The cover features a blue background with a grid pattern. On the left, there is a large, faint gear icon. At the bottom, there is a stylized bar chart with vertical bars of varying heights, transitioning from light blue to a darker teal. The text is centered in the middle of the page.

RingCentral®  
QoS Reports  
User Guide

---

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## Quality of Service Report

The Quality of Service Reports function provides near real time information on the global health of the enterprise phone system and allows for proactive monitoring of potential call quality issues. It is found under the Admin tab of the RingCentral [service.ringcentral.com](https://service.ringcentral.com) for all users with reporting permissions. You can use QoS Reports for a targeted investigation to determine the root cause of problematic calls. You can also use these reports for the following purposes:

- Proactive Monitoring
  - Identify potential issues based on patterns of degradation in call quality
  - Correct quality issues before they become disruptive to the organisation
- Reactive Investigation
  - Handle individual user escalations
  - Find problematic calls and identify their root cause

Here are questions that can be answered by RingCentral Quality of Service Reports:

- What is the overall health of my phone service?
- Where are most of my call quality problems occurring across my various site locations?
- Is there a location that needs to be investigated?
- Is there a sub-set of users that experience unusual call quality degradations (hard phone users, mobile, desktop, specific ISP or codec users)?
- How does call quality change over the course of a day?
- Is the quality affected by the overall volume of calls?

Three pages under the Quality of Service menu help you to answer these questions. They are explained as follows: the [Overview Page on page 5](#), the [Extension Page on page 12](#) and the [Calls Page on page 15](#).

To understand how the QoS reporting tool works, first read the following sections: [Call Scoring and Data Gathering on page 3](#) and [Mean Opinion Score on page 3](#).

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## Call Scoring and Data Gathering

RingCentral's global data collection architecture provides visibility into the delivered VoIP service and empowers businesses with tools to monitor the health of their system.

Quality of Service data is collected at multiple points during a call and combined to score call quality.

Every active call has several connections between participants of the call and the RingCentral Cloud backend. The connection between each participant (RingCentral user) and the RingCentral backend is referred to as a "call leg." Each leg has two data streams: 1) from the endpoint to the RingCentral Session Border Controller (SBC) and 2) from the RingCentral SBC to the endpoint. The transport between the RingCentral endpoint and the RingCentral SBC is provided by the client's ISP (Internet Service Provider) and relies heavily on the ISP network quality.

RingCentral measures the VoIP characteristics for each leg:

- For the up-stream leg, the quality is measured by a RingCentral SBC.
- For the down-stream leg, the quality is measured by the endpoint device.

RingCentral supports and provisions multiple endpoint types: hard phones (Polycom and Cisco devices), desktop (soft client), mobile (application for Android and iPhone), RingCentral App (web based client). Each type of endpoint has proprietary algorithms to calculate the QoS score using various MOS models. At the end of the call, RingCentral endpoints send their statistics via an RTCP-XR protocol to the RingCentral Global Data Collector (GDC) for call score evaluation.

## Mean Opinion Score

Mean Opinion Score (MOS) is a measure of Quality of Experience and it is used to assess the human user's opinion of call quality. RingCentral MOS scores are based on algorithmic estimates and rely on the various transport measures such as bandwidth, jitter, packet loss, latency and codecs. See the following Figure 1.

*Absolute Category Rating  
by Human Subjects*  
Note that digital lines have  
a maximum rating of 4.5

Rating	Label
5	Excellent
4	Good
3	Fair
2	Poor
1	Bad

*RingCentral Category Rating  
Correlation of Algorithmic  
Estimates*

Rating	Label
>= 3.50	Good
3.00 - 3.49	Moderate
<3.00	Poor

*Note: RingCentral may  
adjust the rating  
categories based on  
an actual customer  
experience. We may  
boost MOS scores  
for certain codecs, for  
example OPUS.*

Figure 1 Mean Opinion Score

RingCentral’s ability to collect the QoS data elements on the multiple data streams for each call leg permits correlation between human and algorithmic MOS scores.

## GeoIP Location

RingCentral uses industry leading IP intelligence services by MaxMind® to associate customers’ IP addresses with Geo Addresses. VPN IP addresses cannot be associated with the Geo Addresses and are displayed only as IP addresses that are identified by the internal network or system administrators.



Figure 2 Locations Filter

Note: Submit a Geo IP data correction request at the following address:  
<https://support.maxmind.com/geoip-data-correction-request/>

# Overview Page

Figure 3 shows the opening page of the reports. The **OVERVIEW** page facilitates monitoring the health of your company's phone system as well as displays any anomalies detected. Widgets display near real-time information about multiple attributes that can contribute to a change in call quality. Robust filtering options are available to focus your monitoring and investigations.

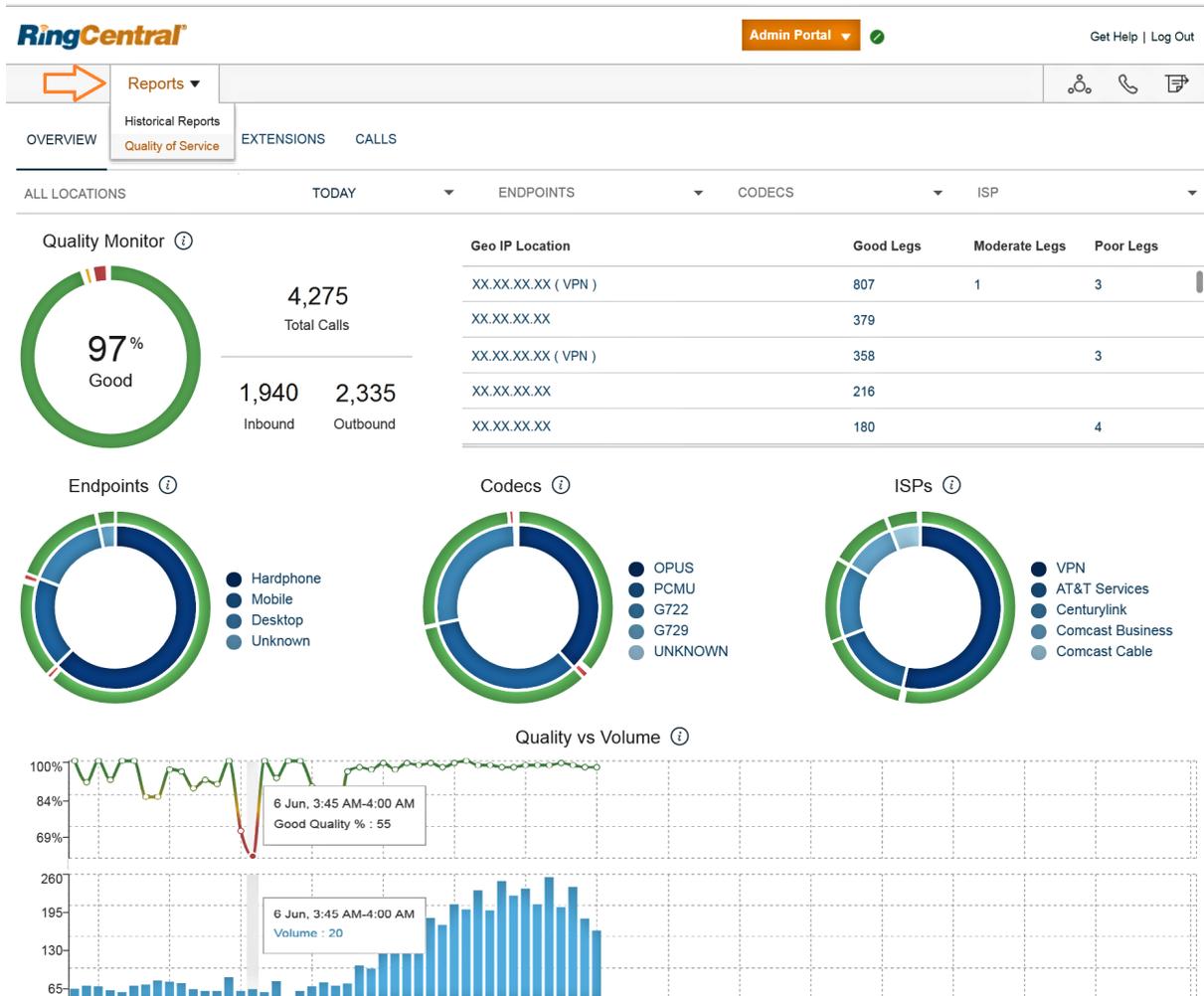


Figure 3 Admin Portal Access

## Filtering on the Overview Page

You can add filters in two ways: by using the filters at the top of the page, or by clicking on a widget's attribute in the centre of the page. See Figure 4.

