# Entuity® 16.5
## Entuity Managing Reports

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# 1  Manage Entuity Reports

Welcome to the Entuity Reports Guide, which is aimed at users and system administrators of Entuity reports. Entuity Reports are grouped into these sets:

■ Standard reports provides modern reports that are easy to stylize, design, use and understand. These reports are easy to interpret and leverage technical data that is captured and processed by Entuity. Access to this data is through the Entuity Data API.

■ **Flex Reports** are flexible in purpose and technology. You can define them through one of a number of general forms designed for different report types, i.e. Inventory, TopN, and Graph report forms. Alternatively you can use advanced features to combine report types, or create your own variables using Expression Builder. (See *Chapter 4 - Flex Reports.*)

Flex Reports are always identified as such, reports that are solely identified as reports belong to the standard set of reports.

## Accessing Reports from the Web Interface

Reports are available to those users that are members of user groups that have permission to use the Reports tools. Entuity provides a number of tools and methods for configuring, running and managing reports:

■ Reports web page, through which you can view, configure and run Entuity reports.

■ URLs, through which you can configure and run Flex Reports. (See *Chapter 4 - Flex Reports.*)

A description of each report is available through the *Entuity Reports Reference Manual*.

From the web interface:

1) Click **Reports.** Entuity displays the Reports page, with links to the categorized reports.
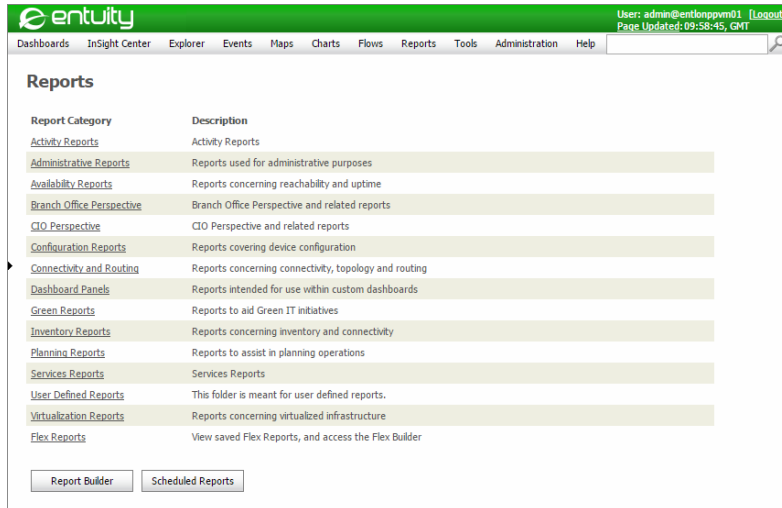
Figure 1      Report Categories

2) Click the required report category link. Entuity displays the reports associated with that category.

### Reporting Access Rights

Entuity controls access to its reports through two permission levels:

■ Entuity allows you to separately allow/deny access to **Flex Reports**, and **Reports and InSight Center**.

■ For user groups with the **Reports and InSight Center** permission you can control access to individual reports, through Report Permissions. By default users are denied access to all reports, however you can amend this default permission. You can set for all reports, or for individual reports these permission level:

  ■ No Access

  ■ View Only

  ■ View and Run

  ■ View, Run and Schedule.

For details on Account Management see the *Entuity User and System Administrator Guide*.

## Entuity Reports and Perspectives

Entuity includes an extensive set of reports that access the Entuity database through the Entuity data API.

Entuity categorizes reports, grouping them to improve their accessibility. Categories include by type for example Activity, Connection and Routing, Administration but also by feature for example CIO Perspective, Branch Office Perspective, Service Perspective.

For most reports having the object under management and in an accessible view is sufficient to run the report. For the perspectives you may have further configurations or restrictions to consider, for example:

- Branch Office Perspective requires a specific hierarchy of services and sub-services.
- CIO Perspective requires a specific hierarchy of services and sub-services, with use of a strict syntax

For more details on requirements for these perspectives see the *Entuity User Guide*. Perspectives are also detailed in the *Entuity Reports Reference Manual.*

## Listing of Reports

Entuity reports are grouped by category. The following tables reflect that grouping, e.g. Activity, Availability. (For full details see the *Entuity Reports Reference Manual*.)

| Activity Reports | |
|---|---|
| Autonomous AP Summary | Port Utilization and Faults Chart |
| Device Health | Port Utilization Chart |
| Device Latency | Port Utilization Details |
| Event Details | Port Utilization Trend |
| Event History | Port and CPU Utilization Chart |
| Event Summary | QoS Utilization |
| Flow Analysis | Routing Summary |
| IP SLA Details | Switching Summary |
| IP SLA Echo | Top-N Devices |
| Managed Host Summary | Top-N Port Error Rates |
| Port Fault Details | Top-N Ports |
| Port Rate Chart | Wireless Controller Summary |
| Port Statistics Comparison | |

| Administrative Reports | |
|---|---|
| Devices Failing SNMP Polling | Polling Diagnostics |
| Devices SNMP Response Time | Process Diagnostics |
| Entuity Server Health Summary | View Comparison |
| Management Start Date and Custom View Memberships | View Hierarchy |

| Availability Reports | |
|---|---|
| Application Availability | Outages |
| Device Reachability | Port Availability |

| Availability Reports | |
|---|---|
| Infrastructure Availability | Port Operational States |
| Network Delivery Perspective | Server Availability |
| Network Delivery Summary | Device Uptime, Reachability and Last Reboot |

| Branch Office Perspective Reports | |
|---|---|
| Branch Office Details | Multi-Branch Office Perspective |
| Branch Office Perspective | |

| CIO Perspective | |
|---|---|
| CIO Perspective | SLA Summary |

| Configuration Reports | |
|---|---|
| Configuration Monitor Settings | Device Configuration Status |
| Device Configuration Summary | |

| Connectivity and Routing Reports | |
|---|---|
| BGP Router Peering | LSR Detail |
| BGP Peering State Transitions | LSR Inventory |
| CDP Port Adjacencies | LSR Performance |
| EIGRP Router Peering | VPN Device Details |
| HSRP Port | VPN Device Summary |
| LDP Label Ranges | VPN Route Capacity |
| LDP Peer Details | OSPF Router Peering |
| LDP Peer Performance | OSPF Peering State Transitions |
| LDP Summary | Switch Port Connectivity |

| Dashboard Panels | |
|---|---|
| Device Reachability Transition Summary | Port Operational State Transition Summary |
| Device Reboot Summary | Port Utilization Charts |
| Event Severity Summary | Port Utilization Gauges |
| Module Change Summary | |

| Green Reports | |
|---|---|
| Shutdown Compliance by Host | Power Consumption Overview |
| Shutdown Compliance by Group | Server Activity History |
| Shutdown Compliance Overview | Spare Ports and Power Consumption Overview |
| Green IT Perspective Dashboard | Spare Ports by Device |
| Nominal Device Power Consumption | Spare Ports and Power Consumption by View |
| Missing Nominal Module Power Consumption | Underutilized Servers |
| Power Consumption by View | |

| Inventory Reports | |
|---|---|
| CUCM Inventory | Models |
| Device Inventory | Spanning Tree Device Changes |
| Device Types | Spanning Tree Device Configuration |
| IP Phone Directory | Spanning Tree VLAN Changes |
| IP Phone Lookup | Spanning Tree VLAN Changes for all VLANs |
| Inventory Change | Spanning Tree VLAN Configuration |
| Inventory Overview | Spare Ports by Device |
| Manufacturers | Spare Ports by View |

| Planning Reports | |
|---|---|
| Device CPU Capacity Planning Heat Map | Port Bandwidth Capacity Planning Heat Map |
| Device Memory Capacity Planning Heat Map | Port Capacity Planning - Rate |

| Services Reports | |
|---|---|
| Service Availability | Service Inventory |
| Service Delivery Summary | Service Delivery Perspective |
| Service Event History | |

| Virtualization Reports | |
|---|---|
| Hypervisor and Virtual Machine Inventory | Impact of Virtualization on Access Switches |
| Switch Traffic by Virtual/Physical Mix | Switches with Connected Hypervisors |
| Virtual/Physical Host Traffic Mix Over Time | Virtual/Physical Host Traffic Mix by View |
| Virtualization Perspective | Virtualization Traffic Trends |
| vSwitch Inventory | |

# 2 Run Reports

Entuity's main set of reports are configured and run from the web interface. Entuity groups the reports by category, e.g. Activity Reports, Administrative Reports. You can manually run reports, or access the scheduler to configure reports to run automatically. By default reports are not scheduled.

## Reporting On Demand

To run a report, from the web interface:

1) Click **Reports.** Entuity displays the Reports page, with links to the categorized reports.
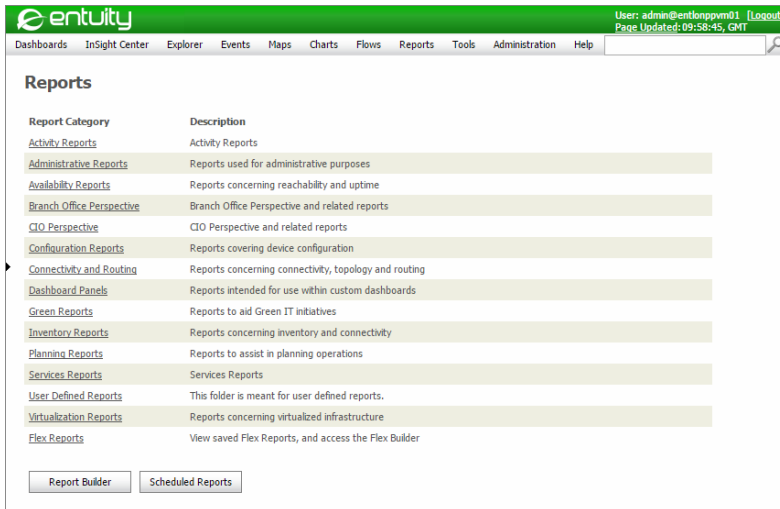


Figure 2    Viewing Report Categories

2) Click the link referencing the reports you are interested in. Entuity displays the available reports for that category.

3) Click the report. Entuity displays the report options page.

4) Configure the report options and click **Run**. Entuity runs and displays the report.

Figure 3    Device Latency Report

## Schedule Reports Overview

Schedules should be associated to a report through its saved report options. Schedules are only associated with the report type for which they were created, e.g. you cannot use a schedule created for an Event Summary report with a Device Latency report. You therefore locate a schedule through its association with its report.

To view report schedules, from the web interface:

1) Click **Reports.** Entuity displays the Reports page, with links to the categorized reports.

2) Click the link referencing the reports you are interested in. Entuity displays the available reports for that category.
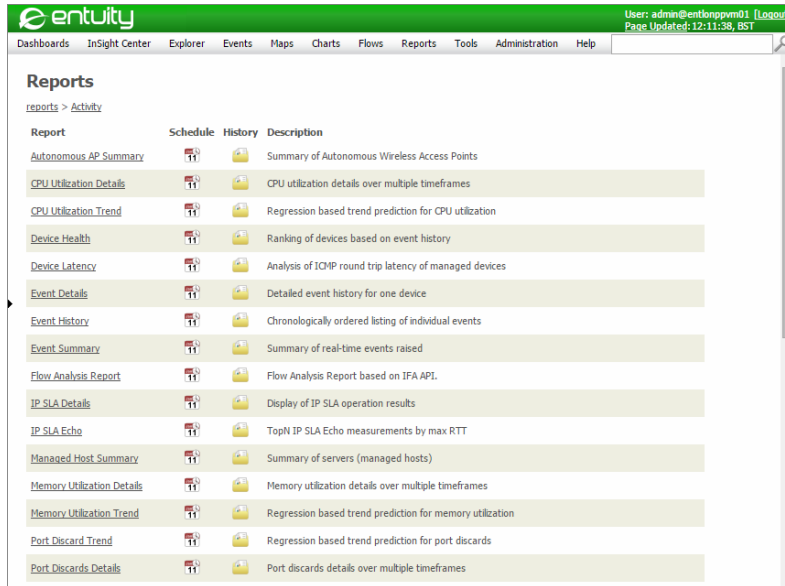
Figure 4       Viewing Report Types

3)  Select the:

- Report to generate the report. Entuity displays the report options page through which you can configure the report.

- Schedule icon ![icon] to select or define a report schedule.

- Schedule History icon ![icon] Entuity displays the generated reports for the report definition. From this page you can also access the reports scheduled jobs, to view, run and delete jobs.

## Report Schedule Definition

A wizard guides you through the components of a Report Schedule that you must configure:

- Schedule, an extended series of schedule options.
- Parameters, defines the scope of the report.
- Email, defines email notification settings.

### Report Schedule
For each report you can select an existing schedule or define a new one. Entuity includes predefined schedules that run the report Daily, Hourly, Minutely or Weekly.

You can also define your own schedule, which comprises of:

- *Start*, the time when Report Server runs the report. Select:
  - **Immediately**

- **On**, select a date and time from the calendar.
- Its pattern of recurrence, select:
    - No Recurrence, to only run the schedule once.
    - Simple Recurrence, to display an abbreviated set of options. You can define in:
        - Occur, for how long the report runs. Indefinitely, until a defined end date, a set number of times
        - Every, how often the schedule runs a report, setting the number of minutes, hours, days or weeks.
    - Calendar Recurrence, to display a set of options that allow fine control over the schedule. You can define:
        - End Date, the end period of the report schedule.
        - Minutes and hours, the time when the report runs.
        - Days, select either every day, weekdays, one or more individual days or Month Days.
    - Months, select All to run every month, or one or more particular months.
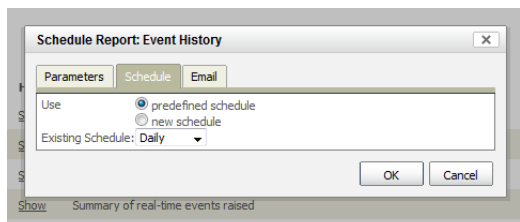


Figure 5      Report Schedule

## Report Parameters

Report parameters define the scope of the report. These report options vary according to the report, for details see the *Entuity Reports Reference Manual*.

You should specify report parameters by running through the process of creating a report instance, and then saving these report options. You can then create a schedule for the report by associating it against the saved report options. (See *Using Report Options*.)
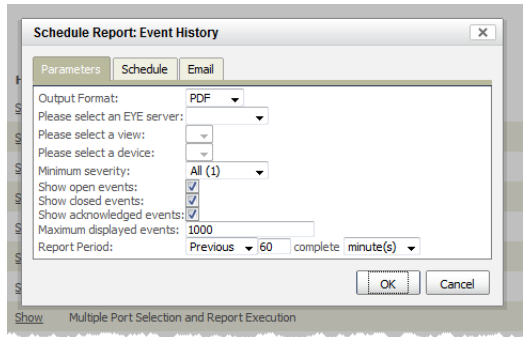
Figure 6      Report Parameters

## Configuring Email Notification

For each report schedule you can define the output format:

■ Email Notification details:

   ■ *To*, email recipient.

   ■ *Subject*, title of the email.

   ■ *Message Text*, standard text for the email. When you are not attaching generated reports this could include the location of the report.

| Email Tags | Description |
|---|---|
| `<reportURL>` | Abbreviated URL to the report on the Entuity server, e.g. `/reports/Activity/EventSummary`. |
| `<user>` | User account which generated the report. |
| `<view>` | Entuity view the report is generated against, e.g. Europe/London Office. |
| `<format>` | Format of the generated report, e.g. HTML, PDF. |
| `<report-name>` | Name of the report. |
| `<report-description>` | Report description, e.g. Summary of real-time events raised. |
| `<report-link>` | URL to the report. The user is required to login to Entuity to view the report. |
| `<report-history-id>` | Identifies the particular instance of the report, for example an identifier of 49 would indicate the 49th time the report has been generated. |
| `<start-time>` | Date and time the report was generated. |
| `<queue-size>` | Report queue size at the time the report generation request was made. |

Table 1      Email Notification Tags

■ *Attach Files*, select to email generated reports.

■ *Skip empty reports*, select to prevent Report Server from sending empty reports.
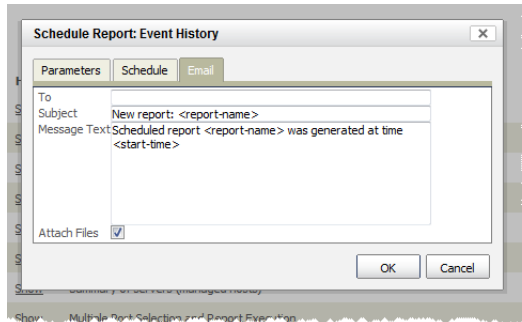
Figure 7      Report Email Parameters

## Using Report Options

It is through report options that you configure the scope of a report, e.g. the Entuity server, view, managed objects. All reports share the same core options and then there are options that are particular to a report. The *Entuity Report Reference Manual* includes a full list of the report options for each report.

Entuity identifies mandatory report options that remain unspecified by highlighting their entry boxes in red. Entuity prevents you from saving report options or running reports where mandatory options remain unset.

If you have access to a report and to the Reports and InSight Center tool permission then you can create, amend and delete the saved report option configurations of that report.

| Report Option | Description |
|---|---|
| *Use saved values* | Entuity shows the report option configurations saved for this report. When you select a saved report option configuration you may then:<br>■  Click **Rename** to rename the saved configuration.<br>■  Click **Delete** to delete the saved configuration.<br>■  Amend the report options and click **Save**. Entuity prompts you to overwrite the previous saved configuration or by entering a new name to save your changes as a new report option configuration. |

Table 2      Core Report Options

| Report Option | Description |
|---|---|
| *Report format* | The Entuity report output formats are:<br>■ HTML(HTML5)<br>■ PDF (Portable Document Format)<br>■ CSV (Comma Separated Value)<br>■ RTF (Rich Text Format)<br>■ TXT (Text file)<br>■ XML (Extensible Markup Language)<br>■ ODF (Open Document Format)<br>■ ODS, Open document spreadsheet<br>■ DOCX (Microsoft Office Open XML)<br>■ XLS (Microsoft Excel)<br>■ XLSX (Microsoft Excel 2007). |
| *Please select an Entuity server* | Available when the server acts as a central server in a multi Entuity server environment. From the drop down list you can select one or **All Servers** to run the report against. |
| *Report Period* | Period over which the report applies. When you select:<br>■ **Recent**, you specify the last complete reporting period in relation to the time the report is run. For example if you run the report on the last day of March and selected 1 month as the report period Entuity will run the report using February's data.<br>■ **Range,** you can enter start and end dates and times for the reporting period. |
| *Prime Time* | The time within the reporting period for which the report is applicable, e.g. between 09:00 and 17:00 each day. |

Table 2     Core Report Options

You save report options and then run and schedule reports using these saved definitions.

Figure 8      Report Options

## Saving Report Options

Report options determine against what the report runs, for example which Entuity server, view, managed object. You can save these report options outside of the report, and use them when scheduling the report rather than scheduling the report itself.

To save report options:

1) Click **Reports.** Entuity displays the Reports page, with links to the categorized reports.

2) Select the link referencing the reports you are interested in. Entuity displays the available reports for that category.

3) Select the report. Entuity displays the report options dialog.

4) Enter the report options.

5) Click **Save**. Entuity displays the Save Report Options dialog.

6) Enter a meaningful name for the report options and click **OK**. Entuity displays the Report Options dialog with the saved values.

7) Select:

   ■ **Run** to run the report with the newly defined report options.

   ■ **Cancel**. Entuity does not run the report, but does display the reports category home page. The saved report options are available as a sub folder of the report.

   You can now schedule and run the report using the report options definition, rather than the report definition.
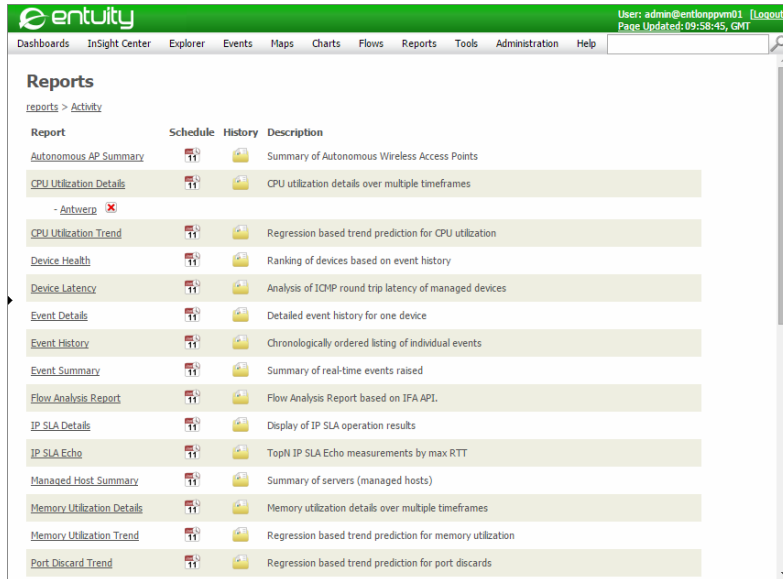
Figure 9      Reports with Saved Report Options

## Running Reports Using Saved Report Options

To run reports using saved report options:

1) Click **Reports**. Entuity displays the Reports page, with links to the categorized reports.

2) Click the category link referencing the reports you are interested in.

3) Click the report type.
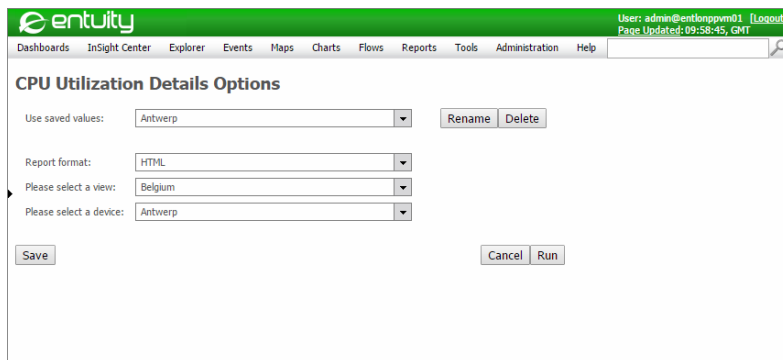


Figure 10     Saved Report Options

4) From *Used saved values* select the required report option and then click **Run**.
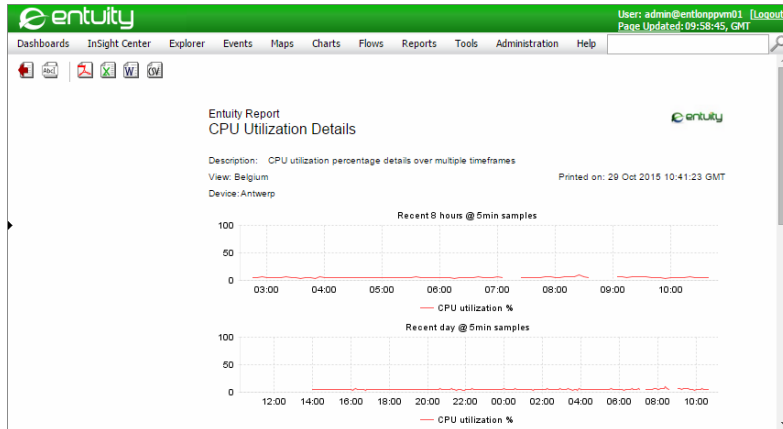
Figure 11    Generated Report

## Scheduling Reports

Entuity allows you to associate report schedules to reports. You can use supplied schedules or create your own. To assist in creation:

■  You can clone existing definitions and edit them to match your requirements.

■  Entuity outlines in red the data entry boxes of mandatory parameters.

■  Entuity considers your previous schedule selections when presenting your current options. For example when specifying a schedule for a view restricted report on devices, you first select a view and then Entuity would restrict the list of devices to those within that view.

### Scheduling Reports Using Report Options

To schedule reports using report options:

1)  Click **Reports**. Entuity displays the Reports page, with links to the categorized reports.

2)  Select the link referencing the reports you are interested in. Entuity displays the available reports for that category.

3)  Select the report option's scheduler icon.

4)  Click New Schedule. Entuity displays the Parameters tab of the Schedule Report dialog.

5)  Complete the parameter details. These report options will vary by report type.

Figure 12    Scheduled Report Parameters

6)   Complete the schedule details and click Email.



Figure 13    Scheduled Report Schedule

7)   Enter the email details and click **OK**.
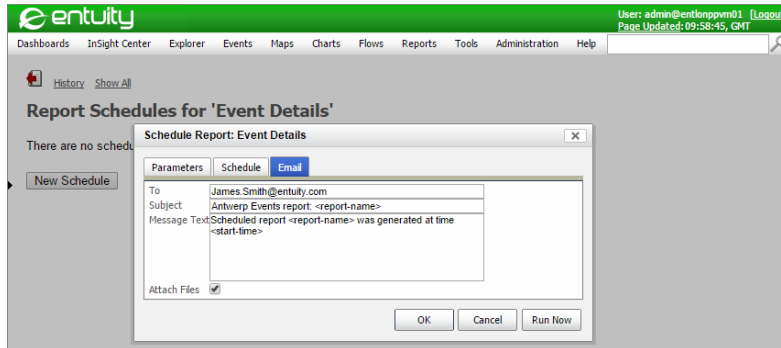
Figure 14    Scheduled Report Email

## Viewing All Scheduled Report Jobs

To view schedule report jobs for a report:

1) Click **Reports**. Entuity displays the Reports page, with links to the categorized reports.

2) Click **Scheduled Reports**. Entuity displays all of the scheduled reports.
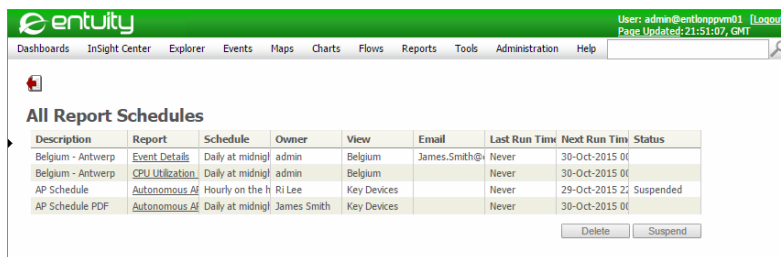


Figure 15    All Report Schedules

3) You can click on the link referencing a particular report to view all of its report schedules. From this page you can:

- Click the Back icon, to return to the list of reports for the report category.
- Click **New Schedule** to create a new schedule for the report.
- Highlight a schedule and then click:
  - **Edit**. Entuity opens the Schedule Report editor through which you can amend the schedule definition.
  - **Clone**. Entuity opens the Schedule Report editor through which you can amend a copy of the selected schedule definition.
  - **Suspend** to prevent Entuity applying the schedule and running the report. Entuity updates the report schedule *Status* to **Suspended**, and also changes the Suspend button to Resume.
  - **Delete**, to delete the report schedule. Entuity does not delete the associated reports.
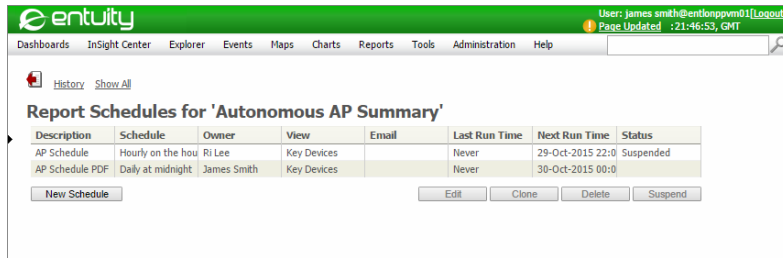
Figure 16    Report Schedules for a Report

## Viewing Scheduled Report History

To view scheduled report jobs for a report:

1) Click **Reports**. Entuity displays the Reports page, with links to the categorized reports.

2) Select the link referencing the reports you are interested in. Entuity displays the available reports for that category.

3) Click Schedule History icon    . Entuity displays the Scheduled Reports History page from which you can.

- ■ Click the Back icon, to return to the list of reports for the report category.
- ■ Click **View**, to view the generated report. You can view the report in the format it was generated, or select a different format.
- ■ Highlight one or more reports and click **Delete**. Entuity removes the report from the list and also deletes the report from the server.
- ■ Click **Scheduled Jobs** to view all of the schedules for the report.
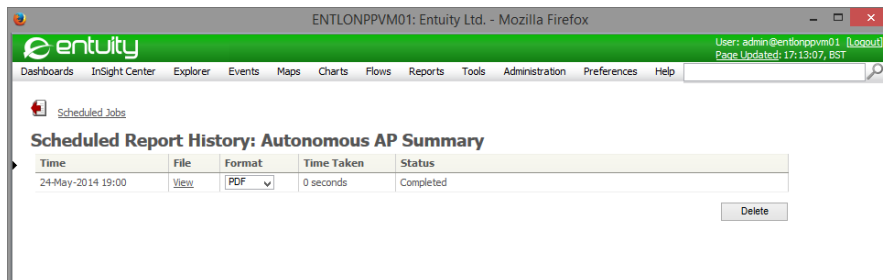


Figure 17    Scheduled Report History

# 3   Report Builder

Report Builder allows you to create your own reports based on a set of templates using data you have collected and stored in Drop Box. Through Report Builder Preview you can review your report as you create it. Once designed you can save the report to the User Defined Reports folder from where you can use it in the same way as Entuity's other reports.

