



Third 5G Global Event

IMT-2020: Standards and Spectrum for 5G

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ITU Overview

Committed to connecting the world

193 Member States
673 Sector Members
168 Associates
108 Academia

ITU-T

Telecommunication
standardization
- network and service
aspects



ITU-D

Promote and assist the
extension of ICTs to all the
world's inhabitants - narrowing
the digital divide

ITU-R

Global radio spectrum
management and
radiocommunication
standardization

IMT-2000, IMT-Advanced, IMT-2020



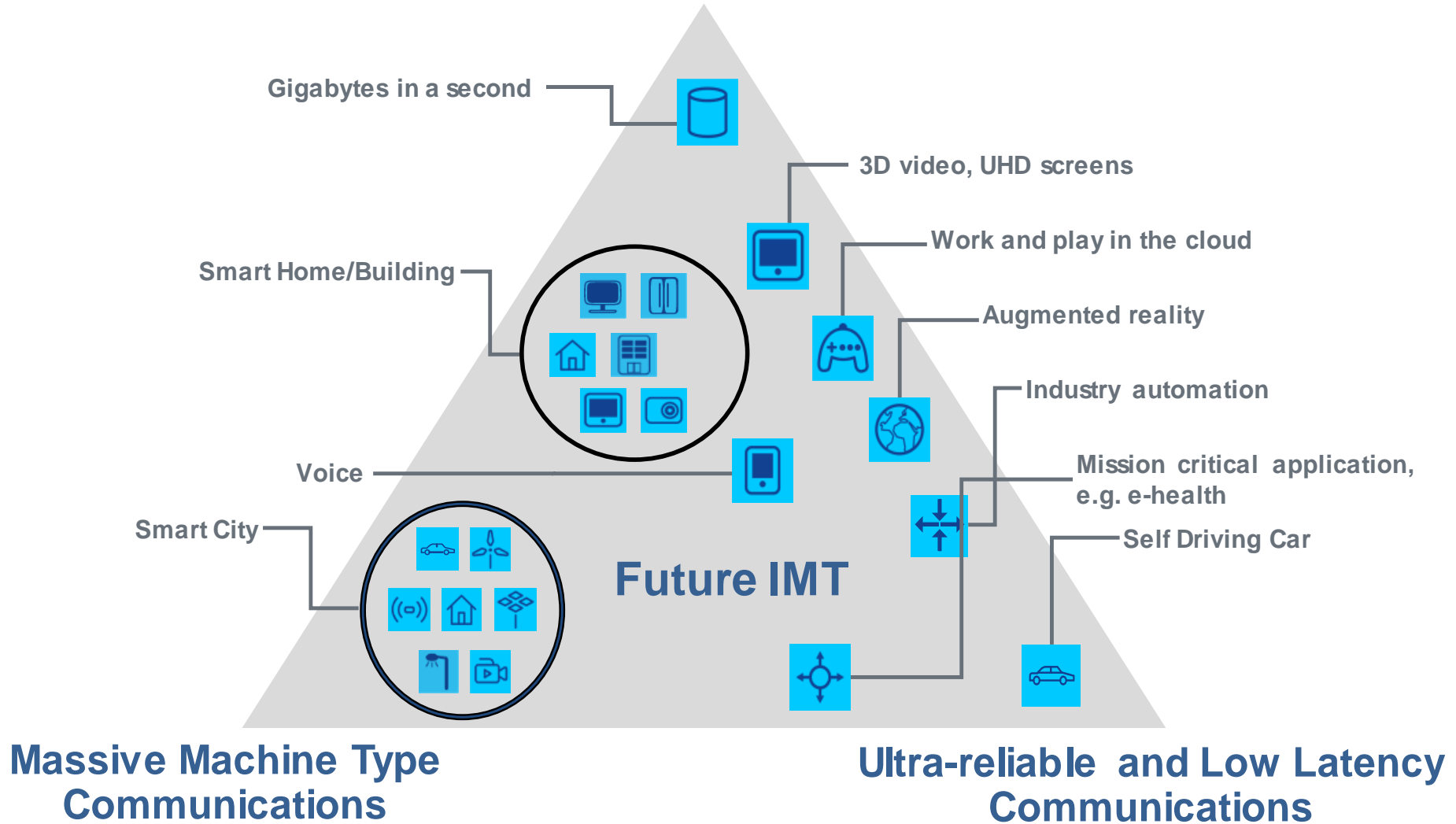
- All 3G and 4G mobile broadband systems are based on the ITU's IMT standards.
- ITU established the detailed specifications for **IMT-2000** and the first 3G deployments commenced around the year 2000.
- In January 2012, ITU defined the next big leap forward with 4G wireless cellular technology – **IMT-Advanced** – and this is now being progressively deployed worldwide.
- The detailed investigation of the key elements of **IMT-2020** is 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.
- IMT provides the global platform on which to build the next generations of mobile broadband connectivity

