University of Alaska
Elluminate Live Best Practices
For Low Bandwidth Networks

Best Practices for Elluminate *Live!* conferences with participants using a low bandwidth network connections:

Background Information:
The University of Alaska has three Elluminate *Live!* servers, one for each of the three MAUs: UAA, UAF, and UAS. All three Elluminate *Live!* servers are located in Anchorage at the UAA campus.

During a conference when the moderator presents new information that information is sent from the moderator's PC to the Elluminate *Live!* Server, and then from the Elluminate *Live!* server to each of the conference's participants.

Example UA Conference:
As an example a UAF instructor is in Bethel running a conference with students located in Anchorage, Fairbanks, and Cold Bay. When the instructor presents a new image on their PC the data for that image is sent from the instructor's PC in Bethel to the UAF Elluminate *Live!* server located at UAA. Then a copy of the data is sent out to each of the students.   Even if students in Bethel are viewing the conference on their own PCs in the same room as the instructor, the data to those students still has to go from the Instructor's PC to the Elluminate *Live!* server at UAA, than a separate copy of the data is sent back to each student's PC in Bethel.

If students are connecting to a conference from one of the UA Main campuses they are accessing the Elluminate *Live!* server at network speeds between 10 and 100 mb per second. Student located at one of the northern UAF remote campus have to connect to the UA core network across a satellite link. Those satellite links are running at speeds between 1 and 5 mb per second. Students out in the smaller Alaskan villages and towns may be connecting via dialup links at network speeds around 56 kb per second.

Keeping Conferences in Sync:
In conferences where participants are connecting at different network speeds Elluminate *Live!* tries to keep the users in sync by adjusting the rate of the audio and video streams being sent to each user. Based on a user's connection speed selection the Elluminate *Live!* server will attempt to deliver the most relevant session traffic as quickly as possible, resorting to queuing unplayed audio and delivering it at a dynamically adjusted rate to the client to ensure no audio is lost while maintaining synchronicity amongst all participants. This accelerated playback is often referred to as "chipmunking" as the distortion results in audio reminiscent of the chipmunks.

A user connecting at 10 mb per second is running 178 times faster than a user connecting at 56bk per second. The higher speed user will be sent real time audio and high frame rate video while the lower speed user may receive audio at an accelerated rate and low frame rate video.

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In order for an Elluminate *Live!* conference to work efficiently all of the participants must set their connection speeds correctly.   If a student is connecting via a 56 kb dialup line but selects LAN as their Elluminate *Live!* connection speed that student will not get good service. The Elluminate *Live!* server will be sending data to the user at 10 mb per second when the student's modem can only send and receive data at 56 kb per second. Since the server is sending data 178 times faster than the modem can receive it the user's connection may become saturated, they will get poor audio performance, little or no video, and possibly become disconnected.

Slow connection speeds for the instructor's machine will slow down the entire conference. Because all session traffic must first reach the server before it can be distributed to participants, any delay in this traffic reaching the server will be reflected on the participant's side as a delay. As the moderator with a slow connection, you may see the audio indicators for all participants light up, and as a participant, you will see the moderator's audio indicators light up.

Elluminate *Live!* will not slow down the entire conference to let one or more students PCs catch up. Elluminate *Live!* will instead send compressed audio and low frame rate video to the slow user trying to keep them synced up with the conference. If the slow machine still can't keep up Elluminate *Live!* may eventually drop the connection and the user will then see Elluminate *Live!* attempting to reconnect as it tries to get a better network connection.

