USB Technology Update
IDF Shenzhen – 2014

Jeff Ravencraft, USB-IF – President and COO
Rahman Ismael, USB-IF – USB-IF Compliance Committee chair
Agenda

• Delivering a Single Cable Solution
  • SuperSpeed USB
  • USB Power Delivery
  • USB Type-C Connector

• Enabling USB Technology Advancements
  • Media Agnostic USB Specification

• Summary
USB-IF: Delivering a Single Cable Solution

Delivers up to 10 Gbps – supporting all of your data transfers, including audio/video for 4K displays

Delivers up to 100W – power all of your devices, including desktops and workstations with USB

One robust and slim connector for all of your devices with reversible plug orientation
SuperSpeed USB

- A *single source* for audio/video that can drive Ultra-HD (4K) displays and *deliver data and power simultaneously*, all over a single USB cable/port for every conceivable platform and mobile device

- End-to-end solutions available to consumers worldwide
  - 1,200+ certified products

- SuperSpeed USB delivers excellent performance with *speeds up to 10 Gbps*

- SuperSpeed USB works with all USB products
SuperSpeed USB 10 Gbps

• Delivers 10 Gbps USB data rate
  • 2x improvement over current SuperSpeed USB 5 Gbps data rate

• Improved data encoding for more efficient data transfer leading to higher through-put and improved I/O power efficiency

• Compatible with USB 3.0 software stacks and device protocols

• Works with both existing 5 Gbps and new 10 Gbps USB 3.0 hubs and devices, as well as USB 2.0 products
Broad international adoption of USB Battery Charging standard for mobile devices

- China, Europe drove standardization as a means to increase charger reuse and reduce electronic waste

Agreement reached on Micro-USB connector and the standard for the common mobile charger

CENELEC and the USB Implementers Forum reach agreement on memorandum of understanding

BRUSSELS – March 1, 2011 – A Memorandum of Understanding (MoU) was signed today between the USB-IF and CENELEC, the European Committee for Electrotechnical Standardization.
USB Power Delivery: Taking a Great Idea and Making it Even Better

Extend ease of use, reduce clutter, reduce even more waste

Audio / Video
Data
Power

USB 2.0
USB 3.0
USB BC 1.2

2.5W 4.5W 7.5W 65W 100W

SSD HDD
Single Cable Solution: The Need for a New Connector

- Existing USB Standard-A host connector is too large for emerging computing platform needs
  - Ultra-thin, convertible, detachable and tablet form factors are in need of thinner connector solutions
- Existing USB 3.0 Micro-AB doesn’t meet robustness and usability requirements beyond phone usages
- Existing USB connector types are difficult to use
  - User confusion over plug orientation, cable direction
  - Difficult to plug in under blind-mating situations
- The USB cable/connector ecosystem is moving forward to address the emerging form-factor/ID design trends with the new USB Type-C Connector
  - Extending and advancing USB as the peripheral connection of choice
USB Type-C Connector
Key Aspects

• **Entirely new design**
  ✓ Tailored for emerging product designs
  ✓ Robust enough for laptops and tablets; slim enough for mobile phones

• **New smaller size**
  ✓ Similar to size of USB 2.0 Micro-B
  ✓ Listen for the “click”

• **Usability enhancements**
  ✓ Reversible plug orientation & cable direction

• **Supports scalable power charging**

• **Future Scalability**
  ✓ Designed to establish future USB performance needs

*Type-C Connector Specification anticipated to be published in July 2014*

Artist renderings courtesy of Foxconn, final design subject to change
USB Type-C Connector

Additional Characteristics

Mechanical specs (preliminary):

- Receptacle opening: ~8.3mm x ~2.5mm
- Durability: 10,000 cycles
- Improved EMI and RFI mitigation features
- Power delivery capacity: 3A for standard cables, 5A for connectors

Functional capabilities:

- USB 2.0: LS/FS/HS
- USB 3.1: Gen1 (5Gbps)/Gen2 (10Gbps)
- Enhanced power delivery options
  - Extended 5V current ranges plus USB PD
- Docking support
  - USB PD-based interface configuration option

Artist renderings courtesy of Foxconn, final design subject to change
Media Agnostic (MA) USB

- Allows wireless devices and docking stations to communicate using USB protocol, without a physical USB connection
  - MA-USB delivers wireless gigabit transfer rates while leveraging existing USB infrastructure

