IEEE 802.15.4 and related standards update

- IEEE 802.15.4 - amendments, corrigendum, and revision
- IEEE 802.15.9 – Key Management Protocol
- IEEE 802.15.10 – Layer 2 Routing
- IEEE 802.15.12 – Upper Layer Interface to 802.15.4

IEEE 802.15.4 Approved Amendments

(Latest Revision: IEEE 802.15.4-2015)

IEEE Std 802.15.4n: IEEE Standard for Low-Rate Wireless Networks - Amendment 1: **Physical Layer Utilizing China Medical Bands**

IEEE Std 802.15.4q: IEEE Standard for Low-Rate Wireless Networks -Amendment 2: **Ultra-Low Power Physical Layer**

IEEE Std 802.15.4t: IEEE Standard for Low-Rate Wireless Networks – Amendment 4: **Higher Rate (2 Mb/s) Physical (PHY) Layer**

IEEE Std 802.15.4u: IEEE Standard for Low-Rate Wireless Networks- Amendment 3: **Use of the 865 MHz to 867 MHz Band in India**

IEEE 802.15.4 amendments in process

IEEE Std 802.15.4s: IEEE Standard for Low-Rate Wireless Networks: **Amendment Enabling Spectrum Resource Measurement Capability**

- spectrum resource measurements, such as packet error ratio, delay, etc,
- information elements and data structures to capture these measurements,
- procedures for collecting and exchanging spectrum resource measurement information with higher layers or other devices.

IEEE Std 802.15.4v: IEEE Standard for Low-Rate Wireless Networks: **Amendment Enabling/Updating the Use of Regional Sub-GHz Bands**

- 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 and Asian regional frequency bands that are not in IEEE Std 802.15.4-2015.

IEEE 802.15.4 Corrigendum

- Two corrections for IEEE 802.15.4-2015 are:
  1. 64-bit MAC address transmission order
     - Transmission order was reversed from earlier standards, this will be corrected, i.e. changed back to original order
  2. Missing value for CID in CCM* Nonce for TSCH mode
     - IEEE 802.15 CID is called out to be inserted into the nonce when using the short address in TSCH mode
     - IEEE 802.15 CID has been approved by IEEE Registration Authority (IEEE RA) with an assigned value of: BA-55-EC
- Estimated approval date is February, 2018

IEEE 802.15.4 Revision

- Changes include:
  - Roll-up of 6 amendments
  - Inclusion of corrigenda and other corrections
  - Correct ambiguities and violations of IEEE style guide
  - Other?
- Major effort will start in July 2017
- Estimated approval date is May, 2019

IEEE 802.15.9 Key Management Protocol (KMP)

- Recommended practice for message exchange framework using information elements (IE) as the transport method for KMP datagrams.
- Guidelines for IEEE 802.15.4 usage of some existing KMPs such as: IEEE 802.1X/MKA, HIP, IKEv2, PANA, Dragonfly, IEEE 802.11/4WH, IEEE 802.11/GKH, ETSI TS 102 887-2.
- Defines a general purpose multiplexed (MPX) data service
- Defines a fragmentation and re-assembly protocol for payloads unable to fit in a single MAC frame.

