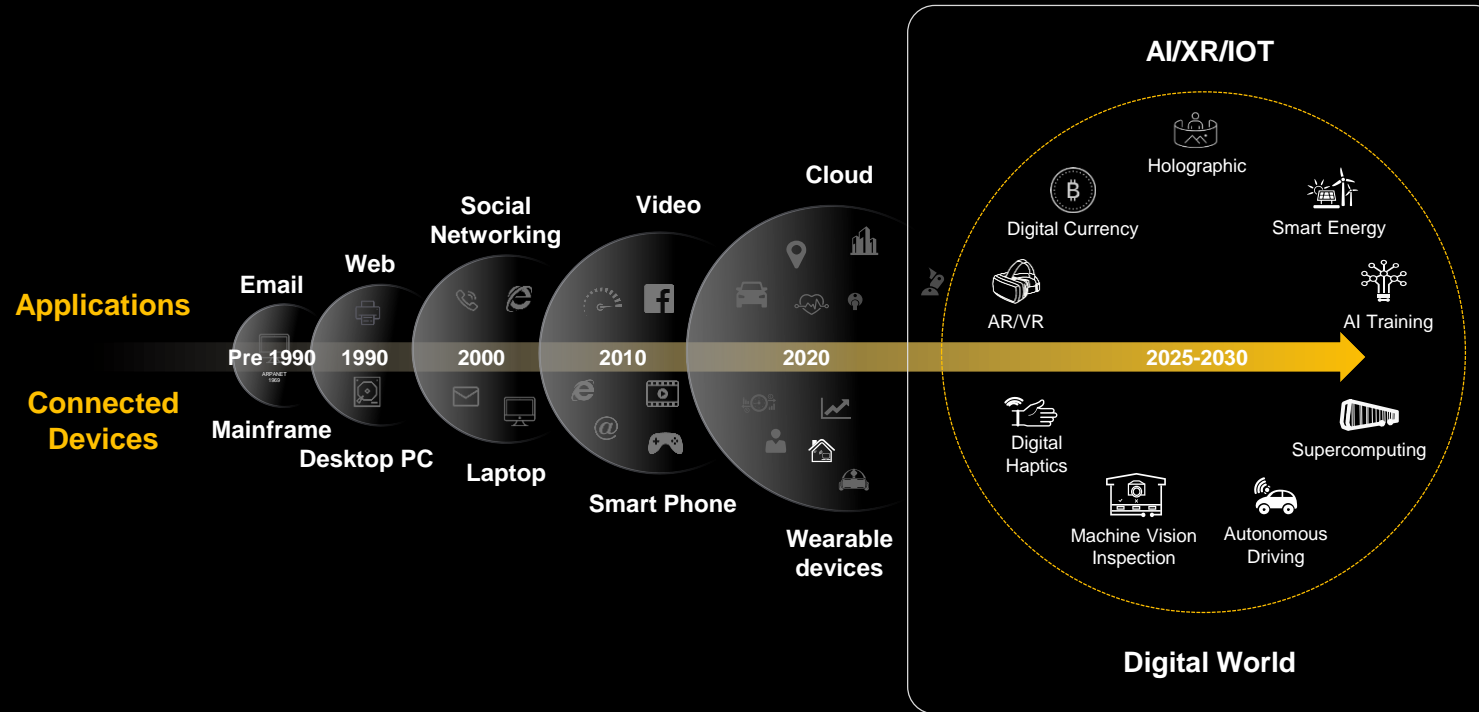


An aerial view of a city, likely Dubai, with a network of white lines overlaid on the buildings and streets, representing a network topology. The lines connect various points across the city, symbolizing connectivity and data flow.

SRv6 Latest Update

Robin Li
Member of IETF IAB

New Requirements of New Applications for IP Network



Key Requirements

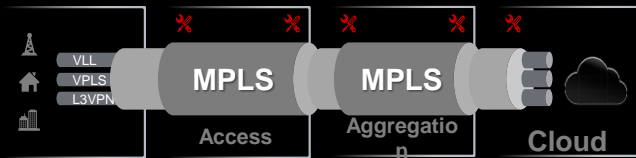
- Network Connectivity
- Network Programmability
- Application-Aware Network

