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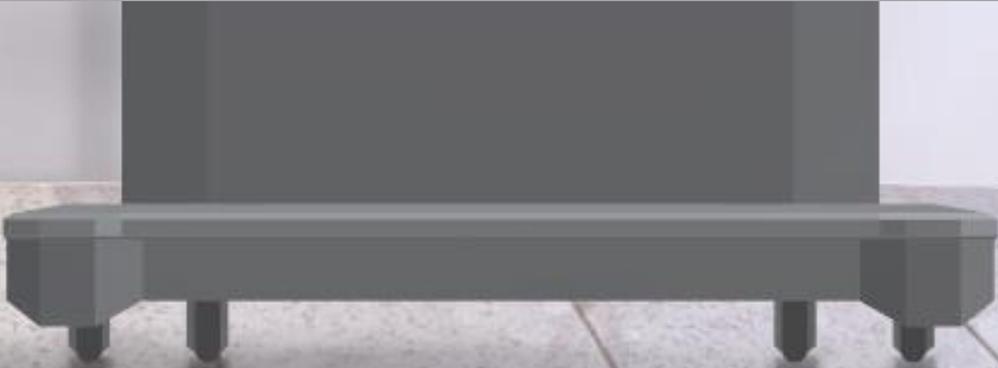


Evaluation of Crestron Flex R-Series

Hands-on testing of a turnkey, cart-based, mobile UC solution offering rapid deployment with BYOD support for Microsoft Teams Rooms (MTR).



This evaluation sponsored by:



Background

Founded in 1972, [Crestron Electronics](#) is a leading manufacturer of audio-visual automation / control systems, AV distribution systems, lighting control systems, building management systems, collaboration technologies, wireless presentation systems, and more. The company offers solutions for enterprises, educational institutions, government agencies, marine applications, and residential environments.

In 2013, Crestron entered the Unified Communications (UC) space when it released one of the first Lync® (eventually Skype® for Business /SfB) meeting room solutions. Today, the company's Crestron Flex product line includes a range of audio, video, user interface, and control solutions designed to work natively with leading UC solutions, including those from Microsoft, Zoom, and others.

In late May 2020, Crestron announced the Crestron Flex R-Series, a line of turnkey, cart-based, rapid-deployment UC solutions available for Microsoft Teams® and Zoom Rooms™ software.

In late June 2020, Crestron commissioned the Recon Research (RR) test team to perform an independent, third-party assessment of the Crestron UC-FCMX-T, a Flex R-Series system for Microsoft Teams with support for BYOD environments.

This document contains the results of our hands-on testing.

Understanding the Crestron Flex R-Series

The Crestron Flex R-Series is a line of turnkey meeting room UC solutions that include an attractive, enterprise-grade wheeled cart (see image at left below).

