



7302 ISAM
7330 ISAM FTTN
7360 ISAM FX
7356 ISAM FTTB REM
7362 ISAM DF/SF
7363 ISAM MX
7367 ISAM SX/DX
Voice Package

R6.0.02

CUSTOMER RELEASE NOTE

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1 About this Document

This document for products **7302 ISAM 7330 ISAM FTTN 7360 ISAM FX 7356 ISAM FTTB REM 7362 ISAM SF/DF 7363 ISAM MX 7367 ISAM SX/DX Voice Package** provides information for following software release:

ISAM R6.0.4.6.0

ISAM OFLMT R6.0.4.6.0

SHub OFLMT V1.84.0

ISAM Push-button Migration Tool V3.3.98

xVPS OFLMT R6.0.4.6.0

2 Release Content

2.1 Introduction

This document provides delivery information of the ISAM software release 6.0.02. This delivery includes support for 7302 ISAM, 7330 ISAM FTTN, 7360 ISAM FX, 7356 ISAM FTTB REM, 7362 ISAM DF/SF, 7363 ISAM MX and 7367 ISAM SX for ETSI/MII markets and support for 7360 ISAM FX, 7356 ISAM FTTB REM, 7362 ISAM DF, 7363 ISAM MX and 7367 ISAM SX/DX for ANSI-markets.

This delivery includes support for FD, FX, SX, DX, MX, SF and DF equipment practices, the XD equipment practice was discontinued since release 4.0.

The ISAM Voice (also called ISAM-V) Package is included in this delivery.

2.2 New Features

A general description of the ISAM (Intelligent Service Access Manager) and its features is given in the System Description that is part of the ISAM Customer Documentation package.

Following table gives an overview of the new features supported in R6.0, R6.0.01 and R6.0.02.

OAM Domain
<p style="text-align: center;"><u>CLI framework: Prompt with Warning and request for confirmation before command execution (R6.0)</u></p> <p>Feature content:</p> <ul style="list-style-type: none">If a command that could affect equipment control/user communication is entered, the CLI shall open a yes/no dialog box to seek confirmation as to whether to execute the command or not, and allow the command to be executed only if Yes is entered. If any other character string is entered, the CLI shall return to the command prompt without executing the command. <p>Value or Application:</p> <ul style="list-style-type: none">Avoiding unexpected customer service impact via CLI changes.
<p style="text-align: center;"><u>CLI framework: Environment setting to display number of lines (R6.0)</u></p> <p>Feature content:</p> <ul style="list-style-type: none">Allows to configure the number of lines which can be displayed at a time. <p>Value or Application:</p>

- Irrespective of the terminal used and paginate options supported, it allows to determine the number of lines in the CLI output.

7363 ISAM MX: Enable Login-Successful alarm (R6.0)

Feature content:

- As described in the 7363 ISAM MX Alarm Guide, the operator login successful alarm is valid for the 7363 ISAM MX-6 node.

ISAM Software Load Validation (R6.0.01)

Feature content:

- Ability to validate the SW running in the ISAM as approved Nokia delivered software.

Value or Application:

- Security enhancement

Restrictions

- Only supported on
 - 7302/7330 ISAM FD with NANT-E or NANT-D
 - 7367 ISAM SX/DX and 7363 ISAM MX

Zero-touch provisioning on 7367 ISAM SX-12VP/16VP/48V and DX-48V (R6.0.01)

Feature content:

- The ISAM will go through an auto provisioning algorithm at startup/install:
 - Stage 1: Basic Connectivity
 - ISAM host IP address assignment via DHCP
 - Stage 2: Download Pre-Config File
 - TFTP Download: infrastructure (BOOTP) config script (CLI)
 - Stage 3: Supervision by AMS
 - SNMP (ready) TRAP notification to AMS
 - AMS in control according to the normal process (SW management and full configuration node specific)
 - External visibility to installer via LED blinking indicator

Value or Application:

- OPEX Benefit Reduce multiple truck rolls in installations at remote places/poles.
 - Simplify installation of micro-nodes in remote locations.
 - Allow installation without requiring use of local provisioning (e.g. no craft port access by PC or other installer tool).
 - Avoid opening the box in the case of sealed units.

ISAM database compatibility check with platform type (R6.0.01)

Feature content:

- The ISAM can be initialized with a database only compatible with a different system-type. Solution is for each running system that creates a new database to mark the database with its own shelf-type and NT-type:
 - Do not allow incompatible downloaded DB activate-with-linked-database action.
 - Automatically clear DB when NT is removed from one shelf type and installed in a different shelf type.

Restriction:

- Only supported on 7302 ISAM, 7330 ISAM FTTN, 7356 ISAM FTTB and 7360 ISAM FX.

Value or Application:

- Operational improvement to prevent the ISAM to be initialized with an incompatible database.

Debug option to trigger IGMP Join/Leave from Interface (R6.0.01)

Feature content:

- When customer does not receive MC TV service, or some particular channel, then Operator should be able to check if a particular channel is available.
 - Debug option (in CLI) to trigger IGMP Join/Leave for an Interface/VLANport shall help in debugging whether the ISAM/MX Uplink or LT is the problem source.

Restriction:

- Only CLI (no management via SNMP) for Trouble shooting purposes.

Value or Application:

- In case of Wholesale Service Provider this helps to quickly debug if ISAM is source of issue for Multicast transmission.
- Allows troubleshooting up to ISAM/MX level, instead of debugging by sending technician or use other features (e.g., static join) at CO level to check.

RADIUS challenge authentication (R6.0.01)

Feature content:

- This feature allows the operator to retype a password as Access-Challenge received from Radius Server and transmit the new password to Radius Server for authentication using a new Access-Request message.
- Validated for 7330 ISAM FTTH (with NANT-E), 7367 ISAM SX-48V and 7363 ISAM

MX.

Login security control enhancements (R6.0.01)

Feature content:

- CLI command & SNMP MIB object to let an admin user cancel the lockout of a specific IP address.

Restrictions:

- Global lockout which is triggered during brute force attempt from multiple IP addresses will still override this specific IP address unlocking.

Value or Application:

- Method for removal of IP address lockout.

Migration using CLI only (R6.0.01)

Feature content:

- Allow to perform ISAM migration via the PBMT tool only using CLI of the ISAM node (i.e. excluding TL1 commands).

CLI output display filters (R6.0.01)

Feature content:

- Each output CLI command (info configure, show) must be able to be redirected using “|” (pipe) enabling the implementation of filter commands like UNIX grep command (or equivalent).

Value or Application:

- Filter out large CLI outputs (show) for easy search and trouble-shooting.

Alarm for MELT board reset (R6.0.01)

Feature content:

- Alarm raised whenever MELT board reset has occurred.

Value or Application:

- Trouble shooting.

ISAM to raise an alarm when an SFP/XFP malfunction is detected (R6.0.01)

Feature content:

- Upon SFP/XFP malfunction, the ISAM shall generate the appropriate alarm to let

the operator know something is wrong with the module. An SFP/XFP malfunction can have different root causes: it could be that the module is not fully/correctly plugged in the cage, or that the module itself is damaged. For LT user ports, this alarm should be raised independently of whether some ONU's are provisioned on the corresponding PON port or not.

- Following cases are supported:
 - GPON/XGS/NGPON2 SFP I2C error
 - NT/NTIO/ETH LT SFP newly insert, I2C access error
 - NT/NTIO SFP is pulled out
 - ETH LT SFP is pulled out (already supported)

Value of Application:

- Optical Link troubleshooting

Support for TL1 ALARMS for XGS-PON in GPON object Model(R6.0.02)

Feature content:

- In R58, XGS-PON on 7360 can be supported with a GPON object model, but still without TL1 support. In this release TL1 alarms are supported for such provisioning.

Restriction:

- TL1 provisioning for XGS-PON ports using GPON provisioning model is planned for later release. With this feature only TL1 alarm reporting is included. R5.8 provides CLI commands to provision XGS-PON ports using GPON provisioning model.

Value or Application:

- Customer can use existing TL1 Alarm interface to report alarms on XGS-PON ports, provisioned using GPON model.
-

Platform Domain

7302/7330 ISAM: NT redundancy support for NDLT-J/K boards (R6.0)

Feature content:

- Support of VDSL2 35b boards NDLT-J/K in a duplex NANT-A/D/E configuration.

Value or Application:

- Supporting VDSL2 35b rollout in ISAM FD for deployment with NT redundancy.

Introduction of VSRM-B = ANSI 7367 ISAM SX-48U with copper uplink (R6.0)

Feature content:

- 48p Vectored VDSL2 17a/35b standalone remote DSLAM with 8p bonded copper uplink or fiber uplink for ANSI market
- Triple input power: 120 VAC, -48VDC, RFT-V over copper uplink
- Integrated Splitter
- HW ready for cross-DSLAM vectoring
- Internal, replaceable primary protectors (GDTs)

Value or Application:

- Allows deployment of VDSL2 in low density (semi-rural) markets.
- Allows existing copper cables to be re-used as uplink instead of requiring additional trenching of fiber.
- Passive cooling of SX form-factor allows deployment in pedestals.

7363 ISAM MX/7367 ISAM SX: Avoid PON outage if SFP plugged in after boot of remote unit (R6.0)

Feature content:

- Modify SFP initialization such that if uplink SFP is not present on initialization, that transmitter is forced off.
- Poll for SFP insertion and reset unit upon insertion allowing normal SFP type detection and configuration to take place.

Value or Application:

- Operational improvement: modify initialization process for remotes that support optional GPON or pt-pt uplinks to avoid taking down the PON if the uplink PON SFP is plugged in after the unit is powered up.

8p U-NGPON FWLT-B AB with non-blocking 100G back-plane support (R6.0.01)

Feature content:

- Introduction of new FWLT-B AB variant board with non-blocking backplane connectivity even in simplex configuration (i.e. when used with Non-redundant NT)
- Apart from increased backplane capacity this board will have feature parity with FWLT-B and will be a functional variant of FWLT-A AA variant.
- Supported in all ISAM FX shelves. Interop with FANT-F, FANT-G and FANT-H.
- Optics to be supported:
 - XGS-PON, N1 (as of the initial release) (*)
 - XG-PON1/GPON multi-PON module (in future release)

(*) The XGS-PON, N1 optical module shall be forward compatible next generation Fiber OLT line boards.

Restriction:

- Restriction might apply depending on the type of optics used.

Value or application:

- FWLT-B AB variant now support non-blocking throughput when used with non-blocking NT (FANT-H) even in a simplex configuration.

DSL Domain

Support of G.fast/VDSL2 line reinitialization TCA (R6.0)

Feature content:

- Support of a G.fast/VDSL2 line reinitialization TCA, both for 15min and 24h PM counters.
 - G.fast: support of a TCA for SpontaneousInterruptionCounter
 - VDSL2: support of a TCA for the RelnitCounter

Increase RTX Service profiles (R6.0.01)

Feature content:

- Increase of number of RTX Service Profiles from 128 to 256.

Value or Application:

- Dimensioning increase for service provisioning.

7363 ISAM MX/7367 ISAM SX, ISAM FD: VDSL2-LR (R6.0.01)

Feature content:

- Autonomous selection of VDSL2 LR mode with single initialization: short, medium or

long loop operation.

- VDSL2 and VDSL2 LR lines can be mixed in same vectoring group.

Applicable Standards:

- ITU-T G.997.1 (06/2012) amd 7
- ITU-T G.993.5 (01/2015) amd 2
- ITU-T G.993.2 (01/2015) amd 3

Restrictions:

- VDSL2-LR requires CPE support.
- Needs vectoring support, hence implemented on vectoring capable boards only.

Value or Application:

- VDSL2-LR capable of replacing ADSL2plus.
- Migration of network to VDSL2 only operation.

7363 ISAM MX/7367 ISAM SX: Short interruption PM counters according to G.997.1 (R6.0.01)

Feature content:

- Support of the VDSL short interruption PM counters according to G.997.1:
 - Loss-of-power interruption count (LPR_INTRPT)
 - Host-Reinit interruption count (HRI_INTRPT)
 - Spontaneous interruption count (SPONT_INTRPT)
- PM TCA support for SPONT_INTRPT

Applicable Standards:

- ITU-T G.997.1 (G.ploam) Physical layer management for digital subscriber line transceivers

Restriction:

- Requires CPE support.

Value or Application:

- Trouble shooting.

Forwarding Domain

7363 ISAM MX: DHCPv6 support for S+C VLAN CC with 3 VLANs wholesale model (R6.0)

Feature content:

- Protocol awareness for S+C VLAN CCs for the protocols: PPPoE, DHCP and DHCPv6.

Value or Application:

- Support of some wholesale models with DHCPv6.

7363 ISAM MX/7367 ISAM SX: Configurable priority for IGMP messages (R6.0.01)

Feature content:

- Configurable p-bit for IGMP messages.

Value or Application:

- Flexibility in network architecture.

7363 ISAM MX/7367 ISAM SX: Block traffic on standby LAG ports (R6.0.01)

Feature content:

- MC-LAG/Dual Home LAG topology with static LAG is not supported, but when connected this causes issues in MX/SX node as the standby port does not block sending traffic and has to be blocked.

Value or Application:

- Existing topology with static LAG will not be entering the BC loop, in case MX/SX is connected with static LAG on Multi-chassis topology.

IPv6 anti-spoofing based on the full IPv6 address (R6.0.01)

Feature content:

- Extending the data plane anti-spoofing to check the full 128 bit IPv6 source address

Requirements:

- Currently, IPv6 anti-spoofing is looking at the first 64 bits of the IPv6 source address. This is acceptable for most customers. However, some customers would like to support the case of a bridged CPE in a wholesale environment, where a 64-bit prefix can be shared among multiple subscribers. This calls for extending the data plane anti-spoofing to check the full 128 bit IPv6 source address

Restrictions:

- To be supported on the following hardware:
 - FGLT-B/C, FWLT-A/B
 - 7362 ISAM DF-16GW SF-8GW

Values or application:

- Using this feature allows anti-spoofing to check the full 128 bit IPv6 source address.

IPv6 support improvements (R6.0.01)

Feature content:

- Allows user to configure separate IPv6 link-local address and setup OLT IPv6 router preference and ND Redirects for IPv6 access network.

Restriction:

- Does not support full RFC4191 Only Route preference is supported.

Value or Application:

- In the typical OLT as IPv6 CE router node scenario (in case of customer IPv6 OLT nodes are in an aggregation IP ring topology) the MDU/ONU IPv6 Prefix delegation router can occasionally dual-home to multiple OLTs and in such scenario, these IPv6 related enhancements will help setup the dual-homing configuration and for quicker recovery and avoiding additional hop delays.

Fiber Domain

7360 ISAM FX: FELT-B UNI (R6.0)

Feature content:

- This feature covers the evolution of Nokia's 7360 ISAM FX 10G point-to-point (P2P) line board, FELT-B, to support UNI (user-network interface). A UNI is a demarcation point between the responsibility of the provider and the responsibility of the subscriber.
- The UNI functionality on FELT-B lines up as much as possible with existing UNI functionality on 7360 ISAM FX point-2-point LT board NELT-B. It allows a full coverage of business users and mobile back-haul use cases.

Restriction:

- Functionality for FELT-B UNI to support the residential market (vMAC, PPPoE relay with MAC concentration and 802.1x) is not within scope.

Value or Application:

- User-network Interface (UNI) functionality on FELT-B allows a full coverage of 7360 ISAM FX point-point connectivity to business users and mobile back-haul applications.

7360 ISAM FX, 7362 ISAM DF/SF: New keywords to the RADIUS NAS-Port-Id attribute (R6.0)

Feature content:

- This feature adds two new keywords to the RADIUS attributes NAS-Port-Id (RFC 2869).
- Keywords OnuSN and NzOnuSN are available in the NAS-Port-Id attribute of all

RADIUS messages.

- The keyword "OnuSN" stands for "ONU Serial Number". In this case, the ONU serial number encoding is done as 24 ASCII characters with leading zeros added if the real string does not reach 24 bytes. The keyword NzOnuSN stands for "No Zero ONU Serial number". In this case, the encoding is done as up to 24 ASCII characters, without leading zeros at the front.
- Note that in previous releases, the following protocols already supported the keywords "NzOnuSN" and "OnuSN":
 - DHCP: for use in option 82
 - DHCPv6: for use in option 18
 - PPPoE: for use in the PPPoE TAG.
- The feature is supported on all GPON and U-NGPON line boards on 7360 ISAM FX and 7362 ISAM DF/SF.

Value or Application:

- In function of what the customer's OSS requires, the customer can configure the ONU serial number as part of RADIUS attribute NAS-Port-Id, such that it becomes configured with or without leading zeros.

7362 ISAM DF/SF: GigE/10GigE NNI support (R6.0)

Feature content:

- The 7362 ISAM DF-16GW supports eight 1/10GigE SFP+ ports which can be used as uplink interfaces. The present feature intends to extend the behaviour of these ports to also support a configuration as a downlink port in a network-network interface (NNI). This functionality is required to offer 1/10GigE point-to-point fibre access to business customers. With this model, up to seven 1/10GigE NNI interfaces can be supported, and the last 1/10GigE interface remains used as uplink port.
- The point-to-point downlink NNI interfaces have been tested with 1000Base-BX10, 1000Base-LX, 1000Base-BX40 and 1000Base-EX optics.
- Please consult the System Description document for further information about VLAN connectivity, traffic forwarding and QoS functionality that is supported.
- The functionality to be supported on both 7362 ISAM DF-16GW and 7362 ISAM SF-8GW.

Restriction:

- A mixture of the above discussed 7 ports as GPON ports in UNI mode and GigE ports in NNI mode is supported. But GigE UNI mode is neither supported nor planned in the future.

Value or Application:

- The functionality allows to use 7362 ISAM DF/SF uplink ports to be used as downlink ports connecting towards business customers.

7360 ISAM FX, 7362 ISAM DF/SF: ONU both CPU and Memory utilization (R6.0)

Feature content:

- This feature enables OLT to collect both CPU and Memory utilization data from ONUs that do support the corresponding functionality.
- For average CPU utilization, OLT supports 15-min records of per ONT average CPU utilization including the current interval and in addition up to 8 hours' worth of previous intervals. The functionality can be enabled or disabled on a per ONU basis.
- For memory utilization, OLT supports to collect daily records of ONU memory utilization including current memory utilization and one week worth of historical data. The collected data shall also indicate the total ONT memory.
- The ONU memory and CPU statistics are collected via OMCI (ITU-T G.988) and available via SNMP and CLI. The data collection can be enabled or disabled on a per ONU basis.
- The feature is supported on 7360 ISAM FX boards FANT-F, FANT-G, FGLT-B and NGLT-C and on 7362 ISAM DF/SF.

Restriction:

- The feature only works with ONUs that do support the counterpart functionality. The feature works on GPON, whereas U-NGPON2 is excluded.

Value or Application:

- The feature allows ONU memory and CPU utilization monitoring via OLT/AMS/OSS.

7360 ISAM FX: FELT-B Link Loss Forwarding (R6.0)

Feature content:

- Uplink failures are propagated to the impacted end users by switching off the user interface of the relevant P2P LTs or PON ONTs.

Value or Application:

- The feature allows to signal to the end user that there is a connectivity failure higher up in the network, so rerouting actions can be taken by the end user's router.

7360 ISAM FX: Untagged traffic & Tunnel support (R6.0)

Feature content:

- Support for untagged traffic (NNI) with:
 - Ability to specify a PVID
 - Application of default p-bit marking
 - Application of DSCP to p-bit alignment
- Support for tunnel mode (NNI) with ability to attach "any" VLAN port for both S-VLAN-CC and S-VLAN iBridge modes. The feature also provided the ability to define "exceptions" by creating a list of C-VLAN ports attached to different forwarders than

the tunnel.

Value or Application:

- This allows the SFP ONT VEIP NNI bridge port configuration to support a DPU independent of the number of subscriber ports it serves.

7360 ISAM FX FELT-B: Cross-LT LAG extension to 8+8 ports for NNI (R6.0)

Feature content:

- In previous releases, on FELT-B the feature “cross-LT A/S LAG” was implemented. It allows to set up a cross-FELT-B LAG, i.e. between two FELT-B boards that are in 2 adjacent slots. The feature was introduced for Uplink, NNI and UNI.
- In R6.0, in NNI operation mode, it becomes possible to configure 8+8 ports in one LAG, with the possibility to enable either a revertive or a non-revertive switching operation mode. In addition, a LAG degrade alarm is provided.

Value or Application:

- With 8+8 LAG, up to 80G per LAG can be offered in NNI mode.

7360 ISAM FX: S+C VLAN cross-connect without MAC storage (R6.0)

Feature content:

- The feature concerns, for instance, operators who want to assign an outer-tag at OLT level, to a set of Business VLANs. The outer-tag, which identifies the wholesale operator who leased out the Ethernet pipe, serves to route to the respective servers of this wholesale operator. E.g. a video operator, or a storage cloud service operator, a Wifi service operator are identified by a one specific outer tag.
- In more technical detail, the feature introduces support VPLS service with S+C QnQ SAPs. As part of introduction of S+C QnQ tagged service, only cross-connect mode is supported (i.e MAC learning is not supported on S+C QnQ SAPs).

Value or Application:

- Customer can use ISAM as NNI interconnection point whereby S+C cross-connects can be used to switch traffic of wholesale operators to their respective networks.

7360 ISAM FX: IS-IS level 2 support (R6.0)

Feature content:

- IS-IS (Intermediate System to Intermediate System) is a routing protocol designed to move information efficiently within a computer network, a group of physically connected computers or similar devices.
- This feature adds support of the IS-IS Level-2 protocol on IES (Internet Enhanced Service) routers. It enables both support for Level1 and Level2 IS-IS router interfaces.

Restriction:

- IS-IS is supported only on IES routers.

Value or Application:

- Operators have service provider network(s) with IPv4/v6 aggregation routers in the IS-IS Level-2 area. To interconnect to OLT, they can now directly use the IS-IS Level-2 area. As such, it is no longer necessary to create an IS-IS Level-1 configuration in the aggregation routers just to be able to interconnect to OLT.

Proper selection of source-IP for FTP as per configuration (R6.0.01)

Feature content:

- When operator uses ftp for upgrade and voice xml download file operations, the source-IP used is always the lowest IP interface address of base router (rather than the management interface). This causes upgrade of new image for 7360 ISAM FX shelf (from operator network management system) to fail. It also causes failure of all file transfer operations (for example to download any configuration file from external server).

Requirements:

- When user selects the source-ip using the existing command “configure system security source-address <system | loopback <intfname> | interface >”, the source-IP address chosen should be used for FTP operations (subject to operationally up status of the chosen interface)

Value or application:

- This feature now allows setting up of IPv4 system-IP address on the ISAM.

Mirror enhancement and packet capture for IHUB based NTs (R6.0.01)

Feature content:

- Allow user to setup IP or L2 ACL filters to select a set of traffic flows (which could map to a PON line or particular subscriber equipment or subscriber or IP subnet etc.) and mirror them to be stored locally in a file.

Restriction:

- A limit of 6000pps is applied to filtered traffic being mirrored and monitored.

Value or Application:

- Allow user to selectively mirror and monitor traffic from subscriber equipment and store them locally for later retrieval to external server for failure analysis.

Ability for Neighbor routers to retain routes to ISAM during restart (Graceful restart) (R6.0.01)

Feature content:

- Allows user to configure graceful restart router helper role for OSPF, BGP to help the uplink aggregation routers which support graceful restart mode (during maintenance) to retrieve routes to respective access network subnets from OLTs which support graceful-restart helper role.

Restriction:

- Only OSPF, BGP IPv4 routes are supported for graceful-restart helper mode.

Value or Application:

- Allows operator to schedule maintenance/upgrade of aggregation nodes without losing routes to OLTs and respective subscriber access networks and MDUs.

Clock Domain

SyncE freq sync on 7362 ISAM DF-16GW/SF-8GW (R6.0.01)

Feature content:

- The customer expects Freq timing sync for TDM service emulation and MBH on the 7362 ISAM DF/SF.
- Support of SyncE with SSM_QL for frequency synchronization on uplink interfaces and xGPON ONT interfaces, Feature parity with 7360 ISAM FX.
- Support on cascading topology, including ring, star, daisy-chain, etc. //For star, daisy-chain, etc., if it is not ready on 7362 ISAM DF/SF yet, the function can be taken when star/daisy-chain introduced.
- From OLT to the UNI interface to smallcell, or from OLT uplink to uplink interface, The frequency performance follows G.8261/G.8261.1/G.8262 standard.

ONT dependency:

- GPON = G-080P-P, G-010S-B and U-050X-A with GPON uplink module
- Universal NG-PON = ONU U-050X-A with XGS-PON uplink mode and ONU U-050X-A with XG-PON1 uplink mode. The solution with tuneable TWDM-PON (NG-PON2) will be covered by another OLT RCR

Value or application:

- SyncE related MBH services can now be extended to DF-16GW/SF-8GW. This feature extends the support already available on 7360 ISAM FX to 7362 ISAM DF-16GW/SF-8GW.

Security Domain

Enable and disable FANT-G Micro USB port via CLI commands (R6.0.01)

Feature content:

- The micro USB on the front plate of FANT-G is open with only a hardcoded password as protection.
- Request to provide CLI and application support to enable/disable this USB interface
- Enable/disable state must persist across reboots
- New CLI command "configure system security debugusb" can be used to "enable/disable" the port.

Restrictions:

- DB changes required for persistence
- Scope is only "configure" command, no "show" command needed.
- Command is only available for the following variants of FANT-G which have undergone CPLD update:
 - For ETSI FANT-G "3FE71256AA" ICS 01 MR 05 or above
 - For ANSI FANT-G "3FE71256BA" ICS 01 MR 07 or above

Value or application:

- Adding functionality to CLI to enable and disable MicroUSB port satisfies security requirement from customers.

Troubleshooting

Reset root cause Analyzer and TS-File for Fiber NTs (R6.0.01)

Feature content:

- Continuation of the troubleshooting tools available in previous releases. Excludes automatic or commanded file TRANSFER to external server from ISAM Management Interface
- automatic or on-demand transfer to external ALU server via CLI is subject to a follow-up RCR
- Excludes operator-commanded file GENERATION from ISAM Management Interface on a running system

Restrictions:

- Focus is on CRASH scenarios only
- Excludes development of a dedicated off-the-shelf TS-file parser
- Platform Scope: NANT-E/FANT-F/FANT-G
- For LTs and Legacy NTs refer to the CRN document for previous release.

Value or application:

- Key benefit for this feature is for support organisations to troubleshoot faults based on TS-files.

Protocol Tracing on XGS-PON ports (R6.0.02)

Feature content:

- Enable Protocol Tracing for DHCP, DHCPv6, ARP and IGMP messages on XGS-PON ports of the FWLT-B board
- Supports syslog message types tracing1, tracing2 and tracing3

Restrictions:

- Only supported when the FWLT-B is configured in gpon-managed-ngpon mode; not supported when the FWLT-B is configured in ngpon mode
- No support for syslog message type tracing4

Value or application:

- Enables the same level of troubleshooting on XGS-PON ports.

Voice Services Domain

ISAM-V H248 MG: Multi-core NT board (FANT-F and NANT-E) as server board Ph1 (R6.0)

Feature content:

- This feature allows ISAM-V to run the H248 MG at the Virtual Voice Packet Server, planned as virtual LT board at the multi-core NT board (FANT-F and NANT-E) using core2/3, and H248 POTS voice service feature parity with the existing physical NVPS-C.

Restrictions:

- VVPS redundancy is supported except
 - Hot switchover is not supported, i.e. established call can't be kept during switchover.
- Please refer to the voice package performance section for VVPS performance.

Value or Application:

- The key benefit of the virtual voice packet server is that it allows for a higher density (there are no longer LT slots required to plan and insert the physical voice packet server (pair)), which can increase density for both POTS and/or Combo services.

ISAM-V/7363 ISAM MX/7367 ISAM SX/DX SIP: TCP support for multiple TCP connections (R6.0)

Feature content:

- TCP is supported as underlying protocol for SIP signaling.
- Autoswitch from UDP to TCP is supported in case the UDP message size exceeds a configurable threshold.
- TCP is supported for single as well as multiple VSG (wholesale) network topologies.

ISAM-V SIP LSA NVPS-C: Multi-core NT board (FANT-F and NANT-E)
as server board (R6.0.01)

Feature content:

- The Local stand-alone SIP server (SIP LSA server) can run at the Virtual Voice Packet Server (VVPS), planned as virtual LT board on top of the NANT-E/FANT-F multi-core NT with full feature parity compared to the SIP LSA server running at the physical Voice Packet Server (NVPS-C).

Value or Application:

- Running the LSA SIP server at the virtual voice packet server (VVPS) allows for a higher density (there is no longer a physical LT slot required for the NVPS-C), which can increase density for both, the POTS the ISDN PRI voice service and/or Combo services.

NIAT-A: number screening and number mapping DSS1-SIP (R6.0.02)

Feature content:

- This feature will enhance the NIAT-A ISDN PRI number screening and number mapping functionalities.

Restrictions:

- When PBX is locally configured by national numbers (Unknown format, real type is national, eg: 053288615306), also at MSAN-PRI & IMS-core the PUIDs should be configured in national format.
- When PBX is locally configured by international numbers (Unknown format, real type is International, eg: 008653288615306), also at MSAN-PRI & IMS-core the PUIDs should be configured in international format.
- When PBX is locally configured by short number (eg: 5306), at MSAN-PRI & IMS-core the PUIDs could be configured in international/national format.

Value or Application:

- With the enhancement of ISDN PRI number screening and number mapping, NIAT-A can provide more flexibility on the number screening and mapping areas to interoperate with different type of ISDN PBX, which will help customer for a smooth deployment.

Interop Domain

Untag support on 7362 ISAM DF/SF NT uplink port (R6.0.01)

Feature content:

- In certain customer deployments requirement may exist to transfer untag management traffic from 3rd party's device (EDFA) via outdoor 7362 ISAM DF/SF.

Requirement:

- EDFA can support untag management traffic (alarm) only with UTP interface (100M/1G speed).
- Require transferring the untag management traffic from 7362 ISAM DF/SF to upstream AN switch via tagged mode.

Restriction:

- Only available tested for the following target platform:
 - OLT type: 7362 ISAM DF/SF
 - ONT type: Nokia G-241W-A, ZTE F668/F612C, Humax HP3310-L2VR.

2.3 Feature Change

Change of the System Vendor ID; from R5.8 on, the System Vendor ID has been changed from "ALCB" into "NOKB" on xDSL cards for ISAM FD/FX/MX and on 7367 ISAM units.

2.4 Feature Discontinuation Announcements

- ▶ The ANCP/L2CP implementation was according to the pre-standard ieff-draft-wadhwa and did not evolve to the standard RCF6320. From R5.1 onwards, ANCP/L2CP is not supported anymore.
- ▶ Inverse Multiplexing for ATM (IMA) feature will not be supported on the new SHDSL line cards (NSLT-C and NSLT-D). Therefore we advise customers not to start using IMA.
- ▶ 7357 ISAM FTTB SEM has been discontinued since some time and has not been documented anymore from R5.5.01 on.
- ▶ External Metallic Test Access (MTA connection to external test head) is no longer supported since R5.6 on. Revert to alternative integrated test solutions (DELT/SELT, NBLT, MELT).
- ▶ The optic XFP modules 3FE-53971-AA/BA are no longer supported from R5.6 on. They have been replaced with support improved modules 3FE-46232-AA/BA.
- ▶ Whereas EPON/DPoE is mentioned in the customer documentation, the support for EPON/DPoE has been discontinued since R5.7.
- ▶ From R6.0 on the support of the RPNI-C board on the 7363 ISAM MX-6 product has been discontinued.

