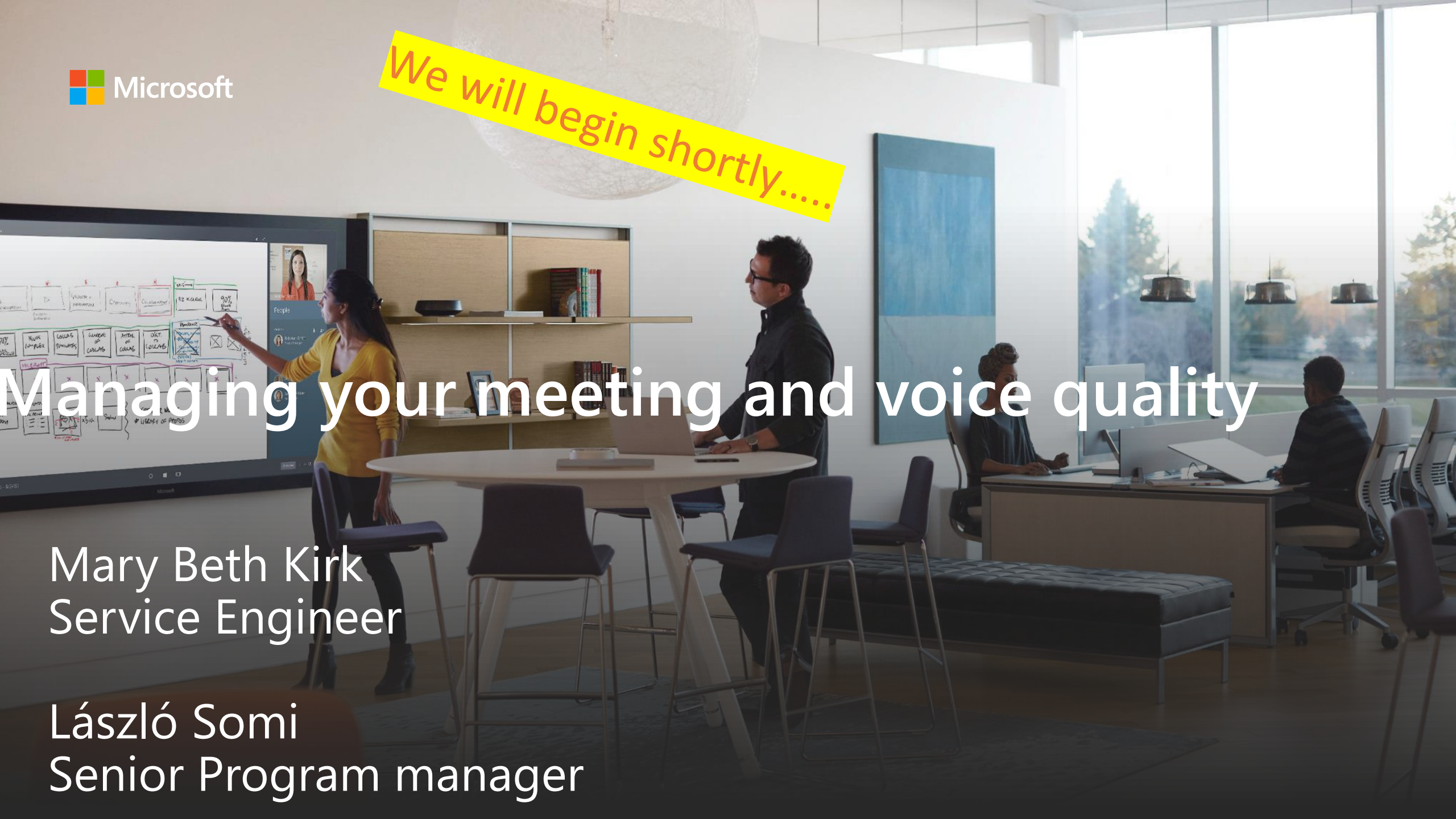
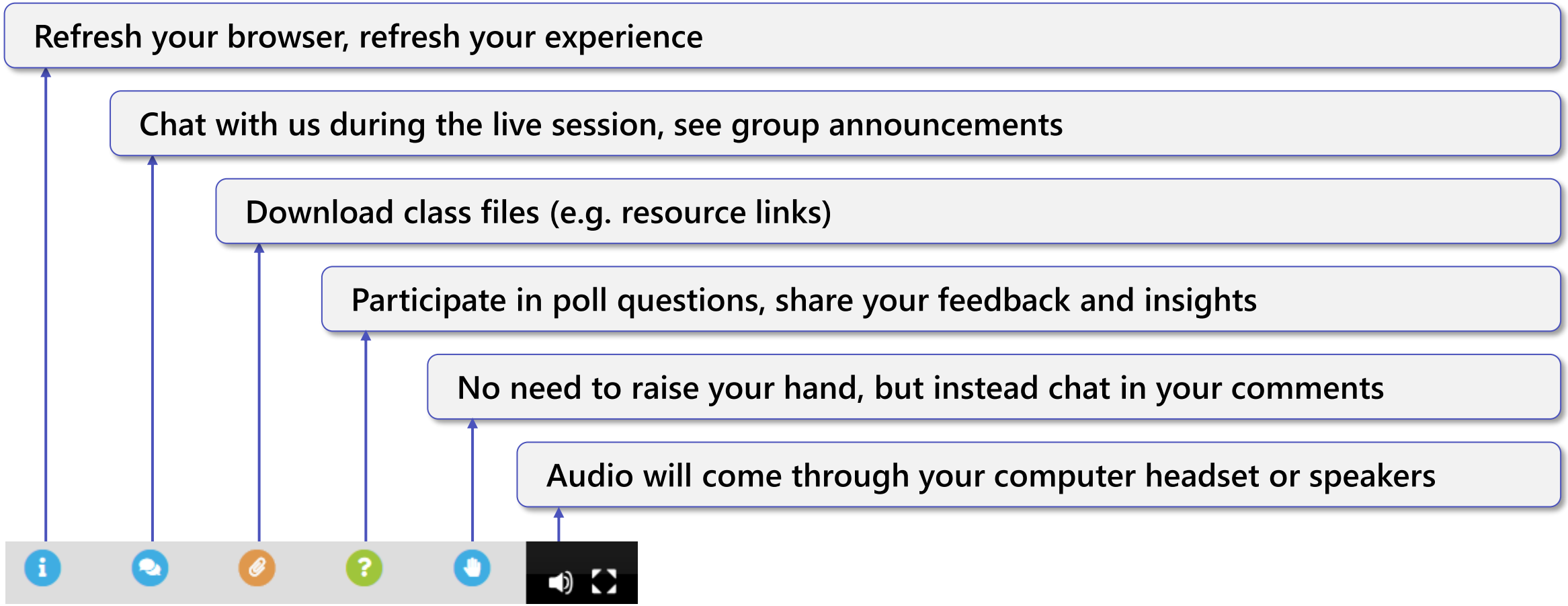


Managing your meeting and voice quality

Mary Beth Kirk
Service Engineer

László Somi
Senior Program manager

Optimize your learning experience for today's live streaming event



Learning objectives

After this session, you will be able to:

- Tools in Teams
- What is quality?
- The Quality Champion role
- Call Analytics
- CQD basics
- The building file
- Monitor and use call quality tools in Teams

Prerequisites

Teams Academy sessions:

- Media - Why meetings are simple
- Media - Media flow

https://aka.ms/TeamsAcademy

Tools in Teams

Tools in Teams

Teams Analytics

How my users are using teams and what is their experience?

