BLE, ZigBee + Wi-Fi technologies enable connected, personal healthcare

Part three of In-Stat and TI’s 2010 wireless webinar series
December 2, 2010

Moderated by Jim McGregor, In-Stat
Welcome to our 2010 webinar series!

Today’s agenda:
- 5-minute market overview
- 35-minute discussion by panelists
- 20-minute live Q&A

Today’s host:
Jim McGregor
Chief Technology Strategist
In-Stat

Webinar archives available: www.ti.com/wirelesspresentations and www.instat.com

Today’s panelists:

Leo Estevez
Technology strategist, Wireless business unit, TI

Chuck Parker
Executive Director
Continua Health Alliance

Eric Rock
Founder/CEO
Intuitive Health
Top-line overview

- Introduction (Jim)
- The use of standards and industry guidelines (Chuck)
- The user experience and software platform (Eric)
- Technical capabilities and usability aspects (Leo)
Introduction
Jim McGregor, In-Stat
Promise of technology

Increase the quality of medical care

Battle rising costs of care and medication through reduced waste and increased efficiency

Provide for the needs of changing populations
Unlimited applications

- Patient monitoring
- Resource tracking
- Information and records
- Medication dispensing
- Remote care
Every environment

Professional

Home

Remote/Active

intuitive health... Life Changing

Continua®

Texas INSTRUMENTS
Convergence & leveraging technologies
### Enabling wireless technologies

<table>
<thead>
<tr>
<th>Wireless Technology</th>
<th>Version</th>
<th>Frequencies</th>
<th>Max Data Rate</th>
<th>Range*</th>
<th>Network Application</th>
<th>Max Power Permitted</th>
<th>Focus</th>
<th>Typical Applications</th>
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<tbody>
<tr>
<td>Wi-Fi</td>
<td>802.11a</td>
<td>5.0 GHz</td>
<td>54 Mbps</td>
<td>30m</td>
<td>WLAN</td>
<td>-</td>
<td>Data rates</td>
<td>Home Networking</td>
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<td>802.11b</td>
<td>2.4 GHz</td>
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<tr>
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<td>802.11g</td>
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<td>54 Mbps</td>
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</tr>
<tr>
<td></td>
<td>802.11n</td>
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<td>Wi-Fi Direct</td>
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<td>WPAN</td>
<td>-</td>
<td>Peer-to-peer/ wire replacement</td>
<td>Consumer electronics (peer-to-peer)</td>
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<td>ZigBee</td>
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<td>915 MHz</td>
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<td>Industrial control</td>
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<td></td>
<td></td>
<td>2.4 GHz</td>
<td>250 Kbps</td>
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<td>Low latency</td>
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<tr>
<td>Bluetooth</td>
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<td>Class 1 - 100m</td>
<td>WPAN</td>
<td>Class 1 - 100 mW</td>
<td>Peer-to-peer/ wire replacement</td>
<td>Handsets</td>
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<td>Class 2 - 10m</td>
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<td>Class 3 - 1 mW</td>
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<td>Bluetooth LE</td>
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<td>-</td>
<td></td>
<td></td>
<td>0.01-0.5 mW</td>
<td>Low power</td>
<td></td>
</tr>
</tbody>
</table>

Source: In-Stat, 11/10
Enabling wireless technologies

Unit Shipments in Thousands

2009 2010 2011 2012 2013 2014

Wi-Fi* Bluetooth* ZigBee

*includes industrial applications
Source: In-Stat, 11/10
The use of standards, and industry guidelines
Chuck Parker, Continua Health Alliance
Continua Health Alliance: Our mission

“Our Mission is to establish an eco-system of interoperable personal health systems that empower people & organizations to better manage their health and wellness”
**Goal**
- Experience peak health potential throughout life for a high quality of life at minimal costs

**Reality**
- Average individual is experiencing much less of full health potential than expected at a high financial & quality of life cost

**Cause**
- Adverse health events such as stress, poor nutrition, and inactivity are causing the population to fall away from their peak health potential

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### Unpredictable Health
- **Unpredictable**: Health events that cannot be predicted.
- **Predictable (Rules-based)**: Health events that can be predicted.

