

ITPro Tools in Skype for Business To Ensure a Stellar Experience

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A description and assessment of the Microsoft and 3rd-party tools to support enterprise deployments of

Skype for Business

Skype for Business offers a comprehensive unified communications and collaboration platform with the ability to revolutionize an enterprise's business processes, enable a high level of business agility and generate a significant return on investment. That promise hinges on Skype for Business's ability to consistently deliver high availability and a high quality user experience (UX). Without that consistent high quality UX, adoption will falter, the potential benefits will not be reaped and ROI will evaporate.

Given the nature of the Skype for Business environment, delivering that consistent high quality UX, particularly for real time voice and video services, will present challenges. The end-to-end path will involve any number of servers, front ends, gateways, mediation servers, routers, switches, Wi-Fi access points, firewalls, end points and network services all of which could be acquired from different vendors and must be configured to interoperate seamlessly. Further, by their very nature, router networks introduce a level of unpredictability with regard to varying traffic levels and the ability to reroute data streams to reduce congestion or to recover from equipment or transmission link failures.

To address those challenges and allow IT Administrators to deliver the required high quality UX in Skype for Business deployments, Microsoft has introduced a set of network planning, operations, reporting, and network assessment capabilities called ITPro Tools. These tools are a combination of capabilities that Microsoft provides as part of the Skype for Business software and [auxiliary tools sold by 3rd party vendors](#)¹, in particular [Event Zero](#), [Nectar](#) and [Unify Square](#). Together they provide a toolkit that IT Administrators and network engineers can use to plan, provision, monitor, troubleshoot and report on the overall performance of a Skype for Business network.

The purpose of this report is to help IT Administrators understand the challenges involved in delivering that high quality UX, recognize the importance of these tools in achieving those objectives, get a clearer picture of where the various tools fit in the overall support complex and highlight some of the key differences in the capabilities they provide.

VoIP Basics

To recognize the challenges involved in delivering a high quality UX in enterprise voice and real time video services, it's important to understand the essentials of how voice and video over IP (V&VoIP) technology works.

To operate over a VoIP service, the analog voice signal must first be converted into digital form; the hardware or software component that performs that translation is called a "codec." The component

¹ All 3rd party tools to be certified for Skype for Business by year-end 2015.

that captures video and represents it in digital form is also referred to as a “codec.” The codec technique employed, along with other factors like the use of forward error correction (FEC), will determine the amount of transmission capacity (i.e. “bits per second” or “bps”) required to carry the call. Skype for Business offers a number of codec options allowing for varying levels of quality and different transmission capacity requirements. The options include Real Time (RT) Audio Wideband, RTAudio Narrowband, G.722 (Wideband), G.722 Stereo, G.711 (PSTN Standard), SILK, and Siren (Conferencing). For video, the transmission requirement is based primarily on the video resolution (i.e. the number of pixels in the image). For content sharing, screen resolution is the major factor. The transmission rate requirements for each type of Skype for Business service is provided in Appendix A.

Once the voice or video is in digital form, it is formed into transmission packets. Along with the encoded voice or video, the packet also includes a series of headers with an address and other information about the packet. IP provides the primary header including the IP address used to deliver it to its destination, and the Class of Service (CoS) priority indicator or DiffServ Control Point (DSCP). Behind the IP header is a User Datagram Protocol (UDP) header and an additional header for the Real Time Protocol (RTP). The RTP header includes a sequence number to ensure the packets are decoded in the correct order and a time stamp so they are played out in the correct cadence.

There is no error recovery mechanism in UDP, so if packets are lost or delayed excessively, the receiver will not be able to reconstruct a good quality representation of the original signal. The impact will depend on the codec employed and the percentage of packets lost in a given period of time; the loss of sequential packets is of particular concern. Those voice and video packets will be vying with data packets for transmission capacity over the network, which is why quality of service (QoS) mechanisms that provide priority for those voice and video packets within the network are so important in ensuring a high quality UX.

Microsoft Network Planning and Operations Framework

To assist IT administrators in building Skype for Business networks that can deliver the required UX, Microsoft has developed a Network Planning and Operations Framework that breaks the overall process of planning, provisioning and operations into 7 functional areas:

1. Network Pre-Assessment
2. Planning and Deployment
3. Provisioning
4. Network Monitoring
5. Reporting
6. Troubleshooting
7. User Surveying

Microsoft has assembled an extensive set of tools to help users to plan, deploy, provision, monitor and troubleshoot every Microsoft-provided element in a Skype for Business deployment. These tools also allow administrators to monitor feature and service adoption across the organization, a key requirement in ensuring the organization derives the greatest benefit out of its Skype for Business deployment.

On top of that, Microsoft has documented extensive amounts of useful information in the Skype for Business Network Planning Guide and other resources like the Skype for Business Server Networking Guide, Bandwidth Calculator Planning Tool/Capacity Planner, the Best Practices Analyzer, the Health Readiness and Connectivity Checks and the Call Quality Methodology. With these tools IT Administrators can deliver a set of communication and collaboration capabilities that operate reliably and consistently and provide a high-level user experience. Further, these tools provide different levels of access to meet the needs and capabilities of administrators with varying levels of expertise.

The Networking Guide provides a model for managing the network infrastructure for a Skype for Business deployment, and it describes three phases—planning, monitoring, and troubleshooting. The guide includes the new Microsoft Call Quality Methodology Scorecard for Skype for Business Server. Key Health Indicators (KHI) are Performance Counters with recommended thresholds aimed at revealing problems that can impact the user experience. The KHI Guide outlines the operational process and remediation steps to maintain a healthy deployment, and includes a sample PowerShell script used to configure KHI Data Collectors and an Analysis and Definitions Workbook, which describes how to analyze KHI performance data.

Many of the Microsoft tools focus on maintaining the health of the server pools and other infrastructure elements needed to run Skype for Business, but they also collect information on the end-to-end performance of services provided over the network. The Microsoft tools are augmented with tools from 3rd party vendors that extend or enhance the IT administrator's ability to plan, deploy, provision, maintain and operate the network. We will be using this framework to identify the functions provided by the various Microsoft provided and 3rd party tools, and we will describe them in the context of the 7 functional areas.

1. Network Pre-Assessment

Before attempting to push Skype for Business traffic over an existing network infrastructure, it is important to first determine if the infrastructure has sufficient bandwidth available on all LANs and all WAN routes to support the additional traffic without degrading other services. It is also important to confirm that all of the various network elements (e.g. switches, routers and network services) have been configured with suitable quality of service (QoS) mechanisms so that voice and video packets will be delivered within the required parameters for packet loss, delay and jitter (i.e. the variation in delay from packet to packet); those parameters are spelled out in the Skype for Business Server Networking Guide.

To make this assessment, you must first understand the PBX and video systems that are in place and their patterns of usage. That would include such things as number and types of stations at each location, number of attendant (i.e. “operator”) consoles, interactive voice response systems (IVRs), voicemail systems and capacities, existing network connections including Internet, MPLS, PSTN access trunks and the like. Particular attention should be paid to any contact centers that exist as these are typically customer-facing operations and utilize highly specialized call routing procedures that must be documented and recreated. In many cases implementation of the contact center components are deferred until the basic Skype for Business services are in place.

From there, you must then develop an estimate of the types (i.e. voice, video, conferencing, IM, etc.) and volumes (i.e. number of calls, number of conferences, bits per second, etc.) of traffic that the Skype for Business deployment will generate between and among all locations on the network. If this is a single site deployment, this assessment will involve the site’s LAN and Wi-Fi infrastructures (if Wi-Fi access is going to be supported), and its connections to the public telephone network. If this is a multi-site deployment, those same parameters must be assessed for each site as well as the bandwidth requirements between all sites.

Regional deployments introduce an additional level of complexity as the routes between those regional centers (e.g. North America, Europe, AsiaPac, etc.) must be sized to carry all of the traffic between those regional centers as well as traffic passing through them on its way to satellite sites in each of those regions.

To assist in preparing your estimate, Microsoft offers the Skype for Business Bandwidth Calculator. This comprehensive Excel-based tool allows you to define user personas for different job functions with their expected usage and site profiles for each location. You can also specify the types of audio and video codecs, screen sharing resolutions and other system wide parameters and develop a network-wide picture of your Skype for Business traffic in each part of the network.

With the traffic estimate in hand, you can now use a tool like Nectar’s Perspective to inject synthetic calls into the network for an expended period while monitoring the impact on performance to identify locations or network routes that require attention. Unify Square also offers a Network Assessment tool that performs “stress testing” on the network infrastructure in conjunction with its UCRightTrack planning service described below. The Unify Square network assessment tool does not use simulated call data; rather it invokes real audio, video, and app sharing sessions using the Skype for Business client to provide what they claim is a more pragmatic insight into the network’s health. Like the Bandwidth Calculator, these tools allow you to specify the codecs and other parameters that will impact the bandwidth requirements per user persona and generate the appropriate volume of traffic for each profile. The data collected include metrics on packet loss, jitter, round-trip delay, packet mis-sequencing, DSCP stripping and an estimate of the resulting Mean Opinion Scores (MOS).

One important feature of Nectar’s Perspective tool is that it supports other vendor platforms as well as Skype for Business. Very often Skype for Business is deployed in mixed vendor environments or a

customer might be migrating from another vendor to Skype for Business and will need to manage that mixed environment during the transition.

The output of this assessment should be a report that describes the readiness of the existing network infrastructure to support the Skype for Business generated traffic, identifies problem areas and routes, and provides a budget for the network and infrastructure upgrades that will be required to make the environment capable of delivering that high quality UX.

2. Planning and Deployment

With a detailed picture of what will be required to deploy Skype for Business in your environment, you can move on to the next phase of the project which will be planning and deployment. That should begin with a high-level plan that describes the overall approach and proposed timetable (e.g. upgrade infrastructure and network services, implement regional centers, interconnect and test, deploy satellite locations, etc.).

Microsoft provides a full suite of tools to plan, size, configure and deploy your Skype for Business network. Key among these is the Microsoft Skype for Business Server Planning Tool. The Planning Tool asks a series of questions about your organization and the features that you are interested in providing; the tool supports deployments up to 10 sites. The requirements also address such issues as high availability and disaster recovery. The Planning Tool will then use the answers to recommend a topology based on the tested Microsoft Skype for Business Server user models. The tool also offers the capacity guidance for the required features and information for the proposed configuration (e.g. hardware, network, DNS, Certificate, IP, etc.) based on the Skype for Business Server user models.

Nectar offers a planning and deployment support tool, which they call UC Foundation. While the Skype for Business Planning Tool addresses the Microsoft configuration, Nectar's UC Foundation product looks at the overall network including the local and wide area networks. The product includes Vendor Knowledge Modules that allow you to auto-discover the network inventory down to the level of PBX models, software releases, cards, routers and switches. Among the vendors supported are Cisco, Avaya, Sonus and Audio Codes. Once it collects all of the inventory information, the tool creates dependency trees so you can recognize potential critical failure points.

Finally, a test and acceptance plan should be drawn up to ensure that all of the network elements are installed and configured correctly and that users should be able to make use of the service on Day One. To assist in that confirmation, Microsoft offers a Best Practices Analyzer (BPA) and a Health Readiness Check (HRC). The Best Practices Analyzer allows you to identify and resolve problems within your Skype for Business Server deployment. The analyzer gathers configuration information from Skype for Business Server components and allows you to proactively perform checks, verify that the configuration is set according to recommended best practices, detect required updates and generate a list of issues, such as

suboptimal configuration settings, unsupported options, missing updates or practices that are not recommended.

The Health Readiness Checks can find components and settings in your current environment that might cause problems when you start to set up or use the services. In effect they allow you to know where the potential roadblocks are before you start, so you can fix them or develop work arounds to make your deployment path easier to complete.

For those who would want professional help in planning their Skype for Business network, Unify Square offers UCRightTrack, a 30-day program of network planning services that focuses on strategy and design, network pre-assessment using the company's network assessment tool, Implementation and deployment, user adoption strategies and operations. Unify Square has drawn on its extensive Skype for Business systems integration practice in designing this program. Unify Square has also developed a Global Voice Deployment Program which, if used across the entire deployment, provides a global voice inventory that can feed into an automated provisioning system. Throughout the process, the company recommends using its PowerMon product to generate synthetic or simulated calls to measure the call quality as the deployment progresses.

3. Provisioning

With the Skype for Business infrastructure in place and tested, we can begin provisioning users. Device provisioning has always been a pain point and there has been a gap in provisioning tools for IT administrators. User services can be provisioned using the Skype for Business Server Control Panel, a web-based tool that provides a graphical user interface (GUI) to manage the configuration of the servers running Skype for Business Server, as well as users, clients, and devices. Skype for Business Server Control Panel uses Skype for Business Server Management Shell as the underlying mechanism to perform Skype for Business Server configuration. More sophisticated users can employ the PowerShell for this purpose.

As an alternative to the Skype for Business Server Control Panel, both Unify Square and Event Zero offer provisioning tools; Unify Square's tool is called PowerProv and Event Zero's is called Dossier: Provisioning Manager and Extension Manager. These provisioning tools manage many of the details of the system including Direct Inward Dial (DID) numbers, extensions, and Enhanced 911 (E911) coordination. Event Zero's will also allow users to self-provision their own services thereby alleviating IT of much of the burden of activating users.

To ease the task of bringing users on line, the IT administrators can first define system-wide parameters; they can also define standard configurations and policies for different job roles or departments. A key part of this set-up is configuring and managing the extension and DID numbers. The last 4-digits of the DID number are typically used as the extension number for station-to-station calls. DID numbers are assigned by the carrier in blocks of a few dozen to several hundred, but rarely will the entire group of

DIDs for a site be in a single uninterrupted sequence. Knowing where those numbers are assigned can also be important for ensuring compliance with Enhanced 911 (E911) requirements.

