Bluetooth & Beyond: Wireless Networks for Multimedia Applications

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Wireless Transfer Rates

Start

IEEE **802.15.3**

5 Pictures

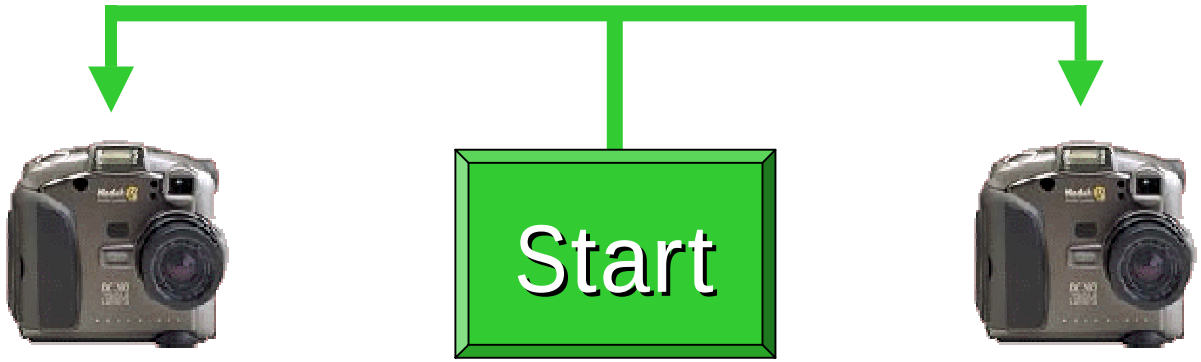
1 second

Bluetooth

5 Pictures

55 seconds

Wireless Transfer Rates



IEEE **802.15.3**

Bluetooth

… and Beyond

- Audience Participation Time:
  - Which would you pick for Vacation Kiosk access, Internet access, or personal printing?
  - Was this NOT painful for anyone?
  - Anyone want to sit through 64 pictures?

- The previous demo outlines one aspect of what lies beyond BT: Ad hoc Digital Image transactions in less than 15 seconds
  - ...or perception becomes “it’s hard to use”
  - ...and customers lose interest if it takes too long

… and Beyond

- The opportunities for Digital Multimedia are expanding beyond the current designs
  - Broadband in the home
  - Retail Kiosks
  - Digital TV distribution
  - Games and Toys
  - Rich Multimedia devices
  - (Concentrated low data volume devices)
- Need one radio capable of covering the wide range of consumer multimedia and asynchronous devices
  - Need a “Ground up” design vs patches and extensions
  - Need a fair and open process to build good results
  - Need enough features and capabilities to give it long life

… and Beyond

- Beyond that, many applications need these features at the SAME time:
  - High Speed (>20 Mbps)
  - *FAST* Joint Time
  - Robust Quality of Service - covering many service types and data types
  - Multiple Video Streams
  - Low Cost (BT range)
  - Ad hoc Network Formation (no PC or Ethernet required)
  - Short-range (~10 meters) and Small Networks
  - Low Power (and battery power management)
  - International Portability
  - Low Protocol Overhead and High Throughputs
  - Outdoor Usage

Some Wireless M/M alternatives

	802.15.3	802.11 g	802.11 a	Bluetooth 802.15.1	Bluetooth (future)
Band	2.4 GHz	2.4 GHz	5.8 GHz	2.4 GHz	2.4 GHz
Data Rate (Mbps)	≤55	TBD	54	1	10
Current Drain (mA)	≤80	≤350	≥350	≤80	≤80
Number of Video Channels	5	2	5	0	~1
Regulatory					
North America	15.249	Requires Rule Change	15.247	15.249	15.249
Europe	ETSI 300.328				
Japan	RCR-STD-T66 and RCR-STD-33A				
Japan			No Outdoor		
Relative Complexity	1.5X	~3X	4X	1X	TBD
Connect time (seconds)	<1	TBD	TBD	<5	TBD
QoS	New (note 1)	802.11e patched QoS		Limited	TBD
Security	Ad Hoc -Link & Data	WEP/TGi - Server Based		Limited	TBD

Note1: Modeled 3 video, 1 Internet, 3 phone, one CD audio streams at 33 Mbps mode

802.11 g is a faster version of the 11 Mbps 802 .11b

General note: BT throughputs do not handle 8 Mbps video w/o compression or reduced video quality.

Standards Are Required

IEEE 802.15.3 is chartered with creating a high rate WPAN standard that provides for low power, low cost, short range solutions targeted to consumer digital imaging and multimedia applications from the "ground up"

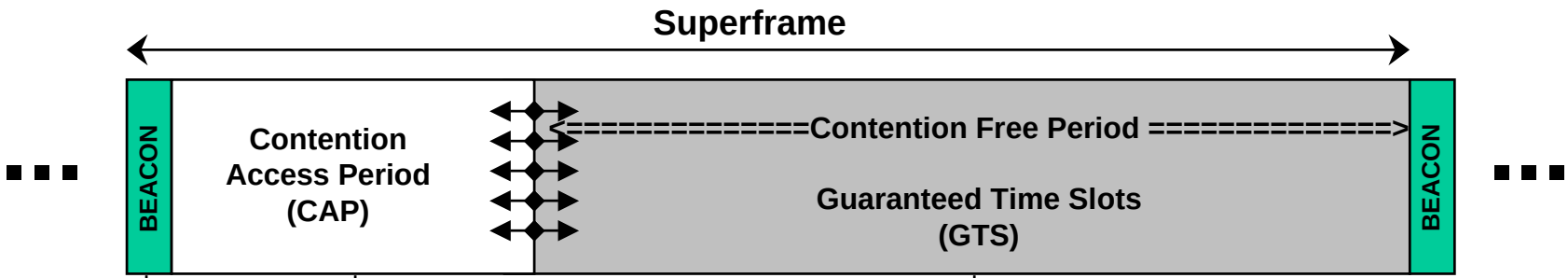








IEEE 802.15.3 MAC Layer Overview



WPAN
Parameters

- Small command/control functions
- Duration can change depending on Isochronous demands
- Pre-assigned start times allow Sleep modes

Isochronous data streams:

- Standard definition MPEG2, 4.5 Mbps
- High definition MPEG2, 19.2 Mbps
- MPEG1, 1.5 Mbps
- DVD, up to 11 Mbps
- CD Audio, 1.5 Mbps
- AC3 Dolby digital, 448 Kbps
- MP3 streaming audio, 128 Kbps

Asynchronous data transfers:

- Image files
- MP3 music files

(All multimegabyte files)

Contact Data for 802.15.3

- The Standard is Due in 1Quarter 2002.
- The Wireless Multimedia Alliance was Initiated July ‘01
- Website: http://www.ieee802.org/15/pub/TG3.html

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IEEE 802.15.3 PHY Layer Overview

Frequency Range	2.4-2.4835 GHz
Symbol Rate	11 Msymbols/s
Modulation Formats	BPSK, QPSK, 16,32,64-QAM/TCM
Coding	BPSK, QPSK: no coding 16,32,64-QAM: 8-State Trellis Code (TCM)
Data Rates	11 Mbps (BPSK) 22 Mbps (QPSK) 33 Mbps (16-QAM/TCM) 44 Mbps (32-QAM/TCM) 55 Mbps (64-QAM/TCM)
Base Modulation	QPSK
RF Bandwidth	15 MHz
Number of Channels	4
Transmit Power	0 to 8 dBm
Range	10 m