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WORK GROUP: Information Modeling group

TITLE: SONET NE View Requirements and Information Model

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ABSTRACT: The document provides SIF's SONET NE View Information Model to support the NMS-EMS interface requirements in this document. For those requirements that cannot be supported by the common NE View, this document also includes additional objects that are specific to EMS management, DCN link management, the management of multiple NEs under an EMS based on element-related criteria, and EMS-NE interface-specific objects (if necessary). EMS-NE interface requirements are for further study (and are assumed to be based on Telcordia Technologies GR-253-CORE).

This document has received the approval of the SONET Interoperability Forum (SIF).

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1 Introduction

1.1 Purpose

The purpose of this document is to provide SONET NMS-EMS interface requirements and a common SONET NE View Information Model, as well as additional interface-specific objects, to support these requirements. For those requirements that cannot be supported by the common NE View, this document also includes additional objects that are specific to EMS management, DCN link management, the management of multiple NEs under an EMS based on element-related criteria, and EMS-NE interface-specific objects (if necessary). EMS-NE interface requirements are for further study (and are assumed to be based on Telcordia Technologies GR-253-CORE).

1.2 Scope

The scope of this document is to define SONET NMS-EMS interface requirements and a SONET NE View Information Model. Section 2 provides high-level and feature requirements for the NMS-EMS interface, as well as mappings of objects to these requirements. Section 3 is a placeholder for future EMS-NE interface requirements. Section 4 provides an overview of the information model in this documents. The Common NE View IM defined in Section 5 is applicable to both the NE View Aspect of the NMS/EMS Interface and the EMS/NE Interface. Other managed objects needed to complete the NMS/EMS Interface are provided in Sections 6, 7, 8, and 9. Other managed objects needed to complete the EMS/NE Interface (if needed) will be provided in Section 10. Additional guidelines for the using certain managed objects and for relationships between the NE View and Network View IMs will be presented in Section 11. Open issues that need to be addressed will be provided in Section 12.

1.3 Inputs

This document takes as input the following:

[1] ANSI T1.264 (4Q98), *Operations, Administration, Maintenance, and Provisioning (OAM&P) - Model for Alarm Synchronization.*

[2] AT&T's *TMN Transport EMS to NMS Q3 Specification*, Issue 1.4, October 26, 1998. (http://www.att.com/tmn)

[3] Telcordia Technologies' GR-1042-CORE, *Generic Requirements for Operations Interfaces Using OSI Tools - Information Model Overview: Synchronous Optical Network (SONET) Transport Information Model*, Issue 3, December 1998.

[4] Telcordia Technologies' GR-1042-IMD, *Generic Requirements for Operations Interfaces Using OSI Tools - Information Model Details: Synchronous Optical Network (SONET) Transport Information Model*, Issue 3, December 1998.

[5] Telcordia Technologies' GR-1114-CORE, *Generic Operations Interface Requirements: ATM Information Model*, Issue 3, September 1996; plus Revision 1, November 1997.

[6] Telcordia Technologies' GR-836-CORE, *OTGR Section 15.2: Generic Operations Interfaces Using OSI Tools - Information Model Overview: Transport Configuration and Surveillance for Network Elements*, (A Module of OTGR, FR-439), Issue 3, December 1998.

[7] Telcordia Technologies' GR-2869-CORE, *Generic Requirements for Operations Based on the Telecommunications Management Network (TMN) Architecture*, Issue 2, October 1996.

[8] Telcordia Technologies' GR-2954-CORE, *Transport Performance Management Based On The Telecommunications Management Network (TMN) Architecture*, Issue 1, December 1997.

[9] SIF - Approved Document # SIF-014-1997, *Information Model for Connection Management and Fault Management at the EMS/NMS Interfac*e, June 1997.

[10]ITU-T Recommendation M.3100 (Version 2, 1995), *Generic network information model*; plus Corrigendum 1 (1998) and Amendment 1 (1999).

[11]ITU-T Recommendation G.774 (1992), *Synchronous Digital Hierarchy* (*SDH) management information model for the network element view*; plus Corrigendum 1 (1996).

[12]ITU-T Recommendation G.774.01 (1994), *Synchronous Digital Hierarchy* (*SDH) Performance Monitoring for the Network Element View*; plus Corrigendum 1 (1996).

[13]ITU-T Recommendation G.774.02 (1993), *Synchronous Digital Hierarchy* (*SDH) Configuration of the Payload Structure for the Network Element View.*

[14]ITU-T Recommendation G.774.03 (1995), *Synchronous Digital Hierarchy* (*SDH) management of Multiplex-Section Protection for the network element view*; plus Corrigendum 1 (1996).

[15]ITU-T Recommendation G.774.04 (1995), *Synchronous Digital Hierarchy* (*SDH) management of Subnetwork Connection Protection for the network element view*; plus Corrigendum 1 (1996).

[16]ITU-T Recommendation G.774.05 (1994), *Synchronous Digital Hierarchy* (*SDH) management of connection supervision functionality (HCS/LCS) for the network element view*; plus Corrigendum 1 (1995).

[17]ITU-T Recommendation G.774.09 (1997), *Synchronous Digital Hierarchy* (*SDH) Configuration of Multiples Section Protection for the network element view.*

[18] ITU-T Recommendation G.774-10 (1999 - Draft), *Synchronous Digital Hierarchy* (*SDH) MS Shared Protection Ring (SPR) management for the network element view.*

[19]ITU-T Recommendation Q.821 (1993), *Stage 2 and 3 Functional Descriptions for the Q3 Interface - Alarm Surveillance.*

[20]ITU-T Recommendation Q.822 (April 1994), Stage 1, Stage 2 and 3 Description for the Q3 Interface - Performance Management.

[21]ITU-T Recommendation X.521 (November 1993), *Information Technology Open System Interconnection – The Directory: Selected Object Classes.*

[22]ITU-T Recommendation X.721 (1992), *Information technology – Open Systems Interconnection – Structure of management information: Definition of management information.*

[23]ITU-T Recommendation X.738 (November 1993), Information Technology - Open Systems Interconnection - Systems Management - Part 13: Summarization Function; plus Amendment 1 (1996).

[24]ISO/IEC 10164-18 | ITU-T Recommendation X.744 (October 1996), *Information Technology - Open Systems Interconnection - Systems Management - Part 18: Software Management Function.*

2 NMS-EMS Interface Requirements

2.1 General Principles and Architecture

The architecture assumed in this Section is shown in Figure 2-1. Note that Figure 2-1 is adapted from Figure 1-1, *Physical Realization Examples of Multi-layer Network Management Architecture*, of the SIF - Approved Document # SIF-014-1997 (reference [9] above). It should be emphasized that other architectures are possible (e.g., the NMS directly accessing the NE).

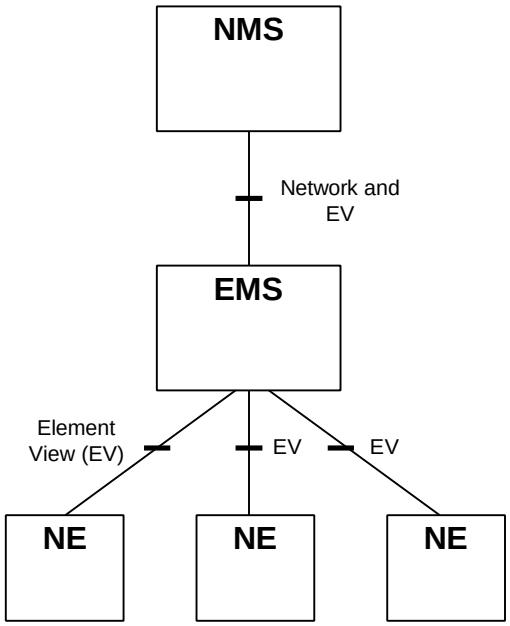

Figure 2-1. Functional Architecture

Another (and unrelated) general principle: the EMS-NMS requirements in this document should compliment the requirements in the SIF Network View document [9].

2.2 High-Level Interface Requirements

This section contains high-level interface requirements that serve the purpose of further defining the scope of this document. The following sections further expand and elaborate upon the high-level requirements. A table of supporting object classes are provided for each high-level requirement.

R 2-1 Network Element Configuration Information Access

The EMS shall reflect the current configuration of the monitored sub-network, including NE connectivity and bay and shelf equipage. The EMS shall ensure that the information it provides to the NMS accurately reflects the state of individual NEs with regard to fault information, equipment configuration, equipment parameters, PM Thresholds, cross-connects and security related information.

> **Comment**: When a new NE (or NE component such as a circuit pack) is installed, the EMS shall auto-discover the NE resources.

Table 2-1 Objects supporting high-level requirement R2-1

Managed Object Class	Source	Comments
alarmSeverityAssignmentProfile	M.3100	
au3CTPBidirectionalR1/SinkR1/Source	G.774/Cor.1	
au3SupervisedCTPBidirectionalR1/SinkR1/Source	G.774-05/Cor.1	
au44cCTPBidirectional/Sink/Source	GR-1114	
au44cSupervisedCTPBidirectionalBCR/SinkBCR /SourceBCR	GR-1042	
au416cCTPBidirectionalBCR/SinkBCR/SourceBCR	GR-1042	
au416cSupervisedCTPBidirectionalBCR/SinkBCR /SourceBCR	GR-1042	
au4CTPBidirectionalR1/SinkR1/Source	G.774/Cor.1	
au4SupervisedCTPBidirectionalR1/SinkR1/Source	G.774-05/Cor.1	
augBidirectional/Sink/Source	G.774	
modifiableAugBidirectional/Sink/Source	G.774-02	
blsrFabricSIF	SIF NE View	
blsrInterconnectFabricSIF	SIF NE View	
circuitPackR1	M.3100/A.1	
connectionProtectionGroupBCRr2	GR-1042	
connectionProtectionUnitBCR	GR-1042	
controlPoint	M.3100/A.1	
crossConnectionR1	M.3100	
ds1CTPBidirectional/Sink/Source	GR-836	
ds1LineTTPBidirectionalBCRr1/SinkBCRr1 /SourceBCRr1	GR-836	
ds1MonitorPointBCR	GR-836	
ds1PathTTPBidirectionalSIF/SinkSIF/SourceSIF	SIF NE View	
ds3CTPBidirectional/Sink/Source	GR-836	
ds3CTPBidirectionalSIF	SIF NE View	
ds3CTPSinkSIF	SIF NE View	
ds3LineTTPBidirectional/Sink/Source	GR-836	
ds3MonitorPointBCR	GR-836	
ds3PathTTPBidirectionalSIF/SinkSIF/SourceSIF	SIF NE View	
e1CTPBidirectional/Sink/Source	ETS 300 371(1996)	European PDH/SDH
e3CTPBidirectional/Sink/Source	ETS 300 371(1996)	European PDH/SDH
e4CTPBidirectional/Sink/Source	ETS 300 371(1996)	European PDH/SDH
e1TTPBidirectional/Sink/Source	ETS 300 371(1996)	European PDH/SDH
e3TTPBidirectional/Sink/Source	ETS 300 371(1996)	European PDH/SDH
e4TTPBidirectional/Sink/Source	ETS 300 371(1996)	European PDH/SDH
eastWestTableBCRr1	GR-1042	
electricalSPITTPBidirectional/Sink/Source	G.774	
electricalSPITTPBidirectionalBCRr1	GR-1042	
equipmentHolder	M.3100	
enutTableBCR	GR-1042	
equipmentR1	M.3100	
fabricSIF	SIF NE View	
gtpR1	M.3100/Cor.1	
managedElementR1	M.3100	
managedEms	SIF NE View	
managementLink	SIF NE View	
msCTPBidirectional/Sink/Source	G.774	
opticalSPITTPBidirectional/Sink/Source	G.774	
opticalSPITTPBidirectionalBCRr1	GR-1042	
protectedTTPBidirectional/Sink/Source	G.774-03	
ringMapBCRr2	GR-1042	
ripTableBCR	GR-1042	

Managed Object Class	Source	Comments
rsCTPBidirectional/Sink/Source	G.774	
sdhBLSRProtectionGroupBCRr1	GR-1042	
sdhBLSRProtectionUnitBCR	GR-1042	
sdhMSProtectionGroupSIF	SIF NE View	
sdhMSProtectionUnit	G.774-03	
securitySystem	GR-1114	
securityUserSIF	SIF NE View	
serviceSelectorProtectionGroupBCR	GR-1042	
namedServiceSelectorProtectionGroupBCR	GR-1042	
squelchTableBCR	GR-1042	
sncpFabricSIF	SIF NE View	
stsSquelchEntryBCR	GR-1042	
thresholdData	Q.822	
tpPool	M.3100	
tu11CTPBidirectionalR1/SinkR1/Source	G.774	
tu11SupervisedCTPBidirectionalR1 /SinkR1/Source	G.774-05/Cor.1	
tu12CTPBidirectionalR1/SinkR1/Source	G.774/Cor.1	
tu12SupervisedCTPBidirectionalR1 /SinkR1/Source	G.774-05/Cor.1	
tu13CTPBidirectionalBCRr1/SinkBCRr1/Source	GR-1042	
tu13SupervisedCTPBidirectionalBCR /SinkBCR/SourceBCR	GR-1042	
tu3CTPBidirectionalR1/SinkR1/Source	G.774/Cor.1	
tu3SupervisedCTPBidirectionalR1 /SinkR1/Source	G.774-05/Cor.1	
tug2Bidirectional/Sink/Source	G.774	
modifiableTug2Bidirectional/Sink/Source	G.774-02	
tug3Bidirectional/Sink/Source	G.774	European SDH
modifiableTug3Bidirectional/Sink/Source	G.774-02	European SDH
unprotectedCTPBidirectional/Sink/Source	G.774-03	The last sentence in the behaviour statement should refer to the unreliableResourcePointer.
vc11TTPBidirectionalBCRr1/SinkBCRr1 /SourceBCRr1	GR-1042	
modifiableVC11TTPBidirectionalSIF/SinkSIF /SourceSIF	SIF NE View	
vc12TTPBidirectionalR1/SinkR1/Source	G.774	
modifiableVC12TTPBidirectionalR1/SinkR1/SourceR1	G.774-02/Cor.1	
vc13TTPBidirectionalBCRr1/Sink BCRr1/Source	GR-1042	
modifiableVC13TTPBidirectionalSIF/SinkSIF /SourceSIF	SIF NE View	
vc3TTPBidirectionalR1BCR/SinkR1BCR	GR-1042	
vc3TTPSourceR1	G.774/Cor.1	
modifiableVC3TTPBidirectionalSIF/SinkSIF	SIF NE View	
modifiableVC3TTPSourceR1	G.774-02/Cor.1	
vc4TTPBidirectionalR1BCR/SinkR1BCR	GR-1042	
vc4TTPSourceR1	G.774/Cor.1	
modifiableVC4TTPBidirectionalSIF/SinkSIF	SIF NE View	
modifiableVC4TTPSourceR1	G.774-02/Cor.1	
vc44cTTPBidirectional/Sink/Source	GR-1114	
vtSquelchEntryBCR	GR-1042	
vtSquelchTableBCR	GR-1042	

R 2-2. Network Element Configuration Event Reporting

The NMS shall be able to request that the EMS forward (or discontinue the forwarding) of configuration notifications (e.g., object creation/deletion, attribute value change, protection switching events) related specific NE View resources.

Table 2-2 Objects supporting high-level requirement R2-2

Managed Object Class	Source	Comments
alarmSeverityAssignmentProfile	M.3100	
circuitPackR1	M.3100/A.1	
ConnectionProtectionGroupBCRr2	GR-1042	
eventForwardingDiscriminator	X.721	
SdhBLSRProtectionGroupBCRr1	GR-1042	
sdhMSProtectionGroupSIF	SIF NE View	
ServiceSelectorProtectionGroupBCR	GR-1042	
thresholdData	Q.822	

R 2-3. Network Element Equipment Provisioning

The EMS shall provide the capabilities to provision network element equipment parameters and Performance Monitoring (PM) thresholds. The EMS shall maintain default values that can be edited and downloaded to NEs under the control of the NMS.

Comment: This requirement entails a basic EMS function. The other possible options for NE provisioning are:

1. the NMS directly accesses the individual NEs
2. the NEs provision themselves, i.e., pre-load the NEs with the needed initialization information. This approach is inflexible but could be used in conjunction with R 2-1, i.e., have the NEs initialize automatically, but allow for subsequent changes via the EMS.

Table 2-3 Objects supporting high-level requirement R2-3

Managed Object Class	Source	Comments
managedElementR1	M.3100	
managedEms	SIF NE View	
managementLink	SIF NE View	
securitySystem	GR-1114	
securityUserSIF	SIF NE View	

R 2-4. Ring and NE Information Provisioned into EMS

Certain information relating to rings and network elements must be provisioned into the EMS. Examples of this are ring name, login and passwords for network elements, communications parameters to the Gateway Network Elements.

Table 2-4 Objects supporting high-level requirement R2-4

Managed Object Class	Source	Comments
For future study		

R 2-5. Fault Correlation and Filtering

The EMS shall supply the NMS with Root Cause Alarm Analysis (RCAA) reports which contain a reference to the set of NE alarm events that have been resolved in the RCAA report. The NMS shall be able to query the EMS for historical fault information related to the RCAA reports.

Table 2-5 Objects supporting high-level requirement R2-5

Managed Object Class	Source	Comments
(all objects capable of notifying alarms)		

R 2-6. Fault Reporting

The NMS shall be able to request that the EMS forward (or discontinue the forwarding) alarms related to specific NE View resources.

> **Comment**: The NMS needs to know the source of NE-related faults (which will likely involve NE View information). The NMS interacts with other systems, e.g., work force administration, which need to know the source of the problem in order to dispatch repair personnel to the right location.

Table 2-6 Objects supporting high-level requirement R2-6

Managed Object Class	Source	Comments
eventForwardingDiscriminator	X.721	

R 2-7. Fault Localization, Reporting and Correction

The EMS shall provide to the NMS sufficient information to isolate NE-level faults (including geographic location), to prepare trouble tickets related to NE faults, and to correct NE faults.

Table 2-7 Objects supporting high-level requirement R2-7

Managed Object Class	Source	Comments
(all objects capable of notifying alarms)		
agingControlSIF	SIF NE View	

R 2-8. Testing

The NMS shall be able to direct the EMS in testing the ability of NE equipment to perform its functions correctly. The testing is specifically related to fault localization and correction.

> **Comment**: The testing procedures are used to localize faults, and to make sure the network is working correctly after fault have been repaired.

Table 2-8 Objects supporting high-level requirement R2-8

Managed Object Class	Source	Comments
circuitPackR1	M.3100/A.1	
ds1CTPBidirectional/Sink/Source	GR-836	
ds1LineTTPBidirectionalBCRr1/SinkBCRr1 /SourceBCRr1	GR-836	
ds3LineTTPBidirectional/Sink/Source	GR-836	
electricalSPITTPBidirectional/Sink/Source	G.774	
electricalSPITTPBidirectionalBCRr1	GR-1042	
opticalSPITTPBidirectional/Sink/Source	G.774	
opticalSPITTPBidirectionalBCRr1	GR-1042	

R 2-9. Performance Monitoring Data Collection

The EMS shall collect performance monitoring data from all network elements. The length of time that the data is to be stored should be a configurable parameter.[1] The NMS shall be able to retrieve all stored data, or issue queries for subsets of the performance data.

The NMS shall be able request that the EMS

- collect PM data on specific parameters,
- suspend or resume PM data collection, or
- reset the registers for PM counts for specified NE(s).

Table 2-9 Objects supporting high-level requirement R2-9

Managed Object Class	Source	Comments
dS1LineTTPSinkFECurrentData	T1.247-1998	
dS1LineTTPSinkNECurrentData	T1.247-1998	
dS1LineTTPSinkFEHistoryData	T1.247-1998	
dS1LineTTPSinkNEHistoryData	T1.247-1998	
dS1PathTTPSinkFECurrenData	T1.247-1998	
dS1PathTTPSinkNECurrenData	T1.247-1998	
dS1PathTTPSinkFEHistoryData	T1.247-1998	
dS1PathTTPSinkNEHistoryData	T1.247-1998	
dS3LineTTPSinkNECurrentData	T1.247-1998	
dS3LineTTPSinkNEHistoryData	T1.247-1998	
dS3PathTTPSinkFECurrentData	T1.247-1998	
dS3PathTTPSinkNECurrentData	T1.247-1998	
dS3PathTTPSinkFEHistoryData	T1.247-1998	
dS3PathTTPSinkNEHistoryData	T1.247-1998	
electricalSourceSPICurrentData	G.774-01	
electricalSPIHistoryData	G.774-01	
msCurrentDataFarEnd	T1.119-02	
msCurrentDataNearEnd	T1.119-02	
msHistoryDataFarEnd	T1.119-02	
msHistoryDataNearEnd	T1.119-02	
opticalSPITTPCurrentData	G.774-01	
opticalSPITTPBidirectionalCurrentDataSIF	SIF NE View	
opticalSPITTPSinkCurrentDataSIF	SIF NE View	
opticalSPITTPHistoryData	G.774-01	
opticalSPITTPBidirectionalHistoryDataSIF	SIF NE View	
opticalSPITTPSinkHistoryDataSIF	SIF NE View	
pathTerminationCurrentData	G.774-01	
pathTerminationHistoryData	G.774-01	
protectionCurrentData	G.774-01	
protectionHistoryData	G.774-01	
rsCurrentDataSIF	SIF NE View	
rsHistoryDataSIF	SIF NE View	
scanReportRecord	X.738	
simpleScanner	X.738	

R 2-10. History Log

[1] Note that Telcordia Technologies GR-2954 recommends 90 days of data be stored.

The EMS shall provide history log(s) to collect and present information on previous events, e.g., alarms, object creation/deletion reports, attribute value change reports and TCAs. The log may include autonomous messages, network element command executions and changes to network element configuration. The log must reflect the login account of the entity making or requesting changes to network element configuration, and/or EMS databases containing network configuration data. The NMS shall be able to retrieve all of the stored data, or issue queries for subsets of history data. [2]

> **Comment**: History logs of configuration changes and alarms may be useful in determining the cause of faults.

Table 2-10 Objects supporting high-level requirement R2-10

Managed Object Class	Source	Comments
alarmRecord	X.721	
apsReportRecord	G.774-03	This object is also used to record notifications issued by protectionGroupBCRr1 and subclasses
attributeValueChangeRecord	X.721	
securityAuditTrailRecord	X.740	
log	X.721	
objectCreationRecord	X.721	
objectDeletionRecord	X.721	
stateChangeRecord	X.721	

R 2-11. Security Management

The EMS shall assist the NMS with the administration of security information. The EMS shall support the NMS in the prevention, detection, containment and recovery of/from security breaches.

Table 2-11 Objects supporting high-level requirement R2-11

Managed Object Class	Source	Comments
attributeValueChangeRecord	X.721	
securityAuditTrailRecord	X.740	
objectCreationRecord	X.721	
objectDeletionRecord	X.721	
securitySystem	GR-1114	
securityUserSIF	SIF NE View	

R 2-12. Software Management

The EMS shall provide software management functions (i.e., software administration/inventory, software download, and backup/restore) to the NMS.

Table 2-12 Objects supporting high-level requirement R2-12

Managed Object Class	Source	Comments
executableSoftware	X.744	
software	M.3100	
softwareDistributor	X.744	subclass may be necessary if simultaneous cut-over is desired
softwareUnit	X.744	

[2] the length of time that data is stored is an implementation issue.

R 2-13. Time Stamp Management

The NMS shall be able to update a time-of-day clock in any assigned EMS.

Comment: It is assumed that an EMS will update time-of-day clocks in assigned NE for use in history logs, alarm correlation, etc.

Table 2-13 Objects supporting high-level requirement R2-13

Managed Object Class	Source	Comments
managedEMS	SIF NE View	

R 2-14. Communications Management

The NMS-EMS interface shall allow for detection, reporting, and recovery of message and link loss between managed entities.

Table 2-14 Objects supporting high-level requirement R2-14

Managed Object Class	Source	Comments
managementLink	SIF NE View	

2.3 Fault Management Feature Requirements

2.3.1 Reliability, Availability, and Survivability (RAS)

RAS quality assurance establishes the reliability criteria that guides the design policy for redundant equipment. The following feature requirements have been identified for Reliability, Availability, and Survivability (RAS):

1. NE Watchdog: The EMS autonomously informs the NMS of failed communication links to managed NE(s) or if NE(s) don't accept or respond to commands from the EMS.

   Comment: The EMS shall issue check messages for each network element for which it is responsible every N minutes (+/- 50% of N). N shall be settable by the NMS and shall have a default value of 5 minutes. Failure to receive a response from the network element within M seconds shall indicate loss of connection to the network element. M, the Expected Network Element Response Time parameter, shall be a settable by the NMS and shall have a default value of 10 seconds. The EMS shall generate an alarm message indicating the loss of connectivity.

   Rationale (concerning NEs that don't respond): This requirement is in support of R 2-6 and R 2-14.

2. EMS Watchdog: The NMS-EMS interface must support the ability for the NMS to identify when it looses communications with an assigned EMS.

   Rationale: This requirement is in support of R 2-14.

3. Communications Buffering: The NMS must be notified of all required alarms and conditions once the EMS/NMS or NE/EMS communications are re-established.

   Rationale: This requirement is in support of R 2-14.

4. Message Loss Detection: The NMS-EMS interface shall support a mechanism that can be used to insure that no messages get lost in transmission between the NMS and EMS.

   Rationale: This requirement is in support of R 2-14.

Comment: In at least some implementations, autonomous messages generated by the NE are tagged with a serial number so the EMS can identify when it has missed an autonomous message. A similar strategy should be used when the EMS generates autonomous messages destined for the NMS. The EMS should also be able to supply any given autonomous message (whether generated by the EMS or a NE) to the NMS. This feature would be very useful in the event the NMS needs to recover a lost or garbled autonomous message. On some current SONET Management Systems, the only way to recover a lost message is to refresh all standing alarms on the NE. This is not an efficient manner to recall a single lost message.

Table 2-15 Objects supporting Section 2.3.1 Reliability, Availability, and Survivability (RAS) Requirements

#	Requirement	Managed Object Class	Source	Comments
1	NE Watchdog	managementLink	SIF NE View	
2	EMS Watchdog	managedEMS	SIF NE View	By Polling
3	Comunications Buffering	enhanced CurrentAlarmSummaryControl	T1.264	
4	Message Loss Detection	Provided by transport layer		

2.3.2 Alarm Surveillance

Alarm Surveillance provides the capability to monitor, report and manage network failures or abnormal conditions.

The following feature requirements have been identified for Alarm Surveillance:

1. NE alarms: The EMS shall send (to the NMS) autonomous alarm transitions (active, clear) that are reported by the NE. The NMS only receives the alarms for which it has registered.

   Rationale: This requirement is in support of R 2-2.

2. Protection switching status: The EMS shall send (to the NMS) autonomous status change reports related protection switching.

   Rationale: This requirement is in support of R 2-2.

3. Initiate alarm reporting: The EMS shall allow the NMS to select which autonomous alarms it desires to receive.

   Rationale: This requirement is in support of R 2-2 and R 2-6.

4. Event forwarding: The NMS instructs the EMS where, i.e., the address to which the events (including alarms) should be sent.

   Rationale: This requirement is in support of R 2-2 and R 2-6.

5. Event reporting conditions: The NMS can modify the criteria that tell the EMS which event reports (including alarms) to send autonomously to the NMS.

   Rationale: This requirement is in support of R 2-2 and R 2-6.

6. Event history: The NMS queries the EMS for past and current events (including alarms). The EMS accepts query parameters and responds with all matching past and current events or some error indication.

   Rationale: This requirement is in support of R 2-2 and R 2-6.

7. Event summary report: The NMS queries the EMS for a summary of active NEs events (including alarms) that it monitors.

Rationale: This requirement is in support of R 2-2 and R 2-6.

8. Alarm condition administration: The NMS instructs the EMS to assign severity to alarms.

   Rationale: This requirement is in support of R 2-6.

9. Alarm Aging: The EMS allows the NMS to specify aging parameters (i.e., alarm aging, sliding window size) that will be used by the EMS to construct an alarm. See GR-2954 for details.

   - Aging refers to the time between when an event (i.e., fault) is detected by the EMS and when the EMS sends an alarm to the NMS (this also applies to alarm clearing), or
   - Sliding window size refers to the length of time the EMS waits in counting discrete events (i.e., faults) before deciding to send an event

   Rationale: This requirement is in support of R 2-6.

10. Office alarm administration: The NMS instructs the EMS to enable/disable an NE's function to emit visible and audible central office alarms.

    Rationale: This requirement is in support of R 2-6.

11. Message log controls: The NMS instructs the EMS to control the logging event history data, i.e., the NMS tells the EMS what kind of events should be logged. The NMS may selectively retrieve data from the log.

    Rationale: This requirement is in support of R 2-2 and R 2-6.

12. Non-redundant NE(s) alarm report: The EMS notifies the NMS of root cause autonomous alarms, indicating the smallest replaceable unit within an NE. Events that have been correlated are suppressed by the EMS. The NMS can retrieve suppressed alarms.

Rationale: This requirement is in support of

R 2-5.

13. Alarm holding control for root cause analysis: The EMS shall allow the NMS to specify/modify the holding times the EMS shall use for reporting alarms and TCAs. I.e., the time between when the alarm or thresholding crossing occurs, and the time when the EMS makes a decision on the root cause.

    Rationale: This requirement is in support of R 2-6.

14. Uncleared Suppressed Alarm Reporting: When an RCAA report (i.e. alarm) is cleared, the EMS must report any lower level alarms that were suppressed in creating the RCAA but were neither cleared nor associated with a new RCAA when the original root cause was corrected.

Rationale: This requirement is in support of

R 2-5.

Comment: i.e. A DS-3 LOS alarm at a port clears, but SES or ES alarms for that DS-3 are still reporting.

15. External Alarm Reporting: The EMS sends autonomous notifications to the NMS to report environmental alarms from external devices.

    Rationale: This requirement is in support of R 2-6.

    Comment: Environmental alarms may include power failure, fire alarm, door open, humidity, etc.

16. External Alarm Query: The NMS queries the EMS for current external alarms.

    Rationale: This requirement is in support of R 2-6.

Table 2-16 Objects supporting Section 2.3.2 Alarm Surveillance Requirements

#	Requirement	Managed Object Class	Source	Comments
1	NE alarms:	(all objects capable of notifying alarms)		
1	NE alarms:	agingControlSIF	SIF NE View	R2-7, 2.3.2#1 2.3.2#9
2	Protection switching status:	connectionProtectionGroupBCRr2	GR-1042	
2	Protection switching status:	sdhBLSRProtectionGroupBCRr1	GR-1042	
2	Protection switching status:	sdhMSProtectionGroupSIF	SIF NE View	
2	Protection switching status:	serviceSelectorProtectionGroupBCR	GR-1042	
3	Initiate alarm reporting:	eventForwardingDiscriminator	X.721	
4	Event forwarding:	eventForwardingDiscriminator	X.721	
5	Event reporting conditions:	eventForwardingDiscriminator	X.721	
6	Event history:	alarmRecord	X.721	
6	Event history:	apsReportRecord	G.774-03	This object is also used to record notifications issued by protectionGroupBCRr1 and subclasses
6	Event history:	attributeValueChangeRecord	X.721	
6	Event history:	securityAuditTrailRecord	X.740	
6	Event history:	log	X.721	
6	Event history:	objectCreationRecord	X.721	
6	Event history:	objectDeletionRecord	X.721	
6	Event history:.	stateChangeRecord	X.721	
7	Event summary report:	enhancedCurrentAlarmSummaryControl	T1.264	
8	Alarm condition administration:	(all objects capable of notifying alarms)		
8	Alarm condition administration:	alarmSeverityAssignmentProfie	M.3100	
9	Alarm Aging:	agingControlSIF	SIF NE View	R2-7, 2.3.2#1 2.3.2#9
10	Office alarm administration:	managedElementR1	M.3100	
11	Message log controls:	log	X.721	
12	Non-redundant NE(s) alarm report:	(all objects capable of notifying alarms)		
13	Alarm holding control for root cause analysis:	*For future study*		
14	Uncleared Suppressed Alarm Reporting	*For future study*		
15	External Alarm Reporting	scanPoint	M.3100/A.1	
16	External Alarm Query	scanPoint	M.3100/A.1	

2.3.3 Fault Localization

Where the initial failure information is insufficient for fault localization it has to be augmented with information obtained by additional failure localization routines. The routines can employ internal or external test systems and can be controlled by a TMN.

The following feature requirements have been identified for Fault Localization.

1. NE configuration: The NMS retrieves from the EMS NE configuration including bay and shelf equipage. The NE configuration information will also include sufficient detail for the determination of NE physical adjacency (i.e., physical connectivity between NEs).

   Rationale: This requirement follows from R 2-1 and is in support of R 2-7.

2. Grouped alarms: The EMS notifies the NMS of root cause autonomous alarms, indicating the smallest replaceable unit within an NE. Events that have been correlated to the alarm are suppressed by the EMS. The NMS can retrieve suppressed alarms.

Rationale: This requirement follows from

   R 2-5.

3. Protection switching alarms: The NMS receives autonomous alarms about protection switching events.

   Rationale: This requirement follows from R 2-2 and is in support of R 2-7.

4. PM data: The NMS retrieves specified physical (optical, electrical), section, line and path layer PM data for specified NE(s) from the EMS.

   Rationale: This requirement follows from R 2-9 and is in support of R 2-7.

5. PM data gathering: The NMS directs the EMS to collect performance parameters.

   Rationale: This requirement follows from R 2-9 and is in support of R 2-7.

6. PM collection control: The NMS instructs the EMS to suspend or resume PM data collection.

   Rationale: This requirement follows from R 2-9 and is in support of R 2-7.

7. Exercise protection switching: The NMS instructs the EMS to invoke the function on a specified NE that simulates a protection switching condition for a specified channel. The EMS forwards the NE's responses to the requesting NMS.

   Rationale: This requirement is in support of R 2-7.

Table 2-17 Objects supporting Section 2.3.3 Fault Localization Requirements

#	Requirement	Managed Object Class	Source	Comments
1	NE configuration:	See R2-1		
2	Grouped alarms:	*(all objects capable of notifying alarms)*		
3	Protection switching alarms:	*(all objects capable of notifying alarms)*		
4	PM data:	See R2-9		
5	PM data gathering:	See R2-9		
6	PM collection control:	See R2-9		
7	Exercise protection switching:	connectionProtectionGroupBCRr2	GR-1042	
7	Exercise protection switching:	sdhBLSRProtectionGroupBCRr1	GR-1042	
7	Exercise protection switching:	sdhMSProtectionGroupSIF	SIF NE View	
7	Exercise protection switching:	serviceSelectorProtectionGroupBCR	GR-1042	

2.3.4 Testing

The testing process directs the network (NEs) to carry out analysis of equipment characteristics and their ability to perform functions. The test results are reported to the manager that issued the request.

The following feature requirements have been identified for Testing:

1. PM data: The NMS retrieves specified physical (optical), section, line and path layer PM data for specified NE(s) from the EMS.

   Rationale: This requirement follows from R 2-9 and is in support of R 2-7 and R 2-8.

2. Current alarm data: The NMS retrieves current alarm data for specified NE(s) from the EMS.

   Rationale: This requirement follows from R 2-6 and is in support of R 2-8.

3. Alarm history data: The NMS retrieves alarm history data for specified NE(s) from the EMS.

   Rationale: This requirement follows from R 2-10 and is in support of R 2-8.

4. PM data gathering: The NMS directs the EMS to collect performance parameters.

   Rationale: This requirement follows from R 2-9 and is in support of R 2-8.

5. Loopback Testing: The NMS directs specific NEs to perform loopback testing.

   Rationale: This requirement follows from R 2-9 and is in support of R 2-8.

6. PM collection control: The NMS instructs the EMS to suspend or resume PM data collection.

   Rationale: This requirement follows from R 2-9 and is in support of R 2-8.

7. Exercise protection switching: The NMS instructs the EMS to invoke the function on a specified NE that simulates a protection switching condition for a specified channel. The EMS forwards the NE's responses to the requesting NMS.

   Comment: This may be supported in future versions of the SIF Network View.

8. Service status control: The NMS directs the EMS to take specified NE(s) or component(s) of NE(s) out of service. The NMS also directs the EMS to return specified NE(s) or component(s) of NE(s) into service.

   Rationale: This requirement is in support of R 2-8.

9. Reset NE(s) PM values: The NMS instructs the EMS to reset the registers for PM counts for specified NE(s).

   Comment: This feature intended to be used to clear "forced errors" introduced by test.

10. Cross connections to test sets: The NMS directs the EMS to cross connect specific ports within specified NE(s), such as SONET DCS, for the purpose of sending traffic to attached test sets. The fact that a test set is connected to one of the cross connected ports may be transparent to the EMS.

    Rationale: This requirement is in support of R 2-8.

Table 2-18 Objects supporting Section 2.3.4 Testing Requirements

#	Requirement	Managed Object Class	Source	Comments
1	PM data:	See R2-9		
2	Current alarm data:	enhancedCurrentAlarmSummaryControl	T1.264	
3	Alarm history data:	alarmRecord		
3	Alarm history data:	log	X.721	
4	PM data gathering:	See R2-9		
5	Loopback Testing:	ds1LineTTPBidirectionalBCRr1/SinkBCRr1 /SourceBCRr1	GR-836	
5	Loopback Testing:	ds3LineTTPBidirectional/Sink/Source	GR-836	
5	Loopback Testing:	electricalSPITTPBidirectional/Sink/Source	G.774	

#	Requirement	Managed Object Class	Source	Comments
5	Loopback Testing:	electricalSPITTPBidirectionalBCRr1	GR-1042	
5	Loopback Testing:	opticalSPITTPBidirectional/Sink/Source	G.774	
5	Loopback Testing:	opticalSPITTPBidirectionalBCRr1	GR-1042	
6	PM collection control:	See R2-9		
7	Exercise protection switching:	connectionProtectionGroupBCRr2	GR-1042	
7	Exercise protection switching:	sdhBLSRProtectionGroupBCRr1	GR-1042	
7	Exercise protection switching:	sdhMSProtectionGroupSIF	SIF NE View	
7	Exercise protection switching:	serviceSelectorProtectionGroupBCR	GR-1042	
8	Service status control:	*(all objects capable of supporting the administrativeState attribute)*		
9	Reset NE(s) PM values:	See R2-9		
10	Cross connections to test sets:	*(all objects capable of supporting cross-connection e.g., au3CTPBidirectional)*		
10	Cross connections to test sets:	blsrFabricSIF	SIF NE View	
10	Cross connections to test sets:	blsrInterconnectFabricSIF	SIF NE View	
10	Cross connections to test sets:	crossConnectionR1	M.3100	
10	Cross connections to test sets:	fabricSIF	SIF NE View	
10	Cross connections to test sets:	sncpFabricSIF	SIF NE View	

2.3.5 Fault Correction

The Fault Correction function provides for the transfer of data concerning the repair of a fault, and for the control of procedures that use redundant resources to replace equipment or facilities that have failed.

