



# OFDMA OUDP Leak Detection Configuration

This document describes how to configure OFDMA OUDP leak detection on the Cisco cBR Series Converged Broadband Router.

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## OUDP Leakage Detection

Cable operators can now measure cable signal leaks by initiating the Orthogonal Frequency-Division Multiple Access (OFDMA) Upstream Data Profile (OUDP) leakage test sessions on one or more upstream OFDMA channels simultaneously. OUDP test sessions are initiated using CLI commands in the config and exec modes.

These commands direct modems to generate a test burst, which enables operators to locate leaks in the Federal Aviation Administration (FAA) frequency range above 100MHz. Operators use handheld or vehicle-based devices to detect leaks.

### Importance of Detecting Signal or RF Leakage

Cable operators desire to increase upstream bandwidth by utilizing high split diplexers. These diplexers increase the upstream frequency range to 204 MHz, which allows the cable modem to transmit in the Federal Aviation Administration (FAA) frequency range above 100MHz. This means that the 118 MHz to 136.975 MHz aeronautical band now overlaps the upstream cable frequency range. When Radio Frequency (RF) cables are damaged or cable faults such as ground failures or shielding failures occur, it may cause electromagnetic energy to escape from the transmission line into the environment. This energy is referred to as RF leakage. Any cable signal leak may interfere with the FAA frequency range. Rectifying upstream RF leakage ensures compliance with FCC guidelines.

## Methods to Configure OUDP Leak Detection

There are two ways to configure the burst sessions on CBR-8 routers:

- In the Configuration mode, you can configure one or more OUDP burst profiles, and associate the burst profiles with persistent OUDP test schedules.
- In the Privileged Exec mode, you can execute commands to create a burst session, however, these commands are not persistent across reboots.

## Supported Line Cards

The OUDP leak detection feature is supported on the following line cards:

First Supported Release	Supported Line Cards
17.9.1w	CBR-LC-8D31-16U31
17.6.1z	<ul style="list-style-type: none"> <li>• CBR-CCAP-LC-40G-R</li> <li>• CBR-CCAP-LC-G2-R</li> </ul>

## OUDP Leakage Detection Test Sessions

OUDP test sessions are created in the Exec CLI or Configuration mode and are maintained on the SUP and CLC line cards. A test session identifies a list of modems that will participate in the OUDP burst test, the frequency range to be tested, the transmit burst parameters, and the start and stop time of the test. Two types of OUDP test sessions are managed by the cBR-8, parent test sessions and child test sessions.

A parent test session is created on the SUP using Exec or Configuration CLI commands and is identified by a unique parent session Id. parent test sessions are set up to include the frequency range to be tested, the transmit burst parameters, and a cable modem mac-address list and/or an interface to be tested.

A child test session is created on the line card, has a child session Id that is unique to the slot and are associated with a parent test session. There can be 0, 1 or many child test sessions associated with a parent test session depending on the method used to identify the participating modem list. The child test sessions are set up with the minislots frequency range and transmit burst parameters corresponding to their parent test session. A unique child test session will be created for each OFDMA channel participating in the OUDP test.

All OUDP test sessions transition through a series of states as the test progresses.

Status/State	Description
CONFIG	Identifies a parent test session that is partially configured through Exec CLI commands.
PENDING	Identifies a parent or child test session that is fully configured, either by Exec CLI or Configuration mode, and whose pretest setup time has not been reached yet.
PRETEST_SETUP	Identifies a parent or child test session that has reached the pretest setup state. The pretest setup time is a configurable number of seconds prior to the test start time.
ACTIVE	Identifies a parent or child test session that has reached its test session start time.
CLEANUP	Identifies a parent or child test session that has reached its test session stop time, or has been manually stopped through the CLI.
COMPLETE	Identifies a parent or child test session that has ended. Per modem OUDP burst stats are retained in completed child test sessions.

The progression of an OUDP Test Session includes the following steps:

1. The Parent Test Session is fully set up on the SUP through the Exec CLI or Configuration commands.
2. At Pre-Test Setup time—a configurable time prior to the test start:



**Note** The default time is 1 minute.

- a. The parent test session is distributed to all cable line cards.
- b. The cable line cards determine whether they have any OFDMA channels that match the parent test parameters.
- c. The cable line cards create a unique child test session for each OFDMA channel with online D3.1 CMs based on the parent test parameters.
- d. The child test sessions are notified back to the SUP from the cable line card.
- e. Each participating CM is assigned a unique OUDP Test Session ID (SID).

- f. A DBC-REQ message is sent to each CM to set up its OUDP Test SID.
        - g. The US Scheduler receives the test parameters for Burst Duration, Burst Gap, and Cycle Time.
        - h. The US Scheduler receives the ordered list of SIDs to be scheduled for the OUDP test cycle.
  3. At the start of the test, the US Scheduler begins granting on the OUDP Test SIDs.
  4. Modems respond to the grants by transmitting the OUDP Test packets as defined in the MULPI specification. Modem bursts are periodic based on the configured OUDP test cycle and always occur at a fixed time-offset from the start of a test cycle.
  5. Modem test bursts are received by the upstream PHY and processed by the upstream FPGA. The PHY and FPGA collect the stats for burst no energy, bursts received, and bytes received.
  6. Stats collection for each SID occurs periodically, every 10 seconds, on the cable line card and are forwarded to the SUP.
  7. The test continues until the test stop time is reached:
    - a. Final Stats collection occurs for each CM.
    - b. The US Scheduler SID list will be deleted.
    - c. The US Scheduler OUDP minislot assignments will be cleared.
    - d. Each modem will be sent the OUDP\_DISABLE\_SID to clear its OUDP Test SID.
    - e. The OUDP test SIDs will be deallocated and deactivated and returned to the SID pool.
  8. Test Session stats can be reviewed through CLI show commands.
  9. Test Sessions are manually deleted or deleted automatically at the specified Expiry age.

## OU DP Leakage Detection Test Procedure

### OU DP Leakage Detection Test Procedure

You can configure a OUDP leakage detection test with the following parameters:

- OFDMA channel parameters
- Subcarrier spacing
- Cyclic prefix
- Frequency of subcarrier 0
- Symbols per frame

The OUDP test commands are configured through exec CLI (test session) and config CLI (burst profile) and are used for the following actions:

1. Create an OUDP test session or burst profile.
2. Configure transmit burst duration, burst gap, and cycle gap or cycle-time.
3. Configure the frequency range of the OUDP test.

4. Assign modems to OUDP test through an upstream controller, MAC domain, or list of modem's MAC addresses.
5. Schedule a start time or end time for the OUDP test.

You can create a parent session through exec or config CLI and the child session is automatically created when the parent session is activated.

## OUDP Parent Test Sessions

An OUDP parent test session is a test session that is created on the SUP to run at a specific time, over a specific frequency range, using specific transmit burst parameters, and that includes a specific set of cable modems. When created using EXEC mode, the parent test session is not persistent. In other words, the Exec mode OUDP test session will be lost if the system is reloaded. To create a persistent OUDP test session the Configuration CLI mode should be used, and the configuration should be saved to startup-config.

A parent test session must include either a CM-List or an interface or both. The CM-List consists of a list of modem mac-addresses. The system supports a maximum of 400 mac-addresses in the CM-List. Mac-addresses included in the CM-List may be from a single slot/single OFDMA channel, or from several different slots on different OFDMA channels. Mac-addresses setup in the parent CM-List are not validated.

A parent test session may also include an interface. The interfaces supported include a mac-domain (for example Cable1/0/0), a controller (for example controller upstream-cable 1/0/4), or a controller channel (for example controller upstream-cable 1/0/4 us-channel 12). When both a CM-List and an interface are setup in a parent test session, the list of modems that will participate in the test will be the logical AND of the CM-List with the modems on the interface.

Multiple parent test sessions can be setup simultaneously. The cBR-8 will manage all parent test sessions appropriately based on their configured start and stop times. Parent test sessions are assigned Ids in the 1 – 9999 range. If a multiple parent test sessions exist that would otherwise include the same OFDMA channels and/or the same cable modems, the first parent test session to start will win. Subsequent overlapping parent test sessions will start on time, but will not include a child test session for an OFDMA channel that is already active in another parent test session.

