

PREPARE YOUR ORGANIZATION'S NETWORK FOR MICROSOFT TEAMS

NETWORK REQUIREMENTS

If you've already optimized your network for Microsoft 365 or Office 365, you're probably ready for Microsoft Teams. In any case - and especially if you're rolling out Teams quickly as your first Microsoft 365 or Office 365 workload to support remote workers - check the following before you begin your Teams rollout:

- 1 Do all your locations have internet access (so they can connect to Microsoft 365 or Office 365)? At a minimum, in addition to normal web traffic, make sure you've opened the following, for all locations, for media in Teams:

Ports UDP ports 3478 through 3481

IP addresses 13.107.64.0/18, 52.112.0.0/14, and 52.120.0.0/14

IMPORTANT!

If you need to federate with Skype for Business, either on-premises or online, you will need to configure some additional DNS records.

CNAME Records / Host name	TTL	Points to address or value
sip	3600	sipdir.online.lync.com
lyncdiscover	3600	webdir.online.lync.com

- 2 Your organization is required to be using Exchange Online and SharePoint Online?

- If your organization doesn't have Exchange Online, see [Understand how Exchange and Microsoft Teams interact.](#)
- If your organization doesn't have SharePoint Online, see [Understand how SharePoint Online and OneDrive for Business interact with Microsoft Teams.](#)

Once you've verified that you meet these network requirements, you may be ready to [Roll out Teams](#). If you're a large multinational enterprise, or if you know you've got some network limitations, read on to learn how to assess and optimize your network for Teams.

IMPORTANT!

Are you running on-premises Skype for Business Server? If your organization is running on-premises Skype for Business Server (or Lync Server), you must [configure Azure AD Connect](#) to synchronize your on-premises directory with Microsoft 365 and migrate your users to Microsoft Teams.

BEST PRACTICE: MONITOR YOUR NETWORK USING CQD AND CALL ANALYTICS

Use the [Call Quality Dashboard \(CQD\)](#) to gain insight into the quality of calls and meetings in Teams. CQD can help you optimize your network by keeping a close eye on quality, reliability, and the user experience. CQD looks at aggregate telemetry for an entire organization where overall patterns can become apparent, which lets you identify problems and plan remediation. Additionally, CQD provides rich metrics reports that provide insight into overall quality, reliability, and user experience.

You'll use [call analytics](#) to investigate call and meeting problems for an individual user.

NETWORK OPTIMIZATION

The following tasks are optional and aren't required for rolling out Teams, especially if you're a small business and you've already rolled out Microsoft 365 or Office 365. Use this guidance to optimize your network and Teams performance or if you know you've got some network limitations.

You might want to do additional network optimization if:

- Teams runs slowly (maybe you have insufficient bandwidth)
- Calls keep dropping (might be due to firewall or proxy blockers)
- Calls have static and cut out, or voices sound like robots (could be jitter or packet loss)

For an in-depth discussion of network optimization, including guidance for identifying and fixing network impairments, read [Microsoft 365 and Office 365 Network Connectivity Principles](#).

Network optimization task

Details

Network planner

For help assessing your network, including bandwidth calculations and network requirements across your org's physical locations, check out the [Network Planner](#) tool, in the [Teams admin center](#). When you provide your network details and Teams usage, the Network Planner calculates your network requirements for deploying Teams and cloud voice across your organization's physical locations.

For an example scenario, see [Using Network Planner - example scenario](#).

Advisor for Teams

[Advisor for Teams](#) is part of the [Teams admin center](#). It assesses your Microsoft 365 or Office 365 environment and identifies the most common configurations that you may need to update or modify before you can successfully roll out Teams.

External Name Resolution

Be sure that all computers running the Teams client can resolve external DNS queries to discover the services provided by Microsoft 365 or Office 365 and that your firewalls are not preventing access. For information about configuring firewall ports, go to [Microsoft 365 and Office 365 URLs and IP ranges](#).

Maintain session persistence

Make sure your firewall doesn't change the mapped Network Address Translation (NAT) addresses or ports for UDP.

Validate NAT pool size

Validate the network address translation (NAT) pool size required for user connectivity. When multiple users and devices access Microsoft 365 or Office 365 using [Network Address Translation \(NAT\)](#) or [Port Address Translation \(PAT\)](#), you need to ensure that the devices hidden behind each publicly routable IP address do not exceed the supported number. Ensure that adequate public IP addresses are assigned to the NAT pools to prevent port exhaustion. Port exhaustion will contribute to internal users and devices being unable to connect to the Microsoft 365 or Office 365 service.

