Introduction to Arista CHANGE in SP

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Arista SE

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Arista Networks

15%,
27.8% for 100GE segment*
Market Share

10+ Million
Ports Shipped

4500+
Customers

$1B+
Revenue

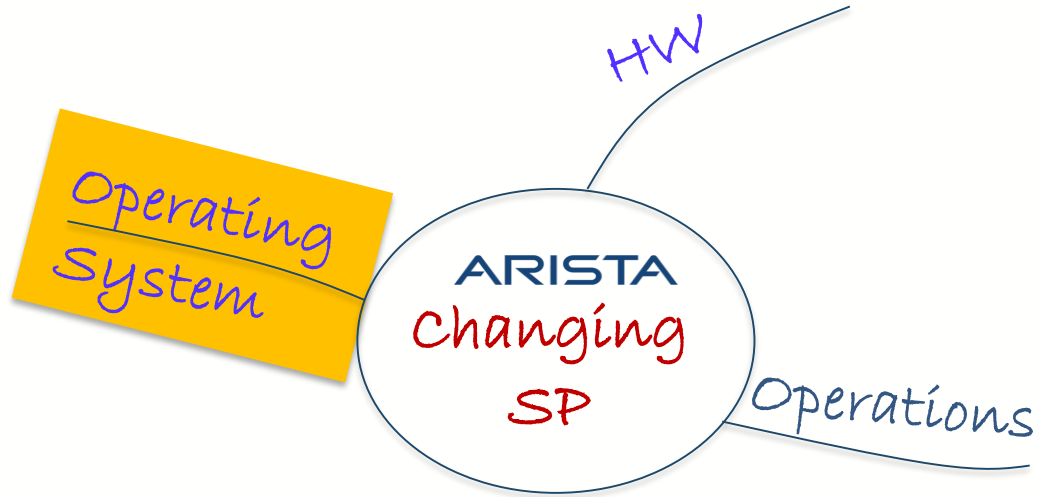1 Operating System

*) IDC report from 9 June 2017

Source: Gartner (July 2017)

Agenda

Changing SP

Short introduction

CHANGE
& Competitive advantage

Big

Focused
Lean
Smart
Fast

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Agenda

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Architecture matters

Typical OS

BGP, FIB, VXLAN, PIM

ARISTA EoS

BGP, eAPI, VXLAN, NetDB, CLI, DRV, DRV

Lean Smart Fast
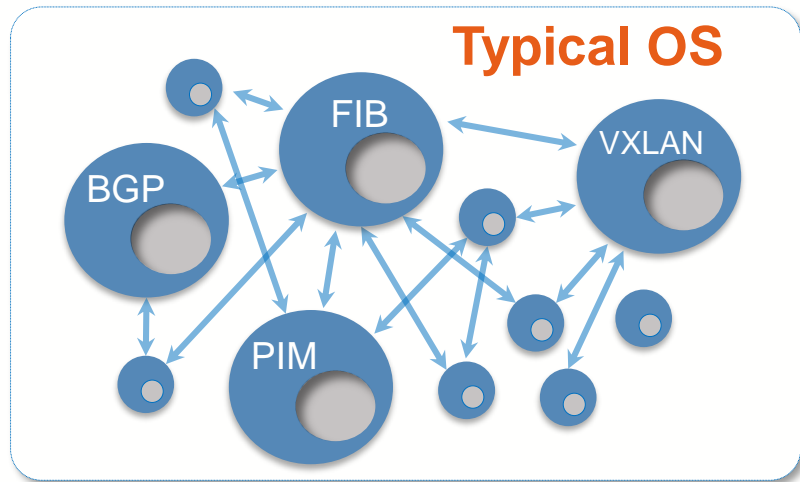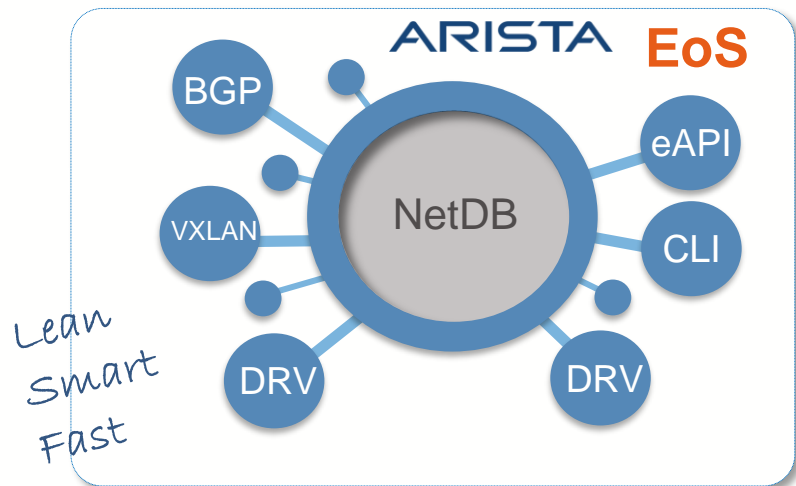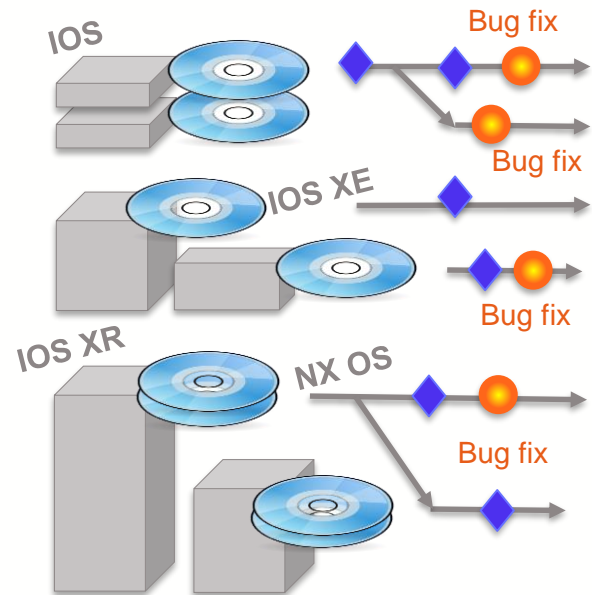
- Stateful Processes – All processes maintain their own state
- Enormously complex code interaction
- IPC with message queues and stores
- Impossible to coordinate development
- Serial Dependency (Christmas Lights)

- Simple underlying architecture
- Fedora Core Linux Kernel
- Stateless Processes
- Publish/ Subscribe Model
- Self Healing

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Number of Operating Systems matters

