Level 1 Technical
Universal Video Collaboration
1 - Glossary

Level 1 introduced three distinct learning paths which all converge when discussing telepresence solutions. They are Polycom terminology for features and functions, technical network terminology which is used to detail how those features and functions work, and also the actual solutions themselves.

We will develop each of these three paths further through each training level, but first we will recap the key points covered so far which specifically apply to resource management and take a look at what is coming up.

Polycom terminology

- H.264 High Profile – unprecedented bandwidth efficiency of up to 50% less bandwidth utilization
- Dynamic resource allocation – best per-call value with up to 3.5 times more capacity than competitive solutions by only using the resources required for each connection

Polycom Universal Video Collaboration solutions

- RealPresence Collaboration Server (RMX) – a network-based video conferencing bridging solution that can support the following functionality with no requirement for additional gateways:
  - H.323
  - SIP
  - SVC
  - ISDN
  - RTV (Microsoft Lync/OCS 2007 R2)
  - Cisco Telepresence Interoperability Protocol (TIP)
2 - Features

Polycom has a long history of success in conferencing and collaboration. Its groundbreaking MGC series of MCUs set the standard for multipoint conferencing when they were introduced in 1997. The RMX series was introduced a decade later to support higher resolution conferencing and has now expanded and been renamed to include a full line of RealPresence Collaboration Server products and complementary solutions to help customers maximize group communication with outstanding audio, video, and content sharing.

Polycom conference platforms are designed to increase user adoption of video collaboration tools and maximize return on investment by delivering unmatched performance, flexible resource optimization, and high-quality user experiences to all parts of the organization.

Software Keys

As mentioned in Level 1, a software key is used to ‘unlock’ extra features should they be required by the customer. Software keys are available for the following features:

Resource Licenses

Can be purchased for any RealPresence Collaboration Server in multiples of 15 resources. Please note that it is only possible to license the hardware resources available. If more licenses than resources exist, the RealPresence Collaboration Server will show an error until the hardware resources are increased.

Encryption

This is not available in all regions and is a no charge upgrade where it is available for all RealPresence Collaboration Server options.

Telepresence Support

In order to use the RealPresence Collaboration Server as a conference platform with the RealPresence Immersive solutions, this license is required. When it is installed, Telepresence Mode is activated, which enables a layout with no background or borders around the participants.

Network Separation

Network Separation is used in multi-tenanted environments. Multi-tenancy is where one piece of infrastructure is shared across more than one subnet (section of the network). It is most commonly used in a service provider environment where a customer is provided with a subnet for their private use. With network separation implemented, a customer could also be allocated a portion of a RealPresence Collaboration Server as well.

ISDN capability

This license is automatically provided when an ISDN card is purchased for a RealPresence Collaboration Server, and is required to configure the ISDN service needed to enable ISDN/PSTN audio and ISDN video.

HD CP (Continuous Presence) capability

This license is only required to unlock HD CP capability on an MPMx-Q card (see below).

Transcoding

Transcoding is the powerful inner working of the RealPresence Collaboration Server when using AVC to receive and deliver audio and video traffic in multiple protocols, and allowing everyone to see and hear each other regardless of their communications protocol. Digital Signal Processors (DSPs) are special computer chips used for real-time media such as video and audio, and they are required for transcoding, which translates between the many protocols transmitting H.323, SIP and ISDN audio and video.
Transcoding also allows each participant to connect at their own resolution and receive the same resolution back from the RealPresence Collaboration Server. So a participant on the local network connects at 1080p and sees a 1080p picture. But a participant connecting via a laptop at 256k as they are on a home internet connection receives a picture in SD. This also works for audio participants, so an end-user on a cellphone can join a call with video endpoints.

As the RealPresence Collaboration Server Virtual Edition is a software solution, it does not use DSPs. This is why the AVC capabilities are more restricted than the dedicated chassis models.

