

6G System - Opportunities and Challenges



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Agenda

- IMT-2030 Societal Considerations
- IMT-2030 Capabilities & Usage Scenarios
- 6G – Opportunities & Challenges
- 6G Network as Platform
- References

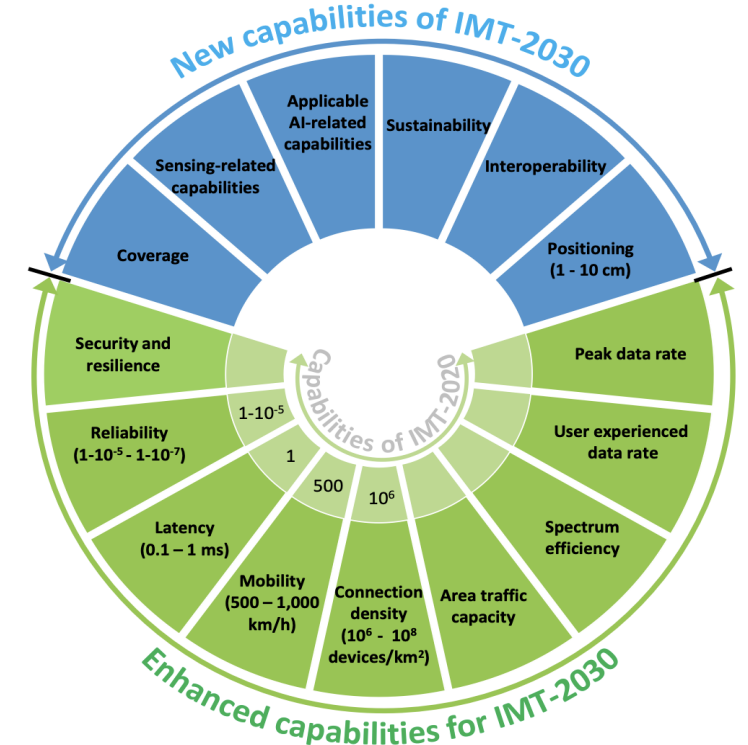
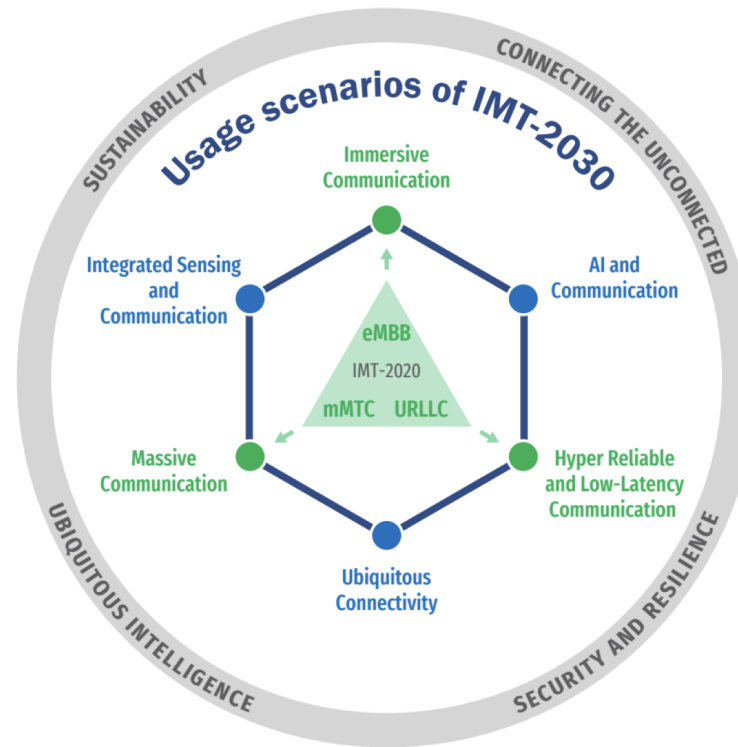
IMT-2030 – Motivation and Societal Considerations

- Inclusivity
 - Bridging digital divide
- Ubiquitous connectivity
 - Connecting the unconnected
- Sustainability
 - Energy-efficient systems
- Innovation
 - Fostering innovation via IMT-2030 technologies
- Interworking
 - Interworking with NTN, existing IMT systems, and non-IMT systems to enable service continuity & flexibility to users
- Enhanced security and resilience
 - Secure and resilient, minimal disruption, quick recovery
- Standardization and interoperability
 - Standardized and interoperable interfaces

