



Overall NTT DOCOMO's view on 6G

Source: NTT DOCOMO, INC.
Agenda item: 8
Document for: Discussion

Motivation for 6G values from DOCOMO perspective

NTT DOCOMO believes 4 values to be important.

6G value

Direction we shall go

Sustainable network design and cost-effective Network

- DCM aims “Carbon neutrality by 2030” and “net zero emission by 2040”.
- Shall be considered as a design principle from **6G day 1 deployment**.

New value creation for improving user experience

- Wearable device such as smart glass will be one of the key driver devices to realize immersive communication.
- The mobile network has already been the 4th essential utilities for our life. **Zero outage** will be new value for users.

New use cases with AI, robotics and automated machine

- Until 5G, use cases mainly targeted human needs. Population decline in several countries so it will be difficult to keep current revenue.
- Must **explore new direction** such as **AI, robotics** and **automated machine** use cases for getting new revenue.

Essential and unconsciously connected NW

- Connectivity in uninhabited areas(e.g., sea) and emergency situation.
- Collaborating between NTN

Mapping of 6G values and Potential study areas

Potential study areas to improve 6G value

Bold topics are our prioritized topics at this point.

6G value

Sustainable network design
and cost-effective Network

Potential study areas

- **Overall architecture design**
- **Energy Efficiency**
- Deployment and operational cost reduction
- Digital twin, Autonomous Operation and Management

New value creation
for improving user experience

- **Computing and Network convergence**
- **Zero outage**
- **Analysis and refactoring existing mobile services**
- Security, authentication and privacy for new services, sensing
- NW integration with other industries

New use cases with AI,
robotics and automated machine

- Network for AI, AI for Network

Essential and unconsciously
connected NW

- Collaborating between NTN

Sustainable network design and cost-effective Network

Overall architecture design

- **Simplified** and **reducing the number of migration options.**
- Consider the lessons and learn from 5GC operations
 - **The granularity of Network Functions is appropriate?**

Energy Efficiency

Following 3 design principles shall be considered and supported 6G day1 deployment.

- Utilize green energy
- Reduce power consumption
- Indirect carbon reduction: The solution itself doesn't directly reduce CO2.

Deployment and operational cost reduction

Make it easy to add new entities of NW deployment

- Extension for indoor coverage with Customer-deployment of small base station like femto
- Resource sharing among operators/systems

Sustainable network design and cost-effective Network

Digital twin

Possible to replicate humans, networks, and objects in the cyber space.

- Simulation, prediction and early detection of NW faults.
- **How to collect the data from the real world.**
- Avatar in cyber space that perfectly reproduces a real human's responses will utilize on person-to-person communication.

OAM

Enabling fully autonomous, AI-base and zero human NW operation.

New value creation for improving user experience

Computing and Network convergence

- The market for wearable devices is expanding immersive communication use cases.
- However, wearable devices have limited computing resources.
- **Realize compute and network convergence between UEs and networks.**

Zero outage

- **“Zero outage” is a concept that network shall avoid massive signaling storms proactively.**
- Reactive approach(ex, UAC, back off timer), how quickly mitigate congestion, shall also be supported in 6G.

New value creation for improving user experience

Analysis and re-factoring existing mobile services

Analyze the existing mobile communication services if they meet to the latest market trend and good opportunity to refactor those services (Ex. voice).

Security, authentication, privacy for new services, sensing

- Simplify the method of security
- Consider privacy issues for new services (e.g., sensing)
- How to trust AI functionalities

NW integration with other industries

- While 5G was designed to technically support a variety of industries, explore opportunities to further enhance its penetration into these industries.

Others

AI

AI for Network,

- AI can automate and optimize various operational configurations that humans have been implementing.

Network for AI,

- NW can provide sufficient computing resources and necessary large amounts of data to maximize AI value.
- The computing resources for AI and sustainability should be balanced.

NTN

Provide coverage anywhere (e.g., land, air, sea and space)

- Collaborating between NTN(GEO, LEO and HAPS)

Proposed way forward

- All potential study areas described in this document are proposed to be considered in SA1 Rel-20 6G discussion.
- Especially, two study areas below are proposed to be potential building blocks of 6G SA1 umbrella SID.
 - Compute and network convergence
 - Zero outage

Thank you