- Apps usage
- PSTN blocked users
- PSTN usage – Calling Plans
- PSTN usage – Direct Routing
- Teams device usage
- Teams Live Event usage
- Teams usage
- Teams user activity

7, 30, 90 day windows

Call Quality Dashboard

What is the quality for my users? What are the trends? Deep troubleshooting and analytics.
Both Skype for Business online and Teams data

- Call quality by region
- Call reliability
- Client version
- Device versions
- Endpoints
- PII/EUII data!
- …and many more

Variable date ranges up to 12 months

Tools in Teams

M365 Message Center

Keep track of upcoming changes, including new and changed features, planned maintenance, or other important announcements.

https://admin.microsoft.com/Adminportal/Home?source=applauncher#/MessageCenter
https://aka.ms/O365MessageCenterDoc

Service Health Dashboard

View the health status of all services that are available with your current subscriptions.

https://admin.microsoft.com/Adminportal/Home?source=applauncher#/servicehealth
https://docs.microsoft.com/en-us/microsoft-365/enterprise/view-service-health?view=o365-worldwide

Tools in Teams

Power BI templates

7 PowerBI reports to query and report CQD data using PowerBI Connector.

https://aka.ms/CQDPowerBITemplates

Quality Experience Review Guide & Web UI Templates

Detailed guide and templates administrators can import to CQD. ~500 templates in the package to get you started on your journey to improving quality and reliability.

https://aka.ms/QERGuide
https://aka.ms/QERTemplates

Teams Analytics and Reporting (DEMO)

Demo time!

- Analytics and reporting reports
- Look at a conference and an individual call and troubleshoot an issue

What is quality?

How does Microsoft define quality?

Quality = Service Metrics + User Experience

Service Metrics

Telemetry

- Jitter, packet loss, and round-trip time
- Classifiers for audio, video, and sharing

Reliability

- Media drop and setup failures

Endpoint

- Who's not using a USB headset?
- Wired vs Wi-Fi

Client

- Validate client updates
- Validate VPN split-tunneling

User Experience

Was I able to join the call or meeting?

How did the audio sound?

Was the video clear?

Did I have any problems with the call or meeting?

Am I able to use the service at any point in time, regardless of where I am?

Am I able to maintain a call?

Audio quality classifier

An audio stream is classified as poor if one of the following service metric averages exceeds its defined threshold.

Metric	Threshold	Description
Jitter	>30 ms	This is the average change in delay between successive packets.
Packet loss rate	>10% or 0.1	This is often defined as a percentage of packets that are lost.
Round-trip time	>500 ms	This is the time it takes to get an IP packet from point A to point B and back to point A.
Network Mean Opinion Score (NMOS) degradation average*	>1.0	Represents how much the network loss and jitter has affected the quality of received audio.
Average ratio of concealed samples*	>7% or 0.07	Average ratio of the number of audio frames with concealed samples generated by packet loss healing to the total number of audio frames.

https://aka.ms/cqdclassifiers

Optimize for quality

For an optimal user experience, the following network performance metrics must be met.

Metric	Client to Microsoft edge	Customer edge to Microsoft edge
Latency (one way)	<50 ms	<30 ms
Latency (RTT, or round-trip time)	<100 ms	<60 ms
Burst packet loss	<10% during any 200-ms interval	<1% during any 200-ms interval
Packet loss	<1% during any 15-sec interval	<0.1% during any 15-sec interval
Packet inter-arrival jitter	<30 ms during any 15-sec interval	<15 ms during any 15-sec interval
Packet reorder	<0.05% out-of-order packets	<0.01% out-of-order packets

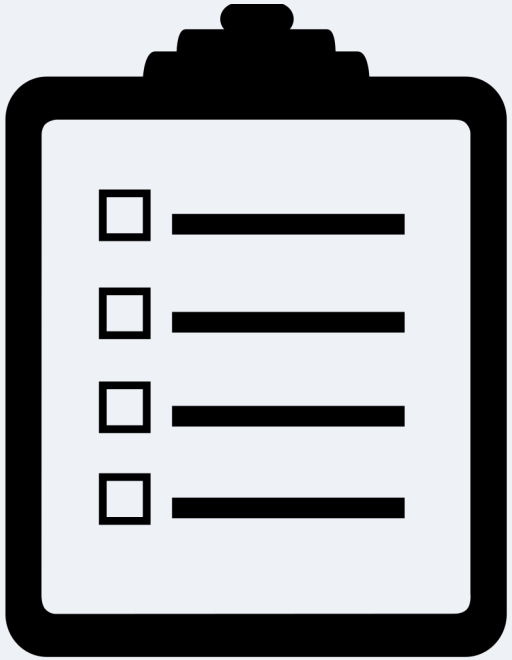
https://docs.microsoft.com/en-us/microsoftteams/upgrade-prepare-environment-prepare-network

