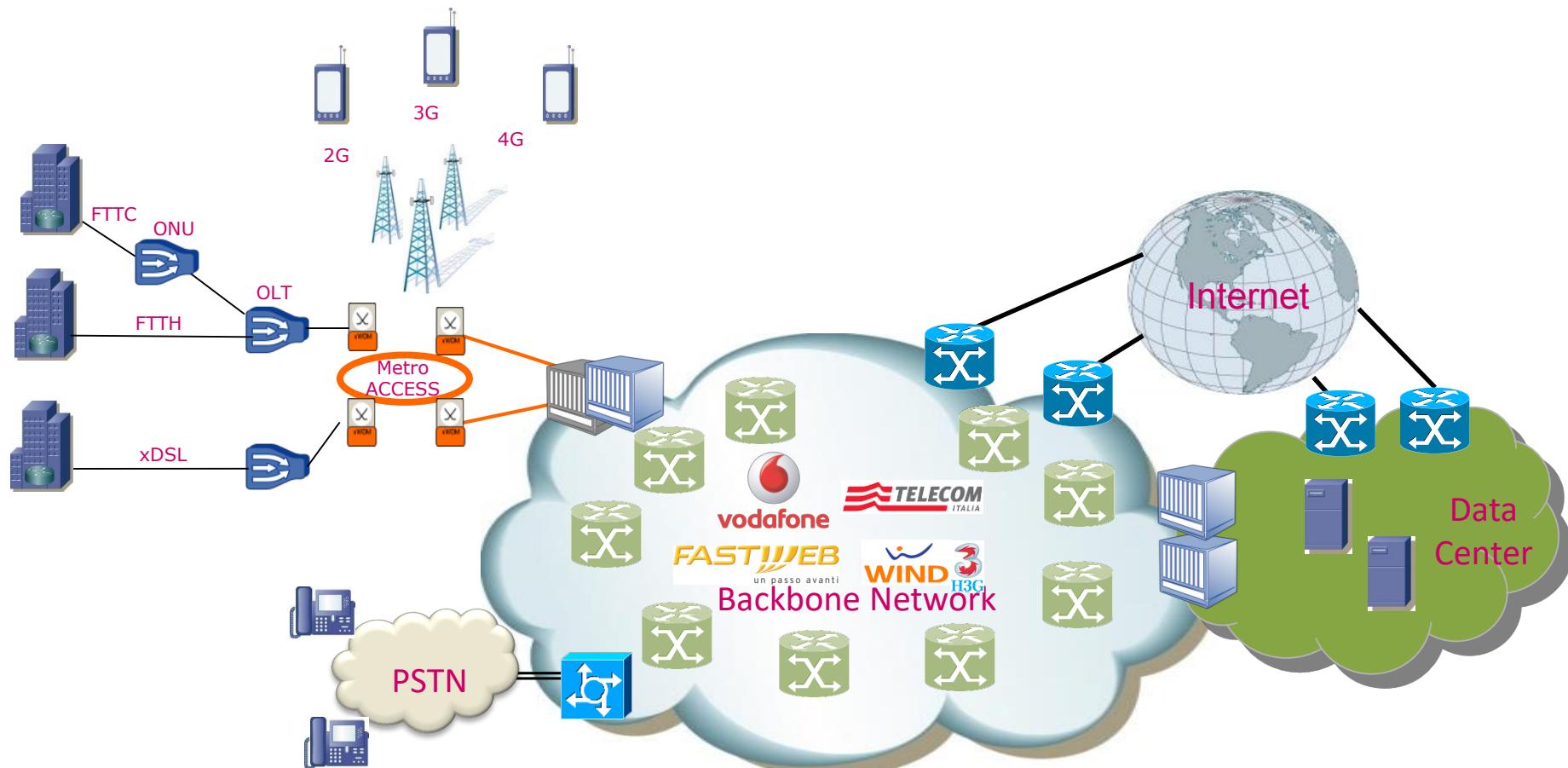


State of the art Routers Architecture (Juniper, Cisco, Huawei)

Relatore: Ing. Mirko Gilioli (K Labs Trainer and Professional Services Engineer)



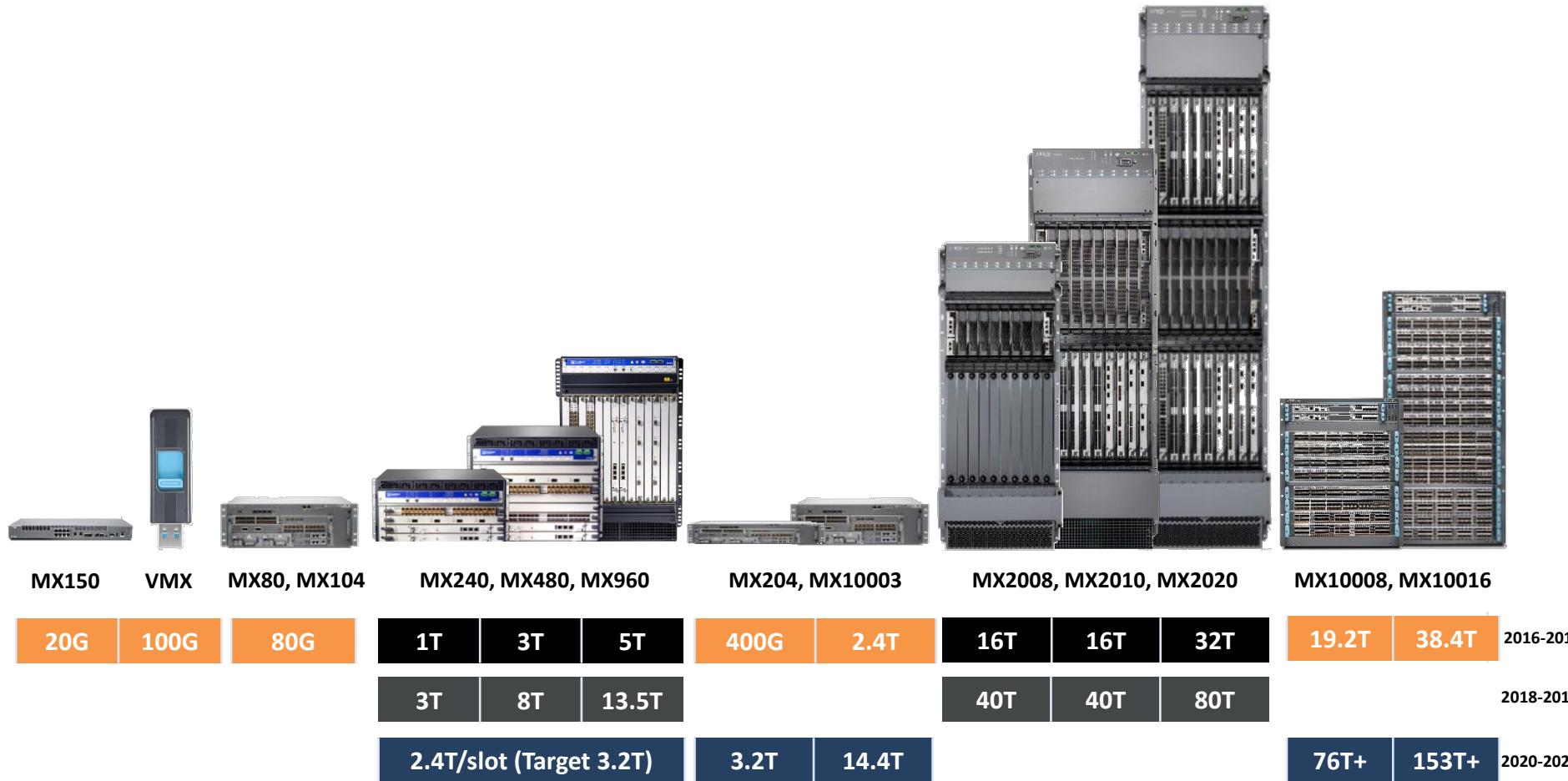
- Telco Network Architecture
- Metro/Core Routers **Evolution**
- **SDN/NFV Evolution**
- FTTH/FTTC Access Network
- **K Labs Job opportunities**
- **K Labs Internship**

