
6GSNS
6G SNS OPS
HSbooster.eu
ETSI
Interim Steps:
6G Standardisation Requirements
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Impact Assessment
and Facilitation Action (IAFA)
6G

Matchmaking during Transition: Moving from 5G to 6G, how we can Synergize Major R&D Outputs with Standardization Workstreams

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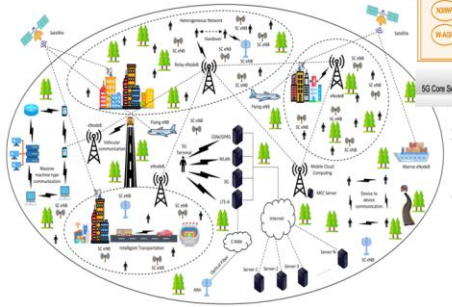
In our session today

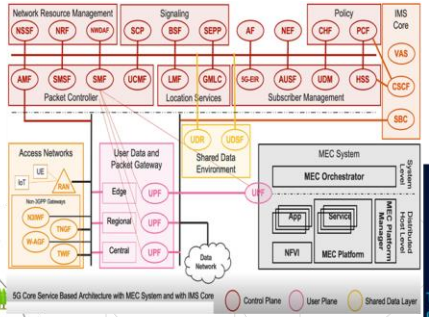
- Transition from 5G to 6G: Recap from Session 1
- 5&6G R&D Megatrend Examples
  - AI&Machine Learning
  - Automation
  - Architectural Evolution
  - Softwerization
- SDO Landscape for Megatrends, and Workstreams:
  - As above, in addition to
  - Security and Privacy
  - Sustainability & Green Communications
- Bridging the Research and Standardization Gap & Conclusion

Series Session1 5G to 6G Recap (1)

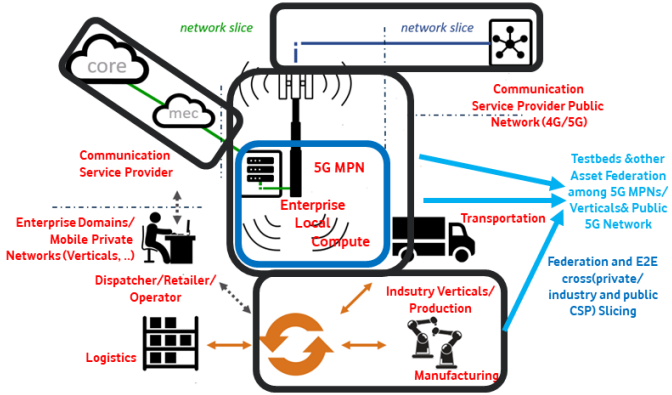
5G NSA (NR)

