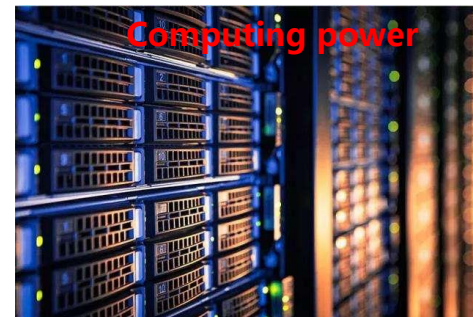
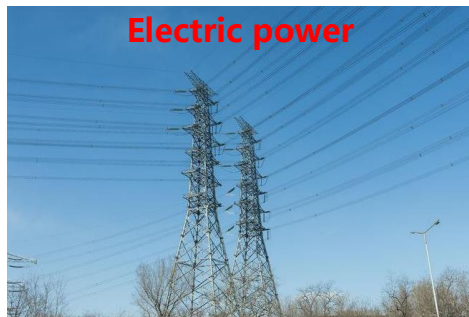
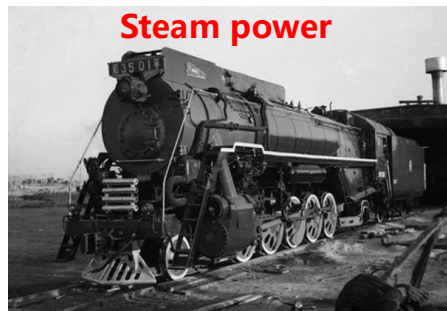


Computing Power Network for MEC

Yunpeng Xie
China Telecom
2019.10.15

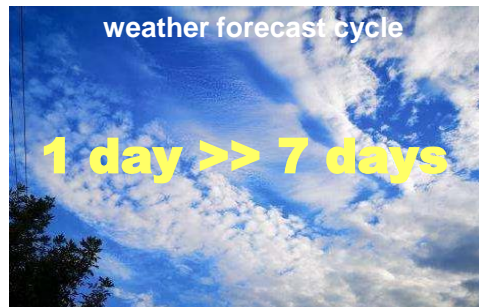
Computing **changes** the world, computing **drives** the future



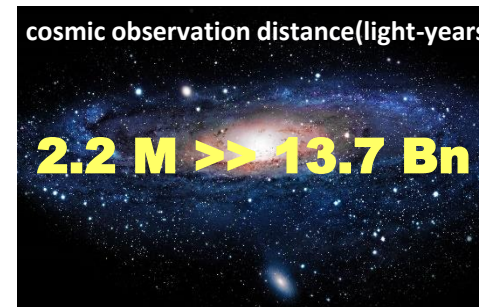
Computing is a pivotal driver of the intelligent world



Micro world



Daily life



Macro world

MEC will be the **focus** in future network

MEC solves the problem of long delay and bandwidth consumption caused by centralized cloud computing and provides **high bandwidth, low latency, and strong security** for vertical industries.

MEC is considered as a combine point of 5G, industrial internet and IOT, which will grow rapidly , the global edge network economy will exceed **4.1 trillion dollars by 2030**.