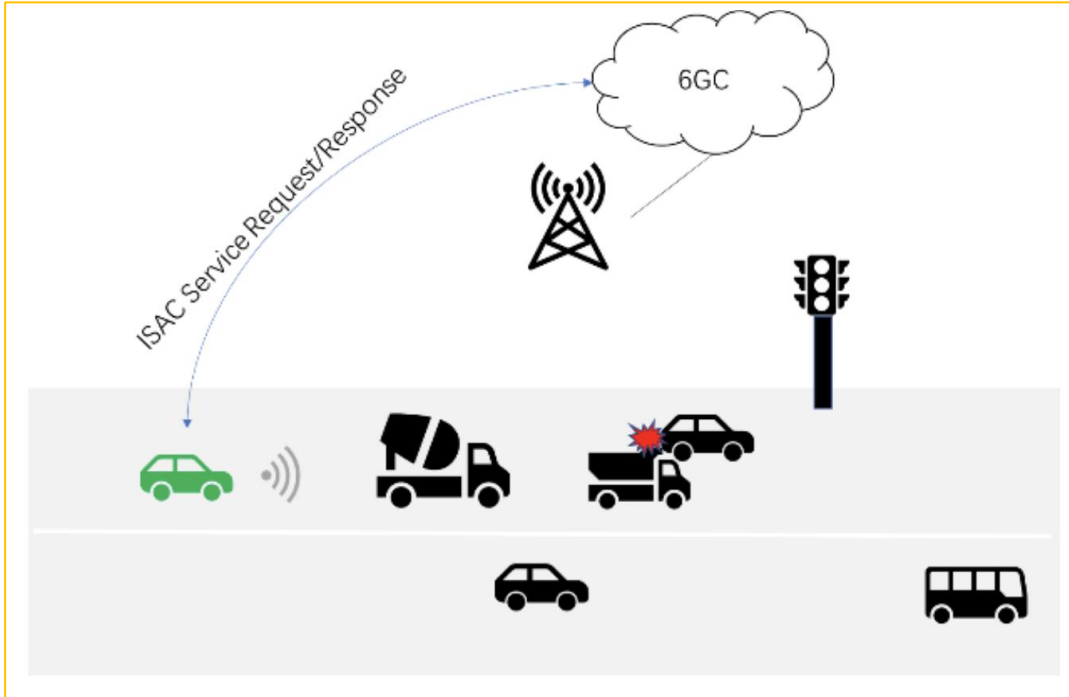
IMT-2030 – Capabilities & Usage Scenarios

Key aspects newly introduced in 6G

- Energy Efficiency and Sustainability
- Ubiquitous Connectivity
- AI and Communication
- Integrated Sensing and Communication
- Integrated Sensing and Communication



6G – Opportunities & Challenges

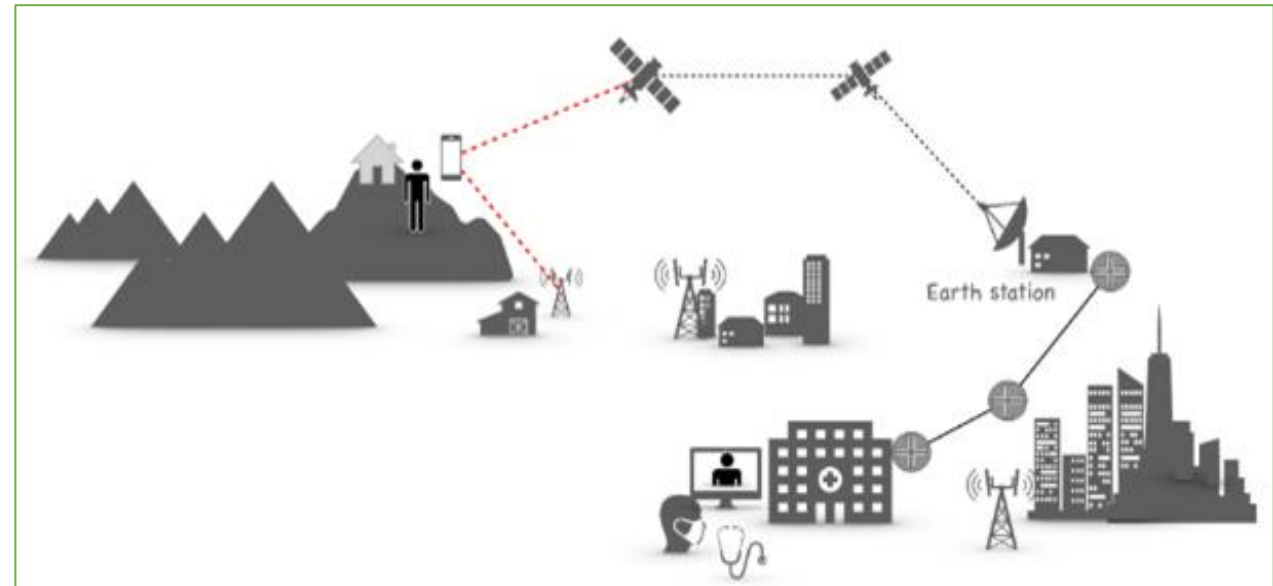


Integrated Sensing and Communication (ISAC)

