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”

International Telecommunications Union (ITU)

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

WRC ⇔ RA

World Radiocommunication Conference

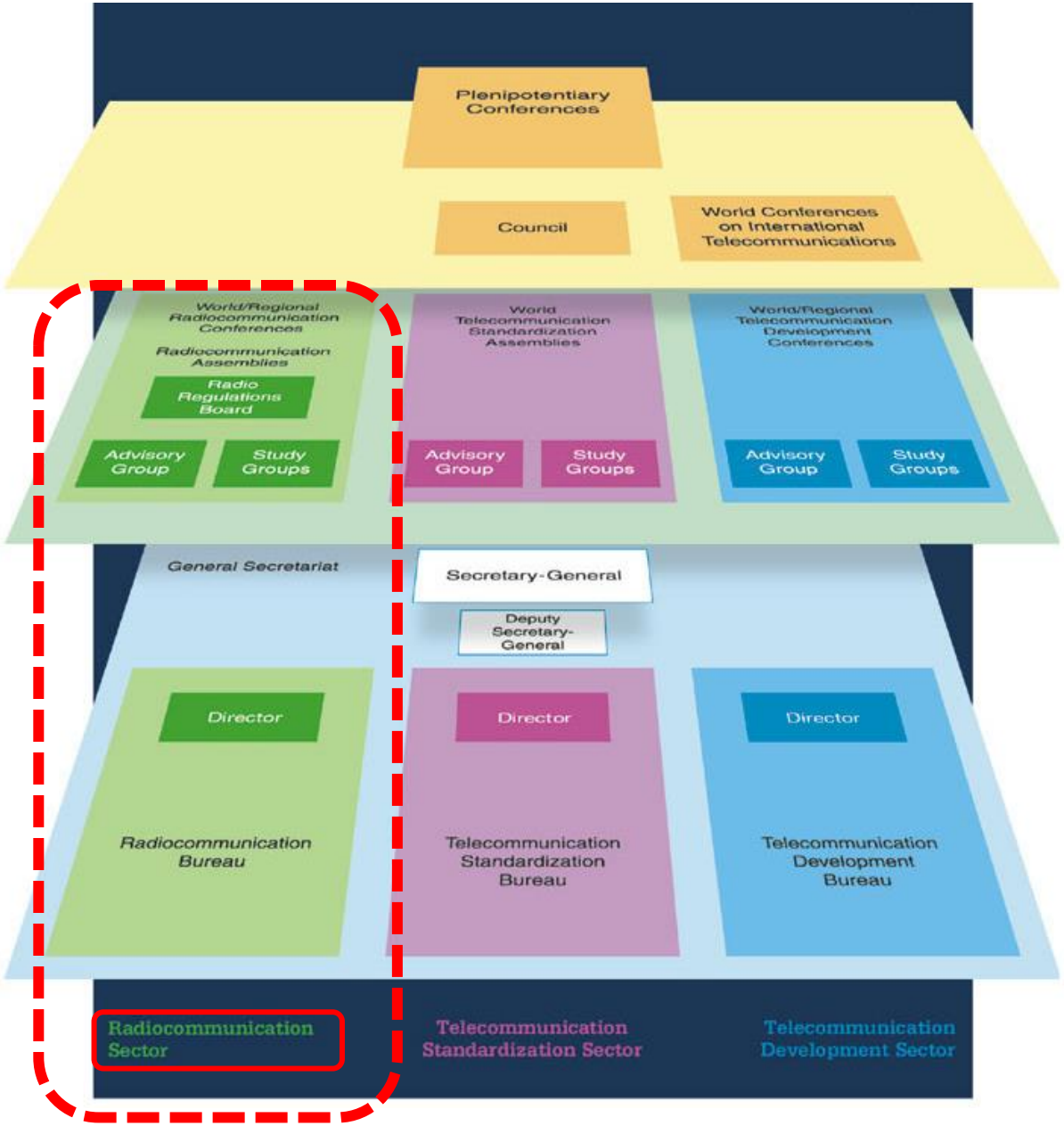
ITUWRC SHARM EL-SHEIKH2019
28 October - 22 November
Sharm El-Sheikh, Egypt

