Installation and Maintenance Manual

Nimbra 300 Series

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Contents

About This Manual

Overview

This manual includes information on how to install and maintain Nimbra 300 series nodes (currently Nimbra 310, Nimbra 320, Nimbra 340, Nimbra 340-HD, Nimbra 360 and Nimbra 380), focusing on hardware installation and maintenance as well as software installation.

For further information on how to operate and administer a Nimbra 300 series node in a network, please see *Element Manager User's Manual.* for the version of software running on the node.

Intended Reader

This manual is intended for service personnel performing hardware installation and maintenance including initial software installation. For software upgrading, please see *Element Manager User's Manual.*

Support and Assistance

If you have any questions about how to use your equipment or software, and do not find the in this manual, please contact your local equipment and support supplier. If questions still remain, please consult Net Insight's Technical Support Center.

Organization of Content

The contents of this manual is organized as follows:

- About This Manual includes information on how to use the manual.
- Product Overview describes the features and layout of the equipment.
- Installation provides instructions for installing and powering the equipment.
- The chapter User Interface describes how to establish communication with the equipment and additional equipment required. The local log in procedure prior to network software access is also described.
- Initial Software Installation provides instructions for first-time software configuration and backup procedures.
- Hardware Maintenance gives information about equipment hardware maintenance.
- Chapter Specifications contains the mechanical and electrical specification of the equipment.

Conventions in This Manual

When this manual mentions Nimbra 300 Series nodes, it refers to Nimbra 310, Nimbra 320, Nimbra 340, Nimbra 340-HD, Nimbra 360 and Nimbra 380 collectively. Some illustrations are made with one of the node types, but are nevertheless general for the entire series. Other illustrations are more specific, but clearly described as such in the text. The elements of the series are very similar from an operational point of view.

To enhance the readability of this manual, sections of special importance or interest are marked as follows:

Information of Specific Importance

Caution:

Information that is important in order to avoid injury or death of personnel working with the equipment and damage to the equipment is contained in this kind of box, with the caution heading and symbol.

Note:

Information for proper function of the equipment is contained in this kind of box, which includes the note heading and symbol.

Tip:

Useful information for better understanding and use of the equipment is contained in this kind of box, which includes the tip heading and symbol.

Instructions

The instructions given in this manual are numbered in the sequence in which they should be performed.

1. Initial measure
2. Next measure
3. And so on

Terminal Output and Keyboard Input

Examples of text and commands appearing on a terminal screen or entered by the user on a keyboard are marked with a special font as follows.

```
Example of terminal text output
Example of keyboard text input
```

Product Overview

General

The Nimbra 300 series nodes are a family of multi-service access and transport nodes with a 1.5 or 2 RU height form-factor. In the series, Nimbra 310, Nimbra 320, Nimbra 340, Nimbra 340-HD, Nimbra 360 and Nimbra 380 are currently available. All Nimbra 300 series nodes have one or two available slots for plug-in modules with a large variety of trunk and access modules available.

Nimbra 340 features one fixed Gigabit Ethernet port and two ASI interfaces. The ASI interfaces each have three different ports, making it possible to send one ASI stream IN and one ASI stream OUT simultaneously over the interface. In addition, either IN or OUT signal can be copied to the MONITOR port.

Nimbra 340-HD features one fixed Gigabit Ethernet and two HD-SDI interfaces. The physical ports of Nimbra 340 and Nimbra 340-HD are identical, but 340-HD uses HD-SDI streams rather than ASI streams. The capacity towards the backplane, 2.5 Gbps in each direction (IN and OUT), is a limiting factor.

Nimbra 360 features one fixed Gigabit Ethernet port and four fixed trunk interfaces. The trunk interfaces comes as default as OC-3/STM-1, but can be upgraded to OC-12/STM-4, OC-48/STM-16 or IP/Ethernet (10/100/1000 Mbps). OC-48/STM-16 and IP/Ethernet trunks can only use two of the four interfaces. Nimbra 360 has also a time transfer option for distribution of accurate real time over the optical network.

Nimbra 360 exists in two different versions, standard and LPN (Low Phase Noise). The difference between them is the better holdover performance in the LPN version.

Nimbra 380 features eight enhanced functionality 10/100/1000 Ethernet ports with RJ-45 electrical interface, in place of the fixed Gigabit Ethernet port. It is also equipped with an Alarm I/O port. In all other respects it is equal to the Nimbra 360.

Like Nimbra 380, Nimbra 310 and 320 features eight Ethernet ports. Furthermore, the node types are equipped one time transfer interface (i.e. two BNC ports). Nimbra 320 has two fixed trunk interfaces, but Nimbra 310 has only one in the base configuration. Nimbra 310 can be upgraded to have two fixed interfaces. Unlike the other models of the series, Nimbra 310/320 have one horizontal slot (rather than two) for modules.

The Nimbra 300 Series is fully interoperable with other Nimbra series of products for central office applications. It supports automated end-to-end provisioning (uni- and multicast) and automatic rerouting upon network failure.

The package of the node is a 1,5 or 2RU high enclosure that either can be installed in a standard 19" rack or used as a stand-alone unit. The 300 series has redundant -48VDC power inlets. If preferred, external 115/230VAC power adapters are available for optional AC powering.

Nimbra 300 comes with an integrated control module and a built-in switch matrix. Apart from the fixed ports described above, the following plug-in modules are available for mounting in the one or two horizontal slots, available in all Nimbra 300 nodes.

- OC-48/STM-16 X-ADM Module
- 3 x IP/Ethernet Trunk Module
- 2 x OC-12/STM-4 Trunk Module
- 4 x OC-3/STM-1 Trunk Module
- 4 x DS3/E3 Trunk/Access Module
- Gigabit Ethernet Access Module
- Fast Ethernet Access Module
- SDI Video Access Module
- 8 x SDI Access Module
- 8 x ASI Transport Access Module
- 4 x OC-3/STM-1 Access Module
- E1 Access Module
- T1 Access Module
- 8 x AES/EBU Access Module

Hardware Overview, Nimbra 300 Series

All elements in the Nimbra 300 series have a common chassis 88x445x240 mm (HxWxD), with two slots for plug-in modules, except Nimbra 320 which has a lower front and only one slot available for plug-in modules (66x445x240 mm). Power and grounding connections have similar front placements in all 300 series nodes. The main board of the 300 series node is housed in the a 1.5/2U compartment, which also contains cooling fans and slot(s) for plug-in modules. All connections to external equipment are made on the front of the node.

Node management connections (one Ethernet and one serial RJ-45 connector) are common for all 300 nodes, but their placement vary. They are located to the right in 340/340-HD and to the left in 310/320/360/380.

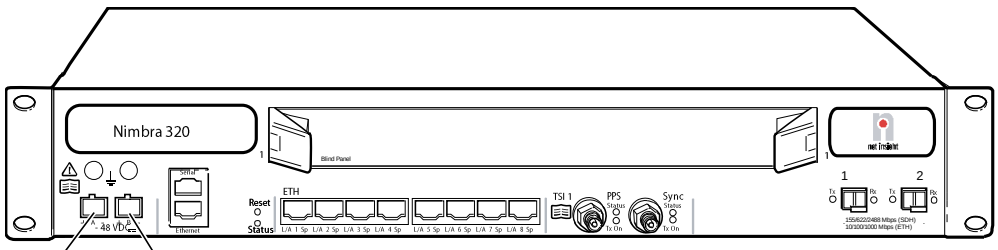


Figure 1. Nimbra 320. Nimbra 310 has the same appearance, except for the text on the front and the default disabling of the second fixed interface.

Nimbra 310 and 320 are the newest node types of the series. It features the eight 10/100/1000 Ethernet RJ-45 interfaces, one time transfer input/output interface (with two ports) and one (310) or two (320) fixed trunk interfaces. Nimbra 310 can be upgraded to two fixed trunk interfaces with an additional license file.

Nimbra 340 and 340-HD are very similar, apart from different front text as the ASI interfaces are substituted with HD-SDI interfaces. Internally, 340-HD handles HD-SDI

signals and 340 ASI signals. Also, Nimbra 340 and Nimbra 340-HD has a DSUB-9 interface for external alarm inputs/outputs.

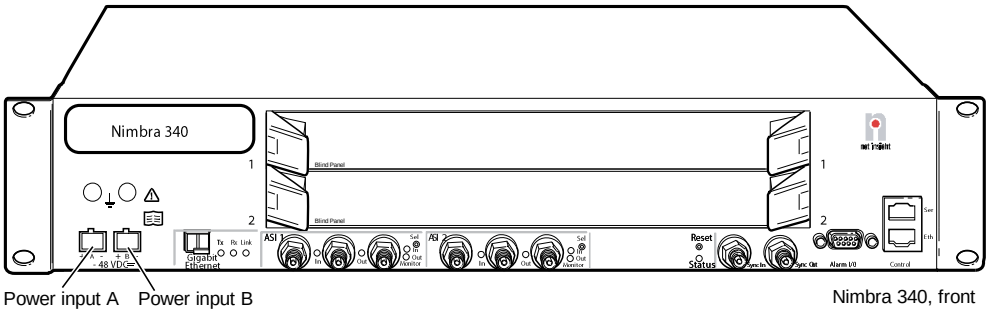


Figure 2. Nimbra 340 (Nimbra 340-HD)

The Nimbra 340 node with one fixed Gigabit Ethernet Access interface and 2 fixed ASI interfaces (each consisting of one IN, one OUT and one MONITOR port) is illustrated above. In Nimbra 340-HD, the ASI interfaces from Nimbra 340 is substituted for HD-SDI interfaces. Physically, however, they look identical apart from the distinguishing text.

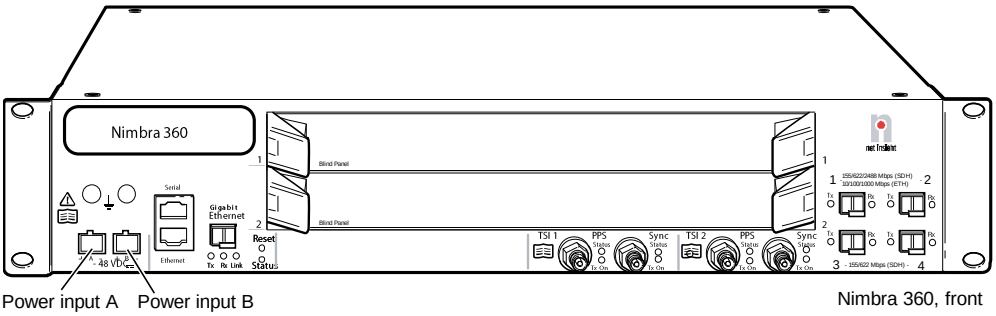


Figure 3. Nimbra 360

Nimbra 360 does not have fixed ASI or HD-SDI interfaces. Instead, it has four fixed trunk interfaces. All trunk interfaces have the same speed, by default OC-3/STM-1.They can be upgraded to OC-12/STM-4, OC-48/STM-16 or IP/Ethernet (10/100/1000 Mbps). In the last two cases, only two interfaces can be used. Upgrade (firmware) licenses are sold separately. The upgrade procedure is found in *Element Manager User's Manual* for the correct system release software version.

