

# **Calnex Paragon CES User Guide**

(Version 1.2 July 2011)

This User Guide describes how to set up and use the Paragon to capture and analyse CES traffic flows.

It also describes how to add impairments and delays to chosen flows including the running of ITU-T G.8261 and MEF-18 Test Cases the importing of real live captured data to simulate the same environment in the lab.

It assumes that the user has set the Paragon up to the point where CES is selected in the "Operating mode" menu on page 11 of the separate *Paragon Start-up guide* 

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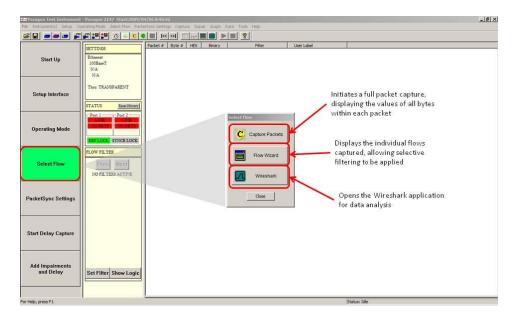
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## Setting the Filters to capture/replay on CES flows

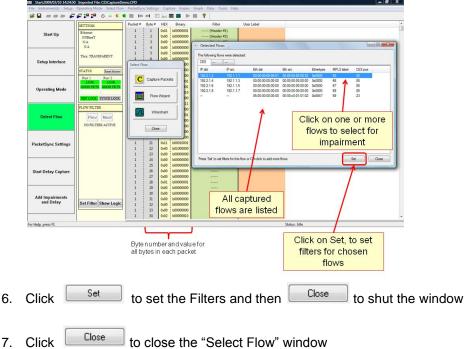
Select Flow

1. Click on the

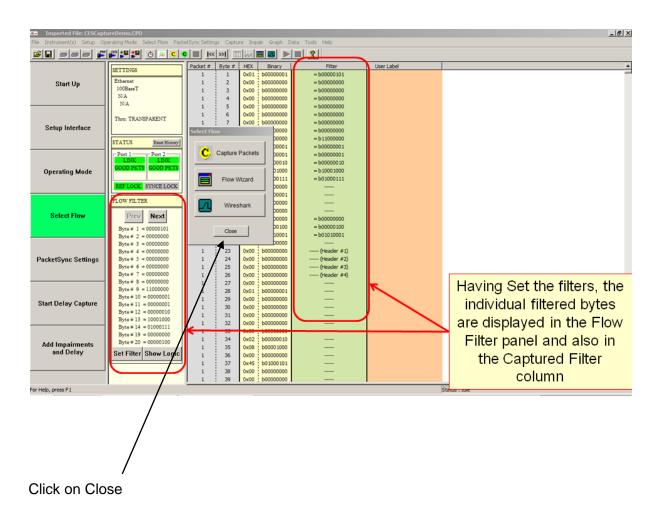
button and the "Select Flow" window will appear



- 2. Click on Capture Packets
- 3. After a short time (~10 Seconds) click on
- 4. Select Flow wizard
- 5. Select flows of interest, multiple flows can be selected by using "Ctrl-click"



8. The Flow Filter Window will now show that filters have been set.



## **Settings for CES**

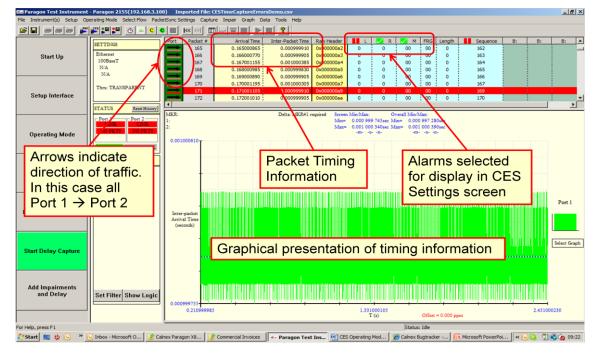
| 1. Se  | Packet<br>lect   | Sync Settings on the Work flow interface.   |       |
|--|--|---|-------|
| Paragon Remote Client<br>File Instrument(s) Setup Op | erating Mode Select Flow PacketS   | ync Settings Capture Impair Graph Data Tools Help   | _ @ × |
| <u></u>  |  |   |       |
| Start Up   | Ethernet<br>100BaseT<br>N/A<br>N/A                                       | adott# Bynt# HEX Bnary Fifter UserLabel   |       |
| Setup Interface                                      | Thru: TRANSPARENT  | Circuit Emulation Service Settings  |       |
| Operating Mode                                       | Port 1 Port 2<br>LINK LINK<br>GOOD PKTS GOOD PKTS<br>REFLOCK SYNCE LOCK. | C Structure aware     Structure aware     Structure aware     Structure aware     TOM Frames per Padet     S0000     Structure to match |       |
| Select Flow  | FLOW FILTER<br>Prev Next<br>NO FILTERS ACTIVE                            | TOM Bytes per Packet 226<br>C E3<br>Encoded Service Data Rate 2040000 bits/s<br>Any Nomnal Packet Gap 1.000000 msec                     |       |
| PacketSync Settings                                  |  | Aiam Detection<br>L マ R マ M   |       |
| Start Delay Capture                                  |  |   |       |
| Add Impairments<br>and Delay                         | Set Filter Show Logic  | Selected alarms will be displayed during timing capture   |       |
| For Help, press F1                                   |  | Status : Ide  |       |

- 2. Select the appropriate Type and Structure to match your flow of interest. Note: it is essential that the resulting Nominal Packet Gap is the same as your traffic flow, for Select the alarms you want to be displayed in subsequent timing captures.
   Click on Close to exit the CES Settings window.

#### **Capturing CES Header and Timing Information**

#### Start Delay Capture

1. Select on the Work flow interface. The timing information for the flows that were selected using Flow Wizard will be displayed on the table. Each line represents one packet making it easy to identify timing anomalies in the device/system-under-test. Errors or anomalies such as packet corruption and misordered packets are colour coded red. Also use the timing information to check that the filters are set as expected and that the appropriate streams are being captured.



- 2. The table continues to update in real-time with the captured packets.
- 3. By Selecting Select Graph and then "Auto Graph Refresh" to "On", the graph will refresh approximately every 10 seconds.
- 4. Select Stop Delay Capture to stop the capture.
- 5. Various graph options are available. To access the graphs select Select Graph
- 6. Then select Graph Display Mode and select the desired graph

As well as Inter-packet arrival Time vs Time or Packet#, you can also plot the variation in inter-packet arrival time as a Time Interval Error (TIE) graph, measured against either the nominal or measured average arrival times.

#### Analysing the Delay Capture

The Paragon has many tools that allow the user to evaluate the Captured data, a brief introduction and explanation of some of these tools can be found below

#### Analysing for mis-ordered, missing & repeated packets

1. The header and timing table allows the user to quickly determine if there are any mis-ordered, missing or repeated packets. To do this, look at the top of the SequenceID column and check the soft LED icon.

sequenceId Indicates no error sequenceId Indicates there is an error

- 2. To go to the first error use the *icon*, and the first/next error will appear at the top of the screen. Errors are identified by the following 1588 message being highlighted in red.
- 3. To go back to the previous error use the k icon, and the previous error will appear at the top of the screen.

