High Definition H.323 MCU Proposal

Background

WestGrid provides a full complement of collaboration tools, infrastructure and expertise to researchers across Western Canada in the form of collaboration rooms and equipment located at each of the WestGrid institutions. These collaboration rooms are intended to support collaboration in all forms – whatever may be required by the researchers. With WestGrid II, the suggested configurations of these rooms includes an H.323 unit capable of sending full 720p High Definition (HD) streams between sites.

One way to increase usage and usability of this equipment is to add a Multipoint Control Unit (MCU). An MCU is a centralized server that provides additional connectivity, control and functionality for H.323 based collaborations by increasing the number of sites that can connect to meetings, easing interoperability issues, offering additional ways to participate (webstreams, webclients) and offering the ability manage and control access to these meetings via a web interface. By adding an MCU to the repertoire of collaboration services and equipment, WestGrid would be greatly enhancing the collaboration capabilities of its researchers.

Benefits

An MCU is a videoconferencing server that provides interoperability and bridging capabilities to H.323 video conferences. While many of the newer H.323 units provide some form of 'built-in' MCU, making the units themselves capable of connecting up with multiple sites (usually 4 to 6 sites), this is not the main functionality of these endpoints and the MCU capability is usually limited in functionality in some way. The main differences between the built-in MCU's and an actual MCU server is in the number of concurrent connections/sites and the layout options provided, enhanced interoperability, the addition of real-time stream transcoding capabilities, the option of web clients and webstreams, the intelligent distribution of the processing and network load, and the ability to manage meetings and collaborations via a web interface.

Additional Concurrent Connections and Layout Options

When using an endpoint as an MCU, typically you are limited in both the number of sites you can connect together, and in how the video feeds are represented at each site. The typical layouts are 'Continuous Presence' (CP) where more than one video feed is visible at the same time (grid layout) and 'Voice Activated' (VA) where the video feed from whichever site is currently speaking is the only feed that is visible at any given time. For most endpoint MCU solutions, users are left with either a CP layout when up to 4 sites are connected, and VA for meetings involving up to 6 participants. This layout choice is decided by the bridging site and connecting sites have very little options to customize their own layouts.

With an MCU, both the site limitation and layout limitation are removed. MCU's, depending on their model/size and configuration are typically capable of handling over 20-24 standard definition (SD) concurrent connections or 12 to 24 High Definition (HD) connections. These connections may all be participating in a single meeting or may involve multiple scheduled and ad-hoc meetings. This capability is usually expandable by either adding additional servers or modules. Further, most MCU's allow each site to decide on their own layout, so that sites can decide the best layout of video feeds based on their own equipment and room configurations.

Enhanced Interoperability and Ease of Use

While all vendors espouse interoperability as an important feature of their H.323 end units, the reality is that interoperability issues are a day to day struggle for video conference users and technicians. For almost every new H.323 based meeting, a test session prior to the meeting involving technical staff is required to ensure that the two units will in fact interoperate. One of the benefits of using an MCU is that the MCU will provide a much greater level of interoperability. Usually, as long as all of the clients can connect to the MCU, the connection will succeed – and since MCU providers depend on the ability to connect to a wide range of units, interoperability is usually greater.

AARNet (Australia's Academic and Research Network provider) ran a detailed survey on Video over IP and found that lower than expected use was mainly due to interoperability issues, and that end users want video conferencing to 'just work'. (reference: http://www.aarnet.edu.au/library/aarnet_video_over_ip_survey_report_final.pdf)

Since most MCU's come with add-on 'firewall traversal' options, usually require less end user setup and help in minimizing interoperability issues, an MCU will help to alleviate the issues found. One AARNet representative noted that 'often when you can't achieve a point-to-point connection, the [MCU] provides the glue to pull things together' to facilitate the connection.

Real Time Stream Transcoding

One of the key limiting factors when using an end unit as an MCU is that these units do not have the capability to offer different streams to different participants depending on their capability. For example, if four sites are connecting to a single LifeSize H.323 unit – three with full HD capability, and one with a low bandwidth SD unit, all parties end up with viewing the same low bandwidth SD stream since the stream quality is based on the 'lowest common' capability of the units. This is unfortunate since the majority of sites are capable of much greater bandwidth and quality; however, since the built-in MCU's on the end points are not capable of transcoding, this is the best they can offer.

A full MCU, on the other hand, can provide different streams/qualities to different clients based on the client's capabilities. HD sites will receive HD streams (SD streams will be 'upsampled') while SD sites will receive SD streams (HD streams will be 'downsampled')

Web Clients and Web Streams

Most MCU's provide the some form of thin 'web-client' connection to existing meetings. These clients can connect to existing H.323 based meetings via a webpage with a simple downloadable client. Additionally, the MCU's typically provide a solution for allowing passive attendance via a webstream.

Load Distribution

When using an end point as an MCU, you are placing the network and processing load of connecting all of the sites together on a unit that may or may not have the processing power required and may or may not be in a network location capable of handling the task. Most end points are on a client network segment, behind client firewalls and may not have the network bandwidth or capability to handle the increased load of multiple sites streams. Furthermore, when working as an MCU, these endpoints have to work much harder than would normally be required since they are handling the task of redistributing the streams. Our experience has been that when connecting multiple sites to endpoints, the overall quality of the meeting/event drops fairly dramatically as each site is added. When using a dedicated unit to handle the stream distribution, adding sites should not affect overall meeting quality. Furthermore, with an MCU, the server would be on dedicated equipment built for the task and located in a server room with high bandwidth capabilities.

