ADLINK®

Leading EDGE COMPUTING



18th March, 2020 INB Webinar

ADLINK MECS Facilitates 5G Network Transformation

Presenter:
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Agenda

- About 5G
  - Market Analysis
  - 5G challenges to carrier network and solutions
    - Access network
    - Core Network
    - Bearer Network
- ADLINK Focus
- ADLINK Product Strategy

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About 5G



- In 7 years, total 5G base stations, 6M~9M in China, double in WW.
- Till Dec, 2019, planed to deploy 1.2M in 2~3 years.

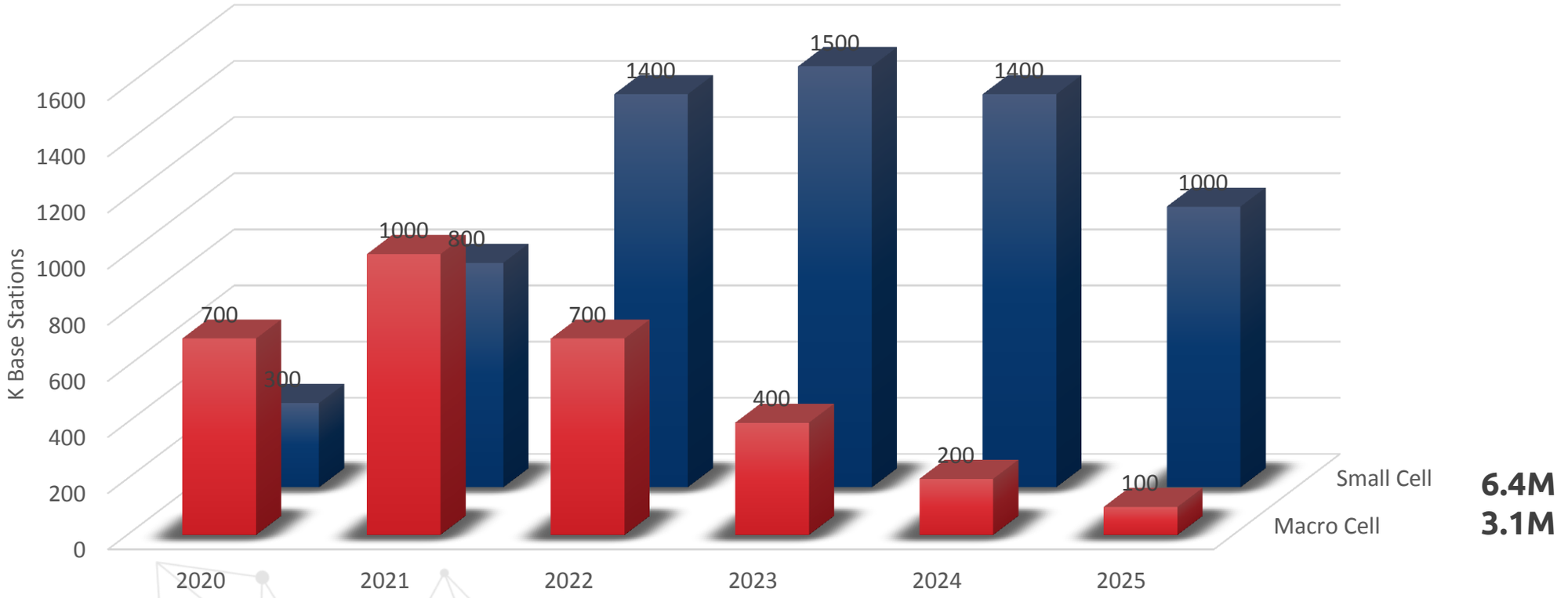


- Investment of base stations in China: 215B$
- Electricity bill: 58B$/year

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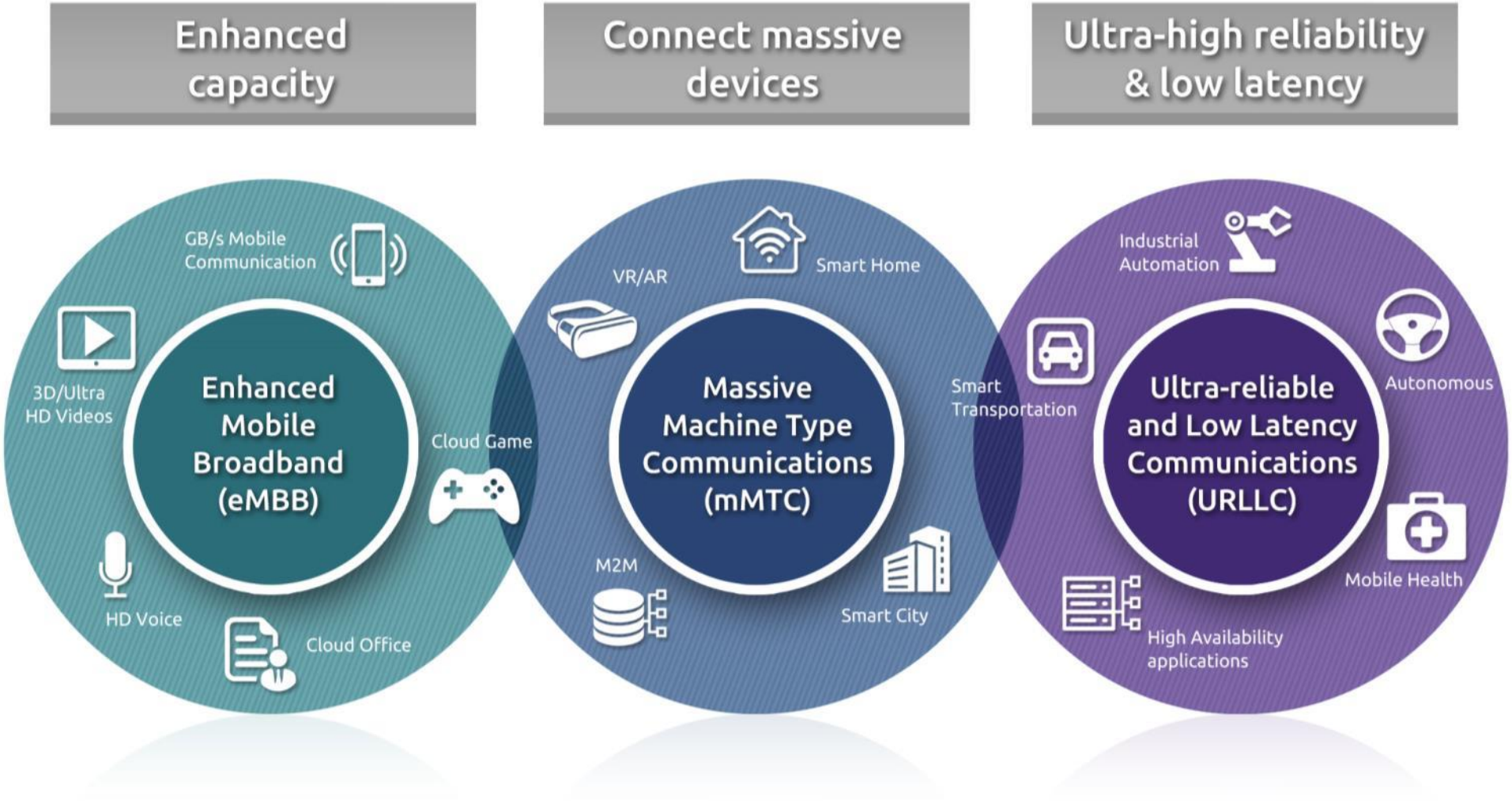
China 5G Deployment Plan

