HDX RealTime Optimization Pack 2.9 LTSR

Copyright © 1997–2026. Citrix Systems, Inc. All Rights Reserved.

Contents

What's new 3

Cumulative Update 7 (CU7) 3

Fixed issues in 2.9 LTSR CU7 4

Cumulative Update 6 (CU6) 4

Fixed issues in 2.9 LTSR CU6 5

Cumulative Update 5 (CU5) 5

Fixed issues in 2.9 LTSR CU5 6

Cumulative Update 4 (CU4) 6

Fixed issues in 2.9 LTSR CU4 7

Cumulative Update 3 (CU3) 7

Fixed issues in 2.9 LTSR CU3 8

Cumulative Update 2 (CU2) 8

Fixed issues in 2.9 LTSR CU2 8

Cumulative Update 1 (CU1) 9

Fixed issues in 1912 LTSR CU1 9

About this release 10

Fixed issues in 2.9 LTSR 10

Known issues in HDX™ RealTime Optimization Pack 15

System requirements 20

Technical overview 25

Download 36

Install the RealTime Optimization Pack 37

Upgrade 43

© 1997–2026 Citrix Systems, Inc. All rights reserved.

Configure features **45**

Configure firewalls **48**

Troubleshoot the RealTime Optimization Pack **49**

© 1997–2026 Citrix Systems, Inc. All rights reserved.

What's new

September 6, 2025

HDX RealTime Optimization Pack 2.9 LTSR

Cumulative Update 7 (CU7) is the latest release of the HDX RealTime Optimization Pack 2.9 LTSR. CU7 adds two new fixes compared to the 2.9 CU6 release of HDX RealTime Optimization Pack.

The HDX RealTime Media Engine 2.9 CU6 release supports the upgraded libraries: libjpeg and zlib.

The HDX RealTime Media Engine 2.9 CU5 for macOS provides native support for Apple M1 and is compatible with Citrix Workspace app on both Intel and M1 Mac devices.

Cumulative Update 7 (CU7)

September 6, 2025

Release date: July 03, 2023

About this release

CU7 adds two new fixes compared to the 2.9 CU6 release of HDX RealTime Optimization Pack.

HDX RealTime Optimization Pack 2.9 LTSR Cumulative Update 6 (CU6)

HDX RealTime Optimization Pack 2.9 LTSR Cumulative Update 5 (CU5)

HDX RealTime Optimization Pack 2.9 LTSR Cumulative Update 4 (CU4)

HDX RealTime Optimization Pack 2.9 LTSR Cumulative Update 3 (CU3)

HDX RealTime Optimization Pack 2.9 LTSR Cumulative Update 2 (CU2)

HDX RealTime Optimization Pack 2.9 LTSR Cumulative Update 1 (CU1)

HDX RealTime Optimization Pack 2.9 LTSR (initial release)

Known issues in this release

Deprecation and removals

Citrix Product Subscription Advantage Eligibility Dates

© 1997–2026 Citrix Systems, Inc. All rights reserved.

Fixed issues in 2.9 LTSR CU7

September 6, 2025

HDX RealTime Optimization Pack 2.9 Cumulative Update 7 (CU7) contains all fixes that were included in HDX RealTime Optimization Pack 2.9, Cumulative Update 1, Cumulative Update 2, Cumulative Update 3, Cumulative Update 4, Cumulative Update 5, Cumulative Update 6, plus the following fixes:

- This fix allows you to check and set the results to false for AEC support for specified hardware. To enable the fix, set the following registry key:

  HKEY_CURRENT_USER\SOFTWARE\Citrix\HDXRTConnector\MediaEngine

  Name: AecHWCheckExclusionList

  Type: REG_SZ

  Value: False

  [LOP-4594]

- The following enhancements are made to improve the user experience:

  - Enable AEC in some headsets.
  - Set the following registry key to remove the echo generation at the end-point for the headsets:

    HKEY_CURRENT_USER\SOFTWARE\Citrix\HDXRTConnector\MediaEngine

    Name: AecHWCheckExclusionList

    Type: REG_SZ

    Value: False

  [LOP-4596]

Cumulative Update 6 (CU6)

September 6, 2025

Release date: January 30, 2023

© 1997–2026 Citrix Systems, Inc. All rights reserved.

About this release

CU6 adds two new fixes compared to the 2.9 CU5 release of HDX RealTime Optimization Pack.

HDX RealTime Optimization Pack 2.9 LTSR Cumulative Update 5 (CU5)

HDX RealTime Optimization Pack 2.9 LTSR Cumulative Update 4 (CU4)

HDX RealTime Optimization Pack 2.9 LTSR Cumulative Update 3 (CU3)

HDX RealTime Optimization Pack 2.9 LTSR Cumulative Update 2 (CU2)

HDX RealTime Optimization Pack 2.9 LTSR Cumulative Update 1 (CU1)

HDX RealTime Optimization Pack 2.9 LTSR (initial release)

Known issues in this release

Deprecation and removals

Citrix Product Subscription Advantage Eligibility Dates

Fixed issues in 2.9 LTSR CU6

September 6, 2025

HDX RealTime Optimization Pack 2.9 Cumulative Update 6 (CU6) contains all fixes that were included in HDX RealTime Optimization Pack 2.9, Cumulative Update 1, Cumulative Update 2, Cumulative Update 3, Cumulative Update 4, Cumulative Update 5, plus the following fixes:

- In some scenarios, audio calls between optimized Skype for Business users and Microsoft Teams users cannot be recorded. [LOP-4577]
- When using some HTTP proxy configurations, the RealTime Optimization Pack might work in fallback mode only. [LOP-4579]

Cumulative Update 5 (CU5)

September 6, 2025

Release date: April 8, 2022

© 1997–2026 Citrix Systems, Inc. All rights reserved.

About this release

CU5 adds one new fix compared to the 2.9 CU4 release of HDX RealTime Optimization Pack.

HDX RealTime Optimization Pack 2.9 LTSR Cumulative Update 4 (CU4)

HDX RealTime Optimization Pack 2.9 LTSR Cumulative Update 3 (CU3)

HDX RealTime Optimization Pack 2.9 LTSR Cumulative Update 2 (CU2)

HDX RealTime Optimization Pack 2.9 LTSR Cumulative Update 1 (CU1)

HDX RealTime Optimization Pack 2.9 LTSR (initial release)

Known issues in this release

Deprecation and removals

Citrix Product Subscription Advantage Eligibility Dates

Fixed issues in 2.9 LTSR CU5

September 6, 2025

HDX RealTime Optimization Pack 2.9 Cumulative Update 5 (CU5) contains all fixes that were included in HDX RealTime Optimization Pack 2.9, Cumulative Update 1, Cumulative Update 2, Cumulative Update 3, Cumulative Update 4, plus the following fix:

- The HDX™ RealTime Optimization Pack About window now shows the correct Windows version when running on Windows 11. [LOP-4524]

Cumulative Update 4 (CU4)

September 6, 2025

Release date: July 9, 2021

About this release

CU4 adds one fix compared to the 2.9 CU3 release of HDX RealTime Optimization Pack.

HDX RealTime Optimization Pack 2.9 LTSR Cumulative Update 3 (CU3)

HDX RealTime Optimization Pack 2.9 LTSR Cumulative Update 2 (CU2)

© 1997–2026 Citrix Systems, Inc. All rights reserved.

HDX RealTime Optimization Pack 2.9 LTSR Cumulative Update 1 (CU1)

HDX RealTime Optimization Pack 2.9 LTSR (initial release)

Known issues in this release

Deprecation and removals

Citrix Product Subscription Advantage Eligibility Dates

Fixed issues in 2.9 LTSR CU4

September 6, 2025

HDX RealTime Optimization Pack 2.9 Cumulative Update 4 (CU4) contains all fixes that were included in HDX RealTime Optimization Pack 2.9, Cumulative Update 1, Cumulative Update 2, Cumulative Update 3, plus the following fix:

- With this fix, HDX RealTime Optimization Pack 2.9 CU4 now supports FIPS-compliant Skype for Business environments. [LOP-4469]

Cumulative Update 3 (CU3)

September 6, 2025

Release date: February 12, 2021

About this release

CU3 adds four new fixes compared to the 2.9 CU2 release of HDX RealTime Optimization Pack.

HDX RealTime Optimization Pack 2.9 LTSR Cumulative Update 2 (CU2)

HDX RealTime Optimization Pack 2.9 LTSR Cumulative Update 1 (CU1)

HDX RealTime Optimization Pack 2.9 LTSR (initial release)

Known issues in this release

Deprecation and removals

Citrix Product Subscription Advantage Eligibility Dates

© 1997–2026 Citrix Systems, Inc. All rights reserved.

Fixed issues in 2.9 LTSR CU3

September 6, 2025

HDX RealTime Optimization Pack 2.9 Cumulative Update 3 (CU3) contains all fixes that were included in HDX RealTime Optimization Pack 2.9, Cumulative Update 1, Cumulative Update 2, plus the following, new fixes:

- When Mac users minimize a video window and then restore it, the window might disappear. [LOP-2811]
- Some USB cameras such as Polycom EagleEye Cube might cause a black frame in participant videos during peer to peer calls. [LOP-4243]
- Video rendering is supported on macOS Big Sur. [LOP-4422]
- After upgrading to the HDX RealTime Optimization Pack to Version 2.9.1, a black screen might appear when you dial into a Polycom RealPresence Collaboration Server. [CVADHELP-15552]

Cumulative Update 2 (CU2)

September 6, 2025

Release date: December 01, 2020

About this release

CU2 adds two new fixes compared to the 2.9 CU1 release of HDX RealTime Optimization Pack.

HDX RealTime Optimization Pack 2.9 LTSR Cumulative Update 1 (CU1)

HDX RealTime Optimization Pack 2.9 LTSR (initial release)

Known issues in this release

Deprecation and removals

Citrix Product Subscription Advantage Eligibility Dates

Fixed issues in 2.9 LTSR CU2

September 6, 2025

© 1997–2026 Citrix Systems, Inc. All rights reserved.

HDX RealTime Optimization Pack 2.9 Cumulative Update 2 (CU2) contains all fixes that were included in HDX RealTime Optimization Pack 2.9, Cumulative Update 1, plus the following, new fixes:

- With HDX™ RealTime Optimization Pack installed, attempts to establish an audio call using Skype for Business Edge Pool composed of multiple servers might fail. The issue occurs when one or more servers are not working. [CVADHELP-14607]
- When a peer-to-peer or conference call is established on an endpoint that uses HDX RealTime Connector 2.9, high jitter values and long round-trip times might be reported. [CVADHELP-15439]

Cumulative Update 1 (CU1)

September 6, 2025

Release date: May 7, 2020

About this release

HDX RealTime Optimization Pack 1912 LTSR Cumulative Update 1 (CU1) includes four new fixes.

HDX RealTime Optimization Pack 2.9 LTSR (initial release)

Known issues in this release

Deprecation and removals

Citrix Product Subscription Advantage Eligibility Dates

Fixed issues in 1912 LTSR CU1

September 6, 2025

- During a Skype for Business call, a robotic voice can be heard. The issue occurs when the HDX™ RealTime Optimization Pack is in fallback mode. [CVADHELP-13782]
- With this enhancement, you can prioritize camera encoding over GPU encoding. However, we do not recommend changing the default behavior. This enhancement is helpful in scenarios where a video must capture a greater level of details in a large room (for example, a conference room). [CVADHELP-14042]

© 1997–2026 Citrix Systems, Inc. All rights reserved.

- If a user holds a call when there is already a call on hold, the Music on hold either becomes distorted or plays at a faster speed. [LOP-3842]
- When you click Citrix HDX RealTime Media Engine in the Mac System Preferences, this error message might appear:

  Could not load Citrix HDX RealTime Media Engine preferences pane.

  [LOP-4191]

About this release

September 6, 2025

What's new

What's new in 2.9 LTSR

Improved user audio experience during conversation pauses:

When speakers pause during calls, the call participants hear comfort noise instead of silence. This enhancement avoids call participants wondering if the call is still connected.

Quality of Experience statistics:

Added more video parameters in the Quality of Experience statistics reports.

TraceRoute information for Quality of Experience reports:

The HDX RealTime Optimization Pack now collects routing information from calls. This information is useful when troubleshooting call performance issues. TraceRoute is not supported on Android. For more information about the Microsoft TraceRoute table, see TraceRoute table.

Fixed issues in 2.9 LTSR

September 6, 2025

The following issues have been fixed since version 2.8:

- When using multiple monitors, Skype for Business video calls running on Microsoft Windows 10 Version 1607 might render correctly on one monitor, but render a black screen or freeze on any other different monitor. [CVADHELP-13153]

© 1997–2026 Citrix Systems, Inc. All rights reserved.

- With HDX™ RealTime Connector installed, the ringer volume adjustment slider on Skype for Business for incoming calls does not take effect. For more information, see Knowledge Center article CTX267066. [CVADHELP-13344]
- With HDX RealTime Optimization Pack installed, audio calls between user1, who is a mobile user and user2, who is using Skype for Business installed on a published desktop, might disconnect. [CVADHELP-13678]
- With HDX RealTime Media Engine installed on macOS, a Skype for Business video call might show the video outside the Skype for Business window. The issue occurs when the published desktop is displayed in full screen mode on more than one monitor. [CVADHELP-13850]
- After you unplug a USB HID audio device running on macOS, the HDX RealTime Optimization Pack might reconnect unexpectedly. [LOP-888]
- With HDX RealTime Optimization Pack installed, Skype for Business might reject incoming calls from third-party applications such as Turret Proxy Open Line Dealing Server. [LOP-3925]
- RealTime Optimization Pack video appears in the letter box format. When the video is sent to native Skype for Business, native Skype for Business might crop and zoom the video to fit it into a square format. [LOP-2431]
- When a user (user2) on a Mac tries to use the RealTime Media Engine that another user (user1) installed, user2 might not receive an optimized experience. [LOP-2203]
- On some Chromebooks, the HDX RealTime Media Engine cannot establish calls with external users. [LOP-4018]

Known issues

> **Important:**
>
> Editing the registry incorrectly can cause serious problems that might require you to reinstall your operating system. Citrix® cannot guarantee that problems resulting from the incorrect use of Registry Editor can be solved. Use Registry Editor at your own risk. Be sure to back up the registry before you edit it.

General known issues

- If macOS X user changes the dock UI setting while Skype for Business is running, current and future calls don't display local or remote video. [LOP-1062]

  Workaround: Restart Skype for Business.

