Voice Quality Troubleshooting

Mitel Performance Analytics for detecting and addressing voice quality issues on the network

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Voice Quality Troubleshooting Blueprint

Troubleshooting Voice Quality (VQ) problems is among the IT community's top challenges when managing voice network performance.

On the network, VQ issues include:

LATENCY

The time it takes for packets of data to arrive from one point to another. Latency presents as echo and delay on the line for end users.

JITTER

The fluctuation in the latency of arriving data packets and can fluctuate depending on the route the data takes. Delay on a call and choppiness are significantly affected by jitter.

PACKET LOSS

This occurs when traveling data packets do not arrive, jump the queue or take too long. This presents as choppiness and can sound like parts of the conversation are missing.

How do VQ Thresholds Work?

MPA calculates an R value VQ rating based on measurements of the IP network performance. You can configure performance thresholds to generate alarms when the VQ R values thresholds are crossed. By setting the appropriate thresholds, you can detect and correct minor issues before they escalate into major issues. Threshold alarms can have different severities: warning, minor, major & critical.

90% of the time it takes to resolve network problems is spent finding its source*

Why VQ Monitoring?

- *Detect problems at an early stage - often before users are impacted.*
- *Shift your support model from reactive to proactive.*
- *Resolving problems quickly increases user satisfaction.*

Why Monitoring the Whole Network is Important for Voice Quality

Most VQ problems are caused by events in the IT infrastructure (ie: mis-configured router or a failing switch).

Knowing that a problem is occurring in a third-party device at the same time as a VQ problem can help you find the source of the VQ problem faster.

38% of Customer Churn is Due to Poor Voice Quality**

Why use MPA?

- *Monitor the Mitel AND third-party components of the network, for better outcomes.*
- *Be more proactive with thresholding and alarms and troubleshoot VQ problems directly from the MiVoice Business handset.*
- *Take advantage of built in remote access, with no need for a VPN.*

Voice Quality Troubleshooting Best Practices

This white paper shows you how to use Mitel Performance Analytics (MPA) tools to detect and fix Voice Quality (VQ) problems.

VQ Thresholds - How They Work

Mitel Performance Analytics uses thresholds to ensure you receive the performance data you want, when you want it – so that you can resolve problems quickly. By setting the appropriate thresholds, you can detect and correct minor issues before they escalate into major issues.

MPA calculates an R value VQ rating based on measurements of the IP network performance. You can configure performance thresholds to generate alarms when the VQ R values threshholds are crossed.

Threshold alarms can have the following severities:

Warning – No immediate impact, but abnormal device behavior detected

Minor – Non-performance impairing

Major – Performance impairing

Critical – Device out of service

Threshold Container Relationship

To set performance thresholds for a series of devices, you must first determine which Probe is monitoring those devices.

System performance thresholds are configurable from the container of the Probe that is monitoring the devices; or that container's parent containers up to the root of the container structure. A system administrator can set system wide thresholds at the root container of a structure. The system thresholds apply to all Probes in the container structure; and therefore to all devices in the system. A local administrator, who has access to just a few containers with just one Probe for example, can set thresholds for just the containers and the single Probe they can access. The local threshold settings apply to just the devices monitored by the local Probe.

Performance thresholds are applied hierarchically throughout a container structure. A threshold set in a lower container in the hierarchy overrides the same

threshold set higher in the hierarchy.

For example, a system administrator can set the following system thresholds for voice quality:

- *Raise a minor alarm when the R value is $\leq$ 80 for longer than 5 minutes.*
  - » *Clear the minor alarm if it increases to > 85 for longer than 3 minutes.*
- *Raise a major alarm when the R value is $\leq$ 70 for longer than 5 minutes.*
  - » *Clear the major alarm if it increases to > 75 for longer than 3 minutes.*

The previous thresholds apply to all Probes and monitored devices in the system.