Car networking



Life Entertainment

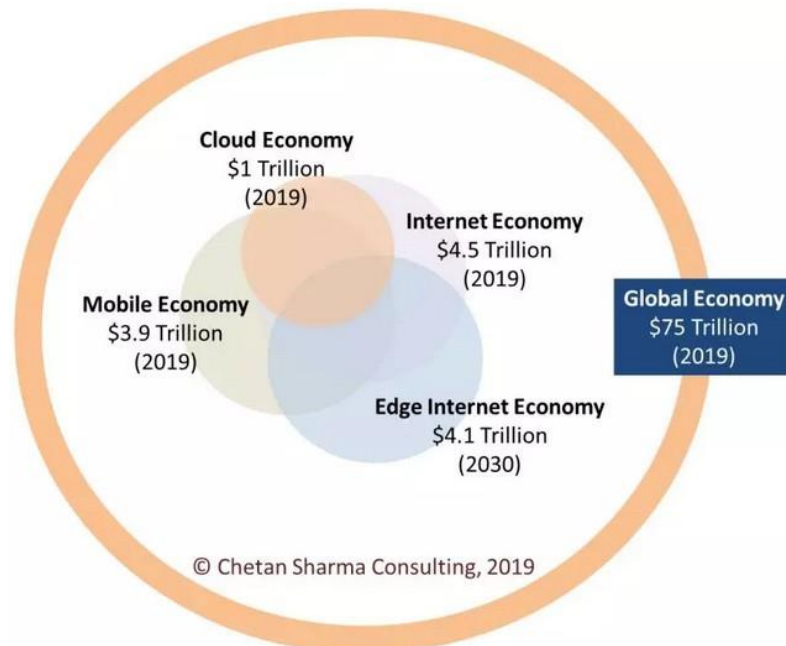


MEC

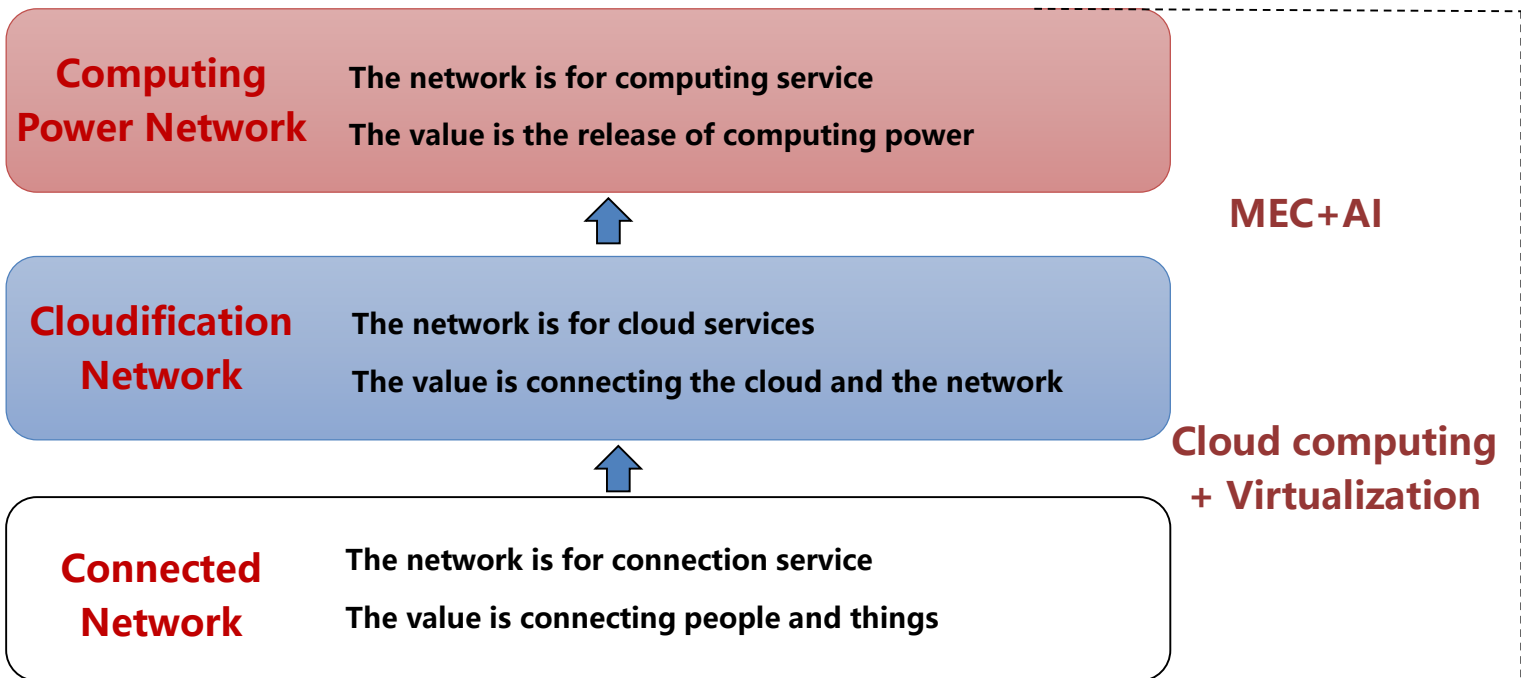
Industrial internet



Smart city

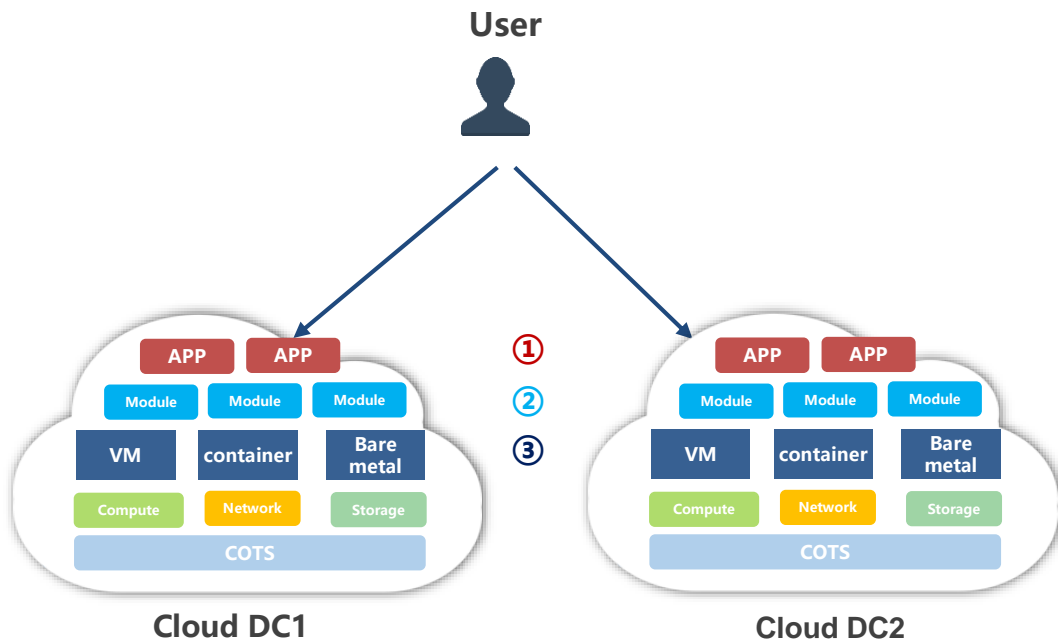


