



# SuperSpeed USB Developers Conference

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# Wireless USB 1.1 Architecture Overview

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# Agenda



- **Wireless USB Current Status**
- **Wireless USB Additions/Modifications**
  - Security
  - WiMedia Convergence
  - Protocol Enhancements
  - Power Efficiency Improvements
  - Wire Adapter Protocol Improvements
  - DRD Enhancements
- **Association and Usability Update**
- **WiMedia UWB Upper Band Support**



# Wireless USB Certifications

- Total Wireless USB Certifications\*: 132

Type of Device	Number
Certified systems	49
Certified devices	12
HWA	15
HWA Silicon	4
DWA	21
DWA Silicon	5
Certified systems silicon	4
IP Building Blocks	4
Wireless Peripheral Silicon	13
System Add-in host adapter	5

\* Data as of November, 2008



# Wireless USB: Next Steps

## Current Solutions

- HWA (Host Wireless Adapter) Host
  - USB interface to PC
  - Embedded and dongle form factors
- DWA (Device Wireless Adapter)
  - Often found in a hub form factor



## Solutions 2009

- WHCI (Wireless Host Controller Interface) Native Host
  - PCIe interface to PC
  - Embedded in desktops and notebooks
- Native Device
  - Cameras, Printers, Media Players, Etc.



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- Update Security Chapter
  - Incorporate the latest errata
  - Align text with the currently supported association models and connection methods
- Explore additional requests in unauthenticated state
  - Provision to get bitmap image/device class before authentication using special descriptors
  - Usability WG discussions might lead to additional requests
- No new encryption schemes



# WiMedia Convergence

- **Directed Beaconsing Devices**
  - Remove support for this feature from the specification
- **Non-Beaconsing Devices**
  - Remove support for this feature from the specification
- **Host Channel Reservation Policy**
  - Current policy supports 2 hosts working on the same channel
- **Looking at techniques to this to 4 hosts/channel**
  - Restrict the number of unsafe MAS that a host can reserve
  - Define Safe for Bulk and Safe for Isoch reservations

# WiMedia Convergence (cont.)



- Clean up Self-Beaconing Devices
  - Remove
    - DN\_MASAvailChange
    - GetStatus(DRP Availability)
    - SetWUSBData(DRPIE Info)
    - SetFeature(TX DRPIE)
  - Define a host's private reservation as a Multicast reservation
  - Define a WiMedia compliant device connection procedure
  - Define a method of associating a Wireless USB device with its beacon
    - Define a New IE
    - Requires unique EUI-48 for devices
  - Describing host support for 1.0 SBD's
    - Renamed "Assisted Beaconing Devices"

# Protocol Enhancements



- Ability to inform the host of the number of packets an endpoint can send
- Bulk Transfer Updates
  - Transmit 3 blank  $W_{DT}$ CTAs at the end of a transfer
- Control Transfer Updates
  - Add guidelines for device vendors on handling a retry or 2nd control transfer for control transfers without a data stage.
- Isochronous Transfer Updates
  - Removed False acknowledgement requirement
- Interrupt Transfer Updates
  - Added a way to declare an endpoint as periodic or notification
- Addition of Task IDs

# Power Efficiency Improvements Host Side



- Currently devices have to poll to detect when the host is awake
  - Expand Channel Stop IE
    - Include precise wakeup time
    - Indicate sleep cycle
    - Add a preferred channel list
- Use Hibernation Anchor
  - Save even more power during channel stop
- Improve power efficiency on resume
- Locating a Sleeping Host
  - Device may miss a host because of hosts transmit infrequently

