



ERICSSON

ERICSSON SERVICE PROVIDER SDN

- SDN INNOVATION FOR SERVICE
PROVIDERS

RAUL CALDEIRA
FBC CUSTOMER SOLUTIONS
ERICSSON

THE ICT INFRASTRUCTURE FOR THE NETWORKED SOCIETY



Applications



Innovation Driven
Optimally Hosted
Optimally Delivered

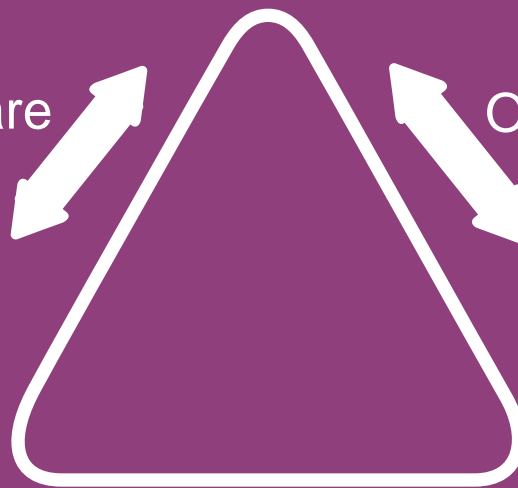
Aware

Open

Real Time,
Programmable
Application
Responsive
(SP-SDN)



Network



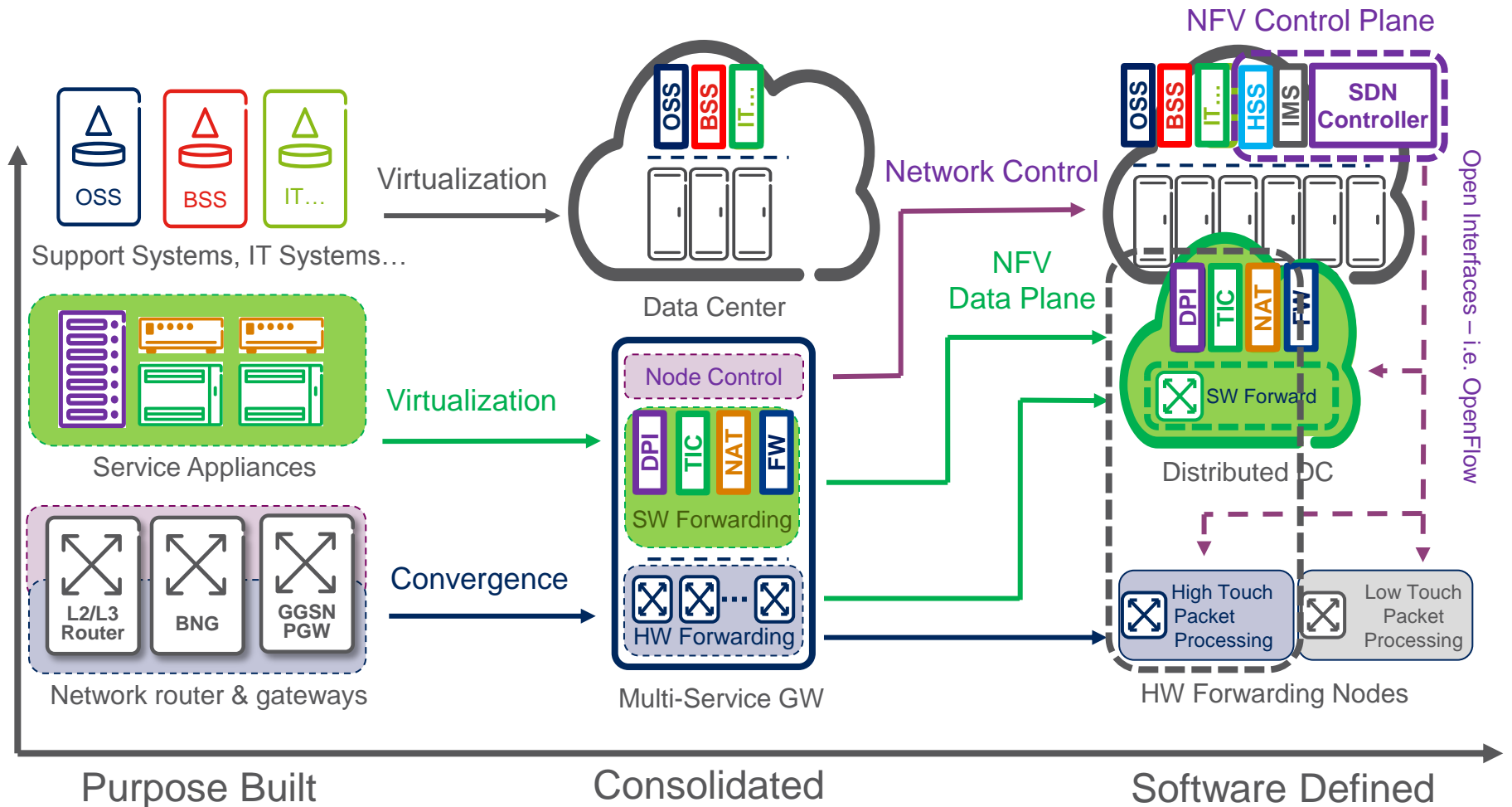
Combined



Infrastruct
ure

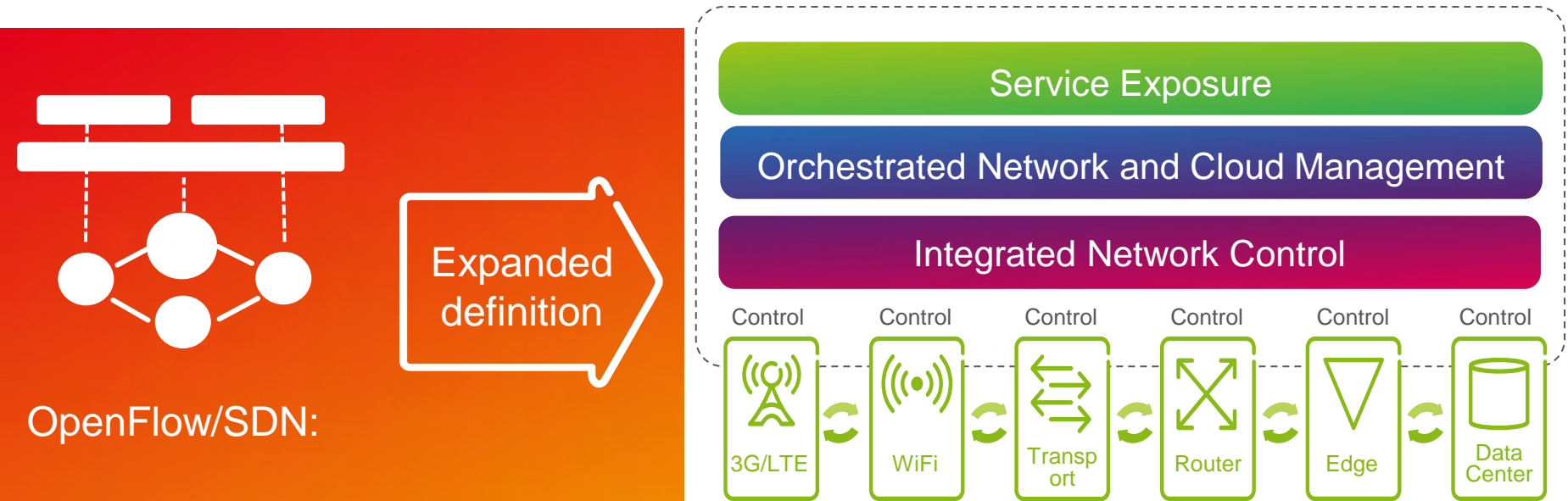
Network Enabled
Secure
Not tied to Data
Centers

TELECOM INDUSTRY TRENDS



SERVICE PROVIDER SDN

MOVING SDN FROM A NICHE TO THE NETWORK

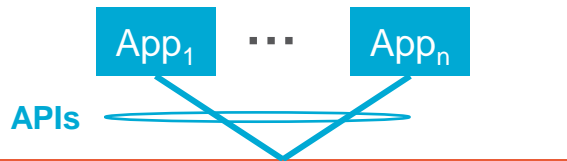
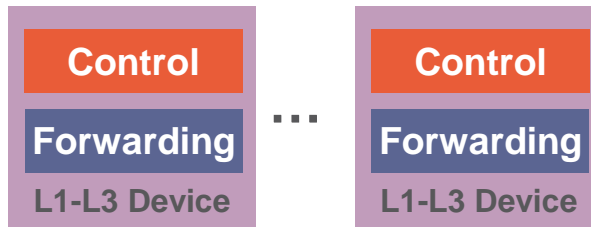


Transforming service provider networks into programmable and dynamically application responsive entities

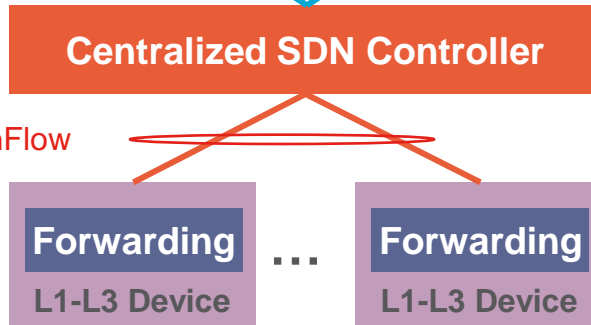
WHAT IS SDN?