MEC+AI promote Computing Power Network



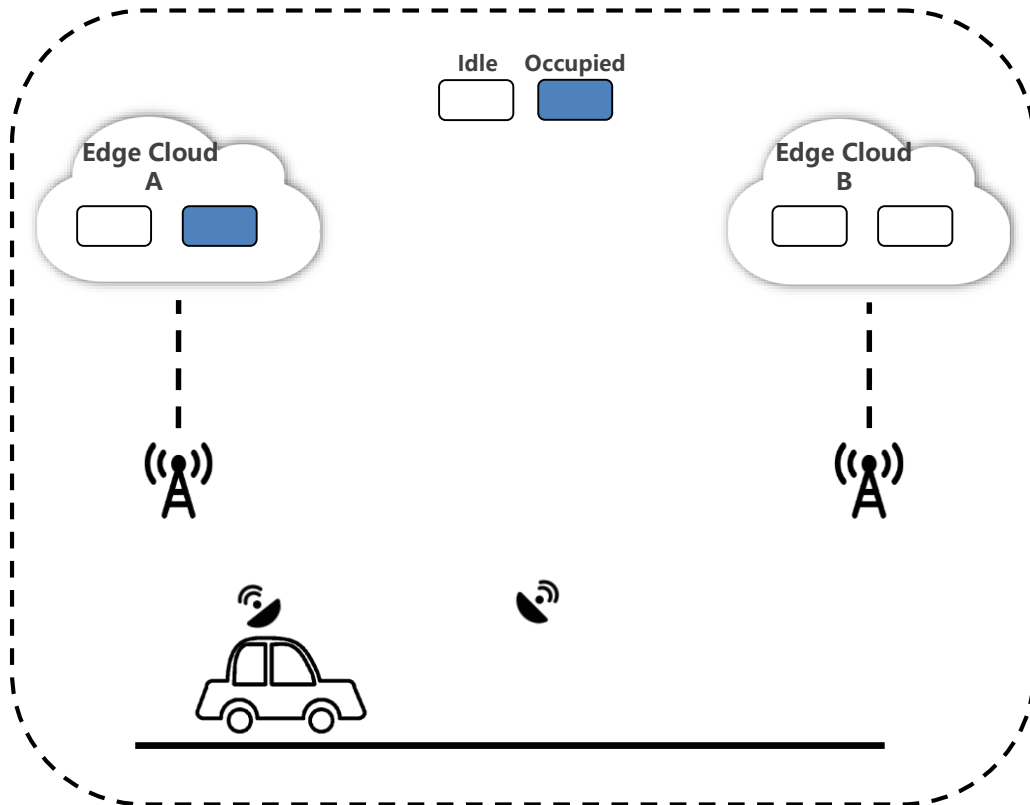
What is Computing power ?

➤ The Computing power refers to the ability to provide services for the calculate tasks of users.