That assignment peculiarity makes it difficult for IT administrators to keep track of which numbers are assigned or unassigned as users join and leave the organization. With an extension management system, numbers are assigned automatically and numbers are returned to the pool when a Skype for Business account is deactivated. This may sound like a rather minor undertaking, but anyone who has had to manage DID numbers for a large site or set of sites will appreciate the magnitude of the challenge.

The number plan can become more challenging if there is a desire to provide inter-site 4-digit dialing capability. In that case, the same 4-digit extension codes cannot exist in different locations; this becomes more difficult as the number of end points increases and there is a physical limit of 9000 total end points. Most typically we see 5- or 6-digit inter-site dialing plans for large installations where the first 1- or 2-digits are a site code and the last 4- or 5-digits are the extension number.

Event Zero's auto-provisioning process is driven by the creation of a new account in Active Directory. That entry triggers a new account in the Skype for Business server, to which the appropriate profile is assigned, a number is allocated, and a message is sent to the user. If the user will have a desk set, they connect it to the Ethernet jack, and an identification number will appear on the screen. The user then navigates to a web address that is provided, enters the identification number and the Provisioning Manager downloads the profile. Barring any problems in the set-up, the user should be ready to start using Skype for Business in a matter of minutes.

Unify Square's PowerProv tools eases the provisioning process for IT administrators, but they feel that the provisioning process is too involved for most users to handle so their approach assumes an IT administrator will be part of the process and designs the tools that automate the provisioning and maintain the Skype for Business policies. They also recommend using their PowerView tool during the provisioning process, particularly its capability to monitor feature adoption so IT administrators can see which features and capabilities are being used in which areas and identify the need for additional training.

Event Zero has also introduced a tool for provisioning for Polycom Skype for Business-certified devices including the VVX, CX, SoundPoint and SoundStation families. This is a very powerful feature, as the Skype for Business tools do not support it natively creating a pain point for customers. Further, Event Zero also includes device management (under Dossier: Skype for Business Devices). The feature will list which users have which devices and the client version they are running. This can be very valuable information for troubleshooting call quality issues (e.g. identifying the fact that the user has a device running an old and unsupported version).

4. Network Monitoring

Once the network has been implemented and the users provisioned, the real work begins. That job involves making sure that users consistently receive a high quality experience on all of the Skype for Business services they use, particularly real time audio and video connections. If we fail to deliver on that UX, adoption will lag, users will find other tools to do their jobs, and the ROI from the Skype for Business deployment will plummet.

Delivering that stellar end-to-end UX on Skype for Business requires that all of the various piece parts work together as planned. That's a tall order when you consider that those elements may come from a dozen or more carriers and equipment suppliers, and are subject to any number of potential failures. Further, critical configuration settings like QoS can unwittingly be disabled in routine network maintenance, and as new services are brought up or equipment replaced, those settings can easily be mishandled. Some [analysts estimate that as many as 90% of network failures](#) are the result of configuration errors.

IT administrators have to take a proactive stance to stay on top of these types of network problems. That starts with monitoring, the process of making a real time assessment of the state of the environment, and routinely surveying users to assess overall Net Satisfaction (NSAT).

Microsoft provides a raft of tools for monitoring the Skype for Business environment including the Monitoring Server or Centralized Logging Services (CLS). CLS drives reports that describe the usage and health of the server deployment. Those reports examine performance factors ranging from individual users' call details to aggregate call quality across various parameters and date ranges. Used in conjunction with the Key Health Indicators Analysis Tool, IT Administrators can get a real time, in-depth view of the overall health of the servers and other components, the quality of the services users are receiving and, very importantly, the adoption rates of the various services provided by the network. Microsoft also provides network monitoring through the System Center Operations Manager (SCOM), Event Logs, PerfCounters and the Call Quality Dashboard.

While Microsoft offers one set of service monitoring tools, there are also 3rd party monitoring tools like Event Zero's Dossier, Nectar's UC Management Platform (UCMP) and Unify Square's PowerMon and PowerView. These tools use a combination of three basic techniques for assessing network health and the quality of the user experience:

1. Analytics-based Assessment
2. Synthetic Transactions Assessment
3. Real Time Media Analyzers

Analytics-based assessment depends on two important pieces of data provided by Skype for Business, the Call Data Record (CDR) and the Quality of Experience (QoE) data. The Call Detail Record provides a detailed look at each individual call and includes nearly all the QoE metrics and statistics collected by Monitoring Server, such as:

- Call Information

- Caller/callee Device and Signal Metrics
- Caller/callee Client Event
- Audio Stream (Both directions)
- Video Stream (Both directions)

Quality of Experience (QoE) data reports on the overall quality of the media exchange and includes such standard telecommunications metrics such as jitter, packet loss, and round-trip delay that can be used to help administrators assess the quality of each call and to troubleshoot any problems that might have degraded the call quality. At the termination of each call, the endpoints generate a record of the average performance of the call (e.g. packet loss, jitter, round trip delay, etc.) that is stored in the QoE database. That QoE data is accessed by both the Microsoft reporting tools and by 3rd party monitoring and reporting tools.

Tools like Event Zero's Dossier, Nectar's UC UCMP and Unify Square's PowerView monitor end-to-end service using analytics-based assessment. Each of these offers a different mix of capabilities and reporting formats geared for different user needs and profiles. IT administrators set thresholds that differentiate good calls from poor calls, and then, by analyzing the poor call data in the QoE database, they can identify problem areas that should be addressed. IT administrators can sort poor calls by call type (cellular, VPN, WLAN remote, WLAN in-house), internal or external, by region, by site, even by individual user. They can also sort by device type identifying problematic deskset models, headset models, and video camera types. In each of those cases it can identify the percentage of poor calls, average round trip delay, average jitter, average packet loss and from that estimate the Mean Opinion Score (MOS).

Unify Square's PowerMon and Nectar's Perspective take those analytics a step further by generating synthetic transactions or simulated calls to monitor performance. IT administrators can configure the frequency of the calls and then use the CDR data from those calls to identify problems. This allows IT administrators to recognize problems developing in the network before users experience them and start calling the help desk.

For now, only Nectar is making use of real time media analyzers. While Nectar provides QoE database analysis via its UC Foundation module, it adds some important additional capabilities with its Perspective and UC Diagnostics products. Skype for Business provides an end-of-call record that reports the average performance of the network during that call. The Real Time Transport Protocol (RTP) that is used to carry voice and video traffic operates in conjunction with a second protocol called the Real Time Control Protocol (RTCP). While RTP carries the media (i.e. the encoded voice or video), throughout the call each endpoint periodically sends an RTCP packet that provides information about the number of packets sent and received. Nectar's Perspective makes use of that RTCP information to determine in real time such things as packet loss and delay. That information can allow Perspective to estimate MOS while the tool continuously monitors network traffic.

The other big differentiator in network monitoring solutions is where the monitoring is performed. The most typical scenario is to collect call performance data at the endpoints; that is the information

collected and stored in the QoE database. The good news with that approach is that you capture the performance of the entire path and all of the elements in it. The bad news is that if a problem does crop up, how do you locate the source? To isolate or “sectionalize” what portion of the path is creating the problem, you need the ability to monitor the performance at multiple points along the path and note the monitoring point where the performance drops off.

With Nectar’s platform you can insert media analyzers at strategic points in the LAN or WAN (e.g. between core and distribution switches or between the local and wide area networks). One important capability that sets Nectar’s solution apart is that it interfaces directly with Microsoft’s Software Defined Network (SDN) API v2.1. In effect, the Skype for Business server reports the identifying parameters of each call (e.g. endpoint addresses, bandwidth requirements, codec type, etc.) directly to the Nectar platform allowing for a much more “informed” assessment of the impact of things like jitter or packet loss. Even though hundreds of simultaneous calls might be running through that monitoring station, the information provided over the SDN API allows Nectar’s UCD to recognize the packet addresses and track the performance of each call independently.

While it doesn’t yet support the SDN API, Event Zero’s Dossier can also get visibility into individual calls. In Event Zero’s approach, the system monitors the Session Initiation Protocol (SIP) signaling exchange to identify end points, call features, endpoint addresses and the like. Dossier also looks at what other call or services are being used in the same areas at the same time to understand the environment in which a problem is occurring. Unify Square’s PowerMon also does an analysis of SIP signaling.

The ability to consistently deliver a high quality UX in Skype for Business depends on your ability to proactively monitor the services you are providing. Depending on the needs of the organization that can be done by analyzing data in the QoE database or by using probes that monitor traffic at strategic points throughout the network to more precisely isolate where the problems are occurring. Many organizations find they need a combination of the two approaches to provide a long-term analysis of performance along with the ability to respond to trouble reports more quickly and effectively.

5. Reporting

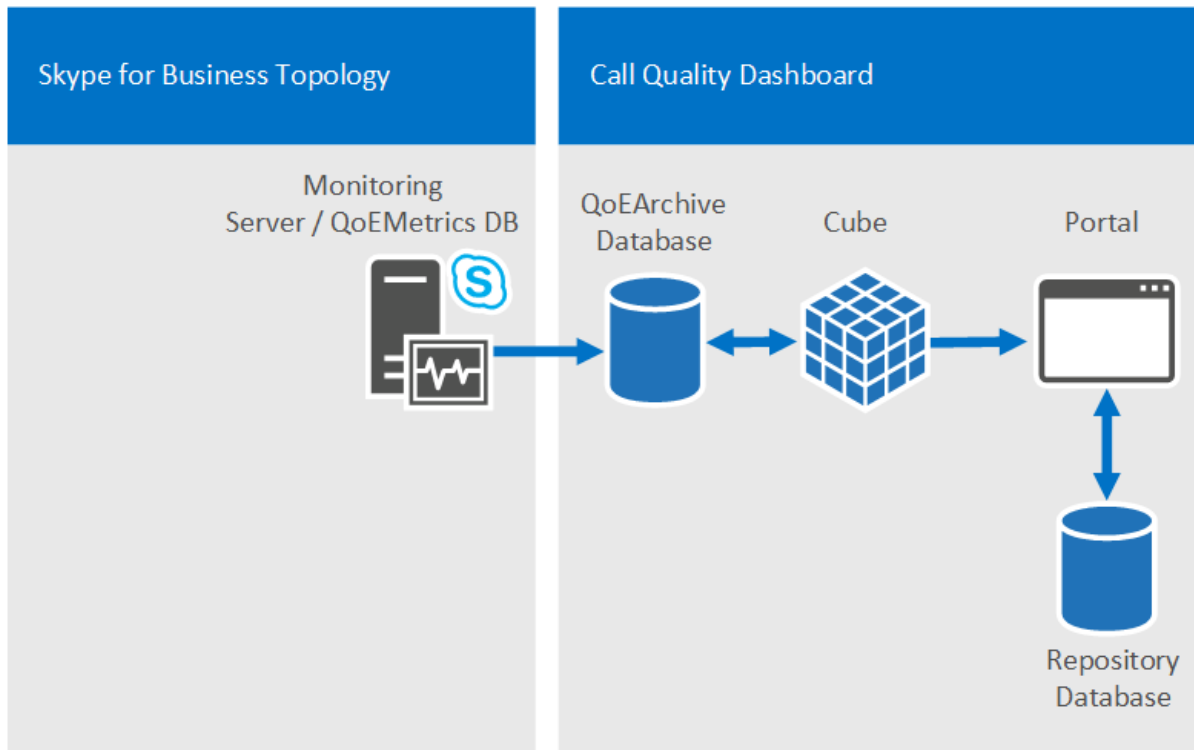
From the continuous monitoring that is done on the network traffic, reports can be produced that provide an ongoing record of network performance, identify trends and highlight areas where service may be degrading. The challenge with reports is that they must be clear, intuitive to understand and provide a meaningful overview of the network performance while allowing the ability to drill down to understand problems in greater detail.

Microsoft offers a Call Quality Dashboard (CQD) that provides IT administrators with a quick overview of their system health and usage. The CQD is essentially a reporting layer on top of the QoE Database in the Monitoring Server in Skype for Business Server 2015. The CQD is a web portal for quickly creating and organizing reports based on Quality of Experience (QoE) data from your Skype for Business

environment. The CQD deploys an SSAS cube to aggregate the data in the QoEMetrics database, which enables users to create and modify reports and see them update in real-time.

Additionally, CQD exposes web APIs that give users programmatic access to the cube data for use in custom dashboards. CQD uses Microsoft SQL Server Analysis Services to show an aggregate view of key system metrics displaying: totals for the current day, totals for the week, and trend totals for the past six weeks. The data tracked includes total IM, audio and video sessions, a/v conferences, web conferences, call failures, poor quality calls and other key metrics of usage and service quality.

Figure 1. Call Quality Dashboard Components



Unify Square also provides a reporting capability in its PowerView product. Event Zero has reporting capabilities its Dossier products: Dossier: EV; Dossier: Conference; and Dossier: Skype for Business Devices. All of the modules in Nectar's UC Management Platform (UCMP) provide extensive reporting capabilities.

The other thing that these tools allow is the ability to measure user adoption for different Skype for Business media or services. So, for example, you can see sites, departments or user groups that are using enterprise voice but not using IM, conferencing or content sharing and use that insight to focus your training efforts. Being able to identify what services are being used is key, because one of the big savings we look for in a Skype for Business deployment is moving conferencing in-house thereby reducing the use of outside conferencing services.

The reporting tools offer a wide variety of formats and options, and the choice of which is best typically comes down to a matter of preference and detail required. Event Zero favors a clean management oriented view that is easy to digest with the ability to easily drill down for a clearer understanding of a problem. Given its more detailed monitoring capabilities, Nectar provides a richer set of information though the format might be somewhat intimidating for novice users. Unify Square falls somewhere in the middle.

