Wireless USB

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- WUSB features
- Ultra -wide Band
- WUSB Architecture
- Transitional WUSB Hardware
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- Conclusion
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Introduction

- Created by the Wireless USB Promoter Group
- Also known as Certified Wireless USB or WUSB
- Based on the Ultra- Wide Band (UWB)
- High-bandwidth (>500 MHz)
- High Speed 480 Mbit/s- up to 3 meters 110 Mbit/s- up to 10 meters
- Frequency range 3.1 to 10.6 GHz
- Connects up to 127 devices
- Used in game controllers , printers , scanners , digital cameras, MP3 players, hard disks and flash drives

Wired USB

- Overview
  - Plug/Play standard for peripheral devices
  - Provides hot swapping
  - Standardized by the USB Implementers Forum
- Technical Details
  - Host/Slave Connection
    - PC (host) manages all transfers; peripherals (slave) just responds
    - Supports 127 slaves per host

    Data Rates
      - Low Speed: 1.5 Mbps (Keyboards, mice, etc.)
      - Full Speed: 12 Mbps (USB1.1 max speed)
      - Hi-Speed: 480 Mbps (USB2.0 max speed)
      - Super-Speed: 5 Gbps(USB3.0 max speed)

Reasons For Wireless USB

- Wired Issues
  - Wires are restrictive
  - Multiple wires can be a hassle
  - Wires slower than wireless solutions
- Inadequacy of current wireless solutions
  - Bluetooth
    - Bandwidth of 3 Mbps not enough for higher demand applications (Video, HDTV, Monitor)
  - WiFi
    - Expensive
    - High power consumption

Wireless USB features

- Backward compatibility
- High performance
- Simple, low-cost implementation
- An easy migration path
- Host-to-device architecture
- Power management
- Logo Certification
- Ease-of-use

