Mobile Edge Computing:
Accelerating to 5G Era

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Current megatrends
Mobile computing, 5G and cloud computing
Architecture vision for mobile networks in the 5G era
Cognitive and Cloud Optimized Network Evolution

FutureWorks

Service enablement layer | Shared data layer | Coordinated Actuation layer

Virtualized network functions

Radio | EPC | IMS | VoLTE

Virtualized resources

IT virtualization

Compute | Storage | Networking

Mobile Edge Computing | Cloud-enhanced RAN

Mobile centric SDN X-haul

External data sources, Applications

Sense > Analyze > Decide > Act

E2e management & orchestration

Security & Privacy

2G...3G...4G...5G Macros, AAS, DAS, Wi-Fi, Pico...
Mobile Edge Computing
Helps satisfying the demanding requirements for the 5G era

Offers distributed cloud-computing capabilities and an IT service environment to application developers and content providers as well as exposure to real-time radio network and context information.

Many use cases can be enabled prior to 5G.

Value
Cooperation between mobile operators, vendors, technology suppliers, application developers and content providers

Flexibility
Open the Radio Access Network (RAN) environment to third-party innovative applications and services

Opportunities
Huge number of new breeds of applications and services for multiple sectors (consumer, enterprise and vertical)
Technical benefits of edge computing

**Real time**

- Lowest robust application latency (≠ transmission latency) end to end
- Examples: edge video orchestration, tactile Internet, Car2X

**Interactive**

- Maximum transaction rate between device and local “cloud” for best compute results
- Examples: augmented reality, indoor navigation, object tracking

**Private**

- Local communications to private networks for performance, privacy, and security
- Examples: unified communications, biometric user identification

**Analytical**

- Real time insights from data exploited at the point of capture, minimum cloud ingress bandwidth
- Examples: throughput guidance, edge video & sound analytics

**Distributed**

- Rapid introduction of network and other functions in the RAN, dynamic filtering rules
- Examples: local broadcast, network probing
ETSI standardization ensures that applications can deploy on any vendor’s platform

Open application platform

The standard defines the architecture, interfaces and APIs of an application platform that vendors can implement on different network elements

Any radio technology

Mobile Edge Computing can be implemented on top of 3GPP and non-3GPP network technologies

Network-wide applications

As a result it will be possible to deploy applications to the edge of any network, regardless of technology, topology and infrastructure vendor
Virtualization based MEC solution: Nokia Liquid Applications on AirFrame

Liquid Applications VNFs
- Application in VNF
- Application in VNF
- Application in VNF
- Application in VNF

Virtual Infrastructure Management:
- Liquid Applications VNFs
- vWLC VNF
- vFlexiZone controller VNF
- vRNC VNF
- vBTS VNF

Traffic offload
- RNIS
- Message bus
- Lifecycle mgmt.
- Cert. mgmt.

Application platform

Host

AirFrame Control Node
AirFrame Compute node

VNF: Virtual Network Function / VM: Virtual Machine / WLC: WiFi Controller
Mobile Edge Computing: deployment options

- **Centralized data center**
- **Distributed data center**
- **Metro aggregation**
- **Access**

Clusters of base stations and small cells at hotspots

Flexible and scalable Mobile Edge Computing brought to all locations
Deployment patterns

**Hotspots**
- Zonal applications
- E.g. special services in stadiums, exhibitions, malls, enterprise campuses
- Deployed in combination with Small Cell and Macro BTS (RRH, DAS)

**Cities**
- City applications
- E.g. IoT applications deployed as part of Smart City initiatives, or services for city residents and visitors
- Deployed at metro aggregation sites and baseband hotels

**Network-wide**
- Network-wide applications
- E.g. essential network functions, and ubiquitous services that require a consistent experience / performance
- Deployment in combination with Radio Cloud, or specific deployment patterns (e.g. Car2X along roads)
Network-performance service scenarios
Intelligent video acceleration

- A Radio Analytics application provides the video server with an indication on the throughput estimated to be available at the radio downlink interface.
- The information can be used to assist TCP congestion control decisions and also to ensure that the application-level coding matches the estimated capacity at the radio downlink.
- Enables improved video quality and throughput.

Source: ETSI Webinar on Mobile Edge Computing

Proof Point
Technical collaboration with Google on mobile delivery optimization

Internet Draft Mobile TG Exposure Req&Arch
Internet Draft Mobile Throughput Guidance

30 to 60%
Average improvement of network level metrics
Mobile Edge Computing complements SDN and NFV and advance the transformation of the mobile-broadband network into a programmable world, ensuring:

1. highly efficient network operation and service delivery,
2. ultimate personal experience, and
3. new business opportunities.

Mobile Edge Computing is a key enabler for IoT and mission-critical vertical solutions.

Mobile Edge Computing is one of the key technologies for enabling the transformation to 5G architecture, helping to satisfy the demanding requirements for the 5G era in terms of expected throughput, latency, scalability and automation.
Thank You!