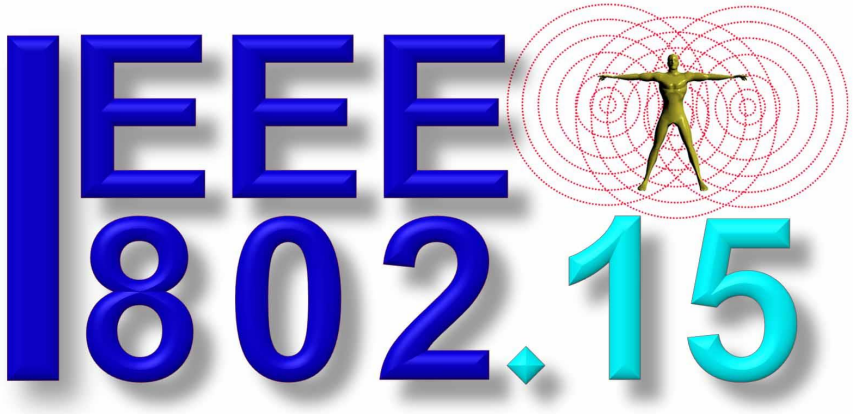


802.15: “Wireless Specialty Networks” Projects Summary Overview/Status

October 2016

Clint Powell

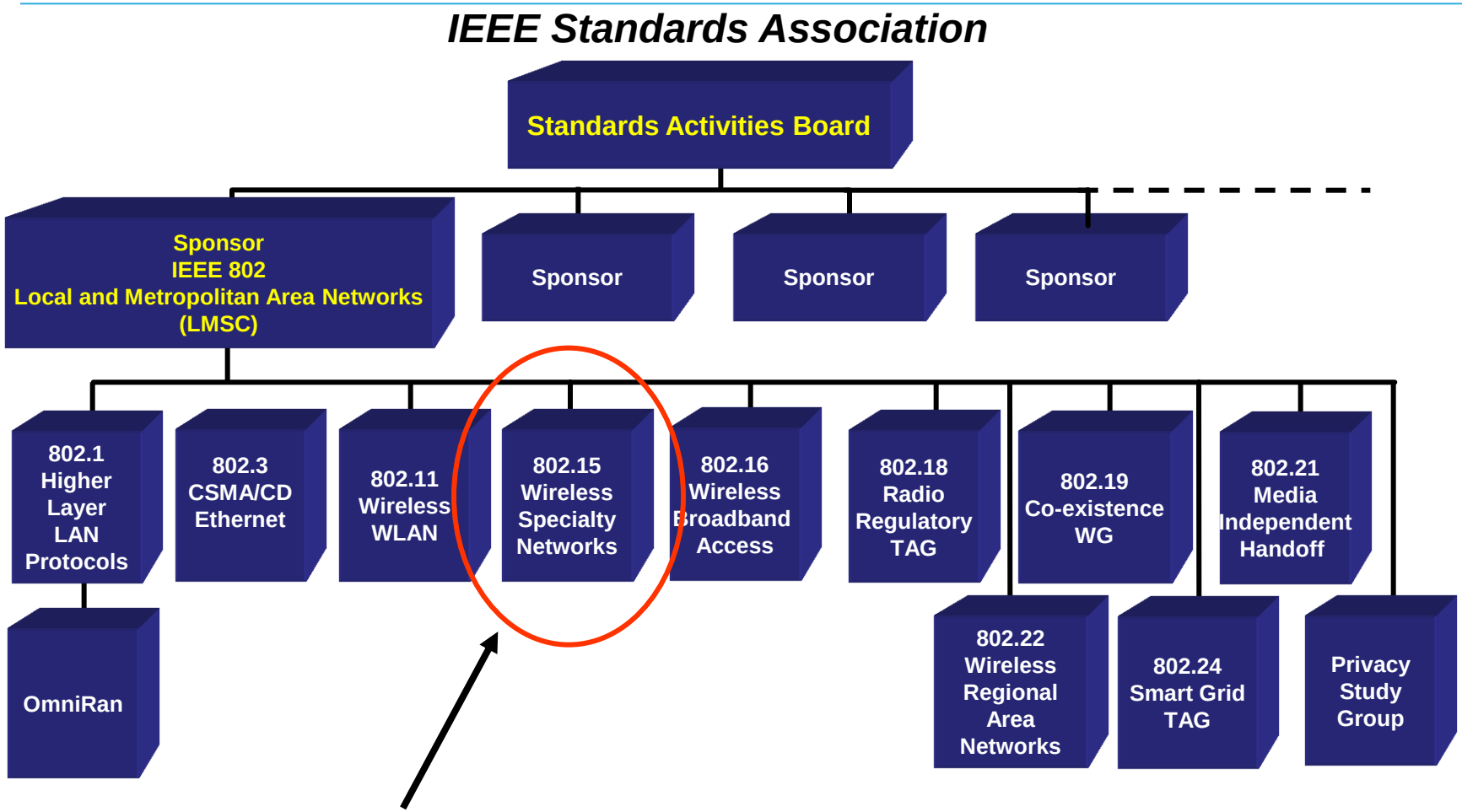
IEEE 802.15 - TG10 (Layer 2 Routing) Chair
IEEE 802.15 - TG4t (Higher Data Rate) Chair
IEEE 802.15.4 - 2015 Revision Co-Editor
ZigBee Alliance - GB 868 MAC/PHY Editor
ZigBee Alliance - Certification Adv. Group Chair
ZigBee Alliance - IEEE 802.15.4 MAC/PHY Adv. Group