Centralized Administrative Management

Another key benefit of using an MCU is the addition of a central web-based administrative interface to manage collaborations. Most MCU's offer detailed technical management capabilities such as the ability to view conference details, create or cancel conferences, control conference access, and monitor and manage behavior within the conferences.

Administrative users can view details about ongoing and future events and have the ability to adjust parameters and current connections to control who can access or participate in the event.

Other Organizations / Success Stories

To determine the effect on the use of collaboration equipment and the quality of collaborations when using an MCU, I have been in contact with two organizations that are using MCU's as part of their collaboration infrastructure. These groups are KAREN, the organization that provides high-speed, high-capacity Internet to New Zealand researchers, and AARNet, the Internet services provider for the education and research communities in Australia. Both of these organizations have MCU's as part of their collaboration infrastructure and both report that these installations have been successful.

The New Zealand group reported they they are using a Codian 4500 bridge and have been happy with the results and capabilities.

The AARNet group indicated that they are currently running 2 Codian MCUs – a 4510 (HD) and a 4220 (SD) together with Codian IPVCR and Tandberg Content Server. These units provide for a complete H.323 collaboration capability and a cohesive collaboration infrastructure.

When asked about the decision to go with Codian, AARNet responde by noting that they 'saw it as a best of breed solution' and that they are very happy with the decision. They also noted that 'one of the most important factors is our very close relationship with Codian team that provide excellent support' – helpful to quickly diagnose and solve interoperability issues, etc.

Options

The two main MCU manufacturers are Codian and Radvision. Codian, which was purchased by Tandberg last year, is seen by many as a 'best of breed solution' but is also, typically, the priciest. Radvision is also a well respected manufacturer, and has recently teamed with LifeSize to produce a rebranded Radvision MCU called the LifeSize Multipoint.

Most MCU's refer to 'number of ports' which roughly translates to the number of concurrent standard definition (SD) connections the unit can handle at any particular time. This ranges from 12 to 24 (and up) depending on model and options. For HD connections, each connection requires more than one port, so typically this means a 24 port MCU can handle approx 16 concurrent HD connections – although the 24 port LifeSize Multipoint can handle 24 concurrent HD connections. These can be part of a single meeting, or part of multiple meetings held concurrently.

Some additional features and options that affect cost are the ability to record sessions, scheduling, web streaming and the ability to allow web clients to join meetings. Both offer these functionality – some requiring additional cost and equipment.

Additionally, Codian offers a chassis/card solution where you buy a slotted chassis and add functionality in the form of cards. This option is more expensive up front, but is an interesting solution long term when upgrades are considered. Further, if splitting the cost among different groups and consortia, it could be an easy way to separate costs.

Finally, both offer a range of maintenance, replacement and warranty options which can substantially affect cost.

Costs

I have received the following preliminary quotes from Commercial Electronics (Tandberg) and Canadian Communication Products (LifeSize/Radvision). These quotes are 'preliminary' and should be viewed as budgetary only.

Canadian Communication Products – LifeSize/Radvision:

24 Port IP LifeSize Multipoint	$ 51,999.00
(LifeSize Extension requires customer provided server)	
Recording (1 Concurrent License)	$ 9,500.00
Installation/Training	$ 8,000.00
1 Year Enhanced On-Site Support (based on Vancouver)	$ 10,500.00
1 Year Advance Replacement	$ 4,056.00
1 Year Warranty on Recording License	$ 1,256.00
All taxes extra	**$ 85,311.00**

Commercial Electronics – Codian/Tandberg:

Option 1 – Tandberg Codian 4500 High Definition MCU

MCU-4510 20 Port MCU (Maintenance Contract Required)	$113,198.00
WCO-4510 Web Conferencing Option	$ 18,900.00
One Year Maintenance Contract	$ 7,290.00
Installation and Training	$ 16,470.00
All Taxes Extra	***$155,858.00***

Option 2 – Tandberg Codian 4200 Enterprise MCU (Standard Definition)

MCU-4210 20 Port MCU (Maintenance Contract Required)	$ 38,172.00
One Year Maintenance Contract	$ 7,290.00
Installation and Training	$ 4,955.00
MCU 4200 Video Firewall (Optional)	$ 13,514.00
HD Resolution Option	$ 7,248.00
All Taxes Extra	**$ 71,215.00**

Option 3 - Tandberg Codian MSE8000 – Chassis/Card Based Solution

MSE-8000 Chassis

MSE-8000 - B2 Media Services Engine chassis – 10 slot chassis - 1 MSE 8050 Supervisor blade - 2 MSE8010 Fan Trays - 1 MSE 8026 Dual power shelves including AC/DC rectifier modules (Maintenance Contract Required)	$ 45,302.00
One Year Maintenance Contract	$ 3,375.00
Installation and Training	$ 5,643.00

Components

Note: Requires port licenses to enable port functionality	
MSE-8510 Media Blade - 20 HD video Ports or 80 448P ports	$ 86,873.00
One year maintenance contract	$ 3,375.00
Installation and Training	$ 12,703.00

Port Licenses

Media Port License – 20 HD Licenses ($3,686 each)	$ 73,720.00
Installation and Training	$ 513.00
All Taxes Extra	**$231,504.00**