



# *WAN Summit London 2017*

## SDN, SD-WAN, NFV, VNF: A Modern WAN Primer



Cloud  
& Infrastructure



Communications  
& Collaboration



Networks  
& Security

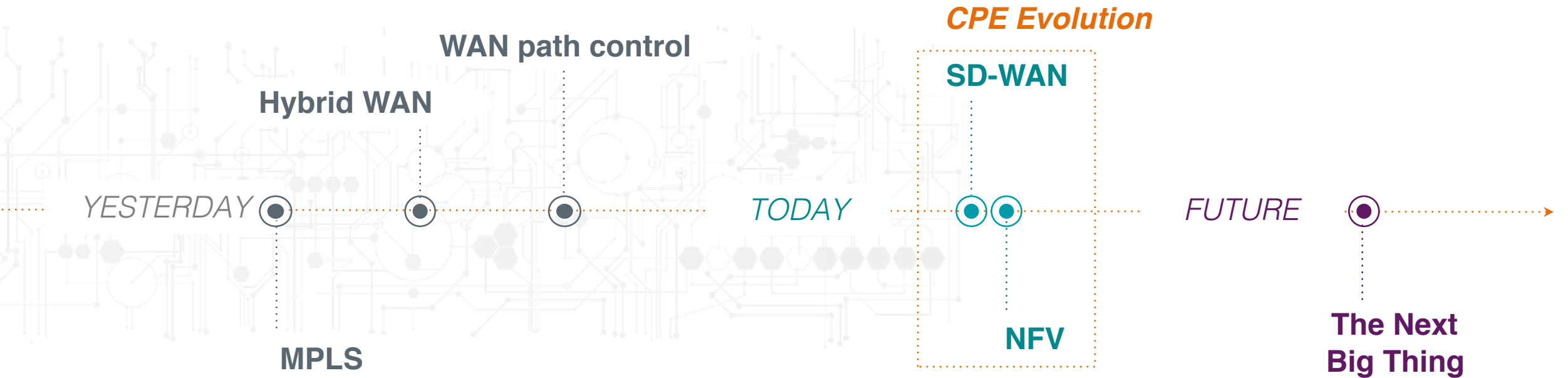
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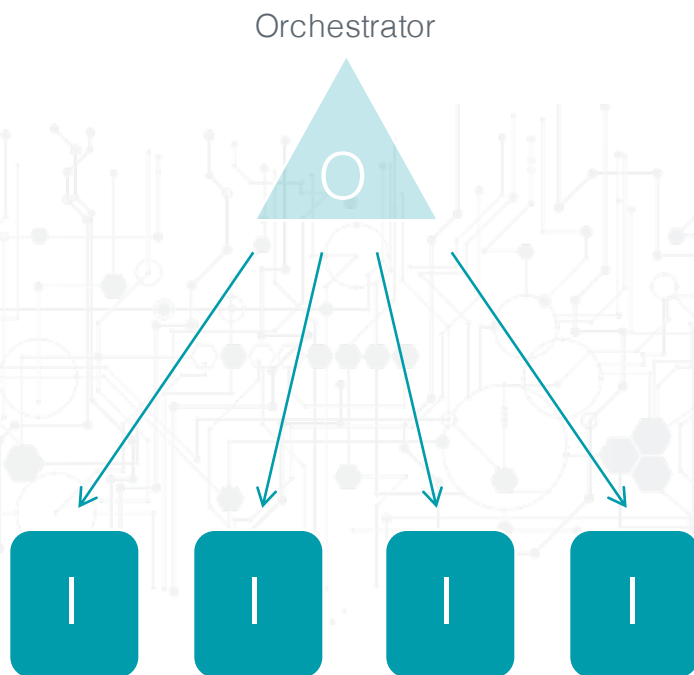
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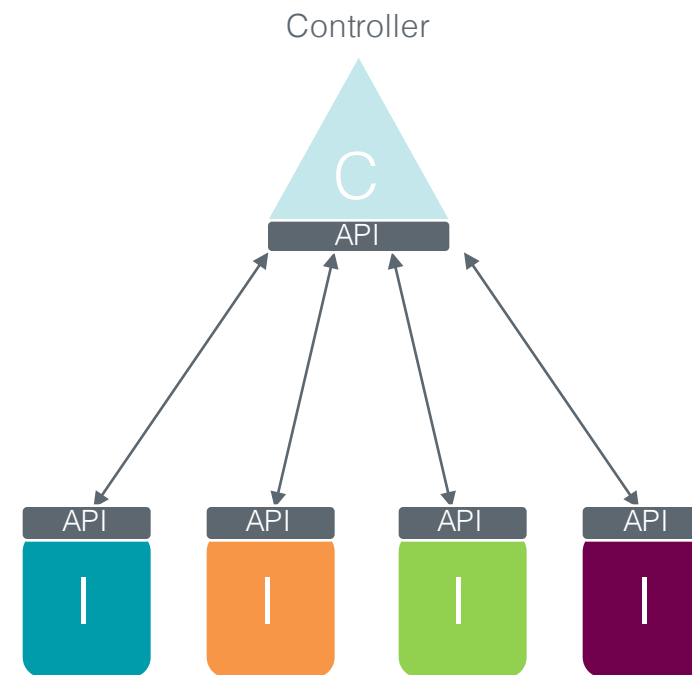
# NETWORK EVOLUTION: FROM TRADITIONAL WAN TO SOFTWARE-DEFINED WAN



