IP Solutions for Broadcasters

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Agenda

- Business opportunity in broadcasting
- Broadcast requirements are challenging
- How the challenges can be met
- Case study: SRG / UPC Orion project in Switzerland
- Cisco/Nevion solutions – what's next?

About **Nevion**

- **Our vision:**
  - Making real-time content creation boundary-free
- **Our mission:**
  - Virtualizing mission-critical connectivity
- **Our markets:**
  - Live broadcasting, esports, movie post-production and government applications
- **Our company:**
  - Over 20 years in business
  - Part of Sony

SONY

nevion

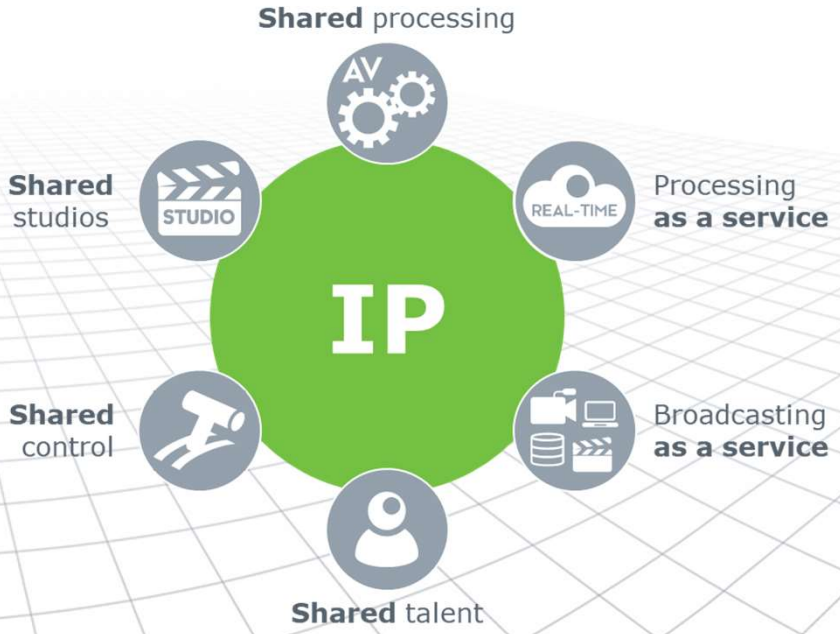
About Cisco

IP fabric for Media

- **Cisco IPFM enables**
  - Flexible IP fabric for SDI to IP transition
  - Automation through open APIs/ DCNM to simplify deployment
  - Real Time Telemetry for flow health monitoring
- **Cisco Media Data Center**
  - For post-production workflows

Technology trends = New opportunities

- Transition from hardware to software
- Virtualization
- LAN / WAN convergence



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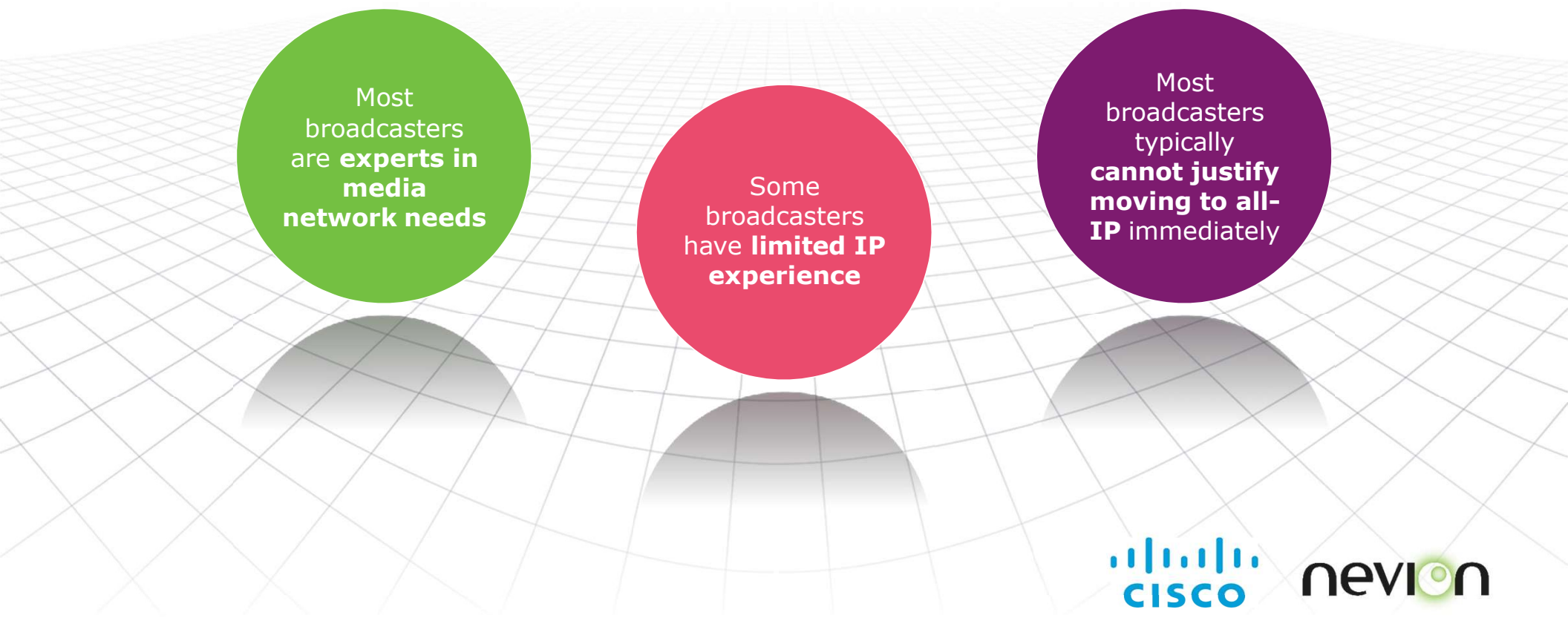
Customer Considerations



Broadcast **media transport facts**

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Meeting the live broadcast challenge

SDI infrastructure is

optimized for

broadcast

Media-centric, high performance, deterministic routing, low latency, fast switching, etc

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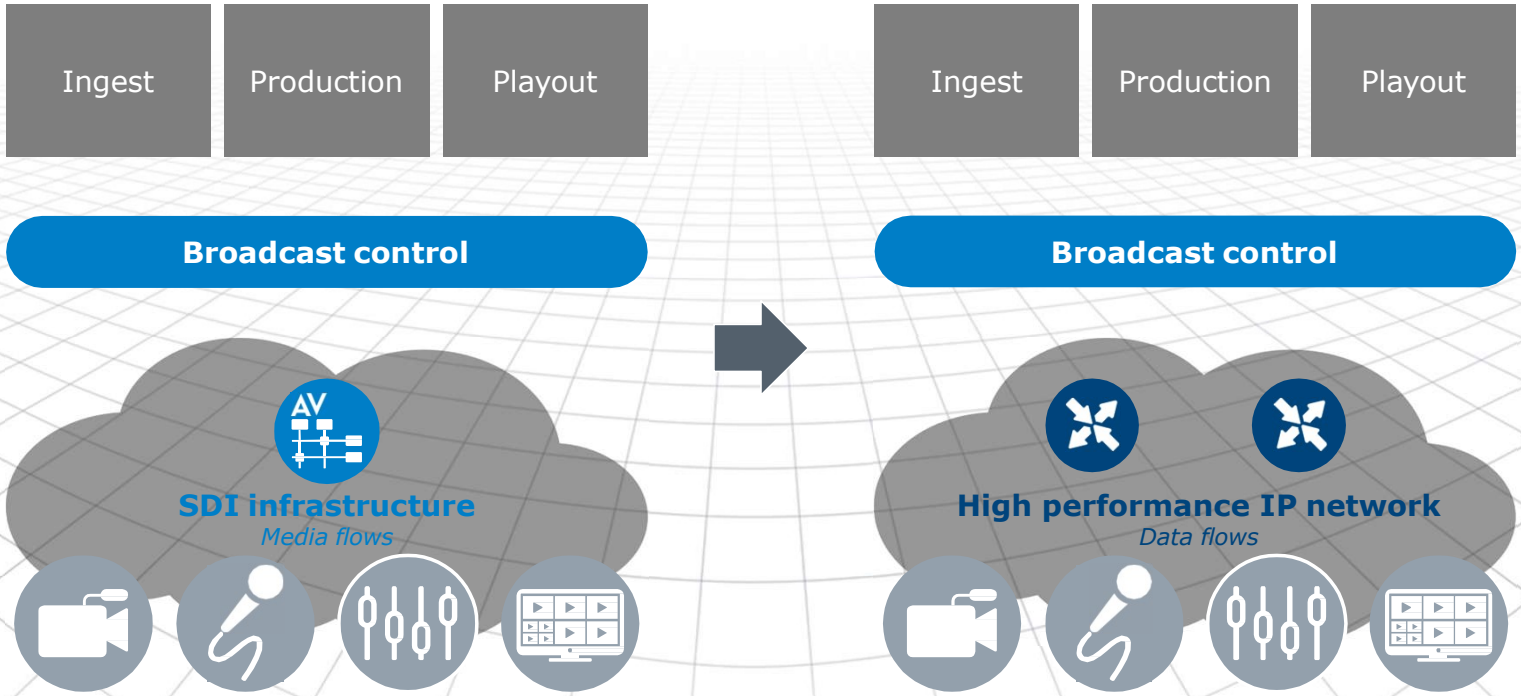
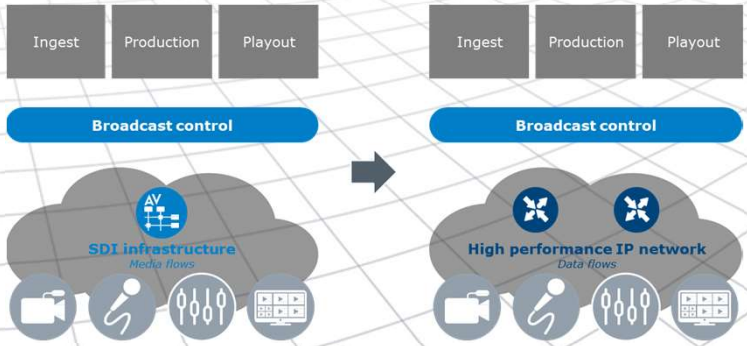
Architecting a high performance IP network



Which applications can run on the same network?

- Realtime audio/video for TV production
- Realtime audio for Radio production
- Playout
- File based applications
- Office applications
- Management
- Data Center applications
- Wide area networking
- ….



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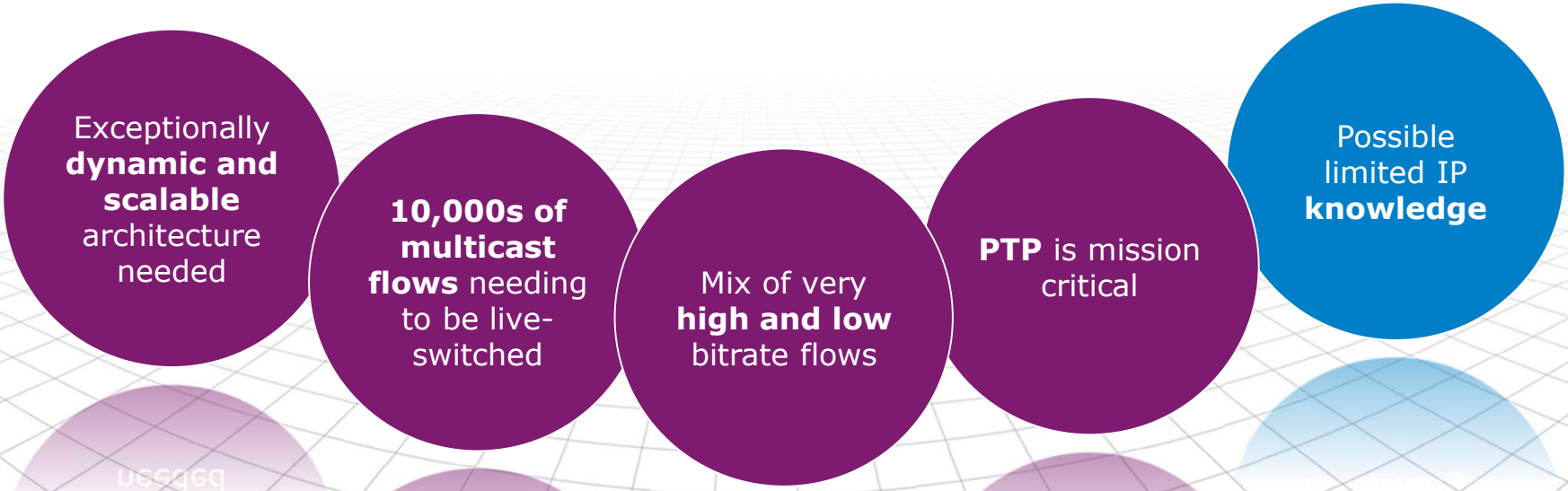
Enterprise & broadcast networks are different

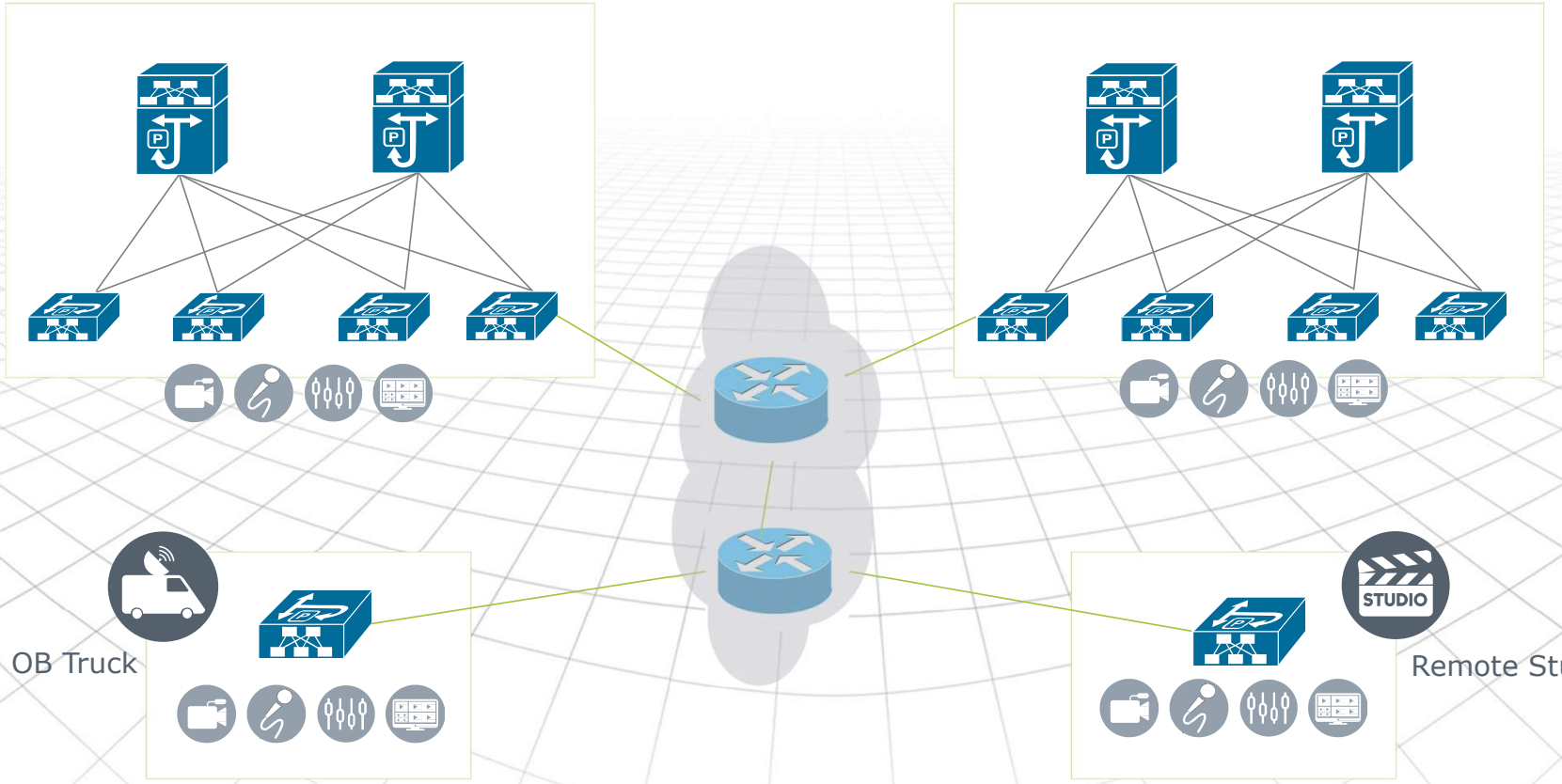
	Enterprise networks	Live broadcast networks
Payload	Data	Video + audio + data
Streams	Mostly < 10Mbps	Up to 12Gbps (4K video), many over 1.5Gbps
Access interface	1Gbps	10/25Gbps
Connection	Client-server	Peer-to-peer
Transmission	Unicast	Multicast (> 10,000 flows)
Profile	Variable and bursty	Constant
Protocol	TCP	UDP
Timing	Often not required	PTP (media flow synchronization) is mission critical

