

NTN465GF

323-1059-310

Nortel Networks

OPTera Metro 3500 Multiservice Platform Provisioning Synchronization

Standard Release 12.0 Issue 1 November 2003

What's inside...

Provisioning synchronization

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Printed in Canada

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About this document

This document describes how to provision system synchronization in OPTera Metro 3500 network elements in a unidirectional path switched ring (UPSR), a bidirectional line-switched ring (BLSR), or a linear system.

Supported software

This document supports the software release for Nortel Networks OPTera Metro 3500 Multiservice Platform Release 12.0.

Supported hardware

This document supports the OPTera Metro 3500 shelf and Universal OPTera Metro 3500 shelf.

Hardware naming conventions

The following naming conventions are used throughout this document to identify the OPTera Metro 3500 hardware:

- The extended shelf processor (SPx) is referred to as the shelf processor.
- The extended network processor (NPx) is referred to as the network processor.

Audience

The following members of your company are the intended audience of this Nortel Networks technical publication (NTP):

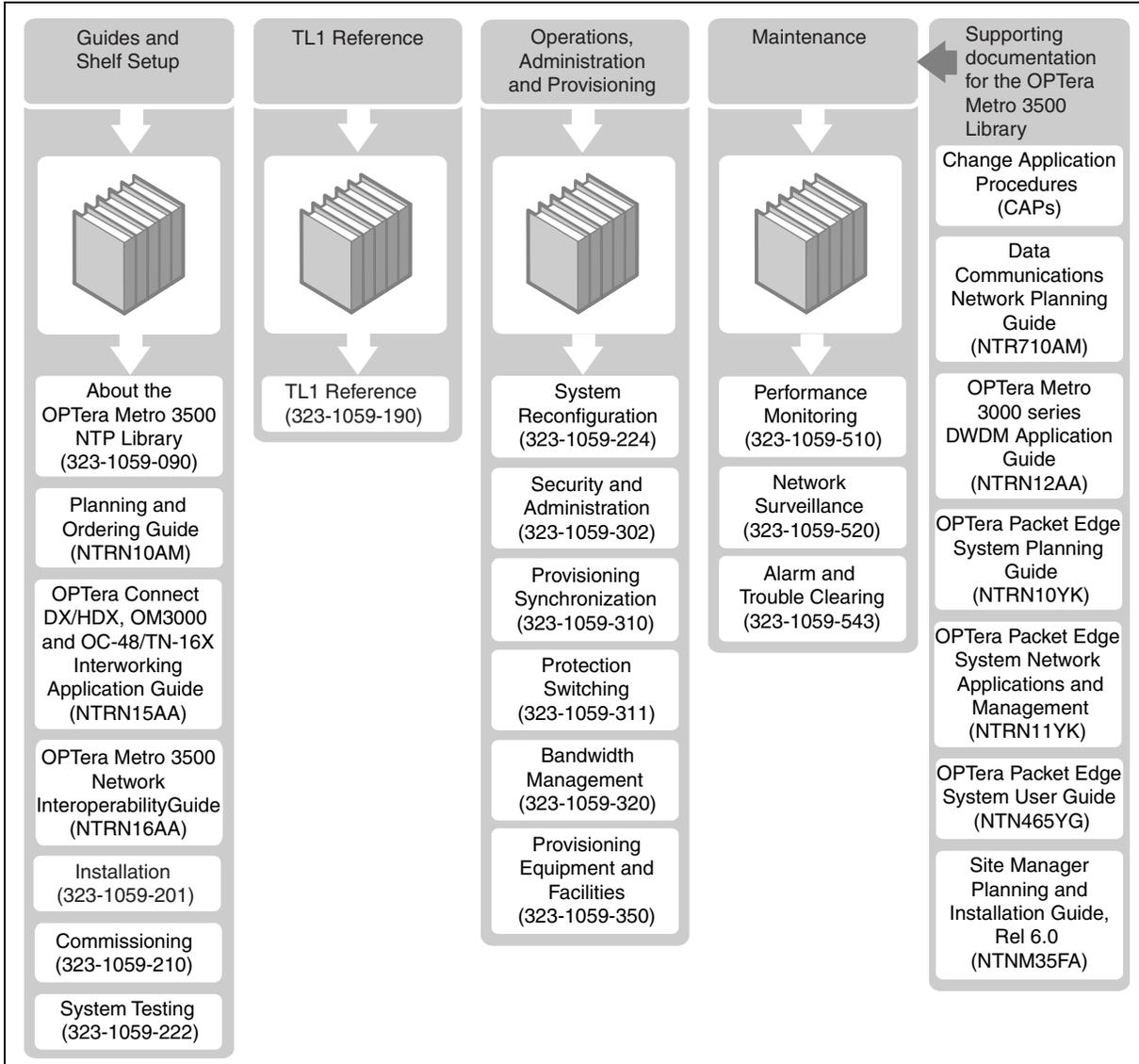
- planners
- provisioners
- network administrators
- transmission standards engineers