#### Analysing the captured packets by using the graphs

The Paragon offers various graphing facilities.

- 1. To Access the graphs select Select Graph
- 2. Then select "Graph Display Mode" which will display 4 options

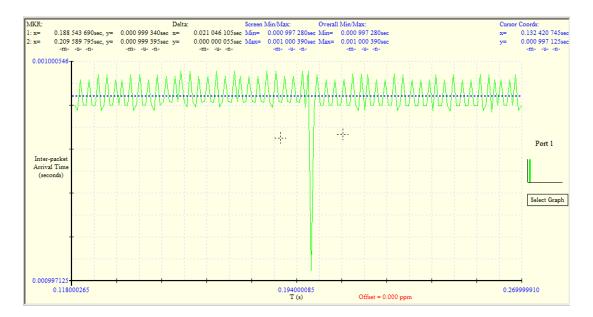
| Menu option                                      | Description   |
|--|---|
| Inter-packet Arrival Time vs Time                | Displays the Inter-packet arrival time for each specific packet against Time.   |
| Inter-packet Arrival Time vs Packet #            | Displays the Inter-packet arrival time<br>against packet number   |
| Time Interval Error (TIE) vs Nominal             | Displays the difference between actual<br>arrival time and calculated arrival time<br>based on the nominal ipg from CES<br>settings.      |
| Time Interval Error (TIE) vs Measured<br>Average | Displays the difference between actual<br>arrival time and calculated arrival time<br>based on the average ipg over the<br>capture period |

#### **Graph Navigation**

Paragon's zoom and delta features allow a variety of graph navigation actions.

- 1. To align the tabular view with any point on the graph, position the mouse pointer on the desired point and select Ctrl + left-click. The top packet visible in the tabular view will be the point selected on the graph.
- 2. To set the time Delta Markers position the mouse cursor at the desired points:
  - a. Alt + left click set Marker #1 and display nearest packet on the table
  - b. Alt + right-click set Marker #2 and display nearest packet on the table

The xy co-ordinates of each marker and the delta x and y values are displayed in the top left corner of the graph.



- To use the zoom feature, place the mouse pointer on the area of interest then leftclick to zoom in. Repeat as necessary. Right-click to zoom out. Left and right keyboard arrows will scroll along the X axis.
- 4. To display a portion of the graphical view, left-click then hold and drag the cursor across the area of interest. When the left-click is released the graph will zoom in to the dragged area.
- To use the vertical Y axis zoom feature, position the mouse pointer in the region of interest then select Shift + left-click. Repeat as necessary. Right-click to zoom out. Up and down keyboard arrows will scroll along the Y axis.

## **Adding Impairments and Delays**

Add Impairments

1. Select and Delay and the following window will be displayed. This allows a variety of Delays and Corruptions to be selected to replay against the filtered traffic flows.

|                              | eCaptureErrorsDemo.csv   |   |  |
|------------------------------|--|---|--|
|                              | perating Mode Select Flow Packet                                       |   | Thru Hode ? X  |
| 📽 🖬 📾 📾 💕                    | 🚰 🚰 🚰 👌 😹 🗘 🕥  |   |  |
| Start Up                     | SETTINGS<br>Ethernet<br>100BaseT<br>N/A<br>N/A                         | Port Packet # Arm<br>0 0.000<br>1 0.000<br>2 0.002<br>3 0.002<br>4 0.002  | Comptions Delay  |
| Setup Interface              | Thru: TRANSPARENT STATUS Reset History                                 | 5 0.004<br>6 0.005<br>7 0.007<br>6 0.007<br>9 0.009   | C Single © Repeat  |
| Operating Mode               | Pert 1 Pert 2<br>LINK<br>GOOD PKTS<br>GOOD PKTS<br>REF LOCK SYNCE LOCK | 10 0.010<br>11 0.010<br>12 0.012<br>13 0.013<br>14 0.013<br>15 0.013  | Variable Delay Inserton  |
| Select Flow                  | Prev Next<br>No filters active   | 15 0.016<br>15 0.016<br>17 0.018<br>18 0.018<br>19 0.019<br>20 0.019  | C Step Function<br>C Literary C Genesian<br>C Constant. C General<br># of packets 1000   |
| PacketSync Settings          |  | 21 0.021<br>22 0.022<br>23 0.022<br>24 0.024<br>25 0.025<br>26 0.025  | Min         0.03000         s         (Fixed delay will offset imported profile)           Mean         0.03000         s         (Fixed delay will offset imported profile) |
| Start Delay Capture          |  | 27 0.027<br>25 0.027<br>29 0.028<br>30 0.030<br>31 0.031  | Generate Auto Level Minimum Delay Goussional States  |
| Add Impairments<br>and Delay | Set Filler Show Logic  | 32         0.032           33         0.033           34         0.033           35         0.035           36         0.036           37         0.036 | Start Overwrite Close  |
| For Help, press F1           | l i  | M   | Status: Ide  |

It is possible to add lost/errored packets at the same time a delay is being applied to the packets.

Corruptions or Delays are added by selecting the appropriate tab

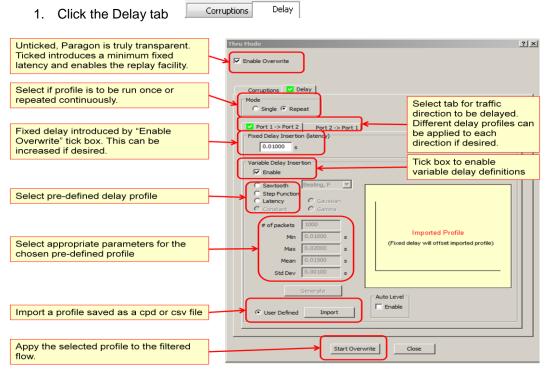
| Delay |
|-------|
|       |

2. To enable the overwrite mode - Ensure the Enable Overwrite box is ticked

📝 Enable Overwrite

#### **Adding Delays**

To test for impact of jitter and wander in your device/system-under-test, you can insert various forms of delay into the traffic to manipulate the CES.



- 2. Select if you want the delay profile to be repeated or to be run as a single event by selecting the relevant radial button.
- 3. A different delay profile can be added to Port 1 ->Port 2 from that applied to Port2 ->Port 1. This optimizes the utilization of test times for the network. The different profiles are added by selecting the relevant tab (Operation of both tabs are identical.)

| Port 1 -> Port 2 | Port 2 -> Port 1 |
|------------------|------------------|
|                  |                  |

4. It is possible to adjust the Fixed Delay of all packets flowing through the Paragon.

Fixed Delay Insertion (latency)

0.00100 s

Maximum delay is 2 seconds.

Minimum delay is dependent on Mode and line rate

|              |      | Instrument Mode   |       |       |
|--------------|------|-------------------|-------|-------|
|              |      | CES 1588 Services |       |       |
| Line<br>Rate | 100M | 10mS              | 1mS   | 1mS   |
| Ra           | 1G   | 2mS               | 0.1mS | 0.1mS |

5. Tick the Variable Delay insertion box and a green tick will appear on the Delay tab and also on the Port direction tab(s) indicating that a delay has been enabled and in which direction(s).