The following feature requirements have been identified for Fault Correction:

1. NE configuration data: The NMS retrieves configuration data for specified NE(s) from the EMS for the purpose of populating trouble tickets.

   Rationale: This requirement follows from R 2-1 and is in support of R 2-6.

2. Current alarm data: The NMS retrieves current alarm data for specified NE(s) from the EMS for the purpose of populating trouble tickets.

   Rationale: This requirement follows from R 2-6 and is in support of R 2-7.

3. Service and protection resource status: The NMS receives autonomous events (alarm transitions) for working and protecting resources. This includes autonomous protection switching events.

   Rationale: This requirement is in support of R 2-6.

4. Failure and protection resource status: Following protection switching, the NMS continues to receive autonomous events (alarm transitions) from the failed and the protection resources.

   Rationale: This requirement is in support of R 2-6.

5. Restore service to primary resource: The NMS directs the EMS to switch service back from the protection resource to the primary service resource.

Rationale: This requirement is in support of R 2-7.

6. Protection lock-out: The NMS instructs the EMS to designate specified protection resource(s) as not available for protection switching, i.e. prevent the NE(s) from protection switching onto the specified resources.

   Rationale: This requirement is in support of R 2-7.

7. Automatic Locking into Protection: The NMS directs the EMS to set time window, number of errors, time to release conditions for a connection to be automatically locked into protection (if the associated NE supports such conditions).

   - The automatic locking into protection function operates by monitoring how often a signal failure or signal degradation is detected and cleared on a line, and "locks on" to that condition if it is detected more than x times in y seconds. After the NE has locked on to the condition, it considers that line to be in a signal failure or signal degradation condition until it determines that the intermittent failure or degradation is gone. The NE will only switch back to the protected line after it has detected that the BER is less than the signal failure clearing threshold and no hard failures have occurred for z seconds.

   Rationale: This requirement is in support of R 2-7.

Table 2-19 Objects supporting Section 2.3.5 Fault Correction Requirements

#	Requirement	Managed Object Class	Source	Comments
1	NE configuration data:	See R2-1		
2	Current alarm data:	See R2-9		
3	Service and protection resource status:	connectionProtectionGroupBCRr2	GR-1042	
3	Service and protection resource status:	sdhBLSRProtectionGroupBCRr1	GR-1042	
3	Service and protection resource status:	sdhMSProtectionGroupSIF	SIF NE View	
3	Service and protection resource status:	serviceSelectorProtectionGroupBCR	GR-1042	
4	Failure and protection resource status:	connectionProtectionGroupBCRr2	GR-1042	
4	Failure and protection resource status:	sdhBLSRProtectionGroupBCRr1	GR-1042	
4	Failure and protection resource status:	sdhMSProtectionGroupSIF	SIF NE View	
4	Failure and protection resource status:	serviceSelectorProtectionGroupBCR	GR-1042	
5	Restore service to primary resource:	circuitPackR1	M.3100/A.1	
5	Restore service to primary resource:	electricalSPITTPBidirectional/Sink /Source	G.774	
5	Restore service to primary resource:	electricalSPITTPBidirectionalBCRr1	GR-1042	
5	Restore service to primary resource:	opticalSPITTPBidirectional/Sink /Source	G.774	
5	Restore service to primary resource:	opticalSPITTPBidirectionalBCRr1	GR-1042	
5	Restore service to primary resource:	rsTTPBidirectional/Sink/Source	G.774	
5	Restore service to primary resource:	rsTTPBidirectionalSIF/SinkSIF/SourceSIF	SIF NE View	
6	Protection lock-out:	connectionProtectionGroupBCRr2	GR-1042	

#	Requirement	Managed Object Class	Source	Comments
6	Protection lock-out:	sdhBLSRProtectionGroupBCRr1	GR-1042	
6	Protection lock-out:	sdhMSProtectionGroupSIF	SIF NE View	
6	Protection lock-out:	serviceSelectorProtectionGroupBCR	GR-1042	
7	Automatic Locking into Protection	sdhMSProtectionGroupSIF	SIF NE View	

2.3.6 Trouble Administration

Trouble Administration transfers trouble reports originated by customers and trouble tickets originated by proactive failure detection checks. It supports action to investigate and clear the trouble, and provides access to the status of services and the progress made in clearing each trouble.

No Feature Requirements Identified

2.4 Performance Management Feature Requirements

2.4.1 Performance Monitoring

Performance Monitoring (PM) provides continuous collection of data concerning the performance of the NE. It designed to measure the overall quality of the NE, using monitoring parameters (e.g., Errored Second) in order to detect degradation.
The following feature requirements have been identified for Performance Monitoring:

1. PM data: The NMS retrieves specified physical (optical), section, line and path layer PM data for specified NE(s) from the EMS.

Rationale: This requirement is in support of R 2-9.

2. PM data gathering: The NMS directs the EMS to configure parameters for performance monitoring (schedule, etc.).

Rationale: This requirement is in support of R 2-9.

3. PM collection control: The NMS instructs the EMS to suspend or resume PM data collection.

Rationale: This requirement is in support of R 2-9.

4. Threshold crossing alerts (TCAs): After TCA thresholds and alarming criteria have been set, the NMS receives autonomous alarms from the EMS about persistent impairments.

Rationale: This requirement is in support of R 2-6.

5. NE connectivity data: The NMS retrieves from the EMS the current physical NE connectivity.

Rationale: This requirement follows from R 2-1 and is in support of R 2-9.

Comment: Not clear why this is a performance monitoring requirement. NE connectivity data is useful for comparing performance data of connected NEs.

6. NE alarms: The NMS receives autonomous alarm transitions (active, clear) that are reported by the NE.

Rationale: This requirement is in support of R 2-6. Related to Item #4 above

7. Invalid data flag: For PM counts accumulated in 15-minute or 24-hour registers, the EMS provides an invalid data flag for each register. This flag is to indicate whether the data in the register is corrupted, e.g. due to missing data or accumulation period shorter than 15 minutes or 24 hours.

Rationale: This requirement is in support of R 2-9.

8. Threshold crossing alert administration: The NMS specifies criteria that the EMS shall use to determine which TCAs to send to a NMS.

Rationale: This requirement is in support of R 2-9.

9. PM processing control: The NMS instructs the EMS to set and put into effect provisionable PM processing modes, e.g. DS3 P-bit or C-bit processing.

Rationale: This requirement is in support of R 2-9.

10. TCA Thresholds: The NMS directs the EMS to set or modify TCA thresholds.

Rationale: This requirement is in support of R 2-15.

Table 2-20 Objects supporting Section 2.4.1 Performance Monitoring

#	Requirement	Managed Object Class	Source	Comments
1	PM data:	See R2-9		
2	PM data gathering:	See R2-9		
3	PM collection control:	See R2-9		
5	NE connectivity data:	See R2-1		
6	NE alarms:	(all objects capable of notifying alarms)		
7	Invalid data flag:	See R2-9		
8	Threshold crossing alert administration:	thresholdData	Q.822	
9	PM processing control:	ds3LineTTPBidirectional/Sink/Source	GR-836	
10	TCA Thresholds:	thresholdData	Q.822	

2.4.2 Performance Analysis

Performance analysis includes function sets that help evaluate the performance levels of the network and managed resources within the network.

The following feature requirements have been identified for Performance Analysis:

1. PM data: The NMS queries the EMS for physical (optical), section, line and path PM data for specified NE(s).

   Rationale: This requirement is in support of R 2-9.

2. TCAs: The NMS queries the EMS for any logged threshold crossing alerts that the EMS received from specified NE(s).

   Rationale: This requirement is in support of R 2-9.

Table 2-21 Objects supporting Section 2.4.2 Performance Analysis

#	Requirement	Managed Object Class	Source	Comments
1	PM data:	See R2-9		
2	TCAs:	alarmRecord	X.721	
2	TCAs:	log	X.721	

2.4.3 Performance Quality Assurance

Performance quality assurance functions help establish and assess performance related quality of service measures.

The following feature requirements have been identified for Performance Quality Assurance:

1. Path layer PM (for NE(s) that support path layer performance parameters): After directing the EMS to collect performance parameters, the NMS queries the EMS for path layer performance parameters collected from specified NE(s) for specified time periods. Depending on the interfaces on the managed NE(s) these parameters include:
    - SONET STS and VT path PM counts
    - SDH VC path PM counts

Path Termination:
AIS/LOP Seconds (ALS) (conditional)
ALS Far End (conditional)
Failure Count
Failure Count Far End
UAS Far End
BBE/CV
ES
SES
UAS
Far End BBE/CV
Far End ES
Far End SES

    - DS3 path PM counts

DS3 Path
SAS
ES
SES
UAS
AISS
CV
FC
ESA
ESB
ESFE
ESAFE
ESBFE
FCFE
SASFE
SESFE
UASFE

    - DS1 path PM (for synchronization sources)

DS1 Path
ES
SAS
UAS
CV
SES
AISS

    If the managed resource supports intermediate path PM, e.g., SONET DCS, the EMS shall support intermediate path PM collection, query and reporting as well.

    Rationale: This requirement is in support of R 2-9.

2. Line PM (for NE(s) that support corresponding performance parameters): After directing the EMS to collect performance parameters, the NMS queries the EMS for line layer performance parameters

collected from specified NE(s) for specified time periods. Depending on the interfaces on the managed NE(s) these parameters include:

- SONET line PM counts
- SDH multiplex section counts

Multiplex Section (Line):
AISS
AISS-FE
FC
FC-FE
UAS
UAS-FE
BBE/CV
ES
SES
Far End BBE/CV
Far End ES
Far End SES

- DS3 line PM counts

DS3 Line
ESL
LOSS
CV
SES

- DS1 line PM counts (for synchronization sources)

DS1 Line
ESL
LOSS
CV
SES

Rationale: This requirement is in support of R 2-9.

3. Section PM (for NE(s) that support corresponding performance parameters): After directing the EMS to collect performance parameters, the NMS queries the EMS for section layer performance parameters collected from specified NE(s) for specified time periods. Depending on the interfaces on the managed NE(s) these parameters include:

   - SONET section PM counts
   - SDH regenerator section PM counts

Regenerator Section (Section):
SEFS
BBE/CV
ES
SES
UAS

   Rationale: This requirement is in support of R 2-9.

   Comment: This is a preliminary list of characteristic data supported by SONET NEs.

4. Physical (optical) PM: After directing the EMS to collect performance, the NMS queries the EMS for optical measurements, such as Laser Bias Current, collected from specified NE(s) for specified time periods.

SONET Physical Interface

Transmit Power Level (Conditional)
Transmit Power Level Tide Mark Maximum (Conditional)
Transmit Power Level Tide Mark Minimum (Conditional)
Laser Bias (Conditional)
Laser Bias Tide Mark Maximum (Conditional)
Laser Bias Tide Mark Minimum (Conditional)
Laser Temperature (Conditional)
Laser Temperature Tide Mark Maximum (Conditional)
Laser Temperature Tide Mark Minimum (Conditional)
Receive Power Level (Conditional)
Receive Power Level Tide Mark Maximum (Conditional)
Receive Power Level Tide Mark Minimum (Conditional)

Electrical SDH Physical Interface*:
Transmit Power Level
Transmit Power Level Tide Mark Maximum
Transmit Power Level Tide Mark Minimum

**The support of the Electrial SDH Physical Interface PM data is conditional, if an object supports it.*

Rationale: This requirement is in support of R 2-9.

5. Invalid data flag: For PM counts accumulated in 15-minute or 24-hour registers, the EMS provides an invalid data flag for each register. This flag is to indicate whether the data in the register is corrupted, e.g. due to missing data or accumulation period shorter than 15 minutes or 24 hours.

   Rationale: This requirement is in support of R 2-9.

6. Line adaptation layer PM (for NE(s) that support line adaptation layer performance parameters): After directing the EMS to collect performance parameters, the NMS queries the EMS for line adaptation layer performance parameters collected from specified NE(s) for specified time periods. Depending on the interfaces on the managed NE(s) these parameters include:

Multiplex Section (Line) Adaptation:
PJC High, Detected
PJC Low, Detected
PJC High, Generated
PJC Low, Generated
PJC Generated Seconds
PJC Detected Seconds

   Rationale: This requirement is in support of R 2-9.

7. BLSR protection PM (for NE(s) that support BLSR protection performance parameters): After directing the EMS to collect performance parameters, the NMS queries the EMS for BLSR protection performance parameters collected from specified NE(s) for specified time periods. Depending on the interfaces on the managed NE(s) these parameters include:

BLSR Protection:
Ring Protection Switching Count (PSC)
Ring Protection Switching Duration (PSD)
Span PSC

Span PSD

Rationale: This requirement is in support of R 2-9.

Table 2-22 Objects supporting Section 2.4.3 Performance Quality Assurance

#	Requirement	Managed Object Class	Source	Comments
1	Path layer PM (for NE(s) that support path layer performance parameters):	See R2-9		
2	Line PM (for NE(s) that support corresponding performance parameters):	See R2-9		
3	Section PM (for NE(s) that support corresponding performance parameters):	See R2-9		
4	Physical (optical) PM:	See R2-9		
5	Invalid data flag:	See R2-9		
6	Line adaptation layer PM	See R2-9		
7	BLSR protection PM	See R2-9		

2.4.4 Performance Management Control

Performance Management Control provides the functions necessary to apply network traffic controls and functions to administer thresholds and PM data collection and analysis.

The following feature requirements have been identified for Performance Management Control:

1. TCA Thresholds: The NMS instructs the EMS to set the criteria for generating TCAs. (provision TCAs parameters)

   Rationale: This requirement is in support of R 2-3.

2. PM data gathering: The NMS directs the EMS to collect specified performance parameters from specified NE(s) for specified time periods.

   Rationale: This requirement is in support of R 2-9.

3. PM collection control: The NMS instructs the EMS to suspend or resume the collection of specified performance parameters from specified NE(s).

   Rationale: This requirement is in support of R 2-9.

Table 2-23 Objects supporting Section 2.4.4 Performance Management Control

#	Requirement	Managed Object Class	Source	Comments
1	TCA Thresholds:	thresholdData	Q.822	
2	PM data gathering:	See R2-9		
3	PM collection control:	See R2-9		

2.5 Configuration Management Feature Requirements

2.5.1 Provisioning

Provisioning is used to condition telecommunication resources for service. This includes setting NE parameters, design and execution of path (across multiple NEs), software download, and service assignment.

The following feature requirements have been identified for Provisioning:

1. Cross-Connects: The NMS instructs the EMS to set or remove cross connections between specified ports within specified NE(s).

Rationale: This requirement follows from **R 2-3**.

2. Equipment Parameters: The NMS directs the EMS to set or modify the specified equipment parameters to the specified values within the specified NE(s).

   Rationale: This requirement follows from **R 2-3**.

3. TCA Thresholds: The NMS directs the EMS to set or modify TCA thresholds.

   Rationale: This requirement follows from **R 2-3**.

4. Configuration Query: The NMS queries the EMS for specified equipment parameter, equipment configuration, or cross connection information for specified NE(s).

   Rationale: This requirement follows from **R 2-1**.

5. Configuration Change reporting: The NMS can setup change reporting with the EMS that tell the EMS which autonomous configuration updates the NMS desires to receive. The updates include notifications when equipment is added to or removed from the network, equipment parameters are modified, cross connections are set, removed or modified, and the status of resources changes (e.g. in-service, out-of-service).

   Rationale: This requirement is an extension of **R 2-2**.

6. Time of Day Setting: The NMS can instruct the EMS to reset (set to a new value) the time-of-day clock of a specified NE.

   Rationale: This requirement follows from **R 2-3**.

7. Reset NE(s) PM values: The NMS instructs the EMS to reset the registers for PM counts for specified NE(s).

   Rationale: This requirement follows from **R 2-9**.

8. Backup/restore NE(s) configuration data: The NMS directs the EMS to backup equipment parameters, TCA threshold settings and cross connection information for specified NE(s) to an EMS-controlled media. The NMS instructs the EMS to restore specified backed-up data from the EMS-controlled media to the specified NE(s).

   Rationale: This requirement is in support of **R 2-3**.

9. Circuit Pack Equipage: The EMS forwards notifications from NE(s) about any equipment changes (e.g. adding/removing port cards) to the NMS. These notifications include unique identification for the changed equipment and it's location (e.g. shelf, slot).

   Rationale: This requirement is an extension of **R 2-2**.

10. Provisioning Attempt Failure: The NMS can instruct the EMS to disconnect the connections for a provisioning failure and the NMS can instruct the EMS to automatically disconnect the connections on provisioning failure as an option on the provisioning action itself.

    Rationale: This requirement is an extension of **R 2-3**.

11. Bridge and/or Roll: The NMS directs the EMS to bridge and/or roll a signal from a leg of an existing cross connection to a new leg. The bridge operation bridges the signal to a new leg (therefore a new one-way cross connection is created), and the old leg still remains. The roll operation takes down the old leg (therefore the old cross connection is deleted), and the newly created cross connection becomes two-way if it is a two-way circuit.

Rationale: This requirement is an extension of **R 2-3**.

12. SONET/SDH Gateway Cross-connects: The NMS instructs the EMS to set or remove cross connections between specified ports within specified SONET/SDH NE(s).

    Rationale: This requirement is an extension of **R 2-3**.

13. External Device Control: The NMS instructs the EMS to control external device points associated with the EMS or a subtending NE.

    Rationale: This requirement is an extension of **R 2-3**.

    Comment: External control points could be used for a relay closure for a bell, lamp, generator, heater, or air conditioner, etc.

14. Flexible Configuration: The NMS directs the EMS to change connection termination point (CTP) configurations for modifiable trail termination points and modifiable indirect adaptors if the current CTPs are not cross-connected and the NE supports flexible configuration.

    Rationale: This requirement is an extension of **R 2-3**.

    Comment: Modifiable TTPs and indirect adaptors are only used when there is flexibility in the configuration. The structure below a TTP is completely configured when the TTP is created, according to the default configuration of the network element (i.e., even if the TTP is modifiable, there will be a default client that is created). Reconfiguration of the multiplexing structure should be supported (e.g. changing a tug3 from 1 tu3 to 7 tug2). Configuration defines the complete subtree between the TTP of the server layer (e.g. vc4TTP) and the CTPs of its clients (e.g. tu3CTP, tu12CTP, etc). Changing the configuration of already cross-connected CTPs that are contained directly or indirectly by a modifiable indirect adaptor or trail termination point is not feasible; the CTPs must be disconnected prior to making the change.

Table 2-24 Objects supporting Section 2.5.1 Provisioning

#	Requirement	Managed Object Class	Source	Comments
1	Cross-Connects:	au3CTPBidirectionalR1/SinkR1/Source	G.774/Cor.1	
1	Cross-Connects:	au3SupervisedCTPBidirectionalR1/SinkR1/Source	G.774-05/Cor.1	
1	Cross-Connects:	au44cCTPBidirectional/Sink/Source	GR-1114	
1	Cross-Connects:	au44cSupervisedCTPBidirectionaBCRl/SinkBCR/SourceBCR	GR-1042	
1	Cross-Connects:	au416cCTPBidirectionalBCR/Sink/CR /SourceBCR	GR-1042	
1	Cross-Connects:	au416cSupervisedCTPBidirectionaBCRl/SinkBCR/SourceBCR	GR-1042	
1	Cross-Connects:	au4CTPBidirectionalR1/SinkR1/Source	G.774/Cor.1	
1	Cross-Connects:	au4SupervisedCTPBidirectionalR1/SinkR1/Source	G.774-05/Cor.1	
1	Cross-Connects:	blsrFabricSIF	SIF NE View	
1	Cross-Connects:	blsrInterconnectFabricSIF	SIF NE View	
1	Cross-Connects:	crossConnectionR1	M.3100	
1	Cross-Connects:	fabricSIF	SIF NE View	
1	Cross-Connects:	sncpFabricSIF	SIF NE View	
1	Cross-Connects:	tpPool	M.3100	
1	Cross-Connects:	tu11CTPBidirectionalR1/SinkR1/Source	G.774/Cor.1	
1	Cross-Connects:	tu11SupervisedCTPBidirectionalR1 /SinkR1/Source	G.774-05/Cor.1	
1	Cross-Connects:	tu12CTPBidirectionalR1/SinkR1/Source	G.774/Cor.1	

#	Requirement	Managed Object Class	Source	Comments
1	Cross-Connects:	tu12SupervisedCTPBidirectionalR1 /SinkR1/Source	G.774-05/Cor.1	
1	Cross-Connects:	tu3CTPBidirectionalR1/SinkR1/Source	G.774/Cor.1	
1	Cross-Connects:	tu3SupervisedCTPBidirectionalR1 /SinkR1/Source	G.774-05/Cor.1	
1	Cross-Connects:	tug2Bidirectional/Sink/Source	G.774	
1	Cross-Connects:	modifiableTug2Bidirectional/Sink/Source	G.774-02	
1	Cross-Connects:	vc11TTPBidirectionalBCRr1/SinkBCRr1 /SourceBCRr1	GR-1042	
1	Cross-Connects:	modifiableVC11TTP BidirectionalSIF/SinkSIF/SourceSIF	SIF NE View	
1	Cross-Connects:	vc12TTPBidirectionalR1/SinkR1/Source	G.774	
1	Cross-Connects:	modifiableVC12TTP BidirectionalR1/SinkR1/SourceR1	G.774-02 Cor	
1	Cross-Connects:	vc13TTP BidirectionalBCRr1/SinkBCRr1/Source	GR-1042	
1	Cross-Connects:	modifiableVC13TTP BidirectionalSIF/SinkSIF/SourceSIF	SIF NE View	
1	Cross-Connects:	vc3TTPBidirectionalR1BCR/SinkR1BCR	GR-1042	
1	Cross-Connects:	vc3TTPSourceR1	G.774/Cor.1	
1	Cross-Connects:	modifiableVC3TTP BidirectionalSIF/SinkSIF	SIF NE View	
1	Cross-Connects:	modifiableVC3TTPSourceR1	G.774-02/Cor.1	
1	Cross-Connects:	vc4TTPBidirectionalR1BCR/SinkR1BCR	GR-1042	
1	Cross-Connects:	vc4TTPSourceR1	G.774/Cor.1	
1	Cross-Connects:	modifiableVC4TTPBidirectionalSIF /SinkSIF	SIF NE View	
1	Cross-Connects:	modifiableVC4TTPSourceR1	G.774-02/Cor.1	
1	Cross-Connects:	vc44cTTPBidirectional/Sink/Source	GR-1114	
2	Equipment Parameters:	(all objects capable of notifying alarms) Severity assignment		
2	Equipment Parameters:	circuitPackR1	M.3100/A.1	
3	TCA Thresholds:	See R2-9 Current Data objects		
3	TCA Thresholds:	thresholdData	Q.822	
4	Configuration Query:	See R2-1		
5	Configuration Change reporting:	See R2-1		
6	Time of Day Setting:	managedEms	SIF NE View	
7	Reset NE(s) PM values:	See R2-9 Current Data objects		
7	Reset NE(s) PM values:	thresholdData	Q.822	
8	Backup/restore NE(s) configuration data:	managedEms	SIF NE View	
8	Backup/restore NE(s) configuration data:	executableSoftware	X.744	
8	Backup/restore NE(s) configuration data:	software	M.3100	
8	Backup/restore NE(s) configuration data:	softwareDistributor	X.744	subclass may be necessary if simultaneous cut-over is desired
8	Backup/restore NE(s) configuration data:	softwareUnit	X.744	
9	Circuit Pack Equipage:	circuitPackR1	M.3100/A.1	
9	Circuit Pack Equipage:	equipmentHolder	M.3100	
9	Circuit Pack Equipage:	equipmentR1	M.3100	
10	Provisioning Attempt Failure	All objects that are provisionable		
11	Bridge and Roll	fabricSIF	SIF NE View	

#	Requirement	Managed Object Class	Source	Comments
11	Bridge and Roll	sncpFabricSIF	SIF NE View	
12	SONET/SDH Gateway cross-connects	e1CTPBidirectional/Sink/Source	ETS 300 371(1996)	
12	SONET/SDH Gateway cross-connects	e3CTPBidirectional/Sink/Source	ETS 300 371(1996)	
12	SONET/SDH Gateway cross-connects	e4CTPBidirectional/Sink/Source	ETS 300 371(1996)	
12	SONET/SDH Gateway cross-connects	e1TTPBidirectional/Sink/Source	ETS 300 371(1996)	
12	SONET/SDH Gateway cross-connects	e3TTPBidirectional/Sink/Source	ETS 300 371(1996)	
12	SONET/SDH Gateway cross-connects	e4TTPBidirectional/Sink/Source	ETS 300 371(1996)	
12	SONET/SDH Gateway cross-connects	p12CTPBidirectional/Sink/Source	ETS 300 304(1997)	
12	SONET/SDH Gateway cross-connects	p31CTPBidirectional/Sink/Source	ETS 300 304(1997)	
12	SONET/SDH Gateway cross-connects	p4CTPBidirectional/Sink/Source	ETS 300 304(1997)	
12	SONET/SDH Gateway cross-connects	pPITTPBidirectional/Sink/Source	ETS 300 371(1996)	
12	SONET/SDH Gateway cross-connects	tu12CTPBidirectionalR1/SinkR1/Source	G.774/Cor.1	
12	SONET/SDH Gateway cross-connects	tu12SupervisedCTPBidirectionalR1/SinkR1 /Source	G.774-05/Cor.1	
12	SONET/SDH Gateway cross-connects	tu3CTPBidirectionalR1/SinkR1/Source	G.774/Cor.1	
12	SONET/SDH Gateway cross-connects	tu3SupervisedCTPBidirectionalR1/SinkR1 /Source	G.774-05/Cor.1	
12	SONET/SDH Gateway cross-connects	tug3Bidirectional/Sink/Source	G.774	
12	SONET/SDH Gateway cross-connects	modifiableTug3Bidirectional/Sink/Source	G.774-02	
12	SONET/SDH Gateway cross-connects	vc12TTPBidirectionalR1/SinkR1/Source	G.774	
12	SONET/SDH Gateway cross-connects	modifiableVC12TTPBidirectionalR1 /SinkR1/SourceR1	G.774-02	
13	External Device Control	controlPoint	M.3100/A.1	
14	Flexible Configuration	modifiableVC11TTPBidirectionalSIF /SinkSIF/SourceSIF	SIF NE View	
14	Flexible Configuration	modifiableVC12TTPBidirectionalR1 /SinkR1/SourceR1	G.774-02 Cor	
14	Flexible Configuration	modifiableVC13TTPBidirectionalSIF /SinkSIF/SourceSIF	SIF NE View	
14	Flexible Configuration	modifiableVC3TTPBidirectionalSIF /SinkSIF	SIF NE View	
14	Flexible Configuration	modifiableVC3TTPSourceR1	G.774-02/Cor.1	
14	Flexible Configuration	modifiableVC4TTPBidirectionalSIF /SinkSIF	SIF NE View	
14	Flexible Configuration	modifiableVC4TTPSourceR1	G.774-02/Cor.1	
14	Flexible Configuration	modifiableAug Sink/Source/Bidirectional	G.774-02	
14	Flexible Configuration	modifiableTug2 Sink/Source/Bidirectional	G.774-02	
14	Flexible Configuration	ModifiableTug3 Bidirectional/Sink/Source	G.774-02	

Status and Control provides the capability to monitor and control certain aspects of the NE on demand (examples includes checking or changing the service state of a NE or one of its sub-parts (in service, out of service)).

The following feature requirements have been identified for Status and Control:

1. Status and Control: The EMS autonomously forwards to the NMS notifications from NE(s) about status (administrative or protection state) changes. The NMS in turn instruct the EMS to set or modify the administrative state of selected NE(s), e.g. to remove selected NE(s) from service or to implement a forced protection switch.

   Rationale: This requirement is in support of **R 2-6** and **R 2-7**.

Table 2-25 Objects supporting Section 2.5.2 Status and Control

#	Requirement	Managed Object Class	Source	Comments
1	Status and Control:	*Any that supports state attributes or represents a protection scheme*		

2.5.2 Software Management

The Software Management functions support the installation of equipment that makes up the telecommunication network.

Software Management functions include software download, copy, installation, setting reset pointers, execution, remote reset, reversion, configuration backup and restore and software data query. The realization of these functions is an Information Modeling issue.

The following feature requirements have been identified for Software Management:

1. Software Download and Software Copy:

Definitions:

code - executable software

data definition - the data structure, data format and default data values associated with a specific code release

generic - a unique grouping of compatible code and associated data definitions modules. Any changes in code or data definitions defines a new unique generic.

download - moving files that define a specific software generic from the managing system to data store on the destination NE.

copy - moving files that define a specific software generic from system other than the managing system to a data store on the destination NE. The other system could be another NE, a backup data store on the destination NE or a different system that acts as the source for the generic.

commitment – an action that makes execution of a previously resident version of a generic (either code or associated data) impossible without initation of a new software download or copy process.

The software download and copy functions are not concerned with the restoration previously backed up data values, although the same action may be used for both software download/copy and data restore functions.

Requirement:

- An NMS shall be able to direct an EMS to download or copy a software generic or patch to a generic (if the NE supports patching) to a specified Network Element (NE).
- A software generic for an NE may be composed of a number of different executable code and data definition modules that may be internally downloaded to different controllers within the NE. Any internal distribution of generic modules within an NE shall be transparent to the managing systems.

- "Download" and "copy" are the same function and may use the same action command, the difference being the source of the software files. In a download, the source is the managing system itself. In a copy, the source may be another NE or a remote or local (to the NE) backup file store.
- A download or copy action is directed to the destination NE. It is the responsibility of the NE to actually set-up and initiate the transfer of files that comprise the generic. The transfer mechanism used depends on the specified source (e.g., FTAM for files from an EMS, or direct file copy for files from a local backup file store).
- A download or copy action only moves the files from the remote source to a local file store in the destination NE. It does not make the new generic the currently executing software nor will it become the executing software in the case of a controller reset.

- A download or copy always moves a complete new software generic or patch (if the NE supports patches), including code and data definitions, to the destination NE.
  - The actual structure and content of the new generic shall be transparent to the interface.
  - A new generic could include completely new code and data definitions for all modules, or it may include a patch to a specific code module. The NE equipment vendor shall provide software generics as a complete packages, including all necessary directories and files, so that the NE can manage the file transfer and installation functions, regardless of the content of the generic.
- The EMS shall receive notification of the successful completion of the download or copy file transfer. The notification may be a direct response from the action that initiates the download or copy or it may be a result of a side effect of the action. The EMS shall verify that the transfer resulted in a valid copy of the generic.
- Commitment of a software generic may be accomplished through copy or download of a generic into secondary storage (if applicable) or through deleting the previous version of the generic. Commitment results when the previously executing software no longer exists in an NE.

Rationale: This requirement is in support of 2-12.

2. Software Installation:

Definition:

Software installation -the preparation for execution of a software generic that is an NEs local data store. Such preparation may include unpacking files, downloading code and data files to individual controllers within an NE and setting data entities to current values.

Requirements:

- An NMS shall be able to direct an EMS to install a software generic on a specified Network Element (NE).
  - Reset of an NE will not require an installed generic to be re-installed.
- The EMS shall receive notification of the successful installation of a new software generic.
  - The notification may be a direct response from the action that initiates the download or copy or it may be a result of a side effect of the action.
- An NMS shall be able to direct an EMS to request that the NE perform a software installation action at some designated future time.

Rationale: This requirement is in support of R 2-12.

3. Setting Reset Pointers:

Definition:

Setting reset pointers - setting pointers to a software generic to be the one that is loaded when a controller is reset or re-initialized

Requirement:

- An NMS shall be able to direct an EMS to specify which software generic on a Network Element (NE) shall be the generic that is loaded and executed when an NEs controller is re-initialized.

  Rationale: This requirement is in support of R 2-12.

4. Software Execution:

Requirement:

- An NMS shall be able to direct an EMS to request the execution of a specified software generic on a Network Element (NE).
- An NMS shall be able to direct an EMS to request that the NE perform a software execution action at some designated future time.
- Only one software generic shall be executing in an NE at any one time.

  Rationale: This requirement is in support of R 2-12.

5. Remote Reset:

Requirement:

- The NMS directs the EMS to reset the processing of specified NE(s), i.e. to reload and run the NE's controller software without causing service interruptions.
- After the NMS instructs the EMS to reset the processing of NE(s), the EMS autonomously reports to the controlling NMS the operational status of the software, e.g. running or did not start, for each of the target NE(s).
- The manager shall be able to reset the processing of separate software modules of specified NE(s) if the NE(s) support this function.

  Rationale: This requirement is in support of R 2-12.

6. Reversion:

Definition:

*Reversio*n - changing of the executing software generic from the generic currently executing to the prior executed generic.

Requirement:

- An NMS shall be able to direct an EMS to instruct a Network Element (NE) to revert to the prior software generic.

  Rationale: This requirement is in support of R 2-12.

7. Backup/restore NE(s) configuration data:

Definitions:

backup - Moving a copy of the current data values associated with a generic to local backup data store or to a remote destination, e.g., a management system.

restore - Moving previously backed up data values from a local backup data store or from a remote system to the NE, and re-setting the current data in the NE to be the restored data (if required).

Requirements:

- The NMS shall be able to direct the EMS to backup equipment parameters, TCA threshold settings and cross connection information for specified NE(s) to an EMS-controlled media.
- The NMS may instruct the EMS to restore the backed-up data.

  Rationale: This requirement is in support of R 2-12. and follows from R 2-3. It assumes that should a backup copy of the executaable generic be needed, it can be obtained using the copy or download function.

8. Software Data Query:

Requirement:

- The NMS can query the EMS for current version/generic information. For any notifications the EMS sends to the NMS about equipment/software configuration updates, the EMS includes version/generic information.
- The NMS can query the EMS for its current object model version.

Rationale: This requirement is in support of R 2-12. and follows from R 2-2.

Table 2-26 Objects supporting Section 2.5.3 Software Management

#	Requirement	Managed Object Class	Source	Comments
1	Software Download and Software Copy:	executableSoftware	X.744	
2	Software Installation:	executableSoftware	X.744	
3	Setting Reset Pointers:	*For future study*		
4	Software Execution:	executableSoftware	X.744	
5	Remote Reset	executableSoftware	X.744	
6	Reversion:	executableSoftware	X.744	
7	backup/restore NE(s) configuration data:	softwareUnit	X.744	
8	Software Data Query:	executableSoftware and softwareUnit	X.744	

2.5.3 Network Planning and Engineering

Network Planning and Engineering deals with the functions associated with determining the need for growth in capacity and the introduction of new technologies. It involves evaluation of alternate plans and the entry of chosen plans into a database that will support the Provisioning function group. Once a plan has been specified, the Provisioning function group will fill in further designed parameters and proceed toward implementation of the plan.

The following feature requirements have been identified for Network Planning and Engineering:

1. Configuration Query: The NMS queries the EMS for specified equipment parameter, equipment configuration, cross connection information for specified NE(s), and NE adjacency information.

   Rationale: This requirement follows from **R 2-2**.

Table 2-27 Objects supporting Section 2.5.4 Network Planning and Engineering

#	Requirement	Managed Object Class	Source	Comments
1	Configuration Query:	*all configurable object classes*		

2.5.4 Service Planning and Negotiation

Service Planning and Negotiation deals with planning for the introduction of new services and with those customer contacts to establish new services, change service features and disconnect services.

No Feature Requirements Identified

2.6 Security Management Feature Requirements

2.6.1 Detection

Detection function sets are those needed to detect an intrusion.

The following feature requirements have been identified for Detection:

1. NE environmental alarms: The NMS receives autonomous central office environmental alarm transitions (active, clear) that are reported by the NE.

   Rationale: This requirement is in support of **R 2-11**.

2. Request security alarm reports: The NMS retrieves previously logged security alarms.

   Rationale: This requirement is in support of **R 2-11** and follows from **R 2-10**.

3. NE alarms: The NMS receives autonomous security related alarm transitions (active, clear) that are reported by the NE.

   Rationale: This requirement is in support of **R 2-11**.

4. Subscription for alarms: The NMS informs the EMS which autonomous alarms the NMS desires to receive.

   Rationale: This requirement is in support of **R 2-11**.

5. Security audit trail: The NMS requests audit trail (retrieve historical user entered commands) of user commands.

   Rationale: This requirement is in support of **R 2-11** and follows from **R 2-10**.

Table 2-28 Objects supporting Section 2.6.1 Detection

#	Requirement	Managed Object Class	Source	Comments
1	NE environmental alarms:	*all objects capable of sending environmentalAlarms*		
2	Request security alarm reports:	userSession	GR-1253	
3	NE alarms:	securitySystem	GR-1114	
4	Subscription for alarms	eventForwardingDiscriminator	X.721	
5	Security audit trail:	securityAuditTrailRecord	X.740	

2.6.2 Containment and Recovery

Containment and Recovery function sets are those needed to deny access to an intruder, to repair damage done by an intruder, and to recover losses.

The following feature requirements have been identified for Containment and Recovery:

1. Request to restore: The NMS requests the restoration of NE configuration after detecting a security violation.

   Rationale: This requirement is in support of **R 2-11** and follows from **R 2-3**.

2. Request of backup: The NMS initiates a data backup of NE provisioned parameters.

   Rationale: This requirement is in support of **R 2-11** and follows from **R 2-3**.

3. Software download: The NMS directs the EMS to download specified software generic(s) to specified NE(s).

   Rationale: This requirement is in support of **R 2-11** and follows from **R 2-3**.

4. Administration of NE login/password: The NMS directs the EMS to initiate, activate, remove or modify users Login and password associated with specified NE.

   Rationale: This requirement is in support of **R 2-11** and follows from **R 2-3**.

Table 2-29 Objects supporting Section 2.6.2 Containment and Recovery

#	Requirement	Managed Object Class	Source	Comments
1	Request to restore:	softwareUnit	X.744	
2	Request of backup:	softwareUnit	X.744	
3	Software download:	executableSoftware	X.744	
4	Administration of NE login/password:	securityUserSIF	SIF NE View	

2.6.3 Prevention

Prevention function sets are those needed to prevent intrusion.

