

Calnex Paragon - *x*



Software Release 29X (X.10.42.xx)

NEW FUNCTIONALITY AND ENHANCEMENTS



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1 Software Release Overview

Release 29X (X.10.42.xx) adds the following features to Paragon-X

SUS (Software Upgrade Service)

New Option: Reverse Sync (Option 285)	Base product enhancements
Addition of Reverse Sync capability:	General Defect Fixes

 To check the current software version installed, select Help > About Paragon Remote Client on the Paragon-X GUI.

2 Features and Benefits

Paragon-X	Benefit
New Option: Reverse Sync (Option 285):	Enables measuring gPTP recovered clock accuracy using the Reverse Sync Method.

3 New Options

3.1 Reverse Sync (Option 285)

The traditional approach to measuring the accuracy of the recovered clock in a gPTP time-aware end station is to use its 1 Pulse Per Second (1PPS) physical output. While this is a valid approach, there are cases where a 1PPS output is not available.

To address this, methods have been proposed by various parties, including Avnu, for testing the accuracy of the recovered clock by sending additional PTP messages in the reverse direction that carry recovered clock timestamps, allowing measurement of the clock accuracy of the endpoint device. These are referred to as “reverse sync” messages.

The endpoint device must generate the reverse sync messages and the receiving device (or tester) must be capable of capturing and interpreting the messages.

This new option provides Paragon-X with the capability to capture and interpret reverse sync messages, and therefore to measure the time error of the DUT.

This capability is available when testing **Time Aware End Station** under **802.1AS-2011** or **802.1AS-2020** profile.

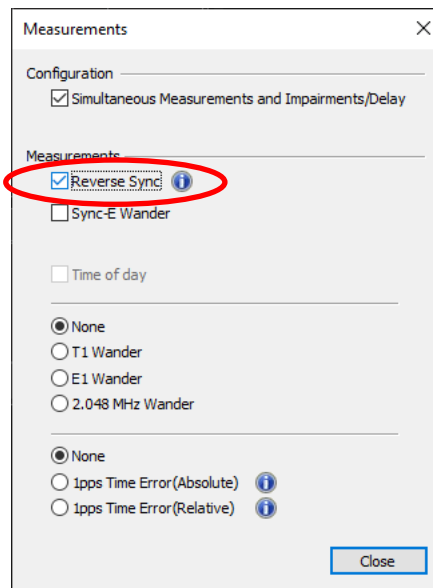
The screenshot displays the Paragon-X Remote Client interface. The main window is titled "Test Setup" and shows a configuration for a "Time Aware End Station" test under the "802.1AS-2020 (gPTP)" profile. The interface is divided into several sections:

- Left Sidebar:** Contains navigation options such as "Start Up", "Operating Mode", "Setup Interface", "Master/Slave/GPS Emulation" (highlighted in blue), "Measurements", "Select Flow" (with "Time Aware End Station" selected), "Configure Capture", "Start Capture", "Add Impairments/Delay", "Add Wander", "Add Jitter", "Packet Generation", and "Statistics/Results".
- Test Configuration Panel:** Shows "Device Configuration" (Master + Slave selected), "Test Configuration" (Time Aware End Station selected), "Capture" (Master selected), and "Measurement" (Manual calibration selected).
- Test Setup Diagram:** A central diagram showing the test setup. It includes a "Calnex Paragon-X" device with a "Master" and "Slave" section. The "Master" section has "Tx Impairment" and "Rx Impairment" blocks, and a "Capture Master Tx" block. The "Slave" section has a "Wander Meas." block. A "D.U.T." (Device Under Test) is connected to "Port 1" and "Port 2". The diagram shows a "1 pps" signal from the Master to the D.U.T., and a "1 pps/ToD" signal from the D.U.T. to the Master. There are also "Accuracy Meas." and "Wander Meas." blocks.
- Right Panel:** Contains "Calnex Master" and "Calnex Slave" sections, both in "Multicast" mode. The "Calnex Master" section has a table for "Multicast / Slave Address" with a value of "01 80 c2 00 00 0e". The "Calnex Slave" section has a table for "Connected Master Address". Below these is a "Link Status" table.

