The Effect of Microburst Traffic on Monitoring Latency Sensitive Networks

In an environment where a millisecond can cost a million dollars, the monitoring infrastructure must capture 100 percent of the traffic, regardless of its characteristics. The world of high-frequency trading (HFT) and algorithmic trading places high demands on the network infrastructure with no tolerance for packet latency or loss.

The messaging nature of the Financial Information eXchange ("FIX") protocol in HFT creates bursty traffic in general. In particular, a microburst is a short, intense increase in the packet rate at or near line rate over short periods. Microbursts can overwhelm network elements, causing packet loss and retransmissions, which the destination application sees as packet latency.
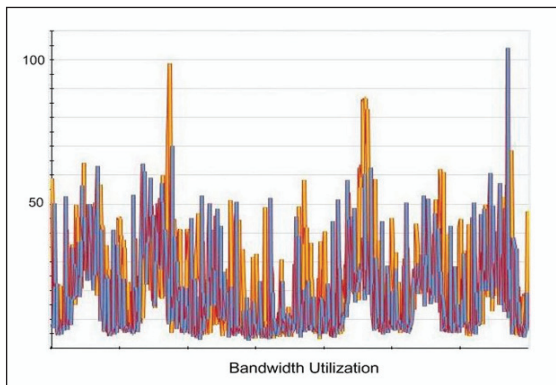

Figure 1. Intermittently bursty traffic applied independently or together as needed by the user depending on the monitoring application.
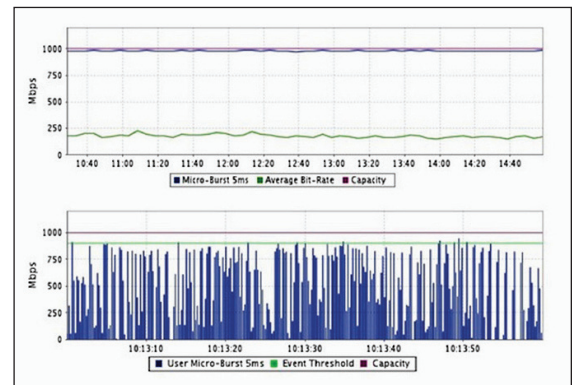

Figure 2. Consistently bursty traffic

Microbursts that overwhelm the monitoring infrastructure result in loss of analytic data, a serious problem for legacy monitoring systems, but not for VSS Monitoring Network Packet Brokers (NPBs), specifically the vBroker 220 Series.

Inline TAP vs. Out-of-Band SPAN

When using a switch SPAN port as a means to monitor the network during microburst conditions, packet loss and out-of-sequence packets will invariably occur. Besides not being able to forward a copy of all traffic for analysis from its SPAN port, the switch can incur additional latency due to the extra processing cycles and buffering required sending packets from the SPAN port. This will result incorrect time stamping.

By using the vBroker 200 Series to capture traffic passively from multiple links, the switch can be left to concentrate on its primary function – switching packets – while at the same time ensuring that not only all packets are captured but that their time stampings are collected at line rate, before aggregation.

Packet Optimization for Regulating Microbursts

Packet optimization allows monitoring tools to receive precisely the data they need. A NPB needs to avoid sending too much data that consumes tools' processing power with unnecessary data. VSS Monitoring's vBroker 220 eliminates packet loss and tool oversubscription. Not only does this provide resilience in network subject to microbursts, it also provides the ability to perform 10G to 1G speed conversion, and remove unwanted data via filtering and conditional slicing with powerful filtering expressions. This gives monitoring applications precisely what they need so they have the CPU cycles left to process packets of interest and not irrelevant traffic.

Support for Centralized and Consolidated Audit Trail

According to a July 11 2012 SEC ruling, financial services firms must report trade activities such as orders, acknowledgement, fulfillment and end of book to a consolidated and central repository for analysis by 8 a.m. Eastern Time the following trading day. Meeting this requirement leaves no room for packet loss in the monitoring infrastructure.

VSS Monitoring's Approach to Delivering Effective Network Monitoring

The features described below enable VSS Monitoring's vBroker Series to monitor latency and regulate microburst traffic end-to-end during the packet capturing process before presenting to the monitoring infrastructure. The process depends on generating timestamps at nanosecond granularity, preventing packet loss, and sending analytic data to a consolidated and centralized storage infrastructure.

High Data Burst Buffer for the Monitoring Tools

The VSS Monitoring High Data Burst Buffer (HDBF) feature provides from 1,000 to 4,000 times the buffer normally found in network ports, allowing the NPB to forward bursty data to the monitoring tools without packet loss at a rate that significantly exceeds the maximum bandwidth of output ports. This capability enhances the performance of traffic aggregation, load balancing, and speed conversion.

HDBF is available on the vBroker 200 and Expert editions of VSS products.

vCapacity™: Measuring Link Utilization Consumed by Microbursts

VSS Monitoring's vCapacity is a high-performance real-time microburst measurement capability that provides sub-millisecond visibility into network performance. vCapacity measures and collects sub-millisecond bandwidth utilization on a network link or port.

vCapacity pinpoints transient and hard-to-measure problem spots the instant they occur; a necessary step in providing complete visibility into networks for analytic and security tools. vCapacity can be used to detect the presence and location of microbursts without introducing noticeable latency, and provide historical data for accurate network utilization reviews and planning.

vCapacity is available on the vBroker 220.

GPS Synchronization: The Most Precise Time Synchronization

Under the best circumstances Network Time Protocol (NTP) can achieve one-millisecond accuracy, which is not acceptable in HFT environments. GPS provides the most accurate distributed time synchronization method with accuracy at best of 50ns, and IEEE 1588 Precision Time Protocol (PTPv2) provides scalability with accuracy at best of 1μs.

The VSS vBroker220 support GPS and PTP input and PTP output.

Time Stamping: At Line Rate

VSS Monitoring NPBs don't suffer from the shortcomings of a chassis-based solution, specifically the problem of oversubscription and latency between the backplane and the ports, where critical timestamps are recorded.

VSS Monitoring Time Stamping is available as an option on Advanced and Expert editions of the Distributed Series, Finder Series, Protector Series and vBroker Series products.

vSpool™: Supporting Centralized and Consolidated Audit Trail

vSpool™ is a write-to-disk solution that allows spooling of user-selected network traffic directly to firms' centralized storage devices. This feature reduces the need for expensive disks in monitoring tools whilst at the same time providing access to more cost effective storage solutions such as previously deployed SANs.

This enables the monitoring infrastructure to meet new SEC requirements for a centralized and consolidated audit trail as well as offline traffic processing and trending analysis.

vSpool is available on Expert editions of VSS products.

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VSS Monitoring network packet brokers (NPB) improve the performance and efficiency of a broad range of network monitoring and security tools by providing the most advanced network-wide visibility, access and processing offload.