The other factor that can sway the decision is the type of customer. Systems integrators and very large enterprises with a staff of technical experts might prefer the type of detail that Nectar's solution

provides, though smaller customers use it as well. Other customers might like the simplicity that Event Zero or Unify Square can provide. We have included samples of each vendor's reports and dashboards in Appendix B.

6. Troubleshooting

Troubleshooting tools are closely related to network monitoring. The network monitoring capability can alert you to the existence of a problem, however the location of its source will likely call for some creative "detective work." In any event, the network monitoring tools will give you some insight into the possible cause. Some like Unify Square's PowerMon actually recommend likely causes, what they call "prescriptive guidance." Nectar's UC Diagnostics tool uses its knowledge of network dependencies and real time monitoring to do a full root cause analysis.

Microsoft offers a Pre-Call Diagnostic (PCD) tool, an application that reports expected audio quality as it relates to the network. The tool should be installed on any desktop or laptop PC that suffers from inconsistent network connection quality. The PCD can provide a quick check of the current network conditions and preserve a history of quality data to let users profile their network performance over time or other conditions. The tool is particularly useful for home/mobile users and users using WIFI access points.

Remote Connectivity Analyzer (RCA) is a web-based tool that allows IT Administrators to test the ability to connect to services in the Skype for Business environment. The tool provides IT administrators and end users with the ability to run connectivity diagnostics for servers to test for common issues with Exchange, Skype for Business and Office 365.

Microsoft has also defined a Call Quality Methodology (CQM), a holistic way to systematically define and assert call quality. CQM divides a Skype for Business implementation into ten discrete areas that impact quality, defining targets and a remediation plan for each one. CQM is a framework to tackle call quality problems that can be modified or extended to address the particular conditions on your network. It includes an updated version of the Microsoft Call Quality Methodology Scorecard for Lync Server. The scorecard should be used to implement the Lync Call Quality Methodology or CQM.

CQM breaks down system troubleshooting into three paths or "Roads": the Server Plant Road, which looks at the servers and the links between them; the End Points Road, which looks at user devices and media used to carry calls; and the Last Mile Road, which addresses integration with traditional switched telephone network calls. Each Road is further divided into several segments relating to a specific area or topic, and definitions are provided for each segment identifying what is an acceptable quality level. Actions can be taken to achieve that quality level and a service management plan is put in place to maintain that quality level before moving on to the next topic. Microsoft even publishes a [poster](#) that leads an administrator through the troubleshooting process.

The analytics-based monitoring tools we described earlier are driven by data that is collected after the call is completed. There are two problems with the post-call analysis approach. The first is that the network has already failed in some way and what we are trying to do is keep it from failing again. The second is that the QoE data provides a measure of the *average* quality the user experienced during the call. The problem is that the call could run well for an extended period of time and then fail abruptly causing the user to disconnect. However, with the long period of good performance, on the “average” the call quality could appear to be good. To address this, Microsoft is planning to add in-call reports similar to the RTCP reports that can be monitored in real time and identify potential problems even before the user disconnects.

Event Zero and Unify Square make use of Session Initiation Protocol (SIP) logs to understand the environment in which the troubles are occurring. Nectar’s UC Diagnostics (UCD) supports network media analyzers that can be inserted at critical points within the network to analyze the performance of calls passing through them in real time; UCD is alerted to that fact that a call has started by a message sent over the SDN API from the Skype for Business server. UCD can also leverage data captured by the UC Foundations product.

Nectar’s UCD is alerted to a problem when a pre-defined threshold is exceeded creating an alarm; alarms can also be created from network events like a link failure or a path change in the network (UCD actually monitors the router advertisements). Knowing the network dependencies and having media analyzers at strategic points in the network allows the UCD platform to do root cause analysis and identify the cause of the problem in real time; the other solutions depend on the post-Call QoE reporting so the fact there was a poor call isn’t known until after the call is terminated. With knowledge of the router configuration, Nectar’s approach can even recognize problems like real time traffic exceeding the bandwidth allocated on a particular link.

These tools do not replace the Microsoft provided tools, but rather must be used in conjunction with them to get a full picture of what is going on in the server environment as well as the performance of the overall network.

7. User Surveying

While network monitoring and reporting along with analysis of trouble tickets can give an overall sense of how well the Skype for Business network is performing, in the final analysis, it is the users' opinions that are most important. Microsoft depends heavily on Net Satisfaction (NSAT) metrics to measure the overall performance of a product. Collecting the user inputs to compute that requires a survey of users.

However, users historically respond poorly to email surveys, which Unify Square estimates typically yield response rates in the 20% to 30% range. To address this problem, Microsoft offers a post-call user survey capability called RateMyCall. At the end of each call, a window can pop up on the user's screen allowing them to provide a ranking on the call quality. IT Administrators can also generate surveys to assess the quality of any Skype for Business service.

Unify Square offers a cloud-based proactive user survey tool called PowerSat that is designed for Skype for Business. On a weekly basis the user is sent a one-question survey with 4-answers to choose from plus a "Comments" field; the survey is sent in the form a Skype for Business text. The standard survey asks the user to provide the NSAT score (1 to 4) and record any comments on the service in the free text field. The survey tool is also presence aware, and will delay sending the survey if the user's status is "Busy." Using Skype for Business text as the delivery vehicle and using the presence status to avoid interrupting users when they are busy yields response rates in the 60% to 70% range. There is also the option of sending more detailed multi-level surveys. Event Zero also has a user survey tool they call Skype for Business Advisor.

Table 1 provides a list of the Microsoft and partner-provided tools and the functions they serve in the seven functional areas of Microsoft's Network Operations framework.

Table 1: Comparison of Microsoft and Partner Tools for the Seven Network Management Functions

	Microsoft Skype for Business Tools	3 rd Party Tools		
		Unify Square	Event Zero	Nectar
1. Network Pre-Assessment	Connectivity Analyzer	UCRightTrack, Network Assessment Tool		Perspective
2. Planning & Deployment	Planning Tool/Capacity Calculator, Topology Builder	UCRightTrack, PowerMon, Global Voice Deployment Program, PowerSat		UC Foundation
Post-Deployment	Best Practices Analyzer, Health Readiness and Connectivity (HRC)	PowerMon, PowerSat		UC Foundation and Perspective
3. User & Policy Provisioning	PowerShell, Skype for Business Services Control Panel	PowerProv	Dossier: Provisioning Manager	Perspective
Devices & Voice Provisioning	PowerShell, Skype for Business Services Control Panel	PowerProv, PowerView	RGS, DID, EXT, E.911 Manager	Perspective
4. Monitoring				
• Server/Service Monitoring	Monitoring Server, SCOM, EventLog, PerfCounters, Key Health Indicators	PowerMon	Dossier: Skype for Business	UC Foundation and Perspective
• Media Quality Monitoring	Call Detail Record (CDR), QoE Data, Call Quality Methodology, Call Quality Dashboard	PowerView	Dossier: EV	Perspective, UC Foundation and UC Diagnostics
• Device Monitoring	CDR, QoE Data	PowerView	Dossier: Skype for Business Devices	UC Foundation and UC Diagnostics
• Network Monitoring	Connectivity Analyzer	PowerView	Dossier	Perspective, UC Diagnostics
5. Reporting	Call Quality Dashboard	PowerView	Dossier	Perspective, UC Foundation and UC Diagnostics
6. Reliability Troubleshooting		PowerView	Dossier: EV, Conferences	UCF, Perspective, UCD
Quality Troubleshooting	Client: Pre-Call Diagnostic	PowerView	Dossier: Skype for Business EV, Conferences	Perspective, UC Foundation and UC Diagnostics
7. User Survey	Client: RateMyCall	PowerSat	Skype for Business Advisor	

Overall Assessment of Options

Event Zero

Event Zero stands out as the option that has the clearest and least intimidating reporting facilities. Their Dossier platform and all of its various modules (e.g. Dossier: Enterprise Voice, Dossier: Conferences, Dossier: Devices, ...) present a clean and well thought out presentation and share a common user interface. While the overview is clear and uncluttered, administrators still have the ability to drill down to the individual call level.

While the company does not currently offer a network assessment tool, it has a comprehensive platform for user provisioning and even supports self provisioning which can go a long way to reducing IT staffing costs. Further its DID/Extension Management capability could produce significant staff savings in what can be a mind-numbing and time consuming task. It is particularly strong in environments using Polycom endpoints, as they offer a Polycom provisioning tool.

While it relies on analysis of the QoE database to produce reports on the quality and availability of the network, Dossier's troubleshooting capability has the ability to look at what other services are in use in the same systems at the same time and draw conclusions based on that. Further, the ability to monitor the SIP signaling exchange allows Event Zero to identify and track individual calls. While the overview reports are clearly management oriented, they do offer the ability to drill down fairly deeply to inspect an individual call if need be.

Dossier also allows IT administrators to monitor Skype for Business adoption. That adoption can be broken down by media and service type for regions, sites, departments and even individual users. If the typical savings from a given service (e.g. conferencing or content sharing) can be identified, the ability to document actual user adoption can drive home the ROI message. Further, if sites are not adopting particular features, it could signal the need for additional user training

Overall, Event Zero may not provide as in depth a view as what Nectar can deliver, but it is also easier to use and could meet the needs of a wide swath of Skype for Business installations.

Nectar

Nectar's offerings are the most distinctive of the three partners researched. Nectar offers the most technically comprehensive suite of tools for Skype for Business assessment, planning, monitoring and troubleshooting. Organized under the UC Management Platform (UCMP) label, the company offers Perspective for Network Assessment, UC Foundation for Planning and Deployment and UC Diagnostics

for troubleshooting; all three modules provide extensive monitoring and reporting capabilities. The company does not as yet offer tools for provisioning or for surveying users.

There are a number of factors that set Nectar apart from the other partner solutions:

- Support for other vendors' platforms along with Microsoft, which is a real benefit for organizations with mixed deployments.
- Full integration with Microsoft's SDN API v2.1, which provides access to information about the network and the connections it is supporting that goes far beyond what can be gleaned from the QoE database and allows for real time performance monitoring down to the individual call level.
- UC Foundation's network topology discovery allows the platform to recognize dependencies and provide root cause analysis quickly and accurately.
- The ability to monitor RTCP reports as well as the QoE database to provide real time assessment of call quality and potentially to recognize network problems sooner and before they escalate to user help desk calls.
- The ability to support media analyzers at strategic points within the network allowing network engineers to get insights into what elements within the network might be the cause of problems and get them resolved sooner.
- The ability to monitor router advertisements to understand bandwidth allocation metrics and recognize path changes in the routing environment.

The extensive displays and reports might appear intimidating to less experienced network engineers, but once mastered, provide a very comprehensive and time saving diagnostic capability. The capabilities appear to be optimized for larger and more complex deployments, though they can be of great value in smaller installations as well. That would target Nectar's offerings to a wide range of enterprise customers as well as systems integrators.

Unify Square

Based on its extensive Lync/Skype for Business systems integration practice, Unify Square has developed a comprehensive set of planning, network pre-assessment, provisioning, monitoring, reporting, troubleshooting and user survey tools. The company focuses on guiding the customer along, regardless of where they are in the Skype for Business journey. They pay particular attention to taking the users' perceptions into account and assisting IT administrators with prescriptive guidance.

Unify Square's tools are similar in approach and capabilities as those offered by Event Zero. The company provides a provisioning and number management solution called PowerProv and a network monitoring tool called PowerMon that uses synthetic transactions to discover network problems before they impact users and prescriptive guidance to highlight likely causes. They also have an analytics-based reporting tool called PowerView and an end user survey tool called PowerSat. Unlike Event Zero's self-service Dossier: Provisioning tool, Unify Square's PowerProv is targeted at IT administrators as they feel

that Skype for Business provisioning is too involved for most users, and it is important that regulatory and compliance requirements be met.

Its UCRightTrack program, which was derived from its extensive Skype for Business systems integration practice, provides a 30-day planning program to help organize an organization's strategy, design, deployment, implementation, user adoption and operations strategies to get a Skype for Business project off on a sound footing.

The PowerView reporting tool uses analysis of CDR and QoE data to alert IT administrators of potential problems. Once problem calls are identified PowerView can isolate them to specific call types (e.g. cellular, VPN, Wi-Fi, internal, external, etc.), and drill down to specific regions, locations, device types used or even individual users. Based on that analysis, IT administrators can be directed to specific parts of the network to isolate and correct problems. PowerView can also highlight overall network performance and identify user adoption of particular media and services by region, site, department and individual user to ensure the customer is getting the full value out of their Skype for Business investment.

Unify Square's PowerSat end user survey capability allows user satisfaction reporting along with a comments field and the ability to conduct more extensive multi-level varieties. The surveys are sent via Skype for Business text messages, and since PowerSat is presence aware, the surveys are not sent when a user's status is "Busy." The result is that the response rate is in the 60% to 70% range which means that IT is hearing from a wide swatch of users.

Conclusion

Skype for Business can provide a powerful set of communications and collaboration services, however full user adoption requires that the platform operates reliably and consistently delivers a stellar user experience. As a Skype for Business implementation can involve network elements (e.g. servers, gateways, session border controllers, switches, routers, Wi-Fi access points, etc.), network services (e.g. Internet, MPLS, SIP Trunking, etc.), and endpoints (e.g. desk phones, video terminals, smartboards, softphones, headsets, etc.) that are provided by a dozen or more Microsoft partners, the ability to monitor performance and isolate problem areas quickly will be key to user satisfaction. A failure or misconfiguration in any one of those could have widespread effects throughout the network.

In planning for an Skype for Business deployment, organizations need to think about not just the elements they will need to deliver the basic services, but all of the other tools they will need to deploy the network, provision the users, and ensure that the network continues to operate properly and deliver the level of service the users expect. That task calls for proactive tools to maintain and monitor the network on an ongoing basis, and to isolate and resolve problems when they occur. Failing to take these steps could hamper user adoption, send users off to find their own alternative solutions and diminish the expected ROI.