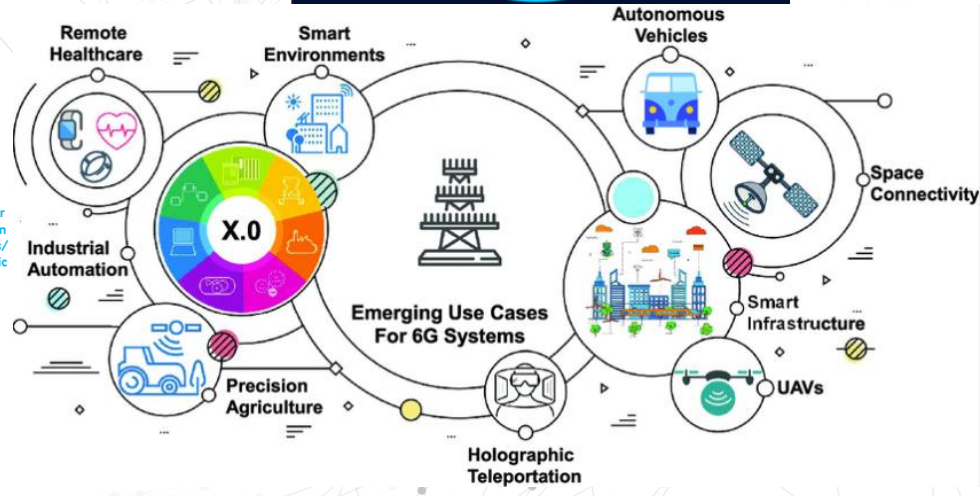


5G SA

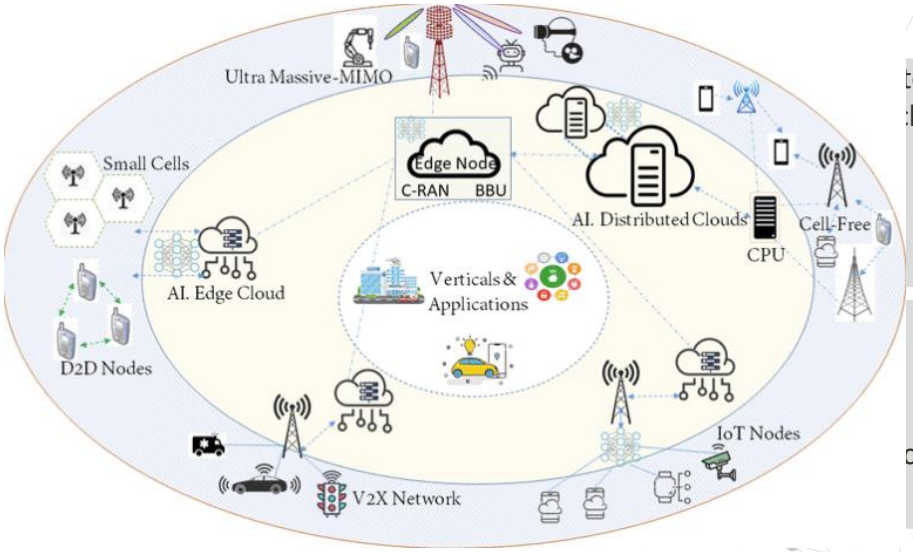


6G





Series Session1 5G to 6G Recap (2)



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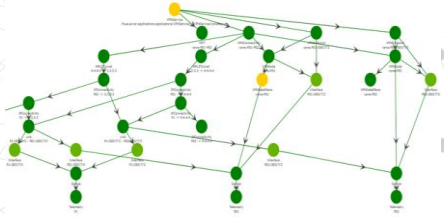
hestration, Level 4&5 AN
Automation,
Advanced AI

6G OVERLAY

6G UNDERLAY

Native by Design
curity, basic AI, Resource
Management, ..



5&6G R&D Megatrend Examples

- AI and Machine Learning: data-intensive, context-aware, computation intensive, powerful range of new use cases and business cases
- Automation: Autonomics, Process& Workflow Automation, Autonomous Networks
- Architectural Evolution:
  - 5G NR, 5G SA, 6G
  - Open RAN, Cloud RAN, Open Ecosystems
  - High precision, high-perfromance
  - Native features; underlay-overlay model
- Softwerization: open ecosystems, Open-RAN

AI and Machine Learning

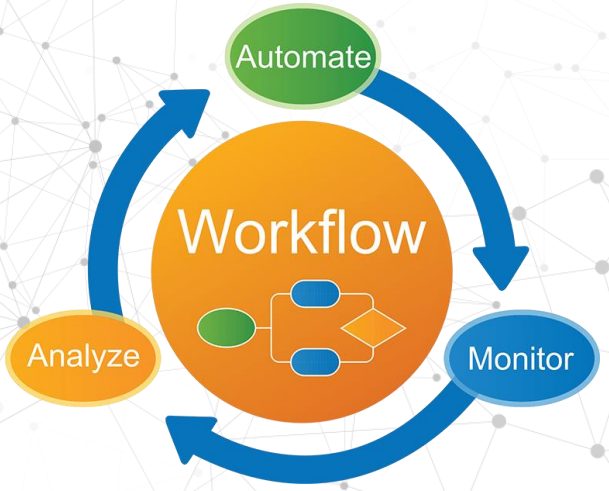
In 5G and 6G networks, one focus is on creating intelligent systems; key sub-trends include:

- Predictive Analytics: Leveraging AI to predict failures or congestion, enabling proactive measures, automating resource management
- Network Slicing Optimization: Using ML to dynamically allocate resources in network slices, maintaining QoS&QoE adaptively and efficiently.
- AI-Driven Security: Implementing AI algorithms to detect and mitigate security threats in real-time

Automation

Automation in 5G and 6G networks reduces HCI, increases efficiency and reliability (e.g. SONs), autonomous functions, and zero-touch operations
Subtrends include:

- Self-Healing Networks: networks automatically detecting and fixing faults
- Dynamic Spectrum Management: optimizing spectrum in real-time, enhancing network capacity and reducing interference
- Energy Efficiency: Automated control, minimize consumption, crucial for sustainability goals



Architectural Evolution

Structural transformation of network architecture; keeping up with demands of 5G and 6G. Includes higher rates, ULL, and massive connectivity, high precision; some sub-trends:

- Edge Computing: smart edge, fat edge, Edge-AI, performant edge, distributed control logic, critical applications support
- Decentralized Networks: e.g. utilizing blockchain and DLT
- Integrated Terrestrial&Non-Terrestrial Networks: for global coverage&resilience.

Softwerization

Allows for more agile and flexible network management with key sub-trends:

- SDN and NFV: enabling dynamic network configuration and management through software; reducing reliance on physical infrastructure
- Virtualized Radio Access Network (vRAN): transforming radio elements into software; running on GP H/W; high scalability and flexibility
- Orchestration and Management: workflow management, VNFs,

SDO Workstreams in AI and Machine Learning (1)

Among the key SDOs and their respective workstreams (TC, WG) and activities in this area:

3GPP (3rd Generation Partnership Project)

- SA6: applications of AI in mobile networks, standardization of services&applications, that utilize AI&ML
- RAN WG3: AI for RAN optimization; interfaces for AI-based RAN improvements.

ETSI (European Telecommunications Standards Institute)

- ISG ENI (Experiential Networked Intelligence): operator experience using AI; creating a standard reference model; defining critical datasets for AI-based systems.
- ISG ZSM (Zero-touch network&Service Mgmt): automation; AI for network automation

ITU (International Telecommunication Union)

- ITU-T SG13 (Future Networks): frameworks and protocols for AI&ML

SDO Workstreams in AI and Machine Learning (2)

IEEE (Institute of Electrical and Electronics Engineers)

- IEEE P3652.1 WG: framework for std. application of AI in AS & intelligent S.
- IEEE SA Industry Connections - AI&ML in Networking (IC-AMLN): platform of standardization for AI and machine learning in networking

NGMN (Next Generation Mobile Networks)

- AI/ML WG: use cases AI&ML in NGN to improve perf& customer experience

GSMA (Global System for Mobile Communications Association)

- Big Data Proj: transforming MNO into intelligence-driven businesses using AI

ISO/IEC (International Electrotechnical Commission)

- ISO/IEC JTC 1/SC 42: AI foundations, comput. approaches, and system char

SDO Workstreams in Automation

3GPP SA5 (Service and System Aspects WG5): management, orchestration, automation of NF; standardization of network management aspects for B5G

3GPP RAN3 (Radio Access Network WG3): integration of NFV&SDN in RAN

ETSI ISG ZSM: ZT automation in network management across domains

ETSI ISG NFV: std. NFV for agile automated deployment of network services

ITU-T SG13(Future Networks): requirements, capabilities, and use cases

ITU-T SG20 (IoT&Smart Cities): automation for network mgmt.&interop.

