SEM for AudioCodes Media Gateways and Servers

SEM | **Session Experience Manager**

User's Manual
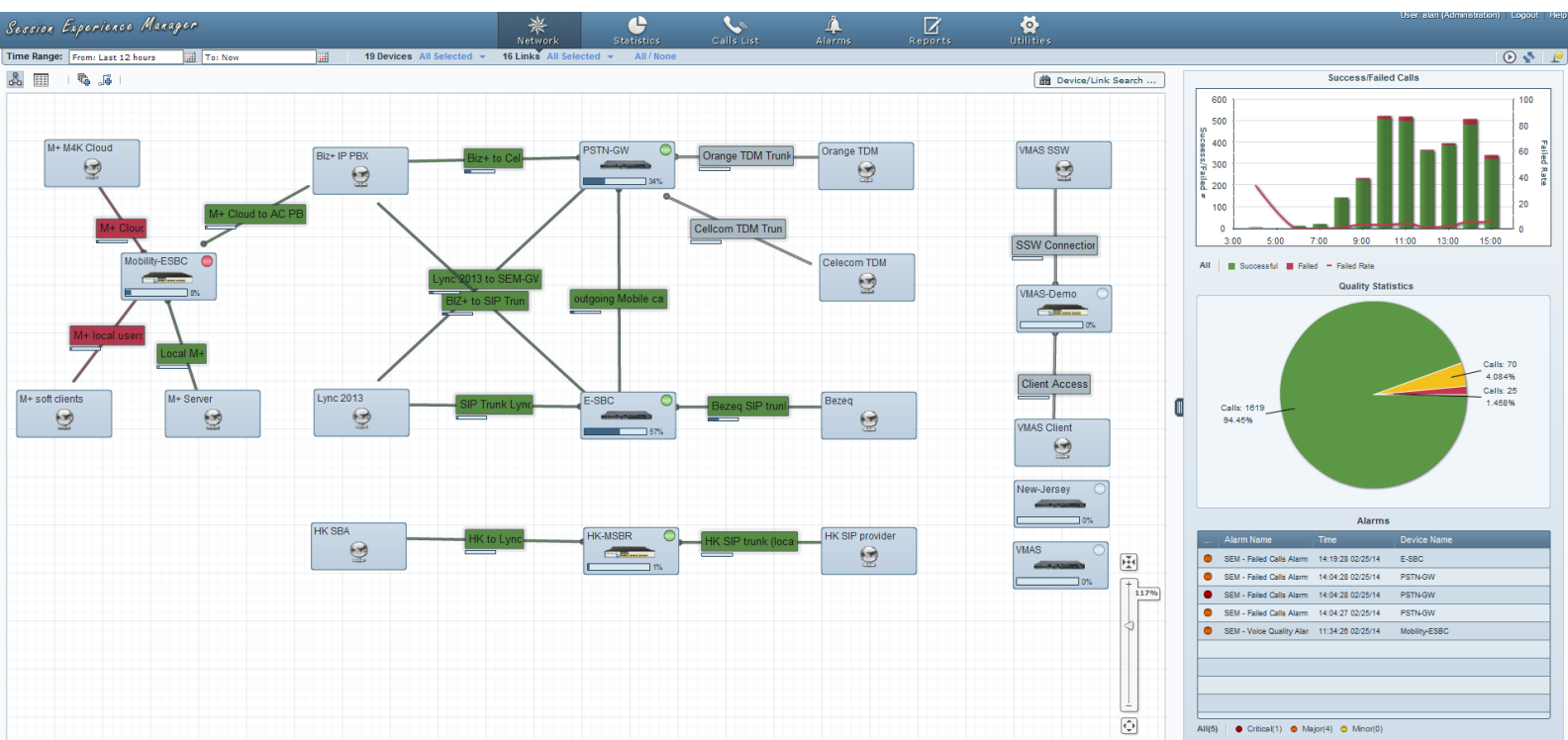
Version 6.8

![AudioCodes logo]

Table of Contents

List of Figures

List of Tables

Reader's Notes

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Related Documentation

Manual Name
Mediant 9000 SBC User's Manual
Mediant 4000 SBC User's Manual
Mediant 2600 E-SBC User's Manual
Mediant SE SBC User's Manual
Mediant SE-H SBC User's Manual
Mediant VE SBC User's Manual
Mediant VE-H SBC User's Manual
Mediant 3000 Media Gateway User's Manual
Mediant 2000 Media Gateways User's Manual
Mediant 1000B Gateway and E-SBC and Mediant 1000B MSBR User's Manual
Mediant 800B Gateway and E-SBC and Mediant 800B MSBR User's Manual
Mediant 500 E-SBC User's Manual
Mediant 500L MSBR and Mediant 500 MSBR User's Manual
MediaPack 11x (MP-11x) Media Gateway User's Manual

1 Session Experience Manager

1.1 Overview

AudioCodes' Session Experience Manager (SEM) is a valuable new tool that delivers important technical and business statistics based on AudioCodes methodologies developed over years of experience in VoIP.

The SEM provides real-time management of VoIP traffic, giving VoIP network administrators a network health monitoring functionality that includes alarms and diagnostics capability.

This document shows how to deploy and utilize the SEM to maximum advantage, to enhance the quality of experience enjoyed by VoIP users.

1.2 Specifications

Table 1-1: Specifications

Session Experience Management	▪ Modular tool with separate views for Network, Statistics, Calls, Alarms and Reports. ▪ Graphic representation of managed devices/links in a Table, Map and Regions view with a popup summary of critical metrics. ▪ Voice quality diagnostics for devices/links and users in the VoIP network. ▪ Real-time, as well as historical monitoring of VoIP network traffic health. ▪ Call quality rating metrics (MOS, jitter, packet loss, delay (or latency) and echo). ▪ Call trend statistics according to key metrics, traffic load, average call duration and call success. ▪ SEM alerts based on user defined call success rate and quality thresholds. ▪ Active alarms and history alarms display. ▪ Monitoring of links quality between AudioCodes and non-AudioCodes devices such as Microsoft Lync 2010 Server. ▪ Filtering according to time range, devices and links.

1.3 SEM Monitored Devices

The following devices can be monitored by the SEM:

■ Mediant 9000 SBC

■ Mediant 4000 SBC

■ Mediant 2600 E-SBC

■ Mediant SE SBC

■ Mediant SE-H SBC

■ Mediant VE SBC

■ Mediant VE-H SBC

■ Mediant 3000 Media Gateways

- Mediant 2000 Media Gateways

- Mediant 1000B Gateway and E-SBC and Mediant 1000B MSBR

- Mediant 800B Gateway and E-SBC and Mediant 800B MSBR

- Mediant 500 E-SBC

- Mediant 500L MSBR and Mediant 500 MSBR

- MediaPack 11x (MP-11x) Media Gateways

Note that all the devices monitored by the SEM should be version 6.8.

1.4 How the SEM Benefits VoIP Network Administrators

The SEM enables VoIP network administrators to do the following:

- Quickly identify the metric or metrics responsible for degradation in the quality of any VoIP call made over the network.

- Accurately diagnose voice quality problems in response to VoIP user criticism.

- Prevent VoIP quality degradation.

- Optimize quality of experience for VoIP users.

1.5 Measuring Voice Quality in a VoIP Network

The following important metrics are factorized into the equation when measuring voice quality of calls made over a VoIP network:

- **Mean Opinion Score (MOS)** (specified by ITU-T recommendation P.800) is the average grade on a quality scale of Good to Failed, given by the SEM to voice calls made over a VoIP network, after testing.
  MOS-LQ = listening quality, i.e., the quality of audio for listening purposes; it doesn't take bi-directional effects, such as delay and echo into account.
  MOS-CQ = conversational quality; it takes listening quality in both directions into account, as well as the bi-directional effects.

- **Jitter,** measured by the SEM, can result from uneven delays between received voice packets. To space evenly, the jitter buffer adds delay. The higher the measurement, the greater the impact of the jitter buffer's delay on audio quality.

- **Packet Loss**, measured by the SEM, can result in choppy voice transmission. Lost packets are RTP packets that aren't received by the voice endpoint for processing.

- **Delay** (or latency), calculated by the SEM, is the time it takes for information to travel from source to destination (round-trip time). Sources of delay include voice encoding / decoding, link bandwidth and jitter buffer depth.

2   Configuring Devices to Measure QoE and Report to the SEM

This section describes how to measure QoE and Report to the SEM.

2.1   Generic Device Configuration

➢   **To provision an AudioCodes device to report quality metrics to the SEM:**

■   In the Navigation pane, select **VoIP** > **Media** and then in the Configuration pane, click **Quality of Experience**. The following screen is displayed:

Figure 2-1: Quality of Experience

Table 2-1: Quality of Experience Parameters

Parameter Name	Description	Values
Server IP	The IP address of the EMS server.	For the parameter to take effect, the device must be reset.
Port	TCP port of the EMS server to which to send metrics. Default = 500.	Range=0-65534 Default=5000
Interface Name	The IP network interface on which the quality experience reports are sent. The default is "DEFAULT".	String of up to 64 characters. For the parameter to take effect, the device must be reset.

➢ **To provision an AudioCodes device to use EMS Server NTP server as Device NTP server:**

1. In the Navigation pane, choose **System ▶ Device Info ▶ System Settings Frame**. The following screen is displayed:

Figure 2-2: System Settings Provisioning

2. Configure 'NTP Primary Server IP Address' to be EMS Server IP.

2.1.1 SEM Time Synchronization Alarm

If the SEM server is unsynchronized with a device in the network, an alarm is sent. Associated with the unsynchronized device, the alarm has two severity levels: Critical / Clear. If the difference between the Server Time and the Device Time is less than one minute, no alarm is sent. If there's a problem, connection with the device is disallowed.

You'll receive the following message if one of the device NTPs is either EMS IP or EMS NTP IP:

NTP configuration is correct, please check your network conditions (Firewalls, Ports, etc.) and make sure that NTP sync of SEM Server and/or Devices is performed correctly.

You'll receive the following message if the EMS IP or the EMS NTP IP are not present as one of the device NTPs:

Please make sure that the time in the SEM server and the device is properly synchronized.

The same feature applies if SEM client-server are unsynchronized. The SEM client notifies you if it's unsynchronized with the NTP server. Client-server time difference should not exceed three minutes (currently) for correct GUI display. When times are unsynchronized, a message pops up notifying you of the server/client times; a red icon appears near the dates filter; position your mouse over it to view the tooltip.

Synchronization status is checked every client-server refresh (same as other stats/calls refresh) but the popup message appears when an unsynchronized status is first encountered. The red icon is cleared when times are resynchronized.

2.2 Voice Quality Metrics Provisioning

The device calculates a score for call quality (the 'color'), based on the device's default values or on provisioned voice quality rules.

In most cases, you can use the device's voice quality metrics default values. However, voice quality provisioning may be used under the following circumstances:
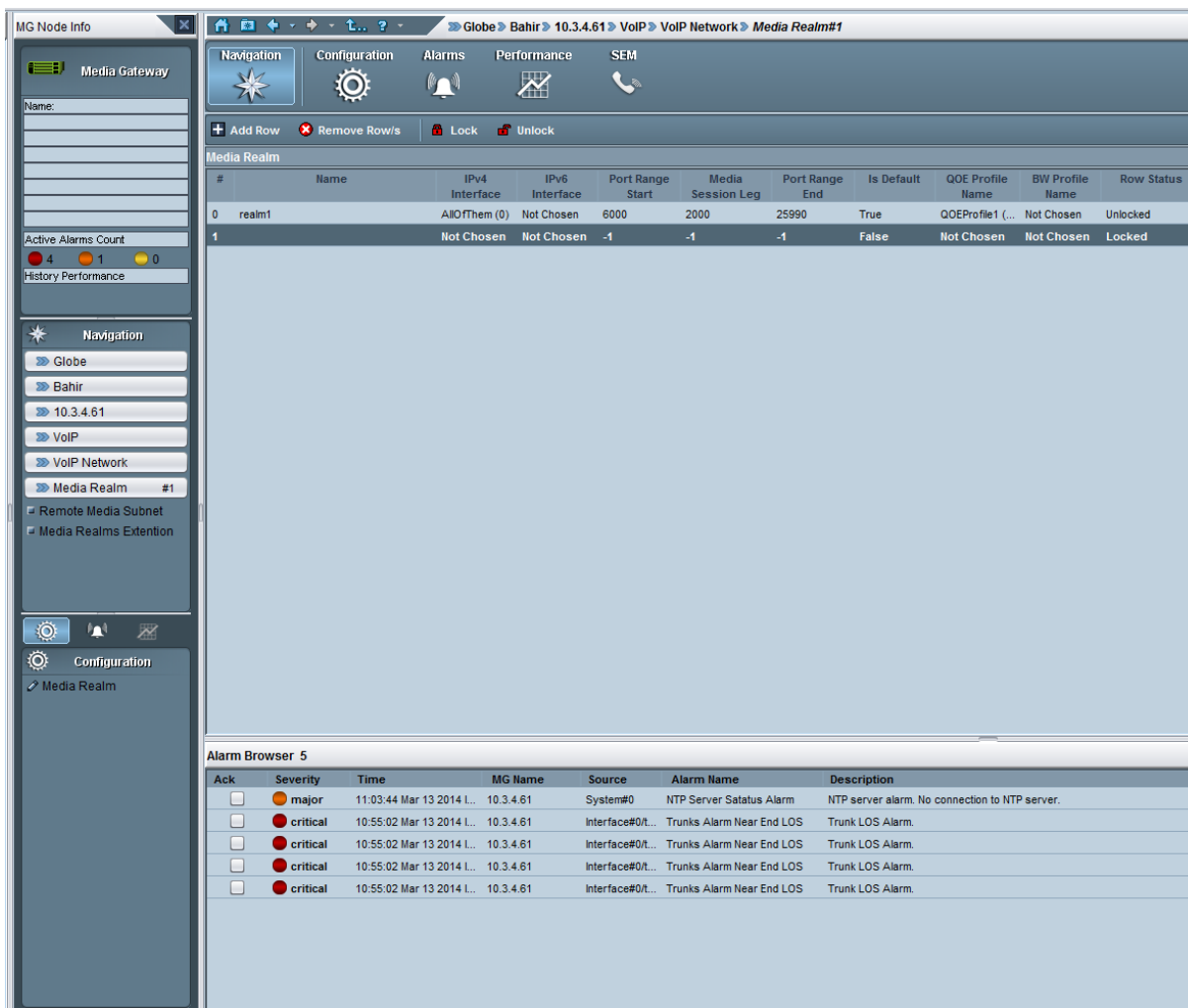
■ When you know the specific sensitivity level in one or more Media Realms

■ When you wish to base voice quality measurement on a specific parameter (MOS, Packet Loss, Jitter or Delay).

When voice quality provisioning is used, voice quality rules are defined for each device's Media Realm. In SIP gateways, a different Media Realm is usually defined for each direction and the voice quality rules are also different. For example, when a Media Realm is defined for a high-quality VoIP network, it's advantageous to utilize high-quality sensitivity settings. Conversely, it's recommended to utilize a low-quality sensitivity level for a Media Realm in an inferior-quality VoIP network.

> ➢ **To provision Voice Quality rules:**

1. In the Navigation pane, select **VoIP** ▶ **VoIP Network** and then choose **Media Realm** -or- **Remote Media Subnet** -or- **Media Realms Extension**. The Media Realm table is displayed.

Figure 2-3: Media Realm Table

Figure 2-4: Remote Media Subnet
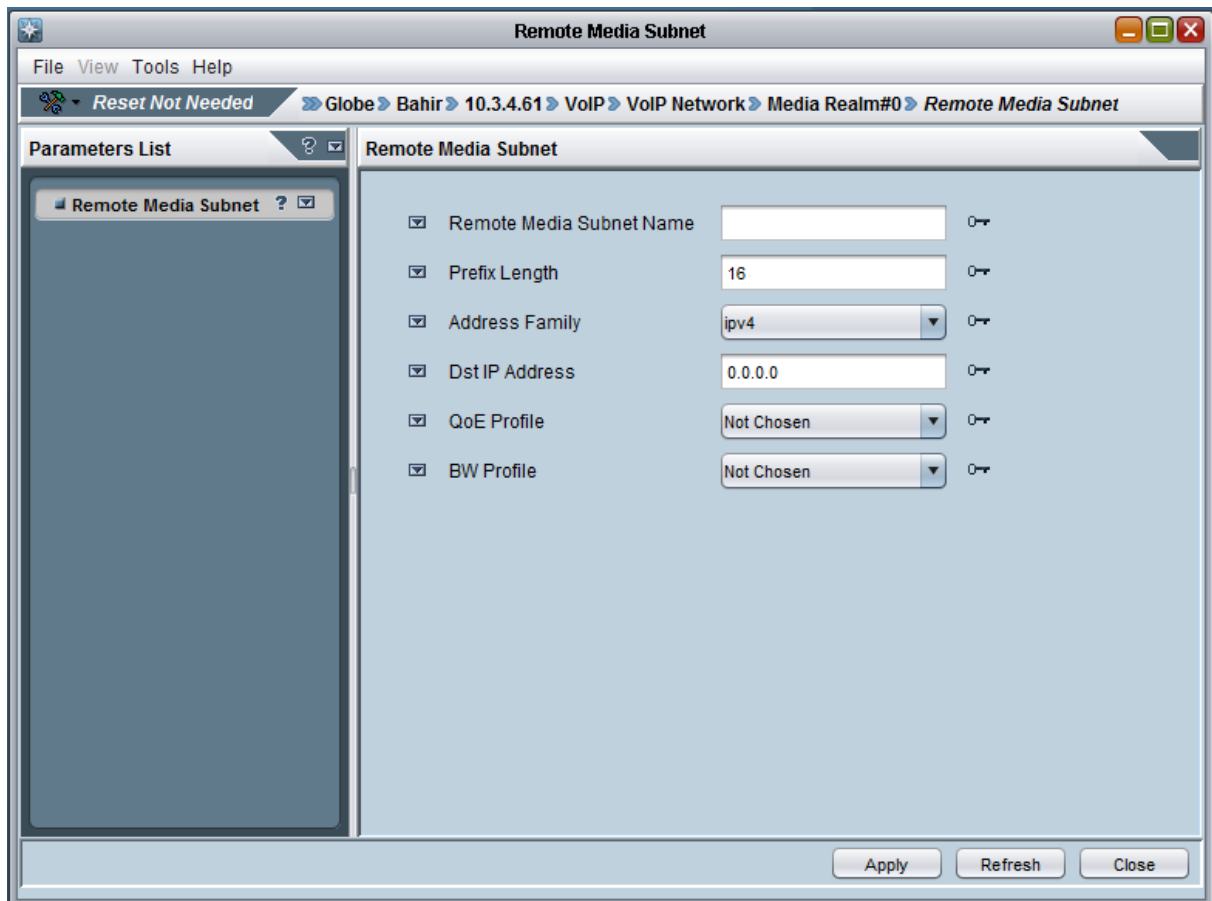
2.   In the Media Realm table, select an entry and then in the Configuration pane, select **Media Realm**; the Media Realm screen is displayed.

3. In the Media Realm table, select an entry and then in the Navigation pane, select **Voice Quality Rule**. The Voice Quality Rule table is displayed.

Figure 2-5: Voice Quality Rule Table

4. In the Voice Quality Rule table, click ⊞ to add an entry and then in the Configuration pane, select **Voice Quality Rules**. The Voice Quality Rules provisioning screen is displayed.