9.5M Base Stations

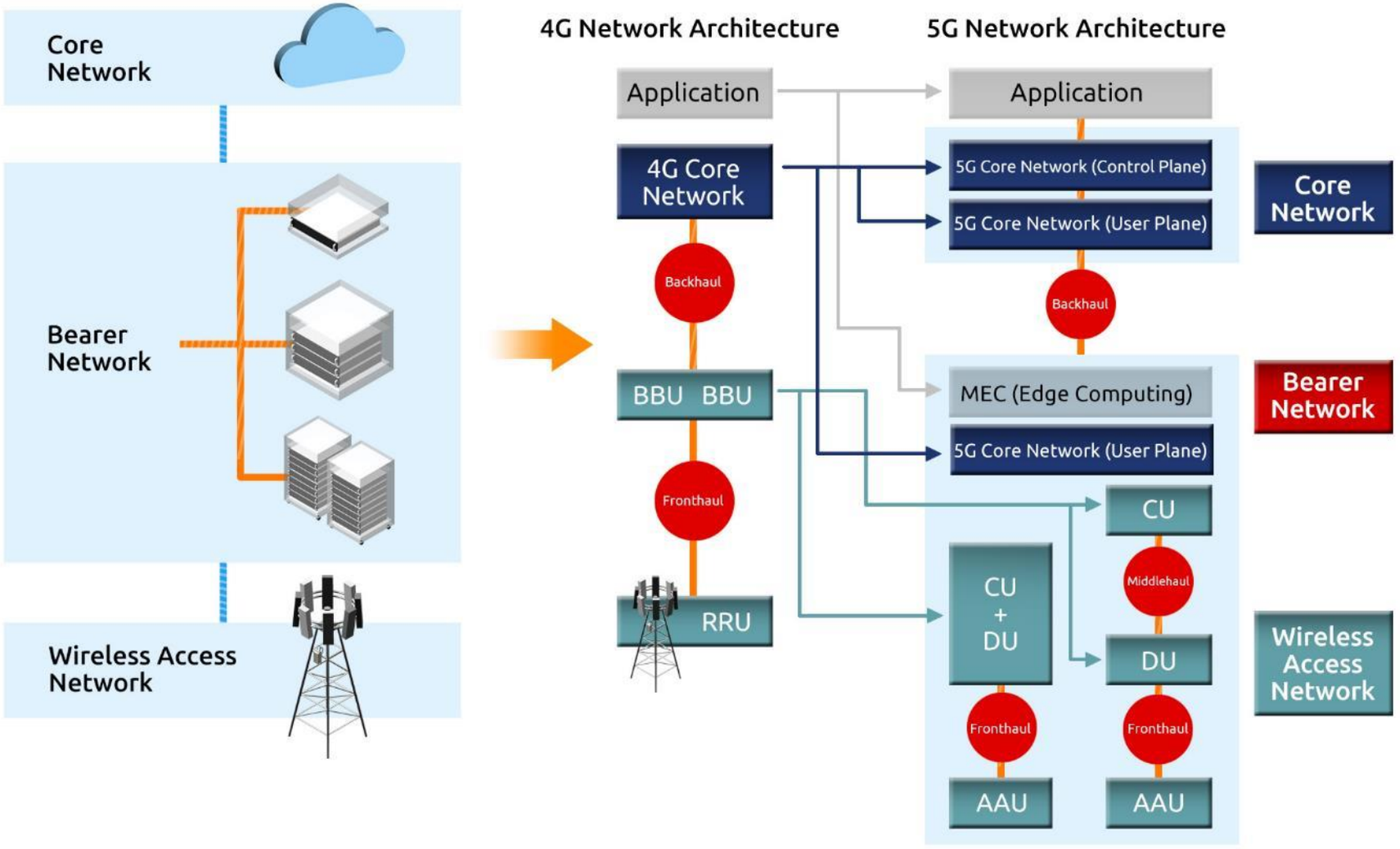


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Application Scenarios of 5G



Whole Network Transformation

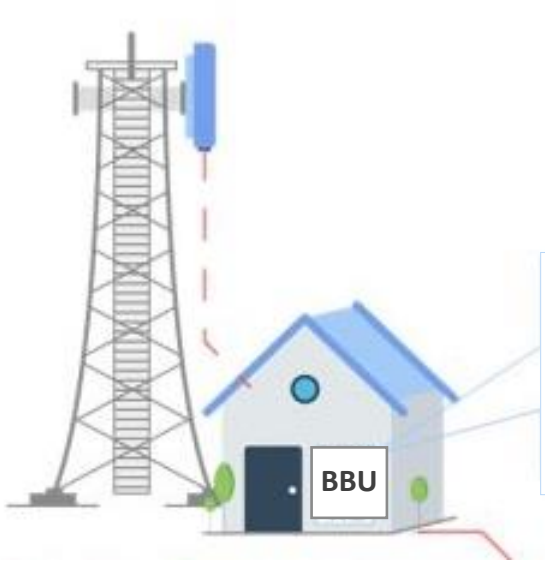


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5G Access Network

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Macro Cell VS. Small Cell



BBU with Air-conditioning room



Indoor



Outdoor

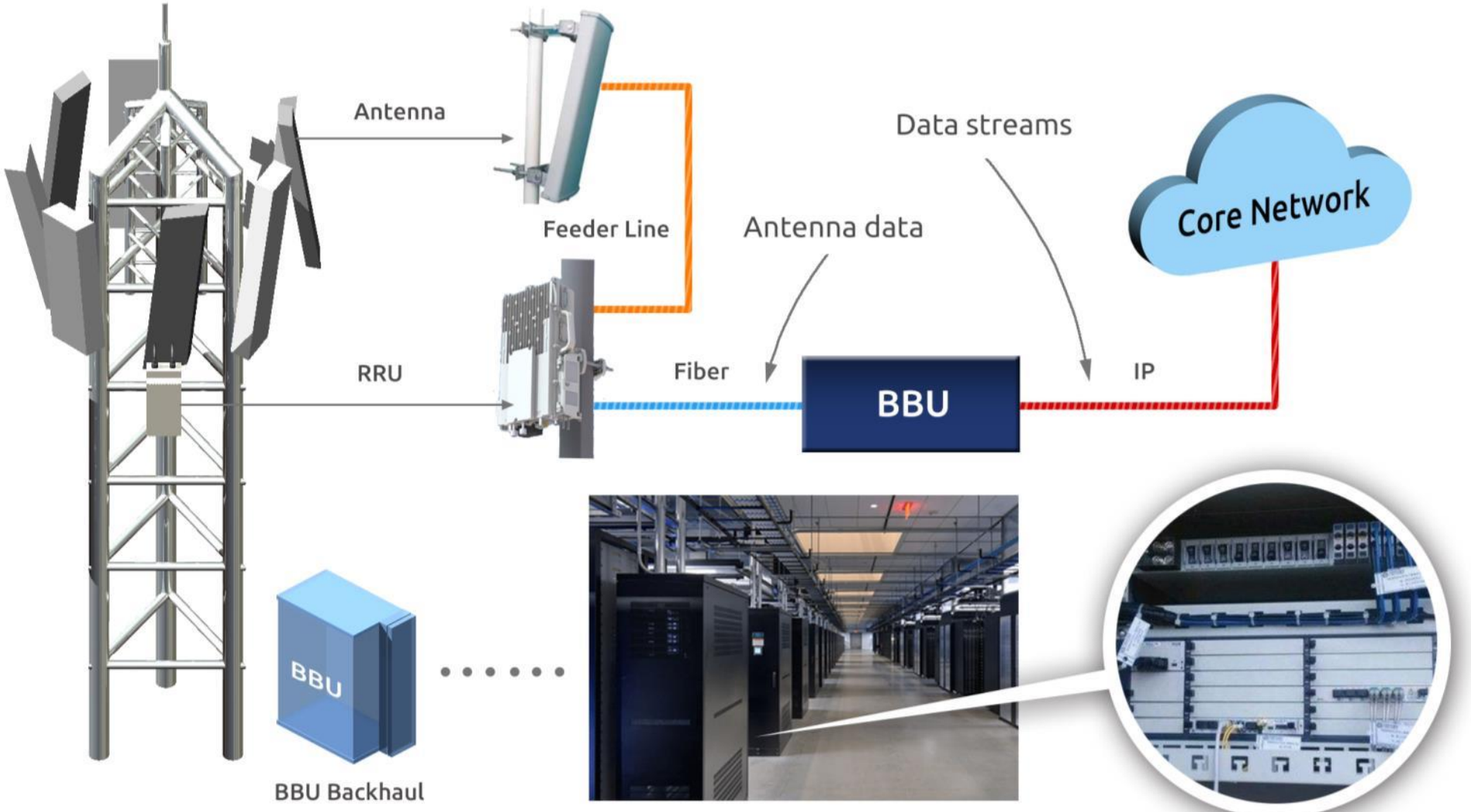
Macro Cell

Small Cell

Enhance the coverage

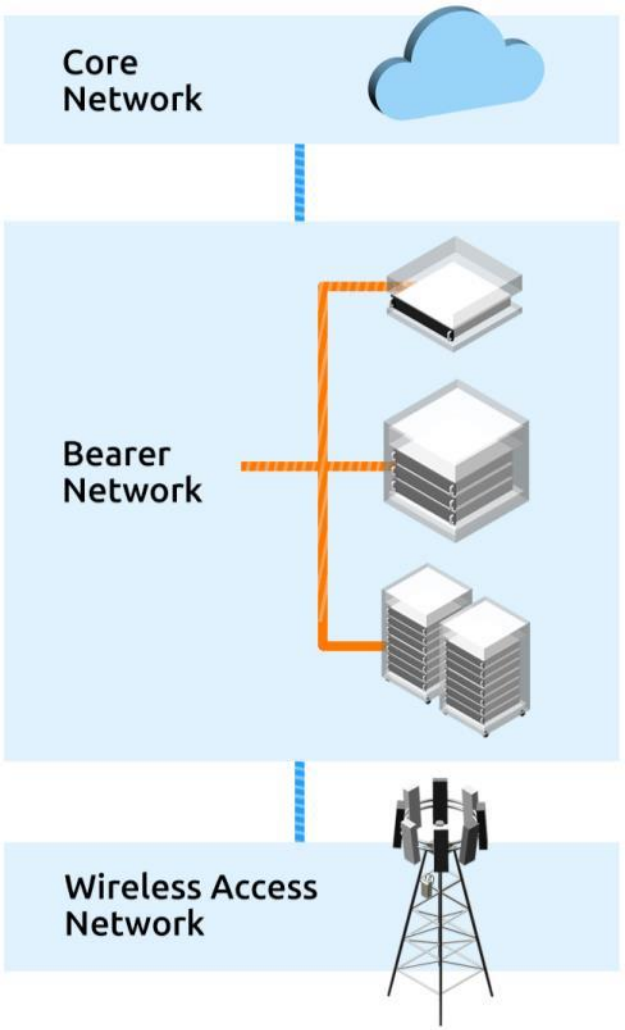
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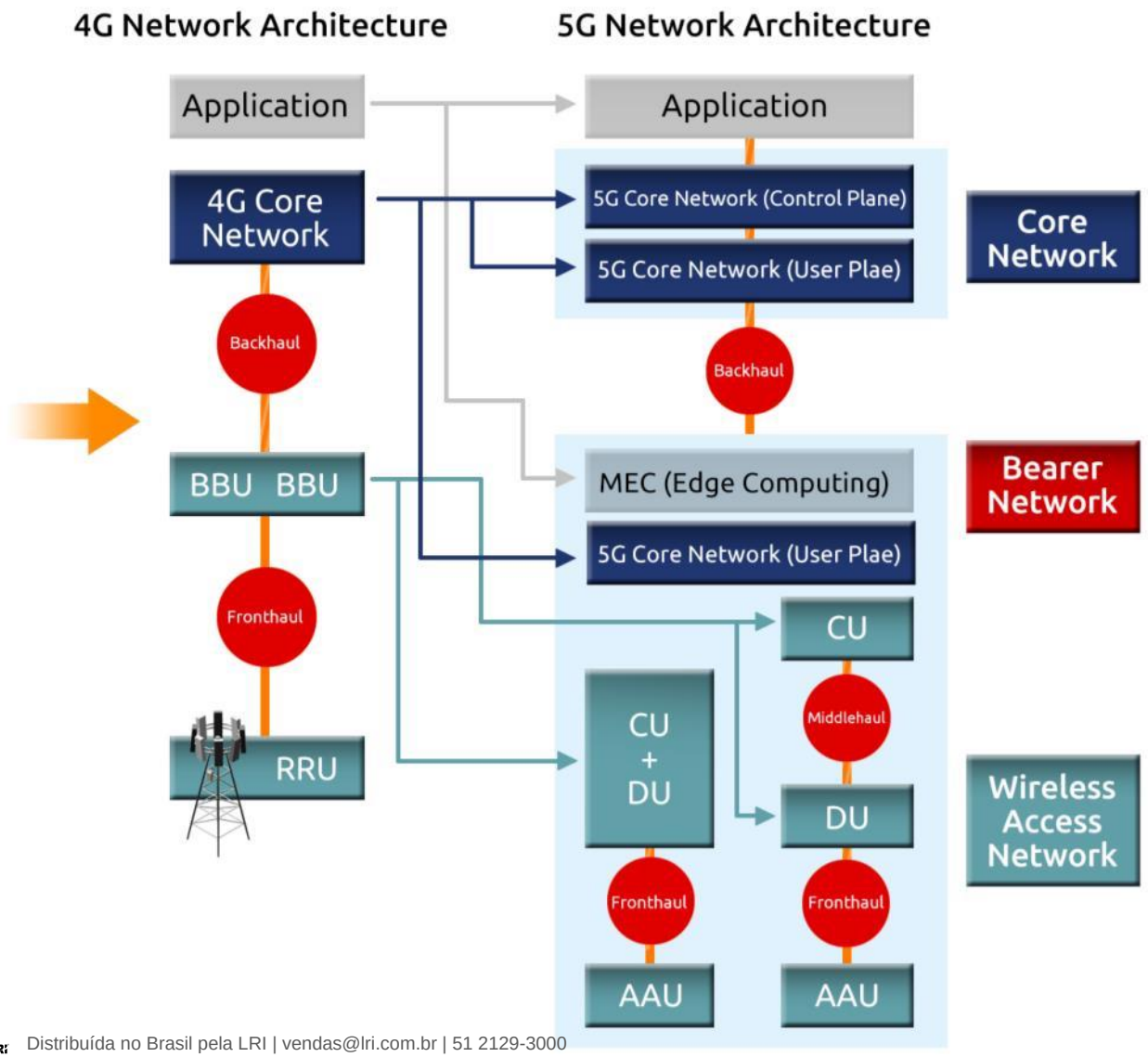
4G Base Station Architecture



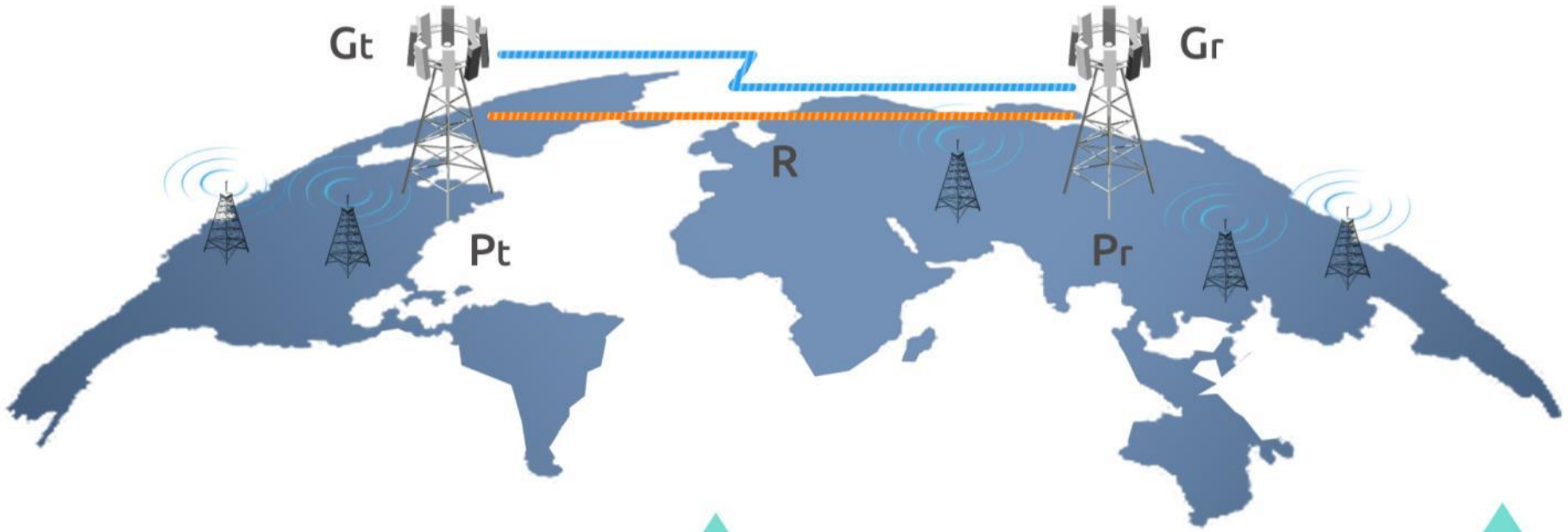
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Comprehensive Network Transform