Microsoft includes an extensive set of planning, provisioning, monitoring and troubleshooting tools along with other background resources to help deploy and maintain a successful Skype for Business network. However, organizations should also consider how they will address the parts of the network that the Microsoft tools do not directly address. By in large that means the complex of network services that, in conjunction with the Microsoft provided elements, constitute a total Skype for Business deployment.

Skype for Business is all about improving productivity and allowing enterprises to work more efficiently, respond to customer needs more quickly and to in this highly competitive business environment. The most impactful Skype for Business deployment is one where everything just works and users can depend on the platform to provide the services they need without a second thought. Delivering that consistent reliable service requires that the IT organization has to think through the entire service process, anticipated the types of problems they might encounter, and secure the tools they need to do the job.

Appendix A

Audio Codec Bandwidth

Audio codec	Scenarios	Audio payload bitrate (KBPS)	Bandwidth audio payload with Headers* (Kbps)	Bandwidth audio payload with Headers* and forward error correction (Kbps)
RTAudio Wideband	Peer-to-peer	29.0	57.0	86.0
RTAudio Narrowband	Peer-to-peer, PSTN	11.8	39.8	51.6
G.722	Conferencing	64.0	95.6	159.6
G.722 Stereo	Peer-to-peer, Conferencing	128.0	159.6	223.6
G.711	PSTN	64.0	92.0	156.0
Siren	Conferencing	16.0	47.6	63.6

* IP header, UDP, RTP and SRTP

Source: <https://technet.microsoft.com/en-us/library/jj688118.aspx>

Audio/Video Capacity Planning for Peer-to-Peer Sessions

Media	Codec	Typical stream bandwidth (Kbps)	Maximum stream bandwidth without FEC	Maximum stream bandwidth with FEC
Audio	RTAudio Wideband	39.8	62	91
Audio	RTAudio Narrowband	29.3	44.8	56.6
Main video when calling Skype for Business endpoints	H.264	460	4010 (for maximum resolution of 1920x1080)	Not applicable
Main video when calling Skype for Business endpoints	RTVideo	460	2510 (for maximum resolution of 1280x720)	Not applicable
Panoramic video when calling Skype for Business endpoints	H.264	190	2010 (for maximum resolution of 1920x288)	Not applicable
Panoramic video when calling Skype for Business endpoints	RTVideo	190	510 (for maximum resolution of 960x144)	Not applicable

Source: <https://technet.microsoft.com/en-us/library/jj688118.aspx>

Audio/Video Capacity Planning for Conferences

Media	Typical codec	Typical stream bandwidth (Kbps)	Maximum stream bandwidth without FEC	Maximum stream bandwidth with FEC
Audio	G.722	46.1	100.6	164.6
Audio	Siren	25.5	52.6	68.6
Main video receive	H.264 and/or RTVideo	260	8015	Not applicable
Main video send	H.264 and/or RTVideo	270	8015	Not applicable
Panoramic video receive	H.264 and/or RTVideo	190	2010 (for maximum resolution of 1920x288)	Not applicable
Panoramic video send	H.264 and/or RTVideo	190	2515 (for sending bitstreams using multiple resolutions/codecs)	Not applicable

Source: <https://technet.microsoft.com/en-us/library/jj688118.aspx>

Bandwidth Requirements for Remote Desktop Protocol (RDP) For Screen Sharing

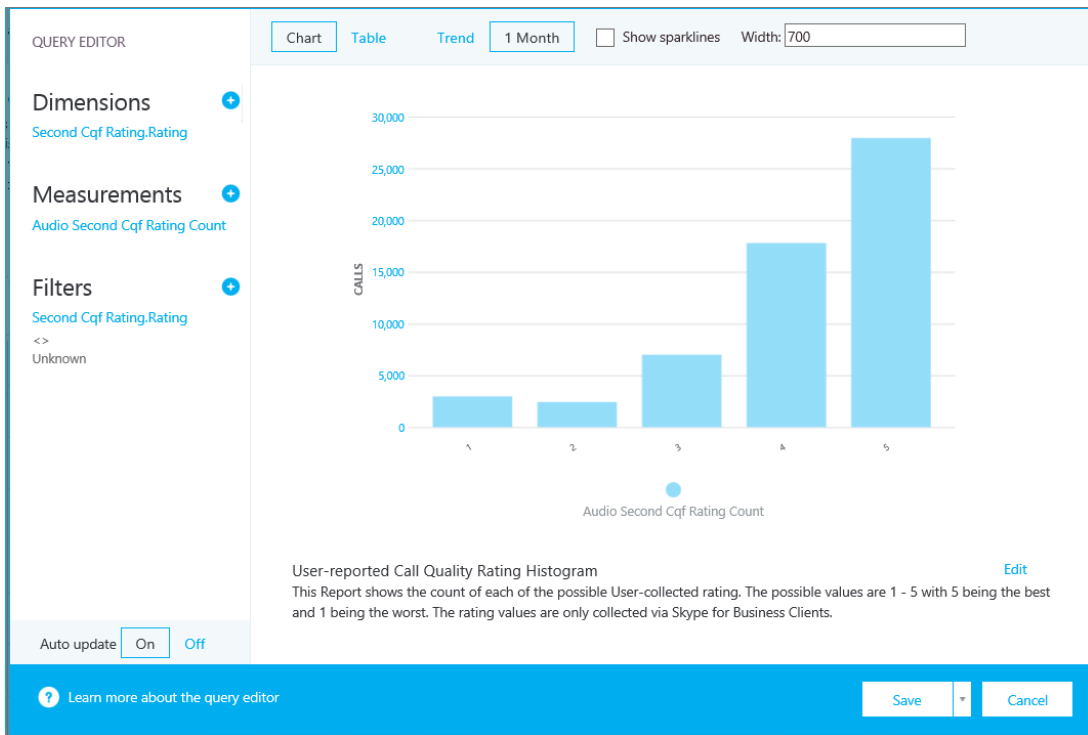
Screen Size	Acceptable	Optimal
1280x800	384 Kbps	1.5 Mbps
1440x900	512 Kbps	2 Mbps
1680x1050	768 Kbps	2.75 Mbps
1920x1200	1 Mbps	3.5 Mbps

Note Sharing in the Microsoft PowerPoint presentation graphics program is accomplished by using a different method for desktop sharing. Older versions of Skype for Business use a built-in PowerPoint file viewer, or, for web presentations, the file is converted into a dynamic HTML stream that requires the Microsoft Silverlight browser plugin. To improve this experience for Skype for Business Server, an Office Web Application Server handles PowerPoint presentations by using dynamic HTML and JavaScript.

Source: Skype for Business Server Networking Guide

Appendix B

Microsoft Call Quality Dashboard- Query Editor



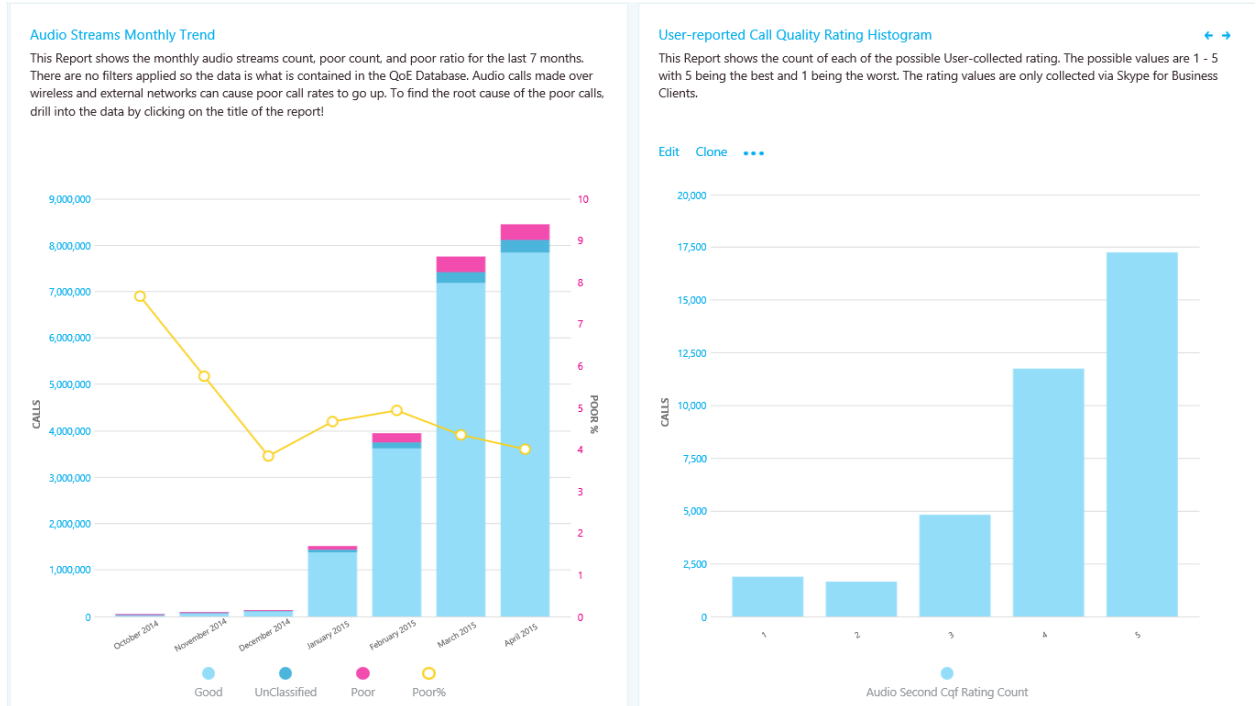
Microsoft Call Quality Dashboard- Sparklines

First	Second	Month	Good	Unclassified	Poor	Poor%
Filter First	Filter Second	Filter Month	Filter Gc	Filter Un	Filter Po	Filter Po
MediationServer	Gateway	April 2015	8,370	0	48	0.57
MediationServer	MSEExchangeUM	April 2015	150,920	9	452	0.299
MediationServer	Conference_Auto_Attendant_1.0	April 2015	362,795	7	20	0.006
MediationServer	AV-MCU	April 2015	414,290	61	20	0.005
AV-MCU	Conferencing_Announcement_Service_1.0	April 2015	478,456	7,688	2	0

