



ITU-APT

Foundation of India

ITU's Association in India

6G Spectrum Studies for ITU

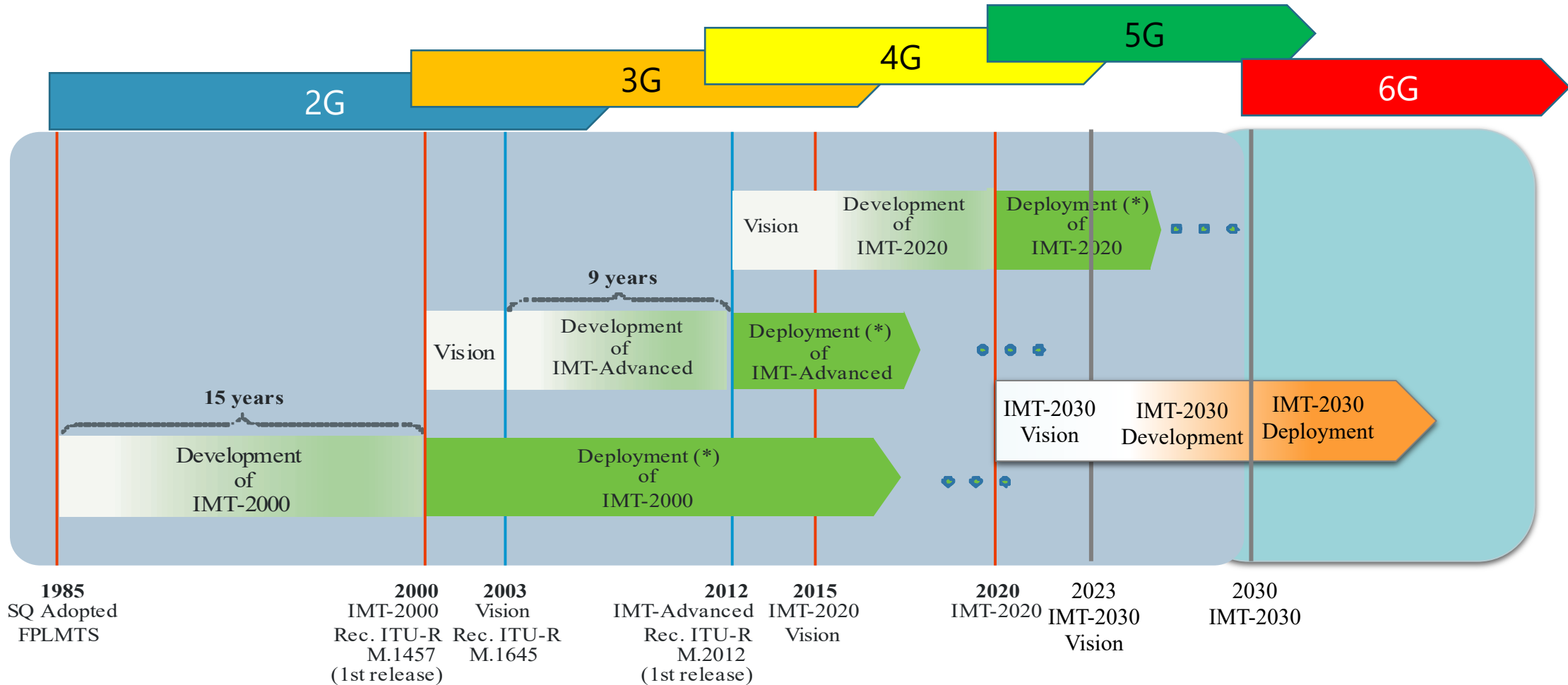
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Vice Chairman - World Wireless Research Forum
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Chairman, APT Task Group on PPDR

ITU 5G Vision – Recommendation ITU-R M.2083

- ✓ While the Public understands the wireless mobile technologies as 2G, 3G, 4G, 5G, within the ITU, mobile cellular technologies are referred as IMT – International Mobile Telecommunications family of standards.
- ✓ ITU has a framework of standards for IMT :
 - ✓ IMT-2000 (3G),
 - ✓ IMT-Advanced (4G) and
 - ✓ IMT-2020 (5G)
- ✓ Development of IMT-2020 was started In early 2012, thus setting the stage for “5G” research activities around the world and finally lead to the 5G technology as we see it today.
- ✓ ITU-R finalized its “Vision” of the “5G” or IMT-2020 mobile broadband connected society in 2015 which is defined in Recommendation ITU-R M.2083



Mobile Technology Development Timelines



(*) Deployment timing may vary across countries.

