White Paper
2016-05

IMT-2020 (5G) Promotion Group

5G Network Architecture Design

CONTENTS

IMT-2020 (5G) Promotion Group was jointly established in February 2013 by three ministries of China (including MIIT, NDRC, and MOST) based on the original IMT-Advanced Promotion Group. The members include the main operators, vendors, universities, and research institutes in China. The Promotion Group is the major platform to promote 5G technology research in China and to facilitate international communication and cooperation.

Introduction

Along with the research on 5G getting further and more detailed, the industrials have shaped the basic consensuses on 5G scenarios. Facing to the application scenario of enhanced mobile Internet, 5G can provide access capability with higher experienced data-rate and wider bandwidth to support multimedia contents featured by higher definition and living experiences. Facing to the interconnection scenario of massive IoT devices, 5G can provide optimal control capability of higher connection density signaling to support the access management of IoT devices featured by massive, low cost and power consumption. Facing to the vertical business scenarios such as critical communication or industrial Internet, 5G can provide information interaction capability with extreme low latency and high reliability to support service cooperation featured by high performance of real-time, accuracy and security among various interconnected entities.

Due to the extreme 5G requirement on experience, efficiency and performance, as well as the vision of "everything connected", 5G network now is facing new challenges and opportunities. Based on the core principles such as network service convergence and on demand service provision, 5G introduces richer radio access network architecture, providing smarter capabilities like radio control, service awareness and protocol stacks. 5G reconstructs the control and forwarding function in the core network, refreshing the existing single pipeline and consolidated service model. 5G will provide highly customized network services for different user and vertical business on top of the new friendly and openness infrastructure. Above all, 5G will transform the network into an integrated information service enabling platform which has the characteristics of fully resource sharing, easily function orchestration and tightly service interworking.

The international 5G standardization work has been launched completely. Therefore, it is very necessary to refine the design of 5G network architecture and focus on main technology direction to guide the follow-up industrial development. In this white paper, we introduce a novel 5G network architecture design from the angel of logical function and platform deployment and expand the architecture design into four-dimension diagrams, then extract the typical 5G service capabilities such as network slicing, mobile edge computing, on-demand mobile network reconstruction, user-centered RAN and network capacities exposure, and finally offer advices on the standardization work of 5G architecture and technology.

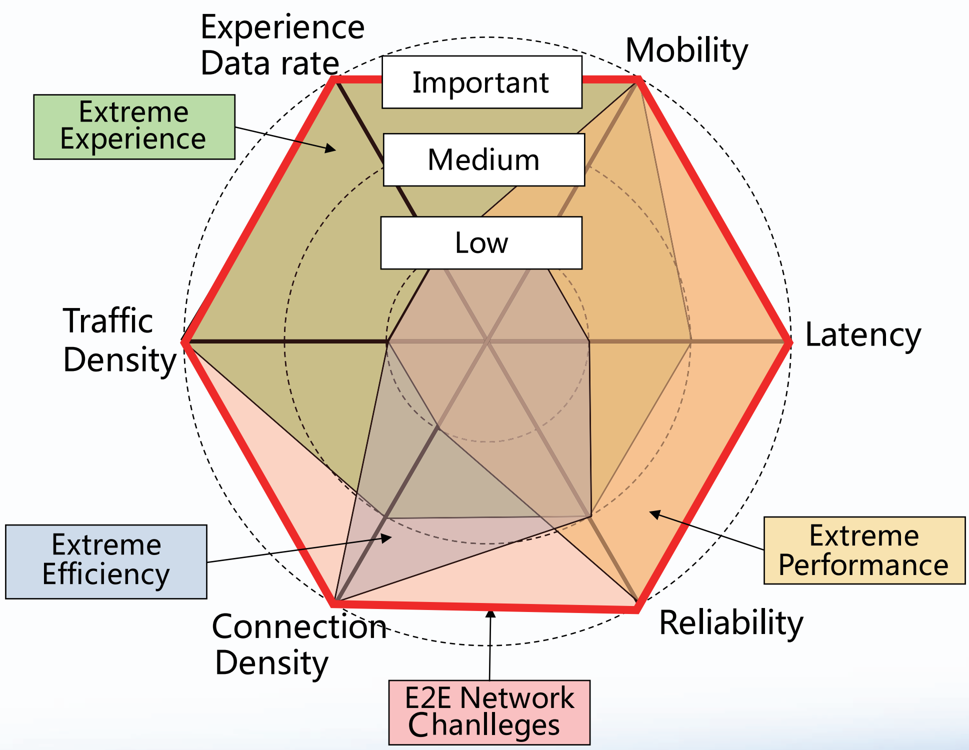
5G Network: Challenges And Opportunities

1. Challenges from extreme high KPI

Firstly, 5G system plans to provide 100M to 1Gbps experience data rate anytime and anywhere to satisfy the mobile internet consumer's experience requirements for services such as HDTV and argument reality. Even in a high-speed mobile environment up to 500km/h, the system shall offer basic service capability and necessary service continuity.

Secondly, 5G system need to support at least tens of Tbps/km^2 traffic volume density and millions/km^2 connection density at the same time for the efficient access requirements of devices in both mobile Internet and IoT scenarios. The traditional network system which is marked by center-converging data forwarding pattern and single control mechanism may lead to traffic overhead and signaling congestion under 5G service background which is featured by high throughput and massive connection.

The last but not the least, 5G system must satisfy the end to end ms level latency requirement under the high reliability condition to support the high real time service such as automated driving and industry control. The latency and service interrupt time of today's mobile system is up to about hundreds milliseconds, which is two order of magnitude higher than 5G latency budget. The exsiting network also can not well support the reliability and sercurty requirement of specific services.



Firgure-1 5G E2E network challenges

2. Opportunities by network and service convergence

Considering the resources reservation for events that may suddenly or periodically happen, the mobility management for scenarios from high-speed rail to stable wireless sensors, and the latency demand of services from real time industrial control to remote meter reading with high time tolerance, all of these 5G services scenarios have put forward higher and more differentiated demands on network functions. To solving such a diverse sort of service scenarios, the novel 5G network concepts like network-service convergence and on-demand service provision will bring new opportunities to all the sectors of the information industry.

Based on the position advantages of “last mile” of 5G network, the Internet applications provider can offer user experience with better discrimination. For example, mobile app can filter out most appropriate service parameters according to the location area, movement tracks and radio contexts exposed by network to increase the satisfaction of gold customers. Meanwhile, ISP can offer particular users with latency and bandwidth assurance by using of network edge caching and computing to gain an early advantage.

