Vision for IMT-systems in the year 2030 and beyond

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Content

UN - the specialised organisation ITU and its responsibilities

Working method / organisation of ITU-R

IMT-Family and naming conventions

IMT-Process (for “IMT for 2030 and beyond”)

Glimpse into draft “Technology Trends” and “IMT-Vision”
The International Telecommunication Union (ITU) is the United Nations specialized agency for information and communication technologies – ICTs.

- **One of 15** special organizations which are legally and organizationally independent, but part of “UN-family”
- **Founded in 1865** to facilitate international connectivity in communications networks,

We are responsible to

- **allocate global radio spectrum** for wireless services (terrestrial, maritime and aeronautical),
- **coordinate the world’s satellites** through the management of spectrum and orbits,
- **develop the technical standards** that ensure networks and technologies seamlessly interconnect, and strive **to improve access to ICTs to underserved communities worldwide**,  
- helps support communications in the wake of **disasters and emergencies**.
Overall structure of the ITU

- **ITU**
  - **ITU-R**
  - **ITU-T**
  - **ITU-D**

**World Radiocommunication Conference (WRC)**

- **Radiocommunication Assembly (Study Period 2019-2023)**
  - **SG1**
  - **SG4**
  - **SG5**

- **Satellite Services (Mr. Strelets, RUS)**
- **Terrestrial Services (Mr. Fenton, UK)**
- **Land Mobile Services (Dr. Costa, CAN)**
- **Maritime, aeronautical mobile and radio-determination service (Mr. Mettrop, UK)**
- **Fixed Service (Mr. Nava, ITA)**
- **IMT (Mr. Blust, USA)**

**Radio Regulations (RR)**

- (9 kHz – 300 GHz)
- [www.itu.int/pub/R-REG-RR-2020](http://www.itu.int/pub/R-REG-RR-2020)

**Term Details**

- **SG:** Study Group
- **WP:** Working Party
- **WG:** Working Group
- **SWG:** Sub-Working Group
- **TG:** Task Group
Application of ITU Radio Regulations in 3 Regions

ITU-Regions

- **Region 1**
  - Europe, Africa, Russia

- **Region 2**
  - Americas

- **Region 3**
  - Asia-Pacific

Regional Groups

- **CEPT (Region 1)**
  - Conference Européen de Poste et Telecommunications

- **ASMG (Region 1)**
  - Arab Spectrum Management Group

- **ATU (Region 1)**
  - African Telecommunication Union

- **RRC (Region 1 & 3)**
  - Regional Commonwealth in the Field of Communications

- **APG (Region 3)**
  - APT (Asia Pacific Telecommunications) Conference Preparatory Group

- **CITEL (Region 2)**
  - Inter-American Telecommunication Commission
International Mobile Telecommunication (IMT)

**IMT-2000**
- **ITU-R M.1457-15**
- Market name: 3G
- Technologies:
  - IMT-2000 CDMA DS
  - IMT-2000 CDMA MC
  - IMT-2000 CDMA TDD
  - IMT-2000 TDMA SC
  - IMT-2000 FDDMA/TDMA
- Year: 05/2000 – 10/2020

**IMT-Advanced**
- **ITU-R M.2012-4**
- Market name: 4G
- Technologies:
  - LTE-Advanced
  - WirelessMAN-Advanced
- Year: 02/2014 – 11/2019

**IMT-2020**
- **ITU-R M.2150**
- Market name: 5G
- Technologies:
  - 3GPP 5G-SRIT
  - 3GPP 5G-RIT
  - 5Gi
- Year: 02/2021
- **Systems beyond IMT-2020**
- As of today, 10. Nov. 2021
- Market name: 6G ?
IMT-2020 Radio Interfaces (ITU-R M.2150)

Scope
• identifies and provides the detailed specifications of the radio interfaces for the terrestrial component of IMT-2020,
• detailed features and parameters of IMT-2020,
• IMT-2020 enables worldwide compatibility, international roaming, and access to the services under diverse usage scenarios (eMBB, mMTC, URLLC).

Initial release includes 3 standards:
• 3GPP 5G-SRIT
• 3GPP 5G-RIT
• 5Gi

Two further IMT-2020 candidate technology proposals have undergone additional evaluation (2021) – in the final assessment, one technology has passed all requirements.

Next release (Q1/2022) is expected to include:
• DECT 5G-SRIT

The final assessment not yet passed:
• EUHT-5G by Nufront
IMT-Process: for “systems beyond IMT-2020”

- Input requested from EO
  - 5D #36
  - New Report
    - ITU-R M. [IMT: FUTURE TECHNOLOGY TRENDS TOWARDS 2030 AND BEYOND]
    - future technical aspects of terr. IMT systems for the time frame up to 2030 and beyond.

