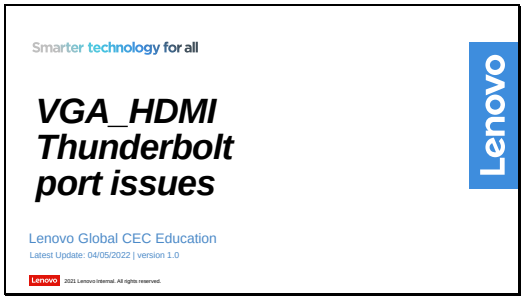
Smarter technology for all

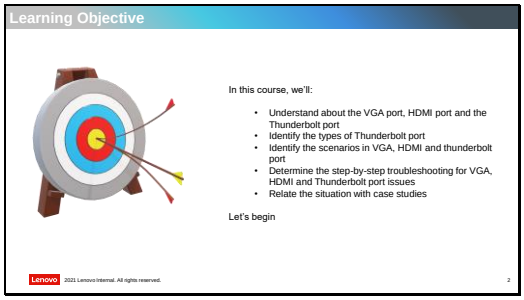
Lenovo

VGA_HDMI_ Thunderbolt port issues

Participant Guide



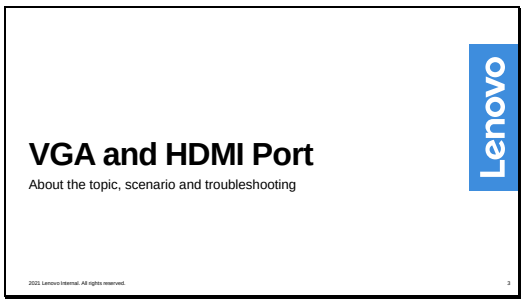
Welcome again!! We all have used computers. At some times, the ports in the computer may not work properly



In this course, we'll

- Understand about the VGA port, HDMI port and the Thunderbolt port
- Identify the types of Thunderbolt port
- Identify the scenarios in VGA, HDMI and thunderbolt port
- Determine the step-by-step troubleshooting for VGA, HDMI and Thunderbolt port issues
- Relate the situation with case studies

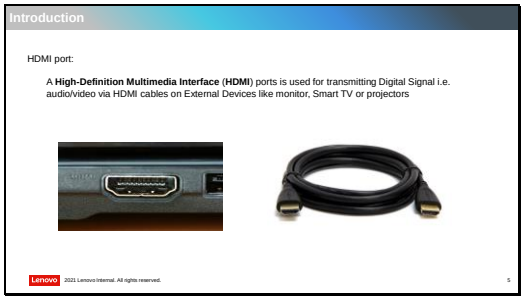
Let's begin



VGA and HDMI Port

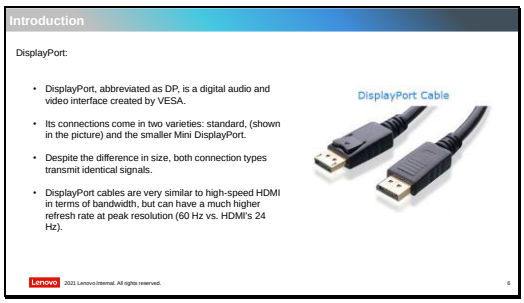
VGA port:

A **Video Graphics Array** (**VGA**) ports carry analog component video signal via VGA cables to project display on External Devices like monitor or projectors.

