

Transforming 5G Networks With Disaggregated Cell Site Gateways

October 20, 2020

Sponsored by



Today's Presenters



Sterling Perrin

Sr. Principal Analyst – Optical Networking & Transport, Heavy Reading



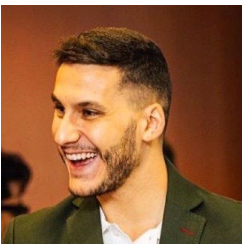
Ray Chang

Director, Research & Development, UfiSpace



Shaji Nathan

VP of Product Marketing, IP Infusion



Diego Mari Moreton

Connectivity Technologies and Ecosystems Manager, Facebook

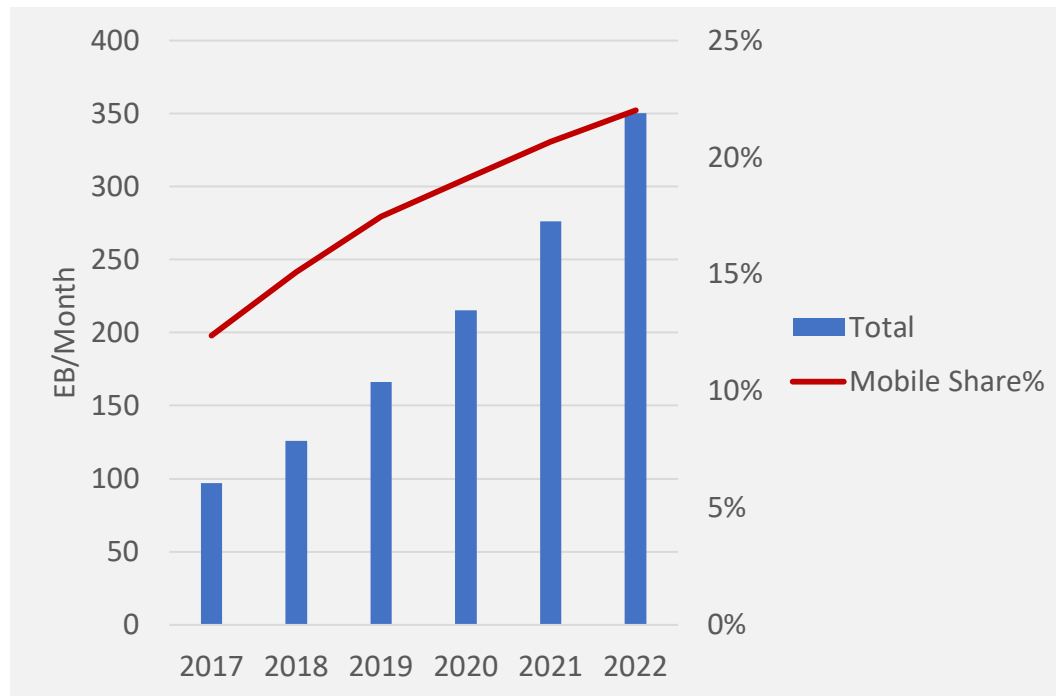
Agenda

- Disaggregation in Telecom
- TIP: The Disaggregated Network - DCSG
- 5G X-haul Use Cases
- DCSG in APT's Network
- Questions & Answers

Mobile Revolution Also Poses Challenges

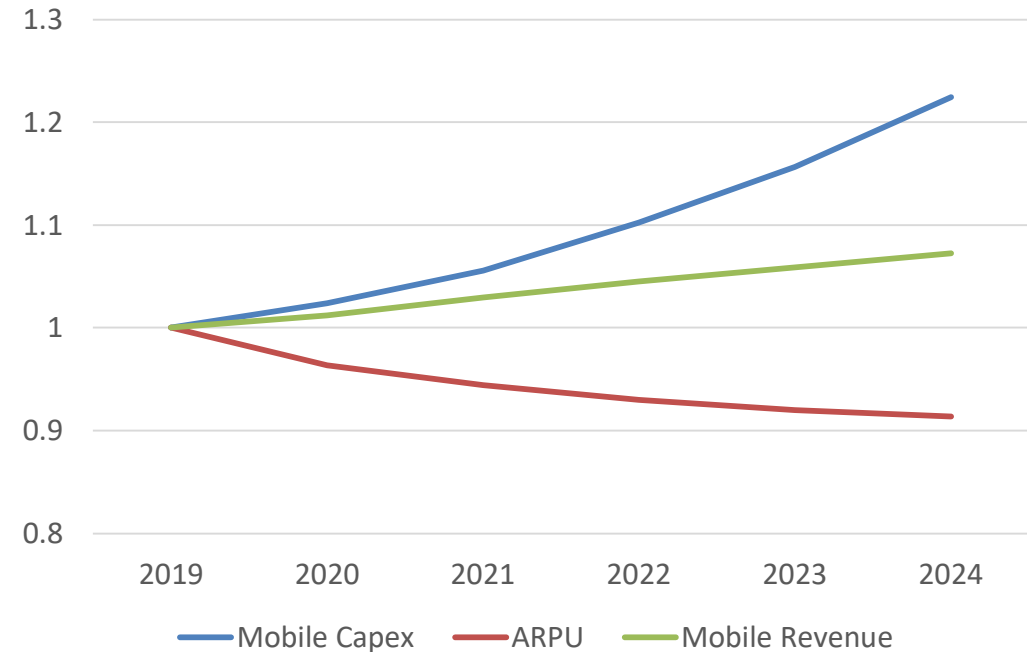
- Internet traffic: 29% CAGR
- Mobility impacts cannot be ignored

Global Internet Traffic and Mobile Share, 2017-2022



Note: Excludes Managed IP Traffic, Source: Cisco VNI, 2019

Growth in global mobile revenue, ARPU, and capex: 2019-24



Source: Omdia, March 2020

- Mobile capex rising faster than revenue
- Global ARPUs on the decline

Disaggregation Defined

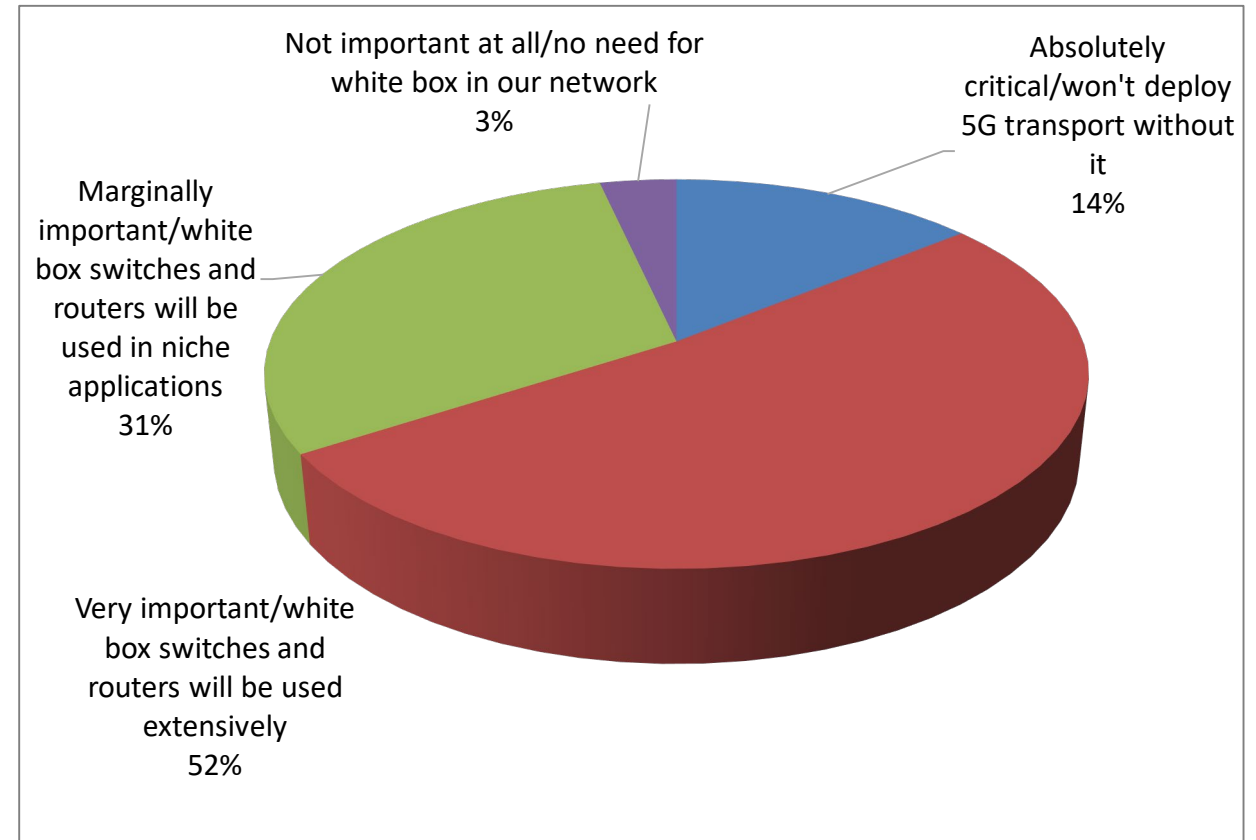
- The separation of networking equipment into **functional components** and allowing each component to be individually deployed:
 - Encompasses separation of software OS from underlying hardware
 - Requires open APIs to enable SDN control
- Degrees of disaggregation exist
 - Vertical vs. horizontal disaggregation
 - Not one size fits all in the market
- **White Box** is a specific subset of disaggregation that requires open spec hardware produced by contract manufacturers
 - White box has its own benefits and challenges



Operators Look to Open and Disaggregated Networks

- Break vendor-proprietary lock-in
- Reduce network costs
- Offer new services and monetization opportunities
- Enable faster innovation with diverse ecosystem

Importance of white box switches/routers for 5G transport



n=85

Source: Heavy Reading

Disaggregated CSG: Challenges are Two-fold

- Can disaggregated products meet key transport performance requirements in:
 - Aggregate capacity?
 - Latency?
 - High density of 10GE+ interfaces?
 - Slicing?
 - Lowest cost/Gbit/s
- Can disaggregated products efficiently and economically be operationalized (without skyrocketing opex)?