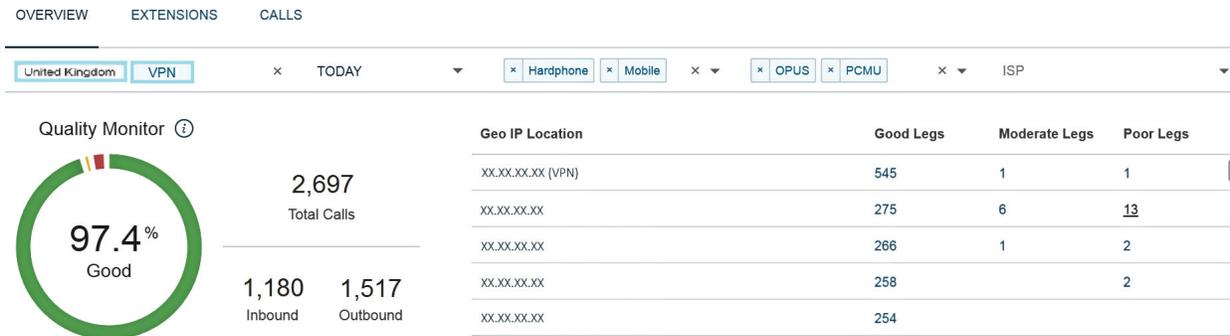


Figure 4 Filters on Overview Page

When you select a filter, your selection is added under its respective filter type at the top of the page and the information on the page is updated in line with the selected filters. Clicking on the 'x' in the corner of the filter removes the selected filters and updates the page accordingly.

Filters can be applied by clicking on one of the filters on the top of the page and by selecting the relevant values. Some filters, such as search or multi-level hierarchies, have expanded capabilities to more easily find the value in question.

The following filters are included on the top of the page with Today selected by default for each filter:

- **Location Filter** — filters based on the Geo IP location rendered by MaxMind; for example, particular sites in the United Kingdom. See Call Scoring and Data Gathering on page 3 for more information.
- **Date/Time Range Filter** — filters call data based on pre-defined time periods or on user defined range as needed. See Figure 5.

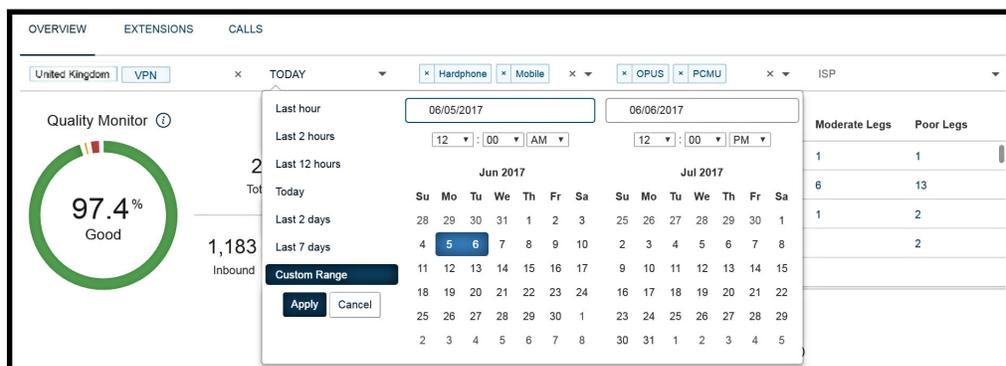


Figure 5 Date/Time Range filter

- **Endpoint Filter**—filter call data based on the type of endpoint connected in the RingCentral network, for example Hard phone or Mobile. See Figure 6.
- **Codec Filter**—filter call data based on the codecs used for calling in the RingCentral network, for example OPUS or PCMU.
- **ISP Filter**—filter calls by the ISPs used in the enterprise network.

Interactive widgets let you view QoS data for a category of calls and add filters to the Overview page. Using your mouse to hover over any segment of the double donut displays detailed information. Clicking on the inner ring adds a filter for that selection, while clicking on the outer ring navigates to the Calls page for a deeper analysis into the specific calls represented by the widget.

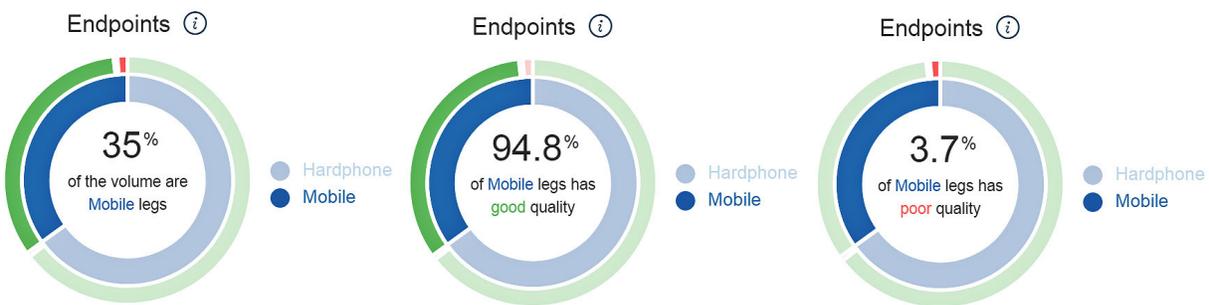


Figure 6 Hovering to see Mobile Call Quality Information

When you hover with a mouse pointer over the Mobile calls part of the inner ring of the donut, information is displayed as shown in Figure 6. Clicking on that portion adds a filter to select only Mobile devices. The second and third pictures represent hovering over the outer ring of the donut for Mobile devices (good and poor calls, respectively).

## Widgets in Detail

You can use several widgets to help you understand the status of your phone system. You can do this by using a quality monitoring widget, a quality by location widget, quality by endpoints widget, quality by codecs widget, or quality by volume widget.

### Quality Monitoring

The quality monitoring widget is an indicator of the overall call quality of an enterprise. Additionally, it includes a breakdown of calls showing the percentage of all inbound, outbound, and internal calls. See Figure 7. Call Volume can help detect unusual activities that may highlight future capacity problems. See Call Scoring and Data Gathering on page 3 for details.

The overall quality of a call is determined by the minimum quality of all call legs. For a call to be considered “Good” all legs of the call must be of “good quality.”

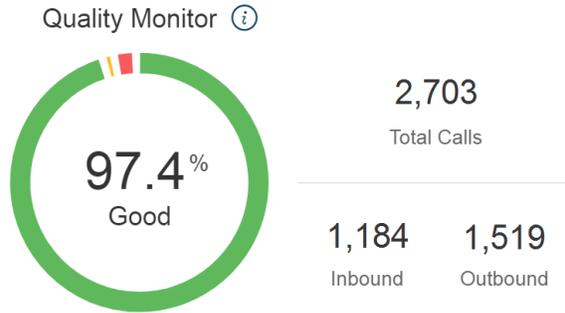


Figure 7 Quality Monitor

### Quality by Location

The Geo IP section of the Overview page compares quality call distribution between top business locations to quickly pinpoint issues. This widget provides near real time monitoring and analysis of Global Geo IP locations at the Country, Regional, or Local level including Good, Moderate and Poor Legs. See Figure 8.

Geo IP Location	Good Legs	Moderate Legs	Poor Legs
XX.XX.XX.XX (VPN)	545	1	1
XX.XX.XX.XX	275	6	13
XX.XX.XX.XX	270	1	2
XX.XX.XX.XX	258		2
XX.XX.XX.XX	254		

Figure 8 Quality by Location A

Clicking on a quality measurement value for a Geo IP location drills down to details of those calls on the Calls page. Clicking in the Geo location link filters for that location. Clicking on the Geo location is useful if one location is most problematic. The filter lets you check the health of that location.

