SUMMARY REPORT
ON
Working Party 5D

27th Jan – 4th Feb 2015
Auckland/New Zealand

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1. Abstract

ITU has a rich history in the development of radio interface standards for mobile communications. The framework of standards for International Mobile Telecommunications (IMT), encompassing IMT-2000 and IMT-Advanced, spans the 3G and 4G industry perspectives and will continue to evolve as 5G with "IMT-2020".

The 21st WP 5D was held in Auckland, New Zealand form 27th Jan to 4th Feb. The meeting started with first Plenary on 27th Jan 2015 follows by Working Group, Sub Working Group and Drafting Group meeting. On the last day on 4th Feb, the meeting closed with Plenary. There were three working group i.e Working Group on General Aspect, Working Group on Spectrum Aspect and Working Group on Spectrum. In early 2012, ITU-R embarked on a programme to develop "IMT for 2020 and beyond", setting the stage for "5G" research activities that are emerging around the world. Through the leading role of Working Party 5D, ITU's Radiocommunication Sector (ITU-R) is finalizing its view of a timeline towards "IMT-2020". In 2015, ITU-R plans to finalize its "Vision" of the "5G" mobile broadband connected society. This view of the horizon for the future of mobile technology will be instrumental in setting the agenda for the World Radiocommunication Conference 2015, where deliberations on additional spectrum will take place in support of the future growth of IMT.

2. List of Participants

At the 21st meeting of WP 5D was attended by over 116 delegates from 19 countries and 39 delegates from Scientific or Industrial Organization (Appendix 1)

3. Introduction /Background

The meeting is organized by International Telecommunication Union (ITU) Radio communication Sector and hosted by the Ministry of Business, Innovation and Employment on behalf of the New Zealand Administration. ITU-R WP 5D is responsible for the overall radio system aspects of International Mobile Telecommunication (IMT) systems, comprising of the current IMT-2000 systems and future development and evolution of the IMT standardization.

In early 2012, ITU-R embarked on a program to develop "IMT for 2020 and beyond", setting the stage for 5G research activities. In 2015, ITU-R plans to finalize its "Vision" of "5G" mobile broadband connected society. This view of the horizon for the future of the mobile technology and setting the agenda for the World Radiocommunication Conference 2015, where deliberation on additional spectrum will take place in the support of the future growth of IMT.

4. Agendas/Topics

ITU-R WP 5D engaged in a wide range of activities for IMT-2020 and beyond which is now known as IMT2020. The use of term IMT-2020 has being adopted for the future development of IMT and is expected to be finalized at Radiocommunication Assembly 2015.The IMT related activities to address the terrestrial IMT technology aspects and enablers considering the approximate timeframe 2015-2020 and beyond for system deployment, including aspects of terrestrial IMT systems related to WRC-15 studies as part of its scope. These activities include new information and deliverables to guide the continuing evolution of terrestrial IMT. At a high level the work is organized in the broad categories related to Working Group on General Aspects, Working Group on Technology Aspect and Working Group on Spectrum Aspect. These Working Groups were further subdivided into Sub-Working Group and Drafting Group.

The topics discussed during ITU-R WP 5D are the development of the new draft on Recommendation ITU-R,[IMT.VISION](Appendix 4) which addresses the longer term vision for 2020 and beyond and will provide a framework and overall objectives of the future developments of IMT. The development of new draft Report ITU-R M.[IMT.ABOVE 6GHz] (Appendix 3) also being discussed to provide information on the study of technical feasibility of IMT in the bands above 6 GHz. Agenda for the closing Plenary is shown in Appendix 2. Figure 1 shows the schedule for the last day of WP5D meeting

