

Raman Tuning

This chapter describes the Raman Tuning optical application for Cisco NCS 1010.

- Overview of Raman Tuning, on page 1
- Raman Tuning with OTDR Lock, on page 9
- Use OTDR for Evaluation of Raman Turn Up, on page 10

Overview of Raman Tuning

Raman Tuning Algorithm calculates and sets the different pump power values across five Raman pumps to obtain the target Raman Gain on a span. Raman tuning runs in both directions of the span independently at the node level. Raman tuning requires communication between peer nodes. Hence, OSC communication between the two nodes is a prerequisite for Raman Tuning.

Raman tuning algorithm uses the following parameters to calculate the pump powers necessary to achieve the target Raman gain.

- Fiber type
- Fiber length
- Loss on the fiber at each pump wavelength
- Loss on the fiber at the signal wavelength

If you configure a span length value, Raman tuning uses this value.

Raman tuning is disabled by default. Raman tuning is enabled if automatic link bring up is enabled. You can manually trigger Raman tuning if necessary. The NCS 1010 initiates the tuning process under the following circumstances:

- During the initial link bring up
- After a fiber cut
- After a power cycle event
- After a line card cold reload event
- After a DFB shut or unshut event
- After an OTS controller shut or unshut event on near end or far end node

· After modification of span length configuration

Raman tuning is traffic impacting. When Raman tuning is in progress, the amplifier on the far end of the span is turned off to block traffic. The Optical Safety Remote Interlock (OSRI) feature allows turning off the amplifier on the peer node for Raman tuning. Only the OSC is active on the link while Raman tuning is in progress.

At the LINE-TX port on the far end of the span, the dedicated Raman probe (DFB) is combined with the transmitted optical channels. The DFB laser at 191.1 THz is used to perform a link continuity check on the Raman span for optical safety. The DFB laser is used during Raman tuning.

At the LINE-RX port, five wavelengths between 1424 nm and 1495 nm are inserted in the counter propagating direction of the signal to provide amplification using the Raman effect for both C and L band optical channels.

The system triggers Raman tuning when a link goes down and comes back up. After completing Raman tuning successfully, soft reloads, RP reloads, Raman OSRI change, and Raman Force APR change do not retrigger Raman tuning.

Raman Tuning Status	Description
WORKING – MEASUREMENT	The algorithm is measuring the span loss on the link.
WORKING – CALCULATION	The algorithm is calculating the gain target and required pump powers.
WORKING – OPTIMIZATION	The algorithm is optimizing the pump powers.
TUNED	Raman tuning is complete.
BLOCKED	The system is unable to perform Raman tuning. This status can occur because the link is down or the system detected high Raman Back Reflection.
DISABLED	Raman tuning is disabled.

The following table lists and describes the different Raman Tuning Status.

Raman tuning works in the following three modes:

- Auto mode: Raman tuning defines the target gain and sets the pump powers and DFB VOA attenuation to achieve the target gain overwriting user configuration.
- Gain mode: User defines the gain target and Raman tuning sets the pump powers and DFB VOA attenuation to achieve the target gain.
- Manual mode: User disables Raman tuning and manually configures the Raman pumps and DFB VOA attenuation.

When Raman tuning is in progress, the node performing Raman tuning triggers the RAMAN-TUNE-IN-PROGRESS alarm. From Cisco IOS XR Release 7.9.1, NCS 1010 supports C+L band networks. In a C+L band configuration, the RAMAN-TUNE-IN-PROGRESS alarm is raised at the C-band OLT or ILA node performing Raman tuning as well as the far end L-band node. OSRI disables the EDFA amplifiers on both the C and L band devices in the peer node during Raman Tuning.



system triggers Raman tuning and turns the Raman pumps on.

• If a Raman span has a span loss value less than 14 dB, Raman tuning goes into the BLOCKED state. The NCS 1010 performs a span loss check at system startup to verify if you can use Raman amplification effectively on the span.