Some challenges



Scalable and Flexible Topologies
- For Studio and Remote Production

Exceptionally **dynamic and scalable** architecture needed



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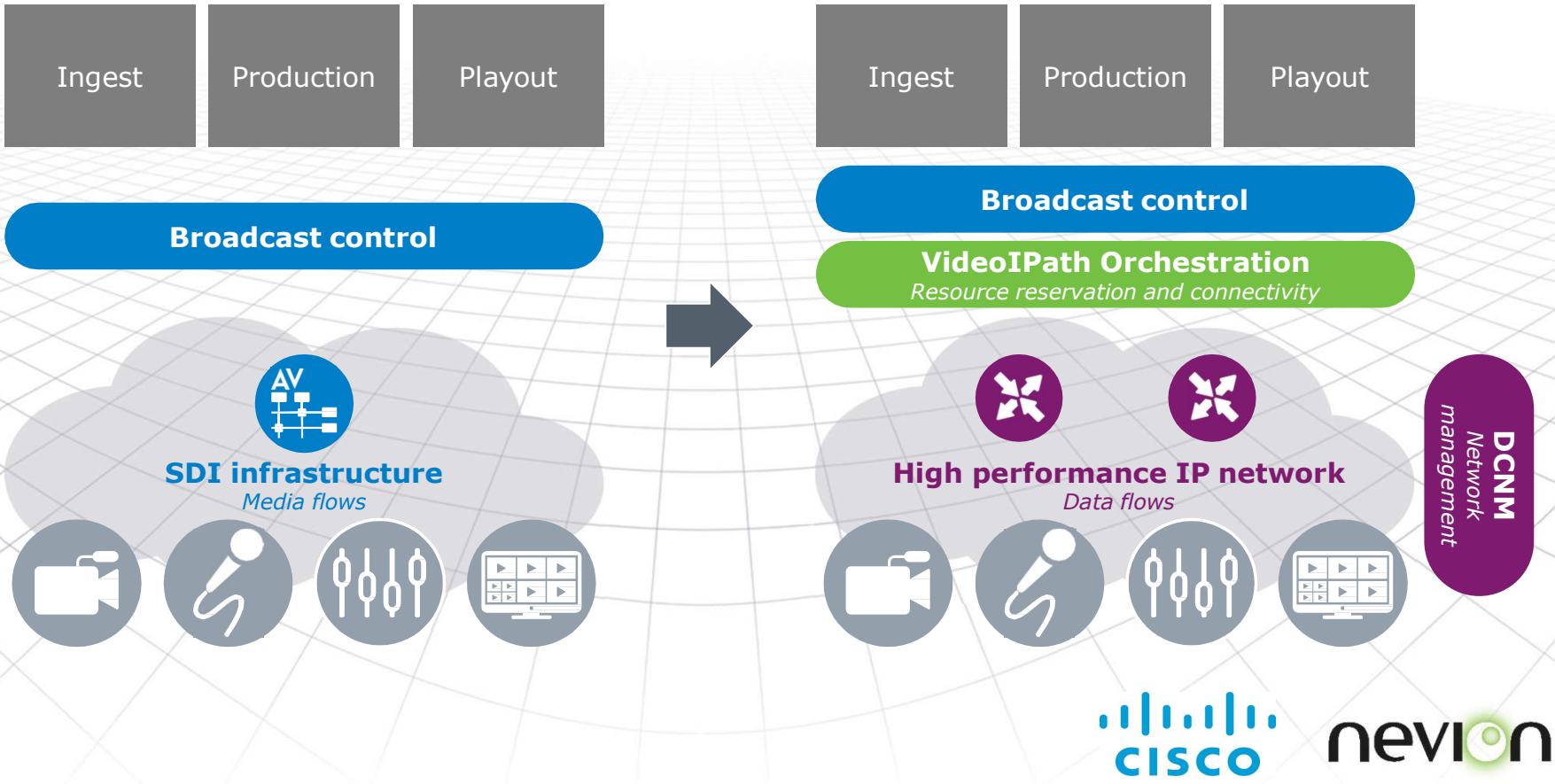
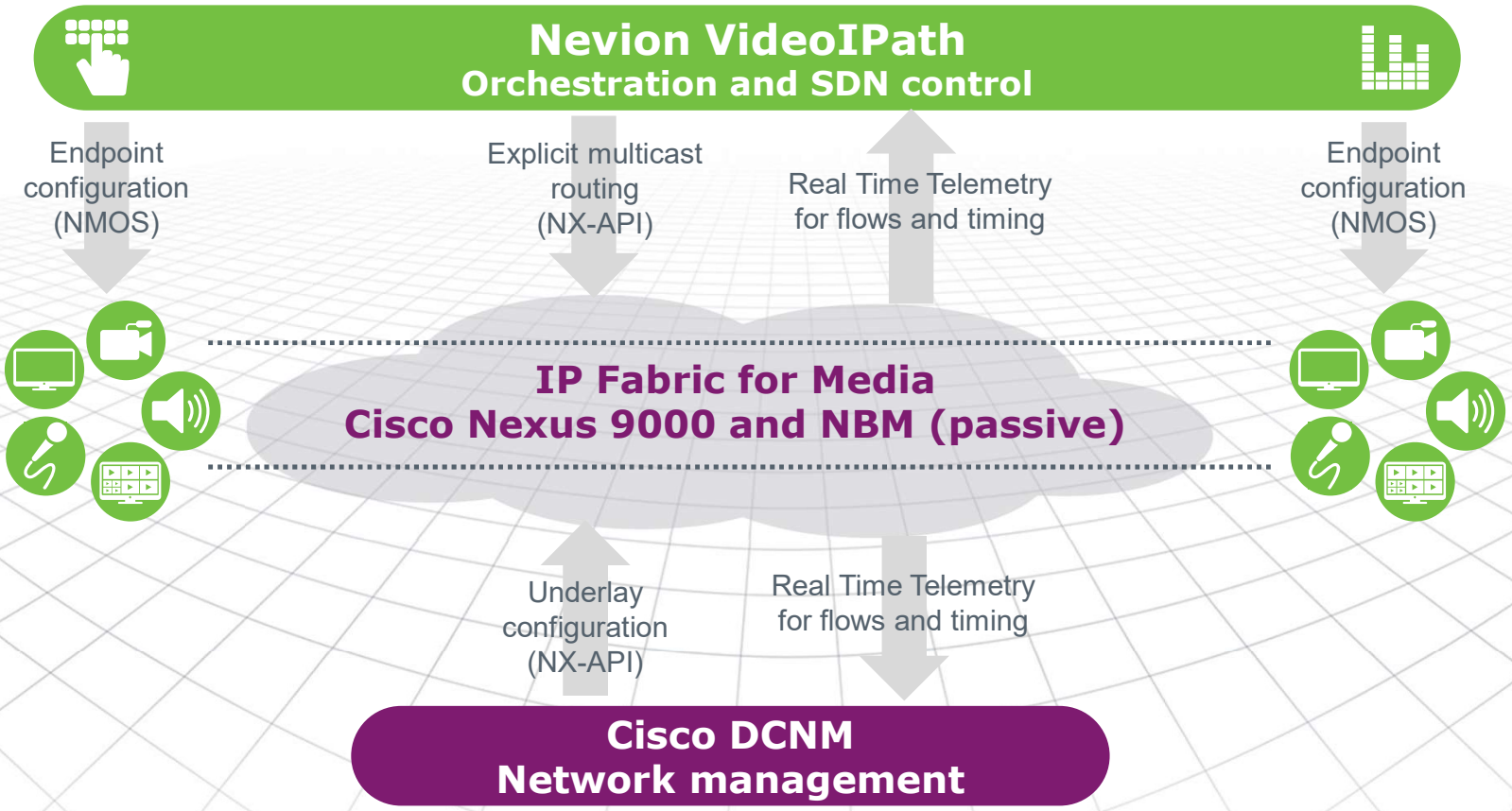
Reliable End to End Orchestration and Monitoring

10,000s of multicast flows needing to be live-switched and monitored



Technical **solution** overview

10,000s of multicast flows needing to be live-switched and monitored



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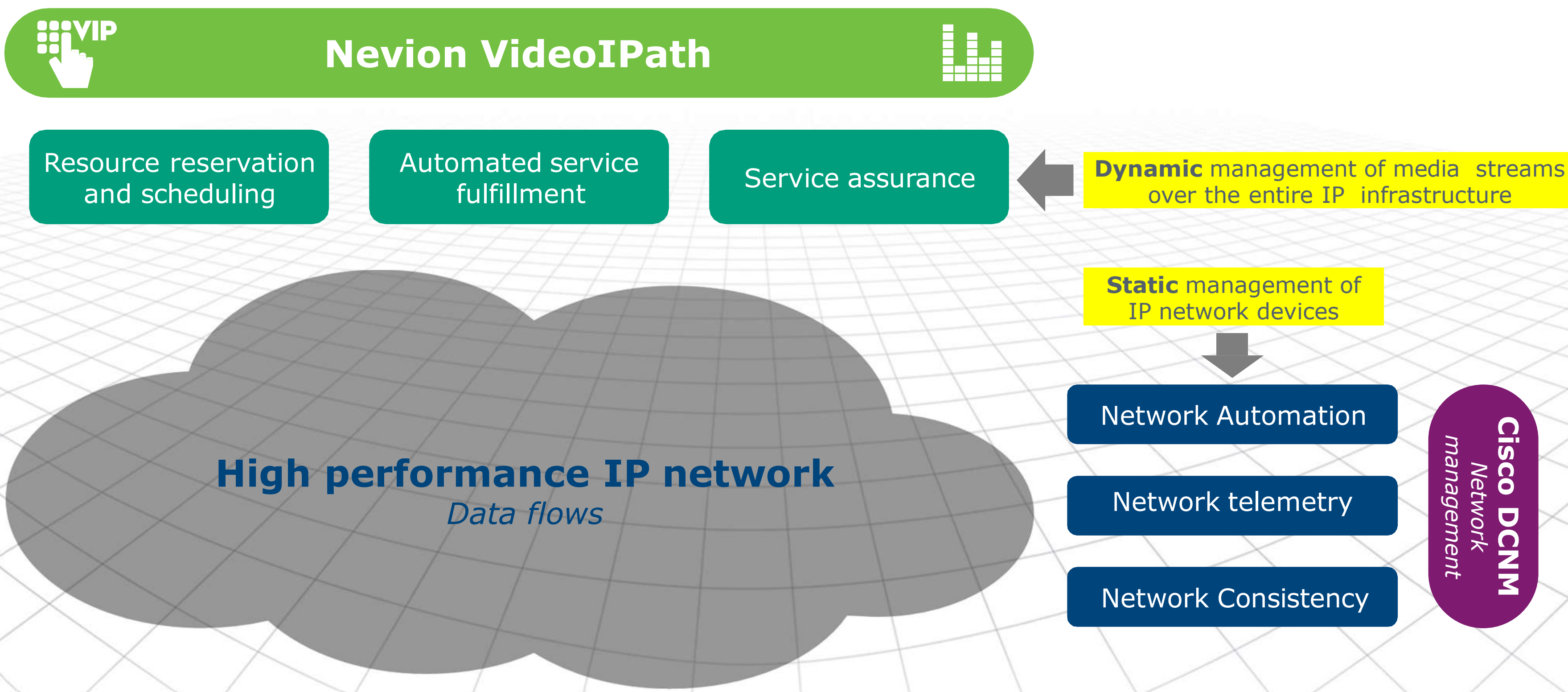
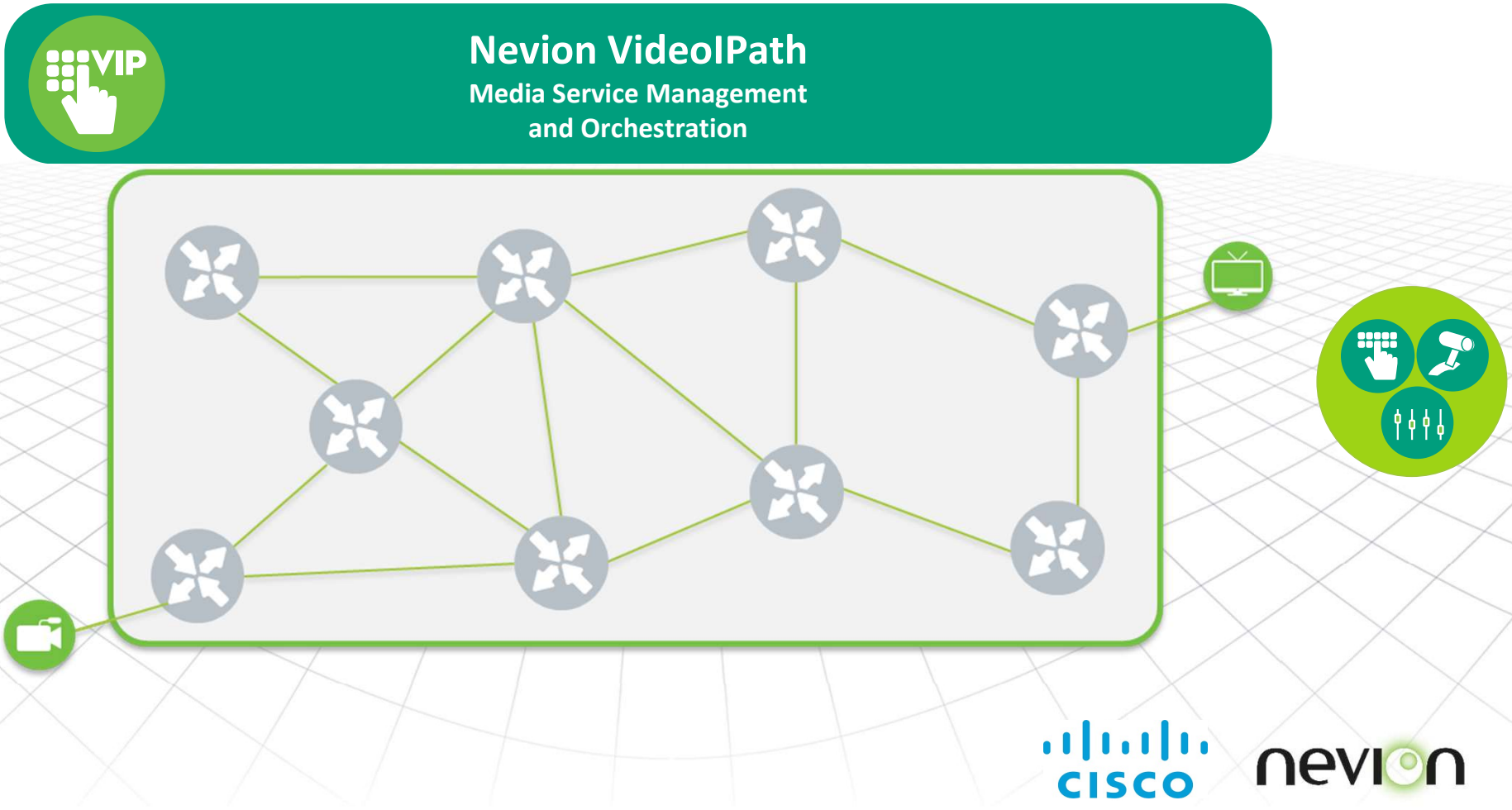
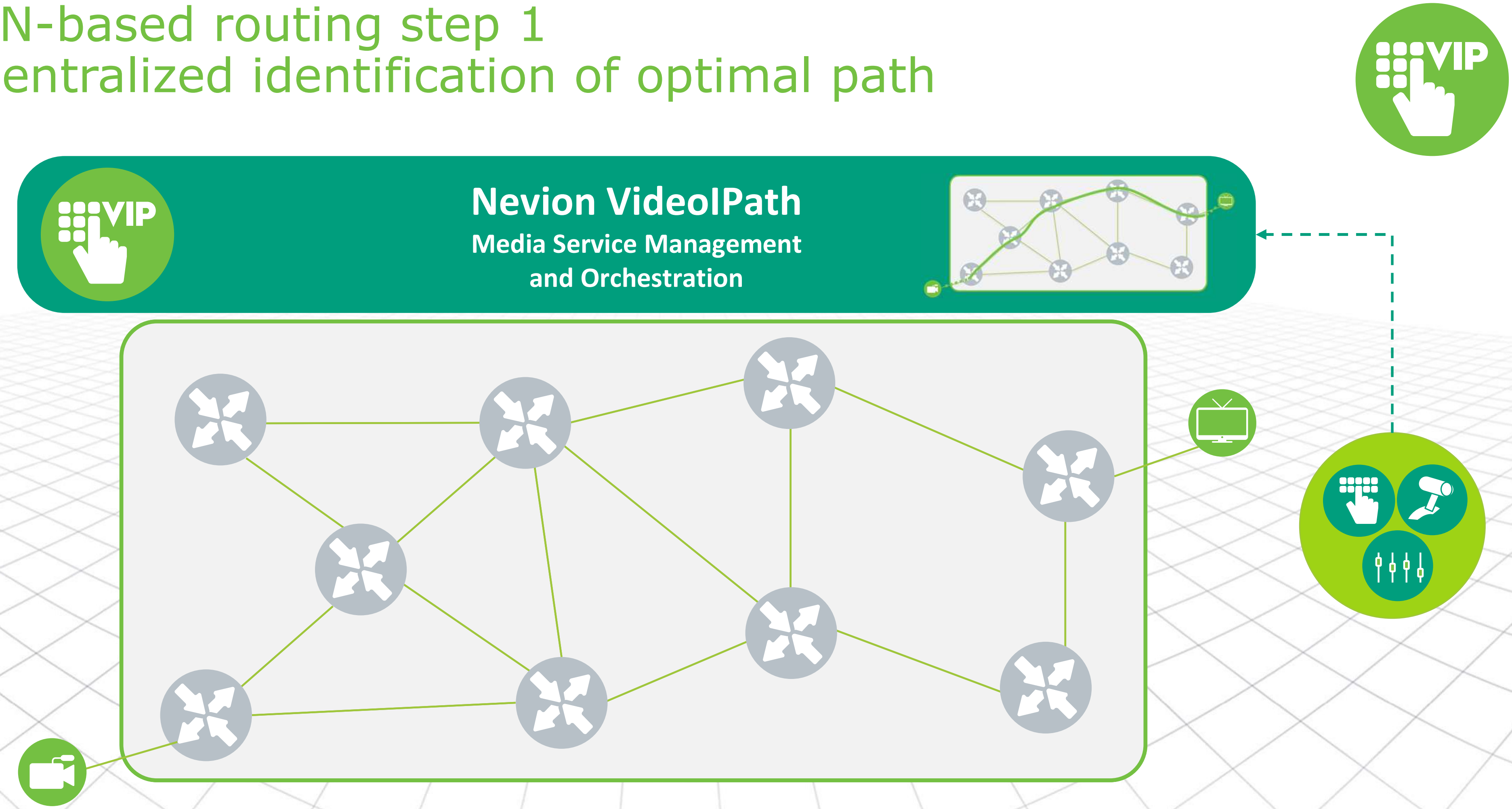
VideoIPath and **DCNM** roles



