User's Manual

AudioCodes One Voice™ Operations Center

Session Experience Manager

Version 7.2

AudioCodes

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Notice

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Trademarks

AudioCodes, AC, HD VoIP, HD VoIP Sounds Better, IPmedia, Mediant, MediaPack, What's Inside Matters, OSN, SmartTAP, User Management Pack, VMAS, VoIPerfect, VoIPerfectHD, Your Gateway To VoIP, 3GX, VocaNom, AudioCodes One Voice and CloudBond are trademarks or registered trademarks of AudioCodes Limited. All other products or trademarks are property of their respective owners. Product specifications are subject to change without notice.

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Abbreviations and Terminology

Each abbreviation, unless widely used, is spelled out in full when first used.

Related Documentation

Manual Name
Mediant 4000 SBC User's Manual
Mediant 9000 SBC User's Manual
Mediant 500 E-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 2000 Media Gateway User's Manual / Mediant 3000 Media Gateway 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 MSBR User's Manual / Mediant 500L MSBR User's Manual
MediaPack 11x (MP-11x) Media Gateway User's Manual
SEM Cloud Service Configuration Note
EMS Server IOM Manual / EMS User's Manual / Performance Monitors and Alarms Guide

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Document Revision Record

LTRT	Description
91061	Beta version
91062	GA
91064	SEM over HTTPS, SNR, Search by Region, transferred and forwarded calls, LDAP server(s) setup description, added 'Enable SEM Client Secured Connection', removed configuration of server security settings, adding an unprivileged user
91065	SEM4IPPhones. Conference calls.
91066	AD exposition.
91067	Call Details page (for Microsoft Lync) updated.
91068	Network Device Definition – SSL; Session Timeout Period; Connectivity Status; Link Direction; 'SIP Termination Reason' from 7,10 to Bye, Cancel; Basic/Full Report; New format for time fields: HH:MM:SS; Max Stored Days, SRD, Media IF, Sub Media IF.
91069	Supported Lync servers. Refresh feature. Signaling Info. Media Info. Calls over Endpoints. Specific Endpoint. Calls Quality. User Details – Member of.
91070	Starting the SEM. SSL for AD options. Maximum Concurrent Calls.
91071	Modified description of FE Server configuration
91072	Comparing statistics obtained from devices, links and endpoints
91073	7.2.2000 Support limitation when Lync functions with Lync server pools. T-B License/alarm/ enforcement. Modified Call Details-Signaling Info. Modified orange triangle status/tooltip. Trunk Groups definition.
91074	7.2.3000

1 Overview

AudioCodes' Session Experience Manager (SEM) is a valuable 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 maximize the quality of experience of users in the VoIP network.

Note: Unless stated otherwise, the term 'user' or 'users' in this document refers to *end user* or *users*, not to users of the SEM.

1.1 Main Features

Following are the main SEM features:

- Modular tool featuring distinct views for Network, Statistics, Calls, Users, Alarms and Reports.
- Graphically represented managed devices/links in Map, Table and Regions view, featuring popup summaries 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/latency and echo).
- Call trend statistics according to key metrics, traffic load, average call duration and call success.
- SEM alerts based on call success rate and quality thresholds defined by the network administrator.
- Active alarms and history alarms display.
- Monitoring of call quality of Microsoft Lync 2013.
- Filtering according to time range, devices and links.
- Reports

Note: SEM supports:

- **Microsoft Lync Server** for customers with one Front End server and one SQL server.
- Up to two **Microsoft Lync** solutions in one SEM application.
- **Microsoft Lync Server limitation**: When functioning with Lync server pools (FE, Edge and Mediation), the FE server defined in the SEM functions as the monitoring SQL database. After connecting, the SEM presents all Call Details from the Lync network in the SEM's Calls List and Call Details views. When functioning with Lync pools, FE, Edge and Mediation servers cannot be defined in the SEM, so the entire Lync network is presented in the SEM only as a single object, namely, the monitoring SQL database.

1.2 SEM Monitored Devices

The following devices can be monitored by the SEM:

- Mediant 9000 SBC
- Mediant 4000 SBC
- Mediant 2600 E-SBC
- Mediant SE/VE 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
- Endpoint devices
  - AudioCodes IP phones (status, provisioning and voice quality)
  - Other endpoint devices supporting SIP Publish reports
    - Located in non-Lync environments, in which AudioCodes IP phones report quality data to the SEM
    - Located in Lync environments, in which quality data is reported to the FE and the SEM4Lync feature enables the SEM to retrieve it

Note that SEM monitors devices that support software versions 6.6, 6.8, 7.0 and 7.2.

1.3 Benefit to VoIP Network Administrators

The SEM enables VoIP network administrators to:

- 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.
- Receive notifications ahead of time on quality degradation for proactive Nerve Operation Center (NOC) users.
- Receive CIO-level dynamic reports for future planning and over-time network quality assurance.

1.4 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.

1.5 Microsoft Lync Monitoring SQL Server

1.5.1 Minimum Requirements

Detailed minimum requirements for Microsoft Lync Monitoring SQL Server can be found at http://technet.microsoft.com/en-us/library/gg412952.aspx

1.5.2 Prerequisites

Following are the Microsoft Lync Monitoring SQL Server prerequisites:

- The server must be defined to accept login in 'Mix Authentication' mode.
- The server must be configured to collect calls before the SEM can connect to it and extract Lync calls for display.
- Call Detail Records (CDRs) and Quality of Experience (QoE) Data policies must be configured to capture data.
- Network administrators must be granted the correct database permissions (see below).
- Excel macros must be enabled so that the SQL queries and reports can be run. It was tested with Excel 2010 and 2013.
- Detailed minimum requirements for Microsoft Lync SQL Server can be found at http://technet.microsoft.com/en-us/library/gg412952.aspx

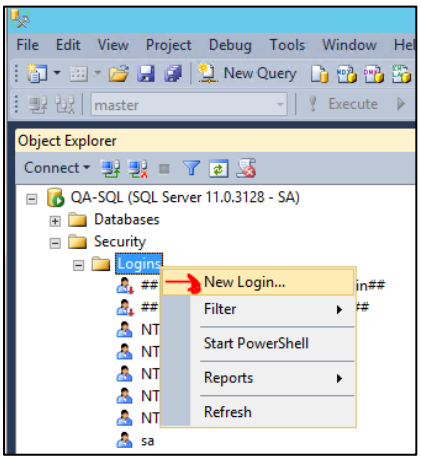
1.5.3 Adding an Unprivileged User

You can add an unprivileged user to the Microsoft Lync Monitoring SQL Server using the SQL Server Management Studio.

➢ **To add an unprivileged user:**

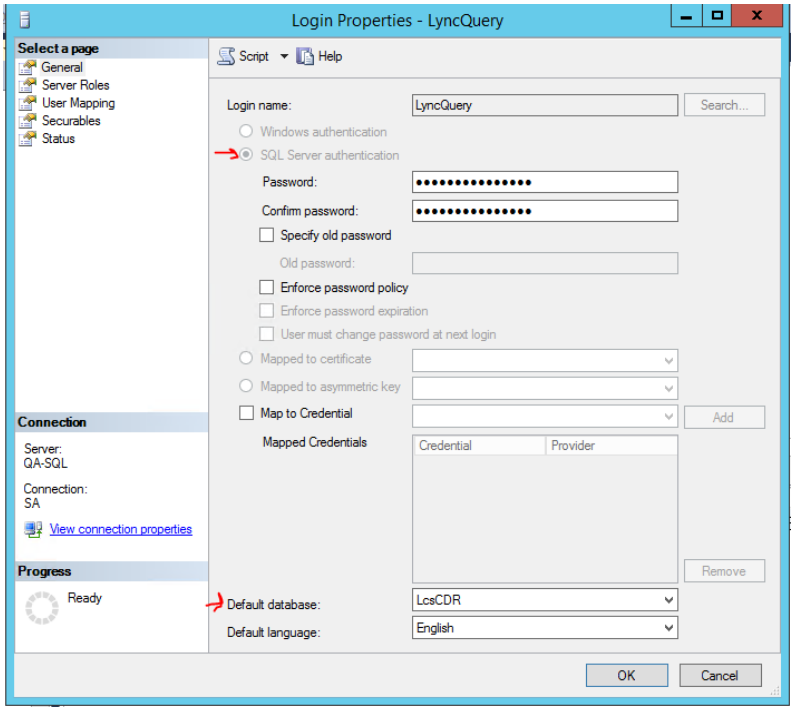
1. From the 'Security' folder, right-click **Logins** and from the popup menu, select **New Login**.

Figure 1-1: SQL Server Management Studio - Logins - New Login



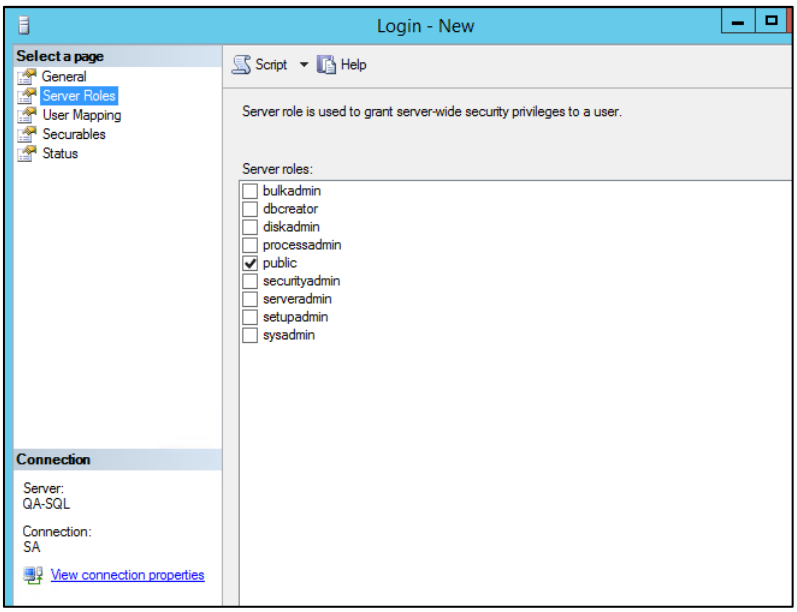
2. Select the **General** page and enter the new user name and password. In this case, select the **SQL server authentication** option, as shown in Figure 1-2.

Figure 1-2: General page – Login Name and Password



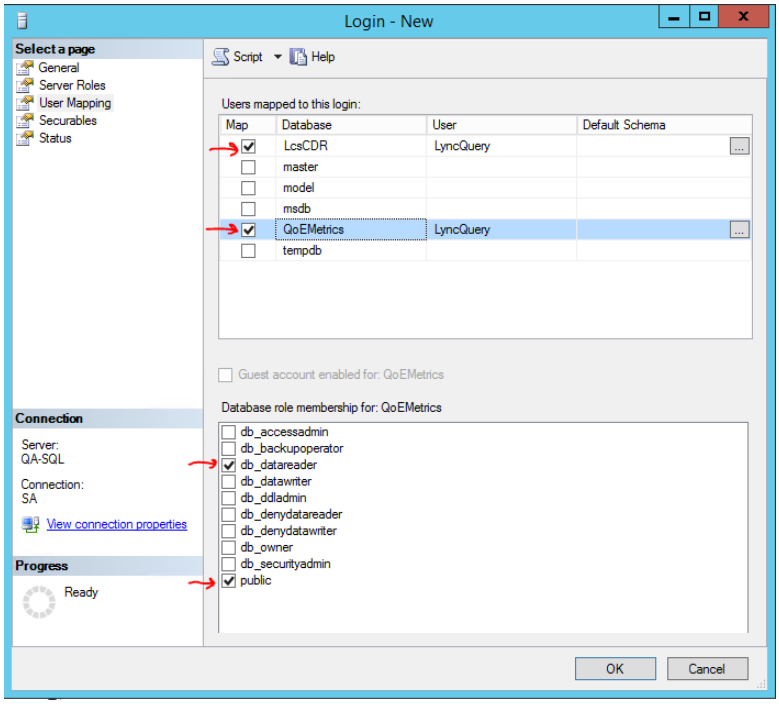
3. Select the **Server Role** page; **public** is selected by default.

Figure 1-3: Server Role page - Public



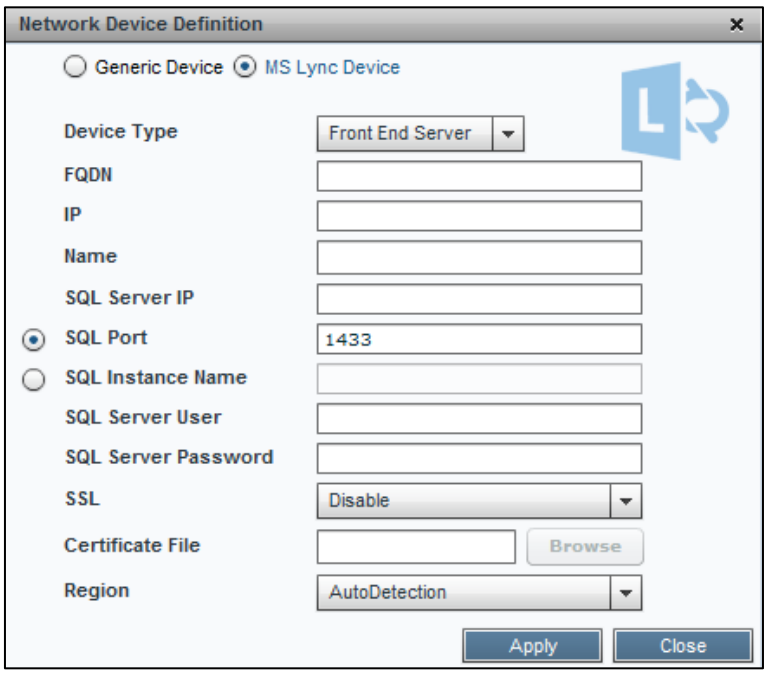
4. Select the **User Mapping** page; the page shown in Figure 1-4 opens.

Figure 1-4: User Mapping page



5. Make sure both Lync databases are selected (in the uppermost pane).
6. For each database, select roles (in the lowermost pane) **db_datareader** and **public**; the SQL server side is now ready.
7. On the SEM server side, under the **Network** tab, click the **Add Non-ACL device** icon ; the Network Device Definition frame opens.

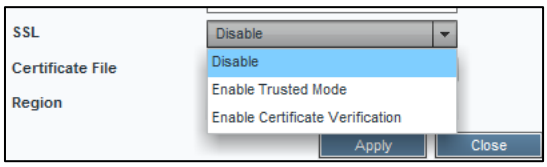
Figure 1-5: SEM - Network tab - Add Non-ACL Device – Network Device Definition



8. Select the **MS Lync Device** option.
9. From the 'Device Type' dropdown, select **Front End Server**.
10. Enter the other details about your MS SQL server.
11. Enter the same user credentials you previously defined in the SQL server.

12. From the 'SSL' dropdown, you can choose to leave the setting at its default of **Disable** or you can select **Enable**. If you select **Enable**, the following options are prompted:

Figure 1-6: SSL



13. Use the table below as a reference when configuring the SSL parameter.

Table 1-1: SSL Parameter Options

SSL Parameter Options	Description
Disable	Communications with the SQL server will be open (unencoded).
Enable Trust Mode	The connection with the SQL server is trustworthy, i.e., no matter what certificate is received from the SQL server, a key will be sent anyway and communications with it will then be SSL-encoded.
Enable Certificate Verification	Enables verification that it is the SQL server and no other entity that is communicating with the SEM server. If selected, a new 'Certificate File' field will be displayed, allowing you to browse for a root certificate. When the SQL server then sends a certificate, the SEM server uses the root certificate to verify that it is the SQL server and no other entity on the other side. Following verification, communications are SSL-encoded.

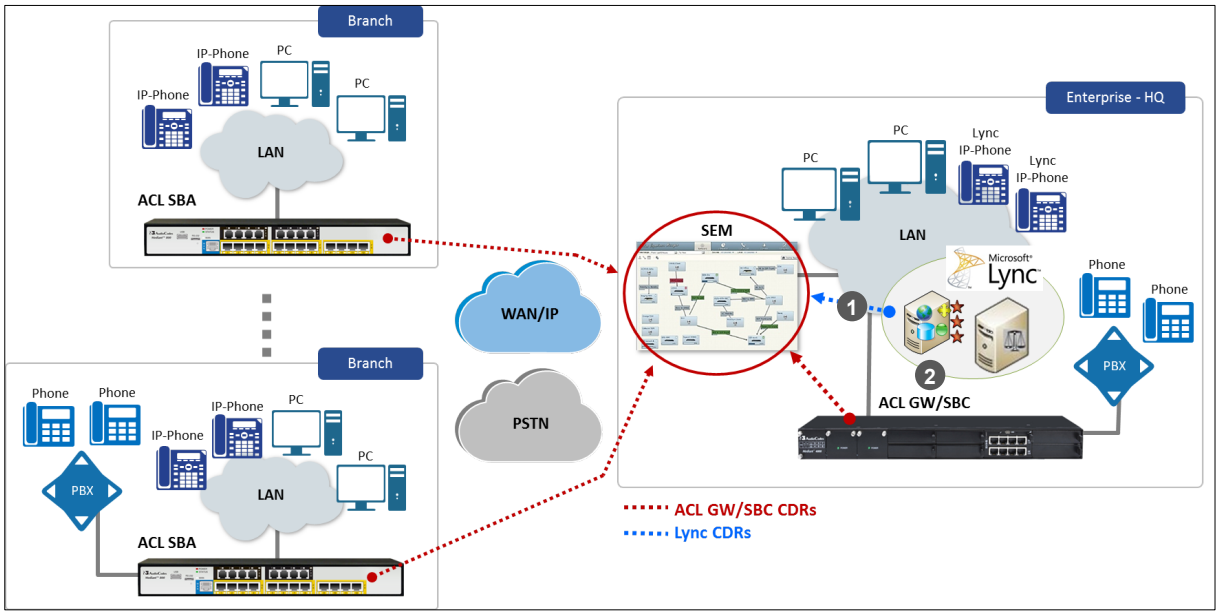
Note:

- If, after a certificate file is added, a new certificate file is added, the new certificate file overwrites the previous.
- If you initially configured the SSL parameter to **Enable Certificate Verification** and then later set it to **Enable Trusted Mode**, the installed certificate file will be removed from the SEM server.

1.5.4 Synchronizing SEM / Microsoft Lync Server with NTP Server

The SEM and Microsoft Lync server must be synchronized with the *same* NTP server.

Figure 1-7: SEM Connected to Monitoring SQL Server dB and AD



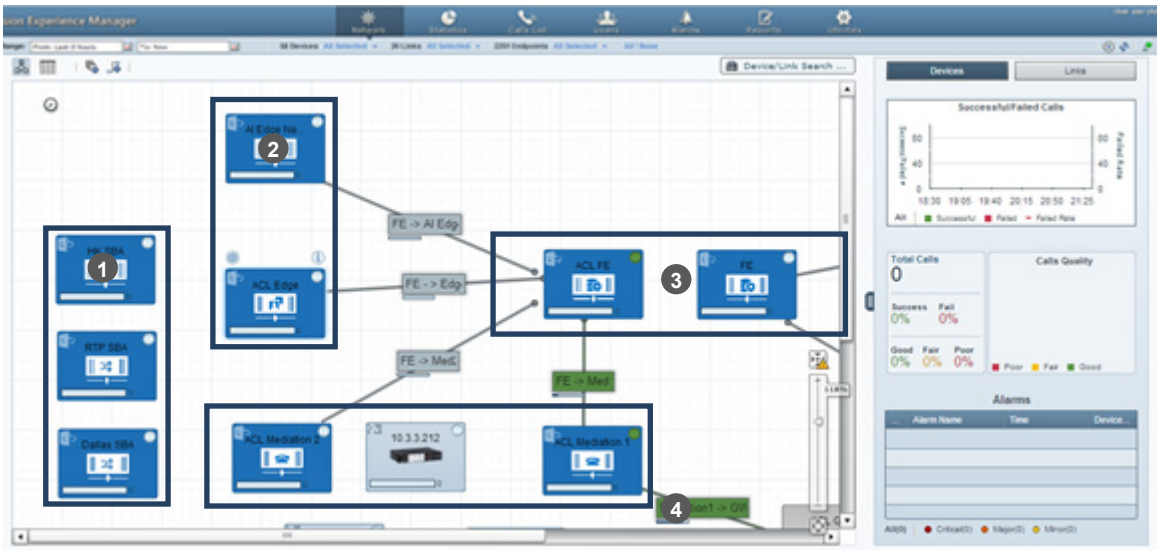
1 = SEM connects to the monitoring SQL server database and to the enterprise AD

2 = Seamless integration using predefined usernames and passwords

The SEM server connects to the Microsoft Lync QoE server, retrieves call quality-related data, and then represents this information in the Microsoft Lync and AudioCodes device icons in the Network page, Map view.

In the Network map, SEM users can define Microsoft Lync-related components (Front End, Edge, SBA and Mediation servers) and their connecting links. Figure 4-7 shows this. The SEM displays all calls made via Microsoft Lync Server.

Figure 1-8: SEM for Lync, Network View



1= SBA
2= Edge
3= Front End
4=Mediation

1.6 Loading a License to the SEM Server

You need to purchase from AudioCodes a license that includes the SEM feature, save it on your PC, and then load it to the server using the EMS. The EMS lets you upload a new license and/or view the details of an existing license.

Note: To obtain your license, note the Server Machine ID, and then download the license activation form from AudioCodes' website's 'Services and Support' page: http://www.audiocodes.com/services-and-support .

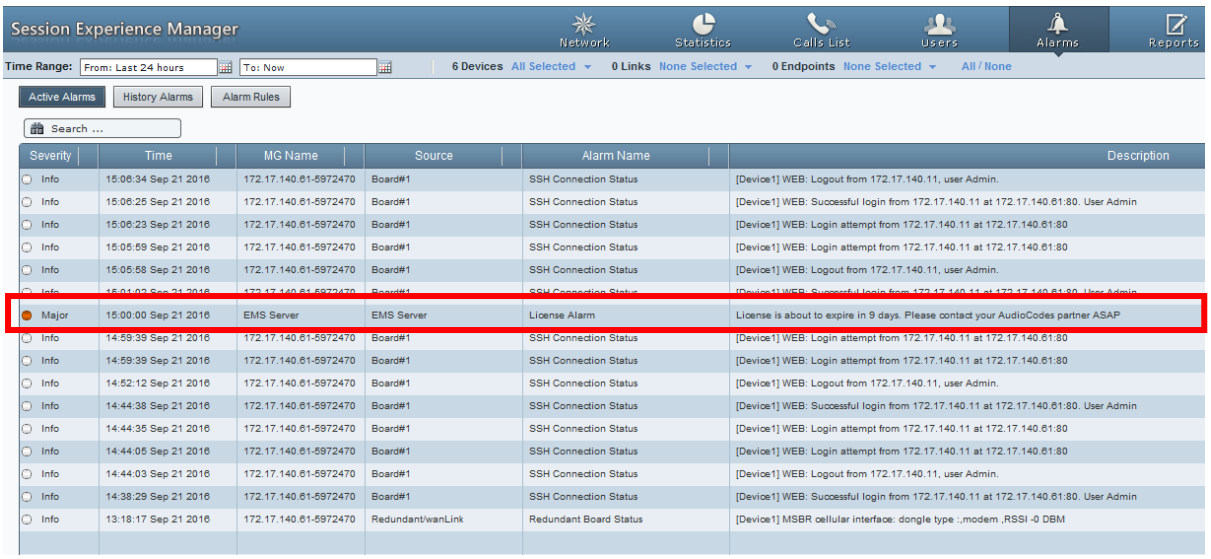
➢ **To load a license to the SEM server:**

- For detailed information on loading the license to the server, see the *EMS Server IOM Manual*. You can view the license details in the EMS Server Manager License screen.

1.6.1 License Alarm

The SEM may display a License Alarm in the Alarms page.

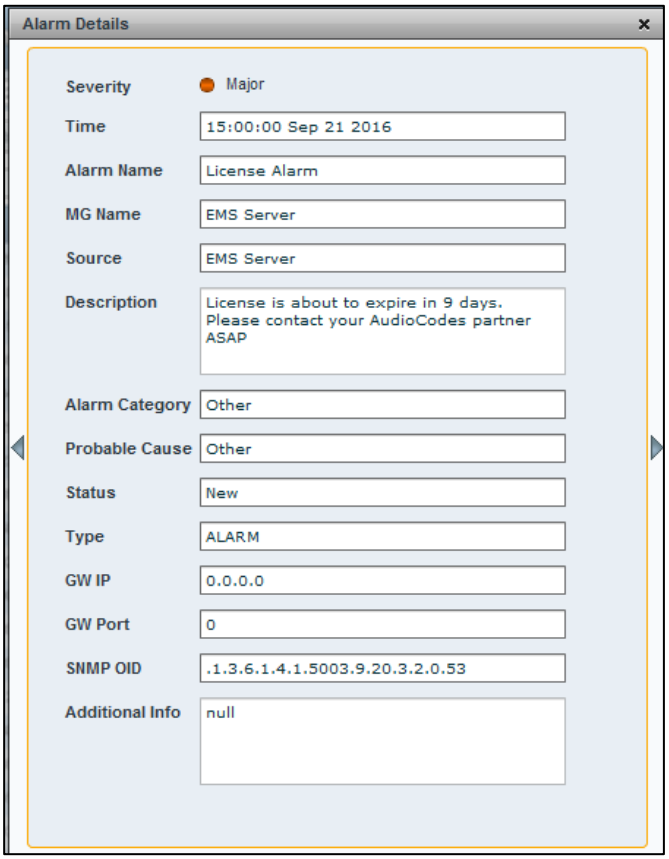
Figure 1-9: License Alarm Displayed in Alarms Page



➢ **To view alarm details:**

1. Click the row of the alarm; the Alarm Details window opens, as shown in Figure 1-10 on the next page.

Figure 1-10: License Alarm Details



2. Use the table below as reference.

Table 1-2: License Alarm

Description	This alarm is issued when the license approaches or reaches its expiration date.	
SNMP Alarm	acLicenseAlarm	
SNMP OID	1.3.6.1.4.1.5003.9.20.3.2.0.53	
AlarmTitle	License Alarm	
AlarmType	Other	
AlarmSource	EMS Server	
Probable Cause	Other	
Additional Info	Info1: • Machine ID In The License Is {0} • Expiration Date In The License Is {0}	
Corrective Action	Contact your AudioCodes partner.	
Alarm Severity	**Condition**	**Alarm Text**
Critical	The license expiration date is less than / equal to 7 days away.	• EMS License is about to expire in {0} days. • EMS License is about to expire in 1 day. • EMS License Will Expire Today
Major	The license expiration date is more than 7 days and less than / equal to 30 days away.	EMS License is about to expire in {0} days.
Clear	The license expiration date is more than 30 days away.	

1.6.2 SEM – License Key Alarm

The SEM may display a SEM - License Key Alarm in the Alarms page. The table below describes its possible 'flavors'.

Table 1-3: SEM – License Key Alarm

Description	Sent if the number of ▪ devices connected to the SEM server approaches or reaches license capacity (shown as 'Devices Number' under 'SEM' in the EMS Server Manager License screen). • sessions running on the SEM server approaches or reaches license capacity (shown as 'SEM Sessions' under 'SEM' in the EMS Server Manager License screen).		
SNMP Alarm	acSEMLicenseKeyAlarm		
SNMP OID	1.3.6.1.4.1.5003.9.20.3.2.0.33		
Alarm Title	SEM License key alarm.		
Alarm Source	SEM server		
Alarm Type	Other		
Probable Cause	Key Expired		
Corrective Action	Contact your AudioCodes representitve to obtain a correct license key.		
Alarm Severity	**Condition**	**Alarm Text**	**Corrective Action**
Critical	The number of currently running sessions/devices has reached 100% of the SEM server license capacity.	Current server load reached 100% of SEM License capacity.	
Major	The number of currently running sessions/devices has reached 80% of SEM server license capacity.	Current server load reached 80% of SEM License capacity.	
Clear	The number of currently running sessions/devices has dropped below 80% of SEM server license capacity.	Clearing currently active device alarm.	

1.6.3 Endpoint License Alarm

The SEM may display an Endpoint License Alarm in the Alarms page. The table below describes its possible 'flavors'.

Table 1-4: Endpoint License Alarm

Description	Sent if the number of • endpoints currently running on the SEM server approaches or reaches its license capacity (shown in the EMS Server Manager License screen under 'SEM', as 'IP Phones Number'). • endpoints currently running on the EMS server approaches or reaches its license capacity (shown in the EMS Server Manager License screen under 'EMS for IP Phones', as 'IP Phones Number').		
SNMP Alarm	acEndpointLicenseAlarm		
SNMP OID	1.3.6.1.4.1.5003.9.20.3.2.0.48		
Alarm Title	Endpoint License Alarm		
Alarm Source	SEM Server/EMS Server		
Alarm Type	Other		
Probable Cause	Key Expired		
Additional Info	Endpoint License capacity {0} devices.		
Corrective Action	Contact your AudioCodes partner		
Alarm Severity	**Condition**	**Alarm Text**	**Corrective Action**
Critical	Currently connected devices are equivelant to 100% of Endpoints License capacity.	Currently running devices reached 100% of Endpoints License capacity.	Contact your AudioCodes partner
Major	Currently connected devices are equivelant to reached 80% of Endpoints License capacity.	Currently running devices reached 80% of Endpoints License capacity.	Contact your AudioCodes partner
Clear	Clearing currently active alarm	Clear - Clearing currently active alarm.	-

1.7 Applying QoE Thresholds

Note:

- Currently, QoE thresholds profiles determine call color *for Lync devices/links only*.
- Refer to a specific device's documentation for information on how call color is calculated for AudioCodes devices.

The QoE Thresholds page (accessed in the Utilities page from the **QoE Thresholds** tab) lets you apply QoE Threshold profiles for voice quality metrics (MOS, Delay, Packet Loss, Echo and Jitter).

A QoE Threshold profile consists of threshold values set for each of these metrics for the 'Poor', 'Fair' and 'Good' call quality categories.

The page displays three *predefined* QoE profiles:

Table 1-5: Three Predefined QoE Profiles

Predefined Profile Name	Description
Low Sensitivity Threshold	Predefined threshold values representing recommended data for the 'Low' sensitivity level.
Medium Sensitivity Threshold	Predefined threshold values representing recommended data for the 'Medium' sensitivity level.
High Sensitivity Threshold	Predefined threshold values representing recommended data for the 'High' sensitivity level.

1.7.1 Predefined QoE Thresholds And Values

This section describes predefined QoE thresholds and values.

You can optionally manually define your own custom profile of threshold values, and include or exclude specific metrics. For example, you can exclude defined threshold values for 'MOS', 'Delay' and 'Echo' metrics from the profile, but include defined threshold values for 'Packet Loss' and 'Jitter' metrics.

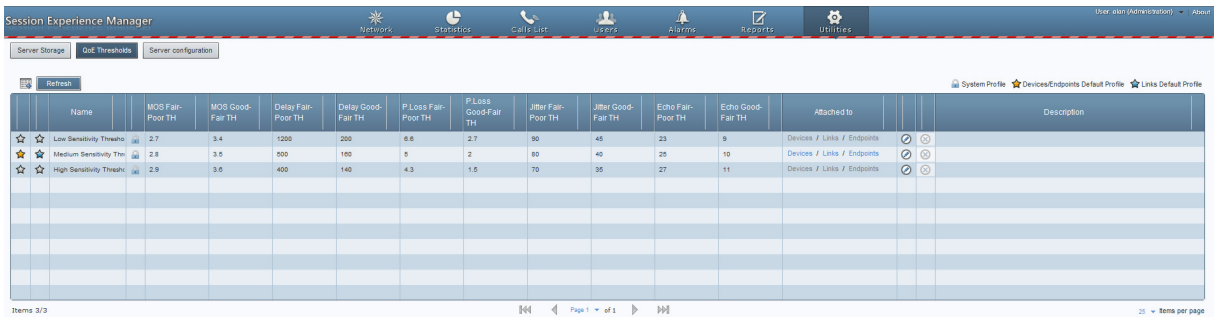
After defining a profile, you can

- Save and attach it to *specific* devices and/or links
- Save and attach it to *all* devices and links

➢ **To apply QoE thresholds:**

- In the Utilities page, click the **QoE Thresholds** tab; the following page opens:

Figure 1-11: QoE Thresholds



The page lets you

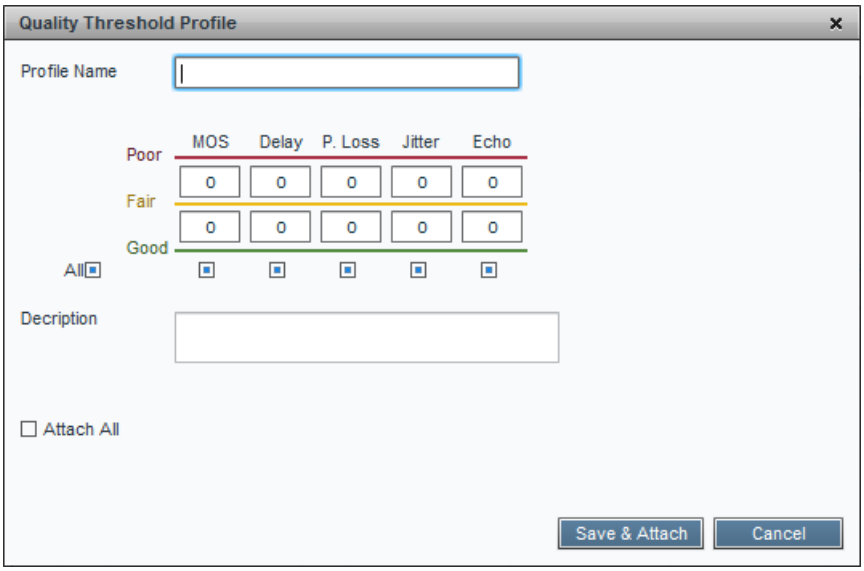
- view existing QoE thresholds profiles and the devices / links / endpoints to which they're attached
- view existing profiles' defined thresholds (columns MOS, Delay, Packet Loss, etc.)
- set existing QoE thresholds profiles as devices / endpoints default or links default.
- Update / Apply existing profiles
- Delete existing profiles

1.7.2 Defining a New QoE Thresholds Profile

➢ **To define a new QoE Thresholds profile**

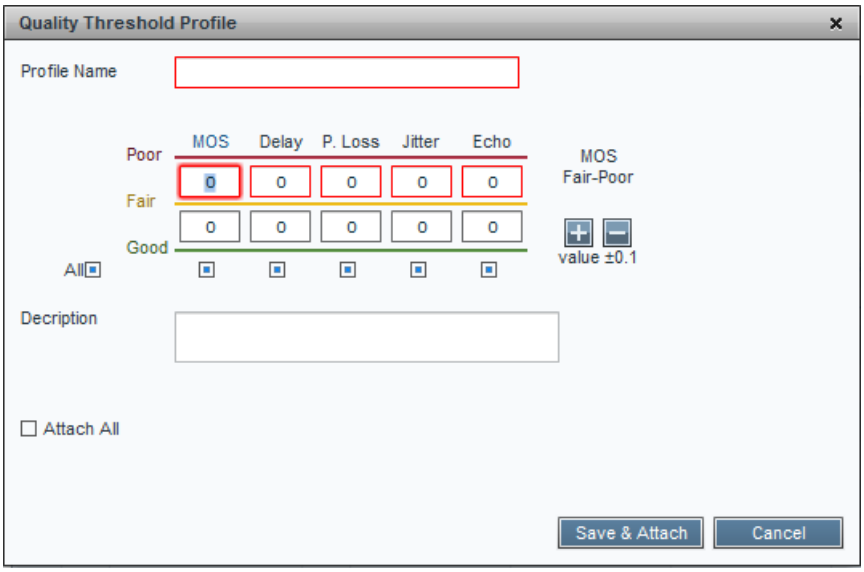
1. In the page above, click the Add Profile icon; this screen opens:

Figure 1-12: Quality Threshold Profile



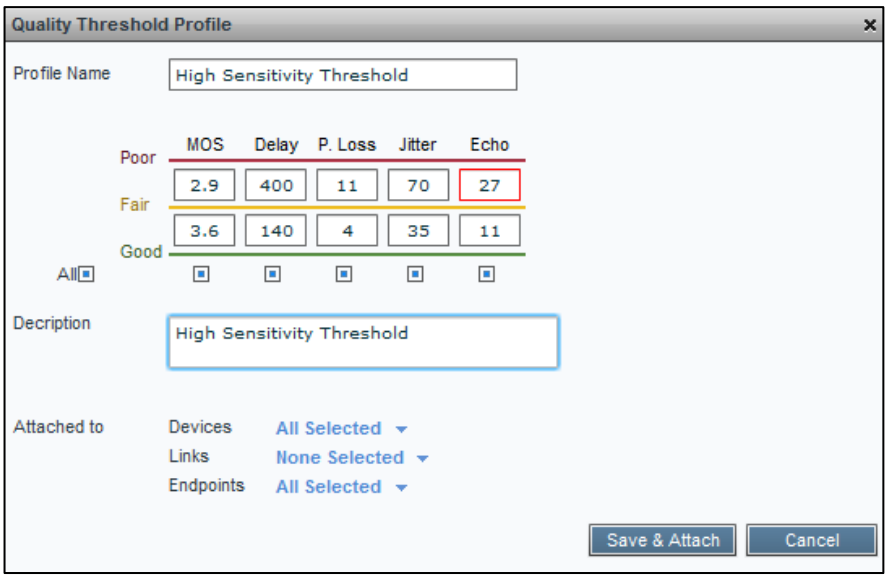
2. Provide an intuitive name for the profile. Use the names of the three predefined QoE profiles, displayed in Table 1-5, as a reference.
3. By default, **All** metrics are included in the profile. To *exclude* a metric, clear its check box. To define the MOS Fair-Poor threshold, for example, click the **0** under 'MOS', between Poor and Fair:

Figure 1-13: Quality Threshold Profile - MOS



4. Click the **+** or the **–** until the threshold value you require is displayed. Each click increments or decreases the threshold by **0.1 (MOS, Packet Loss)**, or by **1 (Delay, Jitter, Echo)**. Alternatively, enter the value you require.
5. After defining the MOS Fair-Poor threshold, define the MOS Good-Fair threshold. Click the **0** under 'MOS', between Good and Fair. Enter the value you require. Do the same for the other metrics thresholds. Figure 1-14 shows the predefined 'High Sensitivity Threshold' profile values as an example.

