22 Predicting Application Performance with QuickPredict and QuickRecode

This section describes the following predictive features of AppTransaction Xpert:

- QuickPredict—enables you to predict the impact of different network conditions on an application's response time.

- Multi-User QuickPredict—enables you to create QuickPredict deployments that involve multiple clients, multiple servers, and/or multiple applications.

- QuickRecode—is a simple way to modify the characteristics of an application task. After you modify an application using QuickRecode, you can see the effects of the changes using QuickPredict or discrete event simulations.

QuickPredict

QuickPredict enables you to determine how varying bandwidths, latencies, and other network parameters affects application performance. You create *what-if* scenarios by varying the characteristics of one or more network paths.

Note—QuickPredict is a quick simulation tool that models common TCP implementations. For more in-depth TCP simulation studies, perform discrete event simulations. See Workflow: Running a Discrete Event Simulation and Predicting Application Deployment with Transaction Analyzer Models.

This section has the following subsections:

- Using QuickPredict

- Viewing Results

- Publishing Results

- Control Panels: Basic, Advanced, Table, and Bar Chart

- QuickPredict Bar Charts

- Using QuickPredict to Simulate WAN Acceleration

Using QuickPredict

The following figure shows the basic QuickPredict Control window, which you open by choosing Simulation > QuickPredict. The idea of QuickPredict is to vary the parameters for a network path and then click Update Graph to see how the variations affect the application response time (y axis on the resulting graph).

Figure 22-1   QuickPredict Control—Basic Dialog Box

1. Choose path to modify

2. Choose x-axis parameter and range

3. Vary other parameters for the selected path

4. View results
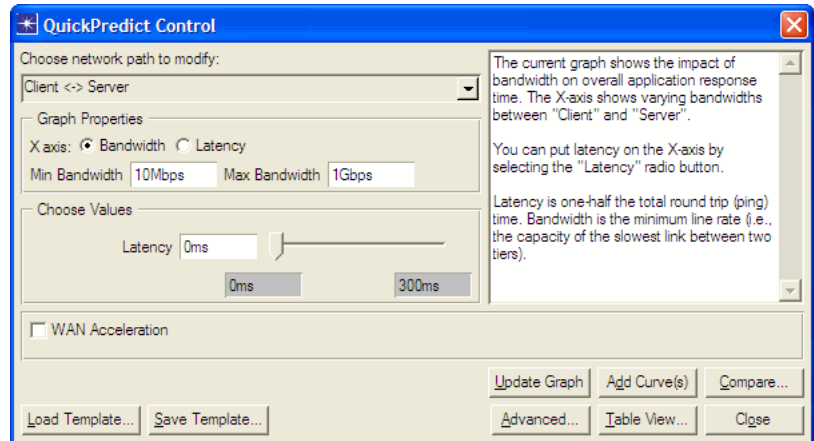
The X-axis radio buttons determine which of the available parameters (Bandwidth or Latency) will form the x axis in the resulting graph. You can then modify the non-x-axis parameter using the edit field or the slider.
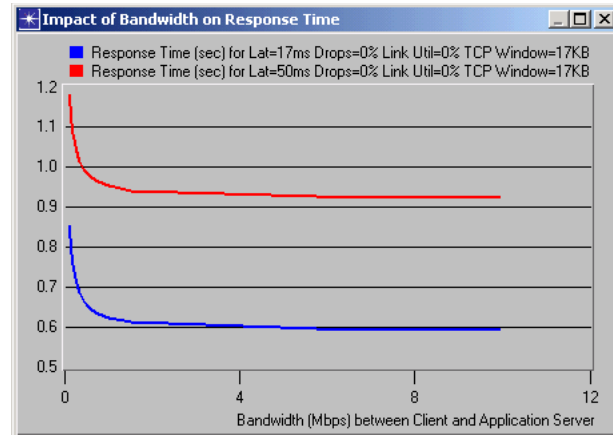
Viewing Results

The QuickPredict results graph shows the affect of your specified network parameter on the application's response time (y axis). Changes to the non-x-axis parameter value made with the slider are reflected immediately in the graph; click Update Graph to view the effects of other changes.

You can add another result to the active graph by clicking "Add Curve(s)" before changing a parameter value; this allows you to compare the effects of different parameter settings in the same graph. (Note that a graph can show multiple results only if they (the results) share the same x-axis; if you specify a new x-axis parameter, QuickPredict shows the result in a separate graph.)

Figure 22-2   Sample QuickPredict Results
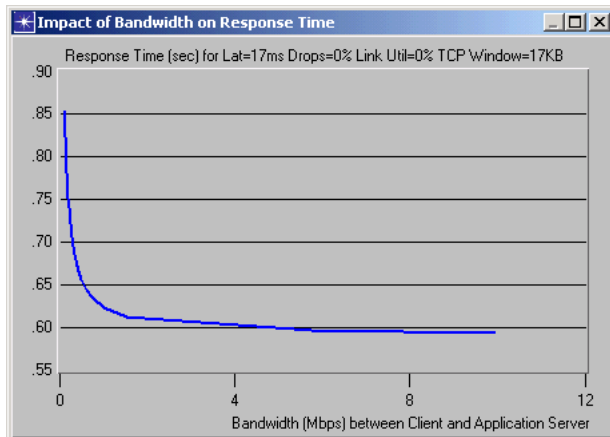
Default results graph with curve for one latency value

Added Curve results in graph with curves for two latency values

Publishing Results

You can publish QuickPredict results in a web report (Reports > Generate Web Report…) or a Microsoft Word report (Reports > Generate MS Word Report (.rtf)…). These reports include all open graphs and the parameter settings for each network path.

