

# Diseño de sistemas USB

para el entorno de trabajo digital

# Presentación

---

- Oscar García
  - Regional Sales Manager



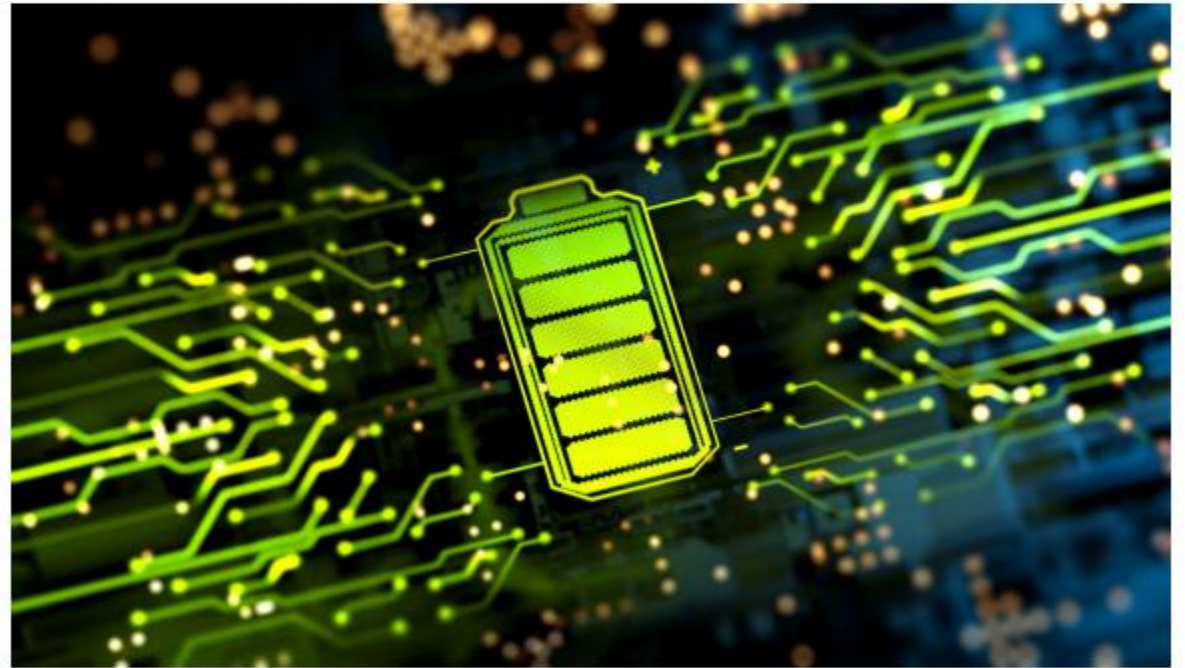
---

# Agenda

---

- **Historia de USB**
- **Conectores**
- **Alimentación**
- **Datos**
- **Tiers y Hubs**

# USB





---

# Historia

---

- Un grupo de siete empresas comenzaron el Desarrollo de USB en 1995: Compaq, DEC, IBM, Intel, Microsoft, NEC y Nortel
- Reemplazaría las conexiones propietarias
- Reemplazaría a los puertos serie tradicionales.
- Proporcionaría alimentación.
- Permitiría conexión y desconexión en caliente.



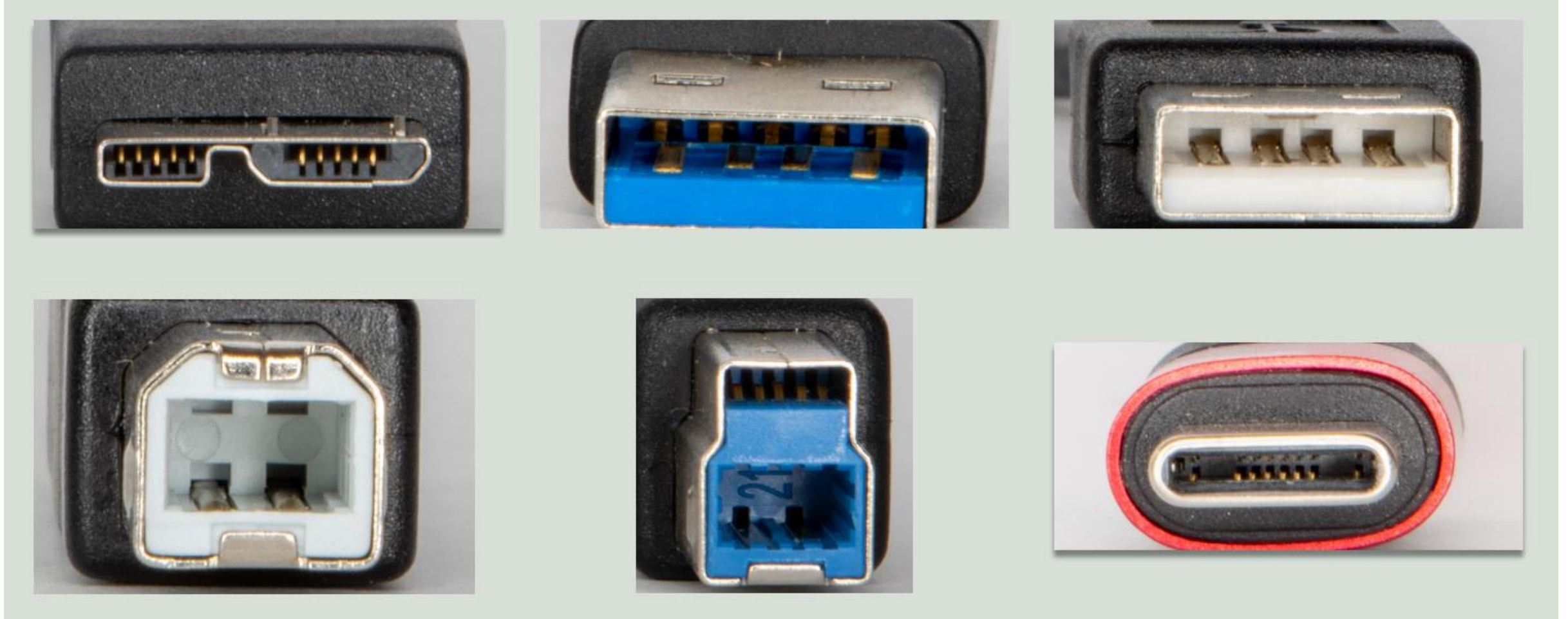
# Historia

Name	Release date	Maximum transfer rate	Note
USB 0.7	11 November 1994	?	Pre-release
USB 0.8	December 1994	?	Pre-release
USB 0.9	13 April 1995	Full Speed (12 Mbit/s)	Pre-release
USB 0.99	August 1995	?	Pre-release
USB 1.0-RC	November 1995	?	Release Candidate
USB 1.0	15 January 1996	Full Speed (12 Mbit/s),	
USB 1.1	August 1998	Low Speed (1.5 Mbit/s)	
USB 2.0	April 2000	High Speed (480 Mbit/s)	
USB 3.0	November 2008	SuperSpeed USB (5 Gbit/s)	Also referred to as USB 3.1 Gen 1 <sup>[25]</sup> and USB 3.2 Gen 1 × 1
USB 3.1	July 2013	SuperSpeed+ USB (10 Gbit/s)	Includes new USB 3.1 Gen 2, <sup>[25]</sup> also named USB 3.2 Gen 2 × 1 in later specifications. Last version to support Type A connector.
USB 3.2	August 2017	SuperSpeed+ USB dual-lane (20 Gbit/s)	Includes new USB 3.2 Gen 1 × 2 and Gen 2 × 2 multi-link modes. <sup>[36]</sup> Requires Type C connector.
USB4	August 2019	40 Gbit/s (2-lane)	Includes new USB4 Gen 2 × 2 (64b/66b encoding) and Gen 3 × 2 (128b/132b encoding) modes and introduces USB4 routing for tunnelling of USB3.x, DisplayPort 1.4a and PCI Express traffic and host-to-host transfers, based on the Thunderbolt 3 protocol

# Entendiendo el USB

El conector

# Conectores





# Emparejando Conectores

- Lo universal en las conexiones macho – hembra!!!

USB connector pairing table (plugger vs. socket)

Receptacle \ Plug	USB A Type-A	USB 3.0 A SS Type-A SuperSpeed	USB B Type-B	USB 3.0 B SS Type-B SuperSpeed	USB Mini-A Mini-A	USB Mini-B Mini-B	USB Micro-A <sup>1</sup> Micro-A	USB Micro-B Micro-B	USB 3.0 Micro-B Micro-B SuperSpeed	USB-C
USB A Type-A	Yes	Only non-SuperSpeed	No	No	No	No	No	No	No	No
USB 3.0 A SS Type-A SuperSpeed	Only non-SuperSpeed	Yes	No	No	No	No	No	No	No	No
USB B Type-B	No	No	Yes	No	No	No	No	No	No	No
USB 3.0 B SS Type-B SuperSpeed	No	No	Only non-SuperSpeed	Yes	No	No	No	No	No	No
USB Mini-A Mini-A	No	No	No	No	Deprecated	No	No	No	No	No
USB Mini-B Mini-B	No	No	No	No	Deprecated	Deprecated	No	No	No	No
USB Micro-A Micro-A	No	No	No	No	No	No	Yes	Yes	No	No
USB Micro-B Micro-B	No	No	No	No	No	No	No	Yes	No	No
USB 3.0 Micro-B SS Micro-B SuperSpeed	No	No	No	No	No	No	No	Only non-SuperSpeed	Yes	No
USB-C	No	No	No	No	No	No	No	No	No	Yes

<sup>1</sup> No corresponding Micro-A receptacle was ever designed.

# USB 1.1 y USB 2.0

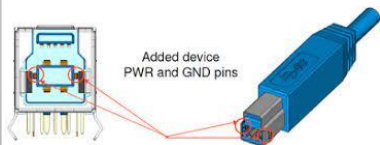
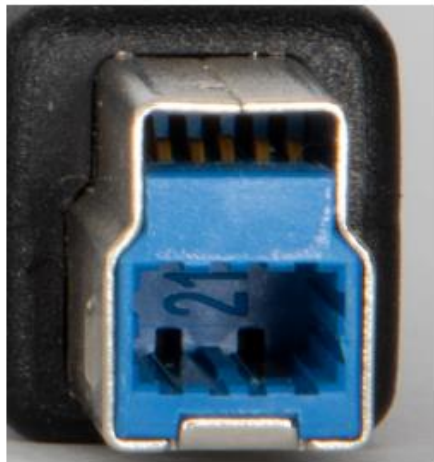
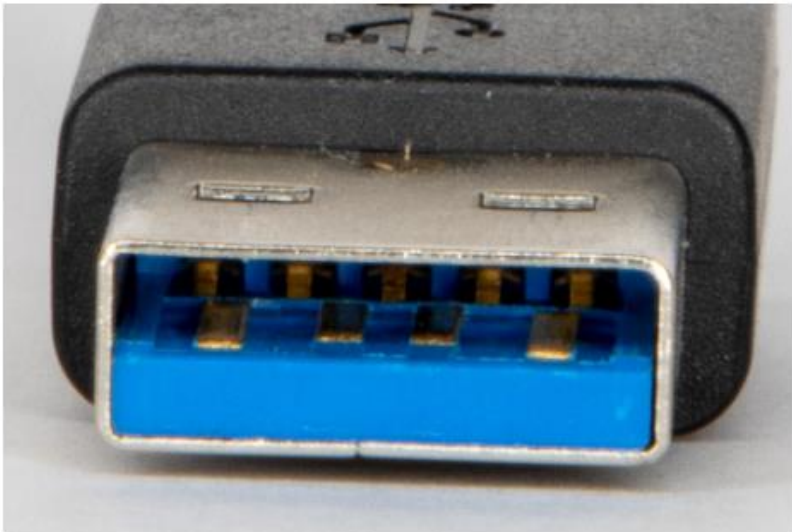


## Pins

1. +5vdc
2. Data –
3. Data +
4. Ground



# USB 3.0



Pin	Color	Signal name		Description
		A connector	B connector	
Shell	—	Shield		Metal housing
1	Red	VBUS		Power
2	White	D-		USB 2.0 differential pair
3	Green	D+		
4	Black	GND		Ground for power return
5	Blue	StdA_SSRX-	StdB_SSTX-	SuperSpeed receiver differential pair
6	Yellow	StdA_SSRX+	StdB_SSTX+	
7	—	GND_DRAIN		Ground for signal return
8	Purple	StdA_SSTX-	StdB_SSRX-	SuperSpeed transmitter differential pair
9	Orange	StdA_SSTX+	StdB_SSRX+	
The USB 3.0 <i>Powered-B</i> connector has two additional pins for power and ground supplied to the device. <sup>[53]</sup>				
10	—		DPWR	Power provided to device (Powered-B only)
11			DGND	Ground for DPWR return (Powered-B only)

# USB-C



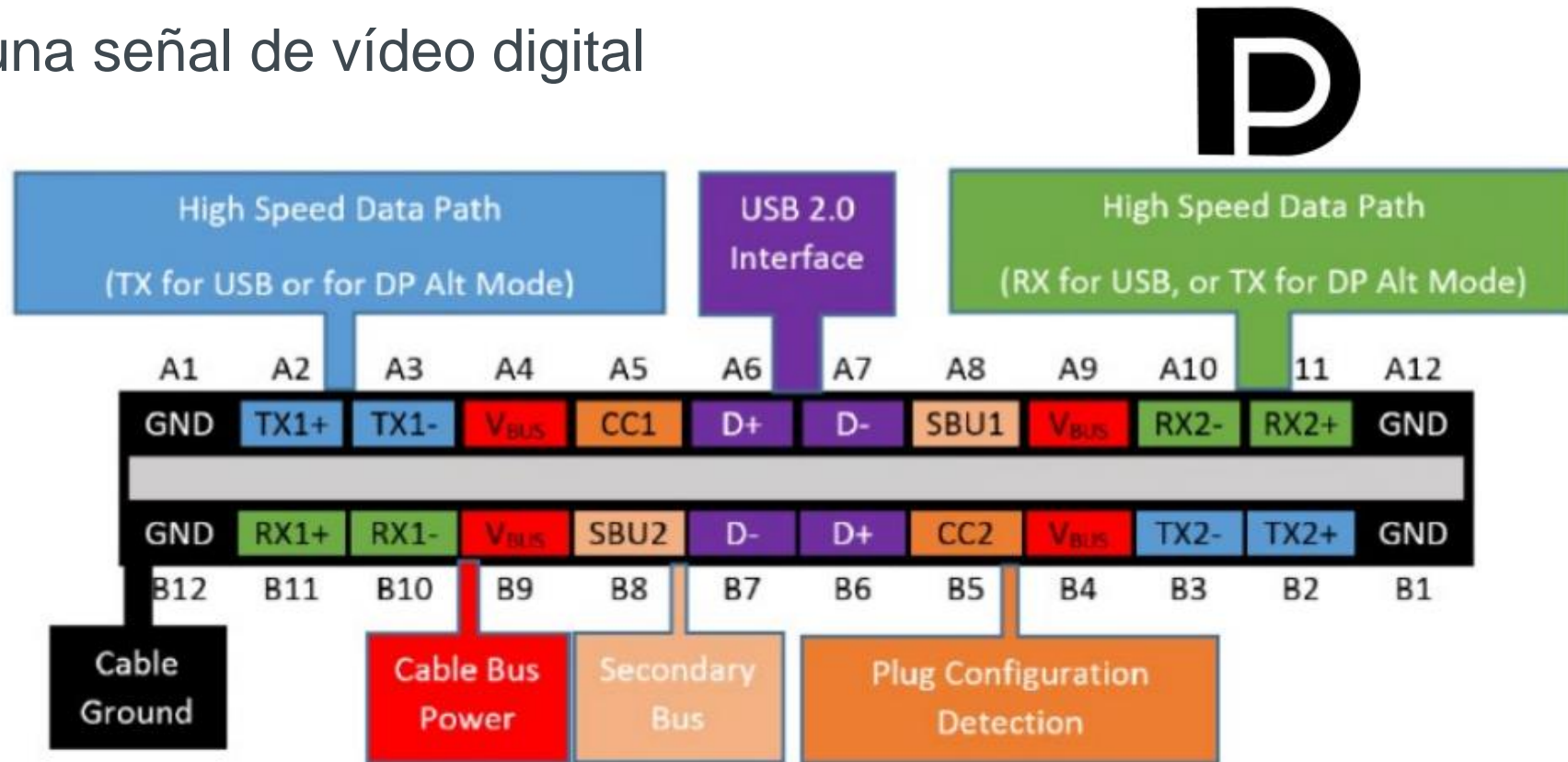
Full-featured USB 3.2 and 2.0 Type-C cable wiring

Plug 1, USB Type-C		USB Type-C cable					Plug 2, USB Type-C	
Pin	Name	Wire color	No	Name	Description	2.0 <sup>[a]</sup>	Pin	Name
Shell	Shield	Braid	Braid	Shield	Cable external braid	✓	Shell	Shield
A1, B12, B1, A12	GND	Tin-plated	1	GND_PWRrt1	Ground for power return	✓	A1, B12, B1, A12	GND
			16	GND_PWRrt2		✗		
A4, B9, B4, A9	V <sub>BUS</sub>	Red	2	PWR_V <sub>BUS</sub> 1	V <sub>BUS</sub> power	✓	A4, B9, B4, A9	V <sub>BUS</sub>
			17	PWR_V <sub>BUS</sub> 2		✗		
B5	V <sub>CONN</sub>	Yellow	18	PWR_V <sub>CONN</sub>	V <sub>CONN</sub> power, for powered cables <sup>[b]</sup>	✓	B5	V <sub>CONN</sub>
A5	CC	Blue	3	CC	Configuration channel	✓	A5	CC
A6	Dp1	Green	4	UTP_Dp <sup>[c]</sup>	Unshielded twisted pair, positive	✓	A6	Dp1
A7	Dn1	White	5	UTP_Dn <sup>[c]</sup>	Unshielded twisted pair, negative	✓	A7	Dn1
A8	SBU1	Red	14	SBU_A	Sideband use A	✗	B8	SBU2
B8	SBU2	Black	15	SBU_B	Sideband use B	✗	A8	SBU1
A2	SSTXp1	Yellow <sup>[d]</sup>	6	SDPp1	Shielded differential pair #1, positive	✗	B11	SSRXp1
A3	SSTXn1	Brown <sup>[d]</sup>	7	SDPn1	Shielded differential pair #1, negative	✗	B10	SSRXn1
B11	SSRXp1	Green <sup>[d]</sup>	8	SDPp2	Shielded differential pair #2, positive	✗	A2	SSTXp1
B10	SSRXn1	Orange <sup>[d]</sup>	9	SDPn2	Shielded differential pair #2, negative	✗	A3	SSTXn1
B2	SSTXp2	White <sup>[d]</sup>	10	SDPp3	Shielded differential pair #3, positive	✗	A11	SSRXp2
B3	SSTXn2	Black <sup>[d]</sup>	11	SDPn3	Shielded differential pair #3, negative	✗	A10	SSRXn2
A11	SSRXp2	Red <sup>[d]</sup>	12	SDPp4	Shielded differential pair #4, positive	✗	B2	SSTXp2
A10	SSRXn2	Blue <sup>[d]</sup>	13	SDPn4	Shielded differential pair #4, negative	✗	B3	SSTXn2



# Vídeo a través de USB-C

- Displayport Alternate mode.
- Transporta una señal de vídeo digital



---

# Thunderbolt incorpora DP alternate mode

---



**THUNDERBOLT**™



# Diseños USB

Soluciones sencillas de extensión

---

# Ejercicios de diseño

---

- **Ejercicio 1:** Diseñar una sala Huddle con un display y una barra UC-SB1-CAM que hay que extender a una mesa donde habrá una caja de conexión.
- **Ejercicio 2:** Diseñar una sala Huddle con un display y un Sistema de audio compuesto con un speakerphone de sobremesa y una cámara independiente. Se requiere extension de señal entre la mesa y la cabecera de sala. Se desea tener dos tomas en mesa: una USB-C y otra hdmi+USB-A.