2.5 R6.0.02 Corrections/Improvements

Nr	Id	Rel. note entry
7363 Equipment		
1	ALU02544578 (1-7382066)	Title: RANT-A: Incorrect reported temperatures when temperature goes below 0 Problem: Incorrect reported temperatures on RANT-A cards. Sensor 6 on NT-A report nonsense temperature 254/255 degrees Celsius when temperatures outside are below 0 degrees Celsius.
2	ALU02570039 (1-7403130)	Title: 7363 ISAM MX-6: Incorrect temperature measurement on RANI-A Problem: RANI-A (NT-B) on outdoor cabinet reports -29 when outside temperature is about -1 degree Celcius.
3	ALU02573471 (1-7519208)	Title: 7363 IFAN manager is wrongly taking into account NT-A sensor 6 to compute temp margins Problem: IFAN manager is wrongly taking into account NT-A sensor 6 to calculate the temperature margins. So, 25 degrees margin is never achieved for NT-A sensor 6 and fan is driven to spin at max speed.
7367 TL1		
4	ALU02567963 (1-7394469)	Title: Issue with ENT-LOGPORT::VDSLPORT command Problem: The ENT-LOGPORT::VDSLPORT command give an error on the 7363 ISAM MX and is not working.
Ethernet		
5	ALU02552737 (1-7409130)	Title: NELT-B boards restarting continuously when E1 is not plugged to SFP Problem: NELT-B boards are restarting continuously (every 48 minutes) when E1 cable is not connected to SFP's.
6	ALU02565344 (1-7486005)	Title: NELT-B ports running at link speed 100M instead of 1G when connected to Fritzbox 5490 CPE Problem: Interop issue with between NELT-B and Fritzbox 5490. When CPE is powercycles or fiber cut the link comes up with 100M in every alternate attempt. Software change has been implemented to resolve the issue.
Equipment		
7	ALU02541125 (1-7304475)	Title: Fan alarm appearing after migration from R5.0 to R5.5 Problem: After upgrade of the nodes from 50.434 to 55.613, a fan alarm appeared for the all SEM equipment. When the alarm is deleted, it appears again after a hot reset of NT.
8	ALU02547295 (1-7444315)	Title: Wrong alarm after uplink port no shutdown Problem: When "uplink port no shutdown" set, the system issues alarm "Host downlink SFP is not detected" rather than "Uplink SFP is not detected"
9	ALU02556836 (1-7215883)	Title: OLT RX optical measurement reports unsupported value Problem: In some cases the RSSI data "OLT RX optical measurement" reports "unsupported". Issue is reported on NGLT-A and FGLT-A LT boards and the issue is also spread over different SFP vendors.
10	ALU02559604 (1-7488638)	Title: Can't retrieve optics parameters on FGLT-B boards running R5.7.02c

		Problem: Resource isolation impacted due to I2C error. Optics parameters are unavailble on FGLT-B boards running R5.7.02c when clock is malfunctioning causing I2C interrupts from slots to be missed when there is no SFP plugged in.
11	ALU02546288 (1-7443111)	Title: NANT-D uplink LED status issue Problem: NANT-D LED in the front panel of the board is off even though the NANT-D uplink is operational up and traffic is OK.
12	ALU02571950 (1-7435493)	Title: There are some junk characters being displayed in OLT rack serial number field Problem: There are some junk characters being displayed in OLT rack serial number field like STRING: "YP1526U19A5----".
G.fast		
13	ALU02461639 (1-6294651)	Title: G.fast sync issues in Paper cable with 22 -106 Mhz spectrum Problem: In G.fast, some sync problems on high Xtalk cables (flat cable, paper cables) are detected when the 22-106MHz spectrum was used. Pilot tones get corrupted by these high crosstalk conditions.
GPON OLT		
14	ALU02516492	Title: No color awareness in FANT-G in case of congestion Problem: Upstream packets are colored with a trtcm (2rate-3color) profile with an action to set the CFI (or DEI) bit at user side (for instance, FELT-B/FGLT-B/FWLT-B boards). In case of congestion, OLT should discard the Red & Yellow colored packets in preference over Green Colored packets. However, OLT discards packets of all colors without preference. This can cause drop of Green/Yellow Colored packets during congestion.
15	ALU02572677	Title: CPU load is high in FGLT-A and NGLT-A with pre-provion 1K ONTs and 8k Vlanports Problem: CPU load is high in FGLT-A and NGLT-A with pre-provion 1K ONTs and 8k Vlanports. Two functions used in 0.5s alarm polling timer have performance issue resulting in high CPU load when system is configured with large number of ONTs.
16	ALU02544244 (1-7420970)	Title: ISAM slow responsiveness during AMS inventory collection Problem: When an inventory collection is triggered, ISAM might respond slowly caused by extreme high CPU load.
17	ALU02575324 (1-7536233)	Title: DHCP failed on FELT-B following activation/migration to R6.1 software on 7360FX Problem: It has been observed during both activation and migration to R6.1 software on FX, that DHCP is unable to lease IP address from the configured pool for FELT-B.
18	ALU02545270 (1-7424275)	Title: FGLT-B forwards network side IGMP GSQ packets to user side even though IGMP proxy is enabled Problem: FGLT-B forwards network side IGMP GSQ packets to user side even though IGMP proxy is enabled.
19	ALU02550070 (1-7411949)	Title: PON auth-method loid-sn-slid causes ONT distance on LTP to fail Problem: When the flag "auth-method loid-sn-slid" is enabled, the ONT distance in "show equipment operational-data" displays the value "not-supported". The ONT is not configured using password, it's simply configured using serial number.
20	ALU02552520 (1-7440360)	Title: IPDR DHCP server on OLT was not assigning IP address to VEIP interface on ONT

		Problem: When ISAM migrates from R5.6.01a to R5.8.02a, IPDR DHCP server on OLT was not assigning IP address to VEIP interface on ONT.
21	ALU02554717 (1-7307166)	Title: NGLT-A reports PON LOK alarm with all ONTs on a PON Problem: NGLT-A reports PON LOK alarm (loss of sync) with all ONTs on one PON when the GLOB message are full.
22	ALU02556217 (1-7456822)	Title: ONT devices report OMCI alarm after upgrading from R5.2 to R5.7.02c Problem: Following OLT upgrade from R5.2 to R5.7.02c all ONTs connected to the OLT reported OMCI Alarm on TL1 namely "ONT fails to respond to OMCI message requests".
23	ALU02559220	Title: Always ONT INACT alarms during ONT provisioning Problem: ONT INACT alarms are raised during ONT pre-provisioning even before the ONT authentication, using Serial Number (SN) authentication, has been passed. This needs to be configurable.
24	ALU02567245 (1-7492855)	Title: ONT Mismatch Provisioning Alarm Problem: An ONT Mismatch Provisioning Alarm is observed on one ONT out of two ONTs on the same PON during LT card lock/unlock or ONT reset.
25	ALU02574765 (1-7475068)	Title: Daily BFMU collection failing on large setups Problem: Daily BFMU collection does not start when BFMU hourly collection has not finished.
26	ALU02543366 (1-7397732)	Title: System time may get set to an invalid value making the time display as 1970 Problem: In rare scenario, the system date can get set to a value less than 1970 preventing login from operators.
27	ALU02556620 (1-7435665)	Title: SFU ZTE F601 worked as HGU rather than SFU on 7362 ISAM DF Problem: SFU ZTE F601 worked as HGU on 7362 ISAM DF. If only 1 Ethernet PPTP reported, ONT should be treated as SFU type and configured for Ethernet PPTP for service provisioning even if VEIP is reported or not. Solution: When correlative CDE key is enabled and ONT has Ethernet card with only one port, it will always be regarded as an SFU, irrespective of the fact that it has VEIP card installed on it or not.
28	ALU02556840 (1-7478727)	Title: For 7362 ISAM DF, an alarm is raised for non-existent UNI port when Single ONT is provisioned on uni 2,3,4 Problem: No alarm should be raised for a non-existent but provisioned UNI port.
H248		
29	ALU02546792 (1-7377137)	Title: FAX ISDN CNG signal detected in notify message prior FAX negotiating Problem: About FAX calls for ISDN customer is requesting same call flow scenario regarding CNG reporting signal as POTS, on which reported is off. Anyway no issue detected about this fact (CNG signal detected during Fax process), only requested to homogenize both ISDN-POTS.
L2 Forwarding		
30	ALU02539837	Title: NELT-B DHCP task causes an exception after migration

	(1-7360421)	Problem: Migration issue was reported whne migrating from R5.1.02h (51.683) to R5.5.02h (55.605) on nodes with NANT-E and only NELT-B boards plugged in. Three problems scenarios were seen: 1) All NELT-B ports are offline, user SFP loss of signal 2) All NELT-B ports are ok but no single customer is able to receive an DHCP address. 3) no NELT-B config seen anymore in AMS but when asked with CLI all config is visible An additional reset of the NELT-B board will fix the issue. Note: above problem symptoms are not noticed in parallel, only one problem scenario in time. Software change was implemented to resolve the issue.
31	ALU02546991 (1-7370181)	Title: VLAN Port deletion took long time Problem: VLAN Port deletion took long time
32	ALU02548924 (1-7451011)	Title: Pbit & EXP bit handling on MPLS layer Problem: Pbit & EXP bits are all 0 on MPLS layer. Solution: Table based approach is modified to classify layer 2 QOS treatment or layer 3 qos treatment based on rules configured in the policy. If only Layer 2 rules are configured for a policy Layer 2 QOS will be applied otherwise Layer 3 QOS will be applied.
33	ALU02575619 (1-7398112)	Title: ISAM MAB behavior incorrect in case TLS is preferred EAP method on server Problem: ISAM should reply NAK when receiving a request without MD5-challenge, but it didn't reply NAK
L3 Forwarding		
34	ALU02537905 (1-7382947)	Title: One node of multiple rings was not reachable Problem: Packet drop is observed in VPLS service running multiple rings. Solution: As multiple rings per service is not allowed, CLI restriction is added to make it apparent to the user.
35	ALU02543837 (1-7430825)	Title: SAP LAG is operational down and CCM messages got dropped at the network port Problem: When MEP is configured on ETH-RING's LAG SAP between ISAMs which has system mac in closer range, LAG port MAC address conflict with peer ISAMs port MAC, CCM packets are dropped through lfpSrcMacDrop filter in peer ISAM and hence CCM connectivity is not established.
LineTest		
36	ALU02532389 (1-7361557)	Title: MELT Measurement Error with R=1M2 Problem: When measured by the MELT method, when diode and resistor are wired between wires a, b, and R> 1M, there is a measurement error of the resistor. The value of the resistor is approximately twice the value. The resistor is also shown in the leakproof diode direction. Test with a standard R = 470k, everything is OK.
Migration		
37	ALU02544535 (1-7419499)	Title: FANT-F upgrade fails with insufficient disk space alarm Problem: The FANT-F upgrade from R5.8 to R6.0 or from R6.0 to R6.0.01 fails with an insufficient disk space alarm. The system can't download the LT SW during the migration process if we plan a new LT card. Solution is to increase the size of SW storage portion (from 200 Mb to 500 Mb).
38	ALU02552472 (1-7444082)	Title: Migration fails from R5.5.00d to R6.0.01 related to the voice configuration on 7360 ISAM FX nodes Problem: Migration fails from R5.5.00d to R6.0.01. The migration database is successfully generated by the PBMT tool, but the 7360 ISAM FX node fails to start up with the new database.
39	ALU02561951	Title: Fatal error with PBMT in R5.5.02f package

	(1-7034483)	Problem: The ISAM R5.5.02f PBMT package, gives some errors. When the swdl.pl and migrate.pl tools are used along with the option --seelog together with a --hosts file, we get many errors and no separate logs.
40	ALU02568961 (1-7511277)	Title: Rollback script fails for 7363 on PBMT 3.3.97 Problem: During rollback testing via PBMT tool, rollback fails due to incompatible NT error.
41	ALU02567989 (1-7480632)	Title: EFM ports are administrative down in NANT-E Problem: EFM ports are administrative down in NANT-E. Existing ports migrated to R6.0 via PBMT: PBMT must set existing EFM ports for VDSL and SHDSL EFM to admin-state up.
Multicast		
42	ALU02565222 (1-7501762)	Title: Multicast traffic recovery is not happening after ONT reboot in S+C tunnel mode Problem: In S+C tunnel mode, after G-010G-P ONT reboot, the multicast traffic will be interrupted and cannot be recovered.
NT		
43	ALU02543378 (1-7406365)	Title: In one particular FANT-G + FWLT-B set up, it was observed that both NT reset after mirror create and delete operation was performed Problem: In one particular FANT-G + FWLT-B set up, it was observed that both NT reset after mirror create and delete operation was performed. Software solution has been implemented to fix the issue.
44	ALU02559134 (1-7380618)	Title: Error record is observed during removal of the active NT Problem: NT redundancy is triggered by removal of the active NT. In one specific case, when standby NT switches from standby to active, immediately below PXFS NON_RECOV error record is observed.
OAM		
45	ALU02544940 (1-7335577)	Title: VLAN-counters from few ports of NDLT-K via SNMP can not be retrieved Problem: Some vlan-counters can not be retrieved from some random ports of NDLT-K via SNMP. Further investigation shows that these are not available from CLI and the command output always displays 0 bytes.
46	ALU02551632 (1-7403914)	Title: Can not retrieve DHCP relay counter Problem: No results from BFMU/snmpwalk on extDhcpRelayPortStatsSumTable
OtherOAM		
47	ALU02563605 (1-7408088)	Title: System reboot during TACACS based SSH Session Problem: System may reboot during SSH Session using a TACACS Authenticated user, if the SSH Client uses abnormally high Columns or Row values.
Redundancy		
48	ALU02564761 (1-7490146)	Title: NT loss-swo-cap alarm raised and cleared in 0 second Problem: NT protection failure (loss-swo-cap) alarm could be raised and cleared within the same second.
SIP		
49	ALU02537223 (1-7341041)	Title: NBLT NPOT-B is reporting ppfailure status in all ports, port have no dial tone

		Problem: When performing from NA-C a narrowband line test (NBLT test) on a specific NPOT-B provisioned on the 7302 FD ISAM 5302e, the resulting parameters obtained for any voice ports provisioned on the line card yield a result of 0. issue remains into persistent pfailed status (some times without dial tone, no detecting off hook due to issue)
50	ALU02548758 (1-7404203)	Title: VoiceSip PORT 163TR26 Call status P0 Problem: After Upgrade to 5.6.02g from 5.3.02k, that the sip port state is P0 (163TR26 Call status). P0 state means=not Created which is not true because the issue is affecting newly created ports.
51	ALU02571641 (1-7503024)	Title: Hotline is delayed and immediate Problem: Hotline not working until the user is locked/unlocked
Security		
52	ALU02536724 (1-7323198)	Title: 802.1x re-authentication failure Problem: The 802.1x client failed to re-authenticate after multiple attempts to switchover.
53	ALU02546294 (1-7398107)	Title: Wrong format for Calling-Station-ID in 802.1X Problem: The ISAM uses the hex format for Calling-Station-ID in 802.1X instead of ASCII (which is specified in the standard).
TL1		
54	ALU02536716 (1-7361047)	Title: Wrong TL1 display Problem: RTRV-DOMAIN count shows 1551 while actual users shown by command show security pae authenticator are 83
55	ALU02554732 (1-7467060)	Title: Cannot edit serial number NOK1AE88C167 from TL1 Problem: When using TLI command to change ONT serial number where digits are included in first four bytes, it always fails. For example when serial numbers starting with NOKK or ABCD are used, the TL1 command completes successfully whereas when NOK1 or NOK2 is the used it fails. No such issue when using CLI or TL1 creation command.
VDSL		
56	ALU02570814 (1-7217486)	Title: "Missing vectoring gain' issue not solved in R5.5.02h Problem: Missing vectoring gain problem still continues with the new release 5.5.02h
57	ALU02536870 (1-7199386)	Title: RDLT-C wrong hlog measurement in US. They are correct with RDLT-E Problem: Customer is complaining that RDLT-C hlog results measured in lab (ideal environment) are wrong and hlog is crossing +3db tolerance (measured by spectrum analyzer). Customer presented measurements containing results for 35b using CPE Comtrend NL3121 and Nokia F-010-GB against RDLT-C, both have results crossing +3db tolerance.
58	ALU02554998 (1-7451485)	Title: NDLT-K bonding error while provisioning through the TL1 GW Problem: Issue on the provisioning of the cards NDLT-K using the TL1GW, more specific when provisioning the bonding groups
59	ALU02575270 (1-7288847)	Title: Many resyncs due to to framer settings not correct Problem: Customer is complaining that there were a lot of re-synchronizations when vectoring is activated
XDSL		
60	ALU02563673 (1-7432739)	Title: The port number is observed correctly from CPE after the LT reboot or re-initialization of the system Problem: The port number is observed correctly from CPE after the LT reboot or re-initialization of the system

XGPON		
61	ALU02546595 (1-7426728)	<p>Title: For XGSPON Type-B protection, unqualified group (255) speed up the memory leak</p> <p>Problem: NT reboot due to memory leak issue in the case of Type-B protection scenario with unqualified group (255). Short term solution is implemented where LT will return 0 iso 255 for LT Sysmac. Long term solution will be planned in a future release.</p>

2.6 R6.0.01 Corrections/Improvements

Nr	Id	Rel. note entry
7363_L2 Forwarding		
1	ALU02522682 (1-7358156)	<p>Title: Hot reset triggered by extensive DHCP usage</p> <p>Problem: Hot reset triggered by extensive DHCP usage (after approximately 7 days).</p>
2	ALU02524209 (1-7208275)	<p>Title: Triple tagged traffic blocked between RANT-A & RANI-A</p> <p>Problem: When connecting the RANT-A to port nt-a:xfp:1 and the RANI-A to port nt-b:xfp:1, we observe that triple tagged traffic gets blocked in downstream.</p>
7363_OAM		
3	ALU02507120 (1-7142685)	<p>Title: Slow Navigation on 7363 ISAM MX with 6 RDLT-A's</p> <p>Problem: When there are RDLT-A's in the 7363, we face an issue where the download speed is going down for a lot of lines spread over all the LT board. After a reset of one of the LT's the problem is gone for a while, but is coming back after a couple of hours, sometimes days. When the 2 RDLT-A's are replaced by 2 RDLT-Bs, it looks like the problem is solved definitively. When the problem is present we see there are a lot of lines which are having discard packets in queue 0.</p>
4	ALU02522684 (1-7358156)	<p>Title: Hot Warm reset breaking the ZTP loop</p> <p>Problem: A hot or warm reset causes the ZTP DHCP discovery loop to be broken.</p>
7367_Equipment		
5	ALU02513539 (1-7129958)	<p>Title: Values given for show equipment power detail for SX-48U are not correct</p> <p>Problem: In-voltage, in-current, in-power values from CLI command (show equipment power detail) for SX-48U(CDAS-C DC-variant) are not correct.</p>
7367_L2 Forwarding		
6	ALU02475657	<p>Title: Convergence is taking more than one second for one of the rings when four or more rings are configured in the ISAM and path switchover is triggered</p> <p>Problem: Four rings are configured and RPL end is same for all the four rings. 8K mac addresses are learnt on each ring, thereby 32 K mac addresses per ISAM for all the rings together. Now the path SWO is triggered. During this time one of the rings converge taking more than one second. This happens inconsistently. With lesser mac addresses (say 10 K mac addresses), or lesser rings, issue is not seen.</p>
ADSL		
7	ALU02532412 (1-7345663)	<p>Title: ADSL actual speed is not matching with value limits in the assigned service profile</p>

		Problem: Some lines which ADSL actual speed are not matching with value limits in the assigned service profile.
CLI		
8	ALU02524615 (1-7086604)	Title: Upload Failed alarm is not reported in CLI Problem: When running a file transfer, which fails, the Upload failed alarm is not raised in CLI and not seen in the alarm table. There is however a notification and the same alarm is raised when using TL1. This alarm is however documented in the Alarm guide.
Equipment		
9	ALU02468948	Title: NDLT-K in NRNT-A remote shelf goes for continuous Plug-Out, Plug-In on LT power down event Problem: On powering-down NRNT-A remote shelf LT's, continuous alarms will be notified in ISAM CLI for continuous LT Plug-Out and Plug-In
10	ALU02502000 (1-7281888)	Title: Command "configure equipment slot" is applicable to all boards Problem: In the CLI Command Guide for FD 24Gbps NT on the manpage, for the command "configure equipment slot", the field "alarm-profile" is stated applicable only to REM & SEM boards. It however also applies to classical 7302/7330 NTs, such as NANT-A or NANT-D.
11	ALU02516978 (1-7294104)	Title: NT resets when a ssh session to ONT is setup and try to ping the gateway IP Problem: NT resets when a ssh session to ONT is setup and try to ping the gateway IP
GPON OLT		
12	ALU02492315 (1-7209499)	Title: P bits and EXP bits wrong after FANT-G reset Problem: MPLS pbits and EXP-pbit from ISAM in Upstream are not as expected instead of individual ones for each service.
13	ALU02495524	Title: In A2A scenario, active CP became down unexpectedly and reported alarm Channel Pair Loss of Signal Problem: In A2A scenario, active CP became down unexpectedly and reported alarm Channel Pair Loss of Signal.
14	ALU02495684 (1-7188979)	Title: OMCI communication failure issue on all ONTs connected to GPON port Problem: When AES is enabled, it may rarely happen that all ONTs under one PON port report OMCI communication failure alarms and cannot be arranged. Issue can be recovered by disabling AES. New debug capacities in Martini FGPA AES module is added as the delivery.
15	ALU02509276 (1-7306282)	Title: Slowness on AMS when FELT-B boards are inserted Problem: When FELT-B boards are inserted in the shelf, loading of the navigation tree on AMS Gui will take longer duration (e.g. 20 seconds). This issue does not exist in case no FELT-B is inserted.
16	ALU02511402 (1-7316496)	Title: Active FANT-G exceptionally reboot due to CORE-1 crash Problem: Active FANT-G will issue exceptionally reboot when standby NT cannot respond dynamic data synchronization messages for a limited time.
17	ALU02515529 (1-7279274)	Title: Nokia 7360 FG5.8.01- FGLT-B PON card not functioning after R05.8.01 upgrade Problem: Lab observed that A single FGLT-B PON failed to boot after the 5.8.01 upgrade. The shelf was equipped with 12 lines cards. Only the FGLTB in slot 16 failed to boot. FGLT-B Card was not recoverable.
18	ALU02522431 (1-7362391)	Title: To report dimension error when user configures the 129th ONT iphost on FWLT-B board

		Problem: When user configures the 129th ONT iphost on FWLT-B boards, there is one error indicating that max services per PON has been reached and operate to config lp host Service failed.
19	ALU02486275 (1-7236976)	Title: VAMS reported 7360 ISAM FX-8 migration failure from R5.02.02i to R5.07.02a Problem: VAMS reported 7360 ISAM FX-8 migration failure from R5.02.02i to R5.07.02a. The database was migrated without any issue but failed to activate. But the logs show that the snmp set did not get valid response. The ISAM actually came up with the correct load.
20	ALU02491089 (1-7154939)	Title: FELT-B restarts when fanmode (ifan) is changed to Protect Problem: There is an issue regarding the protected fan mode. After configuring the fan-mode in protect mode, the FELT-B went in continuous resets due to a "high temperature" alarm condition. Returning to fan mode classic solved the issue, but protected mode is the target fan mode. Also the BFAN-X 3FE66544AA "Intelligent fan unit for FX-4" is installed in the FX-4.
21	ALU02491913 (1-7178882)	Title: Creation of 15 minute's BFMU result file failed Problem: When BFMU generates a new result file while the same file does exist in the same path /BFMU/15/, it will return failure and wrongly append the result in the previous file.
22	ALU02492797 (1-7249328)	Title: FGLT-B hot reset due to DHCP task Problem: FGLT-B hot reset due to DHCP task triggered by FET test (in combination with FANT-F and FGLT-B).
23	ALU02493772 (1-7247440)	Title: FANT-G: ihub drop igmp-query packet Problem: 1] When igmp-proxy is enabled, we internally enable igmp snooping. Here we are not allowing to configure igmp-snooping externally at service level, But at SAP level we were not blocking it. So, when someone enabled, snooping at SAP level and then if they are disabling it, it is removing snooping instance created internally. So, user should not enable igmp-snooping at service/SAP level on proxy enabled VLAN. 2] When migrating from older release, If we have enable snooping on proxy enable VLAN (Invalid configuration) then migration fails and ISAM will go for default-DB.
24	ALU02495143 (1-7248858)	Title: Dual FANT-G NT switchover fail from NT-A to NT-B Problem: NT redundancy scenario, To pull out active NT, standby NT should execute hot reset but execute warm reset instead with low possibility.
25	ALU02496013 (1-7184711)	Title: SDC bulk on FX not working Problem: After 7360 ISAM FX NEs migrated from 5.6.01b to 5.6.02d, Issues were observed in the SDC R9.6.04 bulk daily collection with the resulting .csv file (xdsLine.csv) having nearly all attributes populated as empty: "Instance Unavailable".
26	ALU02496093 (1-7258245)	Title: FANT-G failed to startup Problem: After migration to higher release or burning CF with different release other than factory version, FANT-G might fail to startup due to ToD chipset firmware updating failure.
27	ALU02497584 (1-7168753)	Title: No service on some NELT-B boards after migration Problem: After migration, service of all ports might be lost on some NELT-B boards. It is caused by audit failure when a large amount of VLAN ports is configured.
28	ALU02499017 (1-7208387)	Title: Extremely slow performance when NE is supervised by AMS after migration Problem: After migrating to R5.6, loading NE tree on AMS will be extremely slow when many SFPs are inserted in GPON LTs.

29	ALU02500999 (1-7195301)	Title: No collection failure alarm from SDC for incomplete BFMU result file Problem: When the collection can not complete as a result of reaching the end of the interval duration, BFMU result file will be incomplete, however, 'Collection failure alarm' cannot be reported from SDC.
30	ALU02502824 (1-7284309)	Title: FANT-G NT-A auto power on reboot with fist log Problem: We met one FANT-G NT-A auto power on reboot event. The captured log indicates the POR reset to be highly related to SysRq.
31	ALU02505900 (1-7234383)	Title: GPON LT Software watchdog reset during AMS inventory collection Problem: During AMS inventory collection on PPPoE related tables, in case in configuration that VLAN port is not attached to forwarder, GPON LT might have software watchdog reset due to infinite loop.
32	ALU02506537 (1-7298936)	Title: FANT-G user service was affected after moving MDU device from one CP (with PG) to another CP (without PG) Problem: When we move an MDU from a protection group to another PON which doesn't have protection, then IPTV and HSI are not working for existing subscribers.
33	ALU02510424 (1-7293881)	Title: The case to download OSWP to Dual FANT-G boards failed by using 'user defined mode' Problem: Failed to download OSWP file to OLT by using 'user defined mode' via AMS on FANT-G dual NT setup. Same senario on single FANT-G and FANT-F dual NT set-up are both OK.
34	ALU02515757 (1-7338685)	Title: FANT-G reboots twice Problem: During FANT-G reboot it can happen FANT-G is rebooting a second time.
35	ALU02523771 (1-7299959)	Title: NT went for reset while executing commands via UDP TL1 sessions Problem: NT went for reset while executing commands via UDP TL1 sessions
36	ALU02525394 (1-7251329)	Title: Some ONTs will be ranged, though showing as inactive despite no alarm is present in AMS Problem: Some ONTs will be ranged, though showing as inactive despite no alarm is present in AMS. In case the channel-pair is configured with XGS oper-mode, GLOB will always override the 'localRemote' flag received from OBC in ONT configuration with the value 'local', value 'remote' being only applicable in NG-PON2 TWDM context.
37	ALU02473743 (1-7187866)	Title: Operator with read only rights is able to modify CPU filter Problem: Operator with read only rights is able to modify CPU filter on 7360 ISAM FX product.
38	ALU02498124 (1-7270642)	Title: The CLI Count Filter command command is not supported on iHub command Problem: The CLI Count Filter command is not supported on iHub command.
39	ALU02503239 (1-7189536)	Title: NGLT-C reset with OMCI memory exception error Problem: In some special case, NGLT-C may reset with OMCI memory exception error.
40	ALU02505916 (1-7271772)	Title: 'USBWPROFID' range in TL1 doesn't align with specification Problem: The range for 'USBWPROFID' and 'USBWPROFEXTID' doesn't align with specification, it should be '0 ...1500'.
41	ALU02512057	Title: No access to peer NT

	(1-7311577)	Problem: When a user tries to collect trace and debug data one of the NT's becomes inaccessible for trace and debug access.
H248		
42	ALU02519019 (1-7323619)	Title: Voice configuration loss on an NVPS cluster after NT switchover Problem: Issue has been linked to the H.248 termination configuration process. The H.248 termination configuration is saved in two separate databases tables (UPSL_UP and upTCATable). When adding or removing a H.248 termination of one of these tables would be unsuccessful, these two tables could become inconsistent. This would then lead to losing the complete H.248 Voice database after an NT switchover or NT reset. A preventive check was added that will avoid this database inconsistency.
43	ALU02521776 (1-7333797)	Title: FAX calls to ISDN BRA user not working on ISAM-V after migration Problem: For H.248 customers, due to changes in the UDP port ranges in more recent SW versions, FAX calls to ISDN BRA in may not work on ISAM-V after migration. It was required to extend the UDP port range also on ISDN BRA boards to resolve this issue. For every H.248 customer that migrates from a SW version prior R5.6.01 to a SW version > R5601, it should be checked that it contains this FR fix (cfr. via a clone FR)
L2 Forwarding		
44	ALU02530658 (1-7381453)	Title: ONU takes long time to obtain IPv6 address Problem: We are having the limit on number of allowed transactions (MAX 8000). So whenever we receive any request from Client side we will add the entry in database and increment the count variable and similarly while removing the transaction, we decrement that transaction count variable. When we receive the duplicate request from the client (here we are receiving request packet multiple times from client before server responds), we will try to remove the previous entry from Database and re-add the same. So in this scenario, While removing the entry, Count decrement code is not there but while re-adding the entry count is incremented again. So this way we are having wrong count value (because of missing count decrement). So when count is reaching maximum, we are dropping the packet in IHUB.
45	ALU02531312 (1-7363330)	Title: Eth-ring associated VPLS service failover issues Problem: When the VPLS is created with saps with different VLANs, non eth-ring saps are mapped to STG 1. In this default STG, the eth-ring ports are not in FWD state, this causes traffic drop.
L3 Forwarding		
46	ALU02512253 (1-7323528)	Title: Recreate ERPS ring causes NT reboot Problem: During the delete and recreate action of an ERPS ring, an NT reboot was observed. The NT switchover didn't succeed and the user had to reseal both NTs to take the system back. Repeat the procedure would suffer issue again.
LineTest		
47	ALU02515716 (1-7091505)	Title: NVLT-S MELT test failure due to Passive Test Terminator test failed Problem: The customer observed that during these MELT test failures occurs. Once MELT failures are occurring, it seems the issue remains persistent on the board.
48	ALU02524770 (1-729238)	Title: On NVLT-R, SELT test over an ADSL configured line shows inconsistent errors

		Problem: On NVLT-R, when executing SELT over an ADSL configured line, we see an inconsistent DSL line error, reporting startSELTFailed. The same test however succeeds consistently, when the line is configured in VDSL mode.
MPLS		
49	ALU02515901 (1-7333977)	Title: MPLS traffic discarded in the peer router when network interface configured with NULL tag Problem: When network interface is configured with NULL tag, MPLS traffic egressing from ISAM will have extra VLAN tag. This extra VLAN tag is not known to peer router. So ISAM originated MPLS traffic will be discarded by the router.
Migration		
50	ALU02495423 (1-7201808)	Title: Migration failure for CLI access through SSH Problem: When public SSH key has been generated in an old release, the migration tool may indicate that the operation failed but the actual result is successful.
51	ALU02511859 (1-7300312)	Title: 7363: Migration fails with LLUMngt consistency checking failed Problem: NMDWDP node fails to migrate to the new 5.8.00k release. Node database does not pass AMS consistency check, and therefore fails to migrate. The customer successfully migrated 10 other MX-6 nodes, using the same process, and this is the only one that has failed.
52	ALU02522184 (1-7268701)	Title: Umask option requested for PBMT tool to create files and directory Problem: Introduce a new field UMASK_OVERRIDE in param.cfg. PBMT Application will not perform any umask and chmod operation when UMASK_OVERRIDE field is set to N.
Multicast		
53	ALU02527996 (1-7322561)	Title: Default CPU filter action set to DROP causes user ip traffic to hit cpu queue 0 Problem: While configuring the system default CPU filter action to DROP it causes user ip traffic to hit cpu queue 0. In some load cases this might cause an overflow of the cpu queue 0 and resulting in wrong SLF (source lookup failure) packets counters.
NT		
54	ALU02525343 (1-7370051)	Title: IHUB-EXT-MIB libsmi compilation error Problem: IHUB-EXT-MIB is not loading into wireshark due to error in libsmi compilation. IHUB-EXT-MIB imports a INDEX object(svcVplsVlanId) from TIMETRA-SERV-MIB which has negative value. Negative INDEX is not allowed as per SMI standard so libsmi returns error
OAM		
55	ALU02531011 (1-7347033)	Title: SNMP V3 configuration of user lost during poweron reset Problem: Configuration of SNMP V3 user lost during poweron reset.
56	ALU02498901 (1-7203480)	Title: TL-1 counter BGRUNTIME is not working as expected Problem: There is a difference between running time outputs using Cli command (show xdsl-bonding operational-data group) and BGRUNTIME using TL1 command
SIP		
57	ALU02514804 (1-7240032)	Title: ISAM-V cannot handle call waiting call correctly Problem: Issue in a specific customer network, the Call Waiting call scenario was not working correctly in SIP Tightly Coupled mode. A correction has now been provided for this issue.

58	ALU02519621 (1-6351652)	Title: Route Header of Subscribe after Notify received with subscription state "terminated" is not correct Problem: When the subscription period for subscribed services (e.g. CFU service) expires, a new Subscribe message is sent towards the IMS, to which the IMS will respond with a SIP NOTIFY message with the subscribed services. However, when ISAM-V would receiving a SIP NOTIFY with the subscription state set to <terminated; reason deactivated> before the subscription period had expired, ISAM-V would send the next Subscribe messages with a faulty Route Header. This has now been corrected.
59	ALU02490902 (1-7239252)	Title: Database Restore failed due to corrupted SIP database Problem: A preventive fix was introduced to avoid SIP data corruption to happen during the creation of a new SIP termination. A corrupted SIP database itself cannot be recovered, the SIP data of impacted nodes needs to be re-configured
60	ALU02497366 (1-7056564)	Title: One-way-speech after HW upgrade of first-hop gateway Problem: After a HW upgrade of the first-hop gateway, the MAC of gateway was not updated accordingly by ISAM-V. Thus, the remote side could not hear the speech from the ISAMv subscriber. The ARP handling on the NPOT-B was updated to resolve this issue.
Synchronisation		
61	ALU02501587	Title: Non-TOD supported onu shows synced in CLI show command Problem: If register XS-020X-A ONU on 7360 GPON LT, input "show equipment ont operational-data tod-sync field displays yes, which means the ONT TOD has sync to OLT but ONU XS020X-A doesn't support TOD.
62	ALU02513168 (1-7210882)	Title: SYNC-E clock reference does not recover on 7356, when the pon is toggled Problem: When using the G-010S-B, the SYNC-E clock reference does not recover on 7356 after putting the pon down/up. ONT SFP is seated in the sfp port 1.
TL1		
63	ALU02505132 (1-7292958)	Title: Execute ED-XDSL for same line multiple times fails Problem: When executing TL1 commands multiple times to configure the same XDSL port (ED-XDSL) on FANTF used as an FX REM aggregator with xDSL cards, the first command is successful but the second one may return error.
VDSL		
64	ALU02508463	Title: Issue with slave link getting operational Problem: Without lines configured, slave link reporting is not proper on moving from enable to enable-both-link.
65	ALU02503641 (1-7233591)	Title: Interop sync issue between Sercomm Realtek CPE and Sagemcom Intel CPE Problem: In case of VDSL2 35b (NDLT-J board) when Sercom Speedport Plus coexists in the same Vectoring Group with Intel based CPEs (Sagemcom Speedport Plus, Fritzbox 7590), the Intel based CPEs do not synchronize at all. If we disconnect the Speedport Plus from the board, then the Intel based CPEs synchronize. In case of VDSL2 17a (NDLT-J board) the Intel based CPEs synchronize, no matter if Sercom Speedport Plus coexists or not in the same Vectoring group.
66	ALU02519043 (1-7349953)	Title: XDSL auto switch qos priority 0 was sometimes seen in PTM bridge

		Problem: Qos Policy was wrongly configured with vlan-tag. Corrected the same accordingly with qos policy.
67	ALU02526982	Title: Init failure of vectored VDSL2-35b line on VSRM-B SX-48U with max35mhzvectoring Problem: If one attempts to activate a VDSL2 line configured with a 35b spectrum-profile, and a vce-profile with vectoring enabled above 17MHz ("vce-max-vect-freq max35mhzvectoring"), then the initialization will fail, and eventually an alarm will be generated.
68	ALU02496216	Title: SX-48U with bonded uplink does not correctly report XTU-R equipment serial number Problem: The 7367 ISAM SX-48U is not correctly reporting its serial number to the VTU-O (CO-side) of an 8-pair xdsl bonded uplink.
VoiceServices		
69	ALU02518330 (1-7311937)	Title: No ring tone at FXO/FXS service and call is dropped after 20s Problem: No ring tone was observed for the FXO/FXS service, as the RFC4733 RTP event handling by ISAM-V was not fully per the IETF RFC4733 specification.
XGPON		
70	ALU02515253 (1-7293847)	Title: XGSPON POTS H.248 call fails due to QoS issues Problem: XGSPON POTS H.248 call failures (calls failed to establish, audio delay, static, one-way audio, packet loss etc.) when upstream HSI traffic is about to congest the channel pair. IPTV and VoIP traffic are not impacted.
71	ALU02525920 (1-7369329)	Title: After system reboot (SW upgrade, power outage, ...), with XGS type-B protection groups configured, and when one of the channel-pair of the protection group has a BER not allowing any ONT to range in a stable fashion, hunt-mode mechanism can get blocked, preventing ONTs to range successfully Problem: This issue concerns a corner case during system startup. In case one of the channel-pair in the protection group is having unacceptable high BER resulting in unstable ONT ranging (PONLOS alarm continuously being raised and cleared), the protection group might enter hunting mode, and hunting mode itself might get blocked and lock on the channel pair with the high BER. As a consequence, ONTs won't be able to range stably.
72	ALU02514844 (1-7273788)	Title: WTD XGS optics module: noise on Rx pair is easy to pass preamble check Problem: To do type-B SWO with WTD optics, SWO will fail as some ONT will inactive for a while as WTD optics is more easier to generate preamble/delimiter alike noise
73	ALU02529788 (1-7338671)	Title: Wrong OMCC Version reported by FWLT-B channel-pair over XGS-PON OMCI Problem: Wrong OMCC Version reported by FWLT-B channel-pair over XGS-PON OMCI

2.7 R6.0 Corrections/Improvements

Nr	Id	Rel. note entry
7363 Equipment		
1	ALU02465409	Title: Some installed RFLT-E boards do not get enabled

	(1-7118158)	Problem: In rare conditions, newly installed/planned RFLT-E boards do not become enabled until the ISAM get rebooted.
7363 L2 Forwarding		
2	ALU02470381 (1-7159673)	Title: DHCP packets getting extra VLAN header vid=0 Problem: After network upgrade (5.0.452 -> 54.543), DHCP packets are supposed to get only one VLAN header, but are getting an inner extra VLAN with vid=0. ICMP packets are not affected.
3	ALU02431287 (1-7029399)	Title: Not all MAC addresses learnt on the bridge port on 7363 ISAM MX Problem: When creating a bridge port for the management VLAN for the 7363 ISAM MX-6, not all MAC addresses are learned (they don't exist in the Bridge port MAC table, although they exist in the arp table).
4	ALU02459563 (1-6989801)	Title: After power-on no US AAL5 are cells are received on the RDLT-B Problem: After power-on on some lines no mac addresses was learnt although lines are synced.
7363 OAM		
5	ALU02507119 (1-7142685)	Title: Slow Navigation on 7363 ISAM MX with 6 RDLT-A's Problem: When there are RDLT-A's in the 7363, we face an issue where the download speed is going down for a lot of lines spread over all the LT board. After a reset of one of the LT's the problem is gone for a while, but is coming back after a couple of hours, sometimes days. When the 2 RDLT-As are replaced by 2 RDLT-Bs, it looks like the problem is solved definitively. When the problem is present we see there are a lot of lines which are having discard packets in queue 0.
6	ALU02471067 (1-7161570)	Title: Ipv4 src ip is changed to internal ip within periph-mgmt-vlan when using LEMI Problem: When using LEMI management, source ip is replaced with internal ip, both in upstream (devcec to network) and in downstream (network to device)
7367 SIP		
7	ALU02486374 (1-7210269)	Title: Recall dial tone not working Problem: Star (*) calling features that use recall dial tone are not playing the expected recall dial tone. Feature functionality is working, however user hears silence instead of expected. tones, therefore is no prompt for the user.
ADSL		
8	ALU02462408 (1-6561507)	Title: R5.2.00/R5.2.02d NALT-E on ADSL2+ lines does not report Loss of Power farend (LPR) when is CPE off Problem: R5.2.00/R5.2.02d NALT-E on ADSL2+ lines: does not report Loss of Power farend (LPR) when is CPE off
9	ALU02488894	Title: ADSL2+ (g992-5-a) initialization failures for bonding case if G.inp/RTX is enabled Problem: If an ADSL2+ bonded pair has G.inp enabled (via application of a group-rtx-profile), then an initialization failure may occur accompanied by a "Unable to communicate with peer modem" alarm (xdsl-act-modem NOPEER).
Equipment		
10	ALU02468641 (1-7072447)	Title: False "Transmitted Optical Power Below Alarm Threshold" alarms after uplink move

		Problem: While investigating RSSI alarms in the operational network, it has been found that +/- 100 "Transmitted Optical Power Below Alarm Threshold" RSSI alarms are active, while in fact the power values are inside the threshold limits.
11	ALU02477187 (1-7153145)	Title: Hanging Temperature Threshold Exceeded alarm Problem: Outdoor nodes showing a temperature alarm although reported temperature values are normal (below threshold) and fan dust filters were cleaned (visual inspection fan unit OK). The temperature exceeded alarm on these nodes seems stuck (raised due to high temperature but not cleared after temperature dropped).
12	ALU02487916 (1-7080282)	Title: Chipset serial number reported wrongly in NVLT-G, NVLT-N, NDLT-F and NDLT-J boards Problem: On 7302/7330 ISAM systems with NANT-A/D/E the chipset serial number on NVLT-G, NVLT-N, NDLT-F and NDLT-J boards is wrongly reported.
G.fast		
13	ALU02463455 (1-7147124)	Title: CPE rebooting causes DSL port Lock-Up Problem: CPE will continuously reboot when trying to establish a PPPoE session causing the DSL port to lock as a result of vector engine failure.
GPON OLT		
14	ALU02459837 (1-7103711)	Title: MPLS EXP-pbit is wrong after SDP down/up using 100Gbps NT port Problem: When doing shutdown/no shutdown on the SDP service, running over FANT-G 100Gbps port, the MPLS EXP-P-bit changed for all upstream services to the same value EXP-P-bit 3. This instead of the individual configured EXP-priority for each service.
15	ALU02481151 (1-7209499)	Title: P bits and EXP bits wrong after FANT-G reset Problem: MPLS pbits and EXP-pbit from ISAM in Upstream are not as expected instead of individual ones for each service.
16	ALU02495523	Title: In A2A scenario, Active CP became down unexpectedly and reported alarm Channel Pair Loss of Signal Problem: In A2A scenario, Active CP became down unexpectedly and reported alarm Channel Pair Loss of Signal.
17	ALU02495683 (1-7188979)	Title: OMCI communication failure issue on all ONTs connected to GPON port Problem: When AES is enabled, it may rarely happen that all ONTs under one PON port report OMCI communication failure alarms and cannot be arranged. Issue can be recovered by disabling AES. New debug capacities in Martini FGPA AES module is added as the delivery.
18	ALU02447983 (1-7045974)	Title: Wrong Representation of SFP Status in AMS Problem: When Automatic Laser Shutdown (ALS) is disabled and no fiber connected on FELT-B port, AMS shows SFP status as Automatic Laser Shutdown while it should be loss of signal.
19	ALU02452430 (1-7110696)	Title: Incorrect SFP rx-power value reported Problem: When received optical power value received by SFP module is oscillating around whole number like -7dBm, system reports invalid value -6,100dBm instead of -7,00dBm.
20	ALU02457104 (1-7124753)	Title: OMCICOMM alarms raised on 4 consecutive PON ports Problem: When massive ONT DGi alarms are reported to OLT in a short time, GLOB reset on GPON LT might be triggered which will lead to OMCICOMM alarms raised on 4 consecutive PON ports.