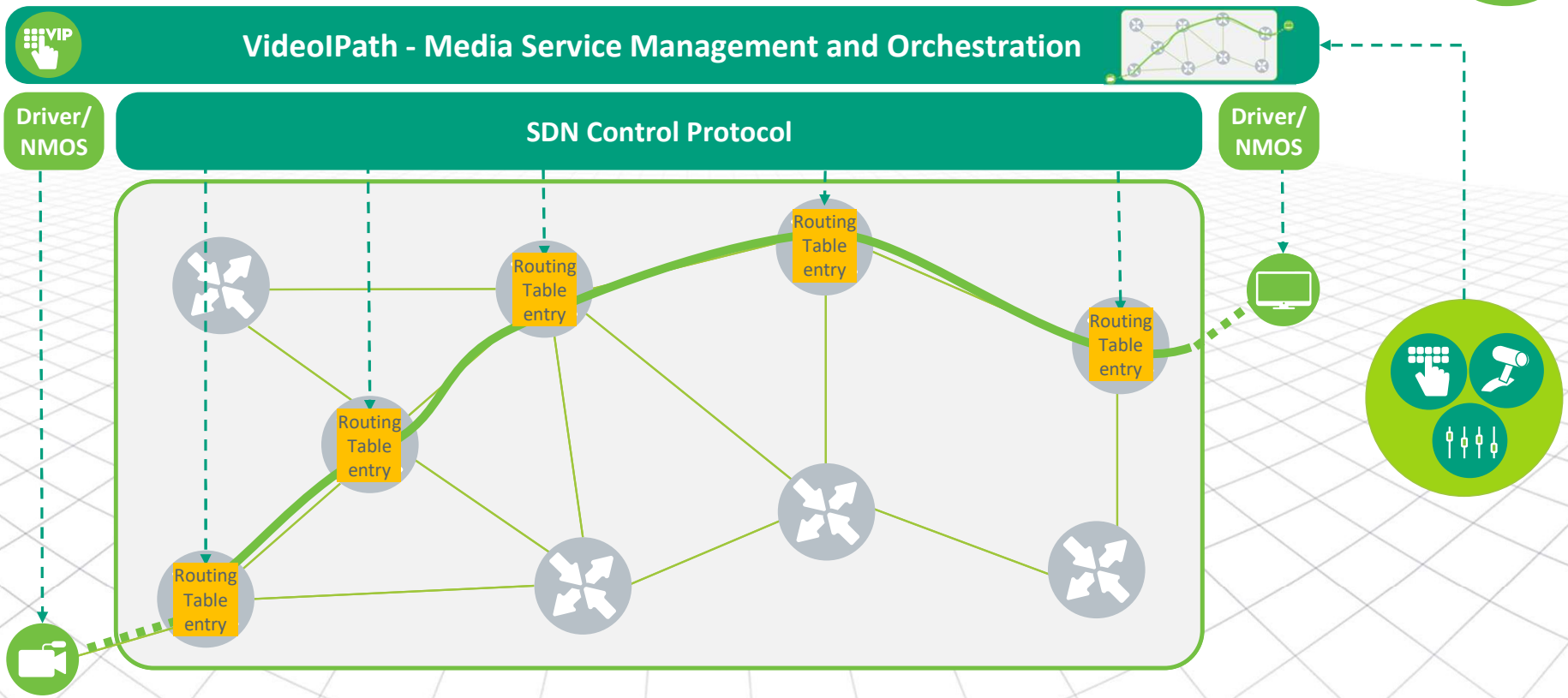
SDN-based routing
- Centralized topology view and routing intelligence



SDN-based routing step 1
- Centralized identification of optimal path



SDN-based routing step 2
- Push routing information into network elements



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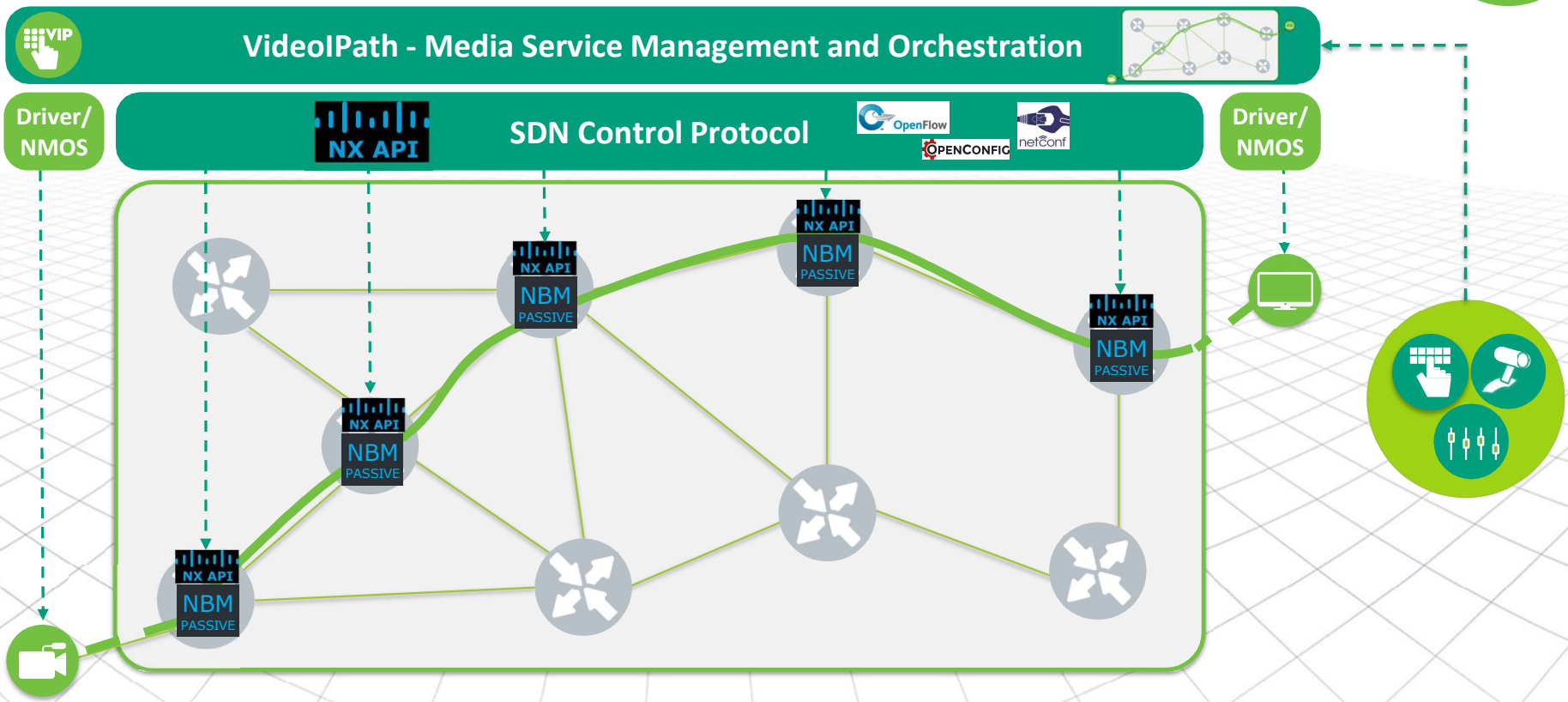
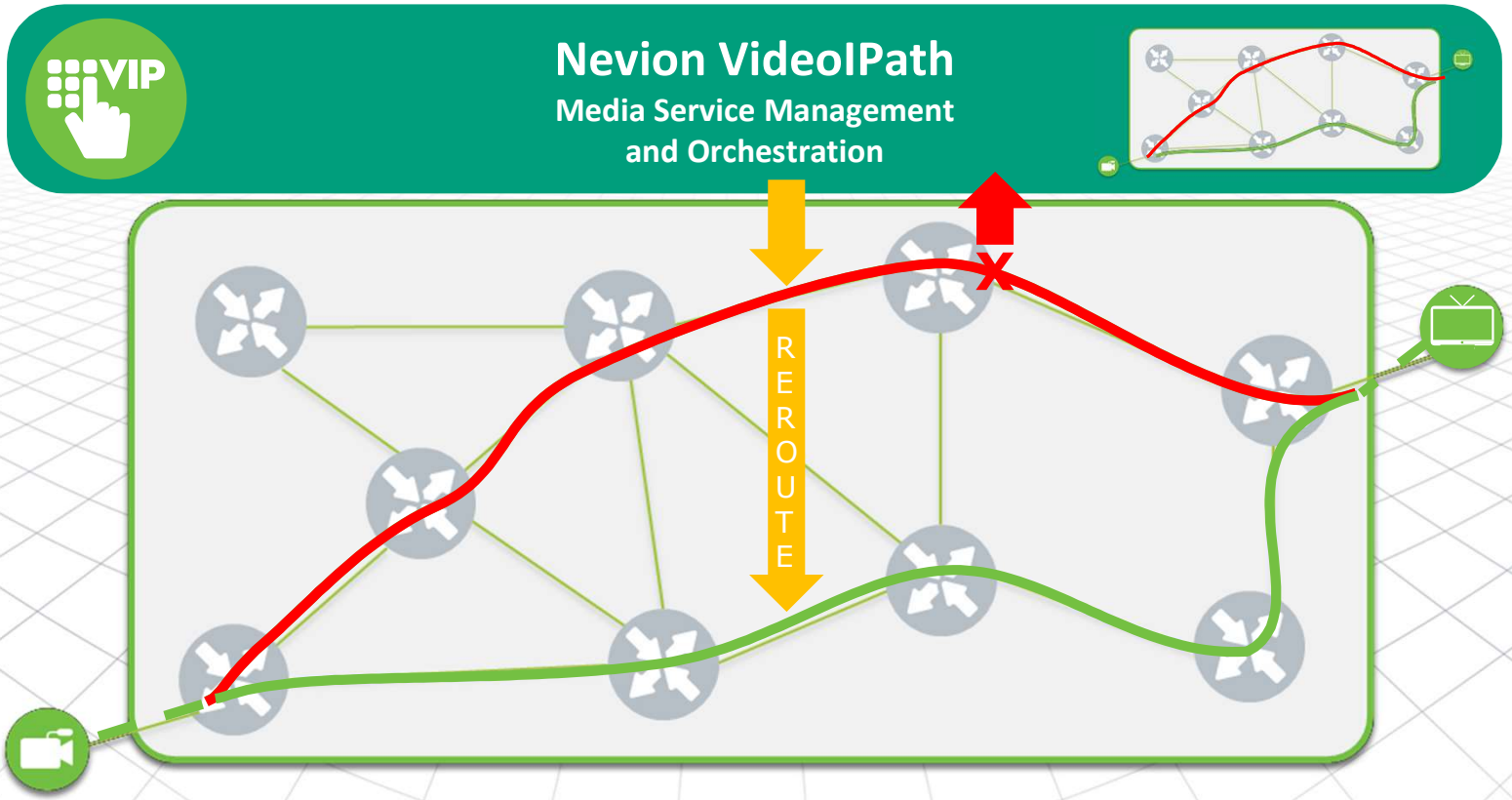
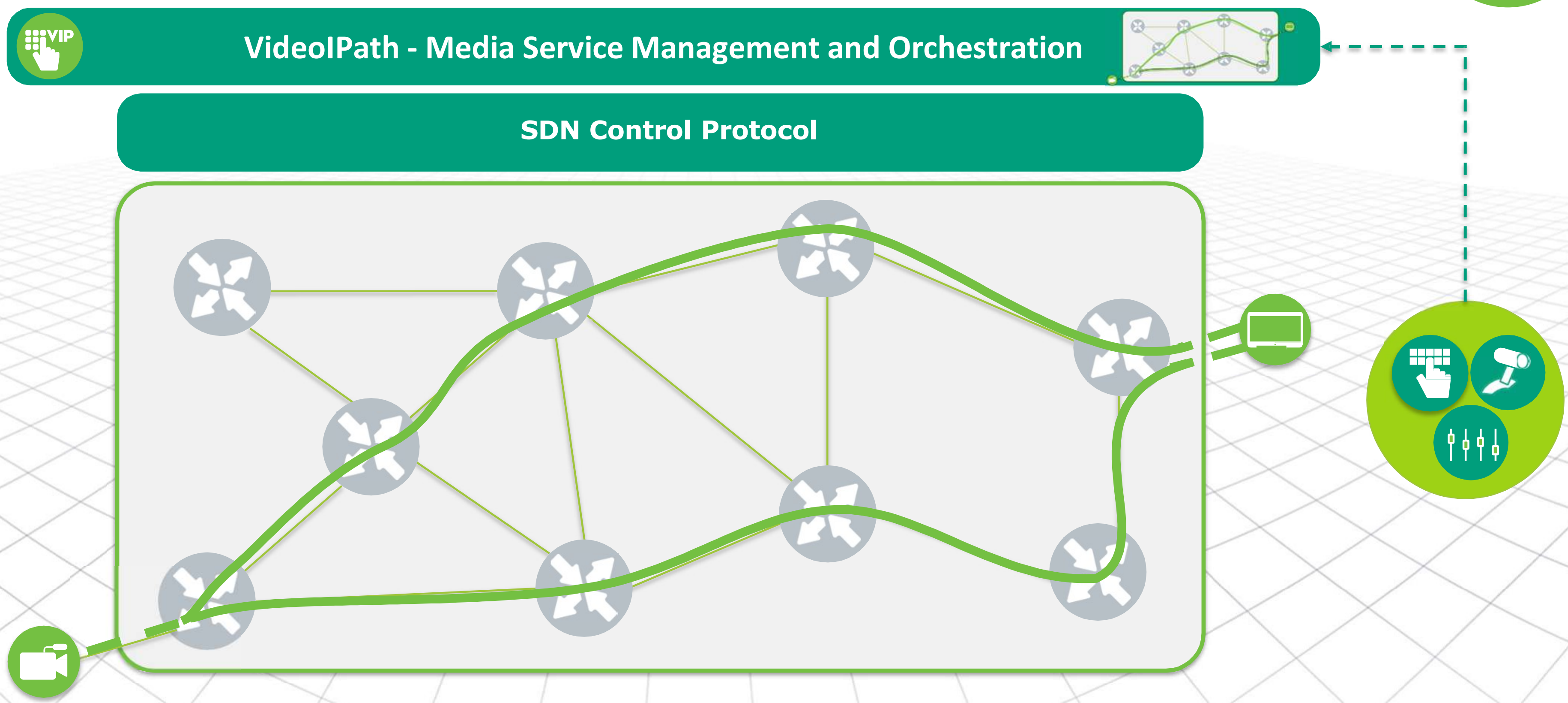
Flexible SDN control
- Cisco Nexus controlled via NX-API



