

IPWorks 2 Network Impact Report

NETW. IMPACT REPORT

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1 Introduction

This Network Impact Report (NIR) describes the changes between IPWorks 2.0 and IPWorks 1.12.

The IPWorks 2.0 is a VNF that can be deployed on CEE/BSP 8100 platform and HP DL380 Gen9 as virtualization.

This document describes how operation is changed in IPWorks 2.0 release on a high level. This document is not intended to list each command, printout, configuration parameter change, as such info is meaningless for a product with a platform change.

The operator is recommended to read this NIR to get an overview of changes in IPWorks 2.0 release. Then, follow the relevant User Guide and Operating Instructions to set up the whole IPWorks 2.0 system.

IPWorks 2.0 adds support of new base package of DHCP (DHCPv4). Table 1 lists Ericsson Software Model based Base Packages and Value Packages till IPWorks 2.0, and shows feature impacts in each release.

Table 1 Base Packages and Value Packages

Base/Value Package (BP & VP)	BP & VP Number	Introduced From	Evolutions	Changes in IPWorks 2.0
Internet DNS Base Package	FAJ 801 0166	IPWorks 1.3	IPWorks 1.6: • Bind uplift	No
DNS Base Package	FAJ 801 0803	IPWorks 1.0	IPWorks 1.3: • Bind uplift IPWorks 1.6: • Bind uplift IPWorks 1.9: • GUI DNS Management	No
ENUM Base Package	FAJ 801 0167	IPWorks 1.0		No
ENUM Front End Base Package	FAJ 801 0735	IPWorks 1.0		No



Base/Value Package (BP & VP)	BP & VP Number	Introduced From	Evolutions	Changes in IPWorks 2.0
AAA Base Package	FAJ 801 0169	IPWorks 1.0: AAA Diameter support.	IPWorks 1.3: <ul style="list-style-type: none">• Subscriber Tracing support in AAA (Diameter) IPWorks 1.6: <ul style="list-style-type: none">• AAA Radius Support• IMEI Check support• Throttling support IPWorks 1.9: <ul style="list-style-type: none">• Subscriber Tracing support (Radius) IPWorks 1.12: <ul style="list-style-type: none">• Emergency control for Wi-Fi (Diameter)	No
AAA Front End Base Package	FAJ 801 0736	IPWorks 1.0: AAA Diameter support.	IPWorks 1.3: <ul style="list-style-type: none">• Subscriber Tracing for AAA Diameter IPWorks 1.6: <ul style="list-style-type: none">• AAA Radius support• IMEI Check support• Throttling support IPWorks 1.9: <ul style="list-style-type: none">• Subscriber Tracing support (Radius)• AAA-FE (PKI) support IPWorks 1.12: <ul style="list-style-type: none">• Emergency Control For Wi-Fi (Diameter)	No
Public Key Authentication	FAJ 801 0165	IPWorks 1.0		No
WiFi Mobility	FAJ 801 0525	IPWorks 1.0		No
IMS Interconnect	FAJ 801 0164	IPWorks 1.0		No



Base/Value Package (BP & VP)	BP & VP Number	Introduced From	Evolutions	Changes in IPWorks 2.0
Advanced Network Protection	FAJ 801 0162	IPWorks 1.0	IPWorks 1.9: <ul style="list-style-type: none"> • Single provisioning for geographical redundancy (ENUM) IPWorks 1.12: <ul style="list-style-type: none"> • Single provisioning for geographical redundancy (Radius AAA) 	No
DHCP Base Package	FAJ 801 0984	IPWorks 2.0		New

Note: Native replacement is supported from IPWorks 1.3.

1.1 Purpose

The purpose of this document provides sufficient information at an early stage to Ericsson system operators to help them plan the introduction of new products and upgrades to their networks.

This document is a living document and is subject to change during the development of the new release. Therefore, part of the information may be incomplete or unavailable until General Availability (GA) of the IPWorks 2.0 release.

