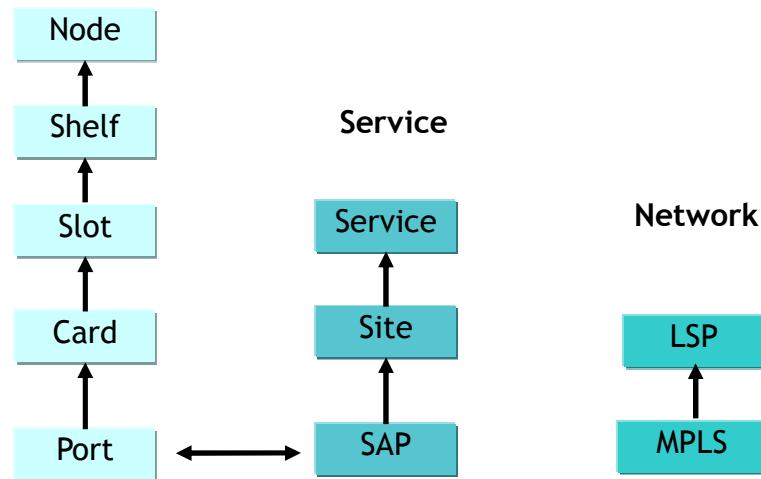
Note

Correlation alarm suppression in the dynamic alarm list does not affect the aggregated alarm status displayed in the navigation tree and topology map.

1.2 Alarm Correlation Model

Alarm correlation is done on equipment, access and network objects

Equipment



4 · 4 · 9

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The 5620 SAM performs alarm correlation on equipment, access and network objects. The diagram above illustrates the 5620 SAM correlation alarm model.



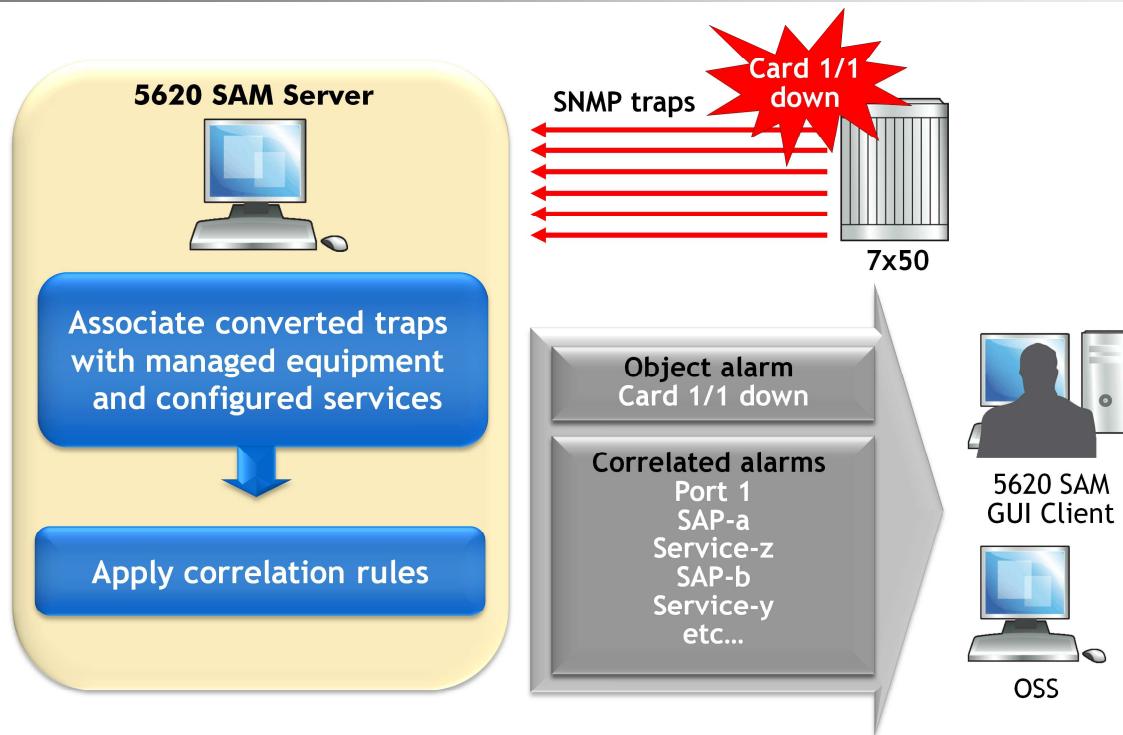
Note

Service Tunnel alarms will not be correlated under an LSP alarm because a Service Tunnel may use multiple LSPs.

The 5620 SAM provides limited service and transport alarm correlation. When an LSP goes out of service, the 5620 SAM raises an alarm against the LSP and raises a correlated alarm against each LSP path that is a child object of the LSP. The LSP alarm is listed as an aggregated alarm for each SDP that uses the LSP. A 5620 SAM operator can use the aggregated LSP alarm for SDP troubleshooting.

Because there is not necessarily a direct relationship between an LSP and the SDPs that use it, for example, when LDP over RSVP is the transport mechanism, the 5620 SAM does not correlate SDP alarms with LSP alarms.

1.3 Alarm Correlation in 5620 SAM



4 · 4 · 10

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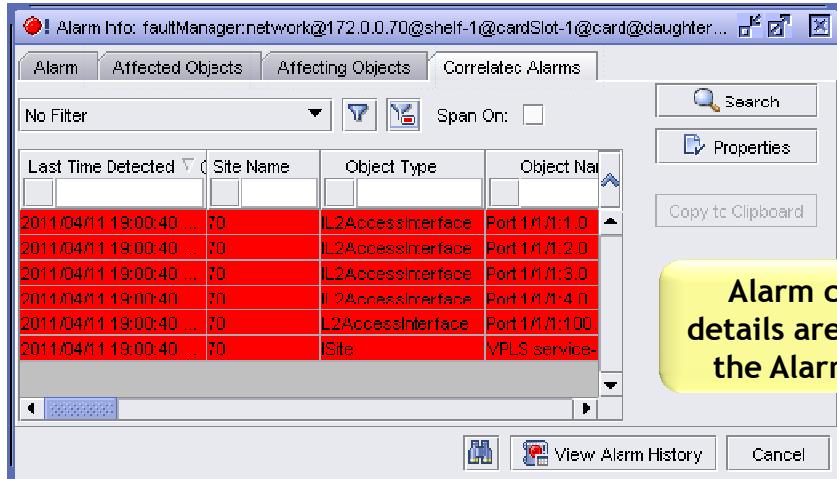
Alarm correlation is based on correlation rules that are built into SAM for each alarm. Using the received SNMP traps, SAM identifies an object alarm as that present on the specific object that has declared the fault condition. Then SAM applies the correlation rules, each alarm knows which other alarms it correlates. Should there be alarms that correlate to the object alarm, SAM marks all these as correlated alarms.

Within SAM there is one level of correlation, all correlated alarms are below the highest level correlating alarm.

The dynamic alarm list in the 5620 SAM client GUI allows to not display correlated alarms in the list. The correlated alarms not displayed in the list are not lost, they can be seen either by drilling into the correlating alarm info from, or by selecting Show Correlated Alarms on the Dynamic Alarm List.

In the example above, MDA 1/1 reports a fault condition that it is down. This event is passed to the SAM Server which then passes it along to the Database. Through the application of the correlation rules, the 5620 SAM determines that this event results in various ports, SAPs, network interfaces, services and subscribers that have been affected. As a result, the alarm manager reports the affected MDA as an object alarm and all others as correlated alarms.

1.4 Alarm Correlation Definitions



Alarm correlation details are displayed in the Alarm Info form

Correlated Alarms list of correlated alarms

Affected Objects list of objects that are affected by the alarm

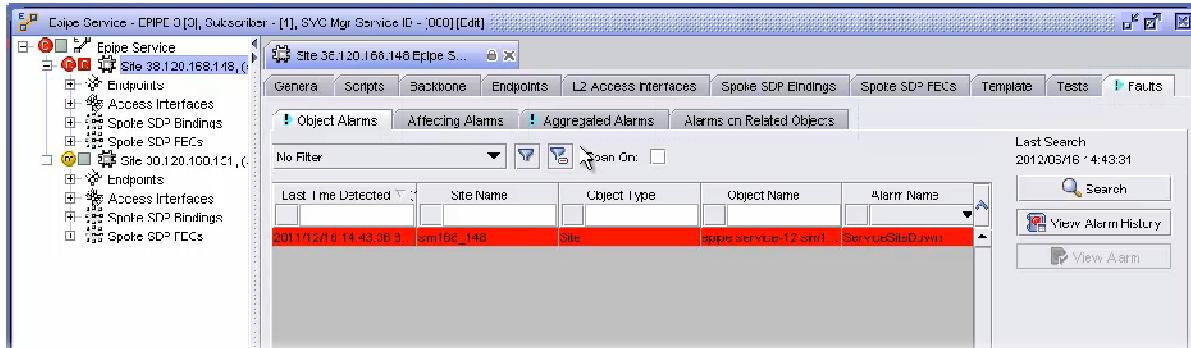
Affecting Objects list of objects that directly affect the object in alarm

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The Alarm Info form provides operators detailed information about correlated alarms. The alarm correlation information is displayed in the Alarm info form in

- **Affected Objects** tab—contains a list of objects that are affected by the alarm. All alarms list the affected objects, even when correlation alarm suppression is enabled.
- **Affecting Objects** tab—contains a list of objects that directly affect the object in alarm.
- **Correlated Alarms** tab—contains a list of correlated alarms. Correlated alarms are raised against other objects that are dependent on the alarmed object.

1.4.1 Affecting Alarms and Aggregated Alarms



Object Alarms — all alarms declared against the object

Affecting Alarms — alarms on objects directly affecting this object

Aggregated Alarms — alarms for child objects

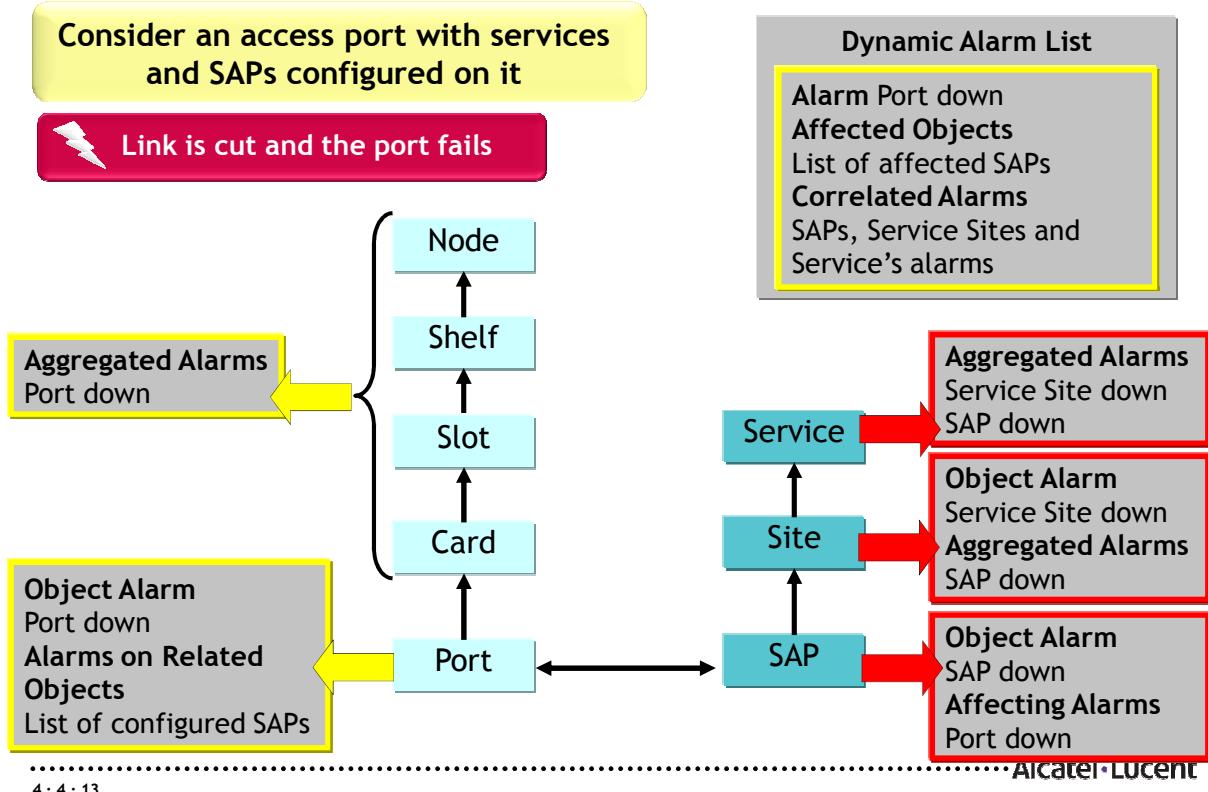
Alarms on Related Objects — alarms that have an indirect relationship

Nearly all object's Properties forms contain a Faults tab.

Within this Faults tab there are 4 tabs which are closely related to the alarm correlation principle:

- **Object Alarms** tab—contains a list of all alarms declared against the object and information about each alarm. The list arrangement in this tab is very similar to the dynamic alarm list.
- **Affecting Alarms** tab—contains information about the alarms on parent objects that are directly affecting this child object.
- **Aggregated Alarms** tab—contains alarm information for child objects below the listed object in the containment hierarchy.
- **Alarms on Related Objects** tab —contains information about the alarms that have an indirect relationship with the object.

1.5 Alarm Correlation Example – Access Port Fault



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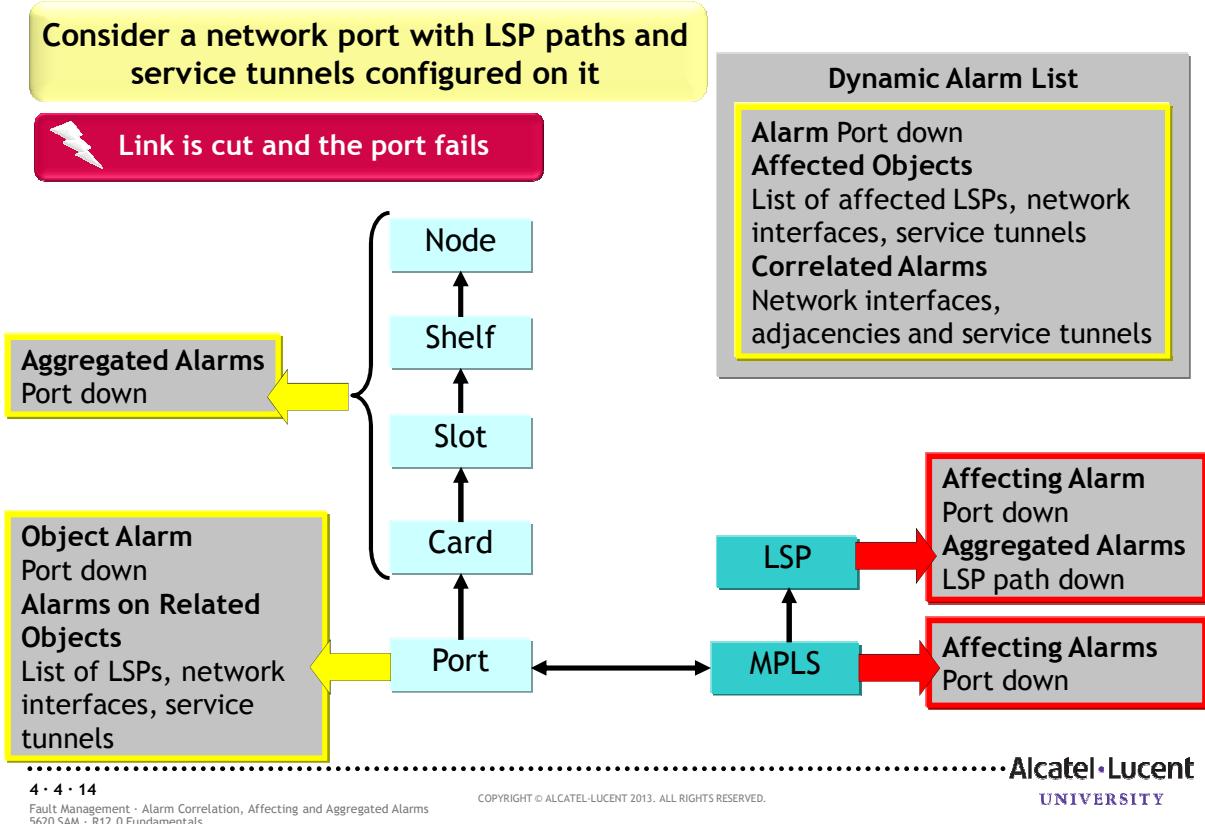
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The diagram above provides an example of alarm correlation as a result of an access port failure, considering the access port has services and SAPs configured on it.

The 5620 SAM will report the following:

- In the **Physical Port Down Alarm Info** form
 - **Affected Objects** tab displays the list of SAPs that are affected by the alarm
 - **Correlated Alarms** tab displays a list of correlated alarms for the SAPs, Sites and Services that are dependent on the access port that has failed
- In the port's **Properties** form under the **Faults** tab
 - **Object Alarm** tab displays the port down alarm
 - **Alarms on Related Objects** tab displays a list of alarms for the SAPs that are configured in the port
- In each of the **configured SAPs' Properties** form under the **Faults** tab
 - **Object Alarm** tab displays the access interface (SAP) down alarm in the list
 - **Affecting Alarms** tab displays in the list the port down alarm which is causing the access interface to be down
- In the port's parent objects (card, slot, shelf and node) **Properties** form under the **Faults** tab
 - **Aggregated Alarms** tab displays in the list the port down alarm
- In the **Service Site's** form under the **Faults** tab
 - **Object Alarms** tab displays the service site down alarm in the list
 - **Aggregated Alarms** tab displays the SAP down alarm in the list
- In the **Service** form under the **Faults** tab
 - **Aggregated Alarms** tab displays in the list the service site down alarm and the SAP down alarm

1.6 Alarm Correlation Example – Network Port Fault



The diagram above provides an example of alarm correlation as a result of a network port failure, considering the network port has LSP paths and service tunnels configured on it.

The 5620 SAM will report the following:

- In the **Physical Port Down Alarm Info** form
 - **Affected Objects** tab displays the list of LSPs, network interfaces and service tunnels that are affected by the alarm
 - **Correlated Alarms** tab displays a list of correlated alarms for the network interfaces, adjacencies and service tunnels that are dependent on the access port that has failed
- In the port's **Properties** form under the **Faults** tab
 - **Object Alarm** tab displays the port down alarm
 - **Alarms on Related Objects** tab displays a list of alarms for the LSPs, network interfaces and service tunnels that are configured in the port
- In each of the **MPLS Interface Properties** form under the **Faults** tab
 - **Affecting Alarms** tab displays in the list the port down alarm which is causing the network interface to be down
- In the port's parent objects (card, slot, shelf and node) **Properties** form under the **Fault** tab
 - **Aggregated Alarms** tab displays in the list the port down alarm
- In the **LSP** form under the **Faults** tab
 - **Aggregated Alarms** tab displays the LSP path down alarm in the list

1.7 Implicitly Cleared and Correlated Alarms

Whether the alarm is automatically cleared or not

Which alarm the current alarm is correlated under

Implicitly Cleared

Correlating Alarm ID

Number of Occurrences

Object ID

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To facilitate alarm suppression, the 5620 SAM dynamic alarm list displays the following information for an alarm:

- An “Implicitly Cleared” field indicates whether the alarm is automatically cleared or not.
- A “Correlating Alarm ID” field displays the unique string that identifies the correlating alarm object down to the lowest.
- The operator can turn suppression on or off through “User Preferences”. Suppression will be enabled by default. When it is enabled correlated alarms will not be visible.



How to do it

Instructor DEMO how to identify aggregated, affecting and correlated alarms as a result of:
an access port fault
a network port fault



Lab Exercises

Disable the Display of Correlated Alarms



Time allowed:

4 • 4 • 16

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Questions



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1. Correlated alarms are alarms raised against a network object that are propagated to objects at higher levels in the managed object hierarchy. True or false?
 - a. True
 - b. False
2. The Affected Objects tab of an Alarm Info form contains a list of objects that are affected by this alarm, and lists affected objects, even when correlation alarm suppression is enabled. True or false?
 - a. True
 - b. False
3. The Affected Objects tab of an Alarm Info form contains details about the alarm clearing conditions, and information about the alarms on objects that are directly affecting this object. True or false?
 - a. True
 - b. False

Answers



1. Correlated alarms are alarms raised against a network object that are propagated to objects at higher levels in the managed object hierarchy. True or false?
 - a. True ✓
 - b. False
2. The Affected Objects tab of an Alarm Info form contains a list of objects that are affected by this alarm, and lists affected objects, even when correlation alarm suppression is enabled. True or false?
 - a. True ✓
 - b. False
3. The Affected Objects tab of an Alarm Info form contains details about the alarm clearing conditions, and information about the alarms on objects that are directly affecting this object. True or false?
 - a. True
 - b. False ✓



This module covered:

- The concept of 5620 SAM alarm correlation
- The 5620 SAM alarm correlation model
- Definitions of aggregated alarms, affected objects and affecting objects
- The concepts of implicitly cleared and correlated alarms

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Section 4
Fault Management

Module 5
Alarm Management tools

TOS36033_V4.0-SG-R12.0-Ed1 Module 4.5 Edition 1

5620 SAM
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TOS36033_V4.0-SG Edition 1

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2.0	2013-07-02	GARCIA LOZANO, René	TOS36033_V3.0 – SAM 11.0 (update)



Upon completion of this module, you should be able to:

- Identify the alarm management tools available on the 5620 SAM
- Describe the characteristics and function of:
 - alarm deletion and purging criteria
 - alarm thresholds
 - alarm severity alterations
 - alarm acknowledgement

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	Page
1 Alarm Management Tools	7
1.1 Alarm Management Tools Overview	8
1.1.1 Global Alarm Settings	9
1.1.2 Dynamic Alarm List - Alarm Management	10
1.2 Alarm Policy – Alarm Deletion and Purging	11
1.3 Alarm Thresholds	13
1.4 Alarm Policy – Severity Alterations	15
1.5 Alarm Acknowledgment	16
Module Summary	17
Questions	18
Answers	19

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1 Alarm Management Tools

1.1 Alarm Management Tools Overview



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The 5620 SAM offers network operators and administrators multiple tools for alarm management. These alarm management tools include:

Alarm deletion and purging criteria

Alarm Thresholds

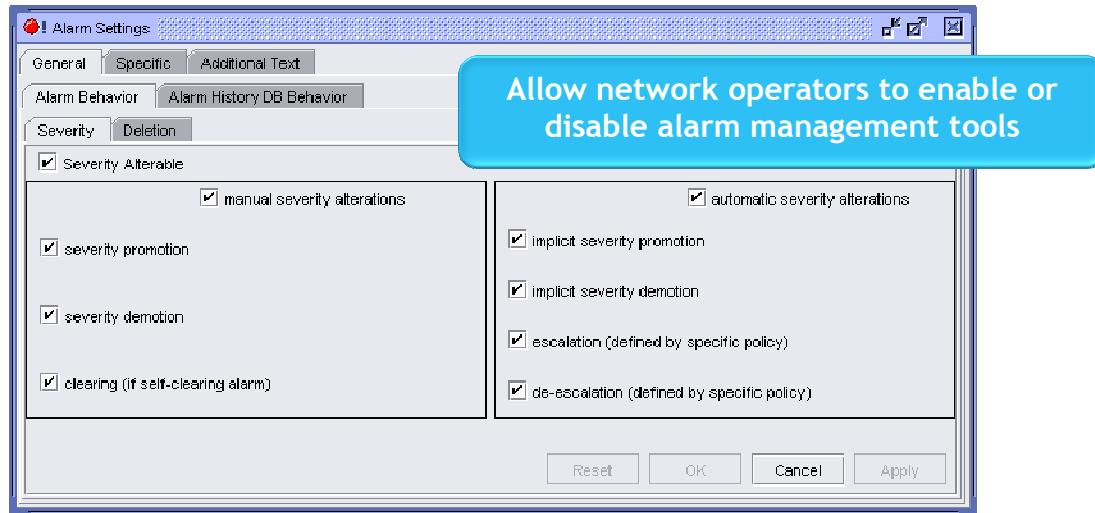
Alarm Severity Alterations

Alarm Acknowledgement

Object Life Cycle state

1.1.1 Global Alarm Settings

Select Administration → Alarm Settings from the main menu



Global alarm policies affect all network alarms

The global alarm settings allow network administrators to enable or disable the alarm management tools.

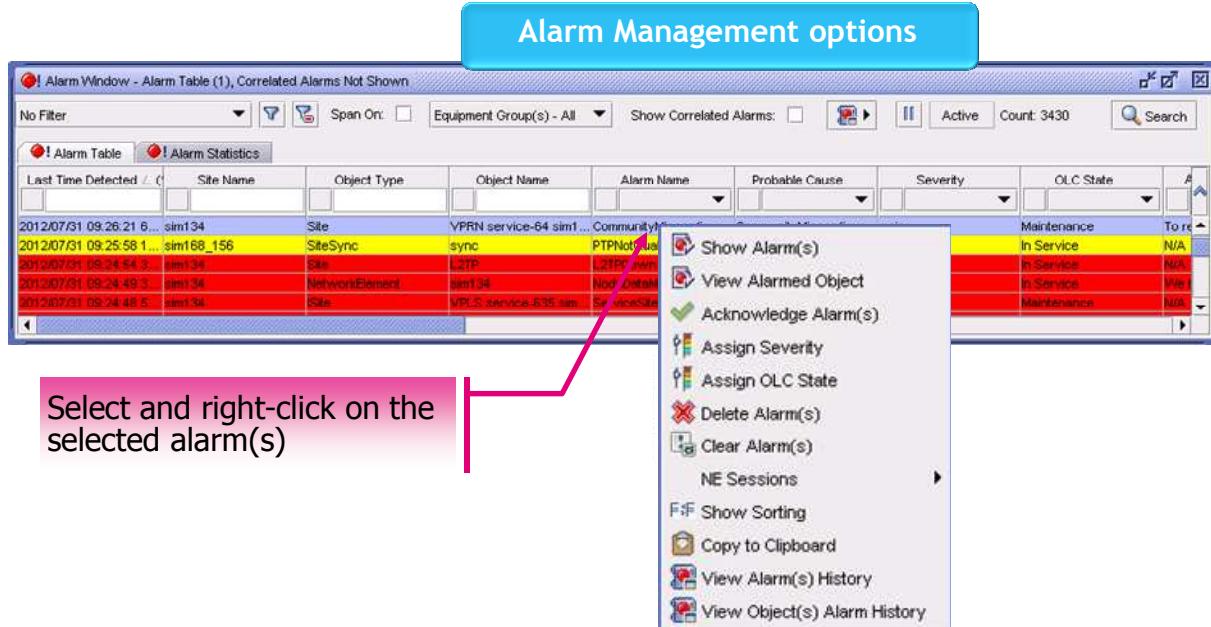
The global alarm settings are opened by selecting Administration→Alarm Settings from the 5620 SAM main menu.

The global alarm setting also allows to:

- Configure global policies for incoming alarms
- Configure specific policies for each alarm type
- Configure additional text policies
- Configure alarm history database behavior for the storage of historical alarm records

Global alarm policies affect all network alarms and can be set by users who are assigned an account with either the administrator scope of command role or a scope of command role with write access permissions to the fm.GlobalPolicy class.

