Before reading this document on various requirements for various online teaching tools such as Zoom, BB Collaborate Ultra and Microsoft Teams, please check your system specs and your bandwidth/internet connectivity using the quick guide here:

- **Finding your System Specs:**

  **Windows PC:** Right Click “Start Button”, select “System” option. It will show Device Specifications (CPU/Processor and Installed RAM) screen such as this:

  ![System](image)

  Device specifications

  | Device name | E15_HPMEL3 |
  | Processor   | Intel(R) Core(TM) i5-10210U CPU @ 1.60GHz 2.30GHz |
  | Installed RAM | 8.00 GB (7.81 GB usable) |


  **Mac OS:**

  Source: [https://support.apple.com/en-ca/HT203001](https://support.apple.com/en-ca/HT203001)

  Choose Apple menu > About This Mac. This opens an overview of your Mac, including your Mac model, processor, memory, serial number, and version of macOS. To see the greater detail provided by the System Information app, click the System Report button.

- **Bandwidth Test:** You can test your bandwidth/speed/connection @ [https://speedtest.utoronto.ca/](https://speedtest.utoronto.ca/)

### Zoom Requirements


#### Processor(CPU) and RAM requirements

<table>
<thead>
<tr>
<th>Processor</th>
<th>Minimum</th>
<th>Recommended</th>
</tr>
</thead>
<tbody>
<tr>
<td>RAM</td>
<td>Single Core 1Ghz or Higher</td>
<td>Dual Core 2Ghz or Higher (i3/i5/i7 or AMD equivalent)</td>
</tr>
<tr>
<td></td>
<td>N/A</td>
<td>4Gb</td>
</tr>
</tbody>
</table>

**Notes:**

- Dual and single core laptops have a reduced frame rate when screen sharing (around 5 frames per second). For optimum screen sharing performance on laptops we recommend a quad core processor or higher.
- Linux requires a processor or graphics card that can support OpenGL 2.0 or higher.

### Bandwidth requirements
The bandwidth used by Zoom will be optimized for the best experience based on the participants’ network. It will automatically adjust for 3G, WiFi or Wired environments.

**Recommended bandwidth for meetings and webinar panelists:**

- **For 1:1 video calling:**
  - 600kbps (up/down) for high quality video
  - 1.2 Mbps (up/down) for 720p HD video
  - Receiving 1080p HD video requires 1.8 Mbps (up/down)
  - Sending 1080p HD video requires 1.8 Mbps (up/down)
- **For group video calling:**
  - 800kbps/1.0Mbps (up/down) for high quality video
  - For gallery view and/or 720p HD video: 1.5Mbps/1.5Mbps (up/down)
  - Receiving 1080p HD video requires 2.5mbps (up/down)
  - Sending 1080p HD video requires 3.0 Mbps (up/down)
- **For screen sharing only (no video thumbnail):** 50-75kbps
- **For screen sharing with video thumbnail:** 50-150kbps
- **For audio VoIP:** 60-80kbps
- **For Zoom Phone:** 60-100kbps

**Recommended bandwidth for webinar attendees:**

- **For 1:1 video calling:** 600kbps (down) for high quality video and 1.2 Mbps (down) for HD video
- **For screen sharing only (no video thumbnail):** 50-75kbps (down)
- **For screen sharing with video thumbnail:** 50-150kbps (down)
- **For audio VoIP:** 60-80kbps (down)

**System requirements for Virtual Background on Zoom**

This article lists the requirements for using Virtual Background in the Zoom client/app.

*Source:* [https://support.zoom.us/hc/en-us/articles/360043484511-System-requirements-for-Virtual-Background](https://support.zoom.us/hc/en-us/articles/360043484511-System-requirements-for-Virtual-Background)

**Video without a physical green screen**

- Zoom Desktop Client for PC, version **4.6.4 (17383.0119)** or higher
- Windows 7, 8, or 10 (64-bit)
- Supported processors (720p video)
  - Intel i5, i7, i9 - 2 cores or higher, gen 6 or higher, except atom and y series
    - Processor must have Intel GPU - except HD620 with driver version 23 or higher
    - OS must be Windows 10, 64-bit
- Supported processors (1080p video)
  - Intel i5 - 4 cores or higher, gen 6 or higher, expect u-series
  - Intel i7, i9, Xeon - 4 cores or higher, gen 4 or higher
  - Intel CPU with HD620 graphics (OS must be Windows 10, 64-bit)
    - i7 2 cores; or
- i5 2 cores with major version 26 or higher and minor version 7323 or higher
  - Other Intel processors - 6 cores or higher, gen 4 or higher, except atom and y series
  - Non-Intel processors - 8 cores or higher and frequency 3.0GHz; or 12 cores or higher
  - AMD - Ryzen 5/7/9 or higher

