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SUPER SPEED DATA TRAVELLER USB 3.0

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***Abstract*- USB 3.0 has transmission speeds of up to 5 Gbit/s, which is 10 times faster than USB2.0 (480 Mbit/s). As the speed is 5Gbit/s, it reduces time required for transmission of data. Reduced power consumption and backward compatibility with USB 2.0 is the features of USB 3.0. The USB 3.0 Promoter Group announced on 17 November 2008 that the specification of version 3.0 had been completed and had made the transition to the USB Implementers Forum (USBIF) The managing body of USB specifications. This move effectively opened the specification to hardware developers for implementation in future products. A new feature is the "SuperSpeed" bus, which provides a fourth transfer mode at 5.0 Gbit/s. The raw throughput is 4 Gbit/s, and the specification considers it reasonable to achieve 3.2 Gbit/s (0.4 GB/s or 400 MB/s).**

***Key Words* — Availability, Connection Type, Durability, USB**

I. INTRODUCTION

Universal Serial Bus (USB) is a serial bus standard to connect devices to a host computer. The USB 3.0 is the new version of the USB. The USB 3.0 is also called super speed. Because the USB 3.0 support a raw throughput of 500 MByte/s. As its previous versions of USB also supports the plug and play capability, hot swapping etc. USB was designed to allow many peripherals and devices to be connected using a single standardized interface socket. Other convenient features include providing power to low-consumption devices, eliminating the need for an external power supply, and allowing many devices to be used without requiring manufacturer-specific device drivers to be installed.[6]

Initially, USB provides two speeds (i.e. 12Mb/s and 1.5Mb/s) for peripherals which are used. In this 21st century personal computers became increasingly powerful. USB is the most popular PC peripheral device and it has migrated heavily into the mobile segments. Now days new technologies are invented, new types of media formats like HD images, videos etc. User wants to Transfer his data in very minimum time or as a fast speed. For these types of user applications USB IF invent new version of USB that is USB 3.0. The goal of USB 3.0 to enable devices from different vendors to interoperate in an open architecture.[2]

There are many new features included in this new version of Universal Serial Bus Specification. The most important one is the supers speed data transfer itself. Then the USB 3.0 can support more devices than the currently using specification which is USB 2.0.

A device which is un-configured can still draw only 1 unit load, but a device which is configured can draw up to 6 unit loads (900mA, an 80% increase over USB 2.0 at a registered maximum of 500mA). Minimum device operating voltage is dropped from 4.4V to 4V. When operating in Super-Speed mode, full-duplex signaling occurs over 2 differential pairs separate from the non-Super Speed differential pair. This result in USB 3.0 cables containing 2 wires for power and ground, 2 wires for non-Super-Speed data, and 4 wires for Super Speed data, and a shield (not required in previous specifications).[1]

II. HISTORY

A. *Pre-Releases:*

Sr.no.	Versions	Released Year
1	USB 0.7:	November 1994
2	USB 0.8:	December 1994
3	USB 0.9:	April 1995
4	USB 0.99:	August 1995
5	USB 1.0:	November 1995

Table No. II. PRE-RELEASES VERSION OF USB

B. *USB 1.0:*

Released in January 1996.

Specified data rates of 1.5Mbit/s which is Low-Speed, and 12Mbit/s is called full speed. USB 1.0 didn't allow extension cables due to timing, power limitations. In market only few devices are made.[9]

C. *USB 2.0:*

USB 2.0: Released in April 2000.

The maximum speed of USB 2.0 is 480 Mbit/s, because of this it is called Hi-Speed.[10]

D. *USB 3.0:*

At 18, September 2007, "Pat Gelsinger", demonstrated at the Intel Developer Forum (IDF). At 17, November 2008, Promoter Group announced that version 1.0 of the specification has been completed and also it will transmitted to (USB-IF). It is the managing body of USB specification. This gives platform for hardware developers for implementation in future products. [4]

III. FEATURES

- A most important feature of USB 3.0 is the "Super Speed" bus, which provides transfer mode at 4.8 Gbit/s. The throughput is 4 Gbit/s, and the

specification considers it reasonable to achieve 3.2 Gbit/s (0.4 GByte/s or 400 MByte/s) or more than it after the protocol is overhead .

