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Common Connector Types

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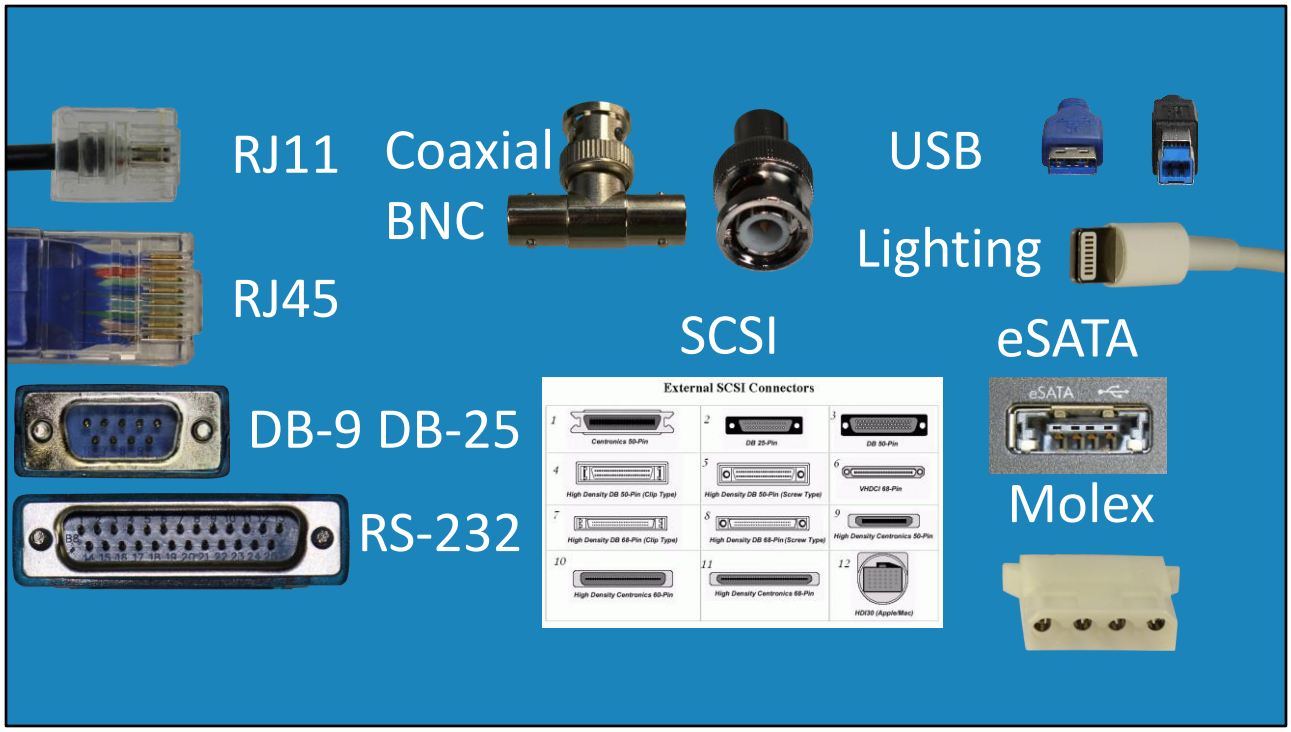
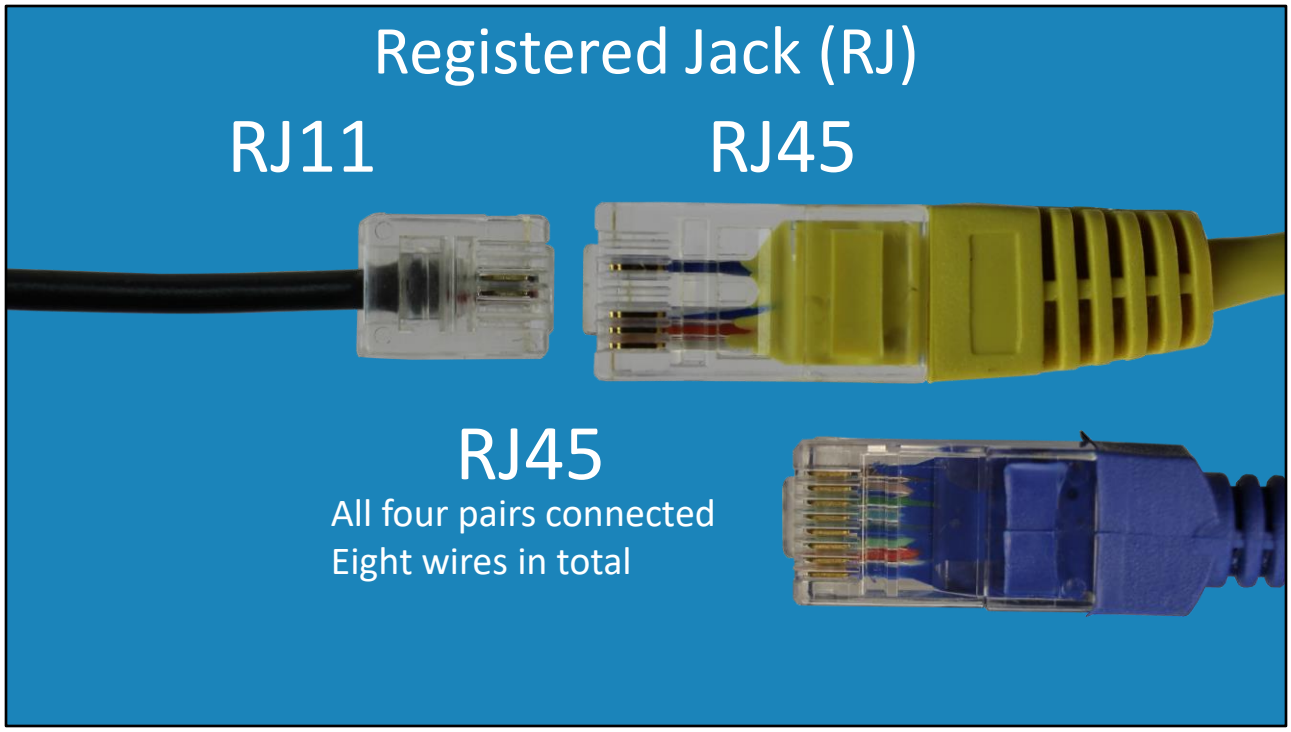
In this video for ITFreeTraining, I will go through the common connector types that you are required to know for the CompTIA exam. Many IT departments have piles of assorted cables. Being able to recognize a connector quickly will allow you to find what you are after quickly, or you could just tidy up the cables!