Based on the infrastructure advantages of “Full coverage and End-to-End” of 5G network, the IoT service demand-side represented by vertical business can easily obtain the powerful and flexible service deployment environment. Vertical business can obtain the rich means to monitor and manage the terminals and devices in the network and control the entire service running states relying on the powerful network management system. 5G infrastructure, which allows flexible function customization and resources configuration, can offer the 3rd party service demand-side with the ability to construct a service platform of their own. In this platform, user data can be safely isolated and HW/SW resource can be dynamically scaled which may dramatically reduce the development threshold.

From the angle of mobile network operators, 5G network may help them to further increase profits and reduce expenditures. In the perspective of profits increasing, 5G network break existing isolated and consolidated service provision framework, comprehensively open the network functions such as infrastructure resources, networking and control logic etc. to construct the integrated information service enabling platform and bring new service growth points for mobile network operators. In the perspective of expenditures reducing, on-demand function and infrastructure resources provision mechanism will facilitate enhanced energy conservation and CapEx/OpEx per unit dataflow.

In particular, along with the deep convergence of mobile network and Internet, these two domains also mutually interact and infiltrate to each other positively at technical aspect. The Internet technologies such as cloud computing, virtualization and softwarization would be the important enablers of 5G architecture design.

Firgure-2 5G integrated information service enabling platform

5G Network Architecture Design

The design of 5G network architecture includes two parts: system design and networking design. The system design mainly considers the network function and information interaction issues and aims to build a E2E unified logical architecture which has more reasonable function plane partitions. The networking design focus on the solution of hardware platform and networking deployment and attempts to fully realize the potential of the networking flexibility and security of the novel infrastructure environment based on SDN/NFV technologies.

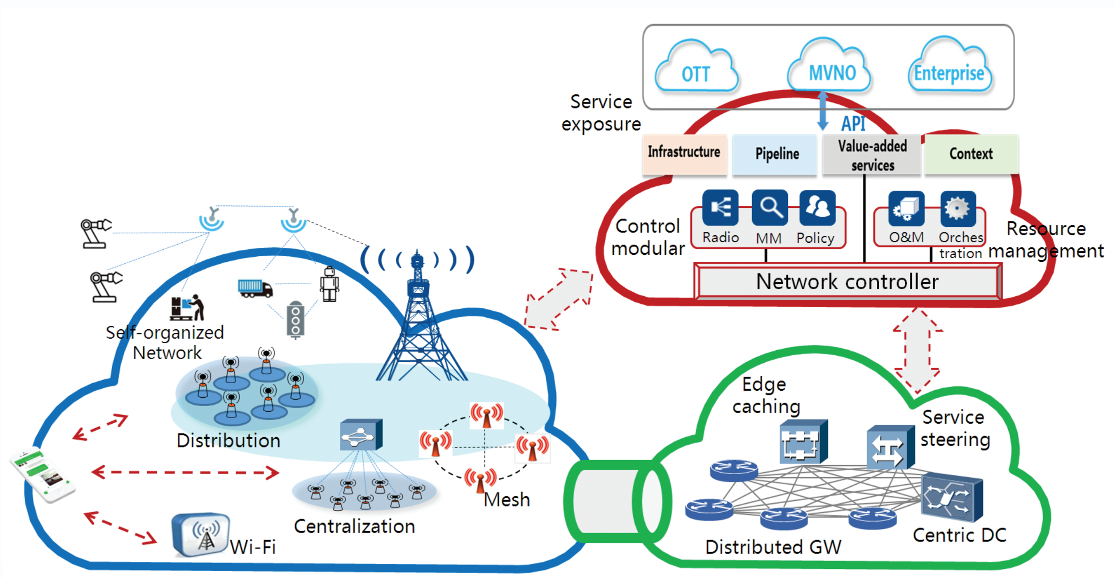
1. 5G system design: logical diagram and function diagram

As shown in Figure-3, the logic diagram of 5G network consists of three function planes: access plane, control plane and forwarding plane.

Access plane can accommodate more flexible radio access network topologies by exploiting multi-BS co-ordination, multi-connection mechanism and multi-RAT interworking technology.

Control plane can provide on-demand network control functions such as radio resources management, mobility management and session management based on the centralized and restructurable control function modulars.

Forwarding plane has the ability to forward and process the service data in a distributed manner and provide more dynamic IP anchor configuration and richer service chain capability.