Figure 1-14: Quality Threshold Profile – High Sensitivity Threshold (Predefined)



6. Click the **Attach** button; the profile is displayed in the QoE Thresholds screen.
7. In the QoE Thresholds screen:
   - **Set as devices default** (in the profile's row, click the star icon)
   - **Set as links default** (in the profile's row, click the star icon)
   - **Delete a profile** (click the ⊗ icon adjacent in the profile row)
   - **Update / apply a profile** (click the ⊘ icon in the profile row)
   - Select Devices / Links / Endpoints for the profile

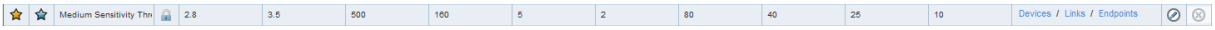
1.7.3 Attaching a Profile to All Devices/Links/Endpoints Except to a Specific One

You may require attaching a profile to all devices/links/endpoints except to a specific one, or to specific ones. This section shows how.

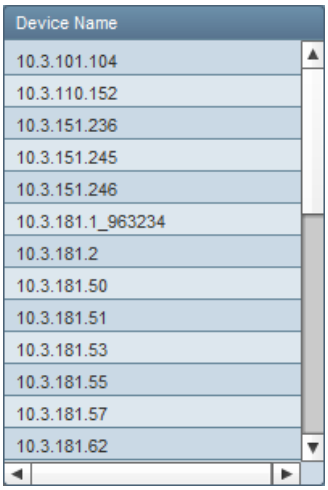
➢ **To attach a profile to all devices / links / endpoints:**

1. In the Utilities page under the **QoE Thresholds** tab, set the default profile:
   - click the leftmost star next to a profile in order to set that profile as the default for all devices/endpoints
   - click the right star next to a profile in order to *set that profile as the default for all links*

   For example, set the **Medium Sensitivity Threshold** profile as default for all devices/endpoints and links. In the figure below, the leftmost star next to 'Medium Sensitivity Threshold' turns orange, indicating that this profile is now set as default for all devices/endpoints; the right star next to the profile turns blue, indicating it's set as default for all links.

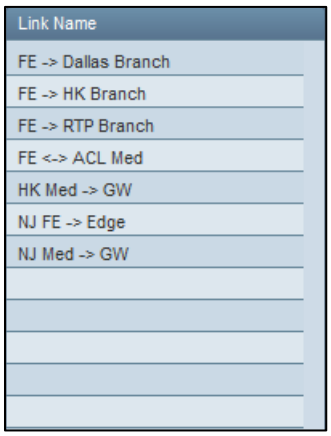


2. Click Devices; the following list is displayed:



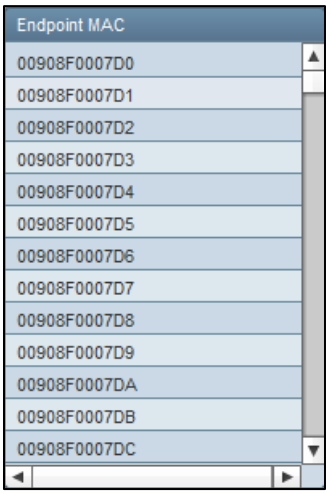
The profile is attached to all these devices.

3. Click Links; the following is displayed:



The profile is attached to all these links.

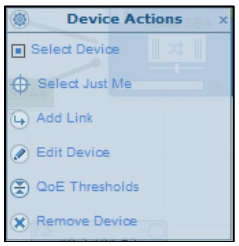
4. Click Endpoints; the following is displayed:



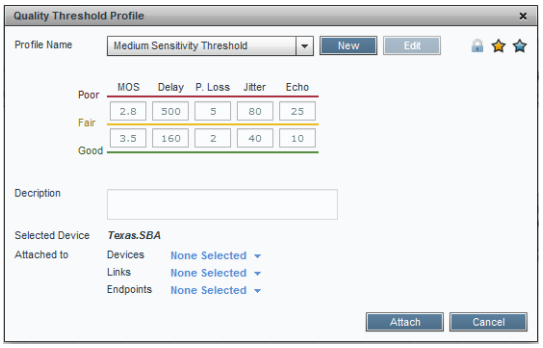
The profile is attached to all these endpoints.

➢ To attach a profile to a specific device / link / endpoint:

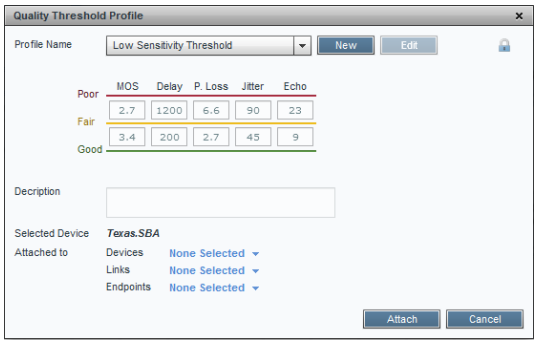
1. Open the Network page and click the specific device to which to attach a different profile; the **Actions** icon is displayed.
2. Click it; the Device Actions menu opens.



3. Click **QoE Thresholds**; the Quality Threshold Profile screen opens.

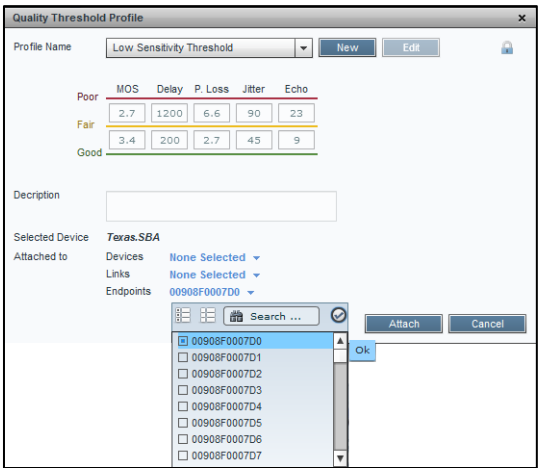


4. From the 'Profile Name' dropdown, change the profile to **Low Sensitivity Threshold** (for example) to replace the **Medium Sensitivity Threshold** profile.

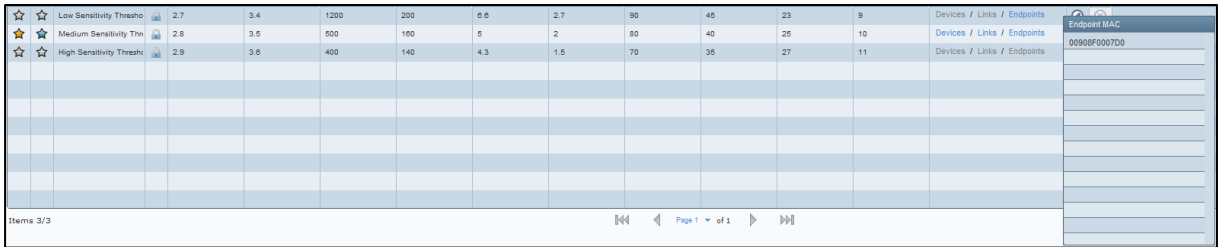


5. From the 'Attached to' dropdown lists, select specific device/s, link/s and/or endpoint/s

whose profile you want to change to **Low Sensitivity Threshold**. The figure below shows how to select a specific endpoint.



6. After selecting, for example, the first endpoint listed, click the OK icon and then click the **Attach** button; the **Low Sensitivity Threshold** profile is attached to this specific endpoint.
7. Open the Utilities page again and again click the **QoE Thresholds** button.



8. In the QoE Thresholds page, verify that the **Low Sensitivity Threshold** profile's Endpoints is now hyperlinked.
9. Click the **Low Sensitivity Threshold** profile's Endpoints hyperlink and verify in the popup shown in the figure above that the specific endpoint, whose profile is now different to **Medium Sensitivity Threshold** defined as default for all other devices/links/endpoints, is listed.

1.7.4 Understanding the 3 Sensitivity-Level Profiles

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.

For each monitored parameter, administrators can use the thresholds in the predefined profile, or define their own thresholds.

Table 1-6: Voice Quality Profile Parameters

Parameter (units)	Sensitivity Level	Good-Fair (Green-Yellow) Threshold	Fair-Poor (Yellow-Red) Threshold
MOS	Low	3.4	2.7
	Medium	3.5	2.8
	High	3.6	2.9
Delay (msec)	Low	200	1200

Parameter (units)	Sensitivity Level	Good-Fair (Green-Yellow) Threshold	Fair-Poor (Yellow-Red) Threshold
	Medium	160	500
	High	140	400
Packet Loss (%)	Low	2.7	6.6
	Medium	2	5
	High	1.5	4.3
Jitter (msec)	Low	45	90
	Medium	40	80
	High	35	70
Echo (dB)	Low	23	9
	Medium	25	10
	High	27	11

1.7.5 Understanding How Call Color is Determined

This section helps you understand how Lync call color is determined. As shown in the previous section, a default profile is assigned to each Front End server, which you can change. (No profile is attached to the Mediation Server or Edge Server).

A default profile is also assigned to each Link, which you can change and apply to each Link as shown in the previous section.

1.7.5.1 Link Profile as Determinant

Each call comprises one or more legs. Each leg is assigned a color, determined by its associated Link profile. If a call leg passes over few Links and each has a different profile, each Link has its own color (displayed in the Summary Panes) corresponding to its profile. However, the call leg's color is set as the worst color received from all the Links profile; the Call Details screen shows what profile caused the leg color. If a call leg does not match any of the Links, its color is defined based on the FE profile. The color representing worst quality among all the legs will be the call color. (If a call comprises only from one leg, the color of the leg will be the call color).

1.7.5.2 MOS Metric as Determinant

Each profile can be configured with a set of quality metrics (MOS / Packet Loss / Jitter / Delay / Echo) as shown in the previous section. Each call leg's color is determined at the end of the call using its reported metrics. If MOS is reported, the leg will be determined by the MOS' color; if not, the color representing worst quality will be the leg's color. If any of the call leg's reported metrics are excluded from the profile, color calculations will ignore this metric.

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2 Configuring Devices to Report to the SEM

This section shows how configure devices to report to the SEM. Before you can use the SEM to monitor a device you need to:

1. Load a license that includes the SEM feature, to the SEM server (see Section 1.6).

Note: It's no longer necessary to install a SEM SLK on the device. It was only necessary up to version 6.6.241.

2. Configure the SEM server address on the device (see Section 2.1 below)
3. Configure QoE Profile Rules (see Section 2.2 below)

2.1 Configuring the SEM Server Address on the Device

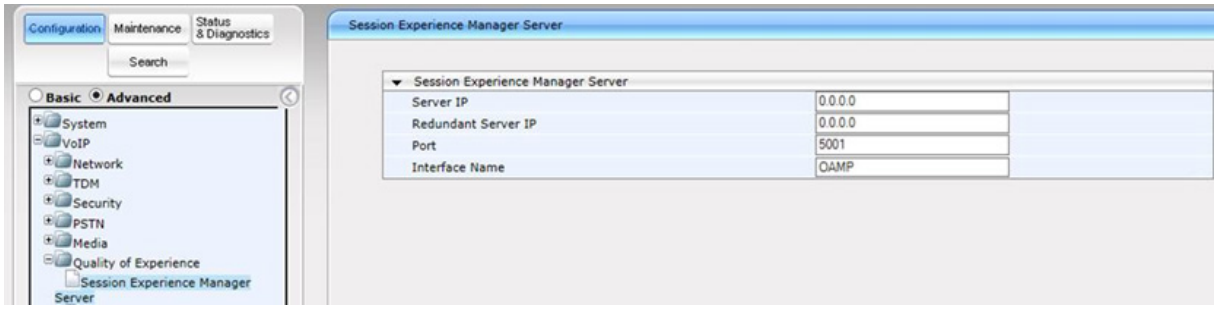
You need to configure the SEM's server address on the device so that the device will report to the SEM.

Note: The instructions below apply to device version 7.0. For earlier device versions, see the version-specific device manual.

➢ **To configure the SEM's server address on the device:**

1. In the Web interface, open the Session Experience Manager page (select the **Advanced** option > **VoIP** > **Quality of Experience** > **Session Experience Manager**):

Figure 2-1: Session Experience Manager Server



2. For detailed information on configuring the SEM's server address (if necessary), see the device's *User's Manual*.

2.2 Configuring a Quality of Experience Profile

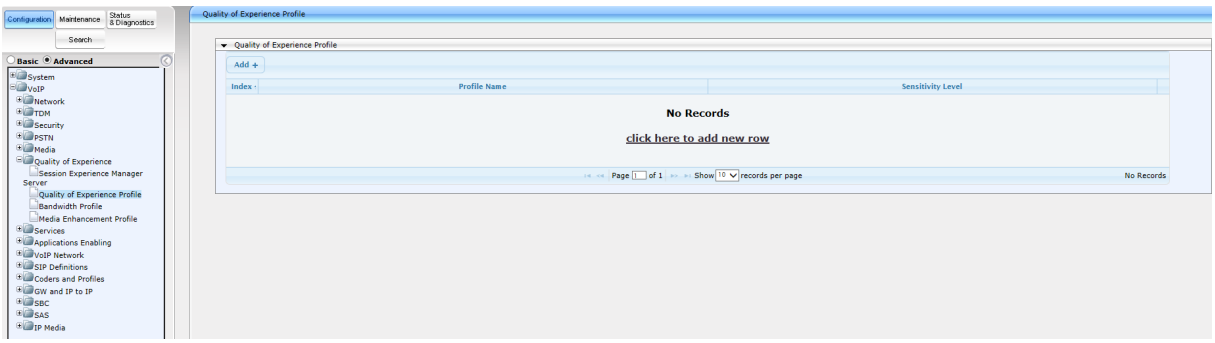
You need to configure a Quality of Experience Profile on the device.

Note: See the device user manual for version-specific instructions. The procedure differs between versions 6.6, 6.8, 7.0 and 7.2.

➢ **To configure a Quality of Experience Profile on the device:**

1. In the Web interface, open the Quality of Experience Profile page (**Advanced** > **Configuration** tab > **VoIP** > **Quality of Experience**):

Figure 2-2: Quality of Experience Profile



2. For detailed information on configuring a Quality of Experience Profile (if necessary), see the device's *User's Manual*.

2.3 Synchronizing Clocks

2.3.1 Synchronizing SEM Server Time with Device Time

For the SEM server to monitor the device, the device and SEM server clocks must be synchronized. Date and time must be identical on both.

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."

3 Starting the SEM

You can directly access the SEM by pointing your web browser to its location on the internet, for example, to:

http://10.1.8.23:8400/sem/Main.html#

You can then log in with your Username and Password which are defined in the EMS.
The default login and password are:
acladmin and **pass_1234**

The tool opens in your browser 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. You can then view the calls success / failure rate, and the call quality statistics distribution over all components.

3.1 Running the SEM over HTTPS

This section shows how to run the SEM over HTTPS. By default, the SEM client communicates with the server over HTTP, but HTTPS is also supported. The URL pointing to port 8400 shown in the note above, opens an HTTP connection, but you can optionally run the SEM client over HTTPS.

➢ **To run the SEM client over HTTPS**

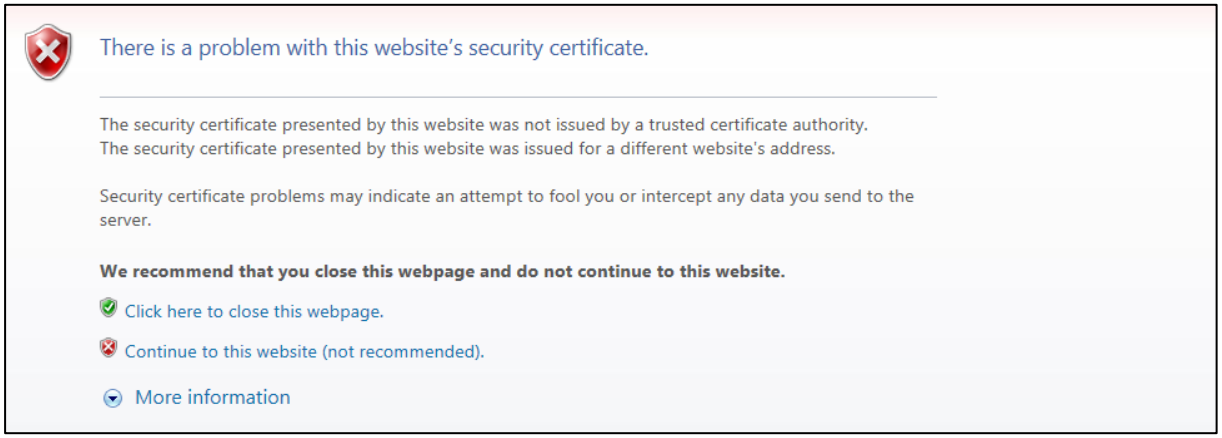
■ In the EMS Server Manager, use the menu option 'Enable SEM Client Secured Connection' (10) to secure and automatically forward all SEM clients communications to port 9400. When this option is enabled, the connection between the SEM client browser and the Tomcat server is secured via HTTPS port 9400 instead of HTTP port 8400.

Note:

- To avoid browser errors, it's strongly recommended to sign the certificate using an official authority. See the *EMS Server IOM Manual* for details on how to replace the default certificate with the customer certificates.
- The steps below show how to accept different browsers' warnings, to proceed working with the self-signed certificate released by default, and where to place the certificate after it is signed.

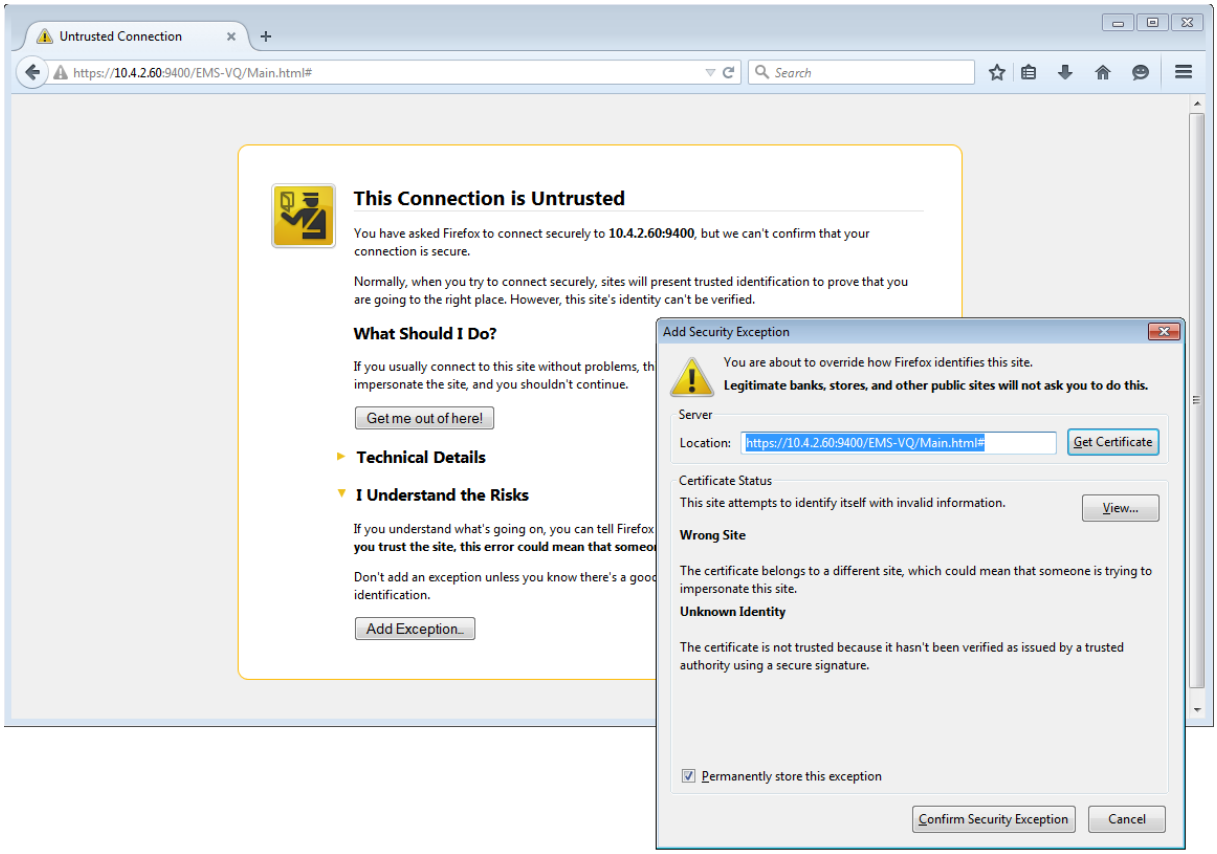
- In the Internet Explorer browser, select the option **Continue to this website**, as shown in Figure 3-1.

Figure 3-1: Starting the SEM in Internet Explorer



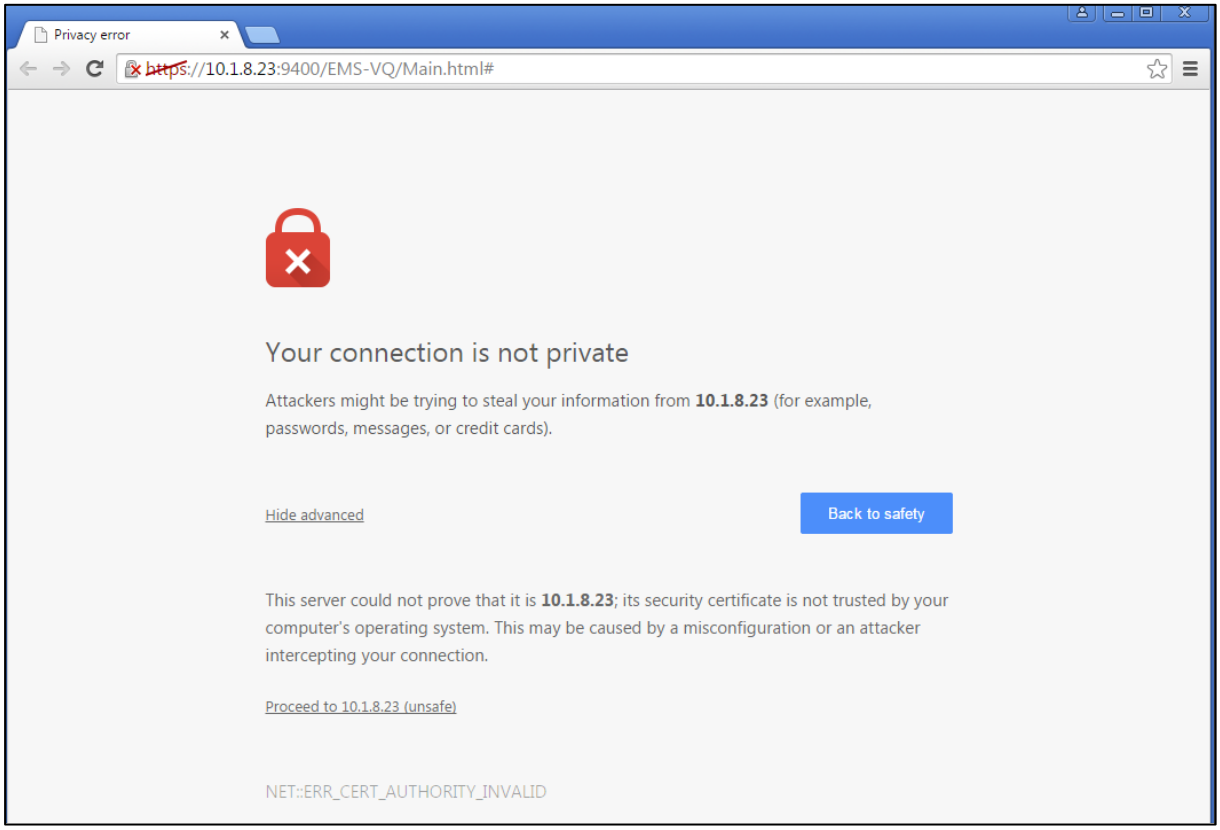
- In the Mozilla Firefox browser, select **I Understand the Risks** and then click **Add Exception** and then **Confirm Security Exception**, as shown in the figure below.

Figure 3-2: Starting the SEM in Mozilla Firefox



- In the Google Chrome browser, click **Advanced** and then **Proceed to <Server IP> (unsafe)**, as shown in Figure 3-3.

Figure 3-3: Starting the SEM in Google Chrome



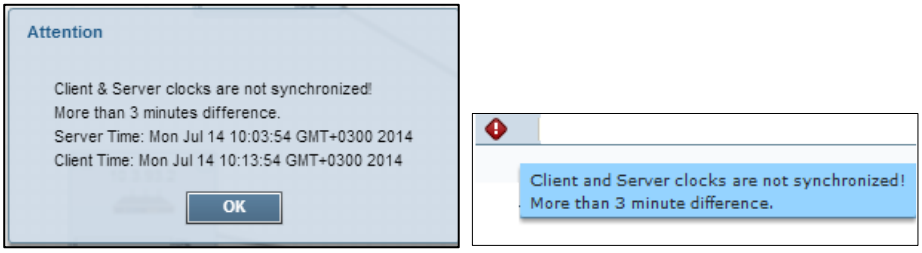
3.2 Synchronizing SEM Client Time with SEM Server Time

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.

When selecting a dates range, incorrect results may be received if there's a client-server synchronization issue, because the dates selected in the GUI (client clock) are not the same as the server-related dates (server clock). In this case, after login (or when clocks become unsynchronized), the indications below are displayed.

Figure 3-4: Client and Server Clocks Not Synchronized



3.3 Configuring Session Timeout Period

Administrators can configure how long the SEM server will maintain an active session with the SEM web client. After a SEM user logs in to the client, every time they interact with it (e.g., by clicking a menu), the session timeout is reset. If the period configured lapses, the SEM web client's session with the EMS server is dropped and the SEM user is prompted to enter their username and password again. After logging in again, the session starts as a new session; the previous session's user interactions with the client are not preserved.

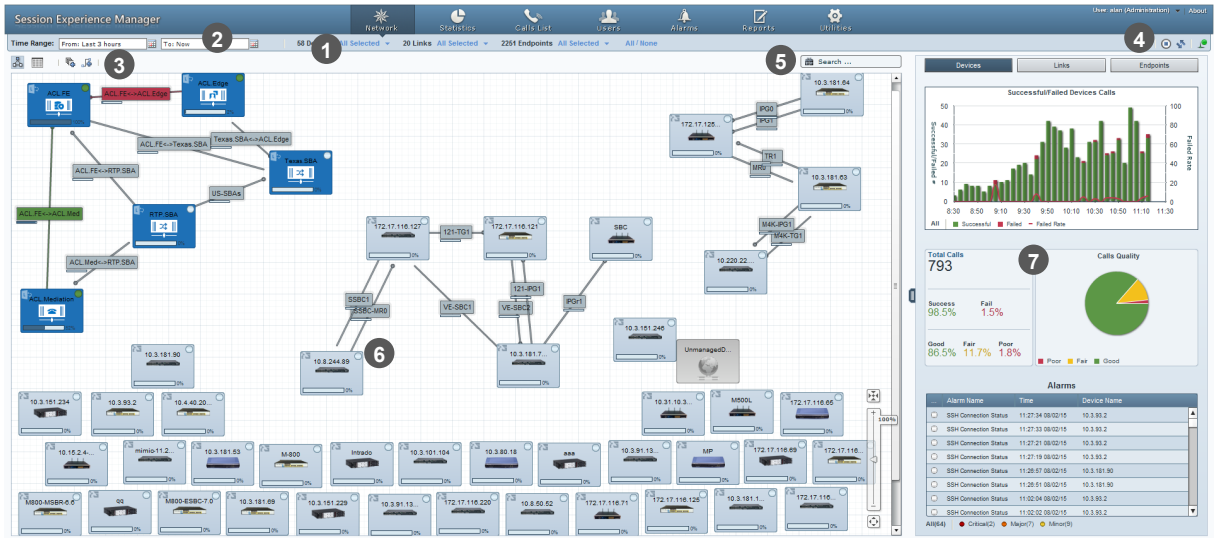
Administrators can configure the 'Session Timeout Period' parameter in the EMS (see the *EMS User's Manual* for more information). Default: 0 (the feature is disabled and a SEM user who logs in to the SEM web client will have their session preserved indefinitely).

3.4 Getting Acquainted with the SEM GUI

This section familiarizes you with the SEM GUI.

See the figure below and use Table 3-1 below it as a reference.

Figure 3-5: SEM GUI Areas



After logging in for the first time, you can change the password by selecting **Change password** from the User menu:

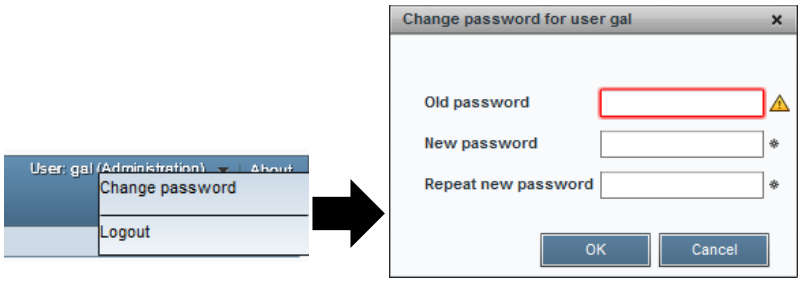


Table 3-1: SEM GUI Areas

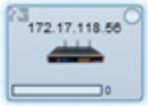
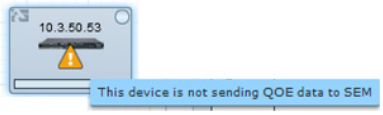
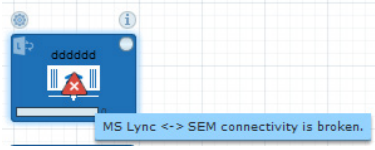
#	GUI Area	Description
1	Toolbar	Toolbar icons let you navigate to the following SEM pages: Network (default), Statistics, Calls List, Users, Alarms, Reports and Utilities.
		Username (read-only); Logout; About (click to display the SEM version)
2	Filters	Time Range, Devices, Links, Endpoints
3	Actions Bar	▪ Map view / Table view ▪ Add Non ACL Device ▪ Add Link
4	Refresh Functionalities and Change Password / Logout	[Start/Stop Auto Refresh] Switches on/off automatic page refresh.
		[Refresh Now] Refreshes the SEM page. After a server version upgrade is performed, you need to refresh. Click this icon (or press **Ctrl+F5**) and then log in to the application.
		Connected or Disconnected (read-only).
		User / admin name menu, to change password or log out.
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.
		Zoom
		= Save devices locations
7	Summary Panes	Network view displays these summary panes: • **Devices** ✓ Successful/Failed Calls ✓ Calls Quality ✓ Alarms • **Links** ✓ Successful/Failed Streams ✓ Streams Quality ✓ Alarms Statistics view displays these summary panes: ✓ Devices (Calls Total #, Successful %, Fail %, Max Concurrent) ✓ Quality % and Color ✓ Quality Cause
		Click to expand the main screen/hide the summary panes.