1.1.2 Dynamic Alarm List - Alarm Management



Right-click on one or more alarms in the list. A contextual menu opens with the following alarm management options:

- **Show Alarm(s)** to view the Alarm Info form for each selected alarm (see next page)
- **Show Affected Object** to display the configuration or **property form** for the object or objects against which the alarm or alarms is raised
- **Acknowledge Alarm(s)** to open the alarm acknowledgement form for the alarm or alarms.
- **Assign Severity** to change the severity policy of the alarm using the Assigned severity parameter.
- **Assign the OLC State** to configure the object life cycle OLC state on the alarmed object to specify whether the object is in maintenance or in-service mode to filter alarms in the alarm window.
- **Delete Alarm(s)** to delete an alarm or alarms.
- **Clear Alarm(s)** to clear the alarm or alarms.

1.2 Alarm Policy – Alarm Deletion and Purging



Large number of outstanding alarms can affect system performance



Alarm purge algorithm criteria

Correlated alarms deleted before root alarms

Lower severity alarms deleted before higher severity alarms

Oldest alarms deleted first

Alarm policies specify how to process alarms and how to create and store the alarm logs

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Automatic purging of alarms

A large number of outstanding alarms can affect system performance, so the 5620 SAM purges outstanding alarms. The alarm purge algorithm sorts alarms using the following criteria:

correlated alarms are deleted before root alarms

lower severity alarms are deleted before higher severity alarms

oldest alarms are deleted first

5620 SAM allows network administrators to create alarm policies that specify how to process alarms and how to create and store the alarm logs.

1.2 Alarm Policy – Alarm Deletion and Purging [cont.]

5620 SAM purging criteria when no alarm policy exists



Outstanding alarm count reaches 50 000

- Alarm raised to indicate alarm purge is in progress
- non-critical and non-root alarms purged to the historical alarm log until the count drops to 45 000
- “Max alarm count exceeded” displayed in status bar

Outstanding alarm count reaches 60 000

- Alarm raised to indicate alarm purge is in progress
- Alarms purged to the historical alarm log, based on purge algorithm, until the count drops to 45 000

Enable historical alarm logging to ensure purged alarms are logged

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When no alarm policy exists, the 5620 SAM purges alarms in the following ways:

If the outstanding alarm count reaches 50 000:

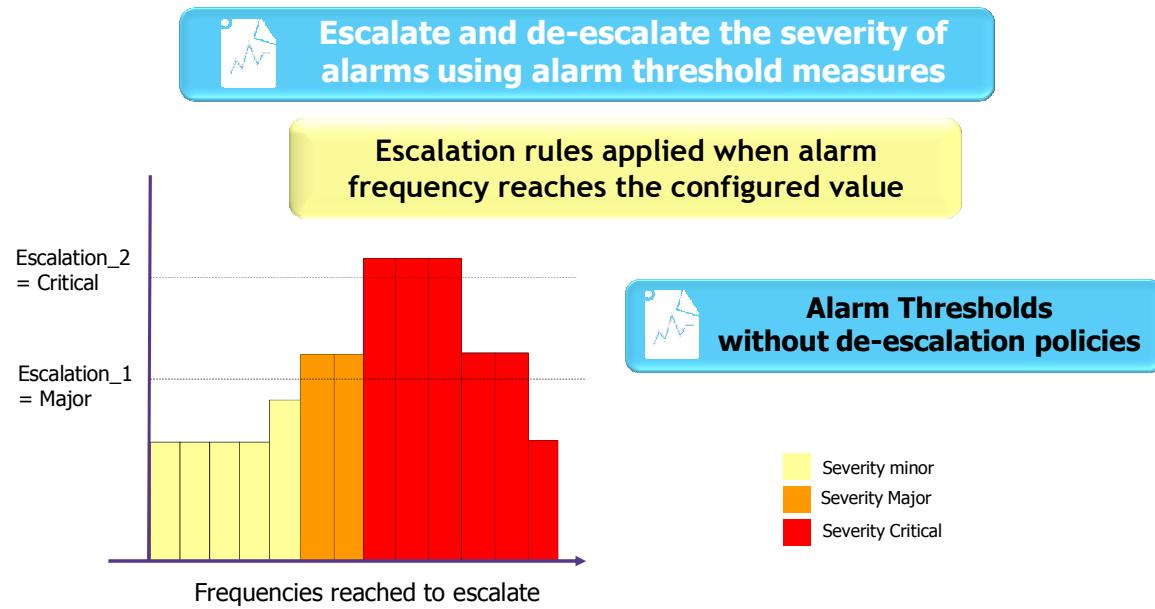
- raises an alarm to indicate that an alarm purge is in progress
- purges non-critical and non-root alarms to the historical alarm log until the count drops to 45 000
- displays “Max alarm count exceeded” in the status bar

If the outstanding alarm count reaches 60 000:

- raises an alarm to indicate that an alarm purge is in progress
- purges alarms to the historical alarm log, based on the purge algorithm, until the count drops to 45 000

To ensure that purged alarms are logged, network administrators must enable historical alarm logging.

1.3 Alarm Thresholds



If an alarm is deleted, then the frequency calculation will be affected

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The 5620 SAM provides tools to escalate and de-escalate the severity of alarms using alarm threshold measures, configurable using the specific alarm parameters.

Escalation rules are applied when the number of instances of the alarm, also called the frequency, reaches the configured value. When the escalation value is reached, the alarm is escalated to the configured value.

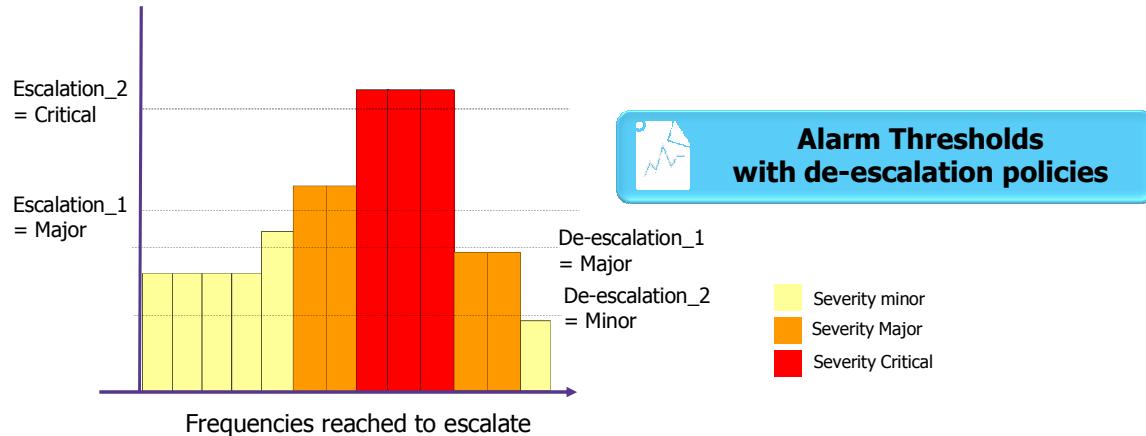
However, if the alarm is deleted, then the frequency calculation is affected.

When no de-escalation policy is applied, escalated alarms are not de-escalated once the frequency of the alarm drops below the alarm escalation threshold.

Escalation policies are affected by the auto parameter of the global alarm deletion policy. When an escalation policy uses the “default when cleared” option, the escalation policy does not work. The parameter must be configured to a value other than “when cleared” to ensure the escalation policy is successful.

1.3 Alarm Thresholds [cont.]

De-escalation rules applied when alarm frequency drops below the configured value



If an alarm is deleted, then the frequency calculation will be affected

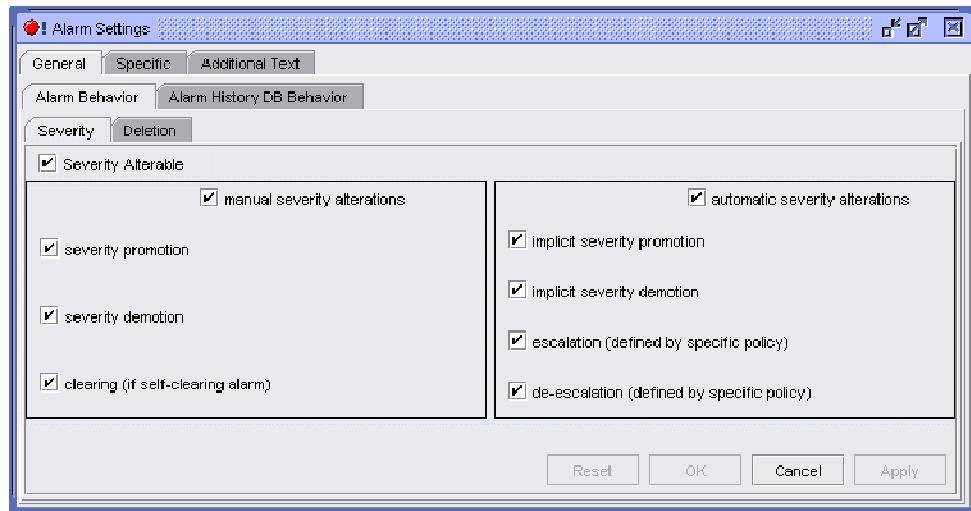
De-escalation rules are applied when the number of instances of the alarm drops below the configured frequency value.

When the appropriate frequency to escalate and de-escalate is reached, the alarm is first escalated in severity and then de-escalated.

However, if the alarm is deleted, then the frequency calculation is affected.

1.4 Alarm Policy – Severity Alterations

Allow automatic changes to severity based alarm policies or manual changes based on operator actions



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In the global alarm settings (Administration > Alarm Settings > General > Alarm Behavior > severity), the network administrator has the possibility to enable/disable the severity alterable functionality.

Severity Alterable: When the severity alterable functionality is enabled, network operators can specify whether to allow automatic changes to severity based on individual alarm policies or manual changes to severity based on operator actions.

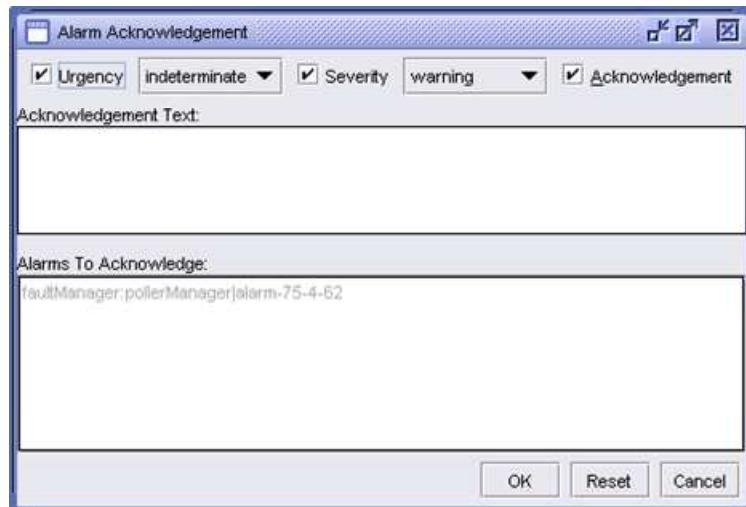
- **Manual Severity alterations:** specifies whether operators can manually change the severity of alarm
 - **Severity promotion:** to allow an operator to increase the severity of an alarm
 - **Severity demotion:** to allow an operator to decrease the severity of an alarm
 - **Clearing:** to allow an operator to clear an alarm if the alarm is self-clearing. A self-clearing alarm is cleared when an alarm-clearing condition occurs
- **Automatic Severity alterations:** specifies whether to enable automatic severity changes for alarms based on specific alarm policies
 - **Implicit severity promotion:** specifies whether to automatically promote the severity of the alarm based on the specific alarm policy
 - **Implicit Severity demotion:** specifies whether to automatically demote the severity of the alarm based on the specific alarm policy
 - **Escalation:** specifies whether to automatically de-escalate the severity of an alarm based on the specific alarm policy
 - **De-escalation:** specifies whether to automatically de-escalate the severity of an alarm based on the specific alarm policy

1.5 Alarm Acknowledgment



Acknowledge alarms under investigation

Allows to ensure duplicate resources are not applied to the same problem



Acknowledgement information is added to the alarm info form

The alarm acknowledgement tool allows operators to ensure that duplicate resources are not applied to the same problem.

When an operator selects an alarm to investigate the root cause, the operator should acknowledge the alarm and its related problems to indicate that the problem is under investigation. An Alarm acknowledgement form for the selected alarm or alarms allows to enter acknowledgement text.

The acknowledgement information is added to the alarm info form, and any acknowledgement text is added to the Notes tab. The Acknowledged By column in the Alarm table indicates the user who acknowledges the alarm. The Alarm information form also stores information about the last time acknowledgement, if the alarm had been previously acknowledged, the assigned urgency and the user who assigned the urgency.

Questions



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1. When outstanding alarm count reaches 50 000 and no alarm policy exists the 5620 SAM raises an alarm to indicate that an alarm purge is in progress, and purges non-critical and non-root alarms to the historical alarm log until the count drops to 45 000. True or false?
 - a. True
 - b. False
1. When outstanding alarm count reaches 50 000 and no alarm policy exists the 5620 SAM deletes the oldest alarms until the count drops to 45 000. True or false?
 - a. True
 - b. False
2. When using the Alarms Threshold tool in the 5620 SAM, escalation rules are applied when the number of instances of the alarm reaches the configured frequency value, and de-escalation rules are applied when the number of instances of the alarm drops below the configured frequency value. True or false?
 - a. True
 - b. False

Answers



1. When outstanding alarm count reaches 50 000 and no alarm policy exists the 5620 SAM raises an alarm to indicate that an alarm purge is in progress, and purges non-critical and non-root alarms to the historical alarm log until the count drops to 45 000. True or false?
 - a. True ✓
 - b. False
1. When outstanding alarm count reaches 50 000 and no alarm policy exists the 5620 SAM deletes the oldest alarms until the count drops to 45 000. True or false?
 - a. True
 - b. False ✓
2. When using the Alarms Threshold tool in the 5620 SAM, escalation rules are applied when the number of instances of the alarm reaches the configured frequency value, and de-escalation rules are applied when the number of instances of the alarm drops below the configured frequency value. True or false?
 - a. True ✓
 - b. False



This module covered:

- Alarm management tools available on the 5620 SAM
- The characteristics and function of
 - alarm deletion and purging criteria
 - alarm thresholds
 - alarm severity alterations
 - alarm acknowledgement

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Section 4
Fault Management

Module 6 Object Life Cycle State

TOS36033_V4.0-SG-R12.0-Ed1 Module 4.6 Edition 2

5620 SAM
R12.0 Fundamentals
TOS36033_V4.0-SG Edition 1

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2.0	2013-07-02	GARCIA LOZANO, René	TOS36033_V3.0 – SAM 11.0 (update)



Upon completion of this module, you should be able to:

- Describe the function and characteristics of the Object Life Cycle (OLC) state in the 5620 SAM
- Identify the objects for which the OLC state can be set
- Identify the options available to set the OLC state
- Describe the use of OLC state to manage alarms raised in the 5620 SAM
- Describe the functionality and use of the Automatic OLC State change

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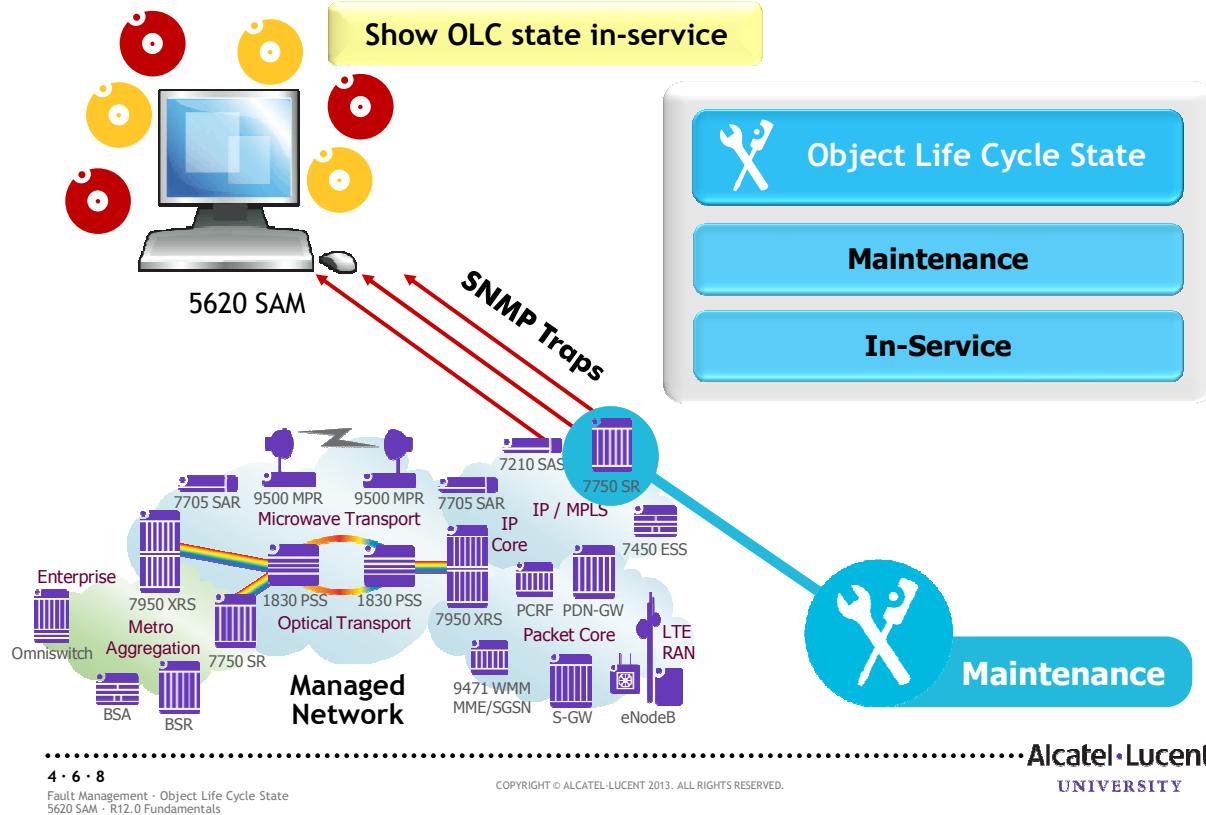


	Page
1 Object Life Cycle State	7
1.1 Object Life Cycle State Overview	8
1.2 Set OLC State	9
1.2.1 OLC State – Setting Options	10
1.3 Scheduling OLC State	11
1.4 Inherited OLC State	12
1.5 Automatic OLC State Change	13
How To Do It and Exercises	14
Questions	15
Answers	16
Module Summary	17

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1 Object Life Cycle State

1.1 Object Life Cycle State Overview



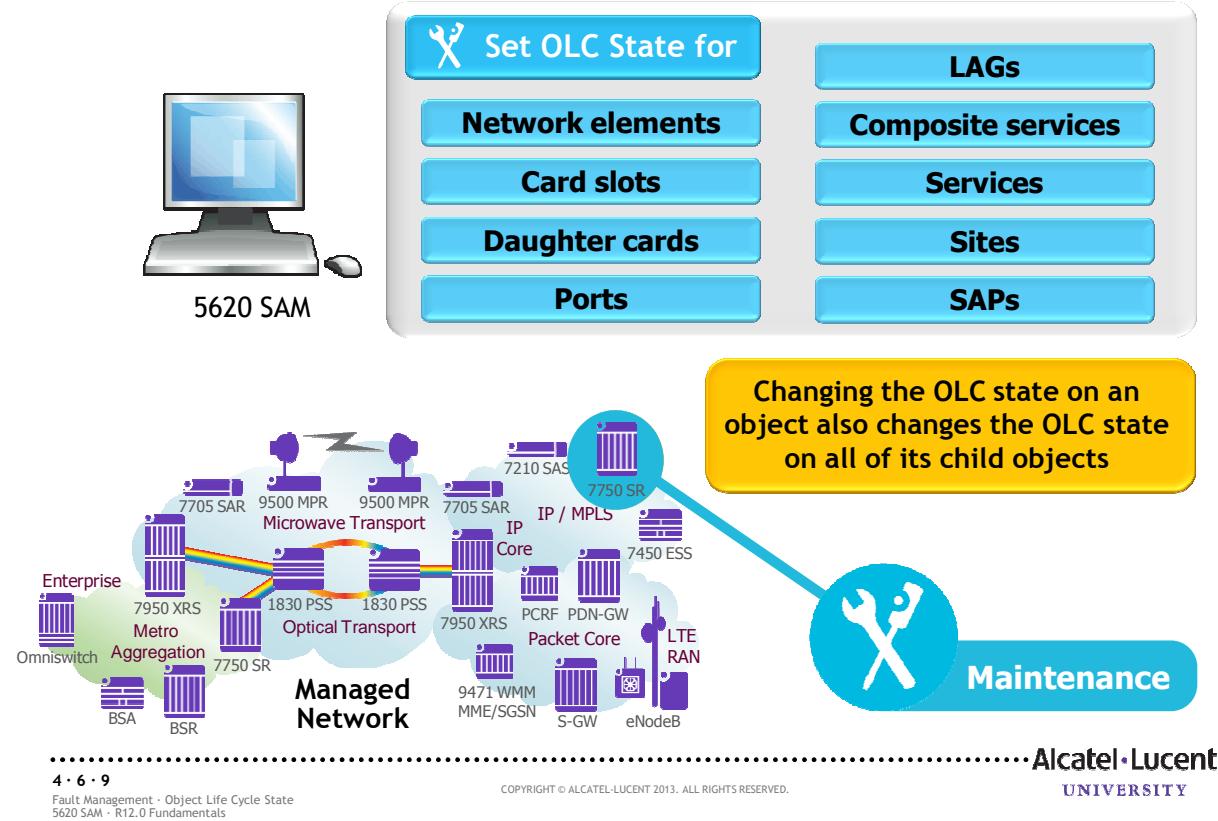
Daily maintenance operations that are performed on NEs can cause a large number of alarms to be raised in the 5620 SAM.

Network operators can use the 5620 SAM to configure the Object Life Cycle (OLC) state on an object to specify whether the object is in maintenance or in-service mode.

The 5620 SAM allows to filter alarms in the Alarms Window based on the OLC state.

For instance, when a programmed maintenance is scheduled on a node the network operator may set the Network Element's OLC state in maintenance mode, and apply a filter to the Alarms Window to only show alarms coming from objects with OLC state set to in-service mode.

1.2 Set OLC State



The 5620 SAM allows to set the OLC state for the following objects and services:

- network elements
- card slots
- daughter cards
- ports
- LAGs
- composite services
- services
- sites
- SAPs (L2 access interfaces and L3 access interfaces)

Changing the OLC state on an object also changes the OLC state on all of its child objects. The operation may take several minutes to complete, depending on the number of objects affected.

When the OLC state of an NE is set to the maintenance mode, all child objects such as access interfaces, card slots, daughter cards, and ports are set to maintenance mode. The sites on the NE are set to the maintenance mode.

In addition, network operators can specify on object properties forms and in discovery rules that the 5620 SAM revert the OLC state back to the in-service or maintenance mode after a specified time, depending on the current OLC state of the object. You can also specify whether the 5620 SAM should raise an informational alarm to notify that the object OLC state is reverting to the opposite state.

1.2.1 OLC State – Setting Options

OLC System Preference

- Raise an Alarm if OLC state is reverted to the opposite state ?
- Enable or disable the Automatic OLC State change

Default OLC State in discovery rule

- OLC State and Revert OLC State (Discovery Complete)

Configure OLC State on objects and services

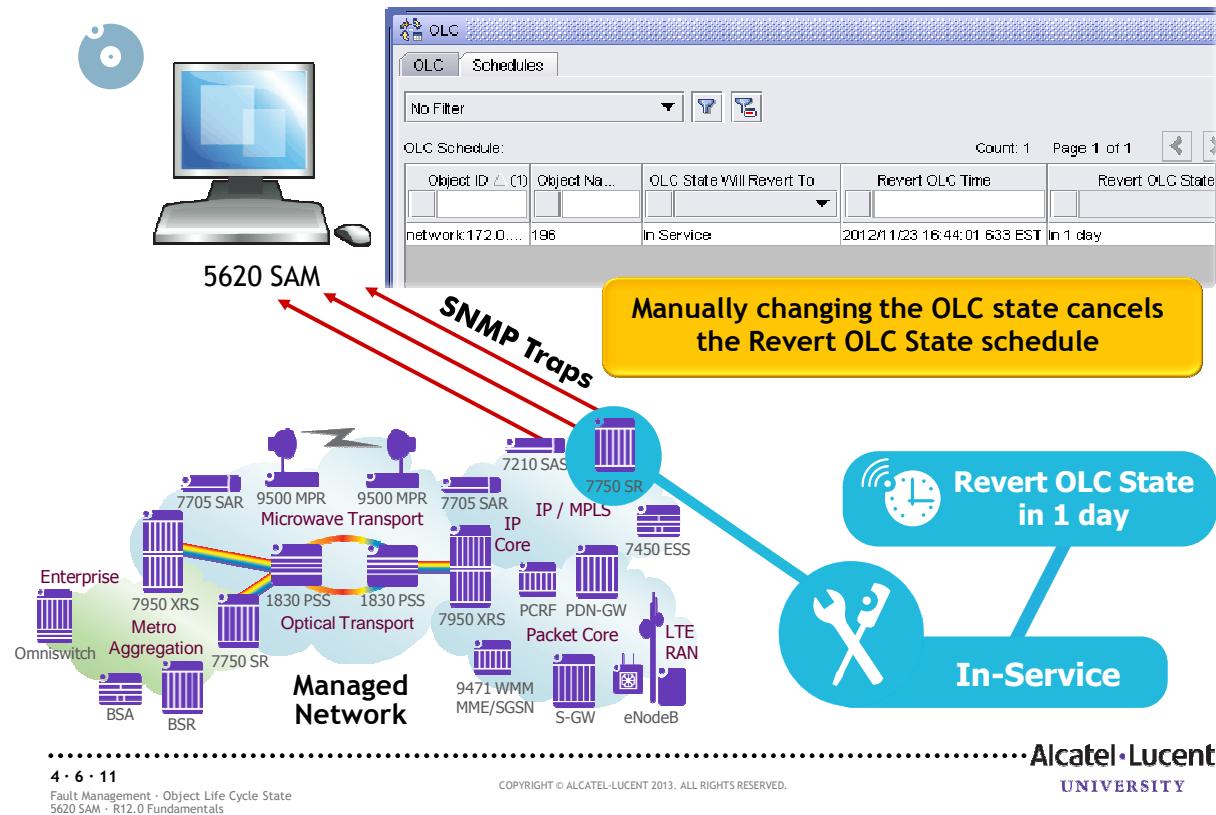
- From the 5620 Main Menu
- Form an object configuration form
- Form Alarm Window

Service Template using GUI Builder

- For 5620 SAM-created service templates, the OLC state property automatically added to the template

- to set OLC states
 - if required, configure the system preferences for OLC parameters and alarm behavior: specify whether the 5620 SAM should raise an informational alarm to notify that the object OLC state is reverting to the opposite state
 - If required, configure the default OLC state for network elements in the discovery rules: in discovery rules, you can specify two parameter : the OLC State and the Revert OLC state when discovery completes parameter specifies whether the object reverts back to either the In Service mode or the Maintenance mode after a the NE has been discovered, depending on the current OLC State. When discovery completes, the Revert OLC State parameter specifies whether the NE changes to either the In Service mode or the Maintenance mode after the NE has been discovered and fully resynchronized, depending on the “OLC State” in the discovery rule.
- As required, configure the OLC state for specific nodes, cards, ports, LAGs, services and alarms, as required.
 - Configure the OLC state from the 5620 SAM main menu. (Administration > OLC)
 - Configure the OLC state from an object configuration form (example: OLC for SAPs on VLL, VPLS, VPRN, MVPLS, and IES services)
 - Configure the OLC state from the Alarm window
- If required, configure the OLC state on a service template using the GUI builder
 - Some service objects have an OLC state property. You cannot configure the OLC state property during the configuration of the service object. For 5620 SAM-created service templates, the OLC state property is automatically added to the template. For manually created service templates, the OLC state property is not automatically added to the template, however the OLC state property can be added to a manually created template by following the appropriate procedure.