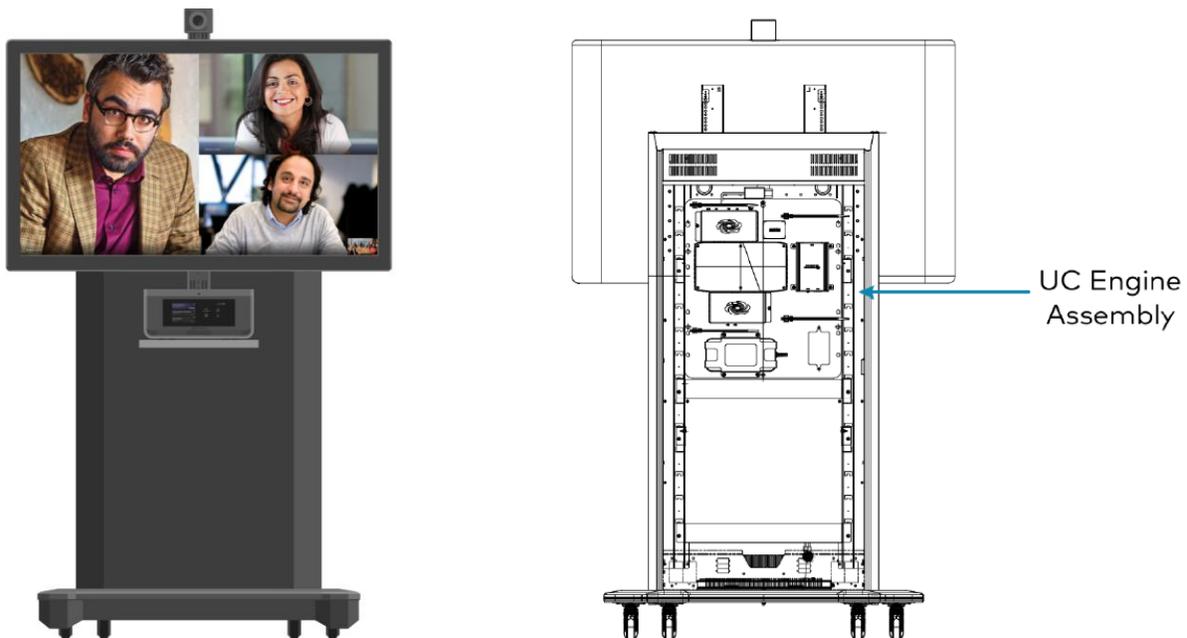


Figure 1: Crestron Flex R-Series System – Front View (Left) and Rear View with Rack Door Removed (Right)

The Flex R-Series solutions address several longstanding issues associated with installing video conferencing in meeting rooms: long lead time (meaning time to value) and required expertise.

The core of each R-Series system is the Crestron UC Engine – an Intel® NUC mini-PC in an integrator-friendly appliance form factor that is pre-loaded and runs the host UC collaboration app (Microsoft Teams or Zoom Rooms).

The UC Engine is pre-installed on a 15" wide x 17" high aluminum panel (the Crestron “UC Bracket”) alongside various other components, including the following:

- 1 x Crestron HD-CONV-USB-250 – an AV and HDMI® over CATx to USB converter
- 1 x USB Hub
- Several power supplies

Combined, the UC Engine and the other devices on the UC Bracket comprise the “UC Engine Assembly.”

The UC Engine Assembly, a Crestron 4-port network switch, and two cable retractors (one for each of the two external connections for the R-Series system) are pre-installed on the rack rails in the back of the cart as shown below.



Figure 2: Crestron Flex R-Series – Rear Equipment Rack including the UC Engine Assembly

The Flex R-Series arrives as shown above – with all devices installed, pre-connected, and ready to use.

The final two parts of the Flex R-Series solution are:

- 1 x Crestron Flex MX – a tabletop console (formerly known as Mercury) that acts as the mics, speakers, and system UI
- 1 x Huddly IQ™ – a 1080p USB camera with 150° field of view and integrated room framing/people-finding



Figure 3: Crestron Flex MX (Left) and Huddly IQ (Right)

The table below lists the versions of the Crestron Flex R-Series bundle with a Crestron Flex MX and Huddly IQ Camera.

	UC-FCM-U	UC-FCM-T	UC-FCM-Z	UC-FCMX-T	UC-FCMX-Z
UC Engine		X	X	X	X
Microsoft Teams Rooms		X		X	
Zoom Rooms			X		X
BYOD Support				X	X
List Price (US \$)	\$7,000	\$8,500	\$8,500	\$9,900	\$9,900

Figure 4: Crestron Flex-R Series Versions (with Flex MX X and Huddly IQ Camera)

Crestron also offers versions of the Crestron Flex R-Series bundled with a Crestron Smart Soundbar and a Crestron TSW-1060 touch screen controller (not tested as part of this evaluation).



Figure 5: Crestron Smart Sound Bar (Left) and TSW-1060 (Right)

For this evaluation effort, Crestron provided Recon Research with a complete UC-FCMX-T package, including the wheeled cart with the pre-installed UC Engine Assembly, the Flex MX mic / speaker / touch controller, and a Huddly IQ camera. Crestron also provided a standard 55" 4K display for our use.

System Installation

For this assessment, the Recon Research test team installed the Flex R-Series system in one of our offices. To be fair, the system arrives pretty much complete. The “installation” we completed just involved installing and connecting the system peripherals.

