

Managing a Quality Service

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Agenda

Introductions

What is quality?

The Quality Champion

CQD basics

The building file

QER Templates





What is quality?



Quality = Service Metrics + User Experience

Service Metrics



User Experience



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

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?



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.

If a call is not classified as poor, it doesn't mean it was perfect. It just means that the averages for the metrics never exceeded the threshold.



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A video stream is classified as poor if:

Metric	Threshold	Description
Video Local Frame Loss Percentage Avg	>50%	Average percentage of video frames lost as displayed to the user. The average includes frames recovered from network losses.
Video Frame Rate Avg	<7	Average frames per second received for a video stream, computed over the duration of the session.
Video Post FECPLR	> 0.15	Packet loss rate after FEC has been applied aggregated across all video streams and codecs.

A video stream is classified as poor due to freeze if:

Metric	Threshold	Description
Video Poor Due to Freeze Classifier	>0.246 (conf) >0.524 (P2P)	A Score between 0 and 1 that is generated based on a combination of user experience, freeze duration statistics and overall call experience



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/>

Defining target metrics (example)



Target metrics define the core service metrics that are used to assess the user experience, along with their defined thresholds.

Metric name		Quality targets	Reliability targets	
			Audio Poor Stream Rate	Setup Failure Rate
All	Internal	2.0%	0.5%	2.0%
	Overall	3.0%	1.0%	3.0%
Meetings	Internal	2.0%	0.5%	2.0%
	Wired internal	1.0%	0.5%	1.0%
	Wi-Fi 5 GHz internal	1.0%	0.5%	1.0%
	Wi-Fi 2.4 GHz internal	3.0%	0.5%	2.0%
	Overall	3.0%	0.5%	3.0%
P2P	Internal	2.0%	0.5%	2.0%
	Wired/Wi-Fi 5 GHz internal	1.0%	0.5%	1.0%
	Wired/Wi-Fi 5 GHz overall	2.0%	1.0%	1.0%
	Overall	3.0%	1.0%	3.0%

Quality/Reliability Checklist

There are 7 key configuration areas to validate – start here



NOTE: Some of these changes can have perceived security risks, please see the [Teams Security Guide](#) to understand how we ensure the security of our traffic.

- 1. Ensure the right ports and protocols are open**
Subnets, 13.107.64.0/18, 52.112.0.0/14, 52.120.0.0/14 and Ports: UDP 3478-3481 & TCP 443 are needed for Teams signalling and media traffic.
- 2. Bypass proxy and deep packet inspection**
Bypass on-premises and cloud-based proxy and inspection services commonly used for Internet browsing.
- 3. Implement split tunnelling for VPN solutions**
Facilitate direct connectivity to these cloud endpoints for VPN users by implementing split tunneling.
- 4. Local DNS resolution**
Microsoft services are deployed globally and use geo-based DNS and Anycast IP to load balance and allocate services closest to the endpoint.
- 5. Take the shortest path to the Internet**
Route traffic to the Internet as close as possible to the endpoint. This ensures traffic enters the Microsoft managed network faster with fewer hops and points of failure in between.
- 6. Deploy Quality of Service (QoS) where needed**
In congested networks, media workloads should be prioritized into proper queues to protect packets on managed networks.
- 7. Exclude important processes from anti virus/DLP scanning**
Excluding teams.exe, for example, from scanning keeps them from interrupting the operation of Teams which can lead to slow system performance.





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.



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

- CQD provides **calling telemetry** that give one 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 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](#))**
 - 30 minute SLA



- 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.



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#pii-euii-data>



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 EUU fields	✗	✗	✓	✓	✓	✓	✓	✓
Create Reports	✓	✓	✓	✓	✓	✓	✓	✓
Upload Build Data	✗	✗	✗	✗	✓	✓	✓	✓



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 than 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



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 (Σ) symbol.

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



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>



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 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.

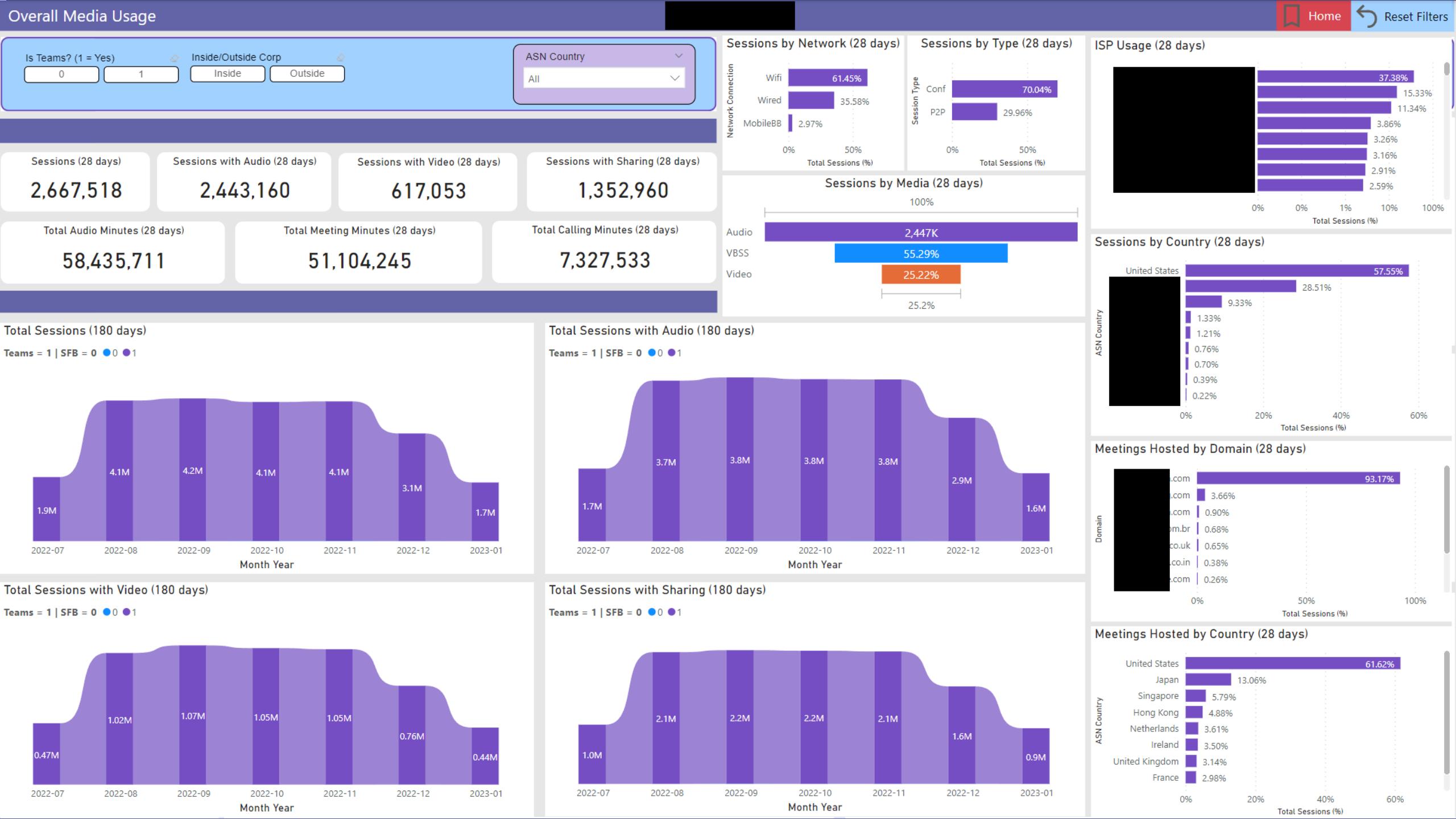
Hint: In CQD, look at the "Poor Due To..." measurements to understand why a stream was classified as poor.

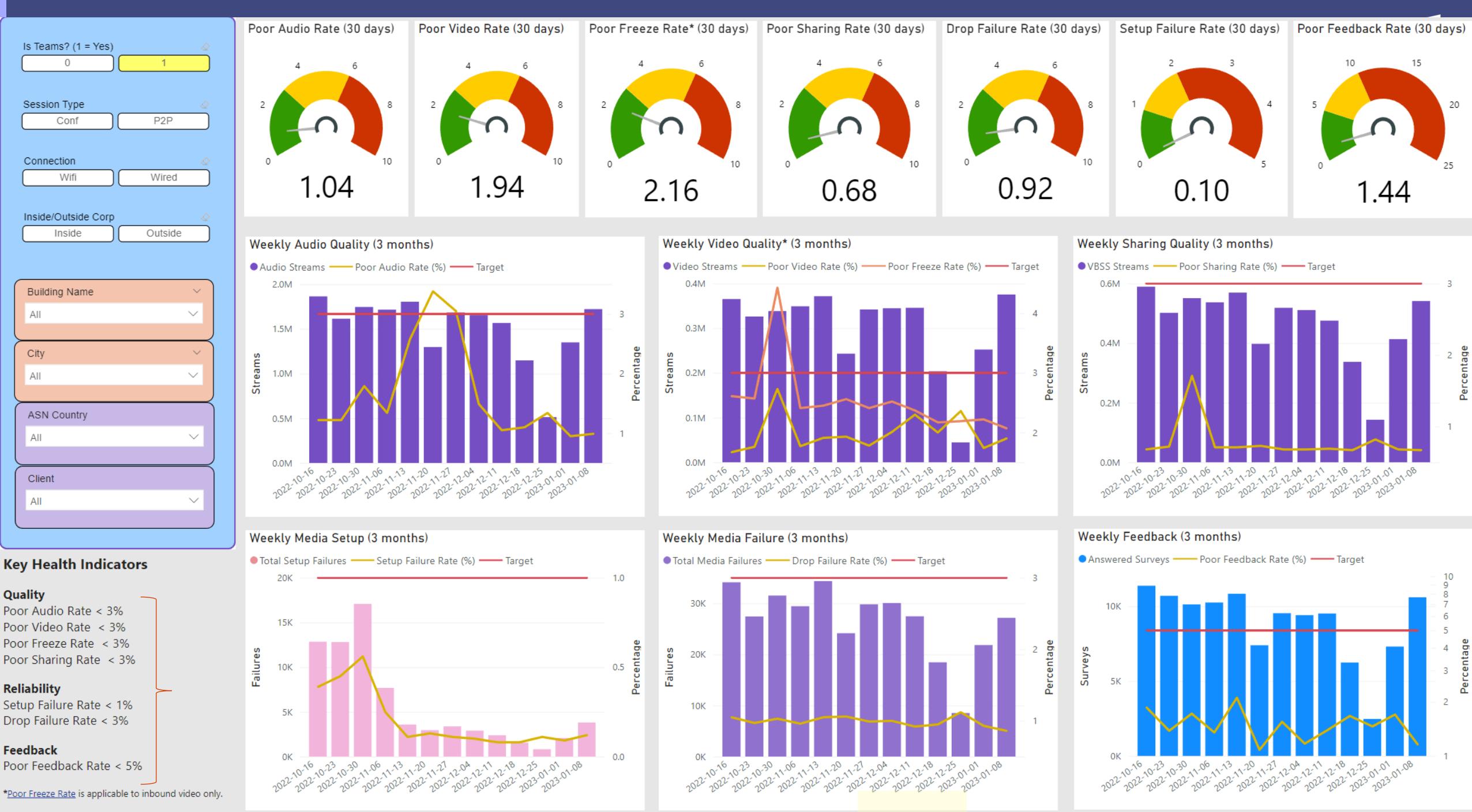
To learn more about the classifiers used to determine if a stream is good or poor