Figure 2-6: Voice Quality Rules Provisioning
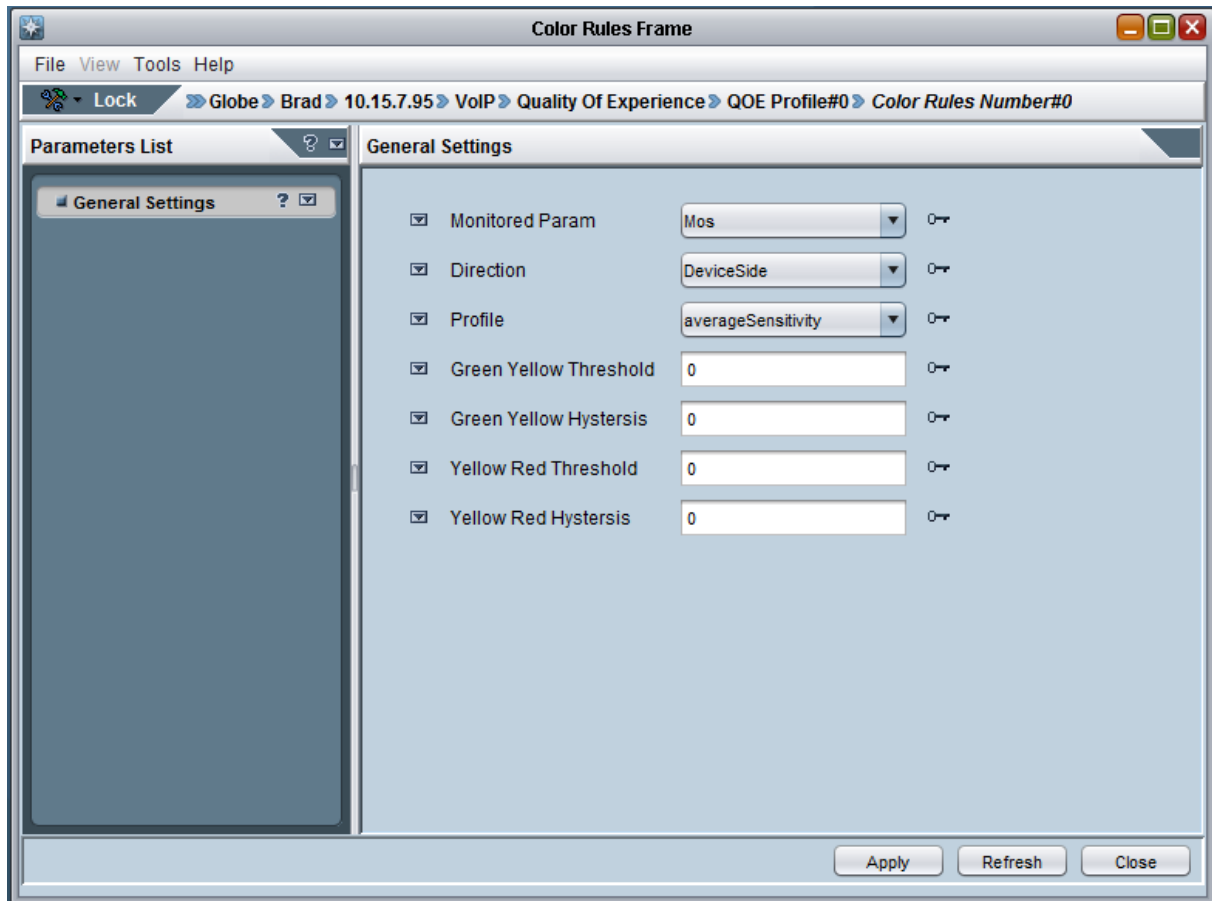
5. From the 'Monitored Parameters' drop-down list, select a Monitored parameter upon which to define Voice Quality Rules.

6. From the 'Profile' drop-down list, select the desired Sensitivity Level; the Threshold and Hysteresis values are updated accordingly (see the table below for appropriate values for each parameter sensitivity level).

Note that if you choose 'No Profile', each parameter field can be manually updated.

The table below shows the monitored parameters MOS, Delay, Packet Loss and Jitter, each associated with each of the 3 sensitivity-level profiles: Low, Default and High. Each parameter's Green-Yellow Threshold and Yellow-Red Threshold differ in association with the configured Profile.

Hysteresis is the amount of fluctuation from a Threshold. A report is sent only after the Hysteresis is exceeded. Hysteresis is used to avoid false reports being sent.

For each monitored parameter, administrators can use Threshold and Hysteresis in the predefined Profile, or define their own Threshold and Hysteresis.

Table 2-2: Voice Quality Profile Parameters

Parameter (units)	Sensitivity Level	Green-Yellow Threshold Green → Yellow	Yellow-Red Threshold Yellow → Red	Hysteresis
MOS (value/10)	Low	34	27	10
	Medium	35	28	
	High	36	29	
Delay (msec)	Low	200	1200	40
	Medium	160	500	
	High	140	400	
Packet Loss (%)	Low	6	15	2
	Medium	5	13	
	High	4	11	
Jitter (msec)	Low	45	90	10
	Medium	40	80	
	High	35	70	
Echo	Low	23	9	3
	Medium	25	10	
	High	27	11	

7. Click **Apply** to save the changes.

3   Starting the SEM Tool

After installing EMS version 6.4 or later (see the *EMS Server IOM Manual*), click the **SEM** button on the Desktop toolbar of the EMS main screen. The tool opens in your browser (Internet Explorer) in the Network page, map view (default).

By default, all VoIP devices managed in the network are displayed. By default, data on calls made in the Time Range of the past 3 hours are displayed.

To familiarize yourself with the various areas of the GUI, see the figure below and the table below it.

Figure 3-1: SEM GUI Areas
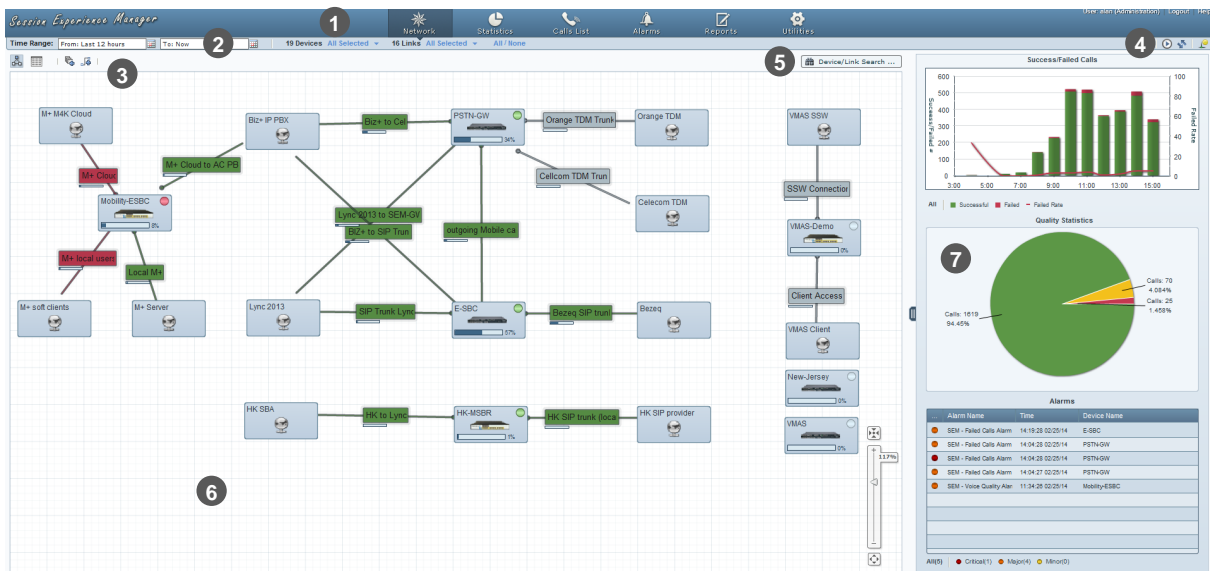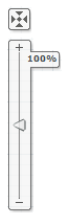
Table 3-1: SEM GUI Areas

#	GUI Area	Description
1	Toolbar	Toolbar icons let you navigate to the following SEM pages: Network (default), Statistics, Calls List, Alarms, Reports and Utilities.
		Username (read-only); Logout; Help (pending)
2	Filters	Time Range, Devices, Links
3	Actions Bar	▪ Map view / Table view ▪ Add Non ACL Device ▪ Add Link
4	Refresh Functionalities	⊙ ⊙ [Start/Stop Auto Refresh] Switches on/off automatic page refresh.
		↱ [Refresh Now] Refreshes the page
		🔵 Connected or 🔴 Disconnected (read-only).
5	Search	Lets you locate specific information in Network view, Calls List and Alarms view.
6	Main Screen	Each SEM view's main working area. In Network view, for example, the main screen displays devices configured on the EMS server.
		⊡ 100% Zoom
		⊡ = Save devices locations
7	Summary Panes	Network view shows summarizes for Call Performance, Quality Statistics and Alarms. Statistics view shows summaries for Top Fail Reasons, Quality Statistics and Avg. Utilization.
		Click ▶ to hide the summary panes and expand the main screen.

4 Filtering to Display Specific Info

Filters let you exclude unwanted information from the Network, Statistics, Calls List, Alarms and Reports pages. Filters let you display only information you require:

Figure 4-1: Filters

| From: Last 3 hours | To: Now | 19 Devices All Selected ▼ | 16 Links All Selected ▼ | All / None |

Table 4-1: Filters

Filter	Description
Time Range	Lets you display time range-specific information.
Devices	Lets you display device-specific information.
Links	Lets you display information on specific communication paths (links) between devices.

Filters can help you speed access to required information.

> **Note:**
>
> - Filters apply to AudioCodes devices only.
> - To filter a device, select **None** in the Links filter and then select the device in the Devices filter.
> - After defining a filter, it remains unchanged in all views until the next time you set a new filter. You can filter again in any view, any time.

4.1 Filtering by Time Range

This section shows how to filter by time range.

4.1.1 Quick Filters

You can filter by time range using use quick filters.

➢ **To use a quick filter:**

1. On the filters bar, click the 'From' or 'To' field:

Figure 4-2: Time Filter
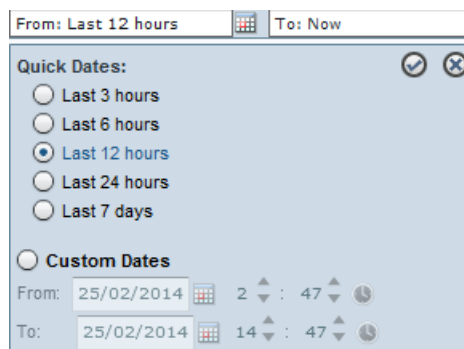
2. Under 'Quick Dates', select a time range and click ⊘; filtering is performed; the filter bar shows this:

Figure 4-3: Filter Bar Showing Quick Date
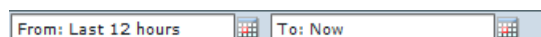
4.1.2 Custom Filters

This section describes how to custom filters.

➢ **To customize a time range filter:**
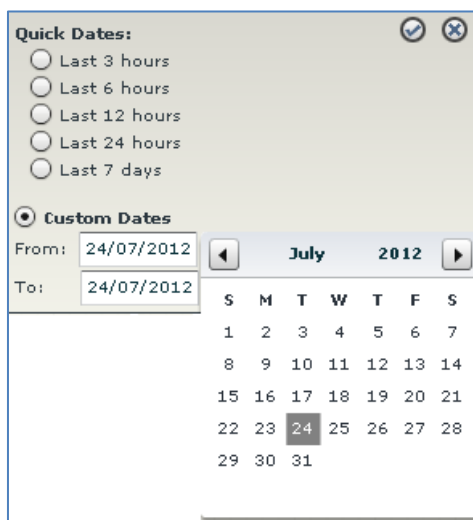
1. On the Filter bar, click the 'From' field or the 'To' field and select the **Custom Dates** option:

Figure 4-4: Time Range Filter - Custom

2.   Under **Custom Dates**, define the **From** date and then **To** date using the 🖩 calendar icon:

Figure 4-5: Time Range Filter – Custom Dates

3.   Define the time of day/night, if you require, using ▲▼.

4.   Click the ⊘ icon to accept; the filtering process is performed and the Filter bar shows the following:

Figure 4-6: Filter Bar - From Date-To Date

4.2 Filtering by Device

You can filter from a list of AudioCodes devices currently connected to the EMS server.

➢ **To filter by device:**

1. On the Filter bar, click the 'Devices' drop-down list.

Figure 4-7: Devices Filter
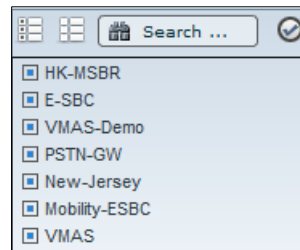
2. Do one of the following:

   - Click the **Select All** icon to automatically select all devices (save the time of manual selection) -OR-

   - Click the **Select None** icon to clear all selections (save the time of manually clearing) -OR-

   - Individually select each device for the SEM to display

   - Search for devices to filter: In the 'Search….' field, enter the name of an AudioCodes device, for example, **sbc**, as shown in the figure below; the list is filtered to display only those devices.

Figure 4-8: 'Search' for Devices to Filter
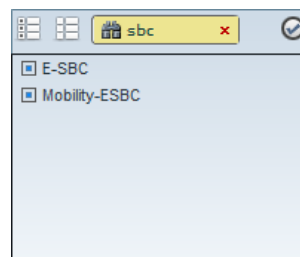
3. Click ⊘; only devices that you selected are displayed in blue; unselected devices are displayed in light gray. If calls were made on a device, a counter bar is displayed showing percentage share of total calls made. Point your mouse over the bar to display the number of calls made on the device:

Figure 4-9: Filter Results
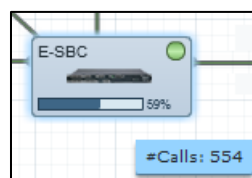
4.3　　Filtering by Links

You can also filter by links. Links are IP communication paths between devices that measure and display key metrics on calls made on them. Links are defined according to IP Group, Trunk Group, Phone Number or SIP IP address.

The 'source' device on which key metrics monitoring is based must be an AudioCodes device. The second device can be an AudioCodes device or a non-AudioCodes device defined by users. Users can define one or more links between devices. The links are displayed in Network Map view. Each device and link status is displayed as 'Red' or 'Green'. If red, then:

■　　Failed Calls threshold is reached (default = 10%)

　　　-OR-

■　　Poor Calls Quality threshold is reached (default = 5%)

Users can define third-party non-AudioCodes devices in Network Map view. The SEM doesn't directly monitor them but enables users to view all relevant devices in the VoIP network and to monitor links with AudioCodes devices.

Most commonly used non-AudioCodes devices are Microsoft Lync Server 2010, IP PBX, ITSP and routers. The SEM can calculate, for example, call quality for the link defined between AudioCodes devices and Microsoft Lync Server 2010 devices. Non-AudioCodes devices are defined by name and IP address.

➢　**To filter by links:**

1.　On the Filter bar, click the 'Links' drop-down list; the links are displayed.

Figure 4-10: Links Filter
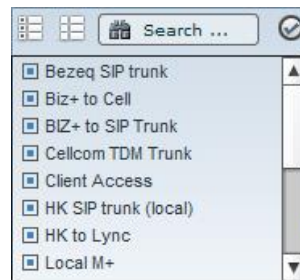
2.　Either:

- Click **Select All** to automatically select all links and save the time of manually selecting -OR-

- Click **Select None** to clear all selections and save the time of manually deselecting -OR-

- Individually select each link for the SEM to display.

After selecting, click **OK**; only links you selected are displayed (in blue); unselected devices are displayed in light gray.

Reader's Notes

5 Displaying VoIP Network Entities

The SEM opens by default on the Network page which you can choose to view in:

■ Map view (default) (shows devices and links located on a map)

■ Table view (shows devices and links in a table).

> **Note:**
>
> • AudioCodes devices must be defined in the EMS for them to be displayed in the SEM. Not all are displayed as the SEM only displays and monitors a supported subset.
>
> • Generic (non-AudioCodes) devices must be defined in the SEM (not in the EMS) for them to be displayed in the SEM, because of links provisioning which applies only to the SEM (see below).

5.1 Map View

On the Actions bar, click the **Map** icon 🔡; VoIP network entities and their links are graphically displayed as icons.

Figure 5-1: Map View
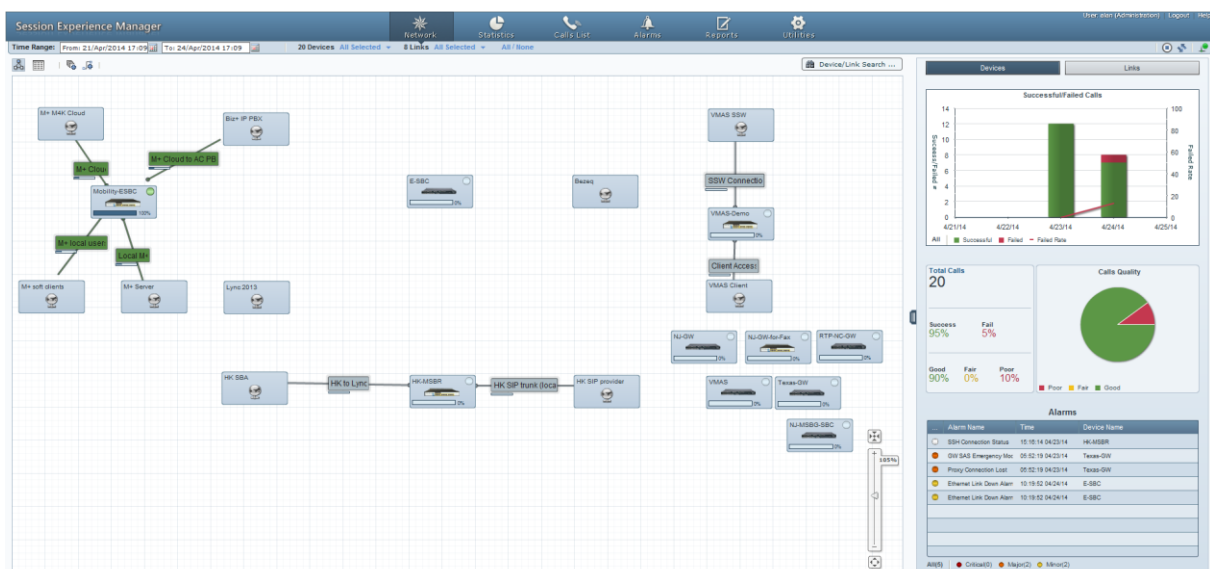
About Map view:

■ Selected entities are displayed light blue; filtered-out entities are displayed in gray.

■ If an entity shows 🔴 it indicates that the percentage of failed calls > 30% *or* that the percentage of poor quality calls > 15%.
If an entity shows 🟢 it indicates that the percentage of failed calls < 30% *and* that the percentage of poor quality calls < 15%.

■ Entities can be positioned or repositioned in the map. After dragging an entity and dropping it in a different location, click **Topology changed! Save devices locations** at the top of the zoom bar. Entity locations are saved per EMS application and not per client. The last saved location determines devices' locations in the map for all users.

■ Three summary panes (to the right) enable quick assessment of (1) successful/failed calls rates (2) quality statistics and (3) alarms.

5.1.1 Viewing Device / Link Information

In Map view, click a device or a link and then click the now-displayed ⓘ; the Device/Link Info popup opens:

Figure 5-2: Device Info / Link Info
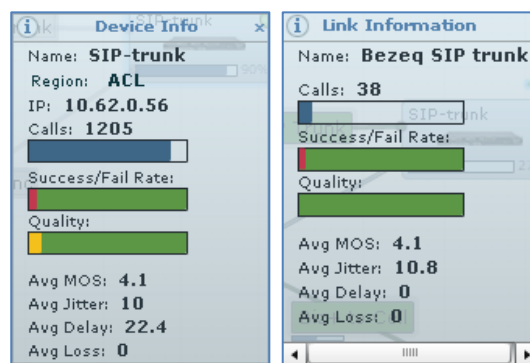
See Section 1.5 on page 12 for quality metrics descriptions.

