Digital transformation of the mobile core in 5G

Enable realization of industry vertical market use-cases flexibly by adopting service-based architecture

Versatile 5G Core architecture is key enabler to deliver wide range of use-cases

5G provides ultra-low latency, massive connectivity, enhanced mobile broadband services, higher capacity and power efficiency. 5G network slicing features make the network service-oriented by allowing different use cases with varying network requirements to run flexibly and simultaneously on the same physical network. 5G is more than just a network, it is a platform for innovation. In the overall 5G network system, 5G Core shapes the network services delivery, QoS implementation, policy enforcement, security, convergence of multiple access network systems and deployment of network slices.

5G Core system is expected to provide digital services to smart device users and as well to industrial systems and enterprises with wide range of connectivity requirements.

SDN concept enabled programmability of network and there by created new cloud service like network as a service (NaaS), 5G core system and the concept of network slicing facilitates creation of dynamic networks and elastically scale the network on demand. This will enable operators to efficiently deploy network resources and fine tune the network to customer requirements.

5G Core system is expected to highly distributed and to be hosted on edge cloud, regional or national DCs of service providers or on public clouds. Also, 5G core system to be offered in SaaS models for different enterprise and industry use-cases.

In order to meet these wide-range of requirements, 5G core system architecture shall be highly agile, modular, flexible, scalable, available, rapid, and efficient.

Cloud native architecture approach, separation of control and user plane (CUPS), service chaining and service-based architecture will address the requirements and change the way telecom core network is realized.

Architecture considerations to realize digital transformation of 5G Core

The 5G core architecture is defined as an SBA with clear separation of control and user plane functions. 5G core functions expose their services on a message bus that can be consumed by other functions. Following figure depicts 5G Core network functions as defined in 3GPP specifications.
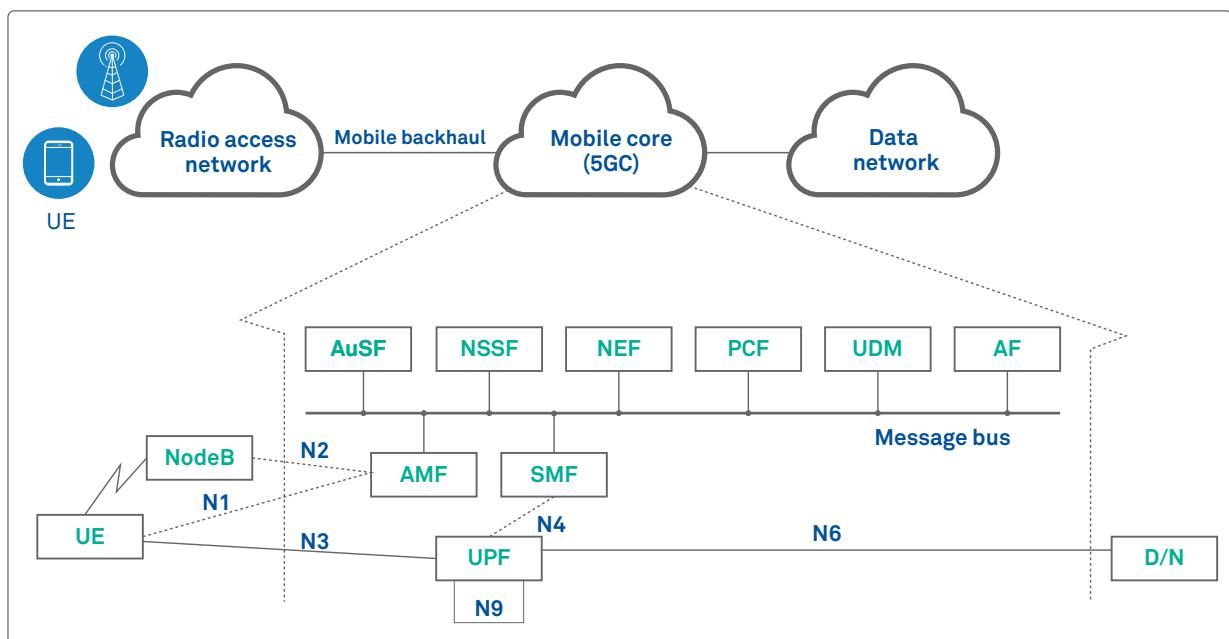