IOS

Bug fix

Bug fix

IOS XE

Bug fix

IOS XR

NX OS

Bug fix

New Features

Bug fix

4.18.1F   4.18.2F   4.18.xM   4.18.xM

Multiple Operating Systems.
SW Image per device type

Complex feature and bug fix development
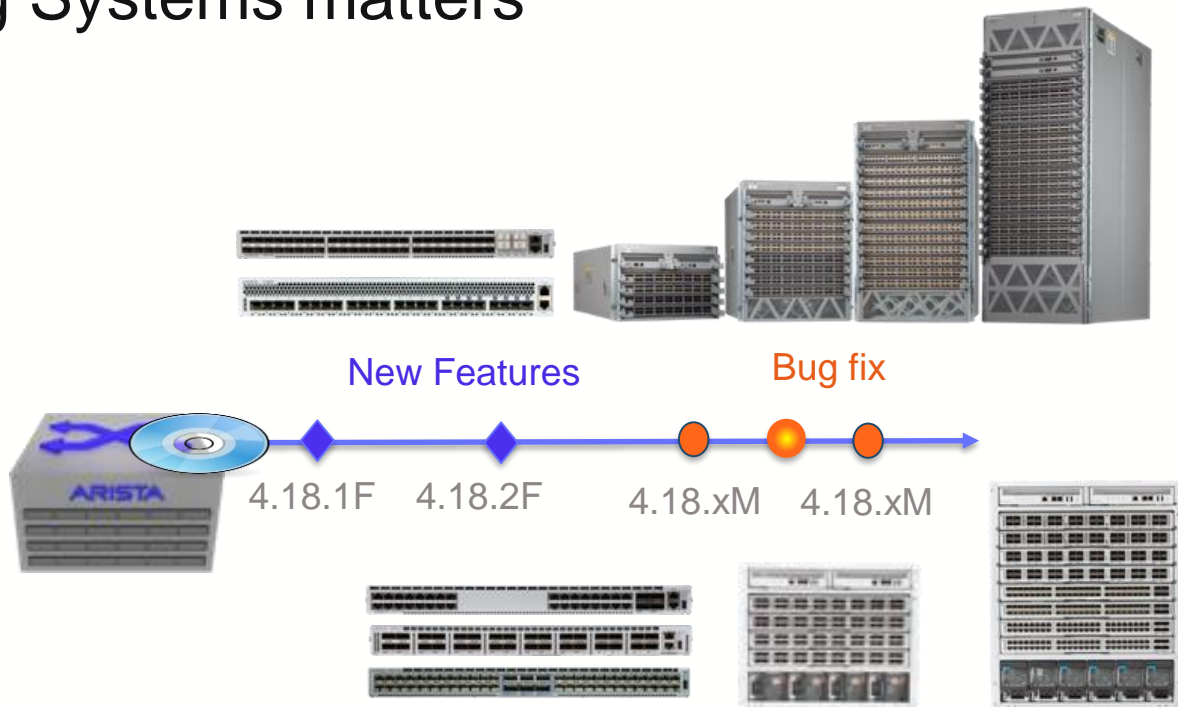
Single SW binary image
for all ARISTA products
Same CLI, API, bug fix, etc

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Software quality

Culture

Architecture

Quality is **THE MOST** important attribute of our products

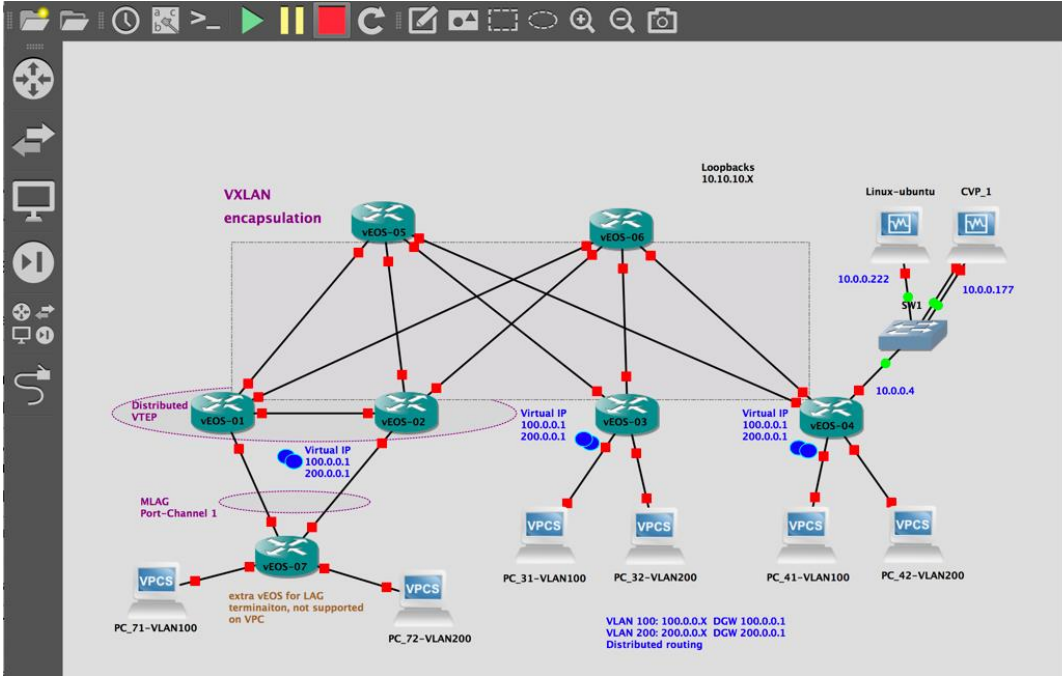Testing, Testing, Testing, Testing, Testing, Testing,

65000 automated test per day

20min Youtube video
„Arista Networks EOS Evolution and Quality with Ken Duda"
CTO of Arista Networks

Quality Obsession…

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Free testing LAB DYI

Register at Arista

Download free vEOS VM

Configure VMs or use free GNS3

L2, L3, VXLAN, STP work! Enjoy….

