



Cisco Jabber Video for TelePresence

Administrator Guide

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Introduction

This guide provides comprehensive information on Cisco Jabber Video for TelePresence, its capabilities and functions.

Jabber Video works in conjunction with other Cisco videoconferencing infrastructure products, primarily the Cisco Jabber Video Video Communication Server (Cisco VCS), the Cisco Jabber Video Management Suite (Cisco TMS) and provisioning. Some knowledge of these products is assumed in this document.

The [References and related documents](#) section contains a list of documents referred to in this guide.

Cisco Jabber Video for TelePresence for Windows is a certified Windows 7 application.

Prerequisites

Infrastructure requirements

Jabber Video requires the Provisioning option on the Cisco VCS and in Cisco TMS to be enabled.

Product	Version required
Cisco TelePresence Management Suite (Cisco TMS)	12.6 or later
Cisco Video Communication Server (Cisco VCS)	X5.2 or later X6.0 or later for ICE support X6.1 or later for NTLM support

NTLM authentication client requirements

Jabber Video now supports authentication with Active Directory and NTLM. For instructions on deploying NTLM authentication with Jabber Video and Cisco VCS, refer to [Cisco TelePresence Video Communication Server Authenticating Devices Deployment Guide](#)

Note that to use NTLM authentication with Jabber Video and Cisco VCS, NTLMv2 must be supported by the client computer.

It is especially important to be aware of this requirement if there are older computers and/or Windows XP users in your network.

On the client computer:

1. Go to **My Computer\HKEY_LOCAL_MACHINE\SYSTEM\CurrentControlSet\Control\Lsa**
2. If the **LmCompatibilityLevel** setting (REG_DWORD) is *1*, set to 2 or higher.
3. Save your changes.

CAUTION: With a setting of *1*, authentication will fail for the client, and no warnings or error messages will be received from Cisco VCS, which passes the request on to the Active Directory server.

PC requirements

Operating system	<ul style="list-style-type: none"> ■ Windows XP SP2 or later ■ Windows Vista SP1 or later ■ Windows 7
Processor	2 GHz Intel Core 2 Duo or equivalent.
Memory	<ul style="list-style-type: none"> ■ Windows XP: 512 MB RAM or more. ■ Windows 7 or Vista 32-bit: 1 GB RAM or more. ■ Windows 7 or Vista 64-bit: 2 GB RAM or more.
Graphics card	OpenGL version 1.2 or higher.
Sound card	Any standard sound card (full-duplex, 16-bit or better) .

Note: On computers with limited processing power and/or memory, Jabber Video will use a lot of system resources, and reduced performance can be expected.

Mac OS X requirements

Processor	Any Intel processor. For business-quality HD video, Cisco recommends using the Cisco PrecisionHD™ USB camera and a 2 GHz Core 2 Duo processor or better.
Operating system	<ul style="list-style-type: none"> ■ Mac OS X 10.7 ■ Mac OS X 10.6
Connection	IP network connection (broadband, LAN, wireless). At least 24 kb/s is required for an audio connection. For a video connection, the recommended minimum is 128 kb/s.

Multimedia device requirements

Microphone

All microphones work well with Jabber Video. Note that some cameras have built-in microphones.

Camera

Jabber Video works with most common web cameras. See the Cisco Knowledge Base for [updated information on Jabber Video and cameras](#).

Obtaining the setup files

Upgrading

When a new version of Jabber Video is available, you will get a Cisco TMS ticket if:

1. Automatic update checking is enabled. To do this:
 - a. In Cisco TMS, go to **Administrative Tools > Configuration > Network Settings**.
 - b. Under **Automatic Software Update**, set **Automatically Check for Updates** to Yes.
2. Cisco TMS Agents are enabled. To do this:
 - a. In Cisco TMS, go to **Administrative Tools > Configuration > General Settings**.
 - b. Set **Enable TMS Agents** to Yes.

The description field of the Cisco TMS ticket includes a link to a .zip archive containing the files described below.

New deployment

If installing Cisco Jabber Video for TelePresence for the first time:

1. Go to the [Jabber Video section](#) of cisco.com.
2. Click the **Download Software** link.
3. Download the .zip archive that contains the latest version of Jabber Video.

Contents of the Jabber Video archive

File name	Description
JabberVideo<version>.msi	For organizations creating their own Jabber Video installer for Windows
JabberVideoSetup<version>.exe	Ready-made installer for Windows containing the .msi file
JabberVideoSetup<version>.dmg	Application bundle for Mac OS X
JabberVideoProvisioningConfigTemplate<version>.xml	Adds Jabber Video provisioning configurations to Cisco TMS. See the Provisioning the client section for more information.
Jabber_Video_Release_Notes_<version>.pdf	Software release notes describing the changes from the last to the current version of Cisco Jabber Video for TelePresence.
Jabber_Video_Web_Help_<version>.zip	Zipped web help for the clients that can be uploaded locally and linked from the Jabber Video menu. See Providing help for more information.

Providing help

Jabber Video has **Help** menu entries available on both Windows and Mac OS X, before and after sign-in. In a default installation, these menu entries will take the user to http://www.cisco.com/en/US/products/ps11328/products_user_guide_list.html, where user guides for both Windows and Mac OS X can be downloaded as PDF documents.

By pre-configuring or provisioning Jabber Video with a Help URL, you can direct users to web-based help files or a local support site instead.

- By pre-configuring the **Help URL**, you can have different URLs for Mac and Windows clients. The URL will be available at all times.
- A provisioned **Help URL** will not be accessible from the menu before the user has signed in.

The Help URL pre-configuration and provisioning settings may also be used to direct users to any internal help and support site that the organization may have for Jabber Video.

See [Pre-configuring Jabber Video](#) and [Provisioning the client](#) for guidance on how to configure these settings.

Uploading web-based help

The Jabber Video deliverable archive contains two sets of web help files; one for the Windows client and one for Mac OS X.

To use the included help files:

1. Unzip the archive(s).
2. Upload the contents to any local server.
3. Make sure to include the full path to the uploaded web help files in the Help URL when pre-configuring or provisioning. Include both the protocol (HTTP or HTTPS) and the file **Default.htm**.

Pre-configuring Jabber Video

This section describes required and optional configuration settings for Jabber Video and makes recommendations on how to configure these settings ahead of deployment.