Wireless USB Vision

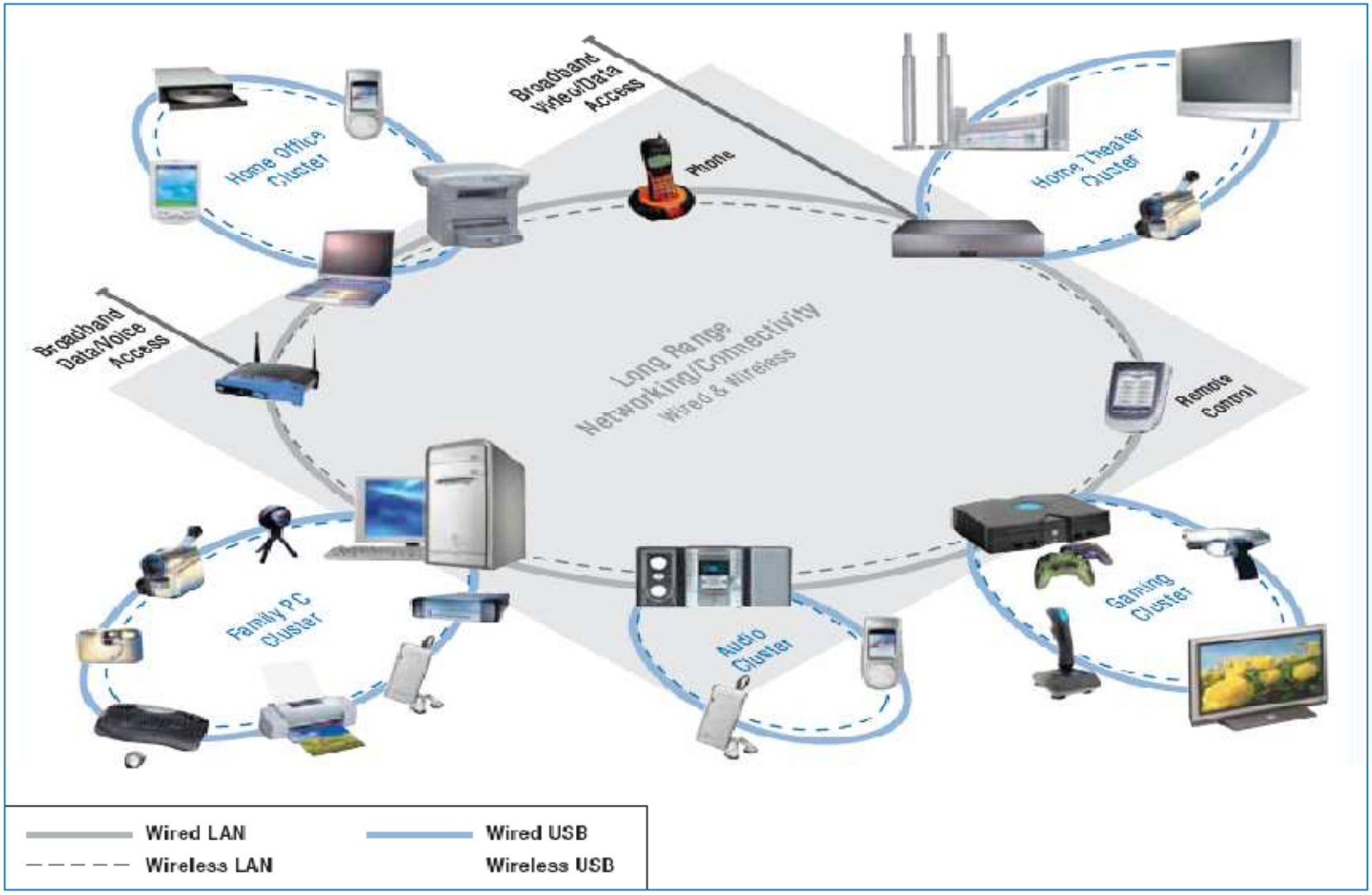
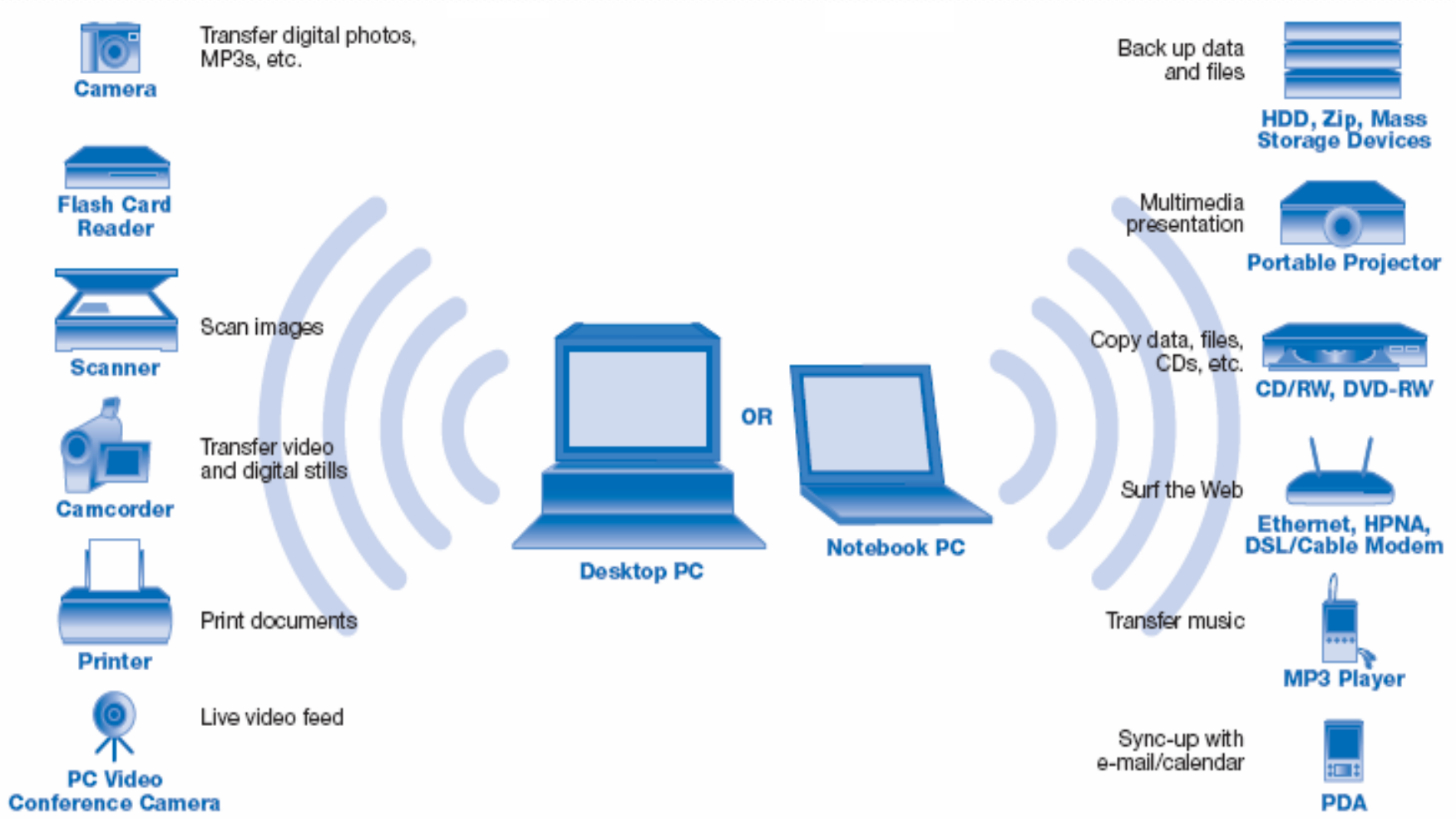


Figure 1. Home usage scenarios that could be "unwired" with Wireless USB.