## Report Builder Process Overview

To build reports:

1) Add to Drop Box managed objects, for example devices, ports and also their metrics, for example device latency, port utilization.

2) Open Report Builder which you can access through the Reports page or the Report Builder icon in Drop box.

3) The Report Builder page includes an overview of the build process, a description of each template and for each template a hyperlink which opens Report Builder in the context of that template.

   Available from the Report Builder page are two movies; an overview movie of the Report Builder process and a second which takes you through how to build a composite report and introduces more advanced concepts for example StormWorks, expressions, filters.



Figure 18    Report Builder and Drop Box

4) When you open a report template Entuity automatically populates the template with the metrics added to Drop Box. You can now complete its setup, for example you can:

- Control report presentation, for example page width, margins, the presence of navigation framework.
- Filter the rows included in tabular a report using StormWorks Statement Language expressions.
- Set a fixed Y-axis for charts.
- Supplement the data added through Drop Box by using the Find Attributes tool to select attributes and stream attributes to include in the report, including those from associated objects.
- Define new attributes by aggregating attributes or using StormWorks Statement Language expressions.

5) You can use Preview to check your progress.

6) Publish the finished report. Entuity saves the new report definition to the User Defined Reports folder.

You can now use your report like any other report distributed with Entuity, e.g. printing, scheduling, export to PDF, CSV, MS Office formats. You can also subsequently edit these reports or make a copy of the report to use it as the basis of another report.

## Report Builder Templates

You can create reports by making a copy of an existing report and modifying it. Entuity also includes a set of Report Builder templates. These templates provide a configurable structure within which you can create new reports. The components of individual templates vary but there is a similar structure:

- *Template Name and Header Details*
- *Report and Advanced Options*
- *Save, Preview and Publish Templates*
- *Time Series Chart Template*
- *Inventory Table Template*
- *Multiple Chart and Table Template*
- *Time Series Table Template*
- *Composite Report Template*.

When you save a report definition it becomes a standalone report, independent of its original template.

### Template Name and Header Details

Although templates have different configuration options, the naming and header options are the same. The preview, reset and publish tools are the also common to all reports.

| Attribute | Description |
|---|---|
| *Name* | Unique name of the report definition. By default the name is derived from the report type and its creation time and date. |
| *Report title* | Title displayed in the report. |
| *Chart title* | Name of the chart. |
| *Include Standard Header* | When selected you can then select the standard components to include in the report's header:<br>■ *View Name,* only useful when defining Single Table reports that are view based.<br>■ *Report Period*<br>■ *Prime Time*<br>■ *Print Time*<br>■ *Logo*<br>■ *Description*. |
| *Prime Time* | The time within the reporting period for which the report is applicable, e.g. between 09:00 and 17:00 each day. |

Table 3     Template Report Header

## Report and Advanced Options

Report Options and Show Advanced Options provide a greater level of control over the report layout but also require an extra level of care as you are adjusting report defaults. For example with:

■ *Report URL* you must ensure that the URL does not unintentionally overwrite an existing definition.

■ *Page Width* and *Margins* you must check that the report content can be displayed in the resultant canvas space.

■ Show Advanced Options selected Entuity displays additional settings (see *Inventory Table Template*), with:

   ■ Row Filter you can apply expressions to filter the content of rows in tables.

   ■ Markup you can select a markup format and enter markup tags.

   ■ Table you can amend the default structure of a report table, controlling where data cells are positioned.

Figure 19    Report Options

| Attribute | Description |
|-----------|-------------|
| *Report URL* | Every report has a URL which by default it is assigned when the report is created.<br>For a new report you can enter a URL and for an existing report amend its URL to make a copy of the existing report, however the URL must be unique. If you enter a URL already assigned to a report that report definition is overwritten. |
| *Navigation Framework* | The navigation framework is included to reports generated in HTML to allow the user to scroll through reports, return to the reports listing, generate the report in another format.<br>Uncheck this option when you do not want the navigation framework, for example when including the report to a dashboard. |
| *Chart Legends* | By default Report Builder includes a legend following a chart. Uncheck this option to suppress the legend from the report. |
| *Row Count* | By default Report Builder includes a row count in the header section of tabular reports. Uncheck this option to suppress the row count. |
| *Page Width* | By default the page width of an HTML report is 612 pixels. Together with the report margins this determines the effective canvas size for the report content.<br>You may want to adjust this canvas size, for example when using the report in a dashboard or defining a sub-report. When defining sub-reports that are displayed side-by-side their combined width should not be greater than that of the composite report in which they reside, otherwise they are not displayed. |
| Margins | These are the default margins used by HTML reports. Together with *Page Width* they determine the effective canvas size for the report content. |

Table 4    Report Options

### Robust Expressions

For the Advanced Reporting option *Row Filter* you can enter a StormWorks Statement Language expression which Entuity evaluates for each object in the report's selection or view. Only those objects for which the evaluation returns a value equivalent to true are included to the report. Any expression must relate to the objects to which it is applied, for example applying this expression against devices:

```
findstr("Server Room", sysLocation, 0)!=-1
```

is not valid because the `sysLocation` attribute does not belong to the `Basic Device` StormWorks type that a report showing **All Devices** is run against. You can use the StormWorks function `get_attribute()` which returns a null value if the attribute does not exist, for example:

```
findstr("Server Room", get_attribute("sysLocation", 0), 0) != -1
```

## Save, Preview and Publish Templates

Custom Report Builder templates have three controls for developing and saving reports:

- **Reset** sets the current report definition to the items in Drop Box.
- **Preview** generates a temporary report from the current definition and displays it in a new window.
- **Publish** provides options for saving the report to the Entuity server, from where it will be available through the User Defined Report categories.

  You should frequently save your report as you develop it; it is only when it is published that the components within it are saved, for example expressions, filters, attributes.

## Time Series Chart Template

With the Time Series template you can build reports that include time-series charts; charts which allow you to view the history of metrics over the reporting period. This report includes one chart on which you can plot a maximum of eight metrics. You could select these metrics from:

- One managed object, for example eight different attributes from the same device.
- Eight different managed objects but use the same metric, for example inbound utilization for eight different ports.
- Multiple managed objects and attributes, for example inbound and outbound utilization for four ports.

You can also aggregate metrics in the report definition and graph the result, e.g. sum inbound and outbound utilization.

You can set two different time periods for the one chart which is useful when comparing performance using the same metric but at two different times, for example comparing before and after a configuration change, comparing the most recent week with last week, last month or last year.

| Attribute | Description |
|---|---|
| *Primary time frame* | Default time frame for the chart. |
| *Secondary time frame* | Select and specify when comparing metrics over different time frames. |
| *Prime Time* | The time within the reporting period for which the report is applicable, e.g. between 09:00 and 17:00 each day. |
| *#* | Row number. |
| *Show* | Select to include the metric in the report. |
| *Name* | Name of the metric displayed in the chart legend. |
| *Value* | Name of the attribute. For metrics derived from polled data this includes the object name and metric, for calculated data Entuity displays Calculated.<br>Selecting this value displays the Attribute Selection dialog through which you specify calculations. |
| *Line Color* | Color of the metric displayed in the chart. Click on the line for Entuity to display the Color Chooser dialog through which you can define chart colors. |
| Chart Style | Report Builder allows line and stacked area type charts. When a secondary time frame is selected only the line type chart is available. |

Table 5     Time Series Chart Template
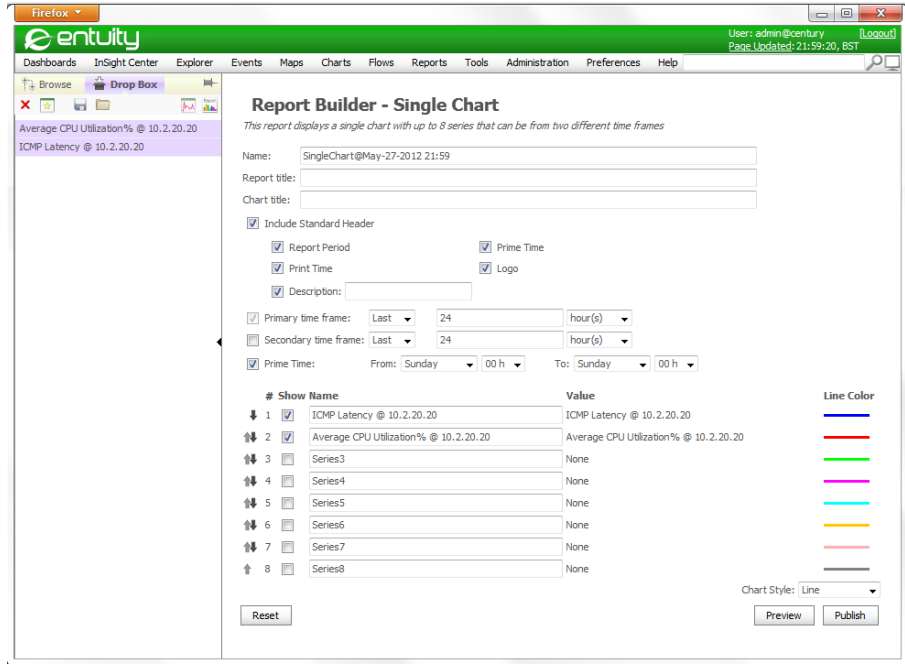
Figure 20    Single Chart Template

## Inventory Table Template

With this template you can build reports that display a single table of data. You can specify one or more attributes on which to sort the data, and also limit the returned results to the Top-N.

You include to the table any available attribute value or aggregate values of time series data. This report type is useful when compiling an inventory of information on all managed items of a certain type, or when generating a Top-N style list of items based upon the aggregate value of a specific metric, e.g. the top 5 most utilized ports, top 50 devices ordered by last reboot time.
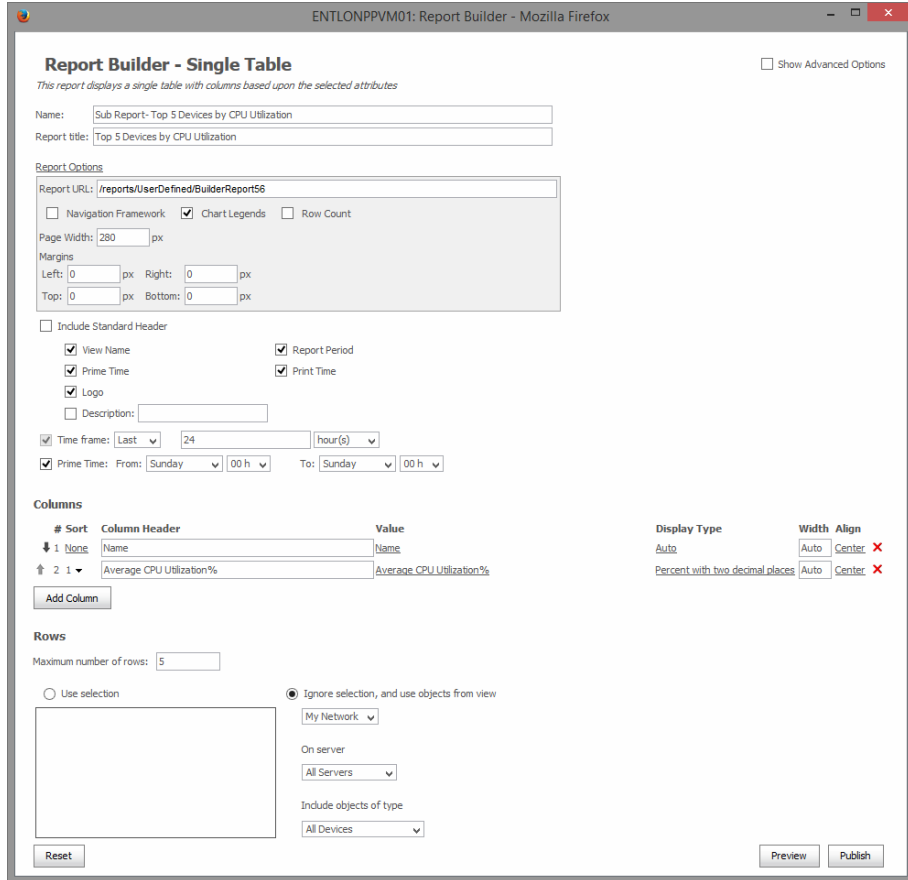
Figure 21     Single Table Template

| Attribute | Description |
|---|---|
| Time frame | Default time frame for the chart. |
| Prime Time | The time within the reporting period for which the report is applicable, e.g. between 09:00 and 17:00 each day. |
| Columns | |
| # | Row number. |
| Sort | Select to include the metric in the report. |
| Column Header | Name of the metric displayed in the chart legend. |

Table 6     Inventory Table Template

| Attribute | Description |
|---|---|
| *Value* | Name of the attribute. For metrics derived from polled data this includes the object name and metric, for calculated data Entuity displays Calculated.<br>Selecting this value displays the Attribute Selection dialog through which you specify calculations. |
| *Display Type* | Select Auto for Entuity to identify the most appropriate format for the data. Alternatively select a format from the drop-down list. |
| *Width* | Enter Auto for Entuity to derive the best width of the column. Alternatively enter the width in pixels, |
| *Align* | Select the horizontal alignment of the column, i.e. **Left**, **Right**, **Center**, **Justified**. |
| *Markup* | This feature is only available when Show Advanced Options is selected. There are a set of markup types from which you can select and then you can enter markup in that format for the cells in that column. Supported markup types are:<br>■ **None**, default no markup is applied.<br>■ **Styled** markup type is proprietary to Jasper and allows simple HTML-like markup tags from the following list: <b>, <u>, <i>, <font>, <sup>, <sub>, <li>, or <br>.<br>■ **HTML** markup type supports HTML markup tags, for example using the <b>bold</b> tags then content is displayed in a bold font.<br>■ **RTF**, Rich text Format markup.<br>■ **Invisible** hides the column from the report. This is distinct from removing the column as its contents are calculated internally and are available as a field in the report JRXML. This feature may be a useful Composite Report feature when passing values as parameters to a sub-report that are not displayed in the Composite report itself. |
| *Table* | This feature is only available when Show Advanced Options is selected for the Time Series and Multi chart and table templates.<br>From the drop down list you can assign each piece of tabular data to a location in the table, for example:<br>■ 0.0 (Main), is the default with Entuity assigning each attribute to its own column.<br>■ 1.1 (Top Left) assigns the data to the top left of the table.<br>■ 3.3 (Bottom Right) assigns the data to the bottom right of the table. |
| *Rows* | |
| Maximum number of rows | Maximum number of rows in the report. |

Table 6    Inventory Table Template

| Attribute | Description |
|-----------|-------------|
| *Row Filter* | This feature is only available when Show Advanced Options is selected. You can enter a StormWorks Statement Language expression which Entuity evaluates for each object in the report's selection or view. Only those objects for which the evaluation returns a value equivalent to true are included to the report.<br>For example you can use row filters to restrict a:<br>■ Port report to only display ports that are currently operationally up, `portOperationalStatus == 1`<br>■ Device report to those devices that do not have a defined Location string, `sysLocation == ""`<br>■ Device report to include only Cisco devices, `tolower(devManufacturer) == "cisco"`<br>■ Device report to show only Cisco devices without defined location strings, `(sysLocation == "") && (tolower(devManufacturer) == "cisco")` |
| Use Selection | Select to use the items in the selection box. |
| Ignore selection, and use objects from view | Select to specify a filter Entuity applies to determine the report content. You can specify the view, the Entuity server and the object type.<br>*Object Type* can be **All Devices**, or a particular device type, or through the **Other Types** option a list of all Entuity object types. |

Table 6     Inventory Table Template

## Multiple Chart and Table Template

With this template you can configure reports that include:

■ One or more charts

■ One or more attribute tables

■ One or more charts and one or more attribute tables.

There are two main uses for the Multiple Chart and Table template:

■ Creating reports that include a chart with some (optional) text for each of the objects reported on.

■ Creating sub-reports that include a single chart with series data from the object passed to it by the parent Composite repor.t

This report type is particularly useful when you want to display both summary information, for example device name, location, mean CPU%, alongside a chart of one or more time series values. Unlike the single time series chart report you cannot display time series data from multiple object on the same chart. However because the objects in this report type are determined at run time it makes it very useful as a sub-report when building composite reports.
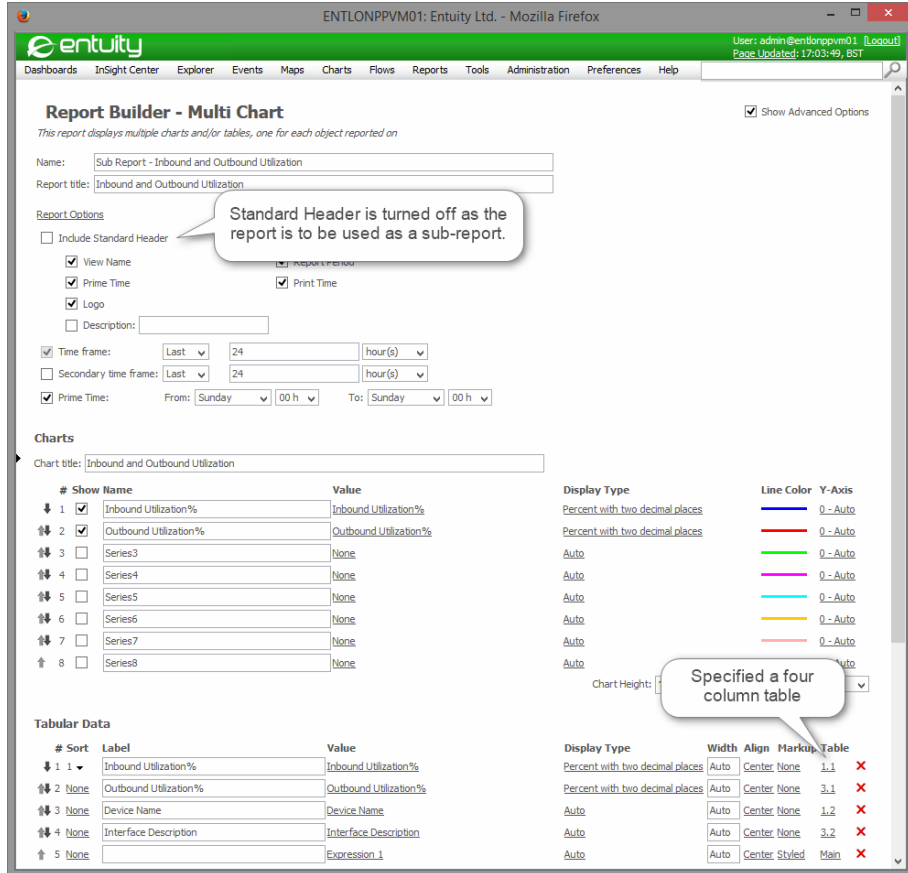
Figure 22    Multi Chart Template

| Attribute | Description |
|---|---|
| *Primary time frame* | Default time frame for the chart. |
| *Secondary time frame* | Select and specify when comparing metrics over different time frames. |
| *Prime Time* | The time within the reporting period for which the report is applicable, e.g. between 09:00 and 17:00 each day. |
| *#* | Row number. |
| *Show* | Select to include the metric in the report. |
| *Name* | Name of the metric displayed in the chart legend. |

Table 7    Multi Chart Template

| Attribute | Description |
|---|---|
| *Value* | Name of the attribute. For metrics derived from polled data this includes the object name and metric, for calculated data Entuity displays Calculated.<br>Selecting this value displays the Attribute Selection dialog through which you specify calculations. |
| *Line Color* | Color of the metric displayed in the chart. Click on the line for Entuity to display the Color Chooser dialog through which you can define chart colors. |
| Chart Style | Report Builder allows line and stacked area type charts. When a secondary time frame is selected only the line type chart is available. |

Table 7     Multi Chart Template

## Time Series Table Template

This template lets you build reports that display time series data in a tabular format for a single selected object. Attributes from one or more streams can be displayed in a single table, and the rows in the table can be optionally sorted by one or more of the column values. so for example if you sort by descending order of the timestamp column (which is always present) then the samples will be presented in reverse chronological order.

| Attribute | Description |
|---|---|
| *Primary time frame* | Default time frame for the chart. |
| *Secondary time frame* | Select and specify when comparing metrics over different time frames. |
| *Prime Time* | The time within the reporting period for which the report is applicable, e.g. between 09:00 and 17:00 each day. |
| *Header Table* | |
| *#* | Row number. |
| *Sort* | Select to include the metric in the report. |
| *Label* | Column name of the metric. |
| *Value* | Name of the attribute. For metrics derived from polled data this includes the object name and metric, for calculated data Entuity displays Calculated.<br>Selecting this value displays the Attribute Selection dialog through which you specify calculations. |
| *Display Type* | Select Auto for Entuity to identify the most appropriate format for the data. Alternatively select a format from the drop-down list. |
| Width | Enter Auto for Entuity to derive the best width of the column. Alternatively enter the width in pixels, |
| Align | Select the horizontal alignment of the column, i.e. **Left**, **Right**, **Center**, **Justified**. |
| *Rows* | |

Table 8     Time Series Table Template

| Attribute | Description |
|---|---|
| Maximum number of rows | Maximum number of rows in the report. |
| Use Selection | Select to use the items in the selection box. |
| Ignore selection, and use objects from view | Select to specify a filter Entuity applies to determine the report content. You can specify the view, the Entuity server and the object type. *Object Type* can be **All Devices**, or a particular device type, or through the **Other Types** option a list of all Entuity object types. |

Table 8    Time Series Table Template

## Composite Report Template

This template lets you build reports that are composed of one or more sub-reports. Sub-reports can be single instances or repeated once per object in the composite report's result set. Since the sub-reports can themselves be composite reports this report type allows you to create reports of arbitrary complexity.

A composite report is a more complex report to build than other reports. The main consideration when building a composite report is its sub-reports and usually you would specially build its sub-reports. For example, a sub-report might have reduced or no page margins and a, smaller page width if the report is to be placed side-by-side with another sub-report. In the latter case the combined width of the two sub-reports must be less than that of the composite report or Entuity will not display them.

### Defining a Composite Report

For a Composite Report you must specify the sub-reports it consists of and how to call them. The sub-reports section allows you to add new sub-reports and select a sub-report from the list of available ones.

Entuity includes a movie with a fully worked composite report which is available from the Report Builder page.

#### Sub-Reports

You can use any report as a sub-report. However sub-reports are usually designed for use within a composite, for example:

- Navigation features are hidden.
- Page and margin settings are adjusted to fit within the layout of the composite report

Figure 23    Composite Report

When you have added a sub-report to the composite report and if you have the edit permission Entuity displays against the report an edit icon. You can open the sub-report and edit it in a new window. If you use a sub-report in more than one composite report you should take care that adjusting it for use in one report does not make it unsuitable for use in another.

By default each sub-report is placed in the details section of the Composite Report, which is the section of a report which is repeated for each row in the data set. By default sub-reports are vertically aligned, however you can control the layout:

■ Repetition when set to:

    ■ Repeat determines that the sub-report is repeated once for each row in the Composite Report's data set.

    ■ Single determines that the sub-report is generated once for the whole report.

■ Alignment determines how this sub-report follows a preceding sub-report, when set to:

    ■ Vertical it follows underneath the previous one.

    ■ Horizontal it sits alongside the previous one. The total width of the sub-reports must not be greater than the width available in the Composite Report. For example you might want to remove all left and right margins from each sub-report and alter its page width to be half or less of the space available in the parent report. By default a report

has a page width of 612 pixels with a left margin of 30 pixels and a right margin of 18 pixels. This leaves 564 pixels available, or 282 each for two sub-reports side-by-side. Usually it is best to leave a little space so you might wish to define each sub-report as having a page width of 280 or 275 pixels.

■ Position allows you to group sub-reports into three sections, Top, Middle and Bottom.

This determines where in the Composite Report the sub-report appears; so all sub-reports in the Top section are placed above those in the Middle, and all those at the Bottom are placed below the other two.

■ Height allows you to specify a minimum height for the sub-report. Content that does not fit within this minimum height is displayed.

■ Parameters is an Advanced Option. Parameters column allows you to control what parameters are passed to a sub-report. Clicking on this presents a panel showing the parameters currently being passed and allows you to add, remove or modify their values.

By default sub-report parameters are populated with the value of the same parameter from the parent report, and this is usually what is wanted. For example the view parameter is passed from the composite report to the sub-report. You could for example change the view the sub-report is run against.

■ Filter is an Advanced Option. Filter column allows you to specify a condition which must be true for the sub-report to be included to the composite report. The filter is usually defined using a StormWorks expression.

## Define Data Sets for Reports

You can define the data types included to a report by:

■ Dragging and dropping them into Drop Box.

■ Using Report Builder's Find Attributes tool to find data types associated with the currently assigned objects in the report. When a report does not have associated data types you can usually navigate the data hierarchy from the Basic Device type.

■ Using Report Builder's Define Attributes tool to create new attributes. For this advanced feature knowledge of the StormWorks Statement Language and the Entuity Open Modeling Framework is required.

When creating a report definition you can set whether a chart report uses the particular instances added to it, or uses the underlying type. For example you could add Average CPU Utilization% from a particular device to the template, you then have the option of restricting the report to that device or extending by setting the Entuity server, view and object type.

### Drop Box

Drop Box acts as a temporary repository for objects, for example gauges, charts, links, device metrics, that you want to include to new reports.

Only objects in Drop Box that are selected when you access Report Builder are included to the new report.

| Icon | Description |
|------|-------------|
|  | Click to display Drop Box in the Navigation Pane. |
|  | Click Browse to display the Explorer tree in the Navigation Pane. |
|  | Click Open to view saved Drop Box contents and then load one. |
|  | Click Save to save Drop Box contents to the server, saved for later use. |
|  | Click Clear to delete the current Drop Box contents. |
|  | Click Delete to remove the selected object from Drop Box. |
|  | Click Pin to keep the Navigation pane open as you use Entuity's web UI. By default the Navigation pane is only displayed when you access Report Builder, Maps, Events or Explorer. |
|  | Click Report Builder to display the Custom Report Builder page. You can also position the mouse pointer over the icon and from the context menu click on the report template that you want to use with Report Builder. |

Table 9    Report Builder and Drop Box Icons

### Find Attributes

Find Attributes is a useful tool when wanting to include data attributes that are:

- Associated with the current object against which the report is to be run, for example a report includes utilization details but not the interface name.
- Not part of the object against which the report is to be run. For example when creating a table on port details you may want to include information about the associated device, for example the device location or device type (for convenience device name is an attribute on the device and on its associated ports).

You can use the Find Attributes tool with:

- Static attributes, attributes for which a history is not maintained for example Device Name, Device Location.
- Stream Attributes, attributes for which a history is essential to their purpose, for example Inbound Utilization, Available Bandwidth, Outbound Packet Rate.

The Find Attribute tool does respond to the context in which it is called; if you open it from a chart then it only displays Stream Attributes as a history is required for an attribute to be plotted on a chart.

#### Add Device Details to a Port Table
To add device details to a port table:

1) From Report Builder click **Add Column**.

2) From the new column in *Value* click **None**. Entuity opens the Static Attribute dialog.

3) Click Find Attributes. Navigate the Types tree, clicking Port and then Associated Attributes.
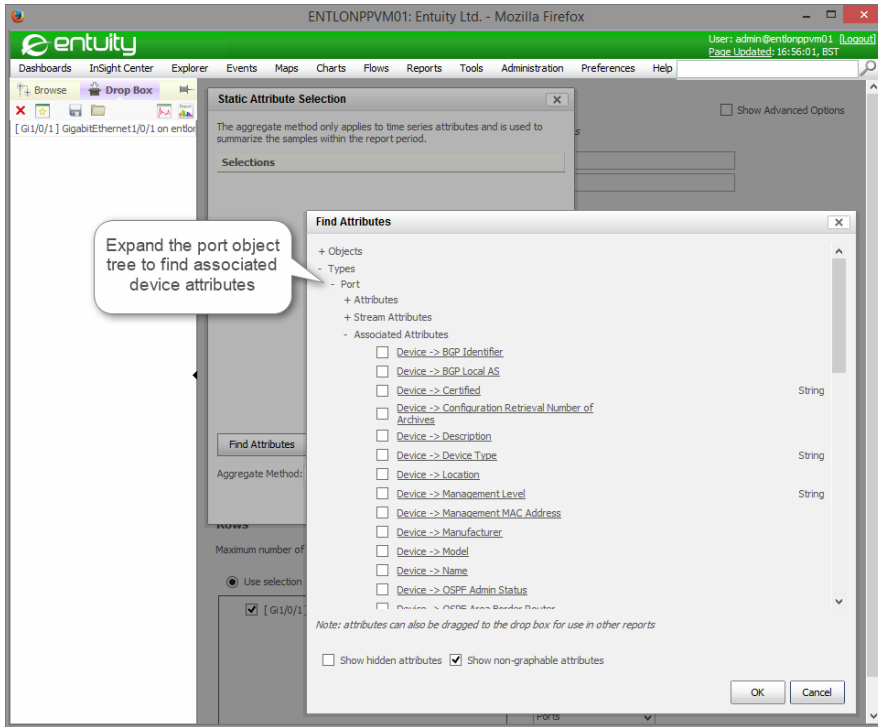


Figure 24    Find Attributes

4) Check the particular device details you want to add to the report and click **OK**.
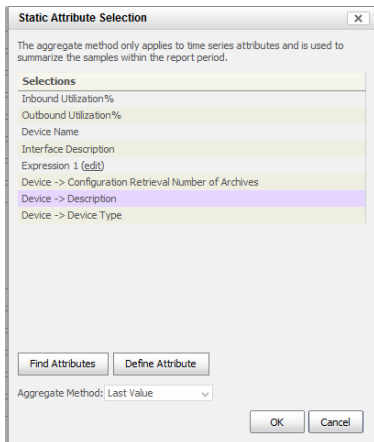


Figure 25    Find Attributes

5)  Select the attribute you want to add to the current column and click **OK**.