- ① **Application is computing power** : Users directly call applications in cloud DC, such as VR rendering
- ② **Algorithm/module is computing power** : Users call some algorithms or modules in cloud DC to serve their own business
- ③ **Basic resources is computing power** : Users only need the basic vm resources provided by cloud DC

The Computing Scheduling **Problem** Faced by MEC

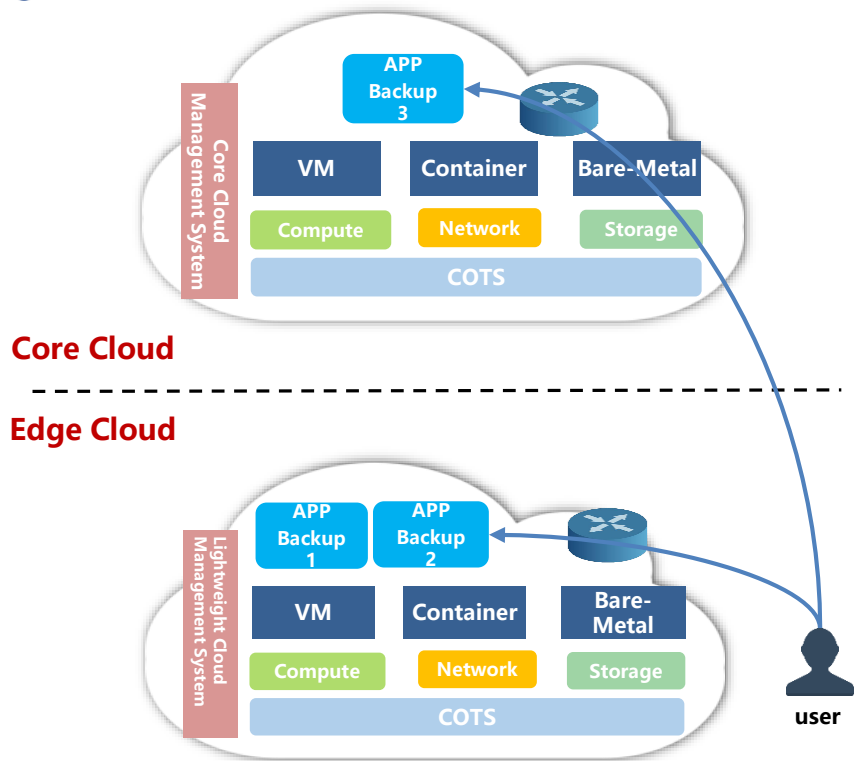


Edge Application Characteristics:

- **High Mobility:** The applications location often changes. **Flexible adjustments to user access point are required.**
- **High time variability:** The application traffic changes significantly with time. **Flexible adjustments to computing resource are required.**
- **Requirement enhancement:** The application has obviously requirement enhancement for low latency and high bandwidth. **User SLA guarantee is required.**

The characteristics of edge application put forward more requirements for flexible computing scheduling crossing-edge cloud. Thus a corresponding solution is needed to be provided by carriers.