To export results to a spreadsheet program, such as Microsoft Excel, right-click in a graph and choose "Export Graph Data to Spreadsheet".

Related Topics

• *Publishing Reports*

Control Panels: Basic, Advanced, Table, and Bar Chart

QuickPredict provides four different control panels for specifying parameters:

- Basic Control Panel—When you start QuickPredict (by choosing Simulation > QuickPredict), the Basic control panel appears. It is useful for studying the effect of bandwidth and latency variations over a single network path.

- Advanced Control Panel—You can open this window by clicking Advanced… in the Basic or Table View control panel. This control is similar to the Basic control panel, but with the following additional capabilities:

  — Allows you to modify all possible parameters (bandwidth, latency, link utilization, packet loss, and TCP window size) on a specific network path.

 — Provides control over the number of data points calculated.

  This control panel is useful for more detailed "what-if" scenarios over a single connection.

- Table View Control Panel—You can open this window by clicking Table View… in the Basic or Advanced control panel. This control panel allows you to view and modify all parameter settings for all network paths in the Transaction Analyzer model. It is useful for "what-if" scenarios that involve variations on multiple network paths.

- QuickPredict Bar Charts—To open this window, choose Simulation > QuickPredict Bar Chart in the Tree View or the Data Exchange Chart. This window divides the total predicted response time into components of processing time and delay. You can also compare multiple scenarios directly, and create templates of your QuickPredict settings.

Remember that all network paths in Transaction Analyzer have the same set of parameters. These control panels differ primarily in the number of parameters and paths they show.

Basic Control Panel

To open the Basic control panel, choose Simulation > QuickPredict. This control allows you to specify bandwidth and latency variations on a single network path at a time.

Figure 22-3   QuickPredict Control—Basic Control Panel
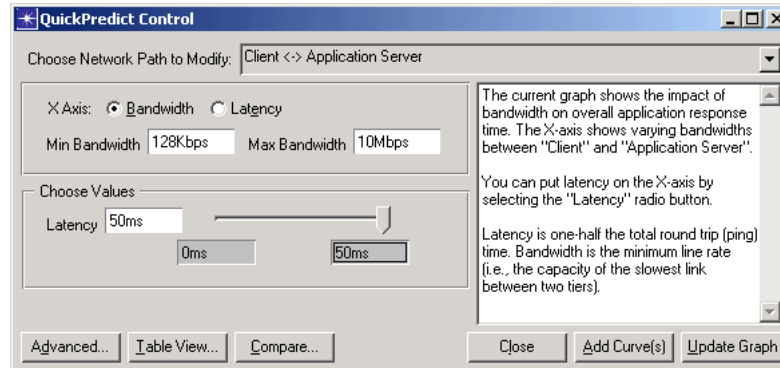
The following table lists, in alphabetical order, the controls available in the Basic control panel.

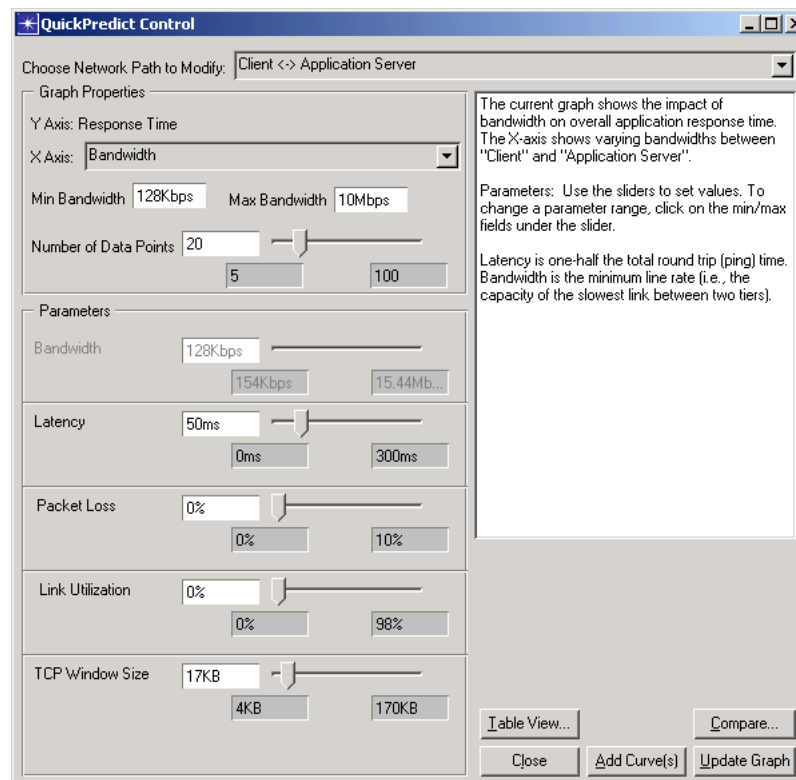**Table 22-1   QuickPredict Control—Basic Controls**

Control	Description
Add Curve(s)	Retains the current curve in the active graph and adds a new result curve that will reflect future changes to the settings.
	Note—If you specified a different parameter for the x-axis, QuickPredict shows the results in a different graph.
Advanced…	Switches to the Advanced control panel.
Choose Network Path to Modify	Selects the network path whose performance you want to study.
Choose Values	Specifies a value for the remaining non-x-axis parameter.
	Note—If you enter a new value in the edit field, you must click Update Graph to show the result of this change. If you use the slider, the result graph updates automatically.
	Note—You can change the minimum/maximum range for a parameter slider by clicking in the range fields beneath the slider.
Close	Exits QuickPredict.
Compare…	Imports another Transaction Analyzer model file into QuickPredict to compare with the current task.
	Note—Use this feature only with tasks that are directly comparable—that is, for tasks that record variations on the same application and were captured over the same network tiers.