## Centrally managed infrastructure necessary for its flexibility



- Same solution
- Configurations pushed to the devices through dedicated interfaces



- Solution agnostic to underlay infrastructure chosen among compatible devices
- Standard interfaces and consolidated “intelligence”
- Feedback for visibility & decision to the controller

Legacy orchestrated infrastructure

Software-Defined infrastructure



Virtualization then cloud-based infrastructure have provided

## Flexibility & Agility

To the business

**> Network became the limit**



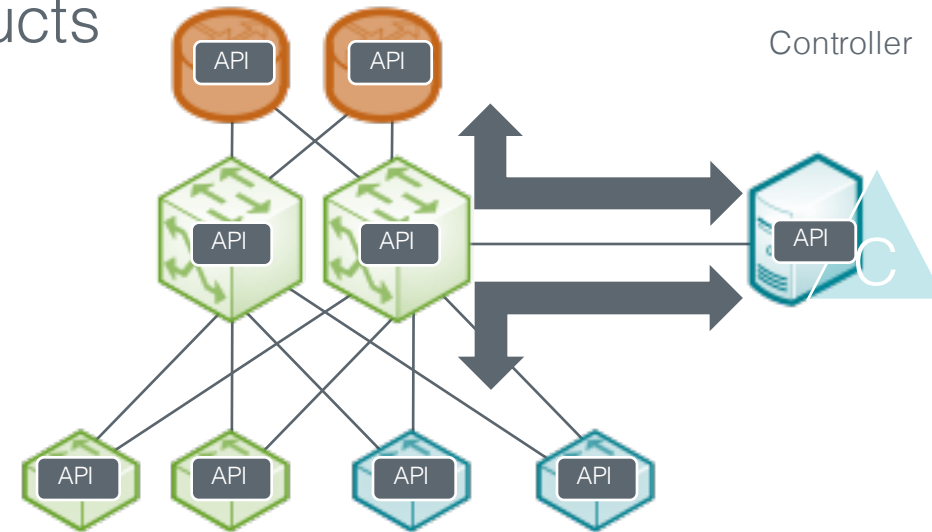
# THE ANSWER: SOFTWARE-DEFINED NETWORK

Underlay networks based on **whatever** vendors' products

Overlay networks managed by the controller

- Calculating best adapted paths
- Embedded **segregation** functions

Standard interfaces for communication between controller and endpoints such as **Openflow**

