4th SG13 Regional Workshop for Africa on
"Future Networks for a better Africa: IMT-2020, Trust, Cloud Computing and Big Data"
(Accra, Ghana, 14-15 March 2016)

IMT2020/ 5G, much more than pure Radio Aspects

Leo Lehmann (Dr. Leo)
Chairman of ITU-T Study Group 13

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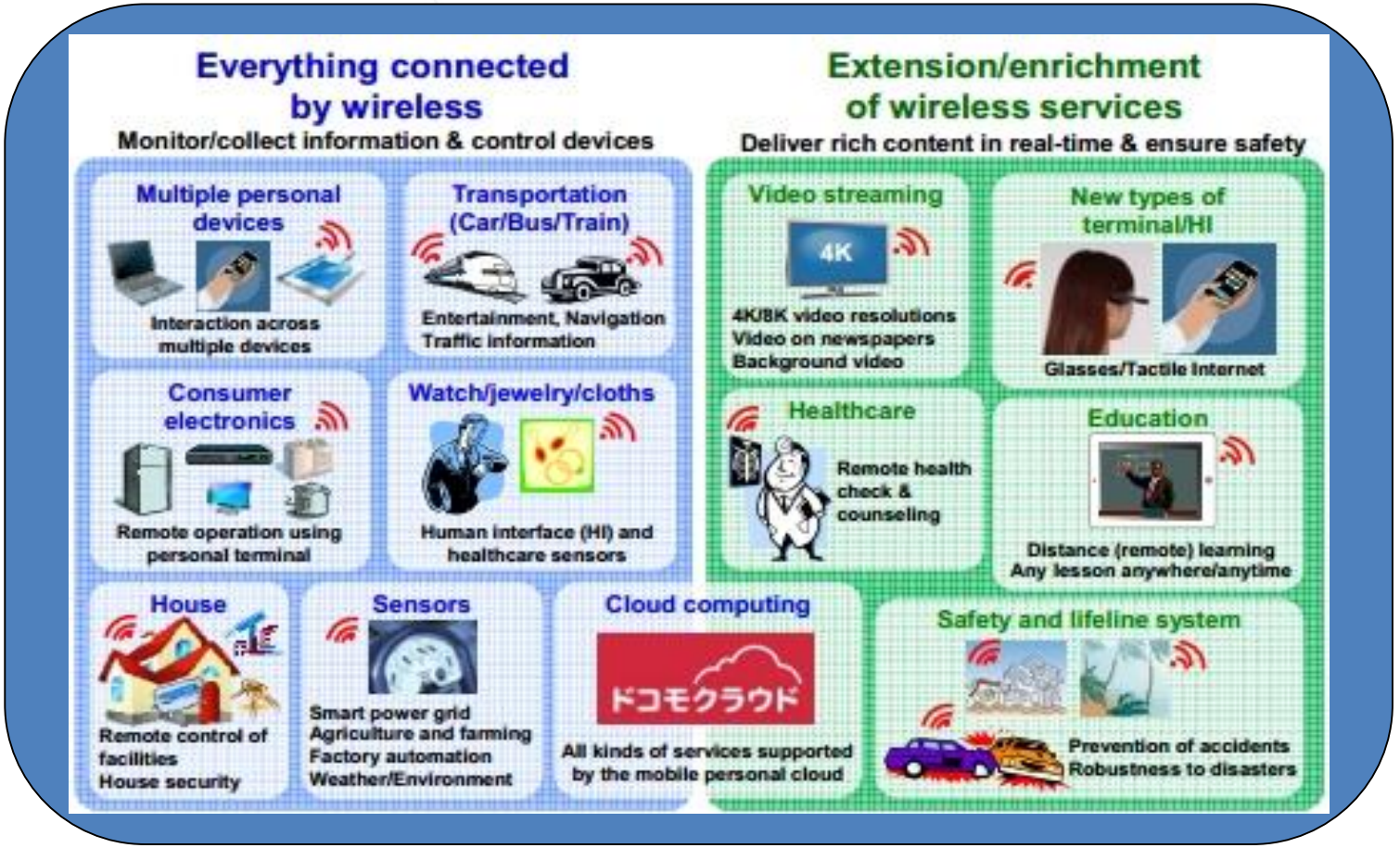
ITU