© 1997–2026 Citrix Systems, Inc. All rights reserved.

- When fallback mode is set to audio only, and the users in fallback mode participate in a video conference, they might see their own states in the participant list incorrectly displayed as **On Hold**. Other users are not affected. [LOP-1175]
- If a caller plugs in another human interface device (HID) during an active call, the call might drop. [LOP-1377]
- After the called party using an IP phone accepts a video call as audio-only, the caller cannot add a third participant to turn the call into a conference call.

  Workaround: The called party can add the third participant, after which all conferencing capabilities are available. [LOP-1504]
- The Optimization Pack is not compatible with the Polycom RealPresence Trio 8800. If you use the Skype for Business UI to accept a call, but use the Polycom RealPresence Trio 88 to hang up the call, the call doesn't end. [LOP-1983]
- Video capture issues sometimes occur when using a Logitech 9000 camera and the Citrix Ready® workspace hub. The **Preview** option might not work, call initialization might be slow, calls placed on hold might not resume, or the camera fails during a call [LOP-2339]
- When starting an audio point-to-point call and starting video at the same time, a **Cannot start video** message appears. [LOP-2356]

  Workaround: Do not start an audio point-to-point call and video at the same time.
- In point-to-point calls using a UVC camera, or in a Meet Now, before a user starts transmitting video, the aspect ratio of the picture-in-picture video window might not display in the correct aspect ratio. On point-to-point calls, the video you're sending might be wider and include more content than what is visible in the picture-in-picture window. In Meet Now, after each participant becomes an active speaker, the aspect ratio changes to 16:9. [LOP-2462]
- When a call is started on a Chrome OS device using a webcam microphone and a Polycom CX100 speaker or a built-in speakerphone/microphone, echo cancellation might not work. The remote participant in the call might hear their own voice at a low volume. Background sounds from the originator can also be heard. [LOP-3082]
- While changing resolution in a peer-to-peer or conference video call, the RealTime Media Engine on the Chrome OS might display a black frame for approximately 1 to 2 seconds. [LOP-3207]
- Calls might be blocked and the Connecting state appears in the tooltip while the RealTime Connector initializes. The blocked call leaves and open Skype window indicating that the call ended. The hang up button is unresponsive and you must use the X in the upper right corner to close the window. [LOP-3634]
- In a call between two Windows users, if both speak at the same time, and one of them is doing software-based acoustic echo cancellation, one user might hear some echo. [LOP-3740]

© 1997–2026 Citrix Systems, Inc. All rights reserved.

- Optimization Pack, does not appear in the Citrix Receiver™ for Windows Support Info generated from the Advanced Preferences menu. [608200, LOP-650]
- If Citrix Receiver for Mac 12.0 is on the endpoint device and a Human Interface Device (HID) is removed after Skype for Business and RealTime Optimization Pack are running, the RealTime Media Engine might crash. [612448]

  Workaround: Upgrade your version of Citrix Receiver for Mac to a more recent version.

HDX RealTime Media Engine known issues

- In Seamless mode, the following issues exist for the Full Screen video:
  - Full Screen video appears in the letterbox format with the Linux version of the RealTime Media Engine in Seamless mode. [13564]
  - The Full Screen Control hides behind other apps in a Seamless session in XenApp® Seamless mode. [10731]
- During installation or uninstallation, it is possible to encounter certain error conditions where the error message string is not localized. [14530, 93]
- Sometimes, when attempting to install HDX RealTime Media Engine on Windows, a message indicates that there is no available disk space. However, limited space does exist on the Z:/ drive of the terminal. This issue is a known issue for Microsoft installers and applies to Citrix Receiver as well.

Third party issues

- You might encounter errors with Skype (not Skype for Business) on iOS 9.2. [LOP-1313]

  Workaround: Upgrade to iOS 9.3.2
- Because of changes to the privacy policies in Microsoft Windows, audio and video calls might fail in fallback mode on VDAs. For more information, see Windows 10 camera, microphone, and privacy. [LOP-3460]

  Workaround: Enable access to the microphone.
- User1 might hear "underwater"(partially canceled echo) noise during the echo cancellation process. This issue can occur when User2's microphone is sensitive to the input audio. [LOP-3742]
- Linux might mistake some audio devices containing buttons for a Human Interface Device (mouse) instead of an audio device. When a user presses a button, Linux interprets it as a

© 1997–2026 Citrix Systems, Inc. All rights reserved.

mouse button press and prevents the regular mouse from working correctly until the call ends. [521088]

Workaround: Configure the Linux X11 graphics subsystem to ignore the devices as sources of the user input. Create or change a **.conf** file in the **/usr/share/X11/xorg.conf.d** directory with the following sections (for example, Jabra, Plantronics, or Sennheiser).

Section "InputClass"

Identifier "Jabra"

MatchVendor "Jabra"

Option "Ignore"*"True"

EndSection

Section "InputClass"

Identifier "Plantronics"

MatchVendor "Plantronics"

Option "Ignore"*"true"

EndSection

Section "InputClass"

Identifier "Sennheiser"

MatchVendor "Sennheiser|1395"

Option "Ignore"*"true"

EndSection

- The microphone volume level of some Linux clients is low.

  Workaround: Increase the microphone level using the Linux system volume control.

- There might be a problem dialing dual-tone multi-frequency (DTMF) digits using a Jabra Pro 9465 device on a Linux client. [547234]

  Workaround: Use the RealTime Optimization Pack interface to dial the DTMF digits.

- Citrix RealTime Optimization Pack does not support the Plantronics Clarity **P340** audio device but does support the **P340-M** (Skype for Business qualified device). [597048, 603639,608218]

- The microphone volume level of the Polycom CX100 speakerphone is low even at its full level when used with the HP Thin Pro client. [604219]

  Workaround: Change the registry key that comes with the HP Thin Pro by using the regeditor program on the client. You can run the program as root or from the Registry Editor component of the Profile editor.

© 1997–2026 Citrix Systems, Inc. All rights reserved.

These settings limit the range of available settings on the input volume slider. The RecordScale default value of 100 limits it to 25% of its maximum value for the microphone jack. Setting RecordScale to the maximum value of 400 allows the slider access to the entire scale.

root>Audio>

Value name: RecordScale

Value data: 400 (Default is 100)

Value name: RecordScaleAuto -

Value data: 0 (Default is 1- sets to 100)

1 Sets the RecordScale value based on the hardware type.

2 Does not set the RecordScale value based on the hardware type.

For playback, these controls work the same way as the input volume controls.

root>

Value name: OutputScale

Value data: 400 (Default is 100)

Value name: OutputScaleAuto

Value data: 0 (Default is 1)

Known issues in HDX™ RealTime Optimization Pack

September 6, 2025

Known issues in 2.9 LTSR CU7

No new known issues have been observed in Cumulative Update 7.

Known issues in 2.9 LTSR CU6

No new known issues have been observed in Cumulative Update 6.

Known issues in 2.9 LTSR CU5

No new known issues have been observed in Cumulative Update 5.

© 1997–2026 Citrix Systems, Inc. All rights reserved.

Known issues in 2.9 LTSR CU4

- When using macOS Monterey version 12.x, the **About** option in the HDX RealTime Optimization Pack displays the OS name as Big Sur. [LOP-4518]
- When the DPI settings in the virtual desktop are manually changed, the video overlay for optimized video calls might be out of alignment. [LOP-4519]

Known issues in 2.9 LTSR CU3

- When using macOS Big Sur version 11.2, the **About** option in the HDX RealTime Optimization Pack might display the OS version as 10.16.0. [LOP-4466]
- In a multi-monitor environment, when using Skype for Business in seamless mode to receive a video call, the video overlay might be displaced from the Skype for Business window. The issue occurs with the macOS running Big Sur. [LOP-4475]

Known issues in 2.9 LTSR CU2

No new known issues have been observed in Cumulative Update 2.

Known issues in 2.9 LTSR CU1

No new known issues have been observed in Cumulative Update 1.

Known issues in 2.9 LTSR

> **Important:**
>
> Editing the registry incorrectly can cause serious problems that might require you to reinstall your operating system. Citrix® cannot guarantee that problems resulting from the incorrect use of Registry Editor can be solved. Use Registry Editor at your own risk. Be sure to back up the registry before you edit it.

General known issues

- If macOS X user changes the dock UI setting while Skype for Business is running, current and future calls don't display local or remote video. [LOP-1062]

  Workaround: Restart Skype for Business.

© 1997–2026 Citrix Systems, Inc. All rights reserved.

- When fallback mode is set to audio only, and the users in fallback mode participate in a video conference, they might see their own states in the participant list incorrectly displayed as **On Hold**. Other users are not affected. [LOP-1175]
- If a caller plugs in another human interface device (HID) during an active call, the call might drop. [LOP-1377]
- After the called party using an IP phone accepts a video call as audio-only, the caller cannot add a third participant to turn the call into a conference call.

  Workaround: The called party can add the third participant, after which all conferencing capabilities are available. [LOP-1504]
- The Optimization Pack is not compatible with the Polycom RealPresence Trio 8800. If you use the Skype for Business UI to accept a call, but use the Polycom RealPresence Trio 88 to hang up the call, the call doesn't end. [LOP-1983]
- Video capture issues sometimes occur when using a Logitech 9000 camera and the Citrix Ready® workspace hub. The **Preview** option might not work, call initialization might be slow, calls placed on hold might not resume, or the camera fails during a call [LOP-2339]
- When starting an audio point-to-point call and starting video at the same time, a **Cannot start video** message appears. [LOP-2356]

  Workaround: Do not start an audio point-to-point call and video at the same time.
- In point-to-point calls using a UVC camera, or in a Meet Now, before a user starts transmitting video, the aspect ratio of the picture-in-picture video window might not display in the correct aspect ratio. On point-to-point calls, the video you're sending might be wider and include more content than what is visible in the picture-in-picture window. In Meet Now, after each participant becomes an active speaker, the aspect ratio changes to 16:9. [LOP-2462]
- When a call is started on a Chrome OS device using a webcam microphone and a Polycom CX100 speaker or a built-in speakerphone/microphone, echo cancellation might not work. The remote participant in the call might hear their own voice at a low volume. Background sounds from the originator can also be heard. [LOP-3082]
- While changing resolution in a peer-to-peer or conference video call, the RealTime Media Engine on the Chrome OS might display a black frame for approximately 1 to 2 seconds. [LOP-3207]
- Calls might be blocked and the Connecting state appears in the tooltip while the RealTime Connector initializes. The blocked call leaves and open Skype window indicating that the call ended. The hang up button is unresponsive and you must use the X in the upper right corner to close the window. [LOP-3634]
- In a call between two Windows users, if both speak at the same time, and one of them is doing software-based acoustic echo cancellation, one user might hear some echo. [LOP-3740]

© 1997–2026 Citrix Systems, Inc. All rights reserved.

- Optimization Pack, does not appear in the Citrix Receiver™ for Windows Support Info generated from the Advanced Preferences menu. [608200, LOP-650]
- If Citrix Receiver for Mac 12.0 is on the endpoint device and a Human Interface Device (HID) is removed after Skype for Business and RealTime Optimization Pack are running, the RealTime Media Engine might crash. [612448]

  Workaround: Upgrade your version of Citrix Receiver for Mac to a more recent version.

HDX RealTime Media Engine known issues

- In Seamless mode, the following issues exist for the Full Screen video:
  - Full Screen video appears in the letterbox format with the Linux version of the RealTime Media Engine in Seamless mode. [13564]
  - The Full Screen Control hides behind other apps in a Seamless session in XenApp® Seamless mode. [10731]
- During installation or uninstallation, it is possible to encounter certain error conditions where the error message string is not localized. [14530, 93]
- Sometimes, when attempting to install HDX RealTime Media Engine on Windows, a message indicates that there is no available disk space. However, limited space does exist on the Z:/ drive of the terminal. This issue is a known issue for Microsoft installers and applies to Citrix Receiver as well.

Third party issues

- You might encounter errors with Skype (not Skype for Business) on iOS 9.2. [LOP-1313]

  Workaround: Upgrade to iOS 9.3.2
- Because of changes to the privacy policies in Microsoft Windows, audio and video calls might fail in fallback mode on VDAs. For more information, see Windows 10 camera, microphone, and privacy. [LOP-3460]

  Workaround: Enable access to the microphone.
- User1 might hear "underwater"(partially canceled echo) noise during the echo cancellation process. This issue can occur when User2's microphone is sensitive to the input audio. [LOP-3742]
- Linux might mistake some audio devices containing buttons for a Human Interface Device (mouse) instead of an audio device. When a user presses a button, Linux interprets it as a

© 1997–2026 Citrix Systems, Inc. All rights reserved.

mouse button press and prevents the regular mouse from working correctly until the call ends. [521088]

Workaround: Configure the Linux X11 graphics subsystem to ignore the devices as sources of the user input. Create or change a **.conf** file in the **/usr/share/X11/xorg.conf.d** directory with the following sections (for example, Jabra, Plantronics, or Sennheiser).

Section "InputClass"

Identifier "Jabra"

MatchVendor "Jabra"

Option "Ignore"*"True"

EndSection

Section "InputClass"

Identifier "Plantronics"

MatchVendor "Plantronics"

Option "Ignore"*"true"

EndSection

Section "InputClass"

Identifier "Sennheiser"

MatchVendor "Sennheiser|1395"

Option "Ignore"*"true"

EndSection

- The microphone volume level of some Linux clients is low.

  Workaround: Increase the microphone level using the Linux system volume control.

- There might be a problem dialing dual-tone multi-frequency (DTMF) digits using a Jabra Pro 9465 device on a Linux client. [547234]

  Workaround: Use the RealTime Optimization Pack interface to dial the DTMF digits.

- Citrix RealTime Optimization Pack does not support the Plantronics Clarity **P340** audio device but does support the **P340-M** (Skype for Business qualified device). [597048, 603639,608218]

- The microphone volume level of the Polycom CX100 speakerphone is low even at its full level when used with the HP Thin Pro client. [604219]

  Workaround: Change the registry key that comes with the HP Thin Pro by using the regeditor program on the client. You can run the program as root or from the Registry Editor component of the Profile editor.

© 1997–2026 Citrix Systems, Inc. All rights reserved.