Wireless USB Vision

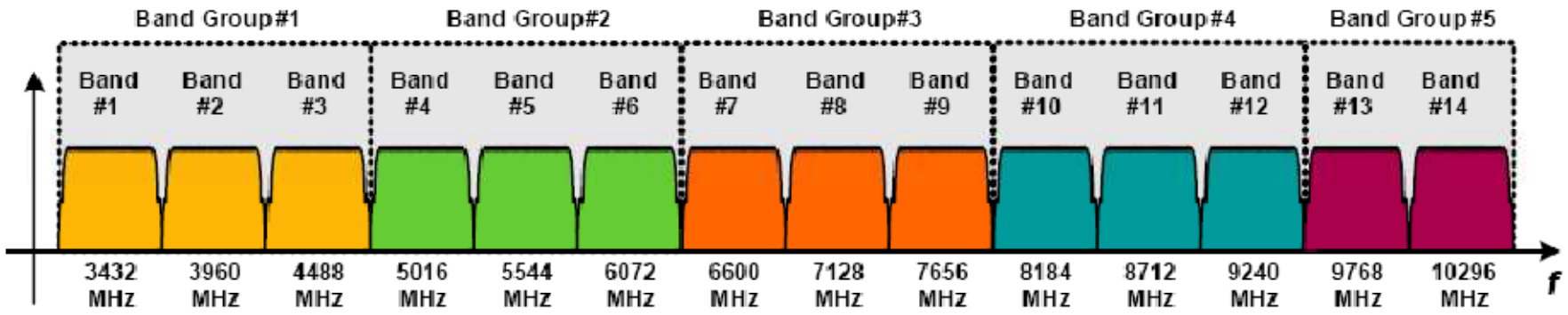


Ultra-wide Band

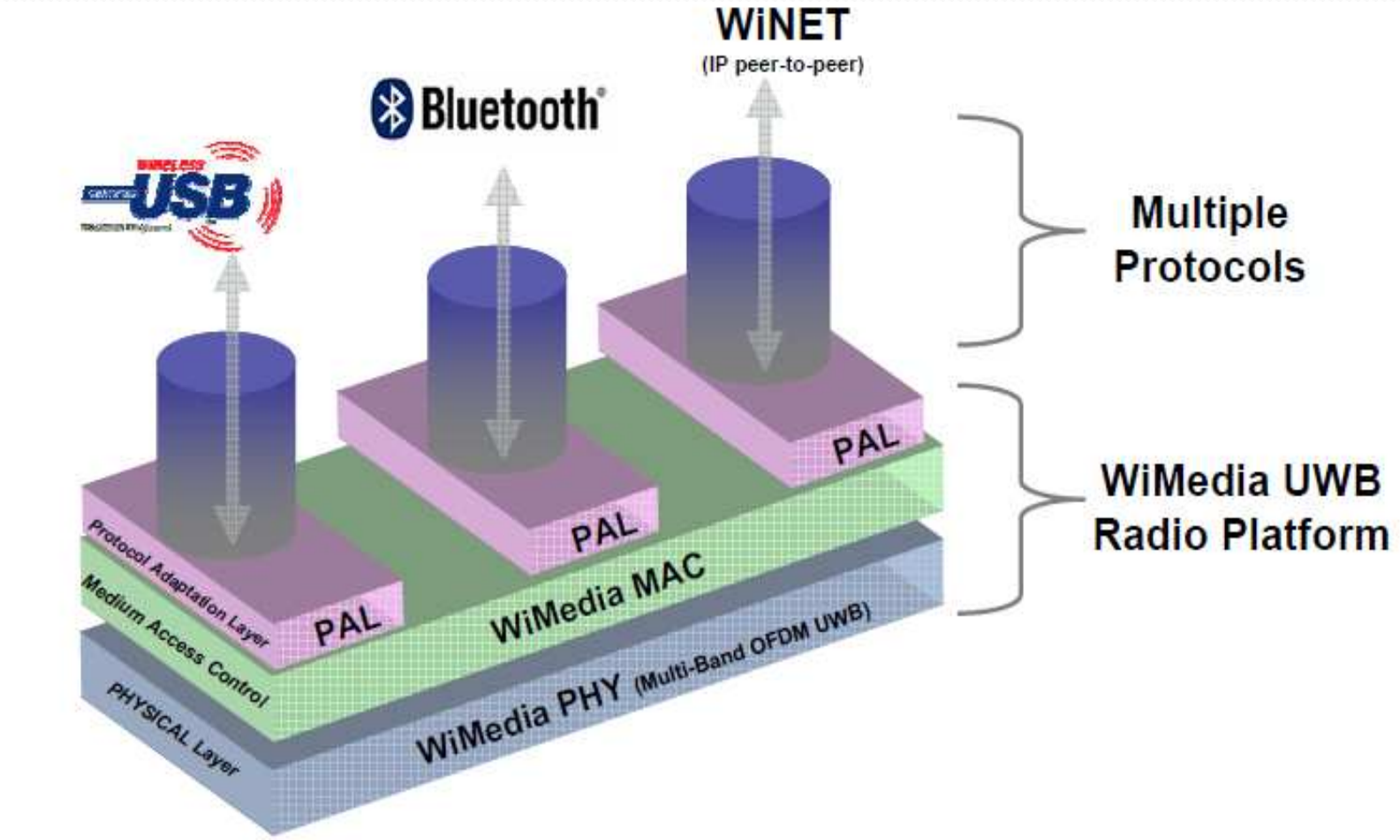
- Developed by WiMedia Alliance
- Also known as UWB, ultra-wide band, ultra band
- Pulse-based system Uses OFDM
- Determines time of flight
- Speeds over 1 Gbps
- Range upto 480 Mbps at 3 m; 110 Mbps at 10 m
- Frequency: 3.1 GHz to 10.6 GHz
- Protection against multi-path / interference
- Bandwidth regulation by FCC

