visual engineering
LIGHTWARE

Lightware Lab summary of
Lenovo ThinkSmart Core Full Room Kit
MTR on Windows validation

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Version	Comment	Date
1.0	Initial version	Sept 22, 2023

1. Introduction

The **Lenovo ThinkSmart Core Full Room Kit MTR** is a complete unified communications solution certified for Teams Rooms. The **Lightware Taurus UCX** and **TPX** extends the functionality of the Lenovo MTR, enabling BYOD mode for multiple clients, while also providing charging and networking for them.

Our customers need confirmation that the UCX interoperability with Lenovo MTR has been tested, validated, and recommended by Lightware.

1.1. Test cases

As validation we tested the connectivity of peripherals, both in-call and in BYOD mode. For testing, we connected to the video conference peripheral using Lenovo MTR, and we initiated a Teams videocall from the connected laptops. We also investigated content sharing through Taurus UCX in a Teams Rooms call.

During calls, we tested the quality and reliability of the audio/video and shared content that was being sent to the far end, and we tested the video and audio received from the far end. In addition to the above, the laptops were dis- and reconnected ten times to check the video/USB auto switching feature of Taurus UCX.

For the MTR integration our **MTRoW integration starter package** was installed and configured before the validation.

We distinguish the following test results:

- **Passed** – Both peripheral (camera, speaker and microphone) and display (DP Alt mode) signals are reliable, and redirection of the peripheral signal works by the video/USB auto switching
- **Failed** – Either peripheral or the display signal is unstable or not presented at all.
- **Not tested** - The test case cannot be interpreted in the given configuration, e.g. due to lack of HDMI port.

1.2. Test environment

Unit	Type	FW/OS version
Camera	Lenovo ThinkSmart Camera	
Soundbar	Lenovo ThinkSmart Bar/Mic	
MTRoW PC	Lenovo ThinkSmart Core	Win11 IoT Enterprise 22H2
Touch	Lenovo ThinkSmart Controller	
HDMI/USB matrix switcher	Lightware UCX-4x2-HC30	v2.5.0b5
HDMI/USB matrix switcher/extender	Lightware UCX-4x3-TPX-TX20 Lightware UCX-TPX-RX107	v1.2.0b3
Display	Samsung QB50B	1090.2
Laptop 1	HP ProBook 440 G9	Win10 Pro 22H2
Laptop 2	Lenovo T14	Win10 Pro 22H2
Laptop 5	MacBook Pro 2020	MacOs Monterey, 12.6

1.3. Tested cables

Unit	Type	
Lightware CAB-USBC-T100A	1m Type C – Type C	
Lightware CAB-USBC-T200A	2m Type C – Type C	
Lightware CAB-USBC-T300A	3m Type C – Type C	
Lightware CAB-USBC-T400B	4m Type C – Type C	
Lightware CAB-USBC-T500B	5m Type C – Type C	
Lightware CAB-USBC-AOC800K	8m Type C – Type C	
Lightware CAB-USBC-AOC1000K	10m Type C – Type C	
AWM2725 3m	3m Type A – Type B USB 3.0	Scenario 1, 2
AWM2725 5m	5m Type A – Type B USB 3.0	Scenario 1, 2
28AWG/1P+24AWG/2C E516271 3m	3m Type A – Type B USB 2.0	Scenario 3
28AWG/1P+24AWG/2C E516271 5m	5m Type A – Type B USB 2.0	Scenario 3