A local administrator who can access a single Probe, called Probe A for example, can set the following thresholds from Probe A's container:

- *Raise a minor alarm when the R value is $\leq$ 90 for longer than 5 minutes.*
  - » *Clear the minor alarm if it increases to > 95 for longer than 3 minutes.*
- *Raise a critical alarm when the R value is $\leq$ 60 for longer than 5 minutes.*
  - » *Clear the critical alarm if it increases to > 65 for longer than 3 minutes.*

As a result of the previous settings, Mitel Performance Analytics generates the following alarms for the devices monitored by Probe A:

- *Raise a minor alarm when the R value is $\leq$ 90 for longer than 5 minutes.*
  - » *Clear the minor alarm if it increases to > 95 for longer than 3 minutes (set locally).*
- *Raise a major alarm when the R value is $\leq$ 70 for longer than 5 minutes.*
  - » *Clear the major alarm if it increases to > 75 for longer than 3 minutes (inherited from the system thresholds).*
- *Raise a critical alarm when the R value is $\leq$ 60 for longer than 5 minutes.*
  - » *Clear the critical alarm if it increases to > 65 for longer than 3 minutes (set locally).*

Note: Only users with the appropriate privileges can set thresholds.

Mitel Performance Analytics

Performance management and analytics have become a strategic requirement for business communications. Monitoring and managing performance offers a better user experience, resulting in less downtime, and decreases the cost of support.

The Mitel Performance Analytics (MPA) software suite helps administrators manage enterprise deployments with multiple network nodes, while allowing partners to proactively detect and address performance issues on customer networks.

Threshold Configuration Procedure

To configure system thresholds, do the following steps:

1. *Determine which Probe is monitoring the devices you want to set thresholds for.*

2. *Access the Probe's container dashboard or the dashboard of a parent container. Select Threshold under the Settings icon.*

The Global Thresholds window is displayed, showing a table of all parameters with thresholds for all device types. The parameters are listed in the left. The device types make up the table columns.

The following is an example :
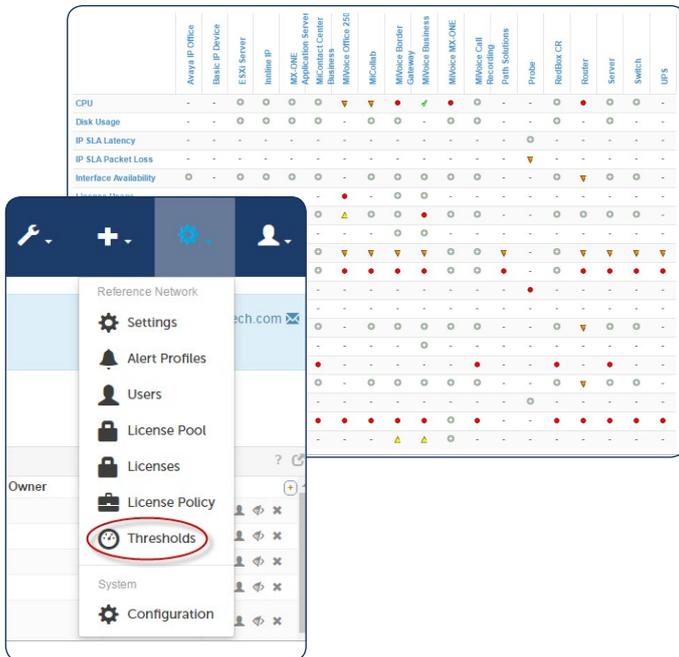
Each element in the table indicates the most severe threshold that has been configured and enabled for that combination of parameter and device type. The following table describes the threshold icons that appear in the Global Thresholds window.

Hovering over a threshold icon provides more details on the thresholds defined for that particular parameter and device combination.

In the following example, there is only one threshold alarm configured for MiVoice Business Voice Quality.

Note: The Global Thresholds window displays settings that apply to the current container and all its descendant containers only. It does not display settings inherited from parent or other ancestor containers.

For further information on the threshold alarm, click on the icon at the intersection of the parameter and device type. The Thresholds page is displayed:

The Thresholds page shows the thresholds settings for that parameter and device pair. In this example, a minor alarm is generated when the R value is ≤ 70 and cleared when it increases to > 70 for 10 minutes.

Click on the Edit button on the Thresholds page to open the Edit page. The threshold Edit page lets you to set warning, minor, major and critical alarm severity threshold values for a specific parameter and device pair.

The Lower is Worse? setting indicates that a lower value means worse conditions. (For some other threshold parameters, such as utilization or noise, lower values mean a better condition.) Ensure the Lower is Worse? setting is selected for VQ thresholds.