Video with a physical green screen

- Zoom Desktop Client for PC, version 4.6.4 (17383.0119) or higher
- Windows 7, 8, or 10 (64-bit)
- Supported processors (720p video)
  - Intel i5, i7, i9 - 4 cores, gen 6 or higher, except atom and y series
  - Intel i5, i7, i9, Xeon - 4 cores or higher
  - Other Intel processors - 6 cores or higher, except atom and y series
  - Non-Intel processors - 6 cores or higher, 3.0GHz frequency or higher; or 8 cores or higher
- Supported processors (1080p video)
  - Intel i5 - gen 5 or higher, quad-core or higher
  - Intel i7 - gen 2 or higher, quad-core or higher
  - Intel i9, Xeon - 4 cores or higher
  - Other Intel processors - 6 cores or higher, except atom and y series
  - Non-Intel processors - 8 cores or higher and 3.0GHz frequency or higher; or 12 cores or higher
  - AMD - Ryzen 5/7/9 or higher

macOS

Video without a physical green screen

- Zoom Desktop Client for Mac, version 4.6.4 (17383.0119) or higher
- macOS 10.9 or later
- Supported processors (720p video)
  - Intel i5, i7, i9, Xeon - 4 cores or higher
  - Intel i7, i9, Xeon - 2 cores, gen 4 or higher
  - Intel i5 - 2 cores, gen 6 or higher, and macOS 10.14 or higher
  - Other Intel processors - 6 cores or higher, except atom and y series
  - Non-Intel processors - 8 cores or higher
- Supported processors (1080p video)
  - Intel i5
    - 4 cores or higher, gen 5 or higher; or
    - 2 cores with gen 7 or higher and 2.0Ghz frequency or higher
  - Intel i7 - 4 cores or higher, gen 2 or higher
  - Intel i9, Xeon - 4 cores or higher
  - Other Intel processors - 6 cores or higher, except atom and y series
  - Non-Intel processors - 8 cores or higher

Video with a physical green screen

- Zoom Desktop Client for Mac, version 4.6.4 (17383.0119) or higher
- macOS 10.9 or later
- **Supported processors (720p video)**
  - Intel i5, i7, i9 - 2 cores, gen 6 or higher, except atom and y series
  - Intel i5, i7, i9, Xeon - 4 cores or higher
  - **Other Intel processors** - 6 cores or higher, except atom and y series
  - **Non-Intel processors** - 8 cores or higher
- **Supported processors (1080p video)**
  - Intel i5 - gen 5 or higher, quad-core or higher
  - Intel i7 - gen 2 or higher, quad-core or higher
  - Intel i9, Xeon - 4 cores or higher
  - **Other Intel processors** - 6 cores or higher, except atom and y series
  - **Non-Intel processors** - 8 cores or higher

**Linux**

- Zoom Desktop Client for Linux, version 2.0.91373.0502 or higher
- Dual Core 2Ghz or Higher (i5/i7 or AMD equivalent) processor
- A physical green screen

**iOS**

- Zoom Mobile App for iOS, version 4.1.27541.0627 or higher
  - iPhone 8, 8+, or X
  - iPad Pro and the 5th and 6th generation iPad 9.7

**BB Collaborate Requirements**

Collaborate doesn't require or use plugins. All you need is one of the supported browsers.

Source: [https://help.blackboard.com/Collaborate/Ultra/Administrator/About_Collaborate/Browser_Support](https://help.blackboard.com/Collaborate/Ultra/Administrator/About_Collaborate/Browser_Support)

**Supported browsers**

Collaborate only supports the most recent two stable channel releases of browsers.