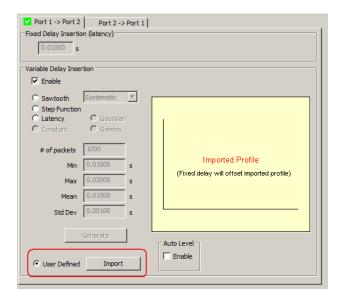
| Thru Mode                  | terrar l'adare                   |
|----------------------------|----------------------------------|
| Tenable Overwrite          |                                  |
| Corruptions Delay          | Type                             |
| Single  Repeat             | Replay on N     Port 2 -> Port 1 |
| Fixed Delay Insertion (lat | tency)                           |
| Variable Delay Insertion   |                                  |

- 6. Different types of delays can be selected by clicking the appropriate radial button O.
  - G.8261 Sawtooth profiles (Beating Delay on faster Stream or on a slower stream)
  - Step Function
  - Latency
  - Constant
  - Gamma
  - Gaussian
  - User Defined (such as files previously captured on the Paragon)
- 7. For each delay profile selected (except User Defined) a picture will show the parameters that define the profile and these parameters can be entered into the relevant boxes. For example, the Step Function is shown here.

| Corruptions Delay<br>Mode<br>Single Repeat<br>Port 1 -> Port 2 Port 2 -> Port 1<br>Fixed Delay Insertion (latency)<br>0.01000 s<br>Variable Delay Insertion<br>Fixed Delay Insertion<br>Sawtooth Systematic<br>Gaussian<br>Constant<br>Offset 0.1 ppm<br>Magnitude 0.1 us<br>Step Period 0.1 s | ← Repeat Period →<br>← Step →<br>Period<br>Magnitude |
|--|--|
| Repeat Period 0.1 s  | Fixed Delay  |
| Generate<br>C User Defined Import  | Step Function  |

Once you have defined your profile of choice, generate the delay profile by clicking

8. User defined profiles: Calnex provides a library of G8261 test profiles that can be imported to stress test your device/system-under-test. Alternatively you can capture data from a live network and import that captured profile for replay in your lab environment. Click the User Defined radial button and then press **Import** which will open a window to allow the import of a file in .cpd or .csv format.



9. Navigate to the folder where the desired profile is, select it and click Open. The profile will be imported and a status bar will show the progress of the import.

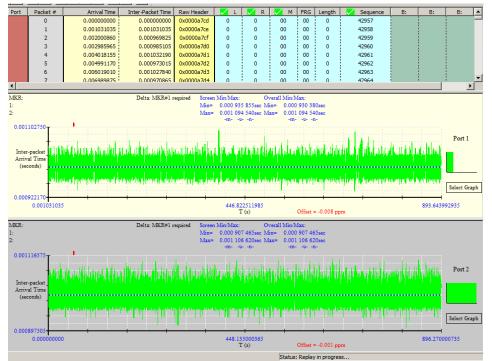
| Corruptions Delay<br>Mode<br>O Single O Repeat                         | 7  |  |
|--|--|--|
| 🖾 Open   |  | ×  |
| Po<br>Fixed  | Profiles   | G 🦻 📂 🖽 -  |
| Varia<br>C<br>C<br>C<br>C<br>C<br>C<br>C<br>C<br>C<br>C<br>C<br>C<br>C | Name         Image: Constraint of the system           Image: I | ■ Date modified         ▼ Type           05/03/2009         12:54         CPD File           02/04/2009         15:59         CPD File           10/11/2008         14:44         CPD File           09/02/2009         17:22         CPD File |
| Network  | File name:       Files of type:         Paragon Files (*.cpd)  | Open     Cancel  |
| © User Defined   | Import   |  |

 For adding the same or different delays in the other direction. Select the other direction tab and follow steps 4 to 9 above.
 When delays are being added in both directions –there will be a green tick shown in each direction tab as shown below.



11. Having generated the desired pre-defined profile, or imported the appropriate

captured file or library file, initiate replay by clicking Start Overwrite and the following screen will be shown.



The replayed profile for each direction is displayed. The Header and timing will show the data for the active graph which is shown in white. To change between graphs, click the graph that is required.

Each graph has a red vertical bar above it, this bar shows the progress of the replay of the delay profile.

12. The replay can be stopped by clicking



#### Adding Packet Corruptions and Signal Alarms

You can introduce standard packet corruption events such as taking out a packet to simulate lost packets, repeat a packet by putting it in twice and you can misorder packets by setting the depth of the mis-order to bring the packet back at a specific position.

As well as packet corruption events, you can introduce alarms (L local, R remote M modified) to the outgoing signal and you can overwrite header bytes with a defined pattern.

- Delay, the following window will appear Corruptions 1. Click the Corruptions tab Select the Delay Corruptions Corruptions tab Port1 -> Port2 C Port2 -> Port1 Select the desired Corruption Contro direction of flow to Packet Corruption Alarm Injectio Overwrite Heade impair Enable Enable Enable Type Type Select the desired м © 00 C Misordered Event Depth © 0 Settings type of impairment: O 1 C Lost Packet O 01 -Packet Corruption R © 0 C 10 Repeated Packet - Alarm Injection O 11 C 1 C Errored Packet - Header Overwrite Mode G Single C Rate 0 . 00001 % Select Corruption C Ratio 1 E- 2 1 C Burst pkts parameters C Duration 0.1 C Constant s This selection is used if the delay profile being Replay Corruption From Captured Data replayed has dropped Enable C Drop Packets packets and you wish to reproduce them during replay. Having selected the Start Overwrite Close desired corruptions click Start Overwrite.
- 2. Select the direction the Corruptions are to be applied by clicking the appropriate radial button.

Flow 

Port1 -> Port2 
Port2 -> Port1

3. Check the box to enable Packet corruption

-Packet Corruption – I Enable

- A green tick will now be visible on the Corruptions tab indicating corruptions are enabled. Corruptions.
- 5. The type of corruption is selected by clicking the relevant radial button and then by selecting the required mode and associated parameters.

| Type<br>Misordered Event 1 Depth |                  |
|----------------------------------|------------------|
| 🔘 Lost Packet                    |                  |
| Repeated Packet                  | 0 0 10           |
| C Errored Packet                 |                  |
| Mode                             | [a] [auaa] a     |
| 💿 Single 🛛 🔘                     | Rate 0 . 01000 % |
| 🔘 Burst 🛛 1 👘 🔘                  | Ratio 1 E- 4     |
| Duration     D.1     S           | Constant         |

The table below provides more information on each corruption and mode available.