0:19 In this video, I will look at the following connectors. These connectors are primarily used for data transfer. Not all connectors are covered, for example, fibre connectors as they will be covered in later videos. This video will cover the more common connectors that you are likely to come across.



0:36 The first connector that I will look at is the registered jack or RJ. The RJ is a standardized telecommunication network interface used for voice and data equipment. The first connection I will look at is the RJ11.

The RJ11 connector has a six-pin connector allowing for six wires. You can see in this example that two wires are in use. This is true to the RJ11 standard. If you used four wires this would be called RJ14 and six wires would be RJ25.

In computing, you will most likely hear this sized connector referred to as RJ11 regardless of how many wires are used. For the CompTIA exam you only need to know that it is the RJ11 connector. If you ever get a job in telecommunications you may need to know the others, but within computing, if you see this connector, regardless of how many wires it is using, no one will criticize you for calling it an RJ11 connector, simply because everyone in the IT industry is so used to referring to it as RJ11.

The next connector that I will look at is the RJ45 connector. The connector used for the RJ45 has eight pins making it slightly larger than the RJ11 connector. Technically, the connector we use in computing is not the true RJ45 connector. However, like the RJ11 connector, it is a de-facto standard, so no one will blink an eye if you call it that; in fact they will be expecting you to refer to it by that name. I won't go into much detail about why it is not a true RJ45 connector because, in IT, you just need to know that a connector that looks like this is an RJ45 connector.

In some cases, you will see an RJ45 cable like the one shown which only has two pairs of wires

making a total of four wires. For networking you only need two pairs of wires, one for sending and one for receiving.

Looking at these cables side by side illustrates an important point. Notice that with the RJ45 cable, one of the wires is connected away from the others. This is done so the RJ11 wires occupy different positions to the RJ45 wires.

