# 6G KEY MESSAGES –

## An Operator View

v1.0

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# 6G KEY MESSAGES – AN OPERATOR VIEW

by NGMN Alliance

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# 6G KEY MESSAGES – AN OPERATOR VIEW

As 6G standardisation progresses at 3GPP, the NGMN Alliance (NGMN) presents the consolidated view of mobile network operators (MNO) globally highlighting a unified and strategic vision for future network generations.

This document consolidates key messages from NGMN as an operator view perspective, ensuring alignment, readiness, and a strong presence covering major 3GPP milestones. It serves as a foundation for engaging with the broader industry, driving collaboration, innovation, and strategic direction in the evolving 6G landscape by considering benefits of end-customers.

## 6G IS NOT ANOTHER GENERATIONAL SHIFT – IT MUST BE EVOLUTIONARY [5] [8] [3]

NGMN believes that the continuing evolution of the mobile industry, and the underlying technologies, need to be beneficial to both end users and operators, creating value through new services, supporting a healthy ecosystem, and fulfilling the needs for a society that is increasingly relying on ICT.

6G standards must be globally harmonised. It is expected to be built upon the features and capabilities introduced with 5G, alongside new capabilities to deliver new services and value. Such technological evolutions should be assessed with respect to their benefits versus their associated impact.

6G standards must learn from the mistakes of 5G, including multiple architecture options, features that are never used and use cases that have no market pull.

## 6G USES CASES [7]

NGMN has studied many use cases and consolidated them into 4 key categories to provide a clear vision for the future of mobile networks. These use cases have been instrumental in shaping the usage scenarios and overarching aspects of the ITU-R IMT framework for 2030 and beyond. The industry needs to develop solutions that have tangible pull from potential customers, as there is increasing concern from operators about the affordability of investment in networks for the sake of technology development.

**Key Categories**

- **Enhanced Human Communications** includes use cases of enriched communications, such as immersive experience, telepresence & multimodal interaction. Voice services must evolve in a business sustainable manner.

- **Enhanced Machine Communications** reflects the growth of collaborative robotics, requiring reliable communication among robots, their environment and humans.

- **Enabling Services** gather use cases that require additional features such as high accuracy location, mapping, or sensing.

- **Network Evolution** describes aspects related to the evolution of core technologies including AI as a service, energy efficiency, and delivering ubiquitous coverage.

## REQUIREMENTS AND DESIGN CONSIDERATIONS [4] [6]

Network evolution is essential for addressing societal goals, ensuring that future communication networks are environmentally friendly, economically sustainable, trustworthy, and capable of supporting innovative services justified by realistic needs.

- **Sustainability:** Minimising environmental impact, securing economic viability, and ensuring social sustainability is the key goal of 6G design.

- **Trustworthiness:** Ensure that security and privacy are intrinsically embedded in the 6G system to protect against threats and provide solutions that measurably demonstrate this attribute.

- **Innovation:** A new radio interface should demonstrate significant benefits over and above IMT-2020, as mentioned in the *Radio Performance Assessment Framework* publication, while considering the practical issues related to deployments in a realistic techno-economical context. It is also critical for innovation that the entirety of the upper 6 GHz band would be available to mobile networks.

Use cases define the high-level requirements and capabilities necessary to realise the identified 6G use cases. These requirements involve mobility inclusive to previous generations, connectivity, AI, sensing, compute requirements, cost implications, and environmental interactions.

Design considerations should incorporate system architecture considerations, open and cloud-native design principles, enhancements and new capabilities and trade-offs analysis among different capabilities.

## RADIO PERFORMANCE ASSESSMENT FRAMEWORK (RPAF) [2]

When considering novel candidates for a new 6G Radio Access Technology (RAT), these must be compared against a reasonable baseline, for significant performance benefits to be demonstrated.

**What constitutes this baseline?**

- It must reflect the true state-of-the-art that 5G Stand-Alone (SA) can deliver with the most sophisticated Rel-18 features that correspond to 5G-Advanced.
- The most advanced capabilities of 5G relating to the latest iteration of IMT-2020 specifications (e.g., 140 Gbps DL, 65 Gbps UL) must be acknowledged in the benchmark recognising that simply improving peak data rates/throughput would be insufficient to justify an expensive hardware refresh.
- New 6G RAT candidates must prove value in energy efficiency, sustainability and network simplification, where all these metrics are considered holistically, since improvements in data rates/latency alone would be insufficient to justify investment.

## NETWORK ARCHITECTURE EVOLUTION [1]

6G should address demonstrable customer needs, business driven investments to support evolving IMT-2030 scenarios, new services and requirements and gradual network evolution to support future services which are not yet foreseen.

Key design principles for 6G architecture must include enabling innovation, delivering new features in a modular manner, network simplicity, sustainability, trustworthiness, cloud-native approaches, and seamless migration from 5G.

**Modularity:**
New features should be deployable on-demand when needed without compromising or impacting existing connectivity services.

**Simplicity:**
6G standards should include those functionalities and specifications really needed with a clear target of having the vast majority of requested specifications implemented in future 6G systems. Also, 6G should have only one option of architecture not replicating the mistakes of 5G architecture options.

