How to design an IMT-2030 network better suited for Developing Countries?

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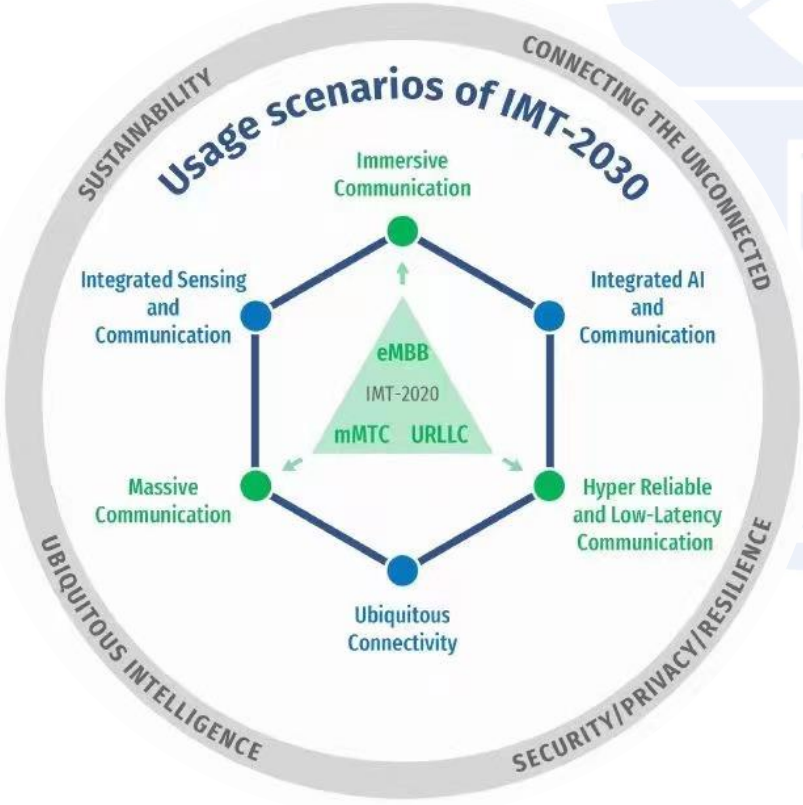
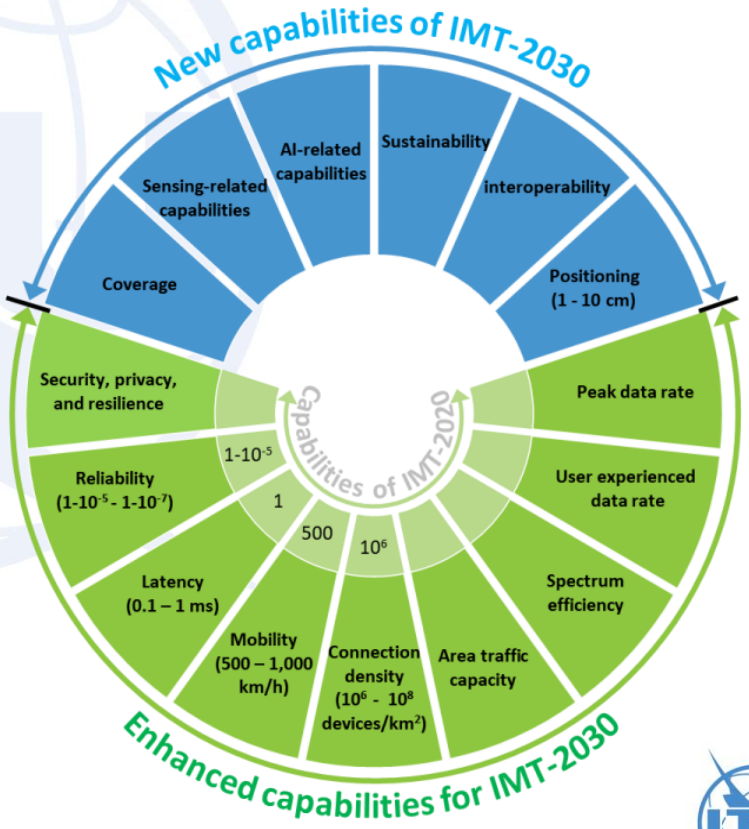
IMT-2030 introduces new usage scenarios and capabilities

The usage scenarios and capabilities of IMT-2030 are significantly enriched.