To illustrate this better, notice that if I have a standard network socket, I can plug the RJ11 cable into a standard network plug. Since the RJ11 pair is separated from the two pairs used for networking this won't cause any issues. If I want to swap the cable, I can just unplug the RJ11 and plug in the RJ45 cable. Both connectors will work in the same plug without issue.

You will find that older telephones will use the RJ11 connector. These will be plugged into RJ45 network sockets and run over RJ45 cables back to the network cabinet. Since the RJ11 pairs are separate from the two pairs for networking this will not cause any problems.

Generally speaking, a standard network cable will use four pairs for a total of eight wires as shown in this example. You can't tell that one of the pairs has been separated by looking at the cable; however, this becomes important if you start crimping your own cables. Crimping is the process of attaching a connector to a cable. When crimping cables, it is important to ensure all the wires are connected correctly. I will cover how to do this in a later video.

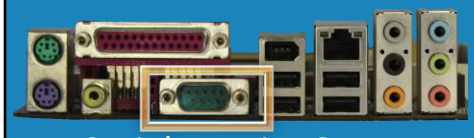
In the real world, the vast majority of network cables will have all eight pins connected. The extra four wires are generally not used, although in some cases they may be. For example, if power over ethernet is used, the extra pairs can be used to carry power to the device they are connecting. This eliminates the need to have power installed where the device is. This is often used for wireless devices where installing them may be impractical or expensive to run power cables to.

Serial (RS-232)

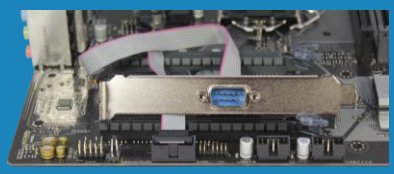
- Around since the first IBM computer
  - Becoming less and less common

9 Pin (DB-9 or DE-9)

25 Pin (DB-25)



Serial port in IO Area



Plugs into motherboard

USB cable

4:38 The next connector I will look at is the serial connector. You may sometimes hear it referred to as RS-232. RS-232 refers to the standard used to transfer serial communication, and not the actual connector.

The serial connector has been around since the first IBM computer was released; however, nowadays it is becoming less and less common. One of the main reasons for this is that the serial connection requires a high voltage difference to transfer data. High voltage signals cannot interface directly to a microchip because the voltage is too high, thus needing a device between them to receive the signal. High voltage is hard to control at high speeds and thus serial communication is limited to what speeds data can be sent at. For these reasons, modern methods can transmit more at lower voltages and higher speeds.

Serial connections come in nine-pin and 25-pin connectors. You will find that nowadays, if your computer comes with a serial connection, it will most likely be the nine-pin connector. 25-pin connectors are not very common on modern computers and devices.

The 25-pin connector is commonly referred to as DB-25. Technically, the nine-pin connector is called DE-9; however, with the 25-pin connector being called DB-25, people started calling the nine-pin connector DB-9.