By default, the network communication settings are available to the user by opening **Sign-in Settings** from Jabber Video's sign-in window. However, we recommend that Jabber Video be pre-configured so that these settings are not editable to the user. The client will then know how to locate and authenticate with the provisioning server on first startup, and the user does not have to worry about servers and domains.

Pre-configurable settings

There are two ways to deploy the below settings as an administrator prior to distributing the client:

- Pushing configurations
 - to the Windows registry key **HKEY_CURRENT_USER\Software\Cisco\JabberVideo** using, for example, Active Directory group policies.
 - to accounts in a managed Mac OS X environment using MCX.
- By pre-configuring installers for Windows and Mac OS X.

Value name	Description	Windows Registry type	Windows installer Public property	Mac OS X .plist element
Domain	Identical to the SIP domain configured on the Cisco VCS, in VCS configuration > Protocols > SIP > Domains .	REG_SZ	FORCEDDOMAIN	<string>
InternalVcs	The DNS address of the primary Cisco VCS Control cluster you want to connect to. Jabber Video will always look for this address first when connecting. It is also possible to specify which port to connect to. For example InternalVCS.example.com:5063 .	REG_SZ	FORCEDINTERNALVCS	<string>
ExternalVcs	The DNS address of the Cisco VCS Expressway cluster you want Jabber Video to connect to. If Jabber Video fails to connect to the Internal Server , it will try this address. It is also possible to specify which port to connect to. For example ExternalVCS.example.com:5063 .	REG_SZ	FORCEEXTERNALVCS	<string>

Value name	Description	Windows Registry type	Windows installer Public property	Mac OS X .plist element
HideAdvancedLogin	Setting to <i>1</i> makes the above network communication settings grayed out and inaccessible for editing by the user.	REG_DWORD	FORCEDHIDE ADVANCEDLOGIN	<true /> or <false />
EncryptionPolicy	The transport protocols to try and to accept for signalling and media. The default setting is <i>Auto</i> . See Encryption for more detail.	REG_SZ	FORCEDENCRYPTION POLICY	<string>
VerifyTlsCertificate	Whether or not to verify the provisioning server's certificate against the system certificate store. The default setting is <i>No</i> .	REG_DWORD	FORCEDVERIFY TLSCERTIFICATE	<true /> or <false />
TlsCommonName	The required TLS certificate subject. This must be set when provisioning against a Cisco VCS using HTTPS. If not set, the resolved DNS name will be expected in the certificate. Note that this setting relies on VerifyTlsCertificate being enabled.	REG_SZ	FORCEDTLS COMMONNAME	<string>
HelpUrl	Specify a full URL to a site containing webhelp or local support information that Jabber Video's Help menu entries will link to. If no URL is provided, the menu will link to the user guides for Windows and Mac on cisco.com. See Help URL for more information.	REG_SZ	FORCEDHELPURL	<string>
ForgotPasswordUrl	Specify a full URL to a password retrieval site.	REG_SZ	FORCEDFORGOT PASSWORDURL	<string>

Value name	Description	Windows Registry type	Windows installer Public property	Mac OS X .plist element
UseWindows Username	<p>We recommend against using this legacy setting as it requires disabling authentication. Jabber Video supports secure NTLM authentication with Cisco VCS version X6.1 and later. For more information on how to configure Jabber Video with NTLM, see Cisco TelePresence Video Communication Server Authenticating Devices Deployment Guide for your version of Cisco VCS.</p> <p>A value of <i>1</i> has the following effects:</p> <ul style="list-style-type: none"> ■ Jabber Video uses the current Windows user's logon name as username. ■ The Username and Password fields are disabled. ■ The Remember me checkbox in the login window is selected and disabled. 	REG_DWORD	USEWINDOWS USERNAME	—

Using DNS for the server addresses

Jabber Video can use IP or DNS addresses to locate the Cisco VCSs.

Using DNS addresses offers advantages such as:

- **Redundancy:** if you have more than one Cisco VCS, using a DNS that translates to the IP address of all Cisco VCSs will enable Jabber Video to "fail over" to other Cisco VCSs in case of a fault in one Cisco VCS.
- **Location awareness:** for global companies, it is possible to configure the DNS servers so that Jabber Video will be directed to the "local" Cisco VCS wherever it may be.
- **Flexibility:** using DNS makes it possible to change the IP address of your Cisco VCS later on.

Jabber Video also supports DNS SRV records, which allow for even greater redundancy and flexibility because they contain information such as "Priority" and "Weight".

Installer preconfiguration

When installers are preconfigured, these configurations:

- take precedence over any other configuration for the application.
- apply to all users on the computer, not only for the user who installed the application.
- cannot be changed by users without administrator rights on their computer.
- will be replaced or removed during upgrades.

We recommend preconfiguring *all* settings when creating the installers to be certain that any old/existing settings are overridden.

Creating a customized installer for Windows

The **JabberVideoSetup.exe** file supplied by Cisco is a basic InstallShield-generated installer that can be run with standard InstallShield switches. By using the format `/v"<properties>"`, **JabberVideoSetup.exe** will be made to run **MsiExec.exe** to set these properties.

Create a self-extracting executable using the tool of your preference that unpacks **JabberVideoSetup.exe** with a minimal UI and then automatically launches it with desired settings on the command line.

The configurations provided to the installer will be written to the registry of the host computer on installation.

Syntax

```
JabberVideoSetup.exe /v"<PROPERTY1>=<value1> <PROPERTY2>=<value2> ... "
```

- Boolean values are specified by "0" or "1".
- Properties must be in uppercase for technical reasons.
- In addition to the standard **MsiExec.exe** public properties, the **JabberVideoSetup.exe** installer supports all public properties described in the [Pre-configurable settings](#) table.

Example

```
JabberVideoSetup.exe /s /v"/qn DOMAIN=example.com HIDEADVANCEDLOGIN=1"
```

- `/s` is a basic InstallShield switch that hides the initialization dialog.
- `/v"<properties>"` passes the properties to the **MsiExec.exe** that is actually performing the installation.
- `/qn` is a basic **MsiExec.exe** switch, an instruction to install silently.
- `DOMAIN=example.com` sets the **SIP Domain** field in the [Pre-configurable settings](#) of the Jabber Video client to `example.com`.
- `HIDEADVANCEDLOGIN=1` hides the server configuration options from the Jabber Video client's [Pre-configurable settings](#).