Port	Link	Rx Packet
1	●	GOOD PACKETS
2	●	GOOD PACKETS

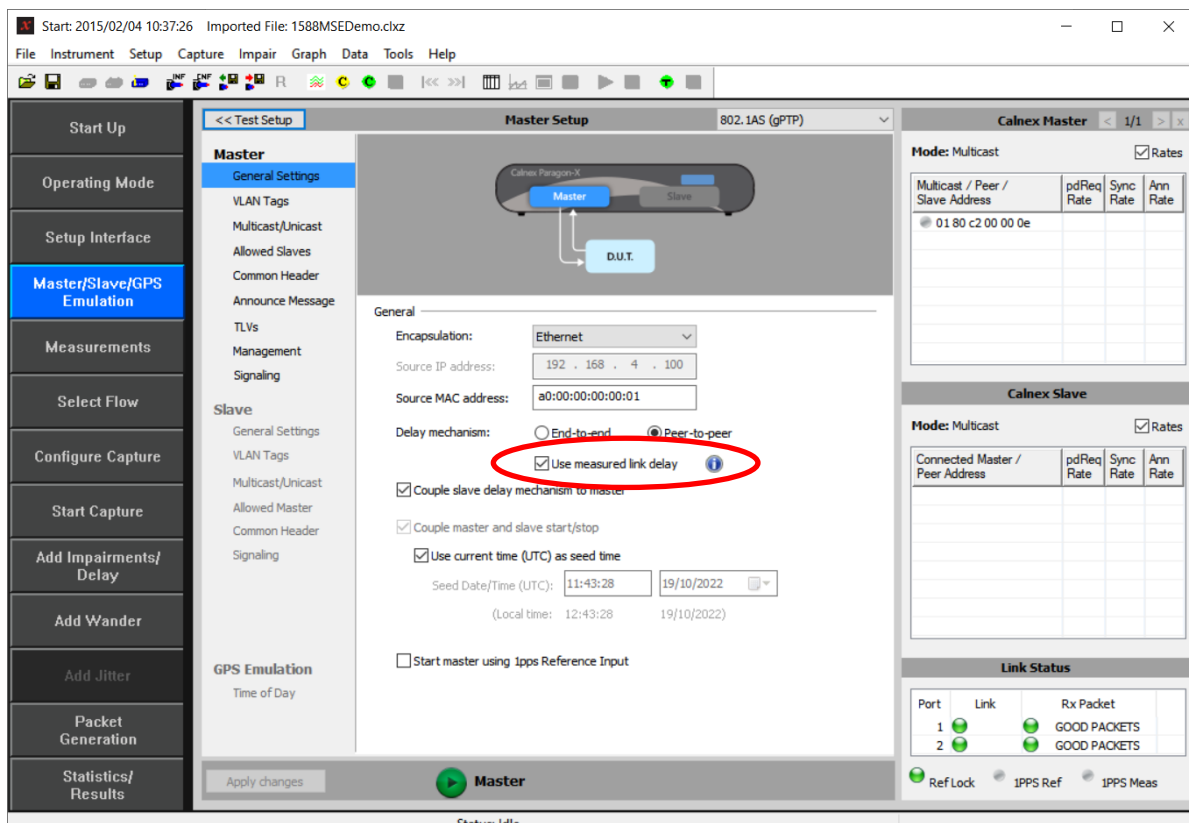
At the bottom of the interface, there is a "Status: Idle" indicator and a "Master" button.

When in an appropriate test mode, it is possible to enable Reverse Sync as a measurement signal in *Measurements* window:

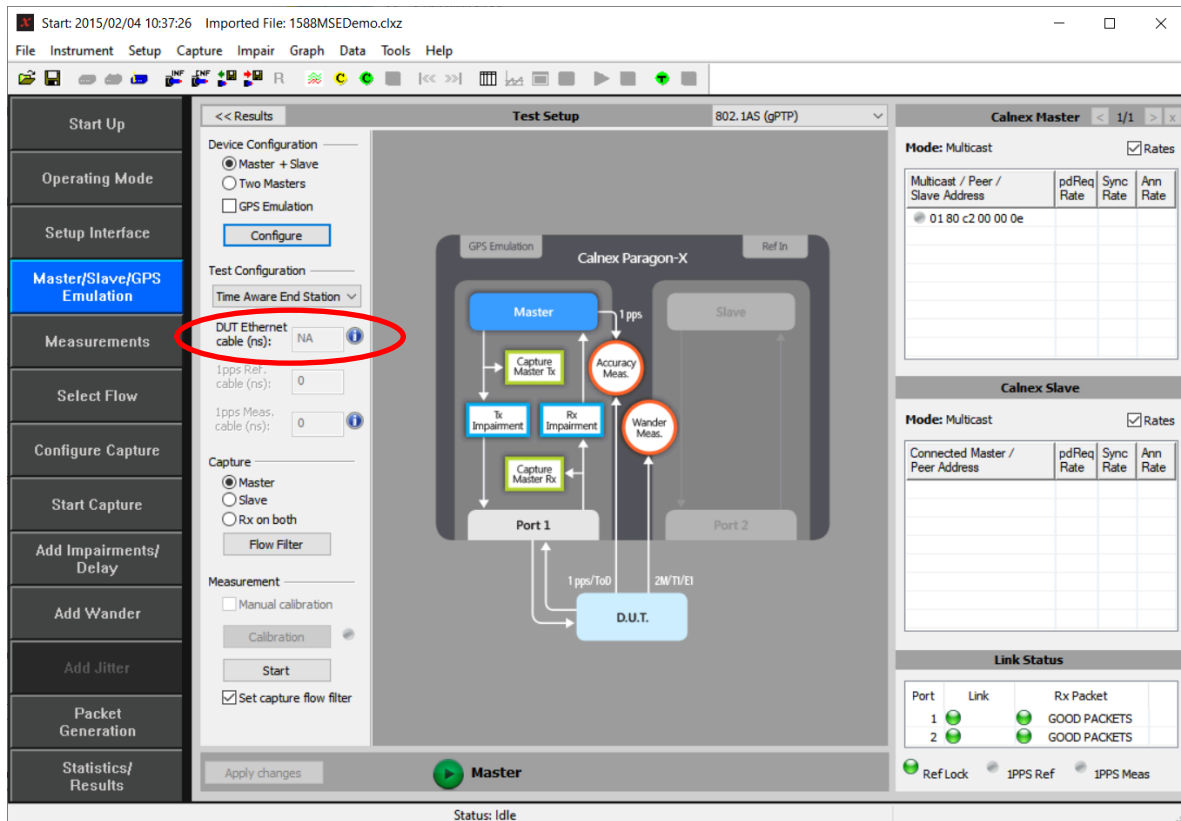


The delay between the transmission of the Reverse Sync message and its receiving by Paragon-X must be known and compensated for in the time error analysis. Two methods are available for this: Paragon-X can use Peer_Delay messaging to measure the link delay between its timestamping plane and that of the DUT, or a fixed cable delay may be entered.