Exec CLI commands are provided to manage parent test sessions. When commands like stop and delete are used on the parent test session, all related child test sessions will also be stopped and deleted.

When Exec CLIs are used to create a parent test session, the admin is allowed to choose the parent test session Id, which must be in the range 1-9999. When the cBR-8 restores persistent OUDP test sessions, it will create parent test sessions using the next available parent test session Id, starting from 1. Duplicate parent test session Ids are not allowed.

You can create a session by using the **cable oudp-leak-detect session-id <id> session create** command at the privileged EXEC mode. The specified ID is referred to as the parent ID.

## OUDP Child Test Sessions

The cBR-8 routers create child test sessions, automatically, as needed. The administrator cannot create the child test sessions directly. A child test session is created for each OFDMA channel that will be participating in an OUDP test. When the child test session is created, it is assigned a unique child session ID. Child session IDs are assigned a value that corresponds to the slot on which they originated.

Slot	Child Session ID Range
0	100,000 – 109,999
1	10,000 – 19,999
2	20,000 – 29,999
3	30,000 – 39,999
6	60,000 – 69,999
7	70,000 – 79,999
8	80,000 – 89,999
9	90,000 – 99,99

For the child test session to be created, it must have at least one valid DOCSIS3.1 cable modem online and that modem must also be using the OFDMA channel.



**Note** If the modem is reporting the OFDMA channel in partial service, it still joins and participates in the OUDP test. Grants will be issued to the modem, but as long as the modem reports partial-service on the OFDMA channel, it is possible that the **BurstNoEnergyRx** stat is incremented.

When a child test session is created from a parent test session, the frequency range of the parent test session is translated into a frequency range aligned with the OFDMA channel minislots that are inclusive of the parent frequency range. Thus, the child test session detailed information may show a minislot frequency range larger than the parent test session frequency range.

The child test session also inherits the transmit burst parameters of the parent test session. These values should always be identical to the parent.

Child test sessions also contain CM-List and interface configuration details. The interface of a child test session will always be a controller upstream-cable us-channel particular to a single OFDMA channel. The CM-List of a child session will only include the cable modems particular to the OFDMA associated with the child test session. By default, cable modems of a child test session are assigned burst positions within the OUDP test cycle starting from position 0. However, an option **strict-cm-list** exists that enforces the parent CM-List position on the child test sessions. For example, when the **strict-cm-list** option is used, a modem in CM-List position 5 of the parent CM-List appears in position 5 of the corresponding child test session CM-List.



**Note** The **strict-cm-list** position should only be used if the exact time offset of the CM must be maintained within the OUDP test cycle. The use of this option can result in unused burst positions within the OUDP test.

Mac-addresses in the parent test session are validated as they are assigned to child test sessions. Mac-addresses in the CM-List that are invalid format, are not known on the system, are valid but the modem is offline, are not D3.1 cable modems, or are D3.1 cable modems that are not using an OFDMA channel will not participate in the OUDP test.

This show command output shows child sessions IDs and their associated parent ID:

Parent	Child	Interface	Modems	Status	Start-Time	Stop-Time
99	-	-	1	ACTIVE	2022-07-23,20:05:12.0,-5:00	never
99	10006	Ca1/0/0/U6	1	ACTIVE	2022-07-23,20:05:12.0,-5:00	never
99	10008	Ca1/0/2/U14	2	ACTIVE	2022-07-23,20:05:12.0,-5:00	never
99	90007	Ca9/0/0/U6	2	ACTIVE	2022-07-23,20:05:12.0,-5:00	never
99	90008	Ca9/0/1/U6	2	ACTIVE	2022-07-23,20:05:12.0,-5:00	never
99	90009	Ca9/0/30/U6	1	ACTIVE	2022-07-23,20:05:12.0,-5:00	never
99	90010	Ca9/0/31/U6	2	ACTIVE	2022-07-23,20:05:12.0,-5:00	never

## Persistent OUDP Test Sessions

OUDP test sessions set up using the Configuration CLI mode are persistent and known as scheduled OUDP test sessions. The parameters and options for configuration mode are similar to the commands offered by the Exec CLI, except for the **cm-add** or **cm-delete** Exec commands. In configuration mode, the CM-List is loaded from a file located on the hard drive, bootflash, or usb IOS file systems.

There are two types of scheduled OUDP test sessions.

- Date-Time
- Recurring Weekday

Date-Time schedules are configured to start and stop at a specified calendar date-and-time. The format follows the OSSI specification for Date-And-Time Strings:

```
[YY]YY-[M]M-[D]D, [h]h:mm:ss.0, [+|-] [T]T:ZZ
```

Example: 2022-07-23,22:31:44.0,-5:00

In addition, Date-Time schedules support the option for start 'now' and stop 'never'. These options are useful to reestablish OUDP test sessions automatically after a system reload.

Recurring Weekday schedules allow the administrator to create a scheduled OUDP test session that runs on specific days of the week, and during specific times of the day. The time-of-day is specified using 24-hour military time, and is relative to the local timezone of the cBR-8. Upon completion, a Recurring Weekday test will be rescheduled to start on the next subsequent weekday at the configured start time.

Persistent OUDP test sessions are configured by first creating an OUDP Burst Profile. The burst profile includes the test session parameters for frequency range, transmit burst parameters, interface and/or CM-List. Each OUDP burst profile is assigned a unique ID, and multiple burst profiles are supported.

After the burst profile is configured, a scheduled OUDP test session can be configured. The OUDP schedule binds the burst profile ID to the Date-Time or Recurring Weekday schedule. A single OUDP burst profile may be configured under one or more OUDP schedules. When the OUDP burst profile and schedule configurations are complete, an OUDP parent test session is created and associated with the OUDP schedule. The assigned parent test session ID can be shown using the **show cable oudp-leak-detect schedules** command.

### CM-List Format

Configured OUDP test sessions may include a CM-List that is read from a file on harddisk, bootflash, or usb0 IOS file systems. The format rules for the file are as follows:

- File type is ASCII text.
- Enter one mac-address per line.
- Mac-addresses may be either **aaaa.bbbb.cccc** or **aa:bb:cc:dd:ee:ff** format.

- Blank lines are permitted.
- Comment lines are permitted and must start with # as the first character of the line.
- Comments or other characters should not follow MAC addresses.
- Include a <CR> after the final MAC address in the file.

### Example

```
#
##### This is an example OUDP CM-List file.#####

# c1/0/0
4800.33ef.00fa
4800.33ef.014a
4800.33ef.0142
4800.33ef.0b0e

# c1/0/2
1459.c0f8.5210
4800.33ef.0d6a
4800.33ee.ff9a
4800.33ea.70c2
4800.33ea.71ba
```

### CM-List Wildcard

The CM-List supports a wildcard mac-address. The wildcard mac-address is ffff.ffff.ffff. When this mac-address is included in the CM-List (either Exec or Config created), it matches all eligible cable modems during child test session creation.

The wildcard CM-List is the easiest method for starting an OUDP test session on the entire cBR-8. All D3.1 modems using an OFDMA channel that matches the OUDP frequency range will be assigned to a child test session and will participate in the OUDP test session.

## OUUDP Late Modem Joining

The cBR-8 provides a feature for D3.1 modems to join an OUDP test session after the test session has started. Cable modems that are offline at the start of a test, but otherwise intended to participate in the OUDP test session, are added to the OUDP test session after they register, provided:

1. The modem mac-address is included in the CM-List of the parent test session.
2. The parent test session includes the interface of the OFDMA channel that the modem is using.

A test session configured with only a CM-List:

- Allows late modem joining for modems whose mac-addresses are listed within the CM-List.
- Allows all eligible modems that contain the wildcard mac address ffff.ffff.ffff to join the test session.

A test session configured with only an interface will allow late modem joining only for new modems on the specified interface.

While an OUDP test session is active, the OUDP process will periodically check every 15 minutes to determine if new modems can be added to an existing test.