- MA-USB specification published March 2014
  - WiGig Serial Extension (WSE) v1.2 specification from the Wi-Fi Alliance® provides the initial foundation

- Multiple media types supported:
  - WiGig 60Ghz
  - Wi-Fi 2.4 and 5Ghz
  - WiMedia UWB radios operating between 3.1 -10.6Ghz
  - Other existing or new media types that want to use USB as the transport protocol

- Compliant with SuperSpeed USB (USB 3.1) and Hi-Speed USB (USB 2.0)
MA-USB Architecture

- Maintains the same connection model and topology as wired USB
  - Tree topology rooted in a single host
  - Host, hub and (native) device as three core architectural elements

- Scalable architecture
  - No dependency on USB bus-level timings
  - Operating System (OS) USB Request Blocks (URBs) are transported using efficient packetization
    - Packets can be as large as 64 KB, limited by network MTU in practice

- Defined as a protocol adaptation layer (PAL) operating over OSI model data link, network or transport-layer protocols
  - Built-in addressing scheme, no need to re-invent medium access rules

(a) Example of a MA USB dual-role element with concurrent operation as a MA USB host and a MA USB device over a common IEEE 802.11 radio
• USB is the most successful interface in the history of PC
• Device charging over USB has become a major consumer feature
• USB installed base is 10+ billion units and growing at 4+ billion units a year
• Shipments will reach roughly 5.1 billion devices by 2018, an increase of over 19% from 2012

Source: SNL Kagan Multimedia Research Group, February 2014
Summary

- USB-IF is delivering a Single Cable Solution
  - SuperSpeed USB delivers speeds up to 10 Gbps, providing support for audio/video that can drive Ultra-HD (4K) displays
  - USB Power Delivery can deliver up to 100W of power; use one USB cable to power all of your devices from mobile phones to laptops and workstations
  - USB Type-C connector is being developed to enable thinner and sleeker product designs, enhance usability and provide a growth path for performance enhancements for future versions of USB
- USB technology advancements support a robust USB ecosystem
  - MA-USB specification delivers wireless gigabit transfer rates while leveraging existing USB infrastructure

Infinite Possibilities!
Exhibiting Member Companies
IDF Shenzhen 2014

- Agilent Technologies
- ASMedia Technology
- Genesys Logic, Inc.
- ROHM Co. Ltd.
- VIA Labs
Questions?

• Press kit available at:
  • [www.usb.org/press/presskit](http://www.usb.org/press/presskit)

• Follow-up:
  • Liz Nardozza
    press@usb.org
    +1 (512) 322-5749
Back-Up
Power Delivery Specification

- Published July 2012
- **Product enabling/development underway**
- Enables high voltage and current in order to deliver power up to 100W
- Compatible with existing cables and connectors
- Enables voltage and current values to be negotiated over the USB power pins
- Switchable source of power delivery without changing cable direction

SSIC Specification

- Published May 2012
- **Product enabling/development underway**
- Defines chip-to-chip USB-based interconnect optimized for mobile device internal use
- Spec will combine MIPI’s M-PHY high bandwidth and low power with the performance enhancements of SuperSpeed USB
USB Specification Developments

- **Audio/Video Class Specification**
  - Published December 2011
  - Supports transfer of A/V data over USB for smartphones, cameras, webcams, large HD displays & TVs
  - Enables manufacturers to develop single-cable devices, providing A/V, data and power over a single USB cable
  - Provides consumers with a solution that supplies data transfer, A/V capabilities power, mass storage and more

- **Mobile Broadband Interface Model Specification**
  - Supports multiple IP connections per a single USB interface
  - Enables flexible, efficient, low-cost, low-power implementations
  - Minimizes overhead, data transfer efficiency by sending raw IP frames, eliminating need for Ethernet headers
Source and Sink capabilities within a given product are not required to be the same.
USB SuperSpeed Inter-Chip (SSIC)

- **Physical Layer:**
  - Replace the SuperSpeed USB PHY with a MIPI M-PHY℠

- **PHY Adapter (PA):**
  - M-PHY Control and Management

- **USB Link Layer:**
  - LTSSM changes for M-PHY

- **USB Protocol and above:**
  - No changes
  - Existing USB SW stack preserved