ITU RECOMMENDATIONS ON IMT

IMT



3G /
IMT-2000

WCDMA/HSPA/LTE
Cdma-2000
TD-SCDMA
EDGE/UWC-136
DECT
WiMAX

4G /
IMT-Advanced

LTE-Advanced
WiMAX

5G /
IMT-2020

3GPP 5G-SRIT
3GPP 5G-RIT
5Gi (TSDSI)

?

6G /
"IMT-2030"

?

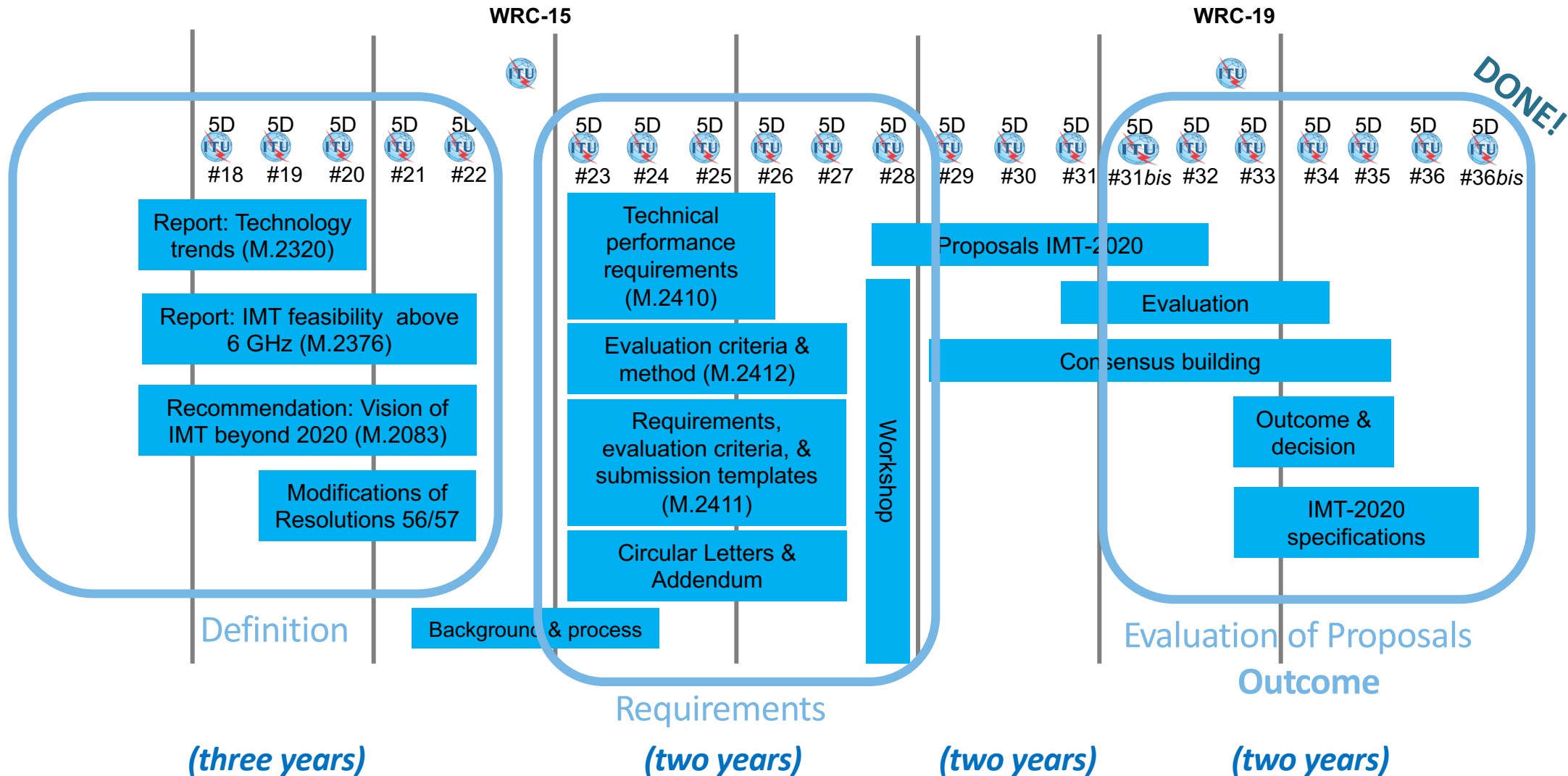


WP 5D timeline for IMT-2020

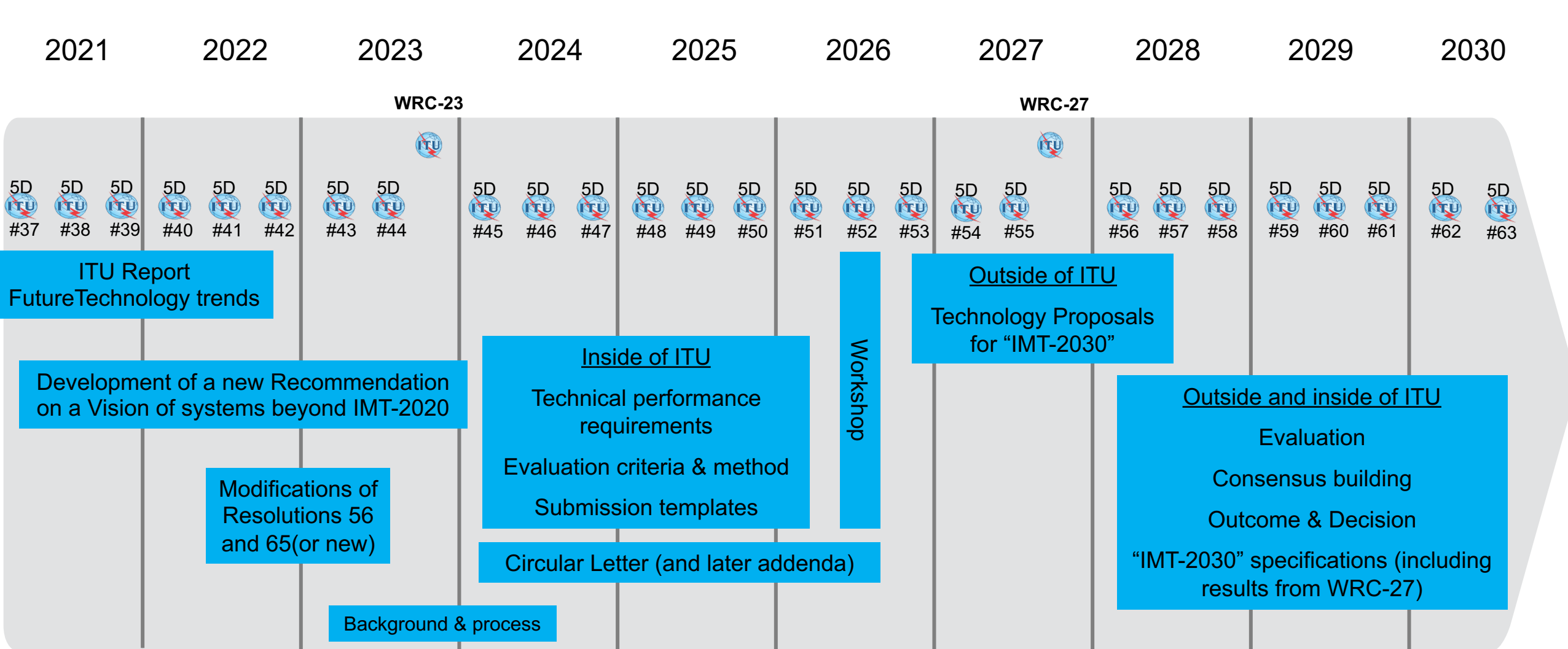


Detailed specifications for the terrestrial radio interfaces

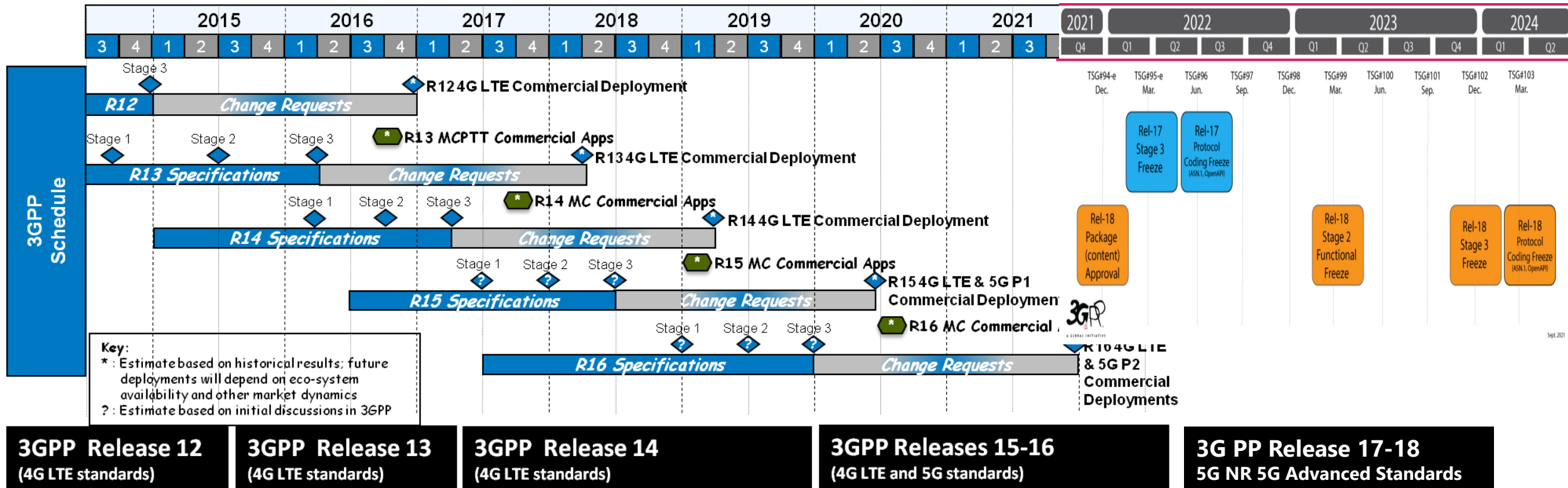
2014 2015 2016 2017 2018 2019 2020



Possible "IMT towards 2030 and beyond"