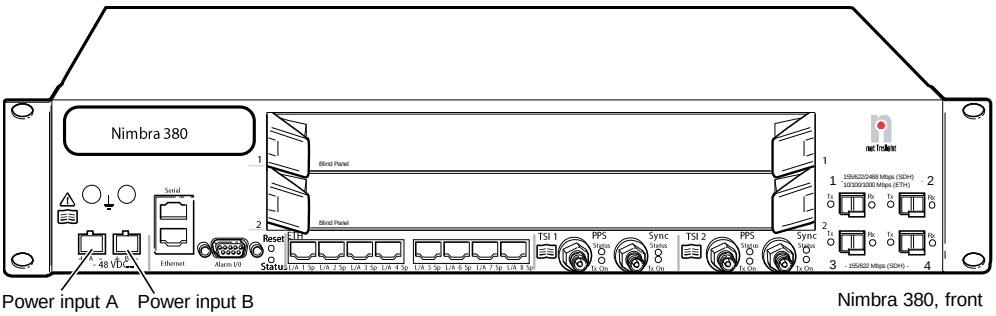


Figure 4. Nimbra 380

Nimbra 380 features eight 10/100/1000 Ethernet RJ-45 interfaces for access services, in addition to the fixed trunk interfaces and two time transfer interfaces of Nimbra 360. The alarm interface (D-SUB 9) is furthermore reintroduced in Nimbra 380, but placed on the left side of the front rather than on the right side as in Nimbra 340/340-HD.

On the front, the following interfaces are available for all Nimbra 300 nodes:

- Power A and Power B: two redundant -48V DC power inputs, each one equipped with a grounding pin, located above respective power input.
- RESET push-button and Status LED. Pressing the reset button causes the Nimbra 300 series node to restart. The LED will be lit during reboot and then turned off. The Status LED shows status of the equipment; in special operating modes, it works as a special purpose indicator. The position of the RESET button and the status LED are different in Nimbra 340/340-HD and Nimbra 320/360/380, but the functionality is the same.
- Control Interfaces

  The 10/100 Mbit Management Ethernet interface is located at the bottom RJ45 connector with integrated LED indicators. The green LED reflects Link Integrity status, while the amber LED shows transmission speed (10 vs. 100 Mbit/sec).

  The RS232 console (serial) interface is located at the top RJ45 connector.

  The position of the Control Interfaces on the front are different in Nimbra 340/340-HD and Nimbra 320/360/380.

The following common interfaces for Nimbra 340 and 340-HD are found in the front

- Sync In: An external sync reference source (2.048 or 1.544 MHz, compliant with ITU-T G.703) may be connected to this 75 Ohm, BNC connector.
- Sync Out: A sync reference output (2.048, 1.544 MHz or 8 kHz) for external equipment is available on this 75 Ohm, BNC connector.

The following common interfaces for Nimbra 340, 340-HD and 380 are found in the front

- Alarm interface connector, featuring six static alarm inputs and one static alarm output for monitoring of alarm indications within an installation. All alarm inputs and the output are galvanically isolated from each other.

The following fixed interfaces for Nimbra 340 are available in the front:

- Two ASI channels (A and B) for transport of video streams, each utilizing three 75 Ohm, BNC connectors for transmit (out), receive (in) and monitor purposes. In and Out connectors are accompanied with dedicated red/green LED indicators, which reflect activity and status on the corresponding link. The MON (monitor) connector is accompanied with a push button and two green LED indicators. The push button allows the user to select whether the In or Out stream should be routed to the monitor output, while the LED indicators show the selection made.

The front panel provides the following fixed interfaces for Nimbra 340-HD:

- One HD-SDI channel for transport of video streams, utilizing 75 Ohm BNC connectors for transmit, receiving and monitoring purposes. In and Out connectors are accompanied with dedicated red/green LED indicators, which reflect activity and status on the corresponding link. The same layout as for Nimbra 340 is used, but only one of the two IN ports can be used and only one of the OUT ports.

The front panel provides the following fixed interfaces for Nimbra 310, 320, 360 and 380:

- Time Synchronization Interface(s), TSI-1 (310, 320, 360, 380) and TSI-2 (360 and 380), each with two 50 Ohm BNC connectors. This interface may also be software configured to handle sync in/out also.
- Trunk interfaces – delivered by default without SFPs and with OC-3/STM-1 firmware. The interfaces can be equipped with different SFPs and upgraded with OC-12/STM-4, OC-48/STM-16 or IP/Ethernet firmware. Nimbra 310 has one fixed interface, 320 has two fixed interfaces, while 360/380 has four.

Interface/LED	**Nimbra 310 Nimbra 320**	**Nimbra 340**	**Nimbra 340-HD**	**Nimbra 360**	**Nimbra 380**
Power A and B	x	x	x	x	x
Gigabit Ethernet	8 x RJ-45 (10/100/1000 Mbps)	x (SFP needed)	x (SFP needed)	x (SFP needed)	8 x RJ-45 (10/100/1000 Mbps)
Reset pushbutton and Status LED	x	x	x	x	x
Serial control interface, RJ-45	x (RS-232)	x (RS-232)	x (RS-232)	x (RS-232)	x (RS-232)
Ethernet control interface, RJ-45	x	x	x	x	x
SYNC_IN		x (75 Ohm, BNC)	x (75 Ohm, BNC)		
SYNC_OUT		x (75 Ohm, BNC)	x (75 Ohm, BNC)		
Alarm (6 in, 1 out)		x	x		x
ASI (2 out, 2 in, 2 monitor)		x (75 Ohm, BNC)			
HD-SDI			x (75 Ohm, BNC)		
TSI-1 (2 ports)	x (1 port, 50 Ohm, BNC)			x (50 Ohm, BNC)	x (50 Ohm, BNC)
TSI-2 (2 ports)				x (50 Ohm, BNC)	x (50 Ohm, BNC)
Fixed trunks	1 (310)/2 (320) x OC-3/STM-1 or OC-12/STM-4 or OC-48/STM-16 or IP/Ethernet optional			4 x OC-3/STM-1 4 x OC-12/STM-4 2 x OC-48/STM-16 2 x IP/Ethernet optional	4 x OC-3/STM-1 4 x OC-12/STM-4 2 x OC-48/STM-16 2 x IP/Ethernet optional

Table 1. Summary of interfaces on Nimbra 300 series nodes

Trunk Modules

There are several versions of trunk modules, according to the table below. See the *Specifications* chapter for data about the different modules. The trunk modules are shown below.

Module	Data rate
OC-48/STM-16 X-ADM Module	2 488 Mbps
2 x OC-12/STM-4 Trunk Module	622 Mbps
4 x OC-3/STM-1 Trunk Module	155 Mbps
4 x DS3/E3 Trunk/Access Module	DS3 45 Mbps / E3 34 Mbps
3 x IP/Ethernet Trunk Module	Configurable, up to 1 Gbps

Table 2. Trunk modules for Nimbra 300 series

OC-48/STM-16 X-ADM Trunk Module

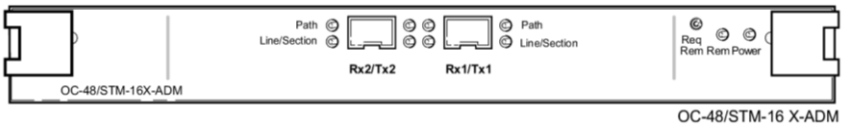


Figure 5. OC-48/STM-16 X-ADM Module

The OC-48/STM-16 X-ADM Module is a dual interface trunk module. It has two interfaces that can be equipped with optical SFPs.

In normal operation the **Power** LED is lit and the **Remove** indicator LED is off. A **Request removal** button is used when the Module is to be replaced. Status indicator LEDs provide information about the status of the respective interfaces.

2 x OC-12/STM-4 Trunk Module

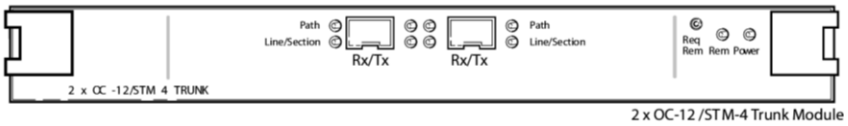


Figure 6. 2 x OC-12/STM-4 Trunk Module

The 2 x OC-12/STM-4 Trunk Module is a dual interface trunk module. It has two interfaces that can be equipped with optical SFPs.

In normal operation the **Power** LED is lit and the **Remove** indicator LED is off. A **Request removal** button is used when the Module is to be replaced. Status indicator LEDs provide information about the status of the respective interfaces.

4 x OC-3/STM-1 Trunk Module

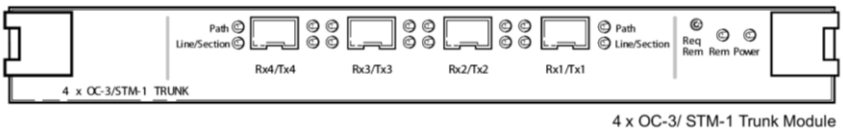


Figure 7. 4 x OC-3/STM-1 Trunk Module

The 4 x OC-3/STM-1 Trunk Module is a quadruple interface trunk module. It has four interfaces that can be equipped with optical SFPs.

In normal operation the **Power** LED is lit and the **Remove** indicator LED is off. A **Request removal** button is used when the Module is to be replaced. Status indicator LEDs provide information about the status of the respective interfaces.

4 x DS3/E3 Trunk/Access Module

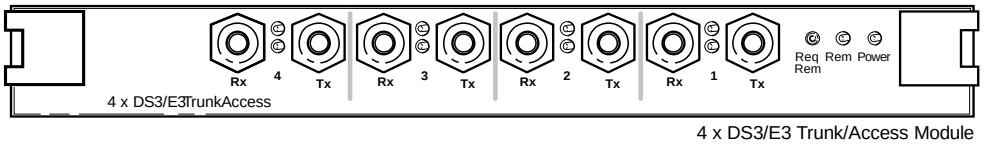


Figure 8. 4 x DS3/E3 Trunk/Access Module

The 4 x DS3/E3 Trunk/Access Module features four standard, bi-directional 75 Ohm, BNC interfaces. Each interface can utilize up to 42.5 Mbps (DS3) / 32.8 Mbps (E3) for user payload.

In normal operation the **Power** LED is lit and the **Remove** indicator LED is off. A **Request removal** button is used when the Module is to be replaced. Status indicator LEDs provide information about the status of the respective interfaces.

