Solutions

COLLABORATION

A Look Under the Hood

"The 'appliance' aspect makes it easy to install, manage, and operate. I like the ease-of-use and configuration simplicity."

Kevin C. Almeroth, Associate Professor
University of California, Santa Barbara

Users Applaud the Ease-of-Use of NCast™ Technology. A Look Under the Hood Shows Why

Having a distance learning collaboration solution that does real-time, reliable encoding and transmission is great. Having that solution easy to use is even greater.

Distance learning managers and instructors want to use the Internet to conduct interactive, multimedia (audio, video and graphics) presentations and to reach remote students. They object to the high costs associated for the hardware, software, service and bandwidth, let alone the time needed to install, maintain and upgrade the systems. Distance learning managers do not want to purchase separate, sometimes cumbersome, pieces of extra equipment from different vendors. On the other hand, students who cannot go to classes or are far away from a university's main campus want access to courses remotely. To date, courses have been televised or taken online via email correspondence with limited interaction and collaboration with the instructor and other students.

Prior to NCast's vision, IP multicast was a labor intensive and expensive technology requiring integration of several different software packages. Multicast was difficult to use, the video streams were "choppy", and video and graphic streams were not integrated.

NCast has significantly contributed to the future of interactive collaboration by taking a complex set of protocols and recasting them, or restructuring them, into a very easy-to-use infrastructure based on the "TV channel" concept. NCast also added user-defined download/upload streaming speeds of high quality MPEG2, MPEG1, or H.261.

The NCast approach at simplifying multicast technology is truly revolutionary. NCast's multicast technology enables interactivity so users can collaborate in real-time with other users, allowing features such as managed floor control and polling using the same stream. Users benefit from trouble-free use and the positives of IP multicast technology -- high quality streaming, low cost, and bandwidth conservation. Since IP multicast is inherently scalable, NCast technology makes economic sense.

Let's take a closer look.

How IP Multicast Works

IP multicast is a form of networking where one computer sends information out to a group of other computers at the same time. The originator achieves this by sending packets through a special multicast address, which delivers to a group of hosts, rather than a single (unicast) host. The number of receivers in a multicast session is not limited to bandwidth of the originator (as in the case of unicast). The technology has proven to be more efficient than sending a copy of the stream to all nodes since not all may want it and users are limited to a particular subnet (as in the case of broadcast). For IP multicast only one copy of the stream will pass over any link in the network - thereby conserving bandwidth.

How NCast Made IP Multicast Easy-to-Use

NCast's made IP multicast more than just easy-to-use, NCast leveraged the inherent benefits of Internet video compression schemes MPEG-1 & 2, and H.261. NCast uses these video formats to provide many-to-many, interactive collaboration environments -- a complete feature rich environment integrated into one small hardware platform. The platform is easy to connect, configure, operate and control.

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Administration: Connecting and Configuring the Telepresenter™ M2

NCast's solution includes the Telepresenter M2, a fully integrated, factory tested system the size of a VCR, and a remote control (see Figure 1).

Figure 1. The Telepresenter M2 and Remote Controller

When the administrator first connects equipment and the IP network to the Telepresenter M2, he follows a simple process to configure each site. From the back panel, the following inputs/outputs are available (see Figure 2):

- S-video input
- S-video output
- Two Composite Inputs
- Two Composite Outputs
- NTSC
- PAL
- RS-232 serial connector
- 2 microphone inputs
- 3 Stereo line level inputs
- Stereo line level input
- 100/BT Ethernet
- 10/BT Ethernet

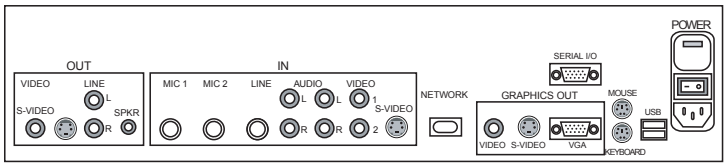

Figure 2. Back Panel of the Telepresenter M2

A number of options are available to the administrator. The Telepresenter M2 can connect to a VCR to broadcast a pre-recorded presentation to an unlimited number of classrooms or desktops anywhere on the IP network. Two Telepresenter M2s can be used, one in the classroom, connected to a camera, microphone, monitor, and the network and one at the remote site, connected to a camera, microphone, monitor, TV, and the network for live interaction, questioning and polling, sharing of graphics, and so forth. Figure 3 shows the equipment that can be conntected to the Telepresenter M2.

