*If this is the first time use of PacketExpert™ 1G unit, then it is recommended follow all the steps explained in PacketExpert-1G-Quick-Install-Guide before proceeding with the steps below.*

Normal Instructions – Follow these precisely

- 'Multi-Stream Traffic Generator and Analyzer' is an optional application and requires purchased licenses to be installed.
- Plug-in the USB installation stick (pen drive) provided with the shipment package by GL Communications.
- Execute **GLHWLicenseInstaller.exe** from the USB Installation Stick to install the optional application licenses.
- Follow onscreen instructions, the license for the purchased optional application will be installed.
- Run **T1E1AppList.exe** available in the **C:\Program Files\GL Communications Inc\GL Hardware License Installer** (or C:\Program Files\GL Communications Inc\GL Hardware License Installer) directory and confirm that the purchased **MultiStream Traffic Generator/Analyzer** licenses **(PXE108)** is listed against the hardware purchased.
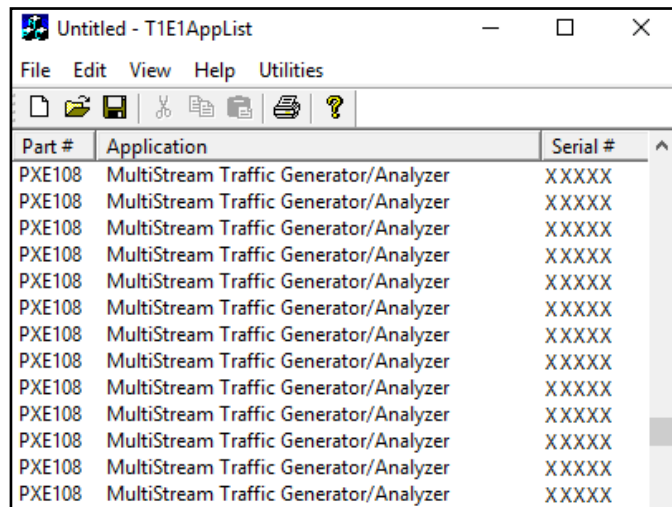
Note: When the application is loaded, if the following **'License** Error' is prompted, then you may have not installed the **Hardware licenses.** You can do so as explained in section above at any time after installing the software.
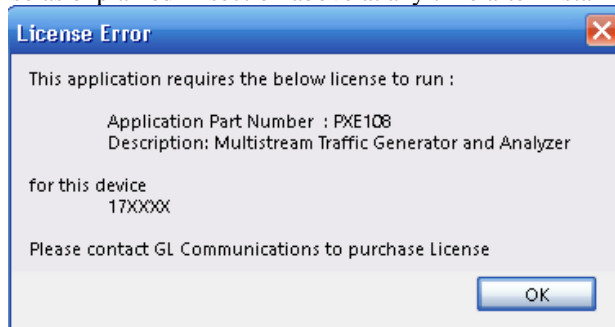

Note: Ensure that warranty license **(GLSupportWarrantyLicenseInstaller.exe)** is installed and also confirm that **Multi-Stream Traffic Generator and Analyzer (PXE108)** is listed in **Warranty Application List.** Refer to *PacketExpert-1G-Quick-Install-Guide.*

Quick Verification

In the following test scenario, a single PacketExpert™ 1G unit is used to verify 'Multi-Stream Traffic Generator/Analyzer' feature.

*'Multi-Stream Traffic Generator/Analyzer' test scenario can be demonstrated on **1G ports** by looping back **Port 2** and **Port 3** of PacketExpert™ 1G unit using **Ethernet cables** (for Electrical Interface test). For Optical Interface test, use SFP Transceivers and LC optical cables for connecting Port 2 and Port 3.*