Industry Support for Open Fixed and Mobile Access Networks



- SDN-Enabled Broadband Access (SEBA) reference design
- Virtual OLT Hardware Abstraction (VOLTHA)



Telco Project Group



- Operator Defined Next Generation RAN Architecture and Interfaces



- Open Broadband-Broadband Access Abstraction (OB-BBA)

DCSG work fits here



- OpenRAN
- Open Optical & Packet Transport



Major and Growing Tier 1 Operator Support:

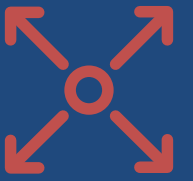
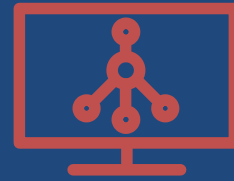
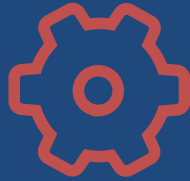


The Disaggregated Network – DCSSG



Diego Marí Moretón

Connectivity technologies and Ecosystems Manager Facebook



IDEA

SPECIFICATION

BUILD

TEST

RELEASE

DEPLOY

Q1 2018

TODAY



IDEA

SPECIFICATION

BUILD

TEST

RELEASE

DEPLOY

Q1 2018

TODAY

IDEA

SPECIFICATION

BUILD

TEST

RELEASE

DEPLOY



IDEA

SPECIFICATION

BUILD

TEST

RELEASE

DEPLOY

IDEA

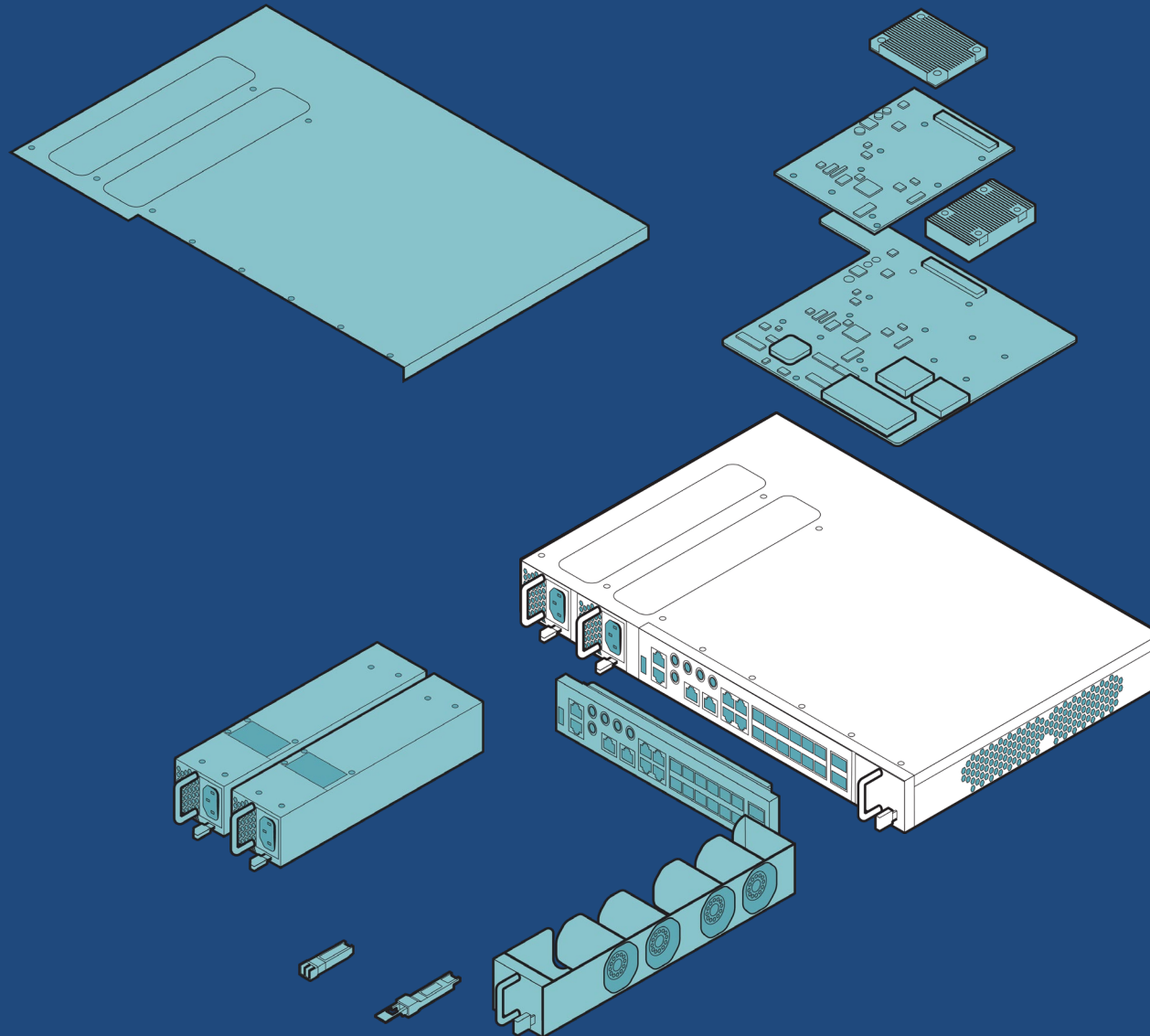
SPECIFICATION

BUILD

TEST

RELEASE

DEPLOY



IDEA

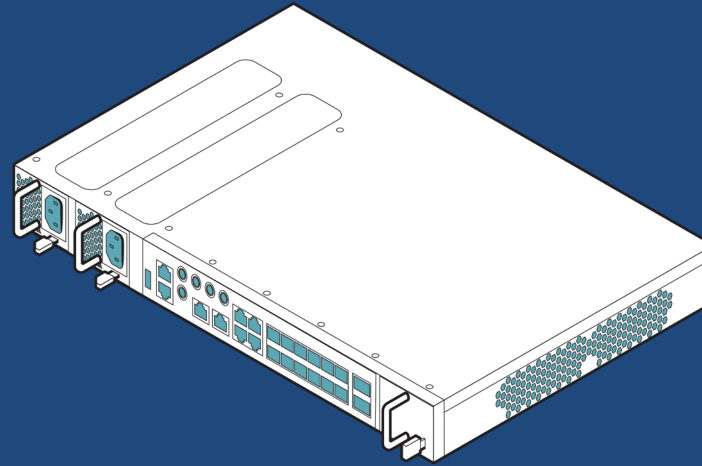
SPECIFICATION

BUILD

TEST

RELEASE

DEPLOY



IDEA

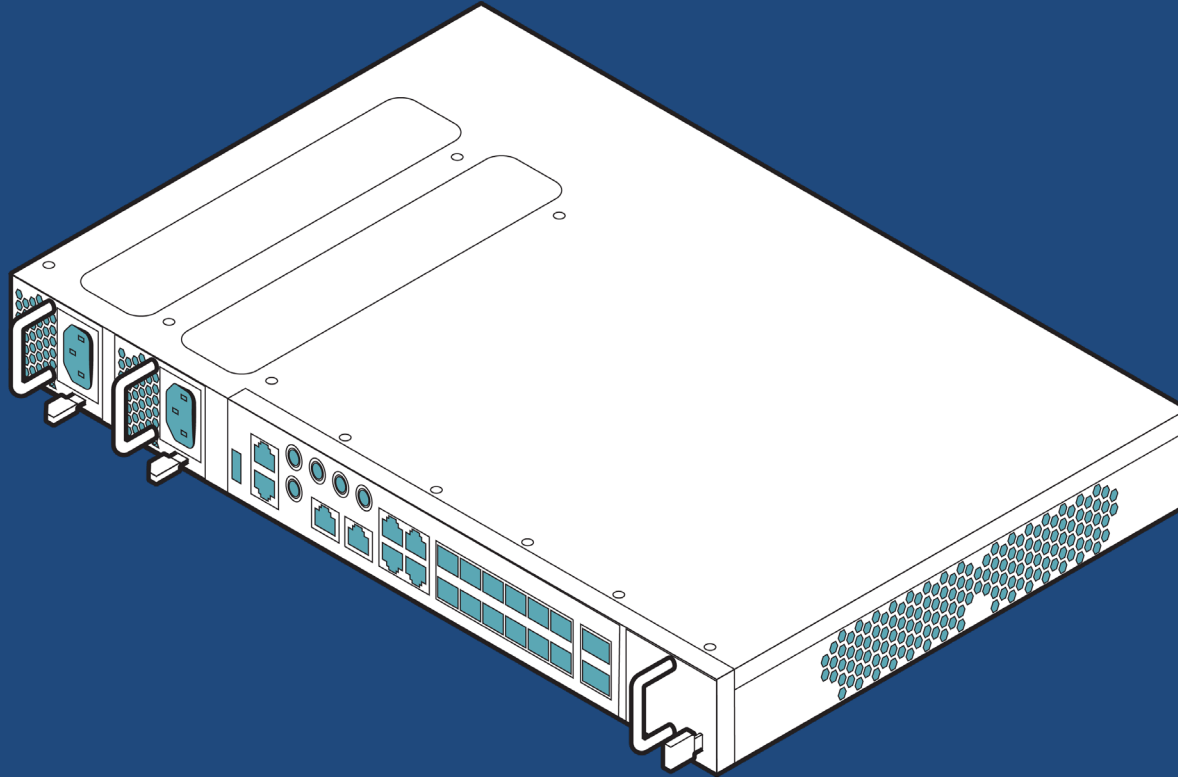
SPECIFICATION

BUILD

TEST

RELEASE

DEPLOY



Edge-core
NETWORKS

ALPHA
Alpha Networks Inc.

