



# Raman Tuning

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

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## 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.

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

| 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.   |

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.

**Note**

- If Raman back reflection (BR) is high, Raman tuning turns the Raman pumps off and goes into blocked state. High BR can damage the optics. When you clear the high BR and BR is at acceptable levels, the 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 : Ots0/0/0/0
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
```

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 : Ots0/0/0/0
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
```

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 : Ots0/0/0/0
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
4              1470.00         127.50
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 *pumpvaluevalue*** 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

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 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)#commit
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 1: Feature History**

| Feature Name                | Release Information         | Description   |
|-----------------------------|-----------------------------|---|
| Raman Tuning with OTDR Lock | Cisco IOS XR Release 7.10.1 | <p>If the OTDR scan and Raman tuning are performed on the same fiber simultaneously, the OTDR reports unexpected results.</p> <p>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.</p> |

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 OTDR](#).

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

```
RP/0/RP0/CPU0:ios#show olc raman-tuning
Tue Feb 28 10:32:12.648 UTC

Controller                : Ots0/0/0/0
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 2: Feature History

| Feature Name                         | Release Information         | Feature Description   |
|--------------------------------------|-----------------------------|---|
| Fiber Health Check for Raman Turn-Up | Cisco IOS XR Release 7.11.1 | <p>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.</p> <p>Commands introduced:</p> <p><b>otdr raman-turn-up [enable   disable]</b></p> <p><b>olc start-raman-turn-up</b></p> <p><b>olc force-raman-turn-up</b></p> |

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.

```
RP/0/RP0/CPU0:ios#show olc otdr-status
Thu Nov  2 10:35:29.338 UTC

Controller                               : Ots0/0/0/0
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
```

```

Controller                : Ots0/0/0/0
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
Last Raman Turn Up Scan Time : 2023-11-02 10:32:56
Last Raman Turn Up Fiber Check : Success
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

| Event# | Detected Event(s)         | Location (m) | Accuracy (m) | Magnitude |
|--------|---------------------------|--------------|--------------|-----------|
| (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

```

```

Controller                : Ots0/0/0/2
Auto-scan Start Time      : 2023-11-02 10:17:49
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 10:17:49
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_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) |      |
|--------------------|-------------------|-------------|-------------|----------------|------|
| Attenuation/km(dB) |                   |             |             |                |      |
| 1                  | R ER              | 18217.3200  | 20.21       | -33.77         | 0.19 |
| 2                  | NR                | 18217.3200  | 20.21       | 0.35           | 0.19 |
| 3                  | R ER              | 68668.7600  | 70.66       | -32.17         | 0.20 |
| 4                  | NR                | 68668.7600  | 70.66       | 0.41           | 0.20 |
| 5                  | R FE ER           | 118869.3000 | 120.86      | -29.21         | 0.20 |
| 6                  | NR FE             | 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 0/0/0/0
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
Auto-scan Start Time                     : 2023-11-02 10:17:50
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 (%)  : 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) | Location (m) | Accuracy (m) | Magnitude (dB) |
|--------|-------------------|--------------|--------------|----------------|
| 1      | R                 | 16444.6100   | 18.44        | -31.57         |
| 3      | NR EA             | 43946.8400   | 45.94        | 2.79           |

```
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_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) | Attenuation/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      | R FE              | 120476.5100 | 122.47      | -34.31         | 0.20               |
| 5      | NR FE             | 120476.5100 | 122.47      | 26.00          | 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
Status Detail             : Completed on Span Up
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) |
|--------|-------------------|-------------|-------------|---------------|--------------------|
| 1      | R                 | 16444.6100  | 18.44       | -31.58        | 0.19               |
| 2      | R                 | 43941.6100  | 45.94       | -33.36        | 0.20               |
| 3      | NR EA             | 43946.8400  | 45.94       | 2.77          | 0.20               |
| 4      | R FE              | 120618.2800 | 122.61      | -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 0/0/0/2
```

```
Thu Nov 2 10:31:33.973 UTC
```

```
Controller                : Ots0/0/0/2
Auto-scan Start Time      : 2023-11-02 10:29:01
OTDR Auto-scan Status     : COMPLETED
Status Detail             : Completed on Span Up
Raman Turn Up Fiber Check : Failed
```

```
Optical Span Status      : Up
Trigger Event           : Manual
```

## 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
```

```
Controller                : Ots0/0/0/0
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
Trigger Event             : Manual
```