5.1.2 Performing Device / Link Actions

In Map view, click a device / link and then click the now-displayed ⚙; the Device/Link Actions popup opens:

Figure 5-3: Device Actions / Link Actions
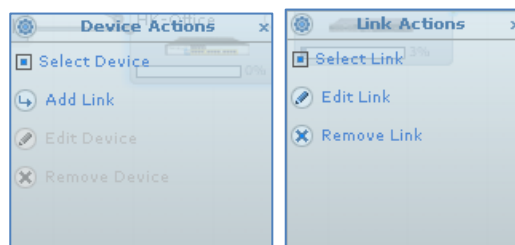
[Device Actions] Select the device, add a link, edit the device or remove it.

[Link Actions] Select the link, edit it or remove it.

5.2   Table View

In addition to viewing the network in map view, you can also view the network as a table. Table view features two options: Devices -or- Links

Click the **Table** icon on the Actions bar; the table displays devices by default:

Figure 5-4: Table View - Devices
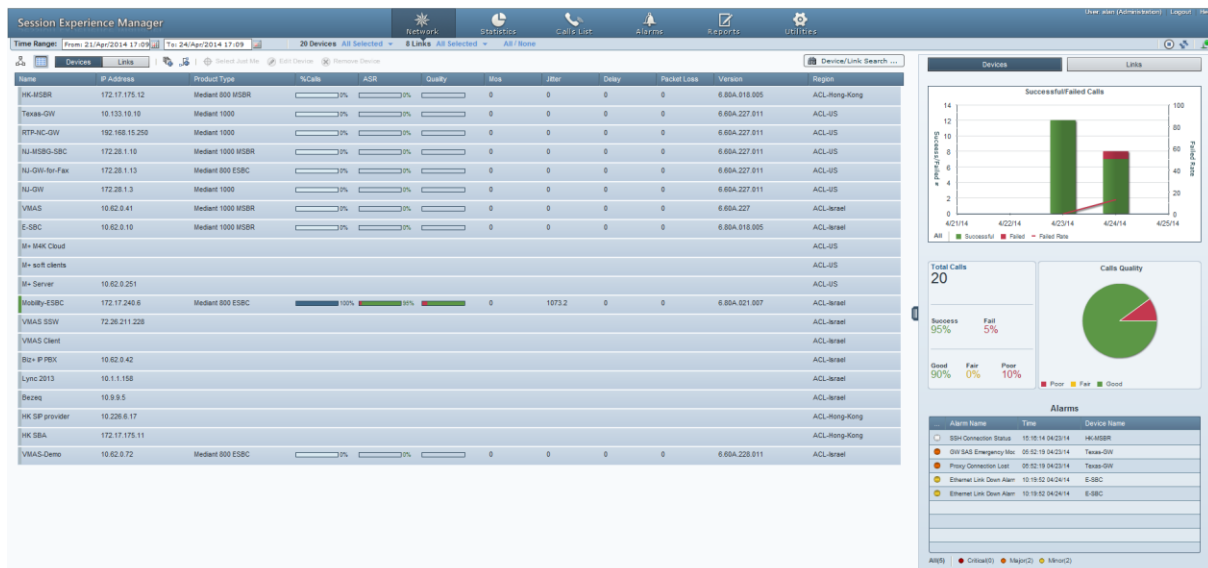
Columns show each device's share of calls as a percentage, ASR (average success rate), Quality distribution, MOS, Jitter, Delay and Packet Loss, allowing you access to specific information and consequently enhancing management efficiency.

To display links in the table, click the **Links** button ; the **Links** button turns navy blue:

Figure 5-5: Table View – Links
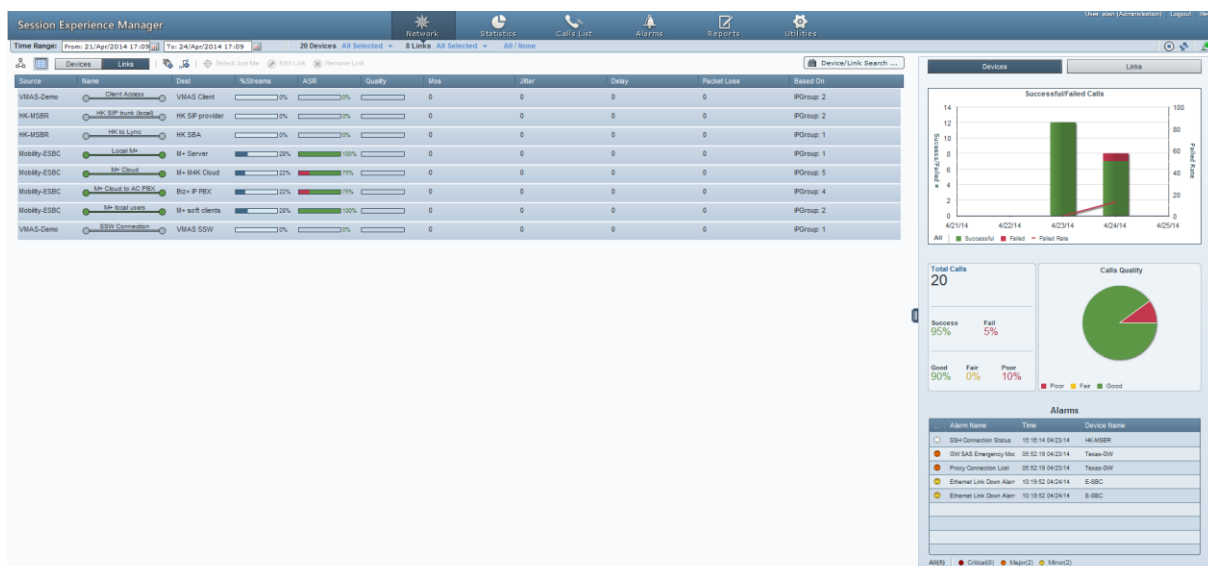
Columns show each link's Source, Name, Destination, %Streams, ASR, Quality, MOS, Jitter, Delay and Packet Loss, allowing you access to specific information and consequently enhancing management efficiency.

Sorting by Column

Table view features sorting by column, enabling administrators to quickly compare across devices/links for enhanced comparative analysis capability.

Tip: Before sorting columns, in the Refresh Page, stop Auto Refresh ⏺ and Start it again ▶ after the sorting results have been displayed.

For example:

➢ **To sort columns according to Network Capacity:**

■ Click the column header and click again if necessary until ▼ shows; entities that consumed the most network capacity are listed highest, and those the least are listed lowest.

■ Click the header again; ▲ shows; entities that consumed most network capacity are now listed lowest, and those the least highest.

5.3   Adding a Generic Device

Generic (non-AudioCodes) devices can be viewed in the SEM if they're supported. To view a generic device in the SEM you must first add it.

➢   **To add a generic device to the SEM:**

1.   Click the icon on the actions bar; this screen opens:

Figure 5-6: Adding a Generic Device

2.   Define the device's Name, IP address and Region and click **Apply**; the device is added and displayed in the SEM.

5.4   Network Health Overview Panes

Both Map and Table views feature three overview panes, enabling at-a-glance assessment of the overall health of the VoIP network.

Figure 5-7: Network Health Overview Panes
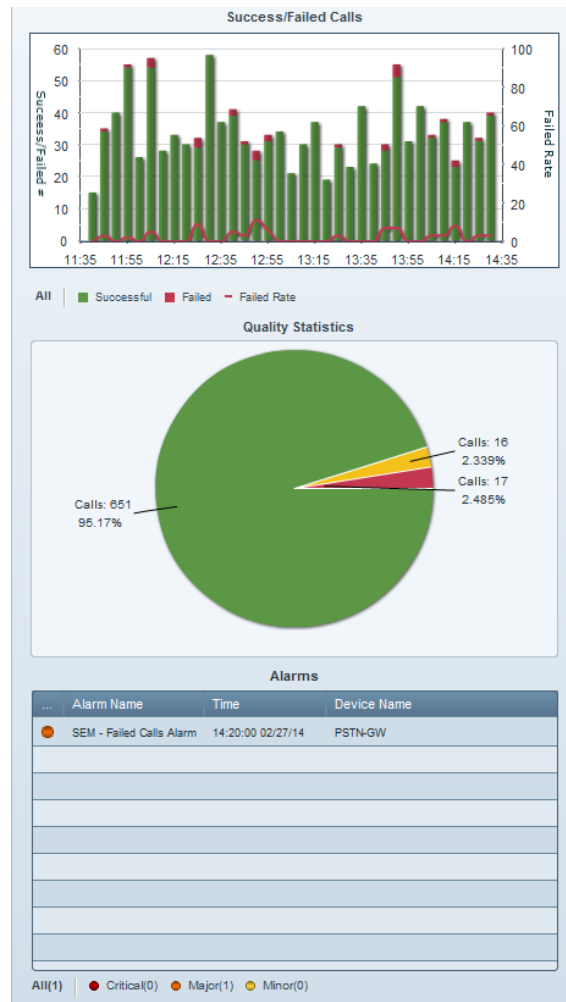
Network health overview panes (top to bottom):

1. **Success/Failed Calls**: Chart enabling quick assessment of the distribution of the rate of successful / failed calls over time.

2. **Voice Quality Pie**: Color-coded pie chart enabling quick preview of the percentage and number of calls whose voice quality was measured as Good (green), Fair (yellow) or Failed (red). Enables quickly identifying the *ratio* of Good/Fair/Failed quality calls. Also indicates the number of calls in each quality category and each category's percentage out of the total number of calls made.

3. **Alarms**: Lists the names of the most recently active alarms, each alarm's Severity level (color-coded), the Time it was received, and the Name of the device triggering it. Sorting by column enhances information accessibility.

5.4.1 Successful/Failed Calls

The 'Successful/Failed Calls' chart displayed in the upper summary pane facilitates quick access to detailed information on calls performance. At a glance you can see the rate of successful calls versus the rate of failed calls distributed over time in 10 minute intervals, where each bar is an interval. The total number of successful and failed calls is indicated below the chart.

➢ **To view information:**

- Point your cursor over a green-coded bar segment; a popup shows the # of successful calls made in that 10-minute interval out of the total # of calls made, the % of successful calls made relative to the total # of calls made in the interval.

- Point your cursor over a red-coded bar segment; a popup shows the # of failed calls made in that 10-minute interval out of the total # of calls made, the % of failed calls made relative to the total # of calls made in the interval.

- Point your cursor over the red-coded line chart; a popup shows the rate of calls that failed during that interval (i.e., Failed Rate) and the end time of the interval.

- Click the **Successful (n)** link below the pie; the Calls List page opens showing information on *all* successful calls in the network (see Section 7 on page 45).

- Click the **Failed (n)** link below the pie; the Calls List page opens showing information on *all* failed calls in the network (see Section 7 on page 45).

- Click a green-coded bar segment; the Calls List page opens showing information on calls that failed in that 10-minute interval (see Section 7 on page 45).

- Click a red-coded bar segment; the Calls List page opens showing information on calls that failed in that specific 10-minute time interval (see Section 7 on page 45).

5.4.2 Voice Quality Pie

The pie chart facilitates quick access to information related to calls' voice quality. At a glance, you can see the % and # of calls whose voice quality was good relative to the % and # of calls whose voice quality was fair (for example).

➢ **To view information:**

Point your cursor over a *green* / *yellow* / *red* / *gray* pie segment; the % and # of calls whose voice quality was graded *good* / *fair* / *poor* / *unknown* pops up.

➢ **To view detailed information:**

Click a *green / yellow / red / gray* pie segment; the Calls List page opens showing detailed information on calls whose voice quality was graded *good* / *fair* / *poor* / *unknown* (see Section 7 on page 45).

5.4.3 Alarms

The 'Alarms' table pane displayed in the lowermost summary pane facilitates quick access to alarms-related information. At a glance you can see how many alarms are currently active (All) and how many there are of each Severity level (Critical, Major, Minor).

➢ **To view detailed information:**

Click the **All (n)** link; the Alarms page opens showing alarms of all Severity levels and detailed information on them (see Section 8 on page 63).

Click the **Critical (n)** / **Major (n)** / **Minor (n)** link; the Alarms page opens showing alarms of that specific Severity level and detailed information on them (see Section 8 on page 63).

6 Displaying Statistics

The Statistics page opens by default in Comparative View, displaying three charts (top to bottom):

■ Successful / Failed Calls (see Section 6.1 on page 39 below)

■ Calls Quality (Good, Fair, Poor or Unknown) (see Section 6.2 on page 39 below)

■ Utilization Distribution (Rx/Tx Rate Kbit/sec) (see Section 6.3 on page 40 below)
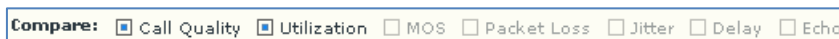
Figure 6-1: Statistics – Comparative View (Default)
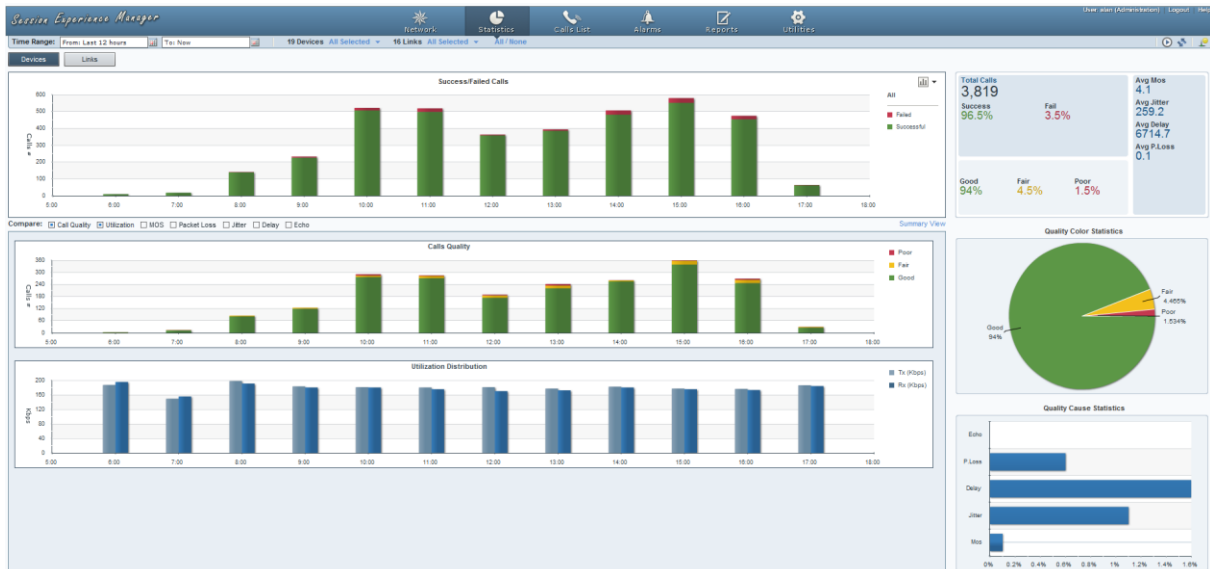
The page lets you compare statistics and identify correlations and patterns for diagnosis and optimization of VoIP network health.

The **Compare** options, located below the uppermost chart, enable this:

Figure 6-2: Compare Options

Select the **Utilization** option and deselect the others; the Statistics page displays the Successful / Failed Calls chart and the Utilization Distribution chart:

Figure 6-3: Comparing Successful/Failed Calls with Utilization Distribution
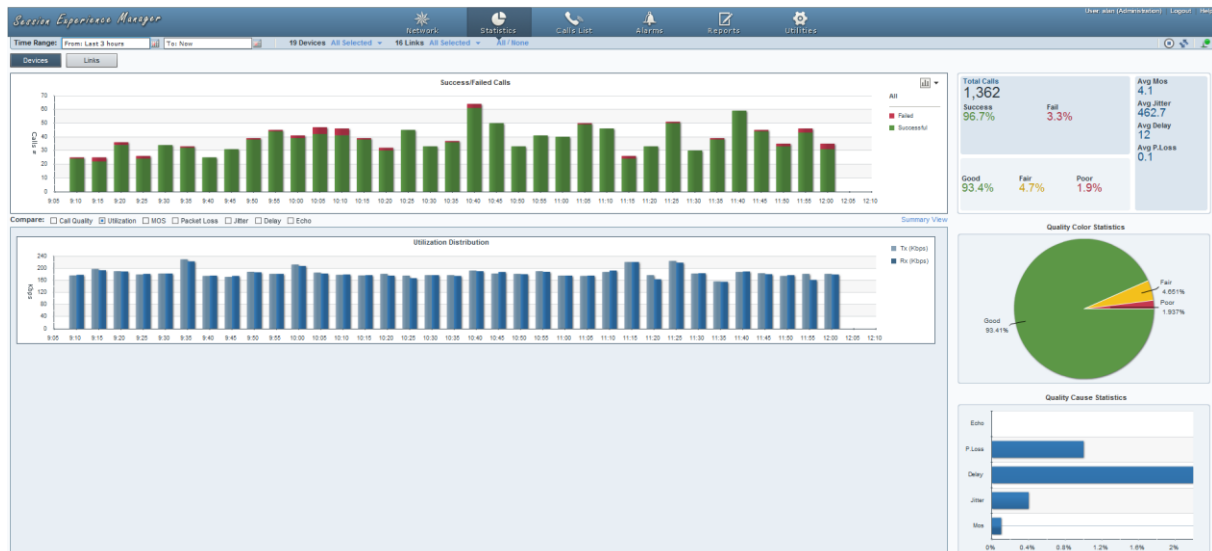
The Successful / Failed Calls chart is always displayed, by default. You can opt to show / hide any of the others, i.e., Utilization, MOS, Packet Loss, Jitter, Delay and/or Echo, to quickly identify correlations.

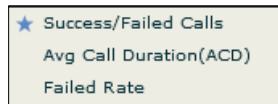## 6.1   Success/Failed Calls Chart

The Success/Failed Calls chart shows by default the distribution of successful / failed calls over time. Click the chart's title; this menu pops up:

```
★ Success/Failed Calls
  Avg Call Duration(ACD)
  Failed Rate
```

You can select:

■   Average Call Duration (ACD) -OR-

■   Failed Rate

All three measurements are displayable as bar chart or linear chart. To select bar chart or linear chart, click 📊 ▾

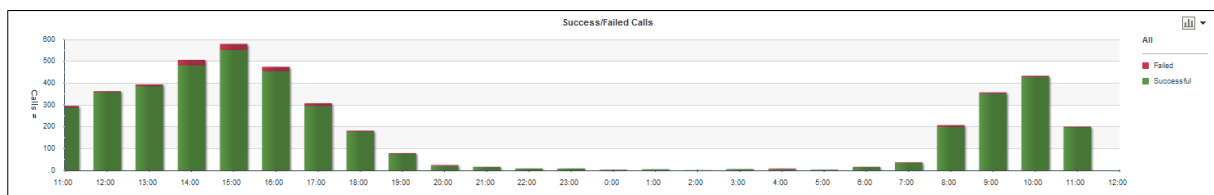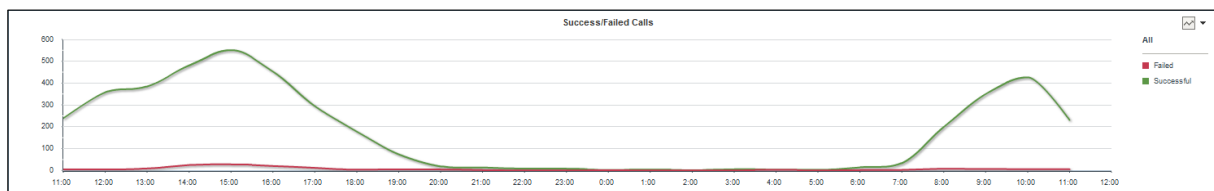**Figure 6-4: Success/Failed Calls – Linear Chart**


Figure 6-5: Successful/Failed Calls – Bar Chart

Users can display this chart for at-a-glance assessment of calls performance. The chart shows *when* successful calls peaked compared to *when* failed calls peaked. This can then quickly be compared with Calls Quality, Utilization Distribution, MOS, Packet Loss, Jitter, Delay or Echo charts, to identify correlation and make a diagnosis.