3.4.1 Determining SEM-Entity Connectivity Status

The SEM's Network page's Map view allows you determine the status of the connectivity between an entity displayed in the page and the SEM.

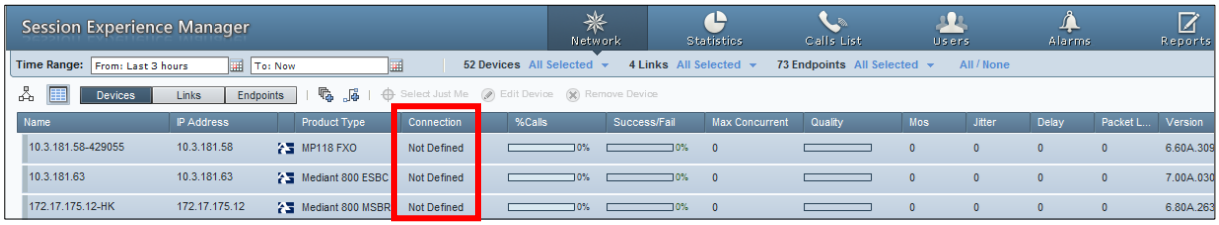
Rule of thumb: If there is no red or orange triangle displayed in the entity, connectivity between that entity and the SEM has been successfully established.

Table 3-2: SEM-Entity Connectivity Status

Entity	Description
	[Light blue] Indicates an AudioCodes entity (e.g., SBC) which successfully initiated connectivity with the SEM.
	[Orange triangle with **!** inside] Indicates an AudioCodes entity (e.g., SBC) that hasn't sent voice quality data to the SEM because connectivity with the entity couldn't be established - possibly because it wasn't configured to send voice quality data to the SEM. Even if you configured the entity in the EMS, you may still receive this status. The tooltip **This device is not sending QoE data to SEM** summarizes the status.
	[Red triangle with **x** inside] Indicates a disconnected AudioCodes entity.
	[Dark blue] Indicates a Microsoft entity (e.g., Lync) with which the SEM successfully initiated connectivity.
	[Red triangle with **x** inside] Indicates that Microsoft Lync is configured for connectivity with the SEM but the SEM's attempt to initiate connectivity with it failed for some reason. Note: Microsoft Lync's Front End (FE) Server is connected to mediation servers, for example, Microsoft's Mediation Server, Microsoft's Edge Server, and AudioCodes' SBA. If you define mediations, they obtain their connectivity status from the FE Server. Thus, if the FE Server is disconnected (red triangle with **x** inside), all mediation servers are disconnected, and if the FE Server is connected (no red triangle), all mediation servers are connected.
	[Gray] Third party devices about whom no status information is available. Typically, a third-party logical device that was added to the network.

The Network page's Table view also shows the connectivity status between an entity listed in the page and the SEM, in a column titled 'Connection' (see the red in the figure below).

Figure 3-6: Network Page's Table View – 'Connection' Column



4 Building your Network Topology

You can build your network topology in the SEM, including:

- Microsoft Lync (see under Section 1.5 above)
- AudioCodes devices (see Section 4.1 below)
- 3rd party devices and links (see Section 4.2 below)

4.1 AudioCodes Devices and Links

Links are logical VoIP 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 or Lync device. The second device can be an AudioCodes device, Lync device or a non-AudioCodes device defined by administrators. Administrators can define one or more links between devices. The links are displayed in Network Map and Table Links views. Each device and link status is displayed as 'Red' or 'Green'. If red, then:

- Failed Calls threshold is reached (default = 30%)

  -OR-

- Poor Calls Quality threshold is reached (default = 15%)

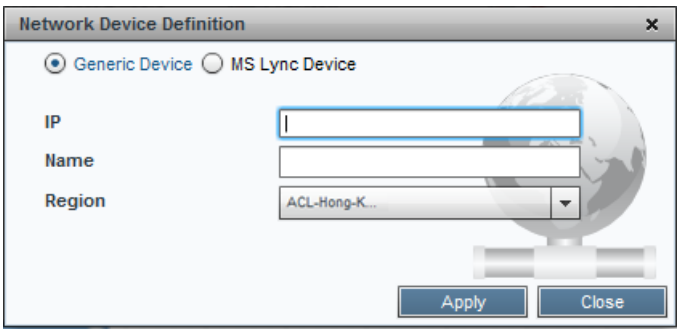
4.2 Generic Devices

You can view generic (non-AudioCodes) devices in the SEM if they're supported. You can define third-party devices in Network Map and Table Links views. The SEM doesn't directly monitor them but enables you to view all relevant devices in the VoIP network and to monitor links with AudioCodes devices.

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

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

Figure 4-1: Adding a Generic Device



2. Make sure the default **Generic Device** option is selected.
3. Define the device's IP address, Name, and Region, and then click **Apply**; the device is added and displayed in the SEM.

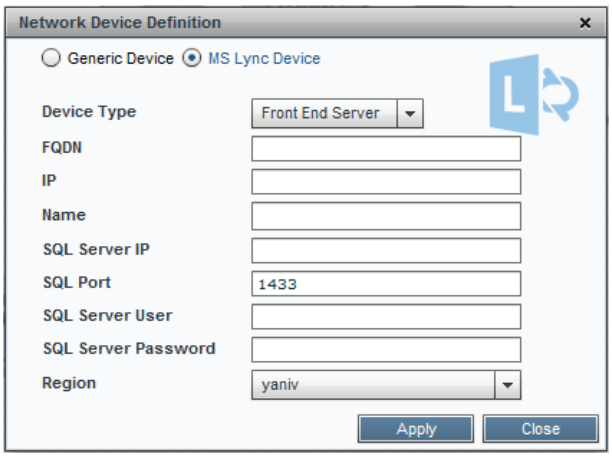
4.3 Microsoft Lync Devices

Most commonly used generic 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.
Generic devices are defined by name and IP address.

➢ **To add a Microsoft Lync device to the SEM:**

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

Figure 4-2: Adding a Microsoft Lync Device



2. Use the table below as reference when configuring the parameters.

Table 4-1: Adding a Microsoft Lync Device

Parameter	Description
Device Type	From the 'Device Type' dropdown, select • **Front End Server** ✓ Includes SQL Server (Back End Monitoring Database) parameters 'FQDN', 'IP' and 'NAME' (see descriptions in this table below). These are the main FE Server parameters. ✓ The other FE Server parameters (except 'Region') are associated with configuration of the SQL Monitoring Server which functions as the backend data store for your monitoring data. ✓ FE Server points/reports to the SQL Database. It does not point/report to the Lync FE Services. ✓ The SEM server connects to the SQL Monitoring Server and pulls control and media information from it for display. • **Mediation Server** ✓ Implements enterprise voice and dial-in conferencing ✓ Translates signaling and media (in some configurations) between your internal Lync Server infrastructure and a public switched telephone network (PSTN) gateway, IP-PBX, or a Session Initiation Protocol (SIP) trunk • **(Lync) Edge Server** ✓ Deployed in a DMZ ✓ Provides access to the Lync system from the Internet ✓ Lets your users communicate and collaborate with users outside the enterprise's firewalls • **SBA** (Survivable Branch Appliance) ✓ Ensures access to data and voice services in the event of a WAN outage

Parameter	Description
Reporting Device	[Only applies to Mediation, Edge and SBA servers] Select the Front End associated with the defined server.
FQDN	Enter the Microsoft Lync device's Fully Qualified Domain Name.
IP	Define the Microsoft Lync device's IP address.
Name	Enter the name of the Microsoft Lync device.
SQL Server IP	[Applies to centralized Lync database] Define the IP address of the SQL Server.
SQL Server Port	[Applies to centralized Lync database] Define the port number of the SQL Server.
SQL Server User	[Applies to centralized Lync database] Enter the user of the SQL Server.
SQL Server Password	[Applies to centralized Lync database] Define the Password of the SQL Server.
Region	Define the Region in which the Microsoft Lync device is located.

3. Click **Apply**; the device is added and displayed in the SEM.

4.4 Defining User Security Levels

You can define different user security levels:

- Administrator Super User (highest level; can view all operations on devices, manage operator security, and manipulate Administrators, i.e., add and remove administrators)
- Administrator (can view all system provisioning operations on devices, and manage operator security)
- Operator (can view and manage all system provisioning operations on devices)
- Monitor (can only view)

See the *EMS User's Manual* for details.

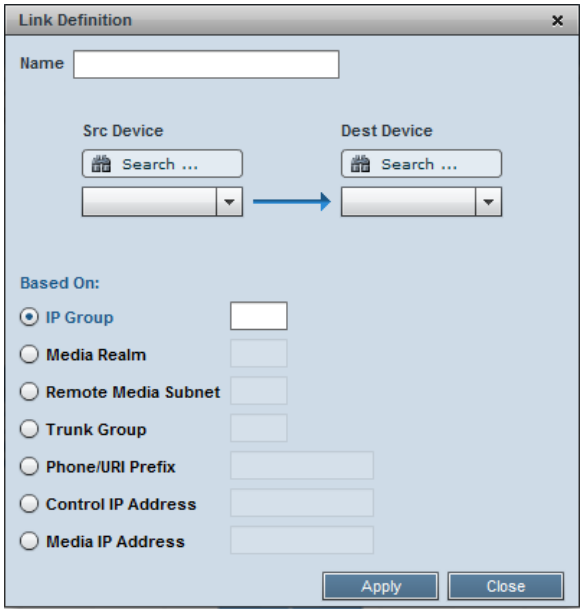
4.5 Adding a Link

You can view links in the SEM. To view a link, you must first add it.

➢ **To add a link to the SEM:**

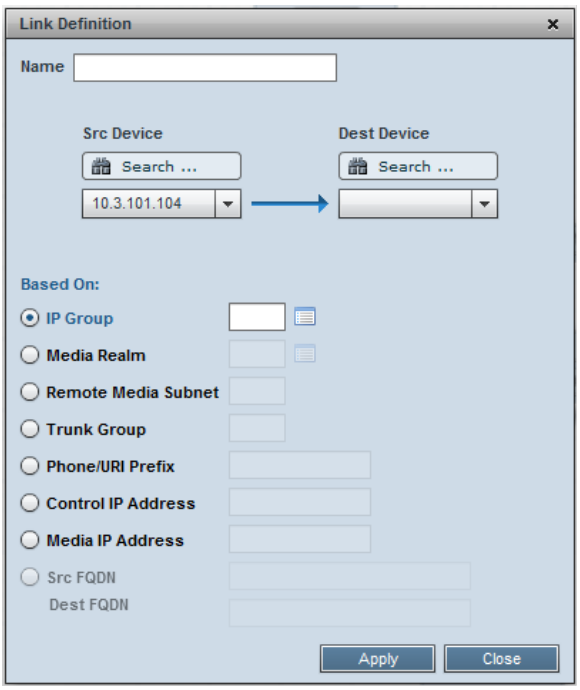
1. Click the icon on the actions bar; this screen opens:

Figure 4-3: Adding a Link



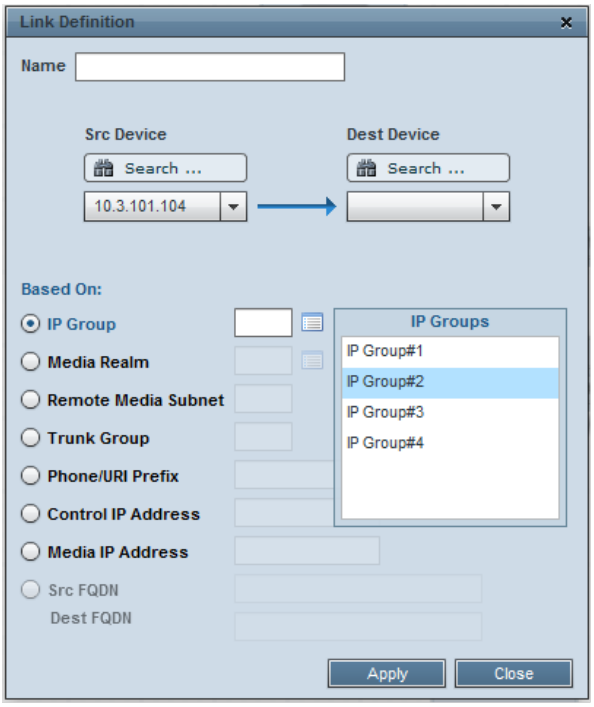
2. After you select the **Src Device**, the screen below opens, showing the available options retrieved from the device.

Figure 4-4: Available Options after Selecting Src Device



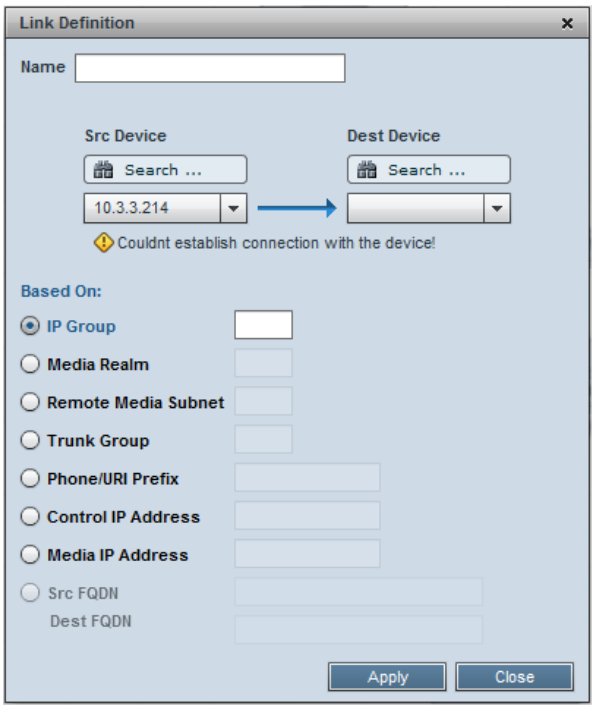
3. Select the **IP Group** option from the device's configured IP-Groups:

Figure 4-5: Selecting IP Group



- If there's no SNMP connection to the device, no options will be available and the error message shown in the figure below will be displayed. Enter the value manually.

Figure 4-6: No SNMP Connection to Device, No Options Available



4. If a Lync device is configured for **Src Device**, the screen below is displayed.

Figure 4-7: Lync Device Configured as Src Device

5. Use the table below as reference when configuring the parameters.

Table 4-2: Adding a Link

Parameter	Description
Name	Enter an intuitive name for the link.
Direction	Defines the direction of the port link between source and destination device. When the link is configured as **Bi Directional** (for example), a bi-directional port will be used for this connection.
Src Device	From the dropdown list, select the source device *from which* to link to the destination device. You can alternatively search for it.
Dest Device	From the dropdown list, select the destination device *to which* to link from the source device. You can alternatively search for it.
The link counts and computes statistics on all calls that originate in the source device, based on one of the following filter options:	
IP Group	Defines the source device IP-Group index (a list of options may be available).
Media Realm	Defines the source device Media Realm index (a list of options may be available).
Remote Media Subnet	Defines the source device Media Realm subnet index (a list of options may be available; Media Realm must also be defined).
Trunk Group	Defines the source device Trunk Group index (a list of options may be available).
Phone/URI Prefix	Defines the prefix text of a phone number or SIP URI string.
Control IP Address	Defines a valid IP-Address on which SIP control messages are originated.
Media IP Address	Defines a valid IP-Address on which SIP media messages (voice/fax) are originated.
Src/Dest FQDN	Available only when the source device is a Lync device. The FQDN of the selected src and dest devices.

6. Click **Apply**; the link is added and displayed in the SEM.

Note:

- Statistics obtained from **Links** form a *subset* of those obtained from **Devices**
- Links statistics are obtained from *streams*. A **stream** is a single leg of an SBC call. It's therefore possible for the total links streams statistics to be higher than the total devices calls statistics. For example, when a call is sent from IP Group 1 to IP Group 2 on same device, and there are two links configured to aggregate streams from IP Group 1 and IP Group 2 respectively, the total **Links** statistics will present it as *two streams* but **Devices** statistics will present it as *one call*.
- **Links**, moreover, are *logical* entities. Multiple links defined on the same device may therefore aggregate statistics on the same streams, so the total number of **links** streams statistics in the network may be higher than the total number of actual streams statistics in the network.

  It's therefore recommended to avoid overlapping links definitions.

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5 Filtering to Display Specific Info

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

Figure 5-1: Filters

Table 5-1: 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.
Endpoints	Lets you display endpoint-specific information, i.e., IP phone status, provisioning and voice quality.

Filters can help you speed access to required information.

Note:

- To filter a device, select **None** in the Links filter and then select the device in the Devices filter. Alternatively, select **Select Just Me** from devices' Actions menu.
- 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.
- The Calls List page and the Reports page display their own filter bar with page-specific options.

5.1 Filtering by Time Range

This section shows how to filter by time range.

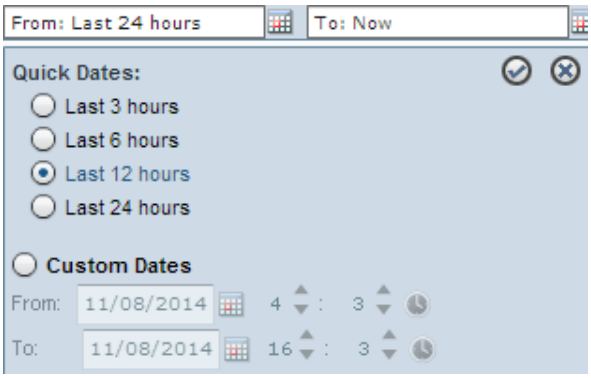
5.1.1 Quick Filters

You can filter by time range using use quick filters.

➢ **To use a quick filter:**

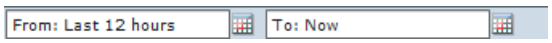
1. On the filters bar, click the 'From' or 'To' field:

Figure 5-2: Time Filter



2. Under 'Quick Dates', select a time range and click ; filtering is performed; the filter bar shows this:

Figure 5-3: Filter Bar Showing Quick Date



5.1.2 Custom Filters

This section describes how to custom filters.

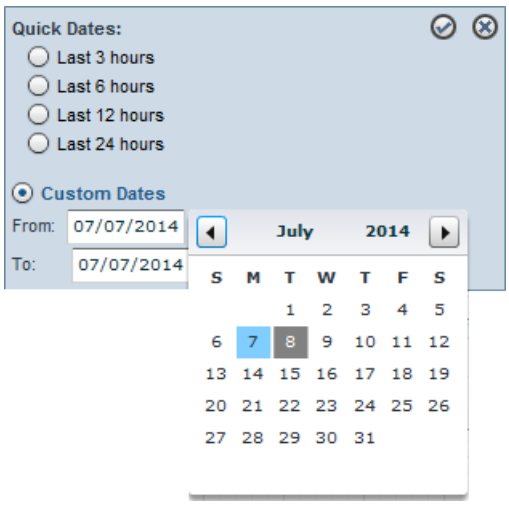
➢ **To customize a time range filter:**

1. On the Filter bar, click the 'From' field or the 'To' field and select the **Custom Dates** option:

Figure 5-4: Time Range Filter - Custom

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

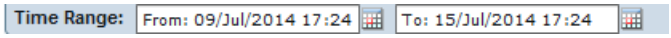
Figure 5-5: Time Range Filter – Custom Dates



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

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

Figure 5-6: Filter Bar - From Date-To Date



Note: Seven days is the maximum time you can define. If you exceed it, you are notified.

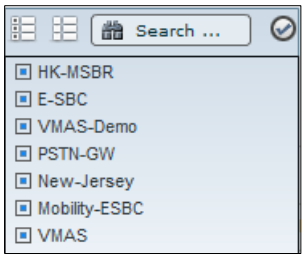
5.2 Filtering by Device

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

➢ **To filter by device:**

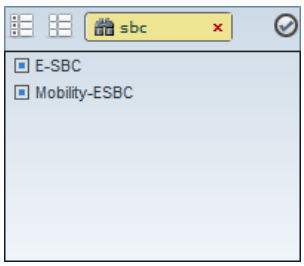
1. On the Filter bar, click the 'Devices' drop-down list.

Figure 5-7: Devices Filter



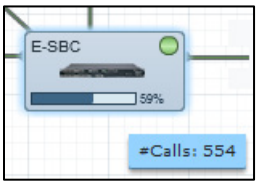
2. Do one of the following:
   - Click the **Select All** icon to automatically select all devices (save the time of manual selection) -OR-
   - Click the **Select None** icon to clear all selections (save the time of manually clearing) -OR-
   - Individually select each device for the SEM to display
   - Search for devices to filter: In the 'Search….' field, enter the name of a device, for example, **sbc**, as shown in the figure below; the list is filtered to display only those devices.

Figure 5-8: '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 5-9: Filter Results



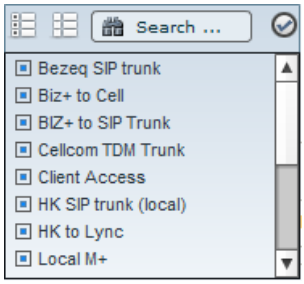
5.3 Filtering by Links

You can filter by links.

➢ **To filter by links:**

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

Figure 5-10: 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 ; only links you selected are displayed (in blue); unselected devices are displayed in light gray.

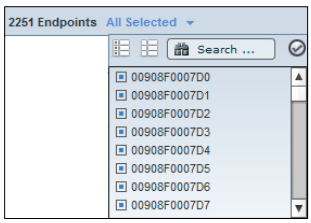
5.4 Filtering by Endpoints

You can filter by endpoints.

➢ **To filter by endpoints:**

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

Figure 5-11: Endpoints Filter



2. Either:
   - Click **Select All** to automatically select all endpoints 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 endpoint for the SEM to display.

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

6 Viewing 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

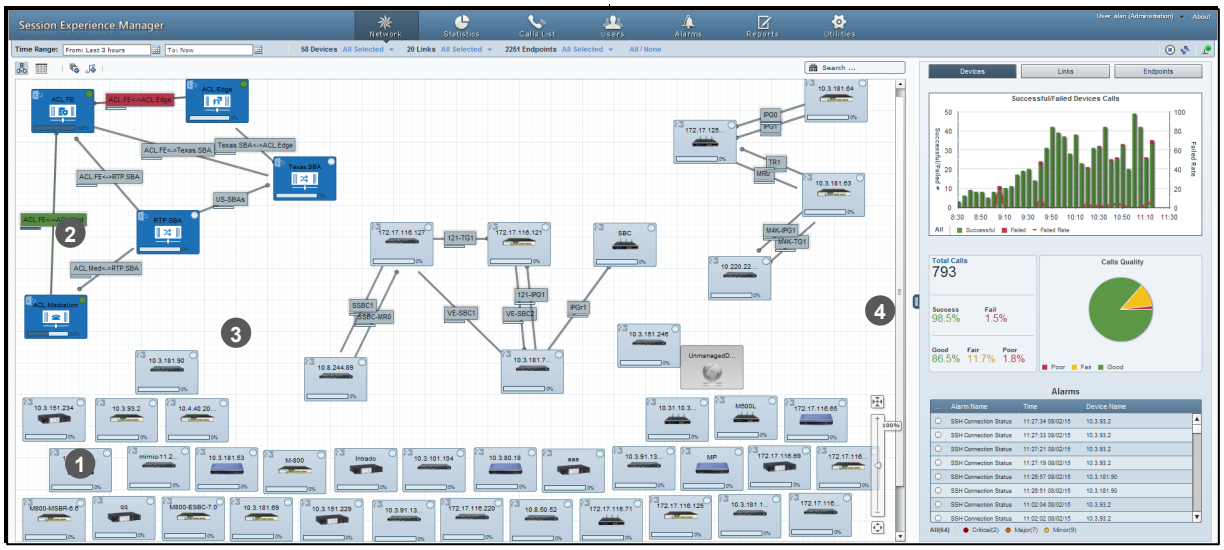
Note:

- AudioCodes devices must be defined in the EMS for them to be displayed in the SEM.
- Generic (non-AudioCodes) devices are defined only in the SEM (not in the EMS) for them to be displayed in the SEM
- Map view can display up to 100 devices. The display automatically changes to Table view if more than 100 devices are defined.

6.1 Map View

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

Figure 6-1: Map View



About Map view:

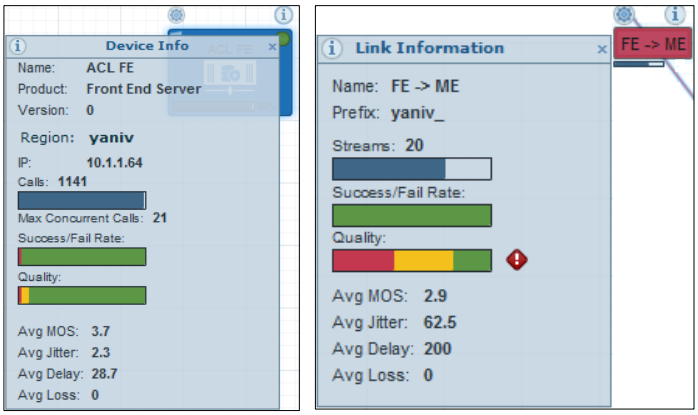
- AudioCodes devices are colored light blue (see **1**, for example)
- Lync devices are colored blue (see **2**, for example)
- Non-AudioCodes' devices have gray background color (see **3**, for example)
- Filtered-out entities are displayed without background color
- Devices can be searched for according to region, product type, name, IP, version, name, etc.
- Devices that are found using the search filter are framed in yellow.
- Selected entities are surrounded with light blue.
- If an entity displays ● it indicates that the percentage of failed calls > 30% *or* that the percentage of poor quality calls > 15%.
  If an entity displays ● it indicates that the percentage of failed calls < 30% *and* that the percentage of poor quality calls < 15%.

- Entities can be positioned / 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. The map supports topology view *per operator*. Administrators whose security level is non admin/superadmin can change entity locations and save the modified topology in their local browser for later viewing. By contrast, the SEM user whose security level is admin/superadmin can modify entity locations but when the changed topology is saved, it's saved in the database, and the last save determines the topology view for all SEM users.
- Three summary panes (to the right) enable quick assessment of (1) successful/failed calls/streams (2) calls/streams quality and (3) alarms (see **4**)

6.1.1 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 6-2: Device Info / Link Info

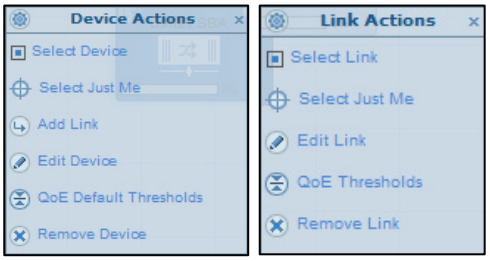


See Section 1.4 on page 15 for quality metrics descriptions.

6.1.2 Performing Device / Link Actions

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

Figure 6-3: Device Actions / Link Actions



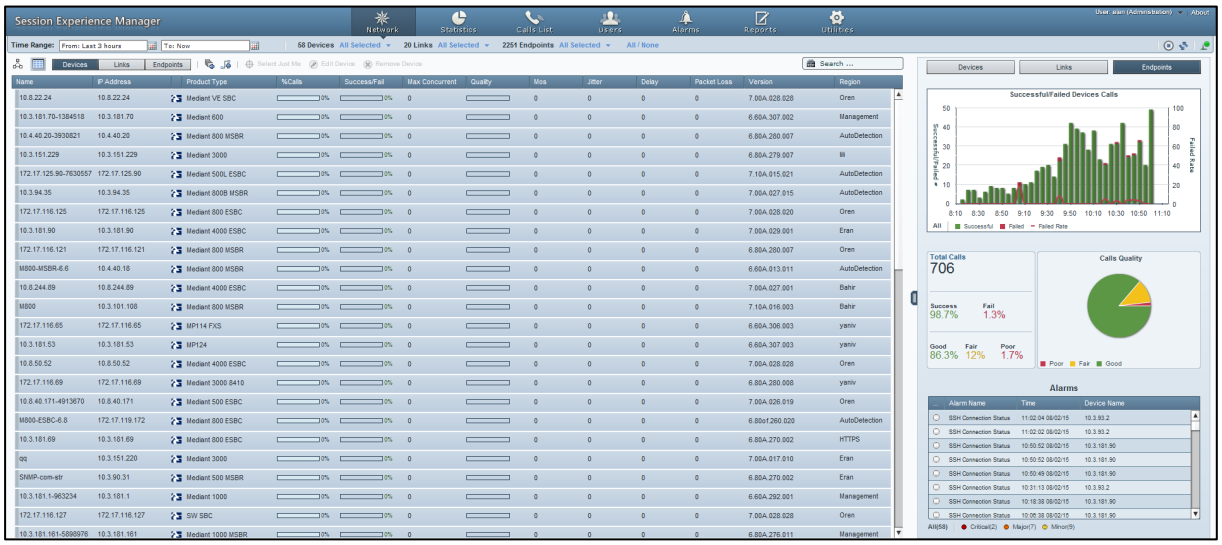
Device/Link	Actions
AudioCodes Device	Select Device, Select Just Me, Add Link.
Lync Device	Select Device, Select Just Me, Add Link, Edit Device, Update Device QoE Profile, Remove Device.
Non-AudioCodes Device	Edit Device, Remove Device.
Link	Select Link, Select Just Me, Edit Link, Edit Link QoE Profile, Remove Link

6.2 Table View

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

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

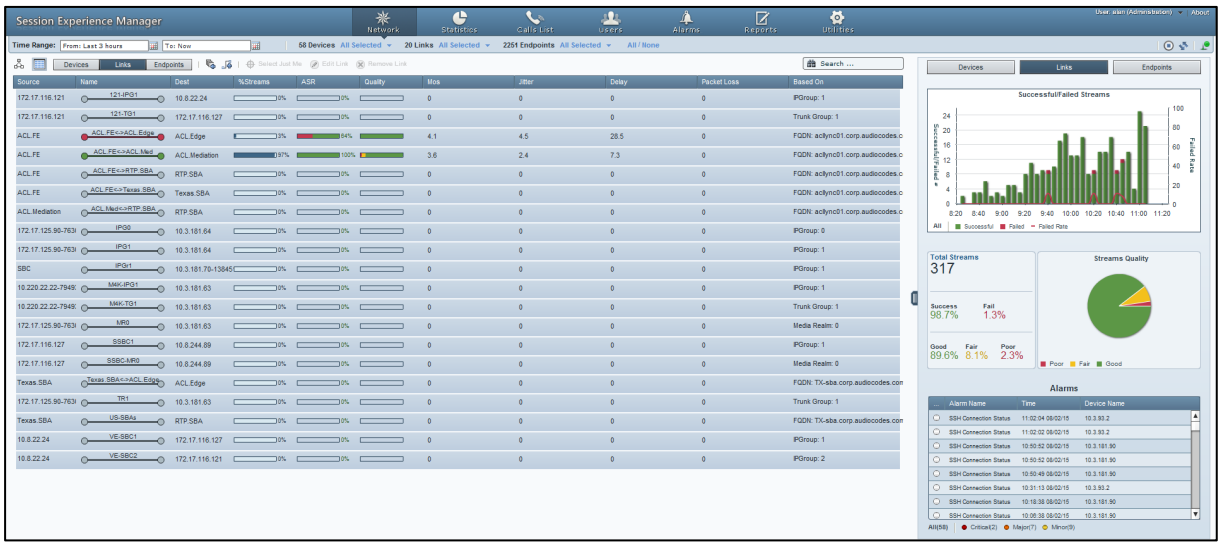
Figure 6-4: Table View - Devices



Columns show each device's share of calls as a percentage,Success/Fail, 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 Devices Links Endpoints; the **Links** button turns navy blue:

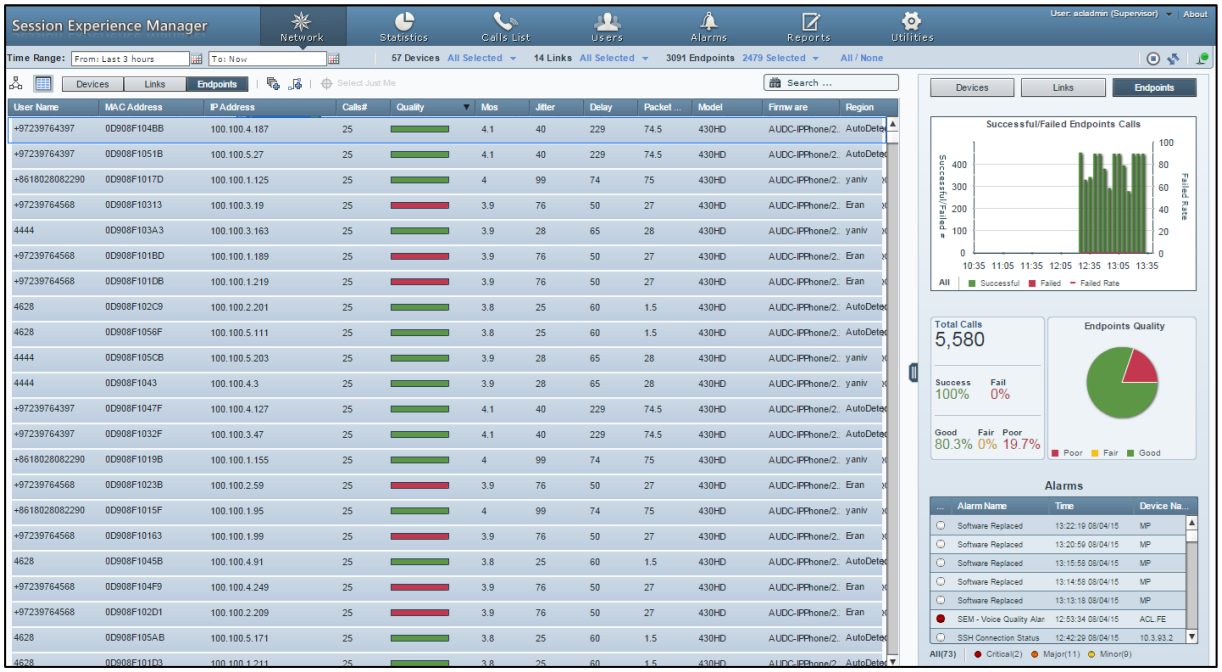
Figure 6-5: Table View – Links



Columns show each link's Source, Name, Destination, %Streams, Success/Fail, Quality, MOS, Jitter, Delay, Packet Loss, Version, and Region, allowing you access to specific information and consequently enhancing management efficiency.