Standards

The Telecommunications Industry Association (TIA) and the Electronics Industries Alliance (EIA) accepted RS-232 as a standard in 1997 and renumbered this standard as TIA/EIA-232. In this document, RS-232 is used to reflect current labels on the hardware and in the software for the OPTera Metro 3500 Multiservice Platform.

OPTera Metro 3500 NTP Library

EX1478p



Technical support and information

For technical support and information from Nortel Networks, refer to the following table.

Technical Assistance Service	
<p>For service-affecting problems: For 24-hour emergency recovery or software upgrade support, that is, for:</p> <ul style="list-style-type: none"> • restoration of service for equipment that has been carrying traffic and is out of service • issues that prevent traffic protection switching • issues that prevent completion of software upgrades 	<p>North America: 1-800-4NORTEL (1-800-466-7835)</p> <p>International: 001-919-992-8300</p>
<p>For non-service-affecting problems: For 24-hour support on issues requiring immediate support or for 14-hour support (8 a.m. to 10 p.m. EST) on non-urgent issues.</p>	<p>North America: 1-800-4NORTEL (1-800-466-7835)</p> <p>Note: You require an express routing code (ERC). To determine the ERC, see our corporate Web site at www.nortelnetworks.com. Click on the Express Routing Codes link.</p> <p>International: Varies according to country. For a list of telephone numbers, see our corporate Web site at www.nortelnetworks.com. Click on the Contact Us link.</p>
<p>Global software upgrade support: For non-service affecting software upgrade issues</p>	<p>North America: 1-800-4NORTEL (1-800-466-7835)</p> <p>International: Varies according to country. For a list of telephone numbers, see our corporate Web site at www.nortelnetworks.com. Click on the Contact Us link.</p>

Provisioning synchronization

Procedures for provisioning system synchronization

[Retrieving synchronization data for a network element on page 1-2](#)

[Synchronizing a network element to an external timing source on page 1-3](#)

[Synchronizing a network element to an internal timing source on page 1-4](#)

[Synchronizing a network element to a line-timing source on page 1-5](#)

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[Operating a synchronization switch on page 1-9](#)

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[Operating a BITS Out switch on page 1-16](#)

Note: For procedures on provisioning time of day synchronization, see [323-1059-302, Time of day synchronization on page 8-1](#).

Procedure 1-1 Retrieving synchronization data for a network element

Requirements

To perform this procedure, you must

- ensure you have all the documentation referenced in this procedure.
- use an account with a level 3 user privilege code (UPC) or higher.

Step	Action
------	--------

- | | |
|---|--|
| 1 | Log in to the network element. See 323-1059-302, Procedures for logging in to a network element on page 2-1 . |
| 2 | Select Synchronization from the Configuration drop-down menu.
The Synchronization window opens and automatically displays the following synchronization data: <ul style="list-style-type: none">• timing mode• timing references• BITS In and BITS Out parameters |

Note: If an STX-192 or VTX-series circuit pack is missing, its corresponding BITS Out field is greyed out and marked “Unequipped”.

—end—

Procedure 1-2

Synchronizing a network element to an external timing source

Use this procedure to set a network element to an external timing source in a unidirectional path switched ring (UPSR), in a bidirectional line-switched ring (BLSR), or in a linear configuration.