| Туре                                  | Mode  |
|---------------------------------------|---|
| Misordered<br>Event<br>(Range 1 – 32) | <ul> <li>Single event</li> <li>Burst (Range 1 to 10,000)</li> <li>Duration (Range 0.1S to 10S in steps of 0.1S)</li> <li>Rate (Range 0.00001 to 99. 99999% in steps of 00001%)</li> <li>Ratio (Range Mantissa 1 to 9, exponent 1 to 7, both in steps of 1)</li> </ul>                   |
| Lost Packets                          | <ul> <li>Single event</li> <li>Burst (Range 1 to 10,000)</li> <li>Duration (Range 0.1S to 10S in steps of 0.1S)</li> <li>Rate (Range 0.00001 to 99. 99999% in steps of 00001%)</li> <li>Ratio (Range Mantissa 1 to 9, exponent 1 to 7, both in steps of 1)</li> <li>Constant</li> </ul> |
| Repeated<br>Packets                   | <ul> <li>Single event</li> <li>Burst (Range 1 to 10,000)</li> <li>Duration (Range 0.1S to 10S in steps of 0.1S)</li> <li>Rate (Range 0.00001 to 99. 99999% in steps of 00001%)</li> <li>Ratio (Range Mantissa 1 to 9, exponent 1 to 7, both in steps of 1)</li> </ul>                   |
| Errored Packets                       | <ul> <li>Single event</li> <li>Burst (Range 1 to 10,000)</li> <li>Duration (Range 0.1S to 10S in steps of 0.1S)</li> <li>Rate (Range 0.00001 to 99. 99999% in steps of 00001%)</li> <li>Ratio (Range Mantissa 1 to 9, exponent 1 to 7, both in steps of 1)</li> <li>Constant</li> </ul> |

- 6. Click Start Overwrite to add the corruptions. Corruptions will be applied to the filtered traffic flows only
- 7. To stop the corruptions click

Stop Overwrite or

Stop Impair

#### **Dropping Packets from a Profile**

There are two methods that determine if a packet should be dropped from a profile during replay. Particular packets can be selected to be dropped or replay can be forced to recognise and reproduce sequence number gaps.

#### • Selecting packets to be dropped

This feature allows a captured profile to be altered so that packets are dropped on a replay of the manipulated profile. A series of profiles can be generated from a single profile to allow the investigation of the impact of progressively longer intervals of packet drop out. The user should remember to save profiles created into suitably named files should they be required for future replay. There are undo features to re-enable packets allowing ease of experimentation or margin testing. The traffic to be re-profiled is captured in the normal way, or a pre-existing profile can be imported for manipulation.

| Start:2009/01/30 16:43:3  | 7 Imported File: CESTimeCaptu | reErrorsDemo.csv   |                  |                   |                  |     |     |     |     |        |       |
|---|-------------------------------|--------------------|------------------|-------------------|------------------|-----|-----|-----|-----|--------|-------|
| e Instrument(s) Setup   | Operating Mode Select Flow    | PacketSync Setting | s Capture Impair | Graph Data Too    | ols <u>H</u> elp |     |     |     |     |        |       |
| ; 🖬 🗰 🖮 👼   | ' 🚝 🎜 🎦 😟 🖉 🌾                 | ) 🔳 🛛 🔛 🗍          |                  | • ?               |                  |     |     |     |     |        |       |
|   | SETTINGS                      | Port Packet #      | Arrival Time     | Inter-Packet Time | Raw header       | L L | 🗸 R | 🗸 М | FRG | Length | . Seq |
| a   | Ethernet                      | 0                  | 0.000000000      | 0.000000000       | 0x0000fffe       | 0   | 0   | 00  | 00  | 0      | 6553  |
| Start Up  | 100BaseT                      | 1                  | 0.000999745      | 0.000999745       | 0x0000ffff       | 0   | 0   | 00  | 00  | 0      | 6553  |
|   | N/A                           | 2                  | 0.002000000      | 0.001000255       | 0x00000000       | 0   | 0   | 00  | 00  | 0      | 0     |
|   | N/A                           | 3                  | 0.002999855      | 0.000999855       | 0x00000001       | 0   | 0   | 00  | 00  | 0      | 1     |
| Setup Interface   | THEY TRANSPARENT              | 4                  | 0.004000110      | 0.001000255       |                  | 0   |     | 00  | 00  | 0      | 2     |
|   |                               |                    |                  |                   |                  |     |     |     | 00  | 0      | 3     |
|   |                               |                    |                  |                   |                  |     |     |     | 00  | 0      | 4     |
|   | STATUS Reset History          |                    |                  |                   |                  |     |     |     | 00  | 0      | 5     |
|   | Port 1 Port 2                 |                    |                  |                   |                  |     |     |     | 00  | 0      | 6     |
|   | LINK LINK                     |                    |                  |                   |                  |     |     |     | 00  | 0      | 7     |
| Operating Mode  | GOOD PKTS GOOD PKTS           |                    |                  |                   |                  | , i |     |     | 00  | 0      | 8     |
|   |                               |                    |                  |                   |                  |     |     |     | 00  | 0      | 9     |
|   | REF LOCK SYNCE LOCK           |                    |                  |                   |                  |     |     |     | 00  | 0      | 10    |
|   | FI OW FILTER                  |                    |                  |                   |                  |     |     |     | 00  | 0      | 11    |
|   | FLOW FILTER                   |                    |                  |                   |                  |     |     |     | 00  | 0      | 12    |
| Select Flow   | Prev Next                     |                    |                  |                   |                  | Ť   |     |     | 00  | 0      | 13    |
|   | Pute # 16 = mm 0000           |                    |                  |                   |                  | Ť   |     | i   | 00  | 0      | 14    |
|   | Dyte # 15 = XXXX0000          | 17                 |                  |                   |                  | Ť   |     |     | 00  | 0      | 15    |
|   |                               | 18                 |                  |                   |                  | Ť   |     |     | 00  | 0      | 16    |
|   |                               | 19                 |                  |                   |                  | , v |     | i   | 00  | 0      | 17    |
| Setup Interface         Thre: TRANSPARENT         4         0.00400110         0.00100255         0.0000002         0         0         00           Start Delay Capture         Thre: TRANSPARENT         5         0.00409970         0.00099865         0.0000003         0         00< |                               | 20                 |                  |                   |                  |     |     |     | 00  | 0      | 18    |
|   | 00                            | 0                  | 19               |                   |                  |     |     |     |     |        |       |
|   |                               | 22                 |                  |                   |                  | Ť   |     | i   | 00  | 0      | 20    |
|   |                               | 23                 |                  |                   |                  |     |     | i   | 00  | 0      | 21    |
|   |                               | 24                 |                  |                   |                  | Ť   |     | i   | 00  | 0      | 22    |
| Start Delay Capture   |                               | 25                 |                  |                   |                  |     |     | i   | 00  | 0      | 23    |
|   |                               | 26                 |                  |                   |                  |     |     |     | 00  | 0      | 24    |
|   |                               | 2/                 |                  |                   |                  |     |     | i   | 00  | 0      | 25    |
|   |                               |                    |                  |                   |                  |     |     | i   | 00  | 0      | 26    |
| Add Imnairments   |                               |                    |                  |                   |                  | Ť   |     | i   | 00  | 0      | 27    |
|   | Set Filter Show Logic         |                    |                  |                   |                  |     |     | i   | 00  | 0      | 28    |
|   | Contract Onow Logic           | 31                 | 0.031000005      | 0.000999855       | 0x0000001d       | 0   | 0   | 00  | 00  | 0      | 29    |
|   | []                            |                    |                  |                   |                  |     |     |     |     |        |       |
| Help, press F1  | N.C.                          |                    |                  | S                 | tatus: Idle      |     | _   |     |     |        | _     |

Capture or file import will yield the tabular display as shown below.