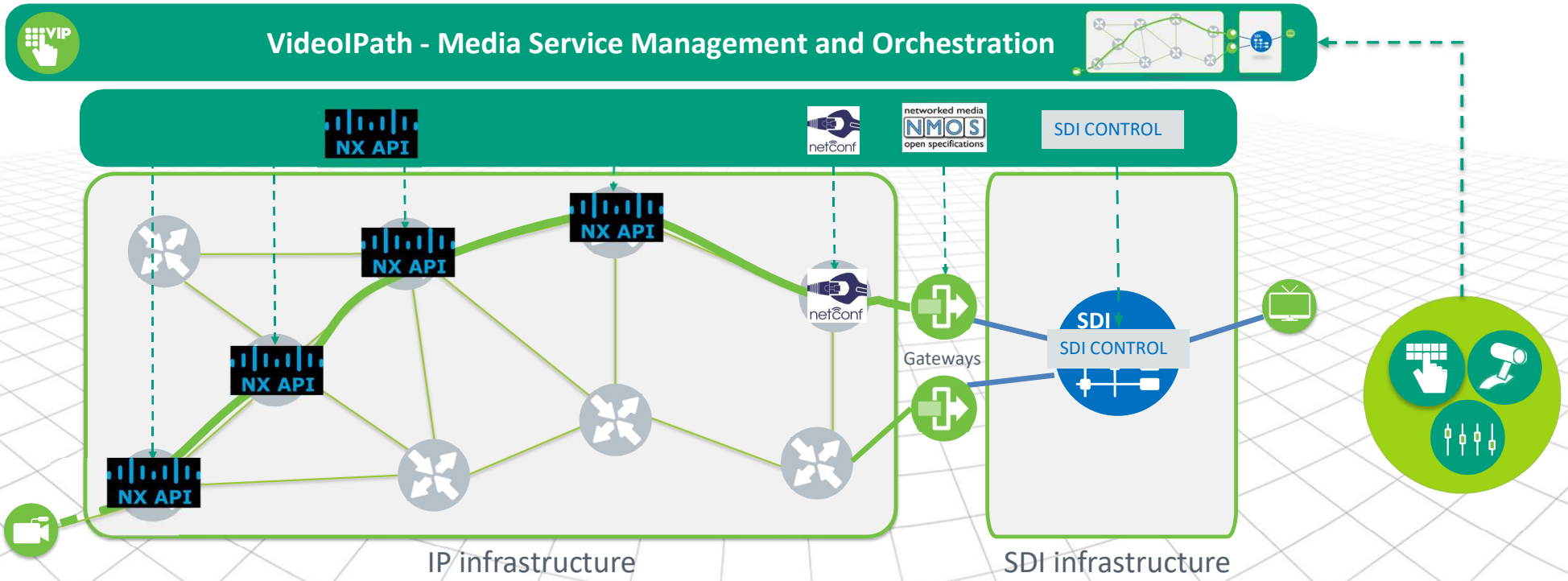
SDN-based routing
- Routing around congestions and network issues



SDN-based routing redundancy
- Ensuring diverse paths for dual routes

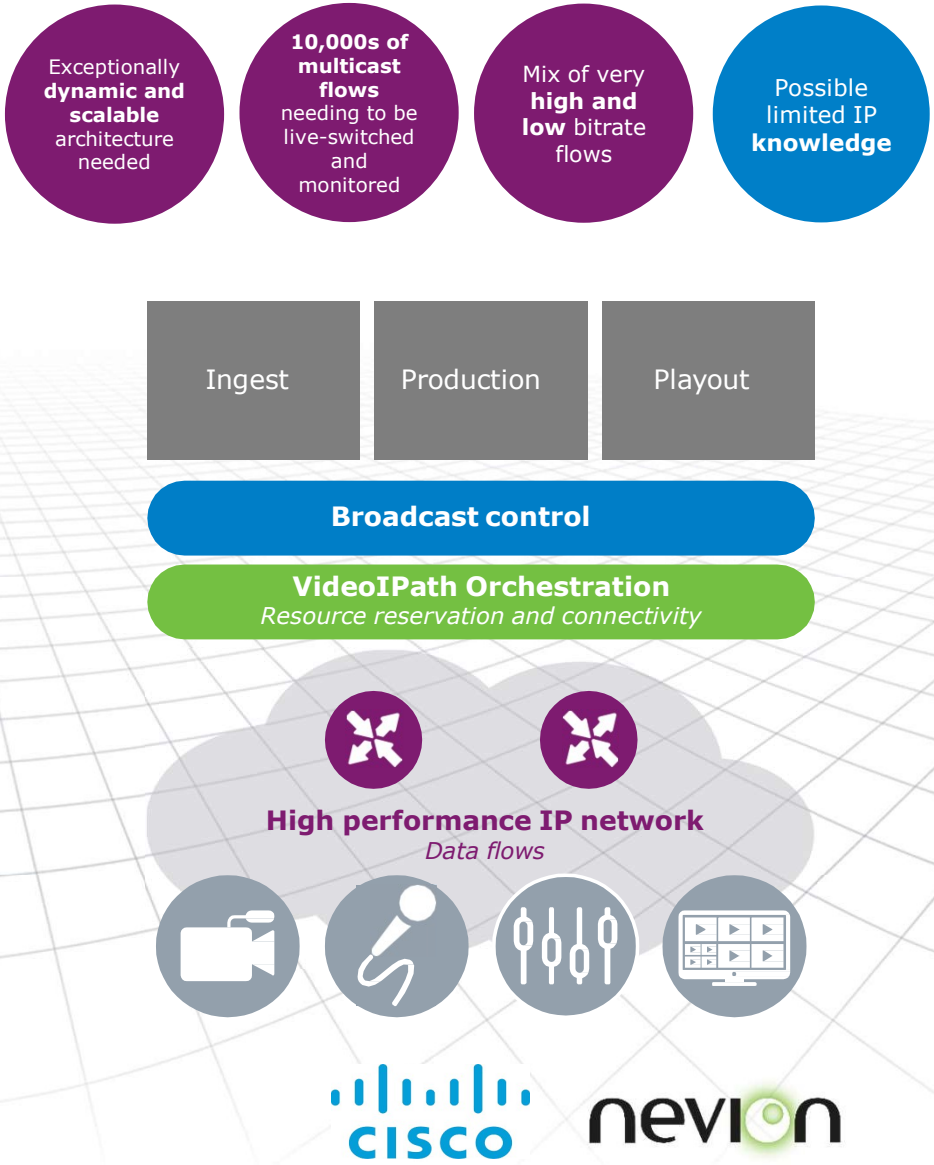


Full end-to-end control in mixed SDI/IP environments - Easy migration from baseband to IP



VideoIPath Advantages

- **Scalable and flexible**
  - Used in both LAN's and WAN's
  - Supporting all types of network topologies
- **Cost-effective**
  - Optimized utilization of network resources
  - Service-aware load balancing of traffic
  - Efficient control of shared resources
- **Reliable and Secure**
  - Automatic calculation of diverse paths
  - Built-in access control

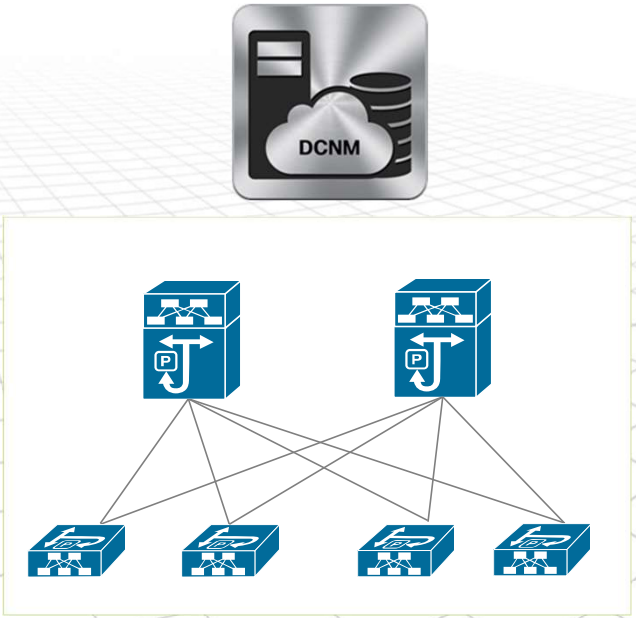


Network Operation Simplification with DCNM

Customers have limited IP **knowledge**

Operational Simplification

- Network configuration
- Link utilization (interface stats)
- Software upgrade
- Topology discovery
- Flow path discovery
- Power-on auto-provisioning



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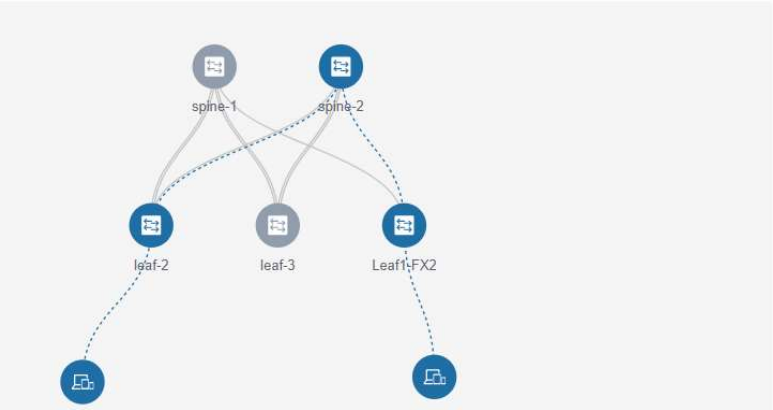
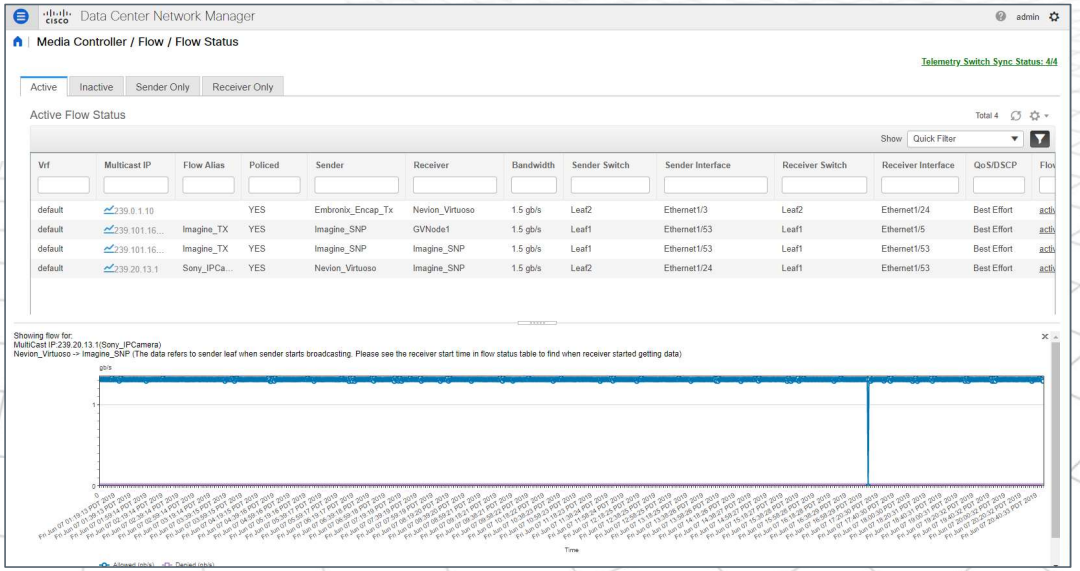
Flow Visualization on DCNM

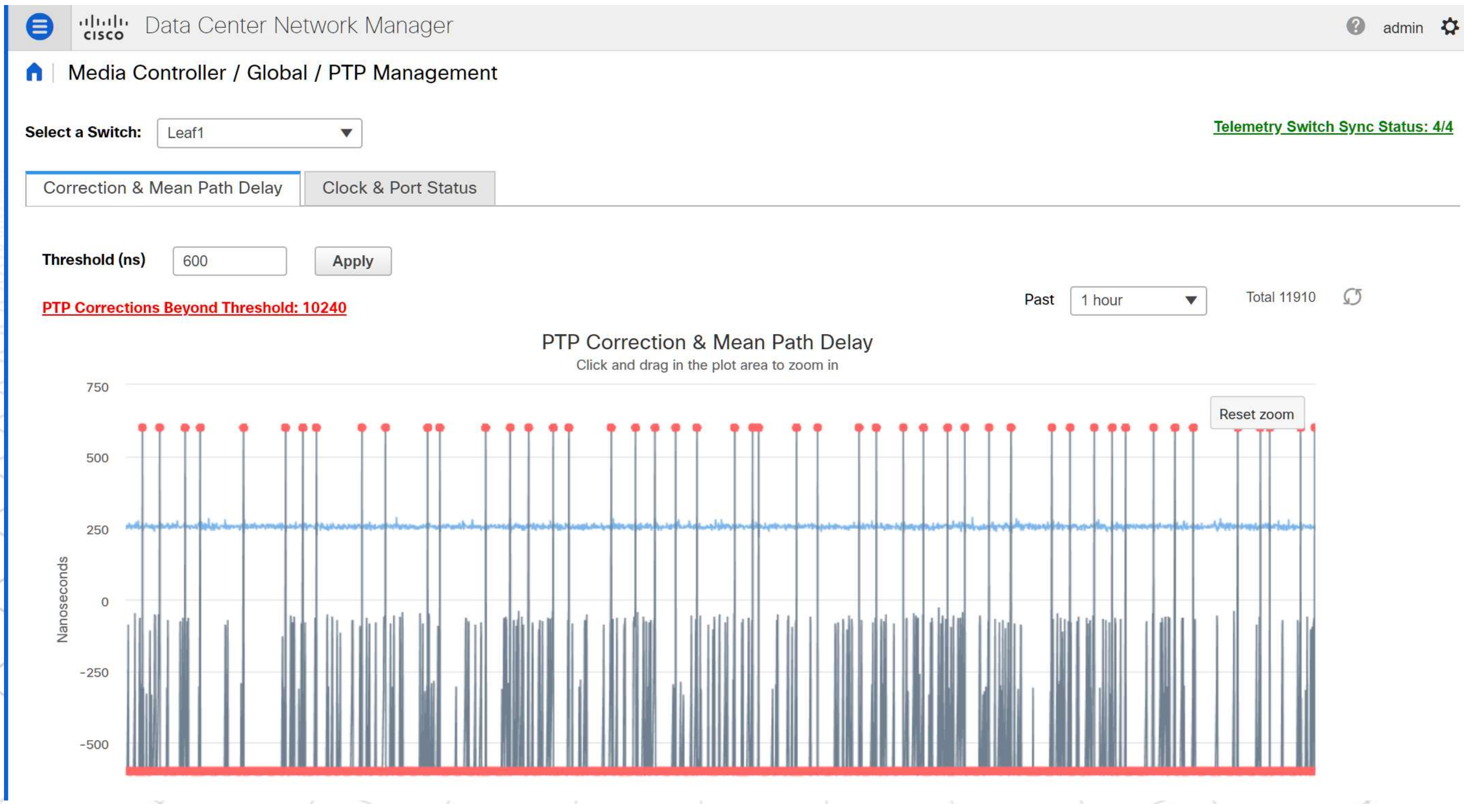


STARTING NODE	DESTINATION NODE
GVN1	leaf-2 Ethernet1/1
leaf-2 Ethernet1/52	spine-2 Ethernet1/30
spine-2 Ethernet1/1	Leaf1-FX2 Ethernet1/50
Leaf1-FX2 Ethernet1/52	Imagine



PTP Visualization on DCNM

PTP is mission critical



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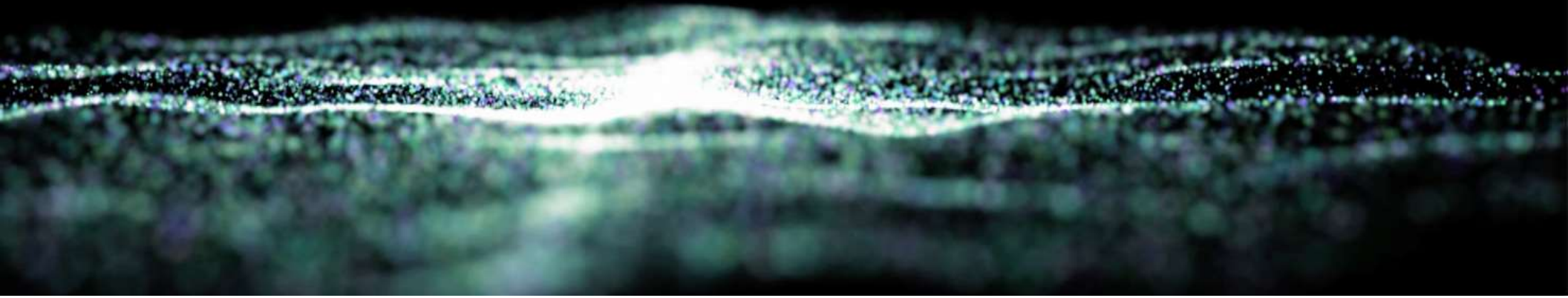
- Case study: SRG / UPC Orion project in Switzerland
- Cisco/Nevion solutions – what's next?