When you provision synchronization in a UPSR, BLSR, or a linear configuration, one network element is designated as the head-end network element and acts as the timing source for the rest of the configuration through the optical line. Typically, one network element in a UPSR or a BLSR is externally timed. To protect against complete nodal failure, two network elements in a UPSR or a BLSR must be externally timed.

Requirements

To perform this procedure, you must

- ensure you have all the documentation referenced in this procedure.
- use an account with a level 3 user privilege code (UPC) or higher.

Step	Action
------	--------

- | | |
|---|---|
| 1 | Log in to the network element. See 323-1059-302, Procedures for logging in to a network element on page 2-1 . |
| 2 | Select Synchronization from the Configuration drop-down menu to open the Synchronization window. |
| 3 | Click Edit to open the Synchronization Edit dialog box. |
| 4 | Select Timing mode & reference from the Type drop-down list. |
| 5 | Select the External Timing radio button to set the timing source.

Note 1: To avoid timing loops, verify the clock source setting of each network element in the network. An incorrect clock source setting can cause a service outage.

Note 2: The External Timing radio button is not available when the shelf does not contain STX-192 or VTX-series circuit packs. |
| 6 | Provision the BITS In parameters. See step 6 through step 21 from Provisioning BITS In on page 1-10 . |

—end—

Procedure 1-3

Synchronizing a network element to an internal timing source

Use this procedure to set a network element synchronization to an internal timing source in a unidirectional path switched ring (UPSR), a bidirectional line-switched ring (BLSR), or a linear configuration. The internal timing source is provided by a SONET-compliant free running clock produced within the network element.

Requirements

To perform this procedure, you must

- ensure you have all the documentation referenced in this procedure.
- use an account with a level 3 user privilege code (UPC) or higher.

Step	Action
1	Log in to the network element. See 323-1059-302, Procedures for logging in to a network element on page 2-1 .
2	Select Synchronization from the Configuration drop-down menu to open the Synchronization window.
3	Click Edit to open the Synchronization Edit dialog box.
4	Select Timing mode & reference from the Type drop-down list.
5	Select the Internal Timing radio button to set the timing source. Note: To avoid timing loops, verify the clock source setting of each network element in the network. An incorrect clock source setting can cause a service outage.
6	Click OK.
7	Click Yes in the confirmation dialog box.

—end—

Procedure 1-4

Synchronizing a network element to a line-timing source

Use this procedure to set a network element synchronization to a line-timing source in a unidirectional path switched ring (UPSR), a bidirectional line-switched ring (BLSR), or a linear configuration. Sources of line timing are OC-3, OC-12, OC-12x4 STS, OC-48, OC-48 STS, OC-192, EC-1, and DS1 facilities.

Note: EC-1 facilities on EC-1x12 circuit packs do not support line timing.

Requirements

To perform this procedure, you must

- ensure you have all the documentation referenced in this procedure.
- use an account with a level 3 user privilege code (UPC) or higher.

Step	Action
1	Log in to the network element. See 323-1059-302, Procedures for logging in to a network element on page 2-1 .
2	Select Synchronization from the Configuration drop-down menu to open the Synchronization window.
3	Click Edit to open the Synchronization Edit dialog box.
4	Select Timing mode & reference from the Type drop-down list.
5	Select the Line Timing radio button to set the timing source. <i>Note:</i> To avoid timing loops, verify the clock source setting of each network element in the network. An incorrect clock source setting can cause a service outage.
6	Select the primary timing reference from the Primary source drop-down list. See Line-timing parameters on page 1-6 .
7	Select the secondary timing reference from the Secondary source drop-down list. See Line-timing parameters on page 1-6 .
8	Click OK.
9	Click Yes in the confirmation dialog box.