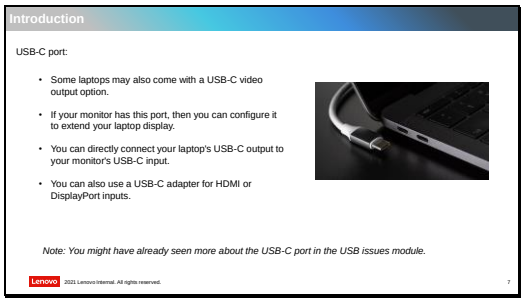


HDMI port:

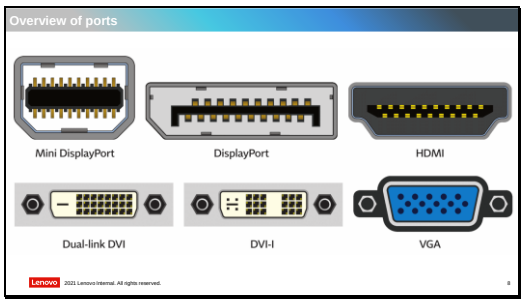
A **High-Definition Multimedia Interface** (**HDMI**) ports is used for transmitting Digital Signal i.e. audio/video via HDMI cables on External Devices like monitor, Smart TV or projectors



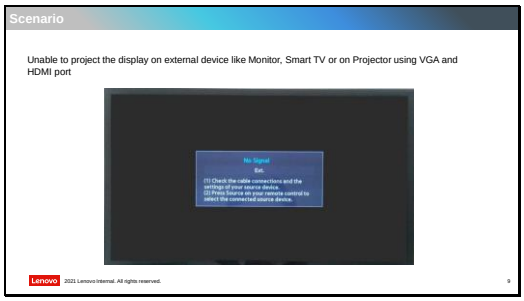
- DisplayPort, abbreviated as DP, is a digital audio and video interface created by VESA.
- Its connections come in two varieties: standard, (shown in the picture) and the smaller Mini DisplayPort.
- Despite the difference in size, both connection types transmit identical signals.
- DisplayPort cables are very similar to high-speed HDMI in terms of bandwidth, but can have a much higher refresh rate at peak resolution (60 Hz vs. HDMI's 24 Hz).



- Some laptops may also come with a USB-C video output option.
- If your monitor has this port, then you can configure it to extend your laptop display.
- You can directly connect your laptop's USB-C output to your monitor's USB-C input.
- You can also use a USB-C adapter for HDMI or DisplayPort inputs.

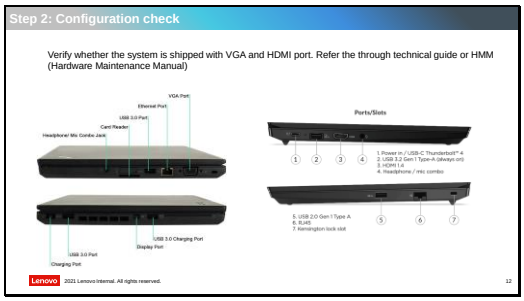


Overview of ports

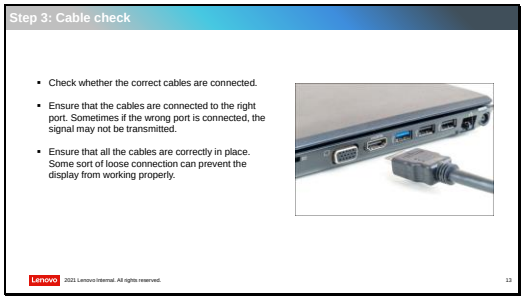


Unable to project the display on external device like Monitor, Smart TV or on Projector using VGA and HDMI port

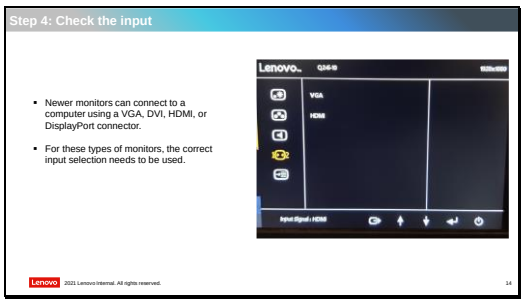
Ask the customer to share a snap and video of VGA/HDMI. Validate the same for CID.



