Quick Card

# **CT-X Setup Guide**

This 10-step guide will show how to program the CT-X and set the 4 possible tagging frequencies in the guard band of the QAM carrier or in the exclusion zone of a OFDM carrier. **NOTE: If Tag levels are set too low then leaks may not be recorded by the Leakage receiver.** 

#### Prerequisite

#### Please Review CT-X Getting Started Guide

#### **System Requirements**

CT-X 10/100 BaseT Ethernet connection with static IP or DHCP ONX-620/630

#### Step 1 Decide what frequencies, up to 4, to be used for leakage detection / monitoring

- Spread leakage monitoring across the frequency spectrum of your network to provide the best coverage, keeping in mind sensitive channels to off-air interference
- Up to 4 tag Frequencies from 130 MHz to 2018 MHZ
- They can be set for Chirp or Dual CW's
- See Figure 1



Figure 1: Tag Frequency Placement

#### Step 2 Decide what types of leakage carriers to be used

- Dual CW's Carriers can be detected by Seeker D or Seeker X
- Good noise discrimination and sensitivity are good with the Seeker D, even better with the Seeker X using the same inserted signals
- Chirp Carriers can be detected by Seeker X only
- Best in the business for meter sensitivity and noise discrimination inserting a very robust tag signal
- OFDM Carriers can be detected by Seeker X only Meter setup only (CT-X not required)
- o Better excellent sensitivity and noise discrimination using full strength carriers

**Note:** In an all-digital plant these days typically 138 MHz is used for FCC rules compliance.

#### Step 3 Off-Air survey to avoid interference to leakage detection

- Connect an OneExpert or spectrum analyzer to the antenna feed intended for the Seeker meter in the vehicle
- Adjust the analyzer to view spectrum of interest and visually inspect the off-air noise level.
- Looking for low noise, quite spaces in the spectrum void of off-air carriers.
- o See figure 2



Figure 2: Downstream off air carriers

#### Step 4 and 5 Installation

- Close to the combining network for CT-X RF output to combine with the Modulator RF out to the plant
- Connect the OneExpert meter to a drop to measure QAM's on either side of the selected leakage frequencies.
- See figure 3 ,4 ,5

#### **Front View**



- Display screen Displays the setup and operational status. Most of the setup can be adjusted here using the front panel.
- Select Scrolls through the main menus, scrolls through the options in the submenus, and adjusts settings.
- 3. Enter Enters the menus/submenus and selects options to adjust settings

#### Figure 3: CT-X Front Panel

**Back View** 



#### 1. RF output

- Ethernet Used to remotely configure the unit and update firmware through your network
- 3. SFP SFP optical port
- 4. AC power input

Figure 4: CT-X Back Pane



Figure 5: CT-X placement in Headend

## Step 6 Log into CT-X over ethernet

- From the CT-X interface, go into network settings to obtain the IP address
- o See figure 6
- In a web browser, enter the IP address of the CT-X to access the web portal of the CT-X
- See figure 7



Figure 6: CT-X IP

Con	necting to CT-X throug	h web portal		
	CT-X Network Settings	Internet Web Browser		
	IP ADDRESS 192.168. 0. 29	New Tab         ×         +           ←         →         C         192.168.0.29		
	CT-2	Login Screen		
	CT-X Login x +     C ▲ Not secure   192.168.0.29/#/login     Apps   C ▲ XV Instruments.	s5 💷 Leakage Training Q 📕 Assets 📑 Viavi StrataSync Sta 🏈 parkINDplus	📕 XOXORLeakage Analy 🜠	
	VIAVI CT-X			
		Username		
1. 2. 3.	Obtain IP Address through CT-X front pa Enter CT-X IP address in Internet Web I The CT-X Login screen will appear	nel Password rowser Login		
4.	<ul> <li>Enter Username and Password</li> <li>Default Username = admin</li> <li>Default Password = admin</li> </ul>	Product: CT-X Model # Serial #. TTDD0042990001 Package Revision: 2.1.18 (Boot: 1.1.286 App: 2.1.18 FPGA: Setup mode: off Device errors: none	1.0.27 Web: 1.5.40)	