The test setup requires 1 PC/laptop which is connected through USB cable of the hardware unit. The following test requires PacketExpert 1G application (PXE100) and 'Multi-Stream Traffic Generator/Analyzer' application (PXE108) licenses to be installed on PC. After successful Software installation, plug in the PacketExpert 1G Hardware unit to PC as indicated below. Then connect Port2 to Port3 of the hardware unit, as shown below:
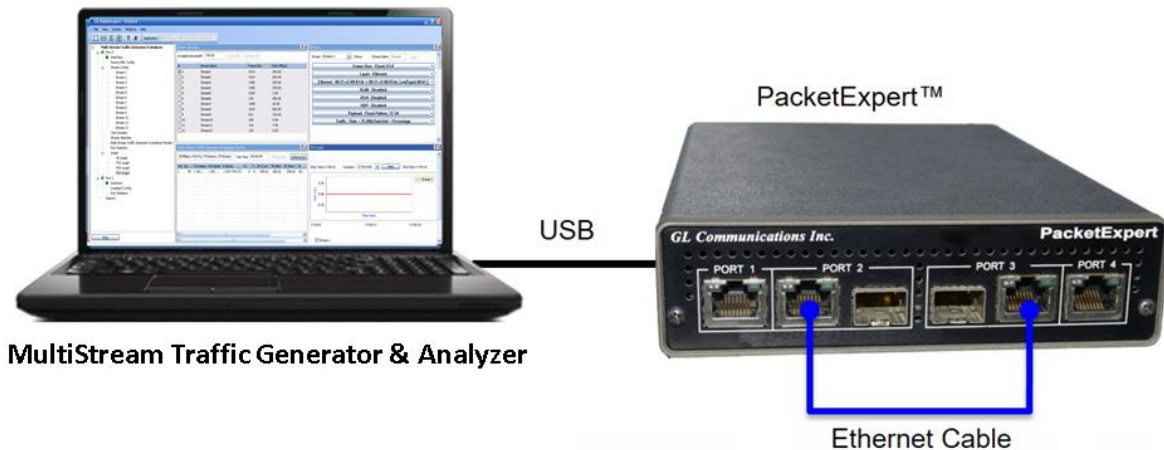
Note: *The above test can be setup using LC optical cables (for Optical Interface) and SFP's*

Step 1: Note down the IP Addresses

The IP Addresses for Ports 2 and 3 on PacketExpert™ are pre-configured as listed below:

- ➢ Port2: 192.168.1.12
- ➢ Port3: 192.168.1.13

Step 2: Connect the cables

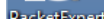**Perform test between Port 2 and Port 3 (Electrical or Optical Interface) of PacketExpert™ 1G unit.**

- • For **Electrical Interface** type, directly connect **Port 2** and **Port 3** using Ethernet cable as shown in the image.

- • For **Optical Interface** type, plug-in **SFP Transceivers** to the optical ports and connect **LC optical cable** between Port 2 and Port 3 (refer to the image below)

**Note:** Make sure SFP is properly locked and the optical cable is properly plugged-in.
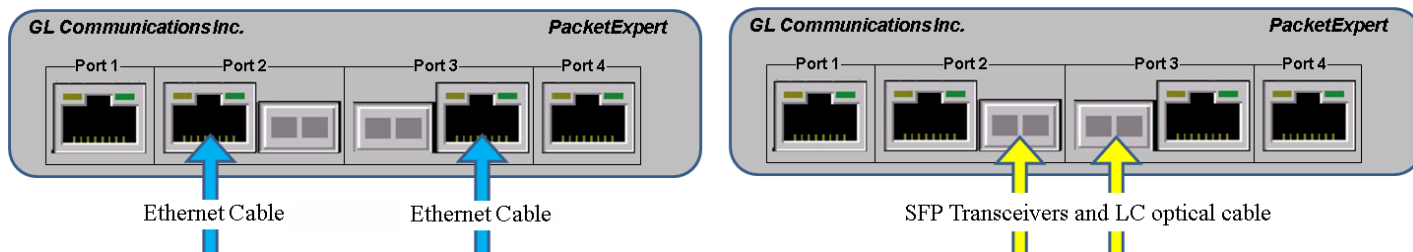
Step 3: Launch PacketExpert 1G Application

- Right click on the PacketExpert 1G shortcut icon [PacketExpert] created on the desktop and select "**Run as administrator**" to launch PacketExpert 1G application.

    Note: The application may take some time to get started due to hardware and software initializations.

- By default, the PacketExpert is invoked displaying **All Port Bert** application. Load **Multi-Stream Traffic Generator and Analyzer** from the **Applications** drop-down list as shown in the screenshot below.
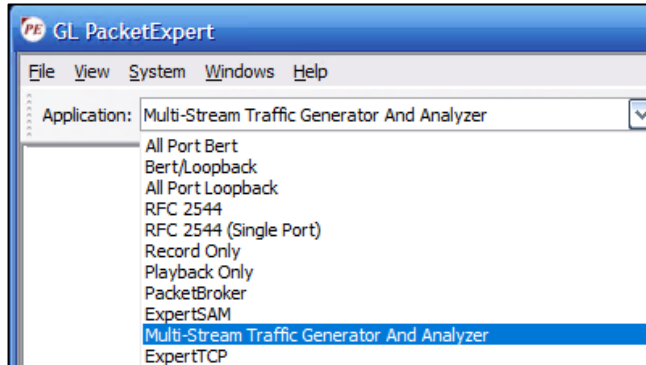
Step 4: Configure Interface parameters