Radio Regulations (RR)
(9 kHz – 300 GHz)
www.itu.int/pub/R-REG-RR-2020

Radiocommunication Assembly (*Study Period 2019-2023*)

- SG1
- SG4 — Satellite Services (Mr. STRELETS, RUS)
- SG5 — Terrestrial Services (Mr. FENTON, UK)
  - WP5A — Land Mobile Services (Dr. COSTA, CAN)
  - WP5B — Maritime, aeronautical mobile and radio-determination service (Mr. METTROP, UK)
  - WP5C — Fixed Service (Mr. NAVA, ITA)
  - WP5D — IMT (Mr. BLUST, USA)
- SG 6
  - TG 6/1
- SG 7

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

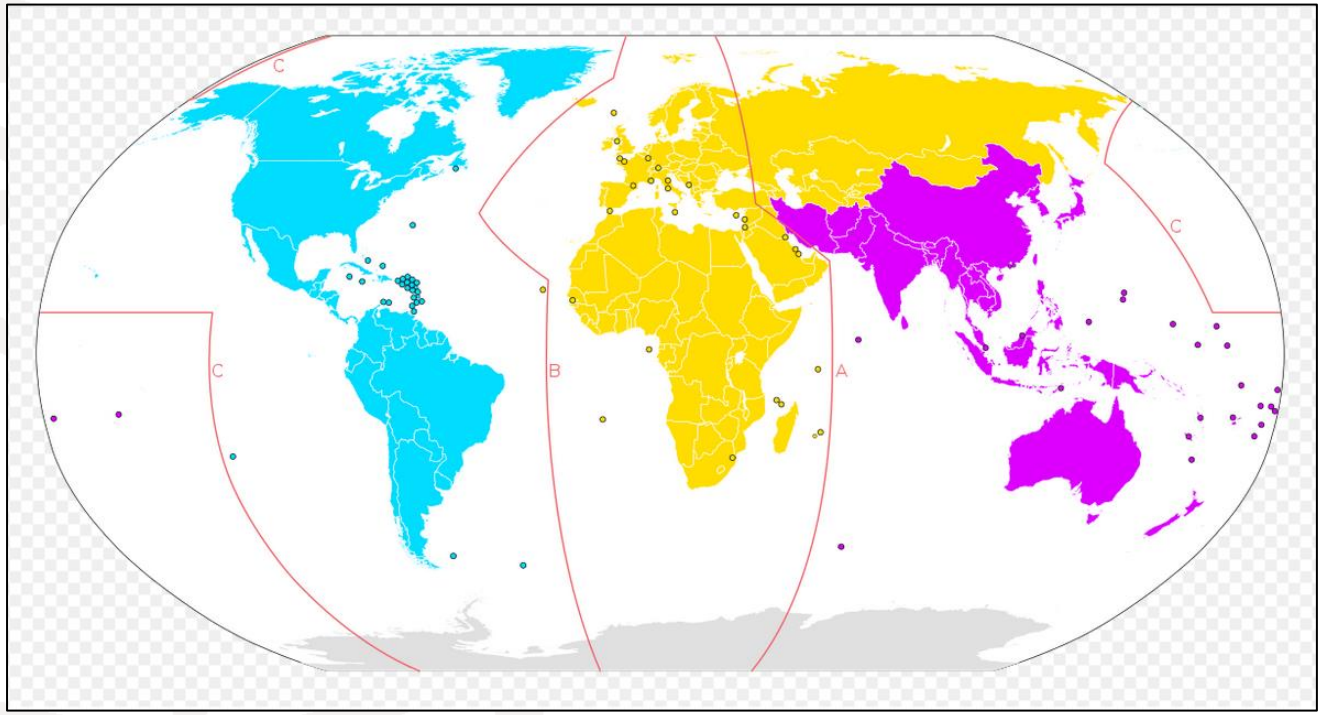
Europe, Africa, Russia

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

Regional Commonwealth in the Field of Communications (RCC)