<table>
<thead>
<tr>
<th>BROWSER</th>
<th>DESKTOP</th>
<th>MOBILE</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>GOOGLE CHROME™</strong></td>
<td><strong>Windows®, macOS, Ubuntu</strong></td>
<td><strong>Android™</strong></td>
</tr>
<tr>
<td><strong>FIREFOX®</strong></td>
<td><strong>Windows, macOS</strong></td>
<td>Not supported</td>
</tr>
<tr>
<td><strong>SAFARI®</strong></td>
<td><strong>macOS 10.13+</strong></td>
<td><strong>iOS® 12+, iPadOS</strong></td>
</tr>
<tr>
<td><strong>MICROSOFT EDGE® (CHROMIUM)</strong></td>
<td><strong>Windows, macOS</strong></td>
<td><strong>Android, iOS</strong></td>
</tr>
</tbody>
</table>

**Certified browsers and operating systems**

Blackboard Collaborate is regularly certified against the following combinations of browsers and operating systems. These combinations also reflect the areas of strongest support.
Browser | Desktop | Mobile
---|---|---
Google Chrome 75+ | Windows 10, macOS 10.14+ | Android 9+
Firefox | Windows 10, macOS 10.14+ | Not supported
Safari | macOS 10.14+ | iOS 12+
Microsoft Edge (Chromium) | Windows, macOS | Android, iOS

For macOS, iOS, and iPadOS, only the latest two major releases of each operating system are certified, using the most recent stable release of Safari on each system.

For Windows, only Windows 10 is certified.

**Additional Requirements:**
Source: [https://blackboard.secure.force.com/publickbarticleview?id=kAB700000008P8m](https://blackboard.secure.force.com/publickbarticleview?id=kAB700000008P8m)

- **Bandwidth / Internet Access** - 28.8 kbps speed or above (Broadband connection highly recommended)
- 256 MB RAM
- 20 MB free disk space
- Soundcard with microphone and headphones (A headset with microphone/headphones is highly recommended)
- Webcam (optional)
- **Note:** Thin client solutions such as Citrix Metaframe and Virtual Machines are NOT supported for use with Blackboard Collaborate Web Conferencing.

**Microsoft Teams Requirements**

**Bandwidth requirements**

Source: [https://docs.microsoft.com/en-us/microsoftteams/prepare-network](https://docs.microsoft.com/en-us/microsoftteams/prepare-network)

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.

<table>
<thead>
<tr>
<th>BANDWIDTH(UP/DOWN)</th>
<th>Scenarios</th>
</tr>
</thead>
<tbody>
<tr>
<td>30 KBPS</td>
<td>Peer-to-peer audio calling</td>
</tr>
</tbody>
</table>
### Hardware requirements for Teams on a Windows PC

<table>
<thead>
<tr>
<th>COMPONENT</th>
<th>Requirement</th>
</tr>
</thead>
<tbody>
<tr>
<td>COMPUTER AND PROCESSOR</td>
<td>Minimum 1.6 GHz (or higher) (32-bit or 64-bit).</td>
</tr>
<tr>
<td>MEMORY</td>
<td>2.0 GB RAM</td>
</tr>
<tr>
<td>HARD DISK</td>
<td>3.0 GB of available disk space</td>
</tr>
<tr>
<td>DISPLAY</td>
<td>1024 x 768 screen resolution</td>
</tr>
<tr>
<td>GRAPHICS HARDWARE</td>
<td>Minimum of 128 MB graphics memory</td>
</tr>
<tr>
<td>OPERATING SYSTEM</td>
<td>Windows Server 2012 R2+, Windows 10, or Windows 8.1 in 32-bit and 64-bit. For the best experience, use the latest version of your operating system.</td>
</tr>
<tr>
<td>.NET VERSION</td>
<td>Requires .NET 4.5 CLR or later</td>
</tr>
<tr>
<td>VIDEO DEVICES</td>
<td>Standard laptop camera, microphone, and speakers</td>
</tr>
</tbody>
</table>
| VIDEO CALLS AND MEETINGS | • For a better experience with 1:1 video calls, we recommend using a computer that has a single-core processor and 4.0 GB RAM (or higher).  
• For a better experience with online meetings, we recommend using a computer that has a dual-core processor and 8.0 GB RAM (or higher).  
• The optional Background video effects are not supported on processors without an AVX2 instruction set running on Windows 8.1 or below.  
• See Hardware decoder and encoder driver recommendations for a list of unsupported decoders and encoders.  
• Joining a meeting using proximity detection in a Microsoft Teams Room requires Bluetooth LE, which requires Bluetooth to be enabled on the client device, and for Windows clients requires the 64-bit Teams client. It's not available on 32-bit Teams clients. |
| TEAMS LIVE EVENTS | If you are producing a Teams live event, we recommend using a computer that has a Core i5 Kaby Lake processor, 4.0 GB RAM (or higher), and hardware encoder. See Hardware decoder and encoder driver recommendations for a list of unsupported decoders and encoders. |
### Hardware requirements for Teams on a Mac