The installation of the peripherals required the following steps:

- 1) Rolling the R-Series cart into the meeting room
- 2) Installing the rack rails on the display
- 3) Installing the display which involved:
 - a. Routing the display’s power cable through one of the grommets on the front of the cart
 - b. Physically installing the display on the R-Series cart (required two people)
 - c. Connecting the HDMI cable to the display
 - d. Connecting the power cable to the power strip in the rack in the back of the cart
- 4) Installing the Huddly IQ camera on top of the display using the provided VELCRO® hook & loop fastener and connecting the USB cable pre-positioned at that location
- 5) Installing the Crestron Flex MX on the cart shelf and connecting the three pre-positioned cables at that location; power, Ethernet (LAN), and Ethernet (for audio / video - labeled TX)
- 6) Connecting the Ethernet and power cables presented at the back of the rack

The entire installation process listed above took our team ~ 15 minutes to complete.

Given that all of the system cables are pre-connected, properly dressed, and presented at the proper locations (e.g., the three cables for the Flex MX are pre-run and sit atop the cart shelf), subsequent installations should take even less time.

Perhaps more importantly, the installation process did not require any special AV or IT expertise. Anyone able to install his or her home stereo could easily install the Flex R-Series system.

The entire installation process took our team less than 15 minutes to complete.

Below, please find some additional comments about the system and the installation process.

The Flex R-Series Cart

The R-Series Cart is not the \$129 DIY cart one buys online and assembles with a hex key. This cart is a relatively attractive and svelte professional AV cart with a wide base, well-sized locking wheels, a sturdy equipment shelf, and an integrated rack system at the back. This cart is quite substantial and more than able to support a 55" or even larger display.

The cart includes cable holes in the proper locations to ensure an attractive, tidy final installation.

The Flex R-Series Equipment Rack

We also spent a few minutes inspecting the rack build quality. In other words, we examined the integration of the various AV components into the equipment rack at the back of the cart. We perform this same inspection during many client AV projects.

As one might expect from an (or perhaps “the”) anchor player in the AV industry, the rack fabrication of the Flex R-Series system was exceptional.

The UC Engine Assembly itself is well-designed and well-thought-out. All of the devices within the Assembly are properly mounted and secured, and external connections (e.g., LAN, USB, HDMI, Power, etc.) are silk-screen labeled directly on the UC Bracket.

The other devices in the rack area were also properly installed. In addition, the rack wiring was in line with industry standards, meaning that each cable was routed correctly, and excess cable lengths were dressed correctly.

Overall, we give the build quality of the Flex R-Series a rousing thumbs-up.

Comments on the System Build and Fabrication

The physical installation and careful inspection of the system left us with only a couple of minor nits.

- The cables in the rack area were not labeled or numbered. Given the simplicity of this system, this is more of a nice-to-have, but we still prefer to see all cables numbered.
- Some cables lacked the proper service loop and strain relief, which prompted us to spend five minutes loosening a few tight cables.

Obviously, neither of these small items materially impacts the installation, serviceability, reliability, usability, appearance, and overall user experience provided by the system. Our system, however, was a pre-production unit. Crestron has confirmed that formal procedures will be in place for GA systems.

In the end, we give the build of the Flex R-Series a rousing thumbs-up.

System Configuration

After completing the physical installation, we powered up the system. Then, we started the configuration process, which was the same as for any other Microsoft Teams Rooms system with one exception – the pairing of the Crestron Flex MX with the UC Engine.

Configuring the Microsoft Teams Rooms part of the system required only a few steps:

- 1) Accepting the Microsoft Software License Terms
- 2) Entering our Microsoft Teams login details (username, password)
- 3) Selecting the default meeting mode (in this case, Microsoft Teams)

At this point, one could also log into the host PC and change audio, video, layout, and other settings. In our case, however, the default settings were acceptable.

Next, we paired the Crestron Flex MX with the UC engine as follows: ¹

- 1) Opening a web browser to the IP address of the Crestron Flex MX device on a computer on the same network (subnet)
- 2) Logging into the Crestron Flex MX device
- 3) Navigating to the DEVICE > Applications menu
- 4) Entering the hostname or IP address of the UC Engine (see the picture at right of the label on the UC Engine including the Serial Number, MAC address, and Host Name)
- 5) Entering the login details for the UC Engine (default username = “admin” and default pw = “sfb”)
- 6) Clicking “Save Changes”



A few moments later, our system was up and running.