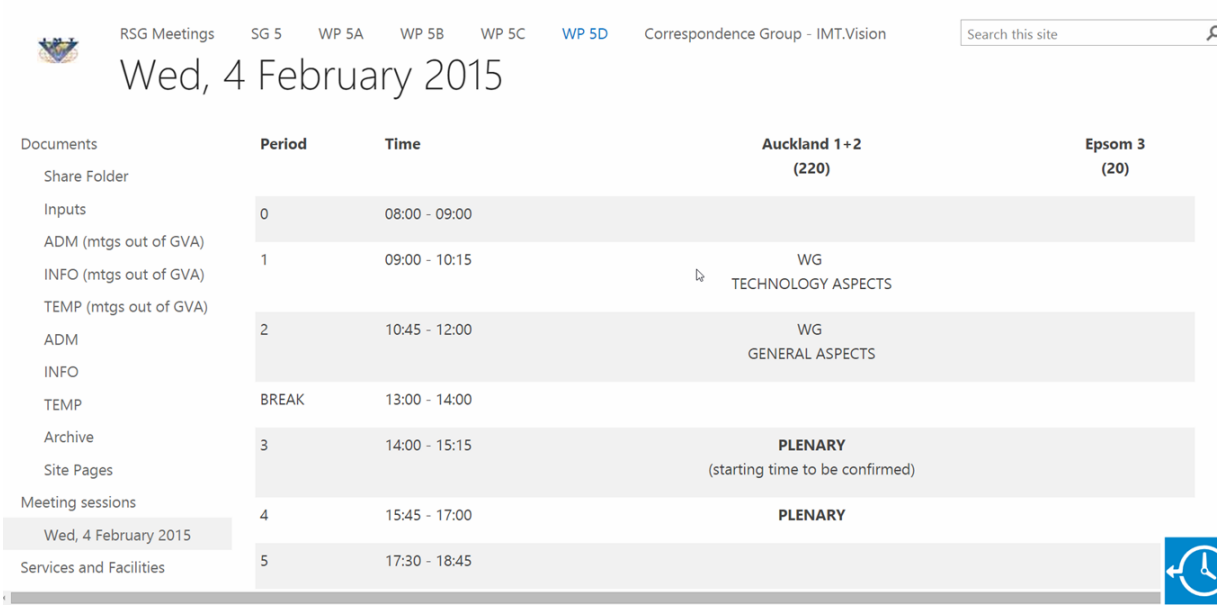


Figure 1: Example of Schedule for WP 5D meeting

Below is the expected recommendation and report to be achieved by WP5D.

Draft new Recommendation ITU-R M.[IMT.VISION] *(June 2015)*
This activity is to address the longer term vision for 2020 and beyond and will provide a framework and overall objectives of the future developments of IMT. (Appendix 4)
Draft new Report ITU-R M.[IMT.ABOVE 6 GHz] *(June 2015)*
The purpose of this report is to provide information on the study of technical feasibility of IMT in the bands above 6 GHz. (Appendix 3)

5. Findings

There are 150 input contributions and 67 temporary being produced during the meeting. The input contributions were from Korea, United Kingdom, United States of America, France, India, Canada, Japan, China, Germany, Egypt, Asia-Pacific Telecommunity (APT) and Industries. Figure 2 shows overview of timeline for IMT development and deployment. It is expected that the deployment of IMT-2020 will be after year 2020 after the development has been completed. As shown in Figure 1, the development for IMT2000 previously known as Future Public Land Mobile Telecommunication System (FPLMTS) started in 1985 until 2000. The development of IMT-Advanced started in year 2000 until year 2012 and this follows by the development of IMT-2020 from year 2012 until year 2020.

