



4 Ways to Optimize MS Teams Performance for the Remote Workforce

White Paper written by
Nick Cavallancia, Microsoft MVP

Many organizations have learned in the last month something many of us already knew: Microsoft Teams is a great collaboration and communication tool. Microsoft has reported 12 million daily users added in just one week, a total of 44 million daily users, and 900 million meeting and calling minutes weekly. Teams has become the lifeblood for many organizations today.

This massive uptick in interest and use of Microsoft Teams over the last month has put strains not only on the Microsoft infrastructure, but on organizations attempting to use the tool using potentially less-than-optimized paths from the endpoint to the Microsoft Teams service. The use of virtual private networks (VPN) – 150% within the month of March alone. This puts pressure on internal IT to deliver a good user experience, despite the complexities of internal network routing that can include proxies, security services, central internet bandwidth, backhaul multiprotocol label switching (MPLS) circuits, network address translations, and more.

When users work from home, Microsoft Teams (as well as all of Office 365) becomes harder to support when a user has a performance issue. IT needs to first understand the scope of the problem (e.g., is it just the one user), as well as the root cause (is it the user's home Wi-Fi, their laptop, the VPN, something with the internal network, or is it something on the Microsoft side of the equation) before any action can be taken.

There's actually a lot you can do today to ensure an optimal Microsoft Teams user experience. So, in this whitepaper, we'll take a look at 4 parts of the path between your users and Microsoft Teams you can optimize:

1. Your internal network path to Teams
2. The VPN
3. Quality of Service (QoS)
4. The user's home network

We'll also look at some best practices to helping support your remote users' use of Microsoft Teams.

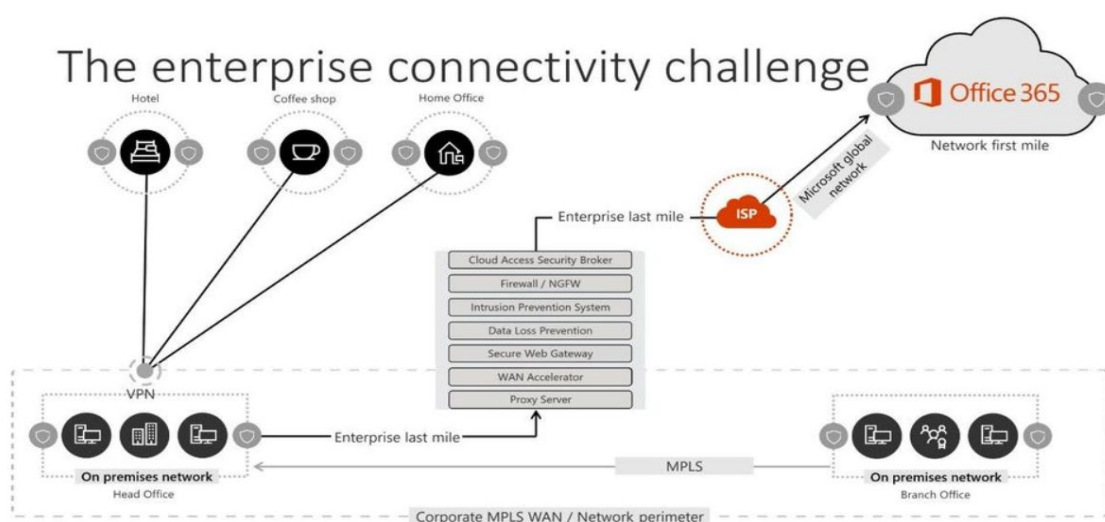
GSX Insights:**Optimizing Office 365 Service Quality Through Synthetic Transactions**

The challenge with using any service in the cloud – including Office 365 – is it's difficult to determine where along the path from a user in one part of the world to a server in another is the source of a performance issue. Without an ability to find the root cause, it's just as difficult to work to remediate the problem. GSX Gizmo uses synthetic transactions to simulate Office 365 user activity (including Teams) in cloud-only and hybrid Office 365 environments. These transactions continually test Office 365 workloads to help identify drops in service quality, providing detail on scope, location, service impact, and more.

Look for insights from GSX throughout this paper.