Applications Drives the Change of IP Network Architecture

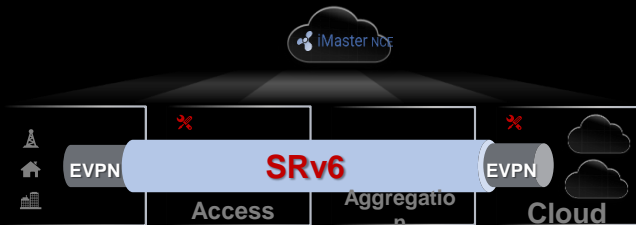
SRv6 is The Best Technology for Future-oriented IP Network

Inter-domain Network Communication

Complex Protocols and Cannot extend to other networks



Unified & simplified **Protocols**



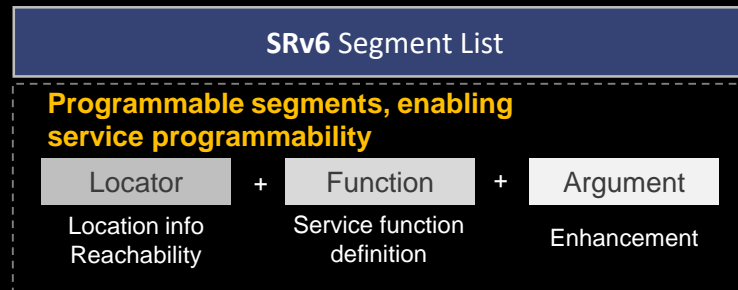
Experience Differentiated Assurance

Un-routable 20-bits label with Limited capacity



MPLS Header

Programmable **Paths & Services**

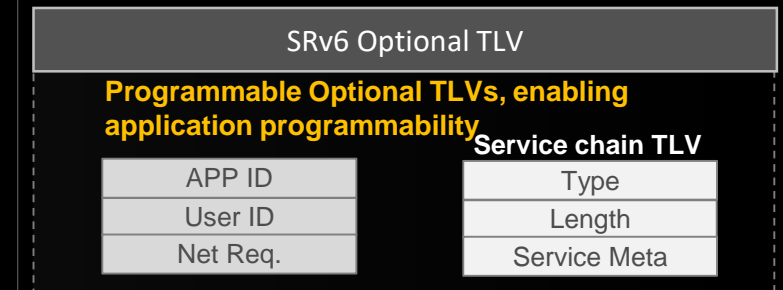


Application-aware Networking (APN)

No solutions(MPLS)



Programmable **Applications**



SRv6: Mature Standardization and Rich Eco-system

Mature Standardization

5 RFCs are released

- RFC 8986 SRv6 Network Programming
- RFC 8754 IPv6 Segment Routing Header
- RFC 9252 SRv6 VPN
- RFC 9256 SR Policy Architecture
- RFC 9259 OAM in SRv6

40+ Drafts are becoming Standard RFC





Mainstream Vendors already support SRv6



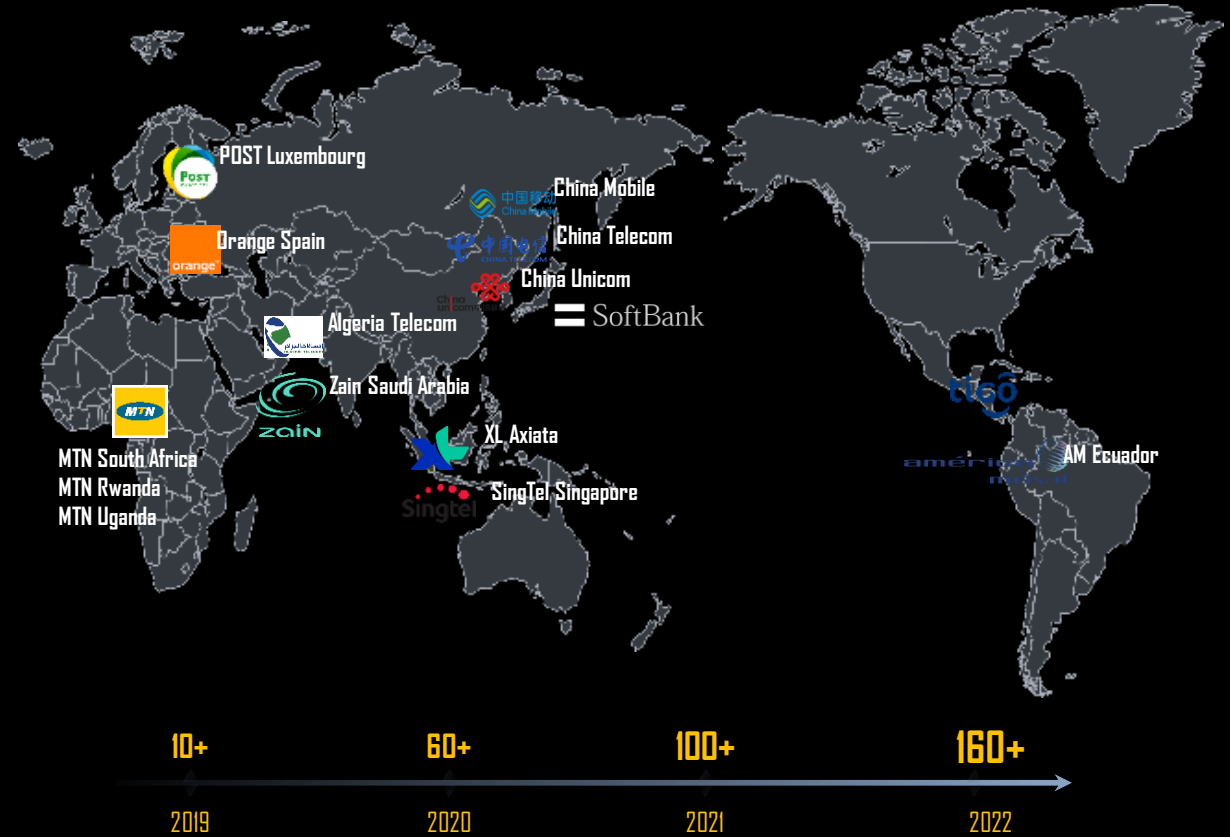
EANTC Continuous SRv6 Inter-op Test (2018 – 2023)

