



# NetX 5.2 User's Guide

NetDialog International B.V.

# 1. About This Guide

This guide is designed to help you use the NetX application. It will help in navigating and interpreting the data provided by NetX in the Monitor and Analyze Views of its user interface and to perform basic reporting tasks. This guide assumes that you have a basic knowledge of application and networking concepts.

This guide is based on version 5.2 of the NetX software.

## 2. The NetX application

NetX is an application performance management platform designed to simplify the process of monitoring, analyzing and optimizing the way applications are delivered over the WAN to the end users. The goal of the system is to enable you to monitor application performance, analyze the way the applications behaves in the network, ensure that you have enough resources for your applications, and to help you solve performance-related application problems. This way NetX enables organizations to continuously optimize the deliver of their crucial applications to the end-users.

### 2.1. Monitor View Screen Layout

If you are a non-administrative user, you will be presented with your 'home page', which is the Monitor View screen. Administrator level users have some extra options, but these will not be covered in this guide. (See the NetX Administrator's Guide for more details.) The following sections describe the common elements available to all users regardless of your access rights to the system.

| Name        | Description                  | Compliant | % Of Sites with status |          | Critical |
|-------------|------------------------------|-----------|------------------------|----------|----------|
|             |                              |           | Marginal               | Critical |          |
| Engineering | Engineering                  | 100.0%    | 0.0%                   | 0.0%     | 0.0%     |
| IT services | IT services                  | 100.0%    | 0.0%                   | 0.0%     | 0.0%     |
| Marketing   | Marketing                    | 78.3%     | 0.0%                   | 21.7%    | 0.0%     |
| Operations  | Operations                   | 73.9%     | 0.0%                   | 26.1%    | 0.0%     |
| Purchasing  | Purchasing                   | 100.0%    | 0.0%                   | 0.0%     | 0.0%     |
| Sales       | Sales                        | 78.3%     | 0.0%                   | 21.7%    | 0.0%     |
| Support     | Business Process for Support | 73.9%     | 0.0%                   | 26.1%    | 0.0%     |
| Training    | Training                     | 100.0%    | 0.0%                   | 0.0%     | 0.0%     |

#### 2.1.1. Information Bar

At the top of each screen is an information bar. This bar provides links (1) to other parts of the system. In the top left of the information bar you will see as whom you are logged in to NetX. In the top-right of the bar you will see several links:

*Home*

return to your home page

*Monitor*

the Monitoring information

*Analyze*

the Analysis screen

*Report*

create report templates and generate reports

*Settings*

for the system, services, SLAs and devices (this link is not available for 'view only users')

*Change Password*

change your login password

*Logout*

log out of the system

## 2.1.2. Time Type, Period and Date Selector Bar

Below the information bar is the time type, period and date selector bar (2). Time type, period and date selection will be discussed shortly.

## 2.1.3. Navigation Tree

Below the time type, period and date selector bar is, at the left hand side, the navigation tree (3). The navigation tree gives you a simple way to navigate the performance of your infrastructure objects (business processes, service levels, applications and sites). The exact structure of the navigation tree will be discussed shortly. The object (node) you select in the navigation provides a context for the set of graphs and tables in the performance display. (4)

## 2.1.4. Performance Display

To the right of the navigation tree is the performance display. This is the area in which all graphs and tables are shown. The major part of this document is devoted to the discussion of these graphs and tables.

The performance display shows both raw and analyzed performance information. It is broken down into various views, allowing you to view general as well as specific information. The views are SLA View, SLO View, Apdex View, Overview View, Summary View, Details View, User View, Trends View, Optimization View, and VoIP View. The views can be displayed by clicking on their tab. Not all views are available for all objects in the navigation tree.

## 2.1.5. Role-based Logins

Role-based logins in NetX are a way of ensuring that users see only the information that is relevant to their role, or that they are authorized to see. Only a user with Administrator privileges can assign roles to specific users. Please see the Administration Guide for more details.

Depending on the role assigned to your user name by the Administrator, some of the graphs and/or items in the Navigation Tree may not be available.

The following non-administrative Role Types are available:

### *View Only User*

With this Role the User has access to all screens except for the Settings View.

### *Business Service Manager*

With this Role the User will only see the graphs and tables available under the Business Services node in the Navigation Tree. (Depending on how the Role has been configured, a sub-selection of all available Business Services may be displayed.) The Applications and Sites nodes in the Navigation Tree are not accessible. Note: The Business Processes node in the Navigation Tree is not displayed when this Role is in use. Instead a list of Business Services is displayed. Only Business Service-related graphs and tables are displayed under this node.

### *Application Manager*

With this Role the User will only see the graphs and tables available under the Applications node in the Navigation Tree. (Depending on how the Role has been configured, a sub-selection of all available Applications may be displayed.) The Business Processes and Sites nodes in the Navigation Tree are not accessible.

### *Site Manager*

With this Role the User will only see the graphs and tables available under the Sites node in the Navigation Tree. (Depending on how the Role has been configured, a sub-selection of all available Sites may be displayed.) The Applications and Business Processes nodes in the Navigation Tree are not accessible.

In addition to the above described Roles, the following options may or may not be enabled for each Role Type:

Allowed to create report templates

When enabled the User is able to create and modify Report Templates and modify Report Settings.

Allowed to generate reports

When enabled the User is able to generate reports, but is not able to create and modify Report Templates or modify Report Settings.

## 2.2. General Overview of Graphs & Tables

This section provides you with general information to help you interpret the graphs and tables provided in NetX. There are a few basic concepts that are applicable to all graphs and tables in NetX. Understanding these concepts will greatly assist you in understanding what is displayed in the user interface. The following concepts apply to all graphs and tables:

### 2.2.1. Graph & Table Types

There are various types of graphs and tables in NetX, each of which presents data in a different way, and each of which is influenced in a different way by the settings described later in this section. There are two primary types of graphs in NetX:

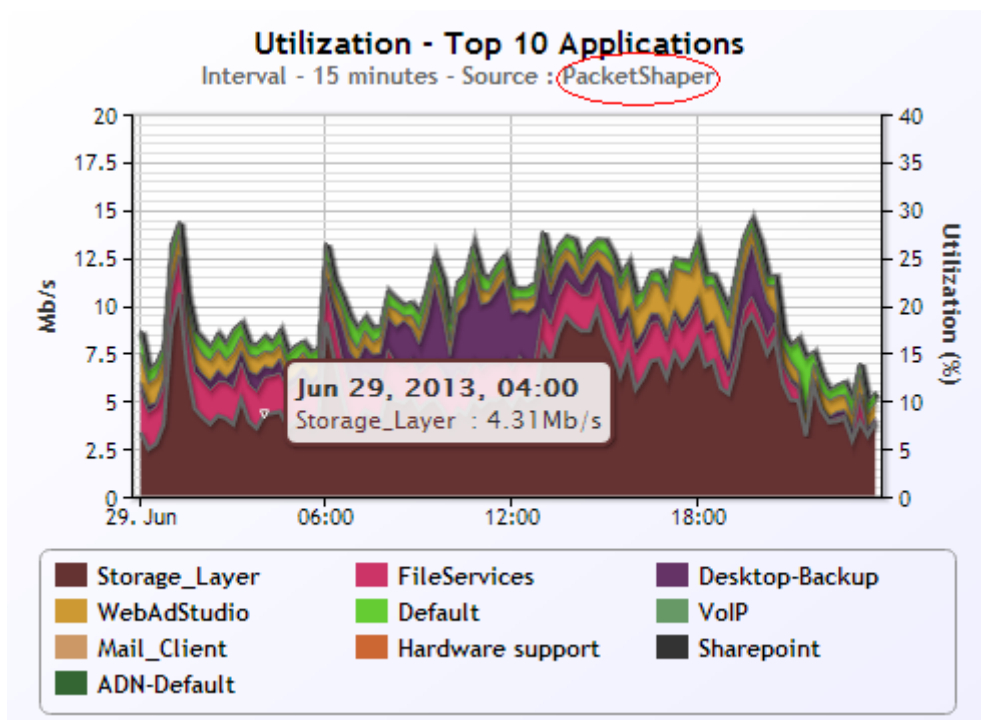
*Raw Data Graph*

This type of graph displays raw data for an object directly from the database.

*Monitor Graph*

This type of graph displays the result of an analysis of raw data in the database. These graphs are dynamic and may change over time to reflect changes to the Time Type (see below) you have selected, or updates to the raw data in the database. For example, if new data is received for a site or application this will change the values used for calculating the content of a monitor type graph.

### 2.2.2. Data from Multiple Device Types



For all graphs it is possible that the data displayed comes from more than 1 Device Type. (E.g., PacketShaper, FDR, or Steelhead.) This is because NetX supports multiple Device Types. If the data for a particular graph can come from more than one Device Type, the source Device Type of the graph is displayed beneath the graph title. (See image above.)

## 2.2.3. Date & Period Selection



Which data is displayed by NetX is influenced by the date and period selected by you. When selecting a 'period' you tell NetX for what range of time you wish to view data (Hour, Day, Week or Month). The start of this period is then selected by choosing a date (and hour if you chose an Hour period). Together these items give you the date and period for a particular graph or table (e.g., Period = Day, Date = July 5, 2007).

When you have selected period and date, use the Update button to update the graphs and tables in the performance display. By clicking the + and - arrows, you can move backward or forward one period (hour, day, week or month) in time.

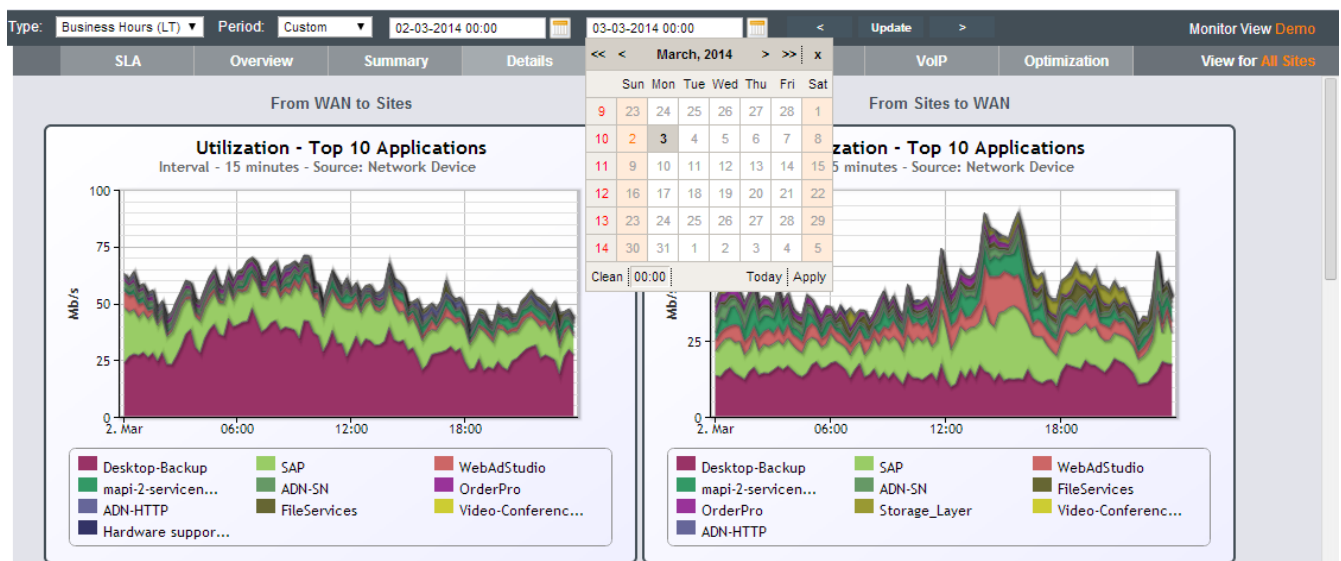
## 2.2.4. Data Interval

Once you have selected a date and period, NetX automatically selects an appropriate data interval. The data interval represents the smallest unit of time displayed in a graph. For instance, if you select a period of one hour in NetX, the data interval displayed will be one minute. This means that each point in the graph represents a value measured over a period of one minute.

For graphs that display raw data, the following intervals are used to draw the graphs:

| Time Period Selected | Data Interval Used |
|----------------------|--------------------|
| Hour                 | 1 Minute           |
| Day                  | 15 Minutes         |
| Week                 | 1 Hour             |
| Month                | 1 Day              |
| Custom               | Custom             |

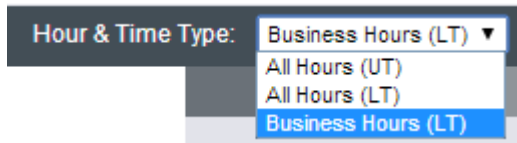
The Custom Time Period allows the user to select arbitrary start and end time. All graphs that have a time scale on the X-axis allow the user to select a sub-range of the shown time period. When the user has selected such a part of the time window and selects the Period Type Custom, the start and end time of the Custom time period will be initialized with the values of the last time window selected.



For monitor type graphs, the data interval used matches the time period selected.

## 2.2.5. Time Type

All monitor type graphs and tables are affected by the Time Type setting currently in use in the system. Depending on the Time Type selected, different data may be displayed. The following Time Types and their meanings are described below:



### *All Hours – Universal Time*

When this option is selected, all graphs are displayed using universal time (UTC). Thus, if you select 09:00 Jan 01 2004 in the date selector, the data displayed represents the UTC hour 09:00.

### *All Hours – Local Time*

When this option is selected, all graphs are displayed using the time zone set for a given Site. Thus, if you select 09:00 Jan 01 2004 in the date selector, the data displayed represents the 09:00 in local time for the site displayed. (09:00 in New York, 09:00 in Tokyo, etc.)

### *Business Hours – Local Time*

When this option is selected, all graphs are displayed using the time zone for a given Site. Thus, if you select 09:00 Jan 01 2004 in the date selector, the data displayed represents the 09:00 in local time for each site displayed. (09:00 in New York, 09:00 in Tokyo, etc.) Additionally, for Monitor type graphs, only Business Hours (as set in the Site settings) are used for the analysis performed.

## 2.3. Service Level Agreements

SLAs in NetX are used to set and monitor the performance of applications and networks. In order to understand what is being displayed in SLA and SLO graphs and tables, a basic understanding of NetX SLAs is required.

### 2.3.1. SLA Components

Each SLA consists of the SLA itself and a list of SLOs:

#### *The SLA itself*

The SLA defines which Business Services (applications) are monitored by this SLA, and for which sites. Additionally, the period over which SLA compliance should be monitored is set. Note: For Network Service type SLAs only sites are defined in the SLA (see 'SLA Types' below for more details). Only a single set of these details are defined for an entire SLA, and are thus applicable to all SLOs.

#### *The list of SLOs*

For each SLA there are one or more Service Level Objectives (SLOs). An SLO represents the performance targets that have been set for an application or site (e.g., response time, bandwidth utilization, availability, et cetera).

### 2.3.2. SLA Types

There are two types of SLAs possible with NetX:

#### *Network Service SLA*

This kind of SLA is used to monitor the aggregate of all traffic to and from a particular physical location in your network. This type of SLA focuses on the overall performance of the network, and not on a particular application.

#### *Business Service SLA*

This kind of SLA is used to monitor the performance of a particular application or set of applications.

### 2.3.3. SLA Compliance

SLAs have a particular status for a particular period of time. This is known as its compliance. In each SLA the period of time over which its compliance is measured is known as the 'SLA Reporting Period'.

It is possible to set a different compliance level for each SLO in an SLA. The compliance level indicates how often marginal or critical thresholds may be exceeded before an alert is generated, and the status of the SLO is changed. For example, a compliance level of 5% means that if in more than 5% of the minutes during the SLA Reporting Period a threshold was exceeded, the compliance status of the SLO changes.

The following statuses are possible:

#### *Compliant (Green)*

This status means that an SLO has not exceeded its marginal or critical compliance levels.

#### *Marginal (Orange)*

This status means that the SLO has exceeded the maximum number of marginal threshold violations for the SLA Reporting Period.

#### *Critical (Red)*

This status means that the SLO has exceeded the maximum number of critical threshold violations for the SLA Reporting Period.

### 2.3.4. Navigating SLA Performance

The performance of Business Service SLAs can be navigated via the Business Processes node in the navigation tree, and the performance of Network Service SLAs can be navigated via the Sites node. All SLAs can also be navigated via the Service Levels node.

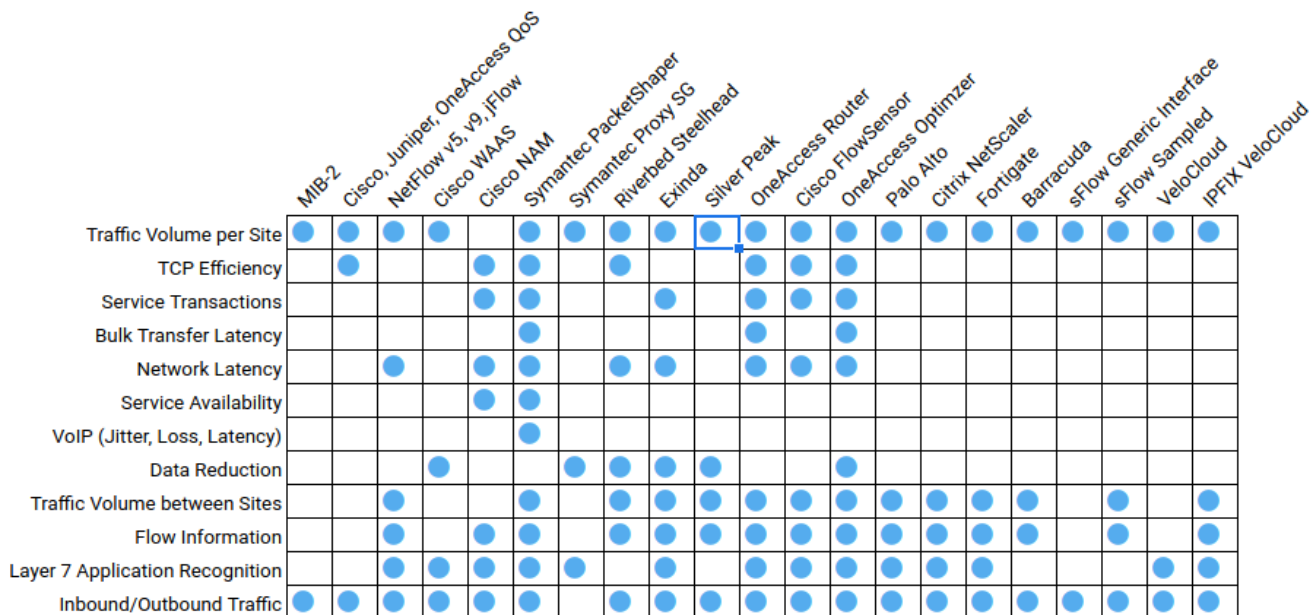
## 2.4. The Adaptive Model

NetX is built around a generic network model that models the core metrics essential for the analysis of network and application performance. As its data sources NetX uses a broad variety of network device types from different vendors (BlueCoat, Riverbed, OneAccess, Cisco, etc.) Since not every device is capable of delivering all the metrics modeled in the generic network model, NetX implements its so-called Adaptive Model.

The Adaptive Model implies that the NetX infrastructure will adapt to the type of information that is available from a specific device type. If the device is capable of delivering metrics that can be transformed into our core metrics, then all those core metrics will show up in the User Interface for that device type. However, if the device type only provides a subset of those metrics, then only the graphs and table columns related to that subset of metrics will show up. This line of reasoning is used throughout the whole system: not only will those metrics not show up in the UI, they will also not be communicated between the NetX agent and server, will not be stored, and will not be available for reporting, Apdex, and SLAs

The following table lists the device types supported by NetX and their adaptive model capabilities.





### Traffic Volume per Site

NetX provides insight in the total amount of traffic per location on the network. Therefore the information can be used for capacity analysis using the per-site inbound and outbound bandwidth settings.

### Goodput

NetX provides insight in the ratio between the total amount of traffic on the network and the amount of traffic that represents real user data (e.g., without protocol overhead in headers and retransmissions.)

### TCP Efficiency

NetX reports the efficiency of the network in terms of retransmissions (packets or bytes, depending on the device type.)

### Service Transactions

NetX reports on the break-down of calling a service from a client's perspective. The breakdown is determined by the network device by analyzing the request/response flows.

### Bulk Transfer Latency

NetX reports on the latency of the network that is measured using the ACK messages in the TCP protocol during bulk transfers.

### Network Latency

NetX reports on the latency of the network as it is measured during the TCP connection setup.

### Service Availability

NetX reports the availability of services by analyzing the number of TCP connections that are initialized, refused, and ignored (i.e., timed out.) The ratio between established and initialized connections provides insight in service availability.

### VoIP

NetX reports on the core VoIP characteristics, such as Jitter, packet loss, latency, and also R-Factor and Mean Opinion Score. The exact set of metrics shown depends on the device type.

### Data Reduction

NetX reports on the data reduction that has been obtained by technologies such as data compression and data redundancy elimination.

### Traffic between (virtual) Sites

Where available, NetX will show information on the traffic between locations. If a device is capable of identifying the 'remote' site of the traffic as seen from the site where the device is located (e.g., by using a class name or an IP range), then this information is used to generate a break-down of the total traffic on that site to each of those remote sites. A consequence of having between-site traffic information is that NetX will also be capable to derive an overview of the traffic for sites where no network device is present that provides information to NetX. A so-called virtual site shows the aggregated information from all the devices that have knowledge of this virtual site as remote site.

#### *Flow Information*

For those devices that deliver information to NetX in the form of a flow record (e.g., NetFlow, FDR), NetX will use this information to derive top-10 hosts and conversation for every context in the navigation tree.

#### *Layer 7 Application Recognition*

For those devices that support some form of Layer 7 application recognition through the use of Deep Packet Inspection, NetX will use this information. This facilitates users to match the network traffic observed to the application model represented in NetX.

#### *Inbound/Outbound Traffic*

For those devices that distinguish between inbound and outbound traffic NetX will use this information.

### 3. The Navigation Tree

In NetX it is possible to define business processes, business services, service levels, applications, site groups and sites (the exact details are beyond the scope of this document). Each node in the navigation tree represents either one of these infrastructure objects or an aggregate (e.g., 'all sites'). These objects may be related to each other either directly by definition or indirectly through SLAs (to be discussed shortly).

Each node in the navigation tree provides a context for the graphs in the performance display.

At the root of the navigation tree is the name of your organization. There are no graphs associated with the root node, and you can't select it. At the level directly below the root node, there are four 'main' nodes, labeled **Business Processes**, **Service Levels**, **Applications** and **Sites**, representing the aggregates of respectively all business processes, all service level agreements (SLAs), all applications and all sites.

Both in the Applications sub-tree and the Sites sub-tree, the children of Site nodes represent the traffic between the parent Site node (representing the local site) and the child Site node (representing the remote site). These child Sites nodes are used to filter the information displayed in graphs and tables of their parents.

The following table summarizes the structure of the navigation tree. Multiplicities are left out. In the right column are, for each type of node, the section titles for the sets of graphs and tables in the performance display corresponding to the node in the navigation tree.

| Navigation Tree Node      | View  |
|---------------------------|---|
| Business Processes        | for All Business Processes                  |
| Business Process P        | for Business Process P                      |
| Business Service S        | for Business Service S                      |
| Site Group G              | for Business Service S in Site Group G      |
| Site X                    | for Business Service S in Site X            |
| Service Levels            | for All Service Level Agreements            |
| Service Level Agreement Y | for SLA Y                                   |
| SLA Element B             | for SLA Y [for A] for X                     |
| Transactions              | for All ATM Transactions                    |
| Applications              | for All Applications                        |
| Application A             | for Application A                           |
| Site Group G              | for Application A in Site Group G           |
| Site X                    | for Application A in Site X                 |
| Site Y                    | for Application A between Site X and Site Y |
| Sites                     | for All Sites                               |
| Site Group G              | for Site Group G                            |
| Site X                    | for Site X                                  |
| Site Y                    | between Site X and Site Y                   |

As mentioned before, in NetX it is possible to create Site Groups. Site groups are used to group sites, and to filter the information displayed in graphs and tables. Site Group nodes appear in three of the main sub-trees (Business Processes, Applications and Sites), as a layer above the (highest level of) sites. When a group is selected in the navigation tree, all graphs and tables displayed are filtered based on the sites that are in the selected group. For example, if you were to click on a group below the node 'Sites' in the navigation tree, instead of seeing data representing all sites you would see data representing only the sites in that group.

Because the parent node of a Site Group node can be viewed as the site group of all sites, graphs and tables which are available for Site Groups nodes are also available for their parent nodes. For this reason, in this document, graphs corresponding to Site group nodes are discussed only as graphs corresponding to their parent nodes.

By default, there is always one site group in the system, and that is 'All Other Sites'. All sites belong to this group, unless they are moved to another group. A site may only belong to one group at a time.

In some circumstances site groups are not shown in the navigation tree. Although in practice this is quite intuitive, the exact rules for showing site groups may appear somewhat complex.

- Site Group nodes that, in the context set by the higher nodes, don't have children are not shown.
- If there is only one Site Group node which, in the context set by the higher nodes, does have children, this Site Group node is not shown either. In the navigation tree, its children become the children of its parent node.

## 3.1. Monitoring Business Processes Performance

The Business Processes View provides you with information regarding all of the Business Processes that you have defined in the system. A business process in NetX represents a group of users that use the same set of Business Services (applications) (e.g., the 'Sales' Business Process uses the CRM, E-mail, and Intranet Business Services).

### *All Business Processes*

This view in NetX provides information regarding all Business Processes that you have defined in the system. This view can be accessed by selecting the 'Business Processes' node from the navigation tree in the Monitor screen.

### *Business Process*

The Business Process View provides you with information regarding all of the Business Services (applications) used by a particular Business Process.

### *Business Service in Business Process*

This view provides an overview of the per-site performance of a particular Business Service.

### *Site using Business Service in Business Process*

This view provides an overview and detail of the performance of the service level objectives that you have set for a particular Business Service in a particular Site.

## 3.2. Monitoring Service Levels

The Service Level View provides you with information regarding all of the Service Level Agreements that you have defined in the system.

### *All Service Level Agreements*

This view in NetX provides information regarding all SLAs that you have defined in the system. This view can be accessed by selecting the 'Service Levels' node from the navigation tree in the Monitor screen.

### *Service Level Agreement*

The Service Level Agreement View provides you with information regarding the performance of the Service Level Agreement Elements for a particular SLA.

### *Service Level Agreement Element*

This view provides an overview and detail of the performance of the service level objectives that you have set for a particular site (Network Service SLA) or Business Service in a particular site (Business Service SLA).

## 3.3. Monitoring Transactions

The Transactions View provides information about the application transactions that are configured. A Transaction in NetX is represented by an ATM Script, which described a single step or a sequence of steps that a network protocol or user application would take. ATM Scripts can contain parameters; the parameterized version is called an ATM Task. ATM Tasks are scheduled with an ATM Schedule, which tells which ATM Agent should run the Task and when. The execution time of the core part of the ATM Script is measured and is shown in the various Transaction Views.

### *All Transactions*

The All Transactions view provides an overview of the performance aggregated per ATM Script. This view can be accessed by clicking on the 'Transactions' node in the navigation tree.

### *ATM Script*

The ATM Script view provides information about all the ATM Tasks that are derived from the selected ATM Script. Since ATM Tasks can define different parameters for the same ATM Script, the Task typically represents which service will be accessed (i.e., the server site) and what specific client parameters to use (e.g., to use different credentials per task.)

### *ATM Task*

The ATM Task view provides information about all the ATM Schedules that are registered for the selected ATM Task. An ATM Schedule defines which ATM Agent will run the ATM Task and when. Therefore, this view will typically show the actual performance observed from the different client sites where the ATM agents run.

### *ATM Agent*

The ATM Agent view provides information about the individual transactions executed by a specific ATM Agent for a specific ATM Task. At the most detailed time interval, this will also include per-transaction details, showing the breakdown of the individual phases of the script.

## 3.4. Monitoring Application Performance

The Applications View provides you with information regarding all of the applications in your network. An application in NetX represents all of the traffic belonging to a unique application.

### *All Applications*

This view provides an overview of the performance of all of your applications. This view can be accessed by clicking on the 'Applications' node in the navigation tree.

### *Application*

The Application View provides you with information regarding all of the sites in your network that are using a particular application. An application in NetX represents all of the traffic belonging to a unique application. A site in NetX represents all of the traffic and bandwidth that belong to a particular physical location in your network.

### *Site Group in Application*

This is the same view as the Application View, except that the list of sites is restricted to the sites belonging to the Site Group selected.

### *Site in Application*

The Site in Application View provides you with information regarding a particular application in a specific site. An application in NetX represents all of the traffic belonging to a unique application. A site in NetX represents all of the traffic and bandwidth that belong to a particular physical location in your network.

## 3.5. Monitoring Sites Performance

The Sites View provides you with information regarding the physical locations in your enterprise. A site in

NetX represents all of the traffic and bandwidth that belongs to a particular physical location in your network.

#### *All Sites*

This view provides an overview of the performance of all of your sites. This view can be accessed by clicking on the 'Sites node in the navigation tree.

#### *Site Group*

This is the same view as the All Sites View, expect that the list of sites is restricted to the sites in the Site Group that is selected.

#### *Site*

The Site View provides you with specific information regarding a single site in your network. A site in NetX represents all of the traffic and bandwidth that belong to a particular physical location.

## 4. Performance Views

This chapter describes the different views (tabs) in the Monitor context. For each view the set of graphs that will be presented to the user is described and the context in which each graph occurs. The context depends on three factors:

1. The selection in the navigation tree
2. The capabilities of the device type
3. The type of network protocol that is generating the traffic (e.g., RTP)

Together these factors determine whether a particular graph or table (column) will be presented to the user in the specific view.

### 4.1. The SLA View

The SLA view provides a summary of the SLA conditions that are monitored by NetX. Each combination of Site and Application can be monitored by one or more Service Level Objectives (SLOs). Each SLO represents a condition using one or more metrics that will lead to an indication per minute of compliance, marginal, or critical violations. The SLA summarizes all the SLO information to a single, condensed form that can be easily navigated.

The SLA view will only be shown if an SLA has been defined in the context selected in the navigation tree.

#### 4.1.1. SLA Performance Table

| Name        | Description | % Of Sites with Status: |          |          |
|-------------|-------------|-------------------------|----------|----------|
|             |             | Compliant               | Marginal | Critical |
| Engineering | Engineering | 100.0%                  | 0.0%     | 0.0%     |
| IT services | IT services | 100.0%                  | 0.0%     | 0.0%     |
| Marketing   | Marketing   | 68.2%                   | 0.0%     | 31.8%    |
| Operations  | Operations  | 63.6%                   | 4.5%     | 31.8%    |
| Purchasing  | Purchasing  | 33.3%                   | 66.7%    | 0.0%     |
| Sales       | Sales       | 59.1%                   | 9.1%     | 31.8%    |
| Training    | Training    | 86.4%                   | 4.5%     | 9.1%     |

##### Context

This table is shown when the user has selected the root node of the Business Processes in the navigation tree.

##### Description

The SLA Performance Table provides you with an overview of the SLA performance of each of your Business Processes during the period you selected. The SLA performance of a Business Process is based on the SLA performance of the Business Services used by a particular Business Process. Thus, if a Business Service used by a Business Process has an SLA problem, the Business Process displayed in the table is also shown as having a problem.

##### Interpretation

For the period selected in the Date/Time Selector, the percentage of sites with a particular SLA status is displayed. The higher the percentage of Sites for a Business Process with a Marginal or Critical status, the worse the Business Process is likely to be performing. To view the Business Services that are reporting SLA performance problems, click on the name of the Business Process.

##### Technical Details

This table displays the percentage of sites for a given Business Process that have the SLA status 'Compliant', 'Marginal', or 'Critical' for the date and period selected. Because Business Processes do not themselves have SLAs or Sites, this display actually shows the percentage of Sites for the Business Services used by a Business Process that have a particular SLA status.

The total number of Sites used for this calculation is taken from the total number of Sites defined in all SLAs

where a Business Service is defined that is in use by the displayed Business Process. Thus, if 18% of the Sites have a critical status, this means that 18% of the Sites defined in all of the SLAs for all of the Business Services used by the Business Process have a critical status for the period selected. Note that this means that if the same site (for a given Business Service) is defined in multiple SLAs, that that site will be counted once for each SLA where it is defined. That is,

Total Sites per SLA = (Business Services used by the Business Process) x (Sites selected in SLA)  
 Total Sites used in table calculation = Totals for each SLA (using applicable Business Services and Sites) added together.

Note: The status will be 'Undetermined' (grey) for SLAs with a different reporting period than the one selected in the Date/Period selector (for example: there is an SLA defined with reporting period 'Day', but the view period is 'Week').

### 4.1.2. Business Process SLA Performance Table

| Name             | Description      | % Of Sites with Status: |          |          |
|------------------|------------------|-------------------------|----------|----------|
|                  |                  | Compliant               | Marginal | Critical |
| E-Mail           | E-Mail Service   | 100.0%                  | 0.0%     | 0.0%     |
| eLearning        | eLearning        | 100.0%                  | 0.0%     | 0.0%     |
| FileServices     | File Service     | 100.0%                  | 0.0%     | 0.0%     |
| Hardware support | Hardware support | 100.0%                  | 0.0%     | 0.0%     |
| OpsPortal        | OpsPortal        | 66.7%                   | 33.3%    | 0.0%     |
| WebAdStudio      | Web Ad studio    | 63.2%                   | 0.0%     | 36.8%    |

#### Context

This table is shown when the user has selected a single Business Process in the navigation tree.

#### Description

The SLA Performance Table provides you with an overview of the SLA performance of each of the Business Services used by the Business Process you selected during the period you selected. The SLA performance of a Business Service is based on the SLA performance of each of the sites where an SLA is defined for the displayed Business Service.

#### Interpretation

For the period selected in the Date/Time Selector, the percentage of sites with a particular SLA status is displayed. The higher the percentage of Sites for a Business Service with a Marginal or Critical status, the worse the Business Service is likely to be performing. To view the Sites that are reporting SLA performance problems, click on the name of the Business Service.

#### Technical Details

This table displays the percentage of sites for a given Business Service that have the SLA status 'Compliant', 'Marginal', or 'Critical' for the date and period selected. The total number of Sites used is taken from the total number of Sites defined in all SLAs where the Business Service is defined. Thus, if 18% of the Sites have a critical status, this means that 18% of the Sites defined in all of the SLAs for the displayed Business Service have a critical status for the period selected.

Note: The status will be 'Undetermined' (grey) for SLAs with a different reporting period than the one selected in the Date/Period selector (for example: there is an SLA defined with reporting period 'Day', but the view period is 'Week').

### 4.1.3. Business Service SLA Performance Table



| Site Name       | Site Group Name | % Of SLOs with Status: |          |          |
|-----------------|-----------------|------------------------|----------|----------|
|                 |                 | Compliant              | Marginal | Critical |
| Amersfoort      | Medium Offices  | 100.0%                 | 0.0%     | 0.0%     |
| Amsterdam       | Large Offices   | 0.0%                   | 0.0%     | 100.0%   |
| Apeldoorn       | Medium Offices  | 100.0%                 | 0.0%     | 0.0%     |
| Arnhem          | Medium Offices  | 100.0%                 | 0.0%     | 0.0%     |
| Assen           | Medium Offices  | 100.0%                 | 0.0%     | 0.0%     |
| ATM01 Almere    | OP ATM          | 100.0%                 | 0.0%     | 0.0%     |
| ATM01 Bilthoven | OP ATM          | 100.0%                 | 0.0%     | 0.0%     |
| ATM01 Bladel    | OP ATM          | 100.0%                 | 0.0%     | 0.0%     |
| ATM01 Enschede  | OP ATM          | 0.0%                   | 0.0%     | 100.0%   |
| ATM01 Tilburg   | OP ATM          | 0.0%                   | 0.0%     | 100.0%   |
| ATM01 Zeist     | OP ATM          | 100.0%                 | 0.0%     | 0.0%     |
| ATM01-Nijmegen  | OP ATM          | 100.0%                 | 0.0%     | 0.0%     |
| Den Helder      | Medium Offices  | 100.0%                 | 0.0%     | 0.0%     |
| Den Haag        | Medium Offices  | 100.0%                 | 0.0%     | 0.0%     |
| Gouda           | Medium Offices  | 0.0%                   | 0.0%     | 100.0%   |
| Maastricht      | Medium Offices  | 100.0%                 | 0.0%     | 0.0%     |
| Rotterdam       | Large Offices   | 0.0%                   | 0.0%     | 100.0%   |
| Tilburg         | Medium Offices  | 0.0%                   | 0.0%     | 100.0%   |
| Utrecht         | Large Offices   | 0.0%                   | 0.0%     | 100.0%   |

*Context*

This table shows if the user has selected a single Business Service as child node of a Business process in the navigation tree. Note that for users with the role 'Business Service Managers' the total list of Business Services will be their top-level view in the navigation tree.

*Description*

The SLA Performance Table provides you with an overview of the SLA performance of each site defined in at least one SLA for the Business Service you selected, during the period you selected. The SLA status of a site is based on the combination of SLO statuses for the period.

*Interpretation*

For the period selected in the Date/Time Selector, the percentage of SLO statuses for the site is displayed. To view the list of SLOs that are reporting performance problems for a site, click on the name of the site.

*Technical Details*

This table displays the percentage of SLO statuses for the site displayed. The system searches through all SLAs where the selected Business Service and Site combination is found, and combines the SLO statuses found during the period you selected (e.g., if there were three different SLOs for a particular Site/Business Service combination, and the status of these were Compliant, Marginal, and Critical respectively, all three columns would show 33.3%).

Note: The status will be 'Undetermined' (grey) for SLAs with a different reporting period than the one selected in the Date/Period selector (for example: there is an SLA defined with reporting period 'Day', but the view period is 'Week').

**4.1.4. Business Service SLO Performance Table**

| SLA Name              | SLA Period | SLO Type                          | Source Application | SLO Status                            | Alerts Enabled           |
|-----------------------|------------|-----------------------------------|--------------------|---------------------------------------|--------------------------|
| Cloud application SLA | Day        | Application Bandwidth Utilization | OrderPro           | <span style="color: green;">●</span>  | <input type="checkbox"/> |
| Cloud application SLA | Day        | Network Reliability               | OrderPro           | <span style="color: green;">●</span>  | <input type="checkbox"/> |
| Cloud application SLA | Day        | Service Availability              | OrderPro           | <span style="color: green;">●</span>  | <input type="checkbox"/> |
| Cloud application SLA | Day        | Round Trip Time                   | OrderPro           | <span style="color: yellow;">●</span> | <input type="checkbox"/> |

*Context*

This table will be shown when the user has selected a specific site in the context of a business service in the navigation tree.

*Description*

The Business Service SLO Performance Table provides you with an overview of the performance of each SLO defined for Business Service and Site selected.

*Interpretation*

For the period selected in the Date/Time Selector, the status for each SLO is displayed. The worse the

indicator status (Green = Compliant, Orange = Marginal, Red = Critical), the worse the performance. SLO status indicators with a Marginal or Critical status are most likely to be the cause of poor application performance. To further determine why and when SLO thresholds were violated, additional functionality is available:

SLO Detail Graph For each SLO in the table there is a corresponding set of SLO Detail Graphs in the SLO View below. Use these graphs to determine when SLO threshold violations occurred.

#### Source Application

This link in the SLO Performance Table takes you to the application that is the source for the SLO performance data. When SLO thresholds are evaluated, they are always done against application data. When you click on this link you will be taken to the appropriate application view for the selected site, so that you can analyze related application data.

In addition to the above described functionality, the following information and functions are available in the SLO Performance Table:

#### SLA Name

This is the name of the SLA where the SLO displayed is defined.

#### Alerts Enabled

This selector enables you to turn alerting on or off for a particular SLO. This is useful when you have discovered a problem for an SLO, and yet you don't want to continue receiving alerts. If you turn alerting off, you will no longer receive notification of marginal or critical SLO violations; however you will still be able to see this status in the user interface.

#### Technical Details

This table displays the status for each SLO defined for this Business Service and Site combination. The system searches through all SLAs where the selected Business Service and Site combination is found, and displays the SLO status (for each SLO) found during the period you selected.

Note: The status will be 'Undetermined' (grey) for SLAs with a different reporting period than the one selected in the Date/Period selector (for example: there is an SLA defined with reporting period 'Day', but the view period is 'Week').

### 4.1.5. All Service Level Agreements Performance Table

| Name                           | Description                    | % Of Sites with Status: |          |          |
|--------------------------------|--------------------------------|-------------------------|----------|----------|
|                                |                                | Compliant               | Marginal | Critical |
| Business Applications SLA      | Business Applications SLA      | 100.0%                  | 0.0%     | 0.0%     |
| Cloud application SLA          | Cloud application SLA          | 33.3%                   | 66.7%    | 0.0%     |
| Default monitoring SLA per day | Default monitoring SLA per day | 63.2%                   | 0.0%     | 36.8%    |
| Default SLA per week           |                                | 0.0%                    | 0.0%     | 0.0%     |
| IP Telephony SLA               | VoIP SLA                       | 86.4%                   | 4.5%     | 9.1%     |
| Office Application SLA         | Office Application SLA         | 63.2%                   | 0.0%     | 36.8%    |
| WAN Quality SLA                | WAN Quality SLA                | 81.8%                   | 4.5%     | 13.6%    |

#### Context

This table is shown when the user has selected the top-level Service Levels node in the navigation tree.