- ✓ We expect an IMT-2030 network with more functions and better performance.
- ✓ Do we expect an IMT-2030 network with much higher complexity?

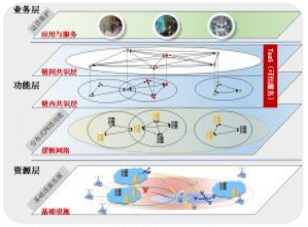


Usage scenarios of IMT-2030



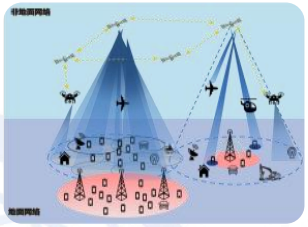
Capabilities of IMT-2030

Potential Enabling Technologies of IMT-2030 network are studied

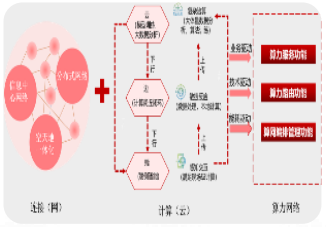


Distributed network

Native network intelligence

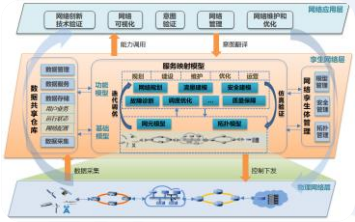


Space and terrestrial integration

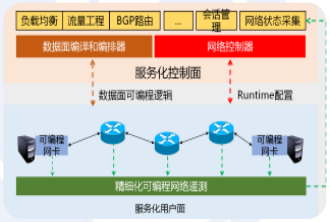


Computing and network convergence

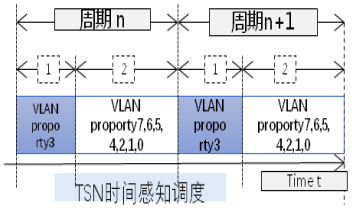
Built-in security



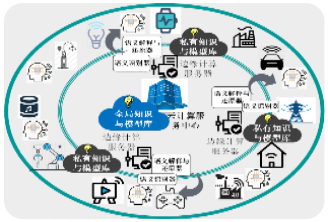
Digital twin network



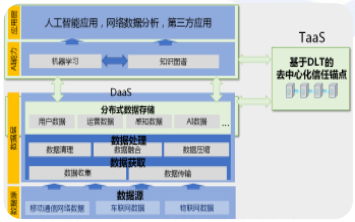
Network programmability



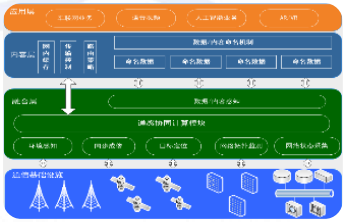
Deterministic communication



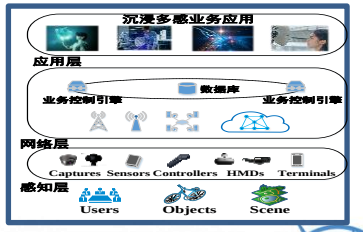
Semantic communication



Trusted data service



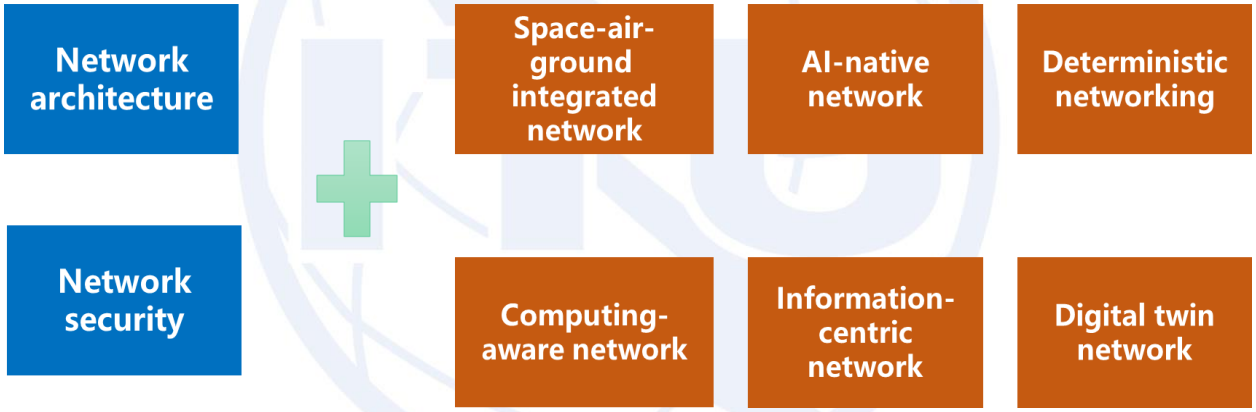
Communication awareness network



Immersion and multi-sensation