# Entendiendo el USB

Alimentación

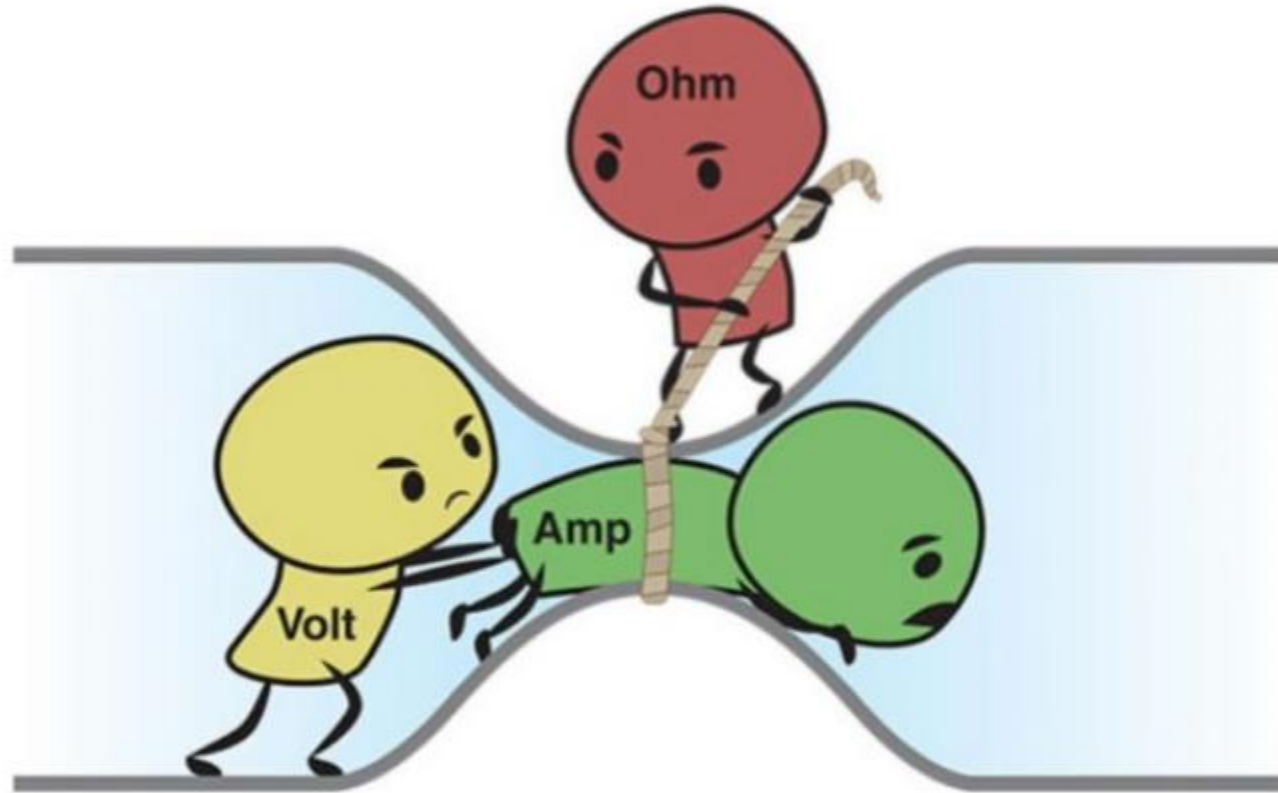
# Alimentación

- La potencia que se puede entregar por un conector USB varía y es necesario tenerla en cuenta.
- Los dispositivos tienen una especificación de potencia
- Puede haber dispositivos (Webcams) que requieran una potencia alta.
- Si se conectan varios dispositivos a un hub cada uno de ellos consume potencia.
- La distancia del cable USB también atenúa la potencia.

USB power standards

Specification	Current	Voltage	Power (max.)
Low-power device	100 mA	5 V <sup>[a]</sup>	0.50 W
Low-power SuperSpeed (USB 3.0) device	150 mA	5 V <sup>[a]</sup>	0.75 W
High-power device	500 mA <sup>[b]</sup>	5 V	2.5 W
High-power SuperSpeed (USB 3.0) device	900 mA <sup>[c]</sup>	5 V	4.5 W
Multi-lane SuperSpeed (USB 3.2 Gen 2) device	1.5 A <sup>[d]</sup>	5 V	7.5 W
Battery Charging (BC) 1.1	1.5 A	5 V	7.5 W
Battery Charging (BC) 1.2	1.5 A	5 V	7.5 W
USB-C	1.5 A	5 V	7.5 W
	3 A	5 V	15 W
Power Delivery 1.0/2.0/3.0 Type-C	5 A <sup>[e]</sup>	20 V	100 W
Power Delivery 3.1 Type-C	5 A <sup>[e]</sup>	48 V <sup>[f]</sup>	240 W
<p>a. <sup>a b</sup> The <math>V_{BUS}</math> supply from a low-powered hub port may drop to 4.40 V.</p> <p>b. <sup>a</sup> Up to five unit loads; with non-SuperSpeed devices, one unit load is 100 mA.</p> <p>c. <sup>a</sup> Up to six unit loads; with SuperSpeed devices, one unit load is 150 mA.</p> <p>d. <sup>a</sup> Up to six unit loads; with multi-lane devices, one unit load is 250 mA.</p> <p>e. <sup>a b</sup> &gt;3 A (&gt;60 W) operation requires an electronically marked cable rated at 5 A.</p> <p>f. <sup>a</sup> &gt;20 V (&gt;100 W) operation requires an electronically marked Extended Power Range (EPR) cable.</p>			

# Más potencia y más ancho de banda equivale a limitación de cable



If the amp (current draw) was smaller, it would fit without resistance



# Diseños USB

Soluciones con Airmedia



---

# Ejercicios de diseño

---

- **Ejercicio 3:** Diseñar una sala Huddle con un display y una barra UC-SB1-CAM que hay que extender a una mesa donde habrá una caja de conexión por USB-C y además requieren presentación y videoconferencia inalámbrica mediante USB-C

# Entendiendo el USB



Datos

# Datos

Rate Name ⇅	Old Name	First publication (Standard) ⇅	Encoding ⇅	Data pairs ⇅	Nominal Rate ⇅	USB-IF Marketing Name <sup>[84][85][86]</sup> ⇅	Logo
Low-Speed		USB 1.0	NRZI	1 HDx	1.5 Mbit/s	Basic-Speed USB	
Full-Speed					12 Mbit/s		
High-Speed		USB 2.0			480 Mbit/s	Hi-Speed USB	
USB 3.2 Gen 1×1	USB 3.0; USB 3.1 Gen 1	USB 3.0	8b/10b	2 FDx	5 Gbit/s	SuperSpeed USB 5Gbps	
USB 3.2 Gen 2×1	USB 3.1 Gen 2	USB 3.1	128b/132b	2 FDx	10 Gbit/s	SuperSpeed USB 10Gbps	
USB 3.2 Gen 1×2		USB 3.2	8b/10b	4 FDx ×2	10 Gbit/s	—	
USB 3.2 Gen 2×2			128b/132b	4 FDx ×2	20 Gbit/s	SuperSpeed USB 20Gbps	
USB4 Gen 2×1		USB4	64b/66b <sup>[a]</sup>	2 FDx	10 Gbit/s	—	
USB4 Gen 2×2			64b/66b <sup>[a]</sup>	4 FDx ×2	20 Gbit/s	USB4 20Gbps	
USB4 Gen 3×1			128b/132b <sup>[a]</sup>	2 FDx	20 Gbit/s	—	
USB4 Gen 3×2			128b/132b <sup>[a]</sup>	4 FDx ×2	40 Gbit/s	USB4 40Gbps	

---

# Tipos de transmission de Datos

---

- **Tranferencia isócrona:** Garantizan un data rate permanente (para hacer streaming de datos con un ancho de banda fijo) pero pueden tener pérdidas de datos (audio y video en tiempo real)
- **Tranferencia interrumpida:** Dispositivos que necesitan garantizar respuestas rápidas (sin latencia) como ratones y teclados (HID).
- **Bulk transfer:** Transferencias esporádicas y muy grandes de datos que usan el ancho de banda disponible por el controlador en ese momento sin necesidad de un ancho de banda garantizado o transferencias sin latencia.



# Enumeración

---

- Cuando un dispositivo USB se conecta por primera vez a un host controller USB comienza el proceso de enumeración.
- La enumeración comienza enviando una señal de reset al dispositivo USB.
- También se determina la clase de dispositivo (*Device Class*)
- El bitrate del dispositivo USB se determina durante este reseteo.
- Tras el reset, la información del dispositivo USB se lee por el host y se asigna al dispositivo una dirección única de 7 bits.
- Como máximo se pueden manejar 127 dispositivos con direcciones de 7 bits.

# Clases de dispositivos (*Device class*)

Class	Usage	Description	Examples, or exception
00h	Device	Unspecified <sup>[46]</sup>	Device class is unspecified, interface descriptors are used to determine needed drivers
01h	Interface	Audio	Speaker, microphone, sound card, MIDI
02h	Both	<a href="#">Communications and CDC control</a>	UART and RS-232 serial adapter, Modem, Wi-Fi adapter, Ethernet adapter. Used together with class 0Ah (CDC-Data) below
03h	Interface	<a href="#">Human interface device (HID)</a>	Keyboard, mouse, joystick
05h	Interface	Physical interface device (PID)	Force feedback joystick
06h	Interface	Image (PTP/MTP)	Scanner
07h	Interface	Printer	Laser printer, inkjet printer, CNC machine
08h	Interface	USB mass storage, USB Attached SCSI	USB flash drive, memory card reader, digital audio player, digital camera, external drive
09h	Device	<a href="#">USB hub</a>	High speed USB hub
0Ah	Interface	CDC-Data	Used together with class 02h ( <i>Communications and CDC Control</i> ) above
0Bh	Interface	<a href="#">Smart Card</a>	USB smart card reader
0Dh	Interface	Content security	Fingerprint reader
0Eh	Interface	<a href="#">Video</a>	Webcam
0Fh	Interface	Personal healthcare device class (PHDC)	Pulse monitor (watch)
10h	Interface	Audio/Video (AV)	Webcam, TV
11h	Device	Billboard	Describes USB-C alternate modes supported by device
DCh	Both	Diagnostic device	USB compliance testing device
E0h	Interface	<a href="#">Wireless Controller</a>	<a href="#">Bluetooth</a> adapter, Microsoft <a href="#">RNDIS</a>
EFh	Both	Miscellaneous	<a href="#">ActiveSync</a> device
FEh	Interface	Application-specific	<a href="#">IrDA Bridge</a> , Test & Measurement Class (USBTMC), <sup>[47]</sup> USB DFU (Device Firmware Upgrade) <sup>[48]</sup>
FFh	Both	Vendor-specific	Indicates that a device needs vendor-specific drivers

# Diseños USB

Soluciones matriciales avanzadas

---

# Ejercicios de diseño

---

- **Ejercicio 4:** Diseñar un Sistema en el que es necesario tener multiples tomas BYOD en una mesa de presidencia y utilizar la misma cámara y el Sistema de captación de audio con un Sistema MTR.