Traditional Networking Devices



e.g., OpenFlow



Software Defined Networking

› SDN

- Decouples control & data planes (CP & DP)
- Centralizes CP
- Provides network programmability via APIs

› SDN ≠ OpenFlow (OF)

- OF is just one option for decoupling CP & DP

› DP under SDN control may span L1-3

- e.g., optical, Ethernet, MPLS, IP routing

› SDN & Cloud are complementary

- Cloud may cost-reduce controller & apps
- SDN simplifies & helps automate cloud orchestration



Stanford University
CLEAN SLATE
An Interdisciplinary Research Program



Clean Slate Program

We created Clean Slate Program more than five years ago with Stanford's depth and breadth of expertise to explore what kind of Internet we would design if we were to start with a clean slate and 20-30 years of hindsight. Though the mission was well defined, the potential approach was not. We began with a number of small exploratory projects that led to a few flagship projects that show lot of promise.

We are pleased to report that Clean Slate Program led to many small projects and the following four on-going flagship projects that have the potential to transform different parts of the Internet.

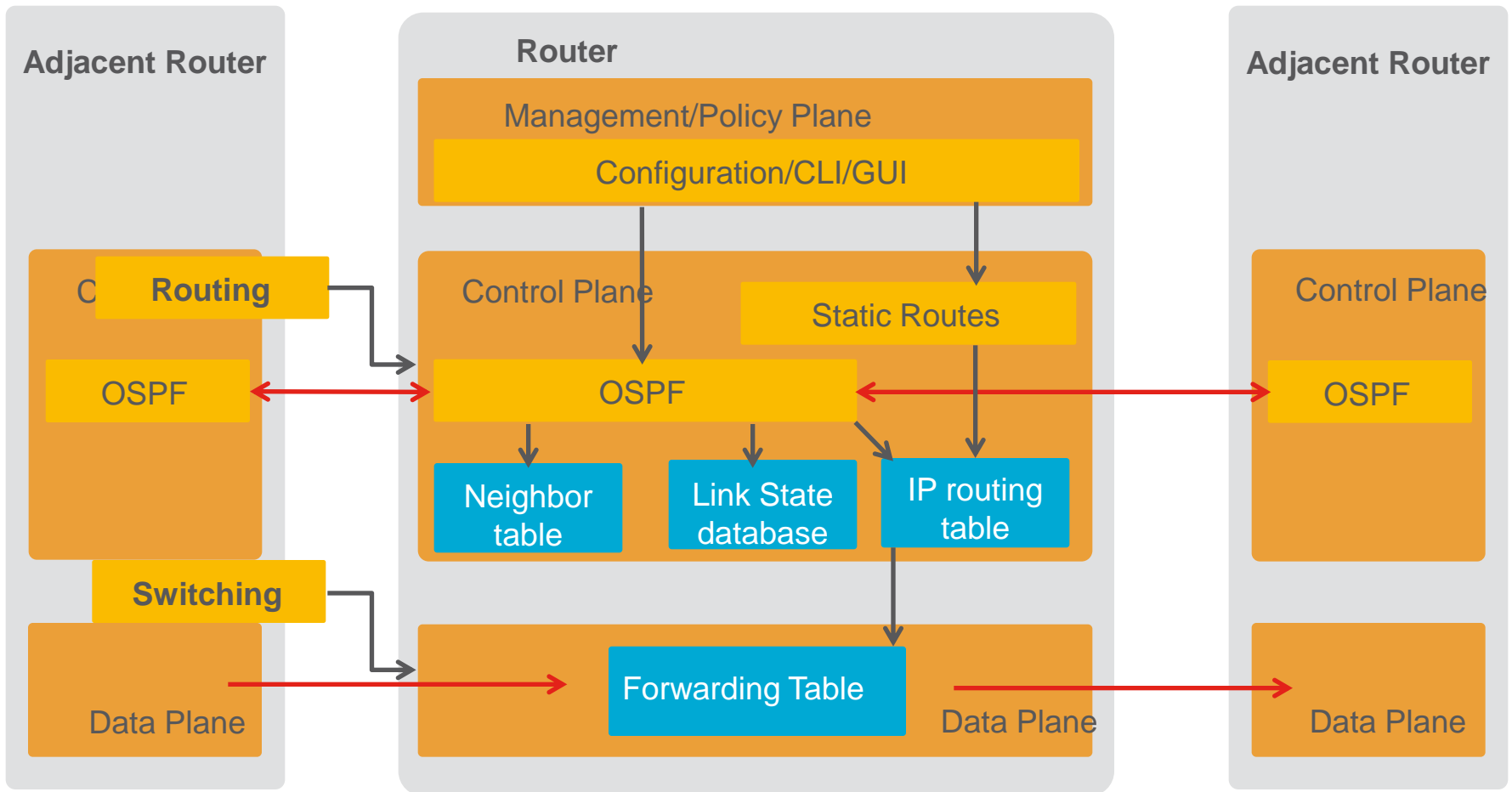
- Internet Infrastructure: [OpenFlow and Software Defined Networking](#)
- Mobile Internet: [POMI 2020](#)
- Mobile Social Networking: [MobiSocial](#)
- Data Center: [Stanford Experimental Data Center Lab](#)