Optimizing Your Internal Network Path to Teams

Organizations today are trying to solve two specific issues to ensure remote worker productivity: providing access to Office 365 (and other cloud-based services), and access to internal on-premises data, systems, and applications. Based on the previously mentioned increases in both the use of Teams and VPN usage, it's likely that most organizations have chosen the "just have everyone VPN in" route. The challenge with this solution is it causes Office 365 traffic to be subject to internal routing and services which can easily decrease overall service quality and slow down the user experience. The scenario shown below is all too common today.



Source: Microsoft

And despite the large acceleration in cloud adoption, many enterprises were already using this architecture that includes remote offices connecting to the datacenter via MPLS, and remote workers using VPNs, backhauling the traffic to the datacenter before egressing to Internet and Office 365

This goes against Microsoft recommendations to provide better performance to your Office 365 users (*you can read more at bit.ly/2UqAsk3*).

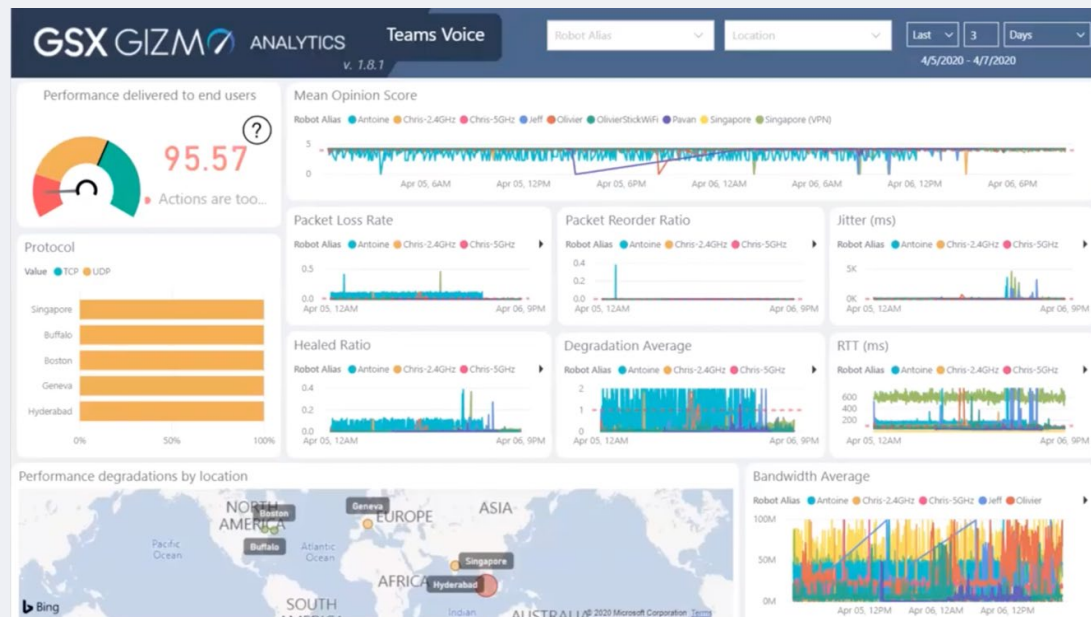
Microsoft's Recommendations

To optimize the path from user to Microsoft Teams, Microsoft recommends a direct connection between your users and the Office 365 datacenter. Their goal is to reduce latency in four ways:

1. **Identify and separate out Office 365 traffic** – Microsoft has gone to great lengths to minimize the number of URLs and ports being used to facilitate this. With 80% of their traffic being limited to a small subset of URLs and port addresses, Microsoft has made it much easier for organizations to recognize Office 365 traffic (you can see and download the list at bit.ly/2VpCP6m).
2. **Egress network connections locally** – When a remote user VPN's into the network, they essentially become a branch office. Microsoft recommends against Office 365 traffic being routed through the corporate network (and eventually out to the Internet). Instead, Office 365 traffic should be routed from the remote worker (and any branch office) directly out to the Internet.
3. **Avoid network hairpins** – If internal routing is unavoidable (as in the case of users within a corporate office and, unfortunately, in the case of remote workers using a VPN), the traffic bound for Office 365 may first need to be routed to a security stack or a cloud access broker. These "network hairpins" only add latency.
4. **Assess bypassing proxies, traffic inspection devices and duplicate security technologies** – Security is a big concern causing many organizations to put security services in place between users and Office 365. Security solutions such as antivirus, data loss prevention, and packet inspection all add security value, but also can dramatically reduce the performance and service quality of Office 365. Microsoft has augmented Office 365 with enterprise-class security services designed to not impede on service quality and, therefore, recommends organizations eliminate these kinds of in-house services and utilize the equivalent Microsoft services to minimize impact on latency.