<table>
<thead>
<tr>
<th>COMPONENT</th>
<th>Requirement</th>
</tr>
</thead>
<tbody>
<tr>
<td>PROCESSOR</td>
<td>Minimum Intel processor, Core 2 Duo or higher</td>
</tr>
<tr>
<td>MEMORY</td>
<td>2.0 GB RAM</td>
</tr>
<tr>
<td>HARD DISK</td>
<td>1.5 GB of available disk space</td>
</tr>
<tr>
<td>DISPLAY</td>
<td>1280 x 800 or higher resolution</td>
</tr>
<tr>
<td>OPERATING SYSTEM</td>
<td>Mac OS X 10.11 El Capitan or later</td>
</tr>
<tr>
<td>VIDEO</td>
<td>Compatible webcam</td>
</tr>
<tr>
<td>VOICE</td>
<td>Compatible microphone and speakers, headset with microphone, or equivalent device</td>
</tr>
</tbody>
</table>

**VIDEO CALLS AND MEETINGS**

- For a better experience with 1:1 video calls, we recommend using a computer that has a single-core processor and 4.0 GB RAM (or higher).
- For a better experience with online meetings, we recommend using a computer that has a dual-core processor and 8.0 GB RAM (or higher).
- See [Hardware decoder and encoder driver recommendations](#) for a list of unsupported decoders and encoders.
- Joining a meeting using proximity detection in a Microsoft Teams Room is not available on Mac OS.

### Hardware requirements for Teams on Linux

<table>
<thead>
<tr>
<th>COMPONENT</th>
<th>Requirement</th>
</tr>
</thead>
<tbody>
<tr>
<td>COMPUTER AND PROCESSOR</td>
<td>Minimum 1.6 GHz (or higher) (32-bit or 64-bit).</td>
</tr>
<tr>
<td>MEMORY</td>
<td>2.0 GB RAM</td>
</tr>
<tr>
<td>HARD DISK</td>
<td>3.0 GB of available disk space</td>
</tr>
<tr>
<td>DISPLAY</td>
<td>1024 x 768 screen resolution</td>
</tr>
<tr>
<td>GRAPHICS</td>
<td>Minimum of 128 MB graphics memory</td>
</tr>
<tr>
<td>HARDWARE</td>
<td>Linux distribution capable of installing DEB or RPM.</td>
</tr>
<tr>
<td>OPERATING SYSTEM</td>
<td>USB 2.0 video camera</td>
</tr>
<tr>
<td>VIDEO</td>
<td>Standard laptop camera, microphone, and speakers</td>
</tr>
<tr>
<td>DEVICES</td>
<td>Compatible microphone and speakers, headset with microphone, or equivalent device</td>
</tr>
<tr>
<td>VOICE</td>
<td></td>
</tr>
</tbody>
</table>

**VIDEO CALLS AND MEETINGS**

- For a better experience with 1:1 video calls, we recommend using a computer that has a single-core processor and 4.0 GB RAM (or higher).
- For a better experience with online meetings, we recommend using a computer that has a dual-core processor and 8.0 GB RAM (or higher).
- See [Hardware decoder and encoder driver recommendations](#) for a list of unsupported decoders and encoders.
- Joining a meeting using proximity detection in a Microsoft Teams Room is not available on Linux.
SUPPORTED LINUX DISTRIBUTIONS
Ubuntu 16.04 LTS, 18.04 LTS, Fedora 30 Workstation, RHEL 8 Workstation, CentOS 8

Hardware requirements for Teams on mobile devices

You can use Teams on these mobile platforms:

- **Android**: Compatible with Android phones and tablets.
  
  Support is limited to the last four major versions of Android. When a new major version of Android is released, the new version and the previous three versions are officially supported.

- **iOS**: Compatible with iPhone, iPad, and iPod touch.
  
  Support is limited to the two most recent major versions of iOS. When a new major version of iOS is released, the new version of iOS and the previous version are officially supported. The optional **Blur my background** video effect on iOS requires an operating system of iOS 12 or later and is compatible with the following devices: iPhone 7 or later, iPad 2018 (6th generation) or later, and the iPod touch 2019 (7th generation).

For the best experience with Teams, use the latest version of iOS and Android.

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