These settings limit the range of available settings on the input volume slider. The RecordScale default value of 100 limits it to 25% of its maximum value for the microphone jack. Setting RecordScale to the maximum value of 400 allows the slider access to the entire scale.

root>Audio>

Value name: RecordScale

Value data: 400 (Default is 100)

Value name: RecordScaleAuto -

Value data: 0 (Default is 1- sets to 100)

1 Sets the RecordScale value based on the hardware type.

2 Does not set the RecordScale value based on the hardware type.

For playback, these controls work the same way as the input volume controls.

root>

Value name: OutputScale

Value data: 400 (Default is 100)

Value name: OutputScaleAuto

Value data: 0 (Default is 1)

System requirements

September 6, 2025

Environments

The RealTime Optimization Pack supports the following Microsoft Skype for Business configurations:

- **Server** (back end)
  - Microsoft Skype for Business server 2019
  - Microsoft Skype for Business server 2015
  - Microsoft Skype for Business Online (Microsoft Office 365 hosted Skype for Business Server)
  - Microsoft Lync 2013 server - Updated to at least the February 2015 Cumulative Update. Citrix® and Microsoft recommend updating to the most recent Cumulative update.

© 1997–2026 Citrix Systems, Inc. All rights reserved.

- **Client** (the Skype for Business application installed on the Citrix Virtual Apps and Desktops™ server). To benefit from the latest fixes and security updates, we recommend that you install the latest version of the Skype for Business client.

  - Microsoft Skype for Business for Office 365
  - Microsoft Skype for Business 2019
  - Microsoft Skype for Business 2016 Click-to-Run minimum version 1611 Build 7571.2072.
  - Microsoft Skype for Business 2016 MSI minimum version 16.0.4483.1000.
  - Microsoft Skype for Business 2015 stand-alone installer (which can be installed on top of Microsoft Office 2016) minimum version 15.0.4875.1001.

  For information about configuring the Skype for Business 2015 client in native UI mode, see https://docs.microsoft.com/en-us/lyncserver/configure-the-skype-for-business-client-in-lync-server-2013?redirectedfrom=MSDN.

The Optimization Pack is compatible with all currently supported versions of Citrix Virtual Apps and Desktops up to version 2407. For information about the lifecycle of Citrix Virtual Apps and Desktops, see Citrix Product Matrix.

For more information about Citrix Virtual Apps and Desktops editions that include Skype for Business optimization, see Citrix Virtual Apps and Desktops features.

The Optimization Pack is compatible with all currently supported versions of Citrix Workspace app for Windows up to version 2405.10, Mac up to version 2405, and Linux up to version 2405. For information about the lifecycle of Citrix Workspace app, see Lifecycle Milestones for Citrix Workspace app.

> **Note:**
>
> If you are using Workspace app for Windows 2402 or later, you must use the HDX RealTime Optimization Pack 2.9 CU7.
>
> To support FIPS-compliant Skype for Business environments, use the HDX RealTime Optimization Pack 2.9 CU4 or later. However, note that HDX RealTime Optimization Pack isn't FIPS certified.

RealTime Connector

Install the RealTime Connector on Citrix Virtual Desktops™ virtual desktops or on servers in your Citrix Virtual Apps site.

- Supported operating systems:

  - Desktops:

    - Microsoft Windows 11
    - Microsoft Windows 10

© 1997–2026 Citrix Systems, Inc. All rights reserved.

    - Servers:
        - Microsoft Windows Server 2019
        - Microsoft Windows Server 2016
        - Microsoft Windows Server 2012
- Memory: 1 GB RAM (maximum in fallback mode), 120 MB paging file
- Disk space: minimum 100 MB available
- Network interface: full-duplex Ethernet TCP/IP local network connection
- Software:
    - DirectX 9 (minimum)
    - Microsoft .NET 4.0 SP1
    - Microsoft Skype for Business 2015 client - minimum Product Update 15.0.4833.1001 (32-bit or 64-bit)
    - Microsoft Skype for Business 2016 client - minimum Product Update 16.0.7341.2032 (32-bit or 64-bit)

Installation prerequisite

1. Right-click the Microsoft Skype for Business shortcut on your desktop or in the list of programs in the Start menu and choose **Properties**.
2. In the Properties dialog box, select the **Compatibility** tab.
3. On the Compatibility tab, ensure the **Run this program as an administrator** check box is cleared.

RealTime Media Engine

You install the RealTime Media Engine on the client device.

See citrixready.citrix.com for HDX Premium client devices verified for Optimization Pack.

Hardware guidelines when the H.264 hardware acceleration is unavailable:

CPU:

Results vary based on the processor architecture.

- For CIF (standard) video, 1.4 GHz
- For VGA, a minimum of 2 GHz.
- For 720p HD (high definition) video, 2.8 GHz dual core
- Support for the SSE3 instruction set

Disk space and memory:

- 50 MB disk space

© 1997–2026 Citrix Systems, Inc. All rights reserved.

- 1 GB total RAM

Supported operating systems:

You can install the RealTime Media Engine on devices running any of the following operating systems:

- Microsoft Windows Desktop:
  - Microsoft Windows 11
  - Microsoft Windows 10
  - Microsoft Windows 10 IoT Enterprise
  - Microsoft Windows 8.1
- Linux 32-bit
  - Ubuntu 16.04
  - Red Hat 7
  - CentOS 7
  - HP ThinPro 7.x and later
- Linux 64-bit
  - Ubuntu 18.04 and 16.04
  - Red Hat 7
  - CentOS 7
  - HP ThinPro 7.x and later
  - IGEL

> **Note:**
>
> GNU Binultils must be installed on the Linux endpoint. This can be accomplished by running `sudo apt-get install binutils`. Please refer to GNU documentation for more details.

- macOS 13.x, 12.x, 11.x

> **Note:**
>
> macOS 11.x (Big Sur) support requires RTOP 2.9 CU3 or later.
> macOS 12.x (Monterey) support requires RTOP 2.9 CU4 or later.
> macOS 13.x (Ventura) requires RTOP 2.9 CU5 or later.
> The Apple Silicon platform is supported on macOS Big Sur, Monterey, and Ventura only by using Rosetta 2.

- Unicon™ - Contact Unicon for the version of eLux that they recommend for use by the RealTime Media Engine.

© 1997–2026 Citrix Systems, Inc. All rights reserved.

> **Important:**
>
> Editing the registry incorrectly can cause serious problems that might require you to reinstall your operating system. Citrix cannot guarantee that problems resulting from the incorrect use of the Registry Editor can be solved. Use the Registry Editor at your own risk. Be sure to back up the registry before you edit it.
>
> The Microsoft Windows 10 Anniversary Update released in August 2016 introduces a new feature called Windows Camera Frame Server. This feature might cause issues including disabling hardware encoding in webcams.
>
> To avoid these issues, install Microsoft updates KB3176938 (Windows 10 CU released on August 31, 2016) and KB3194496 (Windows 10 CU September 29, 2016) for RealTime Media Engine on Windows 10. If you still see performance issues after installing the updates, make these registry changes:
>
> HKEY_LOCAL_MACHINE\SOFTWARE\Microsoft\Windows Media Foundation\Platform
> EnableFrameServerMode=dword:00000000
>
> HKEY_LOCAL_MACHINE\SOFTWARE\Wow6432Node\Microsoft\Windows Media Foundation\Platform
> EnableFrameServerMode=dword:00000000

Requirements for audio and video calling:

- The RealTime Media Engine can support video calls in high-definition (HD) video. If the camera, host device, bandwidth setting, and remote endpoint support high-definition specifications, the RealTime Media Engine measures the speed of the user device. It then encodes HD video.
- Camera:
  - Most USB webcams are supported.
  - Minimum resolution: 320 x 240
  - Color space: 1420 or YUY2
  - Frame rate of at least 10 fps, 24 fps for the HD video
  - Windows UVC driver
- Audio I/O must be DirectSound compatible and capable of 16-bit mono or stereo sound at 16,000, 32,000, or 44,100 samples per second. We recommend a USB headset.

Requirements for Skype for Business compatible audio devices:

The RealTime Connector supports Skype for Business-compatible USB headsets, speaker phones, and phones. For full information about supported devices, see USB audio and video devices.

© 1997–2026 Citrix Systems, Inc. All rights reserved.

Third-party video drivers and the Optimization Pack

Windows USB video class (UVC) drivers for web cameras have been included in Microsoft Windows operating systems for many years. Microsoft Windows operating systems on some thin client terminals might not include those drivers. If you install a web camera on a terminal device, the installation program might report that it doesn't have the required files.

We recommend that you use the standard Windows device drivers for webcams. Vendor-supplied drivers can sometimes cause crashes and Blue Screen events on certain platforms (especially 64-bit Windows).

Technical overview

September 13, 2025

> **Warning**
>
> Editing the registry incorrectly can cause serious problems that may require you to reinstall your operating system. Citrix® cannot guarantee that problems resulting from the incorrect use of the Registry Editor can be solved. Use the Registry Editor at your own risk. Be sure to back up the registry before you edit it.

The RealTime Optimization Pack offers clear, crisp high-definition audio and video calls with Microsoft Skype for Business in an optimized architecture. Users can seamlessly participate in audio-video or audio-only calls to and from other:

- Skype for Business users
- Microsoft Lync users
- Standards-based video desktop and conference room multipoint control unit (MCU) systems
- Standalone IP phones compatible with Skype for Business

All audio and video processing is offloaded from the Server to the end-user device or terminal. Doing so optimizes the quality of the call with minimal impact on the server scalability.

Key features

The Optimization Pack provides Citrix Virtual Apps and Desktops™ customers the following key features:

- Optimizes Skype for Business audio and video calls on Windows, Mac, Chrome OS, and Linux devices by redirecting media processing to the user device. Our partner, Dell, supports Wyse ThinOS.

© 1997–2026 Citrix Systems, Inc. All rights reserved.

- Co-developed with Microsoft, who developed and maintains the native Skype for Business client user interface. The advantage is that there is no UI hooking by the Citrix software. Users see the familiar native Skype for Business interface.
- Compatible with Skype for Business Server 2019, Skype for Business Server 2015, Lync Server 2013, and Skype for Business Online (Office 365).
- Enables call initiation from the Skype for Business dialpad, dial-in bar, contacts list, Conversation window, and Outlook or other Office application.
- Supports all Skype for Business calling and conferencing scenarios. That includes audio and video calling, hold, transfer, call forking and redirection, active speaker conferencing, and simulcast video.
- Compatible with Skype for Business protocols for networking, media encryption (SRTP/AES), firewall traversal (STUN/TURN/ICE), and bandwidth management.
- Forwards device location information to the Skype for Business client, to support Emergency Services (for example, E911) and Location Based Routing (LBR).
- Call Admission Control on the Skype for Business server improves the media quality in enterprise networks. It does so by tracking media bandwidth usage and denying calls that would overload the network by using too much bandwidth.
- Call Admission Control works in all network configurations supported by Microsoft. That is, multiple regions, sites, links, routes, policies, and so forth. It works for both on-premises and remote endpoints. On remote endpoints, as with native Skype for Business clients running remotely, only internal portions of the media path are subject to the Call Admission Control bandwidth policies.
- Support for Skype for Business calls when the Edge Server is not reachable. In these cases, the Optimization Pack goes into fallback mode and audio and video processing occurs on the server.
- Supports these audio codecs: SILK, G.771, G.722, G.722.1, G.722c, and RT-Audio. We don't support the G.722 Stereo and the Siren low bandwidth codec. This support enables voice communications over a wide range of network environments, including the public internet and mobile networks.
- Field-proven compatibility with a broad range of audio devices, conferencing bridges, gateways, and server and network-based recording solutions. For recommended products, see Citrix Ready Marketplace.
- Simulcast video transmission (multiple concurrent video streams) to optimize the video quality on conference calls and Skype Meetings.
- Uses hardware H.264 encoding on Windows devices that support AMD Video Coding Engine (VCE) or Intel Quick Sync, subject to compatibility. We recommend using the latest driver versions.

© 1997–2026 Citrix Systems, Inc. All rights reserved.

- Supports RT-Video, H.264 UC, H.264 Scalable Video Coding (SVC), and H.264 Advanced Video Coding (AVC). Video call rates range from 128 kb/s to 2048 kb/s. All video is encoded at up to 30 fps (depending on the webcam used) and transmitted over RTP/UDP (preferred) or TCP.
- Uses the hardware acceleration capabilities of USB Video Class (UVC) 1.1/1.5 H.264 hardware-encoding webcams with Windows and Linux devices (not including the Citrix Ready workspace hub).
- The Optimization Pack takes advantage of the H.264 hardware encoding functionality of the Logitech C930e and C925e cameras on conference calls that use simulcast video. The hardware-encoding capability of these cameras is available when used with Windows and Linux devices.
- H.264 hardware encoding and decoding on Linux supporting the AMD Video Coding Engine (VCE). The Hardware decoding on Linux is disabled by default. The current AMD driver OMX decoder in
  Linux, decodes video streams with high latency (up to 500 ms). You can enable the hardware decoding
  using the registry:

  HKEY_CURRENT_USER\Software\Citrix\HDXRTConnector\MediaEngine\

  Name: DisableLinuxAMDH264HardwareDecoding

  Type: DWORD

  Data:

  0 –enabled

  1 or no value –disable
- Supports a wide range of video resolutions, from 320x180 to 1920x1080, at up to 30 frames per second.
- Supports most webcams, including built-in webcams on Windows devices and built-in web-cams (FaceTime cameras) on Mac devices.
- Improves audio and video quality over lossy connections by enabling forward error correction (FEC).
- In fallback mode, generic HDX™ RealTime (the Optimized-for-Speech codec) handles Echo Cancellation. Therefore, the RealTime Optimization Pack Echo Cancellation feature is automatically disabled and this option is grayed out under Settings in the Optimization Pack notification area icon.
- When enabled by administrators, all audio and video calls made with the Optimization Pack inform the Skype for Business server infrastructure about the bandwidth usage. The calls follow all bandwidth policy constraints, including:

© 1997–2026 Citrix Systems, Inc. All rights reserved.

    - Limits audio and video bandwidth as required by the policies.
    - Downgrades video calls to audio only if the bandwidth for video is not available. A generic message displays.
    - Reroutes the call through the internet when the bandwidth on the corporate network is not available. A generic message displays.
    - Reroutes the call to voicemail when the bandwidth is not available anywhere. A generic message displays.
    - Reports the Call Admission Control bandwidth constraints to the Quality-of-Experience monitoring database.

