Update on ITU-R Working Party 5D
Actions to Make “IMT for 2020” a Reality

Jim Ragsdale
ATIS WTSC-RAN Chairman

8 June 2015
ITU overview

ITU
Helping the World Communicate

ITU-T
Telecommunication standardization - network and service aspects

ITU-R
Radiocommunication standardization and global radio spectrum management

ITU-D
Assisting implementation and operation of telecommunications in developing countries

193 Member States
>700 Sector Members, Associates and Academia

Helping the World Communicate
IMT activities

- ITU-R has a rich history in the development of radio interface standards for mobile communications. The framework of standards for International Mobile Telecommunications (IMT) encompasses both IMT-2000 and IMT-Advanced systems, these are currently implemented around the world.

- With the approval of Recommendation ITU-R M.1457, ITU established the detailed specifications for IMT-2000 and the first “3G” deployments commenced around the year 2000.


- LTE-Advanced and WirelessMAN-Advanced were the two technologies assessed as being able to meet the stringent performance requirements specified by ITU.
With IMT-Advanced systems in deployment, attention in the industry is now on the “5G” future steps in mobile communications.

There is a necessity to provide by 2020 timeframe, the expected ITU-R outcome of an evolved IMT in support of the next generation of mobile broadband communications systems.

The detailed investigation of the key elements of “IMT for 2020” are already well underway, once again using the highly successful partnership ITU-R has with the mobile broadband industry and the wide range of stakeholders in the “5G” community.

WP 5D is working together with these partners in the same open process to establish the criteria for “IMT for 2020” and the development work is jointly proceeding.

The workplan and timeline for the future development of IMT have been defined and all interested parties are warmly invited to participate in this activity.
WP 5D initiated detailed work in 2012 towards the next generation IMT for the year 2020 and beyond (i.e., “5G”).

- Agreement on a workplan through year 2020 to address constituent parts of “5G” as parts of “IMT for 2020”
- Foundation work now such as technology perspectives and future vision and the more detailed defining information in near future
- Supported the need for additional spectrum for the future success of IMT
- The remaining documents in the foundation set of deliverables will complete in 2015
- Released a detailed time line and action plan for IMT for 2020 to energize and focus the industry “5G” activities through year 2020

The work on the next phases will ramp up in 2016 and early aspects have been initiated towards the radio interface technology or sets of radio interface technologies

- The Report on the Technical Performance Requirements expected of a technology to satisfy “IMT-2020”
- The Report on Specific Requirements of the candidate technology related to submissions, the evaluation criteria and submission templates
- For efficiency, the process and deliverable formats effectively utilized for IMT-Advanced will be leveraged
• **WP 5D also addressed for WRC-15 the future spectrum needs (per the terms of reference of WRC-15 for AI 1.1 & 1.2)**

  - Development of Reports on future market for mobile broadband
  - Development of anticipated spectrum requirements
  - Suggested potential frequency ranges for future use
  - Perspectives on future technology trends aimed at 2020 and beyond to assist national and regional preparations
5G Related Aspects in ITU-R Working Party 5D - Key Current Deliverable Milestones

- A key deliverable, the new Report ITU-R M.2320 “Future technology trends of terrestrial IMT systems” was completed in by WP 5D at end of 2014 and subsequently approved by ITU-R.  
  - This Report provides a broad view of future technical aspects of terrestrial IMT systems considering the time frame 2015-2020 and beyond. It includes information on technical and operational characteristics of IMT systems, including the evolution of IMT through advances in technology and spectrally-efficient techniques, and their deployment.

