Small Computer System Interface – SCSI

Short for Small Computer System Interface, SCSI is pronounced as "Scuzzy" and is one of the most commonly used interface for disk drives that was first completed in 1982.

Unlike competing standards, SCSI is capable of supporting eight devices, or sixteen devices with Wide SCSI.

However, with the SCSI host adapter located on ID number 07 and boots from the ID 00. This leaves the availability of six device connections.

- **SCSI-1** is the original SCSI standard developed back in 1986 as ANSI X3.131-1986. SCSI-1 is capable of transferring up to eight bits a second.
- **SCSI-2** was approved in 1990, added new features such as Fast and Wide SCSI, and support for additional devices.
- **SCSI-3** was approved in 1996 as ANSI X3.270-1996.

The following are advantages of the small computer system interface (SCSI):

1. Unlike other interfaces, when you interface with different device types using SCSI, the interfacing is done through the same cable. In a non-SCSI environment, devices such as a proprietary tape controller, disk controller, and so on, must be used to connect their respective devices to the system bus.
2. SCSI peripheral devices of the same type have similar characteristics (this makes it easy to replace old devices with new ones).
3. SCSI peripheral devices are intelligent and independent: a controller is built onto each SCSI device. This allows the computer to do other work.
4. SCSI I/O is independent of the system bus. This allows peripheral devices to work with different computer types, which preserves a company's hardware investment.
5. SCSI is fast (10 megabytes (MB)/second on 8 bit bus, 20 MB/second on 16 bit bus).
6. Multi-threaded operating systems, such as Windows NT, can take full advantage of the multi-tasking capabilities of the SCSI bus.

SCSI(-3) Parallel Interface - 3 / (SPI-3)

The third generation of the SCSI parallel interface is, unsurprisingly, called the **SCSI(-3) Parallel Interface - 3** or **SPI-3**. This document builds upon the physical and protocol definitions of the SPI-2 document. It is in the process of approval at the time of this writing, so it has no ANSI standard number yet, but should be published by early 2001 (it's T10 project 1302-D).
Five main features were added to parallel SCSI in the SPI-3 standard:

- **Fast-80(DT) Data Transfer:** Reflecting the continuing appetite for speed on the SCSI bus, data transfer rates were again doubled, this time to 160 MB/s on a wide bus. This was accomplished not by increasing the speed of the bus from 40 MHz to 80 MHz, but rather through the use of double transition clocking; thus the "DT" sometimes found in the name for this signaling speed. See here for more.

- **Cyclic Redundancy Check (CRC):** This is a common error checking protocol used to ensure data integrity. It was added as a safety measure since transfer speeds were being increased, leading to the possibility of data corruption.

- **Domain Validation:** This feature improves the robustness of the process by which different SCSI devices determine an optimal data transfer rate; read more about it here.

- **Quick Arbitration and Selection (QAS):** This feature represents a change in the way devices determine which has control of the SCSI bus, providing a small improvement in performance.

- **Packetization:** Another small change to improve performance, packetization reduces the overhead associated with each data transfer; it is described here.

- **High Voltage Differential:** With the widespread adoption of low voltage differential, the older "high voltage" differential became unnecessary. Since it was never very popular, it was removed from the standard.

- **32-Bit Bus Width:** Introduced in SCSI-2, the 32-bit parallel SCSI option never caught on in the industry and was finally removed from the specification in SPI-3.

- **SCAM:** SPI-3 removed the "SCSI Configured AutoMatically" (SCAM) feature, which was a good idea but never was universally adopted and sometimes led to configuration problems. In doing so, the SCSI world was mercifully rid of one of the worst acronyms in the history of the computer industry. :^)

- **Narrow High-Speed Transfers:** Narrow (8-bit) SCSI hasn't been technically "made obsolete", but 8-bit transfers are not defined for Fast-80 transfers. (Considering that faster transfer modes are used to get more throughput, increasing data transfer speeds while staying on an 8-bit bus never really made much sense.)

**SCSI connectors**

The below illustrations are examples of some of the most commonly found and used SCSI connectors on computers and devices and illustrations of each of these connections.
Explain following external SCSI connectors: (01-mark each)

Connectors are the physical devices that are used to attach a SCSI cable to SCSI device. There are 4 types of external connectors:

- **D-Shell Centronics**: It is D shaped. The connector is large and cumbersome.

- **Centronic**: In centronics connector instead of pins, two rows of flat contacts are used to hold the connector in place. Two latches on either side are used to hold the connector firmly. This is called as Alternative 2.