The DS3/E3 Trunk/Access Module has jumpers which may be used to tie the outer shell of the receive (Rx) interfaces (BNC cable) to ground. Corresponding jumpers on the transmit (Tx) interfaces are by default (and should always be) populated with jumpers. The location of all jumpers is shown below.

DC current is allowed to flow on the coaxial cable shield when Rx jumpers are installed. This improves the EMI performance of the module, but significantly increases the risk for problems arising from DC current paths from other DC grounded transmit interfaces. Without Rx jumpers (default), these DC current paths are not generated.

The cable/BNC shield is always connected to ground with a capacitor on the board.

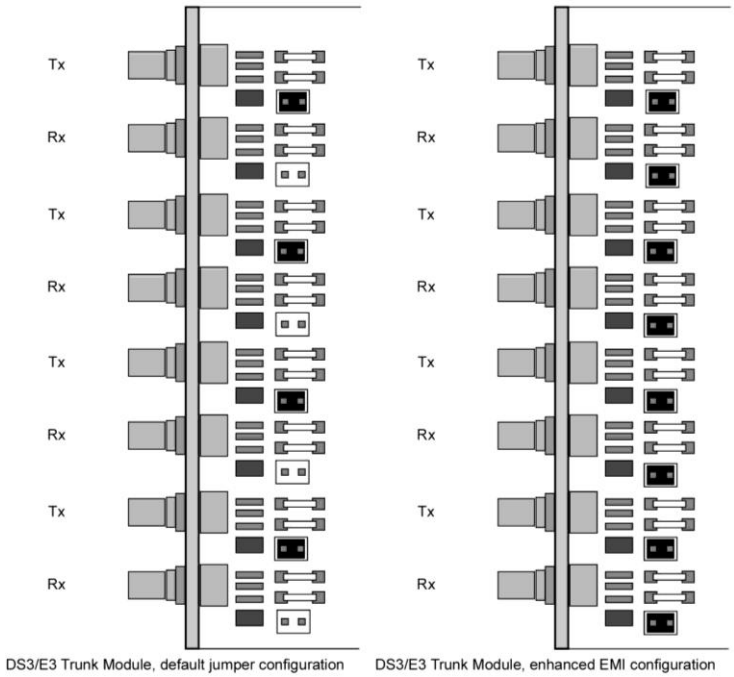


Figure 9. Jumpers settings on the DS3/E3 Trunk/Access Module.

3 x IP/Ethernet Trunk Module

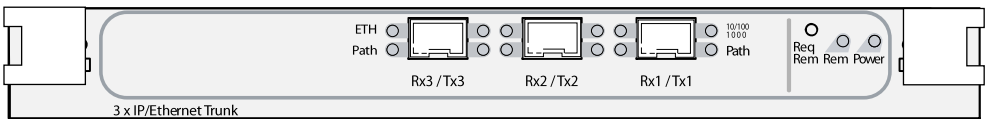


Figure 10. 3 x IP/Ethernet Trunk Module

This trunk module has triple interfaces, where the SFPs have to be added to the default configuration without SFPs. The SFPs should be of Gigabit Ethernet type.

In normal operation the **Power** LED is lit and the **Remove** indicator LED is off. A **Request removal** button is used when the Module is to be replaced. Status indicator LEDs provide information about the status of the respective interfaces.

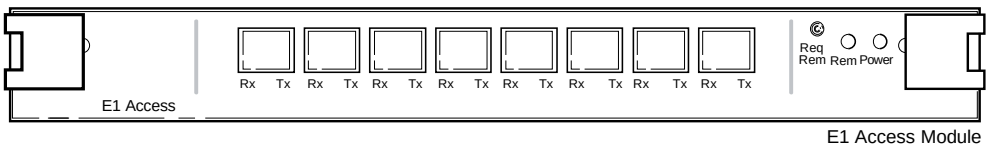
Access Modules

There are several access modules, according to the table below. See the *Specifications* chapter for data about the different modules.

Module
E1 Access Module
T1 Access Module
Fast Ethernet Access Module
Gigabit Ethernet Access Module
4 x OC-3/STM-1 Access Module
4 x DS3/E3 Trunk/Access Module
SDI Video Access Module
8 x SDI Access Module
8 x ASI Transport Access Module
8 x AES/EBU Access Module

Table 3. Access modules for Nimbra 300 series

E1 Access Modules



E1 Access Module

Figure 11. E1 Access Module

Each E1 Access Module provides eight independent bi-directional G.703 compatible interfaces. Each circuit is independently switched and carries its own timing derived from the source.

In normal operation, the **Power** LED is lit and the **Remove** indicator LED is off. A **Request removal** button is used when the module should be replaced.

The module has eight E1 (RJ-48, 120Ω) interfaces. Status indicator LEDs provide information about the status of the interfaces. See chapter *Specifications* for information about these indicators.

To insert, disconnect or replace the module, see chapter *Hardware Maintenance*.

T1 Access Module

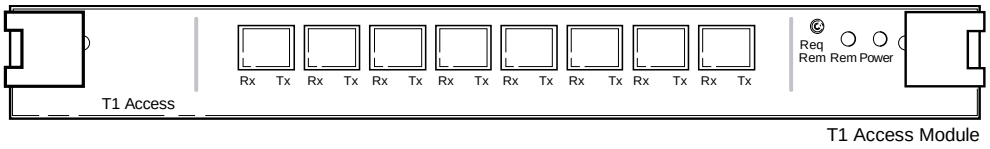


Figure 12. T1 Access Module

Each T1 Access Module provides eight independent bi-directional G.703 compatible interfaces. Each circuit is independently switched and carries its own timing derived from the source.

In normal operation, the **Power** LED is lit and the **Remove** indicator LED is off. A **Request removal** button is used when the module should be replaced.

The module has eight T1 (RJ-48, 120Ω) interfaces. Status indicator LEDs provide information about the status of the interfaces. See chapter *Specifications* for information about these indicators.

To insert, disconnect or replace the module, see chapter *Hardware Maintenance*.

Fast Ethernet Access Module

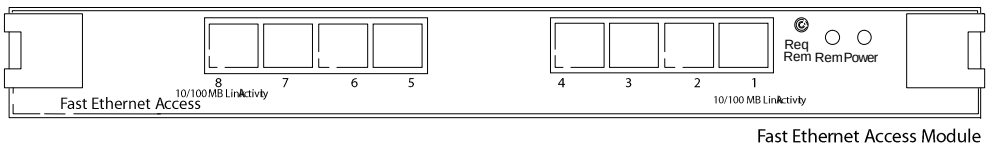


Figure 13. Fast Ethernet Access Module

The Fast Ethernet Access Module uses Ethernet Transport Service (ETS) to transport Ethernet traffic to various Ethernet interfaces in the DTM infrastructure.

The module has eight bidirectional 10/100 Ethernet RJ-45 interfaces. Status indicator LEDs provide information about the status of the respective Ethernet interfaces. See chapter *Specifications* for information about these indicators.

In normal operation, the **Power** LED is lit and the **Remove** indicator LED is off. A **Request removal** button is used when the module should be replaced.

To insert, connect or replace the Fast Ethernet access module, see chapter *Hardware Maintenance*.

Gigabit Ethernet Access Module

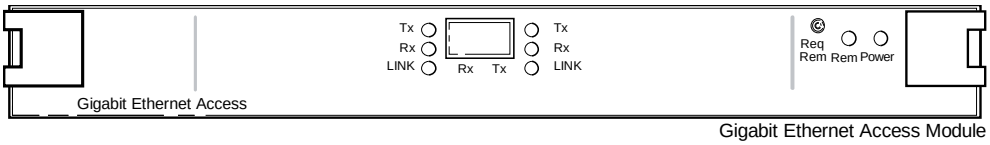


Figure 14. Gigabit Ethernet Access Module

The Gigabit Ethernet Access Module uses Ethernet Transport Service (ETS) to transport Ethernet traffic to various Ethernet interfaces in the DTM infrastructure.

The Gigabit Ethernet Access Module has one interface for one SFP connector. Status indicator LEDs provide information about the status of the port. See chapter *Specifications* for more information about the indicators.

In normal operation the **Power** LED is lit and the **Remove** indicator LED is off. The **Request removal** button is used when the Module should be replaced.

To insert, connect or replace the Gigabit Ethernet Access module, see chapter *Hardware Maintenance.*

4 x OC-3/STM-1 Access Module

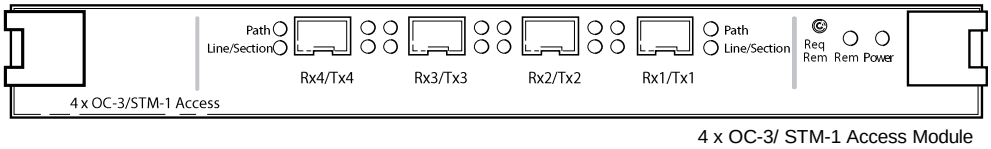


Figure 15. Front panel for 4 x OC-3/STM-1 Access Module

The module features four independent bidirectional interfaces, which use modular SFP devices.

In normal operation the **Power** LED is lit and the **Remove** indicator LED is off. The **Request removal** button is used when the Module should be replaced.

Status indicator LEDs provide information about the status of the interface. See the *Specifications* chapter for more information about the LED indicators.

To insert, connect or replace the 4 x OC-3/STM-1 Access module, see chapter *Hardware Maintenance.*

4 x DS3/E3 Trunk/Access Module

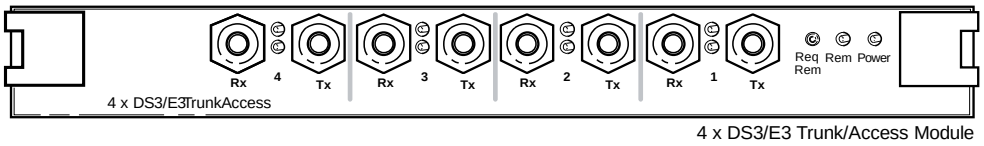


Figure 16. 4 x DS3/E3 Trunk/Access Module

The 4 x DS3/E3 Trunk/Access Module features four standard, bi-directional 75 Ohm, BNC interfaces. Each interface can utilize up to 42.5 Mbps (DS3) / 32.8 Mbps (E3) for user payload.

In normal operation the **Power** LED is lit and the **Remove** indicator LED is off. A **Request removal** button is used when the Module is to be replaced. Status indicator LEDs provide information about the status of the respective interfaces.

The DS3/E3 Trunk/Access Module has jumpers which may be used to tie the outer shell of the receive (Rx) interfaces (BNC cable) to ground. Corresponding jumpers on the transmit (Tx) interfaces are by default (and should always be) populated with jumpers. The location of all jumpers is shown below.

DC current is allowed to flow on the coaxial cable shield when Rx jumpers are installed. This improves the EMI performance of the module, but significantly increases the risk for problems arising from DC current paths from other DC grounded transmit interfaces. Without Rx jumpers (default), these DC current paths are not generated.