Global collaboration

- The detailed technical specifications for ITU's IMT standards are developed in close collaboration with the leading national, regional and international radio standards development organizations and partnerships
- The involvement of ITU Member States, equipment providers, network operators, industry fora and academia in this process enables these harmonized standards to be implemented on a worldwide basis
- Globally harmonized standards enable global roaming and provide massive economies of scale – resulting in lower cost services and equipment usable everywhere

5G usage scenarios

Enhanced Mobile Broadband



IMT-2020 Standardization Process – Where we are and what is ahead

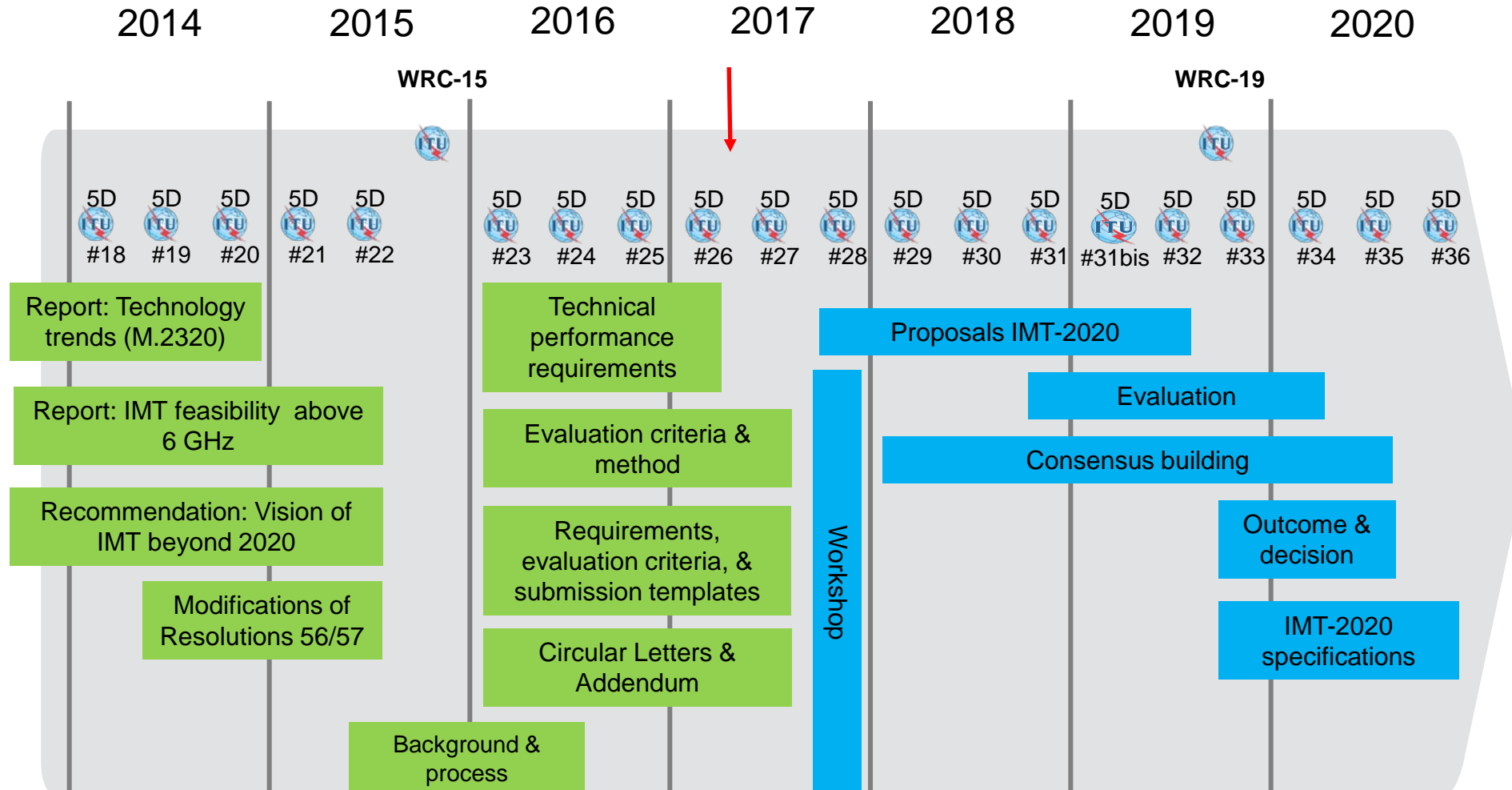


Setting the stage for the future:
vision, spectrum, and
technology views

Defining the
technologies

WP 5D timeline for IMT-2020

Detailed specifications for the terrestrial radio interfaces



Technical trials

- There will now be a number of early technical trials, market trials and deployments of 5G technologies based on the foreseen developments for IMT-2020.
- These technologies may not provide the full set of capabilities envisaged for IMT-2020, but the results of these early activities will flow forward into and assist the development of the final complete detailed specifications for IMT-2020.
- Beyond year 2020, ITU will continue to assist the development and the enhancement of IMT globally.

WRC-19 agenda item 1.13

to consider identification of frequency bands for the future development of International Mobile Telecommunications (IMT), including possible additional allocations to the mobile service on a primary basis, in accordance with Resolution **238 (WRC-15)**

CPM19-1

