SWS-240025

Summary of the Workshop

3GPP Stage 1 Workshop on IMT2030 Use Cases

Rotterdam, NL
08 - 10 May 2024

Introduction

- The **3GPP Stage 1 workshop on IMT 2030 use cases** took place on May 8th to 10th 2024 in Rotterdam, The Netherlands.
  - Its objective was to bring 3GPP closer to the ongoing initiatives of various global/regional research organizations and MRPs related to the 6G use cases. This collaborative effort is of utmost importance as SA1 undertakes the task of defining the requirements and use cases for 6G starting from Rel-20.

- 245 delegates registered as face-to-face, and another 383 as remote participants
  - More than 200 people attended the F2F meeting.

- It was the opportunity for different communities to present their views on 6G/IMT2030 Use Cases. These communities are Operators; Verticals; Regional Alliances and ITU.

- The workshop was co-chaired by Mr. Jose Almodovar, SA1 Chair, and by Mr. Puneet Jain, SA Chair. It was supported by ETSI MCC, coordinated by Mr. Alain Sultan.

Agenda of the Workshop

Time	Wednesday May 8th Opening, Operators, Verticals	Thursday May 9th Research Alliances	Friday May 10th ITU, 3GPP, Closing
1st session	08.45-09.15: Registration 09.15-09.30: Opening ---------- **Operators** 09.30-10.00: GSMA 10.00-10.30: NGMN	09:00-09.45: Japan (B5GPC) 09.45-10.30: South Korea (6G Forum)	09.00-09.30: ITU-R 09.30-10.00: 3GPP 10.00-10.30: **Panel#4**: "ITU & 3GPP synergies for 6G"
Morning break	Morning break (10.30-11.00)	Morning break (10.30-11.00)	Morning break (10.30-11.00)
2nd session	11.00-11.40: **Panel#1**: "6G Drivers for Operators" ---------- **Verticals** 11.45-12.10: Automotive (5GAA) 12.10-12.35: Industry (5G-ACIA)	11.00-11.45: China (IMT2030 Promotion Group) 11.45-12.30: India (Bharat 6G Alliance)	11.00-11.40: Summary read-out of the Workshop 11.40-12.00: Next steps 12.00-12.30: Closing
Lunch break	Complimentary lunch (12.35-14.00)	Complimentary lunch (12.30-14.00)	Workshop ends 12.30 latest
3rd session	14.00-14.25: Multimedia (5GMAG) 14.25-14.50: Satellite (GSOA) 14.50-15.15: Public Safety (TCCA) 15.15-15.40: Wireless Broadband Alliance (WBA)	14.00-14.45: America (ATIS Next G Alliance) 14.45-15.30: Europe (6G-SNS)	
Afternoon break	Afternoon break (15.40-16.10)	Afternoon break (15.30-16.00)	
4th session	16.10-17.00: **Panel#2**: "6G Drivers for Verticals"	16.00-17.00: **Panel#3**: "Building a Global 6G View"	

6G DRIVERS FOR OPERATORS

Speakers

Mrs. Barbara Pareglio
Senior Technical Director, Smart Mobility Lead, GSMA

Mr. Sparsh Singhal
Senior Program Manager, NGMN

Session 1

6G DRIVERS FOR OPERATORS

Time	Event	Speaker
09:30 – 10:00	GSMA Proposal on 6G	**Mrs. Barbara Pareglio** (GSMA)
10:00 – 10:30	NGMN's 6G Vision	**Mr. Sparsh Singhal** (NGMN)
10:30-11:00	Morning break	
11:00-11:40	Panel#1: "6G Drivers for Operators"	Panel

Panel#1: “6G Drivers for Operators”