- Supports Quality of Service (QoS) by observing the audio and video port ranges configured on the Skype for Business server (see https://docs.microsoft.com/en-us/lyncserver/lync-server-2013-configuring-port-ranges-for-your-microsoft-lync-clients?redirectedfrom=MSDN and https://docs.microsoft.com/en-us/powershell/module/skype/Set-CsConferencingConfiguration?redirectedfrom=MSDN&view=skype-ps).
- Supports Differentiated Services Code Point (DSCP) marking for media packets. For Windows, distribute the QoS policies to the endpoints. For Linux, Chrome OS, and macOS X, there are Optimization Pack registry settings that must be applied in the user profile on the server. For more information, see Citrix Knowledge Base article https://support.citrix.com/article/CTX215691.
- Optimizes the Quality-of-Experience (QoE) through various techniques, including:
    - Adaptive jitter buffer
    - Packet loss concealment
    - Call rate adaptation
- The Quality of Experience reports specifies the RealTime Optimization Pack mode (optimized or non-optimized).The endpoint operating system entry is added with a prefix, which specifies the optimized versus non-optimized state of the call.
    - Optimized –`HDXRTME: <OSversion>`

      Example in a report: `HDXRTME: Windows 10 Pro,Windows 10 Pro,No Service Pack WOW64`
    - Unoptimized –`HDXRTC: <OSversion>`

      Example in a report: `HDXRTC: Windows 7 Enterprise,Windows 7,SP1 WOW64`
- Supports Intel-based Chromebook devices that can run Android apps (ARC++), used with the minimum version of the Citrix Workspace app 1809 for Android. Both the Workspace app and

© 1997–2026 Citrix Systems, Inc. All rights reserved.

the RealTime Media Engine are released through the Play Store. For a list of supported Chromebooks and Chromeboxes (only listed as a stable channel), see Chrome OS Systems Supporting Android Apps. For Chromebook limitations, see Limitations.



- If there is no RealTime Media Engine present on the user device, provides fallback to server-side media processing (Generic RealTime).
- The RealTime Media Engine uses the Citrix Workspace™ app for Windows auto-update capability and policy controls.
- Single download, single install bundle of Citrix Workspace app for Windows and the RealTime Media Engine. The single install bundle is ideal for first-time users on unmanaged devices.

Limitations

When you deliver the Skype for Business client in a virtualized environment, there are a few feature differences. For more information, see Citrix Knowledge Base article https://support.citrix.com/article/CTX200279.

- On Linux terminals, the RealTime Media Engine installer disables multimedia redirection in the Citrix Workspace app for Linux. Doing so avoids the Optimization Pack and the Citrix Workspace app for Linux/Unix getting into a conflict when accessing video devices.
  HDXRTME
  Users can enable multimedia redirection in the module.ini file. Enabling multimedia redirection allows the RealTime Media Engine and Citrix Workspace app for Linux to co-exist. Support for coexistence is included in the Citrix Workspace app for Linux 1810 or later with any version of the RealTime Media Engine.

© 1997–2026 Citrix Systems, Inc. All rights reserved.

- If you have more than one camera connected to an endpoint and you want to use the second camera for videos or video previews, open **Tools** > **Video Device Settings** and select the camera and click **OK**.
- The RealTime Media Engine doesn't support these features on Chromebooks:
  - External USB webcams.
  - Camera encoding USB Video Class (UVC) 1.1.
  - Device enumeration and switching from Skype for Business settings. Only default devices are used.
  - G722.1C, RTAudio, and RTVideo codecs.
  - Human interface devices, auto gain control, and Call Admission Control.
  - In fallback mode, webcam and audio devices are not available because of limitations in the Citrix Workspace app for Android.
  - Simulcast support in multiparty video conference calls.
- When using an HP T730 thin client with Windows 10 and a Logitech C925e web cam to make a video call, and then resizing the window to high definition resolution, a 30 fps video stream is sent as a 24 fps video stream.
- If Skype for Business is running locally on your device, right-click the Skype for Business icon in the system tray and Exit the application. Interaction issues are likely when running Skype for Business locally while it is also running in the data center as a hosted application.
- Microsoft does not support the Lync and Skype for Business basic client with the Optimization Pack. Workaround: Use the full version of Skype for Business.
- The Optimization Pack does not support direct media connections to and from public switched telephone network (PSTN) gateways. There is an optional feature of Skype for Business, known as media bypass. For more information, see https://docs.microsoft.com/en-us/skypeforbusiness/plan-your-deployment/enterprise-voice-solution/media-bypass?redirectedfrom=MSDN and Citrix Knowledge Center articles https://support.citrix.com/article/CTX200279. If Skype for Business server administrators enable media bypass, PSTN calls involving Optimization Pack users automatically and transparently route media connections through the Mediation Server. This feature limitation doesn't cause any user impact. Take this limitation in to account when planning network capacity.
- When the Skype for Business client is delivered as a published application rather than as part of a full Windows desktop, desktop sharing is not supported. If you use desktop sharing, the server desktop is shared rather that the local desktop. Application sharing can be used to share other hosted applications during a Skype for Business call. The virtualized Skype for Business client cannot share applications running locally on the user device.
- Client-side recording is not supported. Citrix recommends evaluating third-party server/network-based recording solutions.

© 1997–2026 Citrix Systems, Inc. All rights reserved.

- Gallery view is not supported in multiparty calls. Active speaker view is used in Skype for Business multiparty calls using the Optimization Pack.
- Panoramic webcams that deliver a 360-degree view of the meeting room are not supported.
- We do not support optimized delivery in a double-hop Citrix Virtual Apps and Desktops-Citrix Workspace app scenario. Optimized delivery is redirection of media processing to the user device.
- Web proxy limitations:
    - HTTP proxy authentication is not supported. Configure proxies using allow lists to allow unauthenticated access to target Skype for Business servers (for example, Office 365 servers for cloud-based deployments).
    - Web Proxy Auto-Discovery Protocol (WPAD) and dynamic proxy detection are supported by using Windows endpoints only. Configure Linux and Mac endpoints using a static HTTP proxy address.
- On Linux terminals, the RealTime Media Engine installer disables multimedia redirection in the Citrix Workspace app for Linux for **64-bit applications**. Thus, avoiding the Optimization Pack and the Citrix Workspace app for Linux/Unix getting into a conflict when accessing video devices. However, other unified communications applications cannot support Generic USB redirection when accessed on a Linux terminal that has the RealTime Media Engine installed.

  The RealTime Optimization Pack 2.8 with Citrix Workspace app for Linux 18.10 and above, supports multimedia redirection for all **32-bit applications**.
- The date and time strings on USB telephone devices that have display capabilities are not properly localized.
- The Plantronics Clarity P340 audio device is not supported.
- The Optimization Pack disables the use of hardware acceleration for the Logitech C920 camera on Windows. Support is provided for the C920 as a nonencoding camera. To enable hardware compression for the Logitech C920 on Windows, do the following:

1. Replace the Logitech driver with the stock Microsoft driver.
2. Create a registry setting that enables hardware acceleration with the C920.

   On 32-bit and 64-bit Windows:

   HKEY_CURRENT_USER\Software\Citrix\HDXRTConnector\MediaEngine

   Name: EnableC920Compression

   Type: DWORD

   Data: 1 (enables the hardware acceleration) and 0 or missing (disables hardware acceleration)

© 1997–2026 Citrix Systems, Inc. All rights reserved.

Note: Logitech does not recommend the C920 for business use cases. We recommend the more modern Logitech cameras (C930E, C925E), which are compatible with standard Microsoft drivers.

Considerations and recommendations

- The inclusion of hardware acceleration for video increases the amount of data being sent if you deploy devices that support hardware acceleration for video. Ensure that you have sufficient bandwidth available among all endpoints or update your Skype for Business server media bandwidth policies accordingly.
- In Fallback mode, video quality might degrade to the point of failure on virtual desktops that have a single virtual CPU. Fallback mode is when the RealTime Media Engine is not available on the endpoint and audio and video processing occurs on the server.

  We recommend that you change the VDA configuration to have a minimum of two CPUs for users who might need Fallback mode. For more information, see Citrix Knowledge Base articles https://support.citrix.com/article/CTX133024 and https://support.citrix.com/article/CTX132764.
- When attempting to make high-definition video calls from a home office, consider your user network bandwidth and ISP routing policies. If you observe pixelation of the video or problems with lip sync, adjust the Maximum Packet Size (MTU) on the NIC properties. Specify a lower value such as 900 to avoid situations where ISPs perform traffic shaping based on packet size.
- Various scenarios might not work properly when some conversation participants run 1.x versions of the Optimization Pack. For example, combining content sharing and audio and video conferencing.

  We recommend participants using older versions of the Optimization Pack upgrade to this version of the Optimization Pack.
- Users might see an error when calling or joining a session when they have multiple sessions running.

  We recommend running only one session.
- Old versions of graphics card drivers might impact the stability of the Optimization Pack. H.264 hardware encoding and decoding on Intel and AMD chipsets works most reliably when using the latest versions of graphics drivers. The drivers are available from the endpoint or chipset vendors. If an unsupported driver version is detected, the Optimization Pack might automatically disable these features.

Add the RealTime Optimization Pack virtual channel to the virtual channel allow list

If using the virtual channel allow list feature in Citrix Virtual Apps and Desktops, add the RealTime Optimization Pack virtual channel to the allow list. Otherwise, the Optimization Pack cannot optimize

© 1997–2026 Citrix Systems, Inc. All rights reserved.

Skype for Business.

These items are required to add the virtual channel to the allow list:

- Virtual channel name: `CTXRMEP`
- Skype for Business executable path: `C:\Program Files\Microsoft Office\root\Office16\lync.exe`

> **Important:**
>
> The path of the executable might be different in your environment. The difference is based on the version of Skype for Business installed or if you're using a custom installation path. Make sure to check for the correct path in your environment. For details about adding a virtual channel to the allow list, see Virtual channel allow list policy settings.

Bandwidth guidelines for virtualized Skype for Business

In general, the bandwidth consumption when using the HDX RealTime Optimization Pack is consistent with non-virtualized Skype for Business. The HDX RealTime Media Engine supports the audio and video codecs that Skype for Business commonly uses, and obeys the bandwidth restrictions configured on the Skype for Business server. If the network has been provisioned for Skype for Business traffic, the Optimization Pack might not require more traffic engineering. For new or growing deployments, network bandwidth, and Quality of Service provisioning, follow the Microsoft guidelines for voice and video. These guidelines apply when client endpoints are the sources and destinations of real-time media traffic.

Audio and video traffic in Optimized mode flows out-of-band from ICA. The only extra traffic generated by the Optimization Pack is from the:

- Low bandwidth ICA virtual channel control interactions between the RealTime Connector on the VDA server and the RealTime Media Engine on the client endpoint.
- Compressed logging data sent from the RealTime Media Engine to the RealTime Connector. This additional traffic amounts to under 25 Kbps of upstream ICA bandwidth and about 5 Kbps of ICA downstream bandwidth.

This table summarizes the different types, sources, and destinations of network traffic with the HDX RealTime Optimization Pack:

Network traffic type	Optimized mode	Fallback mode
Real-time audio and video streams sources and destinations	Client endpoints	VDA servers

© 1997–2026 Citrix Systems, Inc. All rights reserved.

Network traffic type	Optimized mode	Fallback mode
Real-time A/V bandwidth usage	Follows Microsoft policies and usage requirements	Follows Microsoft policies and usage requirements
HDX audio and webcam bandwidth usage	Not used in optimized mode	Used in fallback mode; HDX audio and webcam bandwidth guidelines apply
Extra ICA usage by the Optimization Pack	5 kbps downstream, 25 kbps upstream	None
Content sharing sources, destinations, and bandwidth usage	Content sharing network streams always originate and end on VDA servers	Content sharing network streams always originate and end on VDA servers

For the Microsoft bandwidth guidelines for Skype for Business, see https://docs.microsoft.com/en-us/skypeforbusiness/?redirectedfrom=MSDN.

H.264 is the main video codec used by Skype for Business and the RealTime Optimization Pack. H.264 supports a wide range of video resolution and target bandwidth values. The Skype for Business bandwidth usage policies always constrain the bandwidth usage for video. In specific call scenarios, the actual bandwidth usage might be even lower. The usage depends on the current bandwidth availability and client endpoint capabilities. For the HD video resolution in peer-to-peer calls, we suggest 1 Mbps or more and for the VGA resolution, 400 Kbps or more. Conference calls might require more bandwidth to support HD video (we recommend 2 Mbps).

The Optimization Pack also supports the legacy RT Video codec for interoperability scenarios with legacy versions of the Microsoft unified communication software. The bandwidth usage with RT Video is similar to H.264, but video resolutions using RT Video are limited to VGA or less.

Audio codec usage depends on the call scenario. Because the Microsoft Skype for Business Audio-Video Conferencing Server doesn't support SILK or RtAudio, these codecs are used only on point-to-point calls. Conference calls use G.722. SILK offers comparable audio quality to G.722 while consuming less bandwidth.

In addition to the codecs used by the native Skype for Business client, the HDX RealTime Media Engine offers a super-wideband codec, G.722.1C. This codec offers superior audio quality when both parties on a point-to-point call are using the Optimization Pack. This codec consumes 48 Kbps of network bandwidth. The Optimization Pack 2.4 doesn't support the ultra-low bandwidth Siren codec, which is the predecessor to G.722.1. The Optimization Pack does support G.722.1 for interoperability with third-party systems, although Skype for Business does not support G.722.1.

The Optimization Pack automatically selects the best audio codec that all participants on the call support and fits within the available bandwidth. Typically:

© 1997–2026 Citrix Systems, Inc. All rights reserved.

- A call between two Optimization Pack users uses the super-wideband G.722.1C codec at 48 Kbps and has good audio fidelity.
- A conference call uses the wideband G.722 codec at 64 Kbps. That is, 159.6 Kbps with IP header, UDP, RTP, SRTP, and Forward Error Correction.
- A call between an Optimization Pack user and a native Skype for Business client user uses the wideband SILK codec at 36 Kbps. That is, 100 Kbps with IP header, UDP, RTP, SRTP, and Forward Error Correction.
- When an Optimization Pack user makes or receives a public switched telephone network (PSTN) call, one of the narrowband codecs is used: G.711 at 64 Kbps or narrowband RtAudio at 11.8 Kbps.

