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Get started with SolarWinds VNQM

SolarWinds VoIP and Network Quality Manager (VNQM) helps you troubleshoot performance problems you experience with IP-based applications, including audio conferencing, video conferencing, and web conferencing. After you configure SolarWinds VNQM to monitor your IP SLA-capable and call manager devices, SolarWinds provides real-time historical network performance and call quality statistics that you can use to identify issues quickly and take steps to resolve them.

Use this guide to configure SolarWinds VNQM and your devices to monitor network performance and call quality statistics.

**Customers:** following the recommendations in this guide ensures your system capabilities and production environment is sized correctly. Minimum system requirements used during an evaluation are not sufficient for a production environment. Access your licensed software from the SolarWinds Customer Portal. If you need implementation help, contact our Support Team.

Read this SolarWinds Customer Support article to learn how to properly open a support case and get your case the right level of visibility.

**Evaluators:** download your free 30-day evaluation. The evaluation version of SolarWinds VNQM is a full version of the product, functional for 30 days. If you evaluate SolarWinds VNQM on a Windows Server operating system, you can easily convert your evaluation license to a production license by obtaining and applying a license key. If you need assistance with your evaluation, contact sales@solarwinds.com.

Getting started with SolarWinds VNQM involves the following tasks:

- **Install SolarWinds VNQM.**
  The SolarWinds VNQM Installation Guide lists system requirements and provides instructions for downloading and installing the product.

- **Discover and add your devices to the Orion database.**
  You must discover your IP SLA-capable Cisco routers and CallManager, and Avaya Communications and Media Server devices.

  You must then add discovered IP SLA, call manager, and Avaya devices to SolarWinds VNQM.

- **Add an IP SLA Cisco router to SolarWinds VNQM.**
  After discovery, add the IP SLA-capable Cisco router to SolarWinds VNQM. After you add the device, SolarWinds VNQM has SNMP read/write, CLI through Telnet, or SSH access to the device. SolarWinds VNQM requires access to the device to create IP SLA operations.

- **Add IP SLA operations to SolarWinds VNQM.**
  IP SLA operations are performance tests that SolarWinds VNQM runs against network segments you specify. You must configure SolarWinds VNQM and choose which operations you want to monitor.
Troubleshoot an IP SLA network issue.

After you configure the system, network performance data populates resources in the Orion Web Console. Use the resources to troubleshoot network performance issues.

Add a call manager device to SolarWinds VNQM.

After discovery, add Cisco or Avaya call manager devices to SolarWinds VNQM. This step is required so that SolarWinds VNQM can verify service accounts are established, and that it can make direct API calls to the device, and parse CLI commands.

Configure a call manager device to send data to VNQM.

SolarWinds receives call data that is sent from the call manager device. You must configure your Cisco CallManager or Avaya call manager to send data to SolarWinds VNQM.

Troubleshoot a VoIP network issue.

After the system is configured, call quality data populates resources in the Orion Web Console. Use the resources to troubleshoot issues with VoIP services.
Why use SolarWinds VNQM?

SolarWinds VoIP and Network Quality Manager (VNQM) monitors the performance of IP-based services and applications, including but not limited to:

- Audio conferencing
- Video conferencing
- Web/data conferencing
- Instant messaging

SolarWinds VNQM gives you the tools to test the fitness of your current network, and track the quality of service over time. After installation and configuration, SolarWinds VNQM deploys Cisco IP SLA operations to generate various types of network traffic including DNS requests, DHCP IP allocation, FTP and HTTP requests, TCP connect, ICMP and UDP Echo, and simulated VoIP traffic between devices on your network. Cisco IP SLA operations provide real-time and historical performance statistics that SolarWinds VNQM presents in the Orion Web Console.

You can also monitor call details and quality of Cisco CallManager and Avaya Communication and Media Server devices.

