

Peering LAN 2.0

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Agenda

- IXP Challenges
- Migration Details
- Results



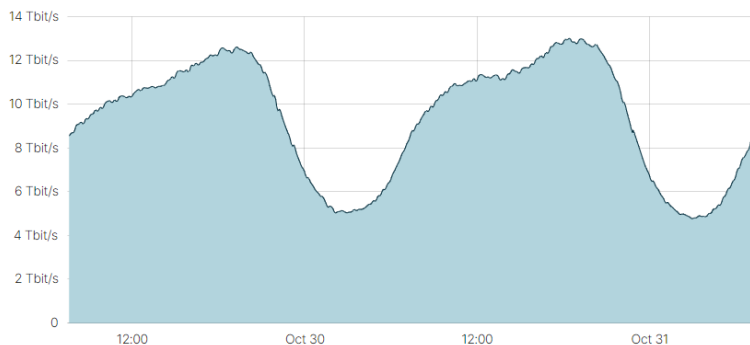
DE CIX

Challenges

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- 1100+ ASNs
- 1800 active IPv4 and IPv6 Peers
- 30 ingress switches from around the world

Traffic Frankfurt – 2 days



ALL-TIME PEAK

13.65 Tbit/s

GRAPH PEAK

13.02 Tbit/s

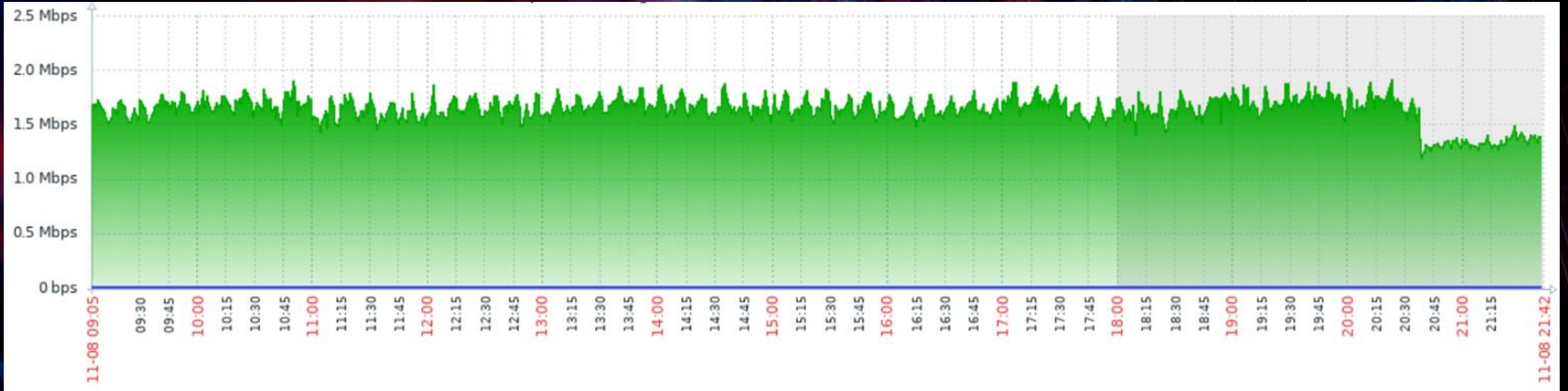
GRAPH AVERAGE

10.18 Tbit/s

CURRENT

8.07 Tbit/s

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- **Broadcast, Unknown Unicast, Multicast Noise (BUM)**
- **Port Speeds vary from 1Gbps to 1.2Tbps**

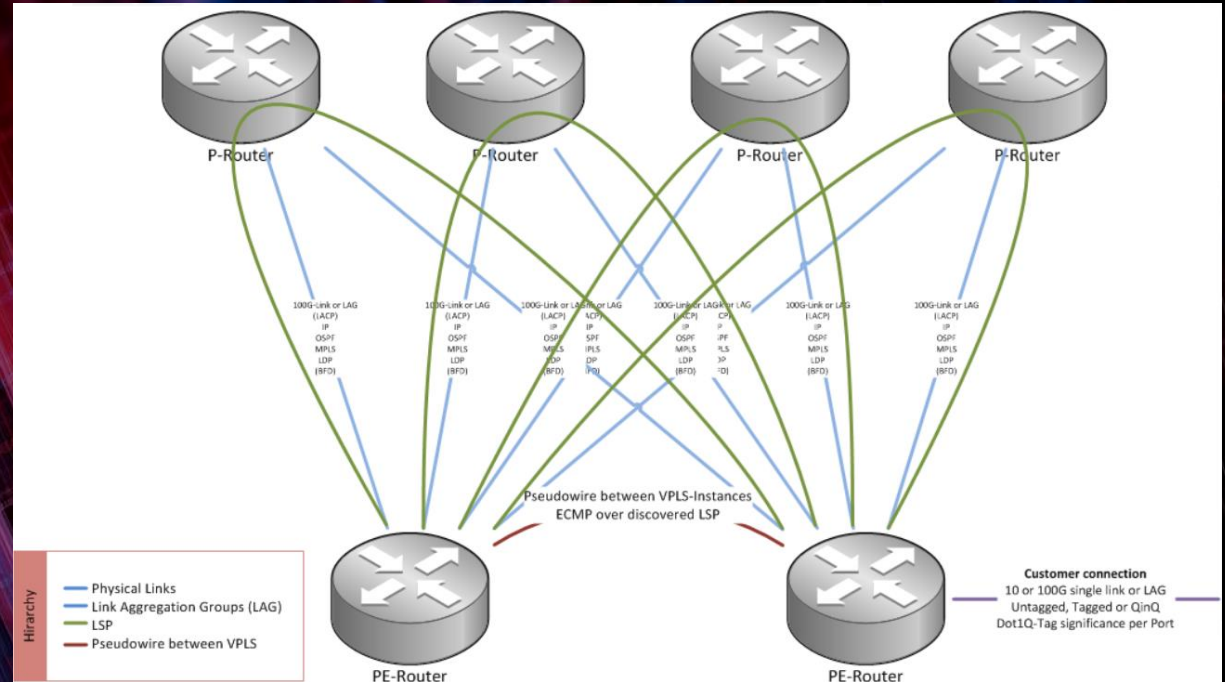
ProxyARP/ND

A router answering to address resolution requests for addresses that do not belong to their own interfaces will start to interrupt all layer 3 based communications