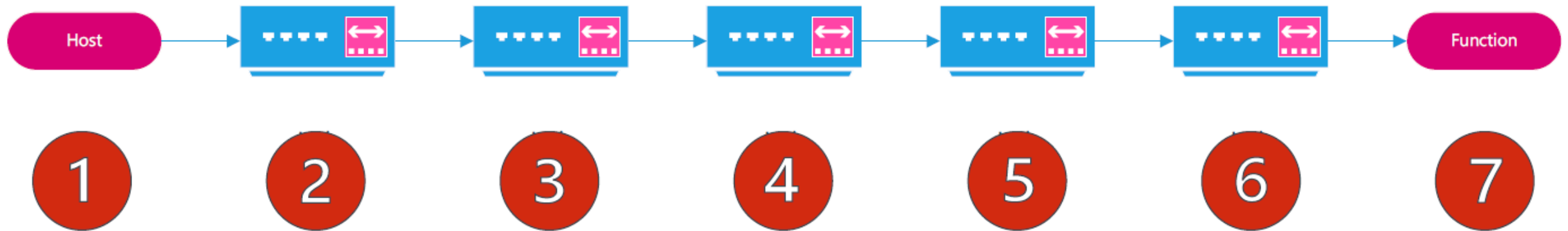


# Entendiendo el USB

Tiers

# Tiers USB

## USB Tiers



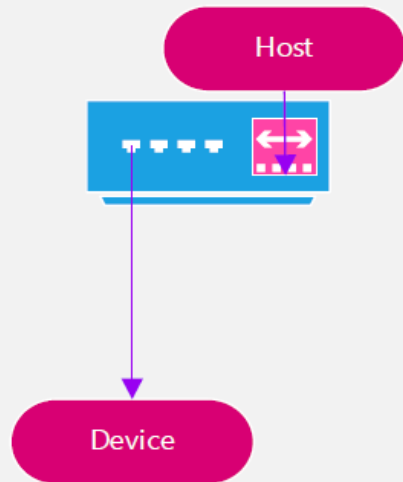
# Entendiendo el USB



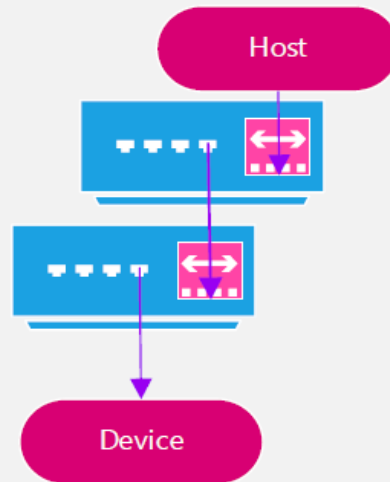
Hubs

## USB Hubs

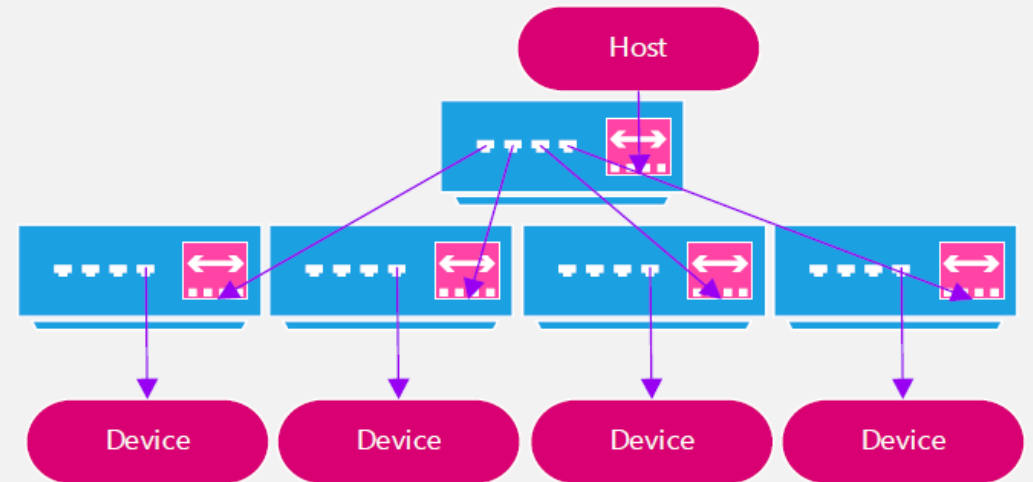
4 Port Hub



7 Port Hub

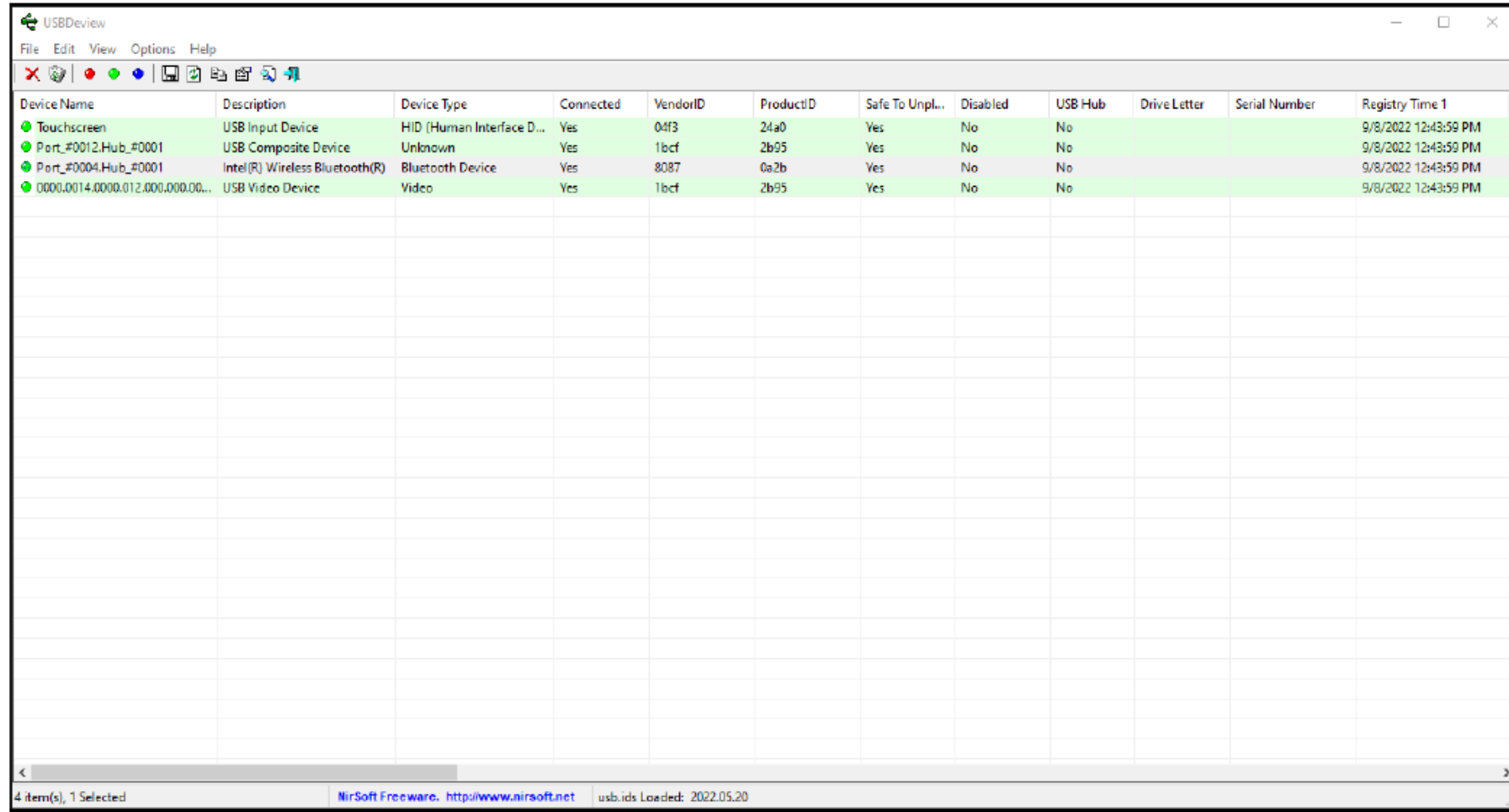


16 Port Hub





# USBDeview



The screenshot shows the USBDeview application window. The title bar reads 'USBDeview'. The menu bar includes 'File', 'Edit', 'View', 'Options', and 'Help'. Below the menu bar is a toolbar with various icons. The main area is a table with the following columns: Device Name, Description, Device Type, Connected, VendorID, ProductID, Safe To Unpl..., Disabled, USB Hub, Drive Letter, Serial Number, and Registry Time 1. The table contains four rows of data, all of which are highlighted in green. The status bar at the bottom indicates '4 item(s), 1 Selected', 'NirSoft Freeware. <http://www.nirsoft.net>', and 'usb.ids Loaded: 2022.05.20'.

Device Name	Description	Device Type	Connected	VendorID	ProductID	Safe To Unpl...	Disabled	USB Hub	Drive Letter	Serial Number	Registry Time 1
Touchscreen	USB Input Device	HID (Human Interface D...	Yes	04f3	24a0	Yes	No	No			9/8/2022 12:43:59 PM
Port_#0012.Hub_#0001	USB Composite Device	Unknown	Yes	1bcf	2b95	Yes	No	No			9/8/2022 12:43:59 PM
Port_#0004.Hub_#0001	Intel(R) Wireless Bluetooth(R)	Bluetooth Device	Yes	8087	0a2b	Yes	No	No			9/8/2022 12:43:59 PM
.0000.0014.0000.012.000.000.00...	USB Video Device	Video	Yes	1bcf	2b95	Yes	No	No			9/8/2022 12:43:59 PM

# USB Device Tree view

The screenshot displays the USB Device Tree Viewer V3.8.1 application. The left pane shows a tree view of the USB device hierarchy under 'My Computer'. The right pane displays system information and registry flags.

**Left Pane (Tree View):**

- My Computer
  - Intel(R) USB 3.0 eXtensible Host Controller - 1.0 (Microsoft)
    - USB RootHub (USB 3.0)
      - [1-1]
      - [1-2]
      - [1-3]
      - [1-4]: Intel(R) Wireless Bluetooth(R) - Mouse, 2x HID, Keyboard, Net
      - [1-5]
      - [1-6]
      - [1-7]
      - [1-8]
      - [1-9]: ELANation ELAN Touchscreen - 2x HID
      - [1-10]
      - [1-11]
      - [1-12]: Sunplus Innovation USB Composite Device - Camera
      - [1-13]
      - [1-14]
      - [1-15]
      - [1-16]
      - [1-17]
      - [1-18]
      - [1-19]
      - [1-20]
      - [1-21]
      - [1-22]
      - [1-23]
      - [1-24]
      - [1-25]
      - [1-26]

**Right Pane (System Information):**

===== My Computer =====

Operating System : Windows 10 Enterprise: NT10.0 Build 19043.1889 Version 21H1 SPO type=1 suite=100 x64  
Up Time : 19 minutes 20 seconds  
Computer Name : NJ104790LT  
Admin Privileges : no

UsbTreeView Version : 3.8.1.0 (x64)

USB Host Controllers : 1  
USB Root Hubs : 1  
USB Standard Hubs : 0  
USB Peripheral Devices : 3

+++++++ Registry USB Flags ++++++

HKEY\_LOCAL\_MACHINE\SYSTEM\CurrentControlSet\Control\USB  
DualRoleFeatures : REG\_DWORD 00000001 (1)  
OsDefaultRoleSwitchMode : REG\_DWORD 00000006 (6)  
UcmIsPresent : REG\_DWORD 00000001 (1)  
HKEY\_LOCAL\_MACHINE\SYSTEM\CurrentControlSet\Control\USB\AutomaticSurpriseRemoval  
AttemptRecoveryFromUsbPowerDrain: REG\_DWORD 00000001 (1)

**Status Bar:** HostControllers: 1 Root Hubs: 1 Standard Hubs: 0 Peripheral Devices: 3

# Entendiendo el USB

¡Gracias!



**Soluciones de integración USB**







➤ Solución sencillas de extensión

➤ Solución con AirMedia®

➤ Solución con AirMedia® y Flex®

➤ Sistemas USB matriciales

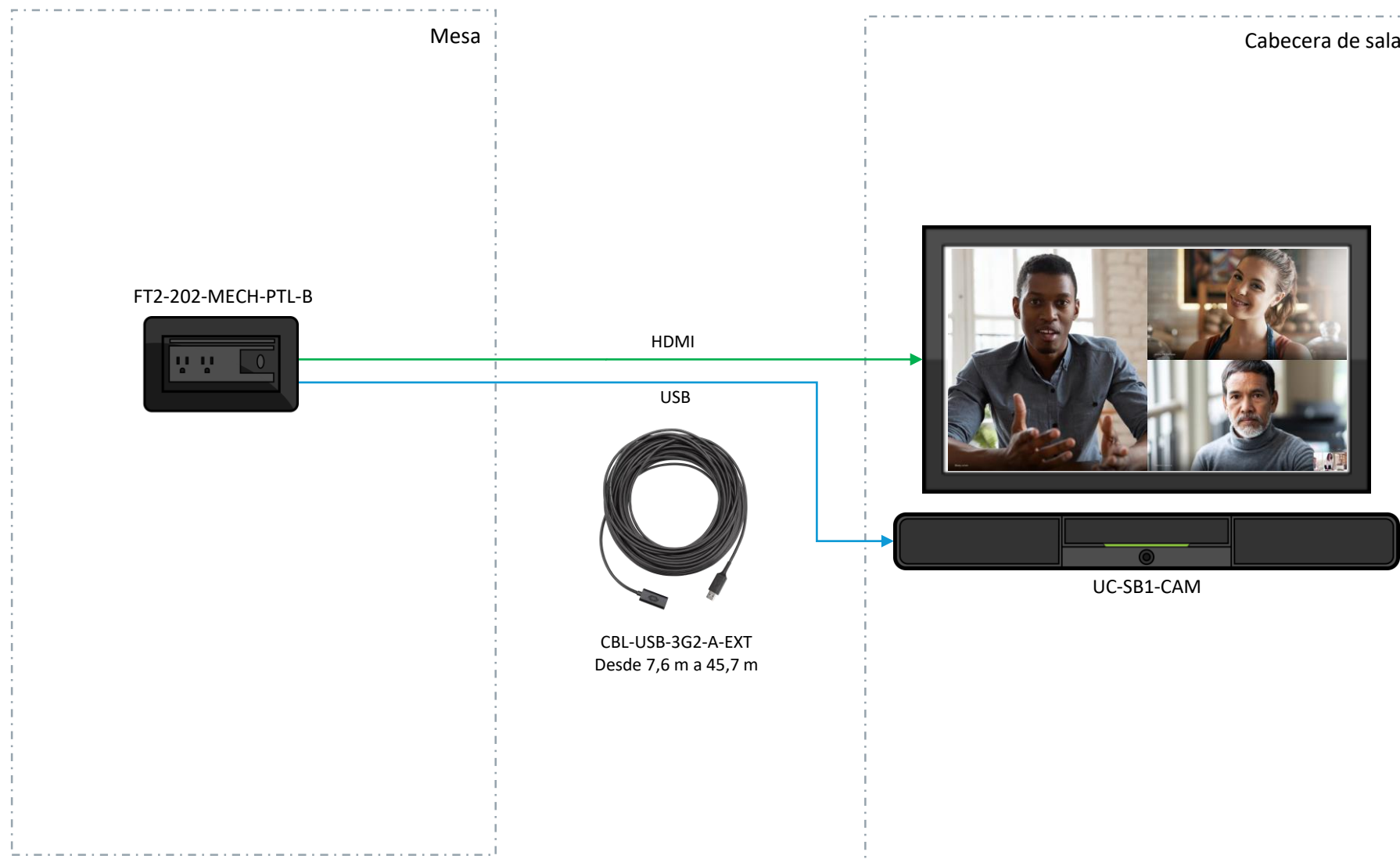
**SOLUCIONES**



# Soluciones sencillas de extensión



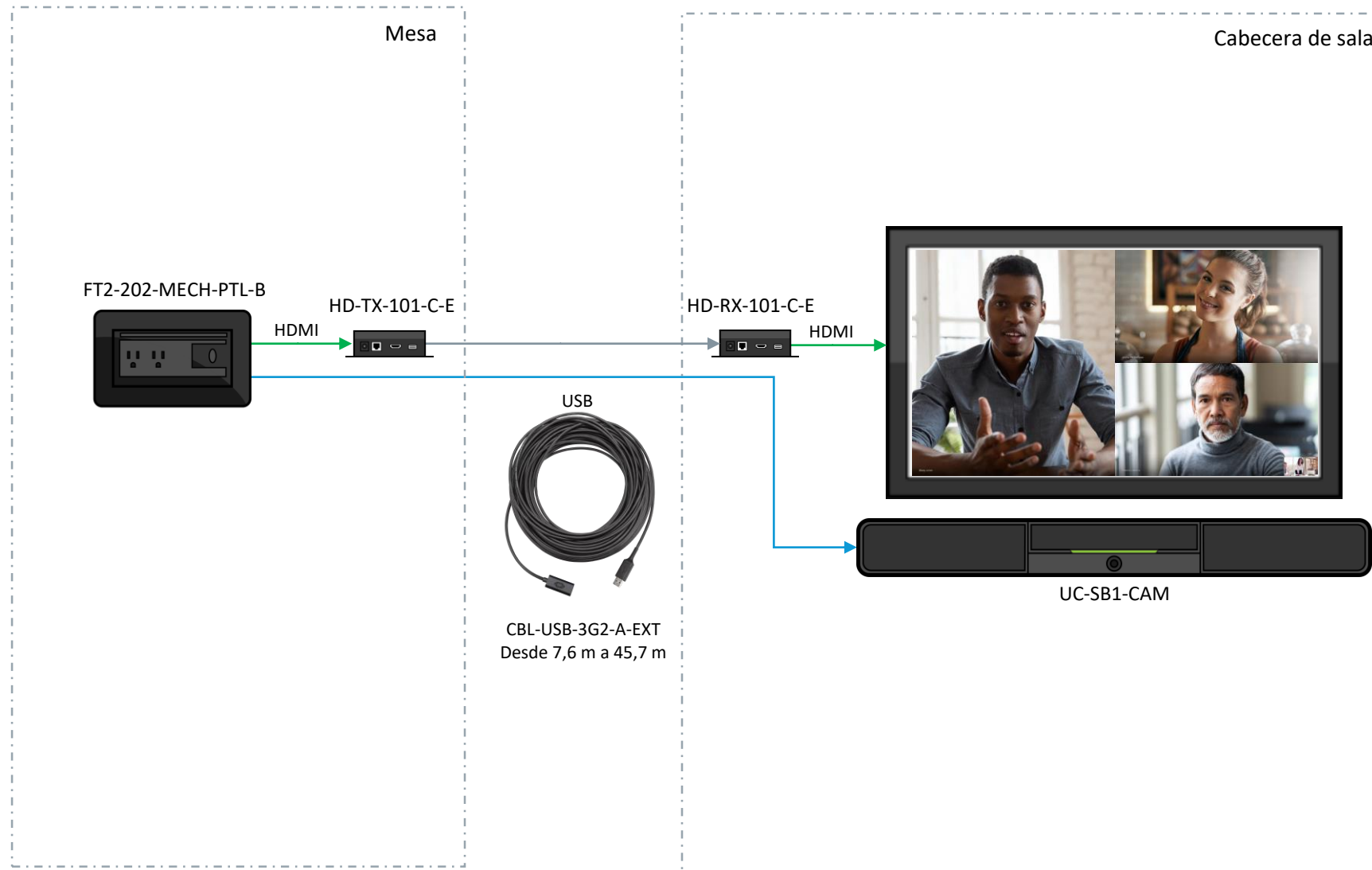
## 1. Solución básica con cable extensor USB