No Feature Requirements Identified

2.6.4 Security Administration

Security Administration function sets are those needed for planning and administering security policy and for the management of security related information.

The following feature requirements have been identified for Security Administration:

1. Log administration: The EMS accepts logging criteria from the NMS such as the log size and which event messages received from NE(s) to log.

   Rationale: This requirement is in support of **R 2-11** and follows from **R 2-10**.

2. Request audit trail records: The NMS requests the EMS to return the contents of the specified security log.

   Rationale: This requirement is in support of **R 2-11** and follows from **R 2-10**.

3. Verification of valid list of users: The NMS requests the EMS to retrieve a subset or all the NE user login records.

   Rationale: This requirement is in support of **R 2-11** and follows from **R 2-10**.

4. List of current NE users: The NMS requests the EMS to retrieve a list of users currently logged-on to an NE.

   Rationale: This requirement is in support of **R 2-11** and follows from **R 2-1**.

5. NE alarms: The NMS receives autonomous security related alarm transitions (active, clear) that are reported by the NE.

   Rationale: This requirement is in support of **R 2-11**.

6. Login Administration: The NMS may direct the EMS to initiate, activate, remove, or modify logins and passwords associated with a specific NE.

   Rationale: This requirement is in support of **R 2-11**.

7. Temporary Password Administration: The NMS may direct the EMS to generate a temporary password for a specific NE or domain of NEs that will expire after a given amount of time.

   Rationale: This requirement is in support of **R 2-11**.

   Comment: Such passwords are occasionally required for field technicians out of their normal area performing maintenance on NEs.

8. User Types and Privileges: Each user shall be assigned a privilege level which shall be used to identify functions that a user may perform. Functions may include provisioning functions, maintenance

functions and security administration functions. Security administration functions are those functions defined in 2.6.1-5, 2.6.2 -4 and 2.6.4.

Rationale: This requirement is in support of **R 2-11**.

9. User Session Management: The NMS requests the EMS to terminate the login session of selected users.

   Rationale: This requirement is in support of **R 2-11**.

Table 2-30 Objects supporting Section 2.6.4 Security Administration

#	Requirement	Managed Object Class	Source	Comments
1	Log administration:	log	X.721	
2	Request audit trail records:	securityAuditTrailRecord	X.740	
3	Verification of valid list of users:	securityUserSIF	SIF NE View	
4	List of current NE users:	userSessionSIF	GR-1253	
5	NE alarms:	userSessionSIF	GR-1253	
6	Login Administration	userSessionSIF	GR-1253	
7	Temporary Password Administration	securityUserSIF	GR-1253	
9	User Session Management	securityUserSIF	SIF NE View	

2.7 EMS Configuration Management Feature Requirements

2.7.1 Provisioning

The following feature requirements have been identified for EMS Provisioning:

1. Time-Of-Day Clock: The NMS shall be able to update a time-of-day clock in any assigned EMS.

   Comment: It is assumed that an EMS will update time-of-day clocks in assigned NE for use in history logs, alarm correlation, etc.

Table 2-31 Objects supporting Section 2.7.1 Provisioning

#	Requirement	Managed Object Class	Source	Comments
1	Time-Of-Day Clock:	managedEms	SIF NE View	

3 EMS-NE Interface Requirements (for future study)

4 Overview of Information Model

The Common NE View portion of the information model will handle management of individual NEs. Additional portions of the IM will handle management on multiple NEs under an EMS based on element-related criteria and EMS management.

Summary of NE View Object Classes

Table 4-1 lists the managed object classes currently proposed for the SIF NE View Information Model. Items marked "Requirement Needed" indicate that the object has not so far been correlated with a requirement or requirements in the functional requirements in Section 2.

Table 4-1 SIF NE View Managed Object Classes (by Information Model Fragment)

Object Class	Source	Comments
Network Fragment		
managedElementComplex	ITU-T Rec. M.3100	R2-1, 2.3.3#1, 2.5.1#9
managedEms	SIF NE View	R2-1, R2-13, 2.3.1 #2, 2.3.3#1, 2.5.1#9, 2.7.1#1
networkR1	ITU-T Rec. M.3100	R2-1, 2.3.3#1, 2.5.1#9
organization	ITU-T Rec. X.521	R2-1, 2.3.3#1, 2.5.1#9
organizationalUnit	ITU-T Rec. X.521	R2-1, 2.3.3#1, 2.5.1#9
Network Element Fragment		
managedElementR1	ITU-T Rec. M.3100	R2-1, R2-4, 2.3.2#10, 2.3.3#1
Hardware Fragment		
memory	Telcordia GR-836	**Requirement Needed**
equipmentR2	ITU-T Rec. M.3100/Cor.1	R2-1, 2.3.3#1, 2.5.1#9
equipmentHolder	ITU-T Rec. M.3100	R2-1, 2.3.3#1, 2.5.1#9
circuitPackR1	ITU-T Rec. M.3100/A.1	R2-1, R2-2, R2-6, 2.3.3#1, 2.3.5#5, 2.5.1#2,9
Software Fragment		
software	ITU-T Rec. M.3100	R2-12, 2.5.1#8, 2.5.3#1
softwareUnit	ITU-T Rec. X.744	R2-12, 2.5.1#8, 2.5.2#7, 8, 2.6.2#1,2, 2.5.3#1
executableSoftware	ITU-T Rec. X.744	R2-12, 2.5.1#8, 2.5.2#1,2,4,5,6,8, 2.5.3#1, 2.6.2#3
softwareDistributor	ITU-T Rec. X.744	R2-12, 2.5.1#8, 2.5.3#1
Generic Support Fragment		
eventForwardingDiscriminator	ITU-T Rec. X.721	R2-3, R2-6, 2.3.2#3,4,5, 2.6.2#4
log	ITU-T Rec. X.721	R2-10, 2.3.2#6,11 2.3.4#3, 2.4.2#2, 2.6.4#1
Configuration Management Support		
objectCreationRecord	ITU-T Rec. X.721	R2-10, R2-11, 2.3.#2
objectDeletionRecord	ITU-T Rec. X.721	R2-10, R2-11, 2.3.#2
attributeValueChangeRecord	ITU-T Rec. X.721	R2-10, R2-11, 2.3.2#6
stateChangeRecord	ITU-T Rec. X.721	R-310, 2.3.2#6
Alarm Surveillance Support Fragment		
alarmRecord	ITU-T Rec. X.721	R2-10, 2.3.2#6, 2.3.4#3, 2.4.2#2
alarmSeverityAssignmentProfile	ITU-T Rec. M.3100	R2-1, R2-2, 2.3.3#1
enhanced CurrentAlarmSummaryControl	ANSI T1.264	2.3.2#7, 2.3.4#2, **2.3.1 #3**
Basic Cross-Connection Fragment		
fabricSIF	SIF NE View	R2-1, 2.3.3#1, 2.3.4#10, 2.5.1#1,11
gtpR1	ITU-T Rec. M.3100	R2-1, 2.5.1#1
tpPool	ITU-T Rec. M.3100	R2-1, 2.5.1#1
crossConnectionR1	ITU-T Rec. M.3100	R2-1, 2.3.3#1,2.5.1#1
Termination Point Fragment		
CTPs		
au3CTP BidirectionalR1/SinkR1/Source	ITU-T Rec. G.774/Cor.1	R2-1, 2.3.3#1, 2.5.1#1

au3SupervisedCTP BidirectionalR1/SinkR1/Source	ITU-T Rec.G.774-05/Cor.1	R2-1, 2.3.3#1, 2.5.1#1
au416cCTP BidirectionaBCR/SinkBCR/SourceBCR	Telcordia GR-1042	R2-1, 2.3.3#1, 2.5.1#1
au416cSupervisedCTP BidirectionalBCR/SinkBCR/SourceBCR	Telcordia GR-1042	R2-1, 2.3.3#1, 2.5.1#1
au44cCTP Bidirectional/Sink/Source	Telcordia GR-1114	R2-1, 2.3.3#1, 2.5.1#1
au44cSupervisedCTP BidirectionalBCR/SinkBCR/SourceBCR	Telcordia GR-1042	R2-1, 2.3.3#1, 2.5.1#1
au4CTPBidirectionalR1/SinkR1/Source	ITU-T Rec. G.774/Cor.1	R2-1, 2.3.3#1, 2.5.1#1
au4SupervisedCTP BidirectionalR1/SinkR1/Source	ITU-T Rec. G.774-05/Cor.1	R2-1, 2.3.3#1, 2.5.1#1
ds1CTP Sink/Source/Bidirectional	Telcordia GR-836	R2-1, 2.3.3#1
ds3CTP Sink/Source/Bidirectional	Telcordia GR-836	R2-1, 2.3.3#1
e1CTPBidirectional/Sink/Source	ETS 300 371(1996)	R2-1, 2.3.3#1, 2.5.1#12 European PDH/SDH
e3CTPBidirectional/Sink/Source	ETS 300 371(1996)	R2-1, 2.3.3#1, 2.5.1#12 European PDH/SDH
e4CTPBidirectional/Sink/Source	ETS 300 371(1996)	R2-1, 2.3.3#1, 2.5.1#12 European PDH/SDH
p12CTPBidirectional/Sink/Source	ETS 300 304(1997)	R2-1, 2.3.3#1, 2.5.1#12 European PDH/SDH
p31CTPBidirectional/Sink/Source	ETS 300 304(1997)	R2-1, 2.3.3#1, 2.5.1#12 European PDH/SDH
p4CTPBidirectional/Sink/Source	ETS 300 304(1997)	R2-1, 2.3.3#1, 2.5.1#12 European PDH/SDH
msCTP Sink/Source/Bidirectional	ITU-T Rec. G.774	R2-1 2.3.3#1
rsCTP Sink/Source/Bidirectional	ITU-T Rec. G.774	R2-1, 2.3.3#1
tu11CTP BidirectionalR1/SinkR1/Source	ITU-T Rec. G.774/Cor.1	R2-1, 2.3.3#1, 2.5.1#1
tu11SupervisedCTP BidirectionalR1/SinkR1/Source	ITU-T Rec. G.774-05/Cor.1	R2-1, 2.3.3#1, 2.5.1#1
tu12CTP BidirectionalR1/SinkR1/Source	ITU-T Rec. G.774/Cor.1	R2-1, 2.3.3#1, 2.5.1#12 European SDH
tu12SupervisedCTP BidirectionalR1/SinkR1/Source	ITU-T Rec. G.774-05/Cor.1	R2-1, 2.3.3#1, 2.5.1#12 European SDH
tu13CTP BidirectionalBCRr1/SinkBCRr1/Source	Telcordia GR-1042	R2-1, 2.3.3#1, 2.5.1#1
tu13SupervisedCTP BidirectionalBCR/SinkBCR/SourceBCR	Telcordia GR-1042	R2-1, 2.3.3#1, 2.5.1#1
tu3CTPBidirectionalR1/SinkR1/Source	ITU-T Rec. G.774/Cor.1	R2-1, 2.3.3#1, 2.5.1#12 European SDH
tu3SupervisedCTP BidirectionalR1/SinkR1/Source	ITU-T Rec. G.774-05/Cor.1	R2-1, 2.3.3#1, 2.5.1#12 European SDH
TTPs		
ds1LineTTPSinkBCRr1 /SourceBCRr1/BidirectionalBCRr1	Telcordia GR-836	R2-1, R2-8, 2.3.3#1, 2.3.4#5
ds1PathTTPBidirectionalSIF /SinkSIF/SourceSIF	SIF NE View	R2-1, 2.3.3#1, 2.3.4#5
ds3LineTTP Sink/Source/Bidirectional	Telcordia GR-836	R2-1, R2-8, 2.3.3#1, 2.3.4#5
ds3PathTTPBidirectionalSIF/SinkSIF /SourceSIF	SIF NE View	R2-1, 2.3.3#1
e1TTPBidirectional/Sink/Source	ETS 300 371(1996)	R2-1, 2.3.3#1, 2.5.1#12 European PDH/SDH
e3TTPBidirectional/Sink/Source	ETS 300 371(1996)	R2-1, 2.3.3#1, 2.5.1#12 European PDH/SDH
e4TTPBidirectional/Sink/Source	ETS 300 371(1996)	R2-1, 2.3.3#1, 2.5.1#12 European PDH/SDH
electricalSPITTP Sink/Source/Bidirectional	ITU-T Rec. G.774	R2-1, R2-8, 2.3.3#1, 2.3.4#5
electricalSPITTPBidirectionalBCRr1	Telcordia GR-1042	R2-1, R2-8, 2.3.3#1, 2.3.4#5
msTTPBidirectional/Sink/Source	ITU-T Rec. G.774	R2-1, 2.3.3#1
msTTP BidirectionalBCRr1/SinkBCRr1	Telcordia GR-1042	R2-1, 2.3.3#1
opticalSPITTP Sink/Source/Bidirectional	ITU-T Rec. G.774	R2-1, R2-8, 2.3.3#1, 2.3.4#5
opticalSPITTPBidirectionalBCRr1	Telcordia GR-1042	R2-1, R2-8, 2.3.3#1, 2.3.4#5

pPITTPBidirectional/Sink/Source	ETS 300 371(1996)	R2-1, 2.3.3#1, 2.5.1#12 European PDH/SDH
rsTTPBidirectional/Sink/Source	ITU-T Rec. G.774	2.3.5#5
rsTTP BidirectionalSIF/SinkSIF/SourceSIF	SIF NE View	2.3.5#5
vc11TTPBidirectionalBCRr1/SinkBCRr1 /SourceBCRr1	Telcordia GR-1042	R2-1, 2.3.3#1, 2.5.1#1
modifiableVC11TTPBidirectionalSIF /SinkSIF/SourceSIF	SIF NE View	R2-1, 2.3.3#1, 2.5.1#1,14
vc12TTPBidirectionalR1/SinkR1/Source	ITU-T Rec. G.774	R2-1, 2.3.3#1, 2.5.1#12 for European PDH/SDH
modifiableVC12TTPBidirectionalR1 /SinkR1/SourceR1	ITU-T Rec. G.774-02/Cor.1	R2-1, 2.3.3#1, 2.5.1#12,14 for European PDH/SDH
vc13TTPBidirectionalBCRr1/SinkBCRr1 /Source	Telcordia GR-1042	R2-1, 2.3.3#1, 2.5.1#1,14
modifiableVC13TTPBidirectionalSIF /SinkSIF/SourceSIF	SIF NE View	R2-1, 2.3.3#1, 2.5.1#1,14
vc3TTPBidirectionalR1BCR/SinkR1BCR	Telcordia GR-1042	R2-1, 2.3.3#1, 2.5.1#1
vc3TTPSourceR1	ITU-T Rec. G.774/Cor.1	R2-1, 2.3.3#1, 2.5.1#1
modifiableVC3TTPBidirectionalSIF /SinkSIF	SIF NE View	R2-1, 2.3.3#1, 2.5.1#1,14
modifiableVC3TTPSourceR1	ITU-T Rec. G.774-02/Cor.1	R2-1, 2.3.3#1, 2.5.1#1,14
vc4TTPBidirectionalR1BCR/SinkR1BCR	Telcordia GR-1042	R2-1, 2.3.3#1, 2.5.1#1
vc4TTPSourceR1	ITU-T Rec. G.774/Cor.1	R2-1, 2.3.3#1, 2.5.1#1
modifiableVC4TTPBidirectionalSIF /SinkSIF	SIF NE View	R2-1, 2.3.3#1, 2.5.1#1,14
modifiableVC4TTPSourceR1	ITU-T Rec. G.774-02/Cor.1	R2-1, 2.3.3#1, 2.5.1#1,14
Indirect Adaptors		
aug Sink/Source/Bidirectional	ITU-T Rec. G.774	R2-1, 2.3.3#1
modifiableAug Sink/Source/Bidirectional	ITU-T Rec. G.774-02	R2-1, 2.3.3#1,14
tug2 Sink/Source/Bidirectional	ITU-T Rec. G.774	R2-1, 2.3.3#1, 2.5.1#1
modifiableTug2 Sink/Source/Bidirectional	ITU-T Rec. G.774-02	R2-1, 2.3.3#1, 2.5.1#1,14
tug3 Bidirectional/Sink/Source	ITU-T Rec. G.774	R2-1, 2.3.3#12, 2.5.1#1 European SDH
ModifiableTug3 Bidirectional/Sink/Source	ITU-T Rec. G.774-02	R2-1, 2.3.3#12, 2.5.1#1,14 European SDH
Monitor Points		
ds1MonitorPointBCR	Telcordia GR-836	R2-1, 2.3.3#1, 2.5.1#1
ds3MonitorPointBCR	Telcordia GR-836	R2-1, 2.3.3#1, 2.5.1#1
Performance Monitoring Fragment		
scanReportRecord	ITU-T Rec. X.738	R2-9
simpleScanner	ITU-T Rec. X.738	R2-9
Current Data		
dS1LineTTPSinkFECurrentData	ANSI T1.247	R2-9, 2.3.4#6,9, 2.3.5#2, 2.4.1#1,2,3,7, 2.4.2#1, 2.4.4#2,3, 2.5.1#3,7
dS1LineTTPSinkNECurrentData	ANSI T1.247	R2-9, 2.3.4#6,9, 2.3.5#2, 2.4.1#1,2,3,7, 2.4.2#1, 2.4.4#2,3, 2.5.1#3,7
dS1PathTTPSinkFECurrentData	ANSI T1.247	R2-9, 2.3.4#6,9, 2.3.5#2, 2.4.1#1,2,3,7, 2.4.2#1, 2.4.4#2,3, 2.5.1#3,7
dS1PathTTPSinkNECurrentData	ANSI T1.247	R2-9, 2.3.4#6,9, 2.3.5#2, 2.4.1#1,2,3,7, 2.4.2#1, 2.4.4#2,3, 2.5.1#3,7
dS3LineTTPSinkNECurrentData	ANSI T1.247	R2-9, 2.3.4#6,9, 2.3.5#2, 2.4.1#1,2,3,7, 2.4.2#1, 2.4.4#2,3, 2.5.1#3,7
dS3PathTTPSinkFECurrentDataSIF	SIF NE View	R2-9, 2.3.4#6,9, 2.3.5#2, 2.4.1#1,2,3,7, 2.4.2#1, 2.4.4#2,3, 2.5.1#3,7
dS3PathTTPSinkNECurrentDataSIF	SIF NE View	R2-9, 2.3.4#6,9, 2.3.5#2, 2.4.1#1,2,3,7, 2.4.2#1, 2.4.4#2,3, 2.5.1#3,7
electricalSourceSPICurrentData	ITU-T Rec. G.774-01	*R2-9, 2.3.4#6,9, 2.3.5#2, 2.4.1#1,2,3,7, 2.4.2#1, 2.4.4#2,3, 2.5.1#3,7*
opticalSPITTPCurrentData	ITU-T Rec. G.774-01	R2-9, 2.3.4#6,9, 2.3.5#2, 2.4.1#1,2,3,7, 2.4.2#1,

		2.4.4#2,3, 2.5.1#3,7
opticalSPITTPBidirectional CurrentDataSIF	SIF NE View	R2-9, 2.3.4#6,9, 2.3.5#2, 2.4.1#1,2,3,7, 2.4.2#1, 2.4.4#2,3, 2.5.1#3,7
opticalSPITTPSinkCurrentDataSIF	SIF NE View	R2-9, 2.3.4#6,9, 2.3.5#2, 2.4.1#1,2,3,7, 2.4.2#1, 2.4.4#2,3, 2.5.1#3,7
protectionSwCurrentData	ANSI T1.119-02	R2-9, 2.3.4#6,9, 2.3.5#2, 2.4.1#1,2,3,7, 2.4.2#1, 2.4.4#2,3, 2.5.1#3,7
rsCurrentDataSIF	SIF NE View	R2-9, 2.3.4#6,9, 2.3.5#2, 2.4.1#1,2,3,7, 2.4.2#1, 2.4.4#2,3, 2.5.1#3,7
msCurrentDataFarEnd	ANSI T1.119-02	R2-9, 2.3.4#6,9, 2.3.5#2, 2.4.1#1,2,3,7, 2.4.2#1, 2.4.4#2,3, 2.5.1#3,7
msCurrentDataNearEnd	ANSI T1.119-02	R2-9, 2.3.4#6,9, 2.3.5#2, 2.4.1#1,2,3,7, 2.4.2#1, 2.4.4#2,3, 2.5.1#3,7
vcCurrentDataFarEndSIF	SIF NE View	R2-9, 2.3.4#6,9, 2.3.5#2, 2.4.1#1,2,3,7, 2.4.2#1, 2.4.4#2,3, 2.5.1#3,7
vcCurrentDataNearEndSIF	SIF NE View	R2-9, 2.3.4#6,9, 2.3.5#2, 2.4.1#1,2,3,7, 2.4.2#1, 2.4.4#2,3, 2.5.1#3,7
History Data		
dS1LineTTPSinkFEHistoryData	ANSI T1.247	R2-9, 2.3.4#6,9, 2.3.5#2, 2.4.1#1,2,3,7, 2.4.2#1, 2.4.4#2,3
dS1LineTTPSinkNEHistoryData	ANSI T1.247	R2-9, 2.3.4#6,9, 2.3.5#2, 2.4.1#1,2,3,7, 2.4.2#1, 2.4.4#2,3
dS1PathTTPSinkFEHistoryData	ANSI T1.247	R2-9, 2.3.4#6,9, 2.3.5#2, 2.4.1#1,2,3,7, 2.4.2#1, 2.4.4#2,3
dS1PathTTPSinkNEHistoryData	ANSI T1.247	R2-9, 2.3.4#6,9, 2.3.5#2, 2.4.1#1,2,3,7, 2.4.2#1, 2.4.4#2,3
dS3LineTTPSinkNEHistoryData	ANSI T1.247	R2-9, 2.3.4#6,9, 2.3.5#2, 2.4.1#1,2,3,7, 2.4.2#1, 2.4.4#2,3
dS3PathTTPSinkFEHistoryDataSIF	SIF NE View	R2-9, 2.3.4#6,9, 2.3.5#2, 2.4.1#1,2,3,7, 2.4.2#1, 2.4.4#2,3
dS3PathTTPSinkNEHistoryDataSIF	SIF NE View	R2-9, 2.3.4#6,9, 2.3.5#2, 2.4.1#1,2,3,7, 2.4.2#1, 2.4.4#2,3
electricalSPIHistoryData	ITU-T Rec. G.774-01	*R2-9, 2.3.4#6,9, 2.3.5#2, 2.4.1#1,2,3,7, 2.4.2#1, 2.4.4#2,3*
msHistoryDataFarEnd	ANSI T1.119-02	R2-9, 2.3.4#6,9, 2.3.5#2, 2.4.1#1,2,3,7, 2.4.2#1, 2.4.4#2,3
msHistoryDataNearEnd	ANSI T1.119-02	R2-9, 2.3.4#6,9, 2.3.5#2, 2.4.1#1,2,3,7, 2.4.2#1, 2.4.4#2,3
opticalSPITTPHistoryData	ITU-T Rec. G.774-01	R2-9, 2.3.4#6,9, 2.3.5#2, 2.4.1#1,2,3,7, 2.4.2#1, 2.4.4#2,3
opticalSPITTP BidirectionalHistoryDataSIF	SIF NE View	R2-9, 2.3.4#6,9, 2.3.5#2, 2.4.1#1,2,3,7, 2.4.2#1, 2.4.4#2,3
opticalSPITTPSinkHistoryDataSIF	SIF NE View	R2-9, 2.3.4#6,9, 2.3.5#2, 2.4.1#1,2,3,7, 2.4.2#1, 2.4.4#2,3
protectionSwHistoryData	ANSI T1.119-02	R2-9, 2.3.4#6,9, 2.3.5#2, 2.4.1#1,2,3,7, 2.4.2#1, 2.4.4#2,3
rsHistoryDataSIF	SIF NE View	R2-9, 2.3.4#6,9, 2.3.5#2, 2.4.1#1,2,3,7, 2.4.2#1, 2.4.4#2,3
vcHistoryDataFarEndSIF	SIF NE View	R2-9, 2.3.4#6,9, 2.3.5#2, 2.4.1#1,2,3,7, 2.4.2#1, 2.4.4#2,3
vcHistoryDataNearEndSIF	SIF NE View	R2-9, 2.3.4#6,9, 2.3.5#2, 2.4.1#1,2,3,7, 2.4.2#1, 2.4.4#2,3
Threshold Data		
thresholdData	ITU-T Rec. Q.822	R2-3, 2.4.1#8,10, 2.4.4#1, 2.5.1#3,7
Linear APS Fragment		
protectedTTP Sink/Source/Bidirectional	ITU-T Rec. G.774-3	R2-1, 2.3.3#1
unprotectedCTP Sink/Source/Bidirectional	ITU-T Rec. G.774-3	R2-1, 2.3.3#1 - The last sentence in the behaviour

		statement should refer to the unreliableResourcePointer.
apsReportRecord	ITU-T Rec. G.774-03	R2-10, 2.3.2#6 -This object is also used to record notifications issued by protectionGroupBCRr1 and subclasses
sdhMSProtectionCoordinator	ITU-T Rec. G.774-9	R2-1
sdhMSProtectionGroupSIF	SIF NE View	R2-1, R2-2, 2.3.2#2, 2.3.3#1,7, 2.3.4#7, 2.3.5#3,4,5,7
sdhMSProtectionUnit	ITU-T Rec. G.774-03	R2-1
UPSR Fragment		
connectionProtectionGroupBCRr2	Telcordia GR-1042	R2-1
connectionProtectionUnitBCR	Telcordia GR-1042	R2-1
dropContinue ConnectionProtectionUnitBCR	Telcordia GR-1042	R2-1
sncpFabricSIF	SIF NE View	R2-1, 2.3.3#1, 2.3.4#10, 2.5.1#1,11
upsrInterconnectFabricSIF	SIF NE View	R2-1, 2.3.3#1, 2.3.4#10, 2.5.1#1,11
BLSR Fragment		
blsrFabricSIF	SIF NE View	R2-1
blsrInterconnectFabricSIF	SIF NE View	R2-1
eastWestTableBCRr1	Telcordia GR-1042	R2-1
enutTableBCR	Telcordia GR-1042	R2-1
ringMapBCRr2	Telcordia GR-1042	R2-1
ripTableBCR	Telcordia GR-1042	R2-1
stsSquelchEntryBCR	Telcordia GR-1042	R2-1
squelchTableBCR	Telcordia GR-1042	R2-1
sdhBLSRProtectionGroupBCRr1	Telcordia GR-1042	R2-1
sdhBLSRProtectionUnitBCR	Telcordia GR-1042	R2-1
serviceSelectorProtectionGroupBCR	Telcordia GR-1042	R2-1
namedServiceSelectorProtection GroupBCR	Telcordia GR-1042	R2-1
vtSquelchEntryBCR	Telcordia GR-1042	R2-1
vtSquelchTableBCR	Telcordia GR-1042	R2-1
Telemetry Fragment		
controlPoint	ITU-T Rec. M.3100/A.1	R2-1, 2.3.3#1,3, 2.5.1#13
scanPoint	ITU-T Rec. M.3100/A.1	R2-1, 2.3.2#15,16, 2.3.3#1,3
User Security Fragment		
securitySystem	Telcordia GR-1114	R2-1,R2-4,R2-11, 2.3.3#1, 2.6.1#3
securityUserSIF	SIF NE View	R2-1,R2-4,R2-11, 2.3.3#1, 2.6.2#4, 2.6.4#3,7,9,10
securityAuditTrailRecord	ITU-T Rec. X.740	R2-10, R2-11, 2.3.2#6, 2.6.1#5, 2.6.4#2

4.5Summary of Additional Object Classes for SONET EMS Management

Table 4-2 Additional Object Classes for SONET EMS Management

Managed Object Class	Source	Comment
agingControlSIF	SIF NE View	R2-7, 2.3.2#1 2.3.2#9
managedEmsSIF	SIF NE View	R2-1, 2.3.1 #1, 2.3.3#1, 2.5.1#6,8
managementLinkSIF	SIF NE View	R2-1, R2-4, 2.3.3#1, R2-14, 2.3.1 #1

4.6Summary of Additional Object Classes for EMS Management of Existing Equipment

Table 4-3 Additional Object Classes for EMS Management of existing Equipment

Managed Object Class	Source	Comment
ds3CTPBidirectionalSIF	SIF NE View	R2-1, 2.3.3#1 (for EMS compatibility with older NEs)

Managed Object Class	Source	Comment
ds3CTPSinkSIF	SIF NE View	R2-1, 2.3.3#1 (for EMS compatibility with older NEs)
ds3CTPSource	Telcordia GR-836	R2-1, 2.3.3#1 (for EMS compatibility with older NEs)

4.7Inheritance Relationships

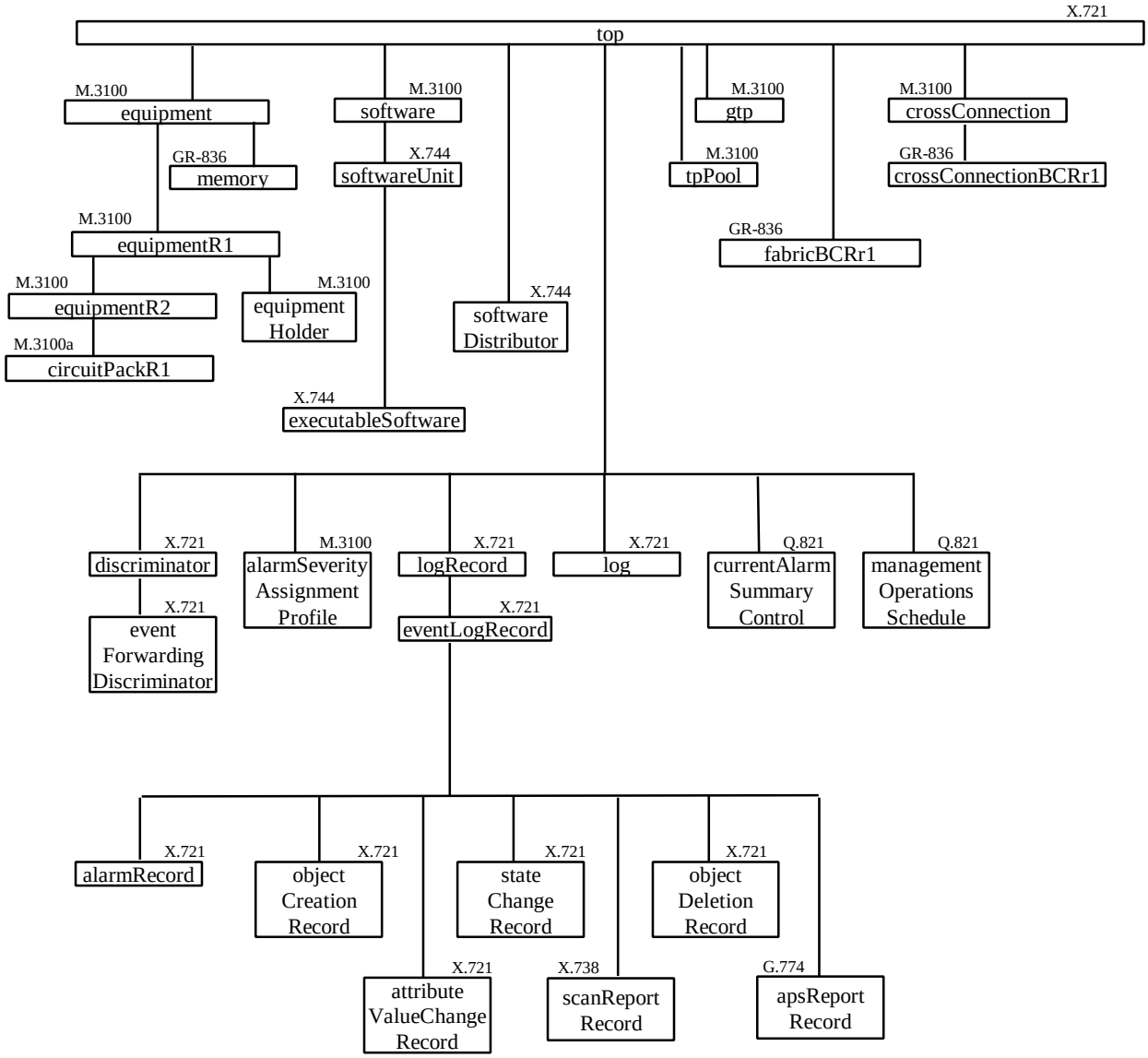

Figure 4-1 Inheritance Relationships for Miscellaneous Object Classes

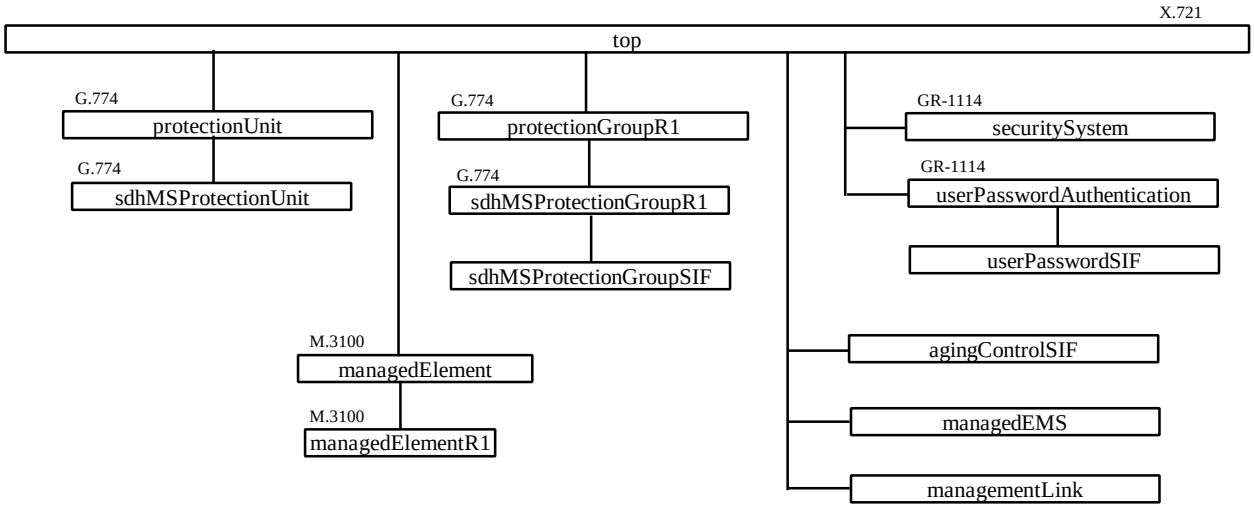

Figure 4-2 Inheritance Relationships for Miscellaneous Object Classes (cont.)