- **High Density (HD)**: HD are used in SCSI 2. In this space between the pins were reduced. The narrow 50 pin connector is called Alternative 1 and the 68 pin version is called Alternative.

- **Very high Density**: VHD is a 68 pin connector. The contacts are much smaller and closer together. It is called Alternative 4.

**Serial Attached Small Computer System Interface (SAS)**

- Short for **Serial Attached SCSI**, SAS is a serial transmission replacement for the parallel SCSI. SAS is an improvement of regular SCSI in that it allow up to 128 devices to be connected at the same time with transmission speeds of 3.0Gb/s. SAS devices have two data ports and can communicate with both SCSI and SATA.

- Short for **Standalone Server**, SAS is a server that does not rely on any other servers or services.
• Abbreviation sometimes used to describe SUPER Anti Spyware.

Universal Serial Bus (USB)

Give any four features of USB. (Any four features 1/2 mark each)

1. Up to 127 different devices can be connected on a single USB bus.
2. Initial USB standard supported 12 Mbps transfer rate. Currently 60 Mbps is supported.
3. Supports wide range of peripherals such as keyboard, mouse, printer, FDD, game pad, joystick etc.
4. Devices are not daisy chained. Each device is connected to USB hub, which is an intelligent device interacting with the PC on one side and USB peripheral devices on the other side.
5. A USB device can be connected without powering off the PC. The plug and play feature in the BIOS together with intelligence in the USB device takes care of detection, device recognition and handling.
6. USB controller in the PC detects the presence or absence of USB devices and does power allocation.
7. The CPU/software initiates every transaction on the USB bus. Hence the overhead on the PC software increases.

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RS 232 Interface

Block diagram of RS 232 connector (Diagram 4 marks signals 4 marks( Any 4 signals))

**RS 232 Signals**

- **Carrier Detect (CD/DCD):** This signal gives a modem a means of signaling the data terminal that it has made a connection with the distant modem.
- **Receive Data (RXD):** The bits coming in from a distant serial port go through receive data line.
- **Transmit Data (TXD):** The serial data leaving the port travels on Transmit data line.
- **Data Terminal Ready (DTR):** when the data terminal is able to participate in communications, it signals its readiness by applying a positive voltage on the DTR line.
- **Signal Ground (SD):** It provides the return path to all the signals used in the serial port.
- **Data Set Ready (DSR):** When the data terminal is ready to receive data, it signals its readiness by applying a positive voltage on the DSR line.
• **Request To send (RTS):** When the data terminal is on and capable of receiving transmissions, it puts a positive voltage on the request to send line. Absence of RTS signal will prevent the data set from sending out the data.

• **Clear To Send (CTS):** The data set needs to control the signal flow of from the data terminal. The CTS signal indicates to the data set that data can be sent. Absence of CTS signal will prevent the data set from sending out the data.

![RS 232 Timing Waveform](image)

**Firewire Features**

List any four features of firewire. (Any 4 features, ½ mark each)

Firewire is a serial interface for different high speed peripherals.

1. Hot pluggability.
2. Multiple devices up to 63.
3. Uses daisy chain topology
4. Data Transfer Rate 400/800 Mbps
5. Snap connection: no need for device ID, jumper, DIP switch, terminators etc.
6. Power sourcing.
7. Dynamic reconfiguration.
8. Max distance between devices: 4.5m
9. Supports DMA transfers
10. Well suited for different devices such as Digital Camera, Scanner, HDD, printers, music systems

**Blue tooth**

State any four Bluetooth features. (Any 4 features, ½ marks each)

Bluetooth features:
1. It can transfer information wirelessly form one enabled device to another.
2. Bluetooth operates in the range of 2400–2483.5 MHz
3. Bluetooth uses a radio technology called frequency-hopping spread spectrum
4. Bluetooth is a packet-based protocol with a master-slave structure.
5. One master may communicate with up to seven slaves in a piconet; all devices share the master's clock.

Write any four advantages of Bluetooth.
(Any four points- each 1M; any other advantage may be considered.)

1. Bluetooth does not require a clear line of sight between the synced devices.
2. Bluetooth transfers data at the rate of 1 Mbps, which is from three to eight times the average speed of parallel and serial ports, respectively.
3. Bluetooth technology is designed to have very low power consumption
4. Bluetooth is extremely secure in that it employs several layers of data encryption and user authentication measures
5. Bluetooth technology is available in an unprecedented range of applications from mobile phones to automobiles to medical devices for use by consumers, industrial markets, enterprises, and more.