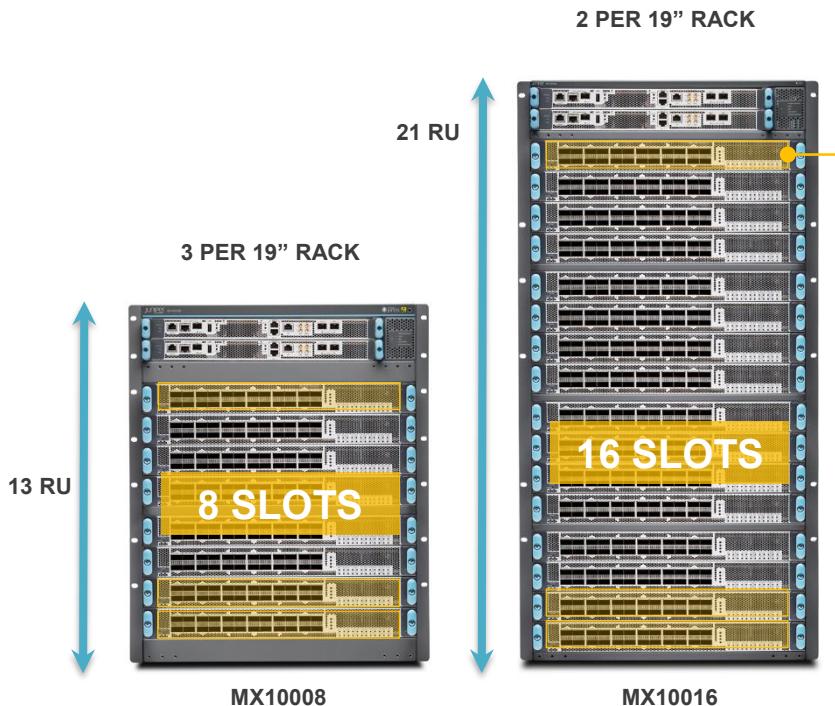


Worldwide Top Router Vendors

The Juniper Networks logo, which includes the word "JUNIPER" in a large, bold, black serif font above the words "NETWORKS" in a smaller, black sans-serif font.

Metro and Core Routers



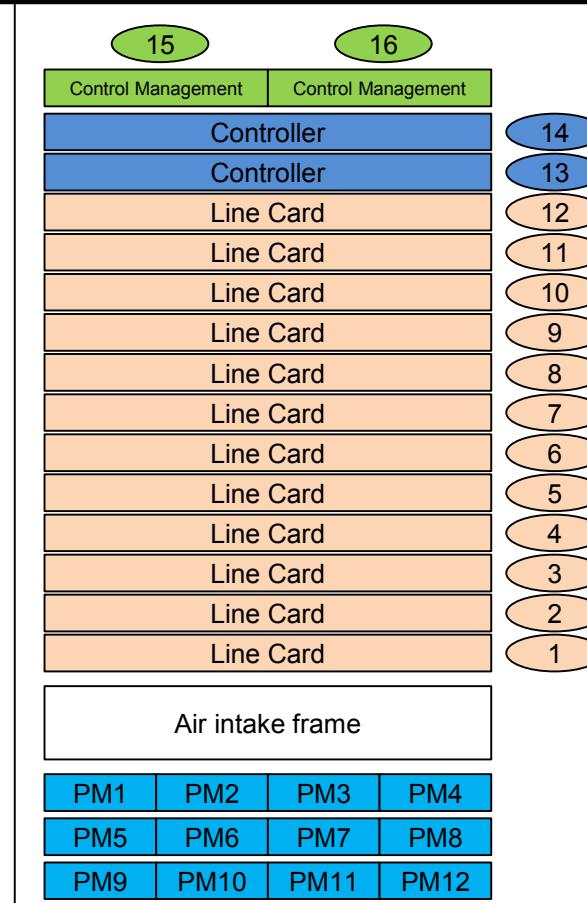


Universal chassis across all product families
Dense 10GE, 40GE and 100GE
Optimal power and cooling design for DC / COLO
Scalable card/fabric interconnect, capacity increase