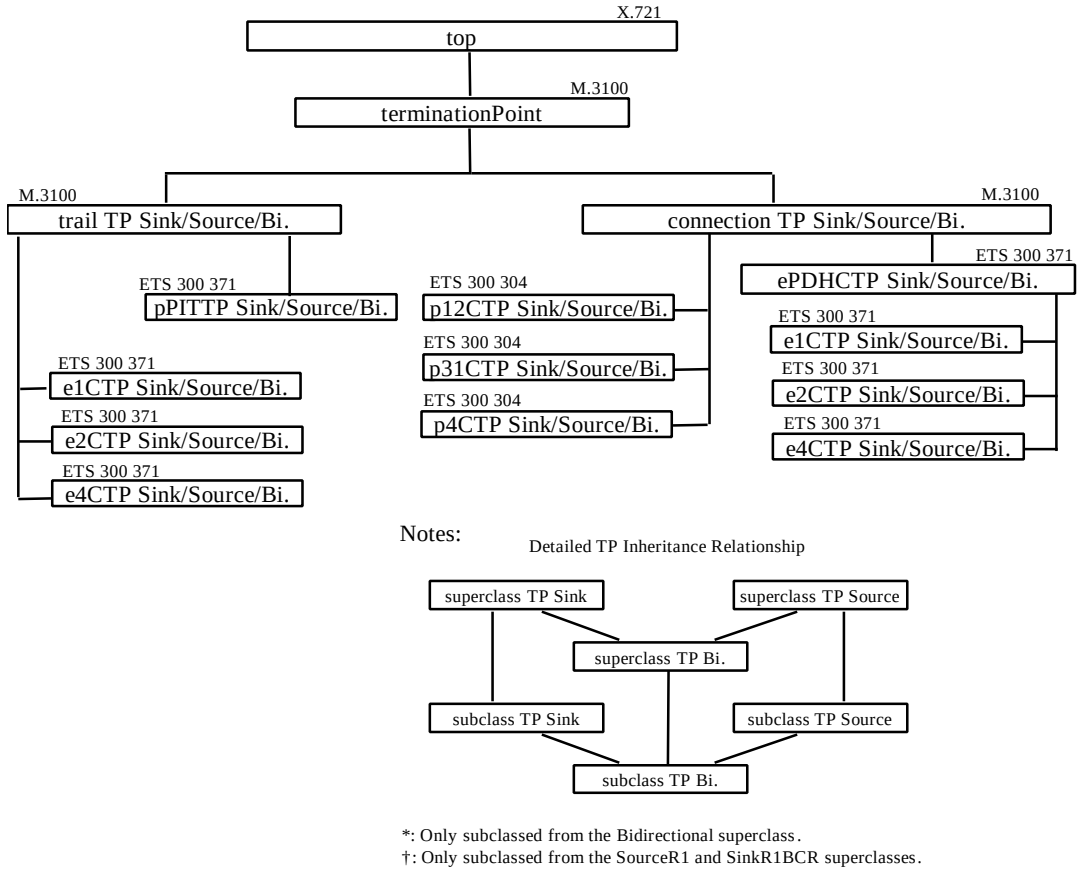

Figure 4-3 Inheritance Relationships for PDH Termination Point Object Classes

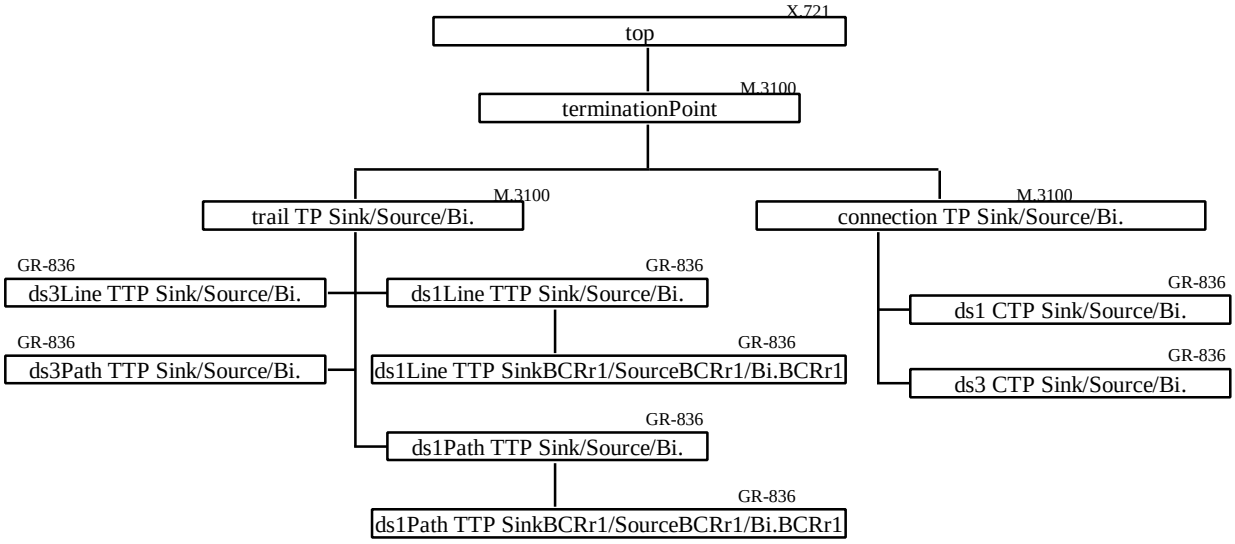

Figure 4-4 Inheritance Relationships for Asynchronous Termination Point Object Classes

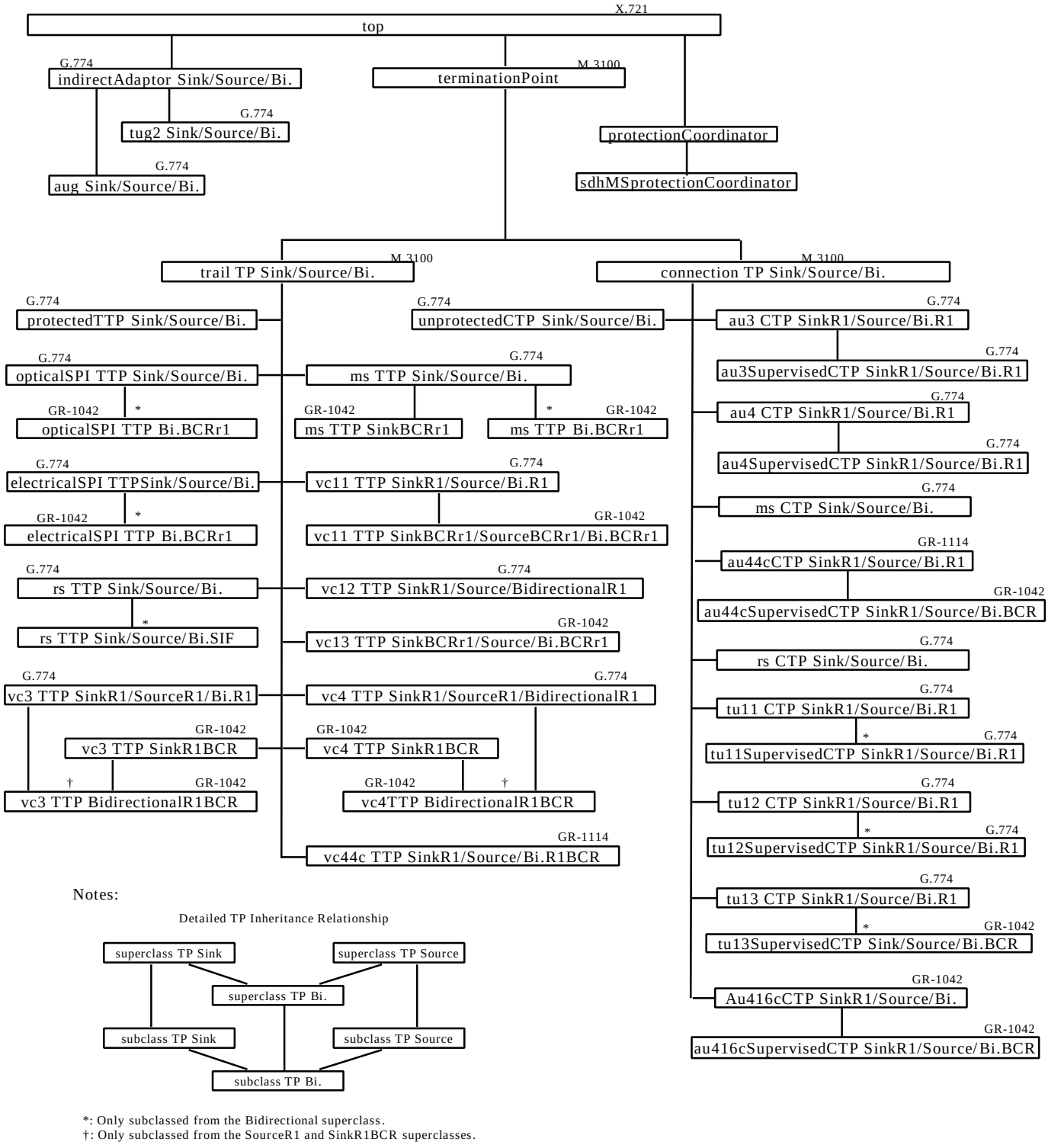

Figure 4-5 Inheritance Relationships for SONET and Protection Termination Point Object Classes

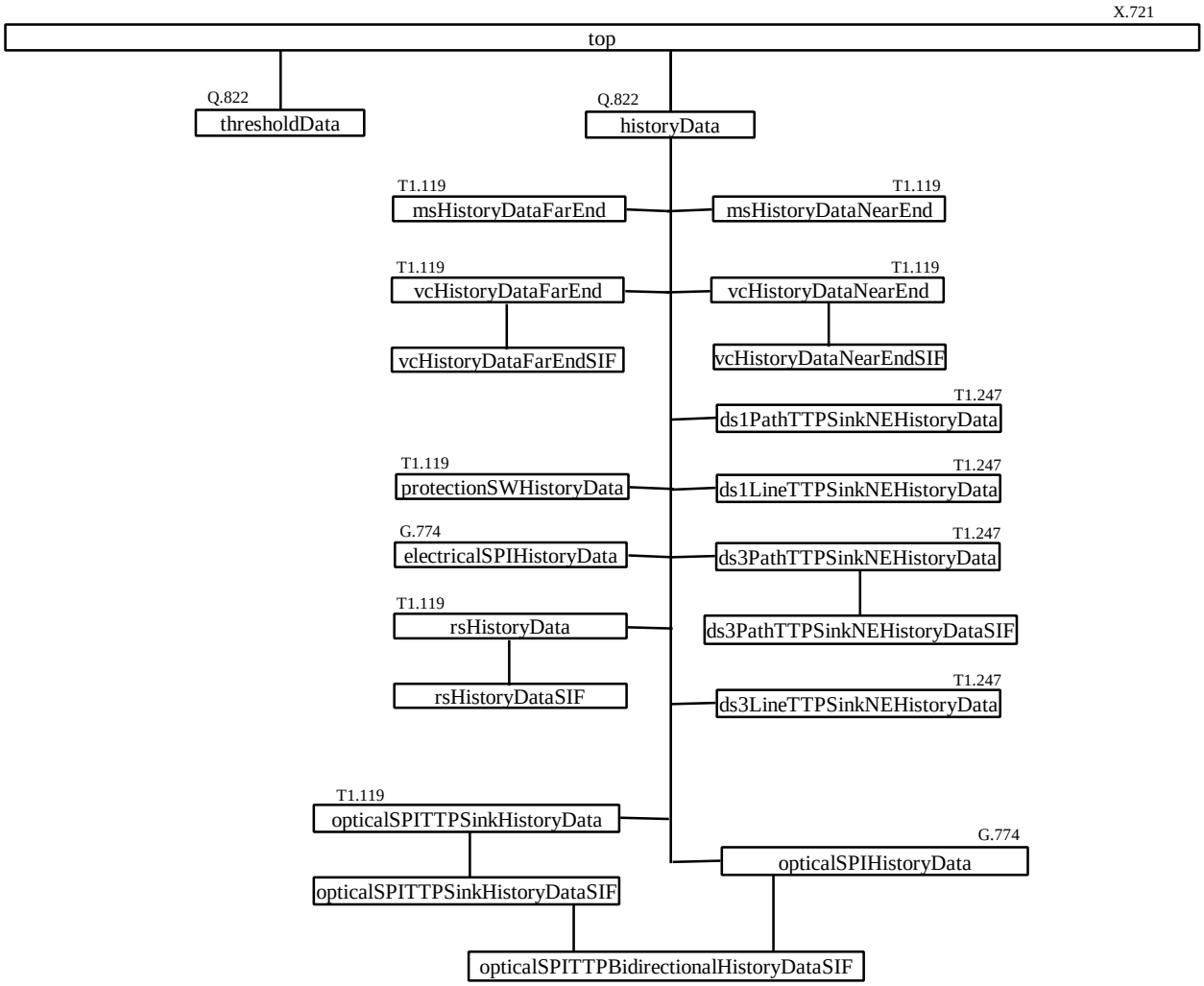

Figure 4-6 Inheritance Relationships for History Data Object Classes

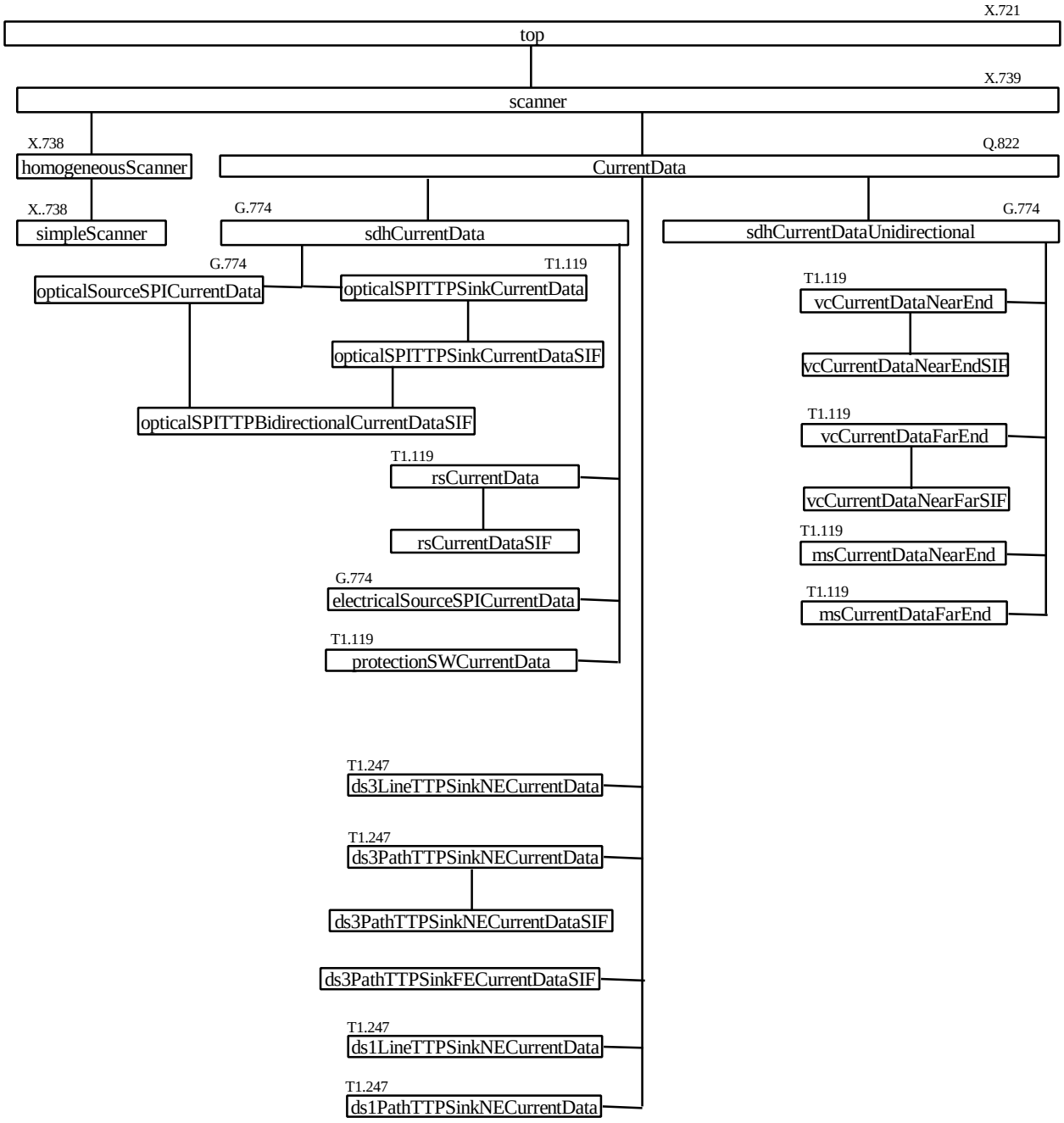

Figure 4-7 Inheritance Relationships for Current Data Object Classes

4.8Name Bindings

For brevity, sink and source namebindings have not been included in Table 4-4 where there are namebindings for bidirectional subclasses as well.

Table 4-4 Common NE-View Name Binding Table

Subordinate Managed Object	Name Binding	Source Document
Network Element Fragment		
managedElementR1	managedElement-organization managedElement-organizationalUnit managedElement-network (the corrected namebinding in M.3100/A1 will be used) managedElement-managedElementComplex managedElement-managedEms	M.3100 M.3100 M.3100/A.1 M.3100 SIF NE View
Hardware Fragment		
memory	memory-managedElement	GR-836
equipmentR2	equipment-equipment-R1 equipment-managedElement-R1	M.3100/Cor.1 M.3100/Cor.1
equipmentHolder	equipmentHolder-equipmentHolder equipment-managedElement-R1	M.3100 M.3100/Cor.1
circuitPackR1	CircuitPackR1-EquipmentHolder-autoCreated circuitPackR1-equipmentHolder-explicitlyCreated	M.3100/A1 M.3100/A1
Software Fragment		
software	software-managedElement software-equipment	M.3100 M.3100
softwareUnit	software-managedElement software-equipment	M.3100 M.3100
executableSoftware	software-managedElement software-equipment	M.3100 M.3100
softwareDistributor	softwareDistributor-managedElement	GR-836
Generic Support Fragment		
eventForwardingDiscriminator	eventForwardingDiscriminator-managedElement-R1	M.3100/Cor.1
log	log-managedElement	M.3100
Configuration Management Support Fragment		
objectCreationRecord	logRecord-log	X.721
objectDeletionRecord	logRecord-log	X.721
attributeValueChangeRecord	logRecord-log	X.721
stateChangeRecord	logRecord-log	X.721
Alarm Surveillance Support Fragment		
alarmRecord	logRecord-log	X.721
alarmSeverityAssignmentProfile	alarmSeverityAssignment-managedElement	M.3100
Enhanced CurrentAlarmSummaryControl	enhancedCurrentAlarmSummaryControl-managedElement enhancedCurrentAlarmSummaryControl-managedElementComplex enhancedCurrentAlarmSummaryControl-network enhancedCurrentAlarmSummaryControl-managedEMS	T1.264 T1.264 T1.264 SIF NE View
Basic Cross-Connection Fragment		
fabricSIF	fabricSIF-managedElement	SIF NE View
gtpR1	gtp-fabricSIF	SIF NE View
tpPool	tpPool-fabricSIF	SIF NE View
crossConnectionR1	crossConnection-fabricSIF	SIF NE View
Termination Point Fragment		
au3CTPBidirectionalR1	au3CTPSinkR1-augSink au3CTPSinkR1-msTTPSink au3CTPSinkR1-g774protectedTTPSink	GR-1042 GR-1042 GR-1042
au3SupervisedCTPBidirectionalR1	au3CTPSinkR1-augSink au3CTPSinkR1-msTTPSink au3CTPSinkR1-g774protectedTTPSink	GR-1042 GR-1042 GR-1042
au4CTPBidirectionalR1	au4CTPSinkR1-augSink au4CTPSinkR1-msTTPSink	GR-1042 GR-1042

	au4CTPSinkR1-g774protectedTTPSink	GR-1042
au4SupervisedCTPBidirectionalR1	au4CTPSinkR1-augSink au4CTPSinkR1-msTTPSink au4CTPSinkR1-g774protectedTTPSink	GR-1042 GR-1042 GR-1042
au44cCTPBidirectional	au44cCTPSinkR1-msTTPSinkau44cCTPSinkR1- g774protectedTTPSink	GR-1042 GR-1042
au44cSupervisedCTP BidirectionalBCR	au44cCTPSinkR1-msTTPSink au44cCTPSinkR1-g774protectedTTPSink	GR-1042 GR-1042
au416cCTPBidirectionalBCR	au416cCTPSinkBCR-msTTPSink au416cCTPSinkBCR-g774protectedTTPSink	GR-1042 GR-1042
au416cSupervisedCTP BidirectionalBCR	au416cCTPSinkBCR-msTTPSink au416cCTPSinkBCR-g774protectedTTPSink	GR-1042 GR-1042
ds1CTPBidirectional	ds1CTPSink-ds1LineTTPSink-BCRr1 ds1CTPSink-ds2PathTTPSink-BCRr1 ***ds1CTPSink-ds3PathTTPSink-BCRr1*** ***ds1CTPSink-vc11PathTTPSinkBCRr1***	GR-836 GR-836 ***GR-836*** ***GR-836***
ds3CTPBidirectional	ds3CTPSink-ds3LineTTPSink-BCRr1 ds3CTPSink-vc3TTPSinkR1	GR-836 GR-836
e1CTPBidirectional/Sink/Source	ePDHCTPSink-pPITTPSink ePDHCTPSource-pPITTPSource ePDHCTPSink-ePDHTTPSink ePDHCTPSource-ePDHTTPSource	ETS 300 371(1996) ETS 300 371(1996) ETS 300 371(1996) ETS 300 371(1996)
e3CTPBidirectional/Sink/Source	ePDHCTPSink-pPITTPSink ePDHCTPSource-pPITTPSource ePDHCTPSink-ePDHTTPSink ePDHCTPSource-ePDHTTPSource	ETS 300 371(1996) ETS 300 371(1996) ETS 300 371(1996) ETS 300 371(1996)
e4CTPBidirectional/Sink/Source	ePDHCTPSink-pPITTPSink ePDHCTPSource-pPITTPSource	ETS 300 371(1996) ETS 300 371(1996)
p12CTPBidirectional/Sink/Source	p12CTPSink-G774vc12TTPSink p12CTPSource-G774vc12TTPSource	ETS 300 304(1997) ETS 300 304(1997)
p31CTPBidirectional/Sink/Source	p31CTPSink-vc3TTPSinkR1BCR p31CTPSource-G774vc3TTPSource	SIF NE View ETS 300 304(1997)
p4CTPBidirectional/Sink/Source	p4CTPSink-vc4TTPSinkR1BCR p4CTPSource-G774vc4TTPSource	SIF NE View ETS 300 304(1997)
msCTPBidirectional	msCTPBidirectional-rsTTPBidirectional	G.774
rsCTPBidirectional	rsCTPBidirectional-electricalSPITTPBidirectional rsCTPBidirectional-opticalSPITTPBidirectional rsCTPBidirectional-electricalSPITTPBidirectionalBCRr1 rsCTPBidirectional-opticalSPITTPBidirectionalBCRr1	G.774 G.774 GR-1042 GR-1042
tu11CTPBidirectionalR1	tu11CTPBidirectionalR1-tug2Bidirectional	G.774
tu11SupervisedCTPBidirectionalR1	tu11CTPBidirectionalR1-tug2Bidirectional	G.774
tu12CTPBidirectionalR1	tu12CTPBidirectionalR1-tug2Bidirectional	G.774
tu12SupervisedCTPBidirectionalR1	tu12CTPBidirectionalR1-tug2Bidirectional	G.774
tu13CTPBidirectionalBCRr1	tu13CTPSinkBCRr1-tug2Sink	GR-1042
tu13SupervisedCTPBidirectionalSIF	tu13CTPSinkBCRr1-tug2Sink	GR-1042
tu3CTPBidirectionalR1	tu3CTPBidirectionalR1-tug3Bidirectional	G.774
tu3SupervisedCTPBidirectionalR1	tu3CTPBidirectionalR1-tug3Bidirectional	G.774
ds1LineTTPBidirectionalBCRr1	ds1LineTTPSink-managedElement-autoCreateCTP	GR-836
ds1PathTTPBidirectionalSIF	ds1PathTTPBidirectionalSIF-managedElementR1 ds1PathTTPSinkSIF-managedElementR1-autoCreate24DS0CTP ds1PathTTPSinkSIF-managedElementR1-noAutoCreateCTP	SIF NE View SIF NE View SIF NE View
ds3LineTTPBidirectional	ds3LineTTPSink-managedElement-autoCreateCTP	GR-836
ds3PathTTPBidirectionalSIF	ds3PathTTPBidirectionalSIF-managedElementR1 ds3PathTTPSinkSIF-managedElementR1-autoCreateDS1CTP ds3PathTTPSinkSIF-managedElementR1-noAutoCreateCTP	SIF NE View SIF NE View SIF NE View
e1TTPBidirectional/Sink/Source	ePDHTTPSink-managedElement ePDHTTPSource-managedElement	ETS 300 371(1996) ETS 300 371(1996)

e3TTPBidirectional/Sink/Source	ePDHTTPSink-managedElement ePDHTTPSource-managedElement	ETS 300 371(1996) ETS 300 371(1996)
e4TTPBidirectional/Sink/Source	ePDHTTPSink-managedElement ePDHTTPSource-managedElement	ETS 300 371(1996) ETS 300 371(1996)
electricalSPITTPBidirectional	electricalSPITTPBidirectional-managedElementR1	SIF NE View
electricalSPITTPBidirectionalBCRr1	electricalSPITTPBidirectional-managedElementR1	SIF NE View
msTTPBidirectional	msTTPBidirectional-managedElementR1	af-nm-0027.001
msTTPBidirectionalBCRr1	msTTPBidirectional-managedElementR1	af-nm-0027.001
opticalSPITTPBidirectional	opticalSPITTPBidirectionalSIF-managedElementR1	SIF NE View
opticalSPITTPBidirectionalBCRr1	opticalSPITTPBidirectionalSIF-managedElementR1	SIF NE View
pPITTPBidirectional	pPITTPSink-managedElement pPITTPSource-managedElement	SIF NE View SIF NE View
rsTTPBidirectional	rsTTPBidirectional-managedElementR1	af-nm-0027.001
rsTTPBidirectionalSIF	rsTTPBidirectional-managedElementR1	af-nm-0027.001
vc11TTPBidirectionalBCRr1	vc11TTPSinkBCRr1-managedElementR1	GR-1042
modifiableVC11TTPBidirectionalSIF	vc11TTPSinkBCRr1-managedElementR1	GR-1042
vc12TTPBidirectionalR1	vc12TTPSinkR1-managedElementR1	GR-1042
modifiableVC12TTPBidirectionalR1	vc12TTPSinkR1-managedElementR1	GR-1042
vc13TTPBidirectionalBCRr1	vc13TTPSinkBCRr1-managedElementR1	GR-1042
modifiableVC13TTPBidirectionalSIF	vc13TTPSinkBCRr1-managedElementR1	GR-1042
vc3TTPBidirectionalR1BCR	vc3TTPSinkR1-managedElementR1	GR-1042
modifiableVC3TTPBidirectionalSIF	vc3TTPSinkR1-managedElementR1	GR-1042
vc4TTPBidirectionalR1BCR	vc4TTPSinkR1-managedElementR1	GR-1042
modifiableVC4TTPBidirectionalSIF	vc4TTPSinkR1-managedElementR1	GR-1042
vc44cTTPBidirectional	vc44cTTPBidirectionalR1-managedElementR1	GR-1114
augBidirectional	augBidirectional-msTTPBidirectional augBidirectional-msTTPBidirectionalBCRr1 augBidirectional-protectedTTPBidirectional	G.774 GR-1042 G.774-3
modifiableAugBidirectional	augBidirectional-msTTPBidirectional augBidirectional-msTTPBidirectionalBCRr1 augBidirectional-protectedTTPBidirectional	G.774 GR-1042 G.774-3
tug2Bidirectional	tug2Bidirectional-vc3TTPBidirectionalR1BCR	GR-1042
modifiableTug2Bidirectional	tug2Bidirectional-vc3TTPBidirectionalR1BCR	GR-1042
tug3Bidirectional	tug3Bidirectional-vc4TTPBidirectionalR1BCR	SIF NE View
modifiableTug3Bidirectional	tug3Bidirectional-vc4TTPBidirectionalR1BCR	SIF NE View
ds1MonitorPointBCR	ds1MonitorPointBCR-managedElement	GR-836
ds3MonitorPointBCR	ds3MonitorPointBCR-managedElement	GR-836
Performance Monitoring Fragment		
scanReportRecord	logRecord-log	X.721
simpleScanner	simpleScanner-managedElement	M.3100/Cor.1
dS1LineTTPSinkFECurrentData	dS1LineTTPSinkFECurrentData-terminationPoint	T1.247
dS1LineTTPSinkNECurrentData	dS1LineTTPSinkNECurrentData-terminationPoint	T1.247
dS1PathTTPSinkFECurrentData	dS1PathTTPSinkFECurrentData-terminationPoint dS1PathTTPSinkFECurrentData-ds1MonitorPointBCR	T1.247 GR-836
dS1PathTTPSinkNECurrentData	dS1PathTTPSinkNECurrentData-terminationPoint dS1PathTTPSinkNECurrentData-ds1MonitorPointBCR	T1.247 GR-836
dS3LineTTPSinkNECurrentData	dS3LineTTPSinkNECurrentData-terminationPoint	T1.247
dS3PathTTPSinkFECurrentDataSIF	dS3PathTTPSinkFECurrentDataSIF-terminationPoint dS3PathTTPSinkFECurrentData-ds3MonitorPointBCR	SIF NE View GR-836
dS3PathTTPSinkNECurrentDataSIF	dS3PathTTPSinkNECurrentData-terminationPoint dS3PathTTPSinkNECurrentData-ds3MonitorPointBCR	T1.247 GR-836
electricalSourceSPICurrentData	electricalSourceSPICurrentData-electricalSPITTPSource	G.774-01
msCurrentDataFarEnd	msCurrentDataFarEnd-msTTPSink	T1.119-02
msCurrentDataNearEnd	msCurrentDataNearEnd-msTTPSink	T1.119-02
opticalSPISourceCurrentData	opticalSPISourceCurrentData-opticalSPITTPSource	G.774-01
opticalSPITTPBidirectional	opticalSPITTPBidirectionalCurrentData-	T1.119-02

CurrentDataSIF	opticalSPITTPBidirectional	
opticalSPITTPSink CurrentDataSIF	opticalSPITTPSinklCurrentData-opticalSPITTPSink	T1.119-02
protectionSwCurrentData	protectionSwCurrentData-protectionUnit	SIF NE View
rsCurrentDataSIF	rsCurrentData-rsTTPSink	T1.119-02
vcCurrentDataFarEndSIF	vcCurrentDataFarEnd-au3SupervisedCTPSinkR1	1.119-02
	vcCurrentDataFarEnd-au4SupervisedCTPSinkR1	T1.119-02
	vcCurrentDataFarEnd-au44cSupervisedCTPSinkBCR	GR-1042
	vcCurrentDataFarEnd-au416cSupervisedCTPSinkBCR	GR-1042
	vcCurrentDataFarEnd-tu11SupervisedCTPSinkR1	T1.119-02
	vcCurrentDataFarEnd-tu12SupervisedCTPSinkR1	T1.119-02
	vcCurrentDataFarEnd-tu13SupervisedCTPSinkBCR	GR-1042
	vcCurrentDataFarEnd-tu2SupervisedCTPSinkR1	T1.119-02
	vcCurrentDataFarEnd-vc11TTPSinkR1	T1.119-02
	vcCurrentDataFarEnd-vc12TTPSinkR1	T1.119-02
	vcCurrentDataFarEnd-vc13TTPSinkBCRr1	GR-1042
	vcCurrentDataFarEnd-vc2TTPSinkR1	T1.119-02
	vcCurrentDataFarEnd-vc3TTPSinkR1BCR	GR-1042
	vcCurrentDataFarEnd-vc4TTPSinkR1BCR	GR-1042
	vcCurrentDataFarEnd-vc44cTTPSinkBCRr1	GR-1042
	vcCurrentDataFarEnd-vc416cTTPSinkBCR	GR-1042
vcCurrentDataNearEndSIF	vcCurrentDataFarEnd-au3SupervisedCTPSinkR1	T1.119-02
	vcCurrentDataFarEnd-au4SupervisedCTPSinkR1	T1.119-02
	vcCurrentDataFarEnd-au44cSupervisedCTPSinkBCR	GR-1042
	vcCurrentDataFarEnd-au416cSupervisedCTPSinkBCR	GR-1042
	vcCurrentDataFarEnd-tu11SupervisedCTPSinkR1	T1.119-02
	vcCurrentDataFarEnd-tu12SupervisedCTPSinkR1	T1.119-02
	vcCurrentDataFarEnd-tu13SupervisedCTPSinkBCR	GR-1042
	vcCurrentDataFarEnd-tu2SupervisedCTPSinkR1	T1.119-02
	vcCurrentDataNearEnd-vc11TTPSinkR1	T1.119-02
	vcCurrentDataNearEnd-vc12TTPSinkR1	T1.119-02
	vcCurrentDataNearEnd-vc13TTPSinkBCRr1	GR-1042
	vcCurrentDataNearEnd-vc2TTPSinkR1	T1.119-02
	vcCurrentDataNearEnd-vc3TTPSinkR1BCR	GR-1042
	vcCurrentDataNearEnd-vc4TTPSinkR1BCR	GR-1042
	vcCurrentDataNearEnd-vc44cTTPSinkBCRr1	GR-1042
	vcCurrentDataNearEnd-vc416cTTPSinkBCR	GR-1042
dS1LineTTPSinkFEHistoryData	historyData-currentData	Q.822
dS1LineTTPSinkNEHistoryData	historyData-currentData	Q.822
dS1PathTTPSinkFEHistoryData	historyData-currentData	Q.822
dS1PathTTPSinkNEHistoryData	historyData-currentData	Q.822
dS3LineTTPSinkNEHistoryData	historyData-currentData	Q.822
dS3PathTTPSinkFEHistoryDataSIF	historyData-currentData	Q.822
dS3PathTTPSinkNEHistoryDataSIF	historyData-currentData	Q.822
electricalSPIHistoryData	historyData-currentData	Q.822
msHistoryDataFarEnd	historyData-currentData	Q.822
msHistoryDataNearEnd	historyData-currentData	Q.822
opticalSPITTPHistoryData	historyData-currentData	Q.822
opticalSPITTPBidirectional HistoryDataSIF	historyData-currentData	Q.822
opticalSPITTPSink CurrentDataSIF	historyData-currentData	Q.822
protectionSwHistoryData	historyData-currentData	Q.822
rsHistoryDataSIF	historyData-currentData	Q.822
vcHistoryDataFarEndSIF	historyData-currentData	Q.822
vcHistoryDataNearEndSIF	historyData-currentData	Q.822
thresholdData	thresholdData-managedElement	Q.822
Linear APS Fragment		

protectedTTPBidirectional	protectedTTPSink-managedElementR1	GR-1042
unprotectedCTPBidirectional	unprotectedCTPBidirectional-msTTPBidirectional	G.774-3
apsReportRecord	logRecord-log	X.721
sdhMSProtectionCoordinator	protectionCoordinator-managedElement	SIF NE View
sdhMSProtectionGroupSIF	protectionGroupR1-managedElement	G.774-03/Corr.1
sdhMSProtectionUnit	protectionUnit-protectionGroupR1	G.774-03/Cor.1
UPSR Fragment		
connectionProtectionGroupBCRr2	connectionProtectionGroupBCR-sncpFabricSIF	SIF NE View
connectionProtectionUnitBCR	connectionProtectionUnitBCR-connectionProtectionGroupBCR	GR-1042
dropContinue ConnectionProtectionUnitBCR	dropContinueConnectionProtectionUnitBCR -connnectionProtectionGroupBCRr1	GR-1042
sncpFabricSIF	fabricSIF-managedElement	SIF NE View
upsrInterconnectFabricSIF	fabricSIF-managedElement	SIF NE View
BLSR Fragment		
blsrFabricSIF	fabricSIF-managedElement	SIF NE View
blsrInterconnectFabricSIF	fabricSIF-managedElement	SIF NE View
eastWestTableBCRr1	eastWestTableBCRr1-sdhBLSRProtectionGroupBCRr1	GR-1042
enutTableBCR	enutTableBCR-sdhBLSRProtectionGroupBCRr1	GR-1042
ringMapBCR	ringMapBCRr2-sdhBLSRProtectionGroupBCRr1	GR-1042
ripTableBCR	ripTableBCR-sdhBLSRProtectionGroupBCRr1	GR-1042
squelchTableBCR	squelchTableBCR-sdhBLSRProtectionGroupBCRr1	GR-1042
stsSquelchEntryBCR	stsSquelchEntryBCR-squelchTableBCR	GR-1042
sdhBLSRProtectionGroupBCRr1	protectionGroupBCRr1-managedElement	GR-836
sdhBLSRProtectionUnitBCR	protectionUnitBCRr1-protectionGroupBCRr1	GR-836
serviceSelectorProtectionGroupBCR	connectionProtectionGroupBCR-sncpFabricSIF	SIF NE View
named ServiceSelectorProtectionGroupBCR	connectionProtectionGroupBCR-sncpFabricSIF	SIF NE View
vtSquelchTableBCR	vtSquelchTableBCR-stsSquelchEntryBCR	GR-1042
vtSquelchEntryBCR	vtSquelchEntryBCR-vtSquelchTableBCR	GR-1042
Telemetry Fragment		
controlPoint	externalPoint-equipment externalPoint-managedElement externalPoint-mangedElementComplex	M.3100/A.1
scanPoint	externalPoint-equipment externalPoint-managedElement externalPoint-mangedElementComplex	M.3100/A.1
User Security Fragment		
securitySystem	securitySystem-managedElementR1 securitySystem-managedEms	SIF NE View SIF NE View
securityUserSIF	securityUserSIF-securitySystem	SIF NE View
securityAuditTrailRecord	logRecord-log	X.721

Table 4-5 EMS Management Name Binding Table

Subordinate Managed Object	Name Binding	Source Document
agingControl	agingControl-managedEms	SIF NE View
alarmSeverityAssignmentProfile	alarmSeverityAssignmentProfile-managdEms	SIF NE View
enhancedCurrentAlarmSummaryControl	enhancedCurrentAlarmSummaryControl-managedEms	SIF NE View
eventForwardingDiscriminator	eventForwardingDiscriminator-managedEms	SIF NE View
log	log-managedEms	SIF NE View
managementLink	managementLink-managedEms	SIF NE View
simpleScanner	simpleScanner-managedEms	SIF NE View
software	software-managedEms	SIF NE View
sdhMSProtectionCoordinator	protectionCoordinator-managedElement	SIF NE View

thresholdData	thresholdData-managedEms	SIF NE View

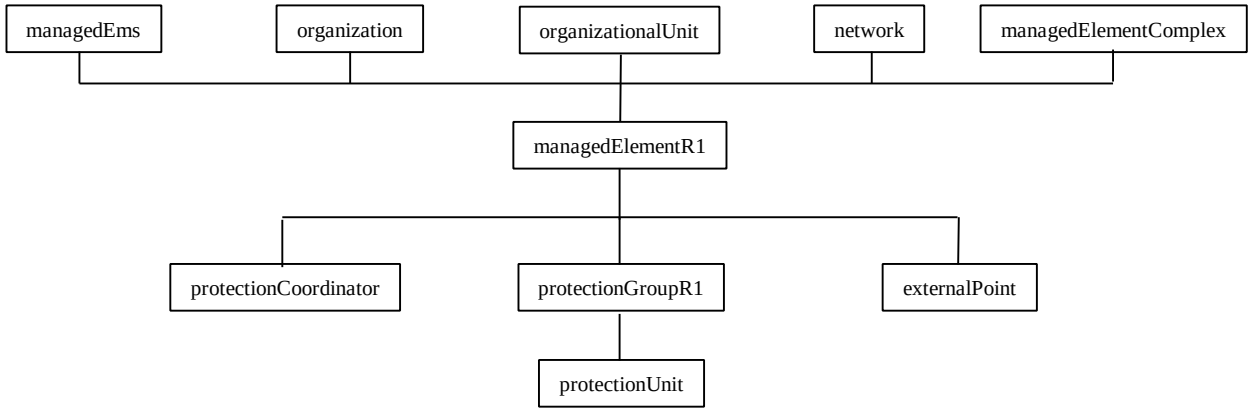

Figure 4-8 Network Element Fragment and Partial Linear APS Fragment

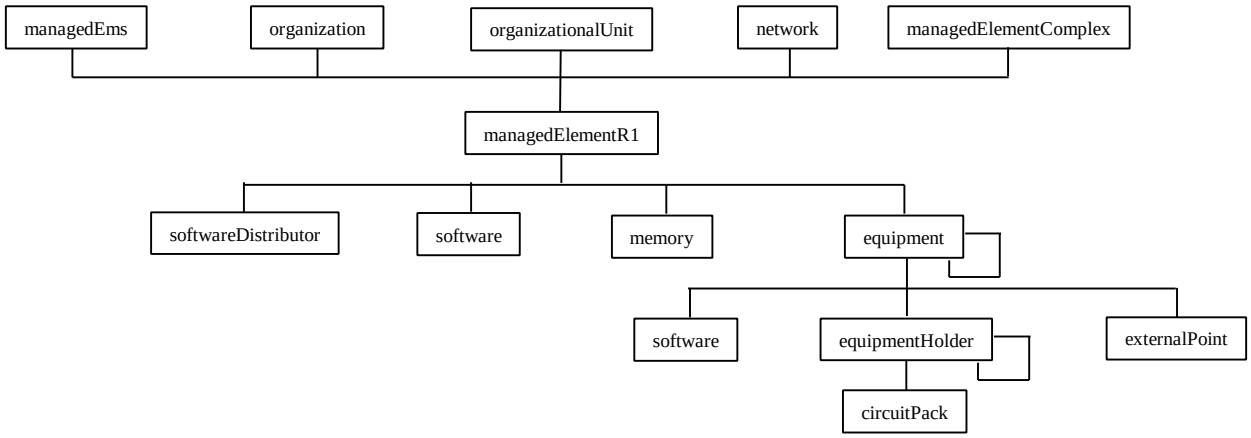

Figure 4-9 Hardware and Software Fragments

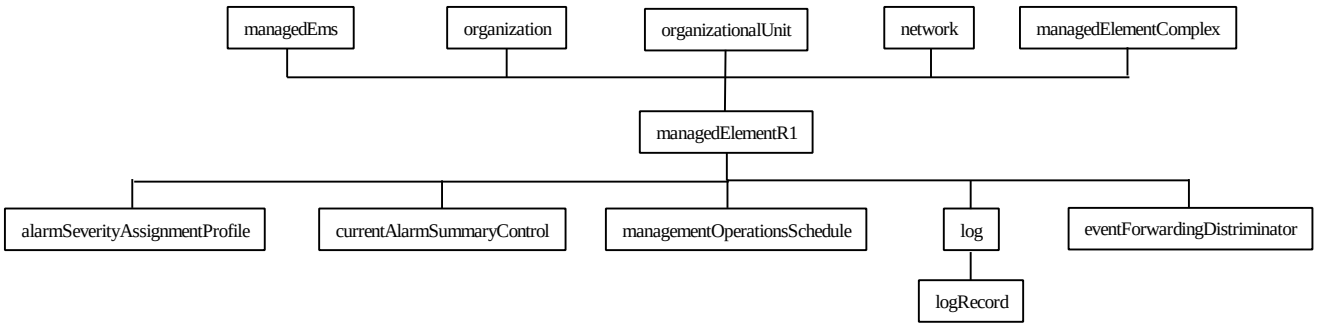

Figure 4-10 Generic, Configuration Management, and Alarm Surveillance Support Fragments