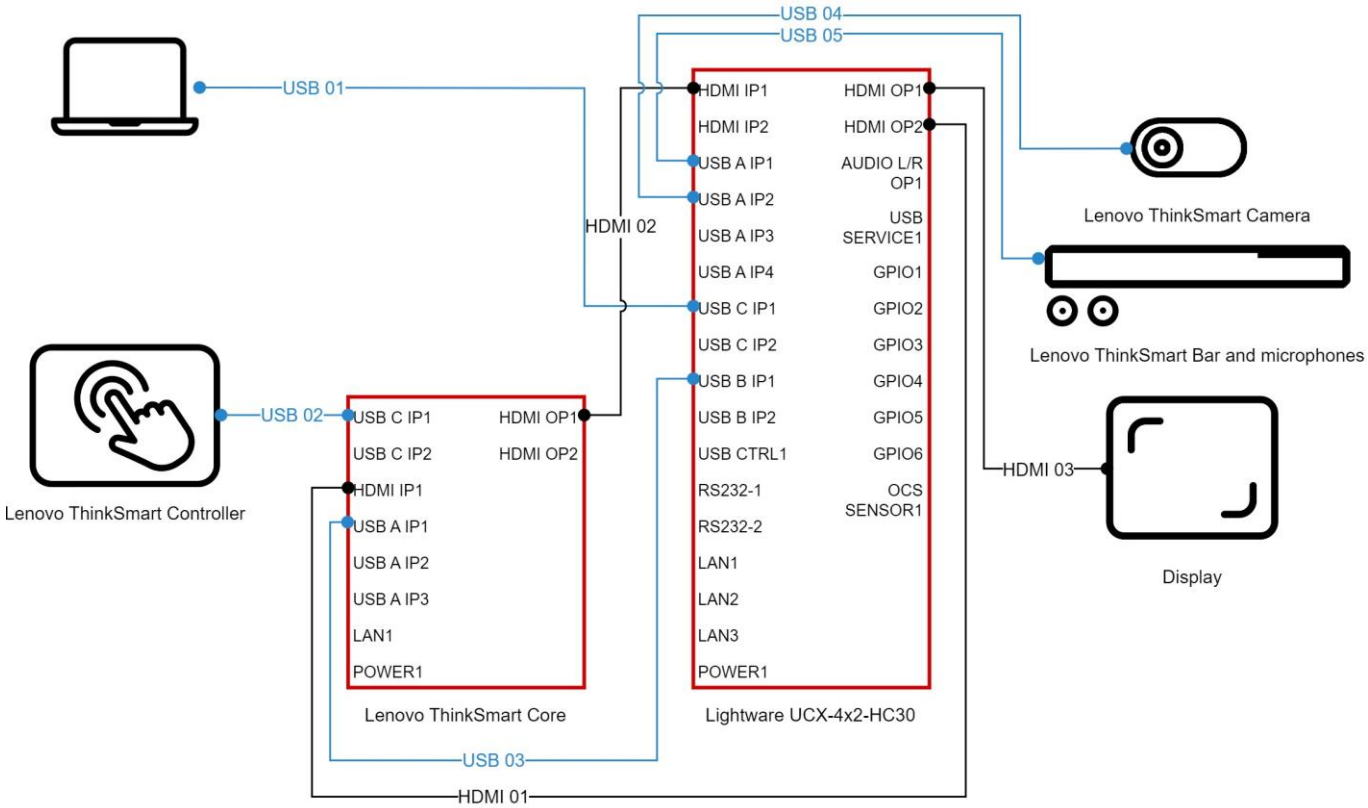
2. Scenario 1 – One Taurus UCX

2.1. Overview

The first test scenario contains one Taurus UCX and Lenovo ThinkSmart Core Full Room Kit.

2.2. Wiring

For clarity, only USB/HDMI connections are shown.



2.3. Cable numbering

Nr	Type
USB 01	*See tested cable list – USB Type C-C*
USB 02	built-in Type-C
USB 03	*See tested cable list – USB Type A-B*
USB 04	10m Type A-C USB 2.0 (given by Lenovo) 2m Type A-C USB 3.0 (SmartAVLink STAC-3000-002)
USB 05	1m 2.0 Type A-C USB 2.0
HDMI 01	Lightware CAB-HDMI20-PHS200F
HDMI 02	Lightware CAB-HDMI20-PHS200F
HDMI 03	Lightware CAB-HDMI20-PHS500P

2.4. Results

2.4.1. Teams Rooms on Windows

Platform:	Lenovo ThinkSmart Core	
USB 03:	3m Type A – Type B USB 3.0	5m Type A – Type B USB 3.0
Test results:	Passed	Passed

2.4.2. BYOD

Platform:	BYOD - Lenovo T14						
USB 01:	CAB-USBC-T100A	CAB-USBC-T200A	CAB-USBC-T300A	CAB-USBC-T400B	CAB-USBC-T500B	CAB-USBC-AOC800K	CAB-USBC-AOC1000K
Test results:	Passed	Passed	Passed	Passed	Passed	Passed	Passed

Platform:	BYOD - HP ProBook						
USB 01:	CAB-USBC-T100A	CAB-USBC-T200A	CAB-USBC-T300A	CAB-USBC-T400B	CAB-USBC-T500B	CAB-USBC-AOC800K	CAB-USBC-AOC1000K
Test results:	Passed	Passed	Passed	Passed	Passed	Passed	Passed

Platform:	BYOD - MacBook 2020 M1						
USB 01:	CAB-USBC-T100A	CAB-USBC-T200A	CAB-USBC-T300A	CAB-USBC-T400B	CAB-USBC-T500B	CAB-USBC-AOC800K	CAB-USBC-AOC1000K
Test results:	Passed	Passed	Passed	Passed	Passed	Passed	Passed