21	ALU02460539 (1-7081273)	Title: Bulk Sync alarms raised that cannot be cleared Problem: In some specific case when the LT board could not be reached by the NT board, Bulk Sync alarms were raised. These alarms could not be cleared even with a LT reset.
22	ALU02464265 (1-7006613)	Title: lwf-on-liu logical loop sporadically not successful for E1 SFP Problem: Enabling a logical loop after removing a physical loop doesn't always restore the traffic.
23	ALU02465127 (1-7121294)	Title: Error "FGLT-A Illegal activity by task GPIO" in NT console when configuring ssmout-ltport Problem: FGLT-A reset was triggered just by removing/creating the bridge ports and ssmout.
24	ALU02468076 (1-5855448)	Title: Packet loss during LACP link recovery (plug back link) Problem: Traffic hit during port re-joining the LAG (e.g. LACP link recovery by plug back link or Port shut/no shut). The loss can be observed when there is another link in the LAG carrying the traffic and traffic gets redistributed in the newly plugged in Link. Loss is ~72 Packets when packet rate is 1000 Frames/Second for multiple iteration.
25	ALU02469289 (1-7078793)	Title: CPU-load-Average & CPU-load-Details Counter value mismatch Problem: For all Linux based boards, the "cpuLoadAverage" and average the 180 samples value of "cpuLoadDetails" in the systemMonitor tree (under systemMIB) do not match. One example of such a box is the 7362. In fact, the "cpuLoadDetails" values are wrong and the "cpuLoadAverage" field is correct.
26	ALU02470178 (1-6807031)	Title: ISAM Rear craft issue Problem: Rear craft will not allow enter key strokes to bring up the login prompt to choose T or C
27	ALU02475500 (1-7191126)	Title: Wrong NE response to snmpgetbulk Problem: Wrong NE response to snmpgetbulk with collection of "ontqosLimQueueConfigUpstream" from OLTs.
28	ALU02478864 (1-7172876)	Title: Reborn NTs report incorrect restart time when timezone offset is set Problem: For reborn NTs (FANT-G, CFNT-B), restart time cannot be changed based on the configured timezone-offset value.
29	ALU02483963 (1-7208387)	Title: Extremely slow performance when NE is supervised by AMS after migration Problem: After migrating, loading the NE tree on AMS will be extremely slow when many SFPs are inserted in GPON LTs.
30	ALU02487577 (1-7181798)	Title: IHUB DB lost after shelf power off and on Problem: In very rare case, IHUB DB might be lost after shelf is powered off and on, even if protective DB is configured via CLI command admin software-mngt ihub database save-protected. Improvement is done to copy IHUB protective DB configpro.cfg to DB config.cfg if config.cfg doesnot exist or file size is zero.
31	ALU02491912 (1-7178882)	Title: Creation of 15 minute's BFMU result file failed Problem: When BFMU generates a new result file while the same file does exist in the same path /BFMU/15/, it will return failure and wrongly append the result in the previous file.
32	ALU02495142 (1-7248858)	Title: Dual FANT-G NT switchover fail from NT-A to NT-B Problem: NT redundancy scenario; when pulling out the active NT, the standby NT should execute a hot reset but sometimes instead executes a warm reset (low possibility).

33	ALU02496011 (1-7184711)	Title: SDC bulk on FX not working Problem: After 7360 ISAM FX NEs migrated from 5.6.01b to 5.6.02d, Issues were observed in the SDC R9.6.04 bulk daily collection with the resulting.csv file (xdsLine.csv) having nearly all attributes populated as empty: "Instance Unavailable".
34	ALU02496085 (1-7258245)	Title: FANT-G failed to startup Problem: After migration to higher release or burning CF with different release other than factory version, FANT-G might fail to startup due to ToD chipset firmware updating failure.
35	ALU02502823 (1-7284309)	Title: FANT-G NT-A auto power on reboot with fist log Problem: We met one FANT-G NT-A auto power on reboot event. The captured log indicates the POR reset to be highly related to SysRq.
36	ALU02504696 (1-7195301)	Title: No collection failure alarm from SDC for incomplete BFMU result file Problem: When the collection can not complete as a result of reaching the end of the interval duration, BFMU result file will be incomplete, however, 'Collection failure alarm' cannot be reported from SDC.
37	ALU02505898 (1-7234383)	Title: GPON LT Software watchdog reset during AMS inventory collection Problem: During AMS inventory collection on PPPoE related tables, in case in configuration that VLAN port is not attached to forwarder, GPON LT might have software watchdog reset due to infinite loop.
38	ALU02506362 (1-7168753)	Title: No service on some NELT-B boards after migration Problem: After migration, service of all ports might be lost on some NELT-B boards. It is caused by audit failure when large amount of VLAN ports are configured.
39	ALU02506536 (1-7298936)	Title: FANT-G user service was affected after moving MDU device from one CP (with PG) to another CP (without PG) Problem: When we move an MDU from a protection group to another PON which doesn't have protection, then IPTV and HSI is not working for existing subscribers.
40	ALU02449275 (1-6803072)	Title: AMS GUI impact when bulkget sfpDiagSfpFaceplateNumber Problem: Increased Response time when loading the NE GUI (FANT-F/NANT-E/NANT-D/NANT-A, NELT-B, FELT-B running R5.6) from AMS, as it fetched SFP face plate number (sfpDiagSfpFaceplateNumber) using snmpbulkget. In case there were optical LT boards which have SFPs plugged and up, the response time increased further higher.
41	ALU02457878 (1-7099460)	Title: OLT misses "admin state" in OMCI Dot1ag MEP creation Problem: OLT misses "admin state" in OMCI Dot1ag MEP creation, this leads ont parses error from admin state.
42	ALU02459746 (1-7103862)	Title: HEX SLID in NEWONT alarm is wrongly displayed on XGSPON product Problem: When configuring the ONT SLID in HEX the SLID info provided by the NEWONT alarm is wrong. The probable reason is the parsing is aborted when a "NULL" ("00") is found, but it should not in case of hexa-dec configuration.
43	ALU02471584 (1-7121294)	Title: FGLT-A exceptional reboot when configuring max nbr of bridge-ports and ssmout-ltport Problem: When configuring 64 GEMs (8 vlans and 8 queues per vlan) per UNI and also ssmout-ltport, FGLT-A exceptional reset can be detected by removing/creating the bridge ports and ssmout.

44	ALU02474793 (1-7189536)	Title: NGLT-C reset with OMCI memory exception error Problem: In some special case, NGLT-C may reset with OMCI memory exception error.
45	ALU02474850 (1-7180865)	Title: Dbru value is wrong when creating bandwidth profile via snmp Problem: When using snmp (via AMS, or via snmpset) to create a bandwidth profile, and when no value for dbru is specified, the dbru value will be wrong after the profile is deleted and recreated.
46	ALU02475723 (1-7141837)	Title: PON LED keeps GREEN when no ONT is connected Problem: In some specific scenario, LED of GPON port might wrongly keep GREEN even though there is no any ONT connected.
47	ALU02477859	Title: Remove "BANZAI" from NT Error Record Problem: When NT switchover is triggered, "Switch Over from Standby to Active requires a Hot Reset. BANZAI " will be printed, remove the confusing word "BANZAI from the Error Record.
48	ALU02494311 (1-7187866)	Title: Read only operator is able to modify CPU filter Problem: Read only operator is able to modify CPU filter on 7360 ISAM FX product.
49	ALU02502439 (1-7270642)	Title: The CLI Count Filter command does not support on iHub command Problem: The CLI Count Filter command does not support on iHub command.
50	ALU02505913 (1-7271772)	Title: 'USBWPROFID' range in TL1 doesn't align with specification Problem: The range for 'USBWPROFID' and 'USBWPROFEXTID' doesn't align with specification, it should be '0...1500'.
H248		
51	ALU02478346 (1-7174201)	Title: MGOverload alarm after migration Problem: Every night after migration the ISAM is issuing a critical MGOverload alarm for the duration of 1-2 minutes.
52	ALU02487144 (1-7170813)	Title: NPOT-B port no dial tone Problem: DC fault is also regarded as ground key alarm, so there are too many ground key alarms on nvps, if the DC frequency is too high, termination will miss some alarm on/off event, which will cause termination kept in down status.
L2 Forwarding		
53	ALU02460868 (1-7131877)	Title: LCP echo messages are duplicated by NDLT-K after migration from R.5.3.02 to R.5.6.02 Problem: LCP echo messages are duplicated by NDLT-K after they migrate the node from R.5.3.02 to R.5.6.02.
54	ALU02462516 (1-5487898)	Title: NALT-E Mac learning limitation Problem: MAC-learning issue on NALT-E was observed but mostly seen on the first port of the board. This was seen when virtual MAC was enabled. Mac learning was again proper after reconfiguring the bridge port.
55	ALU02463460 (1-7117757)	Title: Loop is generated in VPLS when in different VPLS sap is shutdown Problem: Whenever SAP shut is performed in a service, where the SAP port is acting as Alternate(Blocked) by RSTP protocol, Loop will be generated in VPLS. It is because during shutting the SAP, STP state of the port is wrongly configured as FORWARDING.
56	ALU02460176	Title: Enum ProtocolMsgs is not added for attribute isamSyslogMessageType in CLI

		Problem: New enum ProtocolMsgs(18) is added to attribute isamSyslogMessageType. We are able to set this bit 18 in SNMP but not in CLI as the support for this enum in CLI is not available.
L3 Forwarding		
57	ALU02479291 (1-7141982)	Title: ISAM exceptional reboot with clear DB Problem: After using SNMP to set nt:mc properties, it will lead to the invalid configuration in Core1 and ISAM will reboot with clear DB in the next reboot. Ideally nt:mc port should be treated as Internal Port and does not need any port properties. The configuration is blocked in CLI but allowed in SNMP.
LineTest		
58	ALU02459816 (1-7091505)	Title: Output loop when entering invalid SLIC ID in Trace and Debug Problem: During some MELT debugging we noticed that when an invalid SLIC ID is entered, an output loop occurs in T&D. The only way to stop the output is to reboot the the LT.
Migration		
59	ALU02469558 (1-7159374)	Title: Rollback after migration from R5.3.02s to R5.7.01d fails on NANT-D Problem: Rollback after migration from R5.3.02s to R5.7.01d fails on NANT-D.
60	ALU02479021 (1-7011005)	Title: Migration not functional from R5.0 to R5.6 Problem: While performing network migration on 2 of the nodes migration failed and rolled back
61	ALU02495422 (1-7201808)	Title: Migration failure for CLI access through SSH Problem: When public SSH key has been generated in old release, migration tool may indicate that the operation is failed but the actual result is successful.
Multicast		
62	ALU02493769 (1-7247440)	Title: FANT-G: ihub drop igmp-query packet Problem: When igmp-proxy is enable, we internally enable igmp snooping. Here we are not allowing to configure igmp-snooping externally at service level, But at SAP level we were not blocking it. So, when someone enable snooping at SAP level and then if they are disabling it, it is removing snooping instance created internally.
OAM		
63	ALU02498900 (1-7203480)	Title: TL-1 counter BGRUNTIME is not working as expected Problem: There is a difference between running time outputs using Cli command (show xdsl-bonding operational-data group) and BGRUNTIME using TL1 command
64	ALU02463253 (1-7122287)	Title: RFMU fails when XDSL LTs mixed with PON LTs Problem: In a mixed configuration with XDSL LTs and PON LTs, RFMU fails to collect the interface customer-ids for the xdsl interfaces
SHDSL		
65	ALU02480000 (1-6911508)	Title: SHDSL Port uptime counters (previous-1 day mon-sec) not correct Problem: Shdsl segment-counters previous-1 day and 15min do not return the expected value for mon-sec value for some ports
SIP		
66	ALU02477131 (1-7160606)	Title: ISAM-V: cHigh percentage of NPOT cards fails to load the CDE profile correctly Problem: Sometimes CDE download could not get respond from NT

67	ALU02454589 (1-7056564)	Title: Only single-sided speech after migration from etn to fcn Problem: One-way audio when changing the router in SIP with distributed configuration
68	ALU02487724 (1-7180406)	Title: During Call Waiting timeout doesn't work properly Problem: During Call Waiting, the speech path between POTS user A and POTS user B is lost.
69	ALU02490901 (1-7239252)	Title: Restore fails caused by a corrupted Data Base Problem: After Flash Cars replacement in the moment to restore the current configuration, restores available in AMS fails.
Synchronisation		
70	ALU02458083 (1-7121294)	Title: One vlan port is down status when SSM is enabled Problem: When SSM is enabled and 8 vlan ports are configured on the bridge port, always one vlan port is in down status. As enabling SSM will also occupy one vlan port, resource check need be done and only allow to configure 7 vlan ports on one bridge port.
TL1		
71	ALU02505131 (1-7292958)	Title: Execute ED-XDSL for same line multiple times fails Problem: When executing TL1 commands multiple times to configure the same XDSL port (ED-XDSL) on FANTF used as an FX REM aggregator with xDSL cards, the first command is successful but the second one may return error.
72	ALU02477064	Title: NT option to be removed from rtrv-CFUSAGE: in TL1 Problem: In rtrv-CFUSAGE:: we have NT, NTA, NTB options to execute. Both NT and NTA though's same output. In CLI we have option only as NT-A and NT-B. We need to remove NT from TL1.
VDSL		
73	ALU02444370 (1-7069297)	Title: After re-synchronization during fallback mode line becomes Normal Mode Problem: In the nodes with VP boards NDPS-B or NDPS-C and LT boards, NDLT-F and NDLT-J and lines up in Vectoring fallback mode when retaining the VP board in admin down state and resynchronizing a line, made the line go to Normal mode
74	ALU02489140 (1-7164654)	Title: VP LT link failure alarm not recovered after removing fiber link Problem: When link between LT and NRCD-C was disconnected the VP-LT link not up alarm did not re-appear when the fiber between remote and 7360 ISAM FX (or 7330 ISAM FTTN) was disconnected and reconnected.
75	ALU02503638 (1-7233591)	Title: R5.5.02j: Interop sync issue between Sercomm Realtek CPE and Sagecom Intel CPE Problem: This issue is related to FR ALU02487145/AR 1-7233591 The issue was not seen in R5.5.02B Problem description by the customer: During R5.5.02j validation the customer observed the following issue: "In case of VDSL2 35b (NDLT-J board) when Sercom Speedport Plus coexists in the same Vectoring Group with Intel based CPEs (Sagemcom Speedport Plus, Fritzbox 7590), the Intel based CPEs do not synchronize at all. If we disconnect t the Speedport Plus from the board, then the Intel based CPEs synchronize. In case of VDSL2 17a (NDLT-J board) the Intel based CPEs synchronize, no matter if Sercom Speedport Plus coexists or no in the same Vectoring group. "
76	ALU02487491 (1-7138419)	Title: PM counter for DLE disappears for some time when incrementing

		Problem: PM counters of NDLT-G (both for 1 day and 15 min) do not have correct value for DLE it is set to 0 for about 20 sec.
XGPON		
77	ALU02483908 (1-7180876)	Title: Viewing XS-250X-A NGPON2 802.1x authentication caused NE isolation from AMS Problem: After provisioning XS-250X-A ONT and services via TL1 gateway, attempting to view 802.1x authentication status from AMS caused NE Isolation. AMS failed to load child GUI and CLI interface was also unresponsive.
78	ALU02460113 (1-7124723)	Title: XGSPON socket write failures in tune control Problem: When socket write failures happend in tune control on FWLT-B, ONU's cannot be tuning in time but only 60s later to its intended channelpair.
79	ALU02472354 (1-7150903)	Title: FWLT-B board can't detect the SN report when new ONT connected Problem: The channel-pair CP 1/1/1/1, CP 1/1/1/2, CP 1/1/1/4 can't auto detect the SN alarm when new ONT connected.

3 Delivery Information

3.1 Delivered Software

Delivery Note = ALU02577069

	Item Number	Description
SWPA	3FE 75128 CAAA	SWPA-ISAM R60.4.6.0
		Tar file: L6GQAA60.460.tar
		CDE profile
		M113AA60.301.tar
SWPA	3FE 25412 AAAA	OFLMT (ISAM)
		tar file: MLXAAA60.460.tgz
SWPA	3FE 61499 AAAA	OFLMT (xVPS)
		tar file: NBTAA60.460.tgz
SWPA	3FE 25709 AAAA	OFLMT (SHub)
		tar file: Lanx_Migration_Tool1.84.0.tgz
SWPA	3FE 28567 AAAA	Push-button Migration Tool (PBMT)
		Operational code: migratelsam.3.3.98.tar.gz
DOCP	3HH 15106 CAAA	DOCP- ISAM R6.0.02 CD-ROM
		Customer Software Delivery Package

Note Boards with software preinstalled in EPROMs are released as Functional PBAs (FPBA). An FPBA groups a certain HW release with a certain software release. The FPBA is only meaningful for the non-downloadable software. It is the operator's responsibility to download the correct operational software version.

Note The version of the PBMT SW mentioned above, is the latest version available at the moment of the ISAM release. However it is highly recommended to perform the migration with the latest version of the PBMT available. The latest version of the PBMT SW can be downloaded from the server 'networks.nokia.com'.

Note FOSS (Free and Open Source SW) is part of the ISAM product. A license note containing a list of all used FOSS and all relevant licenses is part of the SW-package.

3.2 Delivered XDSL Proxies

Below list of XDSL proxies is part of this release:

- ▶ Broadcom: V19.0.16.1
- ▶ Broadcom 6411: V6411.7.4
- ▶ Broadcom 6511/6518/65118: V13.9
- ▶ Broadcom 65100: V17.1.12.1
- ▶ Broadcom 65200/65300/65400: V19.0.16.1
- ▶ Ikanos: V8.10.7_6.7.3.6
- ▶ Lantiq XDSL: 4.6.0.4
- ▶ Lantiq SHDSL: 2.1.4
- ▶ Lantiq VDSL: 2.6.18

Below list of firmware (FW) is part of this release:

- ▶ Broadcom 6411: VE_10_7_119
- ▶ Broadcom 6511/6518/65118: VE_10_9_21
- ▶ Broadcom 65100: VE_11_3_33
- ▶ Broadcom 65300: VE_11_04_11
- ▶ Broadcom 65200/65400: VE_12_03_100
- ▶ Ikanos CO5: V6.7.3.6
- ▶ Ikanos CO4: V2.0.8r30
- ▶ Infinion IDC: V1.9.2.0
- ▶ Infinion SDFE4: 1.1-1.9.2__002
- ▶ Intel (lantiq) VDSL: XCo3M_17a:13.6.0.44.0.20

3.3 Delivered Documentation

No documentation was delivered for this release. Please use the documentation sets as produced for the latest customer documentation release in this stream, i.e. R6.0.01;

	Item Number	Description
DOCP	3HH 15508 BAAA	DOCP-7302 ISAM R6.0.01 CD-Package (ETSI/MII) Customer Documentation
DOCP	3HH 15509 BAAA	DOCP-7330 ISAM FTTN ETSI R6.0.01 CD-Package (ETSI/MII) Customer Documentation
DOCP	3HH 15511 BAAA	DOCP-7360 ISAM FX R6.0.01 CD-Package (ETSI/MII) Customer Documentation
DOCP	3HH 15510 BAAA	DOCP-7356 ISAM FTTB REM R6.0.01 CD-Package (ETSI/MII) Customer Documentation
DOCP	3HH 15514 BAAA	DOCP-7367 ISAM SX R6.0.01 CD-Package (ETSI/MII) Customer Documentation
DOCP	3HH 15513 BAAA	DOCP-7363 ISAM MX R6.0.01 CD-Package Customer Documentation
DOCP	3HH 15512 BAAA	DOCP-7362 ISAM SF/DF R6.0.01 CD-Package Customer Documentation
DOCP	3FE-75920-AAAA-PMZZA	DOCP-7360 ISAM FX R6.0.01 CD-Package (ANSI) Customer Documentation
DOCP	3FE-75919-AAAA-PMZZA	DOCP-7356 ISAM FTTB R6.0.01 CD-Package (ANSI) Customer Documentation
DOCP	3FE-75922-AAAA-PMZZA	DOCP-7367 ISAM SX/DX R6.0.01 CD-Package (ANSI) Customer Documentation
DOCP	3FE-75921-AAAA-PMZZA	DOCP-7363 ISAM MX R6.0.01 CD-Package (ANSI) Customer Documentation

3.3.1 Documentation Restrictions/Inconsistencies

- ▶ For the ANSI-market, intelligent fan trays (BFANs) have been documented since previous releases in the 7360 ISAM FX ANSI documentation set, but they have not been fully tested for horizontal mounting options.
- ▶ ANCP/L2CP is not supported anymore, and any remaining text on ANCP/L2CP descriptions, CLI commands, TL1 commands, etc) in the customer documentation should be considered as obsolete or mistake.
- ▶ Whereas EPON/DPoE is mentioned in the customer documentation, the support for EPON/DPoE has been discontinued since R5.7.

4 Supported Hardware

Below list gives an overview of the supported ISAM Network Termination (NT) and Line Termination (LT) boards in the 7302 ISAM, 7330 ISAM FTTN, 7356 ISAM FTTB REM, 7360 ISAM FX and 7363 ISAM MX systems. It doesn't pretend to be an exhaustive list of all existing ISAM HW boards.

For a complete list of all supported board(type)s per product, please refer to the product information manual of that specific product.

For the 7367 ISAM SX/DX and 7362 ISAM SF/DF systems, the supported shelf HW-items are listed at the bottom of this list.

Note Product information manuals (and this chapter) reflect recent as well as older hardware items that are all supported in this product release. However, several of these hardware items are no longer offered for sale. Please consult Nokia's contractual price list for information on what hardware items are actually orderable.

Item Number	Description
NTs	
3FE-26698-AA	NANT-A FD Network Termination without BITS interface
3FE-26698-DA	NANT-A FD Network Termination with daisy-chaining, no BITS
3FE-26698-AB	NANT-A FD Network Termination with BITS interface
3FE-26698-DB	NANT-A FD Network Termination with daisy-chaining & BITS support
3FE-61555-AA	NANT-D FD 100Gbps Network Termination without BITS or SyncE interface
3FE-61555-AB	NANT-D FD 100Gbps Network Termination with BITS & SyncE interfaces
3FE-61555-CB	NANT-D FD 100Gbps Network Termination with BITS & SyncE interfaces & MPLS labeling
3FE-64746-AA/BA	NANT-E FD 320Gbps Network Termination
3FE-64746-AB/BB	NANT-E FD 320Gbps Network Termination with BITS & SyncE interfaces
3FE-53701-AA	FANT-F (ETSI/MII) FX 480Gbps Network Termination
3FE-53701-AC	FANT-F (ETSI/MII)

	FX 480Gbps Network Termination with BITS & SyncE interfaces
3FE-53701-AD	FANT-F (ETSI/MII) FX 480Gbps Network Termination with BITS & SyncE interfaces
3FE-53701-BD	FANT-F (ANSI) FX 480Gbps Network Termination with BITS & SyncE interfaces
3FE-71256-AA	FANT-G (ETSI/MII) FX 1.2Tbps Network Termination with BITS & SyncE interfaces
3FE-71256-BA	FANT-G (ANSI) FX 1.2Tbps Network Termination with BITS & SyncE interfaces
3FE-64398-AA	NRNT-A 7356 ISAM FTTB REM Network Termination with Synchronous Ethernet
3FE-68339-AB	RANT-A 7363 ISAM MX NT with integrated SLV support
3FE-72432-AA	RANT-B 7363 ISAM MX NT with integrated G.fast SLV support
3FE-74103-AA 3FE-74103-BA	RANT-C 7363 ISAM MX Next Generation NT
3FE-29506-AC	ERAM-A Remote Aggregator with BITS interface containing combined NT/NTIO (AGNT-A)

LTs/Service boards

3FE-64279-AA	NGLT-A 8 port GPON LT
3FE-67301-AA	NGLT-C 8 port GPON LT
3FE-28682-AA	NELT-A Ethernet LT, 16lines
3FE-62543-AA	NELT-B Ethernet LT, 36lines
3FE-69486-AA	FELT-B High-speed Ethernet LT
3FE-27289-AA/AB	NALT-C ADSL2plus POTS LT
3FE-27289-BA/BB	NALT-D ADSL2plus ISDN LT
3FE-29512-AA/AB	NALT-E MultiDSL POTS LT 72 lines
3FE-61438-AA/BA/AE/BE	NALT-J ADSL POTS LT 48 lines
3FE-61584-BA/BF	NALT-K ADSL ISDN LT 48 lines

3FE-63767-AB	NALT-L MultiDSL POTS LT 48 lines outdoor
3FE-63767-BB	NALT-L MultiDSL POTS LT 48 lines CO
3FE-63423-AA	NALT-M 72 PORTS ADSL WITH ILTF/MELT
3FE-00139-AA/BA	NVLT-C VDSL2 ADSL2plus POTS LT 48 lines
3FE-00140-AA/BA	NVLT-D VDSL2 ADSL2plus ISDN LT 48 lines
3FE-00162-AA/AB	NVLT-G VDSL2 ADSL2plus POTS LT 48 lines (2,5 Gbps)
3FE-00161-AA/AB	NVLT-H VDSL2 ADSL2plus ISDN LT 48 lines (2,5 Gbps)
3FE-63358-AA	NVLT-M 48 PORTS VDSL WITH ILTF/MELT
3FE-64331-AA	NVLT-P VDSL2 ADSL2plus POTS LT 48 lines (2,5 Gbps)
3FE-64332-AA	NVLT-Q VDSL2 ADSL2plus ISDN LT 48 lines (2,5 Gbps)
3FE-64333-AA 3FE-64333-AB	NVLT-N 48 PORTS VDSL WITH ILTF/MELT
3FE-65820-AA	NVLT-R 72 lines VDSL2 over POTS LT
3FE-65821-AA	NVLT-S 72 lines VDSL2 over POTS LT with MELT
3FE-65830-AA	NDLT-C 48 lines VDSL2 over POTS LT with BLV
3FE-65798-AA	NDLT-F 48 lines VDSL2 over POTS LT with MELT and SLV
3FE-65800-AA	NDLT-G 48 lines VDSL2 over POTS LT with SLV
3FE-71471-AA	NDLT-J 48 lines VDSL2 SLV LT with MELT and VDSL2 profile 35b support
3FE-71686-AA	NDLT-K 48 lines VDSL2 SLV LT with VDSL2 profile 35b support
3FE-65728-AA	NDLS-E 48 lines VDSL2 over POTS LT with integrated splitter and SLV
3FE-65728-AB/BA/AC	NDLS-E 48 lines VDSL2 over POTS LT with integrated splitter and SLV (ANSI)

3FE-67645-AA/AB	NDLS-F FD/FX Multi-DSL BLV (ANSI)
3FE-67437-AA	NDPS-B AA 384-port Vectoring Processing Server (ETSI/MII)
3FE-67437-AB	NDPS-B AB 384-port Vectoring Processing Server (ANSI)
3FE-67440-AA	NDPS-C 192-port Vectoring Processing Server
3FE-67717-AA	NRCD-C SB REM DC Controller with Vectoring Processing Server functionality
3FE-64324-AA	NVLS-A integrated LT/splitter VDSL2 ADSL2plus POTS 48 lines (2,5 Gbps)
3FE-66721-AB	FGLT-A 16p GPON LT
3FE-68954-AB	FGLT-B AB 16 p GPON LT
3FE-56399-AB	FWLT-A 4p NG-PON2 TWDM LT
3FE-72955-AA/AB	FWLT-B 8p U-NGPON LT
3FE-27649-AA	NSLT-A SHDSL LT without MELT
3FE-63626-AA	NSLT-B SHDSL LT with MELT
3FE-72043-AA	NSLT-C SHDSL LT without MELT
3FE-72049-AA	NSLT-D SHDSL LT with MELT and E1 support
3FE-61233-AA/AC	NALS-A integrated LT/Splitter POTS outdoor 48 lines
3FE-61233-BA/BB/BC/BD	NALS-A integrated LT/Splitter POTS CO 48 lines
3FE-61582-BA	NALS-B integrated LT/Splitter ISDN CO 48 lines
3FE-63766-AA	NALS-C integrated LT/Splitter POTS outdoor 48 lines
3FE-63766-BA	NALS-C integrated LT/Splitter POTS CO 48 lines
3FE-27420-AA/AB/AC	NPOT-A 48p POTS Line Board

3FE-60858-AA/BA	NPOT-B 72p POTS Line Board
3FE-60858-AB/BB	NPOT-B 72p POTS Line Board new NGCC chipsets
3FE-60858-CB	NPOT-B 72p POTS Line Board with integrated 72p splitter
3FE-65455-AA	NPOT-C (ETSI/MII) 48p POTS Line Board
3FE-65455-BA/BB	NPOT-C (ANSI) 48p POTS Line Board
3FE-27562-AA/AB/AC	NVPS-A Universal Voice packet server version A
3FE-68135-AA	NVPS-C Universal Voice packet server version C
3FE-27715-AA	NBAT-A ISDN Line board supporting 2B1Q
3FE-60609-AA	NBAT-B ISDN Line board supporting 2B1Q
3FE-60609-BA	NBAT-B ISDN Line board supporting 4B3T
3FE-74274-AA	NIAT-A ISDN PRI LT with E1
3FE-60120-AA	NTAU-A TAUS board
3FE-60121-AA	NCTA-A 96 Line Cut-Trough board
3FE-68315-AB	RFAN-B 7363 ISAM MX Fan Unit
3FE-68350-AA	RDLT-A 7363 ISAM MX 32p VDSL2 SLV LT
3FE-68864-AA	RDLT-B 7363 ISAM MX 32p VDSL2 SLV LT
3FE-68863-AA	RDLT-C 7363 ISAM MX 32p VDSL2 SLV LT with integrated MELT
3FE-71636-AA	RDLT-D 7363 ISAM MX 32p Vplus LT, no MELT
3FE-71637-AA	RDLT-E 7363 ISAM MX 32p Vplus LT with integrated MELT
3FE-68858-AA	RDLS-A 7363 ISAM MX 32p VDSL2 SLV LT with integrated splitters
3FE-68425-AA	RPOT-A

	7363 ISAM MX 32p POTS LT with integrated VDSL2/ADSL2 splitter
3FE-68979-AA	RELT-A 7363 ISAM MX 8p/16p P2P GE LT
3FE-73058-AA	RFLT-D 7363 ISAM MX 16p G.fast LT
3FE-74110-AA/AB	RFLS-A 7363 ISAM MX 16p G.fast vectoring LT with integrated Japan splitter
3FE-73061-AA/BA	RFLT-E 7363 ISAM MX 16p G.fast LT with integrated MELT
3FE-74019-AA	RFLT-G 7363 ISAM MX 24p G.fast LT with integrated MELT and single relay
3FE-68410-AA	RANI-A 7363 ISAM MX NTIO with integrated SLV support (DC-powered)
3FE-68410-BA	RPNI-A 7363 ISAM MX POTS NTIO with integrated SLV support (DC-powered)
3FE-68939-AA	RANI-B 7363 ISAM MX NTIO with integrated SLV support (AC-powered)
3FE-68939-BA	RPNI-B 7363 ISAM MX POTS NTIO with integrated SLV support (AC-powered)
3FE-72374-AA/AB	RANI-D 7363 ISAM MX NTIO with integrated G.fast SLV support
3FE-74448-AA	RANI-E 7363 ISAM MX NTIO to be used in combination with RANT-C & supporting 192p VDSL 35b (& HW-ready for MOV/XDLV)
3FE-74532-AA	RPNI-E 7363 ISAM MX POTS NTIO to be used in combination with RANT-C & supporting 192p VDSL 35b (& HW-ready for MOV/XDLV)
3FE-74531-AA	RANI-F 7363 ISAM MX NTIO to be used in combination with RANT-C & supporting 192p VDSL 35b
3FE-75083-AA	RANI-G 7363 ISAM MX NTIO to be used in combination with RANT-C & supporting 24p G.fast LT
3FE-74636-AA	RPOW-A 7363 ISAM MX AC-power NTIO (for Japanese market)
3FE-74647-AA	RACT-A 7363 ISAM MX cut-through NTIO
3FE-74985-AA	RFSS-A 7363 ISAM MX Splitter shelf
3FE-74979-AA	RFSP-A 7363 ISAM MX splitter shelf 16p POTS splitter board

Sealed boxes

7367 ISAM SX-48V	
3FE-68354-AA	CDAS-A AA 7367 ISAM SX-48V shelf (ETSI/MII)
3FE-68354-AC	CDAS-A AC 7367 ISAM SX-48V shelf (ETSI/MII)
3FE-68354-AE	CDAS-A AE 7367 ISAM SX-48V shelf (ETSI/MII)
3FE-68354-CT	CDAS-A CT 7367 ISAM SX-48V shelf (ETSI/MII)
3FE-68354-CU	CDAS-A CU 7367 ISAM SX-48V shelf (ETSI/MII)
3FE-68354-CV	CDAS-A CV 7367 ISAM SX-48V shelf (ETSI/MII)
3FE-68354-CW	CDAS-A CW 7367 ISAM SX-48V shelf (ETSI/MII)
3FE-68354-CZ	CDAS-A CZ 7367 ISAM SX-48V shelf (ETSI/MII)
3FE-68617-AA/AB	VSRM-A 7367 ISAM SX-48V shelf (ANSI)
7367 ISAM DX-48V	
3FE-74136-AA	CDER-A 7367 ISAM DX-48V pizza-box unit (ANSI)
7367 ISAM SX-12VP	
3FE-69098-AA	7367 ISAM SX-12VP ANSI AA 7367 ISAM SX-12VP shelf (ANSI) with network power
3FE-69098-BA	7367 ISAM SX-12VP ANSI BA 7367 ISAM SX-12VP shelf (ANSI) with local DC power
7367 ISAM SX-16F	
3FE-69912-AA	CFES-A 7367 ISAM SX-16F shelf (ETSI)
3FE-71253-BA	CFAS-A 7367 ISAM SX-16F shelf (Japan)
3FE-71254-AA	CFAS-B 7367 ISAM SX-16F shelf (ETSI)
3FE-72147-AA	CFES-C 7367 ISAM SX-16F shelf (ETSI)
3FE-72148-AA	CFES-D 7367 ISAM SX-16F shelf (ETSI)
3FE-71491-AA/BA/AC/ AD/BA/BB/BC/BD/BE/CD	CFAS-D 7367 ISAM SX-16F shelf (ANSI)

3FE-74344-AA	CFAS-K 7367 ISAM SX-16F shelf (ETSI)
7367 ISAM SX-16VP	
3FE-71056-AA	CDES-B AA 7367 ISAM SX-16VP shelf AC- or RFT-V-Powered (ETSI/MII)
3FE-71056-BA	CDES-B BA 7367 ISAM SX-16VP shelf DC-Powered (ETSI/MII)
3FE-71800-AA	CDES-C 7367 ISAM SX-16VP shelf AC/DC-Powered (ANSI)
7367 ISAM SX-48U	
3FE-71410-AA	CDAS-B AA 7367 ISAM SX-48U shelf RFT-V/DC/AC-powered, with splitter (ETSI/MII)
3FE-71410-AB	CDAS-B AB 7367 ISAM SX-48U shelf RFT-V/DC/AC-powered, with splitter without PTCs, deployable without GDTs (ETSI/MII)
3FE-71957-AA	CDAS-C 7367 ISAM SX-48U shelf DC-powered, no splitter (ETSI/MII)
3FE-72987-AA	CDAS-D 7367 ISAM SX-48U shelf RFT-C-powered, with copper backhaul (ETSI/MII)
3FE-74988-AA	VSRM-B 7367 ISAM SX-48U shelf AC, DC and RFT-C-powered, with 8p bonded copper uplink (ANSI)
7367 ISAM SX-8F	
3FE-72303-AA	CFAS-E 7367 ISAM SX-8F shelf (ETSI)
7362 ISAM DF-16GW	
3FE-45632-AA	CFXR-A AA 7362 ISAM DF-16GW shelf AC-powered with fan unit
3FE-45632-BA	CFXR-A BA 7362 ISAM DF-16GW shelf DC-powered with fan unit
3FE-45999-AA	CFAN-A 7362 ISAM DF-16GW Fan Unit
7362 ISAM SF-8GW	
3FE-73517-AA/BA	CFXS-C 7362 ISAM SF-8GW shelf
Wavelength Mux (WM)	
3FE-71568-AA	RWMS-I WM shelf
3FE-45015-AA	FWLC-A WM line card

3FE-45022-AA	FWCC-A WM Alarm/Controller board
3FE-45026-AA	FWPC-A WM Power board
Passive Wavelength Mux (PWM)	
3FE-73554-AA	PWMS-A Passive WM (PWM) shelf
3FE-73553-AA/AB	PWM4-A Dual 4-channel PWM module

5 Compatibility

5.1 AMS-ISAM Compatibility

ISAM R6.0.02 will be supported by 7302/7330/7356/7360/7362/7363/7367 ISAM R6.0 v1.1 plug on AMS R9.7.01.