1.2 Related Information

The following documents include trademark information, typographic conventions, definition, and explanation of abbreviations, and terminology:

- *Trademark Information*
- *Typographic Conventions*
- *Glossary of Terms and Acronyms*

2 General Impact

This section describes the general impact from the introduction of the IPWorks 2.0.

2.1 Deployment and Network

The IPWorks 2.0 is a software delivery that can be deployed as virtualized. For more information about deployment configurations, refer to *IPWorks Technical Description*.

IPWorks 2.0 application software is virtualized, which is not bundled with a hardware platform. In the certification, the hardware and Virtualization/Cloud Infrastructure is BSP8100 and CEE respectively. Another certificate is HP DL380 Gen9. The overall deployment configuration as virtualized is shown in Figure 1.

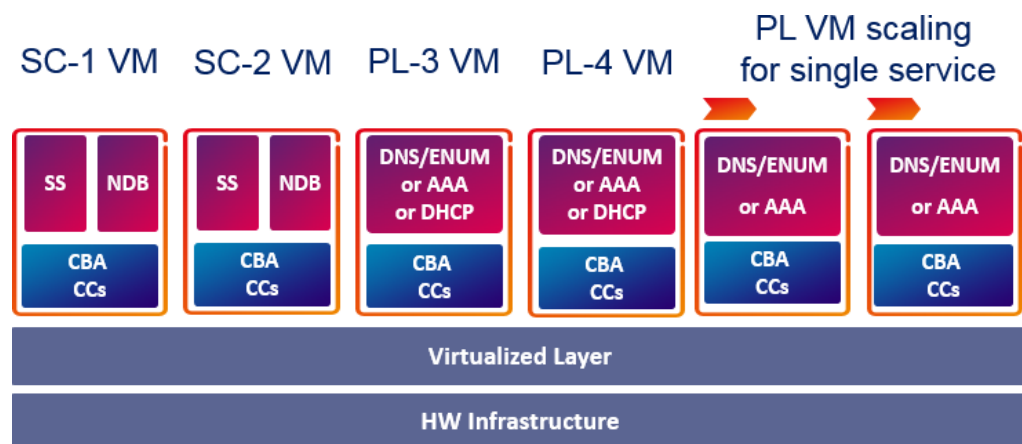


Figure 1 IPWorks VNF Deployment for Single Service with Manual Scalability Support

IPWorks 2.0 supports PL VM scale-out and scale-in only for applications of AAA and ENUM. Scale-out and scale-in for IPWorks DNS server are obsoleted.

IPWorks 2.0 removes the support of mixed configuration (2+2+2 for AAA and DNS/ENUM in one VNF cluster).

IPWorks 2.0 does not support VM operation “suspend” and “resume” for both SC VM and PL VM.

IPWorks 2.0 supports only eVIP static routing without BFD for signaling and data network. Support of OSPF on signaling and data network is obsoleted. User needs to follow the *CPI Replace OSPF with Static Routing* to reconfigure site routers and IPWorks internal network.

2.2 Capacity and Performance

This section describes the capacity and performance.

Flexible VM size is introduced from IPWorks 1.12 release, which means the capacity varies depending on real VM size of deployments. As a consequence,



the capacity and performance of Standard (2+2) deployment configuration are cited when comparing against IPWorks 1.0 to IPWorks 1.12 releases.

The detail subscriber/session capacity for IPWorks 2.0 release measured on certificated hardware is described in *IPWorks 2 Characteristics*.

2.2.1

Subscriber Capacity

This section describes the subscriber and session capacity of the IPWorks 1.12 to 2.0 (Standard configuration).