- RAN & UE as Sensing Entities (Sensors)
- Mobility of UE

Ubiquitous Connectivity

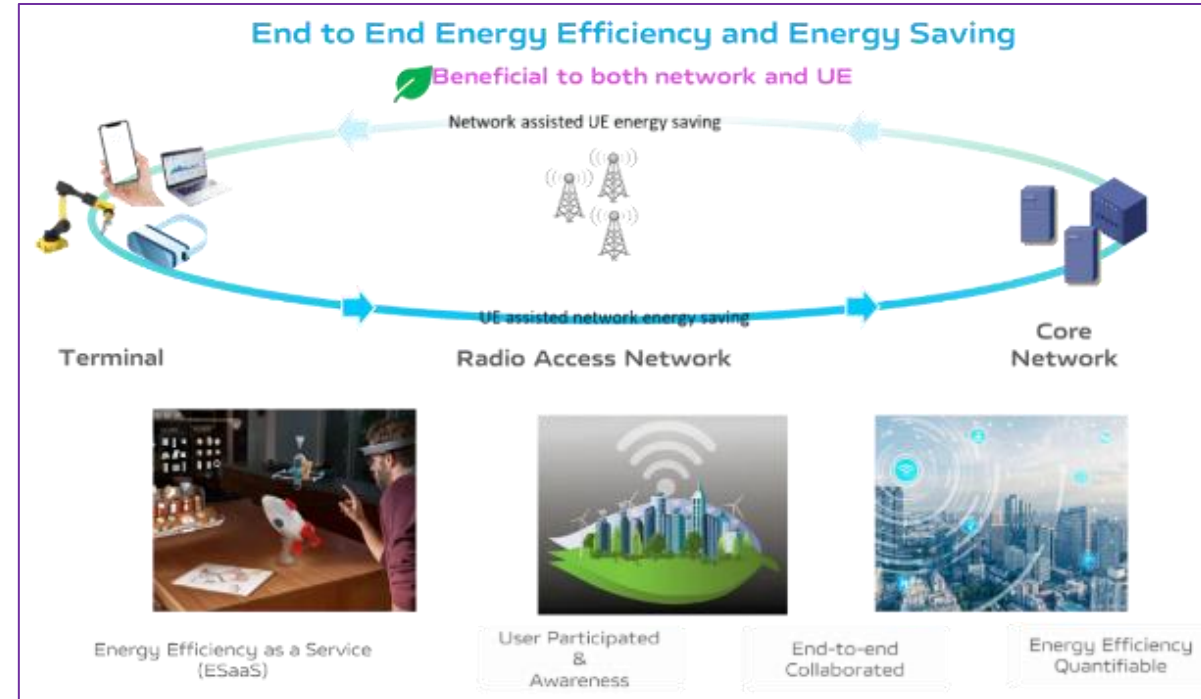
- Alternate solutions to support sparsely populated area
- Coverage expansion vs ROI



6G – Opportunities & Challenges contd.