1.3 Scheduling OLC State



In addition, network operators can specify on object properties forms that the 5620 SAM revert the OLC state back to the in-service or maintenance mode after a specified time, depending on the current OLC state of the object.

For example, when an NE is set to Maintenance mode, the operator can specify that the NE changes back to In-Service mode after 1 day by setting the Revert OLC State to 1 day.

The OLC Scheduler panel indicates the state to which the service will revert and the timestamp at which the state change will occur.

Please note that by manually changing the "Current OLC State" parameter of an object, the selected schedule for the Revert OLC State parameter is cancelled.

System administrators can also specify whether the 5620 SAM should raise an informational alarm to notify that the object OLC state is reverting to the opposite state.

1.4 Inherited OLC State

Parent Object in Maintenance

- Child object's OLC State cannot be changed

Default OLC State

- Child object's default OLC State value inherited from parent object

NE OLC State

- Changing the OLC state of an NE is changed, changes all of its child objects' OLC to the NE's state

Composite Service or Service OLC state set to Maintenance

Related objects changed:

- Sites on which the services reside
- Access interfaces
- SDP Bindings

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The OLC state for a child object is inherited from the parent object.

When the OLC state of a parent object is set to maintenance, the child object's OLC State cannot be changed. The OLC state of the parent object must be in service to change the OLC state of the child object. You can change the OLC state of the parent object regardless of the OLC state of the child object. However, when a child object has more than one parent object and the OLC state of one parent is set to maintenance, the child object is set to maintenance. The OLC state for a child object cannot be changed if one of the parent OLC states is set to maintenance.

The OLC state default value of a child object is inherited from the parent object.

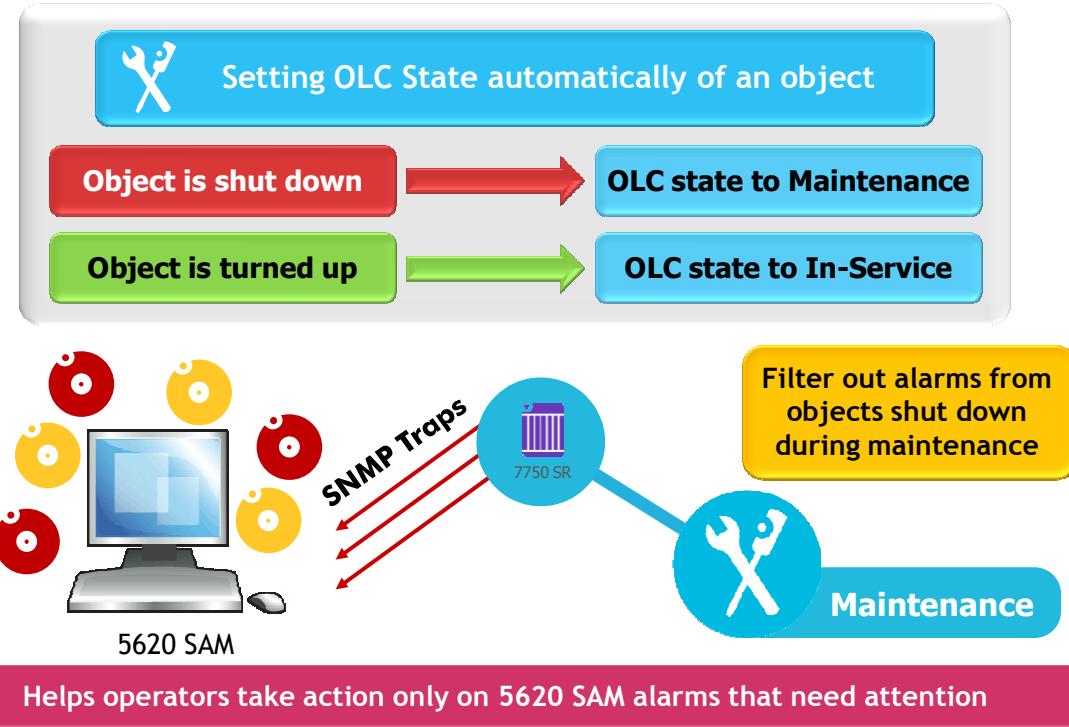
When the OLC state of an NE is set to the maintenance mode, all child objects such as access interfaces, card slots, daughter cards, and ports are set to maintenance mode. The sites on the NE are set to the maintenance mode.

When the OLC state of a composite service or service is set to the maintenance mode, the following related objects are changed:

- sites on which the services reside
- access interfaces (SAPs, L2 and L3 access interfaces)
- SDP Bindings (mesh, mirror and spoke bindings)

When the OLC state of a composite service or services is changed to in service, access interfaces and sites may not change to in service if they belong to equipment objects that are set to maintenance.

1.5 Automatic OLC State Change



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The automatic OLC state change function supports setting the OLC state of an object when the object is shut down, or turned up.

If the Automatic OLC State change parameter is enabled in the System Preferences form, a Shut Down action will set the object's OLC state to Maintenance and this state change is also applied to any child objects. And a Turn Up action will set the object's OLC state to In-Service and this state change is also applied to any child objects.

This function allows operators filtering out alarms coming from objects that are set to a shut down state during maintenance. It helps operators take action only on 5620 SAM alarms that need attention.

How To Do It and Exercises



How to do it

Instructor DEMO how to:

- Set OLC state
- Schedule OLC state change
- Filter alarms based on OLC state
- Automatic OLC state change



Lab Exercises

Configure the system preference for OLC parameters and alarm behavior

Schedule OLC state revert

Set the OLC state of an object

Monitor the scheduling of OLC state change

Filter Dynamic Alarm list alarms based on the OLC state

Enable the Automatic OLC State change parameter



Time allowed:

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Your instructor may perform the above mentioned demonstrations using the 5620 SAM GUI.

In addition, your instructor will point out the appropriate lab module containing the above mentioned hands-on lab exercises, and will indicate the time allowed to perform these hands-on exercises.

Questions



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1. The OLC state allows operators to specify whether an object is in maintenance or in-service mode to filter alarms in the alarm window. True or false?
 - a. True
 - b. False
2. The OLC state can be set to network elements, card slots and daughter cards, and to Services, composite services and service sites. True or false?
 - a. True
 - b. False
3. The OLC state can be set to topology groups. True or false?
 - a. True
 - b. False
4. Changing the OLC state on an object does not change the OLC state on all of its child objects. True or False?
 - a. True
 - b. False
5. If the Automatic OLC State change parameter is enabled in the System Preferences form, and an object is Shut Down, the OLC state of the object AND the object's child objects will automatically be changed to Maintenance. True or false ?
 - a. True
 - b. False

Answers



1. The OLC state allows operators to specify whether an object is in maintenance or in-service mode to filter alarms in the alarm window. True or false?
 - a. True ✓
 - b. False
2. The OLC state can be set to network elements, card slots and daughter cards, and to Services, composite services and service sites. True or false?
 - a. True ✓
 - b. False
3. The OLC state can be set to topology groups. True or false?
 - a. True
 - b. False ✓
4. Changing the OLC state on an object does not change the OLC state on all of its child objects. True or False?
 - a. True
 - b. False ✓
5. If the Automatic OLC State change parameter is enabled in the System Preferences form, and an object is Shut Down, the OLC state of the object AND the object's child objects will automatically be changed to Maintenance. True or false ?
 - a. True ✓
 - b. False



This module covered:

- The function and characteristics of the Object Life Cycle (OLC) state in the 5620 SAM
- Objects for which the OLC state can be set
- Options available to set the OLC state
- The use of OLC state to manage alarms raised in the 5620 SAM
- The functionality and use of the Automatic OLC State change

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End of module
Object Life Cycle State

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Section 4
Fault Management

Module 7 Historical Alarms

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TOS36033_V4.0-SG Edition 1

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2.2	2012-10-08	LOLLIERIC, Pascal	TOS36033_V2.2 – SAM 10.0 (R5 update)
2.3	2012-10-30	GARCIA LOZANO, René	TOS36033_V2.3 – SAM 10.0 (MyPLE and WBT)
3.0	2013-06-20	GARCIA LOZANO, René	TOS36033_V3.0 – SAM 11.0 (update)



Upon completion of this module, you should be able to:

- Describe the function and characteristics of the Historical Alarms in the 5620 SAM
- Identify the information available on historical alarm record objects including general information, severity, statistics and acknowledgment data
- Describe the capability of SAM for creating filters to show alarm history information for a selected alarm

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	Page
1 Historical Alarms	7
1.1 Historical Alarms Overview	8
1.2 Historical Alarms Form	9
1.3 Alarm History Object Form	10
1.3.1 Info	11
1.3.2 Severity	12
1.3.3 Statistics	13
1.3.4 Acknowledgment	14
Questions	15
Answers	16
Module Summary	17

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1 Historical Alarms

1.1 Historical Alarms Overview



Historical Alarms

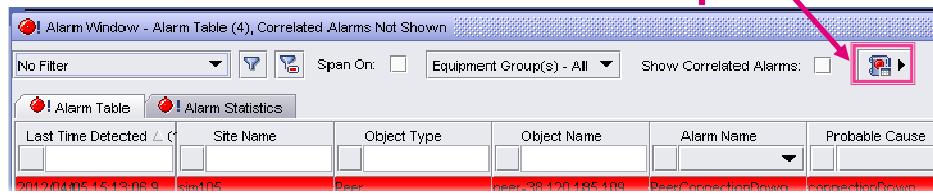
Keep track of what has transpired in the network and the frequency to which things occur

Select Tools → Historical Alarms from the main menu

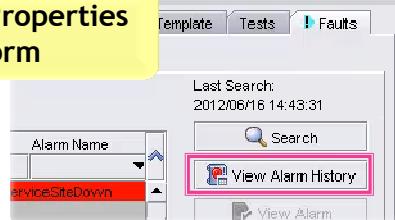


5620 SAM
GUI Client

View Alarm(s) History button



Object Properties Form



Alarm Info Form



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Historical alarms are a mechanism by which the 5620 SAM enables the network operator to keep track of what has transpired in their network and the frequency to which things occur.

Operators can view the history of one or more alarms in the Historical Alarm form using one of the following paths on the 5620 SAM GUI:

- Selecting Tools → Historical Alarms opens a filter window. Once the filter has been defined, clicking on the Search button will provide a list of the appropriate alarms.
- Selecting one or more alarms on the Alarm Window, and using the View Alarm(s) History contextual menu. Note that the View Alarm(s) History and View Object(s) Alarm History menu options are unavailable when more than 20 alarms are selected from the list.
- From the Alarm Info form, clicking on the View Alarm History button.
- From an object Properties form Faults tab, clicking on the View Alarm History button.

1.2 Historical Alarms Form

Historical Alarms

No Filter

Span On: Equipment Group(s) - All

Count: 76119 Page 1 of 77

Last Search: 2012/04/05 15:38:58

Search View Policy Purge Filtered Properties Copy to Clipboard

Time Logged	Last Time Detected	Site Name	Object Type	Object Name	Alarm Name
2012/03/28 20:52:31 ...	2012/03/28 20:52:20 ...	sim102	netw.NetworkElement	sim102	BootParametersMis...
2012/03/28 20:52:32 ...	2012/03/28 20:52:18 ...	sim101	netw.NetworkElement	sim101	BootParametersMis...
2012/03/28 20:52:32 ...	2012/03/28 20:52:20 ...	7750-100	netw.NetworkElement	7750-100	BootParametersMis...
2012/03/28 20:52:38 ...	2012/03/28 20:52:19 ...	sim104	netw.NetworkElement	sim104	BootParametersMis...
2012/03/28 20:53:00 ...	2012/03/28 20:52:23 ...	sim107	netw.NetworkElement	sim107	BootParametersMis...
2012/03/28 20:53:00 ...	2012/03/28 20:52:23 ...	sim109	netw.NetworkElement	sim109	BootParametersMis...
2012/03/28 20:53:00 ...	2012/03/28 20:52:23 ...	sim103	netw.NetworkElement	sim103	BootParametersMis...
2012/03/28 20:53:00 ...	2012/03/28 20:52:23 ...	sim106	netw.NetworkElement	sim106	BootParametersMis...
2012/03/28 20:53:02 ...	2012/03/28 20:52:23 ...	sim108	netw.NetworkElement	sim108	BootParametersMis...

Double-click to open the
Alarm History Object form

Historical Alarms

Filter Applied

Span On: Equipment Group(s) - All

Count: 4 Page 1 of 1

Last Search: 2012/04/05 16:50:52

Search View Policy Purge Filtered Properties

Time Logged	Last Time Detected	Site Name	Object Type	Object Name	Alarm Name
2012/03/29 21:45:40 ...	2012/03/29 21:32:23 ...	sim102	vpis.Site	38.120.165.102	ServiceSiteDown
2012/04/03 20:48:07 ...	2012/04/02 19:16:08 ...	sim102	vpis.Site	38.120.185.102	ServiceSiteDown
2012/04/03 15:29:56 ...	2012/04/03 15:28:41 ...	sim102	vpis.Site	38.120.185.102	ServiceSiteDown
2012/04/03 22:41:12 ...	2012/04/03 22:39:20 ...	sim102	vpis.Site	38.120.185.102	ServiceSiteDown

Alarm policies configure alarm history database behavior for records storage

4 · 7 · 9

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The Historical Alarm form displays a list of historical alarm records. The form allows the creation of filters to narrow down the number of listed items.

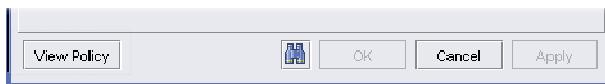
When the Historical Alarm form is opened from an Alarm Info form, or by selecting one or more alarms on the Dynamic Alarm List window or on the Faults tab in an object Properties form, the alarm history filter is refined by automatically creating a filter that is applied to only list history records related to the selected alarm or alarms.

Double-clicking on any of the alarm records listed will open the Alarm History Object form with detailed information for that specific alarm historical record.

System administrators must create alarm policies to configure alarm history database behavior for the storage of historical alarm records. When configuring the Alarm History DB Behavior of an alarm policy, Alcatel-Lucent recommends enabling the Log on Deletion parameter to ensure historical log records of all deleted alarms exists.

1.3 Alarm History Object Form

Alarm History Object
Helps operator isolate problems in the network



Useful details about alarm historical records

Understanding what has transpired in a network goes a long way to helping the network operator to isolate problems within their network. The Alarm History Object Form provides a useful details about alarm historical records which could help to isolate problems and review trends. The data in this form is displayed in four tabs: Info, Severity, Statistics, and Acknowledgment.

The bottom part of the form displays a **View Policy** button. Clicking on the View Policy button opens the Specific Policy form which allows to view the policy configured for the alarm type.

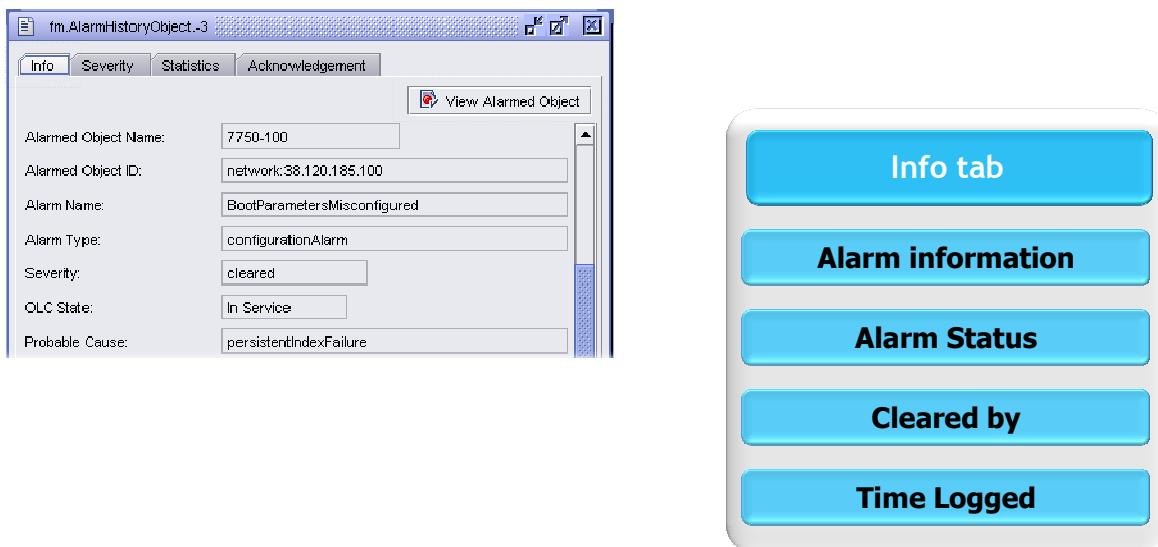
The **Info** tab provides information about the alarmed object, type of alarm, severity, probable cause, first and last time detected.

The Alarm History Object form's Info tab also displays the following parameters:

- Alarm Status describing the reason the alarm was logged to the historical alarm database
- Cleared By displaying the name of SAM user that cleared the alarm
- Time Logged with the timestamp when alarm was moved to the historical alarm database

The Info tab contains a **View Alarmed Object** button which allows to open the properties form for the alarmed object.

1.3.1 Info



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Understanding what has transpired in a network goes a long way to helping the network operator to isolate problems within their network. The Alarm History Object Form provides a useful details about alarm historical records which could help to isolate problems and review trends. The data in this form is displayed in four tabs: Info, Severity, Statistics, and Acknowledgment.

The bottom part of the form displays a **View Policy** button. Clicking on the View Policy button opens the Specific Policy form which allows to view the policy configured for the alarm type.

The **Info** tab provides information about the alarmed object, type of alarm, severity, probable cause, first and last time detected.

The Alarm History Object form's Info tab also displays the following parameters:

- Alarm Status describing the reason the alarm was logged to the historical alarm database
- Cleared By displaying the name of SAM user that cleared the alarm
- Time Logged with the timestamp when alarm was moved to the historical alarm database

The Info tab contains a **View Alarmed Object** button which allows to open the properties form for the alarmed object.

1.3.2 Severity

Current Severity:	cleared
Previous Severity:	critical
Original Severity:	critical
Highest Severity:	critical
Last Time Severity Changed:	2012/03/28 20:52:32 345 CEST
Last Time Cleared:	2012/03/28 20:52:32 345 CEST
Last Time Promoted:	N/A
Last Time Demoted:	2012/03/28 20:52:32 345 CEST



4 · 7 · 12
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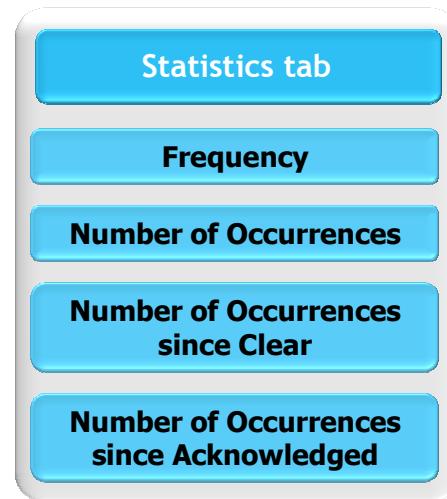
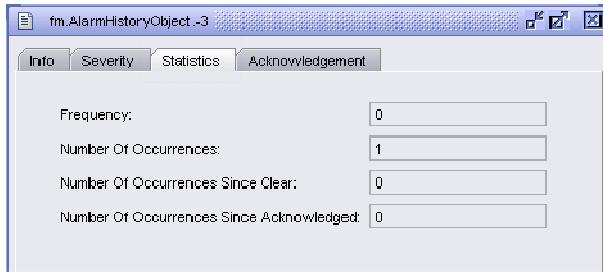
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The **Alarm History Object** form's **Severity** tab provides information pertaining to the severity of the alarm and any changes that may have occurred as a result of escalation and/ or demotion. This also includes the time that the alarm was declared and at which any changes occurred.

The severity tab includes parameters such as:

- Highest Severity indicating the most severe status assigned to the alarm. Alarm severity can change due to escalation.
- Last time records for severity changed, time cleared, promoted, demoted, escalated and de-escalated according to the both the client time and the NE time

1.3.3 Statistics



.....
 4 · 7 · 13
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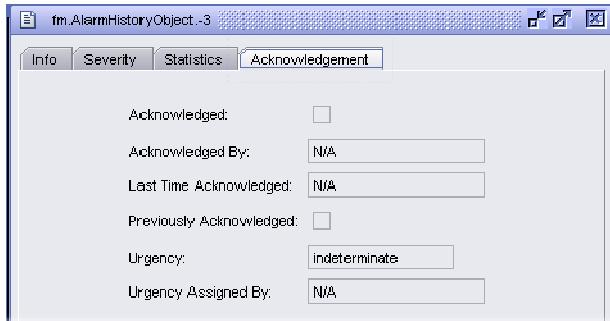
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The Alarm History Object form's **Statistics** tab provides information pertaining to the frequency at which the alarm has occurred including:

- Frequency
- Number of Occurrences indicating how often the alarm was raised
- Number of Occurrences since Clear
- Number of Occurrences since Acknowledged

1.3.4 Acknowledgment



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The **Alarm History Object** form's **Acknowledgement** tab provides information about when the alarm was acknowledged, the user that acknowledged the alarm, and the user that set the urgency.

The **Acknowledged** parameter specifies that the alarm has been acknowledged. Details about the last time the alarm was acknowledged appear under the **Last Time Acknowledged** and **Acknowledge by** parameters.

The **Previously Acknowledged** parameter specifies that the alarm had been previously acknowledged.

Urgency details the user assigned urgency information for the alarm. And the **Urgency Assigned by** displays the name of SAM user that assigned urgency information for the alarm.

Operators can modify the acknowledgement and urgency by clicking on the **View Policy** button and modifying the individual alarm settings.

Questions



4 · 7 · 15
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1. Which of the following is a tab in the Alarms History Object form? (Choose all that apply)
 - a. Severity
 - b. Acknowledgement
 - c. Statistics
 - d. Additional Information

2. The View Alarm History button on the Dynamic Alarm list is unavailable when more than 20 alarms are selected from the list. True or False?
 - a. True
 - b. False

Answers



1. Which of the following is a tab in the Alarms History Object form? (Choose all that apply)
 - a. **Severity** ✓
 - b. Acknowledgement
 - c. **Statistics** ✓
 - d. **Additional Information** ✓

2. The View Alarm History button on the Dynamic Alarm list is unavailable when more than 20 alarms are selected from the list. True or False?
 - a. **True** ✓
 - b. False



This module covered:

- The function and characteristics of the Historical Alarms in the 5620 SAM
- Information available on historical alarm record objects including general information, severity, statistics and acknowledgment data
- The 5620 SAM capability for creating filters to show alarm history information for a selected alarm



End of module
Historical Alarms

.....
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5620 SAM · R12.0 Fundamentals

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Section 4
Fault Management

Module 8

Fault Management Web Application Overview

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R12.0 Fundamentals
TOS36033_V4.0-SG Edition 1

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2.1	2012-08-18	GARCIA LOZANO, René	TOS36033_V2.1 – SAM 10.0 (R1 vILT conversion)
2.2	2012-10-08	LOLLIERIC, Pascal	TOS36033_V2.2 – SAM 10.0 (R5 update)
2.3	2012-10-30	GARCIA LOZANO, René	TOS36033_V2.3 – SAM 10.0 (MyPLE and WBT)
3.0	2013-06-06	GARCIA LOZANO, René	TOS36033_V3.0 – SAM 11.0 (update)



Upon completion of this module, you should be able to:

- Describe the process to launch the SAM Fault Management Web Application
- List the views available in the SAM Fault Management Web Application
- Identify the components and function of each of the SAM Fault Management Web Application views

4 · 8 · 3

Fault Management · Fault Management Web Application Overview
5620 SAM · R12.0 Fundamentals

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	Page
1 Alarm Generation and Fault Management	7
1.1 5620 SAM Alarm Generation	8
1.2 Fault Management Using Alarms - Overview	9
Knowledge Verification - Alarm Generation	10
2 Alarm Information Status and Severity	11
2.1 Alarm Status	12
2.2 Alarm Severity	13
2.2.1 Severity Color Code	14
Knowledge Verification - Alarm Severity	16
3 Alarm Status Display	17
3.1 Topology Maps	18
3.2 Navigation Tree	20
3.3 Faults Tab on Object Properties Form	22
Knowledge Verification - Alarm Status	23
How To Do It and Exercises	24
Questions	25
Answers	26
Module Summary	27

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1 Fault Management Web Application

1.1 Fault Management WebApp Overview

5620 SAM Fault Management Web Application

Enabled by the sophisticated correlation and rules engine of the 5620 SAM server

Visualization approaches that makes clear where the root-cause of a problem resides

External to the 5620 SAM GUI client and do not require a local client installation

4 • 8 • 8

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As of R12.0, a new breed of web applications for the 5620 SAM has been incorporated with the server. The 5620 SAM Web Applications will enable operations to examine the wealth of their network and service infrastructure data, in order to better address problems that emerge in next-generation networks.

Enabled by the sophisticated correlation and rules engine of the 5620 SAM server, the Fault Management Web Application (or FM Web App) allows better sight into the magnitude and impact of faults within massive volumes of assurance data to help eliminate manual troubleshooting.

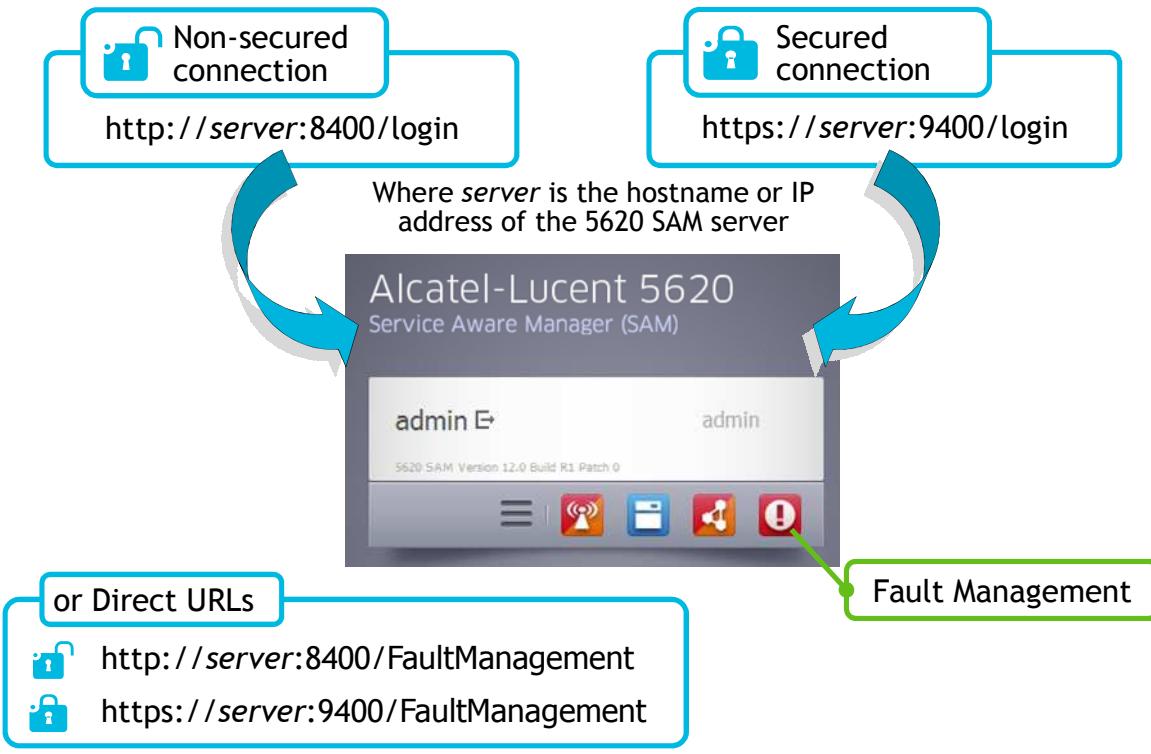
It's visualization approaches also make it clear where the root-cause of a problem resides. By showing a better holistic view of all the areas of impact between root problems, it is also visually intuitive for distinguishing unique problems and their magnitude, enabling operators to hone in on priority #1 issues needing their attention first.