Table 2 Subscriber Capacity

Components	IPWorks 2.0 (Standard)	IPWorks 1.12
EPC AAA (Active Session)	4,000,000	4,000,000
PKI Authentication (Device)	20,000,000	20,000,000
PKI Authentication (Active Session)	10,500,000	10,500,000
AAA Basic (Subscriber)	8,000,000	8,000,000
Wi-Fi AAA (Active Session)	4,000,000	4,000,000
DNS (Resource Record)	2,000,000	2,000,000
ENUM (NAPTR Record)	24,000,000	24,000,000
DHCP (lease number)	5,000,000	N/A
N/A: Not Applicable		

Note: For more details about the subscriber/session capacity, refer to *IPWorks 2 Characteristics*

2.2.2

Network Performance

This section describes the general impact of network performance in IPWorks 2.0 (Standard), compared with previous release of IPWorks 1.12.

Table 3 Processing Capacity

Performance	Type	IPWorks 2.0 (Standard Configuration)	IPWorks 1.12 (Standard Configuration)
ENUM Monolithic (CEE)	Traffic	37,000 TPS	38,000 TPS
DNS IPv4 Traffic (CEE)	Traffic	70,000 TPS	80,000 TPS
DNS Create (CEE)	Provisioning	65 QPS	83 QPS
DNS Modify (CEE)	Provisioning	39 QPS	63 QPS
DNS Delete (CEE)	Provisioning	47 QPS	69 QPS
ENUM Create (CEE)	Provisioning	200 QPS	140 QPS
ENUM Modify (CEE)	Provisioning	74 QPS	89 QPS
ENUM Delete (CEE)	Provisioning	76 QPS	92 QPS



Performance	Type	IPWorks 2.0 (Standard Configuration)	IPWorks 1.12 (Standard Configuration)
Non-SM user Modify (CEE)	Provisioning	82 QPS	90 QPS
Non-SIM user Delete (CEE)	Provisioning	83 QPS	90 QPS
Radius AAA user Create (CEE)	Provisioning	135 QPS	140 QPS
Radius AAA user Modify (CEE)	Provisioning	65 QPS	85 QPS
Radius AAA user Delete (CEE)	Provisioning	71 QPS	85 QPS

Note: For the Compact and Single Server deployments on native HP DL380 Gen9 with KVM, the performances in regards to the items in the above table are not fully tested, it is assumed that they have the same ratio of performance drop.

2.3 Hardware Resource

IPWorks 2.0 is a software-only delivery. It certificates on two kinds of deployment: CEE cloud and native HP DL380 Gen9 server. Refer to the Section *Reference Hardware List* in IPWorks Auto Deployment Guideline for KVM - DL380 Gen9.

2.4 Implementation

- Update paths support

IPWorks 2.0 supports one-step upgrade from IPWorks 1.12 release.

From IPWorks 2.0, the mixed deployment configuration (2+2+2) that supports both AAA and DNS/ENUM on CEE/BSP and native HP platform is obsoleted. The live deployment must be split into two sets of 2+2 deployment configurations, for more information, refer to IPWorks 2+2+2 Split and Upgrade Instruction.

An overview of the changes in IPWorks application is highlighted as in list below:

- IPWorks 2.0 release adds support of DHCPv4 service.
- IPWorks 1.12 release adds the new function Emergency Control for Wi-Fi. Also it contains the following functions implemented in the previous releases:
 - IPWorks 1.9 release adds new function AAA-FE support for PKI authentication, Local read support, GUI DNS Management and Single provisioning for geographical redundancy (ENUM).
 - IPWorks 1.6 release adds new function Trusted Wi-Fi support, IMEI support and Throttling support.



- IPWorks 1.3 release adds new function Internet DNS.
- IPWorks 1.0 release contains DNS, ENUM, IMS Interconnect, Untrusted Wi-Fi Calling AAA, Public Key Authentication, Wi-Fi Mobility, and Advanced Network Protection.
- IPWorks 2.0 is released as a software-only product, which is independent on Virtualization/Cloud Infrastructure and hardware platform without limitation.
- IPWorks 2.0 certificates on native HP DL380 Gen9 hardware. Auto installation also certificates on this hardware platform.
- IPWorks 2.0 release is delivered as HOT format with QCOW2 images, thus installation procedure has changed accordingly. Refer to IPWorks Deployment Guide or IPWorks Auto Deployment Guideline for KVM - DL380 Gen9 for details.