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Final Note

Size matters…

Big
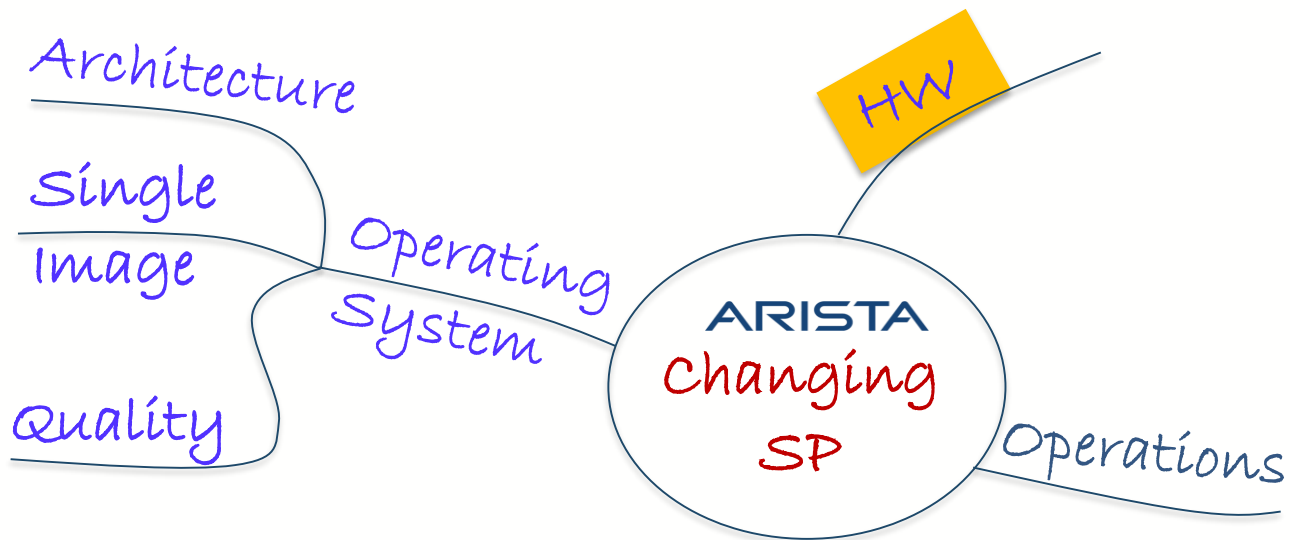
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7500R   7280R   Today

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Plans for 2018

32x
4x100GE
1x400GE

100G-Lambda
Initiative

45 RU	48 RU	18 RU	2 RU	1 RU
32 Tb/s	16 Tb/s	57.6 Tb/s	6 Tb/s	12.8 Tb/s

High end routers: MPLS, Segment Routing, Internet routing,

Switching/Routing

Arista Silicon Landscape: 2016-2019

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Arista Networks Portfolio

EOS: Extensible Operating System – Single Binary Image for all P[...]
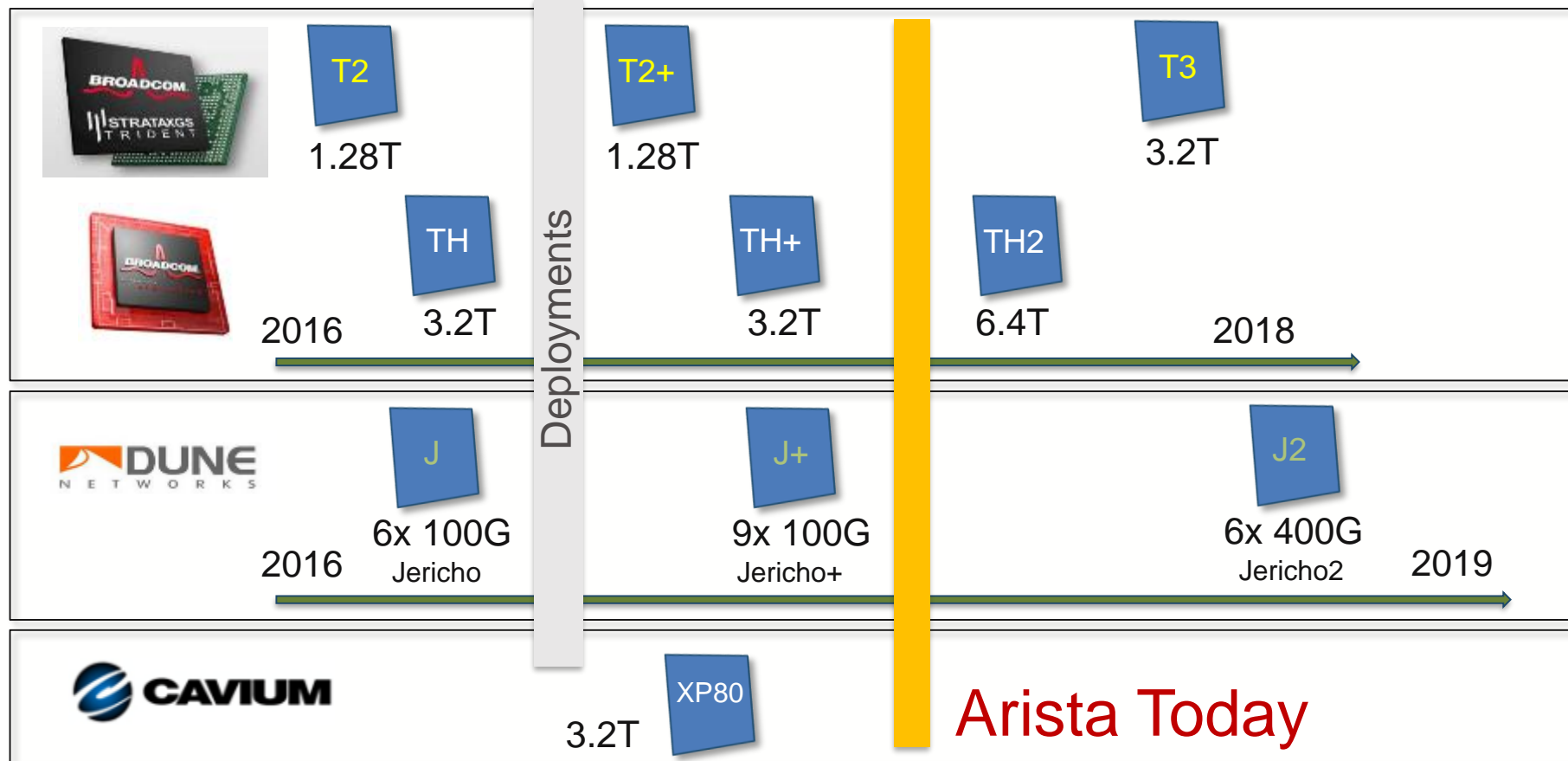
EOS
CloudVision

NetDB
SysDB State
Linux Kernel

7500R
Lossless, High Density, Modular Switching System supporting up to:
432 x 40G/100G ports
864 x 50G ports
1728 x 10G/25G ports at wire speed.