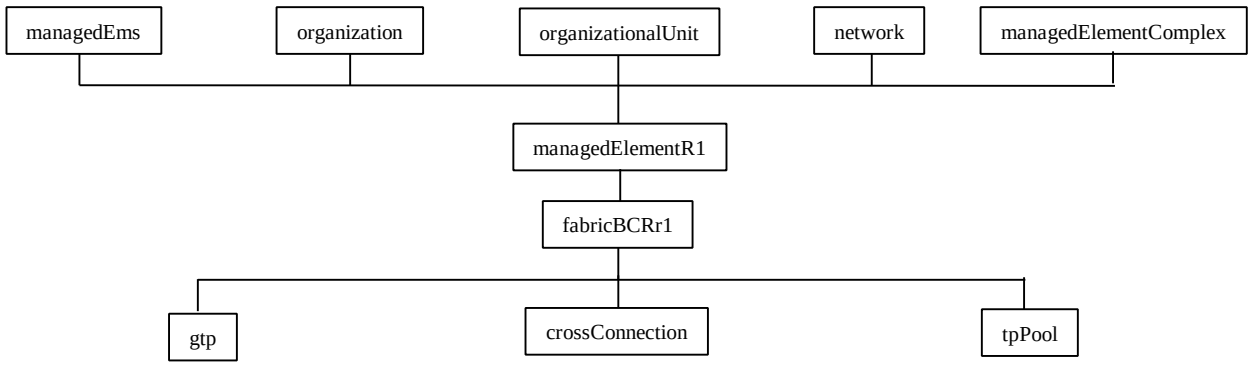

Figure 4-11 Cross Connection Function

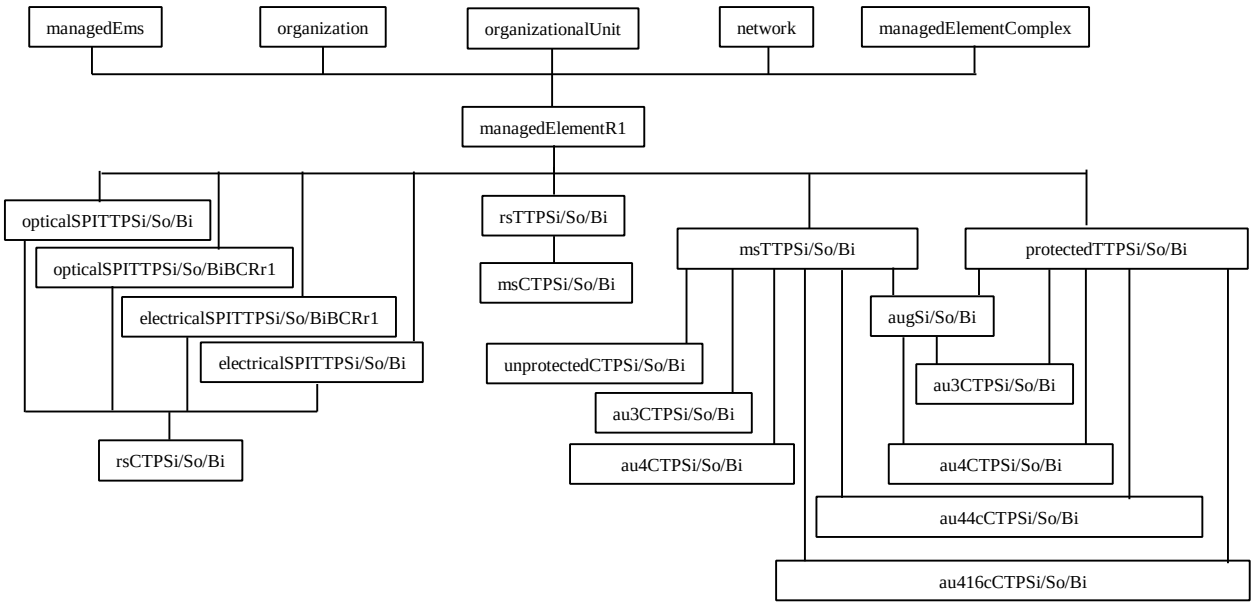

Figure 4-12 Termination Point

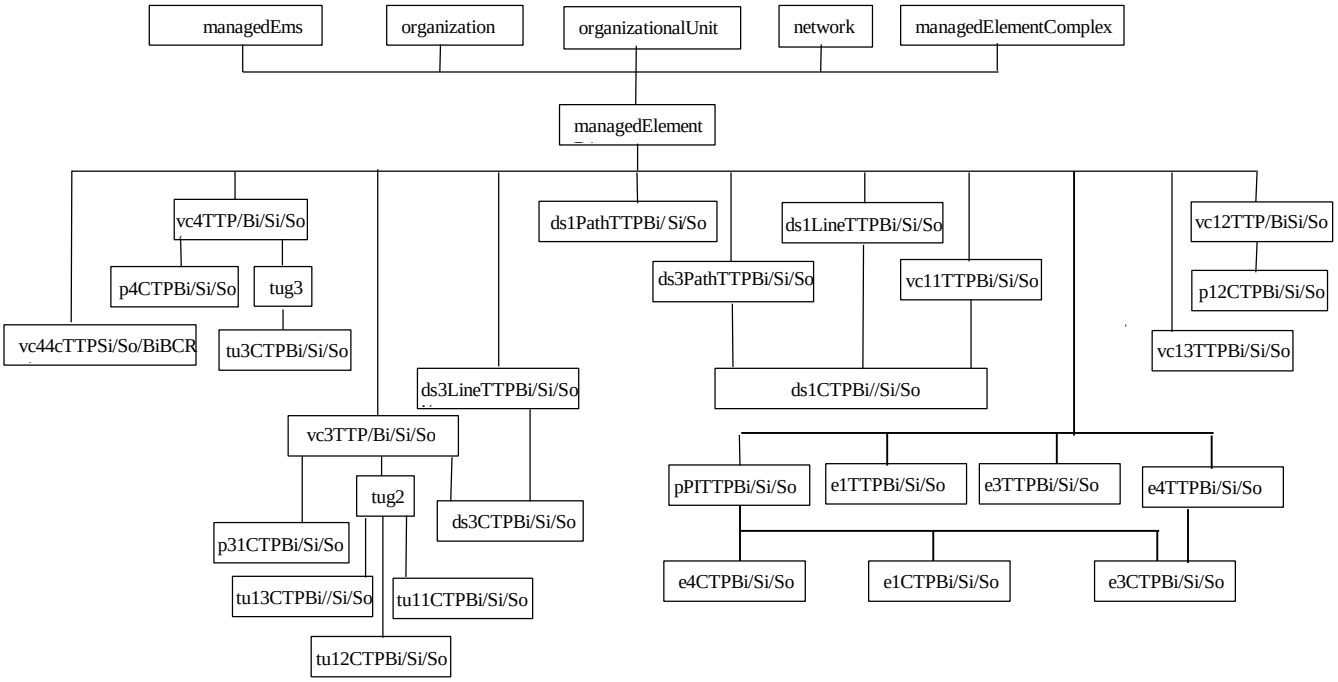

Figure 4-13 Termination Point (cont.)

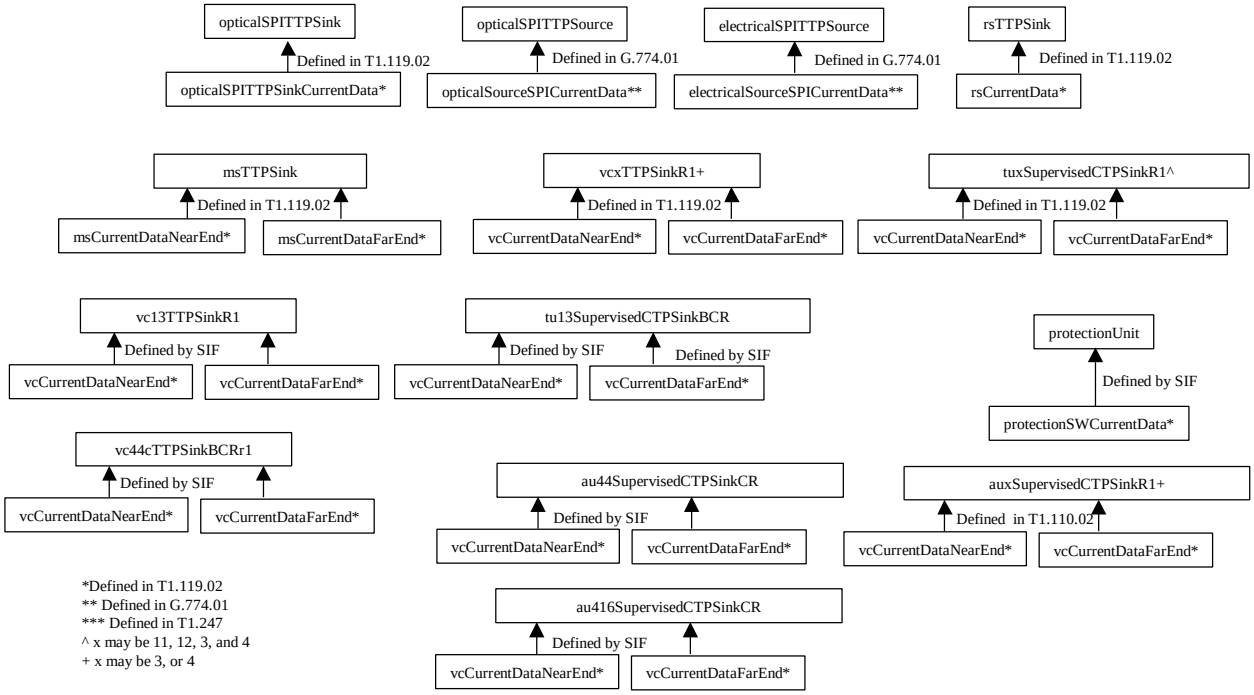

Figure 4-14 Performance Management

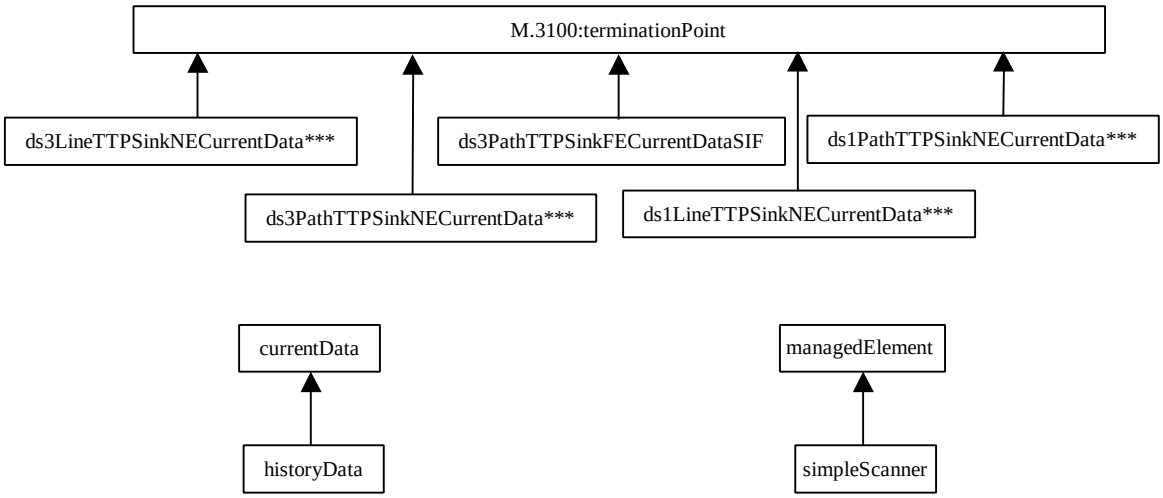

Figure 4-15 Performance Management (cont.)

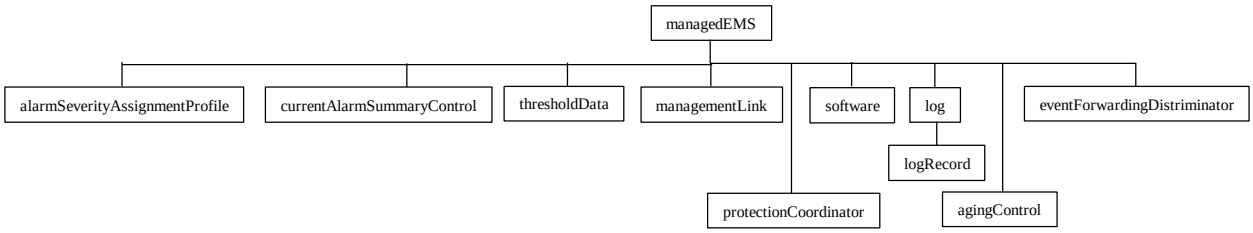

Figure 4-16 EMS Management Fragment

5 Common NE-View CMIP Information Model

5.1 Managed Object Classes

blsrFabricSIF
blsrInterconnectFabricSIF
dS3PathTTPSinkFECurrentDataSIF
dS3PathTTPSinkFEHistoryData
dS3PathTTPSinkNECurrentDataSIF
dS3PathTTPSinkNEHistoryDataSIF
ds1PathTTPBidirectionalSIF
ds1PathTTPSinkSIF
ds1PathTTPSourceSIF
ds3PathTTPBidirectionalSIF
ds3PathTTPSinkSIF
ds3PathTTPSourceSIF
fabricSIF
modifiableVC11TTPBidirectionalSIF
modifiableVC11TTPSinkSIF1
modifiableVC11TTPSourceSIF
modifiableVC13TTPBidirectionalSIF
modifiableVC13TTPSinkSIF
modifiableVC13TTPSourceSIF
modifiableVC3TTPBidirectionalSIF
modifiableVC3TTPSinkSIF
modifiableVC4TTPBidirectionalSIF
modifiableVC4TTPSinkSIF
opticalSPITTPBidirectionalCurrentDataSIF
opticalSPITTPBidirectionalHistoryDataSIF
opticalSPITTPSinkCurrentDataSIF
opticalSPITTPSinkHistoryDataSIF
rsCurrentDataSIF
rsHistoryDataSIF
rsTTPBidirectionalSIF
rsTTPSinkSIF
rsTTPSourceSIF
sdhMSProtectionGroupSIF
securityUserSIF
sncpFabricSIF
upsrInterconnectFabricSIF
vcCurrentDataFarEndSIF
vcCurrentDataNearEndSIF
vcHistoryDataFarEndSIF
vcHistoryDataNearEndSIF

```
blsrFabricSIF MANAGED OBJECT CLASS
  DERIVED FROM      fabricSIF;
  CHARACTERIZED BY
```

```
    blsrFabricSIFPkg PACKAGE
      BEHAVIOUR
        blsrFabricSifBeh BEHAVIOUR
          DEFINED AS
            " This object class provides a parameter to connectBCRr1
            action to support the BLSR cross-connection function.
            The aNode and zNode of the parameter indicates the add/drop points
            (or nodes on the ring) of the path that is associated with the
            termination points being cross-
            connected. A boolean is provided to determine if VT Access is
            available at any point in that STS-1 channel. ";;
      ACTIONS
        "GR-836":connectBCRr1
          "GR-1042":blsrConnectParameterBCR;;;
REGISTERED AS {sIFELMObjectClass 43};

blsrInterconnectFabricSIF MANAGED OBJECT CLASS
  DERIVED FROM
    blsrFabricSIF,
    sncpFabricSIF;
  CHARACTERIZED BY
    blsrInterconnectFabricSIFPkg PACKAGE
      BEHAVIOUR
        blsrInterconnectFabricSIFBeh BEHAVIOUR
          DEFINED AS
            " This fabric supports the interconnect function in BLSR rings using
            the service selector. Use of the connection protection commands in
            this fabric results in the creation/deletion of a service selector
            to be used for interconnection.

            When creating a service selector using these commands,
            the toTP should point to the reliable TP in the resulting
            configuration. The fromTP should point to the unreliable TP that
            will serve as the protected path (normally on the drop side). In the
            case of an existing cross-connect, the TPs that currently are used
            for the cross-connect should be referenced by the from and to
            pointers, and, if necessary, the default path should be changed to
            make the drop side the protected TP.

            The blsrRIPParameterBCR provides the ability to populate the node's
            RIP table in provisioning a connection. ";;
      ACTIONS
        "GR-836":connectBCRr1
          "GR-1042":blsrRIPParameterBCR;;;
REGISTERED AS {sIFELMObjectClass 44};

dS3PathTTPSinkFECurrentDataSIF MANAGED OBJECT CLASS
  DERIVED FROM      "Recommendation Q.822:1994":currentData;
  CHARACTERIZED BY
```

```
    fcfePkg,
    "T1.247":eSCPFEPkg,
    "T1.247":sESCPFEPkg,
    "T1.247":uASCPFEPkg,
    dS3PathTTPSinkFECurrentDataPkg PACKAGE
      BEHAVIOUR
        dS3PathTTPSinkFECurrentDataBehaviour BEHAVIOUR
          DEFINED AS
            "This managed object collects far end performance monitoring
            parameters for a dS3PathTTPSinkFECurrentDataSIF MOI.";;;;
  CONDITIONAL PACKAGES
    "T1.247":eSACPFEPkg  PRESENT IF  "an instance supports it.",
    "T1.247":eSBCPFEPkg  PRESENT IF  "an instance supports it.",
    "T1.247":sASCPFEPkg  PRESENT IF  "an instance supports it.";
REGISTERED AS {sIFELMObjectClass 2};

dS3PathTTPSinkFEHistoryDataSIF MANAGED OBJECT CLASS
  DERIVED FROM      "Recommendation Q.822:1994":historyData;
  CHARACTERIZED BY
    fcfePkg,
    "T1.247":eSCPFEHistoryPkg,
    "T1.247":sESCPFEHistoryPkg,
    "T1.247":uASCPFEHistoryPkg,
    dS3PathTTPSinkFEHistoryDataSIFPkg PACKAGE
      BEHAVIOUR
        dS3PathTTPSinkFEHistoryDataSIFBehaviour BEHAVIOUR
          DEFINED AS
            "This managed object saves performance monitoring information
            collected in the containing MOI.";;;;
  CONDITIONAL PACKAGES
    "T1.247":eSACPFEHistoryPkg  PRESENT IF  "an instance supports it.",
    "T1.247":eSBCPFEHistoryPkg  PRESENT IF  "an instance supports it.",
    "T1.247":sASCPFEHistoryPkg  PRESENT IF  "an instance supports it.";
REGISTERED AS {sIFELMObjectClass 3};

dS3PathTTPSinkNECurrentDataSIF MANAGED OBJECT CLASS
  DERIVED FROM      "T1.247":dS3PathTTPSinkNECurrentData;
  CHARACTERIZED BY
    fcPkg,
    dS3PathTTPSinkNECurrentDataSIFPkg PACKAGE
      BEHAVIOUR
        dS3PathTTPSinkNECurrentDataSIFBeh BEHAVIOUR
          DEFINED AS
            "The dS3PathTTPSinkNECurrentDataSIF managed object class includes
            the FC, Fault Count, attribute.";;;;
REGISTERED AS {sIFELMObjectClass 4};

dS3PathTTPSinkNEHistoryDataSIF MANAGED OBJECT CLASS
  DERIVED FROM      "T1.247":dS3PathTTPSinkNEHistoryData;
```

```
  CHARACTERIZED BY
    fcPkg,
    dS3PathTTPSinkNEHistoryDataSIFPkg PACKAGE
      BEHAVIOUR
        dS3PathTTPSinkNEHistoryDataSIFBeh BEHAVIOUR
          DEFINED AS
            "The dS3PathTTPSinkNEHistoryDataSIF managed object class holds the
            value of monitored attributes at the end of an observation period.";;;;
REGISTERED AS {sIFELMObjectClass 5};

ds1PathTTPBidirectionalSIF MANAGED OBJECT CLASS
  DERIVED FROM
    ds1PathTTPSinkSIF,
    ds1PathTTPSourceSIF;
REGISTERED AS {sIFELMObjectClass 6};

ds1PathTTPSinkSIF MANAGED OBJECT CLASS
  DERIVED FROM      "Rec. M.3100":trailTerminationPointSink;
  CHARACTERIZED BY
    "Rec. X.721 | ISO/IEC 10165-2 : 1992":administrativeStatePackage,
    "Rec. M.3100":createDeleteNotificationsPackage,
    "Rec. M.3100":attributeValueChangeNotificationPackage,
    "Rec. M.3100":stateChangeNotificationPackage,
    "Rec. M.3100":tmnCommunicationsAlarmInformationPackage,
    "GR-836":communicationsAlarmEffectOnServicePkg,
    ds1PathTTPSinkSIFPkg PACKAGE
      BEHAVIOUR
        "GR-836":ds1PathTTPSinkBeh,
        "GR-836":ds1PathTTPSinkBCRr1Beh,
        ds1PathTTPSinkSIFBeh BEHAVIOUR
          DEFINED AS
            "This class differs from the ds1PathTTPSinkBCRr1
            class by supporting an unframed frame format.

            If the ds1PathChannelizationSequencePkg is present and the frame
            format is unframed, the value of the ds1PathChannelizationSequence
            attribute is undefined.";;
      ATTRIBUTES
        "GR-836":ds1PathTTPId
          PERMITTED VALUES SIFneViewMod.IntegerNameType
          GET,
        ds1FrameFormatSIF GET-REPLACE;;;
  CONDITIONAL PACKAGES
    "GR-836":ds1PathChannelizationSequencePkg  PRESENT IF
      "channelization is done on the DS1 framed path payload",
    "GR-836":linkIdPkg  PRESENT IF  "an instance supports it",
    "GR-836":associatedObjectListPkg  PRESENT IF  "an instance supports
      it";
REGISTERED AS {sIFELMObjectClass 7};
```

```
ds1PathTTPSourceSIF MANAGED OBJECT CLASS
  DERIVED FROM       "Rec. M.3100":trailTerminationPointSource;
  CHARACTERIZED BY
    " Rec. X.721 | ISO/IEC 10165-2 : 1992":administrativeStatePackage,
    "Rec. M.3100":createDeleteNotificationsPackage,
    "Rec. M.3100":attributeValueChangeNotificationPackage,
    "Rec. M.3100":stateChangeNotificationPackage,
    ds1PathTTPSourceSIFPkg PACKAGE
      BEHAVIOUR
        "GR-836":ds1PathTTPSourceBeh,
        "GR-836":ds1PathTTPSourceBCRr1Beh,
        ds1PathTTPSourceSIFBeh BEHAVIOUR
          DEFINED AS
            "This class differs from the ds1PathTTPSourceBCRr1 class by
            supporting an unframed frame format.

            If the ds1PathChannelizationSequencePkg is present and the frame
            format is unframed, the value of the ds1PathChannelizationSequence
            attribute is undefined.";;
      ATTRIBUTES
        "GR-836":ds1PathTTPId
          PERMITTED VALUES SIFneViewMod.IntegerNameType
         GET,
        ds1FrameFormatSIF GET-REPLACE;;;
  CONDITIONAL PACKAGES
    "GR-836":communicationsAlarmEffectOnServicePkg  PRESENT IF  "the
      tmnCommunicationsAlarmInformationPackage is present",
    "GR-836":ds1PathChannelizationSequencePkg  PRESENT IF
      "channelization is done on the DS1 framed path payload",
    "GR-836":linkIdPkg  PRESENT IF  "an instance supports it",
    "GR-836":associatedObjectListPkg  PRESENT IF  "an instance supports
      it";
REGISTERED AS {sIFELMObjectClass 8};

ds3PathTTPBidirectionalSIF MANAGED OBJECT CLASS
  DERIVED FROM
    ds3PathTTPSinkSIF,
    ds3PathTTPSourceSIF;
REGISTERED AS {sIFELMObjectClass 42};

ds3PathTTPSinkSIF MANAGED OBJECT CLASS
  DERIVED FROM       "Rec. M.3100":trailTerminationPointSink;
  CHARACTERIZED BY
    " Rec. X.721 | ISO/IEC 10165-2 : 1992":administrativeStatePackage,
    "Rec. M.3100":createDeleteNotificationsPackage,
    "Rec. M.3100":attributeValueChangeNotificationPackage,
    "Rec. M.3100":stateChangeNotificationPackage,
    "Rec. M.3100":tmnCommunicationsAlarmInformationPackage,
```

```
    "GR-836":communicationsAlarmEffectOnServicePkg,
    ds3PathTTPSinkSIFPkg PACKAGE
      BEHAVIOUR
        "GR-836":ds3PathTTPSinkBeh,
        ds3PathTTPSinkSIFBeh BEHAVIOUR
          DEFINED AS
            "This class differs from the ds3PathTTPSink class by supporting an
            unframed frame format.";;
      ATTRIBUTES
        "GR-836":ds3PathTTPId
          PERMITTED VALUES SIFneViewMod.IntegerNameType
          GET,
        ds3FrameFormatSIF GET-REPLACE;;;
REGISTERED AS {sIFELMObjectClass 10};

ds3PathTTPSourceSIF MANAGED OBJECT CLASS
  DERIVED FROM      "Rec. M.3100":trailTerminationPointSource;
  CHARACTERIZED BY
    " Rec. X.721 | ISO/IEC 10165-2 : 1992":administrativeStatePackage,
    "Rec. M.3100":createDeleteNotificationsPackage,
    "Rec. M.3100":attributeValueChangeNotificationPackage,
    "Rec. M.3100":stateChangeNotificationPackage,
    ds3PathTTPSourceSIFPkg PACKAGE
      BEHAVIOUR
        "GR-836":ds3PathTTPSourceBeh,
        ds3PathTTPSourceSIFBeh BEHAVIOUR
          DEFINED AS
            "This class differs from the ds3PathTTPSource class by supporting an
            unframed frame format.";;
      ATTRIBUTES
        "GR-836":ds3PathTTPId
          PERMITTED VALUES SIFneViewMod.IntegerNameType
          GET,
        ds3FrameFormatSIF GET-REPLACE;;;
  CONDITIONAL PACKAGES
    "GR-836":communicationsAlarmEffectOnServicePkg  PRESENT IF  "the
      tmnCommunicationsAlarmInformationPackage is present";
REGISTERED AS {sIFELMObjectClass 11};

fabricSIF MANAGED OBJECT CLASS
  DERIVED FROM      "Rec. X.721 | ISO/IEC 10165-2 : 1992":top;
  CHARACTERIZED BY
    fabricSIFPkg PACKAGE
      BEHAVIOUR
        fabricSIFBeh BEHAVIOUR
          DEFINED AS
            " The fabricSIF object represents the function of managing the
            establishment and release of cross-
            connections. It can also be used to manage the assignment of
```

termination points to TP Tools and GTPs, and execution a 3-step bridge and roll process, if an instance supports them.

Administrative State:

- Unlocked: The fabricSIF is allowed to perform its normal functions. ACTIONS will be accepted to set up or remove cross-connections, to rearrange TP Pools, to add/remove termination points to/from GTPs.

- Locked: The fabricSIF is not allowed to perform its normal functions. No ACTIONS will be accepted. No new cross-connection can be set up or removed, no TP Pool can be rearranged, and no termination points can be add/removed to/from GTPs.

Operational State:

- Enabled: When the fabricSIF is in the enabled operational state, it may be fully operational or partially operational (partially operational is indicated by the availability status attribute).

- Disabled: The fabricSIF is incapable of performing its normal function. For instance, the managing system will not be able to (1) set up or remove any cross-
connection, (2) rearrange TP Pools, and (3) add/remove termination points to/from GTPs.

Availability Status:

The supported values for this attribute are:

- Degraded: The fabricSIF is degraded in some respect. For instance, the fabricSIF cannot perform the function of establishing new cross-connections while it can still accept ACTIONs to rearrange TP Pools. The fabricSIF remains available for service (i.e., its operational state is enabled) while it is degraded.