Inter-American Telecommunication Commission (CITEL)

European Conference of Postal and Telecommunications Administrations (CEPT)

African Telecommunications Union (ATU)

Arab Spectrum Management Group (ASMG)

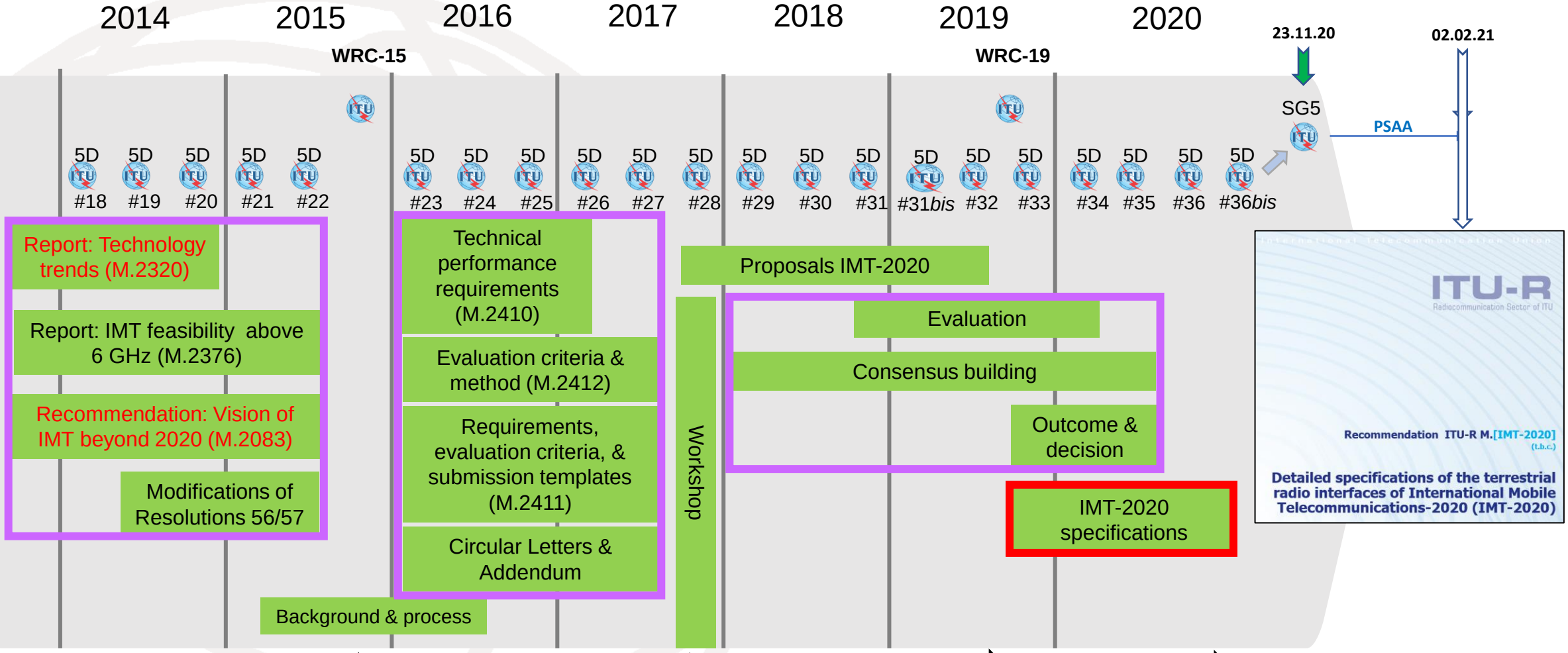
Asia-Pacific Telecommunity (APT)