#### Description

The SLA Performance Table provides you with an overview of the performance of each of your Service Level Agreements during the period you selected.

#### Interpretation

For the period selected in the Date/Time Selector, the percentage of sites with a particular SLA status is displayed. To view the SLA Elements that are reporting SLA performance problems, click on the name of the SLA.

#### Technical Details

This table displays the percentage of sites for a given SLA that have the SLA status 'Compliant', 'Marginal', or

'Critical' for the date and period selected. Thus, if 18% of the Sites have a critical status, this means that 18% of the Sites defined in the SLAs have a critical status for the period selected.

Note: The status will be 'Undetermined' (grey) for SLAs with a different reporting period than the one selected in the Date/Period selector (for example: there is an SLA defined with reporting period 'Day', but the view period is 'Hour').

#### 4.1.6. Service Level Agreement Elements Performance Table

| SLA Element Name        | SLA Element Type | % Of SLOs with Status: |          |          |
|-------------------------|------------------|------------------------|----------|----------|
|                         |                  | Compliant              | Marginal | Critical |
| VoIP in Amersfoort      | Business Service | 100.0%                 | 0.0%     | 0.0%     |
| VoIP in Amsterdam       | Business Service | 0.0%                   | 0.0%     | 100.0%   |
| VoIP in Apeldoorn       | Business Service | 100.0%                 | 0.0%     | 0.0%     |
| VoIP in Arnhem          | Business Service | 100.0%                 | 0.0%     | 0.0%     |
| VoIP in Assen           | Business Service | 100.0%                 | 0.0%     | 0.0%     |
| VoIP in ATM01 Almere    | Business Service | 100.0%                 | 0.0%     | 0.0%     |
| VoIP in ATM01 Bilthoven | Business Service | 100.0%                 | 0.0%     | 0.0%     |
| VoIP in ATM01 Bladel    | Business Service | 100.0%                 | 0.0%     | 0.0%     |
| VoIP in ATM01 Enschede  | Business Service | 100.0%                 | 0.0%     | 0.0%     |
| VoIP in ATM01 Tilburg   | Business Service | 100.0%                 | 0.0%     | 0.0%     |
| VoIP in ATM01 Zeist     | Business Service | 100.0%                 | 0.0%     | 0.0%     |
| VoIP in ATM01-Nijmegen  | Business Service | 100.0%                 | 0.0%     | 0.0%     |
| VoIP in DC-Eindhoven    | Business Service | 100.0%                 | 0.0%     | 0.0%     |
| VoIP in DC-Groningen    | Business Service | 100.0%                 | 0.0%     | 0.0%     |
| VoIP in DC-Rotterdam    | Business Service | 100.0%                 | 0.0%     | 0.0%     |
| VoIP in Den Helder      | Business Service | 100.0%                 | 0.0%     | 0.0%     |
| VoIP in Den Haag        | Business Service | 100.0%                 | 0.0%     | 0.0%     |
| VoIP in Gouda           | Business Service | 100.0%                 | 0.0%     | 0.0%     |
| VoIP in Maastricht      | Business Service | 100.0%                 | 0.0%     | 0.0%     |
| VoIP in Rotterdam       | Business Service | 0.0%                   | 0.0%     | 100.0%   |
| VoIP in Tilburg         | Business Service | 100.0%                 | 0.0%     | 0.0%     |
| VoIP in Utrecht         | Business Service | 0.0%                   | 100.0%   | 0.0%     |

##### Context

This table is shown when the user has selected a single Service Level Agreement.

##### Description

The SLA Element Performance Table provides you with an overview of the SLA performance of each of the SLA Elements of the SLA you selected during the period you selected. An SLA Element consists of the site where the SLA is active in the case of a network service SLA and the site and business service in the case of a business service SLA.

##### Interpretation

For the period selected in the Date/Time Selector, the percentage of SLOs with a particular SLA status is displayed for each of the SLAEs in the selected SLA. To view the SLOs for a particular SLAE that are reporting SLA performance problems, click on the name of the SLAE.

##### Technical Details

This table displays the percentage of SLOs that have the SLA status 'Compliant', 'Marginal', or 'Critical' for the period selected, for each Site (for a Network Service SLA) or for each Business Service/Site Combination (for a Business Service SLA)

Note: The status will be 'Undetermined' (grey) if the SLA has a different reporting period than the one selected in the Date/Period selector.

#### 4.1.7. SLAE SLO Performance Table

| SLA Period | SLO Type                          | Source Application | SLO Status | Alerts Enabled           |
|------------|-----------------------------------|--------------------|------------|--------------------------|
| Day        | Application Bandwidth Utilization | VoIP               | ●          | <input type="checkbox"/> |
| Day        | Call Quality                      | VoIP               | ●          | <input type="checkbox"/> |
| Day        | Jitter                            | VoIP               | ●          | <input type="checkbox"/> |
| Day        | RTP Latency                       | VoIP               | ●          | <input type="checkbox"/> |

##### Context

This table is shown when the user has selected a specific Service Level Agreement Element in the navigation

tree.

#### *Description*

The SLO Performance Table provides you with an overview of the performance of each SLO defined for the selected site (or site and Business Service combination).

#### *Interpretation*

For the period selected in the Date/Time Selector, the status for each SLO is displayed. The worse the indicator status (Green = Compliant, Orange = Marginal, Red = Critical), the worse the performance. SLO status indicators with a Marginal or Critical status are most likely to be the cause of poor application or network performance. To further determine why and when SLO thresholds were violated, additional functionality is available:

#### *SLO Detail Graph*

For each SLO in the table there is a corresponding set of SLO Detail Graphs in the SLO View (see below). Use these graphs to determine when SLO threshold violations occurred.

#### *Source Application*

This link in the SLO Performance Table takes you to the selected site in the application tree that is the source for the SLO performance data. When SLO thresholds are evaluated, they are always done against application data. When you click on this link you will be taken to the appropriate application view, so that you can analyze other related application data. This field will be empty if the source application for the SLO is 'All Applications'.

In addition to the above described functionality, the following information and functions are available in the SLO Performance Table:

#### *SLA Period*

The reporting period for the selected SLA.

#### *SLO Type*

The Service Level Objective Type which describes the kind of performance test that has been performed

#### *Alerts Enabled*

This selector enables you to turn alerting on or off for a particular SLO. This is useful when you have discovered a problem for an SLO, and yet don't want to continue receiving alerts. If you turn alerting off, you will no longer receive notification of marginal or critical SLO violations; however you will still be able to see this status in the user interface.

#### *Technical Details*

This table displays the status for each SLO defined for this SLA Element.

SLAs with a larger reporting period than the selected period will show the SLO status for the entire reporting period that the selected period is a part of. For example: SLA period is Day, but selected period is Hour. Say the SLO status was green for October 20th, then the SLO status shown when any hour of October 20th is selected, will also be green. To put it simply: the status for a Day SLO is the same for every Hour of that Day.

The status will be 'Undetermined' (grey) for SLAs with smaller reporting period than the one selected (for example: SLA defined with reporting period Day, but the view period is Week). You cannot make a statement about the status of a Day SLO over an entire week as there will be seven independent statuses for the SLO during that week.

### **4.1.8. All Applications SLA Performance Table**

| Name             | % Of Sites with Status: |          |          |
|------------------|-------------------------|----------|----------|
|                  | Compliant               | Marginal | Critical |
| Blackberry       | 100.0%                  | 0.0%     | 0.0%     |
| Default          | 63.2%                   | 0.0%     | 36.8%    |
| eLearning        | 100.0%                  | 0.0%     | 0.0%     |
| FileServices     | 100.0%                  | 0.0%     | 0.0%     |
| Hardware support | 100.0%                  | 0.0%     | 0.0%     |
| Mail_Client      | 100.0%                  | 0.0%     | 0.0%     |
| MS SQL Server    | 100.0%                  | 0.0%     | 0.0%     |
| MS Updates       | 100.0%                  | 0.0%     | 0.0%     |
| OperationsPortal | 66.7%                   | 33.3%    | 0.0%     |
| Oracle           | 100.0%                  | 0.0%     | 0.0%     |
| OrderPro         | 33.3%                   | 66.7%    | 0.0%     |
| Video-Conference | 100.0%                  | 0.0%     | 0.0%     |
| VoIP             | 86.4%                   | 4.5%     | 9.1%     |
| WebAdStudio      | 63.2%                   | 0.0%     | 36.8%    |

### Context

This table is shown when the user has selected the All Applications node in the navigation tree.

### Description

The SLA Performance Table provides you with an overview of the SLA performance of each of your Applications (which are selected as measurement source for one or more SLOs) during the period you selected.

### Interpretation

For the period selected in the Date/Time Selector, the percentage of sites with a particular SLA status is displayed. The higher the percentage of Sites for an Application with a Marginal or Critical status, the worse the Application is likely to be performing.

### Technical Details

This table displays the percentage of sites for a given Application that have the SLA status 'Compliant', 'Marginal', or 'Critical' for the date and period selected. Because Applications do not themselves have SLAs or Sites, this display actually shows the percentage of Sites that have a particular SLA status, for the Network or Business services that use the Applications as measurement source.

## 4.1.9. Application SLA Performance Table

| Name            | % Of SLOs with Status: |          |          |
|-----------------|------------------------|----------|----------|
|                 | Compliant              | Marginal | Critical |
| Amersfoort      | 100.0%                 | 0.0%     | 0.0%     |
| Amsterdam       | 0.0%                   | 0.0%     | 100.0%   |
| Apeldoorn       | 100.0%                 | 0.0%     | 0.0%     |
| Arnhem          | 100.0%                 | 0.0%     | 0.0%     |
| Assen           | 100.0%                 | 0.0%     | 0.0%     |
| ATM01 Almere    | 100.0%                 | 0.0%     | 0.0%     |
| ATM01 Bilthoven | 100.0%                 | 0.0%     | 0.0%     |
| ATM01 Bladel    | 100.0%                 | 0.0%     | 0.0%     |
| ATM01 Enschede  | 100.0%                 | 0.0%     | 0.0%     |
| ATM01 Tilburg   | 100.0%                 | 0.0%     | 0.0%     |
| ATM01 Zeist     | 100.0%                 | 0.0%     | 0.0%     |
| ATM01-Nijmegen  | 100.0%                 | 0.0%     | 0.0%     |
| DC-Eindhoven    | 100.0%                 | 0.0%     | 0.0%     |
| DC-Groningen    | 100.0%                 | 0.0%     | 0.0%     |
| DC-Rotterdam    | 100.0%                 | 0.0%     | 0.0%     |
| Den Helder      | 100.0%                 | 0.0%     | 0.0%     |
| DenHaag         | 100.0%                 | 0.0%     | 0.0%     |
| Gouda           | 100.0%                 | 0.0%     | 0.0%     |
| Maastricht      | 100.0%                 | 0.0%     | 0.0%     |
| Rotterdam       | 0.0%                   | 0.0%     | 100.0%   |
| Tilburg         | 100.0%                 | 0.0%     | 0.0%     |
| Utrecht         | 0.0%                   | 100.0%   | 0.0%     |

### Context

This table is shown when the user has selected a single Application in the navigation tree.

### Description

The SLA Performance Table provides you with an overview of the SLA performance of each of the sites where the selected application is a measurement source in an SLA, during the period you selected.

### Interpretation

For the period selected in the Date/Time Selector, the percentage of SLOs with a particular SLA status is displayed for each of the Sites in the SLAs that have the selected application as a measurement source. The higher the percentage of SLOs with a Marginal or Critical status, the worse the Business or Network Service is likely to be performing. To view the SLOs for a particular site that are reporting SLA performance problems, click on the name of the site.

### Technical Details

This table displays the percentage of SLOs that have the SLA status 'Compliant', 'Marginal', or 'Critical' for the period selected, for each site where the selected application is a measurement source in an SLA.

## 4.1.10. Application-Site SLO Performance Table

| SLA Name         | SLA Period | SLO Type                          | Source Application | SLO Status | Alerts Enabled           |
|------------------|------------|-----------------------------------|--------------------|------------|--------------------------|
| IP Telephony SLA | Day        | Application Bandwidth Utilization | VoIP               | ●          | <input type="checkbox"/> |
| IP Telephony SLA | Day        | Call Quality                      | VoIP               | ●          | <input type="checkbox"/> |
| IP Telephony SLA | Day        | Jitter                            | VoIP               | ●          | <input type="checkbox"/> |
| IP Telephony SLA | Day        | RTP Latency                       | VoIP               | ●          | <input type="checkbox"/> |

### Context

This table is shown when the user has selected a site node within an application node in the navigation tree.

### Description

The SLO Performance Table provides you with an overview of the performance of each SLO defined for the selected site.

### Interpretation

For the period selected in the Date/Time Selector, the status for each SLO is displayed. The worse the indicator status (Green = Compliant, Orange = Marginal, Red = Critical), the worse the performance. SLO status indicators with a Marginal or Critical status are most likely to be the cause of poor application performance. To further determine why and when SLO thresholds were violated, additional functionality is available:

### SLO Detail Graph

For each SLO in the table there is a corresponding set of SLO Detail Graphs in the SLO View (see below). Use these graphs to determine when SLO threshold violations occurred.

In addition to the above described functionality, the following information and functions are available in the SLO Performance Table:

### SLA Name

This is the name of the SLA where the SLO displayed is defined.

### SLA Period

The reporting period for the SLA.

### SLO Type

The specific SLO type.

### Alerts Enabled

This selector enables you to turn alerting on or off for a particular SLO. This is useful when you have discovered a problem for an SLO, and yet you don't want to continue receiving alerts. If you turn alerting off, you will no longer receive notification of marginal or critical SLO violations; however you will still be able to see this status in the user interface.

### Technical Details

This table displays the status for each SLO that has the selected application as a measurement source.

SLAs with a larger reporting period than the selected period will show the SLO status for the entire reporting period that the selected period is a part of. For example: SLA period is Day, but selected period is Hour. Say the SLO status was green for October 20th, then the SLO status shown when any hour of October 20th is selected, will also be green. To put it simply: the status for a Day SLO is the same for every Hour of that Day.

The status will be 'Undetermined' (grey) for SLAs with smaller reporting period than the one selected (for example: SLA defined with reporting period Day, but the view period is Week). You cannot make a statement about the status of a Day SLO over an entire week as there will be seven independent statuses for the SLO during that week.

#### 4.1.11. Sites SLA Performance Table

| Site Name       | Site Group Name | % Of SLOs with Status: |          |          |
|-----------------|-----------------|------------------------|----------|----------|
|                 |                 | Compliant              | Marginal | Critical |
| Amersfoort      | Medium Offices  | 100.0%                 | 0.0%     | 0.0%     |
| Amsterdam       | Large Offices   | 100.0%                 | 0.0%     | 0.0%     |
| Apeldoorn       | Medium Offices  | 50.0%                  | 0.0%     | 50.0%    |
| Arnhem          | Medium Offices  | 100.0%                 | 0.0%     | 0.0%     |
| Assen           | Medium Offices  | 100.0%                 | 0.0%     | 0.0%     |
| ATM01 Almere    | OP ATM          | 100.0%                 | 0.0%     | 0.0%     |
| ATM01 Bilthoven | OP ATM          | 50.0%                  | 0.0%     | 50.0%    |
| ATM01 Bladel    | OP ATM          | 100.0%                 | 0.0%     | 0.0%     |
| ATM01 Enschede  | OP ATM          | 100.0%                 | 0.0%     | 0.0%     |
| ATM01 Tilburg   | OP ATM          | 100.0%                 | 0.0%     | 0.0%     |
| ATM01 Zeist     | OP ATM          | 100.0%                 | 0.0%     | 0.0%     |
| ATM01-Nijmegen  | OP ATM          | 100.0%                 | 0.0%     | 0.0%     |
| DC-Eindhoven    | Data Centers    | 50.0%                  | 0.0%     | 50.0%    |
| DC-Groningen    | Data Centers    | 100.0%                 | 0.0%     | 0.0%     |
| DC-Rotterdam    | Data Centers    | 50.0%                  | 50.0%    | 0.0%     |
| Den Helder      | Medium Offices  | 100.0%                 | 0.0%     | 0.0%     |
| DenHaag         | Medium Offices  | 100.0%                 | 0.0%     | 0.0%     |
| Gouda           | Medium Offices  | 100.0%                 | 0.0%     | 0.0%     |
| Maastricht      | Medium Offices  | 100.0%                 | 0.0%     | 0.0%     |
| Rotterdam       | Large Offices   | 100.0%                 | 0.0%     | 0.0%     |
| Tilburg         | Medium Offices  | 100.0%                 | 0.0%     | 0.0%     |
| Utrecht         | Large Offices   | 100.0%                 | 0.0%     | 0.0%     |

##### Context

This table is shown when the user has selected the All Sites node in the navigation tree.

##### Description

The Sites SLA Performance Table provides you with an overview of the SLA performance of each site in your network during the period you selected.

##### Interpretation

For the period selected in the Date/Time Selector, the percentage of SLOs with a particular SLA status is displayed for each of the Sites in the SLAs. The higher the percentage of SLOs with a Marginal or Critical status, the worse the Network Service is likely to be performing. To view the SLOs for a particular site that are reporting SLA performance problems, click on the name of the site.

##### Technical Details

This table displays the percentage of SLOs that have the SLA status 'Compliant', 'Marginal', or 'Critical' for the period selected, for each site.

Note: The status will be 'Undetermined' (grey) for SLAs with a different reporting period than the one selected in the Date/Period selector (for example: there is an SLA defined with reporting period 'Day', but the view period is 'Week').

#### 4.1.12. Site SLO Performance Table

| SLA Name        | SLA Period | SLO Type                      | Source Application | SLO Status | Alerts Enabled           |
|-----------------|------------|-------------------------------|--------------------|------------|--------------------------|
| WAN Quality SLA | Day        | Network Bandwidth Utilization | All Applications   | ●          | <input type="checkbox"/> |
| WAN Quality SLA | Day        | Network Reliability           | All Applications   | ●          | <input type="checkbox"/> |

##### Context

This table is shown when the user has selected a single Sites node in the navigation tree.

### *Description*

The Site SLO Performance Table provides you with an overview of the performance of each SLO defined for this Site in a Network Service SLA. The SLO status displayed is based on the worst SLO status for the period you selected.

### *Interpretation*

For the period selected in the Date/Time Selector, the worst status for a given SLO is displayed. The worse the indicator status (Green = Compliant, Orange = Marginal, Red = Critical), the worse the performance. SLO status indicators with a Marginal or Critical status are most likely to be the cause of poor application performance. To further determine why and when SLO thresholds were violated, additional functionality is available:

### *SLA Name*

This is the name of the SLA where the SLO displayed is defined.

### *SLA Period*

This is the period for which the SLA is defined.

### *SLO Type*

For each SLO in the table there is a corresponding set of SLO Detail Graphs in the SLO View. Use these graphs to determine when SLO threshold violations occurred.

### *Source Application*

This link in the SLO Performance Table takes you to the application that is the source for the SLO performance data. When SLO thresholds are evaluated, they are sometimes done against specific application data. When you click on this link you will be taken to the appropriate application view so that you can analyze other related application data. If 'All Applications' is displayed, this indicates the measurements are based on the aggregate of all traffic for the site.

### *Alerts Enabled*

This selector enables you to turn alerting on or off for a particular SLO. This is useful when you have discovered a problem for an SLO, and yet you don't want to continue receiving alerts. If you turn alerting off, you will no longer receive notification of marginal or critical SLO violations; however, you will still be able to see this status in the user interface.

### *Technical Details*

This table displays the worst status for each SLO defined for this Site. The system searches through all Network Service SLAs where the selected Site is found, and displays the worst SLO status (for each SLO) found during the period you selected.

Note: The status will be 'Undetermined' (grey) for SLAs with a different reporting period than the one selected in the Date/Period selector (for example: there is an SLA defined with reporting period 'Day', but the view period is 'Week').

## **4.2. The SLO View**

The SLO View provides in-depth information on the actual traffic patterns that were measured in the SLO condition. The SLO view can be reached via:

- The leaf nodes of the Business Process part of the navigation tree
- The leaf nodes of the Service Level part of the navigation tree
- The Site and Application nodes in the navigation tree for which one or more SLOs are defined

For each SLO exactly one set (Inbound and Outbound performance) of graphs will appear in the SLO View. In addition, each SLO will also have one 'SLO Threshold Violations' and one 'SLO Threshold Violations Status' graph, representing the summarization of the violations. So in total each SLO will be presented as four graphs. The sidebar next to each set of graphs identifies the SLO Type that is represented, and in the graph



itself is a reference to the source application. This helps you to determine which set of graphs belongs to which SLO in the SLO Performance Table.

### 4.2.1. SLO Threshold Violations

image::image21.png

#### Context

This graph is shown for each SLO that is defined in the context of the navigation tree.

#### Description

The SLO Threshold Violations graph shows when the Marginal and Critical thresholds in the SLO where exceeded.

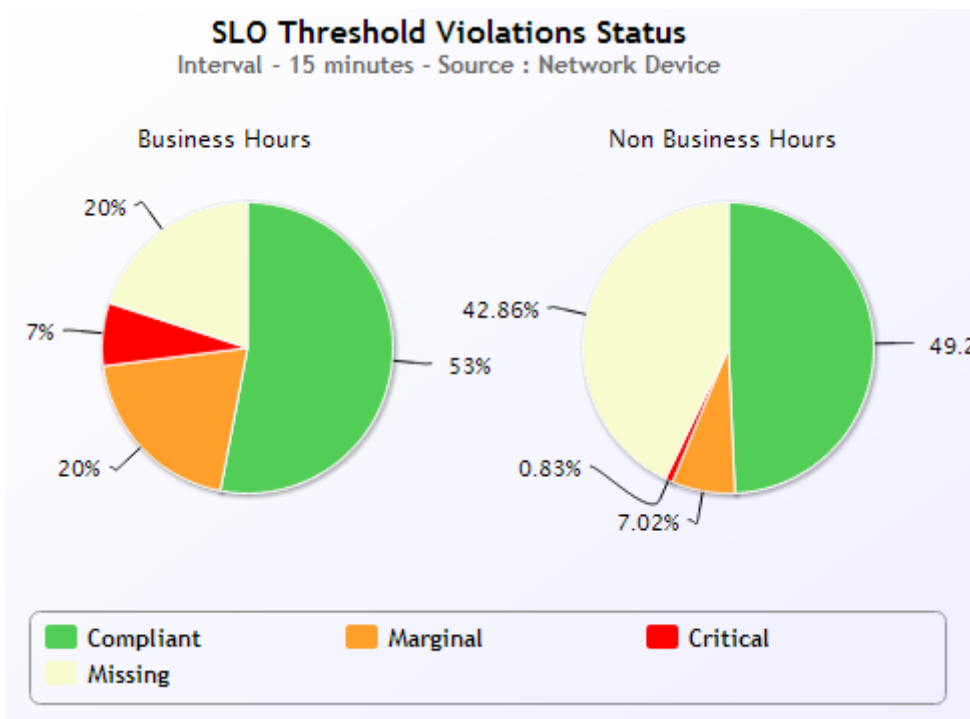
#### Interpretation

Use this graph to determine exactly when SLO thresholds were exceeded, and whether the status was Marginal or Critical. This graph enables you to correlate the raw data displayed in the SLO graphs with the exact time when a threshold violation occurred.

#### Technical Details

For each minute where the SLO status was Marginal or Critical, a point on the graph will be drawn. For intervals larger than 1-minute, the total minutes where the SLO status was Marginal or Critical will be added up and displayed.

### 4.2.2. SLO Threshold Violations Status



#### Context

This graph is shown for each SLO that is defined in the context of the navigation tree.

#### Description

The SLO Threshold Violations Status graph shows what percentage of the minutes in the currently selected period where the Marginal or Critical thresholds in the SLO where exceeded.

#### Interpretation

Use this graph to determine what percentage of the time that your users experienced poor or degraded service. For each minute in the period you selected the status can be Compliant, Marginal, Critical, or

Missing. (For a definition of 'Missing' see below.) If a large percentage of the time the status is Marginal or Critical, it is very likely that your users experienced unacceptable Application performance.

#### *Technical Details*

The percentage of minutes where the SLO status was Compliant, Marginal, or Critical (for the period selected) is displayed. If the status 'Missing' is displayed, this means that SLO data has either not yet been processed (E.g., it is in the future), or the data was never received (E.g., in the past, and the agent was unable to collect the data).

The total number of business hour and non-business hour minutes for the period (thus the number to which the percentages apply) are displayed below the title of the graph. (E.g., for the period 'Day' when using the default Business Hours '600/840' would be displayed. This means that there are 600 Business Hours and 840 non-Business Hours minutes in the currently selected period.)

### **4.2.3. Network Bandwidth Utilization**

image::image23.png[]

#### *Context*

This graph is shows for all Network Bandwidth Utilization SLOs that the user has defined for the context in the navigation tree.

#### *Description*

The Network Bandwidth Utilization SLO Detail graph shows the performance of the Network Bandwidth indicator that was measured during the period selected.

#### *Interpretation*

This graph displays both the value of the Network Bandwidth indicator, and the thresholds that were set for this indicator in the SLO. An orange line in the graph indicates the marginal threshold, and a red line indicates the critical threshold. A green line indicates the site bandwidth.

When the bandwidth for a Site is completely utilized, application traffic is slowed by queuing in routers and other network devices. If this graph shows that the site was full during a certain time period, it is possible that application performance problems occurred during that period. Examine the Site Efficiency and Network Delay graphs (for the selected Site) to see the effect that this had on application traffic.

#### *Technical Details*

The Network Bandwidth indicator represents the average bits per second bandwidth used by the Site during the period selected.

### **4.2.4. Application Bandwidth Utilization**

image::image24.png[]

#### *Context*

This graph is shows for all Application Bandwidth Utilization SLOs that the user has defined for the context in the navigation tree.

#### *Description*

The Application Bandwidth Utilization SLO Detail graph shows the performance of the Application Bandwidth indicator that was measured during the period selected.

#### *Interpretation*

This graph displays both the value of the Application Bandwidth indicator, and the thresholds that were set for this indicator in the SLO. An orange line in the graph indicates the marginal threshold, and a red line indicates the critical threshold. A green line indicates the site bandwidth.

When a WAN link is full, application traffic is slowed by queuing in routers and other network devices. If this

graph shows that the site was full during a certain time period, and the application was also being used at the same time, it is possible that performance problems occurred during that period. Examine the Efficiency and Network Delay graphs to see the effect that this had on the application.

#### *Technical Details*

The Application Bandwidth indicator represents the average bits per second bandwidth used by the application during the period selected.

### **4.2.5. Round Trip Time**

image::image25.png[]

#### *Context*

This graph is shows for all Round-Trip Time SLOs that the user has defined for the context in the navigation tree.

#### *Description*

The Round Trip Time SLO Detail graph shows the performance of the Round Trip Time indicator that was measured during the period selected.

#### *Interpretation*

This graph displays both the value of the Round Trip Time indicator, and the thresholds that were set for this indicator in the SLO. An orange line in the graph indicates the marginal threshold, and a red line indicates the critical threshold. If a dynamic ('trailing average') SLO threshold was used, the orange and red lines may have different values in different parts of the graph. A green line indicates what the trailing average was at a given point in time.

Slow response times are generally caused by congestion, high-delay network paths (e.g., dial-up or international connections), or busy network devices. When abnormally high delays are seen, check to see if the line was congested or if the server or client was experiencing problems.

#### *Technical Details*

The Round Trip Time indicator measures the time it takes to complete a TCP connection setup. This is known as the SYN/SYN-ACK/ACK time. This number gives a good estimation of the latency introduced by the network, since no application logic is involved during this phase of the connection.

### **4.2.6. Network Reliability**

image::image26.png[]

#### *Context*

This graph is shows for all Network Reliability SLOs that the user has defined for the context in the navigation tree.

#### *Description*

The Network Reliability SLO Detail graph shows the performance of the Network Reliability indicator that was measured during the period selected.

#### *Interpretation*

This graph displays both the value of the Network Reliability indicator, and the thresholds that were set for this indicator in the SLO. An orange line in the graph indicates the marginal threshold, and a red line indicates the critical threshold. Poor reliability of the network results in lost or delayed application traffic. This happens because of congested bandwidth, device failures, server or client delays, or very high delay network paths. Check which of these issues may be causing poor network reliability for your application.

#### *Technical Details*

The Network Reliability indicator measures TCP Efficiency. TCP Efficiency represents the percentage of TCP bytes transmitted by an application that were good. Good bytes are bytes that did not need to be

retransmitted. Thus, an efficiency rating of 75% means that 75% of all application traffic got through to the receiver the first time, without needing to be sent twice or more.

### 4.2.7. Service Availability

image::image27.png[]

#### *Context*

This graph is shows for all Service Availability SLOs that the user has defined for the context in the navigation tree.

#### *Description*

The Service Ability SLO Detail graph shows the performance of the Service Ability indicator during the period selected.

#### *Interpretation*

This graph displays the Service Ability indicator with a blue line, and the thresholds that were set for this indicator in the SLO. An orange line in the graph indicates the marginal threshold, and a red line indicates the critical threshold. If the blue line is missing, this indicates that the number of TCP connections set up in that minute was too low to achieve a reliable availability measurement. No violation will be generated in this case.

If unusually low availability percentage appears at a given moment in time, this generally indicates a slow or unavailable server.

#### *Technical Details*

The Service Availability Indicator represents the percentage of successful TCP connection setup attempts made by clients to servers. The raw data used to calculate the Service Availability indicator is TCP Connection Inits (setup attempts = SYN packet sent), and TCP Connection Ignores (no SYN-ACK packet received by client) and Refuses (the server responds with a RST).

### 4.2.8. Call Quality

image::image28.png[]

#### *Context*

This graph is shows for all Call Quality SLOs that the user has defined for the context in the navigation tree.

#### *Description*

The Call Quality SLO Detail graph shows the performance of the Call Quality indicator during the period selected.

#### *Interpretation*

This graph displays the Call Quality indicator, and the thresholds that were set for this indicator in the SLO. An orange line in the graph indicates the marginal threshold, and a red line indicates the critical threshold.

Low scores for Call Quality indicate that a network problem is affecting the quality of your VoIP calls. A marginal score generally indicates that VoIP calls were possible, but of poor quality. A critical score generally indicates that VoIP calls were not possible.

#### *Technical Details*

The Call Quality indicator is based on a version of the industry standard MOS (Mean Opinion Score) value. To convert the displayed indicator to a MOS value divide the value by 10. The displayed value is the average value for all VoIP calls made during the interval displayed.

### 4.2.9. Quality of Experience

image::image29.png[]

### *Context*

This graph is shows for all Quality of Experience SLOs that the user has defined for the context in the navigation tree.

### *Description*

The Quality of Experience SLO Detail graph shows the performance of the Quality of Experience indicator during the period selected.

### *Interpretation*

This graph displays the Quality of Experience indicator, and the thresholds that were set for this indicator in the SLO. An orange line in the graph indicates the marginal threshold, and a red line indicates the critical threshold.

Low scores for Quality of Experience indicate that network problems are affecting the quality of your VoIP calls. The lower the value, the poorer the quality.

### *Technical Details*

The Quality of Experience indicator is based on the industry standard r-factor value. The r-factor is derived from measurements such as latency, jitter, and packet loss.

## **4.2.10. Jitter**

image::image30.png[]

### *Context*

This graph is shows for all Jitter SLOs that the user has defined for the context in the navigation tree.

### *Description*

The Jitter SLO Detail graph shows the performance of the Jitter indicator during the period selected.

### *Interpretation*

This graph displays the Jitter indicator, and the thresholds that were set for this indicator in the SLO. An orange line in the graph indicates the marginal threshold, and a red line indicates the critical threshold.

High Jitter values indicate that unpredictable network conditions are causing high variations in VoIP latency. Jitter is generally caused by packet loss or queuing due to congestion or faulty network equipment. High Jitter values can cause poor VoIP quality.

### *Technical Details*

The Jitter indicator represents the average variation in one-way latencies for RTP packets.

## **4.2.11. RTP Latency**

image::image31.png[]

### *Context*

This graph is shows for all RTP Latency SLOs that the user has defined for the context in the navigation tree.

### *Description*

The RTP Latency SLO Detail graph shows the performance of the RTP Latency indicator during the period selected.

### *Interpretation*

This graph displays the RTP Latency indicator, and the thresholds that were set for this indicator in the SLO. An orange line in the graph indicates the marginal threshold, and a red line indicates the critical threshold.

High latency values can cause VoIP to become unusable. If users of VoIP need to wait too long (= high RTP

Latency values) to hear the other party in a call, they generally hang up.

#### Technical Details

The RTP Latency indicator represents the average one-way latency for RTP packets in a call. The leaf nodes of the Business Process part of the navigation tree

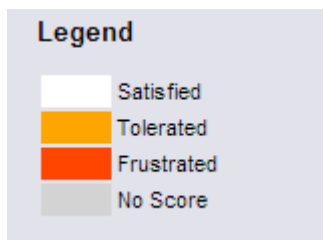
## 4.3. The Apdex View

The Apdex view represents the Application Performance index information for those applications for which one or more Apdex metrics have been configured. Core application performance metrics are determined for all traffic that is classified as Application, Site, Remote Site. For each minute, direction (it depends on the type of metrics whether only one direction is taken into account or both directions) and Apdex metric configured for the application, the Apdex status is computed (the worst status across all configured Apdex metrics). This results in a status per minute of Satisfied, Tolerated, or Frustrated. This information is shown when an Application, Site, Remote Site is selected and the period is set to Hour. For larger time periods, the Apdex calculation formula is used:

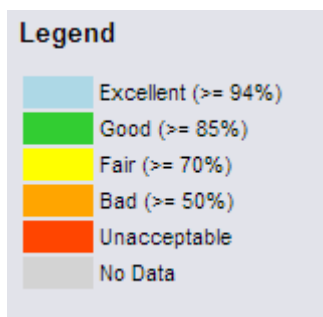
$$((\# \text{ Satisfied} + (\# \text{ Tolerated} / 2)) / \# \text{ Minutes}) \times 100\%$$

When a node is selected in the navigation tree that represents an aggregation of the Application, Site, Remote Site, the worst Apdex score is shown. As a popup on the cell's value, the average Apdex based on the Apdex calculation formula across all minutes in the aggregation.

At the lowest level, the color scheme that is used for the Apdex table is as follows:



For the Apdex tables that represent aggregated data, the following color scheme is applied:

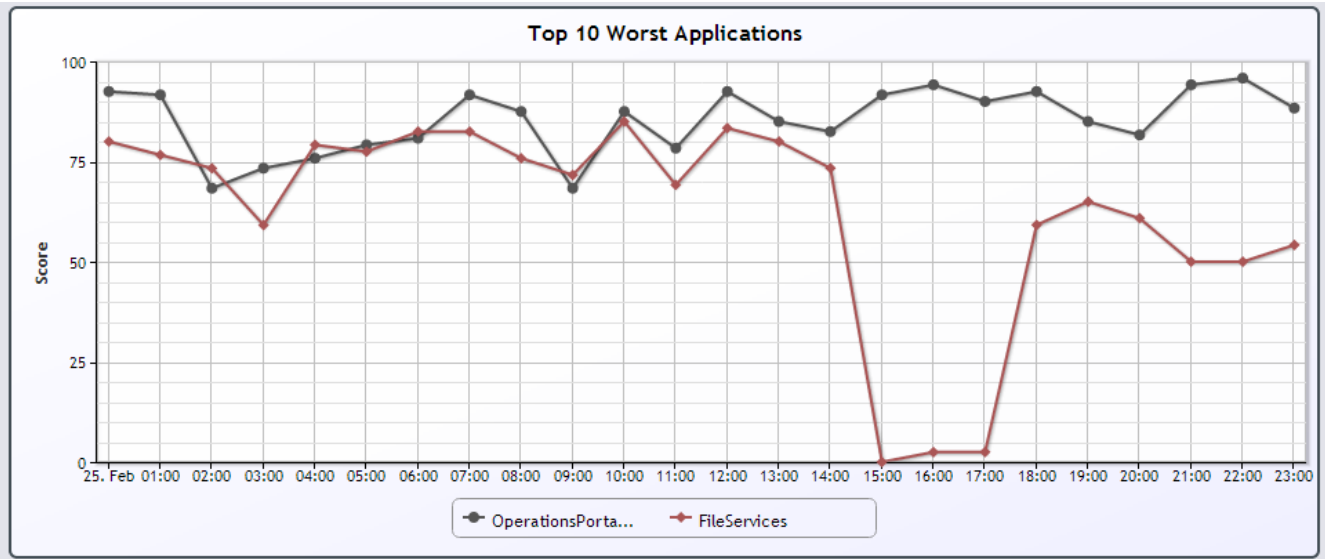


In the heat chart tables the entities defining the rows can be clicked to facilitate a workflow through the Apdex information. Each Time indication in the header of the heat charts can be clicked on to zoom in to that specific time frame.

If Apdex is defined for multiple device types, a table will be drawn per device type. If there is no Apdex information available for a given selection, the Apdex tab will not be shown.

### 4.3.1. All Applications Apdex View

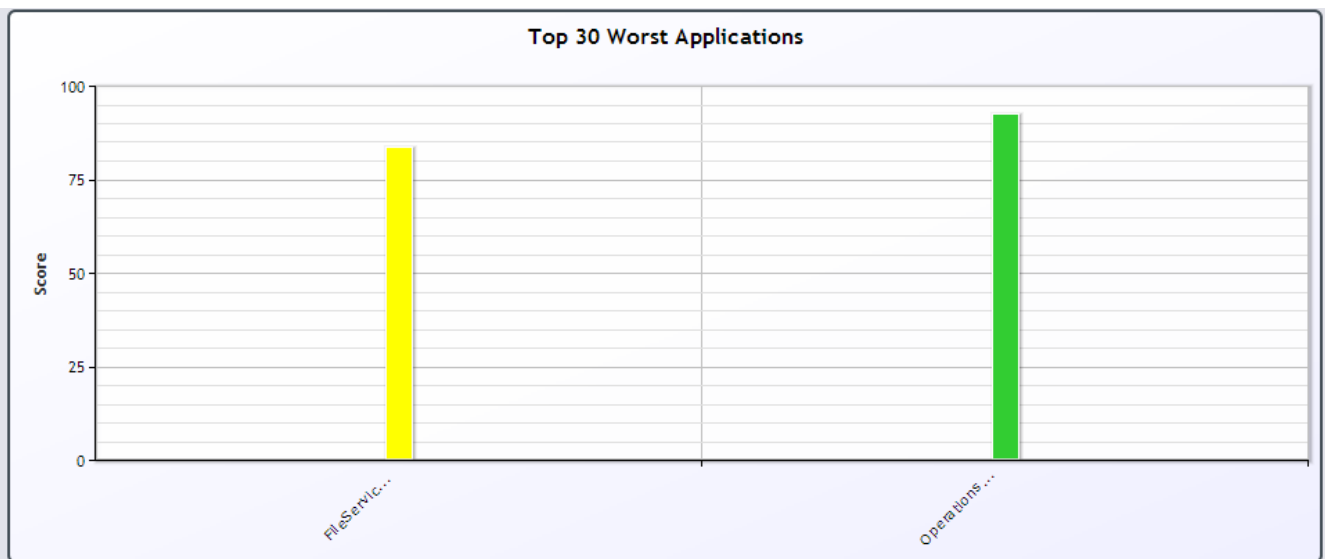
The Apdex tab will show a graph showing the top-10 worst applications for which Apdex is enabled and the Apdex score per application and time division.



