Use Cases and Limitations

Use Case

The PTP solution for NCS 2000 enables leveraging the PTP signals from the NCS 5500 and NCS 540 routers over the NCS 2000 networks.

NCS 2000 Network Configuration for PTP over OSC Link

The PTP solution for the NCS 2000 networks is supported over the following NCS 2000 flex spectrum network configurations.

Table 1: NCS 2000 Networks

NCS 2000 Flex Spectrum Network	Components Required
PTP over OSC Link with OTDR	• Pluggables: ONS-SC-OSC-18.0, ONS-SC-PTP-1514 and ONS-SC-PTP-1510 • Filter: 15216-OSC-PTP

The following table shows the reach of the PTP over OSC link in the NCS 2000 networks with and without RAMAN amplifiers.

Table 2: Reach of the PTP over OSC Link

Signal	Condition	Span Reach (dB)	
		Without RAMAN	With RAMAN
OSC	1518 nm - FE	35	38 (33 dB at RAMAN startup, 38 dB after RAMAN is ON)
PTP	1510/1514 nm - FE	33	37 (RAMAN ON)

| Signal	Condition	Span Reach (dB)	
		Without RAMAN	**With RAMAN**
PTP	1510/1514 nm - GE	30	37 (RAMAN ON

> **Note** To limit the RX power below the allowed maximum (–7 dBm) reach, you must use attenuators with PTP SFPs.

PTP over OSC Link with OTDR using PTP Filter

This solution adds a PTP filter between the TNCS-2O card and the GM clock in the router. The PTP filter multiplexes the PTP signal from the GM clock and the OSC signal from the NCS 2000 TNSC-2O card. The filter sends the combined signal over the NCS 2000 network through the near-end ROADM. The near-end ROADM propagates the signal through its OSC channel to the far end. The combined signal is demultiplexed at the next PTP filter to send the PTP signal to NCS 55xx/540 and the OSC signal to the TNSC-2O card. This sequence of mutliplexing and demultiplexing PTP and OSC signals continue on both sides of the CDC ROADM throughout the NCS 2000 network.

Figure 1: PTP over OSC Link with OTDR Signal Flow using PTP Filter
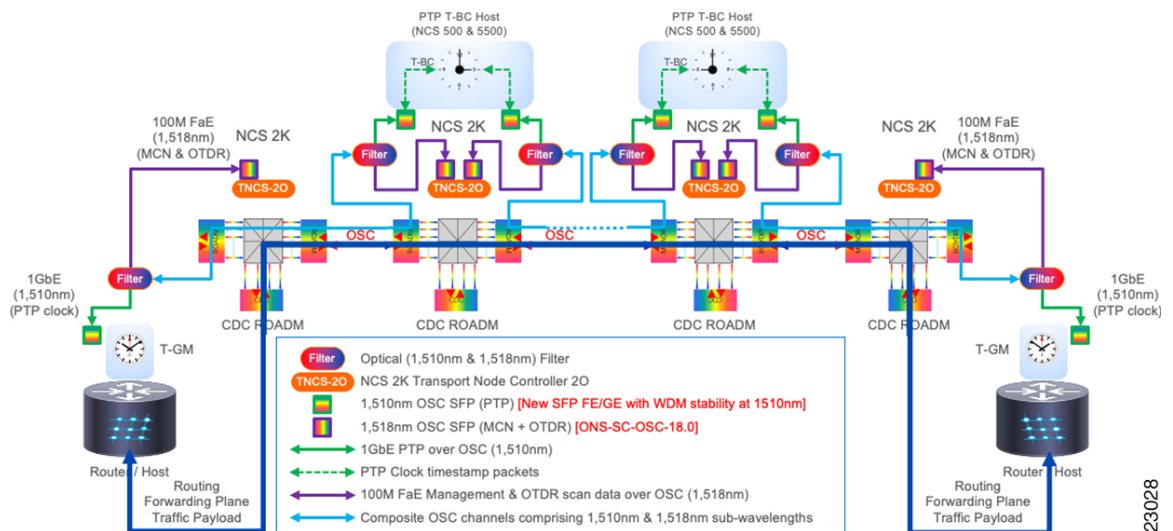
The above image shows the signal flow of the PTP over OSC link using a PTP filter. For more information on the port connection, see PTP Module Port Connections.