5G Brings the Antenna Revolution



Pt Antenna transmitter power

Pr Antenna receiver power

Gt Transmitter antenna gain

Gr Receiver antenna gain

$$Pr = Pt \frac{Gt\ Gr\ \lambda^2}{(4\pi R)^2}$$

Operating wavelength

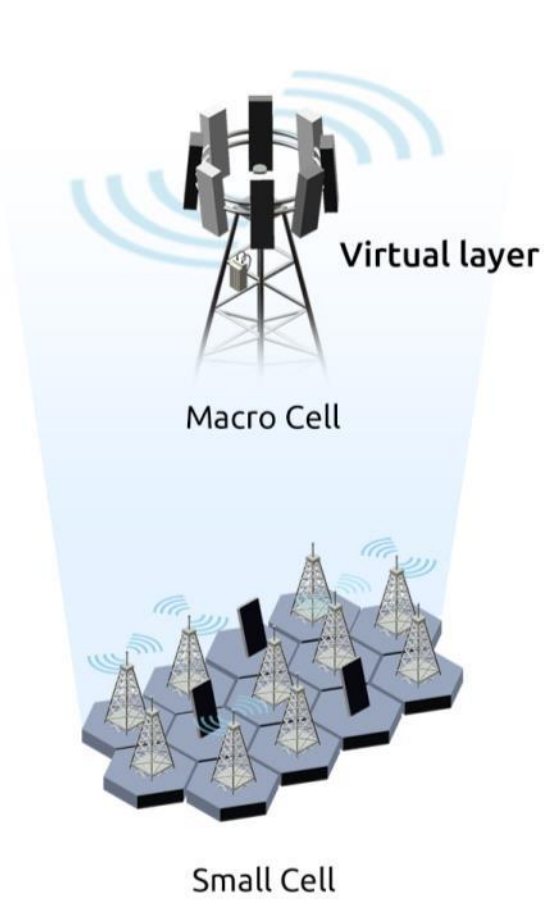
Distance of transmitter and receiver antenna

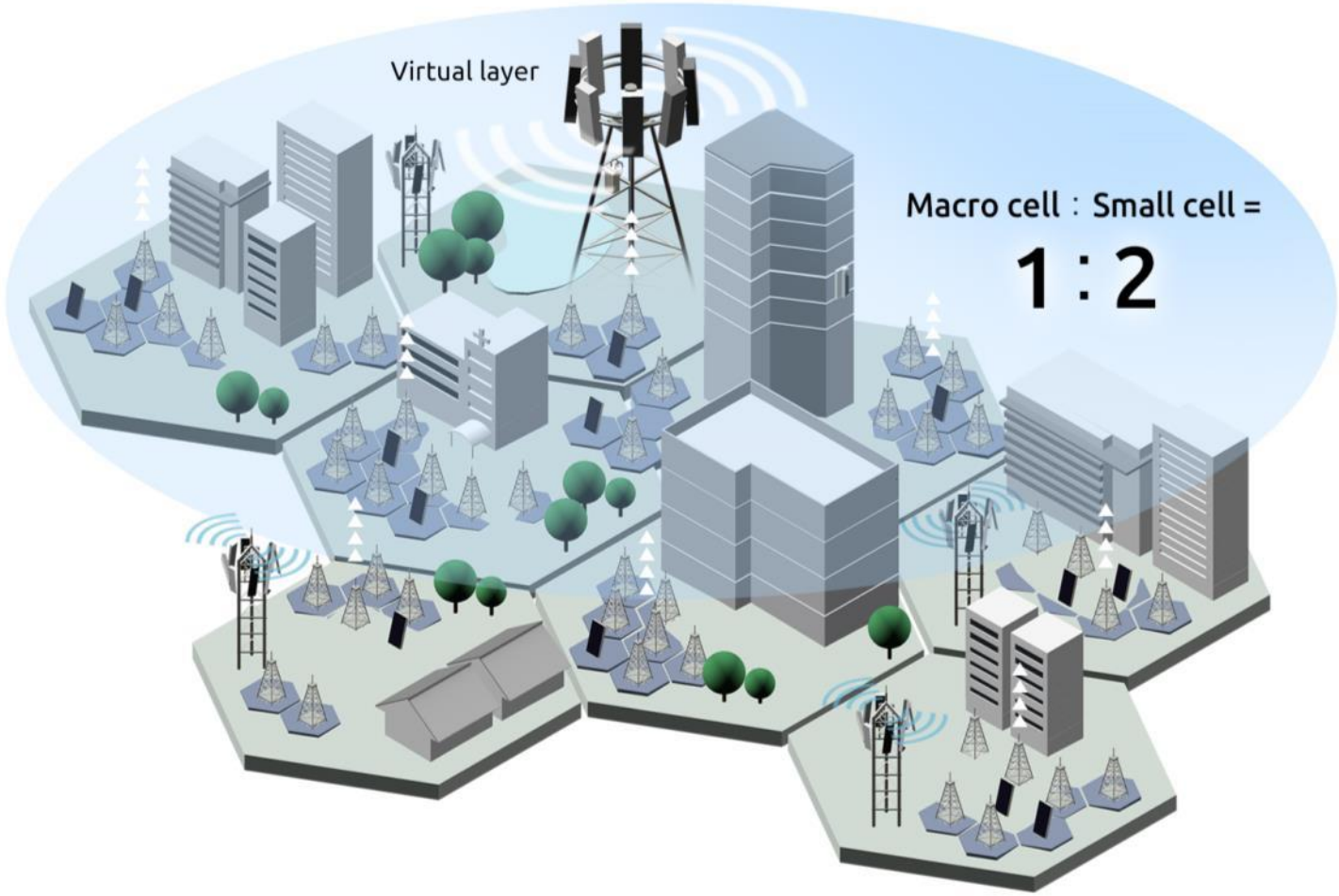
Ultra-high Bandwidth

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Solution 1: 5G UDN(Ultra-Dense Network)

Huge Opportunities in Small Cell





- 103 cell/km^2
- 10 time compared with 4g

- Enlarge the internet coverage
- Improve the internet bandwidth

- Optimize user experience
- Reduce the deployment cost

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The Challenge with high frequency