By default, the list of Geo IP locations is sorted by the “call volume” across locations.

Each quality column supports sorting by clicking on the column header. In Figure 9, data is sorted by Poor Calls volume in descending order.

Geo IP Location	Good Legs	Moderate Legs	Poor Legs ↓
XX.XX.XX.XX	275	6	13
XX.XX.XX.XX	220		10
XX.XX.XX.XX	1		3
XX.XX.XX.XX	258		2
XX.XX.XX.XX	1	1	2

Figure 9 Quality by Location B

Quality by Location is based on the quality of the call leg that belongs to the selected location and not on the overall call.

**Note:** Internal VPN addresses cannot be resolved to Geo IP Addresses.

### Quality by Endpoints

The Quality by Endpoints filter analyses the user experience based on their device type. Problems specific to a device type may relate to Wi-Fi or a customer network.

This representation concurrently provides two related data statistics. The inner ring represents the breakdown of call volume by endpoints, while the outer ring shows their correlation to the quality of the calls for each type of endpoint.

**Note:** Quality by Endpoints is based on the quality of the call leg that belongs to the selected type of endpoint, and not on the overall call. RingCentral collects data on all legs of the call. See Figure 10.

For example, if a call made from a mobile device to a hard phone experiences a mobile service interruption, the overall call quality score is determined as poor. While the poor call quality can be attributed to the mobile endpoint, this does not mean that the call quality contributed by the hard phone user was also poor. See Call Scoring and Data Gathering on page 3.

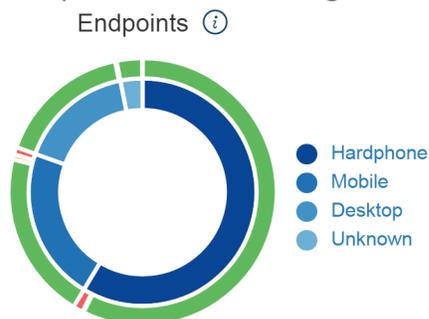


Figure 10 Quality by Endpoints

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## Quality by Codecs

The Quality by Codecs widget displays call quality analysed by codecs. It allows you to investigate how a certain codec performs with your network. See Figure 11

The donut representation concurrently provides two related data statistics. The inside ring represents the breakdown of call volume processed by each codec, while the outer ring shows their correlation to the quality of the calls for each codec.

**Note:** Quality by Codecs is based on the quality of the call leg that uses the selected codec, and not on the overall call.

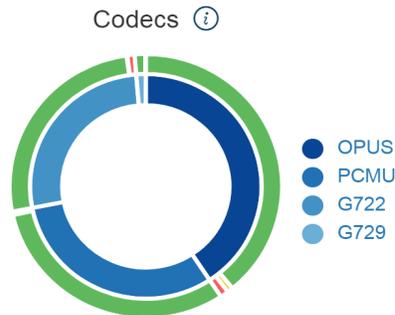


Figure 11 Quality by Codecs

## Quality by ISPs

The Quality by ISPs (Internet Service Provider) widget displays the call quality by ISPs. It relates a network issue to a certain ISP.

The representation concurrently provides two related data statistics. The inside ring represents the breakdown of call volume by ISP, while the outer ring shows their correlation to the quality of the calls for each ISP.

**Note:** Quality of the ISP's is the overall quality of calls handled by that ISP based on any other filters selected. See Figure 12.

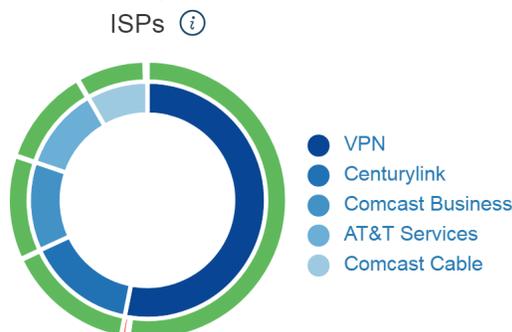


Figure 12 Quality by ISPs

### Quality vs, Volume

The Quality versus Volume chart displays the trending of the overall quality level of all calls as it relates to the overall call volume, over the selected date range as shown in Figure 13. When overall quality drops, the graph changes colors in accordance with its severity. This allows you to see if there is any correlation between the quality and the volume metrics. Placing your cursor over any point shows the quality level versus call volume at a time, while clicking on an area of the graph opens the Calls page, with records relating to the time selected.

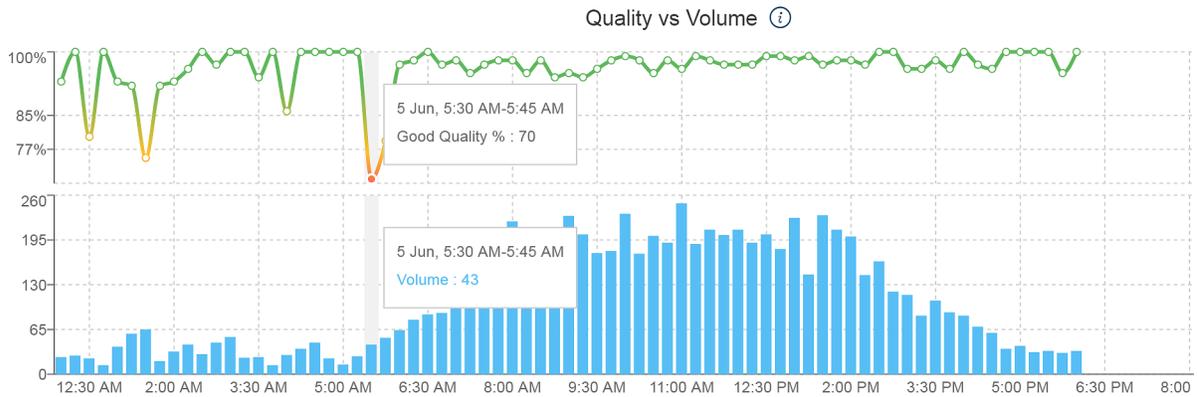


Figure 13 Quality by Volume

**Note:** If there are no calls coming in (volume is 0) then the quality metric connects the quality score before and after the "0". In other words, the line in the graph is shown as continuous even if there are no calls.

## Extension Page

The Extensions page features QoS analysis by user name or extension. The page is accessed by selecting the Extensions page tab. It displays the aggregate data for an individual user, allowing for a much deeper analysis of the call quality by leveraging new graphs and trends.

The data is aggregated by week or month to provide a higher-level overview of trending tendencies for comprehensive investigation. See Figure 14.

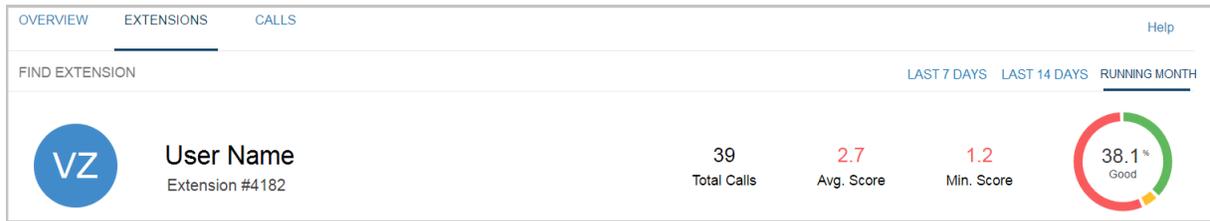


Figure 14 Problematic Calls By User

To start an investigation for a particular user, use the **EXTENSIONS** page in the upper left to search for a user name or an extension.

**Note:** Quality measurements on the Extension page are based on the selected user's call leg (part of the call). This means if a quality downgrade was on the recipient leg of a user's call, the downgrade will not be reflected on the selected user's data. However, scores on the recent and problematic calls panel displays data based on the complete call experience (both legs).

## Recent Calls and Problematic Calls

When managing user escalations, use the Recent Calls and Problematic Calls panel to understand the history of call quality for any given user.