Terms & Definition

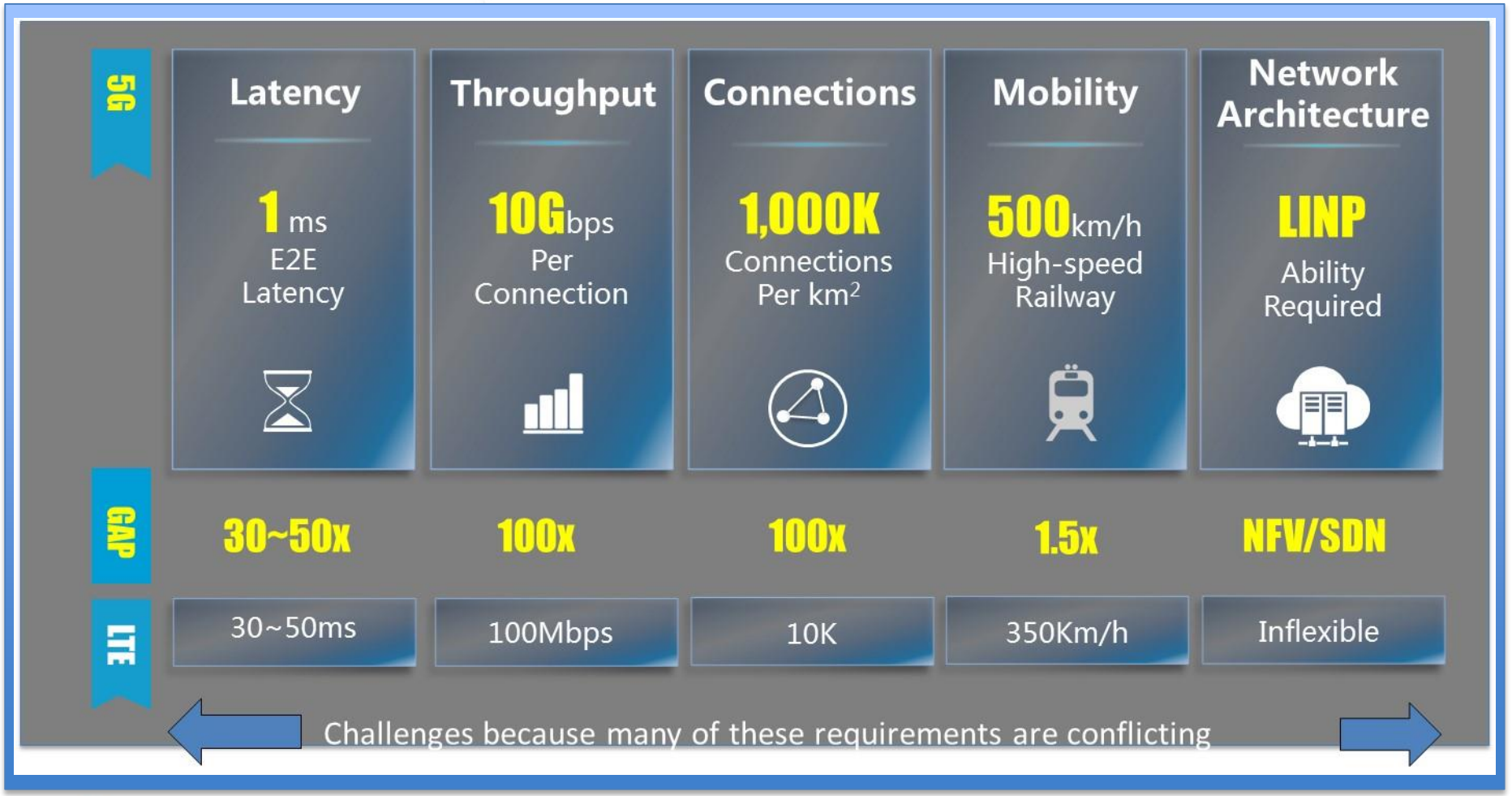
- IMT-2020 [ITU-R M-2083-0]: systems, system components, and related aspects that support to provide far more enhanced capabilities than those described in Recommendation ITU-R M.1645.
- IMT-2020 Radio:= IMT evolution + new RAT revolution
- IMT-2020 Network:= flat architecture + white-box-hardware + Virtualization + LINP/ Slices + Softwarization + MEC + DAN (ICN/ CCN) + e-2-e VoLTE enabling + …

Service Trends



Source: NTTDocumo

Challenges & Gaps



Source: Huawei

Networks are challanged by wide range of requirements

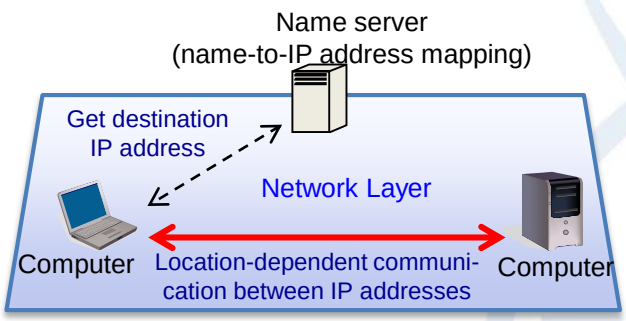
Future network standards by SG13 ...

Awareness	Approved Recommendations
Service	Y.3011: Framework of network virtualization for future networks Y.3012: Requirements of network virtualization for future networks Y.3300: Framework of software-defined networking Y.3320: Requirements for applying formal methods to software-defined networking Y.3321: Requirements and capability framework for NICE implementation making use of software-defined networking technologies
Data	Y.3031: Identification framework for future networks Y.3032: Configuration of node IDs and their mapping with locators in future networks Y.3033: Framework of data aware networking Y.3034: Architecture for interworking of heterogeneous component networks in FNs
Environment	Y.3021: Framework of energy saving for future networks Y.3022: Measuring energy in networks
Socio-Economic	Y.3013: Socio-economic assessment of future networks by tussle analysis Y.3035: Service universalization in future networks
Smart Ubiquitous Net.	Y.3041, Y.3042,Y.3043,Y.3044,Y.3045