Meeting Rooms
A meeting room, sometimes referred to as virtual meeting room or VMR when integrating with a Virtualization Manager (DMA), is configured on the RealPresence Collaboration Server with an ID allowing direct entry into a ‘conference’, the first to call the Meeting Room ID initiates the session. A RealPresence Collaboration Server can support many meeting rooms, so depending on customer workflow these could be a few individually ‘bookable’ rooms, or you could generate a room per user to allow an adhoc conference space for each user, or one might create a mix of generic and individually assigned rooms.

Meeting Rooms are one place where a RealPresence Collaboration Server might host multipoint conferences. They are pre-configured with Conference Profile and ID, so that all one has to do is dial the number, and if resources are available, off you go into a conference.

Conference Profiles
A conference profile is basically a template which is used to define a number of settings within the conference. The heart and soul for multipoint conferencing on a RealPresence Collaboration Server is the Conference Profile. You will be working with them extensively in the ILT, so we’ll keep it brief here.

In the RealPresence Collaboration Server Management pane within your Web interface under Rarely Used, is where you’ll see the Conference Profiles option. By clicking it, the List Pane will show you all existing profiles on the RealPresence Collaboration Server and along the top of the List Pane, you’ll be able to add, modify, and delete profiles to your heart’s content. Conference Profiles are applied to Meeting Rooms and conferences, and set the conference environment.

The layout of the conference is one of the settings defined in the profile, and there are two basic types. The first is continuous presence (often abbreviated to CP) which is sometimes described as the ‘Brady Bunch’ or ‘Hollywood Squares’ effect. As many as 16 participants can be seen in the display at any time, so that many participants can join in and be viewed by the others. The second type of layout is voice-switched (often abbreviated to VSW), where all participants only see the speaker. As the speaker changes, the view on each endpoint changes. The RealPresence Collaboration Server does not switch immediately to prevent any issues from sudden noises like sneezing or coughing.

Entry Queue
You’ve probably called the main number of a company and when the receptionist (or auto-attendant) answers, you are asked for an extension or name for the “party you wish to reach”. Well, Entry Queues are used in multipoint, multi-conference environments in a similar fashion.

When you dial a RealPresence Collaboration Server using an ID to one of its Entry Queues, you will hear an Interactive Voice Recording (IVR) prompt asking you for your Conference ID or passcode (depending upon whether it’s a general Entry Queue with ad hoc conferencing enabled or a Specific Queue for a conference requiring a password). You learn the details of Entry Queues and experience them first-hand in the RealPresence Platform Level 2 ILT. So,
in the meantime, you might say the Entry Queue is the RealPresence Collaboration Server lobby and serves as an entry point into a conference.

**Dynamic Resource Allocation**

As mentioned above, dynamic resource allocation is a key part of the value proposition for the RealPresence Collaboration Server. By only utilizing the resources required for each connected endpoint, the RealPresence Collaboration Server works extremely efficiently to manage the maximum number of endpoints possible, maximizing the customer investment.

**Video Clarity**

Video Clarity is a powerful feature of RealPresence Collaboration Server systems that was touched upon briefly in Level 1, and is ideal for customers with mixed endpoint environments supporting all resolutions.

It upscales QCIF to CIF, CIF to SD and SD to HD 720p in mixed conferences without using any additional resources.

For example, if a CIF endpoint is sending video streams, the RealPresence Collaboration Server would send those streams out as SD streams to SD-capable endpoints, without taking any more RealPresence Collaboration Server processing resources. This will be especially apparent in asymmetric layouts (one big screen with lots of little screens on the side) or 1x1 layouts. If all CIF endpoints are in a call, there will still be a quality improvement with Video Clarity turned on, as sharpness filters will be applied to the video streams, despite the fact they won’t be upscaled.

Customers also have several high definition options to choose from. These options include 720p30, 720p60, and 1080p. When seeing clearly can save someone’s life video quality becomes very important.

**Gathering**

When dialing into a conference the gathering feature can be enabled to show the title of the meeting, the number of attendees, and a small image of each participant, along with optional (configurable) information such as dial in details. At the meeting start time, the gathering screen disappears, leaving the participants to carry on their meeting as usual. Any additional participants who join the conference later will see the gathering screen for a configurable duration before also fully joining the meeting.