6.2   Calls Quality Chart

The Calls Quality bar chart shows the distribution of voice quality of calls over time. A glance at the chart shows when and in what measure voice quality of calls scored 'Good' (green), 'Fair' (yellow) and 'Fail' (red). Gray indicates unknown voice quality.

The Calls Quality chart is displayed as a bar chart.

Figure 6-6: Calls Quality Bar Chart
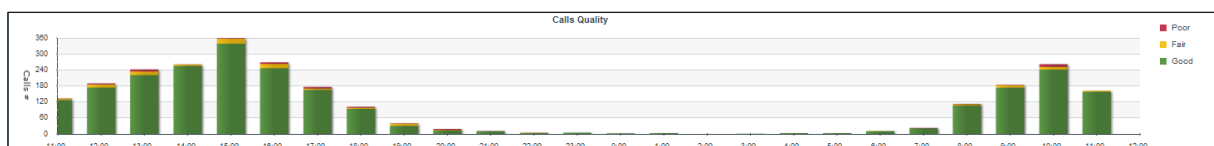
■ Point the cursor over a color-coded bar segment in any time period; a popup (see below) shows the time the period ended, the number and percentage of calls made whose quality scored in the category represented by the color-coded bar segment, and the total number of calls made in the period.

Figure 6-7: Calls Quality Bar Chart - Popup
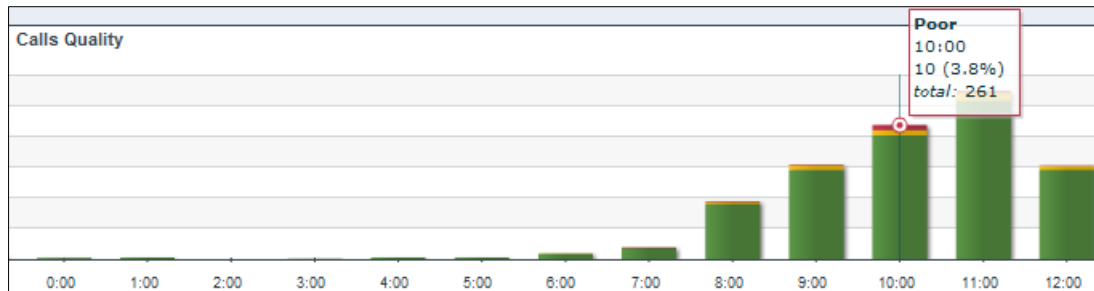
■ To view detailed information on calls scoring 'Good', 'Fair' or 'Poor' in any time interval; click the relevant color-coded segment of the bar; the Calls List page opens (see Section 7 on page 45).

■ To view information on *all* calls whose voice quality scored:

  • 'Poor' - click the **Poor (n)** link; the Calls List page opens

  • 'Fair' - click the **Fair (n)** link; the Calls List page opens

  • 'Good' - click the **Good (n)** link; the Calls List page opens (see Section 7 on page 45).

Compare Calls Quality to Utilization Distribution, MOS, Packet Loss, Jitter, Delay and/or Echo. Use the **Compare** check boxes located below the Success/Fail Calls chart to select a measurement for which to compare.

If for example, you identify a correlation over time between 'Failed' quality calls, and Jitter, then this metric is the reason for the quality failure.

6.3 Utilization Distribution Chart

The Utilization Distribution chart shows distribution of network utilization over time. A glance at the chart shows when a high rate (in Kbps) was received or transmitted. The chart thus indicates when a network is congested or uncongested, i.e., when voice quality scores may be lower.

The chart is by default displayed as a bar chart; however, is also displayable as a linear chart, selectable from the dropdown.
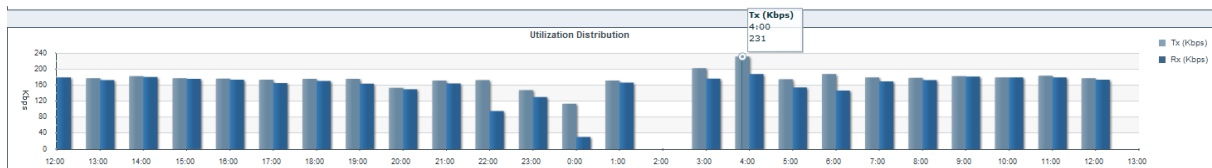
Figure 6-8: Utilization Distribution Chart
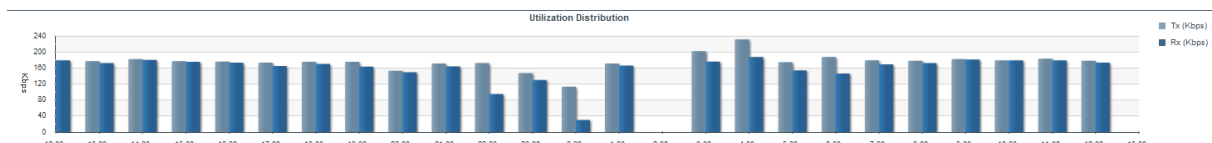
To view information on a specific time period, position the cursor over the bar representing the time period; a popup (see below) pops up showing the time at which

the period ended, the Rx / Tx rate in Kbps, and the kilobits consumed per second during the time period.

Figure 6-9: Utilization Distribution Chart – Popup

6.4 Summary View

You can view the Statistics page in summary view in addition to viewing it in the default Comparative View: Click the **Summary View** link located below the Success/Failed Calls pane:

Figure 6-10: Statistics Page - Summary View - 'Call Quality' Selected as Primary Chart
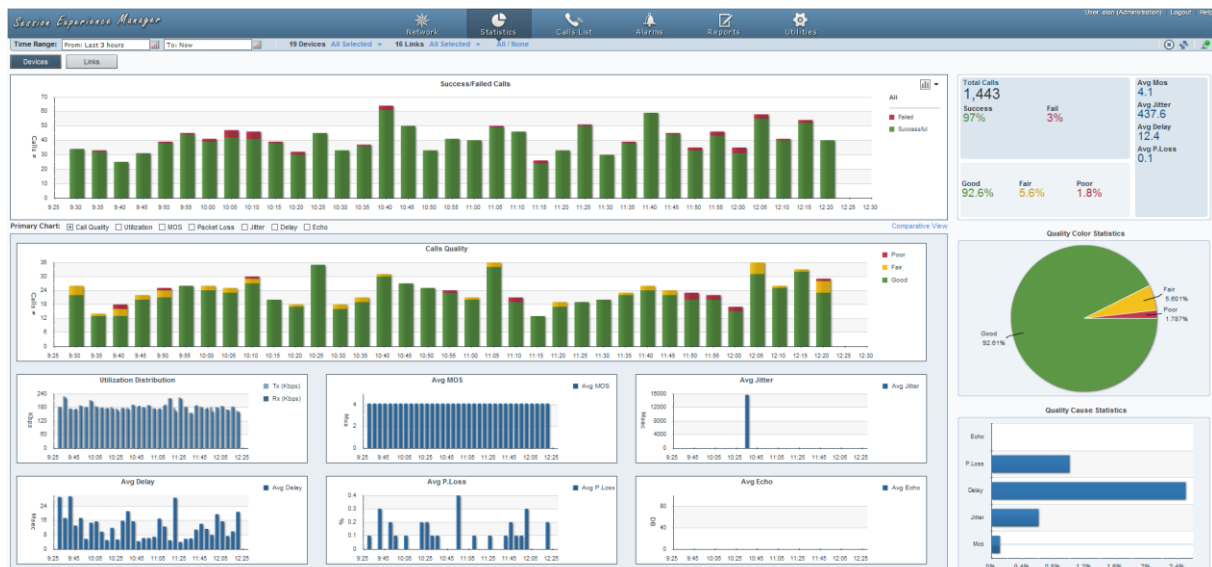
The figure above shows the Statistics page in Summary View. **Primary Chart** options are now displayed instead of **Compare** options. The option selected is displayed below the Success/Failed Calls chart (always displayed by default). Summary View displays the *un*selected metrics. In the figure above:

■ Utilization Distribution (identical to Comparative View, only condensed). Point your mouse over a bar to determine the transmitted (Tx) or received (Rx) kbps at that time. Click the link **Tx (Kbps)** or **Rx (Kbps)** to view either.

■ Average MOS. Point your mouse over a bar to determine the precise average MOS scored at that time.

■ Average Jitter. Point your mouse over a bar to determine the precise average jitter measured at that time, in milliseconds.

■ Average Delay. Point your mouse over a bar to determine the precise average delay measured at that time, in milliseconds.

■ Average Packet Loss. Point your mouse over a bar to determine the precise

average packet loss, as a percentage of the total number of packets sent, measured at that time.

■ **Average Echo**. Point your mouse over a bar to determine the precise average echo measured at that time, in DB.

If **Utilization** is selected as **Primary Chart**, then **Call Quality** is included in Summary View, as shown in the figure below.

Figure 6-11: Statistics Page - Summary View - 'Utilization' Selected as Primary Chart

■ **Call Quality**. Identical to Comparative View, only condensed. See Section 6.2 for a detailed information.

> **Note:** See Section 1.5 for descriptions of the voice quality metrics.

6.5   Network Health Overview Panes

The Statistics page displays three panes located to the right of the charts, enabling at-a-glance assessment of the VoIP network's overall health statistics (top to bottom):

■   **Total Calls**

■   **Voice Quality Pie**

■   **Voice Quality Metrics**

Figure 6-12: Network Health Overview Panes
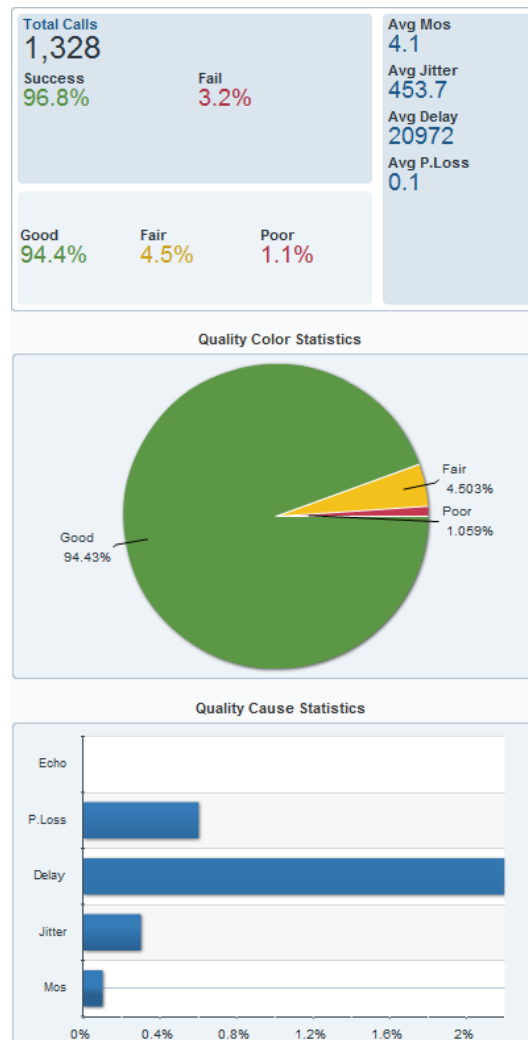
6.5.1   Total Calls Pane

This pane shows:

■   the total number of calls made and the percentage of successful/failed calls

■   the percentage and total number of calls in each voice quality category

■   the total score scored by each voice quality metric

6.5.2 Voice Quality Pie

This pane displays a color-coded pie showing the percentage of calls whose voice quality was measured as good (green), fair (yellow), poor (red), or unknown (gray). The pane is identical to the pie pane in the Network page.

➢ **To view information:**

■ Point your cursor over a segment of the pie; a popup indicates % and # of calls classified in this voice quality category.

➢ **To view detailed information:**

■ Click a segment in the pie; the Calls List page opens, enabling viewing of detailed information on calls in this voice quality category (see Section 7 on page 45).

6.5.3 Voice Quality Metrics

This pane shows which of the five voice quality metrics (Echo, Packet Loss, Delay, Jitter, MOS) impacted voice quality the most, and which least.

➢ **To view detailed information:**

■ Point your cursor over a bar to view the precise percentage and number of calls impacted by the metric.

7 Displaying the Calls List

The Calls List page lists and shows details on all calls made in the network. The page features advanced filtering capabilities to facilitate obtaining precise information on calls quickly and efficiently.

Figure 7-1: Calls List

Click the **Save As** icon to download calls information (numbers and text) in a coma-separated *calls.csv* file format that can later be easily opened and read in any text editor, as well as sent as an attachment in an email to others.

Go to a page using the pager:

Figure 7-2: Pager

■ Select the number of calls to display per page from the 'Items per page' drop-down list: 10, 25, 30, 40, 50, 100 or 1000.

■ Click the Page 1 link; a popup menu listing page numbers and a ▼ scroll enables direct access to a specific page.

■ Page forwards or backwards, one page at a time.

■ Use the **Go to last page** or **Go to first page** icons, in combination with the previous paging capability.
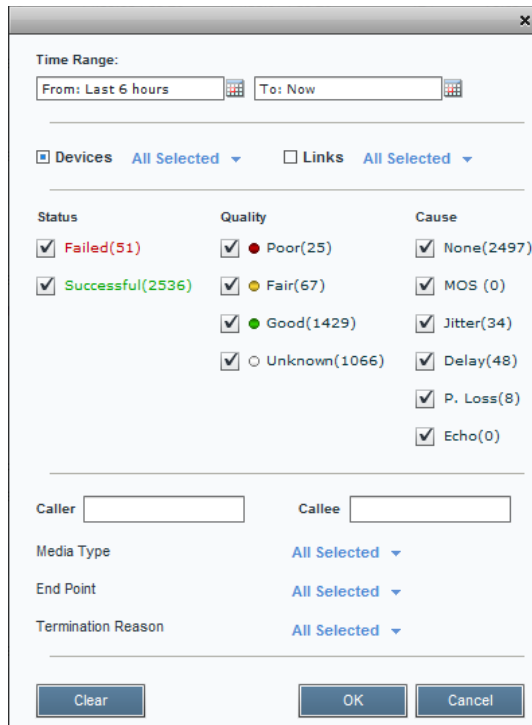
7.1 Filtering to Display Required Information Only

Filtering options on the Calls List page enable users to exclude irrelevant information and display only required information. Filtering is an essential feature in the management of call sessions, thereby facilitating enhanced call session experiences.

➢ **To filter the Calls List:**

1. Click the **Get Calls** button; this screen opens:

Figure 7-3: Calls List

2. Filter for 'Time Range', and/or 'Devices', and/or 'Links'. These filters are identical to those on the Network page. See Section 4 on page 23.

3. Filter for
   a. Status - Failed or Successful
   b. Quality - Poor, Fair, Good or Unknown
   c. Cause - None, MOS, Jitter, Delay, P. Loss or Echo.

   Select, for example, the **Poor** quality option, and deselect the other three quality options. The figure below shows the result:

Figure 7-4: Poor Quality Calls Only

Only calls of poor quality are displayed. The causes are Packet Loss, Jitter, Delay and MOS.

4. Filter these poor quality calls for those whose poor quality was caused *only* by **Delay**, for example. Deselect every cause except **Delay**. The figure below shows the result:

Figure 7-5: Poor Quality Calls Caused by Delay Only

5. Filter for 'Caller' and/or 'Callee'. The fields are case-sensitive.

6. Filter for 'Media Type'.

   a. Click its **All Selected** link. By default, all media types are selected. The dialog below opens.
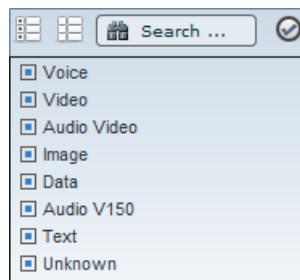
b. Click the **Select None** icon and then select the media type for which to filter.

c. Click the ✓ and then click **OK**.

7. Filter for 'End Point'.

a. Click its **All Selected** link. By default, all end points types are selected. The dialog below opens.
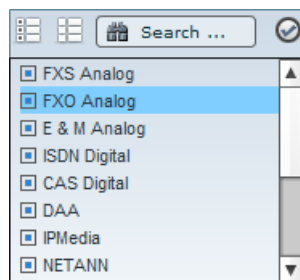
b. Click the **Select None** icon and then scroll down if necessary and select the end point for which to filter.

c. Click the ✓ and then click **OK**.

8. Filter for 'Termination Reason'.

a. Click its **All Selected** link. By default, all termination reasons are selected. The dialog below opens.

b. Click the **Select None** icon and then scroll down if necessary and select the end point for which to filter.

c. Click the ✓ and then click **OK**.

7.1.1   Sorting Calls in the Calls List

> **Tip:**   Before sorting calls in the list, in the Refresh Page, stop Auto Refresh ⊙ and Start it again ▷ after the sorting results have been displayed.

Sort calls in the list by clicking a column header; calls are sorted in the order of that column. Click another column header's sort arrow; calls already sorted are now further sorted in the order of *this* column. Therefore, the Calls List enables you to set multiple sort keys to determine correlations between the information displayed in the different columns. This capability facilitates quick and easy access to those calls on which information is most required. Calls on which information is less critical is listed lower.

Below is an intuitive example of how to perform multiple columns sorting.

➢   **To sort the calls in the list:**

1.   Click the column header 'Call Status'; the sort arrow points down ▼ indicating that successful calls are displayed first, followed by failed calls. If you then click the sort arrow, it points up ▲ indicating that failed calls are displayed first followed by successful calls; indicated by **1** in the column header.

2.   Position your cursor over another column and click its now-displayed sort arrow, for example, 'Call Quality'; calls are now sorted successful-failed *and* in order of quality (Good > Fair > Poor > Unknown), indicated by **2** in the column header.

3.   Click a third column header's sort arrow, for example, 'Cause'; calls are now sorted (1) successful-failed (2) in order of quality *and* (3) in order of cause (Delay, Echo, Jitter, MOS, Packet Loss and None, in *alphabetic order*), indicated by **3** in the Cause column header.

      Calls have now been sorted in three separate columns each in the respective desired sort order. You can now visually draw correlations between the data displayed in each respective sorted column, whilst at the same time, the integrity of each record is maintained.

> **Note:**   To reset column sort ordering, click any column header; a new column sort order begins.

Table 7-1: Calls List Columns

Column	Description
All Calls	
Call Status	**Successful** or **Failed**
Call Quality	🟢 = Good 🟡 = Fair 🔴 = Poor ⚪ = Unknown
Cause	Delay (msec) — Delay (or latency) - the time it takes for information to travel from source to destination (round-trip time). Sources of delay include voice encoding / decoding, link bandwidth and jitter buffer depth. Two Delay values are shown, one value for the caller side and one value for the callee side.
	Echo — The level difference (measured in dB) between the signal transmitted to the listener and the residual echo of this signal.
	Jitter (msec) — Jitter can result from uneven delays between received voice packets. To space packets evenly, the jitter buffer adds delay. The higher the measurement, the greater the impact of the jitter buffer's delay on audio quality. Two Jitter values are shown, one value for the caller side and one value for the callee side.
	MOS — MOS - Mean Opinion Score (specified by ITU-T recommendation P.800) - the average grade on quality scales of Good to Failed, given by the SEM to voice calls made over a VoIP network at the conclusion of the testing.
	Packet Loss (%) — Lost packets - RTP packets that aren't received by the voice endpoint for processing, resulting in distorted voice transmission. Two Packet Loss % values are shown, one value for the caller side and one value for the callee side.
	None — Indeterminate cause
Caller	The phone number or address of the person who initiated the call.
Callee	The phone number or address of the person who answered the call.
Call Start Time	The precise time (hour, minutes and seconds) and date (month, day and year) when the call was started.
Call End Time	The precise time (hour, minutes and seconds) and date (month, day and year) when the call was terminated.
Call Duration (sec)	The duration of the call, in seconds.
Media Type	Voice or Fax.
Monitoring Endpoint	SBC (session board controller), ISDN Digital, or IP2IP.
Device Name	The IP address of the device on which the call was made.
Termination Reason	The reason why the call was terminated, e.g., No Answer.