Benefits of SolarWinds VNQM

With SolarWinds VNQM, you can monitor and report both real-time and historical performance statistics for your IP SLA-capable network. SolarWinds VNQM offers the following features to help you manage your IP-based network:

**Quality of service (QoS) monitoring with Cisco IP SLA operations.** SolarWinds VNQM uses Cisco IP SLA operations to provide immediate insight into network Quality of Service (QoS), including packet loss, latency, jitter, and mean opinion score (MOS) metrics. With SolarWinds VNQM and IP SLA operations, you know at a glance exactly how well your network is and has been performing. For more information about Cisco IP SLA operations, see [www.cisco.com/go/ipsla](https://www.cisco.com/go/ipsla) (© 2017 Cisco, available at https://www.cisco.com, obtained on March 24th, 2017.).

**VolP phone troubleshooting.** SolarWinds VNQM uses Call Detail Records (CDR) and Call Management Records (CMR) data from your call managers to help you identify possible affected calls and patterns of affected calls. CDR/CMR data provides region information per call record in addition to the call source and destination, MOS, latency, packet loss, termination call code, and more.

**Custom charts and gauges.** SolarWinds VNQM provides easy-to-read charts and gauges that you can customize to suit your monitoring requirements. You can quickly determine the current status and performance of your network using custom gauges of key IP SLA metrics such as jitter, latency, packet loss, and MOS. With custom charts, you can easily track the historical performance of all the paths on your network.

**Custom alerts and actions.** You can configure IP SLA-related alerts with a variety of corresponding actions to notify you of events on your network.
Call manager monitoring. Call manager devices are scalable call processing solutions that provide VoIP networks with the features and functions of more traditional telephony. SolarWinds VNQM uses the SNMP and ICMP monitoring technology and the AXL API of Cisco to interact with call managers and to persistently track call manager performance.

SolarWinds VNQM natively monitors Cisco CallManager and CallManager Express, and Avaya call manager devices. You can also define custom Management Information Base (MIB) pollers to monitor call managers from other manufacturers.
Discover devices for SolarWinds VNQM to monitor

This section contains the following topics:

- Supported devices for SolarWinds VNQM version 4.4
- Discovery for SolarWinds VNQM
Supported devices for SolarWinds VNQM version 4.5

SolarWinds VNQM version 4.5 supports the following devices:

- Devices running Cisco IOS version 12.x and later
- Avaya Communication and Media Server series S83xx, S87xx, and S88xx
- Avaya Aura version 6.x
- Cisco CallManagers version 6 through version 11.x

- Cisco ASR 9000 series routers with the firmware 4.3.2-IOS XR are currently not supported for IP SLA operations. SolarWinds VNQM cannot set up operations or poll operations on this device type.
- SolarWinds VNQM does not support Nexus devices.
Discovery for SolarWinds VNQM

For SolarWinds VNQM to monitor network performance and VoIP quality, you must discover those network devices and add them to Orion for monitoring.

- If you completed the Network Performance Monitor Getting Started Guide, you may have already discovered your IP SLA-capable Cisco devices and call manager devices. There is no discovery specific to SolarWinds VNQM.
- If you have not discovered your Cisco or call manager devices, complete the discovery and import sections in the SolarWinds NPM Getting Started Guide, and then return to this guide to add those devices to SolarWinds VNQM.

SolarWinds recommends that you begin by discovering a limited number of routers and call manager nodes and then add more devices as you scale your environment.

If you are unsure if you discovered any network devices, log in to NPM and click My Dashboards > Network > Network Summary. The All Nodes managed by NPM resource lists all network devices discovered and added to Orion for monitoring.

In the following image, dev_ottawa_2621 is a Cisco router that has been discovered and added to the Orion database. This node is used throughout the examples in this getting started guide.

![All Nodes managed by NPM](image)

In the following image, USAUS-AVAYA-ACM-01 is an Avaya Communication and Media Server device that has been discovered and added to the Orion database. This node is used throughout the examples in this getting started guide.
All Nodes managed by NPM

GROUPED BY REGION

- APAC
- EMEA
- North America
  - 3Com
  - American Power Conversion Corp.
  - APC NetBotz
  - Aruba Networks Inc
  - Avaya Communication
    - USAUS-AVAYA:ACM-01
IP SLA monitoring

This section includes the following topics:

- What is IP SLA monitoring?
- Add an IP SLA Cisco router to SolarWinds VNQM
- Add IP SLA operations to SolarWinds VNQM
- Troubleshoot an IP SLA network issue
What is IP SLA monitoring?

