QUICK CARD

IEEE 1588v2 Precision Timing Protocol (PTP) Verification Measurements in an ITU-T G.8275.1 PTP Telecom Profile Architecture

This guick card outlines how to run IEEE 1588 measurements for Time Distribution in an ITU-T G.8275.1 PTP Telecom Profile Architecture with full timing support. The quick card documents how to set up a TEM V2 Timing Expansion Module and OneAdvisor on a 10GigE Optical Interface, but the same workflow may be applied to other data rates.

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EQUIPMENT REQUIREMENTS

- OneAdvisor 800 equipped with the following:
 - RAxxMA-O Radio Analysis Module or SPA06MA-O Spectrum Analyzer Module.
 - Transport software release V5.1.0 or greater
 - o ONA-SP-10GELAN 10 Gig Ethernet option
 - PTP Option ONA-SP-10G1588
- Timing Expansion Module V2 (TEM V2)
- GNSS Antenna (Taoglas A.171, • Taoglas AA.162, Tallysman TW7882, or Maxtena M9706CWT recommended)
- SFP+ Optical Transceiver and cables to match the line under test

CONNECT GNSS ANTENNA AND ACTIVATE TEM V2

- Press the Power button on the 1. OneAdvisor.
- Connect the male SMA connector on the 2. end of the antenna cable to the female SMA connector on the TEM V2 (labeled Antenna).
- Tighten the connector until the antenna is 3. securely attached.
- Place the antenna in a location with 4. minimum interference or blocking.
- **1** Home to display the Home Screen. 5. Tap
- Tap [1] Tests to display the Tests menu. 6.
- Tap Timing Module > 7.
- Tap the **Timing** icon (N) to activate the 8. TEM V2 Timing Module. **OneAdvisor 800 Platform**

TEM V2 GNSS

Antenna



Figure 3: Home Screen





Figure 1: Equipment Requirements

Figure 2: TEM V2



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SETUP GNSS RECEIVER AND START SURVEY

- 1. Tap the Setup soft key on the upper right-hand corner of the screen.
- 2. Configure GNSS settings as follows:
 - > GNSS System: Select GPS for use in North America. Other constellations or combination of constellations can also be used:
 - Galileo and SBAS: European systems
 - GLONASS: Russian System
 - BeiDou: Chinese system
 - QZSS: Japanese system
 - > Too few Satellites Alarm: 3
 - > Time Reference: GPS
 - > Time Format: 12-hour
 - > Elevation Limit: 5 to 15 deg recommended, Using satellites near the horizon may degrade performance but may be needed in "urban canyons".
 - > Minimum C/No: 9 dB-Hz recommended, 30 dB-Hz maximum. Using satellites with a weak carrier to noise ratio may degrade performance but may be needed in "urban canyons".
 - > Antenna Power: 5 volts for VIAVI supplied magnetic mount antennas. If you are using a different antenna, enter the antenna power, or select 0V if the site powers the GPS antenna.
 - > Antenna Time Bias: Select Antenna Type for VIAVI supplied antennas; otherwise, Select "User Defined" and enter the cumulative delay introduced by the antenna, cables, and any inline splitters or amplifiers. In absence of more specific information, use 1.2ns/foot or 4.5ns/meter of cable.
 - Jamming Detection Mode: Off
- 3. Tap the Location settings tab and configure location settings as follows:
 - > Survey mode: Typical (3 hours) is recommended, Fast (15 minutes) may be used with reduced position accuracy, Quick should not be used.
- 4. Tap the Start Survey button to start a survey. If prompted, tap **OK** to continue.
- Tap the **Results** soft key on the upper right 5. corner of the screen.