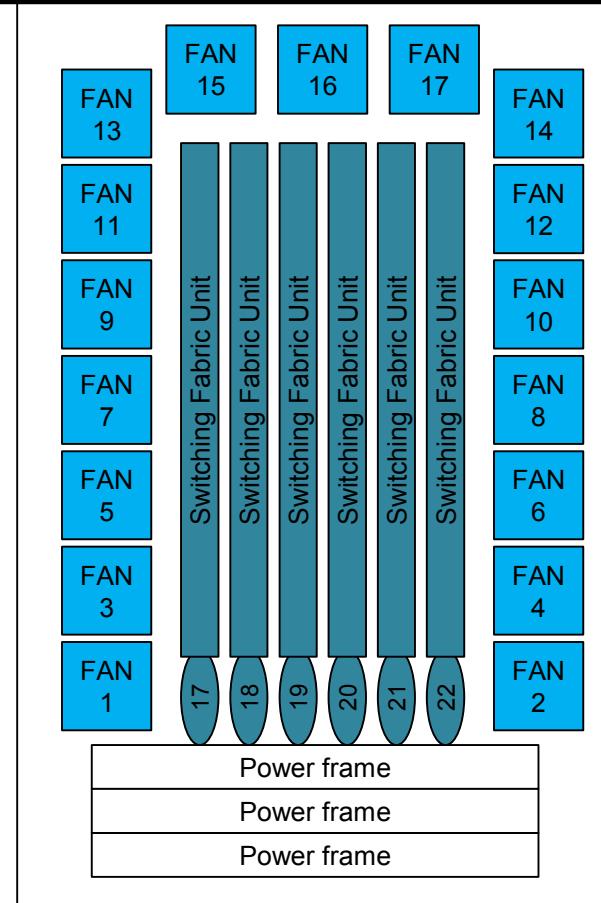
2.4T Line Card supported @ FRS

MAIN FEATURES
COMPACT, OPTIMIZED FOR DC AND COLO
DC-NEBS (GR-3160) COMPLIANT
10GE / 40GE / 100GE

Slot Distribution Diagram example



front view



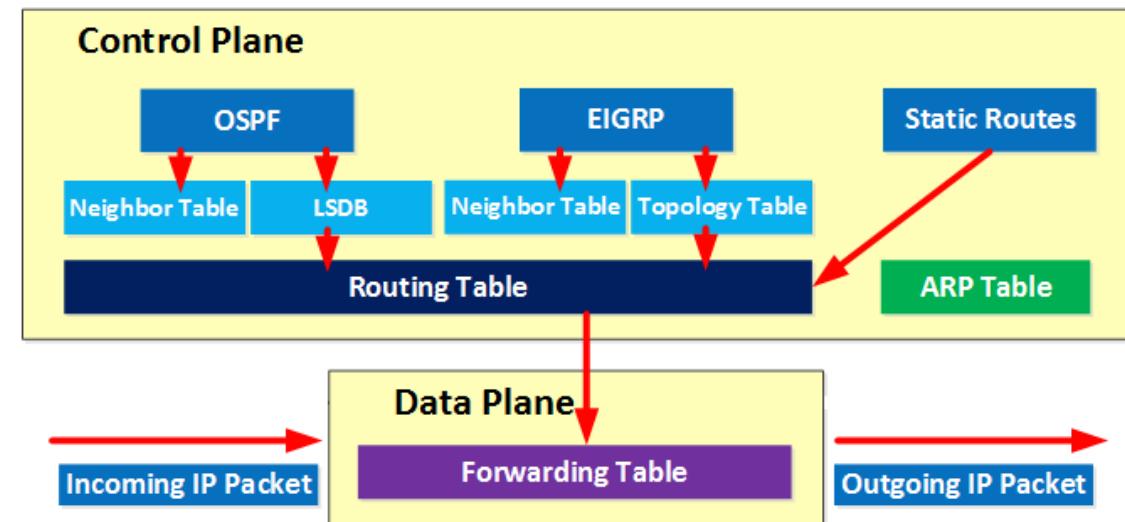
rear view

**ASIC**

- 28nm process
- 23.44mm x 23.15 mm die size
- More than 60% power consumption reduction
- 400 Gb/s Network Processor

