Leading Wireless Technology base for IEEE802.15.4-2006 Devices

Challenges and application demands

PSSS enhancement of IEEE 802.15.4-2006 PHYs

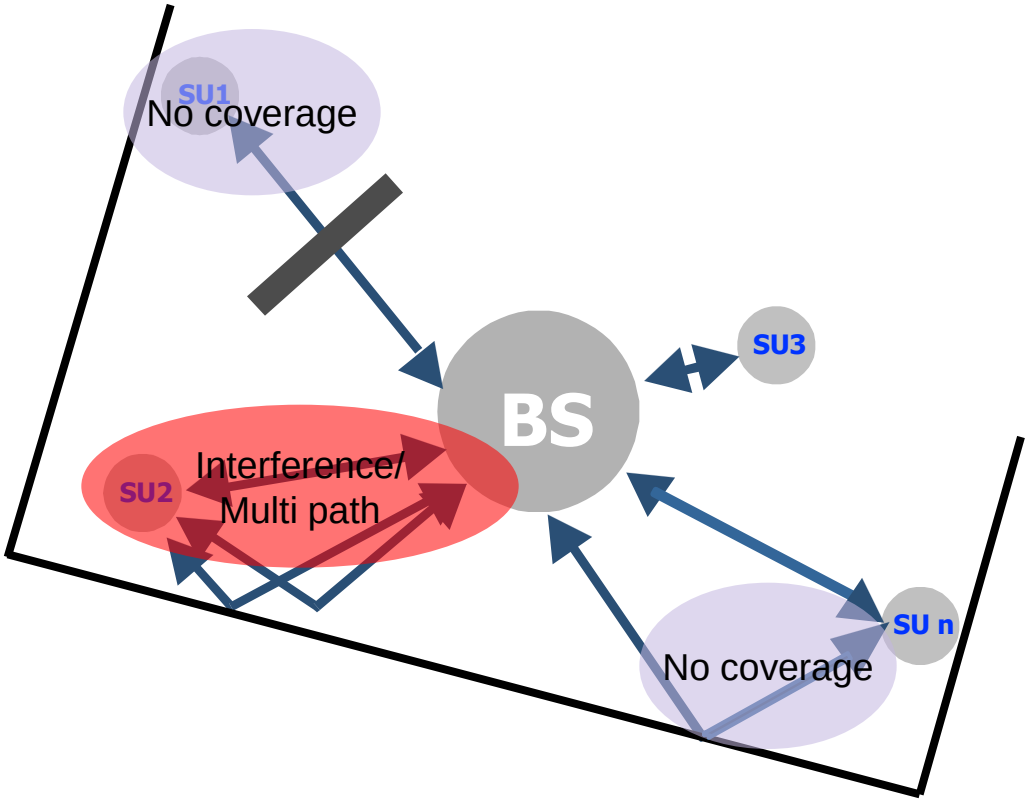
Wireless trends

DWW solutions

© 2010 Dr. Wolf Wireless GmbH

Wireless application challenges short range devices

Real wireless applications (especially indoor) are challenged by various issues



Challenging issues

- **Interference.**
- **Multi-path fading.**
- **Range & coverage.**
- **NLOS.**
- **Spectral density (data rate).**

Application demands

- **Highest reliability / data rate (QoS).**
- **Full coverage.**
- **Many subscribers (nodes).**
- **Low power consumption, key to energy harvesting.**
- **Low system cost.**
- **Co-Existence with e.g. WLAN, Bluetooth.**

Spectral density is the foundation of wireless communication

Data Streaming (Access Points)

250 – 100.000 Kbps
Voice & Data Communications

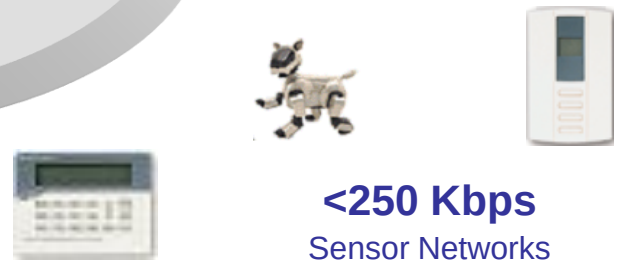
Voice & Video Streaming

5Mbps – 100Gbps
Multi Media & Backbones

Bandwidth
Spectral Density

< 2.000 Kbps
Voice Communications

Mobile Handsets (Voice)