The packets should now be selected to be dropped on replay. There are 3 modes of selection:

- 1. Select an individual packet to be dropped.
- 2. Select a burst of packets to be dropped.
- 3. Select a periodic series of packets to be dropped.

To drop an individual packet:

• Left click on the entry on the table. The entry will highlight in blue as shown for packet 9 in the screen shot above.

 Click the right button on the mouse and a pop-up menu appears, select Drop Packet(s) -> Selected as shown below

| Imported File: CESTime |                            |               |                         |                |                   |            |             |          |     |     |        |      |
|------------------------|----------------------------|---------------|-------------------------|----------------|-------------------|------------|-------------|----------|-----|-----|--------|------|
|                        | Operating Mode Select Flow | Packet        | Sync Settings           | Capture Impair | Graph Data Too    | ols Help   |             |          |     |     |        |      |
| F 🖬 🛲 🗰 👼 🂕            | 🚰 🎜 🎜 🖓 🖉 🤇                | •             | << <b>&gt;&gt;</b>   [] | 1 🚧 🔳 📕 🕨      | • ?               |            |             |          |     |     |        |      |
|                        | SETTINGS                   | Port          | Packet #                | Arrival Time   | Inter-Packet Time | Raw header | L           | 🗾 R      | 🗸 М | FRG | Length | Sequ |
|                        | Ethernet                   | -             | 0                       | 0.000000000    | 0.000000000       | 0x0000fffe | 0           | 0        | 00  | 00  | 0      | 6553 |
| Start Up               | 100BaseT                   | <b>_</b>      | 1                       | 0.000999745    | 0.000999745       | 0x0000ffff | 0           | 0        | 00  | 00  | 0      | 6553 |
|                        | N/A                        | <u> </u>      | 2                       | 0.002000000    | 0.001000255       | 0x00000000 | 0           | 0        | 00  | 00  | 0      | 0    |
|                        | N/A                        |               | 3                       | 0.002999855    | 0.000999855       | 0x00000001 | 0           | 0        | 00  | 00  | 0      | 1    |
|                        | Thru: TRANSPARENT          | <u> </u>      | 4                       | 0.004000110    | 0.001000255       | 0x0000002  | 0           | 0        | 00  | 00  | 0      | 2    |
| 0-1                    | Thru: IKANSPAREN I         | $\rightarrow$ | 5                       | 0.004999970    | 0.000999860       | 0x0000003  | 0           | 0        | 00  | 00  | 0      | 3    |
| Setup Interface        |                            | $\rightarrow$ | 6                       | 0.005999825    | 0.000999855       | 0x00000004 | 0           | 0        | 00  | 00  | 0      | 4    |
|                        | STATUS Reset History       | <u> </u>      | 7                       | 0.007000080    | 0.001000255       | 0x0000005  | 0           | 0        | 00  | 00  | 0      | 5    |
|                        | Port 1 Port 2              | <u> </u>      | 8                       | 0.007999940    | 0.000999860       | 0x0000006  | 0           | 0        | 00  | 00  | 0      | 6    |
|                        | LINK LINK                  |               | 9                       | 0.009000275    | 0.001000335       | 0.0000007  | 0           | 0        | 00  | 00  |        |      |
| Operating Mode         | GOOD PKTS GOOD PKTS        |               | 10                      | 0.010000050    | 0.000999775       | Previou    | s Error     |          |     | 00  | 0      | 8    |
| Operating Mode         |                            |               | 11                      | 0.010999910    | 0.000999860       | Next Err   | or          |          |     | 00  | 0      | 9    |
|                        | REF LOCK SYNCE LOCK        |               | 12                      | 0.012000245    | 0.001000335       | Go to      |             |          |     | 00  | 0      | 10   |
|                        |                            |               | 13                      | 0.013000105    | 0.000999860       | 0010       |             |          | · 1 | 00  | 0      | 11   |
|                        | FLOW FILTER                |               | 14                      | 0.013999960    | 0.000999855       | Drop Pa    | cket(s)     |          | •   | Sel | ected  | 12   |
| Select Flow            | Prev Next                  |               | 15                      | 0.015000215    | 0.001000255       | Re-enal    | ole Selecte | d Packet |     | Bur | st     | 13   |
| 00100011011            |                            |               | 16                      | 0.016000075    | 0.000999860       | Revert t   | o Original  | Profile  |     | Per | iodic  | 14   |
|                        | NO FILTERS ACTIVE          |               | 17                      | 0.016999930    | 0.000999855       |            | ast Drop A  |          |     | 1   |        | 15   |
|                        |                            |               | 18                      | 0.018000185    | 0.001000255       | Undo La    | ast Drop A  |          |     | 00  | 0      | 16   |
|                        |                            |               | 19                      | 0.019000045    | 0.000999860       | 0x00000011 | 0           | 0        | 00  | 00  | 0      | 17   |
| PacketSync Settings    |                            |               | 20                      | 0.019999900    | 0.000999855       | 0x00000012 | 0           | 0        | 00  | 00  | 0      | 18   |
| , °                    |                            |               | 21                      | 0.021000155    | 0.001000255       | 0x00000013 | 0           | 0        | 00  | 00  | 0      | 19   |
|                        |                            |               | 22                      | 0.022000015    | 0.000999860       | 0x00000014 | 0           | 0        | 00  | 00  | 0      | 20   |
|                        |                            |               | 23                      | 0.022999870    | 0.000999855       | 0x00000015 | 0           | 0        | 00  | 00  | 0      | 21   |
|                        |                            |               | 24                      | 0.024000205    | 0.001000335       | 0x00000016 | 0           | 0        | 00  | 00  | 0      | 22   |
| Start Delay Capture    |                            |               | 25                      | 0.025000065    | 0.000999860       | 0x00000017 | 0           | 0        | 00  | 00  | 0      | 23   |
|                        |                            |               | 26                      | 0.025999840    | 0.000999775       | 0x00000018 | 0           | 0        | 00  | 00  | 0      | 24   |
|                        |                            |               | 27                      | 0.027000175    | 0.001000335       | 0x00000019 | 0           | 0        | 00  | 00  | 0      | 25   |
|                        |                            |               | 28                      | 0.027999955    | 0.000999780       | 0x0000001a | 0           | 0        | 00  | 00  | 0      | 26   |
|                        |                            |               | 29                      | 0.028999810    | 0.000999855       | 0x0000001b | 0           | 0        | 00  | 00  | 0      | 27   |
| Add Impairments        |                            |               | 30                      | 0.030000150    | 0.001000340       | 0x0000001c | 0           | 0        | 00  | 00  | 0      | 28   |
| and Delay              | Set Filter Show Logic      |               | 31                      | 0.031000005    | 0.000999855       | 0x0000001d | 0           | 0        | 00  | 00  | 0      | 29   |
|                        |                            | •             |                         |                |                   |            |             |          |     |     |        |      |

• This will mark the packet to be dropped. This is confirmed by the background colour for the line turning orange.