### Predictions
- **60-80% Lifestyle Management**: Happening earlier in life.
- **Higher $$ Costs to All**

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*Adapted from Oregon Medical Labs*
Continua domains

- To organize its work, Continua segmented the market in three large domains:

  Aging independently
  - An adult child helping their elderly parents age gracefully in their own home.
  - Basic life monitoring as appropriate (ADL)

  Health & wellness
  - Weight loss
  - Fitness
  - Email / chat / video
  - Appt scheduling
  - Personal health records

  Disease management
  - Vital sign monitoring (RPM)
  - Medication reminders and compliance
  - Trend analysis and alerts
  - Connect with family care givers
Continua architecture

Personal device
- Thermometer
- Pulse Oximeter
- Pulse / Blood Pressure
- Weight Scale
- Glucose Meter
- Cardio / Strength
- Independent Living Activity
- Peak Flow
- Medication Adherence
- Physical Activity
- Electrocardiogram
- Insulin Pump

Aggregation manager
- ISO
- IEEE
- Bluetooth
- ZigBee

Telehealth service center
- IHE
- W3C
- Health Record Network (HRN) interface

Health records
- EHR
- PHR
Ecosystem development

**Developer Resources**
- Web-based environment (repository, collaboration tools)
- Reference source code
- Bug tracking and open source modeling

**Certification**
- Free downloadable testing tools
- Right to use certified logo upon completion of successful certification
- Certification program for interoperability

**Market Intelligence**
- Access to market research data
- Access to pre-publication drafts of the design guidelines
- Internal and external education and training

**Collaboration**
- Plugfests participation
- Participation in RFP MatchMaker program
- Unlimited participation in Continua quarterly summits, town hall meetings, and education seminars
User experience and software platform
Eric Rock, Intuitive Health
Enabling accountable care

Smart Tablet & Gateway
World Wide Web
EMR / PHR / HIE Interfaces
Family Interactivity and Alerts
Provider Portal, Alerts and Tools
Web Services & EMR / PHR / HIE Interfaces
Personal Health Devices
Smart Television & Video Conferencing
Intuitive by design
Wireless use cases
Technical capabilities and usability aspects
Leo Estevez, TI
Wi-Fi personal health manager applications

- Connecting mobile & stationary personal health managers to an installed base of home access points:
Personal health manager interoperability

- Interoperability between Wi-Fi-enabled managers and access points is addressed by the Wi-Fi Alliance.
- Interoperability between IP-enabled managers and servers is addressed by the Continua Health Alliance.
Usability of Wi-Fi-enabled personal health managers requires that vendors take into consideration problems consumers may encounter in both the setup and use of these devices.
ZigBee/Bluetooth® Low Energy (BLE) personal health device applications

Medical alerts

Aging Independently

Disease management
TI BLE solutions

- 2.4GHz, 1Mbps, GFSK
- Point-to-Point and Star Networks
- Single mode and dual mode devices
  - Dual Mode (*smart phones*)
    - Supports *Bluetooth* and BLE
  - Single Mode (*smart sensors*)
    - Supports BLE only
- Low cost, complete solutions like TI’s CC2540 solution
- Wi-Fi integrated mobile and stationary manager support in TI’s WiLink™ 6.0 (WL1271) solution
- Ultra low power by:
  - Quick connection times
  - Low power synchronization
  - Low peak power
- <1/10th of *Bluetooth* power (low duty cycle)
TI ZigBee solutions

- Fully integrated solutions like TI’s CC2530 solution
- 2.4GHz, 250kbps
- IEEE 802.15.4 PHY/MAC
- Mesh networking
  - Self healing
- TI’s total solutions include:
  - Transceivers, WNPṣ and SoCs
  - SW and development tools
  - Simple, reliable, low cost, and low-power
- Driving applications
  - Ageing independently
  - Monitoring & tracking
Personal health device interoperability & usability

- Continua addresses ZigBee and BLE interoperability in cooperation with ZigBee Alliance, the BT SIG, and IEEE 11073
- TI provides fully interoperable Continua solutions which also protect against wireless interference between these three wireless technologies
TI personal health manager solutions
Summary

- Potential benefits
  - Increased quality of healthcare
  - Reduced costs
  - Higher quality of life

- Improving healthcare through technology requires
  - Utilizing all available technology (TI)
  - Standards (Continua)
  - Platform Solutions (Intuitive Health)
Q & A

- To participate, click on the Ask a Question link on the left side of the interface; enter your question in the box on the screen; hit “Submit.” We’ll answer them during the Q&A session or after the webcast.

www.ti.com/wirelesspresentations
http://e2e.ti.com/blogs_/b/mobile_momentum/default.aspx
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