https://www.microsoft.com/en-us/download/details.aspx?id=53885

https://connectivity.office.com/

Optimizing for Quality

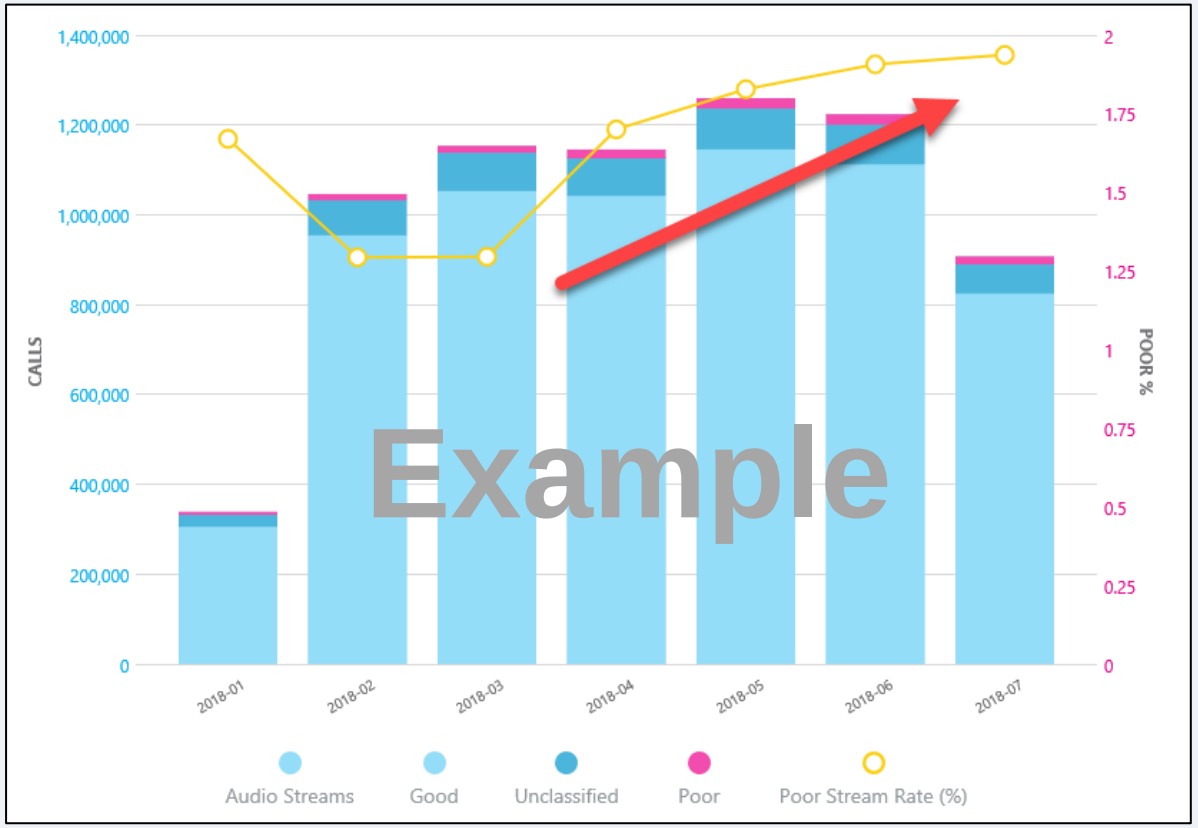
A combination of proper planning and operations management will help ensure that users have a consistent and reliable experience.



1. **Deploy Quality of Service (QoS)**
   Media workloads must be prioritized into proper queues
2. **Bypass proxy for Office 365 traffic**
   PAC file manipulation is the recommended method
3. **Implement split tunnelling for VPN solutions**
   Media traffic must bypass the VPN and connect directly to Office 365
4. **Ensure the right ports and protocols are open**
   TCP and UDP ports must be opened; high port range is optional; 3478–3481 UDP and 443 TCP; https://aka.ms/teamsips
5. **Use certified phones and devices**
   Including the latest Skype for Business clients

The Quality Champion role

Why designate a quality champion?



Usage is trending upward as people are adopting the service more and more.

At the same time, audio quality is getting worse, resulting in a decline in user experience.

It's the role of the quality champion to identify poor trends, take ownership, and drive remediation.

Role of a quality champion

Establish and drive ownership and accountability for the user experience

Profile definition

- Have the sponsorship to work with other teams to drive remediation.
- Passionate about the user experience.
- Have the skills to identify trends in the environment.
- Identify reoccurring issues raised through the helpdesk, drive actions if needed (user awareness, helpdesk training, and so on).

Reactive

- Go-to SME for any issues related to call quality or reliability.

Proactive

- Review trends, identify action items.
- Drive and take ownership of remediation actions to improve overall user experience.
- Report on overall quality and user experience trends to sponsor and service owner(s) at regular intervals.

Call Quality Dashboard basics

What is CQD?

CQD provides **calling telemetry** provides insight into the quality, reliability, and user experience of Teams and Skype for Business.

CQD is designed to help Skype for Business admins, Teams admins, and network engineers **optimize** the network for real-time communication.

CQD looks at **aggregate information** across an entire organization where overall patterns can become apparent, allowing staff to make informed decisions.

CQD Data

CQD consists of the following data:

- Client calling telemetry, delivered at the end of the meeting/call. (https://aka.ms/cqd-dm)
- Direct Routing, Phone System, and Dial-in/out Conferencing telemetry (PSTN)***
- End user identifiable information (EUII)*
- Telemetry from SFB server 2019 on-premises/hybrid (connector required)**

Limitations

CQD won't provide the root cause for every scenario. The data is based on trends allowing CQD to call out areas for further investigation.

CQD queries are limited to 10k results.

Telemetry will be available within 30 minutes from end of meeting/call.

CQD data is stored online.

End User Identifiable Information

EUII data is only kept for 28 days.

- User Principal Name (UPN)
- Machine Endpoint Name
- User Verbatim Feedback – Rate My Call
- Full IP address
- Media Access Control (MAC) Address
- Wi-Fi Basic Service Set Identifier (BSSID)
- Session Initiation Protocol (SIP) URI - Skype for Business only
- Object ID (the Active Directory object ID of the endpoint's user)

https://docs.microsoft.com/en-us/MicrosoftTeams/turning-on-and-using-call-quality-dashboard#piieuii-data

Permissions

Before accessing CQD, ensure the proper permissions are assigned.

- Office 365 Global Administrator role
- Skype for Business Administrator role
- Teams Service Administrator role
- Teams Communications Administrator
- Teams Communications Support Engineer role
- Teams Communications Support Specialist role
- Reports Reader

To learn more about tenant roles
https://docs.microsoft.com/office365/admin/add-users/about-admin-roles

Role Based Access Control

The table outlines the following roles and their associated permissions for CQD.

Ability	Report Reader	Teams Comms Support Specialist	Global Reader	Teams Comms Support Engineer	SFBO Admin	Teams Service Admin	Teams Comms Admin	Global Admin
View Reports	✓	✓	✓	✓	✓	✓	✓	✓
Access EUII fields	✗	✗	✓	✓	✓	✓	✓	✓
Create Reports	✓	✓	✓	✓	✓	✓	✓	✓
Upload Build Data	✗	✗	✗	✗	✓	✓	✓	✓

Report Types

There are four types of reports available in CQD

Power BI Desktop (Direct Query)

Query telemetry directly from CQD through a custom connector allowing you to create Power BI reports.

Web UI (cqd.teams.microsoft.com)

Summary

Summary reports are static reports that cannot be edited or exported.

Detailed

Detailed reports are fully customizable reports that can de exported to a CSV, cloned, and shared. Only table and histogram reports are available.