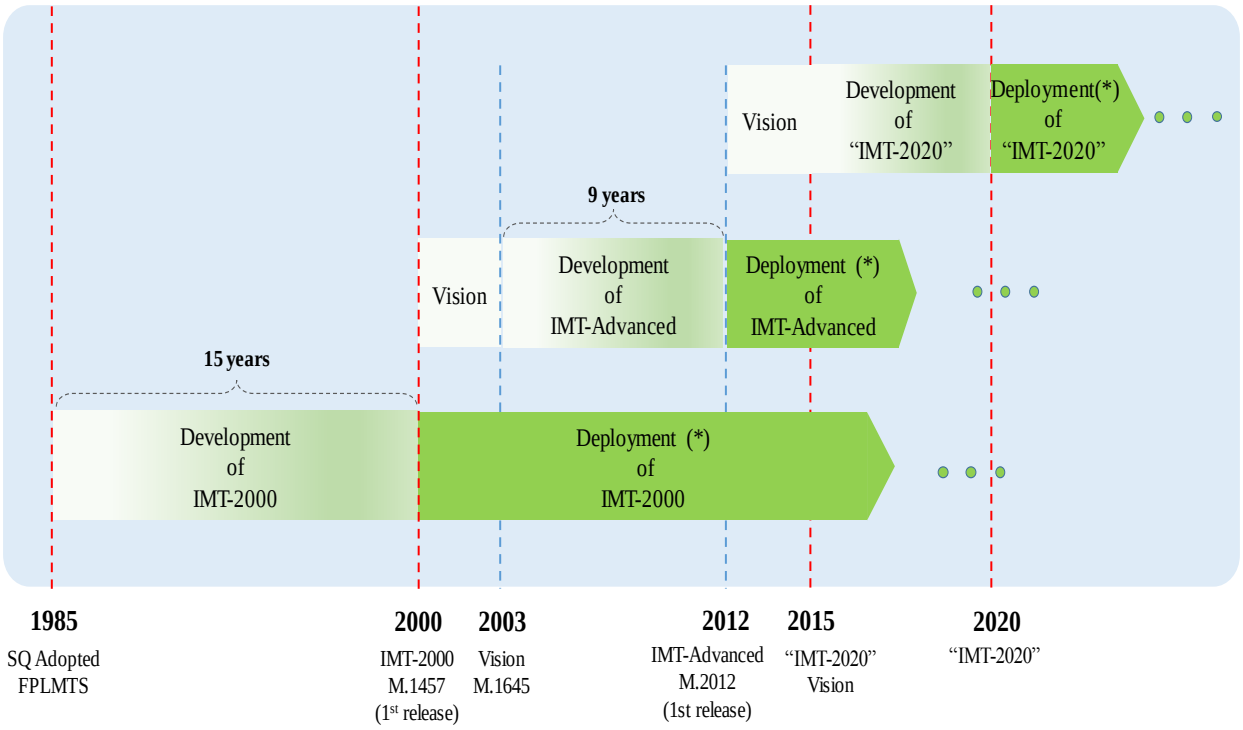


Figure 2: Overview of timeline for IMT development and deployment

Figure 3 shows the evolution from IMT-Advanced towards IMT-2020. IMT-2020 will be considered as evolution from the existing IMT-Advanced plus the integration with new Radio Access Technologies (RAT) such as device to device communication and machine to machine communications. It is expected that new frequency spectrum in millimetre bands above 6GHz will be required with small cell and antenna with steerable beam in order to provide high capacity system for IMT-2020 or "5G".