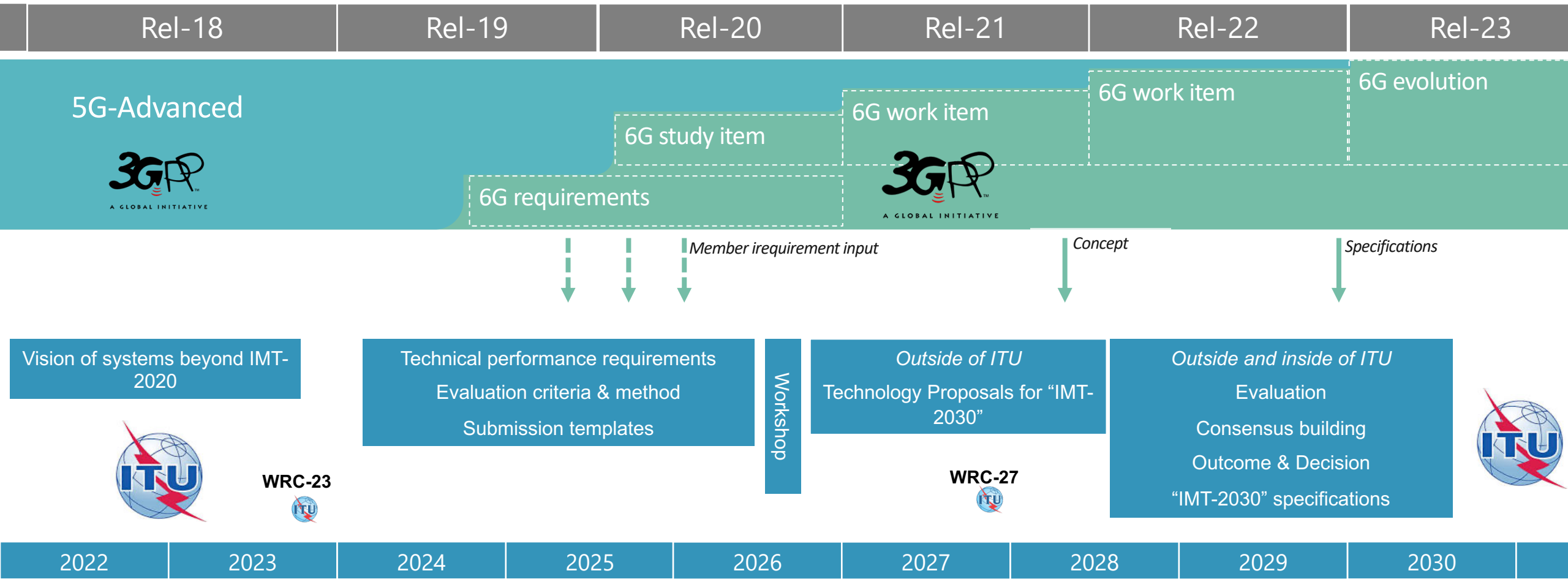


3GPP 5G Development Time frames



Sept. 2021

ITU-R and 3GPP timelines



ITU Plan (TBD) for development of 6G Vision

	2012		2013			2014		2015		
M.2083	5D#13	5D#14	5D#15	5D#16	5D#17	5D#18	5D#19	5D#20	5D#21	5D#22
	▲	●	●	●	●	●	●	●	●	▲

Vision Workshop

10 meetings

	2021			2022			2023	
[Vision 2030] (placeholder)	5D#37	5D#38	5D#39	5D#40	5D#41	5D#42	5D#43	5D#44
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[Vision Workshop]

8 meetings

IAFI submissions on 6G vision to ITU

- ✓ IMT-2030 Vision should include the challenges of coverage, capacity, latency, the user data rate and movement speed of mobile terminals.
- ✓ The vision of the next generation should also fully support the development of a Ubiquitous Intelligent Mobile Society.
- ✓ The focus of IMT-2030 should be on tackling societal challenges identified in the 17 UN Sustainable Development Goals (SDGs).
- ✓ Support future heterogeneous mobile broadband networks
- ✓ digital inclusion and connecting the rural and remote communities. broadband for all.