Table 22-1   QuickPredict Control—Basic Controls (Continued)

Control	Description
Min <parameter> Max <parameter>	Sets the minimum/maximum range of the x-axis parameter.
Table View…	Switches to the Table View control panel.
Update Graph	Updates the active graph to reflect the current parameter settings.
X Axis	Specifies whether to use Bandwidth or Latency for the x axis of the result graph. The y axis is always application response time.

Advanced Control Panel

To open the Advanced control panel, click the Advanced… button in the Basic or Table View QuickPredict Control window. This control panel allows you to modify all available parameters on a single network path at a time.

Figure 22-4   QuickPredict Control—Advanced Control Panel

The following table lists, in alphabetical order, the controls in the Advanced control panel.
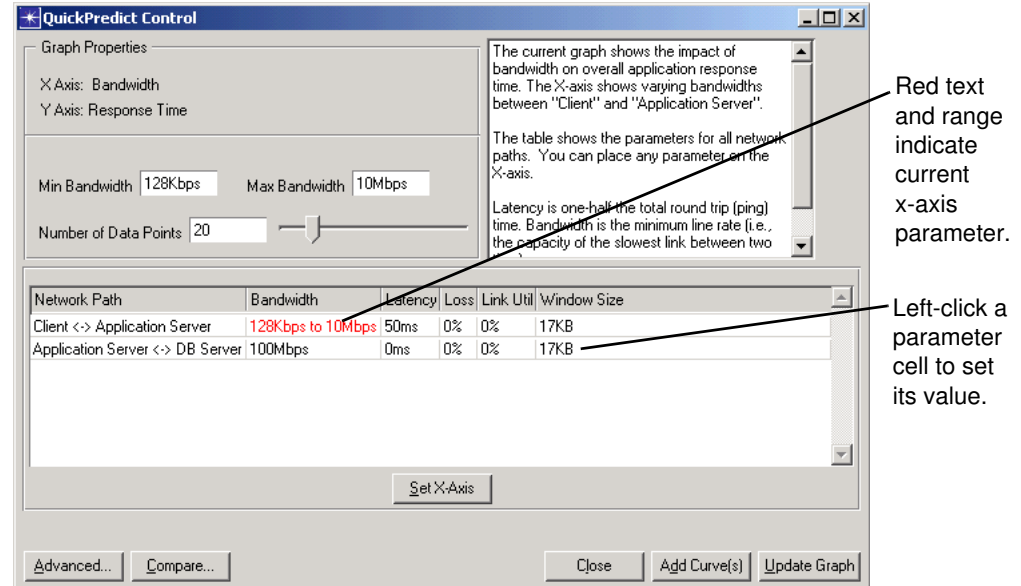
Table 22-2   QuickPredict Control—Advanced Controls

Control	Description
Add Curve(s)	Retains the current curve in the active graph and adds a new result curve that will reflect future changes to the settings. **Note—**If you specified a different parameter for the x-axis, QuickPredict shows the results in a different graph.
Choose Network Path to Modify	Selects the network path whose performance you want to study.
Close	Exits QuickPredict.
Compare…	Imports another Transaction Analyzer model file into QuickPredict to compare with the current task. **Note—**Use this feature only with tasks that are directly comparable—that is, for tasks that record variations on the same application and were captured over the same network tiers.
Min <parameter> Max <parameter>	Sets the minimum/maximum range of the x-axis parameter.
Number of Data Points	Specifies the number of data points that QuickPredict generates for the results curve.
Parameters	Specifies values for the remaining non-x-axis parameters. (Controls for the current x-axis parameter are disabled.) **Note—**If you enter a new value in the edit field, you must click Update Graph to show the result of this change. If you use the slider, the result graph updates automatically. **Note—**You can change the minimum/maximum range for a parameter slider by clicking in the range fields beneath the slider.
Table View…	Switches to the Table View control panel.
Update Graph	Updates the active graph to reflect the current parameter settings.
X Axis	Specifies which one of the five parameters to use for the x axis of the result graph. (The y axis is always application response time.)

Table View Control Panel

To open the Table View control panel, click the Table View… button in the Basic or Advanced QuickPredict Control window. This control panel allows you to modify all available parameters on all network paths in the task.

Figure 22-5   QuickPredict Control—Table View Control Panel

Red text and range indicate current x-axis parameter.

Left-click a parameter cell to set its value.

The following table lists, in alphabetical order, the controls in the Table View control panel.

Table 22-3   QuickPredict Control—Table View Controls

Control	Description
Add Curve(s)	Retains the current curve in the active graph and adds a new result curve that will reflect future changes to the settings. **Note—**If you specified a different parameter for the x-axis, QuickPredict shows the results in a different graph.
Advanced…	Switches to the Advanced control panel.
Close	Exits QuickPredict.
Compare…	Imports another Transaction Analyzer model file into QuickPredict to compare with the current task. **Note—**Use this feature only with tasks that are directly comparable—that is, for tasks that record variations on the same application and were captured over the same network tiers.
Min <*parameter*> Max <*parameter*>	Sets the minimum or maximum range of the x-axis parameter.