Entuity identifies the attribute as being from a associated tab by including to its Label and Value the parent type, for example for device description, **Device-> Description**.

## Define Attributes

To define an attribute you must check the Show Advanced Options check box for the report. When you then open the Attribute Selection dialogs Entuity displays the Define Attribute button in addition to the Find Attribute button which is always available.

You can define new attributes using StormWorks Statement Language expressions. This is an advanced option and you may require guidance from Entuity Support. You can define attributes to display within the report or to use as a filter or parameter when determining what to display in the port.
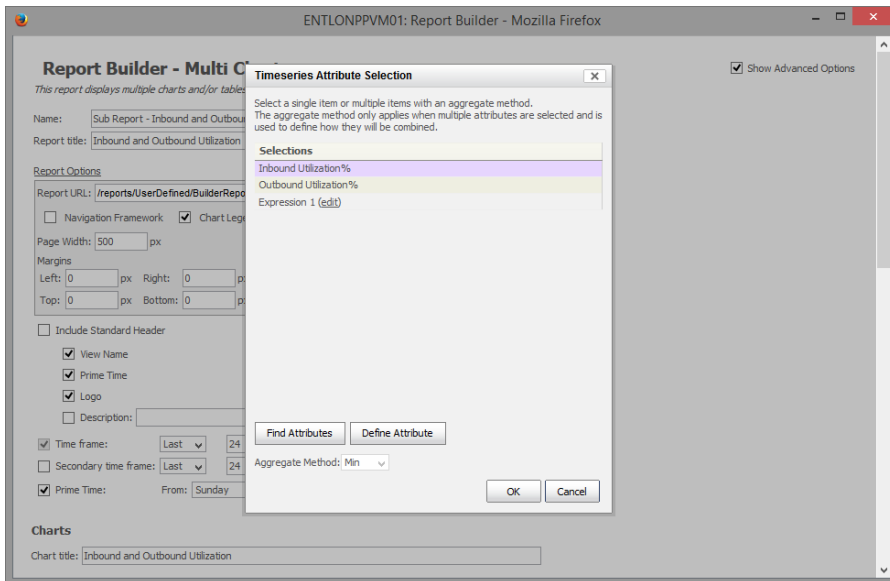


Figure 26     Show Advanced Options Define Attribute

### Define an Attribute Expression

When you define a new attributes using StormWorks Statement Language expression you may also require a knowledge of the underlying structure of the StormWorks object model. You can access the Entuity Data Dictionary through the home page of the Help:

1)  Click **Help > Contents** and then **Entuity Data Dictionary**.

The contents page lists all of the hyperlinked object types, you can click through to see the attributes and associations of an object. Device and Port are object types but the more interesting and connected port and device objects types are PortEx and DeviceEx.
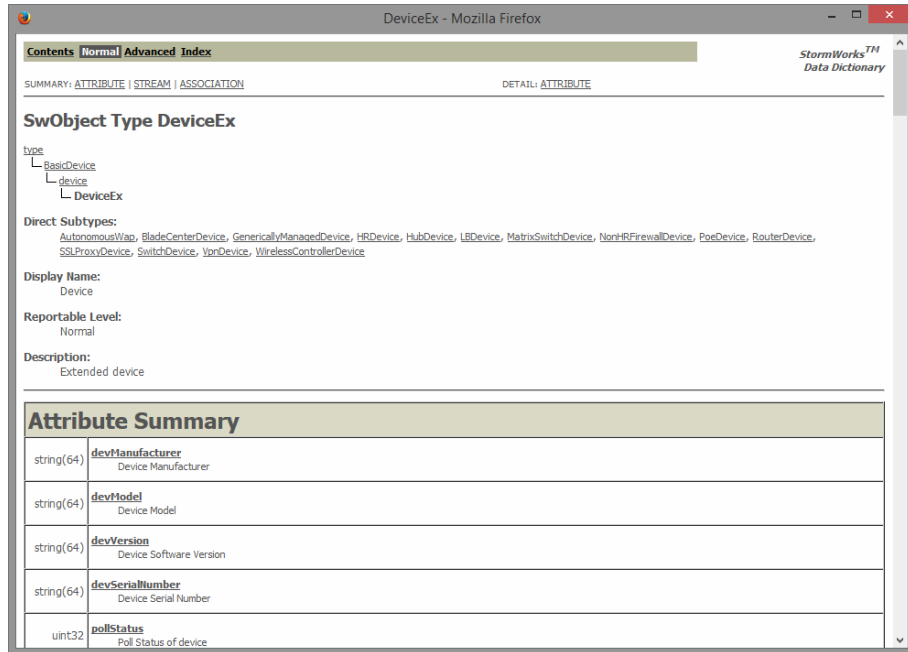
Figure 27    Data Dictionary

You can use the Data Dictionary to identify the StormWorks name of an attribute that you want to use when developing an expression. For example these expressions are all filters that use the StormWorks name of an object. This filter:

■ Limits a port report to only displaying ports that are currently operationally up:

```
portOperationalStatus == 1
```

■ Allows a device report to include only those devices that do not have a location string defined:

```
sysLocation == ""
```

■ Restricts a device report to include only Cisco devices:

```
tolower(devManufacturer) == "cisco"
```

■ Restricts a device report to showing only Cisco devices without defined location strings:

```
(sysLocation == "") && (tolower(devManufacturer) == "cisco")
```

When developing an expression an important consideration is where you it,; applying a port filter on a device report would not be appropriate.

### Define a Row Filter Property

You can define attributes to use as filters when determining what to display in reports. For example you could define a Property attribute that determines the state of ports included to a sub-report. Only when the report includes active ports is that chart included to the composite report.

This example uses applies an expression that checks the active state of ports associated with the devices included to a report before generating a chart on those ports. To define and apply a property:

1)  From Report Builder check **Show Advanced options**.

2)  Click **Add Property**. Entuity opens the Static Attribute dialog.

3)  Click **Define Attribute**. Enter a description of the attribute and then for the expression enter:

```
count(foreach(get_associated_objects("ports"), this, get_at-
tribute("portOperationalStatus", 0) == 1)) > 0
```

4)  Click **OK**.

5)  From the Static Attribute Selection dialog highlight the newly defined expression and click **OK**. Entuity creates a new property, the property number (#) is important as you refer to it when setting the row filter.

6)  From the Sub-Report in its *Filter* column click **None**.

7)  In the Row Filter dialog in *Property* select the property number, in *Value* enter 1 and then click **OK**.
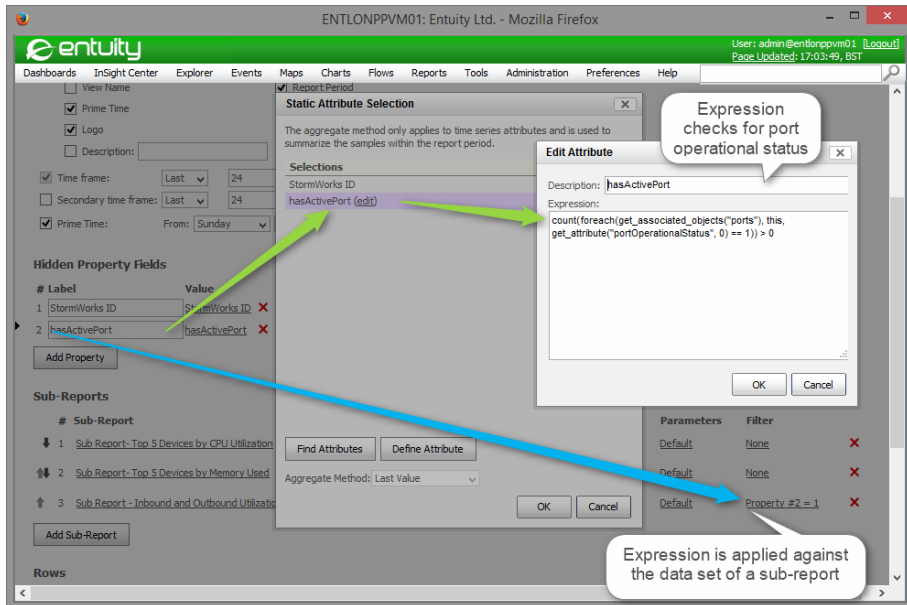


Figure 28    Property Fields

## Define a Parameter Property

The Composite Report movie, available from the Report Builder page, includes an example property that calculates a list of ports for each device in the report. This property,

portServerObjectIds, is applied to a report as a Parameter. This parameter replaces the default value of ServerObjectIds applied to the report

portServerObjectIds uses this StormWorks Statement Language expression:

```
join(  foreach( get_associated_objects("ports"), concat(entuity_-
server_info()[0], ":", id) ), "," )
```

Where:

- get_associated_objects("ports") returns all of the ports associated with the current device.
- entuity_server_info()[0] returns the identifier of the Entuity server managing the device.
- concat(entuity_server_info()[0], ":", id) prepends the server identifier to the port identifier with a colon separating them. This ensures each port is uniquely identified even in Entuity multi-server environments. Each object on an Entuity server has a unique StormWorks identifier, different objects on different servers may have the same identifier.
- foreach command returns the list of ports associated with the device, and the join function converts it into a comma delimited list.

Once defined you can replace the default value of ServerObjectIds, which sets the components included to the report, with the list of ports derived from the current device.
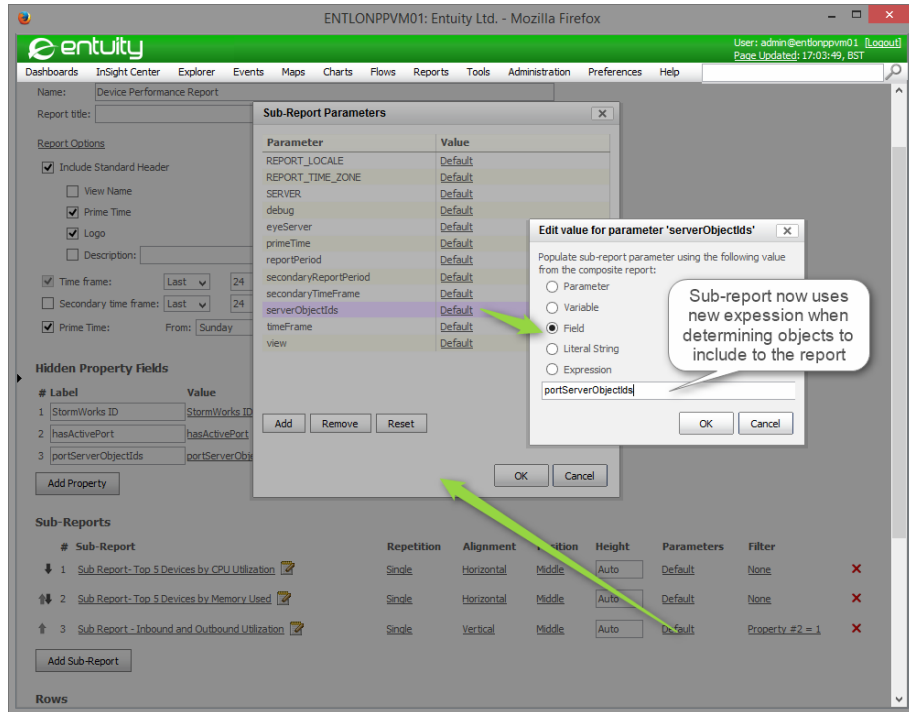
Figure 29    Parameter Property

## Define a Layout Expression

You can define attributes for use in styling the report layout, for example adding a space between sections of the report or as in the following example adding a line. These attribute definitions improve the presentation of the report, specifically Entuity displays:

■ Device name in a bold 18 point font:

```
concat("<b><font size=18>", name, "</font></b>")
```

■ Port description appended to its device name separated by a colon:

```
concat(portDeviceName, ":", ifDescr)
```

This example uses the Styled markup and defines an underline that runs across the page. When creating a layout attribute consider the Label column; leave it empty when creating a line as even a space would prevent the effect applying to both columns (label and value).

To create an underline:

1) From Report Builder click **Add Column**.

2) From the new column in *Value* click **None**. Entuity opens the Static Attribute dialog.

3) Click **Define Attribute**. Enter a description of the attribute and then for the expression enter:

"<u>                                                                                    </u>"

The length of the line is determined by the number of spaces that you enter between the underline instruction.

4) Click **OK**.

5) From the Static Attribute Selection highlight the newly defined expression and click **OK**.

6) From *Label* delete the expression name.

7) In *Markup* select **Styled**.

8) Click **Preview**. You may have to adjust the length of the line to fit the
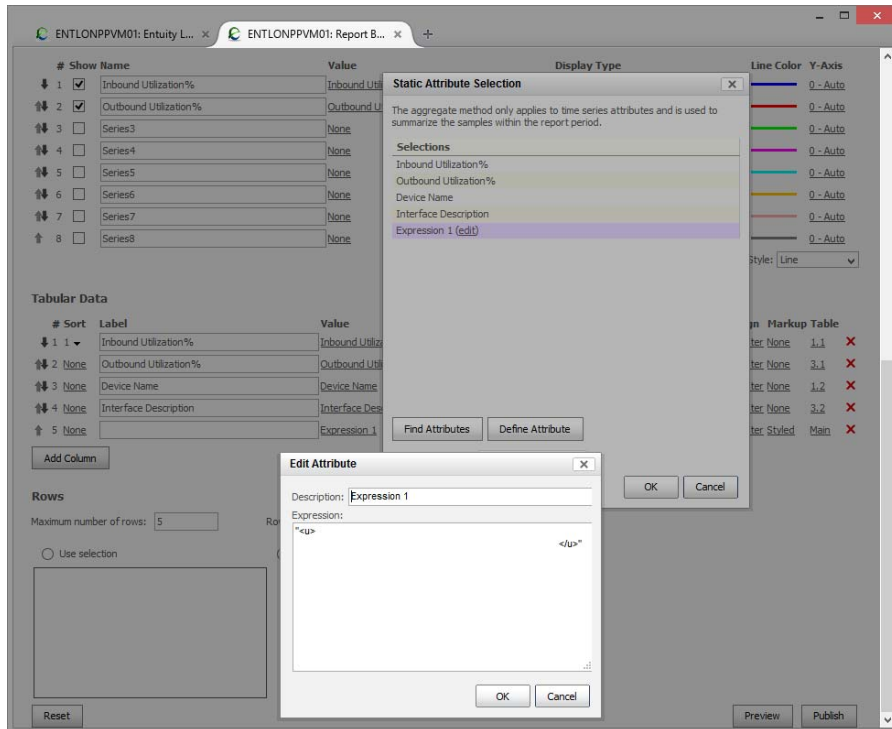


Figure 30    Define an Underline

# Example Single Chart Report

This example creates a simple Single Chart Report, charting device CPU utilization and latency, specifically:

- Name, the default name is derived from the template type and the date and time
- Report Title, Correlating CPU Utilization and Device Latency
- Chart Title, CPU Utilization and Device Latency

- Description, Correlating CPU Utilization and Device Latency Over Time
- Sum CPU utilization for two devices
- Two twenty-four hour time frames, the second is used to chart summed CPU Utilization.

To build a Correlating CPU Utilization and Device Latency report:

1) Add objects and/or their metrics to the Drop Box.

2) Open the Custom Report Builder Single Chart Template.

   You can access this page by placing the mouse pointer over the Report Builder icon in the Navigation pane and from its context menu selecting **Single Chart**.

3) Place data from the Drop Box into your custom report and complete its setup. You can use Preview to check your progress.

4) Specify two time frames *Primary time frame*, and *Secondary time frame*. You can then associate a time frame against an attribute.

5) Specify two aggregate columns, both summing CPU Utilization.

   Click on None in the Value column. Entuity displays the Attribute Selection dialog from which you can select attributes that you want to aggregate. From Aggregate Method you can select from **Min**, **Max**, **Mean** and **Sum**.
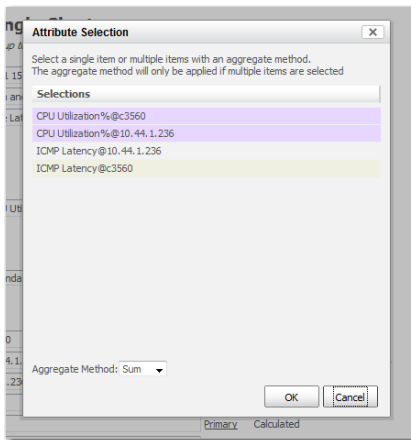


Figure 31     Setting Aggregate Attributes

6) For the second CPU Utilization Sum attribute, in *Time Frame* select **Secondary**. This charts this value using data collected during the tie frame specified in *Secondary time frame*.

7) Preview the report.
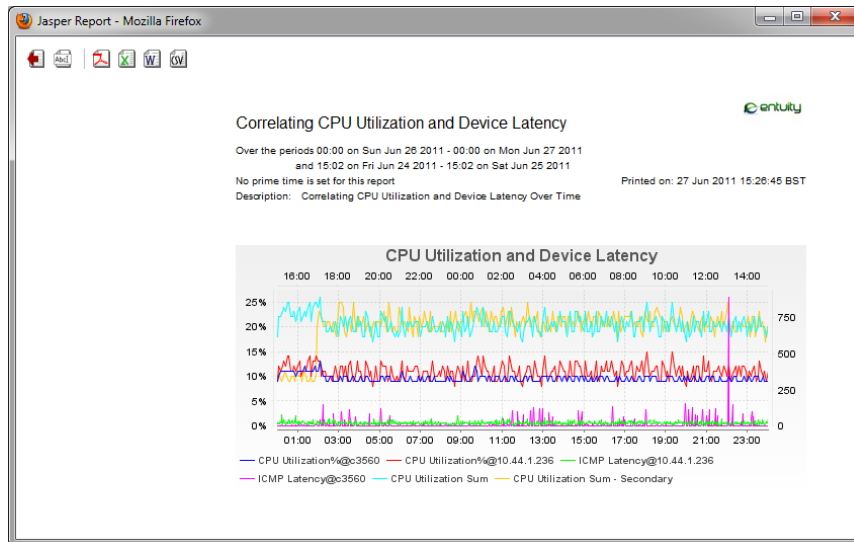
Figure 32     Preview Chart Reports

8)  Publish the finished report to the User Defined Reports folder.

    You can now use your custom report like any other report distributed with Entuity, e.g. printing, scheduling, export to PDF, CSV, MS Office formats.

# Example Single Table Report

This example creates a simple Single Table Report, linking device CPU utilization and latency with an events summary, specifically:

- *Name*, the default name is derived from the template type and the date and time.
- *Report Title*, Device Performance with Events.
- *Description*, Troubleshooting Device Latency and Utilization.
- twenty-four hour timeframe.
- five columns, *Display Name*, *CPU Utilization%*, *CPU RAM Size*, *ICMP Latency*, *Events Summary*, with the table sorted on *CPU Utilization%*.
- *Events Summary* is set to 200px.
- The table has a maximum of twenty rows.

To build a custom Device Performance with Events report:

1)  Add objects and/or their metrics to the Drop Box.

2)  Open the Custom Report Builder Single Chart Template.

    You can access this page by placing the mouse pointer over the Report Builder icon in the Navigation pane and from its context menu selecting **Single Table**.
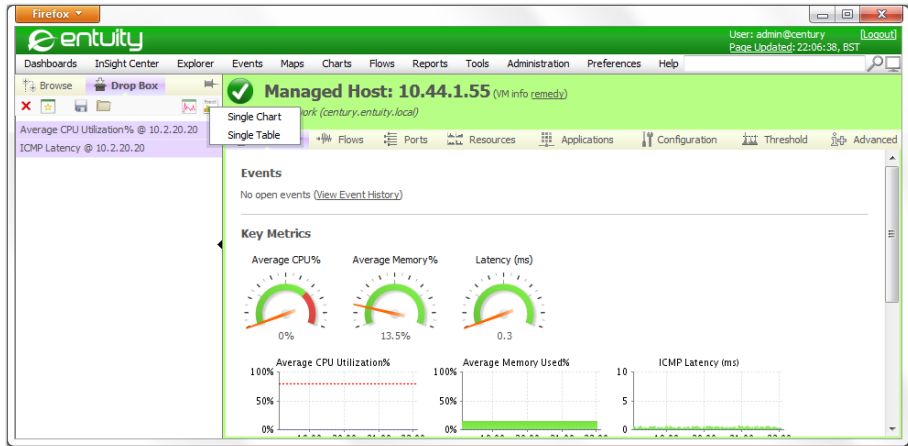
Figure 33    Report Builder Context Menu

3)  Configure the report. You can use **Preview** to check your progress.
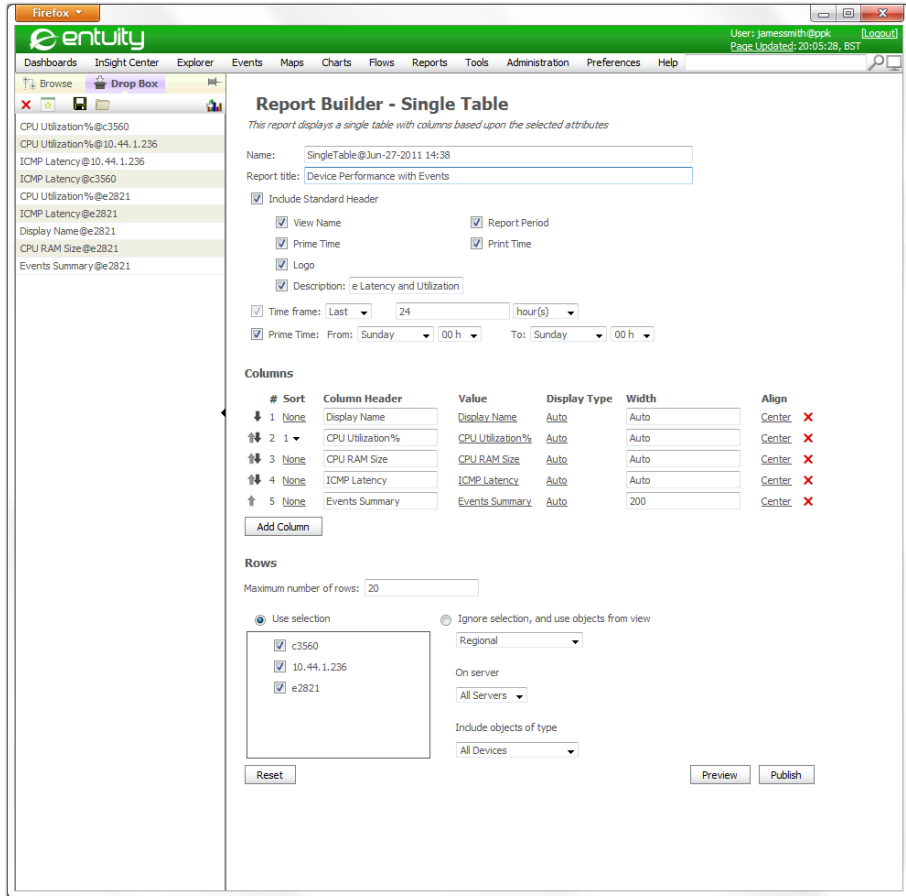
Figure 34    Report Builder - Single Chart Example

4)  **Publish** the finished report to the User Defined Reports folder.

    You can now use your custom report like any other report distributed with Entuity, e.g. printing, scheduling, export to PDF, CSV, MS Office formats.
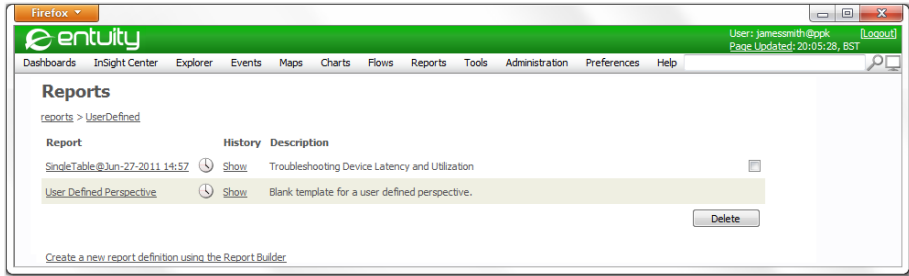
Figure 35    Report Builder - Published Single Chart Example

# 4  Flex Reports

Flex Reports allow access to the Entuity management database, with dynamic configuration and generation of reports. The resulting data can be integrated into web and windows applications.

Flex Reports can be viewed on three levels:

- Information access
- Formatting and design
- Report viewing and interaction.

## Information Access

Flex Reports allow access to Entuity's business management database. They allow you to build the particular report you require, accessing the required data and presenting it in the appropriate format.

Entuity's command-line support allows you to directly query the management database. You can write your own queries on the command-line or use the interface to create and then copy a Flex Reports URL. You can amend these URLs.

## Formatting and Design

Flex Reports offers a high degree of flexibility and control over how data is presented and formatted:

- Guided forms simplify the available data and report formatting options, where Advanced forms allow access to the full range and power of Flex Reports.
- Create virtually any report you need including Inventory, TopN, Graph or combinations of these styles of report elements. These can have both Summary and drill-down functionality.
- Reusable report templates that improve the efficiency of the report design process by making all templates available for use, with the most useful being highlighted.
- Customizable templates. Spend less time formatting individual reports. Design and apply customized templates that specify standards in formatting and logic to ensure design consistency across reports. You can even use existing reports as templates.

## Report Viewing

Flex Reports provides flexible options that let end users view and interact with information in familiar formats and via familiar environments:

- Multiple export formats. Provide end users with reports in the format they prefer. Export reports to popular formats, including CSV, PDF, XML, HTML.

- End user report interactivity options—including page forward/back, drill up/down, export, and print—are automatically included and can be customized based on your requirements.
- Hyperlinks. Use hyperlinks to turn reports into interactive web documents that connect to related information, including web sites and other reports.
- Drill-down. Without additional coding, create reports that allow end users to drill down to uncover details that might otherwise go unnoticed.

# 5 View and Run Flex Reports

Flex Reports are generated from Flex Reports templates. You can then decide whether you want to copy and amend an existing report or create a completely new report.

## View Generated Flex Reports

### Third Party Tools Required to View Flex Reports

Flex Reports are available in a number of formats, including PDF and HTML. To view:

- PDF documents Entuity recommend using Adobe Acrobat.
- HTML reports that include graphs your web browser must have installed an SVG Viewer plug-in. The Scalable Vector Graphics (SVG) format is used in the dynamic generation of high-quality graphics from Entuity's real-time data. Entuity recommend Adobe SVG Viewer, downloadable from the Adobe website (http://www.adobe.com/svg/viewer/install/mainframed.html).

### Viewing Flex Reports

From the Flex Reports page you can view:

- Flex Reports, configurable through its checkbox.
- Temporary Flex Reports, configurable through its checkbox. Temporary reports include files generated as part of other files. They are maintained for one day and are only useful for troubleshooting purposes.
- Queued Reports, reports currently queued for generation.
- Running Reports, displays the reports Entuity is currently running and their state of progress.

To view Flex Reports:

1) From the web interface select **Reports**. Entuity displays the Reports home page.

2) Select **Flex Reports**. To restrict the returned reports set the report filter:

    - *Owner* is the user who created the template.
    - *View* is the Entuity view in which the report is generated.

3) Select **Submit**. Entuity displays a list of Flex Reports templates.
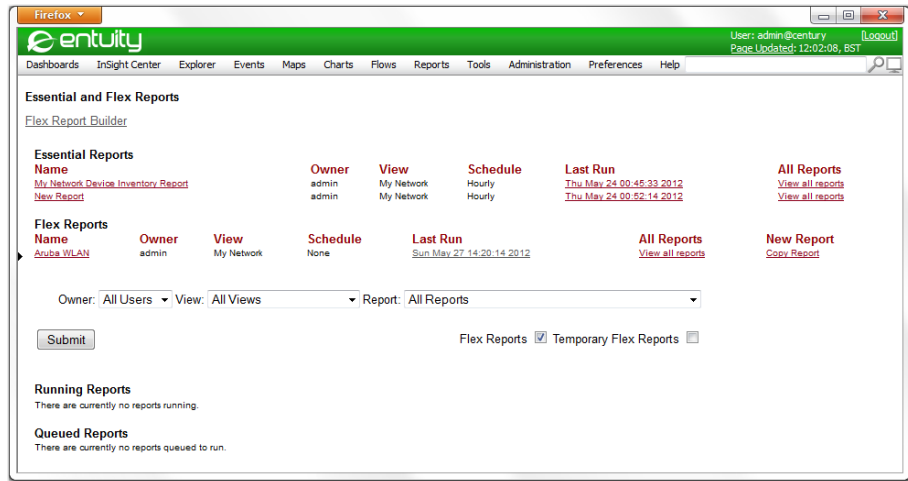
Figure 36    View Flex Reports

# Flex Reports On Demand

Entuity recommend Flex Reports are scheduled for generation when the load on your network and Entuity is low. Entuity also allows you to generate reports on demand.