Case study: SRG/UPC Orion

Jochen Prediger
Project Manager
SRG

Walter Bichsel
Director Business Development & Prod. Mgt.
UPC



ORION

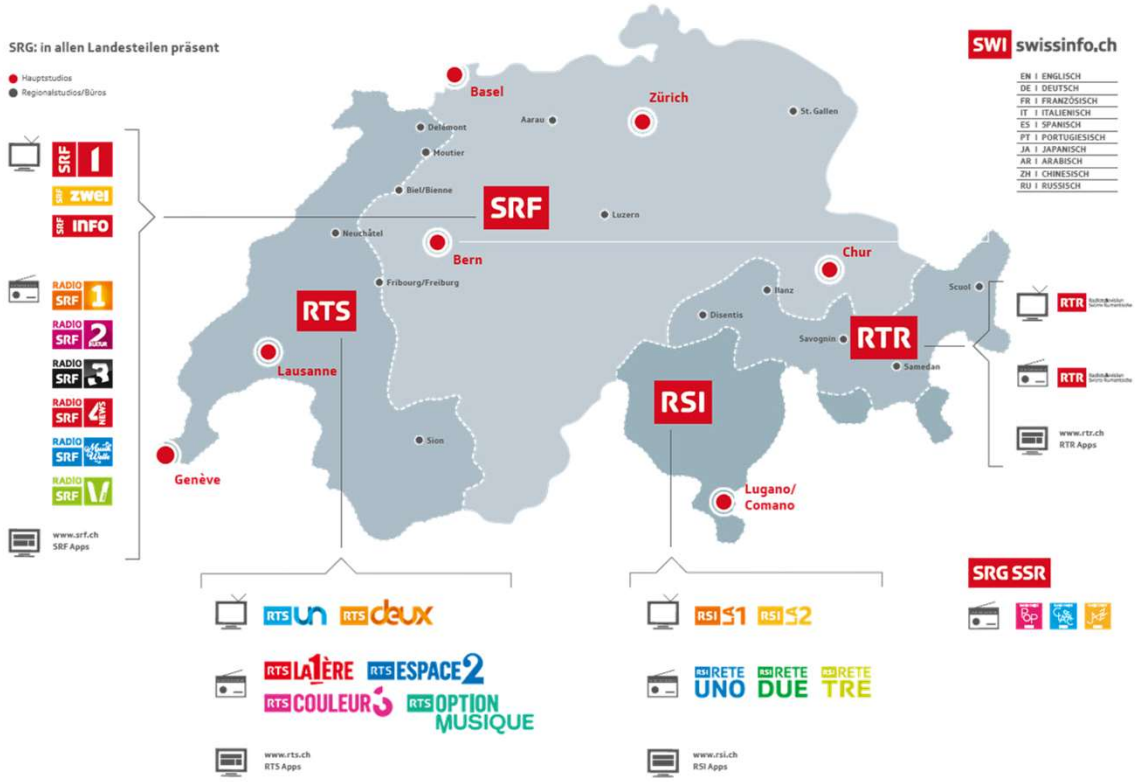
Jochen Prediger

SRG SSR

RSI RTR RTS SRF SWI

SRG SSR at a glance

- SRG SSR is committed to **public service**. Its remit is based on the Federal Constitution, the **Radio and Television Act** (RTVA), and its **charter**.
- 5 Enterprise Units with main and regional locations
- 16 radio & 7 television channels
- Websites and teletext services for 4 language regions
- About 6700 employees (around 5300 full time positions)
- Annual sales of around 1.5 billion Swiss francs (78% license fee /22% commercial)



Project ORION

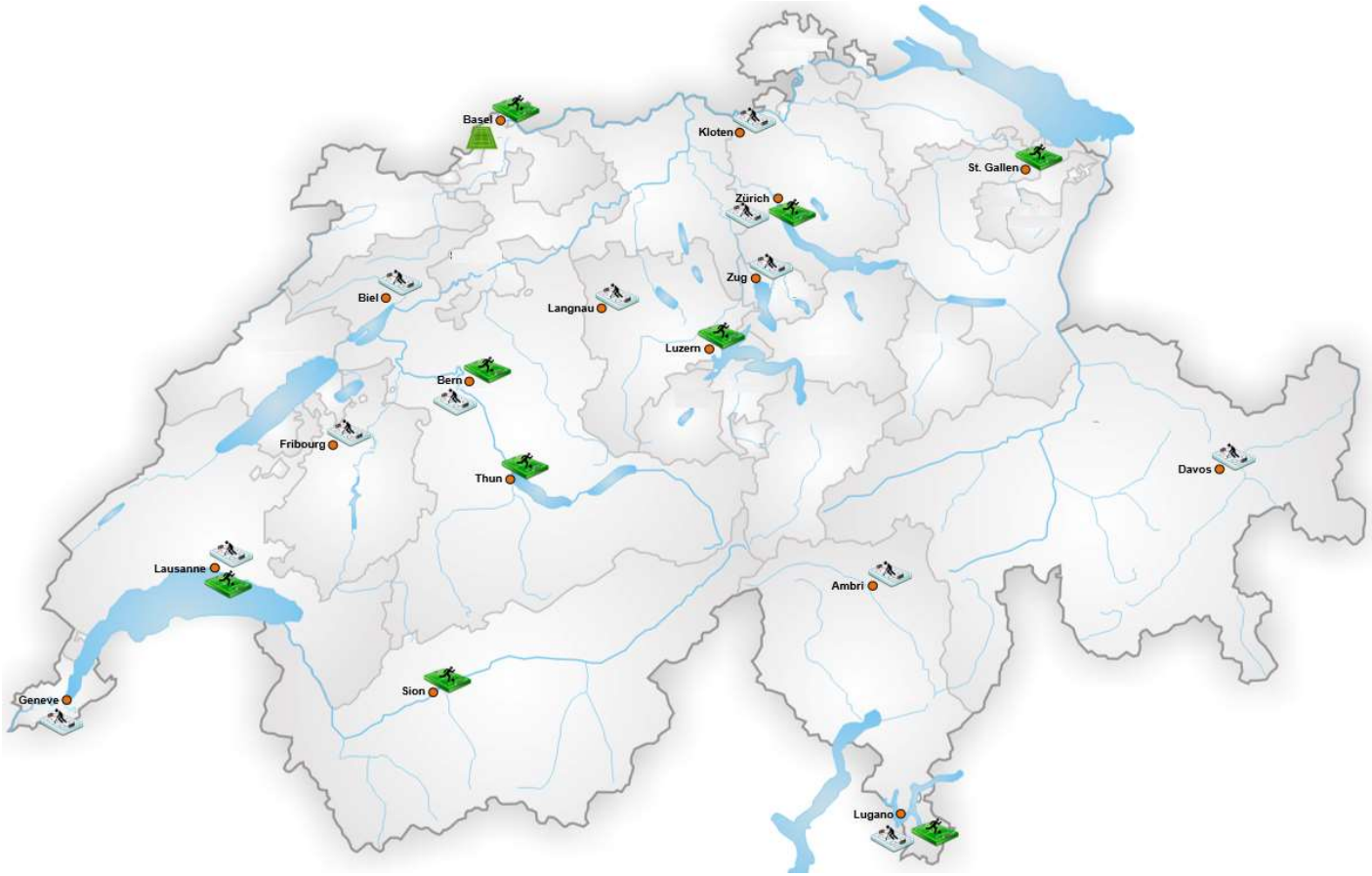
Main TV / Radio Studios & Data- / Playout Centre

Project ORION

Regional TV / Radio Studios & Offices

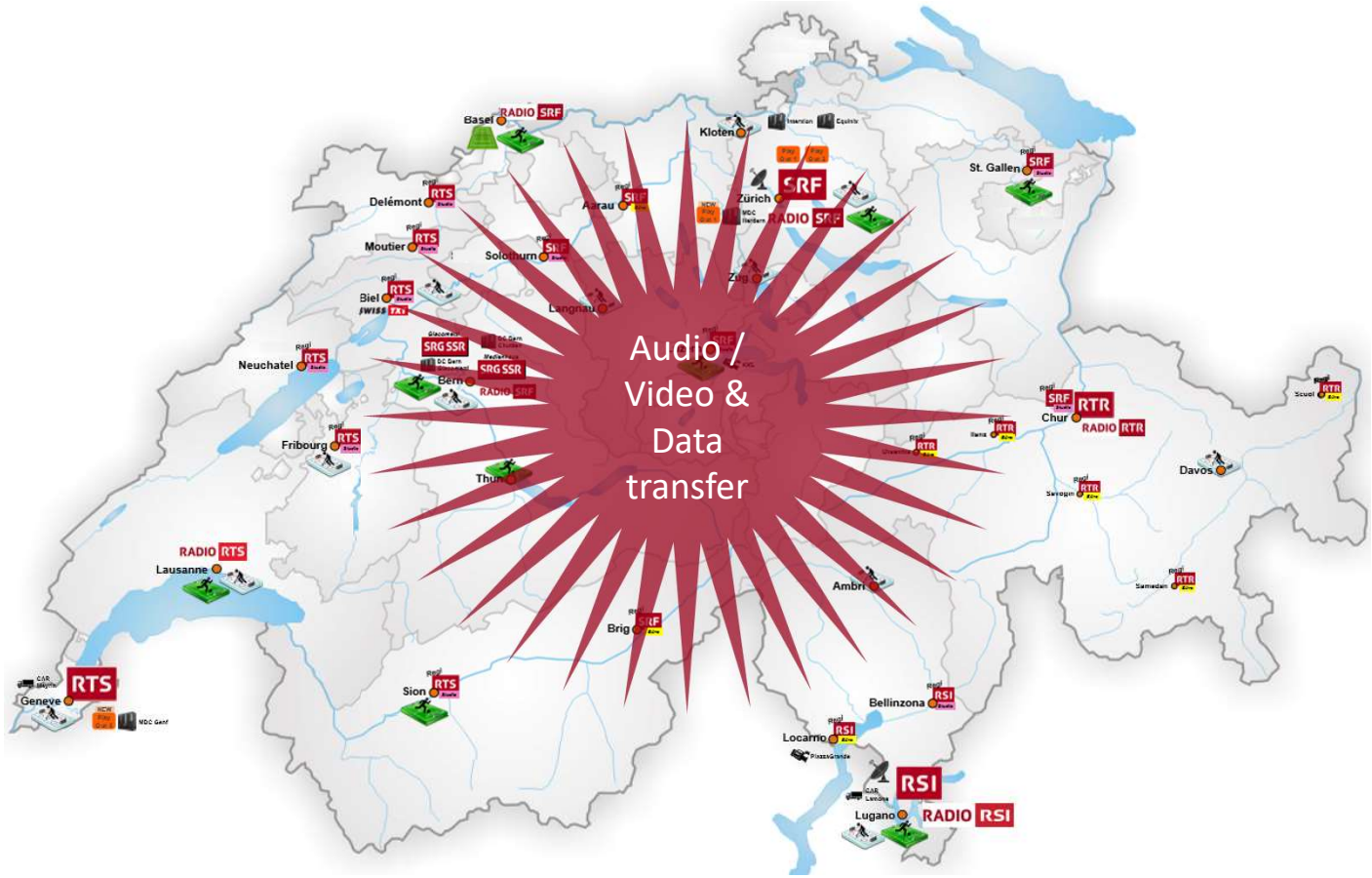
Project ORION

Soccer & Ice Hockey
Arenas



Project ORION

“core networks” connect **55** SRG locations within Switzerland



SRG SSR

RSI RTR RTS SRF SWI

Project ORION

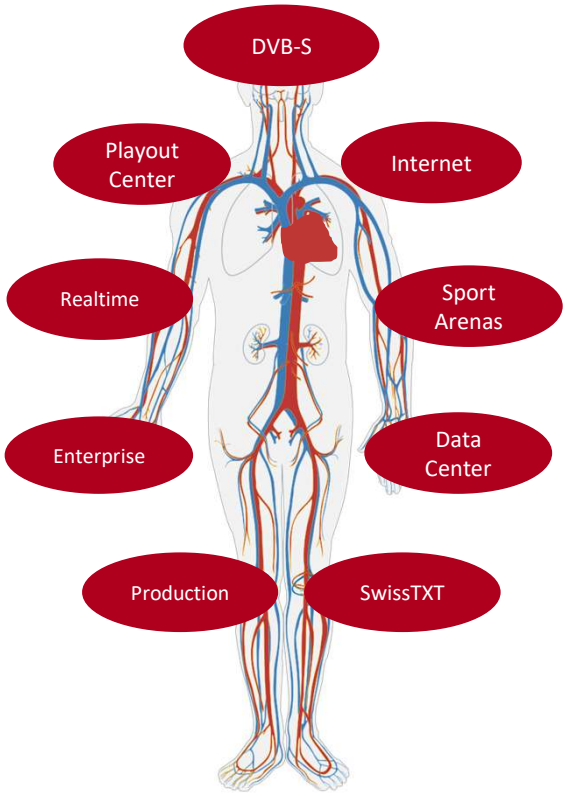
The core networks are the SRG backbone

They connect different types of locations

& fulfil different types of service

If the backbone is not working

the impacts could be immense



Project ORION

The aim of ORION is to renew the AUDIO / VIDEO & DATA services of the existing core networks that have reached the end of their life cycle.