Radiocommunication Study Groups



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GENERAL ASPECTS

ITU-APT Foundation of India (IAFI)

PROPOSED NEW ITU-R RECOMMENDATION ON FRAMEWORK AND
OVERALL OBJECTIVES OF THE FUTURE DEVELOPMENT OF
INTERNATIONAL MOBILE TELECOMMUNICATIONS (IMT) FOR 2030 AND
BEYOND

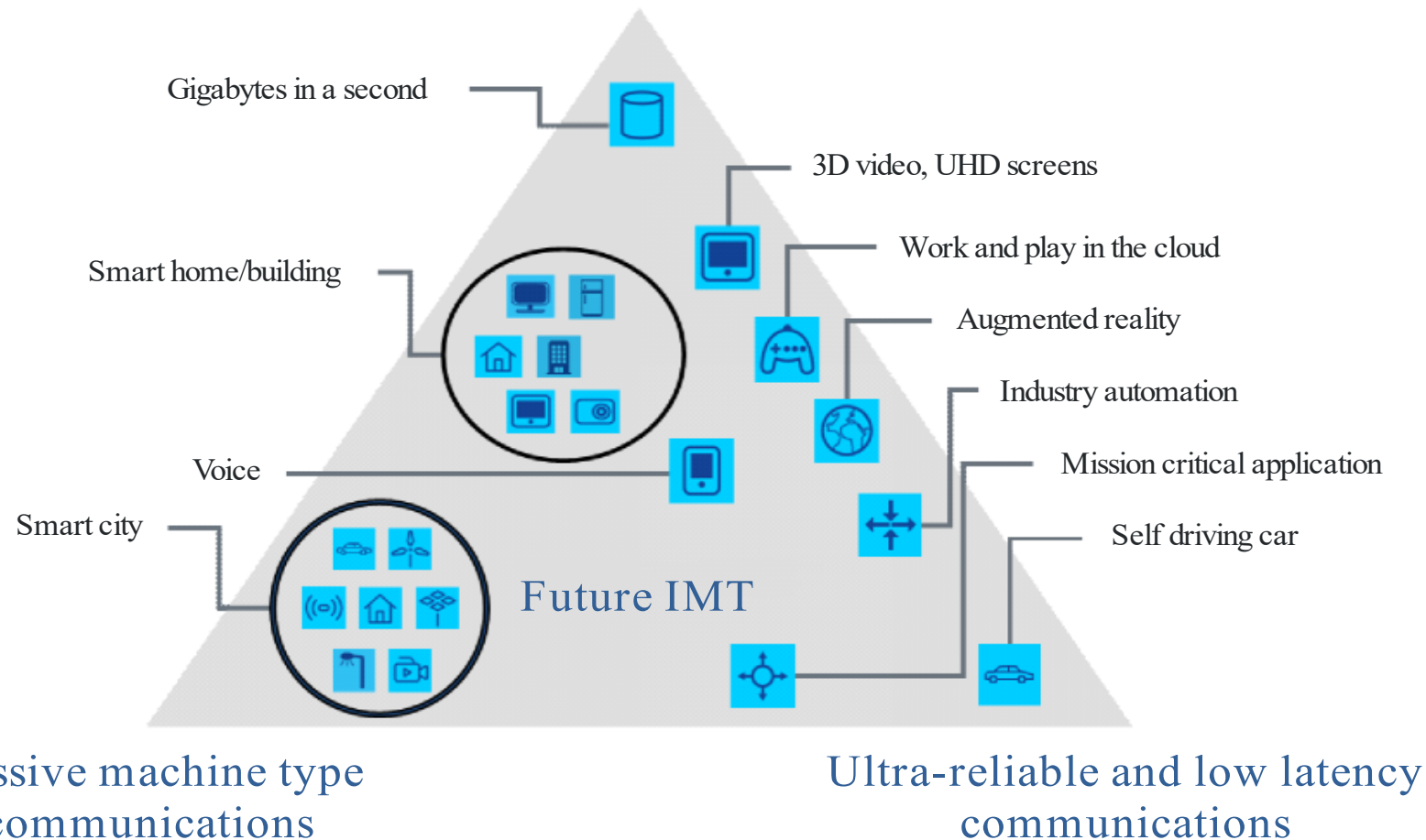
1 Introduction

At the 37th meeting of WP 5D, a new subgroup, SWG Vision was created, which developed a draft work plan and the initial structure of a working document towards a preliminary draft new Recommendation on a future vision of IMT. From very preliminary initial discussions, the proposed new ITU-R Recommendation is expected to define the framework and overall objectives of the future development of International Mobile Telecommunications (IMT) for 2030 and beyond in the light of the roles that IMT could play to better serve the needs of the networked society, for both