- It also provide the additional pins for Super Speed mode, the physical form factors for USB 3.0 plugs and receptacles have been modified from those used in previous versions. Standard -A cables have extended heads where the Super Speed connectors extend beyond and slightly above the legacy connectors. Similarly, the Standard -A receptacle is deeper to accept these new connectors. On the other end, the Super Speed Standard -B connectors are placed on top of the existing form factor .[5]

- A bequest standard A-to-B cable will work as designed and will never contact any of the Super Speed connectors, also it ensuring backward compatibility.[2] Super Speed standard A plugs will fit bequest A receptacles but Super Speed standard B plugs will not fit into bequest standard B receptacles (for this new cable can be used to connect a new device to an old host but not to connect a new host to an old device; for that, a bequest standard A-to-B cable will be an essential requirement).[6]

- When we operating in Super Speed mode, full-duplex signalling occurs over two differential pairs separate from the non -Super Speed differential pair. It gives results in USB 3.0 cables which contains 2 wires for power and ground, 2 wires for non-Super Speed data, and 4 wires for Super Speed data, and a shield required for it.

- The work of Super Speed is to establishes a communications pipe between the host and each device, in a host -directed protocol. USB 3.0 extends the great size transfer type in Super Speed with Streams. This extension allows a host and device to create and transfer multiple streams of data through a single great size pipe.[6]

- The features of power management include support of idle, sleep and suspended states, as well as link, device power management.

- The USB-IF does not define cable assembly lengths, it can any length as long it meets all requirements which are defined in specification. But electronicdesign.com estimated cable length is the 3m at super speed..

- It uses 8B/10B encoding, linear feedback shift register (LFSR) scrambling for data and spread spectrum. It forces receivers to use low frequency periodic signalling (LFPS), dynamic equalization, and training sequences to ensure fast signal locking. [5]

IV. CONNECTOR PROPERTIES

A. Availability :

- The products for consumers are available in the market at the end of 2010. And also the freedom announced a USB 3.0 external hard drive at September 24, 2009.

- Gigabyte Technology announced that they made 7 P55 Chipsets motherboards at October 27, 2009. On January 6th, 2010 ASUS was the first manufacturer to release a USB 3.0 - certified motherboard, the P6X58D Premium. The motto of USB-IF certification is certified motherboards are compatible with peripherals.

- Drivers are under development for Windows 8, but support was not included with the initial release of the operating system. The Linux kernel version 2.6.31 released in Sept 2009 supports USB 3.0.

- At least one complete end -to-end test system for USB3.0 designers is now on the market.[3]

B. Intel will not support USB 3.0 until 2011:

Because it will slow down mainstream adoption. These delays may be due to problems in the CMOS manufacturing process, a focus to advance the Nehalem platform or a tactic by Intel to boost its upcoming Light Peak interface. Current AMD roadmaps indicate that the new Southbridge's released in the beginning of 2010 will not support USB 3.0. Market researcher In-Stat predicts a relevant market share of USB 3.0 not until 2011 .

January 4, 2010, Seagate announced a small portable HDD with PC.Card targeted for laptops (or desktop with PC Card slot addition) at the CES in Las Vegas.[11]

Fig. 4.1. USB 3.0 Hub demo board

Fig. 4.2. USB 3.0 Ports

Fig. 4.3. USB 3.0 Connectors

C. Usability:

- It is difficult to attach a USB connector incorrectly. Most connectors cannot be plugged in upside down, and it is clear from the appearance and kinesthetic sensation of making a connection when the plug and socket are correctly mated. However, it is not obvious at a glance to the inexperienced user (or to a user without sight of the installation) which way around the connector goes, thus it is often necessary to try both ways. More often than not, however, the side of the connector with the trident logo should be on "top" or "toward" the user. Most manufacturers do not, however, make the trident easily visible or detectable by touch. [7]

- It only needs moderate insertion or removal force (by specification). USB cables and small USB devices are held in place by the gripping force from the receptacle (without need of the screws, clips, or thumbturns other connectors have required).

- Minimum force needed to make or break a connection is modest, allowing connections to be made in awkward circumstances (ie, behind a floor mounted chassis, or from below) or by those with motor disabilities. This has the disadvantage of easily and unintentionally breaking connections that one has intended to be permanent in case of cable accident (e.g., tripping, or inadvertent tugging).[10]

- The standard connectors were intentionally intended to enforce the directed topology of a USB network: type A connectors on host devices that supply power and type B connectors on target devices that receive power. This prevents users from accidentally connecting two USB power supplies to each other, which could lead to dangerously high currents, circuit failures, or even fire.[4]

D. Durability:

- The standard connectors of USB 3.0 is designed to be robust. Many previous connector designs were easily broken, specifying embedded component pins or other delicate parts which proved liable to bending or breaks, even with the application of only very modest force. The electrical contacts in a USB connector are protected by a n adjacent plastic tongue, and the entire connecting assembly is usually further protected by an enclosing metal sheath. As a result USB connectors can safely be handled, inserted, and removed, even by a young child also.

