**USB – The Standard that Revolutionised Connectivity**

The USB, short for Universal Serial Bus is perhaps one of the greatest achievements we have made in terms of peripheral connectivity. Looking back since its inception it has changed the way devices of all size and shape, form and function connect and integrate with modern day hosts.

From a technological standpoint the USB is simply a series of shielded wires inside a cable housing. Inside the housing consists of four coloured wires. There is a red wire to deliver up to 5 volts and a brown wire to provide grounding – these are untwisted. There is also a twisted pair of wires, blue and yellow in colour that enable the data link between the device and the host.

When a device is attached via USB it uses the plug and play specification which allows the host to automatically detect the device type and load a driver for it and begin transmitting data. From I high level perspective data is sent between the peripheral and host system in a very similar way to how data is sent across network devices – a packet. Some of the information in this packet includes the source and destination, as well as the length of the data that is being transferred.

**A Brief History**

The USB has evolved significantly over time, not only to meet the demand of faster data transfers, but also for ease of use to the consumer. When the first widely used version of the USB was released in 1998 (USB 1.1) it boasted two different sets of transfer rates: 1.5Mbit/s (Low Speed) and 12Mbit/s (Full Speed), utilised by the type of USB device. Devices such as keyboards and mice did not demand large transfer speeds and so used the Low-speed rate. Other devices such as printers and external floppy disk drives required full speed.

April 2000 saw the release of the USB 2.0 specification and perhaps was the driving force for major companies such as HP, NEC, Philips and Intel to invest heavy research and development into increasing the transfer speeds that USB is capable of. Overwhelming success was the result, as USB 2.0 was released to consumers with a data transfer speed of 480Mbit/s.

There were no further changes to the USB 2.x specification for many years, and 2008 saw the release of USB 3.0 which had data transfer capability of up to 5 Gbit/s along with the ability to provide more power to devices, with decreased power consumption. Changes in the standard di not necessarily mean a change in the ports used to connect. USB 3.x was designed to be backwards compatible with older USB 2.0 devices (but running at 480Mbit/s). This was possible due to using two buses in parallel: one for USB 2.0, and one for USB 3.0 – dubbed SuperSpeed.

There have been a further two revisions to the USB 3.x specification. USB 3.1 was released in July 2013 with speeds of up to 10Gbit/s and maintained backwards compatibility with USB 2.0 and USB 3.1, although it was able to use SuperSpeed+, a revision to the original SuperSpeed. 2017 saw USB 3.2, the current generation released with data speeds of 20Gbit/s.

There have been multiple form factors for types of connectors used for USB devices. In total there have been three major form factors, A, B and C, with a variety of each introduced in between.

**The Good, the Bad and the Ugly**

The USB specification has provided devices significant advantages over its predecessors. For example, before the USB the standard way of transferring data was through floppy diskettes and Compact Disks (CD), both of which had their own problems. Floppy disks were highly susceptible to data loss through magnetic interference. CDs on the other hand were not susceptible this way but faced their own challenge in that data loss and corruption was a likely result of surface scratches. USB Flash drives instead use flash media to store and retrieve the same types of information that were held on its predecessors and are not susceptible to data loss through either magnetic interference, or surface scratches.

It is not all good news for the USB as there are several disadvantages that come with it. Generally, USB peripherals have short cables, usually up to a few feet, making connecting devices from across the room, or another building impractical. Further to this, USB devices cannot generally interact with each other and two hosts cannot directly communicate over their own USB ports. Due to the design of modern USB flash drives and their decrease in physical size it stands to reason that there is significantly more chance of losing a drive than there was a floppy diskette or a CD. Losing a flash drive which has much higher storage capacity increases the chance of losing more amounts of data at one.

**A Personal Reflection**

Whilst my overall opinion of the USB is a highly positive one, I believe it to be far from perfect. In addition to some of the disadvantages mentioned there has seen an increase in ‘counterfeit’ devices sold online. These drives are advertised with a large capacity but are usually drives with built in files that have been edited to display the higher value to a consumer.

Another problem people currently face is that they are now accustomed to most USB devices being plug and play, but this is not always the case. Working in an IT capacity has exposed me to the countless times: you plug a device in expecting it to work, unaware that there is a compatibility issue and addition drivers need to be installed. The average user does is not usually aware of the required steps to do this.

I believe the advantages with the USB overwhelmingly outweigh the cons and offer significant enhancements to previous standards, and therefore overall, I believe the USB to be one of the best technological advancements in recent years.