Citrix Customer Experience Improvement Program (CEIP)

The Citrix CEIP usage and analytics program is a voluntary data collection program designed to improve your product experience. After installing this version of the Optimization Pack, you can participate in the programs anonymously.

You can change your participation in the program at any time. For more information, see https://www.citrix.com/community/cx/ceip.html.

CEIP is voluntary. When you opt-in, the CEIP services running in Citrix products gather anonymous configuration and usage data from your deployment, and automatically sends the data to Citrix. CEIP collects these classes of data:

- Configuration data.
- All system and account identifiers are anonymized before being uploaded.

How your privacy is protected:

- Citrix does not collect any personally identifiable data.
- Random identifier is created at install time, which tracks data transfers over time.
- Citrix does not record information such as IP addresses, server names, or domain names.
- All data is sent using HTTPS directly to Citrix servers - no third-party data hosting services.
- All data is secured on Citrix servers and is accessible only by authorized individuals.

CEIP opt-out policies and the user interface (UI)

The RealTime Connector defines the following registry entries controlling CEIP metrics:

HKEY_LOCAL_MACHINE\Software\Citrix\HDXRTConnector\
DWORD DisableCEIPMetrics

© 1997–2026 Citrix Systems, Inc. All rights reserved.

When absent or set to **0**, the user controls the CEIP metrics collection. If present and set to nonzero, metrics collection is disabled and the opt-out UI is hidden.

On 64-bit Windows, the RealTime Connector checks both HKEY_LOCAL_MACHINE\Software\Citrix and HKEY_LOCAL_MACHINE\Software\Wow6432Node\Citrix for this value.

HKEY_CURRENT_USER\Software\Citrix\
DWORD OptOutOfCEIPMetrics

When absent or set to **0**, the user did not opt out of the CEIP metrics collection. If present and set to nonzero, the user opted out of the CEIP metrics collection.

In the **Settings** dialog screen, the RealTime Connector adds a check box.

Send anonymous usage metrics to Citrix

The check box is hidden if the administrator disables CEIP metrics collection by setting **DisableCEIPMetrics**. Otherwise, it appears. The check box is checked if the **OptOutOfCEIPMetrics** registry value is absent or set to zero. The check box is clear if **OptOutOfCEIPMetrics** is present and set to nonzero. When the user changes the state of the check box, the RealTime Connector updates the registry setting and enables or disables CEIP metrics submission accordingly.

Download

September 6, 2025

Citrix® recommends that you install this version of the RealTime Optimization Pack.

- Upgrading from version 1.8 to this version:
  You must install the RealTime Connector as a new installation - uninstall 1.8 version of the RealTime Connector before installing this version. You can install or upgrade RealTime Media Engine.
- Upgrading from an earlier 2.*x* version to this version:
  You do not need to uninstall the earlier version and can upgrade the RealTime Connector and the RealTime Media Engine to this version.

Download this version by logging on using your My Account credentials and going to the following download page:

HDX RealTime Optimization Pack 2.9.700 for Microsoft Skype® for Business

After downloading, unzip the package and place the following installation files on an available network drive or a local device, such as a USB flash drive.

© 1997–2026 Citrix Systems, Inc. All rights reserved.

For Windows:

The package includes the RealTime Connector for the Citrix Virtual Apps or Citrix Virtual Desktops™ server, and the Windows version of the RealTime Media Engine for user devices.

- HDX_RealTime_Media_Engine_2.9_for_Windows.msi - client running the Citrix Workspace app for Windows
- HDX_RealTime_Connector_2.9_for_Skype_for_Business - server-side (and virtual desktop) - choose the 32-bit or 64-bit version to match your operating system. The Skype for Business client bitness doesn't matter.

For more information, see Deploy the RealTime Media Engine to Windows devices.

For Linux:

- HDX_RealTime_Media_Engine_2.9_for_Linux.zip
- HDX_RealTime_Media_Engine_2.9_for_Linux_x64.zip

For more information, see Deploy the RealTime Media Engine to Linux terminal devices.

For Mac:

- HDX_RealTime_Media_Engine_2.9_for_OSX.dmg

For more information, see Deploy the RealTime Media Engine to Mac devices.

Now you can make the Optimization Pack available to your users. Before installing the RealTime Media Engine or the RealTime Connector, be sure that your environment meets the minimum software hardware and software requirements.

Chrome OS:

To use the RealTime Media Engine for Android on Chrome OS, download the Citrix Workspace app for Android 20.2.0 or later from Google Play at:

https://play.google.com/store/apps/details?id=com.citrix.Receiver

Install the RealTime Optimization Pack

September 6, 2025

If you have not downloaded the installation files for the Optimization Pack, see How to download the RealTime Optimization Pack.

The order of the Optimization Pack new installation (not an upgrade) is important:

1. If Citrix Workspace™ app is running, close it.

© 1997–2026 Citrix Systems, Inc. All rights reserved.

2. Install the RealTime Media Engine on your user devices.
3. Start Citrix Virtual Desktops.
4. Install the RealTime Connector on your Citrix Virtual Desktops virtual desktops and Citrix Virtual Apps™ servers.

> **Important:**
>
> - Configure any antivirus or security software on Citrix Virtual Apps and Desktops™ to allow the Optimization Pack and Skype for Business client to run without any unnecessary performance degradation.
> - RealTime Connector versions 2.x cannot be used with the RealTime Media Engine version 1.8. You can use any combination of the RealTime Connector versions 2.3 or later and this version of the RealTime Media Engine.

Deploy the RealTime Media Engine to your users

You install RealTime Media Engine on client devices. The media engine provides the local media processing of audio and video calls. It also provides the peer-to-peer communication with other callers using Microsoft Skype for Business.

Your method for deploying RealTime Media Engine to a user device depends on the operating system of the device.

Download the RealTime Media Engine files from HDX RealTime Media Engine for Microsoft Skype® for Business.

> **Important:**
>
> If you plan to deploy the RealTime Media Engine for use with the Chrome OS, download and install the Citrix Workspace app 1904 for Android or later from Google Play at: https://play.google.com/store/apps/details?id=com.citrix.Receiver.

Deploy the RealTime Media Engine to Windows devices

RealTime Connector requires the installation of the RealTime Media Engine on the host terminal device. This topic describes the steps for deploying the RealTime Media Engine to thin client terminals running Windows operating systems.

Prerequisites:

Before deploying the RealTime Media Engine to a Windows client device:

- Install the Citrix Workspace app for Windows on the user device. Ensure that it can connect through Citrix Virtual Desktops or to Citrix Virtual Apps.

© 1997–2026 Citrix Systems, Inc. All rights reserved.

- If the device is using RAM disk, increase it to its maximum size.

To maximize RAM disk space:

1. Log on to the device.
    - If there is a red ball (labeled FBWF) in the Windows notification area, skip to the next step. The write filter is disabled.
    - If there is a green ball in the Windows notification area, click the green ball and choose DISABLE so that the ball turns red.
2. Restart your device and log on.
3. Open **Control Panel > Ram disk**.
4. In the Ram disk Configuration dialog box, increase the size of the RAM disk to the maximum amount.
5. Restart your device.

Deploy the RealTime Media Engine:

Ensure system requirements and prerequisites are met. You can then deploy the media engine to your users by making the installer available from a flash drive, webpage, or network drive.

1. Log on to the terminal or computer.
2. Run **HDX_RealTime_Media_Engine_2.9_for_Windows.msi**. After accepting the terms of use, the installer runs silently.
3. Install a web camera on the device, using the built-in Windows drivers.

Deploy the RealTime Media Engine to Mac devices

The RealTime Connector requires the installation of the RealTime Media Engine on the client device. This section describes how to install the RealTime Media Engine on supported Mac OS devices.

Before you run the RealTime Media Engine installation script, ensure that you have Citrix Workspace app 1808 for Mac or Citrix Receiver for Mac 12.0 or later installed on the device.

The installation package for the RealTime Media Engine includes the following components:

- Install HDXRealTimeMediaEngine.pkg
- Uninstall the HDX™ RealTime Media Engine

1. Log on to the Mac as an administrator.
2. Double-click the downloaded file, **HDX_RealTime_Media_Engine_2.9_for_OSX.dmg**. The disk image mounts.
3. To start the installation, double-click **HDX_RealTime_Media_Engine_2.9_for_OSX.dmg**.
4. Follow the instructions provided by the script.

© 1997–2026 Citrix Systems, Inc. All rights reserved.

5. After the installation completes, confirm the installation: In the Mac System Preferences under **Other**, select **Citrix HDX RealTime Media Engine** to view the installed version.
6. If you have Microsoft Skype for Business running as a published application, restart it (Microsoft Skype for Business).

Deploy RealTime Media Engine to Linux terminal devices

The Optimization Pack requires the installation of the RealTime Media Engine on the terminal device. This section describes how to install the RealTime Media Engine for all supported platforms.

Prerequisites:

Before deploying the RealTime Media Engine to a Linux terminal device, install the Citrix Workspace app for Linux. Go to the download page for Citrix Workspace app for Linux. Follow the instructions on that page for the system you are installing on.

- RealTime Media Engine 64-bit requires Citrix Workspace app 1808 for Linux or Citrix Receiver for Linux 13.2 x64 or greater
- RealTime Media Engine 32-bit requires Citrix Workspace app 1808 for Linux or Citrix Receiver for Linux 13.0 x86 or greater

To run the RealTime Media Engine installation script:

The installation package for the RealTime Media Engine includes the following components. Use this package for Ubuntu, and Red Hat. The software detects the type of Linux and installs the appropriate package.

Components for the 32-bit package:

- EULA.rtf
- HDXRTME_install.sh
- /i386 subdirectory containing the Debian and RPM packages:
    - citrix-hdx-realtime-media-engine-2.9.0-XXX_i386.deb
    - citrix-hdx-realtime-media-engine-2.9.0-XXX_i386.rpm

Components for the 64-bit package:

- EULA.rtf
- HDXRTME_install.sh
- /x86_64 subdirectory containing the Debian and RPM packages:
    - citrix-hdx-realtime-media-engine-2.9.0-XXX_amd64.deb
    - citrix-hdx-realtime-media-engine-2.9.0-XXX_x86_64.rpm

1. Place the entire installation package in the directory from which you are running commands.

© 1997–2026 Citrix Systems, Inc. All rights reserved.

2. Use **chmod** to make the **./HDXRTME_install.sh** executable.
3. At the prompt of the directory in which the software resides, type **./HDXRTME_install.sh**, and then follow the instructions provided by the script.
4. If you have Microsoft Skype for Business running as a published application, restart it (Microsoft Skype for Business).

Upgrade the existing RealTime Media Engine installation:

Use the same **./HDXRTME_install.sh** script for upgrading the previous version of the RealTime Media Engine package.

Install the RealTime Connector on your servers and VDAs

The RealTime Connector enables optimized audio and video conferences. To make the RealTime Connector available to your users in Citrix Virtual Apps and Desktops environments, you install the RealTime Connector on your Citrix Virtual Apps servers and Citrix Virtual Desktops virtual desktops.

> **Important:**
>
> Before deploying the RealTime Connector on your servers and VDAs, ensure that you have Skype for Business installed.

Install in to a Citrix Virtual Desktops environment

Install the RealTime Connector onto a Citrix Virtual Desktops virtual desktop you want to make available to your users. Before installation, ensure that Microsoft Skype for Business is not running on the Citrix Virtual Desktops virtual desktop.

> **Important:**
>
> Uninstall older versions of the RealTime Connector before installing this version.

Depending on your VDA/Server operating system, use the 32-bit or 64-bit version of the RealTime Connector.

To install the RealTime Connector:

1. Start a Citrix Virtual Desktops virtual desktop and log on as administrator.
2. On the virtual desktop, run the installation file HDX_RealTime_Connector_2.9_for_Skype_For_Business.msi
   or
   HDX_RealTime_Connector_2.9_for_Skype_For_Business_32.msi and follow the instructions.

© 1997–2026 Citrix Systems, Inc. All rights reserved.

Install into a Citrix Virtual Apps environment

Install the RealTime Connector on each server in a Citrix Virtual Apps site where you want to make RealTime Connector available. Before installation, ensure that the Microsoft Skype for Business is not running in any sessions on the servers.

> **Important:**
>
> Uninstall older versions of the RealTime Connector before installing this version.

1. Log on to a Citrix Virtual Apps server as administrator.
2. Run the installation file HDX_RealTime_Connector_2.9_for_Skype_For_Business.msi **or** HDX_RealTime_Connector_2.9_for_Skype_For_Business_32.msi and follow the instructions.

Exclude lync.exe from antivirus software scanning

Your antivirus and anti-malware software might cause sound issues like those in the list. To avoid those issues, exclude scanning of Lync.exe by updating your antivirus and anti-malware software. That includes network-offloaded antivirus scanners.

- A call arrives and the ring tone plays incorrectly and has interruptions at irregular intervals.
- Dual Tone Multiple Frequencies (DTMF) playback is erratic making it difficult to tell which digit was typed.
- Discontinuous (“stutter”) ringing and Ringback tones.

Disable the Optimization Pack

> **Warning:**
>
> Editing the registry incorrectly can cause serious problems that might require you to reinstall your operating system. Citrix cannot guarantee that problems resulting from the incorrect use of the Registry Editor can be solved. Use the Registry Editor at your own risk. Be sure to back up the registry before you edit it.

To disable and then reenable the Optimization Pack, do the following:

Back up and remove or rename the following registry keys (for example, VdiMediaProviderDisabled). When you restart Skype for Business, the Optimization Pack is disabled.

To reenable the Optimization Pack, restore or rename the key back to VdiMediaProvider.

For 64-bit Skype for Business or 32-bit Skype for Business on 32-bit Windows: HKEY_LOCAL_MACHINE\SOFTWARE\

For 32-bit Skype for Business on 64-bit Windows: HKEY_LOCAL_MACHINE\SOFTWARE\Wow6432Node\Microsoft\O

© 1997–2026 Citrix Systems, Inc. All rights reserved.

Upgrade

September 6, 2025

For access to this version of the RealTime Optimization Pack features, upgrade your Skype for Business 2015 to the June 2016 PU (15.0.4833.1001) or to a subsequent PU. Or update your Optimization Pack 1.x to this version.