2.5 Virtualization Resource

This section describes the minimum memory and vCPU required for implementing a new revision of IPWorks.

Table 4 shows the changes of resource requirements for AAA/DNS/ENUM services between IPWorks 2.0 and IPWorks 1.12 release:

Table 4 Virtualization Resource Requirement Comparison Between IPWorks 2.0 and IPWorks 1.12 for AAA/DNS/ENUM

Virtualization Platform	Deployment Type	VM Node	vCPUs	Memory (GB)
CEE/BSP	2+2 Compact	SC	2	4
		PL	2	<ul style="list-style-type: none"> • IPWorks 2.0: 6 • IPWorks 1.12: 4
Native HP with KVM	2+2 Single Server	SC	6	<ul style="list-style-type: none"> • IPWorks 2.0: 18 • IPWorks 1.12: 20
		PL	8	<ul style="list-style-type: none"> • IPWorks 2.0: 6 • IPWorks 1.12: 4



Table 5 shows the resource requirements for the DHCP service which is introduced in IPWorks 2.0 release:

Table 5 Virtualization Resource Requirement for DHCPv4 Service

Virtualization Platform	Deployment Type	VM Node	vCPUs	Memory (GB)	Hard Disk (GB)
CEE/BSP	2+2 Standard	SC	8	8	280
		PL	8	16	None
	2+2 Compact	SC	2	4	75
		PL	2	6	None
Native HP with KVM	2+2 Standard	SC	8	8	280
		PL	8	16	None
	2+2 Single Server	SC	6	8	75
		PL	8	16	none

For the accurate information on memory and hard disk requirement for each virtual machine, refer to *IPWorks 2 Characteristics*.

2.6 Components

2.6.1 3PPs

Table 6 lists all 3PPs with versions included in IPWorks 2.0 release.

Table 6 3PPs Included In IPWorks 2.0

3PP Name	IPWorks 2.0	IPWorks 1.12
MySQL CGE	7.4.12	7.4.12
MySQL Connector/J - JDBC	5.1.16	5.1.16
JRE	8u152	7u131
ISC BIND	9.9.9	9.9.9
Apache Axis2/Java	1.6.2	1.6.2
Apache Log4j	1.2.15	1.2.15
ISC DHCP	4.3.5	N/A

2.6.2 CBA Common Components

Table 7 lists all CBA Common Components with versions included in IPWorks 2.0 release.



Table 7 CBA Common Components Included in IPWorks 2.0

Component Name	IPWorks 2.0	IPWorks 1.12
COM	7.5	7.3
CoreMW	4.5	4.4
eVIP	3.5	3.4
LDEwS	4.4	4.2
License Manager	6.3	5.1
SS7 CAF	6.3	5.1
JAVA O&M	4.0	3.1
SEC	2.5	2.4
C-Diameter	2.1	1.5
Trace	3.5	3.3
Trace-EA	3.5	3.3

2.7 License Management

License Management is changed in following way:

Table 8 Feature License Changes

Feature Name	License Management Aspect	License Type	Quantity	Associated Applications	Changes in IPWorks 2.0
FAT 102 3219/12	ENUM Base - Classic TPS	Capacity	N (N TPS)	ENUM Server	New ⁽¹⁾
FAT 102 3219/13	ENUM Base - Layered TPS	Capacity	N (N TPS)	ENUM Server	New ⁽¹⁾
FAT 102 3219/11	DHCP Base Package TPS	Throughput Capacity	N (N TPS)	DHCP Server	New



Feature Name	License Management Aspect	License Type	Quantity	Associated Applications	Changes in IPWorks 2.0
FAT 102 3219/2	ENUM Base - Classic Record	Capacity	N	Storage Server	Obsoleted
FAT 102 3219/3	ENUM Base - Layered Record	Capacity	N	ENUM Server	Obsoleted

(1) For ENUM monolithic or layered services, make sure to update ENUM licenses before upgrade according to the section Preparing IPWorks Licenses in IPWorks Upgrade Instruction.