5.2 TL1 and CLI

All TL1 commands can be found in the R6.0.01 TL1 Command and Messages Manuals. A dedicated document exists depending on the NT in use in the system, i.e.

- ▶ 3HH 11977 AAAA TCZZA for the FD 24 Gbps NT,
- ▶ 3HH 11977 BAAA TCZZA for the FD 100/320 Gbps NT & FX NT and
- ▶ 3HH 11977 CAAA TCZZA for the 7367 ISAM SX/DX and 7363 ISAM MX.

All CLI Commands can be found in the ISAM R6.0.01 CLI Command Reference Guides. A dedicated document exists depending on the NT in use in the system, i.e.

- ▶ 3HH-04416-FABA-TCZZA for the FD 24 Gbps NT,
- ▶ 3HH-08079-FABA-TCZZA for the FD 100/320 Gbps NT & FX NT,
- ▶ 3HH-11762-FABA-TCZZA for the 7367 ISAM SX/DX and 7363 ISAM MX and
- ▶ 3HH-13842-FABA-TCZZA for the 7362 ISAM SF/DF.

The CLI Command Reference Guide for the NANT-D/E FD 100/320 Gbps NT and FX NTs will refer you to one of the 6 IHUB Command Guides for details on the CLI IHUB commands, i.e.

	Document Number	Description
1	3HH 11982 AAAA TQZZA	IHUB System Basics, Management and OAM Guide
2	3HH 11983 AAAA TQZZA	IHUB Interface Guide
3	3HH 11984 AAAA TQZZA	IHUB QoS Guide
4	3HH 11985 AAAA TQZZA	IHUB Services Guide
5	3HH 11986 AAAA TQZZA	IHUB Router Configurations and Routing Protocols Guide
6	3HH 11987 AAAA TQZZA	IHUB MPLS Guide

Each of these documents are part of one or more of the 7302 ISAM, 7330 ISAM FTTN, 7360 ISAM FX, 7356 ISAM FTTB, 7367 ISAM SX/DX, 7363 ISAM MX and 7362 ISAM SF/DF R6.0.01 documentation sets.

It should be noted that a number of commands for future features are already part of the SW load but not yet documented in the command reference guides and/or operations guides. These commands should not be used.

5.2.1 CLI/TL1 commands & parameters phased out

For a full list of all CLI/TL1 commands and parameters that have been phased-out or are bound to be removed in a next ISAM release, please carefully check the ISAM CLI Command Guide and ISAM TL1 Commands & Messages Manual documents. Note the CLI/TL1 commands & parameters phase-out is additional to the feature phase-out.

Note CLI and TL1 commands are not always backwards compatible. It can be that old commands are still accepted, but will not be executed.

5.3 SELT-NA Compatibility

For customers using SELT in the 5530 Network Analyzer with R7.0 or higher, every ISAM build needs to be accompanied by the associated SELT calibration package. As this package is customer specific, please contact your Nokia 5530 NA representative to check if a renewal of the calibration package is required.

Line testing is an interactive process. It will be more convenient to use 5530 Network Analyzer to do line testing. When using CLI, multiple commands need to be executed, e.g Create Session, Start Line Test, Check if test is over, Get test result, Destroy Session, etc.

6 Known Restrictions

6.1 Generic Restrictions

Following security restrictions apply to ISAM:

- ▶ The system may have TCP/UDP ports open by default when the functionality that used that port is not enabled. These ports will be visible in a port scan. IP Access control lists shall be configured to limit access to such ports.

Following restrictions apply to the functionality of 7302/7330/7356 ISAM:

- ▶ Following restrictions apply to the functionality of NDLT-J/K:
 - The 2p PTM bonded VDSL2 35b support is only validated vs the Intel EASY550 reference CPE (both based on Intel SW 8.11.1.0.1.7 (hex 8.B.1.0.1.7)).
 - IFEC DS/US is not supported in case of 2p PTM bonded VDSL2 35b, G.INP is supported though.
 - The 2p PTM bonded VDSL2 35b support is limited to three NDLT-J/K cards in case of bonding Mode 1 and vectoring gain at-init.
- ▶ The bonding group will reinit when putting one of the bonded lines admin down while in fallback, because the line will switch from fallback to normal mode when setting the line admin down.
- ▶ While admin down the individual lines of a BG when the BG is in Fallback, the BG will be showing "normal-down".
- ▶ The scenario of upgrading to the same SW build version as the active one, is not supported.
- ▶ Management:
 - When an ISAM shelf is replaced (i.e) the cards in an existing shelf are directly moved to the new shelf that is replacing an existing shelf, the SNMPv3 configured user(s) are deleted silently.
This is due to changed SNMP Engine ID which is based on the ISAM MAC address.

Following restrictions apply to the Vectoring functionality:

- ▶ Following restrictions apply to the functionality of VDSL2 Long Reach:
 - VDSL2-LR is not supported in case of ISDN overlay (US0 Type B).
 - VDSL2-LR is not supported in combination with Vectoring Friendly configurations.
 - VDSL2-LR is not supported for bonding configurations.
- ▶ Following restrictions apply to the functionality of Historical pcoder:
 - In Gain-During-Showtime mode, the historical pcoder configuration won't result in faster init times for joining lines in case no historical correction data is available.

Following restrictions apply to the functionality of NELT-B in 7302/7330/7356/7360 ISAM:

- ▶ Deployment
 - 18xFE or 18xFE ports with SFP in 7302/7330/7356/7360 ISAM.
 - 36xFE or 36xFE ports with cSFP in 7302/7330/7360 ISAM.
 - No cSFP in 7356 REM for thermal reasons: The mechanical class of the 7356 FD REM is limited to class 3M3 according to ETSI standard ETS 300 019. For further information, please contact your Nokia representative.
 - See Hardware Installation Manual for more information.
- ▶ QoS
 - QoS session profile can be configured at the BP and VP Level, and not at the PPP client port (Default priority and session QoS profile cannot be attached to PPP client port).
 - The pbit/DSCP match conditions for a policy action are compared with the received pbit/DSCP values. On the NELT-A card, the pbit/DSCP match conditions for a policy action are compared with the remarked pbit/DSCP values.
 - DSCP to P-bit alignment table can be configured on a SAP Bridge port only (not a SAP vlan port).
 - Upstream Layer 3 filters are not supported for PPPoE packets.
 - The system level and the VLAN level Pbit to TC mappings must be simultaneously used for NELT-B UNI operations. For NELT-B HC-UNI and NNI operations, it is only required to configure the system level Pbit to TC mappings though it might be safer to create a VLAN level Pbit to TC mapping identical to the system level mapping to be ready for a potential future introduction of that feature on HC-UNI and NNI.
 - On HC-UNI and NNI port types, QoS treatment is at parity with UNI with following exceptions:
 - Downstream VLAN based policing is only supported for VLAN-CC forwarders.
 - L2 L3 filters are supported for upstream traffic only (and consequently also policing and marking based on sub-flows).
 - Weights are internally normalized against of scale of 32 (i.e. sum of internal weights ≤ 32), leading to a minimum weight granularity of 3%.
- ▶ L2 Forwarding
 - The amount of VP per BP per interface type is as follows: 8/UNI, 32/HC-UNI, 256/NNI (more details can be found in the Product Information)
 - The HC-UNI mode only supports a subset of the UNI features as indicated in the Product Information
 - Enabling VLAN translation on more than 2K VLAN per NELT-B is subject to licensing.
 - The NNI mode is defined to support an S-ISAM (Subtended ISAM) for residential services. As such the following subscriber management functions are expected to be performed on the S-ISAM (see Product Information for more details):

- vMAC
- Enhanced i-bridge (DHCP snooping, ARP relay, IP anti-spoofing)
- PPPoE relay with MAC@ concentration
- PPPoE Relay
- L2 DHCP relay Lightweight DHCPv6 relay
- IEEE802.3ah
- IEEE 802.1x
- ▶ Video
 - When using NELT-B for subtending applications, via NNI ports, one needs to take into account that the NELT-B card supports up to 55...60 zap/second (i.e. a zap = join + leave) depending on the NT card type and whether the scenario involves a root (joining a multicast channel not present yet in the system or leaving the last branch of multicast tree) or branch (adding/remove a branch of a multicast tree).
- ▶ LAG
 - All port members of a given LAG must belong to either one of the two Port Id ranges: 1...18 or 19...36.
- ▶ Counters
 - NELT-B HC-UNI and NNI counters are subject to constraints and restrictions.

Following restrictions apply to the functionality of NANT-D and NANT-E in 7302/7330 ISAM and to FANT-F in 7360 ISAM FX:

- ▶ SyncE input and BITS input is supported for synchronisation on NANT-D, NANT-E and FANT-F and also on the relevant NTIO's in combination with these NTs, but with following generic restrictions:
 - NCNC-D provides a limited support of Synchronous Ethernet: SyncE IN is not supported. SyncE OUT is only available on SFP6/SFP7.
 - Two SyncE sources on redundant NT (1x per NT) or NTIO are not supported on NANT-D/E.
- ▶ Video
 - IGMP Resource Admission Control (or CAC) on the uplink not supported on NANT-D, NANT-E and FANT-F
 - The ISAM does not support Performance Monitoring counters for multicast traffic on a v-VPLS service. When configuring a v-VPLS service instance and attaching SAPs to that service, it is not possible to count the egress L2 switched or L3 routed multicast traffic on that SAP. This is a hardware limitation. The ISAM is only able to count egress multicast traffic on SAPs attached to a true VPLS service instance.
- ▶ In an Ethernet Ring Protection Switch (ERPS), with a Nokia 7750 SR as Ring Protection Link (RPL) owner, the ERPS switchover time increases in function of the number of SAPs configured on the Nokia 7750 SR.
- ▶ Y.1731
 - L2 ACL's cannot be combined with Y.1731 on same VPLS/V-VPLS service.
 - On NANT-D, SAP statistics and Y.1731 monitoring cannot be enabled simultaneously on same VPLS/V-VPLS service.

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- When Y.1731 is enabled on LAG with ports from active & standby NT's, loss measurement with LMM may contain inaccuracies when adding/removing standby NT ports to LAG while measurement is in progress. The inaccuracy of packet counters is only for duration when ports are being added or removed from LAG.
 - ▶ IES and VPRN IP interface supports a maximum value of 16384 for DHCP lease-populate. When value of dhcp lease-populate is greater than 16384, then it is required to change to 16384 or less before migrating to release R5.3 or higher. For customers using PBMT tool this conversion will be taken care by the PBMT script. When not using PBMT for migration, below steps should be executed:
 - Execute "admin display-config" CLI command. This will provide the IP interface related configuration.
 - Find the lease-populate command under IP interface "lease-populate <value>".
 - If value is greater than 16384 then needs to be changed to 16384 or less.
 - Repeat this for all IP interfaces for which lease-populate is greater than 16384.
 - Do admin save.
 - ▶ Following Alarm Types/Numbers are not supported with TL1: 3/31, 78/1, 84/22, 84/23, 112/2, 194/9, 194/10, 194/11.
 - ▶ Duplicate MAC alarm is not cleared (even not after MAC ageing time) in case the FDB entry gets deleted by other scenario than ageing (e.g. enable VMAC translation).

Following restrictions apply to the functionality of NANT-D and NANT-E redundancy in 7302/7330 ISAM and to FANT-F redundancy in 7360 ISAM FX:

- ▶ Forwarding:
 - The following L3 forwarding functionality is not supported (and so should not be configured) in a duplex NANT-D/E or FANT-F system:
 - RIP and BFD
- ▶ Spanning Tree:
 - Fully supported when the uplinks are connected to the NT I/O.
 - Suffers from the following limitation when the uplinks are directly connected to the two NTs (e.g. first uplink connected to NT-A and second uplink connected to NT-B):
- ▶ MAC address conflicts (duplicate MAC addresses) will temporarily occur during switchover.

Following restrictions apply to the functionality of the 7360 ISAM FX:

- ▶ The feature ISSU is excluded from R6.0.
- ▶ The feature LOIDpre is excluded from R6.0.
- ▶ 7360 ISAM FX in some exceptional cases remains in forced switchover ring protection state after clearing a forced switchover. When performing a forced switchover in an ERPS ring and then clearing the forced switchover, it may happen that a 7360 ISAM FX node in the ring will remain in Forced Switchover state. Specifically, this happens when there is a link failure after the forced switchover was

issued. In this case the ISAM will ignore R-APS Signal Fail (SF) messages, which is correct. However, when the forced switchover is cleared, the ISAM will also ignore R-APS No Request (NR) messages. As a result, the ISAM will remain in Forced Switchover state. Other nodes in the ring (e.g. 7362 ISAM DF-16GW or 7367 ISAM SX) will process the NR messages and will move to Pending state. As a consequence, when a link failure happens after a forced switchover was issued, not all nodes in the ring will be in the same state, and the operator will not be aware that one of the links in the ring is broken. However, there will be no loss of data traffic. To work around the issue: the failure in the ring needs to be restored in order for all nodes to move to Pending state, and then to Idle state.

- ▶ EPIPE is not supported on LSP protected by MPLS-FRR. Such configuration can lead to unpredictable behavior. This restriction applies only for FANT-F
- ▶ Convergence of ERPS Ring using dual-tag R-APS signalling will require approximately 1 sec for the recovery of traffic with the same number of VLANs as in single tag R_APS ring
- ▶ Management:
 - When an ISAM shelf is replaced (i.e) the cards in an existing shelf are directly moved to the new shelf that is replacing an existing shelf, the SNMPv3 configured user(s) are deleted silently.
This is due to changed SNMP Engine ID which is based on the ISAM MAC address.
- ▶ Following restrictions apply to the Timing sync functionality:
 - For xPON network, 7360FX with ONT works as A 'distributed T-BC' node that actually is 2 consecutive T-BC nodes in one system OLT+ access medium IWF+ONT following G.8271. The noise generation performance of the pair configuration for PON access media reaches one T-BC node's definition in G.8273.2 (cTE: +/-50ns, max|TE|:100ns, MTIE: 40ns, TDEV: 4ns) at most cases. Sometimes it may exceed one T-BC node's performance when system restart or high throughput traffics on the unqualified network environment, etc. But it still reaches Cascaded Media Converters' performance defined in G.8273.2 (cTE: +/-100ns, max|TE|:160ns, MTIE: 60ns, TDEV: 6ns). For Ethernet card, 7360FX with FELT-B works as a T-BC' node. The performance reaches one T-BC node defined in G.8273.2 (cTE: +/-50ns, max|TE|:100ns, MTIE: 40ns, TDEV: 4ns) for the whole system. Occasionally, Shutdown/reset the SFP port or the system restart/switch over/high throughput traffic on the unqualified network environment, etc. may impact cTE/TE/MTIE marginally outside G.8273.2 limits.
 - For xPON network, The SyncE to SyncE noise transfer(via NTR 8KHz) is applicable and functions, The PTP to PTP and SyncE to PTP are not applicable as the access solution is a Cascaded Media Converters acting as T-BC which has an internal IWF (defined in the PON standards) that uses the PON physical layer (8KHz NTR) for frequency and the (TC-layer EqD and OMCI G.988) for the time/phase (See G.8273.2 V.3 The noise transfer response of a pair of cascaded clocks is for further study.) For Ethernet card, The SyncE to SyncE noise transfer is applicable and functions, The PTP to PTP and SyncE to

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- PTP are not fully aligned on cut off frequency with G.8273.2 (for FANT-G: FR tracking to be fixed, for FANT-F: not supported due to HW restriction).
- In the cases where IOP is needed between the slave port of a FANT-F and Calnex Paragon-x the Maximum Announce Message Arrival Rate must be configured as 1 pps or less, as opposed the G.8275.1 profile defined default message rate of 8 pps.
 - For Master clock PTP packets over 10G interfaces, ~300ns phase deviation on FANT-F for L2 untag Multicast PTP mode has been compensated automatically without manual operator configuration required from R5.8.01. But Any previous manual compensation done before R5.8.01 release need be removed after migration to R5.8.01 and later.
 - On NT 1pps+ToD input/output interface, ToD format from GPS receiver time server with GPRMC can't be identified correctly. ToD format from GPS receiver time server with GPZDA hasn't been supported yet. Suggest to apply CCSA format as alternative solution.
 - Time of Day is supported on FNIO-A with 10G port only, not for 1G port.
 - Although already documented, Time of Day and SSM on XGS-PON ONT is not yet supported in this release.
 - While each FELT-B physical port can be configured as a master port, master port ids are always shown as 1 via the CLI interface because there can only a single effective PTP master per LT.
 - When 7360 ISAM FX OLT connects to several incoming masters, the non-locked incoming master can't be shown on FANT-F
- ▶ LT backplane load sharing towards NT; no support for 80Gbps per LT slot (FANT-F) on FX16, although supported on FX-4, FX-8.
 - ▶ User-port level commands for PPPoE L2 Statistics do not report actual data in this release.
 - ▶ For NGLT-A, packets discarded by the Traffic Manager (QOS processor) are not taken into account for the trouble-shooting counters.
 - ▶ A (GPON) Rogue ONT may not be detected when the signal level on corresponding ONT is too low. However, in many cases a rogue ONT with such low level signals may not cause disturbance for other ONTs on the PON.
 - ▶ An unprovisioned (GPON) rogue ONT with an optical signal level lower than that of other ONTs on the PON may result in disruption on some ONTs without being automatically detected as rogue as the disruption level is low. Such ONTs are detected by on-demand tests.
 - ▶ NG-PON2 is an ITU-T standard (G.989) name which includes two flavors: TWDM-PON and PtP WDM PON. The 7360 ISAM FX currently only supports the TWDM-PON flavor. Please review all TWDM-PON plans upfront and in detail with Product Management.
 - ▶ The 4*10G KR backplane links between NT and LT in the 7360 ISAM FX mean that configurations must be done carefully to avoid Upstream and Downstream bottlenecks and instead make maximal usage of the available back-plane link capacity. This is influenced by the way in which the iHub (core1) in DS and the LT network processor in US spread the traffic over the back-plane links. This applies to e.g. NGLT, FGLT and FELT cards and to FWLT, but it will more likely be

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- encountered as a potential issue with the FWLT. The FWLT has fewer ONUs, carrying larger throughput traffic, which will increase the probability of traffic passing through the same single backplane link (which would then become a bottleneck). Contact your Nokia representative for assistance.
- ▶ SNMP set of nt:mc properties will lead to unwanted configuration. This will lead to configuration loss in the next reboot. Ideally nt:mc port should be treated as Internal Port and does not need any port properties. This is blocked in CLI but allowed in SNMP
 - ▶ When a software activation of a new software package is started on FANT-F or FANT-G it is advised to not to do new configuration via CLI until the activation either completed or rolled back. The restriction does not apply to configuration done via SNMP since the system can block those during the software activation.
 - ▶ QoS
 - Remote downstream queues schedule may be invalid if remote downstream queues in different UNIs have different scheduling modes on mutiple-slots ONU
 - If remote downstream queues in UNIs have different scheduling modes, then OLT may calculate the same Priority queue instance ID for these UNIs and the remote downstream queues schedule may be invalid
 - Workaround: Use WRR scheduling modes for remote downstream queues.
 - ▶ Clock
 - On FANT-G; NT 1pps Time Error is more than 100ns in case of TC disabled on FANT-G
 - ▶ Following restriction exists on PON LOS alarm reporting on FGLT-B another fiber LTs:
 - PON LED is still green after fiber is plugged out from the port under specific scenario when three ONTs are connected under the PON port 4, and one ONT provision online, the other two status is detected. Then power off the online ONT, then plugout the fiber from the PON port. The PON LED still green, it should be red
 - ▶ Video
 - When IGMP channel created on vlan 4096, and if ONT support attribute "Multicast service package table" in ME "Multicast subscriber config info", OLT would not set correct value in "Multicast service package table". It will affect the Multicast Downstream traffic on the vlan 4096. it is recomended to avoide configuring IGMP channel on vlan 4096 in such a scenario.

Following restrictions apply to the functionality of GPON in 7302/7330/7360/7362 ISAM:

- ▶ If the Dynamic Upstream CAC functionality of the system is not enabled (which is the case by default), the CIR+AIR upstream bandwidth is limited to a maximum of 836 Mbps (aggregated) per GPON port.
- ▶ Virtual Noise and E-side/DPBO on VDSL2 ONT MDUs is covered in the customer documentation, but not supported in this release.
- ▶ Sharing of a QoS BW profile is not supported at the ONT level when the ONT queues are configured in strict priority or with a mix of strict priority and weighted fair queuing scheduling.

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- ▶ The following functionality cannot be activated at the same time: "Downstream UNI rate shaping including multicast" and "UNI shaping based on queue parameters".
 - ▶ When configuring E1 Circuit Emulation Services the Delay Tolerance value must be carefully set; In addition, as the system default may internally be adjusted on a case by case basis, the operator is strongly advised not to rely on this value but apply careful network planning to determine the appropriate DT value for specific services on the PONs.
 - ▶ Background Rogue ONT tests are disabled by default on the PON interfaces and need to be turned on explicitly if the operator chooses to do so. For systems migrating to this release from an older release where this functionality was enabled previously, the prior setting is preserved on the PONs that already existed in the previous release. For newly created PONs however, the default disabling will be set.
 - ▶ Specific restrictions and remarks regarding Type-B protection on GPON&XGS PON (applicable to 7302/7330/7360 ISAM):
 - When MAC learning is enabled on the IHUB NT, the Type-B PON switchover requires that forwarding tables are adapted on the NT switch, which takes a minimal time for each Protection Group (PG) that is being switched. Part of the downstream traffic switchover time remains thus a linear function of the number of PGs (typically ~20 msec per PG when measured over the OLT) affected by a single failure event. Although the total amount of PGs that can be configured in the system is 62, the customers should take care for their provisioning as well as physical wiring in the ODN that no more than 16 simultaneous PON switchovers have to be initiated as a result of an equipment failure (linecard) or accidental cut in the outside plant. To guarantee a rapid re-computation of the ONUs' respective EqD after switchover, and thus to reduce the upstream outage, it is also recommended to limit the number of ONUs to 64 on the GPON protected by a Type-B arrangement. These practices will help guarantee a minimum traffic outage upon switchover, considering the outage time requirements of the specific services that have to be protected. Note that the actual upstream traffic loss upon switchover will also be influenced by the buffering capacity of the protected ONTs.
 - For XGS PON TypeB protection, the validated maximum ONU number on each protection group is 32.
 - Following specific provisioning actions performed by the operator on ONUs that are connected to PON links protected in a Type-B arrangement, the OLT may need a few seconds to synchronize the Mib Data Sync (MDS) counter of those ONUs from the active PON port to the standby PON port. If a switchover was to happen during that very short period of time, it could be that the ONU(s) affected by the aforementioned action have to be automatically re-provisioned by the OLT (by means of an OMCI MIB upload) once they have switched to their new active PON. This unlikely event could affect the services but only briefly; traffic will restore after a few seconds. Only the ONUs whose respective MDS counter increased (due to a provisioning action) and is not yet synchronized since the last switchover or since the

creation of the PG, may be subject to an OLT-triggered MIB upload after switchover. The actions that could lead to such situation are typically: creation of the Type-B protection group (i.e. association between a primary-port and a paired-port), followed by the creation of services or activation of PM counters on ONU(s) already connected to the redundant PONs, or other configuration actions resulting in OMCI provisioning messages being exchanged between the active PON and the ONU. These symptoms won't appear when the system is in steady-state.

- This functionality is not compatible with the feature "PPPoE relay with MAC address concentration". Also, PM counters are not yet dynamically synchronized between active and standby PONs in current release. The current implementation of the Type-B protection does not provide protocol coverage for IPv6/DHCPv6, 802.1x/RADIUS for dynamic configurations, or network-side router (Layer-3) functions.
 - For a Type-B PG, the primary and paired OLT ports must belong to two different linecards of the same board type. This is enforced to offer equipment (linecard) protection along with feeder protection.
 - In a Type-B configuration, if the OLT loses contact with the last remaining ONU on the active PON for any reason including as a result of an ONU power-off event a 'PON loss of signal' may be detected by the OLT, which will trigger an automatic PON switchover. This event has no impact on the services as no ONUs are present on the PON anymore at that moment.
 - When configuring the linecard to its maximum capacity, i.e. 8k static IP address + 16k dynamic IP addresses, the system will not synchronize correctly between the active linecard and the paired linecard. Type-B protection will not operate correctly in this case. To avoid this, the maximum configuration needs to be reduced to either 8k static IP addresses per linecard, 16k dynamic IP addresses per linecard or a combination that is lower than 24k addresses per linecard.
 - Active resources that are in use in association with facilities in a Protection Group arrangement are still governed by the per line or per board scaling applicable to each member (primary and paired member port).
 - In case of deployments based on FGLT-A only, Type-B protection switchover may result in a traffic interruption period of around 1 minute for a small subset of ONTs on the PON
- ▶ TC-Layer PM counters are intended to be used in pairs, with one instance at the OLT and one instance at the ONT, in order to detect impairments of the TC layer connectivity. This determination is made based on significant discrepancies between blocks/fragments reported as transmitted from one end and reported as received from the other in the same timeframe. However, OLT and ONT may report small differences between these counts even in the absence of a noteworthy problem.
 - ▶ Downstream p-bit remarking as a result of policing is not supported on NGLT-C and FGLT-A. However, upstream remarking as a policer action is supported on all GPON line cards.
 - ▶ Queue mode can only be configured per pair of PONs on FGLT-A/NGLT-C.

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- ▶ Protocol tracing is not supported for downstream ARP messages.
 - ▶ Protocol tracing is supported for upstream ARP messages, provided that either Secure Forwarding or MAC address translation is enabled on that VLAN (applies to both iBridge and VLAN cross-connect).
 - ▶ DHCP protocol tracing is not supported on a cross-connect VLAN in case Secure Forwarding is disabled on that VLAN.
 - ▶ In cases where the VoIP IP-Host service is already been created and the associated POTS line is made ISNR, if the Operator deletes the related Bridgeport, ISAM proceeds to auto-deletion of higher layer entities. As part of this, the VoIP IP-Host service is also automatically deleted. No additional service mismatch alarm is raised.
 - ▶ The following S-tunnel mode restrictions and behavior differences apply in the upstream:
 - For RB S-tunnels, the ONT will add an S-VLAN tag in the upstream for all GPON & Universal NG-PON cards and 7362 ISAM DF.
 - For CC S-tunnels via NGLT-A, NGLT-C and FGLT-A cards, the LT will add an S-VLAN tag in the upstream.
 - For CC S-tunnels via FGLT-B and FWLT cards and 7362 ISAM DF, the ONT will add an S-VLAN tag in the upstream.
 - ▶ In case of several S+C iBridges sharing the same S-VLAN on same bridge port, CFM (Ethernet OAM) can only be enabled on one of the S+C iBridges, otherwise, CFM function will fail due to CFM MAC addresses duplicate as the FDB is shared at S-VLAN level.
 - ▶ When enabling 802.1X port-based Network Access Control, the source MAC address of the incoming EAP packet will be learned, even when the authentication fails afterwards. The system does not remove the learned MAC address upon authentication failure.

Following restrictions apply to the functionality of the 7363 ISAM MX:

- ▶ Although the RANT-C, RANI-E, RPNI-E, RANI-F, RANI-G, RACT-A and RPOW-A cards have been documented in the customer documentation, these cards are not fully supported in this release.
Nokia local support should be contacted before planning trials/rollout.
- ▶ Network links:
 - To avoid link connection issues with FELT-B ports, autonegotiation mode should be enabled at both sides.
 - The Uplink Vlanport configuration has been made mandatory for the single as well as the multiple uplink case since R5.5.01. The configuration is documented in the OAM guides, e.g. "Operations and Maintenance Using CLI for 7363 ISAM MX and 7367 ISAM SX" guide, in DLP 4352 "Create a VLAN and attach it to an uplink".
- ▶ Equipment:
 - It takes about 6 minutes for the RFLT-G to come up in enabled state after a cold reset (majority of time spent in self-test).
 - The user-sfp UNI port LED on the RELT-A is still lit after admin-down of the UNI port.

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- ▶ xDSL:
 - Bonding is not supported on the RDLT-A, RFLT-x and RFLS-A LTs.
 - Although stated otherwise in some documents of the customer documentation package, the RFLS-A card is only supporting unvectorized VDSL2 (and no G.fast) in combination with RANT-B.
 - The bonding group will reinit when putting one of the bonded lines admin down while in fallback, because the line will switch from fallback to normal mode when setting the line admin down.
 - While admin down the individual lines of a BG when the BG is in Fallback, the BG will be showing "normal-down".
 - When sending more than 2.5Gbps DS traffic for a RDLT-D/E configured in 24 port mode, there will be no equal load sharing between the lines resulting in some lines to get a lower traffic rate forwarded.
 - Following G.fast functionality is not supported on RFLT-x LTs:
 - Disable vectoring, i.e. Vect-cancel-from and -to in gf-vect-profile must always be enabled.
 - Force the electrical length for UPBO, i.e. upbo-klf parameter in gf-upbo-profile must always be configured as not-forced.
 - G.fast timestamps as defined in G.997.2
 - Flexible cyclic extension and frame size, i.e. gf-vce-profile must always be set to Mf 36 and CE 10.
 - DRA (incl. DRA test mode) is not supported.
 - Following G.fast restrictions apply on RFLT-x LTs:
 - GDR (Gamma Data Rate) is reported equal to NDR.
 - G.fast vce profile needs to be configured on the board.
 - Upstream attainable rate does not change under noise conditions.
 - XDSL per-line overrule functionality is not supported for VDSL2 30a on RFLS-A.
 - When enabling INP on lines with VDSL2 Annex C bandplan, it is required to configure the VDSL2 interleaver memory split with value 50.
The default VDSL2 interleaver memory split is optimal for Annex B bandplans (asymmetrical tone split between US and DS). However, Annex C has a symmetrical tone split between US and DS, consequently requiring a 50/50 interleaver memory split.
 - ▶ Forwarding and Protocols:
 - When vmac-dnstr-filter is not set, the VMAC can move to Network side from user side, like user MAC. But further VMAC conversion will be restricted for any MAC, when the MAC moved to Network side is the last VMAC for the interface. This will not be an issue if the moved MAC is not the last VMAC in that interface. As a workaround the vmac-dnstr-filter should be configured.
 - ▶ QoS:
 - The ethernet etherstats counters are not correct for packet sizes < 64 bytes and > 1518 bytes in case of VLAN tagged packets received from the network via 10G uplink. The counters are correct for untagged packets of these sizes.
 - ▶ Management:

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- The inband management VLAN should be different from the outband management VLAN.
 - When an ISAM shelf is replaced (i.e) the cards in an existing shelf are directly moved to the new shelf that is replacing an existing shelf, the SNMPv3 configured user(s) are deleted silently.
This is due to changed SNMP Engine ID which is based on the ISAM MAC address.

Following restrictions apply to the functionality of the 7367 ISAM SX-16F/48U/8F:

- ▶ Although the VSRM-B has been documented in the customer documentation, it is not fully supported in this release.
Nokia local support should be contacted before planning trials/rollout.
- ▶ Network links:
 - The Uplink Vlanport configuration has been made mandatory for the single as well as the multiple uplink case since R5.5.01. The configuration is documented in the OAM guides, e.g. "Operations and Maintenance Using CLI for 7363 ISAM MX and 7367 ISAM SX" guide, in DLP 4352 "Create a VLAN and attach it to an uplink".
- ▶ Copper uplink (only 7367 ISAM SX-48U, CDAS-D):
 - Interworking with NDLT-F/G (in 7356/7330/7302) in 8p bonded 17a mode, with vectoring, limited to IFEC (no G.INP).
 - The init time for the copper uplink will increase for loops longer than about 700m, caused by internal optimization algorithms.
 - A small number of packets can be dropped in the NDLT-F/G NNI port due to the NNI OBC policer during the MAC learning phase.
 - The lines in the 8 port bonded uplink can go down on the NDLT-F/G when downstream traffic is sent at a too high packet rate. For IMIX DS traffic packet mix, about 2 Gbps is supported for 8 port bonded uplink (max. 250 Mbps per line), incl. bonding/EFM overhead.
 - When a Hub-ISAM aggregates traffic initiated by a sub-tended node through an NNI interface of NDLT-F/G or FELT-B, some configuration fine tuning is required whenever a single multicast VLAN carry all multicast streams (1K or more) to avoid IGMP signalling messages to be discarded by the overload protection mechanism in place on the NNI interface (i.e. control plane packet).
 - IGMPv2: the default control packet policer configuration can be kept (sustained-rate 64 pps, burst-size 128 packets), provided the subtended node spreads its answers to a IGMP General Query over a larger period. This is achieved by increasing the max-rsp-time parameter of the Hub-ISAM IGMP system from default 100 (1/10s) to 140 (1/10s).
 - IGMPv3: burst-size parameter of the NNI control packet policer should be increased to the maximum, to support maximum of ~250 multicast streams in a single multicast VLAN. Further multicast streams handling would need additional mcast vlans to be configured.

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- MaxMAC on the 7367 ISAM SX-48U user lines and NDLT-G local UNI lines must be tuned so as not to exceed the LT max (4K) on NDLT-G (depends also on # UNI/NNI on NDLT-G). To safeguard the inband management traffic downstream, when the NDLT-G LT max cannot be protected in above way (oversubscription case), limit max-unicast-mac on NNI Bridgeport and split the MaxMAC across different vlanports, by reserving a small number of MAC addresses on the NDLT-G NNI management vlanport.
 - ▶ Equipment:
 - The 10Gbase-SR SFP type 3FE63264AA is not fully supported.
 - ▶ xDSL (7367 ISAM SX-16F/SX-8F only):
 - G.fast bonding and VDSL2 bonding are not supported.
 - SELT ECHO and QLN measurements are supported, but no support for SELT QLN on an active G.fast line.
 - Following G.fast functionality is not supported:
 - Disable vectoring, i.e. Vect-cancel-from and -to in gf-vect-profile must always be enabled.
 - Force the electrical length for UPBO, i.e. upbo-klf parameter in gf-upbo-profile must always be configured as not-forced.
 - G.fast timestamps as defined in G.997.2
 - Flexible cyclic extension and frame size, i.e. gf-vce-profile must always be set to Mf 36 and CE 10.
 - DRA (incl. DRA test mode) is not supported.
 - Following G.fast restrictions apply:
 - GDR (Gamma Data Rate) is reported equal to NDR.
 - G.fast vce profile needs to be configured on the board.
 - Upstream attainable rate does not change under noise conditions.
 - ▶ Management:
 - The inband management VLAN should be different from the outband management VLAN.

