4G & 5G Mobile Technology

# 5G Core Technology

## 5G Core Technology

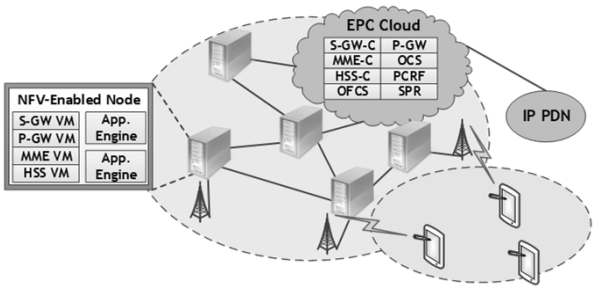
### ❖ 5G Enabling Key Technologies

- Advanced Network
- mmWave System
- Multi-Radio Access
- Advanced MIMO
- Multiple Access
- Advanced D2D
- Advanced Small Cell

## 5G Core Technology

### ❖ Advanced Network

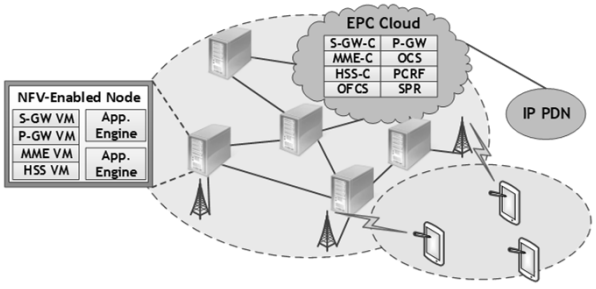
- Flat and distributed network architecture
  - Integrated and distributed network functions




## 5G Core Technology

### ❖ Advanced Network

- Flexible network architecture
  - Programmable network architecture using SDN (Software-Defined Network) and NFV (Network Function Virtualization)



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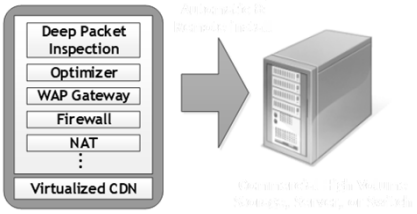
### ❖ NFV (Network Function Virtualization)

- NFV is a technology used to virtualize complex hardware-based network node functions into software building blocks that can be combined and chained to create advanced communication services

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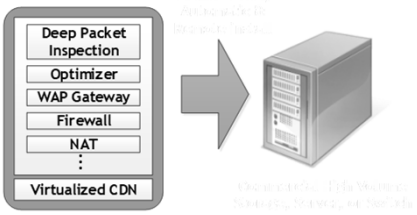
### ❖ NFV (Network Function Virtualization)

- NFV eliminates dependency on complex hardware-based network nodes by using flexible software blocks that are called VNFs (Virtualized Network Functions)
- Improved flexibility & functionality & efficiency



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### ❖ SDN (Software-Defined Network)

- SDN decouples the network control and data forwarding paths and functions
- Distributed management by using the shortest data path without traversing the core network
- Network control can be directly programmable
- Underlying infrastructure is abstracted for applications and network services

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### ❖ Advanced Network

- Flat & distributed network architecture
- Distributed management providing the shortest data path without traversing the core network
- Context-aware resource allocation considering real-time traffic, service type, and device characteristics

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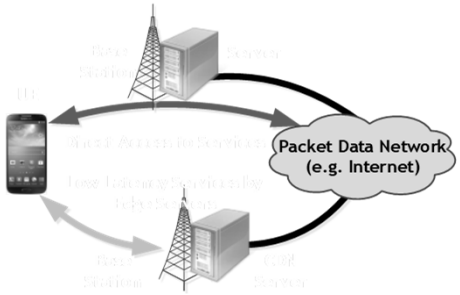
### ❖ Advanced Network

- Popularity based content caching using CDN (Content Delivery Network) technology for latency and packet traffic reduction




## 5G Core Technology

### ❖ Network Slicing

- Divide the 5G physical network into multiple virtual E2E (End-to-End) networks
- Logically isolated network technology influencing the mobile device, access, transport, and CN (Core Network)
- Dedicated for different types of services with different characteristics and QoS requirements

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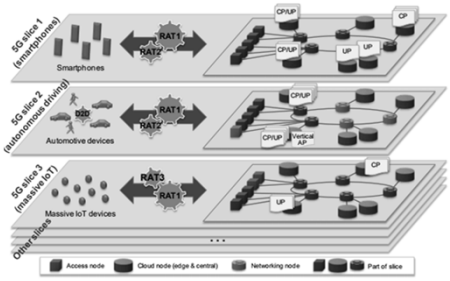
### ❖ Network Slicing Example