For 1G Electrical or Optical connections,

From the **Function Tree**, double-click on the **Interface** to invoke **Interface** pane on RHS window, select the ports from the **Port Selection** drop-down list and do the following for both Port 2 and Port 3:

- Interface Type = **Electrical** (or) **Optical** (depending on the ports connected)

- Link Speed = **1000Mbps**

- Click on the **Apply** button (this will set the Interface Type in the hardware)

- Wait for some time as the port auto-negotiates with its link partner. Verify the following:

    Auto-Negotiation status = Complete, Speed = 1000 Mbps
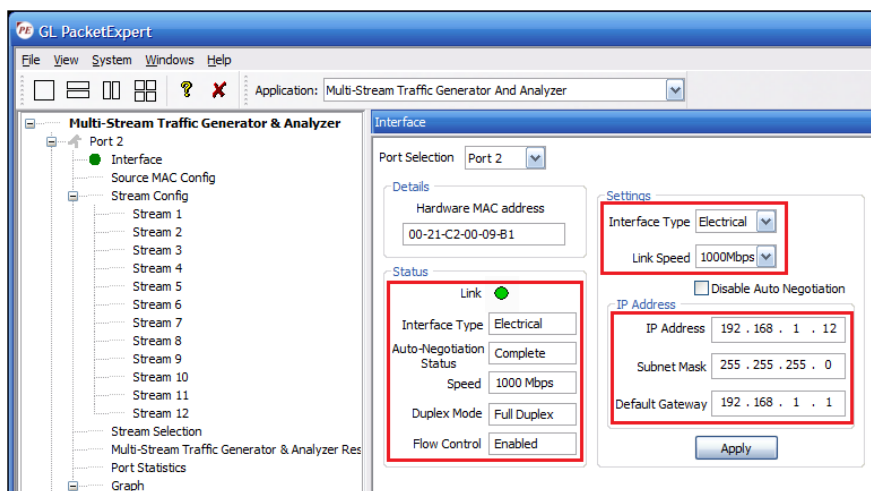
- Similarly, repeat the above procedure for **Port 3**

Step 5: Verify Links

- Verify that the Link Status is **UP** on both ports, that is, the **Function Tree** should display Port 2 and Port 3 with green LEDs link status (refer to the screenshot). If the LED shows red, then link is down.
- If the link status is **Down**, refer to **troubleshooting** steps explained in PacketExpert™ 1G Quick Install Guide.
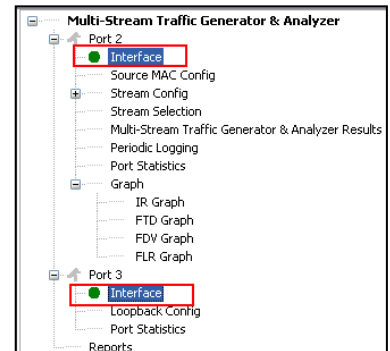
Step 6: Stream Configuration

- From the **Function Tree**, double click and invoke **Stream 1** under '**Stream Config**' option to invoke **Stream Configuration** window in the RHS pane.
- All **12 streams** are configured with default settings.
- Stream1 configuration settings are as follows:
  - EMIX frame sizes (5 frame sizes from 106 to 1518)
  - Source MAC address for all streams are the same and is configured to obtain the MAC address from the Interface Settings.
  - Destination MAC address is pre-configured.
  - Layer 2 is configured with VLAN (both C-Tag and S-Tag)
  - Source IP addresses is configured to obtain the IP address from the Interface Settings.
  - Destination IP address is pre-configured
  - Layer4 (UDP) Source port address is set to 10100 and Destination port address is set to 20100.
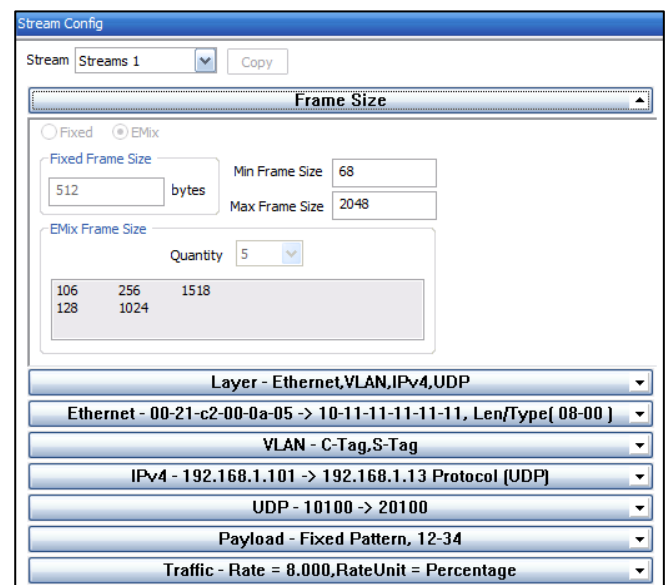