IP Service Level Agreements (IP SLAs) are diagnostic methods developed by Cisco that generate and analyze traffic between Cisco IOS devices on your network. By using SolarWinds VNQM to implement IP SLA operations between your network devices, you can acquire real-time and historical statistics that give you accurate Quality of Service (QoS) measurements over designated network paths. IP SLAs provide baseline information about network performance, and help you identify the root cause of a problem if performance levels drop. IP SLAs are especially useful for WANs that connect multiple locations but need to be monitored from one central location.

The following diagram illustrates how IP SLA monitoring works.

![Diagram of IP SLA monitoring](image)

**Source:** A device that creates and inserts IP SLA packets into the network. The source is where all IP SLA operation tests are initiated.

**Target:** The ultimate destination of the packets created and sent by the source.

**Operation:** The type of test being performed on the network.

Supported operations

When you define an operation, the source device continuously sends tests to the target, running the test every five minutes by default. The Cisco device stores the operation results in its memory, and SolarWinds VNQM polls the results through SNMP and CLI parsing. IP SLAs use active traffic-monitoring to continuously monitor traffic across the network. SolarWinds VNQM supports the following operations:

- **DHCP:** measures the response time taken to discover a DHCP server, and then obtain a leased IP address from it.
- **DNS:** measures the difference in time from when a DNS request is sent and when the reply is received.
- **FTP:** measures the response time between a Cisco device and an FTP server to retrieve a file.
- **HTTP:** measures distributed web services response times.
- **ICMP Echo:** measures round trip time between nodes on the network.
- **ICMP Path Echo:** measures round trip time hop-by-hop between nodes on the network.
- **ICMP Path Jitter:** measures WAN quality by testing connection times hop-by-hop between two devices.
- **TCP Connect:** measures WAN quality by testing connection times between two devices using a specific port.
- **UDP Echo:** measures round trip time between nodes on the network.
- **UDP Jitter**: measures WAN quality by testing connection times between two devices using a specific port number.
- **VoIP UDP Jitter**: measures call path metrics on the VoIP network.

This getting started guide shows you how to add a VoIP UDP Jitter operation to SolarWinds VNQM. For all other operations, see the SolarWinds VNQM Administrator Guide.
Add an IP SLA Cisco router to SolarWinds VNQM

IP SLA operations on Cisco IOS devices acquire real-time and historical Quality of Service (QoS) measurements over designated network paths. IP SLAs provide you with baseline information about network performance, and help you identify the root cause of a problem if performance levels drop.

Before you can create and monitor IP SLA operations, you must add your IP SLA-capable routers to SolarWinds VNQM. When you add the router, SolarWinds VNQM configures the router for the SNMP write access that is required to create IP SLA operations.

Before you begin:

- **Discover the router** and add it to the SolarWinds Orion database.
- Confirm the Cisco device supports SNMP v2 or SNMP v3. To confirm that the Cisco IOS release for your device supports IP SLA operations, visit the Cisco Feature Navigator, and search for IP SLAs - DHCP Operation.
- Collect the device community strings (for SNMP v2 operations) or credentials (for SNMP v3 operations).

The following example shows you how to add a Cisco 2621 XM router to SolarWinds VNQM.

1. Log in to SolarWinds VNQM as an administrator.
2. Click Settings > All Settings > VoIP & Quality Settings.
3. Click Manually Add Nodes to VoIP and Network Quality Manager.

```markdown
PRODUCT SPECIFIC SETTINGS
Global and product specific settings such as session timer, etc.

- IPAM Settings
- VoIP & Quality Settings
- Web Console Settings
```

4. **Manage IP SLA Nodes**

Add Nodes to VoIP and Network Quality Manager. Only VoIP and Network Quality Manager license count.