- UHD (Ultra High Definition) video broadcast & multicast services slice
  - All virtualized DU, 5G Core (UP), and Cache servers are in the Edge cloud
  - Virtualized 5G Core (CP) and MVO servers are in the Core cloud

UP: User Plane
CP: Control Plane
DU: Digital Unit
MVO: Mobile Video Optimization




[Ref] NGMN 5G White Paper, 2015

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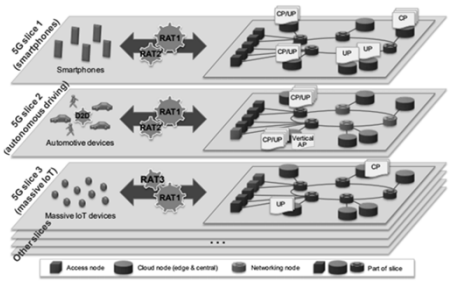
### ❖ Network Slicing Example

- Phone slice
  - 5G Core (UP and CP) with full mobility features, and IMS server are all virtualized in the Core cloud

UP: User Plane
CP: Control Plane
DU: Digital Unit
MVO: Mobile Video Optimization




[Ref] NGMN 5G White Paper, 2015

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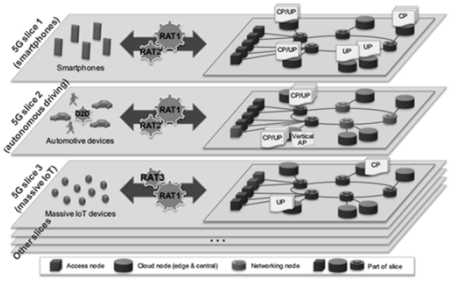
### ❖ Network Slicing Example

- Massive IoT slice (e.g., sensor network)
  - Simpler light duty 5G Core without mobility management features in the Core cloud




[Ref] NGMN 5G White Paper, 2015

UP: User Plane
CP: Control Plane
DU: Digital Unit
MVO: Mobile Video Optimization

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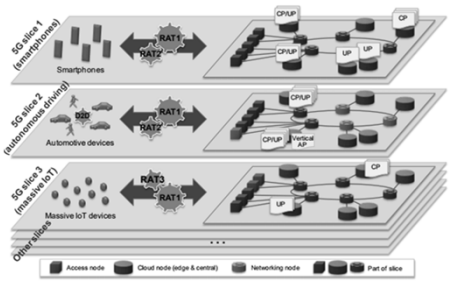
### ❖ Network Slicing Example

- Mission-critical IoT slice
  - 5G Core (UP) and associated servers (e.g., V2X server) are all in the Edge cloud for minimized transmission delay

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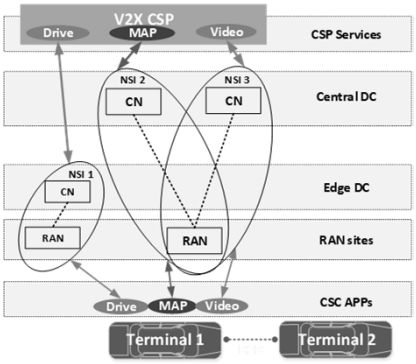
### ❖ V2X Service using Network Slicing




CSP: Communication Service Provider
CSC: Communication Service Consumer
NSI: Network Slice Instance
DC: Data Center
O&M: Operation & Maintenance

S5-174151 Huawei "pCR 28.530 Add concept and use case of V2X services using network slicing," 3GPP TSG SA WG5 Meeting #114, 21-25 Aug. 2017, Sophia Antipolis, France

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### ❖ V2X Service using Network Slicing

- Entertainment
  - Requirements on data throughput (e.g., in-car video service for the passengers)
- Driving assistant
  - High requirements on latency and reliability (e.g., see-through, providing HD dynamic map services with environmental awareness, or real-time sharing of sensor information)

S5-174151 Huawei "pCR 28.530 Add concept and use case of V2X services using network slicing," 3GPP TSG SA WG5 Meeting #114, 21-25 Aug. 2017, Sophia Antipolis, France

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### ❖ V2X Service using Network Slicing

- Efficiency and comfort for fully automated driving
  - URLLC service with strict requirements on reliability
    (e.g., high-density platooning, cooperative intersection control, etc.)

S5-174151 Huawei "pCR 28.530 Add concept and use case of V2X services using network slicing," 3GPP TSG SA WG5 Meeting #114, 21-25 Aug. 2017, Sophia Antipolis, France

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## References

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