**General Purpose CPU**

Control Plane and Data Plane Separation 2/2

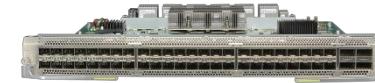




36*100GE QSFP28



36*40GE QSFP+

48*10GE SPF+ +
2*40GE+2*100GE

10GE Flex Port



SFP-T: RJ45,
GE electrical



100m

SFP: GE optical
port connection

500m,
10Km, 40km,
80km, 100km

10GE AOC:
Short-distance, low-
cost connection



3m, 10m, 20m

10GE copper cable:
Low-cost connection
within 5m

1m, 3m, 5m,
7m, 10m

SFP+: 10GE optical
port connection

100m, 220m, 300m,
1.4km, 10km,
40km, 80km

40GE Flex Port



QSFP+ connection

100m, 150m, 300m,
400m, 1.4km, 10km,
40km

40GE copper cable:
Low-cost connection
within 5m



1m, 3m, 5m

40GE AOC:
Short-distance, low-
cost connection



10m

One 40GE splits into 4*10GE

**Fiber
connection**



300m, 1.4km, 10km

**Copper cable
connection**



1m, 3m, 5m

AOC connection



10m

100GE Flex Port



CFP 100G fiber connection



100m,
10km, 20km,
40km, 80km



CXP 100G fiber connection



100m



CFP2 100G fiber connection



100m, 10km



QSFP28 100G fiber connection



100m, 500m
2km, 10km

100GE split into 2/3*40GE



100m

Cable connection



10m

100GE split into 8/10/12*10GE



100m

100GE split into 4*25GE

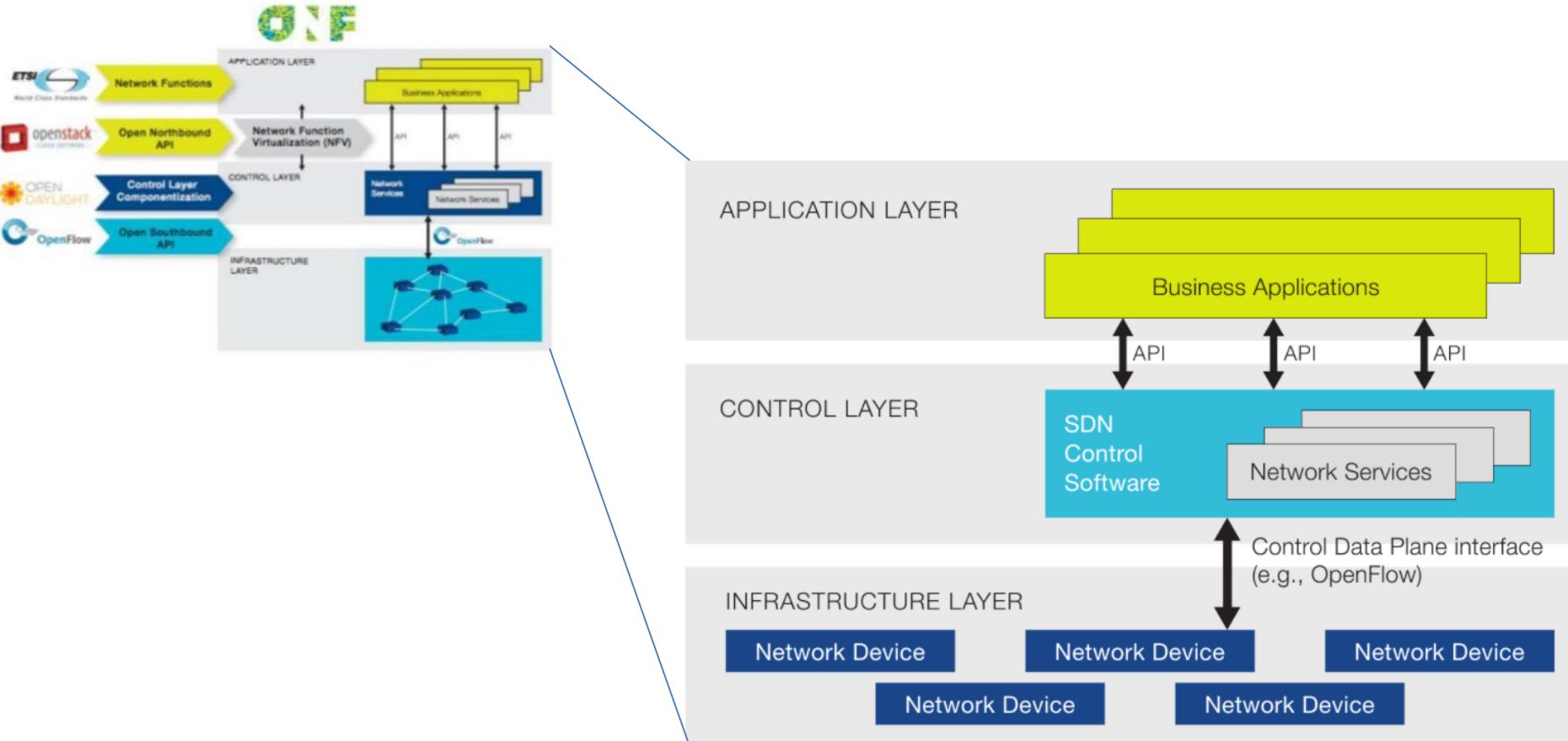


100m, 500m

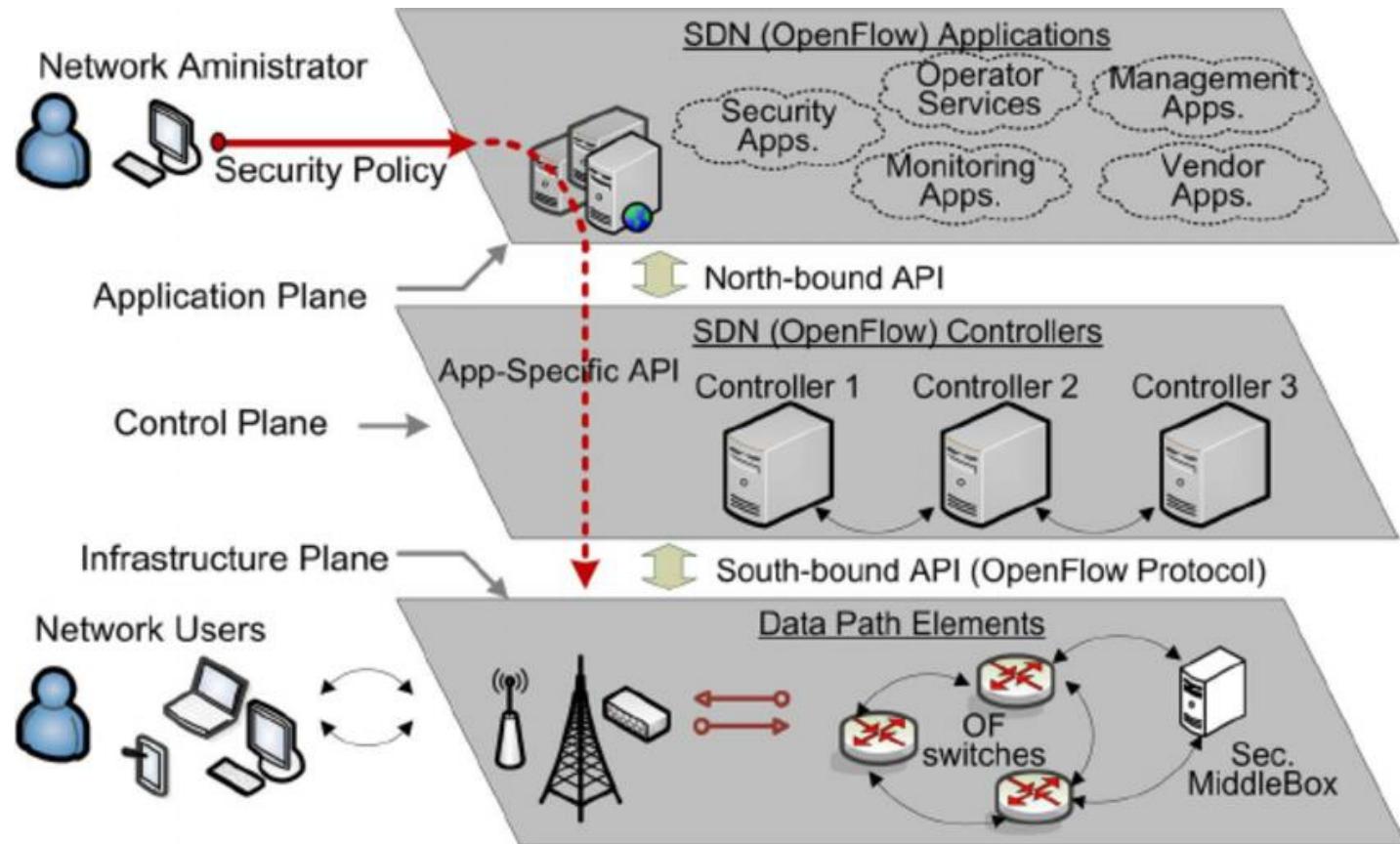


1m,
3m, 5m

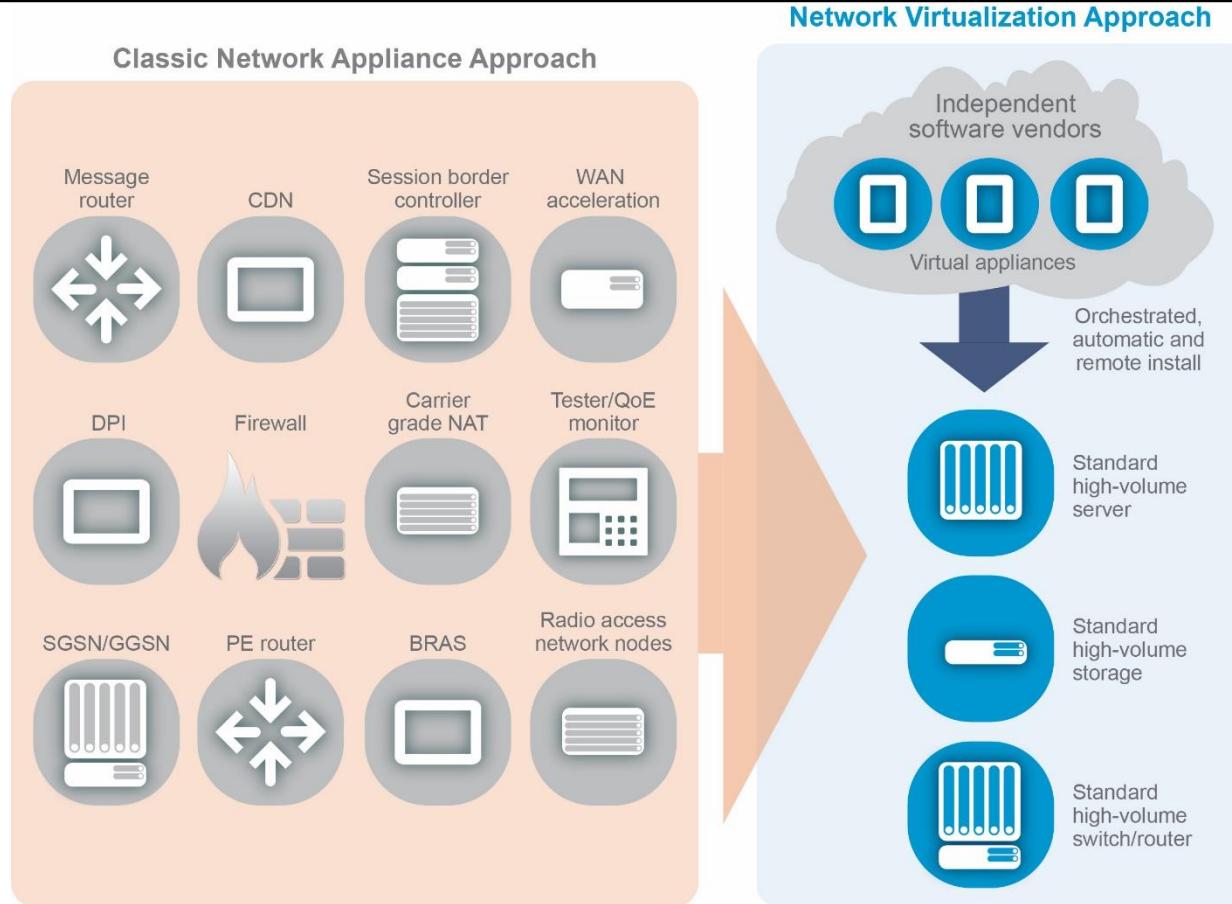
Software Defined Networking (SDN)