### BOM:

- 1 x UC-SB1-CAM
- 1 x FT2-202-MECH-PTL-B
- 1 x CBL-USB--3G2-A-EXT
- 1 x CBL-HD-30

## 2. Solución básica con cable extensor USB y DM-Lite



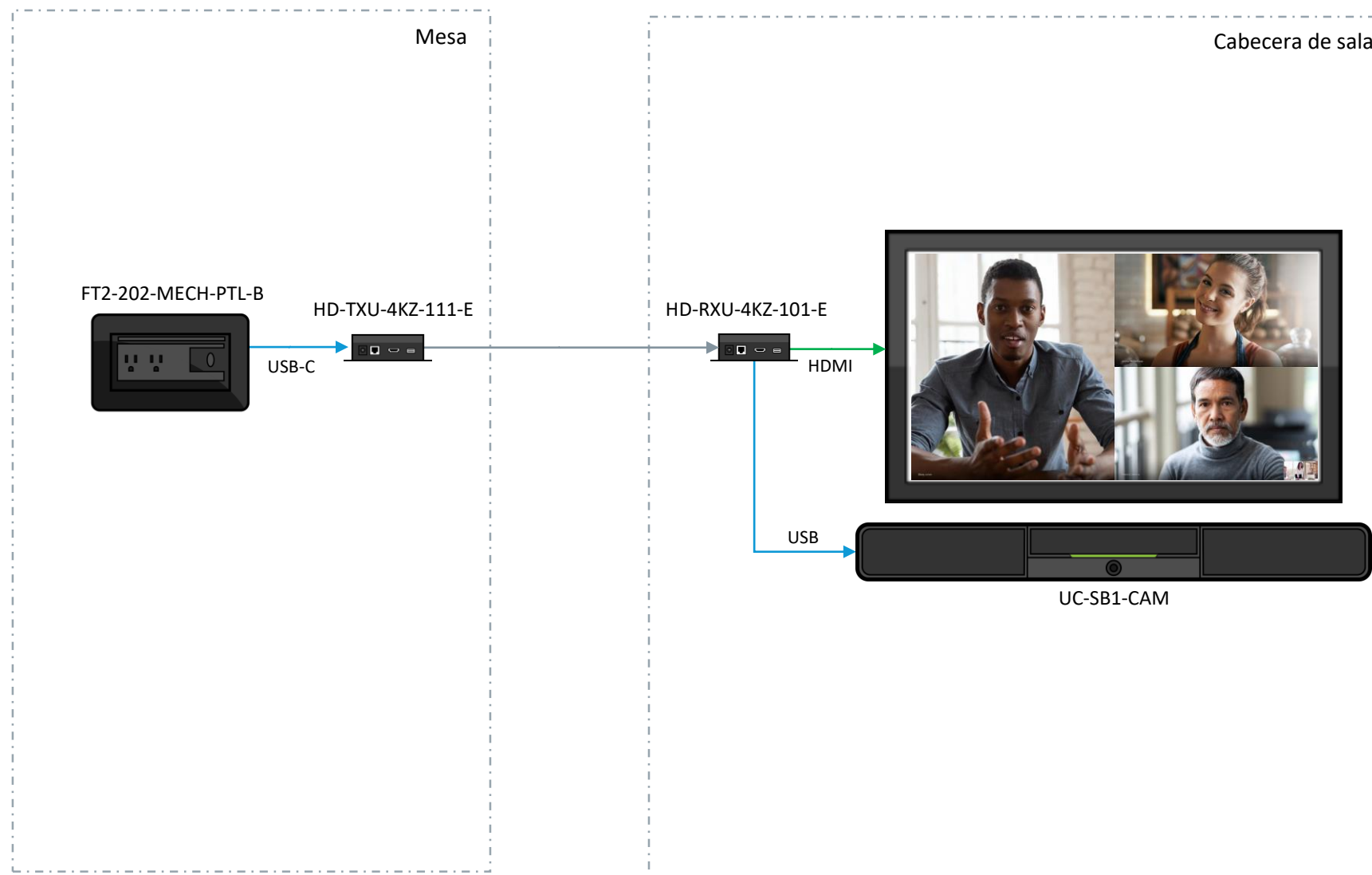
### **BOM:**

- 1 x UC-SB1-CAM
- 1 x FT2-202-MECH-PTL-B
- 1 x CBL-USB--3G2-A-EXT
- 1 x HD-TX-101-C-E
- 1 x HD-RX-101-C-E

- HDMI
- RJ45
- USB






### 3. Solución básica con cable DM-Lite y USB-C

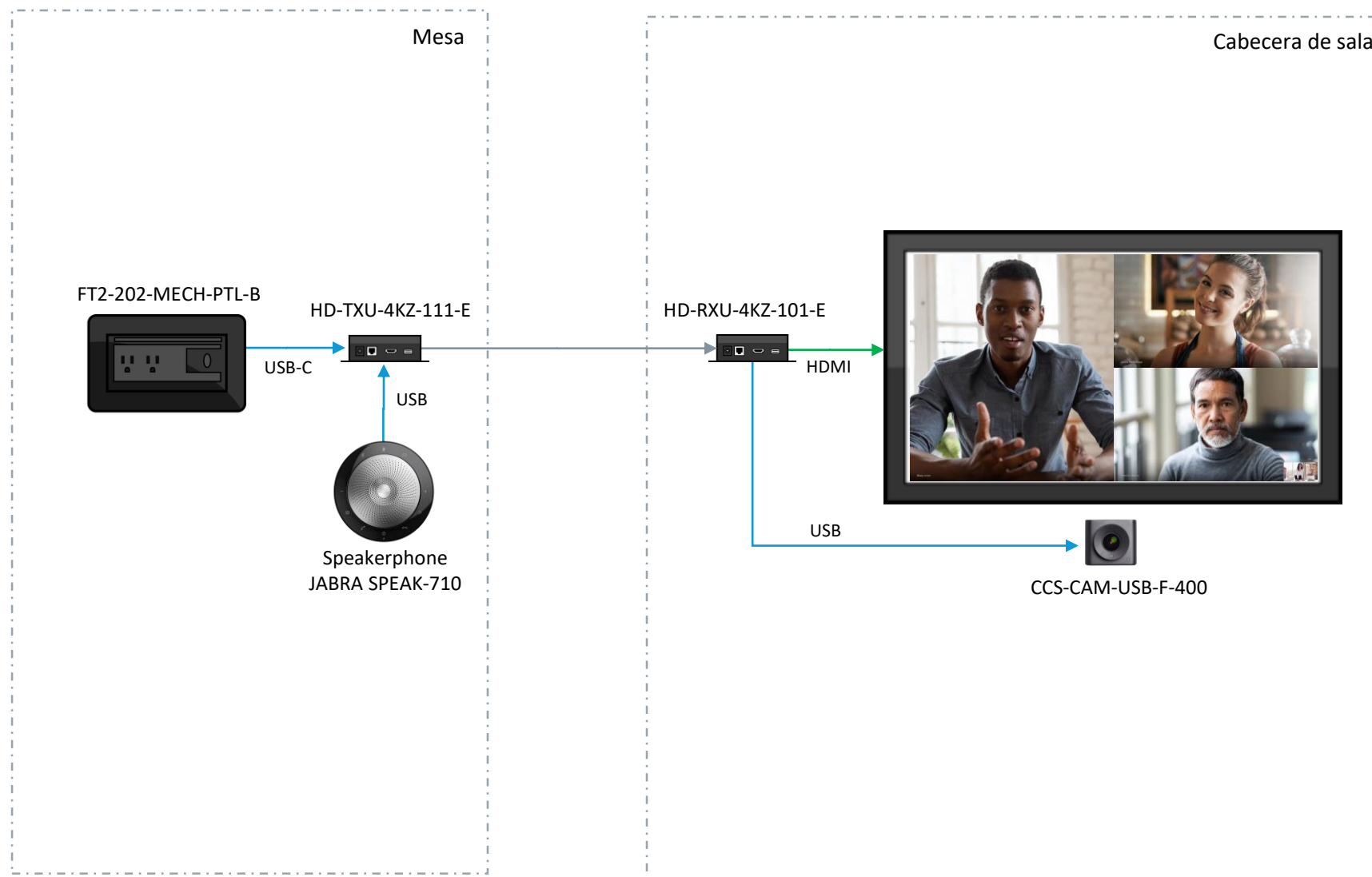


#### **BOM:**

- 1 x UC-SB1-CAM
- 1 x FT2-202-MECH-PTL-B
- 1 x HD-TXU-4KZ-111-E
- 1 x HD-RXU-4KZ-101-E

-  HDMI
-  RJ45
-  USB

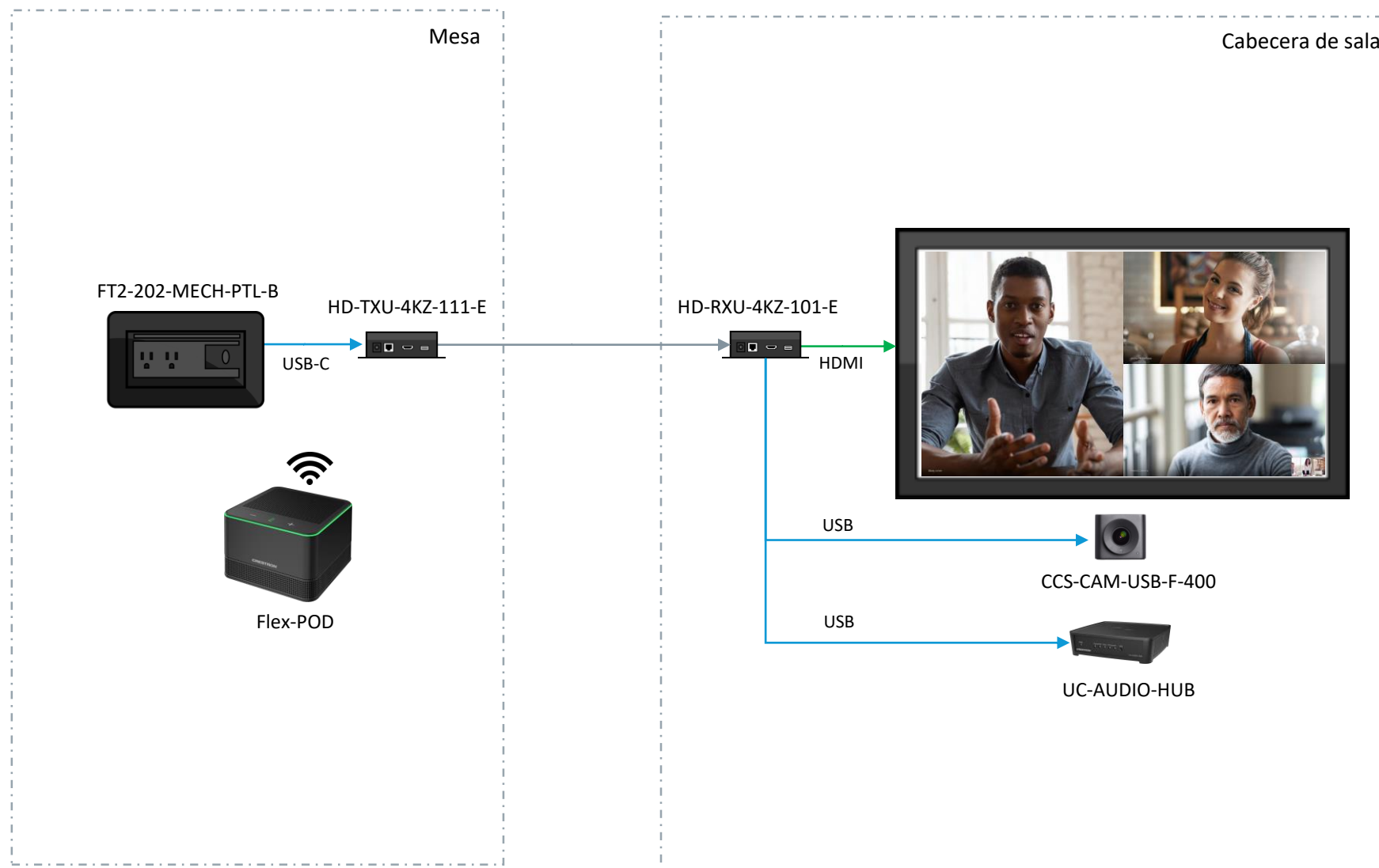
#### 4. Solución básica con cable DM-Lite, speakerphone y USB-C



#### **BOM:**

- 1 x UC-SB1-CAM
- 1 x FT2-202-MECH-PTL-B
- 1 x HD-TXU-4KZ-111-E
- 1 x HD-RXU-4KZ-101-E
- 1 x CCS-CAM-USB-F-400
- 1 x JABRA SPEAK-710

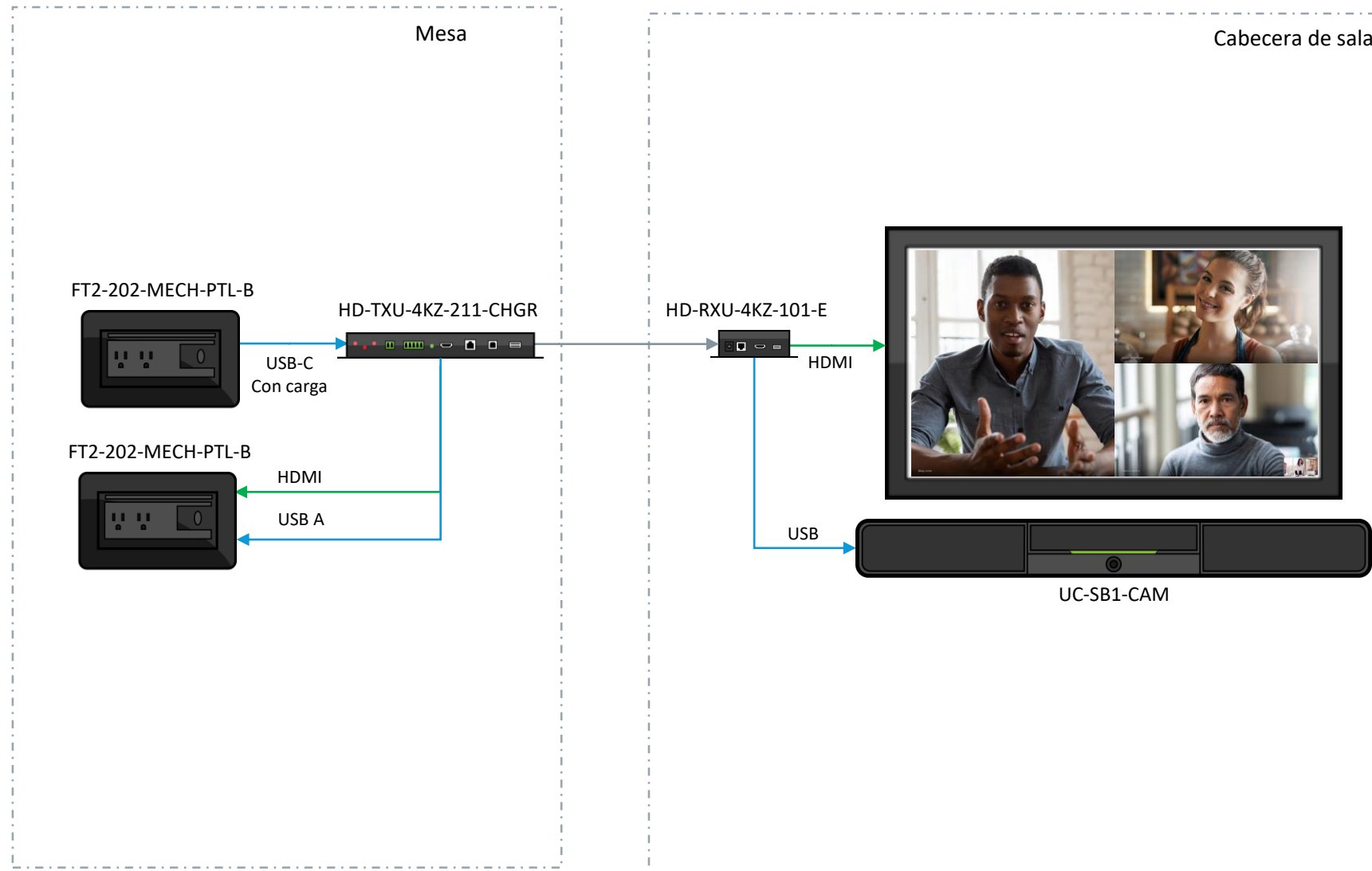
## 5. Solución básica con cable DM-Lite, Flex POD y USB-C



### BOM:

- 1 x UC-SB1-CAM
- 1 x FT2-202-MECH-PTL-B
- 1 x HD-TXU-4KZ-111-E
- 1 x HD-RXU-4KZ-101-E
- 1 x CCS-CAM-USB-F-400
- 1 x UC-AUDIO-1-B-KIT

6. Solución básica con cable DM-Lite y dos tomas en mesa. USB-C y HDMI +USB A

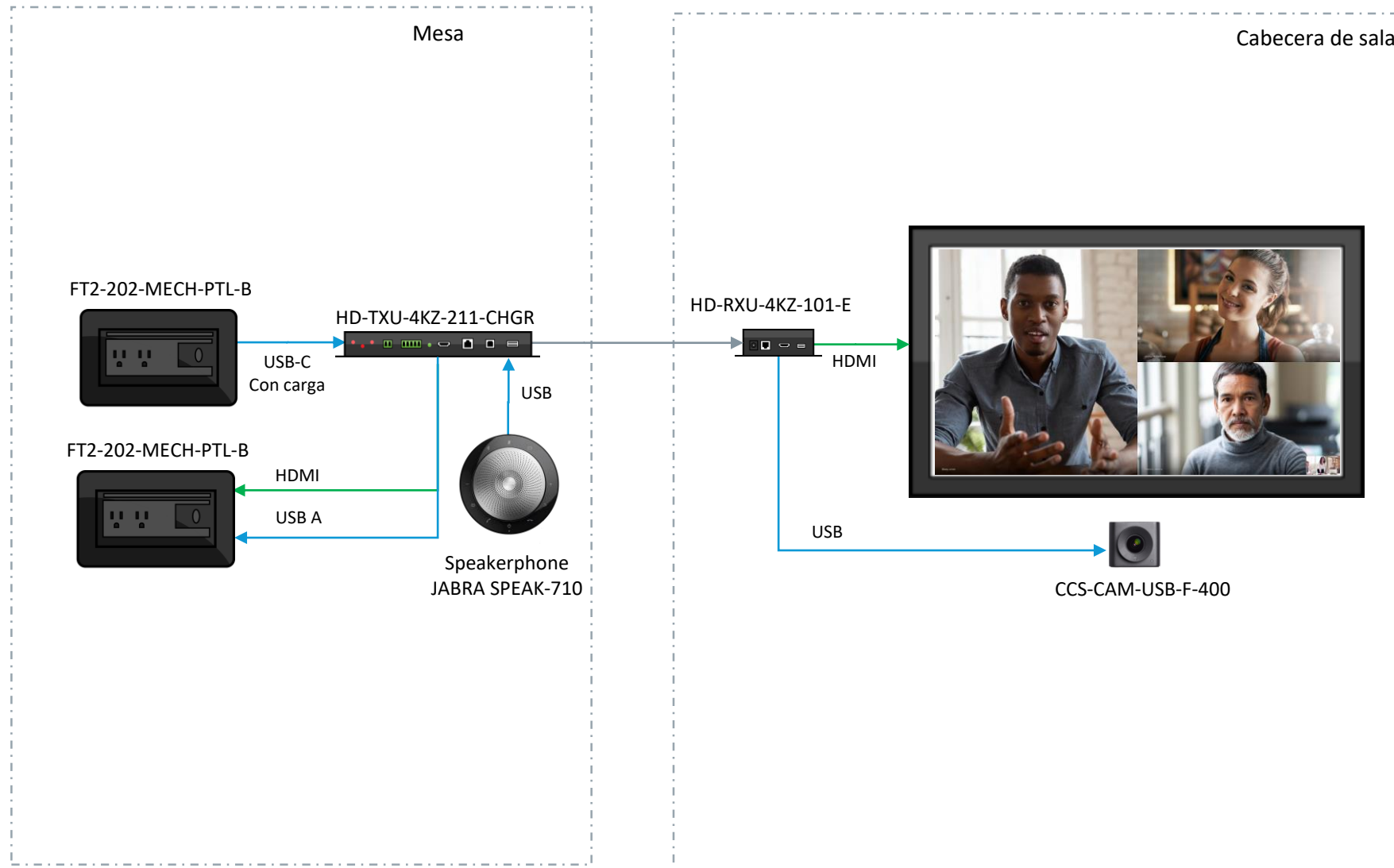


**BOM:**

- 1 x UC-SB1-CAM
- 2 x FT2-202-MECH-PTL-B
- 1 x HD-TXU-4KZ-211
- 1 x HD-RXU-4KZ-101-E



## 7. Solución básica con cable DM-Lite y dos cajas en mesa

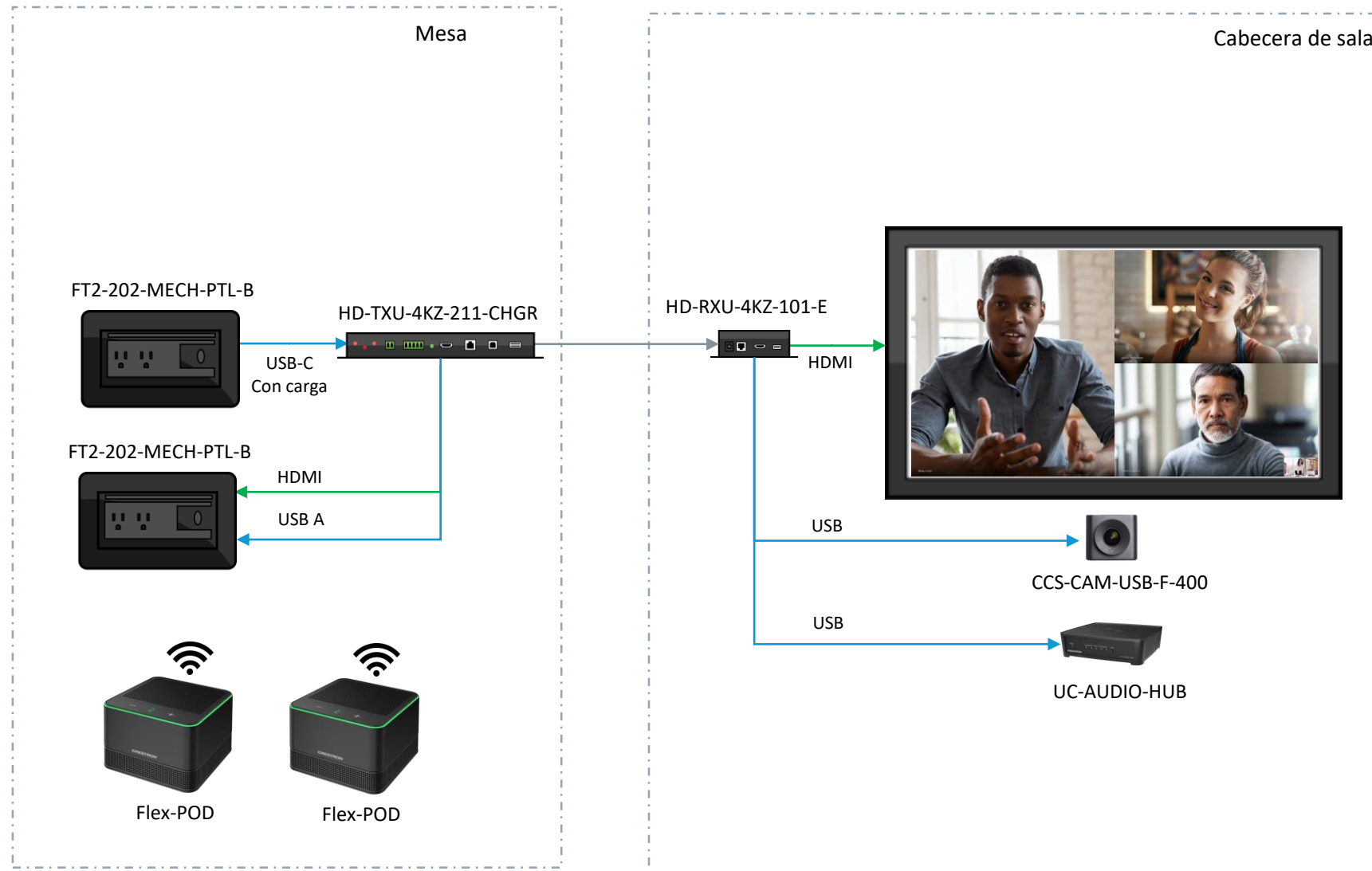


### BOM:

- 1 x UC-SB1-CAM
- 1 x FT2-202-MECH-PTL-B
- 1 x HD-TXU-4KZ-111-E
- 1 x HD-RXU-4KZ-101-R
- 1 x CCS-CAM-USB-F-400
- 1 x JABRA SPEAK-710