DELTA

ufiSpace

NIRAL
NETWORKS

DELL Technologies

alTran

ADVA
Optical Networking

Infinera

exaware

VOLTA
Networks

ipinfusion

DATACOM

Aviat
NETWORKS

metaswitch

IDEA

SPECIFICATION

BUILD

TEST

RELEASE

DEPLOY

IDEA

SPECIFICATION

BUILD

TEST

RELEASE

DEPLOY

facebook
connectivity

telenet

Deutsche
Telekom
Telefonica

Telefonica

VTS

Telefonica

Telefonica

TIM

CPQC

vodafone

airtel

africell

MTN

vodafone

SPECTRA

亞太電信
Asia Pacific Telecom

celcom

NTT

KDDI

IDEA

SPECIFICATION

BUILD

TEST

RELEASE

DEPLOY

IDEA

SPECIFICATION

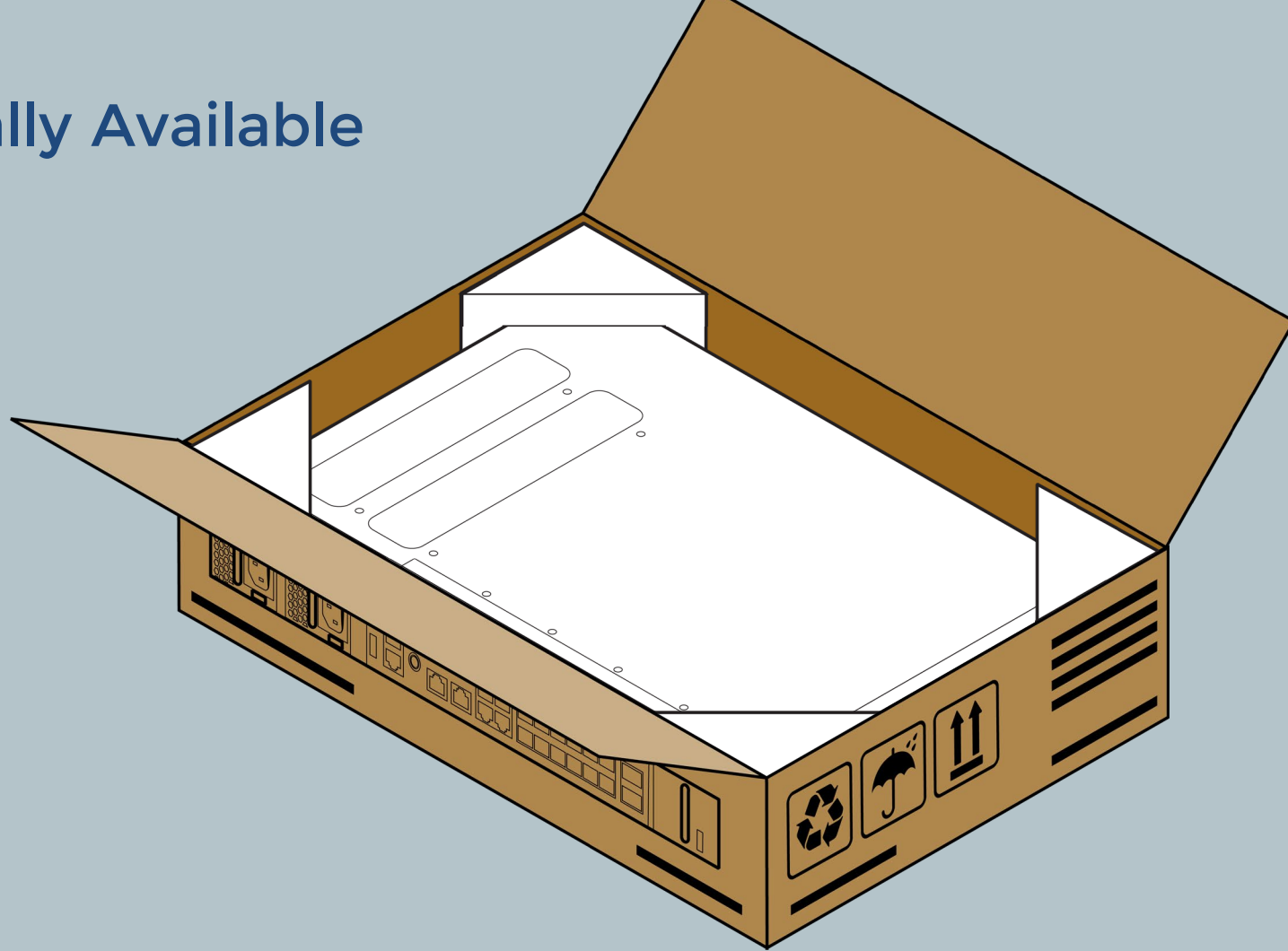
BUILD

TEST

RELEASE

DEPLOY

Commercially Available



IDEA

SPECIFICATION

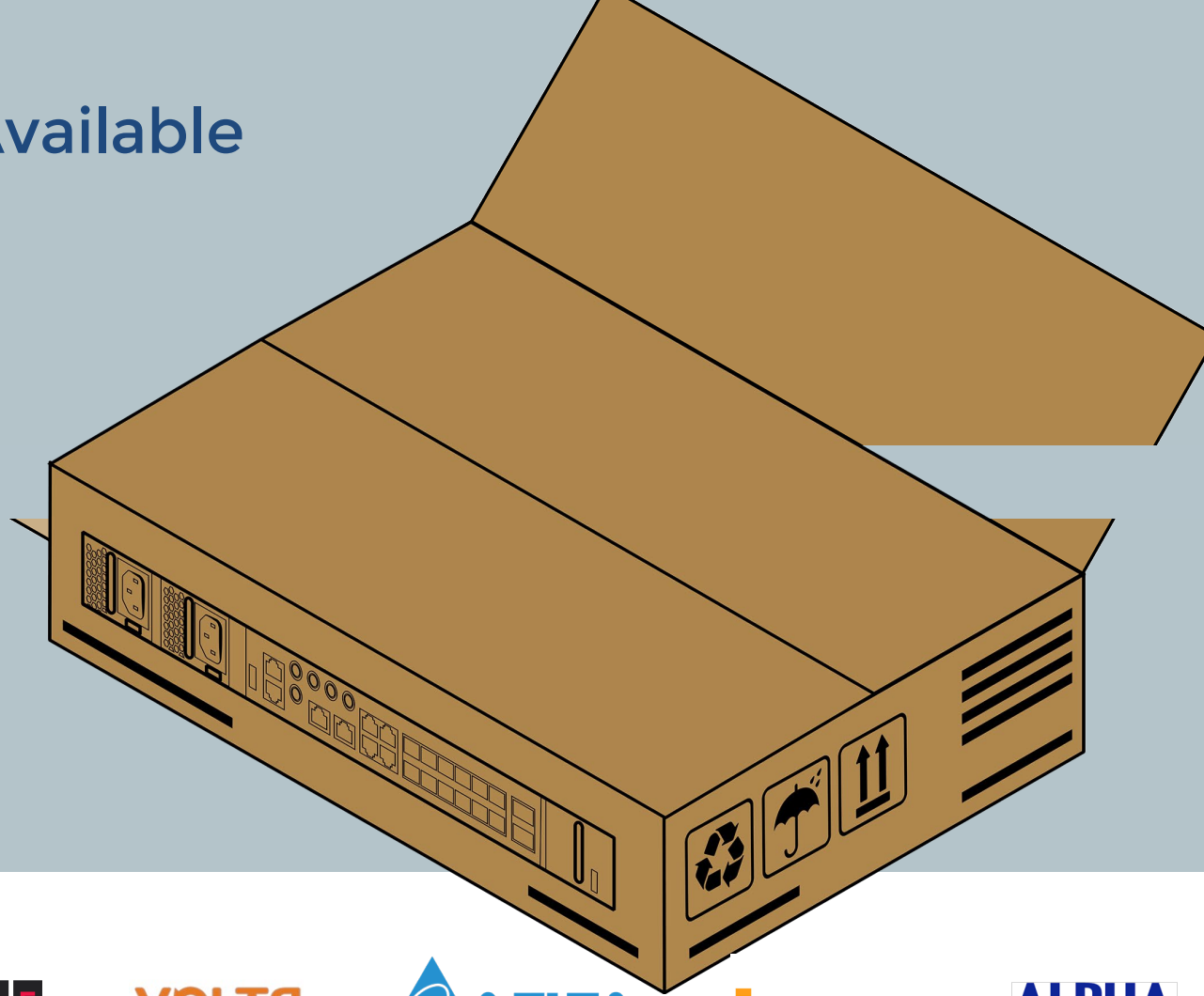
BUILD

TEST

RELEASE

DEPLOY

Commercially Available



IDEA

SPECIFICATION

BUILD

TEST

RELEASE

DEPLOY

IDEA

SPECIFICATION

BUILD

TEST

RELEASE

DEPLOY

TODAY



TODAY

IDEA

SPECIFICATION

BUILD

TEST

RELEASE

DEPLOY