Use Case 1: PTP over OSC Link with OTDR, without RAMAN Amplifier

The following hardware is required for this use case:

- Pluggable optics: ONS-SC-OSC-18.0, ONS-SC-PTP-1514, and ONS-SC-PTP-1510
- Filter: 15216-OSC-PTP

- Amplifier: OPT-EDFA-24

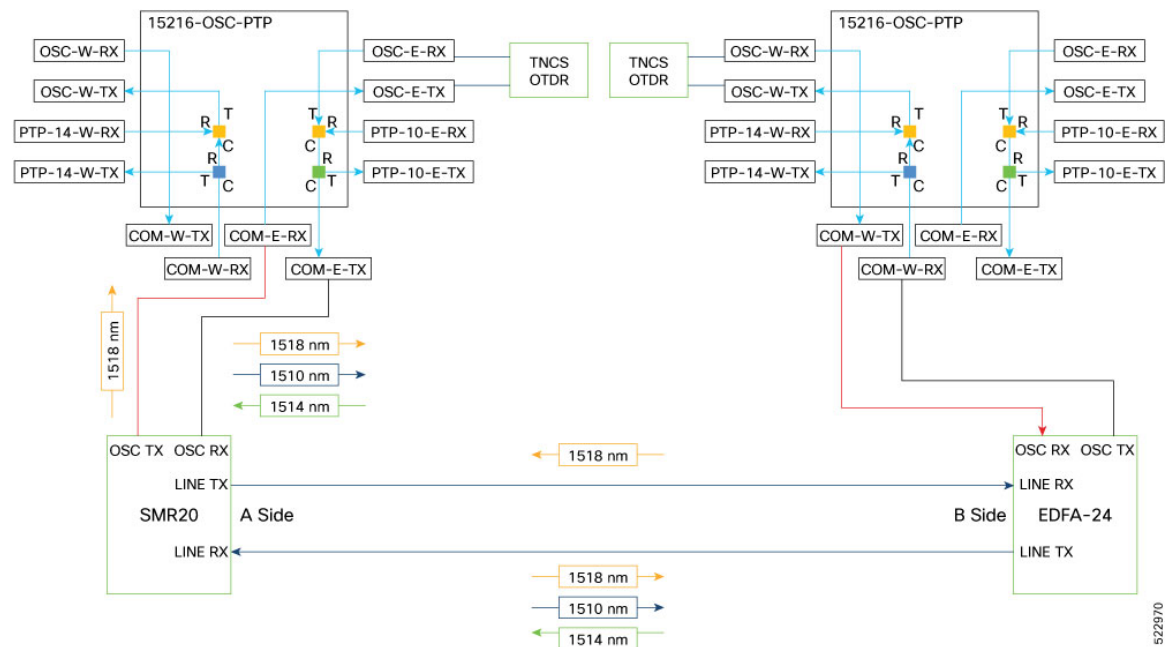- ROADM Cards: SMR20-FS (NCS2K-20-SMRFS / NCS2K-20-SMRFS-CV / NCS2K-20-SMRFS-L)

The 15216-OSC-PTP filter combines the OSC signal from the TNCS-O card and the PTP signal from the ONS-SC-PTP-1510 pluggable in NCS 55xx in the east direction. The filter sends the combined signal to the OSC RX port of the SMR20 ROADM card through the COM-E-TX port. SMR20-FS sends the combined signal to the line port on EDFA-24 line card on Side B. The EDFA-24 card sends the signal to the COM-W-RX port of the 15216-OSC-PTP filter. The 15216-OSC-PTP filter splits the signal and sends the OSC signal to the TNCS-O card via OSC-W-RX port and the PTP clock signal to the NCS 55xx router.

The following table shows the COM port connections for the PTP Filter Module.

Table 3: COM Port Connections of the PTP Filter Module

Near End		Far End	
From PTP Filter	**To SMR20**	**From EDFA-24**	**To PTP Filter**
COM-E-RX	OSC-TX	OSC-TX	COM-W-RX
COM-E-TX	OSC-RX	OSC-RX	COM-W-TX

Figure 2: PTP over OSC with OTDR, Without RAMAN Amplifier

Use Case 2: PTP over OSC Link with OTDR, RAMAN Amplifier

The following hardware is required for this use case:

- Pluggable optics: ONS-SC-OSC-18.0, ONS-SC-PTP-1514, and ONS-SC-PTP-1510

- Filter: 15216-OSC-PTP

- Amplifier: OPT-EDFA-24, 15454-M-RAMAN-CTP

- ROADM: SMR9 (NCS2K-9-SMRxxFS / NCS2K-9-SMRxxFS-L)

The 15216-OSC-PTP filter combines the OSC signal from the TNCS card and the PTP clock signal from the ONS-SC-PTP-1510 pluggable in NCS 55xx in the east direction. The filter sends the combined signal to the OSC RX port of the EDFA-24 (OPT-EDFA-24) amplifier card through the COM-E-TX port. EDFA-24 sends the combined signal via RAMAN-CTP amplifier on Side A and B to the SMR9 ROADM card. The SMR card sends the signal to the COM-W-RX port of the 15216-OSC-PTP filter. The 15216-OSC-PTP filter splits the signal via OSC-W-RX port and sends the PTP signal to boundary clock and the OSC signal to the TNCS card.