- HDMI
- RJ45
- USB

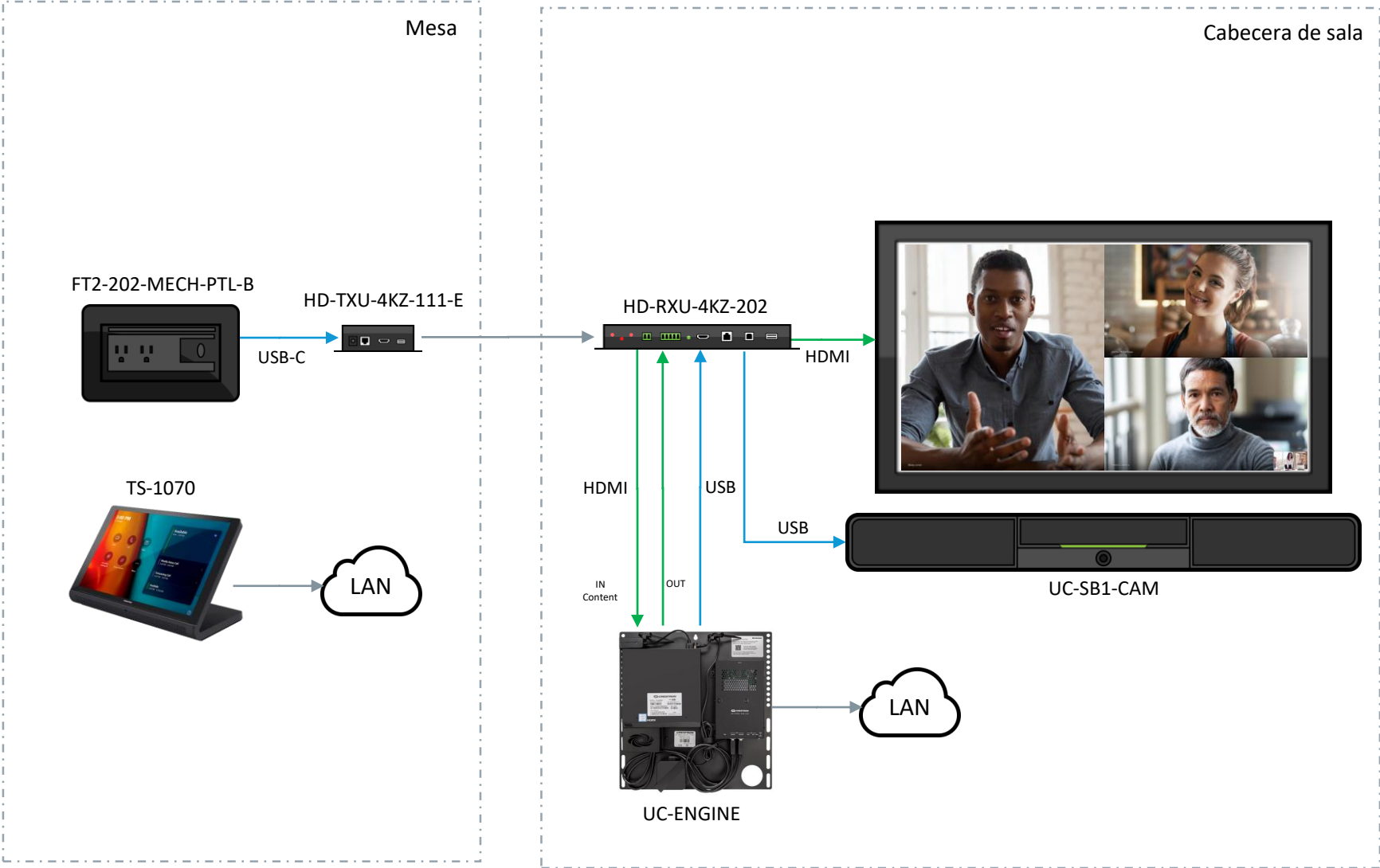
## 8. Solución básica con cable DM-Lite y dos cajas en mesa



### BOM:

- 1 x UC-SB1-CAM
- 2 x FT2-202-MECH-PTL-B
- 1 x HD-TXU-4KZ-111-E
- 1 x HD-RXU-4KZ-101-R
- 1 x CCS-CAM-USB-F-400
- 1 x UC-AUDIO-1-B-KIT
- 1 x UC-AUDIO-POD-B

9. Solución básica para compartir periféricos USB a dos dispositivos



- BOM:**
- 1 x UC-B30-T
  - 1 x FT2-202-MECH-PTL-B
  - 1 x HD-TXU-4KZ-111-E
  - 1 x HD-RXU-4KZ-101-E

- Legend:**
- HDMI**
  - RJ45**
  - USB**

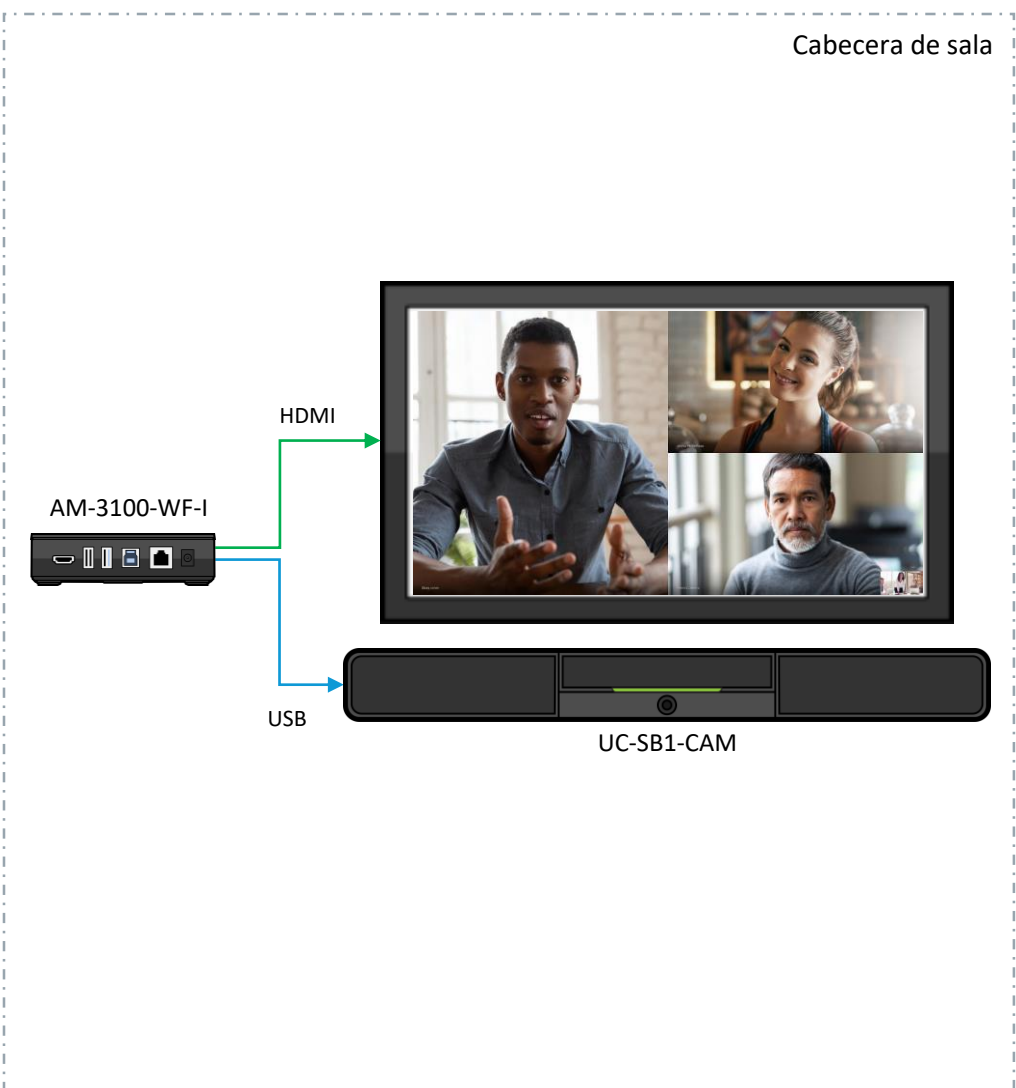
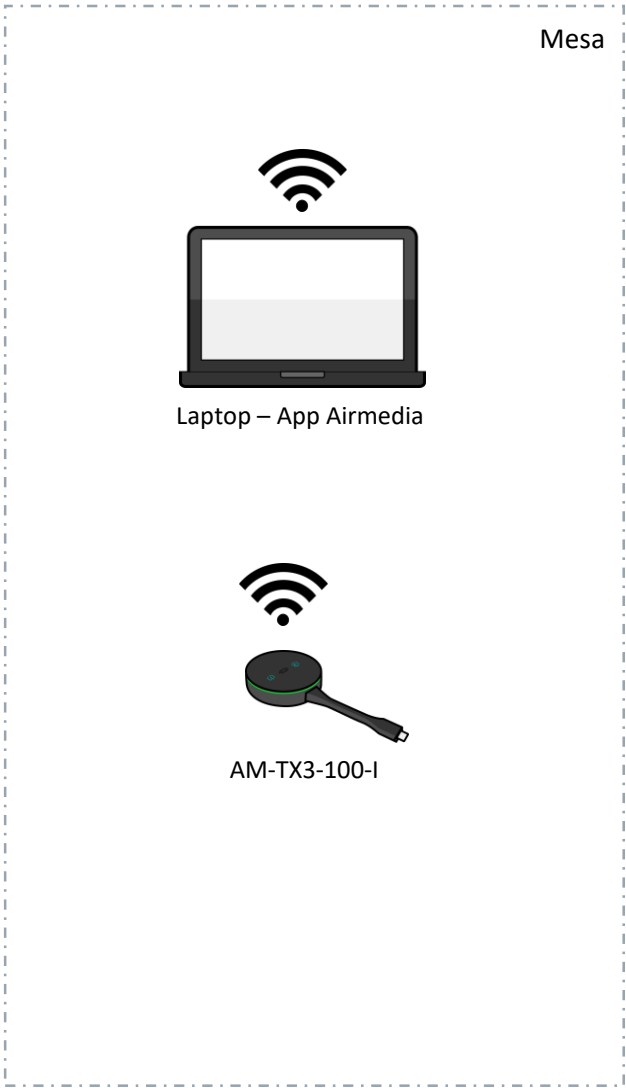


# Soluciones con AirMedia®





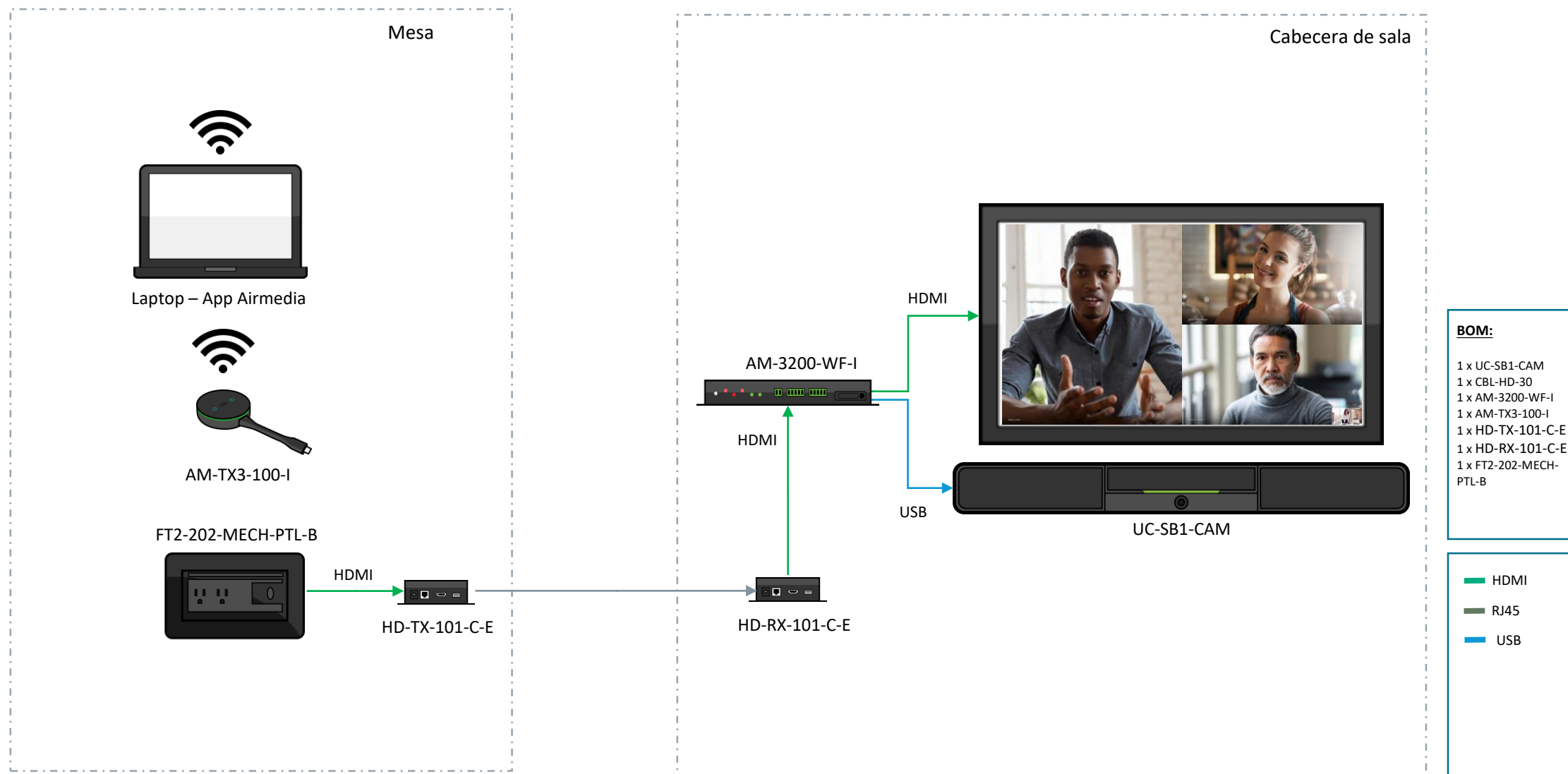
1. Solución básica con Airmedia para presentación y videoconferencia



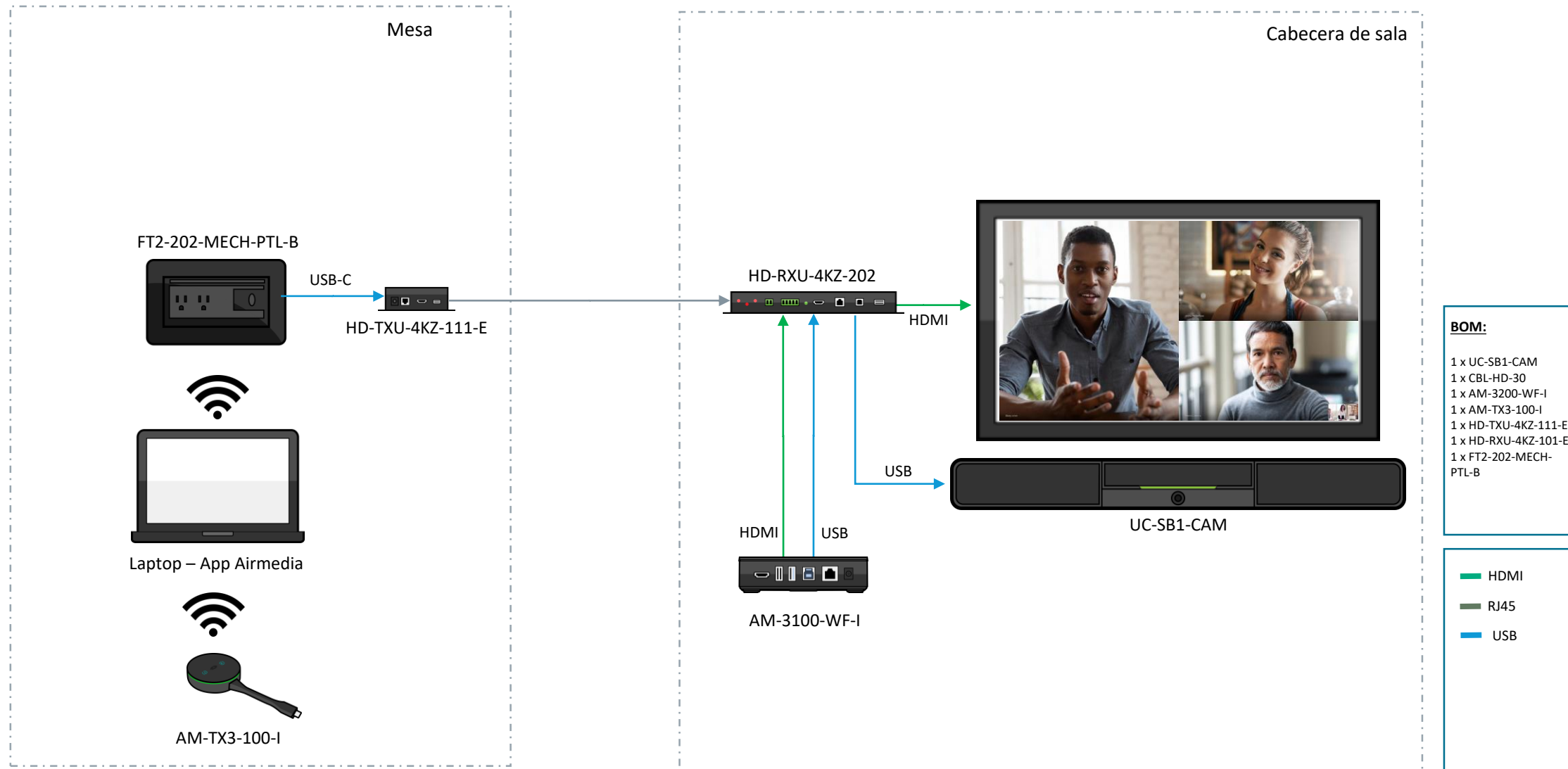
- BOM:**
- 1 x UC-SB1-CAM
  - 1 x CBL-HD-30
  - 1 x AM-3100-WF-I
  - 1 x AM-TX3-100-I