- The construction of connectors always ensures that the external sheath on the plug makes contact with its counterpart in the receptacle before any of the four connectors within make electrical contact. The external metallic sheath is typically connected to system ground, thus dissipating any potentially damaging static charges (rather than via delicate electronic components). This enclosure design also means that there is a (moderate) degree of protection from electromagnetic interference afforded. [8]

- The signals of USB while it travels through the mated connector pair (this is the only location when the otherwise twisted data pair must travel a distance in parallel). In addition, because of the required sizes of the power and common connections, they are made after the system ground but before the data connections.

- The newer Micro-USB receptacles are designed to allow up to 10,000 cycles of insertion and removal between the receptacle and plug, compared to 1500 for the standard USB and 5000 for the Mini -USB receptacle. This is accomplished by adding a locking device and by moving the leaf-spring connector from the jack to the plug, so that the most-stressed part is on the cable side of the connection.

E. Compatibility:

- The USB standard specifies relatively loose educe for compliant USB connectors, intending

to minimize incompatibilities in connectors produced by different vendors (a goal that has been very successfully achieved). Unlike most other connector standards, the USB specification also defines limits to the size of a connecting device in the area around its plug. This was done to prevent a device from blocking adjacent ports due to the size of the cable strain relief mechanism (usually molding integral with the cable outer insulation) at the con nector. Compliant devices must either fit within the size restrictions or support a compliant extension cable which does.

- In this version of USB two way communication is possible, Because it uses full duplex communication for Super Speed. In previous USB versions (i.e. 1.x or 2.0), all communication is half-duplex and directionally controlled by the host.

- USB 3.0 receptacles are electrically compatible with USB 2.0 device plugs if they can physically match. Most combinations will work, but there are a few physical incompatibilities. However, only USB 3.0 Standard-A receptacles can accept USB 3.0 Standard -A device plugs.

- Hosts almost universally have type -A receptacles, and devices one or another type -B variety. Type-A plugs mate only with type -A receptacles, and type -B with type-B; they are deliberately physically incompatible. [8]

V. CONNECTION TYPES

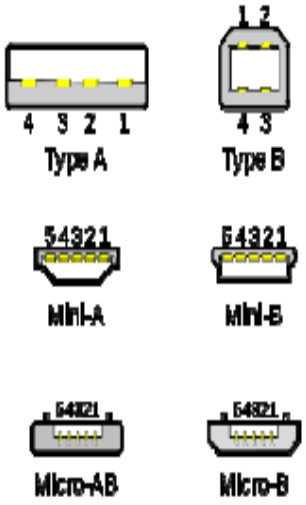

Fig. 5.1 Pin outs of Standard ,Mini, and Micro USB connectors

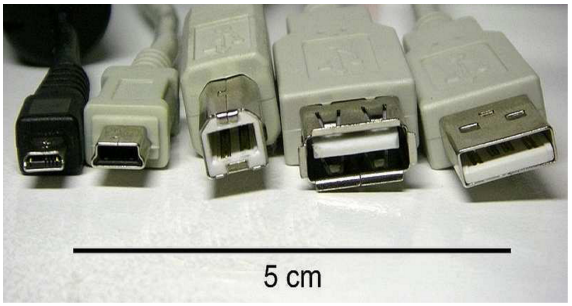

Fig. 5.2. Different types of USB connectors

Different types of USB connectors from left to right:

- Male micro USB
- Male mini USB B-type
- Male B-type
- Female A-type
- Male A-type

