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Network Slicing

Building Next Generation Networks

GCF 5G Workshop for MENA
November 2018

The Future Network: “One slice doesn’t fit all”

Everyone Connected

Everything Connected

Different QoS, SLA, Security, Scale,...

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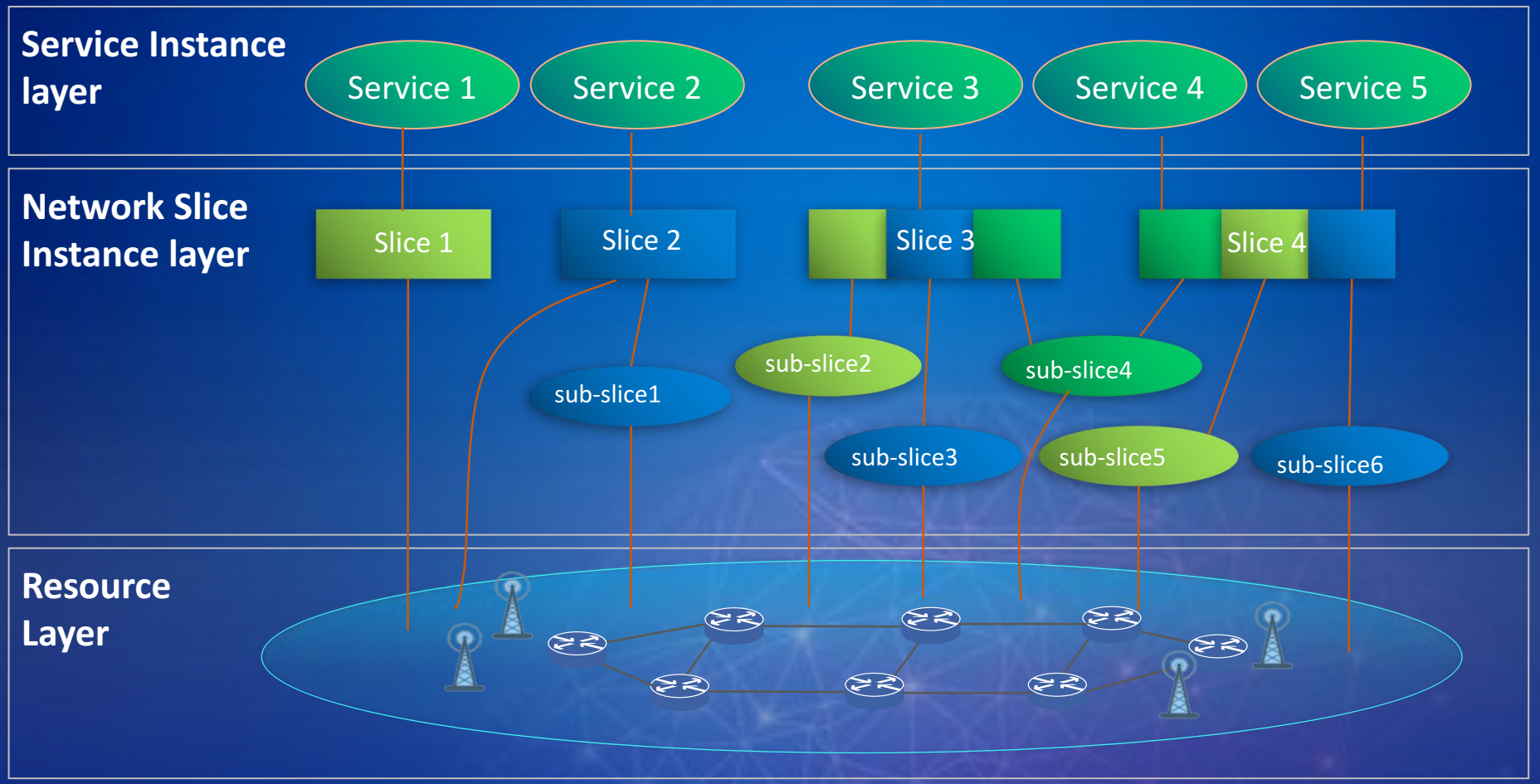
3GPP defines Network Slicing in a general way

A logical network that provides specific network capabilities and network characteristics.



- One slice provides one or more services
- One slice is composed by one or multiple sub-slices which can be CN, RAN or BN
- Two slices can share one or multiple sub-slices

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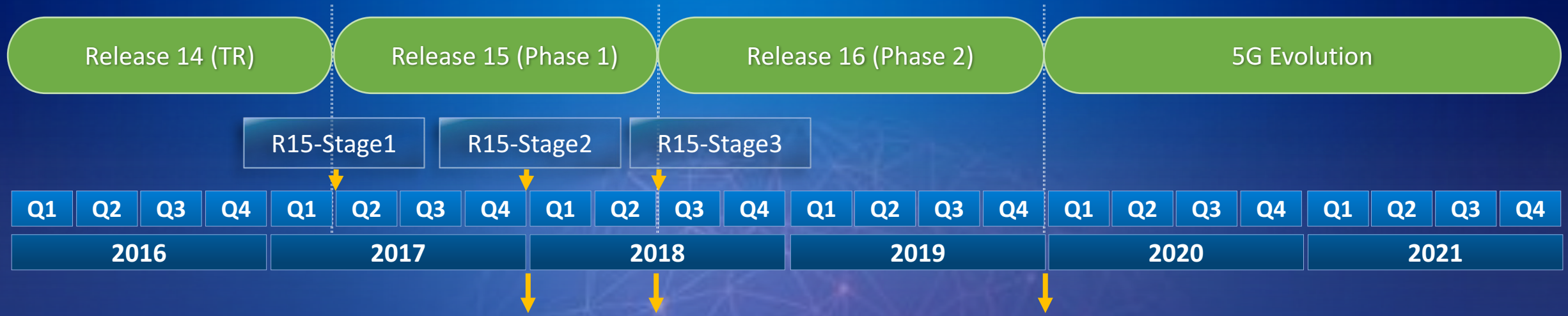
Multiple SDOs collaborate to standardize Network Slicing