… and IMT2020/ 5G relations

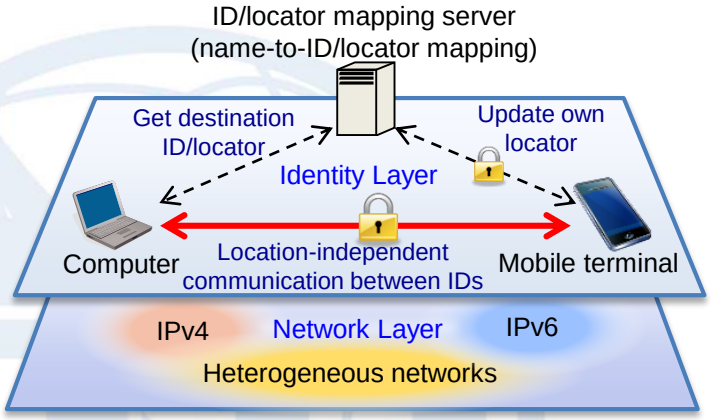
5G RELATIONS

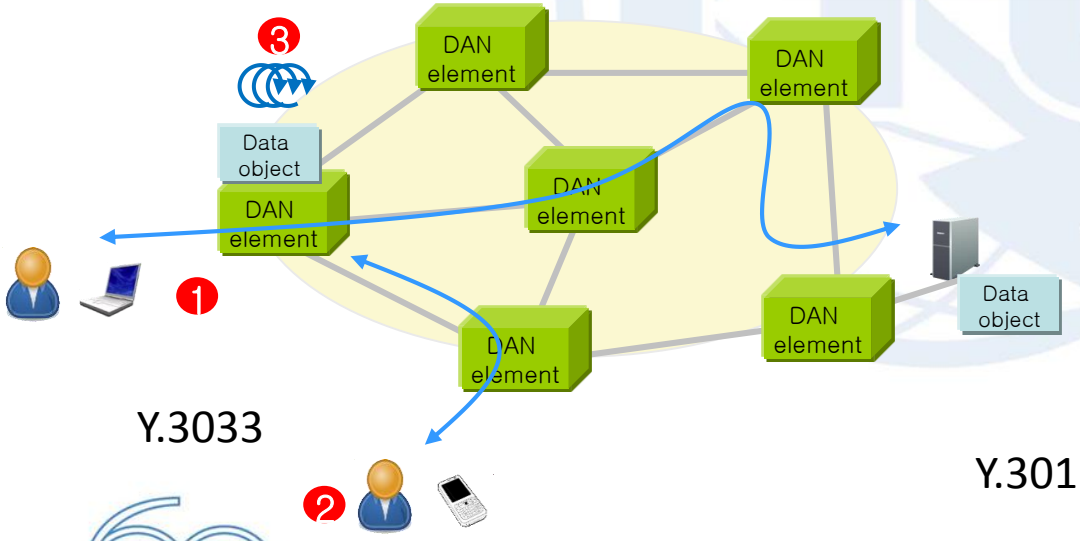
Location-based Communication in the Internet



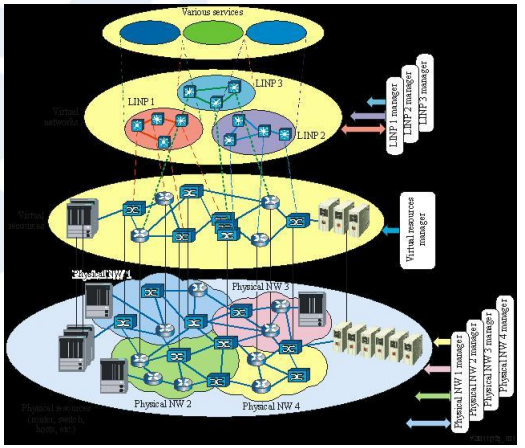
Y.3032

ID-based Communication in Future Networks





Y.3033



Y.3011

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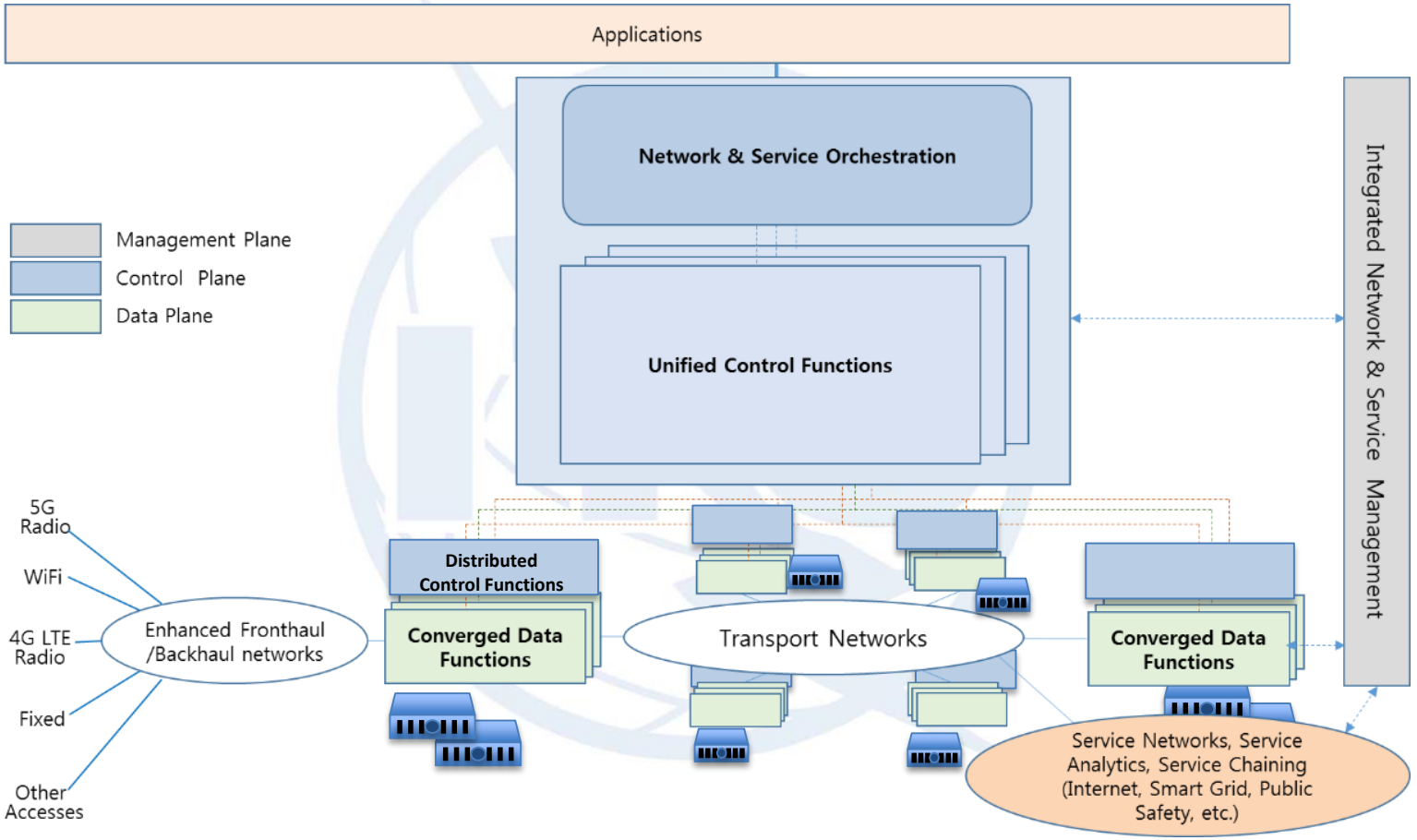
Identified topics (gaps) by FG- IMT2020