Ultra-wide Band Spectrum

- Frequency Range 3 to 10 GHz
- Divided into 14 bands; 5 groups
- Each band group allows up to 7 channels
- Each band is 528 MHz wide
- Band Groups 1 & 2: Longer range apps
- Bands Groups 3 & 4: Shorter range apps



WUSB Architecture

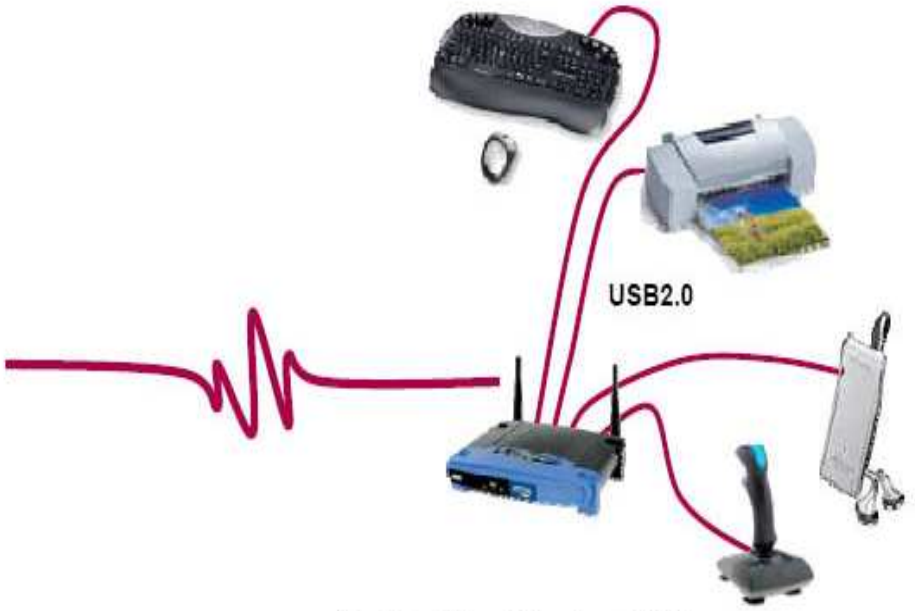


Transitional WUSB Hardware

- Host Wired Adapters (HWA)
  - Plugs into the wired USB host port of a PC
  - Adds WUSB Host functionality to an existing PC
  - Not for host to host communication
  - Connect to the Device wire adapters wirelessly
  - PCI based adapter card