To display endpoints in the table, click the **Endpoints** button Devices Links Endpoints; the **Endpoints** button turns navy blue:

Figure 6-6: Table View – Endpoints



In the Table view's Endpoints page shown in Figure 6-6, columns show each endpoint's User Name, MAC Address, IP Address, Calls #, Quality, MOS, Jitter, Delay, Packet Loss, Model, Firmware, and Region, allowing you access to specific information and consequently enhancing management efficiency.

6.2.1 Sorting by Column

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

Tip: [To optimize SEM GUI performance] Before sorting columns, in the Refresh Page, stop Auto Refresh and Start it again after the sorting results have been displayed.

For example:

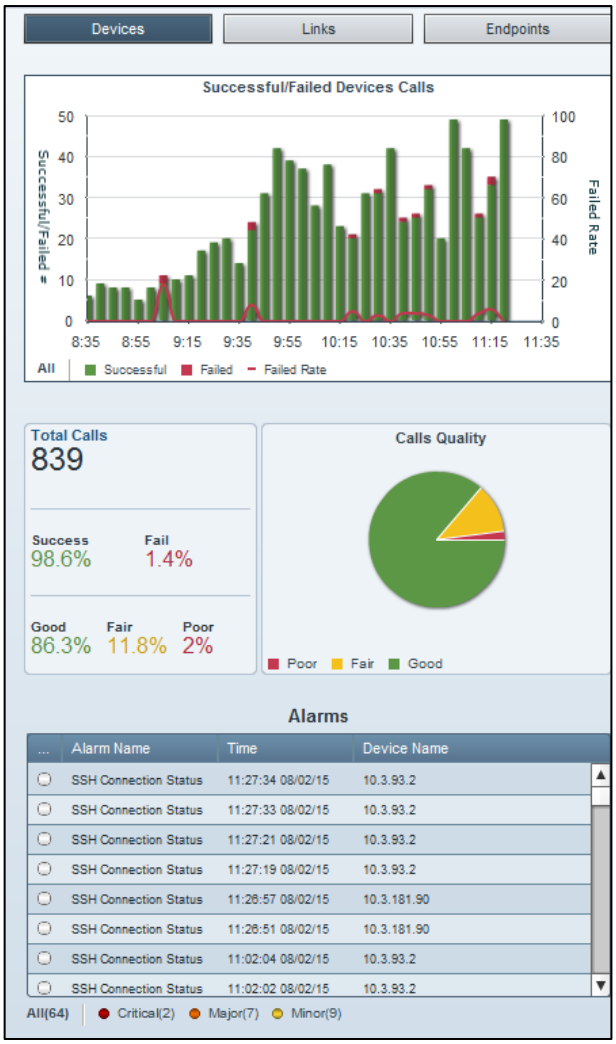
➢ **To sort columns according to %Calls:**

- Click the column header and click again if necessary until ▼ is displayed; entities whose percentage share of calls is highest are listed highest, and those whose percentage share of calls is lowest are listed lowest.
- Click the header again; ▲ is displayed; entities whose percentage share of calls is highest are listed lowermost, and those whose percentage share of calls is lowest are listed uppermost.

6.3 Network Health Overview Panes

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

Figure 6-7: Network Health Overview Panes



Network health overview panes (top to bottom):

- **Successful/Failed Calls** lets you quickly assess how the successful / failed calls rate distributes over time.
- **Calls Quality** pie chart lets you quickly assess % and # of calls whose voice quality was measured as Good (green), Fair (yellow) or Poor (red).
- Total # of calls made, % of successful and failed calls, and the % of Good, Fair or Poor quality calls.
- **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.

6.3.1 Successful/Failed Calls

The uppermost 'Successful/Failed Calls' chart lets you quickly access detailed information on calls performance. You can see at a glance the rate of successful versus failed calls distributed over time.

➢ **To view information:**

- Point your cursor over a green-coded bar segment; a popup shows the # of successful calls made in that 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 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 8 on page 71).
- Click the **Failed (n)** link below the pie; the Calls List page opens showing information on *all* failed calls in the network (see Section 8 on page 71).
- Click a green-coded bar segment; the Calls List page opens showing information on calls that failed in that interval (see Section 8 on page 71).
- Click a red-coded bar segment; the Calls List page opens showing information on calls that failed in that specific time interval (see Section 8 on page 71).

6.3.2 Calls Quality Pie

The pie chart lets you quickly access information related to calls' voice quality.

You can see at a glance 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* pie segment; the % and # of calls whose voice quality was graded *good* / *fair* / *poor* pops up.

➢ **To view detailed information:**

- Click a *green / yellow / red* pie segment; the Calls List page opens showing detailed information on calls whose voice quality was graded *good* / *fair* / *poor* (see Section 8 on page 71).

6.3.3 Alarms

- The lowermost 'Alarms' pane lets you quickly access alarms-related information.
- You can see at a glance the # of alarms currently active, for example, **All(265)**, as shown in Figure 6-7, and the # of alarms of each severity level currently active (Critical, Major, Minor).

➢ **To view detailed information:**

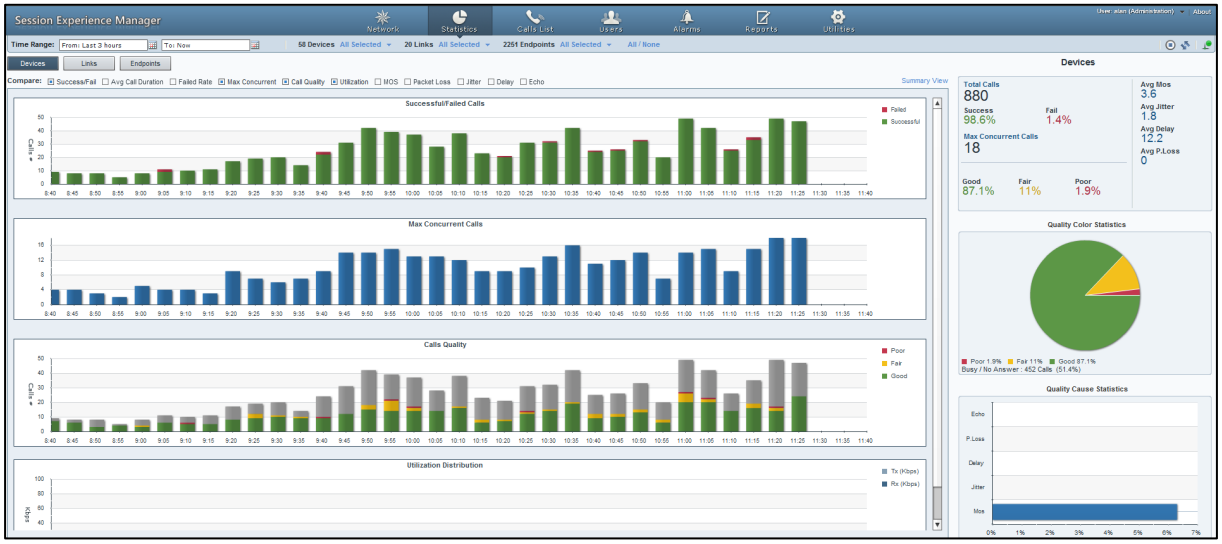
- Click **All (n)**; the Alarms page opens showing alarms of all Severity levels and detailed information on them (see Table 10-1).
- Click **Critical (n)** / **Major (n)** / **Minor (n)**; the Alarms page opens showing alarms of that specific Severity level and detailed information on them (see Table 10-1).

7 Displaying Statistics

The Statistics page opens by default in Comparative View, displaying four charts (top to bottom) according to the same filters as defined for the Network and Table views:

- Successful / Failed Calls (by default always displayed) (see Section 7.1)
- Max Concurrent Calls (see Section 7.3)
- Calls Quality (Good, Fair, Poor or Unknown) (see Section 7.5)
- Utilization Distribution (Rx/Tx Rate Kbit/sec) (see Section 7.6)

Figure 7-1: Statistics – Comparative View (Default)



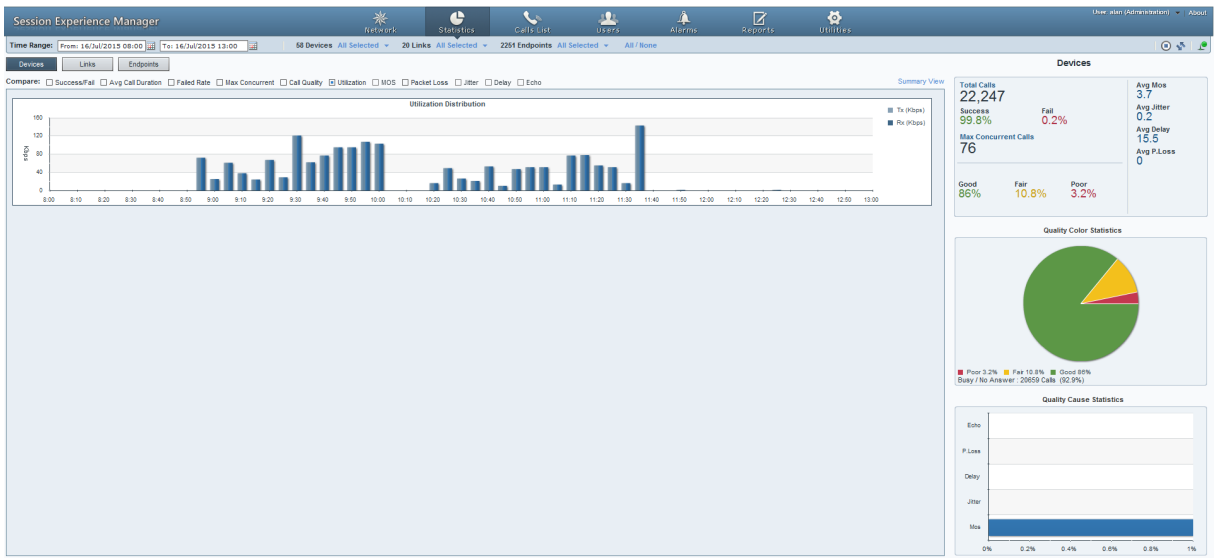
You can compare other statistics charts.

- From the **Compare** bar you can select or deselect Call Quality, Utilization, MOS, Packet Loss, Jitter, Delay, Echo, and/or SNR (Signal to Noise Ratio):

Figure 7-2: Compare Options

Clear all compare options except the **Utilization** option; the Statistics page displays this:

Figure 7-3: Utilization Distribution



- You can hide/display any chart.
- The feature lets you easily identify correlations.

7.1 Successful/Failed Calls Chart

The chart shows successful / failed calls distributed over time. The chart can be displayed as a bar chart or linear chart.

To display a bar chart, select

To display a linear chart, select

Figure 7-4: Successful/Failed Calls – Bar Chart

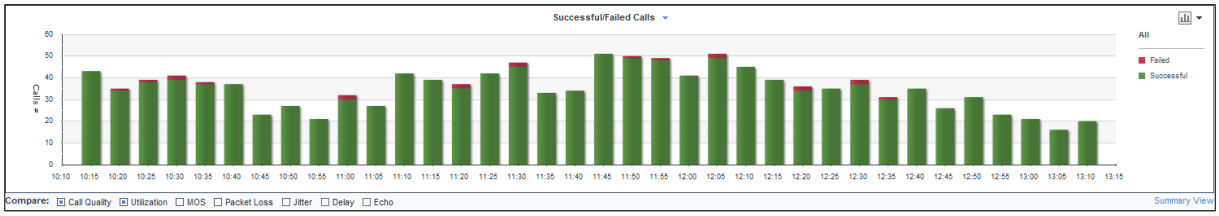
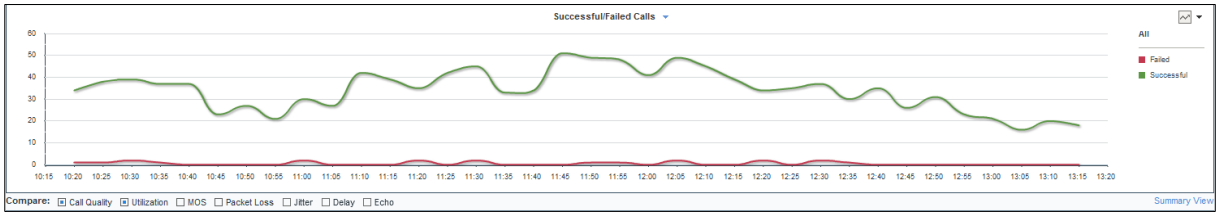


Figure 7-5: Successful/Failed Calls – Linear Chart

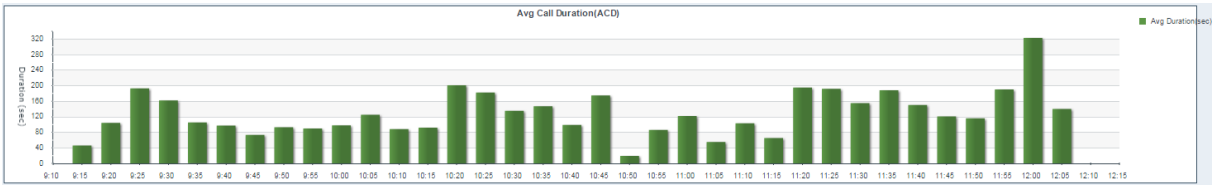


The chart lets you assess calls performance at a glance. The chart shows *when successful calls peaked* compared to *when failed calls peaked*. You can compare this to Average Call Duration, Failed Rate, Maximum Concurrent, Calls Quality, Utilization Distribution, MOS, Packet Loss, Jitter, Delay, or Echo charts, to identify correlation and make a diagnosis.

7.2 Average Call Duration (ACD) Chart

This chart shows the average duration of calls, distributed over time.

Figure 7-6: Average Call Duration

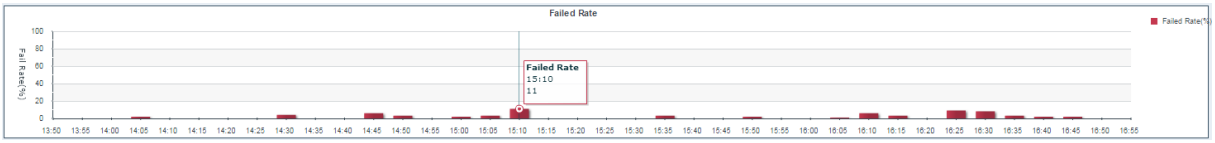


The chart helps you assess calls performance at a glance. The chart shows when the ACDs were longest compared to when shortest. You can compare this to Successful/Failed Calls, Failed Rate, Call Quality, Utilization, MOS, Packet Loss, Jitter, Delay or Echo charts, to identify correlation and make a diagnosis.

7.3 Failed Rate Chart

The chart below shows the Failed Rate distributed over time.

Figure 7-7: Failed Rate

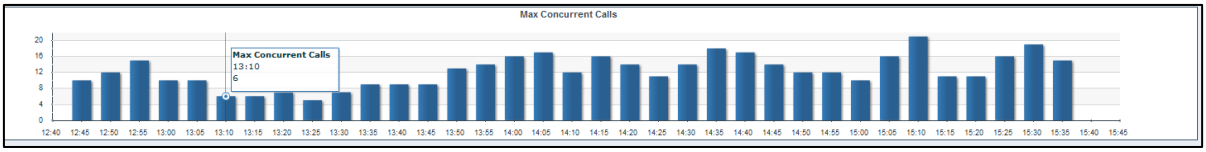


The chart helps you assess calls performance at a glance. The chart shows the failure rate at a point on the time axis. You can compare this to Successful/Failed Calls, ACD, Maximum Concurrent, Call Quality, Utilization, MOS, Packet Loss, Jitter, Delay and/or Echo charts, to identify correlation and make a diagnosis.

7.4 Maximum Concurrent Calls Chart

The chart below shows the maximum concurrent calls distributed over time.

Figure 7-8: Maximum Concurrent Calls Chart



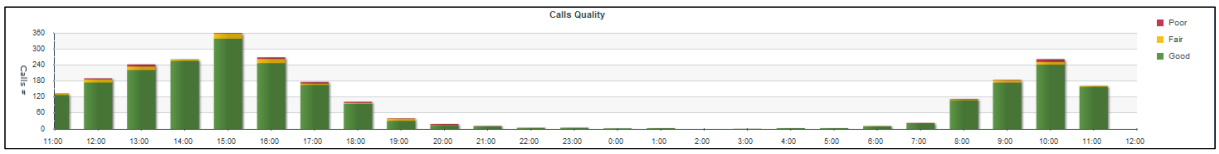
The chart helps you assess calls performance at a glance. The chart shows when the maximum concurrent calls *peaked* compared to when they *dipped*. You can compare this to Successful/Failed Calls, Average Call Duration, Failed Rate, Call Quality, Utilization, MOS, Packet Loss, Jitter, Delay and/or Echo charts, to identify correlation and make a diagnosis. Max Concurrent Calls is the maximum number of calls opened at the same time in the SEM server. The value can be imprecise if more than one entity is monitored. A call, moreover, is defined as opened two seconds after it closes. Note that this parameter is not correlated with any *device performance* parameter.

7.5 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 ‘Poor’ (red). Gray indicates 'Unknown' voice quality.

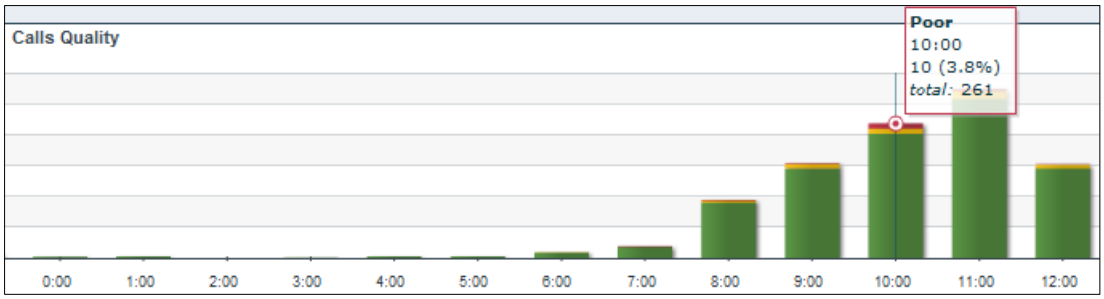
The Calls Quality chart is only displayed as a bar chart.

Figure 7-9: Calls Quality 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 7-10: Calls Quality 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 8 on page 71).
- To view information on *all* calls whose voice quality scored:
  - 'Poor' - click the ■ **Poor** link; the Calls List page opens
  - 'Fair' - click the ■ **Fair** link; the Calls List page opens
  - 'Good' - click the ■ **Good** link; the Calls List page opens (see Section 8 on page 71).

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.

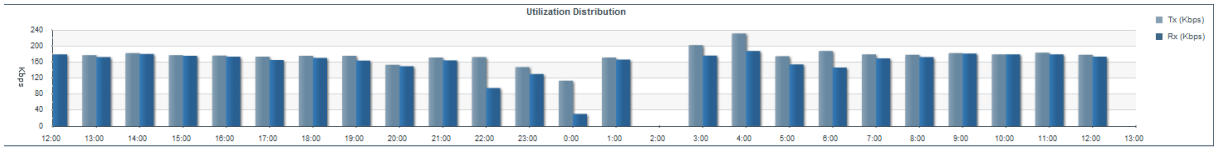
If for example, you identify a correlation over time between 'Failed' quality calls, and Jitter, then this metric is the reason for the quality failure.

7.6 Utilization Distribution Chart

The Utilization Distribution chart shows distribution of the media packets 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.

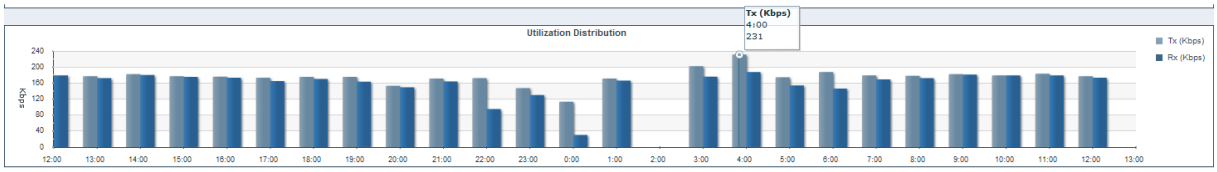
The chart is displayed as a bar chart.

Figure 7-11: 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.

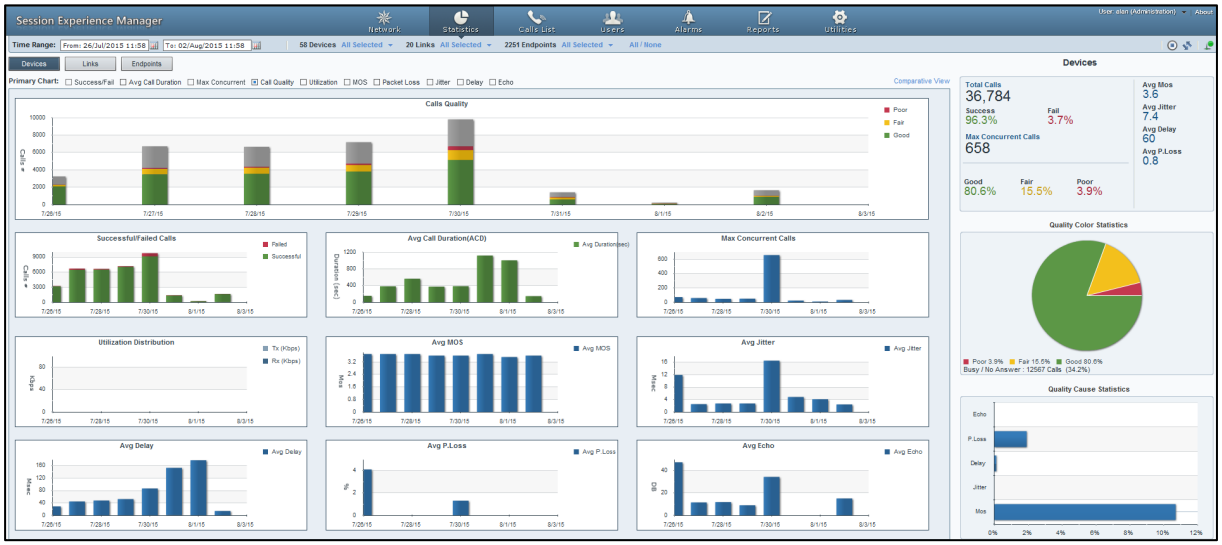
Figure 7-12: Utilization Distribution Chart – Popup



7.7 Summary View

In addition to viewing the Statistics page in the (default) Comparative View, you can also view it in Summary View: Click the **Summary View** link located above and to the right of the chart displayed topmost:

Figure 7-13: Statistics Page - Summary View - 'Call Quality' Selected as Primary Chart



The figure above shows the Statistics page in Summary View. (To revert to Comparative View, click the **Comparative View** link located above and to the right of the chart displayed topmost). Instead of **Compare** options, **Primary Chart** options are now displayed. By default, the Calls Quality chart is displayed as the Primary Chart (displayed topmost), but you can select any of the other Primary Chart options.

Summary View displays all metrics charts. All charts are identical to the bar charts displayed in Comparative View, only condensed. The Primary Chart is not condensed.

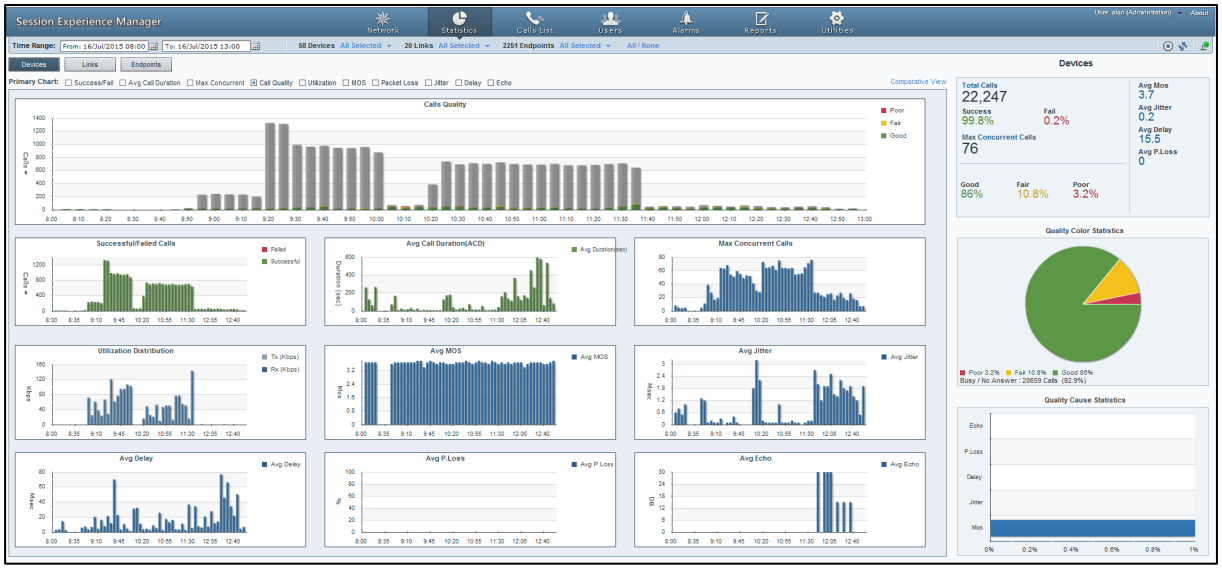
In the figure above you can see:

- Calls Quality (Primary Chart). Point your mouse over a bar to determine the # and % of calls whose quality was good (green), fair (yellow), or poor (red) in that time interval.
- Successful/Failed Calls. Point your mouse over a bar to determine the # and % of calls that were successful (green) or failures (red) in that time interval.
- Average Call Duration (ACD). Point your mouse over a bar to determine average call duration in that time interval.
- Maximum Concurrent Calls. Point your mouse over a bar to determine the maximum number of calls opened at the same time in the SEM server. The value of this parameter may be imprecise if more than one entity is monitored. A call, moreover, is defined as opened two seconds after it closes. Note that this parameter is not correlated with any device performance parameter.
- Utilization Distribution. 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 average MOS scored in that time interval.
- Average Jitter. Point your mouse over the time axis to determine the average jitter measured at that time, in milliseconds.
- Average Delay. Point your mouse over a bar to determine the average delay measured in that time interval, in milliseconds.

- Average Packet Loss. Point your mouse over the time axis to determine the average packet loss, as a percentage of the total number of packets sent, measured at that time.
- Average Echo. Point your mouse over the time axis 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 7-14: Statistics Page - Summary View - 'Utilization' Selected as Primary Chart



- Call Quality. Identical to Comparative View, only condensed. See Section 7.2 for a detailed information.

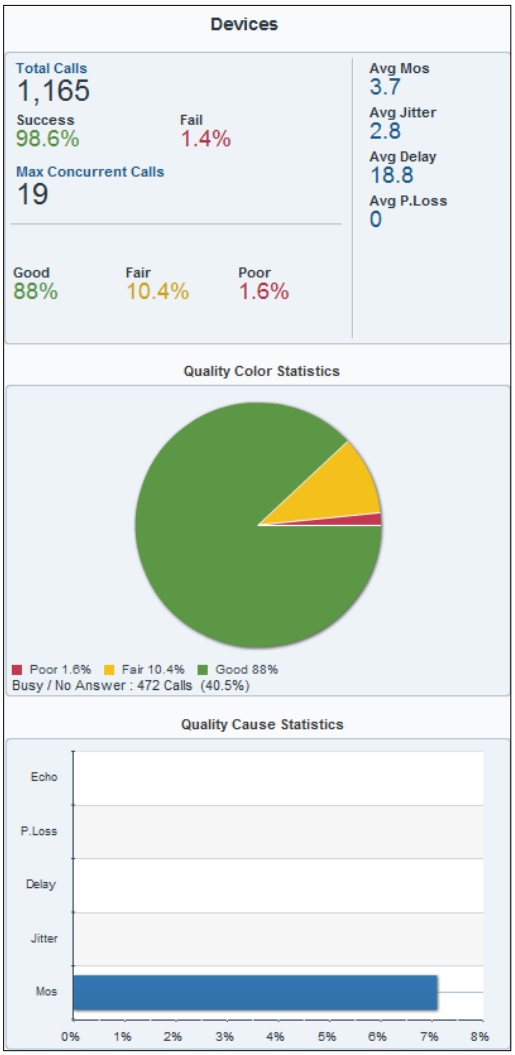
Note: See Section 1.4 for descriptions of the voice quality metrics.

7.8 Network Health Overview Panes

The Statistics page displays three panes to the right of the charts, letting you assess at a glance the VoIP network's overall health statistics (top to bottom):

- Total Calls
- Quality Color Statistics
- Quality Cause Statistics

Figure 7-15: Network Health Overview Panes



7.8.1 Total Calls Pane

This pane shows:

- the total number of calls made
- % successful/failed calls
- Maximum concurrent calls
- the percentage of calls in each voice quality category
- each voice quality metric's score

7.8.2 Quality Color Statistics

This pane displays a color-coded pie showing the percentage of calls whose voice quality was measured as good (green), fair (yellow), or poor (red). The pane also displays the # and % of Busy / No Answer.

➢ **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 letting you view detailed information on calls in this voice quality category (see Section 8 on page 71).

7.8.3 Quality Cause Statistics

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

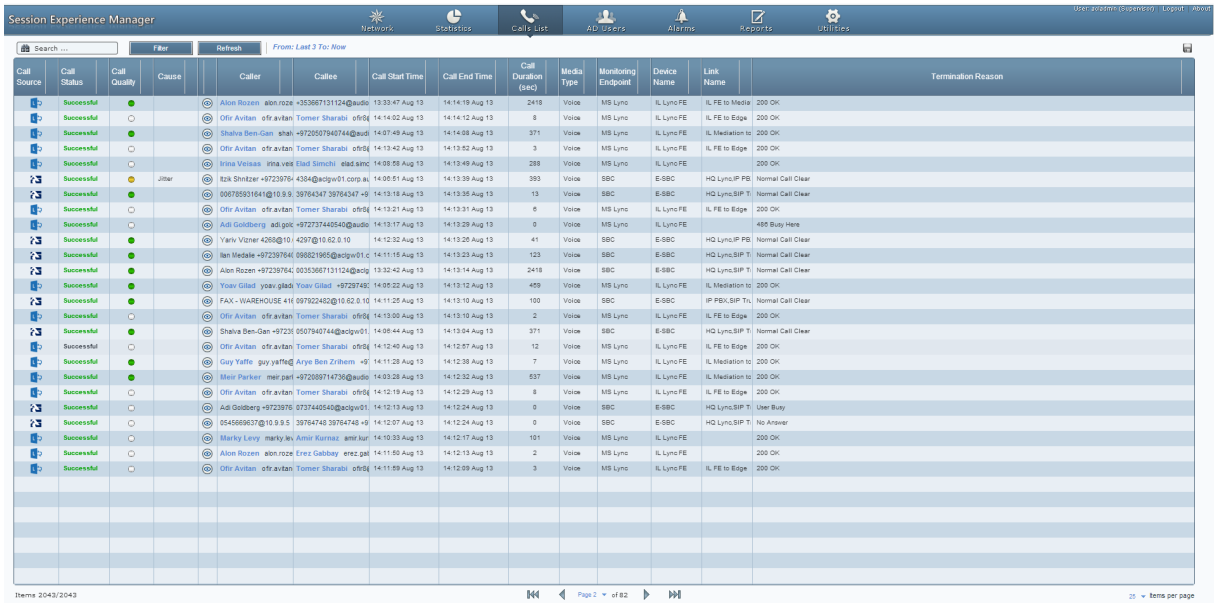
➢ **To view detailed information:**

- Point your cursor over a bar to view the precise % and # of calls impacted by the metric.

8 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 8-1: Calls List



The icon in the 'Call Source' column indicates whether the source of the call is from Microsoft Lync or from an AudioCodes device.

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 8-2: 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.

Note:

- Calls made with a duration of less than ten seconds are not displayed in the Calls List.
- When there are two sucessive calls made with the same Caller ID and the interval between the calls is less than two seconds, the details of the second call are not displayed in the Calls List.

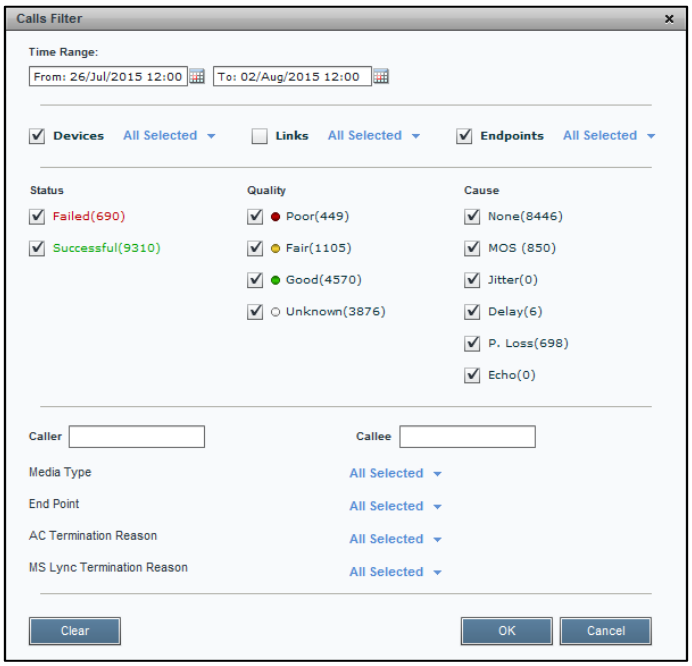
8.1 Filtering to Display Required Information Only

Filtering options on the Calls List page let SEM users 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 **Filter** button; this screen opens:

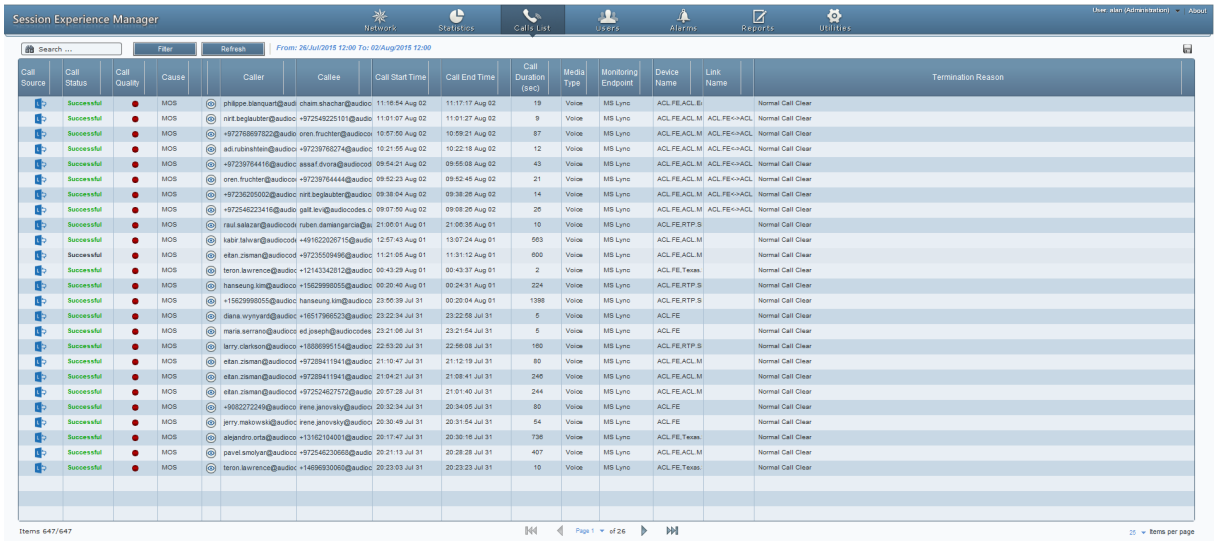
Figure 8-3: Calls Filter



2. Filter for 'Time Range'.
3. Filter for 'Devices' and/or 'Links' and/or 'Endpoints'.
   These filters are identical to those on the Network page. See Section 5.
4. Filter for
   a. Status - Failed or Successful
   b. Quality - Poor, Fair, Good or Unknown
   c. Cause - None, MOS, Jitter, Delay, P. Loss or Echo.