<https://aka.ms/cqdclassifiers>



QER Templates





Is Teams? (1 = Yes)

 0 1

Session Type

 Conf P2P

Connection

 Wifi Wired

Inside/Outside Corp

 Inside Outside

Building Name

 All

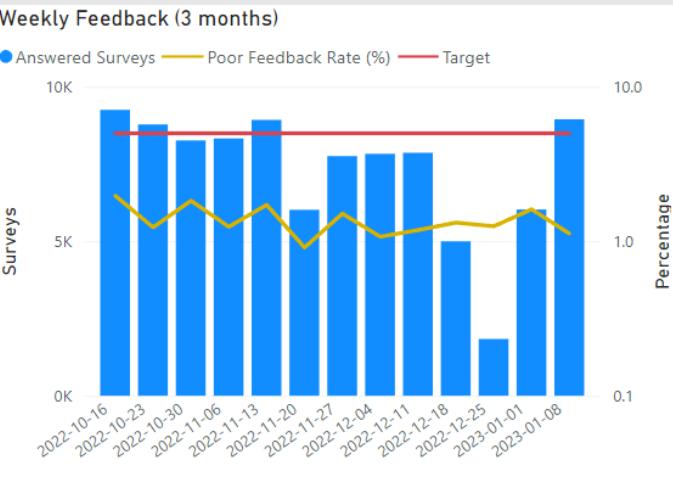
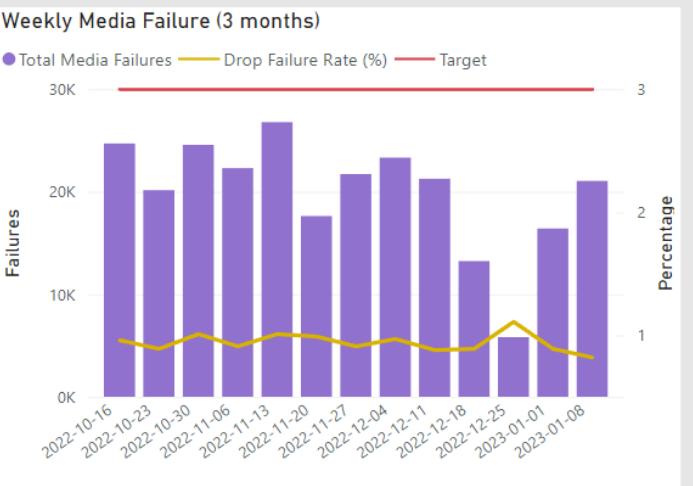
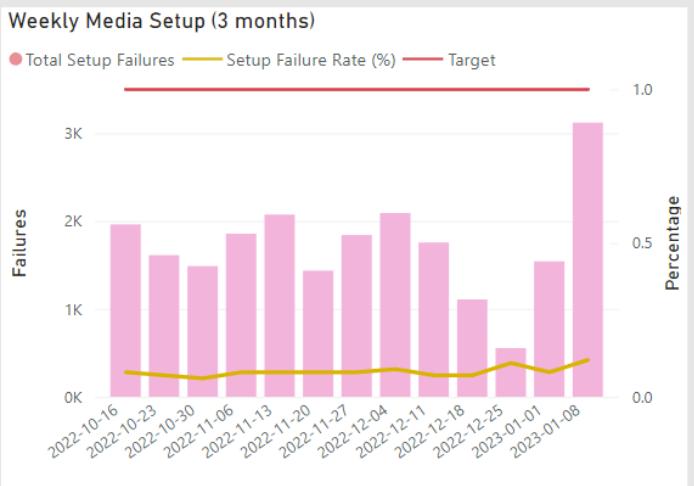
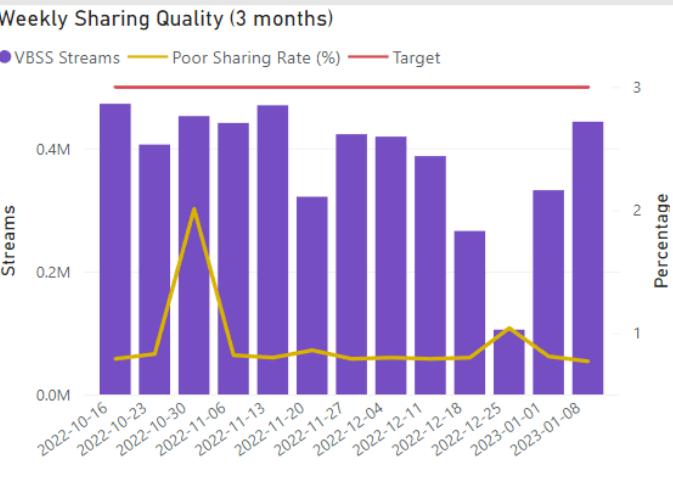
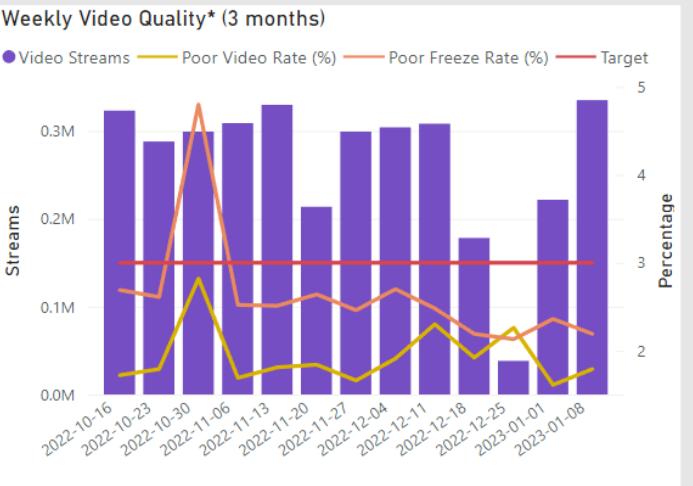
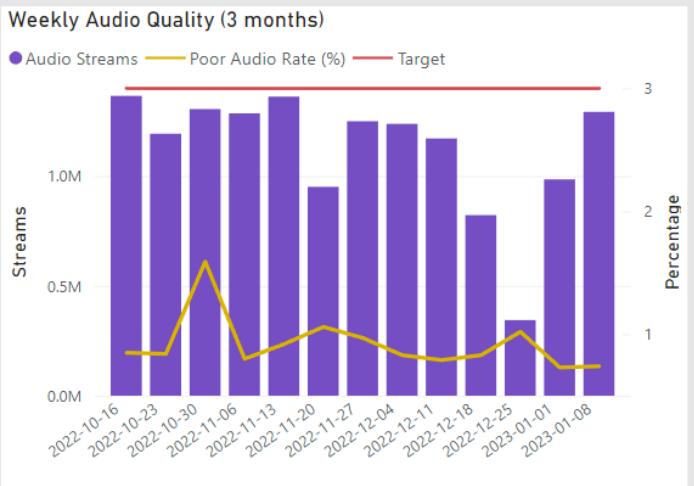
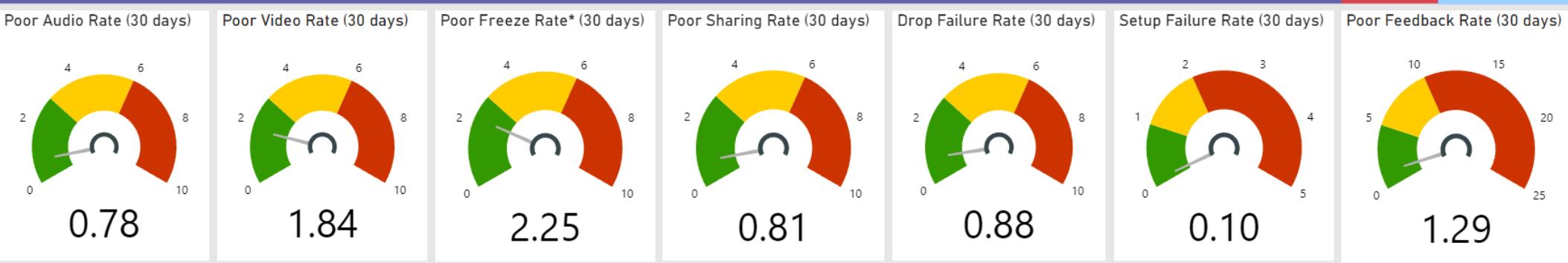
City

 All

ASN Country

 All

Client

 All
**Key Health Indicators****Quality**

Poor Audio Rate < 3%
 Poor Video Rate < 3%
 Poor Freeze Rate < 3%
 Poor Sharing Rate < 3%

Reliability

Setup Failure Rate < 1%
 Drop Failure Rate < 3%

Feedback

Poor Feedback Rate < 5%

*Poor Freeze Rate is applicable to inbound video only.

Is Teams? (1 = Yes)