Report generation can be a resource intensive process, this is certainly true for large reports that include graphs. To avoid impacting Entuity processes that are time critical, all reports have a low priority. This may delay report generation, but not prevent it. Entuity allows you to monitor the progress of report generation through Report Center (see *Canceling Flex Reports Generation*).

You can run reports on demand using already defined Flex Reports:

1) Display Flex Reports (see *View Generated Flex Reports*).

2) Select the Report Name. Entuity displays the Run Report dialog with the required displayed by default.
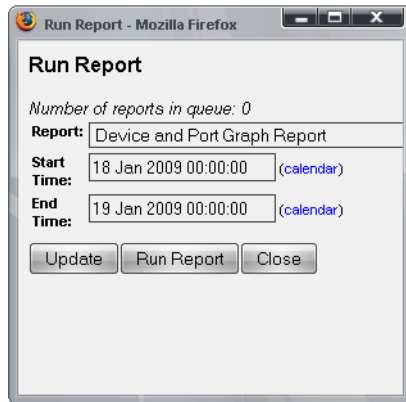
Figure 37    Running Reports from Report Center

3) Specify the report to run:

  ■ *Report* is the Flex Reports template from which Entuity generates the new report.
  ■ *Start Time* is the report period start time.
  ■ *End Time* is the report period end time.

4) Select:

  ■ **Run Report** to generate the report. Entuity schedules the report for immediate generation.
  ■ **Update** to monitor the progress of the report's generation. Progress can also be monitored from the View Reports page.
  ■ **Close** to close the Run Report dialog.

### Canceling Flex Reports Generation

From Report Center's View Reports page you can monitor the progress of report generation. Also from this page you can cancel report generation.

To cancel a Flex Reports as it is being generated:

1) Display Flex Reports (see *View Generated Flex Reports*).

2) From **Running Reports** click on report Name. Entuity displays a cancel report confirmation message.

3) Click **Yes** to confirm cancellation of the report. Entuity displays a report generation scheduled for deletion confirmation message.

   In Report Center a canceled report is marked as a failed report.
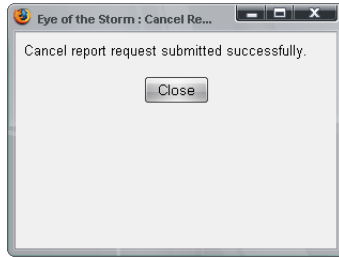
Figure 38    Cancel Flex Reports Generation Confirmation

### Reporting On Demand Considerations

When generating and waiting for on demand reports consider:

- Report generation can take some time, the length of time depending upon the amount of data involved in the report. Look at the length of time the report has taken to generate in the past (available from the Report History page).

- A delay in the report being available may occur when the Entuity server is busy, Flex Reports processes are resource intensive and have been given a low priority to avoid impacting Entuity performance.

- Checking Report Center for on demand reports first. Report Center looks directly at the server report folder.

## Regenerating Flex Reports

Entuity saves both the generated Flex Reports output and data files (to the same folder on the Entuity web server). This allows Flex Reports to be regenerated from the supporting XML, in the original output format or a one of the other available forms.

Regenerated reports are intended for immediate use. When you want to view a regenerated report again, then the report must be regenerated, Entuity only maintains a reference to the original report.

From Report Center you can run reports on demand using already defined Flex Reports:

1) Click **Reports**, and then from the Reports home page **Flex Reports**. (see *View Generated Flex Reports*).

2) For the required Flex Reports select **View all reports**.
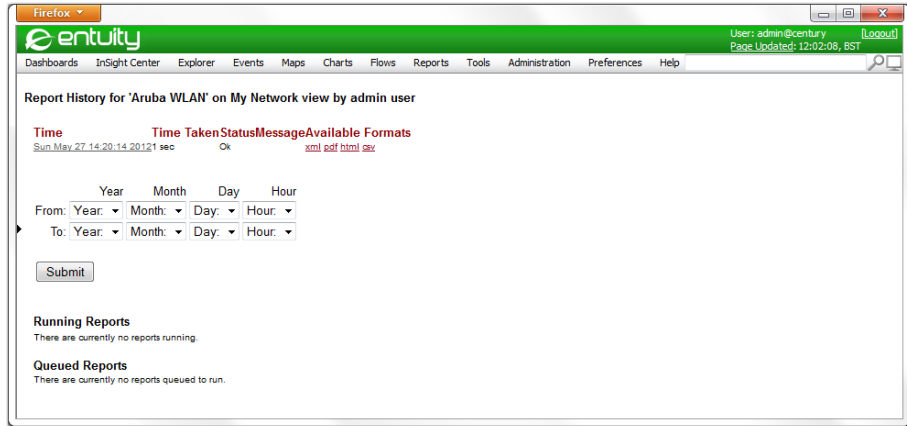
Figure 39    Regenerating Flex Reports

3) From the list of generated reports, select the required output format:

- ■ **XML**, Entuity displays the original XML data file.
- ■ **HTML**, Entuity generates and displays a report using the original XML data file.
- ■ **PDF**, Entuity generates and displays a PDF report using the original XML data file.
- ■ **CSV**, Entuity generates and displays a report using the original XML data file.

Monitoring the progress of regenerated Flex Reports is not available through Report Center.

# 6  Configure Flex Reports

Flex Reports can only be configured and run by all Entuity users. A report is built using a number of elements and is associated with a view. Entuity users that have access to the view then have access to the generated report through Report Center. In this way control is kept over report creation, which is one of the more resource intensive functions, whilst allowing access to reports.
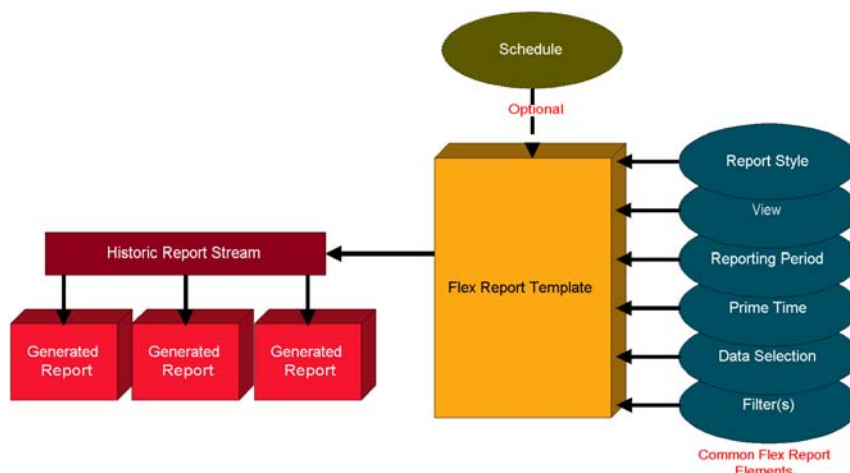


Figure 40    Flex Reports Architecture

This diagram represents the elements in Flex Reports configuration:

- Each Flex Reports definition includes:
  - *Report Style* defines the report type, e.g. graph, inventory TopN.
  - *View* is the Entuity view. This determines the scope of the report and who has access to the generated report.
  - *Reporting Period* determines whether the report runs over hours, days, weeks or months.
  - *Prime Time* determines the period of the day for which the report is applicable, e.g. daytime, night-time, twenty-four hours.
  - *Data Selection* determines the components and their attributes and associations that are the data content of the report.
  - *Filters* are applied to the selected data.

- Schedule determines when the report first runs and stops. This is optional with Flex Reports also being available to run on demand.

Once the report is configured it generates an historic report stream, which is held in Entuity's database. The reports viewed by users are generated from this stream.

# When, And For What Period, Do Reports Run?

There are three components that together determine the period that a generated report encompasses:

- ■ Report Schedule determines when the report is generated.
- ■ Report Period determines whether the report reports over an hour, a day, a week or a month.
- ■ Prime Time determines what data collected during the report period should be included in the report.

For example if a report is generated every Sunday evening, reporting on the previous working week's activity then:

- ■ Report Schedule is set to Sunday and Weekly together with an evening start time.
- ■ Report Period is set to weekly.
- ■ Prime Time is set to Monday to Friday, 07:00 to 19:00, only data collected during this period is included to the report.

## On Demand Reporting

On Demand Reporting allows you to generate reports in real-time, rather than using the report schedule associated with the report. Running a report on demand does not impact the report schedule. Reports that you only want to run on demand still have a report schedule, but it is set to **Never**, which ensures the report is never scheduled.

Although you can generate on demand reports from report definitions that have schedules, this does have implications for reports that reference data from the previous running of a report, e.g. Inventory Change reports.

On demand report configuration is the same as for those reports using an active report schedule. You can set any valid reporting period; for that period Entuity must still have the required rollup data.

When you run an on demand report Entuity still prioritises server resources, so report generation does not adversely impact Entuity performance. The progress of report generation can be viewed through Report Center.

The generated on demand reports are the same as those generated from report definitions that include a report schedule. Generated on demand reports are available from Report Center.

# Flex Reports and Managed Data

The data available for Flex Reports is linked to the rollup, ageout and trend data compression processes that manage trend data. These processes are configured to meet the requirement for fast report generation and sensible data storage without compromising the depth of information maintained.

Rollup is a method of taking polled data and bundling it into larger more manageable units, e.g. rolling twenty-four hourly datapoints into one daily sample. If Entuity generated monthly reports from hourly data then this would cause a significant increase on the processing overhead, i.e. instead of one datapoint for each day there would be twenty-four.

Ageout is a method for removing from the system data that has been rolled up. For example, once hourly data has been rolled up into daily data then the hourly samples are no longer required and can be deleted.

This diagram, not to scale and with example ageout values, illustrates ageout periods for different data rollups. When generating reports Entuity uses rollup and trend compression data, and tries to use the lowest rollup interval that fits the report period.
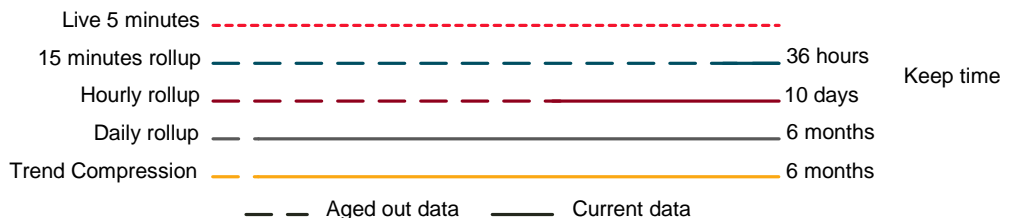


Figure 41    Aging Out Data

On Demand Reporting allows you to generate any Flex Reports at any time, providing the required rollup stream is available.

For example, daily reports detail data collected during the previous day. When the report runs in the:

- morning Entuity uses the previous day's 15 minutes rollup data (i.e. the report is run within the thirty-six hour period).
- afternoon Entuity uses the previous day's hourly rollup data because the ageout process has now deleted part of the 15 minutes rollup data, i.e. more than thirty-six hours have passed.

If unsure of your ageout and rollup configuration, or you require amendments, contact your Entuity representative.

The Rollup and Ageout methods have implications for Flex Reports generation:

- Reports must be scheduled before the data they report on is aged out. For example, where hourly data is aged out after ten days the latest a weekly report should be scheduled is for the following Wednesday.
- Once data is aged out the Flex Reports generated from them can be regenerated from the saved XML. However the generated reports and XML files are aged out after a ten week period.
- When data is rolled up Entuity does not compensate for incomplete polling within that period. For example, if Entuity polls for only half a day Entuity does not handle that data any differently to data that was polled over a full day.

> ⚠ If you do not back up generated reports then when deleted it may not be possible to regenerate them. The generated Flex Reports ageout period and the auto-delete functionality settings can be amended. Contact an Entuity representative for more details.

## Reporting Considerations

These are items that you should consider when building Flex Reports:

- Report generation is a resource intensive process. Flex Reports generation has a low priority call on system resource to avoid it impacting Entuity functions that are time critical. Where possible schedule large reports to run when demand on Entuity is low, i.e. when network usage is low.
- Flex Reports are generated using data from the Entuity management database. When building and testing new reports create a view that has a limited number of objects to report on. This allows quicker development and keeps the impact on the resources of the Entuity management server to a minimum.
- After installing Entuity the first monthly reports may take longer to generate and then display more datapoints than expected. This occurs when Entuity is installed in mid-month so a full month's daily data is not collected and instead the report displays weekly data. The data is accurate and the report correct, it simply has more datapoints.

## Flex Reports Styles

Flex Reports are built from underlying reporting styles. These styles determine how Entuity data is presented in the Flex Reports, these are:

- Inventory.
- TopN.
- Graph.

Flex Reports are built through completion of forms. Advanced report editing allows the building of complex reports comprising one or more of the Inventory, TopN and Graph styles.
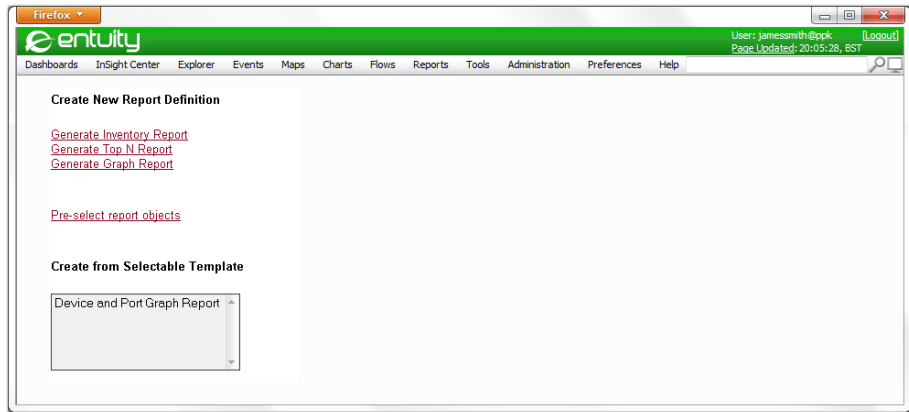
Figure 42    Flex Reports Builder Page

## Flex Reports Guided Forms

The Flex Reports guided forms vary according to the report style but the general process is the same. All reports:

- Use the view concept. This also means reports are tied into Entuity user security levels.
- Can be generated as XML, PDF, HTML and CSV formats. These are the only Entuity reports that have that flexibility.
- Use report periods, including Prime Time.

The data contained in the report is selected through list boxes. For example, Components contains a list of high level objects such as application types, ports types, device types as well as the generic device and port. Highlight the data to report on and press the Next button. If Port was selected then Entuity presents a list of Port Details. This iterative process allows drilling down the object hierarchy.

Report definitions can be held as report templates, which are in effect forms that contain defaulted data. One usage is for the administrator to create templates that ordinary users then run.

These report definitions are saved to the Entuity server.

Pressing the Generate button generates reports. Reports are immediately generated and appear in the browser. They may also be viewed later through the Entuity client, through the Flex Reports tab. Generated reports are saved to the Entuity server.

# Common Flex Reports Elements

All of the Flex Reports can be created through Report Center guided forms. Many of the elements are common to all of the reports.

### Flex Reports Definition Details

The core definition fields on all of the Flex Reports are similar:

- *Report style* is **graph**, **inventory** or **TopN**.
- *Report Name* is:
    - Used as part of the report template name.
    - Used as part of the reports subsequently generated from the template.
    - The folder name that holds the generated reports, and their xml files.

If the same user creates two or more report templates with the same name in the same view then Entuity places both templates in the same folder, together with any subsequently generated reports. Entuity can distinguish between reports generated from the different templates, but for ease of use Entuity recommend all Flex Reports template names are unique.

### Flex Reports Header Fields

The header fields on all of the Flex Reports are similar:

- *Report Title* is the title of the report displayed in the generated report.
- *Company Name* is the company name that appears on the report.
- *Company Logo URL* contains the location and file name of the logo you want to use on your reports. By default, the folder is the same as the one containing the stylesheets, i.e. install_dir/lib/httpd/EOS/reporting/stylesheets.

    The image should be a gif format, Entuity proportionally scales the image to fit the height of the logo space on the report.

### Flex Reports Views

All Flex Reports are View constrained; only objects within a report's view can be included to a report. In this way reports are held within Entuity's security model; only users with access rights that allow them to view the network objects in Entuity can view the reports on those objects.

- *View* identifies the Entuity view against which the report is generated.

Filters may further restrict the objects within a report (see *Flex Reports Filters*).

### Flex Reports Configuration Fields

The configuration fields on all of the Flex Reports are similar. These fields determine how you create a report, the range of fields available and whether the report is available as a template:

- *Advanced Edit* provides the experienced user with access to greater functionality that is usually hidden to users that require more guidance when configuring Flex Reports.
- *Show Hidden Data* displays data that is not usually required for reports.

- *Mark as a Selectable report* identifies the report as one that is likely to be used as a template for other reports. All Flex Reports may be used as templates, but with this flag checked the template is listed on the Generate Flex Reports Menu page.

### Flex Reports Output Format

The output formats available to all of the Flex Reports are similar:

- *Output Format* is the format of the generated report, i.e. CSV, HTML, PDF and XML.

### Flex Reports Prime Time

Prime Time allows you to specify a period of time (minutes, hours and days) that the report reports on, e.g. 09:00 to 17:00 from Monday to Friday. When defining your report you can include the Prime Time. These reports then only report data collected during Prime Time.

### Flex Reports Reporting Period

Reporting Periods are applied to Graph and TopN reports (and to Inventory reports when using Advanced Edit):

- *Last Hour* sets the reporting period to the previous complete hour from the report generation time.
- *Last Day* sets the reporting period to the previous day from the report generation time.
- *Last Week* sets the reporting period to the previous week from the report generation time.
- *Last Month* sets the reporting period to the previous month from the reporting generation time.
- *Previous* allows you to define the number of *Weeks*, *days*, *hours* the reporting period includes.
- *From* and *To* sets the reporting period between two inclusive dates. Select the calendar to aid date selection, it also ensures the date format is correct.

### Flex Reports Data Selection

For reporting purposes you can consider that Entuity holds information as attributes and groups related attributes together as components. For example, device name, device type and device description are all grouped together by the component device.

Entuity allows you to select first the component and then, when you refresh the form by pressing NEXT, allows you to select the component's attributes. There are two underlying attribute types:

- Fixed data does not contain a history of the values of the attribute. For example, if a device name changes, then the previous name is not held and so cannot be reported on.
- Time-Series data maintains a history of previous values. For example, Chassis Status is polled every two minutes and each sample is kept. It is time-series data that is graphed in reports.

Entuity also maintains the relationships between components as associations. Flex Reports allows you to build reports that show these real world relationships, for example devices with a breakdown of their ports.

## Flex Reports Filters

All Entuity reports are constrained by the view in which they are run. Flex Reports also allow you to set filters for the components in the report. These filters are also view constrained. More than one filter can be applied to a report. These filters can be both simple, where only the view and the component type is specified, or more advanced where conditions may be applied against attributes of a component.

A report can be run in a different view from the views applied to filters used in the report. However, for a component to appear in the report it must be available in both the report and filter views.

Filter parameters:

- *view* identifies the Entuity view against which the filter is applied.
- *type identifies* the component type.
- *use advanced filter settings* makes active the otherwise grayed out conditional sections of the filter:
    - *where* is the attribute of type against which the condition is set.
    - *has* is the attribute data type, e.g. **Value**, **String**.
    - *that is* is the condition. e.g. **Less Than**, **Equal To**, **Greater Than**.
    - *value* is the value in the comparison value.
- *Show hidden types* displays those component types usually hidden by Entuity, as they are considered less useful for reporting on.
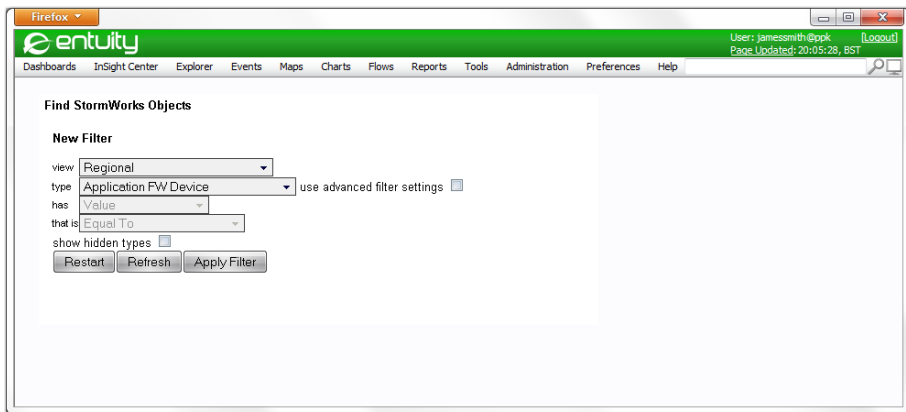


Figure 43    Defining a Filter

Filters are available with all reports against all components. They are accessed:

■ Through the Flex Reports Templates Page by selecting **Pre-select report Objects**.

■ By defining a filter against a selected component.

■ Through the first page of the Graph Report form. Filters are part of the graph report form to highlight how many graphs a report will generate (graphs are resource intensive).

## Pre-Selecting Report Objects

All reports are constrained by the view in which they are run. Filters can also be applied to the components (objects) as part of the report template. These filters can be applied as the first stage in defining a report template.

Pre-selection allows you to see how many components are returned by a filter, often useful when determining whether a report returns a level of information that is usable. For example, Graph Flex Reports components are always pre-selected; you have to define a filter before defining the report. This is for two reasons:

■ Graph reports are the most resource intensive reports, care should always be taken before running them.

■ A graph report that contains thousands of graphs is unlikely to be useful.

To pre-select object filters:

1) Click **Reports > Flex Reports** > **Report Builder**. Entuity displays the Flex Reports templates page.

2) Click **Pre-select report objects**. Entuity displays the New Filter form.

3) Complete the filter definition and select **Apply Filter**. Entuity displays the components that fulfill the criteria. Checking these components includes them to the report when generating the report using **Create Report Using This Selection**.



Figure 44    Pre-Select Report Objects

4) Select:

- **Create Report Using This Filter** to use the filter and create the new report.
- **Create Report Using This Selection** uses the selected components in the report.

Entuity displays the Flex Reports Templates Page.

5) Select the report you want to create. Entuity opens the report form, with the report's View grayed out (the filter's view is used). Selected by default is the component specified in the filter.

## Create Flex Reports

Flex Reports are built through completion of guided forms. Transition from one form to the next, and generation of the report is actioned through HTML buttons. When you select:

- **Next**, the HTML form is refreshed and any new elements displayed.
- **Save**, the report definition is saved. This is useful when creating new reports and wanting to save the current definition.
- **Run**, Entuity generates the report but does not save the definition. This is useful when creating new reports and wanting to experiment with the layout and content.
- **Run & Save**, Entuity generates the report and saves the definition.

## Using Report Definitions Outside of Entuity

To make definitions easy to copy, distribute and integrate with third party scripts they are available in two forms, as URLs and command line definitions.

When Flex Reports is used with Advanced Settings enabled Entuity automatically generates report URLs. The URL does not represent the location of a report definition but rather the command that when issued to the web server results in the creation of a report object, a generated report or both depending upon the set options.

The URL can also be amended for use from the command line. For details on URLs and command line forms of report definitions see *Chapter 11 - Using Flex Reports Definitions*.

# 7  Configuring Inventory Flex Reports

Flex Reports allow extensive access to Entuity's comprehensive inventory of network assets, their dependencies in parent-child and peer-to-peer relationships, and their physical connectivity. Resource profiles combined with fault and performance data provide an unprecedented ability to manage infrastructure in the context of the business it supports.

## Inventory Flex Reports

Before creating any report you should understand what you require. You can then decide whether you can copy and amend an existing report or whether a completely new report has to be created.

### Creating a Simple Inventory Flex Reports

Flex Reports are defined through completion of HTML forms. The Next button on these forms allows Entuity to update and expand the form's content, for example displaying attribute data of an already selected component.

1) Click **Reports**, and then from the Reports home page **Flex Reports**. (See *View Generated Flex Reports*.)

2) Click **Report Builder**. Entuity displays the Flex Reports templates page.

3) Click **Generate Inventory Report**. Entuity displays the first page of the Inventory form.

4) Complete the report header information (see *Flex Reports Definition Details*).

5) Select the report's view (see *Flex Reports Views*).

6) Select the report's output format (see *Flex Reports Output Format*).

7) Enter the report details (see *Flex Reports Data Selection*).

8) Select **Include this report in the list of definition templates** to make the report template available for easy re-use (through its display in a list of key templates on the Flex Reports templates page*).

9) Leave **Advanced Edit** and **Show Hidden Data** unchecked.

10) Click **Run & Save**. Entuity displays the report.

### Example Simple Inventory Flex Reports

This example creates a simple device and module inventory Flex Reports:

- Regional View.
- PDF format.
- device details, with hyperlinks to the associated device's module details.

To create a device and module inventory Flex Reports:

1) From the web interface select **Reports**, and then from the Reports home page **Flex Reports**. (see *View Generated Flex Reports*).

2) Select **Report Builder**. Entuity displays the Flex Reports templates page.

3) Select **Generate Inventory Report**. Entuity displays the first page of the Inventory form.

4) Complete the report header information (see *Flex Reports Definition Details*).

5) Select **Regional** as the report's view (see *Flex Reports Views*).

6) Select **PDF** as the report's output format (see *Flex Reports Output Format*).



Figure 45    Inventory Example - Device Header Details

7) From *Components* select **Device** and then **Next**. Entuity displays an updated form that shows device attributes and associations. Also available is a filter that allows you to restrict the devices included in the report to those you filter in (see *Flex Reports Filters*).

Figure 46    Inventory Example - Device Details

8) Select:

- The device details to include in the report (standard Windows interface behavior of holding down Shift or Control keys while clicking on multiple options allows you to select more than one attribute).

- From Device Associated Components select **Modules** and then **Next.** Entuity displays an updated form that shows module details and associations.
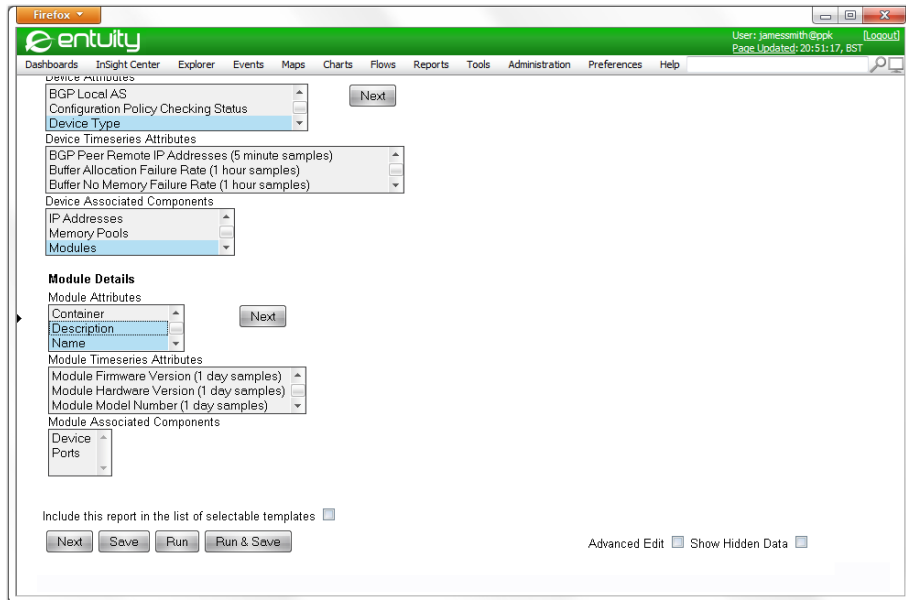
Figure 47     Inventory Example - Module Details

9) Select module details to include in the report and then **Run & Save**. Entuity displays the report in Report Center.

View:          Regional
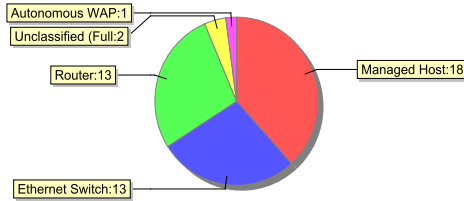


| Device Type: Autonomous WAP | | | |
|---|---|---|---|

**192.168.3.70**

| Model: | C1130 | Manufact.: | cisco |
|---|---|---|---|
| Version: | 12.3(2)JA2 | Serial #: | FOC09201RXQ |
| Mngd. IP: | 192.168.3.70 | Managed since: | 14 Oct 2009 02:55:38 GMT |
| Location: | | Server: | jdiamondnj |
| Description: | Cisco Internetwork Operating System Software | | |
| Ports: | IOS (tm) C1130 Software (C1130-K9W7-M), Version 12.3(2)JA2, RELEASE SOFTWARE (fc 7 | | |

| Device Type: Unclassified (Full) | | | |
|---|---|---|---|

**10.44.2.169**

| Model: | n/a | Manufact.: | Dell Computer Corporation |
|---|---|---|---|
| Version: | n/a | Serial #: | n/a |
| Mngd. IP: | 10.44.2.169 | Managed since: | 14 Oct 2009 02:55:26 GMT |
| Location: | | Server: | jdiamondnj |

Figure 48     Inventory Example - Generated PDF Report

The example Inventory report contains a device inventory table, with each row detailing a device and a hyperlink to its associated modules. The modules table includes module details and hyperlink back to the module's device in the device table.