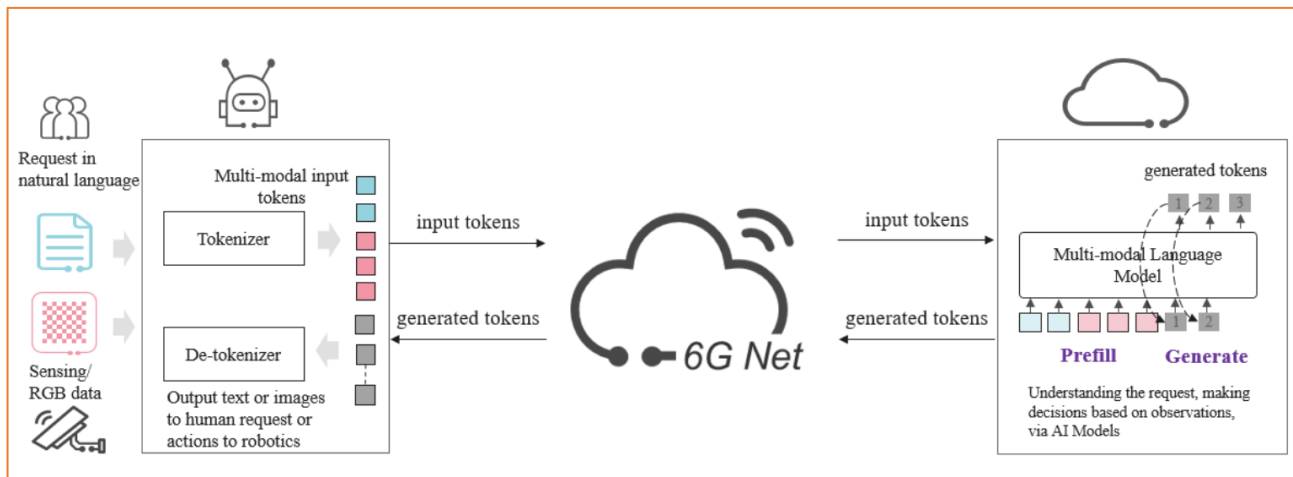
Integration of AI

- Network for AI
 - Enable communication to support vast range of AI/ML applications
- AI for Network
 - AI native architecture & Intent based requests



Energy Efficiency

- Information collection at various levels (e.g., service, user, slice)
- AI vs energy efficiency tradeoff



6G Network as Platform

- Network may transform into a platform
 - Not just data connectivity
 - New services
 - Cloud (Computing)
 - Sensing
 - Information exposure
- Change in User profile
 - Not just Subscribers connected via Radio interface
 - Third-party users interested in data (anonymized) available in networks
 - Public service providers - Disaster Management Authority requesting sensing data, Town planners asking for user roaming/mobility data
 - Accessing services from the backend



References

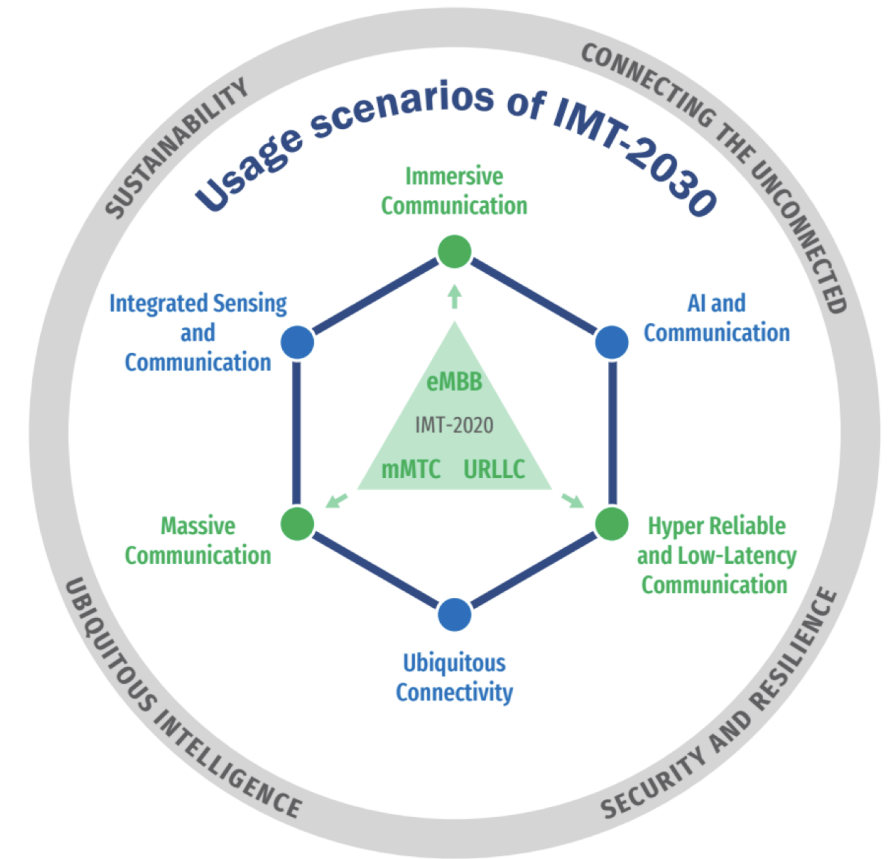
- ITU-R M.2083-0 “IMT Vision – Framework and overall objectives of the future development of IMT for 2020 and beyond”
- ITU-R M.2160-0 “Framework and overall objectives of the future development of IMT for 2030 and Beyond”
- 3GPP TR 22.870 V2.0.0 (2026-03) “Study on 6G Use Cases and Service Requirements; Stage 1 (Release 20)”
- 3GPP TR 23.801-01 V0.4.0 (2026-03) “Study on Architecture for 6G System; Stage 2 (Release 20)”
- RP-253876 - Revised SID: Study on 6G Radio