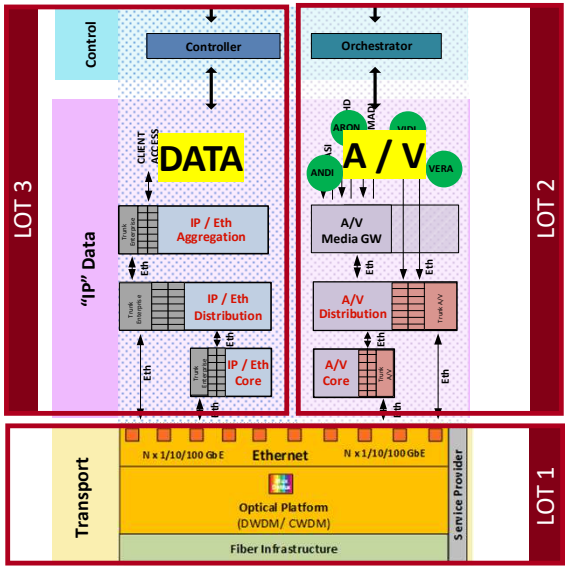
- Sunrise Backbone
- UPC (Samba) Backbone
- Corporate Core Network (CCN)

High Level Goals

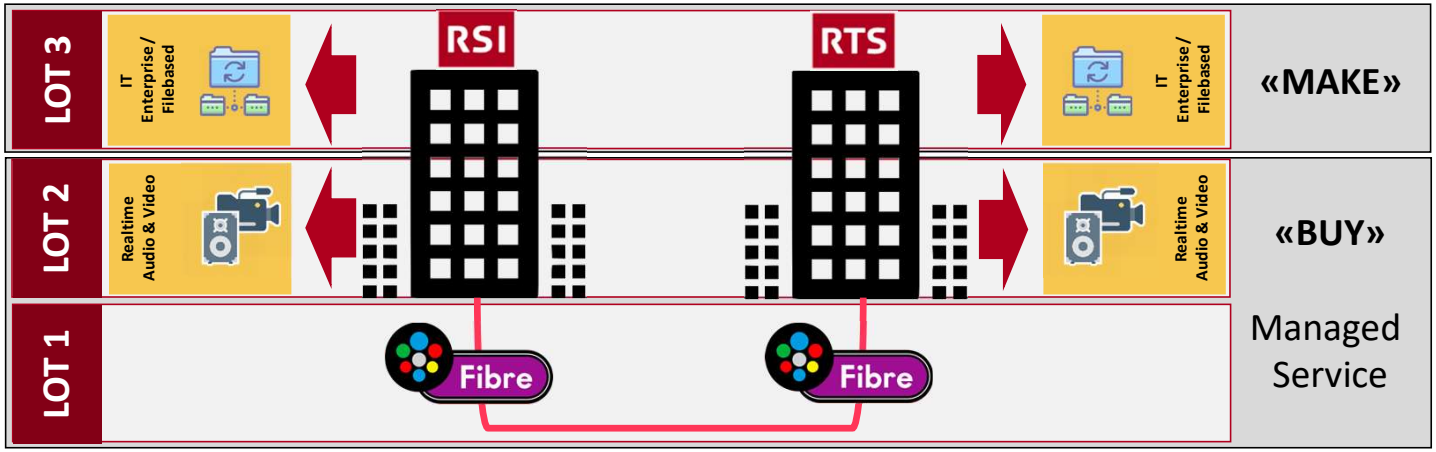
- Cost saving solution
- Single provider strategy (managed service for A/V)
- Future proof IP solution based on SMPTE 2110
  - Connecting locations together – “easy” transition from legacy to IP
  - Signal type agnostic
  - Implementing new workflows in a short time

Project ORION

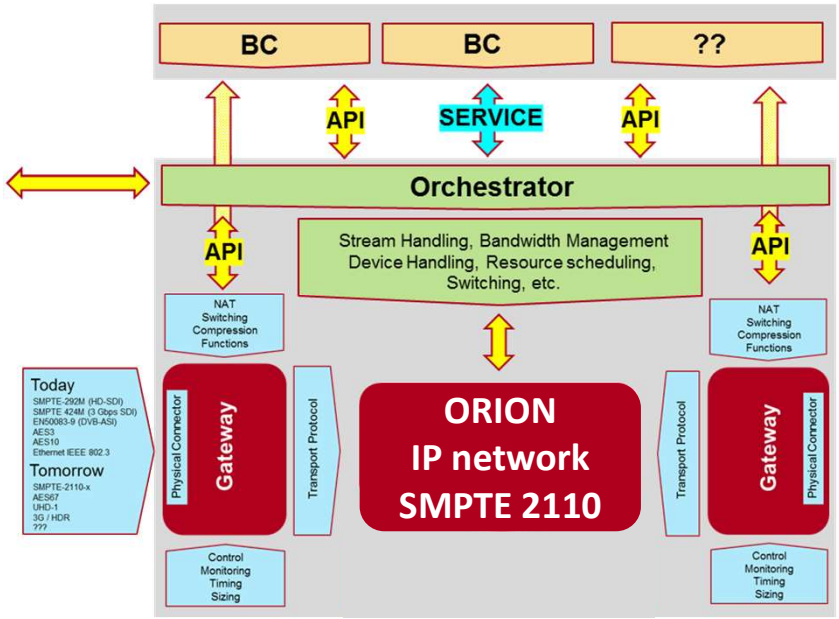
One Optical Backbone but **separated** networks for Realtime A/V & Data (CCN)



Project ORION



Audio / Video



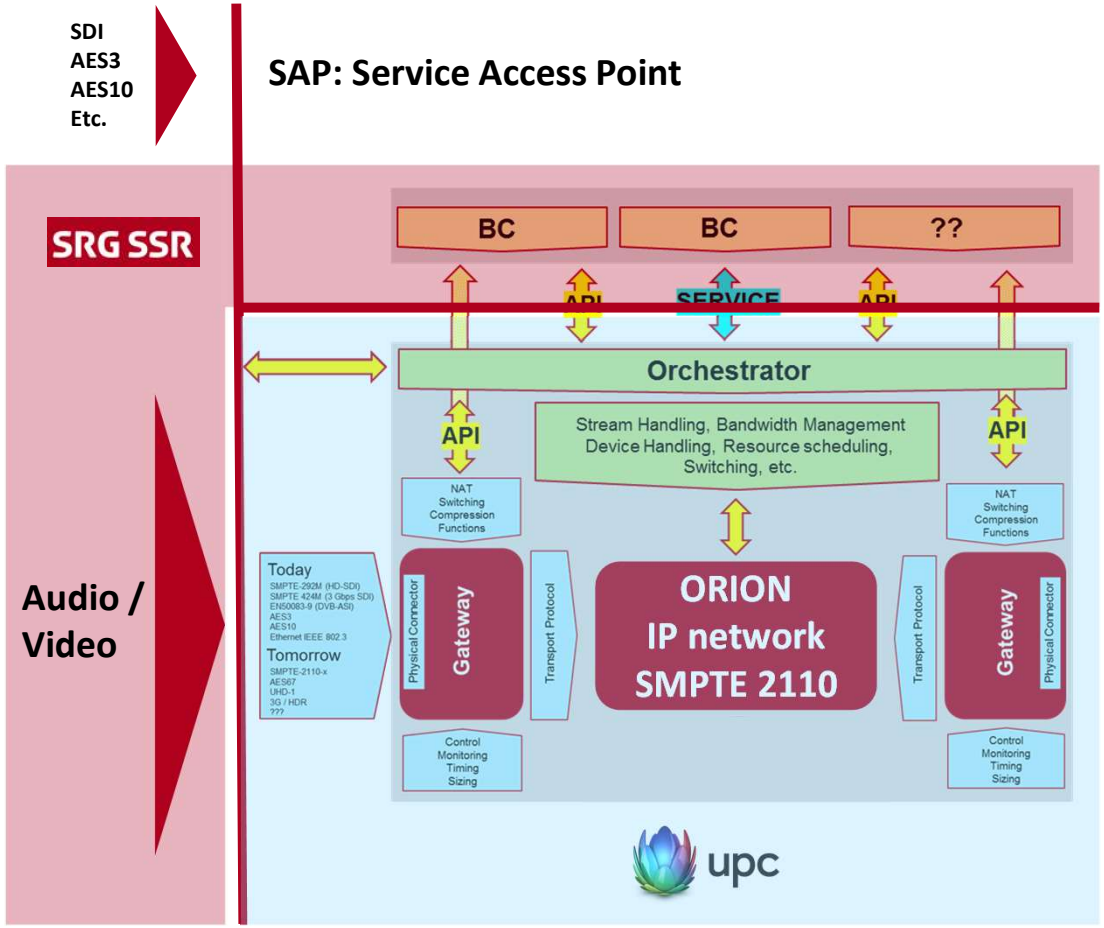
4. Control
= Operational Layer

1. Network
= Transport layer

2. Gateway
= Boundary between LAN & WAN

3. Orchestrator
= Management & Control

ORION – LOT 2



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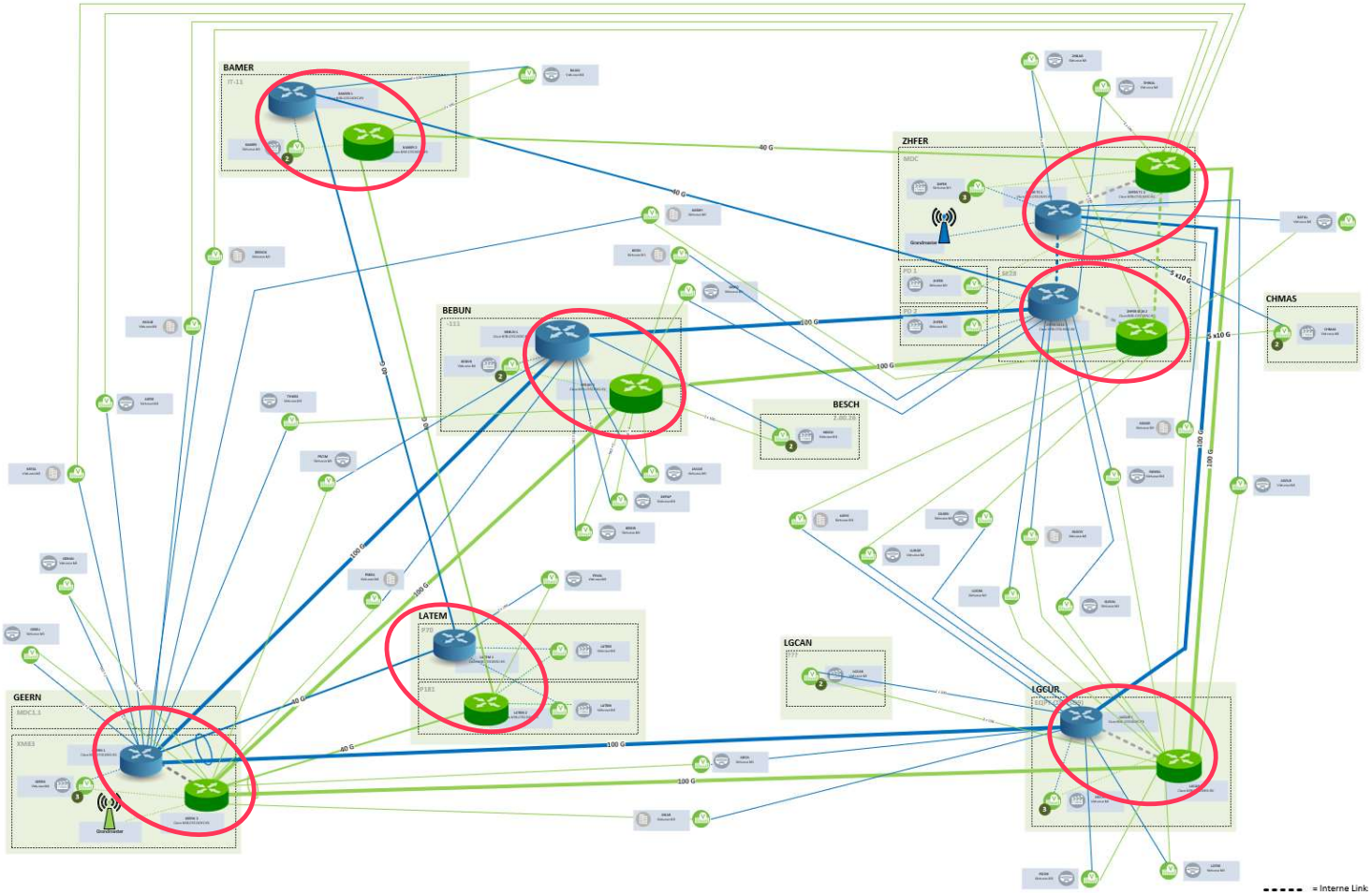
ORION
IP network
SMPTE 2110

