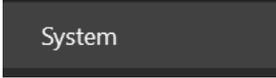Before reading this document on various requirements for various online teaching tools such as Zoom, BB Collaborate Ultra and Microsoft Teams, please check your system specs and your bandwidth/internet connectivity using the quick guide here:

- Finding your **System Specs:**

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

    Device specifications

Device name	E15_IHPMEL3
Processor	Intel(R) Core(TM) i5-10210U CPU @ 1.60GHz 2.10 GHz
Installed RAM	8.00 GB (7.81 GB usable)

    You can find out your CPU generation from using the intel's website.
     https://www.intel.com/content/www/us/en/processors/processor-numbers.html

    Mac OS:
    Source: 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/

Zoom Requirements

Source : https://support.zoom.us/hc/en-us/articles/201362023-System-requirements-for-Windows-macOS-and-Linux

Processor(CPU) and RAM requirements

	Minimum	Recommended
Processor	Single Core 1Ghz or Higher	Dual Core 2Ghz or Higher (i3/i5/i7 or AMD equivalent)
RAM	N/A	4Gb

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

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

Supported browsers

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

BROWSER	DESKTOP	MOBILE
GOOGLE CHROME™	Windows®, macOS, Ubuntu	Android™
FIREFOX®	Windows, macOS	Not supported
SAFARI®	macOS 10.13+	iOS® 12+, iPadOS
MICROSOFT EDGE® (CHROMIUM)	Windows, macOS	Android, iOS

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

- **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

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)

Hardware requirements for Teams on a Windows PC

TABLE 1	
COMPONENT	**Requirement**
COMPUTER AND PROCESSOR	Minimum 1.6 GHz (or higher) (32-bit or 64-bit).
MEMORY	2.0 GB RAM
HARD DISK	3.0 GB of available disk space
DISPLAY	1024 x 768 screen resolution
GRAPHICS HARDWARE	Minimum of 128 MB graphics memory
OPERATING SYSTEM	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.
.NET VERSION	Requires .NET 4.5 CLR or later
VIDEO	USB 2.0 video camera
DEVICES	Standard laptop camera, microphone, and speakers
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 2

COMPONENT	Requirement
PROCESSOR	Minimum Intel processor, Core 2 Duo or higher
MEMORY	2.0 GB RAM
HARD DISK	1.5 GB of available disk space
DISPLAY	1280 x 800 or higher resolution
OPERATING SYSTEM	Mac OS X 10.11 El Capitan or later
VIDEO	Compatible webcam
VOICE	Compatible microphone and speakers, headset with microphone, or equivalent device
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 3

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