View Raman Tuning Status

You can view the Raman tuning status using **show olc raman-tuning** command. The following sample is an output of the **show olc raman-tuning** command.

```
RP/0/RP0/CPU0:ios#sh olc raman-tuning
Tue Mar 21 06:11:36.944 UTC
Controller : Ots0/0/00
Raman-Tuning Status : TUNED
Tuning Complete Timestamp : 2023-03-20 07:54:00
Estimated Max Possible Gain : 19.8 dB
Raman Gain Target : 16.0 dB
Gain Achieved on Tuning Complete : 15.7 dB
```

You can view the Raman tuning status for individual controllers using **show olc raman-tuning controller** ots r/s/i/p command. The following sample is an output of the **show olc raman-tuning controller** ots r/s/i/p command.

```
RP/0/RP0/CPU0:ios#sh olc raman-tuning controller ots 0/0/0/0
Tue Mar 21 06:13:26.535 UTC
```

```
Controller : Ots0/0/00
Raman-Tuning Status : TUNED
Tuning Complete Timestamp : 2023-03-20 07:54:00
Estimated Max Possible Gain : 19.8 dB
Raman Gain Target : 16.0 dB
Gain Achieved on Tuning Complete : 15.7 dB
```

You can view detailed Raman tuning status using **show olc raman-tuning details** command. The following sample is an output of the **show olc raman-tuning details** command.

```
RP/0/RP0/CPU0:ios#show olc raman-tuning details
Tue Mar 21 06:27:13.302 UTC
```

```
Controller : Ots0/0/0/
Raman-Tuning Status : TUNED
Tuning Complete Timestamp : 2023-03-20 07:54:00
Estimated Max Possible Gain : 19.8 dB
Raman Gain Target : 16.0 dB
Gain Achieved on Tuning Complete : 15.7 dB
Last Run Fail Reason : [ Peer node is unreachable ]
Last Run Fail Timestamp : 2023-03-19 12:20:37
Last Successful Tuning Gain : 15.7 dB
Last Successful Tuning Timestamp : 2023-03-20 07:54:00
```

You can view detailed Raman tuning status for individual controllers using **show olc raman-tuning details controller ots** *r/s/i/p* command. The following sample is an output of the **show olc raman-tuning details controller ots** *r/s/i/p* command.

```
RP/0/RP0/CPU0:ios#show olc raman-tuning details controller Ots 0/0/0/0
Tue Mar 21 06:27:58.213 UTC
Controller : Ots0/0/0/0
Raman-Tuning Status : TUNED
Tuning Complete Timestamp : 2023-03-20 07:54:00
Estimated Max Possible Gain : 19.8 dB
Raman Gain Target : 16.0 dB
Gain Achieved on Tuning Complete : 15.7 dB
Last Run Fail Reason : [ Peer node is unreachable ]
Last Run Fail Timestamp : 2023-03-19 12:20:37
Last Successful Tuning Gain : 15.7 dB
Last Successful Tuning Timestamp : 2023-03-20 07:54:00
```

To view the individual Raman pump information and other parameters, use the **show controllers ots** r/s/i/p **raman-info** command.

```
RP/0/RP0/CPU0:ios#show controllers ots 0/0/0/0 raman-info
Fri Apr 1 06:40:33.849 UTC
        Alarm Status:
         _____
        Detected Alarms: None
        Alarm Statistics:
        RAMAN-AUTO-POW-RED = 0
        RAMAN-1-LOW-POW = 0
        RAMAN-2-LOW-POW = 0
        RAMAN-3-LOW-POW = 0
        RAMAN-4-LOW-POW = 0
        RAMAN-5-LOW-POW = 0
        RAMAN-1-HIGH-POW = 1
        RAMAN-2-HIGH-POW = 0
        RAMAN-3-HIGH-POW = 0
        RAMAN-4-HIGH-POW = 0
        RAMAN-5-HIGH-POW = 0
        Parameter Statistics:
        _____
        Raman Safety Control mode = auto
        Raman Osri = OFF
        Raman Force Apr = OFF
        Composite Raman Power = 886.60 mW
        RAMAN Pump Info:
        -----
        Instance
                     Wavelength(nm) Power(mW)
        1
                      1424.00
                                             257.60
         2
                       1438.00
                                              255.10
         3
                       1457.00
                                              71.60
                       1470.00
                                              127.50
         4
         5
                       1495.00
                                              170.10
```

Configured Parameters:

Raman Safety Control mode = auto Raman Osri = OFF Raman Force Apr = OFF

RAMAN Pump Info:

Instance	Power(mW)
1	45.00
2	40.00
3	40.00
4	40.00
5	35.00

The following sample output

Note

In the previous output, there are two sections for Raman Pump Info that show different values. The first Raman Pump Info section displays operational data (current pumps power values). The second Raman Pump Info section displays Raman Pump Power configuration. In this case, the default pump powers are displayed. Use the **raman-tx-power** *pump***value***value* command to configure individual Raman pump powers.