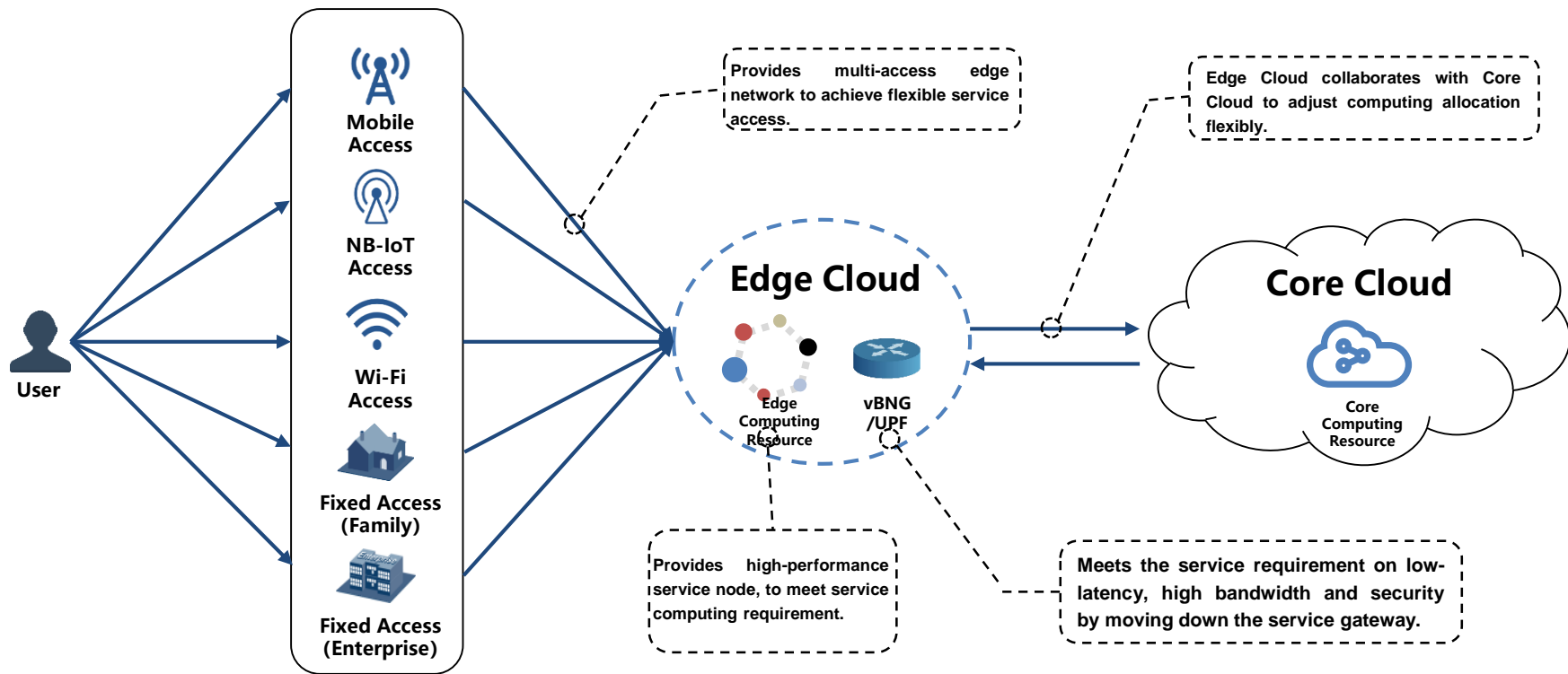
AS-IS: The Computing Scheduling in Cloud Computing



➤ Solution description

- **Elastic capacity expansion and contraction:** In a resource pool, an elastic capacity expansion and contraction strategy is made according to VM's load.
- **Defect:** It is a computing adjustment within one resource pool, and it lacks computing scheduling and service coordination between resource pools.
- **Load-balancing :** In one or more resource pool(s), it creates multi-app backups and makes load-balancing policy to adjust the service computing allocation among multi pools.
- **Defect:** It lacks network cooperation. The best service processing node can not be determined without user access information. Hence, it is difficult to meet the low latency requirement.

TO-BE: Computing Power Network



Build a computing scheduling solution based on cloud, network and edge deeply collaboration.

Key Capability of Computing Power Network



- **Computing Resource Modeling:** It needs to abstract the computing resource, constructs resource model with computing resource, network resource, storage resource and even algorithm resource, then provides them as product to users.



- **Computing Control and Management:** It needs to control the computing resources of core cloud and edge cloud centralized, allocates computing resources to services from a global perspective, to achieve computing resource control and management.



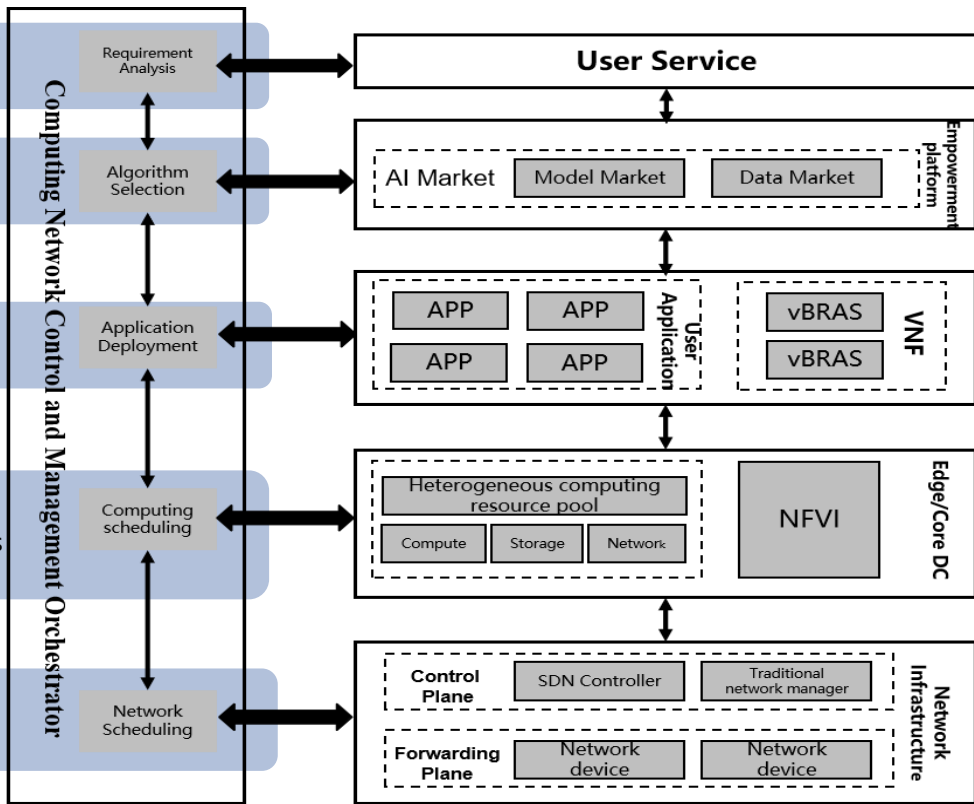
- **Computing Power Scheduling:** It needs to have the capabilities to allocate and schedule computing resources flexibly and elastically, thus quickly responding to and adjusting to the computing requirement.