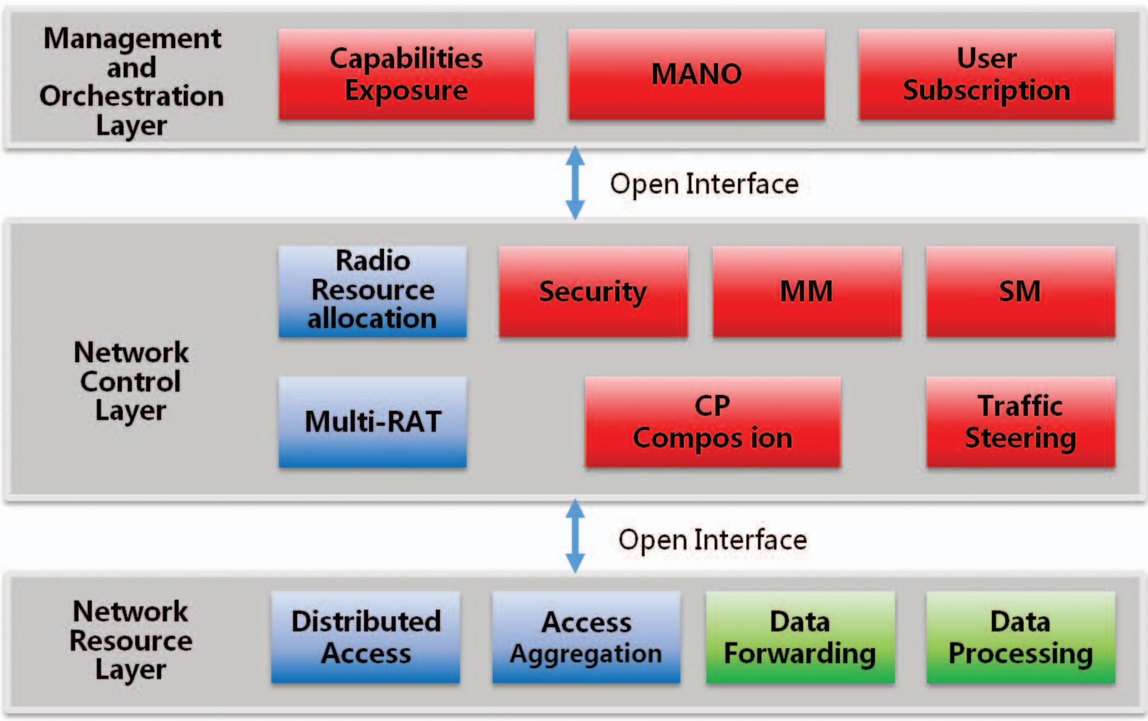
Firgure-3 Logical diagram of 5G network

Based on the overall logic architecture, 5G network function diagram uses the modular-based design principle and build the specific logic network via the composition of the network function modular to meet different scenarios. As shown in Firgure-4, 5G three-layers network function diagram takes control function layer as the core, and the access and forwarding function layer as the basic resources and provides the orchestration and capabilities exposure layer's functions as interface to the 3rd party. Open interfaces are used to support the flexible inter-layers' function invocations. The main functions of each layer include the following:

Management and Orchestration layer consists of three function modules name as user data, management and orchestration and capabilities exposure. The user data function stores the user subscribtion profile, service policies and network context information. Management and orchestration function can create and management network slicing on-demand based on the NFV platform. Capabilities exposure function handles the gathering and encapsulating jobs of the network capabilities and exposes them via APIs to the 3rd party.

Network control layer includes all the control function of 5G network, for example, centralized radio resource scheduling, integrated multi-rat control, MM, SM and security management and flow control. According to the instructions from the Management and orchestration layer, related control functions can be composed in this layer to implement on-demand scheduling of the network resources in the lower layer.

Network resources layer can be divided into access side and network side. The RAN side functions are achieved by hierarchical functional entities, called central units (CUs) and distributed units (DU). While CU acts as the RAN anchor, DUs are remote access points for UEs, equipped with RF and part of baseband processing functions. Network side functions include the data forwarding, traffic optimization and content-oriented function. Based on the distributed IP anchor and flexible data forwarding paths, the user data flow can be introduced to appropriate nodes to implement the efficient forwarding and rich processing functions such as DPI, content-based charging and flow compression etc.



Firgure-4 Function diagram of 5G network

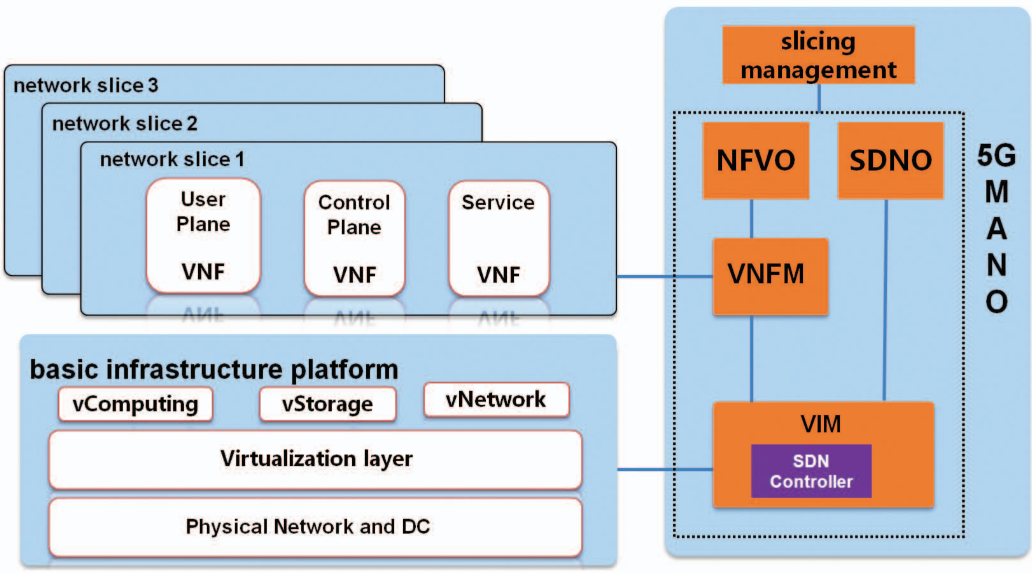
2. 5G networking design: platform diagram and networking diagram

5G infrastructure platform will choose more and more standardized data centers with universal hardware architecture. The platform should support high performance forwarding and carrier level management. 5G infrastructure platform will take network slice as the customized mobile network instance.

By introducing SDN/NFV technologies (shown in Figure-5), 5G platform diagram could support dynamic resource allocation and high efficient scheduling. At the WAN level, the NFV orchestrator function could achieve function deployment and resource scheduling across data centers, and SDN controller could realize the WAN level interconnection between data centers in different levels. In the MAN level and below, single data center is used to carry functions for limited geo area which includes the unified NFVI infrastructure layer to realize the hardware and software decouple and the intra data center resource scheduling based on the SDN controller.

The implementation of NFV/SDN technology in the access network platform is an important research point of today’s industry. With the platform virtualization technology, multiple types of wireless technologies could be supported simultaneously by one single platform, and the logical RAN entities and functions can be dynamically migrated in real-time, achieving higher level of resource scalability. By RAN virtualization, diverse RAN function entities can be dynamically seamless connected, in adaptation to differentiated edge RAN services requested by UE. In addition, to satisfy the special requirements of RAN virtualization, i.e. RAN accelerator for non-virtualized RAN functions and high speed information exchange among virtualized function entities, enhanced virtualization management and orchestration technologies should be utilized.

SDN/NFV technology will further lift the 5G capability of forming large scale network. NFV technology could achieve bottom-up mapping of physical resources to virtualized resources, create the virtualized machine (VM) and load the virtualized network function (VNF). The virtualization system could realize the unified management for the virtualized basic infrastructure platform and dynamically reconfigure of the resources. SDN technology could interconnect the virtualized machines and create the signaling and data forwarding path. The intent of the network virtualization is to realize the dynamic connection between RAN and CN, configure the end-to-end service chain, and construct a flexible network.