7.1.2   Filtering Using the 'Search' Field

Use the 'Search' field as a quick alternative to other filtering methods, or use it combined with other methods as a supplement.

The 'Search' option is a single filter; it cannot filter calls already filtered by a previous filter, or order calls already ordered, as the other methods can do. But you can perform an initial quick filter and then use another method to narrow the results. Enter a device name, e.g., SBC, in the 'Search' field (see the figure below); only calls made and answered on this device are listed.

Figure 7-6: Results after Searching for a Device Name

After the search results are displayed, click the 'x' to undo the filter or narrow the search further using another filter method.

Access a call's details by clicking its row; the Call Details page opens (see Section 7.2 below).

7.2 Displaying the Details of a Call

You can view details on any call listed in the Calls List by clicking its row. The Call Details page gives you detailed diagnostic information on every detail of the call, in graphic and textual format, facilitating effective management, precise diagnosis and targeted remedial action to prevent recurrence of unsuccessful call performance or poor call quality.

Figure 7-7: Call Details
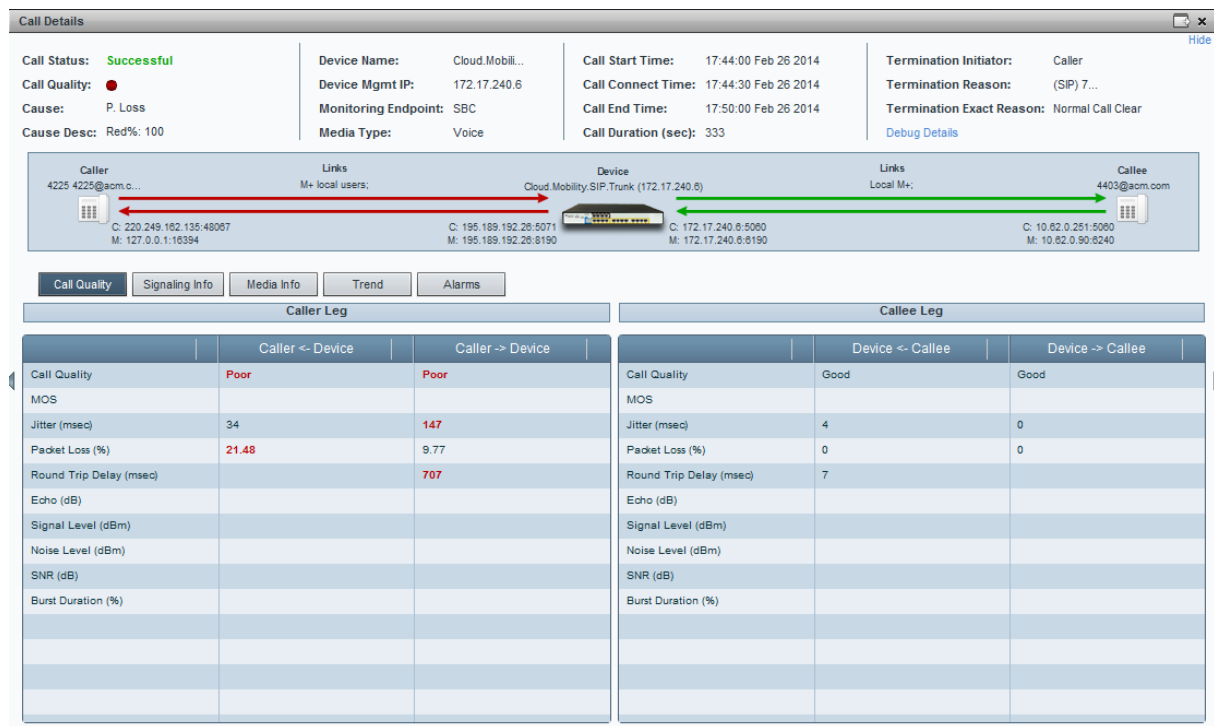
The table below describes the page's subdivisions.

Table 7-2: Call Details Page Subdivisions

Page Subdivision	Description
(Uppermost) Call summary	Displays parameters and values identical to those displayed in the Calls List rows. See Section 7 on page 45.
(Middle) Graphic illustration	Displays a graphical illustration of voice quality on each leg of the call, on both the caller and callee side. Each leg is: ▪ Connected via the VoIP cloud to the device ▪ Color-coded to indicate quality (green = good, yellow = fair, red = poor, grey = unknown) ▪ Tagged by **C** and **M** C = Control summary (point the cursor to view as tooltip) M = Media IP address and Port (point the cursor to view as tooltip)
(Lowermost) Five tabs	Each opens a page displaying detailed information: ▪ Call Quality (see Section 7.2.1 on page 54 below) ▪ Signaling Info (see Section 7.2.2 on page 57 below) ▪ Media Info (see Section 7.2.3 on page 59 below) ▪ Trend (see Section 7.2.4 on page 60 below) ▪ Alarms (see Section 7.2.5 on page 62 below)

7.2.1 Call Quality

The Call Quality tab centralizes all parameters associated with the quality of an individual call, including Round Trip Delay, Signal Level, Noise Level, SNR, RERL and Burst Duration, in a central location for users to comprehensively assess voice quality, perform precise diagnosis and effectively troubleshoot and manage session experience.

Figure 7-8: Call Quality
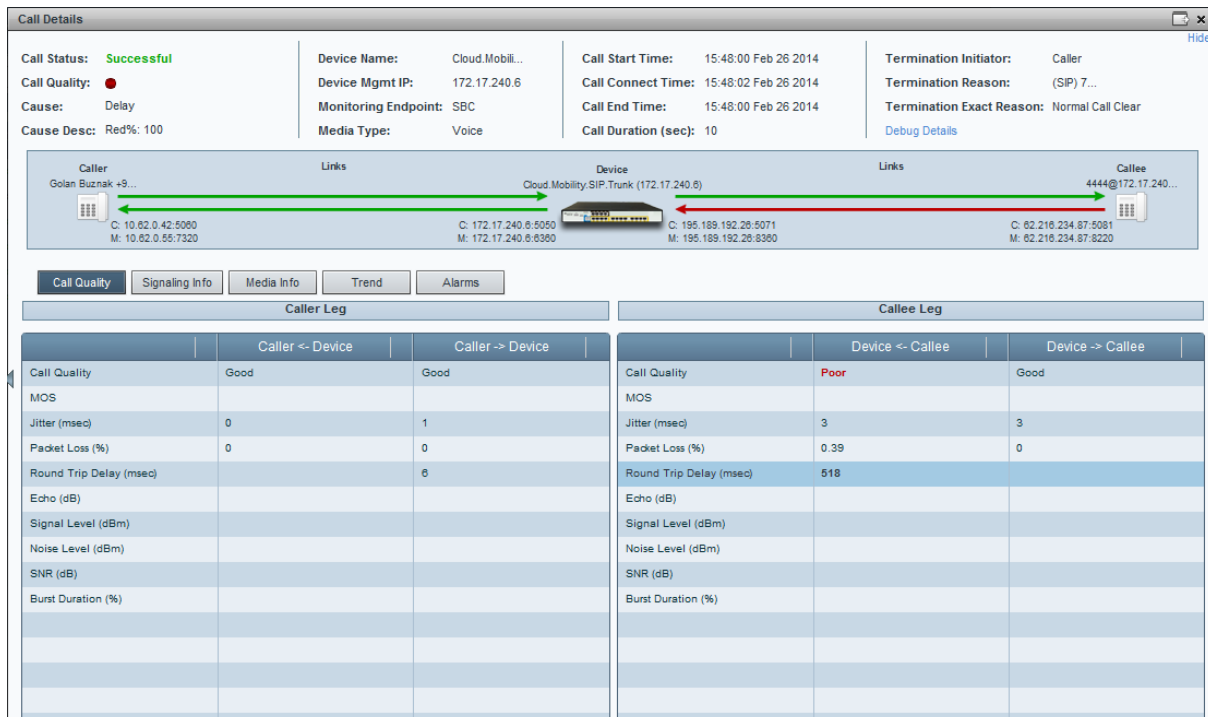
Table 7-3: Call Quality Parameters

Parameter	Description
Call Quality	Good (green), Fair (yellow), Poor (red), Unknown (grey). Indicates the call quality grade scored by both the caller and the device side, on both caller *and* callee legs.
MOS LQ / CQ	MOS = Mean Opinion Score (specified by ITU-T recommendation P.800). Defines the average grade, on a quality scale of Good to Poor, determined by the SEM after testing calls made over a VoIP network. MOS-LQ = listening quality, i.e., the quality of audio for listening purposes. Doesn't account for bi-directional effects such as delay and echo. Two values are shown: (1) for the device side on the caller leg (2) for the device side on the callee leg. MOS-CQ = conversational quality; it takes listening quality in both directions into account, as well as the bi-directional effects. Two values are shown: (1) for the device side on the caller leg (2) for the device side on the callee leg.

Parameter	Description
Jitter	Jitter can result from uneven delays between received voice packets. To space evenly, the jitter buffer adds delay. The higher the measurement, the greater the impact of the jitter buffer's delay on audio quality. Two Jitter values are shown, one value for the caller side and one value for the callee side.
Packet Loss	Lost packets = RTP packets that aren't received by the voice endpoint for processing, resulting in distorted voice transmission. Two Packet Loss % values are shown, one value for the caller side and for the one value for the callee side.
Round Trip Delay (msec)	The round trip delay is the estimated time (in milliseconds) that it takes to transmit a packet between two RTP stations. Sources of delay include voice encoding / decoding, link bandwidth and jitter buffer depth. Two values are shown, one caller side and another for the callee side.
Echo	The residual echo return loss is the level difference (measured in dB) between the signal transmitted to the listener and the residual echo of that signal.
Signal Level (mW)	The ratio of the voice signal level to a 0 dBm0 reference. Signal level = 10 Log10 (RMS talk spurt power (mW)). A value of 127 indicates that this parameter is unavailable.
Noise Level (mW)	The ratio of the level of silent-period background noise level to a 0 dBm0 reference. Noise level = 10 Log10 (Power Level (RMS), in mW, during periods of silence). A value of 127 indicates that this parameter is unavailable.
SNR (mW)	The ratio of the signal level to the noise level (Signal-Noise Ratio). SNR = Signal level – Noise level.
Burst Duration (msec)	The mean duration (in milliseconds), of the burst periods that have occurred since the initial call reception.
Discard Rate	The fraction of RTP data packets from the source that have been discarded since the initial call reception, due to late or early arrival, under-run or overflow at the receiving jitter buffer.

For detailed information, see:

■ RFC-3611 RTCP-XR protocol (go to http://tools.ietf.org/rfc/rfc3611.txt)

■ RFC-3350 RTP protocol (go to http://tools.ietf.org/html/rfc3550)

7.2.1.1 Call Quality – PSTN Leg

Quality can also apply to voice over PSTN (not only to VoIP). The figure below shows the Call Details screen of an IP to PSTN call whose callee leg is over PSTN.

Figure 7-9: Call Quality - PSTN Leg
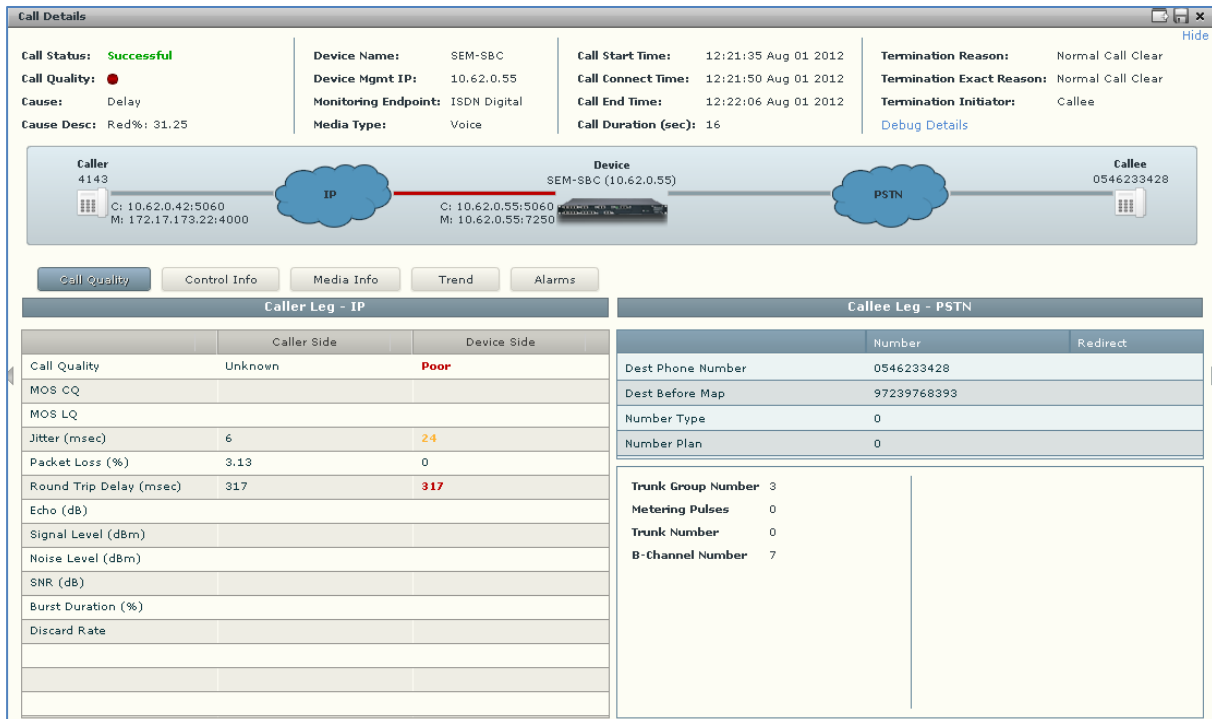
Table 7-4: Call Quality Parameters – PSTN Leg

Parameter	Description
Dest Phone Number (Callee) Source Phone Number (Caller)	Called (destination) phone number Caller's (source) phone number
Dest Before Map (Callee) Source Before Map (Caller)	Called (destination) number before manipulation (if any) was done on it Caller's number before manipulation (if any) was done on it
Number Type	Applies only to IP to Tel calls. Options are: Unknown, Level 2 Regional, Level 1 Regional, PISN Specific, Level 0 Regional (Local), International, National, Network Specific, Subscriber or Abbreviated.
Number Plan	Applies only to IP to Tel calls. Options are: Unknown, Private, E.164 Public, Value Received from PSTN/IP
Trunk Group Number	Defines the Trunk Group number provisioned by the user.
Metering Pulses	Applies only to gateways. Number of 12/16 KHz metering pulses generated toward the Tel side, e.g., for connection to a pay phone or private meter.

Parameter	Description
Trunk Number	Applies only to gateways. Defines the physical trunk number, where 0 is the first trunk.
B-Channel Number	Applies only to gateways. Defines the selected B (bearer) channel, i.e., the channel in which primary voice communication is carried).

7.2.2 Signaling Info

The Signaling Info tab shows a call's control protocol (SIP) parameter settings that users can refer to for diagnostic, troubleshooting and session experience management issues.

The same parameters apply to both the Caller and Callee legs. These parameters are explained in the table below.

Figure 7-10: Signaling Info

Table 7-5: Signaling Info Parameters Descriptions

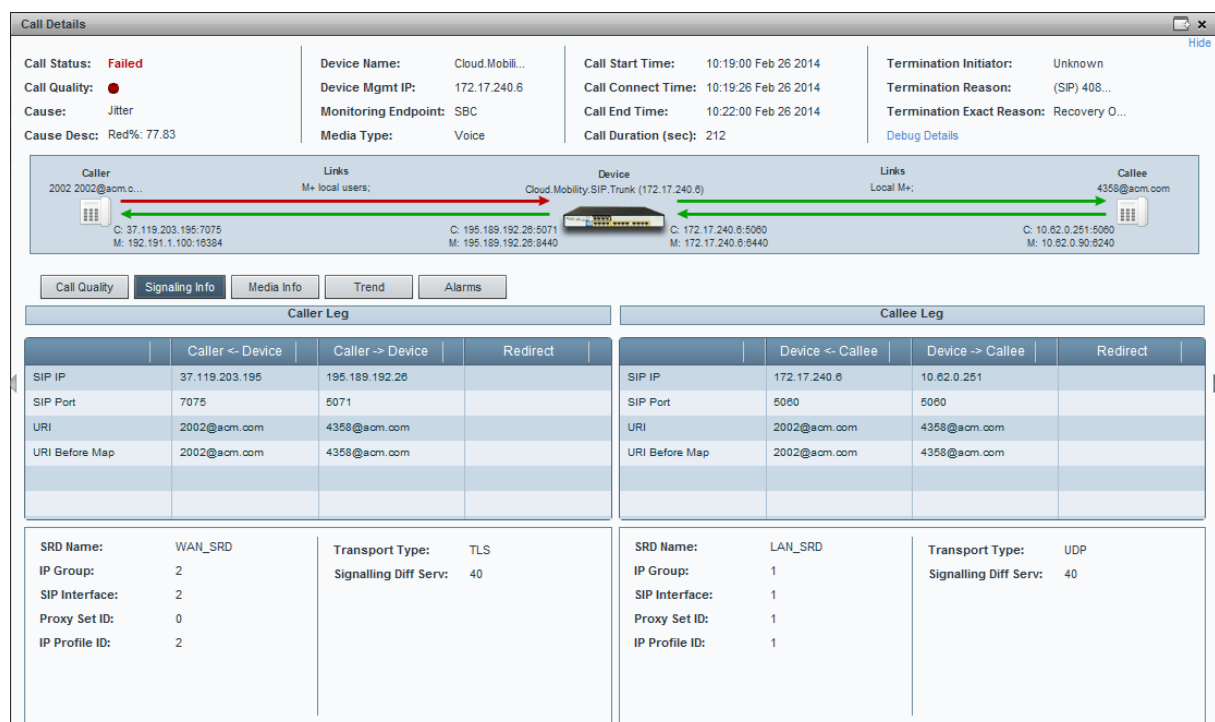| Parameter	Description
SIP IP	IP address (source and destination) of the SIP call
SIP Port	Port number used for the SIP call
Host	The URI (Uniform Resource Identifier) of the host. The SIP URI is the user's SIP phone number (after manipulation, if any). The SIP URI resembles an e-mail address and is written in the following format: sip:x@y:Port, where x=Username and y=host (domain or IP).
Host Before Map	SIP URI address before manipulation (if any) was done on the URI.
Phone number	Caller's phone number after manipulation (if any) was performed on it.
Number Before Map	Caller's phone number before manipulation (if any) was performed on it.
SRD Name	The unique name configured for the signaling routing domain (SRD).
IP Group	The ID of the IP Group with which call is associated.
SIP Interface	The ID of the SIP Interface with which the call is associated.
Proxy Set ID	The ID of the Proxy Set to which the call is associated. A Proxy Set is a group of Proxy servers defined by IP address. Typically, for IP-to-IP call routing, at least two Proxy Sets are defined for call destination – one for each leg (IP Group) of the call (i.e., both directions). For example, one Proxy Set for the Internet Telephony Service provider (ITSP) interfacing with one 'leg' of the device and another Proxy Set for the second SIP entity (e.g., ITSP) interfacing with the other 'leg' of the device.
IP Profile ID	The ID of the IP Profile assigned to this IP destination call. The IP Profile assigns numerous configuration attributes (e.g., voice codes) per routing rule.

7.2.3 Media Info

The Media Info tab displays a call's media parameter settings that users can refer to for diagnostics, troubleshooting and session experience management issues.