Table 22-3   QuickPredict Control—Table View Controls (Continued)

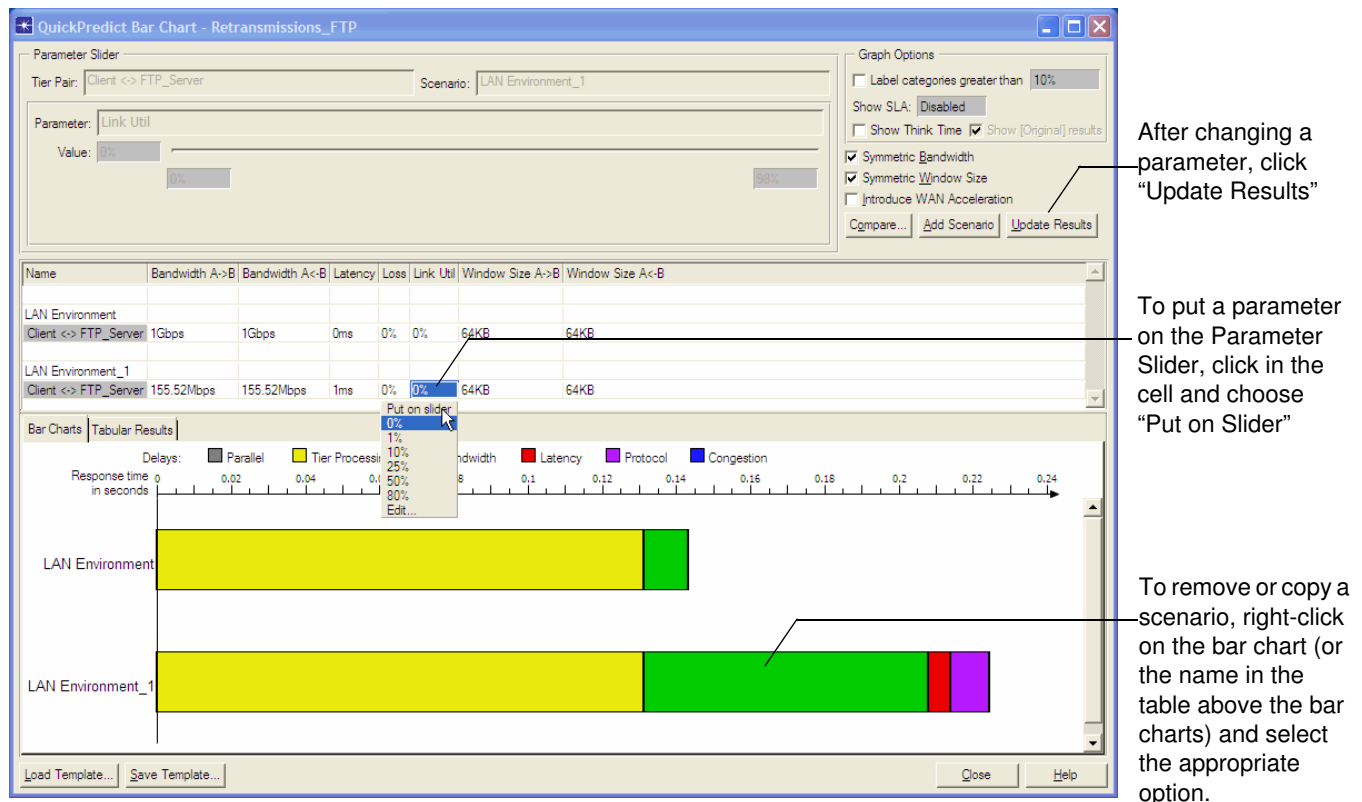| Control	Description
Number of Data Points	Specifies the number of data points that QuickPredict generates for the results curve.
Parameter Table	Shows all parameters of all network paths (tier pairs). The parameter used for the x axis is shown in red with its range of values. **Note—**If you enter a new value for a parameter, click "Update Graph" to display the result of the change.
Set X-Axis	Uses the selected parameter for the x-axis of the results graph. (To select a parameter, right-click on it.) Alternately, to specify a parameter for the x-axis, left-click on the x-axis and choose "Put on x axis".
Update Graph	Updates the active graph to reflect the current parameter settings.

QuickPredict Bar Charts

The QuickPredict Bar Chart Window (Simulation > QuickPredict Bar Charts) enables you to predict response times for an application in different network scenarios. In this context, a "network scenario" is a simplified network model with a small number of parameters per tier pair. You can change any of the parameters and instantly view the affect on application performance.

This window also has the following features:

• Compare multiple scenarios—You can create multiple and visually compare the application performance in different network conditions

• Separate components of delay—The Bar Chart breaks down the total application response time into separate components of delay (tier processing, think time, latency, bandwidth, protocol, congestion, and parallel effects).

• Parameter slider—This slider enables you to see instantly the effects of one network parameter on the application performance.

• Save and reuse network settings—You can save and load templates of your network settings. This makes it easy to reuse your network conditions and compare results with new condition settings.

Figure 22-6   QuickPredict Bar Chart Window

After changing a parameter, click "Update Results"

To put a parameter on the Parameter Slider, click in the cell and choose "Put on Slider"

To remove or copy a scenario, right-click on the bar chart (or the name in the table above the bar charts) and select the appropriate option.

The following table lists the options and controls that are available in this window.