# Power Efficiency Improvements Device Side



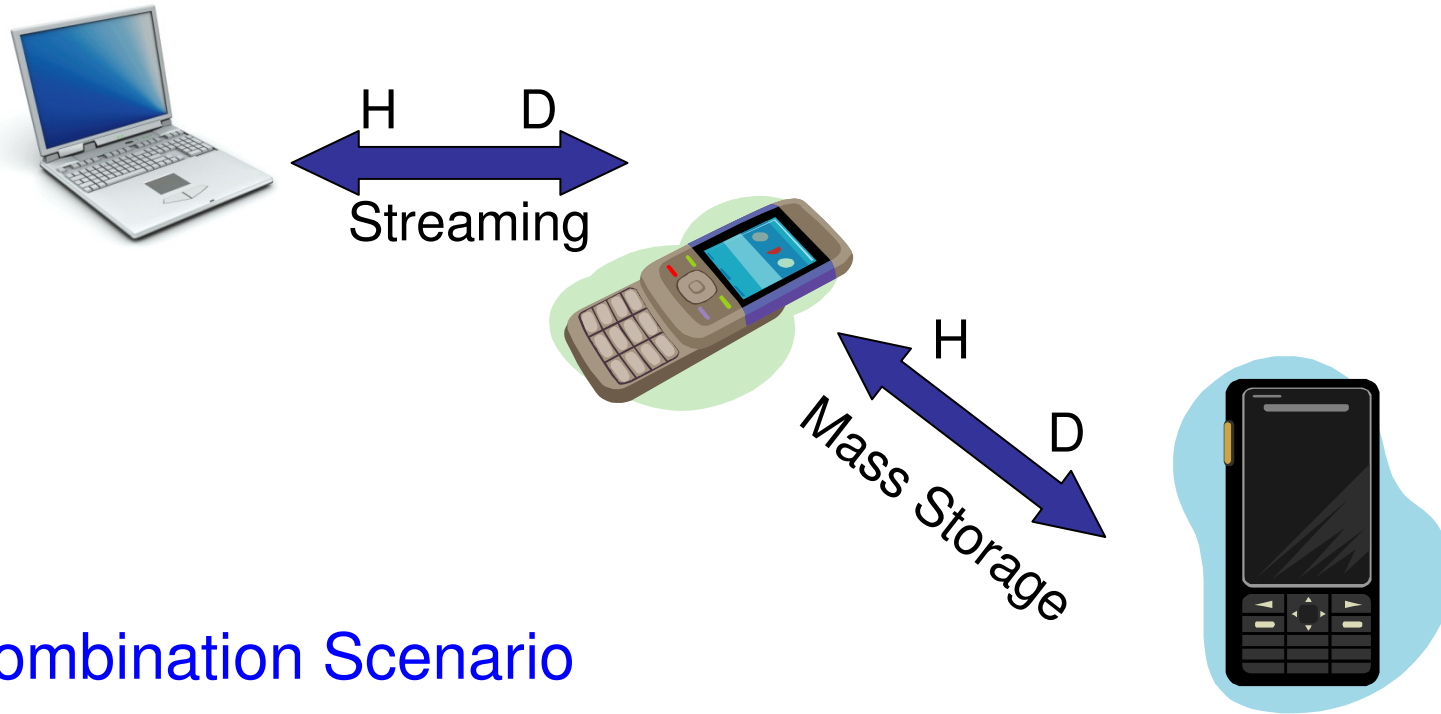
- Host Initiated Sleep
  - New IE provides devices with a specific duration of sleep
  - Devices accept or reject using notifications
- Remote Wakeup Changes
  - Allow hosts to optionally accept unencrypted wake notifications
- DNTS Scheduling
  - Scanning Aperture for DNTS being non-deterministic results in power wastage
  - Include Host Information IE and DNTS Slots in the first WUSB Reserved MAS in Zone 1 and Zone 15
- Low Power Notification and Power Info Probe
  - Ability to notify host of a low power condition
  - Add capability for a Host to query a device for extensive power/battery information