The Raman tuning application locks the OTDR scan at both fiber ends before the tuning starts, and releases the lock after the tuning completes. Therefore, when you try to start the OTDR scan when Raman tuning is running, your request gets rejected. The following example explains the OTDR start request rejection. The OTDR scan request that has been rejected already does not run automatically after the lock is released, so you have to create a new request to start the OTDR again.

Configure Raman Tuning

Table	1: F	eature	History
-------	------	--------	---------

Feature Name	Release Information	Description
Four-Pump Raman Tuning Mode	Cisco IOS XR Release 7.11.1	You can now configure the Raman tuning mode to achieve the target Raman gain using only four pumps instead of all five. In C-band only mode, the algorithm dynamically adjusts to operate with four Raman pumps during the next Raman tuning sequence, while the fifth pump remains available without being automatically shut down. This enhancement introduces C-band-only mode specifically designed for performing Raman tuning in low-dispersion fibers such as E-LEAF fibers.

The following configurations are available for Raman Tuning:

Disable Raman Tuning

You can disable Raman tuning for a controller. Use the following commands to disable Raman tuning. **configure**

optical-line-control controller ots *Rack/Slot/Instance/Port* raman-tuning disable

commit end

The following is a sample configuration that disables Raman tuning.

```
RP/0/RP0/CPU0:ios#configure
RP/0/RP0/CPU0:ios(config)#optical-line-control
RP/0/RP0/CPU0:ios(config-olc)#controller ots 0/0/0/0
RP/0/RP0/CPU0:ios(config-olc-ots)#raman-tuning disable
RP/0/RP0/CPU0:ios(config-olc-ots)#commit
RP/0/RP0/CPU0:ios(config-olc-ots)#end
```

Enable Raman Tuning

You can enable Raman tuning for a controller. Use the following commands to enable Raman tuning.

configure

optical-line-control

controller ots Rack/Slot/Instance/Port

raman-tuning enable

commit

end

The following is a sample configuration that enables Raman tuning.

```
RP/0/RP0/CPU0:ios#configure
RP/0/RP0/CPU0:ios(config)#optical-line-control
RP/0/RP0/CPU0:ios(config-olc)#controller ots 0/0/0/0
RP/0/RP0/CPU0:ios(config-olc-ots)#raman-tuning enable
RP/0/RP0/CPU0:ios(config-olc-ots)#commit
RP/0/RP0/CPU0:ios(config-olc-ots)#end
```

Configure Raman Tuning Mode

The existing Raman tuning algorithm uses all five Raman pumps to achieve the target Raman gain. With this enhancement, an alternative tuning mode now allows operation with only four Raman pumps.

When configured in **C-band-only** mode, the system initiates the Raman tuning process using the four-pump algorithm during the next Raman tuning sequence. To revert to the five-pump configuration, switch to **C-L-band** mode.

configure

optical-line-control

controller ots Rack/Slot/Instance/Port

raman-tuning tuning-mode C-band-only | C-L-band

commit

end

The entry highlighted in bold in the following example shows how to configure the **C-band-only** mode.

RP/0/RP0/CPU0:NCS1010#configure
RP/0/RP0/CPU:NCS1010 (config)#optical-line-control controller Ots 0/0/00
RP/0/RP0/CPU0:NCS1010(config-olc-ots)#raman-tuning tuning-mode C-band-only
RP/0/RP0/CPU0:NCS1010(config-olc-ots)#commit

The entry highlighted in bold in this example shows the configuration of the **C-band-only** mode.

```
IRP/0/RP0/CPU:NCS1010#show running-config optical-line-control
optical-line-control
automatic-link-bringup
controller Ots0/0/0/0
raman-tuning tuning-mode C-band-only
```

Configure Raman Gain Target

You can manually set the desired Raman gain target. Use the following commands to set the Raman gain target.