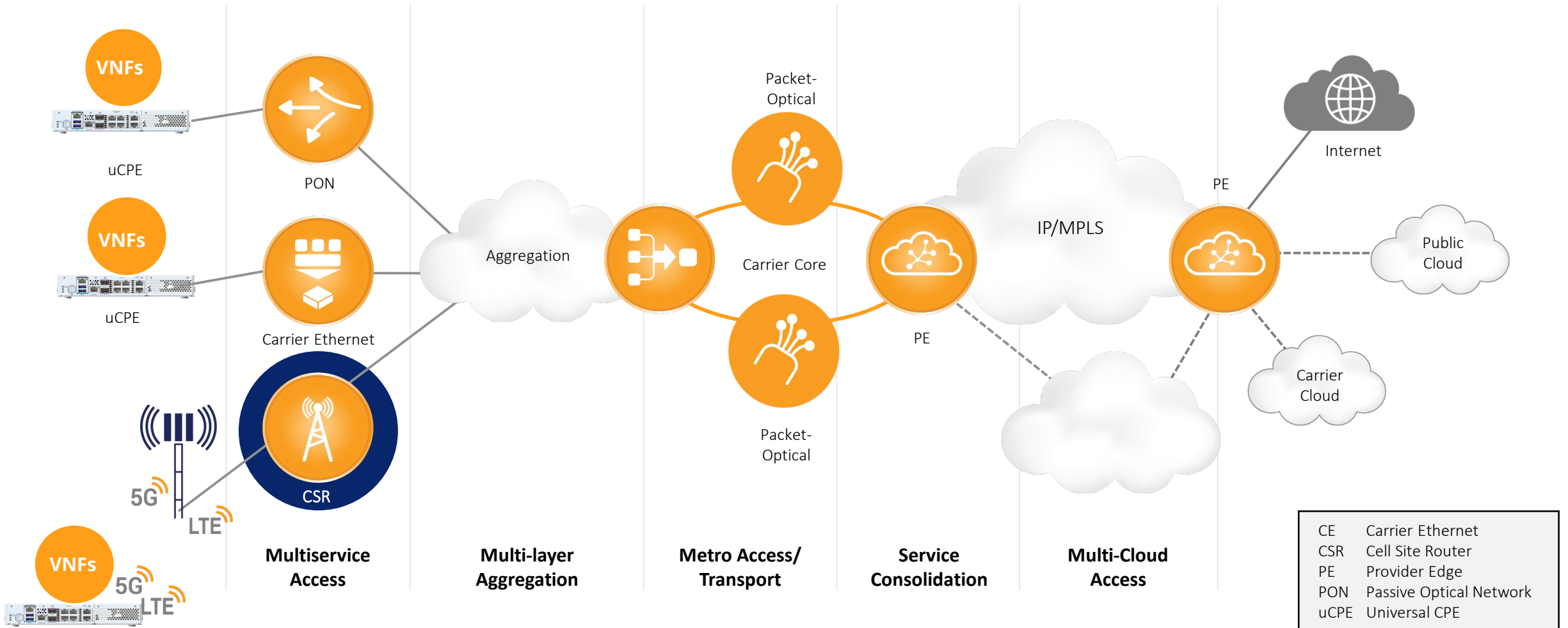
Accelerating Network Disaggregation

DISAGGREGATED CELL SITE GATEWAY FOR 5G X-HAUL

SHAJI NATHAN

October 20, 2020

IP Infusion: Single Platform, Multiple Use Cases



CE	Carrier Ethernet
CSR	Cell Site Router
PE	Provider Edge
PON	Passive Optical Network
uCPE	Universal CPE

ipinfusion
Use Case

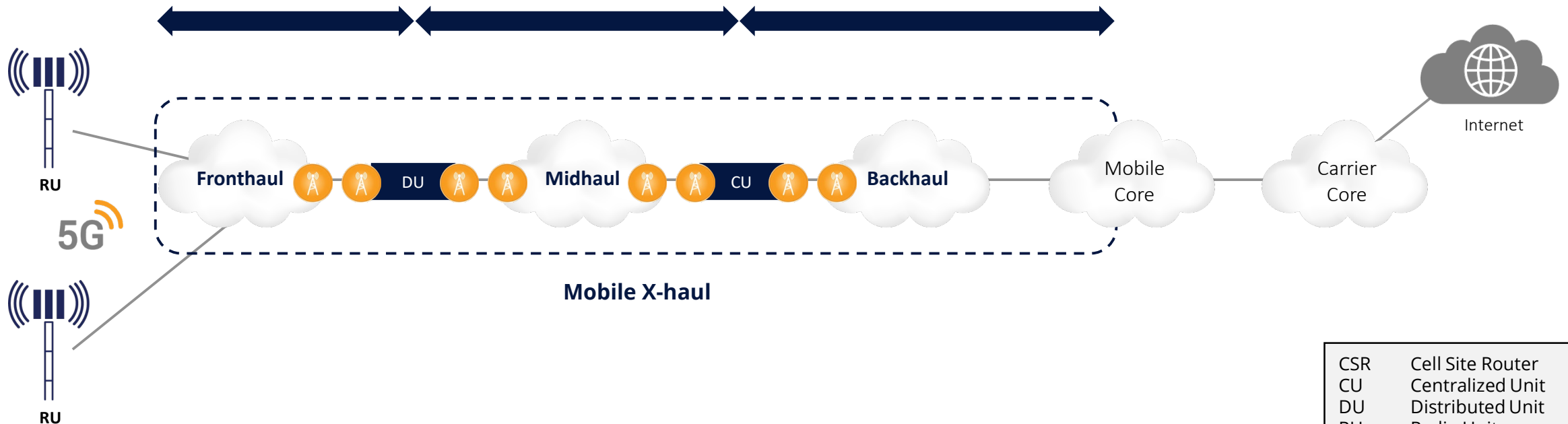


5G Mobile Transport Solution: OcNOS®

Multi-protocol, X-haul Use Cases

TIP/OCP Compliant DCSG

Reach:	< 10 G km	< 40 km	< 200 km
Latency:	< 200 μs	< 5 ms	< 20 ms
Bandwidth:	10 – 100 G	100 G+	> 100 G
L2:	Ethernet	Ethernet	Ethernet
L3:	Mgmt. only	IP/MPLS, EVPN, SR	IP/MPLS, EVPN, SR

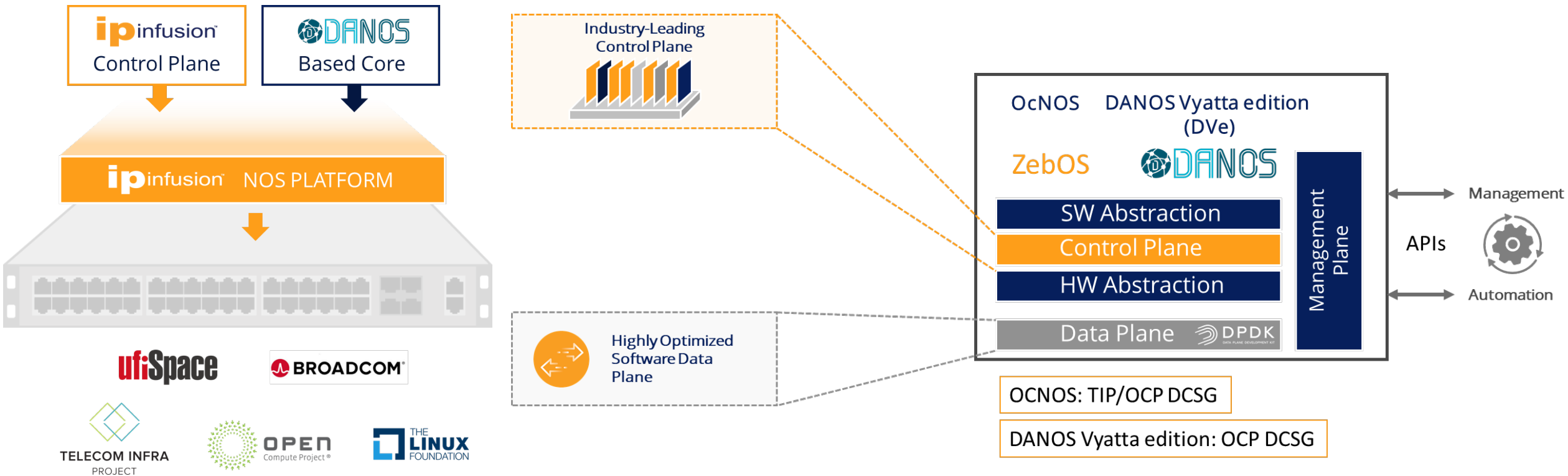


CSR	Cell Site Router
CU	Centralized Unit
DU	Distributed Unit
RU	Radio Unit
vRAN	Virtualized RAN

IP Infusion CSR NOS Platforms

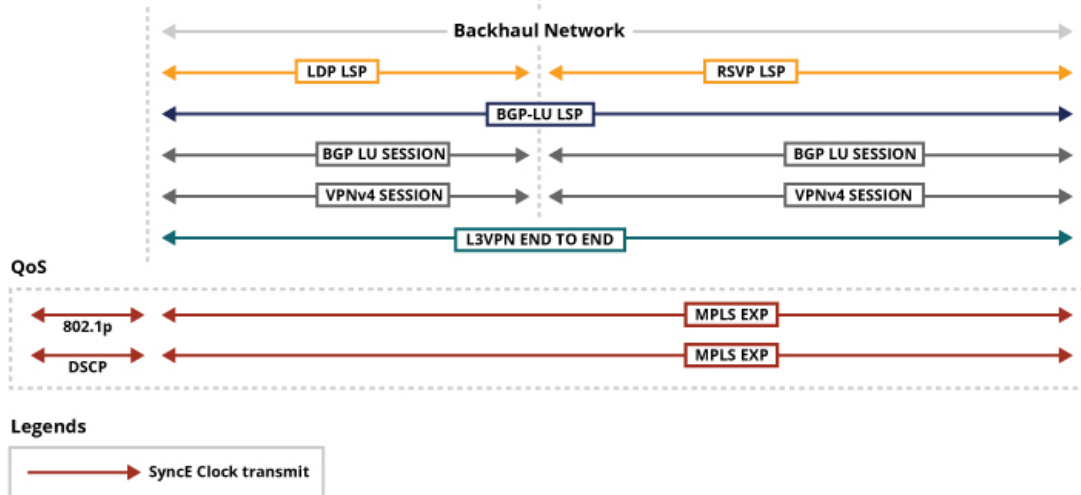
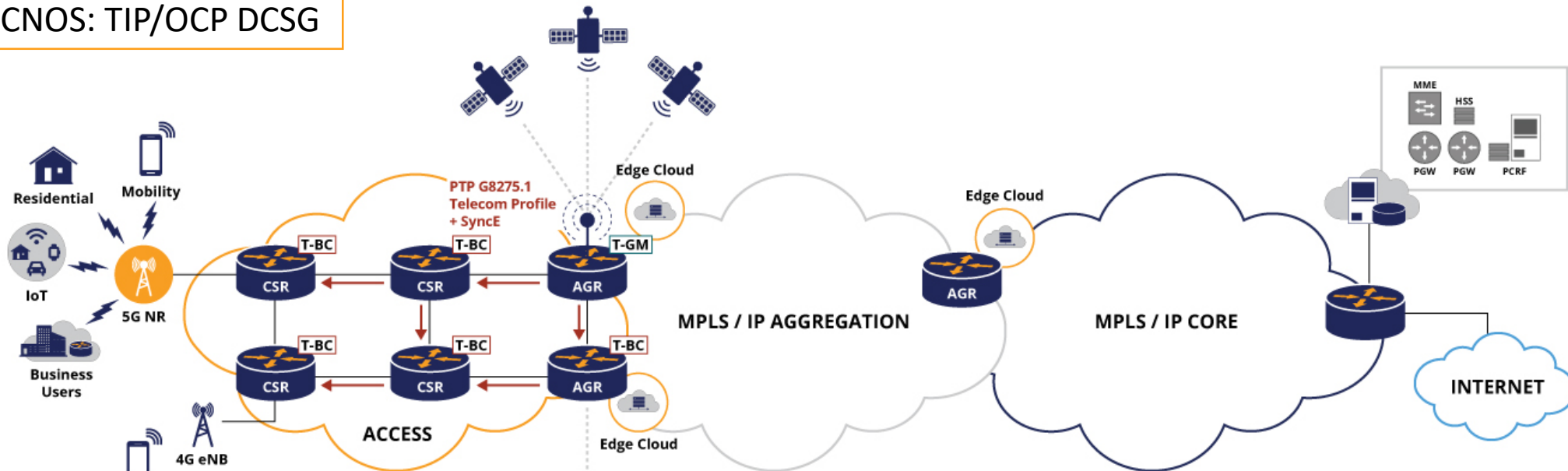
Carrier grade Network OS