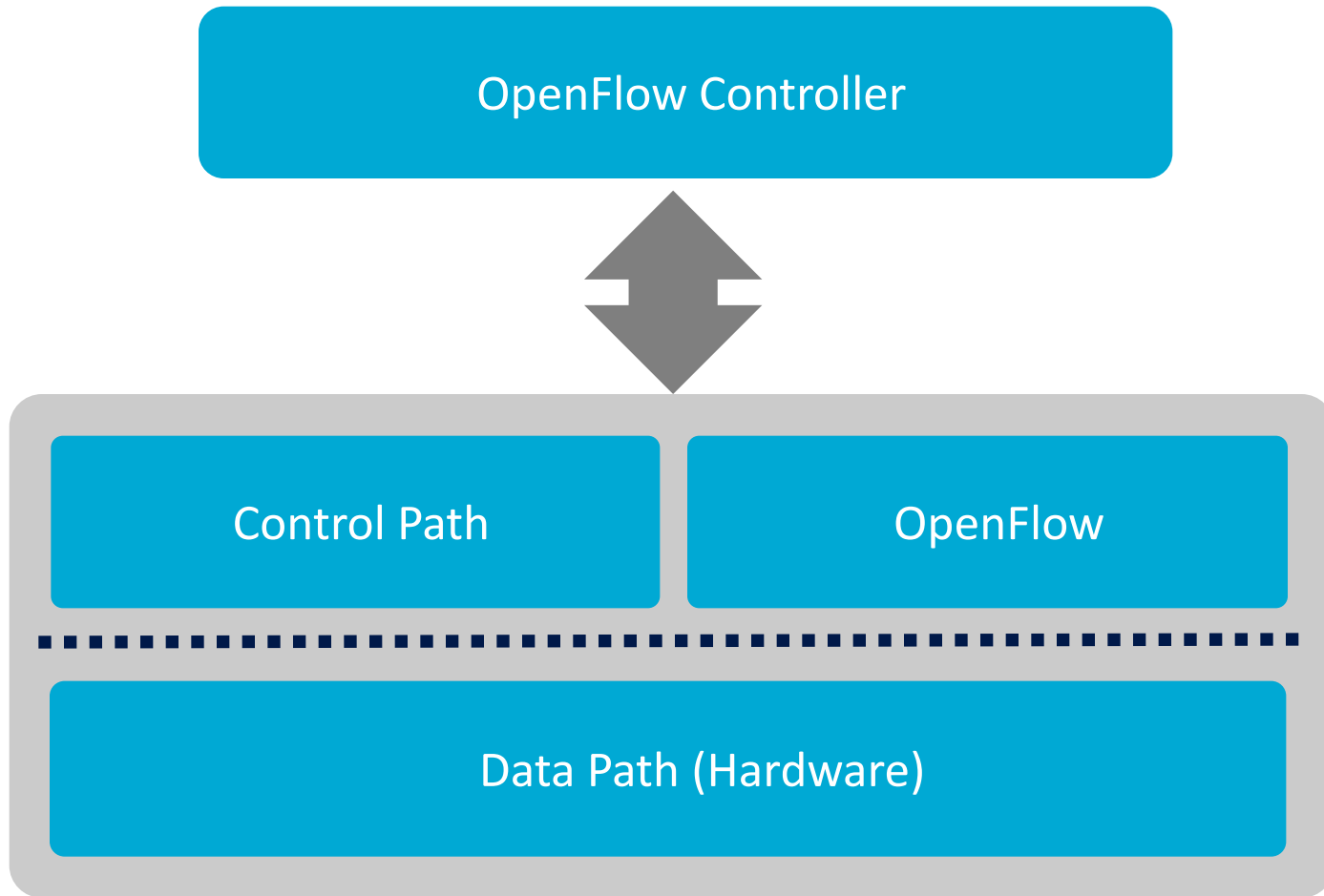
OpenFlow and SDN

Clean Slate Program has ceased to exist as of January 2012 and has successfully transformed into these four large projects. We invite you to visit the website of these projects, become familiar and get involved.

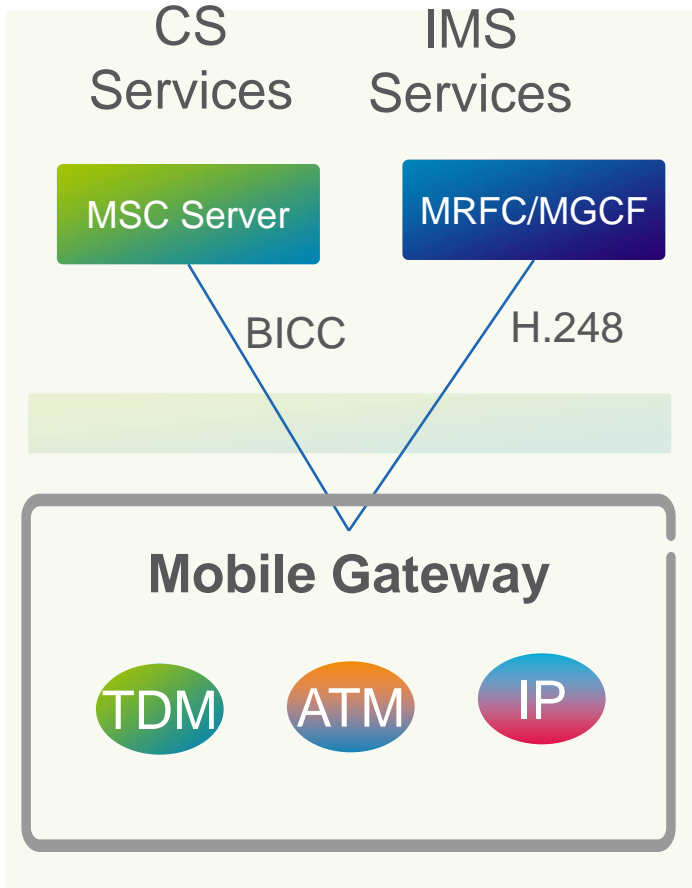
Past Sponsors



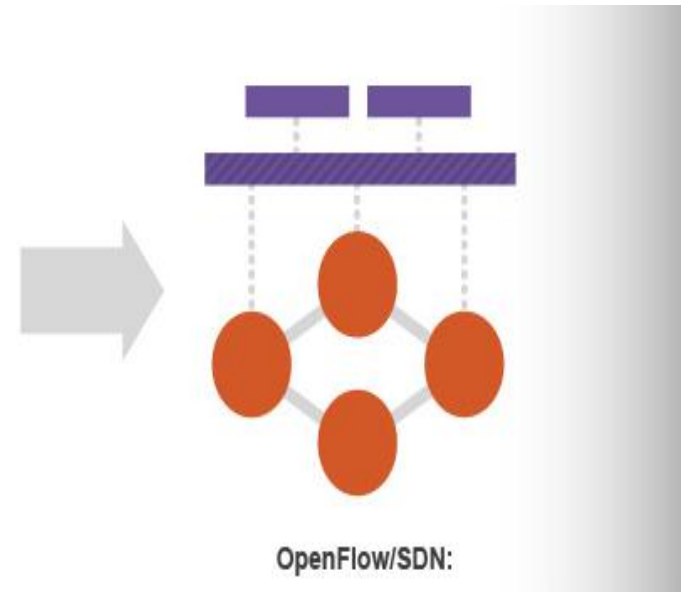




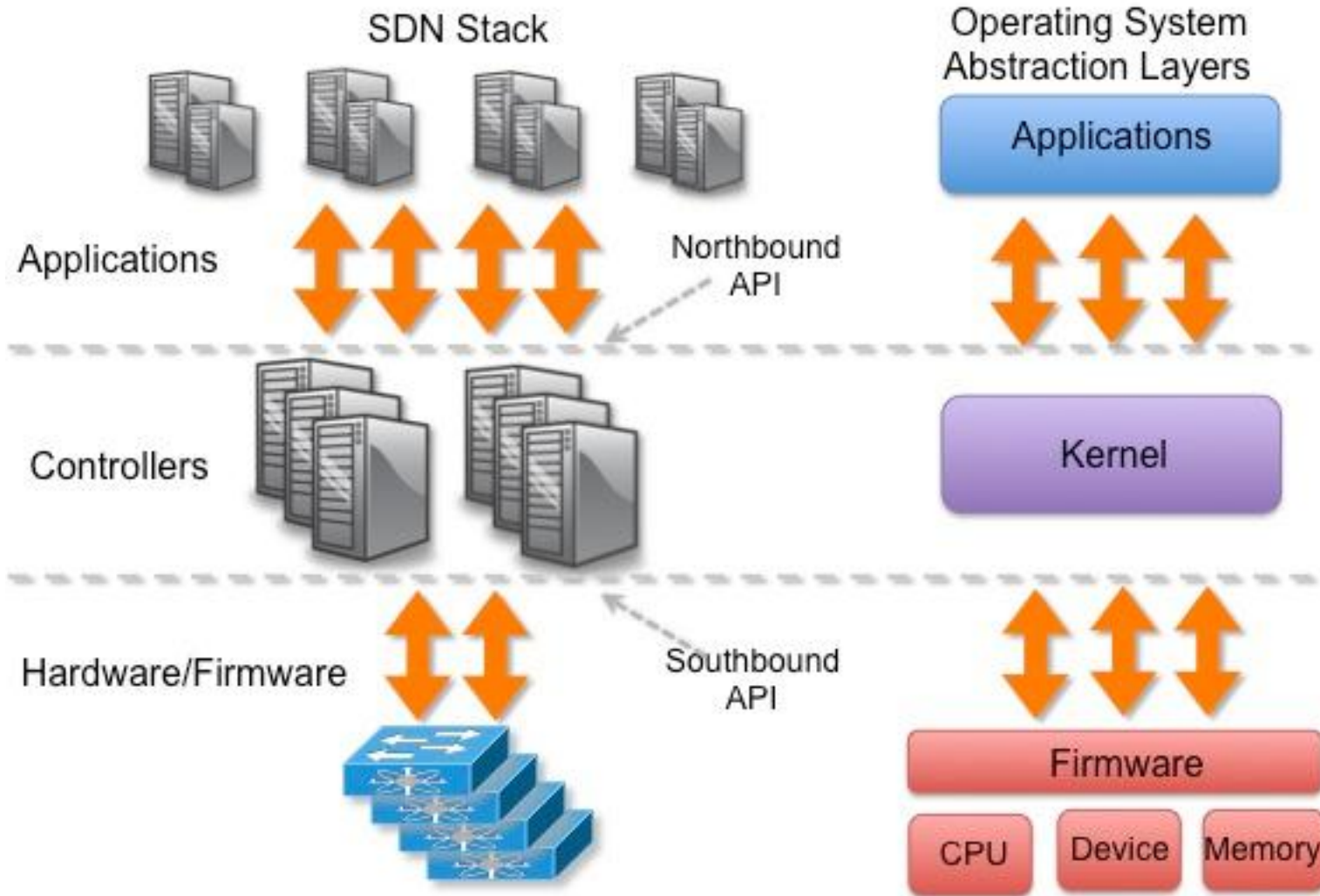
SPLIT ARCHITECTURE IN THE MOBILE NETWORK



