



Freescal^e Technology Forum

Design Innovation.

Nov, 2008

Introduction to Freescal^e's Synkro™ Platform: Wireless Control and Automation for Next-Generation Home Entertainment Products

PC106

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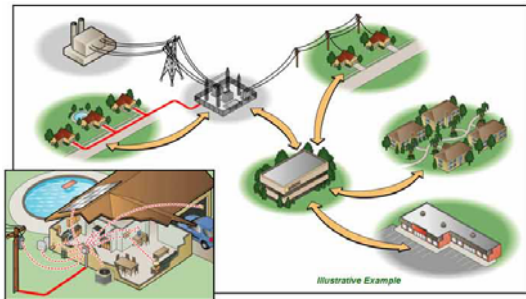


Wireless Connectivity Operation – Market Overview

- ▶ #1 Market Share* in 2007 (50%)
- ▶ Focus on 3 vertical markets
- ▶ Platform solutions (radio, MCU *and* SW) provider
- ▶ 802.15.4 PHY/MAC, ZigBee® protocol and Synkro™ firmware

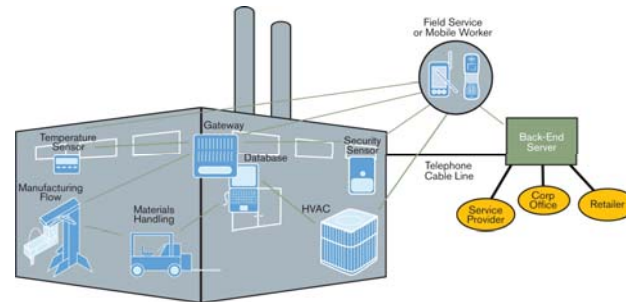
Energy Management

Advanced Metering Infrastructure
(802.15.4/ZigBee)



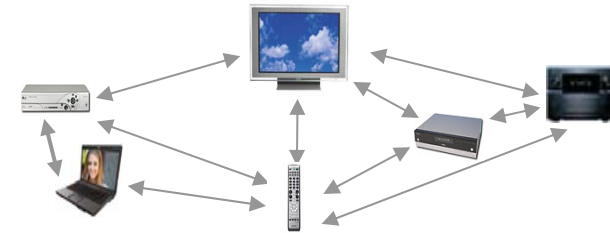
Industrial/Commercial Automation

HVAC/Lighting Control
(802.15.4/ZigBee)



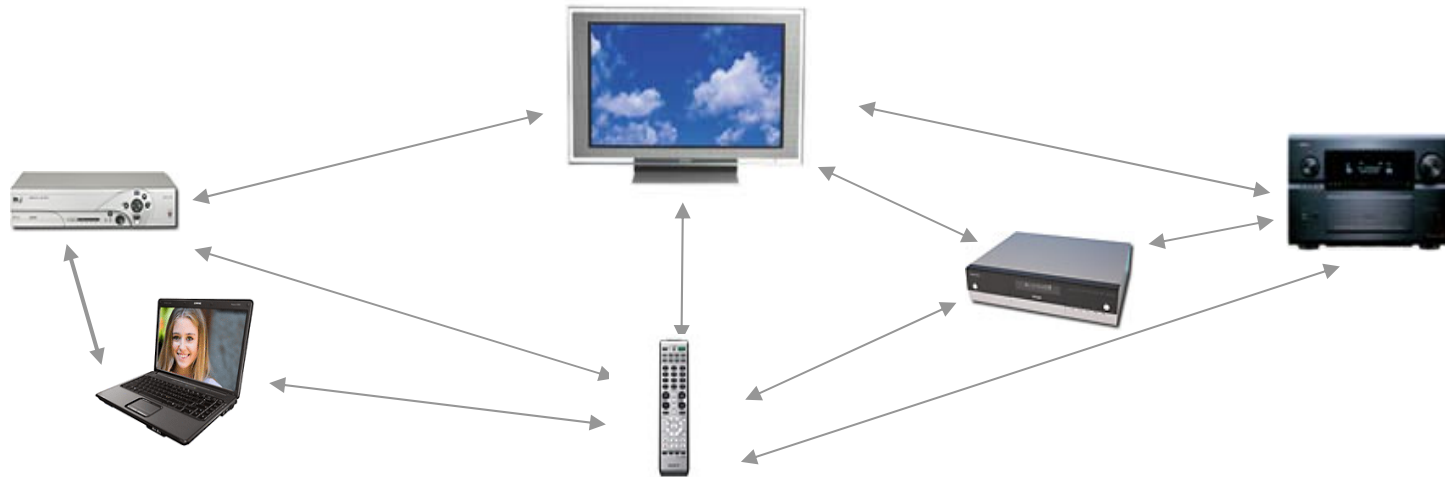
Consumer

Entertainment Control – TVs, DVD, AVR
(Synkro™)