The Apdex tab will also show a heat chart table, showing as rows the set of applications for which Apdex is enabled, and for columns a division in time of the period selected (e.g. when the period Day is selected, the columns will be shown per hour.) Each cell in the table will show the Apdex score with as background the color indicator for that score (so under perfect conditions all the cells will be blue.)

| Application      | 00:00 | 01:00 | 02:00 | 03:00 | 04:00 | 05:00 | 06:00 | 07:00 | 08:00 | 09:00 | 10:00 | 11:00 | 12:00 | 13:00 | 14:00 | 15:00 |
|------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| OperationsPortal | 92.5  | 91.67 | 68.33 | 73.33 | 75.83 | 79.17 | 80.83 | 91.67 | 87.5  | 68.33 | 87.5  | 78.33 | 92.5  | 85.0  | 82.5  | 91.67 |
| FileServices     | 80.0  | 76.67 | 73.33 | 59.17 | 79.17 | 79.11 | 82.5  | 82.5  | 75.83 | 71.67 | 85.0  | 69.17 | 83.33 | 80.0  | 73.33 | 0.0   |

When only a single hour is selected, a bar chart will show the Apdex per application, where the bar color represents the Apdex score:

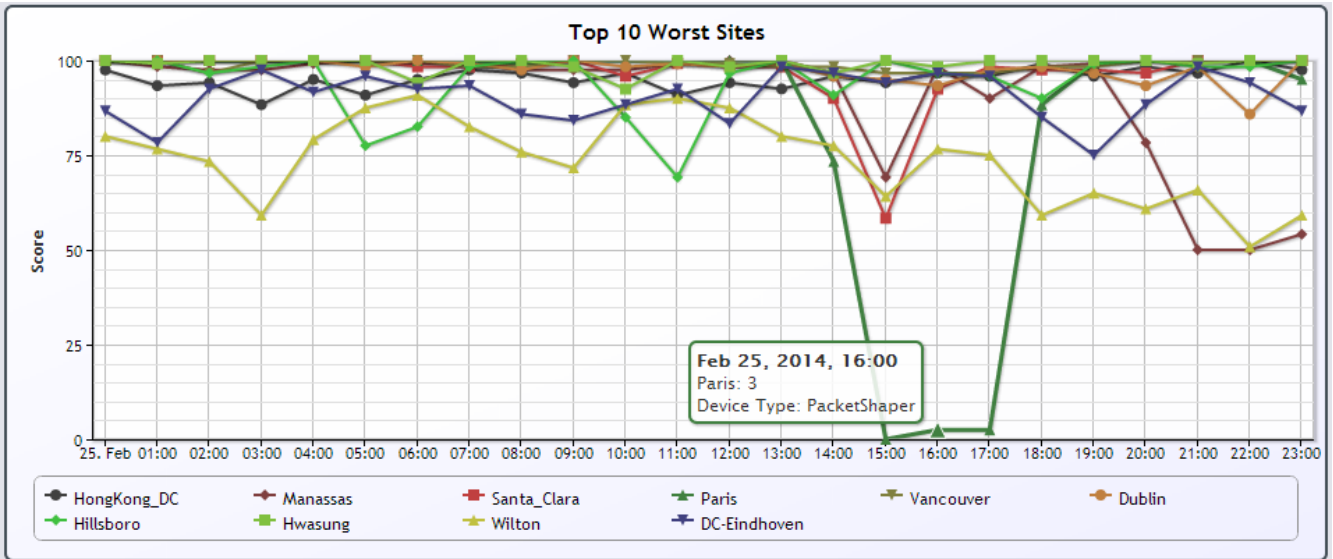


A table will show the total number of Satisfied, Tolerated, and Frustrated minutes:

| Application      | Apdex |
|------------------|-------|
| FileServices     | 83.33 |
| OperationsPortal | 92.5  |

### 4.3.2. Application Apdex View

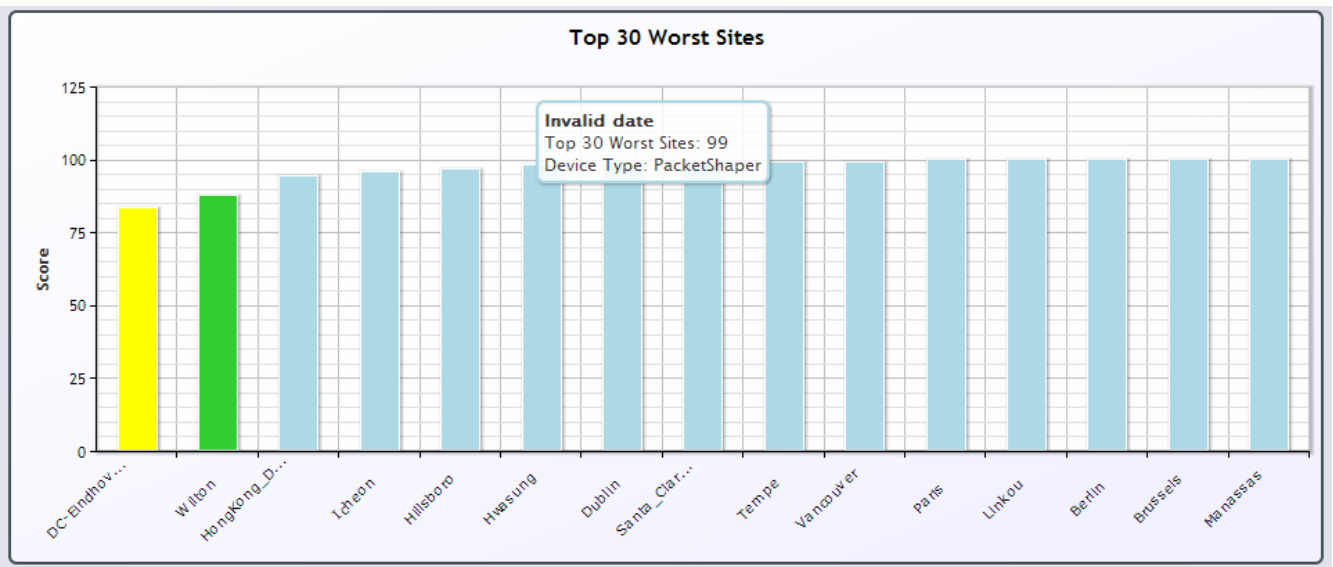
The Apdex tab will show a graph showing the top-10 worst sites (restricted to the Site Group if that node is selected) for which Apdex is enabled for the given application and the Apdex score per site and time division.



The Apdex tab will also show a heat chart table with rows the set of end-user Sites that get an Apdex score for that application (restricted to the Site Group if that node is selected), and for columns a division in time of the period selected. Each cell in the table will show the Apdex score with as background the color indicator for that score.

| Site        | 00:00 | 01:00 | 02:00 | 03:00 | 04:00 | 05:00 | 06:00 | 07:00 | 08:00 | 09:00 | 10:00 | 11:00 | 12:00 | 13:00 | 14:00 | 15:00 |
|-------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| HongKong_DC | 97.5  | 93.33 | 94.17 | 88.33 | 95.0  | 90.83 | 95.0  | 97.5  | 96.67 | 94.17 | 96.67 | 90.83 | 94.17 | 92.5  | 95.83 | 94.17 |
| Icheon      | 100.0 | 100.0 | 100.0 | 100.0 | 98.33 | 100.0 | 100.0 | 99.17 | 98.33 | 100.0 | 100.0 | 100.0 | 95.83 | 99.17 | 100.0 | 99.17 |
| Manassas    | 100.0 | 98.33 | 97.5  | 97.5  | 99.17 | 100.0 | 99.17 | 99.17 | 97.5  | 97.5  | 97.5  | 99.17 | 100.0 | 100.0 | 96.67 | 69.17 |
| Berlin      | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 99.17 | 100.0 | 100.0 | 100.0 | 99.17 | 96.67 | 100.0 | 100.0 | 100.0 | 98.33 |
| Santa_Clara | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 98.33 | 98.33 | 99.17 | 100.0 | 95.83 | 99.17 | 98.33 | 98.33 | 90.0  | 58.33 |
| Hwasung     | 100.0 | 99.17 | 100.0 | 100.0 | 100.0 | 100.0 | 94.17 | 100.0 | 100.0 | 98.33 | 92.5  | 100.0 | 98.33 | 100.0 | 96.67 | 100.0 |
| Wilton      | 80.0  | 76.67 | 73.33 | 59.17 | 79.17 | 87.5  | 90.83 | 82.5  | 75.83 | 71.67 | 88.33 | 90.0  | 87.5  | 80.0  | 77.5  | 64.17 |
| Brussels    | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 |
| Linkou      | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 98.33 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 |
| Paris       | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 99.17 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 0.0   |

Per hour the graph will show the top-30 worst sites as a bar chart, where each bar represent the Apdex score and is colored according to the score:



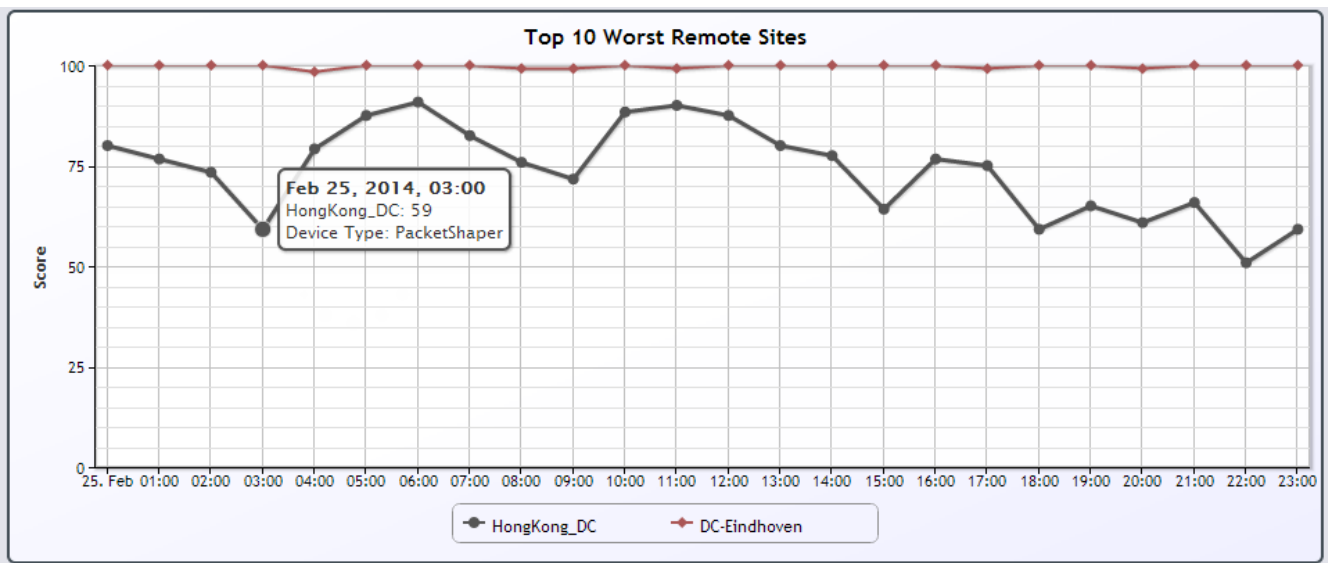
The table will show the Apdex score per Site for all sites:



| Site         | Apdex |
|--------------|-------|
| Vancouver    | 99.17 |
| Wilton       | 87.5  |
| DC-Eindhoven | 83.33 |
| Santa_Clara  | 98.33 |
| Hillsboro    | 96.67 |
| Tempe        | 99.17 |
| Manassas     | 100.0 |
| HongKong_DC  | 94.17 |

### 4.3.3. Application/Site Apdex View

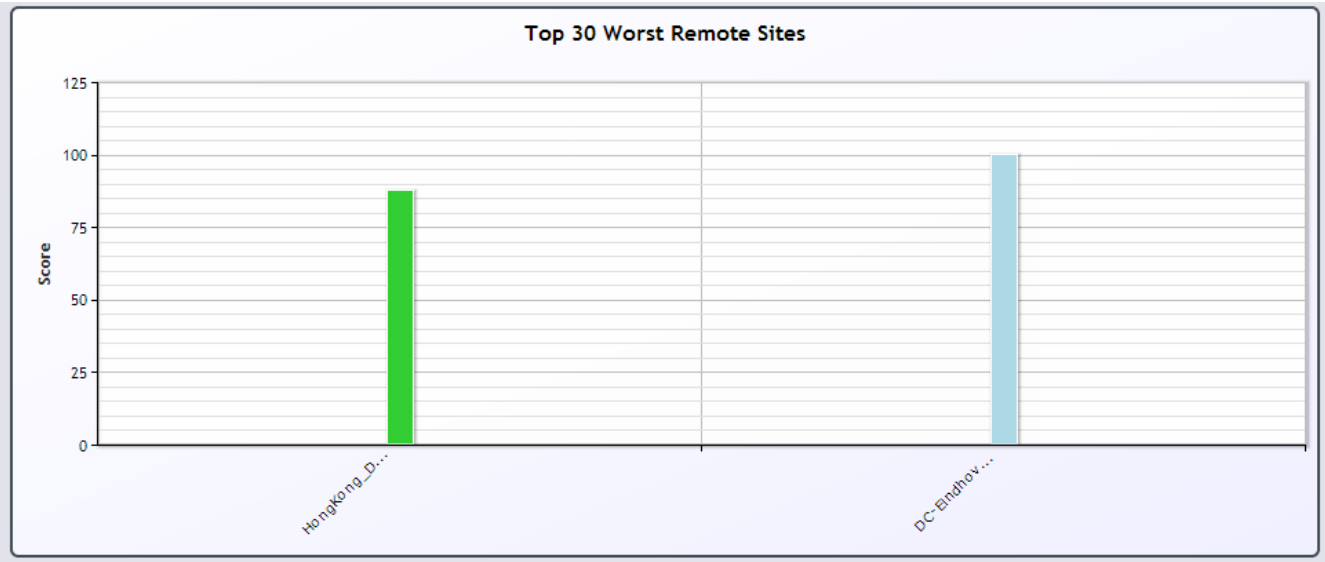
The Apdex tab will show a graph showing the top-10 worst remote sites (i.e., the sites offering the service) that get an Apdex score for the selected Application and Site and the Apdex score per remote site and time division.



The Apdex tab will also show a heat chart table with rows the set of remote Sites (i.e., the sites offering the service) that get an Apdex score for the selected Application and Site, and for columns a division in time of the period selected. Each cell in the table will show the Apdex score with as background the color indicator for that score (including the coloring).

| Site         | 00:00 | 01:00 | 02:00 | 03:00 | 04:00 | 05:00 | 06:00 | 07:00 | 08:00 | 09:00 | 10:00 | 11:00 | 12:00 | 13:00 | 14:00 | 15:00 |
|--------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| HongKong_DC  | 80.0  | 76.67 | 73.33 | 59.17 | 79.17 | 87.5  | 90.83 | 82.5  | 75.83 | 71.67 | 88.33 | 90.0  | 87.5  | 80.0  | 77.5  | 64.17 |
| DC-Eindhoven | 100.0 | 100.0 | 100.0 | 100.0 | 98.33 | 100.0 | 100.0 | 100.0 | 99.17 | 99.17 | 100.0 | 99.17 | 100.0 | 100.0 | 100.0 | 100.0 |

Per hour the graph will show the top-30 worst remote sites as a bar chart, where each bar represent the Apdex score and is colored according to the score:

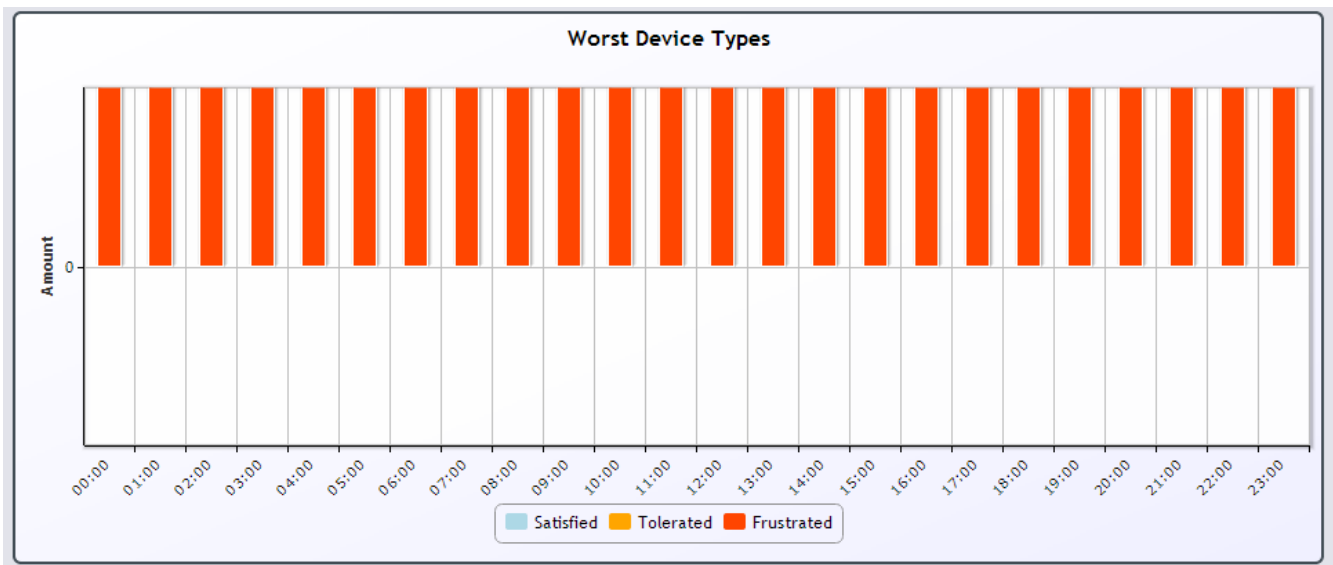


And the table shows the score per remote site:

| Site         | Apdex |
|--------------|-------|
| DC-Eindhoven | 100.0 |
| HongKong_DC  | 87.5  |

#### 4.3.4. Application/Site/Remote Site Apdex View

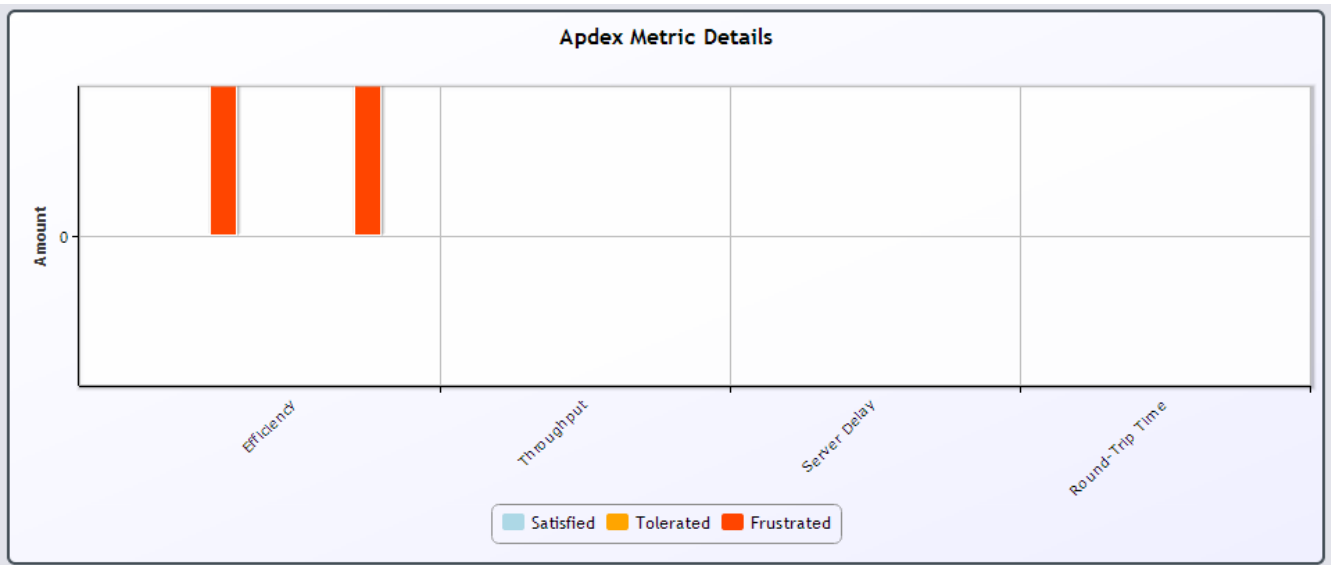
In this context the Apdex tab will show a bar chart with all the metrics (throughput, TCP Efficiency, round-trip time, network delay, and server delay) that are selected for that Application to be used in the Apdex per time division.



The Apdex tab will also show a table with the time division as rows. The columns will show all the metrics (throughput, TCP Efficiency, round-trip time, network delay, and server delay) that are selected for that Application to be used in the Apdex. Each cell will contain the Apdex index for only that metric for the combination <Site, Application> at that time slot. This allows the user to quickly identify the metric that is impacting the overall Apdex score.

| Time  | Satisfied | Tolerated | Frustrated | Apdex |
|-------|-----------|-----------|------------|-------|
| 00:00 | 48        | 0         | 12         | 80.0  |
| 01:00 | 45        | 2         | 13         | 76.67 |
| 02:00 | 42        | 4         | 14         | 73.33 |
| 03:00 | 35        | 1         | 24         | 59.17 |
| 04:00 | 47        | 1         | 12         | 79.17 |
| 05:00 | 52        | 1         | 7          | 87.5  |
| 06:00 | 53        | 3         | 4          | 90.83 |
| 07:00 | 48        | 3         | 9          | 82.5  |
| 08:00 | 42        | 7         | 11         | 75.83 |
| 09:00 | 37        | 12        | 11         | 71.67 |
| 10:00 | 53        | 0         | 7          | 88.33 |

Per hour the full details of all the configured Apdex metrics for the selection in the navigation tree will be shown:



| Minute | Round Trip Time | Efficiency |          | Server Delay | Throughput |            |
|--------|-----------------|------------|----------|--------------|------------|------------|
|        |                 | Inbound    | Outbound |              | Inbound    | Outbound   |
| 12:00  | 0.0             | 100.00 %   | 83.00 %  | 0.00 ms      | 50.27 b/s  | 36.93 b/s  |
| 12:01  | 221.0           | 100.00 %   | 100.00 % | 3.00 ms      | 819.87 b/s | 840.27 b/s |
| 12:02  | 222.0           | 100.00 %   | 100.00 % | 7.00 ms      | 372.13 b/s | 383.73 b/s |
| 12:03  | 222.0           | 100.00 %   | 100.00 % | 36.00 ms     | 662.53 b/s | 891.33 b/s |
| 12:04  | 0.0             |            |          | 0.00 ms      | 0.00 b/s   | 0.00 b/s   |
| 12:05  | 318.0           | 100.00 %   | 100.00 % | 6.00 ms      | 1.30 kb/s  | 951.07 b/s |
| 12:06  | 254.0           | 100.00 %   | 100.00 % | 11.00 ms     | 349.33 b/s | 838.27 b/s |
| 12:07  | 224.0           | 99.00 %    | 99.00 %  | 49.00 ms     | 452.27 b/s | 815.73 b/s |
| 12:08  | 287.0           | 100.00 %   | 100.00 % | 6.00 ms      | 767.60 b/s | 379.33 b/s |
| 12:09  | 235.0           | 100.00 %   | 100.00 % | 21.00 ms     | 1.42 kb/s  | 1.99 kb/s  |
| 12:10  | 301.0           | 100.00 %   | 100.00 % | 1.00 ms      | 93.20 b/s  | 93.20 b/s  |

## 4.4. The Overview View

The Overview view gives a concise overview of the key measurements for all elements for a given selection in the navigation tree.

The Overview table implements a smart sorting mechanism that will automatically switch between inbound and outbound statistics based on the sort ordering requested. For example, Efficiency is a measurement that has different values for inbound and outbound. If the user sorts from best to worst, the table will show for each application the direction with the highest efficiency value. The actual direction that is shown is represented by the red arrow pointing inwards (for example for the application 'Company Website' or outwards (for 'Intranet'). If the user would change the sort order again, the column will show the worst efficiencies and therefore the other direction for each application.

The Overview table also gives an indication of the current measurement values compared to a relevant sample in the past. If the value is 'better' (e.g., lower Volume or higher Efficiency) a green arrow pointing down will be shown (e.g., Volume for the application 'Company Website'); if the value is worse a red arrow pointing up (e.g., Availability for the application 'Email') and if the value is unchanged a blue equal sign is shown (e.g., Efficiency for the application 'Company Website'.)

The relative sample used for the comparison is the last three similar measurement periods as the selected period. If the selected period is an hour, the same hour on the same day for the preceding three weeks is averaged and used as baseline. For day period the same day for the preceding three weeks is used; for the week period the average from the three preceding weeks itself is used. For month period the average of the three preceding months is used.

For devices that do not support the capability needed for a column, the column will not be shown.

#### 4.4.1. All Applications Overview Table

In the context of All Applications, the Overview view shows the best and worst measurement values for Volume, Efficiency, number of Connections, and Availability for each application.

| Application      | WAN Volume | Efficiency | Connections | Availability |
|------------------|------------|------------|-------------|--------------|
| ADN-Default      | 56.34 MB   | 99.94%     | 3899        | 100%         |
| ADN-SN           | 5.53 GB    | 99.88%     | 272583      | 100%         |
| Blackberry       | 0 Byte     | 0%         | 0           | 100%         |
| Default          | 13.26 GB   | 99.56%     | 357104      | 92.72%       |
| Desktop-Backup   | 7.06 GB    | 97.81%     | 6824        | 99.76%       |
| eLearning        | 6.78 MB    | 99.78%     | 879         | 98.07%       |
| FileServices     | 639.46 MB  | 99.8%      | 22163       | 97.26%       |
| FTP              | 431.73 kB  | 99.75%     | 6           | 100%         |
| Hardware support | 637.11 MB  | 99.3%      | 17616       | 99.74%       |
| Mail_Client      | 111.91 MB  | 99.26%     | 2617        | 89.98%       |

The columns for Efficiency, Connections, and Availability distinguish between inbound and outbound, whereas the Volume column shows the total volume in both directions.

#### 4.4.2. Application Overview Table

In the context of a single Application, the Overview view shows the best and worst measurement values for Utilization, Volume, Efficiency, Server Delay, number of Connections, and Availability for each site.

| Site         | Utilization | WAN Volume | Efficiency | Server Delay | Connections | Availability |
|--------------|-------------|------------|------------|--------------|-------------|--------------|
| Amsterdam    | 0.03%       | 1.1 MB     | 99.99%     | 0 ms         | 47          | 100%         |
| Apeldoorn    | 0.02%       | 496.78 kB  | 99.98%     | 0 ms         | 4           | 100%         |
| Arnhem       | 0%          | 27.8 kB    | 100%       | 0 ms         | 0           | 100%         |
| DC-Eindhoven | 0.1%        | 65.23 MB   | 98.52%     | 17.33 ms     | 1454        | 90.32%       |
| DC-Rotterdam | 0.13%       | 26.72 MB   | 99.69%     | 29.53 ms     | 856         | 81.6%        |
| Den Helder   | 0.1%        | 1.73 MB    | 100%       | 0 ms         | 4           | 100%         |
| Gouda        | 0.01%       | 346.39 kB  | 99.97%     | 0 ms         | 23          | 100%         |
| Rotterdam    | 0.04%       | 10.17 MB   | 100%       | 0 ms         | 262         | 100%         |
| Tilburg      | 0.1%        | 3.67 MB    | 99.36%     | 0 ms         | 50          | 100%         |
| Utrecht      | 0.06%       | 2.44 MB    | 99.28%     | 0 ms         | 33          | 100%         |

The behavior of the Overview table in the context of a single application is similar to the Overview table for All Applications. Both the Utilization and the Server Delay columns distinguish between measurements for the inbound and outbound directions and therefore show a direction indication for each value.

#### 4.4.3. Application-Site Overview Table

In the context of a single Application and a single site, the Overview view shows the best and worst measurement values for Utilization, Volume, Efficiency, Round-Trip Time, number of Connections, and Availability for each remote site.

| Remote Site  | Utilization | WAN Volume | Efficiency | Round Trip Time | Connections | Availability |
|--------------|-------------|------------|------------|-----------------|-------------|--------------|
| DC-Eindhoven | 0.03%       | 1.1 MB     | 99.99%     | 270.48 ms       | 47          | 100%         |
| DC-Groningen | 0%          | 0 Byte     | 0%         | 0 ms            | 0           | 100%         |
| DC-Rotterdam | 0%          | 0 Byte     | 0%         | 0 ms            | 0           | 100%         |

The behavior of the Overview table in the context of a single application at a single site is similar to the

Overview table for All Applications. Both the Utilization and the Round-Trip Time columns distinguish between measurements for the inbound and outbound directions and therefore show a direction indication for each value.

#### 4.4.4. All Sites Overview Table

In the context of All Sites, the Overview view shows the best and worst measurement values for Utilization, Volume, Efficiency, number of Connections, and Availability for each site. When Flow Detail Record information is available, the Overview table will also show the number of unique users (based on IP addresses) at that site in the given time frame.

| Site         | Utilization | WAN Volume | Efficiency | Connections | Availability |
|--------------|-------------|------------|------------|-------------|--------------|
| Amersfoort   | 6.97%       | 91.91 MB   | 99.91%     | 7537        | 100%         |
| Amsterdam    | 37.65%      | 1.8 GB     | 99.71%     | 24341       | 91.14%       |
| Apeldoorn    | 2.44%       | 121.27 MB  | 99.96%     | 17799       | 99.17%       |
| Arnhem       | 4.6%        | 65.95 MB   | 99.78%     | 5213        | 98.13%       |
| Assen        | 13.87%      | 140.89 MB  | 99.76%     | 2937        | 100%         |
| DC-Eindhoven | 53.91%      | 33.32 GB   | 99.84%     | 539045      | 94.15%       |
| DC-Rotterdam | 68.65%      | 18.75 GB   | 99.51%     | 662669      | 95.66%       |
| Den Helder   | 6.79%       | 199.77 MB  | 99.93%     | 6222        | 80.04%       |
| Den Haag     | 0.03%       | 519.08 kB  | 100%       | 283         | 95%          |
| Gouda        | 10.72%      | 343.04 MB  | 99.94%     | 22385       | 86.13%       |

The behavior of the Overview table in the context of All Sites is similar to the Overview table for All Applications.

#### 4.4.5. Site Group Overview Tables

If the user selects a Site Group, the Overview view will show two Overview tables, one showing all the sites (as above) and one showing all the applications used by the sites in the Site Group, as for All Applications.

| Site       | Utilization | WAN Volume | Efficiency | Connections | Availability |
|------------|-------------|------------|------------|-------------|--------------|
| Amersfoort | 6.97%       | 91.91 MB   | 99.91%     | 5982        | 100%         |
| Apeldoorn  | 2.44%       | 121.27 MB  | 99.96%     | 12793       | 99.17%       |
| Arnhem     | 4.6%        | 65.95 MB   | 99.78%     | 3481        | 98.13%       |
| Assen      | 13.87%      | 140.89 MB  | 99.76%     | 2758        | 100%         |
| Den Helder | 6.79%       | 199.77 MB  | 99.93%     | 4323        | 80.04%       |
| Den Haag   | 0.03%       | 519.08 kB  | 100%       | 140         | 95%          |
| Gouda      | 10.72%      | 343.04 MB  | 99.94%     | 21185       | 86.13%       |
| Maastricht | 0%          | 4.03 kB    | 100%       | 0           | 100%         |
| Nijmegen   | 23.9%       | 353.98 MB  | 99.57%     | 6074        | 90.96%       |
| Tilburg    | 11.52%      | 586.74 MB  | 99.85%     | 21329       | 98.68%       |

| Application      | WAN Volume | Efficiency | Connections | Availability |
|------------------|------------|------------|-------------|--------------|
| ADN-Default      | 27.59 MB   | 99.9%      | 876         | 100%         |
| ADN-SN           | 68.9 MB    | 100%       | 7975        | 100%         |
| Default          | 335.37 MB  | 99.81%     | 7981        | 99.65%       |
| Desktop-Backup   | 37.15 MB   | 99.78%     | 8           | 100%         |
| FileServices     | 66.32 MB   | 99.96%     | 1121        | 98.22%       |
| FTP              | 0 Byte     | 0%         | 0           | 100%         |
| Hardware support | 54.07 MB   | 98.75%     | 8597        | 100%         |
| Mail_Client      | 6.25 MB    | 99.71%     | 56          | 100%         |
| MPEG-Audio       | 107.37 MB  | 99.02%     | 2           | 100%         |
| MPEG-Video       | 0 Byte     | 0%         | 0           | 100%         |

#### 4.4.6. Site Overview Tables

In the context of a single Site, the Overview view shows two Overview tables, one for the remote sites and one for the applications used at that site. The Overview table for remote sites shows the best and worst measurement values for Utilization, Volume, Efficiency, Round-Trip Time, number of Connections, and Availability. The Overview table for applications shows the best and worst measurement values for Utilization, Volume, Efficiency, Round-Trip Time, number of Connections, and Availability.

| Remote Site  | Utilization | WAN Volume | Efficiency | Round Trip Time | Connections | Availability |
|--------------|-------------|------------|------------|-----------------|-------------|--------------|
| DC-Eindhoven | 30.27%      | 931.47 MB  | 99.83%     | 269.37 ms       | 10877       | 94.28%       |
| DC-Groningen | 0.15%       | 5.2 MB     | 99.87%     | 262.21 ms       | 702         | 90.92%       |
| DC-Rotterdam | 5.52%       | 208.48 MB  | 99.2%      | 101.24 ms       | 3825        | 94.34%       |
| Rotterdam    | 0.34%       | 14.34 MB   | 98.47%     | 60.08 ms        | 2433        | 100%         |

| Application      | Utilization | WAN Volume | Efficiency | Connections | Availability |
|------------------|-------------|------------|------------|-------------|--------------|
| ADN-Default      | 0.14%       | 5.57 MB    | 99.88%     | 989         | 100%         |
| Default          | 4.74%       | 206.74 MB  | 99.42%     | 6849        | 77.48%       |
| Desktop-Backup   | 1.08%       | 31.16 MB   | 98.73%     | 61          | 100%         |
| FileServices     | 0.97%       | 44.64 MB   | 99.42%     | 1127        | 99.73%       |
| Hardware support | 10.44%      | 278.16 MB  | 99.2%      | 2821        | 99.46%       |
| Mail_Client      | 0.03%       | 1.1 MB     | 99.99%     | 47          | 100%         |
| MS Updates       | 0%          | 0 Byte     | 0%         | 0           | 100%         |
| OperationsPortal | 6.85%       | 181.98 MB  | 99.74%     | 697         | 100%         |
| Sharepoint       | 0%          | 37.67 kB   | 100%       | 2           | 100%         |
| Storage_Layer    | 0.01%       | 667.88 kB  | 98.4%      | 28          | 100%         |

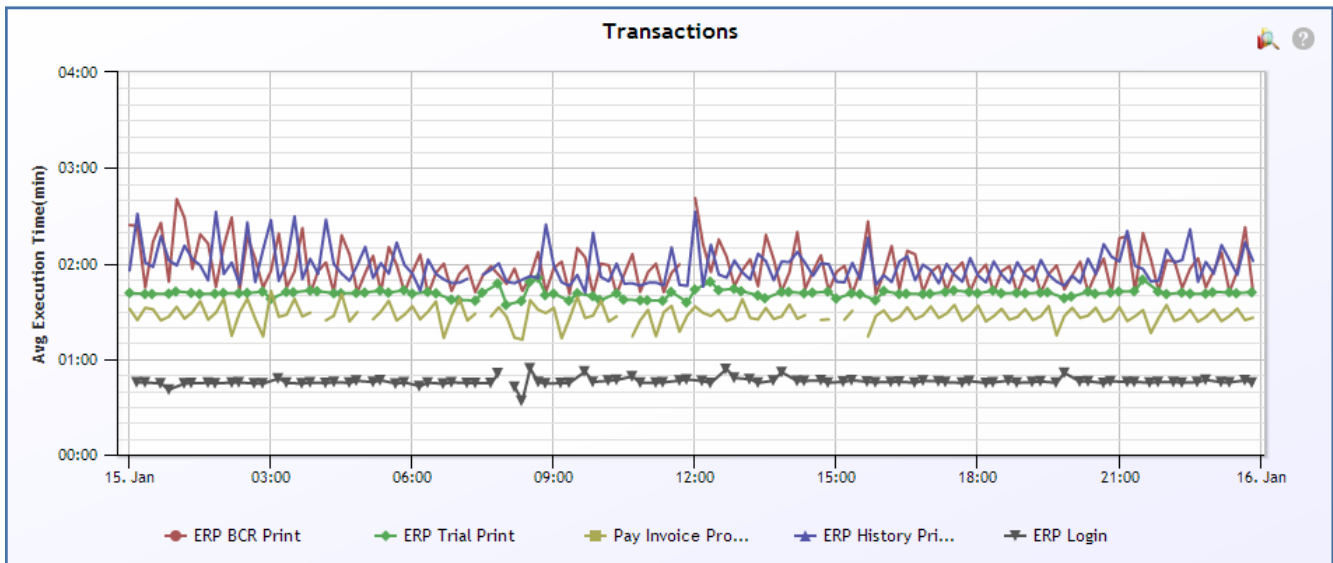
The behavior of the Overview tables in the context of a single site is similar to the Overview table for All Applications. Both the Utilization and the Round-Trip Time columns distinguish between measurements for the inbound and outbound directions and therefore show a direction indication for each value.

## 4.5. The Transaction View

The Transaction View gives information on the ATM transaction measurements that have been collected by the ATM agents. Optionally, for each ATM Task a Service Level Objective threshold can be specified. If set, each script execution that exceeds this threshold will be regarded as 'too slow' and will be counted in the percentage of SLO violations.

### 4.5.1. All Transactions

The All Transactions view shows information for the ATM Scripts. First a graph is shown with a series for each ATM Script, showing the average measurement of the script across all instances per time interval. Interrupts in the line of the series indicate that measurements have failed at that period.



Second a table is shown where the measurements per ATM Script are split per time interval.

| Script              | Time  | Nr. Transactions | Nr. failures | Avg     | Min     | Max     | St Dev  | SLO |
|---------------------|-------|------------------|--------------|---------|---------|---------|---------|-----|
| Pay Invoice Process | 15:00 | 12               | 33.33%       | 1:25 m  | 1:13 m  | 1:34 m  | 9.19 s  | 0%  |
| ERP Trial Print     | 15:00 | 12               | 0%           | 1:39 m  | 1:27 m  | 1:50 m  | 8.67 s  | 0%  |
| ERP Login           | 15:00 | 12               | 0%           | 45.82 s | 33.45 s | 55.36 s | 8.9 s   | 0%  |
| ERP History Print   | 15:00 | 12               | 8.33%        | 1:54 m  | 1:41 m  | 2:35 m  | 14.62 s | 0%  |
| ERP BCR Print       | 15:00 | 12               | 0%           | 1:58 m  | 1:40 m  | 2:47 m  | 17.5 s  | 0%  |
| Pay Invoice Process | 14:00 | 12               | 16.67%       | 1:26 m  | 1:14 m  | 1:35 m  | 9.5 s   | 0%  |
| ERP Trial Print     | 14:00 | 12               | 0%           | 1:41 m  | 1:27 m  | 1:52 m  | 9.96 s  | 0%  |
| ERP Login           | 14:00 | 12               | 0%           | 45.97 s | 33.24 s | 55.64 s | 8.92 s  | 0%  |
| ERP History Print   | 14:00 | 12               | 0%           | 1:59 m  | 1:41 m  | 2:18 m  | 7.9 s   | 0%  |
| ERP BCR Print       | 14:00 | 12               | 0%           | 1:58 m  | 1:38 m  | 2:35 m  | 15.15 s | 0%  |

Showing 41 to 50 of 120 entries

For each combination of Script and time period the following columns are shown:

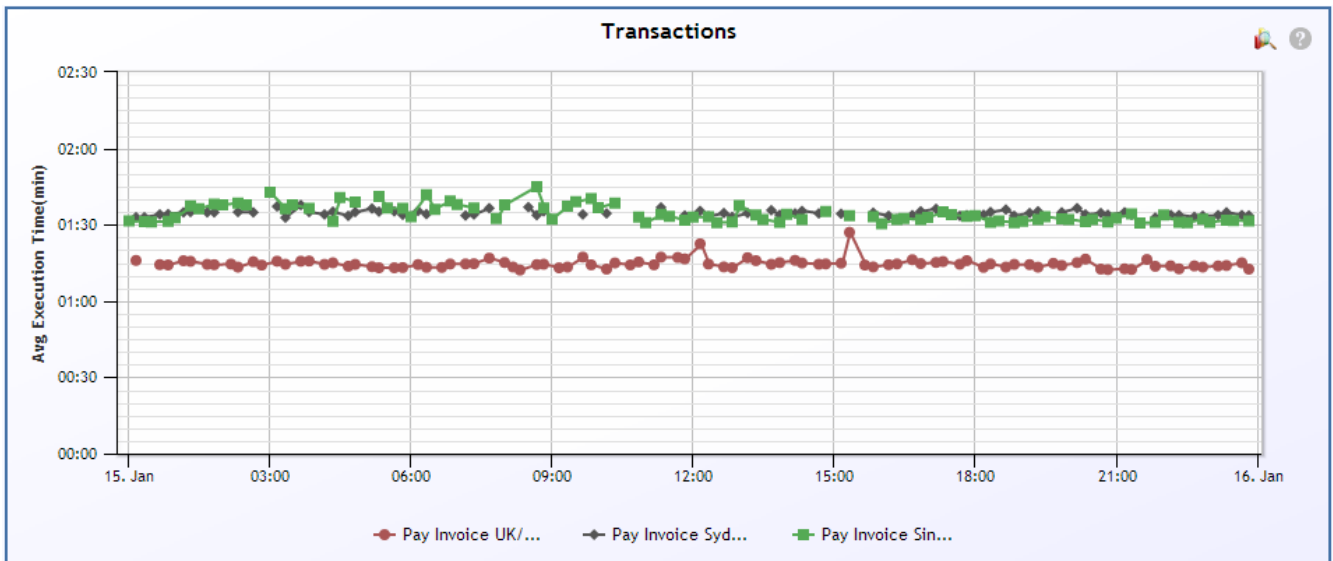
- The total number of transactions scheduled
- The percentage of transaction script execution failures

- The average, minimum, and maximum script execution time
- The standard deviation of the script execution times
- The percentage of SLO violations

In both the Number of Failures and the SLO columns a color scheme is used to emphasize excessive error percentages. If the percentage exceeds 10%, a dark orange background is shown; if it is more than 5%, a light orange, and white otherwise.