## OUDP System Boot Holdoff

The cBR-8 router provides a feature for OUDP, where persistent OUDP test sessions will not be started until the system is up and the OFDMA channel reach UP state with cable modems online. The amount of time to wait after system boot-up is configurable. The persistent test sessions restored from startup-config will not be distributed to the cable line cards and child test sessions will not be created until the system-boot-holdoff time has elapsed.



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**Note** The default **system-boot-holdoff** time is 15 minutes.

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## OUDP Test Expiration

The cBR-8 retains OUDP test sessions for a period of time after they have reached the COMPLETE state. This allows time for the administrator to retrieve CM burst statistics for post processing and analysis. However, OUDP test sessions occupy memory on both the SUP and cable line card processors, so they should be deleted in a timely fashion. To facilitate their deletion, the cBR-8 automatically deletes expired OUDP test sessions when they have aged beyond the globally configured expire-age. By default this is 3 days, and the value is configurable from 1 to 7 days.

## OUDP Test Session High Availability

The cBR-8 supports the high availability feature for OUDP leakage testing.

Supervisor High Availability (SUP-HA) is supported, with child test session CM burst stats restored to the newly active SUP shortly after switchover.

Line Card High Availability (LCHA) is also supported for OUDP leakage testing. After LCHA switchover, CM burst stats will continue to be collected and reported up to the SUP.

CM burst stats are reported periodically every 10 seconds, so it may take up to 20 seconds after switchover for stats to begin incrementing.

## MIB Considerations

- **SUPHA**—All the test session values are calculated on the line card without interruption. The configuration across a switchover is maintained and after the leakage detection process restarts.

For a high availability environment, the MIBs are available only after the newly active SUPHA initialization completes with the SNMP engine.

- **LCHA**—The test session values are available only after the successful initialization of the newly active line card's stats engine.
- **LCPR**—For a High Availability environment, all the test session values are calculated on the line card without interruption.

The MIB entries are available after the process restart.

## EXEC Mode Command Summary

EXEC CLI Command	Description
<b>cable oudp-leak-detect session-id &lt;parent id&gt; session create</b>	Creates a new OUDP Parent test session assigning a new parent session ID.
<b>cable oudp-leak-detect session-id &lt;parent id&gt; session delete</b>	Deletes the specified OUDP Parent test session and frees the parent session ID and all children sessions and IDs.
<b>cable oudp-leak-detect session-id &lt;parent id&gt; session stop</b>	Stops the specified OUDP test session in ACTIVE state. Stopping a parent session stops all child sessions.
<b>cable oudp-leak-detect session-id &lt;parent id&gt; session reset</b>	Resets an OUDP Parent Test Session. Removes all child sessions, deletes all stats, clears the parent start and stop time, and sets the session status back to CONFIGURING. This CLI is intended to allow a COMPLETED parent test session to be reused.
<b>cable oudp-leak-detect session-id &lt;parent id&gt; start datetime &lt;datetime&gt; stop datetime &lt;datetime&gt;</b>	Date-and-Time Format [YY]YY-[M]M-[D]D,[h]h:mm:ss.0,[+ -][T]T:ZZ
<b>cable oudp-leak-detect session-id &lt;parent id&gt; start now stop never</b>	In lieu of specifying the Date-and-Time format, the option start <b>now</b> and stop <b>never</b> are supported.  A test session that is stop <b>never</b> must be manually stopped or deleted by the administrator.
<b>cable oudp-leak-detect session-id &lt;parent id&gt; frequency start &lt;hertz&gt; end &lt;hertz&gt;</b>	Sets the start and end frequencies of the OUDP parent test session. The OUDP child test session includes all minislots, which include the parent test session frequency range.  The valid range is 4500000-204500000 Hz.

EXEC CLI Command	Description
<b>cable oudp-leak-detect session-id &lt;parent id&gt; transmit burst duration &lt;3..50&gt; gap &lt;0..50&gt; [[cycle-gap &lt;0..400&gt;] [fixed-bursts-per-cycle &lt;1..400&gt;]]   cycle-time &lt;milliseconds&gt;</b>	<p>Sets the OUDP parent test session OUDP transmit burst parameters for burst duration, burst gap and either cycle-gap or cycle-time.</p> <p>Cycle-Gap complies with the OSSI specifications for OUDP testing. The OUDP test cycle repeat interval is measured in frames.</p> <p>Cycle-Time provides a time-based repeat interval for the OUDP test cycle that is compatible with RF-detectors requiring a minimum repeat burst interval.</p> <ul style="list-style-type: none"> <li>• The valid range for burst-duration is 3-50 frames.</li> <li>• The valid range for burst-gap is 0-50 frames.</li> <li>• The valid range for cycle-gap is 0-400 frames.</li> <li>• The valid range for cycle-time is 100-20000 msec.</li> </ul>
<b>cable oudp-leak-detect session-id &lt;id&gt;controller upstream-cable &lt;slot/subslot/ctrlr&gt; [us-channel &lt;us-chan&gt;]</b>	<p>Sets the OUDP parent test session interface to specify an upstream-cable controller, or upstream-cable controller channel.</p> <p>A controller upstream-cable interface may expand to include up to two OFDMA channels/child test session.</p> <p>A controller upstream-cable channel specifies a single OFDMA channel/child session.</p>
<b>cable oudp-leak-detect session-id &lt;id&gt; interface Cable &lt;slot/subslot/md-idx&gt;</b>	<p>Sets the OUDP parent test session interface to specify a mac-domain.</p> <p>A Cable MAC domain interface may expand to include up to four OFDMA channels/child sessions.</p>
<b>cable oudp-leak-detect session-id &lt;parent-id&gt; cm-add &lt;mac-address&gt;</b>	<p>Adds the MAC address to the parent test session CM-List.</p>
<b>cable oudp-leak-detect session-id &lt;parent-id&gt; cm-delete &lt;mac-address&gt;</b>	<p>Removes the MAC address from the parent test session CM-List.</p>
<b>cable oudp-leak-detect session-id &lt;parent-id&gt;strict-cm-list</b>	<p>Requires the child test sessions to preserve the CM-List position of modems in the parent test session CM-List.</p>
<b>cable oudp-leak-detect session-id &lt;parent-id&gt; reserved-probe-pct &lt;0-50&gt;</b>	<p>Reserves a percentage of frames in the OUDP test cycle for OFDMA channel upstream profile management probes.</p> <p>The default value is 3%.</p>

EXEC CLI Command	Description
<b>cable oudp-leak-detect session-id &lt;parent-id&gt; clear</b> [ <b>cm-list</b>   <b>cm-stats</b>   <b>interface</b>   <b>strict-cm-list</b> ]	<p>Clears the specified item.</p> <p><b>cm-list</b>—Removes all modems from the CM-List of an OUDP parent test session in CONFIG or PENDING state.</p> <p><b>interface</b>—Removes the interface config from a OUDP parent test session in CONFIG or PENDING state.</p> <p><b>strict-cm-list</b>—Removes the <b>strict-cm-list</b> setting from a OUDP parent test session in CONFIG or PENDING state.</p> <p><b>cm-stats</b>—Clears the accumulated burst statistics of all OUDP child test session in ACTIVE state. Stats will immediately restart accumulating from starting from 0.</p>
<b>cable oudp-leak-detect session-id &lt;parent-id&gt; session preview</b>	<p>Allows the system admin to preview the child test session create from an OUDP parent test session prior to the pretest setup time.</p> <p>Child test sessions and modems are created based on the current state of the system, and are not guaranteed to be the same at the actual pretest setup time when child test sessions are rebuilt for the actual test start.</p>
<b>cable oudp-leak-detect session-id &lt;parent-id&gt; session supha-recover</b>	<p>Provides a mechanism for the child test sessions to be restored to the Active SUP. Existing child test sessions are deleted and all cable line cards update the SUP with their current child test sessions.</p> <p>Not recommended for normal system operational use.</p>
<b>cable oudp-leak-detect delete all</b>	<p>Deletes all OUDP test sessions regardless of state.</p> <p><b>Note</b> Warning: Once deleted all CM burst stats are lost.</p>
<b>cable oudp-leak-detect clear system-boot-holdoff</b>	<p>Allows the administrator to manually terminate the OUDP <b>system-boot-holdoff</b> timer. OUDP test sessions are started based on the state of the OFDMA channels and modems.</p>
<b>cable oudp-leak-detect session-id &lt;parent-id&gt; probe-in-burst-gap &lt;enable disable&gt;</b>	<p>Allow/Disallow OFDMA channel probes in OUDP burst gap frames.</p> <p>This command is introduced in the Cisco IOS XE Bengaluru 17.6.1z1 release.</p>