General architecture and original requirements

E2E bearer network including OTN and FlexE

Overall slicing standards, focusing on RAN/CN aspects

Mgmt. and orchestration of slice resources, LCM of virtualized NEs/NSs



ZTE provides an E2E Network Slicing Solution

E2E Slice Orchestration and management
ZTE CloudStudio (NCO, NFVO, VNFM)

Design | Deployment | Monitoring | Security

ZTE 5G Radio
IT BBU, SDR+, Cloud Radio

AAU | DU/CU

MEC | vCDN | CU | vCN-U
Access Points

MEC | vCDN | CU | vCN-U
Edge DC

ZTE CommonCore
Converged, Cloud Native, SBA

vCN-U | vCN-C
Core DC

eMBB
mMTC
uRLLC

Normal forwarding
High-speed forwarding

eMBB
mMTC
uRLLC

ZTE BN Solutions
FlexE, IP+Optical, SDN

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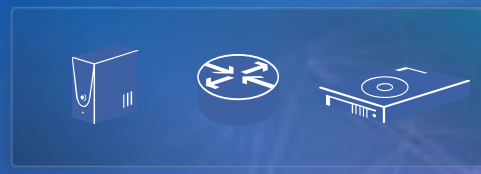
From NFV to Cloud Native – 5G Common Core SBA

HW & SW decoupled

NF decoupled

VNF VNF VNF

Virtualization



SBA(Service based architecture)

App components: VNFC VNFC VNFC

Standard API

Common components: VNFC VNFC VNFC

Standard API

Data components: VNFC VNFC VNFC

VM Container BM

Multi-tiered DCs，heterogeneous resource pool

- Dedicated HW
- Rigid and closed

- NF virtualized
- Cloudified and elastic

- Microservices-based, stateless, and customized on-demand
- Flexible deployment across DCs

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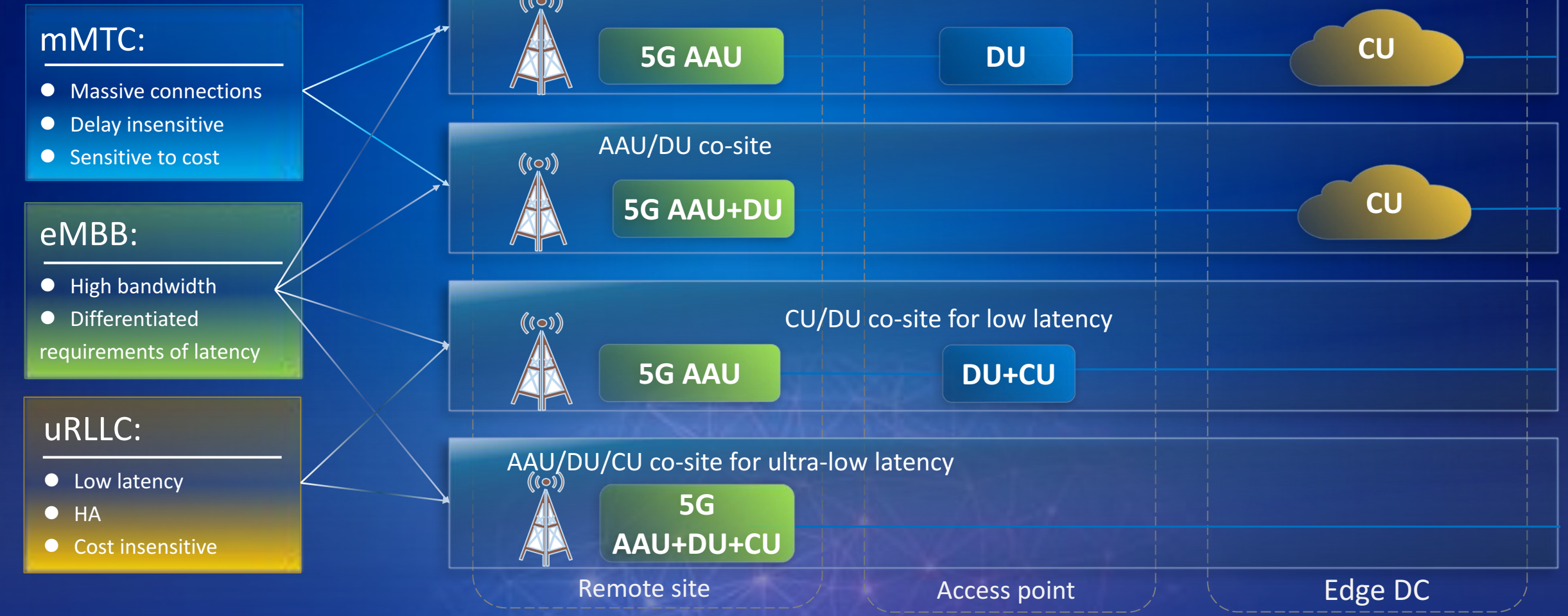
From SDR to Cloud Radio – Cloud RAN and CUPS