Creating a customized Mac OS X installer

1. Specify the desired preferences as a property list (plist) file. Xcode is a good editor for this purpose (see sample file below).
2. Extract the file **create_custom_dmg.tar.gz** from the Jabber Video deliverable archive.
3. Unpack the file: `tar -xzf create_custom_dmg.tar.gz`.
4. Change directory: `cd create_custom_pkg`

5. Run the script **create_custom.dmg.sh** with the desired plist file as parameter. Example: `./create_custom_dmg.sh ~/myconfig.plist`
6. The customized file is now written to the current directory as **JabberVideo.dmg**.

The signature of the embedded application bundle will still be valid.

Sample .plist with forced settings

```
<?xml version="1.0" encoding="UTF-8"?>
<!DOCTYPE plist PUBLIC "-//Apple//DTD PLIST 1.0//EN"
"http://www.apple.com/DTDs/PropertyList-1.0.dtd">
  <plist version="1.0">
    <dict>
      <key>HideAdvancedLogin</key>
      <true/>
      <key>InternalVcs</key>
      <string>https://jabbervideotest.example.com/jabbervideo/provisioning/</string>
      <key>ExternalVcs</key>
      <string></string>
      <key>Domain</key>
      <string></string>
      <key>VerifyTlsCertificate</key>
      <true/>
    </dict>
  </plist>
```

Provisioning the client

Note: Before provisioning, Cisco TMS and Cisco VCS must be configured appropriately. See the *Cisco TelePresence Provisioning Deployment Guide* for detailed information.

Provisioning is a powerful tool for the administrator to control the Jabber Video clients. Upon subscribing to the Cisco VCS, the Jabber Video client will receive provisioning information from the Cisco TMS Agent and act on it.

To access the Cisco TMS provisioning configurations, go to **Systems > Provisioning > Directory** and the **Configurations** pane.

Uploading provisioning templates to Cisco TMS

Each version of Cisco Jabber Video for TelePresence comes with a provisioning template that must be uploaded to Cisco TMS.

1. Go to **Systems > Provisioning > Directory**.
2. Click the link **Manage Configuration Templates**.
3. In the dialog box that opens, click the button **Upload New**.
4. Locate the **JabberVideoProvisioningConfigTemplate<version>.xml** file on your computer (see [Obtaining the setup files](#)).
5. Click **Open**, and the template will be uploaded to Cisco TMS.

For more on managing provisioning templates, see *Provisioning Deployment Guide*.

Provisioning options

The following table details the provisioning options available, including tips on how they can be used and in which situations.

The "Default" column in the table describes how Jabber Video behaves if no specific provisioning information is configured by the administrator.

Note: "Public" provisioning options apply to Jabber Video clients connecting from outside of the organization's network. Unless values for the "public" settings are explicitly configured, they will be inherited from their "non-public" counterparts.

Field	Default	Description
Bandwidth Prober Time	<i>0</i>	<p>After signing in, Jabber Video will probe the TURN relay server for bandwidth quality between client and TURN server.</p> <p>This setting determines the duration of the probing in seconds.</p> <ul style="list-style-type: none"> ■ Minimum value: 5 ■ Maximum value: 600 ■ Recommended value: 30 <p>The provisioned time is split into 256 kb/s intervals up to the maximum provisioned bandwidth.</p>
Bandwidth Prober Auto Scheduling	<i>Off</i>	<p>This setting must be <i>On</i> to enable bandwidth probing as described above. Note that bandwidth probing also requires the following settings to be provisioned:</p> <ul style="list-style-type: none"> ■ TurnAuthPassword ■ TurnAuthUsername ■ TurnServer
ClearPath	<i>On</i>	<p>ClearPath is a Cisco TelePresence solution that minimizes the negative effects of packet loss in a non-optimal network. Among the mechanisms used are H.264-specific error recovery techniques, feedback from decoders and forward error correction (FEC).</p> <p>Both call participants must support ClearPath for it to take effect.</p>
Default Mediatype Candidate	<i>Host</i>	<p>The address to use before ICE negotiation has completed, if ICE fails, or if the remote side does not understand ICE. The available options are:</p> <ul style="list-style-type: none"> ■ <i>Host</i> - the local network address ■ <i>Rflx</i> - the corporate public IP address seen from the outside of the organization's network (public IP) ■ <i>Relay</i> - the address of the TURN relay server <p><i>Relay</i> is typically needed when Jabber Video is deployed in environments where most other endpoints do not understand ICE. See Enabling ICE for more information.</p>
Detect Media Mangling	<i>On</i>	<p>Detect whether a server in the network is trying to relay media.</p>
Encryption Policy	<i>Auto</i>	<p>Determines the encryption policy for the account. This configuration affects both the SIP communication (Transport TLS or TCP) and the media communication (SRTP or no SRTP).</p> <p>See Encryption for more information.</p>
Far End Camera Control	<i>On</i>	<p>This setting lets Jabber Video control far end cameras, when allowed by the far end.</p>
Help URL		<p>A full HTTP(S) URL to a help and/or support site that will be linked from the Help menu entries in Jabber Video. Webhelp files are provided in the Jabber Video deliverable archive.</p> <p>If no URL is provisioned or pre-configured, the menu will link to the user guides for Windows and Mac OS X on cisco.com.</p> <p>See for more information on this feature.</p>

Field	Default	Description
Http Log URL		A log URL that will be posted to after every call from Jabber Video. Note that the URL must be a web page/service capable of receiving HTTPS POST. The posted XML includes information on: <ul style="list-style-type: none"> ■ Time stamp ■ Participating SIP URIs ■ Encryption ■ Call duration ■ Call direction (incoming/outgoing) ■ TURN server ■ SIP proxy
ICE	<i>Off</i>	Interactive Connectivity Establishment (ICE) dynamically discovers the best possible path for media to travel between call participants. See Media routing for more information on what is required to enable this setting.
Inviter Contact URI		You can add a display name and SIP URI that will be automatically added to the favorites of all provisioned users. The string must be on the format "Contact Person <sip:contact.person@example.com>"
IP version	4	Available options: <ul style="list-style-type: none"> ■ <i>Auto</i> ■ 4 ■ 6 <hr/> <p>WARNING: Do not force Jabber Video to use IPv6 unless all users are permanently on an IPv6 network. Users who sign in over IPv4, for example from a home network, will otherwise be rejected.</p> <hr/> <p>Also note that ICE is not supported with IPv6 for Jabber Video. When Jabber Video signs in over an IPv6 connection, ICE will be disabled.</p>
Maximum In Bandwidth	512 kb/s (adjustable to up to 2014 kb/s from within the client)	Determines the maximum bandwidth that can be received/sent by the account. The Jabber Video client will be set to send the provisioned value. With no provisioning, the default starting level is lower than the maximum that can be set by the user. High bandwidth is directly related to good video quality, but bandwidth control can be useful to prevent a client from trying to receive/send beyond its capacity, as this may result in packet loss, jitter and general low video quality.
Maximum Out Bandwidth	384 kb/s (adjustable to up to 2014 kb/s from within the client)	
Media Port Range End	21900	The upper/lower bound of the port numbers that that are used in the video and audio communication.
Media Port Range Start	21000	These can be configured to control security/firewall issues. A range of minimum 10 ports must be provisioned, or Jabber Video will revert to default.