Network Processor for SDN Scenario



Network Function Virtualization (NFV)



Worldwide Top FTTH/FTTC Vendors



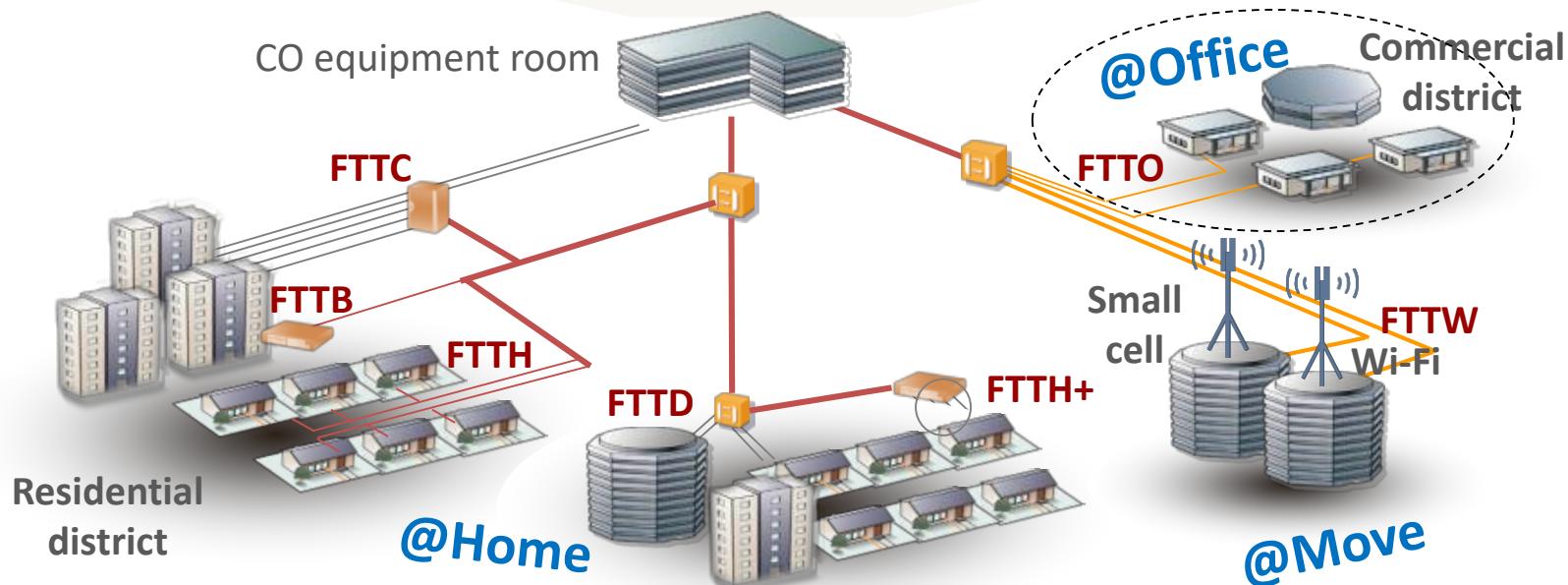
Alcatel-Lucent
Enterprise

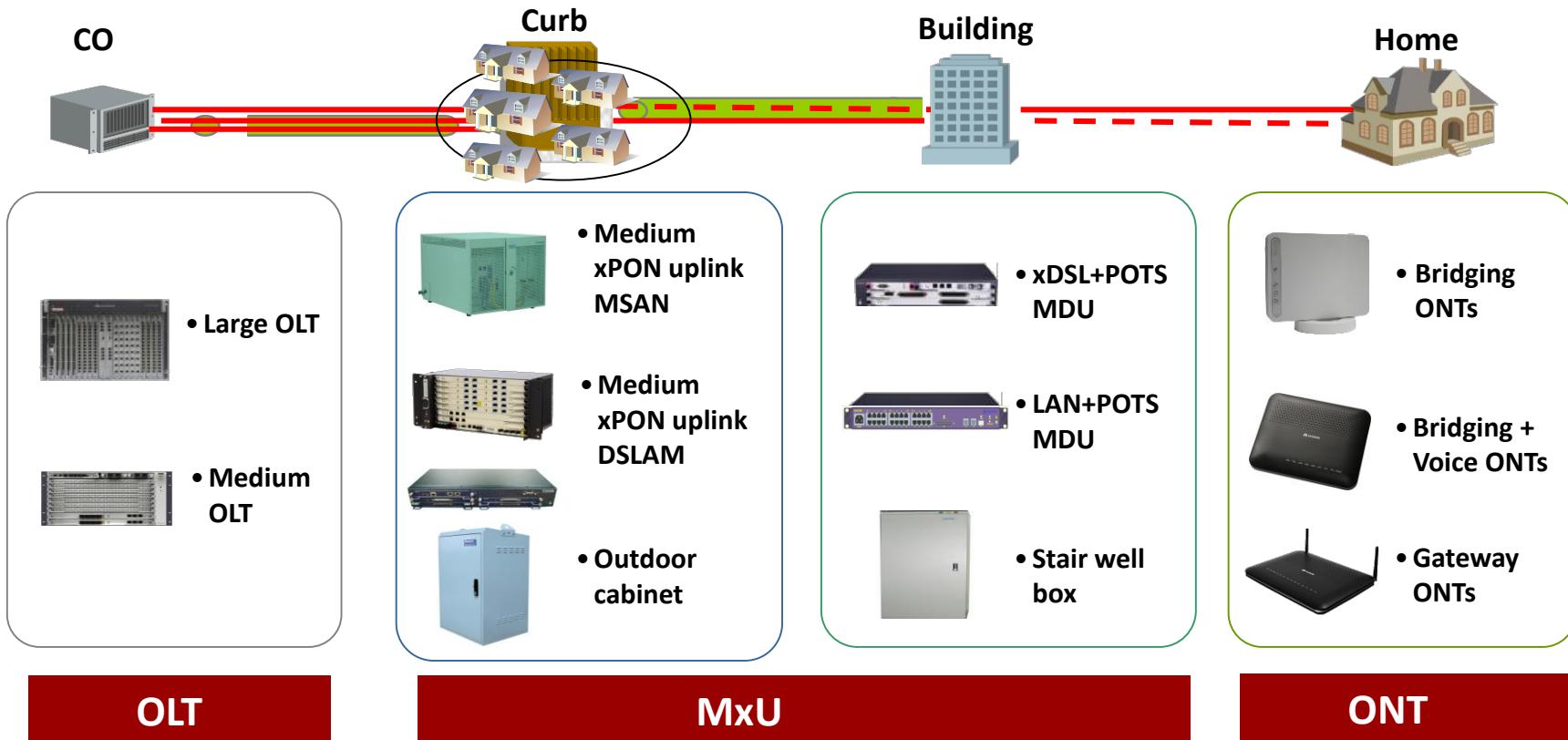


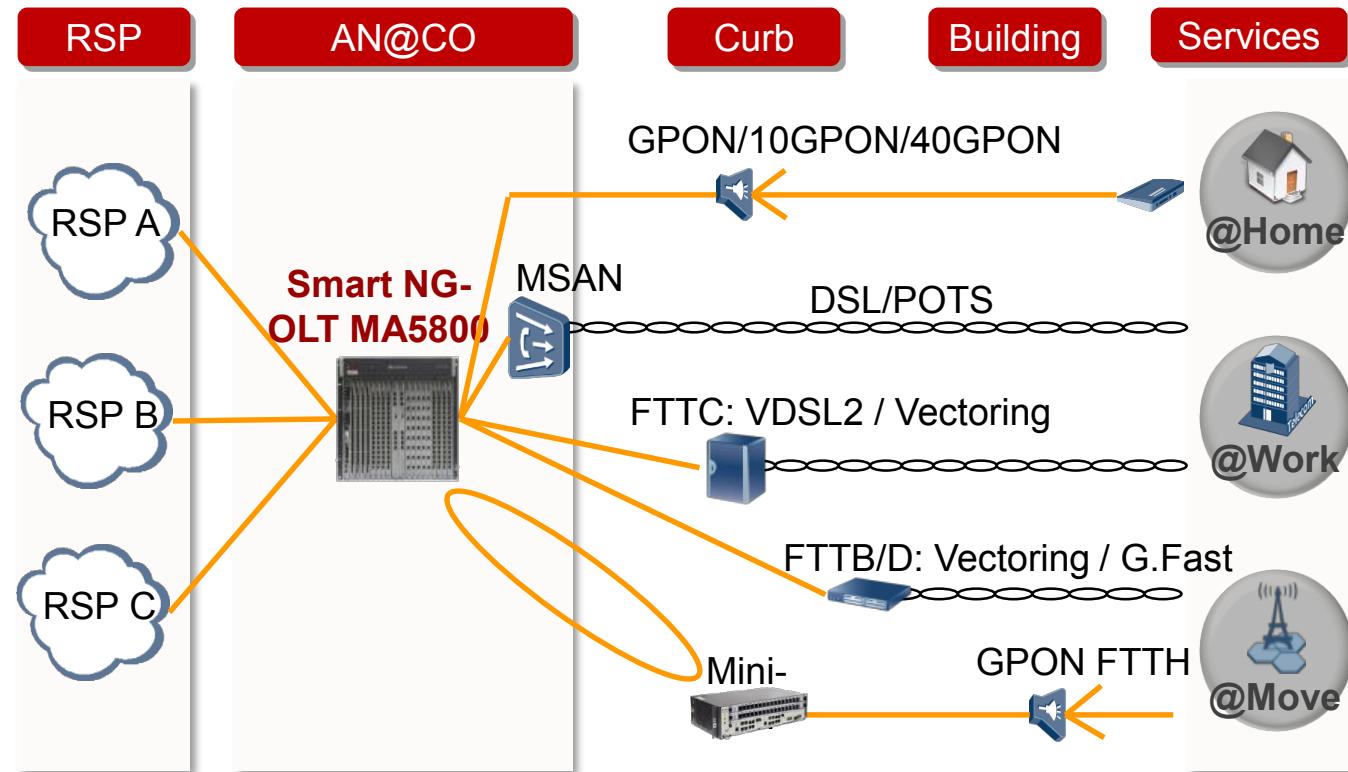
Accredited Training Partner

JUNIPER
NETWORKS

An **integrated full-service network** is required
for full-service operation







Bridging



HG8010
1 LAN

Bridging + Voice



HG8110
1 LAN + 1 POTS

Gateway



HG8240R
4 LAN + 2 POTS

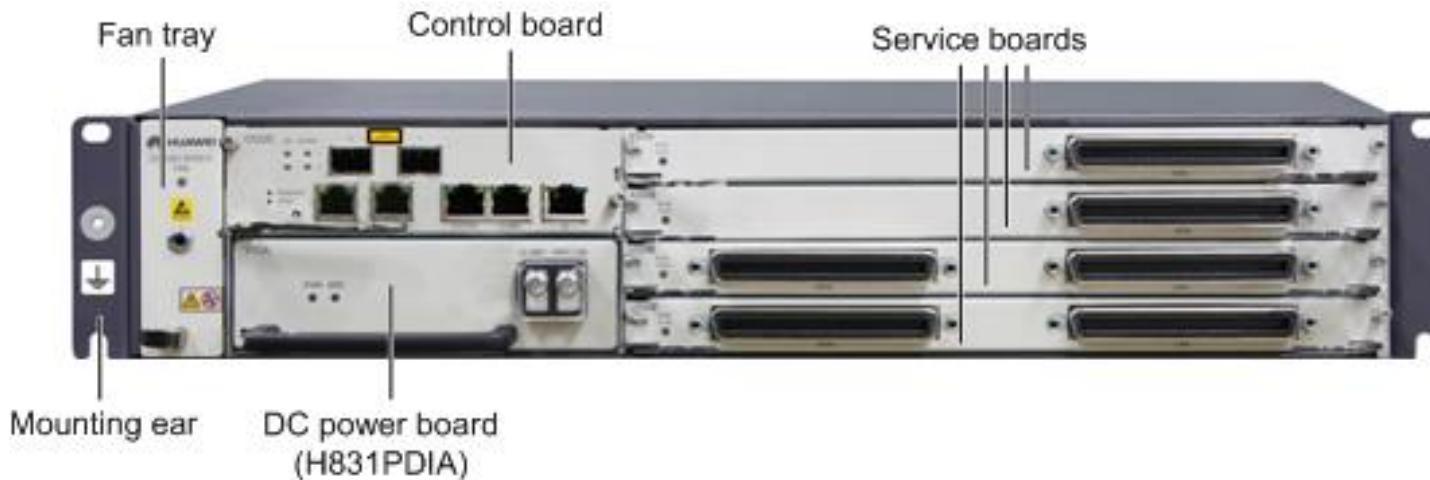


HG8240
4 LAN + 2 POTS



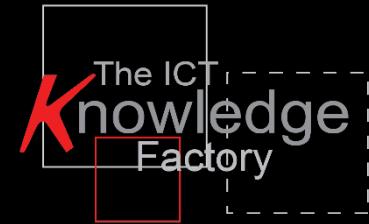
HG8245/HG8245T
4 LAN + 2 POTS
1 USB
Wi-Fi







K Labs Company Presentation



K Labs is a company
specialized in
**Technical Trainings
and Consultancies**
for
Telco and **ICT** market



ISO 9001:2008
Certified





Our aim is to deliver **vendor-independent, high-quality** training courses that provide delegates with **real-life experience** on software and hardware in addition to imparting **theoretical knowledge**. As such, our courses include plenty of practical **hands-on** time.

