IEEE 802 Wireless Summary – Amendments under Development

- **802.11ac** – *Very High Throughput 6 GHz* – 6.9 Gbps data rate; operation in existing 2.4 and 5 GHz bands, but in wider channels (10, 40, 80, 80+80 and 160 MHz channels); beamforming; SU and MU-MIMO (single user and multi-user MIMO); working on comment resolutions on draft 3.0; draft 4.0 expected in September

- **802.11ad** – *Very High Throughput 60 GHz* – 6.8 Gbps data rate in 1.88 GHz wide channel in the 60 GHz unlicensed band; OFDM, SC (single carrier) and low power SC modulations supported; completed letter ballot; expecting draft 3 coming out of the July session; coming to the end of the work; may be ready for RevCom approval in September

- **802.11af** – *TV Whitespace* – operation in the TV Band recently opened by the FCC for unlicensed services; effort focuses on rebanding, including 5 and 10 MHz channels and protocol for communicating with the FCC data base; approved draft 2.0 document 11-12/0809 as clause 23 – TGaf PHY; the new PHY will meet the FCC requirements; document 11-12/0877 explains the new PHY clause; based on TGac PHY, "TVHT" (TV very high throughput)

- **802.11ah** – *Sub 1 GHz* – long-range (1 mile), likely at the expense of throughput; initially targeting 900 MHz unlicensed band, but may also be relevant to 802.11af; channel models also relevant for the Smart Grid project (cross fertilization between projects); 11-11/1137 is the specification framework for TGah

- **802.11ai** – *Fast initialization* – working on SDF (spectrum discovery framework), including active and passive scanning; developing SFD (spectrum framework document)

- **802.11 WNG** – *Wireless Next Generation* – 9 presentations in July; 802.11 links (mesh); non-linear MU-MIMO (more streams, same throughput as 11ac); 6-10 GHz UWB based use of spectrum; next generation post 802.11ac/ad; carrier offloading to Wi-Fi

- **802.11 ARC** – *Architecture* – tracking of the 802 updates; joint work with 802.1 on bridging; TRILL (mesh routing protocol) and 802.11s

- **802.11mb** – *Maintenance* – responsible for integrating new amendments into new releases of the 802.11 standard; with the release of IEEE802.11-2012 this group will be meeting as TGmc in September

- **802.11 ISD SG** – *Infrastructure Service Discovery* – new study group; working to enable 802.11 stations to locate services (e.g. projector) prior to associating with an AP; name changed to Pre-Association Discovery (PAD); reviewing use cases and requirements and scope; working on PAR

- **PAT SG** – *Pre Association Discovery* – will replace ISD SG as of July

- **802.18 RR TAG** – *Radio Regulatory Technical Advisory Group (TAG)* – studying and commenting on the FCC and international spectrum regulations; main focus currently is on 802.11af; TV database is ongoing topic; revisions to 2.4 GHz rules; ETSI ongoing topic; US FCC rule for 5 GHz; working on input to ITU-R from 802.11af; opening

5350-5470 MHz and 5850 to 5925 MHz by NTIA and FCC; NPRM to resolve TDWR radar issue; June 19th TVWS FCC Part 15.700 became law; EU 1st ETSI BRAN meeting on TVWS to begin development of EN 301 598; closely following OFCOM; discussed 900 MHz band interference from Progeny LLC

- **802.19 TAG** – *Coexistence TAG* – discussing coexistence issues between 802 wireless technologies, including 802.11, 802.16, 802.15, etc.; developing coexistence doc; looking at White Space database and coexistence discovery procedures

- **Wi-Fi Alliance** – *liaison report* – WFA now has 385 members; record number of devices being certified; WNM (wireless network management) and other certifications, including power save for handsets and smart grid applications; hostspot 2.0 based on 802.11u and 60 GHz activities; security area around 11w and some work around 11z

- **SG ECSG SC** – S*mart Grid Executive Committee Study Group* – SC (standing committee) serves as a single point of contact and acts as a liaison with regulatory agencies, industry organizations, other SDOs, government agencies, IEEE societies for questions regarding the use of 802 standards in Smart Grid applications

- **IETF** – Mobility EXTensions for IPv6 (mext) group; handover keying (HOKEY); 6 LOWPAN working group related to smart grid; ROLL working group focusing on low power lossy networks; CORE working group security bootstrapping of resource constrained devices; ECRIT (emergency context resolution with internet technologies) – emergency services for devices with no credentials; Geopriv (geographic location and privacy);white space database (paws)

- **IEEE 1905.1** – abstraction layer above MAC (alternate MLME SAP); dynamic routing with end-to-end QoS (neighbor discovery, topology discovery, etc.); works with 1901 (power line), 802.11, 802.3, MOCA; standard to be extendable to other technology; most companies represented in 802.11 are members of 1905.1

- **802.16 Metrology SG** – SG (Study Group) met in May and in July; multiple PARs (project authorization requests) may come out of this; Metrology SG PAR on 802.16.3 mobile broadband performance measurements; higher 802 layers, above layer 2, may be involved

- **802.16 HetNet** – *heterogeneous networking among IEEE 802* – dense overlay deployment of cells; address small cell backhaul; small cells could be 802.11; efficiency of 14 b/s/Hz/sector (4x4 MIMO; 256 QAM)

- **JTC1 SC** – *Interface to ISO SC6 Committee* – reviewing drafts of 802.11ac/ad to get these into the ISO 8802 standards

- **CMMW SG** – *Chinese Mili-Meter Wave* – approved PAR and 5C (project authorization request and 5 criteria); will be TGaj in September

- **802.15.4j** – *medical band* – resolved comments on the letter ballot; discussions with 802.15.4n (Chinese medical band standardization task group)

- **802.15.4m** – *TV White Space* – 3 subgroups, including FSK PHY and OFDM PHY

- **802.15.4n** – *Chinese medical band* – reviewing presentations; reviewed IEEE 11073

- **802.15.4p** – *Positive Train Control* – reviewing technical proposals

- **802.15.8** – *Peer Aware Communications* – application matrix and technical guidance document (TGD); March 2014 ballot
- **802.15.9** – *Key Management Protocol* – reviewing KMP transport mechanism; joint work with 802.1 security working group
- **802.15 Ultra Low Power SG** – working on PAR and 5C
- **Better use of spectrum resources in WPANs IG** (interest group)
- **THz IG** – *Terahertz Interest Group* – discussing ideas on terahertz transmission; have been meeting for 2 years; exploring the space; may form a study group; may do presentation tutorial in November plenary
- **802.15 WNG** – applications for cars, energy, medicine, (document 15-12-0370-00) by Yokohama National University
- **802.21** – 802.21b was published; 802.21c single radio handover TG; 21-12-0067-06 is the draft; 802.21d multicast group management TG; reviewing use cases and requirements

Amendment		Task Group	Standards Board Approval
802.11ad	Very High Throughput 60 GHz	TGad	December 2012
802.11ac	Very High Throughput < 6 GHz	TGac	December 2013
802.11af	TV Whitespace	TGaf	June 2014
802.11ai	Fast initialization	TGai	March 2014
802.11ah	Sub 1 GHz	TGah	March 2015

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