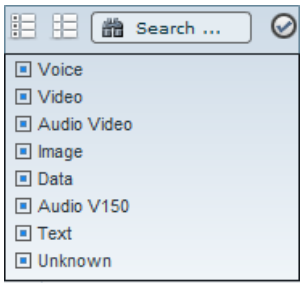
   Select, for example, the **Poor** quality option, and deselect the other three quality options. The figure below shows the result:

Figure 8-4: Poor Quality Calls Only

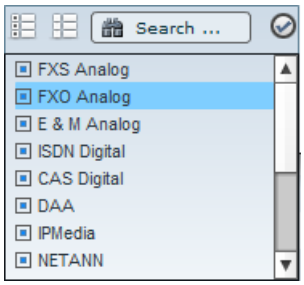


Only calls of poor quality are displayed. The causes can be Packet Loss, Jitter, Delay and MOS.

5. Filter these poor quality calls for those whose poor quality was caused *only* by **Delay**, for example. Deselect every cause except **Delay**.
6. Filter for 'Caller' and/or 'Callee'. The fields are case-sensitive.
7. Filter for 'Media Type'.
   a. Click its **All Selected** link. By default, all media types are selected. The dialog below opens.

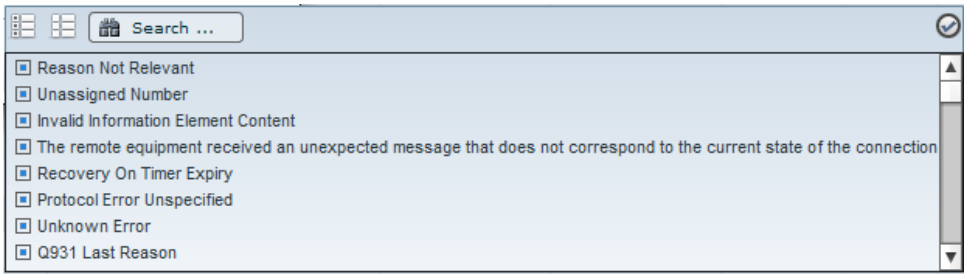


   b. Click the **Select None** icon and then select the media type for which to filter.
   c. Click the ✓ and then click **OK**.
8. Filter for 'End Point'.
   a. Click its **All Selected** link. By default, all end points types are selected. The dialog below opens.



   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**.
9. Filter for 'AC Termination Reason'.

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

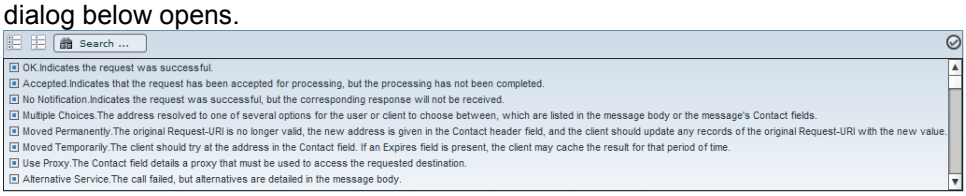


b. Click the **Select None** icon and then scroll down if necessary and select the end point for which to filter.

c. Click the ✓ and then click **OK**.

10. Filter for 'MS Lync 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**.

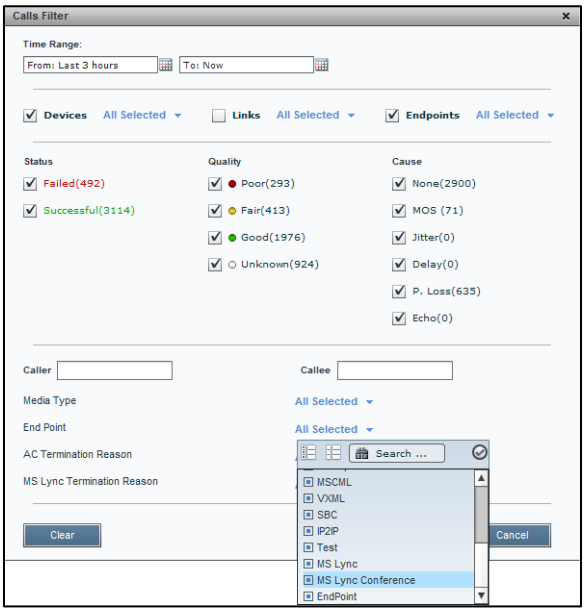
8.1.1 Filtering to Display MS Lync Conference Information Only

In the Calls List you can display call quality information that is exclusively related Microsoft Lync conferences, excluding all other information. A conference can be of media type voice & video, chat, or screen sharing. The conference participant's name is shown in the 'Caller' column. The SEM uses the Microsoft Lync ConferenceSessionDetailsView Monitoring Server report to retrieve Lync conference calls information.

➢ **To display information about Microsoft Lync conferences:**

1. In the Calls List page, click the **Filter** button:

Figure 8-5: Calls Filter - Filtering to Display MS Lync Conferences Information

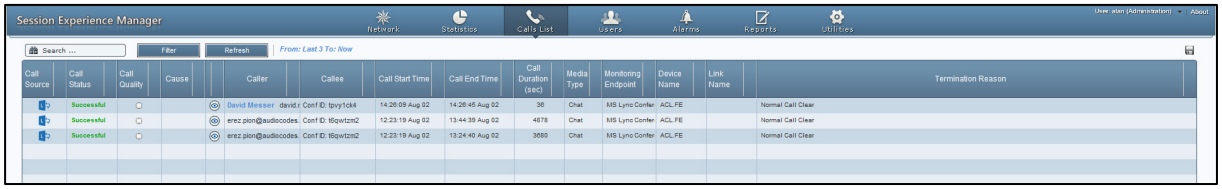


2. Open the 'End Point' drop-down, deselect all, and then select **MS Lync Conference**.
3. Click the ✓ and then click **OK**.

Figure 8-6: Calls Filter - MS Lync Conference Calls

4. [Optionally] filter more. For example, from the 'Media Type' drop-down choose **Chat**; the Media Type column shown in the figure above then displays only MS Lync conferences whose type of media is chat.

Figure 8-7: Calls Filter - MS Lync Conference Calls – Chat Media Type



8.1.2 Sorting Calls in the Calls List

Tip: To optimize SEM GUI performance: 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 8-1: Calls List Columns

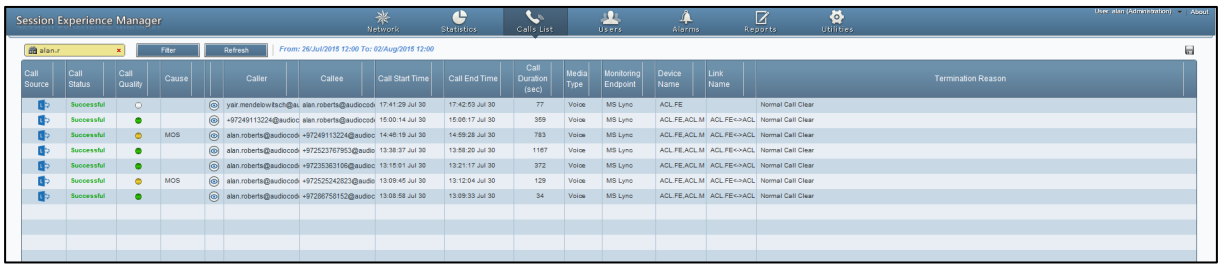
Column	Description	
Call Status	**Successful** or **Failed**	
Call Quality	= Good = Fair = Poor = Unknown	
Cause	Delay (msec)	Delay (or latency) - the time it takes for information to travel from source to destination (round-trip time). Sources of delay include voice encoding / decoding, link bandwidth 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 name of the device on which the call was made.	
Termination Reason	The reason why the call was terminated, e.g., No Answer.	

8.1.3 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 an employee's name, e.g., Alan, in the 'Search' field (see the figure below); only calls made and answered by Alan are listed.

Figure 8-8: Results after Searching for an Employee's Name



After the search results are displayed, click the ‘x’ in the Search field to undo the filter, or narrow the search using another filter method.

Access a call's details by clicking its row; the Call Details page opens (see Section 8.2 following).

8.2 Displaying Call Details

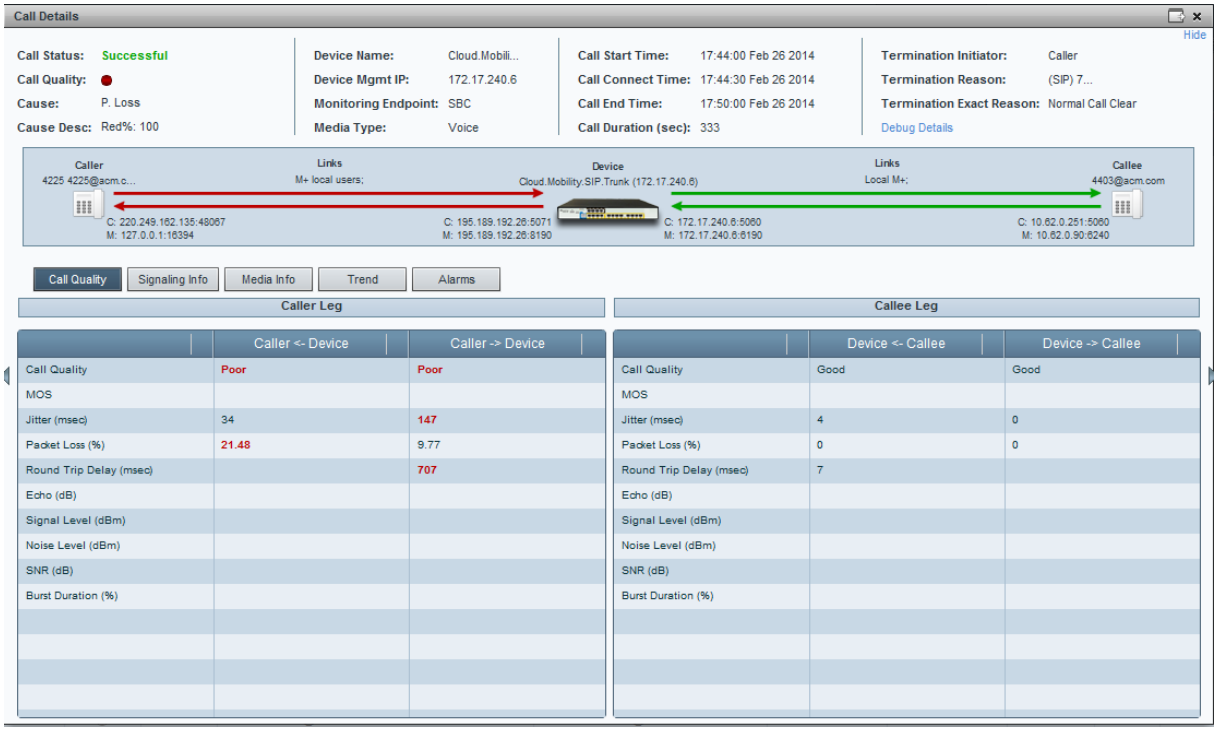
You can view the details of a call listed in the Calls List, by clicking its row. The Call Details screen displays information corresponding to whether the call was over Microsoft Lync or over an AudioCodes entity.

8.2.1 Displaying Details of a Call over an AudioCodes Device

You can display the details of calls made/received over an AudioCodes device (Gateway / SBC / MSBR).

The Call Details page displays detailed diagnostic information on a 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. The figure below shows the details of a call made over an AudioCodes VoIP networking device (Gateway / SBC / MSBR).

Figure 8-9: Details of a Call over a VoIP Networking Device (Gateway/SBC/MSBR)



The table below describes the page's subdivisions.

Table 8-2: 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 8 on page 71.
(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)

Page Subdivision	Description
	M = Media IP address and Port (point cursor to view tooltip)
(Lowermost) Five tabs	Each opens a page displaying detailed information: ▪ Call Quality (see Section 8.2.1.1 on page 81 below) ▪ Signaling Info (see Section 8.2.1.3 on page 84 below) ▪ Media Info (see Section 8.2.1.4 on page 85 below) ▪ Trend (see Section 8.2.1.5 on page 87 below) ▪ Alarms (see Section 8.2.1.6 on page 89 below) ▪ Device Info (applies only to calls over Microsoft Lync) (see Section 8.2.2.1 on page 92 below)

8.2.1.1 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 SEM users to comprehensively assess voice quality, perform precise diagnosis and effectively troubleshoot and manage session experience.

Figure 8-10: Call Quality

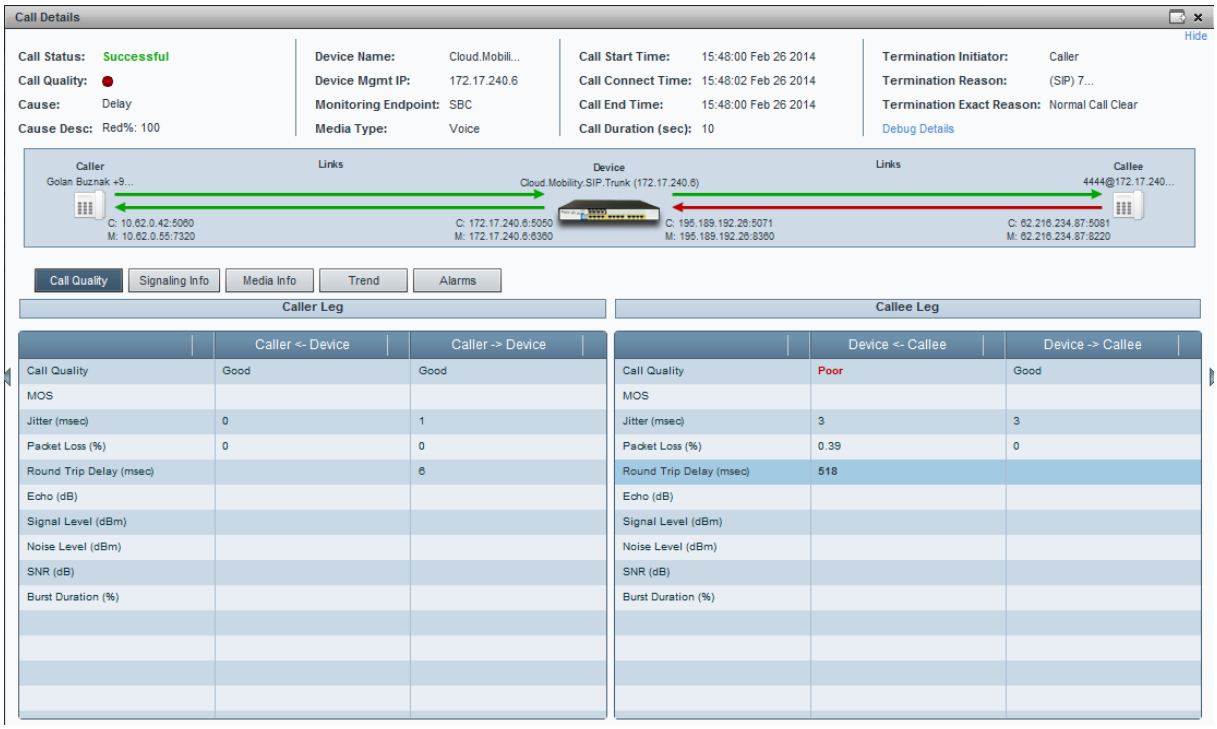


Table 8-3: Call Quality Parameters

Parameter	Description
Call Quality	Good (green), Fair (yellow), Poor (red), Unknown (grey). Indicates call quality grades scored by caller *and* 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.
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, for the caller and 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, discarded since initial call receipt due to late/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)

8.2.1.2 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 8-11: Call Quality - PSTN Leg

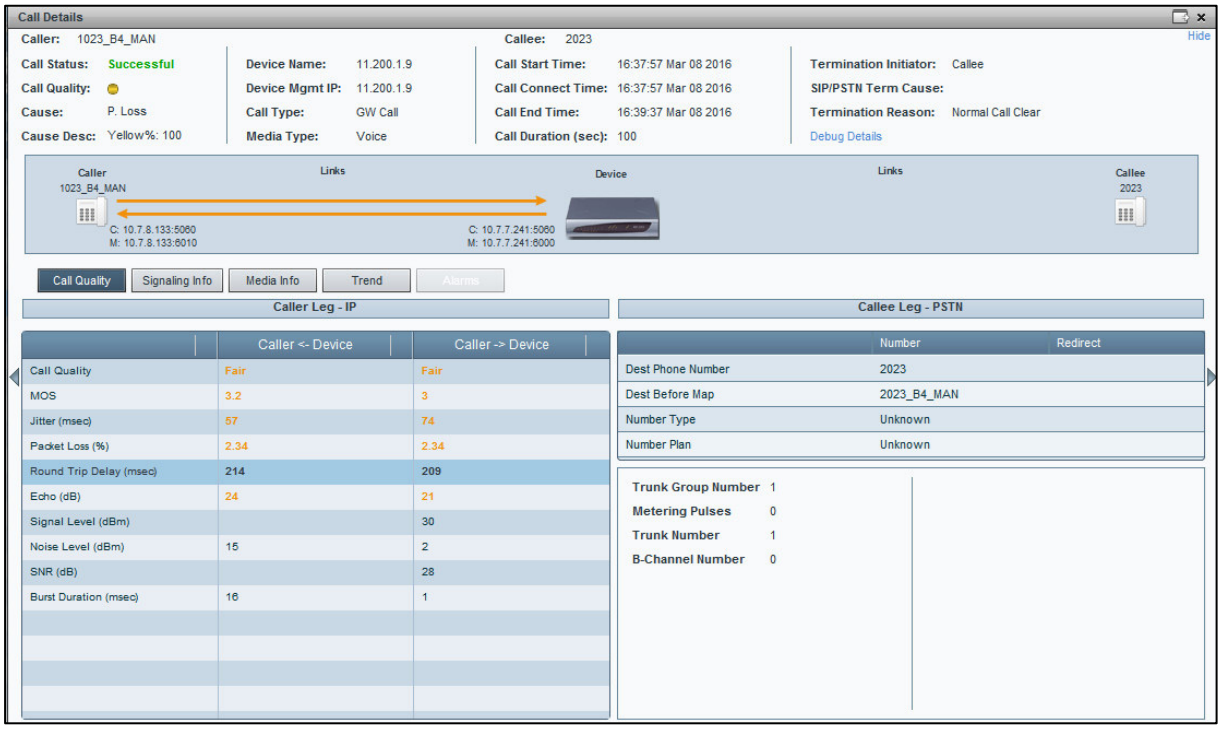


Table 8-4: Call Quality Parameters – PSTN Leg

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 SEM 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.
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).

8.2.1.3 Signaling Info

The Signaling Info tab shows a call's control protocol (SIP) parameter settings that SEM 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 8-12: Signaling Info

Table 8-5: Signaling Info Parameters Descriptions

Parameter	Description
SRD	The unique name and index configured for the signaling routing domain (SRD). Example: **someSRD (n)**, where **n** following the displayed name is the number indicating the SRD's index used to facilitate network configuration.
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	The Proxy Set to which the call is associated. A Proxy Set is a group of Proxy servers. 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	The IP Profile assigned to this IP destination call. The IP Profile assigns numerous configuration attributes (e.g., voice codes) per routing rule.
Transport Type	Optionally: • UDP • TCP
Signalling Diff Serv	The value for Premium Control CoS content (Call Control applications).

8.2.1.4 Media Info

The Media Info tab displays a call's media parameter settings that SEM 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 8-13: Media Info

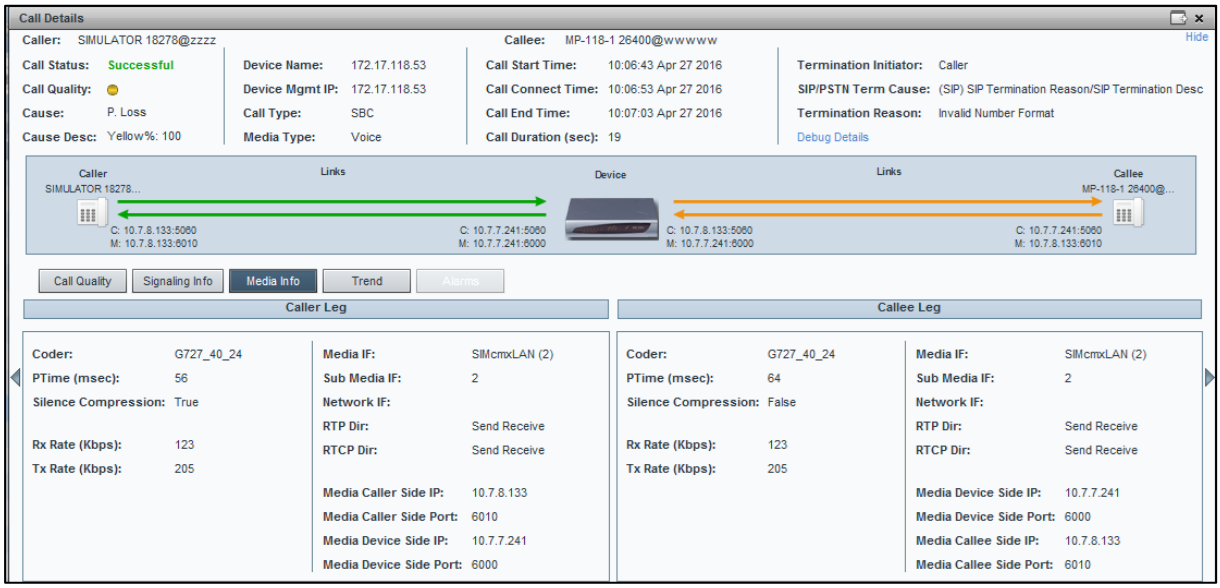


Table 8-6: Media Info Parameters

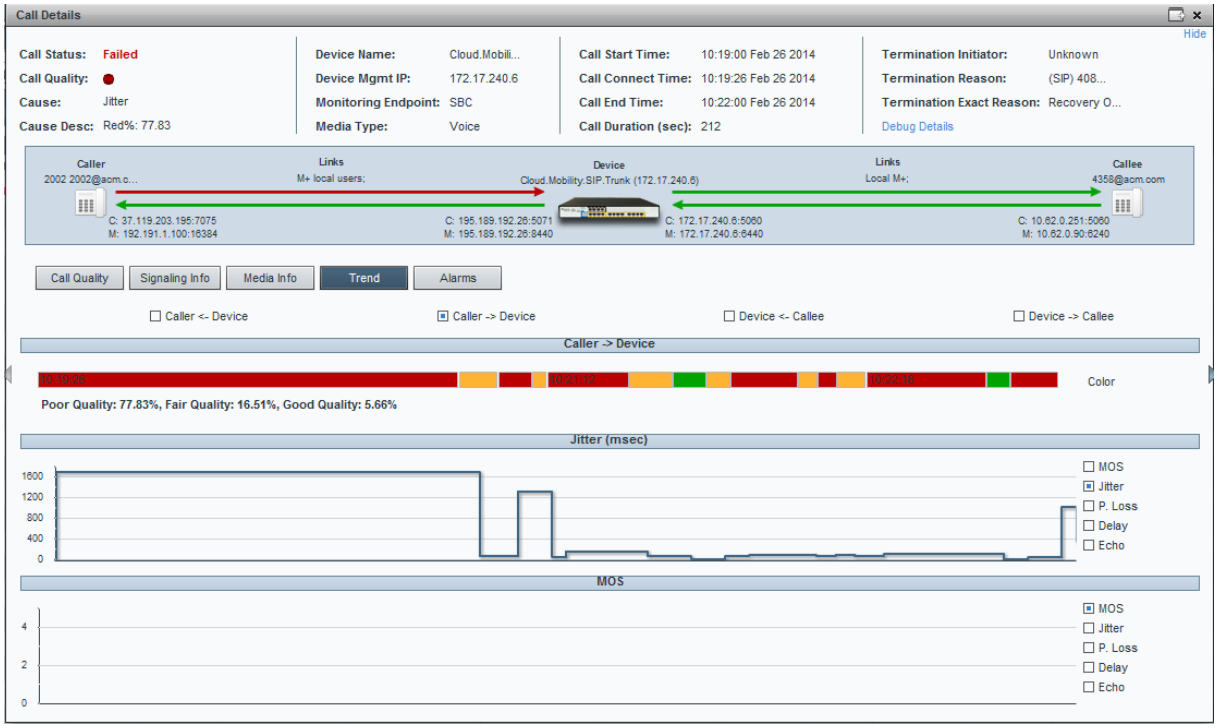
Parameter	Description
Coder	Up to 10 coders (per group) are supported. See the device manual for a list of supported coders.
PTime (msec)	Packetization time, i.e., how many coder payloads are combined into a single RTP packet.
Silence Compression	Method for conserving bandwidth on VoIP calls by not sending 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	Shows the name and index of the Media Realm interface reported by the device. Example: **SIMcmxLAN (n)**, where **n** following the displayed name is the number indicating the Media Interface's index used to facilitate network configuration.
Sub Media IF	Shows the index of the sub Media Realm interface reported by the device.
Network IF	Network Interface Name.
RTP Dir	RTP Directional Control. Controlled internally by the device according to the selected coder.
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.

Parameter	Description
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.

8.2.1.5 Trend

The Trend tab shows the quality trend of a call that SEM users can refer to for diagnostic, troubleshooting and session management experience issues.

Figure 8-14: Trend



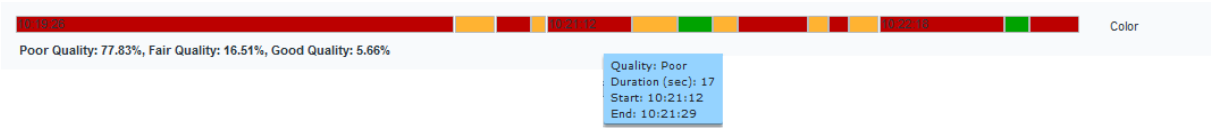
Quality applies to two legs of the call:

- 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 8-15: Call Quality Color Bar



The popup in Figure 8-15 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 8-14 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.

8.2.1.6 Alarms

The Alarms tab lists alarms (if any) issued by the device associated with the call. SEM 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 8-16: Alarms

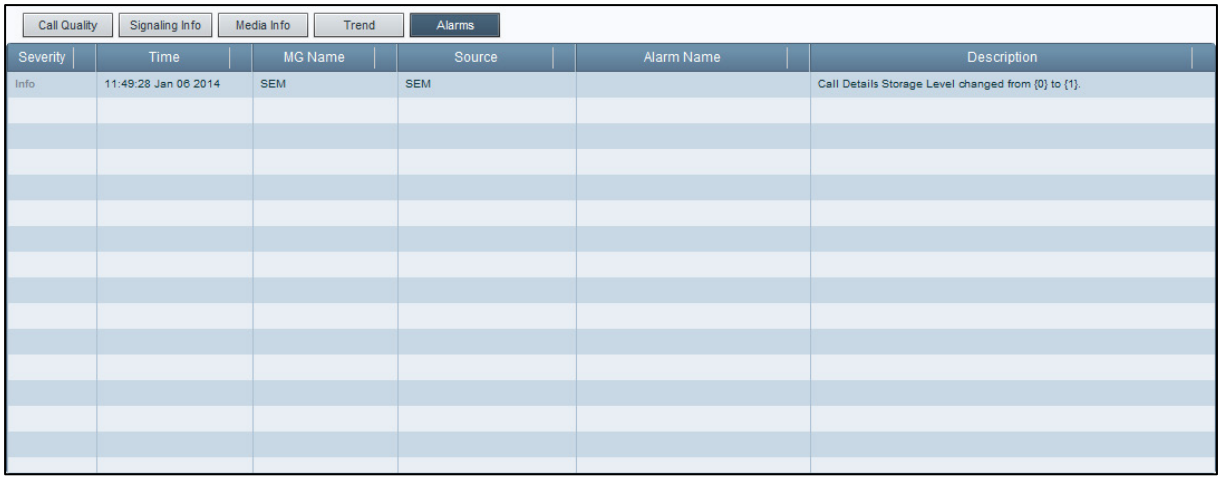


Table 8-7: Alarms Columns*

Column	Description
Severity	For detailed information, see Section 9 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.

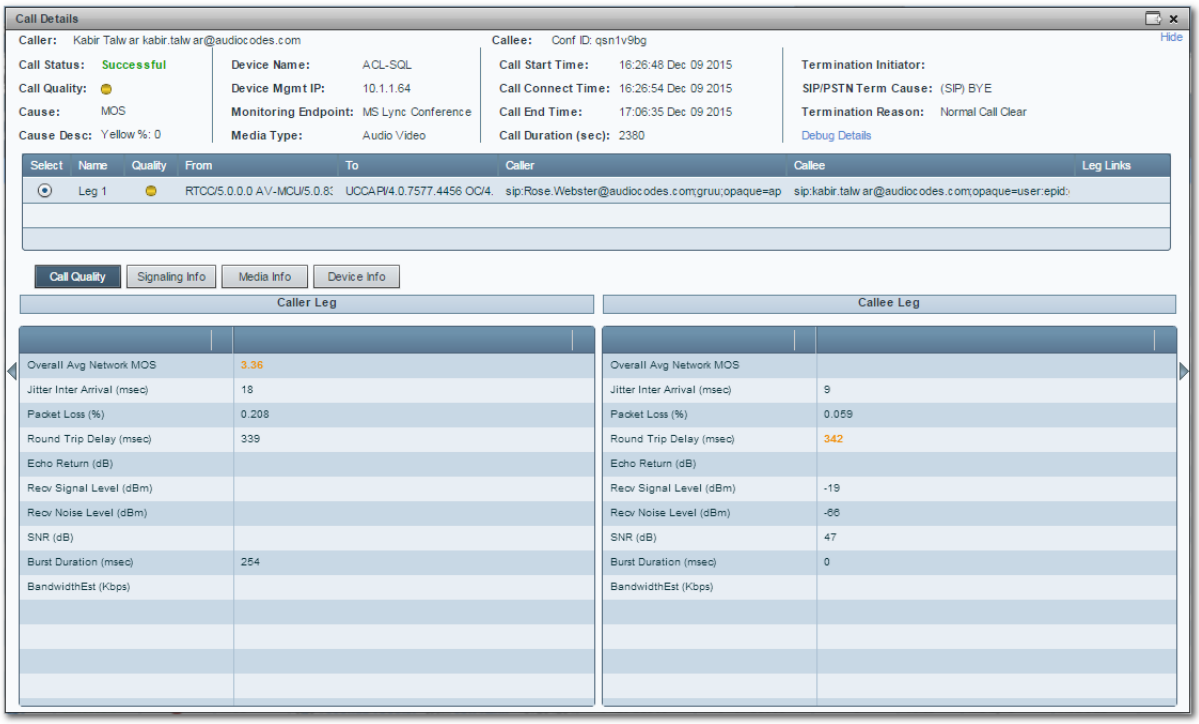
* Excerpted from ITU X.733

8.2.2 Displaying Details of a Call over Microsoft Lync

You can display the details of a call made/received over Microsoft Lync.

The Call Details page displays detailed diagnostic information on the call, in textual format, facilitating effective management, precise diagnosis and targeted remedial action to prevent recurrence of unsuccessful call performance or poor call quality.

Figure 8-17: Call Details – Microsoft Lync



Note:

- The page presents a parameter value highlighted yellow or red when it exceeds a configured threshold (see Section 1.7, Applying QoE Thresholds).
- If a parameter value on both caller and callee sides exceeds the configured threshold, the SEM highlights the worst value.
- The worst MOS value is the *lower* value, yet the worst Delay value is the *higher* value.
- In the the figure above, the caller's delay of 339 exceeds the yellow threshold configured for Delay, but it is not highlighted because the callee's Delay value is higher.

Table 8-8 below describes the page's subdivisions.

Table 8-8: MS Lync 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 8 on page 71.
(Middle) Call Legs Table	Displays the call flow. Each leg represents a section between two devices (Microsoft Lync, AudioCodes, or generic) in the call flow. Select a leg to display its details. Each leg displays: ▪ Quality - Color-coded (green = good, yellow = fair, red = poor, grey = unknown) ▪ From/To - Devices in the leg ▪ Caller/Callee - Endpoint users of the leg ▪ Leg Links - The links on which this leg passed
Four tabs: Call Quality Signaling Info Media Info Device Info	Similar to the tabs for calls over a VoIP networking device (Gateway / SBC / MSBR). ▪ For the Call Quality tab, see Section 8.2.1.1. ▪ For the Signaling Info tab, see Section 8.2.1.3. ▪ For the Media Info tab, see Section 8.2.1.4. ▪ For the Device Info tab, see Section 8.2.2.4

8.2.2.1 Call Quality

This section describes the Call Quality tab screen (see Figure 8-17). Use the table below as a reference.

Table 8-9: Call Quality Parameter Descriptions

Parameter	Description
Overall Avg Network MOS	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. Comprises: 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.
Jitter Inter Arrival (msec)	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, for the caller and 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 Return (dB)	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.
Recv 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.
Recv 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 (dB)	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.
BandwidthEst	Estimated bandwidth.

8.2.2.2 Signaling Info

This section describes the Signaling Info tab screen.