Firgure-5 Platform diagram of 5G network

Generally, the 5G networking is consisted of four levels as shown in Figure-6:

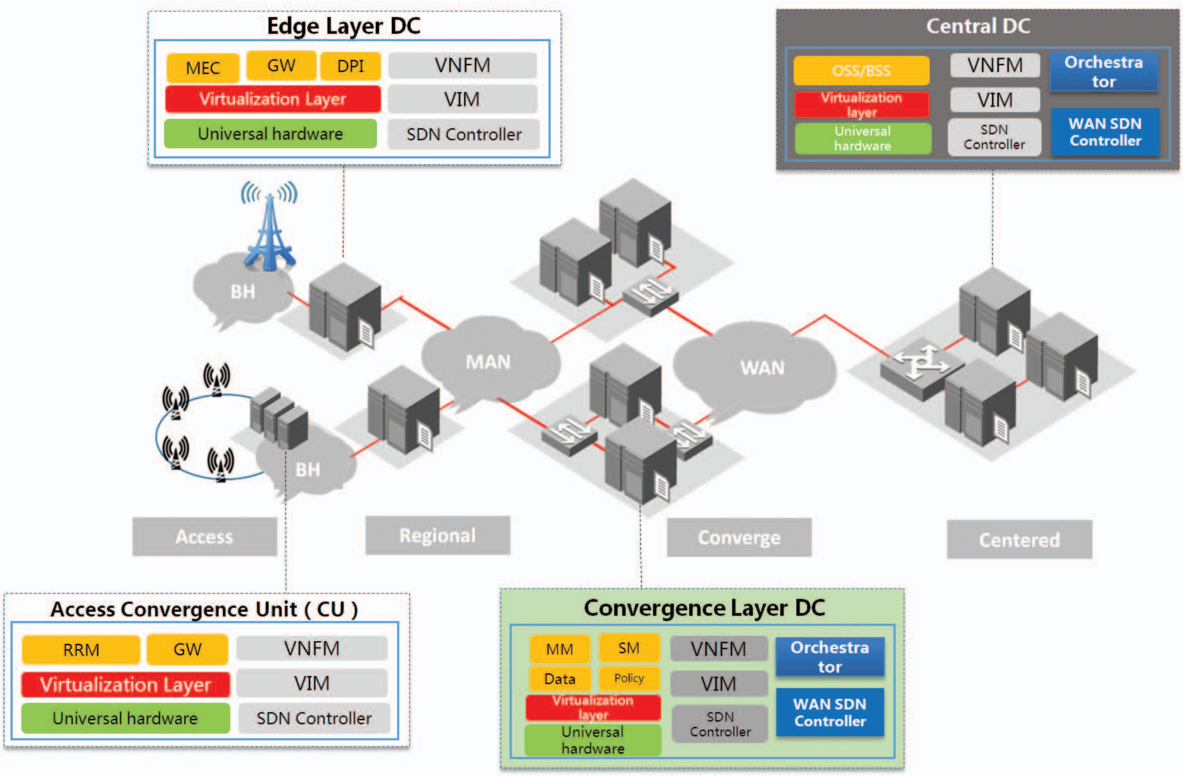
Central level: the main responsibility is for control, management and scheduling. The central level could be deployed in the national nodes and realize whole network monitoring and maintenance.

Convergence level aims to carry the control plane functionalities, such as the mobility management, session management, user data storage and policy which can be deployed at provincial network.

Regional level: the main functions are for data forwarding, and can be deployed at the city level. MEC function, service chain function and part of the control plane network function can also be deployed in this level.

Access level: mainly involves deployment of CU and DU. CU is deployed in access or aggregation domain of backhaul. And DU, as the access point, is deployed close to user terminal. The enhanced low latency transport network between CUs and DUs enables high performance collaboration among multiple unit nodes. Either separated CU and DU or integrated CU and DU in a node can be flexibly supported.

In 5G networking, considering the modular design and high efficient NFV/SDN platform, the networking levels above would not need to be strictly bounded with the geographic location, but, according to operator's networking plan such as service requirement, traffic optimization, user experience and transport cost, 5G networking can achieve integration of the functions across different levels, which may help realize the flexible functions deployment across data center and geographic hierarchy.



Firgure-6 Networking diagram of 5G network

Typical 5G Network Capabilities

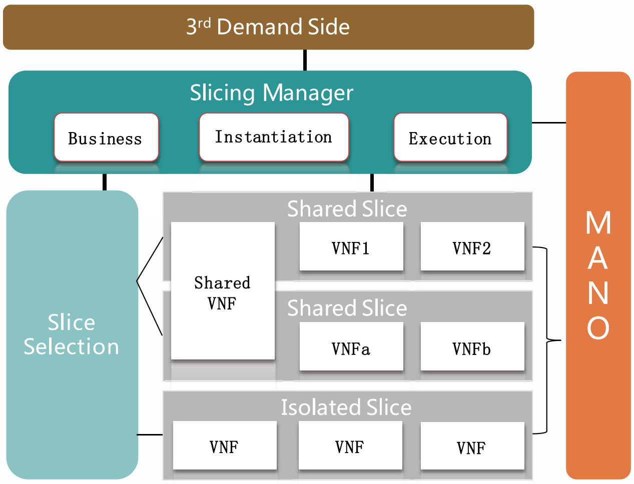
Compared with 4G era, 5G services have specific capabilities such as better fit to user needs, enhanced customization, deeper integration with services and more friendly network function provision. The typical 5G service can be summarized as: network slicing, mobile edge computing, on-demand mobile network, user-centered RAN and network capacities exposure.

Network slicing

Network slice is considered as the key characteristics of NFV application in 5G ear. One network slice will build an end-to-end logical network to provide one or more network services flexibly according to the instructions of slice demand-side. As shown in Figure-7, network slicing architecture mainly includes two parts named as slice management and slice selection.

Slice management function integrates business operation, virtualized resources platform and network management system together for slice demand-side (for example, vertical industry customers, virtual operators and, enterprise customers, etc.) to securely provide isolated and highly self-controlled dedicated logical network. Slice management function can be split into three phases:

Business phase: in this phase, slice demand-side uses the slice template and orchestration tools provided by slice management system to set the parameter of the slice they are commited to, for example, networking topology, function components, interaction protocol, performance index and hardware specifications, etc.



Firgure-7 Network slicing architecture

Instantiation phase: instantiation of a network slice is carried out using interface between slice manager system and NFV MANO. Slice manager also enforces configuration of the specific functions and connectivity test using interface between slice manager and network slices in order to migrate the network slice into execution state.