Research of IMT-2030 network in China

- ✓ Comprehensively promote the layout of key technologies of 6G network
- ✓ Combine the development trend of network technology and industrial progress
- ✓ Accelerate the research on 6G network architecture and key technologies, and promote consensus formation



Design of IMT-2030 network should consider Developing Countries

The following characteristics of communications network in Developing Countries should be considered for IMT-2030 network:

- ✓ Limitation on radio coverage and network connections
- ✓ Limitation on infrastructure and energy supply
- ✓ Limitation on computing, storage and networking resources
- ✓ Underdeployment of IMT-2020 network
- ✓ Limitation on technical capabilities
- ✓ Limitation on industrial chain
- ✓ Customized services and applications
- ✓ Cost of customers and operators

Developing Countries need an efficient and customized IMT-2030 network!

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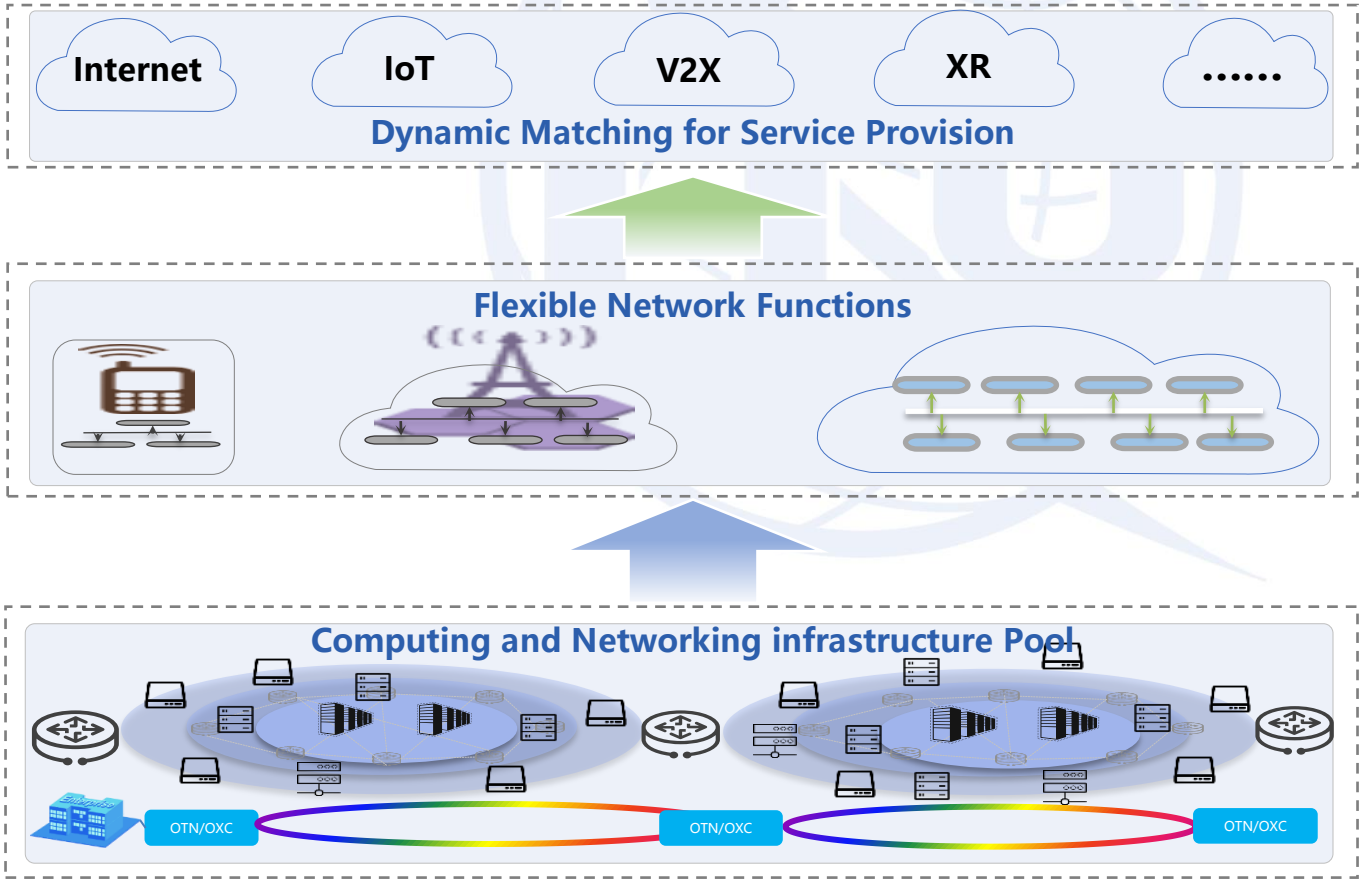
Design principles of IMT-2030 network