 0 1

Building Name

 All

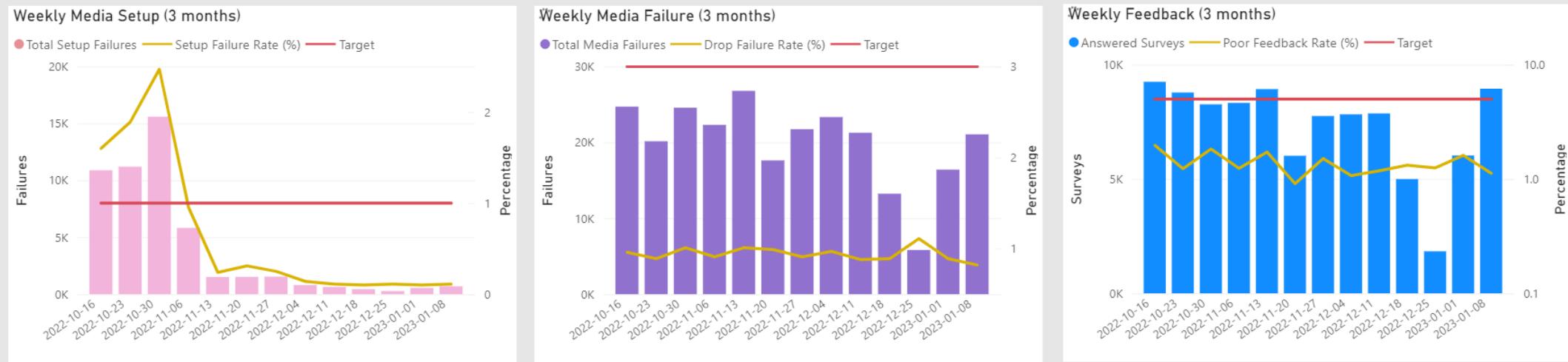
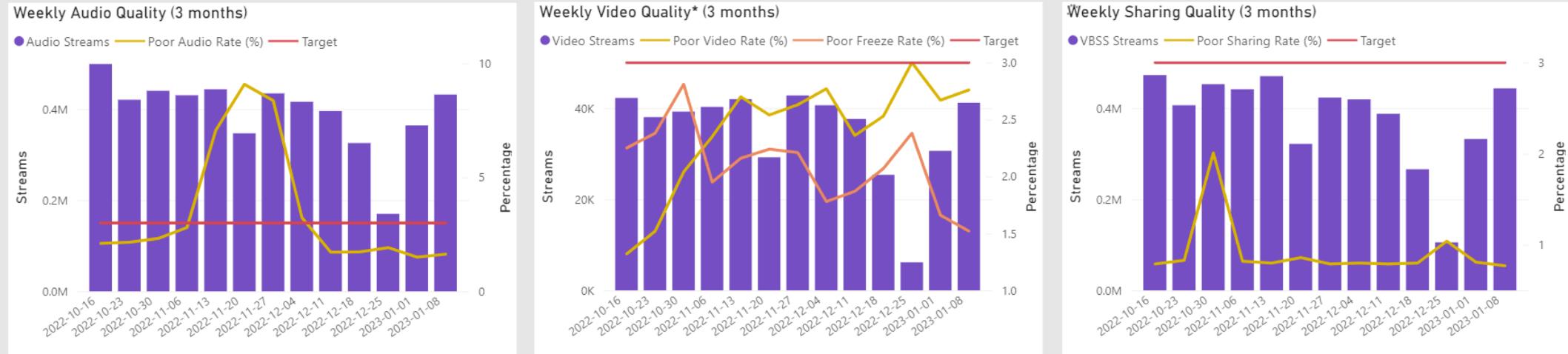
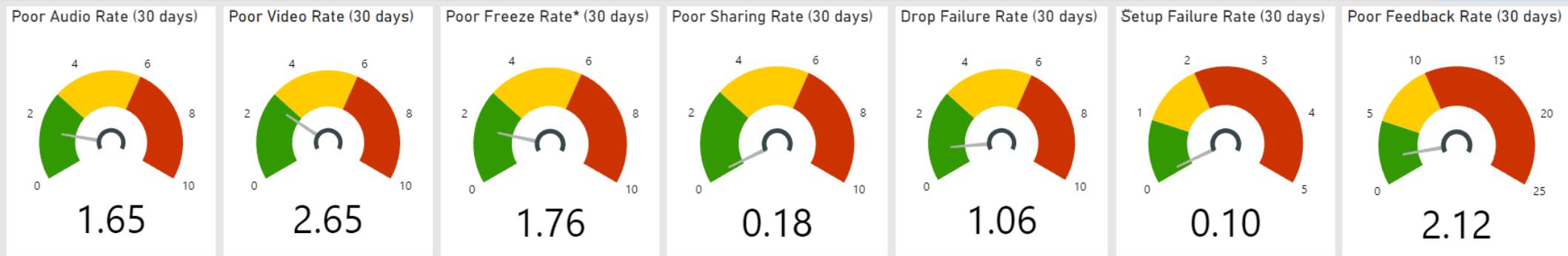
City

 All

ASN Country

 All

Client

 All**Key Health Indicators****Quality**

Poor Audio Rate < 3%
Poor Video Rate < 3%
Poor Freeze Rate < 3%
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Reliability

Setup Failure Rate < 1%
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Feedback

Poor Feedback Rate < 5%

*Poor Freeze Rate is applicable to inbound video only.

Is Teams? (1 = Yes)

 0
 1

Building Name

Session Type

 Conf
 P2P

Inside/Outside Corp

 Inside
 Outside

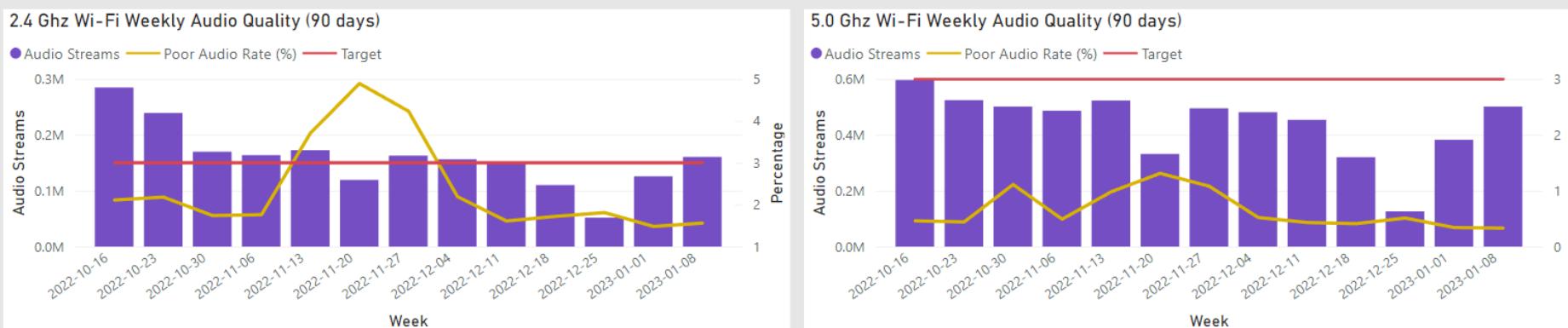
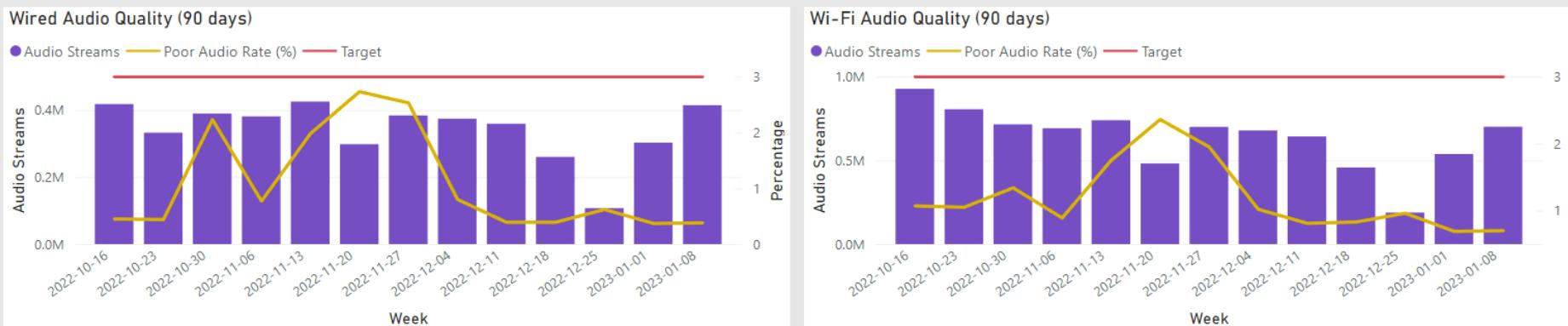
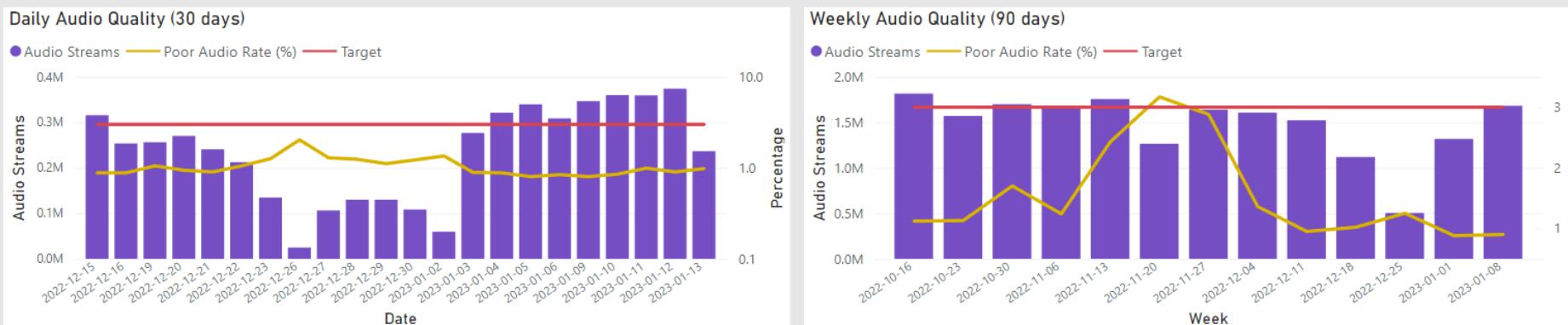
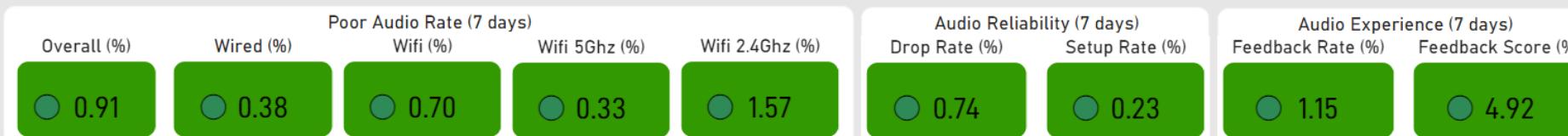
Client

Audio Quality by Country/Subnet (7 days)

ASN Country	User Count	Good Streams	Poor Streams	Poor Audio Rate (%)
United States	556,901	1,841	0.33	0.33
	213,733	2,762	1.28	1.28
	112,193	329	0.29	0.29
	38,442	311	0.80	0.80
	9,169	83	0.90	0.90
	6,061	34	0.56	0.56
	9,093	63	0.69	0.69
	3,406	41	1.19	1.19
	4,316	9	0.21	0.21
	1,607	6	0.37	0.37
			Media Reliability	0.98
			Audio Health Details	0.87
			Video Health Details	0.70
			Sharing Health Details	3.64
				1.37

Audio Quality by ISP/ASN (7 days)

ASN ISP Name	User Count	Good Streams	Poor Streams	Poor Audio Rate (%)
	30,584	387,370	1,435	0.37
	11,282	149,393	2,969	1.95
	7,581	141,740	424	0.30
	5,758	104,675	348	0.33
	2,111	16,599	573	3.34
	2,077	20,364	267	1.29
	1,826	38,220	132	0.34
	1,785	29,946	112	0.37
inc	1,268	22,083	75	0.34