- HDMI
- RJ45
- USB

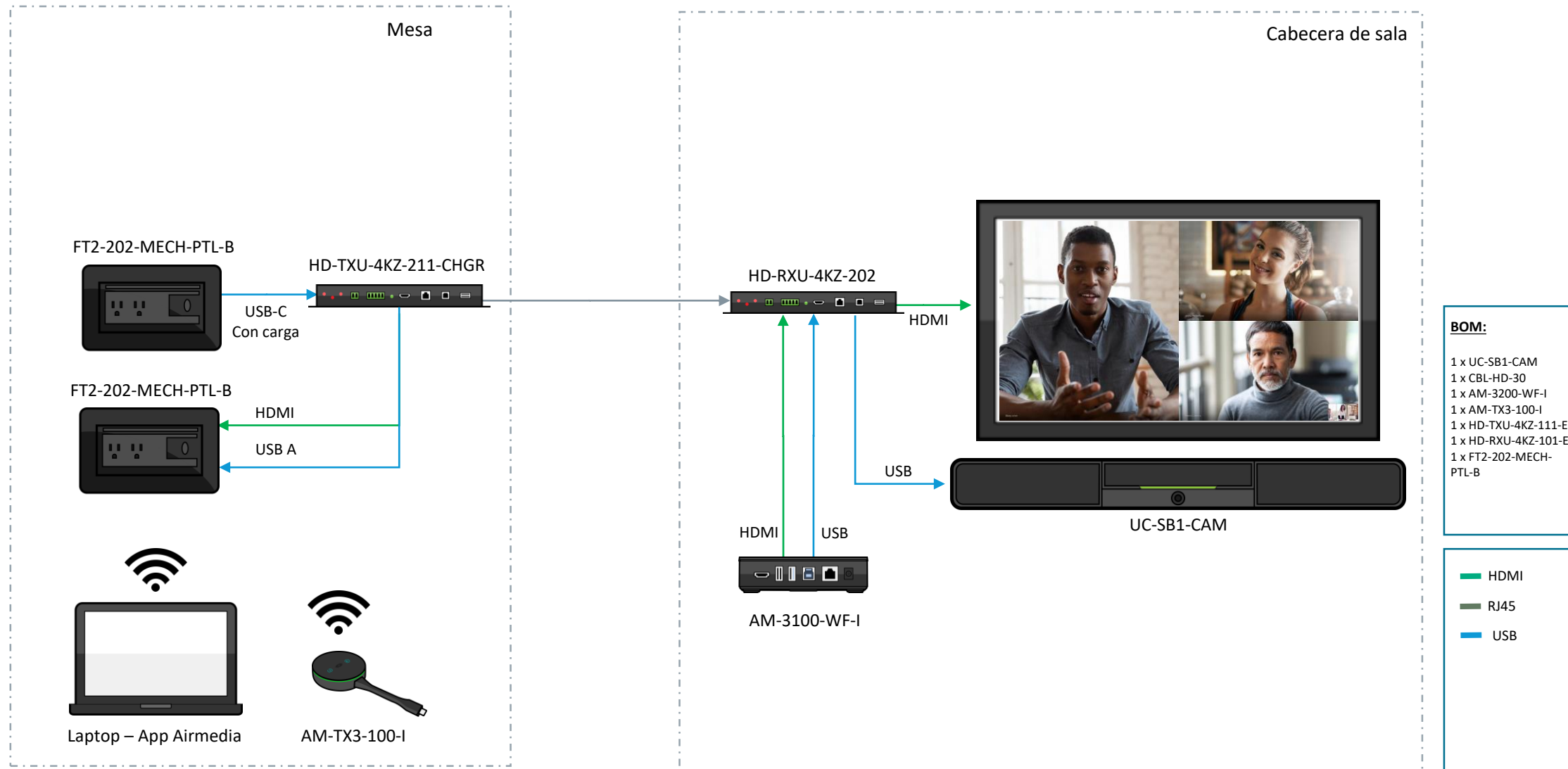
## 2. Solución con Airmedia para presentación y videoconferencia + cable hdmi



### 3. Solución con Airmedia para presentación y videoconferencia + cable USB-C



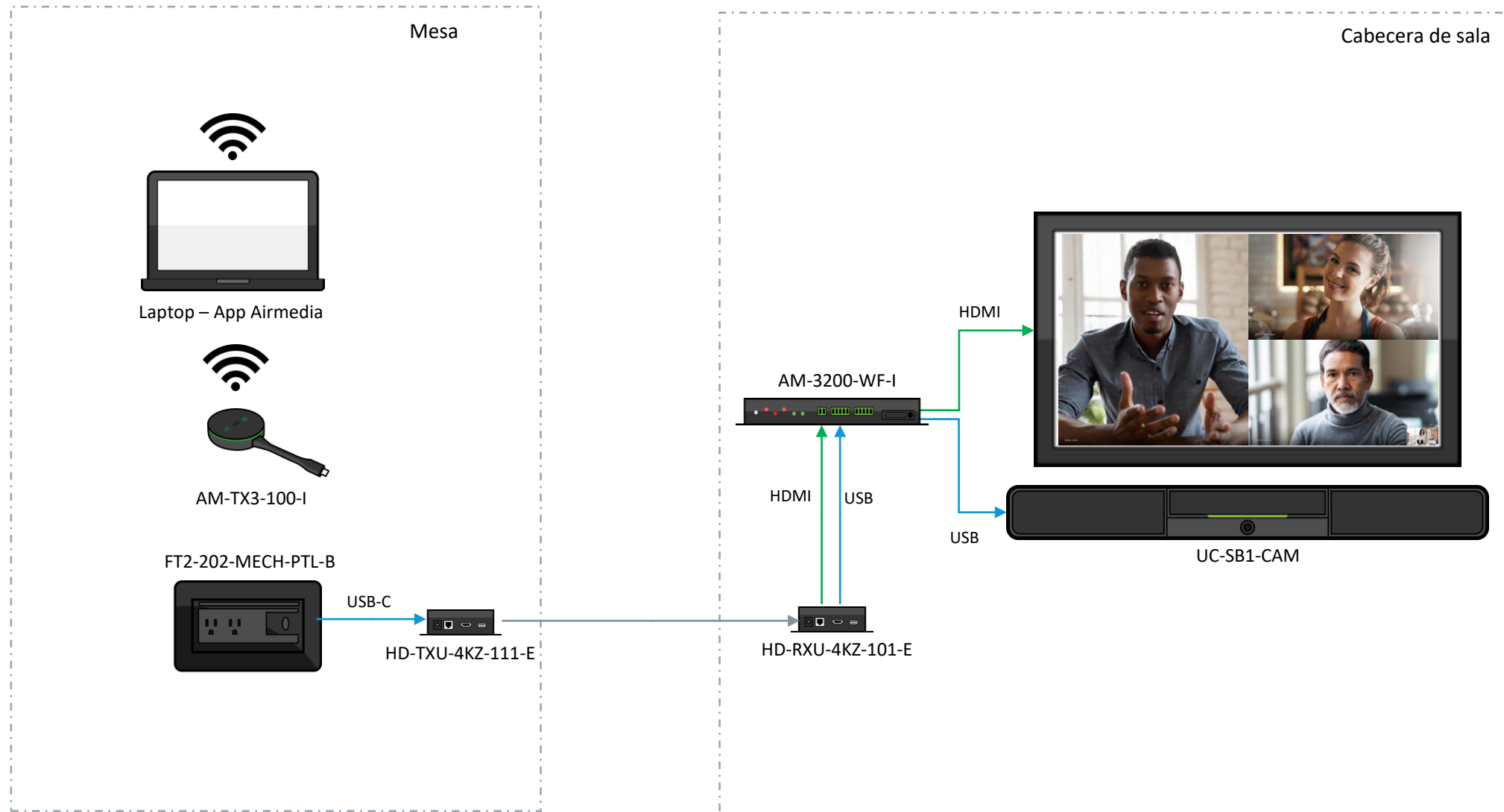
#### 4. Solución con Airmedia para presentación y videoconferencia + cable USB-C o hdmi+ USB-A



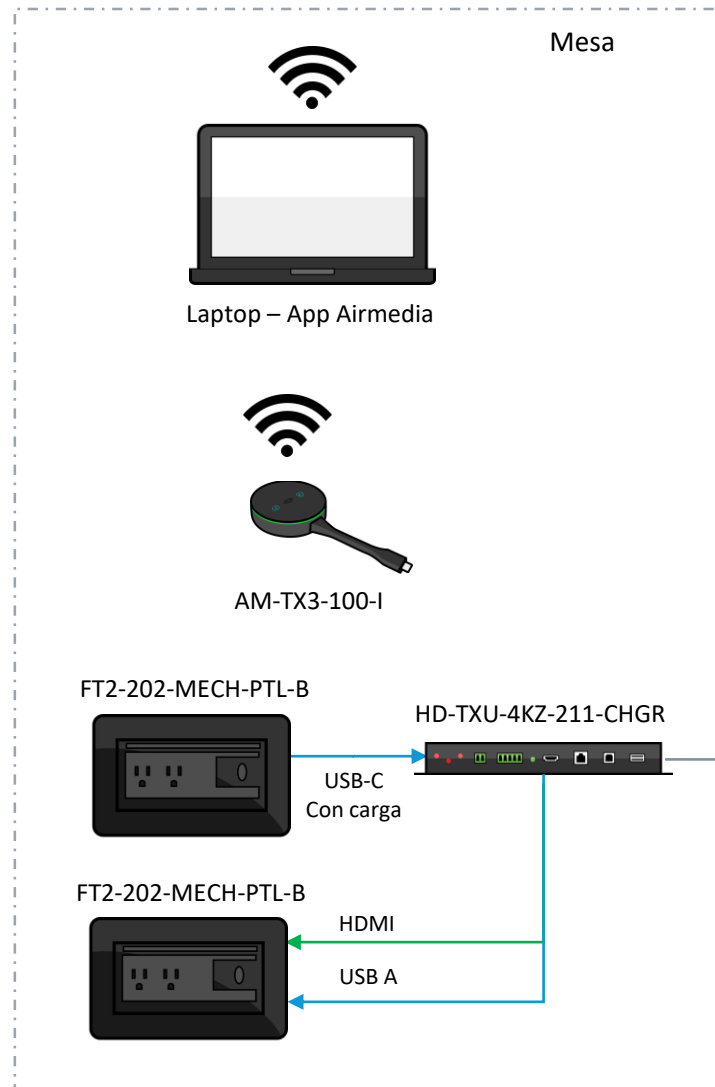


## FUTURE UPDATE

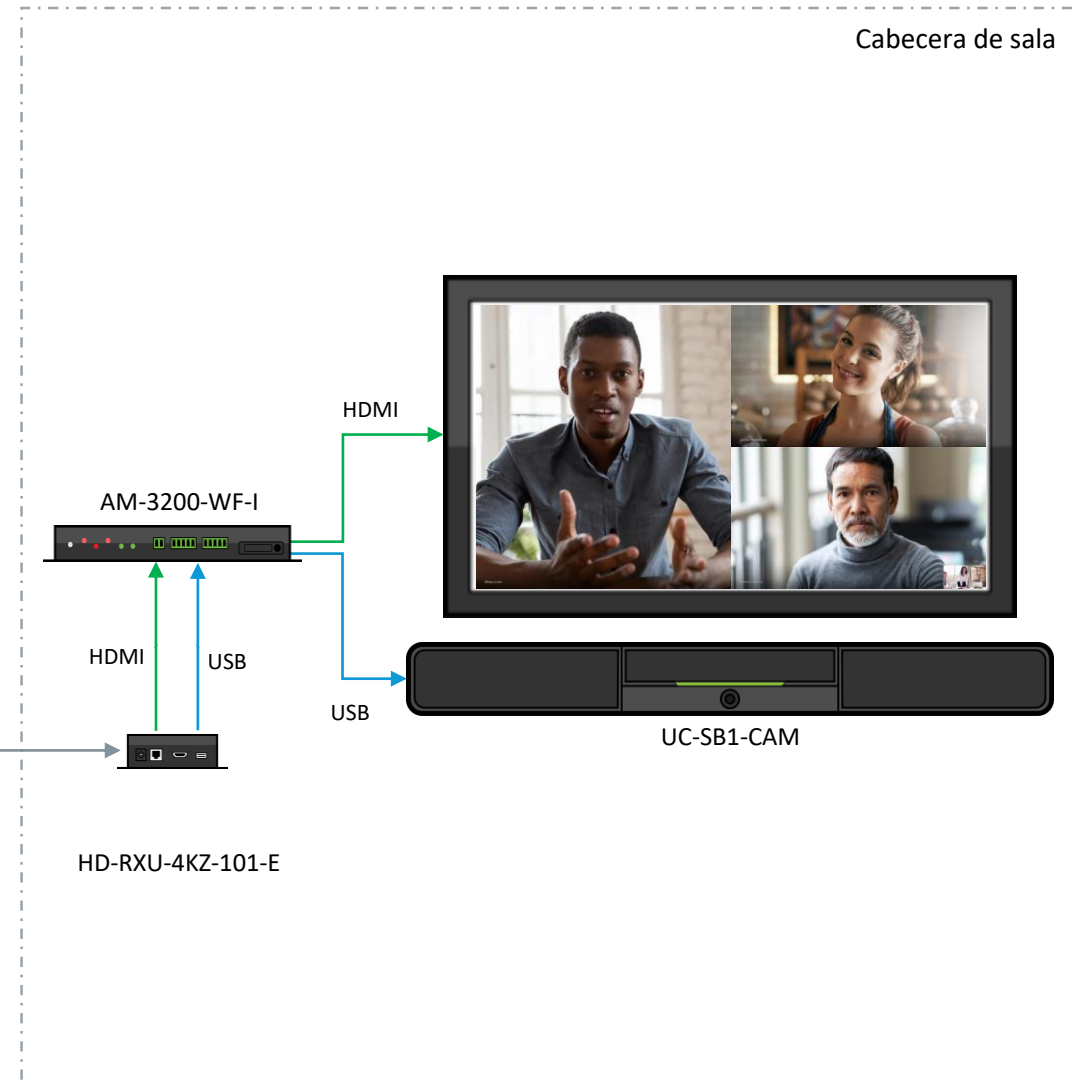
## 5. Solución con Airmedia para presentación y videoconferencia + cable USB-C



## FUTURE UPDATE



## 6. Solución con Airmedia para presentación y videoconferencia + cable USB-C o hdmi+ USB-A



### BOM:

- 1 x UC-SB1-CAM
- 1 x CBL-HD-30
- 1 x AM-3200-WF-I
- 1 x AM-TX3-100-I
- 1 x HD-TXU-4KZ-111-E
- 1 x HD-RXU-4KZ-101-E
- 1 x FT2-202-MECH-PTL-B