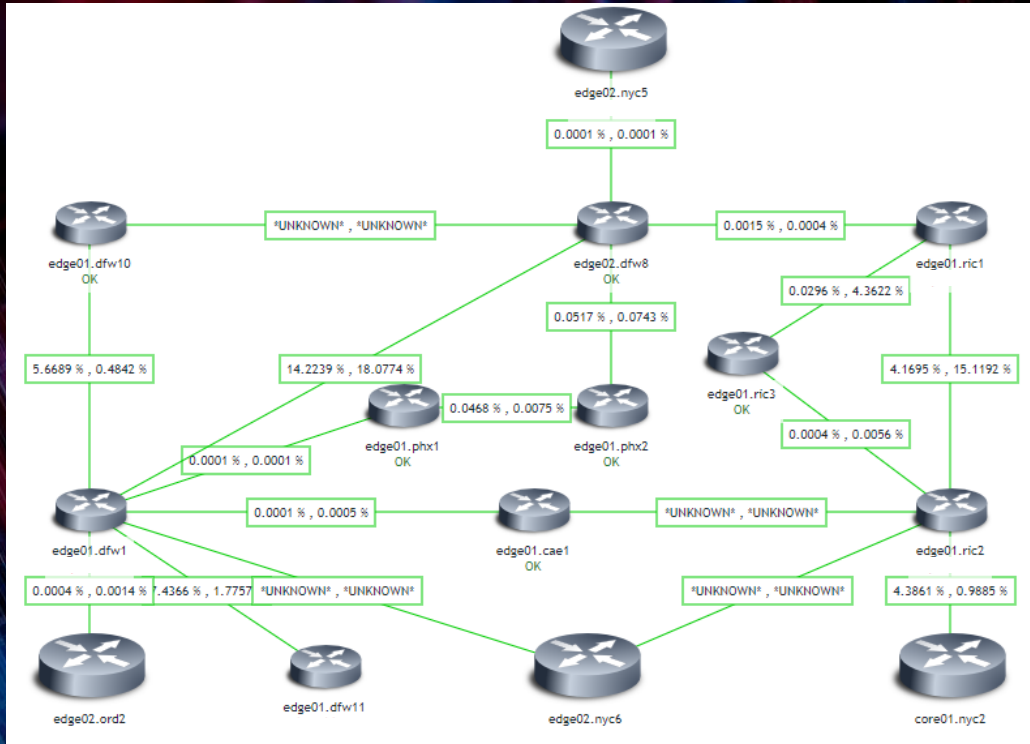


How it started

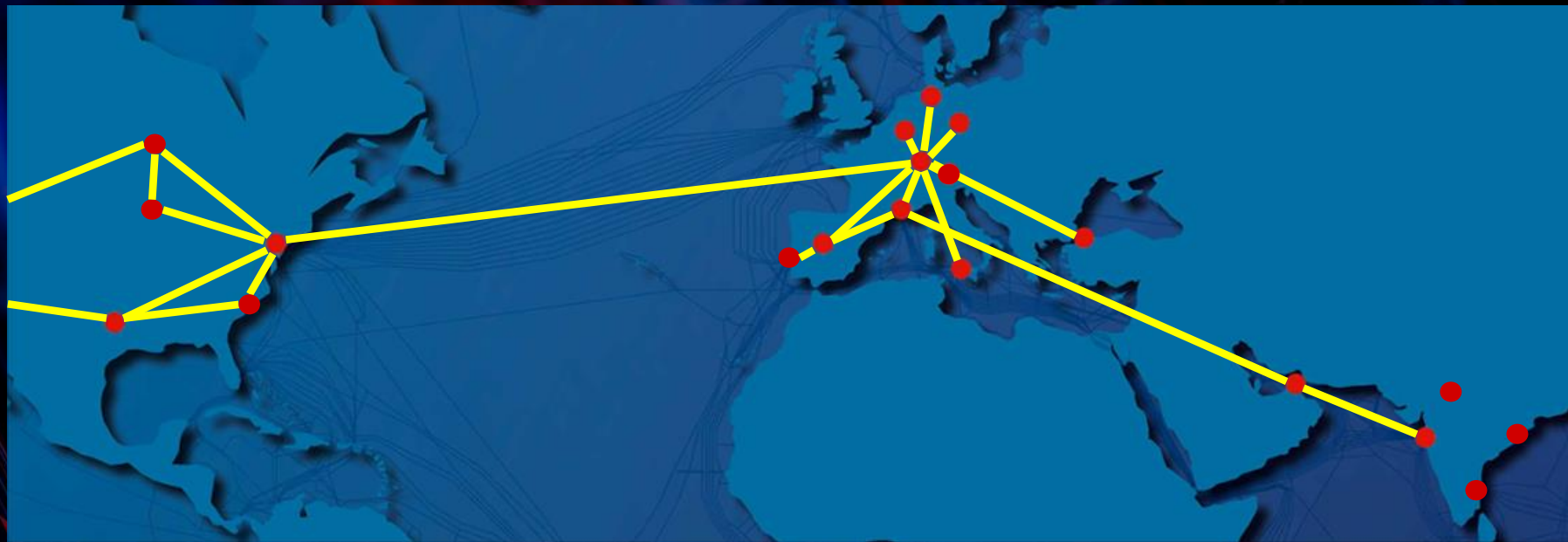
- IP
- OSPF
- LDP
- MPLS
- VPLS/VPWS



How it's going



Topology Evolvment



- DE-CIX Locations (LDP)
- Location Interconnects (RSVP-TE)