Table 22-4   QuickPredict Bar Chart Controls

Option/Field	Description
Parameter Slider	Use this slider to see immediately how changes in a single parameter affect the total application response time as well as the relative amounts of network vs. application delay.
	To put a parameter in this slider, click in the parameter cell and choose "Put on slider" from the pull-down menu.
	To specify a range for the slider, enter minimum and maximum values in the fields below the slider. You can also set the slider using the "Value" field above the slider.
Graph Options	• Label categories larger than X percent—Use this option to label components that account for X percent or more of the total delay time.
	• Show SLA—If you specify an SLA (in seconds), the SLA threshold appears as a vertical line in the bar graph, making it easy to see if the application violates an SLA in a specific scenario.
	• Show Think Time—If selected, the bar charts show user think time as a separate category from tier processing. If this option is not selected, user think time is considered part of the Tier Processing delay. For more information, see User Think Time—.
Symmetric Bandwidth	Select this option to enforce symmetrical bandwidth for each tier pair. When this option is selected, any change to bandwidth in one direction is also applied in the opposite direction.
Symmetric Window Size	Select this option to enforce symmetrical Window Size for each tier pair. When this option is selected, any change to Window Size in one direction is also applied in the opposite direction.
Compare	Imports another Transaction Analyzer model into QuickPredict to compare with the current.
	Note—Use this feature only with tasks that are directly comparable—that is, for tasks that record variations on the same application and were captured over the same network tiers.
Add Scenario	Adds a new scenario to the QuickPredict results. In this case, a *scenario* means a new set of network parameters for the same application.
	Choose one of the following scenarios:
	• Typical LAN Environment: The bandwidth and latency parameters are based on a typical LAN environment that has no congestion or packet loss.
	• Network at Time of Capture: The bandwidth and latency parameters are based on the network conditions specified in the original Transaction Analyzer model. All other parameters are based on a network with no congestion or packet loss.
	• Mobile Network: The bandwidth and latency parameters are based on a typical mobile environment that has no congestion or packet loss.
Update Results	Updates the bar charts and the tabular results to reflect the current parameter settings.
	Note—Click this button after changing a parameter setting in the table.

Table 22-4   QuickPredict Bar Chart Controls (Continued)

Option/Field	Description
Scenario input table	Controls the values for the different network scenarios. • Name—To edit a scenario name, click in the table cell. The new name appears in the results panel after you click "Update Results". (See "Tubular Results" for right-click options.) • Other columns—You can change the value of any parameter for any tier pair for any of your scenarios. To put a value on the slider, click on the cell and choose "Put On Slider". To remove an item from the slider, click on the cell again and choose another value for the parameter. You must click "Update Results" after making any changes in this table.
Bar Charts	Shows a graphical representation of the results, with one bar for each (scenario/task) combination. • Right-click options—Right-click on a bar chart to remove or copy the scenario. • Tooltips—Hold the mouse pointer over a result bar to display the exact time for that component.

Tabular Results	Shows the exact numbers for the components of response time for each scenario/Transaction Analyzer model file. Not all categories (such as app delay for a tier pair) have values; these are denoted with "N/A". This table can show results for average throughput, which is not available in the Bar Charts page.
	
	• Right-click options—
	  - Remove or copy scenario
	  - Copy table, cell, column, or row to clipboard
	  - Hide or restore column

Load Template	Loads a scenario from a template file
Save Template	Saves the current settings for all scenarios to a template file

QuickPredict and UDP

QuickPredict can analyze applications that use TCP and UDP as the transport protocol. To specify the assumptions used by QuickPredict, set the ace_qp_default_transport_tcp preference. This preference has the following options:

• Infer from trace (*default*)—QuickPredict uses the transport protocol specified for each connection in the Transaction Analyzer or Transaction Whiteboard model file.

• TCP—QuickPredict assumes that all messages are transported over TCP.

• UDP—QuickPredict assumes that all messages are transported over UDP. When modeling UDP, QuickPredict assumes that no packets are dropped and does not consider TCP-specific network parameters (such as window size).

Using QuickPredict to Simulate WAN Acceleration

QuickPredict includes the ability to generate *accelerated scenarios* that simulate the effects of common WAN acceleration techniques on the network/protocol delays and overall response time of an application. This functionality is especially useful if your organization does not use WAN accelerators currently and you want to see if WAN acceleration might improve the performance of specific applications.

Note the following:

- QuickPredict simulates the effects of some common WAN acceleration techniques, but is not intended to predict the performance of any specific set of WAN accelerators in a production network.

- WAN acceleration prediction with QuickPredict is not designed to provide an exact response time if traffic is accelerated. Instead, the prediction feature is more of a barometer of sensitivity to various acceleration techniques that are used to optimize the use of WAN links. If moving the slider for a given technique has a significant effect on response time, then you can conclude that the particular application will benefit from WAN acceleration.

- Not all applications will benefit from WAN acceleration. In some cases, an application might even show a slight increase in response time due to overhead introduced by the WAN accelerators themselves. (In general, applications that are sensitive to bandwidth and/or latency bottlenecks are the most likely to benefit from WAN acceleration.)

The following steps outline the general workflow:

1) Open the Transaction Analyzer model in which you want to simulate the effects of WAN acceleration.

   Note—You cannot use this functionality for a Transaction Analyzer model that has been modified using QuickRecode.

2) Open the QuickPredict dialog box using one of the following menu items in the Transaction Analyzer:

   — Simulation > QuickPredict

   — Simulation > QuickPredict Bar Charts

3) Select the tier pair that represents the WAN connection where you want to deploy the "virtual accelerators".