Step 7: Stream Selection

- From the **Function Tree**, double click on **Stream Selection** to invoke Stream Selection window on RHS pane.
- The configured streams are displayed along with Frame Size and the Rate (Mbps) settings.
- By default, all Streams are selected. The Rate and Frame sizes are configured to test a wide range as shown in the screenshot. Total combined rate for all streams is configured for 40.00 Mbps.

Step 8: Verify Loopback Port Setting

- From the Function Tree, double click on **Loopback Config** to invoke Loopback Configuration window in one of the RHS panes.
- Verify that 'Smart Loopback' is selected. This will make the Loopback to automatically traverse each packet's headers and swap each layer's Source and Destination Address/Port automatically.
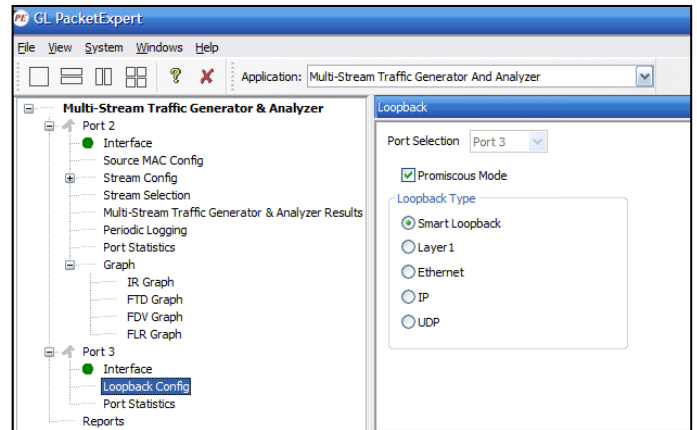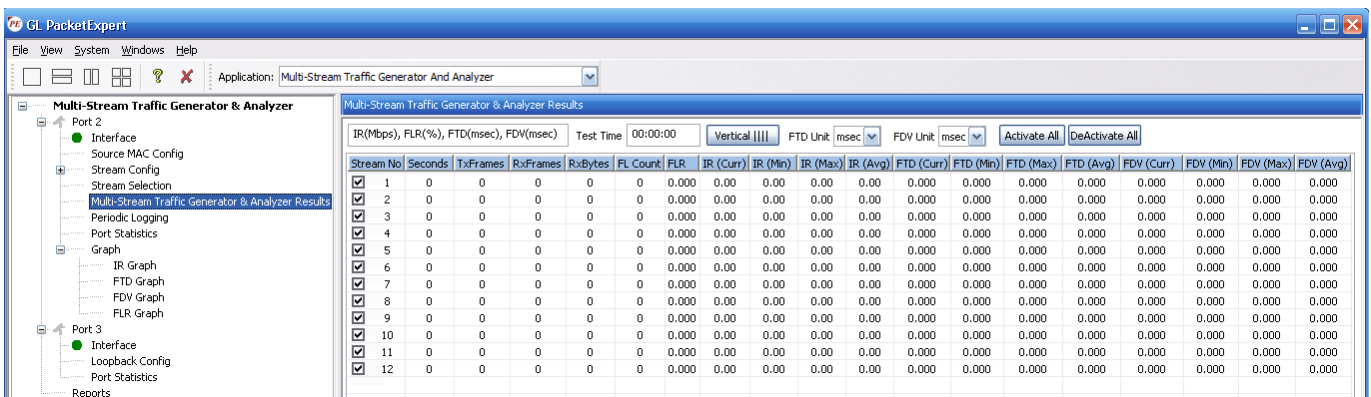
Step 9: Start 'Multi-Stream Traffic Generator and Analyzer'