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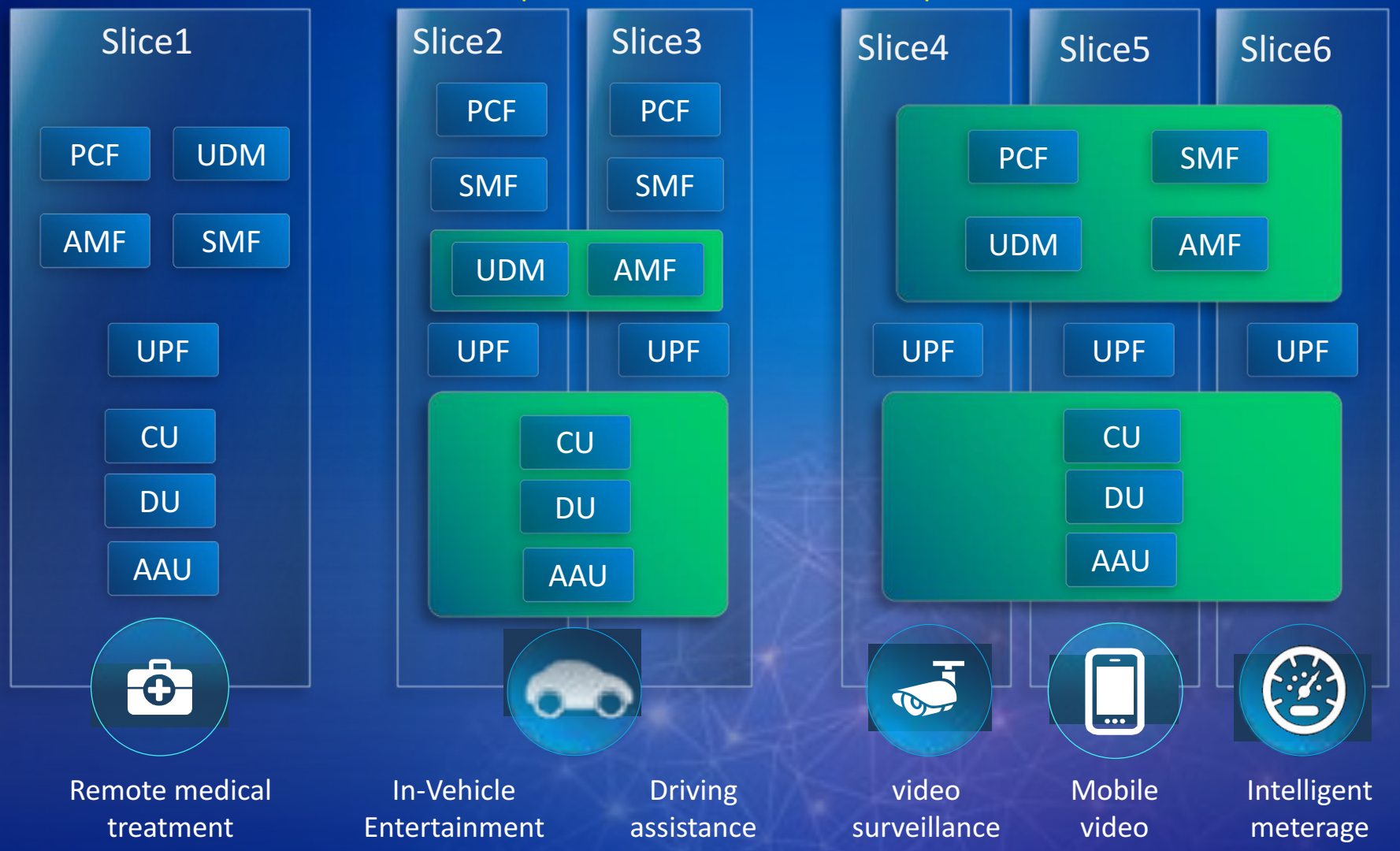
Flexible resource sharing enables diverse scenarios



Sharing mode

Mode I
High requirement of isolation and cost insensitive;
For remote medical treatment or industrial automation

Mode II
Medium requirement of isolation and the terminal accesses to multi-NSs simultaneously;
For driving assistance or in-vehicle entertainment

Mode III
Low requirement of isolation and cost sensitive;
For video surveillance, mobile video or intelligent meterage.