RECENT CALLS		PROBLEMATIC CALLS		
Time	Name	Direction	Quality	Duration
26 Jun, 11:05 AM	XXXXXXXXXX	Inbound	Good	01:54
26 Jun, 9:44 AM	XXXXXXXXXX	Inbound	Poor	01:29
23 Jun, 5:31 PM	User Name	Internal	Good	00:49
22 Jun, 9:06 PM	User Name	Internal	Good	00:37
22 Jun, 10:16 AM	User Name	Internal	Good	17:37
22 Jun, 10:16 AM	User Name	Internal	Good	00:12
22 Jun, 9:31 AM	XXXXXXXXXX	Inbound	N/A	06:26

Figure 15 Recent Calls

---

**RECENT CALLS** displays the last 10 calls for the selected user, in descending order, for the selected time. **PROBLEMATIC CALLS** displays the user's lowest quality calls in the selected time.

The quality displayed is based on the weakest leg of the call, considering both the selected users' as well as their recipients' call quality.

- Clicking on the time stamp provides navigation to the call details.
- Clicking on the user name switches the page focus to that extension.

## Geo Location Map

The Extension Analysis Map shown on the **EXTENSIONS** page lets administrators view the call quality based on the Geo IP Locations of user devices.

The color of the circle shows the average quality of calls: green for good, orange for moderate, red for poor and gray for unknown. See Figure 16.

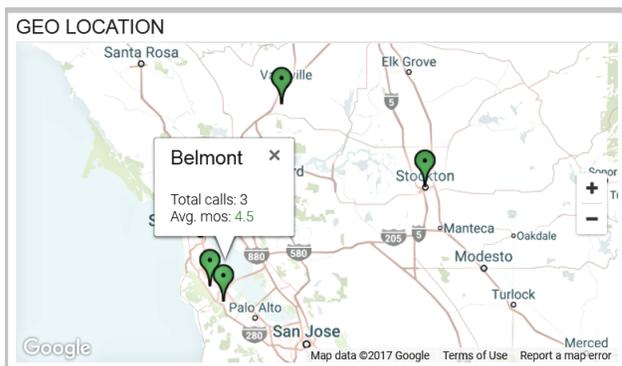


Figure 16 Geo Location

## Calls and Quality

Calls and Quality allows administrators to analyse usage and quality patterns, as they relate to time and weekday of calls made.

This helps to quickly locate a chronic quality degradation issue. A gradient color scale represents slight variations in quality. See Figure 17.

**Note:** Calls and Quality data is based solely on the selected user's call leg only.

## CALLS AND QUALITY

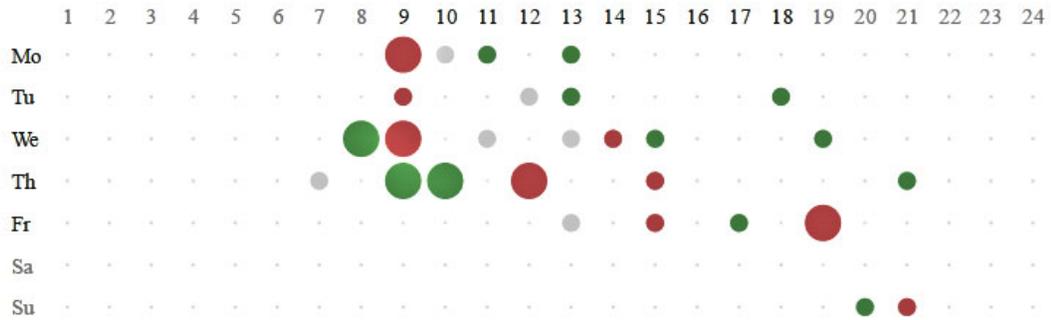


Figure 17 Calls and Quality

## Endpoints and ISPs

The **ENDPOINTS** and **ISPs** panel shows the quality scores for all endpoints and Internet service providers in use by the individual during the selected time interval, broken down by average uplink and downlink scores. See Figure 18.

ENDPOINTS	Uplink		Downlink		ISPs	Uplink		Downlink	
	Score	Score	Score	Score		Score	Score	Score	Score
Hardphone	2.8	3.6			Busin...	4.4	3.8		
Mobile	4.2	3.2			T-Mobile	4.2	3.3		
					Cable	2.0	3.5		

Figure 18 ENDPOINT and ISPs Panel

**Note:** The quality scoring of calls on the **ENDPOINT** and **ISP** tab is based solely on the quality of the selected user's call leg only.

---

## Calls Page

The **CALLS** page lets you view quality data at a per call level, so that you can identify specific quality issues. This page provides more detailed information accessed on the Overview page.

The **CALLS** page includes a full list of a call records based on your selected filters. Each record contains basic information about the call, its quality, as well as access to the record's call card. See Figure 19 Searches, sorts and filters are available to help identify exact call(s).

### Filter Panel

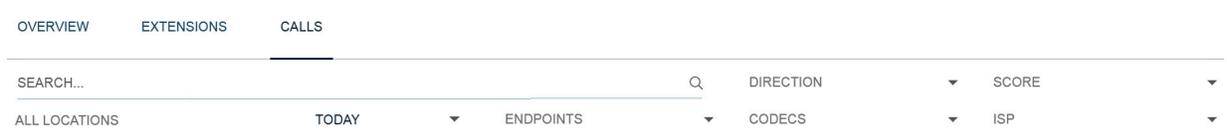


Figure 19 Filter Panel

### Free Text Search

A User, Phone Number, or Extension Search identifies calls involving specific users or extensions. By entering a name, phone number, or extension you populate a call record list that is updated with all records containing the text being searched.

### Filters

Filters at the top of the **CALLS** page let you specify a set of criteria to determine which call records to display on the call records list. Selecting a filter helps navigate to and refine subsequent pages accordingly.

- **Direction Filter** — filters call records by the direction within the RingCentral Network or between the RingCentral network and external lines (filter by inbound calls, outbound calls, or internal calls).
- **Score Filter** — filters call records by the overall quality of a call.
- **Endpoint Filter** — filters call records by the endpoints in the RingCentral network.
- **Codec Filter** — filters call by the codecs used for calling in their RingCentral network.
- **ISP Filter** — filters calls by the ISPs used in the RingCentral network.

## Call Records

Under the CALLS tab, each call record contains an information overview of an individual call, as well as details about the call quality as shown in Figure 20.

Time ↓	From	To	Direction	Duration	Call Score	Result
3:31 PM	User Name - +Phone # Extension	User Name - +Phone # Extension	Internal	00:13	Good	
3:31 PM	User Name - +Phone # Extension	+Phone #	Outbound	23:39	Good	
3:31 PM	+Phone #	User Name - +Phone # Extension	Inbound	Live	★★★★	
3:30 PM	User Name - +Phone # Extension	User Name - +Phone # Extension	Internal	05:08	Good	
3:30 PM	User Name - +Phone # Extension	+Phone #	Outbound	00:05	Moderate	

Figure 20 Call Records

These call records include:

**Time**—when the call was completed (normalised, based on the Administrator’s local computer settings).

**From**—who initiated the call, name and number/extension (when available).

**To**—who received the call, name and number/extension (when available).

**Direction**—details on which of the parties are in the RingCentral call domain and which are not.

**Duration**—length of the call (**Note:** if the call is not yet complete, you will see the word Live).

**Call Score**—approximate overall call quality (from 1 – 4.5) as it relates to RingCentral VoIP service.

**Note:** The quality of the overall call is taken from the weakest leg (for example, if one leg of the call has poor quality then the whole call is marked as having poor quality).

- Calls receive quality scores only after they are completed.
- Calls are marked N/A (Not Available) if information is unavailable, such as when an unanswered call goes to voicemail.

**Result**—an icon represents the result of the call (connected, not connected, voicemail and so on.). The icon meanings are as follows:



Live call



Voicemail



Missed call



Connected call (completed)

Clicking on a call record (a row in the table),

- Opens a Call Card with detailed information related to both parties involved in the call.
- Provides information related to each party's upstream and downstream quality.
- Shows a breakdown of the call metadata, which might be needed in a rigorous investigation.