# WA Protocol Improvements



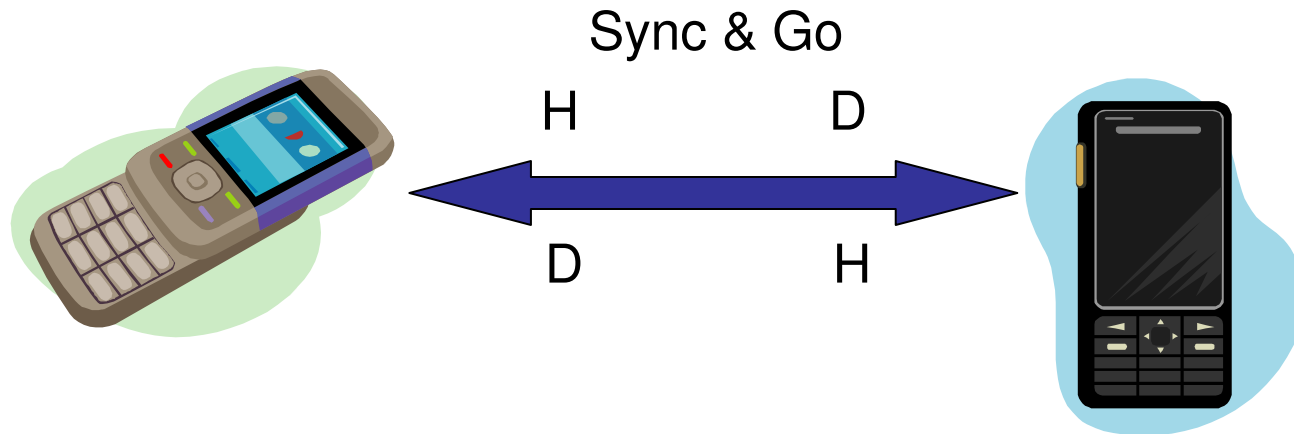
- DWA expected to continue to be an important part of eco-system
  - Desire to wirelessly extend USB bus to wired USB devices
  - WUSB attached laptop docking station application
  - Devices accept or reject using notifications
- Wire Adapter implementations have a relatively low throughput compared to PHY data rate
  - Streamline Wire Adapter Protocol
  - Improve data transfer pipelining
- Host drivers discovers and enables enhanced capabilities
  - Insure path for backward compatibility
  - Enable implementations that support both 1.0 and 1.1 capability
  - Insure path for future devices that are only 1.1 capable