Students in the smaller Alaskan towns and villages may be using internet services providers who do not peer in-state with the University of Alaska. What this means is the traffic to those students has to go from the UAA Elluminate *Live!* server to the UA internet peering point in Seattle then to the user. As an example the traffic for a Starband user in St Michaels may go from the UAF Elluminate *Live!* sever at UAA to Seattle, to Denver, up to a satellite, down from the satellite to the user in St Michaels. There are times when the inbound UA internet link is saturated, this means there is more traffic being sent to UA then the circuit can handle. The excess traffic gets discarded. Congestion of the UA internet links can cause poor quality Elluminate *Live!* sessions and may even drop users out of sessions. At this time the only solution is to find more money to buy more bandwidth.
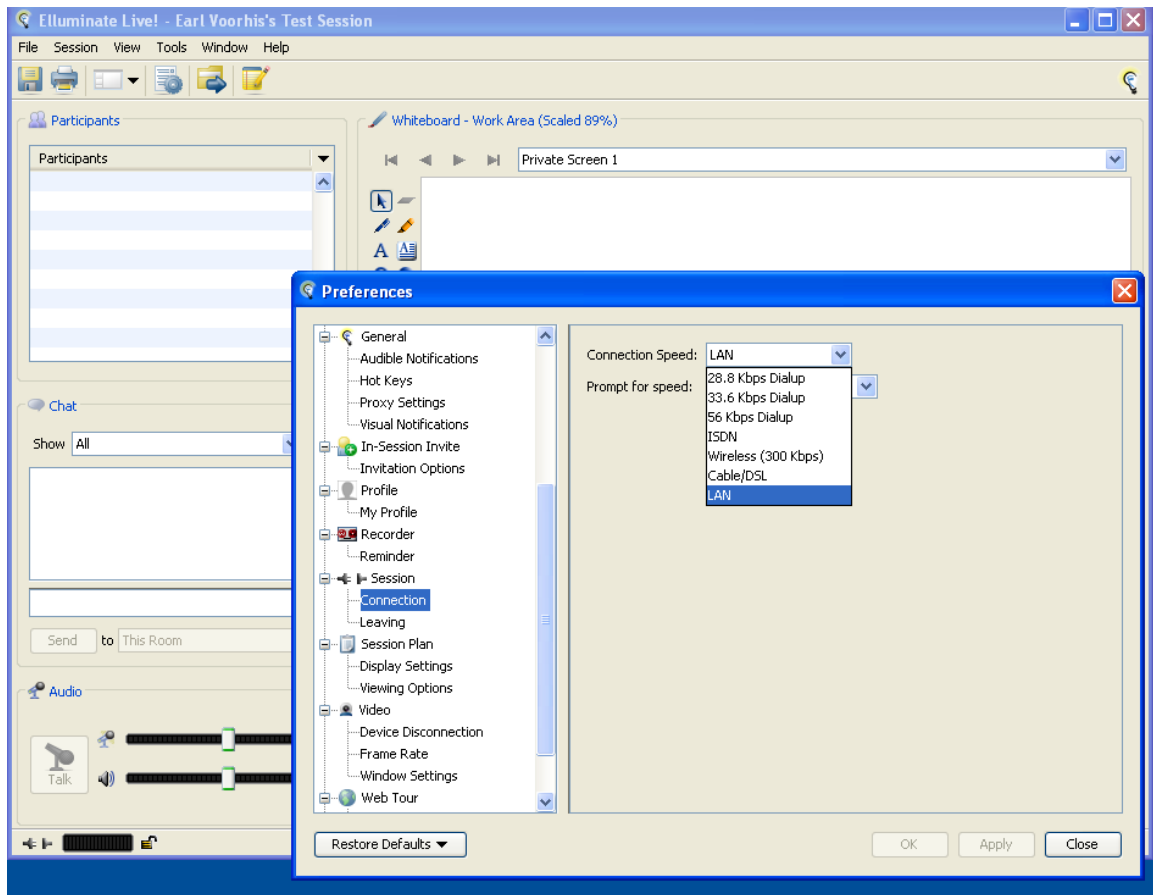
Best Practices:

Since the moderator's access sets the pace of the entire conference the moderator should connect via the fastest network access they have available. They should use a wired LAN connection whenever possible. The next best option would be to use a wireless connection. The instructor needs to change their Elluminate *Live!* Connection Speed to match the type of network access they are using. If you are using a wired LAN connection at one of the UA Main campuses then select "LAN" or "Cable/DSL" as your connection speed. If you only have a wireless connection available then select Wireless as your connection speed.

The students should start out the conference by setting their connection speed to match their network access. If a student keeps falling behind in the conference then that student should pick a SLOWER connection speed. The speeds are listed slowest (at the top of the list) to fastest (at the bottom of the list). See below.

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General Guidelines:

1. **Pre-setup:**
   The moderator should login to the meeting room 15 minutes or more prior to the start of the session and upload the PowerPoint presentation. Students with low speed connection should also log on early so that their machine can download the converted whiteboard presentation before the class starts.