2.8 New Base/Value Package

Table 9 New Base/Value Package

Package Name	Package Number	Description	Available In
DHCP Base Package	FAJ 801 0984	Support of DHCPv4 protocol as DHCP server.	IPWorks 2.0

2.9 Update Impact

IPWorks 2.0 supports following update paths:

- Cloud configuration, from IPWorks 1.12 to IPWorks 2.0. This upgrade path supports only one-step upgrade as a consequence of which traffic disturbance will be experienced.
- Native configuration, from IPWorks 1.12 to IPWorks 2.0. This upgrade path supports only one-step upgrade as a consequence of which traffic disturbance will be experienced.
- For both Cloud configuration and native configuration:
 - Each IPWorks 1.12 mixed deployment configuration (2+2+2 supporting both AAA and DNS/ENUM) must be split into two sets of 2+2 deployments (VNF clusters) in which one cluster serves AAA and the other one serves DNS/ENUM. One new set of OAM, provision and traffic IP addresses are required to be used for AAA service.



- If IPWorks 1.12 deployment scenario is 2+2 (Standard) and the network is OSPF based, after upgrading to IPWorks 2.0, the network will auto upgrade to static routing based.

The following services are available in IPWorks 2.0:

- DNS
- ENUM
- AAA
- DHCP (new installation only)

Note: SS7 related traffic will have around 30 seconds disturbance due to SS7CAF limitation.

From IPWorks 15B FD1 to IPWorks 2.0: this path supports with maiden installation plus data migration for AAA, DNS, and ENUM services. Migration for DHCPv4 service is not ready.

2.9.1 Rollback Impact

IPWorks 2.0 supports rollback to IPWorks 1.12. The rollback method restores the IPWorks system to the previous system. Traffic disturbance happens during rollback.

IPWorks 2.0 cannot rollback to IPWorks 15B FD1. The recovery method of IPWorks 15B FD1 system is maiden installation and system restore.

2.10 Obsolete Base/Value Packages

Not applicable.

2.11 Other Network Elements

ENM 18.3 is required to support the counters, alarms in IPWorks 2.0 release.

2.12 Other Impacts

Not applicable.



3 Interface

This section describes interface changes between the existing and new revisions of the product.

3.1 Inter-Node Interface

The changes to the inter-node interfaces are listed in Table 10.

The description of impact is as follows:

- **No Impact** means that the new version can be installed without affecting other nodes.
- **Minor Impact** means that there are changes, but with extra configuration the previous behavior can be kept.
- **Major Impact** implies that the change has made an interface backwards incompatible.
- **New Interface** indicates that the interface did not exist in the previous revision.
- **Obsolete** means that the interface no longer exists.

Table 10 Inter-Node Interface Changes

Interface	Protocol	Impact	Description of Change from IPWorks 1.9 to IPWorks 1.12
DHCP relay/client - DHCP server	DHCPv4	Major Impact New Interface	Add support of DHCPv4 protocol between DHCP relay and IPWorks DHCPv4 server. Add support of DHCPv4 protocol between DHCP client and IPWorks DHCPv4 server. (only support uni-cast addressing between DHCP client and DHCP server).

3.2 Man-Machine Interface

Table 11 lists all the MMI changes in IPWorks 2.0 release compared with IPWorks 1.12 releases.

The description of impact is as follows:

- **No Impact** means that the new version can be installed without affecting other nodes.



- **Minor Impact** means that there are changes, but with extra configuration the previous behavior can be kept.
- **Major Impact** implies that the change has made an interface backwards incompatible.
- **New Interface** indicates that the interface did not exist in the previous revision.
- **Obsolete** means that the interface no longer exists.