  - This Recommendation defines the framework and overall objectives of the future development of IMT for 2020 and beyond in light of the roles that IMT could play to better serve the needs of the networked society in the future.
  - In this Recommendation, the framework of the future development of IMT for 2020 and beyond, including a broad variety of capabilities associated with envisaged usage scenarios, are described in detail.
  - Furthermore, this Recommendation addresses objectives of the future development of IMT for 2020 and beyond, which includes further enhancement of existing IMT and development of “IMT-2020”.
5G Related Aspects in ITU-R Working Party 5D - Key Current Deliverable Milestones (2)


  ▪ This Report is to study and provide information on the technical feasibility of IMT in the bands between 6 GHz and 100 GHz.
  ▪ Technical feasibility includes information on how current IMT systems, their evolution, and/or potentially new IMT radio interface technologies and system approaches could be appropriate for operation in the bands between 6 GHz and 100 GHz, taking into account the impact of the propagation characteristics related to the possible future operation of IMT in those bands.
  ▪ Technology enablers such as developments in active and passive components, antenna techniques, deployment architectures, and the results of simulations and performance tests are considered.

• Through the leading role of Working Party 5D, ITU-R proposed in July 2014 its high level view of a defined actionable timeline towards “IMT-2020” – which has established for the industry the target dates for the first release of “5G” to become reality in 2020.

• A detailed timeline picture for “IMT-2020” was widely released by WP 5D in February 2015 which includes information on specific work actions over time by WP 5D and the external organizations through year 2020.

• A detailed deliverables table was also widely released by WP 5D in February 2015 which includes further information on the specific work and the planned deliverables for “IMT-2020” for each meeting of WP 5D through year 2020.

• WP 5D will be developing Circular Letters and Liaisons to define the specific interactions with all relevant industry partners outside ITU-R through the year 2020 and relevant timing milestones for each step of the interactive process.

Note:
• WP 5D is currently using “IMT-2020” as an interim terminology to refer to these systems and has under discussion the specific nomenclature to be adopted for the future development of IMT.
• The use of the term “IMT-2020” is a placeholder terminology and the specific nomenclature to be adopted for the future development of IMT is expected to be proposed by WP 5D in June 2015 and subsequently finalized at the Radiocommunication Assembly 2015.
Key themes on the Timeline & Plan for “IMT-2020”

• Working Party 5D will essentially use the same process and deliverable formats successfully utilized in the development of IMT-Advanced.

• In the next phase, in the 2016-2017 time-frame, WP 5D will define in detail the performance requirements and evaluation criteria and methodology for the assessment of new IMT terrestrial radio interface.

• It is anticipated that the timeframe for proposals will be focused in 2018 (window spans late 2017 to mid-2019).

• In 2018-2020 the evaluation by independent external evaluation groups and definition of the new radio interfaces to be included in “IMT-2020” will take place.

• Working Party 5D also plans to hold a workshop in late 2017 that will allow for an explanation and discussion on performance requirements and evaluation criteria and methodology for candidate technologies for “IMT-2020” that has been developed by WP 5D, as well as to provide an opportunity for presentations by potential proponents for “IMT-2020” in an informal setting.

• The whole process for the initial release of “IMT-2020” is planned to be completed in 2020 when a draft new ITU-R Recommendation with detailed specifications for the new terrestrial radio interfaces of “IMT-2020” will be submitted for approval within ITU-R.

• Enhancement and additional capabilities for “IMT-2020” are expected to start in 2021 and be on-going.
WP 5D Timeline for “IMT-2020” related to the Terrestrial Radio Interface Technology and Systems

Source 5D/929 Att 2.12, Figure 1, Meeting #21 (27 Jan – 4 Feb 2015)

Note: While not expected to change, details may be adjusted if warranted.
### WP 5D Planned Meeting Schedule Up to 2020

<table>
<thead>
<tr>
<th>WP 5D</th>
<th>#</th>
<th>Date</th>
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<th>Description</th>
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<td>23</td>
<td>23 February 16</td>
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<td>14 June 16</td>
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**WRC-19 expected during the first half of 2019**
Important “Technology Proponent Organizations” Milestones on “IMT-2020”

- Workshop: WP 5D Meeting #28 ~ October 2017
- Proposals: WP 5D Meeting #28 - #32 ~ October 2017 – June 2019
- Specifications: WP 5D Meeting #33 - #36 ~ October 2019 – October 2020