4) Enable prediction for WAN acceleration:

   — *In QuickPredict:* Select the WAN Acceleration check box.

   — *In QuickPredict Bar Charts:* In the parameters table, set the WAN Acceleration field to Put on Slider.

5) Select the acceleration scenario and parameter settings you want to model, as described in the following sections:

- Basic Scenario

- Advanced Scenario

Note—An accelerated QuickPredict scenario models only one set of parameters at a time, depending on the selected tab (Basic or Advanced). When you switch between the two tabs, the scenario uses the *new* parameter settings as input and the *old* settings have no effect. To ensure that the current scenario reflects the current parameter settings, it is good practice to click "Update Graph" or "Update Results" after switching between the Basic and Advanced settings.

Basic Scenario

A Basic scenario has the following parameters:

- Byte Reduction—Reduction in the number of bytes sent over the WAN, regardless of the acceleration method

- Turn Reduction (Prefetching)—Reduction in the number of application turns over the WAN, regardless of acceleration method

Advanced Scenario

An Advanced scenario has the following options and parameters:

- **Enable Auto-Compression (Checkbox)**

When this option is enabled, QuickPredict estimates the *compressibility* of the transaction by analyzing the application payload data transferred across the WAN in both directions (client–>server as well as server–>client).

To calculate the average compression, QuickPredict performs a *virtual gzip* operation on each application message sent across the WAN to determine the percentage by which that message can be compressed.

For example, HTTP headers have an "Accept-encoding" field that allows for a compression method such as gzip. QuickPredict calculates all the potentially compressible bytes in the trace and offers this as a percentage of data reduction on the wire. (WAN accelerators will perform this compression if available).

The estimated percentage shown (as non-editable text in the Compression field) represents the total reduction for all message bytes sent across the WAN. For example, if the Compression field shows 40%, then the accelerated application will send 40% fewer message bytes across the WAN. You can override the number shown in the Compression field if you know that the WAN accelerators handle your traffic in a specific manner to reduce the data even further.

Note—Auto-compression requires the original packet trace data used to create the Transaction Analyzer model.

- **Compression**

  Percentage reduction in the application payload of each message sent over the WAN due to compression techniques. If this parameter is set to 40%, each application message in the accelerated scenario will be 40% smaller.

  Remember that auto-compression and manually specified compression results are calculated differently:

  — Auto-compression varies from message to message. QuickPredict calculates the "compressibility" of each message individually, and the percentage displayed represents the average compression for all messages.

  — Manually specified compression is uniform for all messages: QuickPredict compresses every message by the percentage you specify.

  Thus, even if you manually specify the compression value shown when auto-compression was enabled, you will probably get different results.

- **Turn Reduction (Prefetching)**

  Percent by which the total number of request/responses over the WAN are reduced in the accelerated transaction. If this parameter is set to 40%, the accelerated application will have 40% fewer request/responses across the WAN.

  Many WAN accelerators seek to reduce application chattiness by pre-fetching requested data whenever possible. For example: if a web page request includes five different graphics files included in that page, the accelerators might pre-fetch those graphics so that the entire page requires only one request (plus all responses for that request) over the WAN.

  Because a transaction can include multiple sets of request/responses, each with its own characteristics, QuickPredict performs a series of "internal simulations" where each simulation pre-fetches different sets of request/responses. The calculated reduction in delays and overall response time is derived from the results of these internal simulations.

  Note—Techniques for reducing application chattiness can vary depending on the application, protocols, and type/make of accelerator. For this reason, the exact effects of reducing application chattiness in a production network can be difficult to predict.

- **Byte-Level Cache Hit Rate**

  Percentage of application bytes sent over the WAN that are cached at the client-side accelerator. If this parameter is set to 40%, the accelerated application will have 40% of the original application bytes cached; 60% of the original bytes will be sent across the WAN.

  Byte-level caching is performed at the transport layer between the client-side accelerator (CSA) and server-side accelerator (SSA) to reduce the amount of data that needs to be sent across the WAN.

- **Object Cache Hit Rate**

    Percentage of application-layer objects that are cached at the client-side accelerator. If this parameter is set to 40%, the accelerated application will have 40% of the original objects cached and 60% of the original objects sent over the WAN. (In this context, an "object" is a set of one or more application messages that are sent in response to a single request.)

    Because a transaction can include objects with different sizes, QuickPredict performs a series of "internal simulations" where each simulation caches/sends a different combination of objects. The calculated reduction in delays and overall response time is derived from the results of these internal simulations.

    Note—Application object caching is not supported on all accelerator models. To determine if this technique is supported on a specific model, check with the device vendor.

Multi-User QuickPredict

Multi-User QuickPredict enables you to create QuickPredict deployments that involve multiple clients, multiple servers, and/or multiple applications. Multi-User QuickPredict is especially useful when you want to perform basic capacity-planning and application-response-time studies on access links—for example, if you want to test your application performance across a WAN network in which the network tiers communicate over T1 links.

Note—This feature requires a license for AppTransaction Xpert Advanced Capabilities or AppTransaction Xpert Plus.

When running Multi-User QuickPredict, a wizard prompts for the following information:

- Deployed applications (defined in Transaction Analyzer and/or Transaction Whiteboard)

- Network topology (number of client sites, clouds, and data centers)

- Tier-pair parameters (bandwidth, latency, link utilization, window size, and packet loss)

- Application deployment options (number of transactions per hour for each client site)

Given this input, Multi-User QuickPredict computes the following:

- "Average-case" response times for applications

- "Worst-case" results for access links (utilization) and applications (total response time and components of tier processing, latency, protocol, and congestion delay).