- Modular
- Scalable
- Flexible
- Future ready



OcNOS® Deployment Use Case: Asia Pacific Telecom Group (Taiwan)

OCNOS: TIP/OCP DCSG



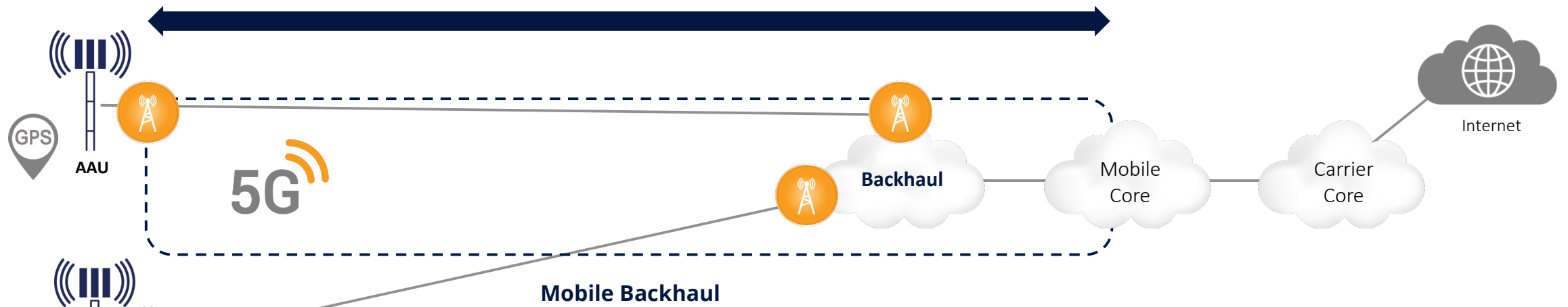
- 5G services launched in Q3; 3.5GHz
- GtTV mobile TV APP, with new 5G live broadcast
- 5G enterprise private network services
- GM Clocking for 1588v2
- Hardware: Ufispac **S9500-30XS**
- NOS: OcNOS-SP 3.0
- CLI, SNMP, NETCONF
- SR Ready IP/MPLS Transport Network

5G Transport: IP Transport Use Case: DANOS-Vyatta edition

IP Network, Backhaul Use Case

OCP Compliant DCSG

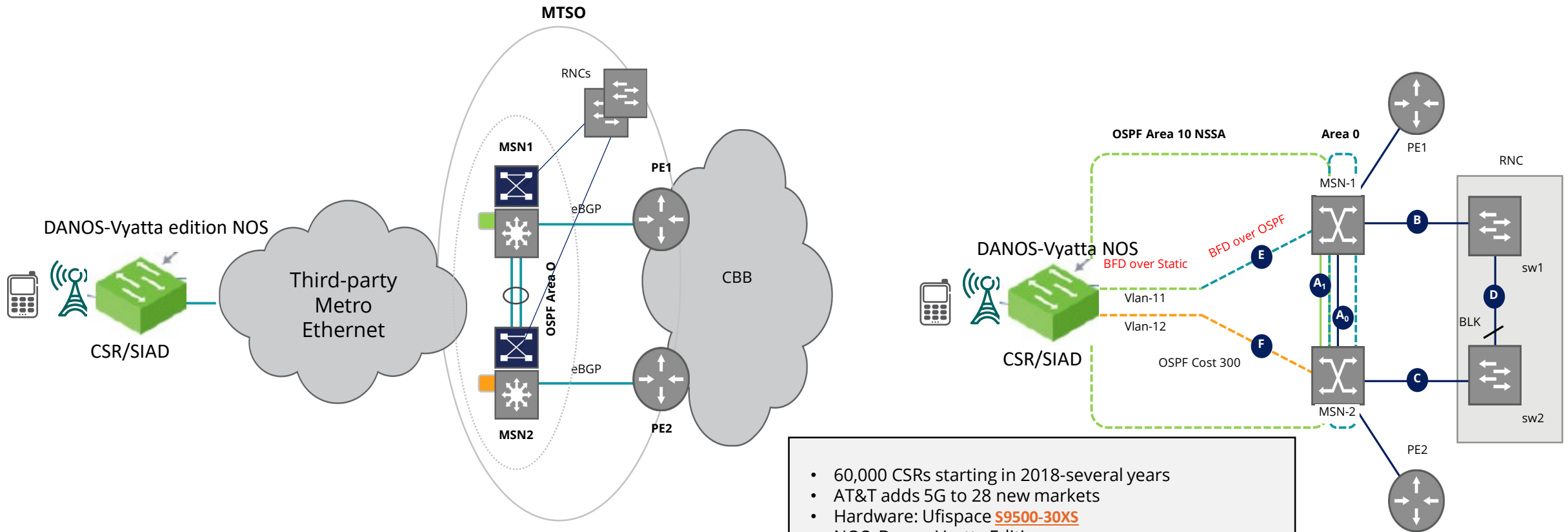
L2:	N/A	N/A	Ethernet
L3:	N/A	N/A	IP/MPLS, EVPN, SR
Timing:	N/A	N/A	N/A



- AAU Active Antenna Unit
- CSR Cell Site Router
- CU Centralized Unit
- DU Distributed Unit
- vRAN Virtualized RAN

DANOS-Vyatta edition CSR Use Case: L3 Backhaul (AT&T use case)

DANOS-Vyatta edition: OCP DCSG



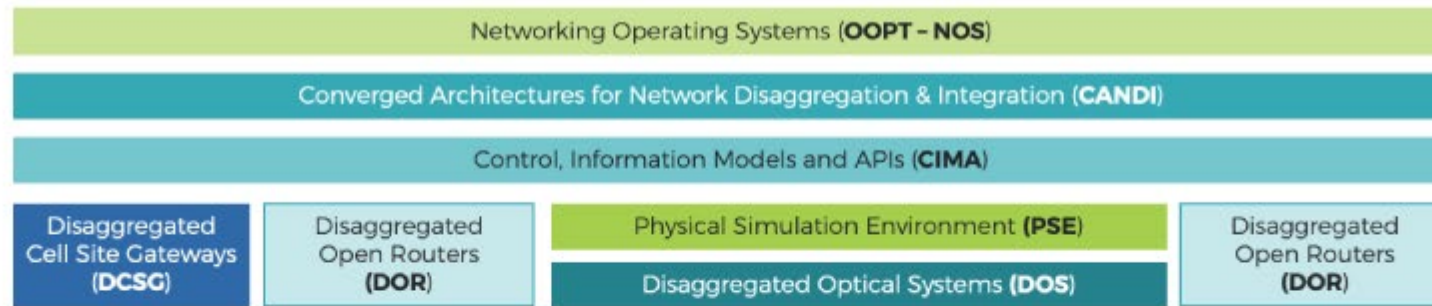
- 60,000 CSRs starting in 2018-several years
- AT&T adds 5G to 28 new markets
- Hardware: Ufispac **S9500-30XS**
- NOS: Danos-Vyatta Edition
- SR Ready IP Transport Network
- 2.9 Million Subscriber Network