Comments on the System Configuration

After configuring the system, we performed system / firmware updates on the various components.

The firmware update for the Crestron Flex MX took ~ 15 minutes to complete using the Update Now function found on the Flex MX’s web UI.

The Microsoft Windows® operating system update on the UC Engine, however, took several hours to complete. To be clear – this is NOT a Crestron issue. Microsoft Teams Rooms is a Windows application that runs on a Windows PC (in this case, the UC Engine), and this was a regular Windows update.²

In the end, the system configuration took 10 minutes, but the Windows update took more than 2 hours.

Connection to Crestron XiO Cloud® Service

While not required, we chose to register both the UC Engine and Flex MX device within our Flex R-Series system to our Crestron XiO Cloud service corporate account (see screenshot below).

The Flex R-Series systems work seamlessly with Crestron’s monitoring and management tools, including XiO Cloud and Crestron Remote.

Crestron XiO Cloud is an IoT-based³ platform used for monitoring and managing Crestron (and some other) devices. XiO Cloud also offers remote control of Flex MX devices.

It took us ~ 5 minutes to register both devices to Crestron XiO Cloud. As shown in the image below, we happened to have another Crestron UC Engine and Flex MX registered to this same Crestron XiO Cloud corporate account.

¹ Step by step instructions for connecting the Crestron Mercury X to a UC Engine for both Microsoft Teams Rooms and Zoom Rooms are found in the Quick Start guide for Crestron Flex R-Series systems on the Crestron website.

² For Microsoft Teams Rooms systems, the Windows update function also updates the Microsoft Teams Rooms software.

³ Crestron XiO Cloud Service leverages the Microsoft IoT hub, making it not just IoT-ready, but IoT-based.

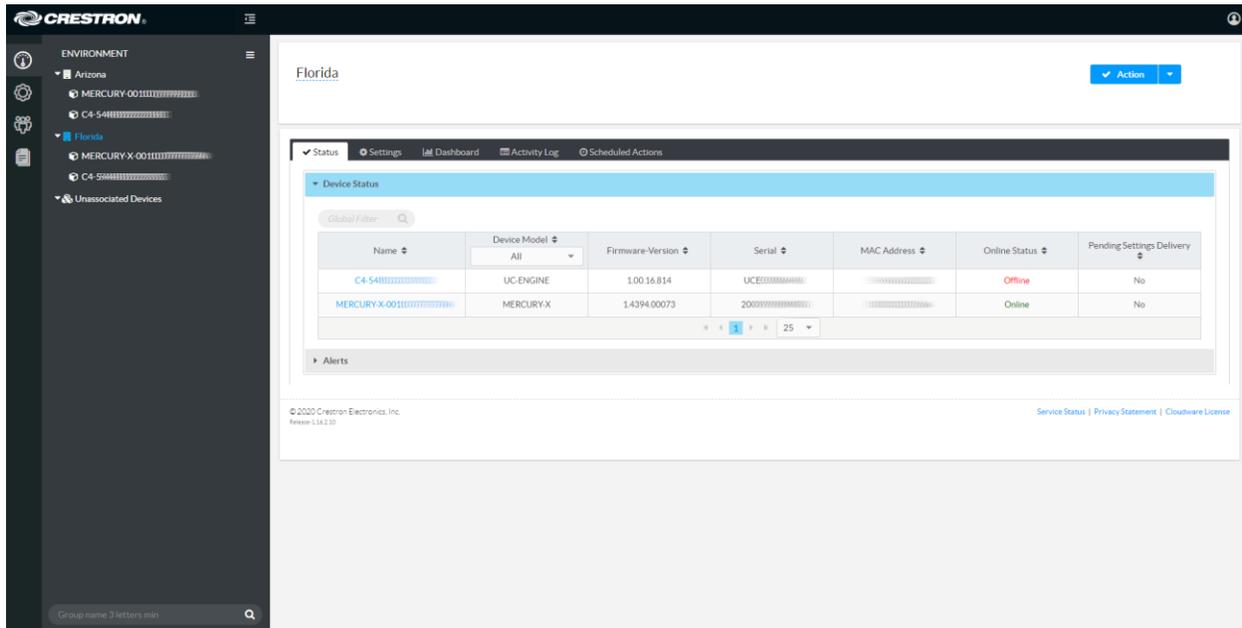
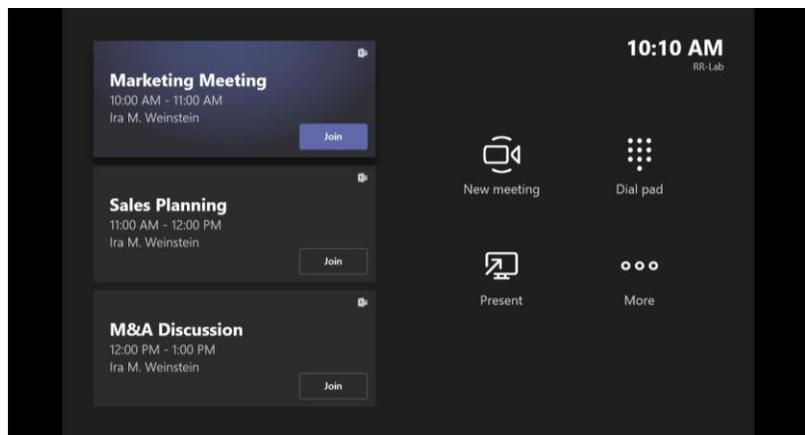