Procedure 22-1   Configuring and Running a Multi-User QuickPredict Study

1 From the Transaction Analyzer window, choose Simulation > Multi-User QuickPredict.

➥ The Multi-User QuickPredict wizard appears.

Figure 22-7   Multi-User QuickPredict Wizard: Topology Type (Initial) Window
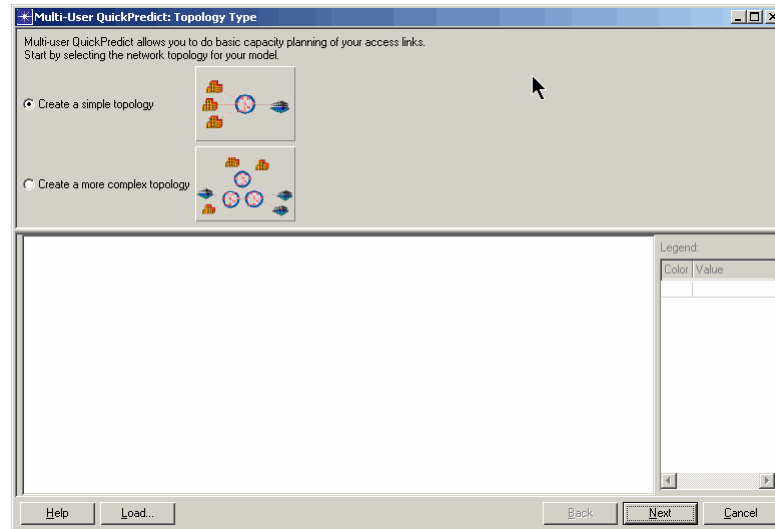
2 Specify the information requested in each window of the Multi-User QuickPredict wizard:

2.1 Network topology type—Create a simple hub-and-spoke topology (one central cloud), or a more complex topology (multiple regional clouds).

2.2 Applications to deploy—Include any number of applications defined in Transaction Analyzer or Transaction Whiteboard model files. For each application, specify a simple SLA ("Response time must always be less than *x* seconds").

2.3 Clouds and cloud-to-cloud links (*complex topology only*)—Specify a "core network" with one to four clouds. For each link, specify the bandwidth and link utilization.

Figure 22-8   Multi-User QuickPredict: Clouds and Cloud-to-Cloud Links
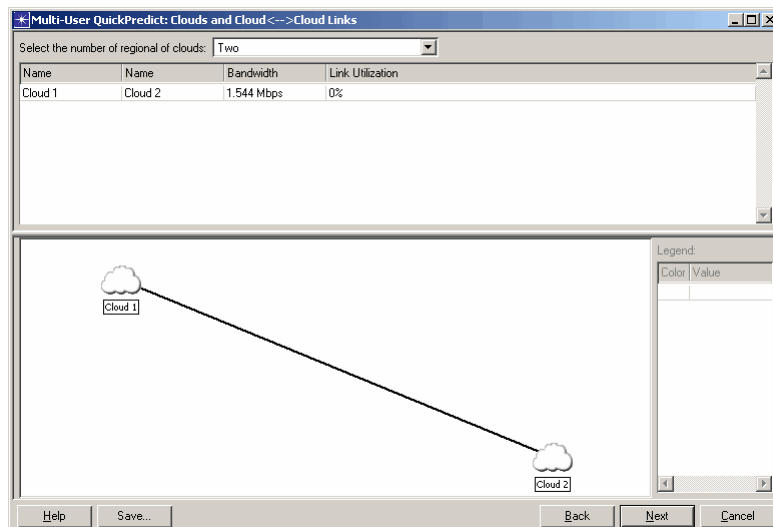
Initially, all nodes are connected through Cloud 1. You can connect nodes to different clouds in the following step.

2.4 Client sites, data centers, and access links—After you specify the number of client sites and data centers (depending on the topology type), specify the bandwidth and background utilization on each access link.

If you selected a complex topology type in step 2.1 and multiple clouds in step 2.3, the link table also includes an "Attached to Cloud" column. You can use this column to reconnect access links to different clouds.

2.5 Back-end tier locations—Map back-end tiers in the applications to data centers in the topology

2.6 Transaction frequency (transactions per hour for each transaction at each site)

2.7 Path characteristics—For each conversation pair, specify the latency, packet loss, and window size.

2.8 Data Center deployment—If the topology has multiple data centers, specify the data center(s) on which each application is deployed.

2.9 Reporting options—Choose to collect results for the *n*th-percentile results for link utilizations and response times. If *n* is set to 90, for example, the *n*th-percentile result means that, of all data points calculated for that statistic, 90% are lower than the reported value and 10% are higher.

3 Click Run Simulation in the Simulation Options dialog box.

➥ A QuickPredict simulation runs. When the simulation completes, the Results window appears.