- ✓ **Inheritance.** Rather than a thorough renovation, 6G architecture should be a smooth innovation inheriting features such as Cloud/SBA/open protocol from 5G.
- ✓ **Decommissioning.** The decommissioning of 2/3G provides an opportunity for 6G to address the issues left over from 5G.
- ✓ **Change.** To support new technologies such as FMSC, the 6G network requires specific local architectural changes and cross-domain, cross-layer management.
- ✓ **Integration.** 6G architecture should consider not only communication but also the integration of new capabilities, such as sensing and AI.
- ✓ **Extensibility.** 6G architecture should be more elastic to entensions to accommodate the rapid growth of network scale.
- ✓ **Security.** The highly distributed and open network raises trust issues. The security system of 6G should set zero trust as the baseline.
- ✓ **Simplicity.** To tackle the problem of network complexity, minimalist design principles should be adopted in the design of 6G architecture.
- ✓ **Easy-deployment.** 6G architecture should allow for more efficient and economical deployment.

High-level framework of IMT-2030 network

Network as a Platform (NSSP): A new design paradigm of platform and service based network architecture is required to realize flexible network evolution, including dynamic expansion of functions, elastic provision of performance, dynamic supply of service, and flexible expansion of network



Network Platformization

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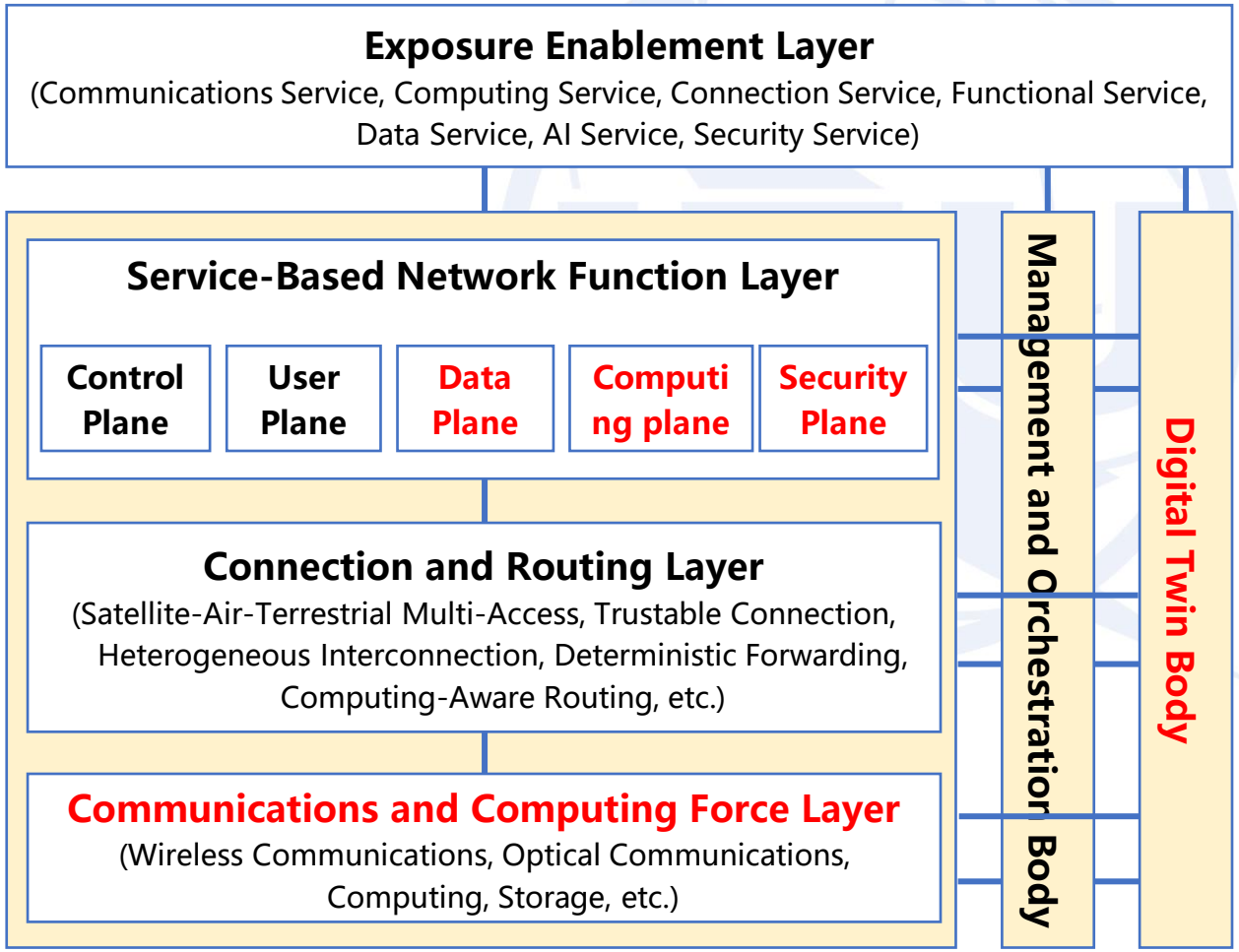
Service Diversification