Port Security at DE-CIX



Static MAC + MAC ACLs

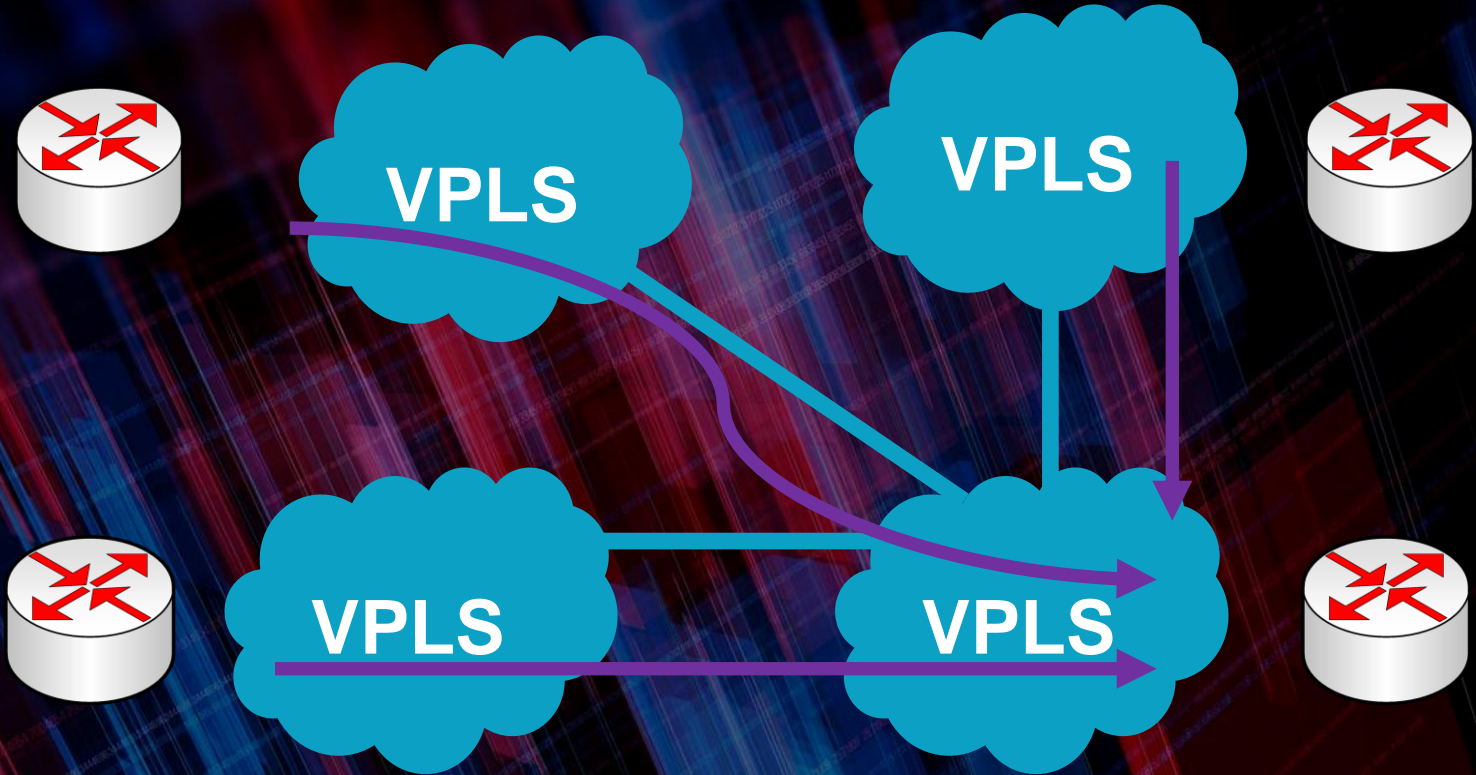
Long Lasting Flows



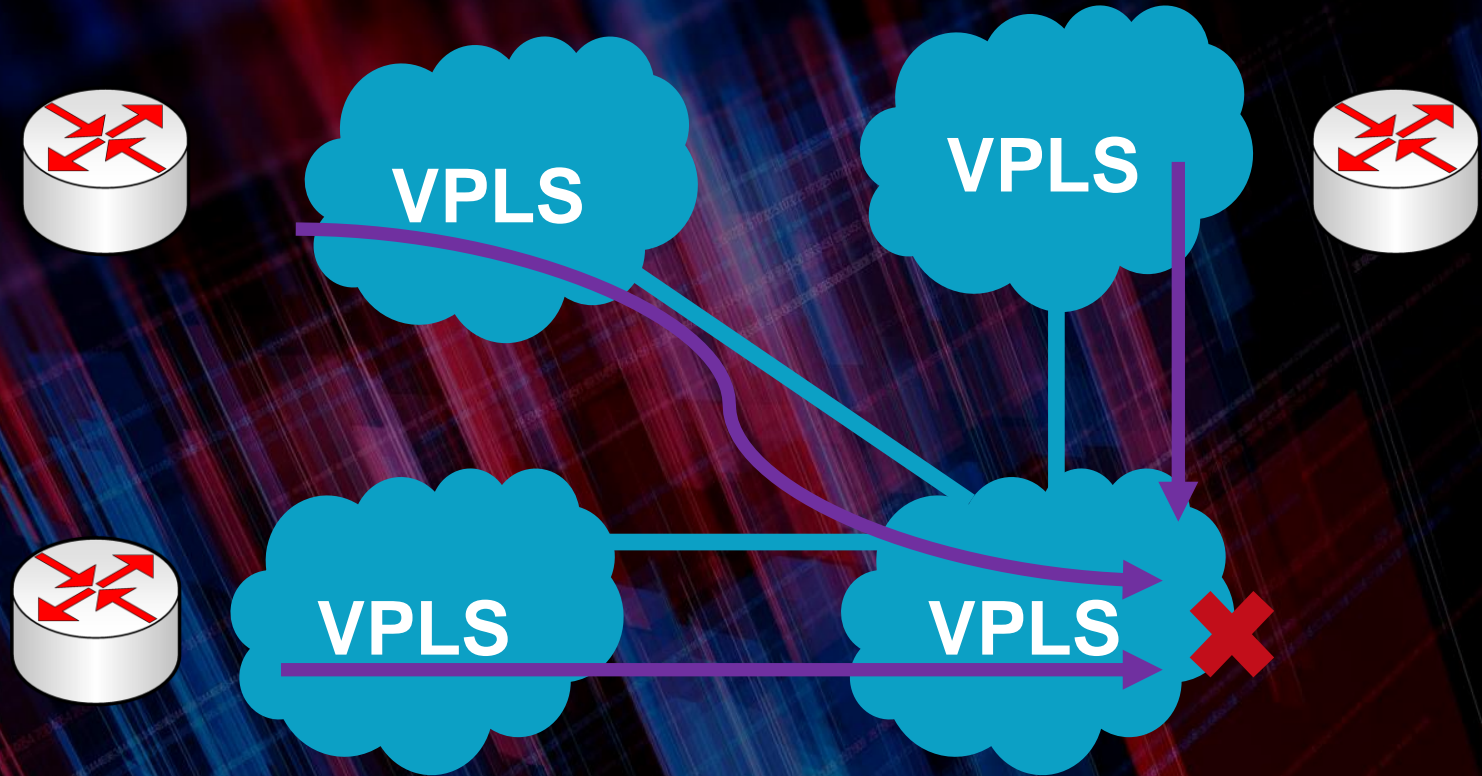
Long Lasting Flows



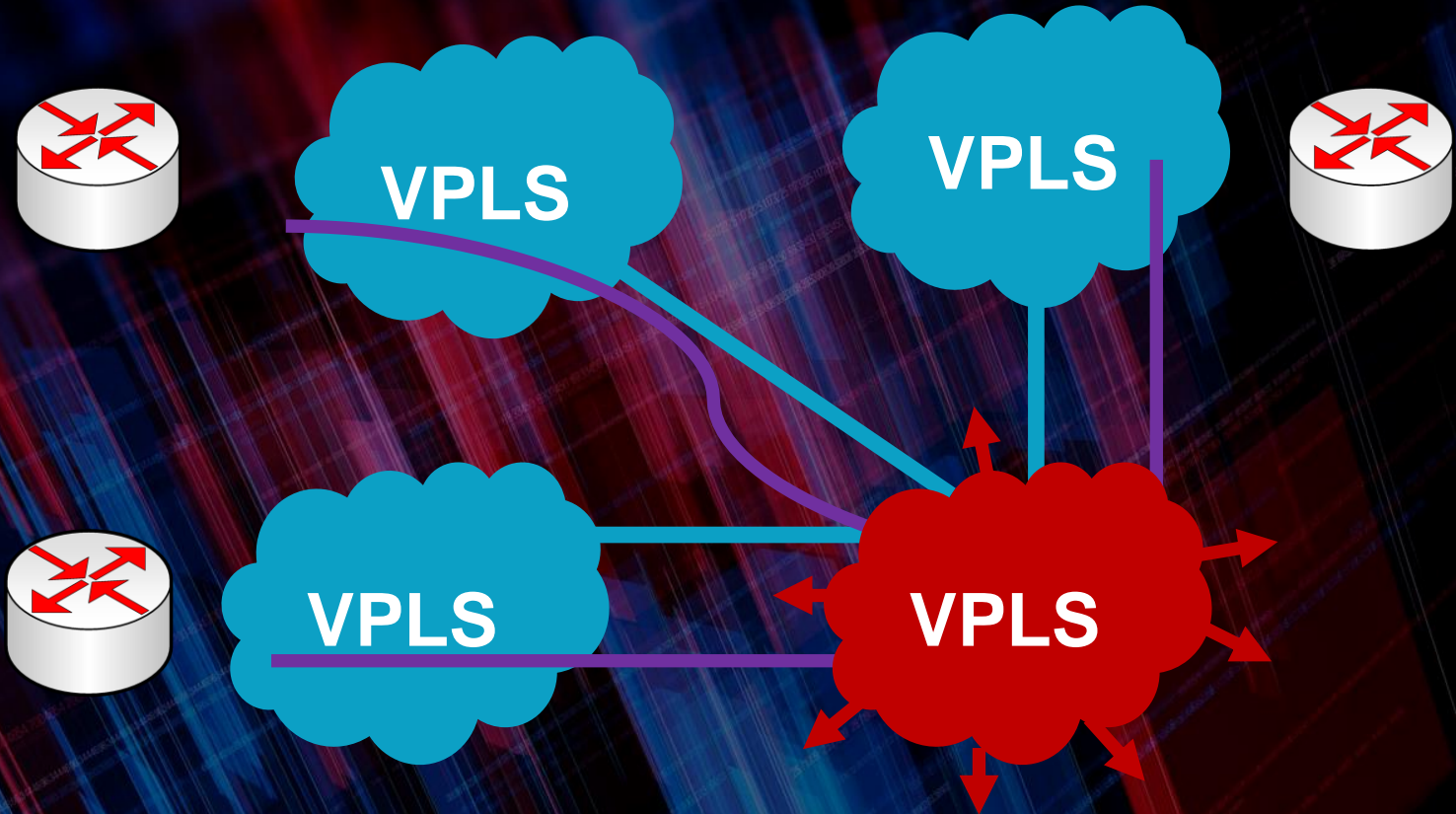
Long Lasting MACs



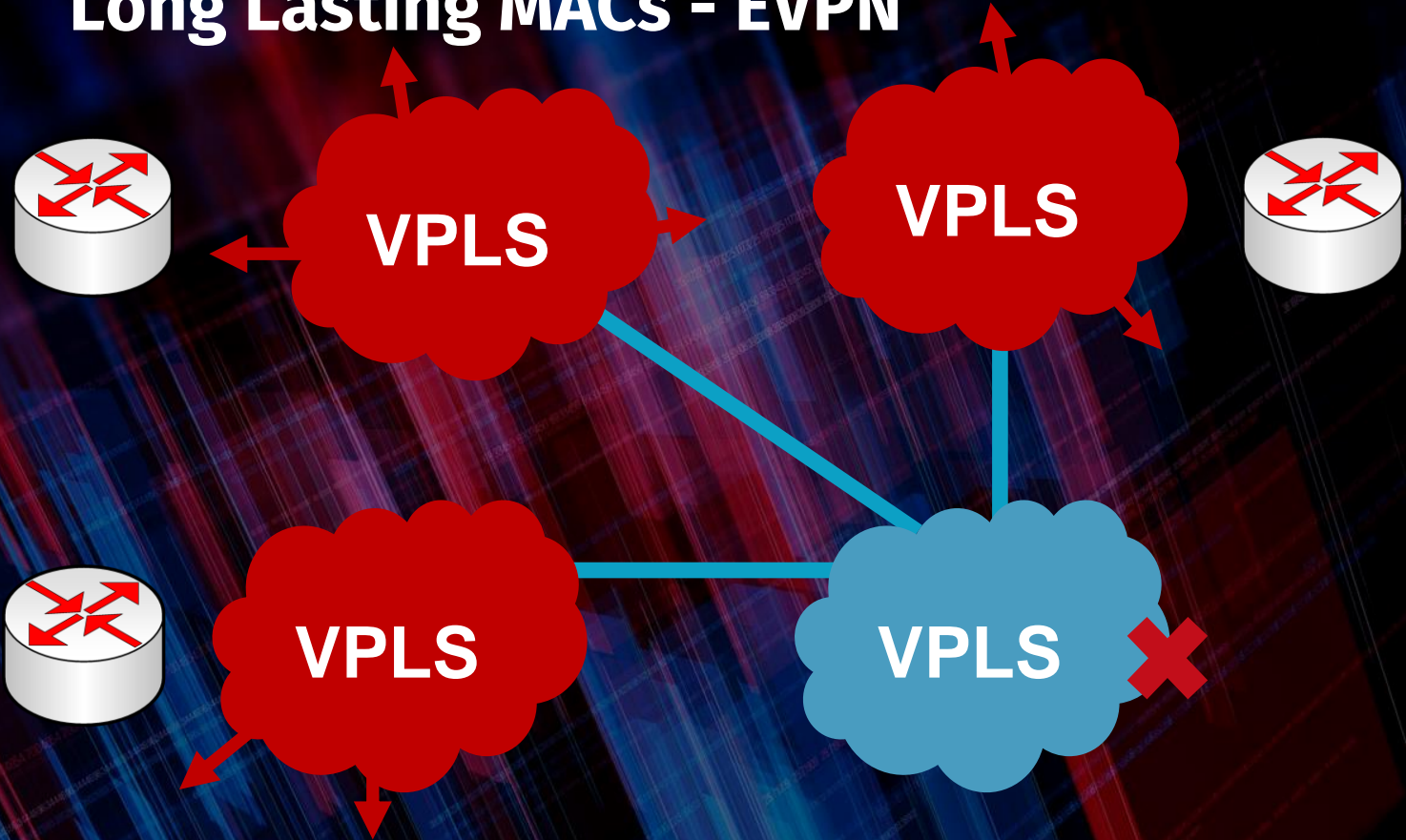
Long Lasting MACs



Long Lasting MACs