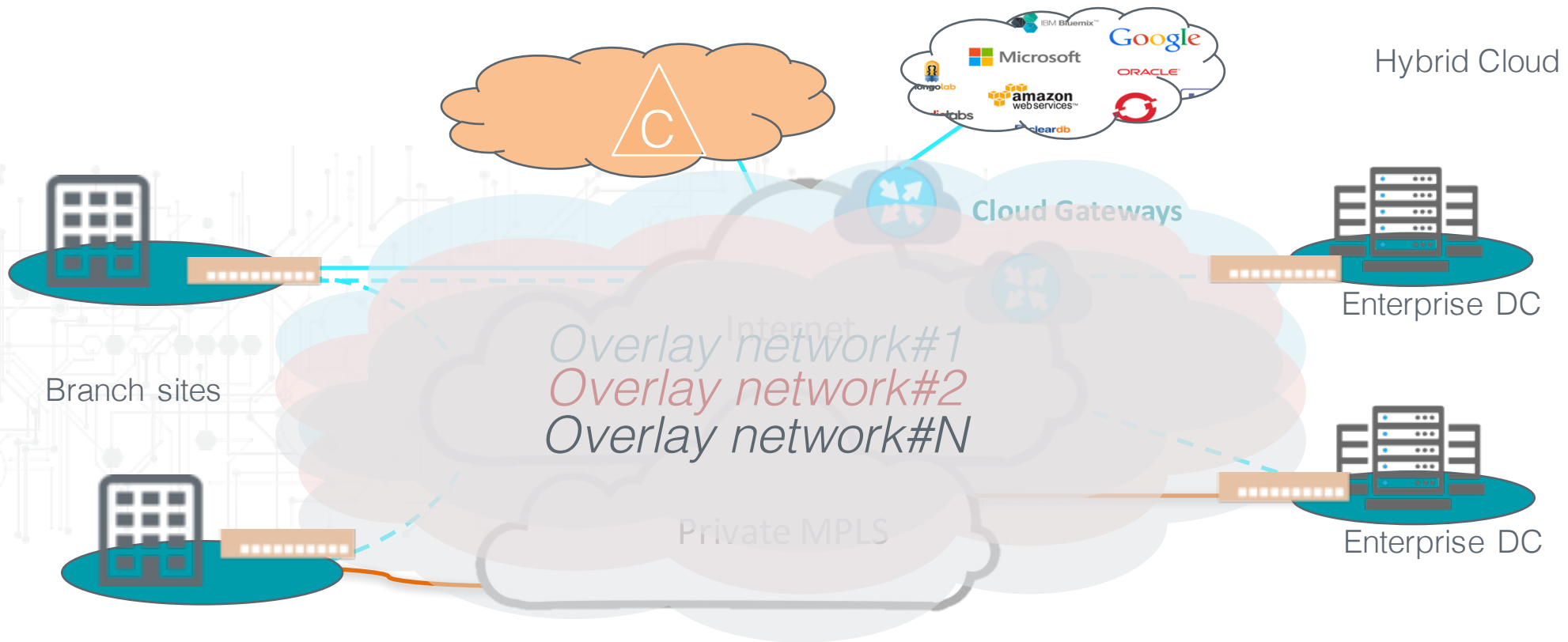


Use for inter-LAN traffic simplifying resiliency



# What about WAN?

# CLOUD-DELIVERED SD-WAN ARCHITECTURE OVERVIEW



Complexity managed by the controller by creating one **overlay network** agnostic to underlay network(s)

.... Or several **service-based overlay networks** with their own topology

# TRANSFORM **WAN** OPERATION - SD-WAN PROMISES



## TIME TO MARKET - BRANCH AGILITY

- Management of **multiple links**, devices and services
- Very fast branch office provisioning with **automated zero-touch deployment**



## VISIBILITY / REPORTING

- Complete **visibility** and **control of the whole network at the application level**
- **Simplified configuration, orchestration** and on-going **monitoring** with **centralized troubleshooting** tools



## OPTIMIZE COSTS

- **Multi-functions consolidation**
- Ordinary **broadband** as enterprise-grade WAN



## MANAGEMENT / AUTOMATION

- **Automation** and follow-up change
- Manual process and **risk of errors reduced**
- Focus on other activity with **more added value** for infrastructure teams