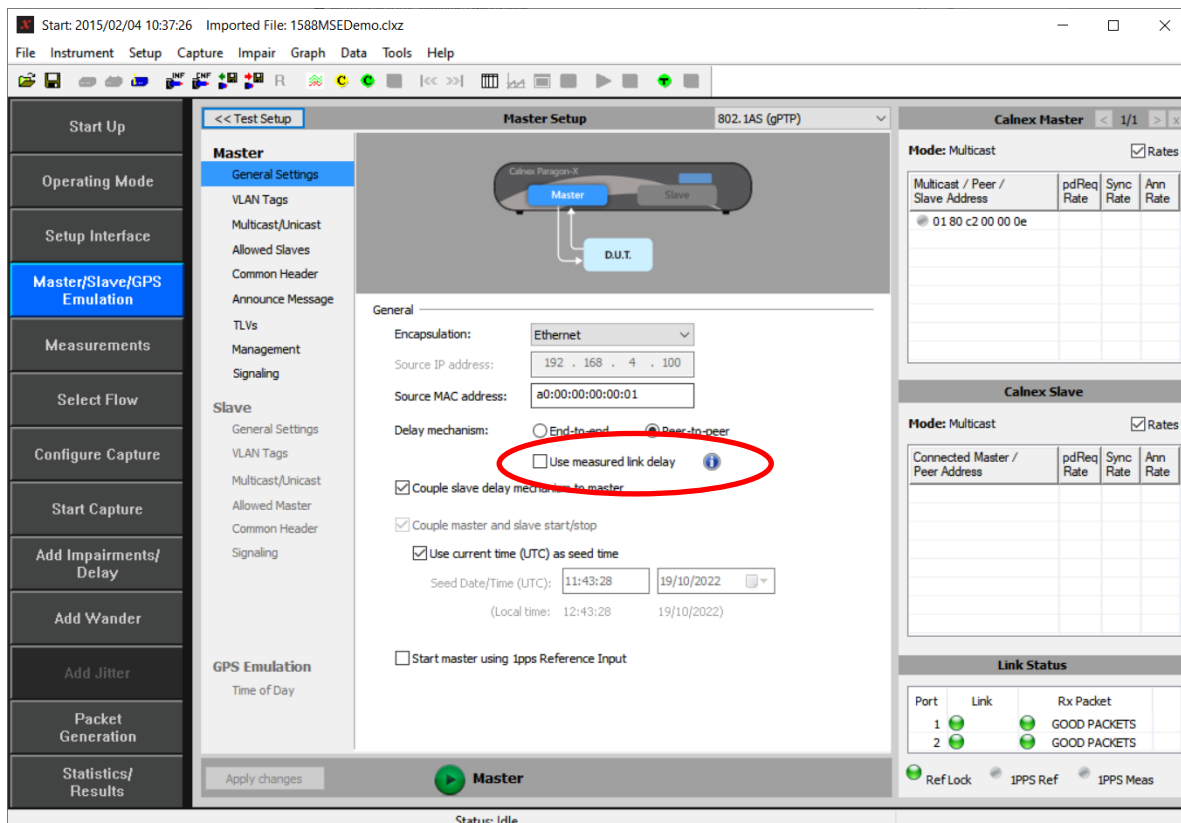
To use the link delay as measured by Paragon-X using the Peer Delay method, tick the appropriate box in the Master/Slave Emulation – Config screen as shown below...



Note that in the resulting *Master/Slave Emulation* screen. Note that the *DUT Ethernet Cable Delay* entry box is now inactive:



To use a fixed cable delay value, uncheck the *Use measured link delay* option...



...to enable entry of the cable delay value manually.

The screenshot shows the Calnex software interface for configuring a test setup. The central part of the window displays a diagram of the Calnex Paragon-X device with a D.U.T. (Device Under Test) connected to Port 1. The diagram includes components like GPS Emulation, Master, Slave, Tx Impairment, Rx Impairment, Accuracy Meas., and Wander Meas. The left sidebar has a 'Measurements' section where 'DUT Ethernet cable (ns)' is set to 10. The right panel shows configuration for 'Calnex Master' and 'Calnex Slave' in Multicast mode, with a table for 'Link Status' showing two ports with 'GOOD PACKETS'.

Multicast / Slave Address	pdReq Rate	Sync Rate	Ann Rate
01 80 c2 00 00 0e			

Connected Master / Peer Address	pdReq Rate	Sync Rate	Ann Rate
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Port	Link	Rx Packet
1	●	GOOD PACKETS
2	●	GOOD PACKETS

The same measurement process as for making a time-aware end station using a 1PPS output can then be followed.

4 Appendix A: Software Advisory Notes

- For more information on features and fixes in this Release, along with other user information on Calnex products, please visit the Knowledge Base at: <https://calnexsolutions.atlassian.net/wiki/spaces/KB/overview>
- When measuring time error at 100M, MSE should be started **before** the capture is started. If MSE and capture are started at the same time, then a time error offset of 40ns may occasionally be measured.

To start MSE separately from capture, in MSE, configure the filters required and press "Set"; **then** start MSE. After a few seconds, start the capture.

- Port 2 link must be up (Rx connection in place to port 1 Tx) in order to allow Port 2 Tx to function in Packet Generation mode.
- Script recorder does not support manual setting of filters through 'flow filter' in Through Mode operation. This can be addressed by saving filter settings and then recalling the saved settings in your script.
- When using IPv6 encapsulation in MSE, it is possible that the Paragon-X slave could generate some Delay-Request messages with an incorrect UDP checksum.

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