Spine Switch with Deep buffer VOQ Architecture 10/25/40/50/100GbE 200G Coherent DWDM with MACSec Encryption

7300X
High Density, Modular System supporting up to 512 40GbE

Cloud Scale
Leaf and Spine
10GbE-40GbE

7280R
Deep buffer VOQ architecture switch with choice of:
48 x 10G(CU) + 6 x 100G,
48 x 10G(FX) + 6 x 100G,
36 x 40G (12 x 100G),
48 x 100G + 8 x 40G

All 100G can be used as 1 x 40G, 4 x 10G/25G or 2 x 50G

Advanced Virtualization
Scale-out
Visibility

7060CX
Dense Low Latency 32 & 64-port
CX32 – 32x40/100G, 64x50G or 128x10/25G
CX64 – 64x40/100G, 128x50G or 246x10/25G

Advanced Virtualization
Scale-out
Visibility

7280SE
Dense 48 Port 10G switch with deep buffer VOQ architecture with choice of:
2 x 100G MXP
2 x QSFP100
4 x QSFP+

Advanced Virtualization
Scale-out
Visibility

7050X & 7200X
Dense Low Latency 32 & 64-port QSFP+
96xSFP+/8xQSFP+
48-port 10Gb w/ 100Gb Uplinks

Advanced Virtualization
Scale-out
Visibility

7150S
Ultra Low Latency 24,52,64-port SFP+ 1G-40GbE Switches

PTP High precisions oscillator Intelligent Application Switch

7010
48-port Data Center Class Gigabit Ethernet Switch

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Provisioning

Various versions of CLI per platform

Various GUI & Automation Tools

Some vendors /platforms OPENCONFIG NETCONF

Scripting with complex CLI parsing

Some vendors/platforms JSON

Single industry standard CLI (Cisco) with multiple extensions and simplifications.
- show everywhere ("do" not needed)
- session config   with "Commit"
- etc

Simple scripting with JSON formatting (input, results, etc)

Multiple APIs (eAPI, REST, XMPP)

EOS
CloudVision

Cloud Vision Portal GUI & Automation

Linux way

Bash Access, Scripting, scheduling, tcpdump, Linux tools, Ansible, Pupet, Chef, Wireshark, etc….

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Monitoring

Slow
Heavy

Legacy

Accelerated sFlow
1:1000

SNMP
Traps

Syslog

SNMP
Statistics
Pull-Push
nightmare

sFlow,
(netFlow,
JFlow)

BGP

VXLAN

NetDB

eAPI

CLI

DRV

DRV

TRM

Telemetry

gRPC,
Netconf

Real time
Data streaming
selected (all)
changes in DB

CPU Load, Statistics, MAC address, BGP,
neighbors, ISIS, ports status, buffers
utilization, … . . . .
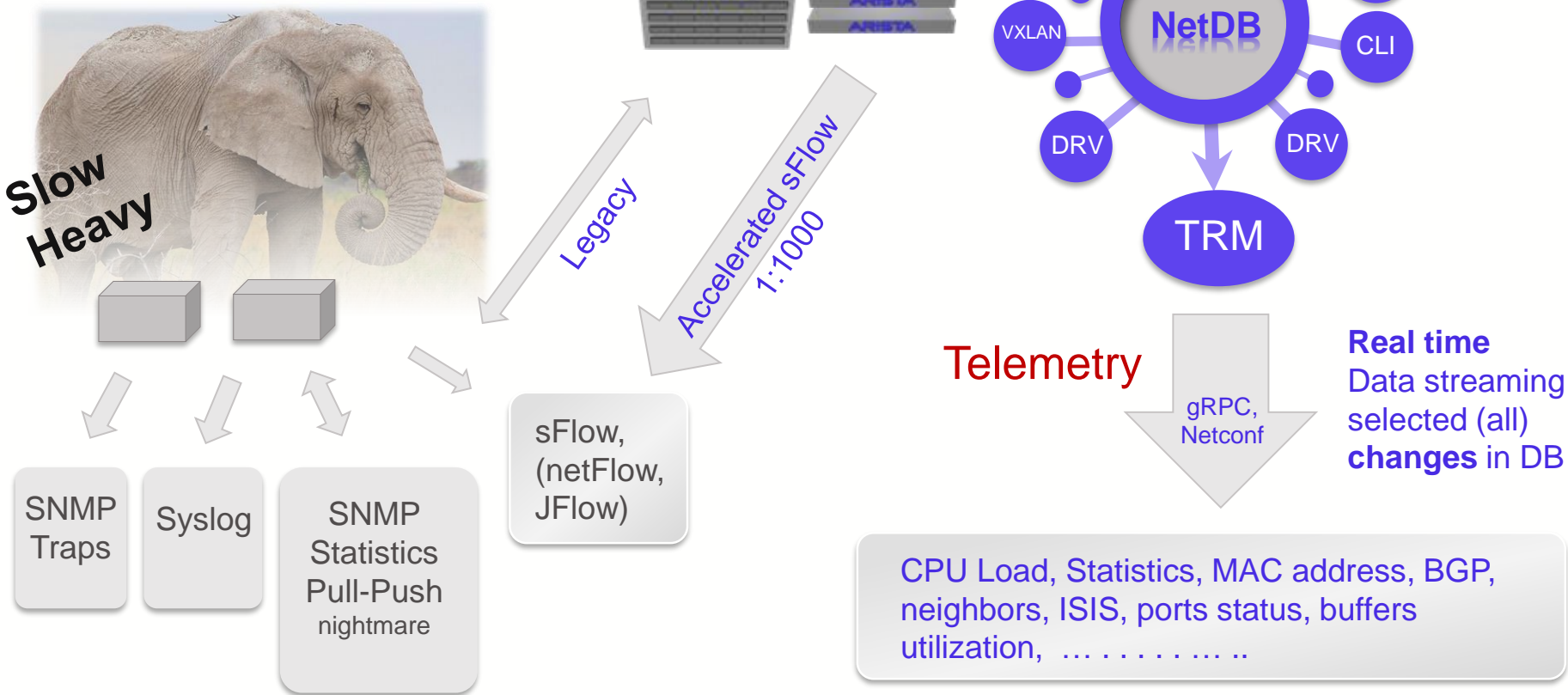
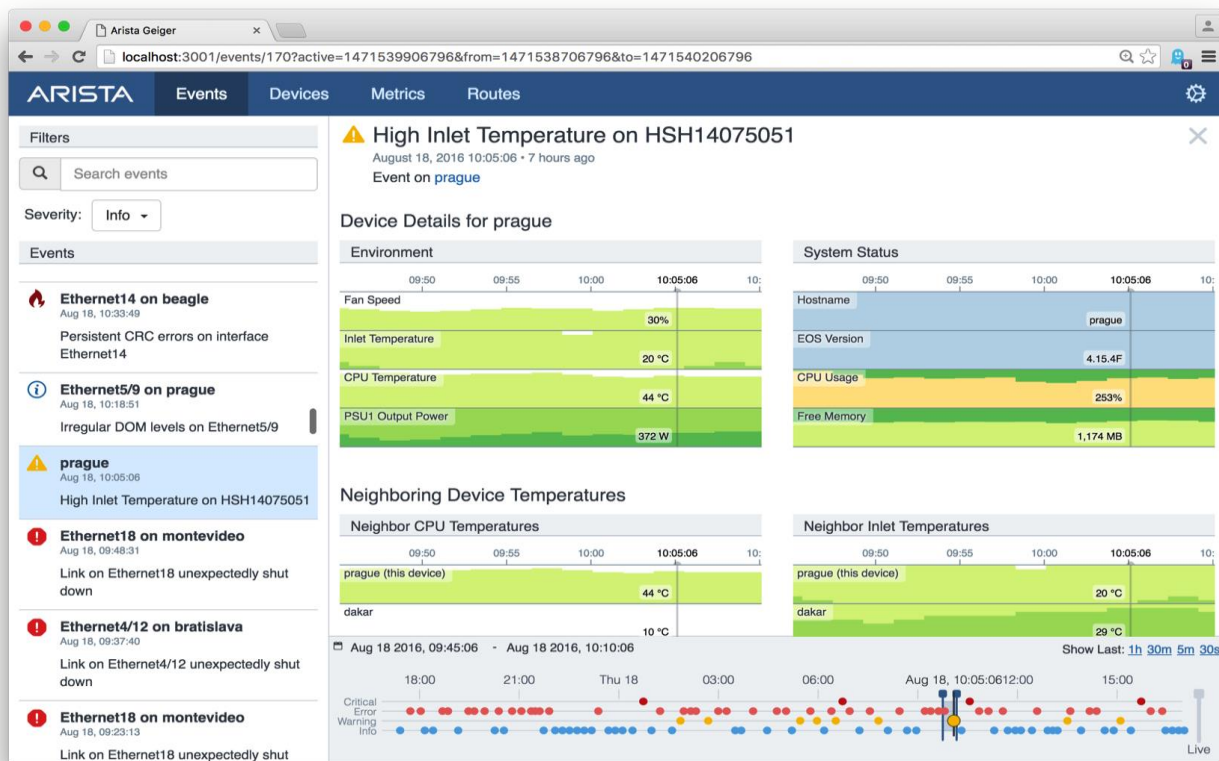ARISTA

