



**ZigBee®**

Control your world

**WSN in the Real World – A Workshop  
Barcelona, Spain**

**ZigBee Overview  
Enabling the Internet of Things**

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**Bob Heile, Chairman  
ZigBee Alliance  
[bheile@ieee.org](mailto:bheile@ieee.org)**





# ZigBee Alliance Overview

- **Organized as an independent, neutral, nonprofit corporation in 2002 for WSN Standards Development**
- **Open and global**
  - Anyone can join and participate
  - Over 400 companies worldwide are members
  - Membership is global [approx. 40% Americas, 30% EMEA, 30% Asia]
- **Activities include:**
  - Open Standards for wireless sensor and control
  - Product Certification and compliance programs
  - Branding, market development and user education
- **ZigBee is a key enabler for the Internet of Things**



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# ZigBee Application Areas

Security  
HVAC  
AMR  
Lighting Control  
Access Control



**BUILDING  
AUTOMATION**

Demand Response  
Net Metering  
AMI, SCADA

**ENERGY MGT.  
& EFFICIENCY**




**CONSUMER  
ELECTRONICS**

TV  
VCR  
DVD/CD  
Universal  
Remotes

Chronic  
disease  
Elderly care  
Fitness  
Wellness




**PERSONAL  
HEALTH CARE**



**TELECOM  
SERVICES**

M-commerce  
Local gaming  
Local chatting  
Info Services



**PC &  
PERIPHERALS**

Mouse  
Keyboard  
Joystick  
Touchpad

Retail Store Mgmt  
Shopping  
Supply Chain  
Environmental  
Energy Mgmt



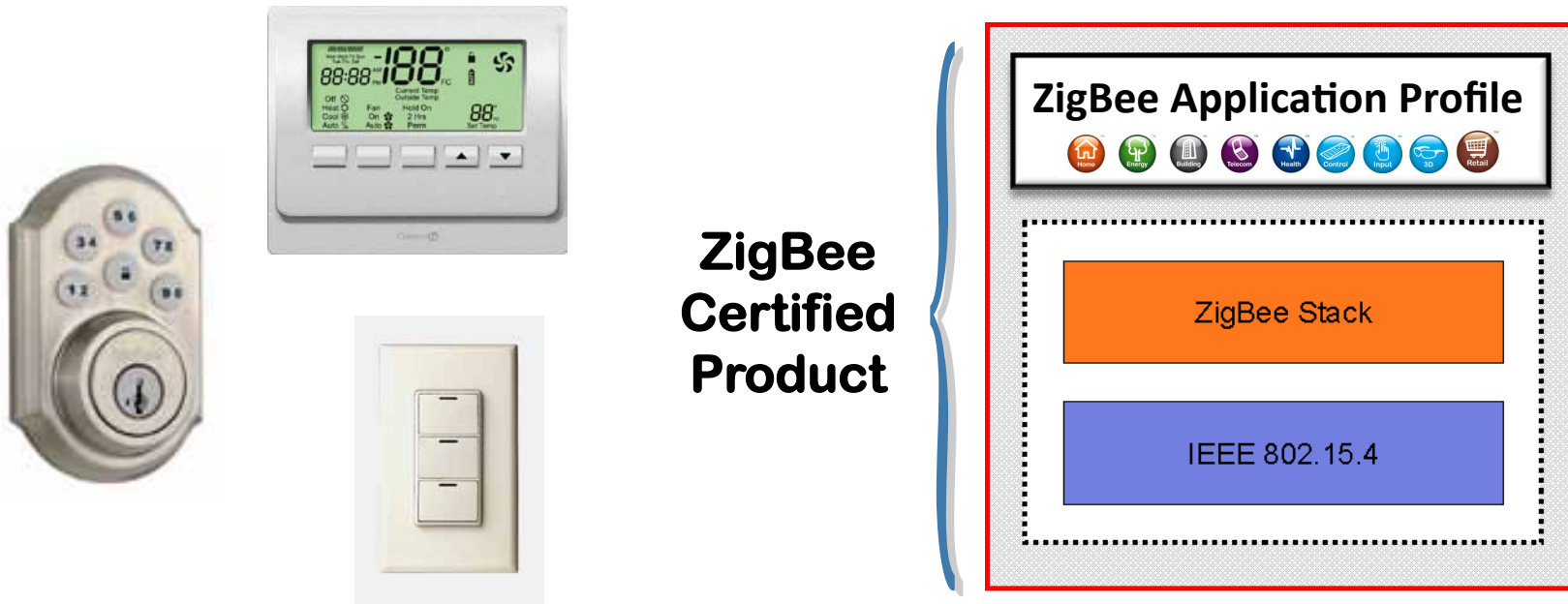
**INDUSTRIAL  
CONTROL**



**HOME  
AUTOMATION**

Security  
Safety  
HVAC  
Lighting Control  
Access Control  
Irrigation

# ZigBee Product Interoperability



- **Products with same application profiles interoperate End-to-End**
- **More than 300 certified products!**