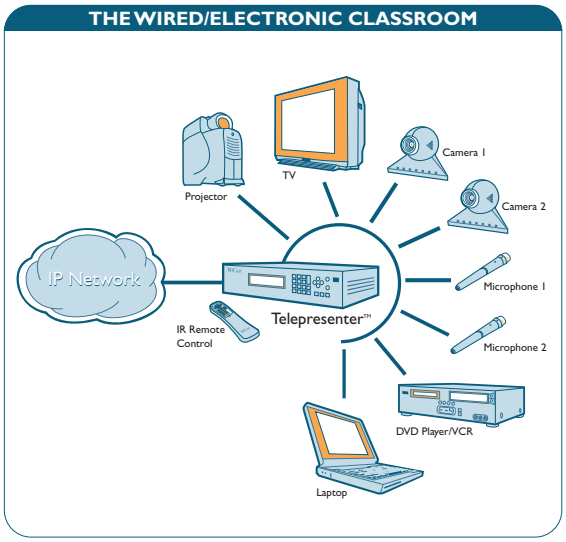

Figure 3. Connecting Presentation Equipment to the Telepresenter M2

Using the Administration Pages on the Web

The administrator opens a web browser and types in the IP address for the Telepresenter M2 after connecting the equipment. Each Telepresenter M2 on the network has a unique IP address. Once the Telepresenter M2 Web-based Administration pages appear in the browser, the Telepresenter M2 is ready for configuration. Table 1. describes the Administration Menu.

Table 1. Web-based Telepresenter M2 Remote Administration Menus

HTML Menus	Description
Main	Main Administration Page. Each of the pages listed allows the administrator to view or change options or characteristics of the controller and its functions or to check on other broadcast activity on the network.
Program Guide	Allows the user to view sessions scheduled for the network and to select a session for active participation.
Session	Gives information about the currently active session on the controller Telepresenter M2.
Session Viewers	Lists all participants currently tuned into the active session, including desktop viewers.
Video/Audio/Graphics Sources	Provides a report on the video/audio/graphics sources currently attached to the unit. Allows the administrator or user to switch input and output sources as required.
Channel Characteristics	Information about the channels in use, primarily transmission related information such as the coder/decoder, bit-rate, and multicast addresses. Network channels are configured on this page.
Unit Setup Options	Configure parameters associated with this particular controller, such as network address and names, security controls, operating defaults, etc.
Status	Detailed information on network performance, errors, traffic loads, throughput and other engineering data.
View Stream QT RO	Allows viewers to participate in conferences from their desktop and view the video stream with industry standard players: QuickTime (QT) or Real Player (RO).

"Easy to configure. Easy to enhance."

Henning Schulzrinne
Department of Computer Science, Columbia University

In the "Channel Characteristics" menu, the administrator configures each channel and enters the parameters for the video stream into a channel number, for example: "Channel 1, Chemistry 101" (see Figure 4). The administrator can configure up to 100 channels during the set-up process. A channel is made up of 66 parameters that are pre-set so the user, the teacher in the classroom or student at the remote site, simply selects the Chemistry 101 channel on a different "Today's Channel" menu accessed via the user's remote control, and the user is on the air.

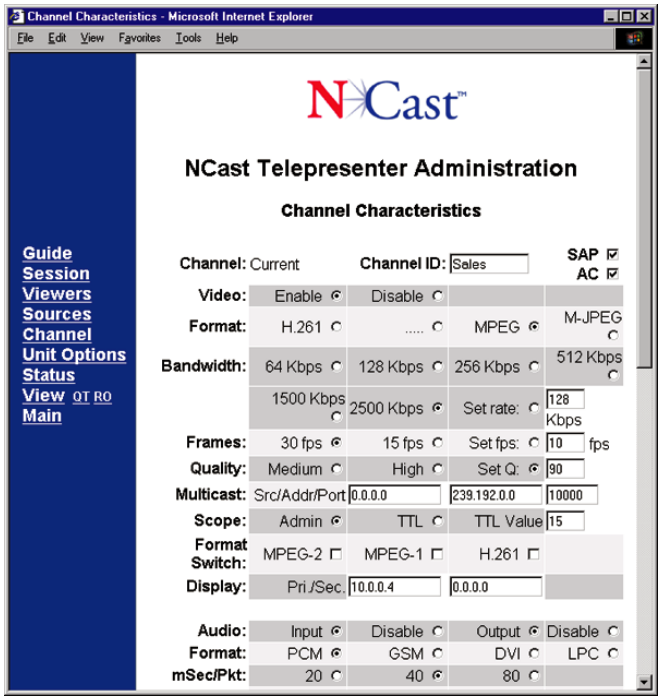

Figure 4. The Telepresenter M2 Configuration Screen

Network administrators are able to use the web Administration pages to control their own multimedia network and organize complex configuration parameters in an efficient manner. Network administrators no longer need to cringe at the idea of using video/multimedia network appliances through their corporations because a number of problems that these devices often come with. These problems include: excessive bandwidth usage, scheduling problems, network overloads, difficult multicast parameters that frustrate infrastructure development, etc.

Once configured the new location is ready to communicate with a Telepresenter M2 at a remote location or to stream video to a desktop located on the IP network, as shown in Figure 5.