Field	Default	Description
MNS Mode	<i>Off</i>	Enabling this option forces relayed media to be relayed via private HD links with guaranteed capacity to ensure quality of video. This setting relies on ICE being enabled. Private dedicated links are provided by companies such as Media Network Services.
Multiple Server Connections	<i>Off</i>	Enable this option to allow Jabber Video to keep open connections with several servers in a cluster, and failover by transferring automatically to the next server in the cluster should one server go down. Should one connection be lost, Jabber Video will also be reachable from multiple servers. Note that the feature can only be enabled if SIP Outbound (RFC 5626) is supported by the backend. For Cisco VCS, this requires version X6.0 or later.
Multiway Participant URI		When Multiway is initiated, participants are directed to this Uniform Resource Identifier (URI). See Multiway initiation for more information.
OS X Software URL		URL linking to the setup file for the new version of the Jabber Video client for Mac OS X. Note: Uploading files with the .dmg extension is only supported in Cisco TMS version 13.1 and later. If using an older version of Cisco TMS, the Jabber Video for Mac installer must either be added using the file system or hosted on a different server. The combination of this and the OS X Software Version setting allows the administrator to inform Jabber Video users that a new version is available, and provide a clickable link from within the client to the setup file.
OS X Software Version		Indicates the version number of the new Jabber Video client for Mac OS X. The setting should indicate the version that the users will have once they have upgraded, including software build number. The complete version number is included on the front page of the release notes for each version.
Phone Book Server URI	If no value is set, the Jabber Video client will not be able to search for contacts.	Enables the account to search for other accounts in the Cisco TMS Agent database. This configuration should be a URI on the form: phonebook@<sip_domain>.com
Presence Server URI	If no value is set, the Jabber Video client will not be able to publish presence and will appear offline.	Enables the account to send presence status. This configuration should be a URI on the form: presence@<sip_domain>.com

Field	Default	Description
Public Default Mediatype Candidate	Uses the value set for Default Mediatype Candidate (changes dynamically).	<p>The address to use before ICE has completed, if ICE fails or if the remote side does not understand ICE. The available options are:</p> <ul style="list-style-type: none"> ■ <i>Host</i> - the local network address ■ <i>Rflx</i> - the corporate public IP address seen from the outside of the organization's network (public IP) ■ <i>Relay</i> - the address of the TURN relay server <p><i>Relay</i> is recommended for Jabber Video clients connecting from outside of the organization's network. ICE negotiation can take a few seconds to complete, and using the TURN relay will help media flow through the firewalls from the beginning of the call. Once ICE negotiation has completed, media will be redirected if a superior media path has been located. See Enabling ICE for more information.</p>
Public IP version	Uses the value set for IP Version (changes dynamically).	<p>Available options:</p> <ul style="list-style-type: none"> ■ <i>Auto</i> ■ <i>4</i> ■ <i>6</i> <hr/> <p>WARNING: Do not force Jabber Video to use IPv6 unless all users are permanently on an IPv6 network. Users who sign in over IPv4, for example from a home network, will otherwise be rejected.</p> <hr/> <p>Also note that ICE is not supported with IPv6 for Jabber Video. When Jabber Video signs in over an IPv6 connection, ICE will be disabled.</p>
Public Maximum In Bandwidth	Uses the value set for Maximum In Bandwidth (changes dynamically).	<p>Determines the maximum bandwidth that can be received/sent by the account after connecting to the external server (Cisco VCS) configured in Jabber Video's sign-in settings.</p> <p>The settings may be useful for controlling the bandwidth of users that connect from outside of the company's network. These users may have slow network connections, or the company may want to limit their bandwidth usage.</p>
Public Maximum Out Bandwidth	Uses value set for Maximum Out Bandwidth (changes dynamically).	
Public Multiple Server Connections	Uses the value set for Multiple Server Connections (changes dynamically).	<p>Enable this option to allow Jabber Video to keep open connections with several servers in a cluster, and failover by transferring automatically to the next server in the cluster should one server go down. Should one connection be lost, Jabber Video will also be reachable from multiple servers. Note that the feature can only be enabled if SIP Outbound (RFC 5626) is supported by the backend. For Cisco VCS, this requires version X6.0 or later.</p>
Public Phone Book Server URI	Uses the value set for Phone Book Server URI (changes dynamically).	<p>Enable the account to search for other accounts in the Cisco TMS Agent database after connecting to the external Cisco VCS configured in Jabber Video's Sign-in Settings.</p> <p>It is sufficient to set the Phone Book Uri configuration.</p>

Field	Default	Description
Public Presence Server URI	Uses the value set for Presence Server URI (changes dynamically).	Enables the account to send presence status after connecting to the external Cisco VCS configured in Jabber Video's Sign-in Settings. It is sufficient to set the Presence Book Uri configuration.
Public SIP Server Address	Uses the value set for SIP Server Address (changes dynamically).	Address of the server to which the user should send a register request after connecting to the external Cisco VCS configured in Jabber Video's Sign-in Settings. Generally, this configuration should be the same as External Server in the Jabber Video Sign-in Settings.
Resolution Preferences	<i>High</i>	Restricts incoming and outgoing video resolution. Windows users may modify Jabber Video's video resolution with the provisioned value as the maximum. The Mac OS X client will always use the provisioned value. The restrictions depend on many factors, but as a general rule: <ul style="list-style-type: none"> ■ <i>High</i> will allow the highest resolution possible up to widescreen HD (1920x1080 or 1280x720). ■ <i>Medium</i> will restrict resolutions to wide CIF (512x288) or lower. ■ <i>Low</i> will restrict resolutions to wide QCIF (256x144) or lower. See Resolution for more on how video resolution is determined by Jabber Video.
SIP Keep Alive Interval	24 seconds	The interval at which SIP Keep Alive messages are sent. For more information, see Communicating with Cisco VCS .
SIP Server Address	The SIP server (Cisco VCS) that the client subscribed to.	Address of the server the user should send a register request to. Should be the same as the Internal Server configuration in the Jabber Video Sign-in Settings.
Tcp Media Relay	<i>Off</i>	Available options: <ul style="list-style-type: none"> ■ <i>Auto</i>. Jabber Video will try to discover TURN relay over TCP or TLS if UDP fails. ■ <i>Off</i>. Jabber Video will not look for TCP or TLS options.
TurnAuthPassword		TURN server settings that are required for enabling ICE. See Enabling ICE for more information.
TurnAuthUsername		
TurnServer		
Windows Software URL		URL linking to the setup file for the new version of the Jabber Video client for Windows. The combination of this and the Software Version setting allows the administrator to inform Jabber Video users that a new version is available, and provide a clickable link from within the client to the setup file.