—end—

Line-timing parameters

Parameter	Domain	Description
Primary source or Secondary source	OC3-slot#-port# (see Note 1)	slot# = 3 to 10 port# = 1 for OC-3 port# = 1 to 4 for OC-3x4
	OC12-slot#-port#	slot# = 3 to 12 for OC-12 slot# = 3 to 10 for OC-12x4 STS port# = 1 for OC-12 port# = 1 to 4 for OC-12x4 STS
	OC48-slot#	slot# = 11 or 12 for OC-48 slot# = 3 to 12 for OC-48 STS
	OC192-slot#	slot# = 11 or 12
	EC1-slot#-port# (see Note 3)	slot# = 3, 5, 7, 9 port# = 1 to 3
	DS1-slot#-port# (see Note 1 and 2)	slot# = 4 to 10 port# = 1 to 12
	None	Deprovision timing reference
<p>Note 1: DS1 service module (DSM) facilities and OC-3 ports which are provisioned as DSM hosts cannot be set as line synchronization sources.</p> <p>Note 2: You can select the timing reference (primary or secondary) from one of the ports on an EC-1x3, OC-3x4, OC-12x4 STS, or DS1 circuit pack. However, you cannot select both primary and secondary timing references from the same multi-port circuit pack.</p> <p>Note 3: You cannot select line timing reference on an EC-1x12 circuit pack.</p>		

Procedure 1-5

Setting the synchronization-status message quality value

Use this procedure to set the following:

- the quality value of an incoming synchronization-status message (SSM) from a timing source for network elements in a unidirectional path switched ring (UPSR), a bidirectional line-switched ring (BLSR), or a linear configuration.
- the quality value of an outgoing SSM that is to be used for BITS Out A or BITS Out B

Note: You can set the quality value to override the incoming or outgoing SSM so that the synchronization signal is given a different quality level. This value specifies the quality of the synchronization signal and is used in the selection of the timing reference. For information, see [Synchronization status description on page 1-8](#).

Requirements

To perform this procedure, you must

- ensure you have all the documentation referenced in this procedure.
- use an account with a level 3 user privilege code (UPC) or higher.

Step	Action
1	Log in to the network element. See 323-1059-302, Procedures for logging in to a network element on page 2-1 .
2	Select Synchronization from the Configuration drop-down menu to open the Synchronization window.
3	Click Edit to open the Synchronization Edit dialog box.
4	Select Source quality from the Type drop-down list.
5	From the Source drop-down list, select the source whose SSM is to be overridden.
6	Select a new value from the New provisioned quality drop-down list. See Synchronization status description on page 1-8 for more information about the possible values.
	Note: To avoid timing loops, verify the clock source setting of each network element in the network. An incorrect setting for SSM can cause a service outage.
7	Click OK.
8	Click Yes in the confirmation dialog box.

—end—

Synchronization status description

Description	Quality level	Possible values
Traceable Stratum 1	1	ST1
Normal-traceability unknown	2	STU
Traceable Stratum 2	3	ST2
Traceable Stratum 3	4	ST3
SONET minimum clock-Traceable	5	SMC
Traceable Stratum 4 (see Note)	6	ST4
Reserved for network synchronization use	7	RES
Do not use for synchronization	8	DUS
Note: The ST4 message is carried in the extended superframe (ESF) datalink of an external DS1 timing signal, not in the SONET overhead.		

Procedure 1-6

Operating a synchronization switch

Use this procedure to operate a synchronization switch for a network element. A synchronization switch switches the source of synchronization for a network element between the primary and the secondary references. The switch is successful when the quality of the new reference source is equivalent to the current one.

Synchronization switching is non-revertive. A timing reference you initiate using this procedure remains active until you activate a reference switch or until a synchronization reference failure occurs.

You can switch the synchronization between the two sources only for network elements that are adjacent to the synchronization boundary.

Requirements

To perform this procedure, you must

- ensure you have all the documentation referenced in this procedure.
- use an account with a level 3 user privilege code (UPC) or higher.