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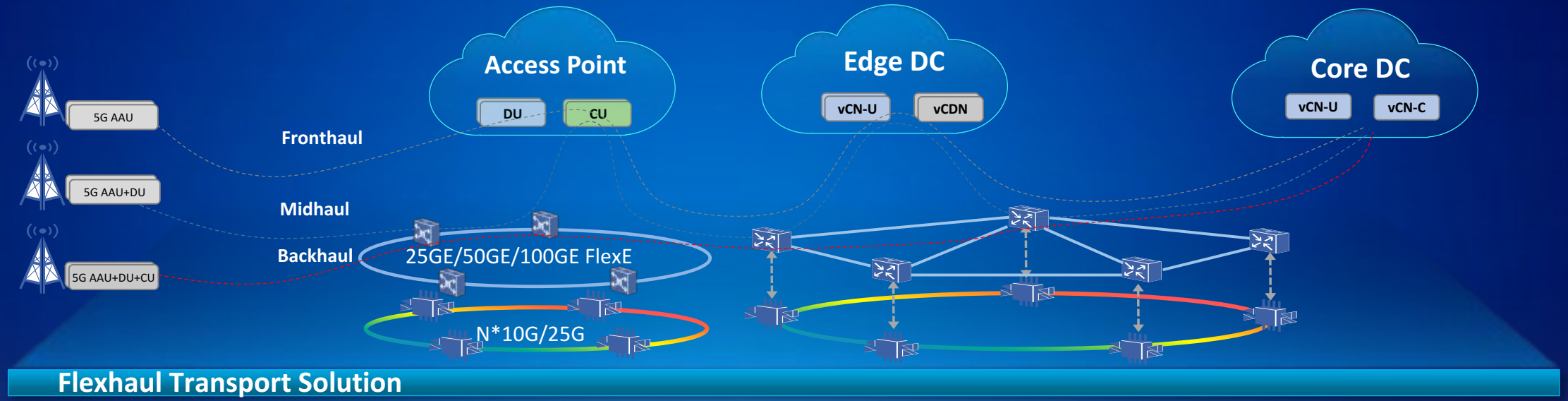
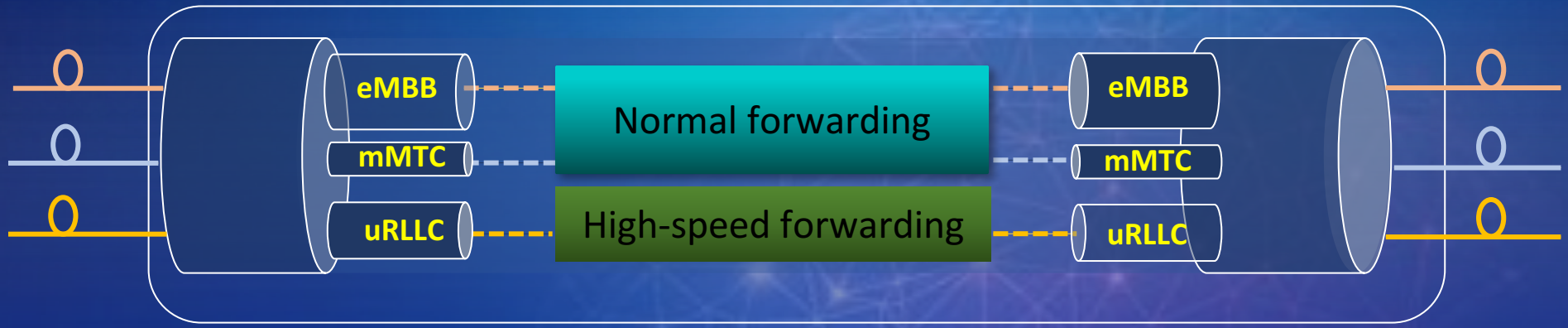
A unified elastic bearer network to support flexible CN/RAN slicing





- Ultra-high bandwidth
- Ultra-low latency
- Slicing on-demand
- Elastic scale-in/scale-out

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Elastic Networks built with SDN based forwarding plane and resource scheduling