GSX Insights – Visibility is Key to Optimization

There are so many factors involved in how your network routes Microsoft Teams traffic from the user's endpoint to the Teams servers. Each part of the network has the ability to impact the performance and service quality of Teams. So, it becomes necessary to gain as much visibility over the entirety of the path users take. GSX Gizmo provides a comprehensive view through its use of Robots generating synthetic transactions to provide insight into each step of the way to Microsoft Teams.



Using fully-customizable dashboards, GSX Gizmo provides insightful detail on all the factors that can be objectively measured, allowing organizations to get the full picture of what the current state of Teams performance is, and to identify points that can be optimized.

Optimizing your VPN

The use of a VPN makes sense when you need secure access to internal corporate resources. And, some organizations – despite Microsoft recommendations – are requiring all traffic (including Teams) to go through the VPN to ensure corporate governance over all traffic. But, if your entire remote workforce is utilizing a VPN, it may also become a chokepoint when it doesn't need to. There are a few things you can do to ensure your use of a VPN doesn't impede Microsoft Teams performance.

1. **Consider a Dedicated VPN** – If your firewall also provides VPN services to your remote workforce, it's important to review its' performance. The increased number of users may impede performance and require a dedicated VPN solution to ensure a good user experience.
2. **Check DHCP** – Every user that connects to your VPN is provided an internal IP address and configuration by DHCP. Ensure you have a large enough IP range dedicated to your VPN users to meet the concurrent user count supported.
3. **Consider Split Tunneling** – Microsoft specifically recommends this method for Microsoft Teams, SharePoint Online and Exchange Online. VPN clients that support split tunneling can be configured to bypass the VPN for the most critical of Office 365 traffic, while the rest of the traffic still passes through the VPN and is routed through your datacenter.

GSX Insights - The impact of a VPN on Teams Performance

VPNs do more than just secure connections. They also force traffic to take a route that is less than desirable. Take the example below of an endpoint in Singapore captured using synthetic transactions with GSX Gizmo.



The yellow line represents an endpoint that directly connects to Microsoft's services over the Internet that is achieving optimal performance levels. The green line represents an endpoint that connects from Singapore to a VPN in France, is routed through a corporate network, exits in France to the Internet, connects to Microsoft's global network, and is finally routed to Teams servers in the US.

Optimizing QoS

In circumstances where split tunneling cannot be achieved and your users are forced to connect to Office 365 through your datacenter, make sure at least that you have implemented QoS. QoS allows specific types of traffic to have priority in real-time. Without QoS, issues with voice and video quality are often seen resulting in decreases in voice and video quality in Teams.

Microsoft breaks up Teams traffic into three categories listed here in descending order of priority (called DSCP values): audio, video, and application/screensharing. Networking devices supporting QoS and Windows endpoints will need to be configured with the following specific port ranges and priorities:

Media traffic type	Client source port range	Protocol	DSCP value	DSCP class
Audio	50,000–50,019	TCP/UDP	46	Expedited Forwarding (EF)
Video	50,020–50,039	TCP/UDP	34	Assured Forwarding (AF41)
Application/Screen Sharing	50,040–50,059	TCP/UDP	18	Assured Forwarding (AF21)

Optimizing the User's Home Network

Because the origination point for all Microsoft Teams traffic begins on the user's own home network, it now becomes a part of the equation. Poor WiFi reception, incorrect configurations, and bandwidth issues can easily impact the performance of Teams. In this section, we'll look at two sets of optimization steps – ones that can be accomplished by the user themselves and ones that will likely require the assistance of corporate IT.