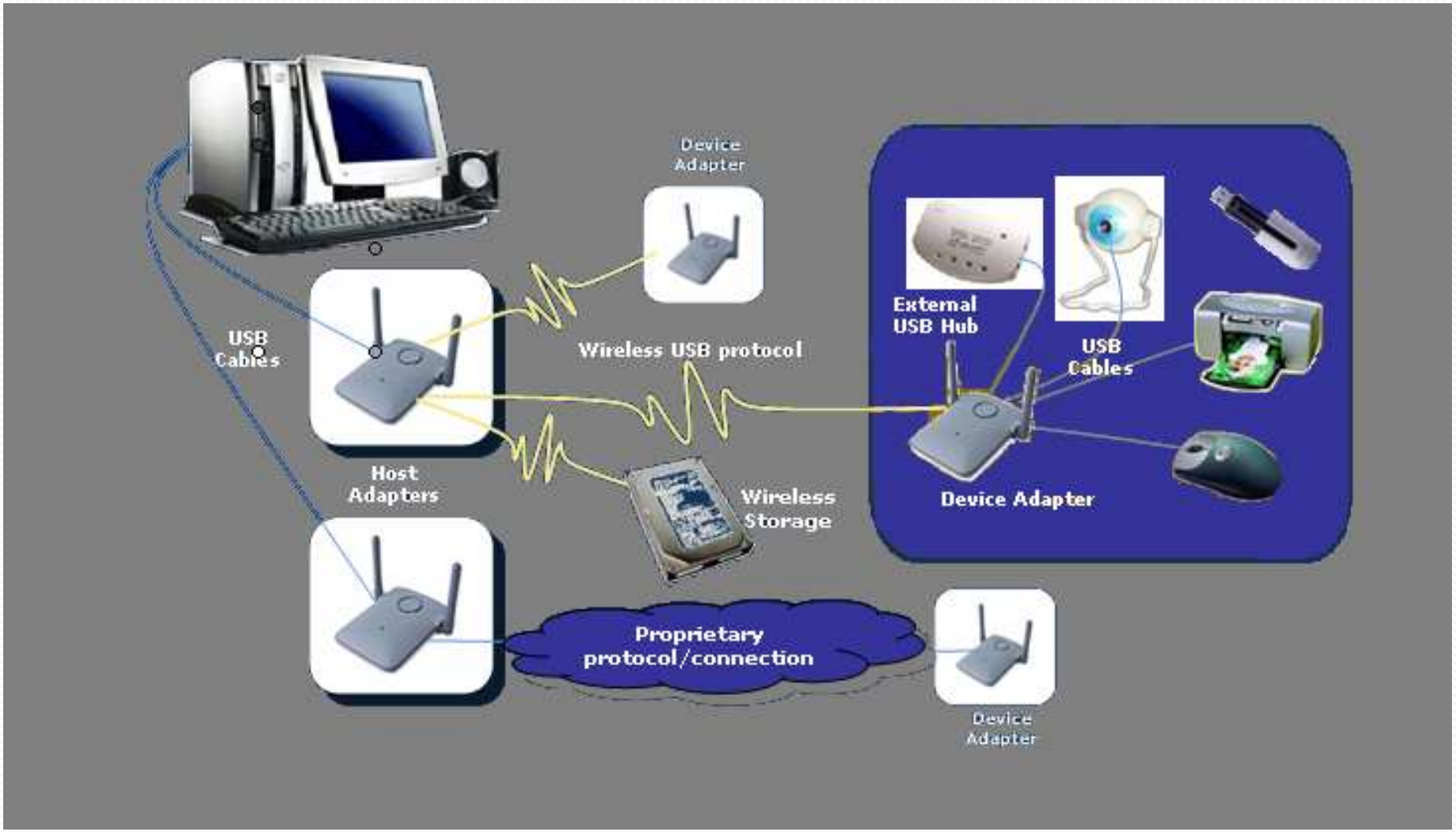
Transitional WUSB Hardware

- Device Wired Adapters (DWA)
  - Also known as USB Hub
  - Plugs into USB port of a peripheral (printers, scanners,cameras,etc.)
  - Adds wireless USB Peripheral functionality to an existing device
  - May have several device ports for making multiple peripherals wireless