To drop a burst of packets repeat the first step above then:

- Select Drop Packet(s) -> Burst. This will bring up the pop-up window shown below.
- Set the Burst Size required

| Drop Burst Setup | ×      |
|------------------|--------|
|                  |        |
| Burst Start      | 9      |
| Burst Size       | 1000   |
| Apply            | Cancel |

Again the table will be updated to indicate the packets to be dropped with a background of orange.

| Port 1 Port 1  | Port       | << >>  []]<br>Packet # | Arrival Time | Inter-Packet Time |            |     |     |     |     |        |     |
|--|------------|------------------------|--------------|-------------------|------------|-----|-----|-----|-----|--------|-----|
| Start Up     Ethernet       Setup Interface     STATUS       Operating Mode     Port 1       Select Flow     FLOW FILTER       PacketSync Settings     Prev  | Port       |                        | Arrival Time | Inter Dacket Time |            |     |     |     |     |        |     |
| Start Up     Ethernet       NA     NA       Setup Interface     STATUS       Operating Mode     Port 1       Select Flow     FLOW FILTER       PacketSync Settings     Prev  |            | 6                      |              | inter-Packet rime | Raw header | L L | 🗾 R | 🖌 М | FRG | Length | l s |
| Start Op     100BaseT       N/A     N/A       Setup Interface     STATUS       Operating Mode     Port 1       Select Flow     FLOW FILTER       PacketSync Settings     Pyte #15 = xxx  |            |                        | 0.005999825  | 0.000999855       | 0x00000004 | 0   | 0   | 00  | 00  | 0      |     |
| N/A       Setup Interface     STATUS       Operating Mode     STATUS       Select Flow     FLOW FILTER       PacketSync Settings     FLOW FILTER   |            | 7                      | 0.007000080  | 0.001000255       | 0x00000005 | 0   | 0   | 00  | 00  | 0      |     |
| Setup Interface     Image: TRANSPAR       Operating Mode     STATUS       Select Flow     ELOW FILTER       PacketSync Settings     Byte # 15 = xxx  |            | 8                      | 0.007999940  | 0.000999860       | 0x0000006  | 0   | 0   | 00  | 00  | 0      |     |
| Setup Interface     STATUS       Operating Mode     STATUS       Select Flow     FLOW FILTER       PacketSync Settings     Prev  |            | 9                      | 0.009000275  | 0.001000335       |            | 0   |     | 00  | 00  |        |     |
| Setup Interface     STATUS       Operating Mode     STATUS       Select Flow     FLOW FILTER       PacketSync Settings     Prev  |            | 10                     |              | 0.000999775       | 0x0000008  | 0   |     | 00  | 00  |        |     |
| Operating Mode     STATUS       Operating Mode     Port 1       Select Flow     FLOW FILTER       PacketSync Settings     Pyte # 15 = xxx  |            | 11                     | 0.010999910  | 0.000999860       | 0x00000009 | 0   |     | 00  | 00  |        |     |
| Operating Mode     Port 1       Select Flow     FLOW FILTER       PacketSync Settings     Prev N   |            | 12                     | 0.012000245  | 0.001000335       | 0x0000000a | 0   |     | 00  | 00  |        |     |
| Operating Mode     LINK<br>GOOD PKTS       Select Flow     REF LOCK       PacketSync Settings     Prev   | et History | 13                     |              | 0.000999860       | 0х000000b  | 0   |     | 00  | 00  |        |     |
| Operating Mode     LINK<br>GOOD PKT = GOOD | t 2        | 14                     |              |                   | 0x000000c  | 0   |     | 00  | 00  |        |     |
| Operating Mode     REFLOCK SYN       Select Flow     FLOW FILTER       PacketSync Settings     Byte # 15 = xxx   | INK 📂      | 15                     |              | 0.001000255       | b0000000x0 | 0   |     | 00  | 00  |        |     |
| Select Flow PacketSync Settings  | D PKTS     | 16                     |              | 0.000999860       | 0x000000e  | 0   |     | 00  | 00  |        |     |
| Select Flow Prev N Byte # 15 = xxx   |            | 17                     |              | 0.000999855       | 0x0000000f | 0   |     | 00  | 00  |        |     |
| Select Flow Prev N<br>Byte # 15 = xxx  | E LOCK     | 18                     |              | 0.001000255       | 0x00000010 | 0   |     | 00  | 00  |        |     |
| Select Flow Prev N<br>Byte # 15 = xxx  |            | 19                     |              | 0.000999860       | 0x00000011 | 0   |     | 00  | 00  |        |     |
| PacketSync Settings  |            | 20                     | 0.019999900  | 0.000999855       | 0x00000012 | 0   |     | 00  | 00  |        |     |
| PacketSync Settings  | xt 💻       | 21                     |              | 0.001000255       | 0x00000013 | 0   |     | 00  | 00  |        |     |
| PacketSync Settings  |            | 22                     | 0.022000015  | 0.000999860       | 0x00000014 | 0   |     | 00  | 00  |        |     |
|  | 0000       | 23                     |              | 0.000999855       | 0x00000015 | 0   |     | 00  | 00  |        |     |
|  |            | 24                     | 0.024000205  | 0.001000335       | 0x00000016 | 0   |     | 00  | 00  |        |     |
|  |            | 25                     |              | 0.000999860       | 0x00000017 | 0   |     | 00  | 00  |        |     |
| Start Delay Capture  |            | 26                     | 0.025999840  | 0.000999775       | 0x00000018 | 0   |     | 00  | 00  |        |     |
| Start Delay Capture  |            | 27                     | 0.027000175  | 0.001000335       | 0x00000019 | 0   |     | 00  | 00  |        |     |
| Start Delay Capture  |            | 28                     | 0.027999955  | 0.000999780       | 0x0000001a | 0   |     | 00  | 00  |        |     |
| Start Delay Capture  |            | 29                     | 0.028999810  | 0.000999855       | 0x000001b  | 0   |     | 00  | 00  | 0      |     |
| Start Delay Capture  |            | 30                     |              | 0.001000340       | 0x0000001c | 0   |     | 00  | 00  |        |     |
|  |            | 31                     | 0.031000005  | 0.000999855       | 0x000001d  | 0   |     | 00  | 00  |        |     |
|  |            | 32                     | 0.032000260  | 0.001000255       | 0x0000001e | 0   |     | 00  | 00  |        |     |
|  |            | 33                     | 0.033000120  | 0.000999860       | 0x0000001f | 0   |     | 00  | 00  |        |     |
|  |            | 34                     | 0.033999975  | 0.000999855       | 0x00000020 | 0   |     | 00  | 00  | 0      |     |
| Add Impairments  |            | 35                     | 0.035000230  | 0.001000255       | 0x00000021 | 0   |     | 00  | 00  |        |     |
| and Delay Set Filter Show Logic  |            | 36                     | 0.036000090  | 0.000999860       | 0x00000022 | 0   |     | 00  | 00  | 0      |     |
| Set Filter Sho   | a la stall | 37                     | 0.036999945  | 0.000999855       | 0x00000023 | 0   |     | 00  | 00  |        |     |