OneAdvisor 800 Platform

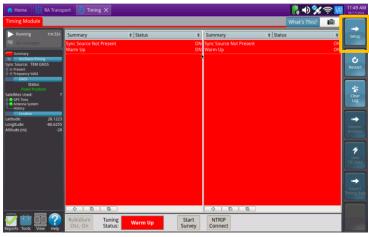


Figure 4: Timing Module Results

GNSS	GNSS System						
Location		GALILEO	BEIDOU	GLONAS	S SBAS		
NTRIP Client							
Oscillator/Timing	Too Few Satellites Alarm	Threshold 3					
1PPS Analysis	Time						
RJ45	Time Reference	GPS	٥	Time Format	12-hour		
Timed Test	UTC Standard		•				
	Filter						
	Elevation Limit (deg)	15		Minimum C/No (dB-Hz)	30		
	Elevation Limit (deg)	13		Millinium C/No (dB-Hz)	50		
	Antenna						
	Antenna Power	5 Volts		😮 Antenna Time Bias	Taoglas AA.171.301111 (28ns)		
	Jamming Detection						
	Mode	off	:				
		*					

Figure 5: GNSS Settings

🟫 Home 🔛 RA Ti	ransport 🧿 Timing 🗙				🛛 🛃 🚸 🐝	(in)	11:56 AN
Timing Module					What's This?	10	
GNSS Location	Start Survey	Survey Mode	Typical	•			Results
Oscillator/Timing 1PPS Analysis RJ45	Position	✓ Alert When Finished Survey Position Accuracy (m) Survey Duration	1 3h:00ិm:00s				
Timed Test	Fixed	Fixed Position Accuracy (m)	44.453				
		Latitude (deg)	28.1222963				
		Longitude (deg)	-80.6255481				
		Altitude (m)	-28.396				1000
	Enter location name Location Name	to save coordinates:			Remove		
	Last Surveyed			*	Remove		
		Clear Sa	aved Locations				
							and the second
Reset Test to Defaults							

Figure 6: Location Settings



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VERIFY GNSS RECEPTION

- Tuning Status will be displayed at the bottom of the screen. The Oscillator will cycle through these stages: Warming Up, Initializing, Wait for 1PPD, Course Tune, Intermediate Tune, Fine Tune. At least Course Tune is required.
- 2. Using the results group and category drop-down menus, change the right results display to the following:
 - Satellites/Sky Plot: Displays the satellites detected by the GNSS receiver.
 - Satellites/Signal Strength: Uses a bar graph to display the signal strength for each identified satellite. Ensure at least 4 satellites are used (green) and that signal strength of used satellites exceeds Minimum C/No setting (bar will be green). Otherwise, relocate antenna to a less obstructed location or reduce the Minimum C/No setting.
 - GNSS/Status: Displays general information concerning the GNSS Satellites. Ensure that Status progresses from "No Lock" to "Locked" to "Fixed Position" during the survey. Ensure that Timing Mode Status progresses from "Survey" to "Survey Done".
 - GNSS/Location: Displays general information concerning the location and position accuracy. A Mean Position Dilution of Precision (PDOP) value below 4.0 is desired.
- A "Typical" survey will run for 3 hours and stop if it has reached a 1-meter position accuracy.
 If, after 3 hours, the survey still shows "Survey Active", the Timing Module was not able to attain a 1-meter or better position accuracy. Tap the Setup soft key, set Survey Mode to Fast, and tap the Results soft key. Repeat steps 1 and 2 above to conduct a 15minute survey with 45-meter position accuracy.