2. **Preloading slides:**
   A. The instructor should can connect to the session early and load the slide presentation. Client machines will start preloading the individual slides while they wait for the session to commence.
   B. Use the Elluminate *Live!* Application or Plan! to convert PowerPoint slides into whiteboard files, and then preload the entire presentation to the server. Client machines will the download the entire presentation when they join the session regardless of the presence of a moderator.
   C. Once the Elluminate *Live!* client has downloaded the whiteboard presentation to the participant's system the session only has to send instructions to load the next slide and not the data to create that slide. This results in a much better session experience for users with a slow speed connection.

3. **Connection Speeds:**
   A. Have slow sites select SLOWER speeds in the Elluminate *Live!* application profile if the site keeps falling behind in the conference.

4. **Using Application Share:**
   A. All data is live. It is sent as it is presented or created.
   B. You can shrink the application (Word, PowerPoint, ect) screen size down and use less bandwidth.
   C. Slides are not preloaded on client machines.
   D. For sites using a 56kbps connection application share will not work very well.
   E. Application share should not be used to share videos.
   F. Application sharing is bandwidth intensive.

5. **Using the White Board:**
   A. No app share over head.
   B. No animation.
   C. No text effects.
   D. Does use preloaded slides for client machines.
   E. Whiteboards are the best tool for low bandwidth sessions.

6. **Audio Types:**
   A. Multiple talkers use 130 kb of bandwidth for the audio.
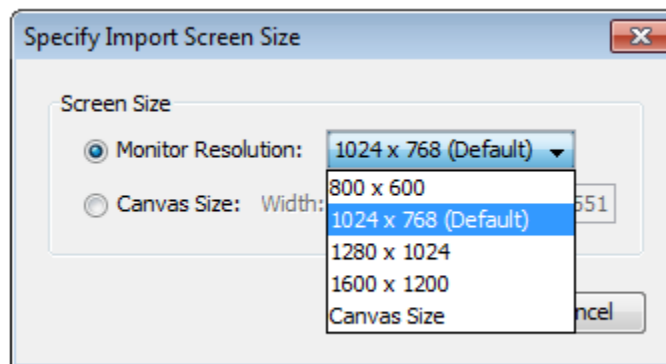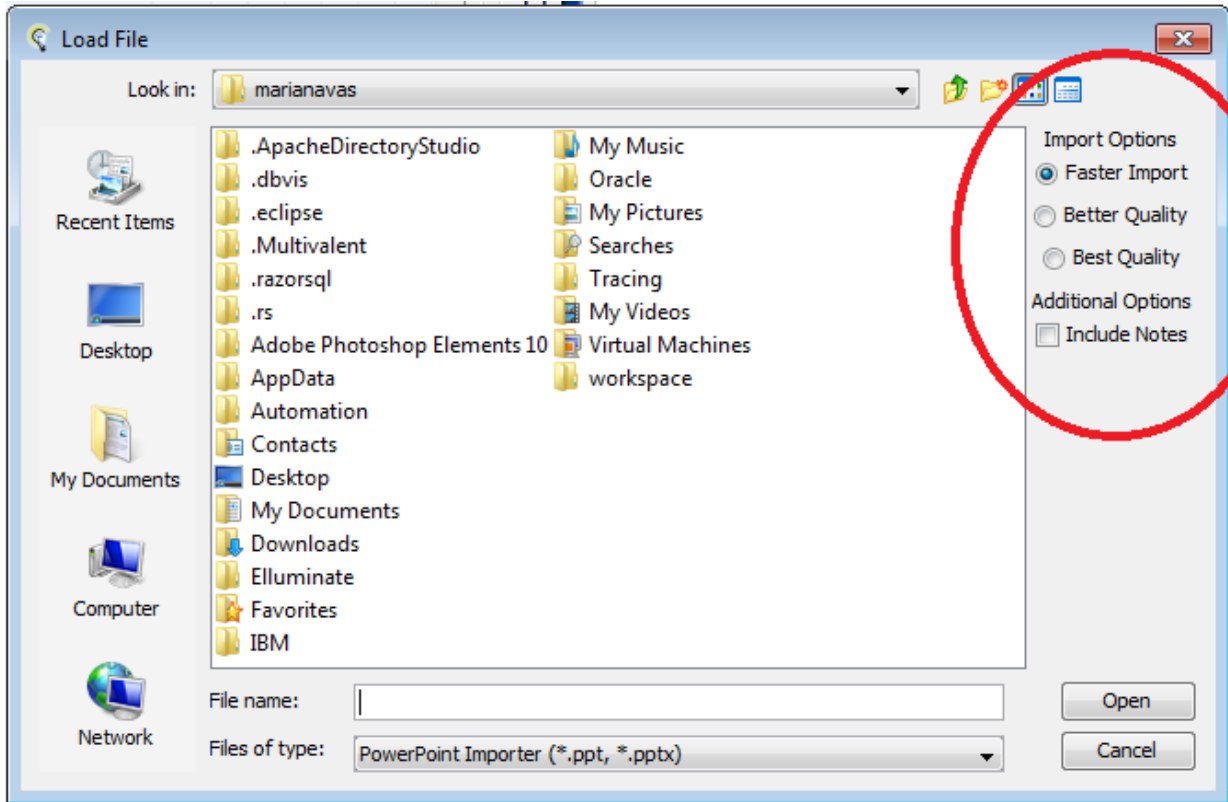   B. Single talker uses 33 kb of bandwidth for the audio.