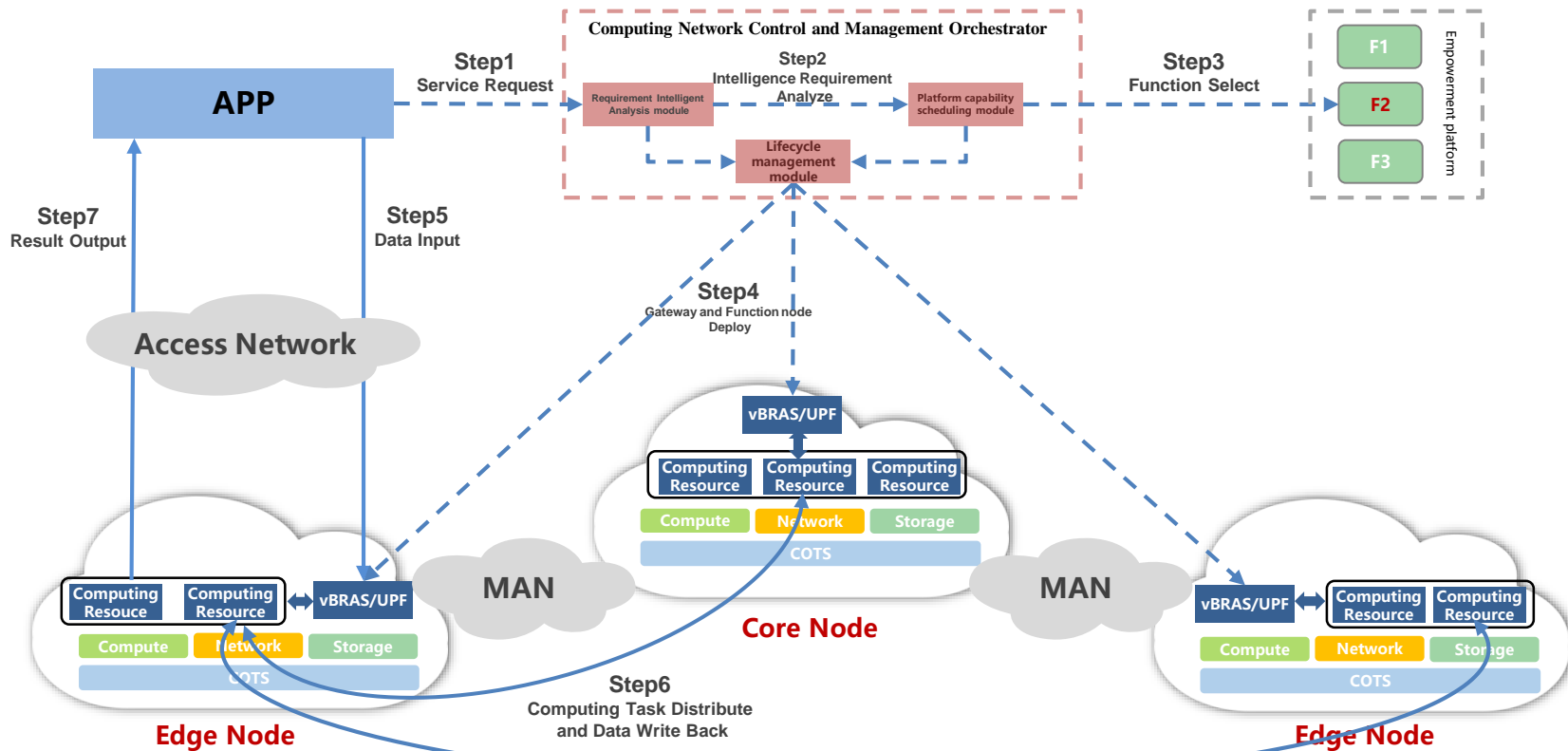
- **Service Guarantee:** It needs to have the capabilities to predict the change of service computing requirement, and adjust the computing resource, guarantee the user SLA in the case of service requirement changing.