- Click **Apply & Start** to apply all the configurations for various streams and start the '**Multi-Stream Traffic Generator/Analyzer**' application. This will take some time, as the configuration needs to be downloaded to the hardware. The progress is indicated in a progress bar as shown in the screenshot.
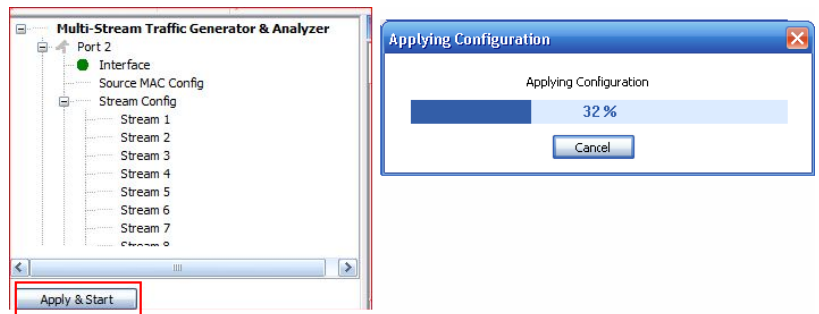
Step 10: Verify Results and Graphs

- From the **Function Tree**, double-click and invoke **Multi-Stream traffic generator and analyzer Results** on the RHS pane, as shown in the screenshot.
- Observe the **Information Rate** (Current/ Min/ Max/ Avg) which indicates the throughout rate of each stream.

- Use the Vertical button to change the view to Vertical orientation
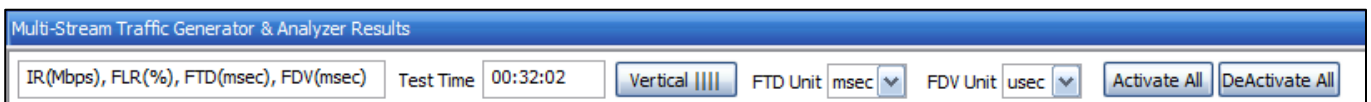
Verify TxFrames, RxFrames and Frame Loss Count and Ratio:

- For each stream, verify that RxFrames = TxFrames, and FL Count (Frame Loss Count) and FLR (Frame Loss Ratio) = 0

Verify Frame Loss Graph

- From the **Function Tree**, double-click and invoke **FLR Graph** on the RHS pane. Observe the FLR (%) values show 0 for all streams.
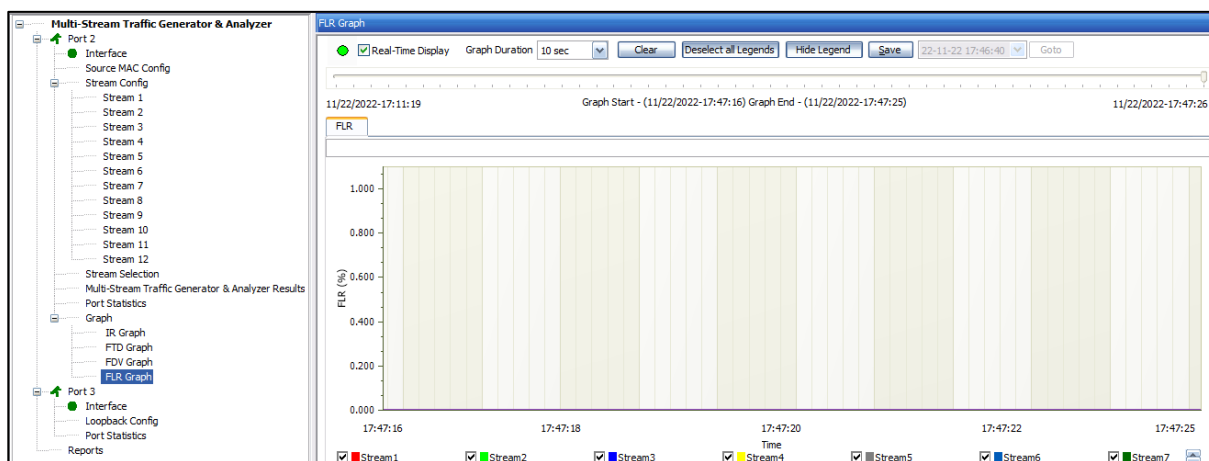

Verify Throughput:

- For each stream, verify that the IR values (Information Rate values) – IR (Curr) – Information Rate (Current), IR (Min) – Information Rate (Minimum), IR (Max) – Information Rate (Maximum) and IR (Avg) - Information Rate (Average) are close to the configured values as shown below.