## Call Card

A call's quality score is broken down to these major factors:

**Packet Loss**—occurs when one or more packets of data traveling across a network fail to reach their destination.

**Jitter**—is the variation in the arrival rate of packets at a destination (endpoint or cloud media processor). The jitter buffer discard rate shows the percent of delayed packages that were discarded because of a long delay time.

**Latency**—the time taken for a packet to get from one endpoint to another endpoint on the network.

The screenshot displays a 'Call Card' interface. At the top, there are two tabs for 'User Name': 'Good' (green) and 'Moderate' (orange). Below the tabs, two quality metrics are shown for different parties:

- Client:** Quality score 4.2, Packet Loss 0%, Jitter Avg 20ms, Max 188ms.
- RC:** Quality score 4.5, Packet Loss 3%, Jitter Avg 64ms, Max 90ms, Burst Density 0.

At the bottom left, there is a note: "You can use this information during your call with customer support. [Copy into clipboard.](#)"

On the right side, there is a table of metadata:

Client IP	xx.xx.xx.xx
Client IP Location	US
Client ISP	Xo Communications
Codec	OPUS
Endpoint	Mobile
Device	RCM(RC/9.1.0;Android/7.0)

Figure 21 Call Card

General information on the call includes the following:

**Client IP**—IP address assigned to each device connected to the network.

**Client IP Location**—location where the Client IP is situated.

**Client ISP** ISP used for that leg of the call.

**Codec**—Coder/Decoder Module (as applied to audio data) involved in the call.

**Endpoint**—type of endpoint utilized by that party in the call.

**Device**—endpoint device model, for example, hard phone.

---

## Mean Opinion Score Performance

The Quality of Service Mean Opinion Score (MOS) Performance dashboard provides an overview of call quality levels based on minimum and target MOS thresholds for the previous month. Open the tool by clicking **Reports > Quality of Service**, then **MOS Performance**.

To deliver superior call quality, we expect a minimum average monthly MOS score of 3.5 or more for RingCentral core services.

While 3.5 is the minimum acceptable for a good call, we generally aim for an average of 3.8 or above to maintain excellent quality levels. A summary of the key metrics available in the MOS dashboard is as follows:

For All Legs of the Call:

- **Daily quality trend** for all call legs, not only those within the RingCentral core network.
- **Upstream and downstream quality levels** for Geo IP locations, endpoint types and ISPs. This information enables you to immediately identify problematic locations, ISPs, or endpoints and address the issues.

For RingCentral Core service:

- **Breakdown of MOS averages** based on RingCentral targets. (This is the percentage of calls at least 3.5 or more and the percentage of calls at least 3.8 or more.)
- **Average MOS scores** of RingCentral core services.

Keep in mind, RingCentral core service consists of the network and supporting facilities between and among the RingCentral points of presence (PoPs), up to and including the interconnection point between RingCentral's network and facilities, the public Internet, private IP networks, and the PSTN. The RingCentral Network does not include the public Internet, a Customer's own private network, or the Public Switched Telephone Network (PSTN).

## Previous Month Trends

The MOS Performance tool shows the previous month's trends. For example, if in the month of March, it will show the month of February trends.

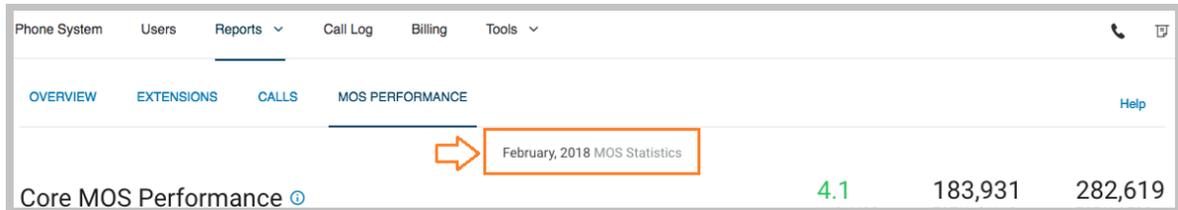


Figure 1 Reported Month

## Performance Averages

Based on the RingCentral goal of providing a minimum average of 3.5 or more for our core services, but targeting better than 3.8 or more. The chart shows the actual percentage of calls with RingCentral core MOS higher or equal to 3.5 (see the left donut) and 3.8 (see the right donut).

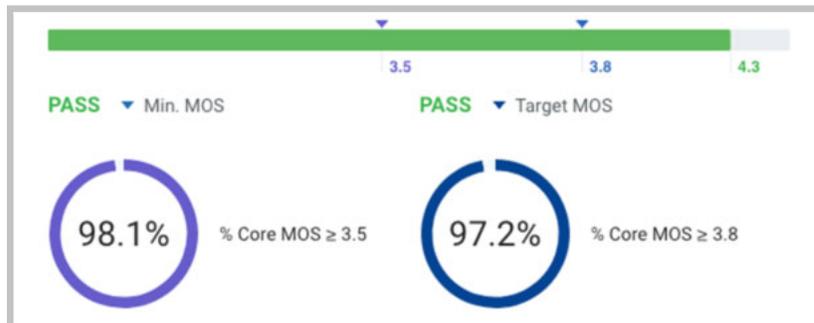


Figure 2 MOS Performance Averages

---

## Daily Trend

This shows a daily trend of average scores for all call legs.

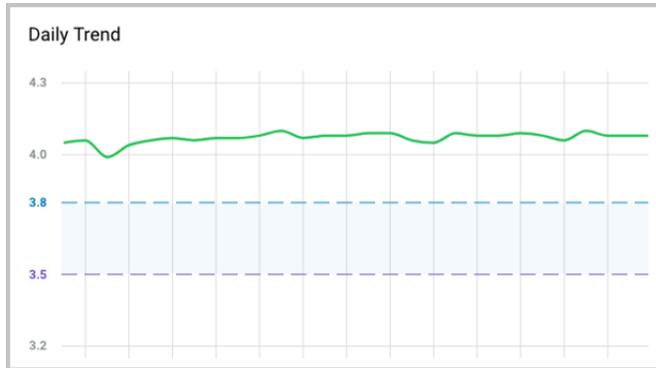


Figure 3 Daily Trend Output

## Upstream and Downstream MOS Performance

This section provides insights into the difference between the upstream and downstream MOS performance. All legs, not only RingCentral core service, are taken into consideration.

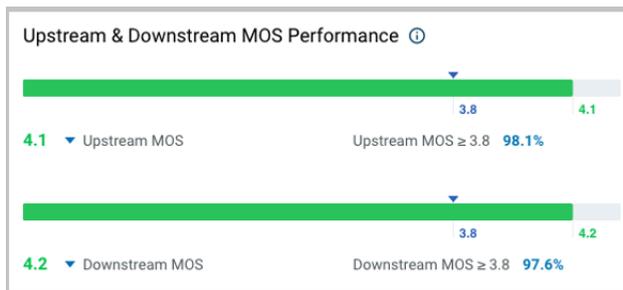


Figure 4 Upstream and Downstream Call Legs

## LOCATIONS

This shows averages by Geo Location. The number of calls for the particular location are listed and the upstream and downstream call quality averages for those calls. The Geo Locations listed are the top 7 locations having an average MOS less than 3.5 and at least 1 call. See Figure 5.

LOCATIONS	ISPs		
Geo IP Location [MOS < 3.5]	Calls	Upstream	Downstream
Xiamen 35 CN 110.87.98.90	24	4.0	3.0
CA US 166.170.38.128	19	4.2	1.0
Thornliebank ERW GB 213.205.198.56	13	3.4	4.4
St Petersburg SPE RU 109.202.168.20	11	4.2	3.4
St Petersburg SPE RU 95.161.158.169	10	4.1	3.4
Denver CO US 65.128.3.170	9	3.4	4.4
St Petersburg SPE RU 88.201.167.154	8	3.2	4.5

Figure 5 Geo Location Averages

## ISPs

This section shows the MOS performance averages by ISPs to help you isolate where to focus your attention. The ISPs listed are the top 9 ISP addresses having an average upstream or downstream MOS less than 3.5 and at least 1 call.