Investment : Dispose amount and Cost increase sharply



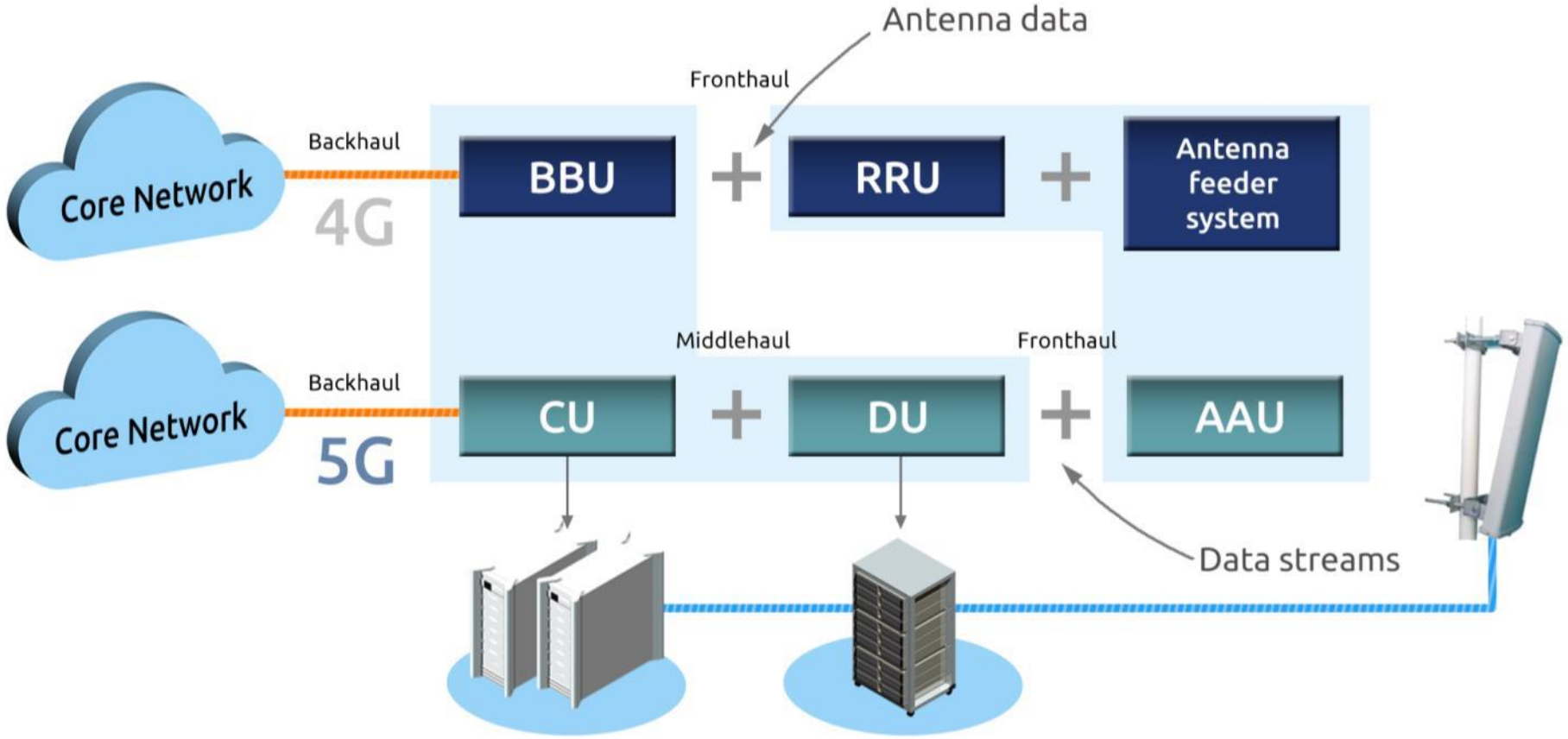
$$A = \pi r^2$$

	2G	3G	4G	5G
R	2km	1km	600m	200m
BTS	1	9	25	100



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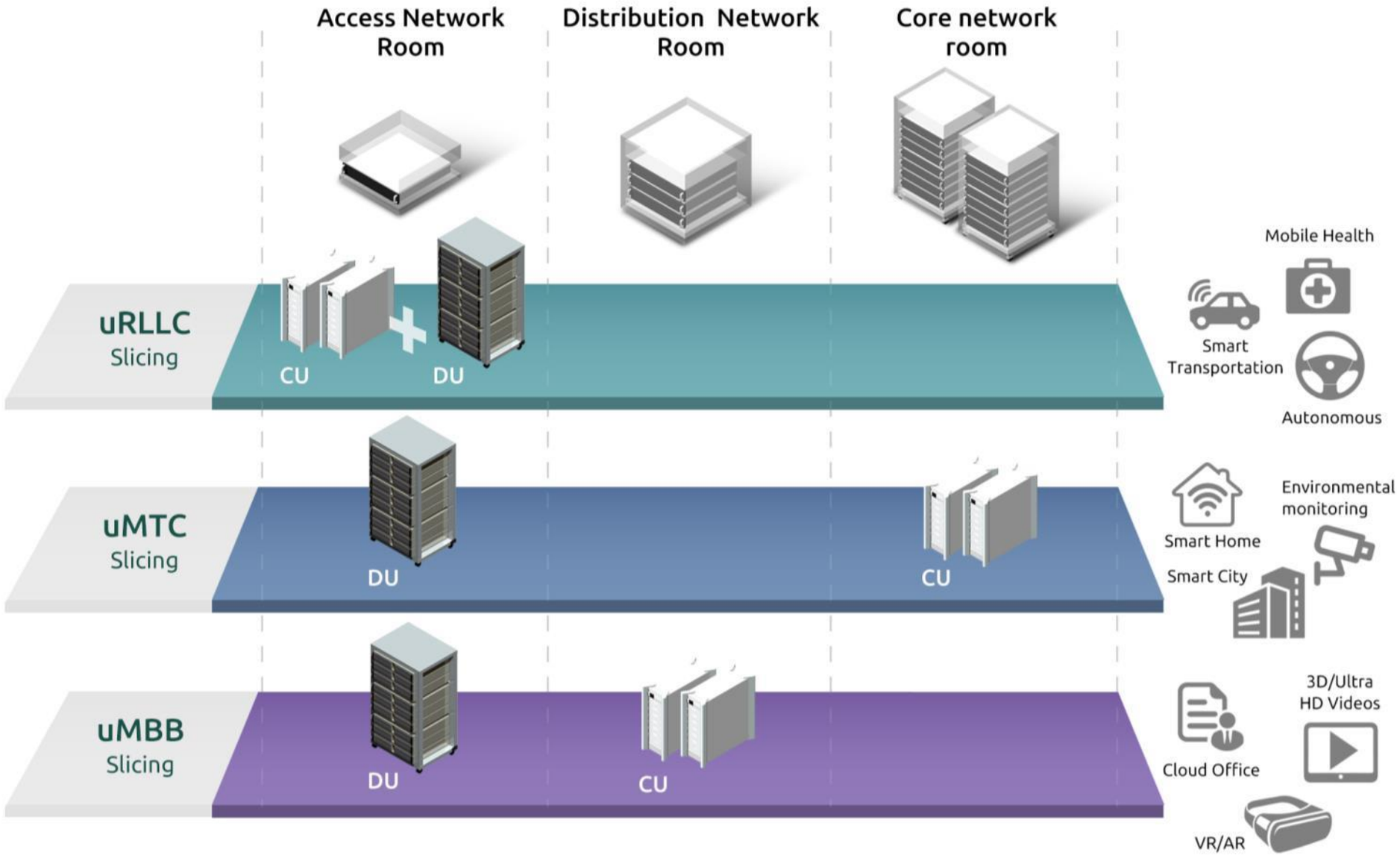
Solution 2: Split CU & DU



- Reduce network loading , fronthaul pressure & construction complexity, Stream data bandwidth = 1/10 bandwidth of antenna data
- Flexible to build CU & DU to meet the various application needs
- Virtualized CU & DU to increase the resource utilization

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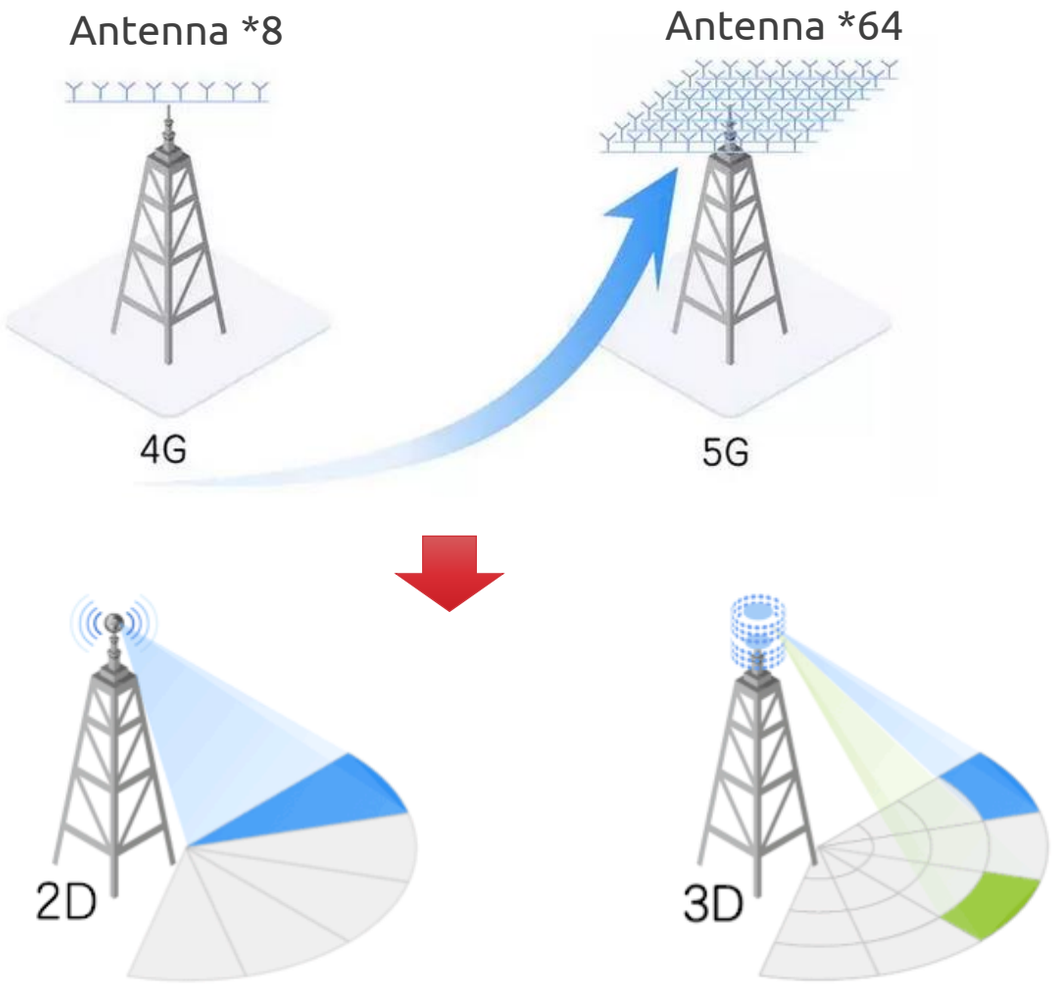
Virtualized/ Split CU & DU to Meet Diverse Scenarios



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Solution 3： Massive MIMO

Beamforming



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5G Core Network

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5G Core Network



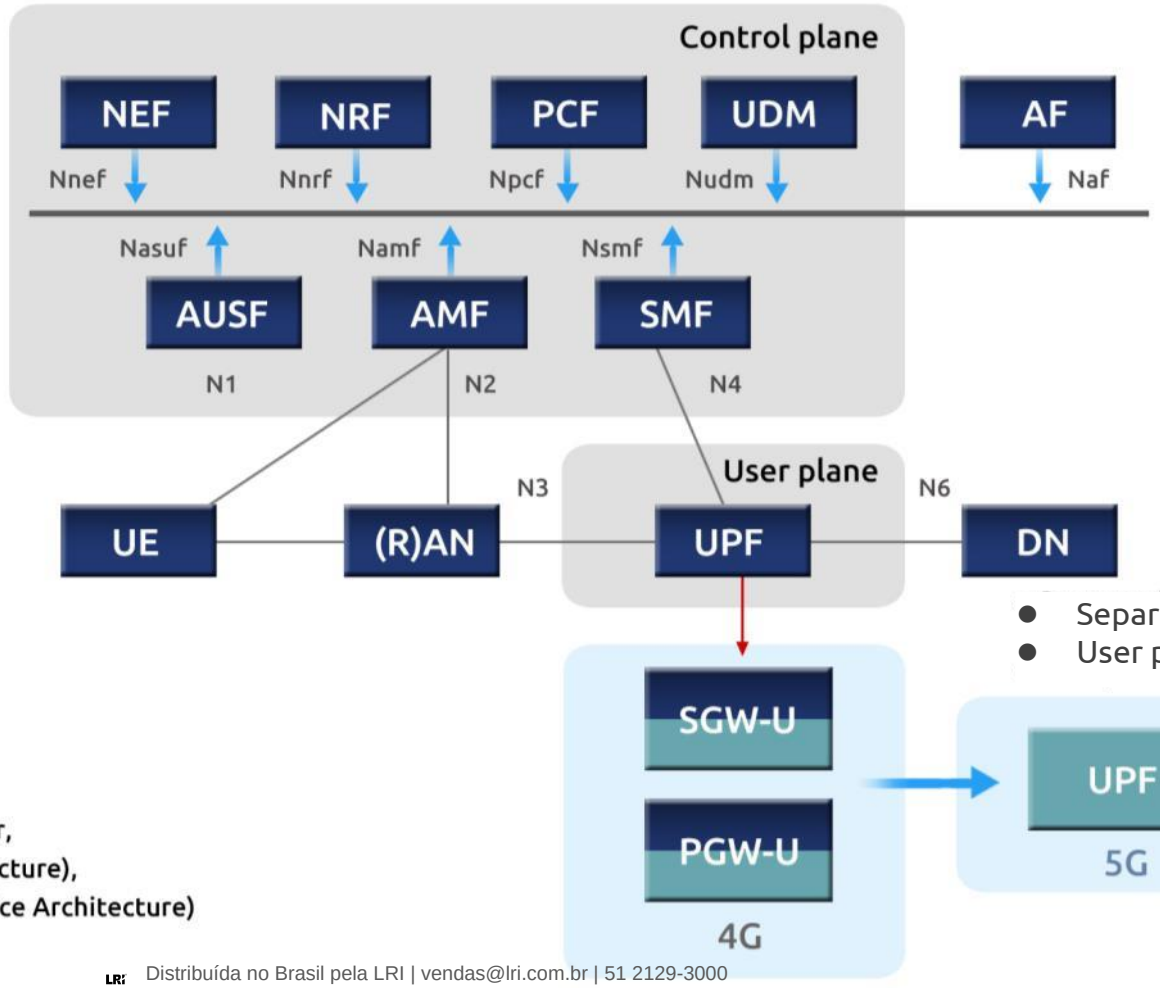
3G: ATCA



4G: General purpose server, NFV



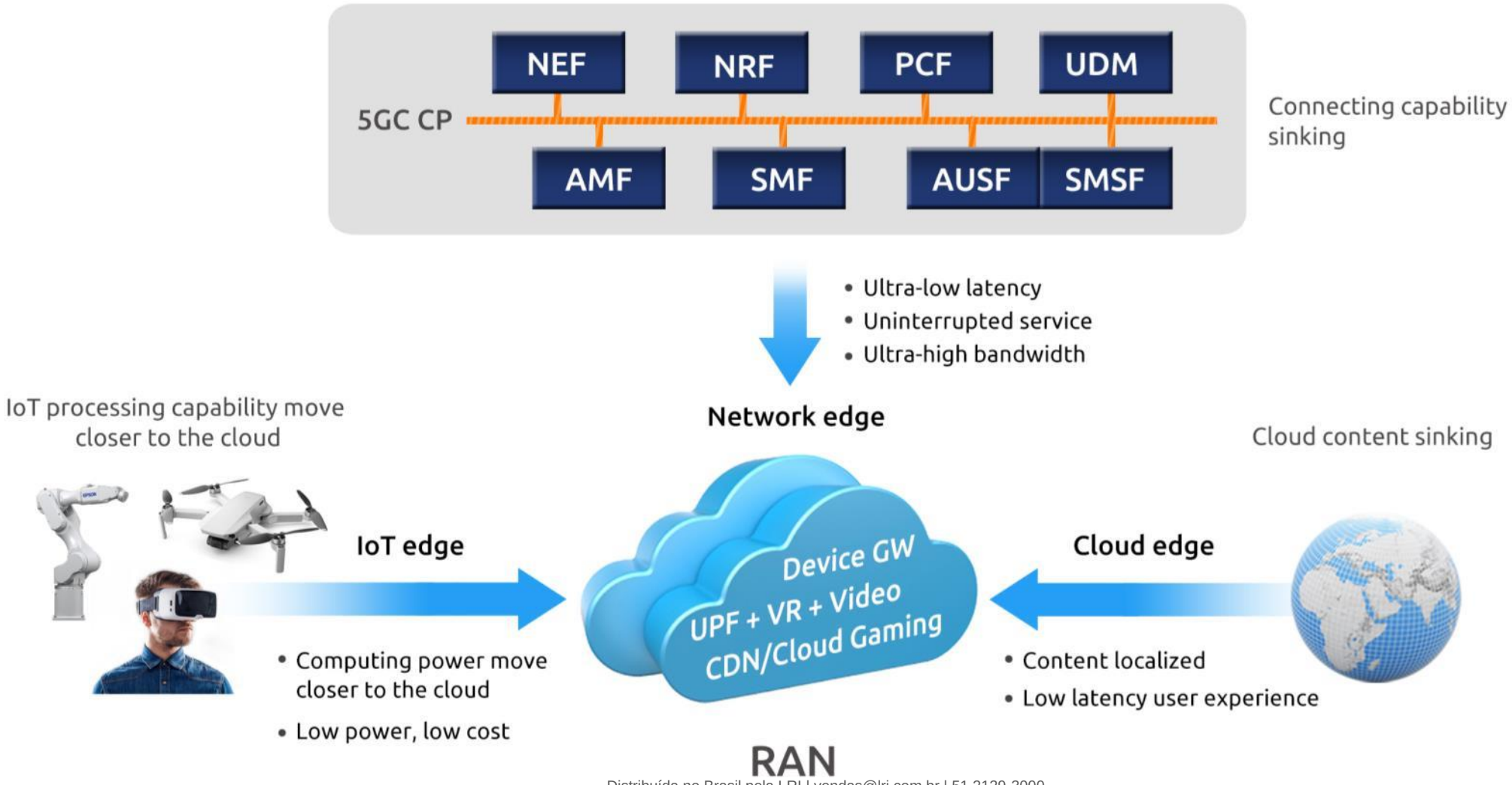
5G: General purpose server, SBA(Service-based Architecture), similar as MSA (Micro service Architecture)