Set threshold values by dragging the slider for the selected alarm severity or by entering the value below the slider. The slider moves to the nearest valid values for the threshold it is being set for.

Correlating Alarms from Different Devices

Poor Voice Quality is often caused by issues in the underlying network. For example, a misconfigured router or failing switch. You can identify the root cause of poor Voice Quality faster by correlating alarms from multiple devices in your network. MPA can monitor both the Mitel and third-party (ie: routers, servers, switches) component of your network.

Correlating Alarms from Different Devices

Use the VQ threshold alarm times to look for alarms from your network devices, such as routers, during those time periods. If the router alarms occur repeatedly when you get VQ threshold alarms, there is likely a relationship between both.

Mitel Performance Analytics is the ideal tool for collecting and analyzing alarms from multiple devices in your network.

In particular, access Alarm Analytics by clicking the icon in the top right corner of the Alarms panel to expand it and see its tabs. The Alarm Analytics tab lets you customize your alarm management environment to help you see more easily, the alarms that matter most to you.

The more data available, the better, Mitel Performance Analytics can help you identify and correct performance issues. For this reason, Mitel recommends that you use Mitel Performance Analytics to monitor as many devices in your network as possible.

VQ Troubleshooting Using Integrated Trace Route Tool

MPA can speed the troubleshooting process by running IP Trace Route directly from a handset connected to a MiVoice Business or MiVoice Border Gateway.

A Mitel Performance Analytics user with Remote Access privileges can run Trace Route from an IP set on a MiVoice Business system. This test can help administrators determine possible voice quality issues. When the test is run, Trace Route executes using the source and destination IP addresses of a specific call. The Trace Route packets are tagged and marked the same as the phone's RTP packets and are sent on the phone's VLAN.

TO RUN TRACE ROUTE FOR A SPECIFIC IP CALL, DO THE FOLLOWING STEPS:

1. From a MiVoice Business or MiVoice Border Gateway dashboard, access the Voice Quality panel. Click on the areas of bad voice quality.

The following is an example:
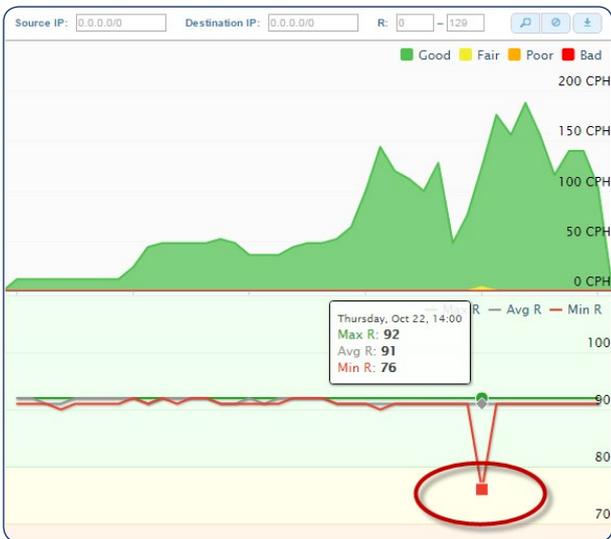
The expanded view is displayed:

2. For a call with bad voice quality, click the Test icon in the Test column.

The Test column appears only if you have Remote Access privileges. The Test icon appears only for calls from a MiVoice Business call server.
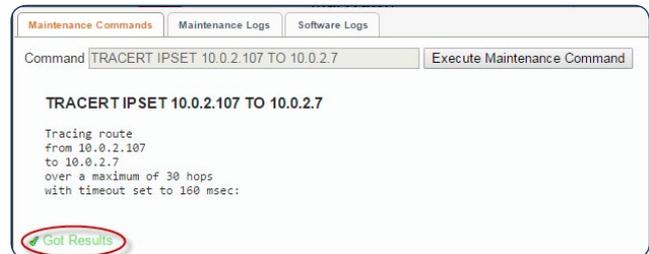
Clicking the Test icon starts the test and displays the results.

The test status is displayed in the lower left corner of the panel.

To run the test for a different set of IP addresses, update arguments in the Command field and click the Execute Maintenance Command button. Mitel Performance Analytics allows you to update the command arguments, but not the command itself.