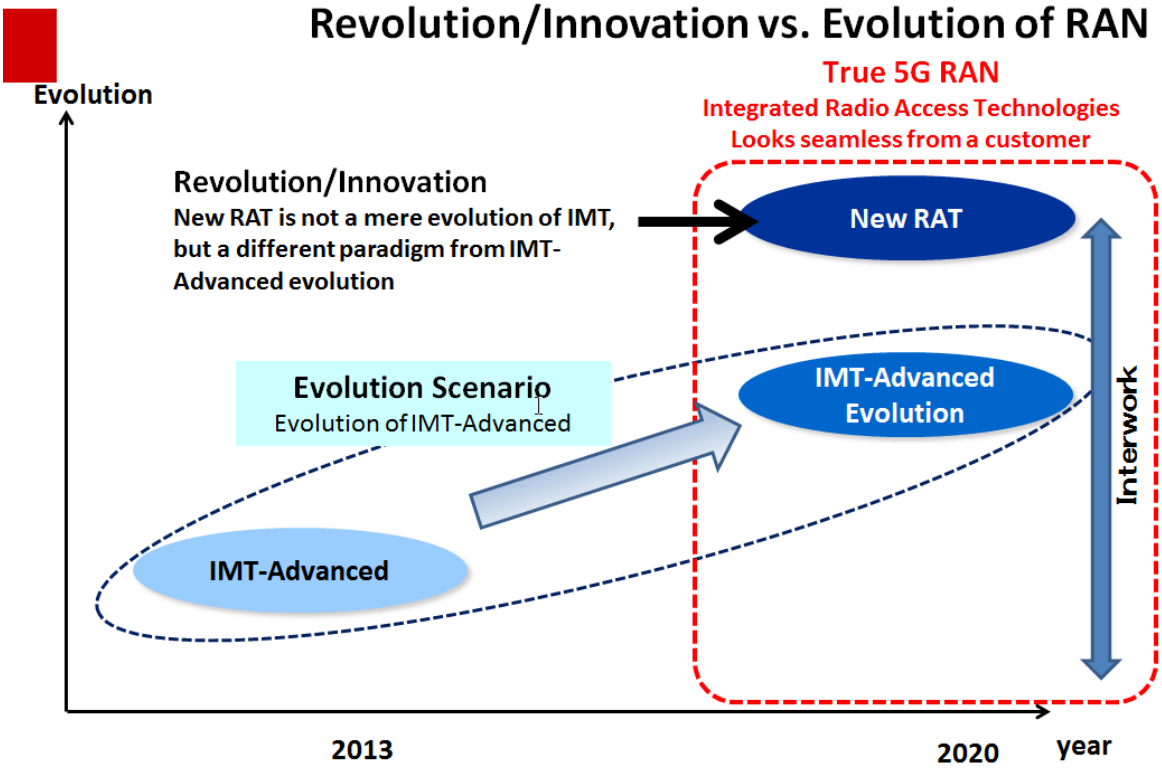
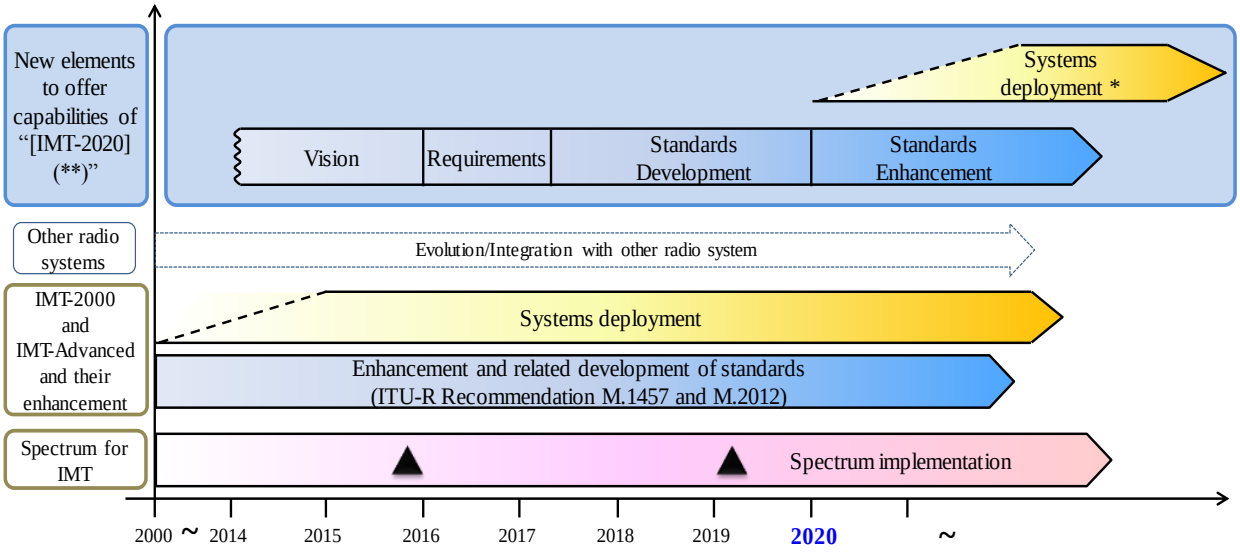