## Global Configuration Mode Command Summary

Global Config CLI Command	Description
<b>cable oudp-leak-detect pre-test-setup-time</b> <seconds>	The valid range is 10-300 seconds. The default value is 60 seconds.
<b>cable oudp-leak-detect expire-age</b> <days>	The valid range is 1-7 days. The default value is 3 days.
<b>cable oudp-leak-detect system-boot-holdoff</b> <minutes>	The valid range is 10-120 minutes. The default value is 15 minutes.
<b>cable oudp-leak-detect reserved-probe-pct</b> <percentage>	The valid range is 0-50 percent. The default value is 3 percent.
<b>cable oudp-leak-detect ccap-modem-select</b> <b>allow-late-cm-join</b>	Enables modems to join child test sessions after they reach the active state. Normal rules for CM-List and interface modem participation apply.
<b>cable oudp-leak-detect adjust-test-time</b> [all icmts none]	<p>OUUDP tests are scheduled based on the PTP/GPS clock time. The cable line card scheduler uses the DOCSIS frame clock. This command enables a timing adjustment between the GPS clock and the DOCSIS clock. Normally RPHY will not require the time adjustment, whereas iCMTS does.</p> <p>The default value is icmts.</p>
<b>cable oudp-leak-detect probe-in-burst-gap</b>	<p>Allow OFDMA channel probes in OUDP burst gap frames. This option is enabled by default.</p> <p>This command is introduced in the Cisco IOS XE Bengaluru 17.6.1z1 release.</p>

## Configuration Mode Command Summary

Config CLI Command	Description
<b>cable oudp-leak-detect burst-profile</b> <#>	<p>Creates a OUDP burst profile and enters the burst profile configuration sub-mode. See the <a href="#">OUUDP Burst-Profile Sub-Mode Config CLI Commands</a> for more information.</p> <p>The valid range is 1-9999.</p>
<b>cable oudp-leak-detect schedule burst-profile</b> <#> start datetime <datetime>	Creates a persistent one-time scheduled test session.
<b>cable oudp-leak-detect schedule burst-profile</b> <#> start now stop never	Creates a persistent 24x7 OUDP test session.

Config CLI Command	Description
<b>cable oudp-leak-detect schedule recurring weekday &lt;days&gt; start timeofday &lt;time&gt; stop timeofday &lt;time&gt;</b>	Creates a persistent weekly test session that runs at the same time, each day, on configured weekdays (“SuMoTuWeThFrSa”).  One or more weekdays, for example, “ <b>MoWeFr</b> ” must be specified.

## OUDP Burst-Profile Sub-Mode Config CLI Commands

OUDP Burst-Profile Sub-Mode Config CLI Commands	Description
<b>transmit burst duration &lt;burst-dur&gt; gap &lt;burst-gap&gt; [cycle-gap &lt;cycle-gap&gt; cycle-time &lt;cycle-time&gt;]</b>	Sets the OUDP parent test session and OUDP transmit burst parameters for burst duration, burst gap, and either cycle-gap or cycle-time.  Cycle-Gap complies with the OSSI specifications for OUDP testing. The OUDP test cycle repeat interval is measured in frames.  Cycle-Time provides a time-based repeat interval for the OUDP test cycle that is compatible with RF-detectors requiring a minimum repeat burst interval. <ul style="list-style-type: none"> <li>• The valid range for burst-duration is 3-50 frames.</li> <li>• The valid range for burst-gap is 0-50 frames.</li> <li>• The valid range for cycle-gap is 0-400 frames.</li> <li>• The valid range for cycle-time is 100-20000 msecs.</li> </ul>
<b>frequency start &lt;start-hz&gt; end &lt;end-hz&gt;</b>	Sets the start and end frequencies of the OUDP parent test session. The OUDP child test session includes all minislots, which include the parent test session frequency range.  The valid range is 4500000-204500000 Hz.
<b>controller upstream-cable &lt;slot/subslot/ctrlr&gt; [us-channel &lt;ofdma-us-channel&gt;</b>	Sets the OUDP parent test session interface to specify an upstream-cable controller, or upstream-cable controller channel.  A controller upstream-cable interface may expand to include up to two OFDMA channels/child test session.  A controller upstream-cable channel specifies a single OFDMA channel/child session.
<b>interface cable &lt;slot/subslot/md-idx&gt;</b>	Sets the OUDP parent test session interface to specify a mac-domain.  A Cable MAC domain interface may expand to include up to four OFDMA channels/child sessions.
<b>cm-list &lt;IOS-filesystem:filename&gt;</b>	Configure the OUDP parent test session to load the CM-List from an IOS filesystem file. The harddisk, bootflash, and usb0 file systems are supported. See the <a href="#">CM-List Format</a> for the text file format.

OU DP Burst-Profile Sub-Mode Config CLI Commands	Description
<b>strict-cm-list</b>	Requires the child test sessions to preserve the CM-List position of modems in the parent test session CM-List.
<b>reserved-probe-pct &lt;0-50&gt;</b>	Reserves a percentage of frames in the OUDP test cycle for OFDMA channel upstream profile management probes. When configured under the OUDP burst-profile, this value overrides the global configuration parameter of the same name.  If not configured, burst-profiles use global default values.
<b>probe-in-burst-gap</b>	Allow OFDMA channel probes in OUDP burst gap frames. If not configured, burst-profiles use global default values.  This command is introduced in the Cisco IOS XE Bengaluru 17.6.1z1 release.

## Show OUDP Command Summary

Show Command	Description
<b>show cable oudp-leak-detect settings</b>	Displays the values of OUDP global configuration parameters and the CBR-8 capabilities (specifically the OSSI <b>SupportsNumBurstsNotReceived</b> —We support <b>RxNoEnergy</b> stat.)
<b>show cable oudp-leak-detect test-sessions</b>	Displays summary of the test session that includes parent/child IDs, start/stop times, interfaces, and status.
<b>show cable oudp-leak-detect session-id &lt;id&gt; detail</b>	Displays the parent or child test session details.  Includes OSSI information pertaining to: <ul style="list-style-type: none"> <li>• LeakageDetectionTestSessionStatus</li> <li>• LeakageDetectionTestChannelStatus</li> </ul>
<b>show cable oudp-leak-detect session [id &lt;id&gt;] cm-stats</b>	Displays the child test session CM stats for BurstGrants, BurstRx, BurstNoEnergyRx, and BytesRx.  Includes OSSI information pertaining to: <ul style="list-style-type: none"> <li>• LeakageDetectionTestSessionStats</li> </ul> All child session CM stats are displayed when the parent session-id is entered.
<b>show cable oudp-leak-detect system-boot-holdoff</b>	Time delay during system boot to allow OFDMA channels to reach UP state and CMs to reach online. After this holdoff time expires, OUDP test sessions will begin.

Show Command	Description
<b>show cable oudp-leak-detect burst-profiles</b>	Displays persistent OUDP burst profiles configured in NVRAM (startup-config).
<b>show cable oudp-leak-detect schedules</b>	Displays persistent OUDP schedules configured in NVRAM (startup-config).
<b>show cable oudp-leak-detect rf-detector</b>	Displays currently available OFDMA channels and frequencies in the system. Useful for identifying OFDMA channel participation for a given OUDP frequency range.
<b>show cable oudp-leak-detect docsis-clock slot &lt;0-9&gt;</b>	Displays the timing reference information of the SUP and selected cable line card slot.