- **IMT2020 network architecture (high level)**
- **Softwarization**
- **Front Haul/ Back Haul**
- **E-2-E Connectivity**
- **Emerging Network Technologies**

http://www.itu.int/en/ITU-T/focusgroups/imt-2020/Pages/default.aspx

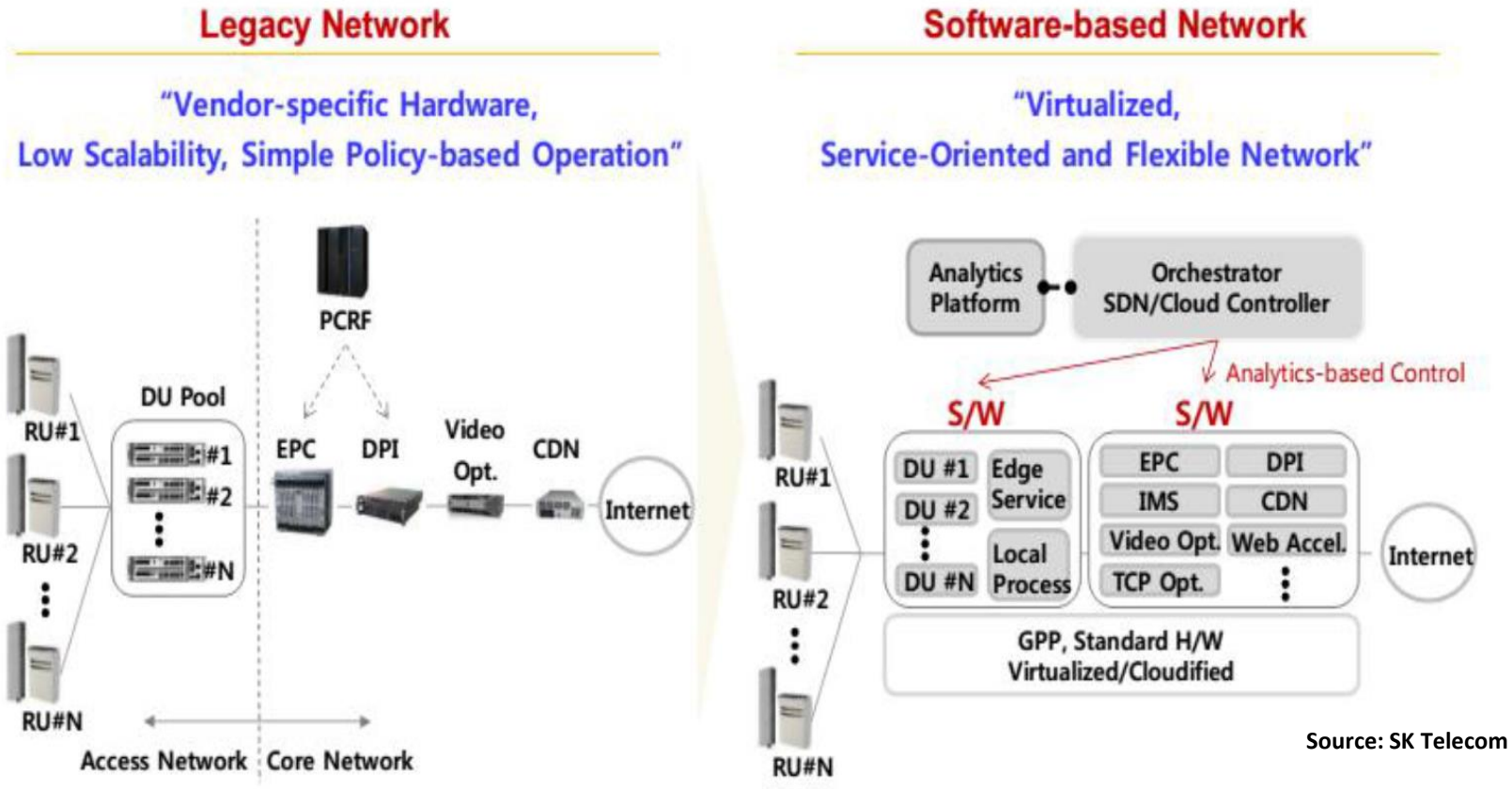
High Level IMT2020 network architecture



High Level IMT2020 network architecture

- Multiple access technologies (IMT2020, IMT, WiFi, fix networks)
- Distributed flat network by converged data plane functions (IP flow management, Multi-RAT coordination, computing & storage) and control functions (access control) at the edge of access agnostic common core with unified control functions (e.g. session, mobility management, QoS)
- Edge Cloud support (MEC), distributed content and services
- Inclusion of «TRUST» as design principle
- Flexibility by «software-based network»