The same parameters apply to both the Caller and Callee legs. These parameters are described in the table below.

Figure 7-11: Media Info
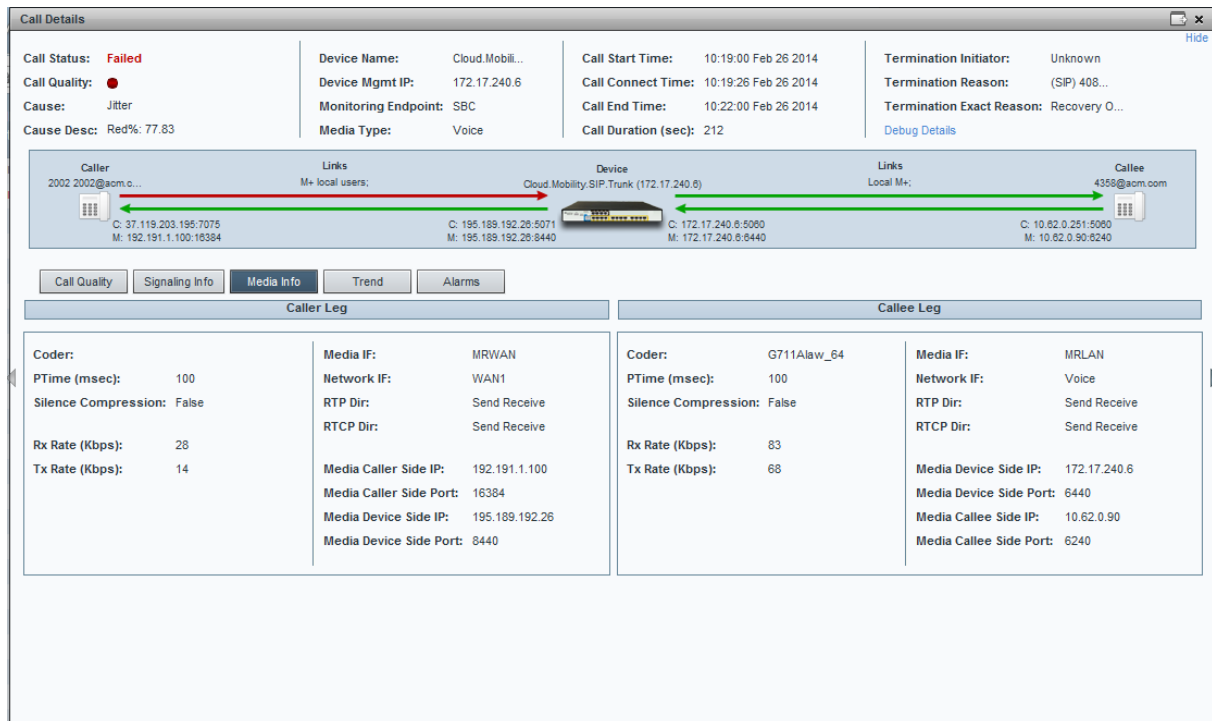
Table 7-6: Media Info Parameters

Parameter	Description
Coder	Up to 10 coders (per group) are supported. See the device manual for a list of supported coders.
PTime (msec)	Packetization time, i.e., how many coder payloads are combined into a single RTP packet.
Silence Compression	Method for conserving bandwidth on VoIP calls by not sending packets when silence is detected. True = Enabled (On), False = Disabled (Off).
Rx Rate (Kbps)	Shows the call's reception rate, in Kbps.
Tx Rate (Kbps)	Shows the call's transmission rate, in Kbps.
Media IF	Media Realm name.
Network IF	Network Interface Name.
RTP Dir	RTP Directional Control. Controlled internally by the device according to the selected coder.

Parameter	Description
RTCP Dir	RTCP Directional Control. Controlled internally by the device according to the selected coder.
Media Caller Side IP	The device's source IP address in the operations, administration, maintenance, and provisioning (OAMP) network.
Media Caller Side Port	The device's source port in the operations, administration, maintenance, and provisioning (OAMP) network.
Media Device Side IP	IP address of the destination host / media network.
Media Device Side Port	Port of the destination host / media network.

7.2.4   Trend

The Trend tab shows the quality trend of a call that users can refer to for diagnostic, troubleshooting and session management experience issues.
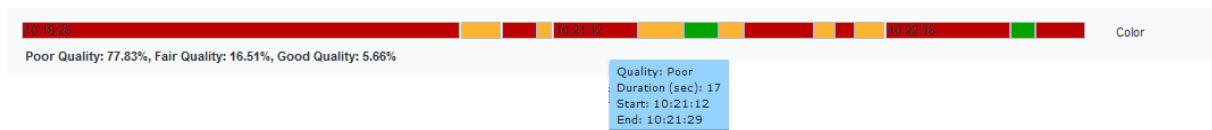
Figure 7-12: Trend
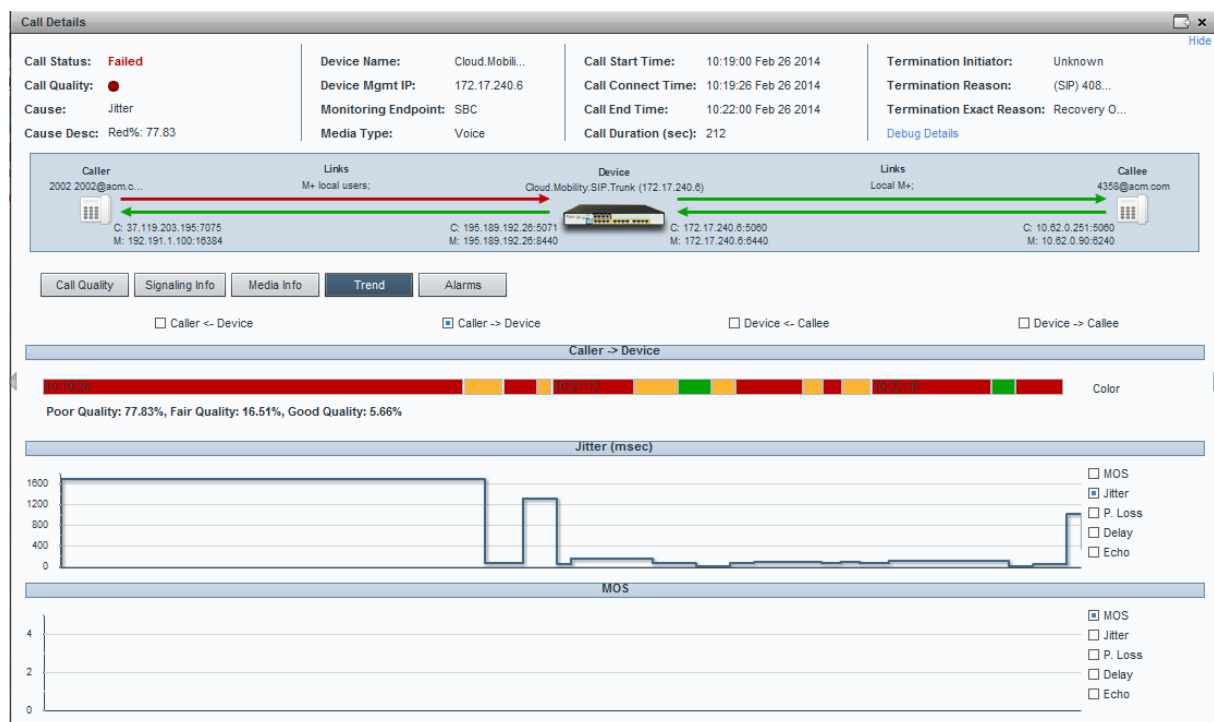
Quality applies to two legs of the call:

■   Caller leg

- •   caller side (of cloud)

- •   device side (of cloud)

■   Callee leg

- •   callee side (of cloud)

- •   device side (of cloud)

> ➢ **To assess call quality:**

1. Select one of the four leg options (uppermost row of check boxes).

2. Point the cursor over the color bar; a popup shows data at that point:

Figure 7-13: Call Quality Color Bar

The popup in Figure 7-13 indicates the quality measurement that the call scored in this segment (good = green, fair = yellow, poor = red), how long the segment lasted, and the time the segment started and ended.

Each quality category's percentage of the total length of the call is textually indicated below the color bar.

> **Note:** Legs over PSTN are not measured for quality, only legs over IP. Check box options are disabled for legs over PSTN.

> ➢ **To compare one call quality metric with another:**

1. Select one of the four leg options (uppermost row of check boxes).

2. Adjacent to the two lower panes, select MOS, Jitter, Packet Loss, Delay or Echo check boxes; you can immediately visually compare one metric with another (see Figure 7-12 above).

3. Optionally select another of the four leg check box options; you can immediately compare the same metrics across this leg, or, optionally, select different metrics to compare.

7.2.5 Alarms

The Alarms tab lists alarms (if any) issued by the device associated with the call. Users can refer to the data displayed to quickly assess a call's alarm/s and consequently effectively diagnose, troubleshoot and manage session experience issues.

Figure 7-14: Alarms

Table 7-7: Alarms Columns*

Column	Description
Severity	For detailed information, see Section 8 below.
Time	The precise time (hour, minutes and seconds) and date (month, day and year) at which the alarm was received.
MG Name	The name of the device on which the individual call's alarm/s were issued.
Source	The entity that triggered the alarm.
Alarm Name	The name of the alarm.
Description	A textual description of the alarm.

* Extracted from ITU X.733

8 Displaying Alarms

The Alarms page features three distinct functionalities:

■ Active Alarms

■ Historical Alarms

■ SEM Quality Alerts

Three tabs in the page enable quick access to each of these:

Figure 8-1: Alarms Page - Active Alarms

8.1 Displaying Active Alarms

The Active Alarms page lists all active alarms on devices selected in the 'Devices' filter and on links selected in the 'Links' filter, issued during the period defined in the 'Time Range' filter. Filtering using the 'Time Range', 'Devices' and the 'Links' filter is performed identically across all pages. For filtering information see under Section 4 on page 23.

8.1.1 Filtering Using the 'Search' Field

The 'Search' field is used to filter active alarms exactly as it's used on other pages to quickly find specific information. Enter a device name, e.g., PSTN-GW, in the 'Search' field; only active alarms made and answered on this device are listed. Click the 'x' to delete a search entry.

Figure 8-2: Alarms Page - Active Alarms – Search Filter

8.1.2   Sorting Listed Alarms

Alarms can be sorted in the same manner as calls in the Calls List (see Section 7.1.1 on page 49). Click the header of the Severity column for example; calls are sorted according to severity, in order of *most* to *least severe* (▼). Most severe alarms are highest in the list. To sort from *least* to *most severe*, click the column header again; the sort order is reversed (▲); less severe alarms are listed lower.

Click another column header, e.g., Time; calls already ordered by severity level are now also ordered in order of time. Multiple ordering is supported.

The feature of multiple sorting columns facilitates quick and easy access to required alarm information.

Table 8-1: Severity in Ascending Order*

Severity	Description
🔴	Critical (red): Indicates that a service affecting condition has occurred and an immediate corrective action is required. Such a severity can be reported, for example, when a device becomes totally out of service and its capability must be restored.
🟠	Major (orange): Indicates that a service affecting condition has developed and an urgent corrective action is required. Such a severity can be reported, for example, when there is a severe degradation in the capability of the device and its full capability must be restored.
🟡	Minor (yellow): Indicates the existence of a non-service affecting fault condition and that corrective action should be taken to prevent a more serious (for example, service affecting) fault. Such a severity can be reported, for example, when the detected alarm condition is not currently degrading the capacity of the device.
🔵	Warning (blue): Indicates the detection of a potential or impending service affecting fault, before any significant effects occur. Action should be taken to further diagnose (if necessary) and correct the problem to prevent it from becoming a more serious service affecting fault.
⚪	Info (grey): Indicates that the severity level cannot be determined.
🟢	Cleared (green): Indicates the clearing of one or more previously reported alarms. This alarm clears all alarms for this device that have the same Alarm type, Probable cause and Specific problems (if given).

* Extracted from ITU X.733

8.1.3 Filtering Using a Severity Filter

The page can be filtered according to a severity level, where only required alarms are displayed. The figure below shows alarms filtered according to the 'Severity' filter (Critical). By contrast, the *sorting* feature displays all alarms; however, with the required alarm/s are listed highest.

Figure 8-3: Severity Filters - Critical

8.1.4   Displaying Alarm Details

Alarm Details can quickly and easily be accessed to determine the incidence of the severity across the network. Click any row page before or after filtering:

Figure 8-4: Alarm Details

Click the ► or ◄ handlebar to move to the next or previous. Refer to this table:

Table 8-2: Alarm Details – Parameters

Parameter	Description
Alarm Category	The category in which the alarm is classified, according to ITU X.733. Five categories are specified: Communications: the procedures and/or processes required to convey information from one point to another. Quality of service: Degradation in the QoS. Processing error: Software or processing faults. Equipment: Equipment faults. Environmental: Conditions relating to an enclosure in which the equipment resides.

Parameter	Description
Probable Cause	The probable cause. See ITU X.733 for probable causes and descriptions.
Status	Can be either one of the following: • **Active Alarms**: New, Ack (acknowledged by the user). • **Historical Alarms**: Cleared (manually cleared by the user), Automatically Cleared (by the device or EMS) or ColdStart Cleared (if system is reset, all alarms are cleared).
Type	The alarm type. EVENT or ALARM. According to RFC 3877: **EVENT** = User Information, for example, a fault, a change in status, crossing a threshold, or an external input to the system. **ALARM** = Persistent indication of a fault (where fault = a lasting error or warning condition, and error = a deviation of a system from normal operation). An alarm is automatically cleared when the condition disappears; by contrast an event is not automatically cleared.
GW IP	The IP address of the device from which the alarm was sent.
GW Port	The port number of the device from which the alarm was sent.
SNMP OID	Identifier used to identify the alarm information available on a managed VoIP network entity, in the alarm management information base (MIB).
Additional Info	Possible corrective action, when applicable.

8.2   Displaying History Alarms

The History Alarms page lists currently active alarms and already-cleared historical alarms on devices selected in the 'Devices' filter and on links selected in the 'Links' filter, issued in the period defined in the 'Time Range' filter. These filters are identical on all pages (see under Section 4 on page 23). The page shows retroactive diagnostic data informative when taking proactive steps to prevent future repetitions and improve future VoIP network functionality.

Figure 8-5: Historical Alarms

- The 'Search' field operates identically to its counterpart in the Active Alarms page (see under Section 8.1.1 on page 63).

- Order alarms precisely as you order alarms in the Active Alarms page (see under Section 8.1.2 on page 65).

- Filter alarms using the 'Severity' filter precisely as alarms in the Active Alarms page are filtered with its counterpart filter (see under Section 8.1.3 on page 66).

8.3   Triggering Quality Alerts

Quality alerts optimize session experience management by providing VoIP network administrators *automatic quality analysis* capability, *automatically triggering alerts* if the quality of service analyzed falls below that defined in rules.

Alerts are triggered by rules defined by network administrators. Alerts, triggered after SEM data analysis, are displayed in the Alarms page as regular alarms and/or sent to administrators as mail, SMSs, SNMP traps or syslog message.
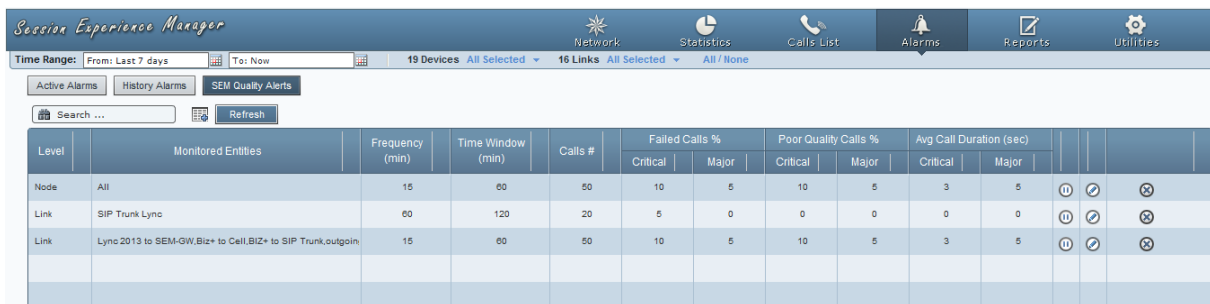
8.3.1 Adding a New Alert Rule

You can add a new rule for an alert to be triggered.

➢ **To add a rule:**

1. Open the SEM Quality Alerts page (Alarms page>**SEM Quality Alerts** tab).

Figure 8-6: SEM Quality Alerts
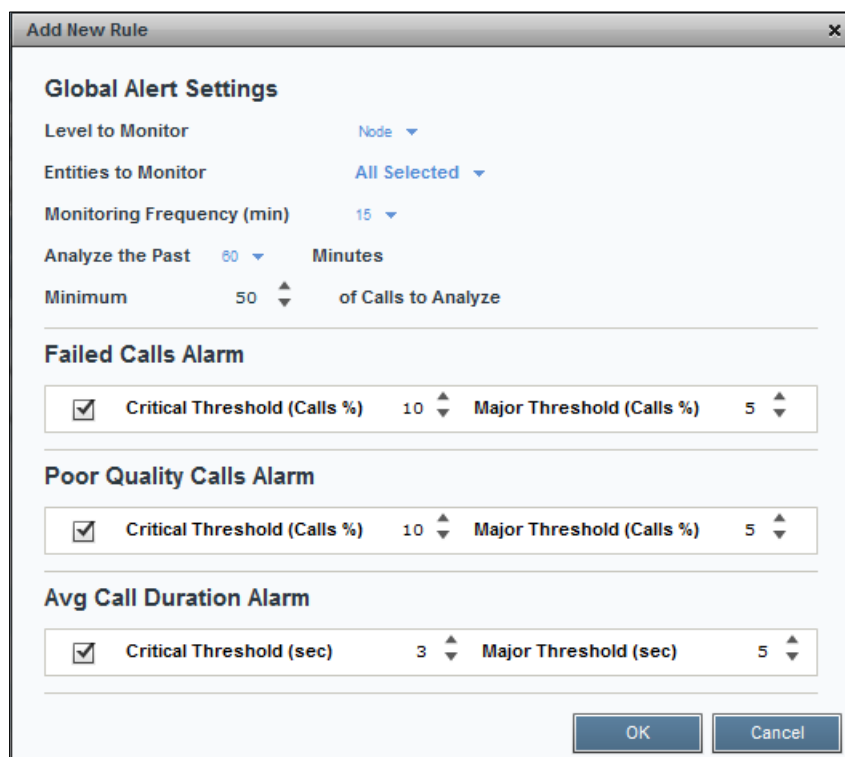
2. Click the **Add Alert** icon; rule the Add New Alert Rule popup opens:

Figure 8-7: Add New Alert Rule

3. Define the following settings:

Table 8-3: Add New Alert Rule

Setting	Definition
Level to Monitor	Device or Link. Use this filter to select **Link** or **Node**.
Entities to Monitor	Use this filter to select the entities to monitor. If you selected **Link** for 'Level to Monitor' (previous setting), the links selection popup opens: Select the links to filter (the default is **All Selected**). If you selected **Node** for 'Level to Monitor', the nodes selection popup opens: Select the nodes to filter (the default is **All Selected**).
Monitoring Frequency (min)	Determines how frequently the SEM automatically performs data analysis. Defines every 15 (default), 30 or 60 minutes.
Analyse the Past *n* Minutes	Determines the period up to the present for which the SEM will perform data analysis. Define 60 minutes (default), 90 minutes or 120 minutes.
Minimum # of Calls to Analyze	Defines the number of calls to analyze. Default = 50 calls. Up to 1000 calls can be defined. If the number of calls made doesn't exceed the defined # of calls to analyze, the SEM won't perform data analysis.
Failed Calls Alarm	Critical Threshold: **5**% of calls (default); if this threshold is exceeded, the alert is triggered. Major Threshold: **3**% of calls (default); if this threshold is exceeded, the alert is triggered.
Poor Quality Calls Alarm	Critical Threshold: **10**% of calls (default); if this threshold is exceeded, the alert is triggered. Major Threshold: **8**% of calls (default); if this threshold is

Setting	Definition
	exceeded, the alert is triggered.
Avg Call Duration Alarm	Critical Threshold: **5** seconds (default), up to 100 seconds; if the average duration of calls is below this, the alert is triggered.
	Major Threshold: **10** seconds (default), up to 100 seconds; if the average duration of calls is below this, the alert is triggered.