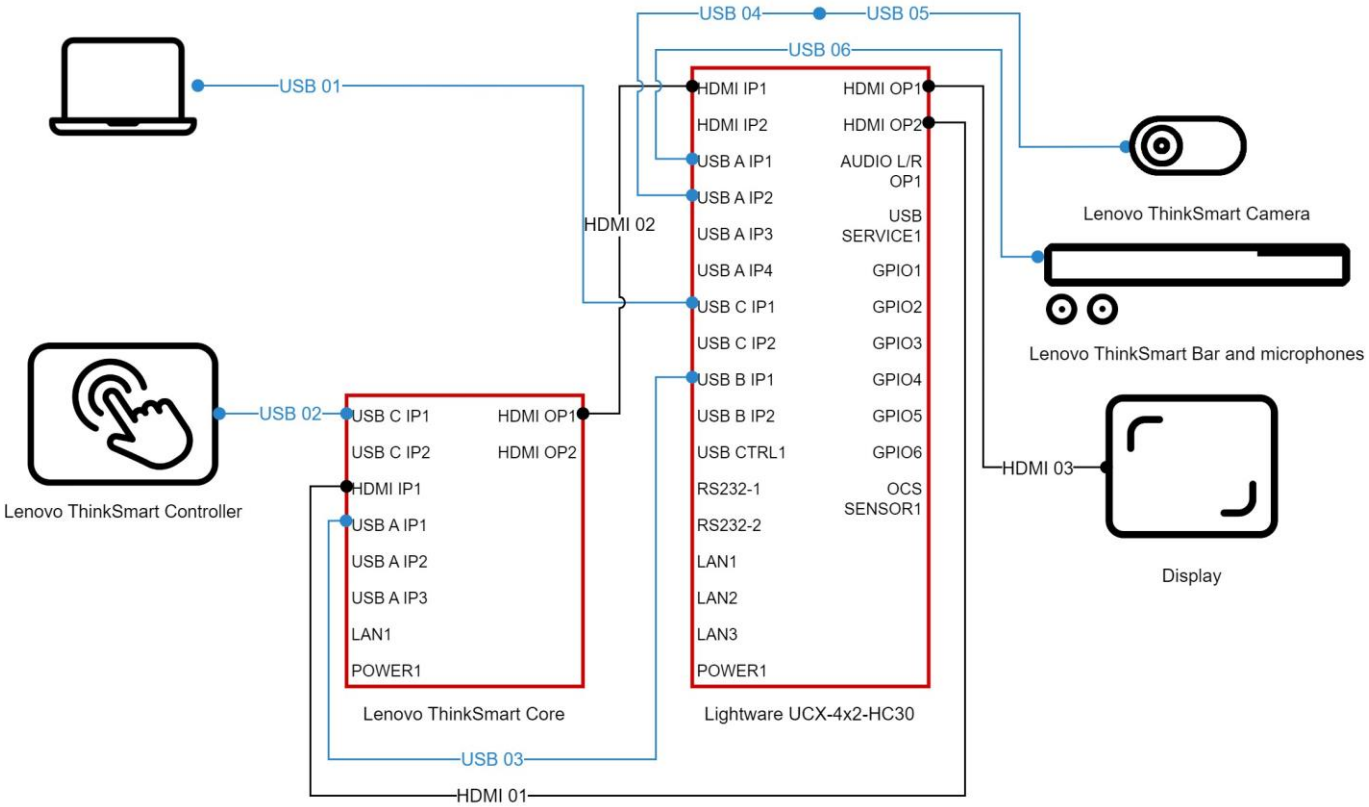
3. Scenario 2 – One UCX with active extension cables

3.1. Overview

This test scenario contains one Taurus UCX and Lenovo ThinkSmart Core Full Room Kit, with ThinkSmart peripherals which are connected by using **10m or 16m long USB 3.1 Gen1 SuperSpeed Active Extension Cable** produced by Lightware. This setup is usually preferred for smaller and medium rooms, where (because of the conduit layout) the peripheral needs a longer wire than the USB cable supports. In this setup the UCX (and optionally the ThinkSmart Core PC) is placed under the table.

3.2. Wiring

For clarity, only USB/HDMI connections are shown.