Execution phase: the slice owners start real-time operation and dynamic maintenance of their network slices. The main function in this pahse includes: resource scaling in/out, slice functions addition/removal and alarm processing and correlation (for analytics) etc.

Slice selection implement the access mapping between user terminals and network slices. Slice selection will offer user terminals with appropriate access policies based on various factors such as subscription and terminal function and so on. A user terminal can access to one or more slices at the same time, which may derive two slice access architecture variants:

- Independent architecture. Network slices are logically completely isolated, and only share physical resources. Each network slice contains the complete control plane and user plane functions.
- Shared architecture. Multiple slices can share certain of network functions. Generally, considering the implement complexity and power consumption of UE, the user granularity control plane functions, such as mobility, could be the preferred shared function. Although in general, the service granularity control and forwarding functions should be the independent function to achieve specific services.

Mobile edge computing

Mobile Edge Computing (MEC) will significantly close the gaps between the exsiting 4G systems and services. MEC will facilitate the key step of mobile network from single pipeline to the integrated information services enabling platform by means of pushing the service platform down to the edge of the network which will offer mobile users with service computing and data caching capabilities locally. As one of the typical 5G network service, the core function of MEC includes (in Figure-8):

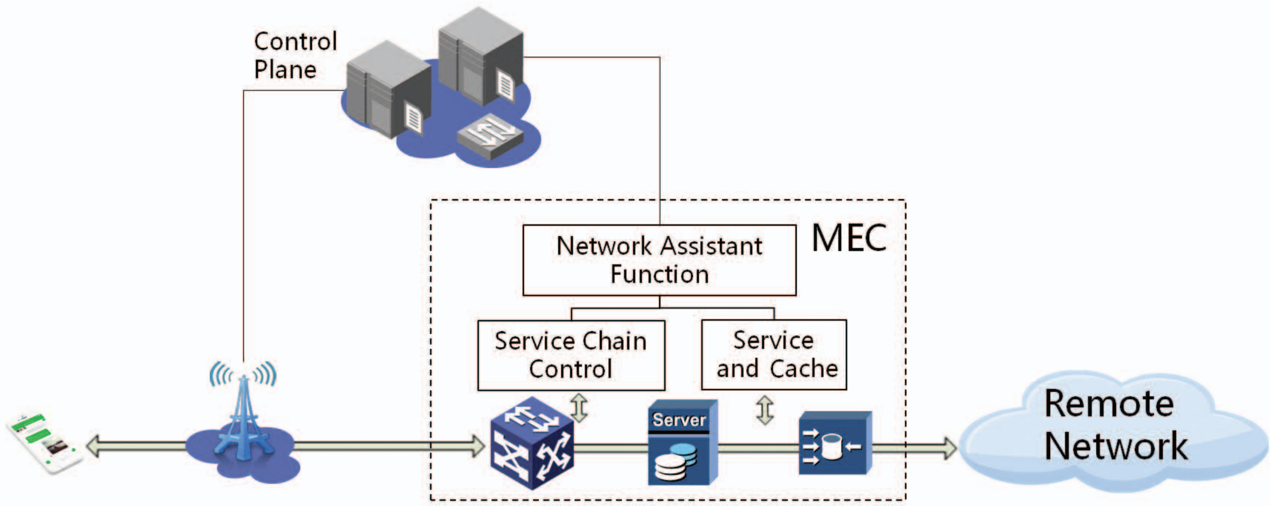
1) Application and content within the pipe. This function enables co-deployment of MEC and gateway functions to build a flexible and distributed service provision system and provide optimal service running environment that is especially suitable for local, low latency and wide bandwidth services, such as mobile office, V2X, 4k-8K video, etc.

2) Dynamic service chaining. MEC function will not be limited to simply sinking-down the cache server only, but also to implement dynamic service chaining by integrating the computing function with forwarding nodes. Under the unified scheduling of centralized control plane, MEC can flexibly set the data forwarding paths among multiple distributed service processing nodes and provide a novel inner-network service convergence model.

3) Network assistance function. Via tightly-

coupled interaction with network control function (for example MM or SM), MEC may optimal its service capabilities further. For example, the applications can be relocated to a more suitable gateway which may support user mobility with the network assistance to dynamically adjust the data path. Service assistance also enables optimization of control for applications based on network contexts and users' profiles.

The deployment of MEC functions can adopt centralized way which is coupled with user plane devices to enhance the gateway functions, or distributed way at different locations and realize service capabilities through centralized coordination.



Firgure-8 Mobile edge computing architecture

On-demand mobile network reconstruction

The service objects of 5G networks are (a) different types of terminals, applications, and session, (b) a variety of mobility rules, and (c) widers spectrum of security requirements. Consequently, it is difficult to manage the network through a single mechanism. The 5G networks must be designed to seamlessly support the requirements of different service scenarios. Hence on-demand reconstruction of the network function is one of the symbolic network services of 5G networks.

● On-demand session management

On demand session management means the 5G network session management could base on the device properties, user type, and service feature to flexibly configure the parameters such as session type, anchor position and service continuity. For example, the always on-line mechanism in 4G would become an optional features in 5G session management.

Users can select the session type according to the service characteristics, for example, choosing to support IP connectivity of Internet service; using the control plane to transfer small data with connectionless state; or customizing Non-IP private session type for specific service.

The network can select anchor location and transmission path according to the transmission requirements. Network could select an anchor in the central network and use tunneling mechanism for the services which require high mobility. For the interactive services, the optimal anchor could be selected for both sides. For the service which has requirement for the higher level of mobility, SDN could be introduced to realize the flexible programming for the user plane.

- On-demand mobility management

On-demand mobility management implies maintenance of session continuity in active state and reachable in idle state. Under the active and idle mode, mobility can be divided into multiple levels. By combining the two modes, and using the service characteristics, the most suitable mobility management model can be offered to the terminals.

The basic requirements for massive IoT sensors and terminals are no mobility, high price-sensitive and energy-efficiency. In response to this demand, network does not detect whether the IoT terminal is accessible when it is in idle state. Only when the terminal wakes up and contacts the network, the UL/DL data would be transferred in order to save power. In the active state, the network could simplify the mechanism for state maintenance and session management, therefore the cost of terminals could be reduced greatly.

In addition, the network can dynamically change the terminal mobility level. For example, for some vertical industry scenarios, the high mobility level could be supported in a particular working areas to ensure service continuity and rapid paging response. When the terminal leaving the area, the network would adjust the mobility level in a lower one for energy efficiency.