Figure 8-18: Call Details – Microsoft Lync - Signaling Info tab

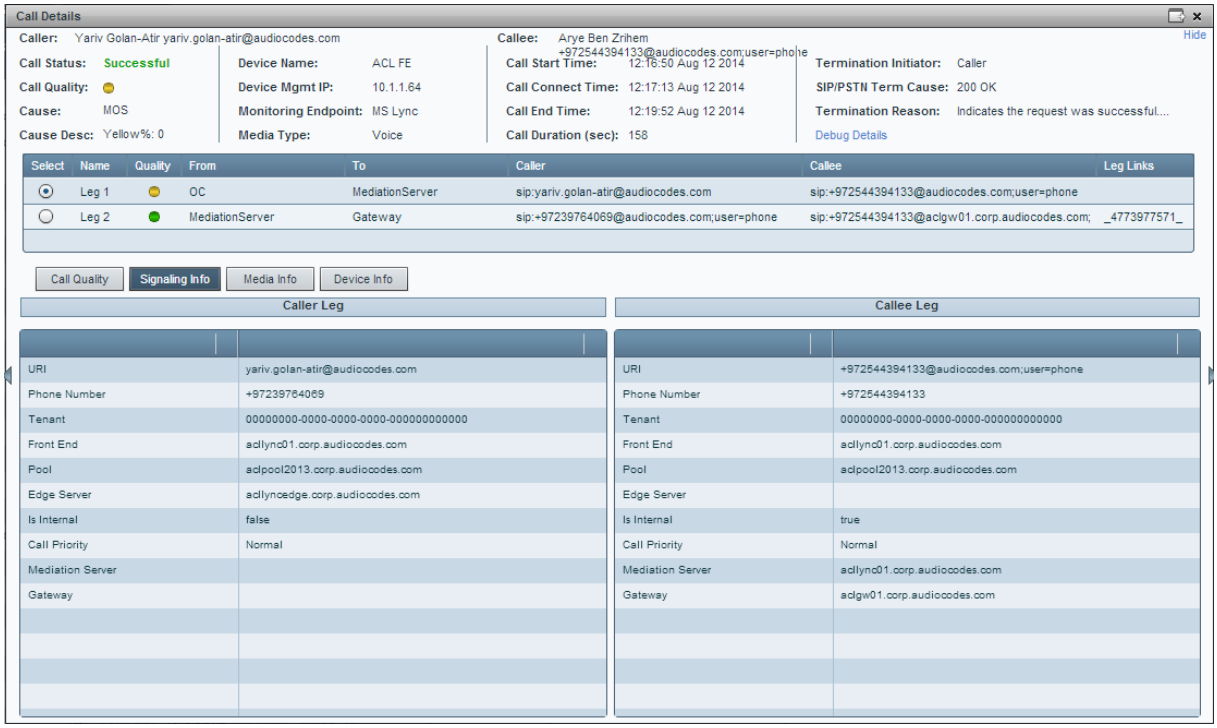


Table 8-10: Signaling Info Parameter Descriptions

Parameter	Description
URI	URI of the user who started (caller) / joined (callee) the session.
Phone Number	Phone URI of the user who started (caller) / joined (callee) the session.
Tenant	Tenant of the user who started (caller) / joined (callee) the session. Can be: • **00000000-0000-0000-0000-000000000000** – Enterprise • **00000000-0000-0000-0000-000000000001** – Federated • **00000000-0000-0000-0000-000000000002** – Anonymous • **00000000-0000-0000-0000-000000000003** – Public IM connectivity
Front End	FQDN of the Front End server that captured the data for the session.
Pool	FQDN of the pool that captured the data for the session.
Edge Server	FQDN of the Edge server used by the user who started (caller) / joined (callee) the session.
Is Internal	Indicates whether the user who started (caller) / joined (callee) the session logged on from the internal network.
Call Priority	Call priority of the session.
Mediation Server	Mediation Server of the user who started (caller) / joined (callee) the session.
Gateway	Gateway of the user who started (caller) / joined (callee) the session.

8.2.2.3 Media Info

This section describes the Media Info tab screen.

Figure 8-19: Call Details – Microsoft Lync - Media Info tab

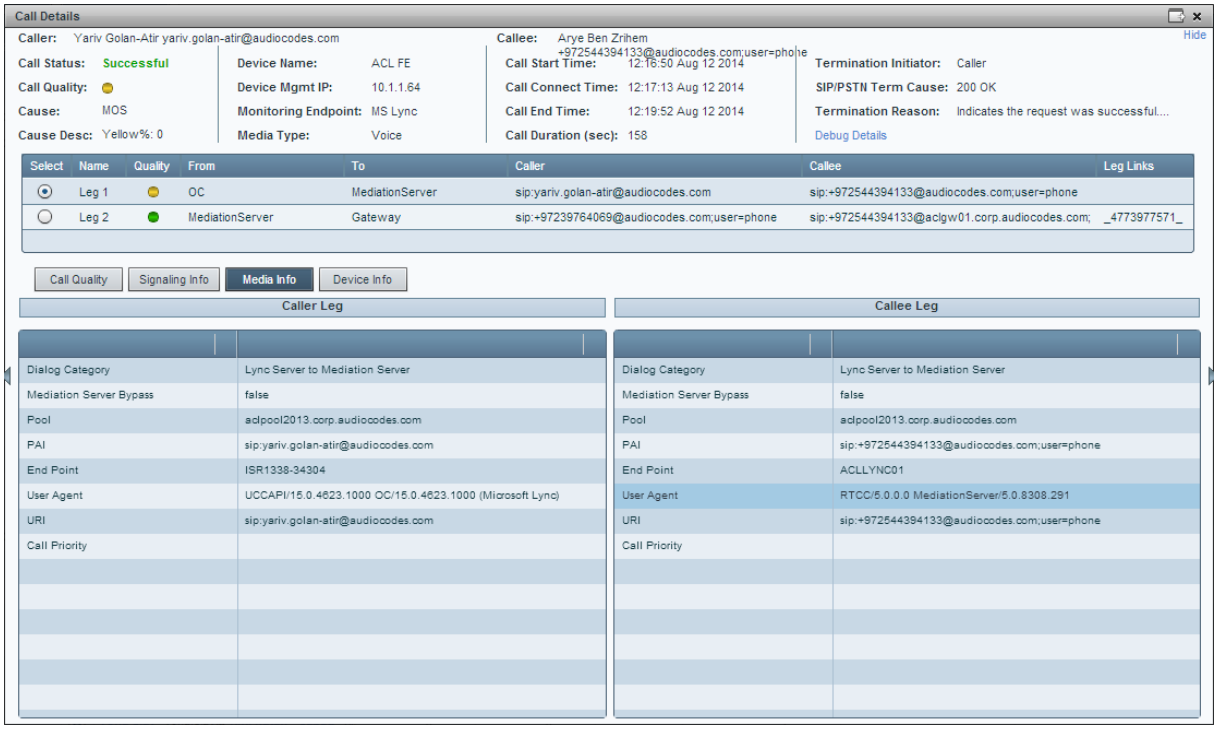


Table 8-11: Media Info Parameter Descriptions

Parameter	Description
Dialog Category	Dialog category: **0** is the Lync Server to Mediation Server leg **1** is the Mediation Server to PSTN gateway leg
Pool	Pool FQDN of the user who started (caller) / joined (callee) the session.
PAI	Indicates direction of the p-asserted identify information: **1** means the stream direction is from the caller to the callee **0** means the stream direction is from the callee to the caller
End Point	Endpoint name of the user who started (caller) / joined (callee) the session.
User Agent	User agent string of the user who started (caller) / joined (callee) the session.
URI	URI of the user who started (caller) / joined (callee) the session.
Call Priority	Priority of the call.

8.2.2.4 Device Info

This section describes the Device Info tab screen. The Device Info tab applies only to calls made over Microsoft Lync.

Figure 8-20: Call Details – Microsoft Lync – Device Info tab

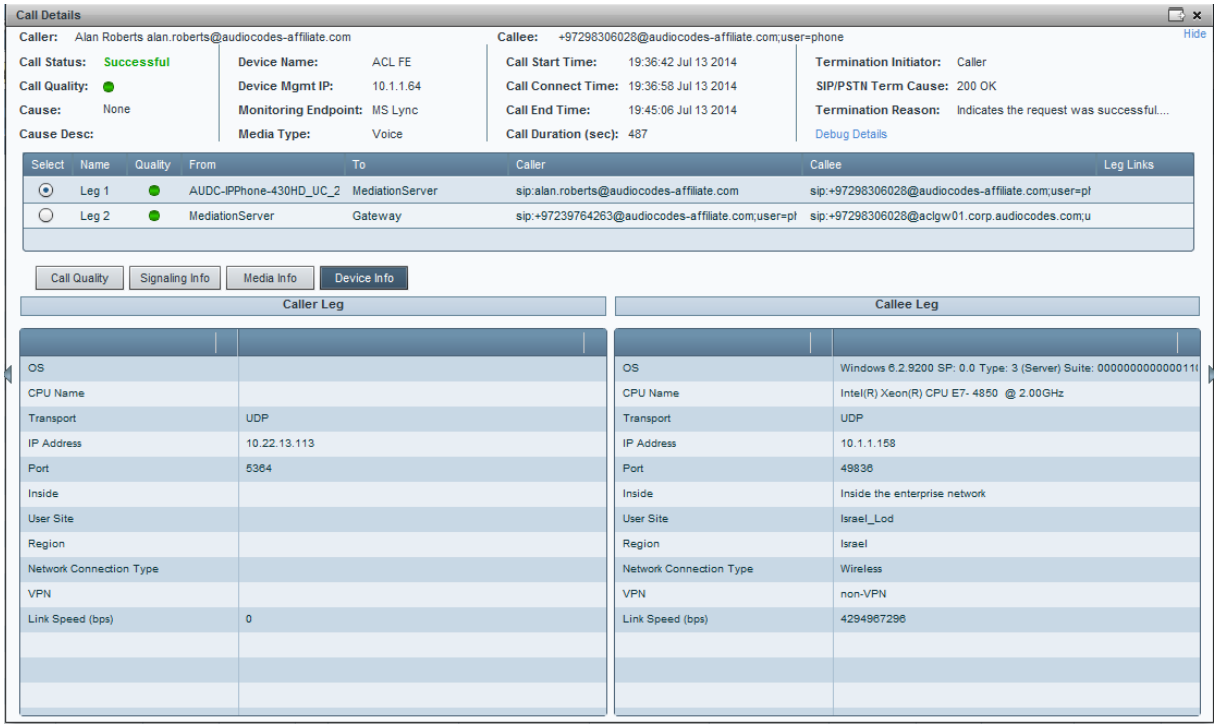


Table 8-12: Call Details – Microsoft Lync – Device Info tab

Column	Description
OS	The operating system (OS) of the endpoint of the user who started (caller) / joined (callee) the session.
CPU Name	CPU name of the endpoint of the user who started (caller) / joined (callee) the session.
Transport	Transport type: • UDP • TCP
IP Address	IP address of the user who started (caller) / joined (callee) the session. This may be either an IPv4 or an IPv6 address.
Port	Port used by the user who started (caller) / joined (callee) the session.
Inside	Indicates whether the caller/callee is inside the interval network: • Caller is inside the enterprise network • Caller is outside the network
User Site	Name of the caller/callee's site.
Region	Name of the country/region of the caller/callee's site.
Network Connection Type	Caller / callee's network connection type: • Wired • Wireless

Column	Description
VPN	Indicates whether the caller/callee connected over a virtual private network: • Virtual Private Network (VPN) • Non-VPN
Link Speed (bps)	Network link speed for the caller / callee's endpoint, in bps.

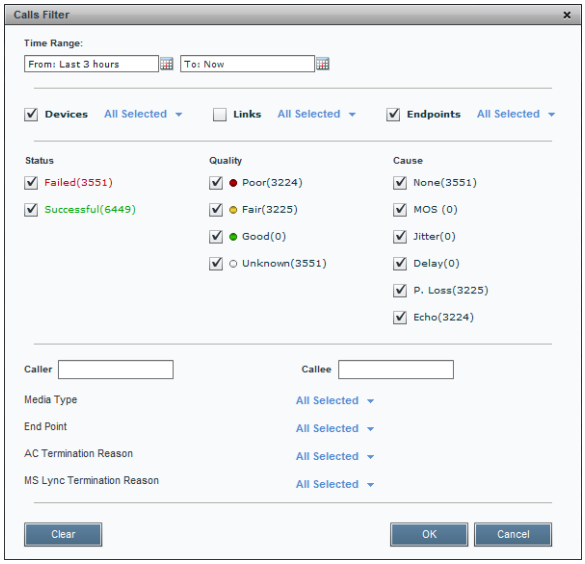
8.2.3 Displaying Details of a Call over a Specific Endpoint

You can display the details of a call made/received over a specific endpoint.

➢ **To display all calls over all endpoints:**

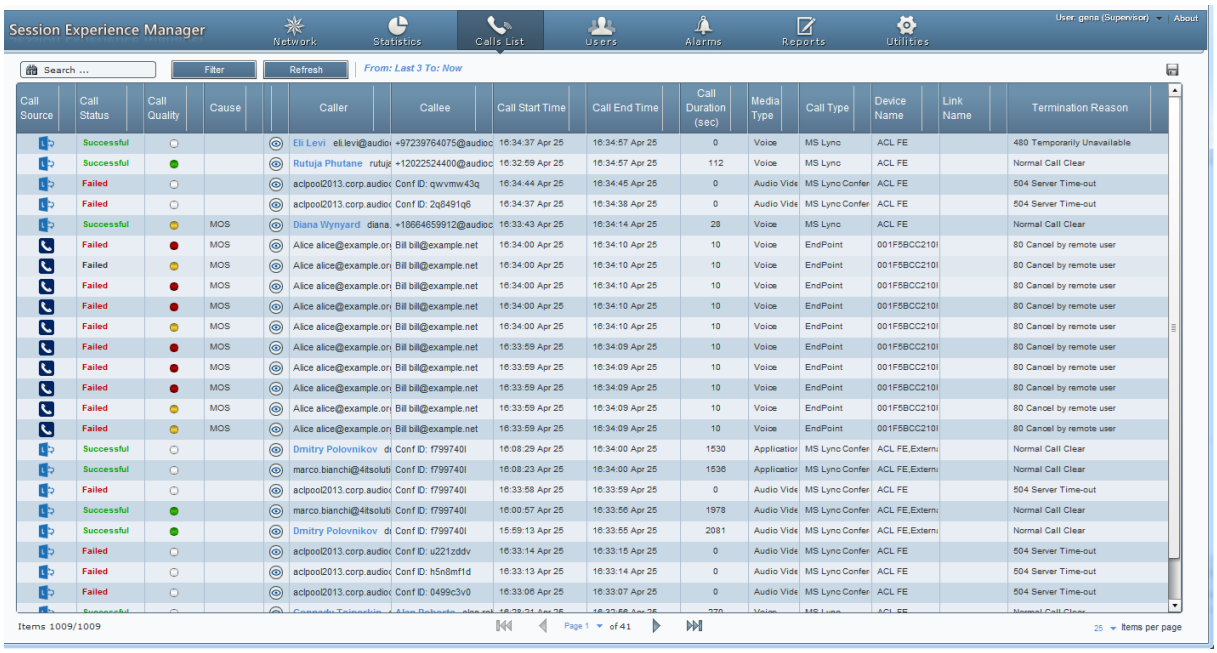
1. In the Calls List page, click the **Filter** button.

Figure 8-21: Calls Filter



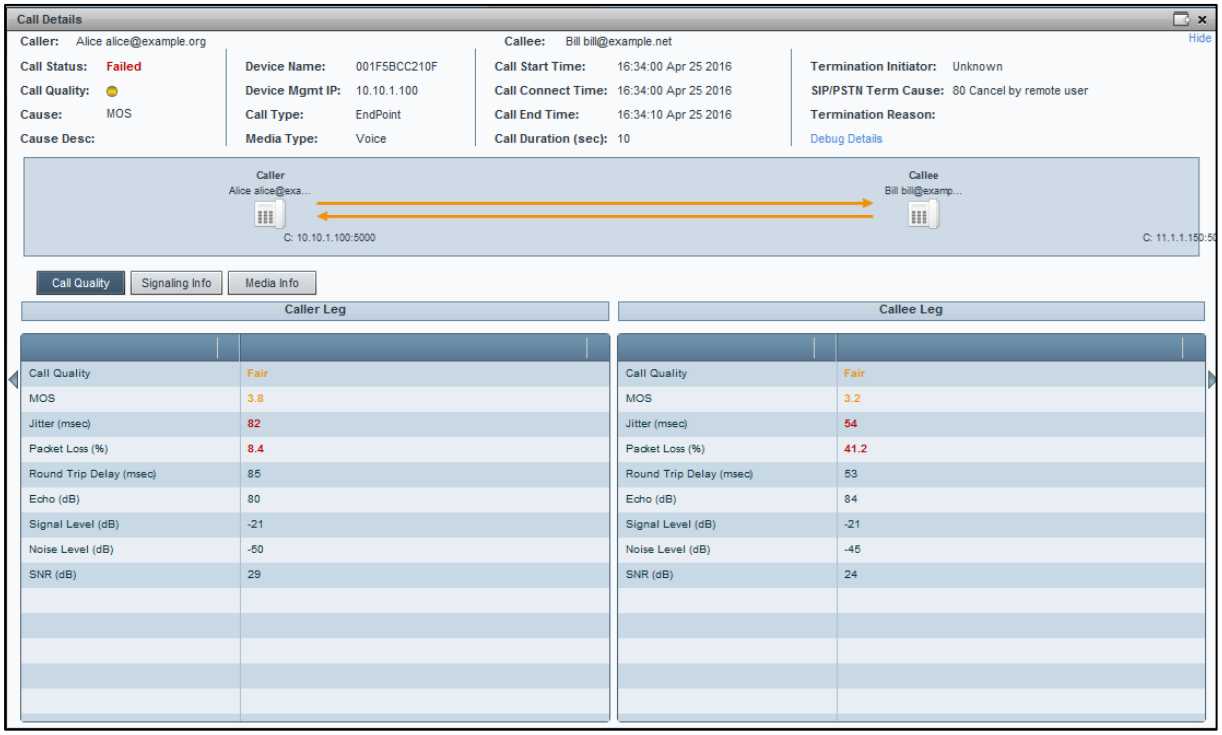
2. Select the **Endpoints** filter option and click **OK**; all calls over all endpoints are displayed.

Figure 8-22: Calls List – Calls over Endpoints



3. Click the **View Call Details** icon  in the row of a specific endpoint.

Figure 8-23: Call Details – Specific Endpoint



The page displays detailed diagnostic information on a call over the specific endpoint, facilitating effective management, precise diagnosis and targeted remedial action to prevent recurrence of unsuccessful call performance or poor call quality.

The table below describes the page's subdivisions.

Table 8-13: Endpoint 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 8 on page 71.
(Middle) Call Legs Table	Displays the call flow. Each leg represents a section between two devices (Microsoft Lync, AudioCodes, or generic) in the call flow. Each leg displays: ▪ Quality - Color-coded (green = good, yellow = fair, red = poor, grey = unknown) ▪ From/To - Devices in the leg ▪ Caller/Callee - Endpoint users of the leg ▪ Leg Links - The links on which this leg passed
Three tabs: Call Quality Signaling Info Media Info	Similar to the tabs for calls over a VoIP networking device (Gateway / SBC / MSBR). ▪ For the Call Quality tab, see Section 8.2.3.1. ▪ For the Signaling Info tab, see Section 8.2.3.2. ▪ For the Media Info tab, see Section 0.

8.2.3.1 Call Quality

This section describes the Call Quality tab screen (see Figure 8-23). Use the table below as a reference. The parameters apply to both caller and callee legs.

Table 8-14: Call Quality Parameter Descriptions

Parameter	Description
Call Quality	Describes the quality of the call: Good, Fair, Poor or Unknown.
MOS	MOS = Mean Opinion Score (specified by ITU-T recommendation P.800). Defines the grade, on a quality scale of Good to Poor, determined by the SEM after testing the call. Comprises: 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.
Jitter (msec)	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, for the caller and 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 (dB)	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	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	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 (dB)	The ratio of the signal level to the noise level (Signal-Noise Ratio). SNR = Signal level – Noise level.

8.2.3.2 Signaling Info

This section describes the Signaling Info tab screen.

Figure 8-24: Call Details – Specific Endpoint - Signaling Info tab

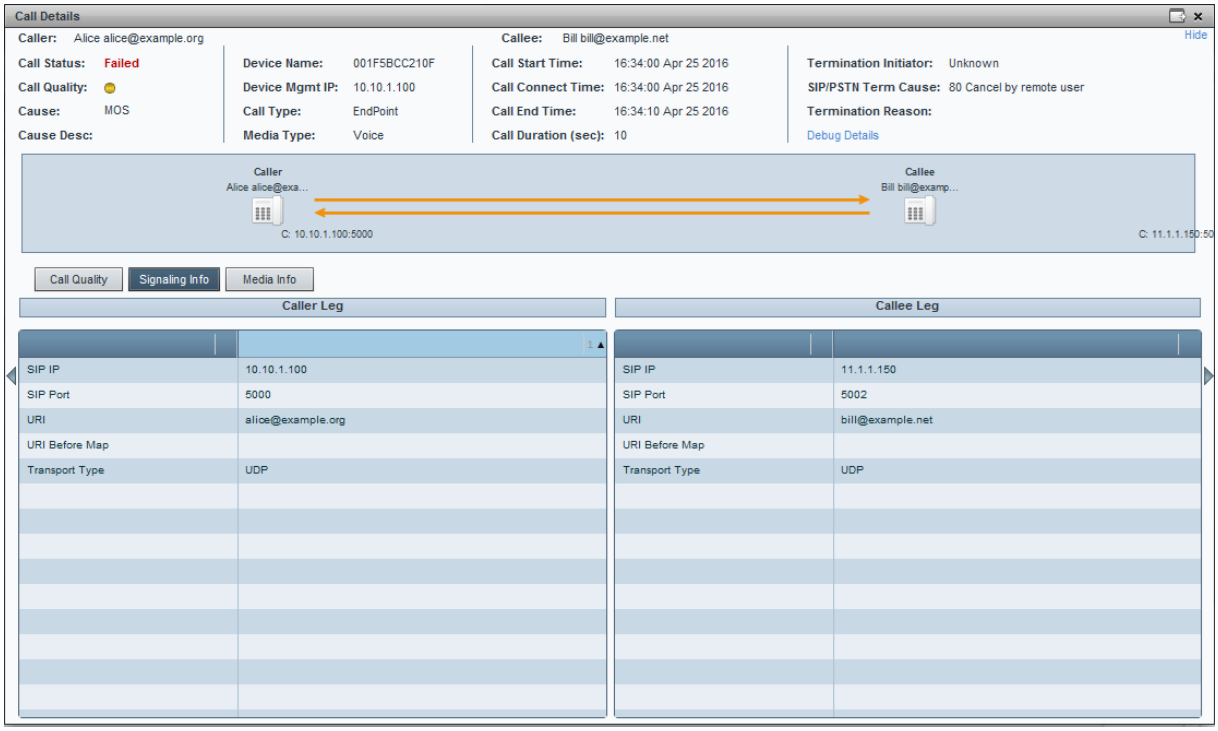


Table 8-15: Signaling Info Parameter Descriptions

Parameter	Description
SIP IP	The call's caller/callee (source/destination) IP address.
SIP Port	The port number used for the SIP call.
URI	The URI (Uniform Resource Identifier) of the caller/callee (source/destination). 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).
URI Before Map	The SIP URI address of the caller/callee before manipulation (if any) was done on the URI.
Transport Type	Two options: • UDP -or- • TCP

8.2.3.3 Media Info

This section describes the Media Info tab screen.

Figure 8-25: Call Details - Specific Endpoint - Media Info tab

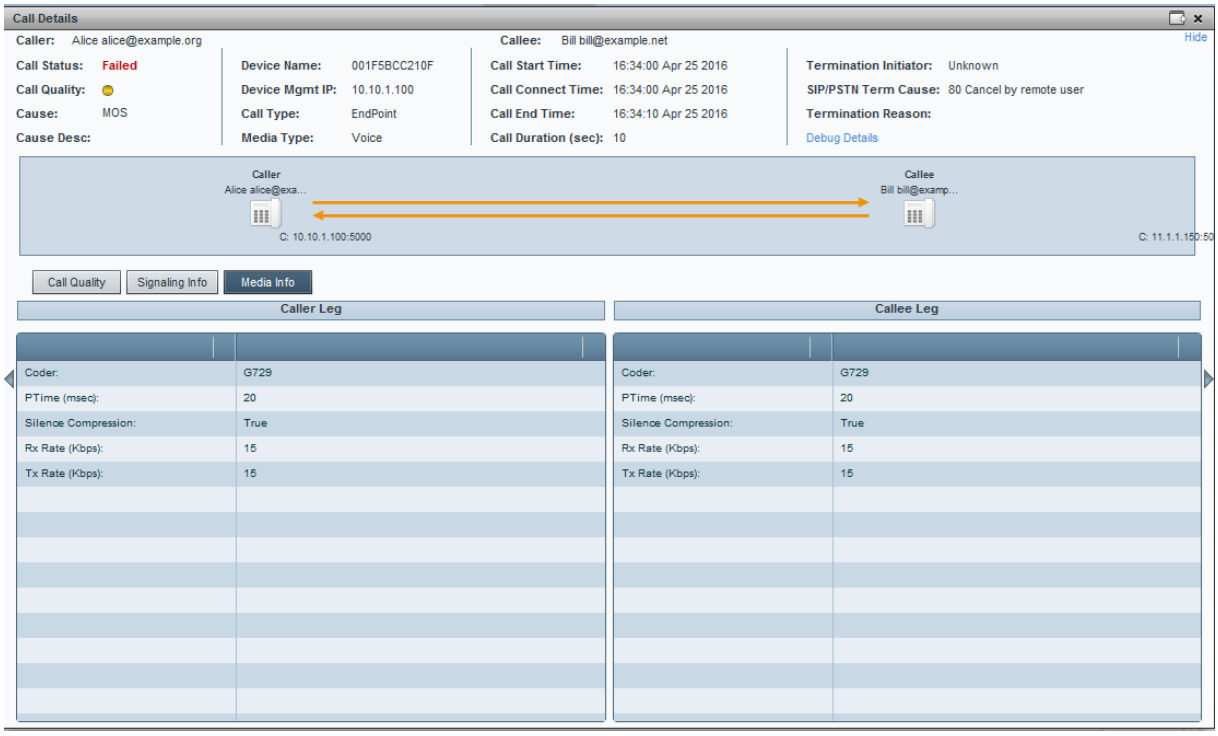


Table 8-16: Media Info Parameter Descriptions

Parameter	Description
Coder	Up to 10 coders (per group) are supported. See the endpoint (phone) 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.

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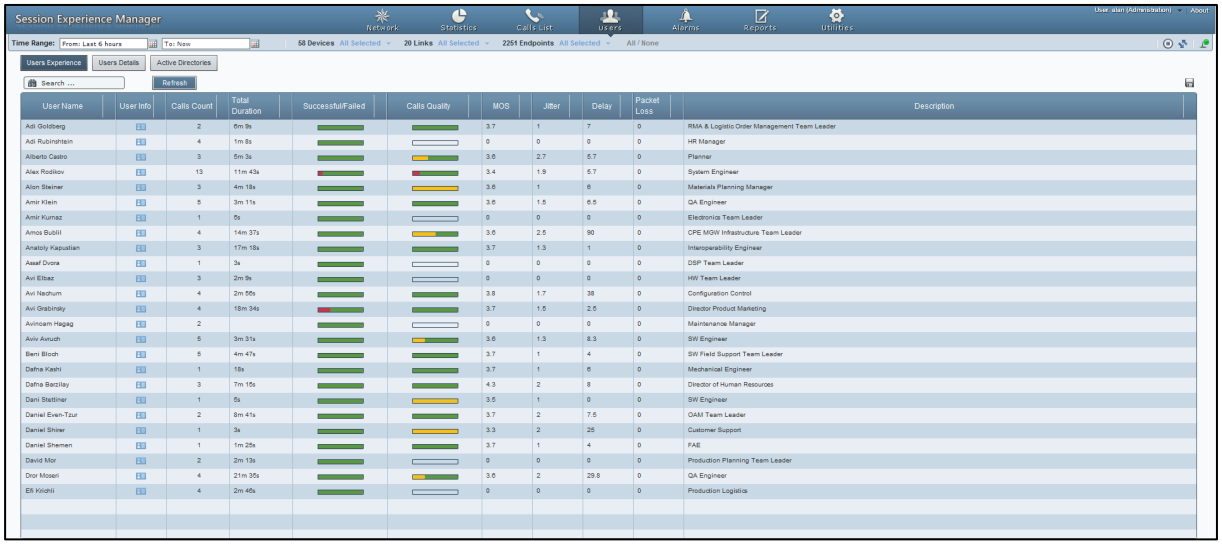
9 Managing Users Experience

The Users page lets you manage the telephony experience of employees listed in the enterprise's Active Directory. You can click the **Users** tab from any SEM page.

Figure 9-1: Users – Users Experience



The page provides you telephony statistics on the employees in the enterprise during a defined time period. To define the time period filter, see Section 5.15.1.

- Calls Count – the number of calls the employee made during the time period
- Total Duration – the total amount of time the employee spoke on their phone during the time period
- Successful/Failed - Point your mouse over the bar to see in the tooltip what percentage of that employee's calls succeeded and what percentage failed during the time period
- Calls Quality - Point your mouse over the bar to see from the tooltip what percentage of that employee's calls' quality was good, fair, and poor during the time period.

Figure 9-2: Users – Users Experience – Calls Quality

User Name	User Info	Calls Count	Total Duration	Successful/Failed	Calls Quality	MOS	Jitter	Delay	Packet Loss	Description
Adi Goldberg		2	6m 9s			3.7	1	7	0	RMA & Logistic Order Management Team Leader
Adi Rubinshtein		4	1m 8s			0	0	0	0	HR Manager
Alberto Castro		3	5m 3s			3.6	2.7	5.7	0	Planner
Alex Rodikov		13	11m 43s			3.4	1.9	5.7	0	System Engineer
Alon Steiner		3	4m 18s			3.6	1	6	0	Materials Planning Manager

- MOS, Jitter, Delay, Packet Loss – the scores of metrics impacting that employee's calls quality
- Description - User role as described in the enterprise's Active Directory

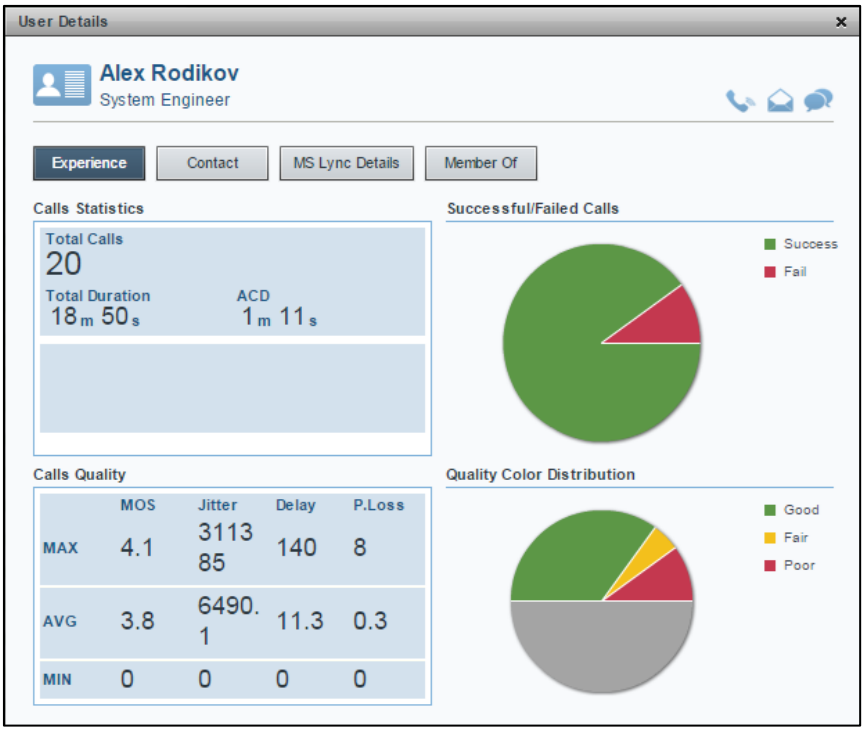
9.1 Managing a Single User's Experience

You can manage a single user's experience.

➢ **To manage a single user's experience:**

- In the Users page, click the **Show user details** icon in the row of the user whose experience you want to manage; the User Details screen opens displaying the **Experience** tab by default.

Figure 9-3: User Details – Experience tab



Note: You can directly contact the user from here, via Microsoft Lync. Click to phone, send an email, or send a message.

The pie charts show

- The ratio of successful calls to failed calls
- The successful and failed calls % and # when pointing your mouse over the pie
- The ratio of calls whose voice quality was Good, to those whose voice quality was Fair, Poor and Unknown
- The % and # of calls which scored Good, Fair, Poor and Unknown when pointing your mouse over the pie

The upper pane indicates user Calls Statistics:

- Total Calls
- Total Duration
- Average Call Duration (ACD)
- Utilization, Rx and Tx, in Kb
- Calls Quality

The lower pane indicates user Calls Quality:

- MOS, Jitter, Delay, Packet Loss
  MAX score, AVG score and MIN score
- Click any pie chart segment; the Calls List view opens, filtered accordingly.

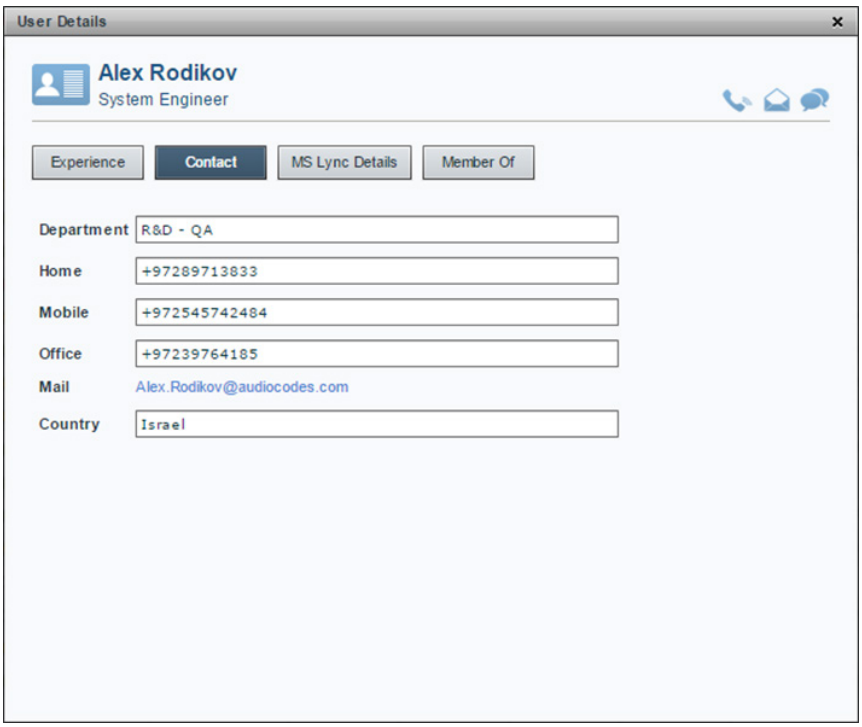
9.2 Managing a User's Details

You can view the details of every user listed in an Active Directory.