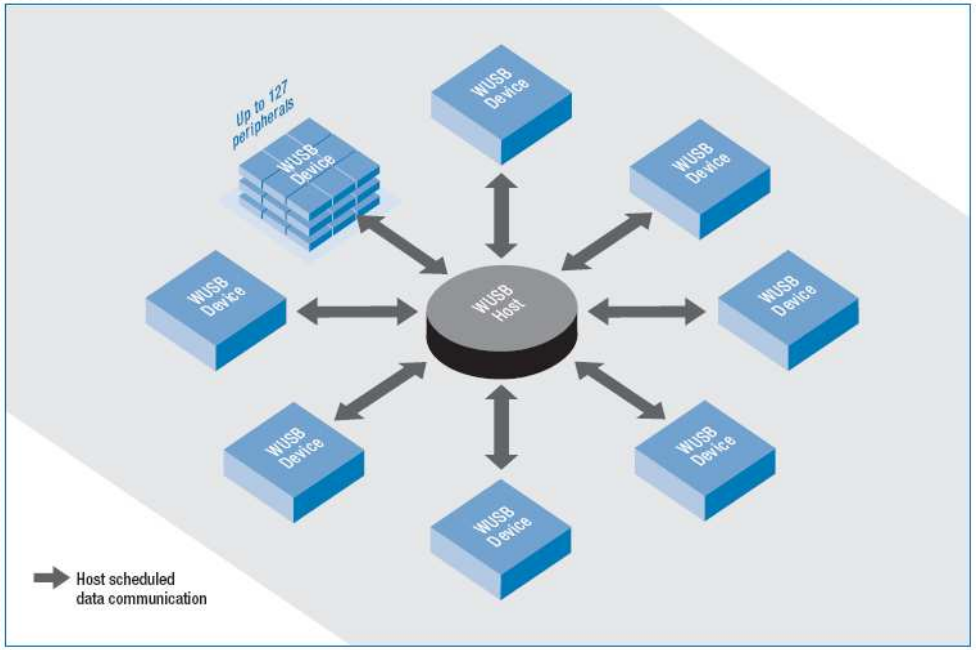
Device Wire Adapter: DWA

WUSB Transmission

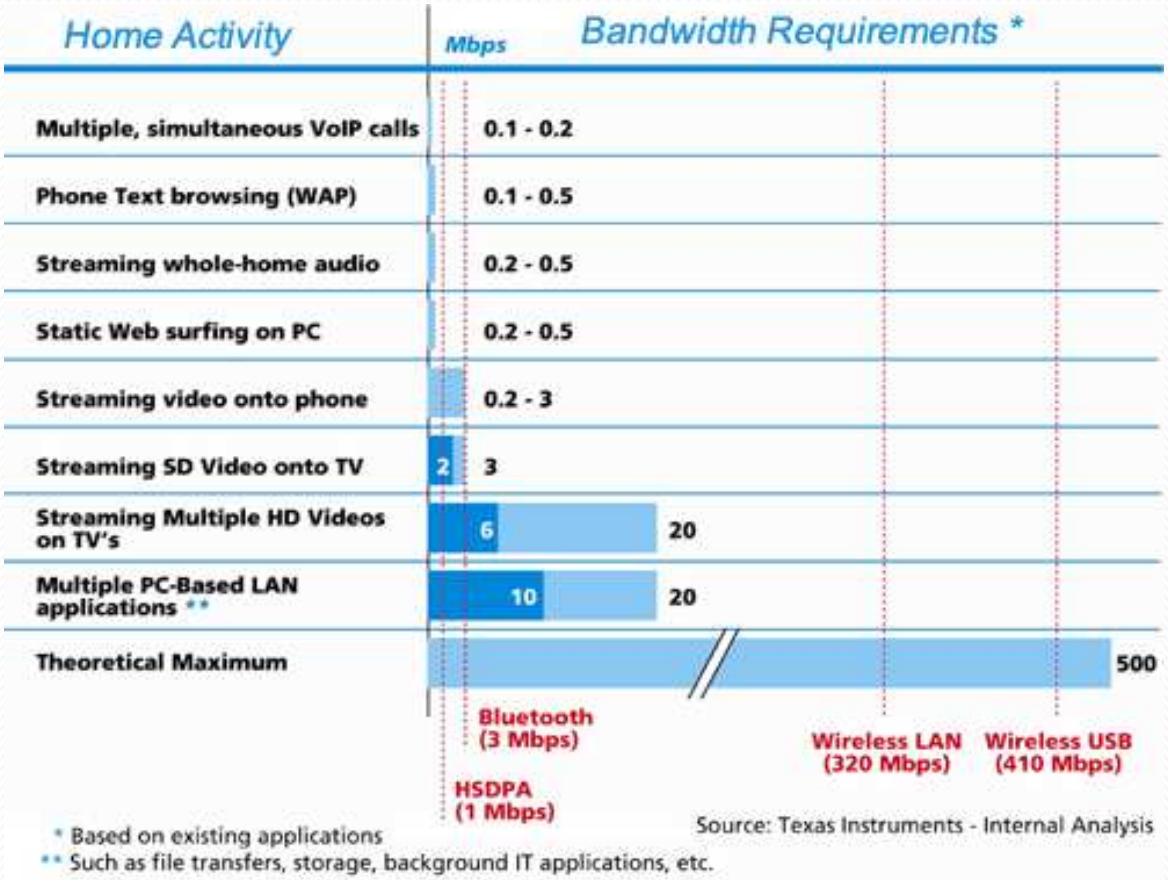


Wireless USB Topology

- Hub & Spoke model
- Host/Slave Connection
  - Similar to wired USB (127 devices; host is PC)
  - Each host forms a cluster
  - Clusters can coexist with minimum interference
- Point to point connection between host & slave