- Automatically Discover IP SLA capable nodes
- Manually Add Nodes to VoIP and Network Quality Manager
- Remove nodes from VoIP and Network Quality Manager

```
4. Select the nodes you want to add, and click Add Nodes.

The list of nodes includes only Cisco® routers that support SNMP v2 and later. The system checks to ensure that SolarWinds VNQM can write to the node.

In this example, the dev_ottawa_2621 router is added to SolarWinds VNQM.

Add Nodes to VoIP and Network Quality Manager

5. If you are prompted to enter credentials that include write privileges:
   a. Select the node.
   b. Click Edit Credentials.
   c. If SNMP v2 is used, set the SNMP version and port number in the associated fields, enter the read/write community string, click Test, and click Save.
d. If SNMP v3 is used, select a saved credential set from the list, or enter the credentials in the provided fields, click Test, and click Save.

![SNMP Credentials Issues](image)

On the SNMP Credentials Issues page, the system displays IP SLA capability test succeeded in the Status column.

6. On the SNMP Credentials Issues page, click Add Selected Nodes. When the system adds the node, a message is displayed.

![Add Nodes Results](image)
Add IP SLA operations to SolarWinds VNQM

An IP SLA operation is a test that SolarWinds VNQM performs between a source and a target Cisco device on your network. The results of an operation help you measure quality of service and identify root causes when network performance levels drop. SolarWinds VNQM supports a number of IP SLA operations, including DHCP, DNS, and FTP. For more information on supported operations, see What is IP SLA monitoring?

You can either manually add IP SLA operations to SolarWinds VNQM, or if you have IP SLA operations already defined on your device, you can automatically add them to SolarWinds VNQM. For instructions on automatically adding operations to SolarWinds VNQM, see Add existing operations to SolarWinds VNQM.

The following example shows you how to manually add a VoIP UDP Jitter operation to SolarWinds VNQM. VoIP UDP Jitter operations measure call path metrics on your VoIP network. These operations ensure that your VoIP network is operational and performing as expected. The network segment in the example is defined between the dev_ottawa_2621 source router and a target external IP address.

The majority of operations use SNMP to poll. Path-based operations use CLI.

1. Log in to SolarWinds VNQM as an administrator.
2. Click Settings > All Settings > VoIP & Quality Settings.
3. In the Manage IP SLA Operations section, click Add new operations.
4. Select Create new operations, and click Next.

Add, edit, and remove HTTP, TCP Connect, VoIP UDP, and VoIP TCP Operations.

Add new operations
Edit or delete operations

I would like to:

Create new operations
Create operations and set up monitoring at one time.

Monitor existing operations
Manually add operations already configured on routers. Use this.

Learn more about manually configuring operations on routers
5. Select VoIP UDP Jitter, and click Next.

WAN Quality Operations
Operations to test quality of the WAN connection between sites.

- **UDP Jitter**