Decision to establish Task Group 5/1 and ToR
Invites ITU-R SG 5 to establish TG 5/1

ITU-R SG 5

Establishes Task Group 5/1 and approves ToR
Elects Chairman

Activities under WRC-19 AI 1.13

Relevant ITU-R Working Parties

Terrestrial component of IMT:

- Spectrum needs
- Technical and operation characteristics including protection criteria
- Deployment scenarios

Existing services (also adjacent bands):

- Technical characteristics
- Protection criteria

All services and relevant frequency bands:

- Propagation models for sharing studies

TG 5/1 Terms of Reference

- Conduct sharing and compatibility studies in accordance with Res. 238 (WRC-15)
- Develop draft CPM-text under WRC-19 AI 1.13

31 March 2017

13 September 2018

New spectrum: bands under study for WRC-19

| Existing mobile allocation | No global mobile allocation |
|----------------------------|-----------------------------|
| 24.25 GHz – 27.5 GHz | 31.8 – 33.4 GHz |
| 37 – 40.5 GHz | 40.5 – 42.5 GHz |
| 42.5 – 43.5 GHz | |
| 45.5 – 47 GHz | 47 – 47.2 GHz |
| 47.2 – 50.2 GHz | |
| 50.4 – 52.6 GHz | |
| 66 – 76 GHz | |
| 81 – 86 GHz | |

Summary



- The scope of IMT-2020 is much broader than previous generations of mobile broadband communication systems.
- Use cases foreseen include enhancement of the traditional mobile broadband scenarios as well as ultra-reliable and low latency communications and massive machine-type communications.
- The ITU's work in developing the specifications for IMT-2020, in close collaboration with the all 5G stakeholders, is now well underway, along with the associated spectrum management and spectrum identification aspects.
- IMT-2020 will be a cornerstone for all of the activities related to attaining the goals in the 2030 Agenda for Sustainable Development.

Thank you!