Data Rate Comparisons



Comparison of Technologies

Specification	Wireless USB	Bluetooth 4.0 (proposed)	IEEE 802.11n	Bluetooth 2.1
Frequency band	3.1 GHz–10.6 GHz	UWB (not decided)	2.4 GHz/5 GHz	2.4 GHz
Bandwidth	480 Mbit/s / 110 Mbit/s	53 - 480 Mbit/s	Max. 600 Mbit/s	Max. 3 Mbit/s
Distance	3 m / 10 m	unknown distance	100 m	1 m–100 m, depending on output
Modulation	OFDM	OFDM	DSSS, DBPSK, DQPSK, CCK, OFDM	GFSK

Wireless USB Issues/Problems

- Interference Issues
  - Potential conflict to devices on same frequencies
  - “Detect and Avoid”
    - Wisair’s solution to detect other frequencies
    - Switches to frequencies not being used
  - Conflict issues are more of a concern for wireless USB devices being overpowered
- Competing Standards
  - Cable-Free USB (Free scale)
  - USB-Implementers Forum (Intel, HP, Microsoft)

WUSB Applications

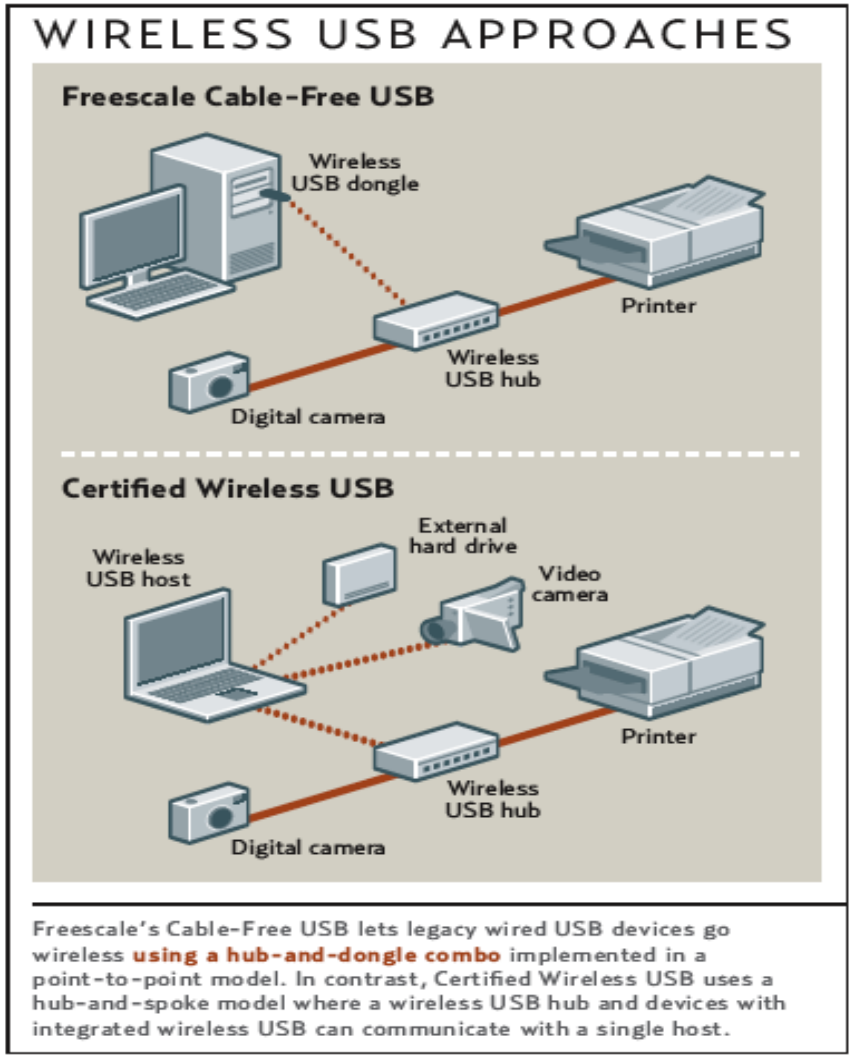
Typical Home Applications

- PCs and peripherals
- PDAs
- External storage devices (HDDs)
- HDTVs and STBs
- Game consoles
- Digital cameras
- Digital camcorders
- DVD players
- MP3 players
- CD players
- Wireless speakers

Typical Office Applications

- Laptop and notebooks computers
- Printers
- Scanners
- Projectors
- Mass storages devices (HDDs)
- PDAs
- Cell phones

Product Comparison



Wireless USB Implementations

- Belkin Cable Free Hub
  - Released Dec, 2006
  - Dongle attaches to PC
  - Retail price of $199.00
  - Speeds up to 480 Mbps