Table 11 Man-Machine Interface Changes

Interface	Nodes	Protocol	Impact / Description of Changes from IPWorks 1.12 to IPWorks 2.0
ECLI			No impact on interface usage. New configuration parameters for DHCP v4 service.
ipw-ctr			Minor impact. Add support of DHCP v4 service.
Trace CLI			No impact.
DNS GUI			No impact.

3.3 Machine-to-Machine Interface

Table 12 lists all the Machine-to-Machine Interface changes in IPWorks 2.0 release compared with IPWorks 1.12 release.

Table 12 Machine-to-Machine Interface Changes

Interface	Nodes	Protocol	Impact / Description of Changes from IPWorks 1.12 to IPWorks 2.0
COM NETCONF Interface	OSS ENM	NETCONF	Minor Impact DHCPv4 service configuration is added in IPWorks 2.0.
IPW SNMP Interface	OSS	SNMP	Minor Impact SNMP interface towards OSS is changed by Fault Management function including: DHCPv4 service SNMP is added in IPWorks 2.0.
EDA CLI Interface	PG	SSH/CLI	No Impact

For different version of Operations Support Systems (OSS), the version of IPWorks viewed from OSS is different. See Table 13 for details:

Table 13 IPWorks Version Viewed from OSS

IPWorks Version	IPWorks Version Viewed from OSS 18A	IPWorks Version Viewed from OSS 17B
IPWorks 1.0	IPWorks 1.0	IPWorks 1.0
IPWorks 1.3	IPWorks 1.3	IPWorks 1.3



IPWorks Version	IPWorks Version Viewed from OSS 18A	IPWorks Version Viewed from OSS 17B
IPWorks 1.6	IPWorks 1.6	IPWorks 1.3
IPWorks 1.9	IPWorks 1.9	IPWorks 1.3
IPWorks 1.12	IPWorks 1.9	IPWorks 1.3
IPWorks 2.0	IPWorks 1.9	IPWorks 1.3

For different version of Ericsson Network Manager (ENM), the version of IPWorks viewed from ENM is different. See Table 14 for details:

Table 14 IPWorks Version Viewed from ENM

IPWorks Version	IPWorks Version Viewed from ENM 18.1	IPWorks Version Viewed from ENM 18A	IPWorks Version Viewed from ENM 17B
IPWorks 1.0	IPWorks 1.0	IPWorks 1.0	-
IPWorks 1.3	IPWorks 1.3	IPWorks 1.3	IPWorks 1.3
IPWorks 1.6	IPWorks 1.6 ⁽¹⁾	IPWorks 1.6 ⁽¹⁾	IPWorks 1.3
IPWorks 1.9	IPWorks 1.9	IPWorks 1.9	IPWorks 1.3
IPWorks 1.12 ⁽²⁾	IPWorks 1.9	IPWorks 1.9	IPWorks 1.3
IPWorks 2.0 ⁽³⁾	IPWorks 1.9	IPWorks 1.9	IPWorks 1.3

(1) IPWorks release is treat-as according to NBC rules. No complete JFT for this release against ENM.

(2) IPWorks 1.12 will be fully supported by ENM 18.2.

(3) IPWorks 2.0 will be fully supported by ENM 18.3.

3.4 Operation and Maintenance

3.4.1 Configuration Management

IPWorks configuration data are presented as a set of Management Objects (MOs), their relationships are described in a *Managed Object Model (MOM)*. The MOM is exposed through the Ericsson NETCONF interface and the ECLI, and provides a consistent view of the configuration and state data.

- Those commands and printouts in ECLI are listed in *Ericsson Command-Line Interface*.
- How to use the NETCONF interface is described in *Ericsson NETCONF Interface*.
- IPWorks configuration is described in *IPWorks Configuration Management*.
- All IPWorks provisioning and configuration parameters are listed in:
 - *IPWorks DNS, ASDNS, ENUM Parameter Description*
 - *IPWorks DHCP Parameter Description*



- *IPWorks AAA Parameter Description*
- MOM configuration changes in IPWorks 2.0 includes:
 - Add DHCPv4 configurations, including “IPWorksDHCPRoot=1” and all its subordinates. Refer to *IPWorksDHCPRoot* in Managed Object Model (MOM) for details.
 - Add MOM “IpworksTrace”. Refer to *IpworksTrace* in Managed Object Model (MOM) for details.

