5G Mobile Network R&D In Japan

Prof. Akihiro NAKAO, The University of Tokyo, TTC, 5GMF
nakao@nakao-lab.org
Activities of Network Architecture Committee of 5GMF

- 5GMF Network Architecture Committee has been studying overall network architecture for 5G mobile.
- Challenges, requirements and technologies for network infrastructure have been discussed to develop the Network Technology Roadmap.
- The first version of the network architecture and the network technology roadmap has completed by the end of June, 2015.
- Outcome of the committee will be included in the 5GMF white paper, which will be released in Autumn, 2015.
Potential Applications Enabled By 5G

Quality of User Experience (Reliability, Low Latency)

Applications delivered by existing technologies

Online Trading  
Telemedicine  
Autonomous Driving  
Infrastructure Surveillance  

Applications enabled by 5G

Sensor-assisted Rehabilitation  
Augmented/Virtual Reality  
Computer-supported cooperative work  
4K/8K Live Streaming for Public Sports Viewing  

Quantity of Data (Peak Data Rate, Number of Devices)
Comprehensive Architecture of 5G Mobile Networks

(Draft 150618)

Goal: End-to-End Quality and Extreme Flexibility to Accommodate Various Applications

Applications & Services with Various Requirements (M2M/IoT, Content Delivery, Tactile)

Virtualized Networks/Platform

UE
Radio Access Network (RAN)
Mobile Packet Core
Cloud

Control

API
App-Driven API

Management Orchestration
Network Management And Orchestration
Network Softwarization

Physical Infrastructure (Network, Computing and Storage Resources)

UE
Mobile Edge Computing

Computation and Storage Resources

Data Centers

Network Resources

RAT(s)
MFH
MBH
Transport

Fronthaul Backhaul
## Technology Roadmap: Focus Areas

### Requirements
- **Extreme Flexibility**
  - (Deep) Programmability
  - Application Driven
  - Multi-Tenancy
  - Fronthaul / Backhaul

- **End-to-end Quality of 5G Applications**
  - Latency
  - Data rate
  - Number of Devices

### Focus Areas and Themes
- **Network Softwarization**
  - (Deep) Programmability
  - Application Driven
  - Multi-Tenancy
  - Fronthaul / Backhaul

- **Management / Orchestration**
  - Automation
  - Autonomy
  - Knowledge
  - Analytics

- **Mobile Edge Computing**
  - Intelligence
  - Edge Security

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**Focus Areas and Themes**

- Extreme Flexibility
- End-to-end Quality of 5G Applications
- Network Softwarization
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**Technology Roadmap: Focus Areas**

- **Requirements**
  - Extreme Flexibility
  - End-to-end Quality of 5G Applications
- **Focus Areas and Themes**

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**GSC-19 Meeting, 15-16 July 2015, Geneva**
Technology Roadmap: Timeline

Network Softwarization
- NFV/SDN Platform
- Elastic Networks
- Deep Programmable Networks

Management / Orchestration
- Autonomous Control for a specific use case
- Intelligent Management Platform
- Application Driven Optimization
- Massive Device Management

Mobile Edge Computing
- Delivery algorithm using MEC
- Application support by use of edge computing
- Latency Optimization for delay-sensitive applications

Fronthaul / Backhaul
- QoS Classifying/Slicing
- Application oriented Dynamic control
- Economization of Distribution Networks

Timeline:
- 2018
- 2020
- 2022
Network Softwarization

The terminology, Network Softwarization, was first introduced in Academia, as the name of conference [1], to include broader interests regarding Software Defined Networking and Network Functions Virtualisation, Network Virtualization, Mobile Edge Computing, Cloud and IoT technologies.

We intend to introduce various requirements of programmable software defined infrastructure, especially specific extension for 5G mobile networks.

Comprehensive Architecture Of 5G Mobile Networks
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Virtualized networks/platform

Radio access network (RAN)  Mobile packet core  Cloud

Physical infrastructure (network, computing and storage resources)

UE  Computation and storage resources  Data Centers

Mobile Edge Computing

Network Resources

RAT(s)  MFH  MBH  Transport

Management Orchestration

Network management and orchestration

Network Softwarization

GSC-19 Meeting, 15-16 July 2015, Geneva
The “Control” function block manages all aspects necessary to run an application and service provided by this slice. It encompasses not only the legacy network related software functions, but also the application related functions in the UE and the Cloud.
Advanced physical infrastructure provides data-plane programmability along end-to-end paths. The slice control is able to leverage the capability to compose custom functions for creating new applications and services.
Overall architecture allows full-fledged integration of value-creating applications and services promptly, with a variety of APIs associated with flexibility and programmability.
TTC Ad-hoc Group on Future Mobile Networking
-Challenges and Technologies-

The Telecommunication Technology Committee (TTC)

TTC’s White Paper now available!
http://www.ttc.or.jp/e/topics/20150413/
Summary

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