

OUDP

Information on OUDP

Leakage Detection Using OUDP -Prerequisites

The following VIAVI software and firmware prerequisites must be met in order to perform OUDP leakage measurements with the Seeker X Leakage Management System in 204 MHz high split networks.

StrataSync v14.5.0 –Used for OUDP software option deployment to the Seeker X and creation of configuration profiles for OUDP leakage tags

MobileTech v4.9.1 –Used for delivery of Seeker X firmware, OUDP software option, OUDP configuration profiles, and OUDP leakage measurement display and GPS logging.

LAW X v5.3.0 –Must be installed before the Seeker X and MCAIII or X-Link is able to upload, display, and report OUDP leakage measurements with geolocation.

Seeker X Firmware v4.1.69 –Must be installed to enable OUDP software option and detect OUDP leakage tags.

OUDP Software Option –Must be deployed to Seeker X via StrataSync and MTA before the Seeker X is able to detect OUDP leakage tags.

Leakage Detection Using OUDP –Setup Steps

1. Verify that your StrataSync, MobileTech App, and LAW X software have been updated to the versions shown in the prerequisites.
2. Deploy the Seeker X firmware v 4.1.69 to the Seeker X from StrataSync via the MobileTech application.
3. Once the new Seeker X firmware has been installed, deploy the OUDP software option to the Seeker X from StrataSync via the MobileTech application.
4. In StrataSync, create a Seeker X configuration profile with OUDP leakage tag setup that matches the configuration of the network that is being monitored.
5. Deploy the Seeker X configuration profile to the Seeker X from StrataSync via the MobileTech application.

Leakage Detection Using OUDP –Seeker X Configuration

The Seeker X is designed to detect the following types of OUDP signals
 Frequency Range = 130 to 150 MHz

IDFT Size = 2K (2048)

Subcarrier Spacing = 50 kHz

Pilot Pattern = 4

Cyclic Prefix = All

Roll-Off-Period = All

Parameter	Upstream OFDMA	
	microseconds (us)	number of samples @ 102.4 MHz sampling rate
Cyclic Prefix (CP)	0.9375	96
	1.2500	128
	1.5625	160
	1.8750	192
	2.1817	224
	2.5000	256
	2.8125	288
	3.1250	320
	3.7500	384
	5.0000	512
	6.2500	640

The following configuration parameters must be entered into the Seeker X configuration profile for OUDP leakage detection

Frequency = Center Frequency of OUDP

Signal Type = OUDP

Tag = 50 kHz with Cyclic Prefix to match system settings

The screenshot shows a table with columns: Enable, Frequency, Signal Type, Tag, and OFDMA Center Frequency. The Tag dropdown menu is open, showing options: 50kHz, 96; 50kHz, 128; 50kHz, 160; 50kHz, 192; 50kHz, 224; 50kHz, 256; 50kHz, 288; 50kHz, 320; 50kHz, 384; 50kHz, 512; 50kHz, 640.

	Enable	Frequency	Signal Type	Tag	OFDMA Center Frequency
1	Enable	138.9 MHz	OUDP	50kHz, 96	150.0 MHz
2	Disable	138 MHz	Dual CW	50kHz, 96	5 MHz
3	Disable	130 MHz	Dual CW	50kHz, 128	5 MHz
4	Disable	138 MHz	Dual CW	50kHz, 160	5 MHz

OFDMA Center

Frequency = Center Frequency of the OFDMA Channel (*Frequency of subcarrier 1024*)

Leakage Detection Using OUDP –OUDP Test Burst Configuration

The following OUDP test burst configuration parameters are not required but some of these settings will affect how often a modem transmits. If the modem is set up so that it transmits too infrequently then driveout smay not detect the signals if they aren't active when the vehicle is in the area. The following settings are provided as a reference to the best practices several MSOs have adopted for OUDP leakage detection.

Transmit Burst Gap = 0 frames (Note 1)

Transmit Duration = 8 frames

Transmit Cycle Gap = 4 frames (Note 2)

Minislots= 4 (1.6 MHz Upstream Bandwidth)

Note 1: If Transmit Burst Gap does not support configuration of 0 frames then use the lowest possible value supported

