Wireless Home Networking Solutions

The Coming of Wireless Home Networking

- Home networking solutions demand
  - No new additional wires or phone jacks
  - Interoperability
    - Compliment phoneline-based home network solutions
  - Convenience
    - Simple to install
    - Easy-to-use
  - Economical: Low cost
  - Performance
    - Bandwidth to support common home networking applications
  - Secure
  - Big industry & consortium support (Bluetooth, IEEE, H2GF)

Why Go Wireless?

- Provide core home networking capabilities
  - Multiple PC users share Internet access, printers, files, drives & participate in multi-player games
  - Internet access - anywhere in & around the home
- Share wireless voice & data
- Review incoming messages
- Activate other home electronic systems by voice
- Needed in countries where phone lines cannot be used

Key Drivers: Portability & "No new wires"

Wireless Home Networking Solutions - Pros & Cons

- Pros
  - Flexibility & mobility
  - Broad geography support at specific frequency
  - Can compliment a wired network with bridging
- Cons
  - Relatively expensive
  - Distance limits & wall attenuation (150ft barrier)
  - Security must be addressed
  - Prone to narrowband interference

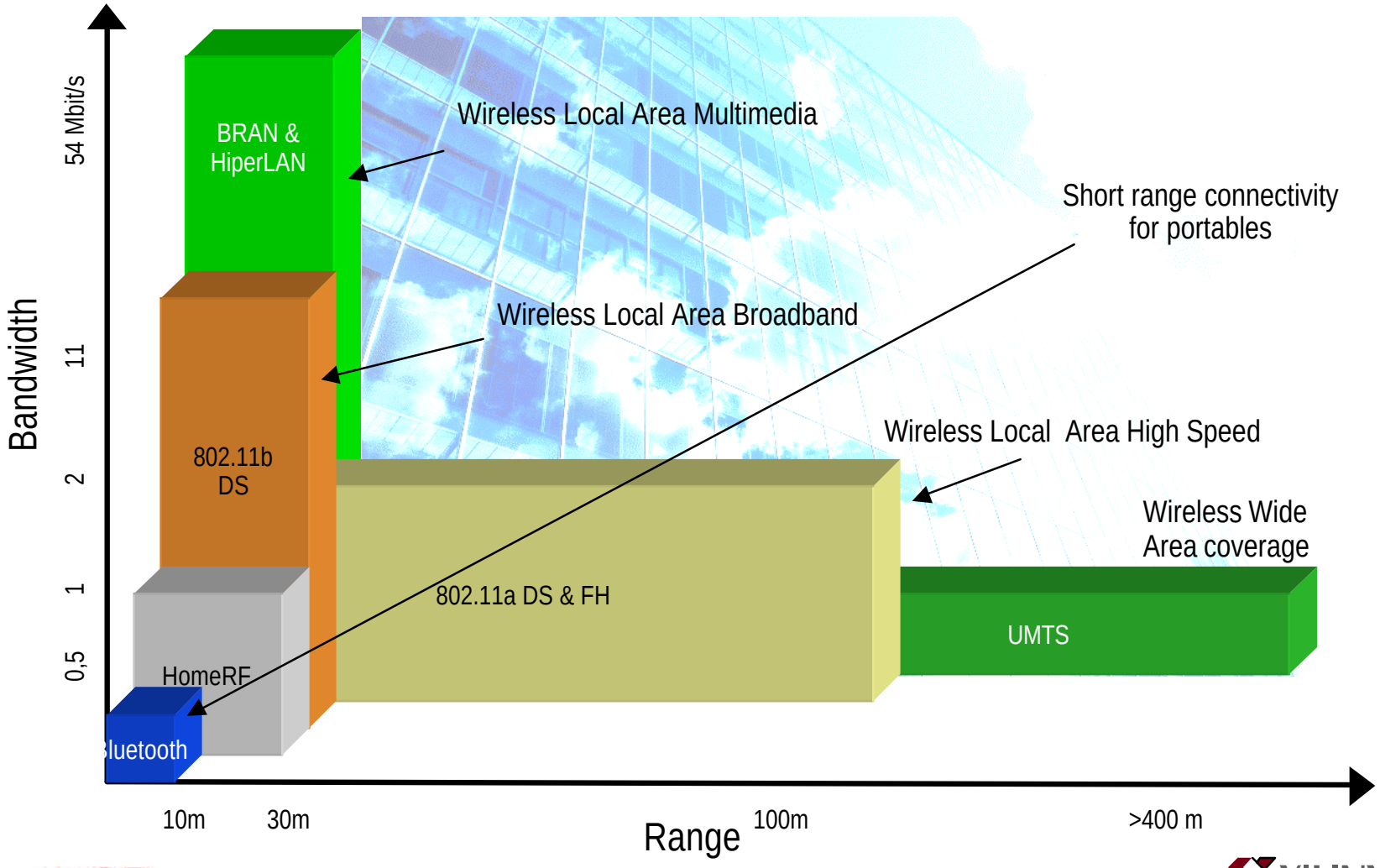
What is a Good Wireless HN Solution?