### 4.5.2. ATM Script

The ATM Script view shows information for the ATM Tasks derived from the selected ATM Script. First a graph is shown with a series for each ATM Task, showing the average measurement of the task across all instances per time interval. Interrupts in the line of the series indicate that measurements have failed at that period.



Second a table is shown where the measurements per ATM Task are split per time interval.

Show 10 entries

| Task                  | Server Site       | Application    | Time  | Nr. Transactions | Nr. failures | Avg    | Min    | Max    | St Dev | SLO |
|-----------------------|-------------------|----------------|-------|------------------|--------------|--------|--------|--------|--------|-----|
| Pay Invoice UK        | Papendrecht-Large | Pay management | 23:00 | 4                | 0%           | 1:13 m | 1:12 m | 1:15 m | 880 ms | 0%  |
| Pay Invoice Sydney    | Papendrecht-Large | Pay management | 23:00 | 4                | 0%           | 1:33 m | 1:33 m | 1:34 m | 517 ms | 0%  |
| Pay Invoice Singapore | Papendrecht-Large | Pay management | 23:00 | 4                | 0%           | 1:31 m | 1:30 m | 1:31 m | 298 ms | 0%  |
| Pay Invoice UK        | Papendrecht-Large | Pay management | 22:00 | 4                | 0%           | 1:13 m | 1:12 m | 1:13 m | 474 ms | 0%  |
| Pay Invoice Sydney    | Papendrecht-Large | Pay management | 22:00 | 4                | 0%           | 1:33 m | 1:33 m | 1:33 m | 331 ms | 0%  |
| Pay Invoice Singapore | Papendrecht-Large | Pay management | 22:00 | 4                | 0%           | 1:31 m | 1:30 m | 1:33 m | 1.22 s | 0%  |
| Pay Invoice UK        | Papendrecht-Large | Pay management | 21:00 | 4                | 0%           | 1:13 m | 1:12 m | 1:16 m | 1.56 s | 0%  |
| Pay Invoice Sydney    | Papendrecht-Large | Pay management | 21:00 | 4                | 25%          | 1:33 m | 1:32 m | 1:34 m | 860 ms | 0%  |
| Pay Invoice Singapore | Papendrecht-Large | Pay management | 21:00 | 4                | 0%           | 1:32 m | 1:30 m | 1:34 m | 1.44 s | 0%  |
| Pay Invoice UK        | Papendrecht-Large | Pay management | 20:00 | 4                | 0%           | 1:14 m | 1:12 m | 1:16 m | 1.74 s | 0%  |

Showing 1 to 10 of 72 entries

For each combination of Task and time period the following columns are shown:

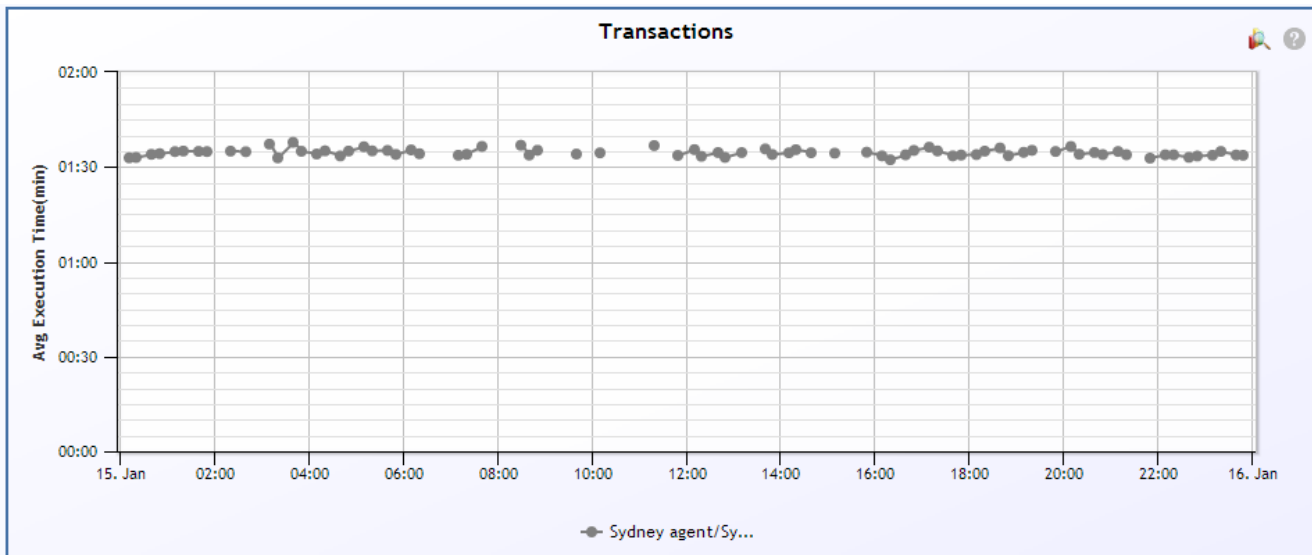
- The server site where the service that is being tested resides
- The application that is being tested by the ATM Task
- The total number of transactions scheduled
- The percentage of transaction script execution failures
- The average, minimum, and maximum script execution time
- The standard deviation of the script execution times
- The percentage of SLO violations

In both the Number of Failures and the SLO columns a color scheme is used to emphasize excessive error percentages. If the percentage exceeds 10%, a dark orange background is shown; if it is more than 5%, a light orange, and white otherwise.

orange, and white otherwise.

### 4.5.3. ATM Task

The ATM Task view shows information for the execution of this task per ATM Agent that is scheduled to run the selected ATM Task. First a graph is shown with a series for each ATM Agent, showing the average measurement of the task execution across all instances per time interval. Interrupts in the line of the series indicate that measurements have failed at that period.



Second a table is shown where the measurements per agent are split per time interval.

Show 10 entries

| Agent        | Client Site | Time  | Nr. Transactions | Nr. failures | Avg    | Min    | Max    | St Dev | SLO |
|--------------|-------------|-------|------------------|--------------|--------|--------|--------|--------|-----|
| Sydney agent | Sydney      | 23:00 | 4                | 0%           | 1:33 m | 1:33 m | 1:34 m | 517 ms | 0%  |
| Sydney agent | Sydney      | 22:00 | 4                | 0%           | 1:33 m | 1:33 m | 1:33 m | 331 ms | 0%  |
| Sydney agent | Sydney      | 21:00 | 4                | 25%          | 1:33 m | 1:32 m | 1:34 m | 860 ms | 0%  |
| Sydney agent | Sydney      | 20:00 | 4                | 0%           | 1:34 m | 1:33 m | 1:36 m | 1.03 s | 0%  |
| Sydney agent | Sydney      | 19:00 | 4                | 25%          | 1:34 m | 1:34 m | 1:35 m | 267 ms | 0%  |
| Sydney agent | Sydney      | 18:00 | 4                | 0%           | 1:34 m | 1:33 m | 1:35 m | 964 ms | 0%  |
| Sydney agent | Sydney      | 17:00 | 4                | 0%           | 1:34 m | 1:33 m | 1:36 m | 1.1 s  | 0%  |
| Sydney agent | Sydney      | 16:00 | 4                | 0%           | 1:33 m | 1:32 m | 1:35 m | 1.05 s | 0%  |
| Sydney agent | Sydney      | 15:00 | 4                | 50%          | 1:34 m | 1:34 m | 1:34 m | 155 ms | 0%  |
| Sydney agent | Sydney      | 14:00 | 4                | 25%          | 1:34 m | 1:34 m | 1:35 m | 462 ms | 0%  |

Showing 1 to 10 of 24 entries

For each combination of Agent and time period the following columns are shown:

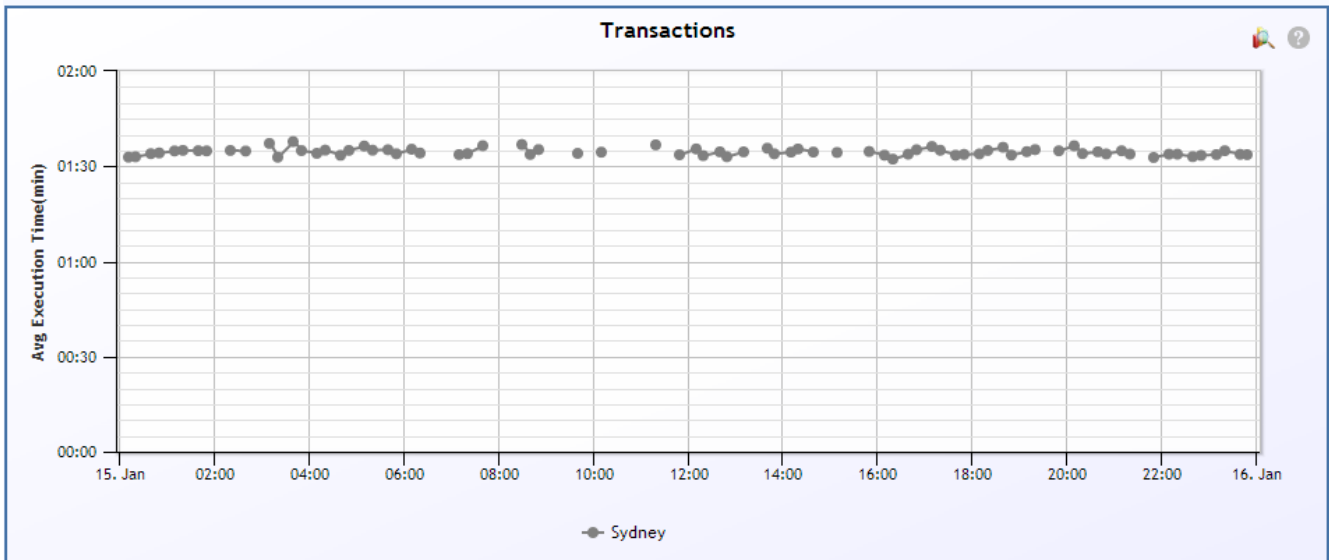
- The client site where the agent is running
- The total number of transactions scheduled
- The percentage of transaction script execution failures
- The average, minimum, and maximum script execution time
- The standard deviation of the script execution times
- The percentage of SLO violations

In both the Number of Failures and the SLO columns a color scheme is used to emphasize excessive error percentages. If the percentage exceeds 10%, a dark orange background is shown; if it is more than 5%, a light orange, and white otherwise.

### 4.5.4. ATM Agent

The ATM Agent view shows information for the execution of the selected ATM Task at the selected ATM Agent. First a graph is shown with a series for each schedule, showing the average measurement of the execution across all instances per time interval. Interrupts in the line of the series indicate that measurements have failed at that period.





Second a table is shown where the measurements per schedule are split per time interval.

Show 10 entries

| Client Site | Time  | Nr. Transactions | Nr. failures | Avg    | Min    | Max    | St Dev | SLO |
|-------------|-------|------------------|--------------|--------|--------|--------|--------|-----|
| Sydney      | 23:00 | 4                | 0%           | 1:33 m | 1:33 m | 1:34 m | 517 ms | 0%  |
| Sydney      | 22:00 | 4                | 0%           | 1:33 m | 1:33 m | 1:33 m | 331 ms | 0%  |
| Sydney      | 21:00 | 4                | 25%          | 1:33 m | 1:32 m | 1:34 m | 860 ms | 0%  |
| Sydney      | 20:00 | 4                | 0%           | 1:34 m | 1:33 m | 1:36 m | 1.03 s | 0%  |
| Sydney      | 19:00 | 4                | 25%          | 1:34 m | 1:34 m | 1:35 m | 267 ms | 0%  |
| Sydney      | 18:00 | 4                | 0%           | 1:34 m | 1:33 m | 1:35 m | 964 ms | 0%  |
| Sydney      | 17:00 | 4                | 0%           | 1:34 m | 1:34 m | 1:36 m | 1.1 s  | 0%  |
| Sydney      | 16:00 | 4                | 0%           | 1:33 m | 1:32 m | 1:35 m | 1.05 s | 0%  |
| Sydney      | 15:00 | 4                | 50%          | 1:34 m | 1:34 m | 1:34 m | 155 ms | 0%  |
| Sydney      | 14:00 | 4                | 25%          | 1:34 m | 1:34 m | 1:35 m | 462 ms | 0%  |

Showing 1 to 10 of 24 entries

For each combination of schedule and time period the following columns are shown:

- The client site where the agent is running
- The total number of transactions scheduled
- The percentage of transaction script execution failures
- The average, minimum, and maximum script execution time
- The standard deviation of the script execution times
- The percentage of SLO violations

In both the Number of Failures and the SLO columns a color scheme is used to emphasize excessive error percentages. If the percentage exceeds 10%, a dark orange background is shown; if it is more than 5%, a light orange, and white otherwise.

When the time period 'Hour' is selected, the table changes into the following table, which shows the information per individual transaction measurement.

Show 10 entries

| Client Site | Time  | Status | Duration | SLO | Details |
|-------------|-------|--------|----------|-----|---------|
| Sydney      | 21:58 | OK     | 1:32 m   |     | Details |
| Sydney      | 21:43 | FATAL  |          |     | Details |
| Sydney      | 21:28 | OK     | 1:33 m   |     | Details |
| Sydney      | 21:13 | OK     | 1:34 m   |     | Details |

Showing 1 to 4 of 4 entries

For each individual transaction measurement the following columns are shown:

- The status of the transaction (OK or FATAL)
- The duration of the transaction execution
- The SLO status

Clicking on the 'Details' link opens an additional Tab called 'ATM Details'. This view shows the breakdown of the transaction execution in terms of its sub-transactions. Also, if available, additional per transaction run information will show, such as generated attachments (e.g., screenshots where the transaction failed) and logging information.

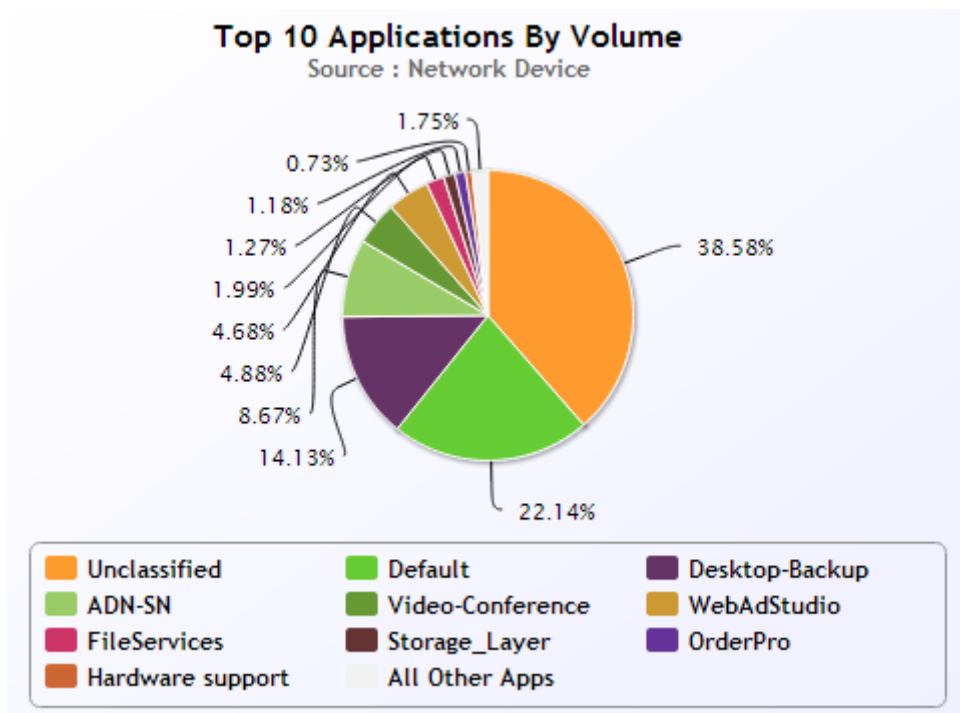
The screenshot displays the 'ATM Details' view. At the top, there are filters for 'Hour & Time Type' (Business Hours (LT)), 'Period' (Hour), 'Year' (2015), 'Month' (Jan), 'Day' (15 Thu), and 'Time' (21:00). The navigation menu on the left includes 'ATM', 'Transactions' (with sub-items like ERP BCR Print, ERP History Print, etc.), 'Applications' (with sub-items like ERP, Pay management, etc.), and 'Sites'. The main content area has three sections:

- Transaction Details:** A table with columns: Transaction name, Path, Start date, Duration, Status. It contains one row: run, /run, 21:43:09 15/01/2015, (blank), FATAL.
- Attachments:** A table with columns: Path, Type, Time, Extension, Size, Select. It contains the text 'No records found.'
- Logs:** A table with columns: Path, Type, Time, Severity, Select. It contains the text 'No records found.'

## 4.6. The Summary View

The Summary View gives a summary of the traffic observed at the selected period of time. It gives quick insight into essential information for understanding your network, such as top-10 applications (aggregated up to the total network) and top-10 sites with bandwidth or efficiency problems.

### 4.6.1. Top 10 Applications by Volume



#### Context

The top-10 applications graph will be shown when the user has selected the All Applications node, or any node in the Sites tree.

#### Description

The Top 10 Applications by Volume graphs shows the top 10 (or top n if you have n < 10 applications) applications in your network by the total number of bytes transmitted. This is shown for the period selected.

#### Interpretation

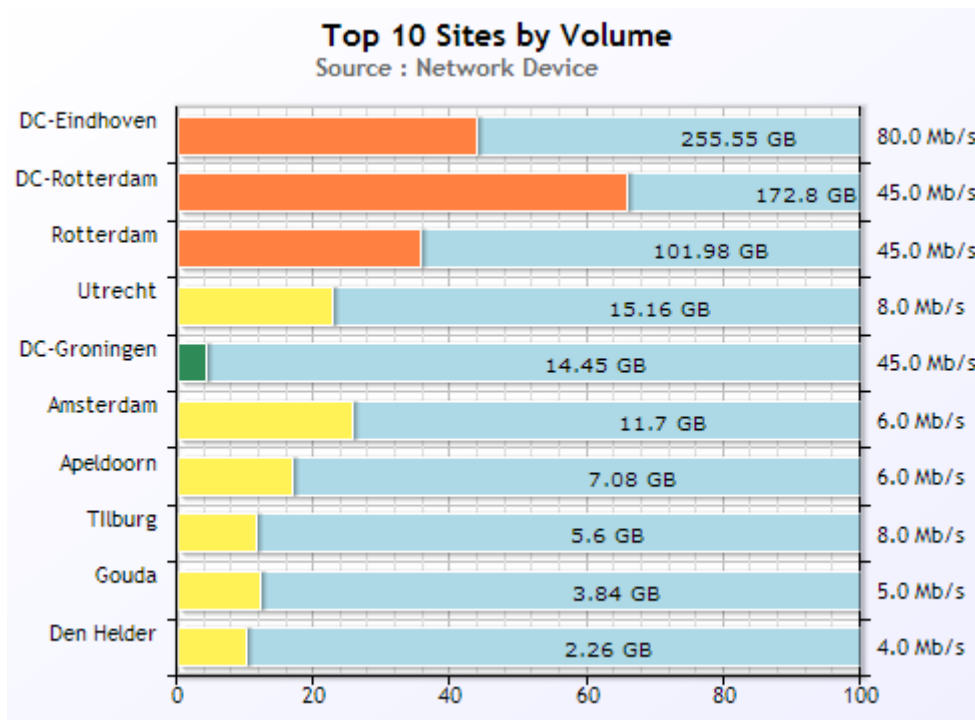
The top applications are typically those applications that use the most bandwidth. If you see your mission-critical applications in this list, this is a good sign. If you see applications that are secondary to your business, then it is important to ensure that these applications are limited in how much bandwidth they can use.

*Technical Details*

For the period selected, the total number of bytes used by each application in each site is added up. This includes bytes transmitted in both the Inbound and Outbound direction over each WAN link. The top applications by bytes are then listed. Applications that use less than 1% of the total number of bytes are not shown. Also, all applications that do not use more than 1% of the bandwidth are added up and displayed as the entry 'All Other Applications'.

Note: For application traffic that is monitored by your infrastructure, but is not yet classified as an application in NetX, an entry called 'Unclassified' may appear. This means that configuration items (e.g., PacketShaper Classes) have been detected by NetX, but have not yet been classified as a particular application.

**4.6.2. Top 10 Sites by Volume**



*Context*

The Top-10 Sites by Volume graph is shown when the user has selected the All Sites node, a Site Group node, or an Application or Application/Site Group node.

*Description*

The Top 10 Sites by Volume graph lists the top 10 (or top n if you have n < 10 sites) sites in your network ordered by the total number of bytes transmitted during the period selected.

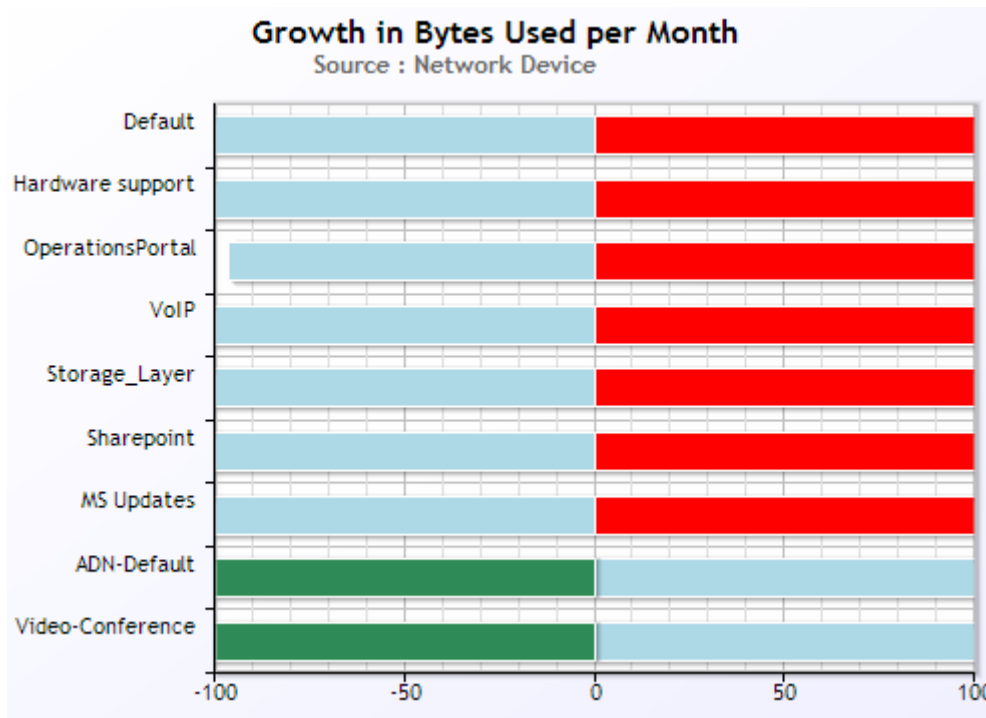
*Interpretation*

This graph helps you to understand which sites make the most use of your network infrastructure.

*Technical Details*

This graphs lists the top 10 sites for your network, ordered by the total number of bytes transmitted (both Inbound and Outbound) during the period specified. The average utilization during the same period is shown beside the bytes total. Additionally, the bandwidth set for the site is also displayed.

### 4.6.3. Application Growth per Month



#### Context

The Application Growth per Month graph will be shown when the user has selected the All Applications node or any node in the Sites tree.

#### Description

The Application Growth per Month graph shows the fastest growing applications on a monthly basis.

#### Interpretation

Application traffic tends to grow over time. This is because of an increase in usage by users, or because of application upgrades that use more bandwidth. Sometimes however, application usage grows faster than the ability of the infrastructure to handle it. Watch this graph to determine which applications are growing the fastest, in order to prevent your infrastructure from being overwhelmed by unexpected utilization.

#### Technical Details

This graph shows two sets of information:

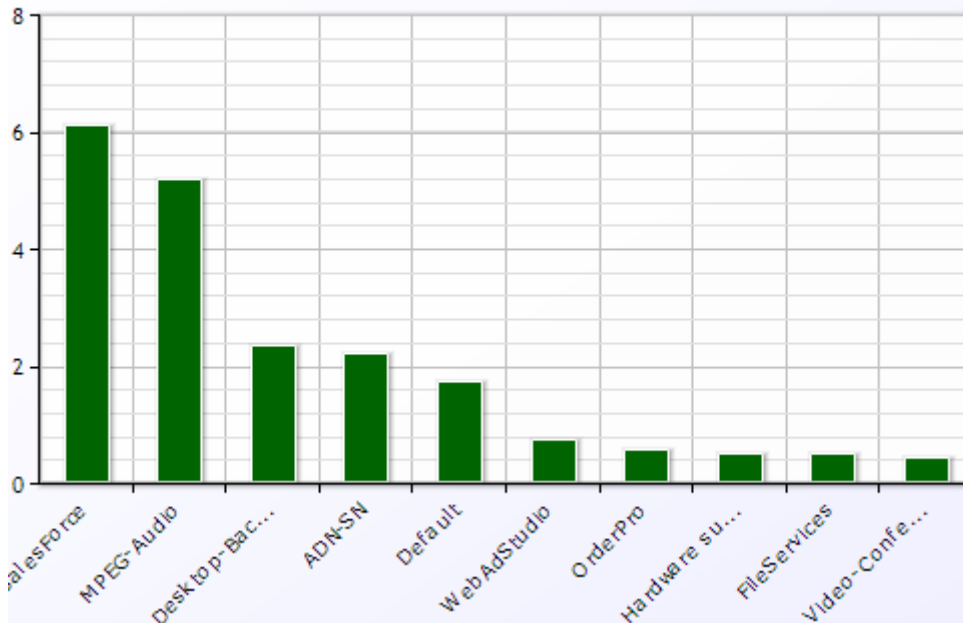
The trend in the growth in the total number of bytes transmitted per month for a given application, averaged over a period of three months. Thus, if an application shows 15% growth in this graph it means that the total number of bytes used each month is growing on average 15% per month. The Least Squares method is used to calculate the average growth over the three-month period. The three-month period used to create this number is based on the three months previous to the current month selected in the Date Selector.

The column 'Growth in Bytes Used per Month' shows the average increase in bytes per month, expressed as a total instead of a percentage.

### 4.6.4. Bandwidth Utilization Top-10 Applications

## Bandwidth Utilization - Top 10 Applications

Source : Network Device



### Context

The Bandwidth Utilization Top-10 Applications graph will be shown when the user selects the All Applications node.

### Description

The Bandwidth Utilization Top-10 Applications graph shows the top 10 (or top n if you have  $n < 10$  applications) applications which are using the largest percentage of your available bandwidth resources.

### Interpretation

This graph serves as an average snapshot of each WAN link in your network. For the period specified, it shows you which applications were using what percentage of the available bandwidth. Use this graph to decide how best to use your available WAN capacity. If you need more bandwidth for your mission-critical applications, use this graph to determine which applications could be removed or changed in order to save bandwidth.

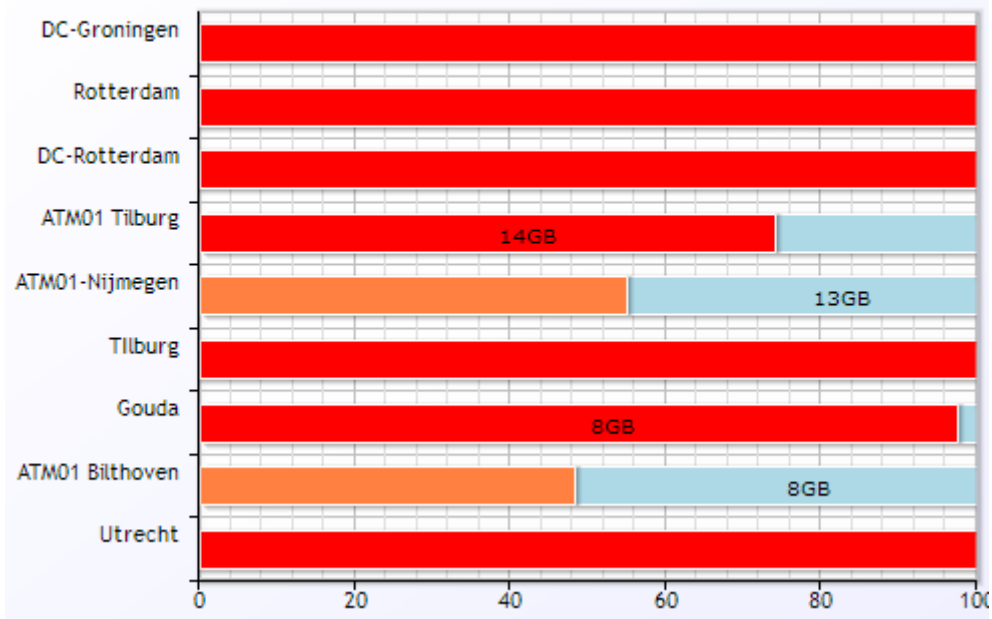
### Technical Details

This graph shows the average bandwidth utilization of the top 10 applications across all sites, for the period specified. Thus, if a particular application is using 5% of your bandwidth resources, it means that for the period specified it used on average 5% of each WAN link across your entire network. E.g., suppose you have (only) two sites. Application A uses 90% of the bandwidth of one site and 30% of the bandwidth of the other site. The average utilization percentage of A in this graph (assuming it's in the Top 10) would be 60%.

## 4.6.5. Top 10 Sites by Growth

## Top 10 Sites by Growth

Source : Network Device



### Context

The Top-10 Sites by Growth graph will be shown when the user has selected a single application in the navigation tree.

### Description

The Top 10 Sites by Growth graph shows the top 10 (or top n if you have  $n < 10$  sites) sites which have the fastest growing utilization of the given application, on a monthly basis.

### Interpretation

Use this graph to determine which sites are using more bandwidth each month for a given application. For time-sensitive applications it is important that there is always enough bandwidth to satisfy their needs. Thus, it is important to monitor this trend to ensure that there will be enough bandwidth to satisfy the needs of a particular site in the months to come. Conversely, if this is a non-critical application, monitor this growth trend to ensure that it does not fill your WAN links and interfere with important applications.

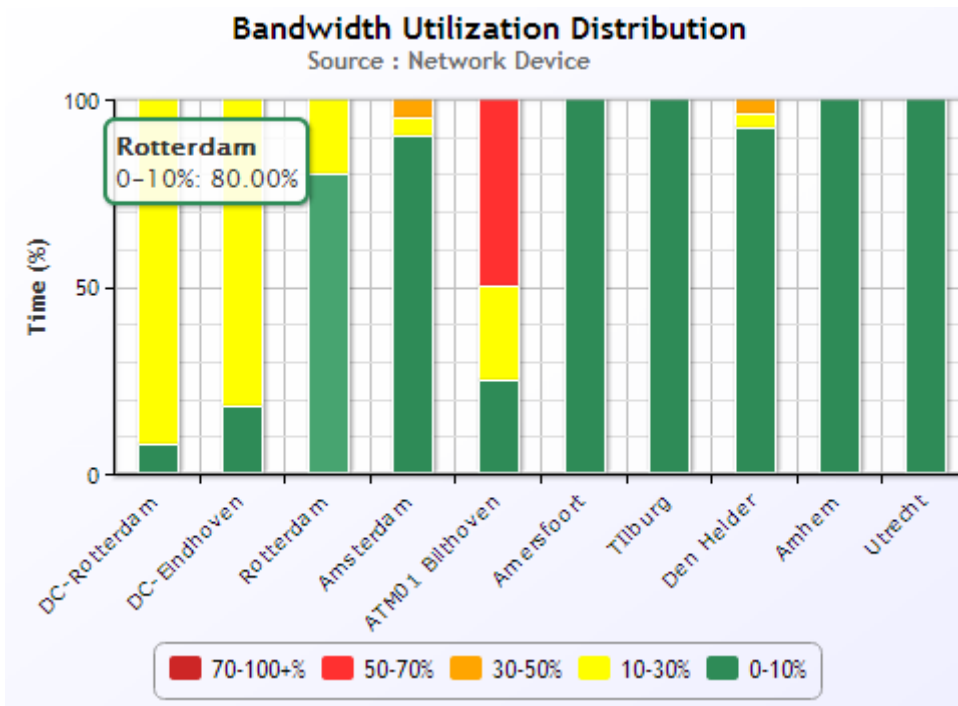
### Technical Details

This graph shows two sets of information:

The trend in the growth in the total number of bytes transmitted per month for a given application in the site displayed, averaged over a period of three months. Thus, if an application shows 15% growth in this graph it means that the total number of bytes used each month is growing on average 15% per month. The three-month period used to create this number is based on the three months previous to the current month selected in the Date Selector.

The column 'Growth in Bytes Used per Month' shows the average increase in bytes per month, expressed as a total instead of a percentage.

## 4.6.6. Site Bandwidth Utilization Distribution



*Context*

The Bandwidth Utilization Distribution graph is shown when the user selects the All Applications node, the All Sites node, or any of the Site Group nodes (with or without application.)

*Description*

The Bandwidth Utilization Distribution graph shows the top 10 (or top n if you have n < 10 sites) sites in your network in terms of their bandwidth utilization, and provides a bandwidth utilization distribution for those sites.

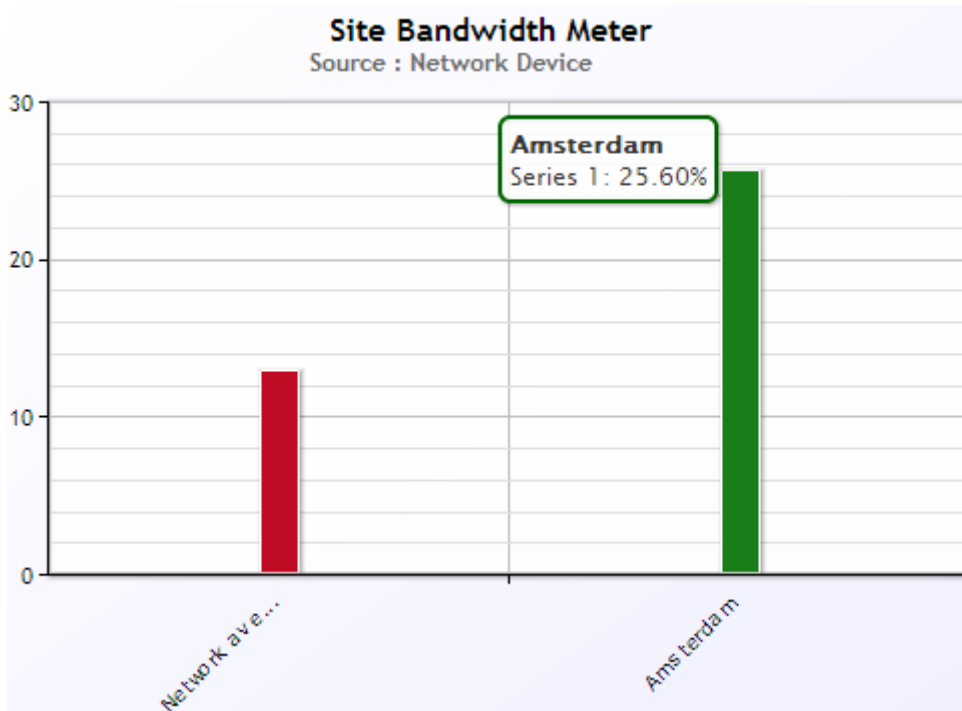
*Interpretation*

High utilization can result in poor performance for time-sensitive applications. Watch this distribution chart for sites that show only yellow or darker colors. This indicates that the average bandwidth utilization of that site is at least 10% or more during every minute of the day. High bandwidth utilization can mean that there is not enough bandwidth for mission critical applications. If you see periods of utilization that are 70%-100%, this means that there are periods when the bandwidth in that site is completely saturated.

*Technical Details*

For each bar displayed, the percentage of the period selected (month, week, day, hour) where the average bandwidth utilization was between x% and y% is displayed as a colored bar. The top 10 sites in your network in terms of average utilization during the period selected are used in this graph. The busiest sites are listed at the left of the graph.

**4.6.7. Site Bandwidth Meter**



*Context*

The Site Bandwidth Meter graph is shown when the user selects a single Site.

*Description*

The Site Bandwidth Meter displays the average utilization of this site, in comparison to the network-wide average utilization during the same period.

*Interpretation*

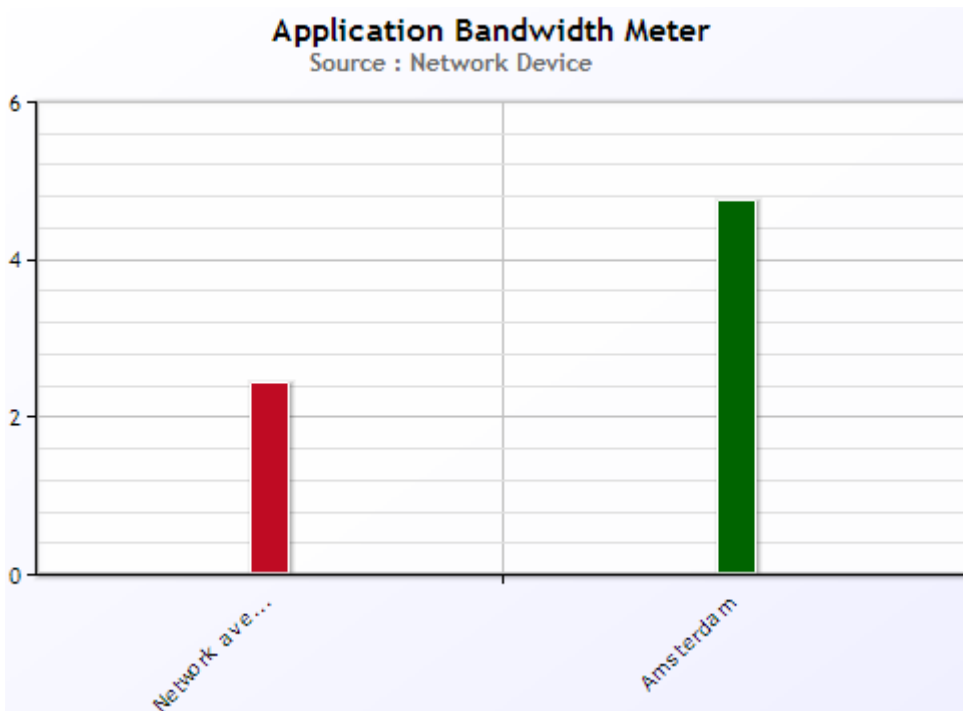
This graph gives you a general impression of how much of this site's bandwidth was used during the period selected. Bandwidth utilization of 50-70% represents heavy utilization. During periods of heavy utilization, application performance problems can occur.

*Technical Details*

This graph shows the average bandwidth utilization for the given site for the period specified.

**4.6.8. Application Bandwidth Meter**





#### Context

The Application Bandwidth Meter graph is shown when the user selects a single site in the context of an application.

#### Description

The Application Bandwidth Meter displays the average utilization of the given application in this site, in comparison to the network-wide average utilization for this application.

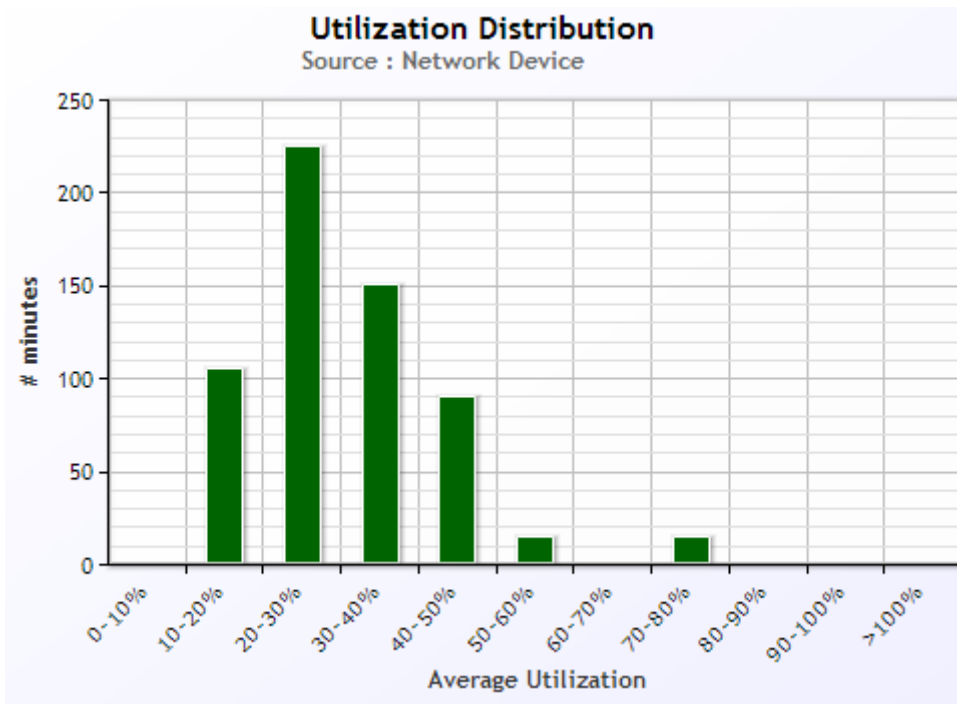
#### Interpretation

This graph gives you a general impression of how much of this site's bandwidth was used for this application. If the utilization is considerably higher than the network-wide average, you may need to consider upgrading your bandwidth in order to provide enough bandwidth for this application.