- Input by Verticals

- New Recommendation:
  - IMT Vision – Framework and overall objectives of the future development of IMT for 2030 and beyond

- Modification of Res. 56/57 (if needed)

- Vision / Definition
- Requirements and Evaluation criteria
- Evaluation and Consensus building
Draft New Report - Driving Factors

The contents of the Technology Trends report is still under discussion, but we are seeing some very interesting contributions for future technologies.

- Current driving factors in the design of IMT Technology:
  - Peak Data Rate, Guaranteed Data Rate,
  - Latency, Jitter,
  - Sensing resolution and accuracy,
  - Connection density, Energy efficiency,
  - Coverage, Mobility,
  - Spectrum utilization, controllable radio environment,
  - User-centric networking,
  - Native artificial intelligence (AI)

Note: this is draft information and is subject to addition/change/modification
Current draft contents

• Technologies to **enhance the radio interface**
  • Advanced modulation, coding and multiple access schemes
  • E-MIMO (extreme-MIMO)
  • Co-frequency Co-time Full Duplex (CCFD) communications
  • Multiple physical dimension transmission incl. Reconfigurable Intelligent Surface (RIS)
  • Terahertz (THz) communications
  • Visible light communication
  • Ambient Backscatter Communication (AmBC)

• Technologies to **enhance radio network performance and precision**
  • New architecture to support new operation and business models
  • Technologies to support resilient and soft network and guaranteed QoS
  • Technologies to support Digital Twin Networking (DTN)
  • Technologies to support the convergence of communication and computing enabling intelligent network and services
  • Technologies to support the integration of terrestrial and non-terrestrial networks
  • Technologies to support native security

*Note: this is draft information and is subject to addition/change/modification*
Current draft contents (cont.)

- Technologies for native **Artificial Intelligence (AI)** based communication
  - Network for AI
  - AI-assisted new air interface (AI-AI)
  - Ethics and its supervision for wireless AI
- Technologies to enhance service coverage
- Technologies to enhance privacy and security
- Technologies for integrated sensing and communication
- Technologies for integrated terrestrial and non-terrestrial communications
- Technologies for integrated access and super sidelink communications
- Technologies to enhance adaptability and sustainability
- Technologies for efficient spectrum utilization
- Terminal technologies
- [Technologies to support a wide range of new use cases and applications]  

Note: This section may be moved to the new “VISION” document

Note: this is draft information and is subject to addition/change/modification
New Vision for “IMT for 2030 and beyond”

- ITU-R WP 5D has sent out the inviting CL to External Organisations (~50)
  - “Systems beyond IMT-2020” → “IMT for 2030 and beyond”
  - Input can be provided until WP 5D meeting #41 (06/2022) latest

IMT Vision – Framework and overall objectives of the future development of IMT for 2030 and beyond

- Current (draft) contents
  - Trends of IMT for 2030 and beyond
    - User and application trends
    - Technology trends
    - Studies and technical feasibility of IMT in bands above 100 GHz
    - Spectrum implications
  - Evolution and role of IMT for 2030 and beyond
  - Usage scenarios for IMT for 2030 and beyond
  - Capabilities of IMT for 2030 and beyond
  - Timelines

Note: this is draft information and is subject to addition/change/modification
Summary / How to contribute?

The work of ITU-R has two main aspects during the period between WRC’s

1. to study spectrum related topics and regulatory procedures that will be submitted to WRC for possible inclusion into Radio Regulations ➔ global regulation
2. to update existing technologies and studying new ones to thrive the technology development ➔ harmonised technologies

For the next IMT-generation (“IMT for 2030 and beyond”)

• The Future Technology Trends report does drive specification work
• The new “Vision” will describe the overall objectives incl. use cases

It is important to receive according contributions from external organisations and in return, they can participate in ongoing discussions within ITU-R.

The future is bright – share your ideas with ITU-R and be part of the IMT-spearhead
ITU – Radiocommunication Bureau

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Helpful links

More about ITU  
https://www.itu.int/en/about/Pages/default.aspx

Beyond 5G: What's next for IMT?


More about IMT-2020  

Details about IMT-2020 submission & evaluation  

Recommendation ITU-R M.2150  
https://www.itu.int/rec/R-REC-M.2150/en

ITU-R WP 5D is responsible for IMT

- **SG5**  
  Terrestrial Services (Mr. FENTON, UK)

- **WP5A**  
  Land Mobile Services (Dr. COSTA, CAN)

- **WP5B**  
  Maritime, aeronautical, mobile and radio-determination service (Mr. METTRIP, UK)

- **WP5C**  
  Fixed Service (Mr. NAVA, ITA)

- **WP5D**  
  IMT (Mr. BLUST, USA)

https://www.itu.int/en/ITU-R/study-groups/rsg5/Pages/default.aspx

https://www.itu.int/en/ITU-R/study-groups/rsg5/rwp5a/Pages/default.aspx

https://www.itu.int/en/ITU-R/study-groups/rsg5/rwp5d/Pages/default.aspx