IEEE P1916.1: standardizing NFV; support automation of network infrastructure

IEEE ComSoc TCs: TC on Network Operations and Management

NGMN: Automation and ZT Orchestration, Operations and Management

ISO/IEC JTC 1/SC 38: automation cloud services&orchestration of virt.resources

TM Forum: ZT Orch., Operations & Management (ZOOM) project

SDO Workstreams Architectural Design

3GPP SA2: network architecture and services, focusing on the system architecture&evolution, incl. slicing, SBA, integration of non-terrestrial netw.

3GPP RAN2&RAN3: RAN arch.; support evolving needs 5G&6G; integr. Edge

ETSI ISG MEC: stand. open env.; multivendor service integration on Edge

ETSI ISG F5G (5th Gen Fixed Netw): evolution arch., complement mobile 5G

ITU-T SG13 (Future Networks): frameworks and functional architectures for 5G and beyond; , network slicing, edge computing, inegr. T&nT Networks

ITU-R: integration of non-terrestrial & terrestrial networks, satellite&5G

IEEE 1932.1 WG: Dynamic Spectrum Access Networks (DySPAN)

IEEE P802.11 WG: Wi-Fi standards

NGMN NG Core Network Project: req.&arch for NG S/W driven Core

GSMA Network Economics WG: opt. economics, edge comp., netw. slicing

IETF: SBA, network slicing, and security protocols for 5G & 6G

Softwerization

Softwareization enables shift to flexible & scalable network infrastructures. Some major SDO workstreams in this area include:

ETSI ISG NFV: standardization NFV; enable flexible deployment of services

ETSI ISG ZSM: framework for automated network and service management

ONF (Open Networking Foundation): adoption of SDN open standards, innovation and deployment of open, programmable networks.

IETF: standards for the protocols& interfaces in SDN (e.g. NETCONF, YANG)

Security and Privacy

Increasingly important as networks become more open and software driven, especially with the open and inclusive ecosystems; some SDO activities are:

3GPP SA3 (Security and Privacy): security architecture and privacy measures

ITU-T SG17 (Security): confidence and security in ICT, cybersecurity, data protection, privacy

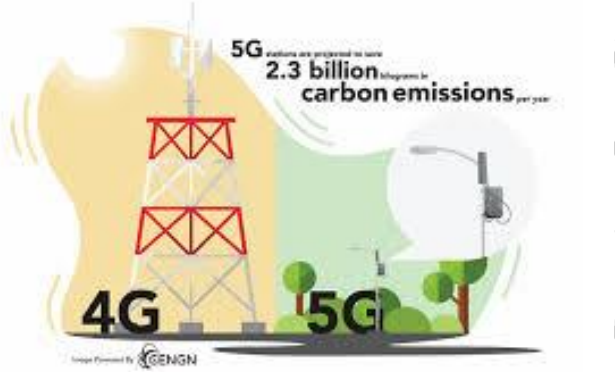
IETF Security Area WG: internet security, protocols and guidelines to enhance the security of the Internet architecture and the applications

Sustainability and Green Communications

Importance of environmental impact &sustainabilit in telco → developing more energy-efficient technologies and practices

ITU-T SG5 (Environment, Climate Change and Circular Economy): standardization ICTs, the environment, and climate change; energy efficiency and e-waste reduction

ETSI ISG OEU (Operational energy Efficiency for Users): energy efficiency of ICT equipment and services, E2E: network infrastructure, end-user devices



GSMA Climate Action Taskforce: guidelines to reduce the carbon footprint of mobile networks and promote sustainability in the telco industry.

Bridging the Research and Standardization Gap & Conclusion

- The landscapes of R&D and Standardization are both complex to navigate through; this creates a vague and substantial gap between their respective stakeholders
- Identifying the megatrends and key worktreams in both sides and matching them is a good approach.
- In particular, within each SDO, it is possible to find workstreams that match subtrends on the R&D megatrends analyzed
- The importance of bridging the two communities and bringing them together is crucial to societal and technological progress; therefore, experts and their inputs are needed to facilitate this process