Moderator

Mr. Balazs Bertenyi
Nokia

Panelists

Mr. Eric Hardouin
Orange

Mr. Scott Migaldi
T-Mobile USA

Mr. Xu Xiaodong
CMCC

Mr. Minsoo Na
SK Telecom

Mr. Shin-Ichi Isobe
NTT DoCoMo

6G Drivers for Verticals

Speakers

Mr. Maxime Flament
Chief Technology Officer,
5GAAA

Mr. Andreas Müller
General Chair,
5G-ACIA

Dr. Jordi J. Gimenez
Head of Technology,
5G-MAG

Ms. Munira Jaffar
Chair of the Standards WG,
GSOA

Mr. Tero Pesonen
Board Vice Chair and
Director, TCCA

Mr. Bruno Tomas
Chief Technology Officer,
WBA

Session 2

6G Drivers for Verticals

Time	Event	Speaker
11:45 – 12:10	5GAA input on IMT-2030 Use Cases	**Mr. Maxime Flament** (5GAA)
12:10 – 12:35	Considerations on 6G Use Cases & Requirements	**Mr. Andreas Müller** (5G-ACIA)
12:35 – 14:00	Lunch	
14:00 – 14:25	Views from 5G-MAG on Use Cases towards IMT-2030	**Dr. Jordi J. Gimenez** (5G-MAG)

Session 2

6G Drivers for Verticals

Time	Event	Speaker
14:25 – 14:50	Evolution into 6G-NTN for IMT-2030 Use Cases	**Ms. Munira Jaffar** (GSOA)
14:50 – 15:15	Can societies depend on 6G?	**Mr. Tero Pesonen** (TCCA)
14:50 – 15:40	Next Generation of Access	**Mr. Bruno Tomas** (WBA)
15:40 – 16:10	Afternoon break	
16:10 – 17:00	Panel#2: “6G Drivers for Verticals”	Panel

Session 3
6G Regional Research Alliances

Speakers

Dr. Satoshi Konishi
Leader of Vision WG
B5GPC

Dr. Namseok Ko
Chair of the Network Technology WG,
6GForum

Ms. Ying Du
Vice-chair of Standards and Int. Cooperation WG,
IMT-2030(6G)PG

Mr. Rajesh Kumar Pathak
Director General,
Bharat 6G Alliance

Dr. Amitava Ghosh
Chair - National 6G Roadmap WG,
Next G Alliance

Dr. Gustav Wikström
Hexa-X-II & 6G-IA member, SNS

Session 3

6G Regional Research Alliances

Time	Event	Speaker
09:00 – 09:45	B5GPC's Views on IMT2030 use cases	Dr. Satoshi Konishi
09:45 – 10:30	6G Forum's View on IMT-2030 use cases	Dr. Namseok Ko
10:30 – 11:00	Morning break	
11:00 – 11:45	Bharat 6G Alliance	Mr. Rajesh Kumar Pathak
11:45 – 12:30	Use cases towards 2030 and beyond	Ms. Ying Du

Session 3

6G Regional Research Alliances

Time	Event	Speaker
12:30 – 14:00	Lunch	
14:00 – 14:45	NGA Vision for 6G	Dr. Amitava Ghosh
14:45– 15:30	The European view on 6G use cases	Dr. Gustav Wikström
15:30 – 16:00	Afternoon break	
16:00 – 17:00	Panel#3: “Building a Global 6G View”	Panel

Panel#3: “Building a Global 6G View”

Moderator

Mr. Puneet Jain
3GPP SA Chair

Panelists

Dr. Satoshi Konishi
B5GPC

Dr. Namseok Ko
6G Forum

Dr. XiaoFeng Liu
IMT-2030(6G) Promotion Group

Dr. Ki-Dong Lee
Next G Alliance

Dr. Gustav Wikström
6G-SNS

ITU & 3GPP synergies for 6G

Speakers

Mr. Uwe Löwenstein
Counsellor for ITU-R Study Group 5 (Terrestrial Services), ITU

Mr. Puneet Jain
3GPP SA Chair

Session 4

ITU & 3GPP synergies for 6G

Time	Event	Speaker
09:00 – 09:30	Update from ITU-R on IMT-2030	Mr. Uwe Löwenstein
09:30 – 10:00	3GPP Intro and 6G Update	Mr. Puneet Jain
10:00 – 10:30	*Panel#4: "ITU & 3GPP synergies for 6G"*	Panel
11:00 – 11:45	Morning break	

Panel#4: “ITU & 3GPP synergies for 6G”