GSO

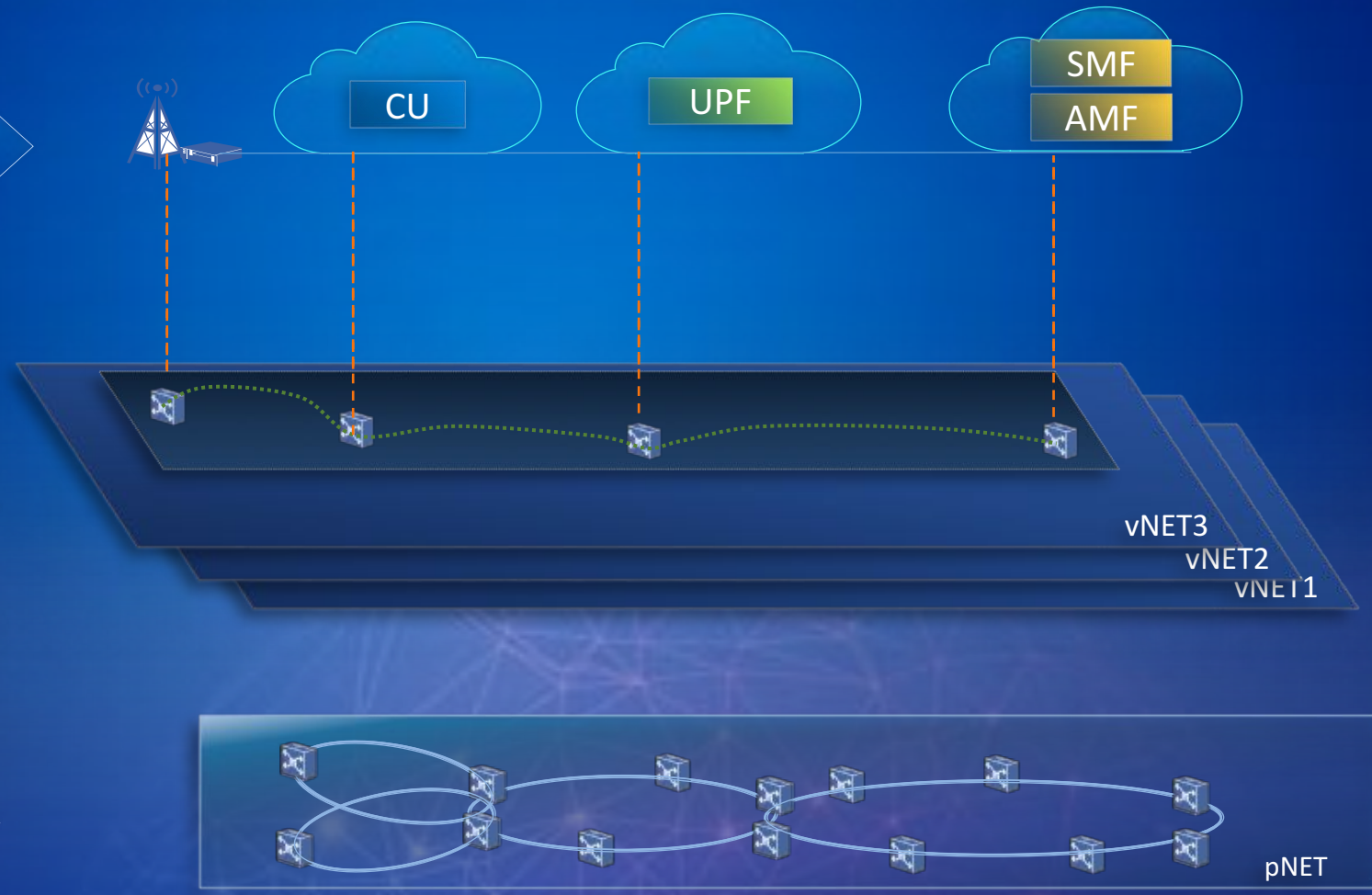
SDNO

NFVO

The hierarchical SDN controllers

vNet Controller

pNet Controller



Service-oriented 'soft-slice' supports E2E networking

'hard-slice' with differentiated SLA guarantees service isolation

Physical NE supports VR/LR, enabling resource slicing and isolation

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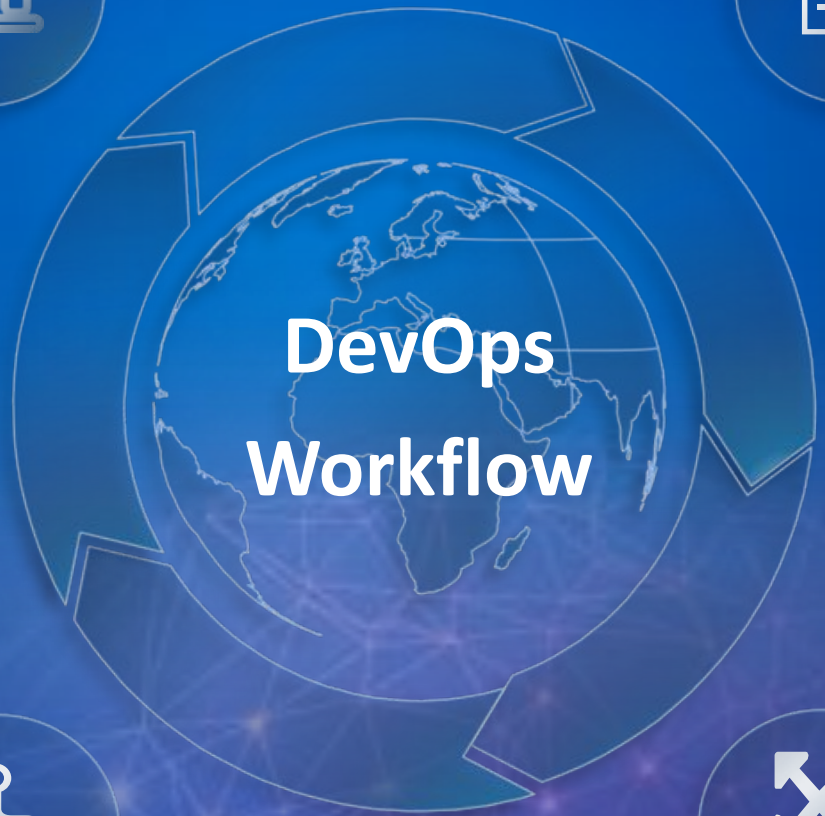
Putting it all together: DevOps based Slice Management