Verify whether the system is shipped with VGA and HDMI port. Refer the through technical guide or HMM (Hardware Maintenance Manual)

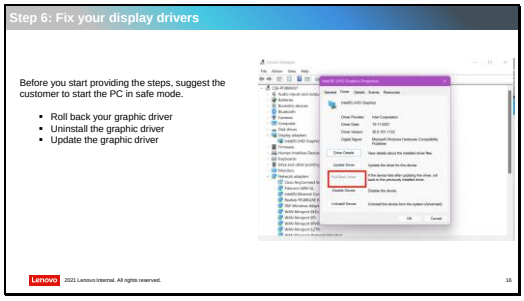


- Check whether the correct cables are connected.
- Ensure that the cables are connected to the right port. Sometimes if the wrong port is connected, the signal may not be transmitted.
- Ensure that all the cables are correctly in place. Some sort of loose connection can prevent the display from working properly.



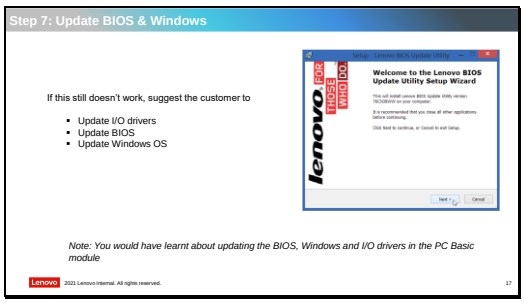
- Newer monitors can connect to a computer using a VGA, DVI, HDMI, or DisplayPort connector.
- For these types of monitors, the correct input selection needs to be used.

- Ensure the projection is on from your computer.
- Go to **Project** Option → and select Duplicate. Use the combination Win + P and select Duplicate.
- If user is using a Smart TV, manually change the input to HDMI option with the remote.



Before you start providing the steps, suggest the customer to start the PC in safe mode.

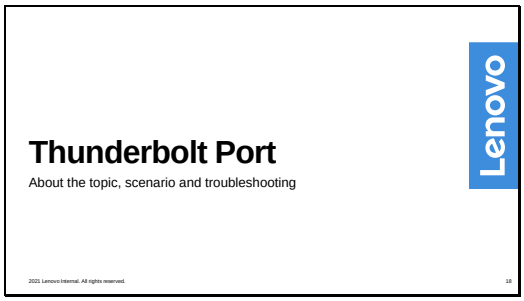
- Roll back your graphic driver
- Uninstall the graphic driver
- Update the graphic driver



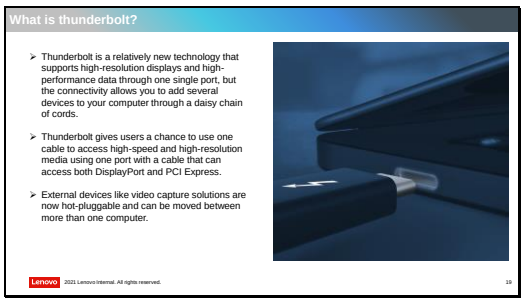
If this still doesn't work, suggest the customer to

- Update I/O drivers
- Update BIOS
- Update Windows OS

Note: You would have learnt about updating the BIOS, Windows and I/O drivers in the PC Basic module

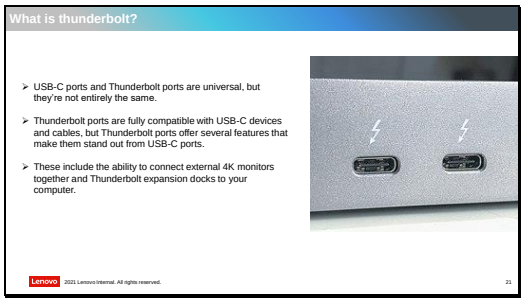


Thunderbolt Port

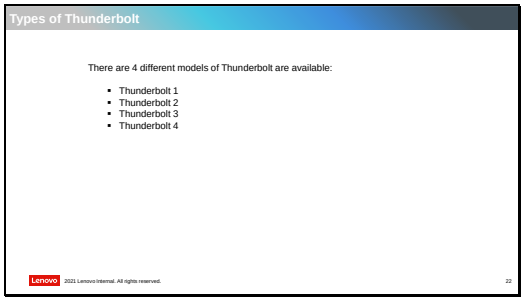


- Thunderbolt is a relatively new technology that supports high-resolution displays and high-performance data through one single port, but the connectivity allows you to add several devices to your computer through a daisy chain of cords.
- Thunderbolt gives users a chance to use one cable to access high-speed and high-resolution media using one port with a cable that can access both DisplayPort and PCI Express.
- External devices like video capture solutions are now hot-pluggable and can be moved between more than one computer.