Step	Action
------	--------

- | | |
|---|--|
| 1 | Log in to the network element. See 323-1059-302, Procedures for logging in to a network element on page 2-1 . |
| 2 | Select Synchronization from the Configuration drop-down menu to open the Synchronization window. |
| 3 | In the Current quality fields under Timing Reference, verify that the quality of both timing references is the same, and is not set to DUS, RES, SMC or ST4. |
| 4 | Click Switch Reference to open the Operating Reference Switch dialog box. |
| 5 | Select Timing reference from the Type drop-down list. |
| 6 | Click Yes. |

—end—

Procedure 1-7 Provisioning BITS In

Use this procedure to retrieve and provision the signal format, line code, and frame format for BITS In A and BITS In B.

Requirements

To perform this procedure, you must

- ensure you have all the documentation referenced in this procedure.
- use an account with a level 3 user privilege code (UPC) or higher.

Step	Action
1	Log in to the network element. See 323-1059-302, Procedures for logging in to a network element on page 2-1 .
2	Select Synchronization from the Configuration drop-down menu to open the Synchronization window.
3	Click Edit to open the Synchronization Edit dialog box.
4	Select Timing mode & reference from the Type drop-down list.
5	Select the External Timing radio button to set the timing source. Note 1: To avoid timing loops, verify the clock source setting of each network element in the network. An incorrect clock source setting can cause a service outage. Note 2: The External Timing radio button is not available when the shelf does not contain STX-192 or VTX-series circuit packs.
6	Select BITS In A from the Primary source drop-down list.
7	Select BITS In B from the Secondary source drop-down list.
8	Click Apply.
9	Click Yes in the confirmation dialog box.
10	Select BITS In A from the Type drop-down list.
11	Select the signal format for BITS In A from the Signal format drop-down list. Note: For signal format, line code, and frame format values, see BITS In parameters on page 1-12 .

—continued—

Procedure 1-7 (continued)

Provisioning BITS In

Step	Action
12	Select the line for BITS In A from the Line code drop-down list.
13	Select the frame format for BITS In A from the Frame format drop-down list.
14	Click Apply.
15	Click Yes in the confirmation dialog box.
16	Select BITS In B from the Type drop-down list.
17	Select the signal format for BITS In B from the Signal format drop-down list. Note: See the BITS In parameters on page 1-12 for signal format, line code, and frame format values.
18	Select the line for BITS In B from the Line code drop-down list.
19	Select the frame format for BITS In B from the Frame format drop-down list.
20	Click OK.
21	Click Yes in the confirmation dialog box.

—end—

BITS In parameters

Parameter	Value	Description
Signal format	DS1	Default value
Line code	AMI	Default value. Alternate mark inversion, both directions
	B8ZS	Bipolar with eight-zero substitution, both directions
Frame format	SF	Default value. Superframe format
	ESF	Extended superframe format

Procedure 1-8 Provisioning BITS Out

Use this procedure to select an incoming signal as the source for BITS Out. BITS Out can be used as a BITS reference for other digital equipment (capable of accepting a BITS reference) in the central office. You can select any incoming signal as the source for BITS Out.

Requirements

To perform this procedure, you must

- ensure you have all the documentation referenced in this procedure.
- use an account with a level 3 user privilege code (UPC) or higher.

Step	Action
1	Log in to the network element. See 323-1059-302, Procedures for logging in to a network element on page 2-1 .
2	Select Synchronization from the Configuration drop-down menu to open the Synchronization window.
3	Click Edit to open the Synchronization Edit dialog box.
4	Select Timing mode & references from the Type drop-down list.
5	Select the External Timing radio button to set the timing source. Note 1: To avoid timing loops, verify the clock source setting of each network element in the network. An incorrect clock source setting can cause a service outage. Note 2: The External Timing radio button is not available when the shelf does not contain STX-192 or VTX-series circuit packs.
6	Select BITS In A from the Primary source drop-down list.
7	Select BITS In B from the Secondary source drop-down list.
8	Click Apply.
9	Click Yes in the confirmation dialog box.
10	Select BITS Out A from the Type drop-down list.