#### Technical Details

This graph shows the average utilization for the given application for the period specified. The network average is calculated based on the average utilization for this application in all sites. E.g., (utilization App A in Site X1 + utilization App A in Site X2 + utilization App A in Site X3) / 3.

### 4.6.9. Utilization Distribution



*Context*

The Utilization Distribution graph will be shown when the user has selected a Site node.

*Description*

The Utilization Distribution graph displays the number of minutes during the period selected that the application’s bandwidth utilization was within a given range.

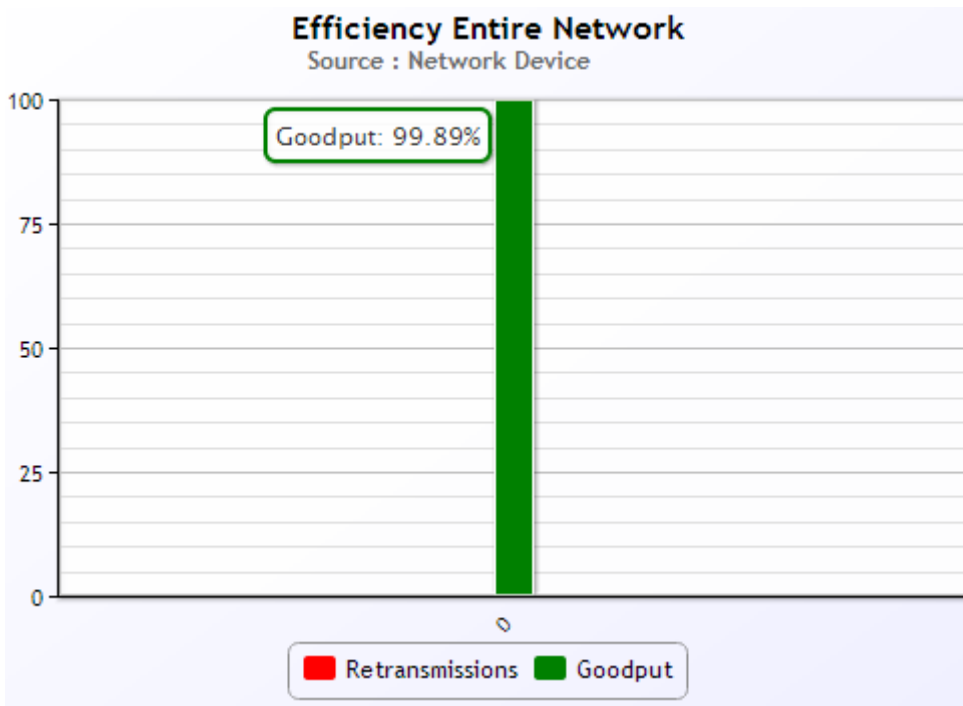
*Interpretation*

This graph gives you a general impression of what the bandwidth utilization profile is for the selected application. This can be helpful in determining peak bandwidth requirements for the application, determining if the application has run out of capacity in this site, or if QoS bandwidth allocations needs to be adjusted.

*Technical Details*

The number of minutes where the bandwidth utilization was within a particular range is displayed.

**4.6.10. Total Efficiency**



*Context*

The Total Efficiency graph will be shown when the user has selected the All Applications node or the All Sites node.

The device must support the TCP Efficiency capability.

*Description*

The Total Efficiency graph shows the average efficiency for all applications or all sites for the entire network during the period specified.

*Interpretation*

Low efficiency represents lost or delayed network traffic. This is typically caused by network congestion (high utilization) or network faults. A low efficiency for all applications generally indicates an infrastructure-wide problem.

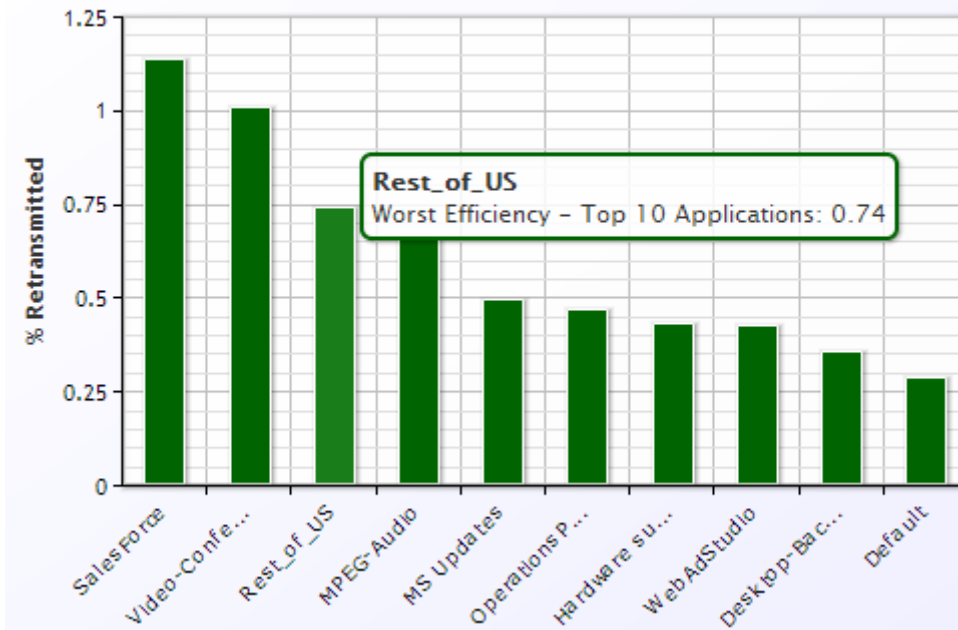
*Technical Details*

This graph shows the average, average efficiency across all applications for the period specified. To calculate this number, the average efficiency of each application (across all sites) is added up, and then that number is divided by the total number of applications. Efficiency represents what percentage of the total number of bytes transmitted were successfully sent and received without being lost or retransmitted.

**4.6.11. Worst Efficiency – Top 10 Applications**

## Worst Efficiency - Top 10 Applications

Source : Network Device



### Context

The Worst Efficiency Top-10 Applications graph will be shown when the user has selected the All Applications node.

The device must support the TCP Efficiency capability.

### Description

The Worst Efficiency – Top 10 Applications shows the top 10 (or top n if you have  $n < 10$  applications) worst performing applications as per percentage of retransmissions for the period specified.

### Interpretation

Applications that have 2% or more retransmissions are most likely experiencing some kind of performance problems. This could be due to congestion, a problem with WAN equipment, LAN equipment, or server delays. Drill-down into the application with the highest level of retransmissions by clicking on it in the Navigation Tree.

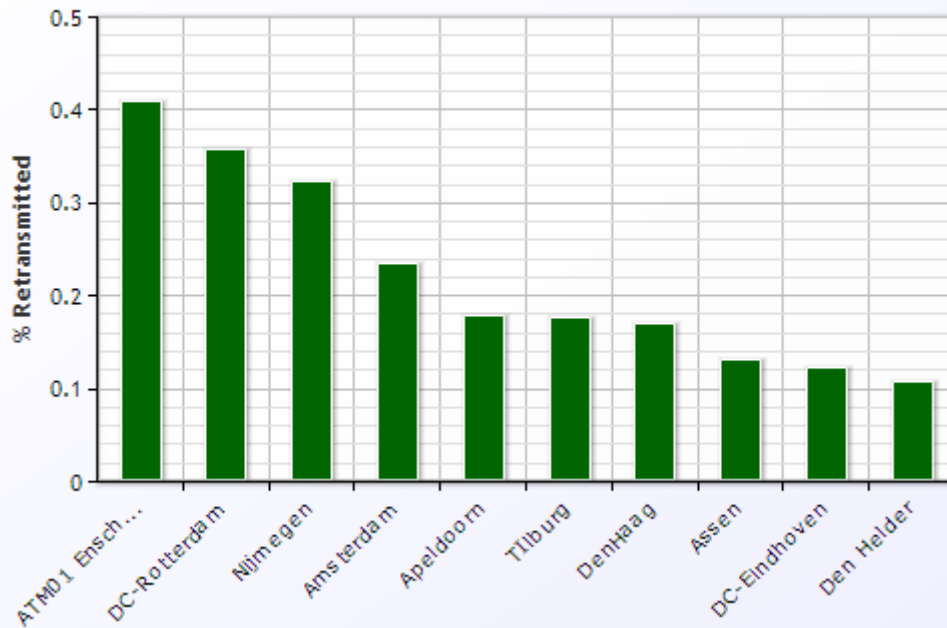
### Technical Details

This graph shows the inverse of application efficiency. Thus, it shows what percentage of the total number of bytes transmitted by that applications were retransmissions, for the period specified.

## 4.6.12. Worst Efficiency – Top 10 Sites

### Worst Efficiency - Top 10 Sites

Source : Network Device



#### Context

The Worst Efficiency – Top-10 Sites by Growth graph will be shown when the user has selected a single application in the navigation tree.

#### Description

The Worst Efficiency – Top 10 Sites shows the top 10 (or top n if you have n < 10 sites) worst performing sites as per percentage of retransmissions for the given application for the period specified.

#### Interpretation

Sites where application traffic experienced 2% or more retransmissions are most likely experiencing some kind of network problems. This could be due to congestion, a problem with WAN equipment, or even a problem with LAN equipment. Drill-down into the sites with the highest level of retransmissions by clicking on them in the Navigation Tree.

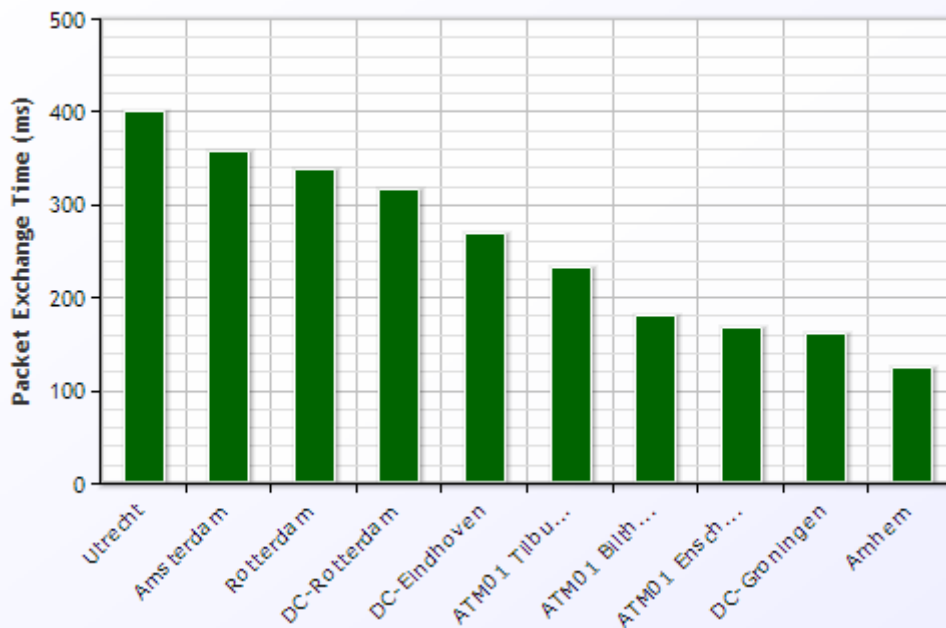
#### Technical Details

This graph shows the inverse of application efficiency. Thus, it shows what percentage of the total number of bytes transmitted for the given application were retransmissions, for the period specified.

### 4.6.13. Round-Trip Time – Top 10 Sites

### Network Delay - Top 10 Sites

Source : Network Device



#### Context

The Round-Trip Time – Top-10 Sites graph will be shown when the user has selected a single application in the navigation tree.

#### Description

The Round-Trip Time – Top 10 Sites shows the top 10 (or top n if you have n < 10 sites) worst performing sites as per the round-trip time for this application for the period specified.

#### Interpretation

This graph shows which sites had the highest response times for the given application. This could be due to congestion, a problem with WAN equipment, or even a problem with LAN equipment. Drill-down into the sites with the highest response times to determine why they were so slow.

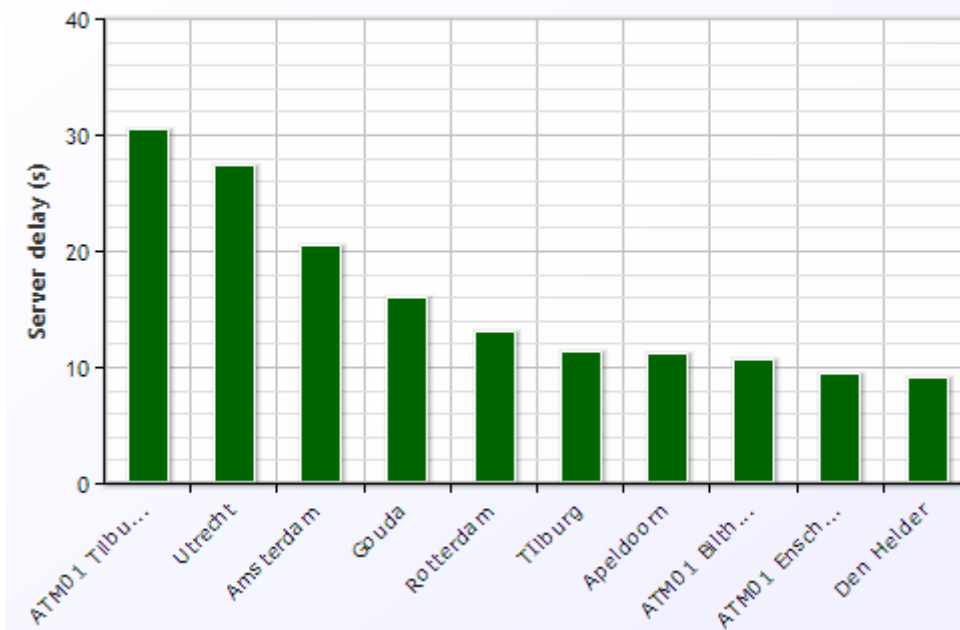
#### Technical Details

This graph shows the average response time for all application packets during the period selected. Response time is a measure of how long it took on average for an application data packet to be delivered, and for an acknowledgement to be received. This variable is referred to as 'Packet Exchange Time'.

## 4.6.14. Server Delay – Top 10 Sites

### Server Delay - Top 10 Sites

Source : Network Device



#### Context

The Server Delay – Top 10 Sites graph will be shown when the user has selected a single application in the navigation tree.

#### Description

The Server Delay – Top 10 Sites shows the top 10 (or top n if you have n < 10 sites) worst performing sites as per server delay for this application for the period specified.

#### Interpretation

This graph shows which sites had the highest server response times for the given application. This could be due to a busy server or large transaction sizes. Drill-down into the sites with the highest response times to determine why they were so slow.

#### Technical Details

This graph shows the average server response time for all application transactions during the period selected. Response time is a measure of how long it took on average for an application transaction to be processed by the server, and for the server to begin sending the transaction response back to the user. This value is averaged across all transactions and all servers.

## 4.6.15. Total Bytes Transmitted

| Total Bytes Transmitted (Source: Network Device)  |           |           |
|---|-----------|-----------|
| Period  | Inbound   | Outbound  |
| 02-03-2014 ( previous day )                       | 684.46 GB | 520.84 GB |
| 03-03-2014 ( selected day )                       | 377.3 GB  | 345.47 GB |
| 24-02-2014 ( same day of the week, one week ago ) | 1.07 TB   | 1.05 TB   |

#### Context

This table is shown when the user selects a node in the Sites tree.

#### Description

The Total Bytes Transmitted table shows the total amount of bytes sent and received by all sites in the network. This is shown for the specified period and two previous periods.

#### Interpretation

This table will help determine which sites transmit (or receive) the most data. A large spike (or decrease) in traffic may indicate a problem. Alternatively, this information is useful in situations where costs are calculated on a per byte basis, instead of available bandwidth.

### Technical Details

This graph adds up the total bytes received and sent for all applications in all sites in your network. The periods shown are the currently selected period, the previous period and one other earlier period that 'matches' the currently selected period:

#### Hour

Same hour of the day of the previous day.

#### Day

Same day of the week, one week earlier.

#### Week

One week, four weeks ago.

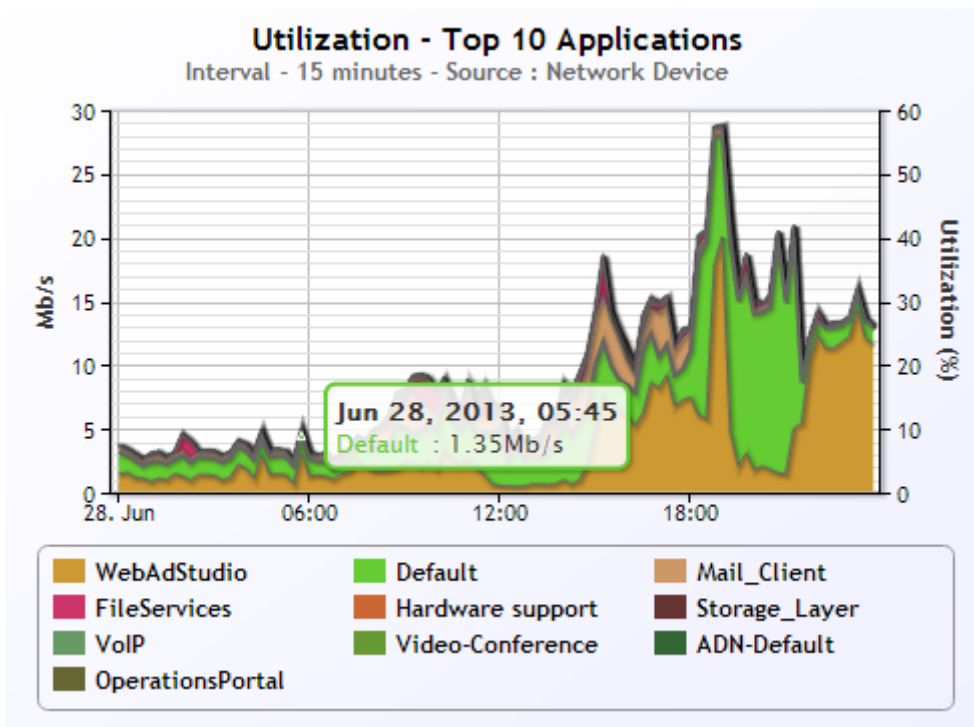
#### Month

The same month of the previous year.

## 4.7. The Details View

The Details View is one of the most commonly used views in NetX. It shows the raw network performance characteristics at a fine-grained granularity (up to per-minute) for all the site and application related nodes in the navigation tree. Users use this view to get in-depth insight in the traffic that occurred on the network at a particular point in time.

### 4.7.1. Utilization – Top 10 Applications



#### Context

The top-10 applications graph will be shown when the user has navigated to a node in the Sites tree.

#### Description

The Utilization – Top 10 Applications graph shows the average bandwidth utilization of the top 10 (or top n if you have n < 10 applications) applications (by utilization) for the period specified for all sites combined.

#### Interpretation

This graph is useful in determining which applications were using your infrastructure's bandwidth during a

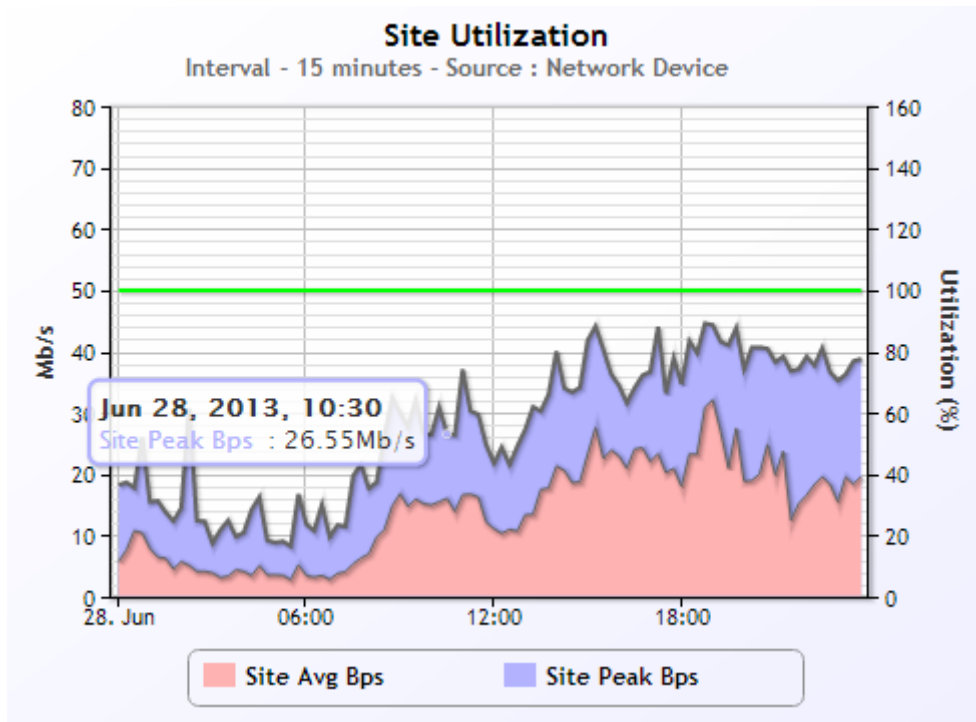


particular moment in time.

#### Technical Details

This graph displays the average bits per second transmitted by each of the top 10 applications in all sites in your network combined. The top applications are chosen by determining which applications transmitted the most bytes during the period selected.

### 4.7.2. Network Utilization



#### Context

The Network Utilization graph will be shown when the user has selected an application or one of its children, or a node in the Sites tree.

The peak b/s metric will only be shown if the device has that capability.

#### Description

The Network Utilization graph shows how much bandwidth is used during the period specified. This utilization is compared to the peak utilization during the same period for those devices that support peak bandwidth utilization. If the site is known in the selection, the second Y-axis will show the utilization as percentage of the site's bandwidth in the given direction.

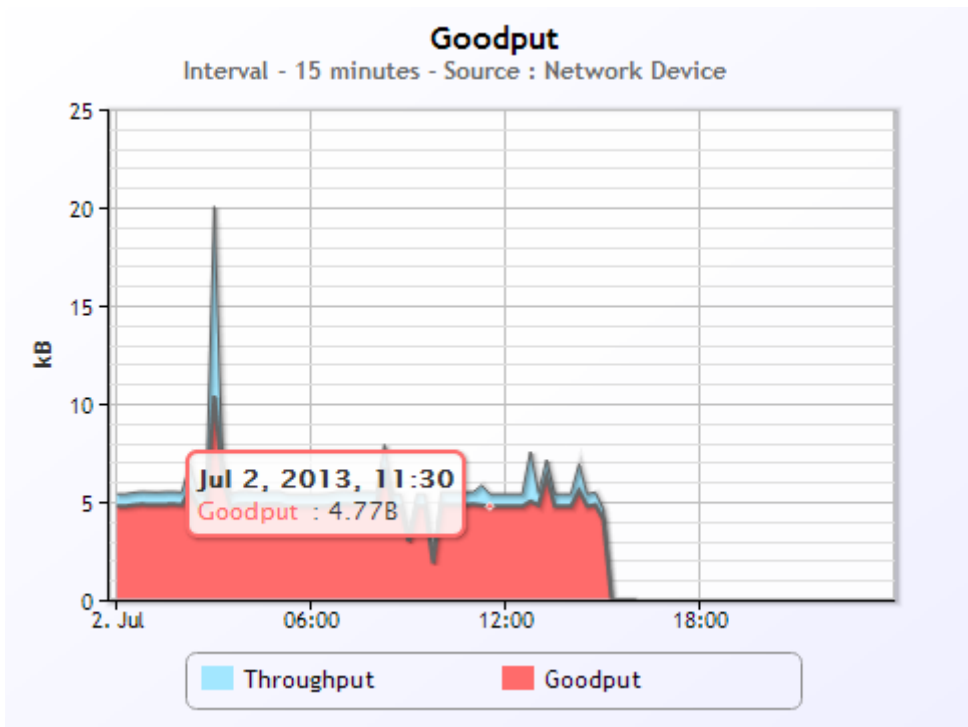
#### Interpretation

When a WAN link is full, application traffic is slowed by queuing in routers and other network devices. When average utilization of a site reaches 70% or more, applications tend to slow down. The peak utilization is useful in determining whether or not there was not enough bandwidth to satisfy all applications during a given period.

#### Technical Details

This graph shows the average bits per second used by all traffic for this site during the period selected. Peak bits-per-second represents the highest recorded 1-second utilization.

### 4.7.3. Network Goodput



#### Context

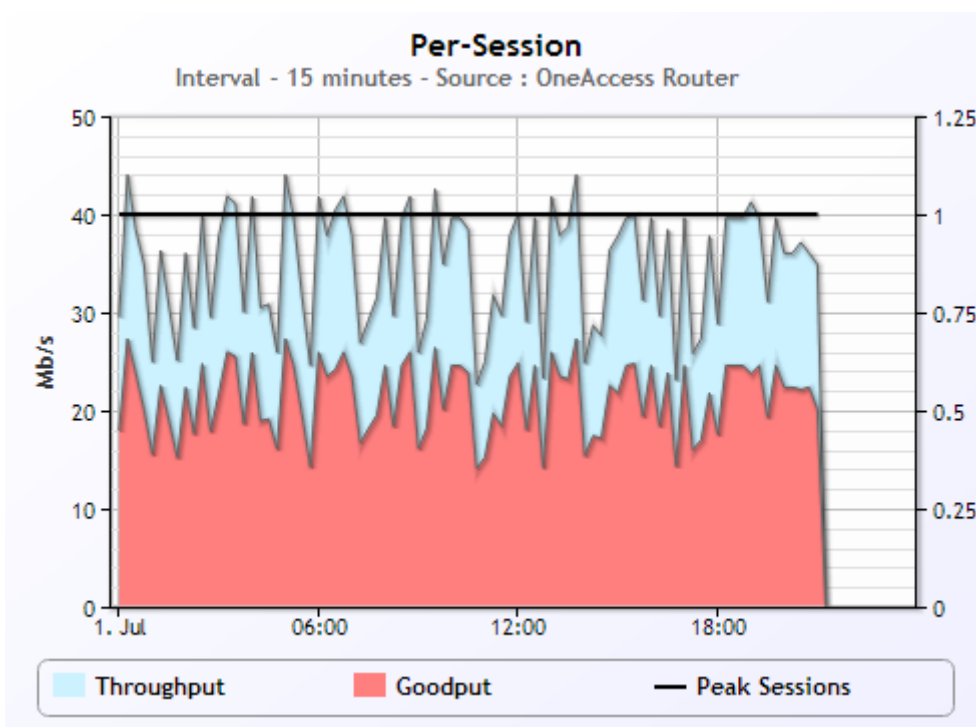
The Network Goodput graph will be shown when the user has selected an application or one of its children, or a node in the Sites tree.

The device must support the Goodput capability.

#### Description

The Network Goodput graph shows the ratio between total network traffic generated and the amount of traffic that is actually sent and delivered by the higher-level applications. The difference between Throughput and Goodput is determined by network protocol overhead and retransmissions.

### 4.7.4. Per-Session



#### Context

The Per-Session graph will be shown when the user has selected an application or one of its children, or a node in the Sites tree.

The device must be based on NetFlow data and contain the session analyzer component.

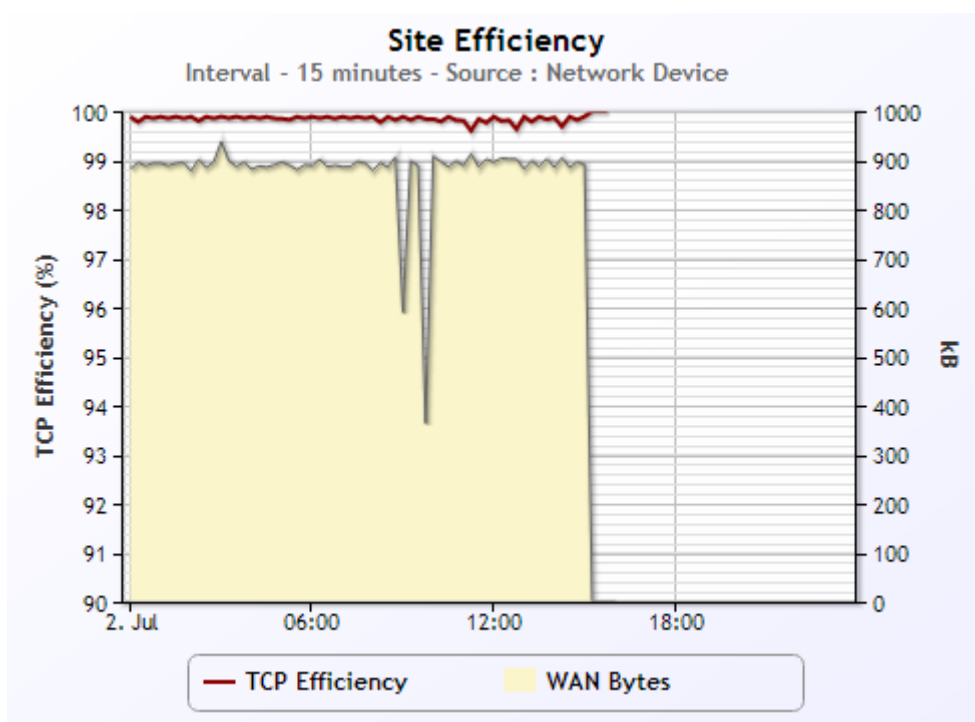
#### Description

The per-session graph shows per session (i.e., the combination of all flows) the average throughput and goodput. In addition, it shows (on the right axis) the peak number of unique users (IP addresses) measured for the context.

#### Interpretation

The combination of per-session throughput and peak number of users gives a good indication whether the load on the network generated by the number of users is becoming too high to support the application with sufficient bandwidth. The difference between Throughput and Goodput is determined by network protocol overhead and retransmissions.

### 4.7.5. Network Efficiency



#### Context

The Network Efficiency graph will be shown when the user has selected an application or one of its children, or a node in the Sites tree.

The device must support the TCP Efficiency capability.

#### Description

The Network Efficiency graph shows the percentage of bytes transmitted that were good. The total number of bytes transmitted during the period is also shown in this graph.

#### Interpretation

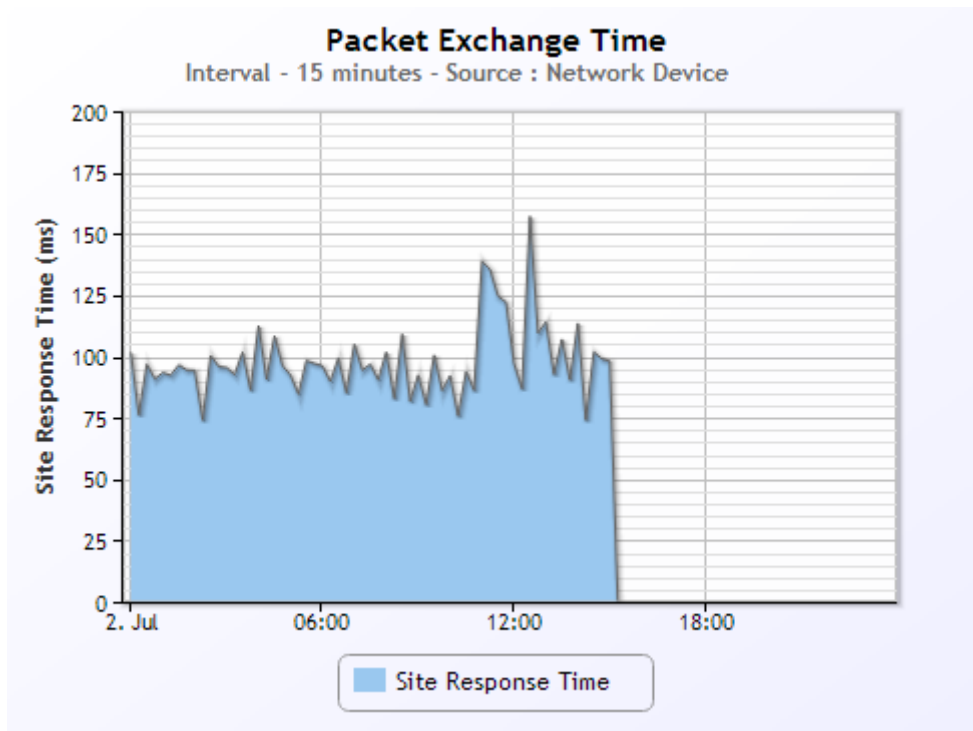
Retransmissions occur due to lost or delayed network traffic. This happens because of congested bandwidth, device failures, server or client delays, or very high delay network paths. Check which of these issues may be causing poor efficiency.

#### Technical Details

The Network Reliability indicator measures TCP Efficiency. TCP Efficiency represents the percentage of TCP bytes transmitted across the network that were good. "Good bytes" are bytes that did not need to be

retransmitted. Thus, an efficiency rating of 75% means that 75% of all network (TCP) traffic got through to the receiver the first time, without needing to be sent twice or more.

#### 4.7.6. Network Response Time



##### Context

The Network Response Time graph will be shown when the user has selected a specific site (with or without first selecting an application) or one of its child nodes.

The device must support the Bulk Transfer Latency capability.

##### Description

The Network Response Time graph shows the average response time experienced by the packets generated by this application. This value is dependent on packet size and the characteristics of the TCP protocol.

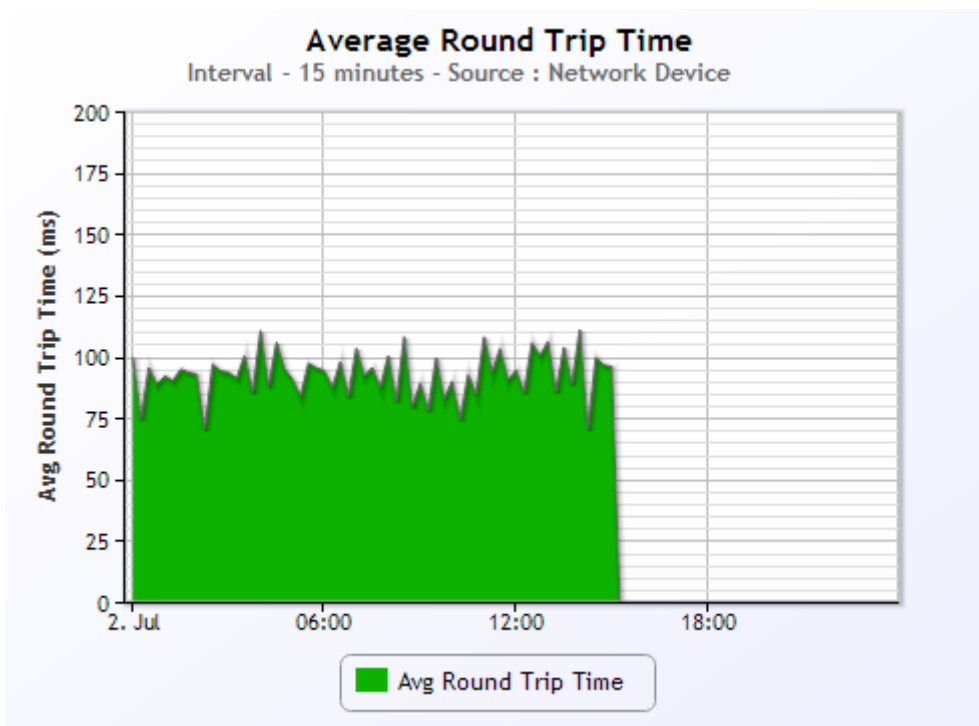
##### Interpretation

Slow response times are generally caused by congestion, high-delay network paths (e.g., dial-up or international connections), or busy network devices. When abnormally high delays are seen, check to see if the line was congested or if the server or client was experiencing problems.

##### Technical Details

Packet Exchange Time represents the time it takes for a data packet from an application to get to the receiver, and for an acknowledgement to be returned. This is measured from the perspective of the measuring device.

#### 4.7.7. Round-Trip Time



#### Context

The Network Response Time graph will be shown when the user has selected a specific site (with or without first selecting an application) or one of its child nodes.

The device must support the Network Latency capability.

#### Description

The Average Round-Trip Time graph shows the average latency introduced by the network for traffic from this application. This value is independent of packet size.

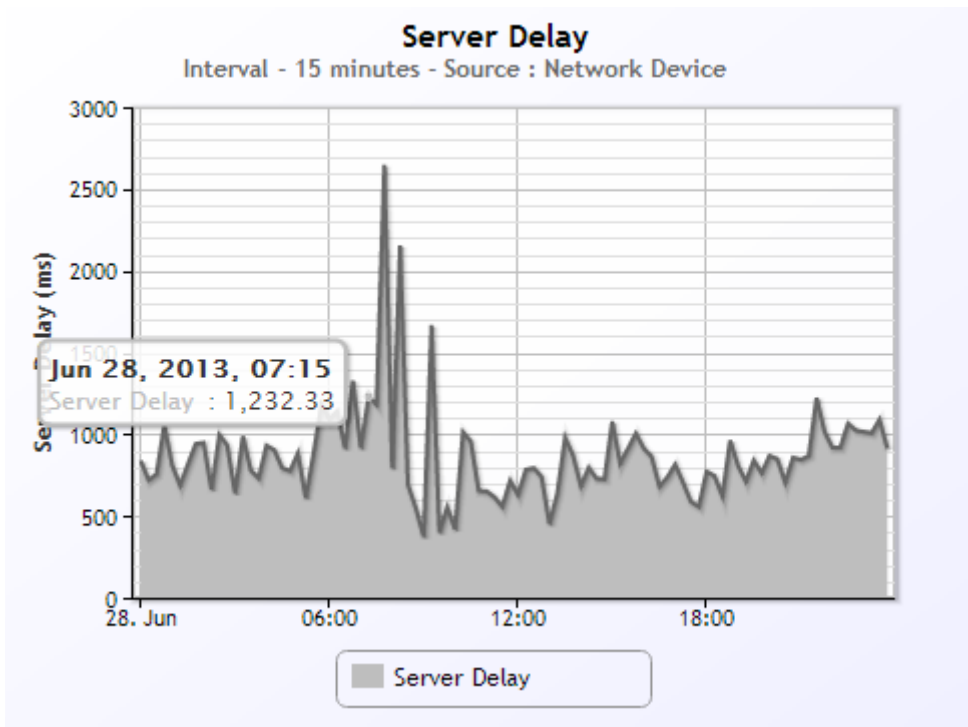
#### Interpretation

Slow response times are generally caused by congestion, high-delay network paths (e.g., dial-up or international connections), or busy network devices. When abnormally high delays are seen, check to see if the line was congested or if the server or client was experiencing problems.

#### Technical Details

Average Round Trip Time is the time is measured each time a new TCP connection is initiated by this application. The time measured is the time between the client sending a SYN packet, the server responding with a SYN-ACK and the transmission of the ACK from the client.

### 4.7.8. Server Delay



#### Context

The Server Delay graph is presented when the user has selected a site node within an application.

The device must support the Service Transactions capability.

#### Description

The Server Delay graph shows the average server response time experienced by application transactions in this site.

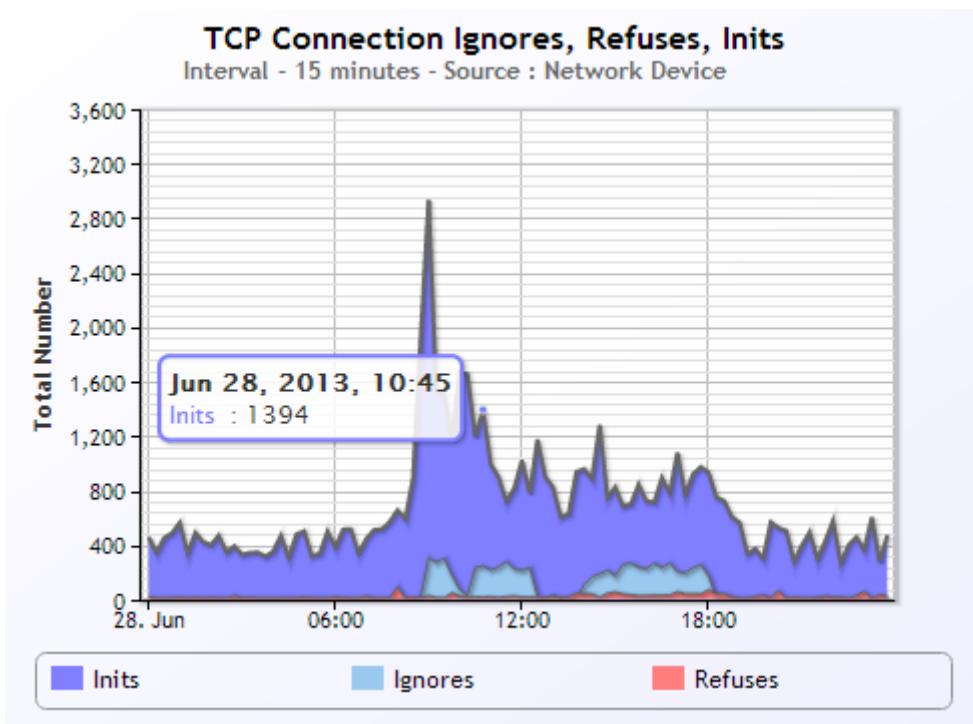
#### Interpretation

Server delays that exceed the average for a given application and site, are usually caused by high server utilization or unusually large transactions. Check to see if the high server delay corresponds with a large increase in TCP connections or bytes, and check the utilization on the application server.