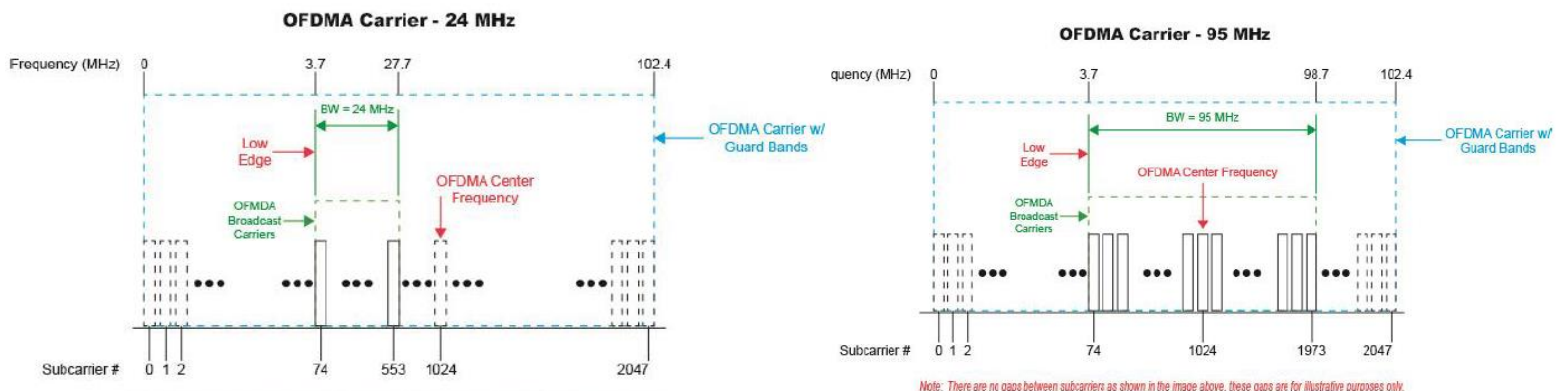
Note 2: Alternatively max-cycle time can be configured on some platforms. Max-Cycle time should be set to 800ms.

Leakage Detection Using OUDP –OFDMA Center Frequency Details

In StrataSync the OFDMA Center Frequency setting is always equal to center of subcarrier 1024. Note that OFDMA Center Frequency as defined in the StrataSync setup parameters is not the actual center frequency of the broadcasted OFDMA channel.

CMTS vendors have designated that broadcasted OFDMA subcarriers always start at subcarrier #74 and end at a maximum of subcarrier #1973 for full bandwidth channels. The subcarriers numbers 0 to 73 and 1974 to 2047 are never broadcasted which provides a guard band within these frequencies at the beginning and end of the OFDMA channel.

For OFDMA channels with a high edge frequency that is lower than the frequency of subcarrier number 1024, the OFDMA Center Frequency that you enter in StrataSync will be outside of the broadcasted OFDMA channel.



Note: There are no gaps between subcarriers as shown in the image above, these gaps are for illustrative purposes only.

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Leakage Detection Using OUDP –Setup Steps for CommscopeCMTS/R-PhyDevices

StrataSync “OFDMA Center Frequency” = Center Frequency of Subcarrier 1024

Run the following command from the Commscopecommand line interface;“show interface cable-upstream <S*/CG*/CH*> detail | iedge”

```
trilithic_e6000# show interface cable-upstream 1/1/24 detail | i edge
Frequency (Hz) low-edge:          108475000
Frequency (Hz) high-edge:         201275000
```

The variable <S*/CG*/CH*> is defined as <slot[/conn-grp[/channel]]>

•The output of this command will return the “low-edge” frequency of the OFDMA carrier as shown in the image above.

•From this information we can calculate the center frequency of the 1stactive subcarrier by adding half the subcarrier width (0.025000 MHz) to the “low-edge” value returned from the CMTS. 1stActive Subcarrier Center Frequency = “low-edge” + 0.025000

$$1^{\text{st}}\text{Active Subcarrier Center Frequency} = 108.475000 + 0.025000$$

$$1^{\text{st}}\text{Active Subcarrier Center Frequency} = 108.500000$$

•Next, we must calculate the center frequency of subcarrier 0 by subtracting 3.7 MHz (74 subcarriers @ 0.050000 MHz) from the calculated value of the 1stActive Subcarrier Frequency. Center Frequency of Subcarrier 0 = 1stActive Subcarrier Center Frequency –3.7 MHz

$$\text{Center Frequency of Subcarrier 0} = 108.500000 \text{ MHz} - 3.7 \text{ MHz}$$

$$\text{Center Frequency of Subcarrier 0} = 104.800000 \text{ MHz}$$

•Finally, we will calculate the center frequency of Subcarrier 1024 (OFDMA Center Frequency in StrataSync) by adding 51.2 MHz (1024 subcarriers @ 0.050000 MHz) to the calculated value of Subcarrier 0.Center Frequency of Subcarrier 1024 = Center Frequency of Subcarrier 0 + 51.2 MHz