Figure 6: Crestron XiO Cloud – Environment Page

Crestron Remote

While not required to manage or use the system, we also installed the Crestron Remote app on one of our Windows PCs. The Crestron Remote app allows administrators to control the UC Engine remotely. Essentially, the Remote app is a cross between Windows Remote Desktop and Crestron XPanel.

The screenshot at right below, taken using the Crestron application, shows the user interface of the Crestron Flex MX after we invited our newly installed and configured Crestron Flex R-Series Microsoft Teams Room to a few meetings.



Note the inclusion of Join buttons for each of the three scheduled Teams meetings.

Additional Note – this same view and remote control capability are also available within XiO Cloud.

Hands-On Testing

To test the performance of the Crestron Flex R-Series for Microsoft Teams Rooms, we:

- 1) Conducted both scheduled and ad-hoc Microsoft Teams calls using the UC Engine
- 2) Conducted ad-hoc BYOD calls using various apps running on a Windows laptop connected to the USB and HDMI inputs of the Crestron Flex MX
- 3) Presented content locally on the system display using a Windows laptop connected to the HDMI input of the Crestron Flex MX
- 4) Created a Crestron program that we loaded onto our Flex MX to control the Huddly IQ camera

The Meeting Experience - Ease of Use

The Crestron Flex MX device is a very good user interface for Microsoft Teams Rooms.

First, Flex MX includes an integrated motion and voice sensor designed to wake the system automatically when someone enters the room.

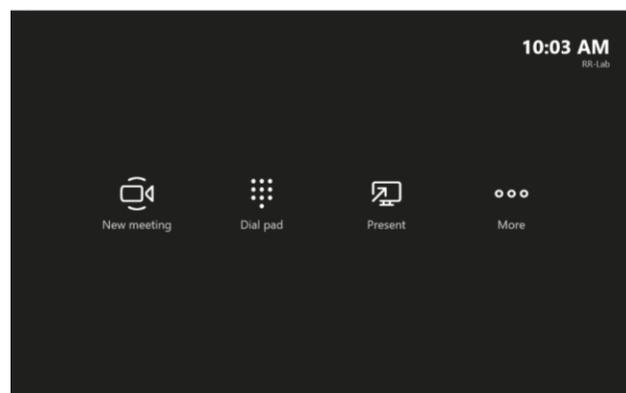
The Crestron Flex MX device is a very good UI for Microsoft Teams Rooms.

Note that with Microsoft Teams Rooms, touch displays (like Flex MX) act as second displays for the host PC (in this case, the UC Engine), and thus display the native user interface of Microsoft Teams Rooms. In other words, Microsoft defined the user interface here – not Crestron.

As we used Flex MX to control the system, we appreciated the sharpness of the text on its display. The device's 1280 x 800 resolution is more than adequate, given its small (7") screen size.