Overall design of IMT-2030 network (3 bodies, 4 layers, 5 planes)

China Mobile proposes all-field and end-to-end **"3-Body, 4-Layer, 5-Plane"** IMT-2030 overall architecture design for implementing **platform and service-based networks**, which will be fundamental to IMT-2030 network systematic innovation.



3 Bodies (Space View)

- ✓ Adding Digital Twin body to carry out the integration of virtuality and reality
- ✓ Reorganizing the management and orchestration body to fulfill intelligent network autonomy

4 Layers (Logic View)

- ✓ Collaborative deployment of centralized and distributed network entities for the service-based network function layer
- ✓ Layered network functions for connecting all network fields

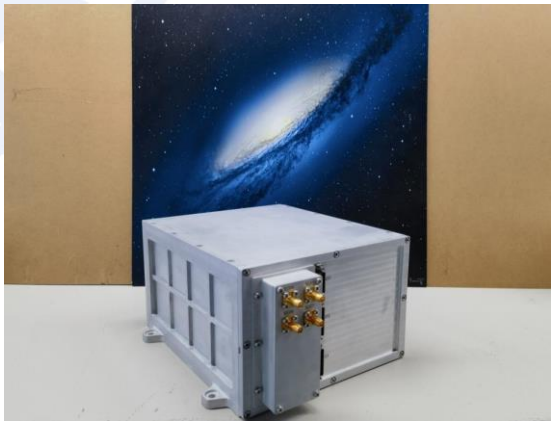
5 Planes (Function View)

- ✓ Enhancing traditional control and user planes
- ✓ Adding independent data plane, computing plane, and security plane

Future work of IMT-2030 network

- ✓ Gather the use case and requirements of IMT-2030 network.
- ✓ Discuss on the design principles of IMT-2030 network, and try to reach consensus.
- ✓ Discuss on the possible architecture solutions of IMT-2030 network, and jointly propose the overall architecture of IMT-2030 network.
- ✓ Discuss on the enabling technologies of IMT-2030 network, and try to reach consensus.
- ✓ Collaborate on the standardization of architecture and enabling technologies of IMT-2030 network in ITU, and convey the solutions to 3GPP.
- ✓ Collaborate on the IMT-2030 experimental network, build an end-to-end trial system.

