Network Congestion: The Case for Measuring Round Trip Delay

application note

Round trip delay (RTD) measurements are a key component in service level agreement management. Using round trip delay measurements, you can pinpoint when and where network congestion occurs, leading to a quick diagnosis of the problem. Regular monitoring can alert you to changes in network usage that will allow you to provision more bandwidth before problems occur.

Frame Relay network users who have signed a service level agreement contract with their carrier can use delay monitoring metrics to assure that the agreed upon delay threshold has not been exceeded. Though there is a wide range of delay guarantees, based in part on the carriers specific configuration guidelines and backbone technology, most guarantees fall between 110 milliseconds to 300 milliseconds. Using the delay measurement function of your Quick Eagle Networks' DSU, you can monitor each PVC to ensure that delay stays within the agreed upon range.

In conjunction with other service level agreement (SLA) measurements, delay monitoring assures that you are getting the level of service you've paid for.

Two Types of Delay Measurements

Quick Eagle Networks' Select family of DSUs provide two levels of delay monitoring. First, there is IP network delay monitoring which allows you to select any IP-addressable device as your endpoint.

When monitoring delay on an IP network, changes in delay or excessive amounts of delay can alert you to potential problems. Generating delay reports on a regular basis will provide the information you need to reallocate resources, increase your committed information rate, or work with your carrier on troubleshooting delay-related problems.

The second method of measuring delay is part of Quick Eagle Networks' service level agreement package for Frame Relay Networks. Quick Eagle Networks' implementation of SLA is based on FRF.13 and includes a means of point-to-point delay monitoring. Using a Select family intelligent access device at each end of your network, you can get an accurate view of the delay attributable to the Frame Relay network.

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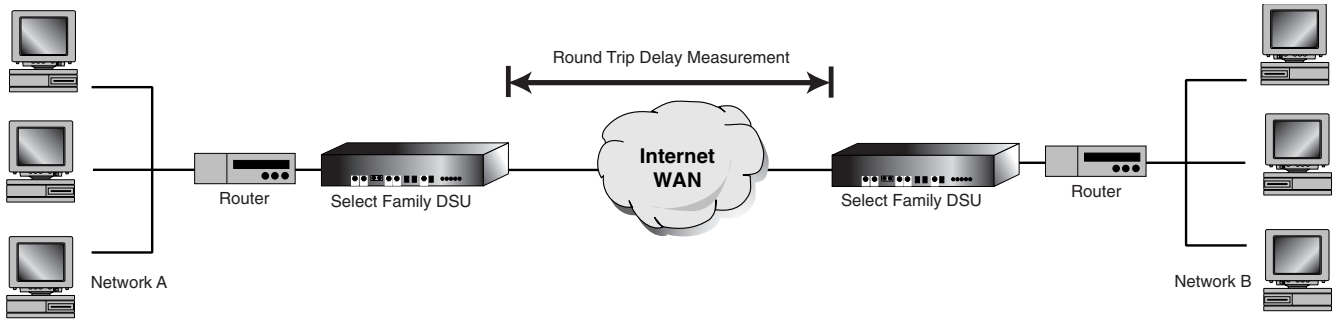
Your service level agreement will include specific delay parameters. Many providers base their guarantees on access line speed, offering lower delay guarantees for T1 access lines than for 56 kbps. The most useful delay guarantees are based on the type of application or type of traffic that is being generated. An example of an application-specific guarantee is illustrated below:

Access Speed	Maximum Round Trip Delay Under TCP/IP Frame Relay	Maximum Round Trip Delay Under SNA Frame Relay
56/64 kbps	260 ms	230 ms
256 kbps	170 ms	140 ms
1544 kbps (T1)	140 ms	110 ms

When measuring delay, it's important that your routers and DSUs are not included in the equation — that way you get a true measure of delay caused by the network, rather than including the overhead of customer premise equipment (CPE). Unlike routers with an integrated DSU, using a standalone DSU provides round trip delay measurements that do not include time spent processing data within the CPE itself. The ping (round trip delay measurement message—RTDMM) is timestamped on delivery, timestamped on receipt, and timestamped again on return. The difference between these figures is the actual network delay.

Measuring Delay with the i-Net Management Suite



Quick Eagle Networks' i-Net Management Suite has been tailored to address all aspects of service level agreement reporting, including delay measurements. The i-Net Management Suite includes the Select family of intelligent devices; WANview Network Management system for managing and configuring your devices; and ChoiceView Network Monitor, a real-time, Java-based solution for remote access through a standard browser. The following table provides a look at delay monitoring using the i-Net Management Suite.

	Select Family of DSUs	ChoiceView Network Monitor	WANview Management System
Configuring Delay Parameters	SLA Configuration, Menu-0H	NA	SLA Configuration Menu
Generating Round Trip Delay Reports	Frame Transfer Delays, Menu-3EB	Quality of Service Module	SLA Quick View or SLA Advance View

How Much Delay is Too Much Delay?

Often, the answer to the question is dependent on the agreement that you signed with your carrier. In the case of Frame Relay networks, carriers and customers enter into a service level agreement (SLA) in which parameters such as delay are clearly outlined. Delay monitoring provides a quantitative means of verifying your service level agreement.

For example, if your service level agreement states that you should receive less than 300 milliseconds of delay, and you are consistently receiving 800 milliseconds, you will want to contact your carrier. While 500 milliseconds may not sound significant, the additional delay can cause degradation in the transmission of time-critical data such as voice and video, and lead to data retransmissions which can result in errors or further delay.

Many carriers require that their customers keep track of delay so that they can assist in the process of monitoring delay. Using the delay monitoring component of Quick Eagle Networks' SLA implementation, you can make sure that the delay experienced is not in excess of the agreed upon threshold.

If you are using an IP network (without Frame Relay) and don't have a service level agreement with your carrier, you may still want to incorporate delay monitoring into your regular schedule so that over time, you can create a baseline, or average delay figure. Noting variance from your baseline will allow you to proactively attend to network problems and increased bandwidth needs before they negatively impact network throughput.

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