In addition, the Flex MX's capacitive multi-touch overlay was both accurate and responsive. Throughout our testing, the touch overlay never caused any issues or sent us to the wrong menu.

On a more critical note, the angle of Flex MX's display makes it prone to glare and reflections from overhead lighting. That said, the text is bright enough to be read – even with some glare.



At this point, we should also discuss what may be the elephant in the room – the placement of the system user interface (Crestron Flex MX) at the front of the room under the meeting room display.

On the one hand, placing the Flex MX on the cart shelf offers excellent mobility. People can easily and quickly roll the entire system from room to room by simply disconnecting two cables; power and network. Such movability is a significant benefit.

On the other hand, the need to walk up to the front of the room to place a call, change layouts, change volume, and mute the system microphone is not ideal. But there's a method to Crestron's madness.

Crestron has wisely included an AV and HDMI-over-CATx converter within the Flex R-Series system. At first glance, we thought this was a bit overkill. But the CATx converter lets users place the Flex MX on the meeting room table (or anywhere else in the room) instead of on the cart shelf.

Moving the Flex MX to a new location requires a single CATx cable between the cart and the Flex MX. The Flex MX also needs network and power.



Figure 7: Crestron Flex MX Installed on Meeting Room Table

The takeaway is that customers can keep the Flex MX on the cart shelf to maximize mobility or install the Flex MX on the meeting room table to maximize convenience. They could even start in mobility mode to video-enable their room in just minutes, and then convert to convenience mode later. All without having to buy or install a single additional device. Not too shabby.

Author's Note – while not yet generally available (GA), Microsoft Teams' mobile app offers rudimentary control of Microsoft Teams Rooms systems, including the Flex R-Series. Given the COVID-19 crisis and the need for touchless UIs, we expect this feature to be quite popular.

The Meeting Experience – Audio Performance

For the audio experience, we are back to our old friend, the Crestron Flex MX device.

Throughout our testing, Flex MX's 360° quad mic array did a fine job capturing the voices of our in-room talkers. We have no complaints in this regard.

Flex MX's audio capabilities are well suited for small and medium rooms.

Furthermore, Flex MX's integrated speaker offered a good reproduction of the incoming speech audio from the remote meeting participants. However, the incoming audio sounded a bit raspy, which we believe is the result of Flex MX's speaker firing directly into the front face of the metal cart.⁴

Also, per Microsoft's specifications, Flex MX's volume level automatically resets to 50% between calls. However, in our test environment, a 30% volume level was more than adequate. Having to re-adjust the volume level at the start of each call should not be necessary. We hope Microsoft eliminates this requirement at some point.

⁴ Mercury was initially designed to sit on a meeting room table, not at the front of the room as is the case with the Flex-R series.

Overall, Flex MX’s audio system is well suited to address the needs of small and even many medium-sized meeting rooms.

The Meeting Experience – Video Performance

Overall, the video experience provided by the Crestron Flex R-Series solution was good.

The included Huddly IQ camera did a fine job capturing the local meeting participants, and the outgoing video quality was excellent.

Plus, the Huddly IQ’s integrated room framing / people finding functionality, combined with its wide (150°) field of view, ensured that everyone was on camera at all times.

The Huddle IQ’s integrated room framing functionality ensured that everyone in the room was on camera at all times.

First, we tested with two people sitting next to each other. Within just a few seconds, the Huddly IQ camera provided a well-framed shot of the two participants. Next, we tested the camera’s ability to find people sitting in different parts of the room. In each case, the Huddly IQ camera properly discovered the people and digitally panned, tilted, and zoomed the camera to capture everyone on camera.

Notably, the Flex R-Series system (like other Microsoft Teams Rooms systems) does not include any kind of remote control. And, of course, the Microsoft Teams Rooms application does not include any form of camera control. Therefore, by default, the Huddly IQ’s ability to find meeting participants is the only way to “adjust” the camera. Fortunately, this worked well throughout our testing.

We did, however, find that the camera’s automatic room framing offers wide shots but not tight shots. In some cases, the local participants covered only a small part of the outgoing camera image. This tendency toward wide shots is common to many camera systems.