Useful links

- **IMT-2020 home page**

<http://www.itu.int/en/ITU-R/study-groups/rsg5/rwp5d/imt-2020>

- **ITU-R Working Party 5D “IMT Systems”**

<http://www.itu.int/go/ITU-R/wp5d>

- **Task Group 5-1 “WRC-19 agenda item 1.13”**

<http://www.itu.int/go/ITU-R/tg5-1>

- **ITU-R Recommendations (M-series)**

<http://www.itu.int/ITU-R/go/rec-m>

- **ITU-R Reports(M-series)**

<http://www.itu.int/ITU-R/go/rep-m>

Evaluation criteria & method - 2017

- Invitation to propose candidate radio interface technologies for IMT-2020
- Guidelines for both the procedure (methodology) and the criteria (technical, spectrum and service) to be used in evaluating the proposed IMT-2020 radio interface technologies
- Submission of proposals for candidate radio interface technologies for the terrestrial components of the radio interface(s) for IMT-2020
- Workshop in October 2017 to present the proposals
- Formation of independent evaluation groups

IMT-2020 candidate technologies

- Developed in collaboration with the ITU Membership (Member States, SDOs, mobile industry, Academia, etc...) using a consensus driven process
 - Presentation of the proposed technologies at ITU workshop
 - Assessments by the evaluation groups
 - Consensus building
 - Decisions
- Outcome of the evaluation and assessment -> October 2019
- Detailed specification of IMT-2020 technology -> **Year 2020**

IMT-2020 Technical performance requirements 1/2*

- **Peak data rate:** Maximum achievable data rate under ideal conditions per user/device (in Gbit/s). **Downlink peak data rate of 20 Gbit/s, Uplink peak data rate of 10 Gbit/s**
- **User experienced data rate:** Achievable data rate that is available ubiquitously across the coverage area to a mobile user/device (in Mbit/s or Gbit/s). **Downlink user experienced data rate of 100 Mbit/s, Uplink user experienced data rate of 50 Mbit/s**
- **Latency:** The contribution by the radio network to the time from when the source sends a packet to when the destination receives it (in ms). **4 ms for eMBB and 1 ms for uRLLC**
- **Mobility:** Maximum speed at which a defined QoS and seamless transfer between radio nodes which may belong to different layers and/or radio access technologies (multi-layer/-RAT) can be achieved (in km/h). **Stationary: 0 km/h, Pedestrian: 0 km/h to 10 km/h, Vehicular: 10 km/h to 120 km/h, High speed vehicular: 120 km/h to 500 km/h**

* These values are applicable to specific scenarios as established in draft Report M.[IMT-2020.TECH PERF REQ] completed by Working Party 5D on 22.02.2017, and submitted to ITU-R Study Group 5 for final approval in November 2017

IMT-2020 Technical performance requirements 2/2*

- **Connection density:** Total number of connected and/or accessible devices per unit area (per km²). **1 million devices per km²**
- **Spectrum efficiency:** Average data throughput per unit of spectrum resource and per cell (bit/s/Hz). **Downlink peak spectral efficiency of 30 bit/s/Hz, Uplink peak spectral efficiency of 15 bit/s/Hz**
- **Area traffic capacity:** Total traffic throughput served per geographic area (in Mbit/s/m²). **10 Mbit/s/m²**
- Other parameters : **Energy efficiency, reliability, control plane latency, mobility interruption time**, etc... with their applicable scenarios are provided in the ITU-R Report.

* These values are applicable to specific scenarios as established in draft Report M.[IMT-2020.TECH PERF REQ] completed by Working Party 5D on 22.02.2017, and submitted to ITU-R Study Group 5 for final approval in November 2017

Bands for IMT above 24 GHz

WRC-19 agenda item 1.13

- The frequencies under study in this agenda item are limited to the following bands, **all above 24GHz**:
- Bands already allocated to the Mobile Service in the Table of Allocations: 24.25-27.5 GHz, 37-40.5 GHz, 42.5-43.5 GHz, 45.5-47 GHz, 47.2-50.2 GHz, 50.4-52.6 GHz, 66-76 GHz and 81-86 GHz
- Bands that would require a new allocation to the Mobile Service in the Table of Allocations: 24.25-27.5 GHz, 31.8-33.4 GHz, 40.5-42.5 GHz and 47-47.2 GHz
- A subset of these bands are expected to be identified for IMT by WRC-19, preferably on a globally harmonized basis
- A new ITU group, TG 5/1, has been established to conduct the studies for this agenda item
- *The availability of bands above 24 GHz offering wide channel sizes are critically important for IMT-2020*