Transition towards SW based



Source: SK Telecom

From dedicated NW components towards deployment of «white-box»-HW by NFV/SDN

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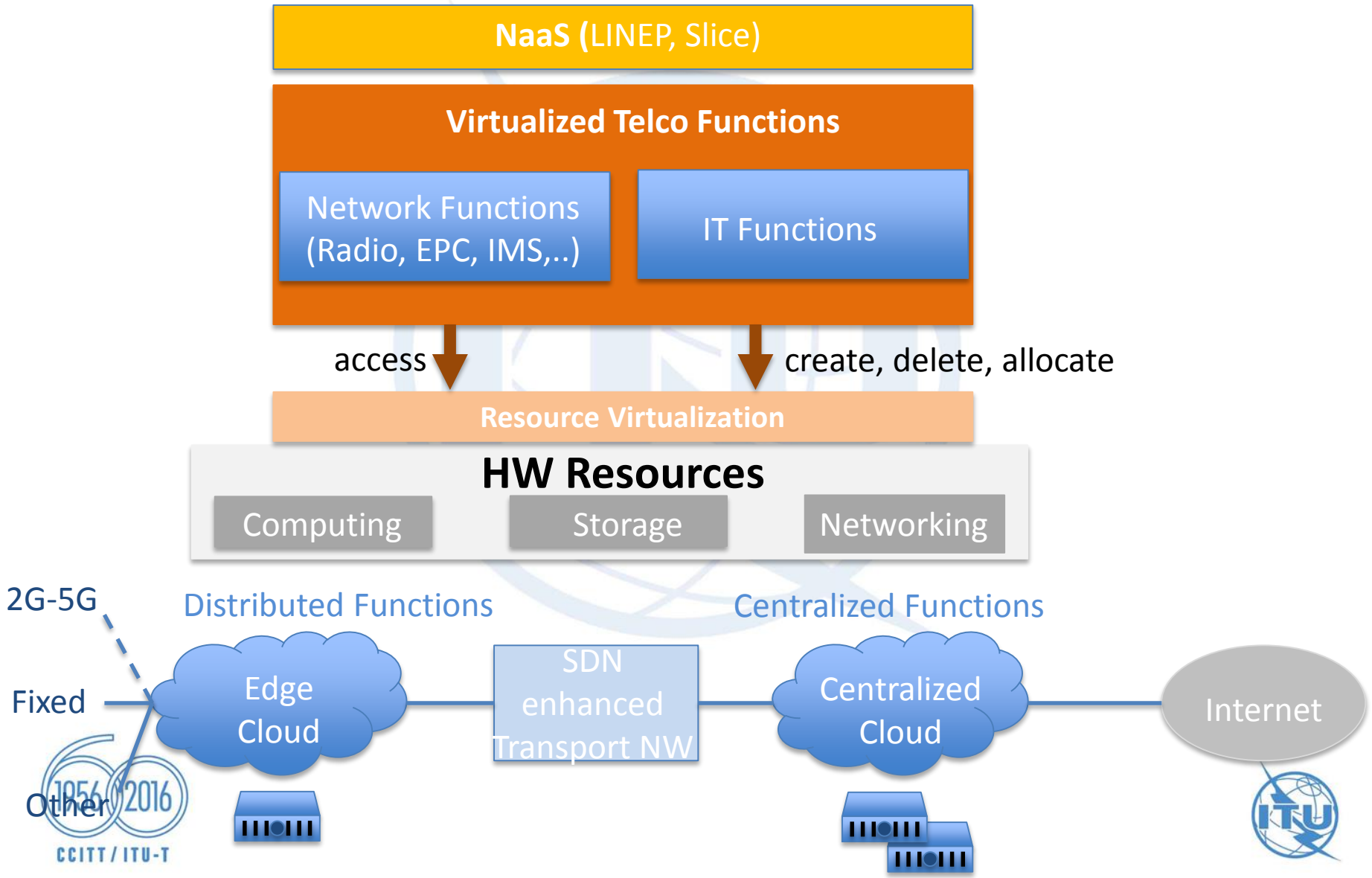
Network Softwarization

- **Automation mechanism for the configuration and maintaining of network equipment and network components.**
- **Rationale: optimization of costs and processes; enabling of self-management.**
- **Related Terms: NFV, NaaS, LINEP, Slice**

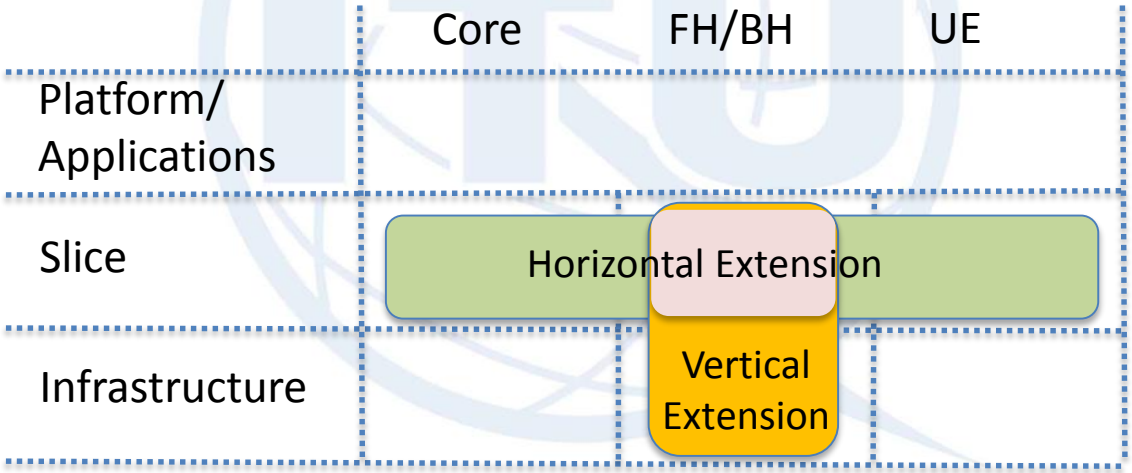
Virtualization of Functions & Ressources