- Separated control and user plane
- User plane sinking

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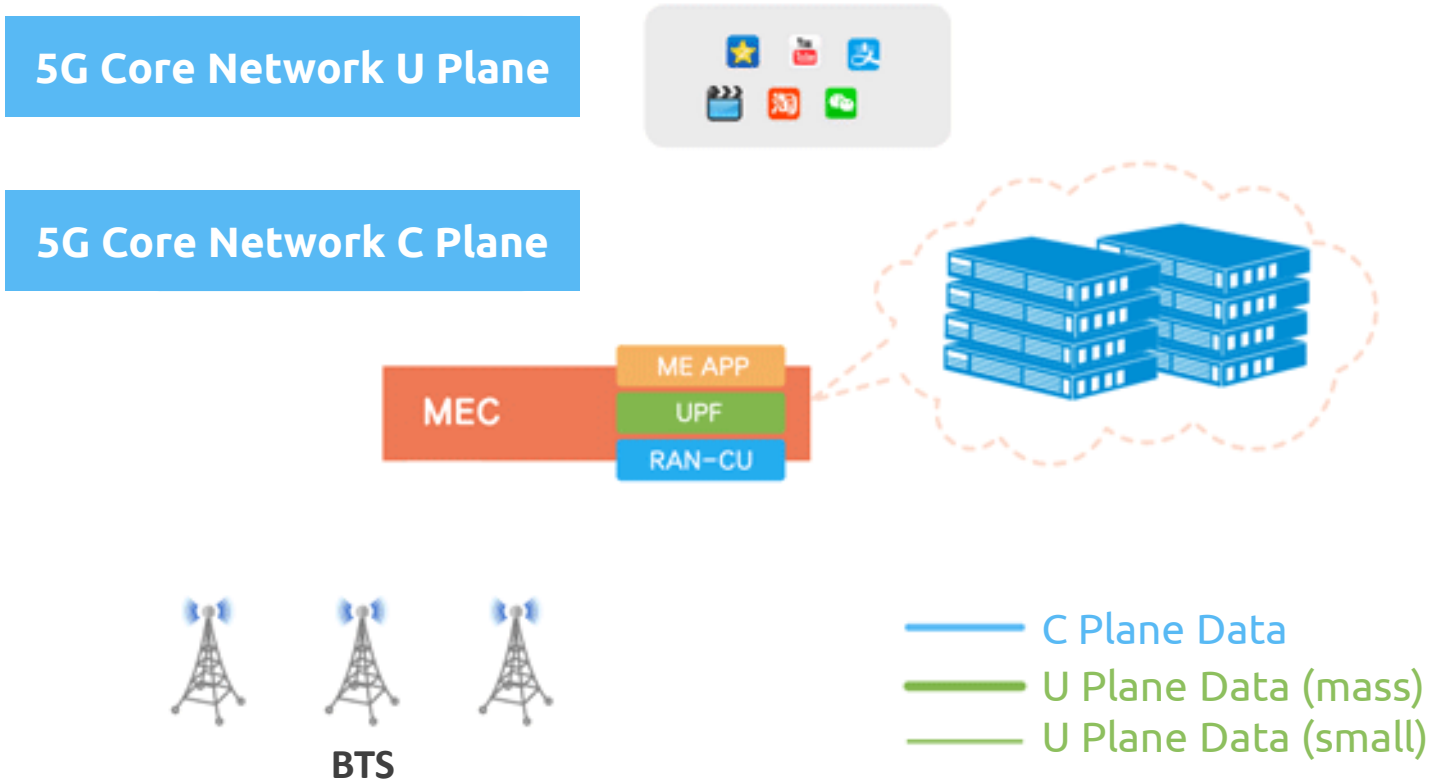
MEC Edge Computing



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5G+

MEC enable various vertical 5G service

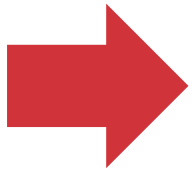


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Requirements in Infrastructure

5G triggering Transformation

- Service Agility
- Reduce OPEX/CAPEX
- Intelligence innovative
- Virtualized network elements



Solutions

- OPENNESS, to bring service agility and cloud scale economics to the RAN
- Enable smaller vendors and operators to introduce their own services
- Open source software and hardware reference designs
- White-box hardware, Flexibility Architecture
- Standardized interface

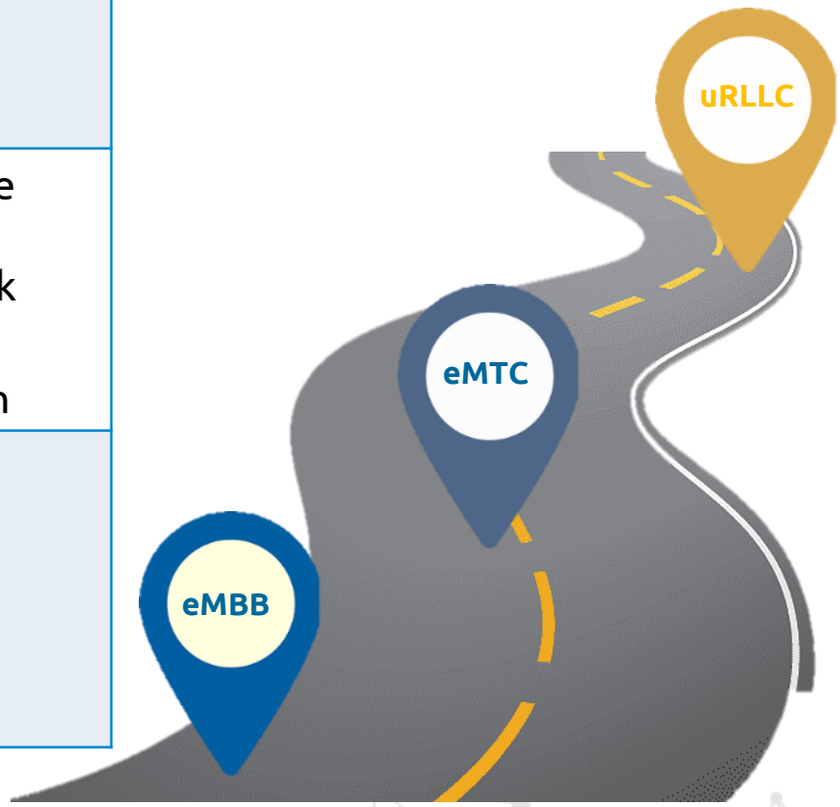
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5G Bearer Network

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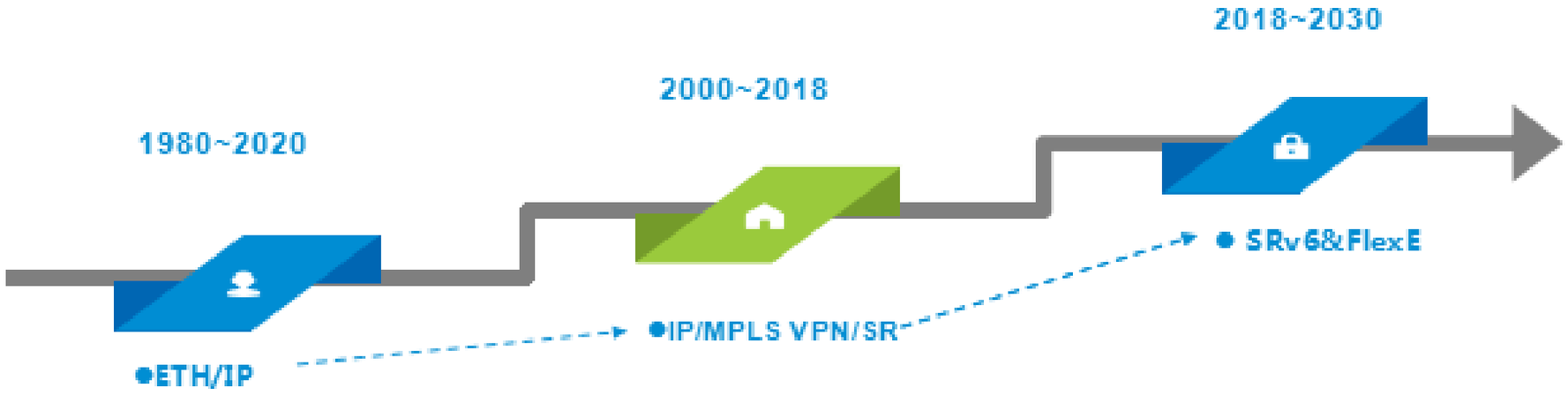
Requirements of Bearer Network by 5G

Scenarios	Main Applications	Requests	Offering
eMBB	High traffic mobile broadband like ultra-HD videos, VR/AR, high-speed mobile internet	**Wide** coverage **High** traffic	Ultra-high **bandwidth**
eMTC	Connecting sensors and data collecting for IoT Smart city	**Massive & Flexible** connections	Support flexible management, precise network **clock** synchronization
uRLLC	Verticals like Internet of Vehicles & Industrial control	On time **Low** Latency	Ultra-low **latency**



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SRv6&FlexE, Next Gen IP Key Technology