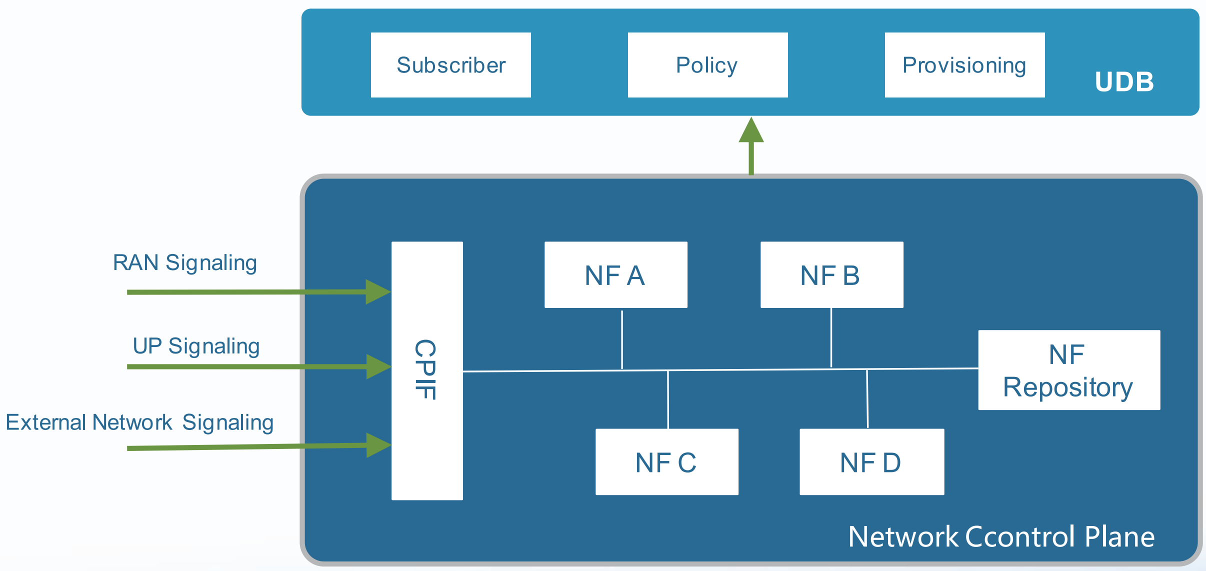
- On-demand security

5G network will provide the different industries with different services, hence the complete security solution should be provided to meet the various security requirements. For example, 5G need to providing high-efficient, uniform and compatible mobility security management mechanism for mobile Internet access; 5G security could provide the IoT network with more flexible and open authentication framework and authentication method and support the capability for new terminal identity management; 5G security can provide security for the network infrastructure. The security isolation by setting trust boundary and protective functions can be supported by the 5G networks for the new network environment such as virtualized networking and multi-tenant/shared network slices.

- Control plane restruction

Control plane restruction allows dynamically setting the network functions via modularizing the network functions and decreasing the complexity of the interaction among the network functions. The network functions can dynamically discover and connect to the required network functions, and these network functions can be provisioned and orchestrated on demand to address the diverse network requirements. The function components shown in Figure-9 may be helpful to achieve the goal.

- Neutral interface: the interface and interaction messages between network functions shall be reusable as possible, and one network function (provider) provides its function and service to other network functions (consumer) via the same interface. Thus the legacy coupled interface between the two specific network functions turns into single neutral interface provided by the network function (provider), and the amount of the interfaces is greatly decreased. The interconnection of network functions utilizes the general communication protocol which is independent with the deployment location of network functions.
- Converged network database: The network data such as subscriber data, network provisioning data and operator's policy is stored in one converged network database. Some context data in the converged network database can be shared among the network functions and be accessed by the network functions via the general interface in order to decrease the interaction message among the network functions.
- Control plane interaction function (CPIF): CPIF receives the messages from the network nodes or the network functions which are outside the control plane, and helps determine the



Firgure-9 Control plane restruction architecture control plane network function which handles this message, then send the message to the corresponding control plane network function. CPIF also transfers the message from control plane network functions to the network nodes or the network functions which are outside control plane.

- Network function repository function: it supports the registration of network function when deploy the network function, the discovery of network function during operation, and monitoring of the network functions during management.

User-centered RAN

5G RAN will change "Base station-Centered" conventional design idea to the new "User Centric" pattern, which, as shown in Figure-10, may include flexible RAN control, context aware service delivery and customized access network.

● Flexible RAN control

The real-time flexible radio processes and simple robust radio link managements are required in order to achieve "User Centric Cell". Therefore, signaling functions and control processes should be redefined as following.

Other than traditional coupled UE-Cell relation, UE management and Cell management can be two independent functions based on the principle of decoupled UE and cell. The context and radio data link of UE managed by UE Management Function is decoupled from cells serving the UE; its serving cells become a type of radio resources – cell domain radio resource, similar to time domain, frequency domain/ code domain and spatial domain resources. The four domains make up four-dimensional radio resource for RAN scheduling. Each time, when RAN is to grant a UE with radio resource, assuming deterministic transmission time (time domain) resource, it will first select cells (cell domain), and then determine frequency domain/code domain/power domain, and antenna selection related spatial domain resources within the cells. Functions of RAN protocol stack can be flexibly controlled or adapted to differentiated link quality requirements and diversified physical layer transmission technologies.