# 8 Configuring TopN Flex Reports

Flex Reports allow access to Entuity's comprehensive performance, availability and resource management data. Through the TopN form you can define a report that shows all, or a restricted set (the top number), of the returned data items. For example your network's top talkers and listeners, the most utilized ports and device events. The sort order can be ascending or descending.

## Flex Reports Sort Criteria

TopN reports allow you to report on all or the first *n*, where *n* is user-definable, items that meet the report configuration. These returned items can be sorted according to a criteria:

■ *Show* defines the number of items included to the report, e.g. **Show All**, **Top 1**, **Top 10**, **Top 500**.

■ *Sorted by* **Ascending** or **Descending** value of the selected *Statistic*.

■ *Statistic* sets the particular statistic of the attribute on which the sort is applied, e.g. **Last Value**, **Mean**, **Max**.

■ *Attribute* sets the attribute on which the returned items are sorted.

## Creating TopN Flex Reports

Before creating any report you should understand what you require. You can then decide whether you can copy and amend an existing report or whether a completely new report has to be created.

### Creating a Simple TopN Flex Reports

In Report Center Flex Reports are defined through completion of HTML forms. The Next button on these forms allows Entuity to update and expand the form's content, for example displaying attribute data of an already selected component.

1) From the web interface select **Reports**, and then from the Reports home page **Flex Reports**. (see *View Generated Flex Reports*).

2) Select **Report Builder**. Entuity displays the Flex Reports templates page.

3) Select **Generate TopN Report**. Entuity displays the first page of the TopN form.

4) Complete the report header information (see *Flex Reports Definition Details*).

5) Select **Regional** as the report's view (see *Flex Reports Views*).

6) Select **PDF** as the report's output format (see *Flex Reports Output Format*).

7) Enter the report's Prime Time (see *Flex Reports Prime Time*).

8) Enter the report's reporting period (see *Flex Reports Reporting Period*).

9) Enter the report details (see *Flex Reports Data Selection*).

10) Set the Sort criteria (see *Flex Reports Sort Criteria*).

11) Select **Include this report in the list of definition templates** to make the report template available for easy re-use (through its display in a list of key templates on the Flex Reports templates page*).*

12) Leave **Advanced Edit** and **Show Hidden Data** unchecked.

13) Select **Run & Save**. Entuity displays the report in Report Center.

## Example Simple TopN Flex Reports

The example creates a simple port TopN Flex Reports:

■ Regional View.

■ PDF format.

■ Prime Time is not set and reporting period is one week, running from the previous Sunday to Sunday.

■ Port details, with reporting on time-series inbound and outbound long term utilization including mean and maximum statistics.

■ Sort Criteria that includes all items sorted by *Inbound Utilization*.

To create the example port TopN Flex Reports:

1) From the web interface select **Reports**, and then from the Reports home page **Flex Reports**. (see *View Generated Flex Reports*).

2) Select **Report Builder**. Entuity displays the Flex Reports templates page.

3) Select **Generate TopN Report**. Entuity displays the first page of the TopN form.

4) Complete the report header information (see *Flex Reports Definition Details*).

5) Select the report's view (see *Flex Reports Views*).

6) Select the report's output format (see *Flex Reports Output Format*).

7) Leave *Prime Time* to its default setting of off and for *Report Period* select Last Week (see *Flex Reports Reporting Period*).

Figure 49    TopN Example - Port Header Details

8) From *Components* select **Port** and then **Next.** Entuity displays an updated form that shows port attributes and associations. Also available is a filter that allows you to restrict the ports included in the report to those you filter in (see *Flex Reports Filters*).

9) Select **Device Name** and **Interface Description**.

Figure 50    TopN Example - Port Attributes

10) From Port Time-Series Attributes select inbound and outbound utilization and then **Next**. Entuity displays an updated form that shows the statistics available against the utilization attributes.
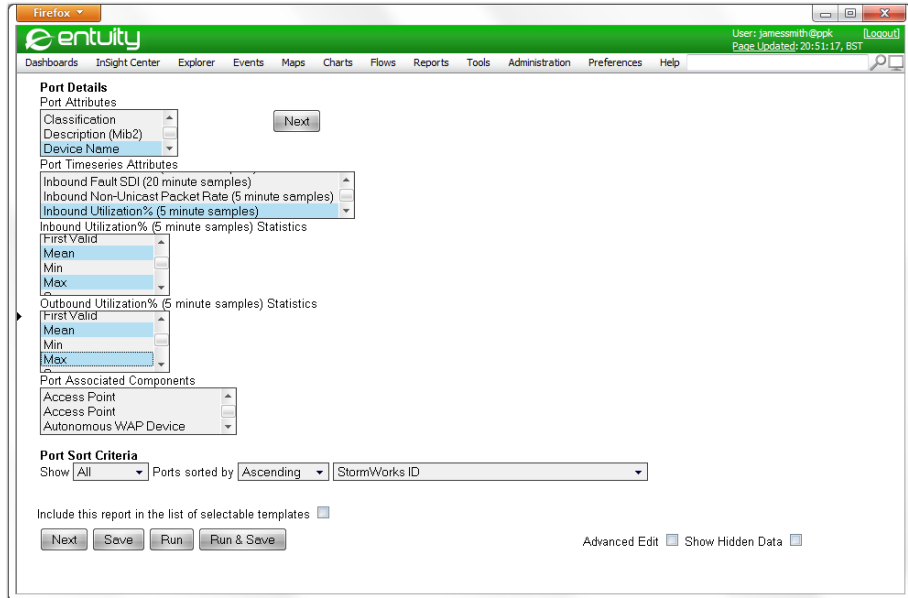
Figure 51    TopN Example - Utilization Statistics

11) From the Statistics lists select **Mean** and **Max**.

12) From Port Sort Criteria, set:

- *Show* to **All** to display all associated ports.
- *Ports sorted by* to **Descending** and **Max**.
- **Inbound Utilization % (20 minute samples)** as the sort attribute.

13) Select **Run & Save**. Entuity displays the report in Report Center.

**Port Top N**
**Over the 1 week period Sun Aug 28 2005 - Sun Sep 04 2005**
**No prime time is set for this report**
Generated at 17:47 on Tue Sep 06 2005 for the **Regional** view

| Port Details | | | | | |
|---|---|---|---|---|---|
| Device Name | Interface Description | Inbound Utilization% (Mean) | Inbound Utilization% (Max) | Outbound Utilization% (Mean) | Outbound Utilization% (Max) |
| IOALANA | [ 96 ] Serial4/0/3.2 | 41.38% | 65% | 63% | 96% |
| IOALANA | [ 100 ] Serial11/0/2.4 | 38.78% | 62% | 99.96% | 100% |
| IOALANA | [ 98 ] Serial11/0/2.2 | 18.44% | 31% | 27.28% | 45% |
| IOALANA | [ 91 ] Serial4/0/0.1 | 16.98% | 28% | 24.11% | 41% |
| IOALANA | [ 15 ] Worldcom Leased 2M link to Brussels | 17.57% | 21% | 32% | 41% |
| IOALANA | [ 13 ] WorldCom Leased to Paris Ser3/3 | 15.92% | 20% | 37.17% | 47% |
| IOALANA | [ 5 ] Worldcom Leased 2Mb Line to Stockholm | 13.18% | 16% | 12.1% | 16% |
| 10.44.1.5 | [ 3/15 ] 10/100 utp ethernet (cat 3/5) | 0.06% | 14% | 0.09% | 2% |
| 10.44.1.5 | [ 2/7 ] LONBDCEX01 | 0.86% | 11% | 0.04% | 0.27% |
| 10.44.1.5 | [ 3/4 ] WINDBREAK | 0.64% | 11% | 0.16% | 3% |
| 10.44.1.5 | [ 2/11 ] 10/100 utp ethernet (cat 3/5) | 0.05% | 9% | 0.03% | 0.25% |
| 10.44.1.7 | [ 2/2 ] TRUNK to lonsw01 | 0.67% | 9% | 0.52% | 9% |
| IOALANA | [ 97 ] Serial11/0/2.1 | 5.53% | 9% | 13.35% | 21% |
| 10.44.1.5 | [ 2/2 ] TRUNK to lonsw03 | 0.53% | 9% | 0.67% | 9% |
| IOALANA | [ 93 ] Serial4/0/0.3 | 5.49% | 9% | 11.37% | 17% |
| 10.44.1.7 | [ 2/24 ] 10/100 utp ethernet (cat 3/5) | 0.02% | 8% | 0.01% | 0.65% |
| IOALANA | [ 101 ] Serial11/1/1.1 | 4.89% | 8% | 8.39% | 13% |
| IOALANA | [ 14 ] WorldCom frame relay access circuit #2 | 5.36% | 7% | 14.93% | 19% |
| IOALANA | [ 17 ] C&W 2Mb link to NY GDC 1 4/0 | 5.77% | 7% | 9.99% | 13% |
| 10.44.1.5 | [ 2/3 ] TRUNK to | 0.09% | 7% | 0.11% | 3% |

Figure 52    TopN Example - Generated PDF Report

# 9  Configuring Graph Flex Reports

Flex Reports allow access to Entuity's comprehensive performance, availability and resource management data. Through the Graph guided form you can define a report that may contain one or more graphs, each graph may plot one or more data types (series). Sample periods, graph and series labels, are all configurable.

## Creating Graph Flex Reports

Before creating any report you should understand what you require. You can then decide whether you can copy and amend an existing report or whether a completely new report has to be created.

### Creating a Simple Graph Flex Reports

In Report Center Flex Reports are defined through completion of HTML forms. The Next button on these forms allows Entuity to update and expand the form's content, for example displaying attribute data of an already selected component.

1) From the web interface select **Reports**, and then from the Reports home page **Flex Reports**. (see *View Generated Flex Reports*).

2) Select **Report Builder**. Entuity displays the Flex Reports templates page.

3) Select **Generate Graph Report.** Entuity displays the first page of the graph form, the graph filter.

4) Complete the graph filter and select **Apply Filter** (see *Flex Reports Filters*). Entuity allows you to add another filter to the report definition or apply the filter.

   When Entuity applies multiple filters it uses a logical AND. Entuity displays the results of the applied filters. You can then select:

   ■ The hyperlink of a returned item to only use that item as the data source for the subsequently defined report.

   ■ **Create Report Using this Filter** to apply the filter to the subsequently defined report.

   ■ **Create Report Using This Selection** to use the returned items that are checked as the data source for the subsequently defined report.

   Entuity displays the Graph Flex Reports definition page. You can check and amend this filter by clicking on the component filter. Entuity displays the Find Filter dialog, containing the filter definition. Amending this filter would amend the filter as applied to the report.

5) Complete the report header information (see *Flex Reports Definition Details*).

6) Select the report's view (see *Flex Reports Views*).

7) Select the report's output format (see *Flex Reports Output Format*).

8) Enter the report details (see *Flex Reports Data Selection*).

9) Select **Include this report in the list of definition templates** to make the report template available for easy re-use (through its display in a list of key templates on the Flex Reports templates page*)*.

10) Leave **Advanced Edit** and **Show Hidden Data** unchecked.

11) Select **Run**. Entuity displays the report in Report Center.

## Example Simple Graph Flex Reports

This example creates a simple port graph Flex Reports:

- Regional View.
- HMTL format.
- Ports selected by VIP Status, with graphed port inbound and outbound long term utilization data.

To create a port graph Flex Reports:

1) From the web interface select **Reports**, and then from the Reports home page **Flex Reports**. (see *View Generated Flex Reports*).

2) Select **Report Builder**. Entuity displays the Flex Reports templates page.

3) Select **Generate Graph Report.** Entuity displays the first page of the graph form, the graph filter.
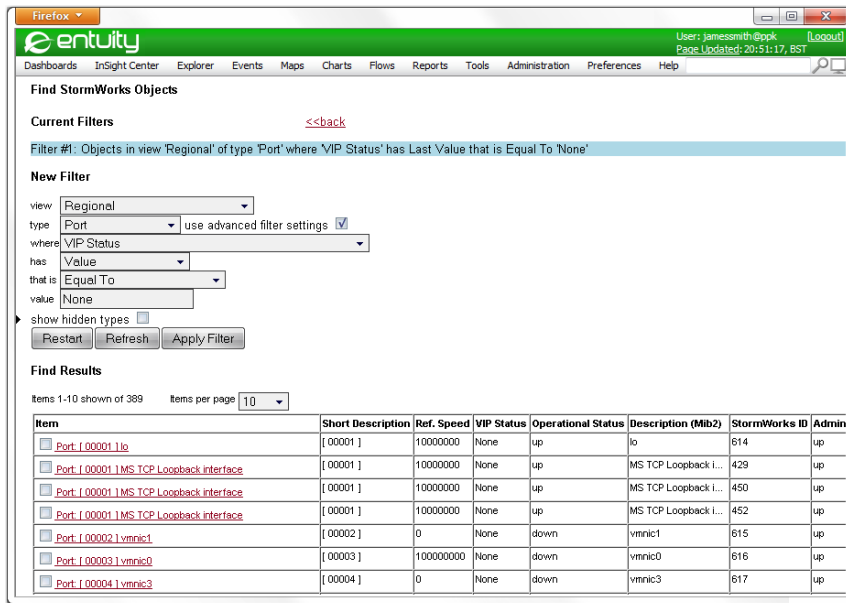


Figure 53    Graph Example - Applied Filter

4) From *View* select **Regional**, from *Type* select **Port** and then use the Advanced Filter

settings to filter by *VIP Status*. Select **Apply Filter** (see *Flex Reports Filters*). Entuity displays a list of ports that meet the set criteria.

5) Select **Create Report Using this Filter** to apply the filter to the report. Entuity displays the graph report form, with the filter applied and *View* set to the filter's view.



Figure 54   Graph Example - Flex Reports Definition Page

6) Complete the report header information (see *Flex Reports Definition Details*).

7) Select the report's output format as HTML (see *Flex Reports Output Format*).

8) Select *Port Details* **Alias**, **Description** and **Device Name**.

9) Select **Add Graph** under **Port Graph Data**. Entuity updates the report form.

10) Enter the port report details, this involves the graphing of port time-series data:

   ■ Enter the graph *Title* and set *Sample Frequency* to **20 Mins**.

   ■ Select **Add Series** this refreshes the report form *In Series 1* add **Inbound Utilization%**.

   ■ Select **Add Series** again, In *Series 2* add **Outbound Utilization%**.

11) Select **Include this report in the list of selectable templates** to make the report template available for easy re-use (through its display in a list of key templates on the Flex Reports templates page*)*.

12) Leave **Advanced Edit** and **Show Hidden Data** unchecked.

13) Select **Run & Save**. Entuity displays the report in Report Center.
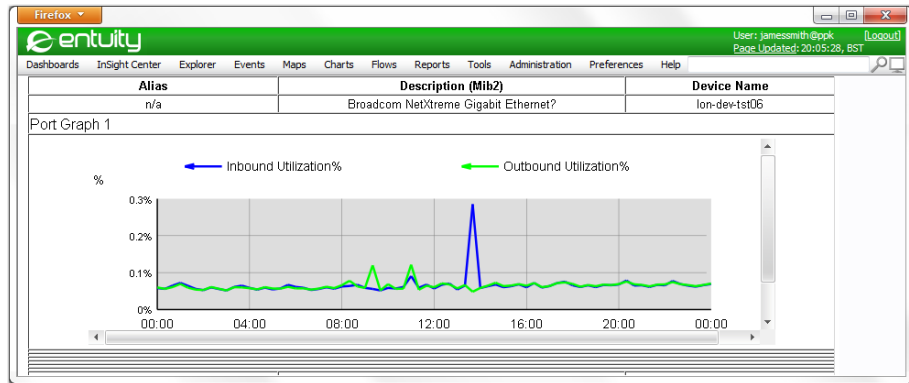
Figure 55    Graph Example - Port Utilization Report

## Example Advanced Graph Flex Reports

The example creates a combined device and port graph Flex Reports that uses:

■ Advanced edit functionality to allow graph and inventory style reporting elements in the same form.

■ Regional View.

■ HMTL format.

■ Devices, with graphed port inbound and outbound long term utilization data.

To create a device and port graph Flex Reports:

1) From the web interface select **Reports**, and then from the Reports home page **Flex Reports**. (see *View Generated Flex Reports*).

2) Select **Report Builder**. Entuity displays the Flex Reports templates page.

3) Select **Generate Graph Report**. Entuity displays the first page of the graph form, the graph filter.

Figure 56     Graph Advanced Example - Applied Filter

4) From *View* select **Regional**, from *Type* select *Device* and then select **Apply Filter** (see *Flex Reports Filters*). Entuity displays a list of device details.

5) Check the devices on which you want to run the report and select **Create Report Using This Selection**. Entuity displays the Graph Flex Reports definition page with the applied filter and the selected view.

Figure 57    Graph Advanced Example - Flex Reports definition page

6) Complete the report header information (see *Flex Reports Definition Details*).

7) Select **HTML** as the report's output format (see *Flex Reports Output Format*).

8) With the checkbox settings:

   ■ Select **Include this report in the list of selectable templates** to make the report template available for easy re-use (through its display in a list of key templates on the Flex Reports templates page).

   ■ Select **Advanced Edit** to allow combining of graph and inventory style reporting elements.

   ■ Leave **Show Hidden Data** unchecked.

9) From *Device Associated Components* select **Ports** and then select **Next**. Entuity updates the report form, specifically reporting elements relating to Devices and Ports.

10) Enter the device report details:

   ■ From *Device Attributes* select **Device Type**, **Location**, **Manufacturer**, **Model** and **Serial Number**.

   ■ Set *Device Sort* to **Location**.

✓ Graph generation is resource intensive, the more ports to be graphed the longer report generation will take. If required select **Filter Associated Ports** and apply a filter to restrict the number of ports included to the report.

11) Select **Add Graph** under **Port Graph Data**. Entuity updates the report form.

12) Enter the port report details, this involves the graphing of port time-series data:

■ Enter the graph *Title* and set *Sample Frequency* to **20 Mins**.

■ Select **Add Series** this refreshes the report form *In Series 1* add **Inbound Utilization%**.

■ Select **Add Series** again, In *Series 2* add **Outbound Utilization%**.



Figure 58    Graph Advanced Example - Port Utilization

13) Select **Run & Save**. Entuity displays the report in Report Center.
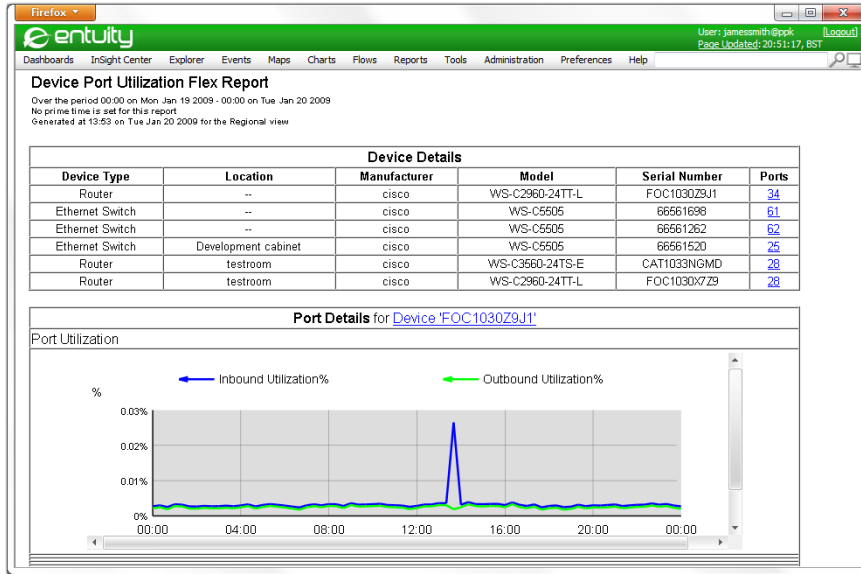
Figure 59    Graph Advanced Example - Device and Port Utilization

# 10 Flex Reports Configuration

Flex Reports templates can be amended through Report Center.

## Flex Report Definition Parameters

The Flex Reports Definition Parameters are defined during Flex Reports configuration.

When creating Flex Reports in Report Center using the Advanced Edit function, the report's URL is visible. The URL instructs the DMK to generate report definition parameters (see *Using Report Definitions Outside of Entuity*).

### Flex Reports Definition Details

These parameters set the underlying report values:

- *reportStylesheet* is reserved for use in future release. Leave blank.
- *reportStyle* can be **graph**, **inventory** or **topN**.
- *reportName* determines to which folder on the Entuity server Entuity writes a report and its files, and also the report name part of that file.

  The internal name of the report template remains the same allowing Entuity to recognize that reports have been generated from the same, but renamed templates. Report Center display these reports together, even though on the Entuity server they are stored in separate folders.

### Flex Report Header Fields

- *companyName* is the company name that appears in the report.
- *reportTitle* is the title of the report displayed in the generated report.
- *logoURL* is a relative path to file name of the logo you want to use on your reports. By default, the folder is the same as the one containing the stylesheets, i.e. *entuity_home*/`lib/httpd/EOS/reporting/stylesheets`.

  The image should be a gif format, Entuity proportionally scales the image to fit the height of the logo space on the report.

### Flex Reports Views

- *viewId* is the unique identifier used internally by Entuity to identify each view.

### Flex Reports Output Format

- *outputFormat* is the report output format, i.e. **HTML**, **CSV**, **XML**, **PDF**.

### Flex Report Prime Time

Reports only report using data collected during Prime Time:

- *primeTimeStartDay*, prime time start day, by default 0, Sunday.
- *primeTimeStartHour*, prime time start time, by default 00, twelve midnight.

- *primeTimeEndDay,* prime time end day by default 0, Sunday.
- *primeTimeEndHour*, end time of prime time, by default 00, twelve midnight.

### Flex Report Reporting Period

- *reportPeriod* is the defined report period, example valid values include:
    - **timestamps**, when *startTimestamp* and *endTimestamp* are used.
    - **2091@1h** defines reporting period by number of hours.
    - **1@1d** defines reporting period by number of complete days.
    - **1@1w** defines reporting period by number of complete weeks, running Sunday to Sunday.
    - **1@1m** defines reporting period by number of complete months.
- Together *startTimestamp* and *endTimestamp* set the reporting period between two inclusive dates. These timestamp values are applied against the time on the Entuity server. when set to 0 *reportPeriod* is used.

### Flex Report Data Selection

Components (also known as types) and attributes define the data content of the report. Against this content filters are applied. The particular parameters vary according to the report and the data, these are example parameters:

- *type* is the report's main component, e.g. Device, Switch, Application.
- *DeviceEx*.filter is the filter applied to the selected components.
- *DeviceEx.attr* defines the attributes of the component to include in the report, e.g. device name, location, manufacturer.
- *DeviceEx.ref* includes components associated with the main component that are to be included in the report. For example, device is associated with its ports.
- *DeviceEx.ports.attr* uses the relationship between the two components to then include the associated components attributes.

## Using Report Schedules

By default Flex Reports are not associated with a schedule.

# 11 Using Flex Reports Definitions

To make Flex Reports definitions easy to copy, distribute and integrate with third party scripts they are available in two forms, as URLs and command line definitions. Entuity can automatically generate URLs, Entuity recommend deriving command line report definitions by amending URL report definitions. Although the format of the two forms differ the functionality is the same, the same parameters are available and the same security constraints are in place.

## Using the Report Definition as a URL

The URL does not represent the location of a report definition but rather the commands that when issued to the web server results in the creation of a report object, a generated report or both depending upon the set options.

A Flex Reports URL is run from a browser calling the report generation cgi. The report definition URL is only available as part of the Advanced Edit settings.

Entuity presents the URL in two forms, both are for use with browsers:

- Full URL uses full parameter names, which is useful when reading the URL:

```
http://drizzle/EOS/cgi/GenerateReport?reportStylesheet=&report-
Style=graph&startTimestamp=0&endTimestamp=0&reportName=Device%20and%20
Port%20Utilization&companyName=Entuity&reportTitle=Device%20and%20Port
%20Utilization&logoURL=%2FEOS%2Freporting%2Fstylesheets%2Fdefault.gif&
viewId=1&outputFormat=html&primeTimeStartHour=00&primeTimeEndHour=00&p
rimeTimeStartDay=0&primeTimeEndDay=0&type=DeviceEx&DeviceEx.filter=(th
is%20!%3D%20null)%2F*clause*%2F%20%26%26%20(isinview(1))%2F*clause*%2F
%20%26%26%20(this.isa(DeviceEx))%2F*clause*%2F%20%26%26%20(true)&Devic
eEx.attr=devType%2CsysLocation%2CdevManufacturer%2CdevModel%2Cname%2Cd
evSerialNumber&DeviceEx.ref=ports&DeviceEx.sort=000000%2Cascending%2Cs
ysLocation&DeviceEx.ports.filter=all&DeviceEx.ports.sort=000000%2Casce
nding%2Cstream.v_PortStatus.portI_ifAdminStatus.lastValue&DeviceEx.por
ts.timeseries.1.title=Port%20Utilization&DeviceEx.ports.timeseries.1.p
eriod=1200&DeviceEx.ports.timeseries.1.data.1=sAttr.v_PortLongUtil.v_I
nLongUtil%20Long%20Term%20Inbound%20Util&DeviceEx.ports.timeseries.1.d
ata.2=sAttr.v_PortLongUtil.v_OutLongUtil%20Long%20Term%20Out-
bound%20Util&reportPeriod=1%401w
```

- Compressed abbreviates the parameter names:

```
http://drizzle/EOS/cgi/Genera-
teReport?rs=graph&rn=Device%20and%20Port%20Utilization&cn=Entuity&rt=D
evice%20and%20Port%20Utilization&DeviceEx.filter=(this%20!%3D%20null)%
2F*clause*%2F%20%26%26%20(isinview(1))%2F*clause*%2F%20%26%26%20(this.
isa(DeviceEx))%2F*clause*%2F%20%26%26%20(true)&DeviceEx.attr=devType%2
CsysLocation%2CdevManufacturer%2CdevModel%2Cname%2CdevSerialNumber&Dev
iceEx.ref=ports&DeviceEx.sort=000000%2Cascending%2CsysLocation&DeviceE
x.ports.filter=all&DeviceEx.ports.sort=000000%2Cascending%2Cstream.v_P
```

```
ortStatus.portI_ifAdminStatus.lastValue&DeviceEx.ports.timeseries.1.ti
tle=Port%20Utilization&DeviceEx.ports.timeseries.1.period=1200&DeviceE
x.ports.timeseries.1.data.1=sAttr.v_PortLongUtil.v_InLongUtil%20Long%2
0Term%20Inbound%20Util&DeviceEx.ports.timeseries.1.data.2=sAttr.v_Port
LongUtil.v_OutLongUtil%20Long%20Term%20Outbound%20Util&rp=1%401w
```
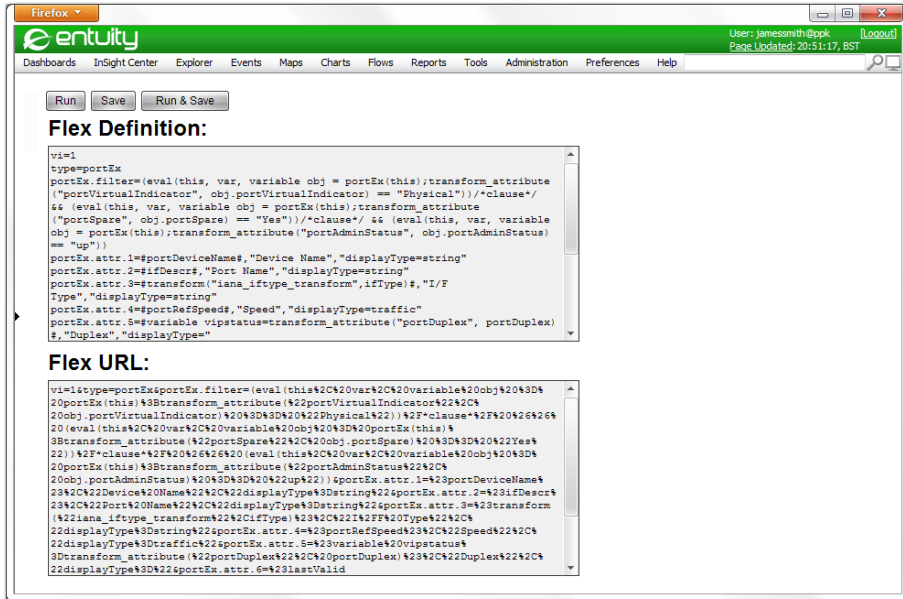


Figure 60    Flex Reports URL

These example URLs specify the same report:

- ■ Entuity server as drizzle
- ■ graph report style
- ■ Device and Port Utilization report (see *Example Advanced Graph Flex Reports*).

## Copying Flex Reports URLs

URLs are only available when a report is created using **Advanced Edit**. URLs should be copied as the last stage of report creation.

To copy a URL:

1) Create the report through Reports web UI.

2) Select **Next** and then **Run** to generate and view the report, checking the report is as required. Run generates a report but does not save the report or the template you are defining.