BYOD (Bring Your Own Device) Testing

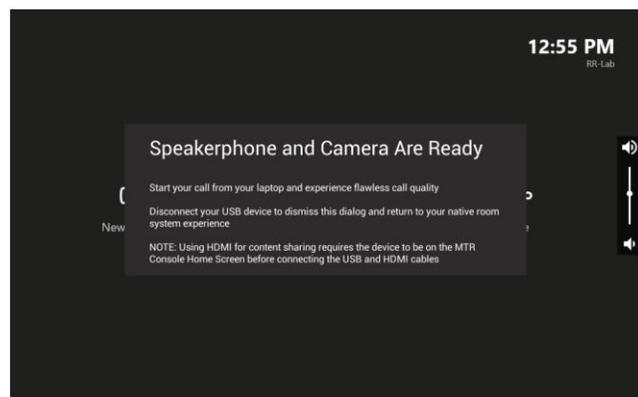
Next, we tested the Flex R-Series’ support for meetings hosted on user devices (e.g., laptops).

To use the system in BYOD mode, we connected the Flex MX USB and HDMI cables to our laptop.

A few seconds later, the system automatically entered BYOD mode, and the Flex MX displayed the “Speakerphone and Camera Ready” message window shown in the screenshot at right.

Next, the user launches the meeting on his laptop using the platform of his choice.

Finally, the user needs to confirm that his laptop is using Flex MX’s mic and speakers, and the Huddly camera.



While in BYOD mode, the incoming volume level is controlled on the Flex MX device – not the user’s laptop. In concept, this is fine. However, the volume control slider on the Flex MX display is tiny – only 5/8th of an inch tall (see the right edge of the screenshot above). The small slider made it challenging to control the incoming volume during the call. Crestron plans to address this issue in a fall software update.

For the BYOD testing, we conducted meetings using various collaboration platforms / apps running on our Lenovo® X1 laptop.

The image at right shows the use of the Flex R-Series system in BYOD mode during a Zoom Meetings call hosted on our laptop.

In all cases, the Flex R-Series system in BYOD mode worked as expected and allowed us to “borrow” the system’s camera, mic, speakers, and display for meetings hosted on a laptop.



Local Content Presentation

The Flex R-Series solution also supports local content presentation.

To present content locally, we connected the Flex MX’s HDMI cable to our laptop. A few seconds later, our laptop content appeared on the system display.

Local content presentation on the Crestron Flex R-Series worked perfectly.

Crestron Control Functionality

While not strictly a Crestron control system, Flex MX can run simple Crestron control programs.

The ability to create, install, and use custom control programs on Flex MX while in Microsoft Teams mode is a Crestron Flex R-Series power feature.

To test this capability, we installed a tiny Crestron program that provides manual control of the Huddly IQ camera onto our system’s Flex MX. Once installed, the custom control functions became accessible via the “More” button on the Teams Rooms UI (see the red circle in the image at left below).

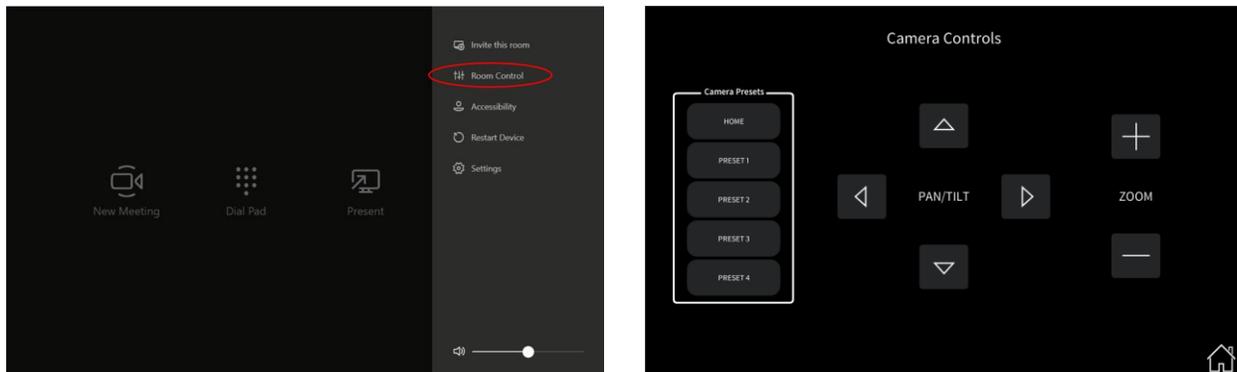


Figure 8: Crestron Flex MX UI Showing Remote Control Menu (Left) and UI of Huddly Control Program (Right)

The ability to create, install, and use custom control programs on the Flex MX device while in Microsoft Teams Room mode is another power feature of the Flex R-Series solution.