At-a-glance, network-wide distribution views, grouping correlated alarms to independent problems, help to determine which fault to investigate first by giving an understanding of which problems have the largest magnitude of impact. Problems can easily be isolated through clear views that show the root-cause of a fault, including an impact tree of correlated faults.

Fault impact network hierarchy views give an understanding of affected infrastructure, and provide simple, more efficient cross-navigation workflows to configuration forms to accelerate problem resolution.

The 5620 SAM web applications, including the FM Web App, are external to the 5620 SAM GUI client and do not require a local client installation.

1.2 Launch Web Applications



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Access to the web applications is controlled through 5620 SAM user groups. The default admin user group can access all 5620 SAM web applications.

In order to launch FM Web App, enter the following URLs in a compatible web browser provide access to the launch panel, from which all supported web applications can be launched.

For a non-secured connection: <http://server:8400/login>

For a secured connection: <https://server:9400/login>

Where *server* is the hostname or IP address of the 5620 SAM server (active or standby)

The Web Applications login page opens, enter the appropriate **Login Name** and **Password**, and click on the **Login** button.

The Web application launch panel opens, click on the Fault Management button (button and exclamation mark icon, as displayed on the slide).

Alternatively, operators can launch the FM Web App by entering one of the following direct URLs in a compatible web browser:

For a non-secured connection: <http://server:8400/FaultManagement>

For a secured connection: <https://server:9400/FaultManagement>

Technical Reference

See *Alcatel-Lucent 5620 SAM User Guide - 5620 SAM web applications section for more information, including browser compatibility.*



1.3 Top Unhealthy NEs View

Top 50 most unhealthy NEs

Filtering options

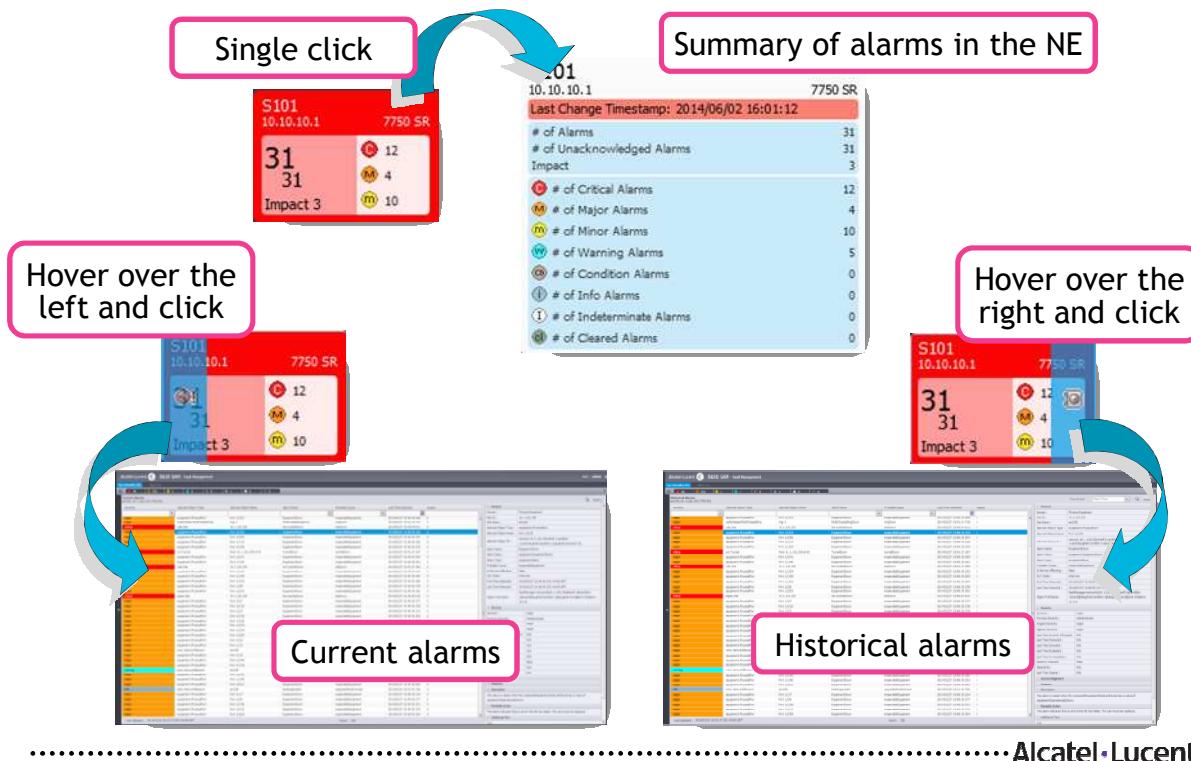
Filter by number of total active or acknowledged alarms, or show only one NE type

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The Top Unhealthy NEs view displays the top 50 most unhealthy (alarmed) NEs in the network. Each NE is represented with an icon.

The bottom part of this view displays filtering options. Operators can filter the unhealthy NEs by number of total active or unacknowledged alarms, or number of alarm impacts, or apply a filter to show only one type of NE.

1.3.1 Fast Navigation to Unhealthy NE's Specific Alarms



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The Top Unhealthy NEs view offers fast navigation to investigate NE specific alarms, both active and historical. A single click on the NE displays an expanded summary of the alarms on the NE, such as total number of alarms, number of acknowledged alarms, and number of alarms by severity. Click again to close the expanded summary and return to the original view.

Hover over the left side and click on the blue bar to open the current list of alarms for the NE.

Hover over the right side and click on the blue bar to open the historical list of alarms for the NE.

From the current alarm list or the historical alarms list, operators can sort, filter, acknowledge, clear and delete alarms, and show impacts and object point of view.

Click on the << sign on the side of the list to close the current alarm list and return to the original view.

1.4 Alarm List View

Filter by severity

Sort ascending or descending

Enter text to search and click on

Full list of alarms

Last Updated : 2014/06/26

Right-click to show impacts or object point of view, and view more options

The Alarm List view provides a full list of alarms for NEs. From the list, operators can sort, filter, acknowledge, clear and delete alarms, and show impacts and object point of view.

Click on top to filter the alarm list by severity

Click on the column title to sort the alarms in ascending or descending order.

Column headings, Enter text to search the column. Then click on the Search button. Click on the Search button to refresh the list with the search parameters you entered in the column text field.

Right-click on an alarm to show impacts or object point of view, to acknowledge, assign severity, assign OLC state, delete or clear, to show affected object, and view history, object alarm history, and current and historical alarm snapshot.

1.4 Alarm List View [cont.]

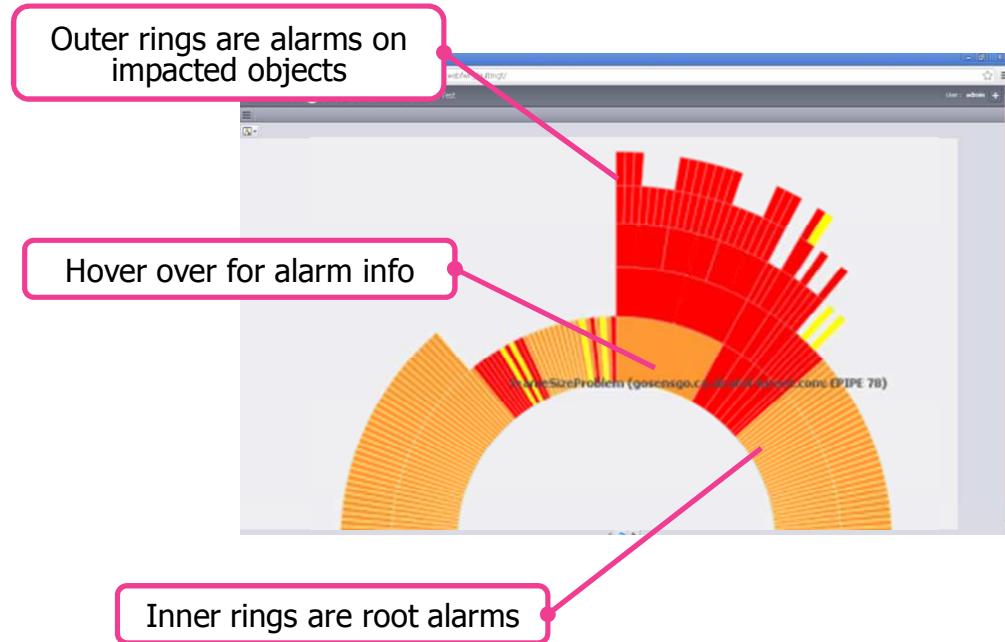
The screenshot shows the Alcatel-Lucent 5620 SAM - Fault Management interface. The main window displays an 'Alarm List' table with columns: Severity, Site ID, Site Name, Alarmed Obj, Alarmed Obj, Alarm Name, Probable Cn, Last Time Detected, and Impact. The table shows several entries, including minor and critical alarms. A pink callout box points to the 'Export' button in the toolbar, which is labeled 'Export alarm list to CSV file'. Another pink callout box points to the right-hand panel, which is titled 'Alarm information' and contains sections for General, Severity, Acknowledgement, Statistics, and Description. A third pink callout box points to the 'Alarm List' table, with the text 'Full list of alarms'. A fourth pink callout box points to the left sidebar, with the text 'Open alarm statistics, alarm distribution, or alarm hierarchy view'. The bottom of the interface includes a footer with the Alcatel-Lucent logo and 'UNIVERSITY'.

Click on the Export button to export the alarm list to a CSV file.

Right-hand frame displays the alarm information organized in collapsible panels. Expand to view more details about the alarm you selected in the list.

Open the alarm statistics, alarm distribution, or alarm hierarchy view.

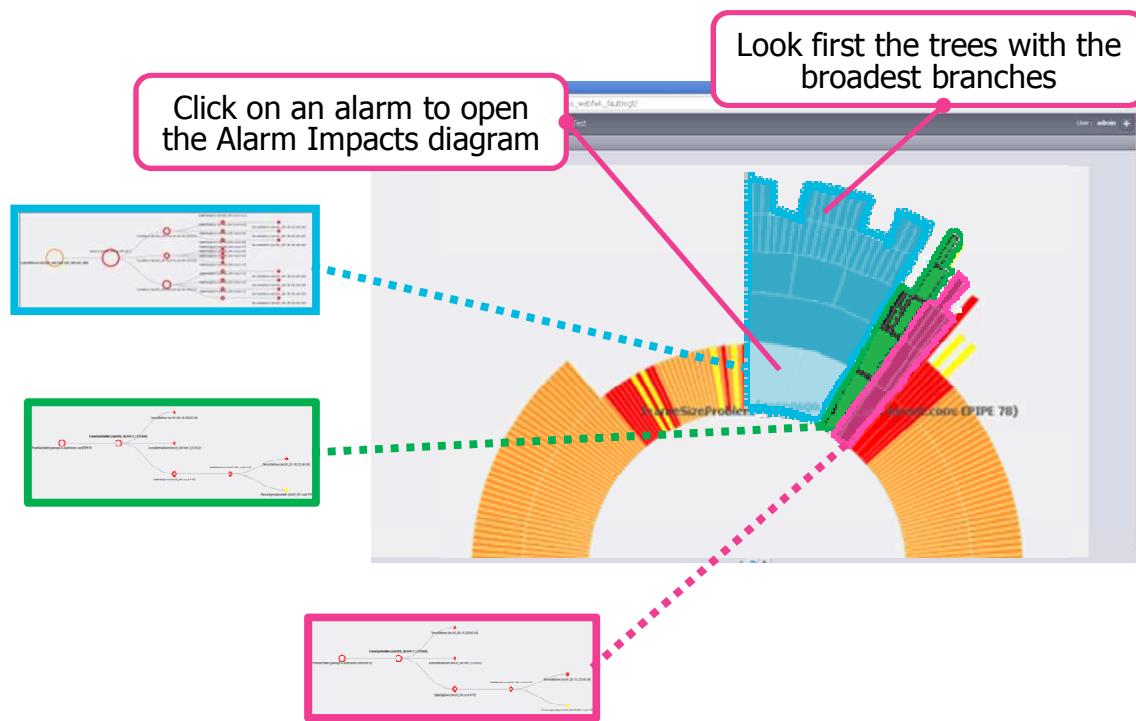
1.5 Alarm Distribution View



5620 SAM advanced fault management automatically isolates issues down to root-cause, and delivers intuitive visualization for operators to quickly understand which problems merit immediate investigation, and where to start. The circular Alarm Distribution view, displays all root-cause trees expanded in a circular view. This new visualization approach makes it intuitive for operators to see which problems to address first and to easily see root-cause. Each unique tree that the circle is composed of the root alarms in the inner rings, and the outer rings represent alarms on impacted objects. This enables operators to get to working on the highest priority issues sooner, and reduce MTTR.

Hovering over displays the alarm information.

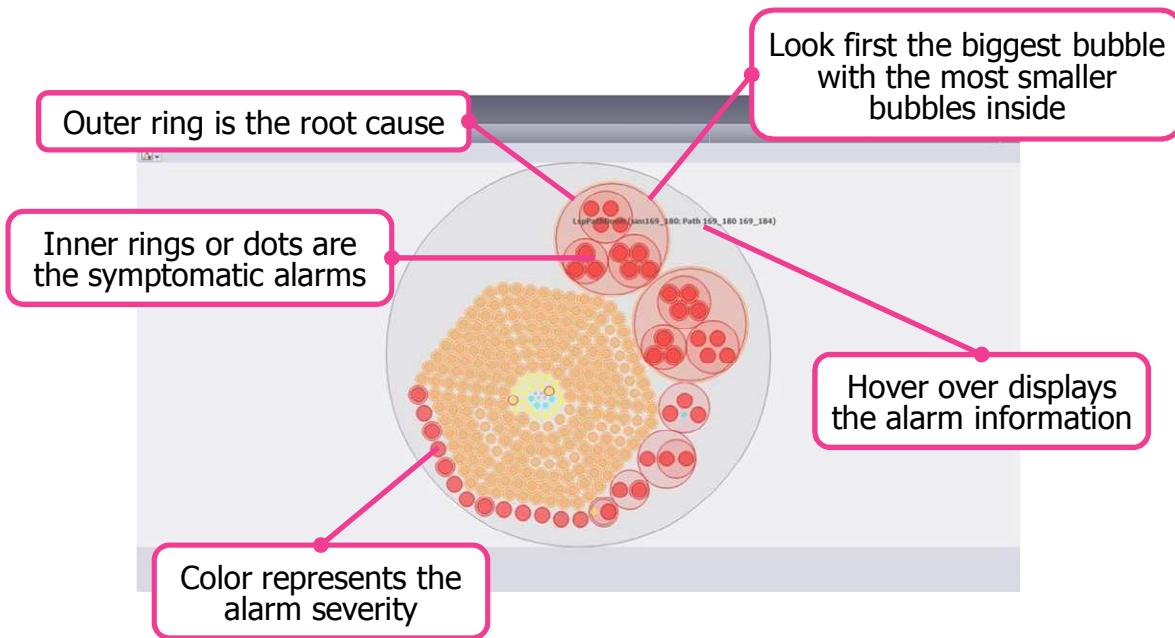
1.5 Alarm Distribution View [cont.]



Using the Alarm Distribution view operators could zero-in on the tree with the broadest branches / leaves (i.e. the one with the most radius of impact) - which is most likely the problem operators would want to look at first, since it is most likely to one with the most associated service alarms which would be a #1 priority problem that should be addressed first.

From either alarm distribution view, operators are just a single click away from showing the individual Alarm impacts tree.

Alarm Hierarchy View



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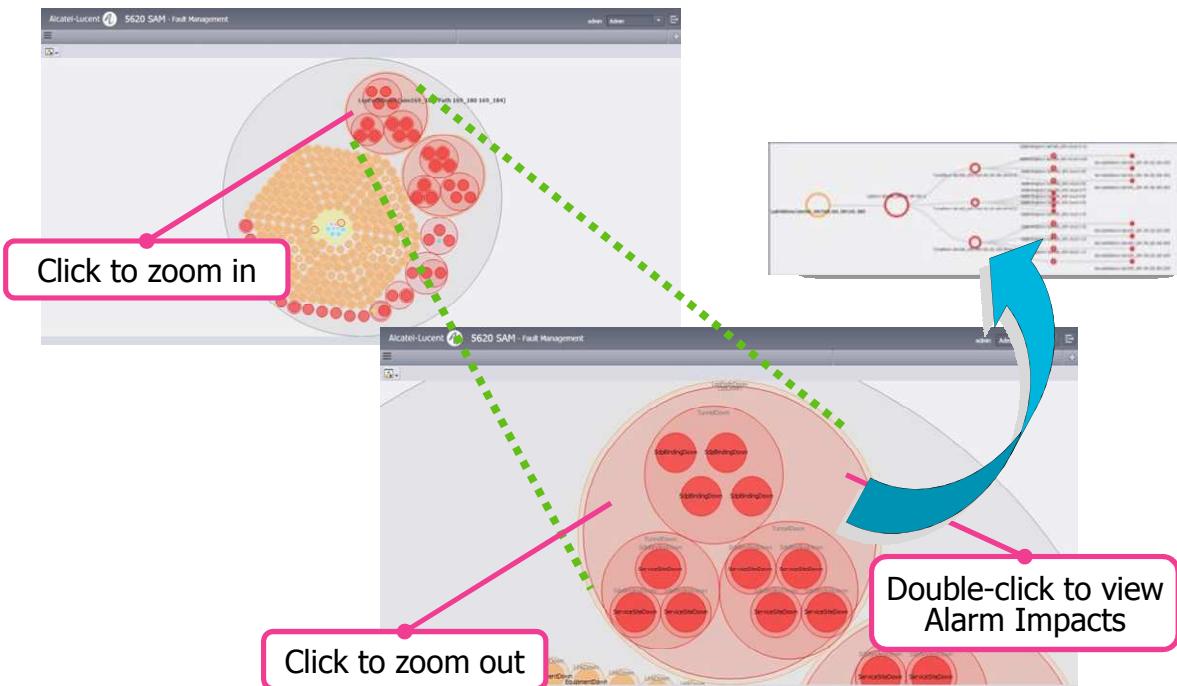
Another alternative way to find this same problem with the most area of impact is to use the bubble Alarm Hierarchy view.

Looking for the biggest bubble with the most smaller bubbles inside it makes is easy to see the biggest problems fast. The outer ring or bubble is actually the root cause of the problem, and the inner bubbles or dots would be the many symptomatic alarms. Always look first at the bubble with many service related symptomatic alarms.

The color of the bubble, ring, or dot represents the alarm severity.

Hover over a bubble displays the alarm information.

Alarm Hierarchy View



4 • 8 • 17
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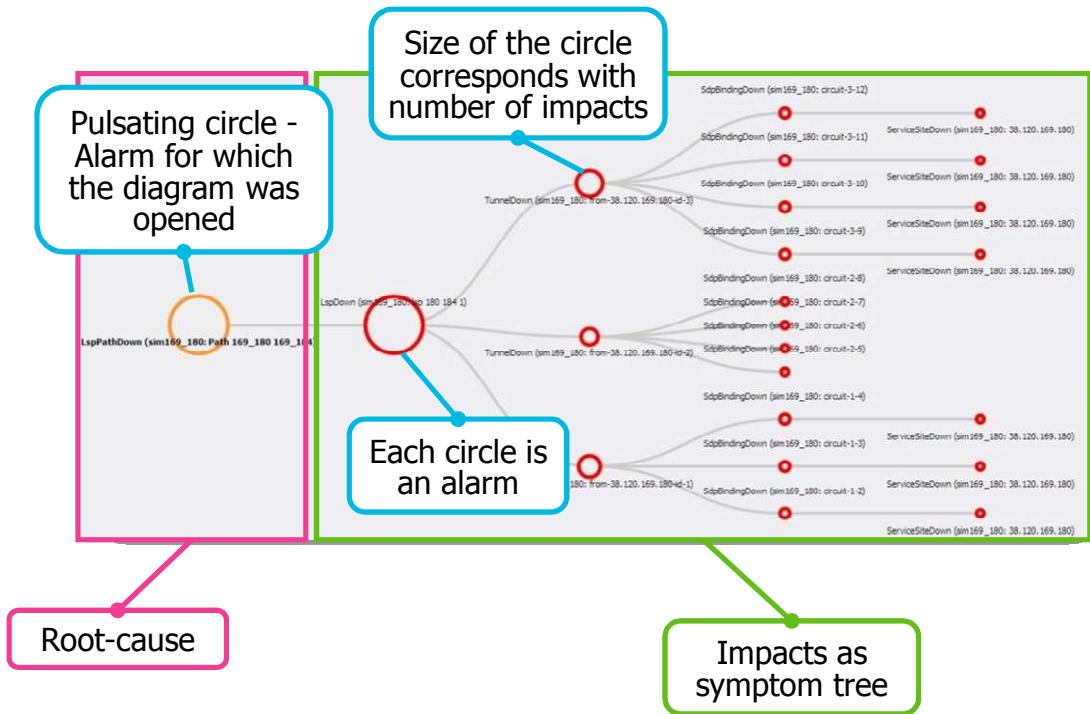
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Click on a bubble, ring or dot to zoom in. Click again to zoom out.

Double-click on a bubble to view the Alarm Impacts diagram.

1.6 Alarm Impacts Diagram



Alarm Impacts diagram tree presents the root-cause (to the left) and its symptom alarm tree fully expanded (to the right).

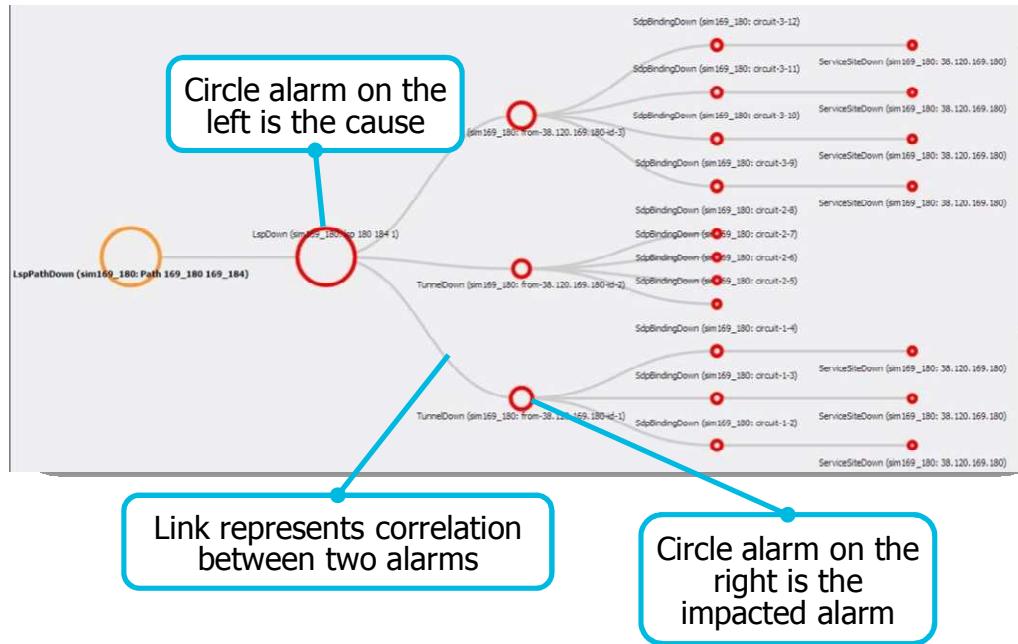
Each circle is an alarm. The color of the circle represents the severity of the alarm.

The size of the circle corresponds with the number of impacts, the more impacts the bigger the circle.

A pulsating circle represents the alarm for which the operator has selected to view the impact diagram. Click on a circle to collapse, click on a solid dot to expand the alarm tree.

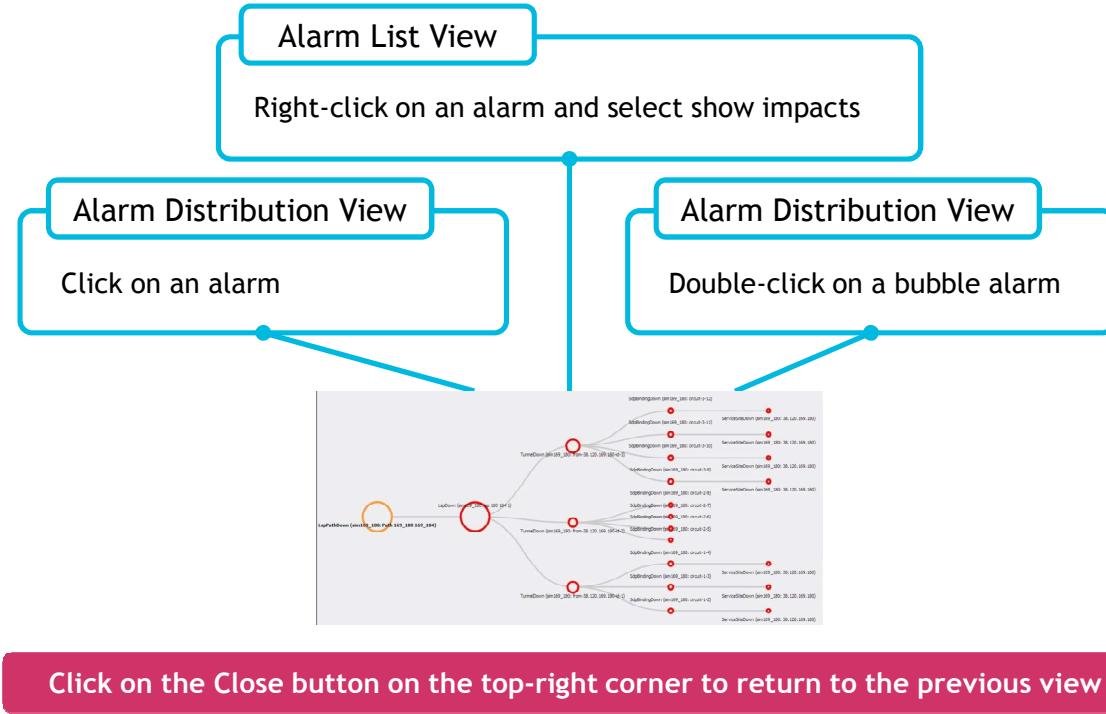
A link that connects between two alarm circles represents a correlation between two alarms. The circle alarm on the left of the correlation is the cause, and the circle alarm on the right is the impacted alarm.

1.6.1 Correlation Representation



A link that connects between two alarm circles represents a correlation between two alarms. The circle alarm on the left of the correlation is the cause, and the circle alarm on the right is the impacted alarm.

