Group	**IEEE 802 5G/IMT-2020 Standing Committee**	
Title	***Report on ITU-R WP 5D Meeting #23***	
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Abstract	This document contains a report on ITU-R WP 5D Meeting #23 of February/March 2016. The report is intended for the IEEE 802 5G/IMT-2020 Standing Committee and may be of interest to other groups within IEEE as well.	
Purpose	For information only.	
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Report on ITU-R WP 5D Meeting #23

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Abstract

This document contains a report on ITU-R WP 5D Meeting #23 of February/March 2016. The report is intended for the IEEE 802 5G/IMT-2020 Standing Committee and may be of interest to other groups within IEEE as well.

Background and Summary

Working Party 5D (WP 5D) held its Meeting #23 in Beijing, China on 23 February – 2 March 2016. The Chairman's Report of the meeting will be available in ITU-R 5D/82. This was the first meeting of WP 5D in the new study period, following the 2015 World Radiocommunication Conference (WRC-15) and the 2015 Radiocommunication Assembly (RA-15), which established the overall assignments of the WP. Although the study period was just beginning, the WP maintains detailed forward-looking work plans, and many of the decisions of WRC-15 and RA-15 (including the existence of the WP and its responsibilities) were aligned with the WP's proposals. Therefore, on a number of topics, the ongoing work was as previously expected, particularly regarding the IMT-2020 program. That program received contributions to Meeting #23 from several sources, and work consequently progressed accordingly. In other areas, such as future IMT spectrum identification at WRC-19, new work was initiated in accordance with WRC-15 decisions. In all, 14 WRC-19 agenda items are associated with WP 5D in some capacity.

The top leadership of WP 5D at this meeting was identical to that of the prior study period. The Chair, Stephen Blust, was absent due to a personal issue.

I was the only IEEE delegate to the meeting. I attended mostly meetings under WG Technology, but attended a few other meetings based on scheduling. IEEE submitted no contributions.

WP 5D and Meeting #23

The purview of WP 5D continues to be "IMT Systems," where "IMT" represents "International Mobile Telecommunications." Note, for contrast, the ITU-R Working Party 5A addresses "Land mobile service *excluding* IMT" (along with amateur services). Somewhat anomalously within ITU, IMT technologies have their own Working Party.

In typical years, excluding WRC years, WP 5D meets three times. Meeting #23 took place over seven meeting days (Tuesday-Friday of the first week and Monday-Wednesday of the second. In the past, six-day meetings were typical, but seven-day meetings are currently presumed for the foreseeable future. Subsequent meetings in 2016 are planned for 14-22 June and 4-12 October.

At Meeting #23, the WP addressed 78 new input contributions and approximately 23 others carried forward from the prior study period. The attendance was approximately 220. There were 154 on government-led delegations, 21 representing operators, 50 representing other industry, 6 from associations, 2 from universities, and 1 staff. Some participants wear multiple hats. China, the host, had the largest delegation, with 38, and another 32 from Chinese industry.

Working Groups

WP 5D includes three Working Groups: WG General Aspects, WG Spectrum Aspects, and WG Technology

Aspects. In addition, Ad Hoc Workplan helps to coordinate the activity.

WG General Aspects

WG General Aspects included three sub-WGs (SWGs): SWG PPDR, SWG IMT-AV, and SWG Circular.

SWG PPDR is mainly working to revise Report ITU-R M.2291 on the use of IMT for broadband public protection and disaster relief applications. It considered information on LTE, and it communicated with 3GPP.

SWG IMT-AV is a new SWG initiated in response to a proposal from a single company member towards a new Report on television distribution using IMT in the frequency range 470-698 MHz.

SWG Circular is developing the IMT-2020 Circular Letter that will invite the submission of IMT-2020 proposals as well as the formation of independent evaluation groups to submit evaluations of the proposals. The initial version of that Circular Letter was completed (5D/TEMP/61r1) and will be prepared for release soon; a work plan was agreed to add additional addenda, specifying the process, technical requirements, and evaluation criteria, by June 2017, as those addenda become available. The Circular Letter will be posted on the future "Web page for the IMT-2020 submission and evaluation process." For information, see the WP 5D web page <http://www.itu.int/ITU-R/go/rwp5d>.