configure

optical-line-control

controller ots Rack/Slot/Instance/Port

raman-tuning raman-gain-target value

commit

end

You can configure Target Raman Gain of 8.0 to 25.0 dB in multiples of 0.1 dB. The following is a sample configuration that configures the Raman gain target to 18 dB.

```
RP/0/RP0/CPU0:ios#configure
RP/0/RP0/CPU0:ios(config)#optical-line-control
RP/0/RP0/CPU0:ios(config-olc)#controller ots 0/0/0/0
RP/0/RP0/CPU0:ios(config-olc-ots)#raman-tuning raman-gain-target 180
RP/0/RP0/CPU0:ios(config-olc-ots)#commit
RP/0/RP0/CPU0:ios(config-olc-ots)#end
```

Configure Raman Pump Powers

You can set the Raman pump powers manually. Use the following commands to set the pump powers.

configure

controller ots Rack/Slot/Instance/Port

raman-tx-power pumpvaluevalue

commit

end

The following is a sample configuration that sets the pump power of the first Raman pump to 211 mW.

```
RP/0/RP0/CPU0:ios#configure
RP/0/RP0/CPU0:ios(config-olc)#controller ots 0/0/0/0
```

```
RP/0/RP0/CPU0:ios(config-olc-ots)#raman-tx-power 1 value 21100
RP/0/RP0/CPU0:ios(config-olc-ots)#commit
RP/0/RP0/CPU0:ios(config-olc-ots)#end
```

Configure DFB VOA Attenuation

Raman tuning algorithm changes the DFB VOA to adjust the DFB Tx power depending on the span loss. The following table lists the DFB TX power for different span loss ranges.

Span Loss	DFB TX Power
14-25 dB	-5 dB
25-33 dB	0 dB
>33 dB	5 dB

Use the following commands to configure DFB VOA attenuation when Raman Tuning is disabled and you want to configure the DFB manually.

configure

controller dfb Rack/Slot/Instance/Port

tx-voa-attenuation value

commit

end

The following is a sample configuration that sets the DFB VOA attenuation to 10 dB.

```
RP/0/RP0/CPU0:ios#conf
Wed Jul 6 04:45:47.720 UTC
RP/0/RP0/CPU0:ios(config)#controller dfb 0/0/0/0
RP/0/RP0/CPU0:ios(config-Dfb)#tx-voa-attenuation 100
RP/0/RP0/CPU0:ios(config-Dfb)#commmit
RP/0/RP0/CPU0:ios(config-Dfb)#end
```

Initiate Raman Tuning

You can trigger Raman tuning manually. Use the following exec command to trigger Raman tuning.

olc start-raman-tuning controller ots Rack/Slot/Instance/Port

The following is a sample configuration that initiates Raman tuning.

RP/0/RP0/CPU0:ios#olc start-raman-tuning controller ots 0/0/0/0

Raman Tuning with OTDR Lock

Table 2: Feature History

Feature Name	Release Information	Description
Raman Tuning with OTDR Lock	Cisco IOS XR Release 7.10.1	If the OTDR scan and Raman tuning are performed on the same fiber simultaneously, the OTDR reports unexpected results. In this release, a check is being implemented to prevent both operations from running simultaneously. The Raman tuning application imposes an OTDR lock at both ends of the fiber before the process starts and releases the same after the tuning is completed.

The OTDR scan and Raman tuning cannot be simultaneously executed on the same fiber. To resolve this issue, Raman tuning application locks the OTDR at both ends of the fiber before the tuning process starts and releases the lock after the tuning completes.

If the OTDR scan is in progress, the lock request is rejected and the Raman tuning application retries every minute to acquire the OTDR lock. The Raman tuning starts only when OTDR scan lock is acquired at both ends of the fiber. If the Raman tuning application is running, user request to start OTDR scan is rejected. See Start the OTDR scan.

The following sample shows the blocked status of the Raman Tuning due to OTDR running in remote node.