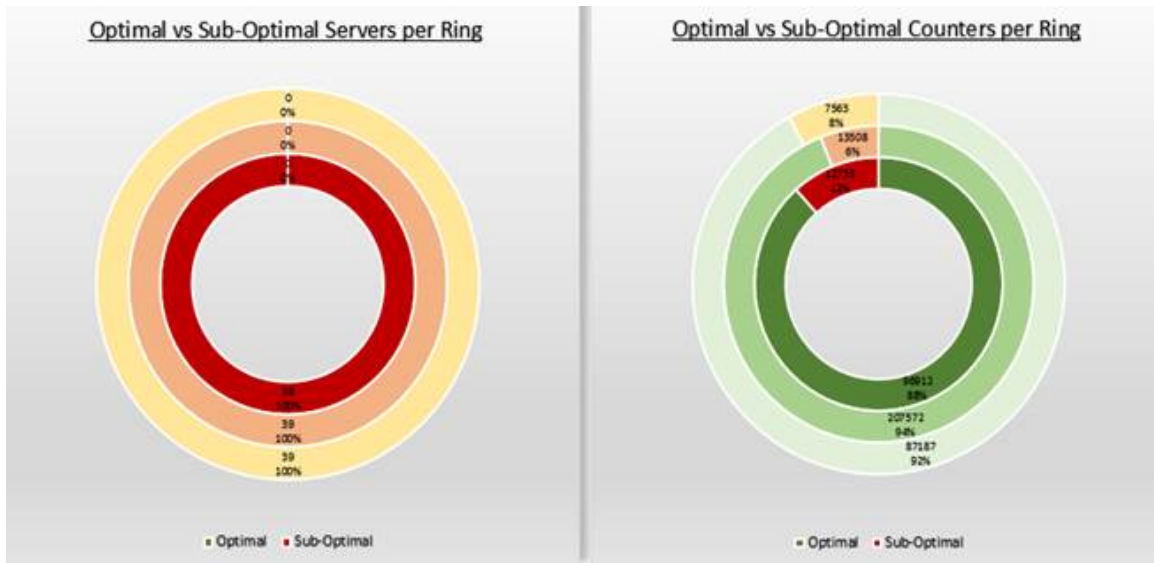
Showing 1 to 10 of 10 entries

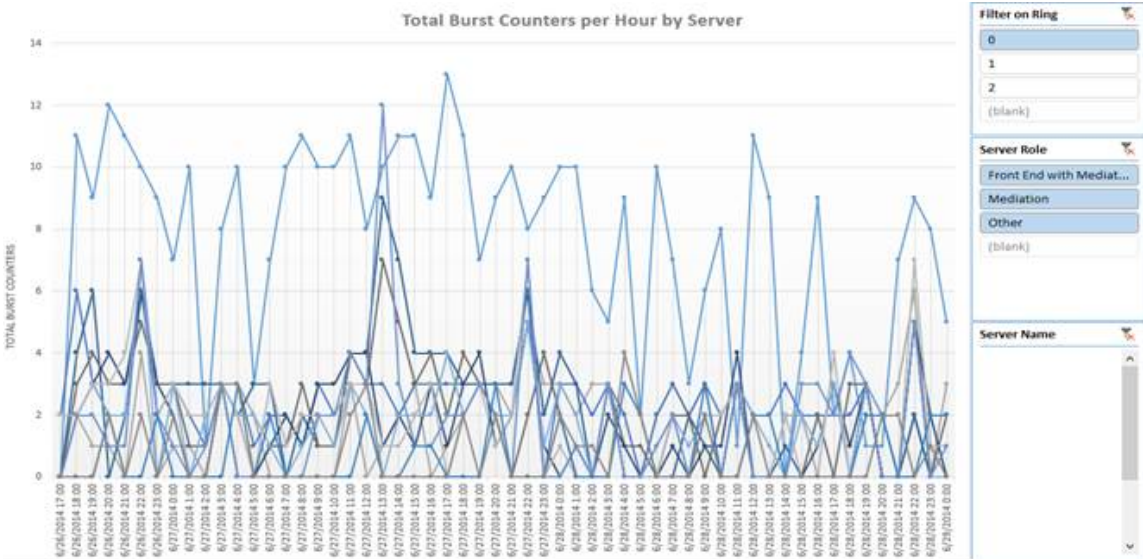
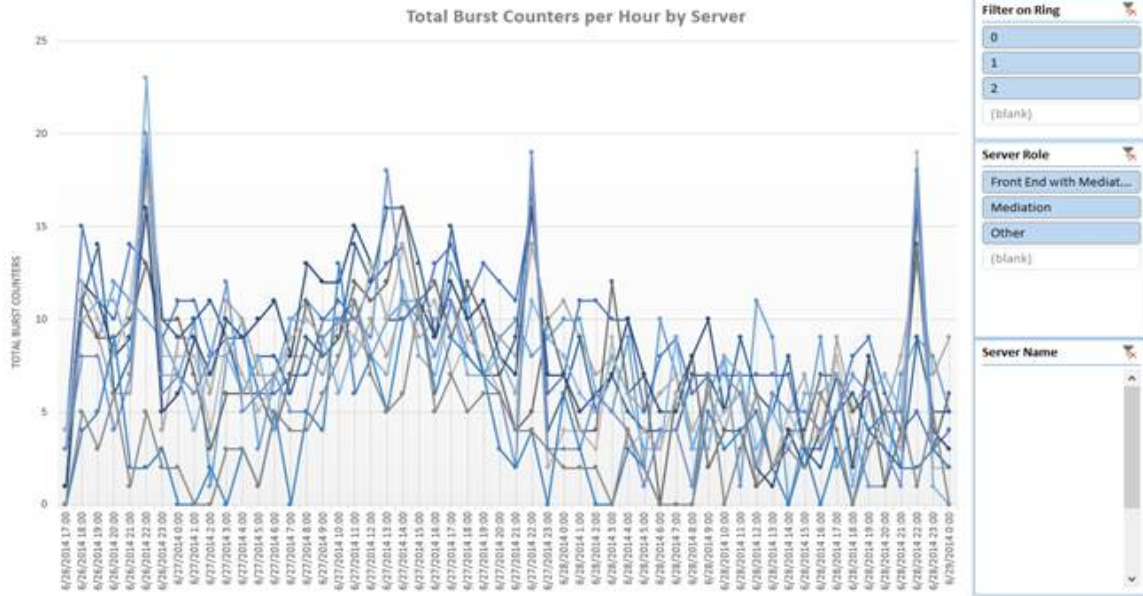
Previous Next

Microsoft Call Quality Dashboard- Reports



Microsoft Key Health Indicators (KHIs)





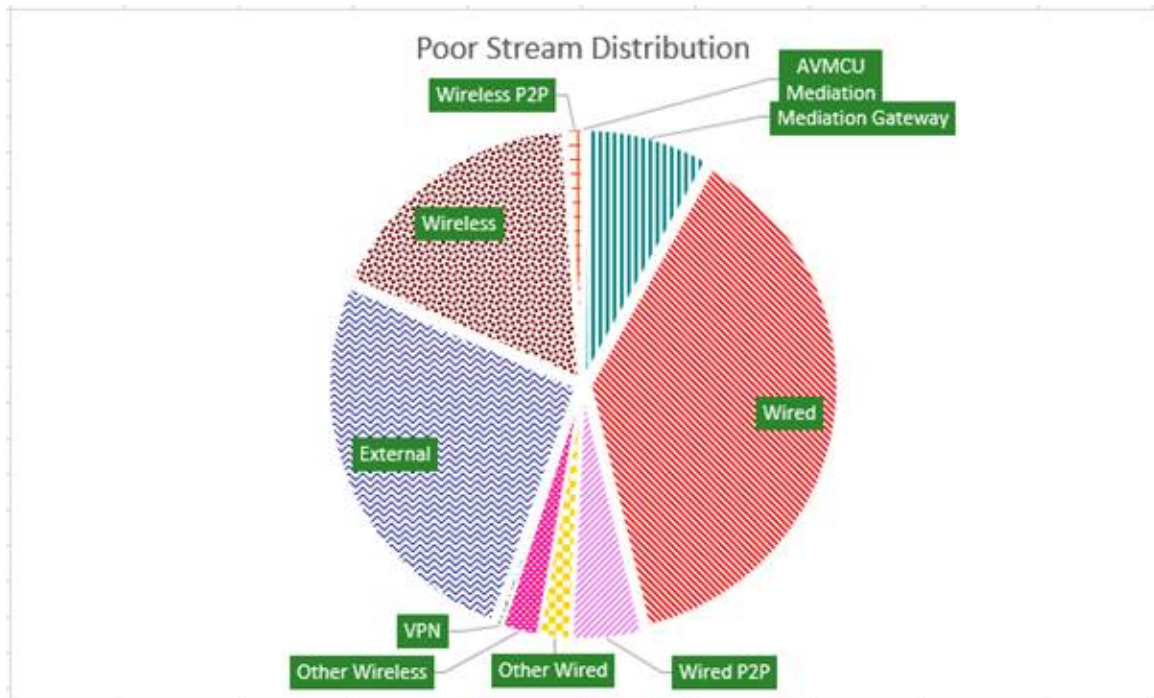
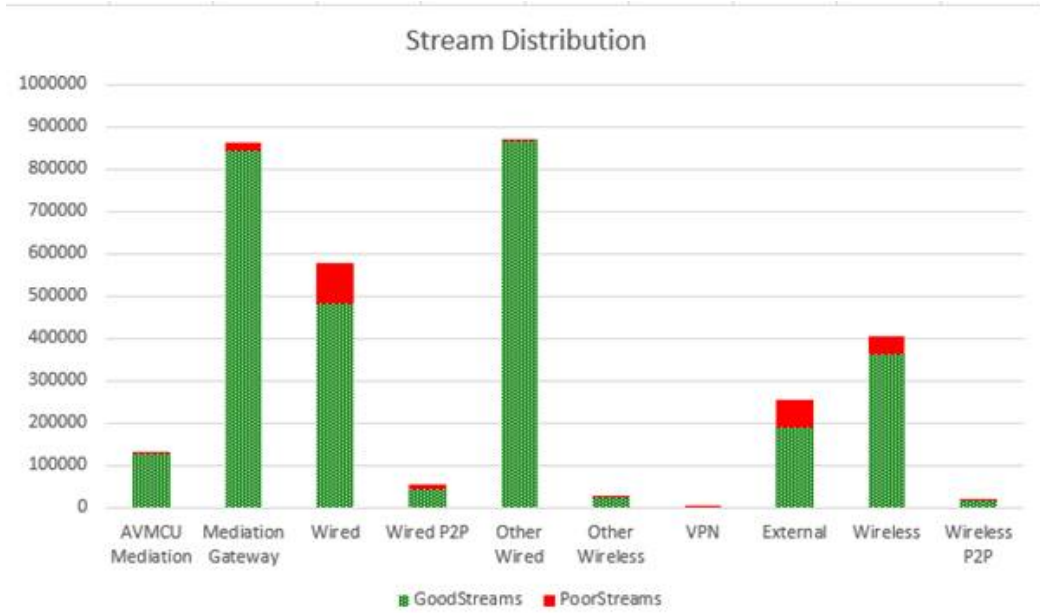
Counters Pivot Table

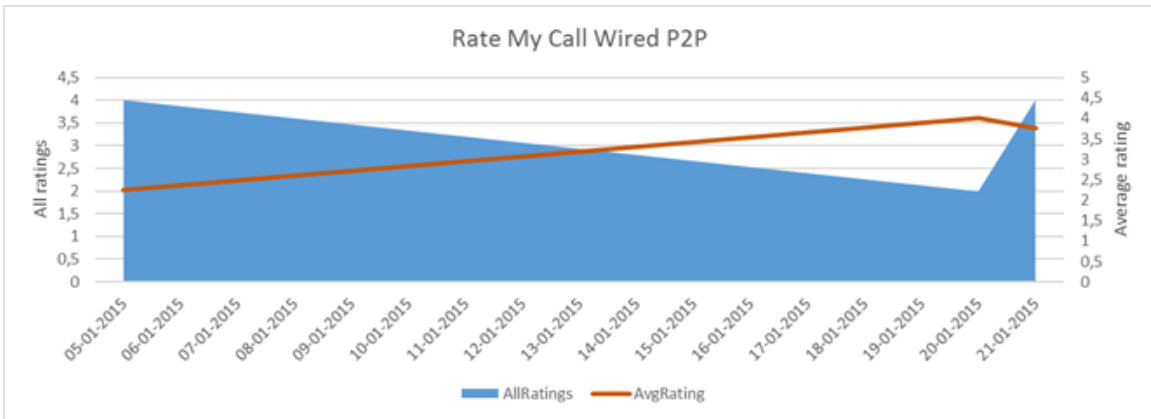
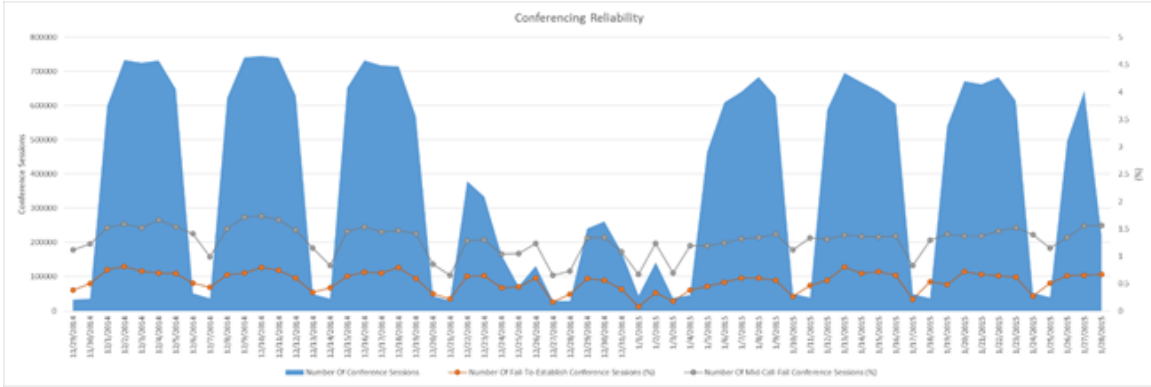
Counter Name \ Counter Instance \ Server Name	Counter Date	KH1	Min	Max	Avg	# Burst	Rings	Health
\LS:JoinLauncher - Join Launcher Service Failures\JOINLAUNCHER - Join Failures		23.49	29.88	26.76	1,641		0	Optimal
\LS:SIP - Load Management\SIP - Average Holding Time For Incoming Messages		0.02	2.53	0.16	107		1	Sub-Opti...
\LS:SIP - Load Management\SIP - Incoming Messages Timed out		0.04	9.34	2.01	27,333		2	(blank)
\LS:SIP - Peers(*)\SIP - Average outgoing Queue Delay		0.00	14.04	0.65	13,598		(bla...	
\LS:SIP - Peers(*)\SIP - Flow-controlled Connections		0.00	194.12	1.97	164			
\LS:SIP - Peers(*)\SIP - Sends Timed-Out/sec		0.00	3.11	0.05	13,918			
\LS:SIP - Protocol\SIP - Average Incoming Message Processing Time		0.07	5.62	0.16	16			
\LS:SIP - Protocol\SIP - Incoming Requests Dropped/sec		1.61	9.33	3.57	53,325			
\LS:SIP - Protocol\SIP - Incoming Responses Dropped/sec		0.00	4.69	0.24	1,377			
\LS:SIP - Responses\SIP - Local 503 Responses/sec		0.00	47.82	1.14	530			
\LS:Usrv - Conference Mcu Allocator\Usrv - Create Conference Latency (msec)		0.00	12,463.61	158.62	194			Front End with Mediatl...
\LS:Usrv - DBStore\Usrv - Queue Latency (msec)		0.46	1,657.14	43.82	553			(blank)
\LS:Usrv - DBStore\Usrv - Sproc Latency (msec)		12.98	190.50	25.49	537			
\LS:Usrv - DBStore\Usrv - Throttled requests/sec		0.00	14.48	0.22	97			
\LS:Usrv - REGDBStore\Usrv - Queue Latency (msec)		0.00	551.09	4.38	38			
\LS:Usrv - REGDBStore\Usrv - Throttled requests/sec		0.00	7.82	0.03	2			
\LS:Usrv - SharedDBStore\Usrv - Queue Latency (msec)		0.00	374.78	2.41	15			
\LS:Usrv - SharedDBStore\Usrv - Sproc Latency (msec)		0.00	152.83	1.39	27			
\LS:WEB - Address Book Web Query\WEB - Failed search requests/sec		0.00	0.07	0.00	13			
\MSSQL\$INSTANCE:Buffer Manager\Page life expectancy		227.28	258.27	243.58	12,581			
\MSSQL\$INSTANCE:Buffer Manager\Page life expectancy		101.56	25,888.67	4,777.74	368			
\Network Interface(*)\Packets Received Discarded		5,999.61	6,121.91	6,075.55	28,862			
\PhysicalDisk(*)\Avg. Disk sec/Read		0.00	0.09	0.01	2,513			
\PhysicalDisk(*)\Avg. Disk sec/Write		0.00	0.36	0.00	80			
\Processor Information(*)\% Processor Time		35.63	91.06	53.24	9,683			