Inside

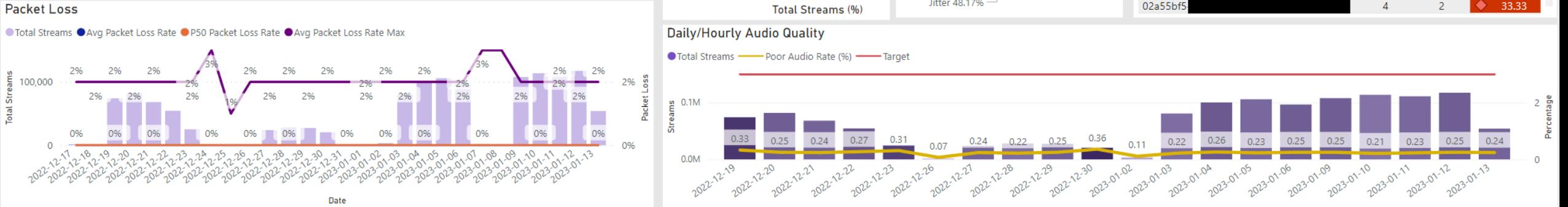
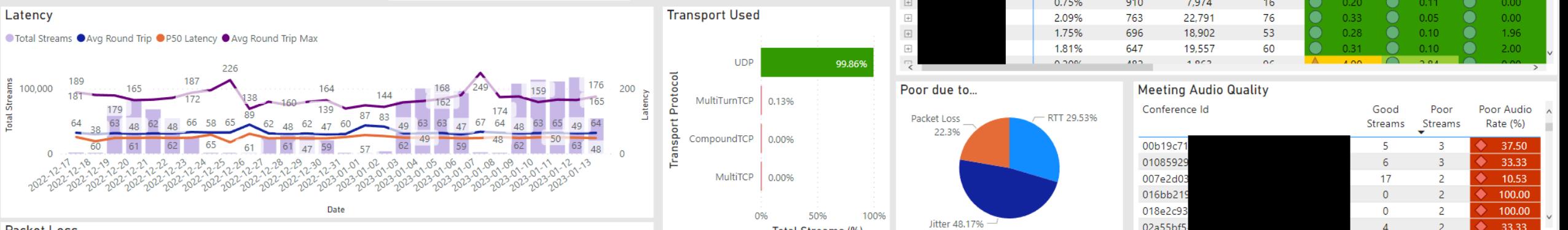
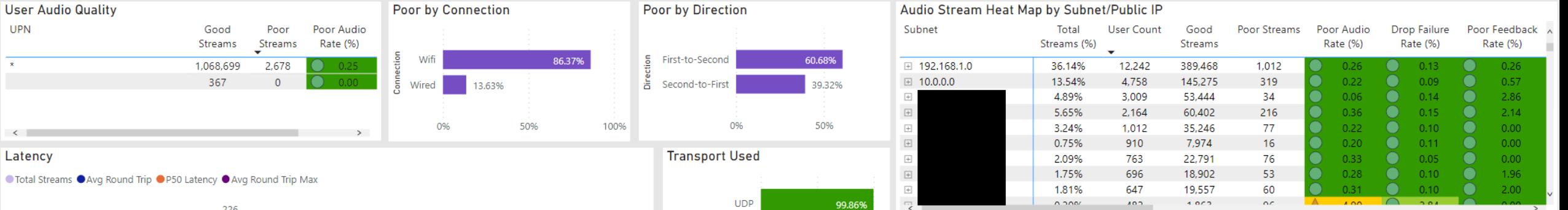
Outside

Home

Reset Filters

Back

Total Good Audio Streams	Total Poor Audio Streams	Overall (%)	Wired (%)	Wifi (%)	Wifi 5Ghz (%)	Wifi 2.4Ghz (%)	Drop Rate (%)	Setup Rate (%)	Feedback Rate (%)	Feedback Score (%)
1,069,061	2,678	0.25	0.12	0.30	0.16	0.70	0.12	0.01	0.78	4.93



Client	User Count	Poor Audio Rate (%)	Country/City Audio Quality			ISP/ASN/Public Network Audio Quality			Wi-Fi Audio Quality							
			ASN Country	User Count	Poor Audio Rate (%)	Poor Streams	Good Streams	ASN ISP Name	User Count	Poor Audio Rate (%)	Poor Streams	Band	User Count	Poor Audio Rate (%)	Poor Streams	Good Streams
Microsoft Teams Windows	26,381	0.22	United States	2,678	27.17300	0	1,069,066	[REDACTED]	18,372	0.09	277	5.0 Ghz	18,646	0.16	939	55
Microsoft Teams iOS	3,963	0.86						[REDACTED]	8,169	0.25	689	2.4 Ghz	8,727	0.70	1,006	14
Microsoft Teams Android	729	1.10						[REDACTED]	6,468	0.27	555					
Microsoft Teams Mac	450	0.35						[REDACTED]	2,093	0.23	135					
Microsoft Teams Room (Android)	10	0.00						[REDACTED]	1,986	0.29	213					
Microsoft Teams /Project Pitch	6	0.00						[REDACTED]	1,397	0.24	100					

Session Type

Client

What is Estimated VPN?

CQD will check to see if the endpoint's local IP address matches the IP subnet. If they match, the stream is marked as VPN by setting the Estimated VPN dimension to True (1). To reliably tag all VPN streams, you must create a building file and upload your VPN subnets. For more guidance please consult the links below.

Building File Guidance: <https://aka.ms/cqdbldgdata>

VPN Split-Tunnel Guidance: <https://aka.ms/teamsvpn>

Teams Subnets/Ports: <https://aka.ms/teamsips>

Understanding Teams Media Flows: <https://aka.ms/teams-media-flows>

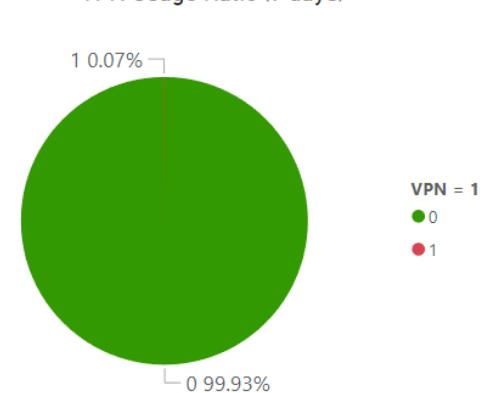
NOTE: Estimated VPN only works if your VPN solution assigns a 32-bit subnet mask to a VPN endpoint.

Estimated VPN Comparison (28 days)

Estimated VPN	User Count	Total Streams	Poor Feedback Rate (%)	Poor Audio Rate (%)	Poor Video Rate (%)	Poor Freeze Rate (%)	Poor Sharing Rate (%)	Drop Failure Rate (%)	Setup Failure Rate (%)	Avg Network Jitter	Avg Network Jitter Max	Avg Jitter	Median Jitter	Avg Jitter Max	Avg Packet Loss Rate	Median Packet Loss Rate	Avg Packet Loss Rate Max	Round Trip	Median Round Trip
0	51,713	4,532,178	1.06	0.62	1.42	1.88	0.50	0.39	0.02	13.80	165.68	2.72	2.00	15.52	0%	0%	3%	91	66
1	434	3,254	0.00	8.65	4.41	10.24	3.57	1.02	2.65	64.96	884.70	8.28	4.00	44.02	1%	0%	12%	287	158

Daily VPN Usage (28 days)**VPN usage by Session and Client (7 days)**

Session Type	0	1
Conf	77.59%	0.05%
Microsoft Teams (Project Rigel)	0.01%	
Microsoft Teams Android	0.96%	0.03%
Microsoft Teams iOS	2.34%	0.00%
Microsoft Teams Mac	1.33%	0.01%
Microsoft Teams Room (Android)	0.01%	
Microsoft Teams Windows	72.94%	0.01%
P2P	22.34%	0.02%
Microsoft Teams (Project Rigel)	0.00%	
Microsoft Teams Android	0.32%	0.01%
Microsoft Teams iOS	0.65%	0.00%
Microsoft Teams Mac	0.31%	0.00%
Microsoft Teams Room (Android)	0.00%	
Microsoft Teams Windows	21.06%	0.00%
Total	99.94%	0.06%

VPN Usage Ratio (7 days)**VPN Usage by UPN (7 days)**

UPN	Total Streams	Poor Feedback Rate (%)	Audio Streams	Poor Audio Rate (%)
*	1,115	0.00	814	11.44

VPN Usage Map with Audio Quality (7 days)**VPN Usage by Public Network/Subnet (7 days)**

ASN ISP Name	User Count	Total Streams	Poor Feedback Rate (%)	Audio Streams	Poor Audio Rate (%)
[Redacted]	71	402	0.00	312	16.09
[Redacted]	6	151	Nan	108	7.32
[Redacted]	37	108	Nan	72	14.89
[Redacted]	3	65	Nan	34	13.33
[Redacted]	10	59	Nan	40	9.09
[Redacted]	8	44	Nan	30	8.70
[Redacted]	13	42	Nan	36	33.33
[Redacted]	6	34	0.00	24	0.00
[Redacted]	3	33	Nan	24	5.26
[Redacted]	1	25	Nan	14	0.00

Inside/Outside Corp

- Inside
- Outside

Session Type

- Conf
- P2P

ASN ISP

- All

Client

- All

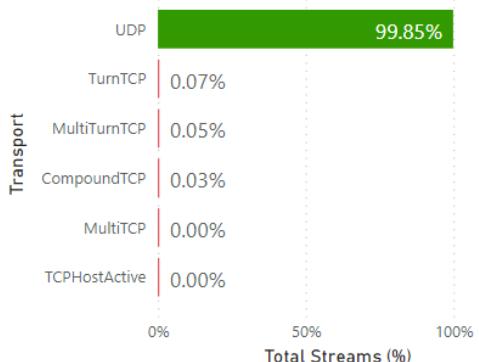
Teams IP Address List:
<https://aka.ms/teamsips>
<https://aka.ms/teamsclientips>

Teams Service Media Subnets:
13.107.64.0/18, 52.112.0.0/14,
52.120.0.0/14

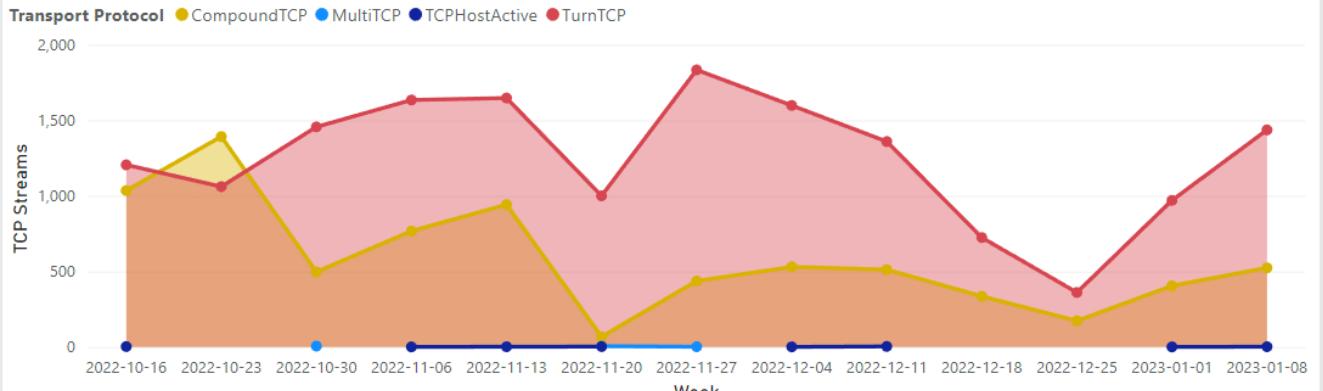
Teams Service Media Ports:
3478-3481 UDP (preferred)

Teams Client Media Ports:
50000-50019 TCP/UDP - Audio
50020-50039 TCP/UDP - Video
50040-50059 TCP/UDP - Sharing

TCP vs UDP (14 days)



TCP Streams by Week/Day (90 days)



Transport usage by Session and Client (7 days)

Session Type	CompoundTCP	MultiTCP	MultiTurnTCP	TCPHostActive	TurnTCP
Conf	0.02%	0.00%	0.05%	0.00%	0.00%
Microsoft Teams (Project Rigel)	0.00%	0.00%	0.00%	0.00%	0.00%
Microsoft Teams Android	0.00%	0.00%	0.00%	0.00%	0.00%
Microsoft Teams Citrix VDI	0.00%	0.00%	0.00%	0.00%	0.00%
Microsoft Teams iOS	0.00%	0.00%	0.00%	0.00%	0.00%
Microsoft Teams Mac	0.00%	0.00%	0.01%	0.00%	0.00%
Microsoft Teams Room (Android)	0.02%	0.00%	0.04%	0.00%	0.00%
Microsoft Teams Windows	0.00%	0.00%	0.00%	0.00%	0.00%
Total	0.03%	0.00%	0.05%	0.00%	0.00%

TCP Usage by ISP/Public IP (7 days)

ASN ISP Name	Total TCP Streams	User Count
[REDACTED]	15.43%	61
[REDACTED]	10.47%	23
[REDACTED]	10.41%	30
[REDACTED]	10.02%	39
[REDACTED]	8.27%	42
[REDACTED]	8.27%	10
[REDACTED]	5.12%	19
[REDACTED]	4.70%	7
[REDACTED]	4.44%	36

CompoundTCP = Media is flowing over HTTPS/Proxy
TurnTCP/TCPHostActive = Media is flowing over TCP
MultiTCP/MultiTurnTCP - Uses multiple TCP connections and distributes packets using round robin.