Gathering is a useful feature in any environment where it’s desirable to ensure you are in the correct conference.

**Cascading**

Imagine holding a call on multiple RealPresence Collaboration Servers where participants join by calling into a meeting room (logical spot on a RealPresence Collaboration Server where multipoint conferences are hosted) in their respective geographic location and then calls are placed between meeting rooms to tie them all together into one multi-bridge conference. This is referred to as cascading and is supported between all members of the RealPresence Collaboration Server series.

**RSS 4000 Recording Links**

The RealPresence Collaboration Server can also be integrated with the RSS 4000 to provide recording and streaming capability for conferences. Many companies use this function to allow people who miss meetings to hear and see what went on, or to purposefully keep recordings for reference and historical reasons. It is often used in education for teachers to deliver real-time lessons and simultaneously record them for future delivery. A church with satellite campuses and homebound members can participate in services from a variety of venues, and then the recording would be available to distribute over the Internet and on PDAs. There are many reasons for simultaneously recording and streaming a conference.
Polycom Conferencing for Outlook (PCO)

The RealPresence Collaboration Server is the key ingredient of PCO. By implementing PCO, calls can be scheduled through Outlook with a single click. This works by assigning a random meeting room number which is attached to the meeting invitation; this can then be used by the meeting room participants.

This solution works in conjunction with Active Directory and enables not only resource (ie endpoint) booking but also room booking when correctly implemented.
3 - Architecture

Meet The Family

There are three different chassis in the RealPresence Collaboration Server appliance family, all using the same software but on different platforms to enable the most flexible solution for any given situation.

Each can boast all the features and benefits listed above but with distinctive features of their own.

The RealPresence Collaboration Server 4000, shown to the right, allows up to 260 concurrent connections in HD in a non-SVC (AVC) environment, and up to 780 concurrent connections in an SVC environment. It also allows AC or DC power connectivity for use in a service provider environment, and with the addition of optional ISDN cards can support up to 400 audio calls.

The RealPresence Collaboration Server 2000, shown to the left, allows up to 130 concurrent connections in HD in an AVC environment, and up to 390 concurrent connections in an SVC environment. Adding ISDN cards means that the RealPresence Collaboration Server 2000 can support up to 260 audio calls.

The RealPresence Collaboration Server 1800, shown to the right, allows up to 75 concurrent connections in HD in an AVC environment, and up to 225 concurrent connections in an SVC environment. There is no ISDN option, but up to 150 VoIP connections are supported.

The RealPresence Collaboration Server 1500, shown to the left, allows up to 30 concurrent connections in HD in an AVC environment, and up to 90 concurrent connections in an SVC environment. It also has an ISDN option, supporting up to 360 audio calls.
In addition to the four appliances available, the RealPresence Collaboration Server Virtual Edition provides Polycom’s first software-based collaboration server solution. Designed and calibrated for SVC conferencing, it allows up to 20 concurrent connections in HD in an AVC environment, and up to 60 concurrent connections in an SVC environment.

While mixed AVC and SVC calls are possible on all the RealPresence Collaboration Servers, the maximum capabilities of AVC and SVC are reduced when the Collaboration Server is processing both AVC and SVC in the same call.

**Chassis**

One way to achieve scalability in a conference bridge is through deploying scalable hardware architecture following industry-recognized Advanced Telecom Computing Architecture (AdvancedTCA) specifications. These are used in the RealPresence Collaboration Server conference platforms.

AdvancedTCA blade and chassis architecture standards define how best to design the high-speed external interfaces with even higher speed internal connections and processors (to avoid bottlenecks), recommend how blades should be implemented (with ample space for continuing innovation), and determine how to calculate and provide redundant electrical power and cooling capacity (to accommodate current and future requirements). With this modular design scheme, right-sizing, integrating with a variety of communications protocols, and upscaling solutions becomes as easy as hot-swapping or adding a blade to the conference bridge.