Long Lasting MACs - EVPN



VLAN Loops



OUTAGE: Forwarding errors on Peering Platform Frankfurt (OPEN)

DE-CIX Maintenance ID: DXDB:MAINT:703

Work start: 2021-09-21 13:40 UTC

Work status: ANNOUNCED

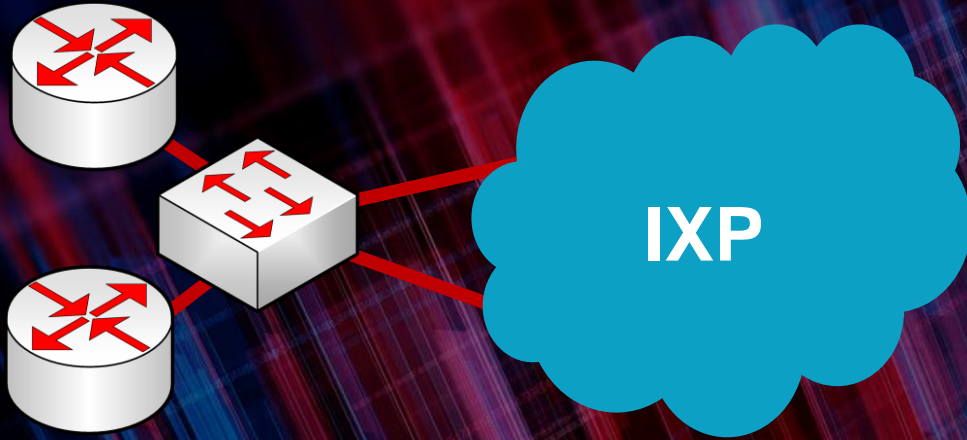
Notification type: OPEN

Impact: Partial Disruption

Affected entities:

Site: DE-CIX Frankfurt (all devices)

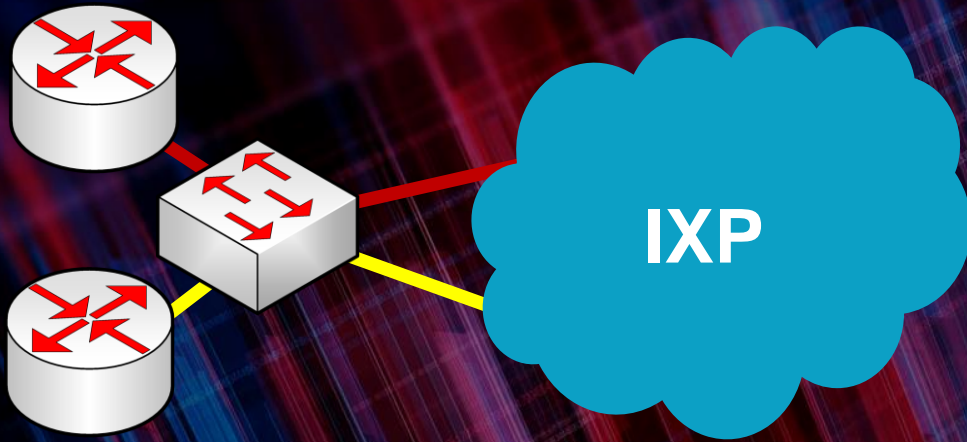
VLAN Loops



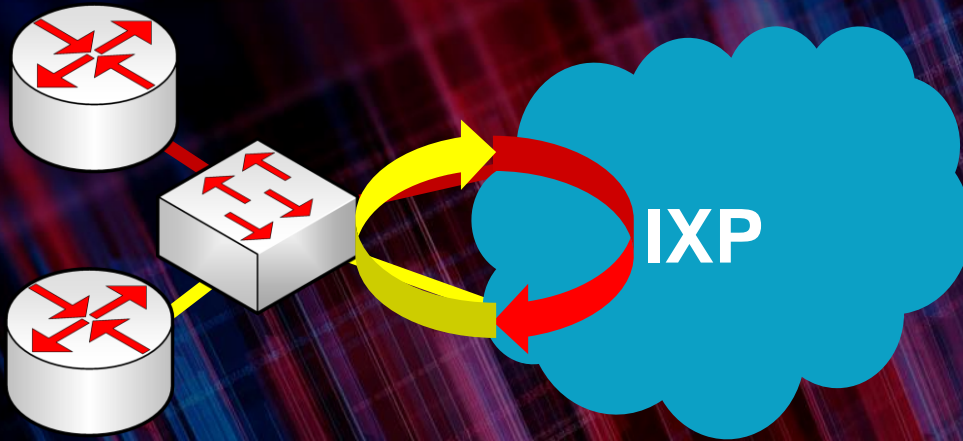
VLAN Loops

Step 1

Routers continuously injecting BUM traffic



VLAN Loops



Step 1

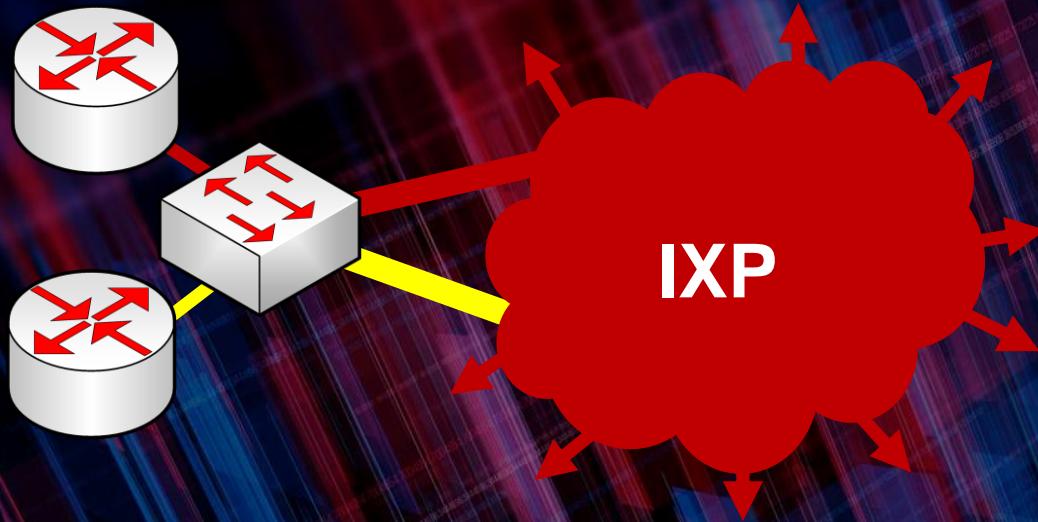
Routers continuously injecting BUM traffic