Microsoft Call Quality Methodology Scorecard

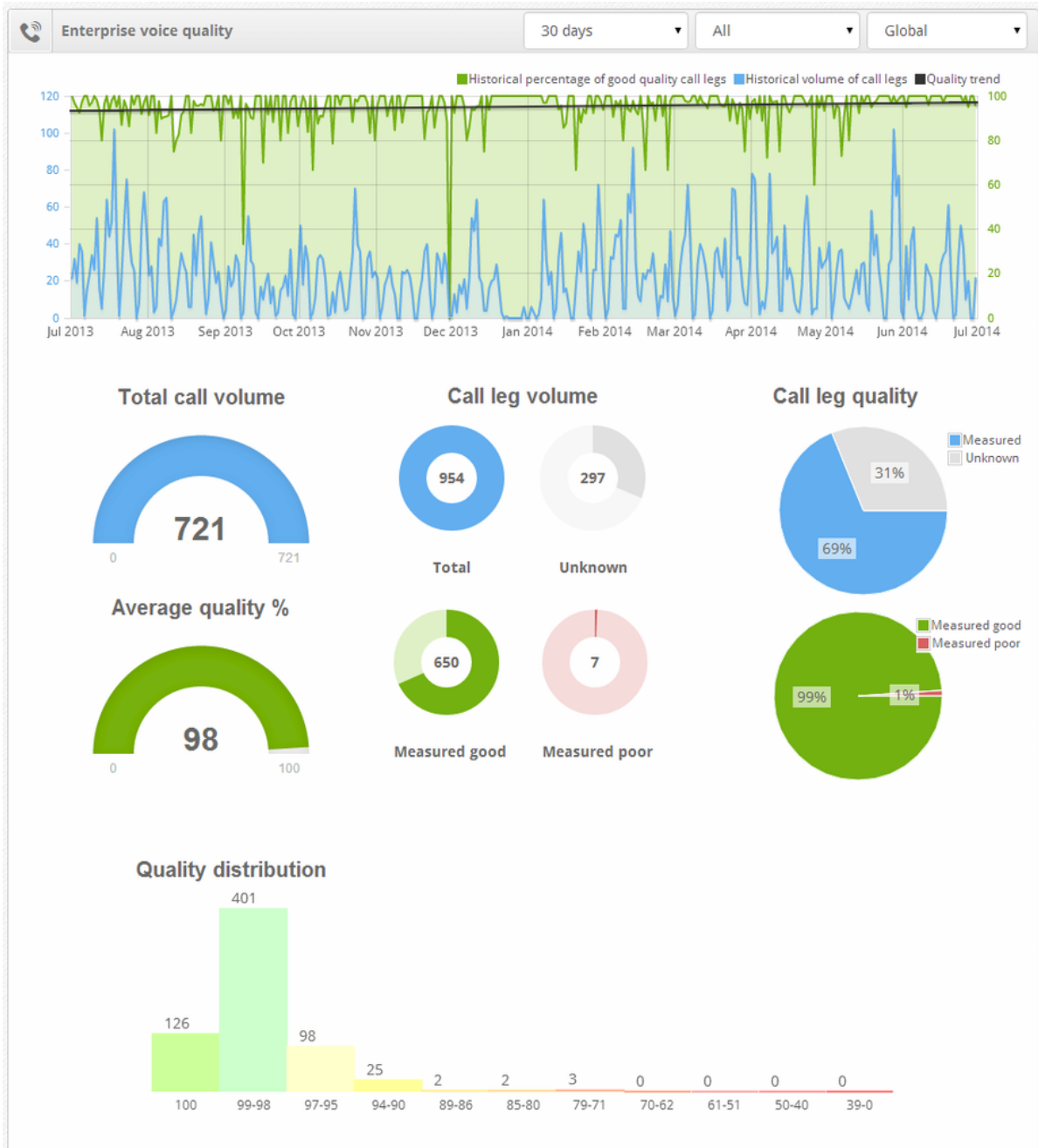
Steps		
1	Select decimal separator used in CSV files	Decimal Separator: Comma
2	Select date format used in CSV files	Date Format: DMY
3	Specify any off-work days	Off-Work day 1: Saturday Off-Work day 2: Sunday
4	Streams cutoff number	Streams Cutoff: 100
5	Import CQM Query results as sheets	Import CQM Query Results
6	Remove results from off work days	Remove Off-Work Days Results
7	Generate Stream Distribution charts	Generate Stream Distribution Charts
8	Generate Trending Charts	Generate Trending Charts
9	Generate Reliability Charts	Generate Reliability Charts
10	Generate Top Issues	Generate Top Issues
11	Update Scorecard sheet	Update Scorecard

Microsoft Call Quality Methodology

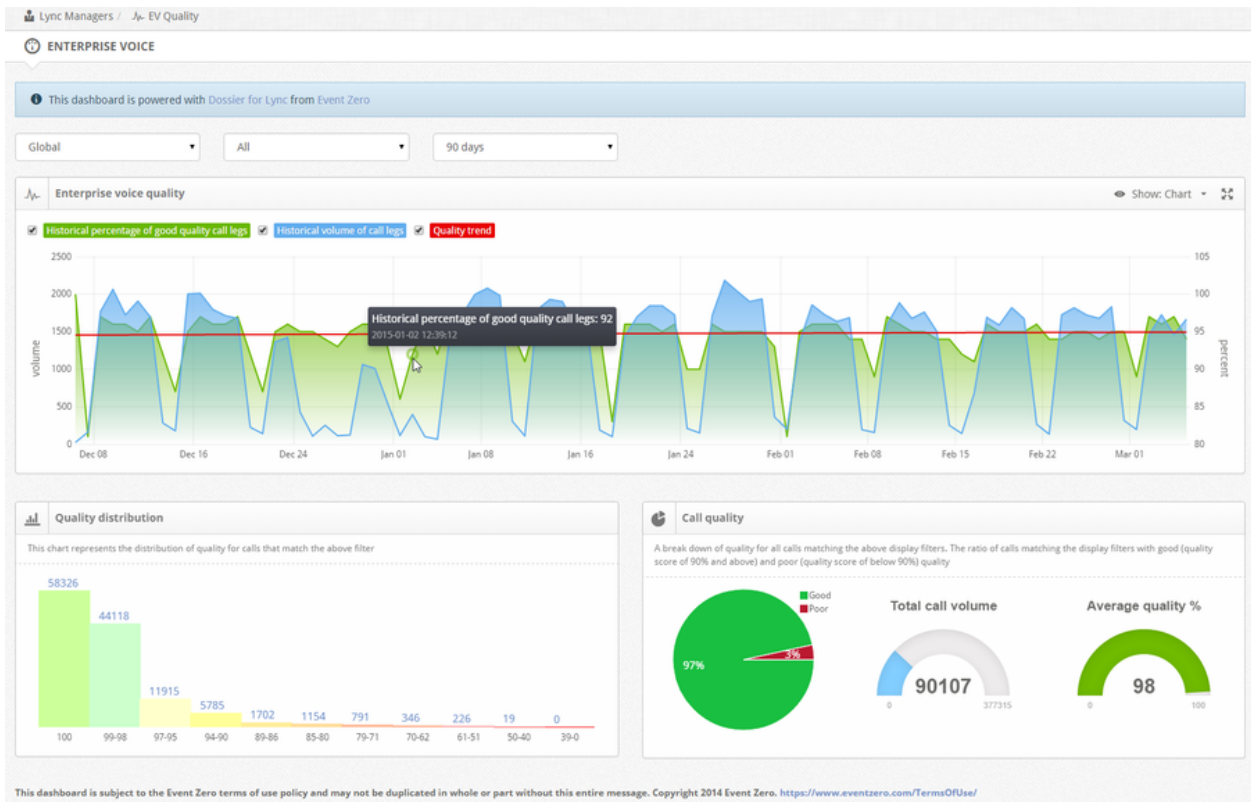




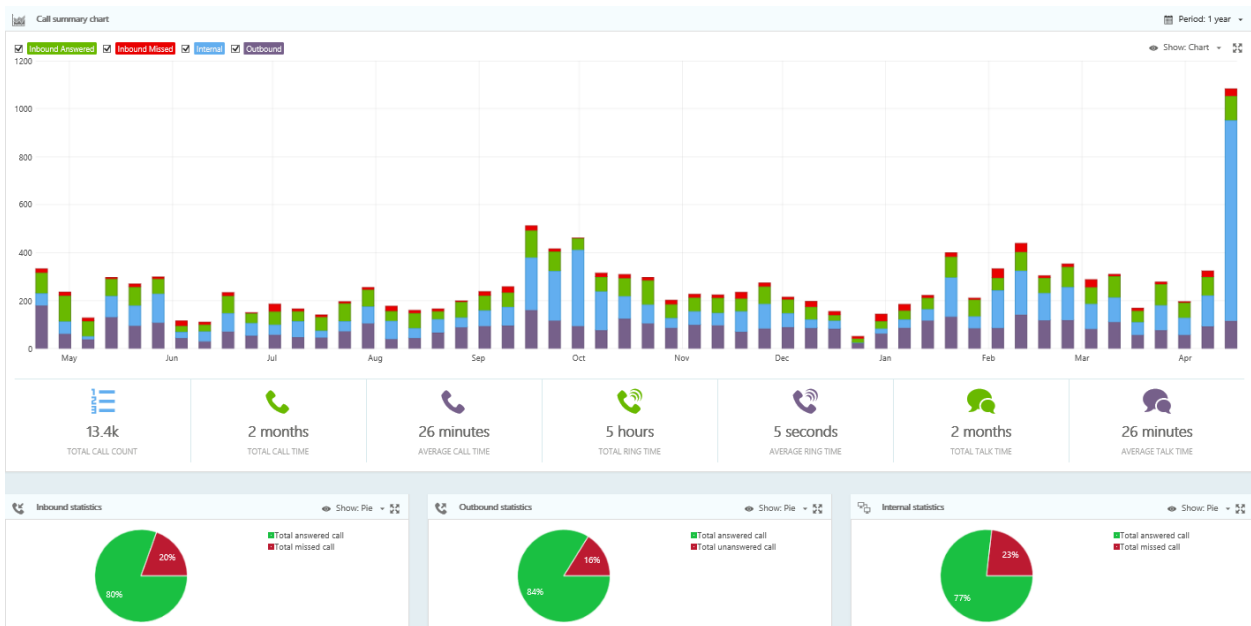
Event Zero Voice Quality Dashboard



Event Zero Enterprise Voice Quality Report



Event Zero Call Summary



Event Zero User Drill Down


Lync information

License applied	Lync Standard CAL, Lync Plus CAL
Last known home pool	emp1skype.eventzero.com
Last known home server	emp1skype.eventzero.com
Service location	Eight Mile Plains

Device count

TOTAL DEVICES	DESKTOP DEVICES	DESKPHONE DEVICES	MOBILE DEVICES
11	7	3	1

David Tucker



Job title	CEO
E-Mail address	[REDACTED]
Office number	[REDACTED]
Mobile number	[REDACTED]
Sip address	[REDACTED]
Department	Admin

Device list

First Previous **1** Next Last Export Filter:

Endpoint Name	Location	Last User	Last Seen
NEW	Eight Mile Plains	David Tucker	6 hours ago -
Deskphone	Eight Mile Plains	David Tucker	7 hours ago -
Deskphone	Eight Mile Plains	David Tucker	7 hours ago -
CASPER	Eight Mile Plains	David Tucker	7 hours ago -
Deskphone	New York	David Tucker	7 hours ago -
WIN-RBD3L6FG07O	Cape Town	David Tucker	9 hours ago -
Windows Phone	Host Networks (Edge)	David Tucker	10 hours ago -
SURFACE	Eight Mile Plains	David Tucker	4 days ago -
NEW	Eight Mile Plains	David Tucker	16 days ago -
CASPER	Cape Town	David Tucker	19 days ago -
CASPER	Cape Town	David Tucker	25 days ago -

Event Zero Drill Down- CPU Utilization

Description

Total CPU utilisation as measured across all Sockets and Cores for the current host.

CPU load plays a particularly central role for any server performing real time operations and especially so for real time communications. Processing of audio information is very time sensitive in that even small delays in processing can result in audible differences in audio streams. A heavily loaded CPU is more likely to have audio quality issues.

Lync and Skype for Business servers performing different roles and each role has a different tolerance for CPU loads. For example, a heavily loaded edge server or mediation server will result in call audio issues where as the same load on a front end server could cause calls not to be connected in the first place.