* On World 802.15.4 forecast

Entertainment Control – Move to RF



Technology Challenge

- ▶ Plasma TV contains high frequency inverter that obstructs IR signals
- ▶ LCD back lighting absorbs IR
- ▶ DTVs field of vision

Value Drivers

- ▶ Provides product differentiation to a price sensitive market
- ▶ 802.15.4 selected for cost and interference avoidance capabilities with benefit of IEEE standard

Synkro Protocol

▶ Today

▶ Line of sight transmission only (IR-based)

- Decades-old technology

▶ Field of vision limitations

- Remote needs to be pointed at equipment being controlled

▶ Unidirectional transfers

- Cannot send information to remote control device from controlled units

▶ Requires manufacturer-specific IR database

- Each device family has its own control protocol
- Requires larger memory for storing tables
 - Savings from 8 to 32 KB

▶ Power consumption

- Multiple redundant transmissions for each command
- Higher TX power required to avoid interference created by plasma/LCD screens

▶ Moving Forward

▶ No line-of-sight or field-of-vision requirements

- Control devices from anywhere!

▶ Bi-directional communication support

- Packet Acknowledgement
- Download information to display on remote control
 - Program guides
 - Stock information
 - News / Alerts
 - Push services
- Device capabilities can be sent to the remote
 - No need to carry information about thousands of devices in memory
- Over-the-air updates
- Device configuration without needing to interrupt device operation

▶ Universal approach

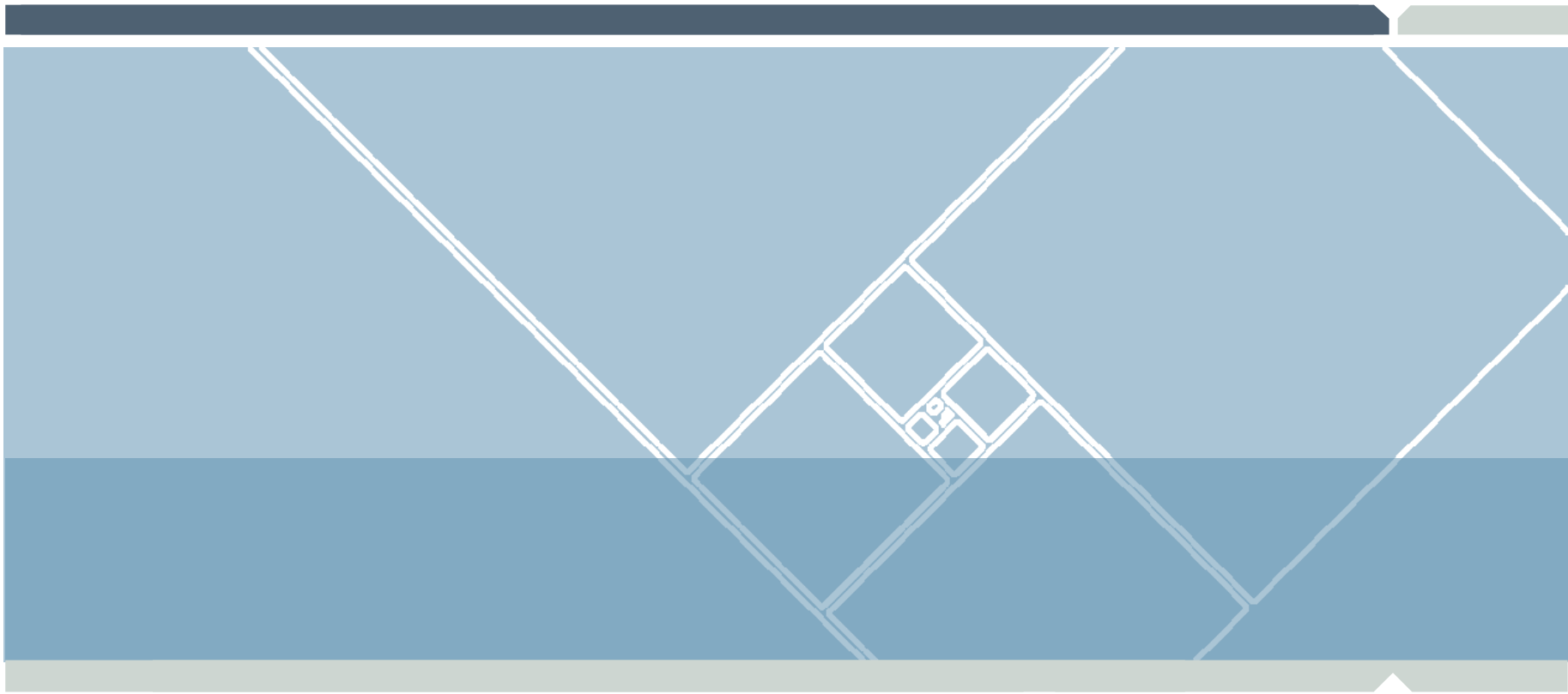
Home Entertainment RF Communication Use Cases