#### Technical Details

Server delay represents how long it took for a server to process a client request. The total time represents the time from when the server received the last packet of the client's request, and the time the first packet of the server's response was seen.

### 4.7.9. TCP Connection Initialization, Ignores, and Refuses



#### Context

The TCP Connection Initialization, Ignores, and Refuses graph will be shown when the user has selected any node in the Sites or Applications trees.

The device must support the Service Availability capability.

#### Description

The TCP Connection Ignores, Refuses, Inits graph represents the total number of TCP connections and connections errors seen during the period specified.

#### Interpretation

Unusually high numbers of TCP connections can represent a sudden increase in user load, or it can represent a security attack. TCP connection errors are not unusual, and can be ignored unless they correspond with other visible problems such as high server delays or high network delays.

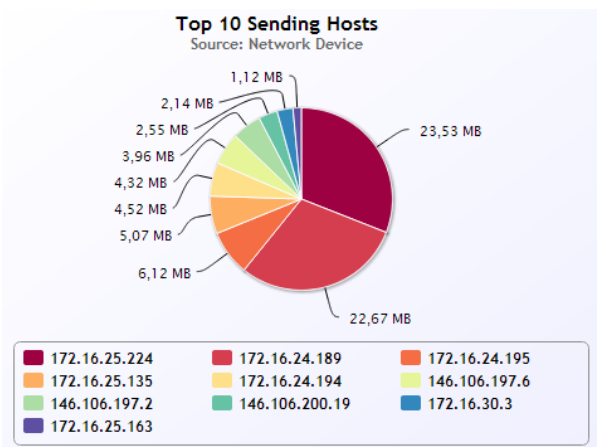
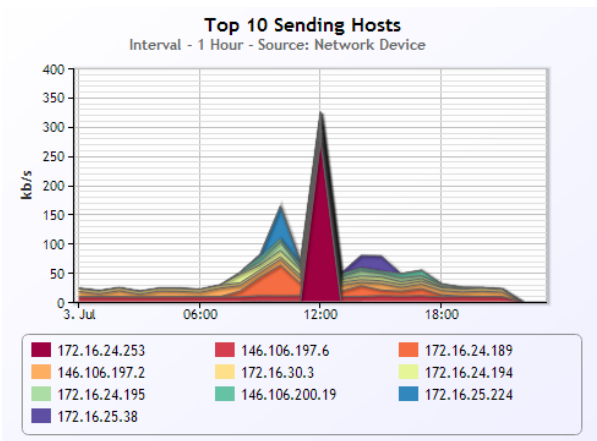
#### Technical Details

TCP connection inits represents the number of connection initializations seen during the period. TCP Refuses represents the number of times the server refused to accept a connection request from a user. TCP Ignores represents the number of times that the server ignored a connection request from a user.

## 4.8. The Users View

The Users view gives insight in the top-10 unique IP addresses and conversations that are responsible for the traffic in the given selection in the navigation tree.

### 4.8.1. Top 10 Sending/Receiving Hosts



#### Description

The Top 10 Sending/Receiving Hosts graphs shows the top 10 IP hosts that sent or received bytes for the selected Application across all Sites.

#### Interpretation

Use this graph to determine which IP hosts are generating the most traffic for a particular Application. For typical client-server applications you would expect to see server IP addresses in this list. Additionally, when monitoring server farms you would expect to see a relatively even distribution of traffic across each IP address in the farm.

#### Technical Details

Two sets (Inbound/Outbound) of graphs are shown: Top 10 Sending Hosts and Top 10 Receiving Hosts. Sending Hosts represent hosts that send application data, and Receiving Hosts represent those hosts that received application data. The data displayed in each graph represents the total in bytes. If you select the period 'Hour', a pie chart is displayed. For all other periods a line graph is displayed.

### 4.8.2. Top 10 Conversations

| Top 10 Conversation - From sites to WAN - Source:FDR |            |                |              |           |                   |                |
|--|------------|----------------|--------------|-----------|-------------------|----------------|
| Local IP   | Local Site | Remote IP      | Remote Site  | Bytes     | Avg Response Time | TCP Efficiency |
| 172.16.25.135  | Amsterdam  | 69.176.108.207 | Unknown      | 180.78 MB | 25 ms             | 100 %          |
| 172.16.24.189  | Amsterdam  | 146.106.193.61 | DC-Rotterdam | 49.50 MB  | 0 ms              | 100 %          |
| 172.16.25.193  | Amsterdam  | 69.176.108.207 | Unknown      | 34.54 MB  | 14 ms             | 100 %          |
| 172.16.24.194  | Amsterdam  | 146.106.193.61 | DC-Rotterdam | 20.26 MB  | 0 ms              | 100 %          |
| 172.16.25.163  | Amsterdam  | 69.176.108.237 | Unknown      | 13.08 MB  | 15 ms             | 99.94 %        |
| 172.16.25.163  | Amsterdam  | 69.176.108.207 | Unknown      | 10.62 MB  | 18 ms             | 100 %          |
| 172.16.24.195  | Amsterdam  | 146.106.193.61 | DC-Rotterdam | 7.47 MB   | 0 ms              | 100 %          |
| 146.106.197.6  | Amsterdam  | 146.106.53.23  | DC-Eindhoven | 5.45 MB   | 0 ms              | 100 %          |
| 172.16.25.179  | Unknown    | 69.176.108.207 | Unknown      | 4.54 MB   | 12 ms             | 99.61 %        |
| 146.106.200.19                                       | Amsterdam  | 146.106.193.44 | DC-Rotterdam | 4.19 MB   | 6 ms              | 100 %          |

Figure 1. FDR version of Top 10 Conversations table



| Top 10 Conversation - From sites to WAN - Source:NetFlow V9 NBAR |            |               |             |           |
|--|------------|---------------|-------------|-----------|
| Local IP   | Local Site | Remote IP     | Remote Site | Bytes     |
| 82.93.98.79  | Bilthoven  | 176.58.28.157 | Sites       | 303.59 MB |
| 82.93.98.79  | Bilthoven  | 85.17.226.211 | Sites       | 251.07 MB |
| 82.93.98.79  | Bilthoven  | 212.72.58.45  | Sites       | 187.33 MB |
| 82.93.98.79  | Bilthoven  | 145.58.53.152 | Sites       | 99.26 MB  |
| 82.93.98.79  | Bilthoven  | 82.201.33.159 | Sites       | 94.35 MB  |
| 82.93.98.79  | Bilthoven  | 82.94.229.11  | Sites       | 31.56 MB  |
| 82.93.98.79  | Bilthoven  | 188.93.150.39 | Sites       | 30.69 MB  |
| 82.93.98.79  | Bilthoven  | 82.201.33.155 | Sites       | 28.41 MB  |
| 82.93.98.79  | Bilthoven  | 145.58.52.150 | Sites       | 23.27 MB  |
| 82.93.98.79  | Bilthoven  | 145.58.53.148 | Sites       | 23.23 MB  |

Figure 2. NetFlow version of Top 10 Conversations table

#### Description

The Top 10 Conversations table shows the top 10 IP host pairs sorted by Total Bytes, Average Response Time (FDR only), TCP Efficiency (FDR Only) or Number of Flows for the selected Application across all Sites.

#### Interpretation

Use this graph to determine which IP hosts pairs are the most active for the selected Application, have the worst response time, or the most packet loss (TCP Efficiency). This table is useful for determining if Application performance problems are specific to a single Host, group of Hosts, or to the entire Application in general.

#### Technical Details

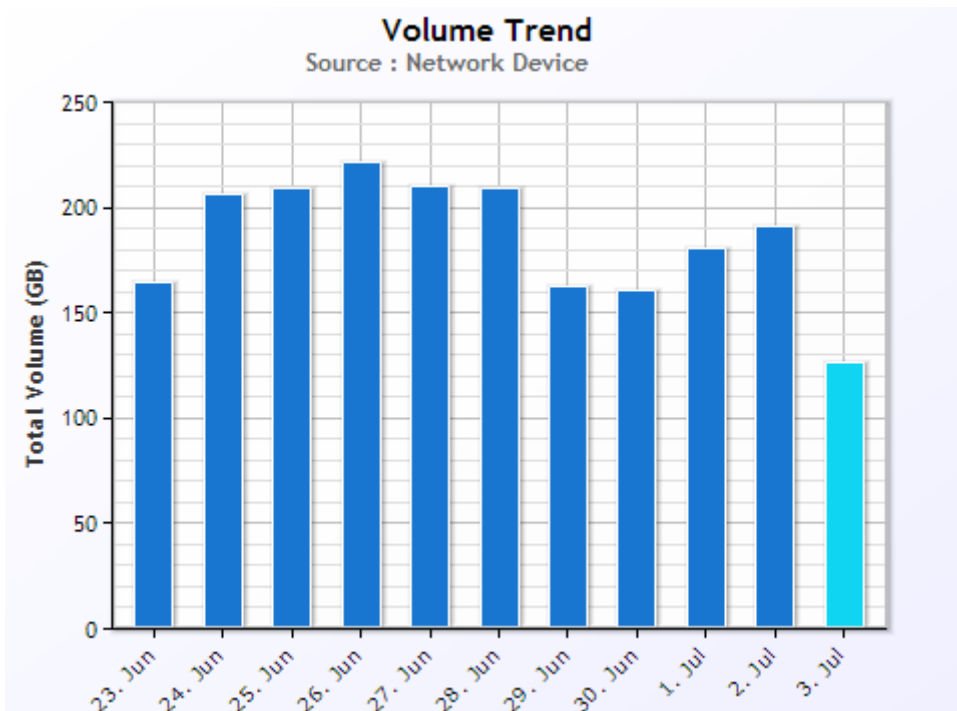
Two tables are displayed: The 'Inbound' direction (E.g., from the WAN to a local Site), and the 'Outbound' direction (E.g., from a Site to the WAN.) The IP pairs displayed in the table may change based on the column you wish to sort on. By clicking on one of the column names you can sort the display based on the highest number of Bytes, highest Response Time, or lowest TCP Efficiency. Additionally, for each IP host pair combination displayed the number of TCP/UDP flows for the period selected is also displayed.

## 4.9. The Trends View

The Trends View provides users with insight into trends in the traffic patterns. These trends can be used to detect slowly-increasing network problems, such as capacity problems or slow network efficiency deteriorations.

Each colored bar represents the metric used for the trend graph for either a single week, or a single month. If you select a period smaller than a month in the date selector, weekly bars will be shown. For any other period you will see monthly bars. Grey bars indicate the projected growth or decrease. The calculation uses either the last six weeks (for weekly bars), or the last three months (for monthly bars). The Least Squares method is used for this calculation.

### 4.9.1. Volume Trend



*Context*

The Volume Trend graph is shown in all nodes where the site is unknown.

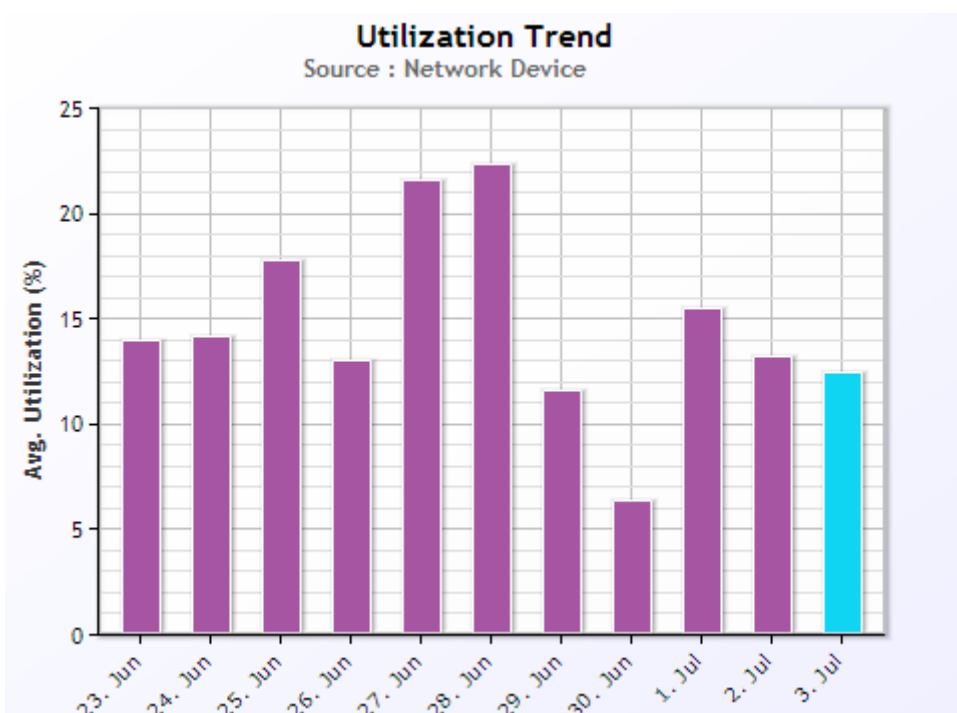
*Description*

The Volume Trend graph shows the total number of bytes transmitted over the entire network for the given selection. Grey bars indicate the projected trend in usage.

*Interpretation*

Most applications grow slowly over time. This is because of increased usage by users, or because of application upgrades that use increasing amounts of bandwidth. A steady growth in the total number of bytes is not a cause for concern. However, if you see a large spike in bytes for any given week or month, it is important to check which site was the cause of that increase, so as to ensure that there is always enough bandwidth for your application.

**4.9.2. Utilization Trend**



### Context

The Utilization Trend graph is shown when the site in the selection is known.

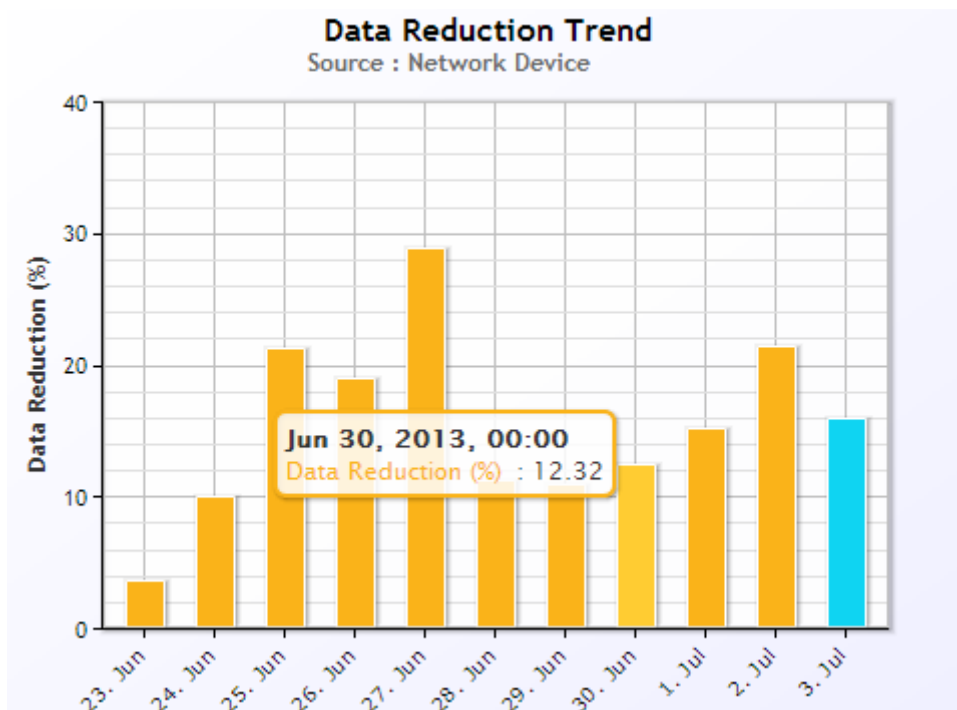
### Description

The Utilization Trend graph shows the average amount of bandwidth for the selected node. Grey bars indicate the projected trend in usage.

### Interpretation

Most applications grow slowly over time. This is because of increased usage by users, or because of application upgrades that use increasing amounts of bandwidth. A steady growth in the total utilization is not a cause for concern. However, if you see a large spike in utilization for any given week or month, it is important to check which site was the cause of that increase, so as to ensure that there is always enough bandwidth for your application.

## 4.9.3. Data Reduction Trend



### Context

The Data Reduction Trend graph is shown for all nodes where data reduction traffic information is available.

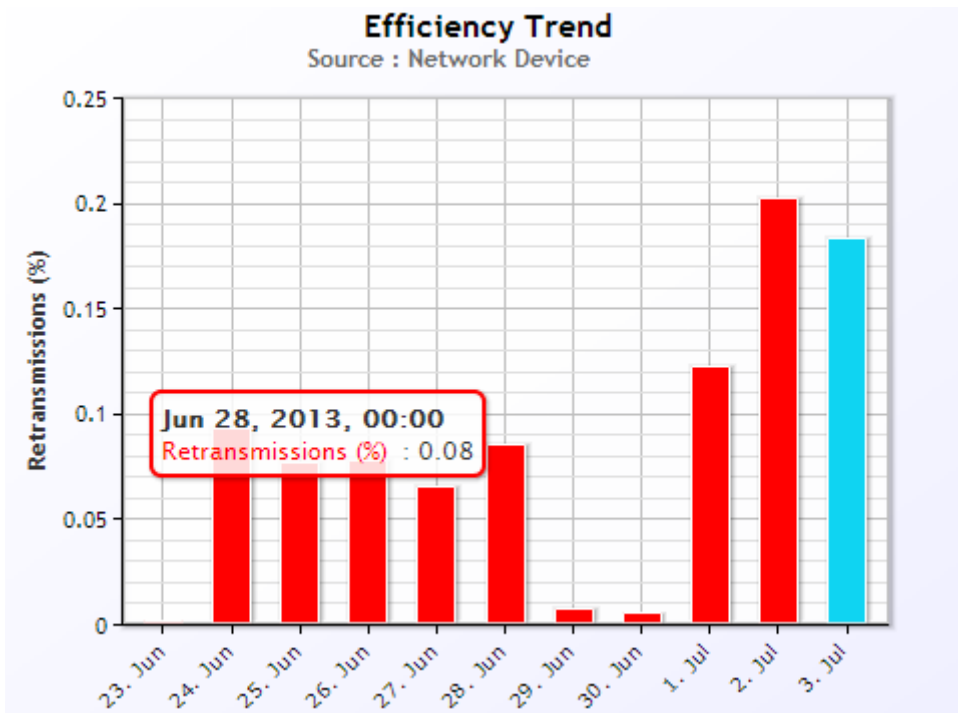
### Description

The Data Reduction Trend graph shows the percentage of data reduction obtained. Grey bars indicate the projected trend in usage.

### Interpretation

Data reduction is becoming more and more important to provide adequate application performance across the WAN. Without insight in the performance of data reduction over time, however, organizations run the risk of losing the initial benefits obtained by deploying data reduction technology.

## 4.9.4. Efficiency Trend



*Context*

The Efficiency Trend graph is shown for all nodes in the Sites and Applications trees.

The device must support the TCP Efficiency capability.

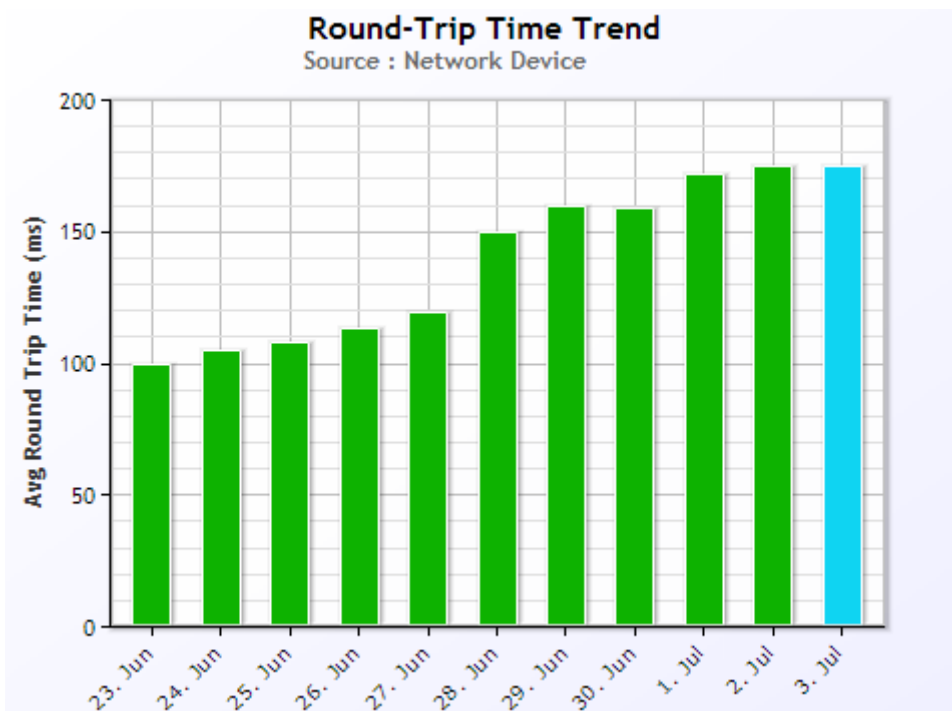
*Description*

The Efficiency Trend graph shows the average retransmissions this application encountered across all sites. Grey bars indicate the projected trend in retransmissions.

*Interpretation*

A steady increase in retransmissions generally indicates that the application is suffering from congestion. A sharp increase in retransmissions generally indicates equipment failure in the WAN or LAN, or possibly a server performance issue. Check the sites that use this application to see what may be the source of the retransmissions.

#### 4.9.5. Round-Trip Time Trend



#### Context

The Round-Trip Time Trend graph is shown for all nodes in the Sites and Applications trees.

The device must support the Network Latency capability.

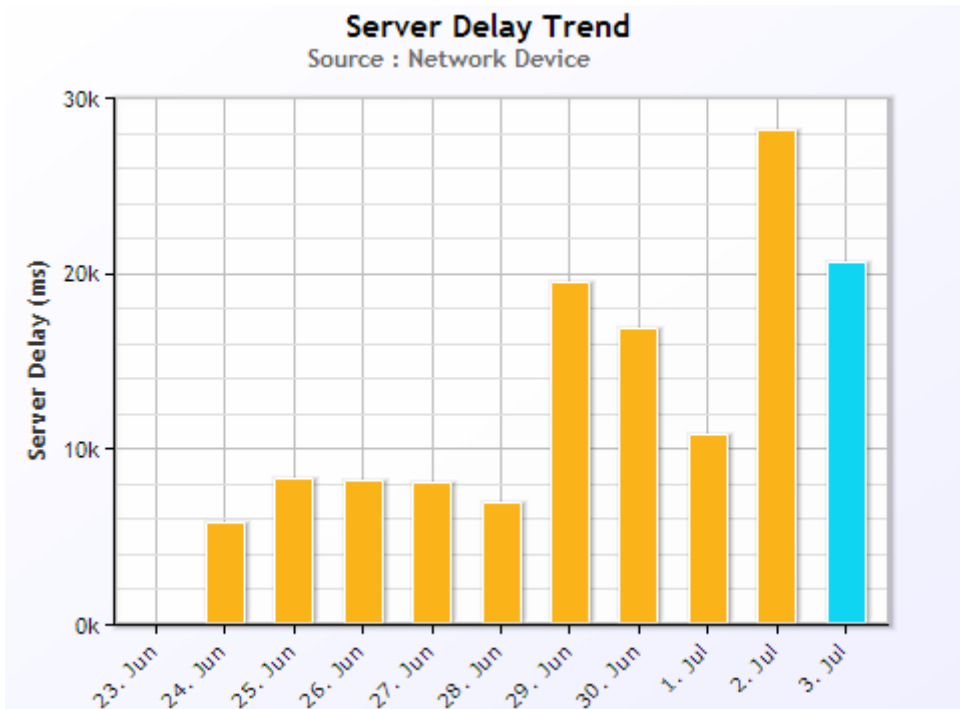
#### Description

The Round-Trip Time Trend graph shows the average response time experienced by traffic for the selected node. Grey bars indicate the projected trend in response time.

#### Interpretation

A steady increase in response time generally indicates that the application is suffering from congestion. A sharp increase in response time generally indicates equipment failure in the WAN or LAN, or possibly a server performance issue. Check the sites that use this application to see what may be the source of the slow response times.

### 4.9.6. Server Delay Trend



*Context*

The Server Delay Trend graph is shown when the Application and Site are defined by the selection in the navigation tree.

The device must support the Service Transactions capability.

*Description*

The Server Delay Trend graph shows the average server response time experienced by application transactions across all sites in your network. Grey bars indicate the projected trend in server response time.

*Interpretation*

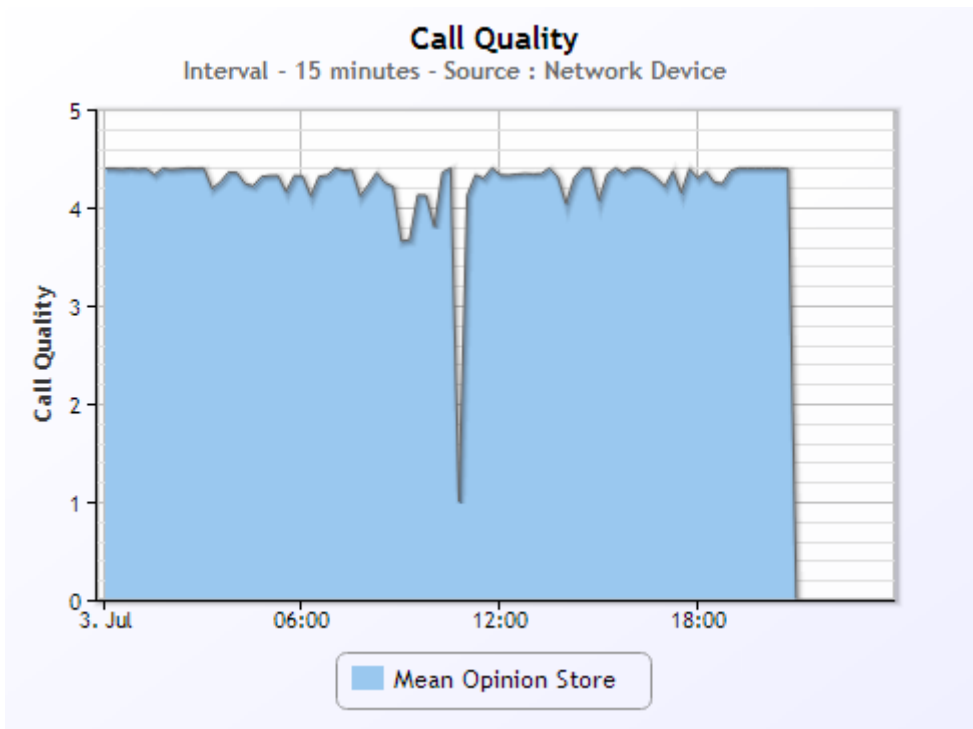
A steady increase in server response time generally indicates that your application servers are increasing in utilization. A sharp increase in response time generally indicates that your servers have reached a critical utilization limit, or that new transaction types are in use. (Thus, they may take longer, which is not a problem). Check the servers that host this application to see what may be the source of the slow response times.

## 4.10. The VoIP View

The VoIP View provides insight into the core VoIP characteristics as observed on the network. This view will only be shown if a VoIP-classified protocol has been used in the selection made in the navigation tree.

Note that the PacketShaper only provides VoIP metrics in the Inbound direction. Therefore, if the only device that provides VoIP information is the PacketShaper, no direction columns are shown. When other devices (also) deliver VoIP metrics, the standard Inbound and Outbound headers will be shown at the top of the view.

### 4.10.1. Call Quality



#### *Context*

The Call Quality graph is shown for those Sites and Applications that have seen VoIP traffic.

The device must support the VoIP capability.

#### *Description*

The Call Quality graph shows the average value for MOS (Mean Opinion Score) for all VoIP calls in this Site during the interval measured.

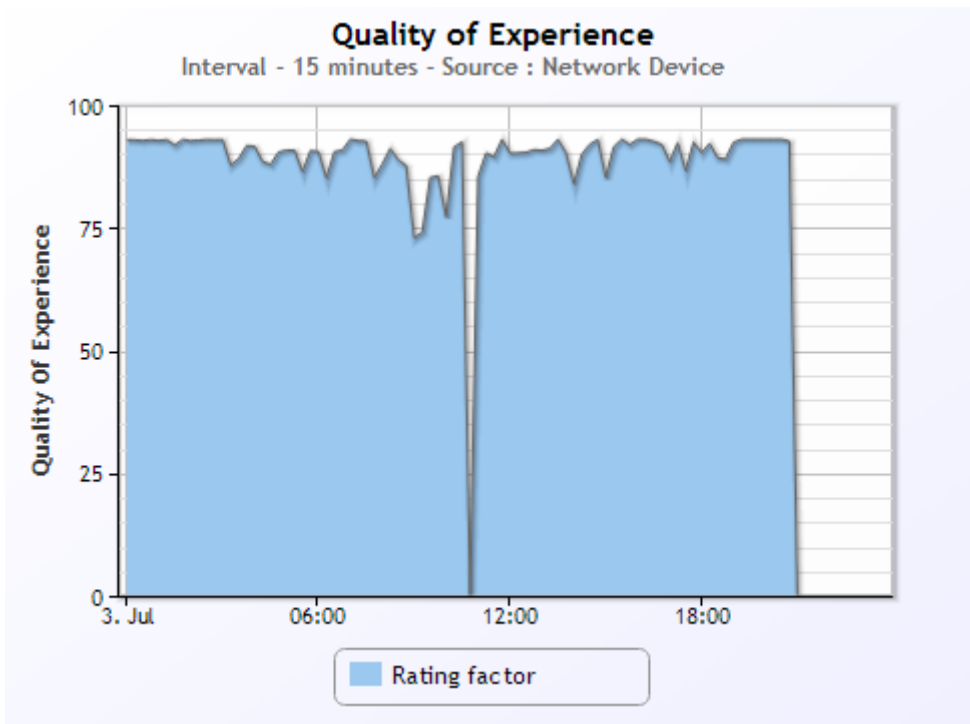
#### *Interpretation*

Low MOS scores indicate that a network problem is affecting the quality of your VoIP calls. Any score lower than 2 is likely to cause severe disruption to your VoIP infrastructure.

#### *Technical Details*

The MOS score displayed is based on the industry standard MOS value. The displayed value is the average value for all VoIP calls made during the interval displayed.

## **4.10.2. Quality of Experience**



#### Context

The Quality of Experience graph is shown for those Sites and Applications that have seen VoIP traffic.

The device must support the VoIP capability.

#### Description

The Quality of Experience graph shows the average R-factor value for all VoIP calls in this Site during the interval measured.

#### Interpretation

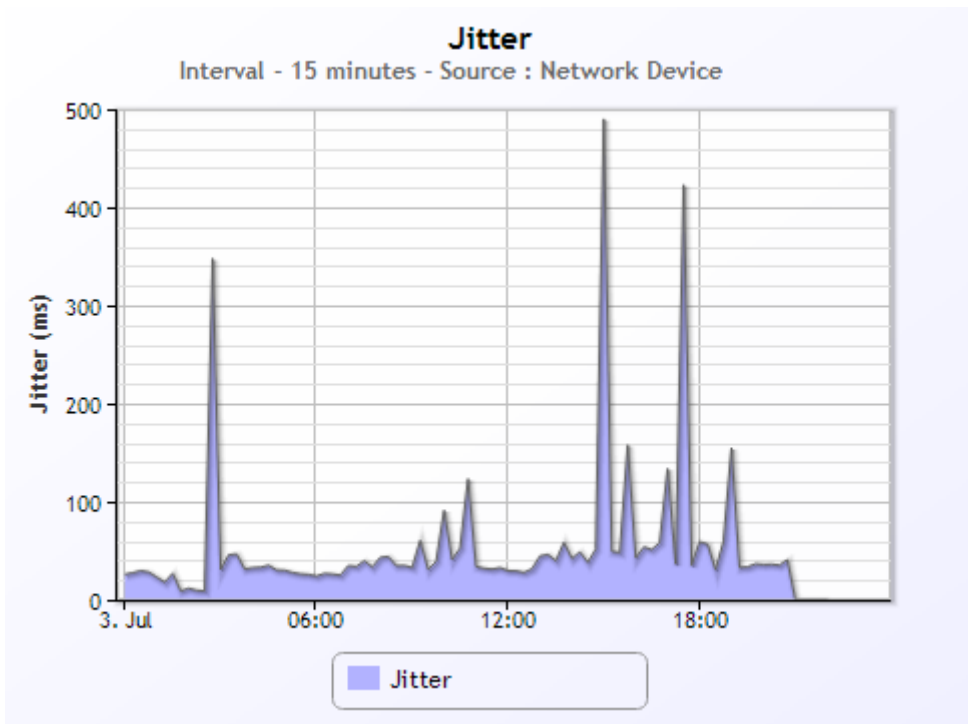
Low R-factor values indicate that network problems are affecting the quality of your VoIP calls. The lower the value, the poorer the quality.

#### Technical Details

The R-factor value is based on the industry standard R-factor value. The R-factor is derived from measurements such as latency, jitter, and packet loss. The displayed value is the average R-factor value for all VoIP calls made during the interval displayed.

### 4.10.3. Jitter





#### Context

The Jitter graph is shown for those Sites and Applications that have seen VoIP traffic.

The device must support the VoIP capability.

#### Description

The Jitter graph shows the average Jitter value for all VoIP calls in this Site during the interval measured.

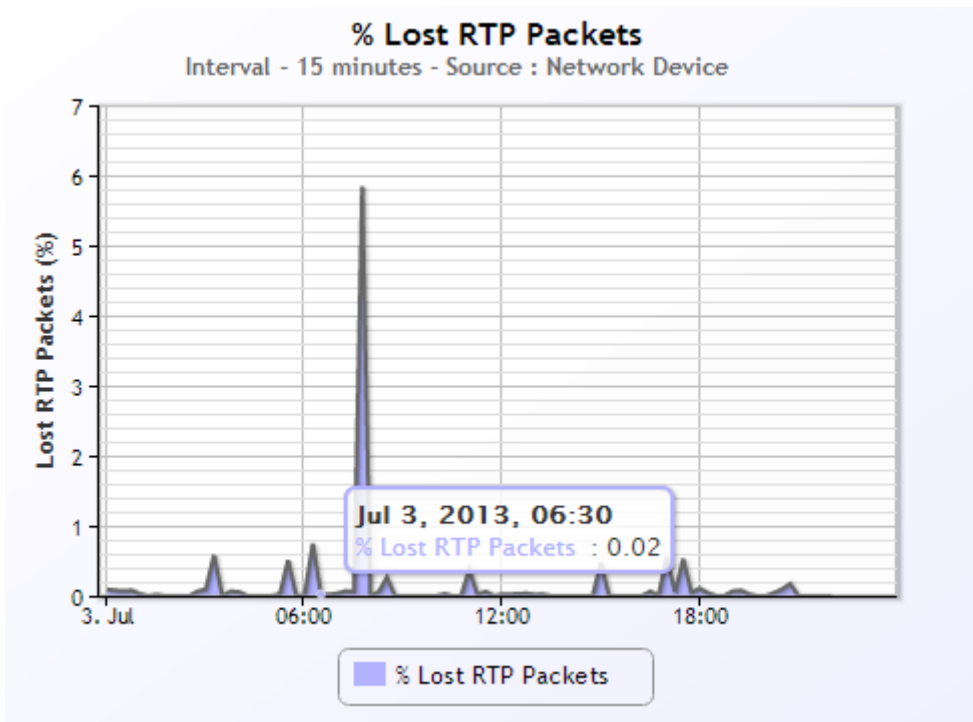
#### Interpretation

High Jitter values indicate that unpredictable network conditions are causing high variations in VoIP latency. Jitter is generally caused by packet loss or queuing due to congestion or faulty network equipment. High Jitter values can cause poor VoIP quality.

#### Technical Details

The Jitter indicator represents the average variation in one-way latencies for RTP packets for all VoIP calls for this Site.

### 4.10.4. % Lost RTP Packets



#### Context

The % Lost RTP Packets graph is shown for those Sites and Applications that have seen VoIP traffic.

The device must support the VoIP capability.

#### Description

The % Lost RTP Packets graph shows the percentage of RTP packets for all VoIP calls that were lost during the interval measured.

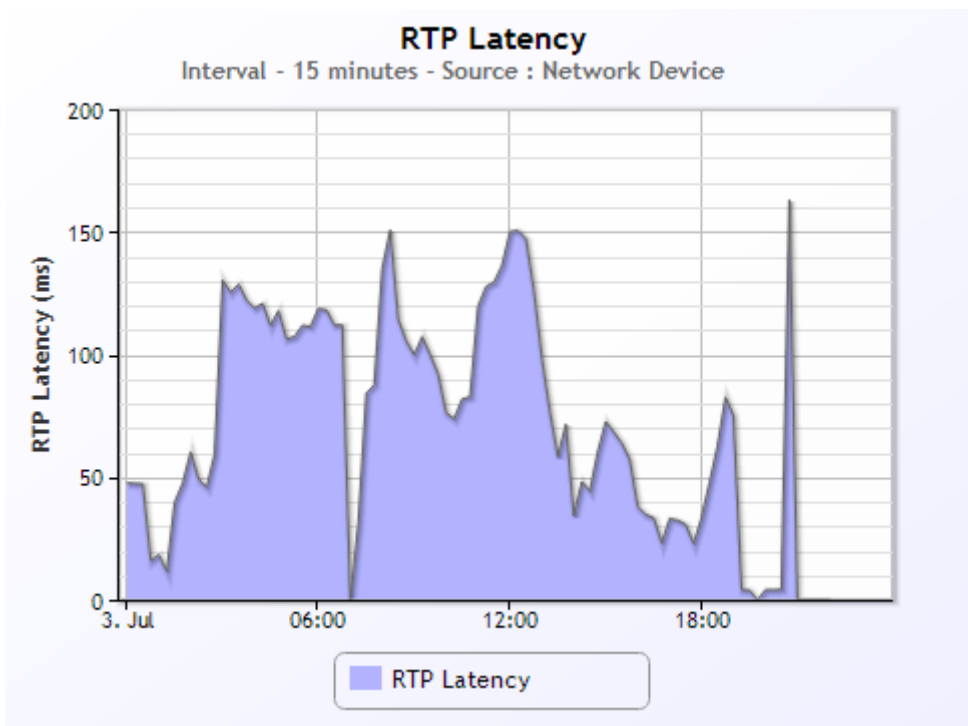
#### Interpretation

High packet loss values can cause VoIP to become unusable. If users of VoIP can't hear all the words said by the other side of a call (= high RTP packet loss % values), they generally hang up.

#### Technical Details

The % Lost RTP Packets value represents the percentage of the total RTP packets that were expected (based on sequence numbers) that were never seen for all VoIP calls in this Site.

### 4.10.5. RTP Latency



*Context*

The RTP Latency graph is shown for those Sites and Applications that have seen VoIP traffic.

The device must support the VoIP capability.

*Description*

The RTP Latency graph shows the average one-way latency for all RTP packets in this Site during the interval measured.

*Interpretation*

High latency values can cause VoIP to become unusable. If users of VoIP need to wait too long (= high RTP Latency values) to hear the other party in a call, they generally hang up.

*Technical Details*

The RTP Latency indicator represents the average one-way latency for RTP packets in a call.

