The ITU-R Framework for IMT-2030
Recommendation ITU-R M.2160
Updated November 2023
ITU-R Working Party 5D

WP 5D is responsible for the overall radio system aspects of the terrestrial component of International Mobile Telecommunications (IMT) systems, comprising the current IMT-2000, IMT-Advanced and IMT-2020 as well as IMT-2030.
ITU-R Timeline and Process

Note 1: WP 5D #59 will additionally organize a workshop involving the Proponents and registered Independent Evaluation Groups (IEGs) to support the evaluation process

Note 2: While not expected to change, details may be adjusted if warranted. Content of deliverables to be defined by responsible WP 5D groups
# IMT Family History

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This Report provides a broad view of future technical aspects of terrestrial IMT systems considering the timeframe up to 2030 and beyond, characterized with respect to key emerging services, applications trends and relevant driving factors.

- Emerging services and applications
- Drivers for future technologies
- Emerging technology trends and enablers
- Technologies to enhance the radio interface
- Technology enablers to enhance the radio network

The technology trends of terrestrial IMT systems described in Report ITU-R M.2516 are applicable to radio interfaces, mobile terminals, and radio access networks by considering the timeframe up to 2030 and beyond.
Framework Recommendation – overall
(a.k.a. Vision in previous technologies)

- Recommendation **ITU-R M.2160** - Framework and overall objectives of the future development of IMT for 2030 and beyond*

- **Framework and overall objectives of the future development of IMT for 2030 and beyond**

- **Workplan**

  - The responsible SWG was established at the 37th meeting of WP 5D (March 2021)

- **Procedural steps**

  - Working Document (WD)
  - Preliminary Draft New Recommendation (PDNR)
  - Draft New Recommendation (DNR)
  - Recommendation

- **Initial concept and items**

  - 5D#37 (Mar/21) Vision group establishment and draft workplan
  - 5D#38 (Jun/21) Tentative structure of Vision & design initial concept of sections
  - 5D#39 (Oct/21) Stable structure and initial draft texts for each section
  - 5D#40 (Feb/22) 11 use case (user/application trends), about 60 capabilities
  - 5D#41 (Jun/22) Vision Workshop, Spectrum vision, 6 usage scenarios and 16 capabilities
  - 5D#42 (Oct/22) Stable WD
  - 5D#43 (Feb/23) Close to the final (PDNR)

- **Structuring**

- **Stabilization and Consensus**

* Approved November 2023 at ITU-R Radiocommunication Assesmbly (RA-23)
The ITU Radiocommunication Assembly, considering further recognizing recommends that the Annex should be considered as the framework and the overall objectives to guide the future development of IMT-2030.

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1. **Introduction**

2. **Trends of IMT-2030**
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   - 2.2 User and application trends
   - 2.3 Technology trends
   - 2.4 Envisaged frequency bands
   - 2.5 Spectrum Harmonization
   - 2.6 Studies on technical feasibility of IMT in bands above 100 GHz

3. **Usage scenarios of IMT-2030**

4. **Capabilities of IMT-2030**

5. **Considerations of ongoing development**
   - 5.1 Relationships
   - 5.2 Timelines
   - 5.3 Focus areas for further study

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### Why is IMT-2030 (6G) needed?
- IMT-2030 expected benefits
- Trend and prospect of 6G features/technology/spectrum in around 2030

### Guidance of 6G features
- Roadmap for technology/standardization/deployment/spectrum

### Guidance of 6G capabilities to fulfil usage scenarios
- Relationship with existing IMTs and other access systems

### Relationship with existing IMTs and other access systems
Trends

§ 2.1 Motivation and societal considerations

IMT-2030 is expected to be an important enabler for achieving the following characteristics, among others:
• Inclusivity
• Ubiquitous connectivity
• Sustainability
• Innovation
• Enhanced and resilience
• Standardization and interoperability
• Interworking

§ 2.2 User and application trends

• 9 trends
  - Ubiquitous intelligence
  - Ubiquitous computing
  - Immersive multimedia and multi-sensory interactions
  - Digital twin and virtual world
  - Smart industrial applications
  - Digital health and well-being
  - Ubiquitous connectivity
  - Integration of sensing and communication
  - Sustainability