IP Infusion Solutions within TIP Framework



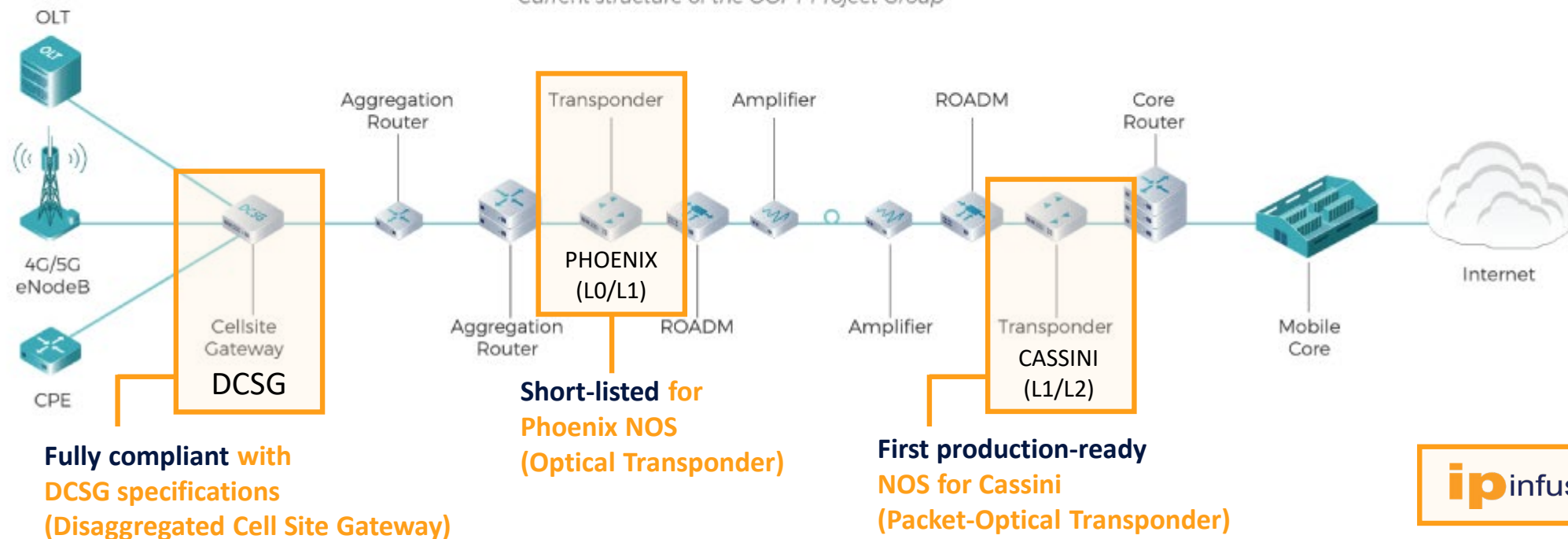
TELECOM INFRA
PROJECT

Building Open and Disaggregated Transport Networks



Collaborate in testing disaggregated solutions at new TIP Community Labs

Current structure of the OOPT Project Group



IP Infusion Solution Recap

Cell Site Router Solutions

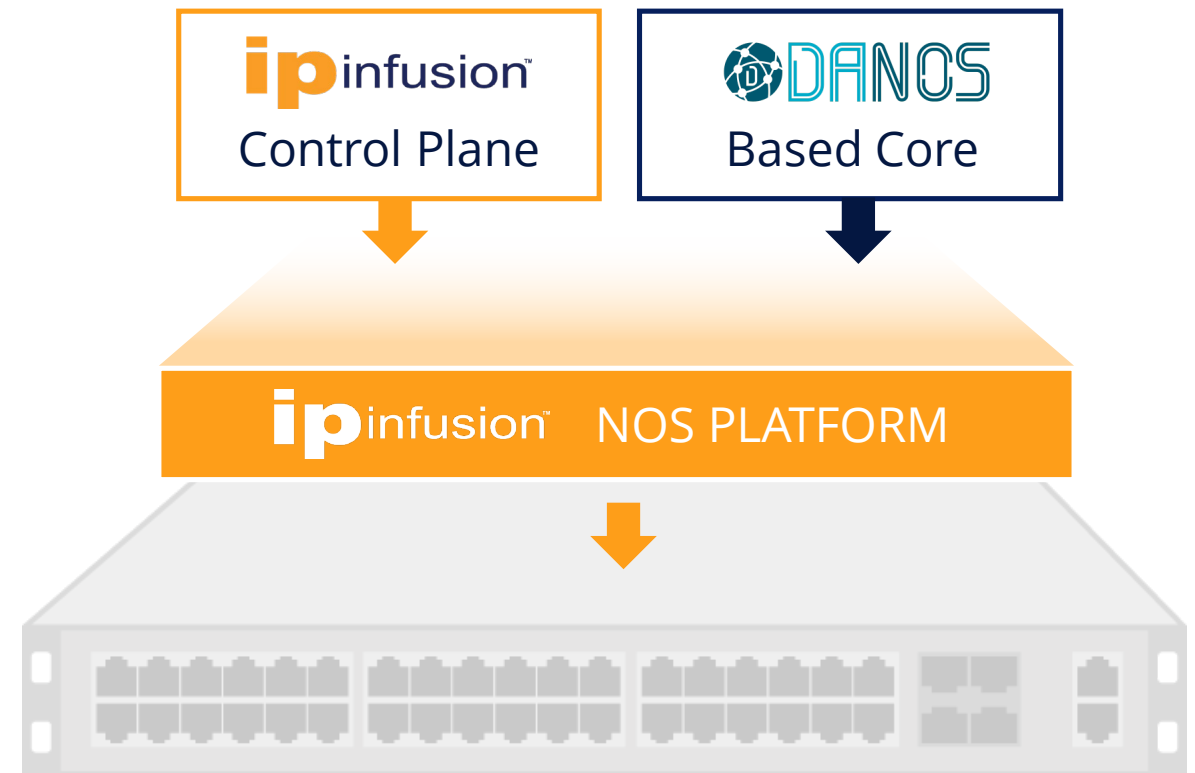
Open, common platform

Enable disaggregated, X-haul use cases

Industry-leading control plane

Lower TCO

Advanced Network Services



ufiSpace

BROADCOM

TELECOM INFRA
PROJECT

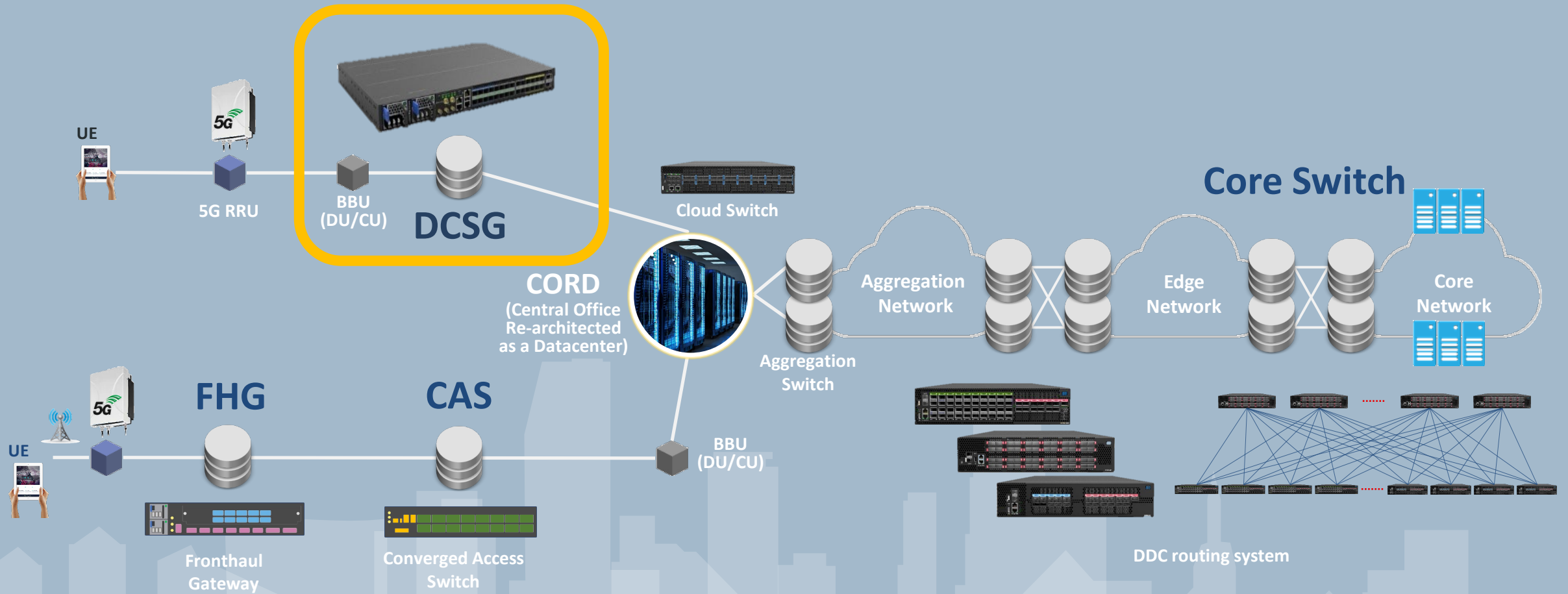
OPEN
Compute Project

THE
LINUX
FOUNDATION

Transforming 5G Networks With Disaggregated Cell Site Gateways

Oct. 20th, 2020

Network Upgrade & the Move to White Box

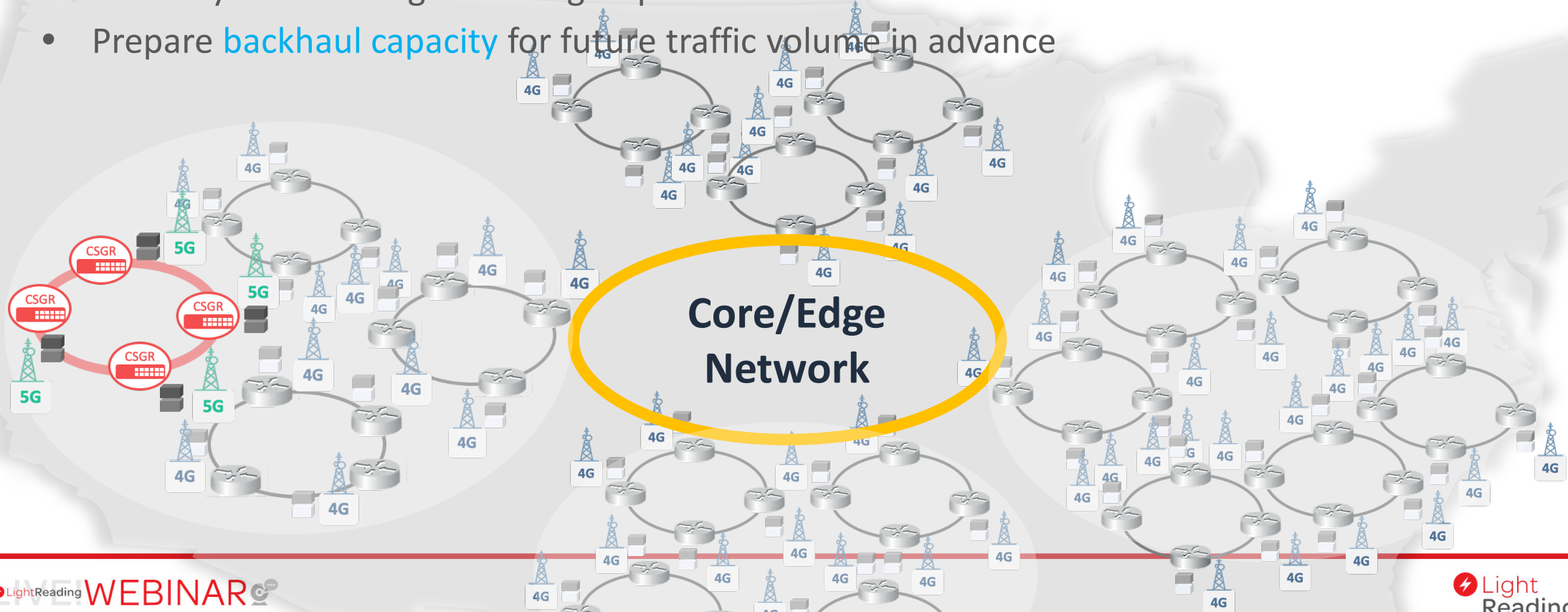




Why Start with Cell Site Gateways?