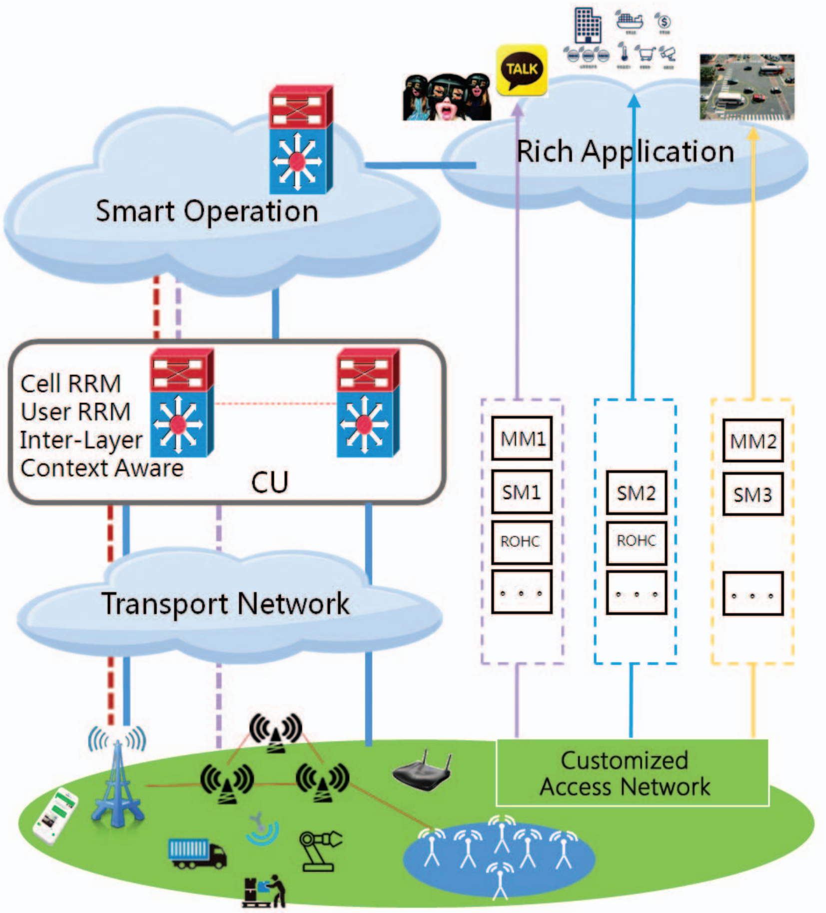
● Context aware service delivery

By introduction of mutual awareness between RAN and application servers, RAN resource allocation and application quality control (e.g. video coding rate adjustment) can be dynamically optimized and matched, simultaneously improving radio channel efficiency and mobile user experience. On the one hand, RAN status information can be exposed to application servers, e.g. per UE available RAN throughput, based on which more accurate bandwidth estimation and therefore more precise quality control can be done by application servers. On the other hand, application related information can be delivered to RAN, e.g. video acceleration request, so that RAN can adjust application priority and resource allocation per service demand. It is noted that, by intelligent perception of services, RAN can also be capable to improve traffic routing efficiency, achieving flexible traffic distribution and smooth traffic steering across data gateways.

- Customized access network

Different from the network with "one-size-fits-all" structure (e.g., rigid protocol stack structure), customized networks can adapt network configuration and differentiate data processing according to diverse service requirements in 5G, which will bring significant benefits such as improving the network performance and supporting effective rapid deployment of new services, more effectively.

The use of SDP technique enables processing of diverse services in a single RAN, in which customized protocol functions are provided for service flows with diverse requirements. By adopting SDP, when a service flow arrives, RAN will identify (via service awareness and identification) the requirements and provide customized protocol function set for the flow. For example, services with requirements of ultra-low latency and high mobility (e.g., the self-driving car scenario), the protocol function set could contain



Firgure-10 User-centered RAN

the mobility management and bearer management, whereas some other protocol functions (e.g., ROHC) can be excluded to allow low latency. On the other hand, for services with requirement of massive connection, the mobility management can be turned off.

Network capacities exposure

A major issue facing the next-generation network research are (a) optimization of user experience, and (b) supporting the emerging business models seamlessly. One of the capabilities of 5G network framework is to expose network capacity to third-party users for applications and services. This will enable applications to take full advantage of network capabilities, and achieve a better user experience and application innovation. It will also helps optimize network resources configuration and traffic management. The following are the main characteristics of this feature (in Figure-11):

Using the principle of separation of control and forwarding functions, open framework based 5G networks can support centralized control plane offering a unified exposure of control functions.

At present in EPC, independent control functions are distributed on different network elements. In order to achieve the diverse requirements of the capability exposure, capability exposure layer should be able to manage various interfaces to acquire network capabilities between its own and third-party network elements. Hence, this feature introduces additional complexity in architecture for capability exposure. 5G network control functions are centralized, and it also simplifies interface between open platform and third-party applications.

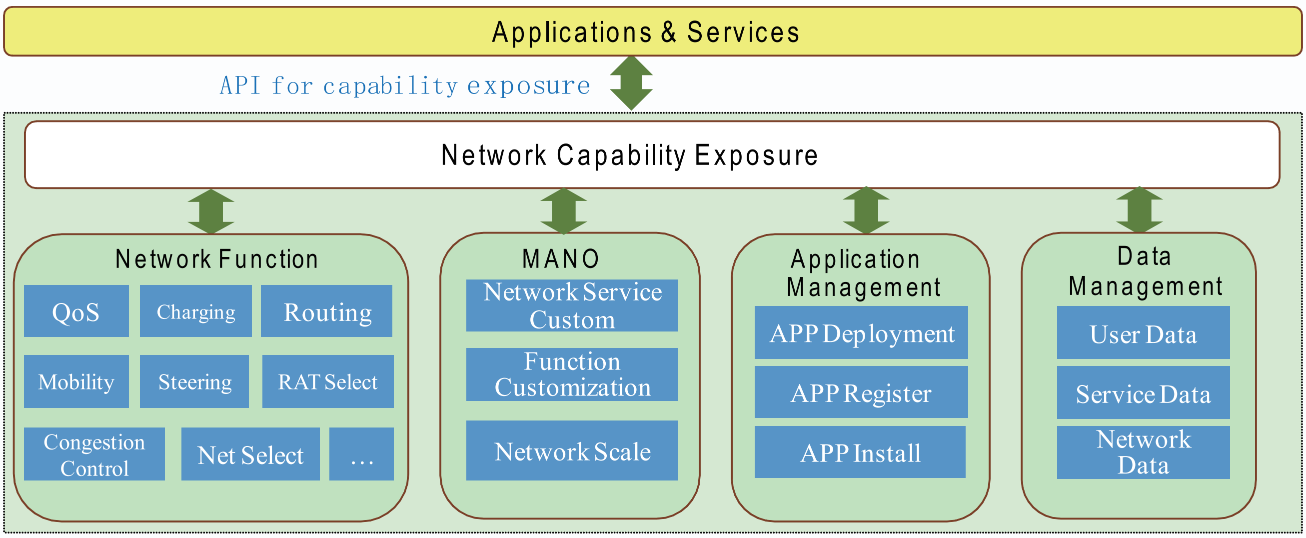
Using infrastructure based on virtualization platforms, the capability exposure function of 5G networks help optimize infrastructure resources management.