Transport Comparison (28 days)

Transport	User Count	Total Streams (%)	Poor Feedback Rate (%)	Poor Audio Rate (%)	Poor Video Rate (%)	Poor Freeze Rate (%)	Poor Sharing Rate (%)	Drop Failure Rate (%)
UDP	51,699	99.86%	1.03	0.61	0.59	1.88	0.53	0.27
TurnTCP	644	0.07%	0.00	6.01	0.35	4.18	0.76	1.20
MultiTurnTCP	284	0.05%	0.00	6.11	Nan	Nan	NaN	0.54
CompoundTCP	164	0.03%	0.00	3.00	1.51	10.29	0.76	1.25
TCPHostActive	2	0.00%	Nan	0.00	Nan	Nan	0.00	0.00
MultiTCP	1	0.00%	Nan	0.00	Nan	Nan	NaN	0.00

TCP Usage Map with Audio Quality (28 days)



TCP Usage by UPN (28 days)

UPN	Total Streams	Poor Inbound Rate (%)	Poor Uplink Rate (%)	Poor Feedback Rate (%)	Audio Streams	Poor Audio Rate (%)	Video Streams
*	7,570	2.05	0.00	0.00	4,906	5.47	1,333

TCP Usage by Endpoint (28 days)

Endpoint Name	Total Streams	Poor Inbound Rate (%)	Poor Uplink Rate (%)	Poor Feedback Rate (%)	Audio Streams	Poor Audio Rate (%)	Video Streams
*	7,518	2.05	0.00	0.00	4,858	5.47	1,333
*	52	1.92	0.00	0.00	48	6.25	0

Client Version

Client

Microsoft Teams Windows

Select a client from the list above or search for a specific version using the text box to display the results below.

Client usage by version

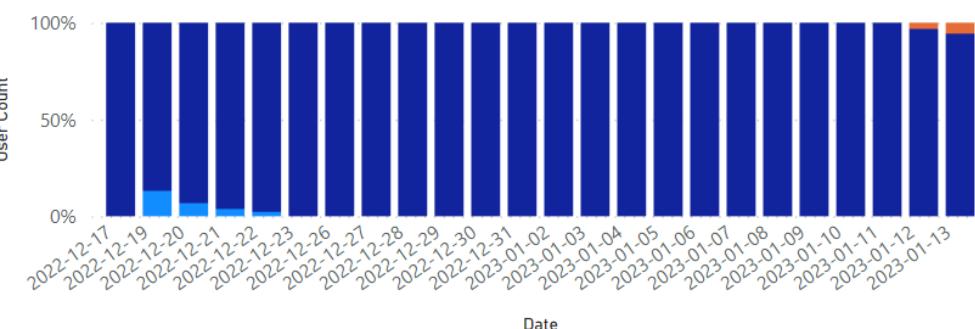
Client Category	Client Version	User Count	Total Sessions (%)
Microsoft Teams Windows	1.5.00.33362	47,196	97.32%
Microsoft Teams Windows	1.5.00.36367	2,152	1.60%
Microsoft Teams Windows	1.5.00.21668	630	0.43%
Microsoft Teams Windows	1.5.00.31168	329	0.21%
Microsoft Teams Windows	1.0.0.2023010518	175	0.11%
Microsoft Teams Windows	1.6.00.376	25	0.08%
Microsoft Teams Windows	1.4.00.8872	97	0.06%
Microsoft Teams Windows	1.5.00.28361	82	0.03%
Microsoft Teams Windows	1.5.00.14473	55	0.02%
Microsoft Teams Windows	1.0.0.2022120214	23	0.01%
Microsoft Teams Windows	1.4.00.26376	14	0.01%
Microsoft Teams Windows	1.5.00.17656	45	0.01%
Microsoft Teams Windows	1.5.00.5967	10	0.01%
Microsoft Teams Windows	1.4.00.29469	9	0.01%
Total		51,082	100.00%

Users by client

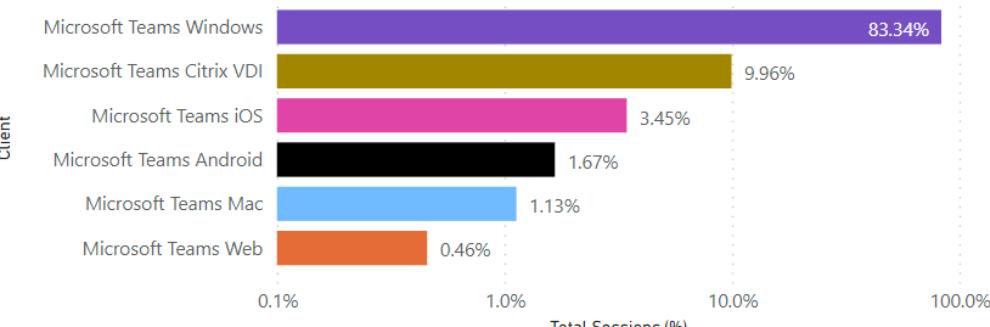
UPN	Total Sessions	Poor Feedback Rate (%)
*	694,688	1.12
	4,935	0.00

Client Version Saturation (28 days)

Client Version ● 1.5.00.31168 ● 1.5.00.33362 ● 1.5.00.36367



Usage by Client (Last 28 days)



Additional metrics to help identify issues detected by the client (Last 28 days)

Detected insufficient CPU impacting audio

UPN	Total Sessions	Poor Audio Rate (%)	Drop Failure Rate (%)
	1	0.00	0.00

Endpoint detected a network delay

UPN	Total Sessions	Poor Audio Rate (%)	Avg Round Trip
*	1	0.00	257

Endpoint detected >5 roaming disconnects

UPN	Total Sessions	Poor Audio Rate (%)	Drop Failure Rate (%)
*	1,476	23.56	7.13
	41	41.18	12.26

Media Type

 Audio VBSS Video

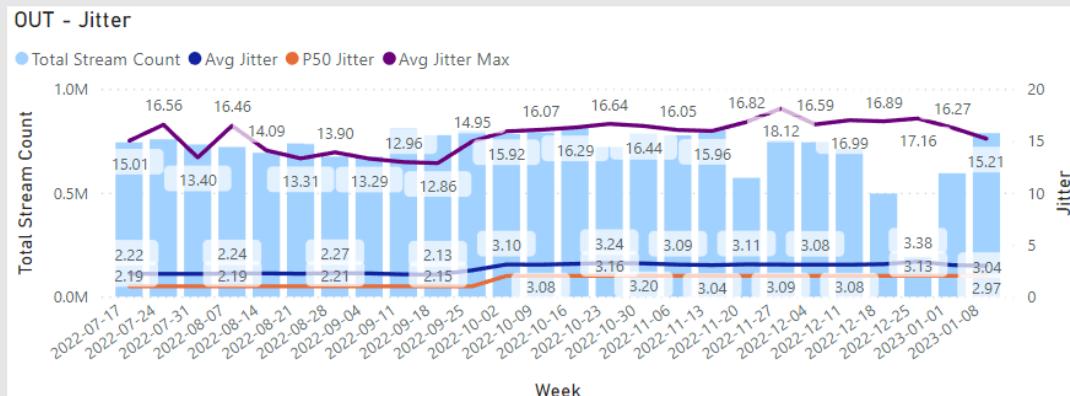
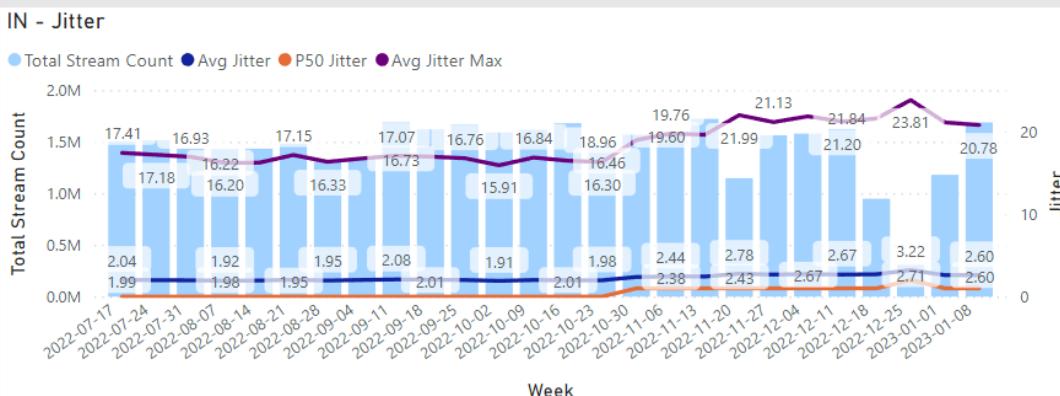
Connection