Power BI (Embedded)*

A new type of report that leverages embedded Power BI. These reports are static and cannot be modified.

Key Definitions

Meeting

Known by the *Meeting ID* dimension, this is created by Teams when a meeting is scheduled or started through Meet-Now and can be found as part of the join URL. A 1:1 call (also known as peer to peer or P2P call) does not have a meeting ID.

Conference

Known by the *Conference ID* dimension, this is a unique ID given to every meeting (>2 participants) or a 1:1 call. More that one conference ID may be associated with a given meeting ID. For example, a reoccurring meeting will have a common meeting ID while each individual meeting instance will have a unique conference ID.

Session or Call

A session or call, as defined by CQD, is a call-leg and is associated with a single meeting endpoint against a single conference ID. It is expected to see multiple call-legs as part of a single conference ID as each unique endpoint "calls" or joins into the meeting. Example: Total Call Count

Stream or Segment

A stream is an individual media connection between two endpoints in any given call. Streams are associated with a direction and media type and are used to diagnose quality issues. It is expected to see multiple streams per call. Streams are also known as segments. Example: Total Stream Count

Dimensions, measures, and filters

A well-formed CQD query contains all three of the following parameters:

Dimension: How I want to pivot on the data.
Measure: What I want to report on.
Filter: How do I want to reduce the dataset the query returns.

Another way to look at this is that a *dimension* is the grouping function, a *measure* is the data I'm interested in, and a *filter* is how I want to narrow down the results to those that are relevant to my query.

"Show me Poor Streams [Measure] by Subnet [Dimension] for Building 6 [Filter]."

Measures in Power BI are denoted by the sum ($\sum$)symbol.

For a complete list of Dimensions and Measures: https://aka.ms/cqd-dm

First vs. second

Many of the dimensions and measures in CQD are classified as either first or second to differentiate endpoints.

First will always be a server endpoint (Conference server, Mediation server, and so on) if a server is involved.

In a meeting, Microsoft is always the First endpoint.

Second will always be a client endpoint unless the stream is between two server endpoints.

If both endpoints are the same type, the choice of which is first is based on internal ordering of the user agent category. This ensures that the ordering is consistent.

More information: https://aka.ms/cqd-dm

Managed vs. Unmanaged

By default, all endpoints in CQD are classified as external. After a building file is introduced, we can begin to look at managed endpoint data.

A ***managed*** network, also known as **internal** or **inside**, can be influenced and controlled by the organization. This includes the internal LAN, the remote WAN, and VPN.

An ***unmanaged*** network, also known as **external** or **outside**, can't be influenced or controlled by the organization. An example of an unmanaged network is a hotel or airport network.

Good, poor, and unclassified

Good or poor

A good or poor call consists of a call that contains a complete set of service metrics, for which a full QoE report was generated and received by the service.

Unclassified

An unclassified stream doesn't contain a full set of service metrics.

> The most common reason for calls to be unclassified is if there was little to no packet utilization. An example of this would be a participant who joins a meeting on mute and never speaks.
>
> These can also be short calls (usually less than 60 seconds) where averages couldn’t be computed.

Hint: In CQD, look at the “Poor Due To…” measurements to understand why a stream was classified as poor.

To learn more about the classifiers used to determine if a stream is good or poor

https://aka.ms/cqdclassifiers

Network Effectiveness Ratio (NER) – Direct Routing ONLY

What is NER?

The NER measures the ability of a network to deliver calls by measuring the number of calls sent versus the number of calls delivered to a recipient.

The NER statistic is used for measuring the effectiveness of Direct Routing

The NER measures the ability of networks to deliver calls to the far-end terminal--excluding user actions resulting in call rejections. If the recipient rejected a call or sent the call to voicemail, the call is counted as a successful delivery. This means that an answer message, a busy signal, or a ring with no answer are all considered successful calls.

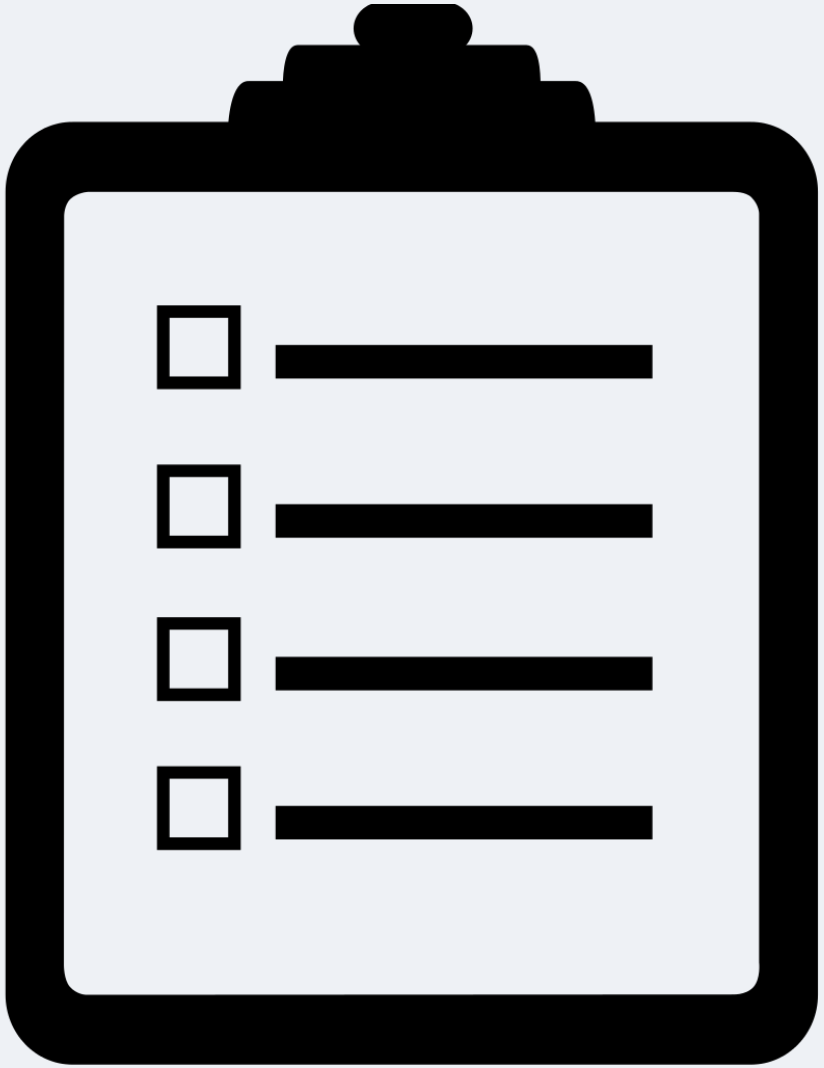
https://docs.microsoft.com/en-us/microsoftteams/direct-routing-health-dashboard

The Building File

What is a building file?