Slice Operation

B2C and B2B2C slice operational model

SLA Model Definition

E2E SLA model definition and splitting

Slice Assurance

Slice self-healing and self-optimization

Slice Design

Slice design, pre-deployment and testing

Slice Isolation

Slice resource isolation and management isolation

Slice Deployment

Creating and Changing of slices and sub-slices

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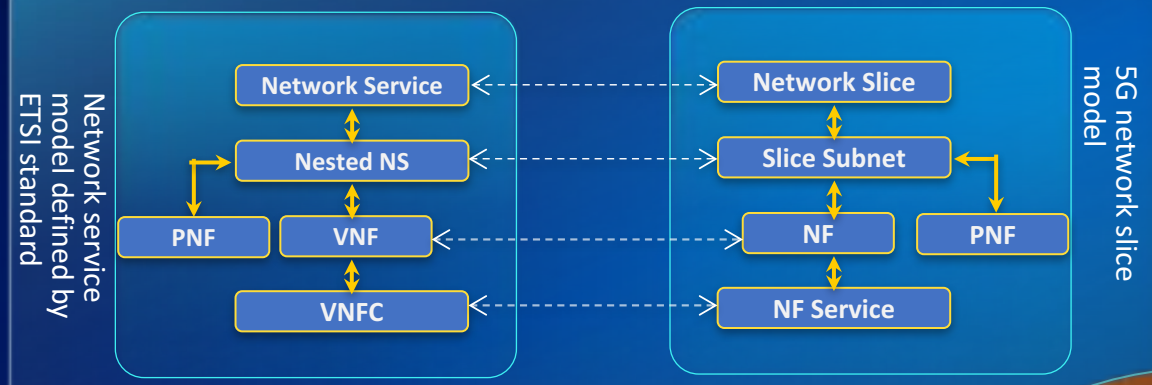
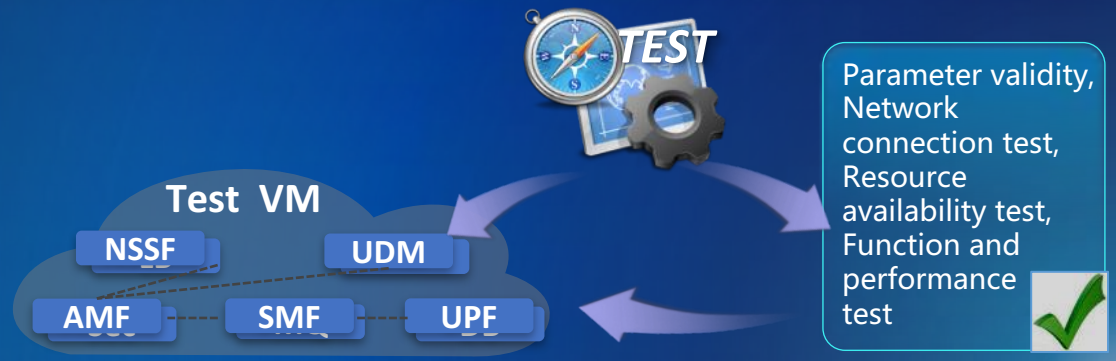
Slice Design: Model-based, visual, automated

Unified design center, unified information model for the whole network, allowing network-wise interconnection



Built-in automatic testing tool, loading testing use cases, enabling automatic testing



Closed-loop Design

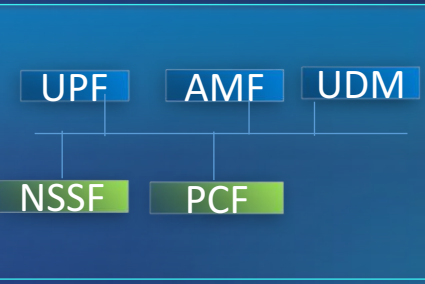
Multiple design capabilities
- Network slice design
- Service process design
- Unified policy design

Rich certified components

A library of certified components for network, drag-and-drop editing, WYSIWYG

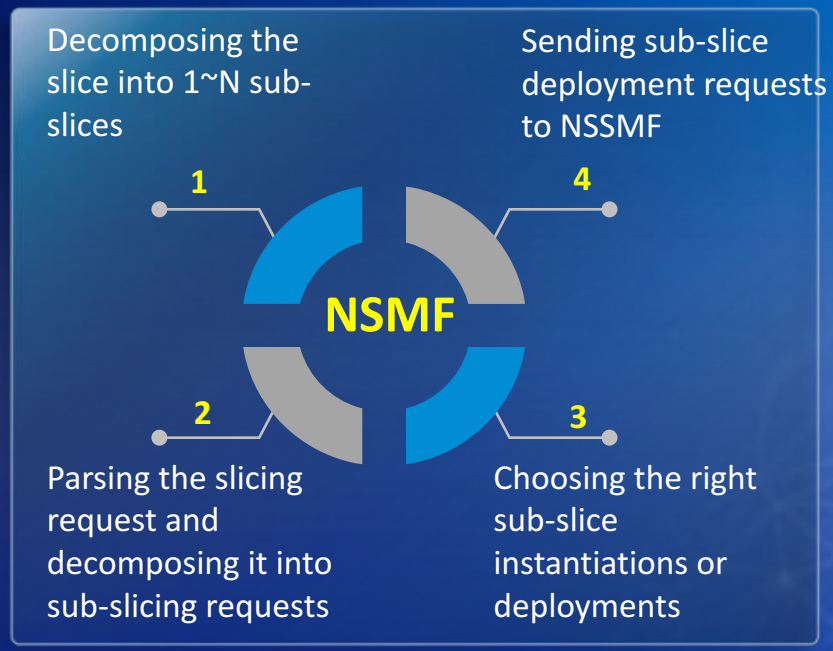
Automatic Config.