## Related Show Command Summary

Related Show CLI Commands	Description
<b>show cable modem &lt;mac-address&gt; verbose   incl OUDP</b>	Displays CM verbose information containing new lines for OUDP test participation.
<b>scm &lt;mac-address&gt; qos</b>	Displays information about the OUDP Burst Test (OBT) SID.
<b>show controller upstream-Cable &lt;slot&gt;/0/&lt;ctrlr&gt; us-channel &lt;12-15&gt;   incl OUDP</b>	Displays the Last Enroll Error for an OFDMA channel (if available).
<b>show controller upstream-Cable &lt;slot&gt;/0/&lt;ctrlr&gt; us-channel &lt;12-15&gt; cdm-ump   i OBT</b>	Displays the UMP start and end minislot values.
<b>show interface cable &lt;slot&gt;/0/&lt;md_idx&gt; sid oudp-counters</b>	Displays the OUDP stats for the specified SID.
<b>show interface cable &lt;slot&gt;/0/&lt;md_idx&gt; mac-scheduler &lt;us-channel&gt; map-stats</b>	Displays the OBT scheduler SID table. Indicates burst/gap positions and SID assignments.
<b>show interface cable &lt;slot&gt;/0/&lt;md_idx&gt; mac-scheduler &lt;us-channel&gt;</b>	Displays the OFDMA IUC reservation percentage due to OUDP testing.
<b>show cable admission-control interface cable &lt;slot&gt;/0/&lt;md_idx&gt; upstream &lt;us-channel&gt;</b>	Displays the admission control rate reservation required by the OUDP test.

## Example: Configuration Command Mode

This example shows how to create a burst profile in the configuration mode:

```
Router#config terminal
Enter configuration commands, one per line. End with CNTL/Z.
```



```
Router(config)#cable oudp-leak-detect burst-profile 55
Router(config-oudp-burst-profile)#frequency start 45000000 end 50000000
Router(config-oudp-burst-profile)#$burst duration 4 gap 2 cycle-gap 10
OUDP cycle-gap can support 53 bursts in the test cycle
Router(config-oudp-burst-profile)#cm-list harddisk:oudp-cm-list-1
Router(config-oudp-burst-profile)#$leak-detect schedule burst-profile 55 recurring
weekdays MoTuWeThFr start timeofday 15:45:00 stop timeofday 18:00:00
```

## Example: EXEC Command Mode

The example shows the creation of a session and assigning the required test parameters.

1. Configure an OUDP session.

```
Router#cable oudp-leak-detect session-id 99 session create
```

2. Configure the frequency test parameters for the OUDP session.

```
Router#cable oudp sess 99 frequency start 60000000 end 66000000
```

3. Configure the Burst Duration and Cycle Gap test parameters.

```
Router#cable oudp sess 99 transmit burst duration 6 gap 4 cycle-gap 20
OUDP cycle-gap can support 64 bursts in the test cycle
```

4. Configure the list of cable modems intended to participate in sending test bursts.

```
Router#cable oudp sess 99 cm-add 4800.33ea.70c2
Router#cable oudp sess 99 cm-add 4800.33ea.71ba
Router#cable oudp sess 99 cm-add 4800.33ee.ff9a
Router#cable oudp sess 99 cm-add 4800.33ef.0c56
Router#cable oudp sess 99 cm-add 4800.33ef.0c5e
```

5. Configure the start time and end time for the test bursts.

```
Router#cable oudp-leak-detect session-id 99 start datetime 2022-01-01,12:00:00.0,
-5:00 stop datetime 2022-01-02,12:00:00.0,-5:00
```

## Verifying the OUDP Session

The **show cable oudp-leak-detect test-sessions** command shows all OUDP test sessions present on the cBR-8. The status of each session will indicate whether it is CONFIG when the configuration is in process or after a session reset, PENDING with a future start time, in PRETEST\_SETUP just prior to the test start, ACTIVE with OUDP burst grants, CLEANUP for final stats collection, or COMPLETE.

```
Router#show cable oudp-leak-detect test-sessions
Load for five secs: 5%/0%; one minute: 6%; five minutes: 6%
Time source is NTP, 14:14:05.873 EST Wed Jul 27 2022
```

```
OUDP Test Sessions: 2
```

Parent	Child	Interface	Modems	Status	Start-Time	Stop-Time
99	-	-	0	ACTIVE	2022-07-27,12:45:03.0,-5:00	never
99	10002	Ca1/0/2/U14	2	ACTIVE	2022-07-27,12:45:03.0,-5:00	never

The **show cable oudp-leak-detect session-id <id> detail** command can be used for either parent or child test sessions. Parent session details show the test parameters as they are configured.

```
Router#show cable oudp-leak-detect session-id 99 detail
Load for five secs: 7%/0%; one minute: 6%; five minutes: 6%
```

## Example: Creating a Test Session on Selected Modems Using the EXEC Mode

```
Time source is NTP, 12:44:33.214 EST Wed Jul 27 2022
```

```
OU DP Test Session : 99 (parent)
```

```
Status : PRETEST
Start Time : 2022-07-27,12:45:03.0,-5:00
Stop Time : never
Burst Duration : 6 (frames)
Burst Gap : 4 (frames)
Cycle Gap : 20 (frames)
Reserved Probe Pct : 3
Freq Start : 60000000 (Hz)
Freq End : 66000000 (Hz)
Interface : controller upstream-cable 1/0/3 us-channel 12
CM-List : 0 modems
```

Child session detail shows test information as it pertains to the particular OFDMA channel.

```
Router#show cable oudp-leak-detect session-id 10002 detail
Load for five secs: 5%/0%; one minute: 6%; five minutes: 6%
Time source is NTP, 14:12:35.623 EST Wed Jul 27 2022
```

```
OU DP Test Session : 10002 (child)
```

```
Interface : Cable1/0/2 upstream 14
Status : ACTIVE
Start Time : 2022-07-27,12:45:03.0,-5:00
Stop Time : never
Burst Duration : 6 (frames)
Burst Gap : 4 (frames)
Cycle Gap : 20 (frames)
Reserved Probe Pct : 3
```

```
Actual SC Freq Start : 59700000 (Hz)
Actual SC Freq End : 66075000 (Hz)
Minislot Start : 38
Minislot End : 53
Microsec per frame : 573.000 (usec)
Burst Spacing : 5730.000 (usec)
```

```
Test Session Type : CycleGap
Current Bursts per cycle : 2
Maximum Bursts per cycle : 64
Probe Oppty per cycle : 20 (frames)
Cycle Interval Info : 2 (bursts) / 40.00 (frames) / 22.920 (msec)
```

```
Child Session 10002, Cable1/0/2 upstream 14 - CM-List 2 modems
CM Mac-Address BurstPos Offset(us) Test Sid BurstGrants BurstNoEnergyRx BurstRx TestBytesRx
4800.33ea.71ba 0 0 27 1373428 0 1371040 2107288480
4800.33ea.70c2 1 5730 28 1373418 0 1371030 2107273110
```

## Example: Creating a Test Session on Selected Modems Using the EXEC Mode

This example is to create a test session where the operator has requested that the cBR-8 choose the modems.

MAC-Address Wildcard—All CLCs and All OFDMA channels

```
cable oudp-leak-detect session-id 5 session create
cable oudp-leak-detect session-id 5 frequency start 138100000 end 139650000
```

```
cable oudp-leak-detect session-id 5 transmit burst duration 4 gap 2 cycle-gap 10
cable oudp-leak-detect session-id 5 cm-add FFFF.FFFF.FFFF
cable oudp-leak-detect session-id 5 start datetime 2022-01-01,12:00:00.0,-5:00
stop datetime 2022-01-02,12:00:00.0,-5:00
```

MAC-Domain Example—All configured OFDMA channels on the MAC-Domain

```
cable oudp-leak-detect session-id 5 interface Cable9/0/0
```

Controller Example—Single controller and one or two OFDMA channels

```
cable oudp-leak-detect session-id 5 controller upstream-cable 9/0/0
cable oudp-leak-detect session-id 5 controller upstream-cable 9/0/0 us-channel 13
```

## Specifications

The support for RF leakage detection is defined in the following specifications:

- CableLabs OSSI Specification: CM-SP-CCAP-OSSIV3.1-I24-220518




---

**Note** The implementation tracks closely to, but does not 100% match the OSSI specification. OSSI specification development was in progress during the time of this implementation.