- By default, CQD classifies every network as external.
- The building file contains a list of internal subnets with location information (city, state, zip, etc…) that enables CQD to separate internal from external networks.
- Uploaded directly into CQD via the web portal.
- You can upload multiple iterations of the building file, however, only one building file is “active” at a time.
- Building files are not cumulative.
- Endpoint Data file is used to map Endpoint Name to asset data

Building information formatting and updates rules



- File contents can’t include table headers that describe the columns.
- The file format must be TSV or CSV, and it must be less than 50 MB.
- Empty columns must be separated by a tab or comma, depending on the file format you selected.
- The file must always contain all definitions plus any new additions when you update the file subsequently.

Building Data Structure

The most important piece is to plan the formatting of how these fields will be used.

Be consistent about entering data.

Don't duplicate data between columns.

https://docs.microsoft.com/en-us/MicrosoftTeams/cqd-upload-tenant-building-data

Name	Data Type	Intended Purpose	Example(s)
Network	String	Subnet definition	192.168.1.0
NetworkName	String	Description for subnet	SEATTLE-SEA-1\2FL-WiFi
NetworkRange	Number	Bitmask of subnet	24
BuildingName	String	Name of Building	SEATTLE-SEA-1
OwnershipType	String	Open	Leased, Owned
BuildingType	String	Open	Marketing, Engineering
BuildingOfficeType	String	Open	Office, Retail, Data Center
City	String	City of Building	Seattle
ZipCode	String	Zip Code of Building	98001
Country	String	Country of Building	US
State	String	State of Building	WA
Region	String	Region of Building	NA
InsideCorp	Bool	Denotes if subnet is inside the corporate network. 1 = True	1
ExpressRoute	Bool	Denotes if subnet is part of ExpressRoute. 1 = True	0
VPN	Bool	Denotes if subnet is a VPN subnet. 1 = True	0

Endpoint Data Structure

EndpointName must be unique, otherwise the upload fails.

The maximum allowed length is 64 characters.

Name	Data Type	Intended Purpose	Example(s)
EndpointName	String	Unique name assigned to the client endpoint (machine name)	1409W3534
EndpointModel	String	Model of the endpoint	Fabrikam Model 123
EndpointType	String	Type of endpoint	Laptop
EndpointLabel1	String	Open	IT designated 2018 Laptop
EndpointLabel2	String	Open	Asset Tag 5678
EndpointLabel3	String	Open	Purchase 2018

https://docs.microsoft.com/en-us/MicrosoftTeams/cqd-upload-tenant-building-data#endpoint-data-file

Accounting for VPN

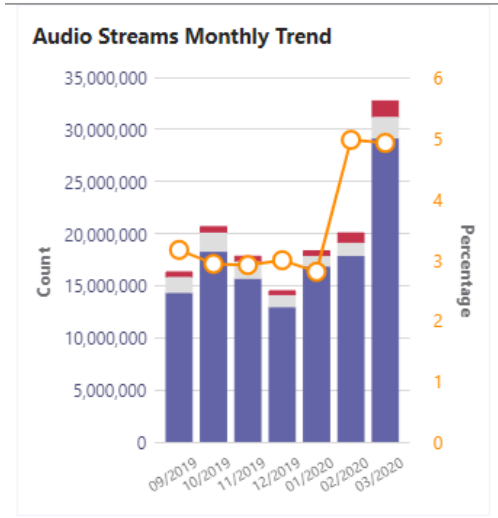
Not all VPN vendors properly register remote access adapters for VPN. This means you need to manually define them in the building file.

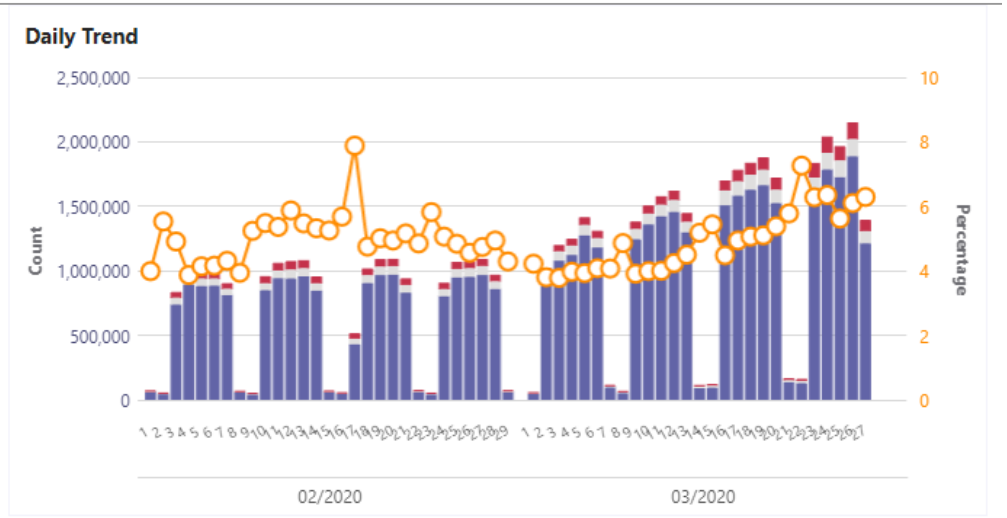
Network	Network Name	Network Range	Building Name	Ownership Type	Building Type	Building Office Type	City	Zip Code	Country	State	Region	Inside Corp	Express Route	VPN
192.168.1.0	VPN\BEIJING-BJW-1\FL2	24	BEIJING-BJW-1	Company Owned	VPN	Office	Beijing	100080	CN		ASIA	1	0	1

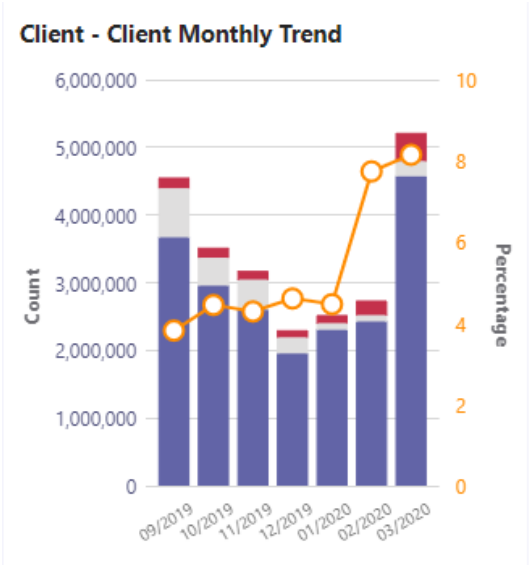
Network	Network Name	Network Range	Building Name	Ownership Type	Building Type	Building Office Type	Country	Zip Code	Country	State	Region	Inside Corp	Express Route	VPN
192.168.1.0	CHN/Beijing/BEIJING-BJW-1	24	VPN-East	Company Owned	VPN	Office	Beijing	100080	CN		ASIA	1	0	1

