Level 2 Development Training

Universal Video Collaboration
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1 – Introduction

Overview

This document is intended to be a self-study guide to be used to prepare the reader for the subsequent Level 2 Instructor-Led Training (ILT) courses on the RealPresence Platform.

Level 1 introduced three distinct learning paths which all converge when discussing the RealPresence Platform. They are Polycom terminology for features and functions, technical video 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 cover some more commonly used terms to assist with the other Level 2 Development modules and help lay a foundation moving forward into Level 2 and beyond.

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:

- **White papers** – http://www.polycom.com/products/resources/white_papers/index.html
  - RMX Quick Installation Guide
  - RMX Getting Started Guide
  - RMX Hardware Guide
  - RMX Administrator’s Guide
- **Video solution matrix** (registration to the Partner Resource Center required)
  - From the Partner Resource Center (PRC) Home page > Sales & Marketing Toolkit > Sales Tools > Product Reference Matrices
  - Select NA (North America) or ROW (Rest of the World) version, depending upon your location
2 - Overview

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.

Level 1 Recap

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 Resource Management solutions

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

Level 2 Overview

We will now begin looking specifically at the RMX family, how it is built and how the entire range fits together in terms of value proposition and positioning.

We will also take a deeper look at some of the features and benefits and introduce some more concepts which are often part of discussions involving recording and streaming solutions.
3 – Key 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 to include a full line of RMX 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.

Meet The Family

There are three different chassis in the RMX 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 RMX 4000, shown to the right, allows up to 120 concurrent connections in HD. 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 1440 audio calls.

The RMX 2000, shown to the left, allows up to 60 concurrent connections in HD. Adding ISDN cards means that the RMX 2000 can support up to 720 audio calls.

The RMX 1500, shown to the right, allows up to 30 concurrent connections in HD. It also has an ISDN option, supporting up to 360 audio calls.
**Transcoding**

Transcoding is the powerful inner working of the RMX receiving and delivering audio and video traffic in multiple protocols, and allowing everyone to see and hear each other regardless of their communications protocol. The DSPs mentioned earlier are required to transcode, 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 RMX. 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.

**Meeting Rooms**

A meeting room (sometimes referred to as virtual meeting room or VMR when integrating with a DMA) is configured on the RMX with an ID allowing direct entry into a ‘conference’ - the first to call the Meeting Room ID initiates the session. An RMX 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 an RMX 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 an RMX is the Conference Profile. You will be working with them extensively in the ILT, so we'll keep it brief here.

In the RMX 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 RMX 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.

**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 an RMX 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 your SE Level 2 class. So, in the meantime, you might say the Entry Queue is the RMX's 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 RMX. By only utilizing the resources required for each connected endpoint, the RMX works extremely efficiently to manage the maximum number of endpoints possible, maximizing the customer investment.
Video Clarity

Video Clarity is a powerful feature of RMX 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 RMX would send those streams out as SD streams to SD-capable endpoints, without taking any more RMX 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.

Cascading

Imagine holding a call on multiple RMXs where participants join by calling into a meeting room (logical spot on an RMX 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 RMX series.

RSS 4000 Recording Links

The RMX 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 RMX 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.
4 - Architecture

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 RMX 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 RMX is referred to as a shelf, and each RMX 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. As the RMX 1500 is an integrated chassis with internal (inaccessible) components not all of which are field-replaceable.

Software

As previously mentioned, all the RMX models covered here use the same software version. We would always recommend a customer install the most recent software suitable for their RMX hardware, but the customer 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 the literally the processing power that generates the video and audio streams. The RMX 1500 has one card, the RMX 2000 has up to two in blade form, and the RMX 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 RMX 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 dialling into it at 1080p would only receive a 720p picture).

The current 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 now 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>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>

It is also worth mentioning that although we are discussing hardware restrictions here, when architecting a solution we also need to include licences for the correct number of resources; these licences ‘unlock’ the hardware required. For example, it would be possible to sell a 90 resource / 30HD RMX with a licence for only 5HD calls. Until further licences 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 RMX is MPM or MPM+, it will either require upgrading to MPMx 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 MPMx card could not be achieved.

**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 RMX 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 RMX 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 a further foundation to the fundamentals covered in the Level 1 Infrastructure Overview Course.

It will be of assistance when working through the Level 2 Development courses and ILT.