- HDMI
- RJ45
- USB

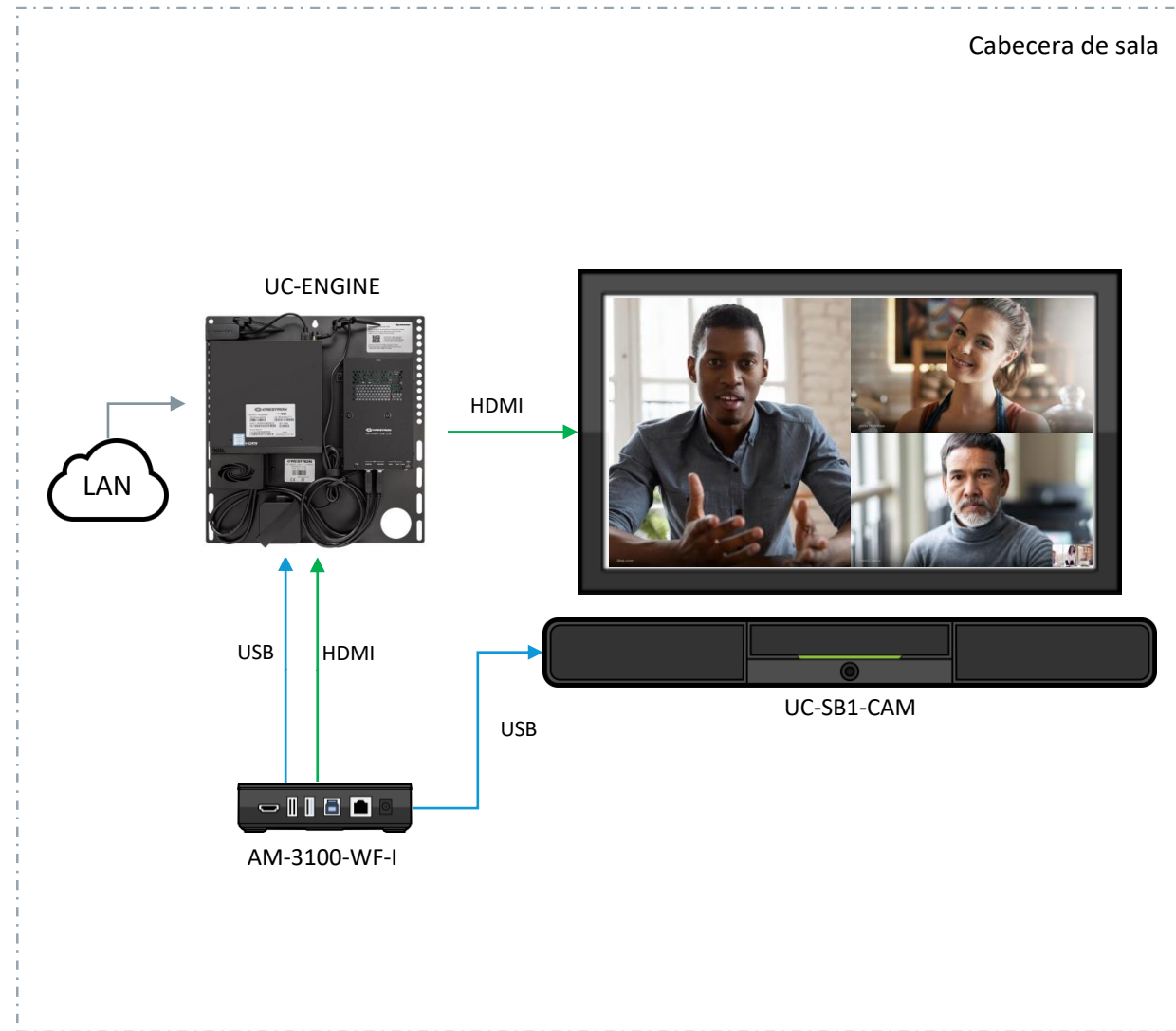
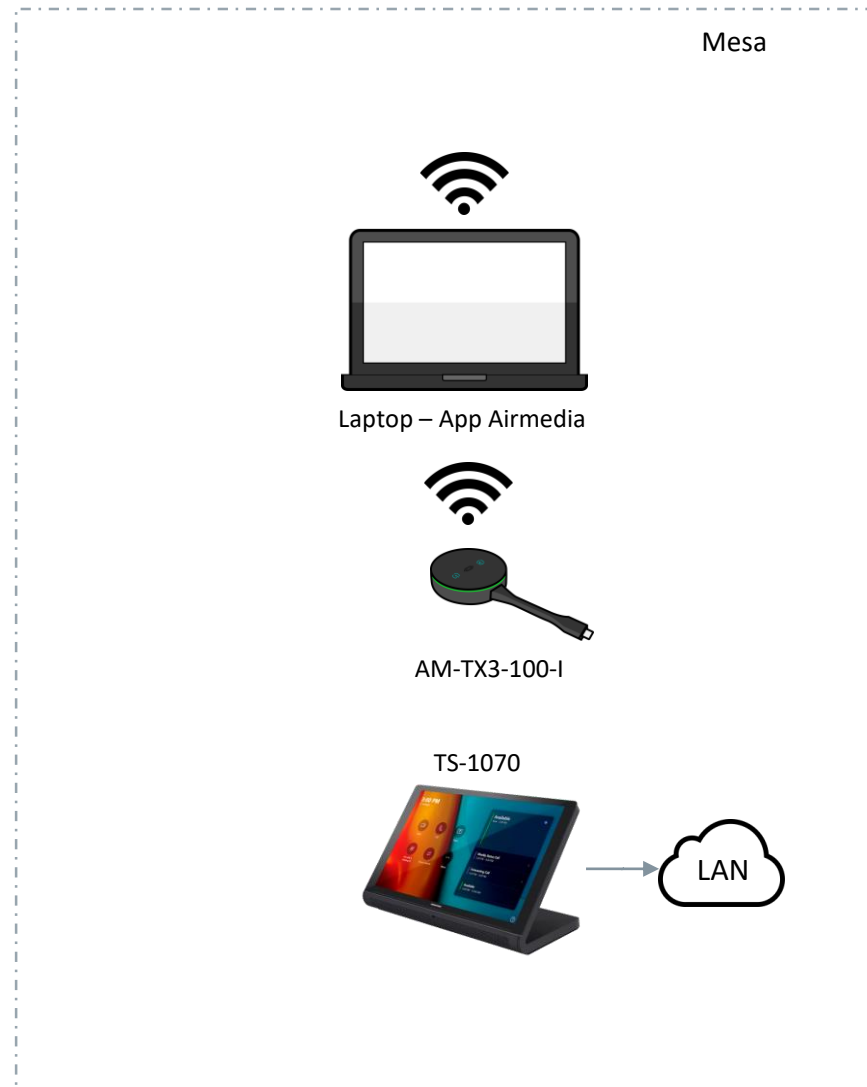


**Soluciones con AirMedia® y Flex®**



## FUTURE UPDATE

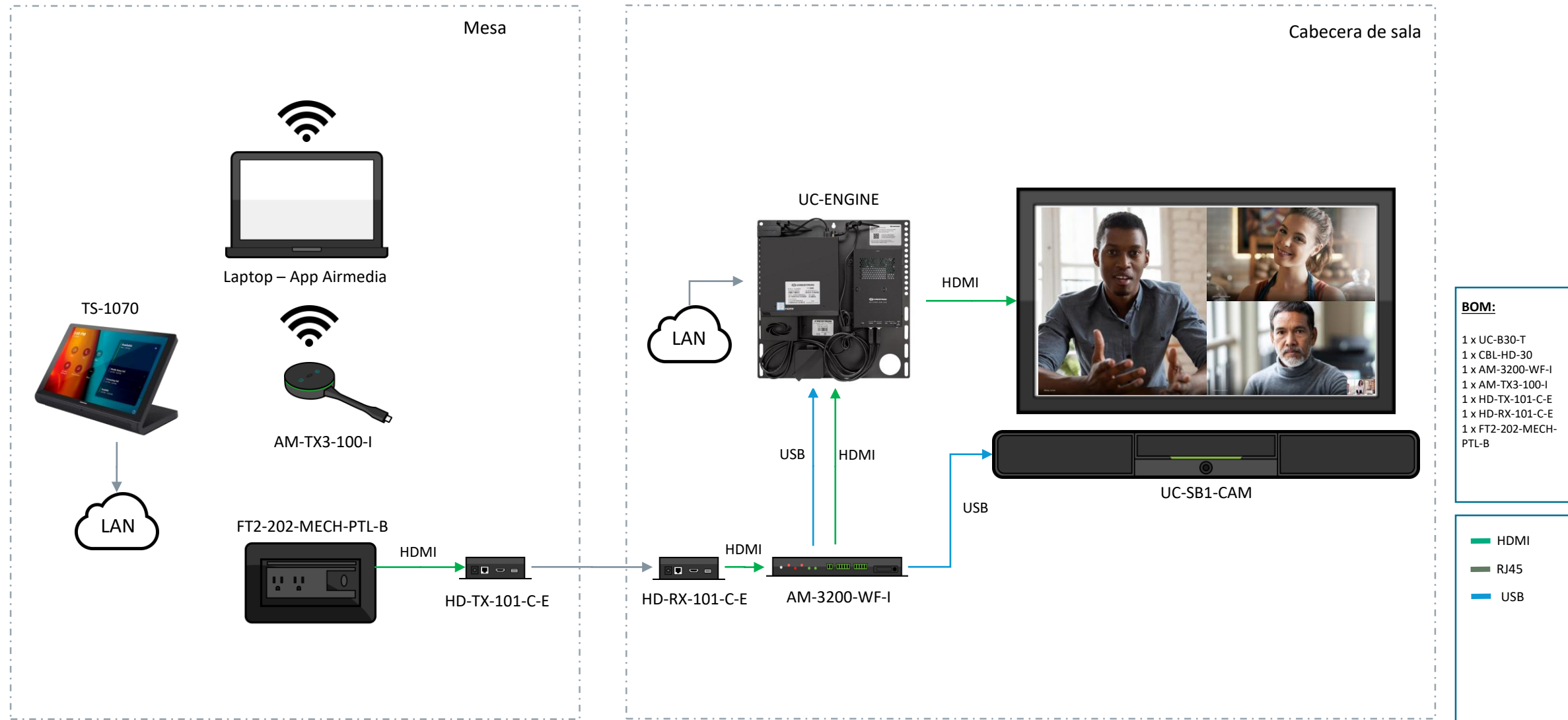
### 3. Solución con Airmedia para presentación y videoconferencia + MTR + BYOD WIFI



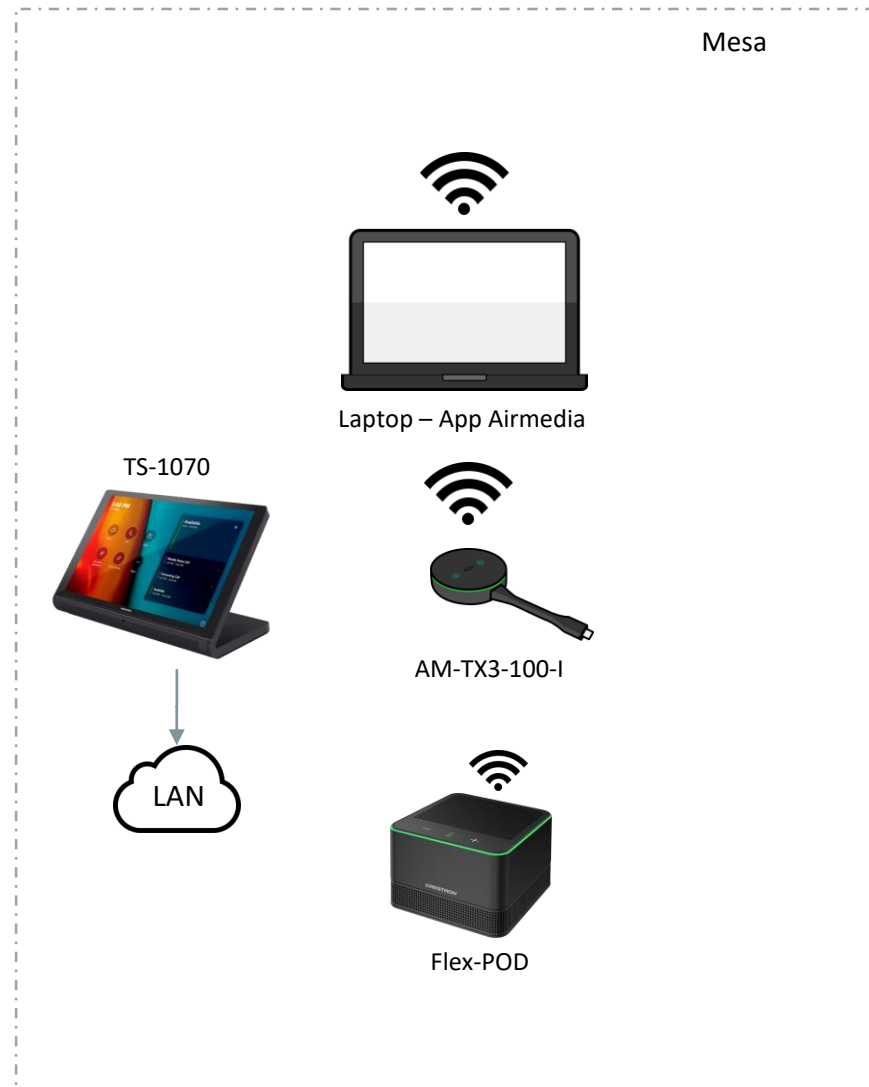


## FUTURE UPDATE

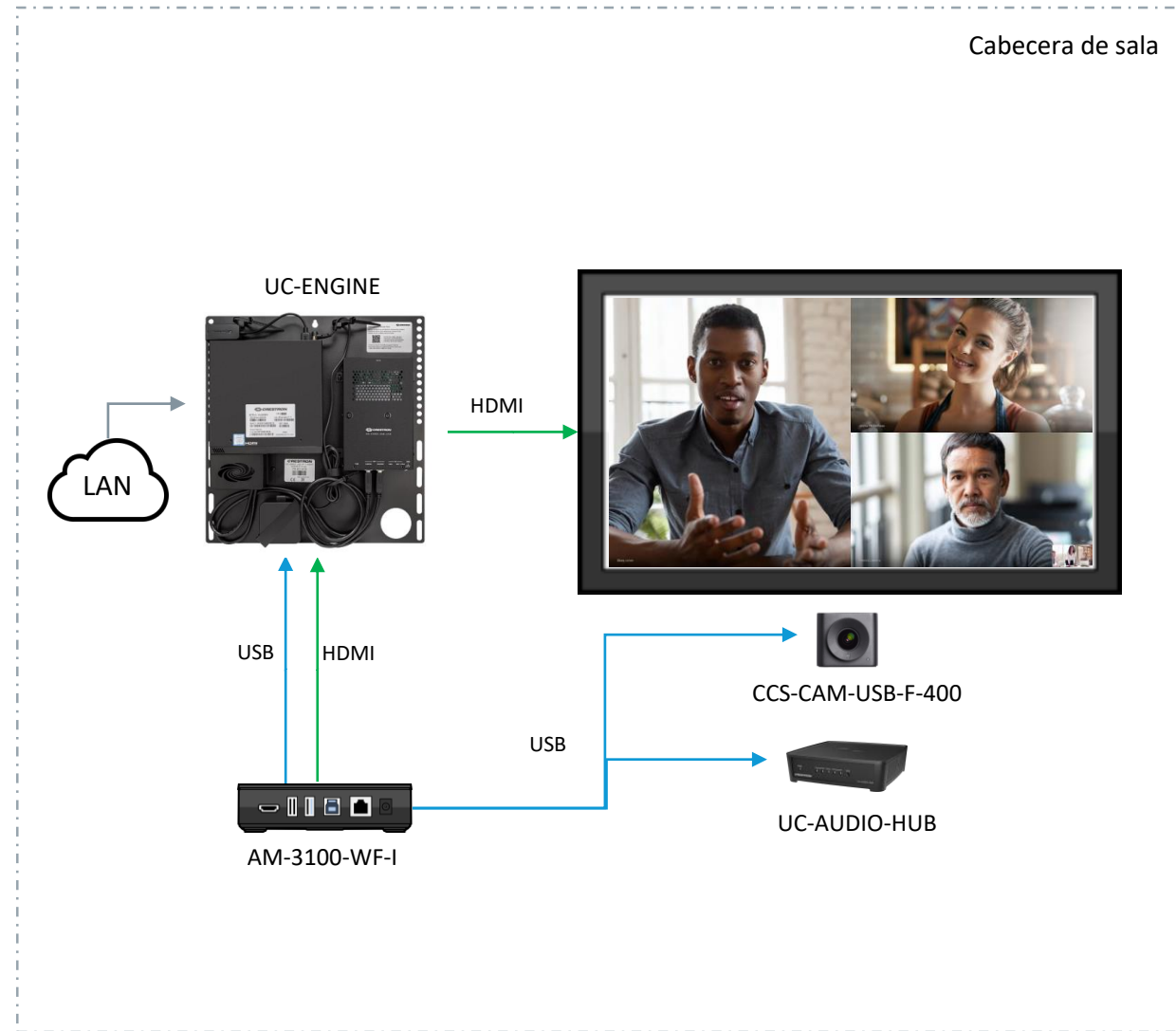
## 4. Solución con Airmedia para presentación y videoconferencia + MTR + BYOD Wifi + Presentación hdmi



## FUTURE UPDATE



## 5. Solución con Airmidia para presentación y videoconferencia + MTR



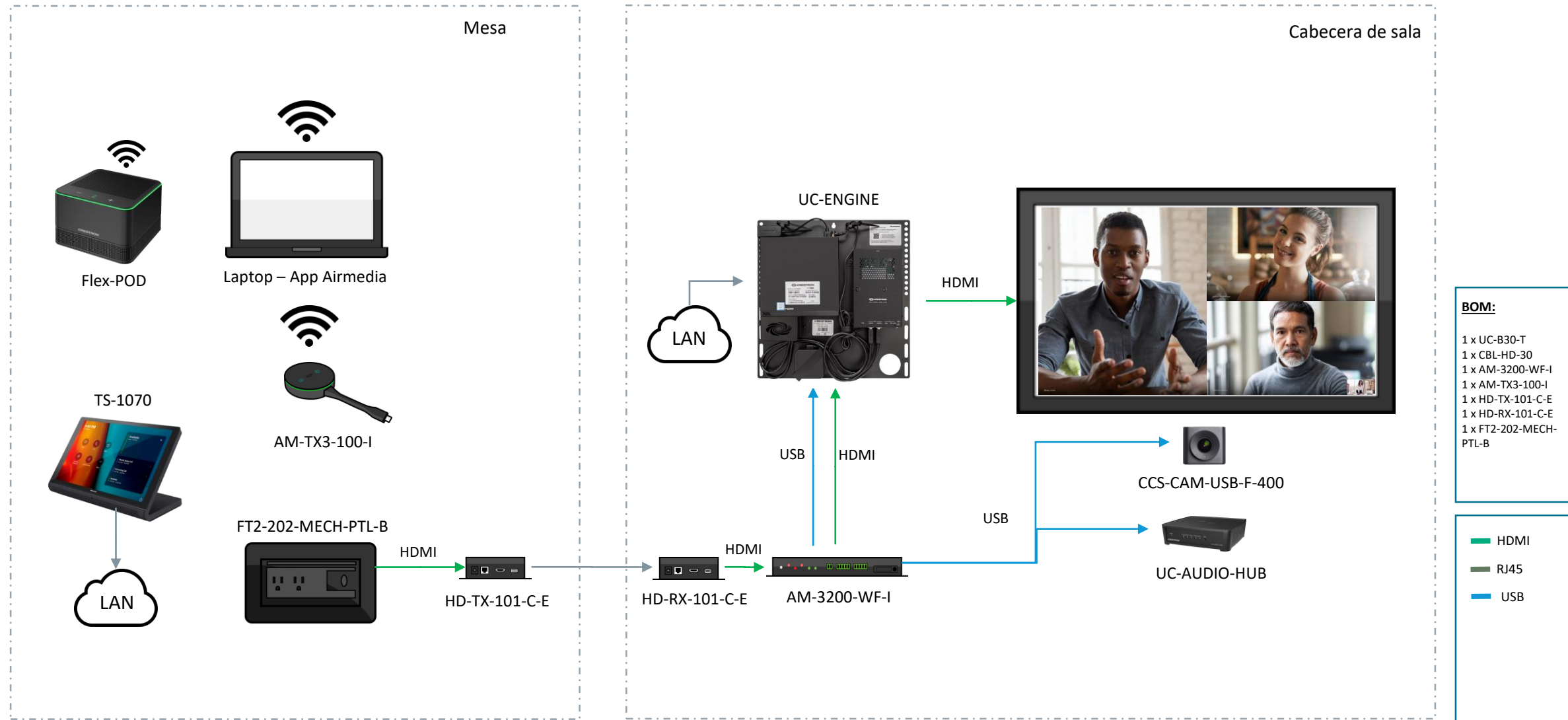
### BOM:

- 1 x UC-B30-T
- 1 x CBL-HD-30
- 1 x AM-3200-WF-I
- 1 x AM-TX3-100-I
- 1 x HD-TX-101-C-E
- 1 x HD-RX-101-C-E
- 1 x FT2-202-MECH-PTL-B

- HDMI
- RJ45
- USB

## FUTURE UPDATE

## 6. Solución con Airmedia para presentación y videoconferencia + MTR





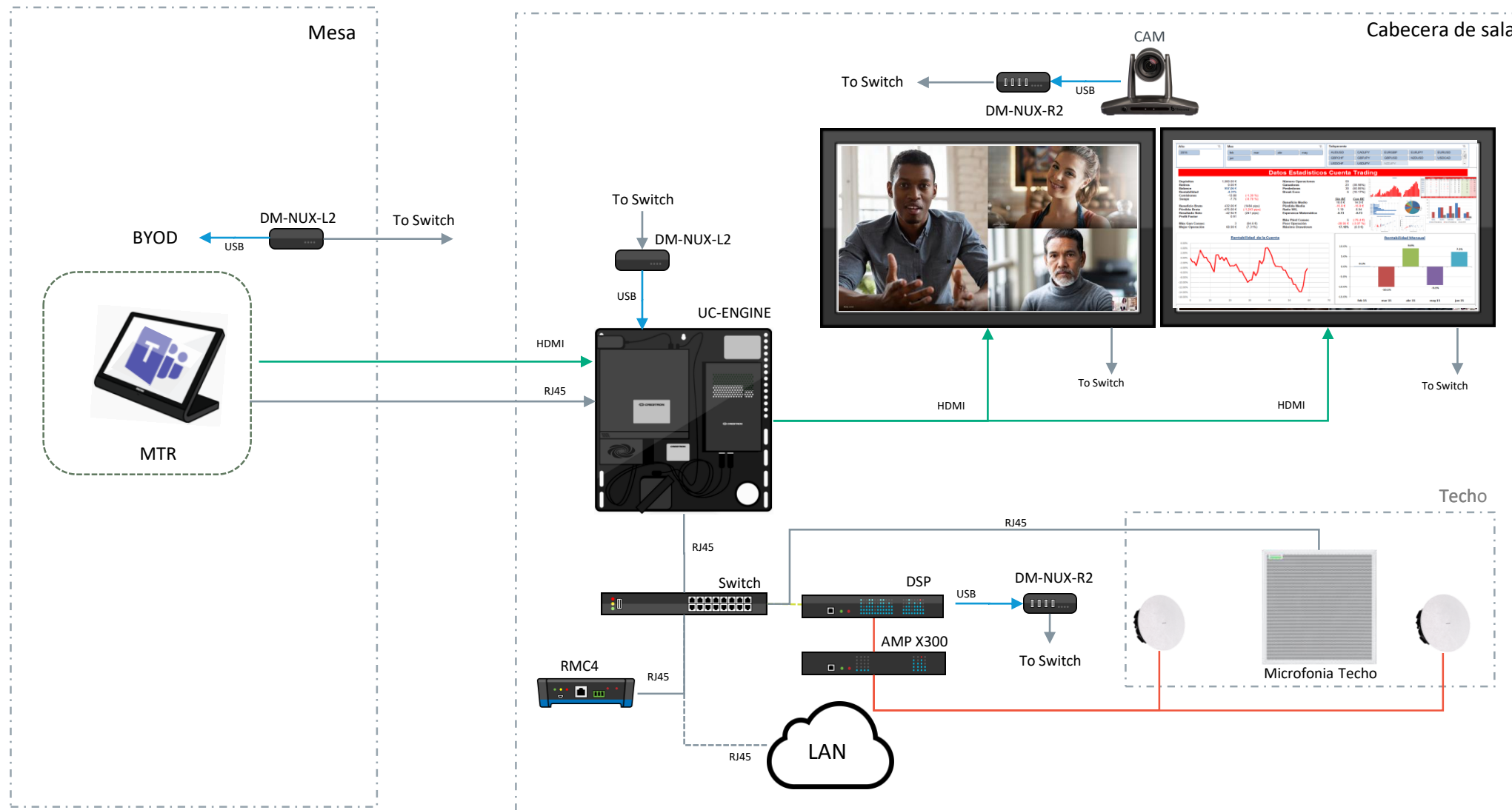


# Sistemas USB matriciales





# 1. Solución matricial USB para sistema distribuido BYOD + MTR con NUX



## BOM:

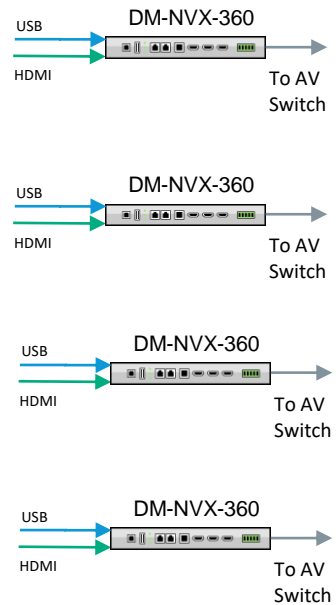
- 1 x UC-SB1-CAM
- 1 x FT2-202-MECH-PTL-B
- 1 x CBL-USB-3G2-A-EXT
- 1 x CBL-HD-30

# 1. Solución matricial USB para sistema distribuido BYOD + MTR con NVX y NUX

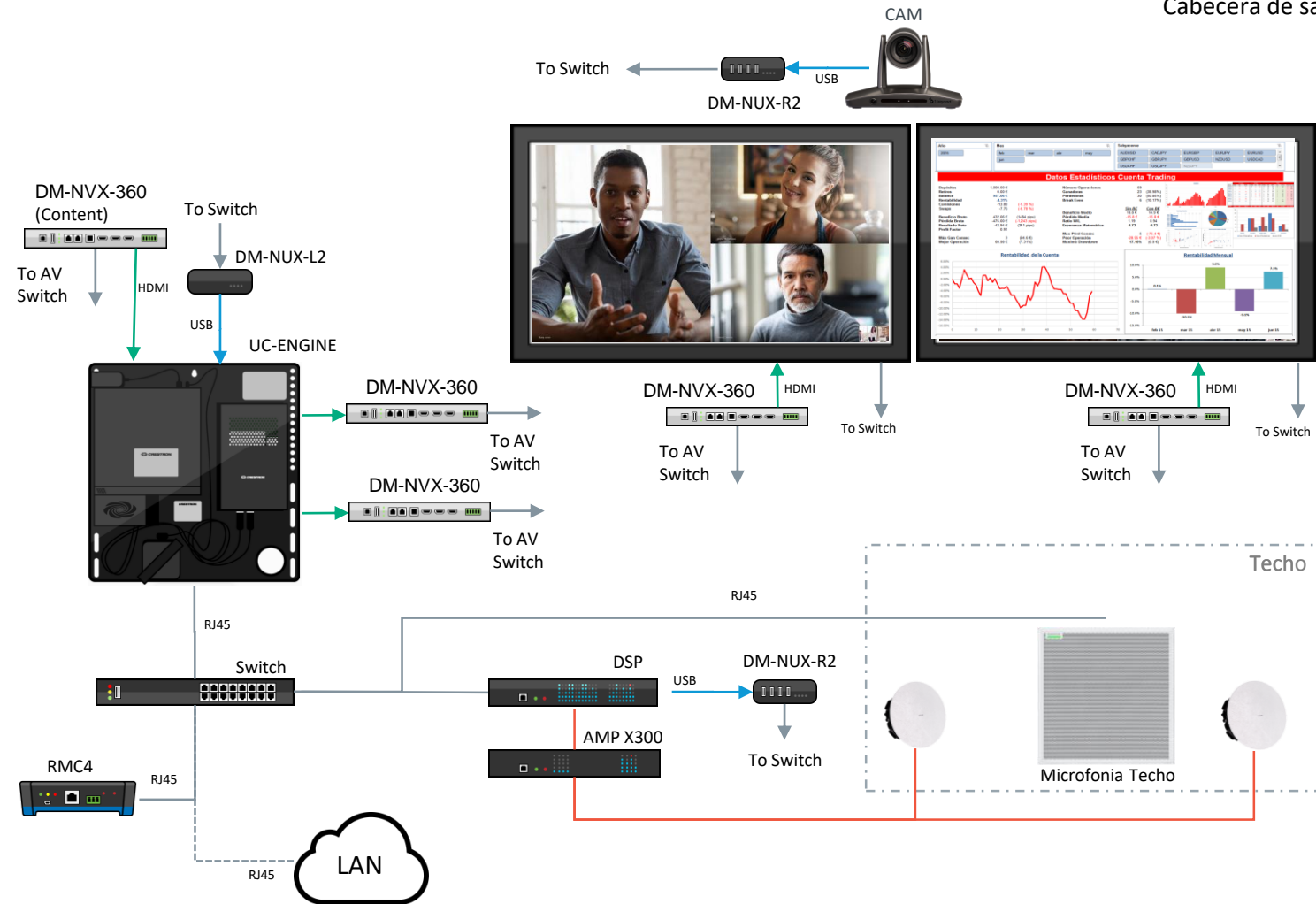
## Mesa



MTR



## Cabecera de sala

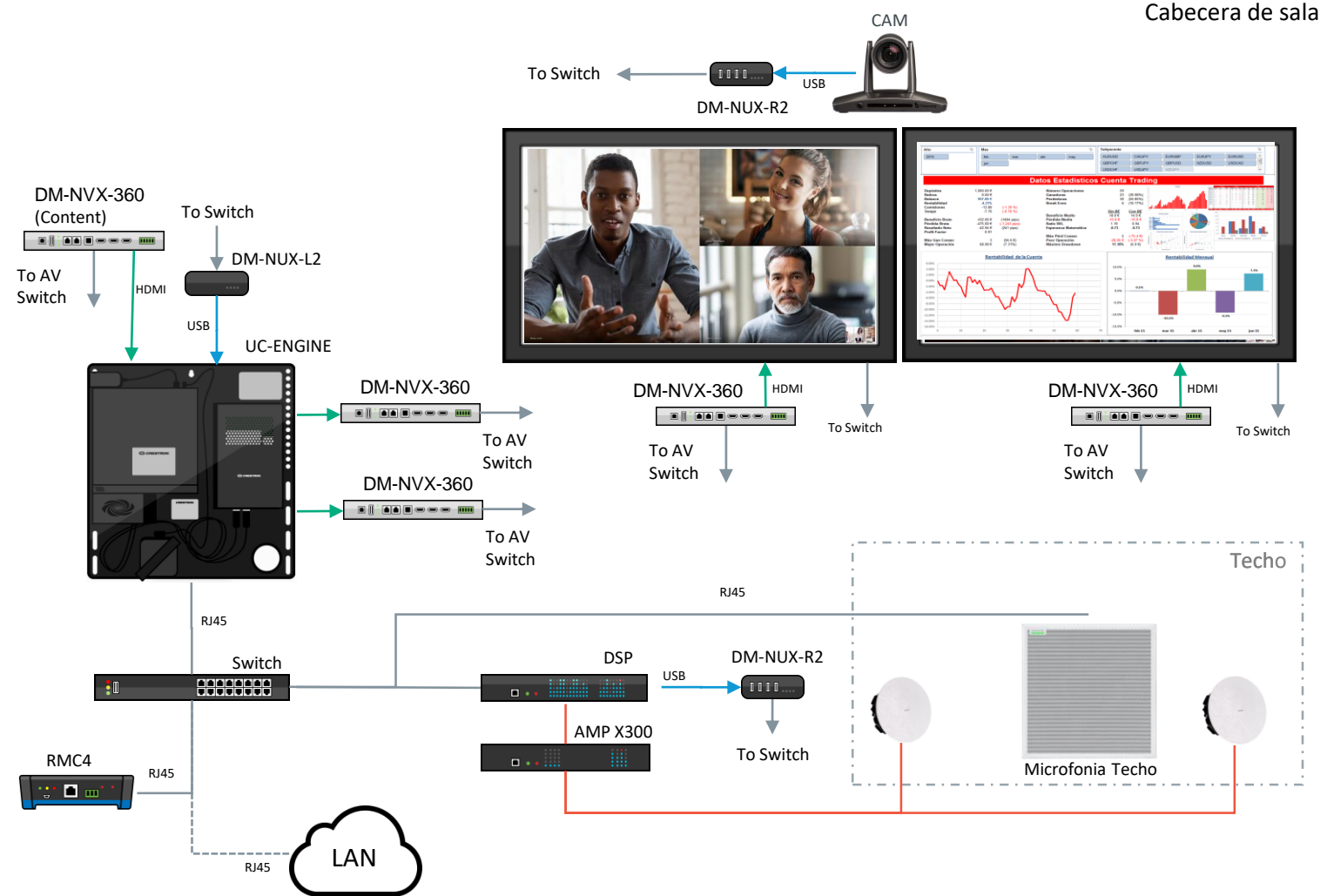
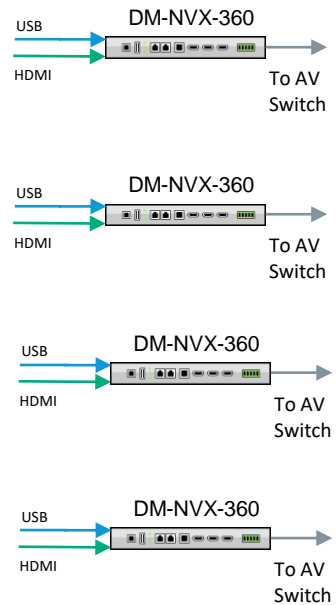


## BOM:

- 1 x UC-SB1-CAM
- 1 x FT2-202-MECH-PTL-B
- 1 x CBL-USB-3G2-A-EXT
- 1 x CBL-HD-30

- HDMI
- RJ45
- USB

## 1. Solución matricial USB para sistema distribuido BYOD + MTR con NVX y NUX

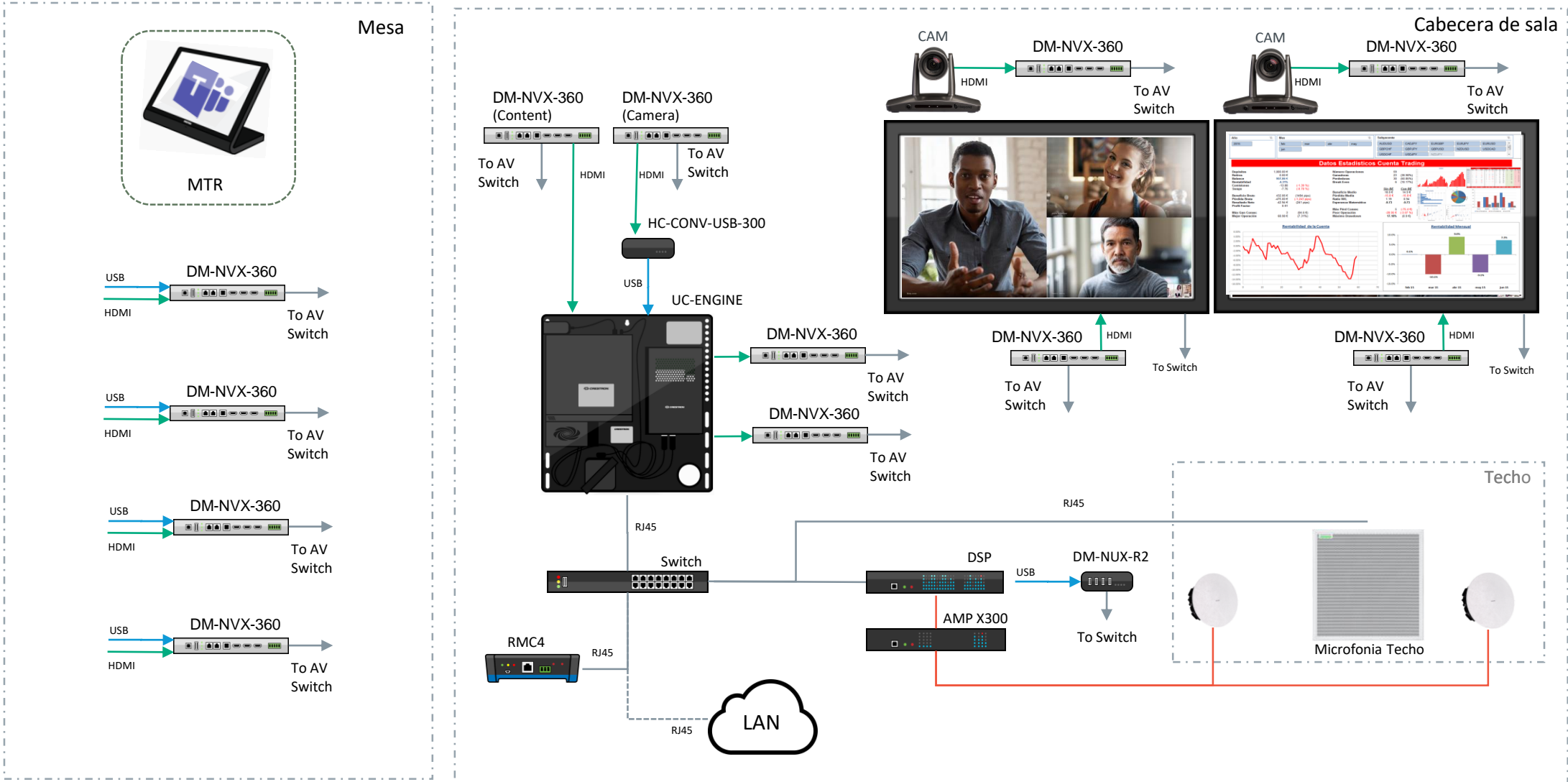


**BOM:**

1 x UC-SB1-CAM  
1 x FT2-202-  
MECH-PTL-B  
1 x CBL-USB-  
3G2-A-EXT  
1 x CBL-HD-30

- HDMI
- RJ45
- USB

## 1. Solución matricial USB para sistema distribuido BYOD + MTR con NVX y NUX (Multicámara)



**BOM:**

1 x UC-SB1-CAM  
1 x FT2-202-  
MECH-PTL-B  
1 x CBL-USB-  
3G2-A-EXT  
1 x CBL-HD-30

- HDMI
- RJ45
- USB

- HDMI
- RJ45
- USB