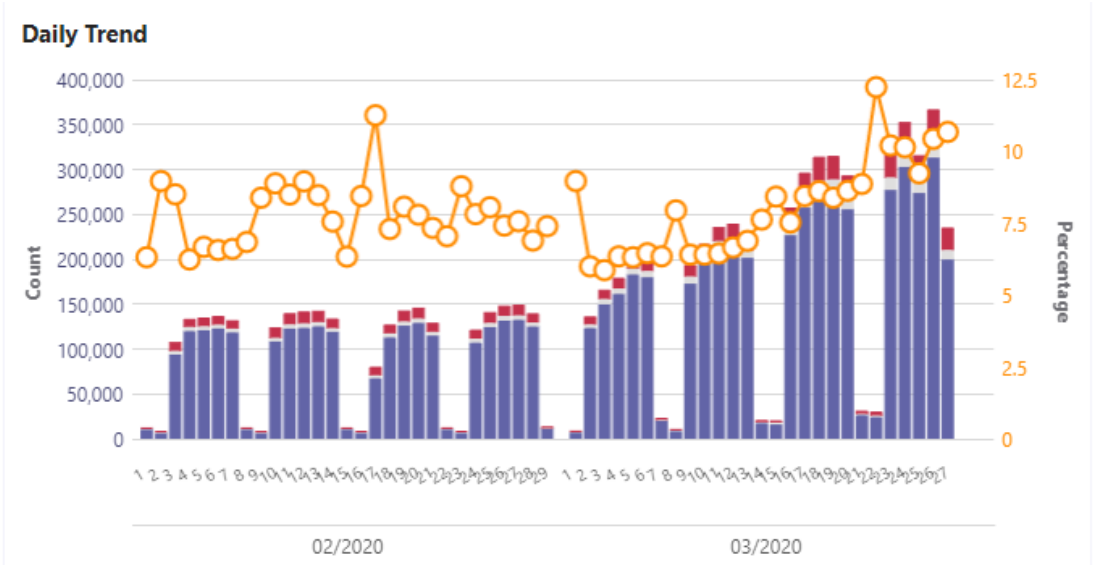
CQD Live Exercise (DEMO)