Figure 22-9   Multi-User QuickPredict: Results
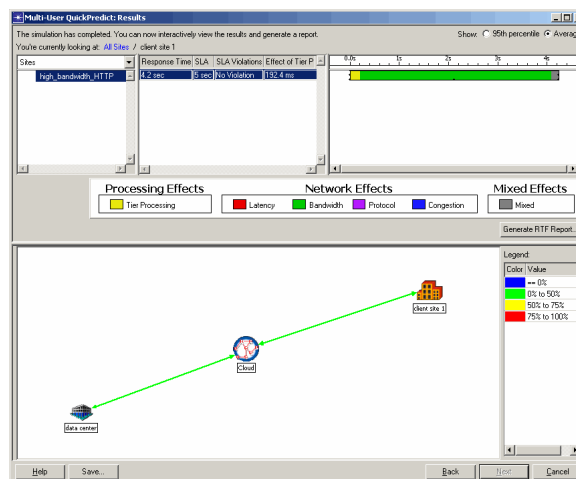
4 To view the results, click Generate RTF Report and select the report options.

End of Procedure 22-1

Guidelines for Introducing WAN Acceleration with QuickPredict

Because WAN acceleration can behave differently depending on the nature of the specific transaction, use the following guidelines when investigating WAN acceleration on a trace that was captured across a normal WAN.

Run the following scenarios:

- *Best-Case* **Scenario**—using high numbers from the WAN accelerator vendor

- *Normal-Case* **Scenario**—using low numbers from the WAN accelerator vendor

- *Conservative-Case* **Scenario**—using conservative (less than the low) numbers from the WAN accelerator vendor

After running and reviewing the scenarios, you can decide which scenario is reasonable. Remember—it's best to err on the side of caution.

For more information, see the OPNETWORK 2012 Proceedings for session 1471 (Monitoring and Troubleshooting Applications in a WAN-Accelerated Environment with AppResponse Xpert and AppTransaction Xpert).

QuickRecode

QuickRecode allows you to manually edit parts of a Transaction Analyzer model; you can then predict the behavior of the *hypothetical application* using either QuickPredict or event-based simulation. Using this approach, you can study the effects of specific changes to an application without changing the actual code.

Note the following considerations:

• When running QuickPredict on an edited application, AppTransaction Xpert calculates and shows results for both the original and the edited application.

• After importing a QuickRecoded application into a network scenario (Topology > Import Topology >
From AppTransaction Xpert in the Project Editor), the discrete event simulation results reflect the QuickRecoded application, not the original application. For this reason, you should always save a QuickRecoded file under a new name to retain the original information.

Procedure 22-2   Editing a Transaction Analyzer Model with QuickRecode

1 Open the model file and switch to the Data Exchange Chart; then make sure that the chart is set to the application view (Application Chart Only in the pull-down menu above the chart).

2 Select a group of messages to edit.

The following limitations apply when selecting groups for a QuickRecode operation:

• All messages must be within the same tier pair.

• All messages in the group must be consecutive (that is, there are no intervening messages).

• If a selected message has a dependency to a message on a different tier pair, then the message must be either the first or last message in the selected group.

3 Right-click on the selected group and choose "QuickRecode Selected Items".

➥ The QuickRecode Selected Items dialog box appears.

Figure 22-10   QuickRecode Dialog Box
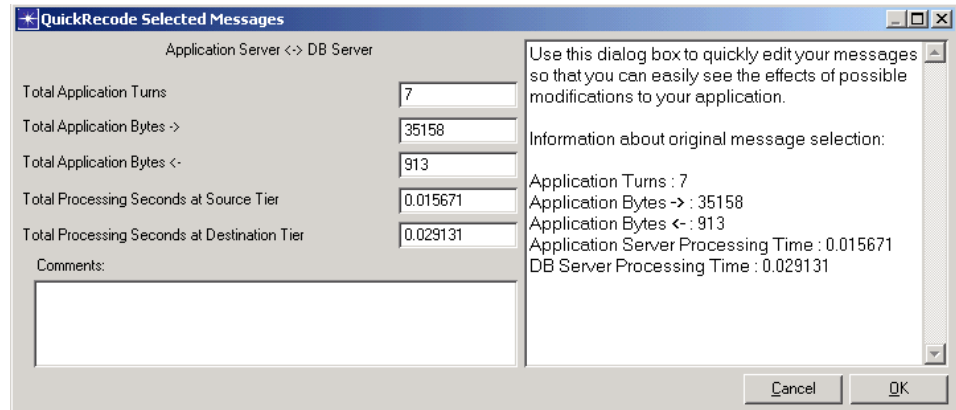
Use this dialog box to modify the behavior of your real-world application (e.g., number of turns, amount of application data, and processing delay associated with each tier). For example, you can specify a "double-payload" level by doubling the amount of application data transmitted by each tier.

4   Specify the characteristics for the "hypothetical application," then click OK to close the dialog box and accept the changes.

➥ A red band appears around the group in the Data Exchange Chart and the group itself changes color to indicate that it has been edited.

Figure 22-11   Packet Group Edited Using QuickRecode
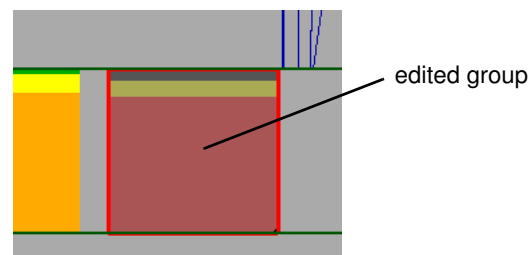
edited group

5   Optionally, edit other groups by repeating steps 2–4.

6   Save the edited task under a new name (File > Save As).

You can now evaluate the effects of the edited application using either QuickPredict or by performing a discrete event simulation.

End of Procedure 22-2

Related Topics

• *QuickPredict*

• *Workflow: Running a Discrete Event Simulation*