Stats

Class	Current	Threshold	Action
Average	4.62896938000001	80	
Maximum	87.43109	Not set	
Minimum	0.7664197	Not set	

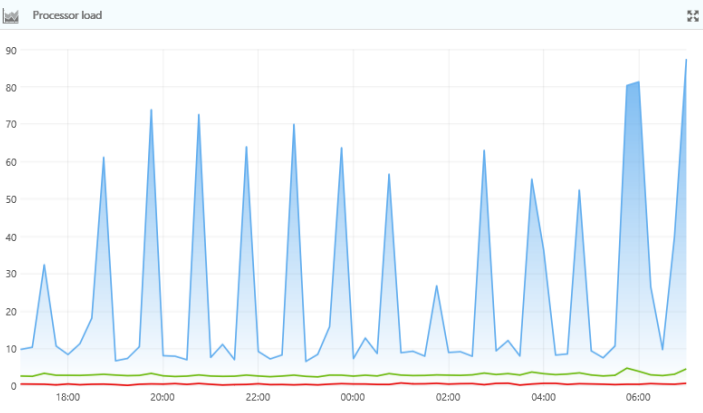
Related KPIs

Free RAM | Disk reads | Disk writes

Related information

Description	Link
MSDN Library	https://msdn.microsoft.com/en-us/library/windows/desktop/aa394317(v=vs.85).aspx

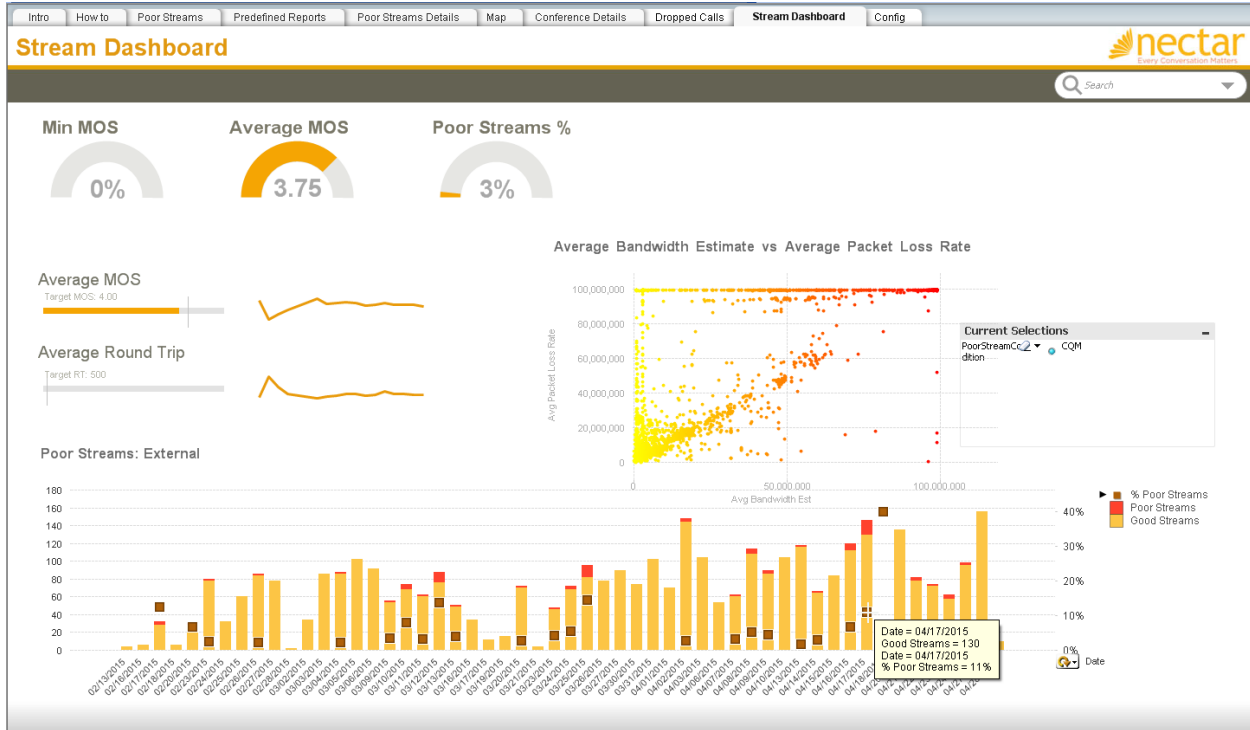
Processor load



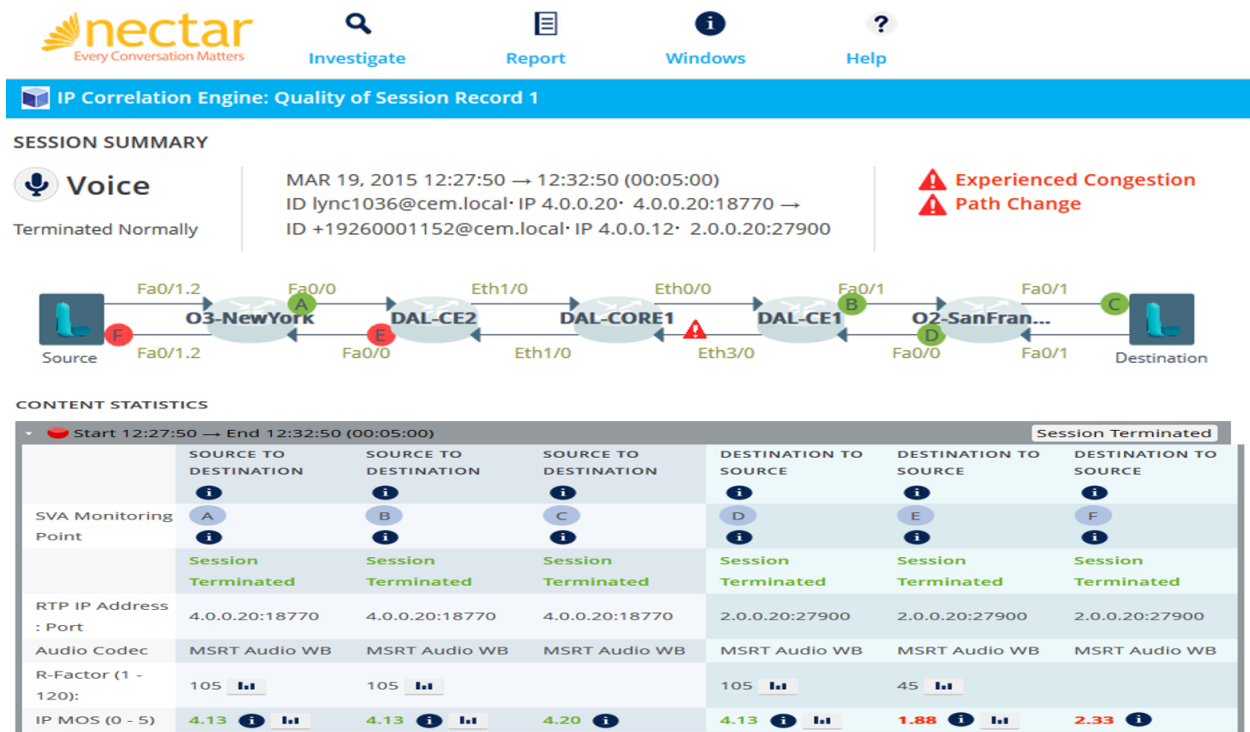
Recent alarms

Reported value	Threshold value	First reported at	Cleared at

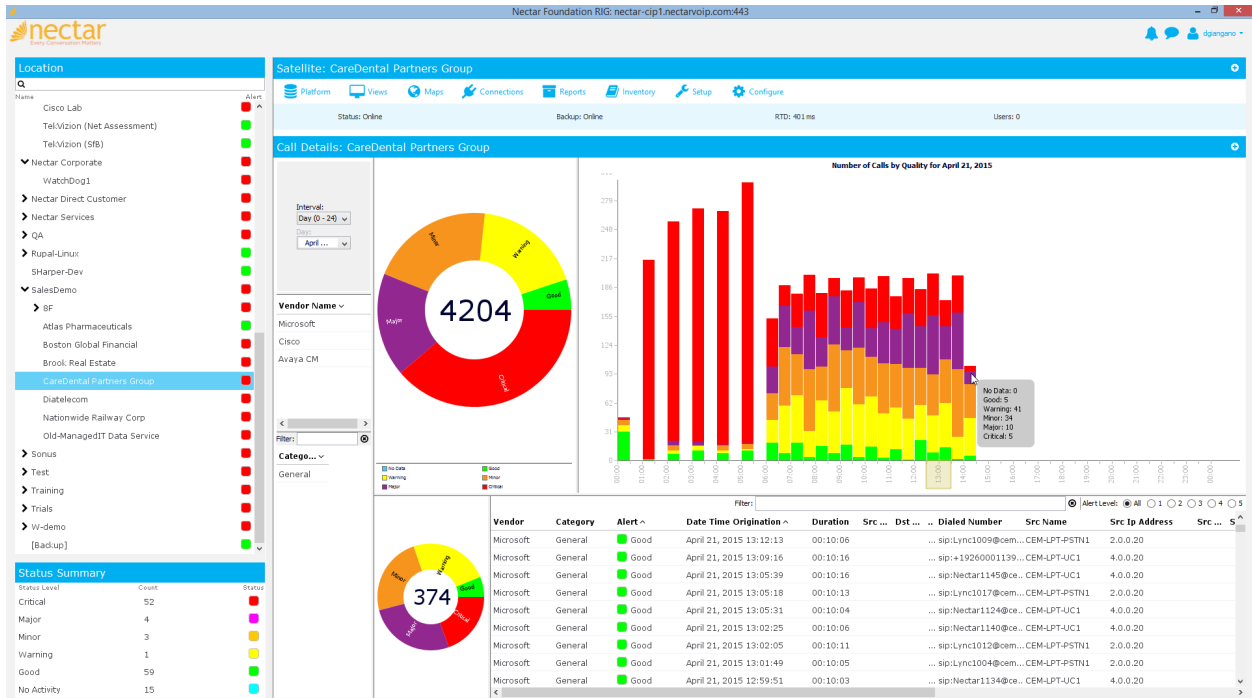
Nectar Stream Dashboard



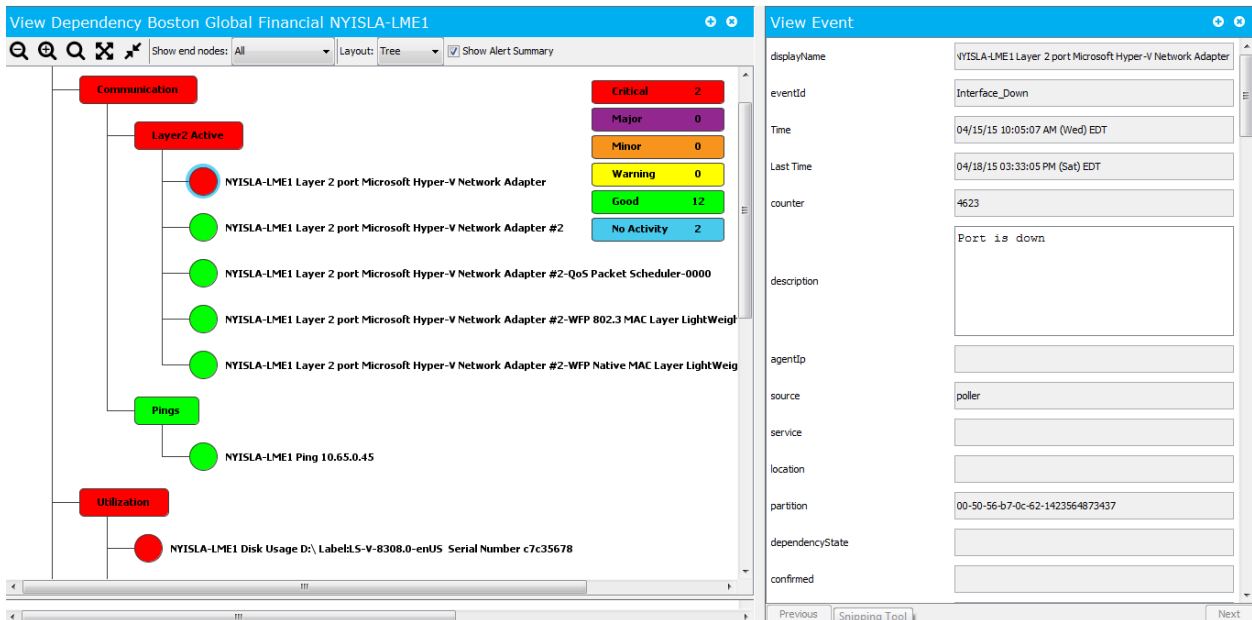
Nectar UC Diagnostics Quality of Session Record



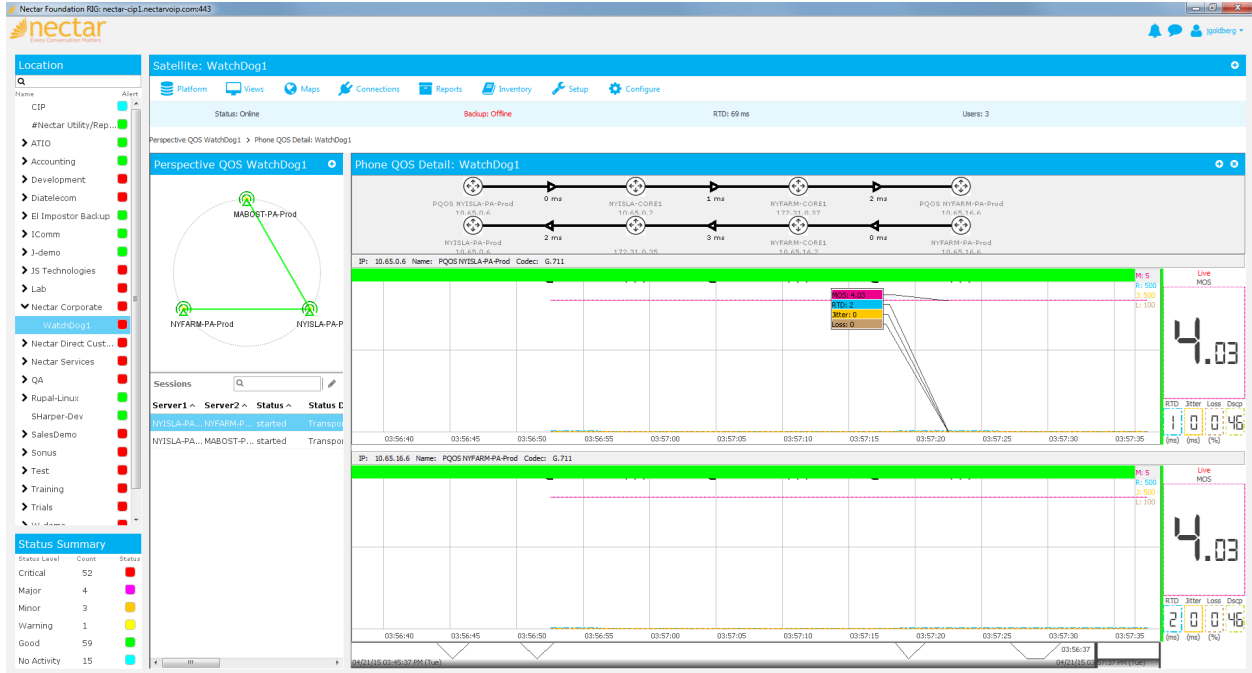
Nectar UC Foundation Call Details Screen