Figure 3: Evolution from ITM-Advanced towards IMT-2020

Figure 4 shows the phase and expected timelines for IMT. For IMT-2020 the vision started in 2014 until 2016 follows by requirement from 2016 to 2017. In this phase, WP 5D will define in detail the performance requirements, evaluation criterial and methodology for assessment of new IMT radio interface Standard development will start from 2017 to 2020 and the system deployment will be after year 2020. It is anticipated that the timeframe for the proposals will be focused in 2018

In 2018-2020 the evaluation by independent external evaluation groups and definition of new radio interface to be included in "IMT-220" will take place. WP 5D also plan to hold 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 processed is planned to be completed in 2020 when a new draft of ITU-R Recommendation with detailed specifications for new radio interfaces will be submitted for approval within ITU-R



The sloped dotted lines in systems deployment indicate that the exact starting point cannot yet be fixed.

▲ : Possible spectrum identification at WRC-15 and WRC-19

* : Systems to satisfy the technical performance requirements of "IMT-2020" could be developed before year 2020 in some countries.
: Possible deployment around the year 2020 in some countries (including trial systems)

** : 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 finalized at the Radiocommunication Assembly 2015.

Figure 4: Phase and expected timelines for IMT-2020.

Figure 5 shows the outcome for the usage scenario of IMT-2020 from 21st meeting of WP 5D where the usage will be more focusing on enhancing the mobile broadband, massive machine type communication, ultra reliable and low latency communications. Figure 6 shows the enhancement in terms of key capabilities from IMT-Advanced to IMT-2020 related to the spectrum efficiency, mobility, latency, connection density, network energy efficiency, area traffic capacity, peak data rate and user experience data rate. The output document related to IMT-2020 from WP 5D related to frequency requirement above 6GHz and vision is given in Appendix 3 and 4 respectively.