  Measures WAN quality. [Tell me more about UDP jitter IP SLA operations](#)

- **ICMP Path Jitter**
  Measures WAN quality hop-by-hop. [Tell me more about ICMP Path Jitter IP SLA operations](#)

- **VoIP UDP Jitter**
  Measures call path metrics. [Tell me more about VoIP UDP Jitter IP SLA operations](#)

6. On the Define Paths panel, click Simple, and click Next.
   
   You can select other path types. See the [SolarWinds VNQM Administrator Guide](#) for more information on path types.

7. Select the source nodes you want to add to the VoIP UDP Jitter operation, and click Next.
   
   In this example, the source node is dev_ottawa_2621.

8. Select the target nodes you want to add to the VoIP UDP Jitter operation.

9. To create the path in only one direction, select No, create the path in just one direction.
   
   When you create a path in each direction, SolarWinds VNQM deploys the operation to the target device, which becomes the source of the second leg of the operation.

10. To specify an external node as a target, click Yes, use external node as a target.
    
    You can also target a node that you have added to SolarWinds VNQM.
11. Enter the IP address or host name of the external node you want to add, and click Next.

**IP SLA Operations Wizard**

**Choose target node for new VoIP UDP Jitter operations**

Operations will be created between the source (selected in previous step) and the target node.

If you don’t see your IP SLA nodes below, you may need to add your nodes to VoIP and IP SLA.

**Group By:**

- Machine Type

**Would you like to make this path bi-directional?**

- Yes, create a path in each direction
- No, create the path in just one direction

**Would you like to specify an external node?**

- Yes, use external node as a target
- IP Address or hostname: 192.168.1.1
- No, use only VoIP and Network Quality Manager node

12. Enter the frequency for the operation to be performed.

SolarWinds recommends you accept the default frequency.

13. Define your warning, critical, and maximum threshold values.

SolarWinds recommends you accept the default thresholds.

**IP SLA Operations Wizard**

**Define properties for VoIP UDP Jitter operations**

The settings below will be applied to each VoIP UDP Jitter operation.

<table>
<thead>
<tr>
<th>PROPERTY</th>
<th>WARNING</th>
<th>CRITICAL</th>
<th>MAXIMUM</th>
</tr>
</thead>
<tbody>
<tr>
<td>Frequency</td>
<td>300 ms</td>
<td>1000 ms</td>
<td>1500 ms</td>
</tr>
<tr>
<td>Port Number</td>
<td>17000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Round Trip Time Thresholds</td>
<td>500 ms</td>
<td>1000 ms</td>
<td>1500 ms</td>
</tr>
<tr>
<td>MOS Thresholds</td>
<td>3.75</td>
<td>3.5</td>
<td></td>
</tr>
<tr>
<td>Jitter Thresholds</td>
<td>30 ms</td>
<td>50 ms</td>
<td>100 ms</td>
</tr>
<tr>
<td>Latency Thresholds</td>
<td>100 ms</td>
<td>150 ms</td>
<td>250 ms</td>
</tr>
<tr>
<td>Packet Loss Thresholds</td>
<td>2.5 %</td>
<td>5 %</td>
<td>100 %</td>
</tr>
</tbody>
</table>
14. Click Advanced and in the CODEC field, select GSM 711 ULAW.

The Advanced options correspond to the type of operation you are creating. GSM 711 ULAW is the most common CODEC for VoIP UDP Jitter operations.