Big Question:
what is the Primary
6G Vision

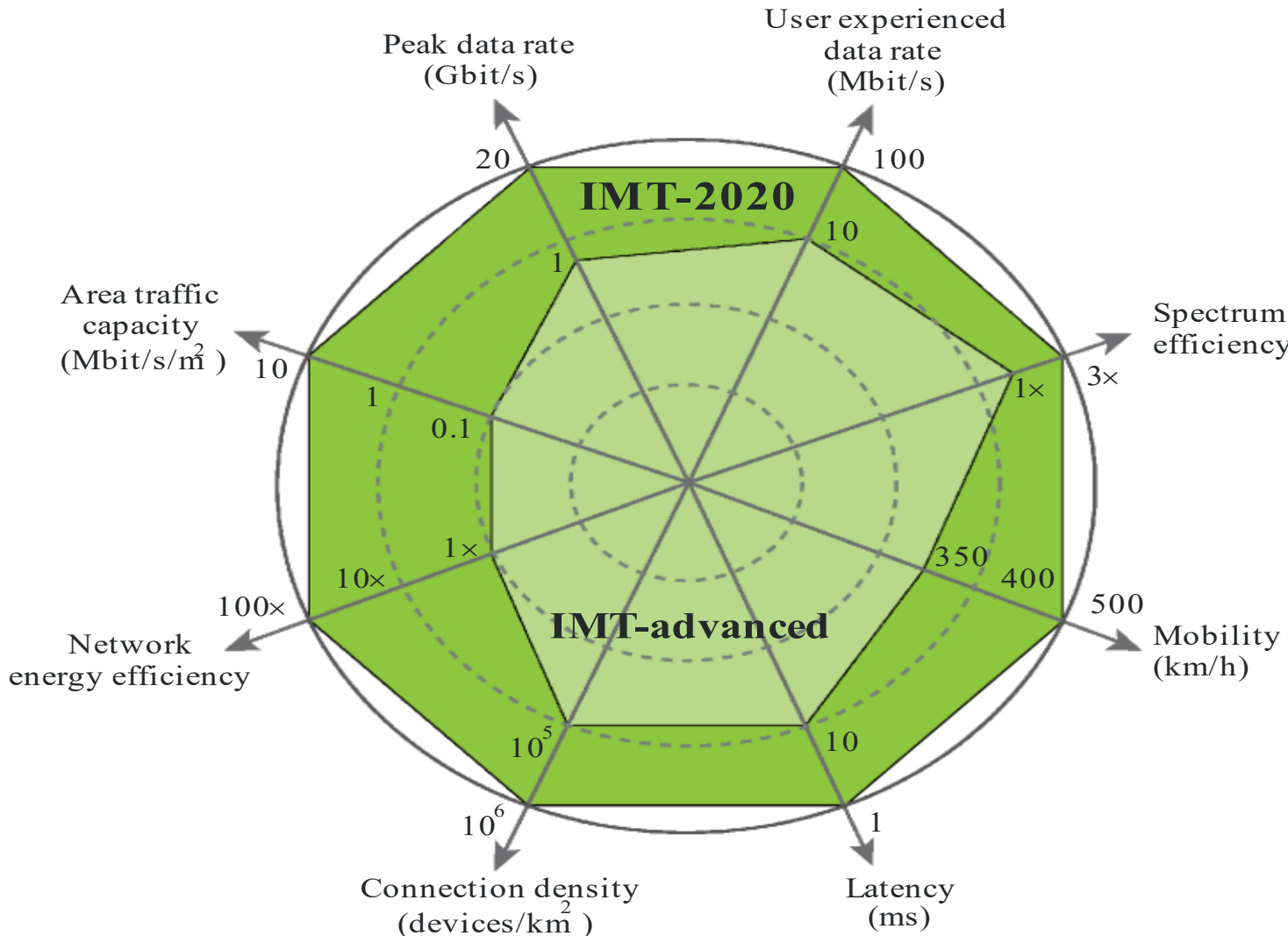
Usage Scenarios of 5G IMT-2020 (ITU-R M.2083)