Slice

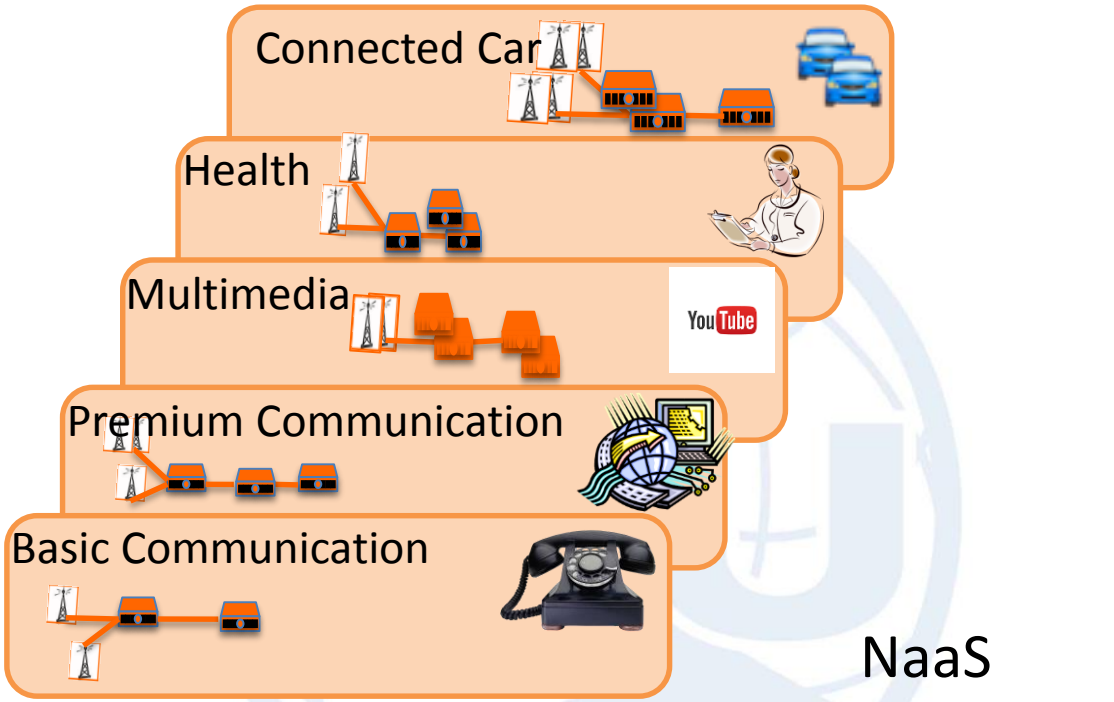
A **slice** is the collection of virtual or physical network functions connected by links to create an end-to-end networked system. A slice provides an isolated environment to efficiently accommodate individual applications meeting specific requirements

Logically Isolated Network Partition (LINP): A network that is composed of multiple virtual resources which is isolated from other LINPs (ITU-T Y.3011)