SWG Circular also developed and completed a second document, on IMT-2020 background, to be known as "IMT-2020/001." The IMT-2020 document series will be posted to the future IMT-2020 web site.

WG Spectrum Aspects

WG Spectrum Aspects included three sub-WGs (SWGs): SWG Frequency Arrangements, SWG Sharing Studies, and SWG Work for TG 5/1.

SWG Frequency Arrangements is beginning to revise Rec. ITU-R M.1036, which addresses frequency arrangements for bands identified for IMT in the Radio Regulations. This work recommends the use of FDD and TDD bands in order to provide international harmonization.

SWG Sharing Studies was very active preparing a Recommendation on modeling and simulation of IMT networks for use in sharing and compatibility studies. It is also preparing a report studying compatibility between FSS networks and IMT systems in 3.4-3.6 GHz for small cell deployment, but this work might not continue.

SWG Work for TG 5/1 is a new SWG responsible for work related to the new Task Group 5/1 (under ITU-R Study Group 5) that is addressing spectrum needs for IMT in the frequency range between 24.25 GHz and 86 GHz. WP 5D is required to report its studies by 31 March 2017, so this will be an intensive activity. The SWG decided it will focus on delivering a liaison statement to TG 5/1 with two annexes, one on spectrum needs and a second on technical and operational characteristics, including protection criteria and deployment scenarios. The SWG developed a liaison statement, subsequently sent to various external organizations, including IEEE, entitled "Characteristics of IMT systems for frequency sharing/interference analysis, 24.25-86 GHz." The statement asks for initial system characteristics by October and final system characteristics by February 2017.

WG Technology Aspects

WG Technology Aspects included five sub-WGs (SWGs): SWG OOBE, SWG IMT Specifications, SWG Radio Aspects, SWG Coordination, and SWG Evaluation.

SWG OOBE addresses out-of-band emissions and began to initiate revision of Recommendations ITU-R M. 2070 and M.2071, which address IMT-Advanced. Inputs from 3GPP were considered. The work is expected to conclude at the next meeting.

SWG IMT Specifications is currently concerned with maintenance of the existing IMT-2000 and IMT-Advanced standards, which are revised in alternate years. It continued with the development of Revision 13 of Rec. ITU-R M.1457, the IMT-2000 standard. No input toward the IEEE element of the standard was proposed for this revision. In initial preparation for developing Revision 3 of the IMT-Advanced standard (Rec. ITU-R M.2012), a schedule was sent to External Organizations, including IEEE. Note that the schedule allows for the contribution of new technologies as well as the update of existing technologies; for example, IEEE could contribute an update of the existing IEEE IMT-Advanced technology, including material (such as an additional radio interface) that differs substantially from the current content. Based on the process requirements, such a technology update would require significantly less effort than a contribution of a new technology proposal.

SWG Radio Aspects began its work toward the development of a draft new Report, with the temporary designation M.[IMT-2020.TECH PERF REQ], to represent the IMT-2020 technical requirements. A working document was created (5D/TEMP/68). A workplan for development was prepared, indicating the following key intentions:

Meeting No. 24 (June, 2016)

1. Finalize the list of technical requirements (i.e., the parameters).
2. Preliminarily agree to the detailed definition of each technical requirement.
3. Discuss the preliminary target value(s) for each technical requirement.

Meeting No. 25 (October, 2016, TBD)

1. Agree with the detailed definition of each technical requirement.
2. Discuss and preliminarily agree to the target value(s) for each technical requirement.