Moderator

Mr. Giovanni Romano
ITU/3GPP liaison officer

Panelists

Dr. Hiroyuki Atarashi
ITU-R WP 5D Chair

Mr. Puneet Jain
3GPP SA Chair

Mr. Peter Schmitt
CT Chair

Mr. Wanshi Chen
3GPP RAN Chair

Workshop's tdoc list

TDoc	Title	Source	TDoc Status
SWS-240001	Opening Day 1	Organisers	noted
SWS-240002	GSMA Proposal on 6G	GSMA	noted
SWS-240003	NGMN's 6G Vision	NGMN	noted
SWS-240004	withdrawn	Not used	withdrawn
SWS-240005	5GAA MRP input to 3GPP Stage-1 workshop on IMT-2030 Use Cases	Automotive (5GAA)	noted
SWS-240006	5G-ACIA's Considerations on 6G Use Cases & Requirements	Industry (5G-ACIA)	noted
SWS-240007	Views from 5G-MAG towards IMT-2030	Multimedia (5GMAG)	noted
SWS-240008	NTN evolution into 6G for IMT-2030 Use Cases	Satellite (GSOA)	noted
SWS-240009	Can societies depend on 6G?	Public Safety (TCCA)	noted
SWS-240010	Next Generation of Access	Wireless Broadband Alliance	noted
SWS-240011	withdrawn	Not used	withdrawn
SWS-240012	Opening Day 2	Organisers	noted
SWS-240013	B5GPC's Views on IMT2030 use cases	Japan (B5GPC)	noted
SWS-240014	6GForum's Views on IMT2030 use cases	South Korea (6G Forum)	noted
SWS-240015	Use cases towards 2030 and beyond	China (IMT2030 Promotion Group)	noted
SWS-240016	Bharat 6G Alliance's Views on IMT2030 use cases	India (Bharat 6G Alliance)	noted
SWS-240017	NGA Vision for 6G	America (ATIS Next G Alliance)	noted
SWS-240018	The European view on 6G use cases	Europe (6G-SNS)	noted
SWS-240019	withdrawn	Not used	withdrawn
SWS-240020	Opening Day 3	Organisers	noted
SWS-240021	Withdrawn	Not used	withdrawn
SWS-240022	Update from ITU-R on IMT-2030	ITU-R	noted
SWS-240023	3GPP Intro and 6G Update	3GPP	noted
SWS-240024	Withdrawn	Not used	withdrawn
SWS-240025	Summary of the Workshop	Organisers	noted

Summary of the Workshop

- Summary (slide #19 to slide#23) is generated based on analytical review of all the presentations, identifying the common themes across presentations.

- The Summary slides are for Information purpose only.

- **The summary slides do not, in any way, imply priority or ranking of the 6G use cases discussed during the 3GPP Stage-1 workshop on IMT2030 use cases.**

Some Potential Drivers for 6G: A table view

	Security	AI	Immersive Com	Sustainability, Energy Efficiency	Ubiquitous and resilient coverage	Sensing	"Smart life"	Native Vo6G	FWA-FWC	LPWA	Northbound API	Healthcare	Autonomous Driving	Positionning	Backward Compatibility
GSMA	✓	✓	✓	✓				✓							
NGMN	✓	✓	✓	✓	✓	✓	✓	✓			✓	✓		✓	✓
5GAA	✓	✓	✓	✓	✓	✓							✓	✓	
5G-ACIA	✓	✓	✓	✓		✓					✓				✓
5G-MAG	✓	✓	✓	✓	✓	✓	✓				✓				
GSOA	✓				✓									✓	
TCCA	✓	✓			✓										✓
WBA	✓	✓				✓									
B5GPC	✓	✓	✓	✓	✓	✓	✓					✓	✓	✓	
6GForum	✓	✓	✓	✓	✓	✓	✓					✓	✓	✓	
IMT-2030RG	✓	✓	✓	✓	✓	✓	✓							✓	
B6GA	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓
NextGA	✓	✓	✓	✓	✓	✓	✓		✓	✓		✓		✓	
6GSNS-ICE	✓	✓	✓	✓	✓	✓	✓					✓		✓	
ITU	✓	✓	✓	✓	✓	✓	✓					✓	✓	✓	

Note: Non-exhaustive list, showing the topics appearing in at least two presentations

Some Potential Drivers for 6G (1/4)