Record-Speed Deployment in Global Carriers

Global Carriers Consensus (Part of the list)

	✓ Orange Spain Deployed
	✓ 2 Round RFP Released
	✓ Brazil VIVO Already Deployed
	✓ Already Deployed
	✓ 24 Provinces Deployed
	✓ SRv6 Flex-Algo on 5G Commercial Network

Global SRv6 Cases



Implements SRv6 Dual-Vendor Interworking

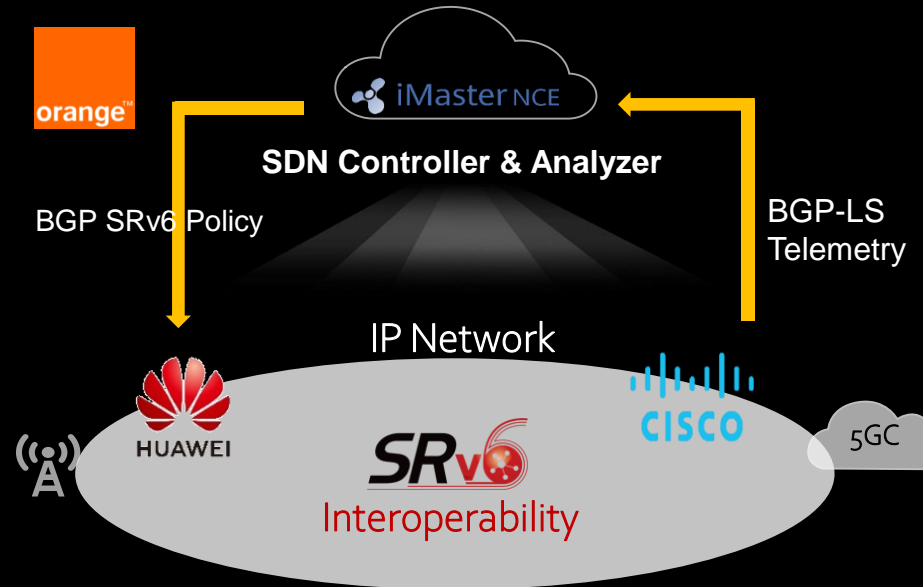
Challenges

- 1. Network evolution is complex**
IP Network of Orange Spain is built by Huawei, Cisco, Nokia and Juniper.
- 2. 5G network optimization is complex**
Manual optimization based on MPLS/RSVP-TE is complex and takes several days.