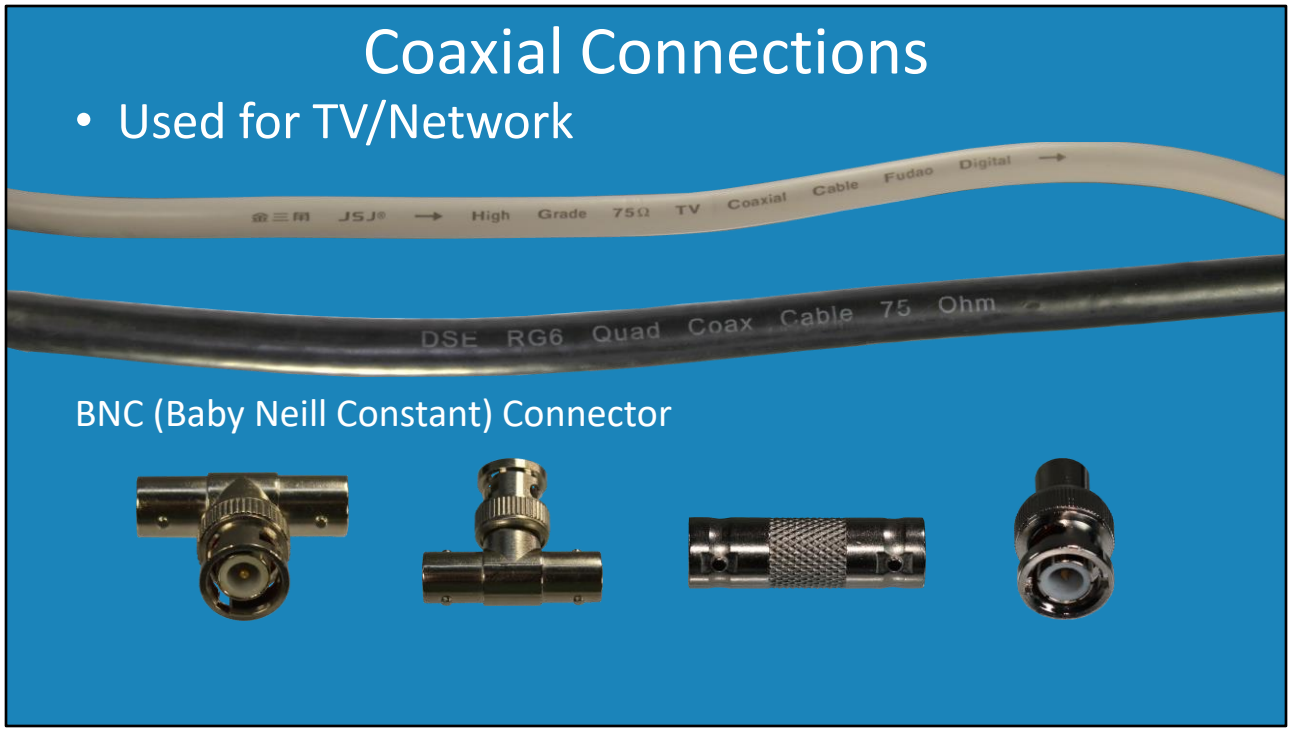
On modern computers, you may see a serial connector in the IO port area of the motherboard; however, this is becoming less and less common. There may also be a 25-pin parallel connector – don't confuse this with the serial connector. The serial connector has a male connector while

the parallel connector will have a female connector.

Since serial connectors are becoming less common, you may find that, rather than having a serial connector in the IO area, there is instead a serial header on the motherboard. In order to use the serial header, a cable needs to be plugged into the motherboard to provide the connector like the one shown.

If you find that you require a serial connector and there isn't one available either in the IO area or a on the header, you can always purchase a USB to serial connector.

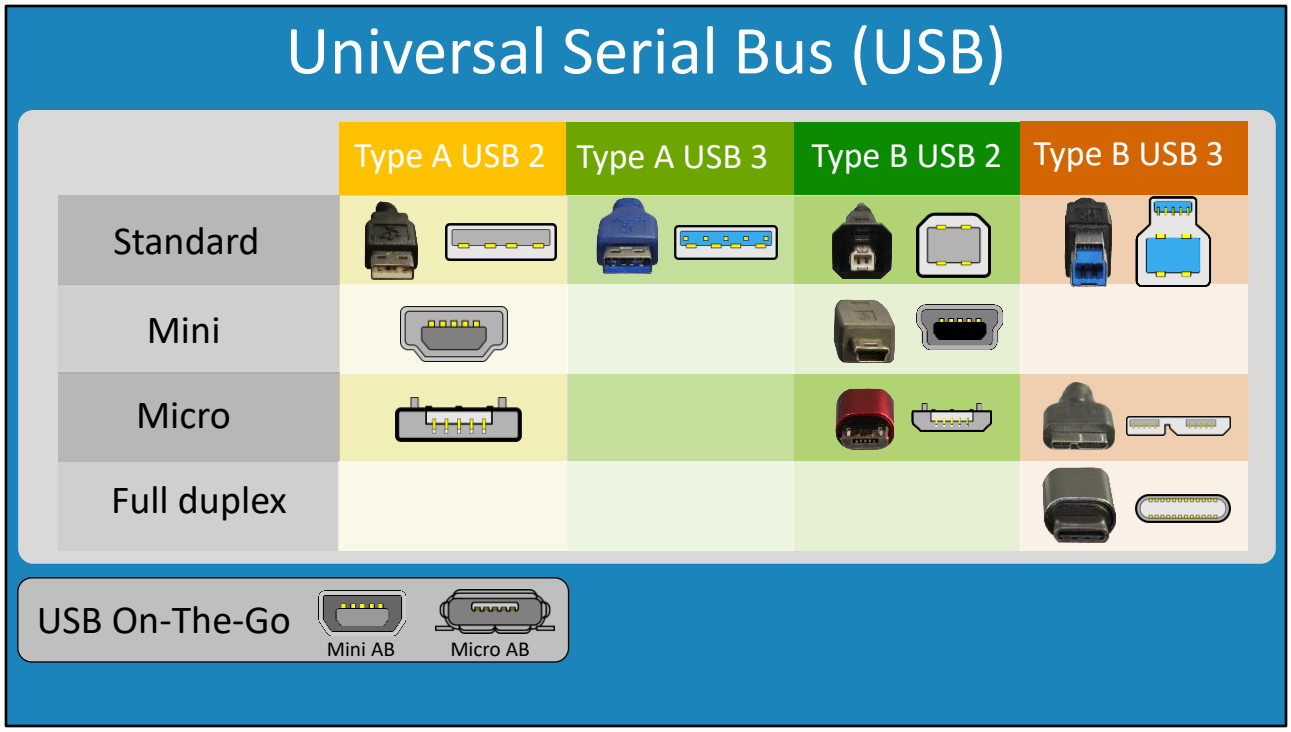
In the old days of computing, serial connections were used for external devices like modems. You may also find it used in old industrial equipment and scientific instruments. Nowadays, you will find that USB has replaced the need for serial connections in most cases. You will generally find that serial connectors are generally only used by administrators to connect to devices for initial configuration of the device.