➢ **To view a user's details:**

- In the User Details screen, click the **Contact** tab:

Figure 9-4: User Details – Contact tab



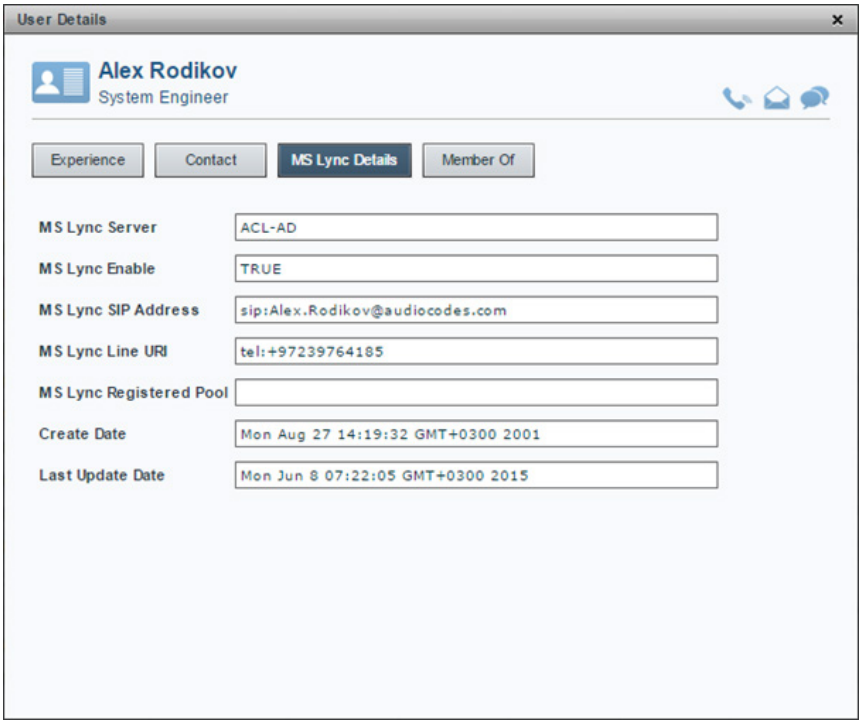
9.3 Viewing a User's MS Lync Details

You can view a user's MS Lync details.

➢ **To view a user's MS Lync Details:**

■ In the User Details screen, click the **MS Lync Details** tab:

Figure 9-5: User Details – MS Lync Details



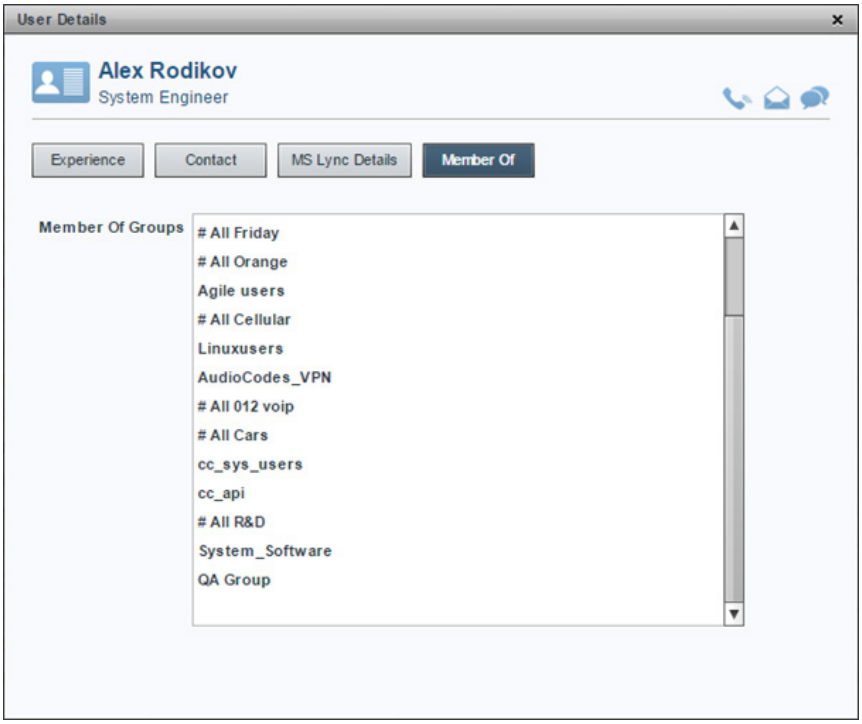
9.4 Viewing the Groups of which the User is a Member

You can view the groups of which a user is a member.

➢ **To view the groups of which the user is a member:**

■ In the User Details screen, click the **Member Of** tab:

Figure 9-6: User Details – Member Of



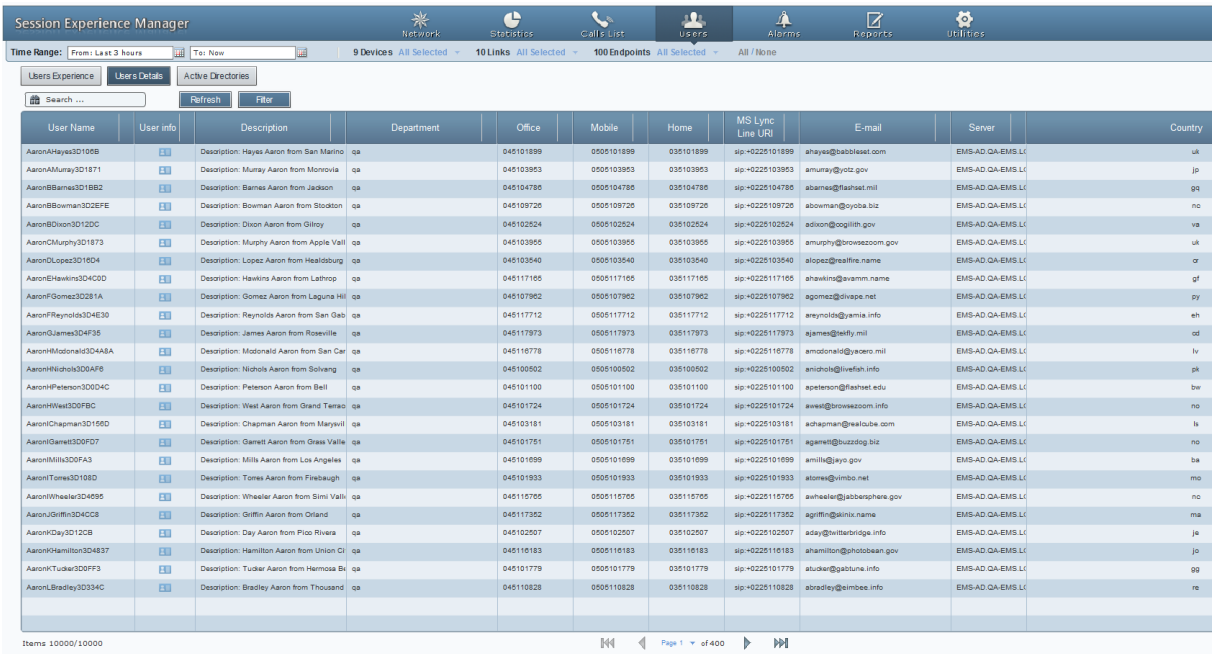
9.5 Viewing Users Details

You can view users details.

➢ **To view users details:**

- In the Users page, click the **Users Details** tab:

Figure 9-7: Users - Users Details tab



- Click the **Show user details** icon in the row of the users whose experience you want to view; the User Details screen opens displaying the **Experience** tab by default.

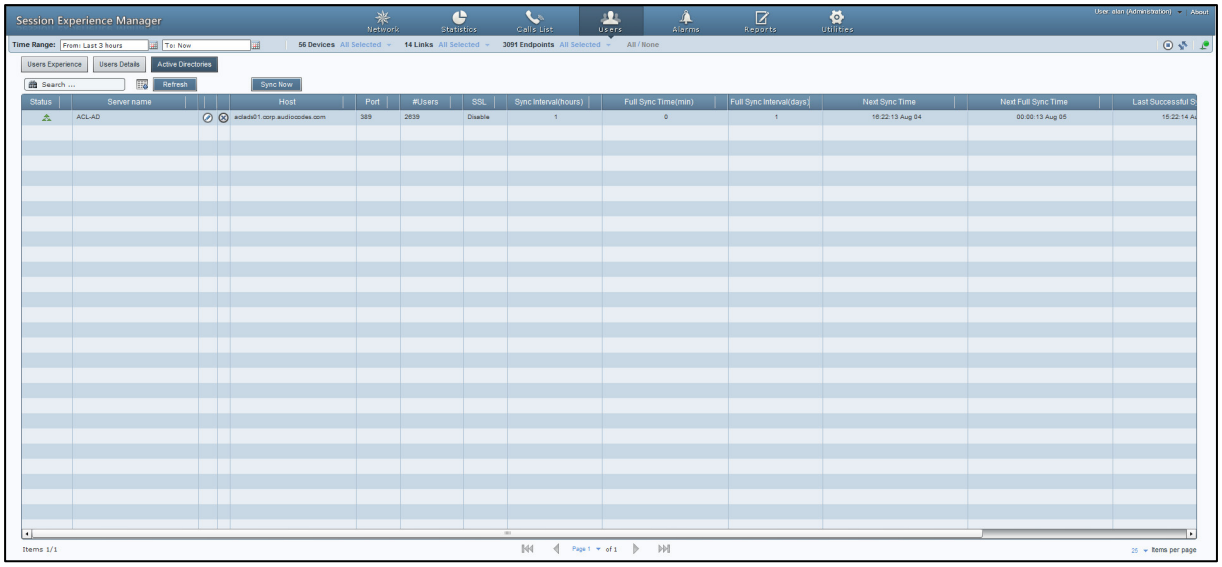
9.6 Managing Active Directories

The SEM displays data on calls made in the enterprise, including data on the callers and the callees making and receiving them. The SEM can display *more extensive* data on callers and callees if you add an Active Directory. A maximum of two Active Directories (servers) can be added. Up to 150,000 users are supported. After adding, you can open the Calls List page (and click on the hyperlinked name of any user listed), or the Users page (under the **Users Experience** and **Users Details** tabs). The SEM presents extensive user information, derived from the AD.

➢ **To manage the Active Directories:**

■ In the Users page, click the **Active Directories** tab.

Figure 9-8: Users – Active Directories



9.6.1 Viewing AD Server Details

The Users page shows you server details under columns. Use the table below as reference.

Table 9-1: AD Server Details

Column	Description
Status	= AD status not OK; connection refused with AD server = AD status is OK; connection established with AD server
Server name	The name of the server.
Host	The server host.
Port	The server port. Typically 389.
# of Users	The number of users listed.
SSL	Enabled or Disabled. • Disabled = Communications with the AD server will be open (unencoded). • Enabled = Enables verification that it is the AD server and no other entity that is communicating with the SEM server.

Column	Description
	If selected, a new 'Certificate File' field will be displayed, allowing you to browse for a root certificate. When the AD server then sends a certificate, the SEM server uses the root certificate to verify that it is the AD server and no other entity on the other side. Following verification, communications are SSL-encoded.
Sync Interval (hours)	The synchronization frequency. Range = 1-48, i.e., every hour (most frequent) to once every two days (most infrequent). A sync retrieves all new users and updates existing users.
Full Sync Time (minutes)	The time (hour and minute) at which a full synchronization starts. Range = 1-7, i.e., once a day (most frequent) to once a week (most infrequent). A full sync retrieves all users and deletes expired users.
Full Sync Interval (days)	The synchronization frequency. Range = 1-48, i.e., every hour (most frequent) to once every two days (most infrequent). A full sync retrieves all users and deletes expired users.
Next Sync Time	The time and the day in the month on which the next synchronization will occur.
Next Full Sync Time	The time and day in the month on which the next full synchronization will occur. A full sync retrieves all users and deletes expired users.
Last Successful Sync Time	The time and the day in the month on which the last synchronization occurred. A sync retrieves all new users and updates existing users.
Last Successful Full Sync Time	The time and day in the month on which the last full synchronization occurred. A full sync retrieves all users and deletes expired users.

9.6.2 Synchronizing AD Database with SEM Database

You can *manually* synchronize the SEM database with the Active Directory database *at any point in time*.

➢ **To manually synchronize the SEM database with the Active Directory database:**

- In the AD Users page, click the **Sync** button.
- Alternatively you can *schedule* synchronization. See the next section for more information.

9.6.3 Adding an AD Server

In the Users page you can add an AD server.

➢ **To add an AD server:**

1. In the Users page, click the **Active Directories** icon ; the Active Directory Settings page opens.

Figure 9-9: Users – Add AD Server

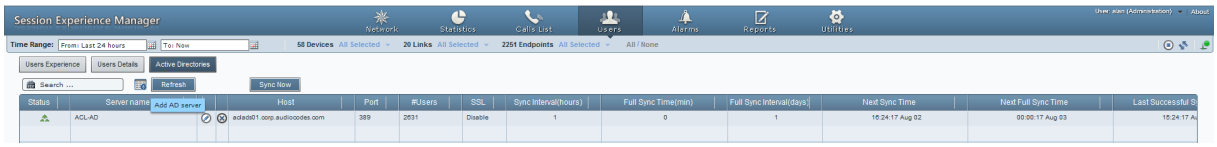
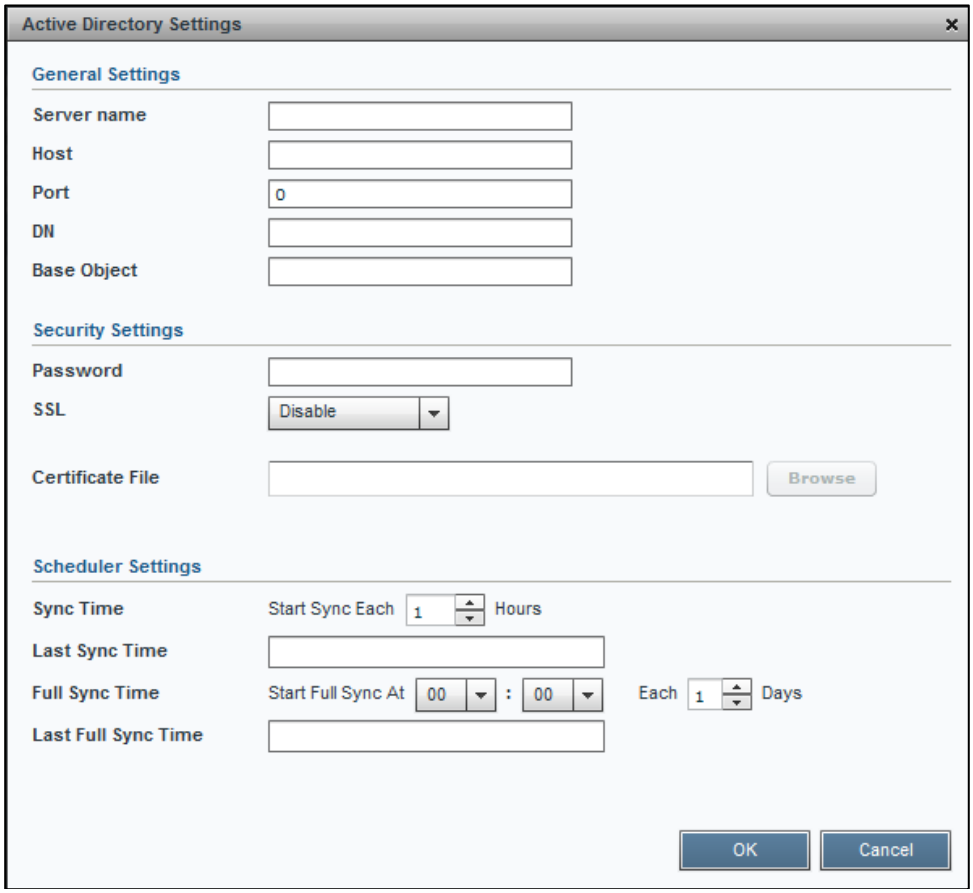


Figure 9-10: Users – Active Directory Settings



2. In the 'Server name' field under General Settings, enter a name for the server. Choose a name that is intuitive, friendly, and easy to remember.
3. For the 'Host' field, consult with the IT manager responsible for the Active Directory in your enterprise.
4. For the 'Port' field, the default is typically 389, but consult with the IT manager responsible for the Active Directory in your enterprise.
5. For the 'DN' (Domain Name) field, consult with the IT manager responsible for the Active Directory in your enterprise.
6. In the 'Base Object' field, consult with the IT manager responsible for the Active Directory in your enterprise.
7. Under Security Settings, configure 'Password'. Consult with the IT manager responsible for the Active Directory in your enterprise.

8. If you set SSL to **Enable**, add a 'Certificate File'.
9. Under Scheduler Settings you can schedule synchronization of the SEM and the Active Directory databases. Use the table below as reference.

Table 9-2: Scheduler Settings

Parameter	Description
Sync Time	Sets the synchronization frequency. Select from the range of 1-48, i.e., every hour (most frequent) to once every two days (most infrequent).
Last Sync Time	Displays the last time the SEM and the Active Directory databases were synchronized.
Full Sync Time	Sets the time (hour and minute) at which to start a full synchronization. Also sets the frequency. You can select from a range of 1-7, i.e., once a day (most frequent) to once a week (most infrequent).
Last Full Sync Time	Displays the last time the SEM and the Active Directory databases were fully synchronized.

Alternatively, you can manually synchronize the databases whenever you require by clicking the **Sync** button in the Users page.

Sync - Retrieves all new users and updates existing users
Full Sync - Retrieves all users and deletes expired users

Note: Except for 'Server name', all parameters are AD connection parameters, required in order to establish a connection with the AD server.

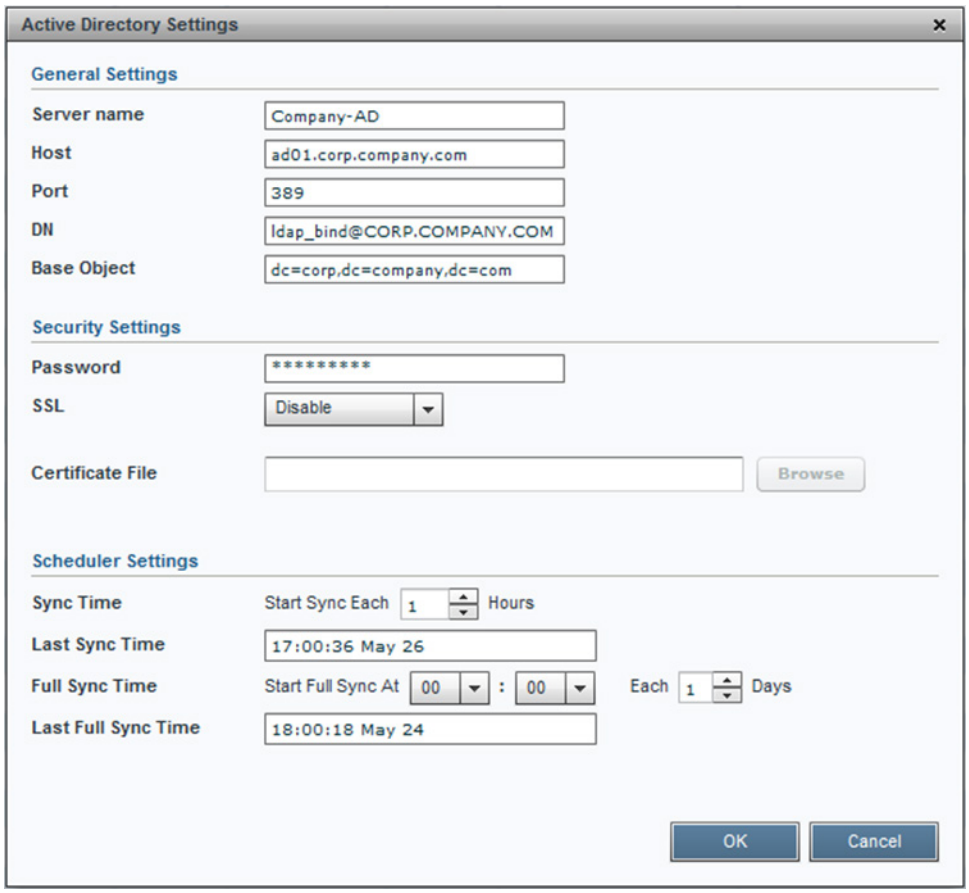
9.6.4 Updating an AD Server

In the AD Users page you can update an Active Directory (AD) server using LDAP (Lightweight Directory Access Protocol) to query and modify items in the AD. The AD is a directory services database. LDAP is the protocol used to communicate with it.

➢ **To update an AD server:**

1. In the row of the AD server whose settings you want to update, click the **Update Server Options** icon ; the Active Directory Settings dialog opens.

Figure 9-11: Users – Active Directory Settings



Note: Except for 'Server name', all parameters are AD connection parameters, required in order to establish a connection with the AD server.

2. In the 'Server name' field under General Settings, enter a name for the server. Choose a name that is intuitive, friendly, and easy to remember.
3. For the 'Host' field, consult with the IT manager responsible for the Active Directory in your enterprise.
4. For the 'Port' field, the default is typically 389, as shown in the figure above, but consult with the IT manager responsible for the Active Directory in your enterprise.
5. For the 'DN' (Domain Name) field, consult with the IT manager responsible for the Active Directory in your enterprise.
6. In the 'Base Object' field, consult with the IT manager responsible for the Active Directory in your enterprise.

7. Under Security Settings, configure 'Password'. Consult with the IT manager responsible for the Active Directory in your enterprise.
8. If you set the 'SSL' parameter to **Enable**, add a 'Certificate File'. See 'SSL' configuration from the dropdown in Step 12 under Section 1.5.3.
9. Under Scheduler Settings you can schedule synchronization of the SEM and the Active Directory databases. Use the table below as reference.

Table 9-3: Scheduler Settings

Parameter	Description
Sync Time	Sets the synchronization frequency. Select from the range of 1-48, i.e., every hour (most frequent) to once every two days (most infrequent).
Last Sync Time	Displays the last time the SEM and the Active Directory databases were synchronized.
Full Sync Time	Sets the time (hour and minute) at which to start a full synchronization. Also sets the frequency. You can select from a range of 1-7, i.e., once a day (most frequent) to once a week (most infrequent).
Last Full Sync Time	Displays the last time the SEM and the Active Directory databases were fully synchronized.

Alternatively, you can manually synchronize the databases whenever you require by clicking the **Sync** button in the AD Users page.

Sync - Retrieves all new users and updates existing users
Full Sync - Retrieves all users and deletes expired users

9.6.5 Deleting AD Server Properties

You can delete AD server properties.

➢ **To delete AD server properties:**

1. Click the **Delete Server** icon ⊗; the "Delete Server Properties – Are you sure?" prompt pops up.
2. Select **Yes**.

10 Displaying Alarms

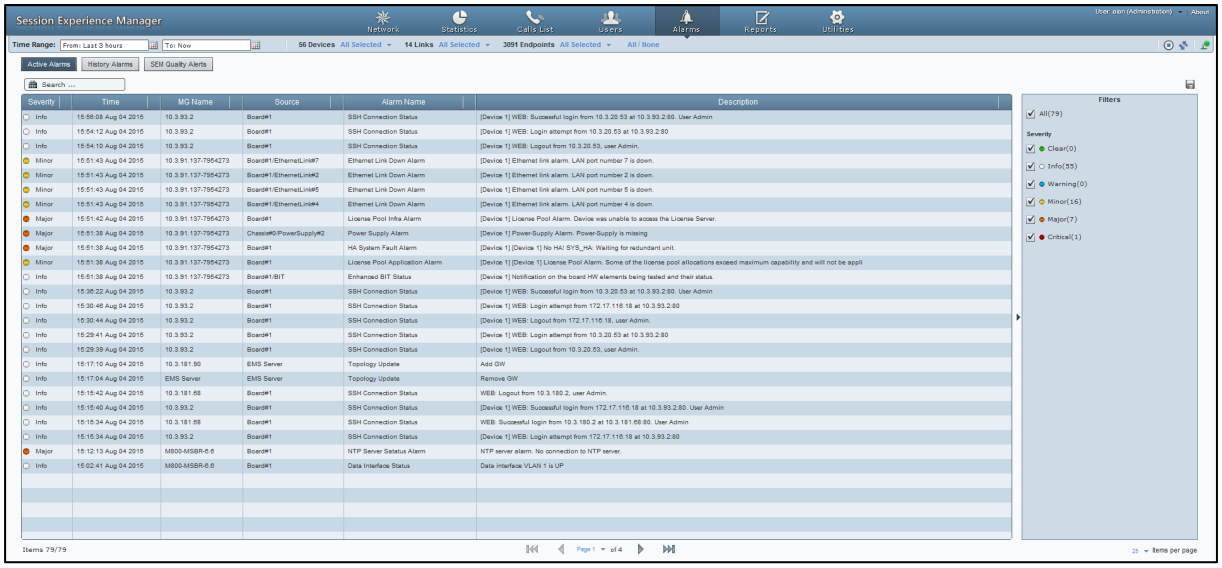
The Alarms page shows both SEM-related quality alerts and regular AudioCodes device alarms, e.g., bad fan tray.

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 10-1: Alarms Page - Active Alarms



10.1 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 3.4.1 on page 40.

10.1.1 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 10-2: Alarms Page - Active Alarms – Search Filter

10.1.2 Sorting Listed Alarms

Alarms can be sorted in the same manner as calls in the Calls List (see Section 8.1.2 on page 77). 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 10-1: 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

10.1.3 Filtering Using a Severity Filter

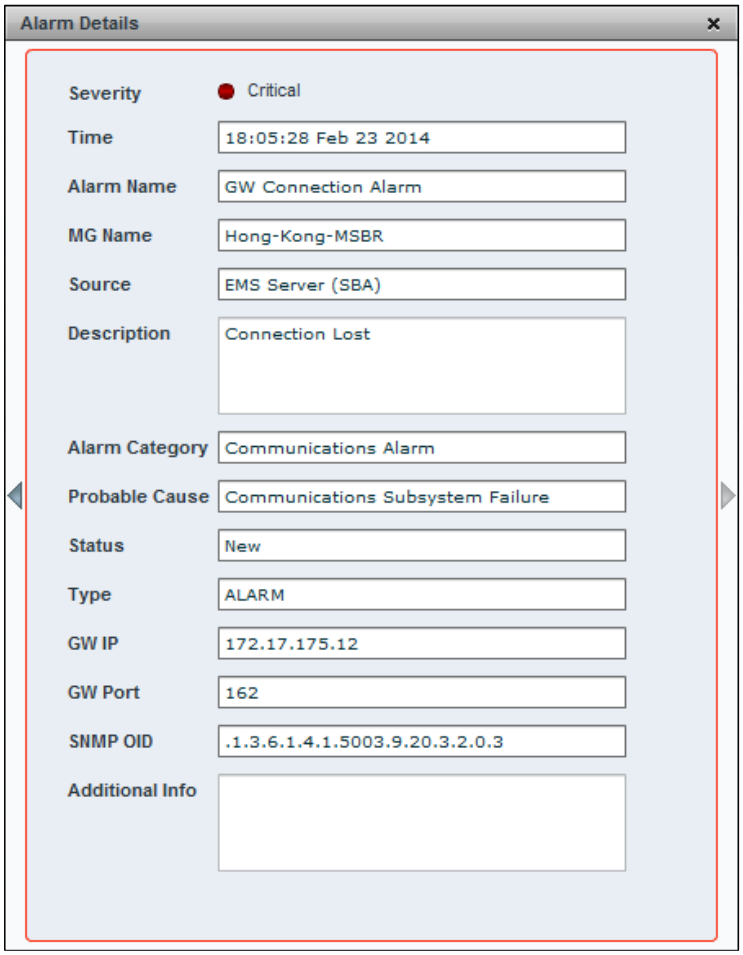
The page can be filtered according to a severity level, where only required alarms are displayed. The figure below shows alarms filtered according to the 'Severity' filter (Critical). By contrast, the *sorting* feature displays all alarms; however, with the required alarm/s are listed highest.

Figure 10-3: Severity Filters - Critical

10.1.4 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 10-4: Alarm Details



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

Table 10-2: Alarm Details – Parameters

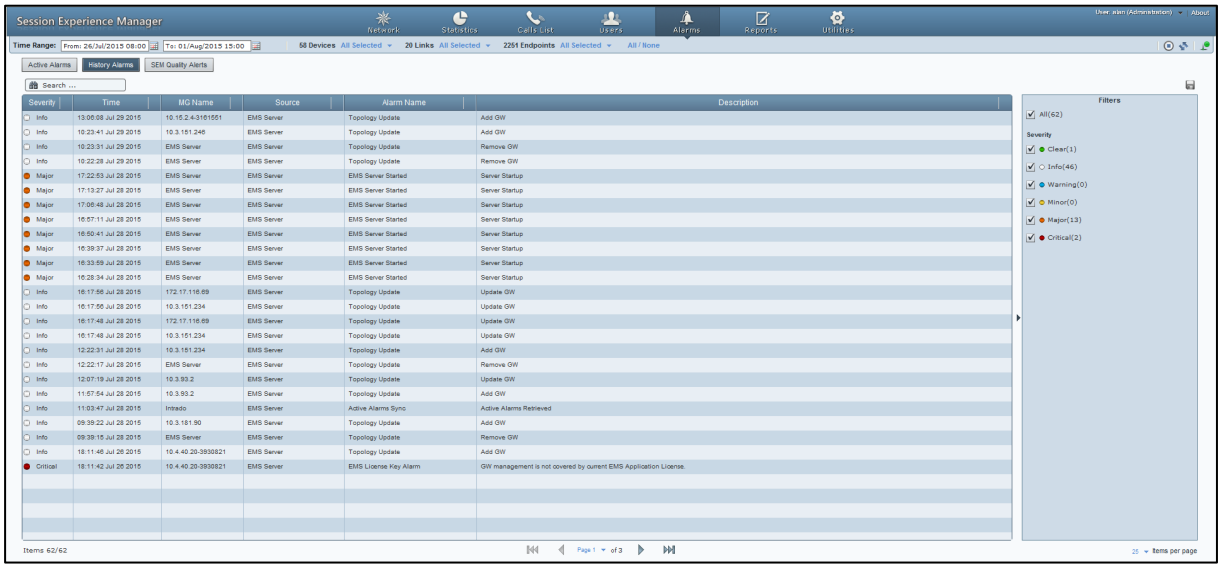
Parameter	Description
Alarm Category	The category in which the alarm is classified, according to ITU X.733. Five categories are specified: Communications: the procedures and/or processes required to convey information from one point to another. Quality of service: Degradation in the QoS. Processing error: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

10.2 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 page. The page shows retroactive diagnostic data informative when taking proactive steps to prevent future repetitions and improve future VoIP network functionality.

Figure 10-5: Historical Alarms



- The ‘Search’ field operates identically to its counterpart in the Active Alarms page (see under Section 10.1.1 on page 115).
- Order alarms precisely as you order alarms in the Active Alarms page (see under Section 10.1.2 on page 116).
- Filter alarms using the 'Severity' filter precisely as alarms in the Active Alarms page are filtered with its counterpart filter (see under Section 10.1.3 on page 116).

10.3 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.

10.3.1 Adding a New Alert Rule

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

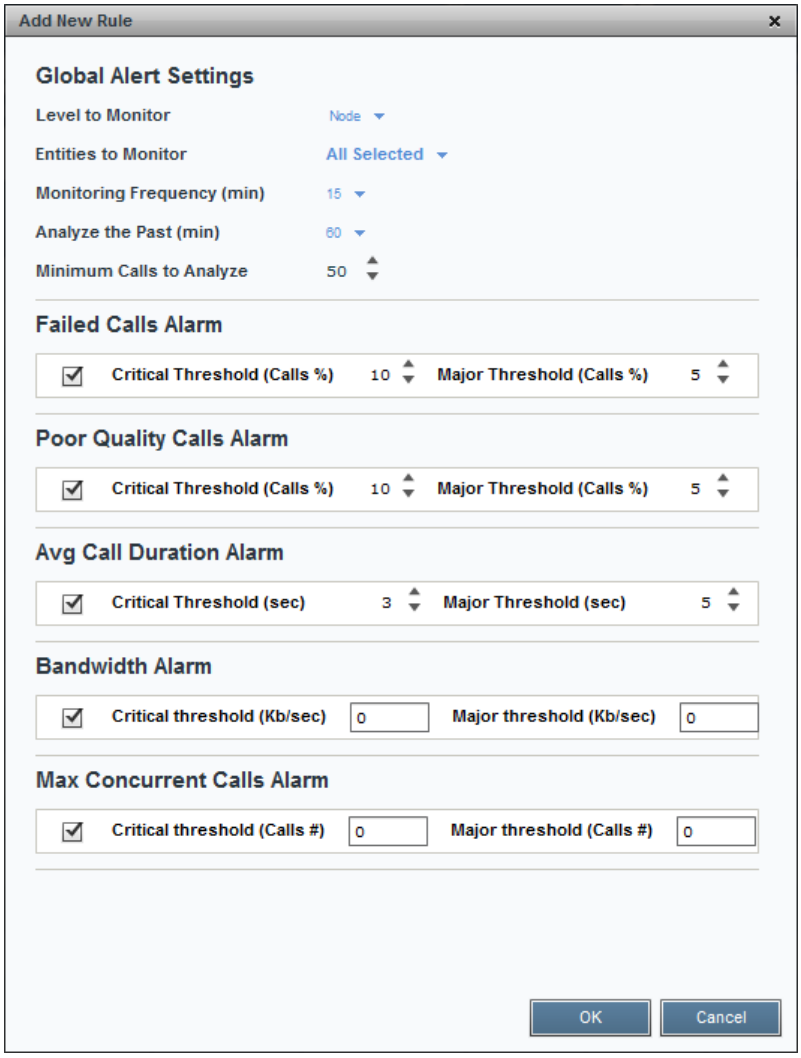
➢ **To add a rule:**

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

Figure 10-6: SEM Quality Alerts

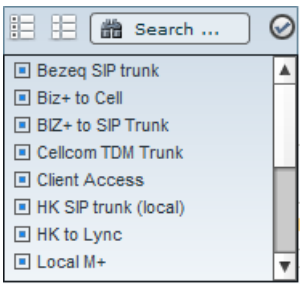
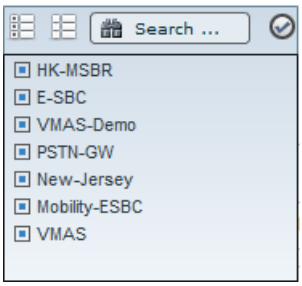
2. Click the **Add Alert** icon ; rule the Add New Alert Rule popup opens:

Figure 10-7: Add New Alert Rule



3. Define the following settings:

Table 10-3: 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 (min)	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 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 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

Setting	Definition
	average duration of calls is below this, the alert is triggered.
Bandwidth Alarm	Major Threshold: if the bandwidth falls below or exceeds the value you configure (minimum of **0** Kbps and a maximum of **1000000** Kbps), an alarm of Major severity is triggered. Critical Threshold: if the bandwidth falls below or exceeds the value you configure (minimum of **0** Kbps and a maximum of **1000000** Kbps), an alarm of Critical severity is triggered. • You must configure a *higher* value for the *Critical* Threshold than for the Major Threshold. • You can configure a minimum of **0** Kbps and a maximum of **1000000** Kbps for either the Critical or the Major Threshold, so long as the value you configure for the *Critical* Threshold is higher than the value you configure for the Major Threshold.
Max Concurrent Calls Alarm	Major Threshold: if the the number of concurrent calls falls below, or exceeds, the value you configure (minimum of **0** and a maximum of **100000**), an alarm of Major severity is triggered. Critical Threshold: if the number of concurrent calls falls below, or exceeds, the value you configure (minimum of **0** and a maximum of **100000**), an alarm of Critical severity is triggered. • You must configure a *higher* value for the *Critical* Threshold than for the Major Threshold. • You can configure a minimum of **0** and a maximum of **1000000** for either the Critical or the Major Threshold, so long as the value you configure for the *Critical* Threshold is higher than the value you configure for the Major Threshold.