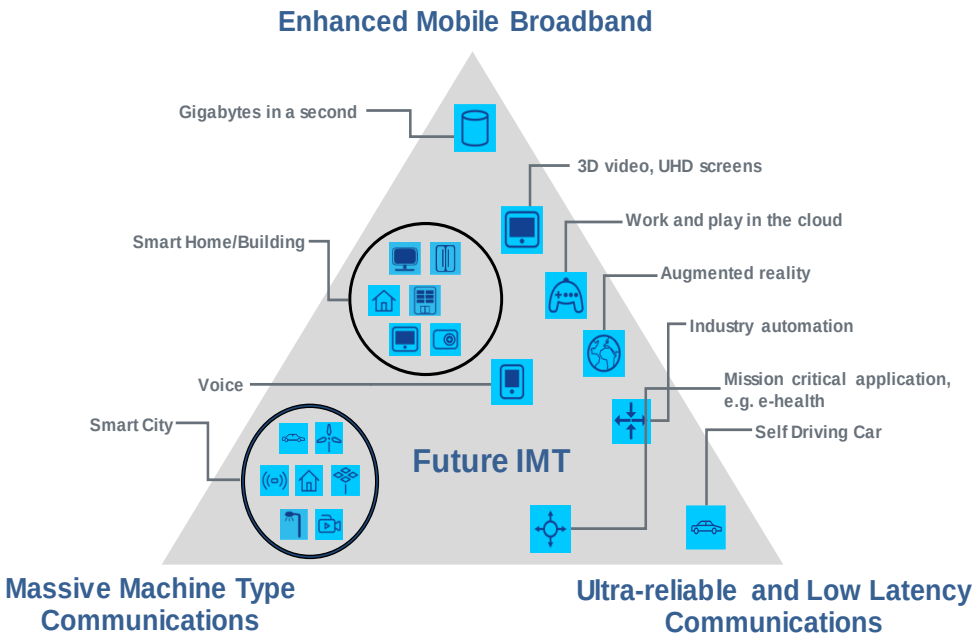


Figure 5: Usage Scenarios of IMT for 2020 and beyond

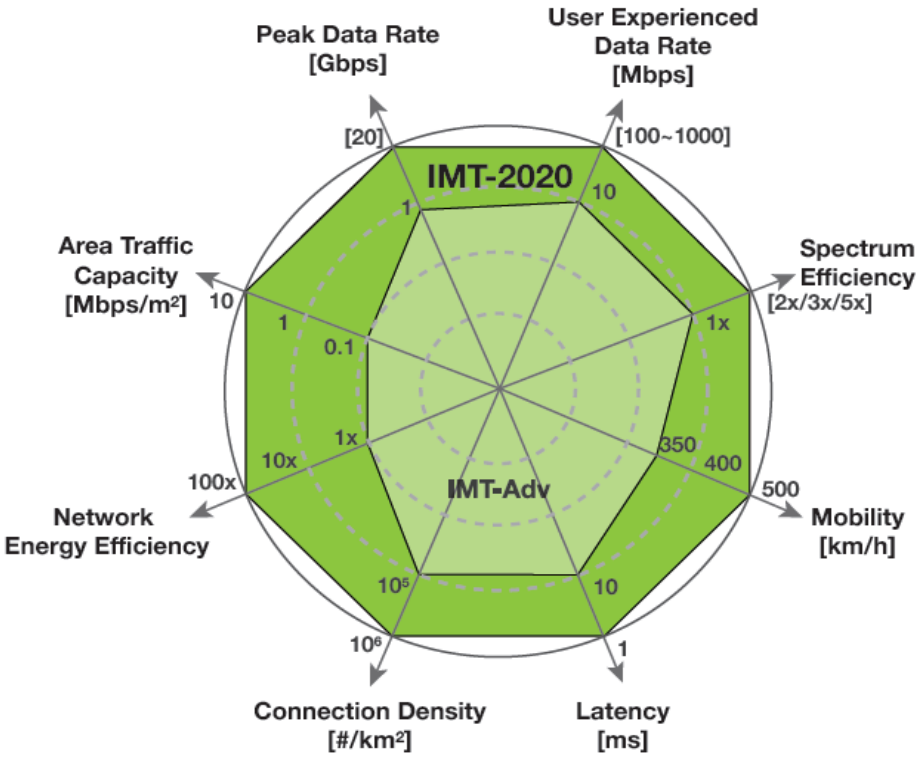


Figure 6: Enhancement of key capabilities from IMT-Advanced to IMT-2020

6. Conclusion

Considering what had been planned for the development and evolution of IMT systems standardization, SWG on 5G under WG IMT is gearing up to take the opportunities of focusing on IMT related matters that will be valuable for research projects that will be beneficial and workable for the industry as well as local manufacturing for small and medium enterprises. The information obtained from WP 5D will enable the universities and industries in Malaysia to shape the future of 5G under SWG on 5G. The 5G initiative aims to foster collaboration and partnership between academia and industry in 5G R&D activities in Malaysia and to contribute to the standardization of IMT-2020 specifications. SWG on 5G was established under the Malaysia IMT Working Group, MTSFB. The initiative consists of technical experts from universities and industries working in ten focus areas. The focus areas include antenna, propagation, RF front end, signal processing, networking, multiple access & modulation coding scheme, interference & coexistence issues, spectrum management, regulatory & deployment issues, big data and societal impacts. Apart from research collaboration in terms of joint funding application and joint publication, the initiative is also promoting facility and equipment sharing among universities and research institutions. Periodic expert meeting and annual seminar are carried out to drive and promote 5G R&D activities in Malaysia.

SWG on 5G is looking forward to participate in the evolution process of Radio Technologies Interface (RTT) in ITU-R. Next meeting of ITU-R WP 5D will be held in San Diego from 8 to 18 June 2015

7. Acknowledgement

Thanks to MTSFB and MCMC for supporting and sponsoring the Chairman of SWG on 5G under WG on IMT attending ITU-R WP 5D that was held in Auckland, New Zealand from 27th Jan until 4th Feb 2015

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