

Scenes from a network: Keeping your network performance and capacity in focus

by Tracy Dean, IBM

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Changes in applications, systems, and networks can often lead to performance problems when you roll them out in production environments. You can avoid these problems and better manage your production environment by projecting system and network performance. For example:

- When adding a new application workload, you may wonder:
 - Will the network be able to handle the additional traffic?
 - Will the application have acceptable performance?
- If the application will use SSL, you may wonder:
 - What will the impact be on host cycles and on application performance?
 - Will the network infrastructure be sufficient or is an upgrade needed prior to deploying this new application?

You can use workload simulation tools, such as IBM Application Workload Modeler for z/OS and Linux on zSeries, to help answer these (and many other similar) questions prior to implementing these changes in production environments.

How these tools work

Workload simulation tools, like Application Workload Modeler (AWM), allow you to proactively plan the performance and capacity of your network infrastructure (such as routers and network adapter cards) and networked applications (such as FTP, TN3270, HTTP, and DNS). To do this, they:

- Simulate a repeatable client or client/server workload,
- Generate real network traffic between the two endpoints,
- Capture measurement data, and
- Plot graphs for you to analyze.

You configure the type and size of the workload so it best matches the scenario you wish to study.

When you want to analyze the impact of new hardware on your network or determine the network impact of an application before the application is fully developed, simulate both the client and server application. In a client/server configuration, the focus is on network performance and capacity because the actual application is not involved in the test. This removes any possibility of tainting the network performance data with application-specific bottlenecks.

In this configuration, Application Workload Modeler can be configured to simulate various types of workloads, such as:

- Interactive workloads that are connection intensive (connect request response) - similar to a Web server workload
- Interactive workloads that maintain a persistent connection (request response) - similar to a TN3270 workload
- Bulk data transfer workloads (streams) - similar to an FTP workload.

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When you want to evaluate the impact of increasing the use of an existing application, or when you want to include the TCP/IP application server performance in the analysis, simulate the client application communicating with a real TCP/IP application server, such as TN3270, FTP, HTTP or DNS. In a client-only configuration, the focus is on performance and capacity of both the network and the TCP/IP application server.

Client/server workload scenarios

- **Upgrading network connectivity to S/390 and zSeries hardware**

Simulate a client/server workload when you are considering replacing a 3745/6, channel-attached router, or an OSA/2 adapter with an OSA Express adapter, and you want to know what kind of performance improvement to expect in terms of increased throughput, improved response time, and improved CPU utilization.

To do this:

- Install AWM on one or more client machines in your network, being sure to choose locations in your network that are “network-near” a representative sample of your end users.
- Install AWM on your z/OS server.
- Configure the AWM client to communicate with the AWM server, specifying a workload using the type and amount of network communication activity you desire.
- Once the workload is configured, it can be run against your zSeries server using the old adapter.
- Then, run again using the new adapter.

The throughput and response time statistics captured by AWM can be used to analyze the performance benefits of the new adapter.

- **Deploying Secure Sockets Layer (SSL) or a Virtual Private Network (VPN)**

If you are considering deploying SSL for a specific TCP/IP application or a VPN for all applications, analyze the impact of this change on your network before the technology is deployed in production. As in the previous network connectivity scenario, install AWM on both the client and server, and configure them to simulate the workload you desire.

For SSL, the AWM client and server can be configured to not use SSL in the first run, then use SSL in the second run. When using SSL, AWM actually drives the operating system's SSL layer for the encryption and decryption of the network traffic being generated. This allows you to measure the impact of using SSL not only on your network, but also on the OS/390 or z/OS host.

For VPN, the connection to your VPN is defined outside of AWM. So, again, you would run

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the workload without the VPN connection, then run it again with the VPN connection, and compare the results.

- **Converging SNA and IP traffic to an IP WAN backbone using Enterprise Extender**
The Enterprise Extender function, first shipped in OS/390 V2R7, allows your IP network to handle both SNA and IP traffic without any change to your SNA applications. You can simulate a client/server workload to evaluate the impact of SNA traffic on your IP network:
 - How will my SNA applications perform over the IP network?
 - What's the impact on my existing IP applications?
 - Do I need additional IP bandwidth before removing my SNA network?
- **Using HiperSockets when consolidating servers on zSeries**
HiperSockets is a high-speed, low-latency TCP/IP network within zSeries processors, such as the z900, that allows applications on virtual servers and LPARs within the zSeries processor to communicate with each other, without going through the network adapter card and without changing the applications.

Use AWM to help you evaluate the response time and zSeries server impact of consolidating multiple distributed application servers (running UNIX or Linux) onto a zSeries box running multiple Linux virtual servers. Before consolidation, your distributed application servers access the data stored on zSeries via a traditional network connection. After consolidation, the application servers run on Linux on zSeries and use HiperSockets to access the data.

To model this:

- Install an AWM client on a distributed application server, most likely Linux/Intel.
- Install an AWM server on z/OS.
- Configure the client to generate the type and size of workload your application server normally generates to your back-end z/OS system.

When you run this workload, AWM gathers response time, throughput, and other statistics to provide a baseline representing your existing environment.

Now:

- Install an AWM client on a Linux on zSeries server.
- Using the same workload you previously ran from the distributed server, run the client workload against the same z/OS server.

This represents your application server running on Linux on zSeries and communicating with your back-end z/OS system for data. Compare the results.

- Other scenarios for simulating client/server workloads include:
 - **Deploying an IPv6 network**, including tunneling IPv6 traffic over your existing IPv4 network.

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- **Designing and deploying a new TCP/IP application** on your existing network
- **General changes to the network infrastructure**, such as router upgrades or moving from Token Ring to Gigabit Ethernet

Client workload scenarios

- **TN3270 server placement**

Simulate client-only workloads to analyze the performance impact of running a TN3270 server on z/OS (or OS/390) versus running a TN3270 server on a distributed server in the network. In both cases, the TN3270 server needs access to the SNA-based application on the mainframe.

To compare the two solutions and their impact on the network and respective servers, install AWM on a client somewhere in the network, most likely on a Linux/Intel machine, again “network-near” your end users. Configure the AWM client, specifying the following:

- Desired number of TN3270 clients,
- Frequency of communication (think time), and
- Size of the data being transferred.

Run this workload when connected to the distributed TN3270 and again when connected to the z/OS TN3270(E) server. AWM will capture data that you can use to analyze the performance of your network and each server.

- **Exploitation of network Quality of Service (QoS)**

As you consider implementing a network Quality of Service policy, you may need help determining the right QoS policy for the workload on your network. This is especially important when migrating from an SNA networking infrastructure to an IP infrastructure because you’ll want to map the SNA COS (Class Of Service) to an appropriate IP QoS.

To do this, perform an AWM base run without any QoS settings. Then, outside of AWM, configure new QoS settings, and perform a second AWM run. You can then compare both runs and see the impact of using QoS not only on your network, but also on the OS/390 or z/OS host.

More information on configuring and implementing a network QoS can be found at <http://www.ibm.com/software/network/commserver/downloads/zqosmanager.html>

- Other scenarios for client-only workload simulation include:
 - **Deploying load balancing solutions**
 - **Evaluating resource and performance characteristics of various TCP/IP servers**

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Summary

Workload simulation tools provide a powerful method for proactively managing your network and networked applications. They allow you to roll out changes with more predictable results and right-size both your network and your zSeries servers. For more information on IBM Application Workload Modeler, visit:

<http://www.ibm.com/software/network/awm/index.html>