Working from home - Overall quality trends



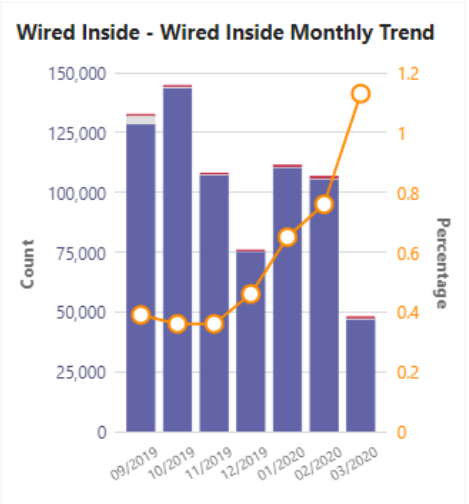


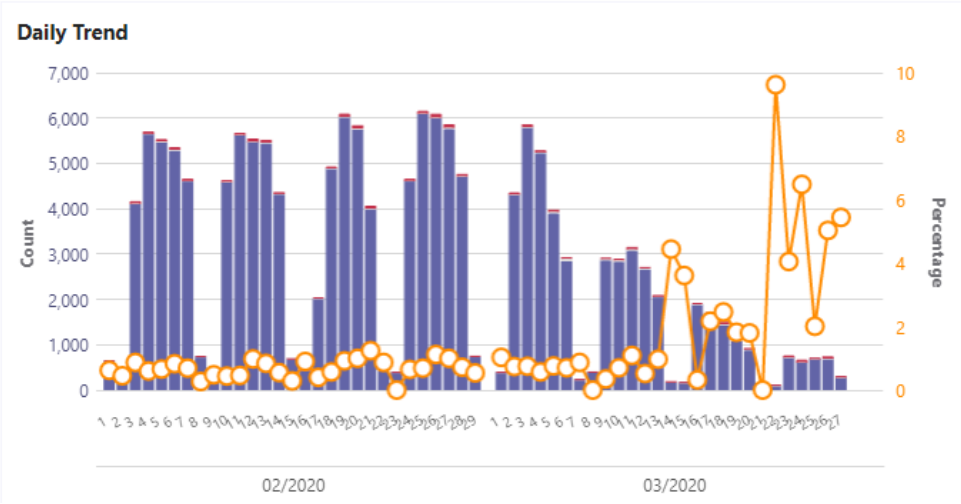




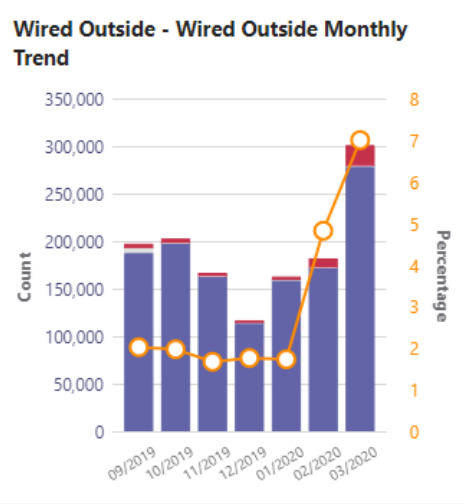
Working from home - P2P trends

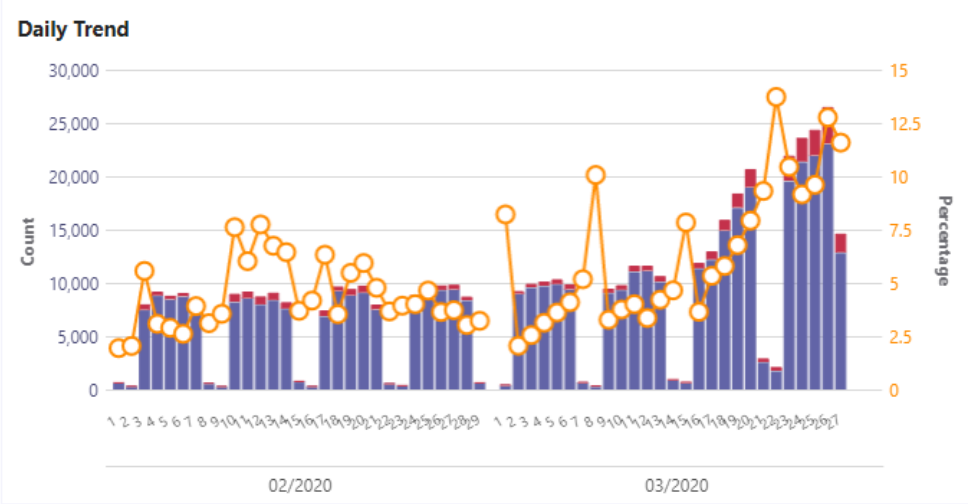
Wired Inside - Wired Inside



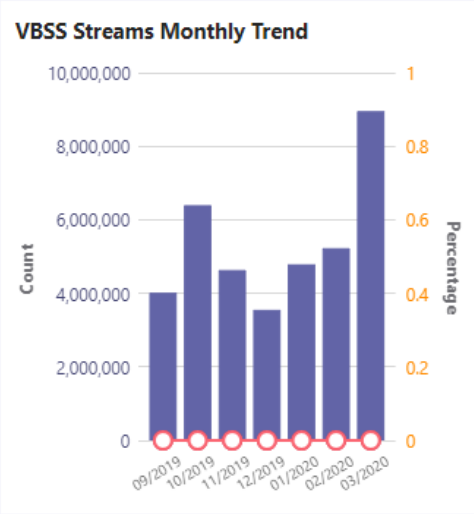


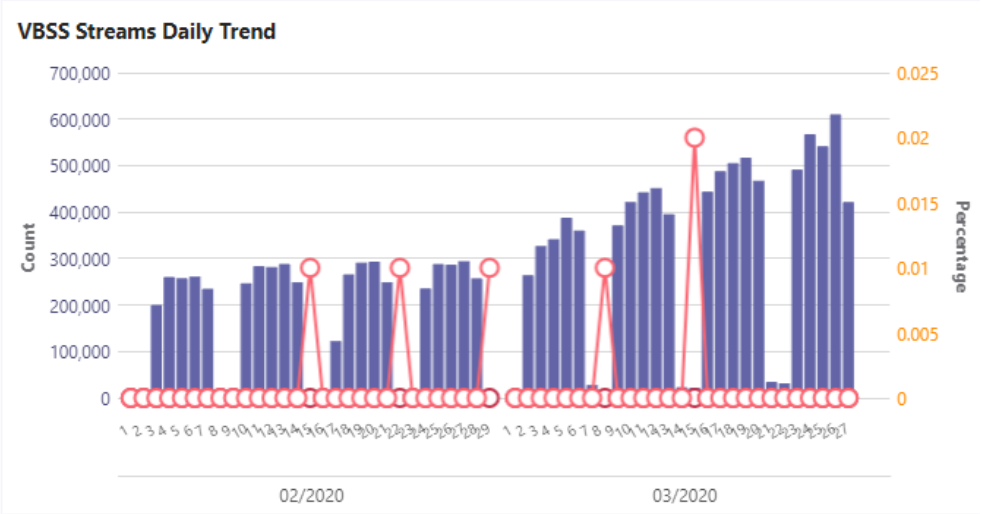
Wired Outside - Wired Outside

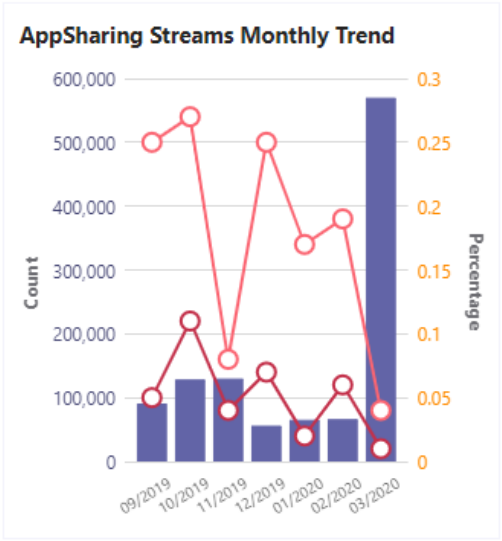


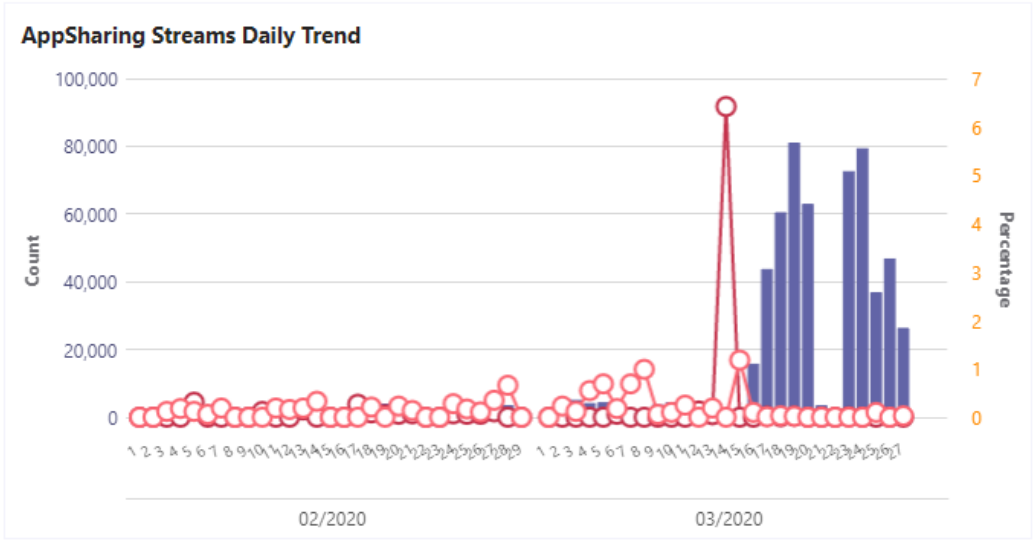


Working from home – desktop sharing

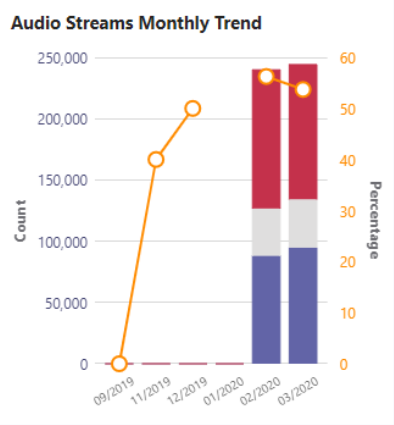


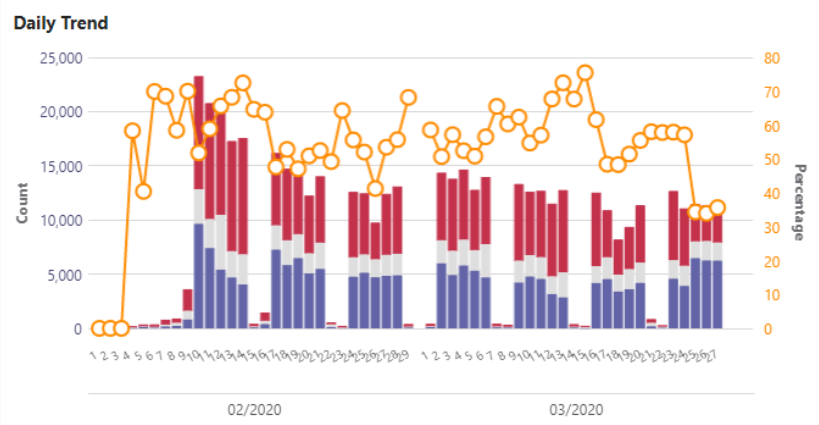






Overall quality with high bad calls ratio





Wifi Outside Subnets

Show 10 entries Search:

Subnet	Month	Good	Unclassified	Poor	Poor %
192.168.0.0	2020-04	11,088	784	2,422	17.93
192.168.1.0	2020-04	7,730	604	1,656	17.64
192.168.3.0	2020-04				

Drill down further – (quality drill down report)

Product Filter : Microsoft Teams

Media Type : Audio

Network Connection : Wifi

Date by Region | Locations | Subnets | Hour | Users

Filters +

No filters applied.

Audio Poor Sessions by Subnet

Show 10 entries

Subnet	BSSID	Poor %	Poor Sessions	Unclassified Sessions	Sessions
Filter: Subnet	Filter: BSSID	Filter: Poor %	Filter: Poor Sess	Filter: Unclassified	Filter: Sessions
192.168.0.0		51.13	22,668	2,450	46,780
192.168.1.0		50.6	17,264	1,765	35,884
192.168.3.0		50.18	9,615	974	20,134