Telemetry matters

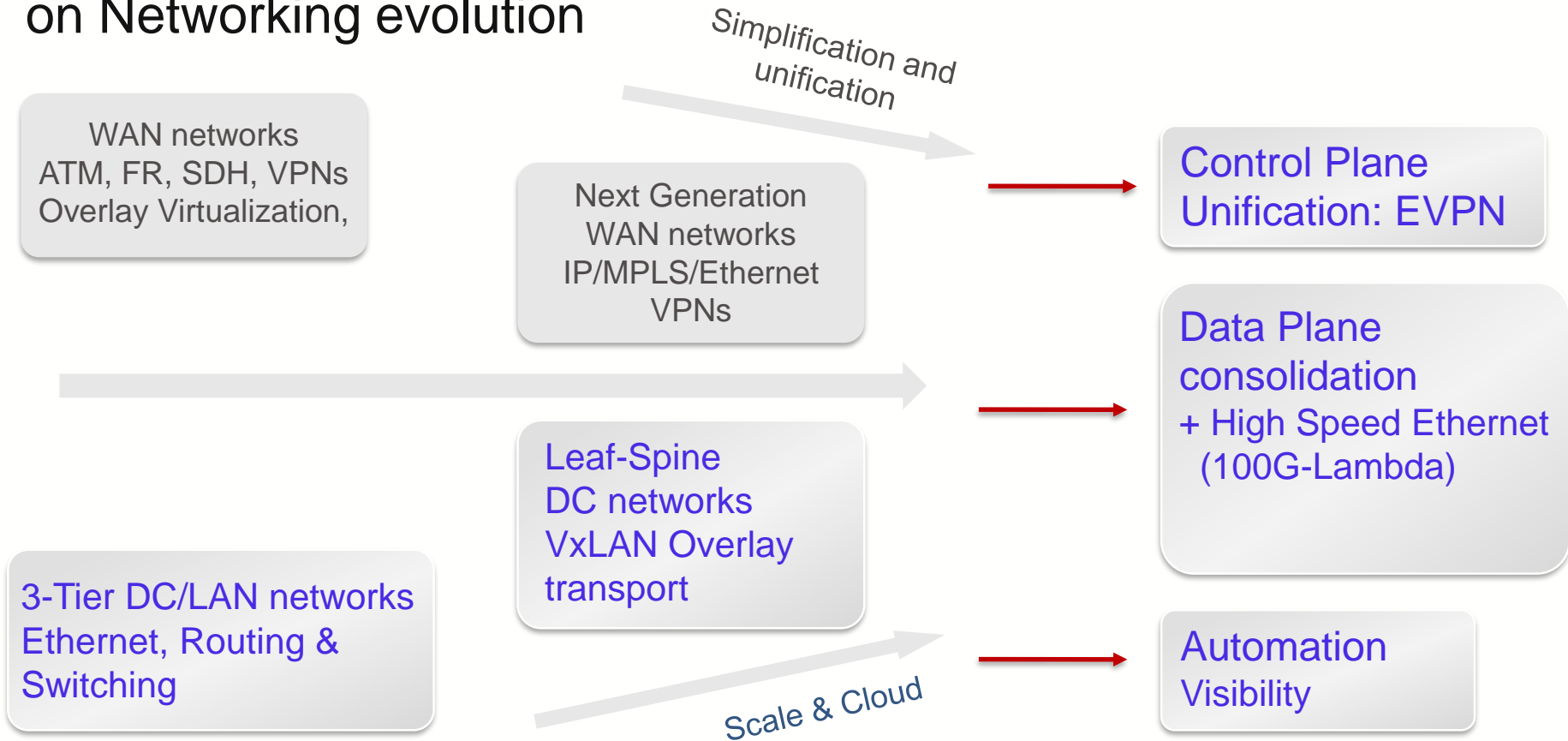Select nodes

Select Metric

How can you answer when exactly specific MAC was learned?
Maybe 2 week ago in the middle of the night?