IMT-2030 core network unit



Satellite network unit

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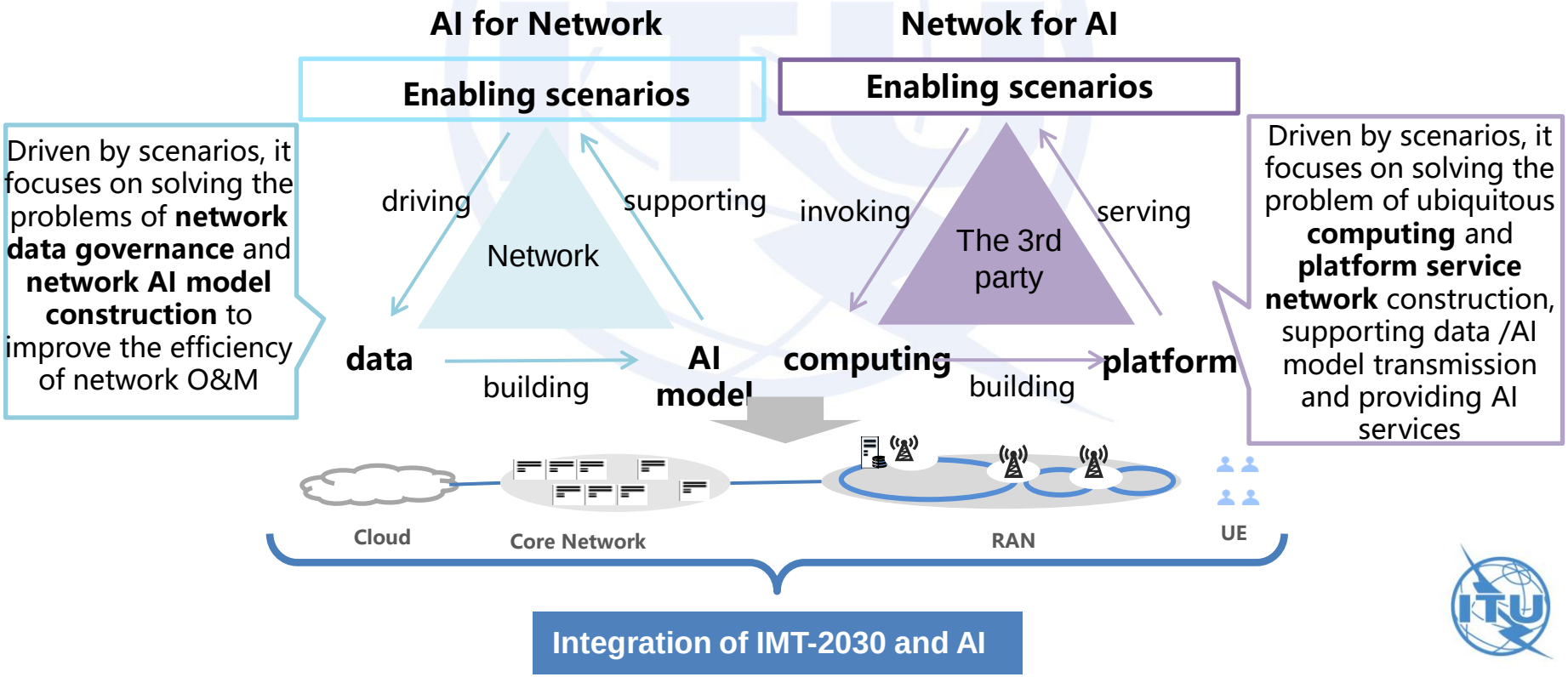
AI native

With the steady progress and fast spread of technologies in AI and particularly machine learning (ML), it is expected that intelligence would be present in every part of the communication system to support the building of smart cities and communities.

ITU-T SG13 has established a **standardization hierarchy of intelligent network** in the context of IMT-2020 and beyond. In IMT-2030, two closed loops need to be further studied, aiming to build a unified endogenous intelligence architecture, and enable the IMT-2030 usage scenario "**Integrated AI and Communication**".