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- Upstream OFDMA Data Profile Testing Burst method as defined in the CableLabs MULPI Specification CM-SP-MULPIv3.1-I23-220328

## Recommendations for the OFDMA Burst Testing Channel Configuration

- OFDMA channel IUC 13 is used by the the cBR-8 to schedule test bursts. Change the IUC 13 parameters as necessary to match compatibility with the leakage detection equipment in use.
- Operations Support System Interface (OSSI) recommends the use of pilot pattern 4 or 11 for OFDMA Burst Testing. OSSI recommends not to use boosted pilot patterns.
- cBR-8 supports all OFDMA pilot pattern configurations for OFDMA Burst Testing, if desired by the operator.

## Example: Channel Configuration for a Third-Party Leak Detector

This example shows the channel configuration for detecting leaks using a digital leak detector.

The following steps are to configure OFDMA controller profile:

```
Router# enable
Router# configure terminal
Router(config)#cable mod-profile-ofdma 420
Router(config)#subcarrier-spacing 25KHz
```

```

Router(config)#initial-rng-subcarrier 64
Router(config)#initial-rng-preamble 8
Router(config)#fine-rng-subcarrier 512
Router(config)#data-iuc 9 modulation 2048-QAM pilot-pattern 9
Router(config)#data-iuc 10 modulation 1024-QAM pilot-pattern 9
Router(config)#data-iuc 11 modulation 512-QAM pilot-pattern 8
Router(config)#data-iuc 12 modulation 256-QAM pilot-pattern 8
##### CableLabs OSSI recommends 11 for 25 kHz SC spacing#####
#####CableLabs OSSI recommends 4 for 50 kHz SC spacing#####
##### CableLabs OSSI recommends not to use boosted pilot patterns#####
Router(config)#data-iuc 13 modulation 64-QAM pilot-pattern 11#####

```

To configure upstream controller profile, use the steps below:

```

Router# enable
Router# configure terminal
Router(config)#cable upstream controller-profile id [RPHY|I-CMTS]
Router(config)#us-channel 13 docsis-mode ofdma
Router(config)#us-channel 13 subcarrier-spacing 25KHz
Router(config)#us-channel 13 modulation-profile 420
Router(config)#us-channel 13 frequency-range 108000000 204000000
Router(config)#us-channel 13 initial-rng-frequency-start 184000000
Router(config)# us-channel 13 cyclic-prefix 256 roll-off-period 128
Router(config)#us-channel 13 symbols-per-frame 9
Router(config)#no us-channel 13 shutdown

```

## OUUDP DOCS-LEAK-DETECT MIB

*Table 1: Feature History*

Feature Name	Release Information	Feature Description
New MIBs for OUDP doc leakage detection (DOCS-LEAK-DETECT)	Cisco IOS XE Dublin 17.12.1w	<p>New MIB support helps to fetch the details of OUDP leak detect test sessions.</p> <p>The following are the new MIBs supported:</p> <ul style="list-style-type: none"> <li>docsLeakDetTestCapabilities</li> <li>docsLeakDetTestSessionStatusTable</li> <li>docsLeakDetTestSessionStatsTable</li> <li>docsLeakDetTestChannelStatusTable</li> </ul> <p>Supported MIB version:  <a href="#">DOCS-LEAK-DETECT-MIB-2022-09-15.txt</a></p>

The OUDP leakage detection feature supports the following new DOCSIS leak detection MIBs.

- docsLeakDetTestCapabilities
- docsLeakDetTestSessionStatusTable
- docsLeakDetTestSessionStatsTable
- docsLeakDetTestChannelStatusTable

Supported MIB version: [DOCS-LEAK-DETECT-MIB-2022-09-15.txt](#).

The following table indicates the object names and the corresponding OIDs for the DOCS-LEAK-DETECT MIB:

**Table 2: DOCS-LEAK-DETECT**

Object Name	Corresponding MIB OID value
docsLeakDetectMib	1.3.6.1.4.1.4491.2.1.37
docsLeakDetObjects	1.3.6.1.4.1.4491.2.1.37.1
docsLeakDetTestObjects	1.3.6.1.4.1.4491.2.1.37.1.1
docsLeakDetTestCapabilities	1.3.6.1.4.1.4491.2.1.37.1.1.1
docsLeakDetTestSupportsNumBurstsNotReceived	1.3.6.1.4.1.4491.2.1.37.1.1.1.1
docsLeakDetTestSessionStatusTable	1.3.6.1.4.1.4491.2.1.37.1.1.2
docsLeakDetTestSessionStatusEntry	1.3.6.1.4.1.4491.2.1.37.1.1.2.1
docsLeakDetTestSessionStatusSessionType	1.3.6.1.4.1.4491.2.1.37.1.1.2.1.2
docsLeakDetTestSessionStatusStatus	1.3.6.1.4.1.4491.2.1.37.1.1.2.1.3
docsLeakDetTestSessionStatusStartTime	1.3.6.1.4.1.4491.2.1.37.1.1.2.1.4
docsLeakDetTestSessionStatusStopTime	1.3.6.1.4.1.4491.2.1.37.1.1.2.1.5
docsLeakDetTestSessionStatsTable	1.3.6.1.4.1.4491.2.1.37.1.1.3
docsLeakDetTestSessionStatsEntry	1.3.6.1.4.1.4491.2.1.37.1.1.3.1
docsLeakDetTestSessionStatsNumBurstsGranted	1.3.6.1.4.1.4491.2.1.37.1.1.3.1.2
docsLeakDetTestSessionStatsNumBurstsNotReceived	1.3.6.1.4.1.4491.2.1.37.1.1.3.1.3
docsLeakDetTestSessionStatsNumTestBytesReceived	1.3.6.1.4.1.4491.2.1.37.1.1.3.1.4
docsLeakDetTestChannelStatusTable	1.3.6.1.4.1.4491.2.1.37.1.1.4
docsLeakDetTestChannelStatusEntry	1.3.6.1.4.1.4491.2.1.37.1.1.4.1
docsLeakDetTestChannelStatusTestStartFreq	1.3.6.1.4.1.4491.2.1.37.1.1.4.1.2
docsLeakDetTestChannelStatusTestEndFreq	1.3.6.1.4.1.4491.2.1.37.1.1.4.1.3
docsLeakDetTestChannelStatusNumModemsCfg	1.3.6.1.4.1.4491.2.1.37.1.1.4.1.4
docsLeakDetTestChannelStatusNumModemsActive	1.3.6.1.4.1.4491.2.1.37.1.1.4.1.5
docsLeakDetTestChannelStatusFirstSubcarrierId	1.3.6.1.4.1.4491.2.1.37.1.1.4.1.6
docsLeakDetTestChannelStatusLastSubcarrierId	1.3.6.1.4.1.4491.2.1.37.1.1.4.1.7
docsLeakDetTestChannelStatusBurstIuc	1.3.6.1.4.1.4491.2.1.37.1.1.4.1.8
docsLeakDetTestChannelStatusCurrCycleTime	1.3.6.1.4.1.4491.2.1.37.1.1.4.1.9
docsLeakDetTestChannelStatusNumBurstPositions	1.3.6.1.4.1.4491.2.1.37.1.1.4.1.10



**Note** The *docsLeakDetTestSessionStatusSessionId*, *docsLeakDetTestSessionStatsCmMacAddress*, and *docsLeakDetTestChannelStatusInterfaceName* are indices and cannot be accessed.

### Doc Leak Detection MIBs

- [docsLeakDetTestCapabilities](#)—Reports number of leakage detection bursts.
- [docsLeakDetTestSessionStatusTable](#)—Reports session status for the parent and child sessions.
- [docsLeakDetTestSessionStatsTable](#)—Reports session stats for the individual or child sessions.
- [docsLeakDetTestChannelStatusTable](#)—Reports channel status for the individual or child sessions.