Select time range

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My personal view
on Networking evolution

Simplification and unification

WAN networks
ATM, FR, SDH, VPNs
Overlay Virtualization,

Next Generation
WAN networks
IP/MPLS/Ethernet
VPNs

Control Plane
Unification: EVPN

Data Plane
consolidation
+ High Speed Ethernet
  (100G-Lambda)

Leaf-Spine
DC networks
VxLAN Overlay
transport

3-Tier DC/LAN networks
Ethernet, Routing &
Switching

Scale & Cloud

Automation
Visibility

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SP architecture change

New Generation Architecture

Extensible Service mix

E-Line	E-LAN	L3VPN

EoMPLS T-LDP	VPLS-LDP VPLS-BGP	IP VPN

LDP +IGP „Shortest Path"	RSVP-TE +IGP Traffic Engineering Fast Protection

MPLS

Legacy POS	Ethernet

Multiple disjoined technologies

E-Line All-Active	E-LAN All-Active	L3VPN	IRB

EVPN (Ethernet VPN)
BGP control plane

Segment Routing
MPLS- forwarding
Traffic Engineering
Fast Protection

Other (NVO) Encapsulations e.g VXLAN

Ethernet (100G-lambda)

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Segment routing in the nutshell

MPLS
Frame
Structure

| N1 |
| N2 |
| NodeZ |
| Service |
| Payload |

| N2 |
| NodeZ |
| Service |
| Payload |

| NodeZ |
| Service |
| Payload |

N1

N2

Ingress

Service

Node-A

Service

Node-Z

MPLS forwarding
- Same paradigm
- Unique label per node
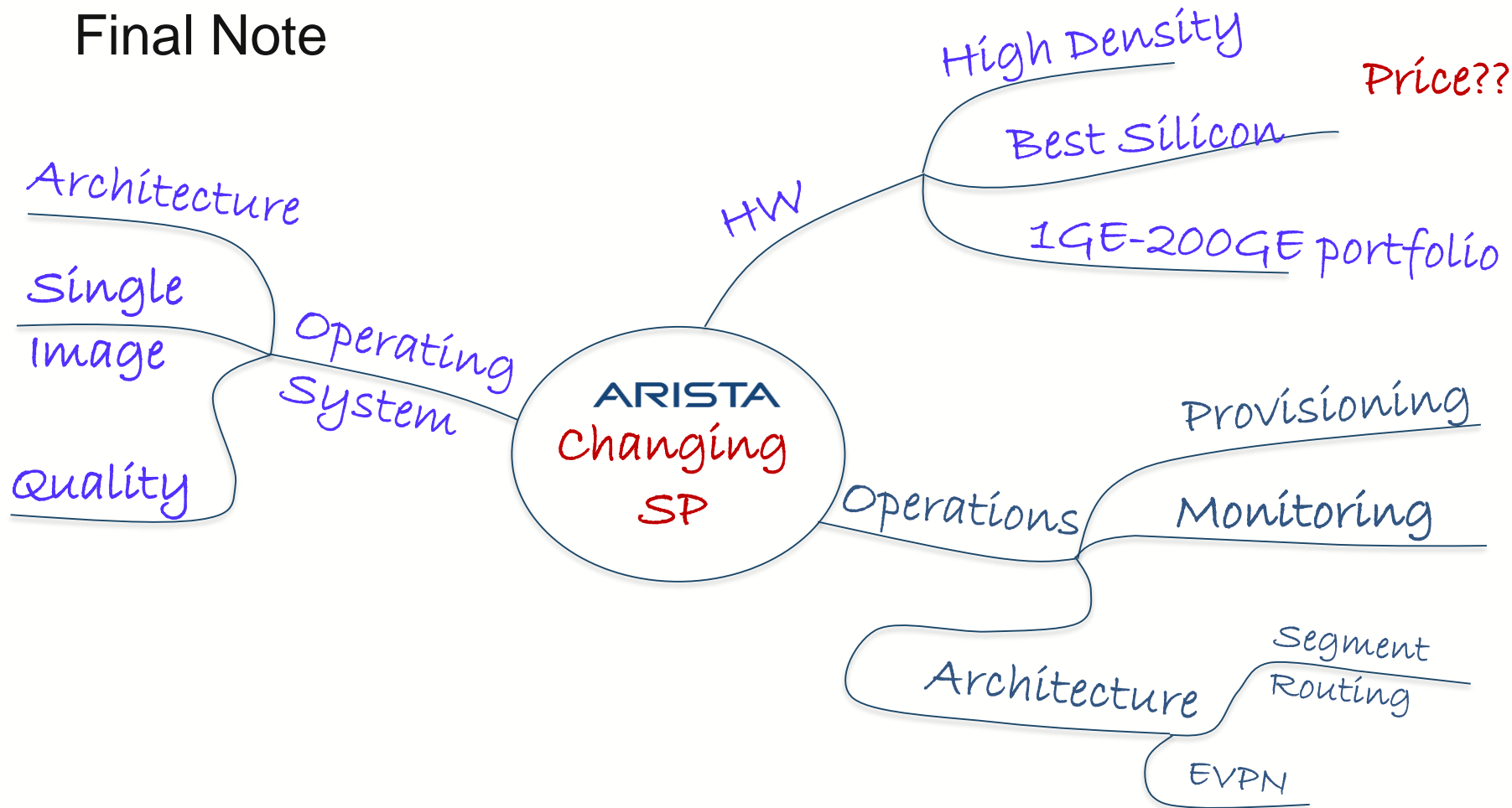- IGP for routing and label distribution

Traffic Engineering
- Programming through label stack
- No state kept by intermediate nodes (unlike RSVP-TE)

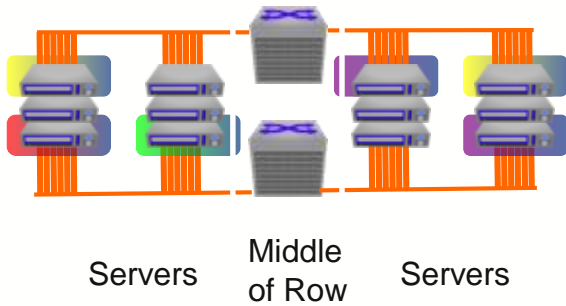**Fast protection**
- Network calculates backup paths (TI-LFA)