- The access to more and better video and audio experiences are available through one Thunderbolt cord.
- Quality will not suffer from connecting more devices, either. Some people may know Thunderbolt better through its former name, Light Peak.
- Thunderbolt (and Light Peak before it) is a new peripheral connection technology that was made with Intel and Apple working together.
- This new technology combines audio, data, power, and video through one connection. Peripherals can also be connected so that high-def video using display port protocol is also available.

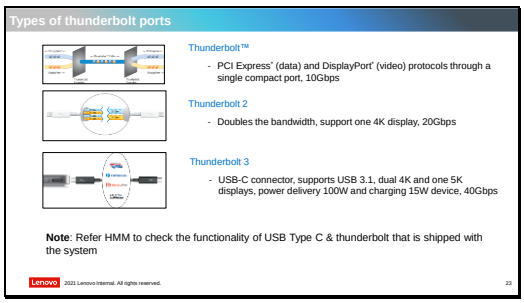


- USB-C ports and Thunderbolt ports are universal, but they're not entirely the same.
- Thunderbolt ports are fully compatible with USB-C devices and cables, but Thunderbolt ports offer several features that make them stand out from USB-C ports.
- These include the ability to connect external 4K monitors together and Thunderbolt expansion docks to your computer.

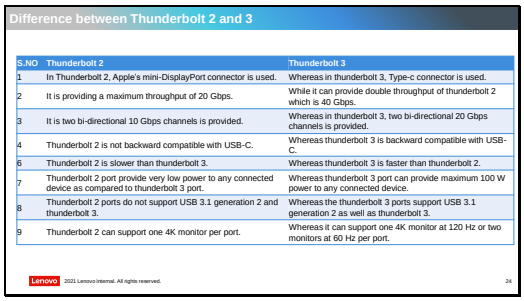


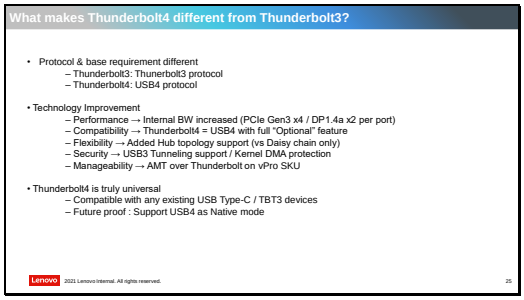
There are 4 different models of Thunderbolt are available:

- Thunderbolt 1
- Thunderbolt 2
- Thunderbolt 3
- Thunderbolt 4



PCI Express* (data) and DisplayPort* (video) protocols through a single compact port, and gives 10Gbps

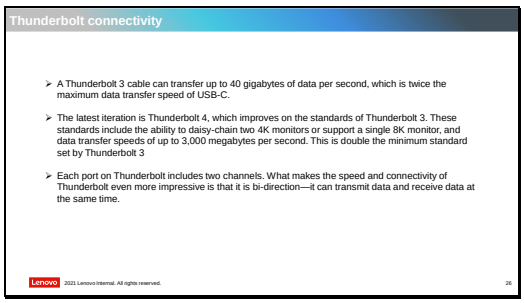




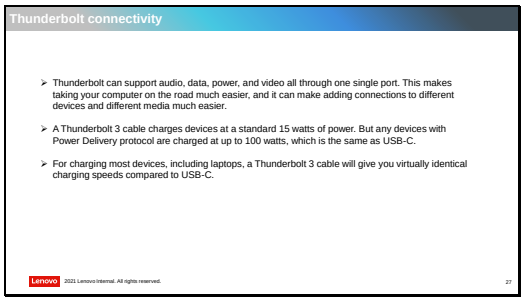
- Protocol & base requirement different
  - – Thunderbolt3: Thunerbolt3 protocol
  - – Thunderbolt4: USB4 protocol