Following restrictions apply to the functionality of the 7367 ISAM SX-48V/-12VP/-16VP and 7367 ISAM DX-48V:

- ▶ No alarm is generated after the power-down of the nt-sfp-x ports on 7367 ISAM SX-48V/-12VP/-16VP and DX-48V.
- ▶ In case of daisy chained setup, the maximum of 1024 IGMP sessions cannot be achieved when IGMP snooping is enabled on the NNI port of the hub node.
- ▶ Warm reset of 7367 ISAM DX-48V is not supported.
- ▶ Following restrictions apply to the functionality of the 7367 ISAM SX-12VP and 7367 ISAM SX-16VP:
 - The USB craft port of the 7367 ISAM SX-12VP/16VP requires driver software when used with a Windows® operating system. On a computer connected to the Internet, this driver will be installed automatically by Windows®. If the computer cannot be connected to the Internet, the driver files can be retrieved beforehand from the URL
<http://www.exar.com/common/content/document.ashx?id=1596> (accurate as of this writing).

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- The 7367 ISAM SX-12VP/16VP requires two software items, one for the DSLAM SW-item, one for the GPON ONT SW-item. When the software is loaded via AMS, the GPON ONT SW-item is not loaded automatically. For an upgrade of the GPON ONT part, that software must be loaded as described in Appendix B.

Following restrictions apply to the functionality of Universal NG-PON in 7360 ISAM FX and 7362 ISAM DF:

- ▶ Generic Functional Restrictions:
 - The following (non-exhaustive) list gives an overview of features that are not yet supported on Universal NG-PON:
 - Type-B PON protection
 - vMAC
 - Downstream remote queues
 - Traffic limiting per GEM port
 - Downstream dedicated VoIP queue
 - Support of single-rate policer (CIR, CBS) at VLAN-port level at ONU
 - ToD
 - SyncE (incl. SSM)
 - Embedded OTDR
 - FWLT-A tests were passed with 128 physically connected ONUs on 1 Channel Pair. Tests were also larger dimensions with a mix of configured and emulated ONUs resulting in the following maximums for the current release:
 - 432 Vlan ports per Channel Pair, or
 - 1728 Vlan ports per LT, or
 - 27648 Vlan ports at ISAM system level;
 - with 8000 ONUs and 40000 UNIs at the system level.
 - In the current release with multiple ONUs on a Channel Pair, upstream throughput measurements may vary considerably from one snapshot to the next, depending on how well services and OMCI traffic fit with the dynamic bandwidth assignment possibilities. This variability is visible at all packet sizes and size mixes to some extent, but it is particularly noticeable when more than 64 ONUs are present on the Channel Pair where it can reach 1-2 Gbps levels.
- ▶ Restrictions and remarks specific to XGS-PON:
 - XGS-PON can only be supported for 10/10 Gbps symmetrical services when XGS-PON PR30 optics are used; XGS-PON dual-rate (mix of 10/10 Gbps capable ONUs and 10/2.5 Gbps capable ONUs on the same OLT port via TDMA co-existence) can be supported only when XGS-PON dual-rate OLT optics are used.
 - In a dual-rate configuration, if the exact same bandwidth profile is assigned to ONUs of a different type (i.e. XGS-PON ONU working at 10Gbps in upstream and XG-PON1 ONU working at 2.5Gbps in upstream), it is possible that there are slight variations between the bandwidth effectively granted by the OLT to the XGS-PON ONU(s) and to the XG-PON1 ONU(s). This will only happen when the XGS-PON Channel Pair is not congested, and for specific

combinations of bandwidth profile parameters. This will be corrected in a next release.

- In a dual-rate configuration, the semantics of the “ont-polling-period” parameter changes because the OLT will alternate the ranging windows for 10/10 Gbps capable ONUs & 10/2.5 Gbps capable ONUs, at the configured period. E.g. if the provisioned period is 10s, the 10/10 Gbps capable ONUs be able to range every 20s; same for the 10/2.5 Gbps capable ONUs respectively, but shifted with 10s.
- While this is still configurable by the operator in the system, it is recommended that the downstream FEC is always enabled on XGS-PON (as per G.9807.1).
- In order for the Dynamic Bandwidth Allocation to be performed in an optimal manner, in cases where provisioned Delay Tolerance level could not be met due to the provisioned Bandwidth for the service, this latter is automatically adjusted up in a way to give precedence to the latency requirement of that service. Retrieved provisioning data in such cases represents the adjusted values.
- In a 10/10 Gbps symmetrical only configuration, there is no consistency check between the ONU’s planned upstream rate and the channel speed of the ONU’s preferred Channel Pair. In this case it is recommended to always keep the ONU’s planned upstream rate on the default value, so that the ONU will be provisioned using the Channel Pair’s nominal speed.
- Bulk reading of RSSI values for multiple ONT's may result in incoherent results. Workaround is to individually read RSSI for every ONT, with some time in between

Following restrictions apply to the functionality of Universal NG-PON in 7360 ISAM FX:

- ▶ In GPON management model operation mode of XGS-PON, a board plug-out plug-in action would result in LT rebooting twice.
- ▶ Restrictions and remarks specific to TWDM-PON:
 - In current release, the TWDM-PON Wavelength Mobility features are supported in a single-chassis context (i.e. Channel Pairs of the same Channel Group cannot be spread across different OLTs).
 - When an alternative-preferred channel-pair or a protection channel-pair is configured on a TWDM-PON ONU, the bandwidth-profile configuration of that ONU shall not be modified on-the-fly, at the risk of inaccuracies in the QoS CAC calculations. If the TWDM-PON ONU has only a preferred channel-pair configured, changing the bandwidth-profile configuration on-the-fly is perfectly allowed. Note that this restriction is only applicable to TWDM-PON, not to XGS-PON nor GPON.
 - When an NG-PON2 ONU connected to FWLT-B is ranged on its preferred channel-pair but is configured with a second channel-pair (i.e. an alternative preferred channel-pair or a protecting channel-pair), it can in exceptional cases occur that the state of that second channel-pair remains reported 'not ready' for that particular ONU after ISAM reboot. If this happens, please

reboot this ONU via the ISAM management interface (admin equipment ont interface <ont-aid> reboot-with-active-image).

- In case of ONU connected to 3 channel pairs of which two are connected to the same FWLT-B, when doing manual ONT switchovers between pref-channel-pair and alt-pref-channel-pair/prot-channel-pair, it can happen exceptionally that switchover fails, and from then onwards subsequent switchover attempts also fail. As workaround, when the ONT is ranged on the pref-channel-pair, remove the prot-channel-pair/alt-pref-channel-pair and reconfigure it again. As workaround when the ONT is ranged on the prot-channel-pair/alt-pref-channel-pair, first do a chpair-role-exch command so that the channel pair the ONT is ranged and becomes the pref-channel-pair, then remove the prot-channel-pair/alt-pref-channel-pair and reconfigure it again.
- The following restrictions apply to the Equipment Protection via autonomous ONU retuning feature (feature specific to TWDM-PON on 7360 ISAM FX):
 - Once configured, the protection Channel Pair of the ONU is not editable. In order to change the configuration, the protection Channel Pair must be deleted and a new protection Channel Pair must be selected for the ONU of interest.
 - The protection is currently not revertive. Once an automatic re-tuning occurred, the ONU will remain on its new active Channel Pair until another failure event forces it to switch back to its original Channel Pair; until its active Channel Pair is made admin-down; or, until a manual ONU re-tuning from its active Channel Pair to its standby Channel Pair by administrative action.
 - So far, this feature was validated for a total of 4 protected ONUs in the TWDM PON system. The scale and the dimensioning will be extended in future releases.
 - To avoid an ONU re-activation after re-tuning, and thus limit the traffic outage following a protection switching event, the channel-attachment fibers (fiber connecting each OLT TWDM-PON port to their respective Wavelength Multiplexer port) of the Channel Pairs involved in the same Subchannel Group must be of equal length.
 - The traffic that can survive an ONU re-tuning must follow a cross-connect model in the current release. If another model is used, the system will not guarantee the recovery of the service.
- ▶ HW Restrictions:
 - TWDM-PON Optics:
 - The OLT optics have a SOA embedded which results in a high output power level. If insufficient attenuation is used the ONU optics will be destroyed. Therefore, it is recommended to have a minimum attenuation of 15dB.
 - Also, the proper Optical jumpers to use are UPC (blue connectors). Using APC (green) can cause bit errors which are sometimes uncorrectable.
 - Active Wavelength Multiplexer (WM) Restrictions:

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- The Active WM has an SOA integrated for upstream optical signal. To avoid that the amplified upstream optical signal damages the OLT optical module, the path loss of the ODN shall be at least about 20 dB. For details please contact your Nokia representative.

Following restrictions apply to the functionality of the 7362 ISAM DF-16GW and SF-8GW:

▶ Functional Restrictions:

- Management via TL1 is not supported. Only SNMP and CLI management are supported.
- Under specific scenarios, it may take considerably longer for ONTs to range when using the Dual-GPON XFP. In particular, this issue was observed when connecting four ONTs on the same PON port of a 7362 ISAM DF-16GW, and then disconnecting and reconnecting the drop fiber of three ONTs while keeping the fourth ONT connected. This scenario shows instabilities during the re-ranging process, impacting the behavior of the other ONTs. This issue can be avoided by configuring the DF-16GW to use "alientolerant" ranging mode. This can be done using the command 'configure pon range-mode'. This ensures the DF-16GW uses a more robust ranging mechanism.
- The 7362 ISAM DF/SF does not support "S+C VLAN ports" on the UNI interfaces. As a result, the 7362 ISAM DF/SF does not support a combination of S+C VLAN iBridge and S-VLAN tunnel iBridge having the same S-VLAN ID.
- The S-VLAN tunnel iBridge and S-VLAN tunnel cross-connect cannot be used to transport the VLAN for R-APS packets for ERPS, i.e. these forwarders are fully transparent to data plane and control plane traffic.
- The 7362 ISAM DF/SF does not yet provide software support for the following synchronization features:
 - SyncE-in and SyncE-out on network links
 - IEEE1588v2 for frequency and phase synchronization
 - 1pps + Time of Day input for phase synchronization
- MAC address translation (vMAC) is not supported
- The SFP+ ports can be used as downlink ports in NNI mode, including some additional functions (i.e. avoiding user-to-user communication between an NNI port and PON downlink ports and supporting traffic policing) but has not been validated to support IGMP-based multicast services
- Type-B protection is not supported
- It is not possible to support a configuration with some ports in GPON mode and some ports in XGS-PON/TWDM-PON mode. At installation time, operator needs to define the "shelf mode", which is either GPON only, or XGS-PON/TWDM-PON only
- The 7362 ISAM DF-16GW GigE RJ-45 interface can only be used for out-of-band management during Nokia lab testing, since the interface can only be configured using Linux T&D commands, which is not accessible for operators.
- The out-of-band management interface has a throughput restriction of maximum 3000 ingress packets per second. Similarly, the in-band traffic on the OAM VLAN has a throughput restriction of maximum 3000 pps of ingress traffic.

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- When changing the shelf mode, the configuration of the Ethernet uplinks will be cleared, including the configured Ethernet MAU type. As a result, the node will fall back to the default MAU type for the Ethernet ports. This may lead to a MAU type conflict with the actual connected link type, leading to the link going down and therefore loss of remote management.
 - CFM OAM support on the uplink ports is restricted to one “Fast CCM” (i.e. 10 CCM messages per second) instance on each bridge port, or two Fast CCM instances per system. This enables fast failure detection using CCM messages in an Ethernet ring. For this, a Down MEP must be configured on the uplink bridge port. LTM/LBM are not supported on the Down MEPs on the uplinks. Also, “Normal CCM”, using long transmission intervals, are not supported.
 - The uplink interfaces support load sharing based on hashing of the Ethernet MAC header and IP header, the so-called “L2/L3 hybrid” hashing. Other hashing algorithms are not supported. If an operator configures hashing based on the IP header (and not the MAC header), the configuration command will not be rejected, but a warning will be prompted for forward compatibility purposes.
 - When performing a MAC flush operation during an ERPS switchover event, the system does not learn MAC addresses of newly received Ethernet frames on any of its user interfaces or network interfaces. Once the MAC flush has been completed (typically within 100 milliseconds) traffic will be relearned.
 - When enabling 802.1X port-based Network Access Control, the source MAC address of the incoming EAP packet will be learned, even when the authentication fails afterwards. The system does not remove the learned MAC address upon authentication failure.
 - When a UNI port enabled with MAB authentication, it is still allowed connecting 802.1x EAP devices under this UNI port to execute 802.1x EAP authentication instead of MAB. However, under heavy traffic conditions the related protocol packets may not be processed temporarily.
 - There is no command to manually force a backup of the current system configuration on the internal storage. Instead, the system automatically backs up its configuration every minute. As a result, a power cycle may result in the loss of configuration performed during the last minute prior to the power cycle.
 - In a ring topology, care is needed when performing a node restart with a default database. Under such condition, all uplink ports of the node will be enabled and as a result, the ring topology will contain a loop. This will lead to flooding of Ethernet management traffic and eventually to a node reset. To avoid this, all Ethernet ports of a link path should be administratively disabled before performing a node restart. This configuration is persistently stored, and will take effect once the node has restarted, thereby avoiding the loop in the ring.
- ▶ Restrictions relate to network management:
- Prior to R5.6.01, the 7362 ISAM DF-16GW did not create an OAM forwarder, nor attach the OAM VLAN port to this forwarder, since the system only supported one logical uplink port. In addition, the configuration of the LAGs

and bridge ports was not stored in the protected database (i.e. data survives a system restart plus survives a restart of the system with "default database"). Instead, it was assumed there is a default LAG interface containing all physical interfaces. OAM connectivity was by default allowed on this default LAG.

- R5.6.01 adds support for storage of the OAM VLAN port, bridge port and LAG ports in the protected database. In addition, the DF-16GW supports a migration process where the unit stores all LAGs and bridge ports from the existing DF-16GW database into the R5.6.01 protected database.
 - In order to be backward compatible, the DF-16GW supports the legacy and new behavior in R5.6.01. In case there is only one logical uplink port created, the system allows OAM traffic to pass through without explicit configuration as before. Next, when the operator creates another logical uplink port, he must create the OAM forwarder and create VLAN ports over both uplink ports in order to properly support OAM traffic.
 - Consequences:
 - Prior to R5.6.01, since all active ports are put in the default LAG, we can NOT control which physical link is used to send out the OAM packets. Thus, OAM packets may be distributed across all physical links. Hence, after a system restart the operator may lose management connectivity (packets sent by management may not be received on the correct physical link).
 - After migrating to R5.6.01, the operator MUST explicitly create the OAM forwarder and VLAN ports, irrespective of the number of logical uplink ports. If not, OAM connectivity will be lost after a system restart with "default database" lateron.
 - Further background: in R5.6.01, in case no OAM forwarder is created and there are multiple logical uplink ports, the system will automatically allow the OAM channel over the over the lowest physical port id (*). When the operator creates the OAM forwarder lateron and attaches the first VLAN port into this forwarder, the system switches the OAM channel to the configured OAM forwarder and VLAN port. If on the other hand the operator does not create the OAM forwarder and VLAN port explicitly, and then creates a new uplink port with a smaller port id, then the system will directly switch the OAM channel to this new port (see *). This will result in a loss of OAM connectivity. This behavior remains the same, regardless of system/linecard restart.
- ▶ HW Restrictions:
- The 7362 ISAM DF/SF is designed to operate in an Ethernet forwarding network model. Consequently, it does not support IP forwarding, IP routing or MPLS functionality.
 - When confuring Ethernet Ring Protection Switching (ERPS), path A and path B should have the same R-APS level value within a ring instance and this for each node in the ring. Otherwise the the ERPS ring may not work properly.

Following restriction applies to 7362 ISAM DF/SF, ISAM 7360 NELT-B and FELT-B:

- ▶ The Automatic Laser Shutdown (ALS) state machine, upon receiving light from the peer, is declaring the link operationally up too quickly, i.e. not leaving enough time to close the feedback loop between the two peers (i.e. potentially allowing the peer to shut down its laser again if it has not received light).
 - This can lead to link state toggling in specific conditions, i.e. whenever the actual link state cannot be made known to the peer by other means than the ALS feedback loop.
 - It applies only in case auto-negotiation on GE optional connections is switched off, whereas, in principle, the standard mandates to have it switched on.

Link state toggling can be observed in exceptional cases when all following conditions are met;

 - Peers are connected over an GE optical connection made of two uni-directional fibres
 - One of the fibres is broken
 - Auto-negotiation is not enabled on that line
 - An SFP with 2 fibres (1 per direction) is used and only one is broken.- This line toggling has following undesired consequences;
 - False operational state changes are reported and
 - Static LAG (i.e. LACP is disabled and cannot verify the link sanity for both directions) suffers from periodic undesired switch-over leading to period packet losses.
- Workaround;

Enable auto-negotiation on GE optical connections made of two uni-directional fibres, especially when they are member of a static LAG, so there is a hardware hand-shake mechanism making the state of both fibres known by the 2 peers at any time, i.e. much faster than what is needed by the ALS feedback loop. Mind that 10G links do not suffer from this issue because 10G standards mandate RDI support (not optional like the GE auto-negotiation).

6.2 R6.0.02 Restrictions

Nr	Id	Rel. note entry
GPON OLT		
1	ALU02529777 (1-7350833)	<p>Title: ONT inactive ("INACT") alarm is reported in conjunction with PONLOS alarm when fiber is disconnected and reconnected</p> <p>Problem: During validating release 6.0 for both on FANT-F/FGLT-B and NANT-E/NGLT-A, often at a fiber disconnection, not only PONLOS alarm is generated, but also an INACT alarm for each ONT connected to the PON. After a short while, the INACT alarms clear (+/- 15 seconds). When the fiber is connected again, the PONLOS alarm clears, again an INACT alarm is raised for each connected ONT, which also clears after a short while.</p>
Synchronisation		
2	ALU02569304	<p>Title: XGSPON ONU timing failed to sync with NT when not configuring NT redundancy and two NT in shelf</p> <p>Problem: XGSPON ONU can't sync the timing</p>

		Workaround: Configuring NT redundancy when plugging two NT in shelf
3	ALU02574934	Title: NT-A hot restart causes huge jump on End to End time error Problem: In a redundancy configuration with the NT-A hot standby and the NT-B active; with 1st priority syncE and the PTP source located on the NT-A, a hot/warm restart of the NT-A causes a huge time error jump, that will recover automatically after 10 minutes.

6.3 Known Restrictions from Previous Releases

Nr	Id	Rel.note entry
7363 Equipment		
1	ALU02529989	Title: Invalid sfp id module alarm Problem: There are difference behavior for "user-sfp-inv-id" alarm after power-down the user-line
7367 Equipment		
2	ALU02485952	Title: No support for 7367 ISAM DX-48V warm reset Problem: Reboot with and without self test for 7367 ISAM DX-48V is not supported, hence next show-commands are also not supported: (1) show>qos# admin equipment slot lt:1/1/1 reboot without-selftest and (2) show>qos# admin equipment slot lt:1/1/1 reboot with-selftest.
Equipment		
3	ALU02472023	Title: 3 sec outage during NT SWO with FANT-G/FNIO-B combination Problem: With FANT-G/FNIO-B combination there is ~3sec outage during NT SWO due to port flap of FNIO-B ports. This is a HW limitation (BCM56860 does not support parallel detect) on FANT-G which causes NTIO port to restart auto-negotiation on NT switchover. Workaround: Outage can be reduced to less than 1 sec by configuring the Ethernet holdtime as 1 second, i.e. "configure port Ethernet hold-time down 1"
G.fast		
4	ALU02461649 (1-6298481)	Title: Microcuts in G.fast causing errors on neighbouring lines in high crosstalk conditions Problem: When CPE microcuts of 10ms or 20ms are introduced on a particular line, errors are observed on neighbor line in high crosstalk conditions. Due to microcuts the ELFEXT changes and causes a dramatic drop in SNR (up to 35dB drop!) resulting in errors on the neighbor line. But the neighbor line remains in showtime despite the huge SNR drop.
5	ALU02461677	Title: Several LOS alarms are raised cleared when powering cycling CPEs on RFLT-G Problem: In large 7363 ISAM MX-6 systems, with 3 RFLT-G fully equipped with CPEs, when powercycling the lines, following behaviour of alarms is observed: Loss of Power alarm is raised, together with LOS alarm. For a few lines, the LOS alarm is cleared and gets re-raised (can be up to 4 times). Finally, all LOS alarms and all LPR alarms are successfully cleared, when those lines reach showtime. When checking the XDSL counters, the init-count for a number of lines is higher than 1 (can be 2, 3, 4). Consequence is that init-time for those lines is much higher than for other lines.
GPON OLT		

6	ALU02483265	<p>Title: Sometimes ONU INACT alarm is observed when PON switchover is triggered from LT1 to LT2 very frequency within a short time</p> <p>Problem: Sometimes may observing an ONU INACT alarm after multiple PON switchovers from LT1 to LT2 within a short time and vice versa. This alarm will be cleared automatically but user traffic recovery timing may impact before the alarm clearance.</p>
7	ALU02510692	<p>Title: After ISAM reboot, backup CP status shows not-ready and manual swo not working</p> <p>Problem: In some exceptional cases, after ISAM reboot, the backup channelpair is in state prot-not-ready. And manual switch-over is not possible anymore. Alarm protection-not-available alarm is raised.</p> <p>Workaround: Unconfigure and reconfigure the prot-channel-pair for the affected ONTs</p>
QoS		
8	ALU02507992	<p>Title: Remote downstream queues schedule may be invalid if remote downstream queues in different UNIs have different scheduling modes</p> <p>Problem: If remote downstream queues in UNIs have different scheduling modes, then OLT may calculate the same Priority queue instance ID for these UNIs and the remote downstream queues schedule may invalid.</p> <p>Workaround: Use same scheduling modes for remote downstream queues.</p>

7 Migration Options

Migration to R6.0.02 is supported from:

- ▶ R5.3 releases
- ▶ R5.4 releases
- ▶ R5.5 releases
- ▶ R5.6 releases
- ▶ R5.7 releases
- ▶ R5.8 releases

8 Installation Manual

Detailed SW Installation Guidelines for the ISAM Software are described in the ISAM SW Installation Guide: 3HH-07196-AAAA-RJZZA.

9 Premium Packages

Premium Package concept:

- ▶ Premium Packages are bundles of features allowing operators to extend the ability to deliver premium services to the subscribers.
- ▶ Premium packages require separate licenses (refer to PPP), which give the customer the right to use the features in the contained packages for the corresponding amount of lines. Therefore the features of these packages are not part of the current Release SW-update specified in the roadmap.
- ▶ The features of the Premium Packages are defined in the specific roadmap for each customer.
- ▶ The number of customer "Right to Use" is limited to a contractually committed number.
- ▶ Premium Package features may be checked (audit) at the customer site. If the number of "Right to Use" is exceeded the customer is obliged to purchase additional SW licences.
- ▶ These additional features within the Premium Packages will only receive technical support if the "Right to Use" is not above the contractually committed numbers.
- ▶ The Premium Packages described here are applicable for:
 - 7302 ISAM
 - 7330 ISAM FTTN
 - 7360 ISAM FX
 - 7356 ISAM FTTB REM
 - 7362 ISAM DF/SF
 - 7363 ISAM MX
 - 7367 ISAM SX/DX

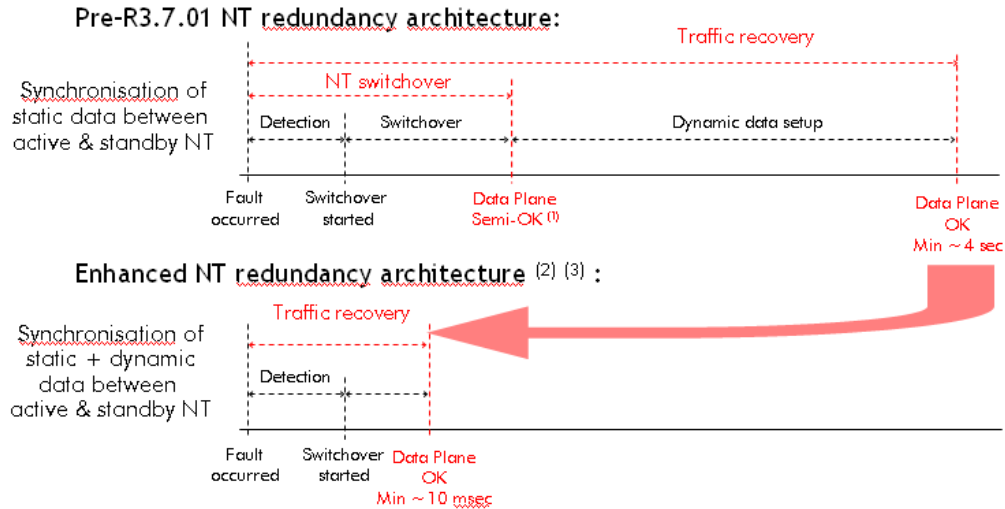
Depending on specific platform characteristics or applications (xDSL, GPON, equipment resiliency, ...) a specific package might not apply.

Note: In case of GPON application, the features as described in the below sub-sections are subject to the support of the respective ONT being used. This is especially the case for the ONT-based DSL and Voice Services. Please refer to the ONT Customer documentation if the respective feature is being supported by the ONT.

9.1 Premium Packages Equipment

ISAM Redundancy

- ▶ ISAM redundancy license for NANT-A on 7302 FD and 7330 FD; for NANT-D/E and FANT-F, NT Load Sharing SW license is applicable.
- ▶ The following architecture can be supported.



Semi-OK (1) : HW is ready to allow dynamic data setup by L2 control protocols (LACP, RSTP...)

(2): Enhanced NT switchover not supported on ECNT-A

(3): Includes seamless switch-over for optical NTIO ports

NT Load Sharing

- ▶ NT Load Sharing license for high capacity NTs on 7302/7330 ISAM FD and 7360 ISAM FX
- ▶ The features enabled with this licence cover:
 - NT redundancy, active-active
 - sub-1s switching capability
 - NT load sharing
 - LT load sharing

2.5 G per LT

- ▶ Increase the data-rate per line or per user
- ▶ Between a high capacity NT (NANT-D/E), FANT-F and NRNT-A and a high capacity LT (e.g. NVLT-P/Q or NGLT-A/B) the internal link speed can be increased from 1 Gbps to 2.5 Gbps.
- ▶ To effectively increase this internal link speed, this “2.5 Gbps per LT” license is required. Else it will be limited to 1 Gbps for even these high capacity boards.
- ▶ This capability is enabled per ISAM system or shelf, and can not be enabled per LT or slot.
- ▶ This license is also applicable for remote LTs in a REM and connected via a 2.5G optical link to an NT/NTIO in 7330.

10 G per LT

- ▶ Increase the data-rate per line or per user
- ▶ Between a high capacity NT (NANT-E/FANT-F) and a high capacity LT, the internal link speed can be increased from 1 Gbps to 10 Gbps.
- ▶ To effectively increase this internal link speed, this “10 Gbps per LT” license is required. Else it will be limited to 1 Gbps for even these high capacity boards.

-
- ▶ This capability is enabled per ISAM system or shelf, and can not be enabled per LT or slot.

20 G per LT

- ▶ Increase the data-rate per line or per user
- ▶ Between redundant high capacity NTs (e.g. NANT-E) and a high capacity LT, the internal link speed can be increased from 1 Gbps to 20 Gbps.
- ▶ To effectively increase this internal link speed, this “20 Gbps per LT” license is required. Else it will be limited to 1 Gbps for even these high capacity boards.
- ▶ This capability is enabled per ISAM system or shelf, and can not be enabled per LT or slot.

40 G per LT

- ▶ Increase the data-rate per line or per user by synchronising the LTs with NTs (either simplex or duplex) at 40 Gbps
- ▶ Between a high capacity 480 Gbps NT (FANT-F) and a high capacity LT, the internal link speed can be increased from 1 Gbps to 40 Gbps
- ▶ To effectively increase this internal link speed, this “40 Gbps per LT” license is required. Else it will be limited to 1 Gbps for even these high capacity boards
- ▶ This capability is enabled per ISAM system or shelf, and can not be enabled per LT or slot

9.2 Premium Packages Connectivity

Connectivity includes next licenses;

- ▶ PPPoX Relay, license per subscriber: enabling either PPPoA to PPPoE relay or PPPoX relay with MAC@ concentration
- ▶ Subscriber Authentication, license per subscriber: Authentication of subscribers based on 802.1x and Radius server
- ▶ IPv4 Security, license per subscriber: all mechanisms enforcing IPv4 security: vMAC, IPv4 address anti-spoofing, ARP relay proxy and IP filters (ACL)
- ▶ IPv6 Security, license per subscriber: IPv6 antispoofing, ICMPv6 filtering
- ▶ IPoA encapsulation, license per subscriber: Enabling IPoA encapsulation for either VLAN-CC or IP routing, IP Routing Re-factoring (IPoA)
- ▶ IPv4 Forwarding, license per subscriber: enabling basic routing at ISAM level, including IGP protocols (RIP, OSPF, IS-IS); practically, this means enabling IPv4 routing at NT
- ▶ IPv6 Forwarding, license per subscriber: Enabling IPv6 routing at ISAM level, including IGP protocols (OSPFv3); Practically, this means enabling IP routing at NT
- ▶ BFD, license per node, for IHUB NTs only: used for IP routing and MPLS resiliency schemes to get a faster detection of the broken link

- ▶ MPLS, license per node, for IHUB NTs only: MPLS for residential & business users
- ▶ MPLS+, license per node, for IHUB NTs only: DOD, LDP support for Inter-area LSPs
- ▶ MPLS OAM, license per node, for IHUB NTs only: MPLS ping, MPLS traceroute, etc
- ▶ MPLS Advanced Resiliency, license per node, for IHUB NTs only: MPLS LSR, MPLS FRR
- ▶ PIM-SSM, license per node, for IHUB NTs only: this is a specific routing protocol for multicast traffic.
- ▶ Enhanced Subscriber Management Lawfull Intercept, license per node: this license is part of the Enhanced Subscriber Management Package. When enabled, it allows for monitoring a limited set of lines.
- ▶ User-to-User Communication, license per node: allows for user to user communication via the ISAM only
- ▶ BGPv4 routing protocol
 - Content: BGP allows to integrate the ISAM in a network where route advertisements are performed through an IGP (e.g. IS-IS or OSPF) and an EGP (BGP), typically in a Multi-VRF environment
 - Applicable Standards: RFC4271, RFC1997

Available (optional) licenses per network model:

Network model	PPP concentration	Subscriber authentication	IP security	IPoA	IP routing	Comment
PPP based HSI	✓	-	-	-	-	PPP Concentration only required if PPPoA or PPPoX concentration is used
DHCP HSI/Multi-Media VLAN-CC	-	✓	✓	-	-	Subscriber Authentication untypical IP Security untypical (potentially vMAC)
DHCP HSI/Multi-Media i-bridge	-	✓	✓	-	-	Subscriber Authentication not deployed today IP Secure Forwarding advised (E-i-Bridge)
DHCP HSI/Multi-Media IP routing	-	-	✓	-	✓	IP Secure Forwarding IP Routing required IPoA untypical Optional BGP
Business L2VPN	-	-	-	-	-	Transparency required

Network model	PPP concentration	Subscriber authentication	IP security	IPoA	IP routing	Comment
Business L3VPN	✓	-	-	✓	-	Two approaches: <ul style="list-style-type: none"> • PPP based with potential PPPoA relay or MAC@ concentration • IP based with potential IPoA encap

9.3 Premium Package Video Applications

Video License, including IGMPv3

- ▶ Video License; license per subscriber;
- ▶ Supports IGMPv3, DoS protection for IGMPv3, increased multicast source table, IGMP echo client/IGMP msg forking

Video Statistics

- ▶ Video Statistics; license per subscriber;
- ▶ Call Data Records (CDR), accessible via FTP, record all zapping actions of the end user, by tracking user-id, channel-id and timing information. The CDR generation can be customized (minimum viewing time before a CDR is generated, use of intermediate CDRs, etc.).
- ▶ Call Data Records available via Syslog, in near real-time.

Video Wholesale

- ▶ Video Wholesale; license per subscriber;
- ▶ Cross-VLAN multicast: infeed of channels from multiple VLANs. Service from different providers is segregated in the network.
- ▶ Channel package policing. Allows offering end-users restricted access to a specific set of channels from a selected subset of content providers.
- ▶ Bundles of channels, BW management and SLA per provider. This supports the BW management for wholesale environments, both in a L2 and in a L3 aggregation network.
- ▶ Statistics on service fulfilment per channel and per bundle. Feedback on SLA and service fulfilment per provider.
- ▶ IGMP Source Specific Multicast:
 - Distinguishes multicast channels by group IP-address and source IP-address, the client (STB) sends IGMP messages that not only specify the group IP-address but also the source IP-address of the video server.
 - Video service wholesale (L2), different service providers can choose group IP-address for their channels independently. Group IP-address from different providers may overlap.

9.4 Premium Packages Voice Applications

9.4.1 Premium Package ISAM-V SIP

The ISAM-V SIP Premium Package delivers the ETSI SIP PSTN (POTS) equipment practices.

This SW package is only applicable for voice line boards inside ISAM shelves (so-called ISAM-V). It is not applicable for voice on ONTs.

The IP address and VLAN scheme in SIP architecture is delivered with a CDE profile.

There is support of "SIP restoration", "SIP-session timer", "POTS T38 Fax over IP", "Lawful Interception" and supplementary POTS-services: such as third party conference and explicit call transfer.

SIP PSTN (POTS) for ETSI equipment practices

- ▶ The ETSI Equipment Practice will support POTS Basic call & Supplementary services based on SIP protocol.
- ▶ The value of this Application is that the Network evolution to complete SIP based architecture is an obvious trend in the ETSI markets. It allows migration to SIP on current and future H.248 installed base via SW upgrade preserving customer HW investments. No new LT type is necessary for this.
- ▶ The Applicable Standards refer to RFC SIP (Session Initiation Protocol).

Evolution of POTS SIP to TISPAN compliance

- ▶ Key Business drivers for IMS/TISPAN are:
 - **Distributed architecture:** Functional decomposition with standardized interfaces allows for better scalability, geographical distribution and multi-vendor network integration.
 - **Open Interfaces:** Open interfaces allow for interoperability between multi-vendor network elements and multi-operator networks.
 - **Centralized Database:** The home subscriber server acts as a centralized subscriber and service database, providing OPEX savings and allowing for more flexible service integration.
 - **Flexible AS integration:** The standardized SIP-ISC interface with multiple application servers triggering allows for fast introduction of new applications and services.
 - **Enabler for Fixed Mobile Convergence:** The converged IMS/TISPAN architecture gives Access agnostic core, Multi-Access architecture, Fixed Mobile network interworking, Converged applications, Terminal independence, etc.

Note: The Applicable Standards refers to TISPAN (Telecoms & Internet converged Services & Protocols for Advanced Networks) standard for SIP POTS.

IP address & VLAN scheme in SIP architecture

-
- ▶ The Basic SIP architecture is a distributed SIP UA for SIP protocol termination, different from centralized server card in a H.248 case with VLAN & IP address scheme for Signalling, Voice & OAM.
 - ▶ This implicates:
 - Flexibility to support either distinct or shared VLAN approach for Signalling and Voice traffic.
 - Flexibility to support either distinct or shared IP address approach for Signalling and Voice traffic.
 - Flexibility to support either multiple or single SIP Signalling/Voice IP address per system (per Node) in public or private IP address range.
 - External OAM VLAN & IP address kept separated from Voice and Signalling for security reasons.
 - ▶ The value of this Application is delivering a good performance and reliability and the Flexibility for deployment model in terms of Subnet & IP address scheme.

Downloadable country specific voice parameters

- ▶ The CDE profile can be downloaded with country-specific voice parameters. The download strategy for SIP is aligned with H.248.
- ▶ The value of this application is that One SW package can support multiple customers as CDE.

Downloadable SIP Service Profile

- ▶ Allows to configure the following service related parameters:
 - SIP call flow related parameters for loosely coupling tightly coupling services
 - SIP headers (session-ID, PANI header, more in the future)
 - Mapping on SIP methods/messages for distinctive ringing, MWI (more in the future)
 - Mapping on the tones for different call terminated scenarios
 - Mapping on the tones with error code received from SIP server

Multiple Voice Service Gateway

- ▶ Allows and Operator Access Provider:
 - To deploy a multiple Voice Service Provider network (a “Wholesale” voice network),
 - To choose for the multiple Virtual Access Gateway network approach (easy network capacity planning).
- ▶ When Multiple VSG enabled, the license allows a maximum number of SIP terminations installed in the Customer’s Network.

Carrier Grade Applications

- ▶ **SIP POTS Termination ID Provisioning**
 - Termination ID can be generated with subscriber line physical info.
 - Termination ID is generated according to data configured by the operator management system.