1.6.2 Opening the Alarms Impact Diagram



Click on the Close button on the top-right corner to return to the previous view

The Alarm Impacts diagram can be opened from:

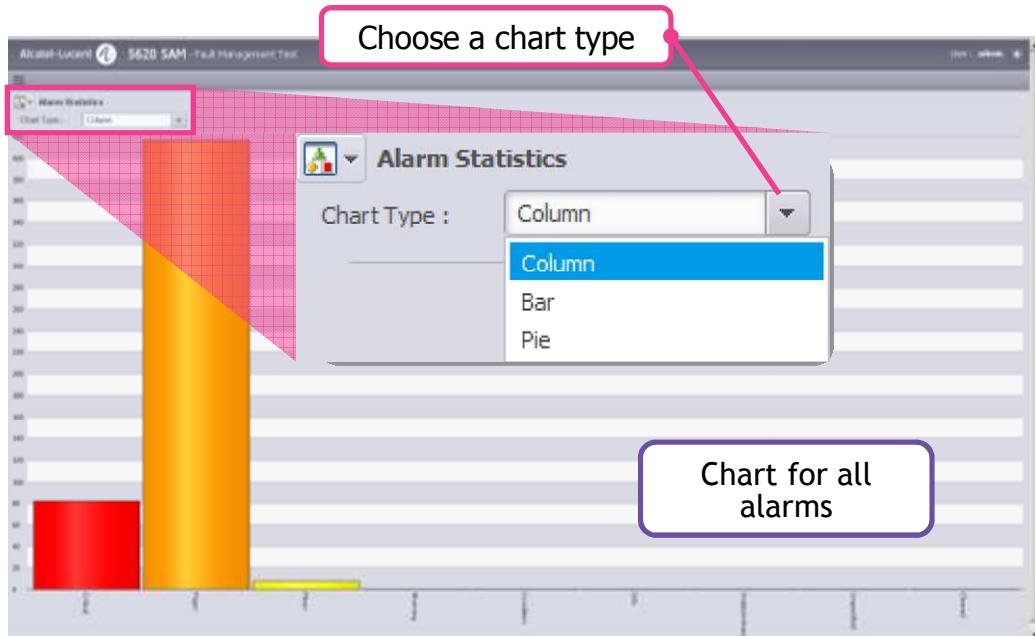
Alarm List view, by right-clicking on an alarm and select show impacts from the contextual menu

Alarm Distribution view, by clicking on an alarm

Alarm Hierarchy view, by double clicking on a bubble alarm

Click on the Close button on the top-right corner of the Alarm Impacts diagram to return to the previous view.

Alarm Statistics View



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The Alarm Statistics view display a chart for all the current alarms in the network. Operators may choose the type of chart to draw: column, bar, or pie.

How To Do It and Exercises



How to do it

Instructor DEMO how to:

Open the Fault Management Web App

Browse through the available views in the Web App



Lab Exercises

Open the Fault Management Web App

View alarms specific to an unhealthy NE

Open the Alarm list view, filter alarms, and show impacts

Find a root cause and view correlated alarms using:

the Alarm Distribution view

the Alarm Hierarchy view

Generate an alarm statistics chart



Time allowed:

4 · 8 · 22

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Your instructor may perform the above mentioned demonstrations using the 5620 SAM GUI.

In addition, your instructor will point out the appropriate lab module containing the above mentioned hands-on lab exercises, and will indicate the time allowed to perform these hands-on exercises.

Questions



4 · 8 · 23

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1. Simple Network Management Protocol (SNMP) is the protocol that Network Elements use for notifying faults or events to the 5620 SAM for alarm generation which are reported on the Fault Management Web Application. True or false?
 - a. True
 - b. False
2. The Top Unhealthy NEs view displays the top 50 most unhealthy (alarmed) NEs in the network. True or false?
 - a. True
 - b. False
3. The Alarm Impacts diagram tree presents the root-cause and its symptom alarm tree fully expanded, in the diagram each circle is an alarm and the color of the circle represents the severity of the alarm. True or false?
 - a. True
 - b. False

Answers



1. Simple Network Management Protocol (SNMP) is the protocol that Network Elements use for notifying faults or events to the 5620 SAM for alarm generation which are reported on the Fault Management Web Application. True or false?
 - a. True ✓
 - b. False
2. The Top Unhealthy NEs view displays the top 50 most unhealthy (alarmed) NEs in the network. True or false?
 - a. True ✓
 - b. False
3. The Alarm Impacts diagram tree presents the root-cause and its symptom alarm tree fully expanded, in the diagram each circle is an alarm and the color of the circle represents the severity of the alarm. True or false?
 - a. True ✓
 - b. False



This module covered:

- The process to launch the SAM Fault Management Web Application
- The views available in the SAM Fault Management Web Application
- The components and function of each of the SAM Fault Management Web Application views

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End of module
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Section 5
Performance Management

Module 1
5620 SAM Statistics Overview

TOS36033_V4.0-SG-R12.0-Ed1 Module 5.1 Edition 2

5620 SAM
R12.0 Fundamentals
TOS36033_V4.0-SG Edition 1

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Document History			
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4.0	2014-05-26	GARCIA LOZANO, René	TOS36033_V4.0 – SAM 12.0 (update)



Upon completion of this module, you should be able to:

- Identify the 5620 SAM statistics collection capabilities
- List the type of statistics 5620 SAM collects
- Describe the flow of statistics collected from managed NEs and transferred to OSS applications
- Describe the elements of the 5620 SAM statistics presentations:
 - Tabular statistics view
 - Graphical statistics view
- Identify the functions of the 5620 SAM statistics plotter components

5 · 1 · 3

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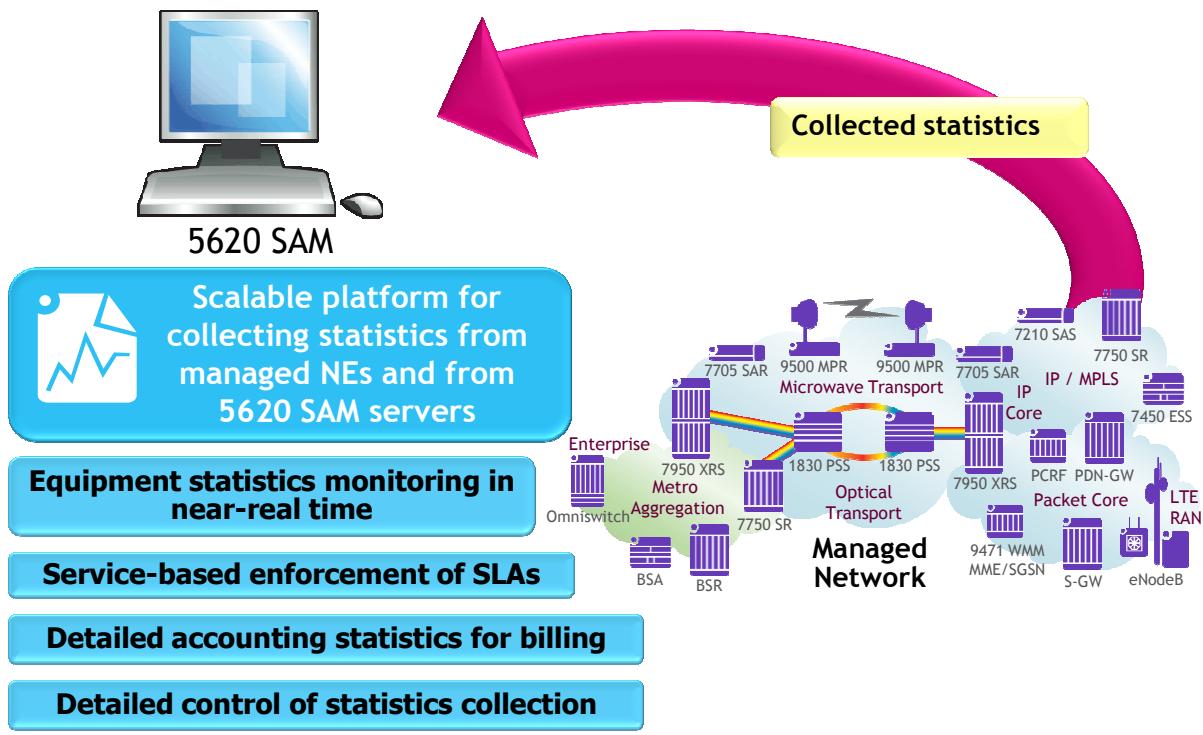


	Page
1 – 5620 SAM Statistics Collection	7
1.1 – 5620 SAM Statistics Collection Overview	8
1.2 – 5620 Statistics Collection Policies	10
1.3 – 5620 SAM Statistics Types	11
1.3.1 – Performance Statistics	12
1.3.2 – Accounting Statistics	13
1.3.3 – Server Performance Statistics	14
1.4 – 5620 SAM Statistics Collection Architecture	15
OSS Client Statistics Collection Process	16
Knowledge Verification - SAM Statistics Collection	17
Knowledge Verification - SAM Statistics Collection	18
2 – 5620 SAM statistics presentations	19
2.1 Tabular Statistics View	20
2.2 Graphical Statistics View	21
2.3 – 5620 SAM Statistics Plotter	22
2.4 – 5620 SAM Statistics Plotter Components	23
2.4.1 Configuration Panel	24
2.4.2 Detail Panel	25
2.4.3 Overview Panel	26
2.4.4 Data List Panel	27
Knowledge Verification - SAM Statistics Collection	28
How To Do It	29
Questions	31
Answers	32
Module Summary	33

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1 – 5620 SAM Statistics Collection

1.1 – 5620 SAM Statistics Collection Overview



5 · 1 · 8

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5620 SAM - R12.0 Fundamentals

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The 5620 SAM provides operators and network administrators with a scalable platform for reliably collecting statistics from managed Alcatel-Lucent NEs and from 5620 SAM servers. The statistics are typically used for monitoring and troubleshooting the 5620 SAM network, and for SLA and billing functions performed by OSS applications that connect to the 5620 SAM.

Some of the benefits of statistics collection from the 5620 SAM include:

- equipment statistics monitoring in near-real time
- service-based enforcement of SLAs
- detailed accounting statistics for billing
- detailed control of statistics collection counters, collection intervals, and application to network objects

1.1 – 5620 SAM Statistics Collection Overview [cont.]



5620 SAM



View statistics data directly in tabular or graphical form



Save the tabular or graphical data to a file in various formats



Export statistics data to OSS applications using the 5620 SAM-O interface

Collected statistics use:

Monitoring and troubleshooting the 5620 SAM network

SLA and billing functions performed by OSS applications that connect to the 5620 SAM

5 · 1 · 9

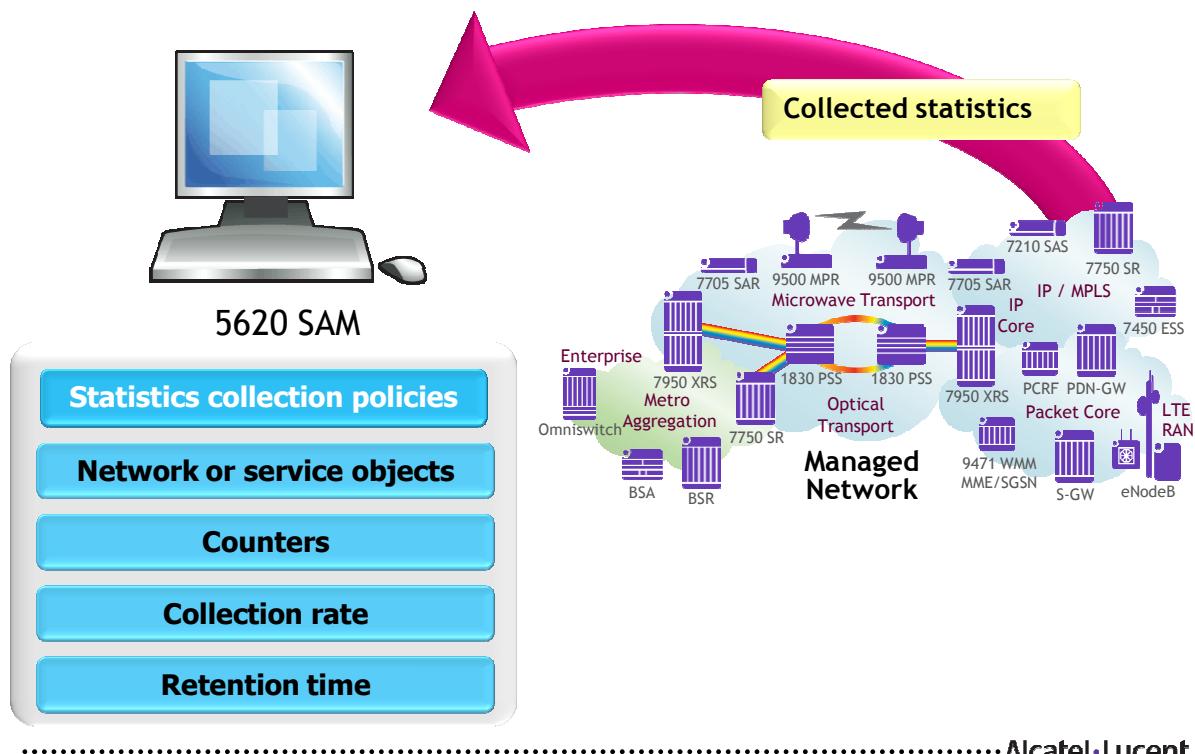
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Operators can use the 5620 SAM to view statistics data directly in tabular or graphical form in the GUI, save the tabular or graphical data to a file in various formats, and export the statistics data to OSS applications using the 5620 SAM-O interface.

1.2 – 5620 Statistics Collection Policies



5 · 1 · 10

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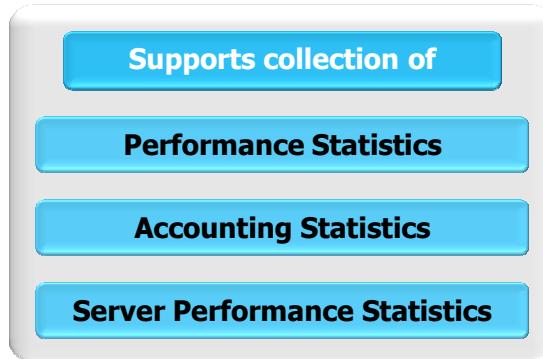
Before the 5620 SAM can collect statistics, policies must be configured to specify the following:

- the network or service objects from which to collect statistics
- the counters to collect
- the rate of collection
- the length of time that the 5620 SAM database retains the collected statistics

1.3 – 5620 SAM Statistics Types



5620 SAM



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The 5620 SAM supports the collection of the following types of statistics:

- performance statistics for network objects
- accounting statistics for network ports and Service Access Points (SAPs)
- server performance statistics collected internally on each 5620 SAM server.

1.3.1 – Performance Statistics

Typical use	NE troubleshooting and monitoring
Source	NE MIBs
On-demand collection	Yes
Scheduled collection	Yes. Configure a specific or general collection policy
Real-time graphing*	Yes
Historical graphing	Yes
5620 SAM-O Available	Yes
Collection default	Off

* minimum interval is 10s. Not stored in the 5620 SAM database

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5 · 1 · 12

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Performance statistics, which are NE-based, are collected by polling management information base (MIB) counters. The collected equipment and object performance statistics help operators monitor the use of physical and logical network elements in near-real time. Statistics logs show equipment and logical network object usage rates.

For Performance statistics, the 5620 SAM supports on-demand collection, scheduled collection by configuring a specific or general collection policy, real-time graphing, and historical graphing.

Performance statistics are available for OSS Clients through SAM-O.

Performance statistics collection is turned off by default, operators must turn collection on for counters of interest.

1.3.2 – Accounting Statistics

Typical use	Billing, SLA compliance, and trend analysis
Source	<ul style="list-style-type: none"> • service, network and subscriber - NE XML files and MIBs • AA - NE ISA-AA MIBs
On-demand collection	No
Scheduled collection	Yes. Configure file and accounting policies
Real-time graphing*	Yes, if MIB-based
Historical graphing	Yes
5620 SAM-O Available	Yes
Collection default	Off

* minimum interval is 10s. Not stored in the 5620 SAM database

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Accounting statistics, which are NE-based, are collected by transferring accounting files from NEs. These accounting statistics for service access points (SAPs) measure usage on each service queue, which can be rolled up for billing. The collected accounting records can be used to determine customer service usage, and to feed into a billing application. Network port statistics measure usage within each forwarding class queue, as defined on the network port. This information can be used to track link utilization and network traffic patterns and trends, to help capacity planning and traffic-engineering efforts.

The 5620 SAM does not support on-demand collection for accounting statistics. However, SAM supports scheduled collection by configuring file and accounting policies, real-time graphing for MIB-based statistics, and historical graphing for accounting statistics.

Accounting statistics are available for OSS Clients through SAM-O.

Accounting statistics collection is turned off by default, operators must turn collection on for counters of interest.

1.3.3 – Server Performance Statistics

Typical use	5620 SAM Server troubleshooting and monitoring
Source	Internal 5620 SAM data
On-demand collection	Yes
Scheduled collection	Yes. Configure a collection policy
Real-time graphing*	Yes
Historical graphing	Yes
5620 SAM-O Available	Yes
Collection default	On, using 15.min interval

* minimum interval is 10s. Not stored in the 5620 SAM database

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5 · 1 · 14

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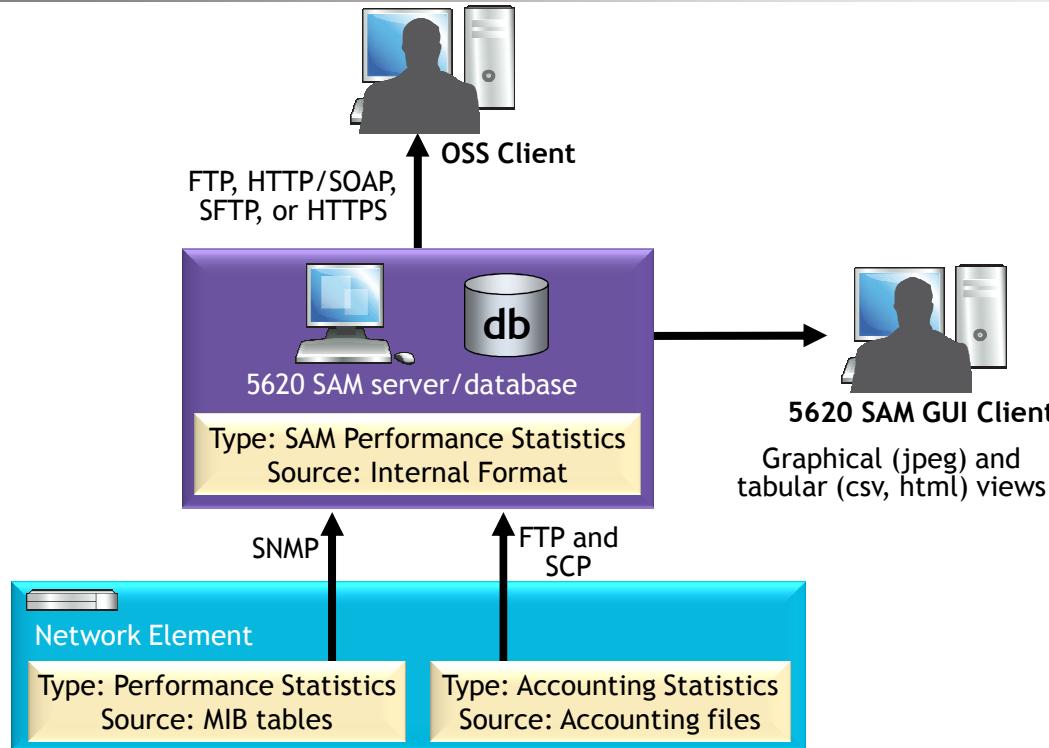
Server performance statistics provide information about 5620 SAM server performance, are collected internally on each 5620 SAM Server.

For server performance statistics, the 5620 SAM supports on-demand collection, scheduled collection by configuring a collection policy, real-time graphing, and historical graphing.

Server performance statistics are available for OSS Clients through SAM-O.

Server performance statistics collection is turned on by default using a 15 minute interval.

1.4 – 5620 SAM Statistics Collection Architecture



5 · 1 · 15

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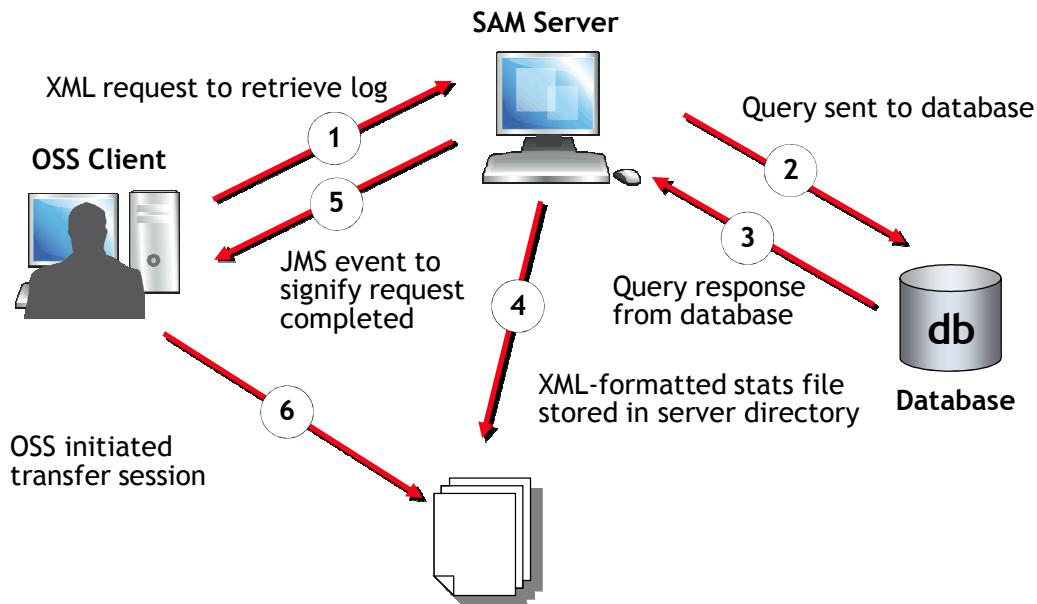
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On an NE, performance statistics are recorded in MIB tables, and accounting statistics are recorded in accounting files. The MIB-based statistics are collected by the 5620 SAM using SNMP. The statistics in the accounting files are transferred to the 5620 SAM by FTP or SCP. Server performance statistics are collected internally on a 5620 SAM server. All statistics types are stored in the 5620 SAM database. Statistics in the database can be viewed using the 5620 SAM GUI and are available to OSS applications. Statistics are transferred from the 5620 SAM database to the OSS applications using FTP or SFTP. Statistics displayed in the 5620 SAM GUI can be exported to files.

Statistics are stored in the 5620 SAM database for a configurable period. The retention period is defined in a 5620 SAM statistics policy. When the retention period elapses, the statistics are removed from the database.

Statistics collected using statistics policies are stored in the 5620 SAM database and are available to all 5620 SAM operators. Statistics collected for real-time display are available only for the duration of the session and for the operator that initiates the session. Real-time statistics are not stored in the 5620 SAM database.

OSS Client Statistics Collection Process



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The figure above provides an overview of the synchronous statistics collection process and the relationship between the 5620SAM and OSS client components.

Step 1: An XML request is sent to retrieve log records from the OSS client.

Step 2: A query is sent from the SAM Client to the SAM database.

Step 3: The SAM database returns a query response to the SAM Client.

Step 4: An XML-formatted statistics file is generated from the SAM database query response. This file is stored on the SAM Server in the directory defined during installation. Sub-directories are not supported.

Step 5: A JMS message is sent from the SAM Client to the OSS Client application to signal that the request to generate the statistics file is completed.

Step 6: The OSS Client initiates a session to transfer the file from the server to the OSS Client. It is possible to transfer files through an **FTP** or **Secure Copy Protocol (SCP)** session. To configure which method will be used, select **Administration** → **Mediation** → **Mediation Security**. From the list, select the appropriate **SNMP** mediation policy and select **Properties**. Scroll down through the window to find **File Transfer** panel and select a file transfer type from the drop down menu.

Knowledge Verification - SAM Statistics Collection



The 5620 SAM collects performance statistics by polling...

- a. Management information base (MIB) counters.
- b. Accounting files.
- c. Internal format.

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Choose the correct answer for the knowledge verification question above.

Knowledge Verification - SAM Statistics Collection



What protocol is used to transfer accounting statistics files from the 7x50 router to the 5620 SAM Server?

- a. FTP
- b. SNMP
- c. OSPF
- d. HTTP

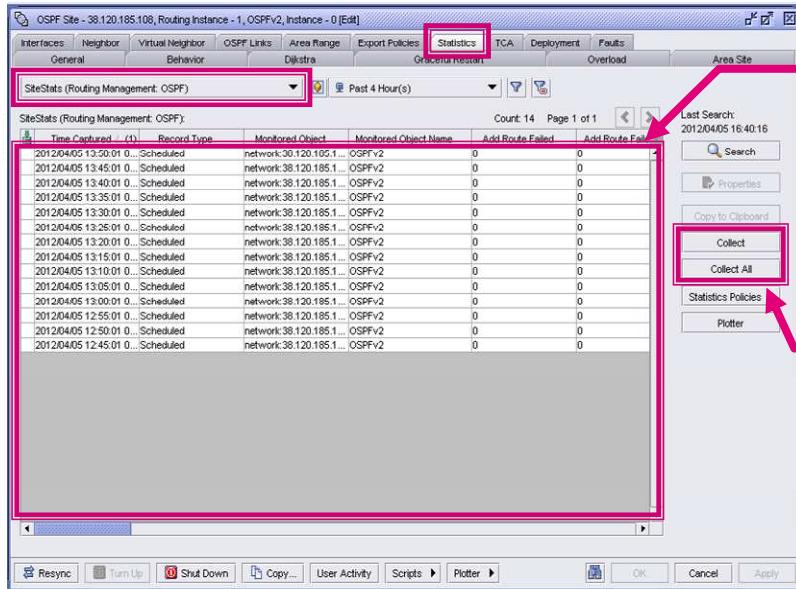
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Choose the correct answer for the knowledge verification question above.

2 – 5620 SAM statistics presentations

2.1 Tabular Statistics View

Statistics for a single object are viewable in the Statistics tab of the object Properties form



List populated with statistics when a collection policy is applied

Collect network and server performance statistics on demand

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5 · 1 · 20

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Statistics for a single object are viewable in the **Statistics** tab of the **Properties** form. Each displayed statistics class corresponds to a MIB table or to an accounting file on the NE. When a collection policy is applied, the list is populated with rows of statistics that are collected from the MIBs or accounting files specified in the policy.

The **Statistics** tab on the **Properties** form allows operators to collect network and server performance statistics on demand by clicking on the **Collect** button. The MIB associated with the selected statistics type is polled and one row appears in the statistics list. The record type is On-Demand, which indicates that the row is not collected using a collection policy.

The **Collect All** button collects one on-demand statistics record for each statistic type that the object supports. This is useful for collecting different types of statistics at the same time.

On-demand collection is not available for accounting statistics. Accounting statistics are available only in the 5620 SAM after an NE transfers an accounting statistics file to the 5620 SAM.

The top section of a statistics tab contains a drop-down menu of statistics classes for the object, and a filter that can be configured to limit the number of listed statistics, for example, statistics collected during a specific time period. You can open a listed entry to display a Statistics Record form that lists each counter and value, and contains information about the record collection.

The 5620 SAM operator can quickly sort a list of statistics by clicking on a list column heading, for example, Time Captured or Record Type, and can customize the sorting by right-clicking on the list heading and choosing **Show Sorting** from the contextual menu.

