IEEE 802 EC 5G / IMT-2020 standing committee

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- **All IEEE-SA standards meetings shall be conducted in compliance with all applicable laws, including antitrust and competition laws.**
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  - Relative costs, including licensing costs of essential patent claims, of different technical approaches may be discussed in standards development meetings.
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This slide set is available at https://development.standards.ieee.org/myproject/Public/mytools/mob/preparslides.ppt

Agenda for July meeting

- Monday
  - Introduction (118) – Glenn Parsons
    - Role of this standing committee
    - Activity since March
    - Plan for this week
  - IEEE ≥ 5G – Paul Nikolich
  - Draft report (94-06) – Roger Marks
- Tuesday
  - Draft report (94-07) – Roger Marks
  - OmniRAN summary (OmniRAN-45) – Max Riegel
  - Next Steps for the SC – Glenn Parsons
    - Rescope or conclude

Role of the 5G standing committee

Approved Scope

- To provide a report on the following items to the EC:
  - Costs and benefits of creating an IEEE 5G specification
  - Costs and benefits of providing a proposal for IMT-2020, considering possible models of a proposal:
    - as a single technology,
    - as a set of technologies,
    - or as one or more technologies within a proposal from external bodies (e.g., 3GPP)
- During its lifetime, to act as the communication point with other IEEE organizations on this topic.

Organization

- The committee is chartered for 6 months (i.e., due July 2016 at the 802 plenary) as an EC SC (type 2).
  - LMSC P&P section 5.6, item #2
    - The subgroup is responsible for assisting the Sponsor (e.g., drafting all or a portion of a document, drafting responses to comments, drafting public statements on standards, or other purely advisory functions).
- Any 802 WG voting member may participate as a voting member of the committee.

Operating practice

- Leadership
  - Chair – Glenn Parsons
  - Secretary (for this plenary) – Max Riegel
- Consensus
  - Any voting, approvals will be done by the EC
- Attendance credit for 802 WGs
  - policy is per home WG
- Meetings
  - Face-to-face monthly
  - Conference calls weekly, as necessary
- Documents on Mentor
  - Post on EC mentor under “EC 5G SC”

Reflector

- For meeting announcements and discussion
  - stds-802-5g@listserv.ieee.org
- To subscribe
  - Use web interface (preferred):
    - https://listserv.ieee.org/cgi-bin/wa?A0=stds-802-5g
    - Login with your IEEE account email/password
  - Send email to:
    - listserv@ieee.org with content:
    - SUBSCRIBE STDS-802-5G yourname
  - All subscriptions require manual approval by the chair
- Archive
  - There is an archive available on listserv and on the web:
  - http://ieee802.org/Stand_Com/5G/index.html

Meetings

- Face-to-Face Meetings
  - March 14 & 15 – IEEE 802 plenary, Macau, CN
  - May 20 – IEEE 802 wireless interim, Waikoloa, HI
  - May 25 – IEEE 802.1 interim, Budapest, HU
  - June 24 – Ottawa, CA
  - July 25 & 26 – IEEE 802 plenary, San Diego, US
- Conference calls
  - Scheduled weekly – March - July

Conference Calls & Meeting Dates

- March 30 – 10am ET
- ~~April 6 – 6pm ET~~
- April 13 - 10am ET
- April 20 – 6pm ET
- April 27 – 10am ET
- ~~May 4 – 6pm ET~~
- May 11 – 10am ET
- May 20 – 1-4pm HAST
- May 25 – 9-12 CEST
- June 1 – 10am ET
- June 8 – 6pm ET
- June 15 – 10am ET
- June 24 – 9-12 ET
- June 29 – 6pm ET
- ~~July 6 – 10am ET~~
- ~~July 13 – 6pm ET~~
- July 20 – 10am ET
- July 25 & 26 – 7:30-9:30 pm PT

What is 5G?

Did the SC define 5G?