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Final Note

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Changing SP

- HW
  - High Density
  - Best Silicon
  - Price??
  - 1GE-200GE portfolio
- Operating System
  - Architecture
  - Single Image
  - Quality
- Operations
  - Provisioning
  - Monitoring
  - Architecture
    - Segment Routing
    - EVPN

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Use cases

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DC Architectures

Spline™

Servers   Middle of Row   Servers

Layer 2 / MLAG
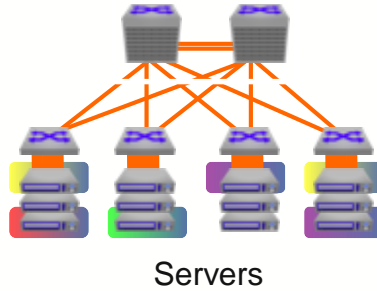
Servers

Layer 3 / ECMP
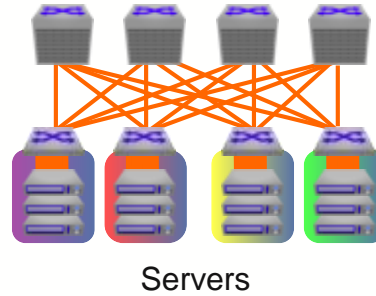
Servers

L2 over Layer 3 VXLAN
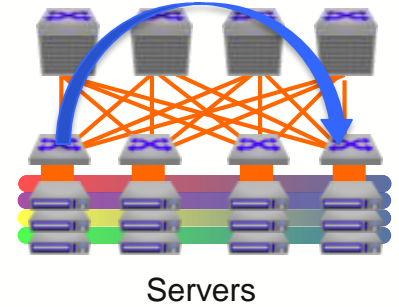
Servers

Servers:	100 to 2,000	100 to 10,000	100 to 100,000+	100 to 100,000+

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Customers

Web
Microsoft, ebay, facebook, Dropbox, YAHOO!

Financial Services
Morgan Stanley, BARCLAYS, citi, Interactive Data, JUMP

Service Provider / Cloud / Hosting
SAP, rackspace, at&t, verizon, COMCAST, TIME WARNER CABLE, kt

High-Tech
EMC², vmware, ARM, VeriSign, Symantec

Government
aps, Communications Security Establishment Canada, NAVSEA, ATC

Media & Entertainment
ESPN, CTV, THOMSON REUTERS, Turner, PIXAR

Education
NORTHWESTERN UNIVERSITY, NORTH KANSAS CITY SCHOOLS, Weill Cornell Medical College, THE UNIVERSITY of TENNESSEE

Oil and Gas
Shell, Petroleum Geo-Services, bp, TGS, ConocoPhillips

Business Services
RMS Risk Management Solutions, channeladvisor, neustar, recall, E-Comm 9-1-1 Helping to Save Lives and Protect Property

Research Labs
Sandia National Laboratories, EMBL-EBI, Los Alamos National Laboratory, OAK RIDGE National Laboratory, BROOKHAVEN NATIONAL LABORATORY

Healthcare
Howard Hughes Medical Institute, NOVARTIS, fumedica, explorys

Retail
Booking.com, Limited brands, BARNES & NOBLE BOOKSELLERS, Tetra Pak, ASHLEY STEWART

Manufacturing
HYUNDAI AutoEver, AMAX, GE, JABIL, DuyvisWiener

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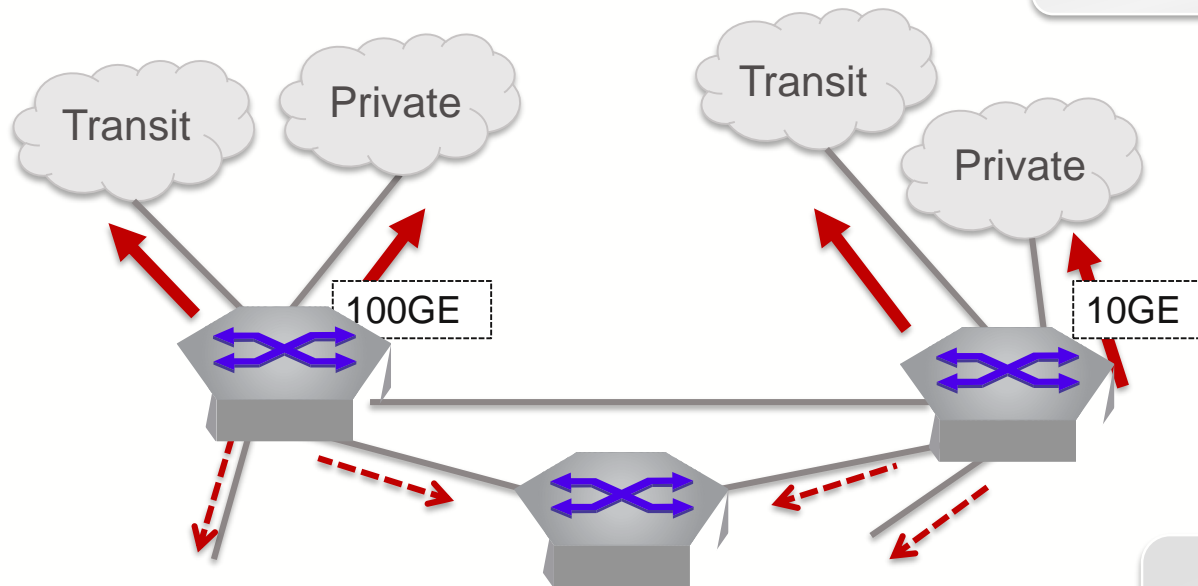# Facebook Luleå Datacenter

Arista 7300

"Look at these racks, the network devices, the cabling. Everything is like reference model!"
Max Zavyalov, Network Engineer in Edge & Network Services team
https://www.facebook.com/zuck/posts/10103136694875121

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Internet peering

7280R – fixed, 1RU, 2RU
7500R – Modular Chassis

BGP FIB for multiple Internet tables

1.3M (Standard)
2.0M (Extended)
5.0M (2018)

100GE

10GE

Transit

Private

Transit

Private

7280R

30x100GE (10G/40GE)

