AT&T Connect®

Video Conferencing Functional and Architectural Overview

v9.5

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1. INTRODUCTION

AT&T Connect® incorporates powerful multi-point desktop video conferencing capabilities that can help employees, customers and partners, collaborate more effectively and intimately—no matter where they are located.

Solution Highlights

- Fully integrated multipoint voice, data and video conferencing solution
- H.264 video codec for superior image quality
- Existing AT&T Connect customers can activate new video capabilities quickly and easily
- Delivers professional interactive video collaboration experience from a desktop or laptop—in the office, at home, or in a conference room
- Simple and intuitive control of video transmission and image layout
- No special firewall configurations required: uses standard outbound port (:80 or :443)—same as a regular web browser
- Robust distributed server architecture routes real-time communication streams in a highly scalable, fault-tolerant, bandwidth-efficient manner
- Special techniques and algorithms for optimizing bandwidth usage and avoiding network congestion
- Provided as part of the AT&T Connect service offering with no need for on-premises components

Video Capabilities

Video conferencing is fully integrated with AT&T Connect. No special scheduling or IT preparations are required to activate video during web conferences. The AT&T Connect Windows-based Participant Application is required to use AT&T Connect Desktop Video. Only attendees who join a conference via this interface can view and/or transmit desktop video during a conference.

To manage video functionality for a specific conference, the host or active presenter can access the Participant Application's, **Conference>Conference Settings** menu and select the option to permit/restrict video transmission. Once permitted, the video icon and menu options will appear

on the Participant Application interface for those with supported cameras connected to their workstation. Note that this is a per-conference setting and will reset to the default value provisioned at the conclusion of the conference.

If the option to permit use of video is not available, users should contact AT&T Customer Care to check if video can be enabled on their account. If allowed, the feature will be activated (the feature may be restricted as a company policy).

Who Can Transmit Video During the Conference?

During a web conference, if video is allowed, the host or active presenter may adjust the video layout options to permit participants with supported USB webcams to transmit their live video to other participants connected to the event using the Participant Application. The video layout selected will determine how many live video streams may be transmitted. If all available video windows are in use by other participants, a "busy" message will be displayed."

Video Layouts

Video is displayed in **All-Same-Size** layout, in which participants view live-stream video of up to four participants in video windows of the same size: **Small (**176w x 144h) or **Large** (352w x 288h). This layout is useful in interactive conferences, when most participants are expected to share information. AT&T Connect Integrated Edition allows up to four simultaneous, standard-definition, small-sized video streams in this layout.

When several video windows are displayed, participants can arrange their local windows horizontally, vertically, or in grid formation.

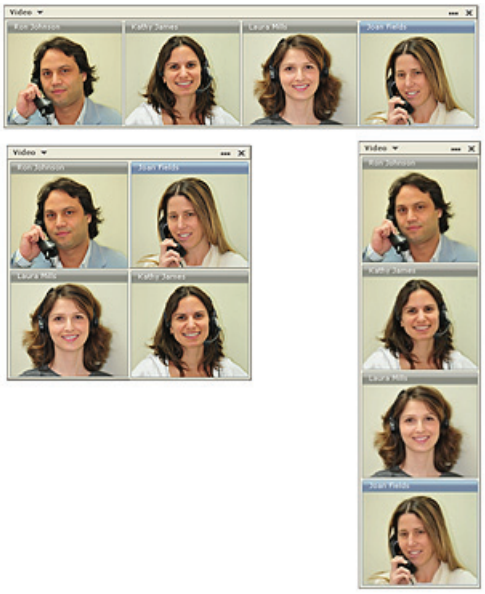

Figure 1–All-Same-Size Layout

Control Management

Host/Active Presenter

- Enables/Disables video usage during a meeting
- Defines the video resolution used for all video windows in the meeting. The options are:
  - Small: 176w x 144h (QCIF)
  - Large: 352w x 288h (CIF)
- Stops video transmission of a specific user (optional)

End-User Control

- Starts/Stops transmitting own video
- Pauses own video
- Changes the local video pane position—floating or docked
- Changes the local video pane view—horizontal view, vertical view or grid
- Full screen—locally views a participant's video stream in full screen

2. USAGE SCENARIOS

AT&T Connect Video Conferencing can typically be used in any of the following applications:

One-on-One Mentoring/Interviewing/Consultation

Video-based job interviews or professional mentoring sessions are intimate exchanges with a powerful emotional element. Interviews benefit greatly from live video's ability to transmit body language and emotional reactions. In short, the use of video yields a more natural interaction and intuitive, effective communication.

If sharing and application or using the whiteboard, it is recommended to use the small video window. This will leave adequate whiteboard space to allow participants to view the application or whiteboard content being shared.

Team Meeting/Business Meetings

Most meetings fall into this category, which can include:

- Project kickoffs, steering, and updates
- Ad-hoc brainstorming and troubleshooting
- Business meetings with customers, partners or vendors

These meetings can bring together just a handful of coworkers, or involve dozens of participants from related teams. Because these meetings involve the active participation of several users, widespread video coverage is crucial.

Training Sessions and Web Seminars

These are classroom training and instructional meetings where there is one primary speaker and limited interaction from other participants. Presenters can also demonstrate physical equipment and processes in real-time, addressing questions as they arise.