As commonly heard at the workshop

- **Security.** Used in different contexts, both about network security and user data confidentiality:
  - Maintaining continuity of service and robust security, especially crucial in times of crisis
  - Identify all relevant new threat-factors for 6G, and develop mitigation solution (e.g. detection and protection against electromagnetic threats)
  - quantum-safe security mechanisms

- **Support of Artificial Intelligence**. Both for:
  - Network-design/performance:
    - network optimization and automation (Intelligent Network management, Network Performance)
    - Energy efficiency/saving/ sustainability
    - AI-assisted air interface/ Radio Performance;
    - AI for improving positioning
  - Enabling AI at the application level:
    - AI data management, model distribution for all AI-assisted “smart” areas (cities, industries, surgeries, robot control, manufacturing plant, rescue missions etc.
    - AI as a Service (AIaaS)
    - To implement a range of media’s personalization and customization (sport TV program, etc)

Some Potential Drivers for 6G (2/4)

As commonly heard at the workshop

- **Immersive Communications**
  - Extended reality
  - Holographic, telepresence
  - Multi-sensorial communication
  - Digital twin; (Hyper-realistic) metaverse; virtual worlds
  - for leisure (gaming, entertainment), professionals (industrial training), education (remote lecture)

- **Sustainability**
  - It mainly refers to energy efficiency/reduction of energy consumption
    - Exact metrics vary between presenters
  - In specific contexts, It might also refer to:
    - Reducing environmental impacts
    - More efficient processes and more utilization of resources in different industrial domains to support a circular economy
    - Reuse of 5G hardware/no forced hardware refresh; Software-based upgrades

Some Potential Drivers for 6G (3/4)

As commonly heard at the workshop

- **Ubiquitous and resilient coverage**
  - Non-Terrestrial Network (Satellite) coverage
  - Remote and underserved areas; Seamless rural coverage for smart agriculture, education, etc
  - Needed for Automotive (also for autonomous driving), Aerial & Maritime communications
  - Network resiliency: minimise network outage, resiliency to the unexpected (natural disaster, etc.)

- **Sensing**
  - Human Activity Recognition; Localization and Tracking; Environmental Object Reconstruction; Monitoring Tasks
  - Use the communication infrastructure as a sensor
  - Intelligent sensing and communication coexistence
  - For different use cases, e.g. autonomous driving

Some Potential Drivers for 6G (4/4)

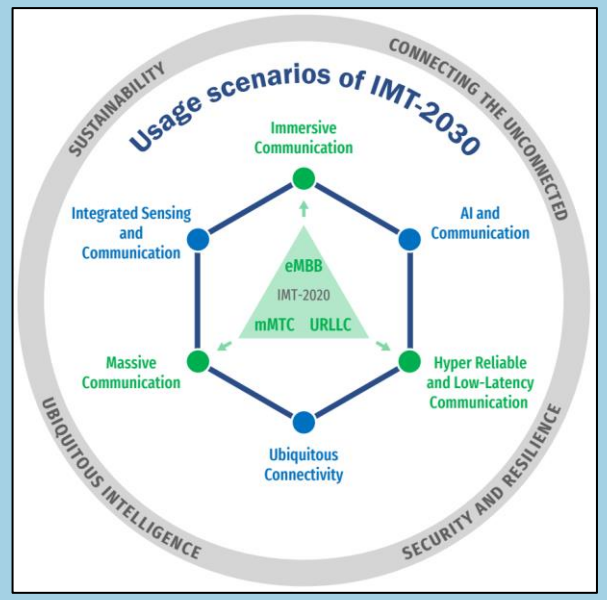
As commonly heard at the workshop

- "Smart" everything:
  - *"Smart" refers to a remotely operable/controllable/configurable system, generally AI-assisted*
  - Smart Cities/home/factory
    - For Factory: Smart Industry/logistic/manufacturing/productivity; this includes the Control of Robot/Cobots/Sobots
  - Smart Infrastructure; Smart Grid
  - Smart Agriculture/education
  - Smart Health & Wellness

- Voice over 6G (Vo6G), including roaming, lawful interception and emergency call
- Fixed Wireless Access (FWA)
- Low Power Wide Area Network (LPWA) and massive IoT/sensors
- Open network Northbound APIs
- Healthcare: monitoring; telesurgery
- Autonomous driving; Connected Vehicles (see also "ubiquitous coverage")
- Enhanced positioning
- Backward compatibility