LOCATIONS	ISPs		
ISPs [MOS < 3.5]	Calls	Upstream	Downstream
Limited Liability Company Cybernet	11	4.2	3.4
Onyx Internet Ltd	8	3.3	3.9
China Telecom Guangdong	5	4.2	2.3
Weba	5	2.5	4.0
Setarnet	5	3.0	4.5
Net By Net Holding Llc	4	2.9	3.7
Hughes Network Systems	4	3.0	4.5
Fastweb	3	4.2	3.2
Megapath Corporation	3	3.4	3.4

Figure 6 Performance by ISP

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## Endpoints

The Endpoints section shows a breakdown of MOS Performance by endpoints.

Endpoints	Calls	Upstream MOS	Downstream MOS
Hardphone	70,424	4.1	4.0
Mobile	34,164	4.1	4.3
Desktop	41,551	4.2	4.5

Figure 7 Performance by Endpoints

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## Frequently Asked Questions

RingCentral Quality of Service Reports provides near real time information on the global health of the phone system. It allows for proactive monitoring of potential call quality issues as well as targeted investigation to determine the root cause of problematic calls.

This feature is available to RingCentral Office Enterprise, Premium, and Standard editions and can be viewed by Administrators with super administrative permission.

- Review the RingCentral Brief: Quality of Service
- Read this manual for more details

To troubleshoot issues, first refer to the Knowledge base article: RingCentral Network Requirements and Recommendations. This tool and guide are intended to give the customer an ability to identify and resolve issues with elements that are not in RingCentral's control.

- How does QoS Reports work?
- Can I see the details for a particular call?
- What is MOS? What do the good, moderate, and poor qualities mean?
- How is the call scored?
- Some IP addresses in the GeoIP® Location table are missing location data associated with them. Why?
- What can I do if some IP addresses in the GeoIP Location table do not match our office locations?
- When I see red on the QoS Monitoring Chart, what can I do?
- When I drill to the 'Good Legs' from the GeoIP Location table, I see poor and moderate calls listed on the Calls Page?
- When I drill to the 'Poor Legs' from the GeoIP Location table, the number of calls on the Calls Page does not match the data from the Overview page?
- Can QoS data be exported?
- What time zone is used for the QoS information details?
- Do we have QoS on live calls?
- What quality information is available on the PSTN legs for the incoming or outgoing calls?
- On the PSTN calls list, I see a good quality, but experience some voice issues?

## How does QoS Reports work?

When making a voice over IP (VoIP) phone call, the sound of your voice is broken into thousands of packets. These packets travel various paths on the Internet to RingCentral and on to their final destination, where they are reassembled. Many factors can affect packets on this journey, and thus impact the quality of the call. The three most common are latency, jitter, and packet loss.

By collecting quality of service (QoS) information on both media streams (upstream and downstream) for each call participant, RingCentral can provide in-depth analytics for quick identification of any poor quality calls and patterns in problematic calls for immediate isolation, troubleshooting, and resolution.

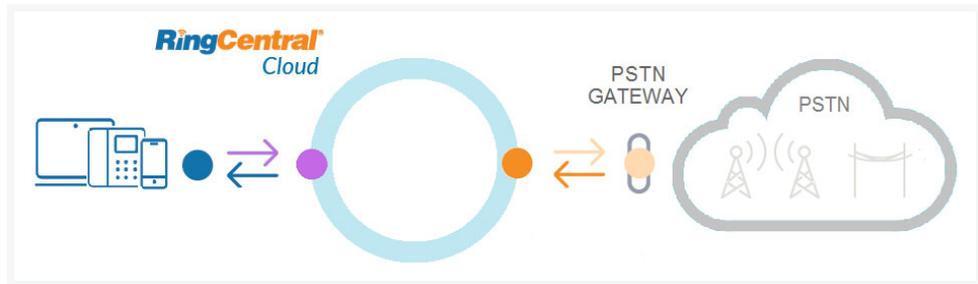


Figure 1 How QoS Reports Work

## Can I see the details for a particular call?

You can search for a particular call on the Calls Page. Call Card allows you to see the QoS details for each call participant in separate tabs. Each tab contains QoS details for the upstream: from the client to the RingCentral grid (green arrow on the picture above); and for the downstream: from the RingCentral grid to the client (blue arrow).

Client IP	xx.xx.xx.xx
Client IP Location	US
Client ISP	Xo Communications
Codec	OPUS
Endpoint	Mobile
Device	RCM(RC/9.1.0;Android/7.0)

Figure 2 Call Details

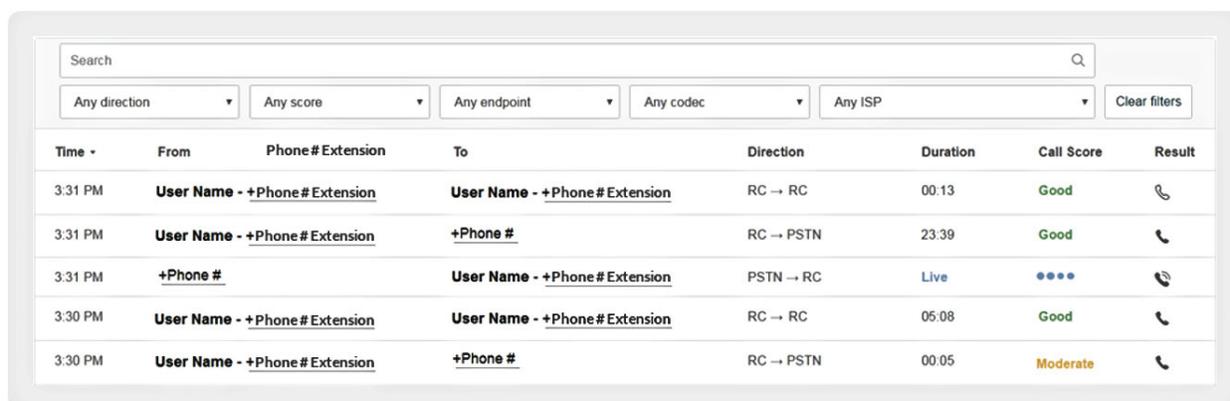
## What is MOS? What do the good, moderate, and poor qualities mean?

Mean Opinion Score (MOS) is a measure of Quality of Experience (over voice or other media domain in telecommunications). It is used to assess the human users' opinion of call quality. RingCentral MOS scores are based on algorithmic

estimates and rely on the transport measures such as bandwidth, jitter, packet loss, latency and on codecs. See [Mean Opinion Score on page 3](#).

### How is the call scored?

The overall quality of a call is determined by the minimum quality of all data streams involved, irrespective of which leg of a call caused the quality reduction. So, for a call to be considered “Good” all legs of the call must be of “good quality”.



Time	From	Phone # Extension	To	Direction	Duration	Call Score	Result	
3:31 PM	User Name -	+Phone# Extension	User Name -	+Phone# Extension	RC → RC	00:13	Good	📞
3:31 PM	User Name -	+Phone# Extension	+Phone #	RC → PSTN	23:39	Good	📞	
3:31 PM	+Phone #		User Name -	+Phone# Extension	PSTN → RC	Live	●●●●	📞
3:30 PM	User Name -	+Phone# Extension	User Name -	+Phone# Extension	RC → RC	05:08	Good	📞
3:30 PM	User Name -	+Phone# Extension	+Phone #	RC → PSTN	00:05	Moderate	📞	

Figure 3 Call Scoring

Clicking on a particular call record opens a Call Card with detailed information related to both parties involved in the call, information related to each party’s upstream and downstream quality, as well as a detailed breakdown of call metadata. All of these might be needed in a rigorous investigation.

The quality score is broken down to these major factors:

- **Packet Loss**—Packet loss occurs when one or more packets of data traveling across a computer network fail to reach their destination
- **Jitter**—Related to the variation in the delay of delivery of packets, causing some packets to arrive out of order. See also, [Call Card on page 17](#)
- **Latency**—measure of delay; how much time it takes for a packet of data to get from one designated point to another in a system. See [Call Scoring and Data Gathering on page 3](#).
- Calls receive quality scores only after they are completed.
- Calls are marked N/A (Not Available) if information is unavailable. For example, when a call went to voicemail or was not answered.