### docsLeakDetTestCapabilities

The *docsLeakDetTestSupportsNumBurstsNotReceived* MIB object provides a report on the number of leakage detection testing bursts that are not received. This attribute reports the CCAP line card capability and has the following values:

- *True*—Indicates that the test session reports a valid value for the count of leakage detection testing bursts it did not receive during a leakage detection.

The system supports the reporting of a count for leakage detection testing bursts not received through the counter *burst\_no\_energy\_rx* which is reported through CLI. Hence this object takes the value *true* indicating support.

The following output shows the details of the **docsLeakDetTestSupportsNumBurstsNotReceived** MIB object:

```
docsLeakDetTestSupportsNumBurstsNotReceived OBJECT-TYPE
SYNTAX TruthValue
MAX-ACCESS read-only
STATUS current
::= { docsLeakDetTestCapabilities 1 }
```

The following output is a sample output of the **docsLeakDetTestSupportsNumBurstsNotReceived**:

```
router> getmany -v2c 8.17.1.1 private docsLeakDetTestSupportsNumBurstsNotReceived
docsLeakDetTestSupportsNumBurstsNotReceived.0 = true(1)
router> getmany -v2c 8.17.1.1 private 1.3.6.1.4.1.4491.2.1.37.1.1.1
docsLeakDetTestSupportsNumBurstsNotReceived.0 = true(1)
```

### docsLeakDetTestSessionStatusTable

The *docsLeakDetTestSessionStatusTable* MIBs reports the status, start, and stop time of the leakage detection test session.

The Leakage Detection Test Session Status table reports the status of a specified leakage detection test session. Rows in this table are created and maintained by the CCAP. Leakage Detection Test Session status is reported for all the session types.

The following output shows the details of the **docsLeakDetTestSessionStatusTable** MIB object:

```
docsLeakDetTestSessionStatusEntry ::= SEQUENCE {
    docsLeakDetTestSessionStatusSessionId      Unsigned32,
    docsLeakDetTestSessionStatusSessionType    INTEGER,
    docsLeakDetTestSessionStatusStatus         INTEGER,
    docsLeakDetTestSessionStatusStartTime      DateAndTime,
```

```

        docsLeakDetTestSessionStatusStopTime      DateAndTime
    }

```

### Verifying the Leakage Detection Test Session Status Configuration

The following is the show output for `docsLeakDetTestSessionStatusTable`:

```

router#show cable oudp session-id 90020 detail
Load for five secs: 6%/0%; one minute: 8%; five minutes: 8%
Time source is NTP, 08:34:11.241 EDT Tue Aug 1 2023
OUDP Test Session : 90020 (child)
Interface          : Cable9/0/24 upstream 6
Status           : ACTIVE
Start Time       : 2023-08-01,08:33:15.0,-4:00
Stop Time        : 2023-08-01,09:00:00.0,-4:00
Burst Duration     : 6 (frames)
Burst Gap          : 4 (frames)
Cycle Time         : 100 (msec)
Reserved Probe Pct : 3
Probe in Burst Gap : Allowed
Actual SC Freq Start : 64900000 (Hz)
Actual SC Freq End   : 66075000 (Hz)
Minislot Start      : 61
Minislot End        : 63
Microsec per frame  : 510.000 (usec)
Burst Spacing       : 5100.000 (usec)

```

The following is the CLI output of the `docsLeakDetTestSessionStatusTable`.

```

router > getmany -v2c 8.17.1.1 private 1.3.6.1.4.1.4491.2.1.37.1.1.2
docsLeakDetTestSessionStatusSessionType.10 = master(2)
docsLeakDetTestSessionStatusSessionType.30 = master(2)
docsLeakDetTestSessionStatusSessionType.40 = master(2)
docsLeakDetTestSessionStatusSessionType.90020 = component(1)
docsLeakDetTestSessionStatusSessionType.90021 = component(1)
docsLeakDetTestSessionStatusStatus.10 = active(1)
docsLeakDetTestSessionStatusStatus.30 = pending(0)
docsLeakDetTestSessionStatusStatus.40 = active(1)
docsLeakDetTestSessionStatusStatus.90020 = active(1)
docsLeakDetTestSessionStatusStatus.90021 = active(1)
docsLeakDetTestSessionStatusStartTime.10 = 2023-Aug-1,08:33:15.0,-4:0
docsLeakDetTestSessionStatusStartTime.30 = 2023-Aug-1,08:45:00.0,-4:0
docsLeakDetTestSessionStatusStartTime.40 = 2023-Aug-1,08:33:21.0,-4:0
docsLeakDetTestSessionStatusStartTime.90020 = 2023-Aug-1,08:33:15.0,-4:0
docsLeakDetTestSessionStatusStartTime.90021 = 2023-Aug-1,08:33:21.0,-4:0
docsLeakDetTestSessionStatusStopTime.10 = 2023-Aug-1,09:00:00.0,-4:0
docsLeakDetTestSessionStatusStopTime.30 = 2023-Aug-1,10:00:00.0,-4:0
docsLeakDetTestSessionStatusStopTime.40 =
docsLeakDetTestSessionStatusStopTime.90020 = 2023-Aug-1,09:00:00.0,-4:0
docsLeakDetTestSessionStatusStopTime.90021 =

```

### docsLeakDetTestSessionStatsTable

The `docsLeakDetTestSessionStatsTable` MIB reports the number of bursts that are granted, received, and not received. Rows in this table are created and maintained by the CCAP.

```

docsLeakDetTestSessionStatsEntry ::= SEQUENCE {
    docsLeakDetTestSessionStatsCmMacAddress      MacAddress,
    docsLeakDetTestSessionStatsNumBurstsGranted Counter32,
    docsLeakDetTestSessionStatsNumBurstsNotReceived Counter32,
    docsLeakDetTestSessionStatsNumTestBytesReceived Counter64
}

```

### Verifying the Leakage Detection Test Session Stats Configuration

To verify the configuration parameters for leakage detection test session stats, use the **show cable oudp session-id 90003 cm-stats** command as shown in the following example:

```
router#show cable oudp session-id 90003 cm-stats
Load for five secs: 5%/0%; one minute: 7%; five minutes: 8%
Time source is NTP, 02:41:50.594 EDT Fri Aug 4 2023
Child Session 90003, Cable9/0/24 upstream 6 - CM-List 3 modems
CM Mac-Address BurstPos  Offset(us)  Test Sid  BurstGrants  BurstNoEnergyRx  BurstRx
TestBytesRx
4800.33ef.094e  0          0          13         15114         0              15000
6135000
4800.33ef.092a  1          5100       14         15114         0              15000
6135000
4800.33ef.07e2  2          10200      15         15114         0              15000
6135000
```

The following is the output of the **docsLeakDetTestSessionStatsTable** MIB that reports the number of bursts that are granted, received, and not received.

```
router > getmany -v2c 8.17.1.1 private 1.3.6.1.4.1.4491.2.1.37.1.1.3
docsLeakDetTestSessionStatsNumBurstsGranted.90003.72.0.51.239.9.78 = 15414
docsLeakDetTestSessionStatsNumBurstsGranted.90003.72.0.51.239.9.42 = 15414
docsLeakDetTestSessionStatsNumBurstsGranted.90003.72.0.51.239.7.226 = 15414
docsLeakDetTestSessionStatsNumBurstsNotReceived.90003.72.0.51.239.9.78 = 0
docsLeakDetTestSessionStatsNumBurstsNotReceived.90003.72.0.51.239.9.42 = 0
docsLeakDetTestSessionStatsNumBurstsNotReceived.90003.72.0.51.239.7.226 = 0
docsLeakDetTestSessionStatsNumTestBytesReceived.90003.72.0.51.239.9.78 = 6257700
docsLeakDetTestSessionStatsNumTestBytesReceived.90003.72.0.51.239.9.42 = 6257700
docsLeakDetTestSessionStatsNumTestBytesReceived.90003.72.0.51.239.7.226 = 6257700
router >
```