Voice Quality Cause Correlation Graphs

Providing deeper insight into voice quality problems, the VQ Cause Correlation graphs point you towards possible root causes. For example, poor call quality correlated with high call volume will point you towards a capacity problem.
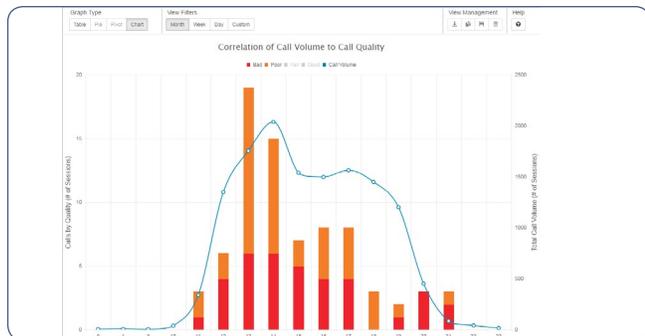
Available voice quality correlation graphs are:

Call Quality by Directory - the number of calls with bad or poor quality for the 10 worst directory numbers associated with a device.

Voice Quality by Hour of Day - VQ metrics for the hours of the day. Metrics include the number and percent of good, fair, poor, or bad calls; the hour of the day they occurred, and the total number of calls.

Worst Performing DNs (%) - the percentage of poor quality calls for the 10 worst directory numbers associated with a device.

Worst Voice Quality Devices - the number of calls with bad quality for the 10 worst devices in a container. Voice Quality Cause Correlation Graphs can be found in the Tools menu under 'Voice Quality Queries'.

Visualize Voice Quality Problems on a Network Diagram

You can see which part of the network is being impacted by a problem by using the network diagram feature in the MPA dashboard, which presents a visual topology of your network, with health status icons overlayed. For example, knowing that directory number 4101 is connected to a MiVoice Business and router impacted by packet loss can point you towards fixing these problems and predicting the impact on the user.

The Network Diagram panel lets you upload to Mitel Performance Analytics your own network diagram with network devices arranged as you prefer.

For example, your network diagram could be:

- *A diagram of devices based on the physical location*
- *A diagram of devices based on the logical distribution*
- *A diagram separating groups of devices based on either VLANs, as a cluster, or as a nested grouping*
- *A diagram of monitored devices with surrounding equipment not monitored by Mitel Performance Analytics*
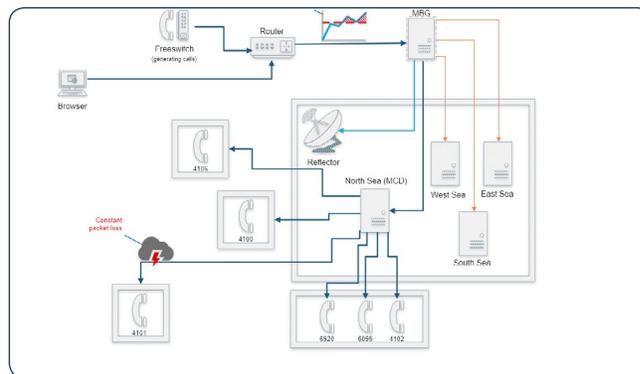
If your network diagram is valid, Mitel Performance Analytics overlays health status icons over the devices being monitored. The health status icons are linked to the alarm filter, just like the Location Map panel, the Alarms panel, and the device hierarchy at the left of the dashboard.

The Network Diagram panel provides you with:

- *A different perspective on viewing collected alarms*
- *A quick reminder of what your network looks like*

From the Network Diagram panel you can display the alarms of a particular container or device. You can also jump to a particular container or device dashboard to see more detail.

You can use Microsoft Visio 2016 Professional and Microsoft Excel to prepare a network diagram suitable for Mitel Performance Analytics. Mitel Performance Analytics uses the shape data for each shape in your diagram to associate alarm data to that shape. When you import a network diagram, Mitel Performance Analytics looks at the shape data for each device and container:

- *For devices, it looks for a device IP address, a device MAC address, or a device name.*
- *For containers, it looks for a container name or the contact information account number as entered in the container settings page.*

For details on how to create and upload a network diagram, consult MPA Online Help.

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The Mitel Performance Analytics (MPA) software suite helps administrators manage enterprise deployments with multiple network nodes, while allowing partners to proactively detect and address performance issues on customer networks. More information can be found at:

mitel.com/mitelperformanceanalytics