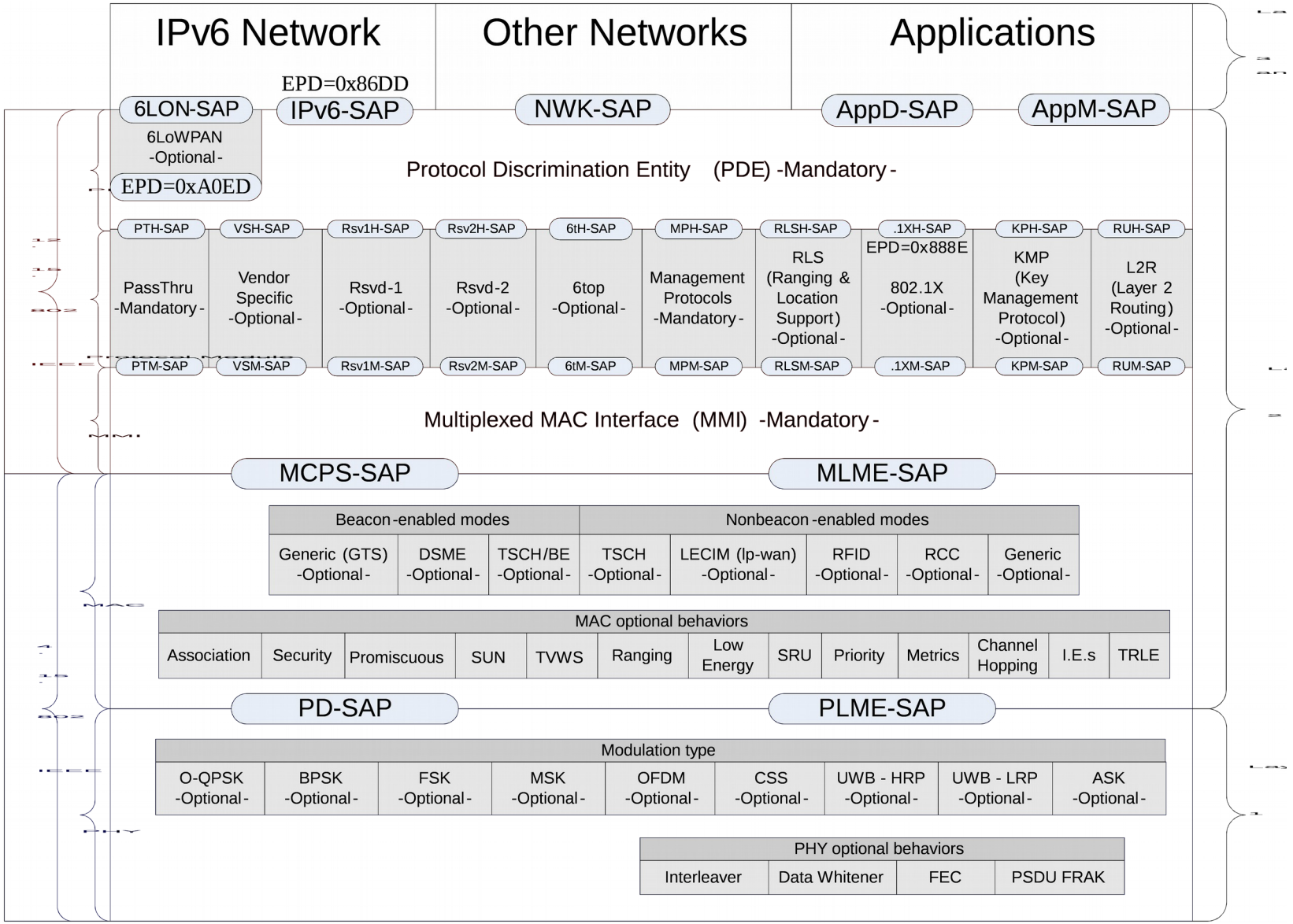
IEEE 802.15.10 Layer 2 Routing (L2R)

- Recommended Practice for L2R:
  - Defines protocols that route packets in a dynamically changing (order of a minute) 802.15.4 network
  - Extends the area of coverage as the number of nodes increase
  - Supports Data Concatenation
  - Supports small, medium and large scale networks
- Overview Tutorial on IEEE 802.15.10:https://mentor.ieee.org/802.15/dcn/17/15-17-0205-00-0010-overview-tutorial-on-802-15-10.pptx

IEEE 802.15.12 Upper Layer Interface for IEEE 802.15.4

- 802.15.12 Presentation to 6tisch was done 3 February https://mentor.ieee.org/802.15/dcn/17/15-17-0113-00-0012-802-15-12-conceptual-overview.pptx. _
- Purpose:
  - Reduction of the complexity in configuring and using the 802.15.4 device
  - Addition of higher layer protocol identification
  - Fragmentation of L3 datagrams
  - Harmonization of L2 protocols
  - Management of 802.15.4 managed objects
- Updates since then:
  - Configuration
  - Network Management

IEEE 802.15.12 paired with IEEE 802.15.4



IEEE 802.15.12 Upper Layer Interface

Configuration

- Approved the concept of profiles where a profile defines all configuration parameters (i.e. data objects) necessary for IEEE 802.15.4 operation,
- Management protocol module would store/access the profile(s) for the IEEE 802.15.4 device and implement them into the device when instructed by a higher layer app or by another protocol module,
- Yang data model initially selected using a format of JSON or XML,
- Growing consensus is that a protocol such as Netconf could provide necessary functionality to extract or install the configuration parameters in an efficient manner, yielding a full, formal application programming interface (API).

Network Management

- Create data objects related to network performance, including those created by IEEE 802.15.4s,
- Leveraging Configuration, would use Netconf with Yang data modeling.

IEEE 802.15.12 Participation

- To complete 802.15.12 in a timely fashion additional participation is requested
- Participation can be via email, conference calls, conference attendance, or all of the above
- Email reflector: stds-802-15-12@listserv.ieee.org
- Conference call: will be set-up
- Conferences:
  - May 7-12, 2017, Daejeon Convention Center, Daejeon Korea, *802 Wireless Interim Session.*
  - July 9-14, 2017, Estrel Hotel and Convention Center, Berlin, Germany, *802 Plenary Session.*
  - September 10-15, 2017, Hilton Waikoloa Village, Kona, HI, USA, *802 Wireless Interim Session.**