$$\text{Center Frequency of Subcarrier 1024} = 104.800000 + 51.2 \text{ MHz}$$

Center Frequency of Subcarrier 1024 = 156.000000 MHz

Leakage Detection Using OUDP – OUDP Center Frequency Details

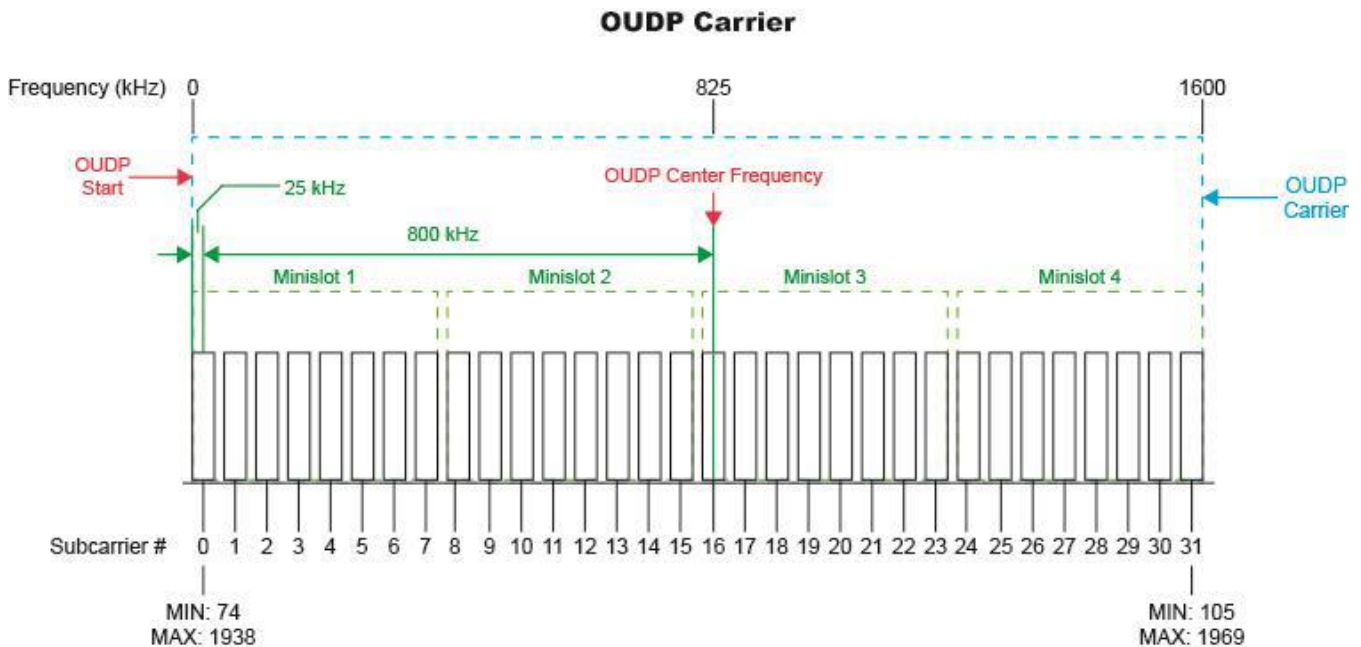
StrataSync “Frequency” = Center Frequency of OUDP Carrier

Each OUDP carrier is comprised of 32 subcarriers (1.6 MHz) divided into 4 minislots of 8 subcarriers a piece.

The OUDP carrier must start at the beginning of a minislot boundary.

For an OFDMA carrier that is set to the maximum allowable bandwidth, the OUDP channel must start at or below the minislot boundary at subcarrier number 1938.

In StrataSync the Frequency setting is always equal to the center frequency of OUDP subcarrier number 16 which is 825 kHz from the OUDP start frequency.



Note: There are no gaps between subcarriers as shown in the image above, these gaps are for illustrative purposes only.

Leakage Detection Using OUDP –Setup Steps for CommscopeCMTS/R-PhyDevices

StrataSync “Frequency” = Center Frequency of OUDP Carrier

Run the following command from the Commscopecommand line interface;“show interface cable-upstream <S*/CG*/CH*> ofdmoudp-leakage params”The variable <S*/CG*/CH*> is defined as <slot[/conn-grp[/channel]]>

The output of this command will return the “Start” frequency of the OUDP carrier as shown in the image below.

```
trilithic_e6000# show interface cable-upstream 1/1/24 ofdm oudp-leakage params
License Enabled (system-oudp-leak-detect)
OU DP US
Interface Tx Tx Cycle -- Cycle Time (ms) -- ----- Frequency (Hz)* ----- Assoc
S/CG/CH Frames Gap Gap Max Current Start End CM Cnt
-----
1/1/24 8 1 4 500 7 138075000 139675000 2
* Frequencies used are configured frequencies expanded to appropriate mini-slot boundaries
```

StrataSync “Frequency” = Center Frequency of OUDP Carrier

From this information we can calculate the center frequency of the 1st subcarrier of the OUDP carrier by adding half the subcarrier width (0.025000 MHz) to the “Start” frequency value returned from the CMTS. 1st OUDP Subcarrier Center Frequency = “Start” + 0.025000

$$1^{\text{st}}\text{ OUDP Subcarrier Center Frequency} = 138.07500 + 0.025000$$

$$1^{\text{st}}\text{ OUDP Subcarrier Center Frequency} = 138.100000$$

We will calculate the center frequency of the OUDP carrier by adding 800 kHz (16 subcarriers @ 0.050000 MHz) to the calculated value of the 1st OUDP Subcarrier Center Frequency. Center Frequency of OUDP Carrier = 1st OUDP Subcarrier Center Frequency + 800 kHz

$$\text{Center Frequency of OUDP Carrier} = 138.100000 + 0.800000 \text{ MHz}$$

Center Frequency of OUDP Carrier = 138.900000 MHz