

USB4: A LOOK INTO THE NEAR FUTURE

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SUMMARY

USB4 ports and cables will start showing up in computers, cell phones, and tablets at the end of 2020. USB4 has the following mandatory speeds for hosts, hubs, and peripheral devices:

20 Gbits/sec and a fall-back USB 2.0 default of 480 Mbits/sec

TOPICS

- "USB4" Basics
- Data Transfer Modes
- "DisplayPort" Support in Two Ways
- "Thunderbolt Alternate Mode" is only mandatory for USB4 hubs
- Optional Support For Other Legacy USB-C Alternate Modes

USB4 BASICS

- "USB4" is the official name:
Unlike for previous versions of USB, there is no space in the name
- ("USB" stands for "Universal Serial Bus")
- A USB4 port is also known as a USB4 receptacle

USB4 BASICS (continued)

- Unlike previous versions of USB., all USB4 ports and all USB4 plugs have to be in the USB-C form factor ("form factor" = mechanical shape and pinout specification)

USB4 BASICS (continued)

- All USB4 peripheral devices have to have either a USB-C ports or a USB -C "pigtail" cable terminated with a USB plug
- All USB4 hubs have to have either either an upstream USB-C port or a "pigtail" cable with an upstream USB-C plug

DATA TRANSFER MODES

- The following data transfer modes are mandatory for and peripheral "downstream" devices that are can be described as "USB4" devices:

Support of data transfer modes^[1]

Mode	Host	Hub	Peripheral device
USB 2.0 (480 Mbit/s)	Yes	Yes	Yes
USB4 20 Gbit/s Transport	Yes	Yes	Yes
USB4 40 Gbit/s Transport	Optional	Yes	Optional
Tunneled USB 3.2 (10 Gbit/s)	Yes	Yes	Optional
Tunneled USB 3.2 (20 Gbit/s) ^[10]	Optional	Optional	Optional
Tunneled Displayport	Yes	Yes	Optional
Tunneled PCI Express	Optional	Yes	Optional
Host-to-Host communications	Yes	Yes	N/A
DisplayPort Alternate Mode	Yes	Yes	Optional
Thunderbolt Alternate Mode	Optional	Yes	Optional
USB-C Alternate Modes	Optional	Optional	Optional

DATA TRANSFER MODES (continued)

- The following data transfer modes are mandatory for "USB4" ports on hosts such as computers, tablets, and cell phones:

Support of data transfer modes^[1]

Mode	Host	Hub	Peripheral device
USB 2.0 (480 Mbit/s)	Yes	Yes	Yes
USB4 20 Gbit/s Transport	Yes	Yes	Yes
USB4 40 Gbit/s Transport	Optional	Yes	Optional
Tunneled USB 3.2 (10 Gbit/s)	Yes	Yes	Optional
Tunneled USB 3.2 (20 Gbit/s) ^[10]	Optional	Optional	Optional
Tunneled Displayport	Yes	Yes	Optional
Tunneled PCI Express	Optional	Yes	Optional
Host-to-Host communications	Yes	Yes	N/A
DisplayPort Alternate Mode	Yes	Yes	Optional
Thunderbolt Alternate Mode	Optional	Yes	Optional
USB-C Alternate Modes	Optional	Optional	Optional

DATA TRANSFER MODES (continued)

- USB4 hubs have more mandatory support requirements relative to USB4 host ports and USB4 peripheral devices
- The following data transfer modes are mandatory for USB4 hubs:

Support of data transfer modes^[1]

Mode	Host	Hub	Peripheral device
USB 2.0 (480 Mbit/s)	Yes	Yes	Yes
USB4 20 Gbit/s Transport	Yes	Yes	Yes
USB4 40 Gbit/s Transport	Optional	Yes	Optional
Tunneled USB 3.2 (10 Gbit/s)	Yes	Yes	Optional
Tunneled USB 3.2 (20 Gbit/s) ^[10]	Optional	Optional	Optional
Tunneled Displayport	Yes	Yes	Optional
Tunneled PCI Express	Optional	Yes	Optional
Host-to-Host communications	Yes	Yes	N/A
DisplayPort Alternate Mode	Yes	Yes	Optional
Thunderbolt Alternate Mode	Optional	Yes	Optional
USB-C Alternate Modes	Optional	Optional	Optional

USB-C BASICS (continued)

- Reference for the previous three charts:

<https://en.wikipedia.org/wiki/USB4>

"DISPLAYPORT" SUPPORT IN 2 WAYS

- "DisplayPort Alternate Mode" is mandatory for all USB4 host ports and all USB4 hubs (unlike for the USB-c standard)
- "Tunneled DisplayPort" is mandatory for all USB4 host ports and all USB4 hubs (unlike for the USB-c standard)

"THUNDERBOLT ALTERNATE MODE" SUPPORT IS LIMITED

- "Thunderbolt Alternate Mode" capability is mandatory for all USB4 hubs (unlike for the USB-c standard)
- However, "Thunderbolt Alternate Mode" capability is optional for USB4 host ports

"USB-C ALTERNATE MODES"

- With the exception of "Displayport Alternate Mode" and "Thunderbolt Alternate Mode", all other "Alternate Modes" are called "USB-C Alternate Modes" in the official USB4 specification
- All of these "USB-C Alternate Modes" are optional for "USB4 host ports", "USB4 hubs", and "USB4 peripheral devices"

APPENDIX 1

DETAILS OF TUNNELING IN USB4

- <https://www.usb.org/sites/default/files/D2T1-1%20-%20USB4%20Configuration%20Layer%20-%20Protocol%20Tunneling.pdf>