To select a periodic dropping of packets repeat the above but select Drop Packet(s) -> Periodic. This brings up the dialogue shown below

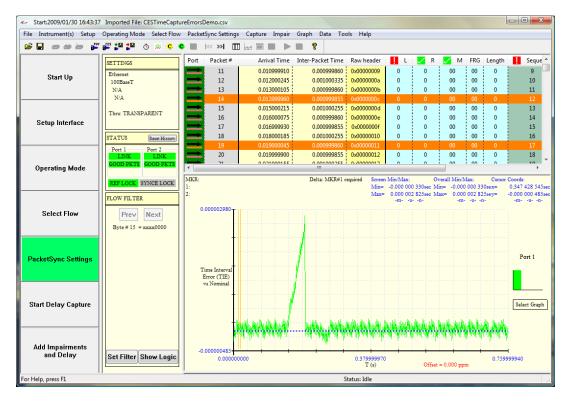
| Drop Periodic Setup |        |
|---------------------|--------|
| Start               | 9      |
| Size                | 2651   |
| Period              | 3      |
| Apply               | Cancel |

This allows the repeat interval to be set by setting the Period field. The Size field is used to set the range of packets over which the repeat applies. So with Period set to 3 the following table display will result.

|  | Start:2009/01/30 16:43:3 | 7 Imported File: CESTimeCaptu | reErrors | Demo.csv            |                |               |                  |   |   |     |    |  | _ 0 |
|--|--------------------------|-------------------------------|----------|---------------------|----------------|---------------|------------------|---|---|-----|----|--|-----|
| Start Up         ETTINGS         Packet #         Arrival Time         Inter-Packet Time         R w header         I         I         N         R is         M         FRG         Length         I           Start Up         Ethemat<br>100Bawf         100         0.000000000         0.000000000            | ile Instrument(s) Setup  | Operating Mode Select Flow    | Packet   | Sync Settings       | Capture Impair | Graph Data To | ols <u>H</u> elp |   |   |     |    |  |     |
| Start Up         Entransit<br>100Bain T<br>NA<br>NA<br>NA         8         0.00799940<br>0.000999200         0.00000000         0         0         00         0         0           Setup interface         The:: TRANSPARENT         9         0.000090025         0.00000000         0         0         00  | * 🖬 🗰 🖮 🖉                | ′ <mark>≝≌⊉</mark> ⊕ ⊗ ♥ ♦    |          | << <b>&gt;&gt; </b> |                | • ?           |                  |   |   |     |    |  |     |
| Start Up         Ehernat<br>Dogenation         9         0.00000273         0.00100335         0.0000000         0         00   |                          | SETTINGS                      | Port     |                     |                |               |                  |   |   |     |    |  |     |
| Index         3         0.00000003         0.00000000            | Start IIn                | Ethernet                      | -        | -                   |                |               |                  |   |   |     |    |  |     |
| NA         11         0.01099910         0.00099860         0.0000000         0         0         00  | otart op                 |                               |          |                     |                |               |                  |   |   |     |    |  |     |
| Setup Interface         12         001000035         00000000         0 <t< td=""><td></td><td></td><td>—</td><td></td><td></td><td></td><td></td><td></td><td>-</td><td></td><td></td><td>0         0           0         0</td><td></td></t<>  |                          |                               | —        |                     |                |               |                  |   | - |     |    | 0         0              |     |
| Setup Interface         Thre: TRANSPARENT         13         0.013000105         0.0000998655         0.0000000c         0         00   |                          | N/A                           | —        |                     |                |               |                  |   |   |     |    |  |     |
| Setup Interface         Image: Setup Interface  |                          | Thru: TRANSPARENT             |          |                     |                |               |                  |   |   |     |    |  |     |
| Add Impairments<br>and Delay         Ext Filter         Show Logic         14         0.01999980         0.0000002         0   | Setun Interface          |                               | _        |                     |                |               |                  |   |   |     |    |  |     |
| Description         Description <thdescription< th=""> <thdescription< th=""></thdescription<></thdescription<>  |                          |                               | —        |                     |                |               |                  |   |   |     |    |  |     |
| Operating Mode         Pert 1         Pert 2         17         0.016999930         0.000999855         0.0000000         0         0         00  |                          | STATUS Reset History          |          |                     |                |               |                  |   |   |     |    |  |     |
| Operating Mode         Image: CoOD Pict Not Not Not Not Not Not Not Not Not No   |                          | Port 1 Port 2                 |          |                     |                |               | i                |   |   | i i |    |  |     |
| Operating Mode         Image: Construct of the second  |                          |                               | _        |                     |                |               |                  |   |   |     |    |  |     |
| Reflects         Reflects         Since Lock         Since Lock<  | Operating Mode           | GOOD PKTS GOOD PKTS           |          |                     |                |               |                  |   |   |     |    |  |     |
| Select Flow         Prev         Next         21         0.02100155         0.00100225         0.0000014         0         00   |                          |                               | _        |                     |                |               |                  |   |   |     |    |  |     |
| Select Flow         FLOW FILTER         22         0.022000015         0.000999860         0.0000014         0         0         00   |                          | REF LOCK SYNCE LOCK           | _        |                     |                |               |                  |   |   |     |    |  |     |
| Select Flow         22         0.02200015         0.000099855         0.0000015         0         0         00         00         0           Prev Next         Byte # 15 = xxxx0000         25         0.022099870         0.00099855         0.0000015         0         0         00         00         00         00         00         0 <td></td> <td>FLOW FILTER</td> <td></td>   |                          | FLOW FILTER                   |          |                     |                |               |                  |   |   |     |    |  |     |
| Select Flow         Prev         Next           Byte # 15 = xxxxx0000         24         0.02400205         0.000099860         0.0000017         0         0         00         00            |                          | FLOW FILTER                   | _        |                     |                |               |                  |   |   |     |    |  |     |
| Byte # 15 = xxxx0000         24         0.024000255         0.000000183         0.00000016         0         0         0   | Select Flow              | Prev Next                     |          |                     |                |               |                  |   |   |     |    |  |     |
| PacketSync Settings         2         0.022000175         0.0000999775         0.0000011         0   |                          |                               |          |                     |                |               |                  |   |   |     |    |  |     |
| PacketSync Settings         27         0.02700175         0.00100335         0.0000019         0         0         00 <td>Byte</td> <td>Byte # 15 = xxxx0000</td> <td>-</td> <td></td>   | Byte                     | Byte # 15 = xxxx0000          | -        |                     |                |               |                  |   |   |     |    |  |     |
| PacketSync Settings         28         0.027999955         0.000999780         0.000001a         0         0         00<   |                          |                               | -        |                     |                |               |                  |   |   |     |    |  |     |
| Add Impairments<br>and Delay         Set Filter         Show Logic         Show Logic         0.028999210         0.000999855         0.00000011         0         0         00  |                          |                               |          |                     |                |               |                  |   |   |     |    |  |     |
| Add Impairments<br>and Delay         Set Filter         Show Logic         30         0.030000150         0.001000340         0.000001c         0         00  | PacketSync Settings      |                               |          |                     |                | 0.000999780   | 0x0000001a       | 0 |   | 00  | 00 | 0  |     |
| Start Delay Capture         31         0.031000005         0.00099855         0.0000014         0         0         00 </td <td></td> <td></td> <td>_</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>00</td> <td>00         0           01         0           02         0           00         0</td> <td></td> |                          |                               | _        |                     |                |               |                  |   |   |     | 00 | 00         0           01         0           02         0           00         0 |     |
| Start Delay Capture         32         0.03200260         0.00100255         0.000001e         0         00 </td <td></td>  |                          |                               |          |                     |                |               |                  |   |   |     |    |  |     |
| Start Delay Capture         33         0.03300120         0.00099860         0.0000011         0         0         00         00         0           Add Impairments<br>and Delay         Set Filter         Show Logic         34         0.03300020         0.00099855         0.00000021         0         00 <td></td> <td></td> <td>_</td> <td></td> <td></td> <td></td> <td></td> <td>-</td> <td></td> <td></td> <td></td> <td></td> <td></td>  |                          |                               | _        |                     |                |               |                  | - |   |     |    |  |     |
| Add Impairments<br>and Delay         Set Filter         Show Logic         34<br>35         0.033999975<br>0.033000230         0.000999855<br>0.00000025         0.00000020<br>0.00000022         0         0         00<   |                          |                               |          | 32                  | 0.032000260    | 0.001000255   | 0x0000001e       | 0 | 0 | 00  | 00 | 0  |     |
| Add Impairments<br>and Delay         Set Filter         Show Logic         35         0.035000230         0.00100255         0.00000022         0         00  | Start Delay Capture      |                               |          | 33                  | 0.033000120    | 0.000999860   | 0x0000001f       | 0 | 0 | 00  | 00 | 0  |     |
| Add Impairments<br>and Delay         Set Filter         Show Logic         36         0.036000990         0.000999860         0.00000022         0         0         00         0         0           37         0.036000990         0.000999855         0.00000023         0         0         00           |                          |                               |          | 34                  | 0.033999975    | 0.000999855   | 0x00000020       | 0 | 0 | 00  | 00 | 0  |     |
| Add Impairments<br>and Delay         Set Filter         Show Logic         37         0.036999945         0.00099855         0.0000023         0         0         00            |                          |                               |          | 35                  | 0.035000230    | 0.001000255   | 0x00000021       | 0 | 0 | 00  | 00 | 0  |     |
| Add Impairments<br>and Delay         Set Filter         Show Logic         38         0.038000280         0.00100333         0.00000024         0         0         00           |                          |                               |          | 36                  | 0.036000090    | 0.000999860   | 0x00000022       | 0 | 0 | 00  | 00 | 0  |     |
| and Delay Set Filter Show Logic 39 0.03900000 0.000999780 0.00000025 0 0 00 00 0   |                          |                               |          | 37                  | 0.036999945    | 0.000999855   | 0x00000023       | 0 | 0 | 00  | 00 | 0  |     |
|  |                          |                               |          | 38                  | 0.038000280    | 0.001000335   | 0x00000024       | 0 | 0 | 00  | 00 | 0  |     |
|  | and Delay                | Set Filter Show Logic         |          | 39                  | 0.039000060    |               | 0x00000025       | 0 | 0 | 00  | 00 | 0  |     |
|  |                          |                               | •        | _                   |                |               |                  | _ | _ |     |    |  |     |