3.3. Cable numbering

Nr	Type
USB 01	*See tested cable list – USB Type C-C*
USB 02	built-in Type-C
USB 03	*See tested cable list – USB Type A-B*
USB 04	Lightware CAB-USB-AMAF-T1000A / T1600A
USB 05	10m Type A-C USB 2.0 (given by Lenovo) 2m Type A-C USB 3.0 (SmartAVLink STAC-3000-002)
USB 05	1m Type A-C USB 2.0
HDMI 01	Lightware CAB-HDMI20-PHS200F
HDMI 02	Lightware CAB-HDMI20-PHS200F
HDMI 03	Lightware CAB-HDMI20-PHS500P

3.4. Results

3.4.1. Teams Rooms on Windows

Platform:	Lenovo ThinkSmart Core	
USB 03:	3m Type A – Type B USB 3.0	5m Type A – Type B USB 3.0
Test results:	Passed	Passed

3.4.2. BYOD

Platform:	BYOD - Lenovo T14						
USB 01:	CAB-USBC-T100A	CAB-USBC-T200A	CAB-USBC-T300A	CAB-USBC-T400B	CAB-USBC-T500B	CAB-USBC-AOC800K	CAB-USBC-AOC1000K
Test results:	Passed	Passed	Passed	Passed	Passed	Failed*	Failed*

Platform:	BYOD - HP ProBook						
USB 01:	CAB-USBC-T100A	CAB-USBC-T200A	CAB-USBC-T300A	CAB-USBC-T400B	CAB-USBC-T500B	CAB-USBC-AOC800K	CAB-USBC-AOC1000K
Test results:	Passed	Passed	Passed	Passed	Passed	Failed*	Failed*

Platform:	BYOD - MacBook 2020 M1						
USB 01:	CAB-USBC-T100A	CAB-USBC-T200A	CAB-USBC-T300A	CAB-USBC-T400B	CAB-USBC-T500B	CAB-USBC-AOC800K	CAB-USBC-AOC1000K
Test results:	Passed	Passed	Passed	Passed	Passed	Failed*	Failed*