Architecture of Computing Power Network

- **analyzes** user service requirement, **turn into** computing resource requirement, **determine deployment location and resources** based on requirement
- **selects AI service for user service** in AI Empowerment Platform, to determine the deployment specification of user service
- **deploys the service** which in AI Empowerment Platform on the specified node
- **manages** the computing resources, **allocates** corresponding computing, storage and network resources, and **adjusts** flexibly the service deployment location and service computing resources on the basis of policy
- **manages** the networks of users, edge cloud and core cloud, **deploy service gateway in the same location with user service**, to route service traffic to the processing node



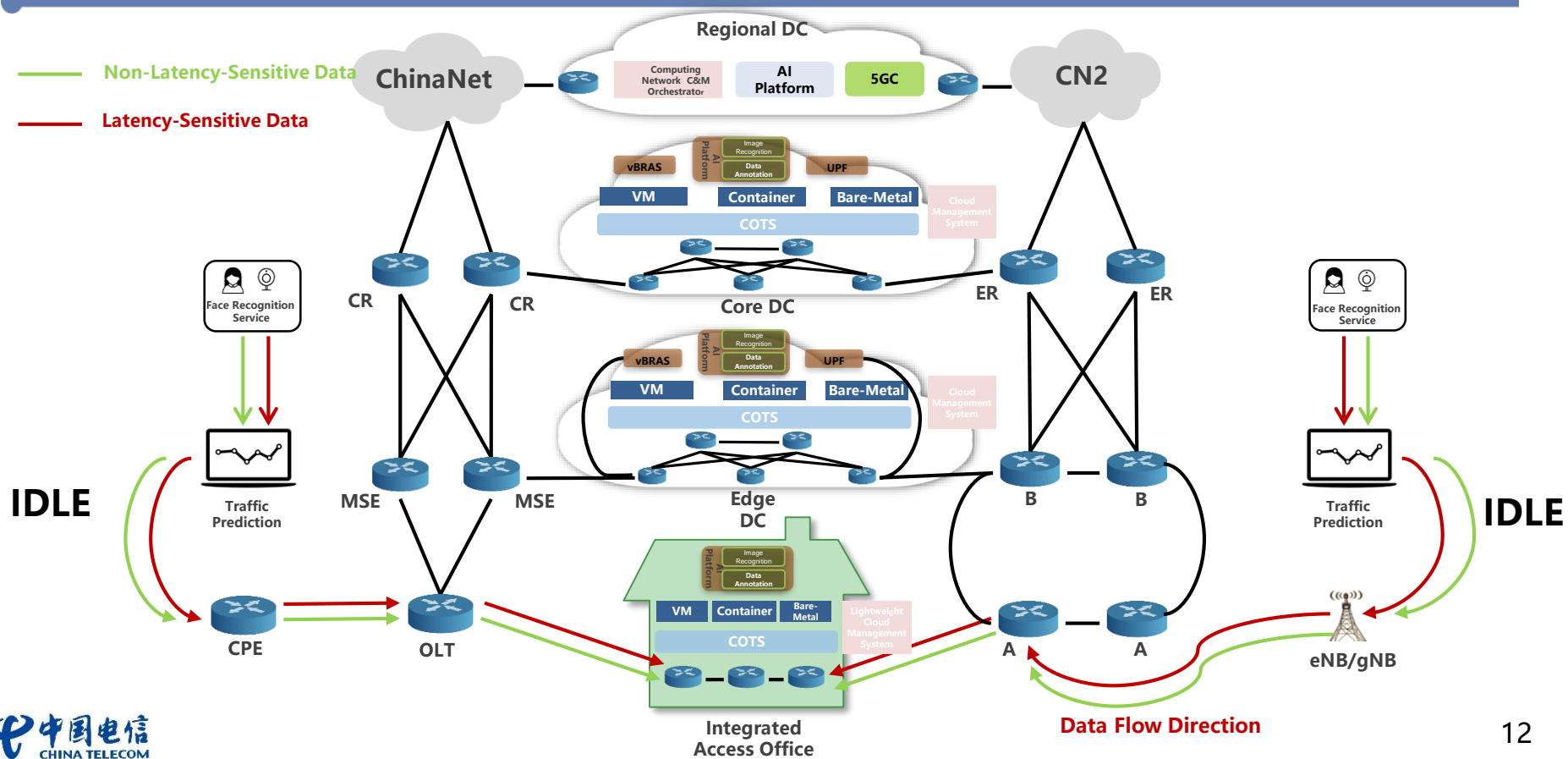
Process Flow of Computing Power Network



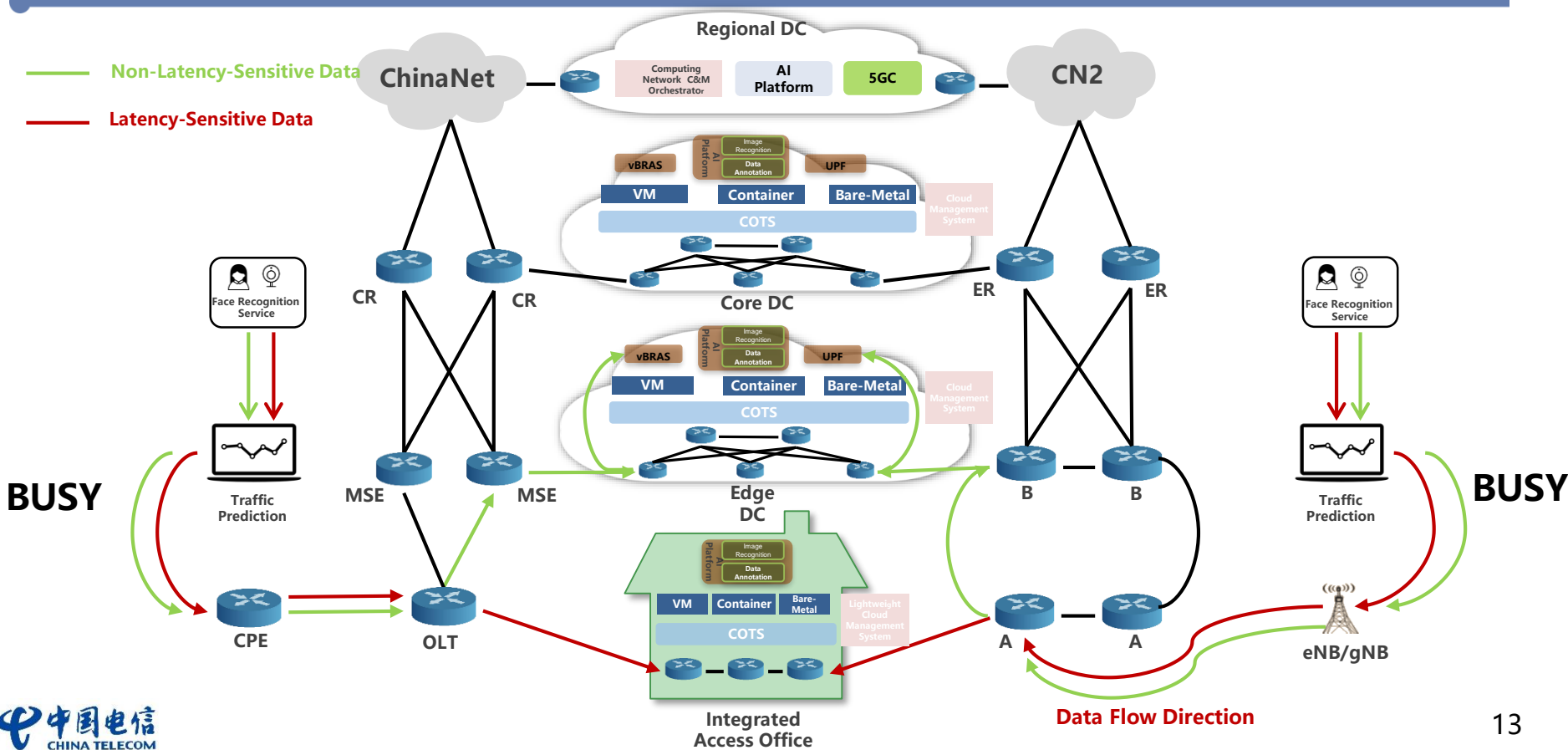
e.g.- Flexible Computing Power Scheduling

— Non-Latency-Sensitive Data

— Latency-Sensitive Data



e.g. - Flexible Computing Power Scheduling



THANKS