The cable/BNC shield is always connected to ground with a capacitor on the board.

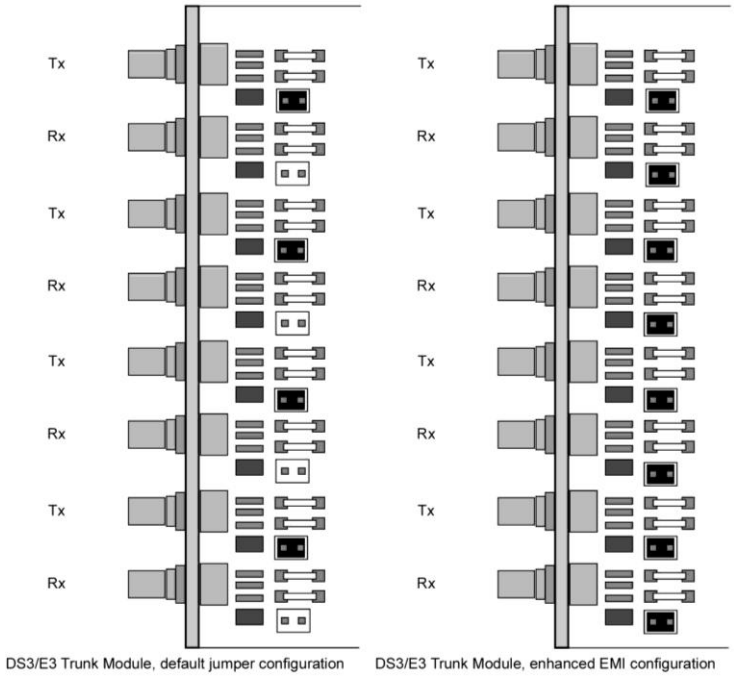
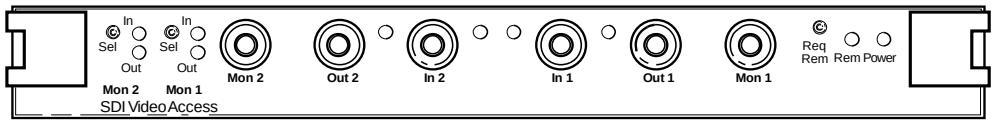


Figure 17. Jumpers settings on the DS3/E3 Trunk/Access Module.

SDI Video Access Module



SDI Video Access Module

Figure 18. SDI Video Access Module

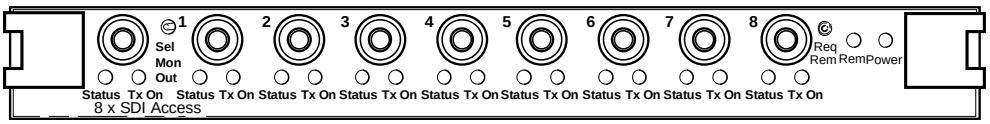
The SDI Video Access Module offers 270 Mbps SDI interface to the Nimbra node, allowing uncompressed SDI signals to be transported over the network. Physically, the signals are handled by two Transmit and two Receive SDI interfaces using 75 Ohm BNC connectors. To each Transmit/Receive interface pair there is an associated monitor interface, which can be configured via a switch button on the front panel, to copy either incoming or outgoing data from the interface pair. Status LED indicators provide information about the status of respective interfaces. See chapter *Specifications* for more information about the indicators.

In normal operation the **Power** LED is lit and the **Remove** indicator LED is off. The **Request removal** button is used when the Module should be replaced.

To insert, connect or replace the SDI Video Access module, see chapter *Hardware Maintenance.*

Note:	*In order to comply with the EMC directives, unused output ports must be terminated with a 75-ohm termination plug. (Two termination plugs are delivered together with the SDI Video Access module.)*

8 x SDI Access Module



8 x SDI Access Module

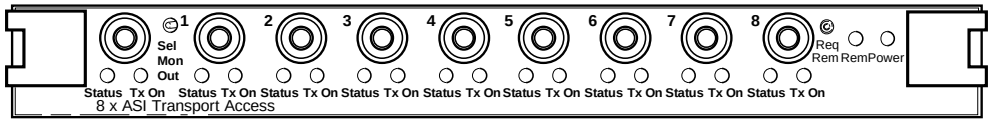
Figure 19. Front panel, 8 x SDI Access Module

The 8 x SDI Access Module provides simultaneous transport of up to eight independent SD-SDI Transport Streams configurable as IN or OUT. The board also has one monitoring interface. Any signal can be passed to the monitoring interface if so configured. The physical interface is a Female, 75 Ohm, BNC connector. Status indicator LEDs provide information about the status of the respective interface. See chapter *Specifications* for data.

In normal operation the **Power** LED is lit and the **Remove** indicator LED is off. The **Request removal** button is used when the Module should be replaced.

To insert, connect or replace the SDI Access module, see chapter *Hardware Maintenance.*

8 x ASI Transport Access Module



8 x ASI Transport Access Module

Figure 20. Front panel

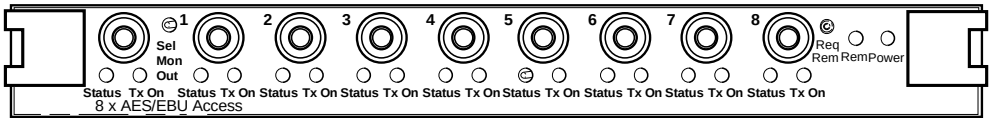
The 8 x ASI Transport Module provides simultaneous transport of up to eight independent MPEG-2 Transport Streams (TS), configurable as IN or OUT. The module has one monitoring interface, which can copy any one of the eight streams on the other interfaces. The ASI physical interface, Transmit and Receive, is Female 75 Ohm, BNC connectors. Status indicator LEDs provide information about the status of the respective interface. See chapter *Specifications* for data.

In normal operation the **Power** LED is lit and the **Remove** indicator LED is off. The **Request removal** button is used when the Module should be replaced.

To insert, connect or replace the 8 x ASI Transport module, see chapter *Hardware Maintenance.*

8 x AES/EBU Access Module

The 8 x AES/EBU Access Module provides simultaneous transport of up to eight independent AES/EBU digital audio signals at various sampling rates, configurable as either in or out interfaces. In addition, there is one monitoring interface, which can copy any of the eight active interfaces. The AES/EBU physical interface is Female 75 Ohm, BNC connectors.



AES/EBU Access Module

Figure 21. 8 x AES/EBU Access Module

In normal operation the **Power** LED is lit and the **Remove** indicator LED is off. The **Request removal** button is used when the Module should be replaced. Status indicator LEDs provide information about the status of the respective interface. See the *Specifications* chapter for more information about the indicators.

To insert, connect or replace the 8 x AES/EBU Access Module, see chapter *Hardware Maintenance*.

Installation

Unpacking and Inspection

Inspect the Nimbra 300 series node upon reception. Notify the carrier and dealer if there is damage. The packaging is recyclable; save for reuse or dispose properly.

Installation Requirements

To ensure a correct installation, read this section to determine environmental, electrical, spatial and interface requirements.

Mechanical Requirements

- Height: 88mm (3.5”) for all models except Nimbra 320, which is 66 mm high (2.6“)
- Width: 445 mm (17.5”)
- Depth: 240 mm (9.4”)

The node type is intended to be mounted in a 19-inch rack.

Caution: *To avoid exceeding the environmental requirements above and allow for enough air circulation around the node, make sure that a minimum distance of 10 cm (4”) is kept free, on left and right side of the node.*

Environmental Requirements

- Operating temperature (short term) 5 to 40 ºC (41 to 104 ºF)
  -5 to 55 ºC (23 to 131 ºF)
- Storage temperature. -40 to 70 ºC (-40 to 156 ºF)
- Relative humidity 10% to 90% (non-condensing)
- Select a clean and dust free location for the unit

Air-flow

To avoid exceeding the environmental requirements above, make sure to allow for enough air circulation around the node. Allow at least 50 mm (2”) clearance on both of the sides for air inlet and air outlet. The rubber feet may not be removed.

Note: The Nimbra 300 series node monitors the internal temperature. To avoid unnecessary warnings, check the temperature after installation (in operation) and verify that it is within operating limits.

Power Requirements

- DC Input Voltage: -48V DC with built-in redundancy; 115/230V AC with external converter

  -48V DC nominal
  -60V DC maximum
  -40V DC minimum
- DC Input Current: 2.0 A at -48V DC
- Power consumption: 90 W maximum

The enclosed power cable type **NPA0028-0030** should be used to connect the power. The cable is shown in Figure 22. Cable ends are prepared for connector to a terminal block.

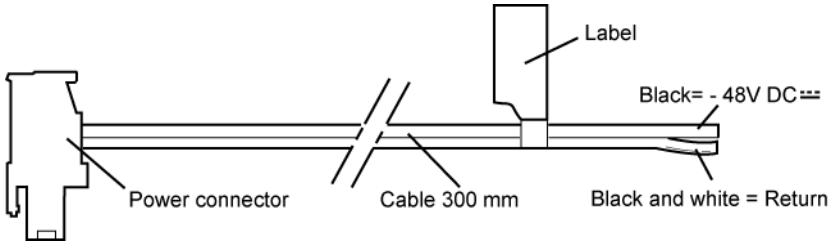


Figure 22. The power supply cable type NPA0028-0030

Caution: *Both power cords must be removed to completely de-energize the unit.*

AC Input Voltage: Requires optional 115/230VAC, 50/60 Hz converter

Installation procedure

This procedure describes the various steps needed to mount, power and ground a Nimbra 300 node. The steps involved are:

1. Mount the appropriate external fan filter to the Nimbra 300 unit.
2. Mount the Nimbra 300 node in a 19" rack
3. Attach the loose end of the ground cable to an appropriate grounding point. Attach the power supply cables to the node. Ensure that the cables are secured (fused) before reaching the node.
4. Attach the protective cover plate

The node is now ready for operation. Please proceed with software installation described in chapter User Interface.

Caution: *Make sure all necessary ESD precautions are made during installation. Failure on this point may harm the equipment and cause malfunction immediately or at a later time.*

External fan filter

Attach the external fan filter to the chassis of the Nimbra 300 series node. Make sure you have a fan filter designed for the particular unit (Nimbra 320 has a more narrow fan filter). Align the two metallic lips protruding from the fan filter frame with the two outmost ventilation holes on the Nimbra 300, the two holes closest to and furthest from the node front. See illustration below for guidance.