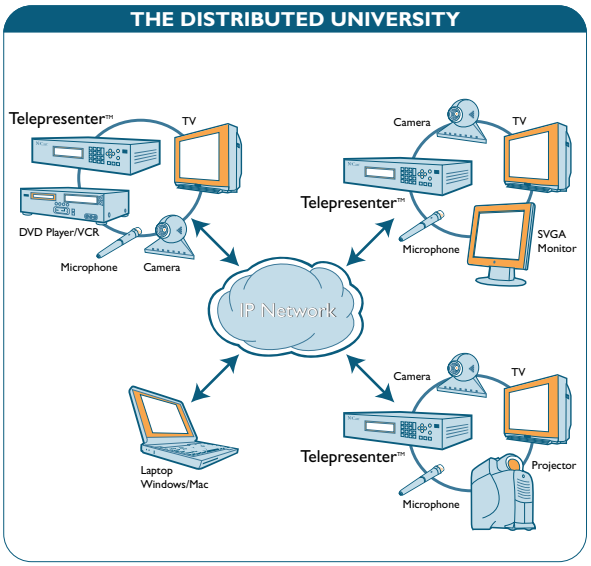

Figure 5. One-way, Two-way or n-way Interactive Media Streams to Multiple Locations

The User: Operating and Controlling the Telepresenter M2

The Today's Channel menu (GUI) lists all channels previously set-up by an administrator (see Figure 6).

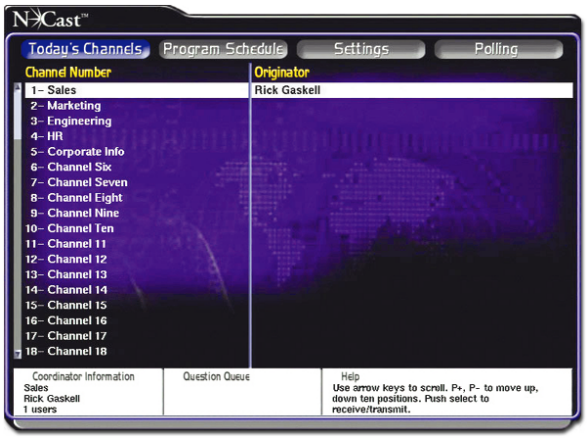

Figure 6. The Telepresenter M2 Menu-Driven User Interface

Users benefit from the Today's Channel menu by its ease of use. Traditionally, using multicast and even video appliances in general has been difficult to both setup and operate. Users are easily frustrated by interfaces that are difficult to use and comprehend. Imagine for instance, the multicast solutions that require a user to type in a primary source IP address, a Primary Display address for the display, etc. This is not easy to use. However, with the NCast solution users simply select a channel number using their remote controller. A user browses between channels and presses "Select" to join a session.

With easy-to-use menus, users can go to various areas of the user interface to control the environment. Table 2. describes each menu.

The wired Chemistry 101 class has one Telepresenter M2 with an SVGA, TV, camera and microphone connected to it. The Telepresenter M2 at the distance learning campus has the same equipment connected to it. The Chemistry professor arrives five minutes before class, turns on all of the equipment and makes sure the camera is in focus on the front of the class. Using the remote control, the professor selects the Chemistry 101 class from the Today's Channels menu. Three minutes before class starts at the remote campus, a student arrives and turns on all of the equipment, making sure the camera is focused on the students' desks. The student selects Chemistry 101 from the Today's Channels menu and connects. The professor and student both see and hear each other.

The student at the remote site can click the question button on the remote controller. The professor will see that there is a question from a remote location on NCast Central and can choose to hand-off floor control to the student. They can interact with each other, enriching the learning experience for all participants, with an easy-to-use interface and powerful technology.

Underneath this simple looking, portable network device and easy-to-use administration and user interfaces, lies a complex set of protocols. Restructuring the protocols was no easy task, but the results: remotely sharing high resolution graphics, collaborating in real-time with participants at numerous locations, and using only one voice/data stream to do it, are incredibly powerful.

Table 2. Graphical User Interface Menus

User Interface Menus	Description
NCast Central - Main Menu	A user can select video, audio, or graphic sub-menus to manipulate.
Attendees List	List of Attendees on NCast Central: attendess name, unit id, and location.
Question Queue	Area on NCast Central where pending question flashes the id of the individual posing the question.
Graphics Area	The user can select an option for graphic input on NCast Central.
Floor Control	Enables the user to browse a remote site's thumbnail id and press select on the remote control to temporarily enable that user with floor control. The remote user from that point can transmit video and graphics until the controller of the conference wishes to resume floor control. Floor Control is accessed from NCast Central.
Statistical Information	Each NCast device submits its user's identity, thumbnail and session information for availability on the network. All members of the conference can access this information from NCast Central.
Today's Channels	Pre-assigned multicast "channels" which a user can select to transmit/receive a presentation.
Program Schedule	Used for pre-announced and live broadcasts. Also adds more information to the Today's Channels Menu. The user can receive a multicast session here.
Settings	Settings Menu. The user can select an option for video input at this screen. The user can manipulate audio selection, and also raise/lower audio levels.
Polling	The Polling Menu is coordinator driven. The coordinater can choose what type of polling session to use: yes/no, good/average/bad, or multiple choice (a,b,c or d).

"The boxes are relatively easy to set up and offer good streaming video functionality with flexible bandwidth control."

Randy Anderson
Director, Network Engineering & Technology
George Mason University