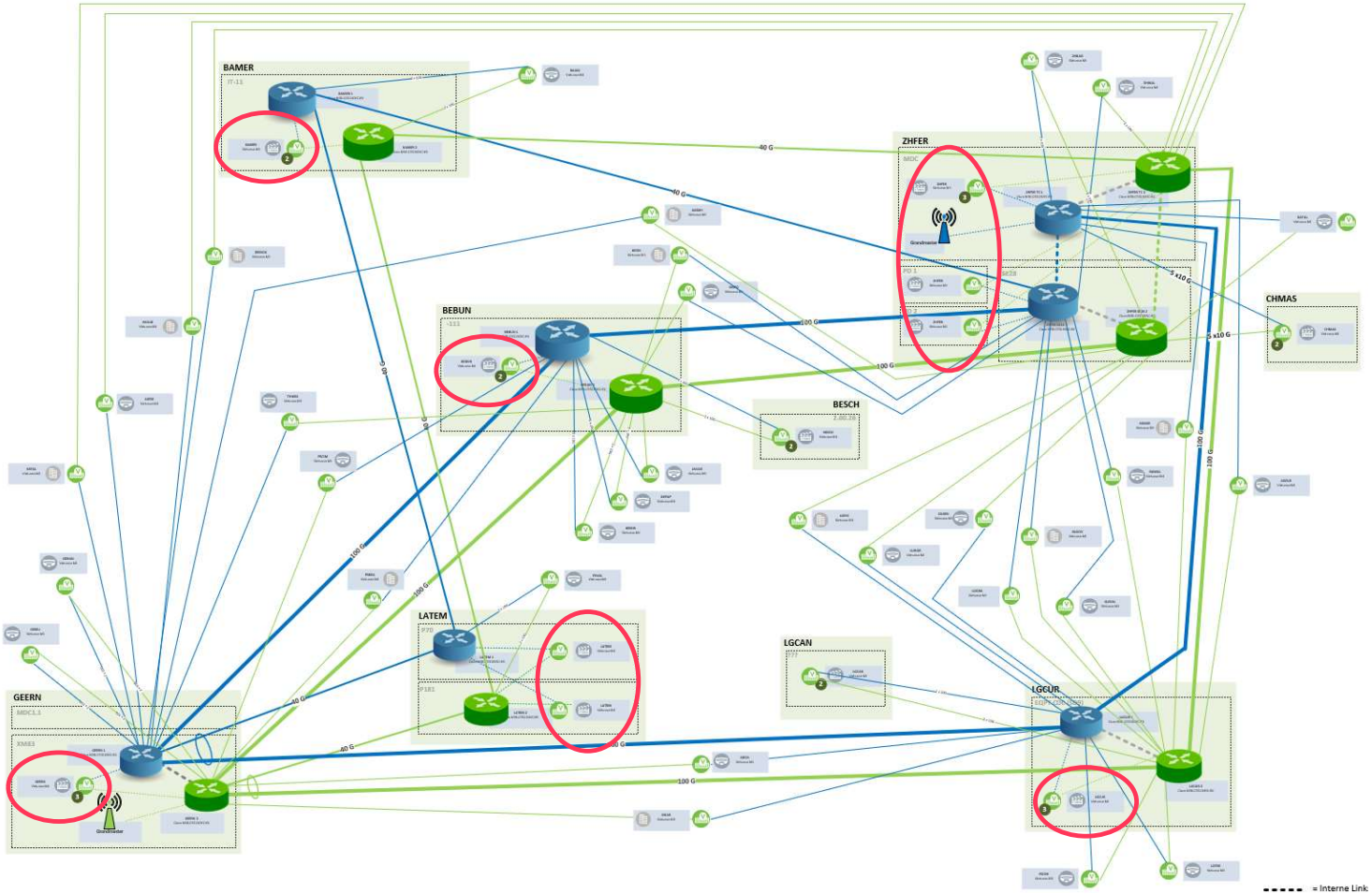
CISCO

Nexus Serie 9000



SDI <-> 2110 Gateway

nevion
virtuoso



SDI <-> 2110 Gateway

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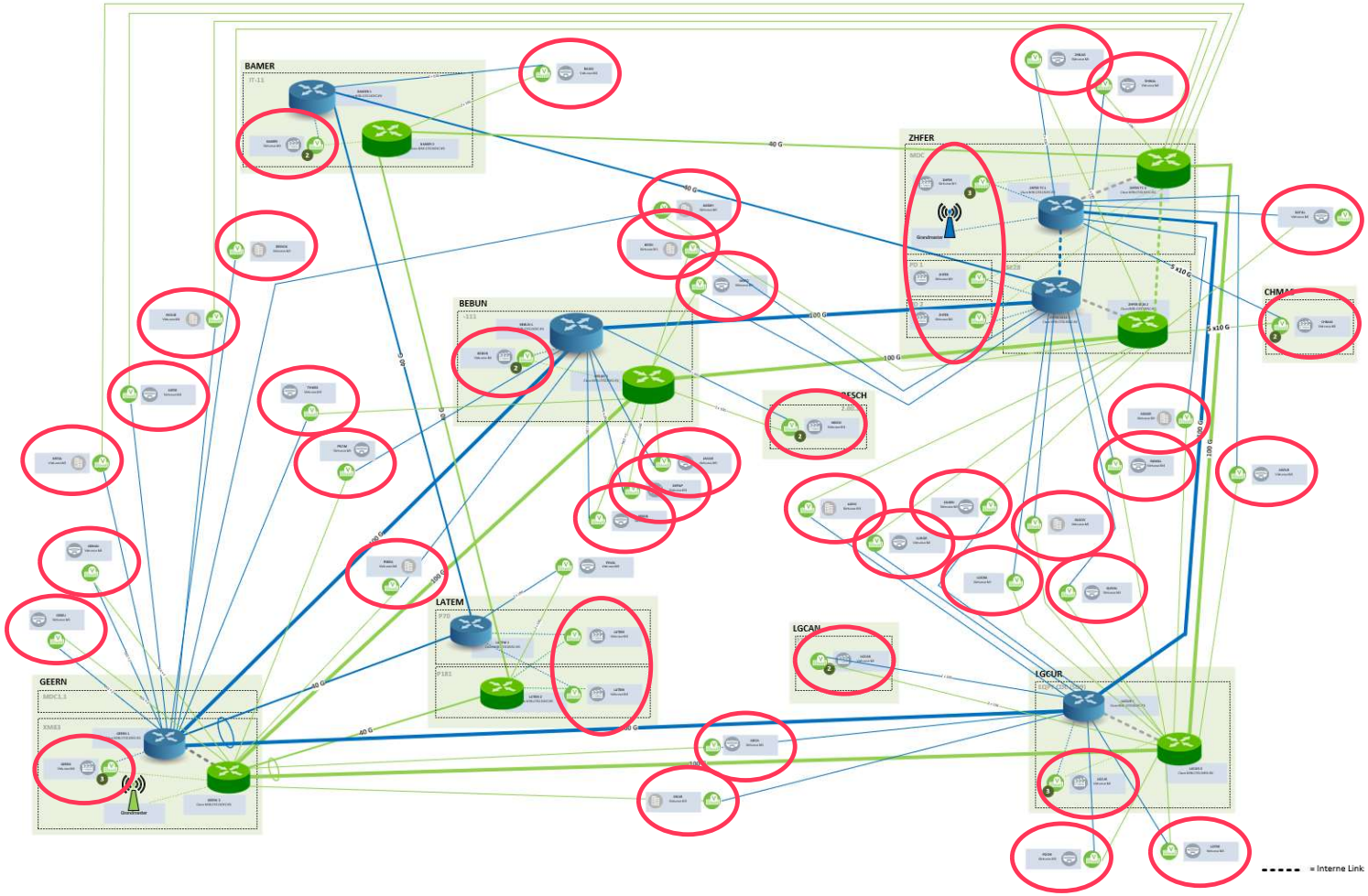
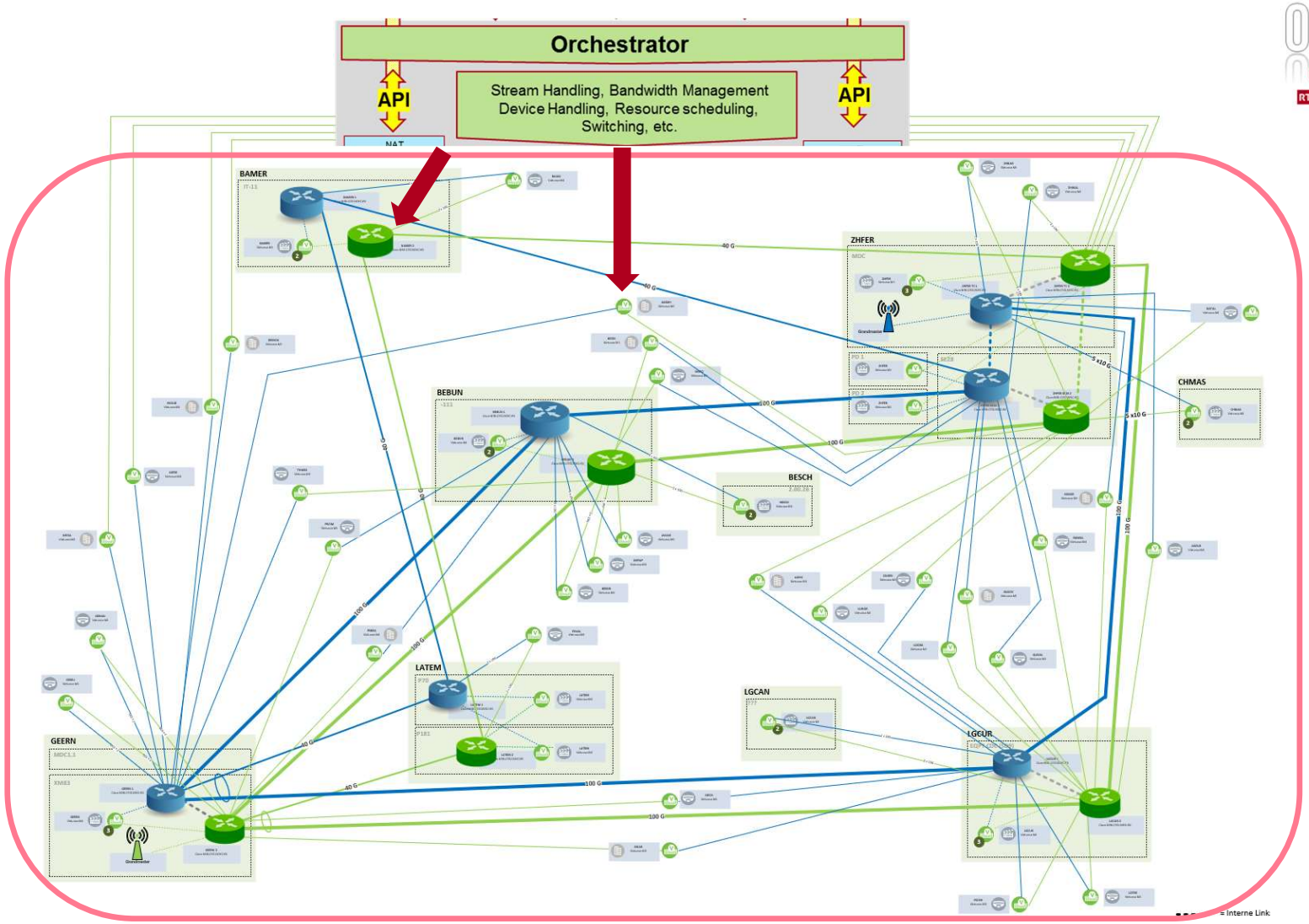


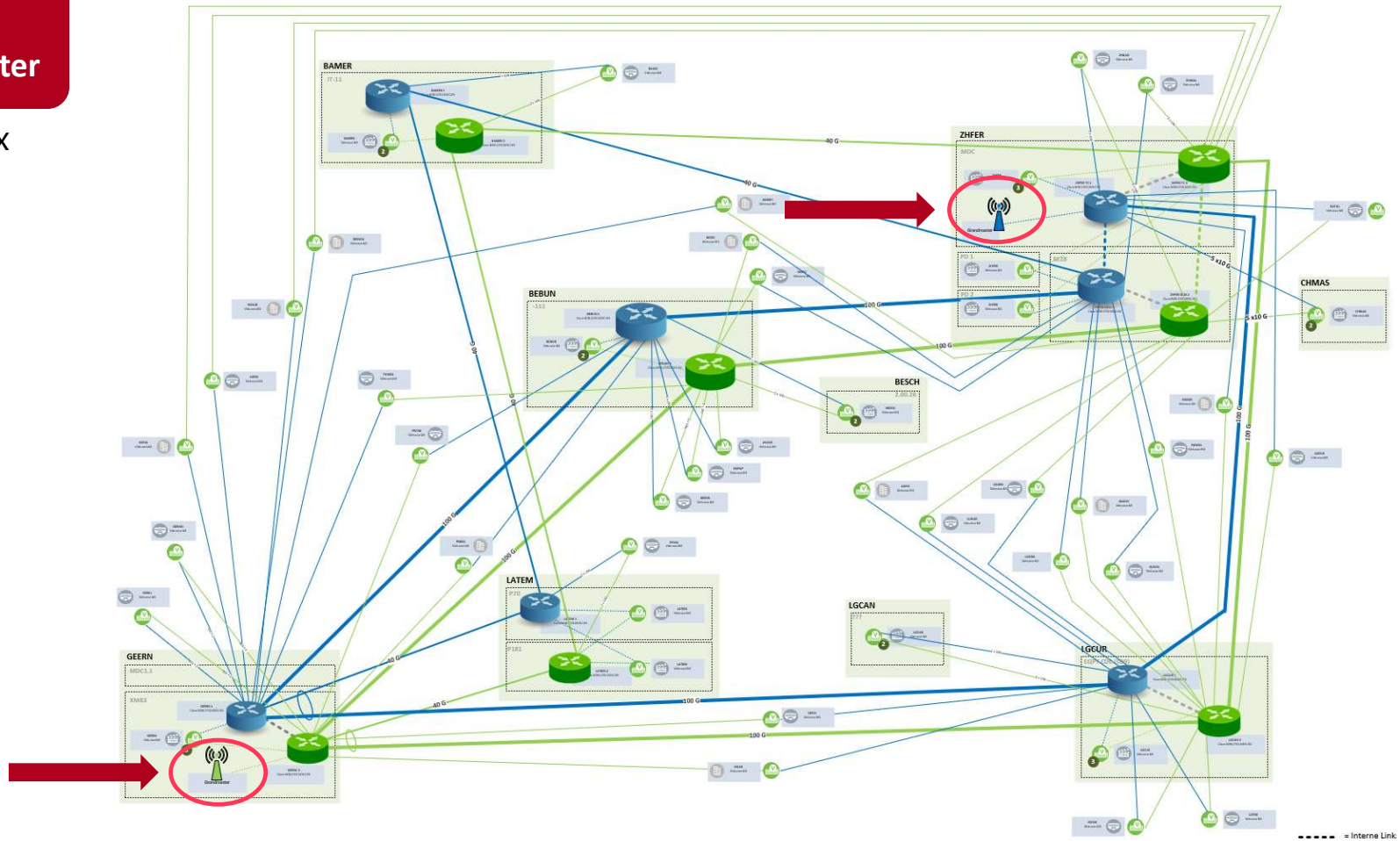
SDN Orchestration

nevion
VideoIPath



PTP Grandmaster

Tektronix

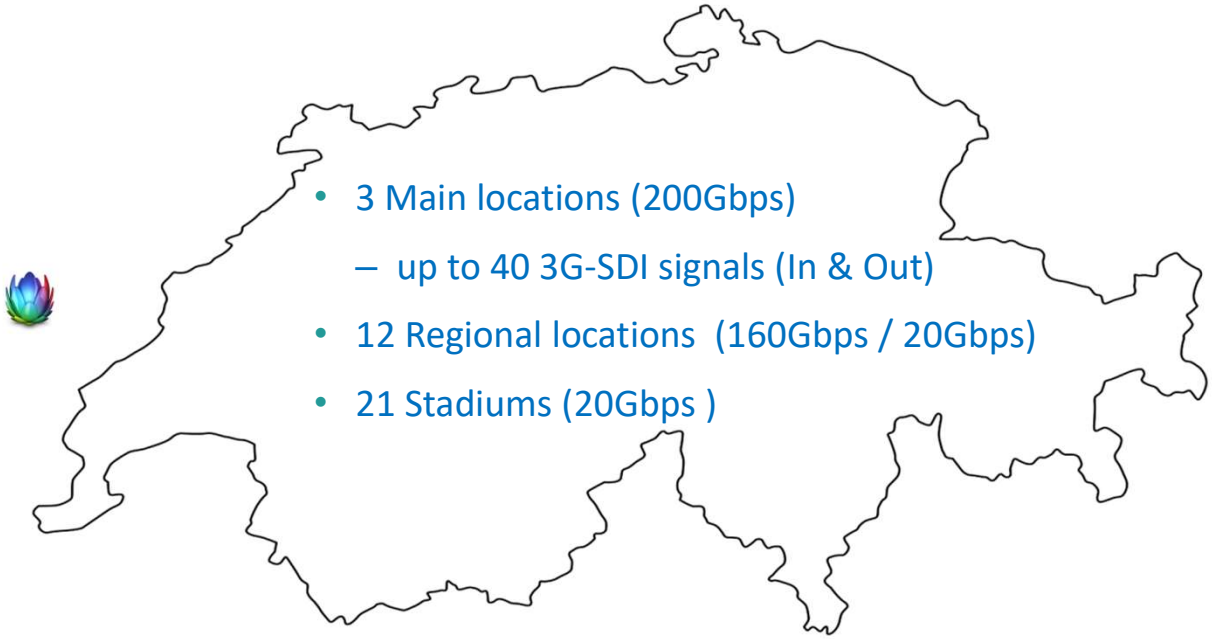


SRG - ORION

walter.bichsel@upc.ch

2020-10-08

SERVICE REQUIREMENTS

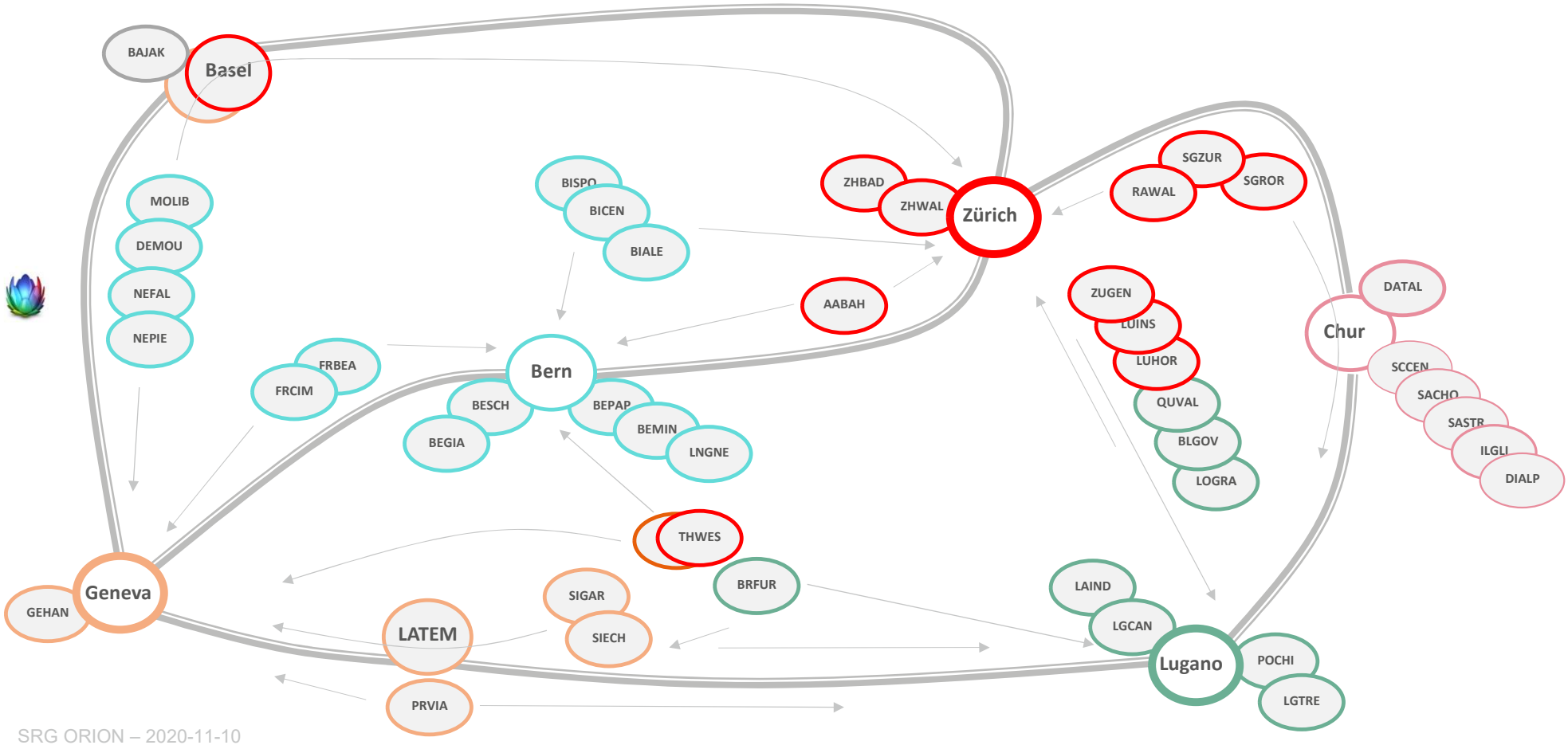


- 3 Main locations (200Gbps)
  - up to 40 3G-SDI signals (In & Out)
- 12 Regional locations (160Gbps / 20Gbps)
- 21 Stadiums (20Gbps)