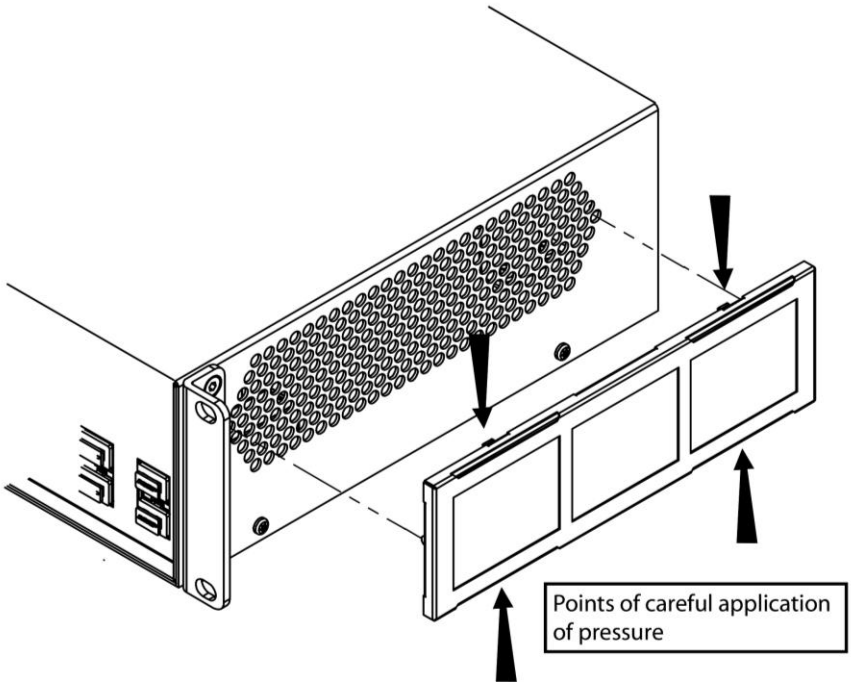


Figure 23. Mounting of external fan filter

Press on the top and bottom sides of the frame to move the four metallic lids protruding from the top and bottom of the frame slightly inwards (towards the center of the frame. Now, snap the frame with filter to the Nimbra 300 node.

Caution: 	*It's recommended to inspect the air filter at least quarterly and to clean the filter every six months.* *Replace the air filter every two to three years.* *Avoid cleaning the air filter with harsh cleaning agents or solvents.*

Rack Mounting

The Nimbra 300 node is intended for rack mounting in a regular 19 inch rack. With the fan filter mounted, attach the node to the rack with proper screws.

Powering

Note: 	*For instructions on how to insert and connect the interface modules, see chapter Hardware Maintenance and the section describing the particular module.*

Protective device

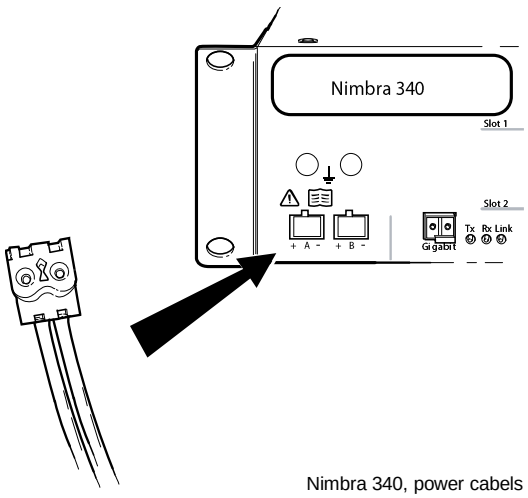
There must be a protective device or disconnect device in front of the unit, i.e. between the power source and the node. This device is needed to protect the power source.

A readily accessible disconnect device shall be incorporated in the building installation wiring. Use AWG12-18 UL and/or CSA approved wire together with fuse or circuit breaker rated max 4A slow-blow.

Power supply cable

Connect the power cable(s) to the DC power input(s) according to the requirements in section, *Installation requirement.*

As soon as power is supplied to the node it should start. After a few seconds the **Power** Indicator LEDs on all installed modules should be lit and all **Remove** indicator LEDs should be off



Nimbra 340, power cabels

Figure 24. Placement and front layout of the power inputs

Grounding and Protective cover plate

The Nimbra 300 series is designed for installation in "Network Telecommunication Facilities". Using CBN (Common Bonding Network – as defined in ITU-T Rec. K.27) as grounding procedure is recommended.

There are two socket grounding points on the chassis, both located on the left side of the front of the chassis (above the power inlets).

Good contact to the metallic frame of the rack must be ensured. Paint must be removed around the grounding points if a painted rack is used. Specially designed washers should be used, together with rack mounting screws, in order to penetrate the isolating surface and create a good metallic contact point.

Use one or both socket grounding points on the Nimbra 300 series node to connect it to the rack grounding point, using an adequate grounding cable.

If no rack is used, make certain that the Nimbra 300 unit (and the power source) is properly grounded using the socket grounding points.

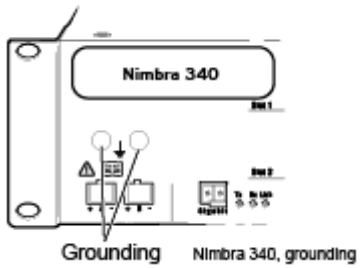


Figure 25. Placement and labeling of grounding sockets

A protective cover plate should be mounted at the same time as the grounding cable shoe. Nimbra 300 contain two grounding sockets, which are internally merged. One or two of the connecting points of the node may be used.

It is suggested that, from the outside in, the order of items connected to the grounding socket are: screw – grounding cable shoe – washer – protective cover plate – grounding socket (in node).

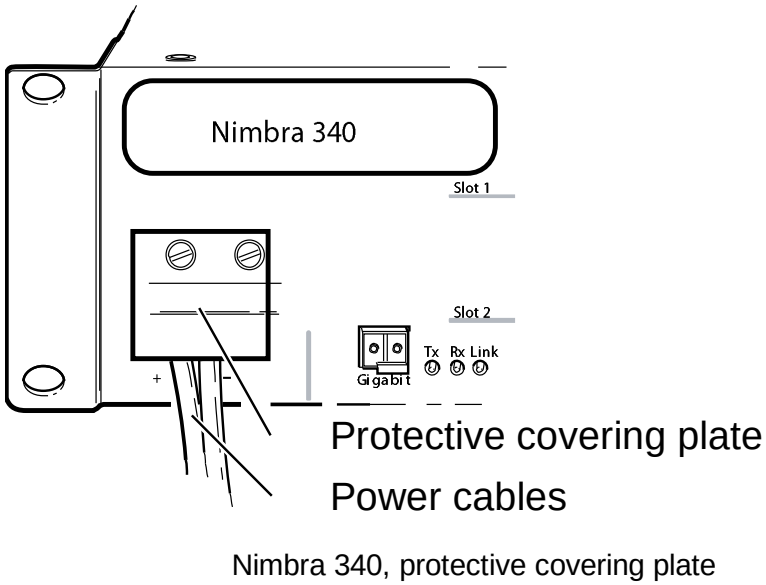


Figure 26. Placement of the protective cover plate

Note: 	*It is essential that the chassis of the Nimbra 300 Series is properly grounded and that all external equipment connected to the Nimbra 300 node is connected to the common grounding network.*

Connecting Optical Fibers to the SFP Module

Caution: 	***Class 1 Laser Product.*** ***Complies with 21 CFR 1040.10 and 1040.11*** *The optical ports must be terminated with an optical connector or with a dust plug.* *The use of optical instruments with this product will increase eye hazard.*

Note: 	*Avoid bending the optical cables more than the minimum bend radius of **35 mm**. A smaller radius could cause inadequate signal levels or damage the cables.* *Handle only one cable at a time. Leave the protecting cap on all connectors until immediately before connecting the cable.* *Clean the cable connector using a standard fiber connector-cleaning tool.*

User Interface

Overview

To handle configuration and supervision of the Nimbra 300 Series node, software is implemented that provides the necessary functionality for element management.

Among the functions are:

- Initial configuration
- Software diagnostics and upgrade
- Hardware diagnostics and replacement

For more detailed information on how to operate the node, see *Element Manager Users Manual* for the correct version of system release software (GX-version)

Connecting to a Nimbra 300 series node

Communication with the Nimbra 300 series node is done either locally through a terminal connected to the serial or Ethernet control interface of the control module or, when the node is in operation, remotely over the network.

Depending on the system release software version running on the Nimbra 300, there may or may not be a fixed IP address defined. There is a set IP address (192.168.125.125) on all Nimbra 300 nodes running GX4.7 or later software.

Local Connection, Serial Control Port

If you use a VT100 terminal emulator on a PC, a serial adapter is provided to adapt the serial connection to the DSUB-9 connector of the PS. Connect a regular (not crossover) twisted-pair cable between the Nimbra 300 and the adapter. In case you lack a serial DSUB-9 port on your PC, a USB/DSUB-9 converter or other device is needed.

The serial interface is used for initial configuration and software installation only.

Connect a terminal type VT100 to the control module with properties as follows:

- Interface: RS232
- Connector: RJ45 connector. Use the RJ45-RS232 adapter (NPA0006-0001) on you r PC and a regular twisted pair cable
- Port speed: 38400 bps
- Data bits: 8
- Parity: No
- Stop bit: One
- Flow control: No

Local Connection, Ethernet Control Port

Connect a TCP/IP network or PC to the Ethernet Control Port of the node. Observe that if the node is directly connected to a PC or laptop computer, the connecting cable must be a crossover cable. If the node is connected to an Ethernet switch, a straight (regular) twisted-pair cable should be used.

- Interface: 100 Base-Tx
- Connector: RJ45
- Cable Direct connection to PC, a crossover twisted-pair cable is needed. Connection to local area network/Ethernet switch, a straight (regular) twisted-pair cable is needed.

The status of the port is indicated by two LEDs, according to the table below:

100 Mb mode LED:	Amber = 100 Mbps mode	Off = 10 Mbps mode
Link/Activity LED:	Green = Link detected Flashing green = Activity	Off = No link

Required Software

- **Terminal software:** To use the serial connection, a standard VT100 terminal emulation software is needed, like Tera Term.

- **Web interface:** Each Nimbra 300 node has an http server running. To connect to it, have a PC with full IP connectivity to the node and connect the PC to the Ethernet management interface of the node. The PC must have a working web browser

Initial Software Installation

Overview

The Nimbra 300 series needs only a few user settings to be fully functional. The necessary user settings from the serial port are IP-address, subnet mask and gateway. In addition, to make the node fully operational in a DTM network, the DTM address has to be set and the node has to be rebooted. This operation can be made from the web interface, but for convenience the CLI description is included in this document.

If running on a System Release Software version of GX4.7 or later, the node have a pre-installed minimal configuration (Factory Default) with a fixed IP address (192.168.125.125). If running on an earlier version, the initial IP address has to be set. Both cases are described in this document.

If a configuration file is provided or an old (backup) configuration file from a replaced node should be used, it should be installed according to the section *Loading the Configuration Settings*.

