Multi-Stream Traffic Generator and Analyzer
(1 Gbps and 10 Gbps)
Introduction
Just bigger Pipes, but same Ethernet/IP Packets
Multi Stream Traffic

A traffic “Stream” or “Flow” can be defined as a set of packets flowing across the DUT/Network, who are logically connected to each other.
Multiple "Stream" or "Flow" in Ethernet/IP Traffic
Multi-Stream Traffic between 2 End Points
Identifying Streams

**UDP headers**

<table>
<thead>
<tr>
<th>UDP Source Port</th>
<th>UDP Destination Port</th>
</tr>
</thead>
<tbody>
<tr>
<td>UDP Length</td>
<td>UDP Checksum</td>
</tr>
<tr>
<td>Data</td>
<td></td>
</tr>
</tbody>
</table>

**IP header**

<table>
<thead>
<tr>
<th>Version</th>
<th>Header Length</th>
<th>Service Type</th>
<th>Total Length</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Identification</td>
<td>Flags</td>
</tr>
<tr>
<td>TTL</td>
<td>Protocol</td>
<td>Header Checksum</td>
<td></td>
</tr>
</tbody>
</table>

**VLAN header**

<table>
<thead>
<tr>
<th>VLAN Type Field</th>
<th>VLAN Priority</th>
<th>VLAN CFI</th>
<th>VLAN ID</th>
</tr>
</thead>
</table>

**MAC header**

<table>
<thead>
<tr>
<th>Destination Address</th>
<th>Source Address</th>
<th>VLAN Tag</th>
<th>Type/Len</th>
<th>Payload</th>
<th>FCS</th>
</tr>
</thead>
</table>
Application-wise Streams

Data
- HTTP
- FTP
- ARP
- ICMP

Voice
- RTP w/ G711
- RTP w/ G729
- RTP w/ G726
- RTP w/ AMR

Video
- RTP w/ H264
Stream Characteristics

Data
- HTTP
  - Frame Size = 100 – 1518, Rate < 5 kbps
- FTP
  - Frame Size = 100 – 1518, Rate ≤ 5 Mbps
- ARP
  - Frame Size = 64, Rate < 1 Kbps
- ICMP
  - Frame Size = 64, Rate < 1 Kbps

Voice
- RTP w/ G711
  - Frame Size = 214, Rate ~ 83 Kbps
- RTP w/ G729
  - Frame Size = 214, Rate ~83 kbps
- RTP w/ G726
- RTP w/ AMR

Video
- RTP w/ H264
  - Frame Size = 64 – 1518, Rate = 1.4 Mbps – 3.4 Mbps
All streams are carried over Single pipe
Multi-stream Traffic Generator

PacketExpert™ 10GX

Multi-Stream Traffic Generator
Multi-Stream Traffic Analysis
Impairments Introduced by Packet Switching Networks

PacketExpert™ 10GX
Multi-Stream Traffic Generator
Multi-Stream Traffic Analysis

Multi Stream Voice, Data, Video Traffic

- Latency (Delay)
- Jitter
- Packet Loss
- Packet Effect
- Recording
- Duplication
Latency or Frame Transfer Delay
Jitter Introduced in Various Ways
Effects of Jitter on Video Playback

Video Streaming

Source Packets

Empty Buffer

Over flowing packets

Destination Packets

Distorted Video

Jitter Buffer

GL Communications Inc.
Packet Loss introduced in many ways
Effects of Packet Loss
IP Measurements

Need to measure these IP Metrics:

• Throughput/Bandwidth
• Latency/Frame Transfer Delay (FTD)
• Jitter/Frame Delay Variation (FDV)
• Packet Loss/Frame Loss (FL)
End-to-End Test Setup
Test Setup Remote Loopback

Traffic Generator & Analyzer

Network

Loopback Traffic

Test Setup
Multi-Stream Generator and Analyzer

PacketExpert™ 10GX

Multi-Stream Traffic Generator
Multi-Stream Traffic Analysis
Local Loopback for Convenience
Hardware
Portable Units

PacketExpert™ 10GX Standalone
- 4 x 1 Gbps Optical OR Electrical
- 2 x 10 Gbps Optical only

PacketExpert™ 10G Standalone
- 2 x 1 Gbps Optical OR Electrical
- 2 x 10 Gbps Optical only

PacketExpert™ 1G (4 Port)

PacketExpert™ 10G Tablet Inspired
(Coming soon)
mTOP™ 1U/2U Rack Option

- 19” rack option, w/ Embedded Single Board Computer (SBC)
- SBC Specs: Intel Core i3 Equivalent, Windows® 10 64-bit Pro, USB 3.0 Hub, ATX Power Supply, 240GB Hard drive, 8G Memory (Min), Two HDMI ports for display
Expert Analyzer 10GX Ports
Application Examples
PacketExpert™ in the Network

PacketExpert™ 10GX
(Multi-stream Traffic Generator & Analyzer)
Stress Testing

PacketExpert™ 10GX
(Multi-stream Traffic Generator & Analyzer)

Background Traffic
Foregound Stream
Background Traffic Generator for Stress Testing

PacketExpert™ 10GX
(Multi-stream Traffic Generator & Analyzer)

VoIP Phone

Background Traffic

Foreground Stream
Foreground Traffic Generator and Analyzer

Network

Background Traffic

Foreground Stream

PacketExpert™ 10GX
(Multi-stream Traffic Generator & Analyzer)
Foreground Traffic Generator and Analyzer

Multi-Stream Generator & Analyzer

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Future Enhancements

• VoIP/ Video traffic easy emulation
• 1G platform
• more graphs
Q and A session