The following table shows the COM port connections for the PTP Filter Module.

Table 4: COM Port Connections of the PTP Filter Module

Near End		Far End	
From PTP Filter	**To EDFA-24**	**From SMR9**	**To PTP Filter**
COM-E-RX	OSC-TX	OSC-TX	COM-W-RX
COM-E-TX	OSC-RX	OSC-RX	COM-W-TX

Figure 3: Sending PTP over OSC Link with OTDR and RAMAN Amplifier
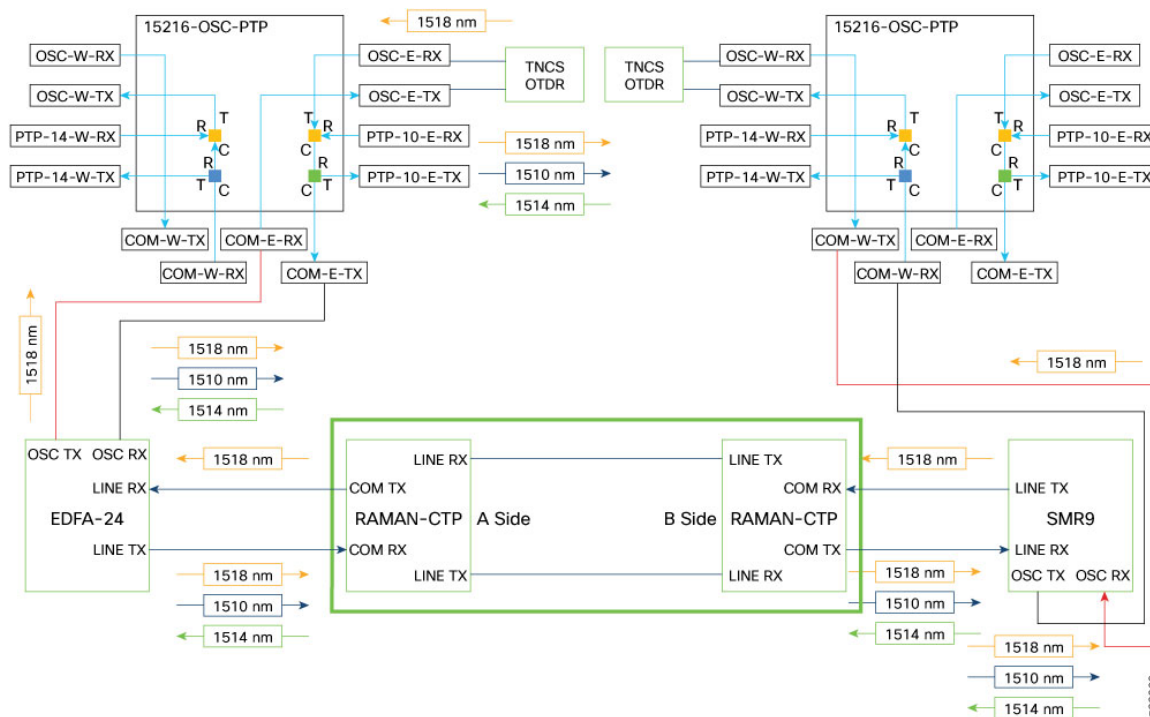
Limitations in PTP for NCS 2000 Networks

The PTP solution has a few limitations in the different use cases that it supports. The following sections provide the limitations that exist in the PTP solution.

NCS 2000 Network with PTP Filter

The following table shows the limitations that are found in the NCS 2000 networks that have PTP filters:

Table 5: Limitations in NCS 2000 Network with PTP Filter

Scenario	Impacted Areas	Description
Sending OSC and PTP combined signals through the DWDM cloud.	OSC alarm management	If OSC is not present in the composite signal, then alarms related to OSC do not function properly.
	Current OSC Optics PM	The OSC RX/TX always reads or displays the composite power (OSC + PTP). If the OSC signal fails, the OSC PM statistics cannot be extracted from the composite signal. The port always displays Optics statistics, irrespective of whether OSC is present or not.
	Existing OSC TCA Monitoring	OSC TCA cannot be managed from the composite signal.
Requesting for an OTDR fast scan.	Existing alarm management	Incoming Overhead Loss of Signal (LOS-O) alarm does not report, when fast scan is in-progress.
Using an EDRA-x-y span	PTP solution	EDRA span does not work due to OSC pass band limitation.

NCS 5500 Router

The following table shows the limitations that exist in the NCS 5500 router:

Table 6: Limitations on the NCS 5500 Router

Limitations	Impacted Areas
Interface state flaps with Up/Down events, when the receive power is less than –41.54 dBm.	1. PTP state is impacted. 2. Router console floods with the Up/Down events.