Optimization Pack 2.x to this version

Optimization Pack supports a flexible upgrade from earlier 2.*x* Optimization Pack versions to this version. To upgrade from previous Optimization Pack 2.x versions to this version, be aware of the following considerations:

- To upgrade the Optimization Pack to this version, upgrade Skype for Business 2015 to minimum Product Update 15.0.4833.1001 or Skype for Business 2016 to minimum Product Update 16.0.7341.2032 (for Click-to-Run).
- You can upgrade the RealTime Connector from a previous 2.x to this version without immediately upgrading the RealTime Media Engine 2.x on the endpoints. Update the RealTime Media Engine eventually to receive all the new features and fixes to known issues. This information applies to major, minor, and patch releases.
- You can use any combination of RealTime Connector versions 2.3 or later and this version of RealTime Media Engine in optimized mode. (Optimized mode is media processing redirected to the user device.) In addition, you can update the RealTime Connector and RealTime Media Engine in any order. You can update the RealTime Media Engine on your devices before you update the RealTime Connector on the server.
- You can upgrade the RealTime Connector and Skype for Business independently:
    - Upgrade the previous RealTime Connector 2.x to this version, and then upgrade Skype for Business 2015 to at least June 2016 Product Update 15.0.4833.1001. For Skype for Business 2016, you must upgrade to minimum Product Update 16.0.7341.2032.

      OR
    - Upgrade Skype for Business 2015 to the June 2016 Product Update or subsequent Product Update. Then upgrade the RealTime Connector 2.0.x or 2.1 to this version. For Skype for Business 2016, you must upgrade to minimum Product Update 16.0.7341.2032.
- Upgrades to a patch release (for example, 2.x to 2.x.100) can be done in either order.

> **Important:**
>
> If you are upgrading from 1.x, you must upgrade both RealTime Connector and RealTime Media

© 1997–2026 Citrix Systems, Inc. All rights reserved.

> Engine to retain the optimized operation.

Upgrade requirement for Linux

If you are running the 32-bit Citrix Workspace™ app for Linux and 32-bit RealTime Media Engine on 64-bit systems, you can use the 32-bit RealTime Media Engine package to upgrade.

If you want a 64-bit RealTime Media Engine, first uninstall both 32-bit Citrix Workspace app for Linux and 32-bit RealTime Media Engine. Then install the 64-bit Citrix Workspace app for Linux 1808 or Citrix Receiver for Linux, version 13.2 or later and the 64-bit RealTime Media Engine

Optimization Pack 1.x to 2.x

During 2015, Citrix and Microsoft co-developed a new architecture for delivering Skype for Business in virtualized environments. This new architecture provides smooth upgrades from one 2.x release to the next. It does so by allowing customers to upgrade the RealTime Connector on the XenApp and XenDesktop servers before upgrading the RealTime Media Engine on all user devices. Upgrading from the original 1.x to 2.x is more challenging because 1.x versions of the RealTime Media Engine aren't compatible with the RealTime Connector 2.x. Therefore, during the time between upgrading the RealTime Connector and upgrading the RealTime Media Engine on user devices, optimized delivery of the Skype for Business client isn't possible.

For the smoothest possible upgrade, we recommend using Electronic Software Delivery mechanisms to update the RealTime Connector and the RealTime Media Engine on user devices. Execute the upgrades as close to simultaneously as possible. The RealTime Connector provides fallback controls to manage server load when some users require Skype for Business audio-video services while a major version mismatch exists between RealTime Connector and RealTime Media Engine. These controls enable you to:

- Configure whether to deny any audio-video service totally until the RealTime Media Engine is upgraded to 2.x
- Permit only audio
- Permit both audio and video

Server-side video processing has the greatest impact on the CPU usage and server scalability.

Microsoft Lync VDI plug-in migration to Optimization Pack

Citrix and Microsoft collaborated on a "version 2"architecture for delivering the Skype for Business client from Citrix Virtual Apps and Desktops. This collaboration culminated in both the RealTime Optimization Pack 2.0 release in December 2015 and a corresponding update to the Skype for Business

© 1997–2026 Citrix Systems, Inc. All rights reserved.

client. Previously, Microsoft promoted a "version 1"solution consisting of a Citrix Receiver for Windows plug-in called the VDI plug-in.

The Lync 2013 client version 15.0.4859.1002 (released in September 2016) includes an enhancement to support co-residency of the Lync VDI plug-in with the RealTime Media Engine 2.2. This enhancement assists migration. The migration procedure:

1. Apply all the latest updates for the Lync/Skype for Business client on the Citrix Virtual Desktops server. Apply all the updates for the Lync VDI plug-in on the users Windows devices. Migration support is available only with the latest updates for both components. Ensure that the client is running in Skype for Business UI mode. This version of the Optimization Pack supports only this mode.
2. Deploy this version of the RealTime Media Engine on the endpoints in parallel with the Lync VDI plug-in. At this point, the Lync VDI plug-in is still used for audio/video calls.
3. Deploy the RealTime Connector for Skype for Business on the Citrix Virtual Desktops server. At this point, the system switches to using the Optimization Pack for audio/video calls.
4. Uninstall the Lync VDI plug-in from the Windows devices.

Configure features

September 6, 2025

> **Warning:**
>
> Editing the registry incorrectly can cause serious problems that might require you to reinstall your operating system. Citrix® cannot guarantee that problems resulting from the incorrect use of Registry Editor can be solved. Use Registry Editor at your own risk. Be sure to back up the registry before you edit it.

RealTime Connector features

You can enable or disable fallback mode and the system notification balloons by changing registry settings in `HKEY_LOCAL_MACHINE\SOFTWARE\Citrix\HDXRTConnector`

Or

`HKEY_CURRENT_USER\SOFTWARE\Citrix\HDXRTConnector`.

Fallback mode:

Control fallback mode by changing the following registry setting:

Key: `HKEY_LOCAL_MACHINE\SOFTWARE\Citrix\HDXRTConnector`

© 1997–2026 Citrix Systems, Inc. All rights reserved.

Or

`HKEY_CURRENT_USER\SOFTWARE\Citrix\HDXRTConnector`

Name: `DisableFallback`

Value: DWORD

0 or missing value - fallback mode enabled

1 - fallback mode disabled

2 - video in the fallback mode disabled

Notification balloons:

Enable or disable the system notification balloons by changing the following registry setting:

Key: `HKEY_LOCAL_MACHINE\SOFTWARE\Citrix\HDXRTConnector`

Or

`HKEY_CURRENT_USER\SOFTWARE\Citrix\HDXRTConnector`

Name: `DisableStatusBalloons`

Value: DWORD

0 or missing value - all status balloons enabled

1 - Connected balloon disabled. Fall back and Disconnected balloons enabled.

2 - all status notification balloons disabled.

Disable or enable version mismatch warning:

Enable or disable the version mismatch warning by changing the following registry setting:

Key: `HKEY_LOCAL_MACHINE\SOFTWARE\Citrix\HDXRTConnector`

Or

`HKEY_CURRENT_USER\SOFTWARE\Citrix\HDXRTConnector`

Name: `DisableVersionWarning`

Value: DWORD

0 or missing value - Warning icon and text are enabled

1 - Warning icon and text are disabled in both the status notification icon and the **About** dialog.

Windows Management Instrumentation (WMI) support:

WMI support provides the connection, call, and device status for all Optimization Pack connections.

The following are the namespace and classes. There is an example PowerShell script at **C:\Program Files (x86)\Citrix\HDX RealTime Connector\wmirtc.ps1** for retrieving all object data.

© 1997–2026 Citrix Systems, Inc. All rights reserved.

Namespace:

`ROOT\Citrix\hdx\RTOptPack`

Classes:

`Citrix_HDXRTConnector`

`Citrix_HDXRTConnector_Call`

`Citrix_HDXRTConnector_Device`

WMI calls:

Run these calls from an account that has administrative privileges.

```
get-wmiobject -namespace root\citrix\hdx\RTOptPack -class Citrix_HDXRTConnecto

get-wmiobject -namespace root\citrix\hdx\RTOptPack -class Citrix_HDXRTConnecto

get-wmiobject -namespace root\citrix\hdx\RTOptPack -class Citrix_HDXRTConnecto
```

Or use this example PowerShell script:

Example PowerShell script at **C:\Program Files (x86)\Citrix\HDX RealTime Connector\wmirtc.ps1**:

Syntax:
wmirtc.ps1 [*Skype_for_Business_Login_name*]

- If no name is supplied, it returns objects for all classes for all users.
- If a name is supplied, it returns objects only for that user.

RealTime Connector and RealTime Media Engine features

Disable logging:

Logging is enabled by default. You can disable server-side and client-side logging by using these registry keys.

RealTime Connector logging:

Key: `HKEY_CURRENT_USER\SOFTWARE\Citrix\HDXRTConnector`

Name: `DisableFileLogging`

Value: DWORD

Data:

0 or no value - logging enabled

© 1997–2026 Citrix Systems, Inc. All rights reserved.

1 - logging disabled

RealTime Media Engine logging:

Key: `HKEY_CURRENT_USER\SOFTWARE\Citrix\HDXRTConnector\MediaEngine`

Name: `DisableFileLogging`

Value: DWORD

Data:

0 or missing value - logging enabled

1 - the RealTime Media Engine doesn't write the logs to files, but sends logs to the RealTime Connector.

RealTime Media Engine service logging:

Key:
`HKEY_USERS\.DEFAULT\SOFTWARE\Citrix\HDXRTConnector`

Name: `DisableFileLogging`

Value: DWORD

Data:

0 or no value - logging enabled

1 - logging disabled

Configure firewalls

September 6, 2025

When using the RealTime Optimization Pack, the RealTime Media Engine runs on the user device. The RealTime Media Engine performs signaling and media transmission. There is an easy way to understand which ports are used by the RealTime Media Engine for supporting external users. Equate running the RealTime Media Engine with running the Microsoft Skype for Business client locally on the user device. The difference is Citrix Virtual Apps and Desktops™ host the UI and business logic layers. Understanding that the media engine is running on the remote endpoint clarifies the port requirements.

External users outside of the corporate firewall connect to the Skype for Business Edge Server or Lync Edge Server. The Edge Server is a component of Skype for Business or Lync Server infrastructure. Install it on a dual-homed server in the DMZ having connections to both the internet and to the intranet. For more information, see https://support.citrix.com/article/CTX201116,https://docs.microsoft.com

© 1997–2026 Citrix Systems, Inc. All rights reserved.

/en-us/skypeforbusiness/plan-your-deployment/edge-server-deployments/edge-environmental-requirements?redirectedfrom=MSDN, and https://docs.microsoft.com/en-us/skypeforbusiness/plan-your-deployment/edge-server-deployments/scenarios?redirectedfrom=MSDN.

To find the Lync Edge Server, the RealTime Media Engine follows the same procedures as the Skype for Business client. See "How Skype for Business Clients Locate Services"at https://docs.microsoft.com/en-us/skypeforbusiness/plan-your-deployment/network-requirements/dns?redirectedfrom=MSDN.

Internal users inside the corporate firewall connect directly to the Lync Server that runs inside the firewall. They also communicate point-to-point among other Lync clients during calls. For internal firewalls, ensure that the proper ports are open to connect to the Lync Server and to transmit and receive media during calls. The port requirements are listed at: https://docs.microsoft.com/en-us/skypeforbusiness/plan-your-deployment/network-requirements/ports-and-protocols?redirectedfrom=MSDN.

Troubleshoot the RealTime Optimization Pack

September 6, 2025

For more information about technical support for Microsoft Skype for Business on Citrix Virtual Apps and Desktops, see the Citrix Knowledge Center article https://support.citrix.com/article/CTX132979.

> **Warning:**
>
> Editing the registry incorrectly can cause serious problems that might require you to reinstall your operating system. Citrix® cannot guarantee that problems resulting from the incorrect use of the Registry Editor can be solved. Use the Registry Editor at your own risk. Be sure to back up the registry before you edit it.

Add the RealTime Optimization Pack virtual channel to the virtual channel allow list

If using the virtual channel allow list feature, add the RealTime Optimization Pack virtual channel to the allow list. Otherwise, the Optimization Pack cannot optimize Skype for Business.

These items are required if you add the virtual channel to the allow list:

- **Virtual channel name:** CTXRMEP
- **Skype for Business executable path:** C:\Program Files\Microsoft Office\root\Office16\lync.exe

© 1997–2026 Citrix Systems, Inc. All rights reserved.

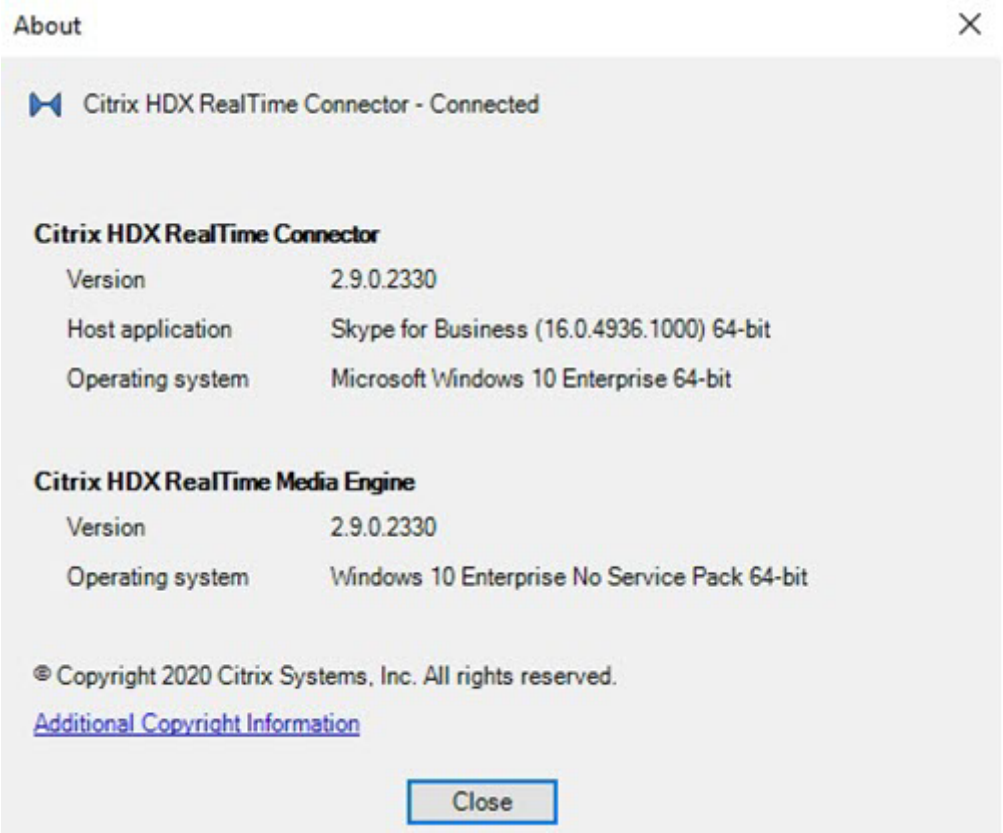
> **Note:**
>
> The executable path is based on your version of Skype for Business or if you're using a custom installation path. Make sure to check for the correct path in your environment.

