Optimizing Your Network for Video

BlueJeans is constantly optimizing the platform for A) the lowest bandwidth situations and B) the fluctuation of bandwidth. On the fly, we will notice the change in available bandwidth (up/down) and reduce the resolution of the video in order to hold onto the connection. In severe situations, the video can be suspended altogether; however, the audio connection will be maintained so the user can continue with the call. The main factors that affect video conferencing are how packets arrive to a destination (or not), as well as network latency/jitter. Below is a listing of variables that can affect packets and the overall user experience.

**Network Preparations**
Make sure your network is properly configured to allow the BlueJeans traffic ([BlueJeans TCP/UDP and IP Ranges used](#)).

**UDP vs. TCP**
Why is UDP ideal for real-time services and not TCP? Believe it or not it’s actually the ‘reliable’ nature of the TCP protocol that hurts the end user experience. With TCP, delays happen every time there is an error, like packet loss. These delays, which are caused by retransmitting broken packets and any following packets that may have already been sent, translate into an unacceptable level of jitter for the end user. This allows UDP to shine. Errors like packet loss usually only have minor impacts on the media output. It is much better to drop a packet and have a few milliseconds of silence than to have full seconds of lag. See the BlueJeans Network Readiness Guide for the UDP ports used.

**Wi-Fi vs. Wired**
On a corporate Wi-Fi network, even if signal strength is great, hotspots or access points can easily be overloaded as they typically have maximum allowed connections and will use time division to slice up access to the wireless bandwidth. All hotspots are not created equal and this is something that needs to be explained. Your typical home Wi-Fi connection will likely be more robust due to fewer devices accessing the wireless bandwidth, however, be aware of your signal strength and wire-in using the Ethernet cable if possible. Being wired-in will help stabilize the network connection at home, in the corporate office, public areas, saturated wireless networks, and areas with signal interference or in poor signal spots. This is very similar to your wireless cellphone service. Your signal may be OK to check emails but very poor for video calls.

**VPN clients are not required**
There’s no need for remote users to be on VPN clients since BlueJeans is a cloud base service not an on-prem solution. Video traffic should be routed directly to the BlueJeans’ cloud via their local Internet access. There’s no need to route the BlueJeans traffic back to the corporate office. Users at home using VPN’s will add additional delay and may run into restrictions on bandwidth and or ports and quality will also suffer if the corporate network is congested. Please implement split tunneling if remote users are required to be on VPN.

**Bandwidth Capacity Planning**
The best way to calculate potential bandwidth utilization would be to establish the individual connection speed; you can use 1024k as an average speed and multiply it by the number of concurrent connections. Once this number is calculated, add 20% for overhead.

**Bandwidth Specifications**
- Minimum of 512 Kbps is recommended for both upload and download during video calls
- For 720p HD resolution, 1024 Kbps (1Mbps) up/down bandwidth as well as a 720p capable webcam
- Video Conferencing Room Systems can connect up to 1.6 Mbps

**Bandwidth & Video Resolution**
- 1024 Kbps + High-Definition
- 768 Kbps High-Quality
- 384 Kbps Standard-Definition
- 100 Kbps Video may be suspended and may be moved to Audio Only

**Network Thresholds**
- Packet Loss Results above 1% can lead to poor video quality
- Jitter Results above 40 ms can lead to poor video quality (The variation in the latency on a packet flow between two systems)
- Latency Results above 300 ms can lead to poor video quality (The time it takes for a packet of data to get from point A to point B)
- Round-trip Delay Results above 250 ms can lead to poor video quality (The length of time it takes for a signal to be sent plus the length of time it takes for an acknowledgement of that signal to be received)
Network Packet Loss

The majority of the time, in a low packet loss environment (under 1%), the overall call quality will not be affected; however, as packet loss increases, this may cause the video to pixelate, become blurry, break-up, or disconnect in worst cases. The type of packet loss can show a variety of symptoms, spiky packet loss can show a quick degradation and then quickly recover. Consistent packet loss can show artifacts, poor audio and low video resolution. Here are some guidelines on what to expect when the network is not optimized for video and experiences packet loss:

### Packet Loss | Quality & Experience
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<1% | High Quality Connection; Smooth HD video, Great Audio
2-6% | Limited Quality Connection; Resolution may drop to Standard Definition, Good Audio
5-10% | Poor Quality Connection; Low Resolution, video bandwidth is reduced, Audio may break-up
10%+ | Worst Quality Connection; call may be disconnected depending on the thresholds per device

### Most common reasons for poor quality | Possible Resolution
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Network congestion | Increase network bandwidth
Wi-Fi Access Point congestion | Add additional Wi-Fi Access Points or Wire-in to the network
Poor Wi-Fi Signal or interference | Move to a better Wi-Fi signal area or Wire-in to the network
Auto/Full/Half Duplex mismatch btw network devices | Make sure both duplex settings match (For Room Systems)
All remote locations are routed to one egress point | Provide multiple egress points for off-net calling
Device performance (Router/Switch/Firewall/etc.) | Replace/Upgrade the network hardware
Remote Users using VPN clients | Disconnect from VPN and connect directly to BlueJeans
Packet loss spikes | Please disable firewall packet inspection for BlueJeans traffic
Audio Echo caused by Desktop/Mobile users | Use Headsets/Earbuds or lower the volume on the device
High CPU utilization on desktop | Set PC to high performance, close none essential programs

