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Improving Bandwidth Utilization in Networks

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Bandwidth constraints, like processor speed and computer memory, will always be an issue.

If the entire world was piped with fiber optic cable, we'd still not have enough bandwidth!

Why? ....

Nature abhors a void;

thus network traffic will continue to grow as faster networks become available.

Give a user a T-1, they'll ask for an OC-48.

Managing your bandwidth on both the LAN and WAN, allows for the best performance, regardless of network speed.

There are currently a number of applications and devices available that allow for smart management of networks, these, as well as a number of utilities and methods to manage and increase transmission performance in applications, will be discussed.

Options Available

- Packet Reduction
- Packet Prioritization
- TCP-IP Stack manipulation
- Application Tuning

Packet Reduction

- Printing
- FTP
- Etc…

Packet Reduction

- **Printing**
  - **Currently a number of off-the-shelf printing applications are available that reduce the network hit on printing from remote sites. An example of this is ThinPrint which compresses the print-jobs before leaving a Citrix server then expands the job at the local thin client.**
  - **Network traffic per job reduced up to 95%!**

Packet Reduction

- FTP
  - In much the same way that ThinPrint reduces print-jobs, FTP clients & servers can be built to auto-compress/decompress individual packets during the file transfer process.

Packet Reduction

- FTP
  - Using smart technology to calculate RTT [round trip time], these applications calculate the current network throughput, and, if desirable, individual packets are compressed prior to sending.
  - Bandwidth reduction: up to 99% in some cases!

Packet Reduction

- Etc…
  - Other applications can also be re-engineered to reduce bandwidth across low-speed connections and/or highly congested networks by using built-in compression.

Packet Prioritization

- Packeteer, Cisco, and other hardware manufacturers have built-in functions in their products that allow users to prioritize packet forwarding on the network.
  - While not actually reducing network congestion, these do allow mission-critical applications to receive higher priority, thus making it seem like a less congested network to those processes.

TCP-IP Stack manipulation

- Configuring the window size in your TCP-IP settings can result in better transmission times.
- Effective transfer times are a function of the receivers max window size divided by the networks packet round trip time.

TCP-IP Stack manipulation

- **"Window sizes are important for maximum throughput calculations,"… "As .. you cannot go faster than the window size offered by your peer, divided by the *round-trip time (RTT)*."**

TCP-IP Stack manipulation

- **"The lower your RTT, the faster you can transmit. The larger your window, the faster you can transmit. If you intend to employ maximum window sizes, you might want to give '*tcp_deferred_acks_max*' another look."**
  - ***[Source] Jens-S. VocKler***

http://www.sean.de/Solaris/tune.html#water

Application Tuning

- Examine applications to see if overhead can be reduced.
  - Some applications are delivered assuming conditions that are not applicable in real-world cases. Client server software designed for a LAN environment may exhibit poor performance on the WAN impacting the network with too many screen refreshes, auto-pull of data, etc…

Application Tuning

- Example: E-mail
  - E-mail users often configure their software to poll the mail server, checking for new mail every 10 to 5 minutes, down to some users auto-checking for new mail every minute. This polling of the network, multiplied by thousands of users, over a large WAN will impact network performance.

Application Tuning

- Example: E-mail
  - Solution 1 - Network administrators can police the action of users mandating new e-mail checks every 10+ minutes.
  - This is not a welcome chore!

Application Tuning

- Example: E-mail
  - Solution 2 Using local mail server proxies, LAN workgroup users can feel free to poll their mail server as often as they want, without impacting performance of the WAN.
  - A further benefit is that all intra-group e-mail remains on the LAN without going out to a corporate server then back down again.

Application Tuning

- **Example: Fax Services**
  - **Schedule known bandwidth hogs to process their jobs at non-peak times.**
  - **Scheduling fax software to run during off hours will reduce traffic during the work day.**

Summary:

Optimizing bandwidth through management, packet reduction, and packet prioritization is essential for enterprises that are encountering network congestion. The result is better, more secured performance.

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Questions?

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