*Device nested too deeply due to too many USB tiers

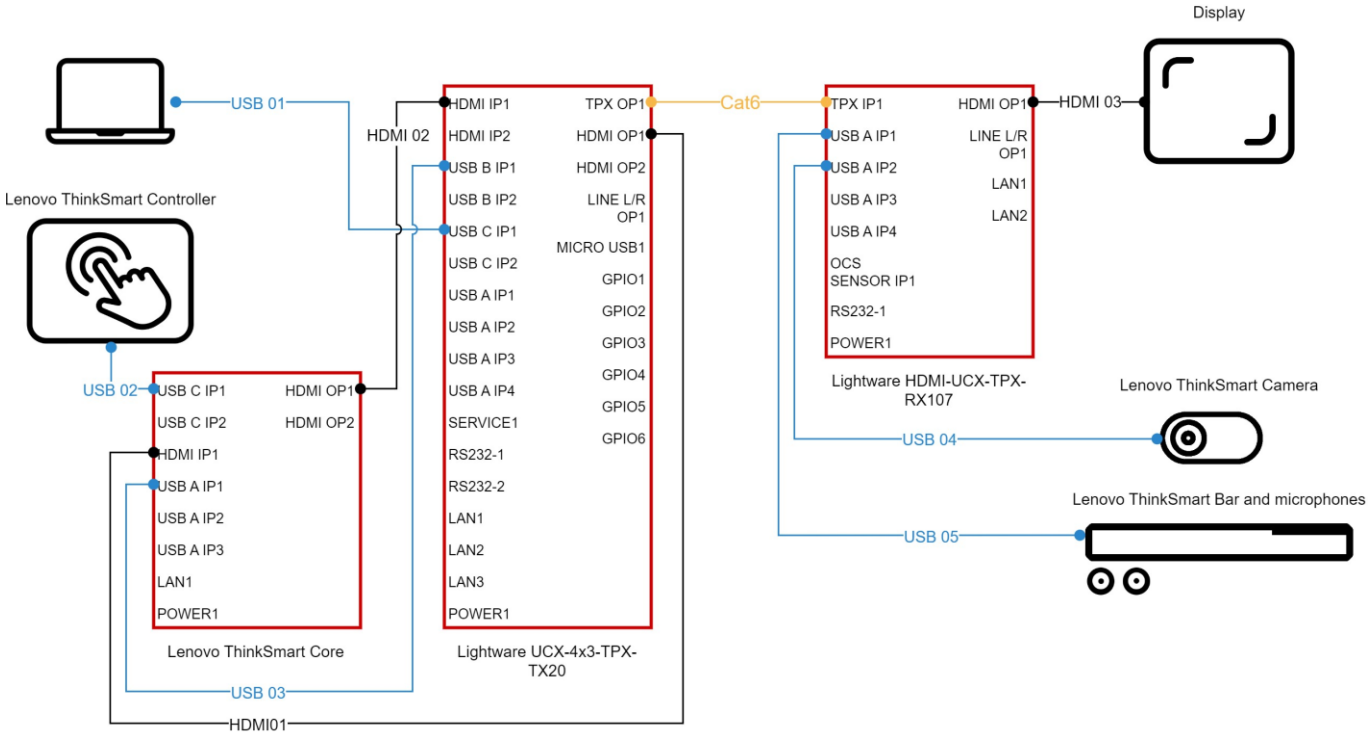
4. Scenario 3 – One pair of Taurus TPX

4.1. Overview

This test scenario contains one Taurus TPX setup and Lenovo ThinkSmart Core Full Room Kit, with ThinkSmart peripherals which are connected to the extender side. This setup is preferred for medium and large rooms, where (because of the conduit layout) the peripheral needs a longer wire than the USB cable supports. In this setup the TX device (and optionally the ThinkSmart Core PC) is placed under the table. We chose this Taurus TPX based solution, because in this case only one UTP cable is needed between the desk and the display.

4.2. Wiring

For clarity, only USB, HDMI and extension Cat6 connections are shown.



4.3. Cable numbering

Nr	Type
USB 01	*See tested cable list – USB Type C-C*
USB 02	built-in Type-C
USB 03	*See tested cable list – USB Type A-B*
USB 04	10m Type A-C USB 2.0 (given by Lenovo)
USB 05	1m Type A-C USB 2.0
Extender CAT6	50m Siemon Category 6A F/UTP 4-Pair Cable
HDMI 01	Lightware CAB-HDMI20-PHS200F
HDMI 02	Lightware CAB-HDMI20-PHS200F
HDMI 03	Lightware CAB-HDMI20-PHS200F

4.4. Results

4.4.1. Teams Rooms on Windows

Platform:	Lenovo ThinkSmart Core	
USB 03:	3m Type A – Type B USB 2.0	5m Type A – Type B USB 2.0
Test results:	Passed	Passed

4.4.2. BYOD

Platform:	BYOD - Lenovo T14						
USB 01:	CAB-USBC-T100A	CAB-USBC-T200A	CAB-USBC-T300A	CAB-USBC-T400B	CAB-USBC-T500B	CAB-USBC-AOC800K	CAB-USBC-AOC1000K
Test results:	Passed	Passed	Passed	Passed	Passed	Passed	Passed

Platform:	BYOD - HP ProBook						
USB 01:	CAB-USBC-T100A	CAB-USBC-T200A	CAB-USBC-T300A	CAB-USBC-T400B	CAB-USBC-T500B	CAB-USBC-AOC800K	CAB-USBC-AOC1000K
Test results:	Passed	Passed	Passed	Passed	Passed	Passed	Passed

Platform:	BYOD - MacBook 2020 M1						
USB 01:	CAB-USBC-T100A	CAB-USBC-T200A	CAB-USBC-T300A	CAB-USBC-T400B	CAB-USBC-T500B	CAB-USBC-AOC800K	CAB-USBC-AOC1000K
Test results:	Passed	Passed	Passed	Passed	Passed	Passed	Passed

5. Conclusion

As a conclusion our statement is that by using **Taurus UCX** and **Taurus TPX**, the functionality of the **Lenovo Thinksmart Core Room Full Kit** can be expanded in a stable way to multiple clients, either in MS Teams Rooms on Windows or in BYOD environments.

During our tests, we recognized, that the length of the used Lightware CAB-xxx cables itself does not affect the signal and connection quality as we expected. Either USB and Video signals were present, or they were not present at all. We did not find any states between.

In a system design the USB standard's specifications, and USB tree structure should be considered. The number of USB tiers must not exceed 7. Some peripherals, has built-in USB hub, which adds to the tier count. In our test cases we found that the Thinksmart Bar does contain additional USB tier, however the Thinksmart Cam does not. This was the reason why some of the test cases (in section 3.4.2) were failed. If it is absolutely necessary to use this configuration, another sound system should be used that does not include an additional USB tier.

This is also true for the extenders, that have multiple peripheral USB ports. In this regard, we need to mention MacBook computers, because they may also have an additional layer in the USB structure, leading to quick consumption of the available USB tiers. Since the 8m, and 10m long USB-C cables are using active optical technology, it also adds to the tiers.

We highly recommend to design the AV system taking into account the above considerations, and choosing the peripherals, and extenders wisely. Counting the USB tiers, and designing the system consciously reduces the risk of an unstable system.