```
<table>
<thead>
<tr>
<th>Advanced</th>
</tr>
</thead>
<tbody>
<tr>
<td>CODEC</td>
</tr>
<tr>
<td>TYPE OF SERVICE</td>
</tr>
<tr>
<td>VIRTUAL ROUTING AND FORWARDING NAME</td>
</tr>
</tbody>
</table>
```

15. Click Next.

16. Select the operation you want to create, and click Create Operations.

Depending on the number of operations you create, this process can take several minutes.

17. Click Go to VNQM Home and review the All IP SLA Operations resource.

It can take several minutes for the resource to populate with data. When the status icon turns green, SolarWinds VNQM is monitoring the operation.

```
All IP SLA Operations
GROUPED BY OPERATION TYPE, OPERATION STATUS, SOURCE NODE, OPERATION

- VoIP UDP Jitter
  - Up
    - dev_ottawa_2621
    - dev_ottawa_2621→10.199.3.5
```
Troubleshoot an IP SLA network issue

SolarWinds VNQM offers a scalable solution that collects IP SLA-specific data and provides presentation tools that enable IP SLA network monitoring and real-time status reporting. After you have added your IP SLA-capable Cisco routers to SolarWinds and added IP SLA operations, SolarWinds VNQM presents current network performance metrics in dashboard views that contain tables, graphs, and charts. You can use the SolarWinds VNQM dashboard view to drill in to problem areas and start identifying the underlying problems.

The following troubleshooting scenario is based on a Mean Opinion Score (MOS) that measures below a predefined threshold for the VoIP UDP Jitter operation you added to SolarWinds VNQM. MOS is a common benchmark used to determine the quality of sound traveling across a segment of your network. MOS is measured on a 5-point scale where scores between 3 and 5 indicate acceptable network performance. A MOS value lower than three indicates a problem with network performance and quality. Using SolarWinds VNQM to measure MOS provides actionable data you can use to troubleshoot network issues.

The following scenario shows how to configure an alert to notify you when a MOS score measures below three for any network segment. When the alert is triggered, use resources in the Orion Web Console to identify the root cause of the problem.

Before you begin:

- Discover IP SLA-capable devices
- Add an IP SLA Cisco router to SolarWinds VNQM
- Add IP SLA operations to SolarWinds VNQM

Create a MOS alert

1. Log in to SolarWinds VNQM, and click Alerts & Activity > Alerts.
2. Click Manage Alerts.
3. Click Add New Alert.
4. Enter an alert name and click Next.

Add New Alert

1. Alert Properties

Name of alert definition (required)
IP SLA MOS Alert

Description of alert definition
Displayed on Manage alerts page.

2. Trigger Condition

I want to alert on:
IP SLA Operation

5. In the I want to alert on field, select IP SLA Operation.
6. In the trigger condition, click the Select fields drop-down and click Browse all Fields.

7. Under IP SLA Operation, click Operation Current Statistics > MOS (VoIP UDP Jitter Operation) and click Select.
8. Complete the trigger condition by selecting is less than or equal to, and enter 3.

9. Click through the remaining panels of the alert wizard, specifying a reset condition, time of day, trigger actions, and reset actions, as necessary.

Investigate the root cause of a MOS alert

In this scenario, the MOS alert you defined has been triggered because the MOS value for a monitored network segment fell below three. The alert sends a notification email to the responsible party who clicks the link in the email, which opens the IP SLA Summary dashboard. Use the resources in the IP SLA Summary dashboard to identify the segment of your network that is failing.

In this example, the Operations with Issues resource shows that performance levels of the dev_ottawa_2621 → 10.199.3.5 segment have dropped.

Click the segment to investigate further.

The MOS score and packet loss percentage indicate that there are issues on the Ottawa to 10.199.3.5 segment.
Looking at the historical data, it seems that the issue is isolated to business hours as the MOS score raises back to 3 after hours. Now that you have identified the segment of the network that is underperforming, log in to the router, run diagnostics, and take steps to resolve the issue.
VoIP monitoring

This section contains the following topics:

- What is VoIP monitoring?
- Add a call manager device to SolarWinds VNQM
- Configure a call manager device to send data to SolarWinds VNQM
- Troubleshoot a VoIP network issue
What is VoIP monitoring?

Cisco and Avaya call manager devices are scalable call processing solutions for managing IP-based telecommunications networks. These devices provide VoIP networks with the features and functions of traditional telephony.

When monitoring Cisco CallManagers, SolarWinds VNQM uses the SNMP and ICMP monitoring technology and the AXL API of Cisco to persistently track call manager performance. The CDR/CMR data that Cisco CallManager writes to an FTP server, and that SolarWinds VNQM downloads, helps you identify affected calls and patterns of affected calls. CDR/CMR data provides region information per call record in addition to the call source and destination, MOS, latency, packet loss, termination call code, and more.