 Wifi Wired

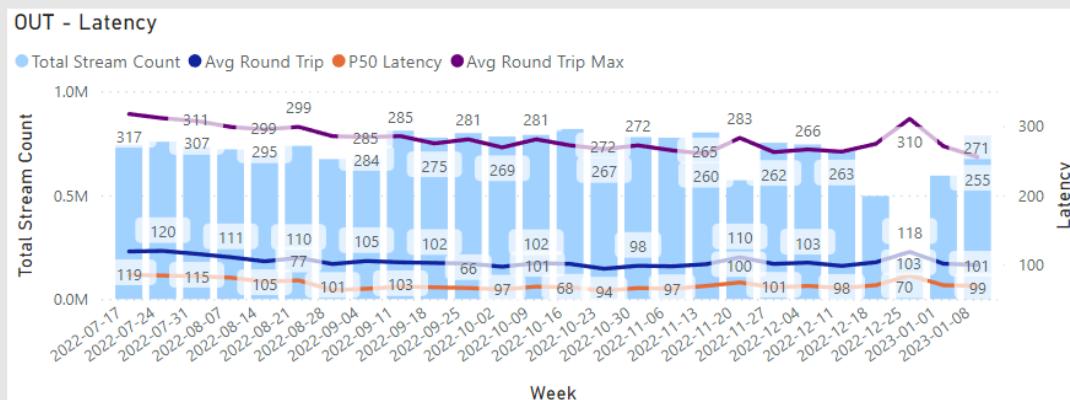
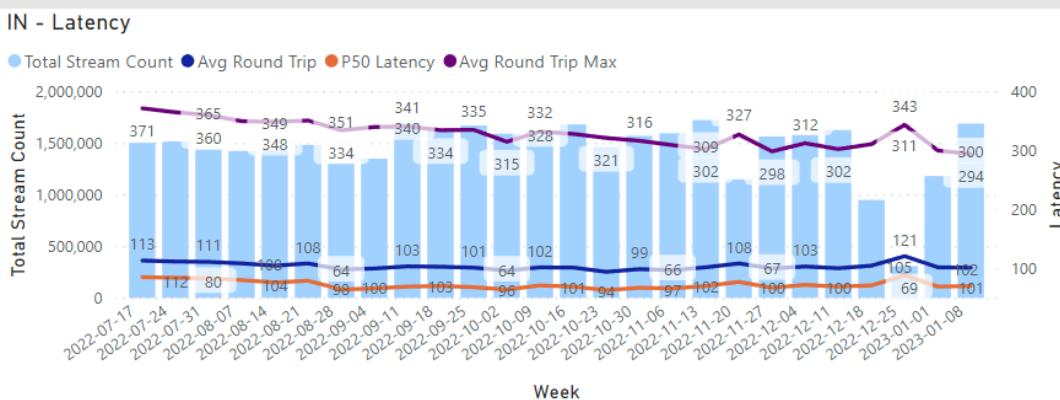
Inside/Outside Corp

 Inside Outside

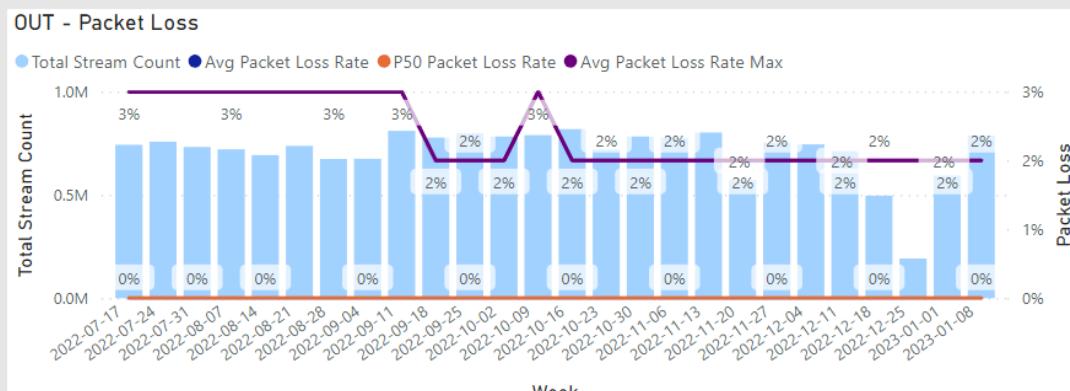
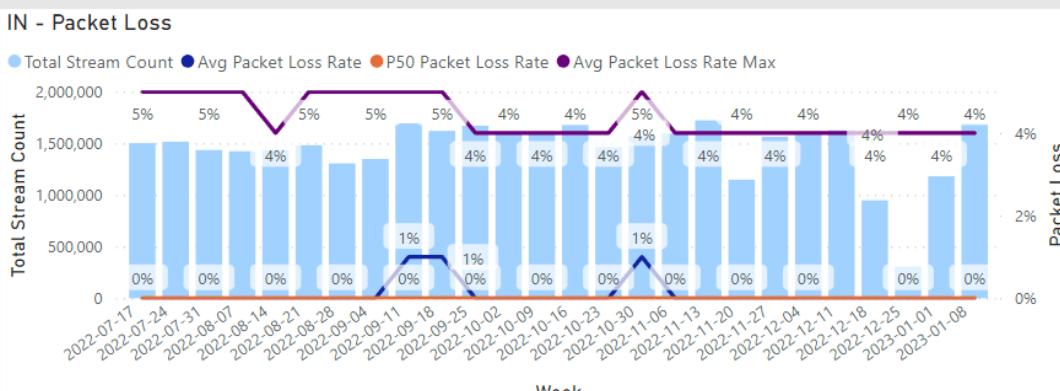
Public Network	Total Calls	Total Users
[REDACTED]	0.85%	8
[REDACTED]	0.74%	6
[REDACTED]	0.73%	8
[REDACTED]	0.44%	3
[REDACTED]	0.44%	9
[REDACTED]	0.40%	6
[REDACTED]	0.38%	8
[REDACTED]	0.38%	10
[REDACTED]	0.36%	5
[REDACTED]	0.36%	90
[REDACTED]	0.35%	4
[REDACTED]	0.35%	8



ASN ISP Name	Total Calls	Total Users
[REDACTED]	38.59%	49,355
[REDACTED]	22.01%	36,237
[REDACTED]	10.80%	9,849
[REDACTED]	7.70%	7,013
[REDACTED]	2.97%	2,145
[REDACTED]	2.30%	2,323
[REDACTED]	1.44%	1,508
[REDACTED]	1.35%	2,135
[REDACTED]	1.05%	2,827
[REDACTED]	0.95%	3,650



Host Country/City	Total Calls
United States	62.02%
Japan	14.09%
Singapore	5.79%
Hong Kong	5.24%
Ireland	3.46%
Netherlands	3.40%
United Kingdom	3.13%
France	2.88%





Search (Last 28 days)

Step 1 - Filter the results

Filter by UPN

Search

Filter for a given user by entering all or part of their User Principal Name (UPN).

Filter by Subnet

Search

Filter the results by a given subnet.

Filter by Public Subnet

Search

Filter the results by a given public network.

Filter by ASN ISP Name

Search

Filter the results by a given ASN ISP Name.

Filter by Conference ID

Search

Filter the results by a given conference ID.

Filter by Meeting ID

Search

Filter the results by a single meeting ID to display the associated conference IDs.

Step 2 - View your results

User Results Right click to Drill Through to [User Health Details](#)

UPN	Total Sessions	Poor Feedback Rate (%)	Poor Audio Rate (%)	Poor Video Rate (%)	Poor Freeze Rate (%)	Poor Sharing Rate (%)	Drop Failure Rate (%)	Setup Failure Rate (%)
*	2,579,997	1.42	1.04	1.91	2.13	0.68	0.88	0.12
	534	0.00	0.33	0.00	2.63	3.40	2.56	0.00

Subnet Results Right click to Drill Through to [Audio, Video, or Sharing Health Details](#)

Subnet	Total Streams	Total Users	Poor Feedback Rate (%)	Poor Audio Rate (%)	Poor Video Rate (%)	Poor Freeze Rate (%)	Poor Sharing Rate (%)	Drop Failure Rate (%)	Setup Failure Rate (%)
1	405,234	5,674	1.10	0.34	1.47	2.01	0.53	0.35	0.01
1	138,688	3,115	2.74	0.16	1.01	0.92	0.63	0.26	0.00
1	25,815	1,245	0.00	0.49	1.89	2.84	0.51	0.43	0.00
1	20,015	956	0.00	0.35	1.03	0.94	0.34	0.32	0.00
1	52,479	780	1.85	0.29	1.25	1.52	0.69	0.30	0.00
1	53,199	721	1.51	0.33	1.18	1.43	0.56	0.29	0.01
1	16,222	652	0.00	0.50	1.11	1.45	0.61	0.30	0.02
1	13,589	588	0.00	0.64	0.83	3.41	0.17	0.40	0.00

Session Results Right click to Drill Through to [Meeting Health Details](#) or [Call Health Details](#)

Conference Id	Date	Session Type	Total Users	Poor Feedback Rate (%)	Poor Audio Rate (%)	Poor Video Rate (%)	Poor Freeze Rate (%)	Poor Sharing Rate (%)	Drop Failure Rate (%)
101bc87a		Conf	446	NaN	2.69	27.96	28.24	0.41	4.66
10aad47d		Conf	170	NaN	2.67	76.52	0.00	3.91	4.22
ee0af867		Conf	106	NaN	1.39	15.42	0.00	0.99	2.03
090afe6e		Conf	85	NaN	0.00	0.00	0.00	NaN	0.00
1525192e		Conf	47	NaN	5.41	8.64	8.33	NaN	2.09
1d9d6c3d		Conf	44	NaN	0.00	0.00	6.38	NaN	0.00
c028ddf0		Conf	37	NaN	2.04	NaN	NaN	NaN	0.00
1e700d40		Conf	26	NaN	0.00	NaN	NaN	NaN	0.00

The **Conference ID** can be located in the Teams Admin Center by selecting a user to display the account's general information. Select the Call History tab to display the users call history. Identify the call you would like to analyze by selecting it from the call history list. Once selected, the conference ID is shown in the URL and can be found as a GUID after the "/calls-sessions/" text.

Example: <https://admin.teams.microsoft.com/users/xxxxxxxx-xxxx-xxxx-xxxx-xxxxxxxxxxxx/calls-sessions/b0abbc44-8be9-4968-b80e-0a44db357c8c>

The **Meeting ID** can be found as part of the Teams meeting join URL.

Example: https://teams.microsoft.com/l/meetup-join/19:meeting_MzI2YTRkZmItMTNmZ00NTUxLTk4NjEtMzcyYWl5ZDY0MTFh@thread.v2/0?context={*}

Time Started (UTC): [REDACTED] /2022 1:47:48 PM

Time Ended (UTC): [REDACTED] /2022 1:49:48 PM

Active Media Usage		Host Tenant		Host Country	
Media Type	Audio	[REDACTED]	[REDACTED]	Brazil	
Video	1	0	5	10	
		0.00	0.00	0.00	6.38
					Nan
Total Users	44	Authenticated Users	44	Anonymous Users	0
Federated Users	0	PSTN Users	0	Impacted Users	0
				Dropped Users	0