48x1/10/25GE + 6x100GE

ECMP (Equal)
UCMP (Unequal)
Accelerated sFLOW
Deep Buffers

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IXP L2 extensions

L2 emulation
Over VXLAN

VXLAN

Multi-chassis
LAG
Active-Active

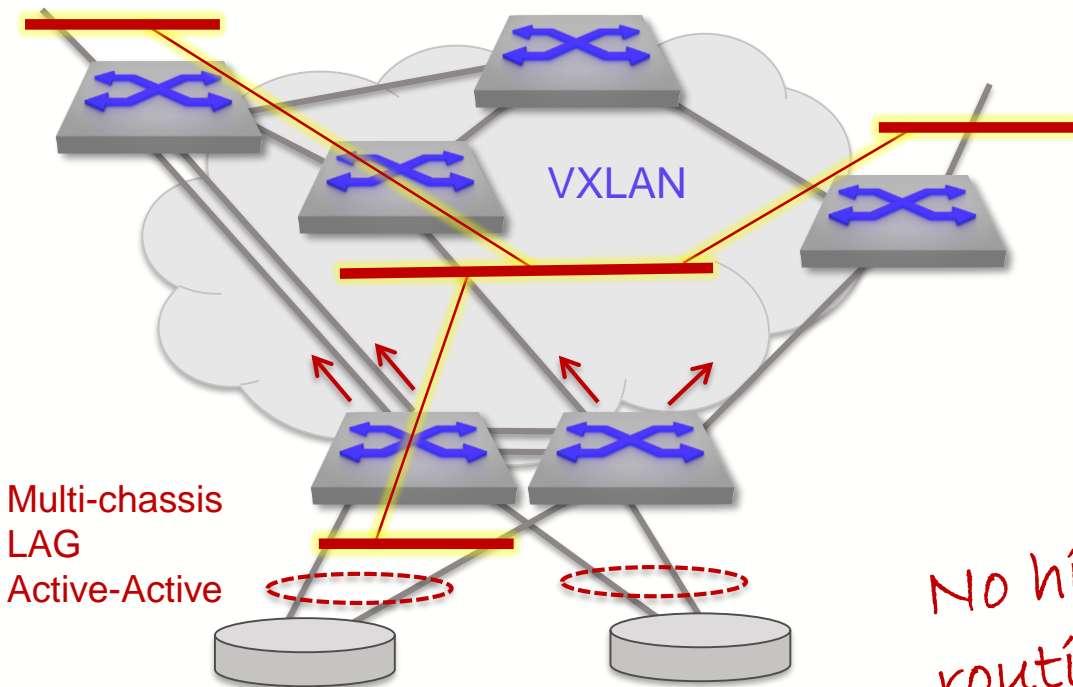**ECMP**
- All paths used
- No Spanning Tree

Fast IP convergence

No VLAN limits
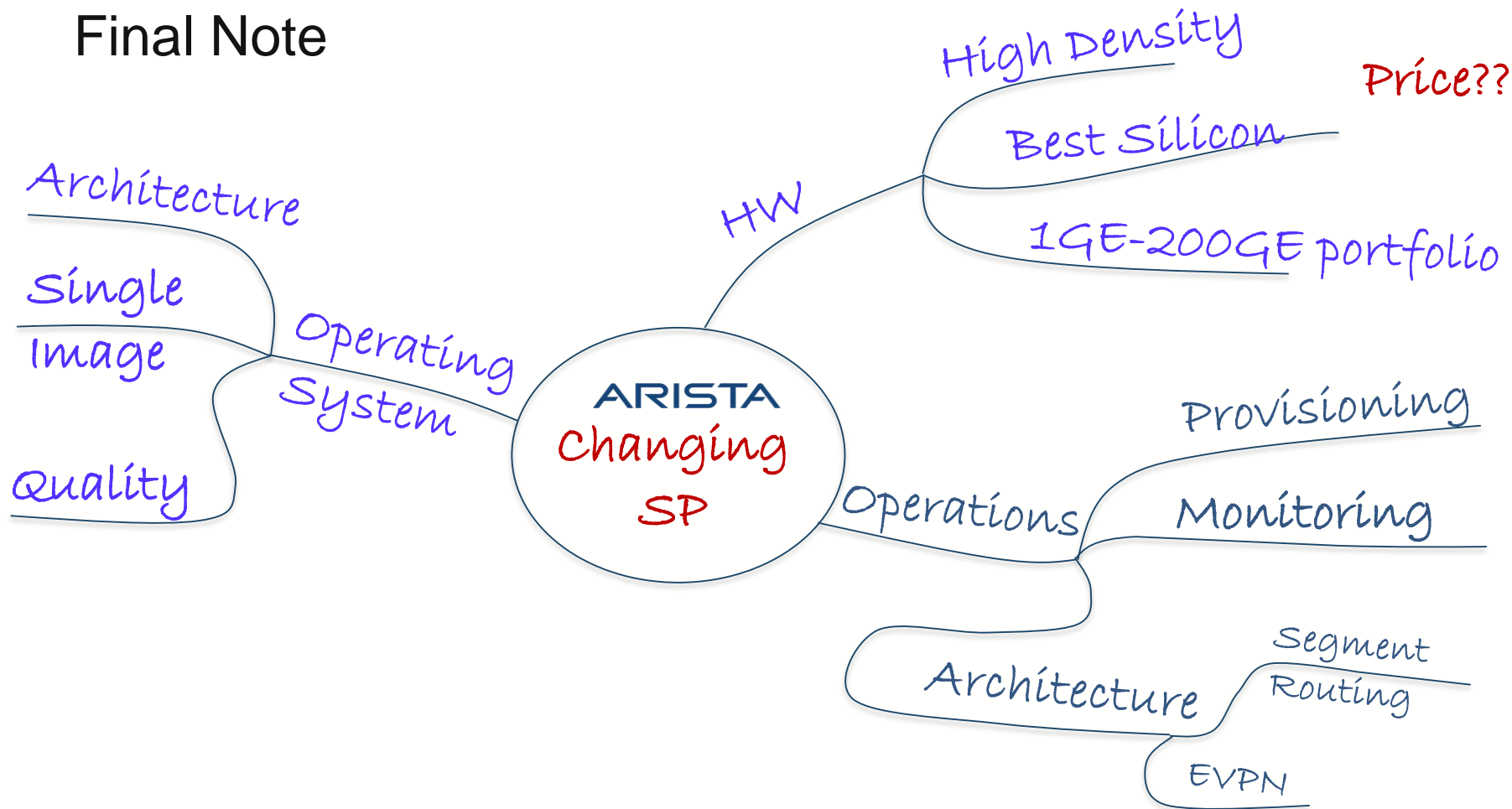- Local VLAN significance

No high end routing needed!!

Lean and fast

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SP network coverage

Some features on roadmap but coming..

EVPN + Segment Routing

Only Open standards

Internet

DC/DCI

IGW

Core

Edge

Access

Aggregation (Distribution)

EVPN + VXLAN

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Final Note

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Thank You

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