ITU's "wheel" and "palette" for IMT-2030

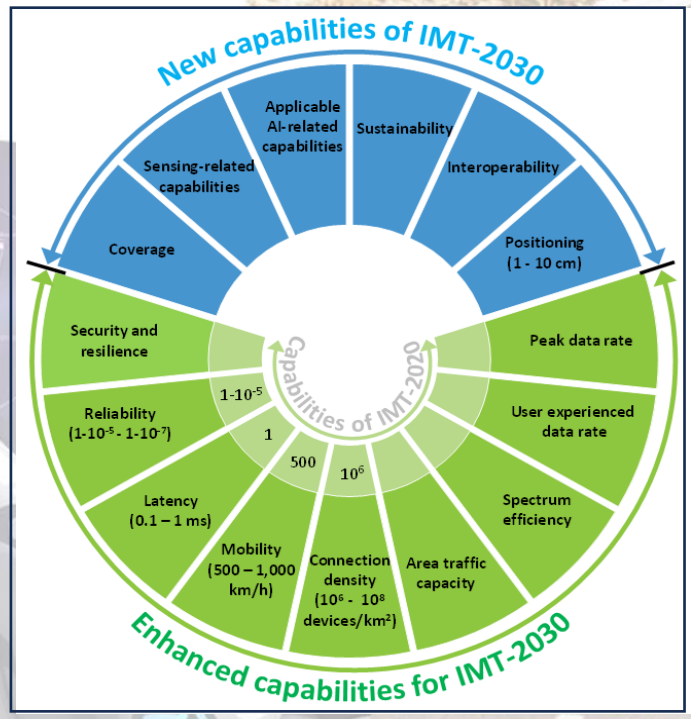
The "wheel diagram": the six Usage Scenarios of IMT-2030 (6G)



- Three Usage Scenarios are extensions from IMT-2020 (5G):
  - **Immersive Communication** (from "eMBB")
  - **Massive Communication** (from "mMTC")
  - **HRLLC** (Hyper Reliable & Low-Latency Communication) (from "URLLC")
- Three Usage Scenarios are new:
  - **Ubiquitous Connectivity**
  - **AI & Communication**
  - **Integrated Sensing & Communication**
- In addition, the four "**Overarching Aspects**" (i.e. design principles applicable to all usage scenarios) are:
  - **Sustainability**
  - **Connecting the unconnected**
  - **Ubiquitous intelligence**
  - **Security/resilience**