- ▶ CE products can now directly communicate
 - One step theater experience
 - Simply insert a DVD and press “Play”
 - TV automatically selects correct input for viewing DVD
 - Surround sound system automatically switches to DVD listening mode
 - Remote control automatically switches modes to control DVD
 - Set top box and other components not needed switch off
 - Lights dim to desired setting
 - Curtains/shades close
- ▶ Set top boxes that require phone connection can now communicate to devices that have outside connection
 - Communicate directly to internet enabled devices (TV, gateway, router) for pay-per-view billing.
 - Update controlled device and remote controls from outside the network

Synkro Adoption

- ▶ Sony Adopts RF Remote Control for New "BRAVIA"
- ▶ Sony Corp. announced 15 new models of its LCD television "BRAVIA" Aug. 29, 2007. 11 models went on sale Sept. 20, and remaining four were released in November.
- ▶ Of the 15 models release, 13 were accompanied by an RF remote control that transmits signals by non-directional radio waves instead of infrared rays.
- ▶ Spring products announced in February 2008 and include RF control in new F, V1 & J1 Bravia LCDs





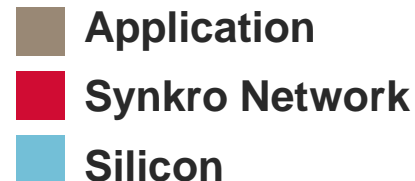
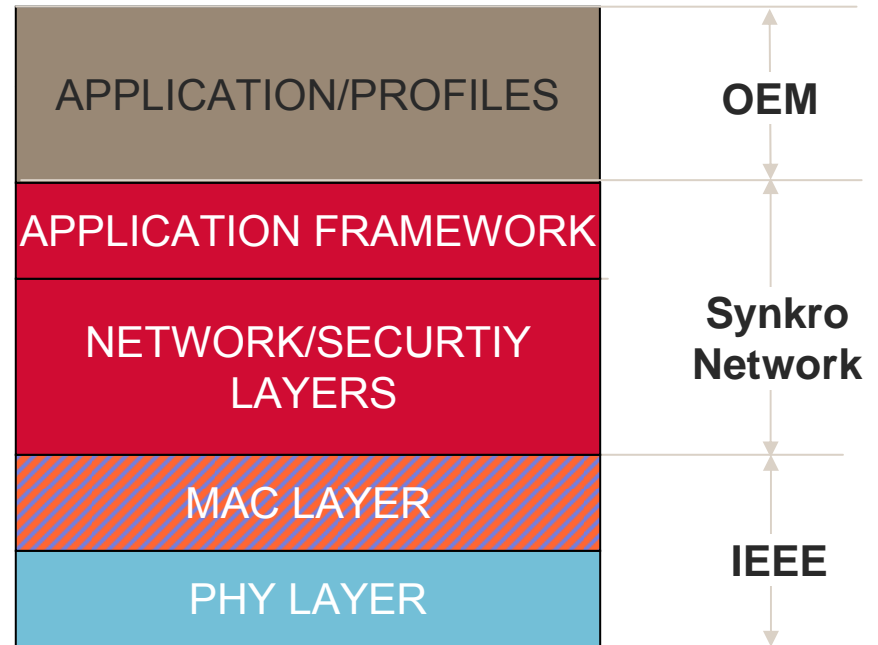
Synkro Architecture



The IEEE® 802.15.4 MAC/PHY

▶ IEEE® STD 802.15.4

- Designed to supply the radio and protocol, allowing the designer to concentrate on the application and their customers' needs