RF/0/RP0/CPU0:ios#show olc raman-tuning Tue Feb 28 10:32:12.648 UTC Controller : Ots0/0/0 Raman-Tuning Status : BLOCKED Blocked Reason Details : [Raman peer response OSRI ON/OTDR LOCK ON failure] Tuning Complete Timestamp : N/A Estimated Max Possible Gain : N/A dB Raman Gain Target : N/A dB Gain Achieved on Tuning Complete : N/A dB

The following sample shows the blocked status of the Raman Tuning due to OTDR running in local node.

```
P/0/RP0/CPU0:ios#sh olc raman-tuning
Tue Feb 28 10:39:18.055 UTC
Controller : Ots0/0/0/0
Raman-Tuning Status : BLOCKED
Blocked Reason Details : [ Raman local OTDR LOCK ON failure ]
Tuning Complete Timestamp : N/A
Estimated Max Possible Gain : N/A dB
Raman Gain Target : N/A dB
Gain Achieved on Tuning Complete : N/A dB
```

Use OTDR for Evaluation of Raman Turn Up

Table 3: Feature History

Feature Name	Release Information	Feature Description
Fiber Health Check for Raman Turn-Up	Cisco IOS XR Release 7.11.1	This feature utilizes OTDR results to evaluate whether the optical fiber and allied components are in good condition to withstand high-power transmission by Raman pump. The automatic check is performed before Raman Turn-up to prevent possible damage to the transmission system during Raman amplification.
		Commands introduced:
		otdr raman-turn-up [enable disable]
		olc start-raman-turn-up
		olc force-raman-turn-up

The Raman turn up algorithm evaluates whether the transmission fiber is in Go-condition or not before turning on the Raman pumps. When you enable OTDR for Raman turn up, OTDR can provide data on loss and reflective anomalies in the fiber along with its location. NCS 1010 software uses this OTDR results to evaluate the Go or No-Go condition of transmission fiber to launch Raman power.

The Raman turn up feature ensures safety by preventing damage to hardware or fiber due to high Raman power, during installation and after every fiber repair. The Raman turn up is triggered during the following events:

- · Span fiber repair
- · Line card cold reload
- Device power cycle

The Raman turn up algorithm uses the following parameters to evaluate the Go condition for fibers:

- · Optical power dissipation
- Magnitude of OTDR loss event
- Critical distance at which a reliable measurement range for OTDR loss event is possible.



Note Fiber End (FE) events are not considered for the evaluation of Raman turn up.



Note

- If only the Raman turn up feature is enabled and the OTDR autoscan feature is disabled, the autoscan will be triggered due to Span Up event, to evaluate the transmission fiber. But it will not be triggered due to Span Down event.
 - If both Raman turn up and OTDR autoscan feature are enabled OTDR autoscan will be triggered due to Span Up and Span Down events.

Configure Raman Turn Up

You can enable or disable OTDR for Raman turn up using the following commands:

configure

optical-line-control

controller ots Rack/Slot/Instance/Port

otdr raman-turn-up [enable | disable]

commit

end

The following are the sample configurations that enable and disable the Raman turn up.

```
RP/0/RP0/CPU0:ios#configure
Thu Nov 2 10:10:53.812 UTC
RP/0/RP0/CPU0:IOS(config)#optical-line-control controller Ots 0/0/0/0
RP/0/RP0/CPU0:IOS(config-olc-ots)#otdr raman-turn-up enable
RP/0/RP0/CPU0:IOS(config-olc-ots)#commit
Thu Nov 2 10:11:20.514 UTC
RP/0/RP0/CPU0:ios#configure
Fri Nov 3 11:12:34.631 UTC
RP/0/RP0/CPU0:IOS(config)#optical-line-control controller Ots 0/0/0/0
RP/0/RP0/CPU0:IOS(config-olc-ots)#otdr raman-turn-up disable
RP/0/RP0/CPU0:IOS(config-olc-ots)#commit
Fri Nov 3 11:13:23.514 UTC
```

View Raman Turn Up Results

You can view the Raman turn up status using **show olc otdr-status** command. The following sample displays the results of Raman turn up evaluation for Go condition.

```
Thu Nov 2 10:35:29.338 UTC

Controller : Ots0/0/0

Auto-scan Start Time : 2023-11-02 10:32:56

OTDR Auto-scan Status : COMPLETED

Status Detail : Completed on Span Up

Raman Turn Up Fiber Check : Success

Optical Span Status : Up

Trigger Event : Span Restore
```