There are several types of USB connectors, including some that have been added while the specification progressed. The original USB specification detailed Standard-A and Standard -B plugs and receptacles. The first engineering change notice to the USB 2.0 specification added Mini -B plugs and receptacles. The data connectors in the A - Plug are actually recessed in the plug a s compared to the outside power connectors. This permits the power to connect first which prevents data errors by allowing the device to power up first and then transfer the data. Some devices will operate in different modes depending on whether the data connection is made. This difference in connection can be exploited by inserting the connector only partially. For example, some battery -powered MP3 players switch into file transfer mode (and cannot play MP3 files) while a USB plug is fully inserted, but can be operated in MP3 playback mode using USB power by inserting the plug only part way so that the power slots ake contact while the data slots do not. This enables those devices to be operated in P3 playback mode while getting power from the cable.[3]

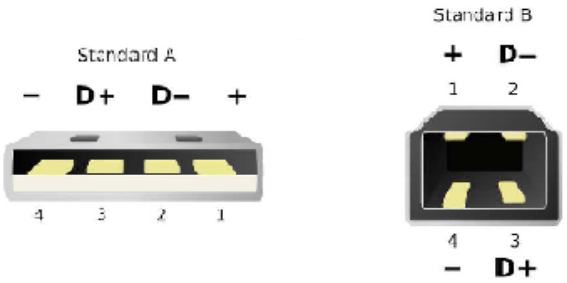

Fig. 5.3 Pin configuration of the USB connectors Standard A/B, viewed from face of plug.

VI. CABLE LENGTH & POWER

The maximum cable length of USB 1.1 is 3 metres (9.8 ft) and USB 2.0 maximum cable length is 5 metres (16 ft). Maximum permitted hubs connected in series is 5. Although a single cable is limited to 5 metres, the

USB 2.0 specification permits up to five USB hubs in a long chain of cables and hubs.

This will allows for a maximum distance of 30 metres (98 ft) between host and device, using six cables 5 metres (16 ft) long and five hubs. In actual use, since some USB devices have built-in cables for connecting to the hub, the maximum achievable distance is 25 metres (82 ft) + the length of the device's cable. For longer lengths, USB extenders that use CAT5 cable can increase the distance between USB devices up to 50 metres (160 ft). [2]

It is important to note that devices which use more bus power, such as USB hard drives and USB scanners will require the use of a powered USB hub at the end of the extension, so that a constant connection will be achieved. If power and data does not have sufficient power then problems can result, such as no connection at all, or intermittent connections during use.[5]

The cable assembly for USB 3.0 may be of any length as long as all requirements defined in the specification are met. However, maximum bandwidth can be achieved across a maximum cable length of approximately 3 metres only.

A. POWER:

The specifications of USB 1.0 and 2.0 provide a 5 V supply on a single wire from which connected USB devices may draw power. The specification provides for no more than 5.25 V and no less than 4.75 V (5 V±5%) between the positive and negative bus power lines. For USB 2.0 the voltage supplied by low-powered hub port s is 4.4 V to 5.25 V.

A unit load is defined as 100 mA in USB 2.0, and was raised to 150 mA in USB 3.0. A maximum of 5 unit loads (500 mA) can be drawn from a port in USB 2.0, which was raised to 6 (900 mA) in USB 3.0. There are two types of devices: low-power and high-power. Low-power devices draw at most 1 unit load, with minimum operating voltage of 4.4 V in USB 2.0, and 4 V in USB 3.0. High-power devices draw the maximum number of unit loads supported by the standard. All devices default as low -power but the device's software may request high -power as long as the power is available on the providing bus. A bus-powered hub is initialized at 1 unit load and transitions to maximum unit loads after hub configuration is obtained. Any device connected to the hub will draw 1 unit load regardless of the current draw of devices connected to other ports.

A hub which will self-powered supply maximum supported unit loads to any device connected to it. A battery -powered hub may supply maximum unit loads to ports. In addition, the VBUS will supply 1 unit load upstream for communication if parts of the Hub are powered down.

For the Battery Charging Specification, new powering modes are added to the USB specification. A host or hub Charging Downstream Port can supply a maximum of 1.5 A when communicating at low-bandwidth or full-bandwidth, a maximum of 900 mA when communicating at high bandwidth, and as much current as the connector will safely handle when no communication is taking place; USB 2.0 standard -A connectors are rated at 1500 mA by default. A Dedicated Charging Port can supply a maximum of 1.8 A of current at 5.25 V. A portable device can draw up to 1.8 A from a Dedicated Charging Port. The Dedicated Charging Port shorts the D+ and D- pins with a resistance of at most 200 . The short disables data transfer, but allows devices to detect the Dedicated Charging Port and allows very simple, high current chargers to be manufactured.[7]

VII. ARCHITECTURAL OVERVIEW

Super Speed USB has a dual-bus architecture to allow hosts to run USB 3.0 right alongside USB 2.0 - hence that USB 2.0 cable tucked inside the USB 3.0 cord. But while hosts and hubs will be able to operate USB 2.0 and USB 3.0 buses simultaneously, plug-in peripherals will not. Super Speed transmits data in packets, as USB 2.0 does, but this time devices explicitly route packets from the source to the target. Compare that to USB 2.0, which simply broadcasts all packets to all connected devices whatever they may be and whether they're the intended recipient or not.[5]

Following are the Architectural Components of USB3.0.