**Note** The CLI and MIB table values differ for active counters during execution and collection processes.

### docsLeakDetTestChannelStatusTable

The *docsLeakDetTestChannelStatusTable* MIB reports the configuration of a specified upstream OFDMA channel that is used for leakage detection testing. Rows in this table are created and maintained by the CCAP.

```
docsLeakDetTestChannelStatusEntry ::= SEQUENCE {
    docsLeakDetTestChannelStatusInterfaceName      SnmpAdminString,
    docsLeakDetTestChannelStatusTestStartFreq     Unsigned32,
    docsLeakDetTestChannelStatusTestEndFreq       Unsigned32,
    docsLeakDetTestChannelStatusNumModemsCfg      Unsigned32,
    docsLeakDetTestChannelStatusNumModemsActive   Unsigned32,
    docsLeakDetTestChannelStatusFirstSubcarrierId Unsigned32,
    docsLeakDetTestChannelStatusLastSubcarrierId  Unsigned32,
    docsLeakDetTestChannelStatusBurstIuc         Unsigned32,
    docsLeakDetTestChannelStatusCurrCycleTime    Unsigned32,
    docsLeakDetTestChannelStatusNumBurstPositions Unsigned32
}
```

### Verifying the Leakage Detection Channel Session Status Configuration

To verify the configuration parameters for leakage detection channel status, use the **show cable oudp-leak-detect session-id <> detail** command as shown in the following example:

```
router#show cable oudp-leak-detect session-id <> detail
Load for five secs: 6%/0%; one minute: 8%; five minutes: 8%
Time source is NTP, 08:34:11.241 EDT Tue Aug 1 2023
OUDP Test Session : 90020 (child)
```



```

Interface           : Cable9/0/24 upstream 6
Status              : ACTIVE
Start Time          : 2023-08-01,08:33:15.0,-4:00
Stop Time           : 2023-08-01,09:00:00.0,-4:00
Burst Duration      : 6 (frames)
Burst Gap           : 4 (frames)
Cycle Time          : 100 (msec)
Reserved Probe Pct : 3
Probe in Burst Gap  : Allowed
Actual SC Freq Start : 64900000 (Hz)
Actual SC Freq End   : 66075000 (Hz)
Minislot Start      : 61
Minislot End        : 63
Microsec per frame  : 510.000 (usec)
Burst Spacing       : 5100.000 (usec)
Test Session Type   : CycleTime
Current Bursts per cycle : 2
Maximum Bursts per cycle : 19
Probe Oppty per cycle : 6 (frames)
Cycle Interval Info : 19 (bursts) / 196.07 (frames) / 100.000 (msec)
    
```

```

Child Session 90020, Cable9/0/24 upstream 6 - CM-List 2 modems
CM Mac-Address BurstPos Offset(us) Test Sid BurstGrants BurstNoEnergyRx      BurstRx
TestBytesRx
4800.33ef.07e2      0          0          27          612         0          372
106020
4800.33ef.094e     1          5100        28          612         0          372
106020
router#
    
```

The following is the CLI output of the docsLeakDetTestChannelStatusTable:

```

mcp-cab-002:/auto/tftpboot-pit/mibs/snmp/bin/linux/17.1 > getmany -v2c 8.17.1.1 private
1.3.6.1.4.1.4491.2.1.37.1.1.4
docsLeakDetTestChannelStatusTestStartFreq.90020.18.67.97.57.47.48.47.50.52.45.117.112.115.116.114.101.97.109.54
= 64900000
docsLeakDetTestChannelStatusTestStartFreq.90021.18.67.97.57.47.48.47.51.48.45.117.112.115.116.114.101.97.109.54
= 61700000
docsLeakDetTestChannelStatusTestEndFreq.90020.18.67.97.57.47.48.47.50.52.45.117.112.115.116.114.101.97.109.54
= 66075000
docsLeakDetTestChannelStatusTestEndFreq.90021.18.67.97.57.47.48.47.51.48.45.117.112.115.116.114.101.97.109.54
= 63275000
docsLeakDetTestChannelStatusNumModemsCfg.90020.18.67.97.57.47.48.47.50.52.45.117.112.115.116.114.101.97.109.54
= 2
docsLeakDetTestChannelStatusNumModemsCfg.90021.18.67.97.57.47.48.47.51.48.45.117.112.115.116.114.101.97.109.54
= 3
docsLeakDetTestChannelStatusNumModemsActive.90020.18.67.97.57.47.48.47.50.52.45.117.112.115.116.114.101.97.109.54
= 2
docsLeakDetTestChannelStatusNumModemsActive.90021.18.67.97.57.47.48.47.51.48.45.117.112.115.116.114.101.97.109.54
= 3
docsLeakDetTestChannelStatusFirstSubcarrierId.90020.18.67.97.57.47.48.47.50.52.45.117.112.115.116.114.101.97.109.54
= 61
docsLeakDetTestChannelStatusFirstSubcarrierId.90021.18.67.97.57.47.48.47.51.48.45.117.112.115.116.114.101.97.109.54
= 53
docsLeakDetTestChannelStatusLastSubcarrierId.90020.18.67.97.57.47.48.47.50.52.45.117.112.115.116.114.101.97.109.54
= 63
docsLeakDetTestChannelStatusLastSubcarrierId.90021.18.67.97.57.47.48.47.51.48.45.117.112.115.116.114.101.97.109.54
= 56
docsLeakDetTestChannelStatusBurstIuc.90020.18.67.97.57.47.48.47.50.52.45.117.112.115.116.114.101.97.109.54
= 13
docsLeakDetTestChannelStatusBurstIuc.90021.18.67.97.57.47.48.47.51.48.45.117.112.115.116.114.101.97.109.54
= 13
docsLeakDetTestChannelStatusCurrCycleTime.90020.18.67.97.57.47.48.47.50.52.45.117.112.115.116.114.101.97.109.54
= 100
    
```

docsLeakDetTestChannelStatusCurrCycleTime.90021.18.67.97.57.47.48.47.51.48.45.117.112.115.116.114.101.97.109.54  
= 20

docsLeakDetTestChannelStatusNumBurstPositions.90020.18.67.97.57.47.48.47.50.52.45.117.112.115.116.114.101.97.109.54  
= 2

docsLeakDetTestChannelStatusNumBurstPositions.90021.18.67.97.57.47.48.47.51.48.45.117.112.115.116.114.101.97.109.54  
= 3

The following are the input parameters for the **docsLeakDetTestChannelStatusTable** MIB:

- docsLeakDetTestSessionStatusSessionId
- docsLeakDetTestChannelStatusInterfaceName

The following are the output parameters for the **docsLeakDetTestChannelStatusTable** MIB.

**Table 3: Output Parameters**

Output Parameters	Description
docsLeakDetTestChannelStatusTestStartFreq	Value of the actual SC frequency start.
docsLeakDetTestChannelStatusTestEndFreq	Value of the actual SC frequency end.
docsLeakDetTestChannelStatusNumModemsCfg	Number of modems configured under the burst session.
docsLeakDetTestChannelStatusNumModemsActive	Number of modems on which the burst session is activated.
docsLeakDetTestChannelStatusFirstSubcarrierId	Lowest subcarrierId on the lowest edge of the first minislot that the CCAP has selected for testing of leakage.
docsLeakDetTestChannelStatusLastSubcarrierId	Highest subcarrierId on the highest edge of the last minislot that the CCAP has selected for testing of leakage.
docsLeakDetTestChannelStatusBurstFluc	The corresponding burstfluc that is used for leakage detection on the OFDMA channel.
docsLeakDetTestChannelStatusCurrCycleTime	If the cycle time is configured, observes the configured cycle time. If the cycle gap is configured, the estimated gap for the session is observed and adjusts it to a whole number (for example, 7.830 will be rounded to 8).
docsLeakDetTestChannelStatusNumBurstPositions	If you configure the cycle time, the burst positions takes the maximum burst position for the cycle time and the current burst position when configured with the cycle gap.