The various modes of selection packets can be repeated to allow the desired pattern to be built up.

Additionally the timing graph will be marked to show where packets are going to be dropped during the replay. Vertical orange bars appear at the appropriate places on the graph as shown below where 2 packets have been selected.



There are 3 additional undo controls worth noting. These are accessed by right clicking the mouse in the table display area.

- Undo Last Drop Action. This allows for a single level of resetting.
- Re-enable Selected Packet will allow one packet to be unselected and replayed correctly. This applies regardless of the method of causing the drop, individual, burst or periodic.
- Revert to Original Profile will reset all the packets selected to be dropped since the file was loaded or captured.

When a profile of dropped packets has been created, it can be saved using File -> Export for later use.

Having selected the packets to be dropped, ensure that the Replay Corruption From Captured Data >Drop Packets boxes are selected. If these are un-checked, all packets will be replayed as normal.

| O Burst 1 pkts O                     | Ratio 1 E- 2   |
|--------------------------------------|--|
| C Duration 0.1 s C                   | Constant   |
| Replay Corruption From Captured Data | This feature will be applied to BOTH flows concurrently. |
|                                      |  |
|                                      |  |
|                                      |  |
| Start Overwrite Stop Overwrite       | Close  |

#### • Reproducing Sequence Number Gaps

This feature allows you to replay a captured profile that had missing packets, by recognising and reproducing the sequence number gaps.

- Import the file in the normal way.
- Select Replay Corruption From Captured Data > use sequence. If these are unchecked, all packets will be replayed as normal, and sequence gaps will be ignored.

| C Burst 1 pkts                       | C Ratio 1 E- 2   |
|--------------------------------------|--|
| C Duration 0.1 s                     | C Constant   |
| Replay Corruption From Captured Data | This feature will be applied to BOTH flows concurrently. |
|                                      |  |
|                                      |  |
| Start Overwrite Stop Overw           | Close  |

#### Adding Impairments and Delays to Multiple Flows

This feature allows a PDV profile to be replayed onto multiple flows. Each point from the profile is applied to a period of time (e.g. for a profile for a 1000 packets per second flow, each point is applied to a 1msec interval). There is therefore no limit to the number of flows and/or packets that can be impacted during each period.

It is accessed using the Add Impairments and Delay button. On the pop-up window the Delay tab will show a selection for single or multiple flows as shown on the screen shot below.

| Enable Overwrite | Instrument Intrinsic Delay<br>Select Distrinsic Delay for Jumbo Packets is 10000.0 us . |  |
|------------------|---|--|
| Corruptions      | verwrite Delay  |  |
| Mode             | Турс  |  |
| 💿 Single 🔘 Rep   | nat Multi Flow  |  |
| Port 1 -> Port 2 | Port Multi Flow   |  |
|                  |   |  |

The selection of Single Flow maintains the existing method of applying the delay profile on a packet by packet basis with the delay changing after each packet.

If Multi Flow is selected, the delay will be applied for the interval represented in the profile file e.g. if the rate is 1000 packets per second then the delay will be applied to all packets received in the 1ms interval. The next delay in the profile will then be applied to all the packets in the next 1ms interval and so on.

The files which can be replayed in this manner are the captured profiles for a Circuit Emulated Services session and the generated delays such as Step and Sawtooth.

As an example, if the instrument filters are set to allow 50 CES streams each at 1000 packets per second and the timing replay profile is generated at 1000 packets per second then each delay in the profile will be applied to one packet in each of the 50 streams. As indicated previously, there is no limit to the number of streams which may be delayed.

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