7:20 The next connectors that I will look at are the connectors used with coaxial cables. In another video I will look at coaxial cables in more detail. For this video, understand that coaxial cables are used for TV and networks. In the old days they used to be used for local area networks, but now days if you see coaxial used at all, it will be for TVs or wide area networks.

Coaxial uses connectors called BNC connectors. These are named after the inventor Paul Neill (BNC standing for Baby Neill Constant). Since the connector was considered quite small at the time, this is where it got the name baby.

The cables are connected together using BNC connectors. When they were used with computer networks, the cables needed a BNC terminator to be put on each end of the cable. This is not required for cables used with networks such as TVs since the signal is only going in one direction.



8:19 The next type of connectors that I will look at are the Universal Serial Bus or USB connectors. There are a few of these connectors and they are quite common. USB, by design, is backwards compatible. So, if you plug a USB 3 device into a USB 2 port it will work, just at a slower speed.

There are a number of differently sized USB connectors. The smaller connectors are generally used for small devices like cameras. One end of the cable will be a Type-A connection and the other end will be a Type-B connector. This ensures that one side of the connection will always be the host and the other side will be the device. The exceptions to this are the USB Type-C connectors and USB On-The-Go connectors. Both these connectors have the ability to swap between the host and device function.

The USB Type-C connection achieves this since the same connector can be used on both sides. USB On-The-Go achieves this by essentially combining a Type-A and a Type-B connector together. This is also called an AB connector. If you look carefully, the connectors look like an A or B connector, but not quite. The AB connector allows either a Type-A or Type-B connection to be plugged in, thus it can support either.

An example of where this would be important is a device like a tablet. With a tablet, you may want to plug it into a computer in order to access data on the tablet. This would make the computer the host. In another case, you may want to plug a keyboard into the tablet to use with the tablet. If a keyboard was plugged in, the tablet would need to be a host as the keyboard would be the device. You can see why a device like a tablet needs to be able to do

both, so therefore you need a connection that can do both.

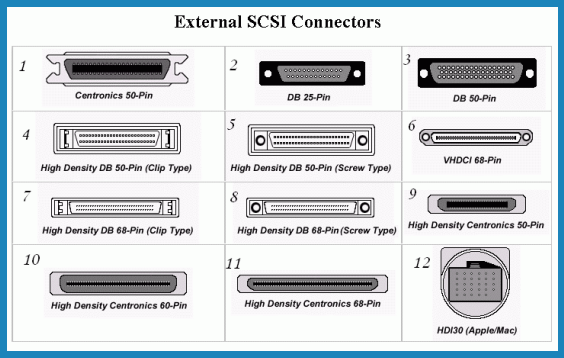
10:14 The next connector that I will look at is the Lightning connector. This cable was created in 2012 by Apple. The cable is designed to replace the old connectors used by Apple. Before this connector, it was not uncommon for different versions of iPhones to have a different connector, but now, at least for the moment, new products are using the same connector.