- Empty SET. ";;

```
    ATTRIBUTES
      "Rec. M.3100":fabricId GET,
      "Rec. X.721 | ISO/IEC 10165-2 : 1992":administrativeState GET-REPLACE,
      "Rec. X.721 | ISO/IEC 10165-2 : 1992":operationalState GET,
      "Rec. X.721 | ISO/IEC 10165-2 : 1992":availabilityStatus GET,
      "Rec. M.3100":listOfCharacteristicInfo GET,
      "Rec. M.3100":supportedByObjectList GET-REPLACE ADD-REMOVE;
    ACTIONS
      "GR-836":connectBCRr1,
      "GR-836":disconnectBCRr1;;;
CONDITIONAL PACKAGES
```

```
    bridgeRollSIFPkg  PRESENT IF  "bridge and roll is supported",
    gtpPkgSIF  PRESENT IF  "GTPs are supported",
    tpPoolPkgSIF  PRESENT IF  "TP Pools are supported",
    "Rec. M.3100":createDeleteNotificationsPackage  PRESENT IF  "an
      instance supports it";
REGISTERED AS {sIFELMObjectClass 40};

modifiableVC11TTPBidirectionalSIF MANAGED OBJECT CLASS
  DERIVED FROM
    "GR-1042":vc11TTPBidirectionalBCRr1,
    "Rec. G.774.02 : 1994":modifiableVC11TTPBidirectionalR1;
REGISTERED AS {sIFELMObjectClass 14};

modifiableVC11TTPSinkSIF MANAGED OBJECT CLASS
  DERIVED FROM
    "GR-1042":vc11TTPSinkBCRr1,
    "Rec. G.774-02":modifiableVC11TTPSinkR1;
REGISTERED AS {sIFELMObjectClass 15};

modifiableVC11TTPSourceSIF MANAGED OBJECT CLASS
  DERIVED FROM
    "GR-1042":vc11TTPSourceBCRr1,
    "Rec. G.774-02":modifiableVC11TTPSource;
REGISTERED AS {sIFELMObjectClass 16};

modifiableVC13TTPBidirectionalSIF MANAGED OBJECT CLASS
  DERIVED FROM      "GR-1042":vc13TTPBidirectionalBCRr1;
  CHARACTERIZED BY
    "Rec. M.3100":supportableClientListPackage,
    modifiableVC13TTPBidPackage PACKAGE
      BEHAVIOUR
        modifiableVC13TTPBidBehaviour BEHAVIOUR
          DEFINED AS
            "This class shall be instantiated when change of the SDH frame
            structure by management operation is supported.";;
      ACTIONS
        "Rec. G.774-02":defineClientType;;;
REGISTERED AS {sIFELMObjectClass 17};

modifiableVC13TTPSinkSIF MANAGED OBJECT CLASS
  DERIVED FROM      "GR-1042":vc13TTPSinkBCRr1;
  CHARACTERIZED BY
    "Rec. M.3100":supportableClientListPackage,
    modifiableVC13TTPSinkPackage PACKAGE
      BEHAVIOUR
        modifiableVC13TTPSinkBehaviour BEHAVIOUR
          DEFINED AS
            "This class shall be instantiated when change of the SDH frame
            structure by management operation is supported.";;
```

```
        ACTIONS
          "Rec. G.774-02":defineClientType;;;
REGISTERED AS {sIFELMObjectClass 18};

modifiableVC13TTPSourceSIF MANAGED OBJECT CLASS
  DERIVED FROM       "GR-1042":vc13TTPSource;
  CHARACTERIZED BY
    "Rec. M.3100":supportableClientListPackage,
    modifiableVC13TTPSourcePackage PACKAGE
      BEHAVIOUR
        modifiableVC13TTPSourceBehaviour BEHAVIOUR
          DEFINED AS
            "This class shall be instantiated when change of the SDH frame
            structure by management operation is supported.";;
        ACTIONS
          "Rec. G.774-02":defineClientType;;;
REGISTERED AS {sIFELMObjectClass 19};

modifiableVC3TTPBidirectionalSIF MANAGED OBJECT CLASS
  DERIVED FROM
    "GR-1042":vc3TTPBidirectionalR1BCR,
    "Rec. G.774-02":modifiableVC3TTPBidirectionalR1;
REGISTERED AS {sIFELMObjectClass 20};

modifiableVC3TTPSinkSIF MANAGED OBJECT CLASS
  DERIVED FROM
    "GR-1042":vc3TTPSinkR1BCR,
    "Rec. G.774-02":modifiableVC3TTPSinkR1;
REGISTERED AS {sIFELMObjectClass 21};

modifiableVC4TTPBidirectionalSIF MANAGED OBJECT CLASS
  DERIVED FROM
    "GR-1042":vc4TTPBidirectionalR1BCR,
    "Rec. G.774-02":modifiableVC4TTPBidirectionalR1;
REGISTERED AS {sIFELMObjectClass 22};

modifiableVC4TTPSinkSIF MANAGED OBJECT CLASS
  DERIVED FROM
    "GR-1042":vc4TTPSinkR1BCR,
    "Rec. G.774-02":modifiableVC4TTPSinkR1;
REGISTERED AS {sIFELMObjectClass 23};

opticalSPITTPBidirectionalCurrentDataSIF MANAGED OBJECT CLASS
  DERIVED FROM
    opticalSPITTPSinkCurrentDataSIF,
    "Rec. G.774.01 : 1994":opticalSourceSPICurrentData;
REGISTERED AS {sIFELMObjectClass 24};

opticalSPITTPBidirectionalHistoryDataSIF MANAGED OBJECT CLASS
```

```
  DERIVED FROM
    opticalSPITTPSinkHistoryDataSIF,
    "Rec. G.774.01:1994":opticalSPIHistoryData;
REGISTERED AS {sIFELMObjectClass 25};

opticalSPITTPSinkCurrentDataSIF MANAGED OBJECT CLASS
  DERIVED FROM      "T1.119.02":opticalSPITTPSinkCurrentData;
  CHARACTERIZED BY
    "T1.119.02":receivePowerLevelPkg,
    opticalSPITTPSinkCurrentDataSIFPkg PACKAGE
      BEHAVIOUR
        opticalSPITTPSinkCurrentDataSIFBeh BEHAVIOUR
          DEFINED AS
            "The opticalSPITTPSinkCurrentDataSIF managed object class requires
            the receivePowerLevel and conditionally adds the
            receivePowerLevelTideMarkPkg";;;;
  CONDITIONAL PACKAGES
    receivePowerLevelTideMarkPkg  PRESENT IF  "an instance supports it";
REGISTERED AS {sIFELMObjectClass 26};

opticalSPITTPSinkHistoryDataSIF MANAGED OBJECT CLASS
  DERIVED FROM      "T1.119.02":opticalSPITTPSinkHistoryData;
  CHARACTERIZED BY
    "T1.119.02":receivePowerLevelPkg,
    opticalSPITTPSinkHistoryDataSIFPkg PACKAGE
      BEHAVIOUR
        opticalSPITTPSinkHistoryDataSIFBeh BEHAVIOUR
          DEFINED AS
            "The opticalSPITTPSinkHistoryDataSIF managed object instances is
            used to store the values of the registers at the end of a reporting
            period. The opticalSPITTPSinkHistoryDataSIF object instance is
            contained in an instance of opticalSPITTPSinkCurrentDataSIF";;;;
  CONDITIONAL PACKAGES
    receivePowerLevelTideMarkPkg  PRESENT IF  "the containing
      opticalSPITTPSinkCurrentDataSIF instance contains this package.";
REGISTERED AS {sIFELMObjectClass 27};

rsCurrentDataSIF MANAGED OBJECT CLASS
  DERIVED FROM      "T1.119.02":rsCurrentData;
  CHARACTERIZED BY
    "T1.119.02":sEFSPkg,
    "Rec. G.774.01:1994":uASCurrentDataPackage,
    rsCurrentDataSIFPkg PACKAGE
      BEHAVIOUR
        rsCurrentDataSIFBeh BEHAVIOUR
          DEFINED AS
            "The rsCurrentDataSIF managed object class requires the SEFS and UAS
            parameters be collected.";;;;
REGISTERED AS {sIFELMObjectClass 28};
```

```
rsHistoryDataSIF MANAGED OBJECT CLASS
  DERIVED FROM      "T1.119.02":rsHistoryData;
  CHARACTERIZED BY
    "T1.119.02":sEFSHistoryDataPkg,
    "Rec. G.774.01:1994":uASHistoryDataPackage,
    rsHistoryDataSIFPkg PACKAGE
      BEHAVIOUR
        rsHistoryDataSIFBeh BEHAVIOUR
          DEFINED AS
            "The rsHistoryDataSIF managed object class holds the value of
            monitored attributes at the end of an observation period. An
            rsHistoryDataSIF MOI is contained in an rsCurrentDataSIF MOI.";;;;
REGISTERED AS {sIFELMObjectClass 29};

rsTTPBidirectionalSIF MANAGED OBJECT CLASS
  DERIVED FROM
    "Recommendation M.3100":trailTerminationPointBidirectional,
    rsTTPSinkSIF,
    rsTTPSourceSIF;
REGISTERED AS {sIFELMObjectClass 30};

rsTTPSinkSIF MANAGED OBJECT CLASS
  DERIVED FROM      "Rec. G.774: 1992":rsTTPSink;
  CHARACTERIZED BY
    rsTTPSinkSIFPkg PACKAGE
      BEHAVIOUR
        rsTTPSinkSIFBeh BEHAVIOUR
          DEFINED AS
            "This subclass of rsTTPSink provides support for j0 section trace
            monitoring functionality.

            rsTTPSink represents the termination of the regenerator section
            trail, i.e. the processing and removal of the regenerator section
            overhead from the incoming signal and the descrambling of that
            signal.

            A communicationsAlarm notification shall be issued if a loss of
            frame is detected. The probableCause parameter of the notification
            shall indicate LOF (Loss of Frame). ";;
      ATTRIBUTES
        j0TraceExpected GET-REPLACE,
        j0TraceReceive GET;;;
REGISTERED AS {sIFELMObjectClass 31};

rsTTPSourceSIF MANAGED OBJECT CLASS
  DERIVED FROM      "Rec. G.774: 1992":rsTTPSource;
  CHARACTERIZED BY
    rsTTPSourceSIFPkg PACKAGE
```

```
      BEHAVIOUR
        rsTTPSourceSIFBeh BEHAVIOUR
          DEFINED AS
            "This subclass of rsTTPSource provides support for j0 section trace
            monitoring functionality.

            rsTTPSource represents the origination of the regenerator section
            trail, i.e. generates the regenerator section overhead for the
            outgoing signal, and scrambles that signal. ";;
      ATTRIBUTES
        j0TraceSend GET-REPLACE;;;
REGISTERED AS {sIFELMObjectClass 32};

sdhMSProtectionGroupSIF MANAGED OBJECT CLASS
  DERIVED FROM      "Rec. G.774.03 : 1994":sdhMSProtectionGroupR1;
  CHARACTERIZED BY
    "Rec. M.3100":tmnCommunicationsAlarmInformationPackage,
    "Rec. M.3100":alarmSeverityAssignmentPointerPackage,
    sdhMSProtectionGroupSIFPkg PACKAGE
      BEHAVIOUR
        sdhMSProtectionGroupSIFBeh BEHAVIOUR
          DEFINED AS
            "This object adds the alarm severity, TMN communications alarms, and
            locking protection based on multiple faults functionality to
            sdhMSProtectionGroup (G774-03).

            A communicationsAlarm notification shall be issued if a protection
            switching byte failure, a channel match failure, or APS mode
            mismatch is detected. The probableCause parameter of the
            notification shall indicate apsByteFailure, apsChannelMatchFailure,
            or apsModeMismatch.

            sdhMSProtectionGroup is used specifically for representing a SDH
            multiplex section protection group in a protection system. Only one
            protecting protection unit is allowed.

            The protectionMismatchStatus indicates a mismatch between the
            provisioned protectionGroupType of this protection group and the
            provisioned protectionGroupType of the far-end. It also indicates
            mismatch of uni-directional versus bi-directional switch
            provisioning between the two protection groups. ";;;;
  CONDITIONAL PACKAGES
    "GR-1042":lockedInConditionPkg  PRESENT IF  "an instance supports it";
REGISTERED AS {sIFELMObjectClass 33};

securityUserSIF MANAGED OBJECT CLASS
  DERIVED FROM      "Rec. X.721 | ISO/IEC 10165-2":top;
  CHARACTERIZED BY
    securityUserSIFPkg PACKAGE
```

```
    BEHAVIOUR
      securityUserSIFBeh BEHAVIOUR
        DEFINED AS
          " The security user object class is a class of managed support
          objects which represents security information related to a user who
          has (currently active) or had (currently suspended) access right to
          the managed system. An instance of this object class represents
          security information related to a user such as a person, process, or
          remote system in the role of a person, who accesses the managed
          system. If the attribute userIdStatus is equal to new, this
          indicates a new user and the attributes lastLoginTime,
          lastLogoutTime, lastLoginLocationId,
          lastUserIdDisabled, and numLastUnsuccessLogin may not contain
          meaningful values.
          The nonUsedPeriod attribute is used to decide when a user ID should
          be put in a suspended status due to being non-used. The non-used
          period is calculated from the difference between current date to the
          date of last login by the user ID (stored in the attribute
          lastLoginTime). If no initial value is specified for the
          nonUsedPeriod attribute at instantiation time, the initial value
          should be obtained from the corresponding attribute in the
          securitySystemInitialValues managed object. ";;
    ATTRIBUTES
      userId GET,
      lastLoginTime GET,
      lastLogoutTime GET,
      lastLoginLocationId GET,
      lastUserIdDisabled GET,
      userIdStatus GET-REPLACE,
      numLastUnsuccessLogin GET,
      nonUsedPeriod
        PERMITTED VALUES SIFneViewMod.SecurityUserNonUsedPeriodPermitted
       GET-REPLACE,
      privilegeLevel GET-REPLACE,
      loginExpiration GET-REPLACE;
    ACTIONS
      userLoginRequest,
      userLogoutRequest;
    NOTIFICATIONS
      "Rec. X.721 | ISO/IEC 10165-2":attributeValueChange,
      "Rec. X.721 | ISO/IEC 10165-2":objectCreation,
      "Rec. X.721 | ISO/IEC 10165-2":objectDeletion;;;
  CONDITIONAL PACKAGES
    systemAccessControlPkg  PRESENT IF  "an instance supports it";
REGISTERED AS {sIFELMObjectClass 34};

sncpFabricSIF MANAGED OBJECT CLASS
  DERIVED FROM      fabricSIF;
  CHARACTERIZED BY
```

```
    sncpFabricSIFPkg PACKAGE
      BEHAVIOUR
        sncpFabricSIFBeh BEHAVIOUR
          DEFINED AS
            " This fabric object represents the function of managing the
            establishment and release of protected (and unprotected)
            cross-connections as well as named cross-connections. ";;
      ACTIONS
        "GR-1042":protectUnprotectBCRr1,
        "GR-1042":protectedConnectBCRr1;;;
REGISTERED AS {sIFELMObjectClass 41};

upsrInterconnectFabricSIF MANAGED OBJECT CLASS
  DERIVED FROM      sncpFabricSIF;
  CHARACTERIZED BY
    upsrInterconnectFabricSIFPkg PACKAGE
      BEHAVIOUR
        upsrInterconnectFabricSIFBeh BEHAVIOUR
          DEFINED AS
            " This fabric is differentiated from its superclass by the ability
            to establish and modify a drop-and-continue protected connection
            (e.g., as used in UPSR applications) via a single action where the
            construction is modeled using drop-and-continue connection
            protection units. ";;
      ACTIONS
        "GR-1042":dropContinueBCR;;;
REGISTERED AS {sIFELMObjectClass 45};

vcCurrentDataFarEndSIF MANAGED OBJECT CLASS
  DERIVED FROM      "T1.119.02":vcCurrentDataFarEnd;
  CHARACTERIZED BY
    vcCurrentDataFarEndSIFPkg PACKAGE
      BEHAVIOUR
        vcCurrentDataFarEndSIFBeh BEHAVIOUR
          DEFINED AS
            "The vcCurrentDataFarEndSIF managed object class allows the ALS
            (AIS/LOP Seconds) parameters to be collected.";;;;
  CONDITIONAL PACKAGES
    alsPkg  PRESENT IF  "an instance supports it.";
REGISTERED AS {sIFELMObjectClass 35};

vcCurrentDataNearEndSIF MANAGED OBJECT CLASS
  DERIVED FROM      "T1.119.02":vcCurrentDataNearEnd;
  CHARACTERIZED BY
    vcCurrentDataNearEndSIFPkg PACKAGE
      BEHAVIOUR
        vcCurrentDataNearEndSIFBeh BEHAVIOUR
          DEFINED AS
            "The vcCurrentDataNearEndSIF managed object class allows the ALS
```

```
            (AIS/LOP Seconds) parameters to be collected.";;;;
  CONDITIONAL PACKAGES
    alsPkg  PRESENT IF  "an instance supports it.";
REGISTERED AS {sIFELMObjectClass 36};

vcHistoryDataFarEndSIF MANAGED OBJECT CLASS
  DERIVED FROM      "T1.119.02":vcHistoryDataFarEnd;
  CHARACTERIZED BY
    vcHistoryDataFarEndSIFPkg PACKAGE
      BEHAVIOUR
        vcHistoryDataFarEndSIFBeh BEHAVIOUR
          DEFINED AS
            "The vcHistoryDataFarEndSIF managed object class holds the value of
            monitored attributes at the end of an observation period.";;;;
  CONDITIONAL PACKAGES
    alsPkg  PRESENT IF  "The current data object which conatins this
      object supports it.";
REGISTERED AS {sIFELMObjectClass 37};

vcHistoryDataNearEndSIF MANAGED OBJECT CLASS
  DERIVED FROM      "T1.119.02":vcHistoryDataNearEnd;
  CHARACTERIZED BY
    vcHistoryDataNearEndSIFPkg PACKAGE
      BEHAVIOUR
        vcHistoryDataNearEndSIFBeh BEHAVIOUR
          DEFINED AS
            "The vcHistoryDataNearEndSIF managed object class holds the value of
            monitored attributes at the end of an observation period.";;;;
  CONDITIONAL PACKAGES
    alsPkg  PRESENT IF  "The current data object which conatins this
      object supports it.";
REGISTERED AS {sIFELMObjectClass 38};
```

5.2 Packages

alsPkg
bridgeRollSIFPkg
fcPkg
fcfePkg
gtpPkgSIF
receivePowerLevelTideMarkPkg
systemAccessControlPkg
tpPoolPkgSIF

```
alsPkg PACKAGE
  ATTRIBUTES
    als
      REPLACE-WITH-DEFAULT
      PERMITTED VALUES SIFneViewMod.RangeOfPMCount
     GET;
```

```
REGISTERED AS {sIFELMPackage 1};

bridgeRollSIFPkg PACKAGE
  ACTIONS
    bridgeRollSIF;
REGISTERED AS {sIFELMPackage 7};

fcPkg PACKAGE
  ATTRIBUTES
    fc
      REPLACE-WITH-DEFAULT
      DEFAULT VALUE SIFneViewMod.integerZeroDefault
      PERMITTED VALUES SIFneViewMod.RangeOfPMCount
     GET;
REGISTERED AS {sIFELMPackage 2};

fcfePkg PACKAGE
  ATTRIBUTES
    fcfe
      REPLACE-WITH-DEFAULT
      DEFAULT VALUE SIFneViewMod.integerZeroDefault
      PERMITTED VALUES SIFneViewMod.RangeOfPMCount
     GET;
REGISTERED AS {sIFELMPackage 3};

gtpPkgSIF PACKAGE
  ACTIONS
    "Rec. M.3100":addTpsToGTP,
    "Rec. M.3100":removeTpsFromGTP;
REGISTERED AS {sIFELMPackage 6};

receivePowerLevelTideMarkPkg PACKAGE
  BEHAVIOUR
    receivePowerLevelTideMarkPkgBeh BEHAVIOUR
      DEFINED AS
        "This package is used to store the maximum and minimum values reached by
        the receive power level guage during an observation period.";;
  ATTRIBUTES
    receivePowerLevelTideMarkMax GET,
    receivePowerLevelTideMarkMin GET;
REGISTERED AS {sIFELMPackage 4};

systemAccessControlPkg PACKAGE
  BEHAVIOUR
    systemAccessControlPkgBeh BEHAVIOUR
      DEFINED AS
        " This package contains information that pertains to system access
        control.
        System access control is used to limit user access to the managed system
```

based on conditions such as location of entry, method of access, time of day, day of week, and/or calendar date. If any of these conditions are specified, then all conditions must be met before a user access is allowed. ";;
  ATTRIBUTES
    systemAccessControlContextualInformation GET-REPLACE ADD-REMOVE;
  NOTIFICATIONS
    "Rec. X.721 | ISO/IEC 10165-2":timeDomainViolation;
REGISTERED AS {sIFELMPackage 5};

tpPoolPkgSIF PACKAGE
  ACTIONS
    "Rec. M.3100":addTpsToTpPool,
    "Rec. M.3100":removeTpsFromTpPool;
REGISTERED AS {sIFELMPackage 8};

5.3 Attributes

als
ds1FrameFormatSIF
ds3FrameFormatSIF
fc
fcfe
j0TraceExpected
j0TraceReceive
j0TraceSend
lastLoginLocationId
lastLoginTime
lastLogoutTime
lastUserIdDisabled
loginExpiration
nonUsedPeriod
numLastUnsuccessLogin
privilegeLevel
receivePowerLevelTideMarkMax
receivePowerLevelTideMarkMin
systemAccessControlContextualInformation
userId
userIdStatus

als ATTRIBUTE
  DERIVED FROM   "Rec. X.721 | ISO/IEC 10165-2 : 1992":counter;
  BEHAVIOUR
    alsBeh BEHAVIOUR
      DEFINED AS
        "The als attribute stores the number of seconds which had an AIS or LOP condition during an observation period.";;
REGISTERED AS {sIFELMAttribute 4};

ds1FrameFormatSIF ATTRIBUTE

```
  WITH ATTRIBUTE SYNTAX    SIFneViewMod.DS1FrameFormat;
  MATCHES FOR EQUALITY;
  BEHAVIOUR
    ds1FrameFormatSIFBeh BEHAVIOUR
      DEFINED AS
        "The ds1FrameFormat attribute identifies the DS1 frame format.
        Valid values are:
        SF Superframe format.
        ESF Extended Superframe format.
        T1DM DS1 frame format for data.
        ZBTSI Zero Byte Time-Slot Interchange.
        DLC13 DLC 13-alarm format (applicable for digital interface between the
        SLC<mrk id=SLC> 96 Digital Loop Carrier System and a Local Digital
        Switch).
        DLC16 DLC 16-alarm format (applicable for digital interface between the
        SLC 96 Digital Loop Carrier System and a Local Digital Switch).
        SLC96 Either DLC13 or DLC16. For switches (e.g., most of the 5E switches)
        that don't need to know one or the other, this value can be used. For
        switches that need to know one or the other, this value should not be
        used. Unframed for a DS-1 rate signal that is not framed.";;
REGISTERED AS {sIFELMAttribute 6};

ds3FrameFormatSIF ATTRIBUTE
  WITH ATTRIBUTE SYNTAX    SIFneViewMod.DS3FrameFormat;
  MATCHES FOR EQUALITY;
  BEHAVIOUR
    ds3FrameFormatSIFBeh BEHAVIOUR
      DEFINED AS
        "The ds3FrameFormat attribute identifies the DS3 frame format.
        Valid values are:
        ASYNC Asynchronous (i.e., M23 Multiplex Format);PM parameters based on
        P-Bit Parity Errors.
        SYNC Synchronous (i.e., SYNTRAN or Synchronous DS3 M13
MultiplexFormat);
        Separate PM parameters based on P-Bit Parity Errorsand on CRC violations.
        CBIT C-Bit (i.e., C-Bit Parity); Separate PM parameters based on P-Bit
        Parity Errors, and on C-Bit PEs. Unframed for a DS-3 rate signal that is
        not framed.";;
REGISTERED AS {sIFELMAttribute 7};

fc ATTRIBUTE
  DERIVED FROM    "Rec. X.721 | ISO/IEC 10165-2 : 1992":counter;
  BEHAVIOUR
    fcBeh BEHAVIOUR
      DEFINED AS
        "The fc attribute stores the number of failures, as defined in T1.231,
        during an observation period.";;
REGISTERED AS {sIFELMAttribute 9};
```

```
fcfe ATTRIBUTE
  DERIVED FROM    "Rec. X.721 | ISO/IEC 10165-2 : 1992":counter;
  BEHAVIOUR
    fcfeBeh BEHAVIOUR
      DEFINED AS
        "The fcfe attribute stores the number of path failures. as defined in
        T1.231, at the far end during an observation period.";;
REGISTERED AS {sIFELMAttribute 10};

j0TraceExpected ATTRIBUTE
  WITH ATTRIBUTE SYNTAX    SIFneViewMod.Trace;
  MATCHES FOR EQUALITY;
  BEHAVIOUR
    j0TraceExpectedBeh BEHAVIOUR
      DEFINED AS
        "This read-write attribute specifies the value of the expected J0 byte
        message. ";;
REGISTERED AS {sIFELMAttribute 12};

j0TraceReceive ATTRIBUTE
  WITH ATTRIBUTE SYNTAX    SIFneViewMod.Trace;
  MATCHES FOR EQUALITY;
  BEHAVIOUR
    j0TraceReceiveBeh BEHAVIOUR
      DEFINED AS
        "This read-only attribute indicates the value of the incoming J0 byte
        message. ";;
REGISTERED AS {sIFELMAttribute 13};

j0TraceSend ATTRIBUTE
  WITH ATTRIBUTE SYNTAX    SIFneViewMod.Trace;
  MATCHES FOR EQUALITY;
  BEHAVIOUR
    j0TraceSendBeh BEHAVIOUR
      DEFINED AS
        "This read-write attribute indicates the value of the outgoing J0 byte
        message.";;
REGISTERED AS {sIFELMAttribute 14};

lastLoginLocationId ATTRIBUTE
  WITH ATTRIBUTE SYNTAX    SIFneViewMod.LastLoginLocationId;
  MATCHES FOR EQUALITY, SUBSTRINGS;
  BEHAVIOUR
    lastLoginLocationIdBeh BEHAVIOUR
      DEFINED AS
        " This attribute indicates the login location (channel) of the last
        successful login session of a user. The value of this attribute is updated
        from the sessionLocationId of the userSession object instance when the
        user session is established. ";;
```

```
REGISTERED AS {sIFELMAttribute 15};

lastLoginTime ATTRIBUTE
  WITH ATTRIBUTE SYNTAX    SIFneViewMod.LastLoginTime;
  MATCHES FOR EQUALITY;
  BEHAVIOUR
    lastLoginTimeBeh BEHAVIOUR
      DEFINED AS
        " This attribute indicates the last successful login time and date of a
        user session of the user. The value of this attribute is updated from the
        sessionStartTime attribute of the userSession object instance when the
        user logs off. ";;
REGISTERED AS {sIFELMAttribute 16};

lastLogoutTime ATTRIBUTE
  WITH ATTRIBUTE SYNTAX    SIFneViewMod.LastLogoutTime;
  MATCHES FOR EQUALITY;
  BEHAVIOUR
    lastLogoutTimeBeh BEHAVIOUR
      DEFINED AS
        " This attribute indicates the time and date when the last user session
        was terminated. The value of this attribute is updated from the time and
        date when the user session is terminated. ";;
REGISTERED AS {sIFELMAttribute 17};

lastUserIdDisabled ATTRIBUTE
  WITH ATTRIBUTE SYNTAX    SIFneViewMod.LastUserIdDisabled;
  MATCHES FOR EQUALITY;
  BEHAVIOUR
    lastUserIdDisabledBeh BEHAVIOUR
      DEFINED AS
        " This attribute indicates the time and date when the last time a user ID
        is disabled (i.e., the userIdStatus attribute is set to a non-active
        state). The value of this attribute should be updated when the
        userIdStatus attribute is set to a non-active state. ";;
REGISTERED AS {sIFELMAttribute 18};

loginExpiration ATTRIBUTE
  WITH ATTRIBUTE SYNTAX    SIFneViewMod.LoginExpiration;
  MATCHES FOR EQUALITY, ORDERING;
  BEHAVIOUR
    loginExpirationBeh BEHAVIOUR
      DEFINED AS
        " This attribute indicates the time and date when the user's password
        expires.";;
REGISTERED AS {sIFELMAttribute 19};

nonUsedPeriod ATTRIBUTE
  WITH ATTRIBUTE SYNTAX    SIFneViewMod.NonUsedPeriod;
```

```
  MATCHES FOR EQUALITY, ORDERING;
  BEHAVIOUR
    nonUsedPeriodBeh BEHAVIOUR
      DEFINED AS
        " This attribute indicates the length of a period in days within which if
        the user did not have a successful login session, the userId will be put
        in a suspended status. If further login is requested by the same user, the
        session should be denied. For a user to login again, an appropriate
        procedure will have to be followed to put the user into an active status.
        ";;
REGISTERED AS {sIFELMAttribute 23};

numLastUnsuccessLogin ATTRIBUTE
  WITH ATTRIBUTE SYNTAX    SIFneViewMod.NumLastUnsuccessLogin;
  MATCHES FOR EQUALITY, ORDERING;
  BEHAVIOUR
    numLastUnsuccessLoginBeh BEHAVIOUR
      DEFINED AS
        " This attribute indicates the number of unsuccessful login attempts by a
        user since the last successful login session. The value of this attribute
        is updated each time there is an unsuccessful login attempt by a user. The
        value of this attribute is set to zero when there is a successful login
        session by the user. ";;
REGISTERED AS {sIFELMAttribute 24};

privilegeLevel ATTRIBUTE
  WITH ATTRIBUTE SYNTAX    SIFneViewMod.PrivilegeLevel;
  MATCHES FOR EQUALITY, ORDERING;
  BEHAVIOUR
    privilegeLevelBeh BEHAVIOUR
      DEFINED AS
        " This attribute specifies the privilege level of a user. This privilege
        level is used to decided what type of functions that a user can perform.
        Examples of privilege level are regular user and super user, which will be
        represented by appropriate numeric digit. ";;
REGISTERED AS {sIFELMAttribute 25};

receivePowerLevelTideMarkMax ATTRIBUTE
  DERIVED FROM    "Rec. X.721 | ISO/IEC 10165-2 : 1992":tideMark;
  BEHAVIOUR
    receivePowerLevelTideMarkMaxBeh BEHAVIOUR
      DEFINED AS
        "The receivePowerLevelTideMarkMax attribute stores the maximum value
        reached by the receive power level during an observation period.";;
REGISTERED AS {sIFELMAttribute 26};

receivePowerLevelTideMarkMin ATTRIBUTE
  DERIVED FROM    "Rec. X.721 | ISO/IEC 10165-2 : 1992":tideMark;
  BEHAVIOUR
```

```
    receivePowerLevelTideMarkMinBeh BEHAVIOUR
      DEFINED AS
        "The receivePowerLevelTideMarkMin attribute stores the minimum value
        reached by the receive power level during an observation period.";;
REGISTERED AS {sIFELMAttribute 27};

systemAccessControlContextualInformation ATTRIBUTE
  WITH ATTRIBUTE SYNTAX
SIFneViewMod.SystemAccessControlContextualInformation;
  MATCHES FOR EQUALITY, SET-COMPARISON, SET-INTERSECTION;
  BEHAVIOUR
    systemAccessControlContextualInformationBeh BEHAVIOUR
      DEFINED AS
        " This attribute stores location of entry, method of access, time of day,
        day of week, and/or calendar date.";;
REGISTERED AS {sIFELMAttribute 30};

userId ATTRIBUTE
  WITH ATTRIBUTE SYNTAX    SIFneViewMod.UserId;
  MATCHES FOR EQUALITY;
  BEHAVIOUR
    userIdBeh BEHAVIOUR
      DEFINED AS
        " The User ID is an attribute type whose distinguished value can be used
        as an RDN when naming an instance of the Security User managed object
        class. This attribute uniquely identifies a user which has (currently
        active) or had (currently suspended) access to the managed system. The
        structure of this attribute should be limited to the alpha-numeric
        character set with a maximum size of 10. ";;
REGISTERED AS {sIFELMAttribute 32};

userIdStatus ATTRIBUTE
  WITH ATTRIBUTE SYNTAX    SIFneViewMod.UserIdStatus;
  MATCHES FOR EQUALITY;
  BEHAVIOUR
    userIdStatusBeh BEHAVIOUR
      DEFINED AS
        " This attribute is used to indicated the current status of the user. The
        status of a user can be new, active, suspended, or revoked. The value of
        this attribute can only be set by an appropriate administrator, such as a
        security administrator. One use of this attribute is to decide if a user
        is allowed to access the managed system. ";;
REGISTERED AS {sIFELMAttribute 33};
```

5.4 Notifications

5.5 Actions

bridgeRollSIF
userLoginRequest

```
bridgeRollSIF ACTION
  BEHAVIOUR
    bridgeRollSIFBeh BEHAVIOUR
      DEFINED AS
        "This action is used to bridge and/or roll a signal from a leg of an
        existing cross-connection to a new leg. The bridge operation will bridge
        the signal to a new leg (therefore a new one-way cross-connection is
        created_, and the old leg remains. The roll operation makes the new
        cross-connection two-way, and the old cross-connection one-way. The
        release bridge operation takes down the old leg (therefore the old
        cross-connection is deleted). The roll and release bridge operation
        combines the roll and release steps.

        The bridgeRollFromTP field of the BridgeRollSIFArg data type indicates the
        leg of an existing cross-connection that will be replaced. The
        bridgeRollToTp field indicates the new leg that will replace the old leg.

        The bridgeRollResult field of the BridgeRollTLABReply data type indicates
        the newly created cross-connection for the bridge and roll operations, and
        the deleted cross-connection for the release bridge and roll and release
        operations.";;
  MODE CONFIRMED;
  WITH INFORMATION SYNTAX SIFneViewMod.BridgeRollSIFArg;
  WITH REPLY SYNTAX SIFneViewMod.BridgeRollSIFReply;
REGISTERED AS {sIFELMAction 5};

userLoginRequest ACTION
  BEHAVIOUR
    userLoginRequestBeh BEHAVIOUR
      DEFINED AS
        " This User Login Request service is sent by a managing system (e.g., an
        OS) on behalf of a user for requesting a user login session to a managed
        system (e.g.
        an NE). A user should supply its user ID and user authentication
        information (e.g., its password if password authentication is used). This
        user ID will be matched with the userId attribute of the securityUser
        object instance, and the authentication information will be matched with
        the appropriate attribute(s) of the authentication object instance (e.g.,
        if password authentication is used,
        the supplied password will be matched with the userPassword attribute of
        the userPasswordAuthentication object instance). If the login request is
        granted, an instance of the userSession object class is created for this
        user session, and information specified by the attribute postLoginMessage
        of the Security System managed object class (such as last login time and
        number of last unsuccessful login attempts of the instance of the
        securityUser object class) is sent to the managing system. If the login
        request is denied (examples are the user ID and user authentication
```

```
        information provided by the user are invalid or the same user is already
        in a login session), error information should be sent to the managing
        system to indicate invalid login request. However, this error information
        should not indicate which part or which information of the login request
        is invalid. If the login request is denied because of multiple login
        sessions, then the error information should indicate the locationId of the
        existing login session. If the login request is denied for any reason, the
        numLastUnsuccessLogin attribute in the securityUser object instance should
        be appropriately updated. ";;
    MODE CONFIRMED;
    PARAMETERS
      specificErrorParameter;
    WITH INFORMATION SYNTAX SIFneViewMod.UserLoginRequestInfo;
    WITH REPLY SYNTAX SIFneViewMod.UserLoginRequestReply;
  REGISTERED AS {sIFELMAction 3};

  userLogoutRequest ACTION
    BEHAVIOUR
      userLogoutRequestBeh BEHAVIOUR
        DEFINED AS
          " This User Logout Request service is sent by a managing system (e.g., an
          OS) on behalf of a user for requesting to terminate a user session. If the
          request is granted, the attributes lastLoginTime, lastLogoutTime, and
          lastLoginLocationId of the securityUser object instance should be replaced
          with the attribute values of locationId and sessionStartTime of the
          userSession object instance and the current time respectively. The
          userSession object instance should then be deleted. ";;
    MODE CONFIRMED;
    PARAMETERS
      specificErrorParameter;
    WITH REPLY SYNTAX SIFneViewMod.UserLogoutRequestReply;
  REGISTERED AS {sIFELMAction 4};
```

5.6 Name Bindings

connectionProtectionGroupBCR-sncpFabricSIF
crossConnection-fabricSIF
dS3PathTTPSinkFECurrentDataSIF-terminationPoint
ds1PathTTPBidirectionalSIF-managedElementR1
ds1PathTTPSinkSIF-managedElementR1
ds1PathTTPSinkSIF-managedElementR1-autoCreate24DS0CTP
ds1PathTTPSinkSIF-managedElementR1-noAutoCreateCTP
ds1PathTTPSourceSIF-managedElementR1
ds1PathTTPSourceSIF-managedElementR1-autoCreate24DS0CTP
ds1PathTTPSourceSIF-managedElementR1-noAutoCreateCTP
ds3PathTTPBidirectionalSIF-managedElementR1
ds3PathTTPSinkSIF-managedElementR1
ds3PathTTPSinkSIF-managedElementR1-autoCreateDS1CTP
ds3PathTTPSinkSIF-managedElementR1-noAutoCreateCTP
ds3PathTTPSourceSIF-managedElementR1

ds3PathTTPSourceSIF-managedElementR1-autoCreateDS1CTP
ds3PathTTPSourceSIF-managedElementR1-noAutoCreateCTP
electricalSPITTPBidirectional-managedElementR1
fabricSIF-managedElement
gtp-fabricSIF
opticalSPITTPBidirectional-managedElementR1
p31CTPSink-vc3TTPSinkR1BCR
p4CTPSink-vc4TTPSinkR1BCR
pPITTPSink-managedElement
pPITTPSource-managedElement
protectionCoordinator-managedElement
protectionSwCurrentData-protectionUnit
securitySystem-managedElementR1
securitySystem-managedEms
securityUserSIF-securitySystem
software-managedEms
tpPool-fabricSIF
tug3Bidirectional-vc4TTPBidirectionalR1BCR
tug3Sink-vc4TTPSinkR1

connectionProtectionGroupBCR-sncpFabricSIF NAME BINDING
SUBORDINATE OBJECT CLASS "GR-1042":connectionProtectionGroupBCR AND SUBCLASSES;
NAMED BY SUPERIOR OBJECT CLASS sncpFabricSIF AND SUBCLASSES;
WITH ATTRIBUTE "GR-836":protectionGroupId;
BEHAVIOUR
connectionProtectionGroupBCR-sncpFabricBCRr1Beh BEHAVIOUR
DEFINED AS
" An instance of the subordinate object class is automatically instantiated as the result of the establishment of a protected connection (point to point or multipoint) or of the protection of an existing non protected connection. When disconnecting a TP involved in a protected connection: if the TP is the reliable resource of a point to point connection protection, or the last reliable resource (last leg) of a multipoint connection protection, this leads to the disconnection of the protection and results in the deletion of the subordinate object class and all contained objects. If the TP is the unreliable resource of a protection unit or a multi-point protection unit, the corresponding Unreliable Resource Pointer is set to NULL. Such a disconnection shall be considered as a signal failure.
A new unreliable resource (TP) may be connected using the capability to add a new unreliable resource using a protected connect action. When both unreliable TPs are disconnected, this leads to the disconnection of the protection and results in the deletion of the subordinate object class and all contained objects.