Meeting No. 26 (February, 2017, TBD)

1. Agree to target values for each technical requirement

In 5D/TEMP/68, the eight “key capabilities” are those specified in ITU-R M.2083 (“IMT Vision – Framework and overall objectives of the future development of IMT for 2020 and beyond”):

- Peak Data Rate
- User Experienced Data Rate
- Latency
- Mobility
- Connection Density
- Energy Efficiency
- Area Traffic Capacity
- Spectrum Efficiency

In addition, 5D/TEMP/68 includes proposed definitions of other proposed parameters. The full list is:

- Peak data rate
- User experienced data rate
- User plane Latency
- Mobility
- Connection density
- Network Energy efficiency

- Device Energy efficiency
- Spectrum efficiency
- Area traffic capacity
- Spectrum flexibility
- Bandwidth flexibility
- Reliability
- Operational lifetime
- Bandwidth
- Support for wide range of services
- Mobility interruption time
- Peak spectral efficiency
- 5th percentile user spectrum efficiency
- 50%-tile of user data rate
- 50th percentile user spectrum efficiency
- Control plane latency
- Latency for infrequent small packets
- Coverage
- Group handover capability
- Inter-system handover
- Signalling overhead
- VoIP Capacity

SWG Evaluation began its work toward the development of a draft new Report, with the temporary designation M.[IMT-2020.EVAL], to represent the IMT-2020 evaluation methodology. Two co-chairs, new to WP 5D leadership, were designated. A working document of M.[IMT-2020.EVAL] was developed (5D/TEMP/73). The discussion centered on the test environments to be used for evaluation and on the development of IMT-2020 evaluation channel models.

The test environment issue is crucial. As background, the IMT-Advanced evaluation process specified evaluation of proposals in four "test environments," each addressing one "deployment scenario" (indoor hotspot, urban micro-cell, urban micro-cell, and rural/suburban macro-cell) with one or more "mobility classes" and in a specified frequency range. IMT-2020 adds an important complication in that it will address not one usage scenario (mobile broadband) but instead three usage scenarios (enhanced mobile broadband [eMBB], ultra-reliable and low-latency communications [URLLC], and massive machine type communications [mMTC]; for details, see Rec. ITU-R M.2083). The SWG tentatively decided to consider three test environments (indoor hotspot, dense urban, and rural) in relation to eMBB. However, no clear general direction was established regarding test environments, whether the set of test environments would apply equally to each usage scenario, or whether different test environments would apply to the various usage scenarios. Also, in the IMT-Advanced process, a decision was reached that a SRIT (set of radio interface technologies, or RITs) would be considered

to be “IMT-Advanced”-qualified only if it could meet the requirement of at least three test environments. Eventually, a parallel decision is likely to follow in the IMT-2020 case as to how many test environments, addressing how many usage scenarios and at what frequency ranges, will be required of the SRIT. These decisions will be critical to establishing the required breadth of the proposal to cover a range of scenarios, and therefore of the required complexity of IMT-2020 SRITs.

SWG Evaluation included a sub-activity on channel models to be used in IMT-2020 technology evaluation. Revised models may be required due to wider bandwidths than IMT-Advanced as well as to the WRC-19 agenda item for IMT identification in the 24-86 GHz range. The SWG decided not to send a liaison to external organizations (which will include IEEE) at this time; such a liaison is expected following Meeting #24. However, a liaison to ITU-R Study Group 3 Working Parties was prepared, explaining that it is developing channel model(s) for the evaluation of IMT−2020 candidate technologies in frequency bands up to 100 GHz, “derived from extensive measurement and simulation results,” to address multiple scenarios. Some tentative decisions regarding the channel model were carried forward in (5D/TEMP/74).

SWG Coordination was re-established, after many years of inactivity, with the same chair from its prior work on IMT-Advanced. It began its work toward the development of a draft new report with the temporary name M. [IMT-2020.SUBMISSION], to represent the IMT-2020 submission process, procedures, and submission templates. A new working document for that report was created. The SWG also began working on a second, less formal document, to be entitled IMT-2020/002 and covering the submission, evaluation process and consensus building; a preliminary draft document was developed. These are important documents, but the critical information at this time is mostly editorial or procedural while the SWG awaits the technical output of the other SWGs. Eventually, some critical decisions will probably be made in the SWG and reflected in the process, most notably on operational requirements such as the required number of usage scenarios and test environments for an SRIT to be qualified for standardization.