Some IP addresses in the GeoIP® Location table are missing location data associated with them. Why?

RingCentral is using industry leading IP intelligence services by MaxMind® to associate customer’s IP addresses with Geo Addresses. VPN IP addresses cannot be associated with the Geo Addresses and are displayed as an actual IP

addresses that are easily identified by the internal network or system administrators.

What can I do if some IP addresses in the GeoIP Location table do not match our office locations?

You can submit a request for a GeoIP data correction to MaxMind.



Figure 4 Geo locations

Use the following link to submit a GeoIP data correction request:  
<https://support.maxmind.com/geoip-data-correction-request/>

When I see red on the QoS Monitoring Chart, what can I do?

The red section on the Quality Monitor is showing the percent of calls that have poor quality. The overall quality of a call is determined by the minimum quality of all data streams involved. So, for a call to be considered “Good” all legs and all media streams of the call must be of “good quality” with MOS  $\geq 3.5$ .

You can always click on the red section of the chart and drill to the calls page for the details. However, trying to figure out the common causes call by call could be a tedious process.

The best way to address poor calls is to use the Overview page investigative abilities.

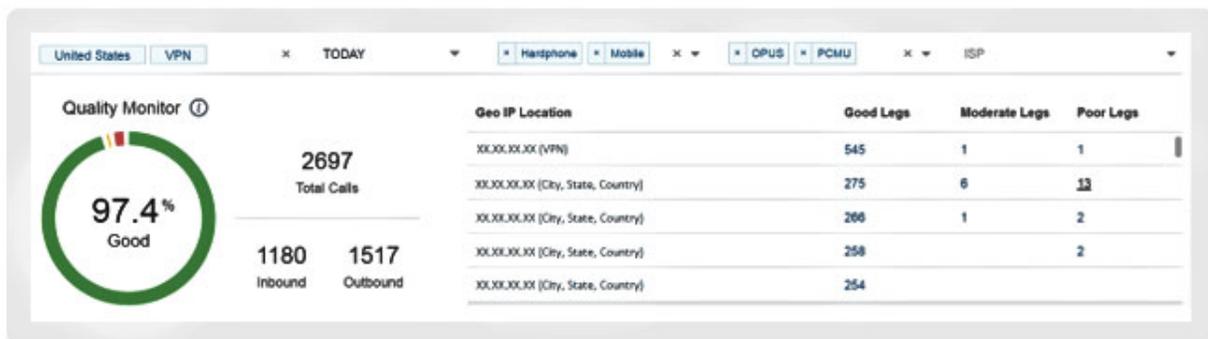


Figure 5 Calls Page Detail

Use the filters or check the Endpoints, Codecs and ISPs double-donuts to identify which group is responsible for the quality degradation. In many cases, there could be a simple explanation. For example, the majority of poor calls could be directed to the mobile endpoints, where the quality is heavily relying on the connectivity to the cellular system networks.

You can also identify the location (GeoIP Location table) that is the main contributor for the poor calls. Sort up and down on the column caption for 'Poor Legs'. Clicking on the IP Location sets the location as a filter and updates the overview page with the details related to the selected location. This narrows your investigation.

Another good way to investigate the problem is to check the Quality vs. Volume chart at the bottom of the Overview page. This chart can help you identify whether your quality depends on the volume of the calls. This may indicate issues with the network capacity. See Figure 6.



Figure 6 Quality vs. Volume

Also, the chart in Figure 7, represents data in time intervals, and you may notice a particular time of day responsible for the drop in the call quality. Repeated behavior of a particular time range in a specific weekday(s) may indicate some scheduled tasks that affect the network bandwidth.



Figure 7 Quality vs. Volume (data in time intervals)

If quality does not depend on the number of calls, and is steadily poor, look at the call details.

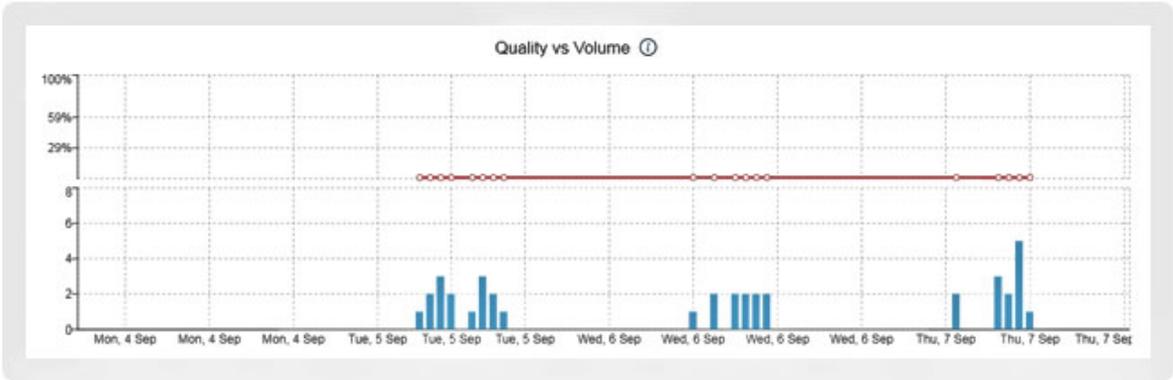


Figure 8 Quality vs. Volume (time intervals in call details)

Most of the poor calls have packet loss on the uplink stream as shown on the following page, see Figure 9.

