Technical Tip

Dynamic Range Window (DRW) Using DRW Detection in CX310

Introduction

Upstream Channel Bonding combines multiple RF channels into a group (MAC layer) to allow DOCSIS 3.0/3.1 cable modems to handle higher bandwidths. The DOCSIS 3.0/3.1 specifications state that up to 8 channels can be bonded into a Transmit Channel Set. As more channels are combined into a group, the per channel maximum power decreases so the combined power of the bonded group matches the total MTP (Maximum Transmit Power) of a single channel before bonding. To mitigate this decrease to equal the approximate single channel maximum channel, the use of Dynamic Range Window (DRW) while in Multiple Transmit Channel (MTC) mode is used.

Figure 1: Dynamic Range Window



When activated, the Dynamic Range Window cycles the channels to find the single upstream channel that has the maximum dB transmit level. It then calculates three

transmit levels approximated by the CMTS upon registration: Minimum Transmit Power (MTP_{MIN}), Top Transmit Power (TTP), and Reported Transmit Power (RTP). These values are used to determine the limits for bonded channels. The DRW supports a 12 dB range between the Minimum and Maximum values. If the values fall outside this range, the modem detects a DRW violation and may not register as online or partially register only.

Figure 2: Dynamic Range Window Pros/Cons

May maximize the	Modems may be missed
transmit levels of bonded	completely (not
channels	registering).
As more service providers use the transmit values reported by the CMTS, the easier troubleshooting will become.	Modems may be difficult to troubleshoot when partially registering.

Using DRW Detection in CX310

The DRW detection option is disabled by default in the test set's Cable Modem. When enabled, if the Cable Modem Transmit power levels fall outside the DRW 12 dB range, a message appears (See Figure 3).

	Cable Mod	lem		IP Tools			
🔒 Setup	Ranging	g Graphs	Link	OFDM	IP		
Primary Freq	87 / 603.00	0 MHz	DOCSIS Mo				
DS Lock Status	Pass		Inform				
US Sync	UCD (1		monn				
US Ranging	47.80 di		Dynamic Range Window (DRW)				
DHCP	Pass	Failure					
ToD	Pass						
Config File	d11_m_	Upstream transmit levels fail to meet DOCSIS DRW Specifications.					
Registration	In Prog						
BPI+Status			in the Cable Modem/Setup page.				
Connection							
Status	Registr		ОК				
Tbl: Atl_X		Loc: mike-te	est-he 🔻 T	P: Off	2	019-04-28 04:57:06	

Figure	3.	Test	Set	DRW/	Failure	Noti	ficatio	
riguic	э.	1CSL	JUL	DIVV	runurc	NOU	jiculioi	4

To troubleshoot why the modem is not registering on the first attempt, disable the DRW detection option and check the upstream power levels of each channel in the Link measurement tab (See Figure 4).

Cable Modem						
Setup	Ranging	Graphs	Link	Link OFDM IP		
Upstream UCD	5	4	3	2		
Frequency	50.500 MHz	43.500 MHz	36.500	MHz 29	.500 MHz	
Modulation	QAM64	QAM64	QAM64	1 Q/	AM64	
Level	32.00	32.25	33.25	33	.75	
Symbol Rate	5.120 MSps	5.120 MSps	5.120 M	ASps 5.1	120 MSps	
A	daptive Equalize	er				
FFE -20 -20 -40 -60 -80 -1.0 0	DFE	3.1 4.3 uS	5 of 6 💿			Marker Vp Setting
Tbl: Standa	rd_Q256 🔻	Loc: Tap		P: Off		2017-05-17 14:52:50

Figure 4: Checking Upstream Power Levels

To enable or disable DRW Detection in CX310

- 1. Connect the test mode. The test set displays the **Cable Modem Ranging** sub-tab.
- 2. Click the Setup sub-tab to view channel configuration settings.
- 3. Click the DRW Detection drop-down box and select Enabled or Disable (See Figure 5).

Figure	5.	CX310		Detection	ontion
rigure	Э.	CV2TO	DIVV	DELECTION	υρτισπ

	Cable Modem		IP Tools					
Setup	Ranging	Graphs	Link	OFDM	IP			
Channel		87		603.00 MHz				
MAC Selection		MAC 1		V				
MAC Address	AC Address 00-D0-DD-61-28-2		-29					
SW Version		0.8.04.031819						
FW Model		CMD31	:MD31					
Diplexer		85 MHz						
Annex		Annex B						
Select UCD		Disable						
DRW Detection	I	Enabled						
DOCSIS Mode	DCSIS Mode DOCSIS 3.1		SIS 3.1 V					
Test Mode	est Mode Terminate		Terminate 🛛 🗸					
Client IP Mode		IPv4			▼			
Tbl: Atl_X		Loc: mike-test-	he 🔻 🚺	Off	20	19-04-28 05:27:10		

About VeEX

VeEX Inc., an innovative, customer-focused communications test and measurement company, develops next-generation test and monitoring solutions for telecommunication networks and services. With a blend of advanced technologies and vast technical expertise, VeEX has developed products that diligently address all stages of network deployment, maintenance, and field service turn-up and integrate service verification features across DSL, fiber optics, CATV/DOCSIS, mobile backhaul and fronthaul (CPRI/OBSAI), next-generation transport network, fiber channel, carrier and metro Ethernet technologies, WLAN, and synchronization. Rev. A00 | August 2019

P/N: D08-00-058

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