Start from cell site to realize ROI:

- Upgrade in ring basis, minimize impact for carrier's entire network architecture
- Traffic pattern is simpler than other parts of network
- Easy to start small with minimal investment
- Be ready to the stringent timing requirement of 5G RAN
- Prepare **backhaul capacity** for future traffic volume in advance



S9500-30XS Disaggregated Cell Site Gateway

- Rich features to enable versatile applications
- First in the industry carrying 5G live traffic



- Individual baseboard management controller (BMC) operation for monitoring and recovery of platform health status.

- Intel® Broadwell-DE 4-Core 1.5G
- Broadcom **Quram-AX Silicon** with 3GB external packet Buffer
- Deliver high performance switching capacity



- Rich timing input/output interfaces: **GNSS, ToD, BITS, 1PPS and 10MHz**
- Supports **full SyncE and IEEE 1558V2** (T-GM, T-BC, T-TC, and T-TSC)

- 20-port 100M/1GE/10GE SFP+
- Support for **legacy BBU**
- Support **ZR+** (Blue label)

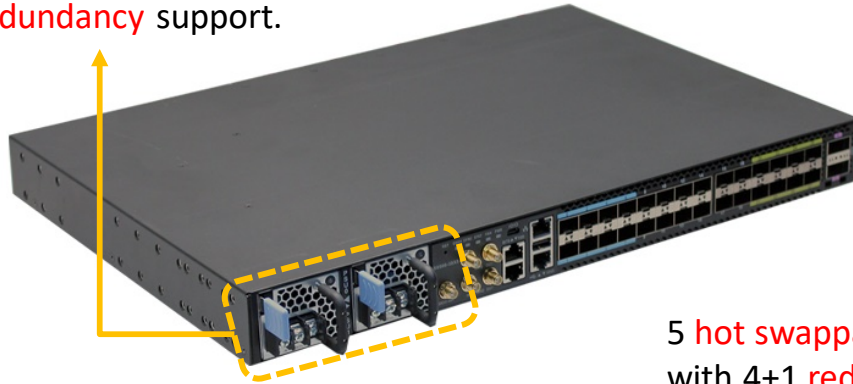
- 8-port 1GE/10GE/25GE SFP28
- Fulfill bandwidth demand of **5G BBU**

- 2-port 40GE/100GE QSFP28
- Upgrade backhaul **capacity up to 100G**
- Support **MACsec** to enable extra data security

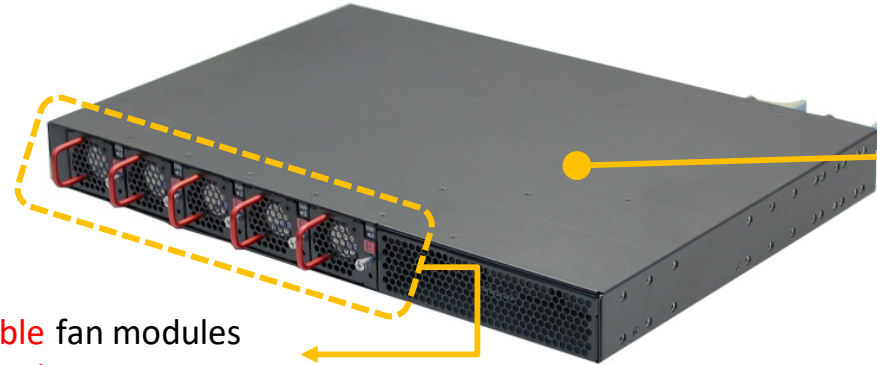
High Availability & High Durability Designed for Any Environment

S9500-30XS DCSG

2 hot swappable power supplies with 1+1 redundancy support.



5 hot swappable fan modules with 4+1 redundancy support.



Temperature hardened design meets TP76200 requirements designed for operation in GR-3108 Class 2 OSP (Outside Plant) cabinets (NEBS Level 3) for cell site backhuls

S9500-22XST DCSG



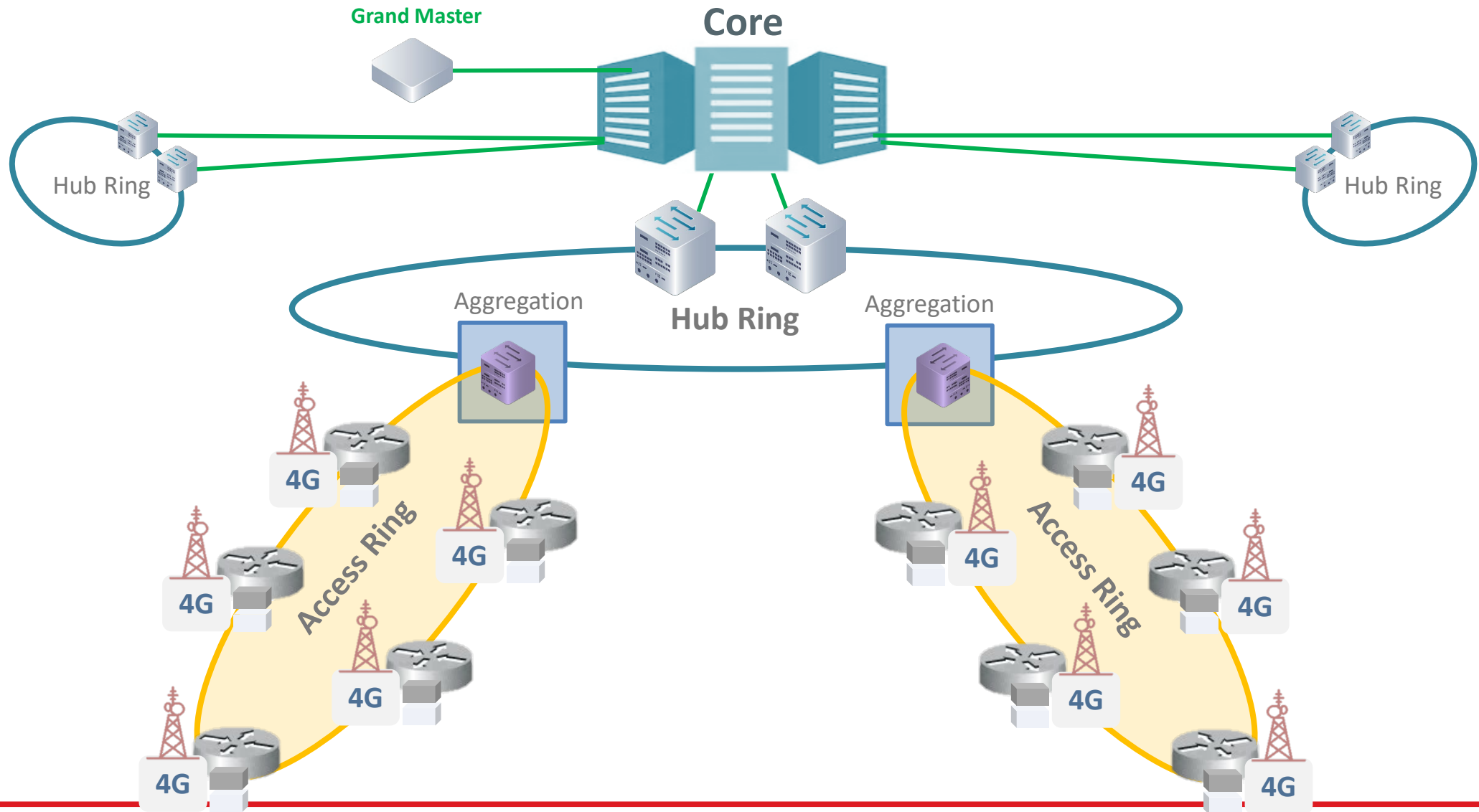
- 4x1GE RJ45+ 8x10GE SFP+
- 8x25GE SFP28 + 2x100GE QSFP28