Figure 1: 5G Core network functions

Key considerations include

Distributed telco cloud platform centric approach:

5G core workloads are optimally placed on highly distributed compute platforms, i.e., 5GC network functions are deployed at edge clouds and centralized telco clouds to deliver optimal performance as per use case requirements. This distributed cloud platforms are interlinked, and workloads are orchestrated centrally to achieve elasticity, availability. These distributed telco cloud platforms could be used for hosting web-scale player application platforms or web-scale players compute platforms can be used to host 5G Core network functions. This cross leverage helps in realizing highly distributed 5G Core with time critical functions deployed closure to cell edge.

Service Oriented architecture and exposure of services

SOA & Cloud native approach to 5G core helps in realizing solution like web-scale player applications. 5G Core to be designed taking all best practices of web-scale players. It shall be built as set of micro services which are loosely coupled stateless services and each of micro services are individually managed, deployed, scaled and upgraded. 5G core network functions to expose service APIs to monitor functions, control & configure services and collect performance data of the network functions & slices. These service APIs shall help in realizing 5G core as a platform for a true NaaS model.

Common infrastructure and a slice for each niche category of service

As 5G eco-system evolves, many new industry use-cases are possible and number of slices in the network may grow. Distributed cloud infrastructure & 5GC CNFs as a common infrastructure and network slices are created based on service types, users and traffic types. The common infrastructure resources are orchestrated or being moved from one slice to another based on usage and traffic pattern.

Closed loop automation

5G core shall be designed to implement several software probes at various reference points to collect intelligence on traffic patterns, signaling message exchange and usage patterns etc., This real time software probe data in combination with other telemetry, fault, event, syslog data shall be useful to realize close loop automation at service orchestration level to improve service availability, service quality.

DevOps – fully automated delivery of 5G core network functions

Transformation of internal processes is key to achieve fully automated continuous delivery as like the way web scale players upgrade infra & applications. 5G Core micro services to be auto upgraded with zero disruption to services.