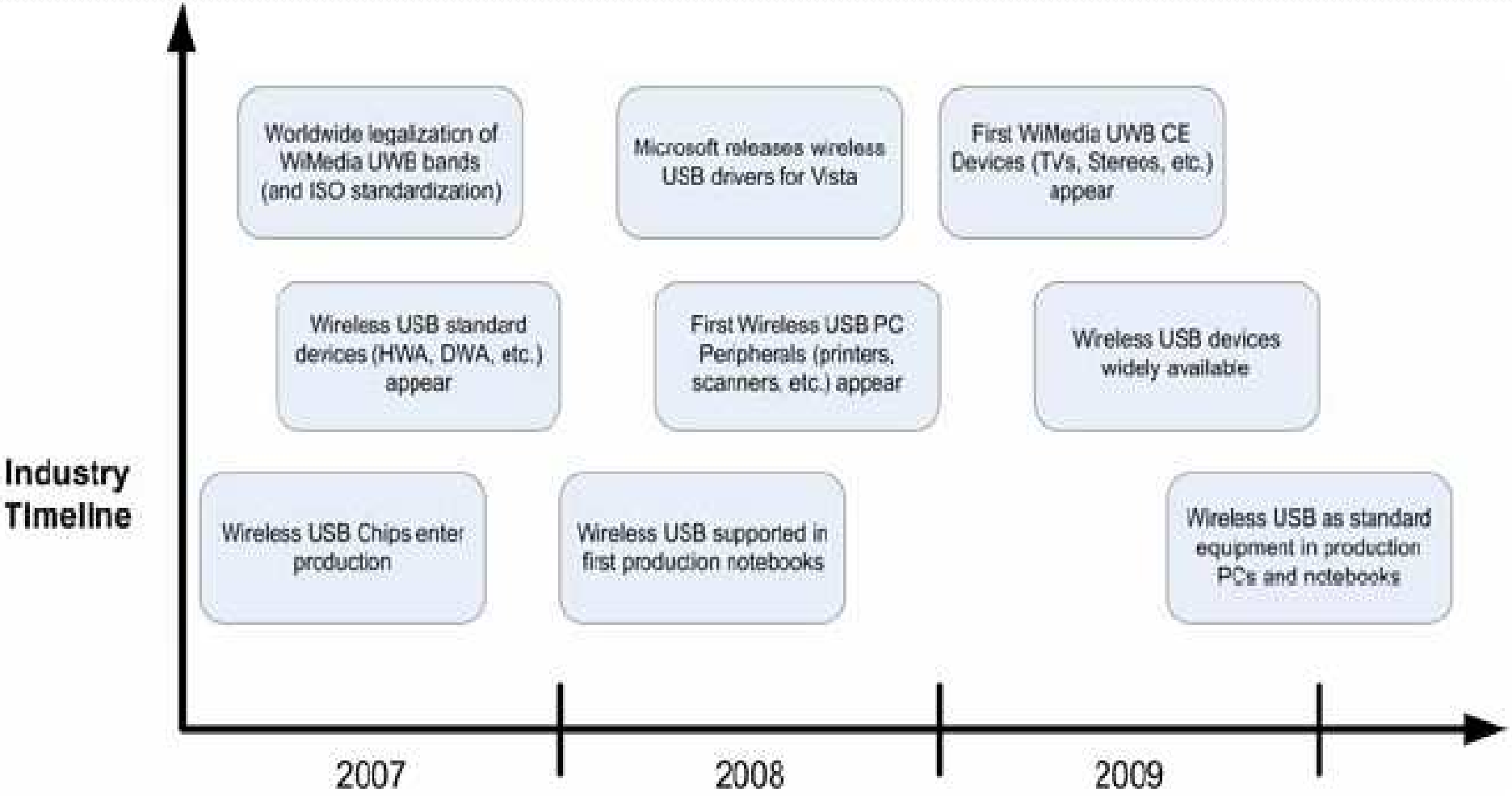
Wireless USB Implementations

- Seagate Wireless USB Hard Drive
  - 2.5 inches wide
  - Speeds up to 480 Mbps

Wireless USB Implementations

- GeFen HMDI Extender
  - Based on WiMedia Alliance specification
  - Retail price of $699.00
  - Range of 20 meters; data rates up to 480 Mbps
  - Frequency band: 3.1 - 4.8 GHz
  - Resolution support : 480i, 480p, 720p, and 1080i

Wireless USB Timeline



Conclusion

- An upcoming 1.1 specification will increase speed to 1 Gbit/s and working frequencies up to 6 GHz
- Appears well designed; good support
- Wireless USB standard replaces Bluetooth and Wi-Fi
- This will be followed by traditional PC peripherals, then later, consumer electronics
- Intel and fellow travelers will continue to drive the Wireless USB initiative into the marketplace
- Certified WUSB will be a serious alternative for wireless transmission in future.
- Next gen Wireless Personal Area Network (WPAN)

References

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THANK YOU.....

Questions??