USB – universal connectiv for now and the future

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USB is the dominant wired connectivity technology in the world tod the most prolific technologies in the computer industry. In the embedde is appearing everywhere, with USB ports in almost every new devi targeting everything from development to storage to replacing para constantly increasing

Application areas

USB has a very wide application area. Traditionally, it is present in interface devices) such as mice and keyboards to mass storage de CD/DVD recorders, card readers, portable devices, printers to aud USB replaces RS-232, parallel, PS/2, CardBus and audio interface connectors that used to be present in PCs and mobile devices.

The wide application area is also reflected in the different speeds o

Low-speed (1.5 Mbit/s gross) is sufficient for mice and keyboards and allows very cost-effective designs through relaxed timing requirements.

Full-speed (12 Mbit/s gross) is still widespread. It is also in new designs where this data rate is sufficient simply because the design requirements are obviously more relaxed than for high-speed.

High-speed (480 Mbit/s gross) is the state-of-the-art speed, used primarily where large amounts of data have to be transferred, such as in memory sticks and mass storage, portable media devices.

This leads immediately to the next level, Super Speed (4.8 Gbit/s gross), whose specification was released in October 2008. It takes into consideration the huge increase in memory density on hard disks as well as on portable media players and video cameras that are facing a significantly increased need for memory with the rise of HD video, and hence the need to transfer these data from mobile devices to a PC or home server.

Figure 1: USB 2.0 connector

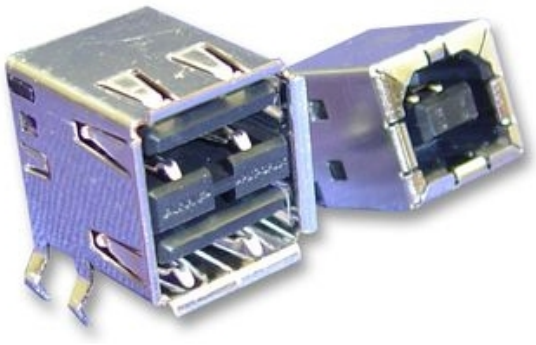

Figure 2: USB 2.0 receptacle

Apart from the conventional function split for USB devices, into host con (OTG, Hi-Speed), has injected greater flexibility in USB functionality.

OTG enables two peripherals to be connected without the intervention o directly to a printer, pictures can be printed without the intervention of a to a USB headset.

With the introduction of OTG and the battery charger detection, the app

Battery charger detection allows a peripheral device to be charged with as defined in the USB specification. A mobile device that detects a USB current to charge its batteries. Manufacturers of mobile devices can get USB connector for data exchange and charging. In conjunction with the jack, it is now possible to get rid of all but one USB connector on mobile manufacturers of mobile devices.

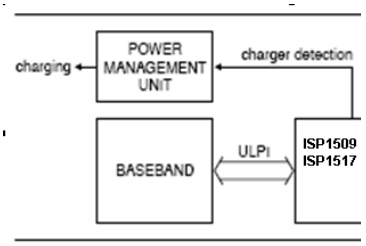

Figure 3: battery charging detection

Another important asset for mobile devices is of course power consump mobile phones, such as the ISP1508, ISP1509, ISP1512, ISP1516, ISP modes.

Small form factor connectors Mini A, Mini B (not used for new designs) a in very small form factor designs as well.

Figure 4: Micro USB receptacle in a mobile phone

The Open Mobile Terminal Platform (OMTP) forum has endorsed Micro-USB as the standard connector for portable mobile phones

The China Electronics Standardization Institute (CESI) is looking at requiring all portable cell phones to use a micro-USB connector for its charging port.

Conclusion

USB can efficiently save cost in terms of reducing the number of connec
on top allows manufacturers to even get rid of the power connector in p
through full-speed and high-speed, and now to Super-Speed shows tha
evolving requirements.

Architecture

Several potential architectures can be considered:

a. For highest density designs and tight space requirements, the USB interface integrated into a host or microcontroller is the architecture of choice. It provides the smallest form factor designs and the highest functional density. The potential drawback of microcontrollers integrating a high-speed physical layer (PHY) is that analog design is still a great challenge, and so such PHY-integrated designs are not yet widely available.

b. USB chips connected to an existing controller via a standard interface (for example: memory, PCI, generic processor) ensures the least design effort, yet allowing a flexible and broad application area. This discrete type of architecture is possible for host controllers, peripheral controllers and hub controllers.

c. The use of USB transceivers can be seen as the optimization of the two architectures mentioned in (a) and (b). The digital part of USB is integrated in the baseband controller; and the analog PHY is realized in an external USB transceiver. Usually this is the architecture of choice for mobile phones. It avoids the effort of integrating the sophisticated analog part required for Hi-Speed USB and also gives the flexibility to react to recent standardization efforts, such as USB battery charger detection. This feature can be integrated by replacing the USB transceiver and without the need to redesign the baseband controller. Also to progress to USB Super Speed (USB 3.0) an external PHY, at least in the ramp-up phase, provides the latest feature set without having to redo any sophisticated analog design in the baseband controller.

USB IC offering

ST-NXP Wireless' offering of USB ICs can address the requirements of a wide range of application areas:

	USB	Hi-Speed USB
Peripheral controllers	ISP1181B ISP1183	ISP1582 ISP1583
Host controllers	ISP1160/01	ISP1563 ISP1568A, ISP1
Hub controllers		ISP1520 ISP1521
Transceivers	ISP1302, ISP11 ISP111x	ISP150x ISP151x ISP170 ISP171x
OTG/dual-role	ISP1161A1 ISP1362	ISP1761, ISP176

All Hi-Speed USB devices are backward-compatible. That is, they can also operate in full-speed mode.

These devices are on the market today and widely available.