Digital transformation of 5G Core enables new opportunities – Media example

OTT players would like to offer very high-quality videos with low latency & minimum buffering to users. OTT player can leverage 5G Core with NaaS APIs to program the network based on subscriber choice and create slice to deliver the content using right deployment model of 5G core resources. Following figure depicts the layers involved in creating service and how OTT player can take advantage of NaaS APIs.
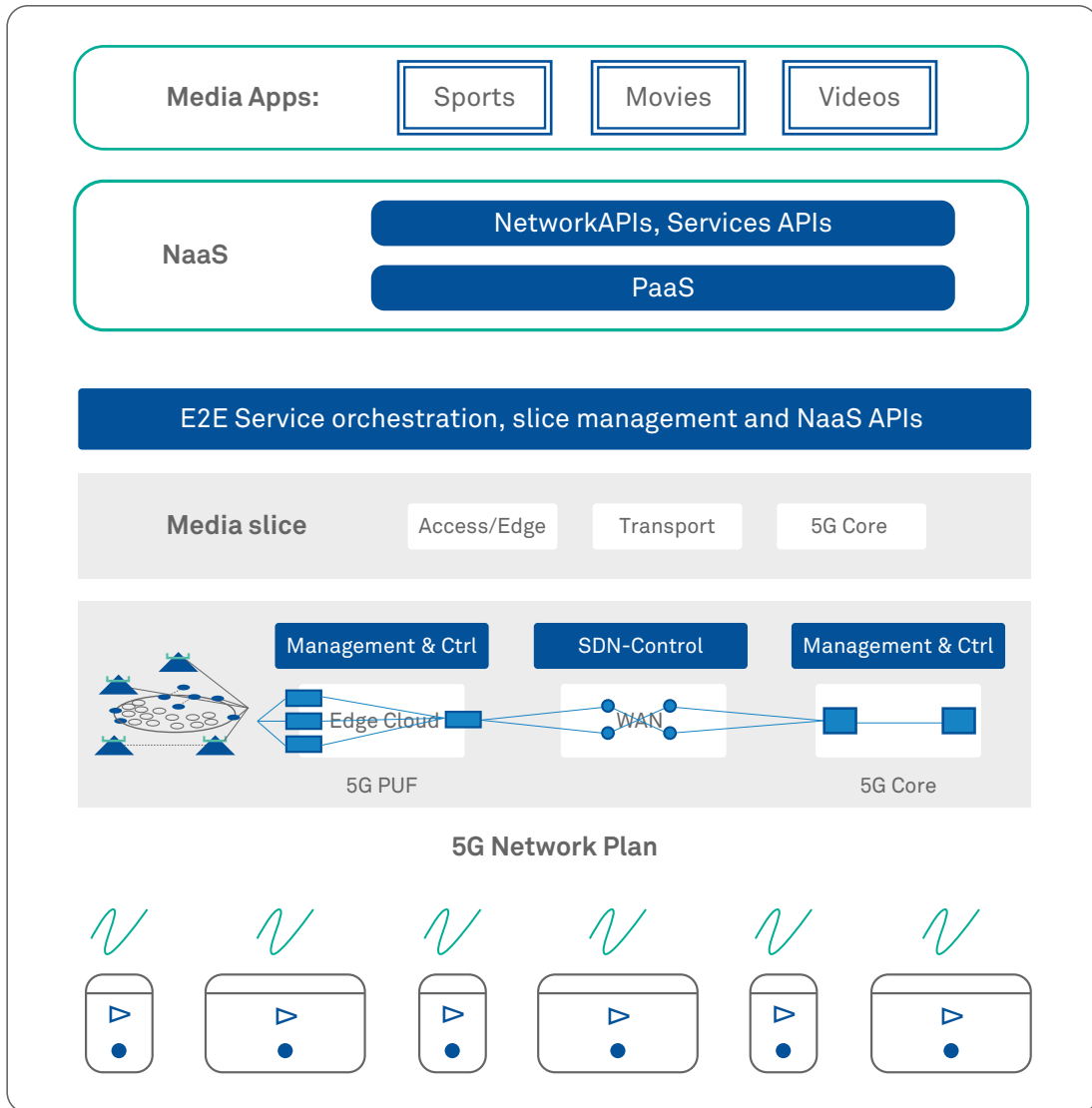
Figure 2: Media– 4K/Ultra HD care use-cases

Conclusion

5G core Digital Transformation is key to realize wide-range of use cases. It shall be realized with right architecture model to achieve programmability, scalability, availability and service APIs. It shall help in prepare network more closure to traffic characteristics of applications. By having right deployment architecture model and with right service exposure in NaaS model help in enriching user experience.

About the authors

Ravi Emani,
Distinguished Member of Technical Staff

Ravi is currently responsible for NEPC (Network & Edge Providers and Consumer Electronics) Practice at Wipro. He has over 23 years' experience in the telecommunication industry and currently working on various 5G reference solutions. His past experience includes developing SW solutions in 2G/3G/4G RAN, Core, SDN and NMS domains

Narayana Pai,
DMTS – Senior Member

Narayana is Principal Architect in Packet Core Portfolio of NEPC Practice, he is currently working on 5G core functions at Wipro. He has over 25 years of experience in Telecommunication industry with experience spanning 5G core, BNG, L2/L3/Forwarding.

References

3GPP TS 23.501 v16.1.0 System Architecture for the 5G System

Wipro Limited

Doddakannelli, Sarjapur Road,
Bangalore-560 035, India

Tel: +91 (80) 2844 0011
Fax: +91 (80) 2844 0256
wipro.com

Wipro Limited (NYSE: WIT, BSE: 507685, NSE: WIPRO) is a leading global information technology, consulting and business process services company. We harness the power of cognitive computing, hyper-automation, robotics, cloud, analytics and emerging technologies to help our clients adapt to the digital world and make them successful. A company recognized globally for its comprehensive portfolio of services, strong commitment to sustainability and good corporate citizenship, we have over 175,000 dedicated employees serving clients across six continents. Together, we discover ideas and connect the dots to build a better and a bold new future.

For more information, please write to us at **info@wipro.com**