The backplane of the RealPresence Collaboration Server is referred to as a shelf, and each RealPresence Collaboration Server has dedicated shelf management to facilitate automated remote hardware monitoring and health even when the device is powered OFF (component by component). The shelf can be configured with an IP address on the management VLAN without taking away any payload bandwidth. Administrators can retrieve inventory information and perform basic recovery operations, such as remotely power cycle the chassis or reset blades. And, field maintenance (both planned and upon failure) becomes a simple task with easy-to-access, hot-swappable components. The RealPresence Collaboration Server 1500 and 1800 are integrated chassis with internal (inaccessible) components not all of which are field-replaceable.

**Software**

As previously mentioned, all the RealPresence Collaboration Server models covered here use the same software version. We would always recommend a customer install the most recent software suitable for their RealPresence Collaboration Server hardware, but the customer must make sure the release notes have been checked to ensure which version should be used.

As much as hardware and network stability determine function, performance and capacity, software versions also play a part, so using the correct software is crucial.

**Media Processing**

The connecting factor between the different chassis is the architecture with which they are built. At the heart of each is the Media Processing Module, or MPM card. These cards contain digital signal processors (commonly known as DSPs) which are literally the processing power that generates the video and audio streams. The RealPresence Collaboration Server 1500 has one card, the RealPresence Collaboration Server 2000 has up to two in blade form, and the RealPresence Collaboration Server 4000 has up to four, also in blade form.

The MPM cards have been developed over time and have gone through a number of iterations. It is important to be aware of these iterations to successfully deal with customers who have existing RealPresence Collaboration Server hardware; each card has its own software limitations and requirements.
The original MPM cards were available in MPM-F or MPM-H capacities. The F (full) card was capable of up to 80 resources or 20 concurrent HD connections, and the H (half) card was capable of up to 40 resources or 10 concurrent HD connections. It was hardware restricted, meaning that there were literally half the DSPs on the card.

Following this, MPM+ cards were released in MPM+80 and MPM+40 capacities. These followed the capacities of the original cards, giving a ‘full’ and ‘half’ card. The MPM+ card was required to support ISDN and asymmetric 1080p resolution (meaning that dialing into it at 1080p would only receive a 720p picture).

The next cards are MPMx, which are available in three capacities; MPMx-Q, MPMx-S and MPMx-D. These three are again hardware differences, which limit the capacity of the cards to 15, 45 and 90 resources respectively. The MPMx hardware revision introduced symmetric 1080p support, full Microsoft support and H.264 High Profile support, amongst others features.

The resource figures differ because the dynamic resource allocation calculations are more efficient (using fewer resources to achieve higher resolution). Using MPMx, the following table shows the resource calculation:

<table>
<thead>
<tr>
<th>Resolution</th>
<th>Resources</th>
</tr>
</thead>
<tbody>
<tr>
<td>Voice only</td>
<td>0.25</td>
</tr>
<tr>
<td>CIF</td>
<td>1</td>
</tr>
<tr>
<td>4CIF (SD)</td>
<td>1.5</td>
</tr>
<tr>
<td>720p 30fps</td>
<td>3</td>
</tr>
<tr>
<td>720p 60fps</td>
<td>6</td>
</tr>
<tr>
<td>1080p 30fps</td>
<td>6</td>
</tr>
</tbody>
</table>

When using voice switching, resources are used in the same manner, unless the profile is specifically set to use a specific resolution. Where this is done, only one resource will be used for each endpoint as no transcoding is necessary, even if HD is used, however, any endpoint which does not connect at that resolution will be reduced to audio only.

The most current iteration of cards is MPMRx, which is available in hardware restricted S or D versions. MPMRx technology introduces 1080p at 60fps video symmetrically (upstream and downstream) and 1080p at 30fps content for RealPresence Collaboration Server 2000 and 4000; 1080p at 60fps asymmetrically (30fps upstream / 60fps downstream) for RealPresence Collaboration Server 1800; and a maximum 6Mbps line rate through the range.