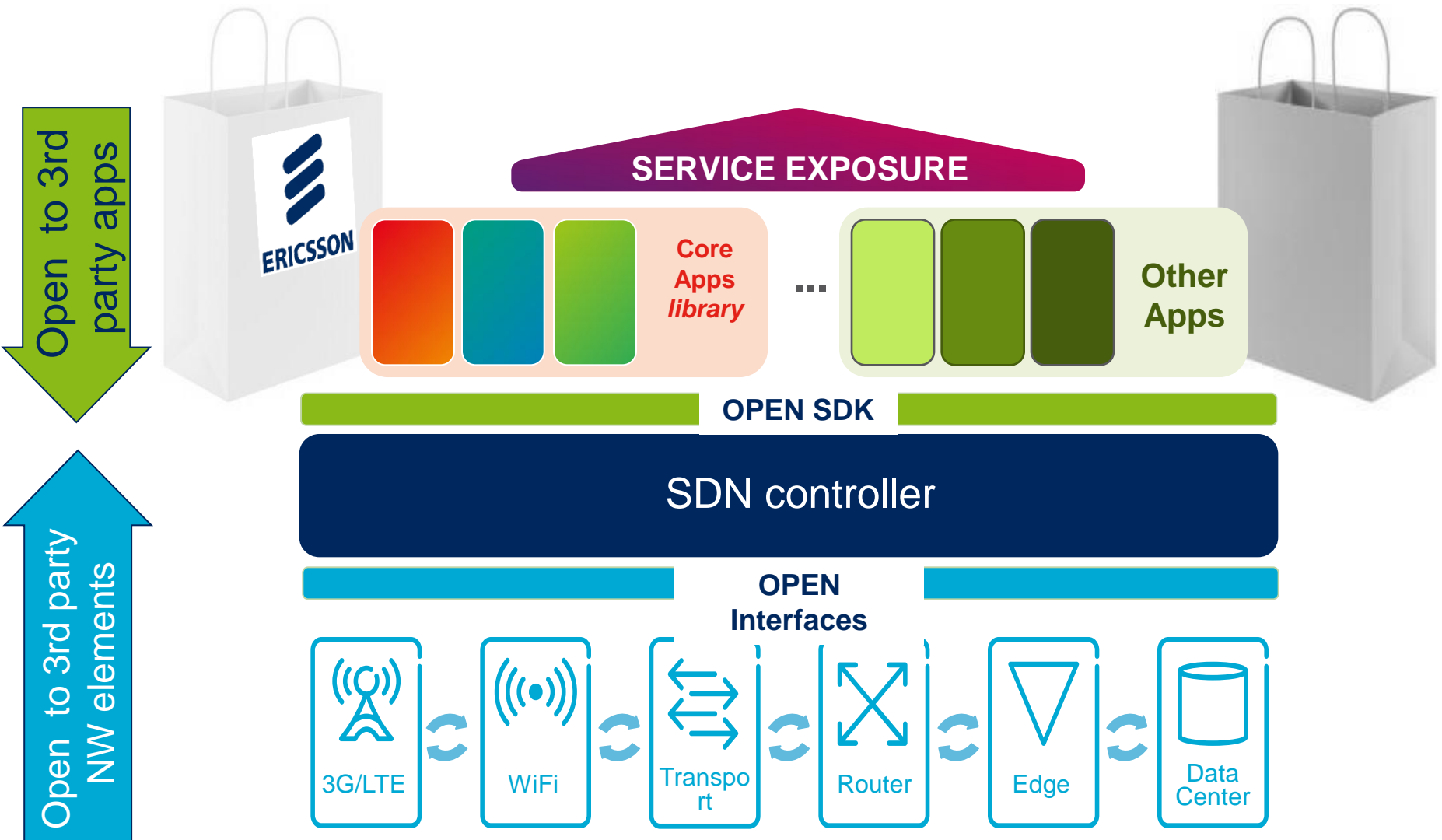
New: Programmability and Virtualization



déjà vu: Scale, Service Velocity



SERVICE PROVIDER SDN



SP-SDN, NFV & CLOUD

THE KEYS TO UNLOCKING VALUE



APIs, Exposable Services & Assets

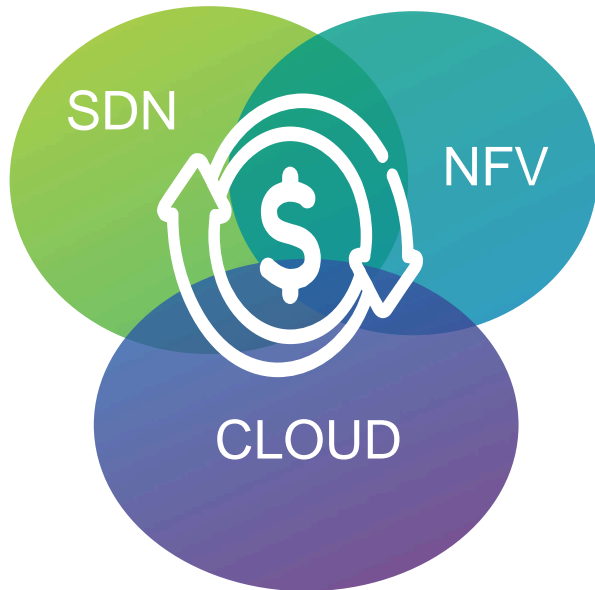
Cross-Domain Orchestration

Access Mgmt & Control | IP & Transport Mgmt & Control | Service Edge Mgmt & Control | Policy Control | Cloud Management