A. HUB:

For electrical interface between the hosts and USB devices, here hub is used. The topology use in this is star topology. A hub is at the centre of each star. Each wire segment is a point-to-point Connection between the host and a hub or function or a hub connected to another hub or function. Following are the major aspects of USB functionality that hub support:

- Connectivity behaviour
- Power management
- Device connect/disconnect detection
- Bus fault detection
- Super speed and USB2.0 (high -speed, full-speed, an low-speed) support A.

The design of USB 3.0 hub it incorporates USB 2.0 hub. The hub of USB 3.0 called is Super Speed hub. This Super Speed hub consist of two components, which are Super Speed hub repeater or forwarder and Super Speed hub controller. The repeater and forwarder of hub are directly responsible for connectivity and setup. The USB 3.0 hub also supports fault recovery. For the host hub communication mechanism hub controller is used.

B. HOST:

As like the hub, USB 3.0 host also have two hosts. First host is used for Super Speed host and second one is used for non-Super Speed host. This incorporation is only for providing backward compatibility for this new device. Transfer rate of Super Speed hub is 500MB/s with full duplex communication mode. And non-Super Speed

supports only old data rates such as High-Speed, Full-Speed, Low-Speed. By using the host controller host interact with the devices.

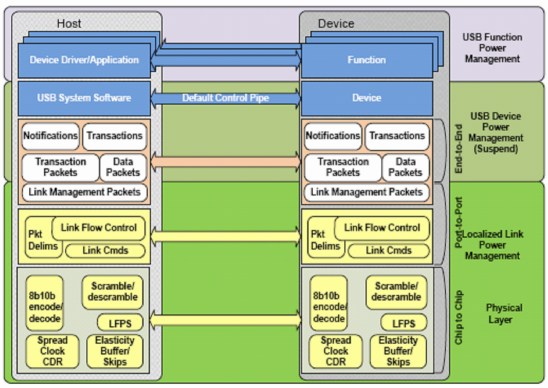

Fig. 7.1 USB 3.0 protocol

If host is powered off mode hub does not provide power to downstream unless hub support the charging application. If host is in powered on mode with Super Speed support enable on its downstream. The work of Hub is here to detects VBUS Super Speed support and powers its downstream ports with Super Speed enabled.[3]

- Hub connects both as s Super Speed and as a High -Speed device.
- Device detects VBUS and Super Speed support and connects as a Super Speed device.
- Host system begins hub enumeration at high-speed and Super Speed.

The Super Speed host is the sink of information. It implements communications layer to accomplish information exchanges over the bus. The host includes an implementation number of the root downstream ports for Super Speed and USB 2.0.

C. DEVICE

The Super Speed devices are sources or sink of information exchanges. They implement the required device -end, Super Speed communication layers to accomplish information exchanges between a driver on the host and a logical function on the device. [6]

The USB 3.0 devices are called Super Speed devices, all these Super Speed devices are share base architecture with USB 2.0. Communication between the host and devices are done through pipes and each Super Speed device support one or more pipes. A device respond a requests on its default pipe whether the device is currently assigned a unique address or using default address. That pipe is known as the control pipe it is same as the message pipe. The default control pipe is control pipe as defined in USB specification revision 2.0. Each device implement the default control pipe as message pipe. This pipe is intended for message initialization and device management.[5]