- Powerful
  - Similar capabilities of a typical office network
  - Simultaneous Internet access, file & drive sharing, printer sharing
- Simple
  - Simple Installation
  - Easy & intuitive use of network
- Economical

Wireless In-Home Networking Technologies

- Bluetooth & IEEE 802.15
  - Personal area network for data & voice communications
- HomeRF
  - Home based data & voice transmissions
- Wireless LAN
  - High-speed wireless connectivity augmenting wired networks
  - IEEE 802.11 (a & b variations)
    - a - 5GHz standard based on OFDM
    - b - 2.4GHz standard based on Ethernet
  - HiperLAN & HiperLAN2
    - 5GHz standard based on OFDM

Wireless Technologies in Home Networking



Bluetooth

- Short-range wireless data transmission technology - Personal Area Networks
  - Provide a simple module that will allow a wide variety of electronic devices to exchange data electronically over short ranges
- Low-cost, low power consumption methods of transmitting data without using wires
- By 2003, Bluetooth market could be worth $5 billion (SG Cowen)
- Major industry backing of Bluetooth SIG
  - Ericsson, Nokia, IBM, Intel, Toshiba, Motorola, Lucent, 3Com
  - 2000+ members today

Key Characteristics & Capabilities of Bluetooth

- Transmits sound and data
- Used worldwide (standard technology)
- Ad hoc connection
- Open environment, but prevents external reception
- Compact, & able to be installed in a variety of devices
- Extremely low power consumption
- Open industry standard
- Low cost

Wireless LANs

- Wireless Local Area Networks combines data connectivity with user mobility
  - Implemented as an extension to wired LAN
  - Minimizes the need for wired connections
- Radio or Infrared waves are used to transmit & receive data over the air
- Strong popularity in vertical markets for productivity gains
  - Health-care, retail, manufacturing, warehousing, academia
- Worldwide wireless LAN market
  - More than $2 billion revenues by year 2000 (Business Research Group)

Different Strokes for Different Folks

	Home Automation	Entertainment	Information	Personal Communications	Communication
Devices	- Home appliances - Security/safety systems - Utility meters	- TV sets - Set-top boxes - DVD Players - Game consoles - VCRs - MP3 Players	- PCs - Screen phones - Printers - Modems - Routers - Hubs - Scanners	- Mobile phones - Smart phones - Handheld - Laptop - Pagers	- Corded/Cordless telephones - Fax machines
Content	Information on home processes, house environment, remote diagnostics and technical support	Rich multimedia content, electronic programming guides, impulse purchases	Discrete information on external world, shopping for household goods	Information used on the move or requiring instant action: travel, weather, local services, stock market	Information on how to reach people in time and space
Usage Pattern	Communal	Communal	Individual Shared	Individual Personal	Communal or Individual Shared
Connection to Outside World	- Power line - POTS	- Cable - DBS	- Cable modem - ADSL - POTS, ISDN	- GSM - Infrared	- POTS
Practical Networking Technology	- CEBus - X-10 - LONWorks	- IEEE 1394 (Fire Wire)	- HomeRF - HomePNA - Ethernet	- Infrared - Bluetooth	- POTS - DECT - 900MHz, 2.4GHz

Home appliances have different content, functionality, application, and use different interconnection technologies

Wireless Home Networking Technology Comparison

- Wireless LAN, HomeRF & Bluetooth technologies vary in data rate, range, frequency & marketplace aimed for

Technology		Standards Body /Proponent	PHY Layer	Data Rate	Range (meters)	Frequency (GHz)	Technology Aimed For
Wireless LAN	IEEE 802.11a	IEEE	OFDM	40	TBD	5	Office Environments
	IEEE 802.11b	IEEE	DSSS	11	100	2.4	
	HiperLAN2	HiperLAN2 Global Forum	OFDM	54	150	5	
HomeRF	SWAP 1.1	HomeRF Working Group	FHSS	1.6	50	2.4	Home Space
	HomeRF (next generation)	HomeRF Working Group	FHSS	10	50	2.4	
Bluetooth	IEEE 802.15 (Bluetooth)	Bluetooth SIG	FHSS	1	10	2.4	Consumer, short-range wireless personal area network communication
	IEEE 802.15 (high-rate)	Bluetooth SIG	FHSS	2+	TBD	2.4/5	

DSSS- Direct Sequence Spread Spectrum, FHSS - Frequency Hopping Spread Spectrum, OFDM - Orthogonal Frequency Division Multiplexing