Note:
- Is expected that the final specifications for the “global core specification” from the external organizations (the technology proponents) towards the work on Draft new Recommendation ITU-R M.[IMT-2020.SPECS] “Detailed specifications of the terrestrial radio interfaces of “IMT-2020” would be received into WP 5D Meeting #34 (February 2020) at the latest.
- Transposed specifications (from the individual regional or national transposing organizations) would be received at WP 5D Meeting #35 (June 2020) at the latest.
- Details of specific requests for material from the external organizations and relevant timings of the process steps will be communicated through ITU-R Circular Letters and liaisons and is expected to be similar to the process in Docs ITU-R IMT- ADV/24 Rev 2.
"IMT-2020" Standardization Process

- Development Plan
- Market/Services View
- Technology/Research Kick Off
- Vision - IMT for 2020
- Name
- < 6 GHz Spectrum View
- Process Optimization

2012-2015

- Spectrum/Band Arrangements (post WRC-15)
- Technical Performance Requirements
- Evaluation Criteria
- Invitation for Proposals
- Sharing Study Parameters (IMT-WRC-19)
- Sharing Studies (WRC-19)

2016-2017

- Proposals
- Evaluation
- Consensus Building
- CPM Report (IMT-WRC-19)
- Sharing Study Reports (WRC-19)

2018-2019

- Spectrum/Band Arrangements
- Decision & Radio Framework
- Detailed IMT-2020 Radio Specifications
- Future Enhancement/Update Plan & Process

2019-2020

Setting the stage for the future: vision, spectrum, and technology views

Defining the technology
## WP 5D deliverables initiated in 2015 to complete in 2016

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## WP 5D deliverables initiated in 2016 to complete in 2017

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<tr>
<td>6</td>
<td>Circular Letter “IMT-2020”</td>
<td>The official ITU-R announcement of the “IMT-2020” process and the invitation for candidate technology submissions</td>
<td>Meeting #23 (February 2016)</td>
<td>Meeting #27 (June 2017)</td>
<td>Circular Letter 5/LCCE/2 and Addenda “Invitation for submission of proposals for candidate radio interface technologies for the terrestrial components of the radio interface(s) for IMT-Advanced and invitation to participate in their subsequent evaluation”</td>
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# WP 5D deliverables initiated in 2017 to complete in 2019

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<tr>
<td>7</td>
<td>Doc. “IMT-2020”/YYY Input Submissions Summary</td>
<td>Capturing in ITU-R documentation the inputs documents and the initial view of suitability as a valid submission</td>
<td>Meeting #28 (October 2017)</td>
<td>Meeting #32 (June 2019)</td>
<td>For example, Documents IMT-ADV/4 thru IMT-ADV/9 “Acknowledgement of candidate submission from ……under step 3 of the IMT-Advanced process (….. technology)”</td>
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<td>8</td>
<td>Doc. “IMT-2020”/ZZZ Evaluation Reports Summary</td>
<td>As the evaluation of each candidate technology proceeds the results of each evaluation of each technology by the different evaluation groups must be documented and analyzed by WP 5D towards the final evaluation assessment</td>
<td>Meeting #31 (October 2018)</td>
<td>Meeting #34 (February 2020)</td>
<td>For example, Documents IMT-ADV/10 thru IMT-ADV/23 “Evaluation IMT-Advanced candidate technology submissions in documents IMT-ADV/xyz by XYZ Evaluation Group”</td>
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### WP 5D deliverables initiated in 2019 to complete in 2020

|------|----------------------------------------|-----------------------------------------------|-----------------------------|---------------------------------------|-----------------------------|
Coordination with activities in External Entities engaged in 5G developments

Liaisons dispatched from WP 5D in February 2015 to the following entities provided the detailed time plan and requested certain information:

- 3GPP,
- 3GPP2,
- 4G Americas,
- 5G Infrastructure Public Private Partnership (Europe),
- 5G Innovation Centre,
- APT Wireless Group,
- Fifth Generation Mobile Communications Promotion Forum (Japan),
- ARIB,
- ATIS,
- CCSA,
- CDG,
- ETSI,
- EU METIS Project,
- GSMA,
- IEEE,
- IMT-2020 Promotion Group (China),
- ITRI,
- NGMN,
- NYU Wireless,
- Telecommunications Standards Development Society (India),
- TIA,
- TTA,
- TTC,
- UMTS Forum,
- WiMax Forum,
- Wireless World Research Forum
- ...