Figure 7: Satellites/Sky Plot Results

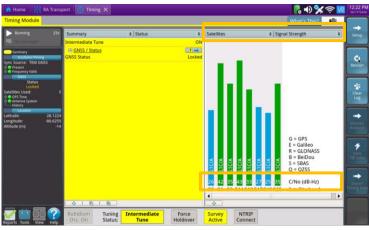


Figure 8: Satellites/Signal Strength Results

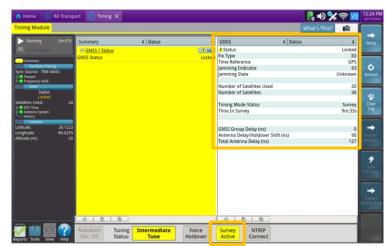


Figure 9: GNSS/Status Results

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LAUNCH PTP/1588 TEST

- 1. Tap **1** Home to display the Home Screen.
- 2. Tap 🗛 Tests to display the Tests menu.
- 3. Tap Radio Analysis Transport > .
- Tap the **RA Transport** icon [™] to activate the Radio Analysis Module.
- 5. Tap the Select Test drop-down and select the following test:
 - Ethernet> 10GigE LAN> PTP/1588> Terminate
- Connect the OneAdvisor SFP+ Port 1 to the network port to be tested using an LC patch cable. Note the cable length.
 - ► Enable the Laser: Laser Off
 - ▶ Press the **Restart** soft key.
 - Look for 5 or 6 green LEDs: This will indicate that the link is up, and GPS sourced timing is available.

CONFIGURE PTP SLAVE SESSION

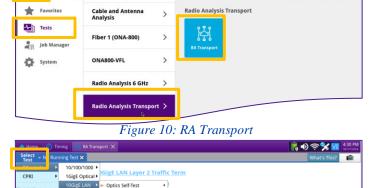
- 1. Tap the Setup soft key.
- 2. Select the **PTP** Folder. Make all PTP settings as necessary for a PTP Slave on the network under test:
 - PTP Layer: L2
 - Mode: Slave
 - Address Mode: Multicast
 - Domain: the default value for G.8275.1 is 24, otherwise use the value recommended by your timing administrators, in the range 24 to 43
 - Encapsulation: None
 - Announce Rx Timeout: 3
 - Announce: 8 per second
 - · Cable Delay: 4 ns per meter of patch cable



Address Mode
✓ Ignore Flag

<u>R</u> •) ?*

R •) ? %



A Home

25GigE

Mode PTP Laye

Mode

Timed Test

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Use 01-80-C2-00-00-01 Encapsulation

None

Encapsulation

Message Interva

TE Sampling p

Announce Rx Timeo Announce

SG NR Discove
QuickCheck

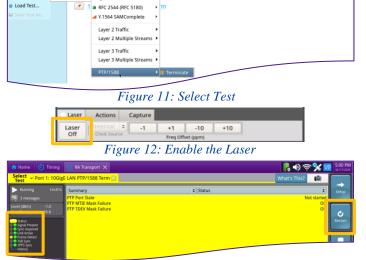


Figure 13: Check LEDs

Figure 14: Setup



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CONFIGURE PTP SLAVE SESSION (Continued)

- 3. Select the **Thresholds** folder. Enable and set the desired settings thresholds including **Time Error Max**.
 - Swipe screen or use scroll bar to view and configure additional Measurement settings and pass/fail limits.
- 4. Tap the **Results** soft key to return to the results view.

🟫 Home 🚫 Timii				. • ?	S:35
Select - Port 1: 10	GigE LAN PTP/1588	Term 😹		What's This?	a l
interface	PTP Threshold	ds			Resul
Capture	Enable	Sync PDV Max. (ns)			Control of the second
Filters	Enable	Delay Request PDV Max. (ns)			
Port Addresses	Enable	Floor Packet Measurement			
	Enable	Packet Select 2-Way TE Measu	irement		
Thresholds	Enable	Slave to Master Delay Min. (n			
nineo rest					
	Enable	Slave to Master Delay Max. (n			
	🗆 Enable	Master to Slave Delay Min. (n			
	Enable	Master to Slave Delay May /n	e)		
	✓ Enable	Time Error Max. (ns)	100		
	Enable	Iwo Way CIE Over Time Abs P	Max. (ns)		
Reset Test to					

Figure 16: Thresholds Setup

START PTP SLAVE SESSION AND REVIEW RESULTS

 The default Results view is single screen with Summary and Status. The view can be changed to dual results (Split Left/Right) through the View button on the lower left.