Possible contexts for 5G

- IEEE 5G
  - There is no focus on the ITU-R IMT-2020 submission
    - 3GPP defines solely, or jointly with IEEE 802, the requirements and use cases for IEEE 802 technology
    - This could be equivalent to, or a subset of, 3GPP 5G
- IMT-2020 5G
  - There is an ITU-R IMT-2020 submission
    - By either 3GPP or IEEE 802
    - The requirements placed on IEEE 802 are based on the usage scenarios and capabilities defined by ITU-R M.2083

IEEE ≥5G Initiative

- This is an orthogonal activity
  - IEEE Future Directions
- Its key objectives include:
  - Unification of IEEE's voice in the marketplace
  - Creation of a fully inclusive environment; all IEEE Societies and OU's
  - Coalescing around a common framework for standards
  - Drive and connect Industry, SMEs
- Organize work in Special Interest Groups (SIG)

5G SC report development

Development Philosophy

- Include and describe all options
  - That are derivatives of the four requested cases
- Expand cost/benefit for each
- SC conclusion recommended
  - Consensus preferred on preference
    - not required
    - Worst case straw poll preference
  - Recommend way forward for preference (s)

Proposed Table of Contents

- Introduction
- Options Considered
  1. IEEE 5G
     - Description
     - Benefits
     - Costs
  2. IMT-2020 – single technology
     - Description
     - Benefits
     - Costs
  3. IMT-2020 – set of technologies
     - Description
     - Benefits
     - Costs
  4. IMT-2020 – external proposal
     - Description
     - Benefits
     - Costs
- Conclusion

What are “costs and benefits”?

- This is a cost-benefit analysis
  - But without monetary cost, only relative costs
  - A quantitative pros vs cons
  - Strengths, Weaknesses, Opportunities and Threats
- Brainstorm all costs and benefits
  - E.g., resource cost, installation cost, operational cost, energy cost, etc.
  - Are the unexpected costs?
  - Are there unanticipated benefits?
- Estimate value relative to a baseline

SWOT Template

1.a.i – option name

Objective

Description

Strength	Weakness	Opportunity	Threat
1.	1.	1.	1.
2.	2.	2.	2.
3.	3.	3.	3.
4.	4.	4.	4.

Cost	Benefit

Report format?

- Following Table of Contents
- Slide deck
  - Allowing for figures, tables, conclusions
    - Follow a template for SWOT summary
  - Will continue to progress content on calls
  - Easy presentation to EC
  - Chair could be editor
- Document
  - Allowing for more detailed wording
  - Contributions and offline editing required
  - Will need an overview presentation for EC
  - Would require editor

What are all the derivatives of options?

1. IEEE 5G

- Description
  - Cost/benefit analysis does not include submission to IMT-2020
  - At least simplified architecture , but likely more
  - A combination of multiple IEEE standard technologies, profiled in a single standard

a) IEEE 802 wireless 5G

i. 802.11 only

a. P802.11ax – high aggregate throughput. High density of users.

b. P802.11ay , IEEE Std 802.11ad – high individual throughput, short range.

c. P802.11ah - <1 GHz for IoT requirements

d. 802.11p - wireless access in vehicular environments

ii. 802.15 only

a. P802.15.3d

b. 100Gb/s THz project

c. P802.15.7 REVa, Optical Wireless Communications,

d. P802.15.4 family.

b) "All IEEE 802" 5G

i. And submit to ITU-R as non-IMT (i.e., WAS/RLAN) and complementary to IMT-2020

c) IEEE 802 5G plus others

i. 3GPP 5G

ii. IETF

d) "All IEEE" 5G

i. IEEE 802 and ComSoc projects

e) IEEE 5G plus others

2. IMT-2020 – single technology

- Description
  - Just radio interface of simplified architecture . Single or multiple singles...
  - IMT-2020 proposal by IEEE

a) eMBB(<6GHz)
   i. IEEE 802.11ax
   ii. IEEE 802.11ac
   iii. IEEE 802.11n

b) eMBB (>6GHz)
   i. IEEE 802.11ay
   ii. IEEE 802.11aj
   iii. IEEE 802.11ad

c) UrLLC– IEEE 802.11p

d) mMTC – IEEE 802.11ah

e) eMBB
   a) P802.15.3d
   b) 100Gb/s THz project
   c) P802.15.7 REVa, Optical Wireless Communications,

f) mMTC - P802.15.4 family.