Real Time Integrated Network Control



Data Center



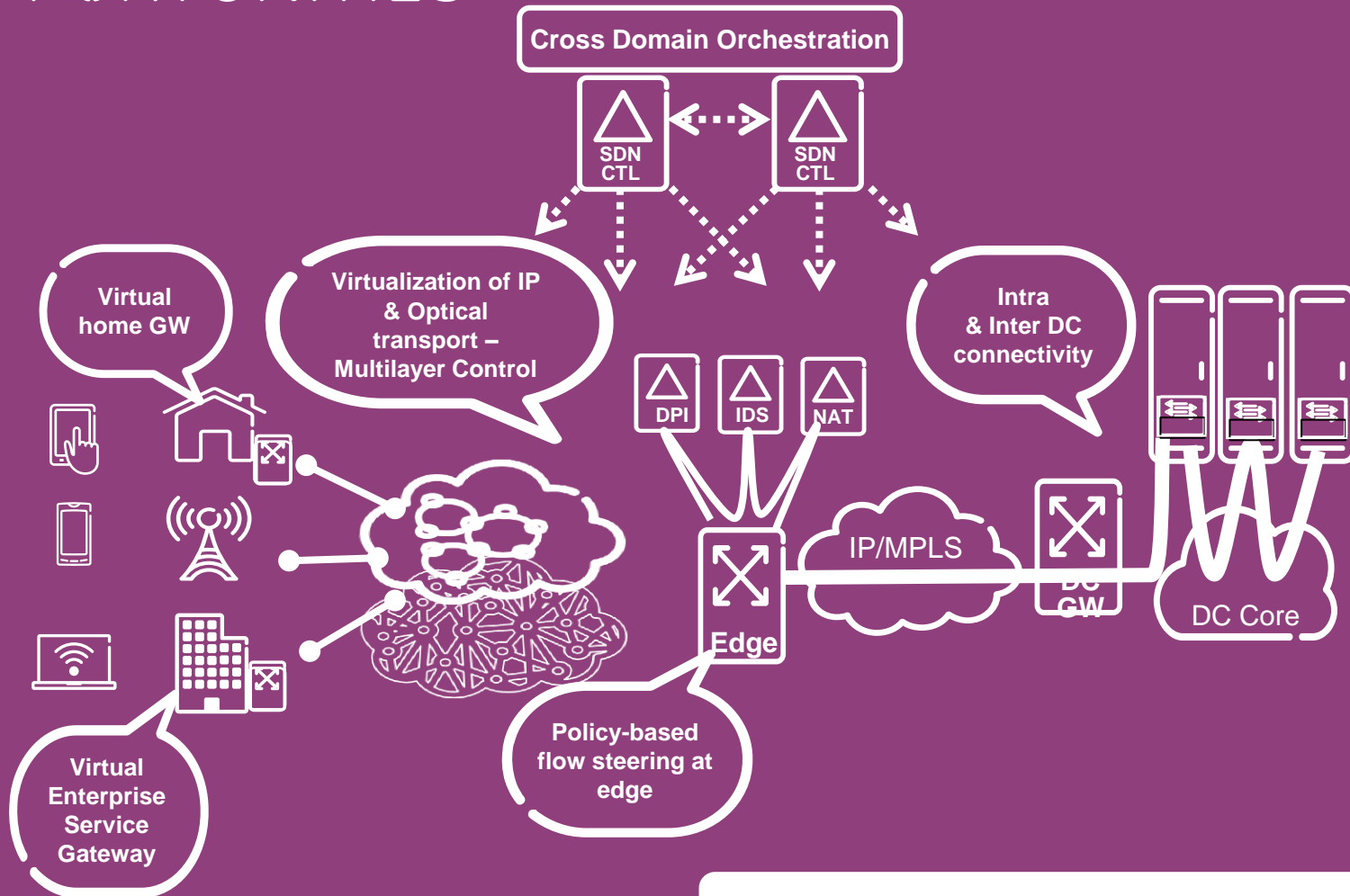
ERICSSON JOINS



- › Open source project for SDN
- › Secures a strong ecosystem for SDN
- › Ericsson member of Board and Technical Steering Committee
- › Ericsson to drive requirements & code for operator needs

SERVICE PROVIDER SDN APPLICATIONS

NETWORK WIDE TRANSFORMATION OPPORTUNITIES



MEANS TO A HIGHER END

SERVICE PROVIDER SDN: VIRTUAL NETWORK SYSTEM



```

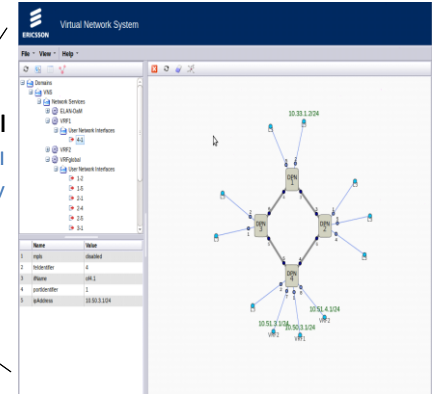
VNS ERS-Window
OSPF process ID:
Neighbor ID Pri Status Dead Time Address Interface
10.30.30.1 1 Full/DRO 00:00:00 10.30.30.1 vrf1
R1-303A
MCR>Show ip route vrf vrf1
MCR>Show ip route vrf vrf1
Color: 0 - Internal, 1 - Connected, 5 - Static, 8 - EFP, 9 - BGP
0 - OSPF, 10 - OSPF inter area
MCR>Show RIB external type 1: 0 - OSPF RIB external type 2
E1 - OSPF external type 1, E2 - OSPF external type 2
I - IS-IS, L1 - IS-IS level-1, L2 - IS-IS level-2, Ia - IS-IS inter area
* - candidate default

10.30.10.0/24 (1/0) via 10.30.3.2, vrf1 [Preference via 10.30.3.2]
10.30.0.0/24 (2/0/0) via 10.30.3.1, vrf1 [200]
10.30.0.0/24 (2/0/0) via 10.30.3.2, vrf1 [200]
10.30.1.0/24 (2/0/0) via 10.30.3.2, vrf1 [200]
10.30.2.0/24 (2/0/0) via 10.30.3.2, vrf1 [200]
10.30.3.0/24 (1/0) via 10.30.3.2, vrf1 [1]
10.30.11.0/24 (2/0/0) via 10.30.3.1, vrf1 [200]
10.30.12.0/24 (2/0/0) via 10.30.3.2, vrf1 [200]
10.30.13.0/24 (2/0/0) via 10.30.3.2, vrf1 [200]
MCR#>
    
```