Please make sure you don’t have any restrictions on BlueJeans traffic:

### IT Checklist | Recommendations
---|---
Firewalls | Allow Outbound TCP/UDP ports to the BlueJeans IP ranges
Proxies (e.g. Websense/Forcepoint) | Whitelist / Allow BlueJeans (*.bluejeans.com, *.bjn.vc and allow Outbound TCP/UDP ports)
Z-Scaler Proxy | Use .bluejeans.com and .bjn.vc exceptions to their Proxy.
The dot (.) prior to bluejeans.com and bjin.vc is used by Z-scaler as a wildcard instead of *
Blue Coat Proxy | Settings for Blue coat proxy
Monitor Internet Traffic | Monitor bandwidth upload and download utilization
Monitor Access Points | Monitor Wi-Fi access points for over-subscriptions
Intrusion Detection System | Whitelist the BlueJeans IP range, ports as well as *.bluejeans.com and *.bjn.vc
Protocol Analyzer | Whitelist the BlueJeans IP range, ports as well as *.bluejeans.com and *.bjn.vc
Traffic Shaper | Add BlueJeans IP range/ports to a higher priority queue/rule
Avast Anti-Virus | Avast has a feature called Secure DNS. Deactivated Secure DNS
Email Span Filters: Whitelist | bjin-sj-fw.bluejeansnet.com bluejeans.com bluejeansnet.com sendgrid.net and meeting.bluejeans.com
Remote VPN users | Some VPN clients will restrict bandwidth, ports and connectivity to BlueJeans. Split Horizon (split tunneling) connectivity will give optimal performance and low latency.
Virtual Desktop | VDI Thin Clients like VMware, Citrix, XenApp etc. are not supported yet
QoS Priority Queuing | Prioritize the routing of BlueJeans traffic on internal routers / firewalls
Microsoft Lync/SFB | Lync Federation Guide

**Note:** Some firewalls, such as Palo Alto Networks, prefer to filter network traffic based on the Fully Qualified Domain Name (FQDN). If this applies to your firewall configuration, please use the following FQDN in order to connect to BlueJeans: *.bjn.vc and *.bluejeans.com Please make sure that Akamai and AWS are not being blocked by your firewall. Blocking them might cause instability with our services.

### BlueJeans Rooms

Allow If you are using BlueJeans Rooms, please make sure these domains are also *.bluejeans.com, *.bjn.vc, *.bjn.sh, *.dolbyvoice.com, *.pubnub.com and *.pndsn.com

### BlueJeans Primetime

Firewall or Proxy setup; make sure to allow or whitelist HTTP content from: *.bluejeans.com *.akamaiedge.net *.akamaihd.net *.bjn.vc *.a2m.bluejeans.com *.bluejeanslive-lh.akamaihd.net *.streaming.bluejeans.com *.streaming.bluejeans.com/crossdomain.xml and bjinsecure_z-vh.akamaihd.net/

- For web filter/proxy (i.e. Websense) whitelist the following (AWS) Amazon Web Services: *.primetime.bluejeans.com
Routing to BlueJeans IP Range
BlueJeans has several Point of Presences (POPs) distributed globally. The call will be automatically directed to the closest POP to the end point or media egress point. Audio/video traffic will likely be routed to any of the BlueJeans IP ranges based on geo location. Hence, it is important that firewall ports are opened against the entire IP range. See https://support.bluejeans.com/knowledge/tcp-udp-ports for more details.

MPLS integration
BlueJeans has several network provider partners that can deliver MPLS integration in order to facilitate end-to-end MPLS connectivity. Any off-net external participants would connect via the Internet directly to BlueJeans.

BlueJeans Cloud based service
With no hardware or software to deploy, BlueJeans allows for quick and easy deployment company-wide within 24-48 hours. Organizations can use their existing video conferencing equipment and infrastructure or simply connect from desktop clients, iOS/Android apps, Microsoft Lync, Cisco Jabber or a telephone to join a BlueJeans meeting. Bluejeans facilitates the cloud meeting place for any video or audio enabled device.

Best Practices & Recommendations
Please see the recommendations below for successful meetings:

- We recommend users to wire-in (cable-in) to the network whenever possible as Wi-Fi can be unreliable for real-time media communications due to signal strength, traffic congestion, and signal interference.
- Use a headset or earphones whenever possible on desktop and mobile devices. The majority of desktop and mobile devices have poor echo cancellation and they also pick up a lot of background noises.
- Do not use external speakers with PC’s or turn the volume up too high, these will cause echo for the others.
- Mute yourself when not speaking. Coughs and keyboard and background noises will cause meeting distractions.
- No need to dial-in with your phone too if you have a mic and speaker on your computer (but use a headset! 😊)
- Do not use the speakerphone feature on mobile devices. Most devices do not have good built-in echo cancellation. Mobile speakerphones can cause echo, half duplex audio and/or a poor audio experience.
- Visit https://support.bluejeans.com for training videos, guides and FAQ’s.

BlueJeans Reference Guides
- Network Readiness
- Network Security Features

BlueJeans Knowledgebase Articles
- Creating a optimal meeting environment
- Fixing Poor Video/Audio Quality

Others
- System Requirements
- BlueJeans Rooms