**Next** must be selected each time you change the report definition. Only when the form is represented are the URLs updated to reflect the latest changes to the form.

3) Use the browser's Back button to return to the report definition page.

4) Copy the URL, selecting **Copy** of either the full or compressed version of the URL.

5) The copied URL can now be pasted where required. When run report progress can be monitored through the web UI Report Center. Once generated the report is automatically opened and is available from Report Center.

If the report template does not exist in Entuity, e.g. it has been deleted or is being run against a different server, then Entuity creates the template and its reporting folders. Running URLs from one Entuity server on a second Entuity server is one way of copying Flex Reports templates.

## Using the Report Definition from the Command Line

There are two forms of command line URL, one directly entered on the command line and the second uses a file redirect. There are differences in the format between the two.

To create a command line report definition amend a report definition URL:

■ remove the reference to the cgi on the Entuity server, e.g. *http://drizzle/EOS/cgi/ GenerateReport?*

■ replace the escape characters between report definition parameters with:

   ■ spaces in the command line

   ■ new lines in the redirect file.

Entuity recommend using the redirect file form of the command line capability as it better handles the length and complexity of report definitions. If you do decide to enter report definitions direct to the command line and they contain spaces these must be escaped otherwise they will be handled as parameter delimiters.

This report definition is in the redirect file form. It specifies the same Device and Port Utilization report as the browser URL examples, and so leads to the same example report (see *Example Advanced Graph Flex Reports*).

```
reportStylesheet=
reportStyle=graph
startTimestamp=0
endTimestamp=0
reportName=Device and Port Utilization
companyName=Entuity
reportTitle=Device and Port Utilization
```

```
logoURL=/EOS/reporting/stylesheets/default.gif
viewId=1
outputFormat=html
primeTimeStartHour=00
primeTimeEndHour=00
primeTimeStartDay=0
primeTimeEndDay=0
type=DeviceEx
DeviceEx.filter=(this!= null)/*clause*/ && (isinview(1))/*clause*/ &&
(this.isa(DeviceEx))/*clause*/ && (true)
DeviceEx.attr=devType,sysLocation,devManufacturer,devModel,name,devSe-
rialNumber
DeviceEx.ref=ports
DeviceEx.sort=000000,ascending,sysLocation
DeviceEx.ports.filter=all
DeviceEx.ports.sort=000000,ascending,stream.v_PortStatus.portI_ifAd-
minStatus.lastValue
DeviceEx.ports.timeseries.1.title=Port Utilization
DeviceEx.ports.timeseries.1.period=1200
DeviceEx.ports.timeseries.1.data.1=sAttr.v_PortLongUtil.v_InLongUtil
Long Term Inbound Util
DeviceEx.ports.timeseries.1.data.2=sAttr.v_PortLongUtil.v_OutLongUtil
Long Term Outbound Util
reportPeriod=1@1w
```

The command line instruction has the format:

*GenerateReportExecutable loginDetails ReadFile < filename*

Where:

- *GenerateReportExecutable* is the location and name of Flex Reports cgi.
- *loginDetails* is the Entuity user name and password.
- *ReadFile* is the instruction to read the redirect file.
- *<* is the standard redirect to file command.
- *filename* is the location and name of the report definition text file.

This example runs the Device and Port Utilization report from the *DevicePortUtil.txt* report definition file:

```
C:\Entuity\lib\httpd\EOS\cgi\GenerateReport.exe
login=username:password -r < DevicePortUtil.txt
```

This extract generates the same report but can be entered directly to the command line:

```
C:\Entuity\lib\httpd\EOS\cgi\GenerateReport.exe
login=username:password reportStylesheet= reportStyle=graph startTime-
stamp=0 endTimestamp=0 "reportName=Device and Port Utilization" compa-
nyName=Entuity "reportTitle=Device and Port Utilization" logoURL=/EOS/
reporting/stylesheets/default.gif viewId=1 outputFormat=html prime-
TimeStartHour=00 primeTimeEndHour=00 primeTimeStartDay=0 primeTi-
meEndDay=0 type=DeviceEx "DeviceEx.filter=(this != null) &&
(isinview(1))      &&      this.isa(DeviceEx))      &&      (true)
DeviceEx.attr=devType,sysLocation,devManufacturer,devModel,name,devSe-
rialNumber DeviceEx.ref=ports" DeviceEx.sort=000000,ascending,sysLo-
cation                                    DeviceEx.ports.filter=all
DeviceEx.ports.sort=000000,ascending,stream.v_PortStatus.portI_ifAd-
minStatus.lastValue "DeviceEx.ports.timeseries.1.title=Port Utili-
zation          DeviceEx.ports.timeseries.1.period=1200"
"DeviceEx.ports.timeseries.1.data.1=sAttr.v_PortLongUtil.v_InLongUtil
Long          Term          Inbound          Util"
"DeviceEx.ports.timeseries.1.data.2=sAttr.v_PortLongUtil.v_Out-
LongUtil Long Term Outbound Util" reportPeriod=1@1w
```

The command line instruction has the format:

*GenerateReportExecutable loginDetails ReportDefinition*

Where:

- *GenerateReportExecutable* is the location and name of Flex Reports cgi.
- *loginDetails* is the Entuity user name and password.
- *ReportDefinition* is the report definition.

This extract is entered on one line. Where a parameter includes a space then the whole parameter is enclosed in quotation marks (where quotation marks are already included to the parameter then use escaping appropriate to the operating system).

Login details are included with the report definition.

# Additional Report Definition Parameters

For advanced users who want to use the command line interface to generate new Flex Reports, or integrate with third party scripts URLs are useful. The advised process is to use Entuity to create a report definition and then copy, and amend if required, the URL.

Usually running a new report definition generates a new report object and associated files. This is different from running an existing report as that only generates new files, not a new object. These Entuity parameters allow you greater control over the report objects and files generated as you develop a new report by amending the URL:

- *useRedirect*, when set to:
  - 1, a redirect page is used.
  - 0, a redirect page is not used, the output file is sent directly to standard out.

- *noCreate*, when set to:
  - 1, after the report has been generated and run Entuity deletes the report object. This is useful when developing a report and wanting to avoid draft versions of the report being available in your system.
  - 0 (default), Entuity retains the report object.

  When *noCreate* is set it Entuity never uses a redirect page because the re-directed file would have already been deleted. It instead sends the output file directly to standard out just as if *useRedirect* was set.

- *noRun*, when set to:
  - 1, the report definition (object) is created but not run, so there is no generated report.
  - 0 (default), the report is generated.

  *noRun* only applies to the URL, the report definition can be run from Report Center or Entuity without restriction.

- *editMode*, when set to:
  - normal (default), Advanced Edit settings are hidden when the report definition is viewed in Report Center.
  - expert, provides the experienced user with access to greater functionality that is usually hidden to users that require more guidance when configuring Flex Reports.
- *reportableOverride*, when set to:
  - 0, hides data that is not usually required for reports.
  - 1, displays data that is not usually required for reports.

- *isTemplate*, when set to:
  - 0 (default), the report definition is not identified as a selectable template in Report Center.
  - 1, identifies the report as one that is likely to be used as a template for other reports. All Flex Reports may be used as templates, but with this flag checked the template is listed on the Generate Flex Reports Menu page.

These parameters use the same format:

```
&useRedirect=1
```

where:

- & (ampersand), adds the new parameter to the URL,
- *useRedirect*, is the parameter name,
- =, assignment symbol,
- 1, is the parameter value.

This example URL includes *login*, *useRedirect* and *noCreate* parameters (highlighted):

```
http://servername/EOS/cgi/GenerateReport?reportStylesheet=&report-
Style=inventory&startTimestamp=0&endTimestamp=0&login=username:passwor
d&useRedirect=1&noCreate=1&companyName=&reportTitle=All%20Events&logoU
```

```
RL=%2FEOS%2Freporting%2Fstylesheets%2Fdefault.gif&viewId=1&outputForma
t=html&primeTimeStartHour=00&primeTimeEndHour=00&primeTimeStartDay=0&p
rimeTimeEndDay=0&type=view&view.filter=all&view.attr=viewName%2Cstream
.v_ViewEvents.v_viewEventSummary.lastValid%2Cstream.ViewEventDaily.Vie
wEventDailySummary.lastValid&view.sort=000000%2Cascending%2Cstream.v_V
iewEvents.v_viewEventSummary.lastValue&view.timeseries.1.title=Event%2
0Summary&view.timeseries.1.period=0&view.timeseries.1.data.1=sAttr.Vie
wEventDaily.ViewEventDailySummary%2C%22%22%2C%22%22&view.timeseries.2.
title=Event%20Details&view.timeseries.2.period=0&view.timeseries.2.dat
a.1=sAttr.v_ViewEvents.v_viewEventSummary%2C%22%22%2C%22%22&report-
Period=672%401h&reportName=All%20Events
```

# Report Definition Security

To successfully use a URL a user must be able to access the Entuity server, this requires having a username and password that allows access to the view used by the URL. For security reasons, by default the URLs do not include Entuity login names and passwords.

When using URLs to run Flex Reports and the user is not logged into Entuity, then the user is prompted to login.

Entuity username and password can be included to the URL, using the format:

```
&login=username:password
```

but this does have security implications (i.e. URLs are not encoded and so are easily read). When login details are not included to the URL the user is prompted to login.

When running report definitions from the command line, the user name and password must be included. When not included Entuity does not run the report and displays an access denied error message.
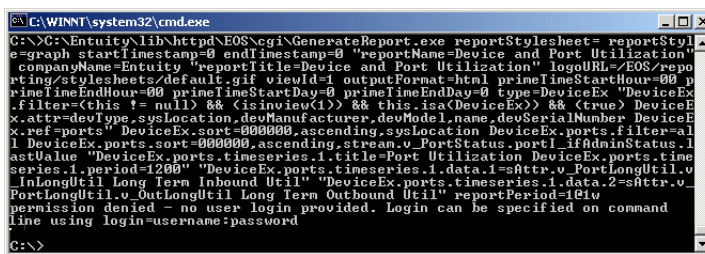


Figure 61    Command line Login Failure

# 12 Advanced Flex Reports

Flex Reports provide ready access to Entuity's management database. Using the default interface the report definitions and generated reports reflect the structure, names and formats of data in the database. Flex Reports includes advanced functionality that allows greater control over report definition:

- Display data that is usually hidden. By default Entuity restricts the type of data available to Flex Reports to what Entuity have identified as the most useful.
- Combine components from the three different types of report, Inventory, TopN and Graphic into one report.
- Creating user defined attributes, using expressions to manipulate Entuity data, for example data names, formats and structure.

## User Defined Attributes and Expressions

For many Flex Reports requirements the standard interface is sufficient, for more demanding tasks where new attributes are required use expressions to manipulate data. Useful applications of expressions include:

- Placing data from different database tables into one report table.
- Controlling the order of columns in tables.
- Converting data formats.
- Performing realtime calculations when the report is generated.

User defined attributes are available for both types of data:

- Static, data for which Entuity does not maintain a history, e.g. *Device Name*, *Spare Status*.
- Time Series, data for which Entuity does maintain historical data, e.g. *Inbound Errored Packet Rate*, *Operational Status*.

## Building Expressions

Flex Reports built using the standard interface only displays attributes held in the management database. Using the advanced features you can use expressions to build new attributes. The Expression Builder guides you through this process.

### Switching on Expression Builder

Expression Builder is enabled by default. It can be deactivated through a setting in entuity.cfg:

```
[FlexReporting]
EnableExpressionBuilder=0
```

For changes to entuity.cfg to impact Entuity, the Entuity server must be stopped and then restarted (for full details on configuration settings see the *Entuity Reference Manual*).

Once enabled Expression Builder is available through hyperlinks on the Flex Reports HTML pages. Expressions built using Expression Builder are also displayed on the Flex Reports HTML pages.



Figure 62    Expressions Built using Expression Builder

## Using Expression Builder

Expression Builder is called from Flex Reports. To use Expression Builder:

1) From the report select *Advanced Edit* and then select **Next** to update the page. The refreshed page now includes the **Add User Defined Attribute** button.

   To access the **Add User Defined Series** button first add a graph and/or time series data to the report.

2) Select **Add User Defined Attribute**. Entuity updates the page, adding three fields which hold the attribute definition:

   ◼ *Name*, attribute name.

   ◼ *Expression*, expression which defines the attribute. The expression can only be defined through Expression Builder.

■ *Display Type*, the data type of the attribute.

3) Select **Define New Expression** to define an expression using Expression Builder. Entuity displays Expression Builder.
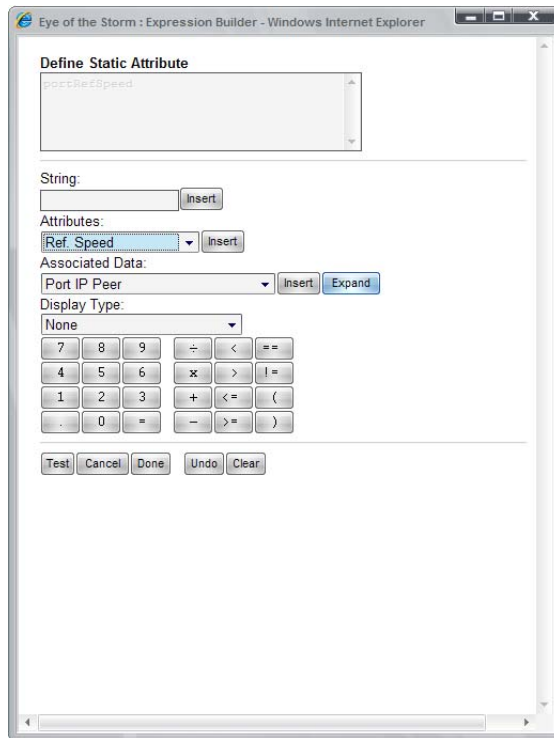


Figure 63    Expression Builder

When first opened Expression Builder displays:

■ *Define Static Attribute*, this is a display only field that shows the current expression.

■ *String*, allows insertion of a text string.

■ *Attributes*, the attributes of the current component data type.

■ *Associated Data*, the component types associated to the current type.

■ *Display Type*, the data type of the attribute (see *Attribute Data Types*).

■ Numbers and operators for use with expressions.

The same options are available when defining time series attributes.

To build expressions select:

■ **Insert**, to insert the value into the expression.

■ **Expand**, causes Entuity to drill-down and display data types associated with the current data type.

- **Test**, tests the syntactical validity of the expression.
- **Cancel**, deletes the current expression and close Expression Builder.
- **Done**, accepts the current expression, closes Expression Builder and writes the expression to the report.
- **Undo**, deletes the last part of the expression. Entuity recognizes the different sections of an expression allowing easy edit and revision of existing expressions.
- **Clear**, deletes the current expression and leaves Expression Builder open.

## Attribute Data Types

User defined attributes must have appropriate data types, otherwise data in reports can be incorrectly handled and presented. Entuity does not perform type checking when expressions are tested in Expression Builder, when an inappropriate type is used then the report may indicate this, e.g. NaN (Not A Number).

| Attribute Data Type | Description |
| --- | --- |
| None | Formatting is not applied to the data. |
| String | Data handled as a character string. |
| Integer | Data handled as integers. |
| Float | Floating point format, rounded to two decimal places. |
| Float (4 Decimal Places) | Floating point format, rounded to four decimal places. |
| Percent | Percentage rounded to two decimal places and displays with the percentage symbol (%). |
| Percent (Whole) | Percentage, rounded to nearest whole number and displays with the percentage symbol (%). |
| Percent (3 Decimal Places) | Percentage, rounded to three decimal and displays with the percentage symbol (%). |
| Traffic | Traffic data displayed in appropriate data format, e.g. bps (bits per second). |
| Volume | Volume data displayed in appropriate data format, e.g. bytes. |
| Memory | Memory data displayed in appropriate data format, e.g. bytes. |
| Voltage | Voltage data displayed in appropriate data format, e.g. mV (millivolts). |
| Temperature | Temperature data displayed in appropriate data format, e.g. $^{o}$C (degrees Celsius). |
| Octets | Data displayed in octets. |
| Cells | Cell data, e.g. for use with buffer sizes, displayed in appropriate data format, e.g. Kcells. |
| Packets | Packet data displayed in appropriate data format. |
| PDUs | PDU data displayed in appropriate data format, e.g. KPDUs. |

Table 10   Attribute Display Data Types

| Attribute Data Type | Description |
|---|---|
| Frames | Frame data displayed in appropriate data format, e.g. frames. |
| Octet Rate | Data displayed in appropriate data format, e.g. Kbytes/s (kilobytes per second). |
| Cell rate | Data displayed in appropriate data format, e.g. Kcells/s (kilocells per second). |
| Packet Rate | Data displayed in appropriate data format, e.g. Kpkts/s (kilopackets per second). |
| PDU Rate | Data displayed in appropriate data format, e.g. KPDUs/s (kilopackets per second). |
| Frame Rate | Data displayed in appropriate data format, e.g. Kframes/s (kiloframes per second). |
| Timestamp | Timestamp converted to an appropriate date format, e.g.22-Jun-2005 00:00:00. |
| Timespan in Seconds | Converts a timespan from seconds to an appropriate format, e.g. 35 years, 25 weeks, 5 days, 23 hours. |
| Timespan in milliseconds | Converts a timespan from milliseconds to an appropriate format, e.g. 1w, 5d, 22h, 56m, 34s, 800ms. |
| Time Since Timestamp | Compares the time when the report is run with the timestamp, the difference is displayed in an appropriate date format, e.g. 1 day, 12 hours. |
| Elapsed Time in Seconds | Displays elapsed time in seconds, rounding to the nearest second, e.g. 168seconds. |
| Elapsed Time in Minutes | Displays elapsed time in minutes, rounding to the nearest minute, e.g. 3minutes. |
| Elapsed Time in Hours | Displays elapsed time in hours, rounding to the nearest hour, e.g. 1hour. |
| IP Address Integer | Entuity stores most IP addresses as strings, but occasionally they are stored as integers. This data type converts IP addresses stored as integers to formatted IP addresses. |
| Unique ID | Data displayed handled as string (reserved for future development). |
| Resolved IP Address | When the report runs Entuity attempts to resolve the IP address and display the hostname in the report. If the IP address does not resolve the IP address is displayed. |
| Resolved IP Address Integer | Entuity stores most IP addresses as strings, but occasionally they are stored as integers. Entuity attempts to resolve IP addresses stored as integers to their hostname. If the IP address does not resolve the IP address is displayed in standard format, e.g.10.15.70.92 |

Table 10   Attribute Display Data Types

Entuity usually handles IP addresses as strings. Only when a report does not display the expected IP addresses when using a string data type should you use the **IP Address Integer** and **Resolved IP Address Integer** data types.

The following examples illustrate common techniques available with the Flex Reports Expression Builder.

# Reporting on Attributes from Multiple Database Tables

The data structure of the database is often not the structure required for a report. By default Flex Reports allows you to follow database associations to display data from different tables, but places this data into linked tables in the report. A more efficient solution is to place attributes from different database tables into the same table in the report.

### Requirement

This example requires the report to display one table containing a list of switch ports, each row contains the details of one port. Each row should include the switch name, interface description, MAC addresses, IP addresses and name(s) of the connected host(s).

### Challenge

This requirement requires access to information held on different components:

■ Interface description and the switch on which that port is located are held on one component type (Port).

■ Host MAC and IP addresses are held on a second, associated type. Using the standard reporting interface, for each port this data would appear in a separate, linked table.

■ These components do not include resolved host names.

### Solution

To create the Port Details Inventory report:

1) From the web interface select **Reports**, and then from the Reports home page **Flex Reports**. (see *View Generated Flex Reports*).

2) Select **Report Builder**. Entuity displays the Flex Reports templates page.

3) Select **Generate Inventory Report**.

4) Complete the report identity fields, e.g. *Report Name*, *Report Title*, *Output Format*.

5) Select from **Components** *Port*. Select **Next** to accept these values and for Entuity to refresh the page.

6) Select from **Attributes** *Device Name* and *Interface Description*.

7) Select *Advanced Edit* and then select **Next** to accept these values and to update the page. The refreshed page now includes advanced reporting features:

■ reporting schedules, including prime time.

- the option to include characteristics from other report types, e.g. graphics, TopN tables.
- table sort criteria
- report URLs.
- **Add User Defined Attribute** button.

8) Below the Port Attributes list select **Add User Defined Attribute**. Entuity refreshes the page and includes text boxes in which the user defined attribute name, expression and data type can be entered.

9) In *Name* enter **Host MAC** and then select **Define New Expression**. Entuity launches its Expression Builder in which the attribute can be defined.

10) From **Associated Data** select the component type *Host MAC Addresses* and then select **Expand**. Entuity displays the component type attributes.

11) From the attribute list select *MAC Address (Arp)*, from *Display Type* select **String** and then select **Done**. Entuity closes the Expression Builder and updates the report definition.



Figure 64    Associating Attributes from Different Tables

12) Repeat steps 8) to 11) to create the user defined attributes:

- *Name* **Host IP**, associated data component *Host MAC Addresses*, attribute *IP*

*Addresses (Concatenated)* and data type *String*.

■ *Name* **Host Name**, associated data component *Host MAC Addresses*, attribute *IP Addresses (Concatenated)* and data type *Resolved IP Address*. When the report is run Entuity attempts to resolve each IP address. Unresolvable IP addresses are left in their numeric format.

13) Select **Run & Save**.

The completed URL:

```
http://drizzle/EOS/cgi/GenerateReport?reportStylesheet=&report-
Style=inventory&startTimestamp=0&endTimestamp=0&reportName=Port%20Deta
ils&companyName=Entuity&reportTitle=Port%20Details&logoURL=%2FEOS%2Fre
porting%2Fstylesheets%2Fdefault.gif&viewId=1&outputFormat=pdf&primeTim
eStartHour=00&primeTimeEndHour=00&primeTimeStartDay=0&primeTimeEndDay=
0&type=portEx&portEx.filter=all&portEx.attr=portDeviceName%2CifDescr&p
ortEx.attr.1=%23ref.HostMACAddresses.macAddr%23%2C%22Host%20Mac%22%2C%
22displayType%3Dstring%22&portEx.attr.2=%23ref.HostMACAddresses.ipAddr
essesString%23%2C%22Host%20IP%22%2C%22displayType%3Dstring%22&portEx.a
ttr.3=%23ref.HostMACAd-
dresses.ipAddressesString%23%2C%22Host%20Name%22%2C%22dis-
playType%3Dresolved-ip-
address%22&portEx.sort=000000%2Cascending%2Cstream.v_PortAvail-
ability.portActiveOperAvailability1.lastValue&reportPeriod=1%401d
```

Port Details
Over the 1 day period Tue Sep 13 2005 - Wed Sep 14 2005
No prime time is set for this report
Generated at 12:11 on Wed Sep 14 2005 for the Regional view

| Port Details | | | | |
|---|---|---|---|---|
| Device Name | Interface Description | Host Mac | Host IP | Host Name |
| Switch_2 | [ 11/23 ] EYE Server 03 | 0F10111220F8 | 10.49.110.10 | saphire |
| Switch_2 | [ 11/22 ] London PC-368 | 0F10111220FC | 10.54.98.10, 10.54.98.11, 10.54.98.12, 10.54.98.13, 10.54.98.14, 10.54.98.15, 10.54.98.16, 10.54.98.17, 10.54.98.18, 10.54.98.19, 10.54.98.20, 10.54.98.21, 10.54.98.22, 10.54.98.23, 10.54.98.24, 10.54.98.25, 10.54.98.26 | saphire diamond gold ruby copper zircon brass pewter emeralds steel iron platinum zinc silver aluminium |
| Switch_2 | [ 11/21 ] London PC-367 | 0F1011123151 | -- | |
| Switch_2 | [ 11/20 ] London PC-366 | 0F1011121476 | 10.54.98.178 | bluejohn |
| Switch_2 | [ 11/19 ] London PC-365 | 0F1011121FE2 | 10.49.80.14 | ruby |
| Switch_2 | [ 11/18 ] London PC-364 | 0F1011122002 | 10.49.80.73 | coal |
| Switch_2 | [ 11/17 ] 10.54.166.173 | -- | -- | |
| Switch_2 | [ 11/16 ] 10.54.166.175 | -- | -- | |
| Switch_2 | [ 11/15 ] 10.54.166.220 | -- | -- | |
| Switch_2 | [ 11/14 ] 10.54.166.228 | 0F1011122115 | 10.54.166.228 | nickel |
| Switch_2 | [ 11/13 ] 10.54.166.222 | 0F10111213FE | 10.54.166.222 | lead |
| Switch_2 | [ 2 ] sl0 | -- | -- | |
| Switch_2 | [ 11/12 ] 10.54.166.218 | 0F1011122087 | 10.54.166.218 | tungsten |
| Switch_2 | [ 11/11 ] 10/100 utp ethernet (cat 3/5) | -- | -- | |
| Switch_2 | [ 11/10 ] London PC-363 | -- | -- | |
| Switch_2 | [ 11/9 ] London PC-362 | 0F1011122001 | 10.49.80.72 | titanium |
| Switch_2 | [ 11/8 ] London PC-361 | 0F101112146B | 10.54.98.88 | tantalum |
| Switch_2 | [ 11/7 ] London Fax | 0F1011121419 | 10.54.98.155 | colombium |

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Figure 65    Combined Database Tables and Host Resolution

# Converting Data Formats

This report example outlines how the advanced Flex Reports Expression Builder can convert data formats.

## Requirement

This example requires a graphical representation of data traffic rate for both data directions on an interface using Bits per Second as the units.

## Challenge

Timeseries rate data is held in Bytes per Second and requires converting to Bits per Second.

## Solution

To create the WAN Port Traffic Rate report:

1) From the web interface select **Reports**, and then from the Reports home page **Flex Reports**. (see *View Generated Flex Reports*).

2) Select **Report Builder**. Entuity displays the Flex Reports templates page.

3) Select **Generate Graph Report**.

4) Create a filter to deliver a WAN Port.

5) Complete the report identity fields, e.g. *Report Name*, *Report Title*, *Output Format*.

6) Select from **Attributes** *Device Name* and *Interface Description*.

7) Select *Advanced Edit* and then select **Next** to accept these values and to update the page.

8) Select **Add Graph**.

9) Name the graph and then select **Add User Defined Series**. Entuity refreshes the page and includes text boxes in which the user defined series name, expression and data type can be entered.

10) In *Name* enter **Inbound Bit Rate** and then select **Define New Expression**. Entuity launches its Expression Builder in which the series can be defined.

11) From **Timeseries Attributes** select the component type *Inbound Octet Rate (5 minute samples)*.

12) From **Display Type** select *Traffic*.

13) To convert the octet (byte) rate to a bit rate multiply by 8 and then select **Done**. Entuity closes the Expression Builder and updates the report definition.

14) Repeat steps 10) to 13) to create a second user defined series, using *Name* **Outbound Bit Rate, Timeseries Attributes** *Outbound Octet Rate (5 minute samples)* and convert to bit rate.

Figure 66    Bit Rate Conversion

15) Select **Run & Save**.

The completed URL:

```
http://drizzle/EOS/cgi/GenerateReport?report-
Stylesheet=&viewId=1&reportStyle=graph&startTimestamp=0&endTimestamp=0
&reportName=WAN%20Port%20Traffic%20Rate&companyName=&reportTitle=WAN%2
0Port%20Traffic%20Rate&logoURL=%2FEOS%2Freporting%2Fstylesheets%2Fdefa
ult.gif&outputFormat=pdf&primeTimeStartHour=00&primeTimeEndHour=00&pri
meTimeStartDay=0&primeTimeEndDay=0&type=wanPort&wanPort.filter=(this%2
0!%3D%20null)%2F*clause*%2F%20%26%26%20(isinview(1)%20%7C%7C%20isinvie
w(2)%20%7C%7C%20isinview(3)%20%7C%7C%20isinview(4)%20%7C%7C%20isinview
(5)%20%7C%7C%20isinview(6))%2F*clause*%2F%20%26%26%20(this.isa(wanPort
))%2F*clause*%2F%20%26%26%20(true)&wanPort.attr=portDeviceName%2CifDes
cr&wanPort.sort=000000%2Cascending%2Cstream.v_PortAvailability.portAct
iveOperAvailability1.lastValue&wanPort.timeseries.1.title=Traffic%20Ra
te&wanPort.timeseries.1.period=3600&wanPort.timeseries.1.data.1=%23(sA
ttr.wanPortDataChain.v_wanOctetRateIn)%2F*edit_delim*%2F%20*%20%2F*edi
t_delim*%2F8%23%2C%22Inbound%20Bit%20Rate%22%2C%22displayType%3Dtraffi
c%22&wanPort.timeseries.1.data.2=%23(sAttr.wanPortDataChain.v_wanOctet
```

```
RateOut)%2F*edit_delim*%2F%20*%20%2F*edit_delim*%2F8%23%2C%22Outbound%
20Bit%20Rate%22%2C%22displayType%3Dtraffic%22&reportPeriod=1%401d
```

**WAN Port Traffic Rate**
**Over the 1 day period Tue Jun 14 2005 - Wed Jun 15 2005**
**No prime time is set for this report**
Generated at 23:58 on Wed Jun 15 2005 for the **Regional** view

| Wan Port Details | |
| --- | --- |
| Device Name | Interface Description |
| IOALANA | [ 10 ] German GDC W/com 2m leased |

**Traffic Rate**
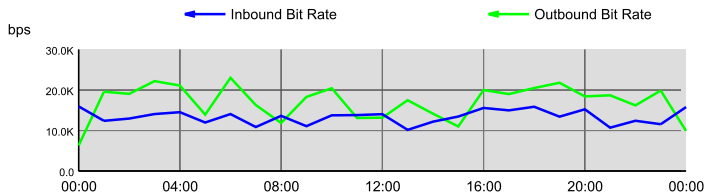


| Device Name | Interface Description |
| --- | --- |
| IOALANA | [ 11 ] EMC link (Deutch Telekom) to Munich DC1 S4/1 |

**Traffic Rate**
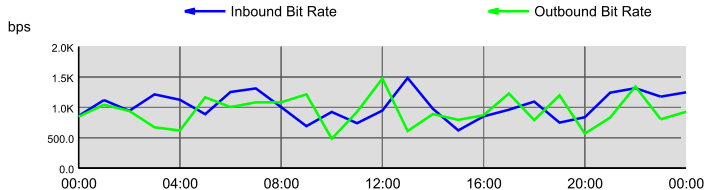


Figure 67    Converted Data Formats Report Example

# Combining Database Tables and Defining Table Sort Order

This report example outlines two advanced Flex Reports functions:

- Placing in one reporting table attributes from two different database tables.
- Specifying the column sort order.