Requirements

- 1. Target network architecture for future**
 - Future services oriented target network
 - Evolvable protocol by multi-vendors
- 2. Flexible network optimization**
 - Easy network optimization

Implement SRv6 Interworking



Service Scope

5G / LTE
SRv6 BE/Policy

2G / 3G
MPLS/RSVP-TE

Standard Solution

IGP IS-IS v6
TOPO BGP-LS

Forward SRv6
Control BGP-SR

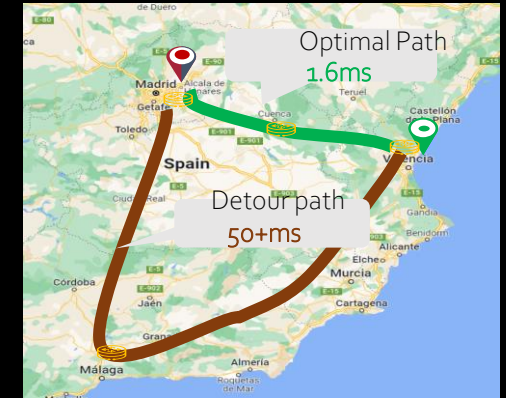
Interworking

Huawei ATN/NE
PE Node, SRv6 Support

Cisco NCS
P Node, SRv6 Support

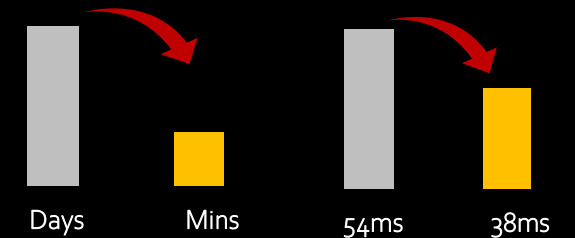
Benefit: Flexible Optimization

Flexible path optimization on demand



Automation
improve
O&M efficiency

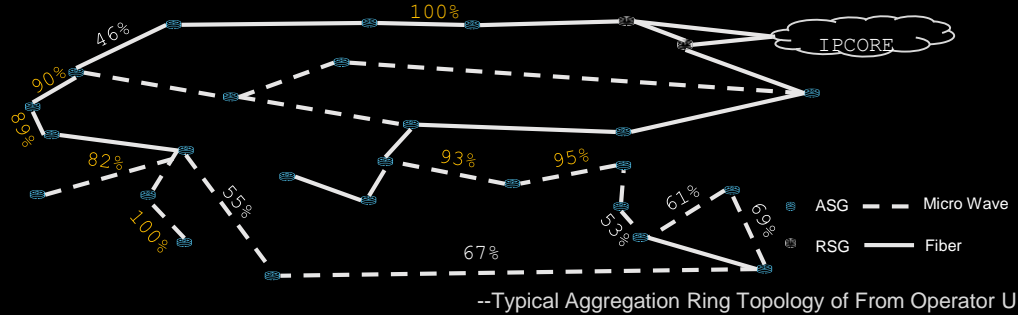
Optimization
average latency
reduce 16ms



We expect in 2023 that all the equipments will have a renewal.
— Hector Llorente
IP & Transport Network Manager, Orange Spain

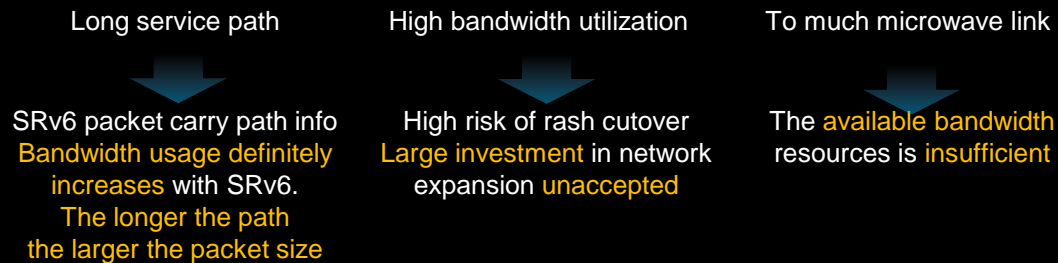
Implements SRv6 Compression to Promote Rapid Traffic Growth

High BW Usage and Insufficient Available Resources



- **To much microwave link:** 50% for aggregation(15/30) and 80% for access
- **Long service path:** 4 aggregation rings have 60 NE on average, and 52 access rings have 8 NE on each ring. The service path is 17 hops on average.
- **High bandwidth utilization:** 70% on average and over 90% in some cases

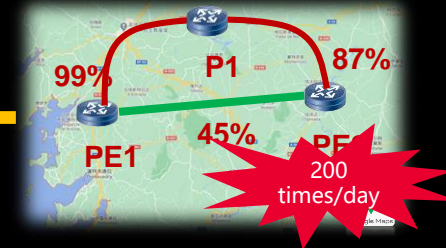
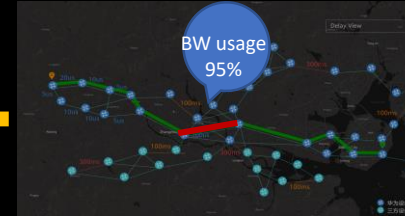
Key Challenge: How to ensure smooth SRv6 cutover without network-wide capacity expansion?