Field	Default	Description
Windows Software Version		Indicates the version number of the new Jabber Video client for Windows. The setting should indicate the version that the users will have once they have upgraded, including software build number. The complete version number is included on the front page of the release notes for each version.

Distributing and installing the setup file

This section describes the process of distributing and installing the Jabber Video client, whether this is the first installation of Cisco Jabber Video for TelePresence or an upgrade from a previous version.

Note: Installing Jabber Video requires administrative rights on the computer.

New deployment

For new deployments, Cisco recommends that you use your own deployment tools.

To distribute to end users, you can send a customized email message from TMS:

1. Go to **Systems > Provisioning > Directory**.
2. In the **Workspace** pane, click **Send Account Info**.
3. In the dialog that opens, click **Configure email settings**.
4. Verify that SMTP host, username, and password have been added correctly, or add them yourself.
5. Choose a suitable subject for the email notification.
6. By default, this email message will contain login credentials for Jabber Video and Cisco IP Video Phone E20. If you want users to download and install Jabber Video themselves, you can add the download link to the same message.

Upgrading

The process of upgrading Jabber Video is controlled by the IT administrator through four provisioning options in Cisco TelePresence Management Suite:

- **Windows Software URL** and **OS X Software URL**.
- **Windows Software Version** and **OS X Software Version**

We recommend that the administrator immediately test and verify that the provisioned URLs work and are available to all provisioned users on the network. When these two options are correctly configured, users will receive a prompt when they sign in asking them whether they want to upgrade immediately:

- If the user accepts, the new installer will be downloaded and started automatically. Restarting the computer after installation is not necessary.
- If the user accepts, but the download is not available—for example because the user is connecting from outside the company network, the user will be notified of the failure and the prompt will return the next time the user signs in.
- If the user clicks **Ask Later**, the prompt will return the next time the user signs in.

If you want to make absolutely sure that all clients are upgraded, you can instead opt to use your deployment tool(s) to force the upgrade.

Upgrading to Jabber Video 4.3

Due to changes in product name and brand, the Jabber Video 4.3 installers will make some changes to previous installations. On Mac OS X, the user must manually remove the old application after installing and

launching Jabber Video 4.3

Windows

During installation:

- Jabber Video 4.3 installs itself to the program file paths described under [File locations](#).
- Jabber Video registers itself as the default SIP protocol handler.

When Jabber Video is launched:

- If upgrading from version 4.1 or later: Existing profile folders and registry settings are renamed from `~\Cisco\Movi\2.0\~` to `~\Cisco\JabberVideo\~`.
- If upgrading from version older than 4.1: Existing profile folders and registry settings are renamed from `~\TANDBERG\Movi\2.0\~` to `~\Cisco\JabberVideo\~`.

Mac OS X

Be sure to install and start up Jabber Video before removing Movi, as settings are imported on first startup.

When installing:

- Jabber Video installs itself as a new application alongside Cisco TelePresence Movi.
- Jabber Video registers itself as the default SIP protocol handler.
- The program bundle identifier is now **com.cisco.JabberVideo**.

When Jabber Video is launched:

- Preferences, Favorites, and History are imported from Movi.
- Stored passwords are not imported and must be re-entered.

Default file locations

Files	Windows location	Mac OS X location
Program file	<ul style="list-style-type: none"> ■ Windows Vista and 7 (64 bit): %Program Files (x86)%\Cisco\ ■ Windows Vista and 7 (32 bit) : %Program Files%\Cisco\ ■ Windows XP: ~\Program Files\Cisco\ 	/Applications/Jabber Video
Favorites and History	%APPDATA%\Cisco\JabberVideo\	~/Library/Application Support/Jabber Video/
Log files for debugging purposes	<CSIDL_LOCAL_APPDATA>\Cisco\JabberVideo\Logs\ The <CSIDL_LOCAL_APPDATA> directory is hidden by default and can be found at <ul style="list-style-type: none"> ■ Windows XP: %USERPROFILE%\Local Settings\Application Data\ ■ Windows Vista and Windows 7: %LOCALAPPDATA% (typically %USERPROFILE%\AppData\) 	~/Library/Logs/Jabber Video/

On a Windows computer, the Favorites and History are individual to each user logging on to Jabber Video.

On Mac OS X, the Favorites and History are specific to the Mac OS X user account, regardless of which Jabber Video user is logged in.

Launching Jabber Video calls from other applications

Jabber Video will install itself as the default SIP protocol handler on the operating system. As long as it remains the default SIP client, activating any SIP URI link will launch a call from Jabber Video.

It is also possible to use "movi:" as the protocol rather than "sip:". This will ensure that Jabber Video is always used even if another SIP client is the system default.

Testing the protocol handler

1. Have the latest version of Cisco Jabber Video for TelePresence installed
2. Open a web browser (or a keyboard launch application such as Quicksilver or Launchy).
3. In the input (URL) field, type a SIP URI, then hit **Enter**.

Jabber Video will now open and launch a call to the URI provided.

Note: Adding "/" after the "movi:" and "sip:" protocols is not supported by the Jabber Video protocol handler.

Use cases

- Add SIP URIs to default employee email signatures and vcards.
- Embed SIP URI links in intranet employee profiles, helpdesk contact pages, and similar.
- Integrate with any application that can send a protocol request to the operating system.

How communication works

This section includes general information on Jabber Video's main types of communication and is essential for the subsequent section, which describes specific messages.