When monitoring Avaya Communication and Media Server devices, SolarWinds VNQM intercepts the CDR packets sent by the TCP protocol, as well as the RTCP data sent through UDP, and based on these data, it provides information about the call details and the call quality.

For VoIP statistics, SolarWinds VNQM uses simulated VoIP traffic, instead of real VoIP traffic. This ensures the continuous collection of performance statistics so you can know the state of your network at any time, regardless of whether the network is actually being used to complete a call.
Add a call manager device to SolarWinds VNQM

SolarWinds VNQM monitors call details and call quality of Cisco CallManager and Avaya Communication and Media Server devices. The metrics captured by SolarWinds VNQM help you identify affected calls and patterns of affected calls. With SolarWinds VNQM, you can drill in to problem areas to start identifying the underlying problems.

Before SolarWinds VNQM captures call manager metrics, you must:

- Discover the call manager node and add it to the SolarWinds Orion database.
- Add the call manager device to SolarWinds VNQM, as described below.
- Configure a call manager device to send data to SolarWinds VNQM

Adding a call manager device to SolarWinds VNQM is required because SolarWinds VNQM must verify that service accounts have been set up and that it can make direct API calls to the device.

Add an Avaya Communications and Media Server device to SolarWinds VNQM

The following example shows you how to add an Avaya Communications and Media Server device to SolarWinds VNQM.

Before you begin, collect the CLI credentials of the device. SolarWinds uses the CLI credentials to connect to the device and collect location and region information.

1. Log in to the Orion Web Console as an administrator.
2. Click Settings > All Settings > VoIP & Quality Settings.
3. Click Add CallManager Nodes.

<table>
<thead>
<tr>
<th>VoIP Management</th>
</tr>
</thead>
<tbody>
<tr>
<td>Manage CallManager Nodes</td>
</tr>
<tr>
<td>Add, delete and manage Call Managers</td>
</tr>
<tr>
<td>Add: Add CallManager nodes</td>
</tr>
<tr>
<td>Manage: Manage CallManager Nodes</td>
</tr>
</tbody>
</table>
4. Select a vendor and a call manager device, and click Next.

### Add Call Manager

<table>
<thead>
<tr>
<th>Vendor</th>
<th>Node Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>Avaya</td>
<td>USAUS-AVAYA-ACM-01</td>
</tr>
<tr>
<td>Cisco</td>
<td></td>
</tr>
</tbody>
</table>

**Select a Call Manager**

Choose the call manager you want to add from the list below.

Cisco CallManager nodes must be running the Cisco CallManager SNMP Service.

To fully benefit from monitoring Avaya Call Managers, they must be configured to poll CDR/CQR.

If you don’t see your nodes below, you may need to [add your nodes](#) to VoIP and Network Quality Manager.

5. Select Enable CDR/CQR polling for this call manager, and click Next.

If you select Add Call Manager without CDR/CQR monitoring, SolarWinds VNQM provides call manager statistics, but does not provide information about calls or call quality.

### Add Call Manager

<table>
<thead>
<tr>
<th>Vendor</th>
<th>Node Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>Avaya</td>
<td>USAUS-AVAYA-ACM-01</td>
</tr>
<tr>
<td>Cisco</td>
<td></td>
</tr>
</tbody>
</table>

**Select what to monitor**

Select what you want to monitor for Call Manager: **USAUS-AVAYA-ACM-01**

- **Enable CDR/CQR polling for this Call Manager**
  - This provides detailed data such as quality metrics for calls going through this call manager.

- **Add Call Manager without CDR/CQR monitoring**
  - No data about calls on this Call Manager will be collected.

6. Select or enter the CLI credentials that SolarWinds VNQM uses to collect region and location information for call managers and phones.
7. Click Test to test the credentials.

8. Click Next, and click Add Call Manager.

After SolarWinds adds the call manager, the call manager is displayed in the VoIP CallManagers resource.

9. After you have added the device, you can configure it to send data.

Add a Cisco CallManager device to SolarWinds VNQM

The following example shows you how to add a Cisco CallManager to SolarWinds VNQM.

Before you begin:

- Collect the AXL credentials that SolarWinds VNQM uses to connect with the device.
- Collect the server address and credentials of the FTP server that stores the CDR and CMR data.

1. Log in to the Orion Web Console as an administrator.
2. Click Settings > All Settings > VoIP & Quality Settings.
3. Click Add CallManager nodes.

![VoIP Management](image)

4. Select a vendor and call manager device, and click Next.

![Add Call Manager](image)

5. Select Enable CDR/CQR polling for this call manager, and click Next.

6. To enable SIP Trunk monitoring on the CallManager, select Enable AXL SIP Trunk Polling, and enter the polling frequency for SIP Trunk Status scanning.

If you select Add Call Manager without CDR/CQR monitoring, SolarWinds VNQM provides call manager statistics, but does not provide information about calls or call quality.
7. Click Next.

8. Select or enter the AXL credentials that SolarWinds VNQM uses to collect region and location information for call managers and phones.