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GSRv6+SDN+precise expansion supports SRv6 successfully deployed

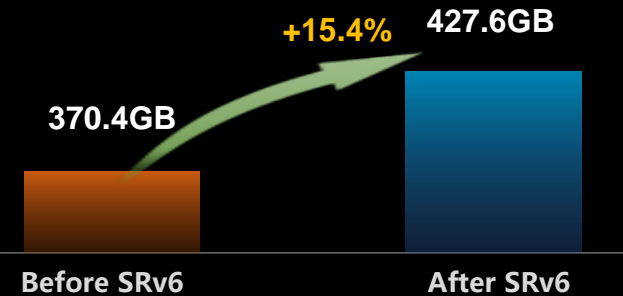
GSRv6



Measure 1: Reduce the SRv6 header size with GSRv6

Measure 2: Identify network bottlenecks and perform precise expansion.

Measure 3: SRv6 Based SDN UC Real-time automatic optimization ensuring optimal paths at any time



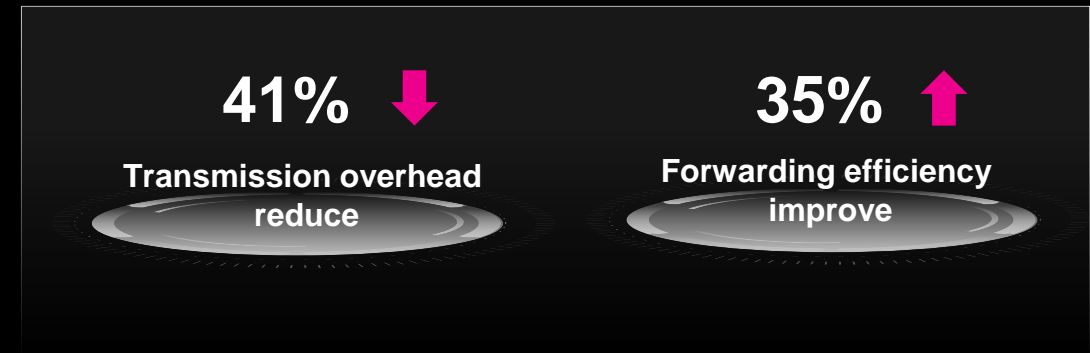
After SRv6 is deployed in area N
Suppressed traffic is rapidly released

1st SRv6 Header Compression Interoperability Test In the World

Huawei & Cisco IOH SRv6 Interoperability Test Success



SRv6 Brings Great Value to IOH Network



Outstanding Contribution to Regional IPv6 Innovation



10+ Successful Integration Cases Proven Fast Integration with NSO and 3rd IT system

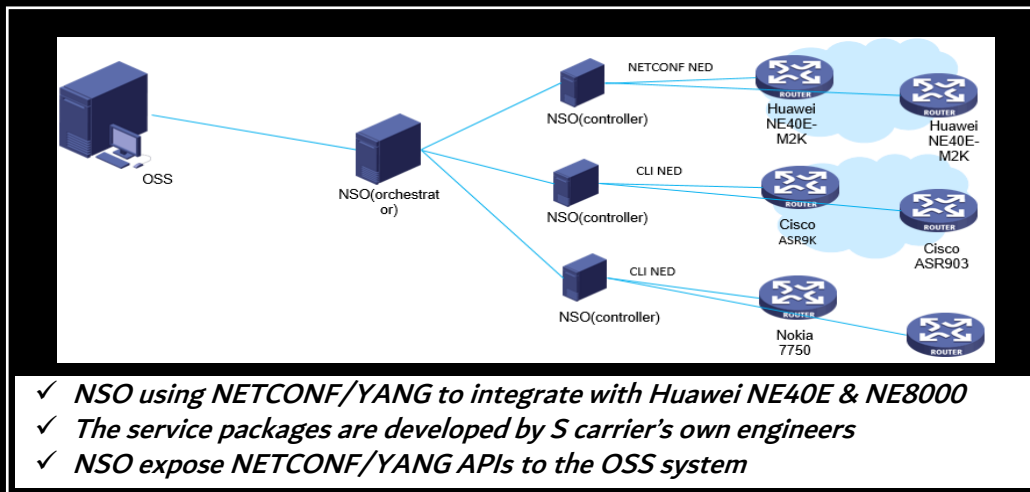
How to develop configuration package

Develop item	Activity
service YANG	Joint define the service YANG model according to scenario. The service YANG model should include the injected model from CP Broker. Other attributes in service YANG varies depending on scenario.
mapping logic	Using python language, user could generate parameters according to fixed rules, by fetching from database, or by allocating from resource pools.
configuration template	After LLD of configuration, HUA could generate and test YANG YANG format configuration file, and the corresponding XML templates. The fixed values could be defined as parameter according to service YANG.