K Labs provides **professional consultancy services**





- DATA CENTER



- LTE



- CLOUD COMPUTING



- MOBILE NETWORKS



- IP NETWORKING



- MULTIMEDIA



- ICT SECURITY



- PERFORMANCE TESTING



- CARRIER



- GREEN IT



- FIXED ACCESS



- SOFTWARE

Customers and Partnership

K Labs delivers training services to a lot of big players or companies involved in the Telecommunication and ICT Market.



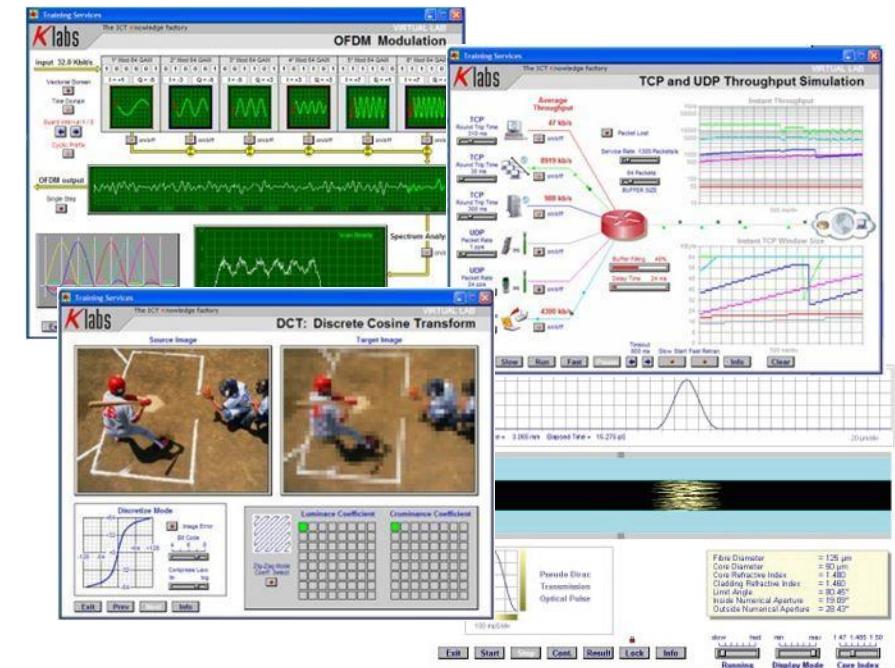
K Labs signed training partnership with the most important Manufacturers in the ICT Global Market.

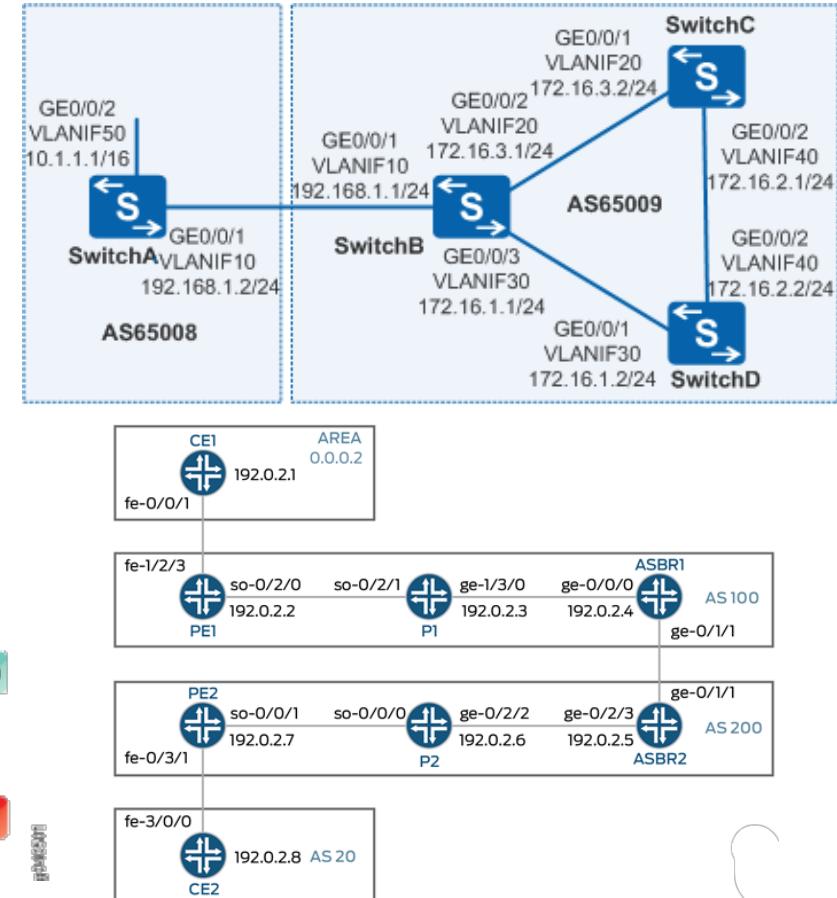
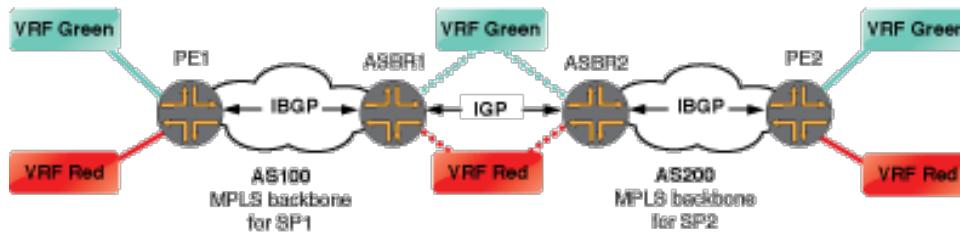
Educational Lab (Multivendor)



Test Instruments

Virtual Lab (Software simulations)