Step 2

BUM traffic in fabric circulating and increasing



VLAN Loops



Step 1

Router continuously injecting BUM traffic

Step 2

BUM traffic in fabric circulating and increasing

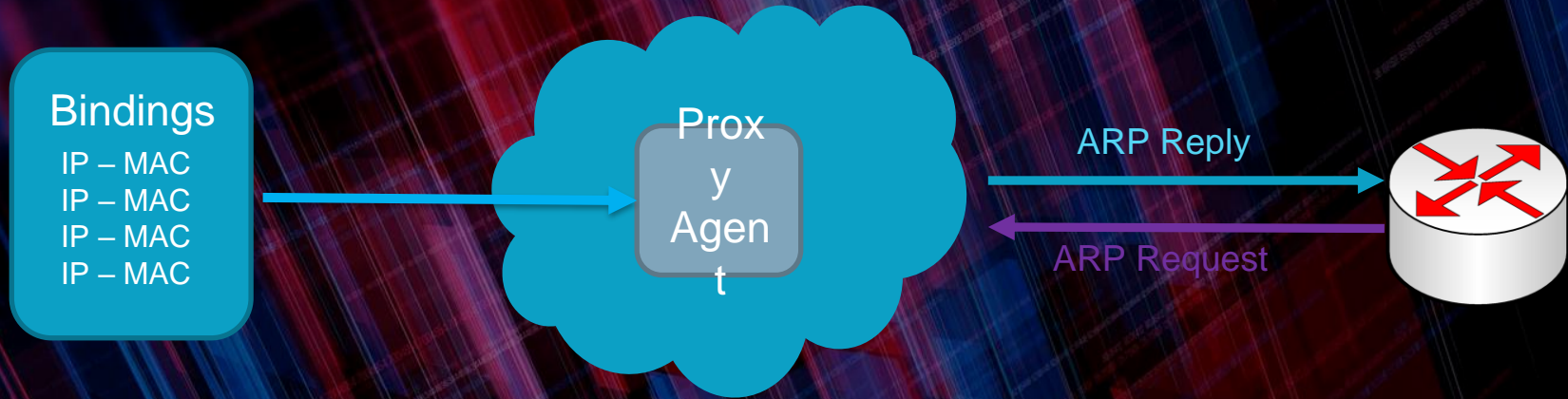
Step 3

BUM traffic level exceeding egress rate limit and blocking valid traffic



ARP/ND Agent

- RFC 9161

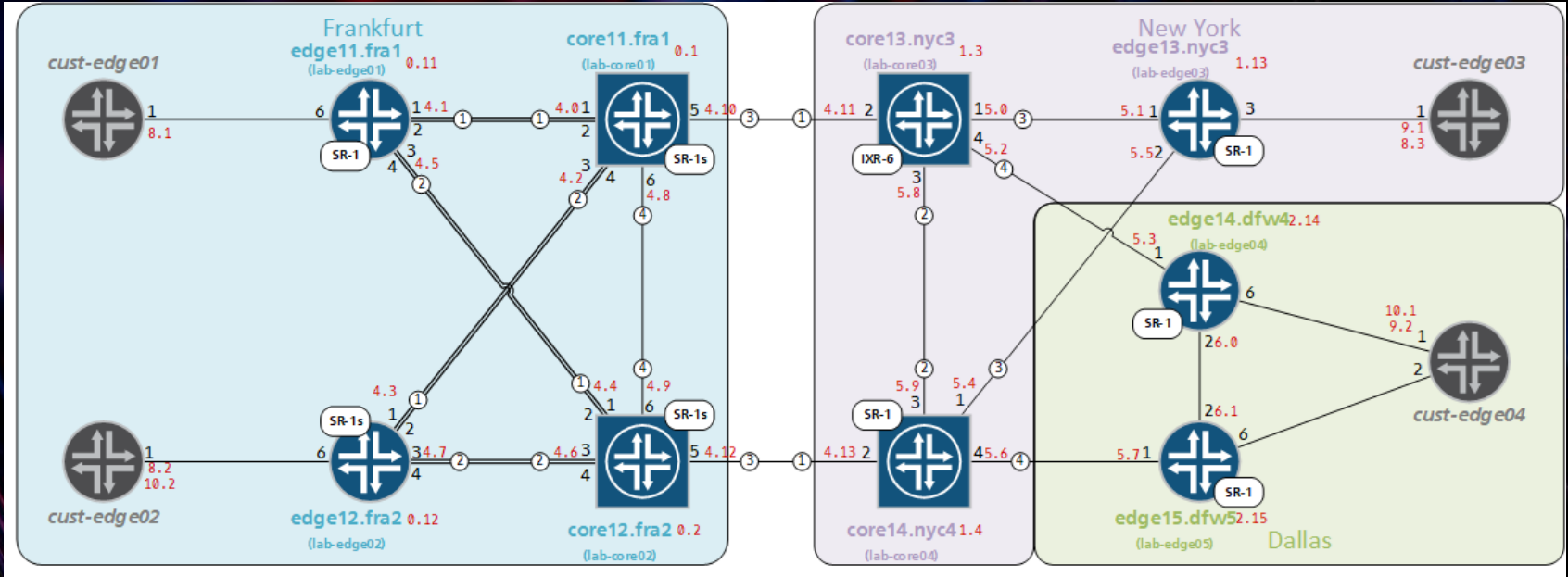


Migration

Migration Scenarios

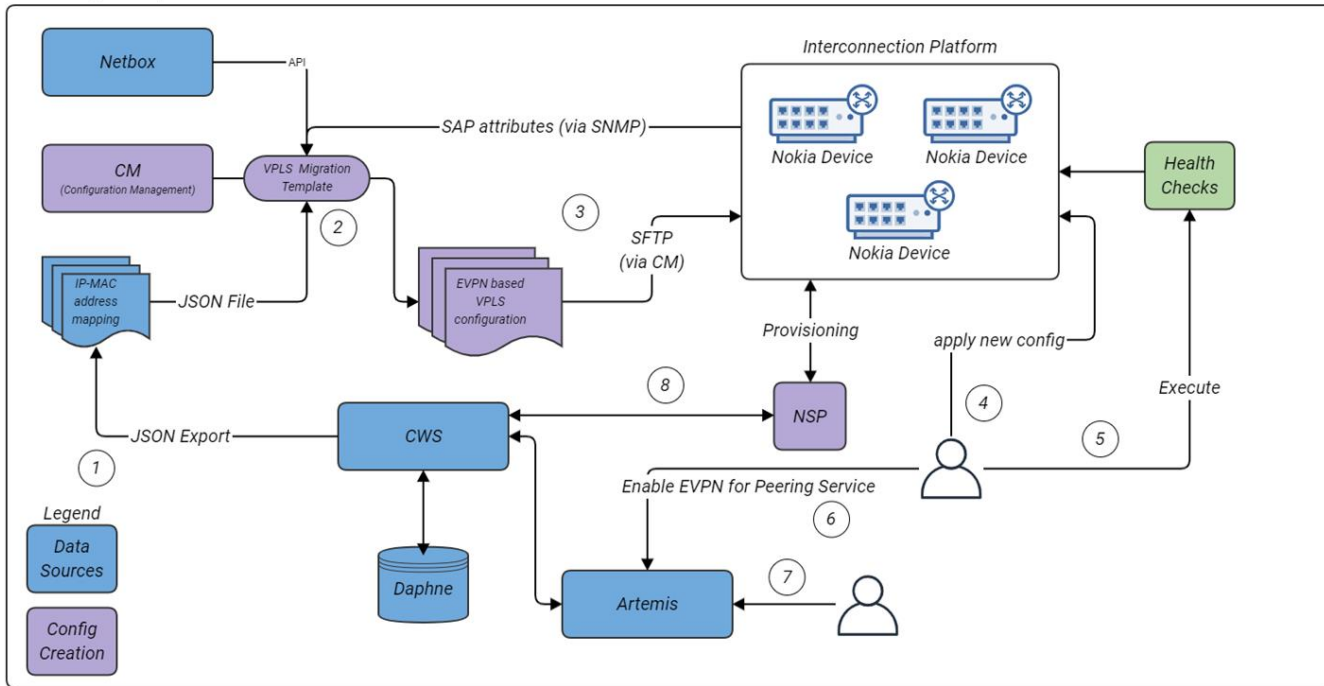
Scenario	Small Steps	Reduce Complexity	Reduce Downtimes
Router by Router			
Location by Location			
Service by Service			