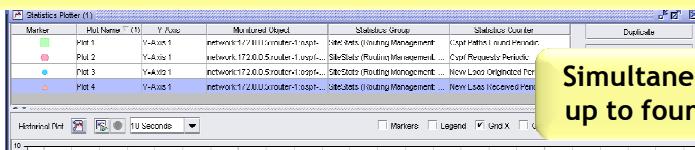
The statistics list can be exported to a file by right-clicking on the list heading and choosing **Save to File** from the contextual menu.

2.2 Graphical Statistics View

Statistics viewed in a graph using the 5620 SAM statistics plotter

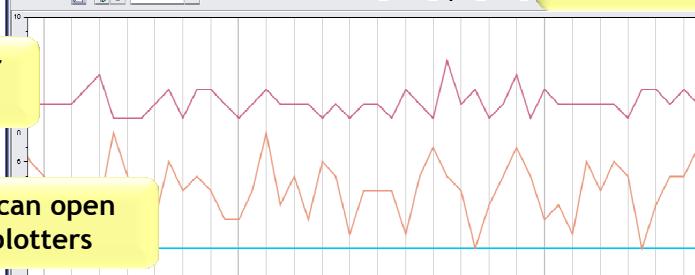


Can display performance, accounting, and server performance statistics simultaneously using dual axes

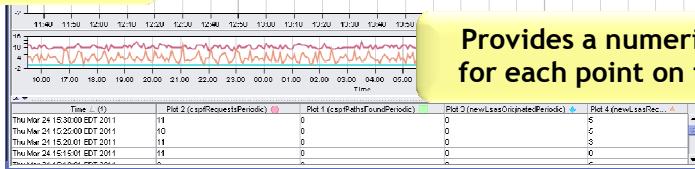


Simultaneously plot up to four counters

Can plot real-time or historical statistics



Each 5620 SAM client can open up to five statistics plotters



Provides a numerical value for each point on the graph

5 · 1 · 21
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5620 SAM - R12.0 Fundamentals

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Statistics can be viewed in a graph using the 5620 SAM statistics plotter. The plotter can display multiple performance, accounting, and server performance statistics simultaneously using dual axes. The plotter also provides a numerical value for each point on the graph.

Each 5620 SAM client can open up to five statistics plotters, and each plotter can simultaneously plot up to four counters. Plotters can have independent Y axes on the left and right sides of a graph, and any counter can be assigned to one of the Y axes.

2.3 – 5620 SAM Statistics Plotter

Historical plots use statistics that are stored in the 5620 SAM database

Real-time plots collect statistics while the plotter window is open and plot the data as it is collected

SAM allows on-demand collection of Performance and Server Performance statistics

Performance statistics are collected from NE MIBs and converted to periodic values

Accounting statistics are collected, filtered, as required, and converted to periodic values

SAM calculates periodic values by subtracting the previous counter value from the current counter value

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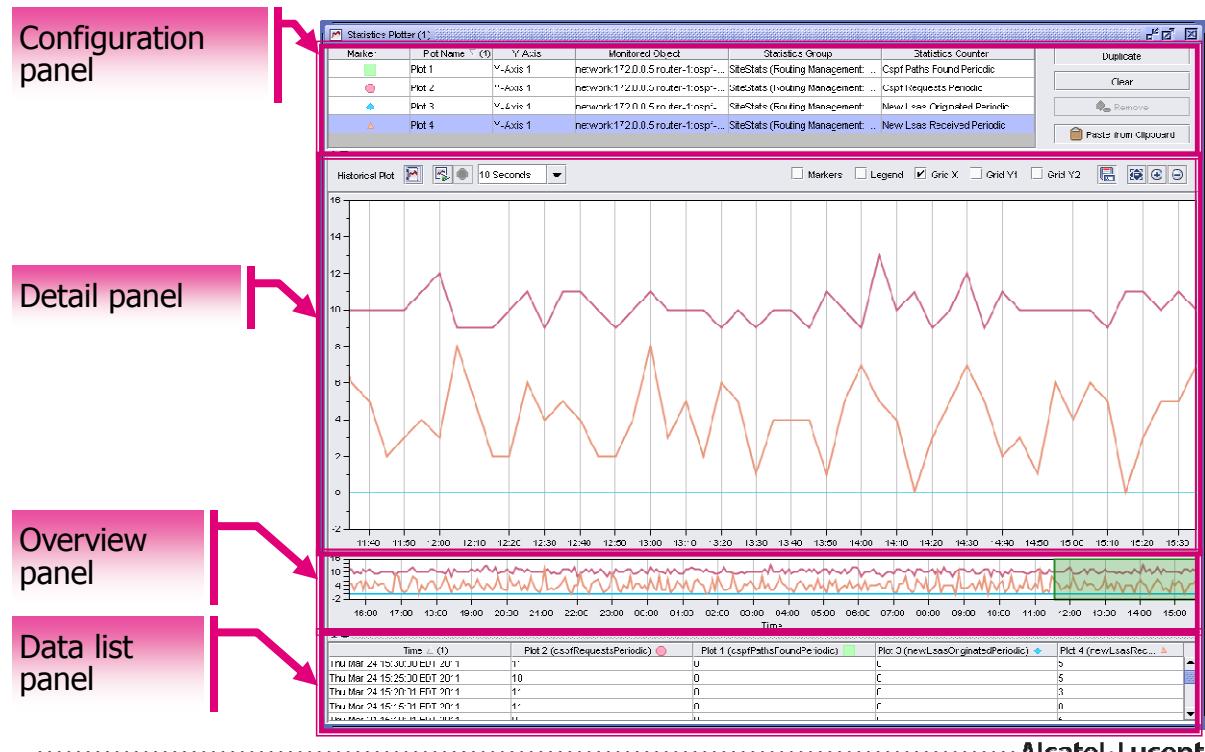
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A 5620 SAM statistic Plotter can plot real-time or historical statistics. Historical plots use statistics from earlier collections that are stored in the 5620 SAM database. The plotter automatically plots all of the stored values for the specified counter. Real-time plots collect statistics while the plotter window is open and plot the data as it is collected.

For real-time statistics, when multiple 5620 SAM clients each have multiple open plotters that are displaying multiple counters, a high volume of statistics is collected from the NEs. If the collection for many of the plotters is from the same NE, the NE is polled independently for each plotter, which may affect performance. System administrators can use a scope of command role to limit plotter access to specific 5620 SAM user groups.

Performance statistics are collected from NE MIBs and converted to periodic values. Accounting statistics are collected, filtered, as required, for example, by queue ID for network ingress objects, and converted to periodic values. The 5620 SAM calculates periodic values by subtracting the previous counter value from the current counter value. Periodic data is typically more useful than raw counter values for troubleshooting and trend analysis.

2.4 – 5620 SAM Statistics Plotter Components



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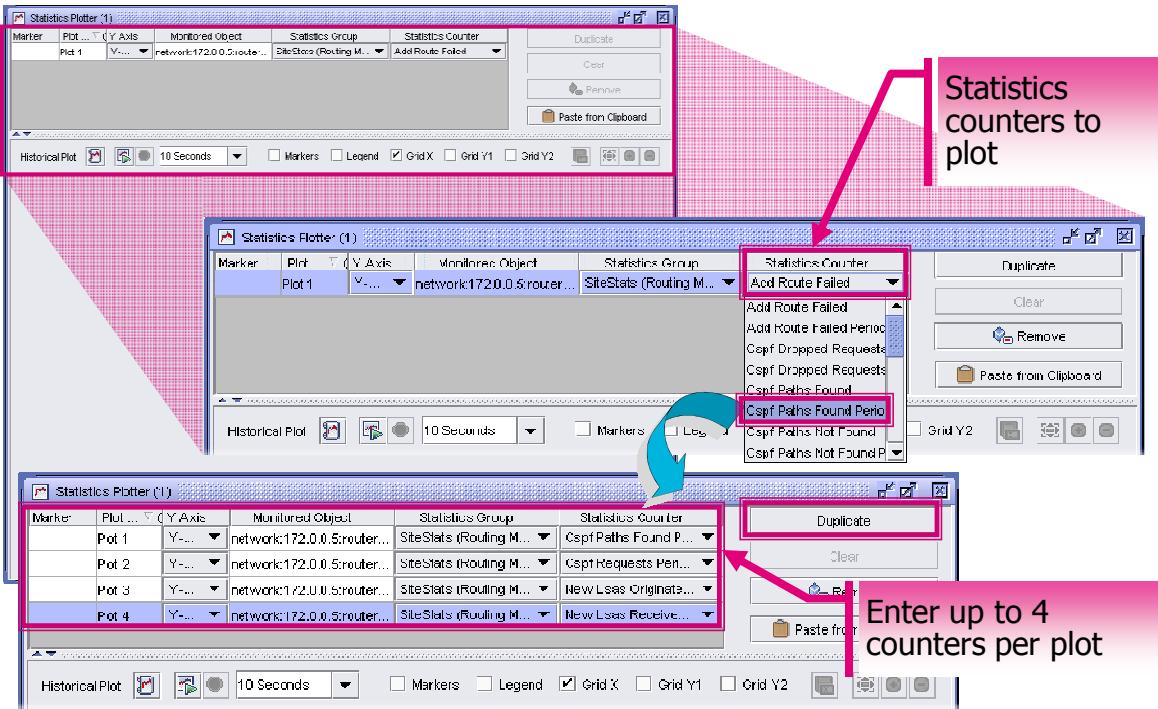
5 • 1 • 23
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The 5620 SAM client GUI can display real-time and historical statistics line graphs of many statistics types. The figure above shows the 5620 SAM Statistics Plotter form and the panels it contains.

The operator can maximize or minimize a panel by clicking on the up or down arrow on the left side of the divider bar between it and the neighboring panel.

2.4.1 Configuration Panel



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The configuration panel identifies the objects and statistics counters in a graph. Operators can enter up to four counters in this panel. The Configuration panel contains the following columns:

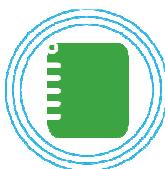
- **Marker** displays the data points as markers in the detail panel
- **Plot Name** identifies the plots in the graph
- **Y Axis** allows you to choose Y Axis 1 or Y Axis 2
- **Monitored Object** lists the monitored objects
- **Statistics Group** allows you to choose the statistics class for the object
- **Statistics Counter** allows you to choose the statistics counter for the object

On the configuration panel of the **Statistics Plotter** form, click on a plot in the **Statistics Counter** column and choose a statistics counter from the drop-down list.

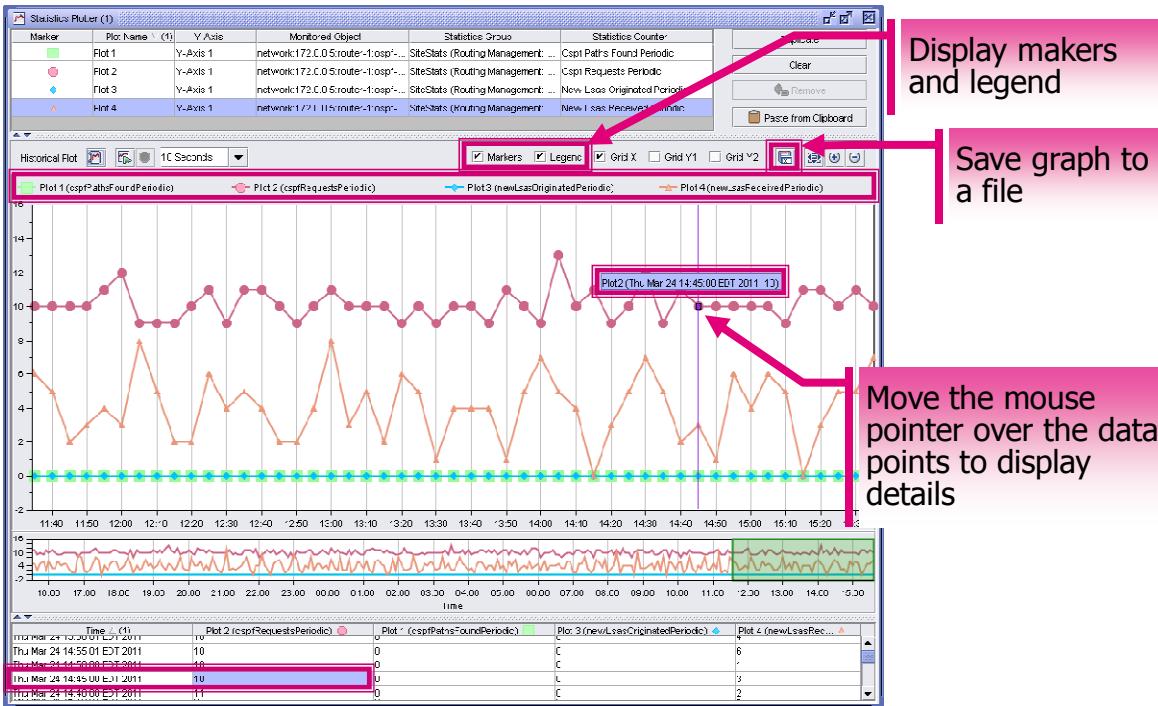
- Add a plot to the statistics plotter duplicate the existing object.
If the same monitored object is used, the statistics counter must be unique.

Note

A statistics graph can plot up to four statistics counters. The statistics counters can all be the same when there are four different monitored objects. If only one monitored object is used, each statistics counter must be unique.



2.4.2 Detail Panel



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The detail panel contains the plotted statistics line graphs. The panel can display historical or real-time graphs, but not both in the same plot.

The historical graphs use the data stored in the 5620 SAM database. To create a graph using historical statistics, click on the **Historical Plot**

button. The statistics that are stored in the database for the selected statistics counters are plotted in the detail panel.

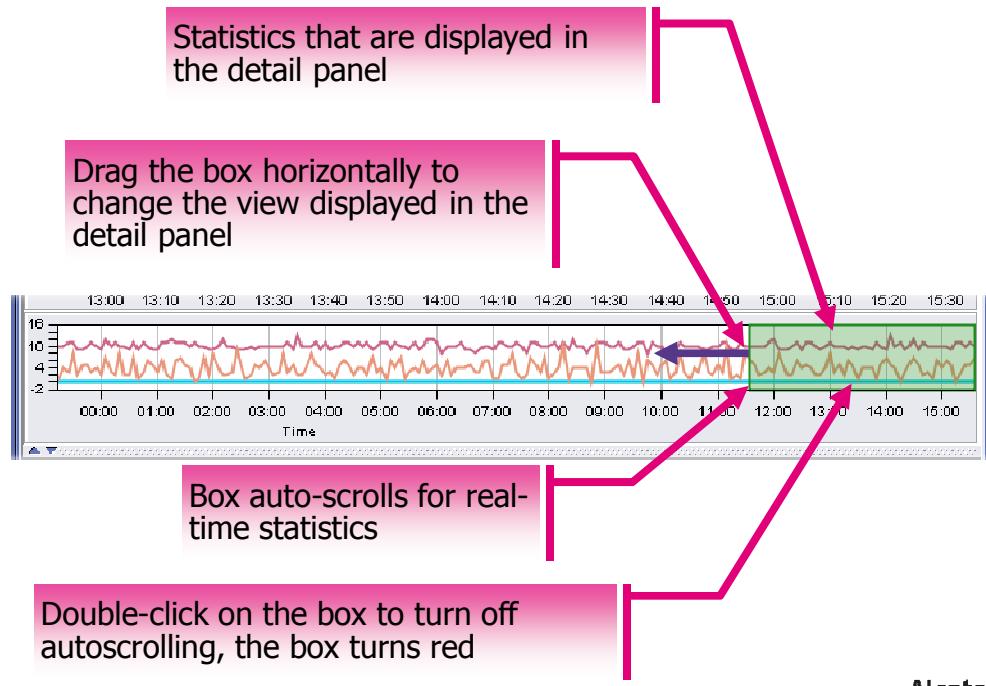
The real-time graphs start collection after the plotter opens. To create a real-time statistics graph choose in the configuration panel a polling interval from the **Real-time Polling Interval** drop-down menu, or enter a value between 10 and 3600 seconds. Click on the **Real-time Plot** button. The detail panel displays the plotted statistics using the configured polling interval.

From the detail panel the user can enable or disable automatic scrolling for real-time statistics.

Operators and network administrators can view more information in the detail panel by performing one or more of the following:

- To display a legend in the detail panel, select the **Legend** check box.
- To display the data points for each plot in the detail panel, select the **Markers** check box.
- To display the X-axis grid lines, select the **Grid X** check box. This check box is selected by default.
- To display the Y1 grid lines, select the **Grid Y1** check box. The Y1 axis is displayed on the left side of the detail panel. The grid lines are displayed only if the Y1 axis is in use.
- To display the Y2 grid lines, select the **Grid Y2** check box. The Y2 axis is displayed on the right side of the detail panel. The grid lines are displayed only if the Y2 axis is in use.
- To resize the objects in the detail panel, click on the **Zoom in Tool** and **Zoom out Tool** buttons; click on the **Reset Zoom** tool button to return to the default graph view.
- To display a tooltip for a plot, move the mouse pointer over the data points in the detail panel. A tooltip identifies the plot number, the statistics collection interval, and the statistics value at that interval. In addition, the data point entry will be highlighted in the Data List panel.
- To save a graph to file with or without the legend or markers click on the **Save to File** button. Only the detail that appears in the detail panel is saved.

2.4.3 Overview Panel

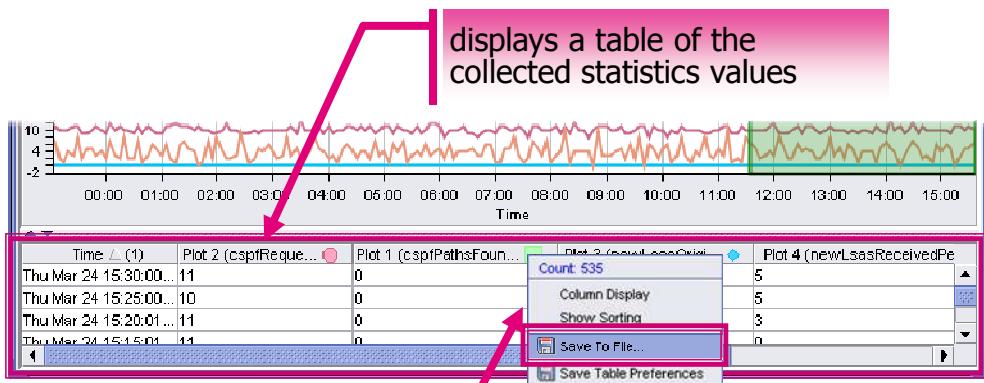


The overview panel displays a high-level view of the plot data. The shaded box in the panel contains the statistics that are displayed in the detail panel.

To change the view displayed in the detail panel, click on the green box in the overview panel and drag the box horizontally.

When real-time statistics are being plotted and the shaded box is not selected, the box autoscrolls to show the latest statistics. For real-time statistics plotting, operators and network administrators can set automatic scrolling to on or off. To turn off or on autoscrolling, double-click on the box. The box is green when automatic scrolling is enabled, and red when it is disabled. When automatic scrolling is disabled, the detail panel remains in the location shown in the red box.

2.4.4 Data List Panel



The data panel displays a table of the collected values for the statistics counters that are being plotted. The statistics table results listed in the data panel can be saved to a file in CSV or HTML format.

Knowledge Verification - SAM Statistics Collection



For what type of statistics the 5620 SAM does not allow on-demand collection?

- a. Performance statistics
- b. Accounting statistics
- c. Server performance statistics

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Choose the correct answer for the knowledge verification question above.

How To Do It



How to do it

Instructor DEMO how to:

Launch a statistics plotter

Identify the statistics plotter components

5 · 1 · 29

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Your instructor may perform the above mentioned demonstrations using the 5620 SAM GUI.

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Questions



5 · 1 · 31

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1. The 5620 SAM collects performance statistics by polling...
 - a. Management information base (MIB) counters.
 - b. Accounting files.
 - c. Internal format.
2. The 5620 SAM collected accounting statistics can be used to...
 - a. monitor the use of physical and logical network elements in near-real time.
 - b. feed into a billing application and to determine customer service usage and SLAs compliance.
 - c. provide information about 5620 SAM server performance.
3. The 5620 SAM allows on-demand collection of what type of statistics?
 - a. Performance statistics
 - b. Accounting statistics
 - c. Server performance statistics
 - d. None of the above
4. What protocol is used to transfer performance statistics files from the 7x50 router to the 5620 SAM Server?
 - a. FTP
 - b. SNMP
 - c. OSPF
 - d. None of the above

Answers



1. The 5620 SAM collects performance statistics by polling...
 - a. **Management information base (MIB) counters.** ✓
 - b. Accounting files.
 - c. Internal format.

2. The 5620 SAM collected accounting statistics can be used to...
 - a. monitor the use of physical and logical network elements in near-real time.
 - b. **feed into a billing application and to determine customer service usage and SLAs compliance.** ✓
 - c. provide information about 5620 SAM server performance.

3. The 5620 SAM allows on-demand collection of what type of statistics?
 - a. **Performance statistics** ✓
 - b. Accounting statistics
 - c. **Server performance statistics** ✓
 - d. None of the above

4. What protocol is used to transfer performance statistics files from the 7x50 router to the 5620 SAM Server?
 - a. FTP
 - b. **SNMP** ✓
 - c. OSPF
 - d. None of the above



This module covered:

- The 5620 SAM statistics collection capabilities
- Type of statistics 5620 SAM collects
- The flow of statistics collected from managed NEs and transferred to OSS applications
- The elements of the 5620 SAM statistics presentations:
 - Tabular statistics view
 - Graphical statistics view
- The functions of the 5620 SAM statistics plotter components



End of module
5620 SAM Statistics Overview

5 · 1 · 34

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Section 5
Performance Management
Module 2
Performance Statistics

TOS36033_V4.0-SG-R12.0-Ed1 Module 5.2 Edition 2

5620 SAM
R12.0 Fundamentals
TOS36033_V4.0-SG Edition 1

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Document History			
Edition	Date	Author	Remarks
1.0	2011-04-20	GARCIA LOZANO, René	TOS36033_V1.0 – SAM 9.0 (R1 update)
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2.0	2012-03-30	LOLLIERIC, Pascal	TOS36033_V2.0 – SAM 10.0 (R1 update)
2.1	2012-08-18	GARCIA LOZANO, René	TOS36033_V2.1 – SAM 10.0 (R1 vILT conversion)
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4.0	2014-05-26	GARCIA LOZANO, René	TOS36033_V4.0 – SAM 12.0 (update)



Upon completion of this module, you should be able to:

- Identify the purpose of collecting performance statistics
- Describe the performance statistics collection process using the 5620 SAM
- List the type of policies available to collect performance statistics using the 5620 SAM
- Identify the relationship between NE MIB statistics policies and specific MIB statistics policies
- Describe the process to:
 - configure the 5620 SAM for performance statistics scheduled collection and on-demand collection
 - collect and display real-time performance statistics
 - create real-time performance statistics graphics

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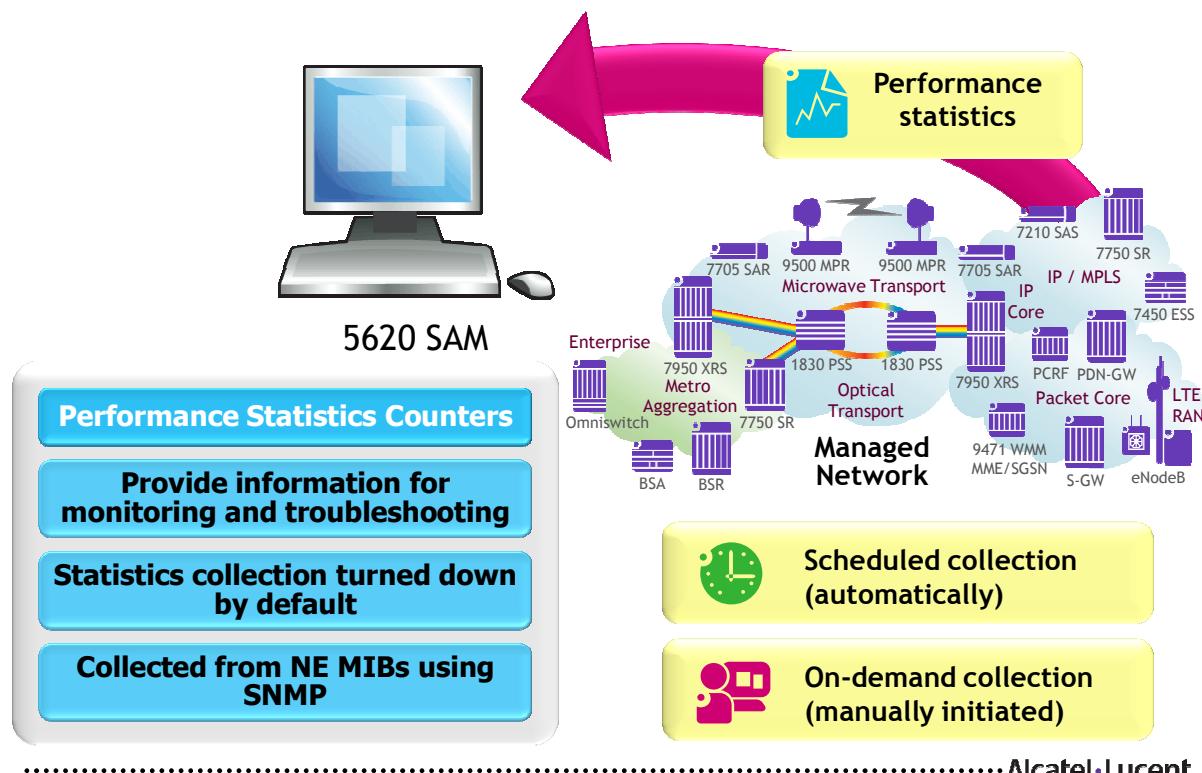


	Page
1 Performance Statistics Collection	7
1.1 Performance Statistics Collection Overview	8
2 Scheduled Performance Statistics Collection	10
2.1 Scheduled Performance Statistics Collection Overview	11
2.2 NE MIB Statistics Policies	12
2.3 Specific MIB Statistics Policies	13
2.4 NE MIB and Specific MIB Statistics Policies	14
2.5 NE MIB Statistics Policy Configuration Workflow	16
2.6 Specific MIB Statistics Policy Configuration Workflow	17
How To Do It and Exercises	18
2.7 Viewing Scheduled Performance Statistics Records	19
2.7.1 Scheduled Performance Statistics Tabular View	20
2.7.2 Scheduled Performance Statistics Graphical View	21
2.7.3 View Scheduled Statistics Bottom-up Method Workflow	22
2.7.4 View Scheduled Statistics Top-down Method Workflow	23
How To Do It and Exercises	24
3 On-Demand Performance Statistics Collection	25
3.1 On-Demand Performance Statistics Collection	26
3.2 Real-Time Performance Statistics	28
3.2.1 Real-Time Performance Statistics Collection Workflow	29
3.2.2 Saving Real-Time Performance Statistics	30
3.2.3 Real-Time Statistics Data Collection Settings	31
How To Do It and Exercises	32
Questions	33
Answers	34
Module Summary	35

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1 Performance Statistics Collection

1.1 Performance Statistics Collection Overview



5 · 2 · 8

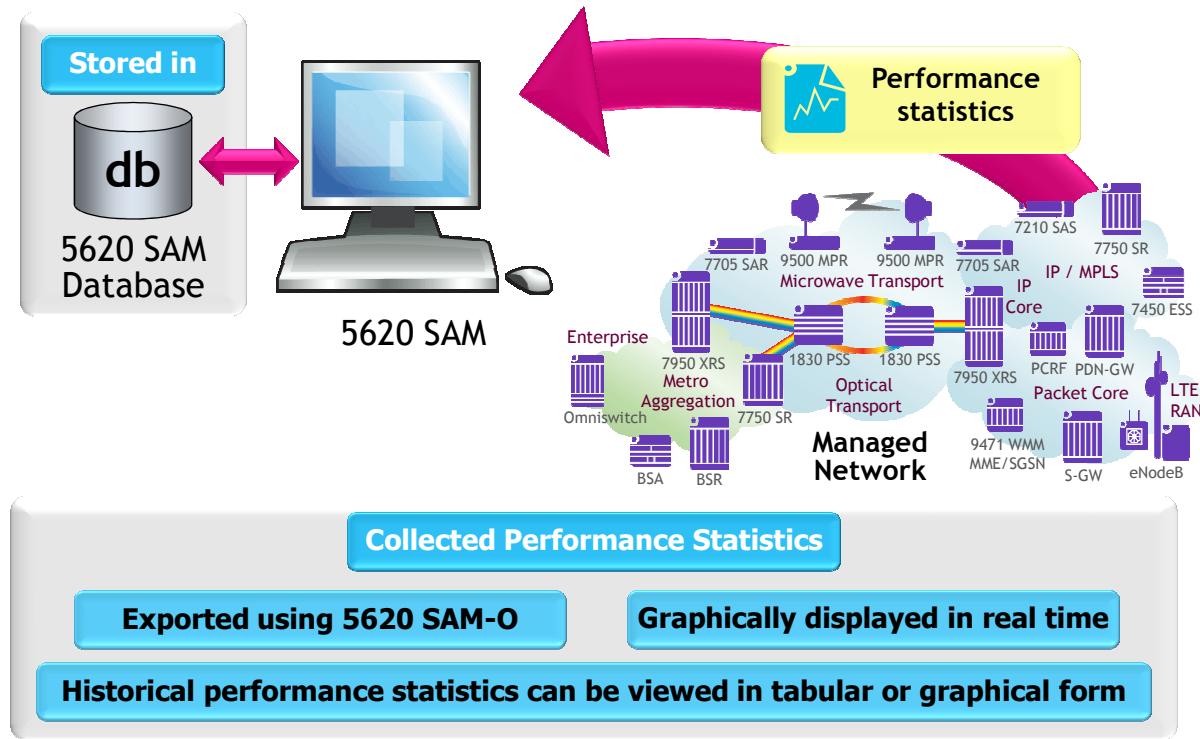
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Performance statistics are counters that typically provide information for monitoring and troubleshooting purposes on physical equipment, routing, and other aspects of the NE. Collecting performance statistics can be CPU intensive and therefore, all statistics are turned down after the initial installation of the 5620 SAM.