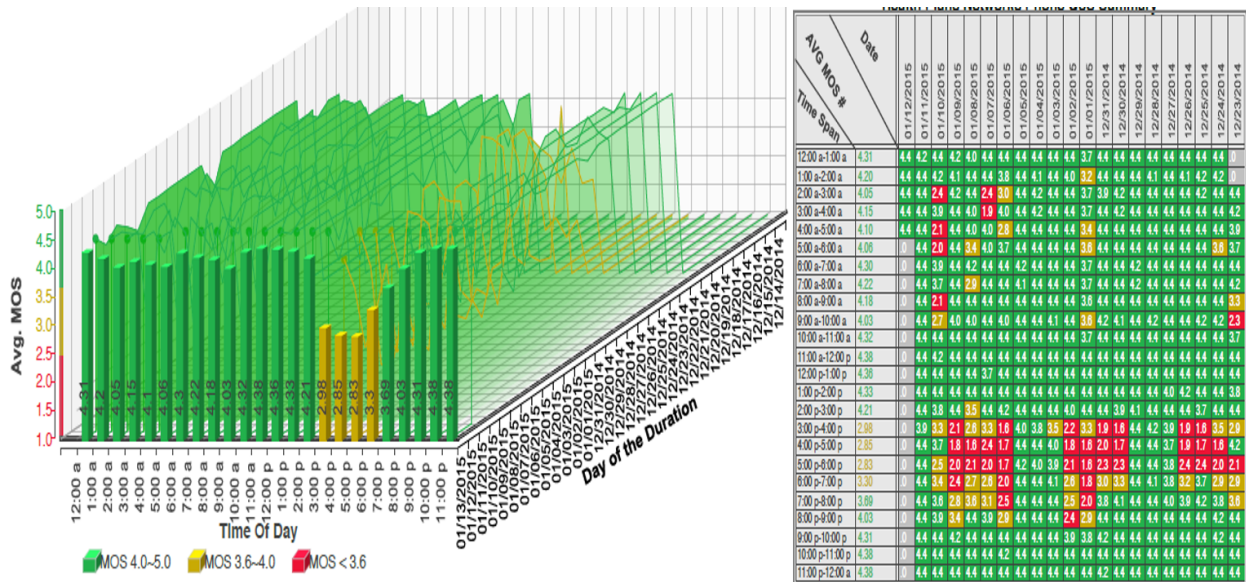
Nectar Dependency Tree- UC Foundation



Nectar Real Time Call Detail- Perspective



Nectar Call Quality Summary Report



Unify Square PowerProv

- User Search 🔍
- Phone Number Search 🔍
- Upload Batch Operations 📄

User

Alex Darrow

 sip:AlexD@CONTOSO.COM San Diego US

Reserve Phone Number / Create Reservation

Phone Number +18585550101

ⓘ

Expiration 30

ⓘ

Comment Alex moving to Tokyo in 3 months, needs DID to print business cards.

[RESERVE](#)

Unify Square PowerMon

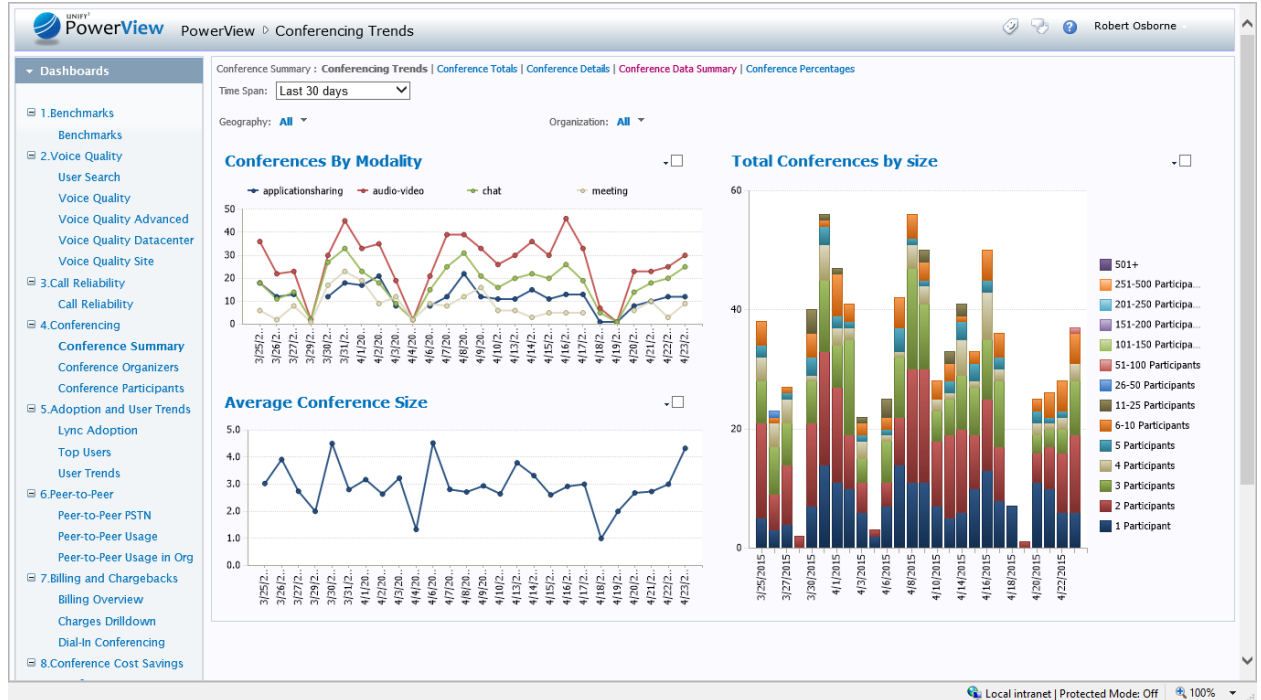
The screenshot displays the Unify Square PowerMon interface. The main window shows details for incident #1082, titled "USSEA-LYNCPool02 : Dial-in Conference : pmus10 : pmus11 : +4258650735;ext=735". The interface is divided into several panes:

- Time Span:** High Priority Incidents, including #109 (US pmus01) and #1082 (6 - US +425865073).
- Incident Details:** A list of failures with start times ranging from 05:58 to 11:05 AM on 04/24/15.
- SIP Messages:** A table showing messages between sip:pmus10@unifysquare.com (Conference Host) and sip:pmus11@unifysquare.com (Conference Dial-In Attendee).

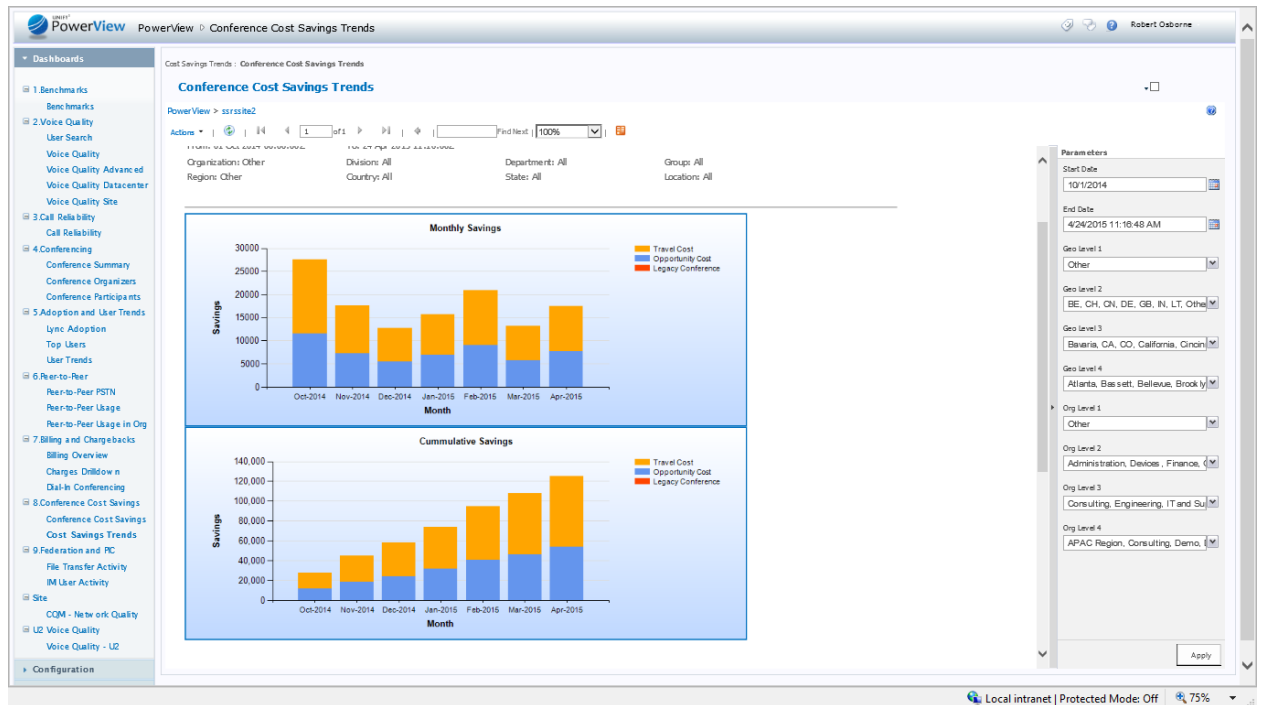
Time	Message	Diagnosis
20:49:06:24...	100 Trying	
20:49:06:51...	200 OK	ms-diagnostics
20:49:10:05...	100 Trying	
20:49:10:13...	101 Progress Report	ms-diagnostics
20:49:10:27...	183 Session Progress	
20:49:11:31...	183 Session Progress	
20:49:11:99...	404 Not Found	ms-diagnostics
- SIP Headers:** A list of headers including SIP/2.0/TLS 162.209.8.126:61620, branch, ms-received-port, ms-received-cid, 10404, source, reason (Gateway responded with 404 Not Found), component, SipResponseCode (404), SipResponseText (Not Found), and GatewayFqdn.

The interface also includes a "Give feedback" link and a status bar at the bottom indicating "Last data update on 11:07:28:431 04/24" and "Internet | Protected Mode: On | 100%".

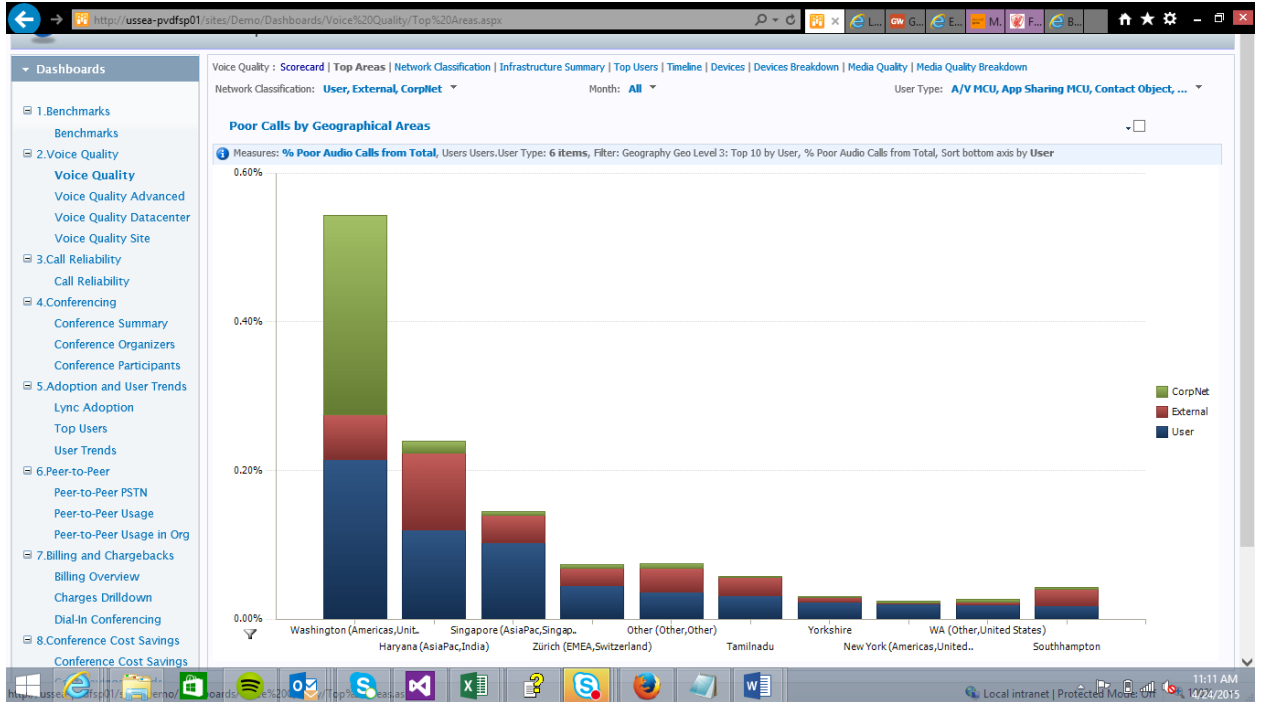
Unify Square PowerView



Unify Square PowerView



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