Slice template



Simulating actual environmental parameters and conducting pre-deployment in cloud testing environment

Multi-Layer orchestration for automatic slice deployment



NSSMF

- Translating the sub-slice deployment request into network service requests
- Sending service instantiation requests to NFVO
- Initiating network service configuration requests
- Reporting NSMF the deployment result

Automatic Deployment

- The multi-layer orchestration realizes automatic provisioning of services and slices
- Support the deployment of cross-domain & cross-DC slice
- Support whole process model-driven

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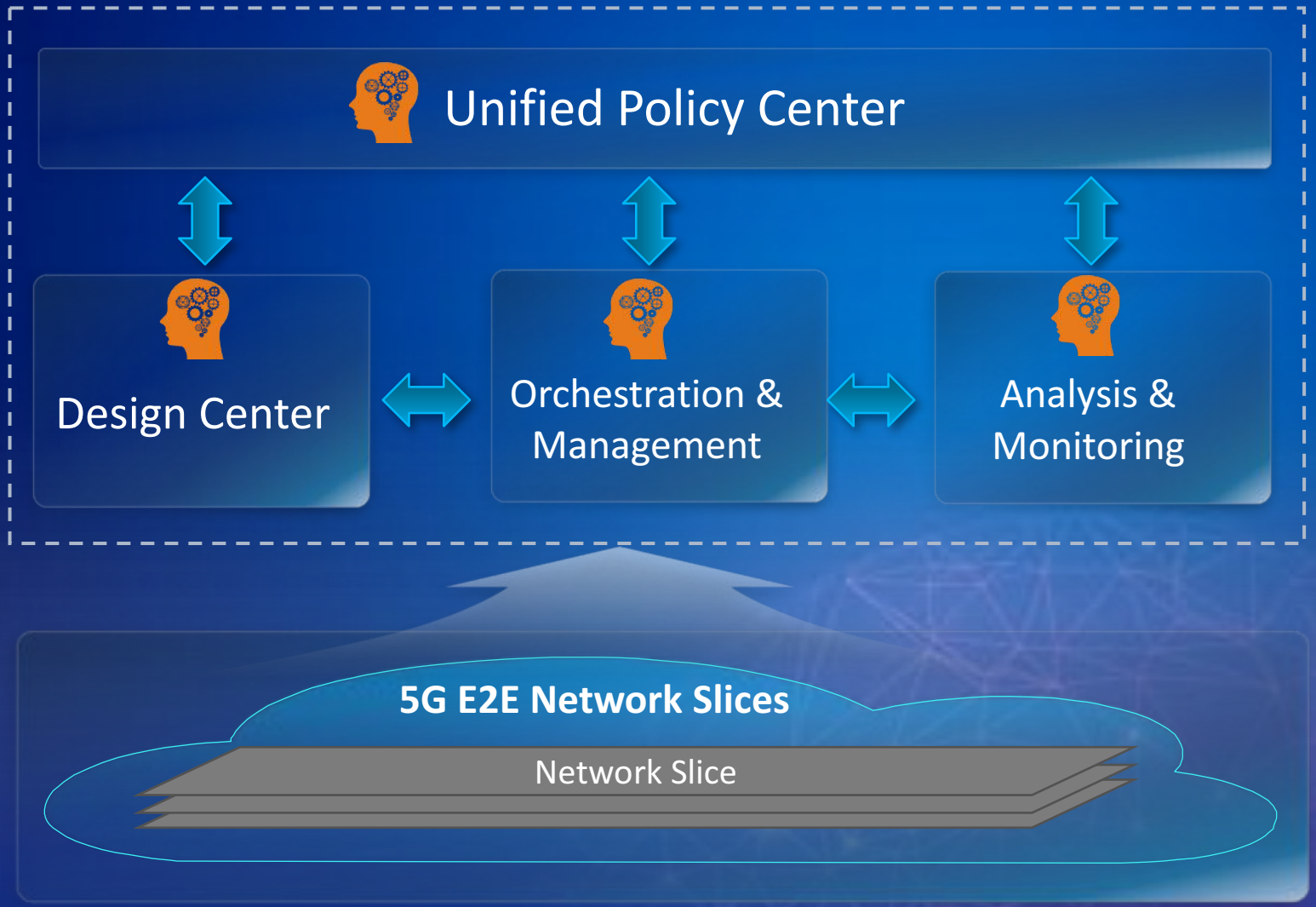
Artificial Intelligence to simplify slice management



Slice Management Intelligence

- The policy empowered by AI realizes the self-generation and self-optimization of policies
- The design empowered by AI realizes the self-learning and prediction of slice models
- The orchestration empowered by AI realizes the intelligent dispatching of resources and optimal configurations
- The monitoring empowered by AI realizes self-optimization of slices and quick healing on faults

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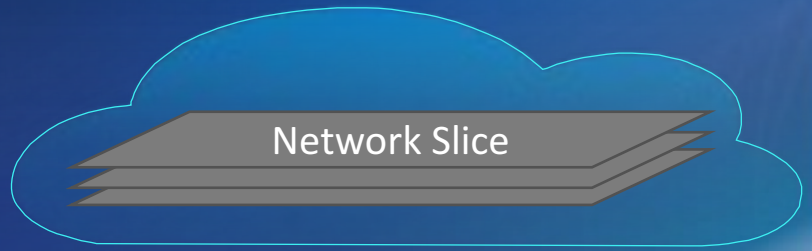
Network Slice selection requires UE prticipation