Such conferences can be performed in the AT&T Connect Integrated Edition, using the "Broadcast Mode" feature. When using this feature, the presenter and the other speakers who are part of the

“Broadcast Group” can broadcast video streams to all other endpoints in the conference. If additional participants are added to the Broadcast Group, they will be able to share their video as well (according to the standard behavior, and up to the number of allowed streams per conference).

Dual Monitors

If a presenter enables the dual monitor mode on his computer, the AT&T Connect Participant Application can be displayed on one monitor and the video pane can be displayed on the other. In this way, the video pane does not cover up important information on the whiteboard.

3. ARCHITECTURE

Each AT&T Connect client application connects to an AT&T Connect real-time conferencing server, which is part of a globally distributed network of interconnected communications servers hosted by AT&T. The AT&T Connect client application transmits an end-user's video from an attached USB desktop webcam. This client application encodes and transmits one outbound H.264 video stream to its connected server. The client application receives multiple H.264 streams from that server, decodes them, and presents them on the client computer's screen, along with any whiteboard data or shared applications being presented during the web conference.

The AT&T Connect communications server distributes incoming H.264 video streams to other servers, and to other connected clients in the conference. If network congestion causes a server's outgoing video streams for specific user(s) to overflow its sending-queue, the server automatically thins or suppresses the outgoing video steam for this user(s) until the congestion clears or more bandwidth becomes available.

4. Deployment as Hosted Service Offering

AT&T Connect video conferencing is deployed as a purely "hosted" service in which the end-users' PC applications connect to the AT&T Connect conferencing servers over public Internet connections (All conferencing traffic is encrypted end-to-end for secure transmission.)

The standard "hosted" video conferencing feature allows using the Small and Medium video layouts (as specified above). Customers need not deploy any special hardware on their premises, other than the standard USB desktop webcams used by participants. Enabling AT&T Connect on a hosted basis requires no additional networking infrastructure at the customer premises.

However, the customer's premises LAN must provide sufficient bandwidth to support the desired video conferencing traffic, and the customer must have sufficient internet WAN access available from those premises (users who are working remotely from home must have a sufficiently capable broadband connection through their residential ISP). Each inbound or outbound CIF-sized (Medium) video stream requires approximately 264 Kbps (including all frame packing, IP header, and Ethernet overhead bytes). Each inbound or outbound QCIF-sized (Small) video stream requires approximately 104 Kbps (including all frame packing, IP header, and Ethernet overhead bytes).

By default, the hosted service does not utilize any QoS measures: video streams are delivered on a "Best Efforts" basis. With suitable internet WAN bandwidth, this usually provides acceptable image quality, but there is no SLA in this arrangement and video quality can be negatively impacted by Internet traffic congestion beyond AT&T's control. If a given user's network connection has insufficient bandwidth, the AT&T Connect software will automatically attempt to reduce that user's video transmission bit rate (yielding a lower-quality video image). If available bandwidth is still insufficient, the system will automatically suspend video transmission from the particular end-user, without disturbing video transmission from other users equipped with better network connections.

5. SECURITY

Real-time conferencing streams are protected with 128-bit end-to-end SSL encryption. Specifically, all streams (audio, video, whiteboard data, application sharing screen images, etc.) pass from the AT&T client software (on the end-user's desktop) through the AT&T Connect conferencing servers, and on to other end-user PC clients. The streams are never decrypted during this transit.

Even before encryption is applied, the real-time data streams passing between AT&T Connect servers, and between servers and connected clients, are compressed and encoded for bandwidth efficiency and added security.

The architecture of the AT&T Connect solution allows participants who are located behind different firewalls to share their live video without the need for a dedicated ISDN connection. The AT&T Connect client application requires only a single outbound port (usually port 80 or port 443) to be opened on the corporate firewall. (This is the same requirements typically required for web navigation using a conventional web browser.)

6. System Requirements (for Desktop Video Conferencing)

Client Computer Requirements

Application

AT&T Connect Windows-based Participant Application

Operating Systems

- Windows XP®
- Windows 2003® Standard Edition, Web Edition
- Windows Vista®
- Windows 7®

All Operating Systems are also supported on 64 bit machines

Office/Mail Applications

- Office XP®
- Office 2003®
- Office 2007®
- Office 2010®
- IBM Lotus Notes® 8.5 and above

Supported Browsers

- Java® 1.5, 1.6
- MS Internet Explorer® 7.0, 8.0, 9.0

- Firefox® 3.6 and above
- Google Chrome®

Hardware and Bandwidth (when Using AT&T Connect Video Feature)

Hardware:

- Pentium 4®—1.5 GHz CPU
- 512 MB RAM
- Monitor with high color (24 bit) display and at least 800x600 resolution (recommended 1024x768)

Disk Space:

- 35 MB for Participant Application installation
- 100 MB to store conference materials. This setting is configurable

Average, per stream, bandwidth required (client-server connection):

- At least 256 Kbps (recommended 512 Kbps).

Please note that the required bandwidth is for the video stream with 15 frames per second. Additional bandwidth is required for other conference actions (such as application sharing). More information can be found in the AT&T Connect System Requirements End User PDF document.

Supported Webcams

- Camera should support CIF resolution or higher (VGA-enabled camera recommended)
- 15 frames per second (fps) or higher
- Video Frame Size: QCIF (176×144), CIF (352×288)
- IYUV/RGB raw video stream to computer driver

For more information on the system requirements, see *ATT_Connect_System_Requirements_v9.5.pdf*.