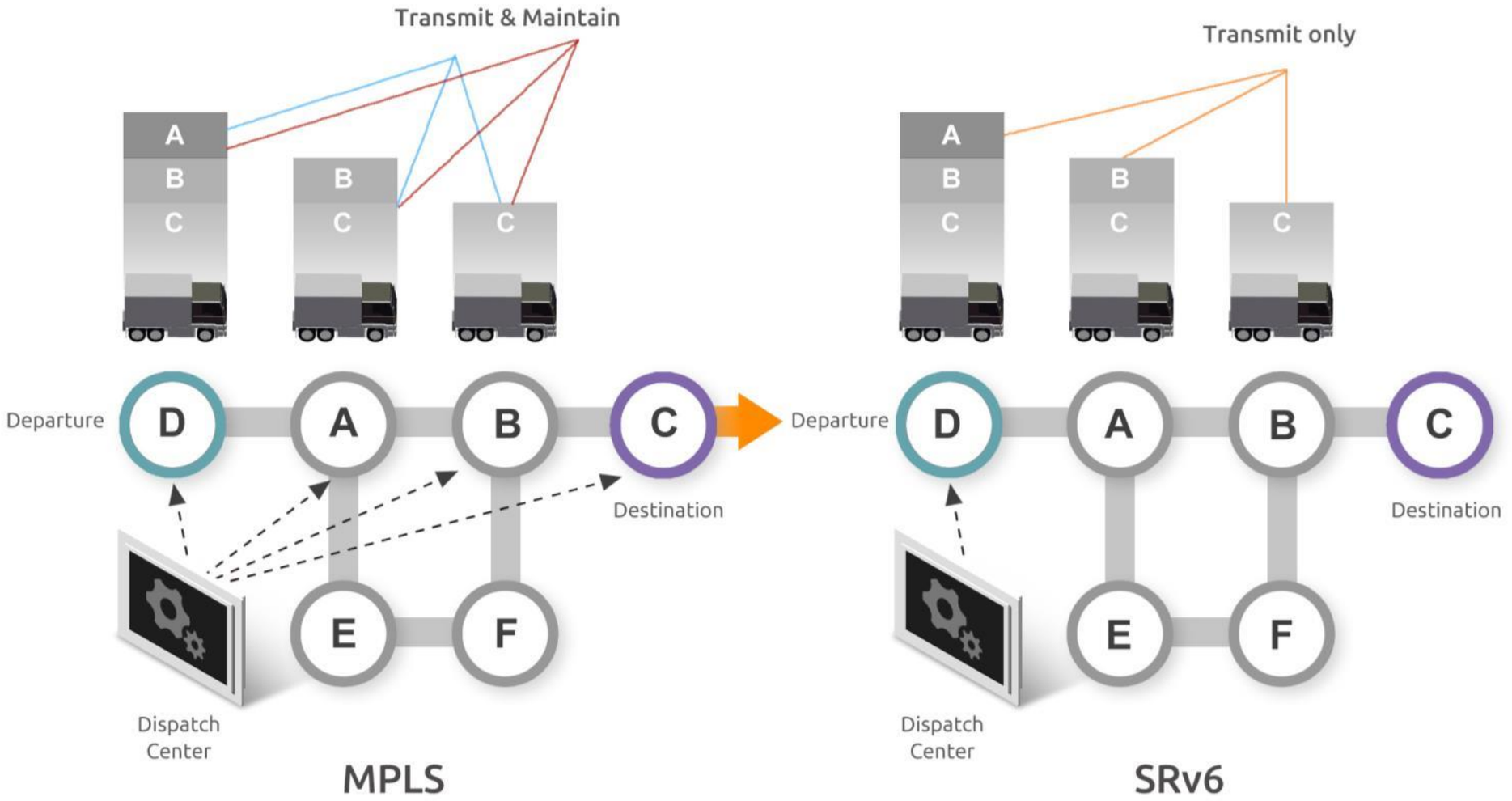


ETH/IP → IP/MPLS/SR	IP/MPLS/SR → FlexE/SRv6
• Traffic engineering • Connection Oriented • Routing isolated, simplify IP Network • Enable Large-Scale IP network • Carrier-grade applications availability	• Flex Ethernet，enrich ETH bandwidth • Service isolated, differential bearing • inband-OAM • Cloud interconnection, Cloud Network convergence, programmable network • Unification of Internet and telecommunication service

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5G Bearer Network

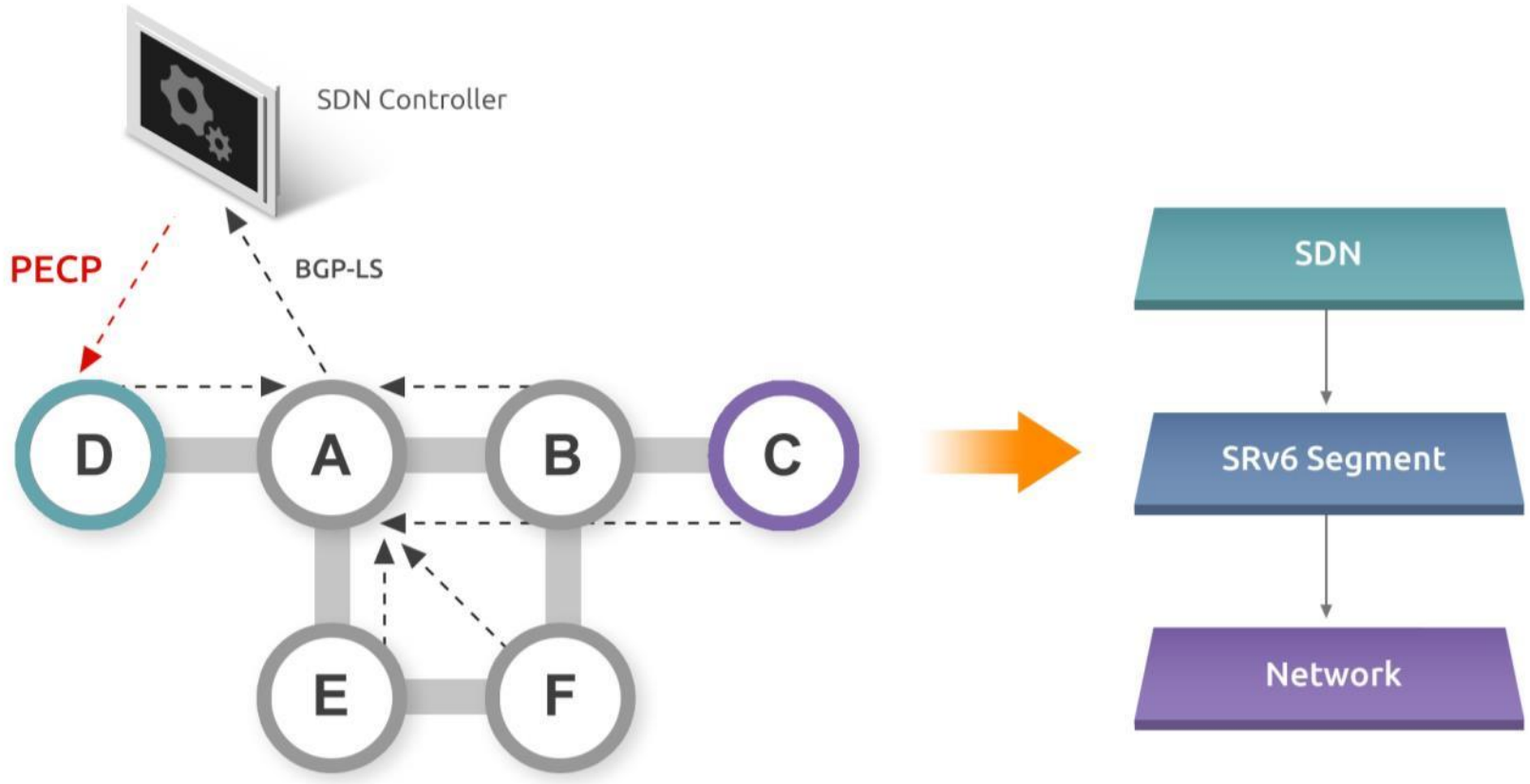
SRv6, Segment Routing



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SRv6 native support SDN

SRv6 becomes the de facto SDN standards



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Open Source, Programmable

Open Source Network Stack

Chip

BAREFOOT NETWORKS

BROADCOM.



Open Source Applications

Pyroute2

SERA IPTABLES

TCPDUMP

WIRESHARK

SNORT

Smart NIC

intel

Mellanox

NFV

TREND MICRO

ENEA Qosmos Division

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Network security impacted by 5G

Architecture of Legacy Network Traffic Visibility



Optical Splitter





Data Acquisition，Flow Classification



Data Analytics

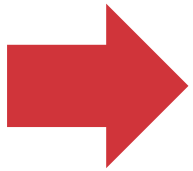
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New Challenge in 5G Era

5G triggering Transformation

network infrastructure
- X 10~100 throughput
- SDN/NFV
- SBA (Service Based Architecture)

Deployment
- Control Plane Centralized
- User Plane Distributed
- Cloud moving to Edge



Challenges/Solutions

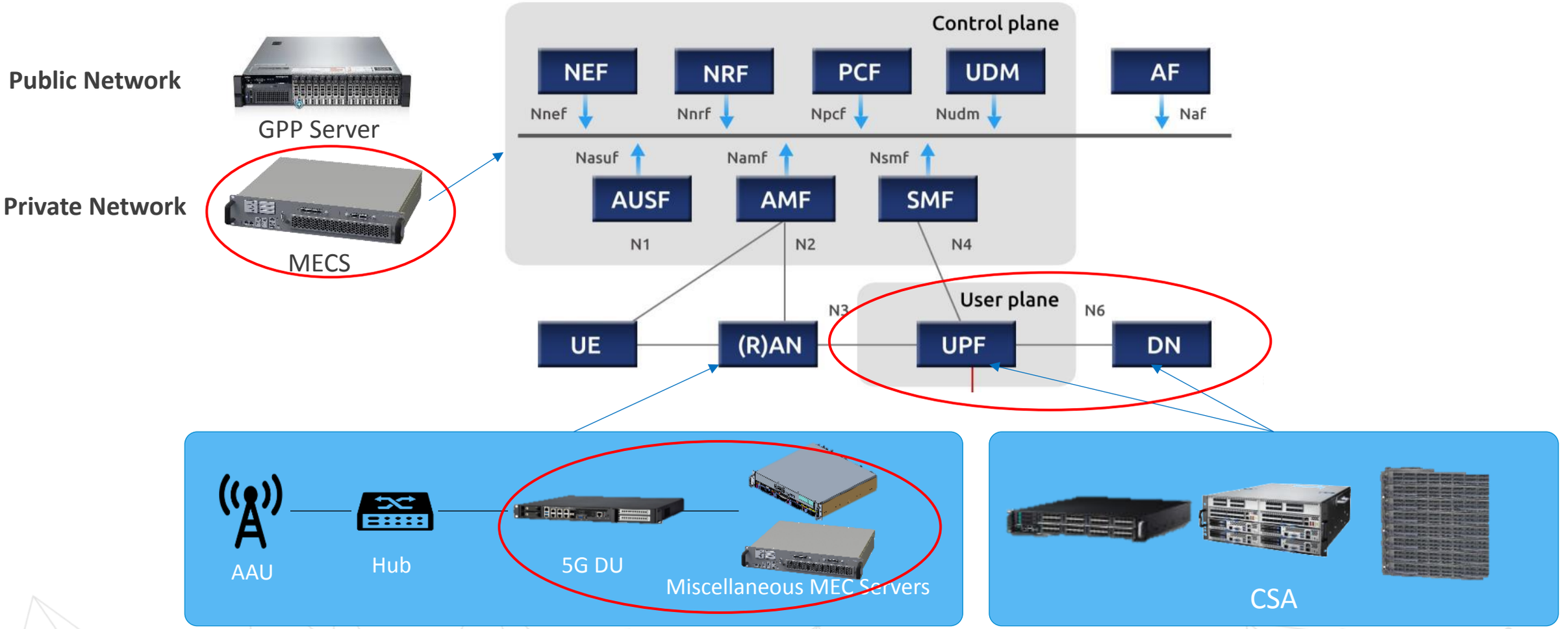
- X 10~100 throughput, I/O capacity, cost/Gbit, leading switching bandwidth
- Flow based for SDN/NFV, but not packet based. Programmable for packet broker and balance
- Virtualized, purpose built data planes to uniquely suit each data center's (or Cloud) workload.
- Interface with 5G core network
- Rich portfolio for different deployment sites

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5G Opportunities & ADLINK Focus

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Opportunities & ADLINK Focus



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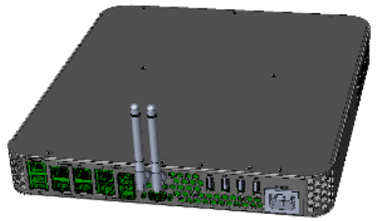
MECS Products