# Two SD-WAN MODELS



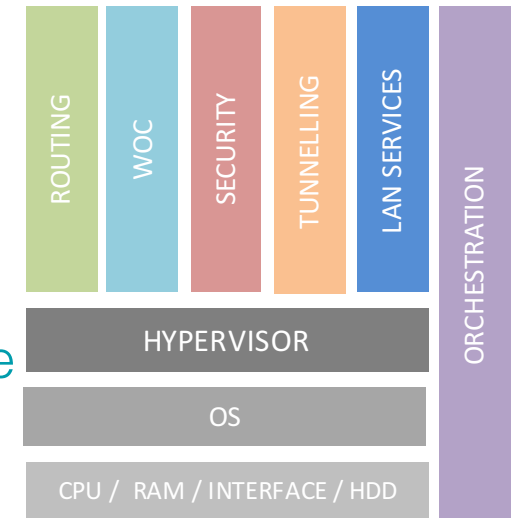
## BLACK BOX

- Based on a **single platform**
- **Software layer is associated to hardware**
- Embedded feature **natively integrated**
- **Limited** to the features and the services offered by the provider



## WHITE BOX

- Based on **X86 server** with hypervisor
- Software layer is **dissociated from hardware**
- **More flexible**





# Still need boxes > where is the flexibility?

VNF: Virtual Network Function / NFV: Network function virtualization

# NETWORK FUNCTION VIRTUALIZATION: BORN IN THE DATACENTER

Use agnostic x86 servers to deploy network-related services



Switching  
Routing  
Optimization



Measuring  
Reporting  
APM



Firewall L4/L7  
Anti-DDoS – APT  
IDS/IPS  
DLP



Web Application Firewall  
Load balancers  
Proxies  
Remote access security



Server

Network change was necessary to support application VMs in virtualized environments



# Two types of VNF deployed in the WAN

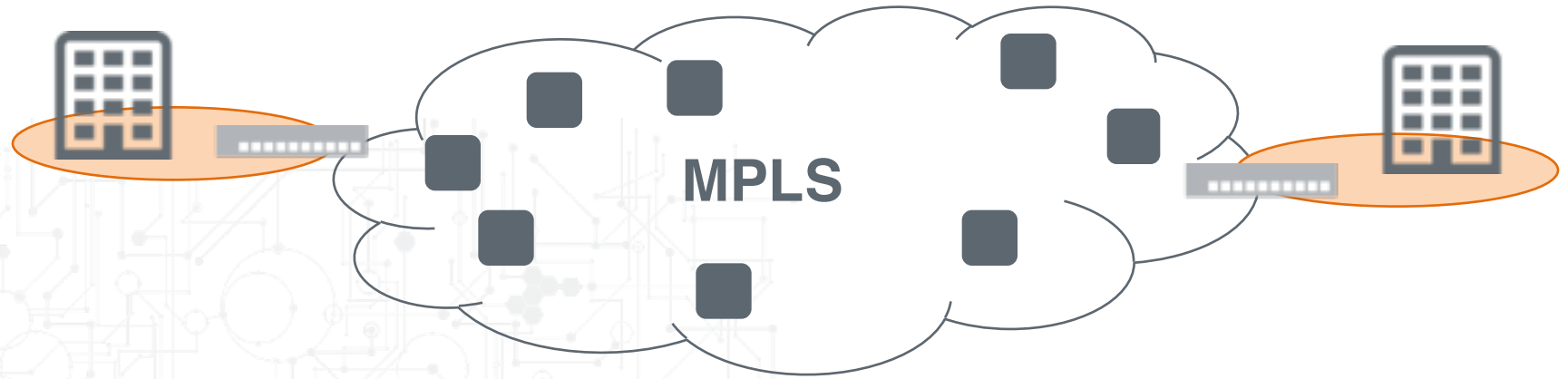
1. Deployed in the core WAN devices by MPLS vendors