4. Click **OK**; see the alert listed now in the SEM Quality Alerts page.

8.3.2 Manually Activating an Alert Rule

You can manually activate an alert.

➢ **To manually activate an alert:**

1. In the SEM Quality Alerts page (see Figure 8-6), click ⏸ to manually activate the rule.

2. Click ▶ to manually deactivate the rule. The rule will continue to be automatically triggered.

8.3.3 Editing an Alert Rule

You can edit an alert rule.

➢ **To edit an alert rule:**

1. In the SEM Quality Alerts page (see Figure 8-6), click 🖉 **Update Rule**; the **Add New Alert Rule** dialog opens (see Figure 8-7).

2. Edit the settings. Use Table 8-3 as reference.

8.3.4 Defining a Rule to Trigger an Alert (Example)

This example shows how to define rule settings to determine monitoring. Using this example, you can intuitively determine how to define a rule to trigger an alert.

If you define in a rule with the following settings:

■ 'Level to Monitor' = Device

■ 'Monitored Devices' = All

■ 'Monitoring Frequency' = 15 minutes

■ 'For the Past' = 60 minutes

■ 'Minimum # of Calls to Analyze' = 50

■ 'Failed Calls Alarm' = defaults

■ 'Poor Quality Calls Alarm' = defaults

■ 'Avg Call Duration Alarm' = defaults

Then the SEM will perform the following:

■ Check every 15 minutes the # of calls made on all devices in the past 60 minutes and for devices on which the # of calls is greater than 50:

- Compare failed / successful calls % to the defined settings

- Compare poor quality calls % (red-coded) to the defined settings

- Compare average call duration to the defined settings

8.4 Distributing Alarm Information

Alarms information displayed in the Active Alarms, History Alarms and Quality Alerts pages are easily downloaded and saved by clicking the **Save As** icon 💾 .

■ Active Alarms information is saved in a plain-text *ActiveAlarms.csv* file.

■ History Alarms information is saved in a plain-text *HistoryAlarms.csv* file.

■ SEM Quality Alerts information is saved in a plain-text *SEMQualityAlerts.csv* file.

Open and read in any text editor, these files can be sent by the administrator as an attachment in an email to others to distribute the information.

Reader's Notes

9   Producing Reports

The SEM features essential reports-generation capability that administrators can utilize *to distribute session experience data and comparative analyses* quickly and effectively to respon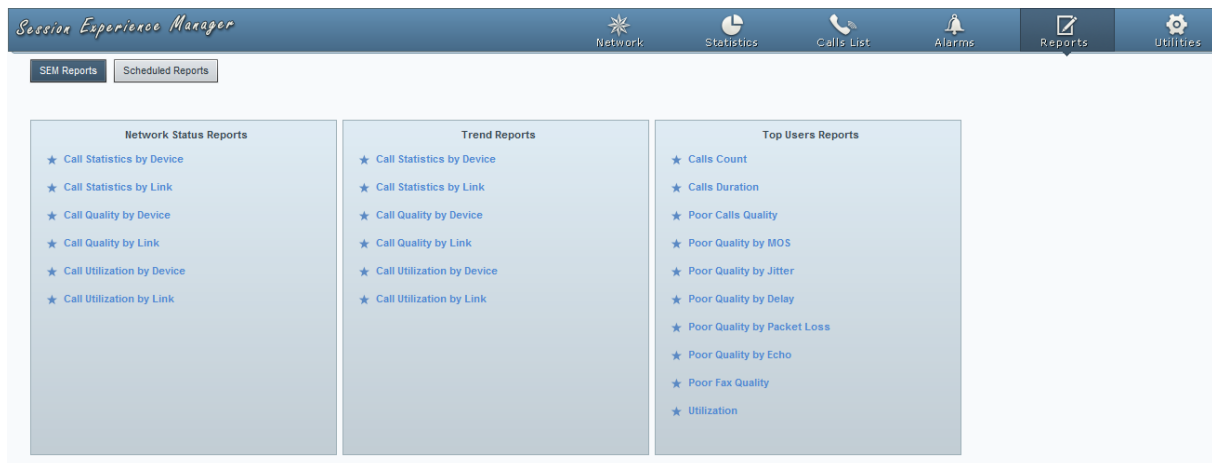sible persons within the enterprise and to external authorities associated with the enterprise's VoIP network, for *accurate diagnosis and correction* of degraded sessions and for general *network optimization.*

Figure 9-1: SEM Reports Page

Three categories of reports help users to quickly and thoroughly analyze different aspects of calls made over the VoIP network:

1. Network Status Reports

2. Trend Reports

3. Top Users Reports

Categories 1 and 2 are identical in terms of the information displayed (columns); however the *calculation* differs.

Category 1 is calculated as a *summary of calls made over the entire period* for specified entities (devices / links). The x axis represents the specified entities.

Category 2 is calculated *per time interval* specified, summarizing the same entity in the specified interval. The x axis represents the time interval (hour / day / week / month).

Table 9-1 shows the categories and the reports options in each.

Table 9-1: Reports Categories
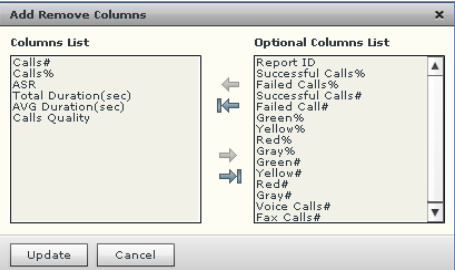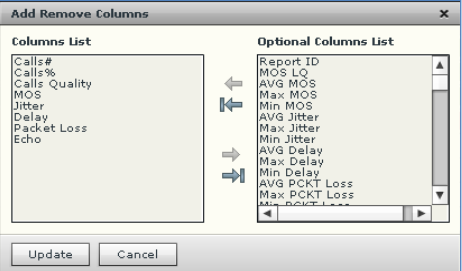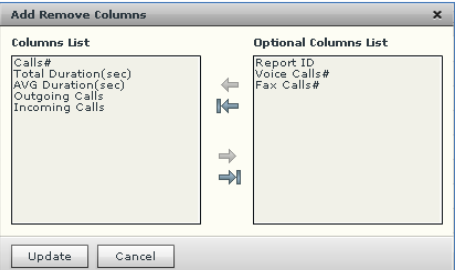
Report Category	Explanation
Network Status Reports • Call Statistics by Device • Call Statistics by Link • Call Quality by Device • Call Quality by Link • Call Utilization by Device • Call Utilization by Link	Displays a summary of key call metrics during a specified time period with a separate row entry for each device/link. Purpose: To compare performance, quality and utilization across devices/links. For example, the 'Call Statistics by Device' report summarizes the % of successful and failed calls and the # of calls that scored in each quality, across specified devices/links. By contrast, a 'Call Quality by Device' report summarizes key metrics affecting voice quality (jitter, delay, packet loss).
Trend Reports • Call Statistics by Device • Call Statistics by Link • Call Quality by Device • Call Quality by Link • Call Utilization by Device • Call Utilization by Link	Displays a summary of key call metrics over specified time intervals of a specified device/link. For example, the 'Calls Trend by Device' report displays 'Number of Calls', 'ASR' and 'Total Duration' in hourly intervals.
Top Users Reports • Calls Count • Calls Duration • Poor Calls Quality • Poor Quality by MOS • Poor Quality by Jitter • Poor Quality by Delay • Poor Quality by Packet Loss • Poor Quality by Echo • Poor Fax Quality • Utilization	Displays users graded according to number of calls made, calls duration, and calls whose quality scored 'Poor' based on specified metrics.

9.1 Using Reports Features

The features below apply to all reports pages across all three reports categories unless stated otherwise:

Table 9-2: Reports Features

Feature	Description
🖫 Save as CSV	Lets you save a report as a Comma-Separated Value (CSV) file which represents charts, data bars, sparklines, gauges, indicators, etc., in a standardized, plain-text format easily readable and exchangeable with many applications. You can open the file in a spreadsheet such as Microsoft Excel or use it as an import format for other programs.
📄 Export to PDF	Lets you generate a PDF file of the report reflecting selected filters, columns, graphs, etc.
Filters	Let you specify: • The Time Range for the report to cover (in the Network Status Reports page) • The Time Range *and* the Interval for the report to cover (in the Trend Report page; Hourly, Daily, Weekly or Monthly) • Devices / Links on which to produce the report • Top 10/20/30 Users on which to produce the report (in the Top Users Report page)
SEM Reports	Click the button at any time to return to the Reports page displaying the three reports categories and the report options available under each. Click an option to produce a report.
Scheduled Reports	Click the button to schedule a report.
▶ Run now	Displayed after selecting a report to produce in the reports menu. First filter (see above) and then click it; the report is produced and displayed.
Charts view / Table view	Two views are displayed in every report produced: Charts (uppermost) and table (lowermost). Click 🗏 to expand charts view; table view is eclipsed. Click ▲ to revert to both views.
Switch to horizontal / Switch to vertical	Charts are by default displayed vertically, one below the other, in this order: Calls #, Calls %, ASR, Total Duration, AVG Duration and Calls Quality. Use the scrollbar to scroll down from one to the next. They can optionally be displayed horizontally to suit user preference. To display horizontally, click the link. Click next ▷ or previous ◁ to navigate from chart to chart.
📊 Bar / 〽 Linear	[Only applies to Network Status Reports] By default, charts are displayed as bar charts. Click the drop-down to choose linear charts if required.
📇 Add / Remove Columns	Click the icon; optional table view columns are displayed. To add, if required, select an optional column and click ⬅ or select all and click ⬅. To remove a column, select it in the Columns List pane

Feature	Description
	and click ➡ or select all and click ➡❘.
	Default metrics columns (left pane) and optional metrics columns (right pane) in the Summary/Trend category (except 'Call Quality by Device / Link') are as follows:
	Default metrics columns (left pane) and optional metrics columns (right pane) in a 'Call Quality by Device / Link' report in the Summary/Trend category are:
	Default metrics columns (left pane) and optional metrics columns (right pane) in the Top Users reports category are:
	See under Section 0 on page 84 for variations across reports in the Top Users Reports category.
📊 Show Column Graphical Representation Display column as chart	Table column headers display this icon. Click one to display the metric as a chart. If the chart is already open, you're notified. After report generation, the table's ASR metric column is the only one displayed as a chart in Charts view.
Table Bottom Line (Total)	The table's bottom line shows column's total. For example: • Calls # column's bottom line shows the total sum of all counts of all calls on all devices / links • ASR column's bottom line shows the average success rate of the average success rates of all devices / links.

Feature	Description
	'Total' is calculated according to the measured parameter. It can be SUM, AVG, MIN or MAX.
Search 🔍	Users can use the 'Search' option to search for and find precise information related to a query. When information related to the search query is found, the report exclusively displays only that information.

9.1.1 Producing a Network Status Report

Network Status Reports show *the sum totals, over the entire period,* of calls performance scores, quality scores, #s, %s, total duration and average duration (default metrics). Reports in this category are identical in terms of metrics measured. Metrics columns can optionally be added / removed (see 'Add / Remove Columns' in Table 9-2).
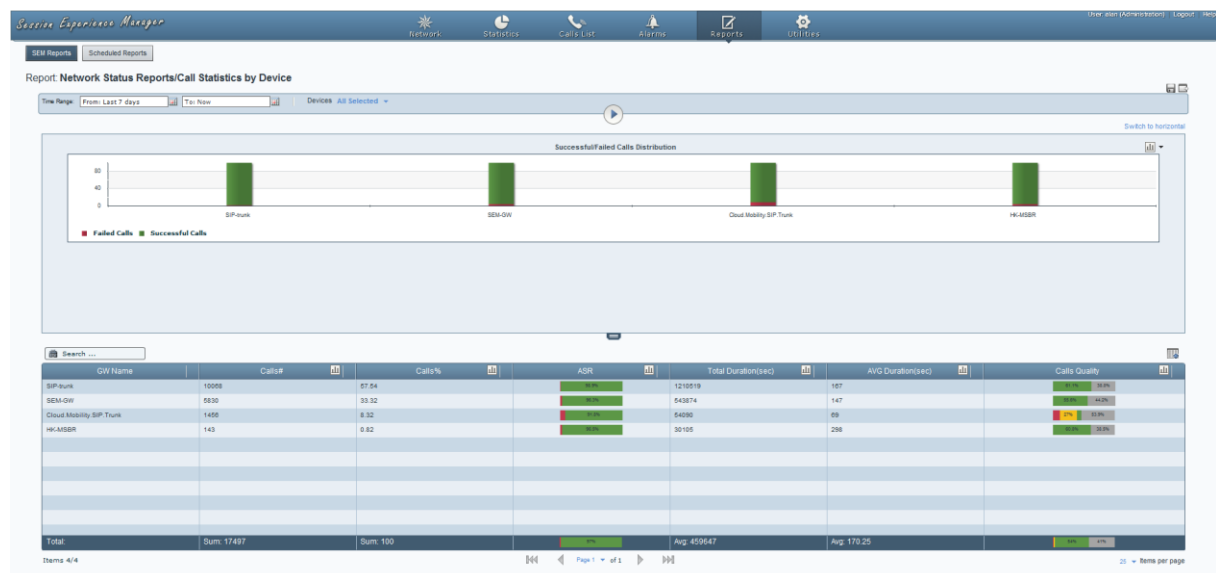
➢ **To produce a Network Status Report:**

1. Click an option in the 'Network Status Reports' category, for example, click the first option, i.e., **Call Statistics by Device**; the 'Run now' ⏵ page opens.

2. Filter for 'Time Range' and 'Devices' (see Section 4 on page 23 for details).

3. Click ⏵; the report is produced:

Figure 9-2: Network Status Reports – Call Statistics by Device

Following report generation, the ASR metric column is the only one displayed in charts view.
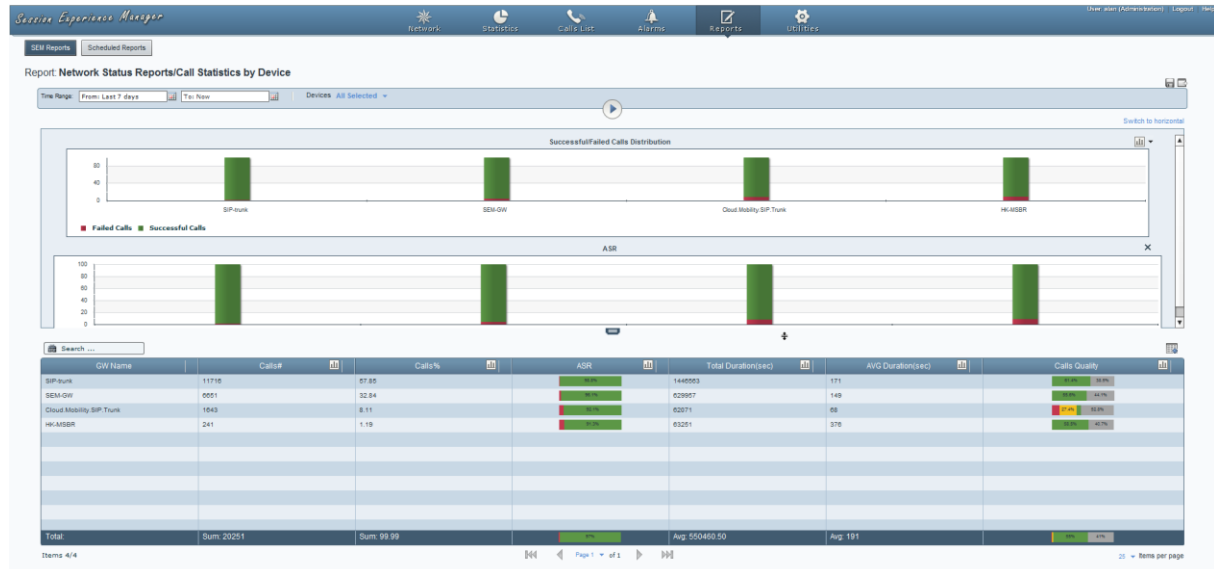
➢ **To display a metric as a chart:**

■ In the table, click [icon] in the metric's column header. For example, click [icon] in the **ASR** column header; the ASR chart is displayed:

Figure 9-3: Displaying the ASR Chart

In a Network Status Report you can:

■ Click the **Switch to horizontal** link (see Table 9-2) to switch from vertical view (default) to horizontal view.

■ Click [icon] to expand the charts pane. Click it again to contract it.

■ Click [icon] to switch from bar charts (default) to linear charts. Select [icon] from the drop-down (see 'Charts view / Table view' in Table 9-2).

■ Click [icon] to add/remove a column to/from the table (see 'Add / Remove Columns' in Table 9-2).

■ See in the chart which entities registered the highest failed / successful calls rate.

■ See in the table on which entities most calls were made, what % of calls were made on each, on which entities most failed / successful calls were made, on which entities most call time was recorded, on which entities the average call duration was longest / shortest and on which entity voice quality scored highest (green = good, yellow = fair, red = poor, grey = unknown).

■ See in the chart an entity's success / fail rate (%). Point your cursor over a color in a bar (green = successful, red = failed):
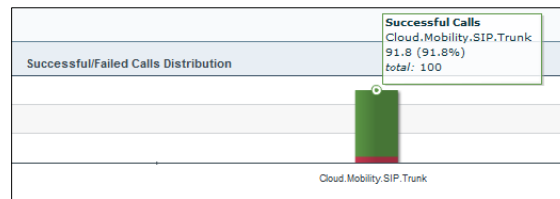
■ See in the table an entity's success / fail rate (%). Point your cursor over the entity's row (green = successful, red = failed):

■ See in the table quality scores by pointing your cursor over a color in the entity's Calls Quality row (green = good, yellow = fair, red = poor, grey = unknown):

Default and optional table columns in Network Status Reports are:

Table 9-3: Table Columns in Network Status Reports

Report	Default Columns	Optional Columns
Call Statistics by Device/Link	Calls #, Calls %, ASR, Total Duration, Average Duration, Calls Quality	Successful/Failed Calls % Successful/Failed Calls # Green/Yellow/Red/Gray % Green/Yellow/Red/Gray # Voice Calls # Fax Calls #
Call Quality by Device/Link	Calls #, Calls %, Calls Quality, MOS, Jitter, Delay, Packet Loss, Echo	MOS LQ AVG/Max/Min MOS/Jitter/Delay/Packet Loss/Echo AVG MOS LQ AVG Signal Level/SNR MOS/MOS LQ/Jitter/Delay/Packet Loss/Echo Remote AVG/Max/Min MOS R/Jitter R/Delay R/P. Loss R/Echo R Red #, Yellow #, Green #, Gray # Red %, Yellow %, Green %, Gray % MOS/MOS LQ/Jitter/Delay/Packet Loss/Echo Red % [Same for Yellow, Green and Gray] MOS Red Remote % [Same for Yellow, Green and Gray] MOS/Jitter/Delay/Packet Loss/Echo LQ Red Remote % [Same for Yellow, Green and Gray]
Call Utilization by Device/Link	AVG Total Kbps AVG Rx Kbps AVG Tx Kbps AVG Packet Loss	AVG Total Kbps Remote AVG Rx/Tx Kbps Remote AVG Packet Loss R

■ You can re-filter and re-run the report (see 'Filters' in Table 9-2).

■ You can generate another report. Click the **SEM Reports** button.

■ You can schedule a report. Click the **Scheduled Reports** button (for details see Section 9.2).