RP/0/RP0/CPU0:ios#show olc otdr-status details Thu Nov 2 10:35:37.969 UTC

RP/0/RP0/CPU0:iOS#show olc otdr-status

: Ots0/0/0/0 Controller Auto-scan Start Time : 2023-11-02 10:32:56 OTDR Auto-scan Status : COMPLETED Status Detail : Completed on Span Up Raman Turn Up Fiber Check : Success Optical Span Status : Up Trigger Event: Span RestoreLast Raman Turn Up Scan Time<td:2023-11-02 10:32:56</td>Last Raman Turn Up Fiber Check: SuccessSpan Restore Last Trigger Event : Span Restore Critical Distance (m) : 10200.00 Raman Turn Up Relaxation Factor (%) : 40 Total Events detected : 0 NO-GO Events List Event Type Legend: NR:Non-Reflective R:Reflective FE:Fiber-End ER:Excess-Reflection EA:Excess-Attenuation | Location (m) | Accuracy (m) | Magnitude Event# | Detected Event(s) (dB) | Min Relaxation Factor (%) The following sample displays the results of Raman turn up evaluation for No-Go condition. RP/0/RP0/CPU0:ios#show olc otdr-status Thu Nov 2 10:19:29.398 UTC Controller : Ots0/0/0/0 Auto-scan Start Time : 2023-11-02 10:19:29 OTDR Auto-scan Status : COMPLETED Status Detail : Completed on Span Up Raman Turn Up Fiber Check : Failed Optical Span Status : Up Trigger Event : Span Restore RP/0/RP0/CPU0:ios#show olc otdr-status details controller Ots 0/0/0/2 Thu Nov 2 10:20:42.173 UTC : Ots0/0/0/2 Controller : 2023-11-02 10:17:49 Auto-scan Start Time OTDR Auto-scan Status Status Dotofi : COMPLETED : Completed on Span Up Status Detail Raman Turn Up Fiber Check : Failed Optical Span Status : Up Trigger Event : Span Restore Last Raman Turn Up Scan Time : 2023-11-02 10:17:49 Last Raman Turn Up Fiber Check : Failed Last Raman Turn Up Fiber Check : Failed Last Trigger Event : Span Restore Critical Distance (m) : 19200.00 Raman Turn Up Relaxation Factor (%) : 1 Total Events detected : 1 NO-GO Events List Event Type Legend: NR:Non-Reflective R:Reflective FE:Fiber-End ER:Excess-Reflection EA:Excess-Attenuation

Event# | Detected Event(s) | Location (m) | Accuracy (m) | Magnitude (dB) | Min Relaxation Factor (%) 1 | R ER | 18217.3200 | 20.21 | -33.77 | 9

```
RP/0/RP0/CPU0:ios#show controllers ots 0/0/0/2 otdr-info rx
Thu Nov 2 10:21:46.246 UTC
Scan Direction: RX
Scan Status: Data Ready
Optical Return Loss: 39.0 dB
SOR file: /harddisk:/otdr/IOS_NCS1010_OTDR_Ots0_0_2_RX_20231102-101952.sor
Total Events detected: 6
Scan Timestamp: Thu Nov 2 10:19:52 2023 UTC
```

Event Type Legend: NR:Non-Reflective R:Reflective FE:Fiber-End ER:Excess-Reflection EA:Excess-Attenuation

Event#		Detected Event(s)		Location(m)		Accuracy(m)		Magnitude(dB)	
Attenua	ti	on/km(dB)							
1		R ER	1	18217.3200		20.21		-33.77	0.19
2	1	NR	1	18217.3200	1	20.21	1	0.35	0.19
3		R ER	1	68668.7600		70.66		-32.17	0.20
4		NR	1	68668.7600		70.66		0.41	0.20
5		R FE ER	1	118869.3000		120.86		-29.21	0.20
6		NR FE	1	118869.3000		120.86		24.50	0.20

Relaxation Factor for Raman Turn Up

You can configure the Relaxation factor (a percentage value) to ignore the reflective event from the fiber evaluation done by the Raman turn-up algorithm. For example, if you configure relaxation factor to 100%, a reflective event at the faceplate (a downward slope in the OTDR traces graph) is ignored from the evaluation that is done by the Raman turn up algorithm. As the location of the reflective event moves away from the faceplate, the need of a relaxation factor reduces to avoid evaluation. After the critical distance, reflective events are ignored by the Raman turn-up algorithm.