# DRD Enhancements Usage Scenario 1



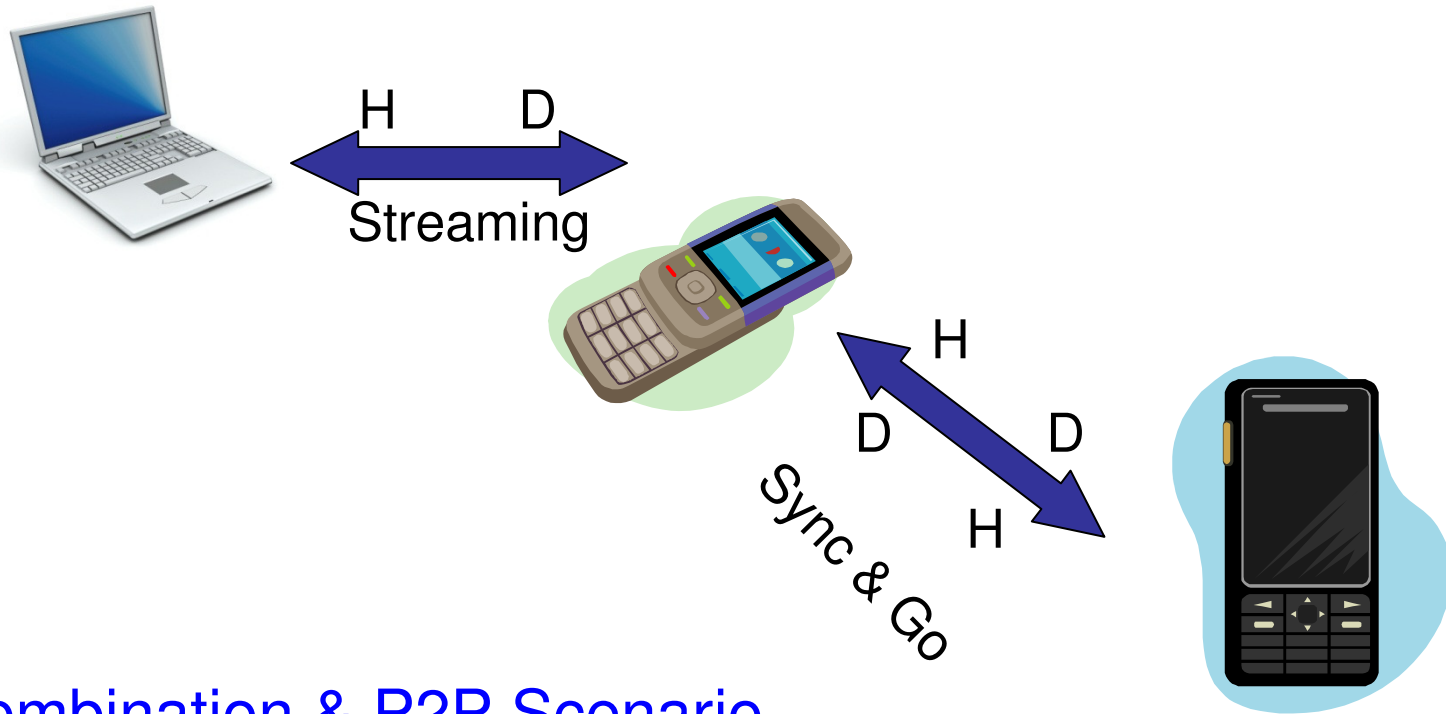
Combination Scenario

# DRD Enhancements Usage Scenario 2



P2P Scenario

# DRD Enhancements Usage Scenario 3



Combination & P2P Scenario

# DRD Enhancements

## Focus points



- Device <->Host bi-directional connection always established
  - Even though most usage scenarios require only one to be the host
- Role decision
  - Which device is the Host is not clear (Possible Role Collision)
  - Having the User decide which device should be the host is undesirable
  - Preferably done at association time
- New association model
  - Cable Based Association is not suited as it requires a cable
  - Numeric association may not suit DRD Devices with no display
  - NFC may be ideal for association
- Association assumes long term host-device relationship
  - P2P DRD connections should always be one time connections



# Association and Usability Update

- Explore additional Association Methods
  - NFC
  - Long PIN association
- Support for multiple languages
  - Currently only English supported
- Connect to me
  - Devices are told to connect to a particular host
  - Identify the host before association
  - Explore a device handoff mechanism
- Friendly names
  - Currently Host/Device friendly names are available only after the association
  - Add capability to advertise the host/device friendly name before association
- Add the ability to identify the capabilities of a device before connection

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# Wimedia UWB Upper Band Support



- Use only BG1, BG6/BG3
- Host: BG1 Mandatory, BG6/BG3 Mandatory
  - Compliance waiver for BG1-only support for next 12 months
- Embedded Host: BG1 Optional, BG6/BG3 Mandatory
  - Compliance waiver for BG1-only support for next 18 months
- Device: BG1 Option, BG6/BG3 Mandatory
  - HB-only device must support Cable Association
  - Compliance waiver for BG1-only support for next 18 months

# Incompatibility Issues Solutions



- HB-only device tries to associate with system with LB-only host
  - Display message to the user
- HB-only device tries to associate with system with LB and HB support host and LB-only device already attached
  - Display message to the user suggesting to choose one of the band groups
  - Association Assist Application shows LB and HB group with Device description(s) for the user to choose
  - User can change operating band groups anytime
- Define a new Common Band Selection Logic
  - Best available channel
  - Keep current channel
  - Never change channel

# Common Band Selection Logic





# Summary

- Emerging Native Host and Devices in 2008
- Wireless USB Supports Great “Use Cases”
- Wireless USB Delivers Excellent Performance
- Wireless USB 1.1
  - Improved power efficiency
  - New association model
  - WiMedia UWB Upper band support

***Wireless USB 1.1 specification est. completed 1H'09***