The subordinate object class and all contained objects can also be deleted as the result of changing the connection from protected to unprotected. ";;
REGISTERED AS {sIFELMNameBinding 3};

```
crossConnection-fabricSIF NAME BINDING
  SUBORDINATE OBJECT CLASS "Rec. M.3100":crossConnection AND
SUBCLASSES;
  NAMED BY SUPERIOR OBJECT CLASS fabricSIF AND SUBCLASSES;
  WITH ATTRIBUTE "Rec. M.3100":crossConnectionId;
  BEHAVIOUR
    crossConnection-fabricSIFBehaviour BEHAVIOUR
      DEFINED AS
        "The value of the fromTermination attribute in the Cross-Connection object
        shall not be NULL. When an instance of cross-connection is deleted, the
        following attributes will be affected. The crossConnectionObjectPointer
        attribute in the termination point objects or in the GTP objects that were
        pointing to the deleted cross-connection instance shall be set to point to
        the Fabric responsible for the connection of the termination points. The
        counters in the appropriate TP Pool objects (if applicable) shall be
        updated. The connectivityPointer attributes in the disconnected
        termination points shall be set to NULL. Deleting a cross-connection
        object instance has no effect on the composition of any GTP.";;
  DELETE ONLY-IF-NO-CONTAINED-OBJECTS
    "Rec. M.3100":generalErrorParameter;
REGISTERED AS {sIFELMNameBinding 4};

dS3PathTTPSinkFECurrentDataSIF-terminationPoint NAME BINDING
  SUBORDINATE OBJECT CLASS dS3PathTTPSinkFECurrentDataSIF AND
SUBCLASSES;
  NAMED BY SUPERIOR OBJECT CLASS "Rec. M.3100: 1995":terminationPoint AND
SUBCLASSES;
  WITH ATTRIBUTE "Recommendation X.739 : 1993":scannerId;
  BEHAVIOUR
    dS3PathTTPSinkFECurrentDataSIF-terminationPointBeh BEHAVIOUR
      DEFINED AS
        " An instance of this object class is instantiated when far end
        performance monitoring data is kept for dS3PathTTPSinkFECurrentDataSIF
        MOIs.";;
  CREATE WITH-REFERENCE-OBJECT, WITH-AUTOMATIC-INSTANCE-NAMING;
  DELETE DELETES-CONTAINED-OBJECTS;
REGISTERED AS {sIFELMNameBinding 5};

ds1PathTTPBidirectionalSIF-managedElementR1 NAME BINDING
  SUBORDINATE OBJECT CLASS ds1PathTTPBidirectionalSIF AND SUBCLASSES;
  NAMED BY SUPERIOR OBJECT CLASS "Rec. M.3100":managedElementR1 AND
SUBCLASSES;
  WITH ATTRIBUTE "GR-836":ds1PathTTPId;
  CREATE WITH-REFERENCE-OBJECT, WITH-AUTOMATIC-INSTANCE-NAMING
    "GR-836":createErrorParameter;
  DELETE DELETES-CONTAINED-OBJECTS;
REGISTERED AS {sIFELMNameBinding 29};
```

```
ds1PathTTPSinkSIF-managedElementR1 NAME BINDING
  SUBORDINATE OBJECT CLASS ds1PathTTPSinkSIF AND SUBCLASSES;
  NAMED BY SUPERIOR OBJECT CLASS "Rec. M.3100":managedElementR1 AND
SUBCLASSES;
  WITH ATTRIBUTE "GR-836":ds1PathTTPId;
  CREATE WITH-REFERENCE-OBJECT, WITH-AUTOMATIC-INSTANCE-NAMING
    "GR-836":createErrorParameter;
  DELETE DELETES-CONTAINED-OBJECTS;
REGISTERED AS {sIFELMNameBinding 30};

ds1PathTTPSinkSIF-managedElementR1-autoCreate24DS0CTP NAME BINDING
  SUBORDINATE OBJECT CLASS ds1PathTTPSinkSIF AND SUBCLASSES;
  NAMED BY SUPERIOR OBJECT CLASS "Rec. M.3100":managedElementR1 AND
SUBCLASSES;
  WITH ATTRIBUTE "GR-836":ds1PathTTPId;
  BEHAVIOUR
    ds1PathTTPSinkSIF-managedElementR1-autoCreate24DS0CTPBeh BEHAVIOUR
      DEFINED AS
        " Twenty four (24) subordinate DS0 CTP Sink (or subclass) objects of the
        ds1PathTTPSinkSIF (or subclass) object will be created automatically when
        the ds1PathTTPSinkSIF (or subclass) object is created. ";;
  CREATE WITH-REFERENCE-OBJECT, WITH-AUTOMATIC-INSTANCE-NAMING
    "GR-836":createErrorParameter;
  DELETE DELETES-CONTAINED-OBJECTS;
REGISTERED AS {sIFELMNameBinding 31};

ds1PathTTPSinkSIF-managedElementR1-noAutoCreateCTP NAME BINDING
  SUBORDINATE OBJECT CLASS ds1PathTTPSinkSIF AND SUBCLASSES;
  NAMED BY SUPERIOR OBJECT CLASS "Rec. M.3100":managedElementR1 AND
SUBCLASSES;
  WITH ATTRIBUTE "GR-836":ds1PathTTPId;
  BEHAVIOUR
    ds1PathTTPSinkSIF-managedElementR1-noAutoCreateCTPBeh BEHAVIOUR
      DEFINED AS
        " Subordinate CTPs of the ds1PathTTPSinkSIF (or subclass) object, such as
        DS0 CTP or Quarter DS0 CTP may be created explicitly by using system
        management operations (e.g., M-CREATE service). ";;
  CREATE WITH-REFERENCE-OBJECT, WITH-AUTOMATIC-INSTANCE-NAMING
    "GR-836":createErrorParameter;
  DELETE DELETES-CONTAINED-OBJECTS;
REGISTERED AS {sIFELMNameBinding 32};

ds1PathTTPSourceSIF-managedElementR1 NAME BINDING
  SUBORDINATE OBJECT CLASS ds1PathTTPSourceSIF AND SUBCLASSES;
  NAMED BY SUPERIOR OBJECT CLASS "Rec. M.3100":managedElementR1 AND
SUBCLASSES;
  WITH ATTRIBUTE "GR-836":ds1PathTTPId;
  CREATE WITH-REFERENCE-OBJECT, WITH-AUTOMATIC-INSTANCE-NAMING
    "GR-836":createErrorParameter;
```

```
  DELETE DELETES-CONTAINED-OBJECTS;
REGISTERED AS {sIFELMNameBinding 33};

ds1PathTTPSourceSIF-managedElementR1-autoCreate24DS0CTP NAME BINDING
  SUBORDINATE OBJECT CLASS ds1PathTTPSourceSIF AND SUBCLASSES;
  NAMED BY SUPERIOR OBJECT CLASS "Rec. M.3100":managedElementR1 AND
SUBCLASSES;
  WITH ATTRIBUTE "GR-836":ds1PathTTPId;
  BEHAVIOUR
    ds1PathTTPSourceSIF-managedElementR1-autoCreate24DS0CTPBeh
BEHAVIOUR
      DEFINED AS
        " Twenty four (24) subordinate DS0 CTP Source (or subclass) objects of the
        ds1PathTTPSourceSIF (or subclass) object will be created automatically
        when the ds1PathTTPSourceSIF (or subclass) object is created. ";;
  CREATE WITH-REFERENCE-OBJECT, WITH-AUTOMATIC-INSTANCE-NAMING
    "GR-836":createErrorParameter;
  DELETE DELETES-CONTAINED-OBJECTS;
REGISTERED AS {sIFELMNameBinding 34};

ds1PathTTPSourceSIF-managedElementR1-noAutoCreateCTP NAME BINDING
  SUBORDINATE OBJECT CLASS ds1PathTTPSourceSIF AND SUBCLASSES;
  NAMED BY SUPERIOR OBJECT CLASS "Rec. M.3100":managedElementR1 AND
SUBCLASSES;
  WITH ATTRIBUTE "GR-836":ds1PathTTPId;
  BEHAVIOUR
    ds1PathTTPSourceSIF-managedElementR1-noAutoCreateCTPBeh BEHAVIOUR
      DEFINED AS
        " Subordinate CTPs of the ds1PathTTPSourceSIF (or subclass) object, such
        as DS0
        CTP or Quarter DS0 CTP may be created explicitly by using system
        management operations (e.g., M-CREATE service). ";;
  CREATE WITH-REFERENCE-OBJECT, WITH-AUTOMATIC-INSTANCE-NAMING
    "GR-836":createErrorParameter;
  DELETE DELETES-CONTAINED-OBJECTS;
REGISTERED AS {sIFELMNameBinding 35};

ds3PathTTPBidirectionalSIF-managedElementR1 NAME BINDING
  SUBORDINATE OBJECT CLASS ds3PathTTPBidirectionalSIF AND SUBCLASSES;
  NAMED BY SUPERIOR OBJECT CLASS "Rec. M.3100":managedElementR1 AND
SUBCLASSES;
  WITH ATTRIBUTE "GR-836":ds3PathTTPId;
  CREATE WITH-REFERENCE-OBJECT, WITH-AUTOMATIC-INSTANCE-NAMING
    "GR-836":createErrorParameter;
  DELETE DELETES-CONTAINED-OBJECTS;
REGISTERED AS {sIFELMNameBinding 36};

ds3PathTTPSinkSIF-managedElementR1 NAME BINDING
  SUBORDINATE OBJECT CLASS ds3PathTTPSinkSIF AND SUBCLASSES;
```

```
  NAMED BY SUPERIOR OBJECT CLASS "Rec. M.3100":managedElementR1 AND
SUBCLASSES;
  WITH ATTRIBUTE "GR-836":ds3PathTTPId;
  CREATE WITH-REFERENCE-OBJECT, WITH-AUTOMATIC-INSTANCE-NAMING
    "GR-836":createErrorParameter;
  DELETE DELETES-CONTAINED-OBJECTS;
REGISTERED AS {sIFELMNameBinding 37};

ds3PathTTPSinkSIF-managedElementR1-autoCreateDS1CTP NAME BINDING
  SUBORDINATE OBJECT CLASS ds3PathTTPSinkSIF AND SUBCLASSES;
  NAMED BY SUPERIOR OBJECT CLASS "Rec. M.3100":managedElementR1 AND
SUBCLASSES;
  WITH ATTRIBUTE "GR-836":ds3PathTTPId;
  BEHAVIOUR
    ds3PathTTPSinkSIF-managedElementR1-autoCreateDS1CTPBeh BEHAVIOUR
      DEFINED AS
        " Twenty eight (28) subordinate DS1 CTP Sink (or subclass) objects of the
        ds3PathTTPSinkSIF (or subclass) object will be created automatically when
        the ds3PathTTPSinkSIF (or subclass) object is created. ";;
  CREATE WITH-REFERENCE-OBJECT, WITH-AUTOMATIC-INSTANCE-NAMING
    "GR-836":createErrorParameter;
  DELETE DELETES-CONTAINED-OBJECTS;
REGISTERED AS {sIFELMNameBinding 38};

ds3PathTTPSinkSIF-managedElementR1-noAutoCreateCTP NAME BINDING
  SUBORDINATE OBJECT CLASS ds3PathTTPSinkSIF AND SUBCLASSES;
  NAMED BY SUPERIOR OBJECT CLASS "Rec. M.3100":managedElementR1 AND
SUBCLASSES;
  WITH ATTRIBUTE "GR-836":ds3PathTTPId;
  BEHAVIOUR
    ds3PathTTPSinkSIF-managedElementR1-noAutoCreateCTPBeh BEHAVIOUR
      DEFINED AS
        " Subordinate CTP of the ds3PathTTPSinkSIF (or subclass) object will not
        be automatically created when the ds3PathTTPSinkSIF object is created.
        Such CTP may be created explicitly by using system management operations
        (e.g., M-CREATE service). ";;
  CREATE WITH-REFERENCE-OBJECT, WITH-AUTOMATIC-INSTANCE-NAMING
    "GR-836":createErrorParameter;
  DELETE DELETES-CONTAINED-OBJECTS;
REGISTERED AS {sIFELMNameBinding 39};

ds3PathTTPSourceSIF-managedElementR1 NAME BINDING
  SUBORDINATE OBJECT CLASS ds3PathTTPSourceSIF AND SUBCLASSES;
  NAMED BY SUPERIOR OBJECT CLASS "Rec. M.3100":managedElementR1 AND
SUBCLASSES;
  WITH ATTRIBUTE "GR-836":ds3PathTTPId;
  CREATE WITH-REFERENCE-OBJECT, WITH-AUTOMATIC-INSTANCE-NAMING
    "GR-836":createErrorParameter;
  DELETE DELETES-CONTAINED-OBJECTS;
```

```
REGISTERED AS {sIFELMNameBinding 40};

ds3PathTTPSourceSIF-managedElementR1-autoCreateDS1CTP NAME BINDING
  SUBORDINATE OBJECT CLASS ds3PathTTPSourceSIF AND SUBCLASSES;
  NAMED BY SUPERIOR OBJECT CLASS "Rec. M.3100":managedElementR1 AND
SUBCLASSES;
  WITH ATTRIBUTE "GR-836":ds3PathTTPId;
  BEHAVIOUR
    ds3PathTTPSourceSIF-managedElementR1-autoCreateDS1CTPBeh BEHAVIOUR
      DEFINED AS
        " Twenty eight (28) subordinate DS1 CTP Source (or subclass) objects of
        the ds3PathTTPSourceSIF (or subclass) object will be created automatically
        when the ds3PathTTPSourceSIF (or subclass) object is created. ";;
  CREATE WITH-REFERENCE-OBJECT, WITH-AUTOMATIC-INSTANCE-NAMING
    "GR-836":createErrorParameter;
  DELETE DELETES-CONTAINED-OBJECTS;
REGISTERED AS {sIFELMNameBinding 41};

ds3PathTTPSourceSIF-managedElementR1-noAutoCreateCTP NAME BINDING
  SUBORDINATE OBJECT CLASS ds3PathTTPSourceSIF AND SUBCLASSES;
  NAMED BY SUPERIOR OBJECT CLASS "Rec. M.3100":managedElementR1 AND
SUBCLASSES;
  WITH ATTRIBUTE "GR-836":ds3PathTTPId;
  BEHAVIOUR
    ds3PathTTPSourceSIF-managedElementR1-noAutoCreateCTPBeh BEHAVIOUR
      DEFINED AS
        " Subordinate CTP of the ds3PathTTPSourceSIF (or subclass) object will not
        be automatically created when the ds3PathTTPSourceSIF object is created.
        Such CTP may be created explicitly by using system management operations
        (e.g., M-CREATE service). ";;
  CREATE WITH-REFERENCE-OBJECT, WITH-AUTOMATIC-INSTANCE-NAMING
    "GR-836":createErrorParameter;
  DELETE DELETES-CONTAINED-OBJECTS;
REGISTERED AS {sIFELMNameBinding 42};

electricalSPITTPBidirectional-managedElementR1 NAME BINDING
  SUBORDINATE OBJECT CLASS "Rec. G.774":electricalSPITTPBidirectional AND
SUBCLASSES;
  NAMED BY SUPERIOR OBJECT CLASS "Rec. M.3100":managedElementR1 AND
SUBCLASSES;
  WITH ATTRIBUTE "Rec. G.774":electricalSPITTPId;
  CREATE WITH-REFERENCE-OBJECT, WITH-AUTOMATIC-INSTANCE-NAMING;
  DELETE DELETES-CONTAINED-OBJECTS;
REGISTERED AS {sIFELMNameBinding 6};

fabricSIF-managedElement NAME BINDING
  SUBORDINATE OBJECT CLASS fabricSIF AND SUBCLASSES;
  NAMED BY SUPERIOR OBJECT CLASS "Rec. M.3100":managedElement AND
SUBCLASSES;
```

```
  WITH ATTRIBUTE "Rec. M.3100":fabricId;
  CREATE WITH-REFERENCE-OBJECT, WITH-AUTOMATIC-INSTANCE-NAMING
    "Rec. M.3100":generalErrorParameter;
  DELETE ONLY-IF-NO-CONTAINED-OBJECTS
    "Rec. M.3100":generalErrorParameter;
REGISTERED AS {sIFELMNameBinding 43};

gtp-fabricSIF NAME BINDING
  SUBORDINATE OBJECT CLASS "Rec. M.3100":gtp AND SUBCLASSES;
  NAMED BY SUPERIOR OBJECT CLASS fabricSIF AND SUBCLASSES;
  WITH ATTRIBUTE "Rec. M.3100":gtpId;
REGISTERED AS {sIFELMNameBinding 9};

opticalSPITTPBidirectional-managedElementR1 NAME BINDING
  SUBORDINATE OBJECT CLASS "Rec. G.774":opticalSPITTPBidirectional AND
SUBCLASSES;
  NAMED BY SUPERIOR OBJECT CLASS "Rec. M.3100":managedElementR1 AND
SUBCLASSES;
  WITH ATTRIBUTE "Rec. G.774":opticalSPITTPId;
  CREATE WITH-REFERENCE-OBJECT, WITH-AUTOMATIC-INSTANCE-NAMING;
  DELETE DELETES-CONTAINED-OBJECTS;
REGISTERED AS {sIFELMNameBinding 13};

p31CTPSink-vc3TTPSinkR1BCR NAME BINDING
  SUBORDINATE OBJECT CLASS "ETS_300_304:1997":p31CTPSink AND
SUBCLASSES;
  NAMED BY SUPERIOR OBJECT CLASS "GR-1042":vc3TTPSinkR1BCR AND
SUBCLASSES;
  WITH ATTRIBUTE "ETS_300_304:1997":p31CTPId;
  BEHAVIOUR
    p31CTPSink-vc3TTPSinkR1BCRBeh BEHAVIOUR
      DEFINED AS
        "The subordinate managed object may be automatically instantiated when the
        superior managed object is instantiated, according to the make-up and mode
        of operation of the equipment.";;
REGISTERED AS {sIFELMNameBinding 14};

p4CTPSink-vc4TTPSinkR1BCR NAME BINDING
  SUBORDINATE OBJECT CLASS "ETS_300_304:1997":p4CTPSink AND
SUBCLASSES;
  NAMED BY SUPERIOR OBJECT CLASS "GR-1042":vc4TTPSinkR1BCR AND
SUBCLASSES;
  WITH ATTRIBUTE "ETS_300_304:1997":p4CTPId;
  BEHAVIOUR
    p4CTPSink-vc4TTPSinkR1BCRBeh BEHAVIOUR
      DEFINED AS
        "The subordinate managed object may be automatically instantiated when the
        superior managed object is instantiated, according to the make-up and mode
        of operation of the equipment.";;
```

```
REGISTERED AS {sIFELMNameBinding 15};

pPITTPSink-managedElement NAME BINDING
  SUBORDINATE OBJECT CLASS "ETS_300_371:1996":pPITTPSink AND
SUBCLASSES;
  NAMED BY SUPERIOR OBJECT CLASS "Rec. M.3100: 1995":managedElement
AND SUBCLASSES;
  WITH ATTRIBUTE "ETS_300_371:1996":pPITTPId;
  CREATE WITH-REFERENCE-OBJECT, WITH-AUTOMATIC-INSTANCE-NAMING;
  DELETE DELETES-CONTAINED-OBJECTS;
REGISTERED AS {sIFELMNameBinding 16};

pPITTPSource-managedElement NAME BINDING
  SUBORDINATE OBJECT CLASS "ETS_300_371:1996":pPITTPSource AND
SUBCLASSES;
  NAMED BY SUPERIOR OBJECT CLASS "Rec. M.3100: 1995":managedElement
AND SUBCLASSES;
  WITH ATTRIBUTE "ETS_300_371:1996":pPITTPId;
  CREATE WITH-REFERENCE-OBJECT, WITH-AUTOMATIC-INSTANCE-NAMING;
  DELETE DELETES-CONTAINED-OBJECTS;
REGISTERED AS {sIFELMNameBinding 17};

protectionCoordinator-managedElement NAME BINDING
  SUBORDINATE OBJECT CLASS "Rec. G.774-9: 1998":protectionCoordinator AND
SUBCLASSES;
  NAMED BY SUPERIOR OBJECT CLASS "Rec. M.3100: 1995":managedElement
AND SUBCLASSES;
  WITH ATTRIBUTE "Rec. G.774-9: 1998":protectionCoordinatorId;
  BEHAVIOUR
    protectionCoordinator-managedElementBeh BEHAVIOUR
      DEFINED AS
        "The subordinate managed object is automatically instantiated when the
        superior managed object is instantiated, according to makeup and mode of
        the equipment.";;
REGISTERED AS {sIFELMNameBinding 18};

protectionSwCurrentData-protectionUnit NAME BINDING
  SUBORDINATE OBJECT CLASS "T1.119.02":protectionSwCurrentData AND
SUBCLASSES;
  NAMED BY SUPERIOR OBJECT CLASS "Rec. G.774.03":protectionUnit AND
SUBCLASSES;
  WITH ATTRIBUTE "Recommendation X.739 : 1993":scannerId;
  CREATE WITH-REFERENCE-OBJECT, WITH-AUTOMATIC-INSTANCE-NAMING;
  DELETE DELETES-CONTAINED-OBJECTS;
REGISTERED AS {sIFELMNameBinding 19};

securitySystem-managedElementR1 NAME BINDING
  SUBORDINATE OBJECT CLASS "GR-1114":securitySystem AND SUBCLASSES;
```

```
  NAMED BY SUPERIOR OBJECT CLASS "Rec. M.3100":managedElementR1 AND
SUBCLASSES;
  WITH ATTRIBUTE "GR-1114":securitySystemId;
  BEHAVIOUR
    securitySystem-managedElementR1Beh BEHAVIOUR
      DEFINED AS
        "The securitySystem managed object shall be automatically instantiated
        when the superior managed object is instantiated.";;
REGISTERED AS {sIFELMNameBinding 20};

securitySystem-managedEms NAME BINDING
  SUBORDINATE OBJECT CLASS "GR-1114":securitySystem AND SUBCLASSES;
  NAMED BY SUPERIOR OBJECT CLASS managedEms AND SUBCLASSES;
  WITH ATTRIBUTE "GR-1114":securitySystemId;
  BEHAVIOUR
    securitySystem-managedEmsBeh BEHAVIOUR
      DEFINED AS
        "The securitySystem managed object shall be automatically instantiated
        when the superior managed object is instantiated.";;
REGISTERED AS {sIFELMNameBinding 21};

securityUserSIF-securitySystem NAME BINDING
  SUBORDINATE OBJECT CLASS securityUserSIF AND SUBCLASSES;
  NAMED BY SUPERIOR OBJECT CLASS "GR-1114":securitySystem AND
SUBCLASSES;
  WITH ATTRIBUTE userId;
  BEHAVIOUR
    securityUserSIF-securitySystemBeh BEHAVIOUR
      DEFINED AS
        " An instance of securityUser object class shall be created when a user is
        authorized to access the managed system. The CMIS M-CREATE and M-
DELETE
        services can be used to create and delete an instance of this object
        class. A temporary suspended user ID should not be deleted by using
        M-DELETE. Instead, the userIDstatus attribute should be used to indicate
        such a status. The maximum number of instances of securityUser object
        class that can be contained in an instance of securitySystem object class
        is dependent on the maximum number of users allowed by the managed
        system. ";;
  CREATE WITH-REFERENCE-OBJECT;
  DELETE ;
REGISTERED AS {sIFELMNameBinding 22};

software-managedEms NAME BINDING
  SUBORDINATE OBJECT CLASS "Rec. M.3100: 1995":software;
  NAMED BY SUPERIOR OBJECT CLASS managedEms AND SUBCLASSES;
  WITH ATTRIBUTE "Rec. M.3100: 1995":softwareId;
REGISTERED AS {sIFELMNameBinding 24};
```

```
tpPool-fabricSIF NAME BINDING
  SUBORDINATE OBJECT CLASS "Rec. M.3100":tpPool AND SUBCLASSES;
  NAMED BY SUPERIOR OBJECT CLASS fabricSIF AND SUBCLASSES;
  WITH ATTRIBUTE "Rec. M.3100":tpPoolId;
REGISTERED AS {sIFELMNameBinding 26};

tug3Bidirectional-vc4TTPBidirectionalR1BCR NAME BINDING
  SUBORDINATE OBJECT CLASS "Recommendation G.774:1992":tug3Bidirectional
AND SUBCLASSES;
  NAMED BY SUPERIOR OBJECT CLASS "GR-1042":vc4TTPBidirectionalR1BCR
AND SUBCLASSES;
  WITH ATTRIBUTE "Recommendation G.774:1992":tug3Id;
  BEHAVIOUR
    tug3Bidirectional-vc4TTPBidirectionalR1BCRBehaviour BEHAVIOUR
      DEFINED AS
        "The subordinate managed objects are automatically instantiated when the
        superior managed object is instantiated, according to the make-up and mode
        of operation of the equipment.";;
REGISTERED AS {sIFELMNameBinding 27};

tug3Sink-vc4TTPSinkR1 NAME BINDING
  SUBORDINATE OBJECT CLASS "Recommendation G.774:1992":tug3Sink AND
SUBCLASSES;
  NAMED BY SUPERIOR OBJECT CLASS "GR-1042":vc4TTPSinkR1BCR AND
SUBCLASSES;
  WITH ATTRIBUTE "Recommendation G.774:1992":tug3Id;
  BEHAVIOUR
    tug3Sink-vc4TTPSinkR1BCRBehaviour BEHAVIOUR
      DEFINED AS
        "The subordinate managed objects are automatically instantiated when the
        superior managed object is instantiated, according to the make-up and mode
        of operation of the equipment.";;
REGISTERED AS {sIFELMNameBinding 28};
```

5.7 Parameters

deleteErrorParameter
specificErrorParameter

```
deleteErrorParameter PARAMETER
  CONTEXT SPECIFIC-ERROR;
  WITH SYNTAX SIFneViewMod.DeleteErrorParameter;
  BEHAVIOUR
    deleteErrorParameterBeh BEHAVIOUR
      DEFINED AS
        "If there is a minimum number of instances of the object class that must
        exist within the containing managed object, and the current number of
        instances is equal to that minimum, attempts to delete an instance will
        result in return of a CMIP Processing Failure error where the
        SpecificErrorInfo field is of the form:
```

SpecificErrorInfo ::= SEQUENCE { errorId OBJECT IDENTIFIER, errorInfo ANY DEFINED BY errorId }
The OBJECT IDENTIFIER carried in errorid shall be the value under which this parameter definition is registered. The type carried in errorinfo shall be the type identified by the WITH SYNTAX construct of this parameter definition. The value carried by this type indicates the number of instances of this managed object class that currently exist in the containing managed object.";;
REGISTERED AS {sIFELMParameter 1};

specificErrorParameter PARAMETER
CONTEXT SPECIFIC-ERROR;
WITH SYNTAX SIFneViewMod.ObjectSpecificError;
BEHAVIOUR
specificErrorParameterBeh BEHAVIOUR
DEFINED AS
"If a requested service (e.g., M-CREATE, M-DELETE, M-ACTION, etc.) failed for errors other than those already defined in CMIP-1 (found in ISO/IEC IS 9596-1),
the attempt will result in return of a CMIP Processing Failure error where the SpecificErrorInfo field is of the form:

SpecificErrorInfo ::= SEQUENCE { errorId OBJECT IDENTIFIER, errorInfo ANY DEFINED BY errorId }

The OBJECT IDENTIFIER carried in errorid shall be the value under which this parameter definition is registered. The type carried in errorinfo shall be the type identified by the WITH SYNTAX construct of this parameter definition.
Note: Detailed information on the descriptions of the specific error and the type 'ObjectSpecificError' should be referred to Telcordia Technologies TA-NWT-001014[61].";;
REGISTERED AS {sIFELMParameter 2};

5.8 ASN.1 Production

SIFneViewMod { joint-iso-ccitt recommendation (0) indStd(3) sifne(779) informationModel(1) asn1Modules(2)

asn1DefinedTypesModule(0) }
DEFINITIONS IMPLICIT TAGS ::=
BEGIN
-- EXPORTS everything --
IMPORTS

NameType,
Failed
FROM

```
ASN1DefinedTypesModule {ccitt  recommendation m(13) gnm(3100)
informationModel(0) asn1Modules(2)

asn1DefinedTypesModule(0)}

Date
FROM
SWMF {joint-iso-ccitt ms(9) function(2) part18(18) asn1Module(2) 1}

ManagementExtension,
WeekMask
FROM
Attribute-ASN1Module {joint-iso-ccitt ms(9) smi(3) part2(2) asn1Module(2) 1}

DistinguishedName
FROM
InformationFramework {joint-iso-ccitt ds(5) modules(1) informationFramework(1) 2}

Attribute,
AttributeId,
ObjectInstance
FROM
CMIP-1 {joint-iso-ccitt ms(9) cmip(1) modules(0) protocol(3)}

RangeOfPMCount,
integerZeroDefault
FROM
PM {iso(1) member-body(2) usa(840) ansi-t1-119-02-1998(10056) informationModel(0)
asn1Module(2)}

Ds1FrameFormat, Ds3FrameFormat, IntegerNameType
FROM
BCRTR836Iss1Mod {1 3 17 104 module(9) tr836(3) bCRTR836Iss1Mod(1)};

--supporting productions

sIFELMInformationModel  OBJECT IDENTIFIER ::= {joint-iso-ccitt  recommendation (0)
indStd (3) sifems(778)

informationModel(1) }
sIFELMSpecificExtension OBJECT IDENTIFIER ::= {sIFELMInformationModel
standardSpecificExtension(0)}
sIFELMObjectClass OBJECT IDENTIFIER ::= {sIFELMInformationModel
managedObjectClass(3)}
sIFELMPackage OBJECT IDENTIFIER ::= {sIFELMInformationModel package(4)}
sIFELMAttribute OBJECT IDENTIFIER ::= {sIFELMInformationModel attribute(7)}
sIFELMNameBinding OBJECT IDENTIFIER ::= {sIFELMInformationModel
nameBinding(6)}
sIFELMAction OBJECT IDENTIFIER ::= {sIFELMInformationModel action(9)}
```

```
sIFELMNotification OBJECT IDENTIFIER ::= {sIFELMInformationModel
notification(10)}
sIFELMParameter OBJECT IDENTIFIER ::= {sIFELMInformationModel  parameter(11)}


AccessEntry ::= SEQUENCE {
    locationAllowed          SET OF ChannelId,
    methodOfEntry            ANY -- no format specified yet
    }

AccessTime ::= SEQUENCE {
    timeAllowed          WeekMask, -- day of week and time of day
    dateAllowed          CalendarDate -- e.g. Sept 1st, 1991
    }

AssociatedEntityUnavailable ::= SET OF SEQUENCE {
    name       Name,
    unavailability   Unavailability OPTIONAL}

BridgeRollSIFArg ::= SEQUENCE OF SEQUENCE {
    xc                   ObjectInstance,
    bridgeRollFromTp     ObjectInstance,
    bridgeRollToTp       ObjectInstance,
    bridgeRollOperation  ENUMERATED {
        bridge(0),
        roll(1),
        releaseBridge(2),
        rollAndReleaseBridge(3) },
    additionalInfo SET OF ManagementExtension OPTIONAL
}

BridgeRollSIFReply ::= SEQUENCE OF CHOICE {
    failed                   [0] Failed,
    bridgeRollResult         [1] ObjectInstance
}


CalendarDate ::= SET OF SEQUENCE {
    fromDate          GeneralizedTime ,
    toDate            GeneralizedTime }

ChannelId ::= PrintableString(SIZE(1..100))

ChangePasswordReply ::= CHOICE {
    changePasswordAccept  [0] NULL,
    changePasswordDeny    [1] NULL
    }

DeleteErrorParameter ::= INTEGER -- number of object instances
```

```
DS1FrameFormat ::= CHOICE {
        unframed      NULL,
         framed       Ds1FrameFormat }

DS3FrameFormat ::= CHOICE {
        unframed      NULL,
        framed        Ds3FrameFormat }

EntityName ::= CHOICE {
    knownObjectClass        OBJECT IDENTIFIER,
    knownObjectInstance     ObjectInstance,
    unknownEntity               NULL}

LastLoginLocationId ::= PrintableString(SIZE (1..100))

LastLoginTime ::=  GeneralizedTime

LastLogoutTime ::=  GeneralizedTime

LastUserIdDisabled ::=  GeneralizedTime

LoginExpiration ::=  GeneralizedTime

Name  ::= CHOICE {
    supporting          [0] EntityName,
    supported           [1] EntityName,
    indeterminate       [2] EntityName}

NonUsedPeriod ::= INTEGER -- non-used period in days

NumLastUnsuccessLogin ::= INTEGER -- number of unsuccess login attempts

ObjectSpecificError ::= CHOICE {
    improperCondition           [0] SET OF Attribute,
    corruptedMemoryError        [1] SET OF AttributeId,
    alreadyInCondition          [2] SET OF Attribute,
    associatedEntityUnavailable [3] AssociatedEntityUnavailable,
    errorDescription            [4] PrintableString,
    containingObjectinstance    [5] SET OF ObjectInstance }

PasswordType ::= ENUMERATED {
    user (0),
    supervisor (1) }

PostLoginInfo ::= SEQUENCE {
    preLoginMessage             PreLoginMessage,
    postLoginMessage            PostLoginMessage,
    attributeList               ANY DEFINED BY postLoginMessage,
```

```
                                        -- att. values
    sessionAcceptMessage        ANY DEFINED BY attributeList}
                                        -- att. list

PostLoginMessage ::= SET OF Attribute -- attribute identifiers

PreLoginMessage ::= PrintableString(SIZE(1 .. 1600))
  -- 1600 characters or 20 80-column lines

PrivilegeLevel ::= INTEGER -- lower for higher privilege

ProcessId ::= PrintableString

ProcessIdList ::= SET OF ProcessId

SecurityUserNonUsedPeriodPermitted ::= NonUsedPeriod(45 .. 90)
  -- 40 to 90 days

SessionAcceptInfo ::= SEQUENCE {
    passwordChange          [0] BOOLEAN OPTIONAL,
    postLoginInfo           [1] PostLoginInfo,
    futureExtension         [2] SET OF ManagementExtension OPTIONAL}
    -- future ext.

SessionIdleTime ::= INTEGER -- session idle time in minutes

SessionLocationId ::= PrintableString(SIZE (1 .. 100))

SessionStartTime ::=  GeneralizedTime

SystemAccessControlContextualInformation ::= SET{
  -- objective requirements
  time                  [0] AccessTime OPTIONAL, -- time, day, and date
  entry                 [1] AccessEntry OPTIONAL, -- location and method of entry
  futureExtension       [2] SET OF ManagementExtension OPTIONAL}  -- future

Trace ::= CHOICE {
    null     NULL,
    g-trace     [1] GraphicString,
    i-trace     [2]  INTEGER }

Unavailability ::= CHOICE {
    improperCondition     SET OF Attribute,
    busy                  [1] NULL,  -- unknown entity would not have state
                                     -- to indicate busy
    failure               [2] NULL}

UserId ::= CHOICE {
    localName         [1] PrintableString (SIZE (1..64)),
```

```
    globalName          [2] DistinguishedName}

-- May consider using other status, such as in service and out of ----- service.

UserIdStatus ::= ENUMERATED {
    new (0),            -- new user, may not have meaningful values for
                        -- other attributes.
     active (1),        -- current active
     suspended (2),     -- temporary suspended
     revoked (3) }      -- revoked

UserLoginRequestInfo ::= SEQUENCE {
    requestorId             UserId,                 -- login user ID
    requestorPassword       EXTERNAL ,              -- encrypted password
    futureExtension         SET OF ManagementExtension OPTIONAL}
-- future ext.

UserLoginRequestReply ::= CHOICE {
    sessionDenial               NULL, -- session denial, don't indicate reasons
    sessionAccept           SessionAcceptInfo}

UserLogoutRequestReply ::= SEQUENCE {
    logoutAccept        BOOLEAN,
    futureExtension     SET OF ManagementExtension OPTIONAL}  -- future ext.

UserSessionId ::= PrintableString

VMR ::= BOOLEAN

XbitPolarity ::= ENUMERATED {
    zero (0),
    allOne (1)}

END    -- of SIFneViewMod
```

6 Additional IM for Element-Related Management of Multiple NEs (for future study)

7 Additional IM for EMS Management

7.1 Managed Object Classes

agingControlSIF
managedEms
managementLink

```
agingControlSIF MANAGED OBJECT CLASS
  DERIVED FROM      "Rec. X.721 | ISO/IEC 10165-2 : 1992":top;
```

```
  CHARACTERIZED BY
    agingControlSIFPkg PACKAGE
      BEHAVIOUR
        agingControlSIFBeh BEHAVIOUR
          DEFINED AS
            "The managed object defines the holding time that alarms may be held
            before the NMS is notified. Absence of an Aging control entity that
            satisfies criteria for potential alarms indicates an immediate
            notification.
            Instances of this managed entity are explicitly created and deleted
            by the NMS.";;
      ATTRIBUTES
        agingControlId GET,
        "Rec. X.721 | ISO/IEC 10165-2 : 1992":administrativeState GET-REPLACE,
        "Rec. X.721 | ISO/IEC 10165-2 : 1992":operationalState GET,
        "Rec. X.721 | ISO/IEC 10165-2 : 1992":discriminatorConstruct GET-REPLACE,
        alarmHoldingTime GET-REPLACE,
        shortAlarmCriteria GET-REPLACE,
        clearingHoldingTime GET-REPLACE;
      NOTIFICATIONS
        "Rec. X.721 | ISO/IEC 10165-2 : 1992":attributeValueChange,
        "Rec. X.721 | ISO/IEC 10165-2 : 1992":objectCreation,
        "Rec. X.721 | ISO/IEC 10165-2 : 1992":objectDeletion,
        "Rec. X.721 | ISO/IEC 10165-2 : 1992":stateChange;;;
REGISTERED AS {sIFELMObjectClass 1};

managedEms MANAGED OBJECT CLASS
  DERIVED FROM      " Rec. X.721 | ISO/IEC 10165-2 : 1992":top;
  CHARACTERIZED BY
    emsPkg PACKAGE
      BEHAVIOUR
        emsBeh BEHAVIOUR
          DEFINED AS
            "The managedEms object represent the managed capabilities of an
            element management system. ";;
      ATTRIBUTES
        emsId GET,
        "Rec. X.721 | ISO/IEC 10165-2 : 1992":systemTitle GET-REPLACE,
        "Rec. X.721 | ISO/IEC 10165-2 : 1992":administrativeState GET-REPLACE,
        "Rec. X.721 | ISO/IEC 10165-2 : 1992":operationalState GET,
        "Rec. M.3100: 1995":alarmSeverityAssignmentProfilePointer GET-REPLACE,
        subNetworkTime GET-REPLACE,
        timeOfDayAllowableDrift GET-REPLACE,
        "Rec. M.3100: 1995":version GET,
        "Rec. M.3100: 1995":vendorName GET,
        managedElementList GET-REPLACE ADD-REMOVE;
      ACTIONS
        addNE,
        removeNE;
```

```
      NOTIFICATIONS
        "Rec. X.721 | ISO/IEC 10165-2 : 1992":equipmentAlarm,
        "Rec. X.721 | ISO/IEC 10165-2 : 1992":processingErrorAlarm,
        "Rec. X.721 | ISO/IEC 10165-2 : 1992":attributeValueChange,
        "Rec. X.721 | ISO/IEC 10165-2 : 1992":objectCreation,
        "Rec. X.721 | ISO/IEC 10165-2 : 1992":objectDeletion,
        "Rec. X.721 | ISO/IEC 10165-2 : 1992":stateChange;;;
REGISTERED AS {sIFELMObjectClass 12};

managementLink MANAGED OBJECT CLASS
  DERIVED FROM      " Rec. X.721 | ISO/IEC 10165-2 : 1992":top;
  CHARACTERIZED BY
    managementLinkPkg PACKAGE
      BEHAVIOUR
        managementLinkBeh BEHAVIOUR
          DEFINED AS
            " The Management Link managed entity represents a communication link
            between the EMS and a NE or between two EMS subsystems. An instance
            of this managed entity shall be created automatically by the EMS for
            each communication link.";;
      ATTRIBUTES
        managementLinkId GET,
        managerNodePointer GET,
        agentNodePointer GET,
        "Rec. X.721 | ISO/IEC 10165-2 : 1992":administrativeState GET-REPLACE,
        "Rec. X.721 | ISO/IEC 10165-2 : 1992":operationalState GET,
        flowControl GET-REPLACE ADD-REMOVE,
        watchdogSettings GET-REPLACE,
        "Rec. M.3100: 1995":alarmSeverityAssignmentProfilePointer GET-REPLACE;
      NOTIFICATIONS
        "Rec. X.721 | ISO/IEC 10165-2 : 1992":communicationsAlarm,
        "Rec. X.721 | ISO/IEC 10165-2 : 1992":attributeValueChange,
        "Rec. X.721 | ISO/IEC 10165-2 : 1992":objectCreation,
        "Rec. X.721 | ISO/IEC 10165-2 : 1992":objectDeletion,
        "Rec. X.721 | ISO/IEC 10165-2 : 1992":stateChange;;;
REGISTERED AS {sIFELMObjectClass 13};
```

7.2 Packages

7.3 Attributes

agentNodePointer
agingControlId
alarmHoldingTime
clearingHoldingTime
emsId
flowControl
managedElementList
managementLinkId
managerNodePointer

shortAlarmCriteria
subNetworkTime
timeOfDayAllowableDrift
watchdogSettings

```
agentNodePointer ATTRIBUTE
  WITH ATTRIBUTE SYNTAX    SIFemsMgtMod.NodePointer;
  MATCHES FOR EQUALITY;
  BEHAVIOUR
    agentNodePointerBeh BEHAVIOUR
      DEFINED AS
        " This read-only attribute identifies the Network Element entity or the
        EMS sub-system Name connected to this Management Link entity.";;
REGISTERED AS {sIFELMAttribute 1};

agingControlId ATTRIBUTE
  WITH ATTRIBUTE SYNTAX    SIFneViewMod.NameType;
  MATCHES FOR EQUALITY;
  BEHAVIOUR
    agingControlIdBeh BEHAVIOUR
      DEFINED AS
        "This read-only attribute provides a unique name for the Aging Control
        entity within the EMS entity. ";;
REGISTERED AS {sIFELMAttribute 2};

alarmHoldingTime ATTRIBUTE
  WITH ATTRIBUTE SYNTAX    SIFemsMgtMod.AlarmHoldingTime;
  MATCHES FOR EQUALITY;
  BEHAVIOUR
    alarmHoldingTimeBeh BEHAVIOUR
      DEFINED AS
        "This read-write attribute provides the holding time value for active
        alarms. ";;
REGISTERED AS {sIFELMAttribute 3};

clearingHoldingTime ATTRIBUTE
  WITH ATTRIBUTE SYNTAX    SIFemsMgtMod.ClearingHoldingTime;
  MATCHES FOR EQUALITY;
  BEHAVIOUR
    clearingHoldingTimeBeh BEHAVIOUR
      DEFINED AS
        "This read-write attribute provides the holding time value for clearing
        alarms. Alarms are cleared if remained cleared for the duration of the
        value in the Clearing Holding Time attribute. If the cleared alarm is
        activated before reaching the clearing holding time the alarm remains in
        the active state. ";;
REGISTERED AS {sIFELMAttribute 5};

emsId ATTRIBUTE
```

```
  WITH ATTRIBUTE SYNTAX    SIFneViewMod.NameType;
  MATCHES FOR EQUALITY;
  BEHAVIOUR
    emsIdBeh BEHAVIOUR
      DEFINED AS
        "This read-only attribute provides a unique name for the EMS entity.";;
REGISTERED AS {sIFELMAttribute 8};

flowControl ATTRIBUTE
  WITH ATTRIBUTE SYNTAX    SIFemsMgtMod.FlowControl;
  MATCHES FOR EQUALITY;
  BEHAVIOUR
    flowControlBeh BEHAVIOUR
      DEFINED AS
        " This read-write attribute is used to administratively activate or
        diactivate NE notifications of alarms, TCAs, and the collections of
        Intermediate Path PM data.";;
REGISTERED AS {sIFELMAttribute 11};

managedElementList ATTRIBUTE
  WITH ATTRIBUTE SYNTAX    SIFemsMgtMod.ManagedElementList;
  MATCHES FOR EQUALITY;
  BEHAVIOUR
    managedElementListListBeh BEHAVIOUR
      DEFINED AS
        " This attribute contains a list of the names of the managed elements that
        this EMS manages.";;
REGISTERED AS {sIFELMAttribute 20};

managementLinkId ATTRIBUTE
  WITH ATTRIBUTE SYNTAX    SIFneViewMod.NameType;
  MATCHES FOR EQUALITY;
  BEHAVIOUR
    managementLinkIdBeh BEHAVIOUR
      DEFINED AS
        " This read-only attribute provides a unique name for Management Link
        entity within an instance of the EMS entity.";;
REGISTERED AS {sIFELMAttribute 21};

managerNodePointer ATTRIBUTE
  WITH ATTRIBUTE SYNTAX    SIFemsMgtMod.NodePointer;
  MATCHES FOR EQUALITY;
  BEHAVIOUR
    managerNodePointerBeh BEHAVIOUR
      DEFINED AS
        " This read-only attribute identifies the EMS entity or the EMS sub-system
        name connected to this Management Link entity.";;
REGISTERED AS {sIFELMAttribute 22};
```

```
shortAlarmCriteria ATTRIBUTE
  WITH ATTRIBUTE SYNTAX    SIFemsMgtMod.ShortAlarmCriteria;
  MATCHES FOR EQUALITY;
  BEHAVIOUR
    shortAlarmCriteriaBeh BEHAVIOUR
      DEFINED AS
        "This read-write attribute provides duration and count criteria that
        applies to potential alarms. Alarms that are cleared before reaching the
        alarm holding time are counted, if N such alarms occur in T interval
        (sliding window) notification is declared. Note that each alarm shall have
        its own counter. ";;
REGISTERED AS {sIFELMAttribute 28};

subNetworkTime ATTRIBUTE
  WITH ATTRIBUTE SYNTAX    SIFemsMgtMod.SubNetworkTime;
  MATCHES FOR EQUALITY;
  BEHAVIOUR
    subNetworkTimeBeh BEHAVIOUR
      DEFINED AS
        "This read-write attribute is used to set the administrative clock of the
        Network Element entities managed by the EMS. When this attribute is
        modified by the NMS, the time-of-day of all Network Elements instances
        controlled of the EMS are synchronized with this value.";;
REGISTERED AS {sIFELMAttribute 29};

timeOfDayAllowableDrift ATTRIBUTE
  WITH ATTRIBUTE SYNTAX    SIFemsMgtMod.TimeOfDayAllowableDrift;
  MATCHES FOR EQUALITY;
  BEHAVIOUR
    timeOfDayAllowableDriftBeh BEHAVIOUR
      DEFINED AS
        "This read-write attribute specifies the maximum acceptable time that the
        EMS synchronized the NEs with its own time of day clock (Sub-network Time
        attribute). The default value shall be set to 30 seconds. The minimum
        allowable drift shall be 10 seconds.";;
REGISTERED AS {sIFELMAttribute 31};

watchdogSettings ATTRIBUTE
  WITH ATTRIBUTE SYNTAX    SIFemsMgtMod.WatchdogSettings;
  MATCHES FOR EQUALITY;
  BEHAVIOUR
    watchdogSettingsBeh BEHAVIOUR
      DEFINED AS
        " This read-write attribute identifies provisional settings that enable
        the EMS to ensure that the NE is communicating with the EMS:
        -The frequency that the EMS shall issue check messages, shall have default
        value of 5 minutes.
        -The duration that the EMS shall wait for response before declaring that
        the link is down, shall have default value of 10 seconds.
```