S9501-28/18/16SMT DCSG-LITE

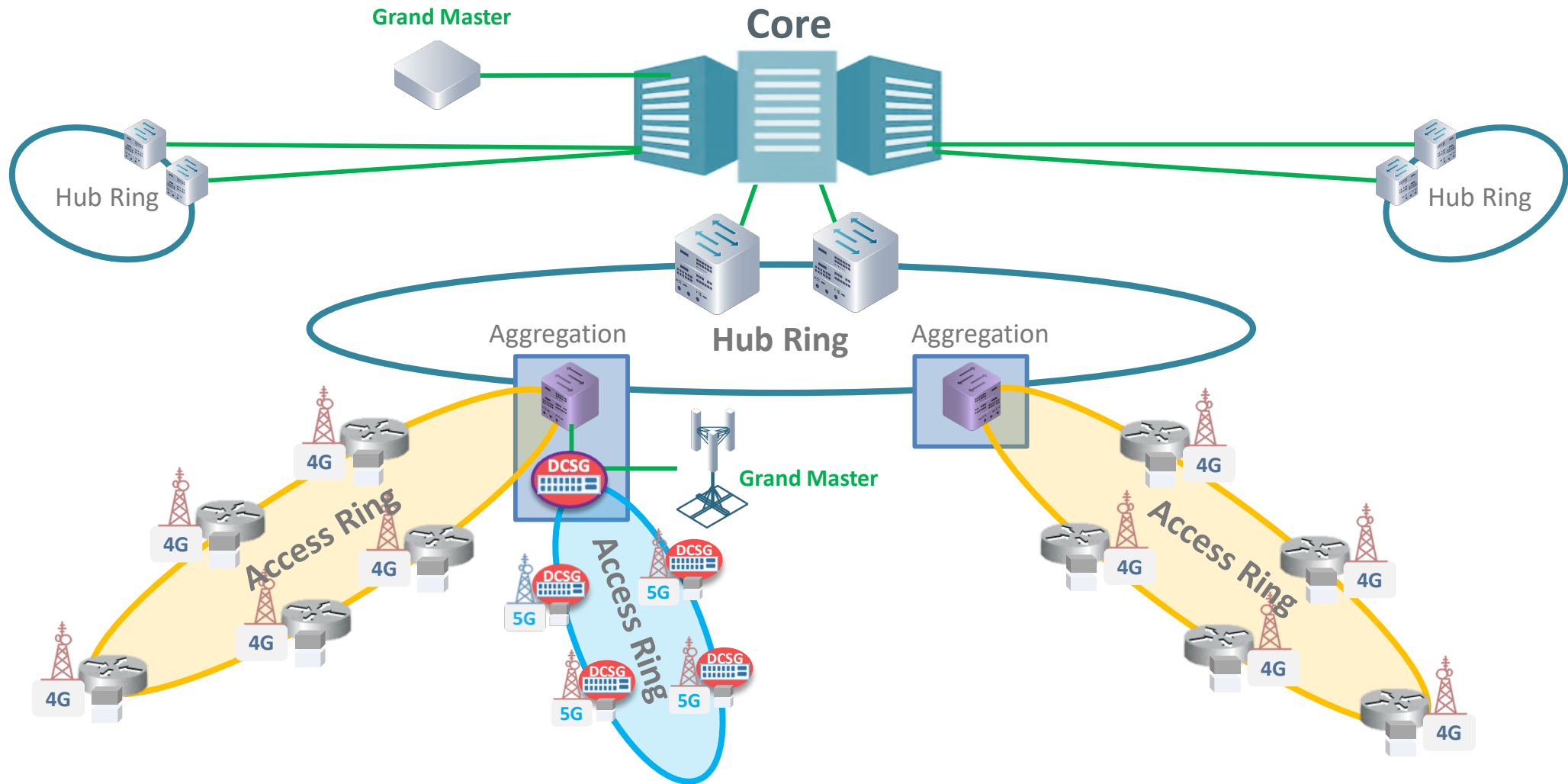


- 4x1GE RJ45 + 8/16x2.5GE SFP
- 4/6/8x10GE SFP+

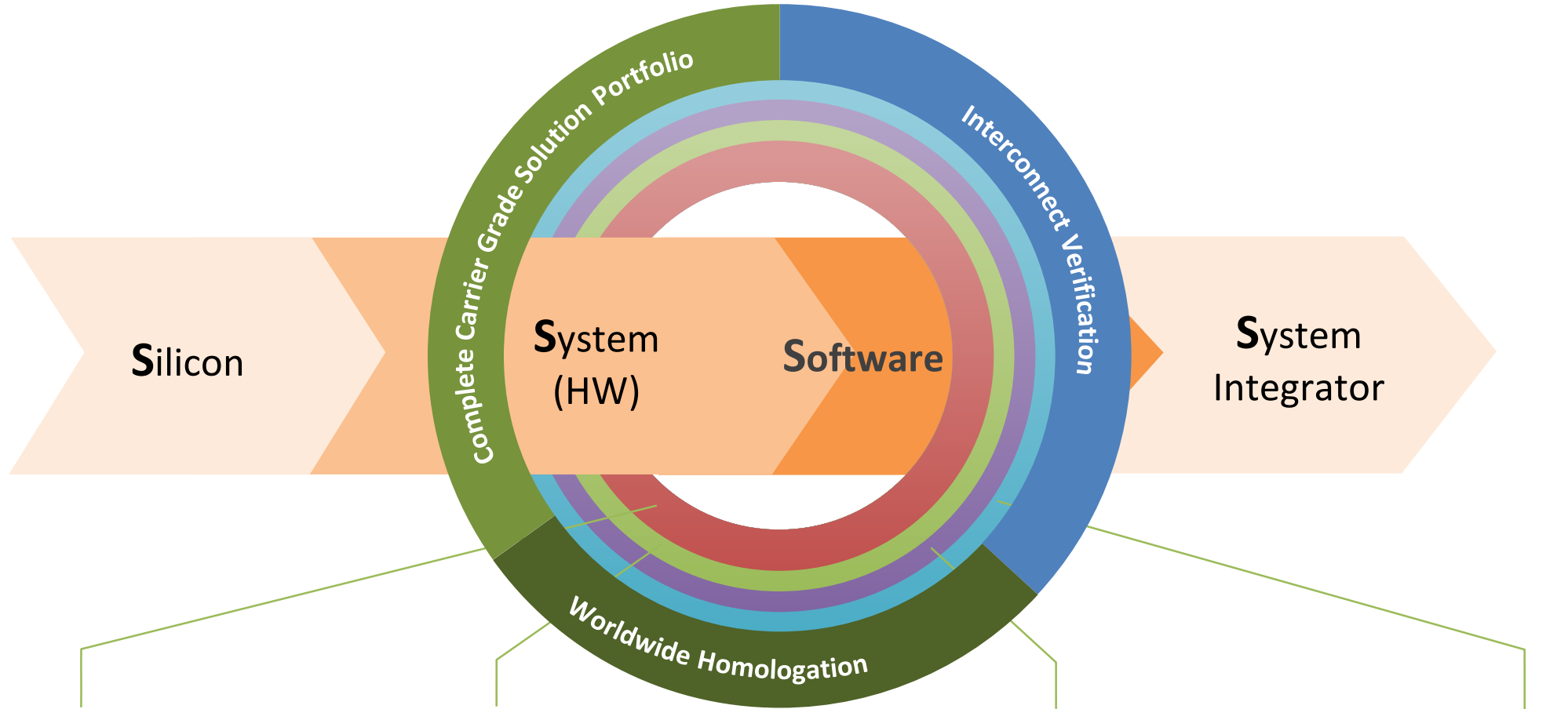
APT Case – Current 4G Configuration



APT Case – 5G Deployment



What Makes UfiSpace Unique?



Advanced Engineering Capabilities



Partner with **world-wide No.1 EMS** manufacturing and engineering services.

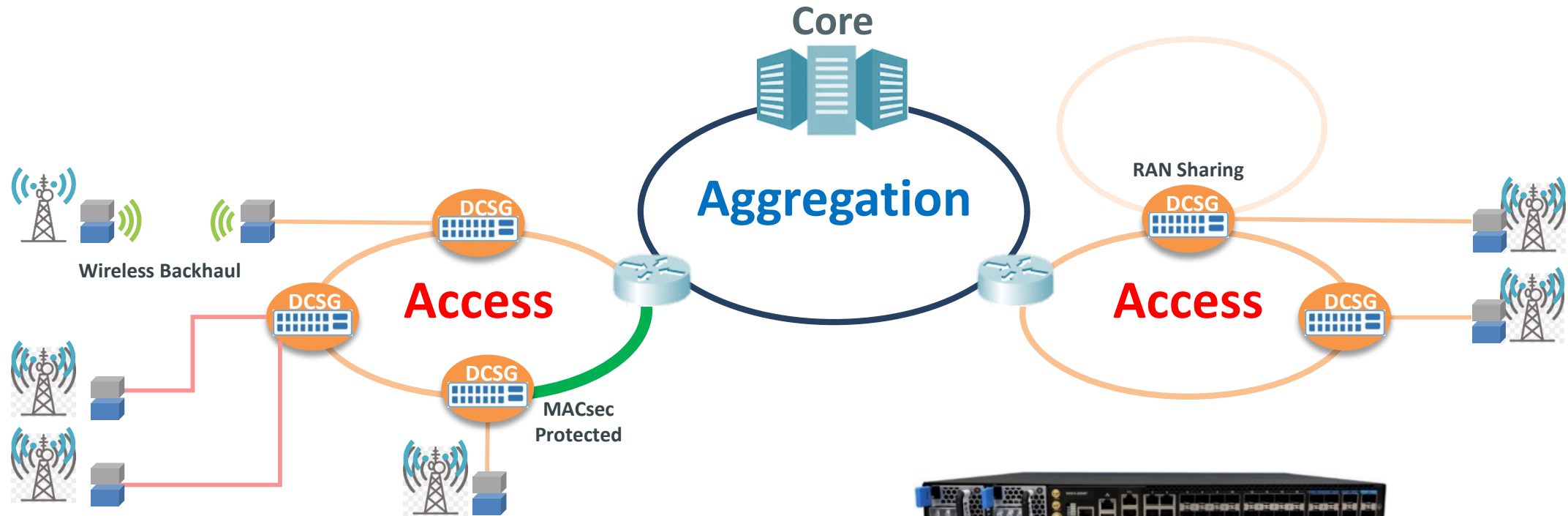


Industry First Disaggregated Open Routers carrying live internet traffic across carrier's network for its customers.



Stay Ahead of Business Rivals 1.5 years in Technology Performance. UfiSpace can focus on next generation rather than chasing trends.

Additional DCSG Application Scenarios



S9500-30XS/22XST
1G/10G/25G/100G



S9501-28/18/16SMT
1G/2.5G/10G

Full Range of Solutions for Diverse Requirements

Your customer needs *flexibility* and we'll provide that for you with our *full range* of solutions!

Model	S9500-30XS		S9500-22XS		S9501-28SMT	S9501-18SMT	S9501-16SMT
Use Case	High Service Capacity Max. 100G Metropolitan/Scenic spot Reserve for future demand				Medium Service Capacity Max. 10G Suburb/Rural area Budget deployment		
ASIC	QAX				QUX		
Ports	100G	2x QSFP28	2x QSFP28		N/A	N/A	N/A
	25G	8x SFP28	8x SFP28		N/A	N/A	N/A
	10G	20x SFP+	8x SFP+		8x SFP+	6x SFP+	4x SFP+
	2.5G	N/A	N/A		16x SFP	8x SFP	8x SFP
	1G	N/A	4x RJ45		4x RJ45	4x RJ45	4x RJ45
Features	T-GM/T-BC/T-TC/T-TSC MACsec		T-GM/T-BC/T-TC/T-TSC		T-GM/T-BC/T-TC/T-TSC MACsec		T-BC/T-TC/T-TSC
Availability	Mass Production		Sample Ready		Sample Ready	Sample Ready	Sample Ready



UFI SPACE

3F., No.109, Jhongcheng Rd.,
Tucheng Dist., New Taipei City, Taiwan



OUR EMAIL
sales@ufispace.com



OUR PHONE
+886-2- 5572 4260



OUR WEBSITE
www.ufispace.com