Disclaimer…

"At lectures, symposia, seminars, or educational courses, an individual presenting information on IEEE standards shall make it clear that his or her views should be considered the personal views of that individual rather than the formal position, explanation, or interpretation of the IEEE."

IEEE-SA Standards Board Operation Manual (subclause 5.9.3)

IEEE 802 Organization



Voting Members: 96

www.ieee802.org/15

802.15 Scope and Purpose

- Initial activities focused on wearable devices hence “personal area networks”
- Focus is on “specialty”, typically short range, communications. If it is wireless and not a LAN, MAN, RAN, or WAN, odds are its 802.15
- Activities are diverse and varied
  - Data rates from 2kbps to 2gbs
  - Ranges from meters to kilometers
  - Frequencies from 400MHz to 800THz
  - Predominantly non TCP/IP applications
- Only 802 Working Group with multiple MACs

802.15 Completed Projects

- 802.15.1 - Original Bluetooth
- 802.15.2 - Coexistence Recommended Practice Bluetooth/802.11
- 802.15.3 - High Rate (55 Mbps) Multimedia WPAN

  15.3 amendments:

  – 802.15.3c - High Rate (>1Gbps) mmWave 15.3 PHY
  – 802.15.3 Revision A - Roll-up of amendments b and c plus conversion from 64 bit to 48 bit MAC addressing
- 802.15.4 - Low Rate (250kbps). Energy Efficient WPAN for WSN type applications

  15.4 amendments:

  – 802.15.4a - Higher data rate 15.4 UWB PHY
  – 802.15.4c - Sub 1 GHz 15.4 PHY for China

802.15 Completed Projects

15.4 Amendments (cont):

- 802.15.4d - Sub 1 GHz 15.4 PHY for Japan
- 802.15.4e - 15.4 MAC Enhancements (GTS among others)
- 802.15.4f - 15.4 PHY for Active RFID
- 802.15.4g - 15.4 PHY for Field Area Smart Utility Networks
- 802.15.4-2011 - 15.4 Roll-up to include 15.4a,c & d
- 802.15.4j - 15.4 PHY using US dedicated medical band
- 802.15.4k - 15.4 PHY for Low Energy Critical Infrastructure Monitoring
- 802.15.4m - 15.4 PHY for operation in TV White Spaces
- 802.15.4n - 15.4 PHY for Chinese Medical Applications
- 802.15.4p - 15.4 PHY for Rail Communications and Control
- 802.15.4q - Ultra Low Power 15.4 PHY

- 802.15.4-2015 - Revision C (bug fixes and roll-up of amendments e,f,g,j,k,m, and p)

802.15 Completed Projects

- 802.15.5 - Mesh Networking Recommended Practice
- 802.15.6 - Body Area Networking for medical and entertainment applications
- 802.15.7 - Visible Light Communications using structured lighting
- 802.15.9 - KMP-Recommend Practice for a 15.4 Key Management Protocol

…Several projects targeting publication in 2017

802.15 Project Stages

3 Main Types of Groups

- Interest Group
  - Determines if sufficient interest to form a Study Group
- Study Group
  - Studies general need
  - Develops PAR and 5 Criteria docs if project is warranted
- Task Group
  - Develops Draft
  - Runs Letter Ballot - 802.15 Voters
  - Runs Sponsor Ballot - Any Voters