- Technology Improvement
  - – Performance → Internal BW increased (PCIe Gen3 x4 / DP1.4a x2 per port)
  - – Compatibility → Thunderbolt4 = USB4 with full "Optional" feature
  - – Flexibility → Added Hub topology support (vs Daisy chain only)
  - – Security → USB3 Tunneling support / Kernel DMA protection
  - – Manageability → AMT over Thunderbolt on vPro SKU

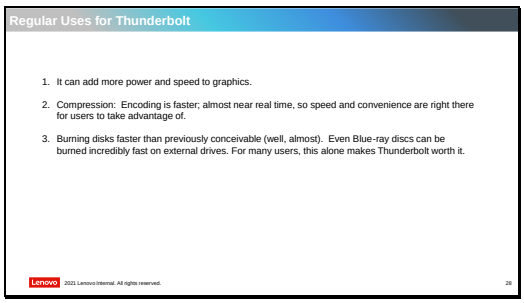
- Thunderbolt4 is truly universal
  - – Compatible with any existing USB Type-C / TBT3 devices
  - – Future proof : Support USB4 as Native mode



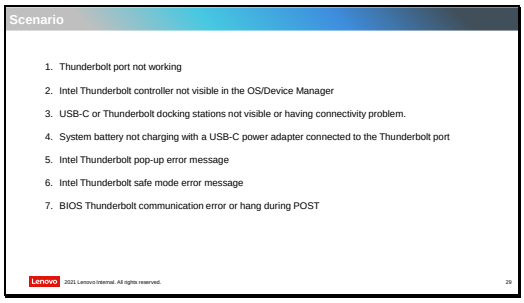
- A Thunderbolt 3 cable can transfer up to 40 gigabytes of data per second, which is twice the maximum data transfer speed of USB-C.
- The latest iteration is Thunderbolt 4, which improves on the standards of Thunderbolt 3. These standards include the ability to daisy-chain two 4K monitors or support a single 8K monitor, and data transfer speeds of up to 3,000 megabytes per second. This is double the minimum standard set by Thunderbolt 3
- Each port on Thunderbolt includes two channels. What makes the speed and connectivity of Thunderbolt even more impressive is that it is bi-direction—it can transmit data and receive data at the same time.



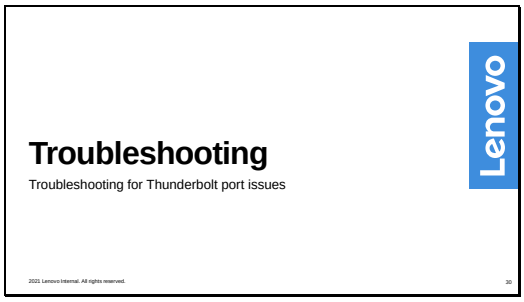
- Thunderbolt can support audio, data, power, and video all through one single port. This makes taking your computer on the road much easier, and it can make adding connections to different devices and different media much easier.
- A Thunderbolt 3 cable charges devices at a standard 15 watts of power. But any devices with Power Delivery protocol are charged at up to 100 watts, which is the same as USB-C.
- For charging most devices, including laptops, a Thunderbolt 3 cable will give you virtually identical charging speeds compared to USB-C.