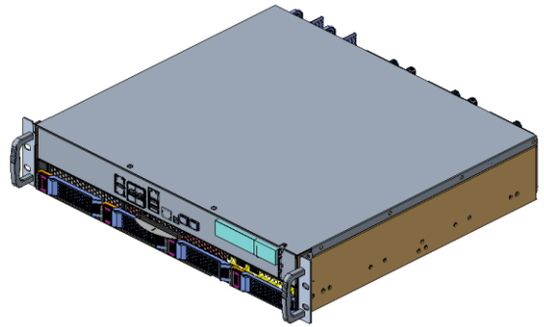




Model Name		MECS-7210	MECS-6110
Form Factor		2U 19’’ rackmount 438mm x 88mm x 420mm (WxHxD)	1U 19’’ rackmount 438mm x 44mm x 420mm (WxHxD)
Processor		Dual Intel® Xeon® Processor Scalable	Single Intel® Xeon® D-2100
Chipset		Intel C621~C627 (support QAT embedded by chipset)	Intel® Xeon® D-2100 SoC
Memory		16x DDR4 memory socket, ECC, registered, up to 1TB	4x DDR4 memory socket, ECC, registered, up to 256GB
Storage	On-board	1x M.2 SATA 2242	2x M.2 SATA 2280
	Drive bay	3x 2.5” SATA drive bay, front access, hot-swappable	2x 2.5” SATA drive bay, front access, hot-swappable
PCIe Expansion		2x single-slot FHFL PCIe 3.0 x16 Or 2x dual-slot FHFL PCIe 3.0 x16 slots	2x single-slot FHFL PCIe 3.0 x16 1x OCP 2.0 Mezz Card
IO	Ethernet	4x10G SFP+ front access 2x 10/100/1000M RJ-45 front access	2x RJ-45 10/100/1000BASE-T Ethernet ports 4x 10G SFP+ Ethernet ports
	Console Port	1x RJ45 front access	1x RJ45 front access
	USB3.0	2x front access, 2x internal	2x front access
	Power/Reset	1x Power button, 1x Reset button front access	1x Power button, 1x Reset button front access
Operating temperature		-5°C~+55°C	-5°C~+55°C

Fast derivative products





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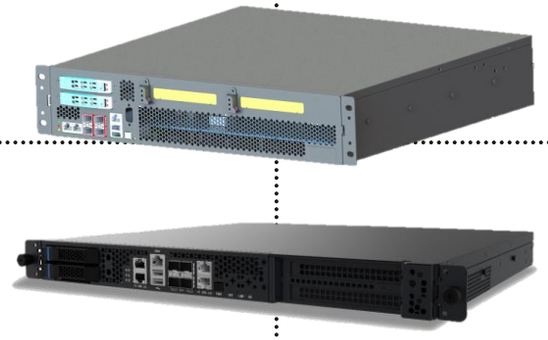
Highlight of ADLINK MECS

Rugged Design

1/2U High, 420mm Deep Deployable in Existing Equipment Sites

Powerful Processing

Powered by Intel® Xeon® Scalable & Xeon® D Processors



-5°C ~ +55°C
For Harsh Environments

Wide Temperature

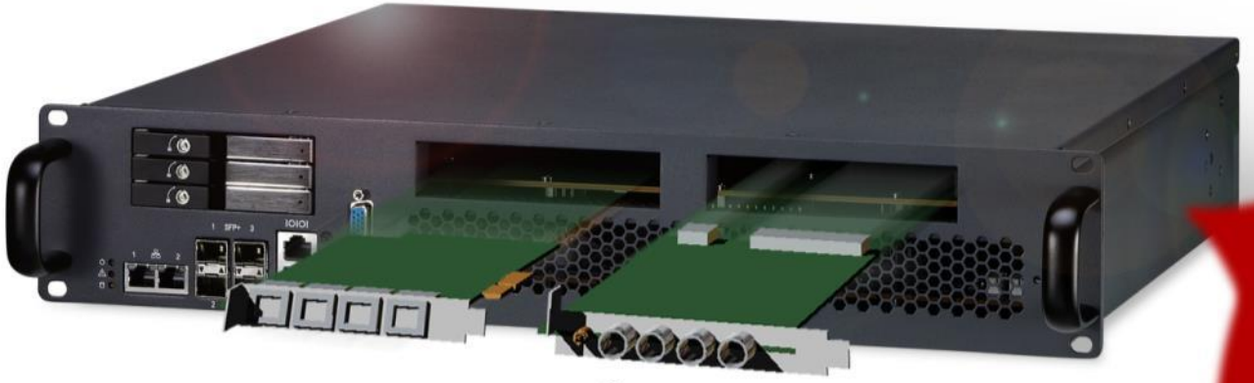
Support 2x PCIe x16 for FPGA, GPU Accelorators, IO expension

Expandable for Hardware Accelerators

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Accelerated Hardware Expansion for Vast Applications



Dual FHFL PCIe Expansions

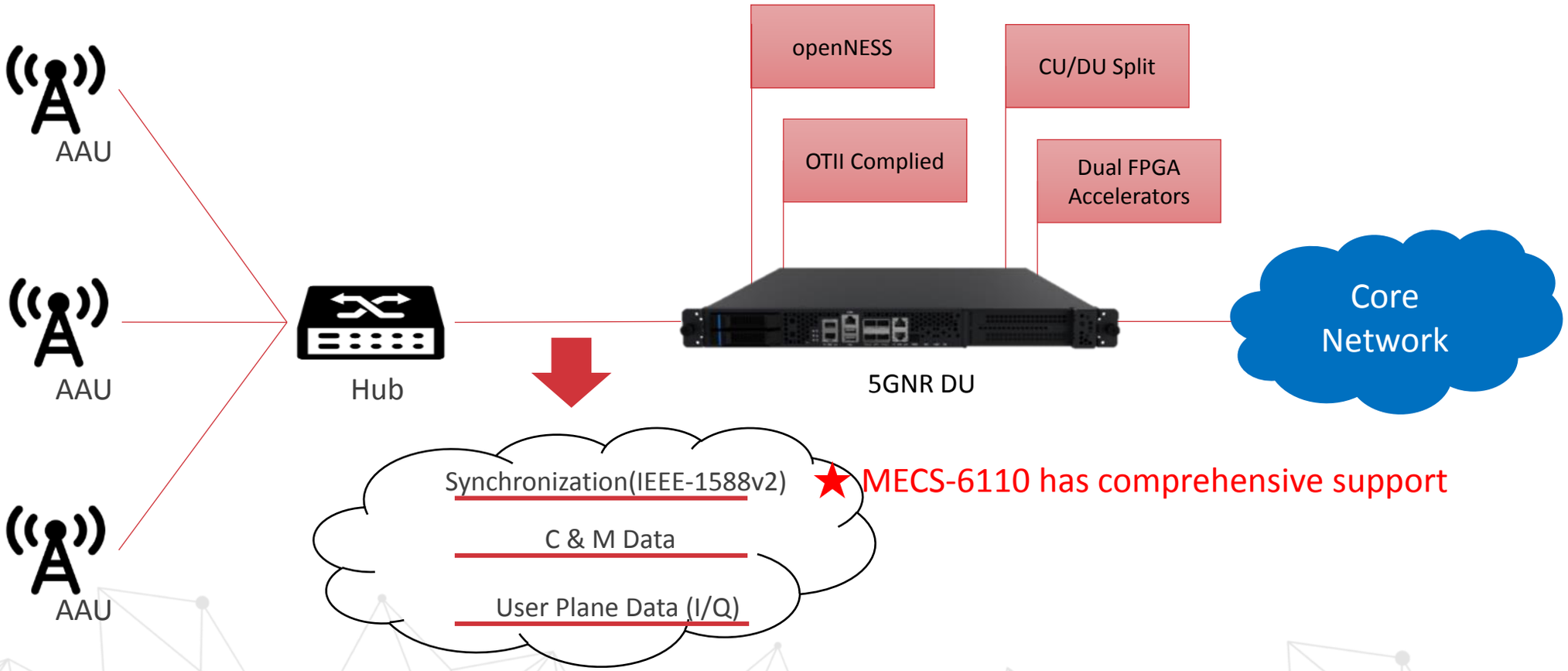


ADLINK VCU | GPU | IO Adapter | FPGA | QAT Adapter

MEC + ? = Unlimited Possibilities

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Stories: 5G DU



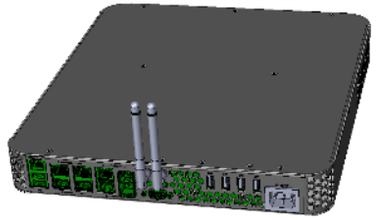
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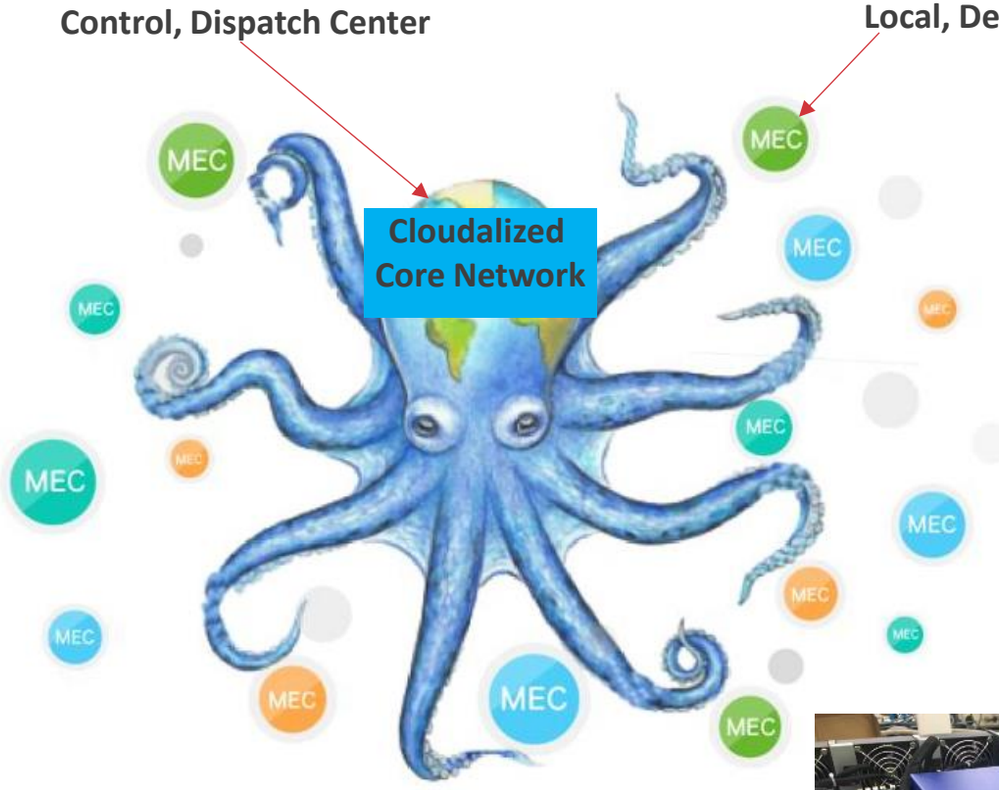
Stories: 5G+, Cloud Network Collaboration

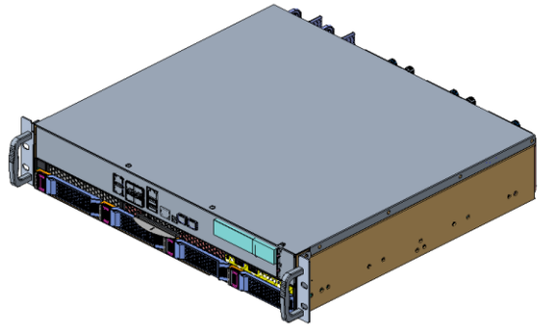
ADLINK Use Cases





BGI Ecoli Server for Gene Test





MECS-6210，AI+Storage Edge Server
2*GPU, 6* HDD



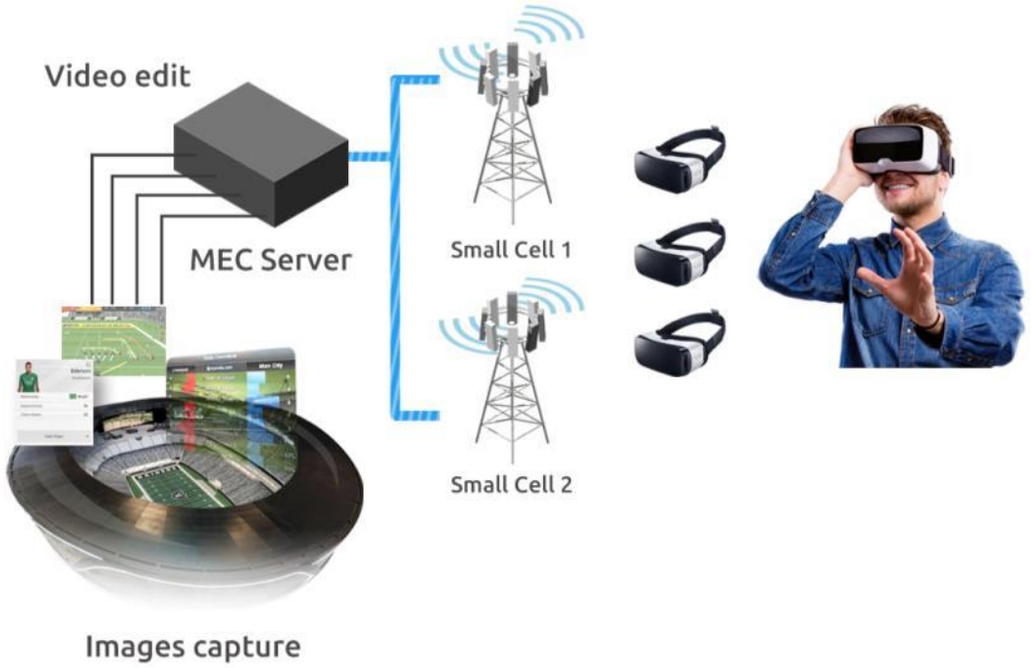
MECS-7210
5G DU+MEC(for AGV)