-The number of retries the EMS shall attempt before issuing an alarm, shall have default value of one.";;
REGISTERED AS {sIFELMAttribute 35};

7.4 Notifications

7.5 Actions

addNE
removeNE

```
addNE ACTION
  BEHAVIOUR
    addNEBeh BEHAVIOUR
      DEFINED AS
        "This action is used to informed the EMS that a new NE was installed. The
        following input parameters are included in the Action request.
        - NE Name - Controller Name - IP address";;
  MODE CONFIRMED;
  WITH INFORMATION SYNTAX SIFemsMgtMod.AddNEInformation;
  WITH REPLY SYNTAX SIFemsMgtMod.AddNEResult;
REGISTERED AS {sIFELMAction 1};

removeNE ACTION
  BEHAVIOUR
    removeNEBeh BEHAVIOUR
      DEFINED AS
        "This action is used to informed the EMS to remove an NE from operation.
        All objects related to this NE are deleted. The following input parameters
        are included in the Action request. - NE Identification";;
  MODE CONFIRMED;
  WITH INFORMATION SYNTAX SIFemsMgtMod.RemoveNEInformation;
  WITH REPLY SYNTAX SIFemsMgtMod.RemoveNEResult;
REGISTERED AS {sIFELMAction 2};
```

7.6 Name Bindings

agingControlSIF-managedEms
alarmSeverityAssignmentProfile-managedEms
enhancedCurrentAlarmSummaryControl-managedEms
eventForwardingDiscriminator-managedEms
log-managedEms
managedElement-managedEms
managementLink-managedEms
simpleScanner-managedEms
thresholdData-managedEms

```
agingControlSIF-managedEms NAME BINDING
  SUBORDINATE OBJECT CLASS agingControlSIF;
  NAMED BY SUPERIOR OBJECT CLASS managedEms AND SUBCLASSES;
```

```
  WITH ATTRIBUTE agingControlId;
  CREATE;
  DELETE ;
REGISTERED AS {sIFELMNameBinding 1};

alarmSeverityAssignmentProfile-managedEms NAME BINDING
  SUBORDINATE OBJECT CLASS "Rec. M.3100:
1995":alarmSeverityAssignmentProfile;
  NAMED BY SUPERIOR OBJECT CLASS managedEms AND SUBCLASSES;
  WITH ATTRIBUTE "Rec. M.3100: 1995":alarmSeverityAssignmentProfileId;
  CREATE;
  DELETE ;
REGISTERED AS {sIFELMNameBinding 2};

enhancedCurrentAlarmSummaryControl-managedEms NAME BINDING
  SUBORDINATE OBJECT CLASS "T1.264":enhancedCurrentAlarmSummaryControl;
  NAMED BY SUPERIOR OBJECT CLASS managedEms AND SUBCLASSES;
  WITH ATTRIBUTE "T1.264":enhancedCurrentAlarmSummaryControlId;
REGISTERED AS {sIFELMNameBinding 7};

eventForwardingDiscriminator-managedEms NAME BINDING
  SUBORDINATE OBJECT CLASS "Rec. X.721 | ISO/IEC 10165-2 :
1992":eventForwardingDiscriminator;
  NAMED BY SUPERIOR OBJECT CLASS managedEms AND SUBCLASSES;
  WITH ATTRIBUTE "Rec. X.721 | ISO/IEC 10165-2 : 1992":discriminatorId;
  CREATE;
  DELETE ;
REGISTERED AS {sIFELMNameBinding 8};

log-managedEms NAME BINDING
  SUBORDINATE OBJECT CLASS "Rec. X.721 | ISO/IEC 10165-2 : 1992":log;
  NAMED BY SUPERIOR OBJECT CLASS managedEms AND SUBCLASSES;
  WITH ATTRIBUTE "Rec. X.721 | ISO/IEC 10165-2 : 1992":logId;
  CREATE;
  DELETE ONLY-IF-NO-CONTAINED-OBJECTS;
REGISTERED AS {sIFELMNameBinding 10};

managedElement-managedEms NAME BINDING
  SUBORDINATE OBJECT CLASS "Rec. M.3100: 1995":managedElement AND
SUBCLASSES;
  NAMED BY SUPERIOR OBJECT CLASS managedEms AND SUBCLASSES;
  WITH ATTRIBUTE "Rec. M.3100: 1995":managedElementId;
REGISTERED AS {sIFELMNameBinding 11};

managementLink-managedEms NAME BINDING
  SUBORDINATE OBJECT CLASS managementLink;
  NAMED BY SUPERIOR OBJECT CLASS managedEms AND SUBCLASSES;
  WITH ATTRIBUTE managementLinkId;
REGISTERED AS {sIFELMNameBinding 12};
```

```
simpleScanner-managedEms NAME BINDING
  SUBORDINATE OBJECT CLASS "Recommendation X.738: 1993":simpleScanner;
  NAMED BY SUPERIOR OBJECT CLASS managedEms AND SUBCLASSES;
  WITH ATTRIBUTE "Rec. X.739 | ISO/IEC 10164-11 : 1993":scannerId;
  CREATE;
  DELETE ;
REGISTERED AS {sIFELMNameBinding 23};

thresholdData-managedEms NAME BINDING
  SUBORDINATE OBJECT CLASS "Rec. Q.822: 1994":thresholdData;
  NAMED BY SUPERIOR OBJECT CLASS managedEms AND SUBCLASSES;
  WITH ATTRIBUTE "Rec. Q.822: 1994":thresholdDataId;
  CREATE;
  DELETE ;
REGISTERED AS {sIFELMNameBinding 25};
```

7.7 Parameters

7.8 ASN.1 Production

```
SIFemsMgtMod { joint-iso-ccitt recommendation (0) indStd(3) sifems(778)
informationModel(1) asn1Modules(2)

asn1DefinedTypesModule(0) }
DEFINITIONS IMPLICIT TAGS ::=
BEGIN
--  EXPORTS everything  --
IMPORTS

NameType,
ProblemCause
FROM
ASN1DefinedTypesModule {ccitt  recommendation m(13) gnm(3100)
informationModel(0) asn1Modules(2)

asn1DefinedTypesModule(0)}

ObjectInstance
FROM
CMIP-1 {joint-iso-ccitt ms(9) cmip(1) modules(0) protocol(3)};

AddNEInformation ::= SEQUENCE {
    addNE               NewNE,
    managedEntityName [0] ManagedEntityName OPTIONAL,
    controllerName    [1] ControllerName    OPTIONAL,
    ipAddress         [2] IpAddress         OPTIONAL}

AddNEResult ::= CHOICE {
    failed          Failed,
```

```
    completed      ObjectInstance}
-- managedElement (and subclasses) of the NE

AlarmHoldingTime ::= INTEGER          -- in seconds

ClearingHoldingTime ::= INTEGER       -- in seconds

ControllerName ::= GraphicString

Failed ::= ProblemCause

FlowControl ::= SET OF CHOICE {
        normal          [0] NULL,
        offAlarms       [1] NULL,
        offTCAs         [2] NULL,
        offIPPM         [3] NULL}

HitsCount ::= INTEGER

IpAddress ::= GraphicString

ManagedElementName ::= GraphicString

ManagedElementList ::= SET OF ManagedElementName

ManagedEntityName ::= GraphicString

NewNE ::= GraphicString

NodePointer ::= CHOICE {
        nodeInstance        ObjectInstance,
                --  managedElement (and subcalasses) or EMS.
        nodeName            GraphicString}

RemoveNEInformation ::= SEQUENCE {
    ne      ObjectInstance}
                -- managedElement (and subclasses) of the NE

RemoveNEResult ::= CHOICE {
    failed      Failed,
    completed ObjectInstance}
                -- managedElement (and subclasses) of the NE

ShortAlarmCriteria ::= SEQUENCE {
    windowTime  WindowTime,
    hitsCount   HitsCount}

SubNetworkTime ::= GeneralizedTime
```

```
TimeOfDayAllowableDrift ::= INTEGER       -- Seconds

WatchdogAttempts ::= INTEGER

WatchdogSettings ::= SEQUENCE {
    watchdogAttempts    WatchdogAttempts,
    watchdogWaitTime    WatchdogWaitTime,
    watchdogRetries     WatchdogRetries}

WatchdogWaitTime ::= INTEGER                -- in seconds

WatchdogRetries ::= INTEGER

WindowTime ::= INTEGER        -- in seconds

END    -- of SIFemsMgtMod
```

8 Additional IM for EMS Management of Existing Equipment

8.1 Managed Objects

ds3CTPBidirectionalSIF
ds3CTPSinkSIF

```
ds3CTPBidirectionalSIF MANAGED OBJECT CLASS
  DERIVED FROM
    "GR-836":ds3CTPSource,
    ds3CTPSinkSIF;
REGISTERED AS {sIFELMObjectClass 39};

ds3CTPSinkSIF MANAGED OBJECT CLASS
  DERIVED FROM      "GR-836":ds3CTPSink;
  CHARACTERIZED BY
    ds3CTPSinkSIFPkg PACKAGE
      BEHAVIOUR
        ds3CTPSinkSIFBeh BEHAVIOUR
          DEFINED AS
            "This object class adds the ability to specify, at a connection
            termination point, how the received DS-3 signal is formatted. This
            information is needed if performance monitoring is being performed
            at the connection termination point.";;
      ATTRIBUTES
        "GR-836":ds3FrameFormat GET-REPLACE,
        vmr GET-REPLACE,
        xbitPolarity GET-REPLACE;;;
REGISTERED AS {sIFELMObjectClass 9};
```

8.2 Packages

8.3 Attributes

vmr
xbitPolarity

```
vmr ATTRIBUTE
  WITH ATTRIBUTE SYNTAX    SIFexistingNEMod.VMR;
  MATCHES FOR EQUALITY;
  BEHAVIOUR
    vmrBeh BEHAVIOUR
      DEFINED AS
        " This read-write attribute controls the capabilities of removing parity
        errors and DS3 framing errors by inserting valid parity and frame. This
        Boolean attribute indicates 'TRUE' VMR is on or 'FALSE' VMR is off (no
        removal). The default value shall be FALSE.";;
REGISTERED AS {sIFELMAttribute 34};

xbitPolarity ATTRIBUTE
  WITH ATTRIBUTE SYNTAX    SIFexistingNEMod.XbitPolarity;
  MATCHES FOR EQUALITY;
  BEHAVIOUR
    xbitPolarityBeh BEHAVIOUR
      DEFINED AS
        " This read-write attribute identifies the polarity of the X-bits of the
        DS3 framing when an RAI is declared. The default value shall be set to
        '1'.";;
REGISTERED AS {sIFELMAttribute 36};
```

8.4 Notifications

8.5 Actions

8.6 Name Bindings

8.7 Parameters

8.8 ASN.1 Production

```
SIFexistingNEMod {joint-iso-ccitt recommendation(0) indStd(3) sifExistingNe(780)
informationModel(1) asn1Modules(2)

asn1DefinedTypesModule(0)}
DEFINITIONS IMPLICIT TAGS ::=
BEGIN
--  EXPORTS everything  --
-- nothing imported to this module

--supporting productions
```

```
VMR ::= BOOLEAN

XbitPolarity ::= ENUMERATED {
    zero        (0),
    allOne      (1)}

END    -- of SIFexistingNEMod
```

9 Additional IM for EMS/NE Interface (for Future Study)

10 Information Model Usage Guidelines

In general, there should only be one way to implement a function in the NE View aspect. However, an implementation may not need to support all functionality in the model (e.g. there should only be one way to populate a squelch table but an implementation may not have to allow a management entity to populate a squelch table if the NE is capable of auto-discovery). In certain instances it may be necessary to support multiple ways to implement a function due to legacy systems; however, multiple implementations should be strongly discouraged and only agreed to on a case-by-case basis.

10.1 Software Management

Software management requirements are provided in Section 2.5.2. Given these requirements, the CMISE actions that we have for software management are:

Action	Standard	Object Class
restore	X.744	softwareUnit
install	X.744	softwareUnit
executeProgram	X.744	executableSoftware
revert	X.744	softwareUnit
backup	X.744	softwareUnit

Given the function definitions also provide Section 2.5.2 above, the question is “how do these functions relate to each of the various available CMISE actions?” The appropriate mapping of functions to CMIP actions is:

- Download - restore action (inLine choice) + validate action (if necessary)
- Copy - restore action (localObject or offLine choice) + validate action (if necessary)
- Install - install action
- Set Reset Pointer - we agree that the reset pointer should be an attribute of a system wide object and should be conditional "if an object instance supports it." The managedElement is a candidate for the system wide object.
- Remote Reset - executeProgram action
- Execute - executeProgram action
- Revert - executeProgram action - see below (2)
- Backup - backup action (localObject, inLine, or offLine)
- Restore - restore action (localObject, inLine, or offLine)
- Software Data Query - M-GET of appropriate attributes

Note that in some implementations, the Install and Execute functions are combined; in that case, the install action is a null operation, and the executeProgram action performs both the Install and Execute functions. The NE could either return "success" when the install action is requested, or it could simply not support the install action (although SIF may want to standardize on one or the other).

Standard processes for version upgrade, reversion to an old version, backup of data, and restoration of backed up data are necessary. The processes are:

Upgrade:

Download or copy

Install
Execute

Reversion:
Download or copy (if necessary)
Install (if necessary)
Execute

Backup:
Backup

Restore:
Restore

10.2 Storing Commands in the securityAuditTrailRecord

10.2.1 Introduction

The securityAuditTrailRecord is an event log record that is used to record commands issued by a user of the Craft Interface (CIT) or an EMS that are directed towards an NE or by an NMS directed toward an EMS. An instance of the securityAuditTrailRecord is created on the NE or EMS for each command issued by a user and received by the NE or EMS on all external interfaces, regardless of the protocol used on the external interface. Thus, the securityAuditTrailRecord has to store TL1 command information, or command information from proprietary interface languages, in addition to commands received over the CMISE interface. The CMISE interface on an NE or EMS that is storing command activity in the securityAuditTrailRecord has to receive internal notifications of the command activity on all other interfaces. Proprietary command languages may be used internally in an NE or EMS and may represent the format and syntax of command information included in the internal command activity notification received by CMISE, even when the external interface used may be TL1.

The following sections describe

1. The type of information that needs to be stored in the securityAuditTrailRecord for non-CMISE command activity, and
2. The format and structure of how this information is stored in the securityAuditTrailRecord.

10.2.2 Information to be stored in the securityAuditTrailRecord

The information to be stored in the securityAuditTrailRecord for user commands received from non-CMISE interfaces include:

1. User Login ID
2. Managed Entity – for TL1 commands, this is the NE TID
3. Entity within the NE to which the command is directed – For TL1 commands, this is the AID
4. Command Name – e.g., the name of the TL1 command
5. Command Text – the remaining command text as reported in the internal command activity notification
6. Command Result – success or failure of the command.
7. Logging Time – The time at which the record was entered into the log.

Since the purpose of the securityAuditTrailRecord is to track user requests and not system activity, the command response to the user request is usually not stored in the this record, although it could be.

Generally, response information is not needed for security purposes, and it is undesirable to store such data since the response could be extensive, especially where a user has requested system wide data, such as for example, a list of all cross-connects.

10.2.3 The securityAuditTrailRecord Managed Object Class

Source: "Recommendation X.740:1992"

Super Classes:
X.721:eventLogRecord
X.721:logRecord
X.721:top

Packages		Attributes	Syntax
Mandatory Packages			
topPackage		nameBinding	
		objectClass	
eventLogRecordPackage		managedObjectClass	(not used)
		managedObjectInstance	(not used)
		eventType	EventTypeId ::= CHOICE { globalForm [6] IMPLICIT OBJECT IDENTIFIER , localForm [7] IMPLICIT INTEGER }
logRecordPackage		logRecordId	
		loggingTime	GeneralizedTime
Conditional Packages	**Include**		
packagesPackage	Yes	packages	
additionalInformationPackage	Yes	additionalInformation	SET OF ManagementExtension
additionalTextPackage	Yes	additionalText	GraphicString
serviceReportCausePackage	Yes	serviceReportCause	OBJECT IDENTIFIER
allomorphicPackage	No	allomorphs	
correlatedNotificationsPackage	No	correlatedNotifications	
eventTimePackage	No	eventTime	
notificationIdentifierPackage	No	notificationIdentifier	

The serviceReportCause attribute indicates the event that caused the log entry. For user commands for received from non-CMISE interfaces, the serviceReportCause is serviceRequest (ServiceReportCause ::= {serviceReportCause 1}).

For the eventType attribute, SIF will need to create and register a new object identifier "nonCMISEUserRequest" (eventType ::= {eventType xx})

The user login ID should be captured in the additionalInformation attribute, with the OBJECT IDENTIFIER set to the OID of the securityUser_SIF object instance for the specific user. It is assumed here that all users are represented by instances of the securityUser_SIF MOC, regardless of the interface through which they access the NE.

All of the remaining required information should be stored in the additionalText attribute. It is recommended that the syntax be of the form of fields defined by quotes, separated by commas. Specifically,

for TL1 commands, the syntax should be “[TL1 command line text]”,”[Result]”, where [Result] may have the values, “success” or “deny”. For non-TL1 commands, the syntax should be “[Command]”, “[TID]”, “[AID]”, “[Command Text]”, “[Result]”. That is, for non-TL1 commands, the information should be stored is the same order as in the standard TL1 command format. If responses to user requests are also included, a “[Response]” field should be added to the additionalText attribute.

The attributes, managedObjectClass and managedObjectInstance are generally used to record the CMISE objects and instances to which the command is directed. However, with commands coming in via TL1 or some other internal command language, it’s probably too difficult (and not worth the effort) to try to match the command or the AID to specific CMISE MOI. Thus, these attributes are not used.

10.3 Security Audit

The securityAuditTrailRecord is used to log security audit trail notifications such as the serviceReport and usageReport notification defined in X.740. Useful TL1 information such as commands issued, command results, login ID of the user entering the command, and identification of the network element processing the command may be stored in the additionalText and additionalInformation fields of securityAuditTrailRecord.

10.4 European PDH Signals

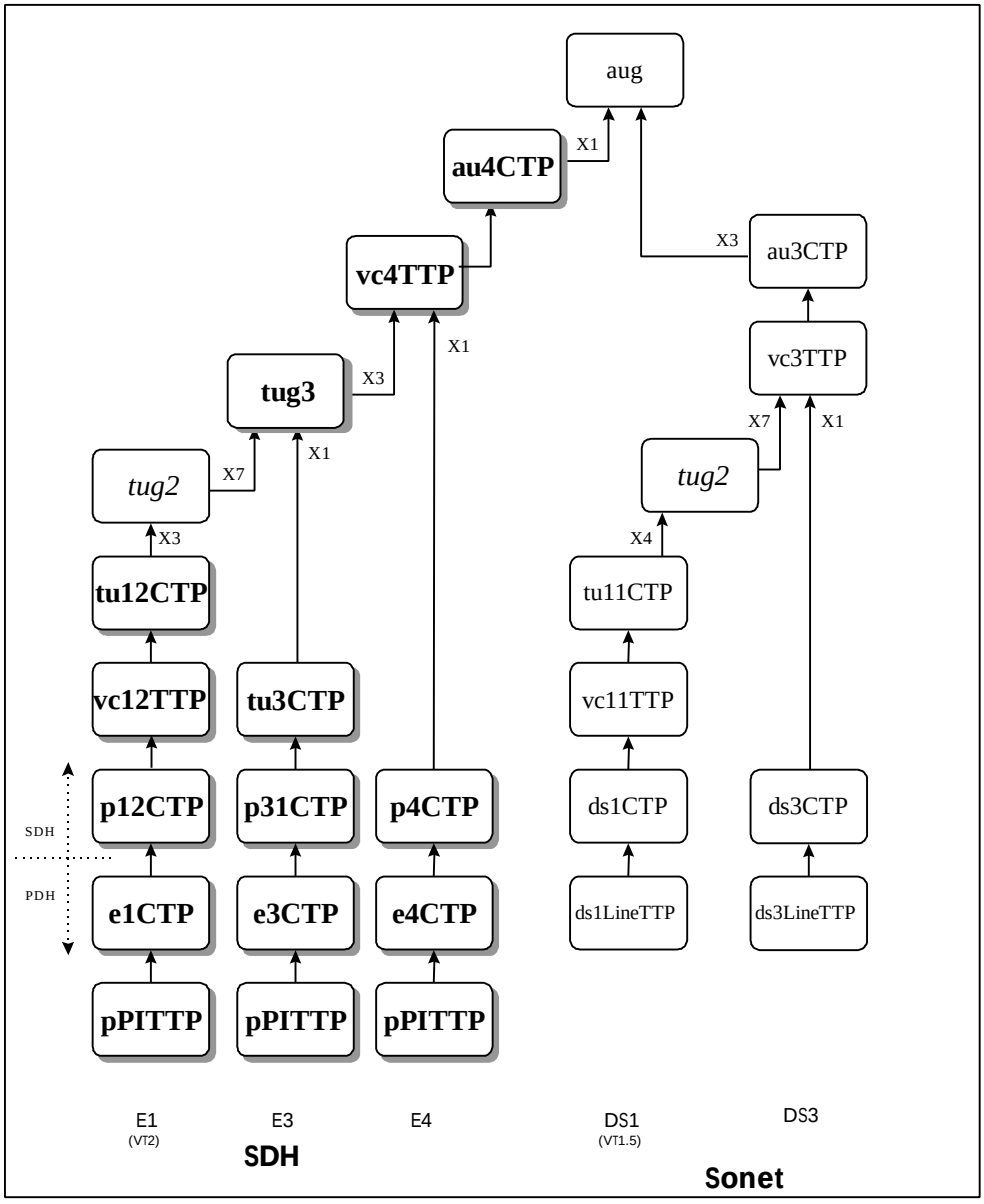

Figure 10-1 PDH, SDH and SONET Object Classes

11 Appendix A: Areas to be covered in future issues of this Document

11.1 Equipment Protection

Study Group 4 of ITU-T has been working IM objects to support equipment protection but is still developing a solution. Its solution will be published in addendum 2 of M.3100 which will not go to determination until sometime in 1999. Section 2.9 of SIF-IM-9804-067R5 also covers some of the issues involved in this topic.

11.2 DCS for interconnected BLSRs

Further modeling is needed to allow DCSs supporting multiple BLSRs to provide same-side interconnection.

11.3 Synchronization (Reference Timing)

11.4 Aspects of Security

Administration of user security is currently not addressed in this model. It is assumed that the security administration functions are currently done through a different interface. The userPassword and userSession objects are included here to preserve our current thinking.

userPasswordSIF	SIF	R2-1,R2-4,R2-11, 2.3.3#1, 2.6.4#7,8
userSessionSIF	SIF	R2-1,R2-4,R2-11, 2.3.3#1, 2.6.1#2, 2.6.4#4,5,6

userPasswordSIF	userPasswordSIF-securityUserSIF	SIF
userSessionSIF	userSessionSIF -securityUserSIF	SIF

11.4.1 userPasswordSIF

```
userPasswordSIF MANAGED OBJECT CLASS
DERIVED FROM "Rec. X.721 | ISO/IEC 10165-2":top;
   CHARACTERIZED BY
      userPasswordSIFPkg PACKAGE
         BEHAVIOUR
            userPasswordSIFBeh BEHAVIOUR
               DEFINED AS
                  "The userPasswordSIF object class is a class of managed
                  support objects which represents password authentication
                  information associated with a user. The user's password,
                  expiration, and type may only be changed, but not
                  retrieved, using the changePassword or
                  supervisorSetPassword action in order to ensure security
                  protection.

                  The passwordExpiration attribute is used to set
                  expiration dates. Password type is used to distinguish
                  between different password types (either user or
                  supervisor).
```

```
                    The userPasswordId attribute is used strictly for naming;
                    since there can be only one userPasswordSIF object per
                    securityUser, this attribute carries no information and
                    therefore it always has the value NULL.";;
            ATTRIBUTES
               userPasswordId GET,
               lastPasswordChange GET,
               passwordExpiration GET,
               passwordType GET;
            ACTIONS
               changePassword,
               supervisorSetPassword;;;
   REGISTERED AS { xxxx securityUserSIF()};
```

11.4.2 userSessionSIF

```
   userSessionSIF MANAGED OBJECT CLASS
   DERIVED FROM "Rec. X.721 | ISO/IEC 10165-2":top;
      CHARACTERIZED BY userSessionSIFPkg PACKAGE
         BEHAVIOUR userSessionSIFBeh;
         ATTRIBUTES
            userSessionId
                 GET,
            sessionLocationId
                 GET,
            sessionStartTime
                 GET,
            processIdList
                 GET,
            sessionIdleTime
                 GET;
         NOTIFICATIONS
            "Rec. X.721 | ISO/IEC 10165-2":objectCreation,
            "Rec. X.721 | ISO/IEC 10165-2":objectDeletion,
            sessionIdleTimeout,
            "Rec. X.721 | ISO/IEC 10165-2":
               securityServiceOrMechanismViolation,
            "Rec. X.721 | ISO/IEC 10165-2":integrityViolation,
            "Rec. X.721 | ISO/IEC 10165-2":operationalViolation,
            "Rec. X.721 | ISO/IEC 10165-2":timeDomainViolation;;;
   REGISTERED AS {xxx userSessionSIF()};

   userSessionSIFBeh BEHAVIOUR
      DEFINED AS
         " The user session object class is a class of managed support objects
         which represents a user login session. The existence of an instance
         of this object class indicates that a user is currently logged in to
         the managed system or its associated support entity. One instance of
         this object class is created by the managed system when a user login
         request is accepted. This instance shall exist at all times during
         the user session. This instance is deleted by the managed system as a
         result of either user session idle time out or a successful user
         logout request action. At the creation of an instance of this object
         class, the sessionLocationId attribute shall be set to reflect the
         current session location (the current channel or port), the
         sessionStartTime attribute shall be set to reflect the starting time
         of this session, the processIdList attribute shall be set to reflect
         initial processes, if any, and the sessionIdleTime attribute shall be
         set to 0. When a CMIS M-GET service is used to retrieve the value of
         the attribute processIdList, such a value should reflect the list of
```

```
processes at the time that the M-GET service is executed. When the
sessionIdleTime attribute value is equal to the idleTimeOutPeriod
attribute value in securityChannel object class, the
sessionIdleTimeout notification is emitted. The emitting of this
notification can result in the immediate termination of the user
session or a warning to the user followed by the termination of the
session after a specified period of time if the user session still
remains idle. Information contained in this object class is used to
support session control functions. ";
```

11.4.3 passwordExpiration

```
passwordExpiration ATTRIBUTE
   WITH ATTRIBUTE SYNTAX SIFneViewMod.Date;
   MATCHES FOR EQUALITY;
   BEHAVIOUR
      passwordExpirationBehavior BEHAVIOUR
      DEFINED AS
          “This attribute indicates the date upon which the password
          will be considered invalid. Valid values for this attribute
          are ASN.1 GeneralizedTime, or NULL if no expiration is
          defined”;;
REGISTERED AS {xxx};
```

11.4.4 passwordType

```
passwordType ATTRIBUTE
   WITH ATTRIBUTE SYNTAX SIFneViewMod.PasswordType;
   MATCHES FOR EQUALITY;
   BEHAVIOUR
      passwordTypeBehavior BEHAVIOUR
         DEFINED AS
           “???”;;
REGISTERED AS {xxxxx};
```

11.4.5 processIdList

```
processIdList ATTRIBUTE
   WITH ATTRIBUTE SYNTAX SIFneViewMod.ProcessIdList;
   MATCHES FOR EQUALITY, SET-COMPARISON, SET-INTERSECTION;
   BEHAVIOUR processIdListBeh;
REGISTERED AS {xxxxxx};

processIdListBeh BEHAVIOUR
   DEFINED AS
" This attribute provides a list of user process information that
currently exists. When a process is invoked by a user, its
information should be added to this list until it is terminated, even
if the interim state, such as a suspended state, of the process may
not be an active state. ";
```

11.4.6 Session idle time

```
sessionIdleTime ATTRIBUTE
   WITH ATTRIBUTE SYNTAX SIFneViewMod.SessionIdleTime;
   MATCHES FOR EQUALITY, ORDERING;
   BEHAVIOUR sessionIdleTimeBeh;
REGISTERED AS {xxx sessionIdleTime()};

sessionIdleTimeBeh BEHAVIOUR
   DEFINED AS
```

```
      " This attribute indicates the time length in minutes that the user
      session remains idle. A session idle is defined as no activity taking
      place by a user at a specific channel, even though there may be user
      processes running. This attribute is used, in conjunction with the
      attribute IdleTimeOutPeriod in the Security Channel object class, to
      determine when a user session will be terminated by the managed
      system. ";
```

11.4.7 Session location ID

```
sessionLocationId ATTRIBUTE
   WITH ATTRIBUTE SYNTAX SIFneViewMod.SessionLocationId;
   MATCHES FOR EQUALITY, SUBSTRINGS;
   BEHAVIOUR sessionLocationIdBeh;
REGISTERED AS {xxx sessionLocationId()};

sessionLocationIdBeh BEHAVIOUR
   DEFINED AS
      " This attribute indicates the login location of the current login
      session of the user. Typically, this is a port or a channel. The
      value of this attribute can take on the type of a printable string.
      ";
```

11.4.8 Session start time

```
sessionStartTime ATTRIBUTE
   WITH ATTRIBUTE SYNTAX SIFneViewMod.SessionStartTime;
   MATCHES FOR EQUALITY;
   BEHAVIOUR sessionStartTimeBeh;
REGISTERED AS {xxx sessionStartTime()};

sessionStartTimeBeh BEHAVIOUR
   DEFINED AS
      " This attribute indicates the starting time and date of the current
      user session. The value of this attribute should be the time and date
      when the userLoginRequest action is granted by the managed system.
      The value of this attribute will also be used to update the attribute
      lastLoginTime in the Security User object instance of the same user.
      ";
```

11.4.9 userPasswordId

```
userPasswordId ATTRIBUTE
   WITH ATTRIBUTE SYNTAX SIFneViewMod.UserPasswordId;
   MATCHES FOR EQUALITY;
   BEHAVIOUR userPasswordIdBeh;
REGISTERED AS {xxxx()};

userPasswordIdBeh BEHAVIOUR
   DEFINED AS
      " This attribute is used for name binding. ";
```

11.4.10 userSessionId

```
  userSessionId ATTRIBUTE
     WITH ATTRIBUTE SYNTAX SIFneViewMod.UserSessionId;
     MATCHES FOR EQUALITY;
     BEHAVIOUR userSessionIdBeh;
  REGISTERED AS {xx userSessionId()};

  userSessionIdBeh BEHAVIOUR
   DEFINED AS
```

```
      " This attribute is used to uniquely identify a current user session
      (or the RDN for the userSession object instance). ";
```

11.4.11 sessionIdleTimeout

```
sessionIdleTimeout NOTIFICATION
   BEHAVIOUR sessionIdleTimeoutBeh;
REGISTERED AS {xxxxxx};

sessionIdleTimeoutBeh BEHAVIOUR
   DEFINED AS
      " This notification is generated when a user session at a specific
      channel remains idle for a period of time specified in attribute
      idleTimeOutPeriod of the security channel managed object instance.
      This notification is served as a warning to the user that the session
      will be terminated by the managed system. ";
```

11.4.12 changePassword

```
changePassword ACTION
   BEHAVIOUR
      changePasswordBeh;
   PARAMETERS
      oldPassword,
      newPassword;
   WITH REPLY SYNTAX SIFneViewMod.ChangePasswordReply;
REGISTERED AS {aaaaa};

changePasswordBeh BEHAVIOUR
   DEFINED AS
      “This action provides the old password along with the new password
      for a request to change the user password. For the user password to
      be changed, the value of the old password has to match the value of
      the current userPassword.  If they don't match, the action is
      denied.";
```

11.4.13 supervisorSetPassword

```
   supervisorSetPassword ACTION
      BEHAVIOUR
         supervisorSetPasswordBeh;
      WITH INFORMATION SYNTAX
         SIFneViewMod.SupervisorSetPasswordInfo;
      WITH REPLY SYNTAX SIFneViewMod.SupervisorSetPasswordReply;
   REGISTERED AS {aaaaa};

   supervisorSetPasswordBeh BEHAVIOUR
      DEFINED AS
         "This action provides the supervisory level password along with
         the new password for a request to the user’s password, user ID
         status, privilegeLevel, or login expiration. For the request to be
         honored the value of the supervisory level password has to be
         varified. If they don't match, the action is denied.";
```

11.4.14 userPasswordSIF-securityUserSIF

```
   userPasswordSIF-securityUserSIF NAME BINDING
      SUBORDINATE OBJECT CLASS
         userPasswordSIF AND SUBCLASSES;
      NAMED BY SUPERIOR OBJECT CLASS securityUserSIF AND SUBCLASSES;
      WITH ATTRIBUTE userPasswordId;
```

```
   BEHAVIOUR userPasswordSIF-securityUserSIFBeh;
   CREATE
      WITH-REFERENCE-OBJECT
            “Recommendation M.3100: 1995”:createErrorParameter;
   DELETE
      DELETES-CONTAINED-OBJECTS
         deleteErrorParameter;
REGISTERED AS { xxx userPasswordSIF-securityUserSIF ()};

userPasswordSIF-securityUserSIFBeh BEHAVIOUR
   DEFINED AS
      " An instance of userPasswordSIF object class shall be created by
      using CMIS M-CREATE when an instance of its superior object class
      is created if and only if password authentication is the choice of
      authentication mechanism for the user. The CMIS M-DELETE service
      can be used to delete an instance of this object class if and only
      if the deletion is replaced by another type of authentication
      mechanism. A maximum of one instance of userPasswordSIF object
      class can be contained in any one instance of securityUserSIF
      object class. ";
```

11.4.15 userSessionSIF-securityUserSIF

```
userSessionSIF-securityUserSIF NAME BINDING
   SUBORDINATE OBJECT CLASS userSessionSIF AND SUBCLASSES;
   NAMED BY SUPERIOR OBJECT CLASS securityUserSIF AND SUBCLASSES;
   WITH ATTRIBUTE userSessionId; -- one session per user
   BEHAVIOUR userSessionSIF-securityUserSIFBeh;
   DELETE;
REGISTERED AS {xxx userSessionSIF-securityUserSIF ()};

userSessionSIF-securityUserSIFBeh BEHAVIOUR
   DEFINED AS
      " An instance of userSession object class is created automatically
      when a user is logged in to the managed system (as a result of
      userLoginRequest action, for example). An instance of this object
      class cannot be created using CMIS M-CREATE service. However, an
      instance of this object class can be deleted using CMIS M-DELETE
      service (by a system/security administrator, for example) to force
      out (logout) a user. Only one instance of this object class may be
      contained in any one instance of the superior object class. This
      is to prevent multiple login sessions by a single user as required
      by the security requirement. However, should this requirement need
      to be modified to allow multiple login sessions by the same user,
      no changes need to be made to the managed object as the user
      session is identified by a session ID. At the creation of an
      instance of the userSession object class, the sessionLocationId
      attribute shall be set to reflect the current session location,
      the sessionStartTime attribute shall be set to reflect the
      starting time of this session, the processIdList attribute shall
      be set to reflect initial processes, if any, and the
      sessionIdleTime attribute shall be set to 0. ";
```

11.4.16 newPassword

```
newPassword PARAMETER
   CONTEXT ACTION-INFO;
   WITH SYNTAX BCRGR1114Iss3Mod.UserPassword;
REGISTERED AS {bbbb};
```

11.4.17 oldPassword

```
oldPassword PARAMETER
   CONTEXT ACTION-INFO;
   WITH SYNTAX BCRGR1114Iss3Mod.UserPassword;
REGISTERED AS {yyyy};
```

11.4.18 ASN.1

```
IMPORT

UserPassword
FROM
BCRGR1114Iss3Mod;

ChangePasswordReply ::= CHOICE {
      ChangePasswordAccept [0] NULL,
      ChangePasswordDeny   [1] NULL
   }

PasswordType ::= ENUMERATED {
user (0),
supervisor (1) }

ProcessId ::= PrintableString

ProcessIdList ::= SET OF ProcessId

SessionAcceptInfo ::= SEQUENCE {
      passwordChange          [0] BOOLEAN OPTIONAL,
      postLoginInfo           [1] PostLoginInfo,
      futureExtension         [2] SET OF ManagementExtension OPTIONAL
      -- future ext.
}

SessionIdleTime ::= INTEGER -- session idle time in minutes

SessionLocationId ::= PrintableString(SIZE (1 .. 100))

SessionStartTime ::=  GeneralizedTime

SupervisorSetPasswordInfo::= SEQUENCE{
      supervisorPassword   UserPassword,
      newPassword          UserPassword OPTIONAL,
      userIdStatus         UserIdStatus OPTIONAL,
      privilegeLevel       PrivilegeLevel OPTIONAL,
      loginExpiration      loginExpiration OPTIONAL
}

UserSessionId ::= PrintableString
```