7. Presentation Import Options:

    A. When uploading a PowerPoint presentation, choose Best Quality for Import Options **and choose 800 X 600 for Monitor resolution for Import Screen Size.**

For more information on the Import Options, please review the document below:

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Preloading PowerPoint Presentations:
In Elluminate *Live!*, moderators are able to load PowerPoint presentations (*.ppt, *pptx) on to the whiteboard using one of three import options:
1. Faster Import
2. Better Quality
3. Best Quality

The following outlines the differences between these three options and offers recommendations on what option to choose depending on your objective and environment.

Import Options:

Faster Import
The **Faster Import** option converts the PowerPoint slides to JPEG images and loads them onto the whiteboard. Of the three options, Faster Import creates the smallest image file size and should be chosen if you are concerned about upload speed or the consumption of whiteboard memory (cache). This default setting can be used in most cases; however, if the text is "fuzzy", try using Better Quality instead.

Better Quality
The **Better Quality** option generates both JPEG and PNG images and produces a foreground and background image for each slide. When loaded onto the whiteboard, the conversion will use whichever combination yields the smallest file size. Use the Better Quality setting if you do not get the required quality (particularly for text) from Faster Import.

Best Quality
If you are unable to get the desired text quality using the Better Quality option, choose the **Best Quality** option. This option generates the same image files as Better Quality but the converter chooses between a single PNG image of the entire slide or a PNG backboard image combined with a different image of the background. Since this option does not compress the slides, it gives the best quality for text; however, it will produce the largest file size.

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Example: Comparing Whiteboard File Sizes during Import
Note: imported at a screen size of 1024 x 768

PowerPoint Overview

	Original File Size	File Size Resulting from Faster Import	File Size Resulting from Better Quality	File Size Resulting from Best Quality
A "typical" PowerPoint presentation with text and images	2.00 MB	3.23 MB	3.69 MB	7.08 MB
A PowerPoint presentation with images only	2.57 MB	0.77 MB	0.86 MB	6.65 MB

Choosing an Import Screen Size
When loading presentations, the Screen Size import setting will also affect the quality of the slides.   Typically, we find that the optimal quality is obtained with selecting **Canvas Size**.

1. Note that the setting of Canvas Size may cause your whiteboard content to exceed the allowable size quota. If this does occur, you can reduce the import size when loading the presentation by choosing a different size or a different quality.

2. The allowable whiteboard quota is 20MB. If your PowerPoint presentation has many images and a large number of slides, the resulting presentation may be too large to load onto the whiteboard. There is no explicit limit for the size of a PowerPoint presentation, the limit is for the whiteboard and is imposed by the limit of the maxImageCache.

3. Have all the participants log in to the meeting room 15 minutes or more prior to the start of the session to give them enough time to download all the whiteboard presentation slides on their end.

4. Ensure that each participant has the correct connection speed configured within the Elluminate Live meeting room by navigating to:
    a. PC: Tools -> Preferences -> Session -> Connection
    b. Mac: Elluminate *Live!* -> Preferences -> Session -> Connection