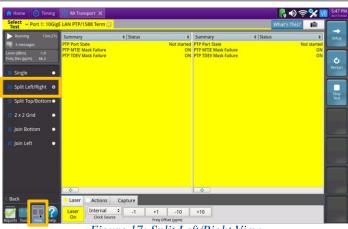


Figure 17: Split Left/Right View

- Processor
 Processor
- 3. Select the **Actions** tab at the bottom of the screen, press **Start Slave PTP Session**.

2. Select PTP / Link Stats for the left result

Figure 18: PTP/Link Stats



windows.



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- Port State should progress from "Not Started" to "Listening" to "Slave"
- Detecting the Rx Domain Number (24) to 43) and seeing a Max TE value indicates that the PTP Slave Session is active. The OneAdvisor is receiving timing from the PTP master.
- Additional PTP/Link Stats results can be viewed by scrolling through the window.
- If Pass/fail thresholds are met, the Summary/Status window and Status LED will remain green.
- If any thresholds are triggered, Summary/Status window and the Status LED and the value for that result will turn red.
- 4. Select Graphs / Max TE for the right results window to view a graph of a key performance indicator.
- 5. Note: There are many more categories and sub-categories of results both tabular and graphed.

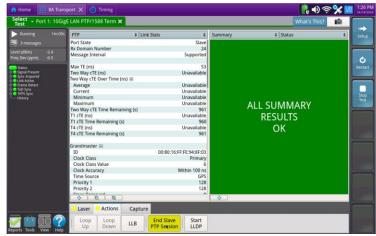


Figure 20: PTP Link Stats

Running	PTP	\$ Link	Stats	•	Graph	hs			¢ Max	TE		•	54
3 messages	Port State			Slave	al	•	10 Minute	s :	Mean		10	R	
	Rx Domain Number			24	0		10 Minute	s Ŧ	Mean	•		H	
	Message Interval			Supported	55 -	1							
							·						
Status	Max TE (ns)			54	50 -			-					Ret
Signal Present	Two Way cTE (ns)			Unavailable	1.1		8						
Sync Acquired	Two Way cTE Over Tin	ne (ns) 🖂			45 -		22						
Frame Detect	Average			Unavailable	40 -					· ·			
ToD Sync	Current			Unavailable	- 13								
1PP5 Sync History	Minimum			Unavailable	35 -								St
	Maximum			Unavailable									
	Two Way cTE Time Re	maining (s)		577	30 -			_					
	T1 cTE (ns)			Unavailable	8								
	T1 cTE Time Remainin	og (s)		576	25 -							-	
	T4 cTE (ns)	0 111		Unavailable									
	T4 cTE Time Remainin	ig (s)		577	20 -			-				-	
		-0 (»)											
	Grandmaster 🖂				15 -			-					
	ID		00:80:16-FF	FE:94:8F:03	10 -								
	Clock Class		00.00.10.11	Primary	10 -								
	Clock Class Value			6	5-			_					
	Clock Accuracy		W	lithin 100 ns									
	Time Source			GPS	0.3			_					
	Priority 1			128	- 13	25:46		13:29:06		13:32:26	12.1	1	
	Priority 2			128	- 13	4.49		10.49000	Max		13:3		
	Etens Demound				-	-		_	a max			=	
	0 0 0	and a			- 0	1							
	Laser Action	is Capture											

Figure 21: Max TE Graph

CREATE REPORT

- to open the Reports Panel and Tap 🔚 Create Report... select
- Choose Optionally, tap to select and 2. Contents unselect report groups.
- Tap Create 3.
- 4. A report will be saved to the OneAdvisor 800's /user/bert/reports folder.

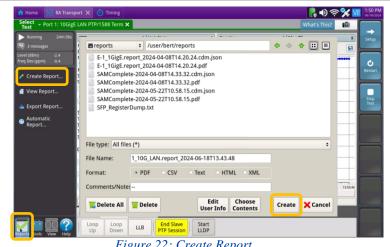


Figure 22: Create Report

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