Enhanced mobile broadband



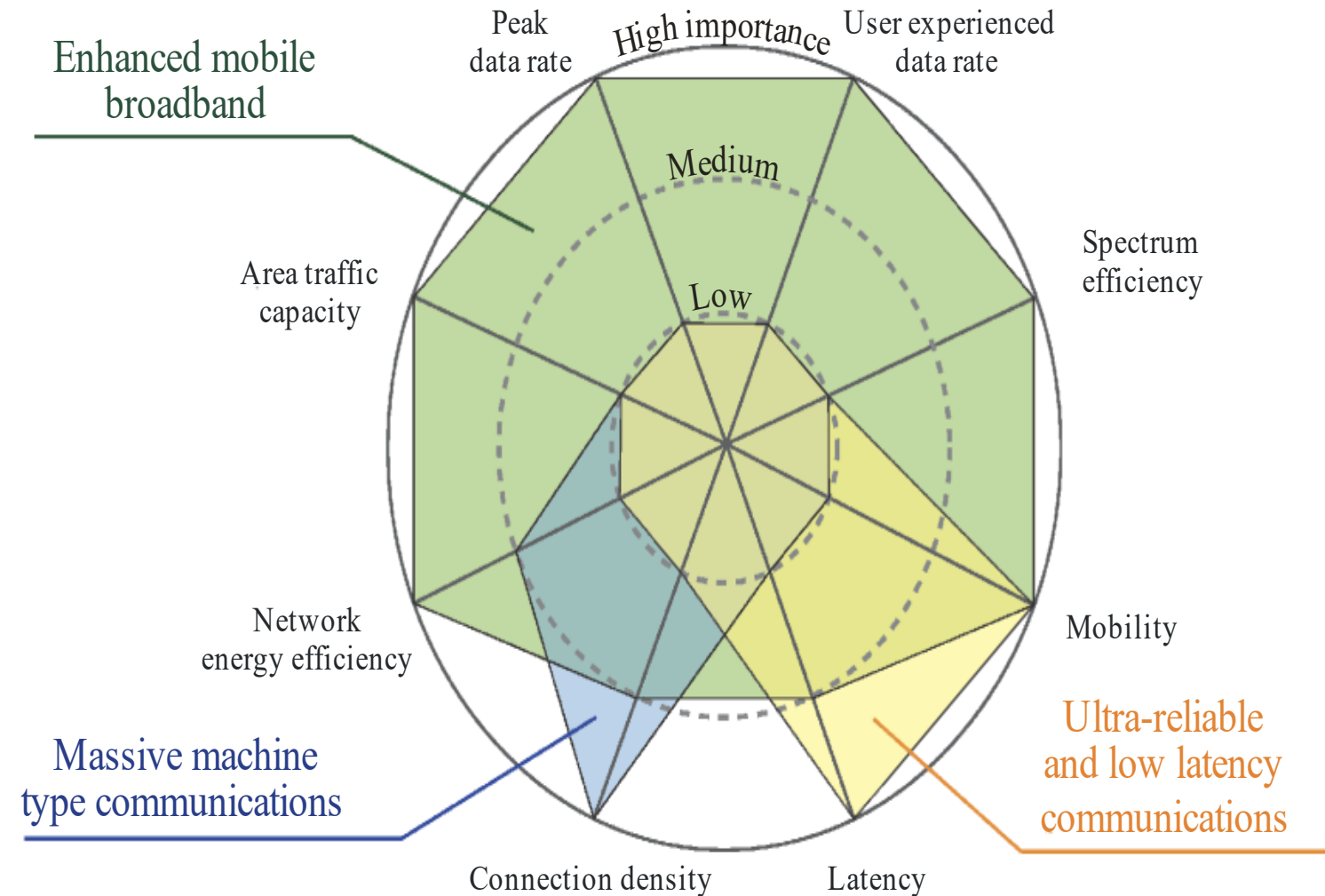
**Q: What
Should be
the usage
scenarios
for 6G**

Enhancement of Capabilities from 4G (IMT-Advanced) to 5G (IMT-2020)