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

10.3.2 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 10-6), click to manually activate the rule.
2. Click to manually deactivate the rule. The rule will continue to be automatically triggered.

10.3.3 Editing an Alert Rule

You can edit an alert rule.

➢ **To edit an alert rule:**

1. In the SEM Quality Alerts page (see Figure 10-6), click **Update Rule**; the **Add New Alert Rule** dialog opens (see Figure 10-7).
2. Edit the settings. Use Table 10-3 as reference.

10.3.4 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

10.4 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.

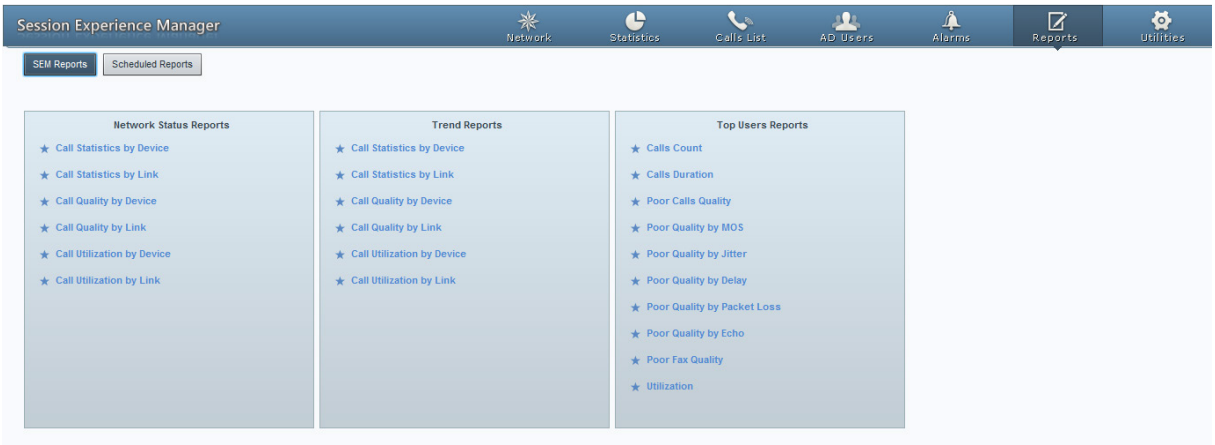
Open and read in any text editor, these files can be sent by the administrator by, for example, email or sms, to others to distribute the information. For more information on forwarding alarms, see *EMS User's Manual*.

Note: Two rules cannot be assigned to the same device/link even if the two refer to two different parameters.

11 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 responsible 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 11-1: 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 11-1 shows the categories and the reports options in each.

Table 11-1: Reports Categories

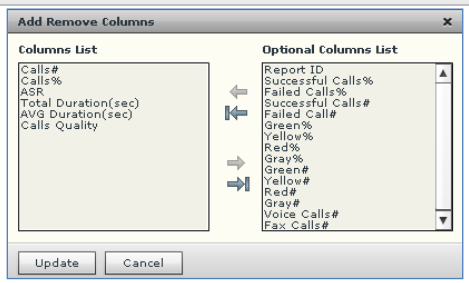
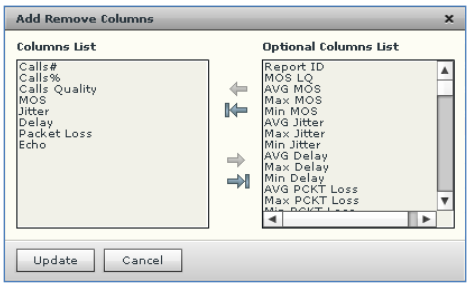
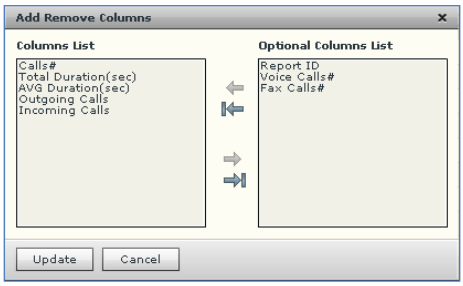
Report Category	Explanation
Network Status Reports ▪ Call Statistics by Device ▪ Call Statistics by Link ▪ Call Quality by Device ▪ Call Quality by Link ▪ Call Utilization by Device ▪ Call Utilization by Link	Displays a summary of key call metrics during a specified time period with a separate row entry 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', 'Success/Fail' 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.

11.1 Using Reports Features

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

Table 11-2: 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 **Scheduled Reports** button to schedule a report. All columns that feature in the report type's page feature in the report.
Create Report	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 %, Success/Fail, 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 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:

Feature	Description
	 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 ☐on page 134 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 Success/Fail 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 • Success/Fail column's bottom line shows the average success rate of the average success rates of all devices / links. '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.

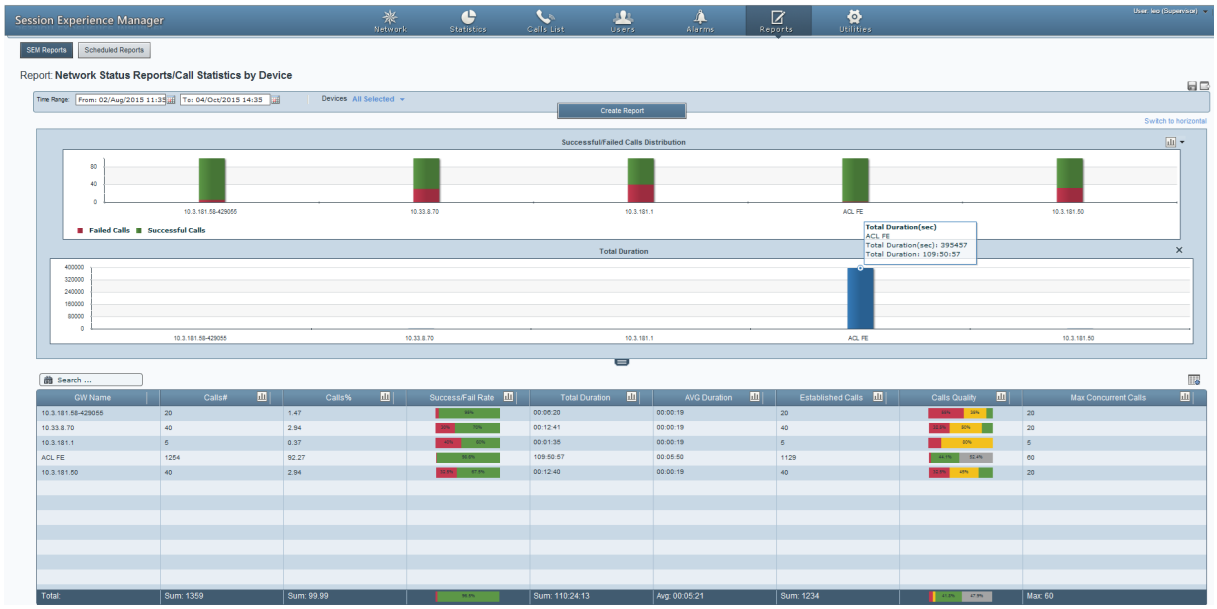
11.1.1 Producing a Network Status Report

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 11-2).

➢ **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 **Create Report** page opens.
2. Filter for 'Time Range' and 'Devices' (see Section 5.1).
3. Click the **Create Report** button; the report is produced and displayed in the SEM GUI:

Figure 11-2: Network Status Reports – Call Statistics by Device

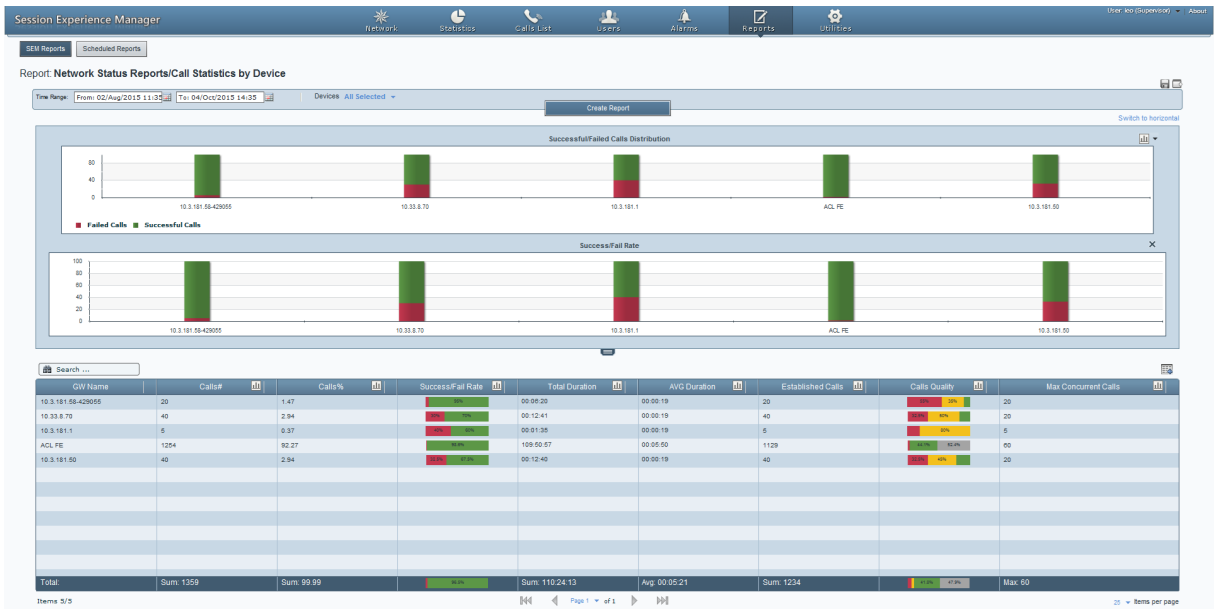


Following report generation, the Success/Fail Rate metric column is the only one displayed in charts view.

➢ **To display a metric as a chart:**

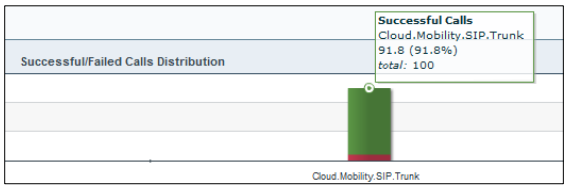
- In the table, click in the metric's column header. For example, click in the **Success/Fail Rate** column header; the Success/Fail Rate chart is displayed:

Figure 11-3: Displaying the Success/Fail Rate Chart

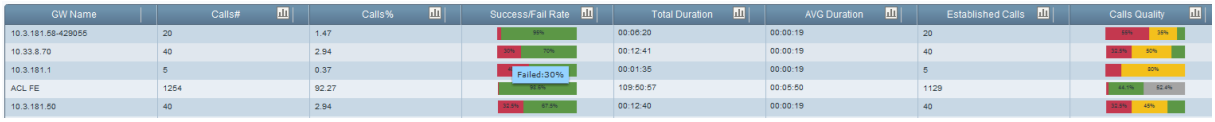


In a Network Status Report you can:

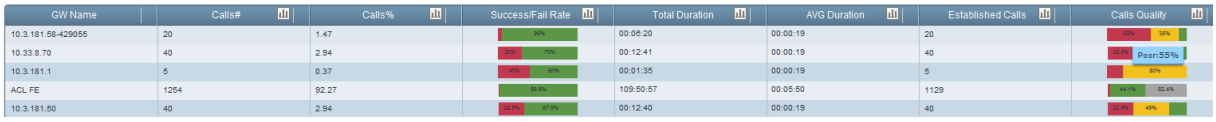
- Click the **Switch to horizontal** link (see Table 11-2) to switch from vertical view (default) to horizontal view.
- Click to expand the charts pane. Click it again to contract it.
- Click to switch from bar charts (default) to linear charts. Select from the drop-down (see 'Charts view / Table view' in Table 11-2).
- Click to add/remove a column to/from the table (see 'Add / Remove Columns' in Table 11-2).
- 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 11-3: Table Columns in Network Status Reports

Network Status Report Type	Default Columns	Optional Columns
Call Statistics by Device/Link	Calls #, Calls %, Success/Fail Rate, 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 11-2).
- You can generate another report. Click the **SEM Reports** button.
- You can schedule a report. Click the **Scheduled Reports** button (for details see Section 11.2).

11.1.2 Producing Trend Reports

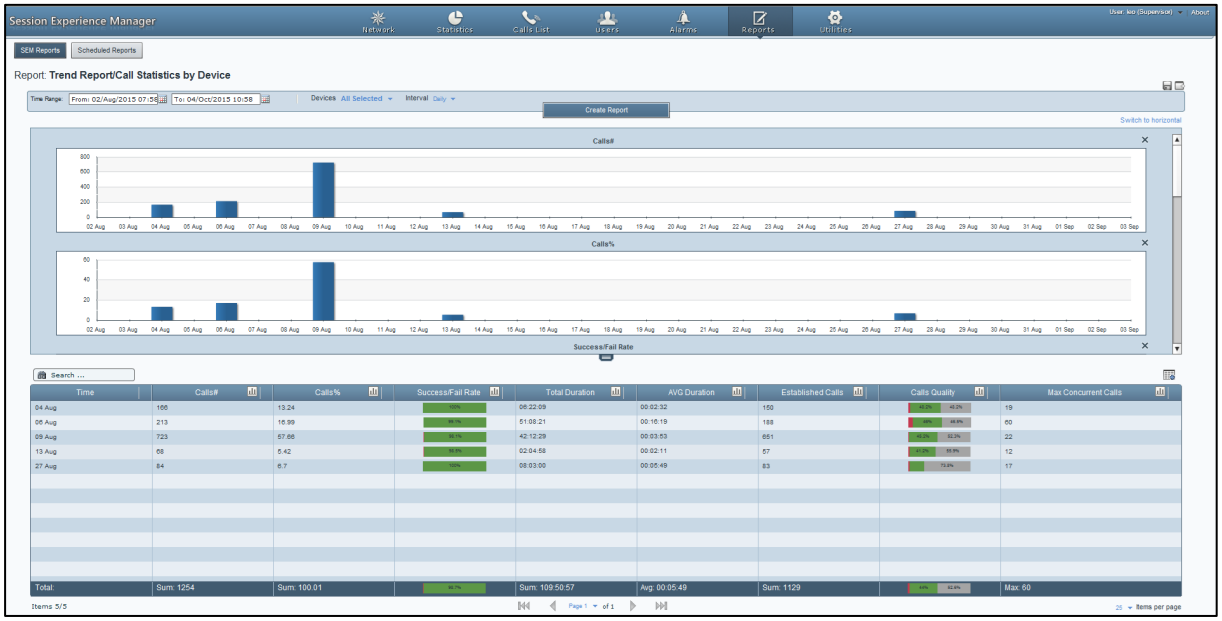
Trend reports show *general tendencies over intervals* of calls performance, quality, #s, %s, total duration and average duration (default metrics measured).

Reports in this category are identical in terms of metrics columns displayed. Columns can optionally be added / removed (see 'Add / Remove Columns' in Table 11-2).

➢ **To produce a trend report:**

1. Click one of the 'Trend Reports', e.g., the first; the **Create Report** page opens
2. Filter for 'Time Range' and 'Devices' (described under Section 3.4.1 on page 40). For the 'Interval' filter select Hourly, Daily, Weekly or Monthly.
3. Click the **Create Report** button; the report opens:

Figure 11-4: 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 11-2).
- Click to switch from bar (default) to linear charts. Select from the drop-down (see 'Charts view / Table view' in Table 11-2).
- Click in a column header in the table to display that column as a chart (see 'Show Column Graphical Representation' in Table 11-2)
- Click to add a column to table view or remove a column from table view (see 'Add / Remove Columns' in Table 11-2). 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 8-2)
- Re-filter and re-run the report (see 'Filters' in Table 11-2)

- Export the report to PDF. Click (see 'Export…' in Table 11-2)
- Save the report as a CSV file. Click (see 'Save…' in Table 11-2)
- Choose to produce another report by clicking the **SEM Reports** button.

11.1.3 Producing Top Users Reports

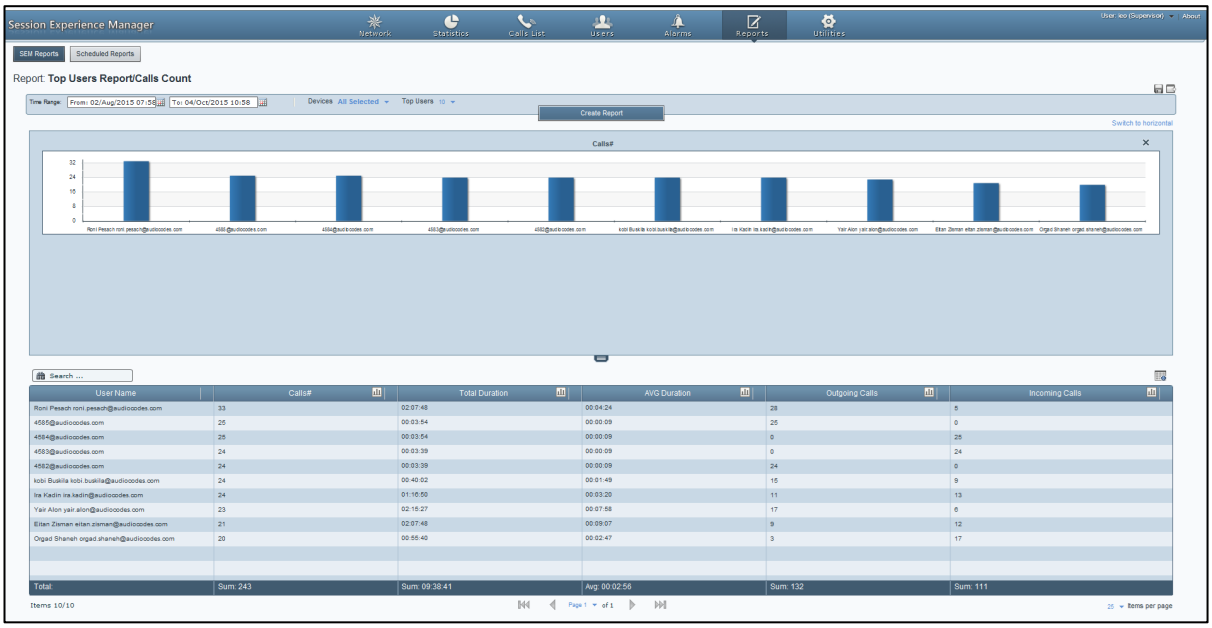
Top Users reports display the *top 10, 20 or 30 users* in terms of # of calls made, total duration, average duration, outgoing calls and incoming calls (default metrics measured).

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 11-2).

➢ **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 **Create Report** page opens.
2. Filter for 'Time Range' and 'Devices' (described under Section 5). For the 'Top Users' filter, select 10, 20 or 30.
3. Click the **Create Report** button; the report opens:

Figure 11-5: Top Users Report – Calls Count



In a Top Users Report you can:

- Save the report as a CSV file. Click (see 'Save…' in Table 11-2)
- Export the report to PDF. Click (see 'Export…' in Table 11-2)
- Click the **Switch to horizontal** link to switch from vertically viewed charts (default) to horizontally viewed charts (see Table 11-2)
- Click in a column header in the table to display that column as a chart (see 'Show Column Graphical Representation' in Table 11-2)

- Click to add a column to table view or remove a column from table view (see 'Add / Remove Columns' in Table 11-2).

  Default and optional table columns in Top Users reports are:

Table 11-4: Table Columns in Top Users Reports

Top Users Report Type	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 8 on page 71)
- Re-filter and re-run the report (see 'Filters' in Table 11-2)
- Choose to produce another report by clicking the **SEM Reports** button.

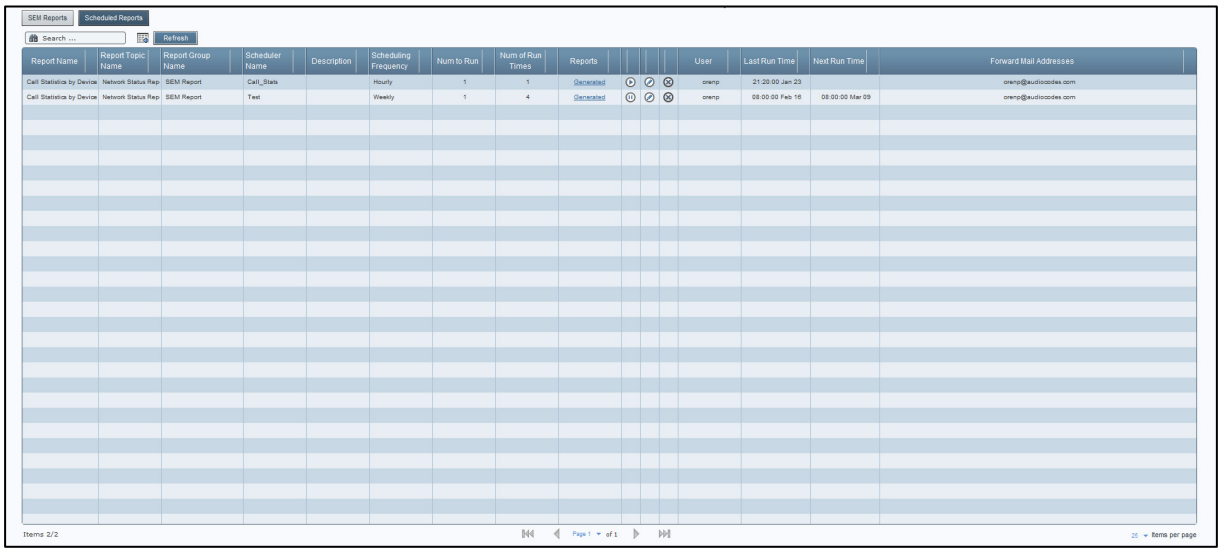
11.2 Scheduling a Report

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

➢ **To schedule a report:**

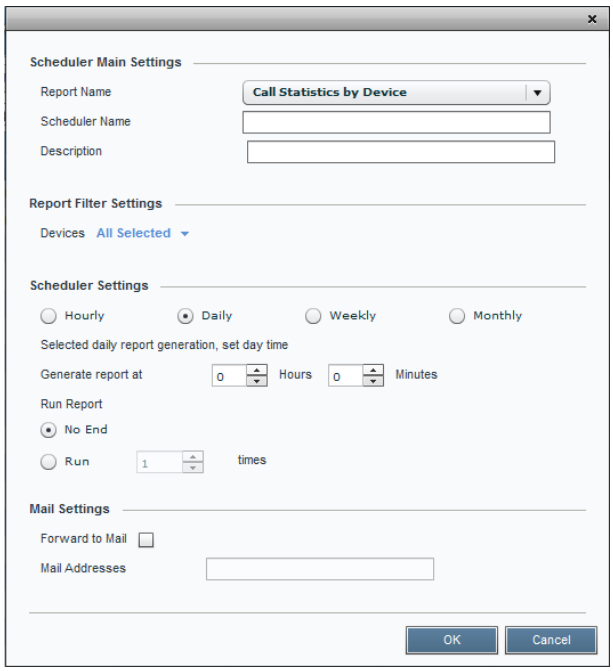
1. Click the **Reports** icon; the SEM Reports page opens (see Figure 11-1)
2. Click the **Scheduled Reports** button; this page opens:

Figure 11-6: Scheduled Reports



3. Click to add a schedule; the Scheduler opens:

Figure 11-7: 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 5.2.
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.

11.2.1 Viewing a Scheduler Generated Report

You can view a report generated by the scheduler.

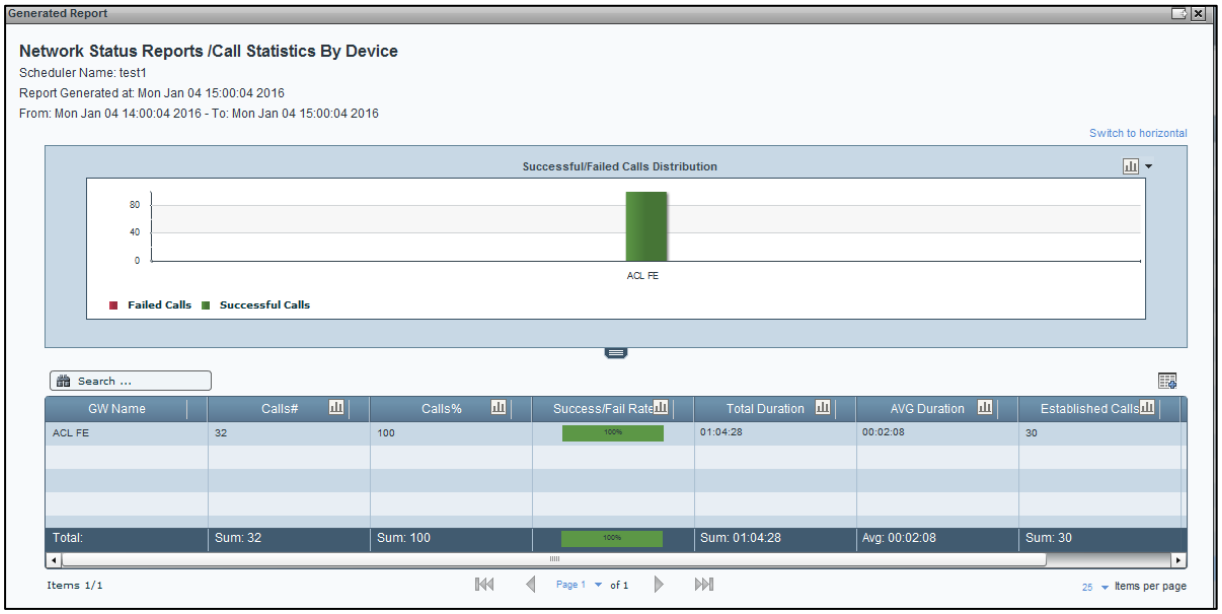
➢ **To view a report generated by the scheduler:**

1. In the Scheduled Reports page under the Reports column (see Figure 11-6), 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 11-8: Report Generated by Scheduler

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

Figure 11-9: Viewing a Scheduler Generated Report



11.2.1.1 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 11-8), click **Save Report File**.
2. Select the location on your pc in which to save the file and click **Save**.

11.2.1.2 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 11-8), click **Delete File**; you're prompted 'Delete Generated Report File?'
2. Click **Yes**; the file is deleted.

11.2.2 Editing a Schedule

You can edit a report schedule.

➢ **To edit a schedule:**

1. In the Scheduled Reports page (see Figure 11-6), click **Update Scheduler**; the Scheduler opens (see Figure 11-7).
2. Edit the reports schedule. See under Section 11.2 for detailed information.

11.2.3 Deleting a Schedule

You can delete a report schedule.

➢ **To delete a schedule:**

1. In the Scheduled Reports page (see Figure 11-6), click **Delete Scheduler**; you're prompted 'Are you sure?'.
2. Click **Yes**; the report schedule is deleted.

11.2.4 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 11-6), 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.

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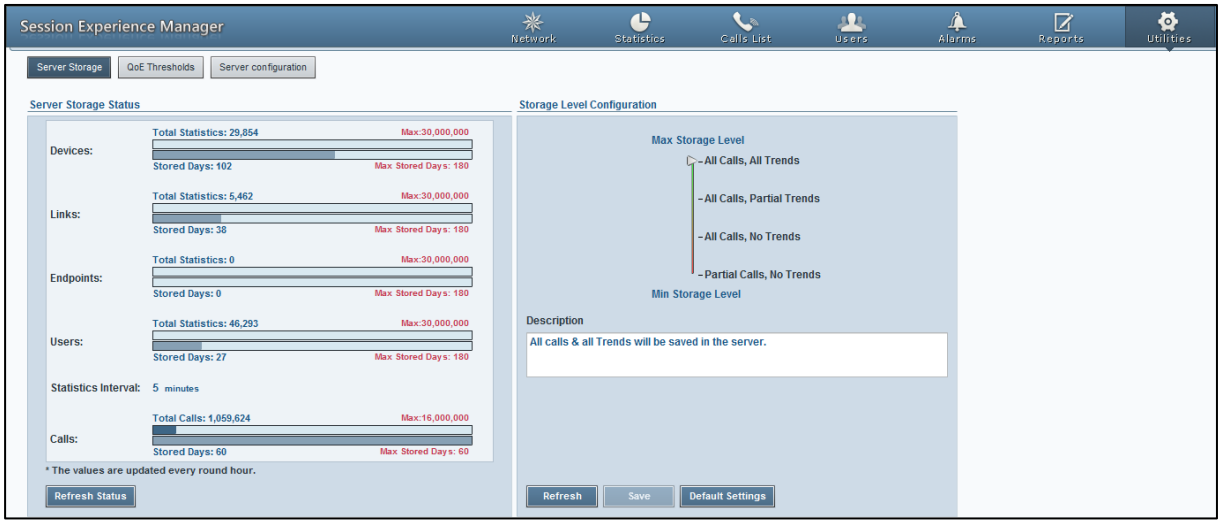
12 Managing Server Storage

The Utilities page shown in the figure below lets you monitor and manage the SEM server's storage status.

Figure 12-1: Utilities – Server Storage Status



12.1 Monitoring Server Storage Statuses

Under the **Server Storage** tab shown in the figure above, you can view and monitor the storage status of

- device-related information
- links-related information
- endpoints-related information
- users-related information
- calls-related information

This information represents statistics calculations associated with devices, links, endpoints, users and calls displayed in the SEM pages.

Each gauge indicates how much of the maximum information storage capacity you have used for that network dimension, and how much remains.

Max indicates the maximum information storage level allowed per network dimension. Information is deleted from storage when this limit is exceeded.

Max Stored Days indicates the maximum number of storage days allowed per network dimension. When exceeded, the oldest call statistics data are purged from the database to free space.

12.2 Configuring Storage Level

In the Utilities page, under Storage Level Configuration section (see the figure above), you can configure the storage level in order to optimize storage capability.

You can select:

- **All Calls, All Trends (maximum storage level)** = all calls and all trends will be saved in the server
- **All Calls, Partial Trends** = all calls but no trends for good quality calls will be saved in the server
- **All Calls, No Trends**
- **Partial Calls, No Trends (minimum storage level)** = only failed, poor and fair quality calls and no trends will be saved in the server.

Note:

- Trends are only relevant to calls made over AudioCodes VoIP networking devices (Media Gateway / SBC / MSBR). Trends use more storage relative to other call statistics.
- After selecting a level, the icon is displayed. Click the **Apply** button to set the level.
- If you're operating with hardware that supports more than 50 CAPS (Call Attempts Per Second), set the storage level to **All Calls, No Trends**
- If you're operating with hardware that supports more than 100 CAPS, set the storage level to **Partial Calls, No Trends**.

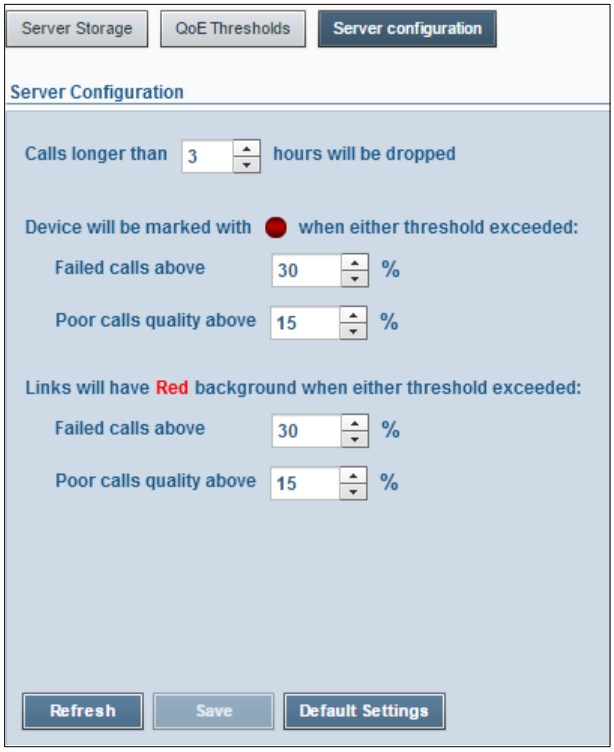
12.3 Applying QoE Thresholds

Under the **QoE Thresholds** tab you can apply thresholds. For information on applying QoE Thresholds, see Section 1.7.

12.4 Configuring the Server

In the Utilities page, under the **Server Configuration** tab shown in the figure below, you can configure server thresholds.

Figure 12-2: Utilities – Configuring Server Thresholds



You can configure:

- **Call duration threshold**; calls longer than this threshold will not be factored into SEM statistical calculations.

Devices thresholds

- **Failed calls % threshold**; if this % is exceeded during operation, the related device will be color-coded red.
- **Poor quality calls % threshold**; if this threshold is exceeded during operation, the related device will be color-coded red.

Links thresholds

- **Failed calls % threshold**; if this % is exceeded during operation, the related link will be color-coded red.
- **Poor quality calls % threshold**; if this threshold is exceeded during operation, the related link will be color-coded red.

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