ZigBee Health Care – What’s in store for Health Care using ZigBee?

Tim Hirou, Convergence Wireless
Lars Schmitt, Philips
Outline

- Overview
- ZigBee Health Care Architecture & Devices
- ZigBee & Continua
- First Proof Points
- Conclusion
ZigBee Health Care – At A Glance

Scope
- Non-invasive, non-critical health care applications

Application domains
- Aging Independently – elderly activity & safety monitoring
- Chronic disease management – episodic / continuous
- Health and Wellness – tracking fitness etc

Environments
- Residential environments
- Retirement communities, nursing homes
- Medical care facilities
- Fitness centers
- Homes
ZigBee Health Care uses the ISO/IEEE 11073 Personal Health Device Communication protocol

- Specified by the ISO/IEEE 11073 Personal Health Data work group
- Includes exchange format, data representation, and terminology for personal telehealth devices
- The work group is specifying Device Specializations for personal health devices (thermometer, weight scale, etc.)

Health Data is tunneled over ZigBee

- Using a protocol tunnel cluster
- ZigBee supplies the transport layer, including device discovery, security etc.
- ZigBee also supplies related functionality such as commissioning, identification, location, voice over ZigBee
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ZigBee Health Care Architecture

- IEEE 11073
- PHD Communication
- -104xx Device Specializations
  - -10404 Pulse Oximeter
  - -10406 ECG
  - -10407 Blood Pressure
  - -10408 Thermometer
  - -10415 Weighing Scale
  - -10417 Glucose
  - -10419 Insulin Pump
  - -10421 Peak Flow
  - -10441 Cardio
  - -10442 Strength
  - -10443 Activity Monitor
  - -10471 Activity Hub
  - -10472 Medication Monitor

- Messaging Protocol & Data Format (Encoding)

- Data Models & Nomenclature

- -20601 Optimized Exchange Protocol

- ZigBee Health Care Profile

- ZigBee Cluster Library

- ZigBee 2007
- ZigBee 2007 PRO

- IEEE 802.15.4

*standards drafting
ZigBee Health Care Devices

- **Personal Health devices**
  - Pulse Oximeter (SPO2 sensor)
  - Blood Pressure Monitor
  - Thermometer
  - Weight Scale
  - Glucose Meter
  - Electrocardiograph (heart rate monitor) – expected soon
  - ... and many more in future

- **Data Management Devices**
  - Data Collection Unit
  - Gateway / Access point
  - Mobile terminal

- **Fitness Devices**
  - Cardiovascular fitness & activity monitor
  - Strength Fitness Equipment
  - ... and many more in future
Social alarm and assisted living devices

- Independent living activity hub (11073 device)
- Safety sensors (e.g. smoke alarm, fire alarm, door sensor, etc…)
- Pendant
- Wrist Transmitter
- Fall detector
Support for low-speed mobility (e.g. walking)
- E.g. a patient equipped with one or more on-body devices strolls through the hallways of a retirement center
- The on-body device(s) might have to change parents

Support for rapid disconnect & rejoin
- E.g. a nurse moves between patients in a medical centre, taking vital signs readings from each.

ZigBee supports this
- Link setup time depends on network size
Strong Security when needed

- Keying material is pre-distributed to devices by the trust server
  - Each device gets different (but correlated) keying material
- Key establishment is done without communicating to the trust server
  - Based on their IDs, two devices agree on a common secret, using their individual keying material – very fast (80 x faster than public key)
- The method is secure against multiple compromised devices
- Two special security clusters defined for PHHC
  - Also handles access control (identities, roles, policies)

Keying Material Distribution

A trusted setup server generates and distributes keying material to medical sensing and management devices.

Usage

Medical devices interact with each other and exploit the pre-stored keying material to generate unique pairwise link keys.
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“Our Vision is that through the efforts of a collaborative industry organization, we can enable a personal telehealth eco-system where many diverse vendors can combine their products into new value propositions with significant health benefits for people worldwide.”

“Our Mission is fostering independence through establishing a system of interoperable personal telehealth solutions that empower people and organizations to better manage health and wellness.”
ZigBee/Continua Members

Already more than 30 ZigBee Members in total joined the Continua Health Alliance!
ZigBee selected by Continua

- The ZigBee health care profile
  - designed to be aligned Continua’s low-power radio use case requirements

- The Continua Low Power LAN use case
  - Connectivity with sensors in a whole house, fitness center or on a campus.
  - Communication interface suitable for battery operated sensors with months to years of life

- Selection Process
  - Six technology candidates: ANT (Dynastream), Bluetooth low energy, BodyLAN (FitLinxx), Sensium (Tooumaz), ZigBee, Z-Wave (Zensys)
  - Rigorous process with various selection criteria (power consumption, network range, market penetration, etc…)

- Continua Press Release (Beaverton, Ore. – June 8, 2009):

  “Continua has selected ZigBee Health Care technology for low power sensors…”
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First Proof Points

ZigBee Health Care Technology Demonstration @ Continua Spring Summit – Barcelona, March 2009

PHILIPS

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at&t

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TEXAS INSTRUMENTS

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MOTOROLA

Continua

Health Alliance

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Conclusion

- ZigBee Health Care sets the standard for low power wireless monitoring & management in
  - low-acuity healthcare
  - aging independence
  - wellness & fitness
- ZigBee Health Care selected by the Continua Health Alliance as low power local area network (LAN) standard
- Successful collaboration between Continua and ZigBee will foster Personal Telehealth market growth