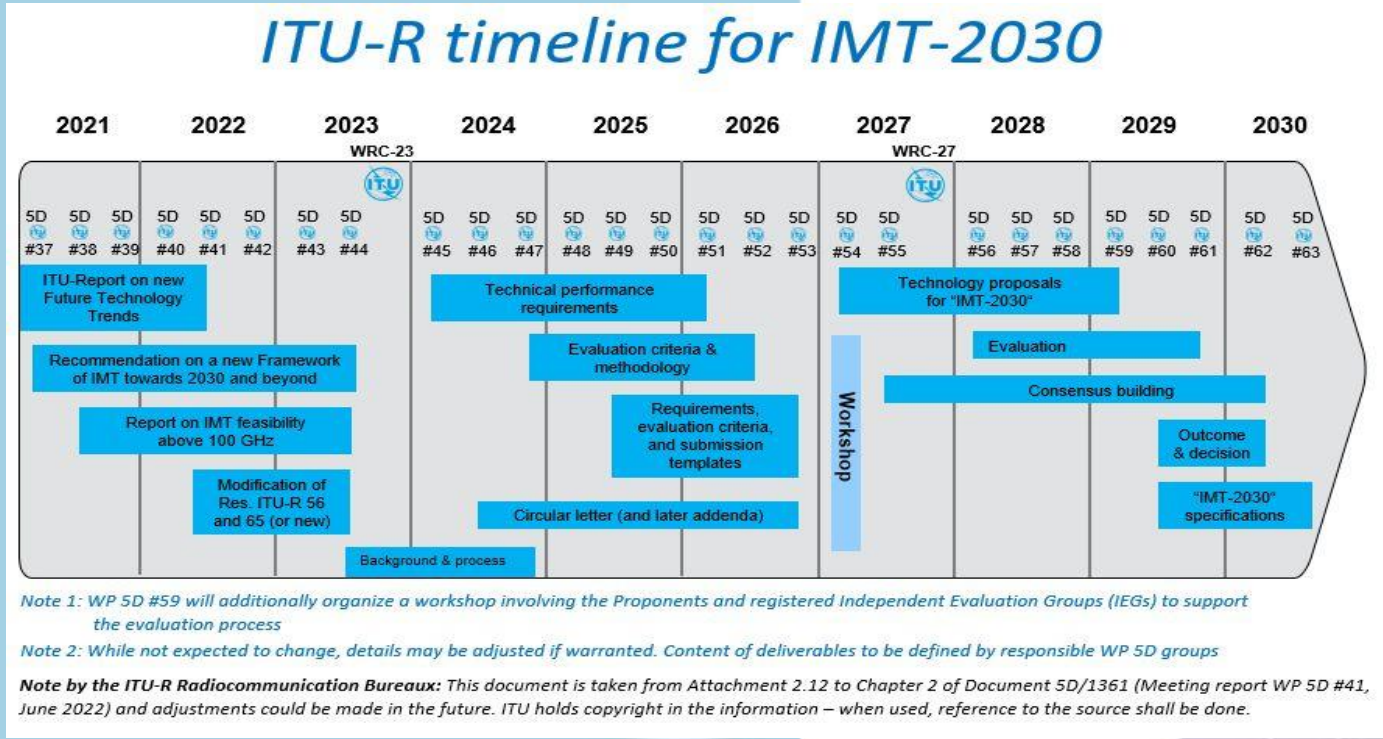
The "palette diagram": the 15 Capabilities of <u>the</u> IMT-2030

- Fifteen capabilities for IMT-2030, including nine derived from IMT-2020
- When given, the range of values are estimated targets for 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
- IMT-2030 is also expected to help address the need for increased environmental, social and economic **sustainability**, and also support the goals of the Paris Agreement of the United Nations Framework Convention on Climate Change

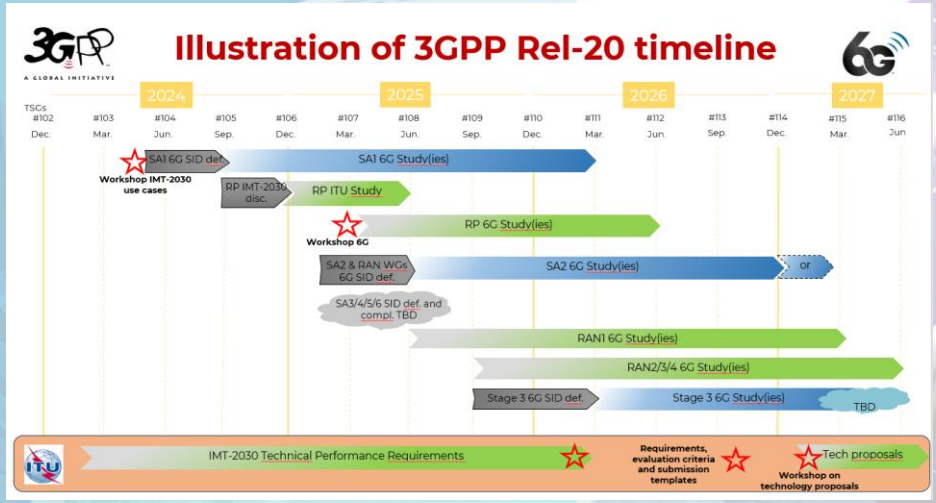


6G Timeline

- **ITU Timeline:**



- **3GPP Timeline:**



Next steps in 3GPP

- SA1#106 (27-31 May 2024 - Korea, Jeju) will invite the presentations from 3GPP Members on:
  - their views on 6G Use Cases
  - the SI organisational aspects: one or several study(ies) on 6G?
  - Further details to be provided as part of SA1#106 meeting agenda.
- Approval of SA1 6G SIDs is targeted for September 2024 (TSG SA#105)
- TSG wide 6G Workshop is planned for Mar 10 – 11, 2025. Further details TBD.