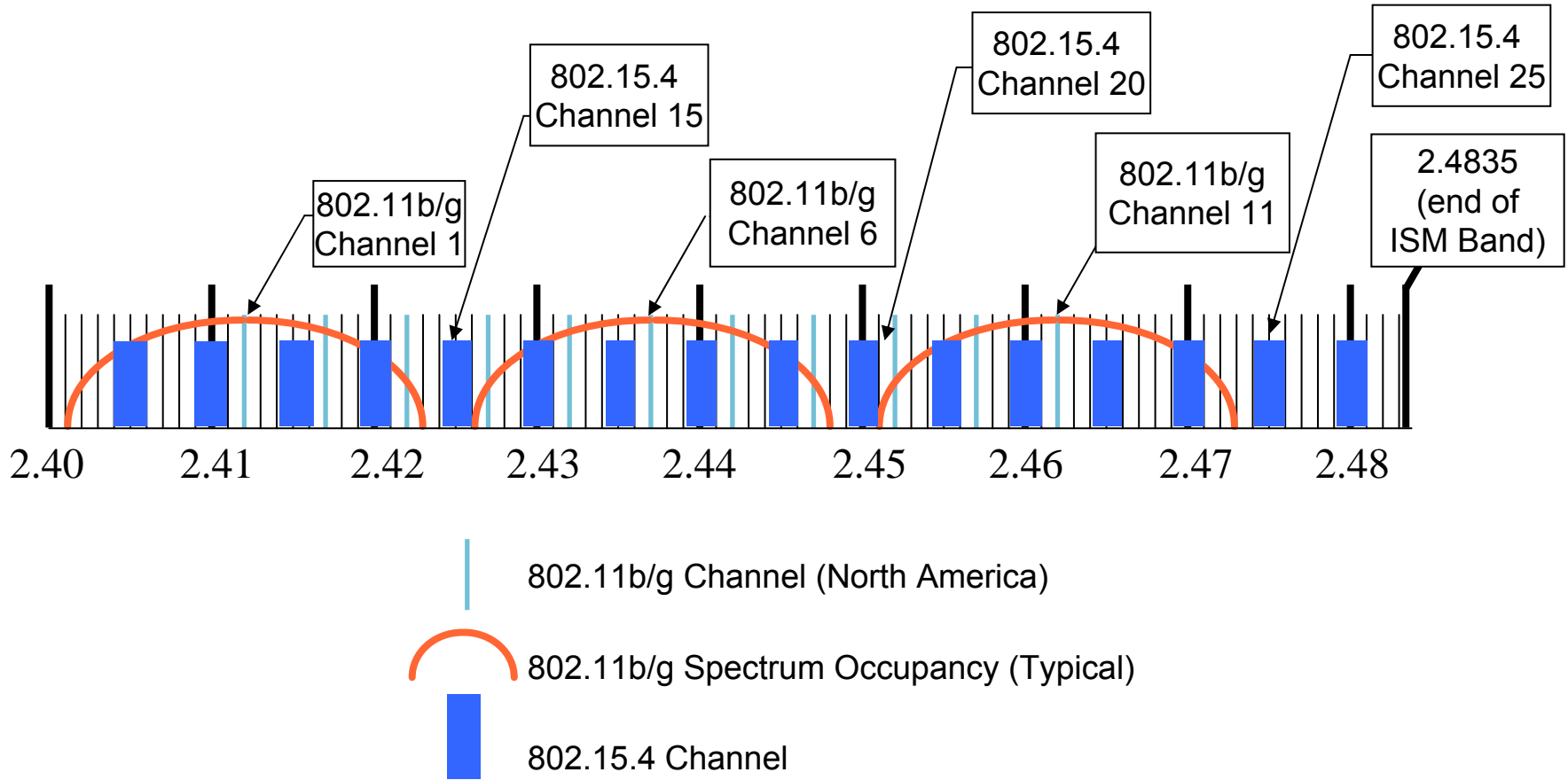
IEEE® 802.15.4 Basics

▶ Simple packet data protocol for lightweight wireless networks

- Released in May 2003
- O-QPSK Modulation (2.4GHz)
- DSSS Energy Spreading Scheme
- Three bands, 27 channels specified
 - 2.4 GHz: 16 channels, 250 kbps
 - 868.3 MHz : 1 channel, 20 kbps
 - 902-928 MHz: 10 channels, 40 kbps
- AES 128 Encryption and Authentication
- Communication Features
 - Simple Frame Structure
 - Reliable Data Delivery
 - CSMA-CA
 - Message Acknowledgement
 - Association/Disassociation
- Network Support
 - Employs 64-bit IEEE & 16-bit short addresses
 - Supports Mesh, Star and Point-to-Point
 - Non-Beaconed
 - Beaconed
 - Optional super frame structure with beacons
 - Supports Guaranteed Time Slots (GTS)

	Frequency Band	License Required?	Data Rate	Channel Number(s)
868.3 MHz	No	Europe	20kbps	0
902-928 MHz	No	Americas	40kbps	1-10
2405-2480 MHz	No	Worldwide	250kbps	11-26

2.4 GHz Channel Occupancy



IEEE® 802.15.4 Advantages

- ▶ Global standard based solution
- ▶ Variety of sources
- ▶ Technology in mass production since 2003
- ▶ Nearly 20 Million units shipped
- ▶ Technology Advantages
- ▶ Optimized for low duty cycle applications
 - Longer battery life (months to years)
- ▶ Interference avoidance
 - Channel Alignment – ideal for co-existence with other 2.4 GHz technologies
 - Clear Channel Assessment – improves collision avoidance
 - Short burst transmission

Related Session Resources

Session Location – Online Literature Library

<http://www.freescale.com/webapp/sps/site/homepage.jsp?nodeId=052577903644CB>

Sessions

<i>Session ID</i>	<i>Title</i>

Demos

<i>Pedestal ID</i>	<i>Demo Title</i>