Role of Unlicensed Technology in IMT-2020

I spoke with many WP 5D delegates regarding their views of IMT-2020, particularly regarding the inclusion in IMT-2020 of technologies fundamentally designed for dispersed unlicensed use. A variety of views were expressed. Participants generally recognize that the Radio Regulations do not specify whether spectrum is to be licensed or not; that is a decision left to regulators. However, many participants took the view that IMT spectrum is implicitly presumed to be for exclusive licensing. Some of these recognized that some of the proposed new WRC-19 spectrum (24-86 GHz), especially at the higher end, would not rationally be licensed exclusively, which leads to a perceived unresolved inconsistency. One regulator indicated that, partly due to this inconsistency, the higher frequencies under consideration are unlikely to be identified for IMT by WRC-19. On the other hand, other regulators indicated that the higher frequencies are the most likely to be the ones identified because they are the least encumbered; one suggested that the parties who encouraged their inclusion did damage to the prospect of more practical bands at the lower frequencies.

Staff of one regulatory body offered the opinion that all spectrum referenced in the Radio Regulations is inherently intended for exclusive licensing and that therefore license-exempt operations have no place within IMT. The premise was that the purpose of the Radio Regulations is to provide international agreements to avoid interference at national borders and that, unless operations are licensed, the government has no ability to oversee the operations and ensure that are consistent with the international commitments. I explained that I cannot fully understand that argument, since some governments take responsibility to ensure that even license-exempt operations are conducted under specific technical requirements. Currently, it appears that some regions are trending toward more explicit coexistence requirements for license-exempt operation.

Participants should also note that at least one existing IMT technology is widely deployed on a license-exempt basis. Namely, DECT is an IMT-2000 technology and is regularly updated in Rec. ITU-R M.1457.

Several participants recommended that stakeholders in license-exempt technologies would be best advised to focus on the 5 GHz band, which will be subject to extensive discussions at WRC-19.

IMT-2020 Effort

I spoke with several delegates about a possible IEEE proposal of an IMT-2020 RIT or SRIT. One member encouraged such a proposal. Some who had participated in prior IEEE proposals toward IMT-2000 and IMT-Advanced were quite cautious and wanted to ensure that IEEE participants be well aware of the very high level work level commitments necessary to progress such a proposal. They warned in particular of the need, beyond internal preparation work, to ensure participation with many active administrations to ensure that governmental representatives are well informed and advised. They also suggested the need to involve a broad complement of participants directly in the WP 5D process, particularly participants familiar with the process. I was also asked by the WP 5D Counselor, who leads the activity from the staff side, to encourage IEEE participation in IMT-2020.

Recommendations

If IEEE 802 has a potential interest in bringing new technology into IMT and therefore subject to IMT spectrum identification under the Radio Regulations, it should consider whether such technologies should be brought into IMT via the IMT-2000 or IMT-Advanced procedures, which will be much easier than IMT-2020 and offer earlier introduction into IMT and equal status under the Radio Regulations. The next opportunity is with the development of Revision 3 of the IMT-Advanced Standards (Rec. M.2012). For more information, refer to the liaison statement and its detailed schedule.

If IEEE 802 has a potential interest in bringing new technology into IMT-2020, it should consider developing contributions, as an IEEE member, that will advance WP 5D's work toward drafting the critical documentation. The deadline toward Meeting #24 is 6 June. Contributions on test environments and technical performance requirements would be timely. IEEE should also consider a contribution on channel models to Meeting #24. Such a contribution would aid in development of the channel models, steer those models toward alignment with IEEE research results, provide an opportunity to highlight IEEE expertise in standardization at these frequencies and channel bandwidths, and serve an an indicator of IEEE's attention to WP 5D's progress toward IMT-2020.

A response to the liaison statement on 24-86 GHz characteristics could be considered in time for the October meeting. Although the characteristics are intended only for sharing study purposes, a contribution could be an opportunity to relay an initial high-level description of 802-based radio systems.