**4.10.6. Inbound/Outbound Calls**

| Top 10 called hosts |               |                |               |                |                     |                         |
|---------------------|---------------|----------------|---------------|----------------|---------------------|-------------------------|
| Local IP            | Local site    | WAN IP         | ▼ Total bytes | Avg jitter(ms) | Avg RTP latency(ms) | Avg lost RTP packets(%) |
| 194.120.0.231       | VoIP-provider | 10.0.0.194     | 9.77 KB       | 71 ms          | 0 ms                | 0 %                     |
| 10.0.0.184          | NetDialog     | 77.72.168.232  | 9.77 KB       | 67 ms          | 0 ms                | 0 %                     |
| 10.0.0.184          | NetDialog     | 80.239.235.231 | 9.77 KB       | 67 ms          | 0 ms                | 0 %                     |
| 194.120.0.231       | VoIP-provider | 10.0.0.184     | 9.77 KB       | 69 ms          | 0 ms                | 0 %                     |
| 10.0.0.194          | NetDialog     | 195.219.64.231 | 9.77 KB       | 72 ms          | 0 ms                | 0 %                     |
| 80.239.235.231      | VoIP-provider | 10.0.0.184     | 9.77 KB       | 67 ms          | 0 ms                | 0 %                     |
| 10.0.0.184          | NetDialog     | 194.120.0.232  | 9.77 KB       | 67 ms          | 0 ms                | 0 %                     |
| 10.0.0.184          | NetDialog     | 195.219.64.231 | 9.77 KB       | 65 ms          | 0 ms                | 0 %                     |
| 208.167.230.117     | VoIP-provider | 10.0.0.184     | 9.77 KB       | 65 ms          | 0 ms                | 0 %                     |
| 194.120.0.232       | VoIP-provider | 10.0.0.184     | 9.77 KB       | 68 ms          | 0 ms                | 0 %                     |

*Context*

The Inbound/Outbound Calls table is shown for those Sites and Applications that have seen VoIP traffic.

The device must support the VoIP and the Flow Information capability, and the flow information must contain VoIP information.

*Description*

The Inbound/Outbound Calls table shows the top 10 IP host pairs (VoIP call partners) sorted by Total Bytes, Average Jitter, Average RTP Latency, and Average RTP Lost Packets.

### Interpretation

Use this table to determine which VoIP call partners (IP Hosts) were the most active for this Site, have the worst Jitter, highest Latency, or the highest Packet Loss. This table is useful for determining if VoIP performance problems are specific to a single Host, group of Hosts, or to all VoIP users in general.

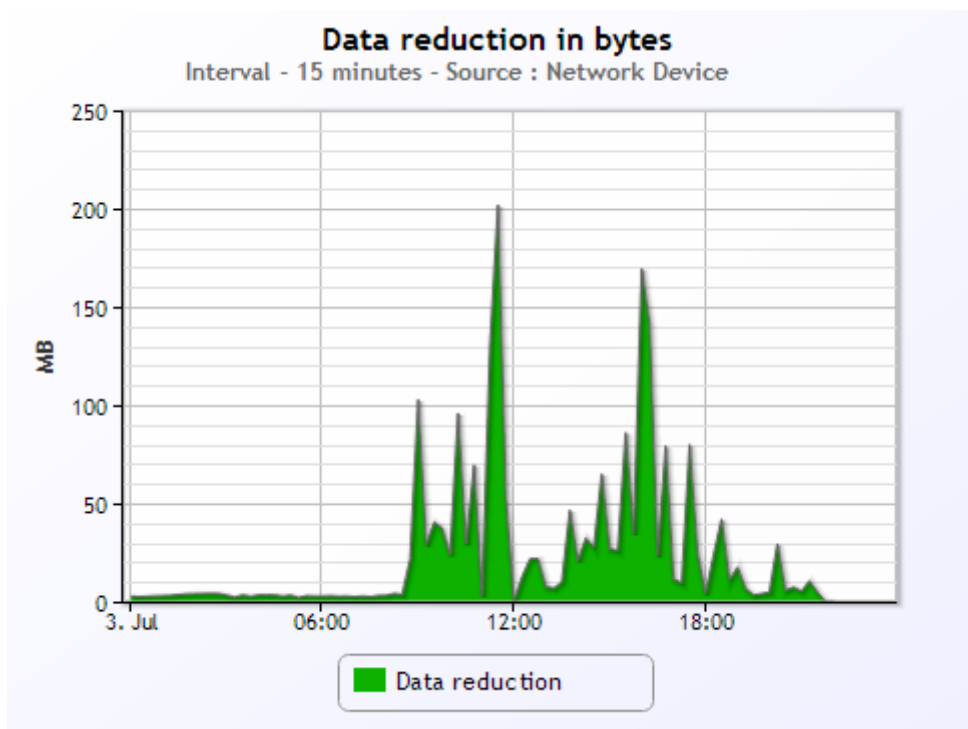
### Technical Details

Two tables are displayed: The 'Inbound' direction (E.g., from the WAN to this Site), and the 'Outbound' direction (E.g., from this Site to the WAN.) The IP pairs displayed in the table may change based on the column you wish to sort on. By clicking on one of the column names you can sort the display based on the highest number of Bytes, highest Jitter, Response Time, or Packet Loss.

## 4.11. The Optimization View

The Optimization view shows the benefits of data reduction technologies used on the network. This view will only be shown if data reduction technologies have been applied on the traffic for the selection made in the navigation tree.

### 4.11.1. Data Reduction in Bytes



### Context

The Data Reduction in Bytes graph will be shown when the user has selected a single application in the navigation tree.

### Description

The Data Reduction in Bytes graph shows the reduction in bytes achieved for the selected Application by your WAN optimization infrastructure during the period specified.

### Interpretation

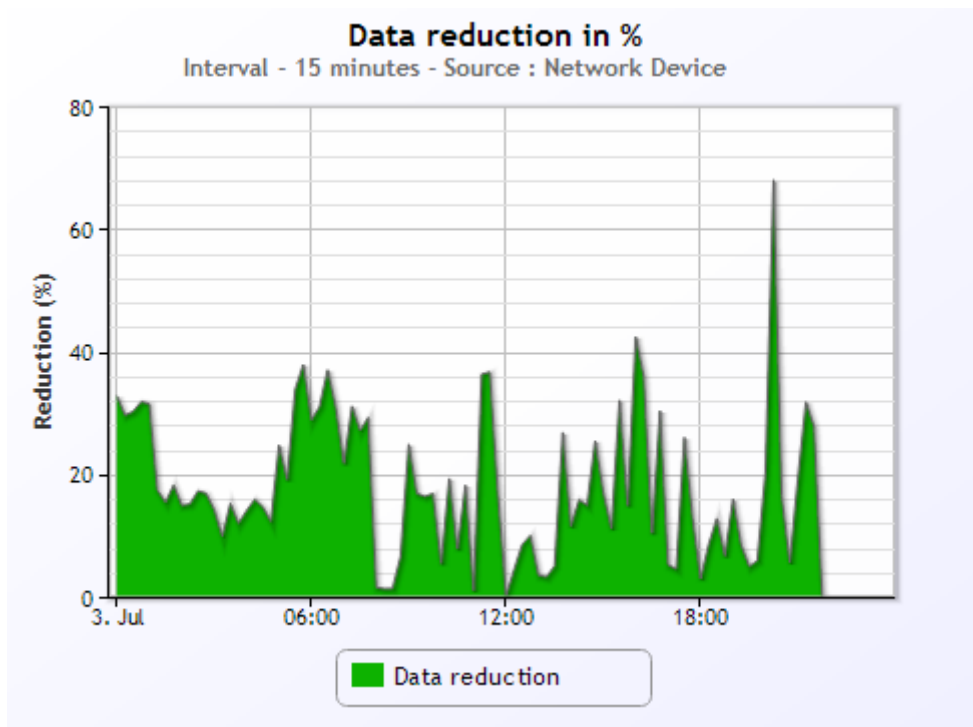
High data reduction indicates that your WAN optimization infrastructure is capable, and configured to compress most of your WAN traffic. If low data reduction is seen this may be because of low WAN utilization or incorrectly configured optimization devices.

### Technical Details

This graph shows the total data reduction achieved for all WAN bytes for the selected Application in your network. E.g., 800 KB compression means that your WAN optimization infrastructure reduced the amount of

traffic by 800KB.

### 4.11.2. Data Reduction in Percentage



#### Context

The Data Reduction in Percentage graph will be shown when the user has selected a single application in the navigation tree.

#### Description

The Data Reduction in Percentage graph shows the data reduction achieved for the selected Application by your WAN optimization infrastructure during the period specified.

#### Interpretation

High data reduction ratios indicate that your WAN optimization infrastructure is capable, and configured to compress most of your WAN traffic. If low data reduction ratios are seen this may be because of low WAN utilization or incorrectly configured optimization devices.

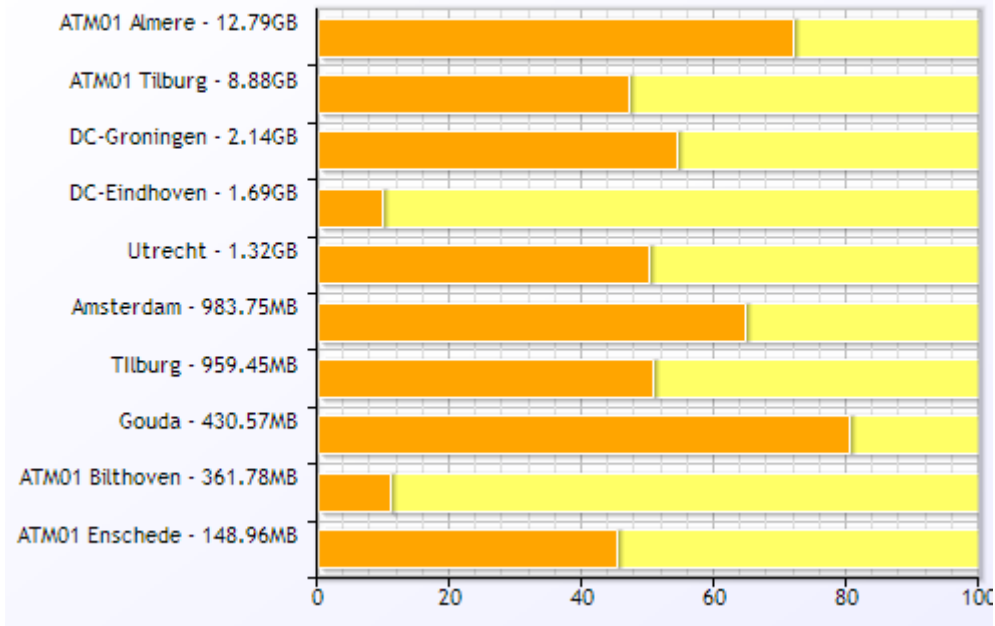
#### Technical Details

This graph shows the average data reduction percentage for all WAN bytes for the selected Application in your network. E.g., 80% compression means that your WAN optimization infrastructure on average reduced the original amount of traffic to 80% of the original size.

### 4.11.3. Top-10 Data Reduction Sites

## Data reduction Top 10 in bytes

Source : Network Device



### Context

The Top-10 Data Reduction Sites graph will be shown when the user has selected a single application in the navigation tree.

### Description

The Top-10 Data Reduction Sites graph shows the Top-10 sites that have the best and worst data reduction achieved for the selected Application by your WAN optimization infrastructure during the period specified.

### Interpretation

Low data reduction on a specific site can indicate that your WAN optimization infrastructure optimization devices are incorrectly configured for this application.

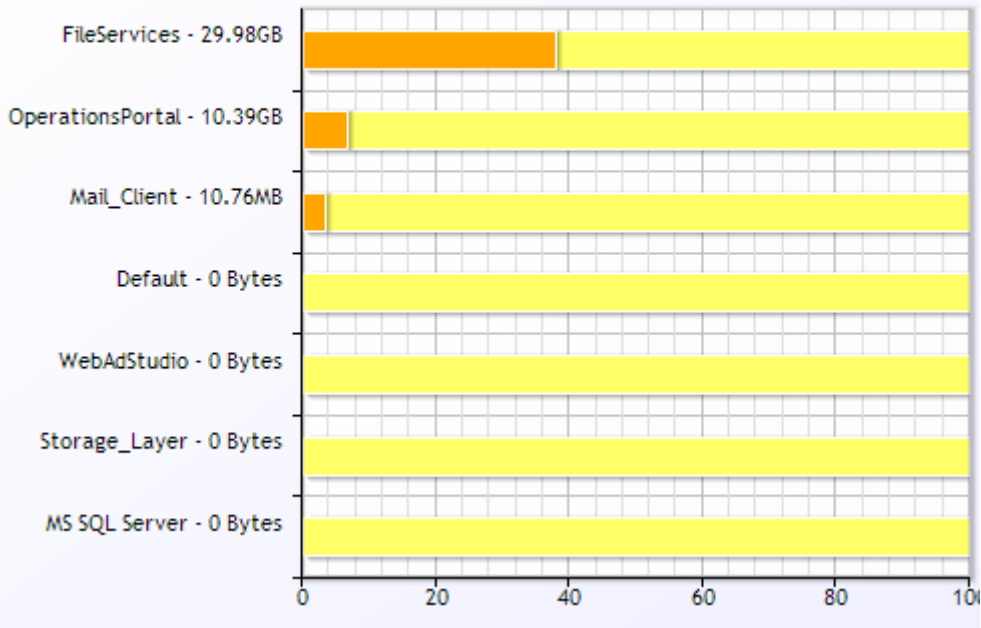
### Technical Details

This graph shows the 10 sites that achieve the highest or the lowest data reduction for all WAN bytes for the selected Application in your network.

## 4.11.4. Top 10 Data Reduction Applications

## Data reduction Top 10 in bytes

Source : Network Device



### Context

The Top-10 Data Reduction Applications graph will be shown in the following navigation tree contexts: All Applications,

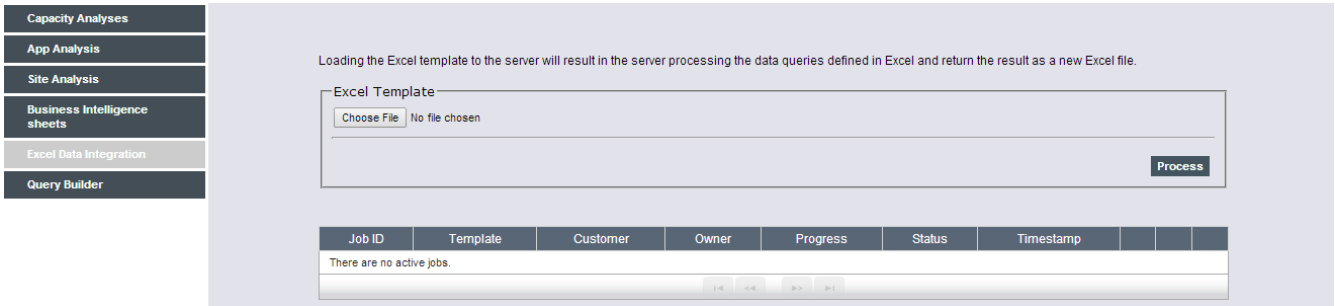
### Description

This view will show the Top 10 best and worst applications with respect to the amount of traffic reduction that has been achieved using WAN optimization techniques like compression and directory-based data deduplication.

# 5. Analyzing NetX Data

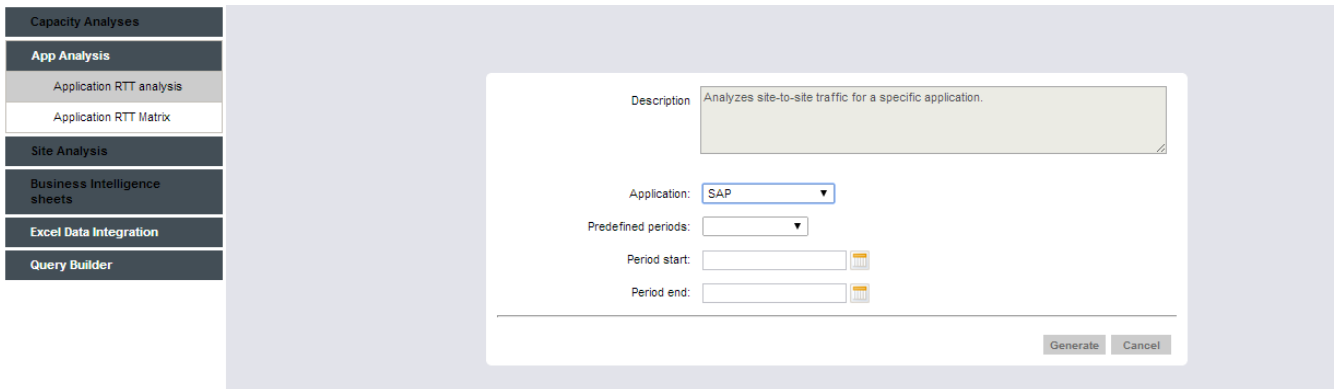
Although NetX offers a set of standard views for monitoring network and application performance, it is sometimes necessary to explore the measurement data in NetX in more detail. The Analyze view offers this functionality through integration with Microsoft Excel (2003 file format) and the NetX Data Mining Interface (DMI).

The following figure shows the default configuration of the Analyze view. With no additional configuration, the Analyze view (available for normal users and administrators) will show a single navigation tree menu entry called Excel Data Integration. This function will allow the user to upload Excel workbooks to the NetX server that contain data queries in the NetX DMI specification. When an Excel workbook is uploaded, the server will parse and evaluate the data queries and fill the Excel workbook with the data results and return those to the user.



The Excel Data Integration offers the means to explore and analyze NetX data in an ad-hoc fashion. Using Excel also offers the means to post-process the data query results, for example using pivot tables and charts for better visualization. If at some point an Excel workbook becomes stable and reusable for a broader user group, NetX offers a mechanism to register this workbook as an Excel template that becomes part of the Analyze view and that allows the data queries to be parameterized.

The following figure shows the navigation tree after an administrator user has registered the Excel templates. Here, the administrator has created four categories (Capacity Analysis, App Analysis, Site Analysis, and Business Intelligence sheets). In the App Analysis category two Excel templates are registered.



In this example, the user has selected the Application RTT analysis template, which provides a description of the functionality it offers and requires the user to fill in two parameters: the application and the Period. The NetX UI helps the user in filling in this Period parameter by providing a set of commonly-used periods, but the user can also fill in her own start and end date.

In Section [Excel Data Integration](#) we will describe the Excel Data Integration query language and the parameter types that can be present in the Excel templates. Section [Excel Templates](#) will describe the user interface that is generated for Excel Templates.

## 5.1. Excel Data Integration

The Excel Data Integration provides a mechanism to query NetX data through Excel worksheets. To run one



or more data queries, a specially named Excel sheet needs to be present (called 'NetX') that contains the queries in the NetX DMI Query language.

### 5.1.1. Constructing Excel DMI Queries

Excel DMI queries are defined as a set of <attribute, value> pairs that occupy a non-interrupted sequence of rows in the NetX sheet, where the attributes are all in one (arbitrary) column and the corresponding value in the next column. This sequence of pairs must always start with the attribute 'NetX Query' in the first row. The value of this attribute is the name of the Excel sheet where the NetX server will generate the output of this query.

Each DMI Query also requires the following attributes:

#### *Granularity*

Identifies at which level in the data hierarchy measurement information is retrieved. This should be one of the values 'Site', 'Site/Site', 'Application', 'Site/Application', or 'Site/Site/Application'.

#### *Period*

The period for which the data records are returned. This should be one of the values 'Minute', 'Quarter Hour', 'Hour', 'Day', 'Week', or 'Month'.

#### *Attributes*

The set of measurements that should be returned in the query result. If the query should return more than one measurement, the measurement names must be separated by a ','. A list of attributes is available in the 'NetX Meta Data' sheet (see below).

#### *Start Date*

The start date of the time range. The value cell must be formatted as Date.

#### *End Date*

The end date of the time range. This date should be later than the start date. The value cell must be formatted as Date.

Queries also have a number of attributes for which default values are set by the system that can be overruled by the user.

#### *Time Type*

The time type selection used for the data query. This should be one of the values 'Universal Time', 'Local Time', or 'Business Hours'. Default value is 'Local Time'.

#### *Device Type*

The device type from which the measurements must be derived. The 'NetX Meta Data' sheet contains all available measurements including the device types that are available. The default value is 'PacketShaper'.

#### *Direction*

The direction of the traffic flow for which the measurements must be retrieved. Possible values are 'Both', 'Inbound', and 'Outbound'; the default value is 'Both'.

#### *Remainder*

Indicates whether the data query should also compute the remaining group for the leaf nodes of the granularity you have selected. For example, if you queried for granularity 'Site/Application', the server will return the measurement values for each known <Site, Application> combination. However, the measurements that are known for the site but not matched to an application will only show if this parameter has the value true, where the application column will show NULL. The default value is false.

The following figure shows an example query and part of the corresponding query result. The query is called 'data', which results in a worksheet called 'data' that will contain the query results. The granularity is 'Site/Application', so the query result will have columns for Site, Site Group, Bandwidth for that site, and

Application. The Period is 'Day', which results in a Time column and an Interval column which indicates the number of seconds that this time slot contains (this is useful to deal with DST and also with month periods, which differ in length.) Since we query for both directions, a Direction column is present that indicates the direction of the traffic for which the measurements are taken. Finally, the query asks for the attribute Bytes, which results in a Bytes column in the result.

|   | A           | B                |
|---|-------------|------------------|
| 1 | NetX Query  | data             |
| 2 | Granularity | Site/Application |
| 3 | Period      | Day              |
| 4 | Start Date  | January 14, 2010 |
| 5 | End Date    | January 16, 2010 |
| 6 | Attributes  | Bytes            |
| 7 | Remainder   | TRUE             |
| 8 |             |                  |
| 9 |             |                  |

|    | A     | B     | C         | D               | E         | F                   | G        | H         |
|----|-------|-------|-----------|-----------------|-----------|---------------------|----------|-----------|
| 1  | Site  | Group | Bandwidth | Application     | Direction | Time                | Interval | Bytes     |
| 2  | Paris | EMEA  | 2048000   | File Services   | Inbound   | 2010-01-14 00:00:00 | 86400    | 888647253 |
| 3  | Paris | EMEA  | 2048000   | Email           | Inbound   | 2010-01-14 00:00:00 | 86400    | 60453060  |
| 4  | Paris | EMEA  | 2048000   | Intranet        | Inbound   | 2010-01-14 00:00:00 | 86400    | 85165853  |
| 5  | Paris | EMEA  | 2048000   | Company Website | Inbound   | 2010-01-14 00:00:00 | 86400    | 118907539 |
| 6  | Paris | EMEA  | 2048000   | Teleconference  | Inbound   | 2010-01-14 00:00:00 | 86400    | 47684696  |
| 7  | Rome  | EMEA  | 1000000   | File Services   | Inbound   | 2010-01-14 00:00:00 | 86400    | 15774694  |
| 8  | Rome  | EMEA  | 1000000   | Email           | Inbound   | 2010-01-14 00:00:00 | 86400    | 67467234  |
| 9  | Rome  | EMEA  | 1000000   | Intranet        | Inbound   | 2010-01-14 00:00:00 | 86400    | 125450855 |
| 10 | Rome  | EMEA  | 1000000   | Company Website | Inbound   | 2010-01-14 00:00:00 | 86400    | 98168590  |
| 11 | Rome  | EMEA  | 1000000   | Teleconference  | Inbound   | 2010-01-14 00:00:00 | 86400    | 7179389   |

In order to limit the number of records that a query will return, it is possible to define query filters. It depends on the selected Granularity whether the filter is valid or not.

#### Site

Only return records for which the Site corresponds with the attribute value. A list of known Site names is generated in the 'NetX Meta Data' sheet.

#### Group

Only return records for which the Site Group corresponds with the attribute value.

#### Remote Site

Only return records for which the Remote Site corresponds with the attribute value.

#### Remote Group

Only return records for which the Remote Site Group corresponds with the attribute value.

#### Application

Only return records for which the Application corresponds with the attribute value.

In the following figure the output is restricted to sites in the site group 'EMEA' and to data for application 'Email'.

|   | A           | B                |
|---|-------------|------------------|
| 1 | NetX Query  | data             |
| 2 | Granularity | Site/Application |
| 3 | Period      | Day              |
| 4 | Start Date  | January 14, 2010 |
| 5 | End Date    | January 16, 2010 |
| 6 | Attributes  | Bytes            |
| 7 | Remainder   | TRUE             |
| 8 | Group       | EMEA             |
| 9 | Application | Email            |

|    | A            | B     | C         | D           | E         | F                   | G        | H         |
|----|--------------|-------|-----------|-------------|-----------|---------------------|----------|-----------|
| 1  | Site         | Group | Bandwidth | Application | Direction | Time                | Interval | Bytes     |
| 2  | Amsterdam    | EMEA  | 512000    | Email       | Inbound   | 2010-01-14 00:00:00 | 86400    | 0         |
| 3  | Amsterdam    | EMEA  | 512000    | Email       | Inbound   | 2010-01-15 00:00:00 | 86400    | 0         |
| 4  | London       | EMEA  | 1000000   | Email       | Inbound   | 2010-01-14 00:00:00 | 86400    | 125432877 |
| 5  | London       | EMEA  | 1000000   | Email       | Inbound   | 2010-01-15 00:00:00 | 86400    | 84804011  |
| 6  | Rome         | EMEA  | 1000000   | Email       | Inbound   | 2010-01-14 00:00:00 | 86400    | 67467234  |
| 7  | Rome         | EMEA  | 1000000   | Email       | Inbound   | 2010-01-15 00:00:00 | 86400    | 109964404 |
| 8  | DC_Amsterdam | EMEA  | 10000000  | Email       | Inbound   | 2010-01-14 00:00:00 | 86400    | 35938669  |
| 9  | DC_Amsterdam | EMEA  | 10000000  | Email       | Inbound   | 2010-01-15 00:00:00 | 86400    | 29091990  |
| 10 | Paris        | EMEA  | 2048000   | Email       | Inbound   | 2010-01-14 00:00:00 | 86400    | 60453060  |
| 11 | Paris        | EMEA  | 2048000   | Email       | Inbound   | 2010-01-15 00:00:00 | 86400    | 82690308  |
| 12 | Amsterdam    | EMEA  | 512000    | Email       | Outbound  | 2010-01-14 00:00:00 | 86400    | 0         |
| 13 | Amsterdam    | EMEA  | 512000    | Email       | Outbound  | 2010-01-15 00:00:00 | 86400    | 0         |
| 14 | London       | EMEA  | 1000000   | Email       | Outbound  | 2010-01-14 00:00:00 | 86400    | 125458904 |
| 15 | London       | EMEA  | 1000000   | Email       | Outbound  | 2010-01-15 00:00:00 | 86400    | 84882676  |
| 16 | Rome         | EMEA  | 1000000   | Email       | Outbound  | 2010-01-14 00:00:00 | 86400    | 67608530  |
| 17 | Rome         | EMEA  | 1000000   | Email       | Outbound  | 2010-01-15 00:00:00 | 86400    | 110251687 |
| 18 | DC_Amsterdam | EMEA  | 10000000  | Email       | Outbound  | 2010-01-14 00:00:00 | 86400    | 89433842  |
| 19 | DC_Amsterdam | EMEA  | 10000000  | Email       | Outbound  | 2010-01-15 00:00:00 | 86400    | 80375854  |
| 20 | Paris        | EMEA  | 2048000   | Email       | Outbound  | 2010-01-14 00:00:00 | 86400    | 60425743  |
| 21 | Paris        | EMEA  | 2048000   | Email       | Outbound  | 2010-01-15 00:00:00 | 86400    | 82653211  |

If filtering needs to take place on more than one value it is possible to use named ranges to filter a set of attributes.

#### Filter Attributes

The attributes on which the filter condition needs to be evaluated.

#### Filter Tuple Values

The named ranges that contain the values for each of the filter attributes. All named ranges must have the same length.

The named ranges defined by the Filter Tuple Values describe value tuples. For a data record to match, it must match the attribute value for each corresponding element in the tuple. In the following example, the data query is filtered on three tuples, defining the filter values <Paris, File Services>, <Rome, Email>, and <Beijing, Email>. The names range Site\_Names is defined as D4-D6; the named range Application\_Names as E4-E6. The query result data will only contain those records matching one of the three tuples (which in the case of <Beijing, Email> is an empty set.)

|   | A                   | B                             | C                 | D                 | E                   |
|---|---------------------|-------------------------------|-------------------|-------------------|---------------------|
| 1 | NetX Query          | data                          |                   |                   |                     |
| 2 | Granularity         | Site/Application              |                   |                   |                     |
| 3 | Period              | Day                           |                   | <b>Site names</b> | <b>Applications</b> |
| 4 | Start Date          |                               | September 5, 2010 | Paris             | File Services       |
| 5 | End Date            |                               | September 8, 2010 | Rome              | Email               |
| 6 | Device Type         | PacketShaper                  |                   | Beijing           | Email               |
| 7 | Attributes          | Bytes, Avg Round Trip Time    |                   |                   |                     |
| 8 | Filter Attributes   | Site, Application             |                   |                   |                     |
| 9 | Filter Tuple Values | Site_Names, Application_Names |                   |                   |                     |

|    | A     | B     | C         | D             | E         | F                   | G        | H         | I                   |
|----|-------|-------|-----------|---------------|-----------|---------------------|----------|-----------|---------------------|
| 1  | Site  | Group | Bandwidth | Application   | Direction | Time                | Interval | Bytes     | Avg Round Trip Time |
| 2  | Rome  | EMEA  | 1000000   | Email         | Inbound   | 2010-09-05 00:00:00 | 86400    | 0         |                     |
| 3  | Rome  | EMEA  | 1000000   | Email         | Inbound   | 2010-09-06 00:00:00 | 86400    | 507506535 | 44.6326             |
| 4  | Rome  | EMEA  | 1000000   | Email         | Inbound   | 2010-09-07 00:00:00 | 86400    | 7398873   | 38.9423             |
| 5  | Paris | EMEA  | 2048000   | File Services | Inbound   | 2010-09-05 00:00:00 | 86400    | 740664906 | 10.9756             |
| 6  | Paris | EMEA  | 2048000   | File Services | Inbound   | 2010-09-06 00:00:00 | 86400    | 191647388 | 10.4171             |
| 7  | Paris | EMEA  | 2048000   | File Services | Inbound   | 2010-09-07 00:00:00 | 86400    | 40457249  | 10.2282             |
| 8  | Rome  | EMEA  | 1000000   | Email         | Outbound  | 2010-09-05 00:00:00 | 86400    | 0         |                     |
| 9  | Rome  | EMEA  | 1000000   | Email         | Outbound  | 2010-09-06 00:00:00 | 86400    | 507615098 | 39.0685             |
| 10 | Rome  | EMEA  | 1000000   | Email         | Outbound  | 2010-09-07 00:00:00 | 86400    | 7702558   | 38.4184             |
| 11 | Paris | EMEA  | 2048000   | File Services | Outbound  | 2010-09-05 00:00:00 | 86400    | 512011644 | 11.0149             |
| 12 | Paris | EMEA  | 2048000   | File Services | Outbound  | 2010-09-06 00:00:00 | 86400    | 192737085 | 11.523              |
| 13 | Paris | EMEA  | 2048000   | File Services | Outbound  | 2010-09-07 00:00:00 | 86400    | 46758268  | 11.2199             |
| 14 |       |       |           |               |           |                     |          |           |                     |

Another mechanism to restrict the number of records is by adding aggregation conditions to the query. Each measurement has its own characteristic aggregation method that will be used to combine multiple data points into a single value. The following aggregation parameters are available.

#### Aggregate Direction

Aggregate the measurements in the direction dimension. If the query returns measurements for both directions (i.e., the Direction attribute is 'Both') then the values will be combined and a single record will be returned. The default value is false.

#### Aggregate Time

Aggregate the measurements in the time dimension. Possible values are 'Off', 'All', 'Quarter Hour', 'Hour', 'Day', 'Week', and 'Month'; the default value is 'Off'. If the Period selected has a lower granularity than the Aggregate Time, the records will be combined to a single record per time slot. The value 'All' indicates that all timestamps will be aggregated to a single record.

In the following figure the measurement data is aggregated over inbound and outbound. Since the natural aggregation mode for the Bytes measurement is to add the numbers, the result will now return the total amount of Email traffic in both directions for each site in EMEA.

|    | A                   | B                |
|----|---------------------|------------------|
| 1  | NetX Query          | data             |
| 2  | Granularity         | Site/Application |
| 3  | Period              | Day              |
| 4  | Start Date          | January 14, 2010 |
| 5  | End Date            | January 16, 2010 |
| 6  | Attributes          | Bytes            |
| 7  | Group               | EMEA             |
| 8  | Application         | Email            |
| 9  | Aggregate Direction | TRUE             |
| 10 |                     |                  |

|    | A            | B     | C         | D           | E                   | F        | G         |
|----|--------------|-------|-----------|-------------|---------------------|----------|-----------|
| 1  | Site         | Group | Bandwidth | Application | Time                | Interval | Bytes     |
| 2  | Amsterdam    | EMEA  | 512000    | Email       | 2010-01-15 00:00:00 | 86400    | 0         |
| 3  | DC_Amsterdam | EMEA  | 10000000  | Email       | 2010-01-15 00:00:00 | 86400    | 109467844 |
| 4  | Amsterdam    | EMEA  | 512000    | Email       | 2010-01-14 00:00:00 | 86400    | 0         |
| 5  | Paris        | EMEA  | 2048000   | Email       | 2010-01-15 00:00:00 | 86400    | 165343519 |
| 6  | London       | EMEA  | 1000000   | Email       | 2010-01-15 00:00:00 | 86400    | 169686687 |
| 7  | Rome         | EMEA  | 1000000   | Email       | 2010-01-15 00:00:00 | 86400    | 220216091 |
| 8  | Rome         | EMEA  | 1000000   | Email       | 2010-01-14 00:00:00 | 86400    | 135075764 |
| 9  | Paris        | EMEA  | 2048000   | Email       | 2010-01-14 00:00:00 | 86400    | 120878803 |
| 10 | London       | EMEA  | 1000000   | Email       | 2010-01-14 00:00:00 | 86400    | 250891781 |
| 11 | DC_Amsterdam | EMEA  | 10000000  | Email       | 2010-01-14 00:00:00 | 86400    | 125372511 |
| 12 |              |       |           |             |                     |          |           |

The final mechanism for restricting the output of a single query is to compute a histogram over the result. The histogram will use a specified number of bins for the range specified, and will create separate groups for

the outliers. The following histogram parameters are available.

### Histogram Attribute

The measurement that should be used for the histogram. This measurement should also be present in the Attributes value.

### Histogram Lower Bound

The lower bound of the first bucket.

### Histogram Upper Bound

The upper bound of the last bucket.

### Histogram Buckets

The number of buckets.

In the following example we retrieve the Average Round Trip Time measurement on a minute interval. For the histogram we specify the range and number of buckets and also specify that we want to aggregate on time to a week interval. The query result gives the number of minutes in which the round-trip time for the application Email for the sites in EMEA felt into one of the buckets.

| A                        | B                   |
|--------------------------|---------------------|
| 1 NetX Query             | data                |
| 2 Granularity            | Site/Application    |
| 3 Period                 | Minute              |
| 4 Start Date             | January 14, 2010    |
| 5 End Date               | January 16, 2010    |
| 6 Attributes             | Avg Round Trip Time |
| 7 Group                  | EMEA                |
| 8 Application            | Email               |
| 9 Aggregate Time         | Week                |
| 10 Histogram Attribute   | Avg Round Trip Time |
| 11 Histogram Lower Bound | 0                   |
| 12 Histogram Upper Bound | 200                 |
| 13 Histogram Buckets     | 10                  |

| A               | B           | C         | D                   | E     | F          | G           | H           | I           | J            | K             | L             | M             | N             | O             | P      |
|-----------------|-------------|-----------|---------------------|-------|------------|-------------|-------------|-------------|--------------|---------------|---------------|---------------|---------------|---------------|--------|
| Site            | Application | Direction | Time                | < 0.0 | 0.0 - 20.0 | 20.0 - 40.0 | 40.0 - 60.0 | 60.0 - 80.0 | 80.0 - 100.0 | 100.0 - 120.0 | 120.0 - 140.0 | 140.0 - 160.0 | 160.0 - 180.0 | 180.0 - 200.0 | >= 200 |
| 2 Paris         | Email       | Inbound   | 2010-01-10 00:00:00 | 0     | 2880       | 0           | 0           | 0           | 0            | 0             | 0             | 0             | 0             | 0             | 0      |
| 3 London        | Email       | Outbound  | 2010-01-10 00:00:00 | 0     | 2866       | 13          | 1           | 0           | 0            | 0             | 0             | 0             | 0             | 0             | 0      |
| 4 Rome          | Email       | Outbound  | 2010-01-10 00:00:00 | 0     | 1626       | 1077        | 174         | 3           | 0            | 0             | 0             | 0             | 0             | 0             | 0      |
| 5 Paris         | Email       | Outbound  | 2010-01-10 00:00:00 | 0     | 2880       | 0           | 0           | 0           | 0            | 0             | 0             | 0             | 0             | 0             | 0      |
| 6 DC_Amsterdam  | Email       | Outbound  | 2010-01-10 00:00:00 | 0     | 2880       | 0           | 0           | 0           | 0            | 0             | 0             | 0             | 0             | 0             | 0      |
| 7 Amsterdam     | Email       | Outbound  | 2010-01-10 00:00:00 | 0     | 2880       | 0           | 0           | 0           | 0            | 0             | 0             | 0             | 0             | 0             | 0      |
| 8 Amsterdam     | Email       | Inbound   | 2010-01-10 00:00:00 | 0     | 2880       | 0           | 0           | 0           | 0            | 0             | 0             | 0             | 0             | 0             | 0      |
| 9 Rome          | Email       | Inbound   | 2010-01-10 00:00:00 | 0     | 1627       | 176         | 1022        | 45          | 9            | 1             | 0             | 0             | 0             | 0             | 0      |
| 10 London       | Email       | Inbound   | 2010-01-10 00:00:00 | 0     | 2609       | 267         | 4           | 0           | 0            | 0             | 0             | 0             | 0             | 0             | 0      |
| 11 DC_Amsterdam | Email       | Inbound   | 2010-01-10 00:00:00 | 0     | 2880       | 0           | 0           | 0           | 0            | 0             | 0             | 0             | 0             | 0             | 0      |

To improve the presentation of the final result it is also possible to sort the output. Sorting also allow top-N results to be shown instead of all results. The following sorting parameters are available.

### Sort Attributes

The attributes in the query that can be used for sorting. Note that this can also include non-measurement attributes (e.g., Site, Application, etc.)

### Sort Order

The order in which the records must be returned. Possible values are 'Ascending' and 'Descending'; the default value is 'Descending'.

### Sort Grouping

A list of attributes that can be used to group the results. Each unique tuple using these attributes is a separate group that will be sorted separately.

### Sort Top N

The number of records per group that will be returned.