IMT-Family and naming conventions

International Mobile Telecommunication (IMT)

Name	IMT-2000	IMT-Advanced	IMT-2020	*Systems beyond IMT-2020*
Rec.	ITU-R M.1457-15	ITU-R M.2012-4	ITU-R M.2150	
Radio Interface Techn.	• IMT-2000 CDMA DS • IMT-2000 CDMA MC • IMT-2000 CDMA TDD • IMT-2000 TDMA SC • IMT-2000 FDMA/TDMA • IMT 2000 OFDMA TDD WirelessMAN	• LTE-Advanced • WirelessMAN-Advanced	• 3GPP 5G-SRIT • 3GPP 5G-RIT • 5Gi As of today, 10. Nov. 2021	
Year	05/2000 – 10/2020	02/2014 – 11/2019	02/2021	2030 ?
Market name	3G	4G	5G	6G ?

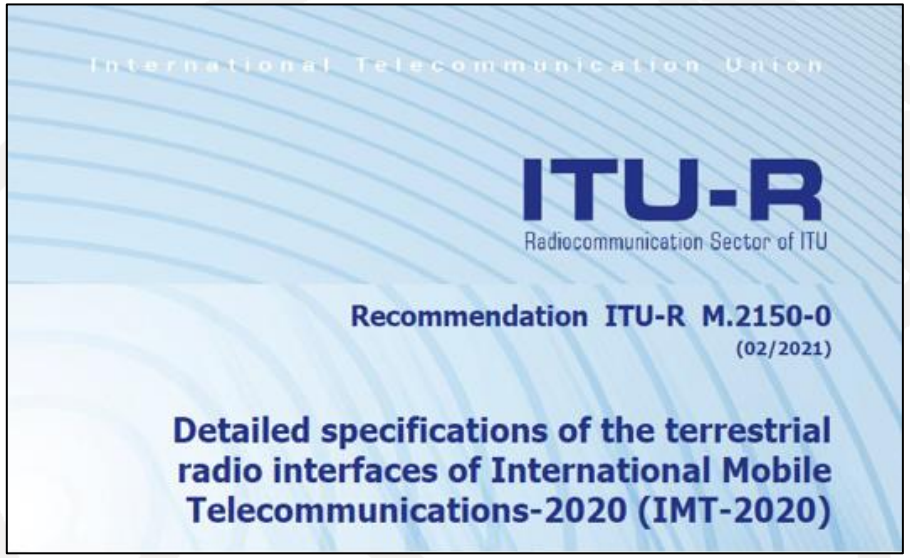
IMT-Process: Timeline for IMT-2020



(ITU-R WP 5D)

Note: Meeting #36bis was a focused meeting (technology) for finalization of Step 8 of the IMT-2020 process and completing draft new Recommendation ITU-R M.[IMT-2020.SPECS]

IMT-2020 Radio Interfaces (ITU-R M.2150)



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

Scope

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

Initial release includes 3 standards:

- 3GPP 5G-SRIT [1]
- 3GPP 5G-RIT [2]
- 5Gi

*[1] Developed as "5G, Release 15 and beyond - LTE+NR SRIT" **(5G-NSA)***
*[2] Developed as "5G, Release 15 and beyond - NR RIT" **(5G-SA)***

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:

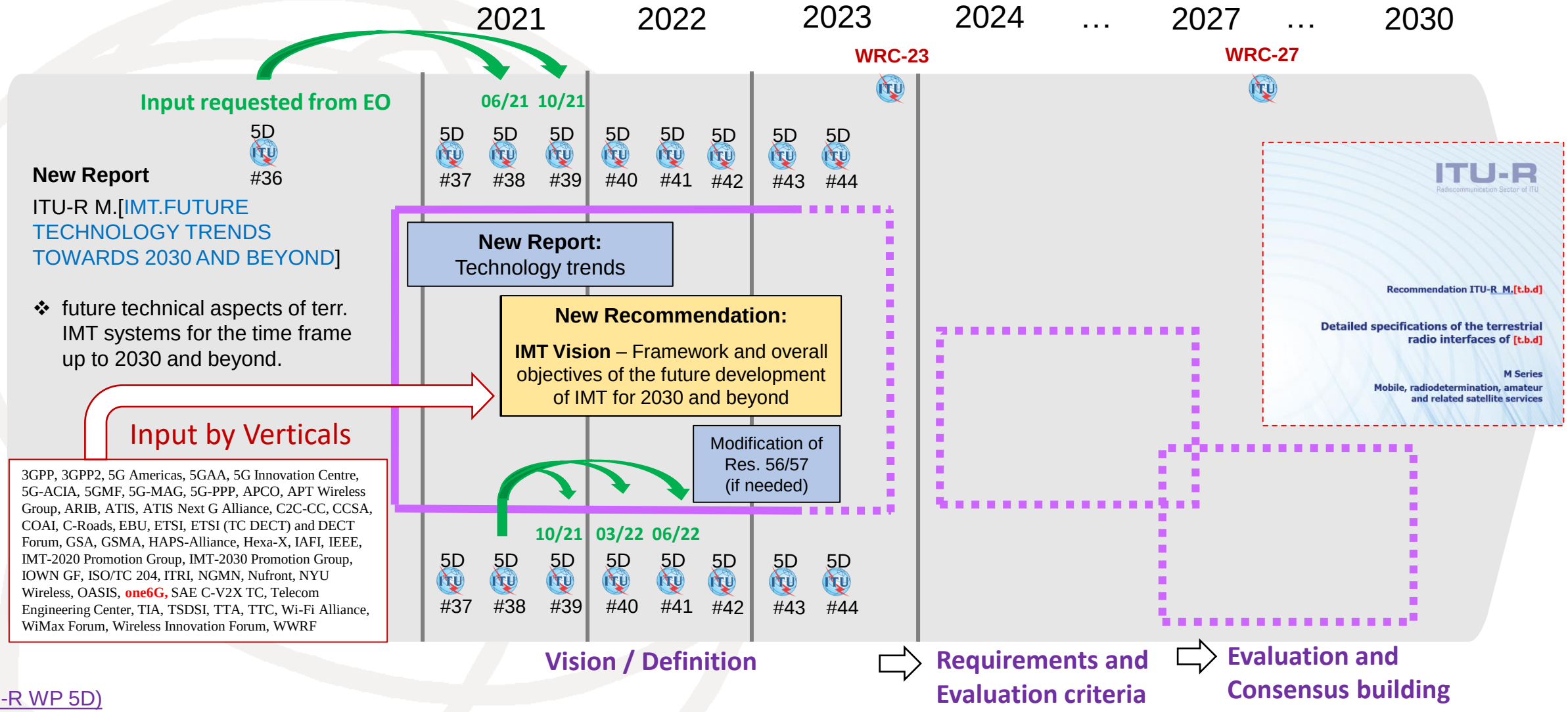
- DECT 5G-SRIT

Developed by ETSI

The final assessment not yet passed:

- **EUHT-5G** by Nufront

IMT-Process: for "systems beyond IMT-2020"



(ITU-R WP 5D)

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

Questions to brmail@itu.int or uwe.loewenstein@itu.int

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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?

https://www.itu.int/en/myitu/News/2021/02/02/09/20/Beyond-5G-IMT-2020-update-new-Recommendation

More about IMT-2020

https://www.itu.int/en/ITU-R/study-groups/rsg5/rwp5d/imt-2020/Pages/default.aspx

Details about IMT-2020 submission & evaluation

https://www.itu.int/en/ITU-R/study-groups/rsg5/rwp5d/imt-2020/Pages/submission-eval.aspx

Recommendation ITU-R M.2150

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

ITU-R WP 5D is responsible for IMT

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