SIP communication

Jabber Video communicates with the Cisco VCS using the Session Initiation Protocol (SIP). Subscribing, registering, presence querying, call invites—all communication except video and audio, is done in SIP. SIP messages are sent using TCP, with or without TLS encryption depending on the provisioned settings.

The default SIP listening ports used on the Cisco VCS are

- 5060 (unencrypted)
- 5061 (encrypted)

These are both configurable. Go to **VCS Configurations > Protocols > SIP > Configuration** to change the listening ports.

Note: If you change the SIP listening port number on the Cisco VCS, you must also configure the Jabber Video clients to contact the Cisco VCS on this port. See [Pre-configurable settings](#) for more information.

Jabber Video itself will use ephemeral TCP ports for this communication. These ports are handed over to the Jabber Video client by the TCP stack and are not configurable.

To enable communication with endpoints and other devices that rely on H.323 and do not support SIP, interworking on the Cisco VCS can be used.

Media communication

Media data is transferred through up to nine UDP links (ports). There are at most five media streams:

- Audio
- Primary video
- Secondary video (presentation sharing)
- BFCP (management of presentation sharing/duo video, see below)
- Far end camera control (FECC)

With the exception of BFCP, each of these streams requires two links: one link for RTP packets and one link for RTCP packets. The SRTP protocol is used if encryption is enabled.

Port ranges

The default port range for Jabber Video to receive media is 21,000-21,900. This range is configurable in Cisco TMS:

1. Go to **Systems > Provisioning > Directory**.
2. Add (or select) the configuration's Media Port Range Start and Media Port Range End.

Note: A minimum range of 10 ports must be configured, or Jabber Video will revert to default.

The default port range used on the Cisco VCS is 50,000-52,399. To configure:

1. Go to **VCS Configuration > Local zone > Traversal subzone**.
2. Set the Traversal media port start and Traversal media port end.

Note that in both cases, the port numbers used will be consecutive, but chosen randomly within the specified range.

Duo video–Binary Floor Control Protocol (BFCP)

Jabber Video supports BFCP for handling the control of duo video. BFCP communication can be sent over a UDP or a TCP link. Jabber Video uses the same ports as for audio and video for this communication.

On the Cisco VCS, a port will be chosen at random from the same range that has been assigned to the media links.

Media routing

Cisco Jabber Video for TelePresence supports Interactive Connectivity Establishment (ICE) for better media routing. ICE will be used if enabled both in Jabber Video and the far end.

Media routing without ICE

Media links can be established directly between the two endpoints in non-traversal calls, or between Jabber Video and the Cisco VCS in traversal calls. As a general rule, non-traversal calls are defined as calls between two participants that are on the same network and do not require interworking.

Note that SIP to H.323 calls require interworking and are therefore traversal calls irrespective of whether the endpoints are on the same network. For detailed information, see *Cisco VCS Administrator Guide* for your version of Cisco VCS.

Media routing with ICE

ICE dynamically discovers the best possible path for media to travel between call participants.

It is possible to further improve the routing of media and force it through dedicated links by using the **Enable MNS Mode** Provisioning configuration.

Enabling ICE

Media routing using ICE requires a TURN server. Cisco VCS Expressway running version X5.2 or later can function as a TURN server if it has TURN Relay licenses. Having the TURN server option key is required.

To start setting up the Cisco VCS Expressway, go to **VCS configuration > Expressway > TURN** and configure the fields as described below.

Setting	Change to
TURN services	<i>On</i>
Port	<i>3478</i>
Media port range start	<i>60000</i>
Media port range end	<i>61399</i>

To finish setup on the Cisco VCS Expressway:

1. Go to **VCS configuration > Authentication > Devices > Configuration** and set the **Database type** to *LocalDatabase*.
2. Go to **VCS configuration > Authentication > Devices > Local database** and create a username and password. The username and password are necessary to allow for use of TURN Relay licenses. The Jabber Video client is provisioned with the username and password as described below.

To enable ICE on the Jabber Video client, go to **Systems > Provisioning > Directory** and the **Configurations** pane for Jabber Video, then update the fields as described below.

Setting	Change to
Enable ICE	<i>On</i>
TurnAuthPassword	Password created when setting up the Cisco VCS Expressway
TurnAuthUsername	Username created when setting up the Cisco VCS Expressway
TurnServer	The address of the server media is relayed through in an "ICE call", typically the address of the Cisco VCS Expressway

Note: The ICE Provisioning configurations are not available by default. See the [Provisioning](#) section for more information.

Configuring Jabber Video's TURN port

TURN port configuration should be controlled through DNS. Jabber Video will do an SRV lookup for the TURN IP, priority, weight, and port. As TURN runs over UDP, the lookup will be for `_turn._udp.<domain>`. If no SRV record for TURN is found, Jabber Video will perform an A record lookup (IPv4) or an AAAA lookup (IPv6), but will default to port 3478.

If the port needs to be provisioned, you can append it to the IP address in the **TurnServer** field, for example `192.0.2.0:3478`.

Running the client

This section provides an overview of Jabber Video's communication with the servers, as a reference to use when configuring, deploying, or troubleshooting Jabber Video.

Signing in

Jabber Video will attempt to sign in to a Cisco VCS according to its **Sign-in Settings**, whether pre-configured or provided manually. The sign-in stages are described below.

Subscribing to the Cisco VCS

Jabber Video first attempts to subscribe to the internal Cisco VCS configured in its Sign-in Settings. If this fails, for example because the user's computer is connected to the public internet, Jabber Video will try to subscribe to the external Cisco VCS.

However, if the internal Cisco VCS is a DNS address that translates to more than one IP address, Jabber Video will attempt to connect to all these IP numbers before trying the external Cisco VCS. If the DNS server contains SRV records, Jabber Video will adhere to the priority and weight of the IP addresses, otherwise they will be tried in random order.

Typically, the Cisco VCS or the Cisco TMS Agent will challenge the first subscription message. Jabber Video will answer this challenge by sending another SUBSCRIBE message with the authentication information.

After the subscription has been authenticated, the Cisco TMS Agent will send provisioning information to the Jabber Video client.

Registering to the Cisco VCS

Jabber Video will register to the Cisco VCS according to the provisioning configuration in Cisco TMS; SIP Server URI or Public SIP Server URI. If this provisioning configuration is identical to the Advanced setting in the Jabber Video client (recommended), Jabber Video will register to the same Cisco VCS it subscribed to. As long as the client is registered, the Cisco VCS will know to forward messages to the client.