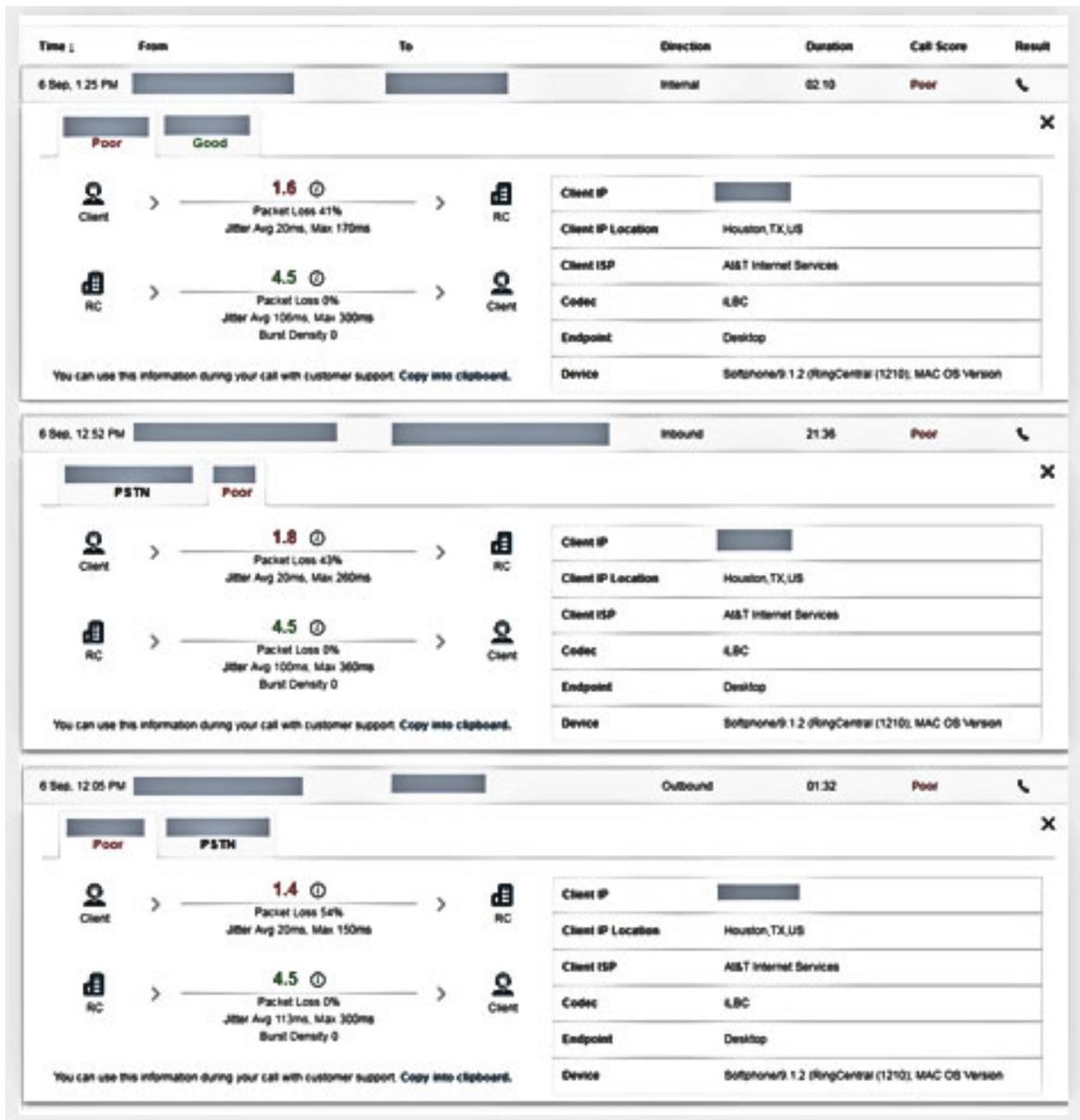


Figure 9 Packet Loss

## How do I use double donut widgets?

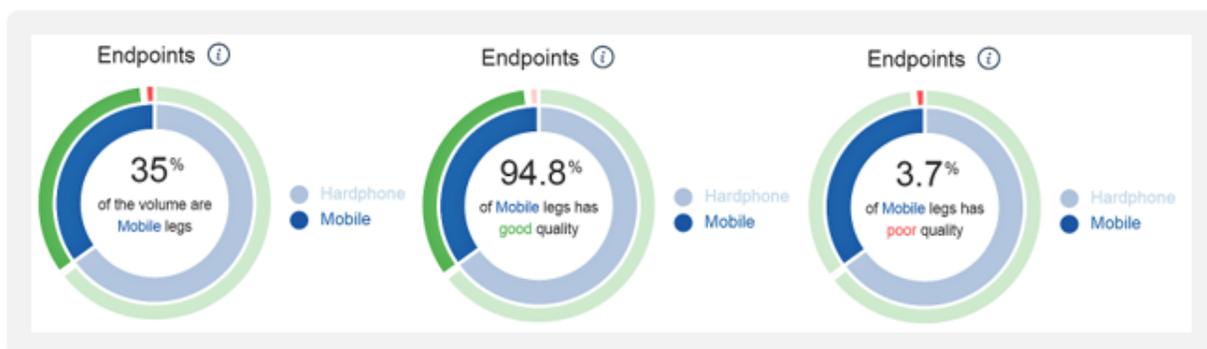


Figure 10 Using Double Donut Widgets

Interactive widgets like the double donut allow users to view QoS data for a particular group of calls and also to add filters to the Overview page. Hovering over any segment of the double donut displays current details of the information over which you are hovering. Clicking on that area adds a filter in-line with the area of the donut to which you are pointing.

In Figure 10, you can see the information shown while hovering over Mobile calls, part of the internal ring of the donut. Clicking on that portion adds a filter to select only Mobile devices. The second and third donuts represent hovering over the outer ring for Mobile devices (good and poor calls respectively). Clicking on that part of the donut shows the corresponding calls.

When I drill to the 'Good Legs' from the GeoIP Location table, I see poor and moderate calls listed on the Calls Page?

When you click on the number of good legs in the GeoIP Location table, you are choosing all the calls associated with your selection.

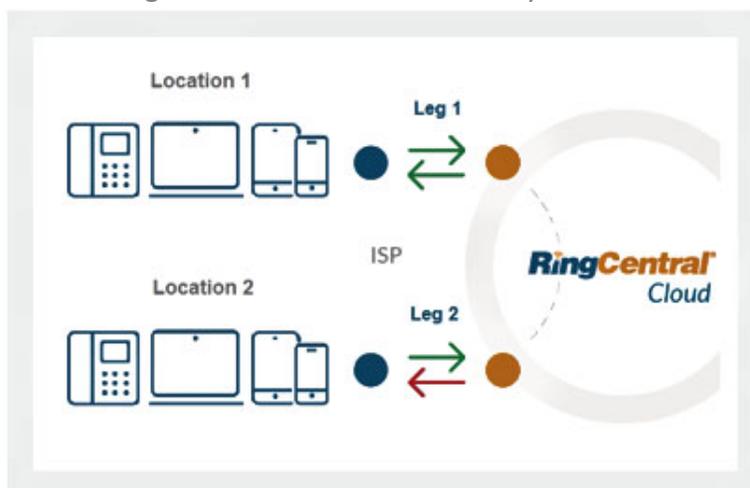
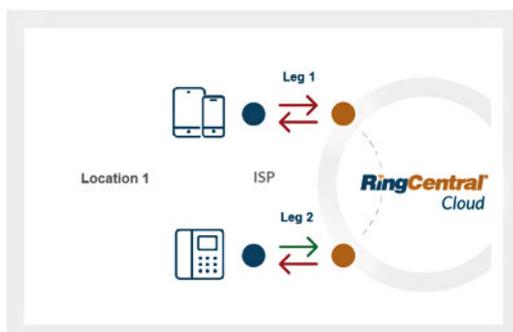


Figure 11 Poor and Moderate Calls

A leg is just a part of the call, one side. Calls have at least two legs, one for the caller and one for the recipient. For the overall call quality we consider the minimum score for all available media streams from all involved legs.

Those calls that have a poor or moderate quality on the side of another participant from a different location or PSTN, will show lower quality for the overall call.



### Call Leg Quality

When I drill to the 'Poor Legs' from the GeoIP Location table, the number of calls on the Calls Page does not match the data from the Overview page?

Data in the Geo IP Location table is based on the leg's quality, the part of the call that was initiated or terminated at the particular location and belongs to that location.

In , we show a call between employees of the same location with poor quality on both legs (min. of media streams, so Leg 2 also has poor overall quality). In the GeoIP Location table, this results in 2 poor legs quantity. However, in the call list there is one call with overall poor quality. You can see all the details for each participant by accessing the call card.

Can QoS data be exported?

QoS data extraction is not currently supported. However, you may copy information from specific calls by using Copy to clipboard when viewing Call Cards.

What time zone is used for the QoS information details?

QoS time zone defaults to the logged in user's local computer settings.

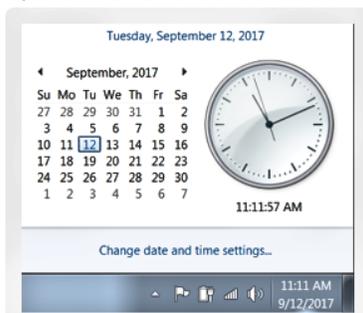


Figure 12 Time Zone

## Do we have QoS on live calls?

We are using tools that monitor live media streams. However, we are receiving quality information reports after call completion. The data on the Call Card represents this information for different media streams.

## What quality information is available on the PSTN legs for the incoming or outgoing calls?

The public switched telephone network (PSTN) is the aggregate of the world's circuit-switched telephone networks operated by national, regional, or local telephony operators, providing infrastructure and services for public telecommunication. The PSTN consists of telephone lines, fiber optic cables, microwave transmission links, cellular networks, communications satellites, undersea telephone cables, and fixed-line analog telephone systems, all interconnected by switching centres, thus allowing most telephones to communicate with each other. It includes mobile and other networks, as well as fixed telephones.

QoS information is not available inside the PSTN. The call can start from a fixed telephone on the old fixed-line analog system and go through a number of switching centres before reaching the RingCentral' PSTN Gateway. From that moment we begin to capture QoS information.



Figure 13 Capturing QoS Information

RingCentral captures the QoS data from the last switching centre to the RingCentral core: bright orange arrow above.

## On the PSTN calls list, I see a good quality, but experience some voice issues?

Because RingCentral does not have a full control over the PSTN, we do not have all the PSTN quality information. The reported value is from portions that are known to us. If there was a significant loss of data prior to reaching the point from which RingCentral can monitor the quality, we will not be able to identify it.

## Can I access QoS Reports using the Mobile App?

Yes, you can access QoS Reports on your Mobile App. Under My Profile tap

 Reports, then tap Quality of Service.

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