Self-Optimization

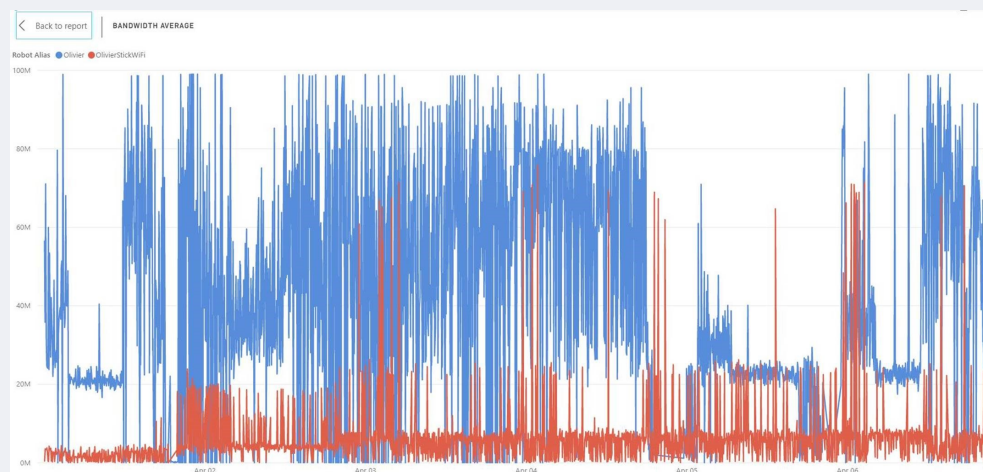
There are actually a few things the user themselves can do to improve the Teams experience.

1. **Use a desktop client** – The desktop Teams client provides more functionality and a better experience than the web client. The web clients do far less client-side caching and processing, so much of the experience is reliant on the browser's ability to effectively communicate with the Teams service.
2. **Use a wired network connection** – WiFi, while fast, still is susceptible to dead spots in a user's home and interference. A dedicated wired connection provides a consistently stable connection, improving Teams performance.

3. **Get the best WiFi signal possible** – when a wired connection isn't possible, users should consider whether 2.4GHz or 5GHz is the better band to connect to. In general, 5GHz is faster, but has less range. So if a longer distance, they should try the 2.4GHz band instead.

GSX Insights – the Impact of Using a Wired Connection

It's pretty simple, really: wired connections are dedicated, while WiFi is shared. And with users working from home while their kids are doing distance learning, watching Netflix, and playing video games online, getting every bit of bandwidth possible is needed for successful use of Teams. The image below shows how GSX Robot Users can be used to determine the average bandwidth available for a wired connect (in blue) and a wireless connection (in red).



GSX Robot Users can also be used to provide insight into other networking factors like packet loss, round trip time, and jitter.

IT Optimization

The following tasks will help to optimize Teams performance but may be beyond the level of expertise for most users.

1. **Consider a New WiFi Router** – if the user's existing router is over 5 years old, it may not support the latest version of WiFi (e.g., 802.11ac is better than 802.11g). Additionally, newer devices have faster processors. The user probably won't know what their router does and doesn't support, so you'll likely be needed here.
2. **Update Router Firmware** – WiFi device manufacturers are always improving performance. Make sure the firmware is up to date.