Testing - Network



Testing – Configuration Systems

VPLS Migration per VPLS



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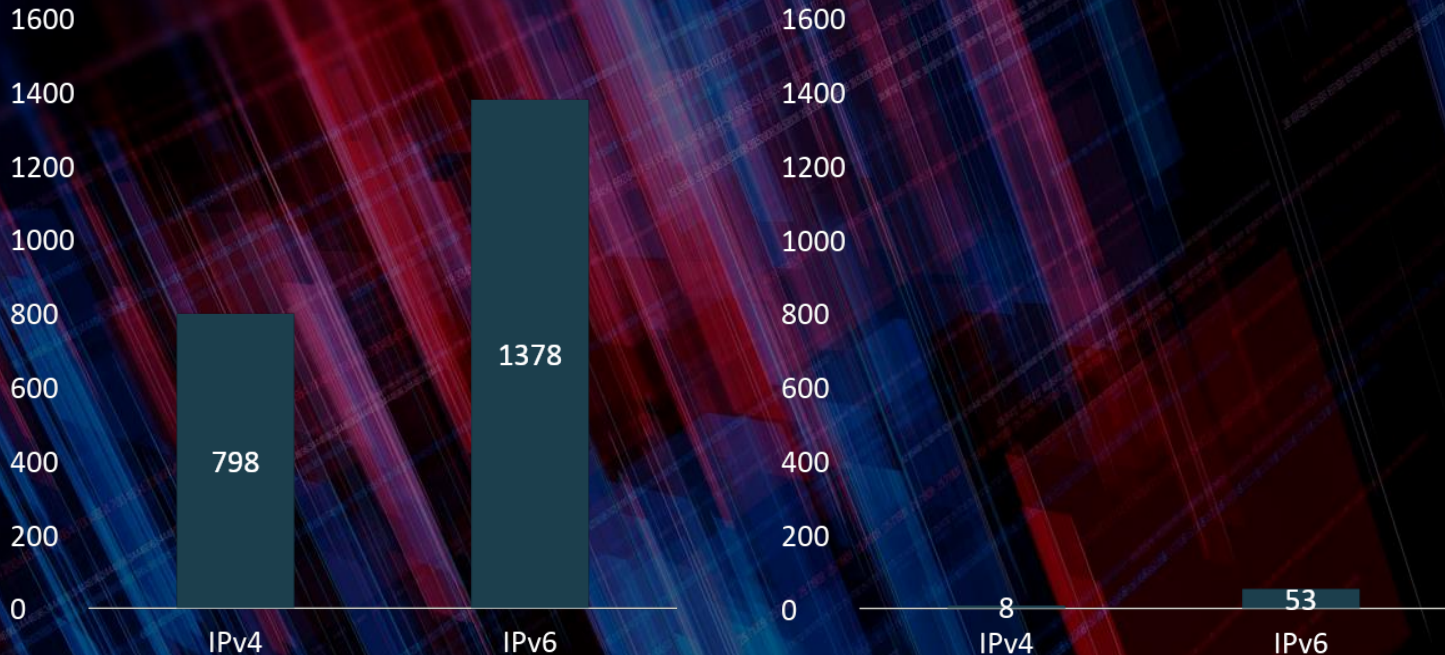
Broadcast, Unknown Unicast, Multicast Noise (BUM, sliced mirrored)

Results



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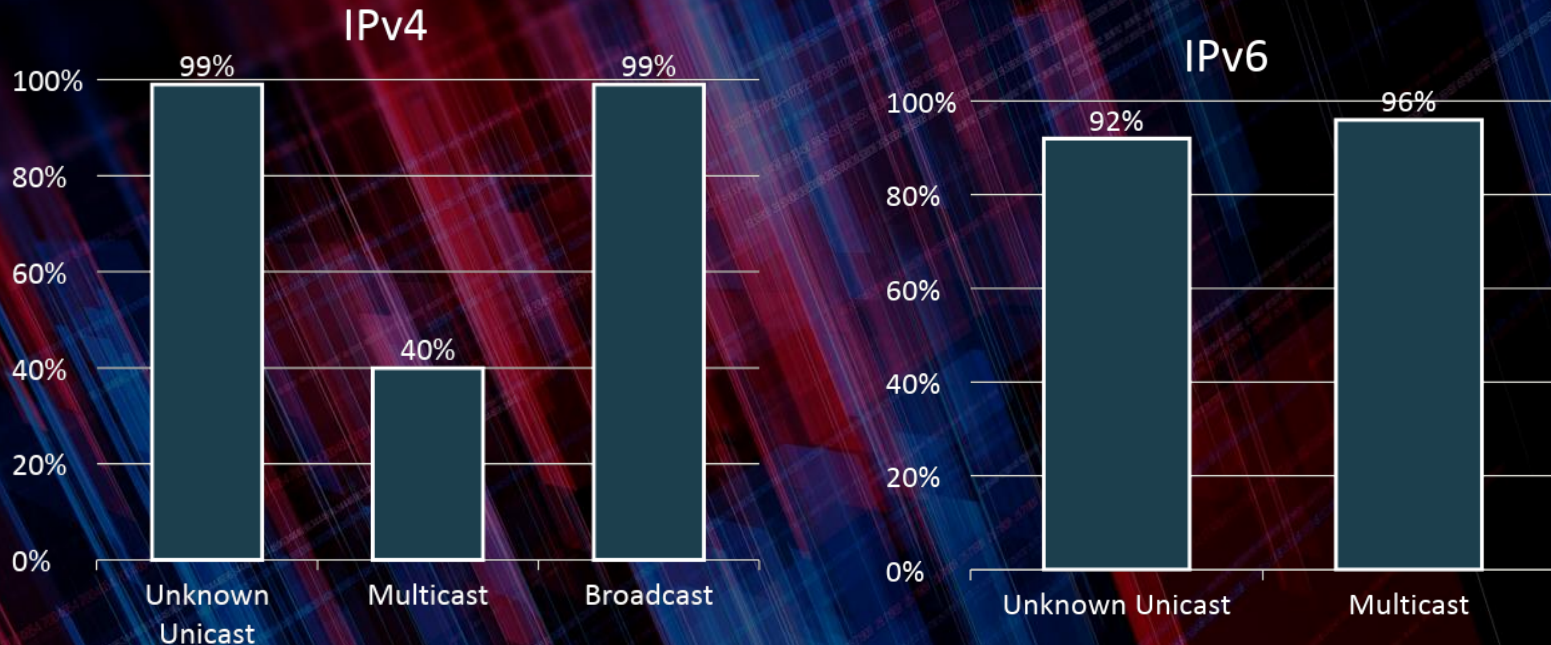
BUM traffic packets per second* by protocol



* measured on edge01.fra9 (Equinix FR7), ymmv

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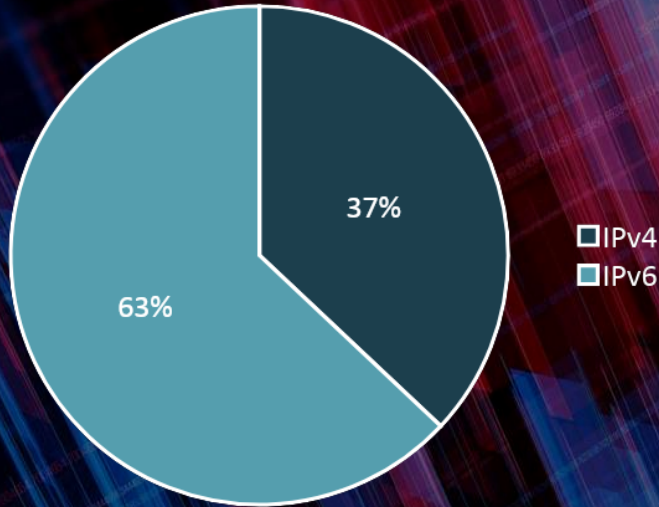
BUM traffic decrease rates compared per protocol