Poor Call

False
True

Stream Direction

First-to-Second
Second-to-First

Inbound = First-to-Second
Outbound = Second-to-First

Search for a User

Media Type

Audio
VBSS
Video

Media Failure Type

CallSetup
Midcall

CDR Response	Media Type	Stream Direction	Avg Jitter Buffer Size (Audio Only)	Max Jitter Buffer Size (Audio Only)	Avg Network Jitter (Audio Only)	Max Network Jitter (Audio Only)	Avg Jitter	Max Jitter	Avg Packet Loss Rate	Max Packet Loss Rate	Avg Round Trip	Max Round Trip	Avg Video Frame Rate	Avg Video Frame Loss (%)	Packet Utilization	Avg Send Mute Percent	Network Count
OK	Video	First-to-Second	Nan	Nan	Nan	Nan	1.00	4.00	1%	87%	12	26	14.64	0.01	131: [50000 - 2147483647]	Nan	064: [1 -]
OK	Audio	First-to-Second	158	380	6.47	31.84	2.00	5.00	0%	2%	10	26	Nan	NaN	131: [50000 - 2147483647]	95.82	064: [1 -]
OK	Audio	Second-to-First	53	70	0.84	0.84	0.00	0.00	0%	0%	23	24	Nan	NaN	072: [25 - 30)	95.82	064: [1 -]
OK	Video	First-to-Second	Nan	Nan	Nan	Nan	1.00	31.00	0%	4%	25	202	14.95	0.14	131: [50000 - 2147483647)	Nan	
OK	Audio	First-to-Second	164	594	10.81	436.15	3.00	25.00	0%	8%	26	72	Nan	NaN	131: [50000 - 2147483647)	99.92	
OK	Audio	Second-to-First	60	70	8.81	19.68	2.00	5.00	0%	0%	26	37	Nan	NaN	082: [100 - 110)	99.92	
OK	Video	First-to-Second	Nan	Nan	Nan	Nan	1.00	7.00	1%	78%	22	66	14.68	0.41	131: [50000 - 2147483647)	Nan	064: [1 -]
OK	Audio	First-to-Second	200	420	8.31	41.43	2.00	13.00	1%	97%	21	100	Nan	NaN	131: [50000 - 2147483647)	96.19	064: [1 -]
OK	Audio	Second-to-First	60	90	4.95	29.76	1.00	10.00	0%	0%	21	24	Nan	NaN	121: [4500 - 5000)	96.19	064: [1 -]
OK	Audio	First-to-Second	152	170	13.80	36.07	3.00	4.00	0%	0%	26	36	Nan	NaN	119: [3500 - 4000)	93.18	
OK	Audio	Second-to-First	Nan	Nan	Nan	Nan	Nan	Nan	Nan	Nan	Nan	Nan	Nan	NaN	062: [0 - 0)	93.18	
OK	Video	First-to-Second	Nan	Nan	Nan	Nan	1.00	7.00	0%	4%	260	339	8.32	0.29	131: [50000 - 2147483647)	Nan	
OK	Audio	First-to-Second	170	300	13.57	130.74	2.00	9.00	0%	3%	247	338	Nan	NaN	131: [50000 - 2147483647)	99.90	
OK	Audio	Second-to-First	47	60	2.92	4.89	0.00	1.00	0%	0%	243	251	Nan	NaN	081: [90 - 100)	99.90	
OK	Audio	First-to-Second	154	220	6.06	35.07	1.00	5.00	0%	1%	12	25	Nan	NaN	131: [50000 - 2147483647)	100.00	
OK	Audio	Second-to-First	Nan	Nan	Nan	Nan	0.00	0.00	0%	0%	11	11	Nan	NaN	064: [1 - 2)	100.00	
OK	Video	First-to-Second	Nan	Nan	Nan	Nan	0.00	3.00	0%	3%	14	35	9.19	0.05	131: [50000 - 2147483647)	Nan	
OK	Audio	First-to-Second	165	400	8.32	205.73	3.00	16.00	0%	26%	11	97	Nan	NaN	131: [50000 - 2147483647)	99.65	
OK	Audio	Second-to-First	56	90	6.17	25.27	0.00	7.00	0%	0%	12	148	Nan	NaN	090: [180 - 190)	99.65	
OK	Video	First-to-Second	Nan	Nan	Nan	Nan	1.00	34.00	0%	3%	12	80	14.04	1.53	131: [50000 - 2147483647)	Nan	
OK	Video	First-to-Second	Nan	Nan	Nan	Nan	1.00	4.00	0%	0%	18	104	14.83	0.00	131: [50000 - 2147483647)	Nan	

User Feedback

Rating	Feedback
NaN	Text

Meeting Organizer

* [REDACTED]

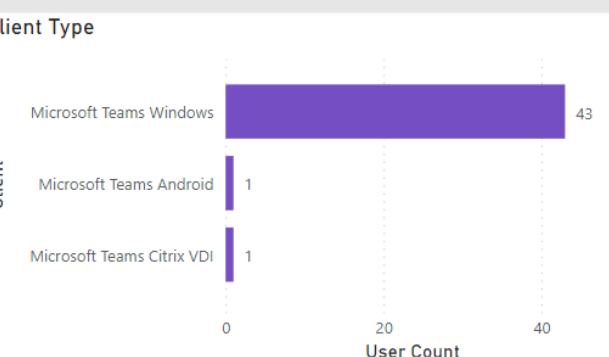
Click on Conference ID for more details

1d9c [REDACTED]



Quality by ISP/ASN/Public Network

ASN ISP Name	User Count	Total Streams	Poor Audio Streams	Poor Audio Rate (%)	Poor Video Streams
[REDACTED]	14	50	0	0.00	0.00
[REDACTED]	12	39	0	0.00	0.00
[REDACTED]	8	26	0	0.00	0.00
[REDACTED]	4	12	0	0.00	0.00
[REDACTED]	2	6	0	0.00	0.00
[REDACTED]	1	6	0	0.00	0.00
[REDACTED]	1	3	0	0.00	0.00



QER Templates



- More than 20 different reports to help troubleshoot media quality issues.
- Can be used to troubleshoot individual meetings, individual users and overall quality issues.
- Updated every quarter (latest version is 4.8)

Search (Last 28 days)

Search for a User
Search Reset Filters

Use the search box to search for a given user by entering all or part of their User Principal Name (UPN).

Search for a Subnet
Search Reset Filters

Use the search box to filter the results for a given subnet.

Search for a Conference ID
Search Reset Filters

Use the search box to filter the results for a given conference ID.

Search for a Meeting ID
Search Reset Filters

Use the search box to filter the results by a single meeting ID and display the associated conference IDs.

User Results Right click to Drill Through to **User Health Details**

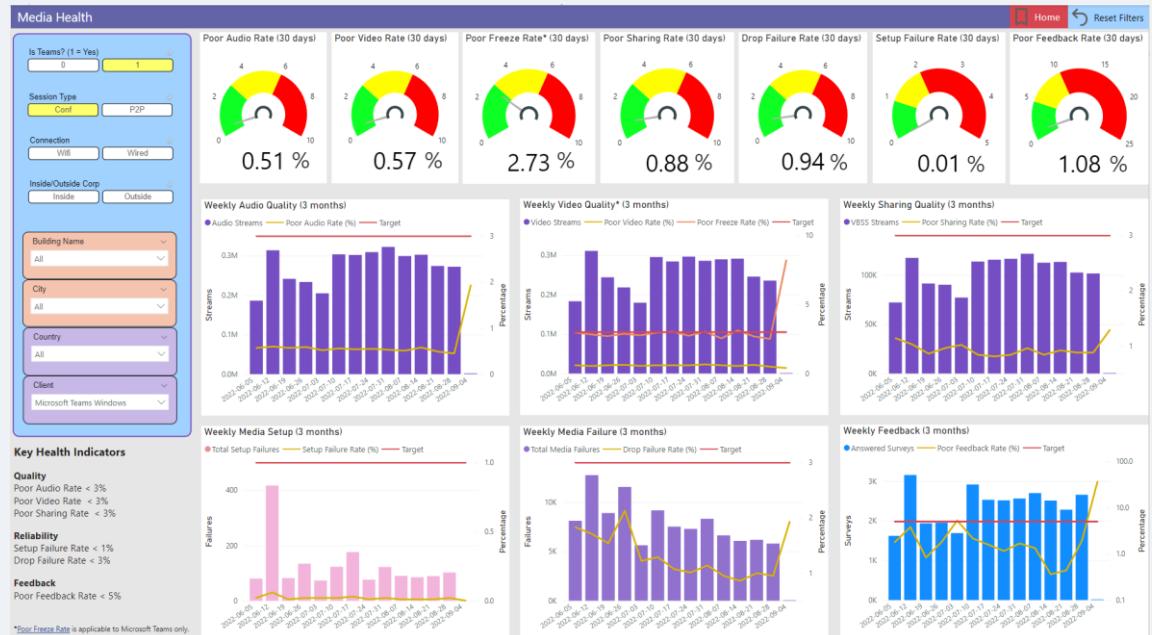
UPN	Total Sessions	Poor Feedback Rate (%)	Poor Audio Rate (%)	Poor Video Rate (%)	Poor Freeze Rate (%)	Poor Sharing Rate (%)	Drop Failure Rate (%)	Setup Failure Rate (%)
926,092	1.48	0.93	0.68	3.16	0.78	1.13	0.10	
313	0.00	1.00	0.00	4.12	3.45	1.63	0.00	

Subnet Results Right click to Drill Through to **Audio, Video, or Sharing Health Details**

Subnet	Total Streams	Poor Feedback Rate (%)	Poor Audio Rate (%)	Poor Video Rate (%)	Poor Freeze Rate (%)	Poor Sharing Rate (%)	Drop Failure Rate (%)	Setup Failure Rate (%)
10.0.0.0	288,827	0.73	0.57	0.56	3.02	0.80	0.19	0.01
10.11.190.0	5,635	0.00	0.68	0.38	3.09	0.75	1.17	0.00
10.11.193.0	5,267	0.00	0.29	0.50	3.34	0.41	2.11	0.00
10.11.195.0	5,192	0.00	0.34	0.85	1.69	0.41	2.49	0.04
10.21.396.0	5,010	0.00	1.64	0.63	8.79	0.63	1.28	0.04
10.11.194.0	5,006	50.00	0.32	0.70	2.46	0.43	2.14	0.00
10.11.188.0	4,965	0.00	0.11	0.51	3.08	0.93	0.99	0.00
10.11.197.0	4,947	0.00	0.81	0.49	2.97	0.16	2.87	0.00

Meeting and Call Results Right click to Drill Through to **Meeting Health Details**

Conference Id	Session Type	Date	Authenticated Participants	Poor Feedback Rate (%)	Poor Audio Rate (%)	Poor Video Rate (%)	Poor Freeze Rate (%)	Poor Sharing Rate (%)	Drop Failure Rate (%)
000024d3-9f0c-430d-90a2-5eddd68e22b9	P2P	2022-08-09	1	Nan	0.00	0.00	0.00	0.00	0.00
00027cf7-7e3d-4282-bf00-0dec1ff69a1	Conf	2022-08-09	5	Nan	0.00	0.00	0.00	0.00	0.00
00030a0c-0511-40a8-a029-3fb35bf7ed5	P2P	2022-08-09	1	Nan	0.00	Nan	Nan	Nan	0.00
0003ae1d-120a-4784-a226-eb1a3af40b10	P2P	2022-08-09	1	Nan	0.00	Nan	Nan	Nan	0.00
00043149-e10b-4bd3-affd-f398b0778883	Conf	2022-08-09	3	Nan	0.00	0.00	0.00	NaN	0.00
0006517d-9737-44c6-8286-8566cf7052b	P2P	2022-08-09	1	Nan	0.00	0.00	0.00	Nan	0.00
00091744-a197-4b29-b755-383dc8e03fd	P2P	2022-08-09	1	Nan	0.00	0.00	0.00	Nan	0.00



Public version:
<http://aka.ms/qerbitemplates>



Additional Tools for Troubleshooting Quality



- Very useful to troubleshoot call quality issues for individual users or specific calls
- Real-time Telemetry available for calls in progress (only available for admins)

Jul 8, 2018 1:04 PM PDT

OVERVIEW ADVANCED DEBUG

User / Services / Password... COMPLETE 00:00:05 Audio quality GOOD

Device System Connectivity Network Connectivity System Device

Audio capture device

Device name	Microphone (Realtek High Definition Audio)
Device driver	Realtek Semiconductor Corp.: 6.0.1.7329

Audio render device

Device name	Speaker/HP (Realtek High Definition Audio)
Device driver	Realtek Semiconductor Corp.: 6.0.1.7329