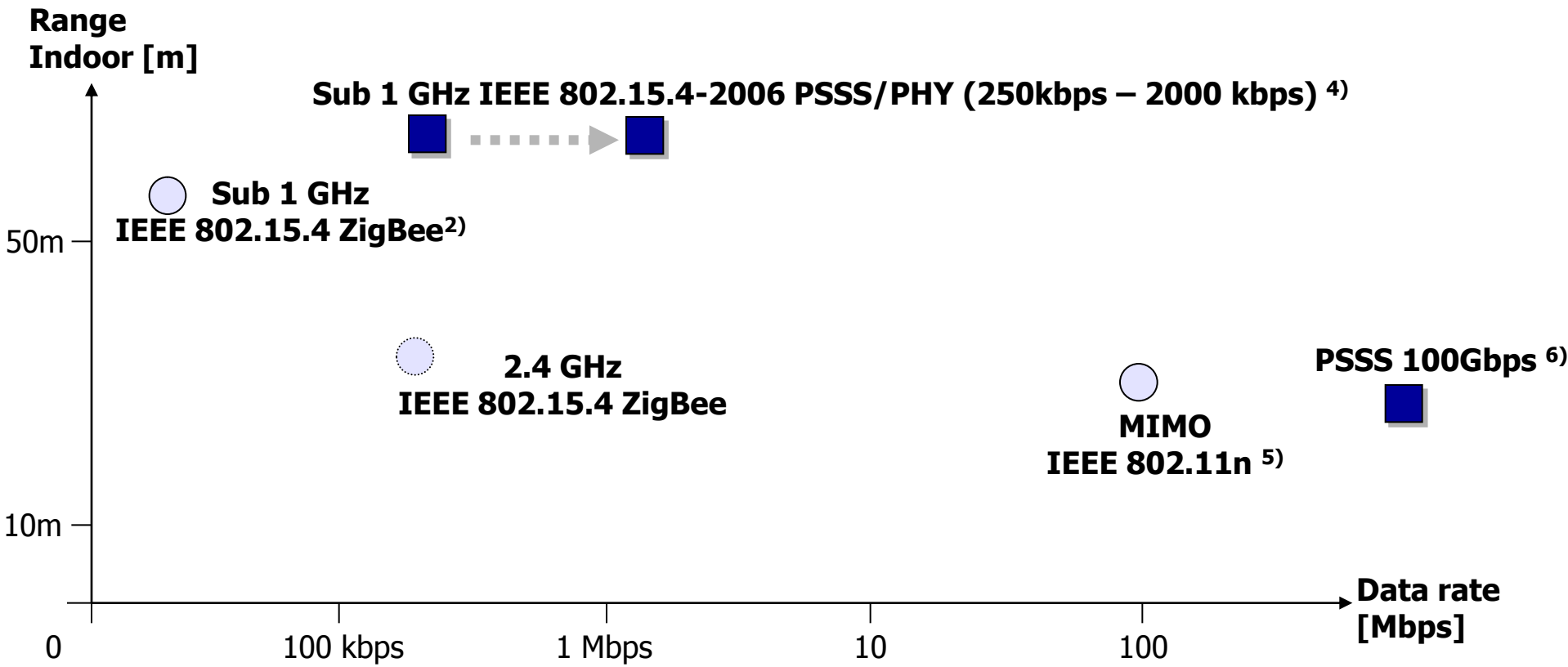


<250 Kbps
Sensor Networks
Building Automation

Building Automation

IEEE standards – Enhanced by PSSS, DWW's leading wireless technology
Data rate vs. range

IEEE802.15.4-2006 PSSS/PHY solution improves existing wireless IC solutions from 20 kbps to 250 kbps – with performance modes up to 1000 kbps and even more. Avoids Interference to 2.4 GHz devices (WLAN, Bluetooth). PSSS - Parallel Sequence Spread Spectrum - technology is developed and global patented by DWW.



1) Z-Wave FSK based 10/40 kbps EU/US. No IEEE Standard.
2) IEEE 802.15.4 868/915 MHz system 20/40 kbps EU/US.
3) In combination with OFDM (high complexity of IC).
4) 1 Mbps proprietary.
5) Draft IEEE Standard.
6) Factor 100 less complex (gate count&die size) then OFDM. Could be build with today in mass markets available components.

© 2010 Dr. Wolf Wireless GmbH

Energy per Bit
Key to Success for Mobile Applications

- **WSN**
  - Increasing data rate by factor of ten, decreases approximately needed energy per bit by factor of ten, if PER (packet error ratio) vs. coverage is still the same for the application.
  - Due to PSSS (Parallel Spead Sprectrum Technology) usage the data rate of IEEE802.15.4-2006 increased by factor of 12.5 and even the coverage. **Link budget is up to 30dB higher then products of main competitor.**
  - ACK messages are the most common one in networks. Biggest part of the PDU is the SHR (Synchronization Header). **DWW patented synchronization technology** allows shortest SHR in IEEE802.15.4-2006 PHYs.
  - All those facts together with a high energy efficiency implementation are the base for lowest energy per bit demand.
- **100Gbps Networks**
  - PSSS low power consuming enables designs for wireless and optical systems. First prototypes will be available Q1 2011.

© 2010 Dr. Wolf Wireless GmbH

Product Roadmap IEEE 802.15.4-2006

IEEE 802.15.4-2006 PSSS Devices

Q1-2/2011

Module „IEEE802.15.4-2006“ including EN 13757-4 Wireless M-Bus

Q3/2010

Single Chip IEEE802.15.4-2006 EN 13757-4 Wireless M-Bus

Q3/09

Module Eval Board

Q1/09

FPGA Module Eval Board Prototype

Europäische Union

Europäischer Fond für regionale Entwicklung.

Investition in Ihre Zukunft. Allgemeine Informationen unter www.efre.brandenburg.de

2009 2010 2011

PSSS: Parallel Sequence Spread Spectrum

Summary

- **PSSS based IEEE802.15.4-2006 platform**
  - Best-in-Market spectral efficiency AND all advantages of spread spectrum system.
- **100 Gbps solution coming soon**
  - Lowest power consumption and complexity. Enabling mass market products.
  - Highest performance.
- **Lowest energy needed for successful data transmission – key to enable energy harvesting.**
- **Discrete EVAL boards available – Single chip transceiver in development. First cores in test.**

© 2010 Dr. Wolf Wireless GmbH

- **Thank You**

- **Contact:**
  - www.dw-w.com.
  - info@dw-w.com.