## Requirement

This example requires the report to display a device availability table, ordered by worst availability. The table should include both the name and model for each device as separate columns.

## Challenge

This requirement requires access to information held on different components:

- Device availability is held in the Monitored Device component type
- Model details are held in Device component type. Using the standard reporting interface, for each device this data would appear in a separate, linked tables.

## Solution

To create the Device Availability and Model report:

1) From the web interface select **Reports**, and then from the Reports home page **Flex Reports**. (see *View Generated Flex Reports*).

2) Select **Report Builder**. Entuity displays the Flex Reports templates page.

3) Select **Generate TopN Report**.

4) Complete the report identity fields, e.g. *Report Name*, *Report Title*, *Output Format*.

5) Select from **Component** *Monitored Device*. Select **Next** to accept these values and for Entuity to refresh the page.

6) From **Monitored Device Attributes** select *Name*.

7) From **Monitored Device Timeseries Attributes** select *Component Availability*.

8) Select *Advanced Edit* and then select **Next** to accept these values and to update the page.

9) From **Component Availability (1 hour samples) Statistics** select **Mean**. This produces an average availability for the time frame of the report.

10) To add a column for the Model select **Add User Defined Attribute**. Entuity refreshes the page and includes text boxes in which the user defined attribute name, expression and data type can be entered.

11) In *Name* enter **Model** and then select **Define New Expression**. Entuity launches its Expression Builder in which the attribute can be defined.

12) From **Associated Data** select the component type *Device* and then select **Expand**. Entuity displays the component type attributes.

13) From the attribute list select *Model*, from *Display Type* select **String** and then select **Done**. Entuity closes the Expression Builder and updates the report definition.

14) To set the table's sort order select ALL, Ascending, Mean, Component Availability and then select **Next** to accept these values and to update the page.

15) Select **Run & Save**.

The complete URL for the example Device Availability and Model report:

```
http://drizzle/EOS/cgi/GenerateReport?reportStylesheet=&report-
Style=topN&startTimestamp=0&endTimestamp=0&companyName =&report-
Title=Flex%20Report&logoURL=%2FEOS%2Freporting%2Fstylesheets%2Fdefault
.gif&viewId=1&outputFormat=html&primeTimeStartHour=00&primeTimeEndHour
```

```
=00&primeTimeStartDay=0&primeTimeEndDay=0&type=MonitoredDevice&Monitor
edDevice.filter=all&MonitoredDevice.attr=compName%2Cstream.availabilit
yChain.v_compAvail.mean&MonitoredDevice.attr.1=%23ref.device.devModel%
23%2C%22Model%22%2C%22displayType%3Dstring%22&MonitoredDevice.sort=000
000%2Cascending%2Cstream.availabilityChain.v_compAvail.mean&report-
Period=1%401m&reportName=Example3
```

### Device Availability and Model
**Over the 1 day period Wed Jun 15 2005 - Thu Jun 16 2005**
**No prime time is set for this report**
Generated at 13:25 on Thu Jun 16 2005 for the **Regional** view

| Monitored Device Details | | |
|---|---|---|
| Name | Component Availability (Mean) | Model |
| hali | 80% | 7200 |
| 10.18.149.72 | 85% | s72033_rp |
| 10.18.149.75 | 85% | WS-C6509.Cisco |
| 10.18.149.76 | 85% | Summit48i |
| 10.18.149.73 | 91% | WS-C6509.Cisco |
| 10.18.149.74 | 93% | WS-C6509.Cisco |
| 10.18.149.77 | 100% | Summit48i |
| 10.18.3.34 | 100% | 2611 |
| 10.44.1.2 | 100% | WSX5302 |
| IP129 | 100% | x86 |
| 12.18.149.140 | 100% | x86 |
| 12.18.149.150 | 100% | 2GG |
| 12.18.149.163 | 100% | WS-C6513 |
| 12.18.149.164 | 100% | WS-C3750G-24TS-S |
| 12.18.149.161 | 100% | C2950 |
| 12.18.149.160 | 100% | 4000 |
| 12.18.149.158 | 100% | 1XX |
| 12.18.149.152 | 100% | Layer2-7 |
| IOALANA | 100% | 7513 |
| HUKO | 100% | 7507 |
| 10.44.1.13 | 100% | 2503 |
| 10.44.1.12 | 100% | WS-C3550-24-EMI |
| 10.44.1.7 | 100% | WS-C5505 |
| 10.44.1.5 | 100% | WS-C5505 |
| 10.44.1.6 | 100% | WS-C5505 |
| 12.18.149.165 | 100% | C2950lre |
| 12.18.149.162 | 100% | C2950 |
| 12.18.149.149 | 100% | 1XX |

Figure 68    Combined Database Tables and Set Sort Order

# Table Column Renaming and Reordering

This report example outlines how advanced Flex Reports function Expression Builder can change the default column order of tables.

## Requirement

This example requires the report to display a device table, listing in this column order name, model and manufacturer. The second and third column should be renamed Device Model and Device Manufacturer, respectively.

## Challenge

This report requires:

- A column order which conflicts with the default column order (alphabetic ordering by attribute name).
- Renaming of column headings, by default columns are titled using the attribute name.

## Solution

Columns can be re-ordered and renamed using user defined attributes. Columns in Flex Reports tables are ordered by

To create the Device Details Inventory report:

1) From the web interface select **Reports**, and then from the Reports home page **Flex Reports**. (see *View Generated Flex Reports*).

2) Select **Report Builder**. Entuity displays the Flex Reports templates page.

3) Select **Generate Inventory Report**.

4) Complete the report identity fields, e.g. *Report Name*, *Report Title*, *Output Format*.

5) Select from **Component** *Device*. Select **Next** to accept these values and for Entuity to refresh the page.

6) Select from **Attributes** *Name*.

7) Select *Advanced Edit* and then select **Next** to accept these values and to update the page. The refreshed page now includes advanced reporting features:

8) Below the Device Attributes list select **Add User Defined Attribute**. Entuity refreshes the page and includes text boxes in which the user defined attribute name, expression and data type can be entered.

9) In *Name* enter **Device Model** and then select **Define New Expression**. Entuity launches its Expression Builder in which the attribute can be defined.

10) From **Attributes** select *Model,* from *Display Type* select **String** and then select **Done**. Entuity closes the Expression Builder and updates the report definition.
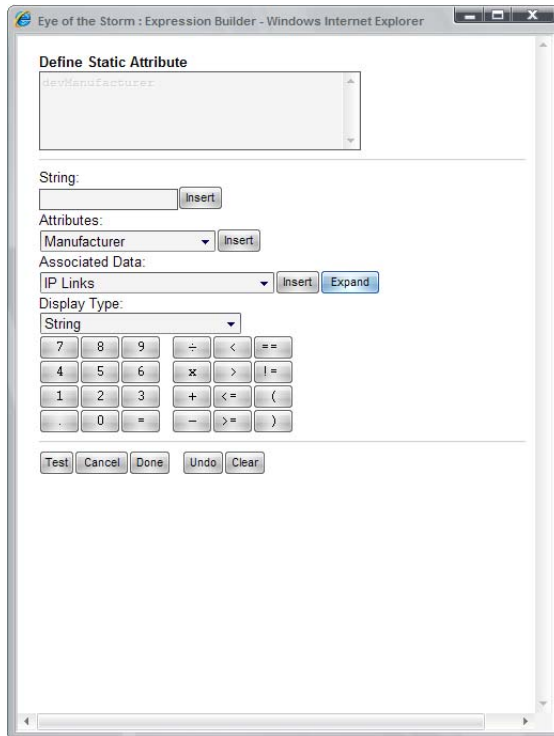
Figure 69    Expression Builder - Renaming Attributes

11) Repeat steps 8) to 10) to create the second user defined column, enter for *Name* **Device Model, Attributes** *Manufacturer* and *Display Type* select **String.**

12) Select **Run & Save**.

The complete URL for the example Device Availability and Model report:

```
http://drizzle/EOS/cgi/GenerateReport?reportStylesheet=&report-
Style=inventory&startTimestamp=0&endTimestamp=0&companyName=Entuity&re
portTitle=Device%20Details&logoURL=%2FEOS%2Freporting%2Fstylesheets%2F
default.gif&viewId=1&outputFormat=pdf&primeTimeStartHour=00&primeTimeE
ndHour=00&primeTimeStartDay=0&primeTimeEndDay=0&type=DeviceEx&DeviceEx
.filter=all&DeviceEx.attr=name&DeviceEx.attr.1=%23devModel%23%2C%22Dev
ice%20Model%22%2C%22displayType%3Dstring%22&DeviceEx.attr.2=%23devManu
facturer%23%2C%22Device%20Manufacturer%22%2C%22displayType%3Dstring%22
&DeviceEx.sort=000000%2Cascending%2Cstream.routerBufferSummaryPerforma
nce.bufferAllocationFailureRateHourly.lastValue&report-
Period=1%401d&reportName=Device%20Details%20(1)
```

## Device Details

**Over the 1 day period Wed Jun 15 2005 - Thu Jun 16 2005**
**No prime time is set for this report**
Generated at 14:30 on Thu Jun 16 2005 for the **Regional** view

| Device Details | | |
|---|---|---|
| Name | Device Model | Device Manufacturer |
| hali | 7200 | cisco |
| 10.18.149.77 | Summit48i | Extreme Networks |
| 10.18.149.76 | Summit48i | Extreme Networks |
| 10.18.149.75 | WS-C6509.Cisco | cisco |
| 10.18.149.74 | WS-C6509.Cisco | cisco |
| 10.18.149.73 | WS-C6509.Cisco | cisco |
| 10.18.149.72 | s72033_rp | cisco |
| IP129 | x86 | Microsoft |
| 10.18.149.140 | x86 | Microsoft |
| HUKO | 7507 | cisco |
| 12.18.149.165 | C2950Ire | cisco |
| 12.18.149.164 | WS-C3750G-24TS-S | cisco |
| 12.18.149.163 | WS-C6513 | cisco |
| 12.18.149.162 | C2950 | cisco |
| 12.18.149.161 | C2950 | cisco |
| 12.18.149.160 | 4000 | cisco |
| 12.18.149.158 | 1XX | IBM |
| 12.18.149.152 | Layer2-7 | Alteon Networks Inc. |
| 12.18.149.150 | 2GG | IBM |
| 12.18.149.149 | 1XX | IBM |
| 10.44.1.7 | WS-C5505 | cisco |
| 10.44.1.6 | WS-C5505 | cisco |
| 10.44.1.5 | WS-C5505 | cisco |
| IOALANA | 7513 | cisco |
| 10.44.1.2 | WSX5302 | cisco |
| 12.168.3.34 | 2611 | cisco |
| 10.44.1.13 | 2503 | cisco |
| 10.44.1.12 | WS-C3550-24-EMI | cisco |

Figure 70    Renamed and Reordered Table Columns Report

# 13 Delete Flex Reports

Flex Reports templates and their generated reports and associated files are stored on the Entuity web server. Entuity automatically deletes the generated reports and associated files once they have exceeded their *KeepTime* (ten weeks).

## Deleting Generated Flex Reports

By default Entuity is configured to automatically delete generated Flex Reports ten weeks after their generation date. Entuity does not automatically delete Flex Reports templates, but does delete the generated Flex Reports':

- Output file, e.g. PDF, HTML
- Associated XML files used when generating the report.
- Related objects that are not used by any other Entuity objects.
- Entuity database entries.

## Delete Flex Reports Files and Objects

Flex Reports are the report definitions Entuity uses when generating the output Flex Reports (e.g. PDF files). Deleting Flex Reports deletes this definition, uniquely associated objects and the generated report files and support files held on the Entuity web server.

# Glossary

### 802.1p

An IEEE standard for providing quality of service (QoS) in 802-based networks. 802.1p uses three bits (defined in 802.1q) to allow switches to reorder packets based on priority level. It also defines the Generic Attributes Registration Protocol (GARP) and the GARP VLAN Registration Protocol (GVRP). GARP lets client stations request membership in a multicast domain, and GVRP lets them register into a VLAN.

### AAL (ATM Adaptation Layer)

AAL enhances the service provided by the ATM layer to a level required by the next higher layer. It performs the functions for the user, control and management planes and supports the mapping between the ATM layer and the next higher layer.

### Advanced Actions

Advanced Actions, also known as user menus and user actions, are defined through configuration files. Actions may be automatically triggered through Entuity raising an appropriate event, or interactively through advanced action menus, available both from the menu bar and context menus.

### Agent

Intelligent management software embedded in a network device. In network management systems, agents reside in all managed devices and report the values of specified variables to management stations.

### Antenna / Radio

Each Wireless Access Point has one or more Antennas. Each Antenna is attached to an 802.11 radio within the Access Point. Wireless Hosts communicate with the network via a wireless association with an Antenna/Radio. Each Antenna/Radio can have multiple hosts simultaneously attached. Each Antenna/Radio operates in a chosen 802.11 compatibility mode such as 802.11a, 802.11b or 802.11g. Additionally, each Antenna/Radio has a single SSID assigned. Each Antenna/Radio operates on a chosen radio channel and with a specified transmit power setting, which is measured in mW. Many controller based installations use dynamic optimization algorithms to pick a suitable channel and power setting. Frequent auto-adjustment of these setting indicates that there are problems being encountered with the quality of the wireless communications.

### AP (Access Point) / WAP (Wireless Access Point)

A device that has one or more 802.11 radios and Wireless Antennas. For example, laptops, PDAs, connect to a wired LAN through an AP, which is a hardware device or software that acts as a communication hub.

It bridges traffic from wireless attached hosts to/from an Ethernet interface that connects to an access layer switch port. APs provide heightened wireless security and extend the physical range of a wireless LAN. The access layer switch will see the MAC addresses of the individual wireless attached hosts (the MAC address of the wireless NICs) plus the MAC of the Access Point Ethernet interface.

### AR System

BMC Remedy Action Request System (AR System) is a framework within which applications are built by AR System administrators. Applications consist of a set of AR System forms that are linked using workflow rules designed for the application. These forms contain fields which Entuity can be configured to populate.

### ARs

Entuity integrates with AR System to generate Action Requests (ARs). The sample integration with the Remedy Help Desk includes ARs of the type incident.

### ARP

ARP (Address Resolution Protocol) is the layer 2 standard for TCP/IP. It is used to obtain a node's physical address when only its logical IP address is known.

### ATM

ATM (Asynchronous Transfer Mode) is a packet-switching technology, that delivers high-speed performance together with a scalable architecture. Its use of small packets (fixed length cells of 53 bytes), provide for low latency so sound and vision arrive together. It can also handle bursty, non time-sensitive data, translating variable length packets to fixed size packets.

### Attribute

In Entuity an attribute is a property of an object that is defined through StormWorks. Attribute data can be charted using the Attribute Grapher and is available to Report Builder.

### Autonomous Wireless Access Point (AWAP)

 A Wireless Access Point (WAP) that embodies all of its necessary control functionality in a self-contained manner. AWAPs are usually connected to switched access layer ports and can coexist with ordinary wired connections to end user hosts and servers on the same switch. AWAPs do not require wireless controllers and do not interact with them if they exist.

### Backbone

The part of a network that acts as the primary path for traffic that is most often sourced from, and destined for, other networks.

### BECN (Backward Explicit Congestion Notification)

BECN is a bit in the header of a frame-relay frame that is set when frames are sent on the data path backwards from destination to source. It indicates congestion to the source node.

WAN News combines BECN and FECN values to determine congestion on a data path.

### Bandwidth

The upper limit of the rate at which data can be transferred.

### BMC Atrium CMDB

The BMC Atrium Configuration Management Database (BMC Atrium CMDB) is a data repository that provides a working model of your enterprise IT infrastructure.

### BMC Cell

BMC Impact Manager instance. A cell receives events from Entuity and displays them in the BMC IX.

### BMC II Web Services Server

BMC Impact Integration Web Services Server. You can connect to the BMC II Web Services at the end point as defined by the URL format, http://*webServerHostName*:*webServerPortNumber*/*webServiceName*, e.g. http://decade:6080/impactManager.

### BMC IX

BMC IX (BMC Impact Explorer) displays events received from Entuity.

### BMC ProactiveNet Performance Management

BMC ProactiveNet Performance Management which receives events from Entuity.

### Blackout

Blackout is complete loss of the network, as opposed to a brownout, which is degradation in the performance of the network.

### BPDU

Bridge Data Protocol Units are special frames that contain spanning tree information. There are two types of BPDU, Topology Change Notification (TCN) BPDU contains topology change information, Configuration BDU contain configuration information.

### Bridge

A device that interconnects local or remote networks. Bridges form a single logical network, centralizing network administration. They operate at the physical and link layers of the OSI Reference Model.

### Brownout

Brownouts, also known as soft faults, are typically caused by cabling faults, faulty transceivers, faulty NIC cards and configuration errors such as duplex/half-duplex mismatches. These problems cause a percentage of the packets traversing that particular area of the network to be corrupted. The total number of packets discarded as a percentage of packets is directly related to the severity of the brownout.

### Burst

Burst is the access rate of the physical connection to the Frame Relay carrier network.

### Central Server

A central server is an Entuity server trusted by remote Entuity server(s). A user logged into the central Entuity server is able to view information collected by the remote Entuity server(s), according to their user account access rights. A remote Entuity server responds to requests from a trusted central Entuity server, and freely shares information with it.

An Entuity server can be configured to perform both roles, be both a remote and central Entuity Server. This allows administrators to create both hub-n-spoke and fully meshed deployments.

A central Entuity server can also act as a central license server. From it you can allocate, and de-allocate, license credits to its remote servers.

Configuration of central and remote servers is through the Multi-Server Administration area of the Entuity web UI.

### CDP (Cisco Discovery Protocol)

CDP is primarily used to obtain protocol addresses of neighboring devices and discover the platform of those devices. CDP can also be used to show information about the interfaces your router uses. CDP is media- and protocol-independent, and runs on all Cisco-manufactured equipment including routers, bridges, access servers, and switches.

Entuity uses CDP as a method when maintaining links on maps and identifying trunk ports.

## CI

Within BMC Atrium CMDB a Configuration Item (CI) is a collection of objects related to the specific functionality of a larger system.

## CIR

Committed Information Rate is the rate (in bps) that the network agrees to transfer information over a permanent virtual circuit (PVC) in Frame Relay. The CIR applies to the rate of data entering the network.

## Cisco IOS IP SLA Operations

Cisco IOS IP SLA Operations are created on devices by Entuity (via SNMP). Entuity currently fully supports DHCP, DNS, HTTP, HTTP Raw, ICMP Echo, ICMP Path Echo, TCP, UDP Echo, UDP Jitter and UDP Jitter VoIP operations. Entuity can also monitor operations other than these ten, for example FTP. The completeness of the returned data depends upon how close the operation's data structure corresponds to Entuity's default representation of the IP SLA operation data structure.

These are the ten fully supported operations:

- DHCP, Verify availability of dynamic IP addresses.
- DNS, DNS server functionality check.
- HTTP, Web page availability.
- HTTP Raw, Web page availability.
- ICMP Echo, Simple connectivity tests.
- ICMP Path Echo, Simple connectivity tests.
- TCP, Connect Application availability.
- UDP Echo, Simple connectivity tests.
- UDP Jitter, Detailed latency measurements (requires IP SLA on both devices).
- UDP Jitter VoIP, Detailed latency measurements (requires IP SLA on both devices).

## Client

A computer that requests a service from another. In Entuity the Java client is Component Viewer which requests, for example, information from the Entuity server on the devices on your network.

## Collisions

Collisions occur when two transmitters attempt to send data at the same time. The greater the number of collisions the poorer network performance appears.

## Component Viewer

Component Viewer is the Entuity Java client, available through the web UI Tools menu. Through it you can quickly scan the network for both current and historical performance

data. It creates an intuitive hierarchy which lets you easily view configuration settings, check status information and launch fault, utilization and traffic volume history graphs.

## Context Menus

Context menus are available from the Entuity web UI and Component Viewer. The contents of the menu are dependent on the position of the mouse when you clicked the right button.

## Core Ports

Entuity considers core ports, as WAN ports, administratively up ports which have a configured IP addresses (i.e. layer 3 ports) on devices which are routers or have router capability, or trunks and uplinks that are administratively up.

By default the port status event, Port Operationally Down, is only enabled for core ports.

## Current Configuration

The device configuration (either startup- or running) currently being processed.

## DLCI (Data Link Connection Identifier)

A unique logical identifier assigned to a PVC end point in a frame relay network. It identifies a particular PVC endpoint within a user's access channel therefore allowing multiple connections to many destinations over a single, physical channel.

## Data Management Kernel (DMK)

The DMK supports Entuity's intelligent discovery function. It includes out of the box data models for a wide range of managed devices including hundreds of Ethernet switches and routers. These customizable data models define the attributes of each managed element, its possible dependencies in relation to other elements of the network, and the specific details to retrieve for each element. The DMK manages these data models and automatically applies updates and changes to the Entuity database schema.

## Data Path

A data direction on each PVC is a data path. For example, a PVC that connects points A and B has two data paths, from A to B and from B to A. WAN News analyzes the data paths separately.

## Data Rollup

Data Rollup is a method of taking polled data and bundling it into larger more manageable units, e.g. rolling 24 hourly datapoints into one daily sample. If Entuity generated monthly reports from live polled data then this would cause a significant increase on the processing overhead, i.e. instead of one datapoint for each day there would be hundreds.

## DE (Discard Eligibility)

DE is a bit in the header of a frame-relay frame that indicate the frame may be discarded in preference to other frames if congestion occurs. It is usually set by a network node if the user is offering data (frames) at a higher rate than has been negotiated. This maintains the committed quality of service within the network. Frames with the DE bit set are considered to be excess data.

## Derived Events

IA derived event is an event derived from an existing event definition. It retains the event identifier of the original definition, unlike a custom event which has its own unique identifier. Derived events are defined as part of an action. They useful for adding additional information to an incoming event, and can also be called from an incident.

## Devices

In Entuity devices refers to network devices, for example switches and routers.

## Device Support Datasets

Device support datasets define the attributes of each managed element, its device type, its possible dependencies in relation to other elements of the network, and the specific details to retrieve for each element. This comprehensive library streamlines modeling and ultimately shows exactly what you own, where it is deployed and how it is connected.

Datasets are available through these types of vendor files, all have a .vendor extension. These vendor files are, listed in ascending order of priority:

- `newbin.vendor`, which is created in *entuity_home*\etc when Entuity discovers devices with sysoids for which there is not a device support dataset. These generic device support datasets should be considered temporary definitions, and only used until Entuity supply an appropriate vendor file.

  Device support datasets in `newbin.vendor` have the lowest priority when Entuity is determining which vendor device definition to use to manage a device type.

- `bin.vendor` has the second lowest priority when Entuity is determining the source of device information.Device support datasets in bin.vendor have the second lowest priority when Entuity is determining which of those available to use to manage a device type.

- exotica vendor files are installed to *entuity_home*\etc\exotica. Exotica files are only used by Entuity when they are copied to *entuity_home*\etc, either manually or during Entuity configuration, e.g. when selecting a module.

  Device support datasets in exotica vendor files have the highest priority when Entuity is determining which vendor device definition to use to manage a device type.These files use a simple naming convention, using the vanilla filename, with a plus sign in the filename and identifying name, e.g. `SOLSERV+managed Host.vendor`.

  During Entuity upgrades configure identifies and removes exotica files from the installation that are now part of the updated bin.vendor.

vendinfo identifies the vendor device support datasets available to Entuity and the decisions made when more than one vendor file is available for a particular sysoid; which device support dataset Entuity uses to manage that device type (as identified through its sysoid).

## Device Types

In Entuity every device has a type, which you can view through the web interface and Component Viewer. The device type is derived from its vendor file information, and helps to determine how Entuity manages a device. Device types include hubs, switches and routers. There are also two Unclassified device types, Basic Management and Ping Only, and also Full Management.

Unclassified device types have two distinct roles:

- Basic Management and Ping-only, is used for those devices Entuity has taken under management at the Basic Management and Ping-only level.
- Full Management, is used for those devices Entuity has taken under management at the Full level but for which there is no vendor file information but Entuity can generate a suitable generic device type. These are uncertified devices.

## Domains

Domains and domain filters are terms used within Component Viewer, in fact supplied domains are now only used within Component Viewer to group objects in its Explorer tree, e.g. the routers domain. In the web UI, where you manage views In Entuity, domain filters are referred to by the more apt term view content filters as they determine the type of object that can potentially appear in a view.

## DHCP Operation

The IP SLA DHCP operation measures the round trip time (RTT) taken to discover a DHCP Server and obtaining a lease from it. After obtaining an IP Address, Cisco IOS IP SLA releases the IP address that was leased by the server.

The Dynamic Host Configuration Protocol (DHCP) is an Internet protocol for automating the configuration of computers that use TCP/IP. DHCP can be used to automatically assign IP addresses, to deliver TCP/IP stack configuration parameters such as the subnet mask and default router.

## Drop Box

Drop box acts as a temporary repository for objects, for example gauges, charts, links, device metrics, that you want to include to new reports, dashboards.

## Duplex

A full-duplex link with one telegrapher at each end, transmitting alternately in each direction.

## Dynamic Thresholds

Dynamic thresholds enable Entuity to alert the user to deviations from what Entuity's previous polling has established as normal behavior for that hour on that day. Entuity establishes normal behavior for a given attribute on a given port by maintaining the last four weeks worth of polled data, and applying an averaging algorithm.

## EIR

The Excess Information Rate (EIR) is the sustainable rate of information in excess of CIR, that the network will deliver if there is available bandwidth. The total information rate is CIR + EIR.

Frame Relay allows data rates in excess of the CIR to be successfully used on occasions. It is also possible that the amount of data that can be transferred per measurement interval (Tc) may be limited to less than the burst (or access rate) of the physical connection to the carrier network.

EIR defines how many bits per second beyond the CIR the data rate may be exceeded. This is may be policed by the carrier ingress switch per Tc on a pro-rata basis. This means that although data can be transmitted for periods of time at the burst rate of the physical port it would not be possible to continue transferring data at this rate successfully on a continuous basis if the CIR+EIR were to be less than the burst rate.

## Entuity

Entuity is both the name of the network management software and the company producing it. Entuity software is designed for networks of any size and complexity, from the smallest, simplest corporate infrastructure to the largest multinational. Every customer can access the full functionality of our cornerstone solution, incorporating fault, performance and inventory management.

## entuity_home

*entuity_home* is used within the Entuity documentation to indicate the Entuity server's root folder. The root folder is set by Entuity `install`, in Windows environments the default is `C:\Entuity`. You can view its current setting through *destination* in *entuity_home*`\etc\entuity.cfg`. Within Entuity configuration files it is represented by the variable *ENTUITY_HOME.*

## Ethernet

IEEE standard network protocol that specifies how data is placed on and retrieved from a common transmission medium. Forms the underlying transport vehicle used by several upper-level protocols, including TCP/IP and XNS.

## Events

Events are alerts and alarms that are generated through Entuity monitoring the network. Event Viewer displays events and they can also be reported on.

## Expect

Expect is a Unix automation and testing tool, written by Don Libes as an extension to the Tcl scripting language, for interactive applications such as telnet, ftp, passwd, fsck, rlogin, tip, ssh, and others. It uses Unix pseudo terminals to wrap up subprocesses transparently, allowing the automation of arbitrary applications that are accessed over a terminal. With Tk, interactive applications can be wrapped in X11 GUIs.

## Eye of the Storm® (EYE)

Until Entuity 12.5 the software was known as Eye of the Storm (EYE).

## Entuity Remedy AR System Integration

The Entuity Remedy AR System integration allows forwarding of event and managed object information from Entuity to one or more AR System servers.

Entuity allows two types of forwarding:

■ automatic generation of Action Requests (ARs), derived from Entuity events, to particular application forms on target AR System servers

■ interactive generation of Action Requests (ARs), initiated from Entuity. The specified application forms on target AR System servers are opened for editing, with default data populated from the current Entuity managed object(s) or event(s).