For more information on adding a virtual channel to the allow list, see Virtual channel allow list policy settings.

Verify your installation and collect troubleshooting information

Open the **About** page and confirm the attributes:

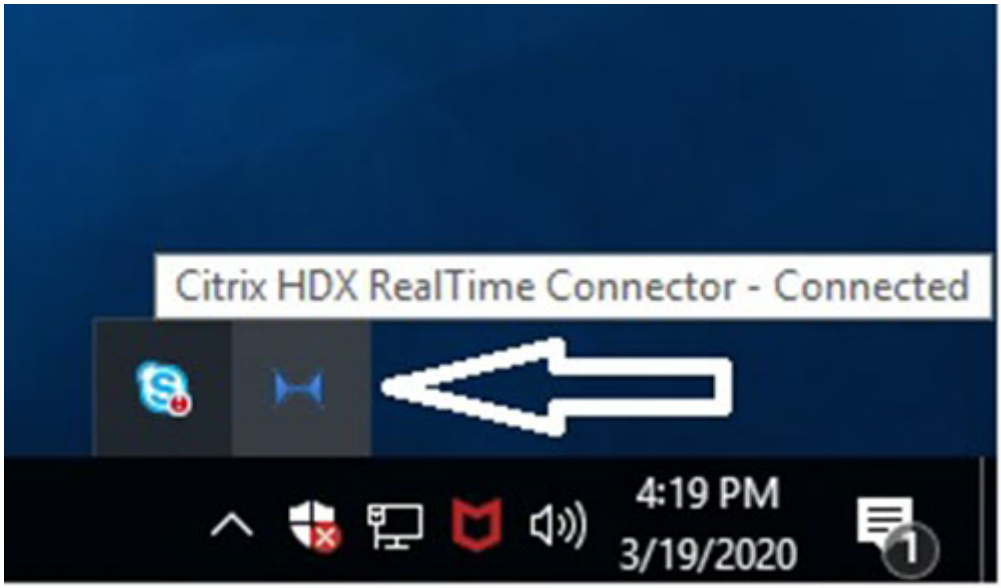
- Connection type
- RealTime Connector and RealTime Media Engine versions
- Skype for Business version
- Operating system



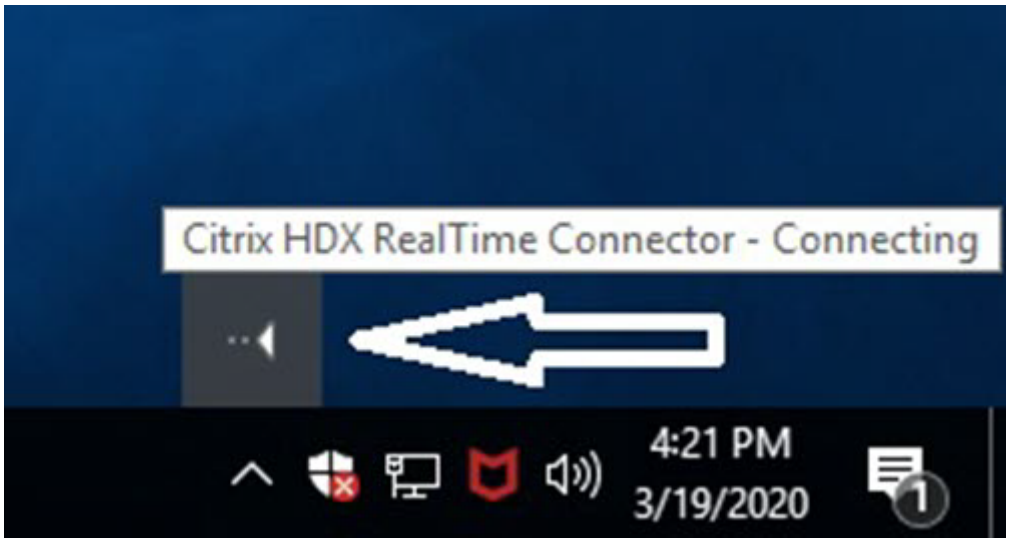
Open the **Optimization Pack** icon in the navigation area and confirm connection attributes. The following screenshots show the possible connection values.

Connected - There is a RealTime Connector connection over a virtual channel and the version of the remote RealTime Media Engine matches the version of mediaEngine.Net.

© 1997–2026 Citrix Systems, Inc. All rights reserved.

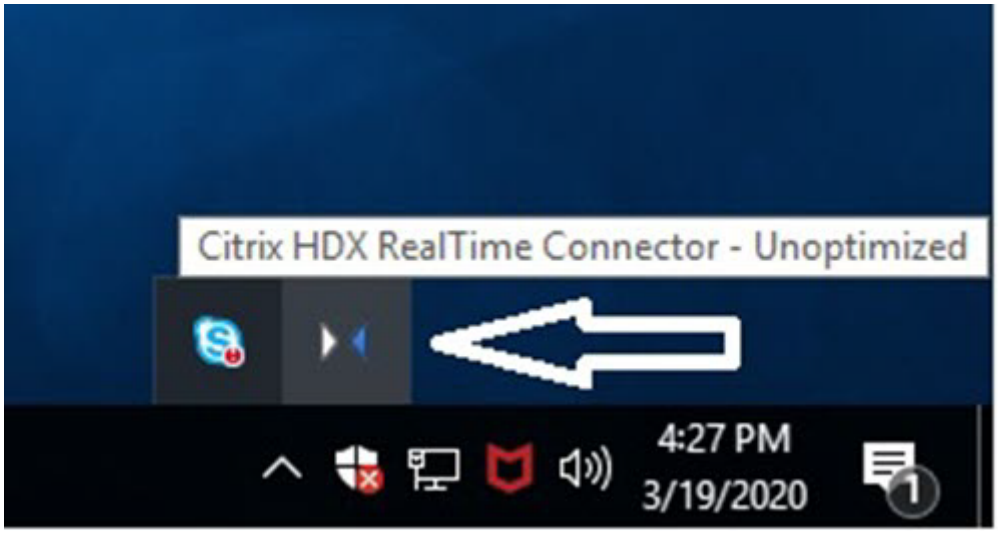


Connecting - MediaEngine.Net is trying to establish a RealTime Connector connection.

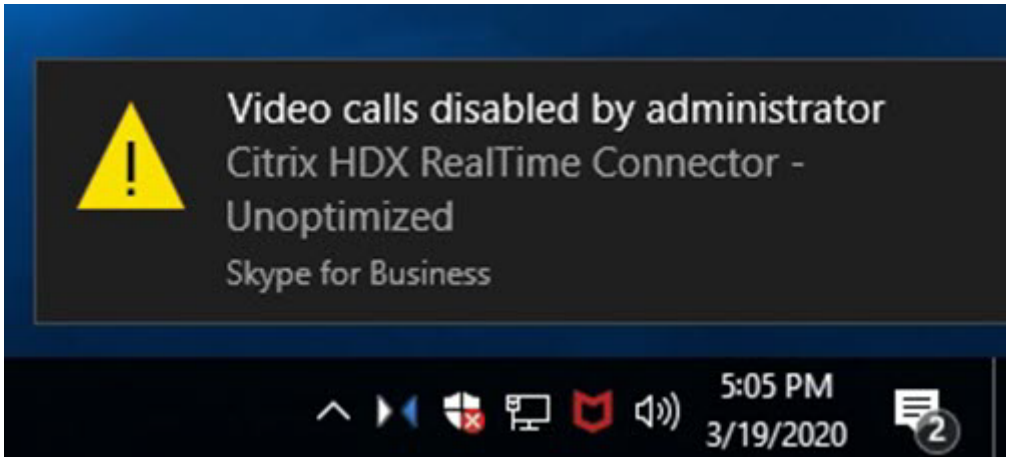


Fallback or unoptimized mode - There is a RealTime Connector connection to a local RealTime Media Engine process.

© 1997–2026 Citrix Systems, Inc. All rights reserved.

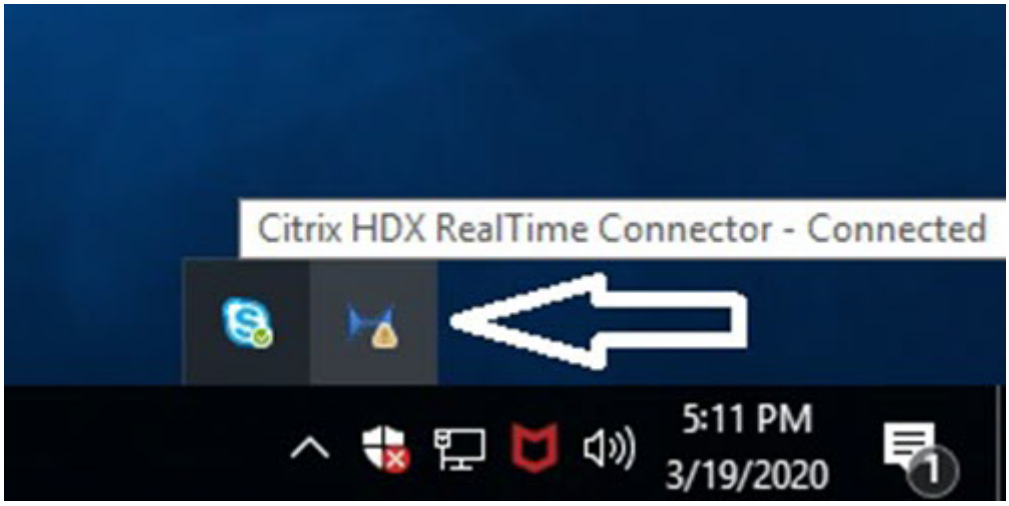


DisableFallback is set to audio only - When DisableFallback is set to audio only, the icon displays this popup. For more information about controlling fallback mode, see the Fallback mode information.

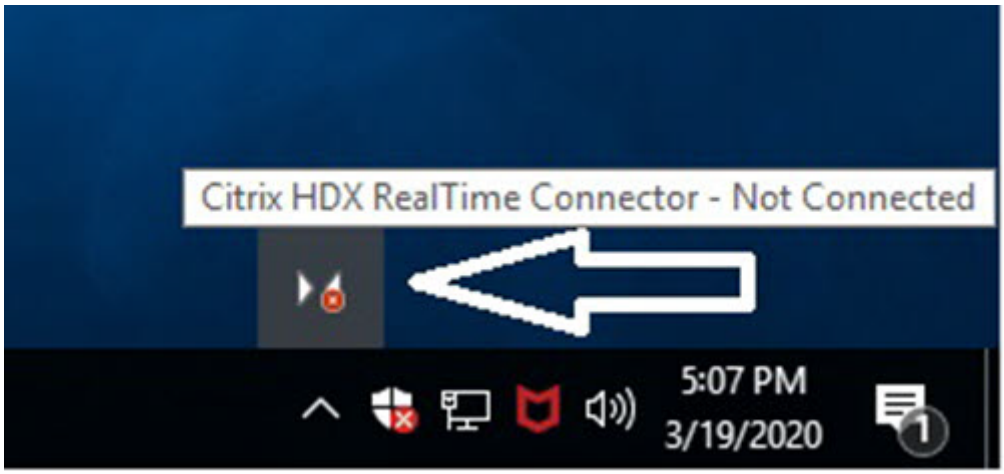


Version mismatch - Same as Connected but the version match is not exact (different major or minor numbers)

© 1997–2026 Citrix Systems, Inc. All rights reserved.



Not connected - A registry setting (policy) preventing MediaEngine.Net from running RealTime Media Engine locally.



You can verify your installation and collect troubleshooting information by right-clicking the **Optimization** icon and making selections from the menu.

- About - Specifies the version of the RealTime Connector and RealTime Media Engine
- Settings - Contains check boxes for **Automatically Adjust Microphone Level** (Automatic Gain Control (AGC)) and **Enable Echo Cancellation**, which are on by default. Disable these options only when users experience issues using either function.
- Call Statistics - During a call, you can view information about your network health by selecting **Call Statistics**. The Network Health window appears, as shown in the following example. To write the values to a text file whose default name is call_statistics_<date>.txt, select **Save Statistics**. Note: Other menu items are disabled when the Call Statistics window is open.
- Collect Logs - When you select **Collect Logs**, a **Save as** dialog box appears and you can save the log file. We offer a log parser tool called RTOP Analyzer. The tool displays the following information:

© 1997–2026 Citrix Systems, Inc. All rights reserved.

- Call details like caller, callee, call duration, and so forth.
- Detail description of the call and any issues encountered.
- Session Description Protocol (SDP) payload Flow among endpoints.
- Call statistics.
- Any errors or warnings during the call.
- Session Description Protocol (SDP) messages.