- Termination IDs is regenerated through updating syntax in profile; System support to store and read out the generated Termination ID.
- The Value of this Application is that it is easy and flexible to generate with subscriber line physical info and it will also fasten the provisioning and identification of the physical position of Termination ID
- ▶ **SIP restoration**
 - SIP restoration improves the reliability for integrated services supported in an IMS network architecture requiring the support of Failover and Failback functionality for both equipment and network related failures regardless of the physical location of components such as the voice server in the network.
 - SIP restoration is specified by the TIPSPAN R2 (Feature Server 5000, CPE Interface Specification, QDI ID 28575 reference sections 4.11 and 4.17 and TS 0373/96, Teil 4 Multi-Service Access Node (MSAN), reference sections 2.2.1.1.12 and 2.9.4).
- ▶ **Lawful Interception (LI)**
 - The Lawful Interception (via Media Server) is a requirement in most countries towards telecom operators. Operators are required by law to provide intercepted communication data based on legal warrants and procedures enacted by the host country.
 - The value for this Application is that the lawful interception function enables the telecom operators to meet the needs of authorized organizations that are entitled to monitor subscriber's telecommunications activities.

The principle is the use of a Media Server as centralized Call Content copy point.

- ▶ **SIP POTS 12/16 kHz Metering**
 - Provide the 12/16 kHz metering signal for SIP POTS users
- ▶ **Local Stand Alone & Emergency Call**
 - Emergency call services allows routing/mapping of an Emergency call (911, 112 or other designated Emergency Call number) to a Emergency service provider. Emergency calls are to be routed to a designated Emergency service provider that is connected via a standard POTS line within the ISAM-V stand-alone cluster. Provide the 12/16 kHz metering signal for SIP POTS users

Voice Functionality

- ▶ **SIP E2E negotiation of Dynamical payload type**
 - Dynamic payload number negotiation (range from 96...127) per RFC3264.
 - Following media type has dynamic payload type in this feature: telephone-event/8000 or DTMF relay with named telephony events.
 - The Value for this application is that its guarantees a better Interoperation among different devices on one network
- ▶ **SIP Subscriber control for POTS (PIN).**

-
- ▶ **Support of SIP session timer**
 - The session time is conforming to RFC4028, used for a periodic refresh of SIP sessions through a re-INVITE or UPDATE request.
 - The refresh allows both user agents and proxies to determine whether the SIP session is still active and synchronize the session state.
 - ▶ **POTS T38 Fax over IP**
 - The Support of T38 (FAX over IP) allows for POTS service, support the procedures for real time group 3 facsimile communication over IP networks based on the SIP signalling protocol, compliant with ITU-T T38 and IETF draft/V.152.
 - The performance of this feature is kept same as H.248 T38 feature.
 - ▶ **POTS overlap dialling & open numbering**
 - Support the overlap dialling mode with multi-invite method.
 - When overlapped dialling mode is selected, the ISAM-V sends the initial INVITE upon detecting a digit match, then, additional digit input is acXDted on which an associated and subsequent INVITE may be issued.

POTS Supplementary services

Third Party Conference

- ▶ The third party conference provides valued service for users to setup third party conference in the user's premises.
- ▶ The third party conference is a useful C5 supplementary service, with the function enabled in IMS solution, user can easily apply it as like it would be used in legacy PSTN but with more flexible in service deployment.
- ▶ Either use a Media Server as centralized Y-function point or the NPOT-B as audio mixer with the loosely coupled mode.

Explicit Call Transfer

- ▶ The feature Explicit Call Transfer (ECT) provides 3 modes for the application service:
 - Consultative call transfer transferor has a communication with transfer target before hang-up.
 - Call transfer from a 3-way call third party call is setup before transfer or hangs up.
 - Blind call transfer transferor has no communication with transfer target before the hang-up and doesn't know if the service is setup or not.
- ▶ This is an important and useful C5 supplementary service, and provides added-value for customer service deployment in IMS solution.

Call Waiting

- ▶ This is an important and useful C5 supplementary service, and provides added-value for customer service deployment in IMS solution.
- ▶ Calling termination presses the flash-hook (and dials an additional digit) to switch between the current called termination and a 3rd party.

Call Hold

- ▶ This is an important and useful C5 supplementary service, and provides added-value for customer service deployment in IMS solution.
- ▶ Hard Hold: Allowing calling termination to Flash Hook once to put the called termination on hold, and to Flash Hook once again to resume the call with the hold termination.
- ▶ Call Hold Consultation: Allowing calling termination to put an existing call on hold and to initiate a second call to a 3rd party.

9.4.2 Premium Package Narrowband Integrated Line Test Access SW

H248/SIP POTS

This package is only applicable for voice line boards inside ISAM shelves (so-called ISAM-V). It is not applicable for voice on ONTs.

- ▶ Support Group Test
- ▶ Support AC voltage of user's line (AB, AG, BG)
- ▶ Support DC voltage of user's line (AB, AG, BG)
- ▶ Support Insulating resistance of user's line (AB, BA, AG, BG, A-Bat, B-Bat)
- ▶ Support Capacitance of user's line (AB, BA, AG, BG)
- ▶ Support Impedance of user's circuit (AB, AG, BG)
- ▶ Support Termination (M Socket detection)
- ▶ Support AC & DC Current Test Normal Test
- ▶ Support Feeding current (AB)
- ▶ Support Dial Tone Delay of user's circuit
- ▶ Support Howler Test Under Normal Test Condition
- ▶ Support Howler Test Terminated by Test Operator
- ▶ Support Rejection Error Code & Message Returned for Wrong Command input
- ▶ Support Status monitored
- ▶ Support Resistance of user's loop (AB)
- ▶ Support Block/Continuous Reading Tests
- ▶ Support Line Reverse Normal Test
- ▶ Support Line Reverse Test Terminated by Test Operator
- ▶ Support Feeding Voltage in the line
- ▶ Support Subscriber Private Meter Pulses Test
- ▶ Support Talking with Subscriber Test normal test
- ▶ Support Talking with Subscriber Test Terminated by Test Operator
- ▶ Support Ring Subscriber with Auto Ring Trip Normal Test
- ▶ Support Ring Subscriber with Auto Ring Trip Terminated by Test Operator
- ▶ Support DP/DTMF Signal Normal Test
- ▶ Support DP/DTMF Signal Test Terminated by Test Operator
- ▶ Support Cable pair identification tone test

H248 ISDN BA

This package is only applicable for voice line boards inside ISAM shelves (so-called ISAM-V). It is not applicable for voice on ONTs.

- ▶ Complete loopback with test pattern
 - Loopback of full bit stream (B1 and B2 and D channel)
- ▶ Loopback at ISDN LT and NT/NT1
 - Self test on layer 1 by the ISAM-V: ISAM-V generates a test pattern and activates a loopback at the LT + verification and evaluation of received test pattern.
 - Test towards the NT/NT1: ISAM-V generates a test pattern and activates a loopback at the NT + Verification and evaluation of received test pattern.
- ▶ Electric line tests on the ISDN line card:
 - Foreign DC voltage (A&B, A&G, B&G)
 - Foreign AC voltage (A&B, A&G, B&G)
 - Resistance (A&B, B&A, A&G, B&G)
 - Capacitance (A&B, B&G, A&G)

9.5 Premium Packages Transport

9.5.1 Premium Package SmartDSL AN/VN

Virtual noise

- ▶ Line stability has a huge impact on the Quality of Experience. An unstable xDSL line, caused by crosstalk variations for example, can result in service degradation and even service interruption. In a typical DSL network, up to 25% of lines can be unstable leading to higher operational costs, lower ARPU, and increased churn. The traditional approach to stabilize lines, increasing the noise margin, results in a significant bit rate loss.
- ▶ The Smart DSL Virtual Noise (VN) is supported on 48p VDSL2 ETSI cards, for VDSL2. VN is a technology invented by Nokia, that allow operators to stabilize VDSL lines with minimal bit rate loss. Virtual Noise is part of the VDSL2 ITU-T standard (G.993.2) and works with any standards-compliant Customer Premise Equipment (CPE) that supports Virtual Noise.
- ▶ Nokia not only offers VN support in its ISAM product line, but also offers consultancy services related to VN and the 5530 Network Analyzer (NA), which is a line analysis and management system to support VN deployments. Use of the 5530 NA for Smart DSL is optional.

9.5.2 Per Line Management

-
- ▶ Allows overruling a selective set of parameters in the xDSL spectrum and service configuration profile individually and per line without changing the line profile itself.
 - ▶ Facilitates deployment of features such as Virtual Noise and Artificial Noise in a customer-care environment.

9.5.3 Premium Package BB SELT Test Access SW

ISAM Broadband Simultaneous SELT measurements Package

- ▶ Allows concurrent SELT (Single-Ended-Line-Testing) measurements per ISAM and per LT: up to 5 per LT where the current 'Lite' SELT implementation only supports 1 concurrent SELT per NT
- ▶ Provides enhanced error codes when SELT test fails
- ▶ Provides SELT state management to prevent conflicting actions triggered by independent applications Example: SELT inspection started by 5530NA while line is being reconfigured by EMS
- ▶ Scope: all ADSLx and VDSL2 LTs that support SELT on ISAM FD and XD
- ▶ Advantage = Support of multiple concurrent SELT inspections per NT enables, Usage of SELT in a helpdesk environment, Proactive use of SELT inspections, Enhanced error codes facilitate integration of 5530 NA SELT into operator's OSS and brings SELT implementation in ISAM at same level as SELT implementation in ASAM
- ▶ Known chipset limitations in terms of number parallel SELT inspections:
 - 48p ADSLx LTs: up to 5 concurrent SELT inspections per LT without limitation.
 - 72p ADSLx LT (NALT-E): up to 5 concurrent SELT inspections per LT but max 1 SELT inspection per DSP. A 2nd simultaneous SELT request on the same DSP is rejected with 'out of resources' error code.
 - NVLT-C/D: up to 5 concurrent SELT inspections per LT but max 1 SELT inspection per DSP. A 2nd simultaneous SELT request on same DSP is rejected with 'out of resources' error code.
 - NVLT-P/Q: up to 5 concurrent SELT inspections per LT without limitation.

9.5.4 Premium Package MultiDSL

ISAM Support of 24k Downstream Interleaver for ADSL2plus MultiDSL SW Package

- ▶ Extend support of downstream interleaver memory to 24k for ADSL2plus mode of multi-DSL LTs
- ▶ 24k Interleaver for ADSL2plus mode of NALT-E
- ▶ 24k interleaver memory enables higher data rates with high impulse noise protection

Integer INP 0 to 16 for ADSL2/ADSL2plus

-
- ▶ Add support of INP_min values 3, 5, 6, 7, 9, 10, 11, 12, 13, 14, 15 and 16 for ADSL2/plus on all multi-DSL LTs
 - ▶ Impulse Noise Protection (INP) is used to protect the DSL transmission from impulse noise.
 - ▶ The INP_min is the minimum number of DMT symbols that can be protected from an impulse of length (number of DMT symbols -1).
 - ▶ It offers also an increased protection against impulsive noise and a finer control of INP_min settings. This allows to have higher bitrates than when only powers-of-2 were supported

Support D_max up to 511 for ADSL2/ADSL2plus

- ▶ D_max is the maximum interleaver depth supported by the system
- ▶ Higher D values result in increased bitrates for higher INP setting. These high INPs are becoming more common in video-grade deployments

9.5.5 Premium Package ADSL Backwards Compatibility

ADSL backwards compatibility

- ▶ ADSL Backwards Compatibility license for VDSL ports is a license per configured ADSL subscriber on a VDSL port;

9.5.6 Premium Package All Digital Loop

ISAM All Digital Loop SW Package

- ▶ With Annex-J support on Multi-DSL LT (or ADL = all digital loop) the POTS/ISDN baseband service is removed. This allows the US band to be extended to lower frequencies, hence increasing US capacity.
- ▶ All US PSD masks are supported, except masks ADLU-32 and ADLU-36 on ISDN front-ends.
- ▶ With this feature the operator can switch to ADL when voice services become integrated into DSL transport (VoIP). Annex-J allows offering increased US bandwidth in such case and Lowpass splitters are no longer required and can be removed, saving cost and space.
- ▶ Optimal performance is reached on the ADSL linecard optimized for Annex-J operation, the NALT-M.

9.5.7 Premium Package Bonding

Bonding can be used to increase the rate or extend the reach, when two or more pairs are available.

ISAM ADSLx Bonding

- ▶ license per ADSLx bonding configured port

ISAM VDSL2 bonding

- ▶ license per VDSL2 bonding configured port

9.5.8 Premium Package Business DSL

ISAM Business DSL Package

- ▶ ISAM Business DSL SW Package is a license per configured Annex-M subscriber;

9.5.9 Premium Package Enhanced SHDSL

ISAM Enhanced SHDSL Package

- ▶ Enhanced SHDSL (G.SHDSL.bis) is a license per configured subscriber;

9.5.10 Premium Package UPBO Policing

ISAM UPBO policing Package

- ▶ UPBO Policing is solving the problem of having lower performance on long loops: a strong upstream signal on a short loop interferes with weaker upstream signals on long loops.
- ▶ With UPBO a lower Tx PSD on short loops will be introduced and a stronger Tx PSD on long loops which gives a performance equalization similar upstream performance on short & long loops
- ▶ UPBO Policing is a license per configured subscriber where UPBO policing can be used.
- ▶ Scope only for VDSL LTs

9.5.11 Premium Package Impulse Noise Sensor

ISAM Impulse Noise Sensor Package

- ▶ Impulse Noise Protection sensor will provide a more accurate configuration which results in higher bitrates.
- ▶ ISAM Impulse Noise Sensor Package is a license per configured subscriber;
- ▶ Current approach to estimate IN is CRC Count: too coarse to measure IN duration and inter-arrival time. The impulse Noise Sensor will define in VDSL2 Amendment2 as optional feature the measurement of Impulse Noise statistics in down- & upstream and will store histograms in DSLAM.
- ▶ The advantages are:
 - long term stats and monitoring of link quality
 - more accurate configuration of INP (INP_min and Delay_max)

9.5.12 Premium Package Smart DSL SRA

Smart DSL SRA

-
- ▶ Seamless Rate Adaptation license is for VDSL2 ports only, and per configured subscriber. This license is part of the of the smart DSL family of features. Seamless Rate Adaptation is standard included for ADSL.

9.5.13 VDSL 30a Profile

VDSL 30a

- ▶ License per configured 30a profile on a VDSL port. Applicable for very short line (f.i. 50m or max 100m) to offer bandwidth approaching 100Mbps DS.

9.5.14 Premium Package Reference Timing Source

SyncE Reference Timing Source

- ▶ License per NT port on which SyncE is activated
 - ▶ ISAM can accept synchronization input not only via E1/T1 BITS, but also via Synchronous Ethernet, for which this license is required
 - ▶ Synchronization input has three main applications:
 - Mandatory to achieve the clock accuracy for mobile backhaul over ISAM (in combination with NTR over xDSL)
 - Mandatory for many customers for ISAM-V, where it allows for long fax & modem calls, and increases achievable modem speeds
 - More cost-effective for leased lines deployments using pseudo-wire
- Synchronization input via synchronous Ethernet (as opposed to BITS) is also possible in places where there is no BITS network (e.g. in cabinets).
- ▶ Applicable standards ITU-T G.8261/Y.1361 (formerly G.pactiming) "Timing and Synchronization Aspects in Packet Network"

Note: Use of BITS or SyncE external clock at the NT is required for GPON applications

ToD (Time of Day) Reference Timing Source

- ▶ License per ToD external input source configured as ToD reference
- ▶ ToD reference source as input is used for phase/ToD synchronization, mainly applied on Mobile Backhaul application for base-station sync.

9.5.15 Premium Package Smart DSL ARQ

Smart DSL ARQ

The standard ARQ license per configured subscriber is part of the of the smart DSL family of features.

9.5.16 Premium Package MELT

MELT functionality

-
- ▶ MELT functionality is applicable for dry DSL deployment where no POTS or ISDN voice lines are offered. The default line test functionality is SELT/DELT. NBLT on NPOT boards offer similar function (so MELT is not applicable for ISAM-V solution)
 - ▶ The general strategy is to support integrated test solutions:
 - DELT/SELT for lines that run DSL services
 - Combined with NBLT in case these lines also run Voice/POTS services
 - Combined with MELT in case pro-active maintenance of ADL (or dry DSL) lines is needed

9.5.17 Premium Package Green DSL

ISAM Green DSL L2

- ▶ license for all lines or for a subset of all lines (e.g. for all video lines);
- ▶ Allows the operator to reduce power consumption on multiADSL lines

9.5.18 Premium Package Vectoring

ISAM Vectoring Package

- ▶ Vectoring is a noise-cancellation technology addressing the gap between the theoretical maximum rate and the speeds that service providers can deliver in typical field conditions.
- ▶ Vectoring takes full advantage of existing copper binders by making conditions in the field as close to ideal as possible.
- ▶ ISAM Vectoring Package is a license per configured subscriber; i.e. per line with a vectoring profile (BLV or SLV) associated
- ▶ Applicable standards ITU-T vectoring standard, G.993.5 (G.vector)
- ▶ Scope: VDSL2 only; applicable for both Board Level Vectoring (BLV) and System Level Vectoring (SLV)

9.5.19 Premium Package Zero Touch Vectoring

ISAM Zero Touch Vectoring Package

- ▶ Crosstalk cancellation on legacy VDSL2 lines (i.e. on the non-vectorized and non-vector-friendly lines): this functionality allows to have vectored lines in combination with legacy lines
- ▶ Can be enabled/disabled per subscriber line
- ▶ ISAM Zero Touch Vectoring Package is a license per configured subscriber, i.e. per subscriber line with Zero Touch Vectoring enabled
- ▶ Scope: all vectoring boards, be it Board Level Vectoring (BLV) or System Level Vectoring (SLV) boards

9.5.20 Premium Package G.fast

- ▶ Fast Access to Subscriber Terminals (FAST) supports asymmetric and symmetric transmission at an aggregate net data rate up to 1 Gbit/s on twisted wire-pairs using spectrum up to 106 MHz.
- ▶ This package adds support to run subscriber user ports in G.fast mode.
- ▶ Applicable standards ITU-T G.9701, ITU-T G.9700, ITU-T G.994.1Amd4 and ITU-T G.997.2
- ▶ Scope 7367 ISAM SX-xxF (Standalone G.fast Remote DSLAM)

9.5.21 Premium Package VDSL2 35b

- ▶ Adds support for the VDSL2 35b operational mode and associated band plans
- ▶ VDSL2 35b delivers aggregate speeds of 200Mbps and more over traditional copper telephone lines at distances up to 500 meters, and 300Mbps and more on loops shorter than 250m
- ▶ Extends the frequency range used by VDSL2 17a to 35MHz to achieve these higher speeds.
- ▶ Can be mixed with existing VDSL2 17a deployments
- ▶ Offers higher speeds (up to double) compared to VDSL2 on loops shorter than 550m
- ▶ Offers longer reach (higher bit rates beyond 250m) and higher density (100-200 subscribers) compared to G.fast
- ▶ Applicable standards ITU-T G.993.2Amd1
- ▶ Scope 7363 ISAM MX, 7302 ISAM, 7330 ISAM FTTN

9.5.22 Premium Package VDSL Long Reach

- ▶ Adds support for VDSL2 Long Reach (VDSL2-LR) operation according to ITU-T G.993.5 Annex B (Vectored Long Reach VDSL) and G.993.2 Annex D (Unvectored Long Reach VDSL)
- ▶ VDSL2 Long Reach allows to extend the reach of VDSL2 lines and/or to outphase ADSL2/plus based lines.

9.5.23 Premium Package Type-B PON Protection

ISAM Type-B PON Protection Package

- ▶ Large bundles of feeders in a cable or duct increase the risk of intolerable repair times in case of a breach or an accident. Furthermore, the increasing number of split ratios and deployment of business critical services highlight the importance of implementing PON protection schemes.

-
- ▶ ITU-T G984.1 (section 14.2.1) and ITU-T G.sup51 (section 5) specifications describe multiple PON protection schemes. The ISAM OLT implements the Type-B protection architecture for GPON access, which addresses route diversity to the first splitter in a 1:1 arrangement (active-standby). This configuration doubles the OLTs and the optical fibres between the OLTs and the optical splitter, and the splitter has two input/output ports on the OLT side. Hence, this functionality is also known as PON feeder protection.
 - ▶ The PON links of the ISAM can be configured in Protection Groups (PGs) on the GPON linecards (inter-card protection among linecards of the same type, within the same OLT chassis). In case of an active PON link failure (e.g. fibre cut on the active PON feeder), all traffic is switched to the associated standby protection link without service loss and without necessitating a full reactivation of the ONUs on their new active PON.
 - ▶ Scope: NGLT-A, NGLT-C, FGLT-A and FGLT-B in combination with NANT-E or FANT-F.
 - ▶ ISAM Type-B PON Protection Package is a license per configured GPON Protection Group.

9.5.24 Premium Package 40 km Differential Distance PON Operation

40 km Differential Distance PON Operation

- ▶ The differential distance refers to the relative position of the closest and farthest ONTs on a PON with respect to the Central Office. Standard PON operations are supported for ONTs placed on the PON across this range. In normal operations a differential distance of 20 km is expected to be deployed. In this scheme, the closest ONT distance is a provisioned parameter.
- ▶ The present premium feature allows to extend PON deployments to a 40 km differential range where the closest ONT distance is still a provisionable parameter between 0 and 20 km. So, in essence, the farthest ONT on a PON can be placed at a 60 km distance from the CO.
- ▶ This behavior is defined on a per PON basis
- ▶ The actual performance may depend on the power and sensitivity characteristics of the ONTs that are deployed. Please check related ONT documentation.

9.5.25 Premium Package NGPON2 Multi-Lambda

- ▶ Required in case multiple TWDM wavelengths are stacked on the PON. This will allow the operator to move ONTs from one wavelength to another
- ▶ This requires ONUs that support tunable optics so if they range on a non-preferred channel pair and then the system can request they retune to the preferred channel pair within the same Channel Group.
- ▶ Scope: ISAM 7360 system and requires the use of the FANT-F and the FWLT-A

9.5.26 Premium Package NGPON2 Enhanced Upstream

- ▶ Providing 10 Gbps in upstream direction on the PON; determined by the optics used.
 - 10Gbps (symmetrical service) over fiber, high bandwidth for business customers
 - Ultra broadband service enabler for fixed-wireless full service operators.
 - Next generation backhaul solution
- ▶ Full range of fault management, configuration, accounting, performance, and security (FCAPS) functions
- ▶ Licensed per PON port
- ▶ Scope 7360 ISAM FX

9.5.27 Premium Package Ethernet OAM

ISAM Ethernet OAM Package

- ▶ Ethernet Connectivity Fault Management provides capabilities for connectivity verification, as well as detection, verification & isolation of connectivity failures, using specific maintenance points on LT user ports & NT uplinks.
- ▶ Applicable Standards: IEE802.1ag and ITU-T Y.1731
- ▶ ISAM Ethernet OAM Package is a license per MEP
- ▶ Scope: all IHUB-based NT's (NANT-D/E, FANT-F) and DSL LT's
- ▶ This license does not apply to xPON LT's

9.5.28 VULA Uplink SW Package

- ▶ Virtual Unbundled Local Access (VULA) ISAM as handover point between Access Provide and Servie Provider
- ▶ Downstream SLA enforcement features that one would expect on edge switches
- ▶ It ensures fairness between subscribers, across multiple Service Providers, via its advanced QoS/VLAN features
- ▶ Scope: P2P Fiber FELT-B

10 Validated Voice Supplementary Services

The following is a list of representative POTS supplementary services that are available via the ISAM Voice working in conjunction with the Nokia MGC/IMS iAGCF products for H248 and IMS/5420 CTS products for SIP. More extensive treatment of the supplementary services supported is available in the associated Nokia IMS documentation.

Interoperability of the ISAM Voice with the 3rd party MGC or IMS cores is also possible through commercial agreement.

The following relates to Voice on Voice LTs inside the ISAM shelves, not to voice on ONTs.

10.1 H.248 POTS Supplementary Services

Supplementary Service	5020MGC12	5020AGCF
Hold For Enquiry [HFE] Call Hold [CH]	Y	Y
Call Forwarding Unconditional (CFU)	Y	Y
Call Forwarding Busy (CFB)	Y	Y
Call Forwarding No Reply (CFNR)	Y	Y
Hot Line/Delay Hot Line	Y	Y
Calling Line Identification Restriction	Y	Y
Malicious Call Identification	Y	Not tested
Calling Line Identification Presentation	Y	Y
Outgoing Call Barring (OCB)	Y	Y
Do not disturb	Y	Y
Anonymous Call Rejection	Y	Y
Abbreviated Address (AA)	Y	Not tested
Incoming Call Barring (ICB)	Y	Y
Inhibition of Incoming Forwarded Calls (IIFC)	Y	Y
Administrative Call Barring	Y	Not tested
Alarm call	Y	Not tested
Call Waiting	Y	Y
Call Return	Y	Y
Explicit Call Transfer	Y	Y
Three Party Service	Y	Y
CWID service	Y	Not tested
Distinctive Ring	Y	Not tested
Special Dialtone	Y	Not tested
VMWI via H248.3 ind package	Y	Not tested

10.2 H.248 ISDN BA Supplementary Services

Supplementary Service	5020MGC12
Change Password	Y
Calling Line Identification Presentation (CLIP)	Y
Calling Line Identification Rejection (CLIR)	Y
Connected Line Identification Pres. (COLP)	Y
Connected Line Identification Rej. (COLR)	Y
Call Forwarding Unconditional (CFU)	Y
Call Forwarding on Busy (CFB)	Y
Call Forwarding on No Reply (CFNR)	Y
Incoming Call Barring (ICB)	Y
Malicious call Identification (MCID)	Y
Outgoing Call Barring (OCB)	Y
Subaddressing (SUB)	Y
CLIR-O	Y
COLR-O	Y
Call Waiting (CW)	Y
Third Party Call	Y
Conference Call	Y
Hotline	Y
DDI (Direct Line)	Y
Call Hold [Retrieve]	Y
UUS (User-User Signalling)	Y
TP (Terminal Portability)	Y
Alarm Call	Y
Do not disturb	Y
Multiple Subscriber number (MSN)	Y
Abbreviated Address	Y
Call completion to busy subscriber (CCBS)	Y

10.3 SIP POTS Supplementary Service

Supplementary service	CTS 5420
Call Hold(CH)	Y
Call Forwarding Unconditional(CFU)	Y
Call Forwarding Busy(CFB)	Y
Call Forwarding No Reply(CFNR)	Y
Calling Line Identification Restriction(CLIR)	Y
Calling Line Identification Presentation(CLIP)	Y
Call Waiting(CW)	Y
Explicit Call Transfer	Y
Three Party Service	Y
Call Barring (outgoing)	Y
Call Blocking (incoming)	Y
Hot Line	Y
Anonymous Call rejection	Y

Inhibit Call Forwarding	Y
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10.4 SIP ISDN PRA Supplementary Service

Supplementary service	CTS 5420
Direct Inward Dialing (DID)	Y
Call Hold(CH)	Y
Call Forwarding Unconditional(CFU)	Y
Call Forwarding Busy(CFB)	Y
Call Forwarding No Reply(CFNR)	Y
Calling Line Identification Restriction(CLIR)	Y
Calling Line Identification Presentation(CLIP)	Y
Call Waiting(CW)	Y
Explicit Call Transfer	Y
Three Party Service	Y

10.5 SIP ISDN CAS/R2 Supplementary Service

Supplementary service	CTS 5420
Direct Inward Dialing (DID)	Y
Calling Line Identification Restriction(CLIR)	Y
Calling Line Identification Presentation(CLIP)	Y

10.6 SIP E1 Leased Line Supplementary Service

Supplementary service	CTS 5420
Support Nx64 E1 Leased Line as per CESoPSN	N/A

11 Voice Package Performance

11.1 H.248 POTS Performance

Note: The performance figures heavily depend on H.248 signaling call flows. The data below is tested with Nokia 5020 MGC12 as reference. The performance could be different while IOT-ing with other softswitches according to the signaling processing and behavior of different softswitches.

POTS Performance NVPS-A AC /NVPS-C:

Standard	Call Hold Times	Load Model		Supported Users	Performance (BHCA)	Call Loss
ETSI	90 sec	Load A	20k	5000	40k	1.00E-04
		Load B	27k			

POTS Performance NVPS AB:

Standard	Call Hold Times	Load Model		Supported Users	Performance (BHCA)	Call Loss
ETSI	90 sec	Load A	20k	5000	30k	1.00E-04
		Load B	27k			

POTS Performance Virtualized NVPS:

Standard	Call Hold Times	Load Model		Supported Users	Performance (BHCA)	Call Loss
ETSI	90 sec	Load A	4.8k	1200	10K	1.00E-04
		Load B	6.5k			

Virtualized NVPS Dimensioning:

Description	Value
Number of registered POTS subscribers	1.2K
Maximum number of connected ISAM Voice nodes	1 ⁽¹⁾
Maximum number of associated NPOTs	16 ⁽¹⁾
Number of IP addresses per NVPS	1 or 2 ⁽²⁾

⁽¹⁾ Multicore NT (hosting VVPS) and the NPOT cards are to be equipped in same shelf.

⁽²⁾ Depends on the IP address/VLAN deployment model, see "IP Address Usage Optimization" in the System Description document.

7363 ISAM MX H.248 POTS Performance:

Standard	Call Hold Times	Load Model		Supported Users	Performance (BHCA)	Call Loss
ETSI	90 sec	Load A	768	192	5.1k	1.00E-04
		Load B	1.1k			

7367 ISAM SX-16VP (ETSI/ANSI) H248 POTS Performance:

Standard	Call Hold Times	Supported Users	Performance (BHCA)	Call Loss
ETSI	90 sec	16	640	1.00E-04

7367 ISAM SX-12VP (ANSI) H248 POTS Performance:

Standard	Call Hold Times	Supported Users	Performance (BHCA)	Call Loss
ETSI	90 sec	8	320	1.00E-04

- Note** Load A (Nominal load): BHCA=n subscribers *0.1Erl*3600/hold time
- Note** Load B (High load): BHCA=n subscribers *0.1Erl*3600/hold time * 1.35
- Note** Performance is measured as BHCA

11.2 H.248 ISDN Performance

ISDN Performance NVPS-A AC/NVPS-C NBAT-B:

Standard	Call Hold Times	Load Model		Supported Users	Performance	Call Loss
ETSI	90 sec	Load A	10k	2500	17k	1.00E-04
		Load B	13.5k			

ISDN Performance NVPS-A AB NBAT-B:

Standard	Call Hold Times	Load Model		Supported Users	Performance (BHCA)	Call Loss
ETSI	90 sec	Load A	10k	2500	13.5k	1.00E-04
		Load B	13.5k			

11.3 SIP Performance

ISAM-V SIP POTS Performance (SIP over UDP)			
Call Mode	Call Hold Time	Performance (BHCA)	Call Loss
36 call 36(NPOT-B)	90 sec	5K	1.00E-04
24 call 24(NPOT-A)		5K	1.00E-04
24 call 24(NPOT-C)		5K	1.00E-04

7363 ISAM MX SIP POTS Performance (SIP over UDP)			
Call Mode	Call Hold Time	Performance (BHCA)	Call Loss
16 call 16 (1 RPOT-A)	90 sec	5K	1.00E-04
48 call 48 (3 RPOT-A)		5K	1.00E-04

7367 ISAM SX-16VP (ETSI/ANSI) SIP POTS Performance (SIP over UDP)			
Call Mode	Call Hold Time	Performance (BHCA)	Call Loss
8 call 8 (1 SPOT-C)	90 sec	640	1.00E-04

7367 ISAM SX-12VP (ANSI) SIP POTS Performance (SIP over UDP)			
Call Mode	Call Hold Time	Performance (BHCA)	Call Loss
4 call 4 (1 SPOT-A)	90 sec	320	1.00E-04

ISAM-V SIP ISDN-PRA Performance (SIP over UDP)			
Call Mode	Call Hold Time	Performance (BHCA)	Call Loss
120 call 120 (1 NIAT_A)	90 sec	14.4K	1.00E-04

ISAM-V SIP CAS R2 performance (SIP over UDP)							
codec	pptime	ip_inband_tone_detection	VAD	Call Mode	Call Hold Time	Performance (BHCA)	Call Loss
G711	20	disbale	off	120 call 120 (1 NIAT_A)	90 sec	14.4K	1.00E-04
G729	20	disbale	off	90 call 90 (1 NIAT_A)	90 sec	14.4K	1.00E-04
G723	30	disbale	on	90 call 90 (1 NIAT_A)	90 sec	14.4K	1.00E-04

12 DSL Interoperability

Nokia preserves the right to implement IOP changes without being reflected in this overview.

12.1 CPEs for specific ISAM functionality

The table below lists the CPEs that Nokia has used to test the indicated features.

ADSL	Features
DT W503V	Support of Annex-J masks U-R compliance
AVM 7270	Support of Annex-J masks G.994.1 Amd 3 Annex-J U-R compliance
DT W700V	U-R compliance
Technicolor TG585nv2	G.994.1 Amd 3 Annex A Annex-A regression
Technicolor TG585inv2	G.994.1 Amd 3 Annex B Annex-B regression
Technicolor TG585v8	Annex-M regression G.994.1 Amd 3 Annex M
SagemCom F@ST 3504	Annex-A regression
Comtrend CT-5631E	ATM bonding (ISDN)
Comtrend CT-5631	ATM bonding (POTS)
Cellipe 7130RG 6Ae.A2101DmA/B	Enhanced L2 mode

VDSL	Features
CellPipe 7130RG 5Ve.A2000	TR-114 Region B Type A compliance VDSL Region B Type B on Pots HW VDSL Region B regression
CellPipe 7130RG 5Ve.B2000	TR-114 Region B Type B compliance VDSL Region B regression VDSL Type B on Pots HW
Motorola 7357	VDSL regression
AVM 7570	TR-114 Region B Type B compliance
Technicolor TG789nv	TR-114 Region B Type A compliance
Technicolor TG789inv	VDSL Region B regression
SagemCom F@st3462v2	VDSL Region B Type B on Pots HW
Comtrend CT5374	TR-114 compliance VDSL regression G993.2 Amd 3
CellPipe 7130RG 6Ve.A4111	PTM bonding
Sagemcom F@ST 4320	PTM bonding
Nokia 7705 SAR-M	8-port VDSL2 bonding

Vectoring	Features
SagemCom F@ST 5310	VDSL2 vectoring (SRA, g.INP)
SagemCom F@ST 3864	VDSL2 vectoring (SRA, g.INP)
Sagemcom F@ST 4320	VDSL2 vectoring (bonding)
Nokia F-010G-B	VDSL2 vectoring

35b	Features
Nokia F-010G-P	VDSL2 35b vectoring
Nokia F-010G-B	VDSL2 35b vectoring
Nokia F-010G-C	VDSL2 35b vectoring

G.fast	Features
Nokia F-010G-P	G.fast vectoring
Nokia F-010G-A	G.fast vectoring
Nokia F-010G-B	G.fast vectoring
Nokia F-010G-C	G.fast vectoring

SHDSL	Features
Technicolor TG605s/ST620s	SHDSL regression
Technicolor TG605s/ST620s	ATM 4-wire bonding EFM 4-wire bonding
RAD LA-110	IMA 4-wire bonding IMA 8-wire bonding
Technicolor TG628s	ATM 4-wire bonding EFM 4-wire bonding
RAD LA-110PW	NTR
1521 CLEM (Hatteras)	Repeater
Elcon ZWR2MSKUDS	Repeater

12.1.1 ADSL1/2/2plus Annex B support

The POTS 48p ETSI VDSL2 line cards support ADSL Annex B (ISDN) operating modes. This allows that both POTS and ISDN CPEs to be connected to the same line card if no ISDN overlay is present.

For ISDN CPEs, the same IOP restrictions apply as if it was connected to the ISDN 48p ETSI VDSL2 line card.

12.2 NVLT-C and NVLT-D

12.2.1 ADSL1 and ADSL2plus interop

Minimum interoperability tests have been performed against the Nokia ADSLx CPE wall (category 3). For these CPEs, full ADSLx functionality and optimal performance cannot be guaranteed in the mentioned ISAM release.

Due to a common front-end for VDSL2 and ADSLx, the upstream sensitivity is somewhat less, such that especially for long loops in the upstream direction and with low noise the TR-100 and TR-67 performance requirements are not achieved.

Following performance TARGETS were set on straight PE04 loops (1).

In ADSL2plus (G.992.5) Annex-A mode on NVLT-C in interleaved mode:

- ▶ Maximum reach under ETSI-FB noise (TR-100) of 3000m, compared to 3250m per TR-100.
- ▶ Downstream bit rate under ETSI-FB noise within 95% of TR-100 (2).
- ▶ Upstream bit rate under ETSI-FB noise within 90% of TR-100 (2).

In ADSL1 (G.992.1) Annex-A mode on NVLT-C in interleaved mode:

- ▶ Maximum reach under ETSI-FB noise (TR-67) of 2750m, compared to 3000m per TR-67.
- ▶ Downstream bit rate under ETSI-FB noise within 95% of TR-67 (2).
- ▶ Upstream bit rate under ETSI-FB noise within 90% of TR-67 (2).