Analysis and Opinion

Traditionally, the deployment of an integrated video conferencing room involves many steps, including:

- Designing the AV system
- Procuring the required components
- Fabricating the equipment rack
- Programming the control system and UI
- Installing conduits
- Preparing the room for display mounting
- Running and terminating all cables
- Installing the AV system
- Commissioning the system
- Testing / punching out the system

Given the list above, it's no surprise that such installations often take weeks or months to materialize. The Crestron Flex R-Series rapid deployment solutions eliminate the need for many of these steps, thereby reducing deployment time.

For example, with the Flex R-Series solutions, there is no need to create a system design. Similarly, the R-Series solutions include all required AV components for the meeting room, except for the system display, under a single SKU.

One of the most important benefits of the Flex R-Series solutions is the ability to install this system in minutes – and notably without the need for any facilities or construction work within the space. Simply roll the cart into the room, connect the peripherals (Flex MX device, camera, and display), and provide power and network. It's just that quick. It's just that simple.

We especially appreciate that this cart-based solution eliminates the installation of the system display on a meeting room wall, which cuts costs and reduces the system deployment time down to a matter of minutes. Also, the entire system can be rolled easily from room to room.

For this effort, we installed a Crestron Flex R-Series for Microsoft Teams solution in one of our meeting rooms. First, we used the R-Series system to host numerous scheduled and ad-hoc Microsoft Teams meetings. Then, we used the R-Series' BYOD support to host meetings on other collaboration platforms, including Cisco Webex®, Google Meet®, GoToMeeting® by LogMeIn, Zoom Meetings, and others.

Throughout this assessment, we were quite pleased by the build quality, ease of use, and experience provided by this solution. The audio and video performance were both consistently strong, and the auto room framing feature worked well throughout our testing.

We also registered the Flex R-Series system to Crestron's XiO Cloud monitoring and management system, and remotely controlled the system using both XiO Cloud and the Remote app.

Finally, we tested another Crestron power feature – the ability to install and use Crestron AV control programs during Microsoft Teams Rooms meetings. In this case, we used a custom app to manually control the Huddly IQ camera within the Flex R-Series system.

With a list price starting at US \$7,000, Flex R-Series is not the cheapest option. It was designed for rapid deployment, portability, short time to benefits, and build quality - all high priorities for large companies.

Overall, the Crestron Flex R-Series solution is a well-designed, easy to install mobile UC solution that can very quickly video-enable small and medium meeting rooms, as well as other spaces in the enterprise.

About Crestron



(Information below provided by Crestron)

At **Crestron**, we build technology for every way people work, everywhere in the world – from desktop to boardrooms, offices to multi-nationals. Technology that adapts to what you have and prepares you for what you'll need. Platforms, devices, and systems designed to improve communication and collaboration. All managed by a cloud-based system for easy deployment, monitoring, and upgrading. At Crestron, we create faster, better, simpler solutions so people can work faster, better, and more productively.

Our products are backed by more than 90 fully-staffed offices that provide 24 x 7 x 365 sales, technical, and training support across the globe. In addition to our World Headquarters in Rockleigh, New Jersey, Crestron has sales and support offices throughout the U.S., Canada, Europe, Asia, Latin America, and Australia. Discover Crestron by visiting www.crestron.com.

About Recon Research



Recon Research (RR) is an analyst / market research firm focused on the enterprise communications space. Our areas of coverage include unified communications, video conferencing, collaboration and ideation, audio-visual AV solutions, wireless presentation, and more.

RR provides enterprise customers, vendors, channel partners, and investment professionals with the information and insight needed to make fact-based decisions.

What makes RR different is the depth of knowledge and experience that comes from 15+ years of company briefings, market analysis, and hands-on testing of products and services in the space.

For more information, visit us at www.reconres.com.

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