Typical integration cases in Europe

Country	Features	Details
Sweden	FMC POP :PIM,VPN,MLDP,ISIS,OSPF,MPLS TE,VPLS,	HUA provides YANG files and the customer performs self-test.
France	IPRAN ASBR:VSI/L3VPN,QINQ,ISIS,OSPF, MPLS TE,VPLS etc.	Customer use NSO to connect OSS: 1. Query service information. 2. Service configuration and provisioning; HUA provides YANG files and the customer performs self-test.
Italy	CPE L3VPN, MPLS, QoS, Y.1731	HUA performs the test based on the service scenarios provided by provided by the customer. After the test is complete, provide the corresponding XML file to file to the customer. Customer performs integration development/testing based on on XML files provided by us

S Carrier Case



DevZone for learning YANG & integration develop

Document center <ul style="list-style-type: none"> technical documents about device northbound interface and related, such as Netconf/YANG/Tel emetry etc. 	API center <ul style="list-style-type: none"> YANG modules and API reference .proto files for telemetry Ansible api 	Cloud Sandbox help developer test their program or learn about device functions.
Certification <ul style="list-style-type: none"> provide certification courses to help developers grow 	Toolchain help developer build/test their program. <ul style="list-style-type: none"> Telegraf plugin for Huawei MDT Elk plugin for Huawei MDT Ansible-gen/ Protoyang yang-transformer Yang test suite 	Discussion forum Help developer solve their questions or share their experience.

SRv6-based Innovation is Accelerating

Network slicing

+ dedicated lane



Exclusive resources in any case

In-flow detection (IFIT)

+ dashboard camera



Real-time monitoring and whole-process logs

Stateless multicast

+ shared mobility



Multi-user resource sharing, saving resources

Deterministic IP

+ cruise control



Consistent speed at any moment

An aerial, high-angle view of a city, likely Dubai, showing a dense cluster of skyscrapers and a complex network of roads. A semi-transparent network of white lines is overlaid on the city, connecting various points across the urban landscape. The overall image is in a dark, monochromatic color scheme, possibly black and white or a very dark grey.

THANK YOU

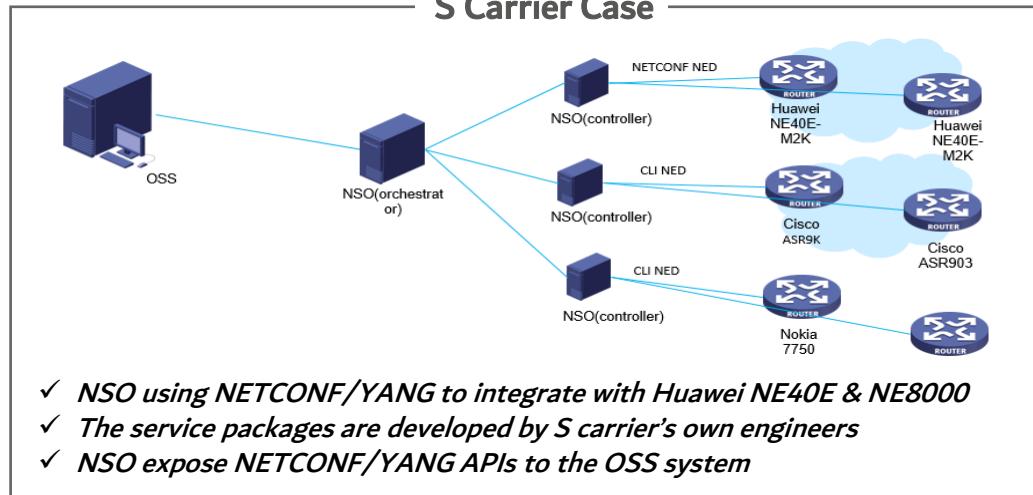
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Intelligent IP Network Boost New Growth

28 February | W Hotel Barcelona | Online



**CREATE
A BETTER
FUTURE**