**Openness:**
Openness, cloud nativeness and disaggregation should be supported in all the network layers of 6G. Specifically in RAN, those principles should be included at least as an alternative of network deployment, with Open RAN being an option to consider.

**Network Operational Simplification:**
Network operational simplification should be triggered through automation (including AI), Digital Twin, cloud-native design, open standards and interfaces, interoperable components, network exposure, and extended Service Based Architecture (SBA). Network simplification should lead to lower operational costs whilst providing the same QoE/QoS levels retaining scalability and flexibility to accommodate evolving digital ecosystems. Capacity on demand is a key scalability feature that will avoid operators having to invest in capacity that is not needed or is under-utilised.

**Sustainability:**
The environmental impact should be reduced through absolute energy consumption reduction and minimal resource usage, both could be achieved via global optimisation strategies. Ensure economic sustainability by implementing cost-efficient deployment and optimised operational models. Promote social sustainability by delivering digital inclusion and trustworthiness.

**Trustworthiness:**
Ensure built-in security by leveraging evolving security paradigms and technologies and implementing a quantum-safe approach, zero trust architecture to enhance security, privacy and resilience.

**Network as a Service:**
Enable network exposure though common APIs and the provision of new services, such as computing as a service, data as a service, and AI as a service, leveraging the network's capabilities and assets, to enhance the value of telecommunication infrastructure.

**Interoperability and Compatibility:**
Ensure seamless 6G interoperability across fixed networks, NTNs, and 5G systems to enable ubiquitous connectivity, and ensuring full compatibility with 5G architectures. It is crucial to maintain existing IMT spectrum identifications (<8 GHz) as a critical asset for mobile coverage, and to secure new IMT spectrum (6-15 GHz) for IMT-2020 and beyond technologies, ensuring sufficient capacity enhancements.

**Smooth Migration:**
Prioritise a smooth migration from 5G to 6G and minimise unnecessary deployment complexities. Key priorities, like native voice support from day one, are needed to guarantee seamless user experience. The ability to deliver 6G services via software upgrades is essential for addressing challenges where legacy frequency bands provide adequate capacity. This approach allows MNOs to prioritise new hardware deployments only where higher capacity expansion through new spectrum bands is essential, ensuring efficient resource allocation. By emphasising efficiency, scalability, and adaptability, the 6G rollout can maximise impact while optimising resource utilisation.

**Backwards Compatibility and Reusability:**
Ensure seamless compatibility by maximising the reuse of existing infrastructure and equipment through software upgrades, rather than requiring extensive new deployments, facilitated by open interfaces and modular design.

## TAKE AWAY MESSAGES

- Global standards for 6G should be harmonised to support the continuous evolution of the mobile industry. They must deliver tangible benefits to end users and operators, while fulfilling the dynamic and emerging societal needs and supporting a healthy ecosystem.

- The introduction of 6G should not necessitate a forced hardware refresh. While new radio equipment is required for deployment in new frequency bands, the evolution toward 6G in existing bands should primarily occur through software upgrades, ensuring a smooth transition.

- New technologies must demonstrate clear benefits that justify investments within a realistic techno-economic framework. Prioritising efficiency improvements particularly in spectrum utilisation and energy consumption.

- Modularity, flexibility, and openness are essential drivers for enhancing operational efficiency, simplifying network operations, and enabling network exposure to power the development of market-aligned services.

- Migration must minimise complexity, enabling operators to leverage fast deployment, guaranteeing a seamless user experience, notably by providing native voice support from day one, while evolving voice and enriched services in a business sustainable manner.

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# NEXT GENERATION MOBILE NETWORKS ALLIANCE

NGMN is a global, operator-driven leadership network founded in 2006 by leading international mobile network operators (MNOs). As a global alliance of nearly 70 companies and organisations - including operators, vendors, and academia - NGMN provides industry guidance to enable innovative, sustainable and affordable next-generation mobile network infrastructure.

NGMN drives global alignment of technology standards, fosters collaboration with industry organisations and ensures efficient, project-driven processes to address the evolving demands of the telecommunications ecosystem.

## VISION

The vision of NGMN is to provide impactful industry guidance to achieve innovative, sustainable and affordable mobile telecommunication services to meet the requirements of operators and address the demands and expectations of end users. Key focus areas include Mastering the Route to Disaggregation, Green Future Networks and 6G, while supporting the full implementation of 5G.

## MISSION

The mission of NGMN is:

- To evaluate and drive technology evolution towards the three **Strategic Focus Topics:**
  - **Mastering to the Route to Disaggregation**
    Leading in the development of open, disaggregated, virtualised and cloud native solutions
  - **Green Future Networks**
    Developing sustainable and environmentally conscious solutions
  - **6G**
    Providing guidance and requirements related to design considerations and network architecture evolution
- To define precise functional and non-functional requirements for the next generation of mobile networks
- To provide guidance to equipment developers, standardisation bodies, and collaborative partners, leading to the implementation of a cost-effective network evolution
- To serve as a platform for information exchange within the industry, addressing urgent concerns, sharing experiences, and learning from technological challenges
- To identify and eliminate obstacles hindering the successful implementation of appealing mobile services.