Q: What Should be the enhancement of Capabilities from 5G to 6G

The importance of capabilities in different usage scenarios



Q: What Should be the most important Capabilities of 6G

Spectrum was critical for 5G Success Same will apply for 6G

URBAN

SUBURBAN

RURAL



24-70 GHz
Typical Bandwidth ~1 GHz

**HOTSPOT / CAPACITY
LAYER**

3-10 GHz
Typical Bandwidth 10-100 MHz

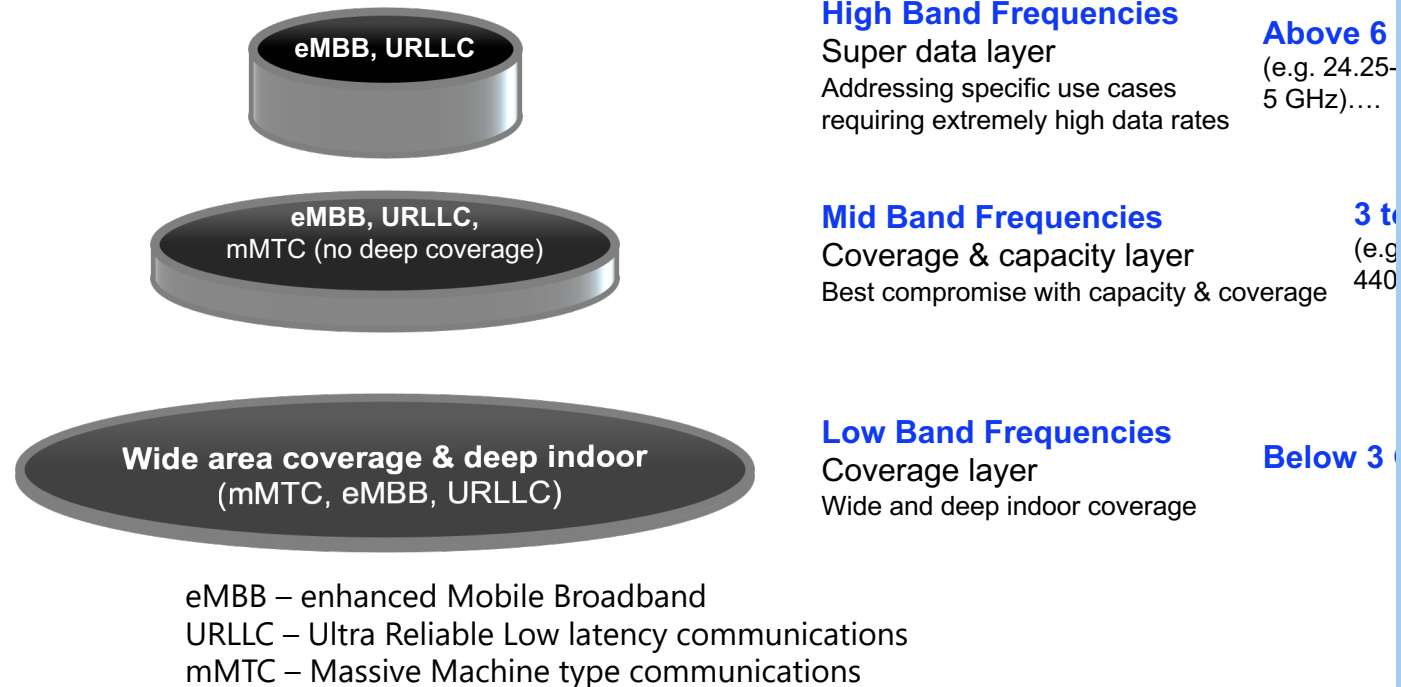
**CAPACITY
LAYER**

Below 3 GHz
Typical Bandwidth 10-20 MHz

**BASIC COVERAGE
LAYER**

Spectrum for 5G: Multi layer approach

5G will require access to multiple bands of spectrum.

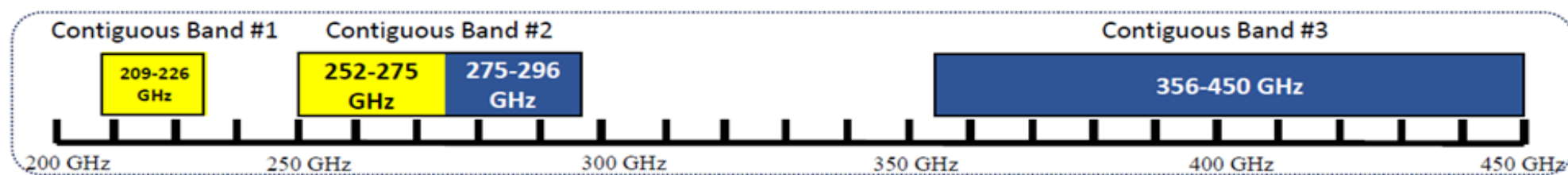


Q: What Should be the most important Spectrum for 6G

Key Spectrum that is being discussed for 6G is THz

- The terahertz frequency band above 100 GHz can provide a larger usable bandwidth
- It also suffers from greater path attenuation but it is possible to overcome certain path attenuation by improving the directivity and gain of the antenna and using beamforming technology to increase the coverage of the cell.
- IMT technologies adopted for bands above 100 GHz can be used in indoor/outdoor hotspot environments, integrated sensing and communication and ultra-short-range environments to provide ultra-high data rate services.

Example of contiguous bands larger than 15-20 GHz





Thank you

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