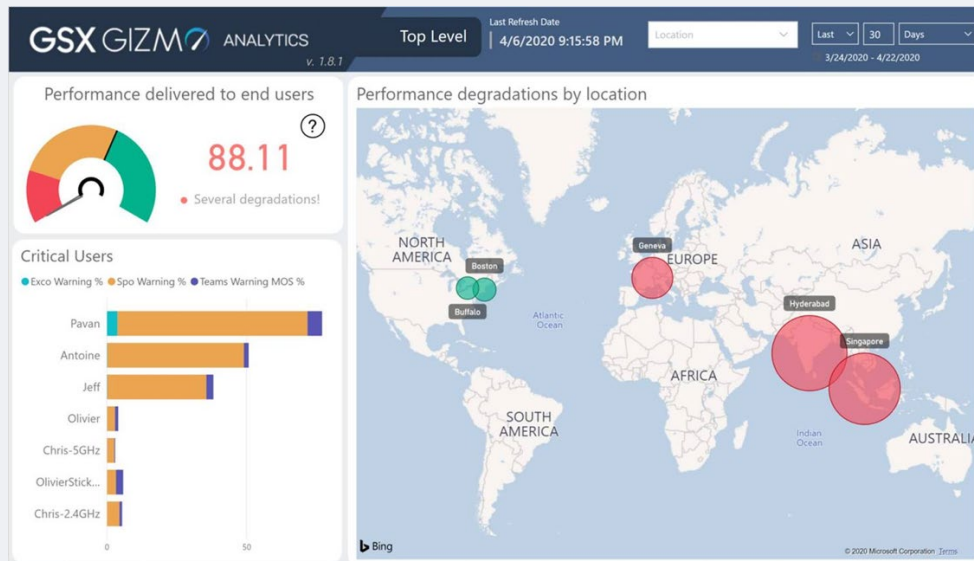
3. **Implement QoS** – If supported by the user's router, this can be enabled and configured. Usually based on IP or MAC address, you'd need to specify the user's work computer and prioritize the Audio / Conference traffic for that device over the others in the home.
4. **Check WiFi Channel Overlap** – The user and their neighbor may be using the same band and channel to communicate, which can slow down performance, despite being on two separate WiFi networks. Finding a faster channel (whether using a WiFi analyzer or by trial and error) may help.
5. **Verify DNS Settings** – If users are utilizing a personal device and are getting their DNS from their ISP, it may be beneficial to review the DNS configuration. Some ISP-based DNS servers are less robust than, say, Google's servers at 8.8.8.8 and 8.8.4.4.

GSX Insights – Optimizing Every Remote Worker

One of the challenges in supporting any Office 365 service is a lack of understanding where the problem lies. The following process will help you both identify when performance issues arise, as well as where the problem root cause lies. It should be noted that this process still can be used whether you have synthetic transactions in place or are using other methods.

1. Establish a Performance Baseline. You can look at metrics like bandwidth available, packet loss, jitter, and any other data available.
2. Compare what normal service to when issues occur. Look for patterns in service degradation across different remote workers having the issue.
3. Compare network options between those remote users that are and are not having issues. This can be which Teams client is being used, use of a wired connection, Wifi band, and VPN, etc.
4. Make needed changes and measure service improvement.

Having visibility into the user experience for some or all of your remote workers can be impactful in order to better understand whether one or all users are experiencing issues, as well as whether the issue is something many remote users have in common or an issue unique to just one. GSX Gizmo can provide the needed visibility down to the individual remote worker.



By maintaining visibility, it's possible to see optimization of your remote workforce as an on-going effort, rather than a one-time attempt in improving Teams service quality.

Getting an Optimized Teams Experience for Your Remote Workforce

The challenge of getting every user to have a great Teams experience was already tough in a corporate setting. But with the shift to a fully remote workforce, achieving this goal is even more difficult. By optimizing the four aspects of your user's connection to Microsoft Teams, you can increase service quality levels, improve performance, and create a consistent user experience for remote workers.

The continual monitoring of service quality is also needed, as users will continue to call IT whenever they have issues. So, coming up with an ongoing method of monitoring service quality is going to be necessary until such time as users return to working within the four walls of the organization.

About the author

Nick Cavalancia is a Microsoft Cloud and Datacenter MVP and has over 25 years of IT experience dealing with the architecture, implementation and training of Microsoft technologies to enterprise customers.

Nick has attained industry certifications including MCSE, MCT, MCNE, and MCNI. He has authored, co-authored and contributed to over a dozen books on Windows, Active Directory, Exchange and other Microsoft technologies and has spoken at many technical conferences on a wide variety of topics.



About GSX Solutions

GSX Solutions provides the only Office 365 end-user experience monitoring solution that truly measures the quality of the service delivered to all enterprises' sites, enabling their IT to take power of the Office 365 end-to-end service delivery.

Working hand-in-hand with Microsoft for more than 400 large companies in the world, we focus on constantly reducing their operational and financial risk while keeping their employees on the path of optimal productivity.

[Discover & Try GSX Today ►](#)