—continued—

Procedure 1-8 (continued)

Provisioning BITS Out

Step	Action
11	Select the primary source from the Primary source drop-down list. Note: For information about possible values for any of the BITS Out parameters, see BITS Out parameters on page 1-15 .
12	Select the secondary source from the Secondary source drop-down list.
13	Select the frame format for the BITS Out A from the Frame format drop-down list.
14	Select the equalization for BITS Out A from the Equalization drop-down list.
15	Select a clock quality level from the Threshold AIS drop-down list. Note 1: Valid threshold settings are: ST1, STU, ST2, ST3, SMC, ST4, and None. See Synchronization status description on page 1-8 . Note 2: If the threshold is set to None, AIS is not inserted.
16	Click Apply.
17	Click Yes in the confirmation dialog box.
18	Select BITS Out B from the Type drop-down list.
19	Select the primary source from the Primary source drop-down list.
20	Select the secondary source from the Secondary source drop-down list.
21	Select the frame format for BITS Out B from the Frame format drop-down list.
22	Select the equalization for BITS Out B from the Equalization drop-down list.
23	Select a clock quality level from the Threshold AIS drop-down list. Note 1: Valid threshold settings are: ST1, STU, ST2, ST3, SMC, ST4, and None. See Synchronization status description on page 1-8 . Note 2: If the threshold is set to None, AIS is not inserted.
24	Click OK.
25	Click Yes in the confirmation dialog box.

—end—

BITS Out parameters

Parameter	Domain	Description
Primary source or Secondary source	OC3-slot#-port# (see Note 1)	slot# = 3 to 10 port# = 1 for OC-3 port# = 1 to 4 for OC-3x4
	OC12-slot#-port#	slot# = 3 to 12 for OC-12 slot# = 3 to 10 for OC-12x4 STS port# = 1 for OC-12 port# = 1 to 4 for OC-12x4 STS
	OC48-slot#	slot# = 11 or 12 for OC-48 slot# = 3 to 12 for OC-48 STS
	OC192-slot#	slot# = 11 or 12
	EC1-slot#-port# (see Note 3)	slot # = 3, 5, 7, 9, port# = 1 to 3
	DS1-slot#-port# (see Note 1 and 2)	slot # = 4 to 10, port# = 1 to 12
	BITS In-A or BITS In-B	Building Integrated Timing Supply
	None	Deprovision timing reference
Frame format	SF	Default value. Superframe format
	ESF	Extended superframe format
Equalization	0 ft. to 220 ft.	Short
	220 ft. to 430 ft.	Medium
	430 ft. to 655 ft.	Long
<p>Note 1: DS1 facilities associated with a DS1 service module (DSM) and OC-3 ports that are provisioned as DSM hosts cannot be set as BITS Out sources.</p> <p>Note 2: You can select the timing reference (primary or secondary) from one of the ports on an EC1x3, OC-3x4, OC-12x4, or DS1 circuit pack. However, you cannot select both the primary and the secondary timing references from the same multi-port circuit pack.</p> <p>Note 3: You cannot select the timing reference from a port on an EC-1x12 circuit pack.</p>		

Procedure 1-9 Operating a BITS Out switch

Use this procedure to operate a BITS Out switch. A BITS Out switch switches the source of BITS Out A or BITS Out B for a network element between the primary and secondary sources. The switch is successful only if the quality of the two references is the same. The network element always chooses the best quality timing reference for its synchronization reference. A BITS Out switch you initiate using this procedure remains active until you activate another BITS Out switch or until a synchronization reference failure or lower quality level overrides it.

For information about how to set the BITS Out timing references, see [Provisioning BITS Out on page 1-13](#).

Requirements

To perform this procedure, you must

- ensure you have all the documentation referenced in this procedure.
- use an account with a level 2 user privilege code (UPC) or higher.

Step	Action
1	Log in to the network element. See 323-1059-302, Procedures for logging in to a network element on page 2-1 .
2	Select Synchronization from the Configuration drop-down menu to open the Synchronization window.
3	In the Current quality fields under BITS Out A and BITS Out B, verify that the quality of both timing references is the same, and is not set to DUS or RES.
4	Click Switch Reference to open the Operating Reference Switch dialog box.
5	Select BITS Out A or BITS Out B from the Type drop-down list.
6	Click Yes.

—end—

Nortel Networks

OPTera Metro 3500 Multiservice Platform Provisioning Synchronization

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