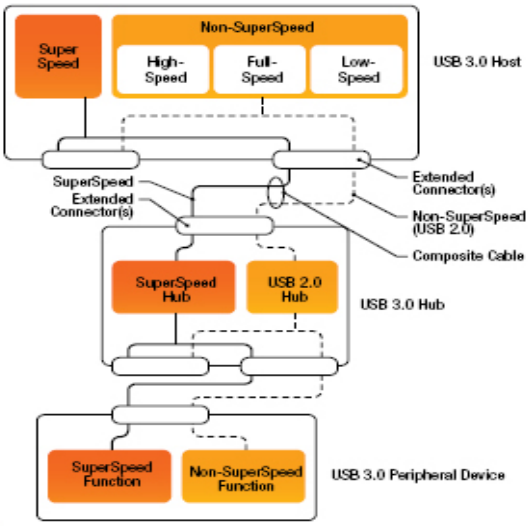

Fig 7.2 ARCHITECTURE OF USB 3.0

VIII. PHYSICAL STRUCTURE

A.. CABLE STRUCTURE

The cables of USB 3.0 have eight primary conductors: three twisted signal pairs for USB data paths and a power pair. In addition to the twisted signal pair for the USB 2.0 data path, two twisted signal pairs are used to provide the Super Speed data path, one for the transmit path and one for the receive path. USB 3.0 receptacles (both upstream and down stream) are backward compatible with USB 2.0 connector plug. USB 3.0 cables and plugs are not intended to be compatible with USB 2.0 upstream receptacles. As an aid to the user, USB 3.0 mandates standard colouring for plastic portions of USB 3.0 plugs and receptacles. Electrical (insertion loss, return loss, cross talk etc) performance for USB 3.0 is defined with regard to raw cables, mate connectors, and mated cable assemblies, with compliance requirements using industry test specification established for the later two categories.[5]

Here the USB is using a differential pair data cables. The differential pair data cables are used to reduce the transmission error. The data to be transmitted is passed through an Op Amp and the inverse of the data is produced. And then these two data are passed through the +, - lines provided. In USB 3.0 both shielded and unshielded differential pair lines are used. Shielded for the Super Speed transmission and the unshielded for the non-Super Speed.[6]

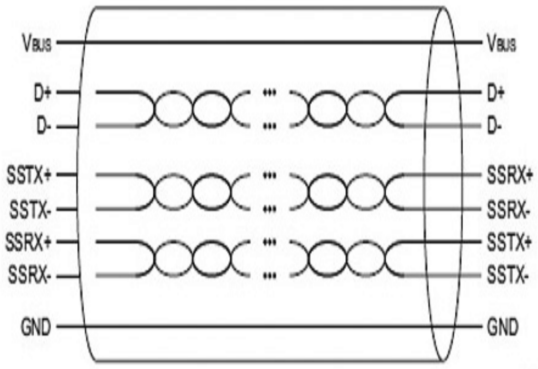

Fig. 8.1 Architectural view of USB 3.0 bus

PIN NO	COLOUR	DISCRIPTION
1	RED	POWER
2	GREEN	USB 3.0 DATA+
3	WHITE	USB 3.0 DATA -
4	BLACK	GROUND
5	ORANGE	SUPER SPEED RECEIVER-
6	VIOLET	SUPER SPEED RECEIVER +
7	BLACK	GROUND USB 3.0
8	GREEN	SUPER SPEED TRANSMITTER -
9	BLUE	SUPER SPEED TRANSMITTER +

Table VIII. Cable Colors of Cross Section View

VBUS : This cable is used to carry power.

GND : It's the ground of the power cable.

D+ : It's the '+' data bus for the USB 3.0, which support backward compatibility with 2.0

D- : It's the '-' data bus for the USB 3.0, which support backward compatibility with 2.0

SSTX+ : It's the '+' data transmission bus of USB 3.0, which support Super Speed.

SSTX- : It's the '-' data transmission bus of USB 3.0, which support SuperSpeed.

SSRX+ : It's the '+' data reception bus of USB 3.0, which support Super Speed.

SSRX- : It's the '-' data reception bus of USB 3.0, which support Super Speed.

C. CROSS SECTIONAL REVIEW

Fig. 8.2 illustrates a USB 3.0 cable cross-section view. There are three group of wires: Unshilded Twisted Pair(UTP), Shielded Differential Pair (SDP), and power and ground wires.