§ 2.3 Technology trends

§ 2.3 Technology trends
  “Summary of Future TECH Trends (FTT)”
  - Emerging technology trends and enablers
  - Technologies to enhance the radio interface
  - Technology enablers to enhance the radio NW

§ 2.4 Envisaged frequency bands and § 2.5 Spectrum harmonization

• § 2.4. Multiple frequency ranges will be needed to meet the capacity and coverage requirements of IMT systems and to serve the emerging services and applications. New generations of IMT may expect new spectrum for increasing data rates, capacity, new applications and to provide for new capabilities. IMT-2030 is envisaged to utilize a wide range of frequency bands ranging from sub-1 GHz up to frequency bands above 100 GHz. Low bands will continue to be crucial to enable nationwide coverage, in particular addressing the digital divide and expandin
• § 2.5. The benefits of spectrum harmonization include facilitating economies of scale, enabling global roaming, reducing complexity of equipment design, improving spectrum efficiency including potentially reducing cross border interference. Harmonization of spectrum for IMT would lead to increased commonality of equipment and is desirable for achieving economies of scale and affordability of equipment, thus promoting digital inclusion.

§ 2.6 IMT in bands above 100 GHz

The development of IMT for 2030 and beyond is expected to enable new use cases and applications with high data rate and low latency, which will benefit from large contiguous bandwidths of tens of GHz. This suggests the need to consider spectrum in higher frequency ranges above 92 GHz as a complement to the use of lower frequency bands.
Usage scenarios and overarching aspects of IMT-2030

Usage scenarios

**Extension** from IMT-2020 (5G)
- eMBB → **Immersive** Communication
- mMTC → **Massive** Communication
- URLLC → **HRLLC** (Hyper Reliable & Low-Latency Communication)

**New**
- Ubiquitous Connectivity
- AI and Communication
- Integrated Sensing and Communication

4 **Overarching aspects:**

- act as design principles commonly applicable to all usage scenarios

Sustainability, Connecting the unconnected, Ubiquitous intelligence, Security & resilience

So called “Wheel diagram”
The range of values given for capabilities are estimated targets for research and investigation of IMT-2030.

All values in the range have equal priority in research and investigation.

For each usage scenario, a single or multiple values within the range would be developed in future in other ITU-R Recommendations/Reports.
§ 5.1 Relationships

• § 5.1.1 Relationship between IMT-2030 and existing IMT

  Enhancements to existing IMT
  Interworking with existing IMT

• § 5.1.2 Relationship between IMT-2030 and other access systems

  Interworking between different access networks
  such as non-terrestrial network of IMT (including satellite, HIBS and UASs)
  as well as with other non-IMT terrestrial networks (including RLAN and broadcast)

§ 5.3 Focus areas for further study

• Radio interface(s) standards development
• Access network related issues
• Traffic characteristics
• Spectrum related issues

§ 5.2 Timelines

• Roadmap for technology/standard development, deployment and spectrum
• In addition, enhancement of existing IMTs and relationship with other radio systems

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

▲: Possible spectrum identification at WRC-23, WRC-27 and future WRCs
  •: Systems to satisfy the technical performance requirements of IMT-2030 could be developed before year 2030 in some countries.
  ◇: Possible deployment around the year 2030 in some countries (including trial systems)
Summary

• The Future Technology Trends Report ITU-R M.2516 summarizes anticipated developments

• The new “Framework Recommendation” ITU-R M.2160 for IMT-2030 describes the overall objectives including use cases

• This marks the achievement of the initial phase, setting the basis for the development of IMT-2030. The next phase (2024-2027) will be the definition of relevant requirements and evaluation criteria for potential radio interface technologies (RIT) for IMT-2030.

• With the evolution of information and communications technologies, IMT-2030 is expected to support enriched and potential immersive experience, enhanced ubiquitous coverage, and enable new forms of collaboration. Furthermore, IMT-2030 is envisaged to support expanded and new usage scenarios compared to those of IMT-2020, while providing enhanced and new capabilities.

• Essential part of the IMT-process is liaison with External Organizations to receive contributions covering and elaborating future trends and new services ... ... but also, internal liaison within ITU (other ITU-R Study Groups and ITU-sectors)