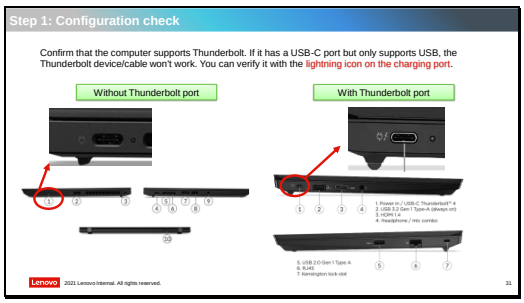


- It can add more power and speed to graphics.
- Compression: Encoding is faster; almost near real time, so speed and convenience are right there for users to take advantage of.
- Burning disks faster than previously conceivable (well, almost). Even Blue-ray discs can be burned incredibly fast on external drives. For many users, this alone makes Thunderbolt worth it.

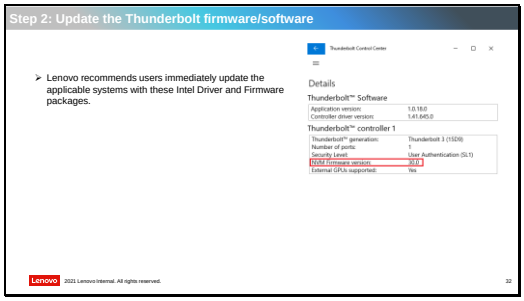


- Thunderbolt port not working
- Intel Thunderbolt controller not visible in the OS/Device Manager
- USB-C or Thunderbolt docking stations not visible or having connectivity problem.
- System battery not charging with a USB-C power adapter connected to the Thunderbolt port
- Intel Thunderbolt pop-up error message
- Intel Thunderbolt safe mode error message
- BIOS Thunderbolt communication error or hang during POST

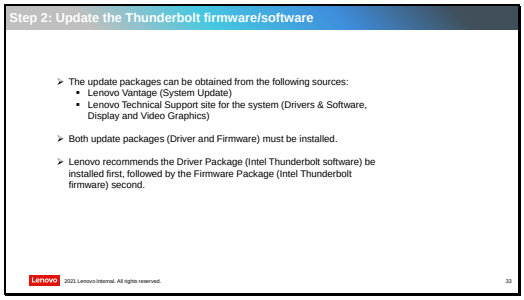




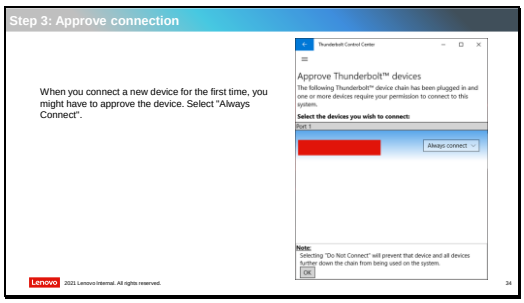
Confirm that the computer supports Thunderbolt. If it has a USB-C port but only supports USB, the Thunderbolt device/cable won't work. You can verify it with the lightning icon on the charging port.



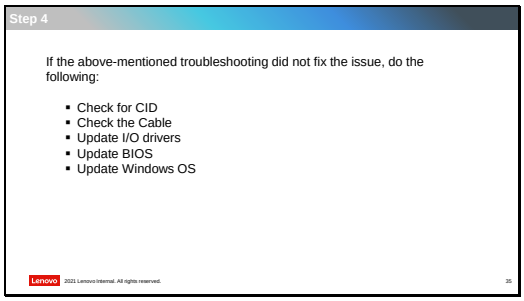
Lenovo recommends users immediately update the applicable systems with these Intel Driver and Firmware packages.



- The update packages can be obtained from the following sources:
  - Lenovo Vantage (System Update)
  - Lenovo Technical Support site for the system (Drivers & Software, Display and Video Graphics)
- Both update packages (Driver and Firmware) must be installed.
- Lenovo recommends the Driver Package (Intel Thunderbolt software) be installed first, followed by the Firmware Package (Intel Thunderbolt firmware) second.



When you connect a new device for the first time, you might have to approve the device. Select "Always Connect".



If the above-mentioned troubleshooting did not fix the issue, do the following:

- Check for CID
- Check the Cable
- Update I/O drivers
- Update BIOS
- Update Windows OS