User Equipment (UE)

- Fixed
- Smartphone
- Sensors
- Connected devices…

NSSAI
(Network Slice Selection Assistance Information)

5G E2E Network Slices



Industry Wide Cooperation Required

- Availability of terminals with required capabilities
- End to end testing of the slicing operation including terminals
- Multi-vendor interoperability
- Multi-network interoperability

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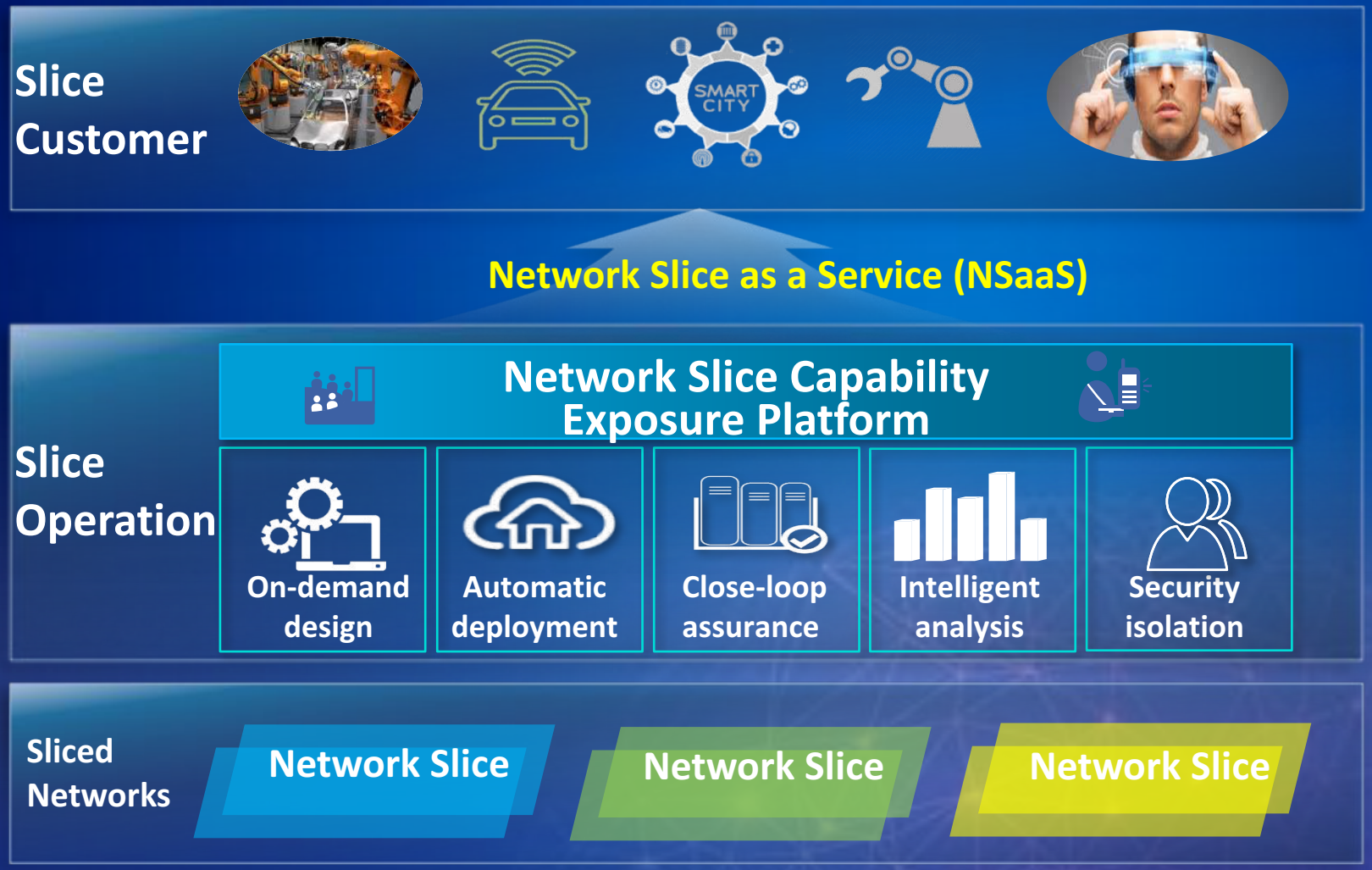
NSaaS opens up new business models for Industry verticals



Slice Operation

- Extending from the traffic operation of 4G era to the slice operation of 5G era
- Network as a service flexibly provides proprietary network services to industry customers
- The slice and service can be further combined to be provided to the end customer as a whole

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Summary

The industry is moving from NFV to Cloud Native network architectures, enabling E2E Network Slicing

Technology Readiness

- ✓ *5G RAN: Unified frame structure, uRLLC, eMBB, mMTC, Cloud RAN, CUPS*
- ✓ *Core Network: Cloud Native, SBA, Stateless*
- ✓ *Bearer Network: SDN, FlexE, OTN based slicing*

Operation/Business Model Changes

- ➢ *DevOps (tools, organisation, training, processes)*
- ➢ *NSaaS to open up new business opportunities with industry verticals*
- ➢ *Rethink the traditional models of MVNO, Network Sharing, etc.*

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Thank You