Performance statistics counters are collected from NE management information bases (MIBs) using SNMP. The network administrator or operator may configure the 5620 SAM to collect statistics automatically, referred to as **scheduled**, or they may initiate an instance for collecting statistics at any time, also referred to as **on-demand**.

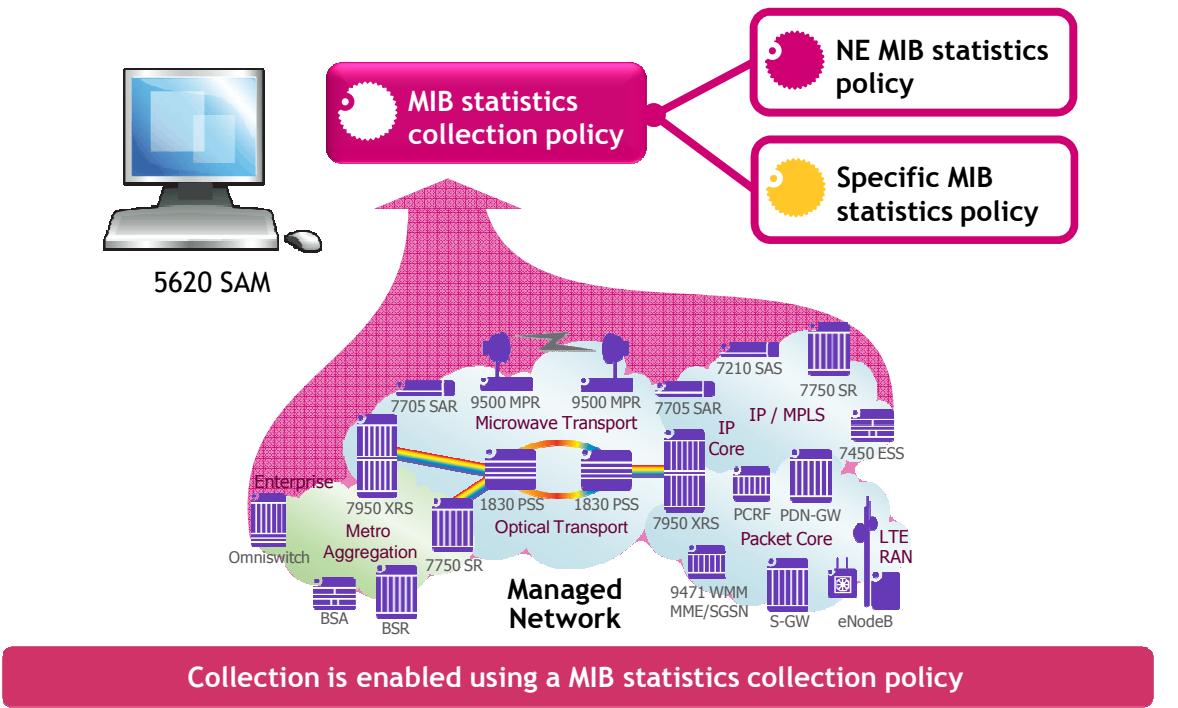
1.1 Performance Statistics Collection Overview [cont.]



Collected performance statistics are stored in the 5620 SAM database and can be graphically displayed in real time, or exported using the 5620 SAM-O interface. Historical performance statistics can be viewed in tabular or graphical form using the 5620 SAM client GUI.

2 Scheduled Performance Statistics Collection

2.1 Scheduled Performance Statistics Collection Overview



5 · 2 · 11
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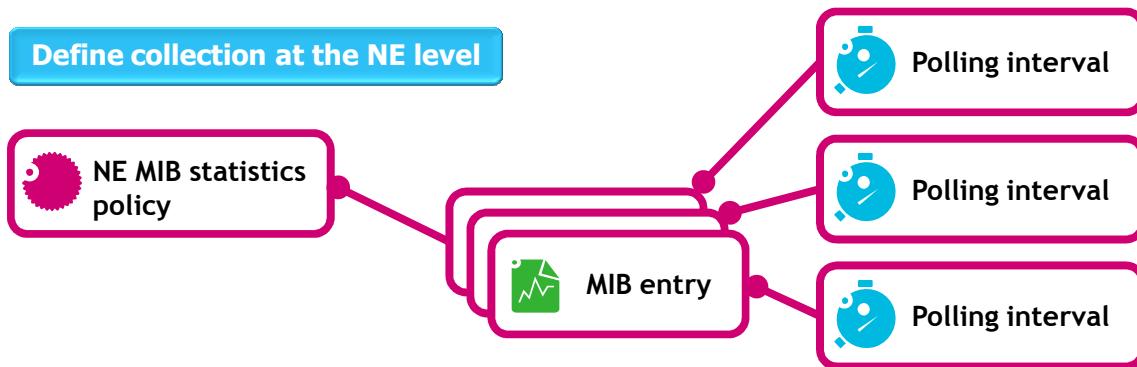
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Scheduled performance statistics collection is enabled using a MIB statistics collection policy and associating the policy with one or more NEs or specific objects within the NEs, for example, ports. For greater efficiency and collection granularity, the following types of MIB statistics policies are available:

- **NE MIB statistics policies**
- **specific MIB statistics policies**

2.2 NE MIB Statistics Policies

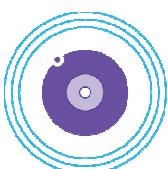


Technical Reference

Lists of lists of the MIB-based performance statistics that the 5620 SAM supports ***Alcatel-Lucent 5620 SAM Statistics Management Guide***

NE MIB statistics policies define collection at the NE level. An NE MIB statistics policy contains a list of the MIB entry policies that are invoked for all objects on the NE.

The NE MIB policy also specifies polling interval for each MIB entry. The Polling Interval specifies how often MIB elements of discovered and managed devices are polled for changes. When changes are detected, the 5620 SAM rereads the MIB element and updates the database.

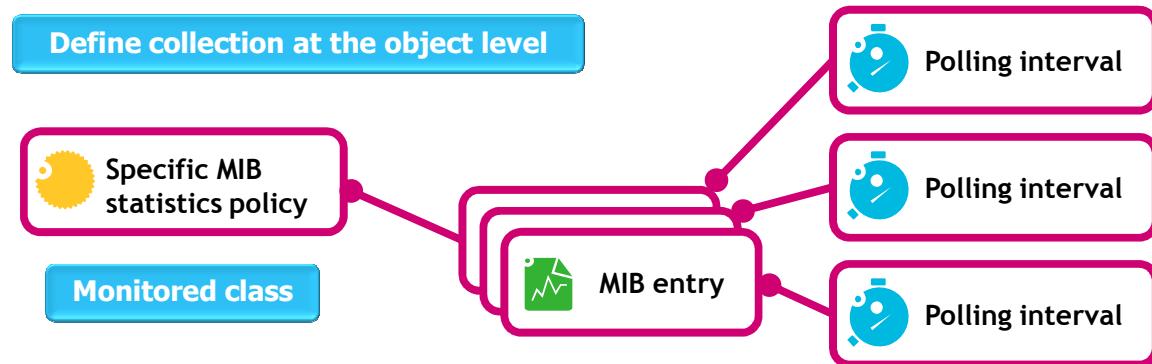


Technical Reference

See the ***Alcatel-Lucent 5620 SAM Statistics Management Guide*** for lists of the MIB-based performance statistics that the 5620 SAM supports.

For MIB-based performance statistics supported by other release versions of the 5620 SAM, refer to the corresponding 5620 SAM release documentation.

2.3 Specific MIB Statistics Policies

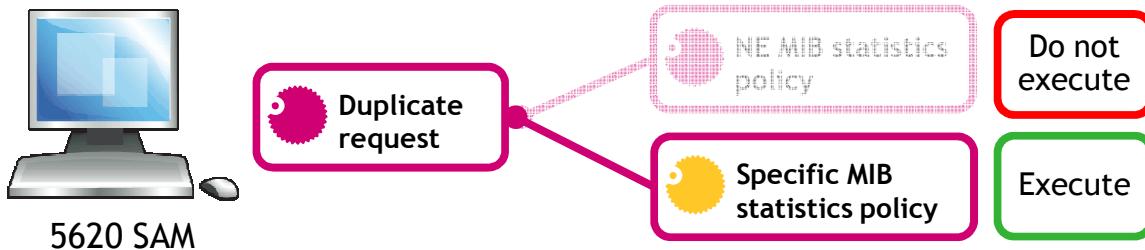


Monitored object instances must be specified in specific MIB statistics policy

Specific MIB statistics policies define collection at the object level. A specific MIB statistics policy contains the same list of MIB entry policies as an NE MIB statistics policy, but the MIB entry policies are applied only to the objects specified in the specific MIB statistics policy. A specific MIB statistics policy uses the concept of a monitored class, which is the type of object on which to collect statistics, for example, a port or service site. The monitored object instances must be specified in the specific MIB statistics policy. For example, if port is selected as the monitored object, then the actual ports in the network to which the policy applies must be specified, and become part of the policy.

The Specific MIB policy allows operators to define a polling interval for each MIB entry for the monitored object.

2.4 NE MIB and Specific MIB Statistics Policies



Alcatel-Lucent recommendation



Use to collect statistics from all instances of an object on an NE



Use to enable or disable collection for specific NE MIB objects

NE MIB policies can be specified in NE discovery rules

Before the 5620 SAM performs a statistics collection based on a MIB statistics policy, it checks for duplicate collection requests, such as when the same object is included in an NE MIB policy and a specific MIB policy. If a duplicate request is found, the 5620 SAM performs the collection on the object based on the specific policy rather than on the NE policy.

For performance reasons, Alcatel-Lucent recommends using NE MIB policies to collect statistics from all instances of an object on an NE, and specific policies to enable or disable collection for specific NE MIB objects. This is a much more efficient use of NE resources than using a specific policy in which each object instance is specified. For example, you can configure an NE MIB policy to collect OSPF routing statistics on all the routing instances of the NE, and use a specific MIB policy to collect statistics on a subset of the routing instances.

NE MIB policies can be specified in NE discovery rules to ensure that statistics collection starts immediately after the NE is discovered. Specific MIB policies must be updated manually for specific objects on the new NE after it is discovered or new objects are created.

2.4 NE MIB and Specific MIB Statistics Policies [cont.]



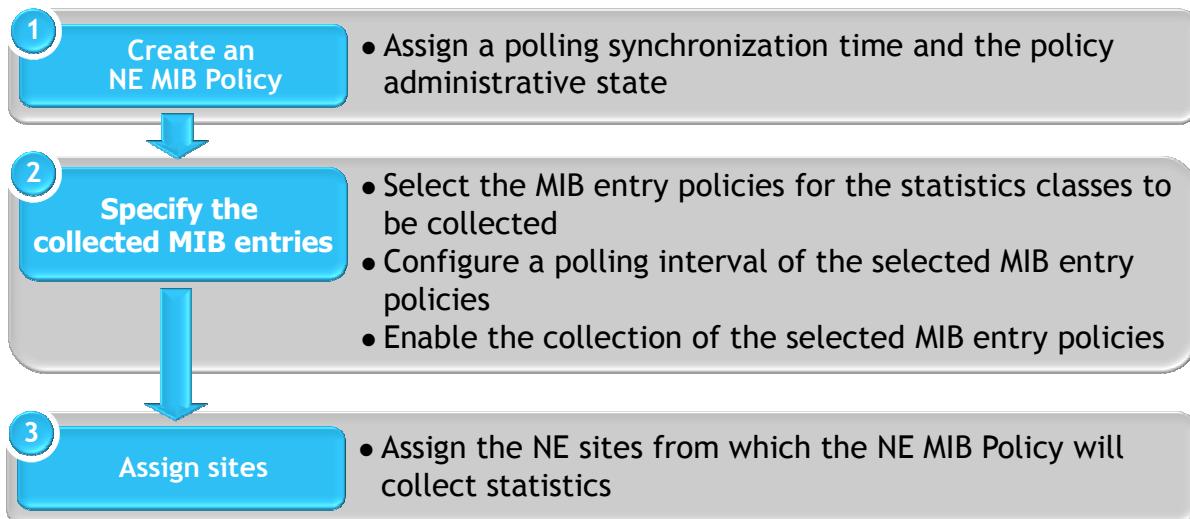
NE MIB policy	Specific MIB policy	Action
Collect	Collect	Statistic is collected once
Do not collect	Do not collect	Statistic is not collected
Collect	Do not collect	Statistic is not collected
Do not collect	Collect	Statistic is collected

Specific and NE MIB policies can operate together to streamline statistics collection

Specific and NE MIB policies can operate together to streamline statistics collection. Specific MIB policy settings override NE MIB policy settings. The table above summarizes the specific MIB statistics policy overrides for an object.

For example, to collect network port statistics at 5-min intervals and access port statistics at 15-min intervals, you can create an NE MIB policy for all ports with a 15-min collection interval and create a specific policy for network ports with a 5-min collection interval. At every third interval, when the two policy activations coincide, the NE policy is used and duplicate collection is prevented.

2.5 NE MIB Statistics Policy Configuration Workflow



Configuring an NE MIB Statistics Policy

5 · 2 · 16
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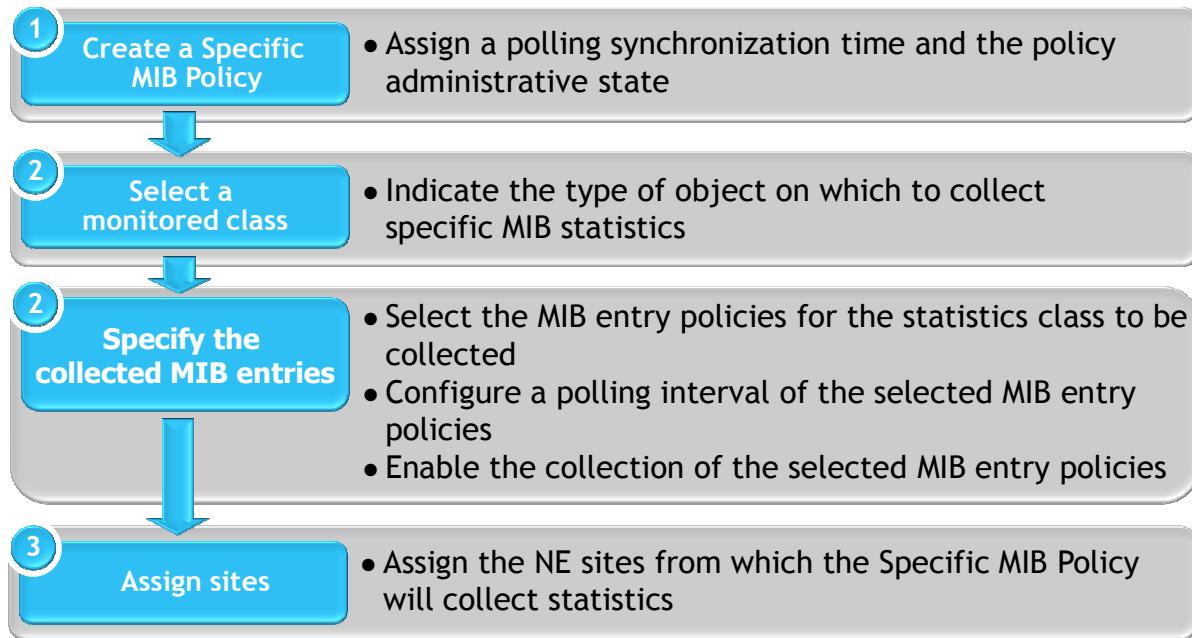
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Scheduled NE MIB statistics collection is performed through configuring a policy which will permit the network administrator or operator to specify the collected object MIB, set the collection time interval and then enable the policy.

The following workflow and the diagram above outline the high-level steps necessary to configure an NE MIB performance statistics policy using the 5620 SAM:

1. Create an NE MIB performance statistics policy assigning a polling synchronization time and the policy administrative state
2. Specify the collected MIB entries.
 Select the MIB entry policies for the statistics classes that will be collected with the NE MIB policy.
 Configure a polling interval of the selected MIB entry policies for the statistics classes to be collected.
 Set the administrative state to enable or disable the collection of the selected MIB entry policies.
3. Assign NE sites from which the NE MIB Policy will collect data for the configured statistics classes.

2.6 Specific MIB Statistics Policy Configuration Workflow



Configuring a Specific MIB Statistics Policy

5 · 2 · 17
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Specific MIB statistics policies can operate together with NE MIB Policies allowing the network administrator or operator enable or disable collection for specific MIB objects.

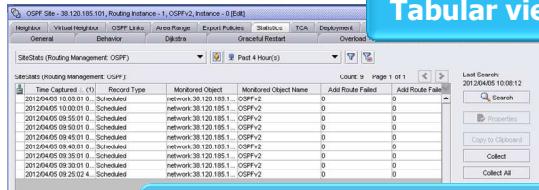
The following workflow and the diagram above outline the high-level steps necessary to configure a specific MIB performance statistics policy using the 5620 SAM:

1. Create a specific MIB performance statistics policy assigning a polling synchronization time and the policy administrative state.
2. Select a monitored class. The monitored class indicates the type of object on which to collect specific MIB statistics.
3. Specify the collected MIB entries.
 Select the MIB entry policies for the statistics classes that will be collected with the NE MIB policy.
 Configure a polling interval of the selected MIB entry policies for the statistics classes to be collected.
 Set the administrative state to enable or disable the collection of the selected MIB entry policies.
4. Assign NE sites form which the NE MIB Policy will collect data for the configured statistics classes.

2.7 Viewing Scheduled Performance Statistics Records



5620 SAM GUI Client



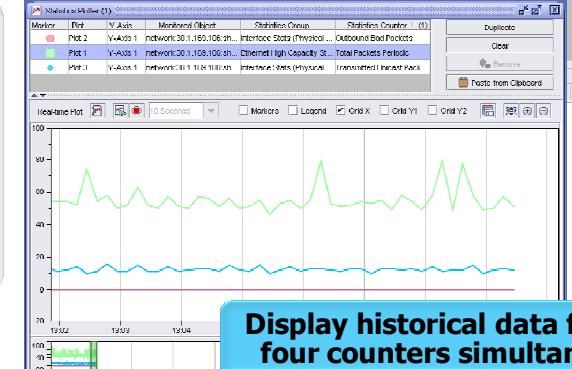
Tabular view

List values for the each of the counters in a statistics class

Methods for specifying scheduled statistics to present

Bottom-up

Top-down



Display historical data for up to four counters simultaneously

Graphical view

5 · 2 · 19
 Performance Management - Performance Statistics
 5620 SAM - R12.0 Fundamentals

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The 5620 SAM Client GUI allows network administrators or operators to view scheduled statistics records in tables or graphs for all statistics types that the 5620 SAM supports.

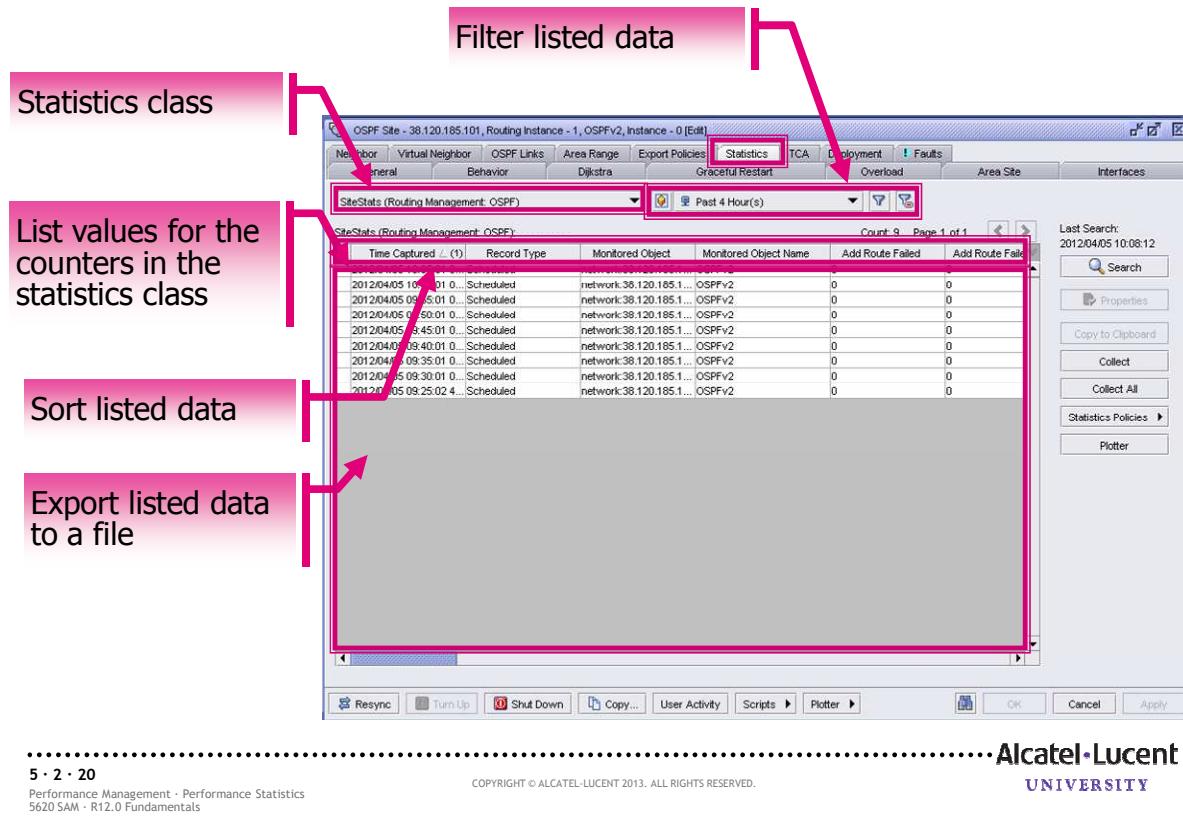
Scheduled statistics in a table list values for the each of the counters in a statistics class as they were recorded from monitored objects according to the assigned statistics policy.

Scheduled statistics in a graph can displaying historical records for up to four counters simultaneously.

There are two methods for specifying the scheduled statistics to present in a table or graph:

- **bottom-up method** involves navigating to the object on which the statistics are collected, such as a SAP, SDP, or network port
- **top-down method** involves opening a browser form using the **Tools→Statistics Browser** option in the 5620 SAM main menu. The browser can display in one list scheduled statistics from multiple objects, for a specific statistics type, or from a specific object.

2.7.1 Scheduled Performance Statistics Tabular View



Statistics tables list the values for the counters in a statistics class, where each displayed statistics class corresponds to a MIB table.

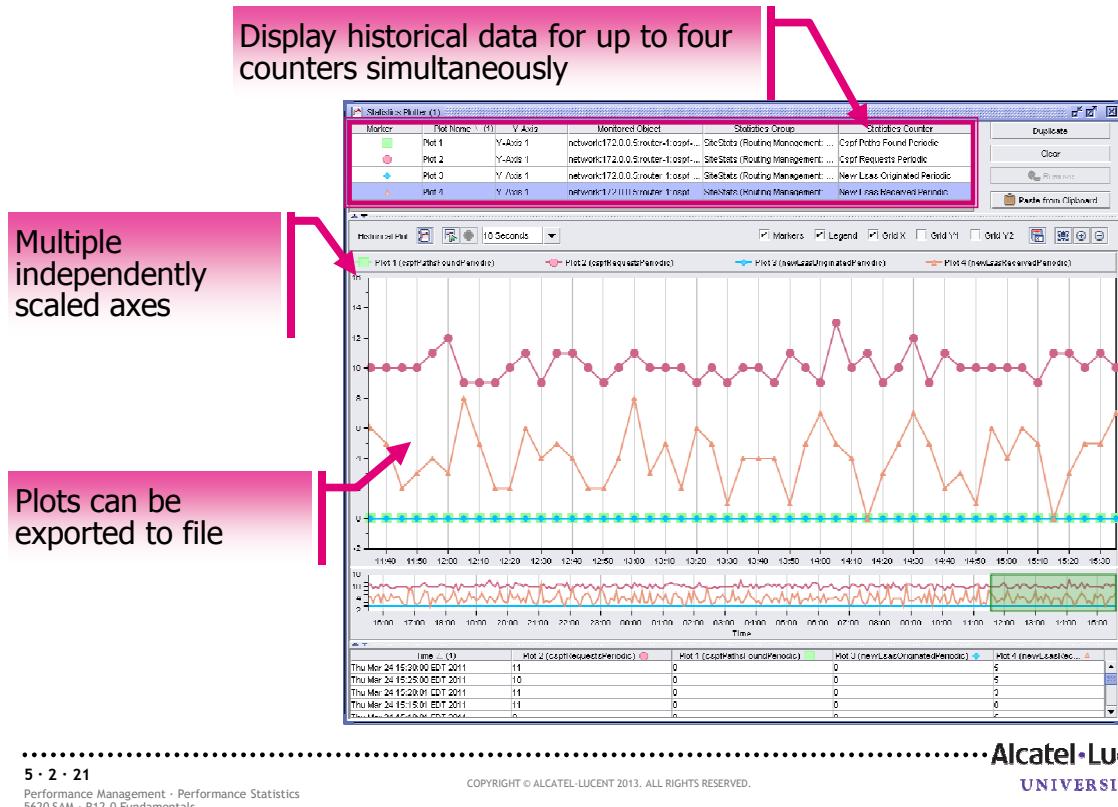
The image above shows a list of scheduled statistics records for a single object displayed in the Statistics tab of the object properties form. The scheduled statistics data recorded from the monitored object according to a statistics policy are shown in the list with a **Record Type** of **Scheduled**. The top section of a statistics tab contains a drop-down menu of statistics classes for the object. It also contains a filter that the network administrator or operator can configure to limit the number of listed statistics, for example, statistics collected during a specific time period.