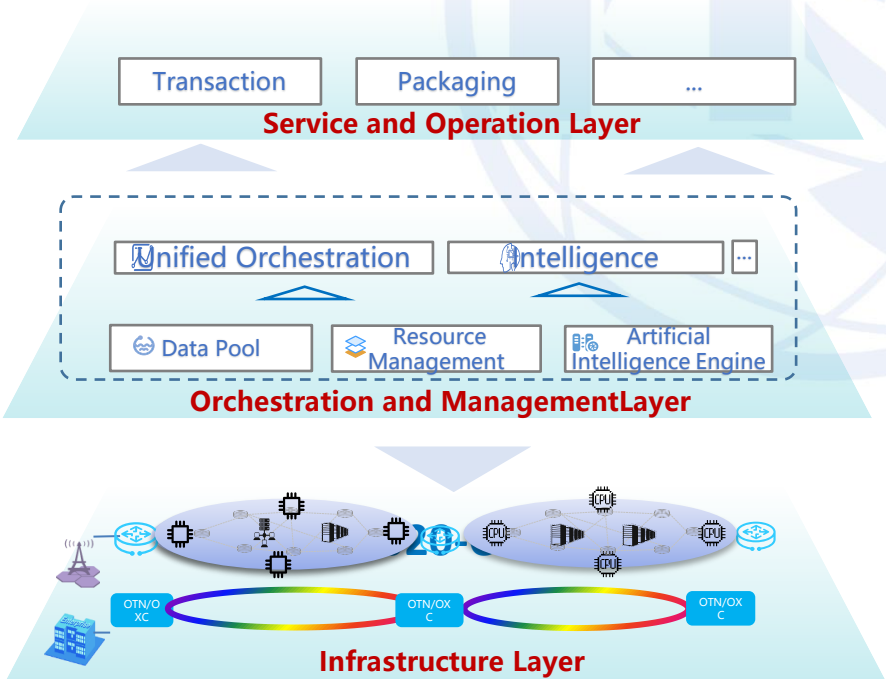


Coordination of computing and networking (CNC)

By the application of the coordination of utilization, control and management of computing, storage, and networking resources for the purpose of provisioning and optimization, satisfaction of requirements of resources' users and improvement of resource utilization may be achieved. CNC is a promising technology to support the IMT-2030 user and appliction trend "**Ubiquitous Computing**" in the non-radio part.

ITU-T SG13 has started **a series of standardization work of CNC** in the context of IMT-2020 and beyond, focusing on requirements, framework, QoS and management.

In next study period of ITU-T, CNC is to be addressed in the context of IMT-2030.



9 Key requirements of CNC

- ✓ Identification of resources
- ✓ Measurement of resources
- ✓ Awareness of resources
- ✓ Joint scheduling of resources
- ✓ Unified management and orchestration
- ✓ AI/ML integration
- ✓ Resource transaction
- ✓ Energy saving
- ✓ QoS assurance

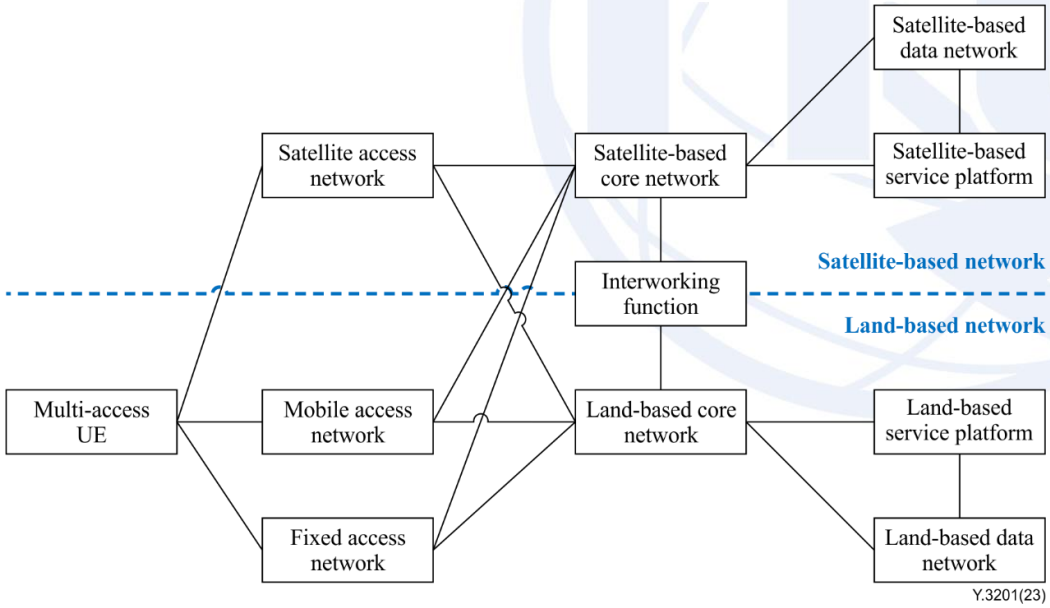
[Y.IMT2020-CNC-req]

Fixed, mobile and satellite convergence (FMSC)

The FMSC is the capability that provides services and applications to end users regardless of the fixed, mobile or satellite access technologies. FMSC is a promising technology to support the IMT-2030 usage scenario "**Ubiquitous Connectivity**" in the non-radio part.