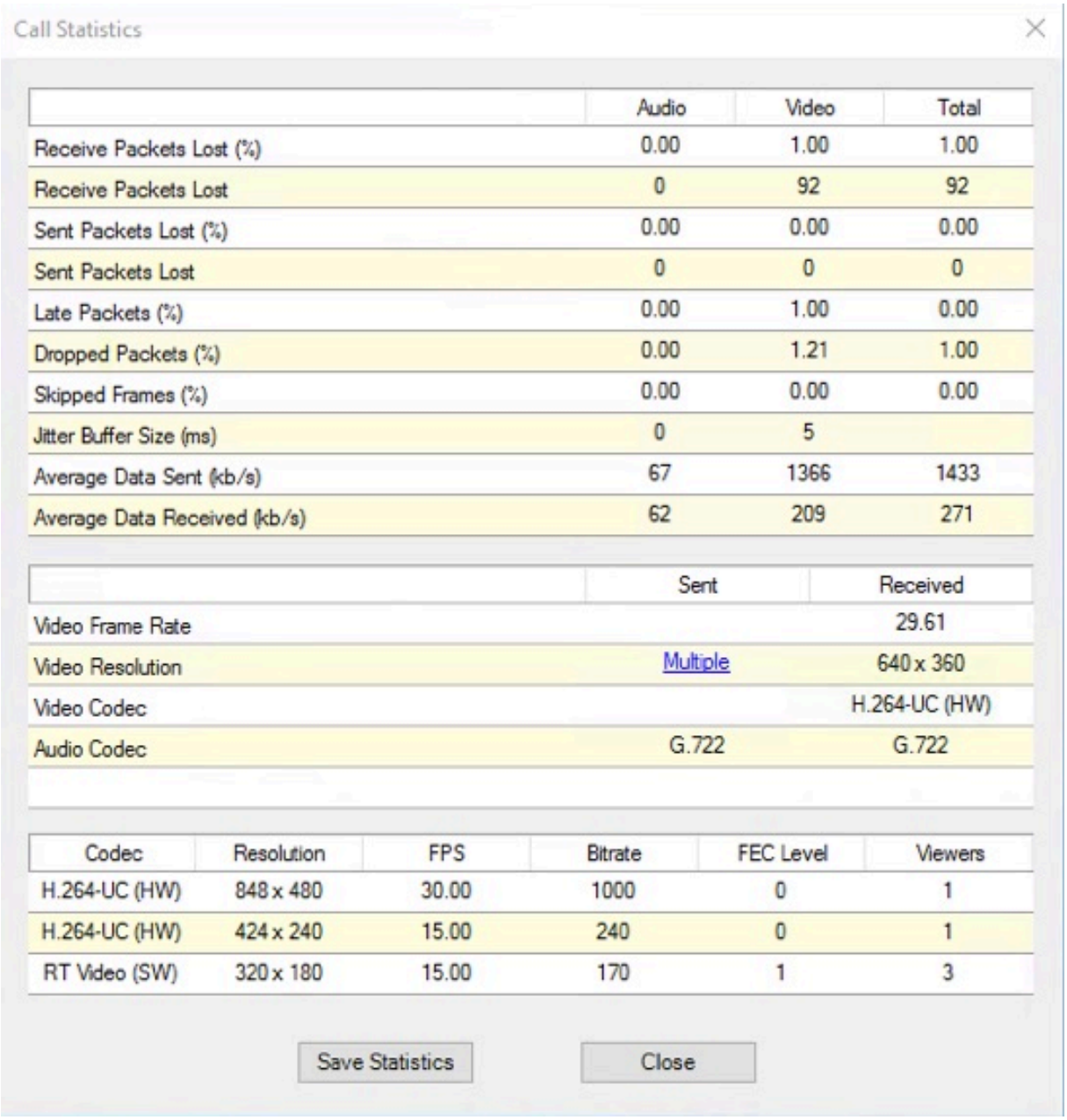
- When you select the Collect Logs icon in the notification area:
  - The RealTime Optimization Pack includes the AudioTranscoder folder in the log collection process. This information helps to analyze audio and sound related issues.
  - The RealTime Optimization Pack captures the current UCCAPI and the UCCAPI .bak log files.

For information about the RTOP Analyzer tool, see the Citrix Knowledge Center article https://support.citrix.com/article/CTX214237.

- Help - Takes you to the Skype for Business Help.

Call statistics - Displays audio and video statistics, including simulcast video information.

© 1997–2026 Citrix Systems, Inc. All rights reserved.



Resolve the poor performance

If the performance and stability of the Optimization Pack are poor, a likely cause is interaction with an antivirus or security application. Resolve this issue by correctly configuring the antivirus or security application.

Correct configuration includes the following software exclusions:

- Optimization Pack process
- Log file location of Optimization Pack

© 1997–2026 Citrix Systems, Inc. All rights reserved.

- Log file location of the Skype for Business client
- Disable Network Directory Scan in the real-time settings (Scan files and folder in network shares and mapped network drive)

For information about sound issues, see Sound issues and slow call establishment.

Save crash logs for Dell Wyse terminals

On Dell Wyse terminals, the log file of an application crash is not saved when the user works in User mode. To save crash logs, the user must work in Administrator mode. You can find crash logs in MS-RAMDRIVE, which is drive Z by default on Wyse terminals.

Resolve poor video quality

One of the following issues often causes the poor video quality:

- When the user device is capable and sufficient bandwidth is available, the RealTime Media Engine can deliver high-definition (HD) video calls. Some devices can deliver only low-resolution video, unless using a webcam that offers H.264 hardware encoding.
- Inadequate CPU capabilities often cause the poor video quality. Check your CPU performance by right-clicking the Optimization Pack icon and selecting **Call Statistics**.
- Out-of-date Windows 7 hardware and software can cause error messages during video rendering. Ensure that your hardware and software have the latest updates.
- Logitech RightLight technology can cause video problems because it lowers the frame rate produced by the camera. Edit the Logitech camera settings to ensure the RightLight check box is unselected so that the camera captures more frames per second.
- Wireless network connections might cause the poor video quality. To ensure reliable transmission of the video packets, if a wired connection is available, disable the wireless adapter and connect to a wired network.

Other options for improving the video quality include:

- Improving lighting.
- Creating a darker background in the room from which the image is transmitted.
- Adjusting the anti-flicker setting of the transmitting camera.

For more information about factors impacting video quality with Skype for Business, see Citrix Knowledge Base article https://support.citrix.com/article/CTX222553.

© 1997–2026 Citrix Systems, Inc. All rights reserved.

Resolve poor quality or failed call connections on laptops running Windows

Intel processors include the SpeedStep technology, which lowers the clock speed of the processor when the machine runs on battery. Because desktop video applications require normal processor speeds to run, SpeedStep can cause poor visual and audio quality and failed call connections.

SpeedStep is enabled when the Windows power scheme is set to Portable/Laptop. To resolve poor call connections, change the power scheme to Home Office/Desk or Always On. Connecting the laptop to a regular power source is also recommended for improving the call quality.

Determine whether your firewall is blocking the RealTime Connector

If a personal firewall blocks the network initialization for too long, the RealTime Connector can fail to initialize. This condition resolves itself the next time the program is run after you unblock the application.

When the firewall is blocked, an error message such as the following can appear:

- RealTime Connector is waiting for the connection from the RealTime Media Engine.
- Failed to maintain RealTime Connector on this device. Communication to the RealTime Media Engine was disrupted. Contact your system administrator.

In such cases, create an exception in the Windows firewall.

Resolve video quality issues when using a wireless network connection

If you experience issues with video quality when using a wireless network connection, try moving closer to the wireless access point. If that does not resolve the issue, try a wired network connection instead. When using a wired network connection, disable the wireless network adapter to avoid transmission issues.

Resolve installation issues

For software in general, the most common installation problems are related to corrupt system files needed for installation. These errors are rare, but difficult to troubleshoot.

The RealTime Media Engine installer requires Microsoft .NET 4.0. If it is missing from the computer, install it to resolve the problem. If it is already installed, run a repair installation on .NET.

On some Windows machines, customers encounter errors during the software installation when embedded custom-action VB scripts run. Common errors presented to the user or captured in install logs are 2738 and 1720. Some customers have encountered these errors when an antivirus

© 1997–2026 Citrix Systems, Inc. All rights reserved.

program places the vbscript.dll Class ID under the HKEY_CURRENT_USER registry hive instead of under HKEY_LOCAL_MACHINE. The HKEY_LOCAL_MACHINE hive is where it is needed for the proper elevated runlevel.

Run the following registry queries to determine if the vbscript.dll Class ID is installed for the current user, system wide, or both:

- % reg query HKEY_CURRENT_USER\SOFTWARE\Classes\CLSID{ B54F3741-5B07-11CF-A4B0-00AA004A55E8 }
- % reg query HKEY_LOCAL_MACHINE\SOFTWARE\Classes\CLSID{ B54F3741-5B07-11CF-A4B0-00AA004A55E8 }

The Class ID appears only for HKEY_LOCAL_MACHINE. If it is under HKEY_CURRENT_USER, follow these steps. If Class ID is under HKEY_LOCAL_MACHINE and not HKEY_CURRENT_USER, start at step 2.

1. Run an antivirus clean-up utility:
    a) If the terminal has an antivirus program installed and the vendor has a clean-up utility, run the clean-up utility.
    b) Rerun the RealTime Media Engine installer MSI.
    c) If the issue persists, go to the next step.
2. Register vbscript.dll:

    The vbscript.dll file or registry reference to its Class ID can become unregistered or corrupted. Follow these steps to register or repair it.

    a) Run CMD.exe as an administrator: Click Start, type cmd, right-click cmd, and select **Run as administrator**.
    b) Type in the Command window:
        - For the 32-bit version of Windows: **cd %windir%\system32**
        - For the 64-bit version of Windows: **cd %windir%\syswow64**
    c) Type in the Command window: **regsvr32 vbscript.dll**
    d) Rerun the RealTime Media Engine installer MSI.
    e) If the issue persists, go to the next step.
3. Remove the vbscript.dll Class ID:
    a) In the Registry Editor, locate and remove the registry key HKEY_Current_User\SOFTWARE\Classes\CLSID{ B54F3741-5B07-11CF-A4B0-00AA004A55E8 }.
    b) Select **Start > Control Panel**, navigate to the User Account Control Settings, and then move the slider to **Never notify.**

© 1997–2026 Citrix Systems, Inc. All rights reserved.

After you complete the troubleshooting, you can revert this change if needed.

c) Rerun the RealTime Media Engine installer MSI.

d) If the issue persists, go to the next step.

4. Repair corrupt system files by using System File Checker:

   a) Run CMD.exe as an administrator: Select Start, type cmd, right-click cmd, and select **Run as administrator.**
   b) In the Command window, type: **sfc /scannow**
   c) Rerun the RealTime Media Engine installer MSI.
   d) If the issue persists, go to the next step.

5. Restore corrupt registry entries to their original state:

   a) Restart the Windows terminal and during the restart, insert the OS installation DVD to start from it.

      The OS installation DVD must match the Windows service pack installed on the terminal.

   b) Follow the installation steps, selecting the option to repair the OS.

   c) Rerun the RealTime Media Engine installer MSI.

Notification area icon displays an unoptimized fallback operation

An unoptimized session in fallback mode—the RealTime Connector is not able to connect to the RealTime Media Engine, and audio and video processing occurs on the server. When the notification area icon indicates an unoptimized fallback session, try these troubleshooting tips:

- If the RealTime Media Engine isn't installed on the client device, install it.
- A version of the RealTime Media Engine that is newer than the RealTime Connector is installed on the user device. Reinstall the correct version of RealTime Media Engine or upgrade your RealTime Connector. You can use a combination of versions 2.x RealTime Connector and RealTime Media Engine. The RealTime Connector version must be newer than, or the same as, the RealTime Media Engine.
- The RealTime Media Engine might be failing to start. To obtain the logs, click the RealTime Optimization Pack icon and select **Logs**. If you can't determine the cause of the issue, contact Citrix Technical Support.

Notification area icon does not appear

After you install the Optimization Pack on both the endpoint and server and start Skype for Business, the **Optimization Pack** icon appears in the notification area. If not, ensure that the Skype for Business

© 1997–2026 Citrix Systems, Inc. All rights reserved.

version is Public Update (PU) 15.0.4779.1001 or later.

Notification balloons do not appear

If the notification balloons do not appear, ensure that they were not disabled. You can enable or disable them. For more information, see Notification balloons.

Sound issues and slow call establishment

If calls take a long time to establish or established calls have sound issues, check your antivirus software and ensure **lync.exe**is excluded from scanning. For example:

- A call arrives and the ring tone plays incorrectly and there are interruptions at irregular intervals.
- Dual Tone Multiple Frequencies (DTMF) playback is erratic making it difficult to tell which digit was typed.
- Discontinuous (stutter) ringing and Ringback tones.

Windows Defender

Sound issues might occur because of Windows Defender. We recommend that you do the following proactively for all for Windows 8.1 and Windows 10 VDAs:

1. Select **Start** and type **Defender**.
2. Choose the Windows Defender settings option.
3. Scroll down to Exclusions and choose **Add an exclusion**.
4. Choose **Exclude a .exe, .com or .scr process**.
5. Navigate to where Skype for Business is installed (C:\Program Files\Microsoft Office\Office15).
6. Choose Lync.exe and choose **Exclude this file**.

Skype for Business does not recognize the webcam

If non-optimized Skype for Business doesn't recognize the webcam of the user, edit the system registry on the VDA and add DevicePath:

`HKEY_CLASSES_ROOT\CLSID\\\{ 860BB310-5D01-11d0-BD3B-00A0C911CE86 } \ Instance\Citrix HDX Web Camera` (32-bit devices)

`HKEY_CLASSES_ROOT\Wow6432Node\CLSID{ 860BB310-5D01-11d0-BD3B-00 A0C911CE86 } \Instance\Citrix HDX Web Camera` (64-bit devices)

Name: DevicePath

© 1997–2026 Citrix Systems, Inc. All rights reserved.

Type: REG_SZ

Value: Citrix Client

Optimized calls fail when Edge Servers are not accessible by the client device

Remote connectivity with the RealTime Optimization Pack requires Edge Servers are deployed and reachable from remote endpoints.

Edge fallback detection allows you to use the RealTime Optimization Pack in fallback mode when your endpoint cannot reach an Edge Server. Edge connectivity checks are performed when the RealTime Media Engine starts. The RealTime Media Engine goes into fallback mode if the Edge Server is configured and inaccessible from the remote endpoint. Set these registry keys:

`HKEY_CURRENT_USER\SOFTWARE\Citrix\HDXRTConnector`

Name: EdgeFallbackEnabled

Type: DWORD (32-bit)

Value: 1

Name: DisableFallback

Type: DWORD (32-bit)

Value: 0

After you set the registry to enable Edge fallback detection, the **About** screen displays **Edge Server Inaccessible** when in fallback mode.

© 2025 Cloud Software Group, Inc. All rights reserved. This document is subject to U.S. and international copyright laws and treaties. No part of this document may be reproduced in any form without the written authorization of Cloud Software Group, Inc. This and other products of Cloud Software Group may be covered by registered patents. For details, please refer to the Virtual Patent Marking document located at https://www.cloud.com/legal. Citrix, the Citrix logo, NetScaler, and the NetScaler logo and other marks appearing herein are either registered trademarks or trademarks of Cloud Software Group, Inc. and/or its subsidiaries in the United States and/or other countries. Other marks are the property of their respective owner(s) and are mentioned for identification purposes only. Please refer to Cloud SG's Trademark Guidelines and Third Party Trademark Notices (https://www.cloud.com/legal) for more information.