The Lightning cable is different from many other cables on the network in that it can be plugged in either face up or face down. Most other connectors are keyed so they can only be plugged in one way.

The other connector used with the Lightning cable is generally USB like the one shown. USB-C is also available which will allow, if the device supports it, USB 3.0 speeds. The Lightning cable is primarily designed to work with Apple devices; however, other manufacturers have managed to work out ways of getting other devices to work with the Lightning cable.

Small Computer System Interface (SCSI)

- Connectors obsolete
- Protocol and SAS (Serial Attached SCSI) still used

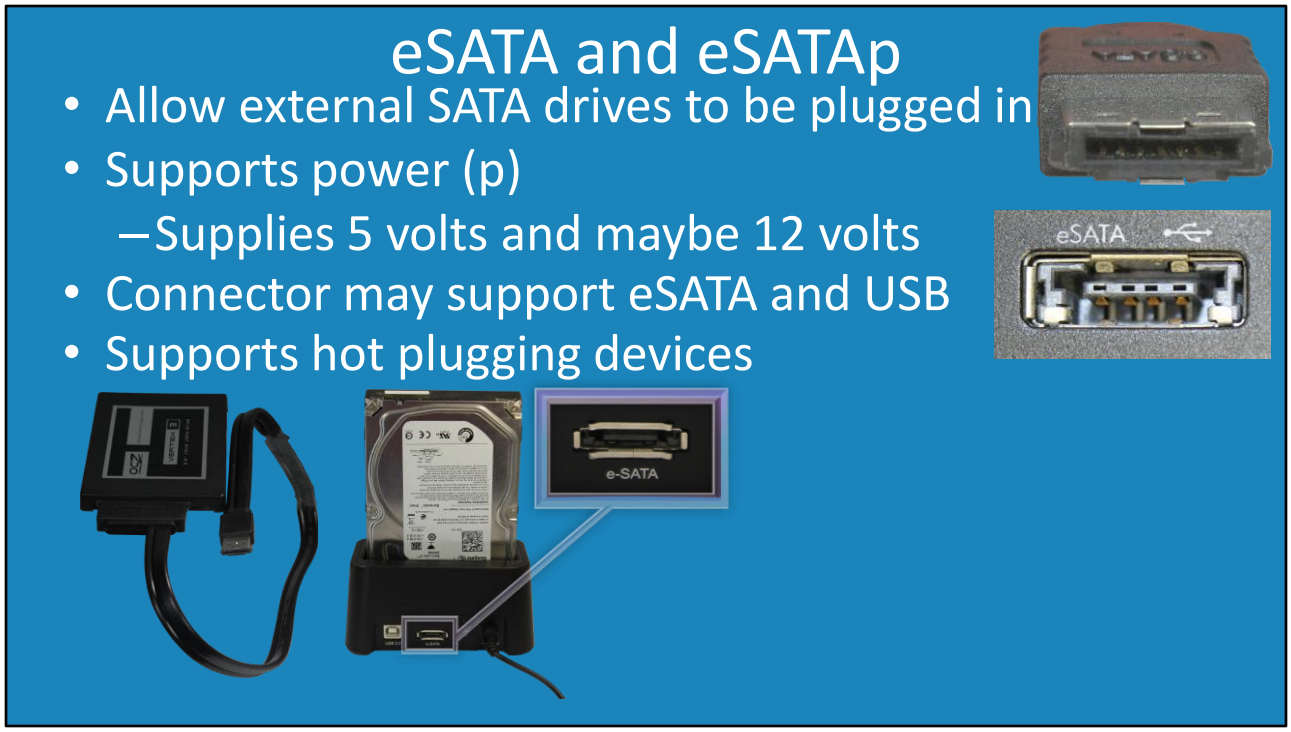


Some legacy connectors

SAS connectors

11:09 The next connectors that I will look at are the Small Computer System Interface or SCSI connectors. Nowadays, these connectors are obsolete. You won't find SCSI used on new computers except for Serial Attached SCSI or SAS. Traditional SCSI used parallel interfaces to transfer data. Thus, the SCSI connector tended to be quite large. The SAS connector uses a serial interface to transfer data. You will notice that the connection is more like a SATA connector.