After initial registration, Jabber Video will continue to send registration messages to the Cisco VCS according to the Registration expire delta setting under **VCS configuration > Protocols > SIP > Configuration**. Jabber Video will send the message after 75% of the specified time interval has elapsed.

Communicating with Cisco VCS

After Jabber Video has signed in, connectivity checks and bandwidth probing is performed if enabled, and a number of other tasks are performed continuously.

Connectivity checks

In deployments that support this functionality, Jabber Video will now perform connectivity checks using DNS to find TURN servers and ports after signing in. If specified in the SRV records and supported by the TURN server, Jabber Video can use any ports including 80 (HTTP) and 443 (HTTPS).

Jabber Video looks for ports in the following order of priority:

1. UDP
2. TCP (if supported)
3. TLS (if supported)

If no ports are detected, Jabber Video will default to ports 3478 and 5349.

Note that firewall traversal using TCP relay is not supported when using Cisco VCS as a TURN server at this time.

Bandwidth probing

If bandwidth probing is provisioned, Jabber Video will route dummy media to the TURN server and back after signing in to determine the available bandwidth. The functionality relies on a TURN server being successfully provisioned.

The result of the bandwidth probing is used for Jabber Video's dynamic resource adaptation. It is also displayed to users in the **Quick Setup** dialog as part of the calculation of expected outgoing video quality.

Note that the results of the bandwidth probing depends on the provisioned time for probing and in many cases will represent a "worst case" bandwidth scenario where more bandwidth may be available during an actual conference.

Presence

The presence status service is provided by Cisco VCS. Jabber Video publishes its own presence to Cisco VCS and subscribes to presence statuses for any SIP URIs the user has stored as favorites. Subscribing to the presence status of a contact informs the Cisco VCS that the client should be notified when the contact's presence status changes.

In **Applications > Presence** there are two settings that determine timeouts for the Presence server:

- **Subscription expiration time**
- **Publication expiration time**

Jabber Video will subscribe and publish when 75% of the specified time intervals have elapsed. The client will be automatically subscribed to the presence status of any contact that is added.

In addition to these periodic messages, Jabber Video will also publish presence information when the user's status has been changed, either manually or because the user is in a call.

See the "Presence" section of the [Cisco VCS Administrators Guide](#) for more information about the presence server.

SIP keep alive

To make sure that the connection between the Jabber Video client and Cisco VCS remains open and does not get closed by a firewall as an idle connection, Jabber Video sends SIP Keep Alive messages.

By default the interval for these messages is 24 seconds. To configure the SIP Keep Alive Interval:

1. In Cisco TMS, go to **Systems > Provisioning > Directory**.
2. Click on the group or user you want to provision and find the **Configurations** pane.
3. Change the **SIP Keep Alive Interval** configuration if it exists, or add one.

Losing connection

If Jabber Video gets an indication that the connection has been lost or is unable to continue registering to Cisco VCS, Jabber Video will sign out and display the sign-in screen.

If the **Sign in automatically** box is checked, Jabber Video will attempt to sign in again. The first attempt will be one second after connection got lost, the second attempt after two, the third after four, then eight and next sixteen. From the ninth attempt onwards, Jabber Video will try to sign in only once every 5 minutes, to prevent putting too much strain on system resources.

Searching for a contact

Every time a user types a character in the search field of the Jabber Video client, Jabber Video queries the TMS Agent on the Cisco VCS, and the TMS Agent answers with matching results.

Note: Phone book search results are determined by the Cisco VCS/TMS Agent and dependent on Cisco VCS version.

When a search result is selected, Jabber Video will also query the Cisco VCS for the presence status of that contact.

Call setup

Call setup is communicated using SIP messages passed through the Cisco VCS. The following describes how the call's attributes are determined during call setup.

Encryption

For a call to be encrypted, both the SIP and the media communication must be encrypted, and all parties must support encryption. Encrypted media communication is sent using the Secure Real-time Transport Protocol (SRTP) with a 128-bit Advanced Encryption Standard (AES).

The Encryption policy setting is provisioned to the client as configured in [Systems > Provisioning > Directory](#) in Cisco TMS.

- *Force TLS/TCP* determines whether the SIP communication is encrypted (TLS) or not (TCP). The TLS version used by Jabber Video is currently 1.0.
- *Force/No Srtp* determines whether the media communication is encrypted or not.
- *Auto* means the Jabber Video client will try to have an encrypted call, but if not possible, it will allow the call to be unencrypted.

Note: Users can tell whether their current call is encrypted by the icon in the information bar at the top of the video window.  means the call is encrypted,  means it is unencrypted.

Sent and received bandwidth

During call setup, Jabber Video signals the maximum bandwidth it would like to receive according to the settings in the client. It is up to the system on the other end of the call to respect this signaling.

Both the maximum bandwidth to be sent during call and the bandwidth sent at the start of the call are determined at call setup.

During the call, Jabber Video can change and send more or less bandwidth, but never more than the maximum bandwidth decided during call setup.

Maximum bandwidth sent

To determine the maximum bandwidth to be sent, Jabber Video chooses the lowest of these two values:

- Max outgoing bandwidth, configured in the Jabber Video client's settings
- Max incoming bandwidth restriction from the far end

Bandwidth sent at the start of the call

To determine the initial bandwidth for a new call, Jabber Video uses its traffic data history, pulled from a database of your last 250 calls. The calls are indexed by the network locations from which the calls were made. Based on what Jabber Video knows about the network and the far end SIP URI, a "safe" initial bandwidth is chosen.

The database resides in the Windows user profile:

- Windows XP: %userprofile%\Local Settings\Application Data\Cisco\Jabber Video\2.0
- Windows Vista and Windows 7: %userprofile%\AppData\Local\Cisco\Jabber Video\2.0

Resolution

Note: High image resolution is not the only factor linked to high video quality. Frame rate, scene lighting and optical quality of the cameras used in the conference are also important.

Resolution preferences

The **Resolution Preferences** provisioning setting limits the resolution for both incoming and outgoing video. See [Provisioning the client](#).

Jabber Video for Windows treats the provisioned value as the maximum, with end-user configuration available through the client's settings. Users with older Windows computers with limited system resources may need to lower the resolution setting for their Jabber Video client to ensure that it runs smoothly.

Note: It is up to the far end to obey restrictions on incoming video.