3.4.2 Fault Management

Fault Management is changed in following way:

- Alarms supported in IPWorks 2.0 are listed in *IPWorks Alarm List* and *IPWorks Alarm List for DL380 Gen9 Host Management*.
- FM list changes in IPWorks 2.0 includes:
 - New alarms for DHCPv4 service.

3.4.3 Performance Management

Measurements for DHCPv4 service is added. Refer to *IPWorks Measurement List*.

PM list changes in IPWorks 2.0 includes:

- New measurements and measurement groups for DHCPv4 service.
- New measurements “ipworksEnumServTransactionPerSecond” due to ENUM price model change.

3.4.4 Backup and Restore

Backup and restore for DHCPv4 service is added.

3.4.5 Others

Not applicable.

3.5 Other Interface Impacts

Not applicable.



4 Summary of Impacts per Base/Value Packages

This section summarizes the impact per feature when the feature is turned on.

The description of impact is as follows:

- **Major Impact** means that the Base/Value Package has done an incompatible change so that another node requires an update.
- **Minor Impact** means that the Base/Value Package has caused changes that affect other nodes, but with extra configuration, the previous behavior can be kept.
- **No Impact** means that the Base/Value Package has no impact on the system.

A summary of impacts per Base/Value Package is shown in Table 15.

Table 15 Summary of Impacts IPWorks 2.0

Base/Value Packages	Impact	Properties	Base/Value Package Number	Comments
	IPWorks 2.0	Basic or Value Package		
IPWorks Base DNS	No Impact	Base	FAJ 801 0803	
IPWorks Base ENUM Classic	No Impact	Base	FAJ 801 0167	
IPWorks Base ENUM Layered	No Impact	Base	FAJ 801 0735	
IPWorks Base AAA Classic	No Impact	Base	FAJ 801 0169	
IPWorks Base AAA Layered	No Impact	Base	FAJ 801 0736	
IMS Interconnect (Value Package)	No Impact	Value	FAJ 801 0164	
Advanced Network Protection (Value Package)	No Impact	Value	FAJ 801 0162	
IPWorks Internet DNS Base Package Support	No Impact	Base	FAJ 801 0166	
DHCPv4 Base Package Support	Major, new	Base	FAJ 801 0984	



Reference List

Ericsson Documents

- [1] *Trademark Information*
- [2] *Typographic Conventions*
- [3] *Glossary of Terms and Acronyms*
- [4] *IPWorks Technical Description*
- [5] *IPWorks Network Connectivity Overview*
- [6] *IPWorks Deployment Guide, 21/1553-AVA 901 33/2 Uen*
- [7] *IPWorks Auto Deployment Guideline for KVM - DL380 Gen9, 19/1553-AVA 901 33/2 Uen*
- [8] *IPWorks 2+2+2 Split and Upgrade Instruction, 2/153 72-AVA 901 33/3 Uen*
- [9] *Ericsson Command-Line Interface*
- [10] *IPWorks Configuration Management*
- [11] *IPWorks 2 Characteristics*
- [12] *Ericsson NETCONF Interface*
- [13] *IPWorks DNS, ASDNS, ENUM Parameter Description*
- [14] *IPWorks AAA Parameter Description*
- [15] *Managed Object Model (MOM)*
- [16] *IPWorks Measurement List*
- [17] *Performance Management Report File Format*
- [18] *Performance Management*
- [19] *Fault Management*
- [20] *IPWorks Alarm List*
- [21] *Backup and Restore*
- [22] *IPWorks Auto Health Check*



- [23] *Install License Key File*
- [24] *License Management*
- [25] *IPWorks Trace User Guide*
- [26] *Trace Command Line Interface (CLI) Reference, 1/1540-APR 901 0500/3 Uen*