The resource calculation for MPMRx changes due to the ability to achieve mixed AVC and SVC calls. For this reason, rather than look at individual resource usage for individual connections, instead we look at the maximum achieved per card, which is as follows for the MPMRx-D:

<table>
<thead>
<tr>
<th>Resolution</th>
<th>Connections</th>
</tr>
</thead>
<tbody>
<tr>
<td>Voice only</td>
<td>150</td>
</tr>
<tr>
<td>CIF</td>
<td>150</td>
</tr>
<tr>
<td>4CIF (SD)</td>
<td>150</td>
</tr>
<tr>
<td>720p</td>
<td>75</td>
</tr>
<tr>
<td>1080p 30fps</td>
<td>37</td>
</tr>
<tr>
<td>1080p 60fps</td>
<td>18</td>
</tr>
</tbody>
</table>

It is also worth mentioning that although we are discussing hardware restrictions here, when architecting a solution we also need to include licenses for the correct number of resources; these licenses ‘unlock’ the hardware required. For example, it would be possible to sell a 90 resource / 30HD RealPresence Collaboration Server with a license for only 5HD calls. Until further licenses were added, only 5HD concurrent connections would be achievable.
One final point with regards to the different cards; in a situation where a customer has existing hardware and wishes to add additional resources, different MPM cards are not interchangeable. If the existing RealPresence Collaboration Server is MPM or MPM+, it will either require upgrading to MPMRx throughout, or the additional card would need to match the existing MPM or MPM+ hardware. This would be a less preferable option as all the benefits of the MPMRx card could not be achieved.

As a comparison, here is a table showing the capabilities of the RealPresence Collaboration Server Virtual Edition.

Note that as the software solution does not require DSPs, the calculations for Dynamic Resource Allocation are different:

<table>
<thead>
<tr>
<th>Resolution</th>
<th>Resources</th>
</tr>
</thead>
<tbody>
<tr>
<td>Voice only</td>
<td>0.33</td>
</tr>
<tr>
<td>CIF</td>
<td>1</td>
</tr>
<tr>
<td>4CIF (SD)</td>
<td>1</td>
</tr>
<tr>
<td>720p 30fps</td>
<td>2</td>
</tr>
<tr>
<td>720p 60fps</td>
<td>-</td>
</tr>
<tr>
<td>1080p 30fps</td>
<td>-</td>
</tr>
</tbody>
</table>

**Chassis Components**

Other than at least one media processing module, the chassis comprises the shelf, power supply, fan unit, management (control) unit and IP card. It might also have an ISDN card if implemented. The RealPresence Collaboration Server 4000 also has a switching fabric module which provides a high-speed network link between the MPMx cards, and additional power supplies.

In addition, each RealPresence Collaboration Server has at least one USB port and is supplied with a USB drive. This drive contains documentation and some configuration, including the configuration file (lan.cfg) mentioned in Level 1. lan.cfg may be manipulated in a text editor, but this should be avoided as it is very easy to alter the layout, rendering the file unusable. Instead, use the utility provided on the USB drive called LanConfigUtility if the IP addresses need to be changed using the USB port.
5 - Conclusion

This guide has provided an introduction to the RealPresence Collaboration Server range and how it fits into the RealPresence Platform. Your next step following the qualifying assessment will be Level 2 Instructor-Led Training, where you will learn more about how to set up, configure and manage the RealPresence Collaboration Server range of conference platforms.

Available Resources

There are several references to online documentation and other resources. Therefore, it will be beneficial if you have access to the Internet as you work your way through this self-paced material.

Before you begin, please take a moment to familiarize yourself with the following:

Solution brochures –


Product documents & downloads –
http://support.polycom.com/PolycomService/support/us/support/network/index.html

- RMX Quick Installation Guide
- RMX Getting Started Guide
- RMX Hardware Guide
- RMX Administrator’s Guide

Infrastructure solution matrix (registration to Polycom Connect required)

- From the homepage Resources > Sales Tools > Product Reference Matrices
- Select NA (North America) or ROW (Rest of the World)