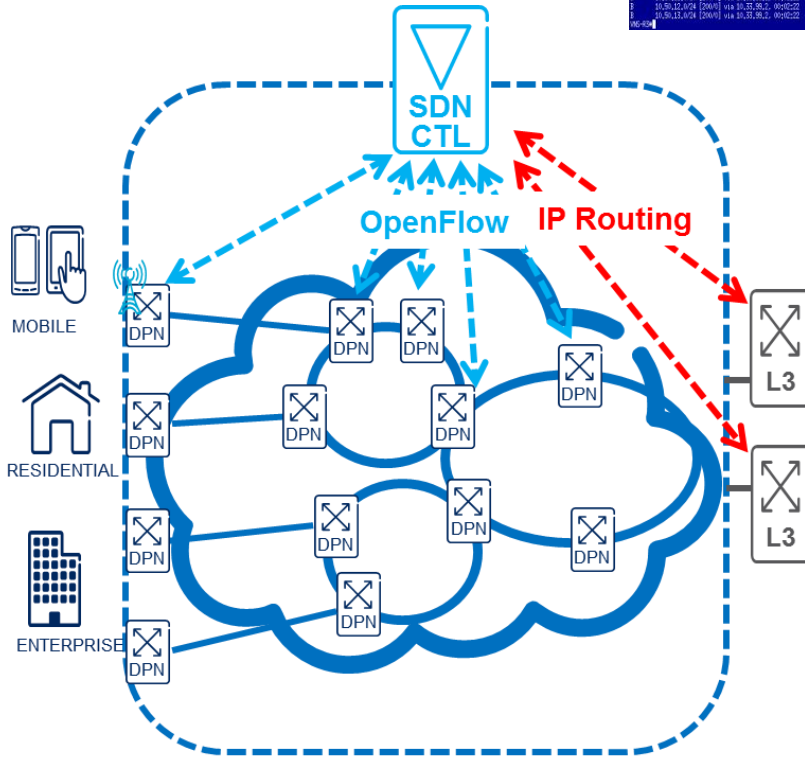
ERS CLI
external
ports

TCN

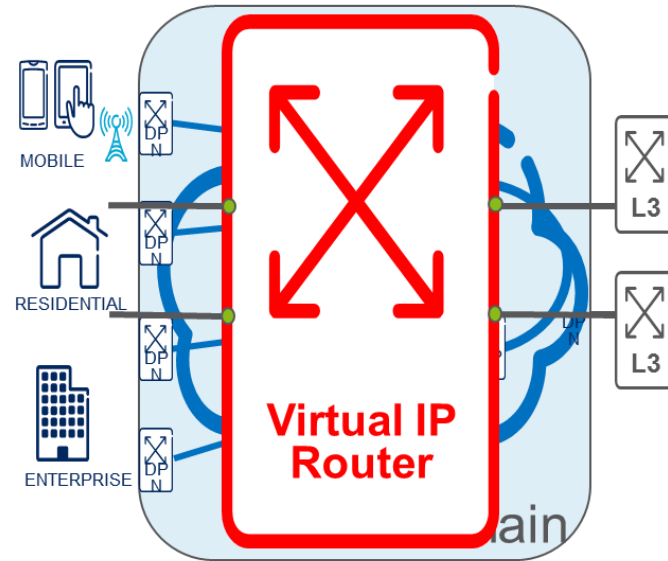
GUI
internal
topology



VIRTUAL NETWORK SYSTEM

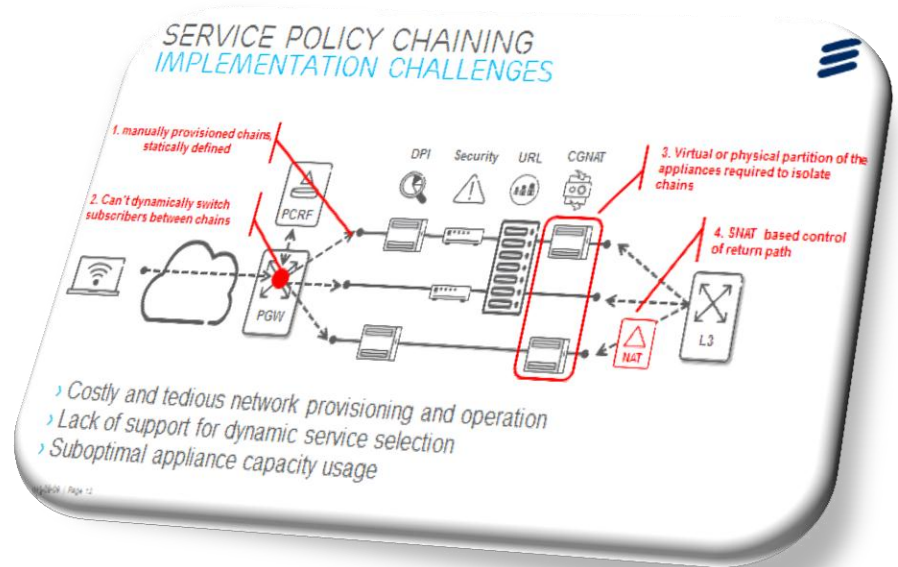
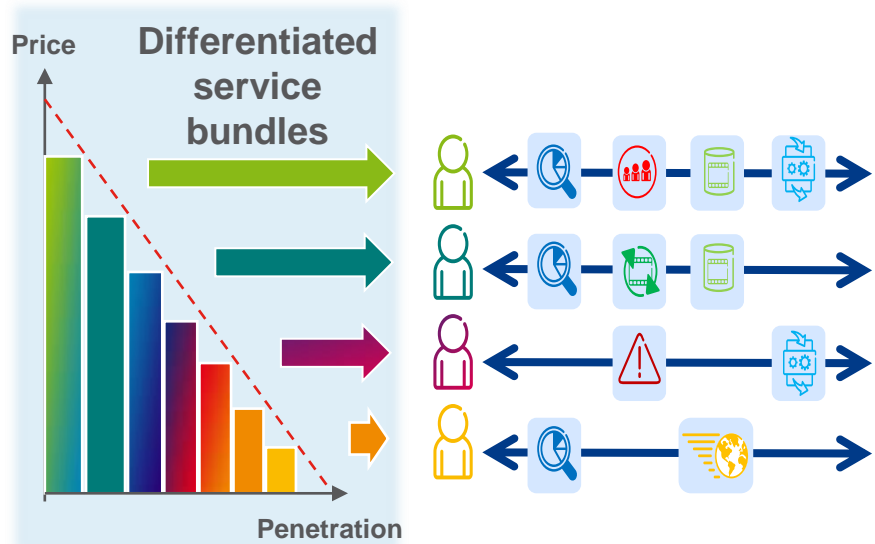








VNS Domain: Internal view



VNS Domain: External view

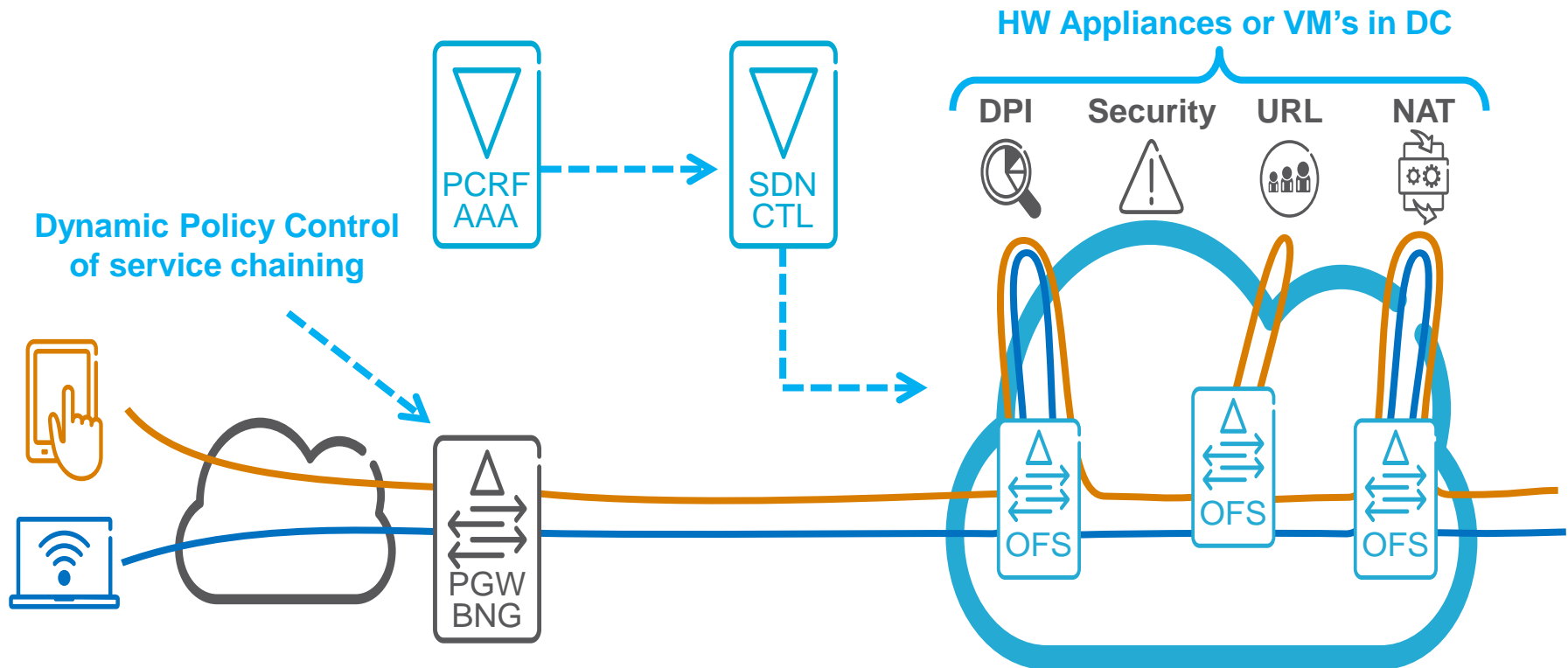
SERVICE CHAINING FOR DIFFERENTIATION



-  Firewall/AV
-  Parental Control
-  TCP/HTTP Web optimization
-  CDN & TIC
-  Media live compression
-  IPv6 transition/NAT
-  DPI, Charging and analytics
-  Advertising, profiling, enrichment