Entuity can also pass to AR System a URL identifying the managed object that is the source of the AR. From AR System you can open Entuity's Component Viewer with the focus on the managed object.

## Factory Default

The shipped values of event thresholds are the factory defaults. You can amend a factory default, which if done at the root level effectively changes the default value for all objects against which that threshold can be set. For example, if you amend a threshold setting for a device event at the Entuity (system) level, all devices on that server will have a new default value.

## FEC

Forwarding Equivalence Class (FEC) is central concept to MPLS. An FEC is a set of packets that a single router forwards to the same next hop, using the same interface and with the same handling (e.g. queuing). The FEC is determined only once, at the ingress to an LSP, rather than at every router hop along the path.

### FECN (Forward Explicit Congestion Notification)

FECN is a bit in the header of a frame relay frame that is set to indicate to the destination node that congestion is occurring on the network. WAN News combines BECN and FECN values to determine congestion on a data path.

### Filters

Filters in Entuity act by filtering in those objects specified in the filter. There are three types of filters, view, event and Flex Report.

Entuity uses these types of filter:

- View content filters are applied to the views, restricting the components available from a view to those that meet the criteria.
- Event Filters restrict the events available through a view.
- Flex Report filters restrict the data included to the report.

### Flow Collector

The Flow Collector is the set of processes within an Entuity Integrated Flow Analyzer responsible for the receiving, processing and storage of flow records.

Administrators can enable/disable an Entuity server's Flow Collector through `configure`, a decision which should be made according to the role the administrator wants the server to perform in the management of the network.

### Frame Relay

A fast packet protocol that relies on physical component and higher level software reliability. The network discards any frame with bit errors. Frame relay services include PVCs (Permanent Virtual Circuit) and SVCs (Switched Virtual Circuit).

### Full Duplex

A full-duplex link with one telegrapher at each end, transmitting alternately in each direction.

### Generic Device Type

Entuity uses the concept of an underlying generic object against which are mapped the characteristics of different device types, e.g. routers, switch, firewalls, BladeCenters. This allows complete management of devices that have characteristics of one or more of the traditional types of devices, e.g. a router with switching capabilities.

### Half-Duplex

A type of communication channel using a single circuit which can carry data in either direction but not both directions at once.

### Host Identifier

Your Entuity representative requires the host identifier of the Entuity server machine before they can generate your license. The host identifier associates the Entuity license with the physical footprint of the machine. Entuity install and configure programs both display the host identifier, alternatively you can run the command line program `hostIdent` (which is included with the software but is also available from the Support website).

### Hot Standby Router Protocol (HSRP)

Hot Standby Router Protocol (HSRP) establishes a framework between network routers to achieve default gateway failover if the primary gateway becomes unavailable in close association with a rapid-converging routing protocol like EIGRP or OSPF. By multicasting packets, HSRP sends its hello messages to the multicast address 224.0.0.2 (all routers) using UDP port 1985, to other HSRP-enabled routers, defining priority between the routers. The primary router with the highest configured priority will act as a virtual router with its own IP and MAC address, which the hosts on the local segment will be configured to use as a gateway to the destination in question. If the primary router should fail, or the link to the destination drop, the router with the next-highest priority would take over communications through alternative routes within seconds, without major interruption to network connectivity.

HSRP and VRRP on some routers have the ability to trigger a failover if one or more interfaces on the router go down. This can be useful for dual branch routers each with a single serial link back to the head end. If the serial link of the primary router goes down, you would want the backup router to take over the primary functionality and thus retain connectivity to the head end.

### Hypervisor

 A hypervisor, also called virtual machine monitor (VMM), allows multiple operating systems to run concurrently on a host computer. The hypervisor presents to the guest operating systems a virtual operating platform and monitors the execution of the guest operating systems. Multiple instances of a variety of operating systems may share the virtualized hardware resources. Hypervisors are installed on server hardware whose only task is to run guest operating systems.

### Infrastructure Ports

Entuity considers infrastructure ports, as:

Entuity considers infrastructure ports, as router ports, as uplinks which are ports connecting routers with switches and as trunk ports which are ports connecting switches together.

- Router ports.
- Uplinks, ports connecting routers with switches.
- Trunk ports, ports connecting switches together.

### Interface

This is the entity on a node which is polled, such as a physical port. Nodes are likely to have more than one interface.

## IP

In TCP/IP, the standard for sending the basic unit of data, an IP datagram, through the Internet.

## IP Link

IP links may be autoDiscovered or created manually. They represents a link of some form at layer 3 or above e.g. a pair of IP addresses, an IP address and a URL.

## IP Peering

IP Peering provides visibility into your WAN links, i.e. leased line, Frame Relay DLCIs, ATM VCCs, using subnet masking. It also reflects any manual IP pairings you may have made in Entuity.

## ISO

International body that is responsible for establishing standards for communications and information exchange; developed the OSI reference model. ISO is not an acronym, but the Greek word for "equal."

## Java Web Start

A technology for simplifying deployment of Java applications. It allows you to download and launch the Entuity client from your Web browser or shortcuts placed on your PC.

## Key Metrics Gauge

From Entuity's Explorer you can access the Device and Port Summary pages, both of which display Key Metric graphs. Key metrics vary according to the managed object, e.g. Device CPU utilization, Port Inbound Utilization%.

These graphs are of two forms a:

- green only gauge is used with metrics that do not have thresholds.
- green and red gauge is used with metrics that have thresholds. When the indicator is pointing to the red area then the threshold has been crossed. The relative size of the red and green areas of the gauge is fixed, i.e. the red area does not take a larger or smaller proportion of the total area of the gauge on changes to the threshold level.
  You can view the current threshold value by passing the cursor over the data value below the graph.

You can click on each key metric gauge to view a larger graph.

## LAP (Lightweight Wireless Access Point)

A low cost Wireless Access Point (WAP) that delegates much of the control functionality usually embodied within an Autonomous WAP to a WC. LAPs are usually connected to switched access layer ports and can coexist with ordinary wired connections to end user

hosts and servers on the same switch. The associations between the LAPs and WCs are negotiated dynamically and can change under fault conditions.

A LAP is an AP that is designed to be connected to a wireless LAN (WLAN) controller (WLC). The LAP provides dual band support for IEEE 802.11a, 802.11b, and 802.11g and simultaneous air monitoring for dynamic, real-time radio frequency (RF) management. In addition, Cisco Aironet 1000 Series LAPs handle time-sensitive functions, such as Layer 2 encryption, that enable Cisco WLANs to securely support voice, video, and data applications.

Entuity Wireless currently supports Cisco LAP, part of the Cisco Unified Wireless Network architecture.

### Leased Line

A leased line is a dedicated point-to-point connection over a WAN via a router at the subscriber's premises to the telecommunications provider.

Entuity identifies a leased line, by default, when both of these conditions are true:

- The interface type is either IANAifType 22 (propPointToPointSerial) or 23 (PPP).
- The WAN port is not:
- A Frame Relay port.
- An ATM port.
- An ISDN port. These are identified as having an associated lower layer protocol port (found from the ifStack table) of ifType 81 (ds0). This indicates the port is a layer on top of either basic rate or primary rate ISDN.

### Link Layer Discovery Protocol (LLDP)

The IEEE 802.1AB Link Layer Discovery Protocol (LLDP), provides a solution for the configuration issues caused by expanding LANs. It runs over the data link layer and specifically defines a standard method for Ethernet network devices to advertise information about themselves to other nodes on the network and store the information they discover. LLDP is available as a technology link type on the Entuity maps.

### Load Balancers

Load balancers are devices that control and optimize traffic flow over your network. For example directing traffic away from over utilized servers to those less utilized, improving mission critical service delivery, providing fall over protection.

Entuity delivers a similar level of fault, performance and inventory management for load balancers as provided for other standard Entuity device types, e.g. routers, switches, hubs. For example device reports include load balancers, you can build your own reports using Flex Reports, device and port events apply and full load balancer details are viewable through Component Viewer.

Entuity currently manages F5 Labs Big IP 6400 Load Balancer. Entuity delivers additional polling of the device ports using F5 lab's propriety MIB, returning additional port identification, port status, port traffic and port utilization data. The full integration of this

additional data within Entuity allows administrators to set up utilization and traffic events against this data.

## Log Files

Entuity process messages are written to their individual log files, in *entuity_home*/`log`. For example, `applicationMonitor` writes to `applicationMonitor.log`. When the log file becomes full, it automatically wraps to another file with up to four versions, e.g. `applicationMonitor.log.1`, `applicationMonitor.log.2`, `applicationMonitor.log.3`.

## Management Level

Every device under Entuity management is managed according to its management level, which is set when the device is added to Entuity but can be subsequently amended. Each managed device costs one license object.

These are the management levels:

- Full Management (all interfaces), Entuity manages all interfaces on the device.
- Full Management (management interfaces only), Entuity only manages the management interface.
- Full Management (no interfaces)
- Basic Management Entuity collects only basic system information and the full IP address table via SNMP. This management level is used when Entuity does not have the appropriate device support dataset (vendor file), cannot generate an appropriate dataset or you only want the device placed under basic management. Entuity does not manage any ports or modules on the device.
- Ping Only, devices only under ping management, SNMP data is not collected for these devices.

## Managing Agent

Handles requests for information or action from the management station on a node. A protocol links the management station and the Managing Agent; for Entuity users this must be SNMP.

## MIB (Management Information Base)

Entuity supports SNMP MIBs only. MIBs are present within nodes on a network, and comprise a logical collection of managed objects arranged in a tree structure. Managing agents on an element use MIBs to store information regarding the element, e.g. the speed at which packets of information are transferred.

All managed objects within a MIB share a common root.

## Mobility Controller

An SNMP manageable hardware device, manufactured by Aruba, that controls and coordinates the operation of a group of Aruba Wireless Access Points. In an Aruba wireless

network deployment all wireless equipment discovery and real-time monitoring is performed via the Mobility Controllers rather than via SNMP/ping monitoring of the individual Access Points.

### Multicast

Network communication between a single sender and multiple receivers.

### My Network

Supplied view that contains the entire set of managed object's the user is permitted to view. Different users may have different devices in their My Network view, reflecting their different access permissions.

### Node

An SNMP managed device attached to a network, from which data can be retrieved. For example, node devices such as hubs, routers, bridges, or network printers.

### OID

An Object Identifier is a sequence of integers that represent the position of an object in the hierarchical structure of objects in a MIB.

### OMF (Open Modeling Framework)

Flexible Entuity framework that allows the fast integration and management of new types of managed objects, e.g. new device types. For example, the BladeCenter device type is implemented through the OMF.

### OSI Model

A model for networks developed by International Standards Organization (ISO). The network is divided into seven layers, each layer building on the services provided below it.

### Packet

Any logical block of data sent over a network; it contains a header consisting of control information such as sender, receiver, and error-control data, as well as the message itself. May be fixed or variable length.

### PCR (Peak Cell Rate)

PCR is the maximum short term data throughput supported by an ATM port; the limit to which traffic can burst.

### Percentile Utilization

Percentile Utilization indicates that for a defined percent of the time, e.g. 95, port utilization is below this value. It is useful for monitoring the sustained utilization of the port.

The 95th percentile is derived by ordering the utilization data by value, from highest to lowest. Application of a least square fit method removes spikes that would distort the analysis. The top 5% values are discarded, leaving the 95th percentile. This value is calculated for both inbound and outbound utilization.

### Policy Group

Entuity licensing is enabled by grouping related types of managed objects into groups. These Policy Groups are then assigned a license credit quota. Before Entuity manages an object it first checks whether the license allows its management and then whether a credit is required. When a license credit is required, Entuity checks that the policy group to which the object's type is associated has available credits. For example, before Entuity manages a device it checks the device licensing policy group for available credits.

### Polling

Devices on the network are accessed by the system at regular, pre-defined, intervals in order to retrieve required data. This is referred to as polling the devices.

### Polling Engine

The Polling Engine (or Core Management Engine) is the set of processes within an Entuity server responsible for all general network management tasks excluding flow collection (e.g. network discovery, inventory, monitoring, event management).

Administrators can enable/disable an Entuity server's Polling Engine through `configure`, a decision which should be made according to the role the administrator wants the server to perform in the management of the network.

### Port

Entuity considers ports as interfaces on network devices, e.g. routers, and as endpoints in communications systems. In IP an upper-layer process that receives information from lower layers. Ports are numbered, and each numbered port is associated with a specific process. For example, SMTP is associated with port 25.

TCP and UDP transport layer protocols used on Ethernet use port numbers to distinguish between (demultiplex) different logical channels on the same network interface on the same computer.

### Protocol

A set of formal rules detailing how to transmit data across a network. Example protocols include TCP, UDP and IP.

## PVC (Permanent Virtual Circuit)

PVC is a Frame Relay virtual connection providing the user with the equivalent of a physical connection to a destination address, using shared facilities. Virtual circuits can be permanent (PVC) or switched (SVC).

## Reachability

Availability Monitor sends an ICMP ping to the management IP address of managed devices, by default every two minutes. Devices that respond are considered reachable, those that do not respond, after the set number of retries, are considered unreachable. When Availability Monitor (`applicationMonitor`) is not running, then the reachability of the device is Unknown for that period, although Entuity maintains the last known state of the device.

### Reboot

Entuity uses the device sysuptime to calculate when the device was last rebooted, or more accurately when the device last came up after being rebooted.

## Reconciliation Rules

Within BMC Atrium reconciliation rules are applied by the reconciliation engine to improve accuracy and efficiency of maintaining IT environment data in the CMDB. Reconciliation is used to identify and merge CI information and relationship form imported dataset with production dataset.

## Remedy Help Desk / Service Desk

Entuity Remedy AR System Integration for Remedy AR System 7.0 includes a sample configuration which integrates with the Remedy Service Desk application.

## Remote Server

A remote server is an Entuity server configured to trust another central Entuity server. A user logged into the central Entuity server is able to view information collected by the remote Entuity server(s), according to their user account access rights. A remote Entuity server responds to requests from a trusted central Entuity server, and freely shares information with it.

An Entuity server can be configured to perform both roles, be both a remote and central Entuity Server, allowing administrators to create both hub-n-spoke and fully meshed deployments.

Configuration of central and remote servers is through the Multi-Server Administration area of the Entuity web UI.

## Router

A device that routes data between networks. Routers connect multiple LAN segments to each other or to a WAN.

Routers may be equipped to provide frame relay support to the LAN devices they serve. These routers can:

- encapsulate LAN frames in frame relay frames and send those frames to a frame relay switch for transmission across the WAN.
- receive frame relay frames from the WAN, strip the frame relay frame off each frame producing the original LAN frame, and forward it to the end device.

### Running-config

The configuration controlling the current operation of a piece of Cisco hardware. This may be different to the start-up config if changes have been made since start-up and the changes have not been saved. The running-config can be saved as the startup-config replacing any previous start-up config. The running config is held in DRAM. If the machine is restarted without the running-config being saved, all changes are lost.

### Sample Interval

In Entuity the period between two data samples. This may be between two pollings of a port, or between two rolled up data samples.

### SCR (Sustainable Cell Rate)

SCR is the long term data throughput of an ATM port. Traffic can burst above this limit up to the PCR.

### Server

Any computer whose function in a network is to provide user access to files, printing, communications, and other services. Servers usually have more memory, more disk storage, and a more advanced processor than a single-user desktop PC.

Where Entuity manages an application, Entuity can manage the application server as a device.

### Services

Services is a method of grouping together collections of ports that provide a service and associating with them other ports which use that service. For example, a service maybe e-mail, with one port designated as the provider of the service and all others in the group defined as consumers.

### SLA

A Service Level Agreement (SLA) is a set of rules and metrics which can be used to measure the efficiency and performance of an object. That object may be a department, a server, a network or any other functional component of an organization. If an object adheres to its associated set of rules and metrics, then it can be said to be conforming to its SLA. Similarly, if the object breaches the set of rules and metrics, then this means that it is no longer conforming to its SLA.

## SNMP

Standardized method of managing and monitoring network devices on TCP/IP based internets. SNMP defines the formats of a set of network management messages, and the rules by which those messages are exchanged. The network management messages are used to make requests for performing network management functions and to report on events that occur in the network. Also, SNMP defines the allowable data types for MIBs, they way in which MIBs can be structured, and a set of standard objects that can be used in implementing a MIB.

## Spanning Tree

Spanning tree provides a vendor neutral technology for visibility into your network. When correctly implemented Entuity discovers bridge links, switch to switch relationships, through polling the Bridge MIB. Complete spanning tree connectivity relies on a contiguous set of Entuity managed devices.

## Spare Ports

By default Entuity spare port calculations include ports that have been unused for forty days or more, include ports that have system uptime of less than forty days and are currently unused and exclude ports that have been unused for less than forty days but have a system uptime of forty days or more.

By default Entuity spare port calculations:

- Include ports that have been unused for forty days or more.
- Include ports that have system uptime of less than forty days and are currently unused.
- Exclude ports that have been unused for less than forty days but have a system uptime of forty days or more.

The forty day threshold is configurable through the reporting section of entuity.cfg. Entuity distinguishes between physical and virtual ports using interface type. If required System Administrators can amend the virtual port identifier.

## SNMP Agent

Management code that resides in the device, controls the operation of the device, and responds to SNMP requests.

## SSL

An SSL Certificate consists of a public key and a private key. The public key is used to encrypt information and the private key is used to decipher it. When a browser points to a secured domain, an SSL handshake authenticates the server and the client and establishes an encryption method and a unique session key. They can begin a secure session that guarantees message privacy and message integrity.

### Startup-config

The initial configuration when a piece of Cisco hardware starts-up. If there have been no changes to the configuration since start-up, this will be the same as the running-config. The startup-config is also referred to as the saved config. The startup-config is held in NVRAM.

### Static Thresholds

Static threshold settings allow you to configure the trigger points which when crossed cause Entuity to raise events. You can set thresholds against an individual event, a managed object, view or all objects on an Entuity server.

### StormWorks

StormWorks is the internal Entuity engine, also known as the Data Management Kernel (DMK). It runs as the **DsKernelStatic** process.StormWorks enables the delivery of functionality through a highly configurable set of core services. The configuration files, found in *entuity_home*\etc, prefixed with **sw_** define and configure StormWorks services.

Entuity assigns all of the objects it manages their own StormWorks identifier. StormWorks identifiers are sequentially assigned, do not consider the object type and are unique within each Entuity server. *StormWorks ID* is visible from the object's web UI Advanced tab, and is used in creating dashboards to the user, for example during Data Export, Map Export, running of Flex Reports.

### Stream Attributes

Information Entuity collects from your network is stored within Entuity as an attribute of the managed object, for example a port's name, a port's utilization are stored as attributes. Stream attributes are to maintain a history of a metric, for example Entuity maintains a history of port utilization.

### SVG

Scalable Vector Graphics (SVG) is a graphics file format and Web development language based on XML. SVG is used by Entuity's reports to dynamically generate, high-quality graphics from real-time data.

### Switch

A switch is a network device that selects a path or circuit for sending a unit of data to its next destination. It is usually simpler and faster than a router, which requires knowledge about the network to determine the route.

A switch may also include the function of the router, a device or program that can determine the route and specifically what adjacent network point the data should be sent to.

### SynOptics Network Management Protocol (SONMP)

SONMP is also known as the Nortel Discovery Protocol (NDP), a Data Link Layer network protocol for discovery of Nortel (Avaya and Ciena) devices. It is available as a technology link type for the Entuity maps.

### System Capabilities

Entuity determines the switching capability of a device by checking the group dot1dtp, specifically the mandatory scalar value dot1dTpLearnedEntryDiscards. dot1dtp is only present when the device supports transparent bridging, which implies it has Ethernet switching capability.

Entuity determines the routing capability of a device by checking for the ip-forwarding variable from the ip group in the MIB of the device. When ip-forwarding has a value of 1, this implies the device is acting as a gateway and so has routing capability.

Entuity determines whether the device type is hub by comparing its type to device types detailed in the vendor files.

### TCP

Connection-oriented protocol that provides a reliable byte stream over IP. A reliable connection means that each end of the session is guaranteed to receive all of the data transmitted by the other end of the connection, in the same order that it was originally transmitted without receiving duplicates.

### TCP/IP

Combination of TCP and IP protocols common to many different computer systems and so often used for communication between them.

### TFTP

Trivial File Transfer Protocol (TFTP) is a very simple file transfer protocol, with the functionality of a very basic form of FTP. It uses UDP as its transport protocol and has no authentication or encryption mechanisms.

### Ticker

Ticker allows you to view real time output at the device and port level, viewing data changes as they occur. You can select to view data activity for one or more client devices or ports.

For monitored:

- Ports you can select from a list of MIB variables the particular variable(s) you want to use to monitor the port. Entuity is supplied with a default number of MIB variables for use with ports and you can also add your own MIB variables to this list.
- Devices you can create your own list of MIB variables on which to monitor the device.

### traceroute

Entuity includes two types of traceroute functionality, identified in the Entuity client as TraceRoute from Client and TraceRoute from Server.

TraceRoute from Entuity Client, calls the traceroute utility installed on the Entuity client machine and performs a live traceroute from the Entuity client to the target IP address.

TraceRoute from Entuity Server, uses data collected by `applicationMonitor`. This traceroute information is updated every two minutes, so calling TraceRoute from Server does not initiate a live traceroute but instead interrogates the data returned from the last `applicationMonitor` traceroute.

`applicationMonitor` uses Entuity's own implementation of traceroute functionality. This implementation performs ICMP pings in a similar way to a standard traceroute but with this key difference. When performing a traceroute `applicationMonitor` increments TTL values by one, until the pings reach the edge of an invisible cloud. At this point `applicationMonitor` increase the TTL value to 32. When this results in the ping reaching its target, the response from the target includes the actual number of hops required to reach target.

### Traps

Traps can be used by network components to signal abnormal conditions. Entuity can both receive and forward SNMP traps.

Entuity can be configured to:

■ Generate events in Event Viewer then traps are received.

■ Forward traps to up to six concurrent recipients.

Entuity also supply a more advanced SNMP trap forwarding integration module. Contact your Entuity sales representative for details.

### Trivial Change

A difference between a current-configuration file and a previously archived one that is not considered important by the system because it matches a set of rules codified as patterns in an "ignore file". Trivial changes may include comments such as timestamps in a configuration file.

### Root Cause Analysis (RCA)

RCA isolates IT related problems using vector differencing. This involves the building of a dependency chain of objects and monitoring the object states in that chain. In the event of state changes (where each object state change is a vector), differencing the dependency chain state vectors enables Entuity to determine the true cause of the event. Entuity can then raise the appropriate event.

For example, if an application becomes unavailable because a switch has failed then Entuity raises an event relating to the switch failure in Event Viewer. Entuity does not raise events for

the application being unavailable as changes in state in the dependency chain are attributed to the switch failure.

## Trunk Ports

Trunk ports, i.e. ports connecting switches together.

Entuity identifies a trunk port by:

- reading the MIB.
- *macman* identifying the switch port as having more than ten MAC addresses and also having associated VLANs.
- using CDP Trunk Port Discovery, a CISCO proprietary method.

When one or more of these methods identifies a trunk port, Entuity also considers it as a trunk port.

## Unclassified Devices

Entuity managed devices for which Entuity does not have a device support dataset, provided through individual vendor, bin.vendor or newbin.vendor files, are included to Entuity as Unclassified devices under Full Management, or Unclassified devices under Ping-only and Basic Management.

Unclassified generically managed devices use an Uncertified device type, created by Entuity and held in newbin.vendor. These are Entuity managed devices and do incur a license charge. System Administrators should contact their Entuity support representative for a vendor file which would ensure Entuity fully manages these devices.

## Unicast

Unicast is network communication between a single sender and a single receiver.

## Uplink Detection

Entuity considers an uplink as trunking on a connection to a router or layer 3 switch, which is visible through spanning tree. This technology attempts to link layer 3 with layer 2.

Where links between switches and routers are not done using VLAN trunking and spanning tree then the spanning tree technology will not detect them. This is typically at smaller satellite offices, which do not need the greater port density and much greater speed available from router on a stick and even greater speed available from layer 3 switching.

## Uplinks

Ports connecting routers with switches.

## Uptime

By default Entuity polls devices every five minutes, retrieving device *sysuptime*. Entuity checks as to whether the device has been continually up since the last poll, and modifies the device's uptime value accordingly.

When *sysuptime* indicates the device has been down during the polling interval but is now up, from *sysuptime* alone Entuity cannot identify for how long the device was down. Entuity takes this unknown time, and adds fifty percent of it to the known uptime value, with the remaining fifty percent considered UNKNOWN. For example where *sysuptime* has a value of two minutes. Entuity cannot determine the state of the device over the first three minutes of the polling interval. Entuity adds ninety seconds to the *sysuptime* value, giving an uptime value of two hundred and ten seconds and records the device state as UNKNOWN for ninety seconds.

Device uptime is visible through Component Viewer, and is used in many reports, e.g. Routing Summary, Switching Summary.

## Utilization

In Entuity port utilization is expressed as a percentage of actual traffic volume against the maximum volume that can be handled by the port.

## UUID (Universally Unique ID)

A 16 byte value written to a system's planar at manufacturing time to uniquely identify a system across time and space.

## Variable Binding

A variable binding, or VarBind, refers to the pairing of the name of a MIB variable to the variable's value. A VarBindList is a simple list of variable names and corresponding values. Some PDUs are concerned only with the name of a variable and not its value (e.g., the GetRequest-PDU). In this case, the value portion of the binding is ignored by the protocol entity. However, the value portion must still have valid ASN.1 syntax and encoding. It is recommended that the ASN.1 value NULL be used for the value portion of such bindings.

## VCC (Virtual Channel Connection)

A VCC is an association established at the ATM Layer between two or more endpoints for the purpose of user-user, user-network, or network-network information transfer. The points at which the ATM cell payload is passed to the AAL for processing signify the endpoints of a VCC. Virtual Circuit is a more generic, non-ATM specific term.

## VCI (Virtual Channel Identifier)

VPI and VCI together identify a virtual channel link on an ATM interface.

## Vendor Files

Entuity identifies the device type of discovered devices by matching their sysoid to that held against the device support datasets. Device support dataset definitions are held in, listed here in order of precedence, individual vendor files, bin.vendor file, newbin.vendor file, and then uncertified file.

*vendinfo* identifies the vendor information available to Entuity and the decisions made when more than one vendor file is available for a particular sysoid; which vendor device definition Entuity uses to manage that device type.

| File Type | Description |
|---|---|
| individual vendor files | When Entuity does not currently manage a device that you require it to, you can request your Entuity support representative for an appropriate vendor file. Those non-standard definitions are listed in entuity_home/etc/exotica. Only when a vendor file is moved to entuity_home/etc does Entuity use that definition. |
| bin.vendor file | File includes the default vendor file definition |
| newbin.vendor file | File includes device type definitions generated by earlier versions of Entuity. |
| uncertified file | File includes device type definitions created by Entuity, using proliferate with the -g parameter. Devices of this type are considered as Unclassified Devices. |

## View

All network objects within Entuity are displayed through views. View filters allow you to restrict the displayed objects in the view to the ones you are interested in. You can also use user profiles to control access to different views.

## Virtual Channel Links (VCLs)

A VCC consists of the concatenated VCLs. A VCL is a means of unidirectional transport of ATM cells between the points where a VCI value is assigned and the point where the value is translated or removed. The VPI and VCI within the ATM cell header associates each cell with a particular VCL over a given physical link.

## Virtual Circuit

A Virtual Circuit is a generic term for an association established between two or more endpoints for the purpose of user-user, user-network, or network-network information transfer. An example would be ATM's VCC.

### Virtual Port

Entuity distinguishes between physical and virtual ports using interface type. If required System Administrators can amend the virtual port identifier.

### VLAN

A logical association that allows users to communicate as if they were physically connected to a single LAN, independent of the actual physical configuration of the network.

### VM Platforms

Entuity currently manages Oracle and VMware VMs through its VM Platform device type. Entuity communicates with VMs and their hypervisors through the VM's SDK. This requires specification of different connection attributes when compared to devices of other types. It also requires that all VMs are added to Entuity with a **Ping Only** management level, as this allows the selection of the VM Platform type and its connection configuration. When adding VMs using autoDiscovery care must be taken to ensure candidate device VMs are always added as **Ping Only**.

### VPD (Vital Product Data)

VPD is information about a device that is stored on a computer's hard disk (or the device itself) that allows the device to be administered at a system or network level. Typical VPD information includes a product model number, a unique serial number, product release level, maintenance level, and other information specific to the device type. Vital product data can also include user-defined information, such as the building and department location of the device. The collection and use of vital product data allows the status of a network or computer system to be understood and service provided more quickly.

### VPI (Virtual Path Identifier)

VPI identifies a virtual path leg on an ATM interface.

### VRF (Virtual Routing and Forwarding)

VRF allows multiple instances of a routing table to co-exist within the same router at the same time. Because the routing instances are independent, the same or overlapping IP addresses can be used without conflicting with each other.

### VTP (VLAN Trunk Protocol) Domain

A VTP domain consists of one or more connected switches that share the same VTP domain name. A switch can be configured to be in one and only one VTP domain. The vtpDomainTool generates a view that groups devices and VLANS by this VTP domain name.

## Wireless Controller (WC)

A network attached device that coordinates traffic to and from Lightweight Wireless Access Points (LAPs). It provides centralized control over the configuration and dynamic behavior of potentially many LAPs.

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