In ADSL2plus (G.992.5) Annex-B mode on NVLT-D in interleaved mode:

- ▶ Maximum reach under ETSI-FB noise (TR-100) of 3000m as per TR-100.
- ▶ Downstream bit rate under ETSI-FB noise within 95% of TR-100 (2).
- ▶ Upstream bit rate under ETSI-FB noise max. 32 kbps below TR-100 (2).

In ADSL1 (G.992.1) Annex-B mode on NVLT-D:

- ▶ Not tested

Important notes:

- (1) Observation is that most listed CPEs in categories 1 and 2 get close to the TARGETS but some CPEs may fall short. No performance statement can be made for CPEs outside categories 1 and 2.
- (2) Except for possible dips at some loop lengths.

12.2.2 VDSL2 interop

NVLT-C/D is not planned to be interoperable with CPEs based on former-Connexant and Metanoia chipsets.

For NVLT-C bitswap to and from 0 bits has successfully been tested in VDSL2 mode against CPEs based on a Broadcom BCM6368 chipset with 32a FW version. Bitswap to 0 bits is not supported on Broadcom CPEs with older FW versions.

The NVLT-C is interoperable with Ikanos, Broadcom and Intel based CPEs but only for certain tested CO and CPE combinations. General IOP cannot be guaranteed.

Before introducing a new VDSL2 CPE in the network, we advice careful IOP testing upfront. Also, specific CPE tuning against a particular CO SW version is not recommended as it will prohibit introduction of more recent releases later on.

12.3 NVLT-G/H and NVLT-M

12.3.1 ADSL1, ADSL2 and ADSL2plus interop

The ADSLx functionality has been extensively tested against following “reference test CPE’s”:

- ▶ Sagem F@ST3404 and Sagem F@ST3304 (ADSL2plus Annex A) for NVLT-G only
- ▶ Speedtouch 536i (ADSL2plus Annex B) for NVLT-H only

Functional and performance tests have also been performed against other ADSLx CPEs (see IOP list). However, the test coverage was less than for the above three CPEs.

Due to a common front-end for VDSL2 and ADSLx, the sensitivity is somewhat less, such that especially for long loops in the upstream direction and with low noise the TR100 and TR67 performance requirements are not achieved.

12.3.2 VDSL2 interop

The VDSL2 functionality has been extensively tested against following VDSL2 CPEs:

- ▶ Comtrend CT5372 (based on BCM chipset) NVLT-G only
- ▶ Sagem BBOX2 (based on BCM chipset) NVLT-G only
- ▶ Netopia 7356 (based on IKA chipset) NVLT-H only

Functional and performance tests have also been performed against other VDSL2 CPEs (see IOP list). However, the test coverage was less than for the above two CPEs.

NVLT-G/H is not planned to be interoperable with CPE based on Ikanos CPE-4 VDSL2 chipset.

12.4 Vectoring line cards

12.4.1 Vectoring interop

Reference CPE for vectoring is the SagemCom F@ST 5310, based on BCM63168 chipset. Alternative is SagemCom F@ST 3864, based on the same chipset.

Basic IOP has been achieved with following CPE types:

- ▶ Technicolor TG789vn (BCM6368)
- ▶ Pirelli ADB V226N1W (BCM6368)
- ▶ Arcadyan VGV7519
- ▶ T-HOME Speedport W 724V Type A
- ▶ T-HOME Speedport W 724V Type B
- ▶ T-HOME Speedport W 724V Type C
- ▶ T-HOME Speedport W921V
- ▶ AVM Fritzbox 7490

And, NOKIA F-010G-B, F-010G-C based on BCM63138 chipset.

Based on its own testing, Nokia recommends CPE Software based at least on 39f2 Broadcom Firmware for BCM63168 chipset and 45k Broadcom Firmware for BCM63138 chipset.

Basic interoperability against Intel based chipsets has been performed. Limited vectoring tests were done in combination with SRA and in combination with g.998.4 Amd 2. Based on its own testing, Nokia recommends CPE Software based at least on R7 Intel Firmware.

Basic interoperability against non-Broadcom or non-Intel cannot yet be declared. Consequently, Nokia doesn't recommend deploying vectoring in front of non-Broadcom or non-Intel based CPEs. Further vectoring interop exercises with other chipsets depend on availability of a stable G. Vector-capable firmware.

Reference CPE for vectoring on bonded lines is the SagemCom F@ST 4320.

12.5 35b vectoring line cards

12.5.1 35b interop

Reference CPE for 35b are the NOKIA F-010G-B, F-010G-C based on BCM63138 chipset.

Basic IOP has been achieved with following CPE types:

- ▶ NOKIA F-10GC

-
- ▶ NOKIA F-10GB
 - ▶ FritzBox 7590
 - ▶ ZTE H186
 - ▶ FritzBox 7582
 - ▶ Alpha Network ASL-74322R0

Based on its own testing, Nokia recommends CPE Software based at least on 45k Broadcom Firmware.

Basic interoperability against Intel based chipsets has been performed. Based on its own testing, Nokia recommends CPE Software based at least on 8.11.0.11.7 Intel Firmware.

Basic interoperability against non-Broadcom or non-Intel cannot yet be declared.

Consequently, Nokia doesn't recommend deploying 35b vectoring in front of non-Broadcom or non-Intel based CPEs. Further 35b vectoring interop exercises with other chipsets depend on availability of a stable 35b vectoring capable firmware.

12.6 G.fast line cards

12.6.1 G.fast interop

Reference CPE for G.fast are the Nokia F-010G-A, F-010G-B, and F-010G-C based on BCM63138 chipset.

Based on its own testing, Nokia recommends CPE Software based at least on 45k Broadcom Firmware.

Our G.fast solution has been certified by the Broadband Forum versus Metanoia, Broadcom and Scipio chipset.

For the complete list of Broadband Forum G.fast Certified Interoperable Products:
<https://www.broadband-forum.org/implementation/interop-certification/gfast-certified-products>

12.7 CPEs verified on performance regression versus previous releases

12.7.1 Performance Interop Test Coverage

A selection of modems from the Nokia CPE Wall and shown below has been tested against the line cards as indicated below according to the Nokia Performance interop test package. This Performance test package consists of a "rate/reach" tests.

The table below contains the number of different CPE vendors and different CPE products tested during the 7302 ISAM validation. Please note that per CPE vendor different CPE products could be tested. As a CPE product is defined by a combination of hardware and software, the same hardware product could be present several times in the wall with different software releases. Each HW/SW combination has an assigned mnemonic.

For example: 2WIR-HP1000HW-v357 represents
CPE Vendor: 2Wire
CPE Product: HomePortal 1000HW HW/SW: 3.57

Important remark:

Some boards supported in this release may not be tested because of similarity with one or more tested boards.

12.7.2 ADSL Performance CPE test description

This test is a pure performance test. It uses an accurate line simulator and a noise generator. A rate/reach test from 0 to 6km with a 400m step is performed. The profile is configured as fast and rate adaptive mode with target noise margins 0/6/max.

The modem is connected and must sync within 60sec. After initialisation some measured values are read out, such as current bitrate, max. attainable bitrate, noise margin and attenuation. Then the port is locked and the line simulator length is set to the next step. The rate/reach test is performed with noise injected at both ATU-C and ATU-R side. Each time, the modem pair is kept in showtime for 10 seconds. Then the line is shut down, some recovery time for the CPE is allowed, and then the next initialisation is started.

Interoperability criterion: Test is ok if the performance is equal or above the reference for this modem for each measured point. See also the IOP Policy appendix of this document.

12.7.3 VDSL2 Performance CPE test description

This test will measure the upstream and downstream bit rate of the modem under TR-114 conditions. Bandplans 8b and 17a are tested. Bandplan 30a is not tested as this bandplan is not supported.

Interoperability criterion: Test is ok if the performance is equal or above the reference for this modem for each measured point.

12.7.4 SHDSL Performance CPE test description

This test is a pure performance test. It uses a SHDSL PE04 line simulator, the test is executed with dual sided white noise injection. A rate/reach test from 0 to 5.4km with a 200m step is performed. The profile is configured as rate adaptive. The modem is connected and must sync within 300sec. After initialisation some measured values are read out, such as current bitrate, noise margin and attenuation. Then the port is locked and the line simulator length is set to the next step.

Interoperability criterion: The modem has to initialise within 300 sec on each initialisation. A reach of at least 5000m is expected for modems supporting the PMMS implementation. Other should initialise always at 2302kbps until at least 3800m.

12.7.5 Test result overview

12.7.5.1 Test result overview ADSL line cards

No proxy change.

12.7.5.2 Test result overview VDSL line cards

No proxy change.

12.7.5.3 Test result overview vectoring line cards

RA performance tests for BA17a with D&UPBO: interleaved		
Modem	LT-Board	Status
DLNK-225 B1	NDLS-E	OK
DLNK-6740U-H1	NDLS-E	OK
NGEAR-DGN2200v2	NDLS-E	OK
NGR-VEGN2610	NDLS-E	OK
PACE-PrivateBox2	NDLS-E	OK
VTCH-NB403IL	NDLS-E	OK

RA performance tests for BA12A: fast		
Modem	LT-Board	Status
DLNK-225 B1	NDLS-E	OK
DLNK-6740U-H1	NDLS-E	OK
NGEAR-DGN2200v2	NDLS-E	OK
NGR-VEGN2610	NDLS-E	OK

PACE-PrivateBox2	NDLS-E	OK
VTCH-NB403IL	NDLS-E	OK

RA performance tests for BA8B: interleaved		
Modem	LT-Board	Status
DLNK-225 B1	NDLS-E	OK
DLNK-6740U-H1	NDLS-E	OK
NGEAR-DGN2200v2	NDLS-E	OK
NGR-VEGN2610	NDLS-E	OK
PACE-PrivateBox2	NDLS-E	OK
VTCH-NB403IL	NDLS-E	OK

RA performance tests for BA12A: fast		
Modem	LT-Board	Status
PER-DV2210-vE502	NDLT-C	OK
PER-PRGAV4202N-v535	NDLT-C	OK
TMM-TG588v-v1054W	NDLT-C	OK
TMM-TG788A1vn-v1054W	NDLT-C	OK
TMM-TG789vn-v8CH2	NDLT-C	OK

RA performance tests for BA8B: interleaved		
Modem	LT-Board	Status
PER-DV2210-vE502	NDLT-C	OK
PER-PRGAV4202N-v535	NDLT-C	OK
TMM-TG588v-v1054W	NDLT-C	OK
TMM-TG788A1vn-v1054W	NDLT-C	OK
TMM-TG789vn-v8CH2	NDLT-C	OK

RA performance tests for BA17a with D&UPBO: interleaved		
Modem	LT-Board	Status
PER-DV2210-vE502	NDLT-C	OK
PER-PRGAV4202N-v535	NDLT-C	OK
TMM-TG588v-v1054W	NDLT-C	OK
TMM-TG788A1vn-v1054W	NDLT-C	OK
TMM-TG789vn-v8CH2	NDLT-C	OK

RA performance tests for BA17a with D&UPBO: interleaved		
Modem	LT-Board	Status
Dlink DVA-2800	NDLT-F	OK
Dlink-DSL-2877	NDLT-F	OK
Dlink-DSL-2885A	NDLT-F	OK
Fritzbox 7490	NDLT-F	OK
Netcomm-NF10WV	NDLT-F	OK
Netcomm-NFV4-6f039k	NDLT-F	OK
Netgear-D7800	NDLT-F	OK

SAGEM-5310-v039n	NDLT-F	OK
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RA performance tests for BA12A: fast

Modem	LT-Board	Status
Dlink DVA-2800	NDLT-F	OK
Dlink-DSL-2877	NDLT-F	OK
Dlink-DSL-2885A	NDLT-F	OK
Fritzbox 7490	NDLT-F	OK
Netcomm-NF10WV	NDLT-F	OK
Netcomm-NFV4-6f039k	NDLT-F	OK
Netgear-D7800	NDLT-F	OK
SAGEM-5310-v039n	NDLT-F	OK

RA performance tests for BA8B: interleaved

Modem	LT-Board	Status
Dlink DVA-2800	NDLT-F	OK
Dlink-DSL-2877	NDLT-F	OK
Dlink-DSL-2885A	NDLT-F	OK
Fritzbox 7490	NDLT-F	OK
Netcomm-NF10WV	NDLT-F	OK
Netcomm-NFV4-6f039k	NDLT-F	OK
Netgear-D7800	NDLT-F	OK
SAGEM-5310-v039n	NDLT-F	OK

RA performance tests for BA17a with D&UPBO: interleaved

Modem	LT-Board	Status
ACD-VGV7519	NDLT-G	OK
Alpha-Network	NDLT-G	OK
SAGEM-BBOX2-v95713	NDLT-G	OK
SAGEM-BBOX3-v39x6	NDLT-G	OK
THMSN-TG789vn-V842U	NDLT-G	OK
ZTE-H220N-v2T09	NDLT-G	OK
ZTE-ZXHNH368N-v00T10	NDLT-G	OK
ZTE-ZXHNH369A-v42p	NDLT-G	OK

RA performance tests for BA12A: fast

Modem	LT-Board	Status
ACD-VGV7519	NDLT-G	OK
Alpha-Network	NDLT-G	OK
SAGEM-BBOX2-v95713	NDLT-G	OK
SAGEM-BBOX3-v39x6	NDLT-G	OK
THMSN-TG789vn-V842U	NDLT-G	OK
ZTE-H220N-v2T09	NDLT-G	OK
ZTE-ZXHNH368N-v00T10	NDLT-G	OK
ZTE-ZXHNH369A-v42p	NDLT-G	OK

RA performance tests for BA8B: interleaved

Modem	LT-Board	Status

ACD-VGV7519	NDLT-G	OK
Alpha-Network	NDLT-G	OK
SAGEM-BBOX2-v95713	NDLT-G	OK
SAGEM-BBOX3-v39x6	NDLT-G	OK
THMSN-TG789vn-V842U	NDLT-G	OK
ZTE-H220N-v2T09	NDLT-G	OK
ZTE-ZXHNH368N-v00T10	NDLT-G	OK
ZTE-ZXHNH369A-v42p	NDLT-G	OK

RA performance tests for BA17A: fast

Modem	LT-Board	Status
Alpha-Network	NDLT-G	OK

RA performance tests for BA17A: interleaved

Modem	LT-Board	Status
Alpha-Network	NDLT-G	OK

RA performance tests for BA17a with D&UPBO: fast

Modem	LT-Board	Status
Alpha-Network	NDLT-G	OK

RA performance tests for BA12A: interleaved

Modem	LT-Board	Status
Alpha-Network	NDLT-G	OK

RA performance tests for BB12A: fast

Modem	LT-Board	Status
TECH-BBOX3-v39x5	NDLT-G	OK

RA performance tests for BB8B: interleaved

Modem	LT-Board	Status
TECH-BBOX3-v39x5	NDLT-G	OK

RA performance tests for BB17a with D&UPBO: interleaved

Modem	LT-Board	Status
TECH-BBOX3-v39x5	NDLT-G	OK

WT-114i3 Rev-15, Q.7 RA Perf tests for QM35b, Perfwith QM35b RA R-17/2/41_400_150

Modem	LT-Board	Status
Alpha-Network	NDLT-J	OK
Fritzbox 7590	NDLT-J	OK
Intel Easy550	NDLT-J	OK
NOKIA-F-010-GB-A2pvfbH045k	NDLT-J	OK
NOKIA-F-010-GC-A2pvfbH045k	NDLT-J	OK
ZTE-H186	NDLT-J	OK

RA performance tests for BA17a with D&UPBO: fast

Modem	LT-Board	Status
Alpha-Network	NDLT-J	OK
Fritzbox 7590	NDLT-J	OK
Intel Easy550	NDLT-J	OK
NOKIA-F-010-GB-A2pvfbH045k	NDLT-J	OK
NOKIA-F-010-GC-A2pvfbH045k	NDLT-J	OK

RA performance tests for BA17A: fast

Modem	LT-Board	Status
Alpha-Network	NDLT-J	OK
Fritzbox 7590	NDLT-J	OK
Intel Easy550	NDLT-J	OK
NOKIA-F-010-GB-A2pvfbH045k	NDLT-J	OK
NOKIA-F-010-GC-A2pvfbH045k	NDLT-J	OK

RA performance tests for BB17a with D&UPBO: interleaved

Modem	LT-Board	Status
SAGEM-5311-v039b	NDLT-J	OK
SPARC-W723-v13800	NDLT-J	OK
SpeedportW724VTYP-C	NDLT-J	OK
SpeedportW724VTyp-A	NDLT-J	OK
SpeedportW724VTyp-B	NDLT-J	OK
THOME-SP300HS-v130	NDLT-J	OK
THOME-SP721V-v640475	NDLT-J	OK
THOME-SP723VA-v10116	NDLT-J	OK
speedport-921-v14300	NDLT-J	OK

RA performance tests for BB8B: interleaved

Modem	LT-Board	Status
SAGEM-5311-v039b	NDLT-J	OK
SPARC-W723-v13800	NDLT-J	OK
SpeedportW724VTYP-C	NDLT-J	OK
SpeedportW724VTyp-A	NDLT-J	OK
SpeedportW724VTyp-B	NDLT-J	OK
THOME-SP300HS-v130	NDLT-J	OK
THOME-SP721V-v640475	NDLT-J	OK
THOME-SP723VA-v10116	NDLT-J	OK
speedport-921-v14300	NDLT-J	OK

RA performance tests for BB12A: fast

Modem	LT-Board	Status
SAGEM-5311-v039b	NDLT-J	OK
SPARC-W723-v13800	NDLT-J	OK
SpeedportW724VTYP-C	NDLT-J	OK
SpeedportW724VTyp-A	NDLT-J	OK
SpeedportW724VTyp-B	NDLT-J	OK

THOME-SP300HS-v130	NDLT-J	OK
THOME-SP721V-v640475	NDLT-J	OK
THOME-SP723VA-v10116	NDLT-J	OK
speedport-921-v14300	NDLT-J	OK

RA performance tests for BA12A: fast		
Modem	LT-Board	Status
ACD-VGV7519	NDLT-K	OK
CISCO-887VA-39md24h	NDLT-K	OK
SAGEM-LB3-v51581	NDLT-K	OK
SAGEM-LB4-v42g3	NDLT-K	OK
SAGEM-LBPv3-V51581	NDLT-K	OK
THMSN-TG789vn-V842U	NDLT-K	OK
ZTE-H220N-v2T09	NDLT-K	OK
ZTE-ZXHNH368N-v00T10	NDLT-K	OK
ZTE-ZXHNH369A-v42p	NDLT-K	OK

RA performance tests for BA8B: interleaved		
Modem	LT-Board	Status
ACD-VGV7519	NDLT-K	OK
CISCO-887VA-39md24h	NDLT-K	OK
SAGEM-LB3-v51581	NDLT-K	OK
SAGEM-LB4-v42g3	NDLT-K	OK
SAGEM-LBPv3-V51581	NDLT-K	OK
THMSN-TG789vn-V842U	NDLT-K	OK
ZTE-H220N-v2T09	NDLT-K	OK
ZTE-ZXHNH368N-v00T10	NDLT-K	OK
ZTE-ZXHNH369A-v42p	NDLT-K	OK

RA performance tests for BA17a with D&UPBO: interleaved		
Modem	LT-Board	Status
ACD-VGV7519	NDLT-K	OK
CISCO-887VA-39md24h	NDLT-K	OK
SAGEM-LB3-v51581	NDLT-K	OK
SAGEM-LB4-v42g3	NDLT-K	OK
SAGEM-LBPv3-V51581	NDLT-K	OK
THMSN-TG789vn-V842U	NDLT-K	OK
ZTE-H220N-v2T09	NDLT-K	OK
ZTE-ZXHNH368N-v00T10	NDLT-K	OK
ZTE-ZXHNH369A-v42p	NDLT-K	OK

RA performance tests for BA12A: fast		
Modem	LT-Board	Status
Dlink DVA-2800	RDLS-A	OK
Dlink-DSL-2877	RDLS-A	OK
Dlink-DSL-2885A	RDLS-A	OK
Netcomm-NF10WW	RDLS-A	OK

Netcomm-NFV4-6f039k	RDLS-A	OK
Netgear-D7800	RDLS-A	OK

RA performance tests for BA17a with D&UPBO: interleaved

Modem	LT-Board	Status
Dlink DVA-2800	RDLS-A	OK
Dlink-DSL-2877	RDLS-A	OK
Dlink-DSL-2885A	RDLS-A	OK
Netcomm-NF10WV	RDLS-A	OK
Netcomm-NFV4-6f039k	RDLS-A	OK
Netgear-D7800	RDLS-A	OK

RA performance tests for BA8B: interleaved

Modem	LT-Board	Status
Dlink DVA-2800	RDLS-A	OK
Dlink-DSL-2877	RDLS-A	OK
Dlink-DSL-2885A	RDLS-A	OK
Netcomm-NF10WV	RDLS-A	OK
Netcomm-NFV4-6f039k	RDLS-A	OK
Netgear-D7800	RDLS-A	OK

RA performance tests for BA8B: interleaved

Modem	LT-Board	Status
ACD-VGV7519	RDLT-B	OK
Alpha-Network	RDLT-B	OK
CISCO-887VA-39md24h	RDLT-B	OK
Fritzbox 7590	RDLT-B	OK
Intel Easy550	RDLT-B	OK
NOKIA-F-010-GB-A2pvfbH045k	RDLT-B	OK
NOKIA-F-010-GC-A2pvfbH045k	RDLT-B	OK
SAGEM-BBOX2-v95713	RDLT-B	OK
SAGEM-BBOX3-v39x6	RDLT-B	OK
SAGEM-LB3-v51581	RDLT-B	OK
SAGEM-LB4-v42g3	RDLT-B	OK
SAGEM-LBPv3-V51581	RDLT-B	OK
THMSN-TG789vn-V842U	RDLT-B	OK
ZTE-H186	RDLT-B	OK
ZTE-H220N-v2T09	RDLT-B	OK
ZTE-ZXHNH368N-v00T10	RDLT-B	OK
ZTE-ZXHNH369A-v42p	RDLT-B	OK

RA performance tests for BA17a with D&UPBO: interleaved

Modem	LT-Board	Status
ACD-VGV7519	RDLT-B	OK
Alpha-Network	RDLT-B	OK
CISCO-887VA-39md24h	RDLT-B	OK
Fritzbox 7590	RDLT-B	OK

Intel Easy550	RDLT-B	OK
NOKIA-F-010-GB-A2pvfbH045k	RDLT-B	OK
NOKIA-F-010-GC-A2pvfbH045k	RDLT-B	OK
SAGEM-BBOX2-v95713	RDLT-B	OK
SAGEM-BBOX3-v39x6	RDLT-B	OK
SAGEM-LB3-v51581	RDLT-B	OK
SAGEM-LB4-v42g3	RDLT-B	OK
SAGEM-LBPv3-V51581	RDLT-B	OK
THMSN-TG789vn-V842U	RDLT-B	OK
ZTE-H186	RDLT-B	OK
ZTE-H220N-v2T09	RDLT-B	OK
ZTE-ZXHNH368N-v00T10	RDLT-B	OK
ZTE-ZXHNH369A-v42p	RDLT-B	OK

RA performance tests for BA12A: fast

Modem	LT-Board	Status
ACD-VGV7519	RDLT-B	OK
Alpha-Network	RDLT-B	OK
CISCO-887VA-39md24h	RDLT-B	OK
Fritzbox 7590	RDLT-B	OK
Intel Easy550	RDLT-B	OK
NOKIA-F-010-GB-A2pvfbH045k	RDLT-B	OK
NOKIA-F-010-GC-A2pvfbH045k	RDLT-B	OK
SAGEM-BBOX2-v95713	RDLT-B	OK
SAGEM-BBOX3-v39x6	RDLT-B	OK
SAGEM-LB3-v51581	RDLT-B	OK
SAGEM-LB4-v42g3	RDLT-B	OK
SAGEM-LBPv3-V51581	RDLT-B	OK
THMSN-TG789vn-V842U	RDLT-B	OK
ZTE-H186	RDLT-B	OK
ZTE-H220N-v2T09	RDLT-B	OK
ZTE-ZXHNH368N-v00T10	RDLT-B	OK
ZTE-ZXHNH369A-v42p	RDLT-B	OK

RA performance tests for BA17A: interleaved

Modem	LT-Board	Status
Alpha-Network	RDLT-B	OK
Fritzbox 7590	RDLT-B	OK
Intel Easy550	RDLT-B	OK
NOKIA-F-010-GB-A2pvfbH045k	RDLT-B	OK
NOKIA-F-010-GC-A2pvfbH045k	RDLT-B	OK

WT-114i3 Rev-15, Q.9 RA Perf tests for QM35b with DPBO and UPBO

Modem	LT-Board	Status
Alpha-Network	RDLT-B	OK
Fritzbox 7590	RDLT-B	OK
Intel Easy550	RDLT-B	OK
NOKIA-F-010-GB-A2pvfbH045k	RDLT-B	OK
NOKIA-F-010-GC-A2pvfbH045k	RDLT-B	OK

ZTE-H186	RDLT-B	OK
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RA performance tests for QA35b with QA35b_RA_R-17/2/41_400_150

Modem	LT-Board	Status
Alpha-Network	RDLT-B	OK
Fritzbox 7590	RDLT-B	OK
Intel Easy550	RDLT-B	OK
NOKIA-F-010-GB-A2pvfbH045k	RDLT-B	OK
NOKIA-F-010-GC-A2pvfbH045k	RDLT-B	OK
ZTE-H186	RDLT-B	OK

RA performance tests for QA35b with DPBO and UPBO

Modem	LT-Board	Status
Alpha-Network	RDLT-B	OK
Fritzbox 7590	RDLT-B	OK
Intel Easy550	RDLT-B	OK
NOKIA-F-010-GB-A2pvfbH045k	RDLT-B	OK
NOKIA-F-010-GC-A2pvfbH045k	RDLT-B	OK
ZTE-H186	RDLT-B	OK

RA performance tests for BA17A: fast

Modem	LT-Board	Status
Alpha-Network	RDLT-B	OK
Fritzbox 7590	RDLT-B	OK
Intel Easy550	RDLT-B	OK
NOKIA-F-010-GB-A2pvfbH045k	RDLT-B	OK
NOKIA-F-010-GC-A2pvfbH045k	RDLT-B	OK

RA performance tests for BA12A: interleaved

Modem	LT-Board	Status
Alpha-Network	RDLT-B	OK
Fritzbox 7590	RDLT-B	OK
Intel Easy550	RDLT-B	OK
NOKIA-F-010-GB-A2pvfbH045k	RDLT-B	OK
NOKIA-F-010-GC-A2pvfbH045k	RDLT-B	OK

RA performance tests for BA17a with D&UPBO: fast

Modem	LT-Board	Status
Alpha-Network	RDLT-B	OK
Fritzbox 7590	RDLT-B	OK
Intel Easy550	RDLT-B	OK
NOKIA-F-010-GB-A2pvfbH045k	RDLT-B	OK
NOKIA-F-010-GC-A2pvfbH045k	RDLT-B	OK

WT-114i3 Rev-15, Q.7 RA Perf tests for QM35b, performance tests with QM35b_RA_R-17/2/41_400_150

Modem	LT-Board	Status

Alpha-Network	RDLT-B	OK
Fritzbox 7590	RDLT-B	OK
Intel Easy550	RDLT-B	OK
NOKIA-F-010-GB-A2pvfbH045k	RDLT-B	OK
NOKIA-F-010-GC-A2pvfbH045k	RDLT-B	OK
ZTE-H186	RDLT-B	OK

RA performance tests for BB12A: fast

Modem	LT-Board	Status
TECH-BBOX3-v39x5	RDLT-B	OK

RA performance tests for BB8B: interleaved

Modem	LT-Board	Status
TECH-BBOX3-v39x5	RDLT-B	OK

RA performance tests for BB17a with D&UPBO: interleaved

Modem	LT-Board	Status
TECH-BBOX3-v39x5	RDLT-B	OK

RA performance tests for BA17A: fast

Modem	LT-Board	Status
Alpha-Network	RFLT-D	OK

RA performance tests for BA17a with D&UPBO: interleaved

Modem	LT-Board	Status
Alpha-Network	RFLT-D	OK
Netcomm-NF10WV	RFLT-D	OK
Netcomm-NFV4-6f039k	RFLT-D	OK
PER-DV2210-vE502	RFLT-D	OK
PER-PRGAV4202N-v535	RFLT-D	OK
SAGEM-BBOX2-v95713	RFLT-D	OK
SAGEM-BBOX3-v39x6	RFLT-D	OK
THMSN-TG789vn-V842U	RFLT-D	OK
TMM-TG588v-v1054W	RFLT-D	OK
TMM-TG788A1vn-v1054W	RFLT-D	OK
ZTE-H220N-v2T09	RFLT-D	OK
ZTE-ZXHNH369A-v42p	RFLT-D	OK

RA performance tests for BA17a with D&UPBO: fast

Modem	LT-Board	Status
Alpha-Network	RFLT-D	OK

RA performance tests for BA8B: interleaved

Modem	LT-Board	Status
Alpha-Network	RFLT-D	OK
Netcomm-NF10WV	RFLT-D	OK
Netcomm-NFV4-6f039k	RFLT-D	OK

PER-DV2210-vE502	RFLT-D	OK
PER-PRGAV4202N-v535	RFLT-D	OK
SAGEM-BBOX2-v95713	RFLT-D	OK
SAGEM-BBOX3-v39x6	RFLT-D	OK
THMSN-TG789vn-V842U	RFLT-D	OK
TMM-TG588v-v1054W	RFLT-D	OK
TMM-TG788A1vn-v1054W	RFLT-D	OK
ZTE-H220N-v2T09	RFLT-D	OK
ZTE-ZXHNH369A-v42p	RFLT-D	OK

RA performance tests for BA12A: fast

Modem	LT-Board	Status
Alpha-Network	RFLT-D	OK
Netcomm-NF10WV	RFLT-D	OK
Netcomm-NFV4-6f039k	RFLT-D	OK
PER-DV2210-vE502	RFLT-D	OK
PER-PRGAV4202N-v535	RFLT-D	OK
SAGEM-BBOX2-v95713	RFLT-D	OK
SAGEM-BBOX3-v39x6	RFLT-D	OK
THMSN-TG789vn-V842U	RFLT-D	OK
TMM-TG588v-v1054W	RFLT-D	OK
TMM-TG788A1vn-v1054W	RFLT-D	OK
ZTE-H220N-v2T09	RFLT-D	OK
ZTE-ZXHNH369A-v42p	RFLT-D	OK

RA performance tests for BB12A: fast

Modem	LT-Board	Status
TECH-BBOX3-v39x5	RFLT-D	OK

RA performance tests for BB17a with D&UPBO: interleaved

Modem	LT-Board	Status
TECH-BBOX3-v39x5	RFLT-D	OK

RA performance tests for BB8B: interleaved

Modem	LT-Board	Status
TECH-BBOX3-v39x5	RFLT-D	OK

RA performance tests for BA12A: fast

Modem	LT-Board	Status
Dlink DVA-2800	7367 ISAM SX-48V CDAS-A	OK
Dlink-DSL-2877	7367 ISAM SX-48V CDAS-A	OK
Dlink-DSL-2885A	7367 ISAM SX-48V CDAS-A	OK
Netcomm-NF10WV	7367 ISAM SX-48V CDAS-A	OK
Netcomm-NFV4-6f039k	7367 ISAM SX-48V CDAS-A	OK
Netgear-D7800	7367 ISAM SX-48V CDAS-A	OK

RA performance tests for BA17a with D&UPBO: interleaved

Modem	LT-Board	Status
Dlink DVA-2800	7367 ISAM SX-48V CDAS-A	OK
Dlink-DSL-2877	7367 ISAM SX-48V CDAS-A	OK
Dlink-DSL-2885A	7367 ISAM SX-48V CDAS-A	OK
Netcomm-NF10WV	7367 ISAM SX-48V CDAS-A	OK
Netcomm-NFV4-6f039k	7367 ISAM SX-48V CDAS-A	OK
Netgear-D7800	7367 ISAM SX-48V CDAS-A	OK

RA performance tests for BA8B: interleaved		
Modem	LT-Board	Status
Dlink DVA-2800	7367 ISAM SX-48V CDAS-A	OK
Dlink-DSL-2877	7367 ISAM SX-48V CDAS-A	OK
Dlink-DSL-2885A	7367 ISAM SX-48V CDAS-A	OK
Netcomm-NF10WV	7367 ISAM SX-48V CDAS-A	OK
Netcomm-NFV4-6f039k	7367 ISAM SX-48V CDAS-A	OK
Netgear-D7800	7367 ISAM SX-48V CDAS-A	OK

Initialization speed G.Vector at-init		
Modem	LT-Board	Status
Fritzbox 7490	NDLT-J	OK
Fritzbox 7490	NDLT-J	OK
Fritzbox 7590	NDLT-J	OK
Fritzbox 7590	NDLT-J	OK
SP-W724V-TypeA	NDLT-J	OK
SP-W724V-TypeB	NDLT-J	OK
SP-W724V-TypeC	NDLT-J	OK
speedport-921-v14300	NDLT-J	OK

Performance G.Vector_998ADE17_at-init_inp2_8		
Modem	LT-Board	Status
ARC-VGV7519-v138V2	NDLT-K	OK
AVM-F7340-v603	NDLT-K	OK
AVM-F7340-v603	NDLT-K	OK
AVM-Fbox7390	NDLT-K	OK
ZTE-H220N-v2T10	NDLT-K	OK
ZTE-ZXHN186-v00T02	NDLT-K	OK
ZTE-ZXHNH368N-v0T010	NDLT-K	OK
ZTE-ZXHNH369A-v00T02	NDLT-K	OK

Initialization speed G.Vector at-init		
Modem	LT-Board	Status
ARC-VGV7519-v138V2	NDLT-K	OK
AVM-F7340-v603	NDLT-K	OK
AVM-F7340-v603	NDLT-K	OK
AVM-Fbox7390	NDLT-K	OK
ZTE-H220N-v2T10	NDLT-K	OK
ZTE-ZXHN186-v00T02	NDLT-K	OK
ZTE-ZXHNH368N-v0T010	NDLT-K	OK
ZTE-ZXHNH369A-v00T02	NDLT-K	OK

Initialization speed G.Vector during-showtime		
Modem	LT-Board	Status
ARC-VGV7519-v138V2	NDLT-K	OK
AVM-F7340-v603	NDLT-K	OK
AVM-F7340-v603	NDLT-K	OK
AVM-Fbox7390	NDLT-K	OK
ZTE-H220N-v2T10	NDLT-K	OK
ZTE-ZXHN186-v00T02	NDLT-K	OK
ZTE-ZXHNH368N-v0T010	NDLT-K	OK
ZTE-ZXHNH369A-v00T02	NDLT-K	OK

Initialization speed G.Vector at-init		
Modem	LT-Board	Status
ARC-VGV7519-v138V2	RDLT-B	OK
AVM-F7340-v603	RDLT-B	OK
Alpha-Network	RDLT-B	OK
DLNK 6850U	RDLT-B	OK
DLNK-699U5	RDLT-B	OK
DLNK-G256DG	RDLT-B	OK
NGR-VEGN2000	RDLT-B	OK
SAGEM-BBOX3-v39x6	RDLT-B	OK
TECH-BBOX3-v39x5	RDLT-B	OK
VTCH-IAD604-IL	RDLT-B	OK
ZTE-H220N-v2T10	RDLT-B	OK
ZTE-ZXHN186-v00T02	RDLT-B	OK
ZTE-ZXHNH368N-v0T010	RDLT-B	OK
ZTE-ZXHNH369A-v00T02	RDLT-B	OK

Performance G.Vector_998ADE17_at-init_inp2_8		
Modem	LT-Board	Status
ARC-VGV7519-v138V2	RDLT-B	OK
AVM-F7340-v603	RDLT-B	OK
Alpha-Network	RDLT-B	OK
DLNK 6850U	RDLT-B	OK
DLNK-699U5	RDLT-B	OK
DLNK-G256DG	RDLT-B	OK
NGR-VEGN2000	RDLT-B	OK
SAGEM-BBOX3-v39x6	RDLT-B	OK
TECH-BBOX3-v39x5	RDLT-B	OK
VTCH-IAD604-IL	RDLT-B	OK
ZTE-H220N-v2T10	RDLT-B	OK
ZTE-ZXHN186-v00T02	RDLT-B	OK
ZTE-ZXHNH368N-v0T010	RDLT-B	OK
ZTE-ZXHNH369A-v00T02	RDLT-B	OK

Initialization speed G.Vector during-showtime		
Modem	LT-Board	Status

DLINK DVA-2800	7367 ISAM SX-48V CDAS-A	OK
Dlink DSL-2877AL	7367 ISAM SX-48V CDAS-A	OK
Netcomm-NFV4-6f039V4	7367 ISAM SX-48V CDAS-A	OK
Netgear_X4S D7800	7367 ISAM SX-48V CDAS-A	OK
Netocmm- NF10WV-d26b	7367 ISAM SX-48V CDAS-A	OK