Use the command **otdr raman-turn-up relaxation factor** value to configure the relaxation factor.

The following is a sample that configures relaxation factor for the Raman turn-up algorithm:

```
RP/0/RP0/CPU0:IOS#configure
Thu Nov 2 10:24:55.778 UTC
RP/0/RP0/CPU0:IOS(config)#optical-line-control controller Ots 0/0/00
RP/0/RP0/CPU0:IOS(config-olc-ots)#otdr raman-turn-up relaxation-factor 40
RP/0/RP0/CPU0:IOS(config-olc-ots)#commit
Thu Nov 2 10:25:06.733 UTC
RP/0/RP0/CPU0:IOS(config-olc-ots)#end
RP/0/RP0/CPU0:IOS#olc start-raman-turn-up controller Ots 0/0/0/0
Thu Nov 2 10:25:24.143 UTC
```

The following sample displays the Raman turn-up evaluation results with **No-Go** events, after configuring the relaxation factor:

```
RP/0/RP0/CPU0:IOS#show olc otdr-status details
Thu Nov 2 10:21:14.053 UTC
Controller
                                  : Ots0/0/0/0
                                  : 2023-11-02 10:17:50
Auto-scan Start Time
OTDR Auto-scan Status
                                  : COMPLETED
Status Detail
                                  : Completed on Span Up
Raman Turn Up Fiber Check
                                 : Failed
Optical Span Status
                                  : Up
Trigger Event
                                  : Span Restore
Last Raman Turn Up Scan Time
                                  : 2023-11-02 10:17:50
```

Last Raman Turn Up Fiber Check	:	Failed
Last Trigger Event	:	Span Restore
Critical Distance (m)	:	17900.00
Raman Turn Up Relaxation Factor (9	5) :	10
Total Events detected	:	2

NO-GO Events List

Event Type Legend: NR:Non-Reflective R:Reflective FE:Fiber-End ER:Excess-Reflection EA:Excess-Attenuation

Event	#	Detected Event(s)	1	Location (m)	- I	Accuracy (m)	1	Magnitude
(dB)	1	Min Relaxation Factor (%)						
1		R	1	16444.6100	- I	18.44	1	-31.57
	I	15						
3		NR EA	I	43946.8400	I	45.94	Ι	2.79
	1	33						

RP/0/RP0/CPU0:IOS#show controllers ots 0/0/0/0 otdr-info rx Thu Nov 2 10:21:30.227 UTC Scan Direction: RX Scan Status: Data Ready Optical Return Loss: 36.0 dB SOR file: /harddisk:/otdr/IOS_NCS1010_OTDR_Ots0_0_0_RX_20231102-102001.sor Total Events detected: 5 Scan Timestamp: Thu Nov 2 10:20:01 2023 UTC Event Type Legend: NR:Non-Reflective R:Reflective FE:Fiber-End ER:Excess-Reflection EA:Excess-Attenuation

Event#		Detected Event(s)		Location(m)		Accuracy(m)		Magnitude(dB)		
Attenua	ati	on/km(dB)								
1		R		16444.6100		18.44		-31.57		0.19
2		R		43941.6100		45.94		-32.88		0.20
3		NR EA		43946.8400		45.94		2.79		0.20
4	I	R FE	I	120476.5100	I	122.47	I	-34.31	I	0.20
5		NR FE		120476.5100	I	122.47	1	26.00	I	0.20

The following sample displays the Raman turn-up evaluation results with **Go** events, after configuring the relaxation factor:

RP/0/RP0/CPU0:IOS#show olc otdr-status details Thu Nov 2 10:28:47.930 UTC

```
Controller
                                   : Ots0/0/0/0
Auto-scan Start Time
                                   : 2023-11-02 10:25:44
OTDR Auto-scan Status
                                   : COMPLETED
                                   : Completed on Span Up
Status Detail
Raman Turn Up Fiber Check
                                   : Success
Optical Span Status
                                    : Up
Trigger Event
                                    : Manual
Last Raman Turn Up Scan Time : 2023-11-02 10:25:44
Last Raman Turn Up Fiber Check : Success
Last Trigger Event
                                    : Manual
Critical Distance (m)
                                    : 10200.00
Raman Turn Up Relaxation Factor (%) : 40
Total Events detected
                                    : 0
```

```
NO-GO Events List
```