# ZigBee Certification Program

- **Rigorous testing plans established to ensure conformance to the standard**
- **Golden-unit and test harness approach used to support real product interoperability**
- **Process of Change-Control Board to rapidly address any discovered errors or issues**
- **Currently three approved testing labs provide competition and choice for vendors**
- **China Electric Standards Institute working to be validated as an approved test lab in China**
- **Test houses adhere to internationally accepted standards (IEC, etc.) to support global market adoption and conformance**





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# ZigBee Technology-Performance

- **Excellent in-building coverage**

- Inherently robust radio link
- Mesh networking
- Acknowledge oriented protocol

- **Coexistence**

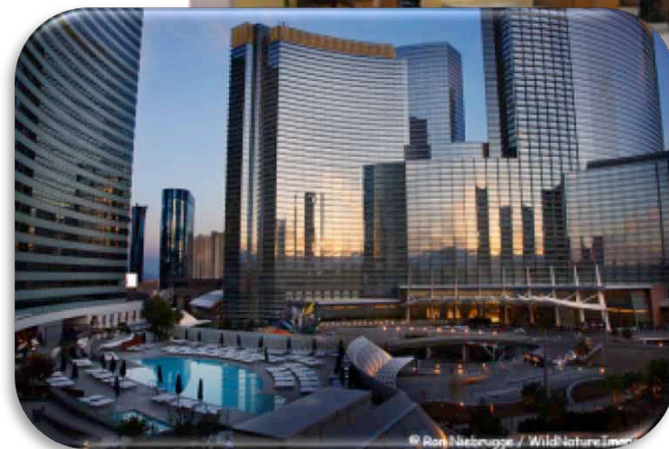
- Many multi-radio products in use
- Multi-radio deployments common

- **Tolerance to interference**

- CES – ZigBee performs flawlessly
- Large scale commercial, hospitality, and hospital deployments

- **Proven scalability**

- MGM City Center Aria Hotel with 85,000+ radios in 4200 separate ZigBee networks concurrently to 3 independent WiFi networks
- University of Miami Hospital, 4.2 million square feet, 27 buildings, 121 floors with 16,000 assets





## A world with less batteries



- Energy consumption and battery operation are two of the most critical challenges for wireless sensor networking
- Combining energy harvesting and wireless communications allows for maintenance free control and monitoring
- There are huge market opportunities for batteryless, wireless solutions, in particular in the building/office/hotel segments

**ZigBee does it all!**



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# ZigBee Standards & Market Adoption





# ZigBee has become “Mainstream Technology”

“Our research with more than **600 companies** has found that the **ZigBee market has "crossed the chasm"** and is now a **mainstream technology**. This is further illustrated by several new ZigBee entrants such as BlueRadios, CEL, and SyChip (Murata), as well wireless sensor network pioneer Dust Networks. We have identified **over 350 companies that offer, or are developing, products** based on IEEE802.15.4 and ZigBee.

These companies have combined **of more than \$1 trillion.** In a challenging economy, 15.4/ZigBee increased at an average of 62% per 2007.”

annual  
In fact,  
unit sale  
ye



- *Market Dynamics Report, electronics publications*

# Current ZigBee Applications

- ZigBee Home Automation (ZHA)
- ZigBee Smart Energy (ZSE)
- ZigBee Building Automation (ZBA)
- ZigBee Telecom Services (ZTS)
- ZigBee Health Care (ZHC)
- ZigBee Remote Control (ZRC)
- ZigBee Input Device (ZID)
- ZigBee 3D Sync (Z3D)
- ZigBee Retail Services (ZRS)



+Future profiles proposed by member companies...



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# ZigBee Retail Services



Work with other profiles



Shipping/Receiving



Consumer Devices



Video/Voice



Monitoring/Alerts



Scan/Shop



Proximity Marketing



Customer Services



Payment Services



# ZigBee RF4CE

- **Addresses interaction & communication with and between consumer electronic devices**
- **Greatly improved CE Experience**
  - Resolves interference issues with Plasma high frequency inverter and LCD backlight with robust RF solution
  - Improves battery life by up to >10X while improving reliability and functionality
  - No line-of-sight restrictions (you can control from anywhere in the home)
  - Typical range ~25-35 meters @ 0dBm (10mW)
  - Standardized inter-CE device communication
- **Supports extensive list of devices including digital TVs, DVD and Blu-ray players, set-top boxes, remotes, media centers, gaming consoles & more**



# ZigBee RF4CE Application Profiles

- **RF4CE Application Profiles are developed to deliver smarter functionality on top of the RF4CE standard**
  - Defines pairing and discovery procedures
  - Standardizes commands
  - Ensures interoperability between devices from different vendors
- **Three application profiles defined**
  - Remote Controls: ZRC (completed)
  - Keyboards/mice: ZID (work in process)
  - 3D-glasses: Z3S (work in progress)
- **Other application profiles under consideration**