Figure 7: Logging into CT-X

## Step 7 Setting Tag types, Frequencies and Level

- 1. Set Ouput
- 2. Set the Chip Tag 1 to 4 typical is 2
- 3. Set Dual CW tag for 1 to 8 typical is 2
- 4. Set dBmV
- 5. Enable Signal 1 to 4
- 6. Set the type for tag for each frequency dual or chirp.
- 7. Set Output level (This may change when setting up for proper levels)
- 8. Frequency (Typically in Guard band of QAM or Exclusion Zone of OFDM)
- 9. Put CT-X in Setup mode to properly measure and adjust the RF output levels
- 10. Press and save the Save to CT-X button
  - See Figure 8 for visual

Note: if any changes occur then user must save to CT-X for changes to take affect

¢	Administration	Save to CT-X Cancel			
•	Network	#10			
••••••••••••••••••••••••••••••••••••••	Network       Output     #1	#10  * The device is transmitting in setur  The device is transmitting in setur  Enirp Tag  2 #2  Dual CW Tag  2 #3  Dual CW Tag  2 #3  #4  A BmV  Bignal 1  Enable signal #5  C Chirp Dual CW #6  Dutput level (demv)	Addendum for Tag de Signal 2 Chirp O Dual CW #6 Output level (dBmV)	etails Signal 3 Chirp O Dual CW #6 Output level (dBmv)	Signal 4 ✓ Enable signal #5 ○ Chirp ○ Dual CW Output level (dBmv) #6
		20 #7	16 <b>#7</b>	21 <b>#7</b>	21 <b>#7</b>
		Center frequency (MHz) 138 #8	Center frequency (MHz) 450 #8	Center frequency (MHz) 612 #8	Center frequency (MHz) 666 #8
		Exit setup mode <b>#9</b>			

Figure 8: Setting the tagging frequencies and type of tag

## Step 8 Using the ONX to set the proper tag Level

Measure adjacent QAM Channels to 612 MHz and 138 MHz •Ch. 88 or 89, and 16 or 17 respectively

•Log channel power levels for each

•Measure the peak value of the dual CW's combined (Not in Low-Res mode)

•612 MHz and 138 MHz

•Log peak value of both frequencies

Connect signal to port 1 of the ONX

CATV Home Screen select "Channel Check"



Figure 9: Channel Check

Channel Check Setup select "Start"