Required Information

Note: 	*To minimize any downtime of the system, before starting any configuration operation, make sure to have at hand all the information that the operation requires, such as addresses of DTM nodes and specific interfaces within the nodes.*

For the initial software installation the following data for the particular Nimbra 300 series node are required:

- IP address
- Subnet mask
- IP address of Default gateway

If the node is running System Release Software version GX4.7 or later, the default settings are:

IP address:	192.168.125.125
Subnet mask	255.255.255.0
IP address of Default Gateway	Not defined in Factory Default Configuration

Setting Initial Parameters for pre-GX4.7 software

Serial port settings

- Port speed: 38400 bps
- Data bits: 8
- Parity: No
- Stop bit: One
- Flow control: No

Setting the IP Address and Netmask

Connect to the serial port of the Nimbra 300 series node. Log on to the node.

The default user name and default password are “root” and “neti” respectively.

1. List current IP registry. This shows the actual status of the node. An example without predefined IP configuration is shown.

```
resedit get –r -n ipconf.if.0
.ipconf.if.0
.ipconf.if.0.name       "eth0"
.ipconf.if.0.address
.ipconf.if.0.media
.ipconf.if.0.media.current      "autoselect"
.ipconf.if.0.media.active       "autoselect"
.ipconf.if.0.mac        "00:10:5b:00:00:1b"
.ipconf.if.0.mtu        1500
```

2. Create a new address structure

```
resedit create -n ipconf.if.0.address
```

3. Set the IP address, where `x.x.x.x` is the IP address

```
resedit set –n ipconf.if.0.address.0.inet –v x.x.x.x
```

4. Set the new IP subnet mask, where `y.y.y.y` is the subnet mask.

```
resedit set –n ipconf.if.0.address.0.netmask –v y.y.y.y
```

Gateway Setup

If a router is present in the same IP subnet as the Nimbra 300 series node, routing information must be entered.

Start with creating a new routing entry:

```
resedit create -n ipconf.routes
```

Then set the routing parameters, where `z.z.z.z` is the gateway. Default is the default route, i.e. the IP address to which all packets are routed except the packets with a specific route defined..

```
resedit set -n ipconf.routes.0.dest -v default
resedit set -n ipconf.routes.0.gw -v zzz.zzz.zzz.zzz
resedit set -n ipconf.routes.0.mask -v 0.0.0.0
```

Check the gateway registry:

```
resedit get –r -n ipconf.routes.0
.ipconf.routes.0
.ipconf.routes.0.dest   "default"
.ipconf.routes.0.gw     "zzz.zzz.zzz.zzz"
.ipconf.routes.0.mask   "0.0.0.0"
.ipconf.routes.0.modifiers      "none"
```

Setting the DTM Address

The DTM address can be configured by the following commands:

Start with creating a new DTM address entry:

```
resedit create -n dtm.addrTable
```

Set the DTM address. The structure should be **zz.zz.zz.zz.zz.zz.zz.zz**

```
resedit set -n dtm.addrTable.1.address -v
zz.zz.zz.zz.zz.zz.zz.zz
```

Set the alias for DTM address to false. This means that the DTM address is primary.

```
resedit set -n dtm.addrTable.1.isAlias -v false
```

Now, save (backup) the configuration and restart the node.

Backup the Registry Setting

The new configuration must be saved by using the backup command. If it is not, it will be lost during the next restart. The save configuration (backup) command is:

```
registry backup -n new -c "IP"
```

The new configuration is saved on the node with name **new** and comment `"IP"`.

Restart of the node

Restart the Nimbra 300 series node to make the new configuration active. (Make all changes in the registry before rebooting.)

```
reboot
```

Now, with an IP network up and running, the rest of the parameters for the network can be entered using the web-interface. The log-in procedure is previously described (Default user/password combination is root/neti) and a more detailed description of the web-interface is found in the *Element Manager User's Manual*

Loading the Configuration Settings

Note: 	The following text (loading configuration settings and remote software upgrade) can set-up parameters not valid for this unit.

When the IP connection is up and running, a pre-prepared configuration file can be uploaded to the node with FTP. The file needs then to be installed and activated.

1. Start the FTP client and enter the IP address and log-in details.
2. When connected to the node, go to directory `/tmp` (`cd /tmp`) and upload the configuration file to the temporary directory.
3. Exit the FTP-program and connect to the Nimbra 300 series node with telnet.
4. When logged in anew, enter the following command and parameters at the prompt:

   `registry install –n confname -f conffile`

   The `confname` is the name of the configuration used by the node. It is defined by the command. The **`conffile`** is the configuration file name including the path on the ftp server. The file name needs to match the file name of the file uploaded to the node in step #2 of this process.

5. Enter command:

   `registry list`

The new configuration should be listed with index zero.

```
registry list
0 newconfig
1 earlier config
2 even earlier config
3 first config
```

6. Restart the Nimbra 300 series node to make the new configuration active.

Special considerations for GX4.7 and higher

As previously stated, nodes running GX4.7 or later system release software have a preset IP address (192.168.125.125) and netmask. In order to configure such nodes, the serial port can be used to set a different IP address/netmask and gateway (if needed). The node can

then be attached to an Ethernet switch and the rest of the configuration can be made from the web interface (see Element Manager User's Guide) for details.

Alternatively, all necessary configurations can be made from CLI (setting of DTM address, saving of the configuration and restart of the node) and the node connected to the data management system from the Ethernet port.

The difference to the previous description is that the two variables

ipconf.if.0.address.inet

ipconf.if.0.address.netmask

are already defined variables and have the default values.

All that now must be done is to set these variables to the customer defined values.

In the example, the IP address is reset to 192.168.234.3

1. List the registry for `ipconf.if.0`.

```
resedit get –r -n ipconf.if.0
.ipconf.if.0
.ipconf.if.0.name       "eth0"
.ipconf.if.0.address
.ipconf.if.0.address.0
.ipconf.if.0.address.inet       ”192.168.125.125”
.ipconf.if.0.address.netmask    ”255.255.255.0”
.ipconf.if.0.media
.ipconf.if.0.media.current      "autoselect"
.ipconf.if.0.media.active       "autoselect"
.ipconf.if.0.mac        "00:10:5b:00:00:1b"
.ipconf.if.0.mtu        1500
```

2. Set the IP address to the customer specific value.

```
resedit set –n ipconf.if.0.address.0.inet –v x.x.x.x
```

As the netmask is by default 255.255.255.0, normally it does not have to be set. In case the netmask should be set (e.g 255.255.254.0), it is done with a simple CLI command.

```
resedit set –n ipconf.if.0.address.0.netmask –v 255.255.254.0
```

Save the configuration and restart the node. The Ethernet port is now configured and should be accessible with a properly configured IP infrastructure.

Hardware Maintenance

General

All network interface modules in the node can be replaced without powering down the entire node. A push button touch on the module front (**Request removal** button) or a software change (setting admin status of the module to down) indicate that the module is going to be replaced. This is confirmed on the front of the module with a lit LED (Rem).

The replacement can be made without any reconfiguration of the node, as long as the replacement module is of the same type as the module to be replaced. Note that all communications of which the specific module is part of will be disabled until the module is replaced and started, whereas other traffic to and from the node is unaffected.

Removing/Replacing Plug-in Modules physically

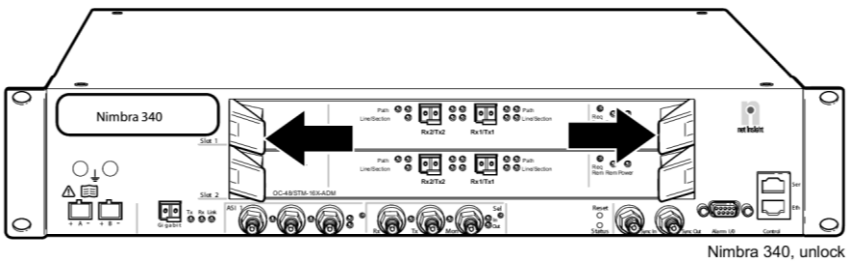
Disconnecting a Network Interface Module

Note:	*All traffic to and from the module to be removed is disabled when the module is replaced. Ensure to prepare well for the maintenance operation in order to keep the interruption minimal*

1. Press the **Request removal** button on the module to be replaced. In a short while, the **Power** LED is turned off and the **Remove** LED is turned on.

Caution:	*The modules are sensitive to ESD and static discharges. Make sure to use ESD precautions to avoid damaging the modules.*

2. Remove the screws at the handles of the module. Push the locks outward to unlock the module from the chassis, see Figure 27. (Use a Torx T8 screwdriver.)



Nimbra 340, unlock

Figure 27. Opening the module locks

3. Retract the module straight out (Figure 28). Place the module in an ESD protective package immediately.

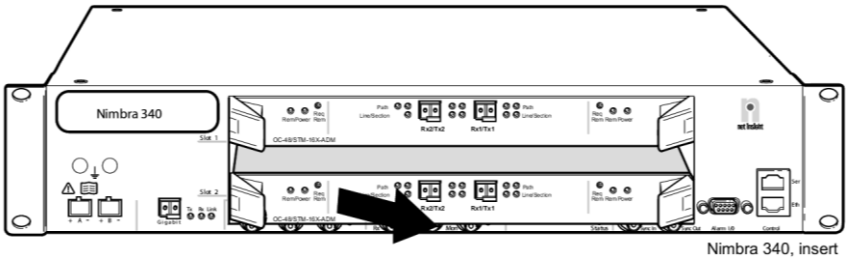


Figure 28. Retracting the module

Connecting a Network Interface Module

1. Make sure you are properly grounded before proceeding (anti-static bracelet, anti-static shoes or other means)
2. Grab the module by the handles and insert the module in the guides of the node chassis, see Figure 29. Make sure to keep the module vertical, otherwise the module might stick at the upper or lower end of the module.

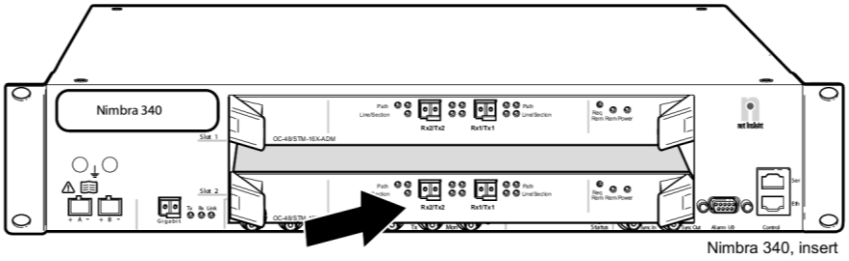


Figure 29. Inserting the module

3. When the module is fully inserted, push the locks inward, according to Figure 30, and tighten the screws to lock the module to the chassis.