SUBSCRIBER AWARE CHAINS

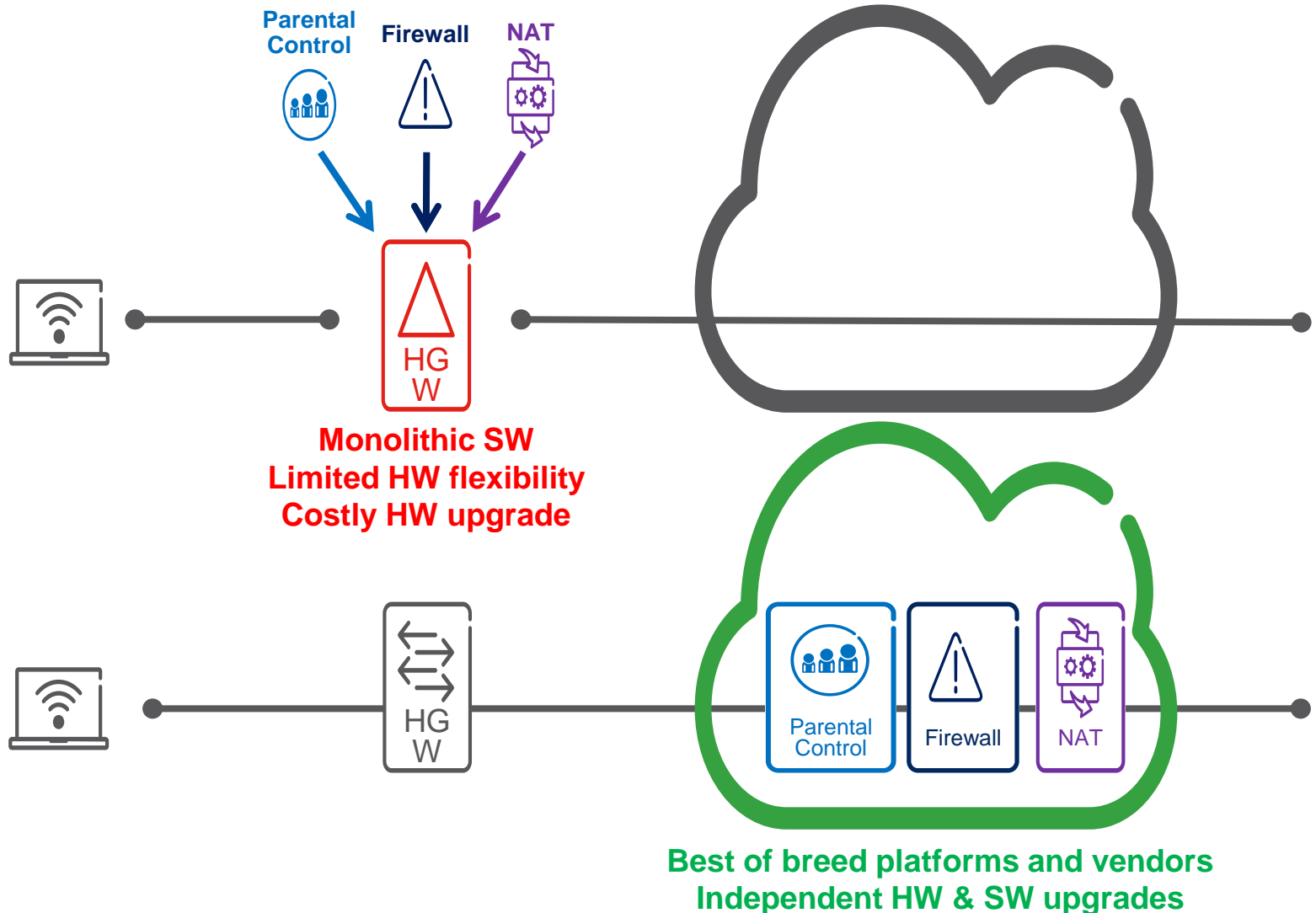
SERVICE CHAINING & AUTOMATION



- › Fully automate service chain build out
- › Per subscriber to allow service change on the fly
- › Dynamically built at subscriber connection time

VIRTUAL HOME GATEWAY

SP-SDN FOR FIXED NETWORKS

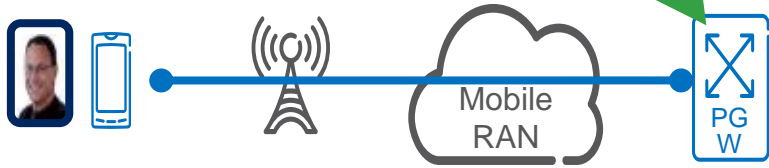


SERVICE PERSONALIZATION

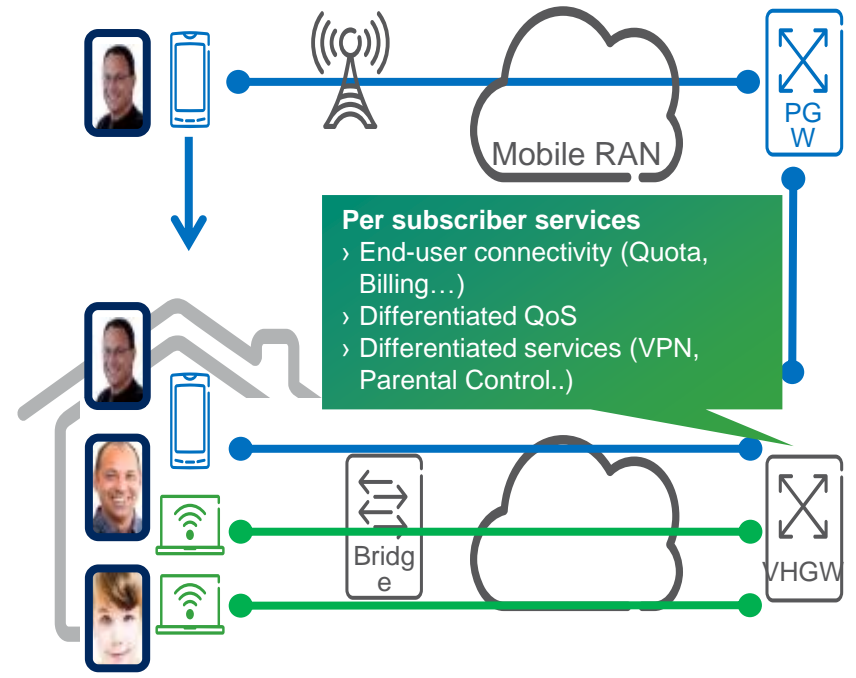
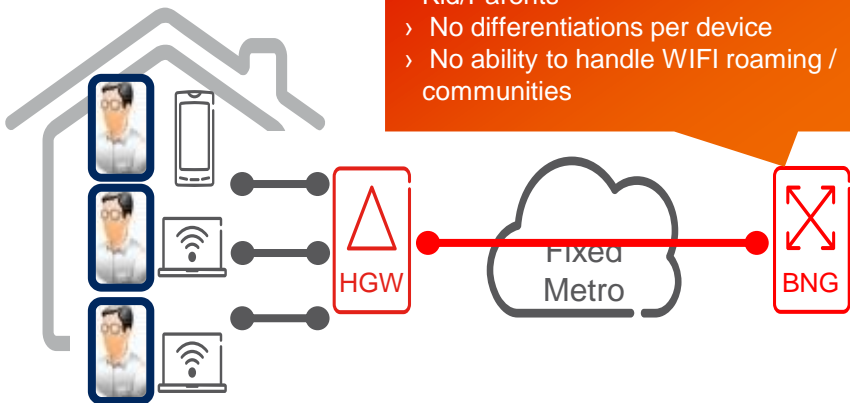
MOVING TO A NEW MODEL



- Per subscriber services**
- › End-user connectivity (Quota, Billing...)
 - › Differentiated QoS
 - › Differentiated services (VPN, Parental Control..)



- Per broadband line session / services**
- › No differentiation by profile i.e. Kid/Parents
 - › No differentiations per device
 - › No ability to handle WIFI roaming / communities



- Per subscriber services**
- › End-user connectivity (Quota, Billing...)
 - › Differentiated QoS
 - › Differentiated services (VPN, Parental Control..)