Routing to Microsoft data centers

[Implement the most efficient routing to Microsoft data centers](#). Identify locations that can use local or regional egress points to connect to the Microsoft network as efficiently as possible.

Intrusion Detection and Prevention Guidance

If your environment has an [Intrusion Detection](#) or Prevention System (IDS/IPS) deployed for an extra layer of security for outbound connections, be sure to allow all Microsoft 365 or Office 365 URLs.

Configure split-tunnel VPN

We recommend that you provide an alternate path for Teams traffic that bypasses the virtual private network (VPN), commonly known as [split-tunnel VPN](<https://docs.microsoft.com/windows/security/identity-protection/vpn/vpn-routing>). Split tunneling means that traffic for Microsoft 365 or Office 365 doesn't go through the VPN but instead goes directly to Microsoft 365 or Office 365. Bypassing your VPN will have a positive impact on Teams quality, and it reduces load from the VPN devices and the organization's network. To implement a split-tunnel VPN, work with your VPN vendor.

Other reasons why we recommend bypassing the VPN:

- VPNs are typically not designed or configured to support real-time media.
- Some VPNs might also not support UDP (which is required for Teams).
- VPNs also introduce an extra layer of encryption on top of media traffic that's already encrypted.
- Connectivity to Teams might not be efficient due to hair-pinning traffic through a VPN device.

Implement QoS

Use [Quality of Service \(QoS\)](#) to configure packet prioritization. This will improve call quality in Teams and help you monitor and troubleshoot call quality. QoS should be implemented on all segments of a managed network. Even when a network has been adequately provisioned for bandwidth, QoS provides risk mitigation in the event of unanticipated network events. With QoS, voice traffic is prioritized so that these unanticipated events don't negatively affect quality.

Optimize WiFi

Similar to VPN, WiFi networks aren't necessarily designed or configured to support real-time media. Planning for, or optimizing, a WiFi network to support Teams is an important consideration for a high-quality deployment. Consider these factors:

- Implement QoS or WiFi Multimedia (WMM) to ensure that media traffic is getting prioritized appropriately over your WiFi networks.
- Plan and optimize the WiFi bands and access point placement. The 2.4 GHz range might provide an adequate experience depending on access point placement, but access points are often affected by other consumer devices that operate in that range. The 5 GHz range is better suited to real-time media due to its dense range, but it requires more access points to get sufficient coverage. Endpoints also need to support that range and be configured to leverage those bands accordingly.

- If you're using dual-band WiFi networks, consider implementing band steering. Band steering is a technique implemented by WiFi vendors to influence dual-band clients to use the 5 GHz range.
- When access points of the same channel are too close together, they can cause signal overlap and unintentionally compete, resulting in a bad experience for the user. Ensure that access points that are next to each other are on channels that don't overlap.

Each wireless vendor has its own recommendations for deploying its wireless solution. Consult your WiFi vendor for specific guidance.

BANDWIDTH REQUIREMENTS



Teams is designed to give the best audio, video, and content sharing experience regardless of your network conditions. That said, when bandwidth is insufficient, Teams prioritizes audio quality over video quality.

Where bandwidth isn't limited, Teams optimizes media quality, including up to 1080p video resolution, up to 30fps for video and 15fps for content, and high-fidelity audio.

This table describes how Teams uses bandwidth. Teams is always conservative on bandwidth utilization and can deliver HD video quality in under 1.2Mbps. The actual bandwidth consumption in each audio/video call or meeting will vary based on several factors, such as video layout, video resolution, and video frames per second. When more bandwidth is available, quality and usage will increase to deliver the best experience.

Bandwidth(up/down)	Scenarios
30 kbps	Peer-to-peer audio calling
130 kbps	Peer-to-peer audio calling and screen sharing
500 kbps	Peer-to-peer quality video calling 360p at 30fps
1.2 Mbps	Peer-to-peer HD quality video calling with resolution of HD 720p at 30fps
1.5 Mbps	Peer-to-peer HD quality video calling with resolution of HD 1080p at 30fps
500kbps/1Mbps	Group Video calling
1Mbps/2Mbps	HD Group video calling (540p videos on 1080p screen)

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