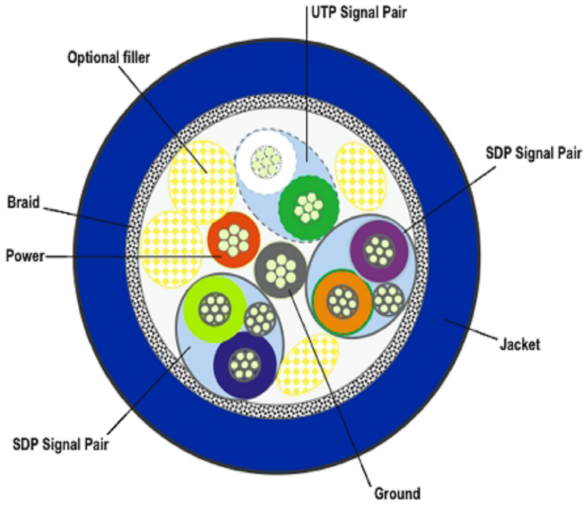

Figure 8.2. Cross sectional view of USB 3.0 cable

In this cross section view the UTP is intended to transmit the USB 2.0 signaling while the SDPs are used for Super Speed. The shield is needed for the Super Speed differential pairs for signal integrity. Each SDP is attached with a drain wire which is eventually connected to the system ground.[7]

IX. APPLICATIONS

The USB ports are used for a number of applications. The USB ports get the popularity because of its simplicity as well the easiness in use. The main application of USB 3.0 is listed below.

- These external drives usually contain a translating device that interfaces a drive of conventional technology (IDE, ATA, SATA, ATAPI, or even SCSI) to a USB port. Functionally, the drive appears to the user just like an internal drive.
- These are used to provide power for low power consuming devises. These can be used for charging the mobile phones.
- Though most newer computers are capable of booting off USB Mass storage devices, USB is not intended to be a primary bus for a computer's internal storage: buses such as ATA (IDE), Serial ATA (SATA), and SCSI fulfill that role. However, USB has one important advantage in that it is possible to install and remove devices without opening the computer case, making it useful for external drives.

- Mice and keyboards are frequently fitted with USB connectors, but because most PC motherboards still retain PS/2 connectors for the keyboard and mouse as of 2007, they are often supplied with a small USB-to-PS/2 adaptor, allowing usage with either USB or PS/2 interface.

- It can support USB smart card reader, USB compliance testing devices, Wi-Fi adapter, Bluetooth adapter, ActiveSync device, Force feedback joystick.[5]

- USB implements connections to storage devices using a set of standards called the USB mass storage device class (referred to as MSC or UMS).

- This was initially intended for traditional magnetic and optical drives, but has been extended to support a wide variety of devices, particularly flash drives. This generality is because many systems can be controlled with the familiar idiom of file manipulation within directories (The process of making a novel device look like a familiar device i s also known as extension).[8]

USB 3.0 can also support portable hard disk drives. The earlier versions of USBs were not supporting the 3.5 inch hard disk drives. Originally conceived and still used today for optical storage devices (CD -RW drives, DVD drives, etc.), a number of manufacturers offer external portable USB hard drives, or empty

X. Future Scope

The USB 3.0 Promoter Group announced at January 6, 2013 in the LAS VEGAS. The development of a Super Speed USB 3.0 enhancement that will add much higher data rate, delivering up to twice the data through-put performance of existing Super Speed USB over enhanced, fully backward compatible USB connectors and cables. This enhancement builds on the tremendous success of USB and expands its capability by doubling the data rate. While maintaining backward compatibility, the 10 Gb/s data rate allows users to do more with a universal standard that can be leveraged by many industries.[6]

A. Key Characteristics:-

- New 10 Gb/s USB data rate.
- Compatibility with existing cables and connectors.
- Improved data encoding for more efficient data transfer.
- improved I/O power efficiency.
- Compatible with existing USB 3.0 device class protocols.
- Compatible with both existing 5 Gb/s and 10 Gb/s.

The USB 3.0 is supporting super speed that is about 10Gb/s.This technology is developing very fastly and in this there is huge scope for the research to improve its speed.

Conclusion

The Universal serial bus 3.0 is supporting a speed of about 5 Gb/sec i.e. ten times faster than the 2.0 version. And it is also faster than the new Firewire product S3200. So hopefully by the help of this Super speed data transfer rate the USB 3.0 will be replacing many of the connecters in the future. The prototype of the USB 3.0 was already implemented by ASUSE in their motherboard. The drivers for the USB 3.0 are made available to the open source Linux.

The Linux kernel will support USB 3.0 with version 2.6.31, which will be released around August. Because of the backward compatibility of the USB 3.0 the devises which we are using now and the ports we are using now(which is USB 2.0) will be working proper with the new USB 3.0 devises and ports. Consumer products are become available in market.[7].

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