REAL-TIME IP SERVICES

VoIP / STREAMING VIDEO / IPTV / VoD / MULTICASTING

ANUE SYSTEMS

GEL2M

Network Emulator

- **Simulate real-world network conditions in a laboratory environment**
- **Full duplex-support for 10/100/1000baseT, Gigabit Ethernet, and 10 Gigabit Ethernet**
- **Precise, accurate, and repeatable**
- **Emulate:**
  - ✓ **Network delay/latency**
  - ✓ **Packet loss**
  - ✓ **Packet jitter**
  - ✓ **Bit errors**
  - ✓ **Traffic congestion**
  - ✓ **And many other impairments**
- **Simultaneous emulation of multiple impairments**
- **Dynamically modify impairment profiles on-the-fly without halting system operation**
- **Specify different impairment profiles for up to 16 independent traffic flows**
- **Precision in-line test instrument for Layer 1 and Layer 2+ impairment emulation**
- **Sophisticated and feature-rich, yet easy to use**

All networks have impairments and delays. Network emulators from ANUE SYSTEMS provide emulation of these network traffic conditions. ANUE's GEL2M is ideally suited for the comprehensive testing of real-time IP services in the laboratory for:

- System test under real-world conditions prior to deployment
- Proof of concept
- Characterization of Quality of Service (QoS) and Quality of Experience (QoE)

Network Delay/Latency

Delay or latency in a network can cause serious application problems. This is especially true for real-time applications such as voice and video services over IP. Voice calls with beyond-acceptable latency levels will experience intolerable pauses and delays between responses of the two calling parties. Video applications will experience freezed frames and corrupted images.

To measure acceptable levels of latency, use ANUE's GEL2M to inject delays up to 250 msec with increments as low as 16 nsec.

Increase delay in the system under test to see where applications start to perform at unacceptable levels of service, and to see where applications start to fail altogether.

Packet Loss

Packet loss in a network is a serious problem for real-time applications. Even in low levels, packet loss can result in unacceptable degradation of voice and video service. Higher levels can garble voice traffic and cause graininess and dropouts in a video signal. Eventually, phone calls gets dropped and video reception abruptly ends.

Use the GEL2M to specify packet loss up to 100% in 0.01% increments.

Packet Jitter

Use the GEL2M to emulate packet jitter in network traffic. In addition to specifying the percentage of

packets that will experience jitter, set the maximum and minimum possible delay values. Also set the maximum possible positive and negative changes in delay values from one packet to the next. The GEL2M will randomly change the delay based on these values in an uniform distribution.

Bit Errors

The GEL2M has a sophisticated bit error injection capability. Inject bit errors in the 10-bit domain at rates from 10^{-12} to 10^{-2}. For each error event, specify the range of bits that are to be corrupted. For each range of bits, specify the corruption to be all zeroes, all ones, or the inversion of the bits. You can specify the number times the bit error event to occur before bit error injection ends, or have the bit error injection continue indefinitely at the specified rate.

After bit error injection, you can opt to have the CRC corrected automatically.

Traffic Congestion

The GEL2M can emulate network traffic congestion with its Throttle feature. Specify the output bandwidth available from 0% to 100% in 0.005% increments. Additionally, specify the threshold at where data starts to drop due to traffic congestion. For burst tolerance testing, specify the amount of credit in bytes.

Other Impairments

In addition to the above impairments, use the feature-rich ANUE GEL2M Network Emulator to:

- Emulate Loss of Signal
- Corrupt CRC
- Reorder packets
- Duplicate packets
- Rotate Ethernet code word alignment

Selective Impairments

You can select specific packets for impairment based on eight user-defined criteria, each specified as an offset from the start of the frame. Offset bytes can be located up to 1000 bytes from the start of the frame.

Statistics

The GEL2M provides:

- Real-time statistics on the input such running disparity errors, IPG errors, idle errors, FCS errors, bandwidth statistics, and more.
- Impairment statistics introduced at the output port such as dropped, corrupted, duplicated, and reordered packets, output bandwidth, and more.

Specifications, availability, and features subject to change without notice.

You cannot afford to buy a network emulator without first consulting ANUE SYSTEMS. Our products reflect our experience, and our philosophy dictates that every instrument we make be clearly the best in its class.

For more info, please contact ANUE SYSTEMS at +1 (512) 527-0453. We will be happy to help you with your application testing requirements.