ITU-T SG13 has established a **standardization hierarchy of FMSC** in the context of IMT-2020 and beyond, focusing on requirements, framework, network capabilities, enabling technologies, network function enhancements, and service enhancements.

In next study period of ITU-T, FMSC is to be addressed in the context of IMT-2030.



Overall framework of FMSC [Y.3201]

9 Key capabilities of FMSC

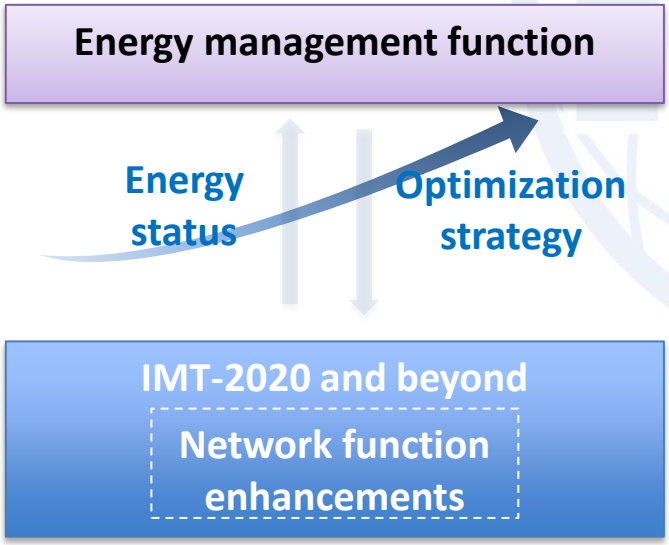
- ✓ Multi-access convergence
- ✓ Distributed networking
- ✓ Multi-connection management
- ✓ Converged mobility management
- ✓ Converged session management
- ✓ Converged policy control
- ✓ Converged capability exposure
- ✓ Service Continuity
- ✓ Network sharing

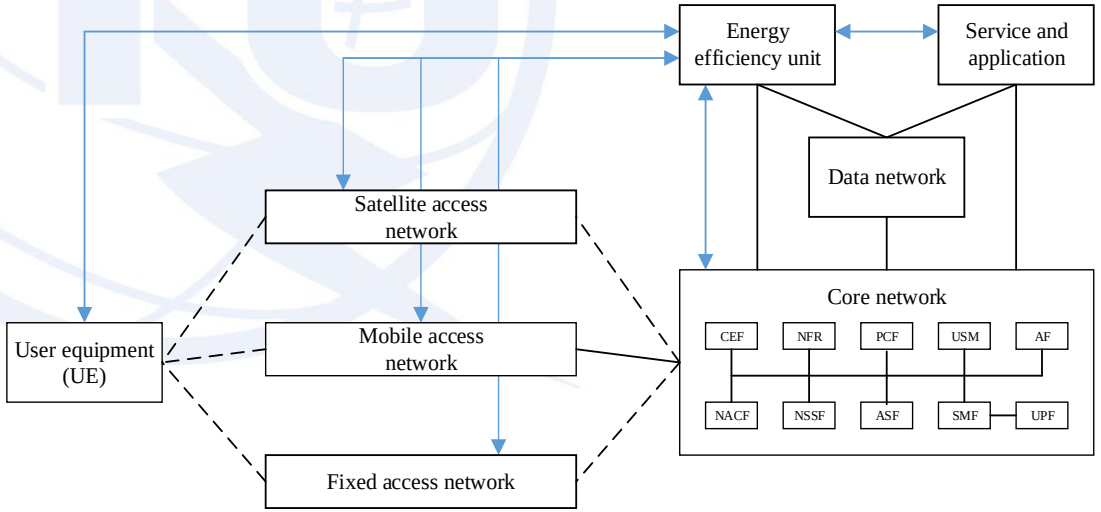
Energy saving

Climate change and globally energy shortage have made energy efficiency a strategic priority for telecoms operators. Energy saving supports to reduce energy use and improve energy efficiency, while guaranting the QoS. Energy saving is a promising technology to support the IMT-2030 capability "**Sustainability**" in the non-radio part.

ITU-T SG13 has started **standardization work on energy saving**, and began to discuss **network function enhancements from an energy efficiency perspective.**

In next study period of ITU-T, energy saving is to be addressed in the context of IMT-2030.





Framework of IMT-2020 network energy efficiency

Looking forward to further cooperation on IMT-2030 network with all of you!