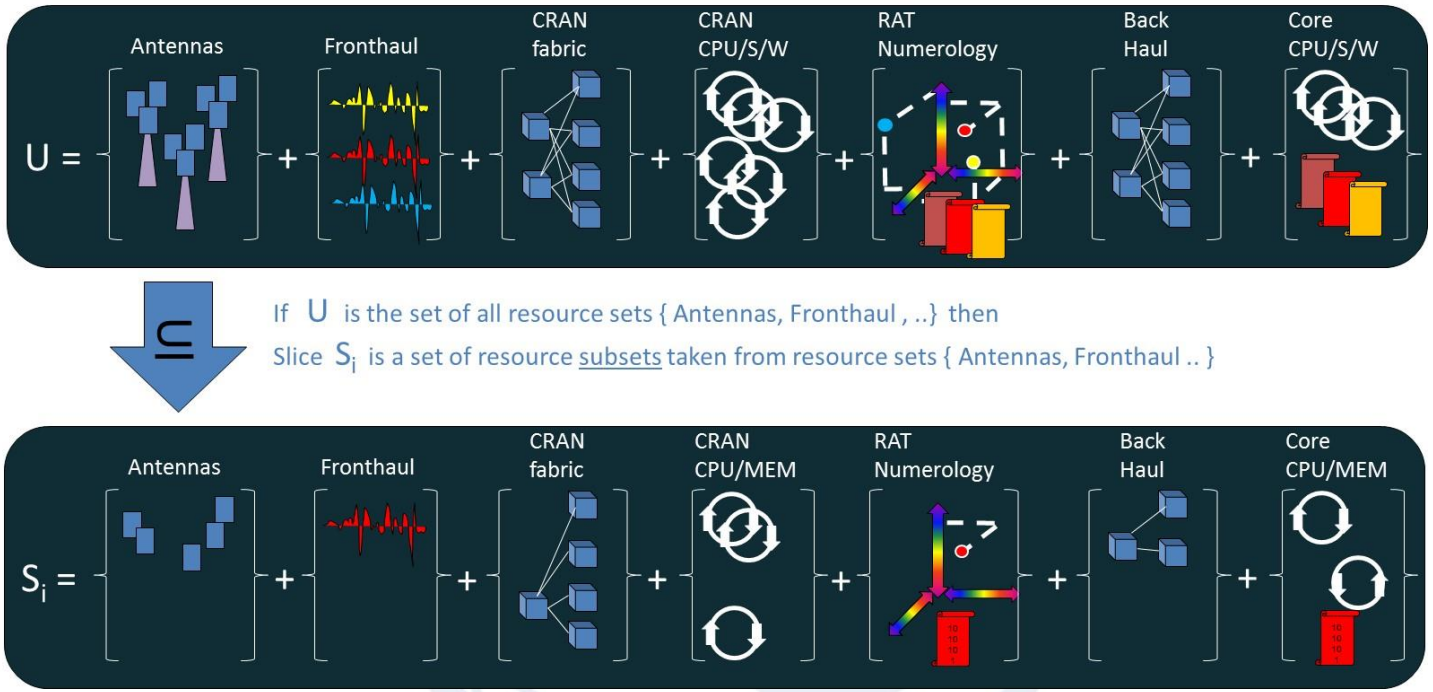


FG IMT2020

Network Slices Example



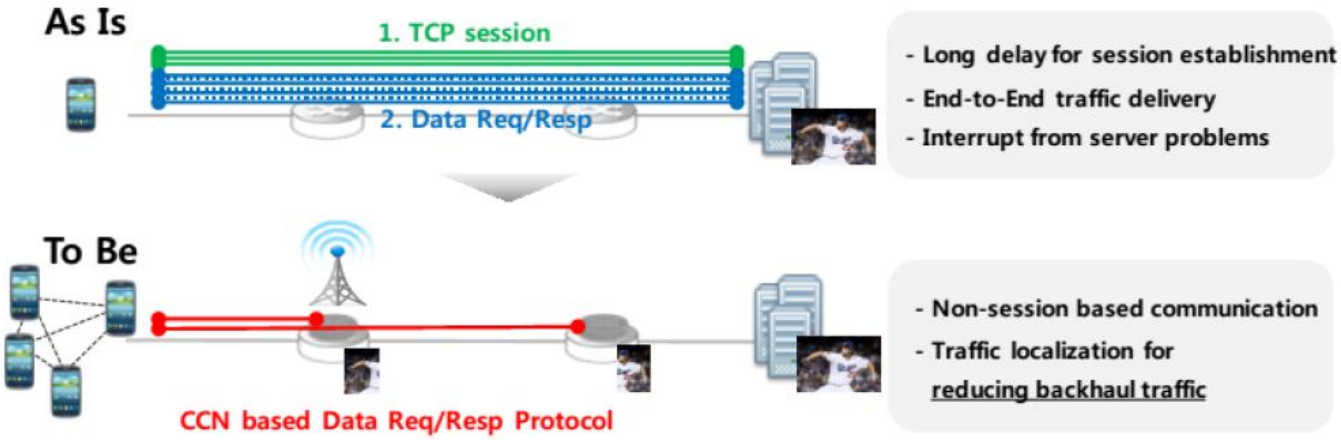
FH/BH Slice Example

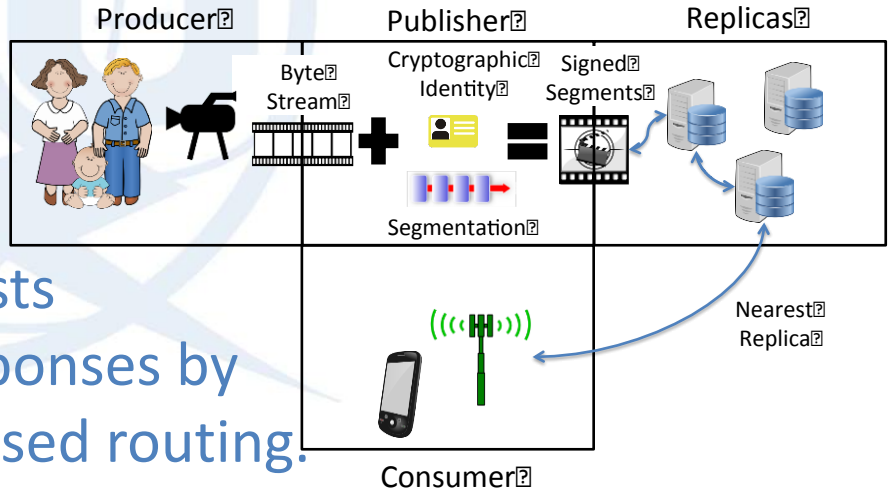


Source: Huawei

Logically Isolated Network Partition (LINP): A network that is composed of multiple virtual resources which is isolated from other LINPs (ITU-T Y.3011)