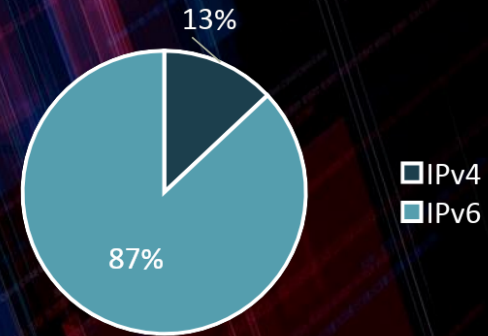
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BUM traffic overall distribution by protocol

Flood & Learn

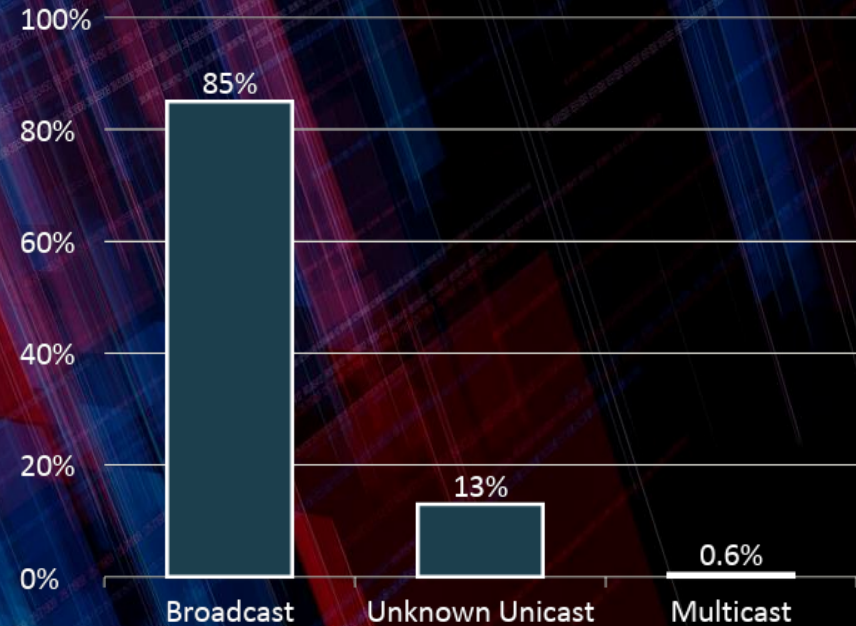
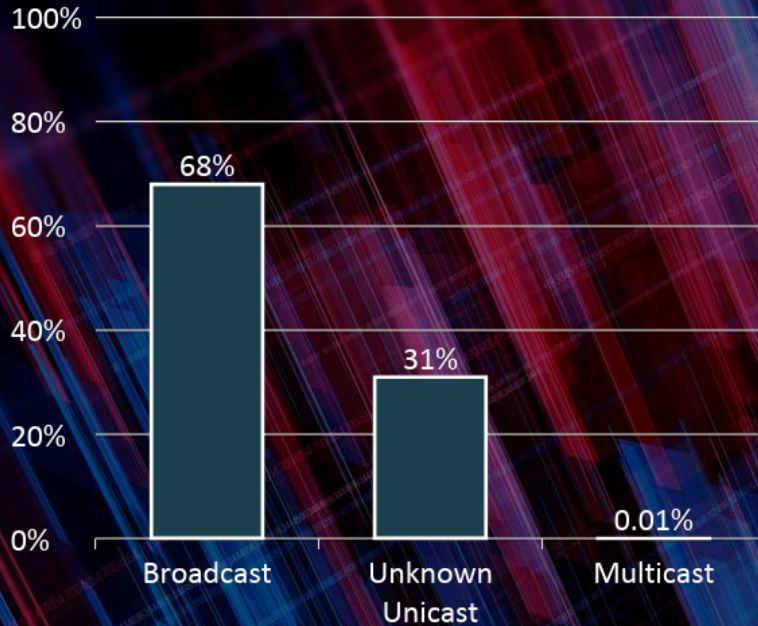


EVPN Agent



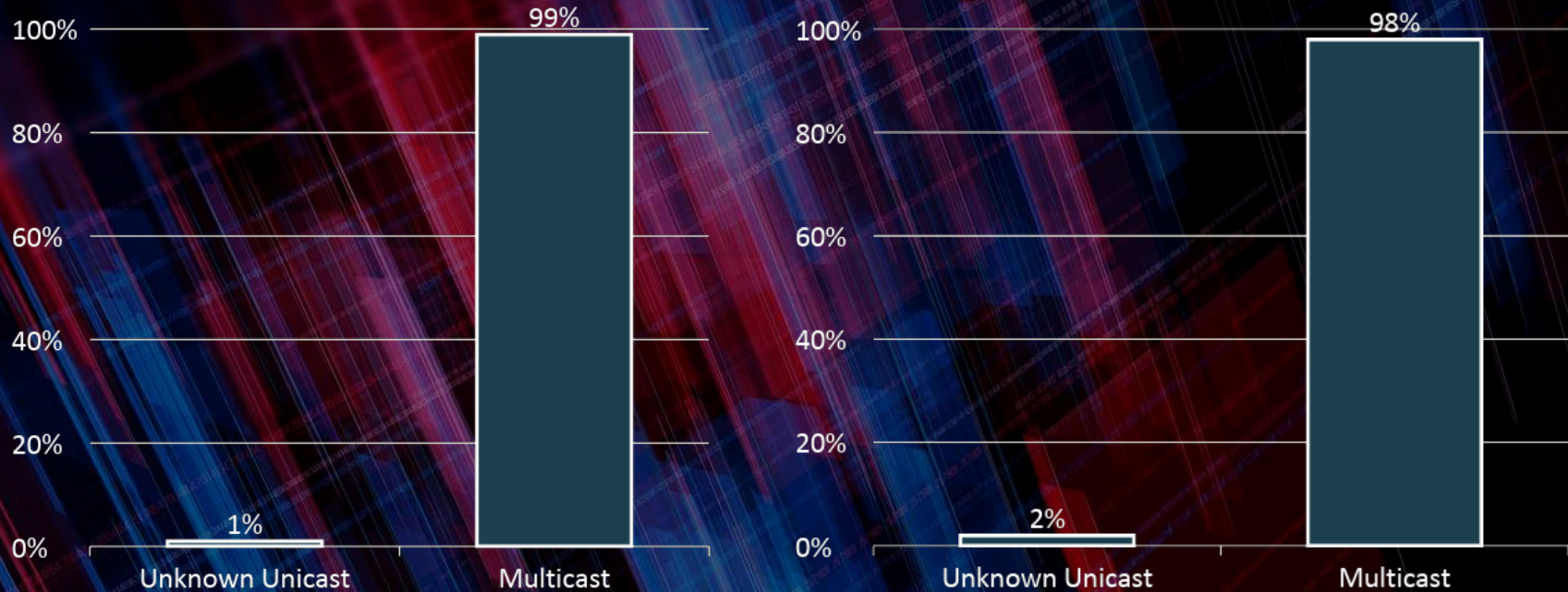
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IPv4 BUM traffic distribution by frame type per technology



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IPv6 UM traffic distribution by frame type per technology



Bugs & Accidents

- Traffic distribution with LDP entropy labels not working as expected
- IPv6 ND Agent Replies with wrong source IP Address, Software upgrade required



**Questions?
Complaints?
Comments?**



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