Although the old parallel SCSI connectors are no longer used in new computers, the SCSI protocol itself still lives on. For example, the iSCSI protocol is used to access storage over the network.



11:51 The next connector that I will look at is the eSATA connector. The eSATA connector allows an external SATA drive to be plugged into the computer. There are two different version of eSATA, and these are eSATA and eSATAp. The p simply means it supports power.

The addition of power means that using an eSATA plug with a cable that supports power as shown, it can be used to connect data and power to an external drive. The power provided by the eSATA port will be 5 volts, but may also supply 12 volts.

Desktop computers will generally supply both voltages. Laptops may or may not supply both voltages. If you are plugging in a storage device that requires 12 volts, you can still use the eSATA plug; however, you will also need an external power supply. For example, a device like a docking station will most likely have an external power supply that can be used to power the storage device. It is just a matter of plugging the eSATA cable into the docking station and making sure the external power supply is plugged in.

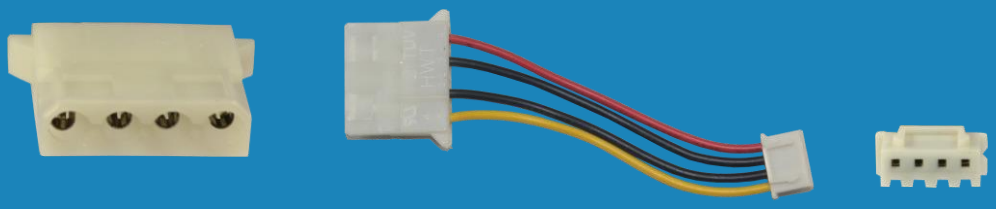
In some cases, the eSATA connector may also support a USB connection. You will notice that this connector has eSATA and the USB logo on it. If you have a device that supports this, it is just a matter of plugging in the cable you want. The computer will detect which one has been plugged in.

For example, I can plug in my eSATA cable into the laptop. There are other USB ports on this laptop; however, if I need to, I can plug a USB cable into the eSATA plug. Both are supported and it is your choice which one you want to use.

Just like USB, eSATA supports hot plugging devices. So, you can use an eSATA port to attach an external device like a hard disk anytime you like. Given the popularity of USB, you can see that many people will use USB rather than eSATA just for convenience, since USB is much more common than eSATA.

Molex

- Computers use Molex and mini-Molex connectors
- Used for
  - Hard disks/floppy drives/optical drives
  - Video cards/fans/motherboards



13:55 The last connector that I will look at is the Molex connector. The Molex connector is named after the company Molex which manufactures electronics and electrical equipment. In computers, there are two connectors, named Molex and mini-Molex.

The connectors are used for devices like hard disks, floppy disks, optical drives, video cards, fans and extra power for the motherboard. Generally, the mini-Molex is not used that much nowadays. Historically, they were used for floppy disks, however this technology is now obsolete. You may sometimes see the mini-Molex used for fans and some devices like internal flash card readers.

Both Molex connectors are keyed to prevent them being plugged in the wrong way. However, by using a little bit of force, it is possible to connect the mini-Molex connector the wrong way. For this reason, I would always recommend care when using the mini-Molex connector and not to force it if you are having trouble plugging it in.

That concludes this video on the common connectors that you will come across. I hope you have found this video useful, and I look forward to seeing you in the next video from us. Until the next video, I would like to thank you for watching.

References

"Registered jack" https://en.wikipedia.org/wiki/Registered_jack
"RS-232" https://en.wikipedia.org/wiki/RS-232
"BNC connector" https://en.wikipedia.org/wiki/BNC_connector

“USB” https://en.wikipedia.org/wiki/USB
“Lightning (connector)” https://en.wikipedia.org/wiki/Lightning_(connector)
“Molex connector” https://en.wikipedia.org/wiki/Molex_connector

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