Video capture device

Video render device

Adele Vance

Meeting ID: 0cc2f5f7-ffdb-4667-b77a-f4d0c547f71f

Device 20T00026US
Operating system Windows 10.0

IP address 192.168.100.x
Network type Wi-Fi
Location Canada

Meeting information

Meeting status In progress

Start time Sep 29, 2021 12:00 AM

Duration 00:22:46

Participant details

Participant status In meeting

Join time Sep 29, 2021 12:07 AM

Leave time --

Streams and events

Audio stream details (Inbound)

0 ms 10 ms 30 ms 5 ms 0 ms 0.5 ms

00:21:50 00:22:00 00:22:10 00:22:20 00:22:30

Jitter Packet Loss

Audio stream details (Outbound)

1000 ms 160 Kbps 500 ms 80 Kbps 0 ms 0 Kbps

00:22:00 00:22:15 00:22:30

Round trip time Bitrate

Use real-time telemetry to troubleshoot poor meeting quality - Microsoft Teams | Microsoft Learn
Use Call Analytics to troubleshoot poor call quality - Microsoft Teams | Microsoft Learn

Bandwidth Estimation Tool



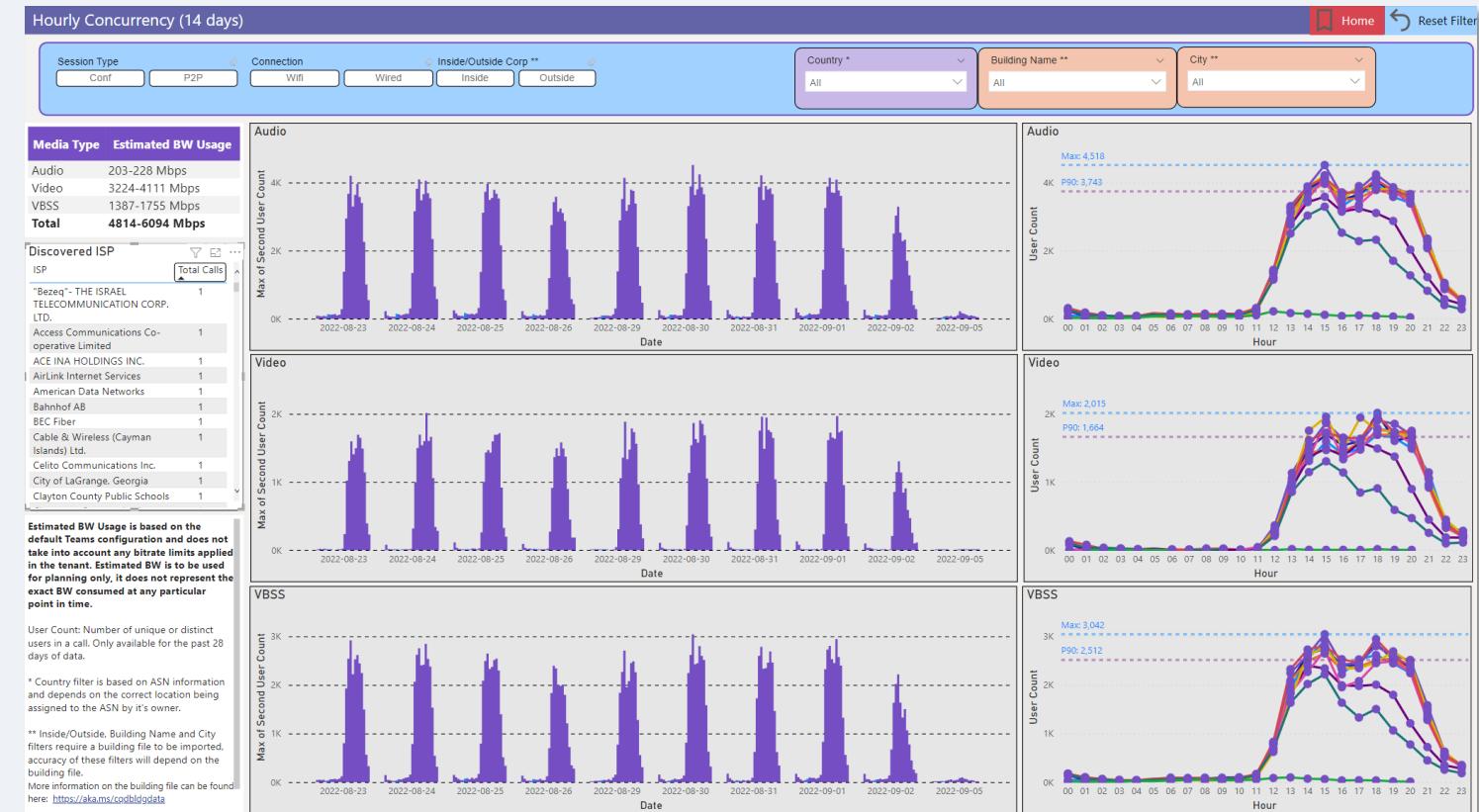
Use to estimate the total bandwidth utilization for Teams media.

Calculation is based on the real hourly concurrency for the tenant.

Can be helpful for planning

<https://aka.ms/TeamsBWEstimation>

New version coming soon.



Wireshark



Very useful to troubleshoot packet loss by using the RTP Sequence Number

Use to dig deeper into issues identified by CQD and the QER templates.

Use also to confirm QoS tagging

<https://www.wireshark.org>

Internet Protocol Version 4, Src: 52.112.28.45, Dst: 40.36.3.74

0100 = Version: 4
.... 0101 = Header Length: 20 bytes (5)

Differentiated Services Field: 0x88 (DSCP: AF41, ECN: Not-ECT)
1000 10.. = Differentiated Services Codepoint: Assured Forwarding 41 (34)
.... ..00 = Explicit Congestion Notification: Not ECN-Capable Transport (0)

Total Length: 711
Identification: 0x6688 (26248)

Flags: 0x00
...0 0000 0000 0000 = Fragment Offset: 0

Time to Live: 107
Protocol: UDP (17)
Header Checksum: 0x6a0b [validation disabled]
[Header checksum status: Unverified]

Source Address: 52.112.28.45

Stream 0							
Graph							
Stream	Packet	Sequence	Delta (ms)	Jitter (ms)	Skew	Bandwidth	Marker
52.115.186.64:3480 → 40.9.145.121:50013	7378	11982	11.993000	0.000000	0.000000	48.77	✓
	7404	11983	20.003000	0.000000	0.000000	48.79	✓
SSRC: 0x00006ea9	7423	11984	22.994000	0.000000	0.000000	47.87	✓
Max Delta: 13182.034000 ms @ 7936	7456	11985	20.003000	0.000000	0.000000	47.86	✓
Max Jitter: 0.000000 ms	7477	11986	18.005000	0.000000	0.000000	48.77	✓
Mean Jitter: 0.000000 ms	7529	11990	86.988000	0.000000	0.000000	45.02	Wrong sequence number
Max Skew: 0.000000 ms	7538	11991	14.998000	0.000000	0.000000	44.96	✓
RTP Packets: 559	7571	11993	38.008000	0.000000	0.000000	44.96	Wrong sequence number
Expected: 1222	7582	11995	37.992000	0.000000	0.000000	44.03	Wrong sequence number
Lost: 663 (54.26 %)	7621	11996	20.004000	0.000000	0.000000	44.02	✓
Seq Errs: 4	7632	11997	20.003000	0.000000	0.000000	44.02	✓
Start at: 0.000000 s @ 1	7642	11998	17.989000	0.000000	0.000000	44.05	✓
Duration: 24.41 s	7680	11999	22.002000	0.000000	0.000000	44.03	✓
Clock Drift: 0 ms	7698	12000	20.995000	0.000000	0.000000	43.07	✓
Freq Drift: 0 Hz (0.00 %)	7705	12001	18.996000	0.000000	0.000000	44.05	✓
	7734	12002	20.003000	0.000000	0.000000	44.00	✓
	7758	12003	22.003000	0.000000	0.000000	43.02	✓
	7765	12004	22.002000	0.000000	0.000000	43.01	✓
	7802	12005	15.990000	0.000000	0.000000	43.96	✓
	7815	12006	21.010000	0.000000	0.000000	43.94	✓
	7850	12007	18.996000	0.000000	0.000000	43.92	✓
	7882	12008	20.995000	0.000000	0.000000	43.86	✓
	7904	12009	18.997000	0.000000	0.000000	43.86	✓
	7911	12010	20.003000	0.000000	0.000000	43.87	✓
	7917	12011	20.003000	0.000000	0.000000	43.87	✓
	7936	12670	13182.034000	0.000000	0.000000	0.98	Wrong sequence number
	7939	12671	20.003000	0.000000	0.000000	1.91	✓

Real-Time Transport Protocol

10... = Version: RFC 1889 Version (2)
..0. = Padding: False
...1 = Extension: True
.... 0001 = Contributing source identifiers count: 1
0.... = Marker: False

Payload type: DynamicRTP-Type-122 (122)
Sequence number: 27373
Timestamp: 463867338
Synchronization Source identifier: 0x00003d6b (15723)

Contributing Source identifiers (1 items)
Defined by profile: Unknown (0xbede)
Extension length: 1



Teams media logs

Used to troubleshoot complex issues.

Provides 5 second interval snapshots for all metrics.

Make sure it's enabled for the user, enabled by default for higher end machines.

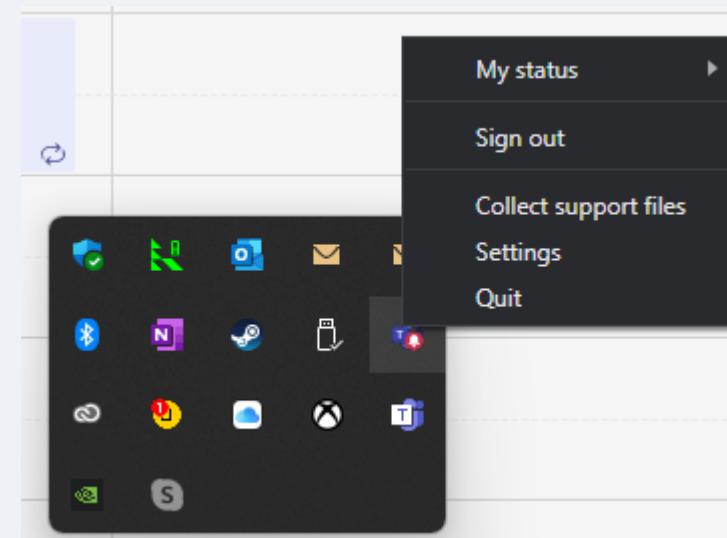
[Configure log files for monitoring and troubleshooting in Teams - Microsoft Teams | Microsoft Docs](#)

Logs can also be enabled by policy:

[Grant-CsTeamsMediaLoggingPolicy \(MicrosoftTeamsPowerShell\) | Microsoft Learn](#)

Need to be decoded/analyzed by Microsoft

- Disable GPU hardware acceleration (requires restarting Teams)
- Register Teams as the chat app for Office (requires restarting Office applications)
- Turn on new meeting experience (New meetings and calls will open in separate windows. Requires restarting Teams.)
- Enable media logs (diagnostic data for audio, video, and screen sharing)





Q&A