The use of rigid existing network hardware and deployment in advance cannot meet the requirements of functions, resources from different vertical industries. The Exposure platforms interacting with MANO can achieve exposure of virtualization features. Invoking the NFVO/VNFM function, can help operator expose network planning, deployment, update and scale capacity to dynamically support customized network services according to 3rd business needs. Calling VNFM function achieves network element function management. Calling VIM function to schedule CPU/memory/network resources of network can help achieve virtualization of network of resources and scheduling of hardware resources in a unified fashion.

Using network computing platform at the edge of the network, 5G networks exposure platform enables seamless execution of 3rd business applications inside the operator network.

5G network operations need to change the current status of separated operation of network and service functions. On the one hand, besides to be transmit pipes, the network hopes to provide more value-added services. On the other hand, applications can also take advantage of networking capabilities to further enhance the user experience. Based on the exposure of business operation capacity, 5G network guides 3rd business deployed inside operator's network close to user location. This helps 3rd businesses achieve both high performance (e.g., delay limit guarantee) and high reliability. In addition, it reduces the threshold of service deployment, and can be more convenient for tracking network real time information (e.g., user location and network load), which helps to upgrade user experience.

Finally, 5G networks produce large volume of record data in real-time related to user behaviors, business operations, and network operations, which are major sources for big data analytics. Exposure platform interacting with the data analysis center produces more detailed analysis and offer greater value to all concerned parties.



Firgure-11 Network capabilities exposure framework

Standardization Suggestion

5G network architecture standardization work is related with 3GPP SA2, RAN2 and RAN3.

Currently, 3GPP SA2 has established a study item called NextGen (TR 23.799), which is responsible for the Rel-14 phase of 5G network architecture standardization. Overall 5G network architecture standardization work will be completed by Rel-14/15/16 versions.

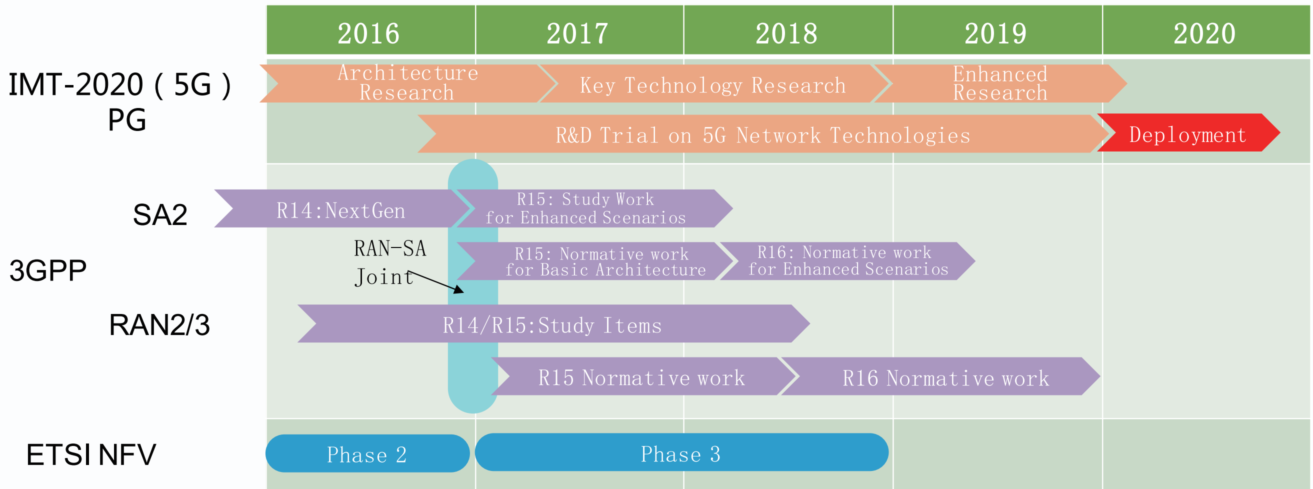
IMT-2020 recommendations for 5G network architecture of 3GPP SA2 are as follows:

- In Rel-14, studys should focus on the 5G new architecture features and in priority consider such network functions as network slicing, MEC, network function reconstruction, network capability exposure, new interface and protocol, and control and user plane separation, etc.
- In Rel-15, normative work should complete including basic architecture and prior key issues. The study work for enhanced scenarios such as enhanced policy control, critical communications and UE relay can be kicked off.
- In Rel-16, normative work for enhanced architecture should be completed.

Meanwhile, IMT-2020 recommendations for 5G NR RAN standardization are as follows:

- Rel-14 covers study on NR key issues.
- Phase I WI should focus on standardization points of basic NR RAN existence, including LTE-NR tight integration, NR function and protocol design, RAN-CN interface and process, context aware service delivery, etc.
- Phase II WI should further study following key points to enhance RAN capabilities and efficiency: customized RAN, RAN function virtualization and network slicing, self-organized RAN and related technologies to enhance eMBB services and to enable mMTC and URLLC services.

In addition to the network architecture standardization work above, the 5G network architecture involved in security management, charging management, network virtualization, network slicing management, will also be promoted in the relevant standardization organizations synchronously. In particular, in order to ensure that the 5G network could be deployed in NFV platform, ETSI NFV ISG needs to consider the 5G network standardization process, and provide a commercial-ready NFV-based telecom network platform.



Firgure-12 5G network standardization timeline

Conclusions

To meet the challenges from the 5G extreme requirements of experience, efficiency and performance, hold the new develop opportunities of information industry in next decade, and fulfill the strategic transition into the integrated information service enabling platform, 5G network services need to be integrated with services tighter and enhanced customization capabilities further.

The 5G architecture design can be expanded into two layers: system design for logic function and networking design for deployment. Based on this principle, 5G architecture finally can be present as reasonable planes partition, on-demand function composition, elastic resources management and flexible networking deployment. The typical 5G services can be summarized as: network slicing, mobile edge computing, on-demand mobile network reconstruction, user-centered RAN and network capacities exposure.

Along with the 5G research and standardization wrok 5G getting further and more detailed, IMT-2020 (5G) promotion Group is willing to strengthen cooperation with global organizations, enterprises, universities and research institutes to jointly shape the consensus on the solution of 5G network architecture and technologies and promote the globally unified 5G network standardization and industrialization.

Main Contributors

Contacts
Tel：+86-10-62300182
Email：imt2020@catr.cn

COPYRIGHT © 2016 IMT-2020 (5G) PROMOTION GROUP.
ALL RIGHTS RESERVED.