# ZigBee RF4CE Use Cases

- **Interactive Remote Control**

- Does not require point-and-shoot
- Displays messages
- Can be woken up (“find-me” function)



- **Media Center Control**

- Server/STB etc. in different room or closed cup-board
- Controls content like streaming music, photos and movies
- Remote navigation of content



- **Internet TV**

- Usage of keyboard as Remote Control and entering URL's or data
- Use of (air-)mouse for browser control on the TV

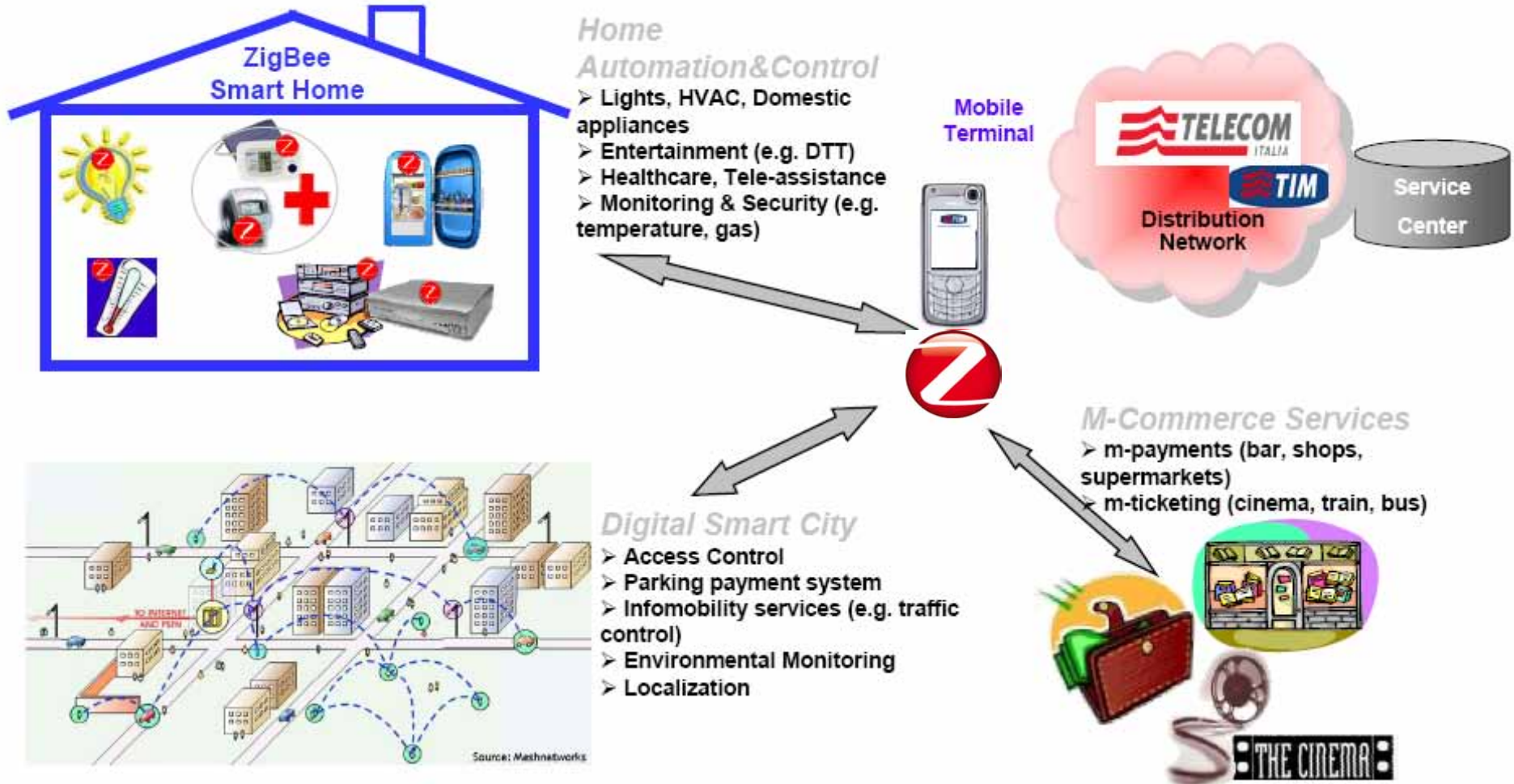
- **3D Television**

- Bring your own 3D glasses for watching movies



# The Home and Beyond from a Telecom perspective

Handset is the hub of interaction with the Internet of Things



# Thank-You!

**For More Information:**



Bob Heile, ZigBee Alliance Chairman  
[bheile@ieee.org](mailto:bheile@ieee.org)

***Be a part of the future: JOIN the ZigBee Alliance!***