We welcome any other interested partner
Liaison to External Organizations and Research Entities engaged in “5G” development requesting an update on IMT activities

Request for Information (providing a focal point for the global activities)

- In early 2014, Working Party 5D held a workshop on “Research Views on IMT Beyond 2020” and at that time had the opportunity to hear the perspectives of various organizations and entities engaged in the developmental activities on future systems commonly referred as “5G”.
- Recognizing that progress on the development of “5G” has occurred since then, Working Party 5D has requested information to our June 2015 meeting on:
  - the current status of the work and conclusions that may have been reached on “5G”
  - and on the respective planned work programs for the remainder of 2015 and into 2016 (if available).
  - Of particular interest to WP 5D are updates that might relate to “the general technical performance requirements of a radio interface technology or set of technologies for 5G”.

Initiating the Work in WP 5D of the Detailed Technical Performance Requirements Deliverable (setting the stage in June 2015)

- The information will be utilized by WP 5D in organizing the detailed work that is scheduled to begin at WP 5D Meeting #23 in early 2016
- The updates will assist WP 5D in understanding how WP 5D might further appropriately engage with the recipients of the liaison as the work on “IMT-2020” continues to unfold.
- Additional liaisons are anticipated as the detailed work on “IMT for 2020” in WP 5D begins to address other 2016/2017 deliverables such as the evaluation criteria and methods.
Conclusions

• The development of **IMT-2000** and **IMT-Advanced** has been an open, collaborative process involving the ITU’s Member States, national and regional standards development organizations, equipment manufacturers, network operators, academia and industry fora, and our collective achievement will be considered as a "model" for "IMT-2020"

• Frequent interactions between ITU, SDOs and other partners (Operators, Industries, Academia, Regulators, etc...) using coordinated work plans aim to achieve year 2020 with a new standard in place

• ITU, accompanied by the support of its membership, feels comfortable that this is achievable and is the way to contribute to a connected society
Thank You
ADDITIONAL MATERIAL FOR INFORMATION
• **Recommendation ITU-R M.2070** - Generic unwanted emission characteristics of base stations using the terrestrial radio interfaces of IMT-Advanced.

• **Recommendation ITU-R M.2071** - Generic unwanted emission characteristics of mobile stations using the terrestrial radio interfaces of IMT-Advanced.


• **Report ITU-R M.2334** - Passive and active antenna systems for base stations of IMT systems.
2013 Deliverables completed and approved that support WRC-15

- **Recommendation ITU R M.1768-1** - Methodology for calculation of spectrum requirements for the terrestrial component of International Mobile Telecommunications


- **Report ITU-R M.2291** - The use of International Mobile Telecommunications (IMT) for broadband public protection and disaster relief (PPDR) applications

- **Report ITU-R M.2292** - Characteristics of terrestrial IMT-Advanced systems for frequency sharing/interference analyses
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<td>Ms. Anne Leino</td>
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<td>SWG OUT OF BAND EMISSIONS</td>
<td>Mr. Uwe Löwenstein</td>
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<td><strong>AH WORK PLAN</strong></td>
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<td>Dr. Håkan Ohlsten</td>
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</table>
• **Reference Links:**
  - WP 5D Home Page
  - WP 5D “IMT-2020” Page
  - Report of WP 5D Meeting #21 (TIES restricted access)

• **ITU-R Key 2015 Meeting Schedule**
  - WP 5D Meeting #21: 27 Jan–4 Feb 2015 (Auckland, New Zealand)
  - CPM 15-2: 23 March-2 April 2015 (Geneva)
  - WP 5D Meeting #22: 10-18 June 2015 (San Diego)
  - Study Group 5: 20-21 July 2015 (Geneva)
  - RA-15: 26-30 October 2015 (Geneva)
  - WRC-15: 2-27 November 2015 (Geneva)