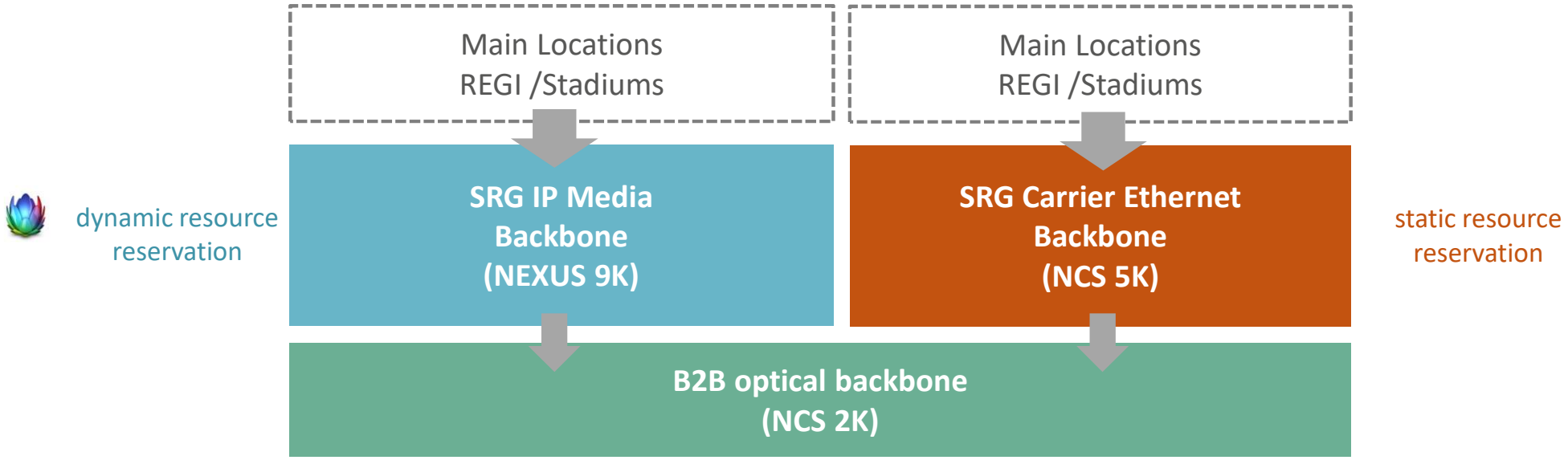
- **Services:**
  - Video 3G-SDI (2110-20/30/40)
  - Audio AES3/AES10 (2110-31)
  - Ethernet 1/10/100G

REGIONS AND CONNECTIVITY REQUIREMENT

Regional sites and stadium require are protected path to the main location

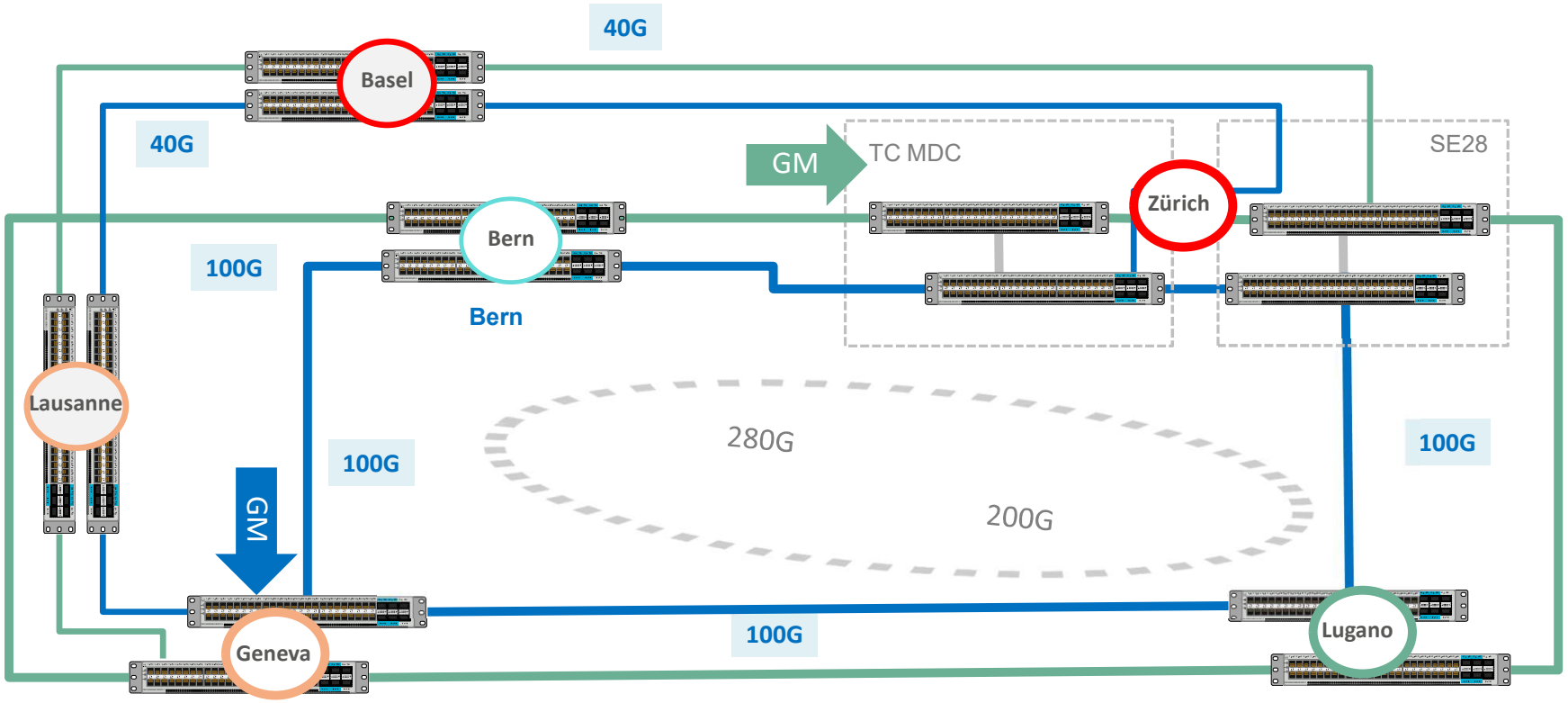


SERVICE / NETWORK CONCEPT



IP/MEDIA NETWORK & CLOCK DESIGN

NEXUS 9K as Boundary Clocks (BCs)

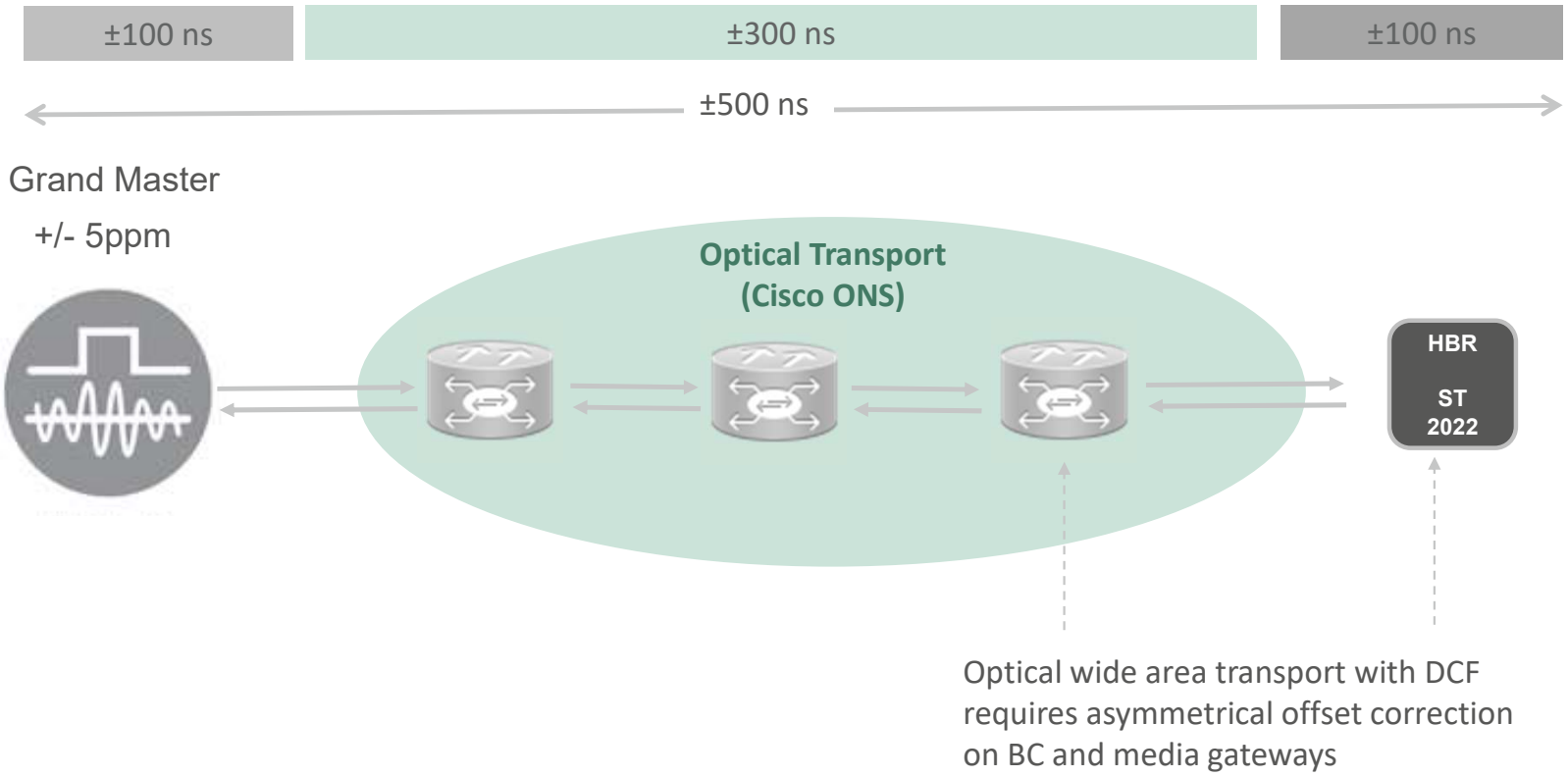


DESIGN CONSIDERATIONS / CHALLENGES

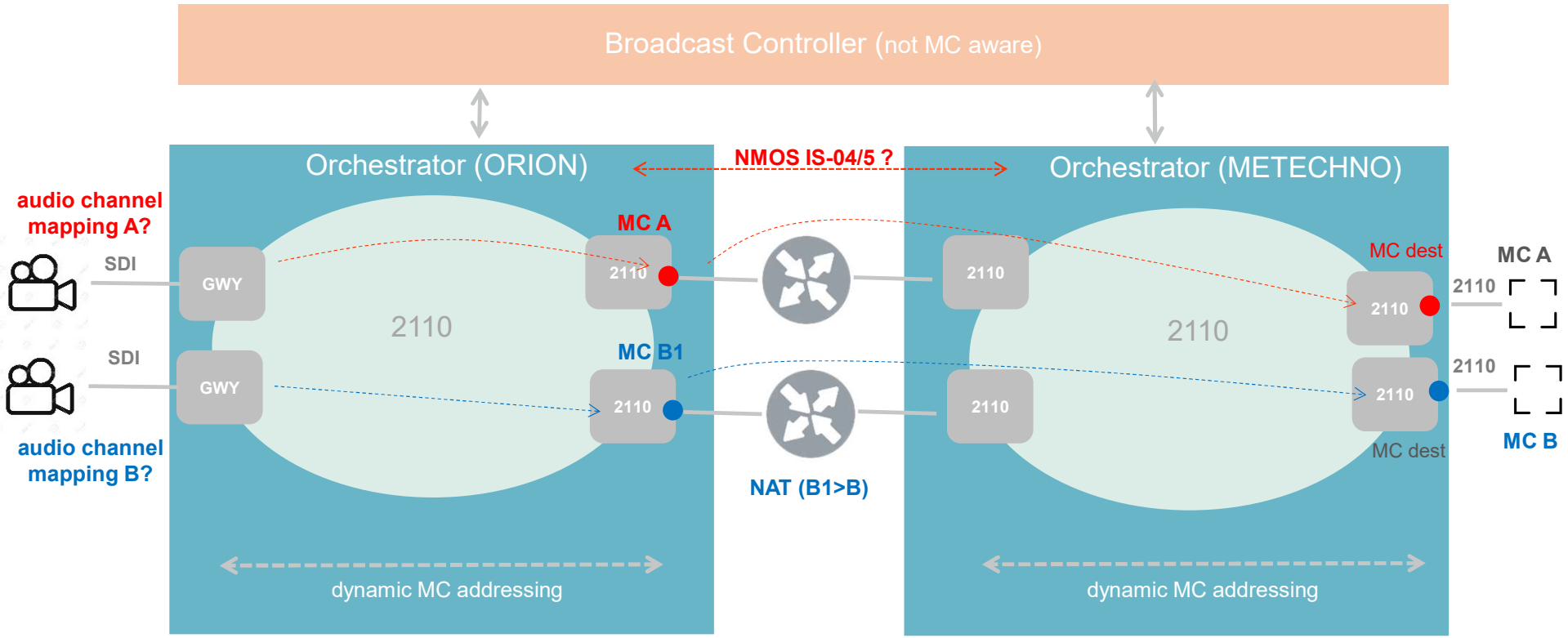
- **PTP**
  - Optical transport networks
    - DCF
    - MuxPonders

- **IP/media**
  - Multicast & 2110 Domains

CHALLENGES


±100 ns
±300 ns
±100 ns
±500 ns
Grand Master
+/- 5ppm
Optical Transport
(Cisco ONS)
HBR
ST
2022
Optical wide area transport with DCF
requires asymmetrical offset correction
on BC and media gateways

CHALLENGES


Broadcast Controller (not MC aware)
Orchestrator (ORION)
NMOS IS-04/5 ?
Orchestrator (METECHNO)
audio channel mapping A?
SDI
GWY
2110
MC A
2110
MC dest
MC A
2110
2110
2110
2110
SDI
GWY
2110
MC B1
2110
2110
2110
audio channel mapping B?
NAT (B1>B)
MC dest
MC B
dynamic MC addressing
dynamic MC addressing

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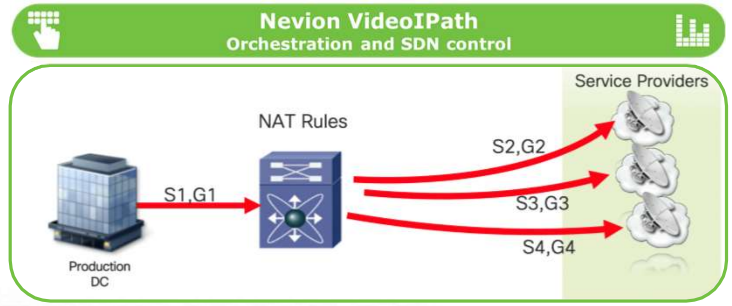
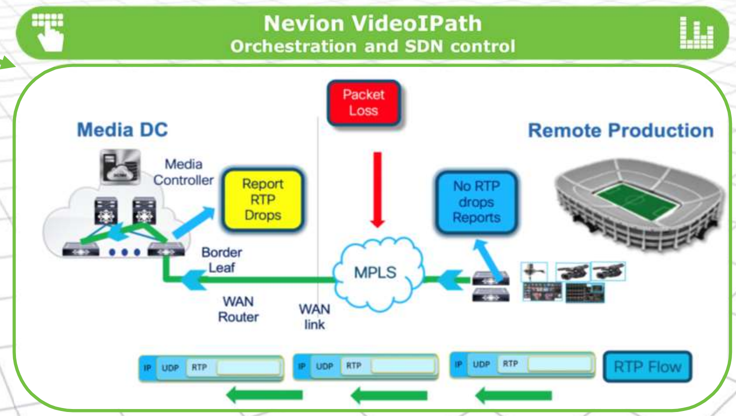
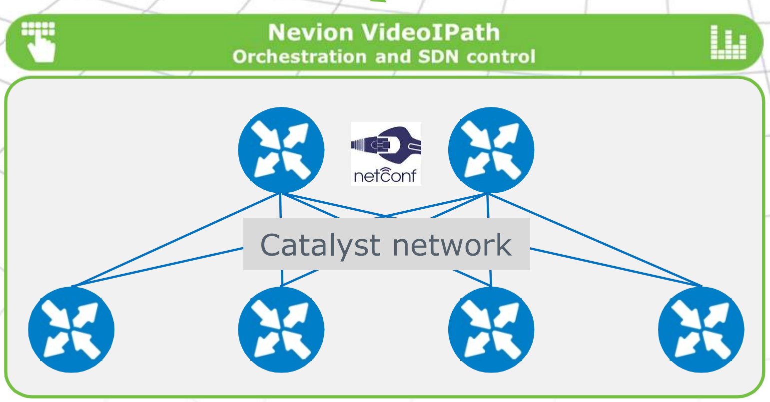
What’s next?

- **SDN Controlled NAT - Ingress/Egress**
- **Media Flow Analytics with RTP flow monitoring**
- **Integration of Cisco’s Catalyst Switches**







Cisco / Nevion – **Stronger together!**

IP network expertise	Broadcast network expertise
IP network management	Broadcast-centric orchestration
High-performance switches	Software defined media node (optional)

THANK YOU!