802.15 Active Projects/Status

IEEE802.15.3 Amendments:

- 802.15.3d THz band 100Gb/s PHY layer for point to point data center applications

  STATUS: Reviewing proposals

- 802.15.3e High Rate (100Gb/s), Close Proximity Communications using mmWave for 4k HD MPEG file transfers in <250ms total transaction time

  STATUS: in Sponsor Ballot phase, targeting going to Publication in 2017

802.15 Active Projects/Status (cont)

IEEE802.15.4 Amendments/Projects:

- 802.15.4r - Common 15.4 ranging protocol for Location Based Services indoors or out

  STATUS: on hold

- 802.15.4s - MAC enhancement for improved spectrum resource utilization
  - Includes Tx Pwr Control

  STATUS: in Letter Ballot phase

- 802.15.4t Higher Rate Phy (HRP) - PHY capable of 2 Mb/s data rates, utilizing the 2.4 GHz ISM band, having backwards-compatibility to, and the same occupied bandwidth as, the present 2.4 GHz O-QPSK PHY, and be simple to implement.

  STATUS: in middle of Sponsor Ballot phase, targeting going to Publication in 2017

802.15 Active Projects/Status (cont)

IEEE802.15.4 Amendments/Projects (cont):

- 802.15.4u - India Sub 1 GHz PHY (ISB): PHY for 865-867 MHz band in India.

  STATUS: nearing end of Sponsor Ballot phase, targeting going to Publication in 2017

- 802.15.4v - Regional Sub 1GHz Band (RSB):
  - Define 15.4 PHY clause changes to use 870-876 MHz & 915-921 MHz bands in Europe, 902-928 MHz band in Mexico, 902-907.5 MHz & 915-928 MHz bands in Brazil, 915-928 MHz band in Australia/New Zealand that are not in 15.4-2015
  - Update the channel parameters for the 470-510 MHz band in China and the 863-870 MHz band in Europe to align them with current requirements.

    STATUS: in middle of Letter Ballot phase, targeting going to Publication in 2017

802.15 Active Projects/Status (cont)

Revision to IEEE802.15.7 - 2012, Standard for Visible Light Communications.

- Extend spectral range to include near UV and near IR
- Rename to “Optical Wireless Communications”
- Add capability to specifically to address Optical Camera Communications for use with existing as well as future smart mobile devices

STATUS: Resolved Task Group comments on baseline draft D0, in TG D1 review, targeting going to Letter Ballot phase in 2017

802.15 Active Projects/Status (cont)

802.15 New Standards Work:

- 802.15.8 - Peer Aware Communications (PAC)
  - Standard for Infrastructure-less Peer Aware Communications among Mobile Devices

  STATUS: in Letter Ballot phase, resolving comments from 1st Letter Ballot
- 802.15.10 - Recommended Practice for Layer 2 Routing (Mesh Under)

  STATUS: nearing end of Sponsor Ballot phase, targeting going to Publication in 2017

802.15 Active Projects/Status (cont)

802.15 New Standards Work (cont):

- 802.15.12 - Upper Layer Interface (ULI) for 15.4:
  - Make IEEE 802.15.4 easier to use, like 802.11 and 802.3
  - Enable the use of many of the higher layer protocol stacks used by 802.11 and 802.3 without changes
  - Allow 15.4 to address new applications, yet maintain backward compatibility with existing devices and applications
  - Potentially consolidate L2R, KMP, 6T,& 6lowpan in one ULI
  - Will need tight coordination with 802.1 and IETF

  STATUS: Continue to develop content for draft

802.15 Active Project Status

802.15 Interest Groups:

- Dependability IG (IG DEP): seeking to identify non implementation based strategies, which could be standardized, that inherently improve wireless link reliability.
- High Rate Rail Communications IG (HRRC)
- THz IG: Review and discuss the latest advances for using THz bands for wireless date applications

NEW

Low Power Wide Area (LPWA): Defining Objectives

Call tonight @ 10pm Wed. - HK time

Ph: +49 6151 155-9732

Pin: 6117#

802.15 Other Activity

Joint effort with IETF:

- 6Tisch Interest Group-formed to support collaboration and coordination of 802.15 activities/positions with IETF on an activity to utilize capabilities in 15.4e in conjunction with IPv6, specifically time slotted channel hopping (TSCH).

802.15 Future Projects

802.15.4:

- Revision D – anticipated starting in 2017
  (bug fixes and roll-up of amendments q,s,t,u,v,…)

Questions?

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