Verify Throughput Graph

- From the **Function Tree**, double-click and invoke **IR Graph** on the RHS pane. Observe the IR (Mbps) for each stream reflects the value shown in the Results dialog.
- In the graph dialog, uncheck all streams, and check each individual stream to view the graph for only that stream. Verify that the IR shown matches with the tabular values in the results dialog.
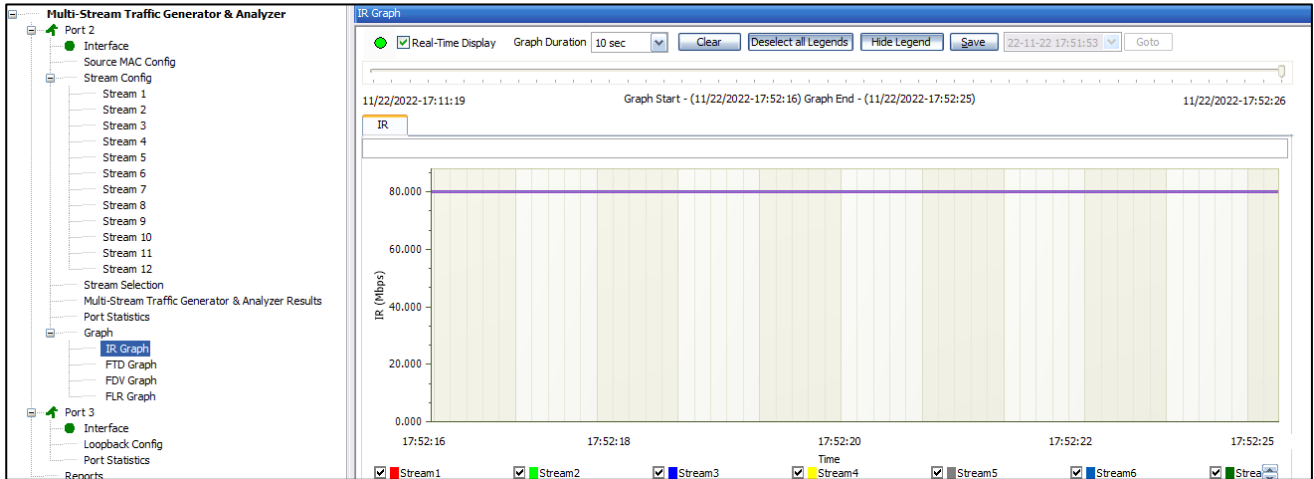

Verify Latency values:

- For each stream, verify that the FTD values (Frame Transfer Delay values) – FTD (Curr) – Frame Transfer Delay (Current), FTD (Min) – Frame Transfer Delay (Minimum), FTD (Max) – Frame Transfer Delay (Maximum) and FTD (Avg) - Frame Transfer Delay (Average) are showing relevant values as shown below.

Multi-Stream Traffic Generator & Analyzer Results

IR(Mbps), FLR(%), FTD(msec), FDV(msec)   Test Time 00:38:54   Horizontal---   FTD Unit msec   FDV Unit usec   Activate All   DeActivate All