Thank You

Backup Slides

IMT-2030 – Usage Scenarios

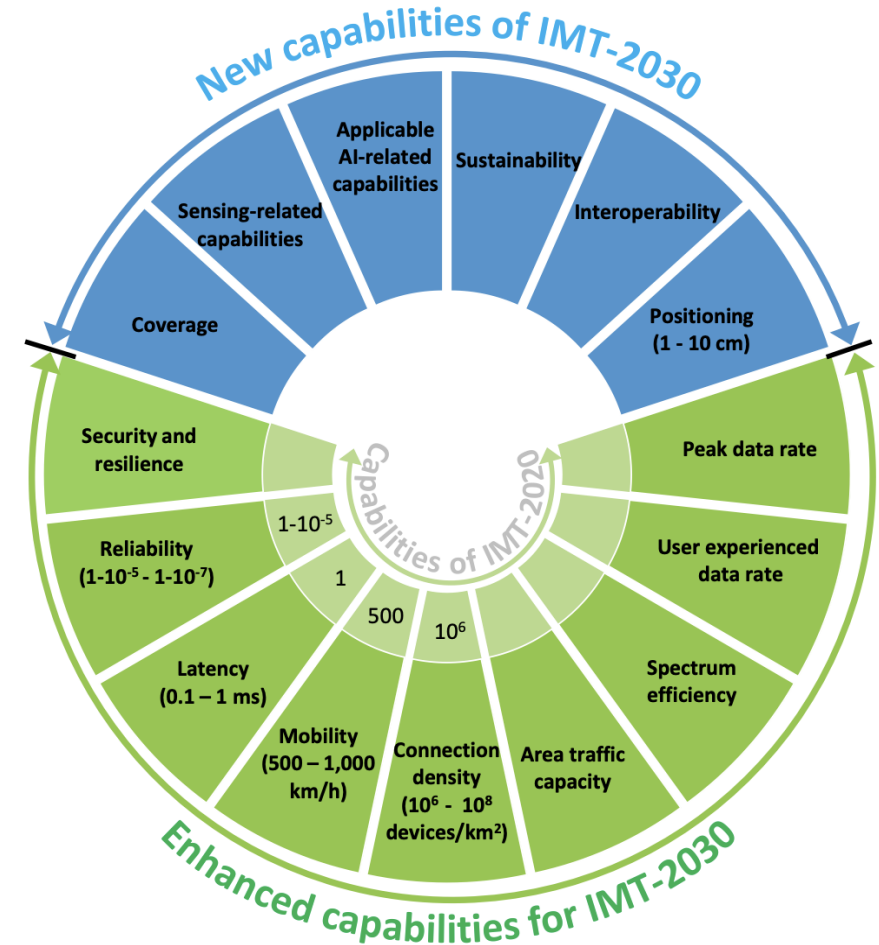
- Immersive Communication
 - Immersive XR, remote multi-sensory telepresence, holographic communications
- Integrated AI and Communication
 - Automated driving, autonomous collaboration between devices for medical assistance applications, offloading heavy computation operations across devices/networks
- Hyper-Reliable and Low-latency Communication
 - Robotic interactions, emergency services, tele-medicine
- Ubiquitous Connectivity
 - Uncovered or scarcely covered areas, rural, remote and sparsely populated areas
- Massive Communication
 - Smart cities, transportation, logistics, healthcare
- Integrated Sensing and Communication
 - Activity detection, movement tracking, gesture recognition, fall detection, vehicle detection, environmental monitoring



IMT-2030 - Capabilities

New capabilities for IMT-2030

- **Coverage:** Improved cell edge service range through enhanced link budgets
- **Positioning:** High-precision positioning with accuracy of 1–10 cm
- **Sensing:** Advanced capabilities like object detection, localization, imaging, mapping, etc.
- **AI Integration:** AI-enabled features such as distributed learning, data processing, and AI model inference, etc.
- **Sustainability:** Reduced environmental impact through energy-efficient systems and resource optimization
- **Interoperability:** Seamless functioning across diverse systems with transparent standards



Learnings from 5G

Opportunities

- Cloud native architecture
 - Enabled scalability
- Network Slicing
- Integration of AI
- Multi-RAT network
 - NTN, UAV
 - WLAN
 - NR, LTE

Challenges

- Higher bands (mmWave) may not be suitable
- URLLC implementation challenges
- Multiple deployment variants (SA & NSA)
- Implementation challenges in DU & CU split variants