2. Deployed at the edge of the WAN: CPE\*

\*Customer's Premise Equipment

# EMBEDDED NETWORK FUNCTIONS BY WAN PROVIDERS

■ Provider's POPs with a fabric hosting additional services



1

CORE MPLS NFV services

## Fabrics where the Provider proposes its services

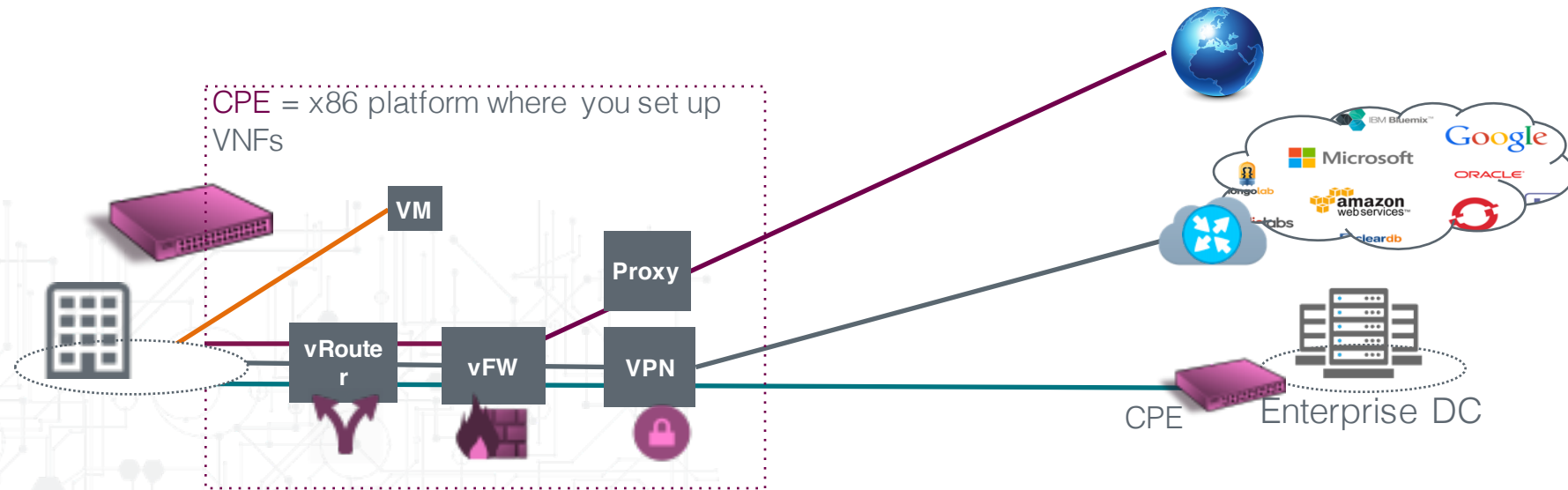
- ✓ Service such as WAN Internet breakout, firewalling, optimization, etc.
- ✓ Central management with self-service platform
- ✓ To be efficient → Provider's POPs = customer's footprint



# VIRTUALIZED PLATFORM AS A CPE

2

NFV on CPE



## x86 platform to set up various VMs

- ✓ Promises to be agnostic to x86 platforms
- ✓ Network-related services (router, firewalls, optimization, etc.) or application VMs
- ✓ Policy-based service chaining
- ✓ Central management with self-service platform → Marketplace
- ✓ Capacity planning mandatory

Built on white boxes or black boxes

# CPE IS THE CURRENT KEY DRIVER

## Choose a solution

### **Black box from the market**

- Corresponding to your expectations
- Delivery capabilities adapted to your footprint
- Fixed ecosystem and partnership

### **White box**

- Hardware approval
- Delivery capabilities adapted to your footprint
- Build the ecosystem
- Agnostic?

## Choose a way to operate it


### **WAN providers**

### **Third parties / specialist**

### **Do It Yourself**



# What's next?



What's next?

# Co-management / Self-management

Providers have to develop their co-managed services to provide more flexibility

## x86 platform

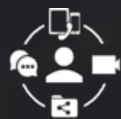
More functions more possibilities on branch sites

## Unique controller

Consolidate management & reporting (WAN / LAN / etc.)



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IT Consulting & Networking