ONX builds channel plan and provides measurement for all channels in the plan



Figure 11: Channel Check Start

Note the Power Level of the selected Channels



mode

#### Note: If Type Chirp tag then the tag level would be 6 dB higher



## Downstream Spectrum Setup (612 MHz) Continued

Enter Start Freq 611.9 MHz



Enter Stop Freq 612.1 MHz





Move Marker

to



## Downstream Spectrum Setup (138 MHz) Continued

## Enter Start Freq 137.9 MHz



## Enter Stop Freq 138.1 MHz



## Move Marker to Peak Level



## Step 9 Return CT-X to normal setting.

Press the Exit setup mode for normal operation

See figure 12

<ul> <li>Notput</li> <li> <ul> <li>The device is transmitting in setup mode at the configured frequencies and output levels.</li> </ul> </li> <li> <ul> <li>Enable output</li> <li>Enable output</li> <li>Enable output</li> <li>Dual CW Tag</li> <li>Od BmV O dBuV</li> </ul> </li> <li>         Signal 1         Signal 2         Signal 3         Signal 4         <ul> <li>Enable signal</li> <li>Enable signal</li> <li>Enable signal</li> <li>Chirp O Dual CW</li> <li>Output level (dlimiv)</li> <li>Conter frequency (MHz)</li> <li>Center frequency (MHz)</li> <li>Center frequency (MHz)</li> </ul> </li> </ul>	Network				
Image: Chirp Tag         2         Dual CW Tag         2         Image: Chirp Tag         Image: Chirp	Output	* The device is transmitting in setur	o mode at the configured frequenci	es and output levels.	
Chirp Tag         2         Dual CW Tag         2         Image: Chirp Tag         Image: Chiron Tag         Imag		Enable output			
Dual CW Tag         2         Image: Control of the contro		Chirp Tag 2 0			
2       Image: Constraint of the sector of th		Dual CW Tag			
Signal 1       Signal 2       Signal 3       Signal 4         Image: Signal 1       Enable signal       Enable signal       Enable signal       Enable signal         Image: Signal 2       Enable signal       Image: Signal 3       Signal 4         Image: Signal 3       Enable signal       Image: Signal 3       Enable signal         Image: Signal 4       Image: Signal 3       Image: Signal 3       Enable signal         Image: Signal 4       Image: Signal 4       Image: Signal 3       Image: Signal 3         Image: Signal 4       Image: Signal 4       Image: Signal 4       Image: Signal 3       Image: Signal 3         Image: Signal 4       Image: Signal 4       Image: Signal 4       Image: Signal 3       Image: Signal 3       Image: Signal 3         Image: Signal 4         Image: Signal 4       Image: Signal 4       Image: Signal 4       Image: Signal 4       Image: Signal 4       Image: Signal 4       Image: Signal 4         Image: Signal 4       Image: Signal 4       Image: Signal 4       Image: Signal 4       Image: Signal 4       Image: Signal 4       Image: Signal 4       Image: Signal 4         Image: Signal 4       Image: Signal 4       <		dBmV O dBuV			
Image: Signal       Image: Signal<		Signal 1	Signal 2	Signal 3	Signal 4
O chirp     Dual CW     O chirp		Enable signal	Enable signal	Enable signal	Enable signal
Center frequency (MHz) Center frequency (MHz) Center frequency (MHz) Center frequency (MHz)		O Chirp Dual CW Output level (dtimv) 25	Chirp Outload CW Output level (dtlm/) 15	Output level (dBmV) 26	Chirp Dual CV Dutput level (dBmV) 21
40 012 000		Center frequency (Miriz) 138	Center frequency (MHz) 450	Center frequency (MHz) 612	Center frequency (MHz) 666

Figure 12: Exit Setup

### Step 10 Test the system

Note: If levels are off by 6dB too low, then leakage readings will be cut by 1/2.

#### Example:

A 20 microvolt leak would be only 10 microvolts.

### Addendum

### Tag information

## **Dual CW Settings**

When the Signal Type is set to Dual CW, the Tag dropdown allows for the selection of spacing between the two carriers of the Dual CW tag. The Seeker X supports the following tag spacings

- 1 Sets the spacing to 156.25 Hz
- 2 Sets the spacing to 625 Hz
- 3 Sets the spacing to 312.5 Hz
- 4 Sets the spacing to 468.75 Hz
- 5 Sets the spacing to 781.25 Hz
- 6 Sets the spacing to 937.5 Hz
- 7 Sets the spacing to 1093.75 Hz
- 8 Sets the spacing to 1250 Hz

## **Chirp Settings**

Chirp is a Digital Spread Spectrum technology that is designed to provide the following improvements over traditional dual CW leakage tags

- Robust tag identification to minimize false detection
- Increased immunity to high levels of off-air interference/noise of up to 30 dB over Dual CW leakage tags
- Increased sensitivity of 6 dB over Dual CW leakage tags

VIAVI provides four distinct patterns to allow unique signatures in the case of adjacent providers using the same VIAVI technology and tagging.

- 1 Chirp Type 1
- 2 Chirp Type 2
- 3 Chirp Type 3
- 4 Chirp Type 4