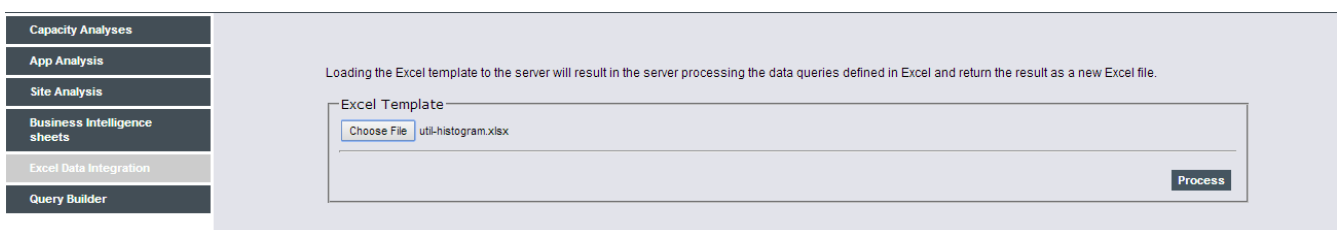
In the following example the result is sorted on the measurement Bytes. Before sorting takes place, all records are grouped per Site and aggregated in direction and time. Since the query specifies that only the top 3 records should be returned, the result will present the three applications per site that generate the most traffic.

|    | A                   | B                |
|----|---------------------|------------------|
| 1  | NetX Query          | data             |
| 2  | Granularity         | Site/Application |
| 3  | Period              | Day              |
| 4  | Start Date          | January 14, 2010 |
| 5  | End Date            | January 16, 2010 |
| 6  | Attributes          | Bytes            |
| 7  | Aggregate Direction | TRUE             |
| 8  | Aggregate Time      | All              |
| 9  | Sort Attributes     | Bytes            |
| 10 | Sort Grouping       | Site             |
| 11 | Sort Order          | Descending       |
| 12 | Sort Top N          | 3                |
| 13 |                     |                  |

|    | A            | B               | C         | D               | E        | F          |
|----|--------------|-----------------|-----------|-----------------|----------|------------|
| 1  | Site         | Group           | Bandwidth | Application     | Interval | Bytes      |
| 2  | Amsterdam    | EMEA            | 512000    | Teleconference  | 86400    | 672814273  |
| 3  | Amsterdam    | EMEA            | 512000    | Company Website | 86400    | 238550010  |
| 4  | Amsterdam    | EMEA            | 512000    | File Services   | 86400    | 35925621   |
| 5  | Beijing      | APAC            | 2000000   | Email           | 86400    | 1342512366 |
| 6  | Beijing      | APAC            | 2000000   | Company Website | 86400    | 33824      |
| 7  | DC_Amsterdam | EMEA            | 10000000  | File Services   | 86400    | 1756265562 |
| 8  | DC_Amsterdam | EMEA            | 10000000  | Teleconference  | 86400    | 1461350060 |
| 9  | DC_Amsterdam | EMEA            | 10000000  | Company Website | 86400    | 709772990  |
| 10 | Hong Kong    | APAC            | 2000000   | Email           | 86400    | 159811078  |
| 11 | Hong Kong    | APAC            | 2000000   | Company Website | 86400    | 0          |
| 12 | Internet     | Internet Access | 6000000   | Intranet        | 86400    | 3986187840 |
| 13 | Internet     | Internet Access | 6000000   | Extranet        | 86400    | 3889510553 |
| 14 | Internet     | Internet Access | 6000000   | Print Services  | 86400    | 1435369632 |
| 15 | London       | EMEA            | 1000000   | Email           | 86400    | 420578468  |
| 16 | London       | EMEA            | 1000000   | Intranet        | 86400    | 357525994  |
| 17 | London       | EMEA            | 1000000   | Company Website | 86400    | 212883160  |
| 18 | Paris        | EMEA            | 2048000   | File Services   | 86400    | 1579916933 |
| 19 | Paris        | EMEA            | 2048000   | Email           | 86400    | 286222322  |
| 20 | Paris        | EMEA            | 2048000   | Company Website | 86400    | 279941989  |
| 21 | Rome         | EMEA            | 1000000   | Email           | 86400    | 355291855  |
| 22 | Rome         | EMEA            | 1000000   | Intranet        | 86400    | 232479725  |
| 23 | Rome         | EMEA            | 1000000   | Company Website | 86400    | 209795827  |
| 24 | Singapore    | APAC            | 1000000   | Email           | 86400    | 22463763   |
| 25 | Singapore    | APAC            | 1000000   | Company Website | 86400    | 0          |
| 26 |              |                 |           |                 |          |            |

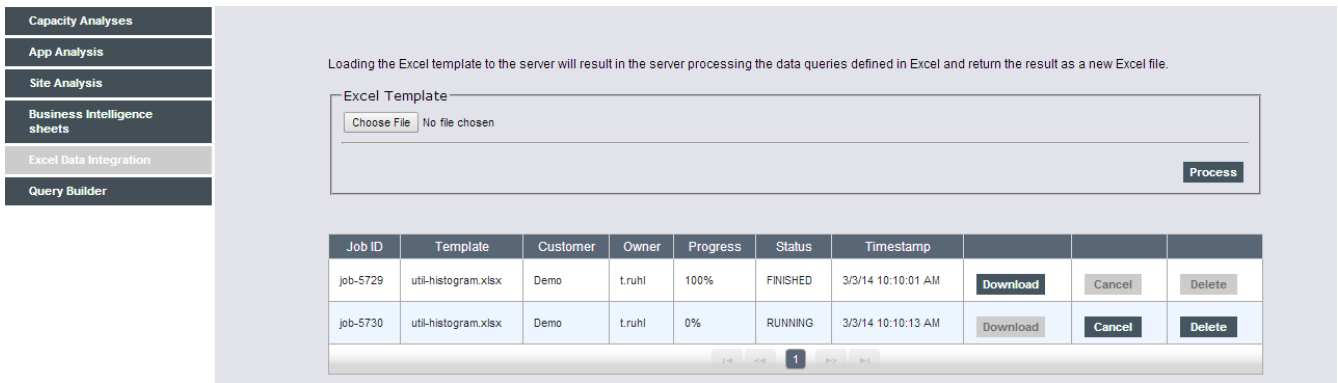
### 5.1.2. Running Excel Data Integration

To execute an Excel DMI workbook the user needs to upload the workbook to the server. Select the entry 'Excel Data Integration' in the navigation menu of the Analyze view and select the template Excel file using the browse menu that pops up when you click the browse button. When a template has been selected, press the 'Process' button, which will upload the template to the server and start the query evaluation engine.



During and after the processing of the Excel file, the user interface will show the actual status of the processing and if the processing is finished, will allow you to download the result Excel file. After two hours

entries will automatically be removed from the queue.



While a job is waiting in the job queue or is currently being processed you can cancel the job prematurely. This will result in an Excel workbook containing the query data that has been processed so far.

To download the Excel result file, click on 'Download'. Note that typically browsers will then offer the possibility to either Open or Save the result file. Opening is possible, but typically the opened file will be read-only and therefore features like pivot tables will not work. Therefore, it is better to save the file first and then open the result file in Excel.

### 5.1.3. Excel DMI Query Results

The result of running Excel Data Integration workbook is a new version of the Excel workbook with a number of changes reflecting the query results. Three types of output sheets are generated:

- For each query a sheet with the output data is generated;
- A sheet called 'NetX Meta Data' is generated that contains all the relevant meta data in the repository;
- A sheet called 'NetX Log' is generated that contains log output generated during the query processing.

The output of the data sheets depends on the query that is specified. Typically it contains columns for all the relevant key attributes in the query output (e.g., Site, Group, Application, Time, Direction, etc.) and a column per measurement attribute.

The NetX Log sheet contains logging information. If all queries can be processed, the log will typically contain only a few INFO records that describe how long each query took:

|   | A                   | B    | C  |
|---|---------------------|------|--|
| 1 | 2010-08-31 12:35:02 | INFO | Processing NetX data query 'data'          |
| 2 | 2010-08-31 12:35:02 | INFO | Finished processing NetX data query 'data' |
| 3 |                     |      |  |
| 4 |                     |      |  |

If an error is detected in the query, this is also reported here as an ERROR record. The NetX Log sheet will be the default sheet that is selected when the workbook file is opened if it contains an ERROR record.

|   | A                   | B     | C  |
|---|---------------------|-------|--|
| 1 | 2010-08-31 12:37:12 | ERROR | Illegal direction setting: 'Oubtound'. Valid values are: {Both, Inbound, Outbound} |
| 2 |                     |       |  |

The NetX Log is cleared before each run, so all log records relate to the last execution of the queries.

The NetX Meta Data sheet contains meta-data information about the repository. First, it gives an overview of all the sites that are currently registered in the repository:

|    | A            | B               | C                | D                 | E                        | F                         |
|----|--------------|-----------------|------------------|-------------------|--------------------------|---------------------------|
| 1  | <b>Sites</b> |                 |                  |                   |                          |                           |
| 2  | <b>Name</b>  | <b>Group</b>    | <b>Real Site</b> | <b>Timezone</b>   | <b>Bandwidth Inbound</b> | <b>Bandwidth Outbound</b> |
| 3  | DC_Amsterdam | EMEA            | TRUE             | Europe/Amsterdam  | 10000000                 | 10000000                  |
| 4  | Amsterdam    | EMEA            | TRUE             | Europe/Amsterdam  | 512000                   | 512000                    |
| 5  | Paris        | EMEA            | TRUE             | Europe/Amsterdam  | 2048000                  | 2048000                   |
| 6  | Beijing      | APAC            | TRUE             | Asia/Hong_Kong    | 2000000                  | 2000000                   |
| 7  | Hong Kong    | APAC            | TRUE             | Asia/Hong_Kong    | 2000000                  | 2000000                   |
| 8  | London       | EMEA            | TRUE             | Europe/London     | 1000000                  | 1000000                   |
| 9  | Singapore    | APAC            | TRUE             | Asia/Kuala_Lumpur | 1000000                  | 384000                    |
| 10 | Internet     | Internet Access | TRUE             | Europe/Amsterdam  | 6000000                  | 6000000                   |
| 11 | Rome         | EMEA            | TRUE             | Europe/Amsterdam  | 1000000                  | 1000000                   |
| 12 |              |                 |                  |                   |                          |                           |

The output presents the name of the site, the site's group, whether it is a site that contains a device delivering data for that site or not, the time zone in which the site is located, and the inbound and outbound bandwidth settings as they are known to NetX.

Second, the meta data contains a column showing all the applications that are currently registered:

|                     | I |
|---------------------|---|
| <b>Applications</b> |   |
| Services            |   |
| Teleconference      |   |
| Print Services      |   |
| Company Website     |   |
| Email               |   |
| Extranet            |   |
| File Services       |   |
| Intranet            |   |
| IP Telephony        |   |
| Siebel CRM          |   |
| Citrix              |   |
| SAP Logistics       |   |

Finally, the meta data sheet shows all the valid measurement attributes that can be selected per device type:

|                        | L                  | M                     | N |
|------------------------|--------------------|-----------------------|---|
|                        | <b>Attributes</b>  |                       |   |
| <b>Name</b>            | <b>Device Type</b> | <b>Base Attribute</b> |   |
| Bytes                  | PacketShaper       | TRUE                  |   |
| Avg Bps                | PacketShaper       | TRUE                  |   |
| Avg Round Trip Time    | PacketShaper       | TRUE                  |   |
| Packet Exchange Time   | PacketShaper       | TRUE                  |   |
| Peak Bps               | PacketShaper       | TRUE                  |   |
| Server Delay           | PacketShaper       | TRUE                  |   |
| TCP Connection Ignores | PacketShaper       | TRUE                  |   |
| TCP Connection Inits   | PacketShaper       | TRUE                  |   |
| TCP Connection Refuses | PacketShaper       | TRUE                  |   |
| TCP Efficiency         | PacketShaper       | TRUE                  |   |
| MosX10                 | PacketShaper       | TRUE                  |   |
| R-Factor               | PacketShaper       | TRUE                  |   |
| RTP Packets            | PacketShaper       | TRUE                  |   |
| RTP Jitter Count       | PacketShaper       | TRUE                  |   |
| RTP Jitter Sum         | PacketShaper       | TRUE                  |   |
| RTP Lost Packets       | PacketShaper       | TRUE                  |   |
| LAN Bytes              | Steelhead          | TRUE                  |   |
| WAN Bytes              | Steelhead          | TRUE                  |   |

Also generated for all query data is a set of Excel named ranges that describe the whole data table that



contains the result of the query, as well as the individual column values.

The following figure shows the set of named ranges generated for the 'data' query. The data\_Bytes named range contains all the values in the Bytes column. Selecting data\_Table will select the whole table, including the header row. This named range can then be used for further data processing, e.g., as the data source for pivot tables.

|  | B               | C         | D              | E         | F                   | G        | H          | I                   |
|--|-----------------|-----------|----------------|-----------|---------------------|----------|------------|---------------------|
|  | Group           | Bandwidth | Application    | Direction | Time                | Interval | Bytes      | Avg Round Trip Time |
|  | Internet Access | 6000000   | Intranet       | Inbound   | 2010-09-06 00:00:00 | 86400    | 1560101148 | 198.6667            |
|  | Internet Access | 6000000   | Extranet       | Outbound  | 2010-09-06 00:00:00 | 86400    | 988157019  |                     |
|  | EMEA            | 10000000  | File Services  | Outbound  | 2010-09-05 00:00:00 | 86400    | 745208975  | 9.1655              |
|  | EMEA            | 2048000   | File Services  | Inbound   | 2010-09-05 00:00:00 | 86400    | 740664906  | 10.9756             |
|  | APAC            | 2000000   | Email          | Outbound  | 2010-09-06 00:00:00 | 86400    | 648975534  |                     |
|  | Internet Access | 6000000   | Intranet       | Inbound   | 2010-09-07 00:00:00 | 86400    | 572881764  | 289.8               |
|  | Internet Access | 6000000   | Print Services | Inbound   | 2010-09-06 00:00:00 | 86400    | 527142312  |                     |
|  | EMEA            | 2048000   | File Services  | Outbound  | 2010-09-05 00:00:00 | 86400    | 512011644  | 11.0149             |
|  | EMEA            | 10000000  | File Services  | Inbound   | 2010-09-05 00:00:00 | 86400    | 508959866  | 60.477              |
|  | EMEA            | 1000000   | Email          | Outbound  | 2010-09-06 00:00:00 | 86400    | 507615098  | 39.0685             |

Since the NetX sheet can contain multiple queries that are executed in the order they occur on the sheet, it is possible to use the result of the first query as filter values for the second query.

## 5.2. Excel Templates

When an Excel Data Query has proven its value and needs to be run repeatedly with different parameters, it can be registered as an Excel template. From then on, the Excel template becomes integrated in the NetX UI Analyze view navigation tree. When you select an Excel template, a set of defined parameters is presented in the user interface that need to be filled in before the Excel template can be processed.

There are three types of parameters: Select, Range, and Period. Here we will describe these three parameter types.

The **Select** parameter type asks the user to select a single value from a set of predefined values contained in the Excel workbook. This set of predefined values can also contain the data present in the 'NetX Meta Data' sheet, which contains named ranges for the Applications, Sites, and Measurements that are available in the server.

The following figure shows a Select parameter where the user can select one of the Applications known in the repository.

Description: Analyzes site-to-site traffic for a specific application.

Application: SAP

Predefined periods: TCP Tunnel:SMTP, TCP Tunnel:SSH, SAP (selected), QoS/BestEffort, QoS/Bronze, MS Updates, ADN-HTTP, FileServices, mapi-2-servicenode, WebAdStudio, OperationsPortal, Mail\_Client, Hardware support, Blackberry, VoIP, OrderPro, Video-Conference, ADN-HTTP-Proxy, ADN-Sftw-updates, ADN-Default

Period start: [calendar icon]

Period end: [calendar icon]

Generate Cancel

The **Range** parameter type asks the user for a single value within a predefined range of values. The range upper and lower bounds are defined in the Excel template. The following figure shows an example of a Range parameter, where the user needs to fill in a value between 1 and 100 (inclusive) that represents the Percentage that is used in the query.

Description: Computes the number of minutes (both inbound and outbound) where the average volume of traffic exceeds the bandwidth utilization by a given percentage for the specified time period.

Predefined periods: [dropdown]

Period start: [calendar icon]

Period end: [calendar icon]


Percentage [1 - 100]: 90

Generate Cancel

The **Period** parameter type asks the user for a time period. Based on the configuration settings in the Excel template the time period can be either two dates, or two dates and hours. In the following figure the user has filled in the start date and now selects an end date.

Description: Computes the number of minutes (both inbound and outbound) where the average volume of traffic exceeds the bandwidth utilization by a given percentage for the specified time period.

Predefined periods:

Period start:  

Period end:  **<< < March, 2014 > >> x**

Percentage [1 - 100]:


|    | Sun | Mon | Tue | Wed | Thu | Fri | Sat |
|----|-----|-----|-----|-----|-----|-----|-----|
| 9  | 23  | 24  | 25  | 26  | 27  | 28  | 1   |
| 10 | 2   | 3   | 4   | 5   | 6   | 7   | 8   |
| 11 | 9   | 10  | 11  | 12  | 13  | 14  | 15  |
| 12 | 16  | 17  | 18  | 19  | 20  | 21  | 22  |
| 13 | 23  | 24  | 25  | 26  | 27  | 28  | 29  |
| 14 | 30  | 31  | 1   | 2   | 3   | 4   | 5   |


Today  Apply

Note that the user interface will ensure that the end date of the period is after the start date. For convenience there is also a period selection box that presents the most commonly used time periods.

Description: Computes the number of minutes (both inbound and outbound) where the average volume of traffic exceeds the bandwidth utilization by a given percentage for the specified time period.

Predefined periods: **Last Week** ▼

Period start:  

Period end:  

Percentage [1 - 100]:

**Last Hour**

**Last Day**

**Last Full Day**

**Last Week**

**Last Full Week**

**Last Month**

**Last Full Month**

## 6. Reporting

The reporting functionality in the system enables you to export any of the graphs and tables available in the Monitor view into a custom formatted document. The following chapter describes the reporting functionality available in NetX.

To better understand Reporting in NetX, a description of how Reports are structured is required. A Report Template is used to generate a Report. A Report Template consists of the following items:

### *Report Item(s)*

Each Report Template consists of 1 or more Report Items. A Report Item is essentially a chapter in your Report, and will contain 1 or more related graphs or tables. (E.g., the 'Monthly Network SLA Performance' Report Item would contain graphs and tables describing the performance of the SLA associated with the network.)

### *Report Type*

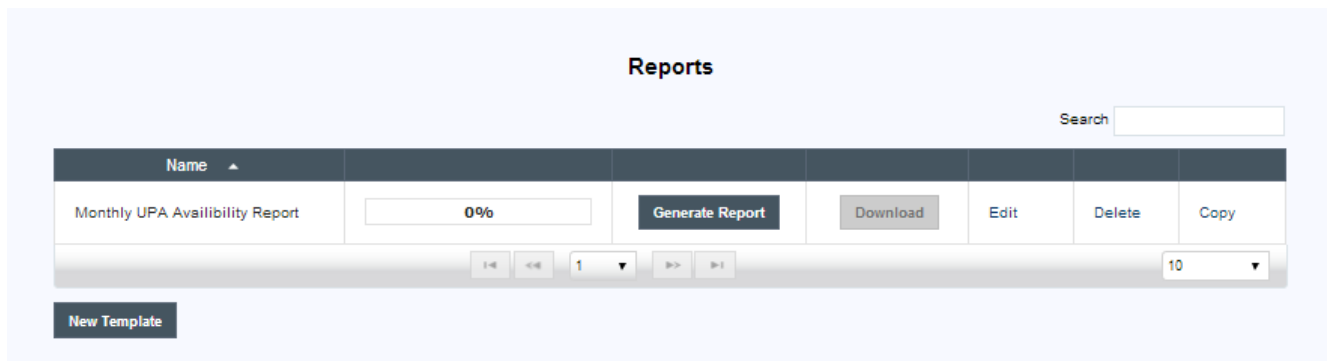
For each Report Item you create you must select exactly 1 Report Type. A Report Type is equivalent to the tabs available in the Monitor Screen in NetX. For example the 'VoIP' tab under the 'All Sites' node in the Navigation Tree.

### *Report Type Item(s)*

Once you have selected a Report Type 1 you then selected 1 or more Report Type Items. Report Type Items are the individual graphs and tables available under a particular tab in the Monitor Screen. All of the graphs and tables available under a particular Monitor Screen tab are available to be inserted into your report.

## 6.1. Reports

The Reports view gives an overview of all the available Report templates for the customer.



Each Report can be generated on demand by clicking the Generate Report button, after which the bar indicator will keep track of the progress. Once the report has been generated it can be downloaded with the Download button.

Templates can be deleted using the Delete link and copied to a new template using the Copy link. A new template can be added using the New Template button.

### 6.1.1. Report Template Settings

Creating a new Report or editing an existing Report will open the Report Template Settings view.

## Report Template Settings

**Report Template Settings**

Report Contents:

- Title Page
- Table Of Contents
- ATM Report for UPA Landing page
- ATM Report for Enterprise portal
- ATM Report for Central Analysis Server

**\*Template Name:** Monthly UPA Availability Report Fields with a \* are mandatory fields

**\*Report Title:** Monthly UPA Availability Report

**\*Report Description:**

- Service checks for
- Landing page (146.106.56.28:80)
- Enterprise Portal (146.106.56.28:8080)
- Central Analysis Server (146.106.56.27:82)

Characters left: 114/255

New Edit Duplicate Delete

Save and Close Save Cancel

The Report Template Settings view enables you to manage the details of your Report Template. A Report Template holds the details of a Report that you wish to generate on a regular basis. This includes such items as which graphs and tables should be generated, in which order, their titles and descriptions, and for which period the data in the Report should be generated.

The following describes the functions available in this screen:

### *Template Name*

Use this text field to give this Report Template a name.

### *Report Title*

This is a free text entry box. You can fill in a title for this Report Template, and this will be displayed on the Title Page of your generated Report.

### *Report Description*

This is a free text entry box. You can fill in a description for this Report Template, and this will be displayed on the Title Page of your generated Report.

### *Save*

This buttons save the details of the currently displayed Report Template to the database.

### *Save and Close*

This buttons save the details of the currently displayed Report Template to the database and closes the dialog.

### *Cancel*

This button cancels any changes you have made to your Report Template, and re-loads it from the database.

### *Report Contents*

This box displays a list of all Report Items that have been added to the Report Template. The first 2 items in the list are always 'Title Page' and 'Table of Contents'. These items cannot be deleted or moved.

### *Report Contents – Order*

When a Report Item in the Report Content list is selected, these buttons move the selected Report Item either

higher or lower in the list. If no Report Item is selected in the list, these buttons do nothing.

#### Report Contents – Delete Item

When this button is clicked, the currently selected Report Item is removed from the Report Contents list.

#### Report Contents – New Item

When this button is clicked the Report Item tab is opened and a new Report Item is displayed.

#### Report Contents – Edit Item

When this button is clicked, the currently selected Report Item is opened for editing in the Report Item tab.

## 6.1.2. Report Item Details

The screenshot shows the 'Report Template Settings' dialog box. The 'Report Item Settings' section is active. On the left, the 'Report Contents' list includes 'Title Page', 'Table Of Contents', and 'Sla Report for Utilization for Day' (selected). Below the list are 'New', 'Edit', 'Duplicate', and 'Delete' buttons. The 'Report Item Name' field contains 'Sla Report for Utilization for Day'. The 'Report Item Description' field is empty, with a 'Characters left: 5000/5000' indicator. Below the description field is a 'Description Only' checkbox with the text 'If checked, the current item will only show the Description and Name'. At the bottom, there are two tabs: 'Report Item Date Settings' and 'Report Item Type Settings'. The 'Report Item Date Settings' section includes: 'Period Used: Day', 'Time Type Used: Business Hours (LT)', 'Use: This 1 Day(s)', 'Report Item Start Date: 2016 Jul 21 Thu', 'Use relative dates: [checkbox]', and 'Date to use as current: [calendar icon]'. At the very bottom are 'Save and Close', 'Save', and 'Cancel' buttons.

The Report Item Details screen enables you to manage the details of a Report Item in your Report Template. A Report Item holds the details of which graphs and tables you wish to include in a particular chapter in your Report, in which order they should appear, their titles and descriptions, and for which period the data in the Report should be generated.

The following describes the functions available in this screen:

#### Report Item Name

This text entry field enables you to define a name for the current Report Item. When you save this Report Item its name will appear in the Report Contents list.

#### Report Item Description

When you select an individual Report Type Item (but not multiple at the same time), the Description of this item is displayed in this text field. It is possible to modify the default Description for this item. Editing the Description for a Report Type Item can make it easier to recognize by the readers of this Report.

#### Edit Title/Description

When this button is clicked, the currently selected Report Type Item in the 'Selected Report Type Item(s)' list is made accessible for editing. The 'Item Title' and 'Item Description' fields described below can be edited. If multiple Report Type Items are selected, this button is not accessible. When editing a Report Type Item Title and Description, the label for this button changes to 'Save Title/Description'.

#### Save

When this button is clicked, the currently displayed Report Item is saved.

#### Save and Close

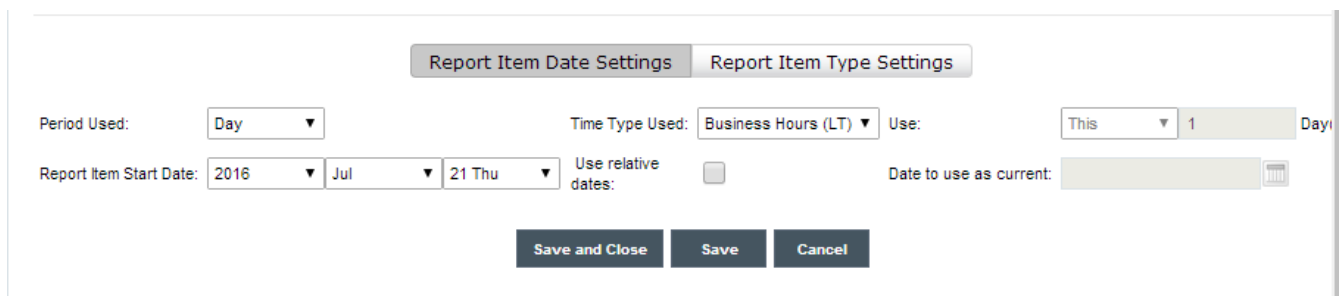
When this button is clicked, the currently displayed Report Item is saved and the dialog is closed.

#### Cancel

When this button is clicked, any changes made to the currently displayed Report Item are discarded, and you are returned to the Report Template screen.

When the user has selected one or more Report Items, she can choose to either edit the date settings (leaving the individual Report Item Type settings as is) or the item type settings (leaving the individual Report Item Date Settings as is). This provides a quick way to adapt existing report templates to a new situation.

## Report Item Date Settings



The following describes the functionality available in the Report Item Date Settings part of the screen:

#### Period Used

This drop-down selector enables you to select for what period the Report Item should be generated. (E.g., if you select the Period 'Day', a Period of exactly 1 Day will be used when selecting data for the graphs and tables in this Report Item.)

#### Report Item Start Date

This selector control enables you to select for which date the report should be created. (E.g., if you select the date 'January, 2008' and you selected the Period 'Month', the graphs and tables in this Report Item will display data that represents the entire month of January.) If 'Use Relative Dates' is selected, this control is disabled.

#### Use Relative Dates

If this checkbox is selected, the relative date selector is enabled. 'Relative Dates' enables you to create a Report based on the last X Periods instead of a fixed date.

When you choose to use the last X periods (Hour, Day, Week, etc.), or this period (Hour, Day, Week, etc.), for each of the X periods the same Report Item will be generated however for a different date.

When using Relative Dates the Periods generated are relative to the Date selected in the Date Selector. E.g., the Relative Date 'Last X Month(s)' or 'Last X Hour(s)' would be calculated as the date selected in the Date Selector + X-1 months, days, hours, etc.

#### Time Type Used

This drop-down selector enables you to choose the Time Type to be used for this Report Item.

## Report Item Type Settings

The screenshot shows the 'Report Item Type Settings' dialog. It has a navigation tree on the left with 'Service Levels' expanded. The 'Select a Report Type' list contains 'Sla'. The 'Available Report Type Item(s)' list is empty. The 'Selected Report Type Item(s)' list contains 'SLA S View Table' and '<blank>'. There are arrows for moving items between lists and an 'Order' section with up/down arrows. At the bottom, there are fields for 'Item Type Title' and 'Item Type Description', an 'Edit Title/Description' button, and 'Save and Close', 'Save', and 'Cancel' buttons.

### Select Service Object

This Navigation Tree displays all the possible objects that can be used to create reports. This is the same navigation tree as in the Monitor screen. When you click on an item in the tree it is highlighted, and a list of all possible Report Types for that object is displayed in the 'Select a Report Type' list.

### Select a Report Type

This list displays all of the Report Types that are available for the Service Object selected by the user. The user can only select one item from this list. The list of Report Type is the same as the available tabs in the Monitor Screen for the currently selected object.

### Available Report Type Item(s)

This list displays all of the Report Type Items that are available for the Report Type currently selected. This list of items is equivalent to the graphs and tables available in the Monitor Screen for the currently selected Service Object and Report Type (UI Tab).

### Selected Report Type Item(s)

This list displays all of the Report Type Items that you have selected to be included in this Report Template. To add items to this list select one or more items from the 'Available Report Type Item(s)' list, and click the arrow pointing towards this list. To remove items from this list select the items and click the arrow pointing towards the 'Available Report Type Item(s)' list.

If you wish to re-order the items in this list, select one or more items and use the up and down arrows to re-position them.

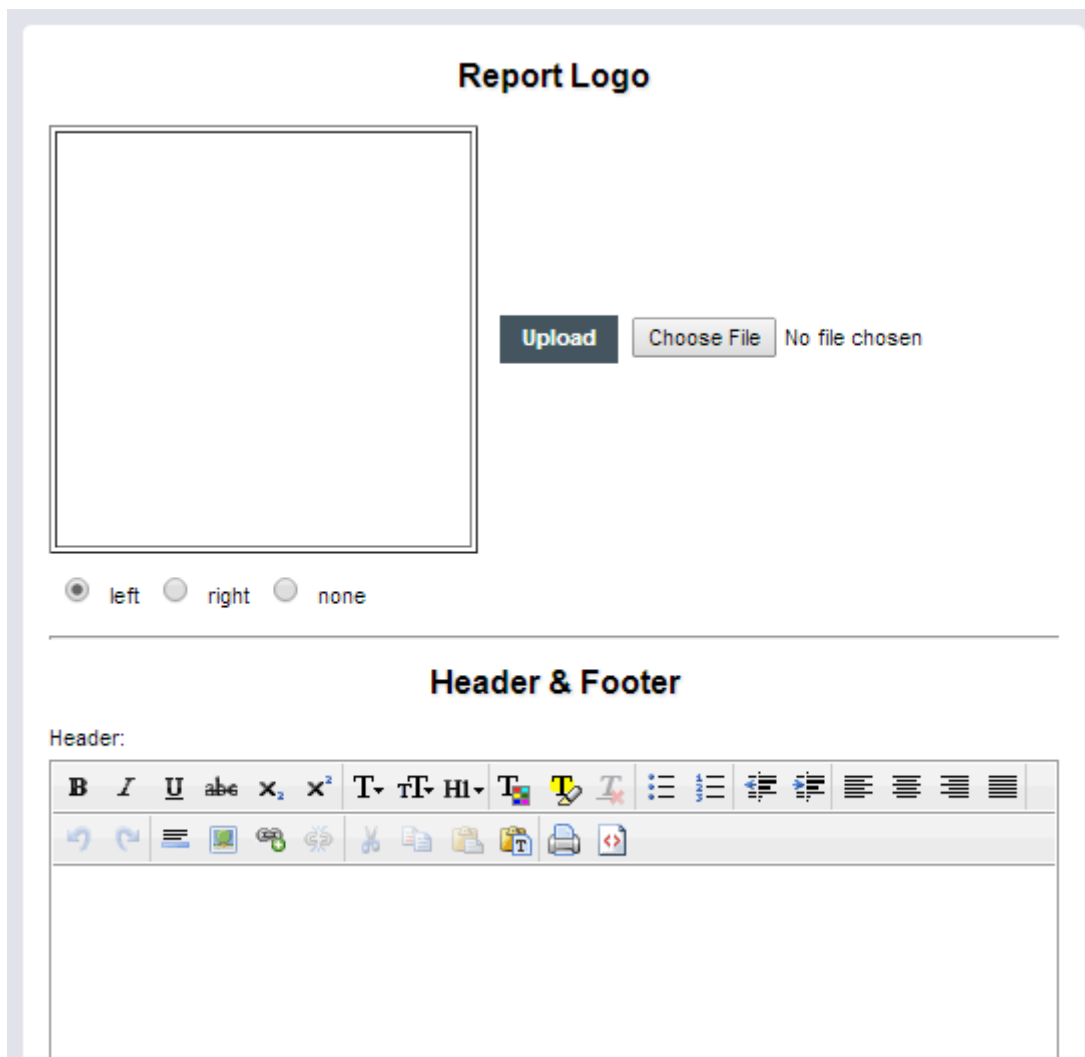
Because Report Type Items are positioned next to each other in a Report (2 in a row), it is sometimes desirable to have only one Report Type Item per line in a graph. If you wish to have a blank space between items in a Report, move the <blank> entry in the list to the appropriate position. One or more <blank> items are possible in a Report.

## 6.2. Report Settings

This tab enables you to manage the defaults that are to be applied to managing and creating Reports and Report Templates. The different settings pages are accessed by using the drop-down list available at the top of the screen.



## 6.2.1. Header and Footer



The image shows two configuration panels. The top panel, titled 'Report Logo', features a large empty rectangular box on the left. To its right are three buttons: 'Upload' (dark grey), 'Choose File' (light grey), and 'No file chosen' (light grey). Below the box are three radio buttons labeled 'left', 'right', and 'none'. The bottom panel, titled 'Header & Footer', has a 'Header:' label above a rich text editor toolbar. The toolbar includes icons for Bold (B), Italic (I), Underline (U), font color (abc), font size (x<sub>2</sub>, x<sup>2</sup>), text color (T), text background color (rT), font family (H), font style (T), bulleted list, numbered list, indent, outdent, left-align, center-align, right-align, and justify-align. Below the toolbar is a large empty text area.

This group of settings enables you to modify the defaults for the headers and footers generated in your Reports:

### *Report Logo: Choose File*

When you click on this button a pop-up is displayed enabling you to browse your local file system for a logo file to be uploaded. When you click 'Ok' in the pop-up, the local pathname to the logo is displayed.

### *Report Logo: Upload*

When you click on the 'Upload' button the selected logo is uploaded to the server. Before uploading the system will first be check to ensure that the logo file is in the proper file format (JPEG or PNG), and it does not exceed the maximum allowed dimensions (200 x 200 pixels). If it does, you will be alerted and the upload will be cancelled.

### *Placement*

This radio select enables you to choose if the logo will be displayed on the left side of the header, the right side, or not at all.

### *Header Text*

This text box enables you to enter text that should be displayed in the header of the generated report. The text can be formatted by using the 4 controls available: Bold, Italic, Underline, and Font Size.

### *Footer Text*

This text box enables you to enter text that should be displayed in the footer of the generated report. The text can be formatted by using the 4 controls available: Bold, Italic, Underline, and Font Size.

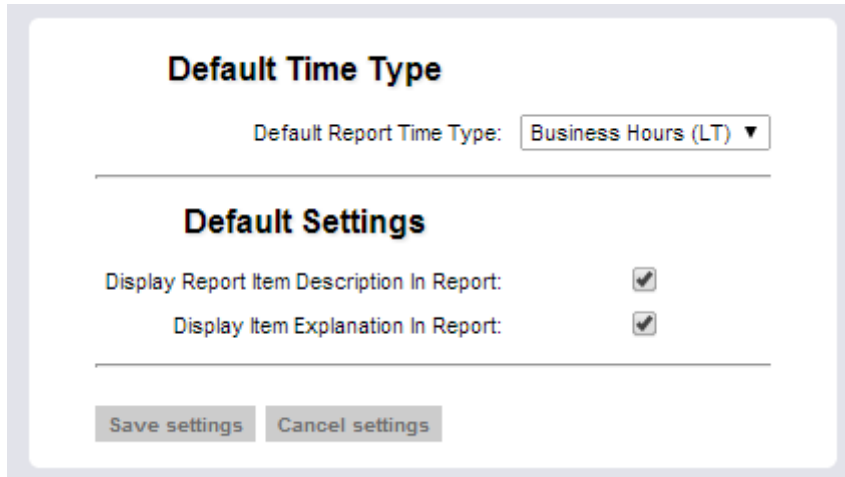
### *Save Settings*

When you click this button, the changes that you made to these settings are saved to the database.

### *Cancel Changes*

When you click this button, the changes that you made to these settings are discarded and the original settings are loaded from the database.

## **6.2.2. Report Defaults**



The screenshot shows a configuration panel with two main sections. The first section, titled 'Default Time Type', contains a label 'Default Report Time Type:' followed by a dropdown menu currently set to 'Business Hours (LT)'. The second section, titled 'Default Settings', contains two checkboxes: 'Display Report Item Description In Report:' and 'Display Item Explanation In Report:', both of which are checked. At the bottom of the panel are two buttons: 'Save settings' and 'Cancel settings'.

This group of settings enables you to modify settings that apply to all Report Items:

### *Default Report Time Type*

This drop-down list enables you to select what the default Time Type to be used when a new Report Item is created in a template.

### *Display Report Item Descriptions in Report*

When this checkbox is selected, Report Type Item Descriptions are displayed in generated reports. If this is not selected, the description is not displayed and the description box is also not drawn in the report.

### *Display Item Explanation in Report*

When this checkbox is selected, Report Type Item Explanations are displayed in generated reports. If this is not selected, the explanation is not displayed.

### *Save Settings*

When this button is clicked the currently displayed settings are saved to the database.

### *Cancel Changes*

When this button is clicked, any changes made to the settings are discarded and the original settings are reloaded from the database.

## **6.2.3. Report Item Descriptions**

### Report Item Descriptions

|   |  |  |
|---|--|--|
| <b>Service Object Type</b><br>Business Processes<br>Business Process 'X'<br>Business Service 'X'<br>Group 'X' in Business Service 'Y'<br>Site 'X' in Business Service 'Y'<br>All Sites<br>All Sites in Group 'X'<br>Site 'X'<br>Between Sites 'X' and 'Y'<br>All Applications<br>Application Group 'X'<br>Application 'X'<br>Application 'X' in group 'Y' | <b>Device Type</b><br>Common ▼<br><b>Available Report Types</b><br>Sla | <b>Report Type Items</b><br>SLA Business Service Performance Table |
|---|--|--|

**Item Description**  
 The SLA Performance Table provides you with an overview of the SLA performance of each of your Business Processes during the period you selected. The SLA performance of a Business Process is based on the SLA performance of the Business Services used by a particular Business Process. Thus, if a Business Service used by a Business Process has an SLA problem, the Business Process displayed in the table is also shown as having a problem.

This screen enables you to modify the default descriptions displayed for each Report Type Item in the system.

#### *Service Object Type*

This lists all of the available Service Object Types in the system. A Service Object Type is a class of objects available in the Navigation Tree in the Monitor Screen. E.g., 'All Sites', or 'Site X'. Only one item in this list can be selected at the same time. When you select an item in this list, all of the available Report Types for that Service Object Type are displayed in the 'Available Report Types' list.

#### *Device Type*

The device type determines which Report Types will be available.

#### *Available Report Types*

This lists all of the available Report Types for the currently selected Service Object Type. Only one item in this list can be selected at the same time. When selected, a list of all Report Type Items available for the selected Report Type is displayed in the Report Type Items list.

#### *Report Type Items*

This lists all of the available Report Type Items for the currently selected Report Type. Only one item in this list can be selected at the same time. When selected, the item description is displayed in the Item Description text box.

#### *Item Description*

This text box displays the description for the currently selected Report Type Item. You can modify this text directly by clicking on the text and typing. If you select a different Report Type Item (via the Service Object, Report Type, or Report Type Item lists) after editing the description, the change you made are not discarded. Note: To save the changes you made you must click on the 'Save Settings' button before you leave this settings page.

#### *Save Settings*

When this button is clicked, the changes you made to any of the Report Type Item descriptions are saved to the database.

### Cancel Changes

When this button is clicked, any changes you made to the Report Type Item descriptions are discarded, and the original descriptions are loaded from the database.

## 6.3. Report Scheduling

Report scheduling allows the user to schedule a report at regular intervals. The main view shows all registered report schedules:

| Report Scheduling |        |            |               |        |                     |             |      |        |
|-------------------|--------|------------|---------------|--------|---------------------|-------------|------|--------|
| Job Name          | Report | Start Date | Mail          | User   | Next Fire Time      | Description |      |        |
| Weekly demo       | Demo   | 03.03.2014 | info@acme.com | Admin1 | 10.03.2014 10:21:00 |             | Edit | Delete |

[Add New Job](#)

Adding or editing a Report Schedule presents the user with a view in which the essential schedule settings can be specified:

### Add New Job

Job Name:

Report:

Start Date:

Start Time:

None  
 Daily  
 Weekly  
 Monthly

Monday  
 Tuesday  
 Wednesday  
 Thursday  
 Friday  
 Saturday  
 Sunday

Job Description:

Send to mail:(s)

This view shows the following fields:

*Job Name*

The name of the report scheduling job.

*Report*

The report to run at the scheduled time.

*Start Date*

The first date at which the report should be generated.

*Start Time*

The time at which the report should be generated.

*Interval*

The periodic interval at which the report should be generated. Options are None, Daily, Weekly and Monthly. With None the report is scheduled only once.

*Job Description*

The description for this report schedule.

*Send to Mail*

The user or users to send the report to by email once it has been generated. Individual users can be added and removed from this list.

*Save*

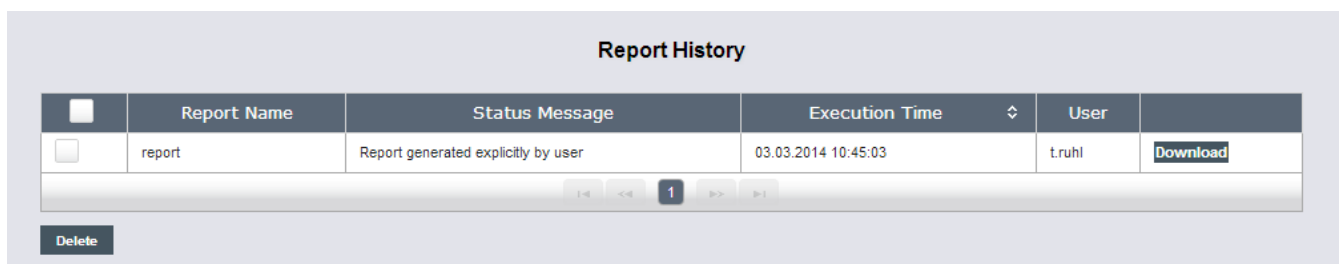
Save the report schedule configuration settings

*Back*

Ignore the report schedule configuration changes.

## 6.4. Report History

All reports that are generated, whether by explicit user control or by scheduled reporting, are stored in the database and are available for retrieval. The list of generated reports is shown in the Report History:



| <input type="checkbox"/> | Report Name | Status Message                      | Execution Time      | User   |                          |
|--------------------------|-------------|-------------------------------------|---------------------|--------|--------------------------|
| <input type="checkbox"/> | report      | Report generated explicitly by user | 03.03.2014 10:45:03 | t.ruhl | <a href="#">Download</a> |

Navigation: << 1 >>

[Delete](#)

From this view the report can be downloaded if needed.

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