Performance G.Vector 998ADE17 at-init inp2 8		
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Modem	LT-Board	Status
DLINK DVA-2800	7367 ISAM SX-48V CDAS-A	OK
Dlink DSL-2877AL	7367 ISAM SX-48V CDAS-A	OK
Netcomm-NFV4-6f039V4	7367 ISAM SX-48V CDAS-A	OK
Netgear_X4S D7800	7367 ISAM SX-48V CDAS-A	OK
Netocmm- NF10WV-d26b	7367 ISAM SX-48V CDAS-A	OK

Initialization speed G.Vector at-init		
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Modem	LT-Board	Status
DLINK DVA-2800	7367 ISAM SX-48V CDAS-A	OK
Dlink DSL-2877AL	7367 ISAM SX-48V CDAS-A	OK
Netcomm-NFV4-6f039V4	7367 ISAM SX-48V CDAS-A	OK
Netgear_X4S D7800	7367 ISAM SX-48V CDAS-A	OK
Netocmm- NF10WV-d26b	7367 ISAM SX-48V CDAS-A	OK

Performance G.Vector 998ADE17 at-init inp2 8		
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Modem	LT-Board	Status
ARC-VGV7519-v138V2	7367 ISAM SX-48V CDAS-C	OK
AVM-F7340-v603	7367 ISAM SX-48V CDAS-C	OK
AVM-Fritzbox7581	7367 ISAM SX-48V CDAS-C	OK
PER-DV2210-vE502	7367 ISAM SX-48V CDAS-C	OK
PER-PRGAV4202N-v535	7367 ISAM SX-48V CDAS-C	OK
TMM-TG588v-v1053k	7367 ISAM SX-48V CDAS-C	OK
TMM-TG788A1vn-v1053K	7367 ISAM SX-48V CDAS-C	OK
ZTE-H220N-v2T10	7367 ISAM SX-48V CDAS-C	OK
ZTE-ZXHN186-v00T02	7367 ISAM SX-48V CDAS-C	OK
ZTE-ZXHNH368N-v0T010	7367 ISAM SX-48V CDAS-C	OK
ZTE-ZXHNH369A-v00T02	7367 ISAM SX-48V CDAS-C	OK

Initialization speed G.Vector during-showtime		
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Modem	LT-Board	Status
ARC-VGV7519-v138V2	7367 ISAM SX-48V CDAS-C	OK
AVM-F7340-v603	7367 ISAM SX-48V CDAS-C	OK
AVM-Fritzbox7581	7367 ISAM SX-48V CDAS-C	OK
PER-DV2210-vE502	7367 ISAM SX-48V CDAS-C	OK
PER-PRGAV4202N-v535	7367 ISAM SX-48V CDAS-C	OK
TMM-TG588v-v1053k	7367 ISAM SX-48V CDAS-C	OK
TMM-TG788A1vn-v1053K	7367 ISAM SX-48V CDAS-C	OK
ZTE-H220N-v2T10	7367 ISAM SX-48V CDAS-C	OK
ZTE-ZXHN186-v00T02	7367 ISAM SX-48V CDAS-C	OK
ZTE-ZXHNH368N-v0T010	7367 ISAM SX-48V CDAS-C	OK
ZTE-ZXHNH369A-v00T02	7367 ISAM SX-48V CDAS-C	OK

Initialization speed G.Vector at-init		
Modem	LT-Board	Status
ARC-VGV7519-v138V2	7367 ISAM SX-48V CDAS-C	OK
AVM-F7340-v603	7367 ISAM SX-48V CDAS-C	OK
AVM-Fritzbox7581	7367 ISAM SX-48V CDAS-C	OK
PER-DV2210-vE502	7367 ISAM SX-48V CDAS-C	OK
PER-PRGAV4202N-v535	7367 ISAM SX-48V CDAS-C	OK
TMM-TG588v-v1053k	7367 ISAM SX-48V CDAS-C	OK
TMM-TG788A1vn-v1053K	7367 ISAM SX-48V CDAS-C	OK
ZTE-H220N-v2T10	7367 ISAM SX-48V CDAS-C	OK
ZTE-ZXHN186-v00T02	7367 ISAM SX-48V CDAS-C	OK
ZTE-ZXHNH368N-v0T010	7367 ISAM SX-48V CDAS-C	OK
ZTE-ZXHNH369A-v00T02	7367 ISAM SX-48V CDAS-C	OK

Performance G.Vector_998ADE17_at-init_inp2_8		
Modem	LT-Board	Status
ACTC-V2000H-vL11	7367 ISAM SX-48V VSRM-A	OK
ACTC-V2200H-vL11	7367 ISAM SX-48V VSRM-A	OK
ARRIS-NVG448B	7367 ISAM SX-48V VSRM-A	OK
MOTO-NVG589-v12d19	7367 ISAM SX-48V VSRM-A	OK
PACE-5168NV-v10.5.1	7367 ISAM SX-48V VSRM-A	OK
PST-AK624-v10912	7367 ISAM SX-48V VSRM-A	OK
Pace-5031NV	7367 ISAM SX-48V VSRM-A	OK

Initialization speed G.Vector at-init		
Modem	LT-Board	Status
ACTC-V2000H-vL11	7367 ISAM SX-48V VSRM-A	OK
ACTC-V2200H-vL11	7367 ISAM SX-48V VSRM-A	OK
ARRIS-NVG448B	7367 ISAM SX-48V VSRM-A	OK
MOTO-NVG589-v12d19	7367 ISAM SX-48V VSRM-A	OK
PACE-5168NV-v10.5.1	7367 ISAM SX-48V VSRM-A	OK
PST-AK624-v10912	7367 ISAM SX-48V VSRM-A	OK
Pace-5031NV	7367 ISAM SX-48V VSRM-A	OK

Initialization speed G.Vector during-showtime		
Modem	LT-Board	Status
ACTC-V2000H-vL11	7367 ISAM SX-48V VSRM-A	OK
ACTC-V2200H-vL11	7367 ISAM SX-48V VSRM-A	OK
ARRIS-NVG448B	7367 ISAM SX-48V VSRM-A	OK
MOTO-NVG589-v12d19	7367 ISAM SX-48V VSRM-A	OK
PACE-5168NV-v10.5.1	7367 ISAM SX-48V VSRM-A	OK
PST-AK624-v10912	7367 ISAM SX-48V VSRM-A	OK
Pace-5031NV	7367 ISAM SX-48V VSRM-A	OK

Initialization speed G.Vector during-showtime		
Modem	LT-Board	Status
ACTC-V2000H-vL11	7367 ISAM SX-16VP CDES-C	OK
ACTC-V2200H-vL11	7367 ISAM SX-16VP CDES-C	OK

ARRIS-NVG448B	7367 ISAM SX-16VP CDES-C	OK
MOTO-NVG589-v12d19	7367 ISAM SX-16VP CDES-C	OK
PACE-5168NV-v10.5.1	7367 ISAM SX-16VP CDES-C	OK
PST-AK624-v10912	7367 ISAM SX-16VP CDES-C	OK
Pace-5031NV	7367 ISAM SX-16VP CDES-C	OK

Initialization speed G.Vector at-init		
Modem	LT-Board	Status
ACTC-V2000H-vL11	7367 ISAM SX-16VP CDES-C	OK
ACTC-V2200H-vL11	7367 ISAM SX-16VP CDES-C	OK
ARRIS-NVG448B	7367 ISAM SX-16VP CDES-C	OK
MOTO-NVG589-v12d19	7367 ISAM SX-16VP CDES-C	OK
PACE-5168NV-v10.5.1	7367 ISAM SX-16VP CDES-C	OK
PST-AK624-v10912	7367 ISAM SX-16VP CDES-C	OK
Pace-5031NV	7367 ISAM SX-16VP CDES-C	OK

12.7.5.4 Test result overview G.fast line cards

Initialization speed G.Vector at-init		
Modem	LT-Board	Status
ARC-VGV7519-v138V2	7367 ISAM SX-16F CFAS-B	OK
AVM-F7340-v603	7367 ISAM SX-16F CFAS-B	OK
ZTE-H220N-v2T10	7367 ISAM SX-16F CFAS-B	OK
ZTE-ZXHN186-v00T02	7367 ISAM SX-16F CFAS-B	OK
ZTE-ZXHNH368N-v0T010	7367 ISAM SX-16F CFAS-B	OK
ZTE-ZXHNH369A-v00T02	7367 ISAM SX-16F CFAS-B	OK

Performance G.Vector_998ADE17_at-init_inp2_8		
Modem	LT-Board	Status
ARC-VGV7519-v138V2	7367 ISAM SX-16F CFAS-B	OK
AVM-F7340-v603	7367 ISAM SX-16F CFAS-B	OK
ZTE-H220N-v2T10	7367 ISAM SX-16F CFAS-B	OK
ZTE-ZXHN186-v00T02	7367 ISAM SX-16F CFAS-B	OK
ZTE-ZXHNH368N-v0T010	7367 ISAM SX-16F CFAS-B	OK
ZTE-ZXHNH369A-v00T02	7367 ISAM SX-16F CFAS-B	OK

Initialization speed G.Vector during-showtime		
Modem	LT-Board	Status
ARC-VGV7519-v138V2	7367 ISAM SX-16F CFAS-B	OK
AVM-F7340-v603	7367 ISAM SX-16F CFAS-B	OK
ZTE-H220N-v2T10	7367 ISAM SX-16F CFAS-B	OK
ZTE-ZXHN186-v00T02	7367 ISAM SX-16F CFAS-B	OK
ZTE-ZXHNH368N-v0T010	7367 ISAM SX-16F CFAS-B	OK
ZTE-ZXHNH369A-v00T02	7367 ISAM SX-16F CFAS-B	OK

12.7.5.5 Test result overview bonding line cards

RR test 2p bonding, no ds delay optimiz, ilv_2_8 profile, 998ADE 17a, equal loops, white noise -140		
Modem	LT-Board	Status
AVM-FritzBox-7581	NDLT-G	OK
NK-SARM-vB-6.0.R2	NDLT-G	OK
NK-SARWx-vB6.1.R3	NDLT-G	OK
ZTE-H-186	NDLT-G	OK
ZTE-ZXHNH368N-v00T09	NDLT-G	OK
ZTE-ZXHNH369A-v00T02	NDLT-G	OK

RR test 2p bonding, no ds delay optimiz, ilv_2_8 profile, 998ADE 17a, equal loops, white noise -140		
Modem	LT-Board	Status
NK-SARWx-vB6.1.R3	7367 ISAM SX-48V CDAS-A	OK
ZTE-H-186	7367 ISAM SX-48V CDAS-A	OK
ZTE-ZXHNH368N-v00T09	7367 ISAM SX-48V CDAS-A	OK
ZTE-ZXHNH369A-v00T02	7367 ISAM SX-48V CDAS-A	OK

RR test 2p bonding, ds delay optimiz by CO, 1 line fixed to 300m, ilv_4_8 profile, 998ADE 12a, white noise -140		
Modem	LT-Board	Status
ACTC-V2000H-vL11	7367 ISAM SX-12VP CDES-A	OK
ACTC-V2200H-vL11	7367 ISAM SX-12VP CDES-A	OK
MOTO-NVG589-v12d19	7367 ISAM SX-12VP CDES-A	OK
PACE-5168NV-v2954att	7367 ISAM SX-12VP CDES-A	OK
PST-AK624-v10912	7367 ISAM SX-12VP CDES-A	OK

RR test 2p bonding, ds delay optimiz by CO, ilv_2_8 profile, 998ADE 12a, equal loops, white noise -140		
Modem	LT-Board	Status
ACTC-V2000H-vL11	7367 ISAM SX-12VP CDES-A	OK
ACTC-V2200H-vL11	7367 ISAM SX-12VP CDES-A	OK
MOTO-NVG589-v12d19	7367 ISAM SX-12VP CDES-A	OK
PACE-5168NV-v2954att	7367 ISAM SX-12VP CDES-A	OK
PST-AK624-v10912	7367 ISAM SX-12VP CDES-A	OK

RR test 2p bonding, ds delay optimiz by CO, ilv_2_8 profile, 998ADE 17a, equal loops, white noise -140		
Modem	LT-Board	Status
ACTC-V2200H-vL11	7367 ISAM SX-12VP CDES-A	OK
MOTO-NVG589-v12d19	7367 ISAM SX-12VP CDES-A	OK
PACE-5168NV-v2954att	7367 ISAM SX-12VP CDES-A	OK
PST-AK624-v10912	7367 ISAM SX-12VP CDES-A	OK

13 GPON Uplink Interoperability on 7363 ISAM MX and 7367 ISAM SX

GPON OLT interop releases for the 7363 ISAM MX and 7367 ISAM SX with embedded GPON MAC:

- ▶ 7302 FD/7360 ISAM FX GPON OLT: R5.6/R5.7/R5.8 (C5)
- ▶ 7302 FD/7360 ISAM FX GPON OLT: R6.0.02

- ▶ 7342 GPON OLT: FGU4.8.13y, FGU4.9.06 and FGU4.10.30

14 APPENDIX A: DSL IOP Policy

14.1 Introduction

In view of the fast rollout of DSL lines in many countries around the world, there is a fast growth in the number of CPE (DSL modems, IAD's ...) that are being introduced in the market by different vendors. In order to ensure that the volume rollout of DSL lines can proceed efficiently, the aspect of interoperability between ISAM's and CPE's requires a dedicated attention and follow-up.

By this document Nokia would like to outline how we propose to manage this aspect of interoperability, in close co-operation with our customers.

14.2 Objective

The objective of this policy is to reach a common agreement with our customers on the short-term actions, as well as the longer-term strategy, to manage the interoperability between successive releases of our ISAM product, the Nokia 73xx ISAM, and the growing range of CPE, which are deployed in the field.

14.3 Interoperability definition

Interoperability means that

- ▶ The interworking between the Nokia 73xx ISAM and 3rd party CPE equipment meets basic functional and performance (e.g. bandwidth/reach) requirements, and
- ▶ When new releases of the Nokia 73xx ISAM are introduced, then for each CPE in the interoperability wall maintained by Nokia as defined below, the interworking between this CPE and the new version of the ISAM continues to meet these functional and performance requirements.

14.4 Policy Guidelines

Ultimately Nokia wants to come to the situation that we can rely on it that a particular ISAM and a particular CPE are interoperable, when this ISAM and this CPE are each separately formally verified by an officially certified party that applies this standardised methodology.

As the longer-term strategy to be implemented, Nokia supports the current initiatives by standardisation bodies and industry forums to establish an objective standardised methodology to establish the interoperability between a ISAM and a CPE. The main references of these standards are TR-067, TR-100, TR-105, TR-114, TR-115 and TR-273 (Broadband Forum www.broadband-forum.org).

Until we are able to reach this future situation, we need to manage the still growing installed base of CPE in the market. For this legacy CPE a dedicated action is required, since the aspect of interoperability was not formally assessed in this objective standardised way, but established in more ad hoc ways.

In order to deal with this short term situation Nokia propose the following strategy for the installed base of CPE equipment, and for new CPE's that are to be introduced in its customer networks:

- ▶ We propose to establish with our customers a formal agreement on the list of CPE that are officially deployed in their network (i.e. with formal approval by our customer to their end-users). The maximum supportable size of this list is 20 CPE. If the list is full and new CPE are added to the list, then it must be agreed which one shall be removed. From this list at maximum 3 CPE can be marked as 'high priority' CPE. These CPE will be used for the 'customer Focus Testing' (CFT) if the Network operator is part of the first off customers of a release.
- ▶ For all legacy CPE's which are included on this list and which are made available to Nokia, Nokia will do its best to ensure continued interoperability with the Nokia 73xx ISAM, in case of hardware or software upgrades to the installed base of Nokia 73xx ISAM, and new ISAM deployments.
- ▶ For new ADSL1 CPE types to be introduced in the customer's network, these will only be added to the officially agreed list mentioned in point 1 above after having passed an interoperability test. To this end either the CPE Vendor or the Network Operator needs to provide an interoperability conformance test report. This report can be issued by a Broadband Forum approved ITL according to TR-067, or by the Network Operator according to TR-067 or a mutually agreed test list.
- ▶ For new ADSL2 and ADSL2plus CPE types to be introduced in the customer's network, these will only be added to the officially agreed list mentioned in point 1 above after having passed an interoperability test. To this end either the CPE Vendor or the Network Operator needs to provide an interoperability conformance test report. This report can be issued by a Broadband Forum approved ITL according to TR-100, or by the Network Operator according to TR-100 or a mutually agreed test list.
- ▶ For new VDSL2 CPE types to be introduced in the customer's network, these will only be added to the officially agreed list mentioned in point 1 above after having passed an interoperability test. To this end either the CPE Vendor or the Network Operator needs to provide an interoperability conformance test report. This report can be issued by a Broadband Forum approved ITL according to TR-114 and TR-115, or by the Network Operator according to TR-114 and TR-115 or a mutually agreed test list.
- ▶ Nokia wishes to make clear that for all existing and new ISAM deployments it can only ensure interoperability for the CPE used in customer's networks in case these CPE are conforming to the specification as described above.

14.5 Practical implementation

Nokia will strive to capture as many as possible interop issues during the test and integration process of the Nokia 73xx DLAM development, according to the implementation guidelines described below. However, Nokia cannot and will not certify, guarantee interoperability or assume any liability of operation of CPE products.

- ▶ Nokia will do its best to ensure continued interoperability of new ISAM releases with the existing installed base of CPE's by carefully regression testing new ISAM releases against the currently deployed and interoperable CPE.
- ▶ To this intent Nokia maintains a 'CPE Wall' (i.e. a wall in which the legacy CPE's are stacked for interworking testing with the ISAM)

The objective is to have in this CPE Wall the modems that are field deployed with the Nokia 73xx ISAM's

To build out the CPE Wall the Network Operator provides 5 samples of all CPE types (unique HW and SW version) that are on the agreed list of CPE being deployed against the Nokia 73xx ISAM.

In order that the CPE Wall is an accurate representation of the modems being deployed in the field it is important that Nokia is kept informed on new CPE versions being deployed in the customer's network (i.e. the agreed CPE list needs to be kept up to date). If not informed, Nokia will use the latest available CPE list.

Nokia reserves the right to remove modems that have been present in the modem wall for more than 3 years (after integration date), in order to limit the modem wall size and create room for integration of newer CPE types.

- ▶ In order to ensure that there is sufficient time available for new modems to be included in the interop regression test of the next ISAM product release, these modems should be made available at least 3 months before the planned ISAM release date.
- ▶ A new CPE will only be integrated if there is a different **physical layer** implementation. This means that a CPE with only a different end user interface compared to a modem already in the modem wall, will NOT be integrated.
- ▶ A new CPE will only be integrated if all information regarding **chipset vendor, chipset version, firmware and software versions** etc. is provided (i.e. there will be no black box testing). If CPE's are provided without this information they will NOT be integrated. The information can be provided on request.
- ▶ Before making a new ISAM release available a set of dedicated interop tests will be performed

Before the initial Customer Product Release ('CP milestone') of a new main ISAM release (release x.y) at maximum 3 'high priority' CPE's from the agreed CPE list and available modems in the CPE Wall of first-off customers will be verified for continued interoperability. These interoperability tests are done by a "customer focus team" and use a customer specific test plan.

For maintenance releases (release x.y.z), a full CPE modem wall run will not be done. It is expected that the number of fixes in a maintenance release does not drastically change the interoperability behaviour compared to the corresponding main ISAM release. Limited interoperability regression tests will be run on a best effort basis for the target customers of the release. These interoperability tests are done by a “customer focus team” with focus on a maximum of 2 ‘high priority’ CPE’s from the agreed CPE list and available modems in the CPE Wall. These tests are based on a subset of a customer specific test plan.

For emergency fix (EF) release (x.y.za), interoperability is not re-tested. The number of fixes is very small compared to the corresponding maintenance release and therefore the interoperability behaviour is not expected to change. Only those CPE’s for which fault reports are being fixed will be retested.

Before the General Availability Release (‘C5 milestone’) of a new ISAM release all modems present in the CPE Wall will be verified for continued interoperability as described in section [7]. In practice these test occur may also before CP and as such may span several FW deliveries

- ▶ The CPE Wall regression test is performed according to the following scenario:

A general interop regression test is performed which covers the initialisation aspects, with in addition performance, stability, functional and traffic tests. In case a interop test fails, a fault report will be made.

Next to the general CPE Wall tests, more detailed interop tests will be executed on a representative subset of the modems in the CPE Wall. The set of modems may vary for each new ISAM release, depending on the release content and impact on modem related hardware and software. The focus of these tests is mainly on performance under noise conditions.

Note: Regression test results are valid for the specific HW and FW versions of that CPE

- ▶ Nokia has established a close relation with the major Chipset and CPE vendors to be able to detect more interoperability issues in an earlier stage of product development and ensure there is a process in place so that any corrections will be efficiently implemented.
- ▶ Nokia will facilitate public CPE-Interop qualification via the Broadband Forum Independent Test Labs (ITL), by ensuring that the ITL have up-to-date ISAM hardware and software. Currently Nokia is working closely with the following ITL: LAN (France) and KTL (UK).
- ▶ Nokia is a member of the DSL Testing Consortium of the University of New Hampshire interoperability lab (USA). (<http://www.iol.unh.edu/services/testing/dsl/>). UNH-IOL is a neutral, third-party laboratory dedicated to testing data networking technologies. Apart from participating to Broadband Forum plugfests, our ISAM products are available at UNH for testing by CPE manufacturers.

15 APPENDIX B: Undocumented feature; SIP protocol VoIP Service

SIP protocol VoIP service ISDN-PRI: PUID configured with "subscriber" number format

The ISDN-PRI service supports the configuration of a PUID (public user id) based on the "subscriber" number format i.e. the area code/city code are not part of the configured PUID value.

The ISDN-PRI PBX passes the CgPn IE to the ISDN-PRI voice LT board with TON=unknown & CgPn-digits=subscriber number.

SIP protocol VoIP service ISDN-PRI: The mapping rules for the DSS1 Calling and Called Party number IE as well as the Calling Party Number screening procedure.

Number screening is the feature whereby the SIP UA checks whether the user (ISDN-PRA PBX) provided calling party number is in the correct number format and is part of the ISDN-PRA PBX assigned number range.

Number mapping is the feature whereby the SIP UA maps

1. the user (ISDN-PRA PBX) provided Calling & called party information elements onto SIP protocol
2. the network provided Calling & called party number from SIP protocol onto the ISDN-PRA Calling & called party information elements

The NE allows to configure a "Number screening and Mapping" profile (NSM profile) including the following configuration options:

- To indicate whether the From-header user part of an outgoing SIP Invite request needs to be set to 'Unavailable' or to be set to the default group number (GDN) in case a call is to be established with the default GDN (General Directory Number).
- To define the priv-values (RFC3323) that are to be set in the privacy header field of an outgoing INVITE for the case the received DSS1 SETUP message does not contain a CgPn IE or contains a CgPn IE with non-valid NPI value or contains a CgPn IE with valid NPI value (*) AND PI with value "absent"
- To indicate whether the 'From' header is to be anonymized or not, when PI = Presentation restricted is received.
(In case PI = Presentation restricted, the calling user explicitly indicates that the presentation of the calling number is restricted. In this case, the privacy-header must be included with value 'id and 'header' and 'user.)
- To configure the string value the IMS will send in the 'From' header user info in case the user does not have the CLIP feature assigned. Upon the receipt of a SIP INVITE with this string value in the 'From' header user info, then SIP UA must not send the CGPN IE to the terminating ISDN PRA user.
- To configure the string value the IMS will send in the 'From' header user info in case the CLI has to be kept private. Upon the receipt of a SIP INVITE with this string value in the 'From' header user info, the SIP UA must NOT send the CLI to the terminating ISDN PRA user.
- To configure the string value the IMS will send in the 'From' header user info in case no CLI is available. Upon the receipt of a SIP INVITE with this string value in the 'From' header user info, the SIP UA knows that there is no CLI to be send to the terminating ISDN PRA user.

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- To configure how the numbering plan identifier field must be coded towards the terminating ISDN PRA user. It shall be coded either as 'ISDN/telephony numbering plan (ITU-T Recommendation E.164)' or as 'unknown'.
 - To configure the preferred value of the TON (Type Of Number) parameter of CgPn IE that is sent to the terminating ISDN PRA user.
 - The international prefix
 - The national prefix
 - The country code
 - The number of digits that allows the SIP UA to distinguish whether the phone number received in the CgPn is a shortened phone number (a DDI extension) or a phone number with a national or international format.
 - o In case the length of the received CgPn < configured CgPn length, the MSAN treat this as invalid CgPn, and configured Global Directory Number (GDN) will be used to setup the call
 - o In case the length of the received CgPn = configured CgPn length, the MSAN extends the received phone number with extra digits deduced from the configured Global Directory Number (GDN) before starting the number screening.
 - o In case the length of the received CgPn > configured CgPn length, the number screening of the phone number can immediately be started i.e. no extra digits must be added to the received phone number in the CgPn.

Multiple of these NSM profiles can be created and for each ISDN-PRA PBX, the one applicable NSM profile can be assigned. The same NSM profile can be shared by multiple ISDN-PRA PBXs.

Calling Party Number mapping & screening at originating side:

- In case no Calling Party Number Information element is provided by the ISDN-PRA PBX, the call proceed with the calling party number set to the ISDN-PRA PBX "default" number (GDN)
 - o The SIP message P-Preferred-Identity header field is set to the default" ISDN-PRA PBX number
 - o Based on configuration input (Ref. Number Screening & Mapping profile), the SIP message From header field is either set to
 - the default" ISDN-PRA PBX number
 - or to From: "Unavailable" <sip:unavailable@unavailable.invalid>
 - o The sip message Privacy header field is set to privacy level "none"
- In case a Calling Party Number Information element is provided by the ISDN-PRA PBX with a NPI (Numbering Plan Indicator) value other than "ISDN/telephony numbering plan" or "unknown, the call proceed with the calling party number set to the ISDN-PRA PBX "default" number (GDN)
 - o The SIP message "P-Preferred-Identity" header is set to the default" ISDN-PRA PBX number
 - o Based on configuration input (Ref. Number Screening & Mapping profile), the SIP message "From" header field is either set to
 - the default" ISDN-PRA PBX number
 - or to From: "Unavailable" <sip:unavailable@unavailable.invalid>
 - o Based on configuration input (Ref. Number Screening & Mapping profile), the sip message Privacy header field is set to either
 - privacy level "none"
 - or privacy levels "id, header, user"
- In case a Calling Party Number Information element is provided by the ISDN-PRA PBX with a NPI (Numbering Plan Indicator) value set to either "ISDN/telephony numbering plan" or "unknown and with a Presentation Indicator (PI) value set to either

- "Number not available due to interworking"
 - In this case the call proceed with the calling party number set to the ISDN-PRA PBX "default" number (GDN)
 - The SIP message "P-Preferred-Identity" header is set to the default" ISDN-PRA PBX number
 - Based on configuration input (Ref. Number Screening & Mapping profile), the SIP message "From" header field is either set to the default" ISDN-PRA PBX number or to From: "Anonymous" <sip:anonymous@anonymous.invalid>
 - Based on configuration input (Ref. Number Screening & Mapping profile), the sip message Privacy header field is set to privacy levels "id, header, user"
- "presentation restricted"
 - The sip message "Privacy" header field is set with privacy levels "id, header, user"
 - The SIP message "P-Preferred-Identity" header is set to either the screened Calling Party Number if the "screening" of the calling party number is successful Or to the ISDN-PRA PBX "default" number (GDN) if the "screening" of the calling party number failed
 - Based on configuration input (Ref. Number Screening & Mapping profile), the SIP message "From" header field is set to either From: "Anonymous" <sip:anonymous@anonymous.invalid> Or to the screened Calling Party Number if the "screening" of the calling party number is successful Or to the ISDN-PRA PBX "default" number (GDN) if the "screening" of the calling party number failed
- "presentation allowed"
 - The sip message "Privacy" header field is set with privacy level "none"
 - The SIP message "P-Preferred-Identity" header is set to either the screened Calling Party Number if the "screening" of the calling party number is successful the ISDN-PRA PBX "default" number (GDN) if the "screening" of the calling party number failed
 - Based on configuration input (Ref. Number Screening & Mapping profile), the SIP message "From" header field is set to either the screened Calling Party Number if the "screening" of the calling party number is successful Or if the "screening" of the calling party number failed to the default" ISDN-PRA PBX number or to the value From: "Unavailable" <sip:unavailable@unavailable.invalid>

Calling Party Number mapping at terminating side:

- The mapping is based on TS183.036 section 5.2.3.1 and is as follows.
- The below rules are applied in the indicated order of priority
- If no P-Asserted-Identity header field is received
 1. If the sip "Privacy" header field is received with privacy level "id" and/or "header" and/or "user", then the SIP UA sends CgPN IE as:
 - NPI = Unknown
 - TON = Unknown
 - PI = Presentation restricted
 - SI = Network provided

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- Number digits = no digits
2. If the sip "From" header userinfo field is in the form of a telephone number", then the SIP UA sends CgPN IE as:
 - Based on configuration input (Ref. Number Screening & Mapping profile), the Numbering plan indicator (NPI) is either set to "Unknown"
Or "ISDN/telephony numbering plan"
 - Based on configuration input (Ref. Number Screening & Mapping profile), the Type Of Number (TON) is either set to "Unknown"
"International"
 - PI = Presentation Allowed
 - SI = User provided not verified
 - Number digits = copied from sip From header userinfo field and adapted as follows:
 - If TON = unknown
 - ♦ If the telephone number in From userinfo is preceded by a leading "+", then the leading "+" is replaced by the configured "international prefix"
 - If TON = international number
 - ♦ If the telephone number in From userinfo is preceded by a leading "+", then remove the leading "+"
 - ♦ If the telephone number in From userinfo starts with the configured "international prefix", then remove "international prefix"
 - ♦ Otherwise set TON = unknown
 3. Based on configuration input (Ref. Number Screening & Mapping profile), the SIP UA sends CgPN IE as:
 - if the sip "From" header userinfo field is set to the pre-configured fixed value for "no subscription to clip" (f.i. unsubscribed@unsubscribed.invalid)
no CgPN IE is send
 - if the sip "From" header userinfo field is set to the pre-configured fixed value for "no CID available" (f.i. unavailable@unavailable.invalid)
NPI = Unknown
TON = Unknown
PI = Not available due to interworking
SI = Network provided
Number digits = no digits
 - if the sip "From" header userinfo field is set to the pre-configured fixed value for "CLIR" (f.i. anonymous@anonymous.invalid)
NPI = Unknown
TON = Unknown
PI = Presentation restricted
SI = Network provided
Number digits = no digits
 - if the sip "From" header userinfo field is set to a non-significant string value which is different from telephone number and any of above pre-defined fixed string values:
no CgPN IE is send
- If P-Asserted-Identity header field is received
1. If the sip "Privacy" header field is received with privacy level "id" and/or "header" and/or "user", then the SIP UA sends CgPN IE as:
 - NPI = Unknown
 - TON = Unknown
 - PI = Presentation restricted

- SI = Network provided
 - Number digits = no digits
2. If the sip "PAI" header userinfo field is in the form of a telephone number", then the SIP UA sends CgPN IE as:
- Based on configuration input (Ref. Number Screening & Mapping profile), the Numbering plan indicator (NPI) is set to either
"Unknown"
Or "ISDN/telephony numbering plan"
 - Based on configuration input (Ref. Number Screening & Mapping profile), the Type Of Number (TON) is set to either
"Unknown"
"International"
 - PI = Presentation Allowed
 - SI = User provided not verified
 - Number digits = copied from sip PAI header userinfo field and adapted as follows:
 - If TON = unknown
 - ♦ If the telephone number in PAI userinfo is preceded by a leading "+", then the leading "+" is replaced by the configured "international prefix"
 - If TON = international number
 - ♦ If the telephone number in PAI userinfo is preceded by a leading "+", then remove the leading "+"
 - ♦ If the telephone number in PAI userinfo starts with the configured "international prefix", then remove "international prefix"
 - ♦ Otherwise set TON = unknown

Called Party Number mapping at originating side:

- In case a Calling Party Number Information element is provided by the ISDN-PRA PBX with a TON (Type Of Number Indicator) value set to either
 - o "International number"
 - Based on configuration input (Ref. Number Screening & Mapping profile), the mandatory "international-prefix" is added in front of the received Called Party Number and then mapped onto the sip message Request-URI and To header field
 - o "National number"
 - Based on configuration input (Ref. Number Screening & Mapping profile), the optional national-prefix is added in front of the received Called Party Number and then mapped onto the sip message Request-URI and To header field
 - o "Unknown" OR "Subscriber" OR "Abbreviated number" OR "Network specific number"
 - the received Called Party Number is copied "as is" onto the sip message Request-URI and To header field
- The Called Party IE "Number Plan Indicator" (NPI) is ignored by the SIP UA.
- Based on configuration input (Ref. VSG) the SIP RURI and FROM header fields are formatted as either
 - o SIP-URI
 - o Or Tel-URI

Called Party Number mapping at terminating side:

- For an ISDN PBX with explicit registration, the Called Party Number is retrieved from the SIP RURI of the incoming initial INVITE request
 - o In case of explicit registration all DDI extension are registered by the SIP UA individually with their own AOR and individual contact-address.

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- For a call to a specific DDI-extension, the RURI of INVITE request contains the user individual contact-address the SIP UA has registered for the DDI-extension AOR
 - For an ISDN PBX with implicit registration, the Called Party Number is retrieved from the SIP To-header of the incoming initial INVITE request UNLESS the To-header contains the identity of a user which is not part of the PBX.
In the latter case the SIP RURI is used
 - In case of implicit registration, the SIP UA only registers the "default" number of the ISDN-PRA PBX (GDN)
 - All the underlying DDI-extension number AOR's will be auto registered by the IMS core and will all be binded to the one and the same contact address the SIP UA has registered for the "default" number.

For a call towards a DDI-extension of the PBX, the RURI of INVITE request will always contain the contact-address of the "default" number (GDN).

Using the RURI to derive the CdPN will result in the GDN to ring.

Note:

Since the full-fledged number screening and mapping solution is introduced from R6.0.02 onwards, the manipulation rule "outg-add-prefix-in-cpn:<CgPnLength>" especially introduced in R6.0.01 to support the number screening and mapping with limited scope, becomes obsolete from R6.0.02 onwards.

16 APPENDIX C: SW installation Policy of 7367 ISAM SX-12VP (ANSI) and 7367 ISAM SX-16VP

16.1 General

A new SW concept was introduced with the introduction of the next two 7367 ISAM SX standalone combo sealed remotes, i.e.

- ▶ 7367 ISAM SX-12VP, CDES-A (since R5.1.01 for ANSI-markets only),
- ▶ 7367 ISAM ETSI SX-16VP, CDES-B (since R5.3 for ETSI-markets only) and
- ▶ 7367 ISAM ANSI SX-16VP, CDES-C (since R5.5 for ANSI-markets only).

that has not yet been documented.

The SW on the 7367 ISAM SX-12VP/16VP is, in this release, a combination of two SW parts, i.e. a DLSAM- and a GPON/ONT system. These two SW-items are part of the OSWP (Overall SW Package) in the SWPA SW deliverable (see chapter 3.1 above), i.e.

- ▶ DLSAM SW-item (identical to the operational SW on all other ISAM systems), that will be loaded onto the 7367 ISAM SX-12VP/16VP system itself and
- ▶ GPON/ONT SW-item (containing ONT SW), to be loaded onto the hosting GPON OLT, that will, in its turn, then upgrade the ONTs when it is told to do so.

16.2 Restriction

As already mentioned above, in this release, the GPON/ONT SW load of these remotes is included in the OSWP (Overall SW Package) that is stored in the ISAM directory of the SW-Package (delivered onto OLCS).

It will however not be loaded onto the GPON OLT by the AMS when doing a SW package installation via AMS. And also in case of a manual package installation, an extra step needs to be taken into consideration that has not yet been documented in the SW installation manual nor readme.txt file of this release.

Below chapter describes the (manual) installation procedure to do a SW installation on the 7367 ISAM SX-12VP and 7367 ISAM SX-16VP.

16.3 Installation Procedure

This installation procedure will get the GPON/ONT system out of the OSWP package. The operator has to download this system manually onto the NT board of the GPON OLT, and then upgrade it to the 7367 ISAM SX remote device.

Please execute next steps:

- ▶ STEP1: Get the GPON/ONT SW-item out of the SW package.

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- STEP1.1: Download the SW-package from OLCS.
 - STEP1.2: Untar the SW-package.
 - STEP1.3: The GPON/ONT SW-item is stored at /ISAM/L6GQAA60.460/NSWEAA60.105
 - STEP1.4: Untar NSWEAA60.105 into the GPON/ONT SW-item: 3FE56554U60105
- ▶ STEP2: Download 3FE56554U60105 to the GPON OLT
 - ▶ STEP3: Upgrade the SX-12VP/16VP GPON build via OLT or AMS.