Event Type Legend: NR:Non-Reflective R:Reflective FE:Fiber-End ER:Excess-Reflection EA: Excess-Attenuation Event# Detected Event(s) | Location (m) | Accuracy (m) | Magnitude (dB) | Min Relaxation Factor (%) RP/0/RP0/CPU0:IOS# RP/0/RP0/CPU0:IOS#show controllers ots 0/0/0/0 otdr-info rx Thu Nov 2 10:28:54.026 UTC Scan Direction: RX Scan Status: Data Ready Optical Return Loss: 36.0 dB SOR file: /harddisk:/otdr/IOS NCS1010 OTDR Ots0 0 0 0 RX 20231102-102755.sor Total Events detected: 5 Scan Timestamp: Thu Nov 2 10:27:55 2023 UTC Event Type Legend: NR:Non-Reflective R:Reflective FE:Fiber-End ER:Excess-Reflection EA:Excess-Attenuation Event# | Detected Event(s) | Location(m) | Accuracy(m) | Magnitude(dB) | Attenuation/km(dB) | 16444.6100 | 18.44 1 | R | -31.58 | 0.19 | -33.36 2 | 43941.6100 | 45.94 | 0.20 | R 3 | NR EA 43946.8400 | 45.94 2.77 0.20 | 120618.2800 | 122.61 4 | R FE | -37.87 | 0.20 5 | NR FE | 120618.2800 | 122.61 24.74 | 0.20

Manually Trigger Raman Turn Up

If Raman turn up fiber check fails, RAMAN-TURNUP-FAIL alarm is raised. In this case, if you want to re-trigger Raman turn up check after the failure of previous evaluation, you can trigger using the command **olc start-raman-turn-up controller Ots R/S/I/P**. You can trigger Raman turn up fiber check without causing span up or span down event.

NCS 1010 software accepts the manual trigger of Raman turn up, in the following scenarios, and the OTDR scan will be triggered in Rx direction.

- When HIGH-RX-BR-PWR alarm is present
- · When Raman pumps are configured in APR mode

The following is a sample configuration to trigger the Raman turn up.

RP/0/RP0/CPU0:IOS#olc start-raman-turn-up controller Ots 0/0/0/2 Thu Nov 2 10:28:41.529 UTC

The following sample displays the status of Raman turn up fiber check.

```
RP/0/RP0/CPU0:IOS#show olc otdr-status controller ots 0/0/0/2Thu Nov 2 10:31:33.973 UTCController: Ots0/0/0/2Auto-scan Start Time: 2023-11-02 10:29:01OTDR Auto-scan Status: COMPLETEDStatus Detail: Completed on Span UpRaman Turn Up Fiber Check: Failed
```

Trigger	Event	:	Manual
Optical	Span Status	:	Up

Force Raman Turn Up

If Raman Turn up fiber check fails, RAMAN-TURNUP-FAIL alarm is raised. In this case, you can forcefully turn up the Raman pumps through the command **olc force-raman-turn-up controller ots R/S/I/P**. This action will bypass only Raman turn up algorithm. It will not bypass Raman safety procedure.

NCS 1010 software accepts the forced turn up of Raman pumps, in the following scenarios, But raman pump's status will not be altered.

- When HIGH-RX-BR-PWR alarm is present
- When Raman pumps are configured in APR mode

The following is a sample configuration to forcefully configure the Raman pumps:

```
RP/0/RP0/CPU0:IOS#olc force-raman-turn-up controller ots 0/0/0/0
Thu Nov 2 10:12:26.668 UTC
RP/0/RP0/CPU0:IOS#show olc otdr-status
Thu Nov 2 10:12:34.130 UTC
                                 : Ots0/0/0/0
Controller
Auto-scan Start Time
                                  : 2023-11-02 10:02:26
OTDR Auto-scan Status
                                  : COMPLETED
Status Detail
                                  : Completed on Span Up
Raman Turn Up Fiber Check
                                 : Forced
Optical Span Status
                                 : Up
                                 : Manual
Trigger Event
```