The data listed in a statistics table can be exported to files in HTML, CSV and plain text formats by right-clicking on the list heading and choosing **Save to File** from the contextual inventory menu.

There are two methods for seeing statistics counter values for a statistics record in the list. The first method consists on scrolling horizontally in the list to view all the statistics counter columns. The list headings allow operators to sort the listed data.

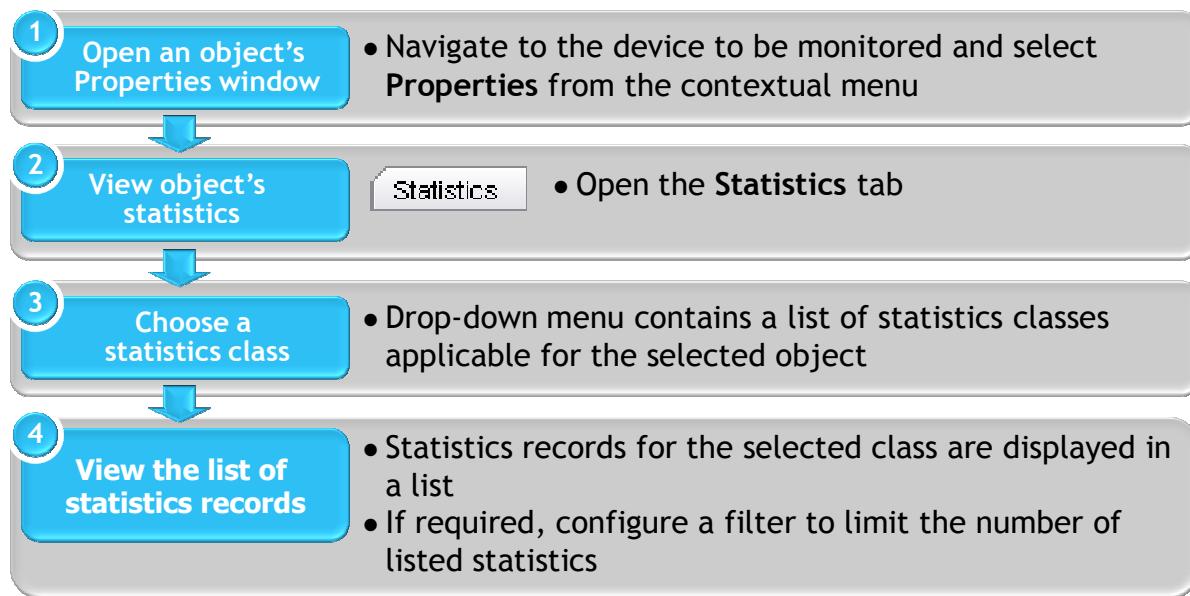
The second method consists on selecting a statistics record and clicking on the **Properties** button, the **Statistics Record** form opens displaying the statistics counter values for the statistics record

2.7.2 Scheduled Performance Statistics Graphical View



Scheduled statistics graphs can help identifying historical trends. A graphical view can display historical statistics records for up to four counters simultaneously. A graph can have multiple independently scaled axes that allow a 5620 SAM operator to visually compare statistics with high numbers, such as throughput statistics, to statistics with very low numbers, such as dropped packet statistics. Plotted graphs can be exported to file in jpeg or png file formats.

2.7.3 View Scheduled Statistics Bottom-up Method Workflow



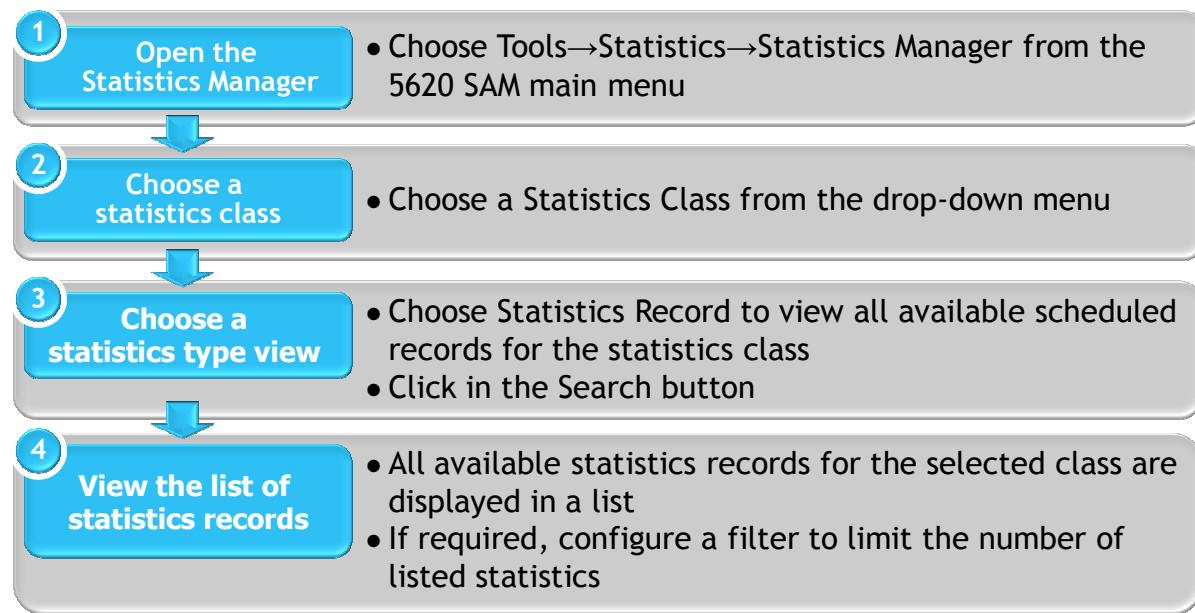
View the scheduled performance statistics data records in a monitored object

The bottom-up method allows the network administrator or operator to view the scheduled performance statistics data records in a monitored object.

The following workflow and the diagram above outline the high-level steps necessary to open a list of statistical data collected for a statistics class in an object using the bottom-up method:

1. Open an object's properties form. For instance, select on the **Navigation Tree** an object that has been assigned to an NE MIB statistics policy or a specific MIB performance statistics collection policy. Right-click on the object to open the contextual menu and choose **Properties** from the contextual menu. The **Object Properties** form opens with the **General** tab displayed.
2. Open the **Statistics** tab. Click on the **Statistics** tab button. The **Statistics** tab contains a statistics classes drop-down menu and a filter which can be configured to limit the number of listed statistics.
3. Choose a statistics class. Use the statistics class object drop-down menu which contains the list of statistics classes applicable for the selected object.
4. View the list of statistics records. The statistics records for the selected statistics class are displayed in a list. If required, configure a filter to limit the number of listed statistics, for example, statistics collected during a specific time period.

2.7.4 View Scheduled Statistics Top-down Method Workflow



View the scheduled performance statistics data records in a set of objects

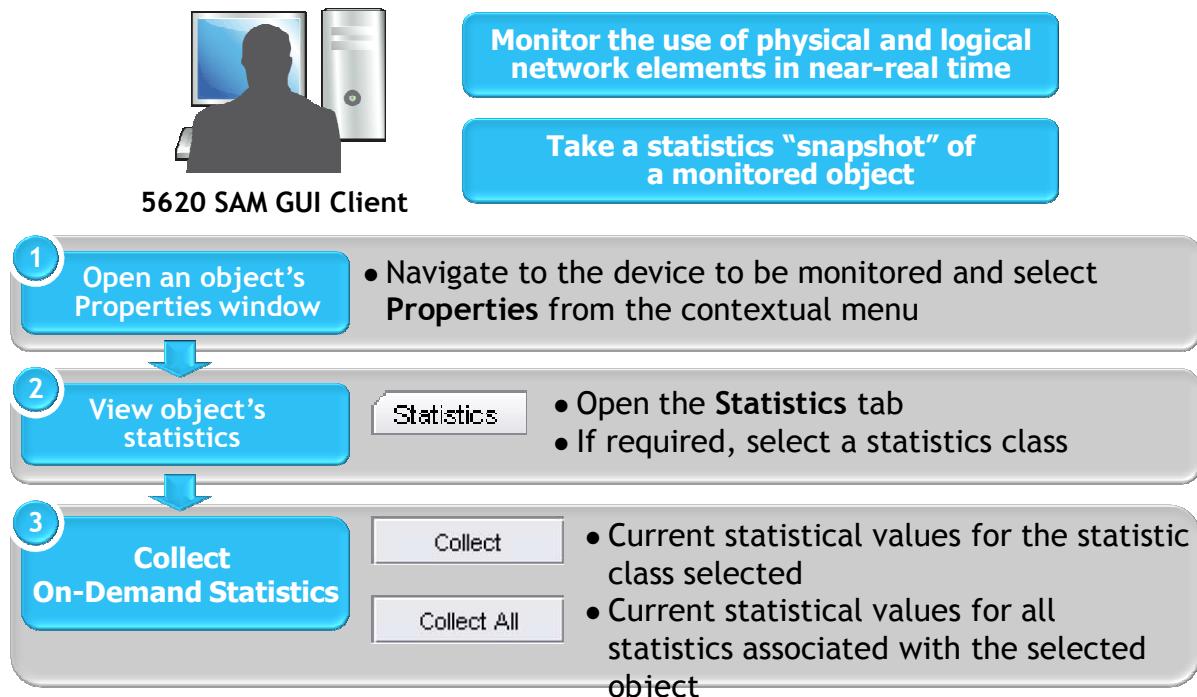
The top-down method allows the network administrator or operator to view scheduled performance statistics data records in a set of objects.

The following workflow and the diagram above outline the high-level steps necessary to open a list of statistical data collected for a statistics class in a set of objects using the top-down method:

1. Open the Statistics Browser. Choose Tools→Statistics→Statistics Manager from the 5620 SAM main menu.
2. Choose a statistics class from the drop-down menu.
3. Choose a **Statistics Type** view. Choose **Statistics Record** from the object drop-down menu to view all available scheduled records for the selected statistics class. Click on the **Search** button.
4. View the list of statistics records. All available statistics records for the selected statistics class are displayed in a list. If required, configure a filter to limit the number of listed statistics, for example, statistics collected during a specific time period.

3 On-Demand Performance Statistics Collection

3.1 On-Demand Performance Statistics Collection



Equipment and object-based performance statistics help operators monitor the use of physical and logical network elements in near-real time. Statistics logs show equipment and logical network object usage rates. Though the network administrator or operator may have enabled automatic collection of statistics, as already discussed, it may become necessary to take a 'snapshot' of the statistics of a monitored object before the next collection interval. The 5620 SAM enables the accommodation of this situation through the collection of on-demand Selective statistics.

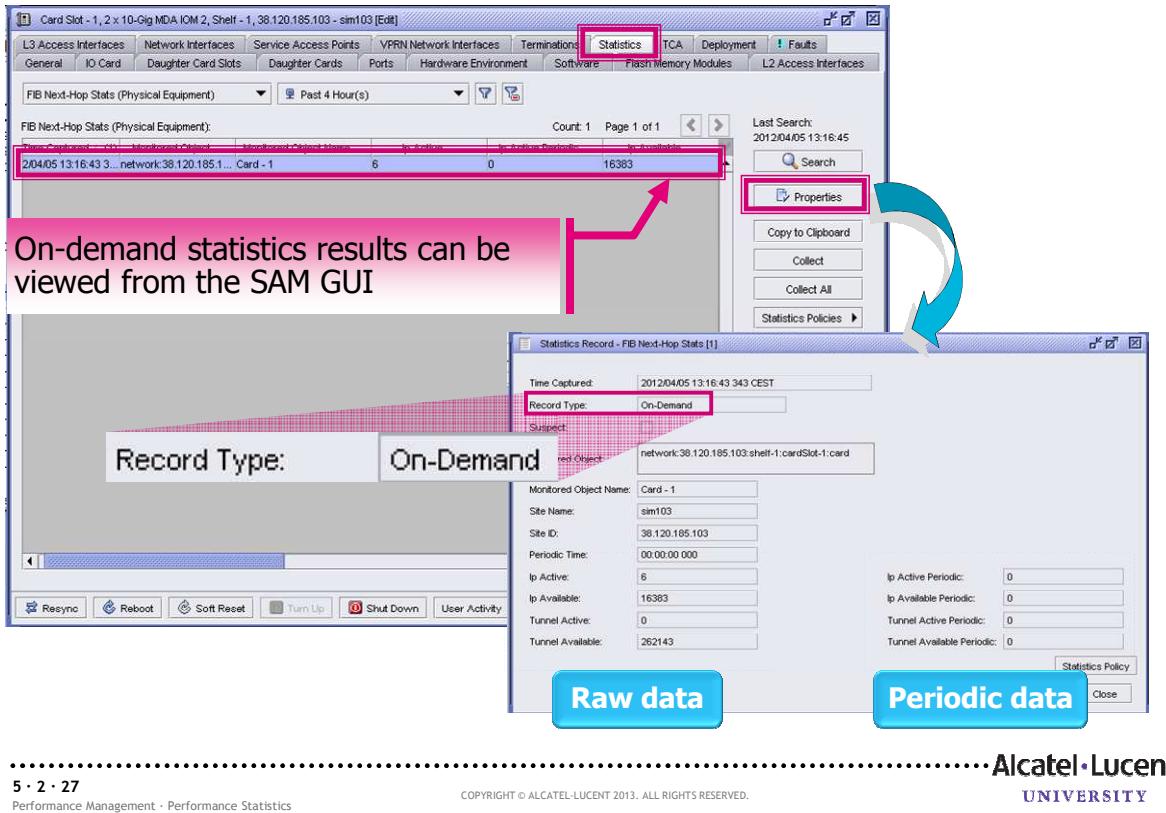
To start the collection process, navigate to the device to be monitored and select **Properties** from the contextual menu.

From the **Properties** window, open the **Statistics** tab. If required, choose a statistics class. The statistics class drop-down menu contains all statistics classes available for the object. At this point, the network operator has the option to collect individual classes of statistics or to collect all available classes by selecting either the **Collect** or **Collect All** button.

Collect - capture the current statistical values of the selected statistic (tab from within the Statistics window) for the selected object. The MIB associated with the selected statistics type is polled and one row appears in the statistics list. The record type is On-Demand, which indicates that the row is not collected using a collection policy.

Collect All - capture the current statistical values for all statistics associated with the selected object. The Collect All collects one on-demand statistics record for each statistic type that the object supports.

3.1 On-Demand Performance Statistics Collection [cont.]



To view the on-demand performance statistics data collected for the monitored object, in the properties form with the Statistics tab open use the Statistics Class drop-down menu to navigate to the appropriate class of statistics to be viewed. Note that an statistics entry with a **Record Type** of **On-Demand** will appear in the Results list corresponding to each time an on-demand collection event was initiated. Use the list to scroll horizontally to view all the statistics counter columns, or select the entry and click on the **Properties** button. The Statistics Record form opens.

In the Statistics Records form, note the Record Type indicates On-demand. Also note that statistics counters in the records form are typically organized in two columns. The left column displays the raw data for the current counter value, which is the cumulative value of statistics collected for the counter since the collection process was launched. The right column displays periodic values, which are the difference (delta) between the current and the previous raw counter values.

3.2 Real-Time Performance Statistics



5620 SAM GUI Client

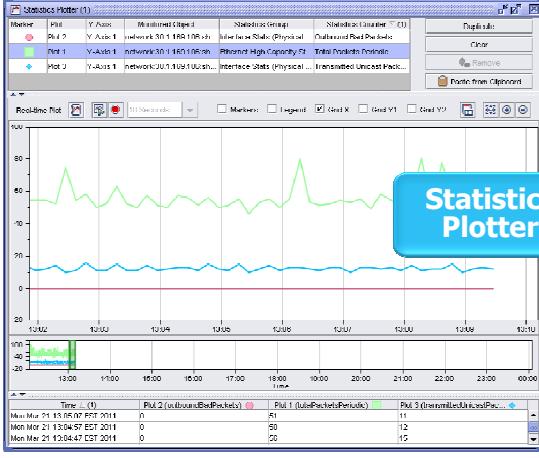
Monitor performance statistics in real time

Real-Time Statistics

Available only for the duration of the session

Not stored in the 5620 SAM database

Displayed in the native format



Statistics Plotter

Statistics Plotter allows choosing units of rate to plot data throughput

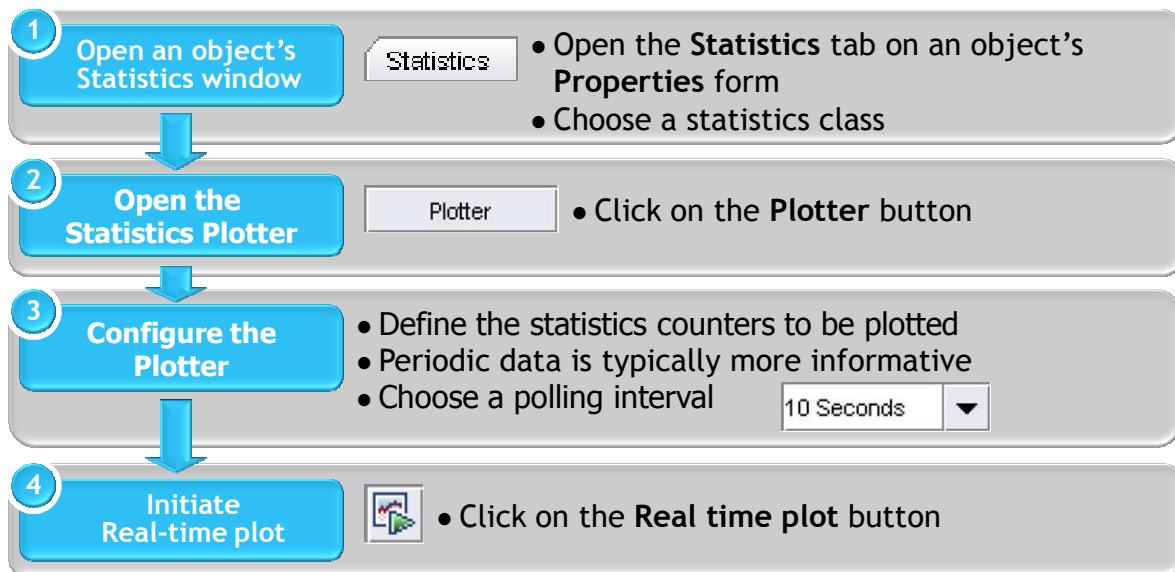
When an operator wants to monitor performance statistics in real time, such as to monitor network traffic levels, the operator typically uses the 5620 SAM Statistics Plotter. The Statistics Plotter queries an NE for the data which is typically presented as raw data, or as calculated periodic values.

Statistics collected for real-time display are available only for the duration of the session and for the operator that initiates the session. As opposed to historical performance statistics, Real-time statistics are not stored in the 5620 SAM database.

The real-time statistics data in the plotter is displayed in the native format that is available on the NE, with minimal post-processing. Raw data is presented is typically presented in units of octets per collection interval. Unfortunately, these values are difficult to work with, as operators often need to perform additional calculations to derive a data rate such as bits per second or kilobits per second.

As of Release 11.0, the 5620 SAM Statistics Plotter allows operators to choose units of rate to plot data throughput. Rate options allow the operator to select the most appropriate units for a task; for example, raw data in octets, periodic data, bps, kbps, Mbps, or Gbps. Plotting data that is normalized in this way eliminates the need to perform manual calculations to convert the data to units of rate.

3.2.1 Real-Time Performance Statistics Collection Workflow



The following workflow and the diagram above outline the high-level steps necessary to display collected real-time performance statistics using the 5620 SAM Statistics plotter:

1. Select an object from the map or the navigation tree, choose Properties from the contextual menu. The object's Properties form opens, click on the Statistics tab. Choose a statistics class, the statistics class drop-down menu contains all statistics classes available for the object. Upon the selection of an entry from the listed statistics classes the plotter button gets enabled.
2. Click on the **Plotter** button, and select an existing graph window or the **New Plot** option from the popup menu. The 5620 SAM Statistics Plotter.
3. Use the plotter configuration panel to define the statistics counters for which real-time statistics will be plotted in a graph. In graphical form, periodic data is typically more informative than raw counter data for troubleshooting and trend analysis. The 5620 SAM calculates periodic values by subtracting the previous counter value from the current counter value. Choose a polling interval from the Real-time Polling Interval drop-down menu. The Polling Interval controls the time interval between successive real-time sample polls. This interval will range from 10 seconds to 3600 seconds (one hour). The default value at start up is ten seconds.
4. To initiate a real-time plot, click on the **Real time plot** button.

3.2.2 Saving Real-Time Performance Statistics



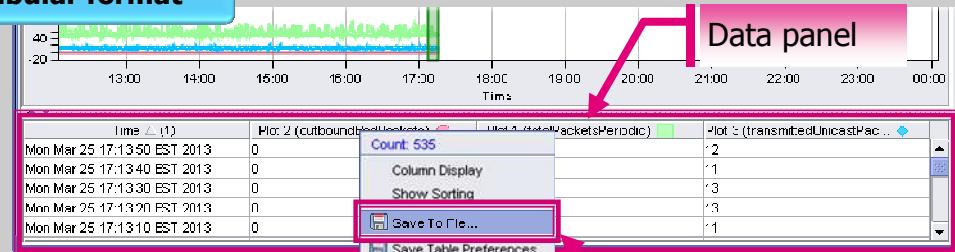
5620 SAM Statistics Plotter allows saving real-time statistics data

Graphical format



- Click on the **Save Current View** button

Tabular format



Data panel

Choose Save to File to save tabular data

The 5620 SAM Statistics Plotter allows saving the plotted real-time statistics data in graphical format, and in tabular format.

To save the current view of the plotted data in graphical format, click on the **Save Current View** button. The 5620 SAM allows saving the graph in JPG or PNG file formats.

The data panel of the plotter displays the collected real-time statistics values in tabular form. Right click on the table header, and choose **Save To File** from the contextual menu to save the collected data in tabular format in CSV or HTML file formats

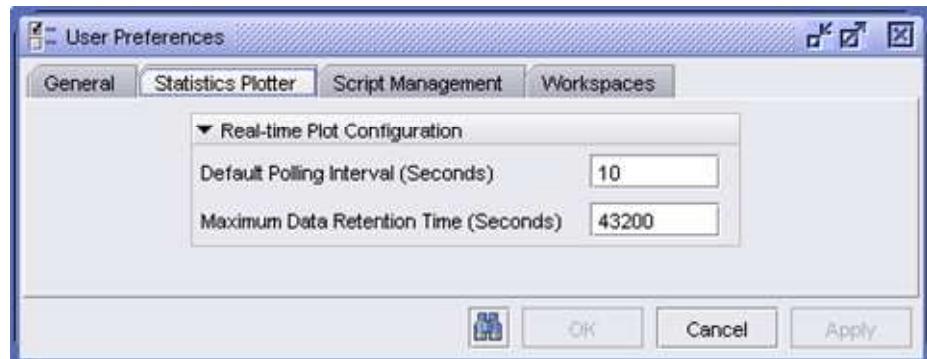
3.2.3 Real-Time Statistics Data Collection Settings



5620 SAM GUI Client

Configurable default polling interval and retention period for real-time statistics collection

Application→User Preferences→Statistics Plotter



Collection for many plotters simultaneously from a same NE may affect performance

5 · 2 · 31
Performance Management - Performance Statistics
5620 SAM - R12.0 Fundamentals

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The Statistics Plotter has a configurable default polling interval and a retention period for real-time statistics collection. The default polling interval and retention period are configurable from the User Preferences form, accessible by choosing Application → User Preferences → Statistics Plotter.

The Polling interval by default is set to 10 seconds, which is the minimum configurable value. It could be configured up to a maximum of 3600 seconds (1 hour).

The retention period specifies how long the 5620 SAM collects real-time statistics before it deletes the oldest sample. The retention time is set by default to 43200 seconds (12 hours). The configurable range for this parameter is 3600 seconds (1 hour) to 86400 seconds (24 hours).

For instance, at a sampling rate of 10 seconds, the plotter stores 8640 real-time statistics samples per counter in one day.



Note

For real-time statistics, when multiple 5620 SAM clients each have multiple open plotters that display multiple counters, a large volume of statistics is collected from the NEs. If the collection for many simultaneous real-time plotters is from the same NE, the NE is polled independently for each plotter, and this may affect performance. SAM system administrators can use a scope of command role to limit plotter access to specific 5620 SAM user groups.

Questions



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5 · 2 · 33
Performance Management · Performance Statistics
5620 SAM · R12.0 Fundamentals

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1. Which of the following statements is FALSE for performance statistics collection.
 - a. All performance statistics are turned down after the initial installation of the 5620 SAM.
 - b. Performance statistics collection is enabled using a MIB statistics collection policy.
 - c. 5620 SAM does not support on-demand collection for performance statistics.
 - d. There are two types of MIB statistics policies are available NE MIB statistics policies and Specific MIB statistics policies.

2. What protocol does 5620 SAM use to collect performance statistics counters from NE MIBs?
 - a. FTP
 - b. SNMP
 - c. HTTP
 - d. None of the above

3. Which of the following statements is FALSE for performance statistics graphing:
 - a. Plotted data can be saved to file in either tabular (.CSV/HTML file) or graphical format (JPG / PNG file).
 - b. Each statistics plotter can simultaneously plot up to four counters.
 - c. The user can configure the statistics plotter preferences parameters for Default Polling Interval and Maximum data retention time.
 - d. The default and smallest polling interval available for plotting is 60 seconds.

Answers



1. Which of the following statements is FALSE for performance statistics collection.
 - a. All performance statistics are turned down after the initial installation of the 5620 SAM.
 - b. Performance statistics collection is enabled using a MIB statistics collection policy.
 - c. **5620 SAM does not support on-demand collection for performance statistics.** ✓
 - d. There are two types of MIB statistics policies are available NE MIB statistics policies and Specific MIB statistics policies.
2. What protocol does 5620 SAM use to collect performance statistics counters from NE MIBs?
 - a. FTP
 - b. **SNMP** ✓
 - c. HTTP
 - d. None of the above
3. Which of the following statements is FALSE for performance statistics graphing:
 - a. Plotted data can be saved to file in either tabular (.CSV/HTML file) or graphical format (JPG / PNG file).
 - b. Each statistics plotter can simultaneously plot up to four counters.
 - c. The user can configure the statistics plotter preferences parameters for Default Polling Interval and Maximum data retention time.
 - d. **The default and smallest polling interval available for plotting is 60 seconds.** ✓



This module covered:

- Purpose of collecting performance statistics
- Performance statistics collection process using the 5620 SAM
- Type of policies available to collect performance statistics using the 5620 SAM
- Relationship between NE MIB statistics policies and specific MIB statistics policies
- Process to:
 - configure the 5620 SAM for performance statistics scheduled collection and on-demand collection
 - collect and display real-time performance statistics
 - create real-time performance statistics graphics



End of module Performance Statistics

5 · 2 · 36

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5620 SAM · R12.0 Fundamentals

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