9.1.2 Producing Trend Reports

Trend reports show *general tendencies over intervals* of calls performance, quality, #s, %s, total duration and average duration (default metrics measured).

Reports in this category are identical in terms of metrics columns displayed. Columns can optionally be added / removed (see 'Add / Remove Columns' in Table 9-2).
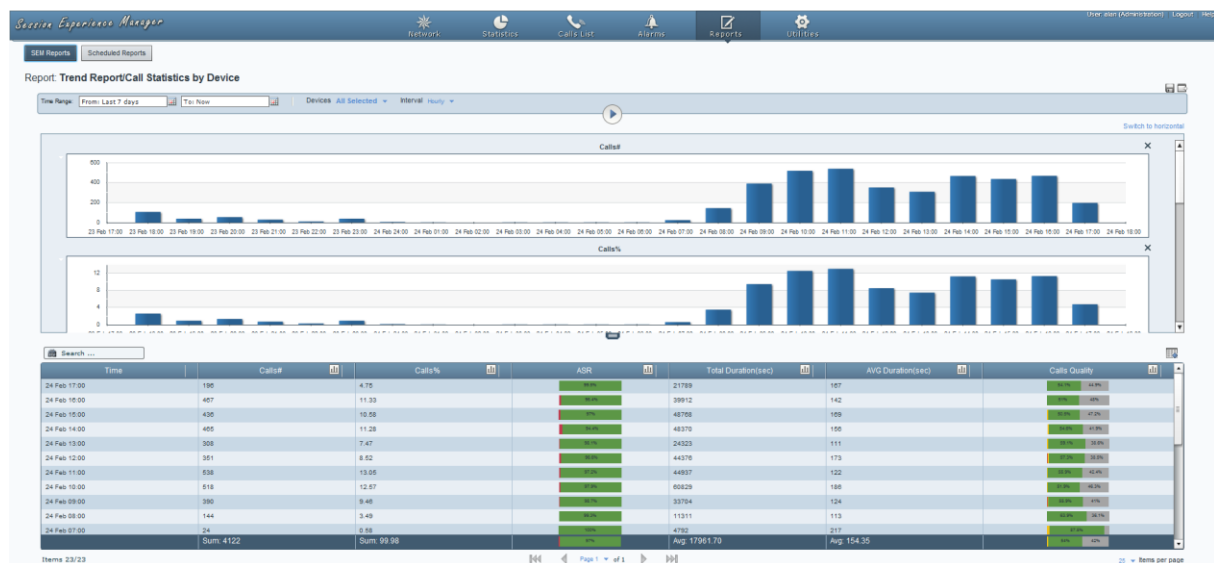
➢ **To produce a trend report:**

1. Click an option in the 'Trend Reports' category, e.g., the first; the 'Run now' ⊙ page opens

2. Filter for 'Time Range' and 'Devices' (described under Section 4 on page 23). For the 'Interval' filter select Hourly, Daily, Weekly or Monthly.

3. Click the 'Run now' ⊙ icon; the report opens:

Figure 9-4: Trend Reports – Call Statistics by Device

In a Trend Report you can:

■ See when most/least calls were made, how many, % of total, each period's success/fail rate and each period's quality scores.

■ Click the **Switch to horizontal** link to switch from vertically viewed charts (default) to horizontally viewed charts (see Table 9-2).

■ Click ⬛ to switch from bar (default) to linear charts. Select ⬛ from the drop-down (see 'Charts view / Table view' in Table 9-2).

■ Click ⬛ in a column header in the table to display that column as a chart (see 'Show Column Graphical Representation' in Table 9-2)

■ Click ⬛ to add a column to table view or remove a column from table view (see 'Add / Remove Columns' in Table 9-2). Default columns and optional columns are identical to the 'Call Statistics by Device/Link' and 'Call Quality by Device/Link'

reports in the Network Status Reports category.

■ Use the pager to navigate to a page if there are multiple pages (see under Figure 7-2)

■ Re-filter and re-run the report (see 'Filters' in Table 9-2)

■ Export the report to PDF. Click (see 'Export…' in Table 9-2)

■ Save the report as a CSV file. Click (see 'Save…' in Table 9-2)

■ Choose to produce another report by clicking the **SEM Reports** button.

9.1.3 Producing Top Users Reports

Top Users reports display the *top 10, 20 or 30 users* in terms of # of calls made, total duration, average duration, outgoing calls and incoming calls (default metrics measured).

Reports in this report category are identical in terms of metrics columns displayed. Metrics columns can optionally be added / removed (see 'Add / Remove Columns' in Table 9-2).
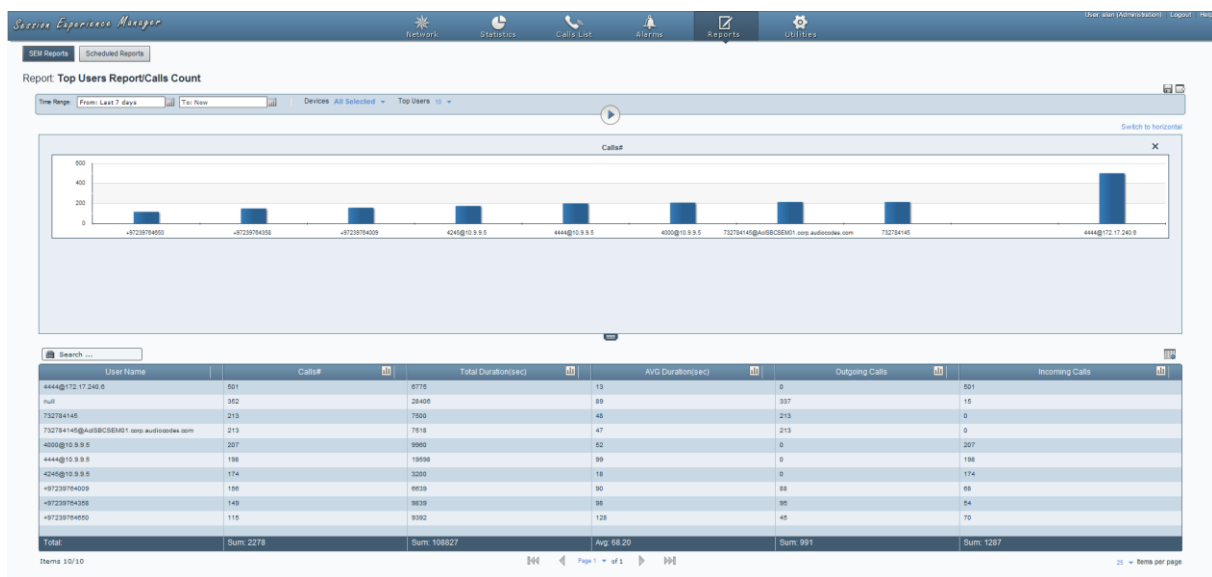
➢ **To produce a top users report:**

1. Click an option in the 'Top Users Reports' category, for example, click the first report option, i.e., Calls Count; the 'Run now' ▶ page opens.

2. Filter for 'Time Range' and 'Devices' (described under Section 4 on page 23). For the 'Top Users' filter, select 10, 20 or 30.

3. Click the 'Run now' ▶ icon; the report opens:

Figure 9-5: Top Users Report – Calls Count

In a Top Users Report you can:

■ Save the report as a CSV file. Click 🖫 (see 'Save…' in Table 9-2)

■ Export the report to PDF. Click 🖼 (see 'Export…' in Table 9-2)

■ Click the **Switch to horizontal** link to switch from vertically viewed charts (default) to horizontally viewed charts (see Table 9-2)

■ Click 📊 in a column header in the table to display that column as a chart (see 'Show Column Graphical Representation' in Table 9-2)

■ Click 🖽 to add a column to table view or remove a column from table view (see 'Add / Remove Columns' in Table 9-2).

Default and optional table columns in Top Users reports are:

Table 9-4: Table Columns in Top Users Reports

Report	Default Columns	Optional Columns
Calls Count	Calls #, Total Duration, Average Duration, Outgoing Calls, Incoming Calls	Voice Calls #/Fax Calls #
Calls Duration	Total Duration, Calls #, Average Duration, Outgoing Calls, Incoming Calls	None
Poor Calls Quality	Poor Quality Calls, Calls #, Calls Quality	Gray/Green/Yellow/Red % Yellow/Red #
Poor Quality by MOS / Jitter / Delay / Packet Loss / Echo	AVG MOS / Jitter / Delay / Packet Loss / Echo, Calls #, Total Duration	None
Poor Fax Quality	Poor Quality Faxes, Poor Quality Pages, Total Faxes, Total Pages	None
Utilization	Total Bytes, RX Bytes, TX Bytes	None

- User the pager to navigate if there are multiple report pages (see under Section 7 on page 45)

- Re-filter and re-run the report (see 'Filters' in Table 9-2)

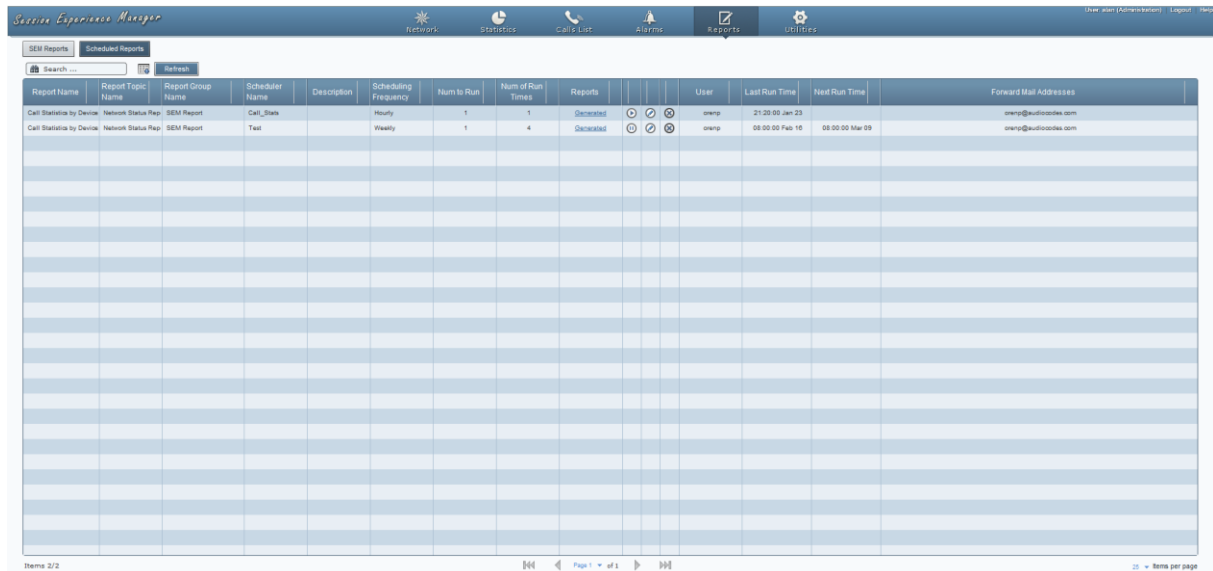- Choose to produce another report by clicking the **SEM Reports** button.

9.2 Scheduling a Report

You can schedule the SEM to automatically produce a report periodically.

➢ **To schedule a report:**

1. Click the **Reports** icon; the SEM Reports page opens (see Figure 9-1)

2. Click the **Scheduled Reports** button; this page opens:

Figure 9-6: Scheduled Reports
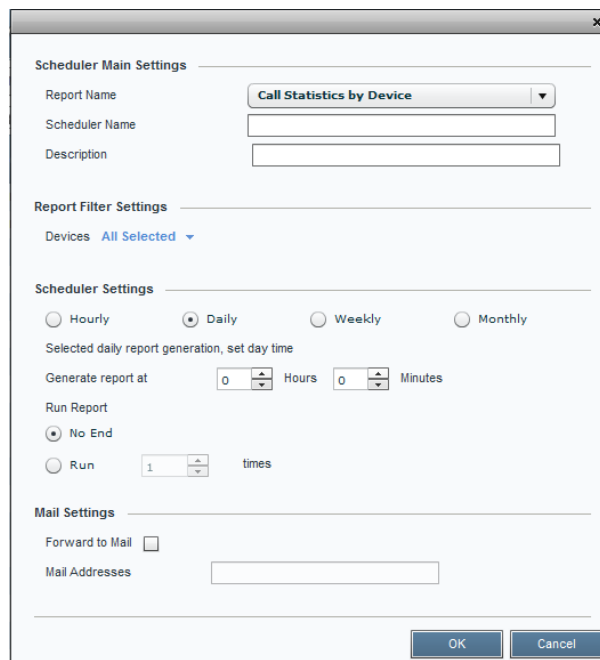
3. Click ![icon] to add a schedule; the Scheduler opens:

Figure 9-7: Scheduler

4. Under 'Schedule ID', select a report to schedule from the 'Report' drop-down list. All reports under all three report types are listed.

5. In the 'Schedule Name' field define a name that will let you easily identify the schedule.

6. In the 'Description' field, provide a description to help you distinguish this schedule from others.

7. Under 'Report Filter' you can filter the devices on which the report which you're scheduling will be produced. By default, all devices will be included. Click **All Selected** to change the default. For detailed information on how to filter devices, see Section 4.2.

8. Under 'Report Frequency', select either **Hourly**, **Daily** (default), **Weekly** or **Monthly**. If the frequency you select is **Daily**, set the 'Time'.

9. Under 'Run Times', select **Unlimited** or **Limit** to limit the schedule to a limited number of report run times (you can limit to up to 100 run times).

10. Under 'Forward Report', select the **Mail** option for the report to be automatically forwarded to your email address.

11. In the 'Mail Addresses' field, define the email address/addresses to which to automatically forward the report.

12. Click **OK**; the report is scheduled; you can expect the first to arrive in your mail according to schedule.
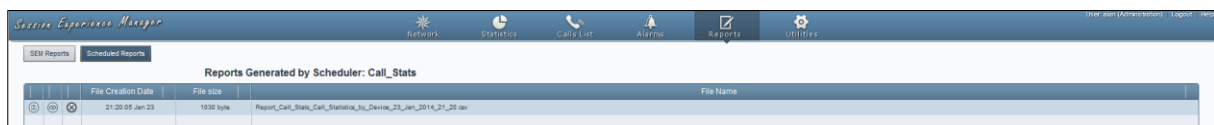
9.2.1 Viewing a Scheduler Generated Report

You can view a report generated by the scheduler.

➢ **To view a report generated by the scheduler:**

1. In the Scheduled Reports page under the Reports column (see Figure 9-6), click the **Generated** hyperlink in the row of the report generated by the scheduler; the Report Generated by Scheduler opens (see the figure below).
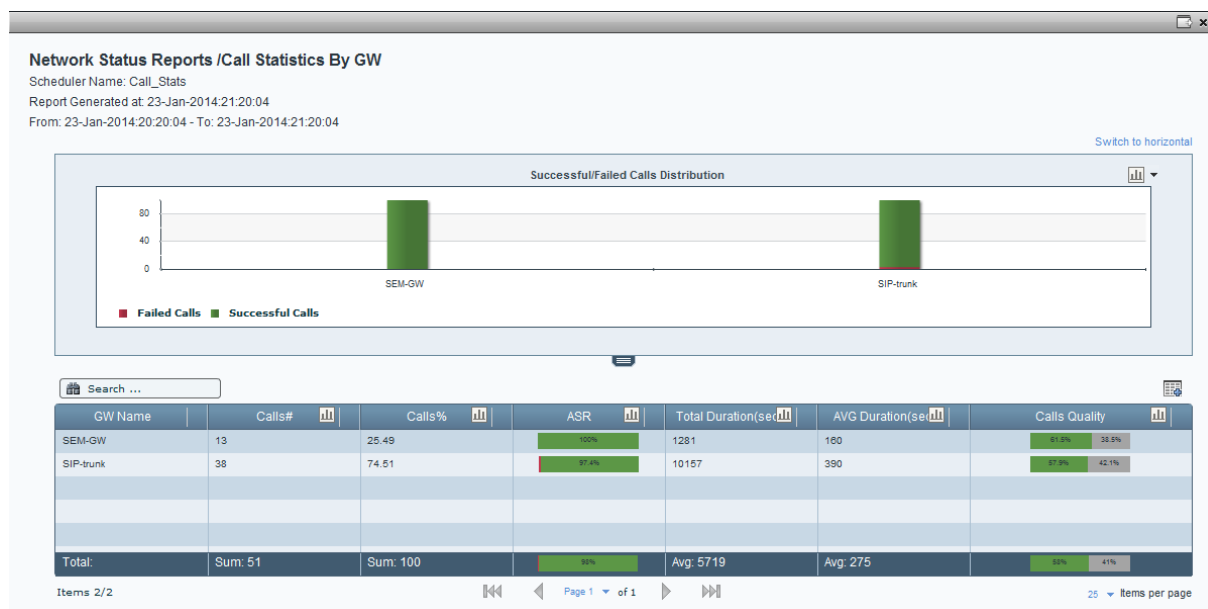
Figure 9-8: Report Generated by Scheduler

2. Click ⊙ **View Report**; the report is displayed:

Figure 9-9: Viewing a Scheduler Generated Report

9.2.1.1 Saving the File of a Scheduler Generated Report

You can save the file of a report generated by the scheduler.

➢ **To save the file:**

1. In the Report Generated by Scheduler page (see Figure 9-8), click 🖫 **Save Report File**.

2. Select the location on your pc in which to save the file and click **Save**.

9.2.1.2 Deleting the File of a Scheduler Generated Report

You can delete the file of a report generated by the scheduler.

➢ **To delete the file:**

1. In the Report Generated by Scheduler page (see Figure 9-8), click ⊗ **Delete File**; you're prompted 'Delete Generated Report File?'

2. Click **Yes**; the file is deleted.

9.2.2 Editing a Schedule

You can edit a report schedule.

➢ **To edit a schedule:**

1. In the Scheduled Reports page (see Figure 9-6), click ✎ **Update Scheduler**; the Scheduler opens (see Figure 9-7).

2. Edit the reports schedule. See under Section 9.2 for detailed information.

9.2.3   Deleting a Schedule

You can delete a report schedule.

➢ **To delete a schedule:**

1. In the Scheduled Reports page (see Figure 9-6), click **Delete Scheduler**; you're prompted 'Are you sure?'.

2. Click **Yes**; the report schedule is deleted.

9.2.4   Manually Running or Pausing a Schedule

You can manually run or pause a report schedule.

➢ **To manually run a schedule:**

■ In the Scheduled Reports page (see Figure 9-6), click **Run Scheduler**; the icon changes to and the report scheduler is run.

➢ **To manually pause a schedule:**

■ Click **Pause Scheduler**; the icon reverts to and the scheduler is paused.

Reader's Notes

10 Viewing Server Information

In the Utilities page under Server Info (see the figure below) you can determine your storage capacity status.

To open the page, click the **Utilities** icon.

Figure 10-1: Utilities Page

10.1 Setting Call Details Storage Level

In the Utilities page under Server Configuration (see the figure above) you can configure the Call Details storage level to optimize storage capability. You can select:

■ **All Calls, All Trends**

■ **All Calls, No Trends for Good Quality Calls**

■ **All Calls, No Trends**

-OR-

■ **Failed, Poor and Fair Quality Calls, No Trends**

> **Note:**
> - Least data is stored if you select the last option. Most data is stored if the default option is selected.
> - After selecting a level, the ⊘ icon is displayed. Click the **Apply** button to set the level.
> - The default storage level is **2**: **All Calls, No Trends for Good Quality Calls**.
> - If you're operating with more than 50 CAPs, set the storage level to **3**: **All Calls No Trends**
> - If you're operating with more than 100 CAPs, set the storage level to **4**: **Failed, Poor and Fair Quality Calls, No Trends**.

SEM for AudioCodes Media Gateways and Servers

SEM   Session Experience Manager

User's Manual

Version 6.8