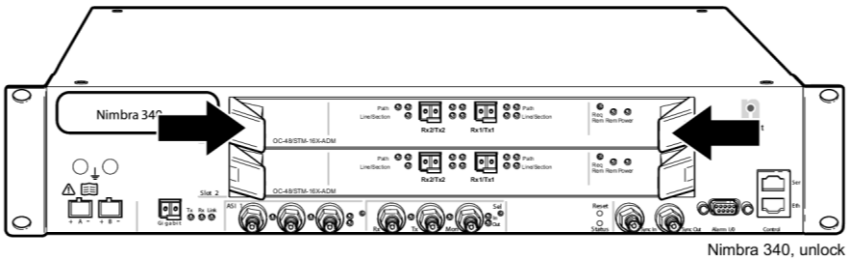


Figure 30. Locking the module in place

Specifications

Product numbers, Nimbra 300 Series

Product number	Description
NPQ0022-DW01	Nimbra 310 Base Unit
NPQ0018-DW01	Nimbra 320 Base Unit
NPQ0011-DW01	Nimbra 340 Base Unit
NPQ0011-DWH1	Nimbra 340-HD Base Unit
NPQ0013-DW01	Nimbra 360 Base Unit
NPQ0013-DWG1	Nimbra 360 LPN Base Unit
NPQ0015-DW01	Nimbra 380 Base Unit

Common Nimbra 300 Series features

Physical Dimensions

Height	88 mm (3.5”), except Nimbra 310/320 (66 mm or 2.6”)
Width	445 mm (17.5”)
Depth	240 mm (9.4”)
Rack mounting	19”
Weight	5.5 kg (12 lbs.), except Nimbra 310/320 (5.3 kg/12 lbs.)
Weight, with packaging	7.5 kg (17 lbs.), except Nimbra 310/320 (7.3 kg/17 lbs.)

Environmental

Operating temperature	5 to 40 ºC (41 to 104 ºF)
(short term)	-5 to 55 ºC (23 to 131 ºF)
Storage temperature	-40 to 70ºC (-40 to 156 ºF)
Relative humidity	10% to 90% (non-condensing)
Other:	Select a clean and dust free location for the unit

Power

DC input voltage	-48V DC nominal (-60V DC max, -40V DC min)
Power dissipation	Max. 90 W

Ports, buttons and plug-in slots

Power Supply

Type: 2-pole

Number of inputs: Two for redundancy, labeled A and B. The node is operational on either power feed.

Pin configuration:

Pin	Description
1	Return
2	-48V DC

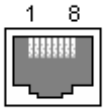
LED	State	Description
Status	Green	The node is in its start-up phase
	Off	The node is operational (or powered off)

Caution: *Both power cords must be removed to completely de-energize the unit*

Serial Control Port

Type: RS232 interface, RJ-45 female connector

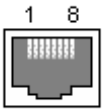
Pin	Description
1	RTS
2	DSR
3	RXD
4	DTR
5	TXD
6	GND
7	DTR
8	CTS



Ethernet Control Port

Type: 100 Base-Tx, RJ-45 female

Pin	Description
1	Transmit (positive)
2	Transmit (negative)
3	Receive (positive)
4	NC
5	NC
6	Receive (negative)
7	NC
8	NC



Plug-in slots

Two horizontally slots for plug-in modules, except for Nimbra 310/320 which have one slot

Push button

Reset: Hardware reset of the node

Common ports for Nimbra 340, 340-HD and 360

Gigabit Ethernet Access Port

Type: 1000Base-SX/LX/LX70 SFP or 1000Base-T required

Connectors: LC connector (optical) or RJ-45 (electrical)

Laser classifications: Class 1

LED	State	Description
Link	Green	The link is available
	Flashing green	Port activity
Rx	Flashing green	Port activity
	Off	No port activity
Tx	Flashing green	Port activity
	Off	No port activity

Common ports for Nimbra 340, 340-HD and 380

Alarm

Type: Female, 9 pole D-sub

Pin configuration: Pin #5 is a configurable for alarm export

Pin #2-4 and pin #6-8 are configurable for alarm import

Common ports for Nimbra 340 and 340-HD

Sync In/Sync Out

Type: 75 Ohm, BNC

Ports for Nimbra 340

ASI Transport Ports

Number of ports: 6 (2 In, 2 Out and 2 monitoring ports)

Connectors: 75 ohm, BNC (female)

LED indicator	State	Description
In (Rx)	off	disabled
	green	receiving, data OK
	flashing green	DTM loopback mode
	red	loss of video signal
	flashing red	loss of packet alignment
Out (Tx)	off	disabled
	green	transmitting, data OK
	flashing green	line loopback mode
	red	loss of DTM data
	flashing red	buffer overflow/alarm indication signal
Monitor – In	off	Rx stream not active
	green	monitor port in Rx stream mode
Monitor – Out	off	Tx stream not active
	green	monitor port in Tx stream mode

Ports for Nimbra 340-HD

HD-SDI Ports (Nimbra 340-HD)

Number of ports: 6 (2 In, 2 Out and 2 monitoring ports)

Connectors: 75 ohm, BNC (female)

LED indicator	State	Description
In (Rx)	off	disabled
	green	receiving, data OK
	flashing green	DTM loopback mode
	red	loss of signal (LOS)
	flashing red	receive error (not LOS)
Out (Tx)	off	disabled
	green	transmitting, data OK
	flashing green	line loopback mode
	red	TX buffer underflow
	flashing red	TX buffer overflow/alarm indication signal
Monitor – In	off	Rx stream not active
	green	monitor port in Rx stream mode
Monitor – Out	off	Tx stream not active
	green	monitor port in Tx stream mode

Common Ports for Nimbra 310, 320, 360 and 380

Trunk ports

The trunk ports must be equipped with SFPs, which are not delivered with the product but must be ordered separately. The possible data rates are OC-3/STM-1, OC-12/STM-4, OC-48/STM-16 and IP/Ethernet (10/100/1000 Mbps). If OC-48/STM-16 or IP/Ethernet rates are used, only two ports can be used. IP/Ethernet trunk rates require hardware version B of Nimbra 360, Nimbra 380 or Nimbra 320. Nimbra 310 and 320 has two physical ports. Nimbra 310 has only one port enabled by default. Nimbra 360 and Nimbra 380 each has four physical ports.

Connectors:	LC connectors or electrical (OC-3/STM-1, coax; IP/Ethernet, RJ-45)
Laser classifications:	Class 1

LED	Status	Description
Tx	Off	Port disabled
	Green	Operating
	Flashing Green	Line loop back enabled
	Flashing Red	Tx-Fault
	Red	Not used/Remote Defect Indication possible use
Rx	Off	Port disabled
	Green	Operating
	Flashing Green	Not used/DTM loop-back possible future use
	Flashing Red	Loss Of Signal
	Red	Trail Signal Fail (TSF) and “not LOS”

Time Synchronization Interface

Connectors: 50 Ohm, BNC

Configurable interfaces: Two ports per interface (TSI 1 and TSI 2), Nimbra 310/320 only has the TSI-1 interface.

Interface description: One PPS port and One Sync port per interface, individually configurable. TSI-1 is available for in- and output, TSI-2 only for output. Nimbra 320 only has the TSI-1 interface.

PPS port, configuration #	Description
1	Time Transfer Input Interface, 1 PPS (Pulse per second), only supported by TSI-1
2	Time Transfer Output Interface, 1 PPS (Pulse per second)
3	Sync Output Interface, 2.048 MHz
4	Sync Output Interface, 1.544 MHz
5	Sync Output Interface, 8 kHz
6	Not connected

Sync port, configuration #	Description
1	Time Transfer Input Interface, 10 MHz, only supported by TSI-1
2	Time Transfer Output Interface, 10 MHz
3	Sync Input Interface, 2.048 MHz
4	Sync Input Interface, 1.544 MHz
5	Sync Input Interface, 8 kHz
6	Sync Input Interface, 10 MHz

LED indicators: Two indicators per port (‘Status’ and ‘Tx On’) that are interpreted together according to the table below.

LED ‘Tx On’	LED ‘Status’	Description
Green	Off	Tx disabled
Green	Green	Tx enabled and transmitting error free
Green	Red	Unable to transmit requested signal
Off	Off	Rx disabled
Off	Green	Receiving error free
Off	Flashing red	Error and not Loss Of Signal
Off	Red	Loss Of Signal

Ports for Nimbra 310, 320 and Nimbra 380

Access interfaces: Eight Electrical RJ-45 with 10/100/1000 Mbps, auto-negotiated speed

LED indicators	State	Description
L/A (Line/activity) for eight ports	Off	No port activity
L/A	Green	Operating, i.e. link is up
L/A	Blinking green	Operating with traffic
L/A	Red	Not used/RDI Indication possible use
Sp (Speed)	Off	Operating at 10 Mb/s
Sp (Speed)	Amber	Operating at 100 Mb/s
Sp (Speed)	Green	Operating at 1000 Mb/s
Sp (Speed)	Flashing red	Loss Of Signal (LOS)
Sp (Speed)	Red	Trail Signal Fail and not LOS

Common 300 series accessories

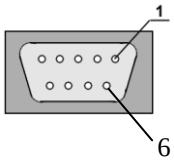
Serial Control Port Adapter, NPA0006-0001

Type: RJ45 female to 9-pole D-sub female.

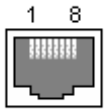
Pin configuration: According to the table and figures below.

Connection of the adapter: The adapter fits the PC. Connect the adapter to the Nimbra 300 node with a straight Ethernet cable.

Pin, D-9 female	Pin, RJ-45 female	Signal (on RJ-45)
1	4	DCD (Carrier Detect)
2	5	RXD (Receive Data)
3	3	TXD (Transmit Data)
4	2	DTR (Data Terminal Ready)
5	6	GND (Ground)
6	7	DSR (Data Set Ready)
7	1	RTS (Request To Send)
8	8	CTS (Clear To Send)
9	-	NC (Not Connected)



D-sub 9



RJ-45

Battery, NEB0003-2032

Used for RTC (real time clock) when the power is gone.