Outgoing video resolution

Jabber Video determines which resolution to send according to the following criteria:

- Jabber Video must be able to get the resolution in native format from the camera.
- Priority is given to resolutions that can be received from the camera at 30 frames per second.
- The resolution must be permitted by Jabber Video's own settings, as described above.
- The resolution must be permitted by the receiving end.
- Sending high resolution at low bandwidth will result in poor quality. The bandwidth sent must be sufficient for the resolution:

- HD 1080p (1920x1080) requires a minimum of 2600 kb/s.
- HD 720p (1280x720) requires a minimum of 1200 kb/s.
- VGA (640x480) requires a minimum of 442 kb/s.

Increasing the bandwidth further will improve image quality. Bandwidth permissions are controlled by the **Maximum Out Bandwidth** settings, see [Provisioning the client](#).

If HD resolution is not achieved despite sufficient bandwidth as described above, this can usually be attributed to one or both of the following:

- Issues with network connection, including packet loss
- Adaptation due to high CPU usage by Jabber Video. See [Automatic CPU adaptation](#).

Incoming video resolution

Bandwidth permissions for incoming video are controlled by the **Maximum In Bandwidth** settings, see [Provisioning the client](#). The bandwidth required for incoming HD video will vary with the capabilities and limitations of each far-end endpoint.

Note that even with an HD-capable endpoint at the far end and no restrictions on bandwidth, network connection issues, such as packet loss, may still cause incoming video not to achieve HD resolution.

Presentation resolution

The maximum resolution for a shared presentation is dependent on the video codec used (H.263/H.263+/H.264), the available bandwidth, and the capabilities of the far end.

For a Jabber Video-to-Jabber Video call on unlimited bandwidth, the presentation resolution would be 1280x800.

The resolution for presentations is not configurable.

Video and audio standards

Jabber Video supports both sending and receiving the standards described below. Jabber Video will always use the best standard that is supported by the far end.

Audio

- MPEG4/AAC-LD
- G.722.1
- G.711

Note: If the bandwidth available is less than 192 kb/s and the far end supports G.722.1 at 24 kb/s, Jabber Video will send that protocol in order to free up bandwidth for better video quality.

Video

- H.264
- H.263+
- H.263

Far-end camera control and ICE negotiation

Once the call has been established, far-end camera control (FECC) and ICE are negotiated if enabled and supported by both call participants.

Please note that:

- FECC negotiations may take several seconds. The **FECC** button in the Jabber Video client is enabled once negotiations are complete.
- ICE negotiations take a couple of seconds and require nine TURN server licenses; one license for each media link.

During a call

Once a call has been set up, there are a number of actions that can be prompted in Jabber Video, either as a result of a user action or as an automated response to changing conditions.

Multiway initiation

Multiway is the ability for a user to join calls and seamlessly create a multi-participant conference. If multiway is initiated by the user, the current call is put on hold (there has to be at least one other call already on hold) and all the endpoints are redirected to a multi-conference system according to the **Multiway Participant URI** provisioning option.

Muting media streams

If the camera or microphone is muted, Jabber Video allocates the bandwidth for the other media links to use. This means that if the user does not have enough bandwidth for two video streams, it is possible to mute one video stream and improve the quality of the other stream.

To prevent the unused link from being closed (for example by a firewall), Jabber Video sends STUN keep alive messages every 7 seconds.

Automatic bandwidth adaptation

In case of a Jabber Video client sending or receiving bandwidth which exceeds the network capabilities, high packet loss may occur and the user may experience poor call quality. Jabber Video uses automatic bandwidth adaptation mechanisms to tackle bandwidth issues.

Note: Automatic adaptations take time. Configuring the client to fit the network and system capabilities is always recommended.

Automatic CPU adaptation

Running Jabber Video with the highest video quality on a less powerful computer might result in 100% CPU usage and a poor call quality. Jabber Video monitors the CPU usage of the computer.

If CPU usage exceeds 95% for 10 seconds or more:

- if Jabber Video is responsible for less than 90% of the CPU usage, it will display a warning asking the user to close other applications.

- if Jabber Video is responsible for 90% or more of the CPU usage, it will lower the resolution for the video picture sent.

Note: Automatic adaptations take time. Configuring the client to fit the network and system capabilities is always recommended.

Conference information

When moving the cursor over the video window, an information bar appears at the top. Clicking the **i** button opens **Conference information**, an overview of outgoing (transmit) and incoming (receive) traffic data.

Field name	Description
Max allowed bitrate	Restrictions taken from Jabber Video's settings.
Signaled bitrate	The signaled bitrate combines Jabber Video's restrictions with those from the far end.
Configured bitrate	The configured bitrate varies based on automatic bandwidth adaptation. This value is not transmitted to the far end.
Encryption	This field is blank if no encryption is used.
Protocol	The video and audio standards currently in use.
Resolution	The current outgoing and incoming resolution. This value changes based on automatic adaptation.
Bitrate	The actual bandwidth sent and received, which will always be equal to or lower than the configured bitrate.
Total packet loss	Number of packets lost during the call so far.
Current packet loss	Percentage of packets lost in the last five seconds (transmit) or three seconds (receive).
Post FEC total	Number of packets recovered (FEC = forward error correction) by ClearPath.
Post FEC current	Percentage of packets recovered by ClearPath in the last three seconds.
Jitter	Jitter is a continuously calculated estimate of the mean deviation of the difference in transit time of adjacent packets. The transmit jitter information is based on RTCP reports from the far end. High jitter affects the call quality and is usually indicative of poor network conditions.

Bibliography

The following table lists documents and web sites referenced in this document. All product documentation can be found on our [web site](#).

Document title	Document reference	URL
<i>Cisco Jabber Video for TelePresence Software Release Notes 4.3</i>	D14835	http://cisco.com
<i>Cisco Jabber Video for TelePresence User Guide for Windows</i>	D14409	http://cisco.com
<i>Cisco Jabber Video for TelePresence User Guide for Mac OS X</i>	D14733	http://cisco.com
<i>Cisco TelePresence Video Communication Server Authenticating Devices Deployment Guide</i>	D14819	http://cisco.com
<i>Managing Client-Initiated Connections in the Session Initiation Protocol (SIP)</i>	RFC 5626	http://tools.ietf.org/html/rfc5626
<i>PackageMaker User Guide</i>	—	http://developer.apple.com/library/mac/#documentation/DeveloperTools/Conceptual/PackageMakerUserGuide/

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