Stream No.	1	2	3	4	5	6	7	8	9	10	11	12
Stream Selec...	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑
Seconds	2337	2337	2337	2337	2337	2337	2337	2337	2337	2337	2337	2337
TxFrames	37 315 501	43 928 202	16 692 332	16 692 332	22 171 349	155 808 830	16 692 332	43 925 458	43 925 458	106 225 931	155 808 830	155 808 829
RxFrames	37 315 501	43 928 202	16 692 332	16 692 332	22 171 348	155 808 828	16 692 332	43 925 458	43 925 457	106 225 930	155 808 828	155 808 828
RxBytes	22 623 097 972	22 491 239 424	23 035 418 160	23 035 418 160	22 925 173 832	20 255 147 640	23 035 418 160	22 489 834 496	22 489 833 984	21 245 186 000	20 255 147 640	20 255 147 640
FL Count	0	0	0	0	1	2	0	0	1	1	2	1
FLR	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
IR (Curr)	80.00	80.00	80.00	80.00	79.99	80.00	80.00	80.00	79.99	80.00	80.00	80.00
IR (Min)	79.98	79.99	79.99	79.99	79.99	80.00	79.99	79.98	79.98	79.99	80.00	80.00
IR (Max)	80.01	80.00	80.00	80.00	80.00	80.01	80.00	80.00	80.00	80.00	80.01	80.01
IR (Avg)	80.00	80.00	80.00	80.00	80.00	80.00	80.00	79.99	79.99	80.00	80.00	80.00
FTD (Curr)	0.014	0.013	0.013	0.013	0.013	0.013	0.013	0.013	0.013	0.013	0.013	0.013
FTD (Min)	0.014	0.013	0.013	0.013	0.013	0.013	0.013	0.013	0.013	0.013	0.013	0.013
FTD (Max)	0.014	0.014	0.014	0.014	0.014	0.014	0.014	0.014	0.014	0.014	0.014	0.014
FTD (Avg)	0.014	0.013	0.013	0.013	0.013	0.013	0.013	0.013	0.013	0.013	0.013	0.013
FDV (Curr)	0.527	1.807	0.644	0.644	1.215	0.804	0.644	1.630	1.631	0.910	0.804	0.804
FDV (Min)	0.520	1.803	0.641	0.641	1.202	0.802	0.641	1.626	1.626	0.890	0.802	0.802
FDV (Max)	9.048	8.064	1.120	1.112	3.888	11.112	1.112	8.056	8.056	10.552	11.112	11.112
FDV (Avg)	0.525	1.814	0.644	0.644	1.209	0.805	0.644	1.637	1.637	0.902	0.805	0.805

Verify Latency graph:

- From the Function Tree, double-click and invoke **FTD Graph** on the RHS pane. Observe the FTD (msec) values for each stream reflects the value shown in the Results dialog.
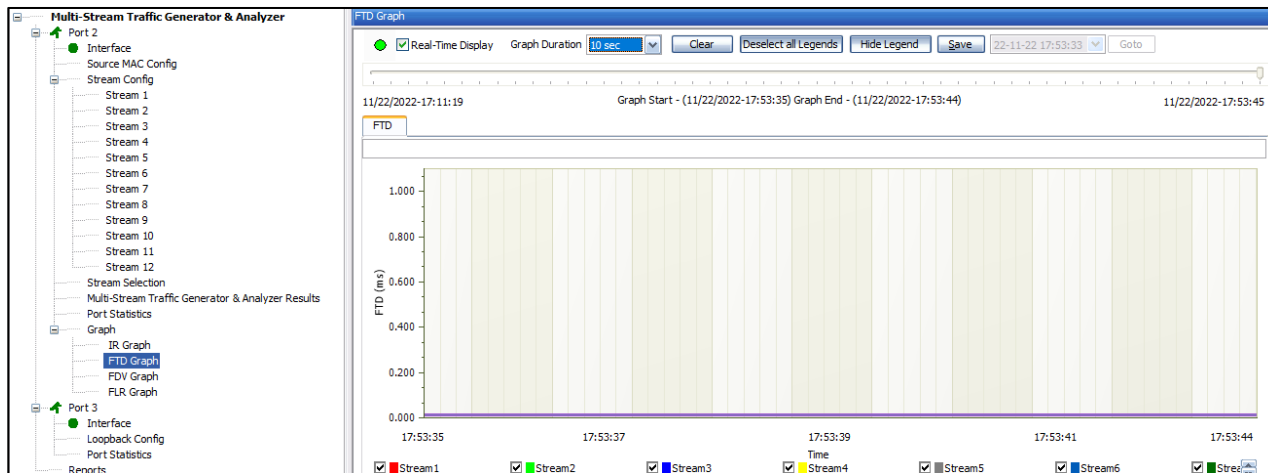

Verify Jitter values:

- For each stream, verify that the FDV values (Frame Delay Variation values) – FDV (Curr) – Frame Delay Variation (Current), FDV (Min) – Frame Delay Variation (Minimum), FDV (Max) – Frame Delay Variation (Maximum) and FDV (Avg) - Frame Delay Variation (Average) are showing relevant values as shown below.
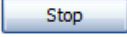
Stream No.	1	2	3	4	5	6	7	8	9	10	11	12
Stream Selec...	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑
Seconds	2337	2337	2337	2337	2337	2337	2337	2337	2337	2337	2337	2337
TxFrames	37 315 501	43 928 202	16 692 332	16 692 332	22 171 349	155 808 830	16 692 332	43 925 458	43 925 458	106 225 931	155 808 830	155 808 829
RxFrames	37 315 501	43 928 202	16 692 332	16 692 332	22 171 348	155 808 828	16 692 332	43 925 458	43 925 457	106 225 930	155 808 828	155 808 828
RxBytes	22 623 097 972	22 491 239 424	23 035 418 160	23 035 418 160	22 925 173 832	20 255 147 640	23 035 418 160	22 489 834 496	22 489 833 984	21 245 186 000	20 255 147 640	20 255 147 640
FL Count	0	0	0	0	1	2	0	0	1	1	2	1
FLR	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
IR (Curr)	80.00	80.00	80.00	80.00	79.99	80.00	80.00	80.00	79.99	80.00	80.00	80.00
IR (Min)	79.98	79.99	79.99	79.99	79.99	80.00	79.99	79.98	79.98	79.99	80.00	80.00
IR (Max)	80.01	80.00	80.00	80.00	80.00	80.01	80.00	80.00	80.00	80.00	80.01	80.01
IR (Avg)	80.00	80.00	80.00	80.00	80.00	80.00	80.00	79.99	79.99	80.00	80.00	80.00
FTD (Curr)	0.014	0.013	0.013	0.013	0.013	0.013	0.013	0.013	0.013	0.013	0.013	0.013
FTD (Min)	0.014	0.013	0.013	0.013	0.013	0.013	0.013	0.013	0.013	0.013	0.013	0.013
FTD (Max)	0.014	0.014	0.014	0.014	0.014	0.014	0.014	0.014	0.014	0.014	0.014	0.014
FTD (Avg)	0.014	0.013	0.013	0.013	0.013	0.013	0.013	0.013	0.013	0.013	0.013	0.013
FDV (Curr)	0.527	1.807	0.644	0.644	1.215	0.804	0.644	1.630	1.631	0.910	0.804	0.804
FDV (Min)	0.520	1.803	0.641	0.641	1.202	0.802	0.641	1.626	1.626	0.890	0.802	0.802
FDV (Max)	9.048	8.064	1.120	1.112	3.888	11.112	1.112	8.056	8.056	10.552	11.112	11.112
FDV (Avg)	0.525	1.814	0.644	0.644	1.209	0.805	0.644	1.637	1.637	0.902	0.805	0.805

Verify Jitter Graph

- From the **Function Tree**, double-click and invoke **FDV Graph** on the RHS pane. Observe the FDV (msec) values for each stream reflects the value shown in the Results dialog.
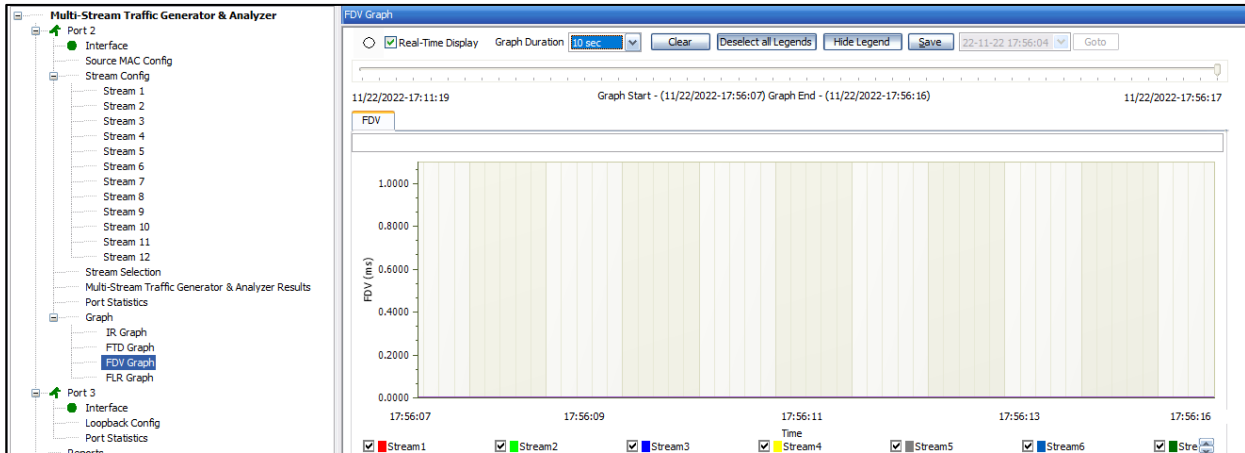
- Click on [Stop] to stop the running MTGA test.

This concludes 'Multi-Stream Traffic Generator and Analyzer verification'.

For technical issues contact GL Communications Inc at info@gl.com.