

Consideration for SA1 Rel-20 Part2 study

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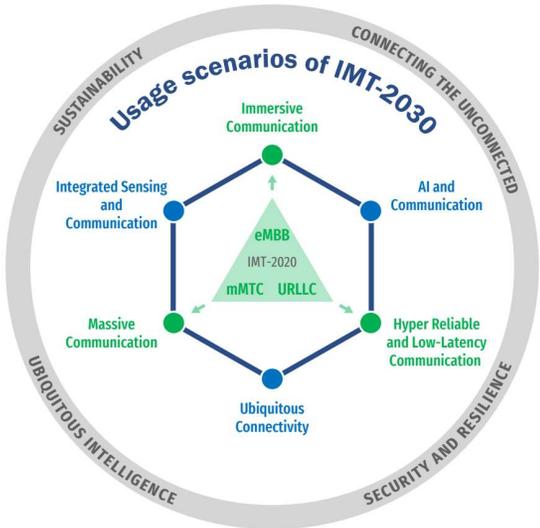
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Motivation, drivers and trends

To continue empowering the mobile industry and driving its profitability is of vital importance. This first means enabling operators to increase and diversify revenue streams by servicing the established and burgeoning markets, considering the needs of new services and usage scenarios such as AI and Sensing. Meanwhile, CAPEX/OPEX reduction is imperative by realizing flexible, fast, energy-efficient service offering and attending to economical aspects of system operation, including spectrum-efficiency, improved network coverage, network simplification, network automation, intelligent OAM.

Migration and interworking aspects should be gauged, and it's compelling to apply the knowledge built and experiences gained from deploying and operating the existing 3GPP systems and services.



6 Usage scenarios

Extension from IMT-2020 (5G)

- eMBB → Immersive Communication
- mMTC → Massive Communication
- URLLC → HURLLC (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, Ubiquitous intelligence, Security/privacy/resilience.

Consideration of Usage Scenarios 1/3

Immersive Communication

- **Immersive Extended Reality**
 - Ultimate immersive XR with higher data rate and lower latency
 - Haptic and multi-sensory communication
 - Glasses-free 3D and holographic displays
 - Multi-media services with deterministic experience by collaborative processing among UE(s), network, and cloud (e.g. imaging processing and split XR rendering)
- **Immersive Communication with built-in Real Time Communications**
 - Human to X communication, e.g. with machines (e.g. robots), or with digital world (e.g. Personal AI assistants)
- **Immersive Human-Centric Experience**
 - Interactive social service and cloud gaming
 - Enhanced In-Vehicle Experience.
 - Non-interactive streaming media, e.g. 3D IMAX video, 180° panorama video
 - Consistent user experience for real-time traffic (voice, conference, live broadcast) incl. in high speed railway/underground garage scenarios

AI and Communication

- **Net4AI**
 - Support connected intelligence, e.g. intelligent COBOTS
 - Support new types of communications between human, and AI-enabled machines, e.g. for AI phones and AI smart wearables
 - Support transmission of new traffic, e.g. AI Generated Content (AIGC) traffic, training data from device towards cloud
 - ...
 - Support distributed AI learning service and/or inference, including device-network-APP server collaboration on inference, monitoring and computation offloading
 - Support data collection and management, e.g. more efficient ways for collection, transmission, etc.

ISAC

- **Real-time Digital Twinning**
 - Environment object reconstruction
 - Simultaneous localization and mapping
 - ISAC-enabled creation of city-wide or industrial digital twin and Metaverse
- **Detection, Localization and Tracking**
 - High-accuracy localization and tracking
 - Sensing Assisted driving automation, UAV/UAM and robot autopilot
 - Sensing assisted NLOS positioning
 - Environmental monitoring
- **Gesture and Posture Recognition**
 - Gesture and activity recognition
 - Wireless interaction (replace need for hand-held controllers, cameras), e.g. to enable new XR experience
 - Contactless health monitoring
- **Sensing-assisted communication**

Consideration of Usage Scenarios 2/3

HRLLC

- **Full-capacity Industry 4.0**
 - Factory of the future
 - Motion control
 - Cloud robot and teleoperation
 - ...
- **Driving Automation**
 - L4+ self-driving of vehicles
 - Autonomous driving of UAM with human beings on board
 - Autonomous moving robots in open areas

Massive Communication

- **Smart Urban City and Life**
 - Smart transportation & autonomous vehicles
 - Smart buildings
 - Smart healthcare
 - Smart services enabled by UAVs e.g. goods delivery
 - low power high position accuracy tags/wearables
- **Enable massive communication for IoT devices with extremely low power consumption**
 - Logistics
 - Embedded IoT

Ubiquitous Connectivity

- **Global Coverage of Mobile Services**
 - MBB for the unconnected
 - Wide-range IoT for the unconnected
 - Human communication on board of UAM
 - Enhanced user experienced for different constellation sizes
 - ...

Consideration of Usage Scenarios 3/3

System Operation

- **Sustainability**
 - Increase network energy efficiency and reduce network energy consumption
 - Increase UE energy efficiency at different typical data rates and reduce UE energy consumption
- **Ubiquitous Intelligence**
 - Improve overall system performance incl. AI-assisted air-interface performance improvement
 - Network digital twin and AI-assisted network automation.
- **Network simplification**
 - Balance the flexibility and complexity, reduce the overall CAPEX/OPEX
- **Flexible and fast deployment**
 - Distributed and customized network, e.g. to support on-demand plug-and-play subnetwork in order to enable MNO to support varying local SLAs and to reduce TTM when introducing new features
 - Efficient coordination of the diversified network capabilities and resources between different services (e.g. AI, sensing, communication)
- **Security, Privacy and Resilience**
 - Enhanced security and privacy mechanism, e.g. Quantum safe, data protection
 - Security and privacy for new services
- **Migration and interworking**
 - Consideration of legacy services and 3GPP systems

Way forward: Study planning

- Proposal #1: SA1 106 should focus on agreeing on the general principle for SA1 to carry out the Rel-20 Part2 study/studies. The technical details including the SID objectives should be discussed at SA1 107.
- Proposal #2: We currently prefer one self-contained SI to cover and elaborate the main service-level objectives.
- An example SID structure with following objectives can be considered at SA1 107:
 - Immersive Communication
 - Integrated Sensing and Communication
 - AI and Ubiquitous Intelligence
 - Massive Communication
 - Hyper Reliable and Low-latency communication
 - Ubiquitous Connectivity
 - System Operation