SERVICE PERSONALIZATION



On-Net



Off-Net



OTT-Specific

Per Destination



SDN



Video



Interactive
Multimedia



Business Service



E-commerce

Per Application



Residential, SMB, Enterprise



Package



Fixed / mobile



Per Subscriber



Health

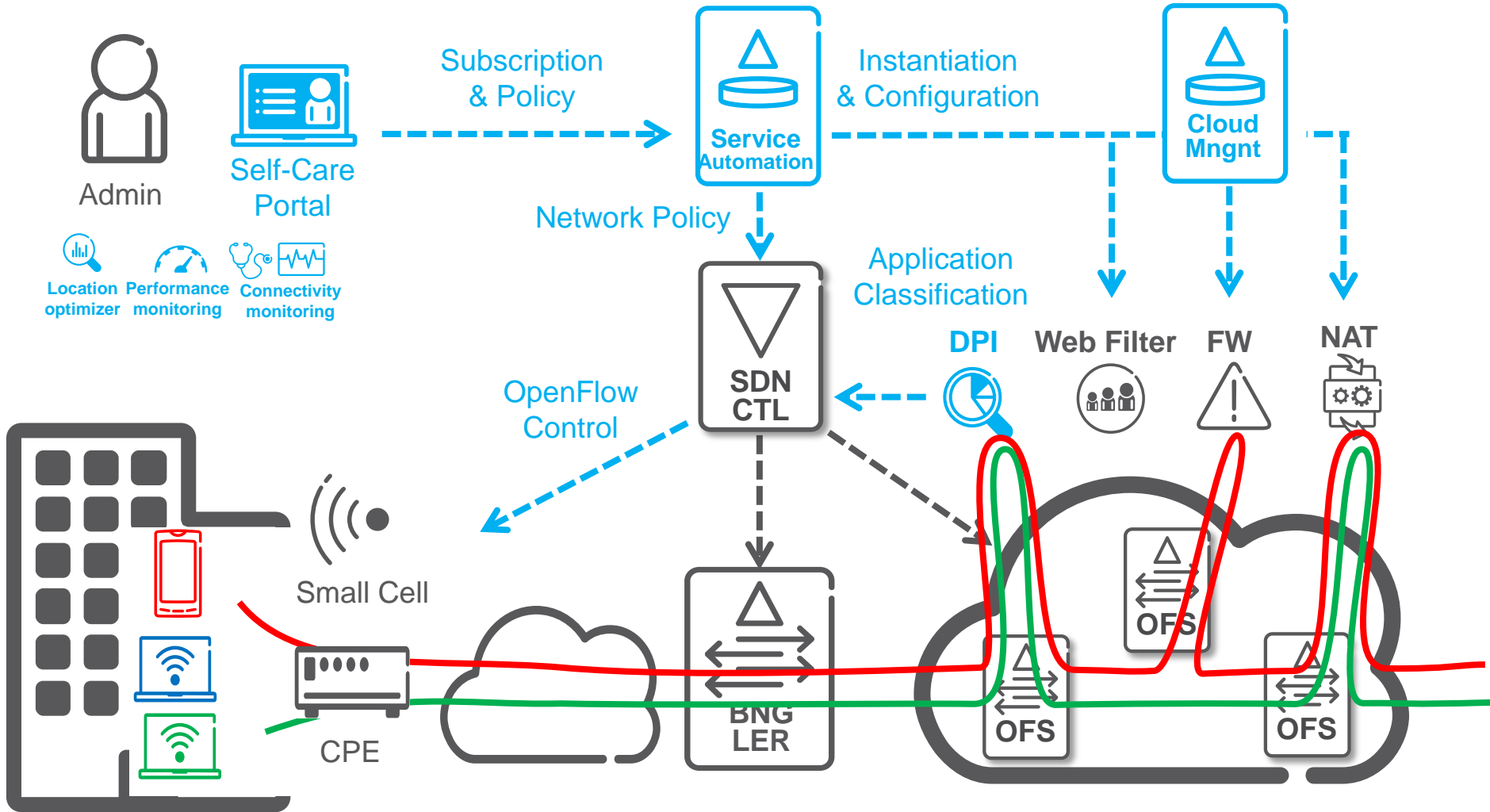


QoS KPI

Performance

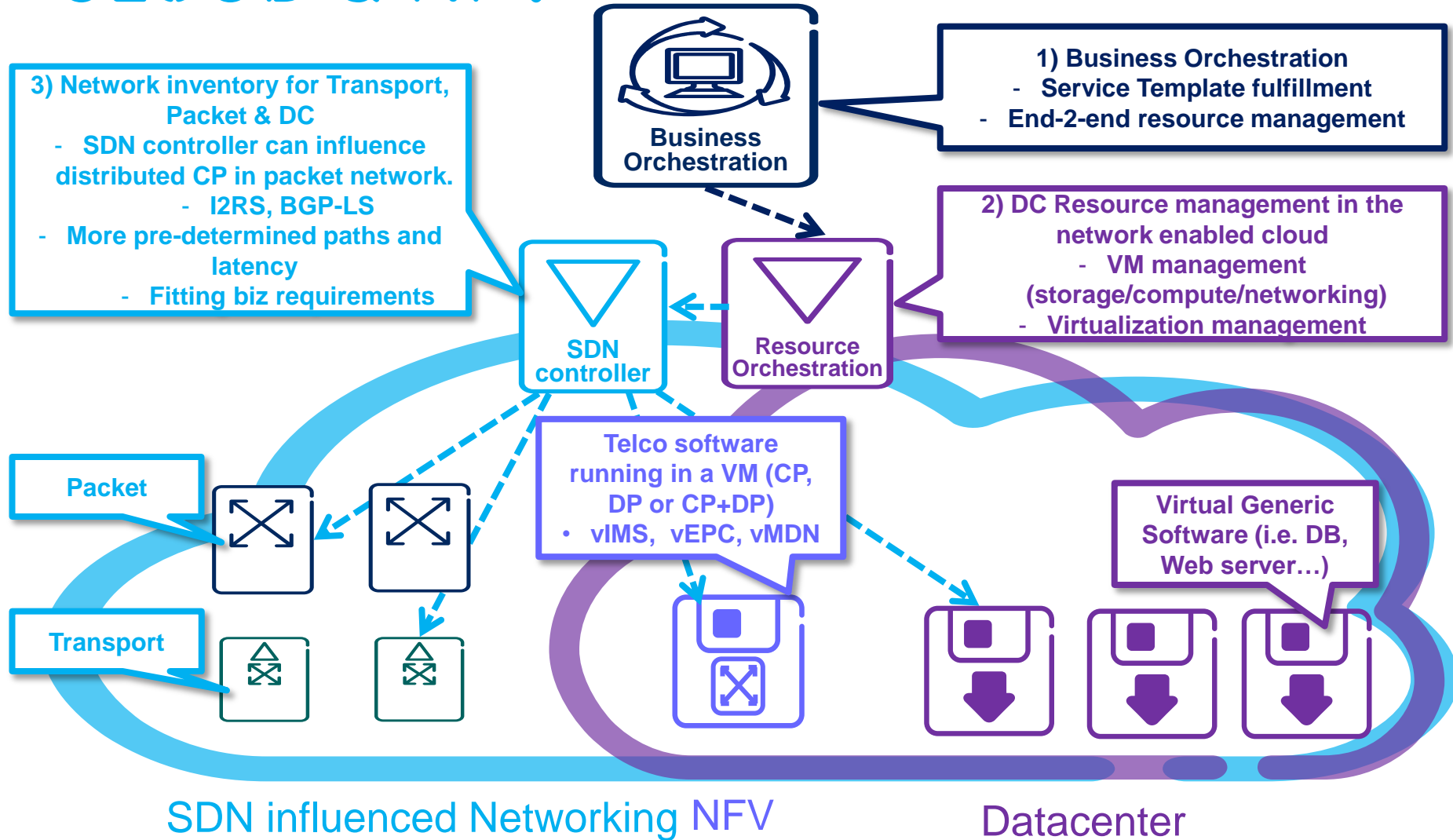
VIRTUAL ENTERPRISE GW

VHGW FOR ENTERPRISE SITES



ALL COMES TOGETHER

TRANSPORT, PACKET, SDN, CLOUD & NFV



THE ICT INFRASTRUCTURE FOR THE NETWORKED SOCIETY



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Optimally Hosted
Optimally Delivered

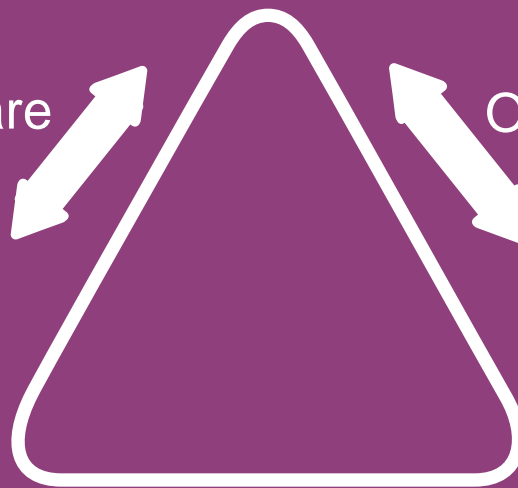
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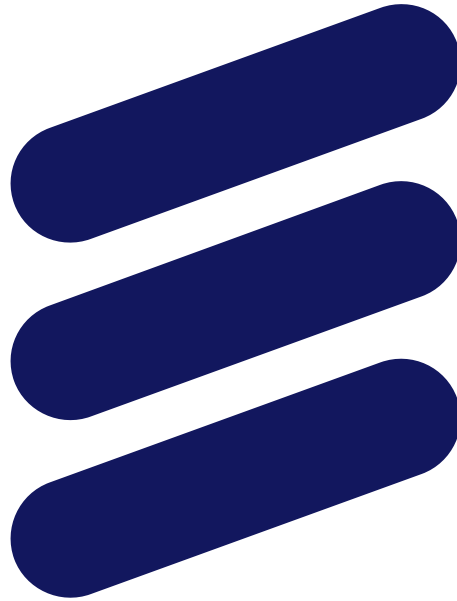


Combined



Infrastruct
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Network Enabled
Secure
Not tied to Data
Centers



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