Emerging Technologies



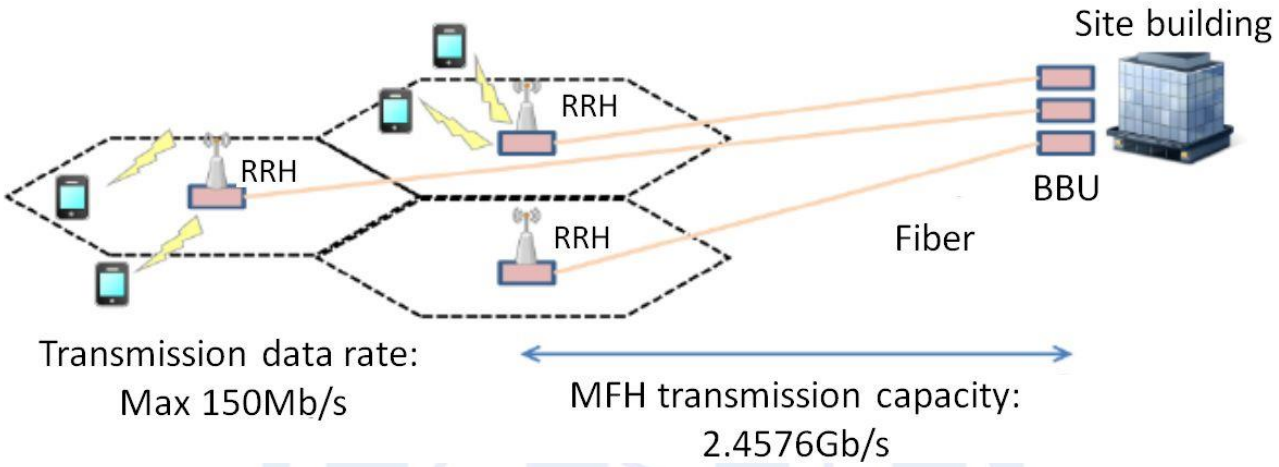


Information/-Content- Centric Networking (ICN, CCN)

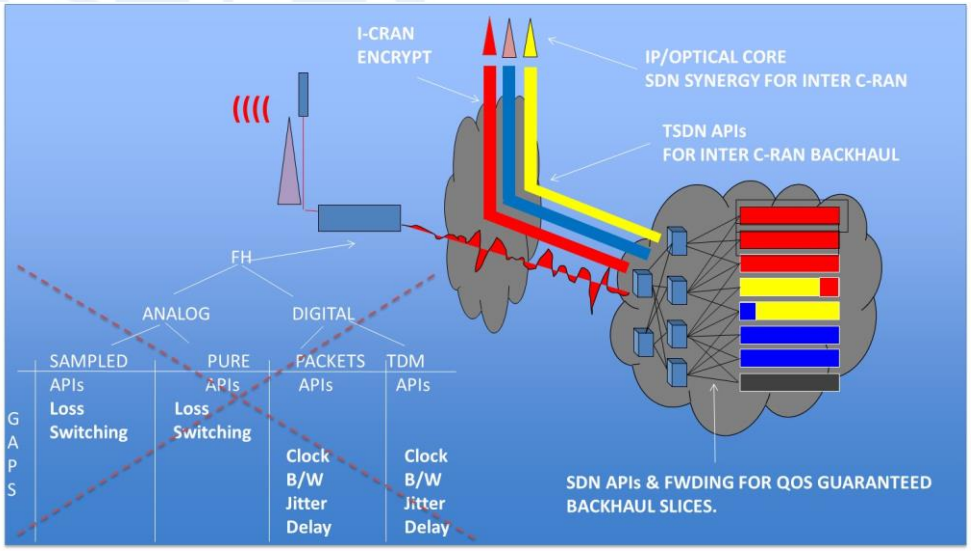
- Recognization of user requests and their corresponding responses by networks due to its name based routing.
- Overlay/ native transport

See also DAN (Y.3032)

Front Haul/ Back Haul



- Low latency
- Reliability and resiliency
- Diversified types of terminals
- Diversified types of traffic
- Power saving by resource optimization



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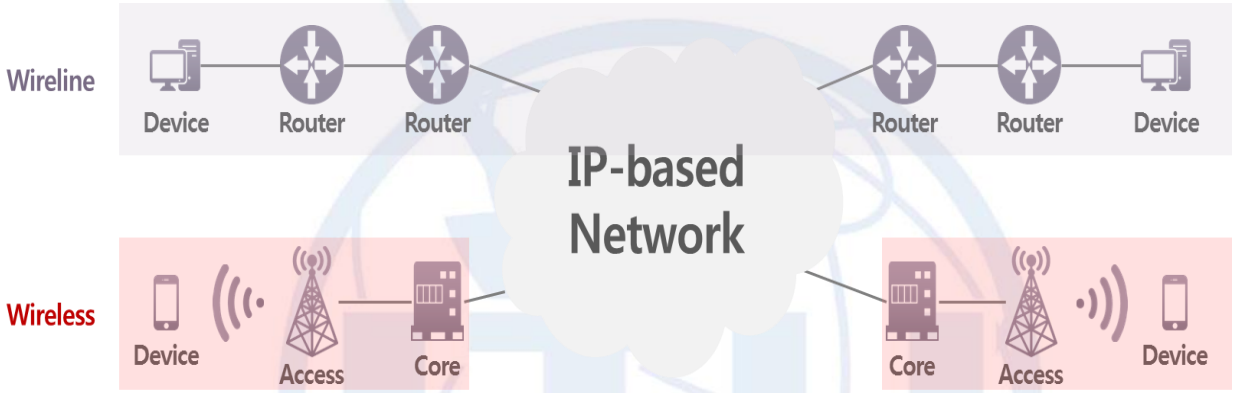
E-2-E Connectivity



- E-2-E Definition
- E-2-E VoLTE
- Different QoS classification among mobile and fixed networks
- Overall QoS study applicable to IMT-2020

IMT2020 Goals of SG13

- Definition of IMT2020 Roadmap based on FG results begin 2017
- First IMT2020 related recommendations in spring 2017 as
  - Softwarization Framework
  - Softwarization General Requirements
  - Framework on emerging network technologies

Contacts

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Media:

https://www.youtube.com/watch?v=PlLdNxgBfpY#t=20

https://www.youtube.com/watch?v=j4OtGJvNTzg

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