Type: Lithium coin battery

Panasonic 2032

Dimension: 20 x 3.2 mm

Output: 3V

Input: 190 mAh

Note: *The battery should be disposed of properly, according to relevant environmental regulations.*

Power Cable kit, NPA0028-0030

Length: 3000 mm

Current rating: 5 A maximum

Common buttons and LEDs

Button/LED	State	Description
Button		
Req rem		Request removal button. Pressing it initiates the module removal process.
LED		
Rem	Off	No removal request received
	Green flashing	Removal request given to node. Processing of the request is initiated but not finished or the unit needs to be replaced.
	Green	Removal request is processed and the plug-in unit can safely be removed.
Power	Green	The plug-in module is powered by the backplane

LEDs for the Ethernet Control Port

LED indicators	State	Description
L/A (Line/activity)	Off	No port activity
L/A	Green	Operating, i.e. link is up
L/A	Blinking green	Operating with traffic
Sp (Speed)	Off	Operating at 10 Mb/s
Sp (Speed)	Amber	Operating at 100 Mb/s

Common Replaceable Trunk Modules

OC-48/STM-16 X-ADM Module

Module type: Trunk module **NPS0022-3S31**

Data speed: 2488 Mbps

Number of ports: 2

Wavelength: 1310 nm or 1550 nm depending on type of SFP

LED indicator	State	Description
Line/Section Tx	off	Port disabled
	red flashing	Error (sending MS-AIS or TX-fault indication from SFP)
	red	RDF received (both types)
	green flashing	Line loop back
	green	Operating
Line/Section Rx	off	Port disabled
	red flashing	Error (LOS, LOF, MS-AIS or DEG)
	red	TSF and “not LOS”
	green flashing	DTM loop back
	green	Operating
Path Tx	off	No DTM trunk enabled on the interface
	green	At least one DTM trunk enabled on the interface
Path Rx	off	No DTM trunk enabled on the interface or TSF set for at least on trunk
	green	At least one DTM trunk enabled on the interface and no TSF set for any trunk on the interface

2 x OC-12/STM-4 Trunk Module

Module type: Trunk module **NPS0019-3001**

Data speed: 622 Mbps

Number of ports: 2

Wavelength: 1310 nm or 1550 nm depending on type of SFP

LED indicator	State	Description
Line/Section Tx	off	Port disabled
	red flashing	Error (sending MS-AIS or TX-fault indication from SFP)
	red	RDF received (both types)
	green flashing	Line loop back
	green	Operating
Line/Section Rx	off	Port disabled
	red flashing	Error (LOS, LOF, MS-AIS or DEG)
	red	TSF and “not LOS”
	green flashing	DTM loop back
	green	Operating
Path Tx	off	No DTM trunk enabled on the interface
	green	At least one DTM trunk enabled on the interface
Path Rx	off	No DTM trunk enabled on the interface or TSF set for at least on trunk
	green	At least one DTM trunk enabled on the interface and no TSF set for any trunk on the interface

4 x OC-3/STM-1 Trunk Module

Module type: Trunk module **NPS0009-3S31**

Data speed: 155 Mbps

Wavelength: 1310 nm

Launched power: Min: -5 dBm, Max: 0 dBm

Receiver sensitivity: Min: -34 dBm, Max: -2 dBm

LED indicator	State	Description
Line/Section Tx:	off:	port disabled
	red flashing:	RDI, both types
	red:	sending AIS
	green flashing:	DTM payload loop back
	green:	operating
Line/Section Rx:	off:	port disabled
	red flashing:	LOS, SF, LOFS
	red:	receiving AIS, both types, SD
	green flashing:	line or payload loop back
	green:	Operating
Path Tx:	off:	port disabled
	green:	operating
Path Rx:	off:	TSF or port disabled
	green:	operating

3 x IP/Ethernet Trunk Module

Module type:	Trunk module **NPS0053-3001**
Data speed:	Configurable, up to 1 Gbps
SFP	1000Base-T
	1000Base-SX
	1000Base-LX
	1000Base-ZX

LED indicator	State	Description
Line/Section Tx:	off:	port disabled
	red flashing:	RDI, both types
	red:	sending AIS
	green flashing:	DTM payload loop back
	green:	operating
Line/Section Rx:	off:	port disabled
	red flashing:	LOS, SF, LOFS
	red:	receiving AIS, both types, SD
	green flashing:	line or payload loop back
	green:	Operating
Path Tx:	off:	port disabled
	green:	operating
Path Rx:	off:	TSF or port disabled
	green:	operating

4 x DS3/E3 Trunk/Access Module

Module type:	Trunk or access module **NPS0027-3001**
Firmware:	**NPM0027-TR01** (DS3/E3 Trunk FW option for Nimbra One/300)
	NPM0027-AC01 (DS3/E3 Access FW option for Nimbra One/300)
	One of the two firmware options must be included with the module.
Number of ports:	8 (4 Rx and 4 Tx)
Connectors:	75 ohm, BNC (female)
Data speed:	Up to 42.5 Mbps (DS3) / 32.8 Mbps (E3) Mbps Ports can be trunked together; it is possible to carry up to 170 Mbps (DS3) / 131 Mbps (E3) of payload to and from the board.
Jumpers:	Eight (one per port), by default only the Tx side is populated. Populating the Rx side improves EMI performance, but may induce DC currents.
Mode	The module can be used in trunk or access mode depending on firmware.

LED indicator	State	Description
Tx:	off:	port disabled
	red flashing:	TX-fault
	red:	N/A
	green flashing:	Line loop-back enabled
	green:	operating
Rx:	off:	port disabled
	red flashing:	LOS
	red:	TSF and not LOS
	green flashing:	N/A
	green:	Operating

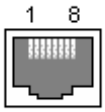
E1 Access Module

Module type: Access module, **NPS0029-3001**

Number of ports: 8 ports

Connectors: RJ-48, 120 Ω, female
Pin configuration according to the table and figure below

Pin	Description
1	RX
2	RX (hot)
3	NC
4	TX
5	TX (hot)
6	NC
7	NC
8	NC



LED	State	Description
Tx (transmit)	off	disabled
	green	enabled, transmitting valid signal
	red	enabled, far end attempts to re-synchronize signal
Rx (receive)	off	disabled
	green	enabled, receiving valid data
	red	enabled, port attempts to re-synchronize signal

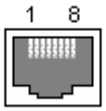
T1 Access Module

Module type: Access module, **NPS0030-3001**

Number of ports: 8 ports

Connectors: RJ-48, 100 ohm, female
Pin configuration according to the table and figure below

Pin	Description
1	RX
2	RX (hot)
3	NC
4	TX
5	TX (hot)
6	NC
7	NC
8	NC



LED	State	Description
Tx (transmit)	off	disabled
	green	enabled, transmitting valid signal
	red	enabled, far end attempts to re-synchronize signal
Rx (receive)	off	disabled
	green	enabled, receiving valid data
	red	enabled, port attempts to re-synchronize signal

Fast Ethernet Access Module

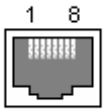
Module type: Access module **NPS0017-3001**

Number of ports: 8 ports

Type: 10BASE-T / 100BASE-TX

Connectors: RJ-45, female,
Pin configuration according to the table and figure below

Pin	Description
1	Receive (positive)
2	Receive (negative)
3	Transmit (positive)
4	NC
5	NC
6	Transmit (negative)
7	NC
8	NC



LED	State	Description
Link/Activity	On	Link is up
	Flashing	Port activity
100 Mbps	On	100 Mbps mode
	Off	Not 100 Mbps mode

Gigabit Ethernet Access Module

Module type: Access module **NPS0010-3001**

Number of ports: One

Type: 1000BASE-SX/LX/LX70, 1000Base-T

Connectors: LC connectors, RJ-45

LED indicators: Three indicators per port:

LED indicator	State	Description
Link	Green	Link is up
	Flashing green	Port activity
Rx	Flashing green	Port activity
Tx	Flashing green	Port activity

4 x OC-3/STM-1 Access Module

Module type:	Access module, **NPS0020-3S31** OC-3/STM-1 Access Module (S3), 4port
Number of ports:	4
Connectors:	LC connectors
Data rate:	155 Mbps

LED	State	Description
Status Tx	Off	SFP transceiver removed or wrong type of SFP
	Green	Operating
	Flashing green	Line Loop-back
	Flashing red	Fault
Status Rx	Off	SFP transceiver removed or wrong type of SFP
	Green	Operating
	Flashing green	DTM Loop-back
	Flashing red	Fault
Mode Tx	Off	AU-4
	Green	3xAU-3
Mode Rx	Off	AU-4
	Green	3xAU-3

SDI Video Access Module

Module type:	Access module, **NPS0005-3001**
Number of ports:	6 (2 Rx, 2 Tx, 2 monitoring)
Connectors:	75 Ohm, BNC (female)
Data rate:	270 Mbps

LED indicator	State	Description
In (Rx)	off	disabled
	green	receiving, data OK
	flashing green	DTM loopback mode
	red	data not OK, loss of signal
	flashing red	data not OK, loss of frame pulse
Out (Tx)	off	disabled
	green	transmitting, data OK
	flashing green	line loopback mode
	red	data not OK, data underflow
	flashing red	data not OK, data overflow or alarm indication signal
Monitor - In	off	Rx stream not active
	green	monitor port in Rx stream mode
Monitor - Out	off	Tx stream not active
	green	monitor port in Tx stream mode

8 x SDI Access Module

Module type:	Access module, **NPS0048-3001**
Number of ports:	8 x SD/SDI In or Out, individually configurable plus one monitor port
Connectors:	75 Ohm, BNC (female)
Bandwidth:	270 Mbps

LED	State	Description
In (Rx)	off	disabled
	green	receiving, data OK
	flashing green	DTM loopback mode
	red	loss of video signal
	flashing red	loss of packet alignment
Out (Tx)	off	disabled
	green	transmitting, data OK
	flashing green	line loopback mode
	red	loss of DTM data
	flashing red	buffer overflow/alarm indication signal
Monitor - In	off	Rx stream not active
	green	monitor port in Rx stream mode
Monitor - Out	off	Tx stream not active
	green	monitor port in Tx stream mode

8 x ASI Transport Access Module

Module type:	Access module, **NPS0031-3001**
Number of ports:	8 x ASI In or Out, individually configurable 1 monitor port
Connectors:	75 Ohm, BNC (female)
Minimum bandwidth:	2 Mbps
Maximum bandwidth:	212 Mbps

LED	State	Description
In (Rx)	off	disabled
	green	receiving, data OK
	flashing green	DTM loopback mode
	red	loss of video signal
	flashing red	loss of packet alignment
Out (Tx)	off	disabled
	green	transmitting, data OK
	flashing green	line loopback mode
	red	loss of DTM data
	flashing red	buffer overflow/alarm indication signal
Monitor - In	off	Rx stream not active
	green	monitor port in Rx stream mode
Monitor - Out	off	Tx stream not active
	green	monitor port in Tx stream mode

8 x AES/EBU Audio Transport Module

Module type:	Access module **NPS0050-3001**
Number of ports:	8 x Digital Audio In or Out, individually configurable 1 monitor port
Connectors:	75 Ohm, BNC (female)
Sampling frequency	32,48,96,172,44.1,88.2,176.4 kHz
Standard	AES3/5/11-2003, AES-3id-2001

LED	State	Description
In (Rx)	Off	disabled
	Green	receiving, data OK
	Flashing green	DTM loopback mode
	Red	loss of video signal
	Flashing red	loss of packet alignment
Out (Tx)	Off	disabled
	Green	transmitting, data OK
	Flashing green	line loopback mode
	Red	loss of DTM data
	Flashing red	buffer overflow/alarm indication signal
Monitor - In	Off	Rx stream not active
	Green	monitor port in Rx stream mode
Monitor - Out	Off	Tx stream not active
	Green	monitor port in Tx stream mode