192.168.31.0		50.58	5,537	631	11,578
192.168.2.0		58.33	5,075	432	9,132
192.168.101.0		52.34	4,544	500	9,181
		56.05	1,436	45	2,607
192.168.50.0		54.66	1,097	96	2,103

Quality of Experience

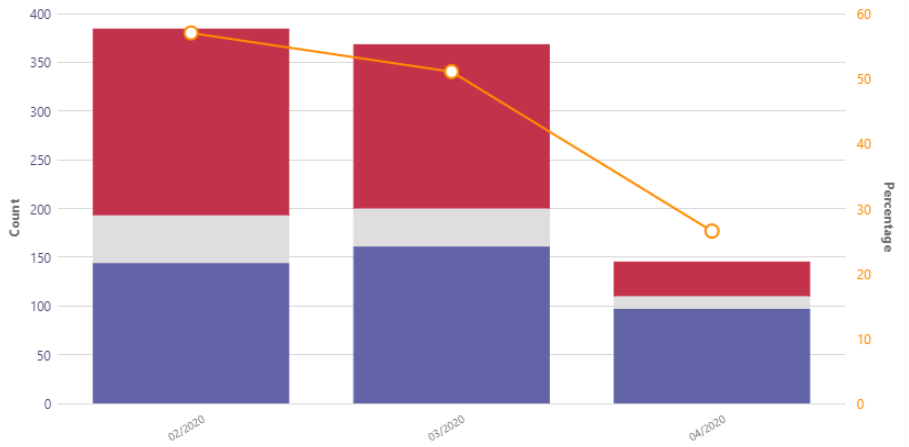
Filters

Second Inside Corp : <No Filter>

Transport : TCP

Audio Quality

This report shows monthly trend of audio stream quality



Quality of Experience

Filters

Second Inside Corp : <No Filter>

Transport : UDP

Audio Quality

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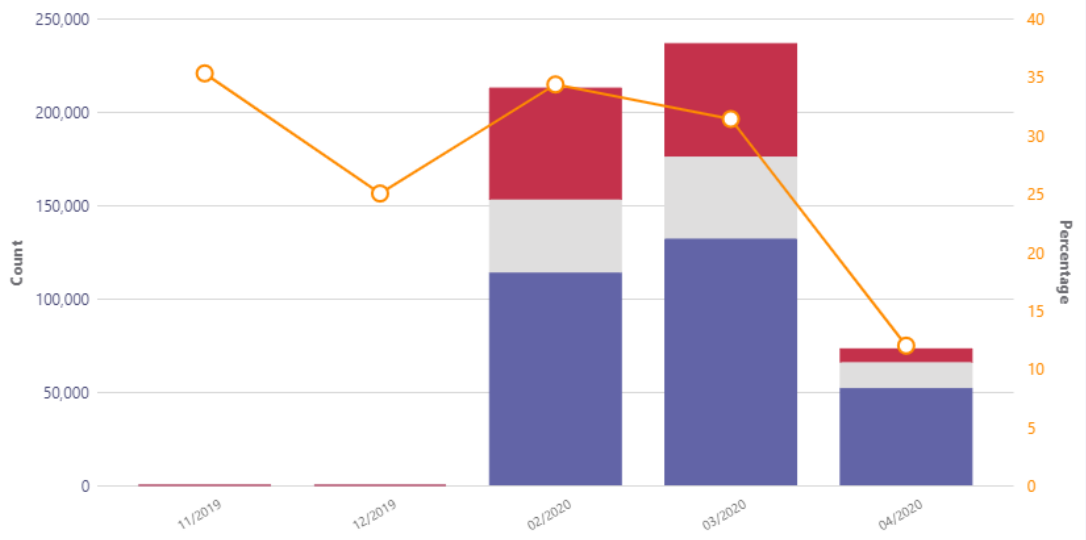

Where do you go from here?

Key takeaways

In this session, you learned how to:

- User the tools in Teams
- What is quality?
- Why it is important to have Quality Champion role in your org
- How to use Call Analytics
- What is CQD and the basics
- Why you need to upload the building file
- Monitor and use call quality tools in Teams

Explore more resources

- Adoption Site: https://Adoption.Microsoft.com
- Live, online training: https://aka.ms/TeamsLiveTraining
- Self-guided how-to articles: https://support.office.com
- Overview of apps in Teams: http://aka.ms/OverviewAppsInTeams
- Add apps to Microsoft Teams: https://aka.ms/addappstoteams
- Custom apps in Microsoft Teams: https://aka.ms/teamsdev
- Teams Chalk Talk Series: https://aka.ms/TeamsChalkTalks
- Chalk Talk Handout: https://aka.ms/TeamsAudioQuality

New!

Thank you for attending!