JunOS

IOS

```
SLB#sh ip slb serverfarms
server farm predictor nat reals bind id interface(s)
-----
7301-FARM LEASTCONNNS none 2 0 <any>
SLB#sh ip slb real
Real farm name weight state connns
-----
192.168.1.1 7301-FARM 1 OPERATIONAL 0
192.168.2.1 7301-FARM 1 OPERATIONAL 0
SLB#sh ip slb vservers
slb vserver prot virtual state cons interface(s)
-----
ESP ESP 200.1.1.1/32:0 OPERATIONAL 0 <any>
ISAKMP UDP 200.1.1.1/32:500 OPERATIONAL 0 <any>
NAT-T UDP 200.1.1.1/32:4500 OPERATIONAL 0 <any>
SLB#sh ip slb conn
Vserver prot client real state nat
-----
```

```
[edit interfaces]
so-0/2/0 {
    unit 0 {
        family inet {
            address 19.19.19.1/30;
        }
        family mpls;
    }
}
fe-1/2/3 {
    unit 0 {
        family inet {
            address 18.18.18.2/30;
        }
        family mpls;
    }
}
lo0 {
    unit 0 {
        family inet {
            address 2.2.2.2/32;
        }
    }
}
```



```
<HUAWEI> system-view
[HUAWEI] sysname SwitchA
[SwitchA] vlan batch 10 50
[SwitchA] interface gigabitethernet 0/0/1
[SwitchA-GigabitEthernet0/0/1] port link-type trunk
[SwitchA-GigabitEthernet0/0/1] port trunk allow-pass vlan 10
[SwitchA-GigabitEthernet0/0/1] quit
[SwitchA] interface gigabitethernet 0/0/2
[SwitchA-GigabitEthernet0/0/2] port link-type trunk
[SwitchA-GigabitEthernet0/0/2] port trunk allow-pass vlan 50
[SwitchA-GigabitEthernet0/0/2] quit
[SwitchA] interface vlanif 10
[SwitchA-Vlanif10] ip address 192.168.1.2 24
[SwitchA-Vlanif10] quit
[SwitchA] interface vlanif 50
[SwitchA-Vlanif50] ip address 10.1.1.1 16
[SwitchA-Vlanif50] quit
[SwitchB] bgp 65009
[SwitchB-bgp] router-id 172.17.2.2
[SwitchB-bgp] peer 172.16.1.2 as-number 65009
[SwitchB-bgp] peer 172.16.3.2 as-number 65009
[SwitchB-bgp] quit
```

Do you enjoy the challenge of learning the newest technologies on the ICT market ?

Do you have a pioneering spirit and enjoy being seen a subject matter expert ?

K Labs want to invest in bright and dynamic Engineers that would like to join our team of enthusiastic and highly qualified:

“Trainer and Professional Services Engineer”

For more information on Internships and Job positions:

Tel. 059 821229, e-mail: job@klabs.it www.klabs.it



Requirements for the applicants



2nd or 3rd year of Telecommunications,
Computer Science or Electronics preferred

Passion for technology and
telecommunications

Good communication skills

Good knowledge of English

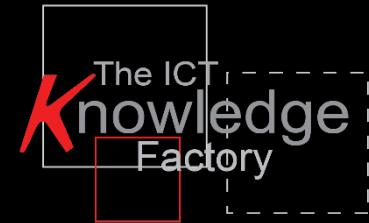
Flexibility and Adaptability to change

Optimism, Proactivity

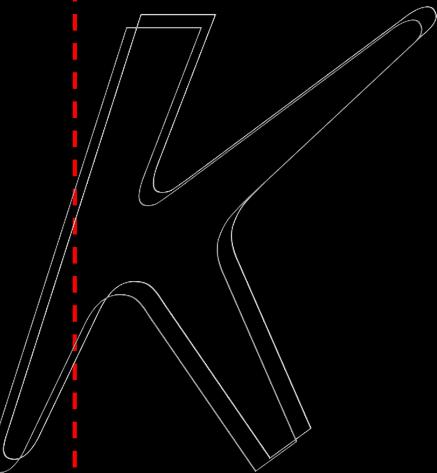
The candidates will be interviewed before being admitted to the internship



K Labs Internship



**an opportunity to jump
into the ICT world**





Software Defined Networking



Internet of Things



Mobile 5G

Internship 1: Software Defined Networking



Field: Software Defined Networking

Description: Preliminary study and development of a test environment able to check multivendor devices interworking controlled by SDN.

Test Environment Design, SDN Function Evaluation, Test Execution, Reporting.

Team work in cooperation with K Labs engineers.

Application Deadline: Available Year-round

Internship 2: Internet of Things



Field: Internet of Things

Description: Preliminary study and development of a test environment able to check multivendor IoT devices interworking.

Test Environment Design, IoT Function Evaluation, Test Execution, Reporting

Team work in cooperation with K Labs engineers.

Application Deadline: Available Year-round

**Field: 5G**

Description: Preliminary study and content development of an e-learning training course focused on 5° Generation Mobile Network and Services.

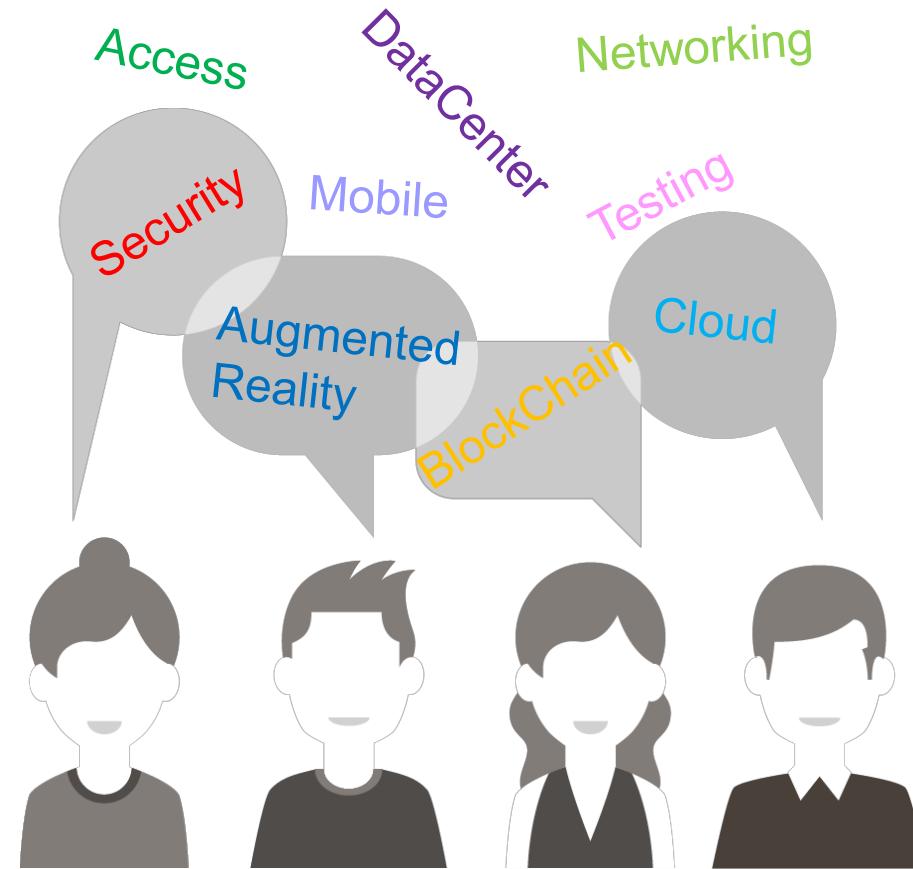
5G Standard evaluation, Learning Objects Design, cooperation with Multimedia Developer for e-learning course implementation.

Team work in cooperation with K Labs engineers.

Application Deadline: Available Year-round

Suggestions?

You can suggest us also different topics, in order to design together your internship @K Labs





Per maggiori informazioni:

Tel. 059 821229
e-mail: job@klabs.it
www.klabs.it

Klabs
The ICT **Knowledge** factory