3. IMT-2020 – set of technologies

- Description
  - At least radio interface of simplified architecture , but likely more
  - A combination of multiple IEEE 802 standard technologies, profiled in a single standard
  - IMT-2020 proposal by IEEE

a) IEEE 802.11
   i. eMBB (<6GHz) – IEEE 802.11 ax,ac,n
   ii. eMBB (>6GHz) – IEEE 802.11 ay,aj,ad
   iii. UrLLC– IEEE 802.11p
   iv. mMTC – IEEE 802.11ah

b) IEEE 802.11 with 802.1/3

c) IEEE 802.15
   a) eMBB
      a) P802.15.3d
      b) 100Gb/s THz project
      c) P802.15.7 REVa, Optical Wireless Communications,
   b) mMTC - P802.15.4 family.

d) IEEE 802.11 with 3GPP 5G
   i. LWA
   ii. LWIP
   iii. eLWA
   iv. New?

4. IMT-2020 – external proposal

- Description
  - Part of a complete architecture
  - A combination of IEEE 802 standard technologies with other technologies (e.g., 3GPP)
  - IMT-2020 proposal by external party (e.g., 3GPP)

a) IEEE 802.11 with 3GPP 5G
(no IMT-2020 RIT requested for 802.11)
   i. LWA
   ii. LWIP
   iii. eLWA (Release 14)
   iv. Release 16?

b) IEEE 802.11 with 3GPP 5G
(IMT-2020 RIT requested for 802.11)
   i. New IEEE 802.11 standard for IMT-2020 RIT

Was this easy?

Progress

- Vibrant discussion
  - level set on ITU-R IMT-2020, IEEE 5G , 3GPP 5G and relevant 802 projects
  - 15-40 on conference calls and meetings
    - ~10 core contributors
- Contributions
  - Informal guidance from 802.1 and 802.11
  - SWOT based cost/benefit analysis

Challenges

- There is reduced interest in 5G in 802
  - IMT-2020
    - No value in an independent submission
  - IEEE 5G
    - Uncertain value in describing
- Interest is still more about sufficient spectrum
  - Support, defense, acquisition, …
- View that 802 technology will be used in 5G
  - It is inevitable, so there is nothing extra that we need to do

The draft report

Consensus

- Consensus on the report
- Agreement that the actions are mutually exclusive

Straw polls

- Which action do you support?
  - A
  - B1
  - B2
  - B3
  - None
- Which action is your preference?

Next steps

Options to progress - Action A

- Pre-PAR discussion
  - Industry Connections project
- New PAR
  - EC study group
  - 802.11 study group
  - 802.1 study group
  - 802.1 OmniRAN TG

Options to progress - Action B3

- Proposal development
  - Industry Connections project
  - 802.11 WG – new project?
  - 802.1 WG - OmniRAN
- Liaison with 3GPP
  - EC 5G/IMT-2020 SC
  - 802.24 – new 5G vertical
  - 802.18 WG
  - 802.11 WG – Arch?
  - 802.1 WG - OmniRAN

Possible Re-Scope of SC

- To provide a focal point for coordinating all IEEE 802 activities on 5G with external bodies (e.g., 3GPP)
- During its lifetime, to act as the communication point with other IEEE organizations on this topic.

Industry Connections

- The IC program offers an efficient, economical environment for building consensus and producing shared results, such as.
  - Proposals for standards
  - White papers
  - Peer-reviewed guides and position papers
  - Conferences, workshops and other events
  - Databases and registration services
  - Software, tools and web services
  - Other jointly developed results

Recommendation

1. Declare success and disband 5G SC
2. Action A
   - Organized by 802.1 WG (Industry Connection project)
3. Action B3
   - Organized by 802.11 WG (Liaison with 3GPP)
4. Spectrum issues handled by 802.18
5. Joint 802.1/802.11 meetings as necessary for coordination of actions A & B3