   - Enter AXL credentials for both publisher and subscriber call managers.

9. Click Test to test the credentials.

10. Click Next.

11. Define the FTP server details.
    a. Enter the FTP server IP address or host name where your CDR/CMR data is stored.
    b. Enter the FTP port number.
    c. Select Passive mode to connect to the FTP server in passive mode.
    d. If you connect to an SFTP site, select Secure connection.
    e. Enter the CDR/CMR file path, if applicable.
    f. Enter the FTP credentials.
g. Enter a number in Polling Frequency between 1 and 60 to configure how frequently you want to poll the FTP server in minutes.

h. If you want to remove the files from the FTP server, select Delete CDR/CMR files from FTP server after download.

Deleting CDR/CMR files from the FTP server may cause serious data loss. Ensure that your backups are running successfully before selecting this option.

Removing the files from the FTP server prevents the device from filling up with log files, and helps speed up data collection from the FTP server.

i. Click Test FTP Server Connection to test the connection.

j. Click Next.

12. On the Summary panel, review the information you entered, and click Add Call Manager. After SolarWinds VNQM adds the call manager, the call manager is displayed on the VoIP CallManagers resource.

13. After you have added the device, you can configure it to send data.
Configure a call manager device to send data to SolarWinds VNQM

After you discover a call manager node, add it to the SolarWinds Orion database and add it to SolarWinds VNQM, you must configure the call manager device to send CDRs and quality data to SolarWinds VNQM. SolarWinds recommends that you consult your vendor’s documentation for instructions on configuring your device to send data.

If you are unsure of which documentation to use to configure your device, or if you cannot find the documentation, use the following keywords when searching the vendor website:

- For Cisco: CDR, CMR, SNMP Master Agent, Billing\FTP server, AXL API access
- For Avaya: CDR, CQR\RTCP

SolarWinds provides detailed configuration instructions for Cisco CallManager and Avaya Communication and Media Server devices.

- Configure Avaya Communications and Media Server to send call data to VNQM
- Configure Cisco CallManager to send call data to VNQM
Troubleshoot a VoIP network issue

SolarWinds VNQM offers a scalable VoIP monitoring solution that tracks Cisco CallManager and Avaya Communication and Media Server performance. After you have added your call manager devices to SolarWinds VNQM and configured them to send call data to SolarWinds VNQM, SolarWinds VNQM presents current network performance metrics and different aspects of your VoIP infrastructure in views that contain tables, graphs, and charts. You can use the SolarWinds VNQM dashboard view to drill in to problem areas to start identifying the underlying problems.

In this VoIP troubleshooting scenario, an employee has called you (the VoIP engineer) complaining of a call that dropped earlier in the day. To head off other complaints, you decide to be proactive and use SolarWinds VNQM to identify the cause of the issue.

Before you begin:

- Discover your call manager devices
- Add the call manager device to SolarWinds VNQM
- Configure your call manager device to send call data to SolarWinds VNQM

The following example shows you how to use SolarWinds VNQM to look up the record of the dropped call and identify the source of the problem.

1. Log in to the Orion Web Console and select My Dashboards > VoIP & Network Quality > VoIP Search.
2. On the Search VoIP Calls page, use the filter options to narrow your search.
   In this example, the search includes all calls that failed within the last 2 hours.
3. Scroll through the results until you locate the call that dropped, and click it.
   In this example, the USAUS-AVAYA-ACM-01 device managed the call.
4. Click View Call Details.

![View Call Details Table]

5. Review the VoIP Call Details resource.

While the MOS and packet loss at the call origin are acceptable, the latency and jitter values are high. For the call destination, all quality metrics are too high, especially the 39% packet loss.

![VoIP Call Details]

6. Review the Path Details resource.

This resource shows that jitter and latency between hop 1 and hop 2 are too high. In addition, the network segment between router 2 and router 5 is not meeting its SLA.

From here you can:
- Click the SLA Operation Path to further investigate that network segment.
- Log in to each router, run diagnostics, and troubleshoot the issue.
Beyond getting started

Congratulations on completing the SolarWinds VNQM Getting Started Guide. This guide has shown you how to:

- Add your IP SLA-enabled devices and call managers to SolarWinds VNQM.
- Add IP SLA operations to SolarWinds VNQM.
- Configure Cisco and Avaya call managers to send call data to SolarWinds VNQM.
- Troubleshoot problems with network performance and call quality.

To learn more about SolarWinds VNQM, see these additional resources:

- SolarWinds VNQM Administrators Guide
- SolarWinds VNQM on THWACK
- SolarWinds VNQM Release Notes