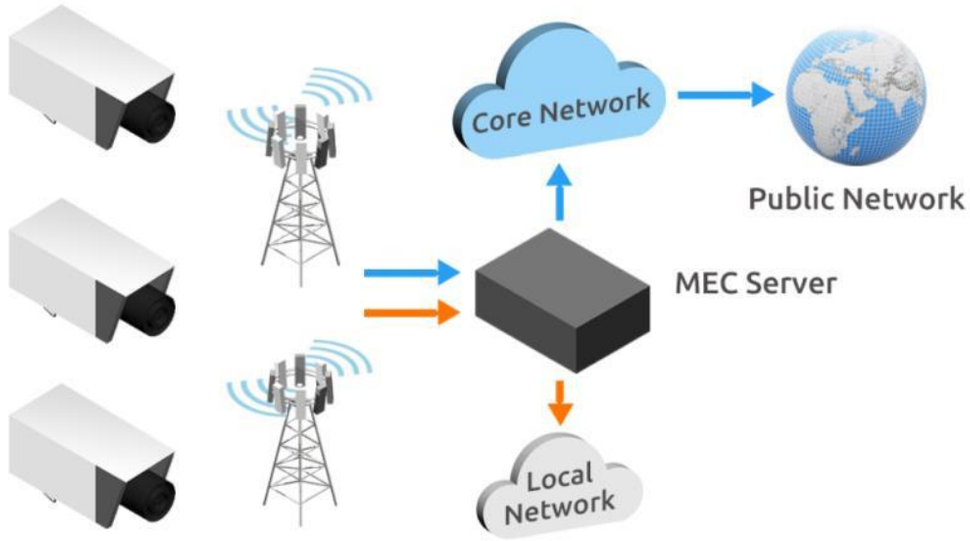


5G AGV

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Stories: 5G+, VR/AR, VA





VR/AR MEC Server

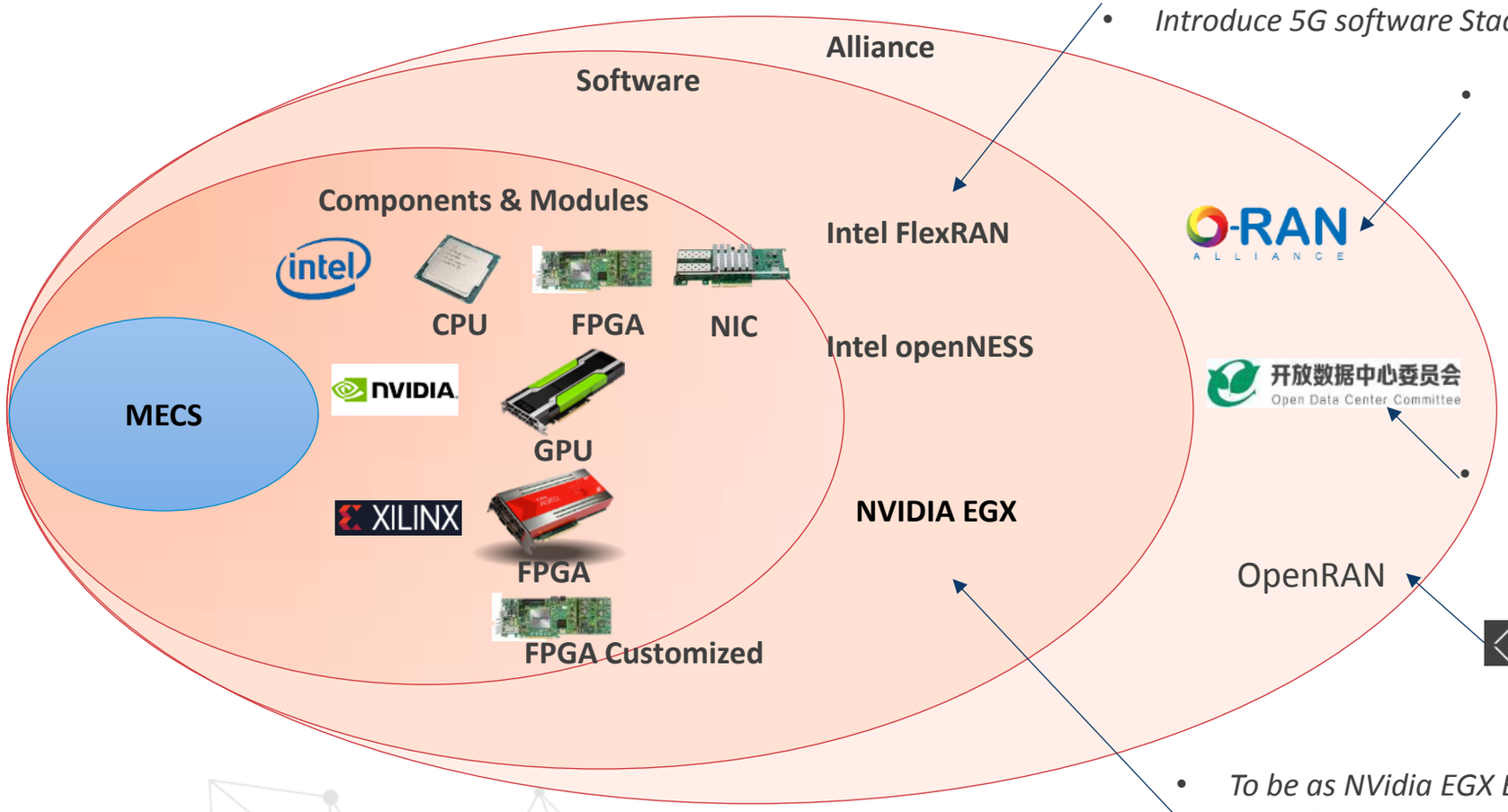


Super Brain Server



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Eco-System for lower TCO



- *Pre-integrated Intel FlexRAN/openNESS*
- *Introduce 5G software Stack partners to customers*
- *Adopting OTII spec as ORAN DU spec*
- *One of OTII project initiator;*
- *To be as NVidia EGX Edge Server partners*
- *Co-selling, like CMCC PoC project*

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CSA Roadmap

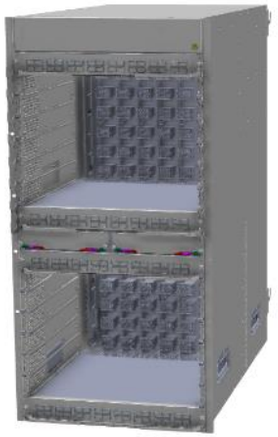
Tb

76xx

CLOS 2.0



CSA-7608



CSA-7616



CSA-7604

40~100G

74xx



CSA-7400

Upgrade with Intel Roadmap

10~40G

72xx



CSA-7210

Upgrade with Intel Roadmap

2018 2019 2020 2021 2022

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CSA Product Portfolio





CSA-5200/5100
Single E3/core-I CPU
4 NIMs

Entry Level



CSA-7200/7210
Dual E5/Scalable CPU
8 NIMs

Rich I/O



CSA-7400
4 Compute Nodes,
360G Throughput

High Compute Performance &Throughput

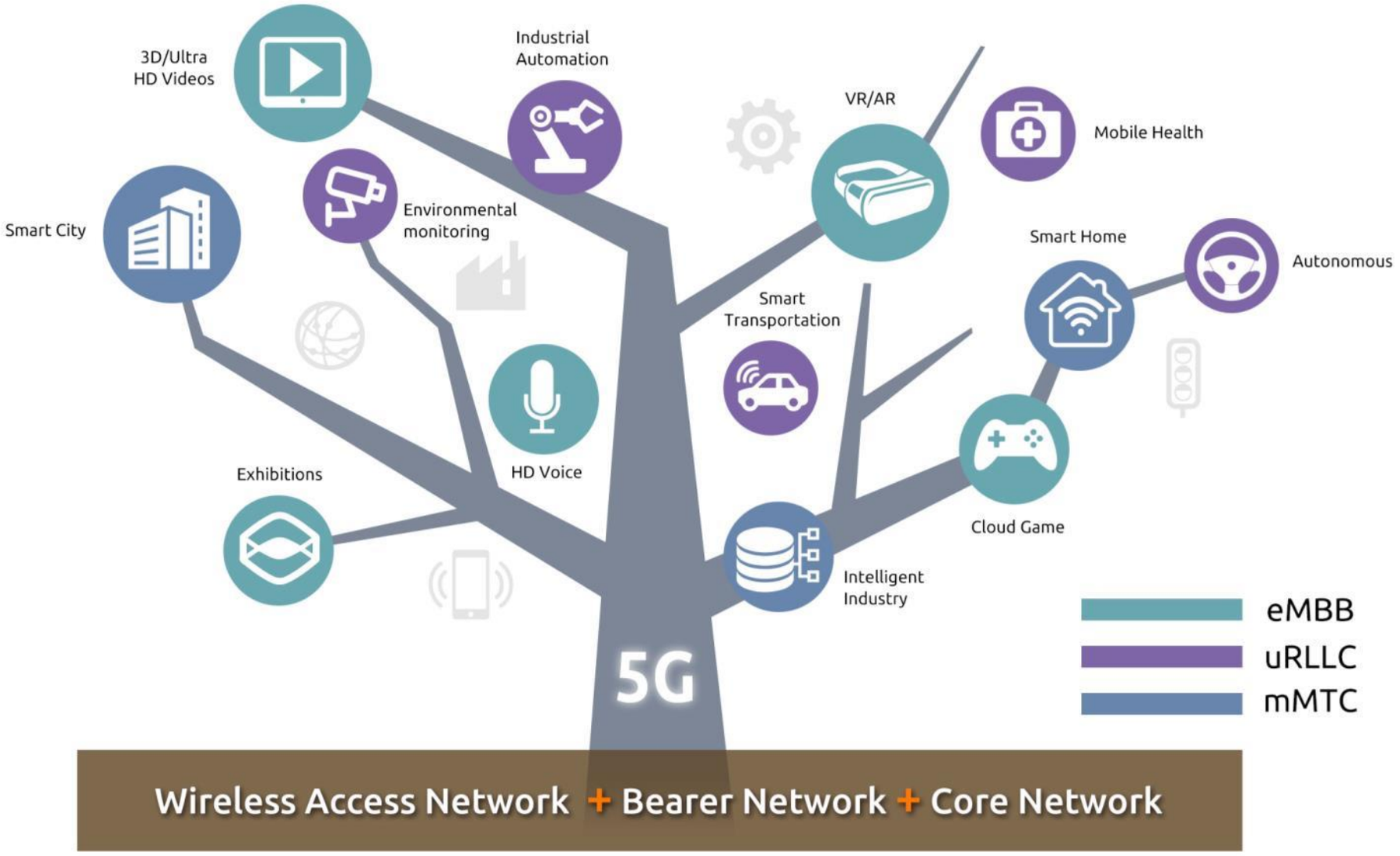


CSA-7608
12 Compute Nodes
Barefoot Programmable Switch

All in Network Packet Broker

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5G Network as the Foundation Makes the Imagination Comes True



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THANK YOU

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