Altran – Enabling White box Networking

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# Data center (DC) industry trend Worldwide and India

Worldwide trend

- More capacity, less in numbers, consolidating to larger DCs

- DCs worldwide - 8.7M (2017), 8.4M (2019), 7.2M (2021)

- DC spending – 210 B$ (2019, 0.7% growth) 188 B$ (2020, -10.3% growth), 200 B$ (2021, 6.2%)

The Indian Context

- DC capacity normalized for mobile traffic – substantial headroom for growth

  - India - 5W/TB

  - China 100W/TB (20X)

  - US/EU 250W/TB(50X), headroom for growth

- Expected investments ~ 500 M$ / year (~3700 Cr ₹ / year) over 10 years
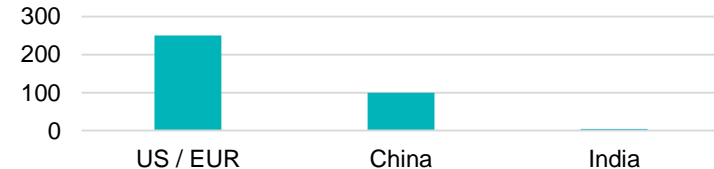
- Key driver - rise in digital adoption
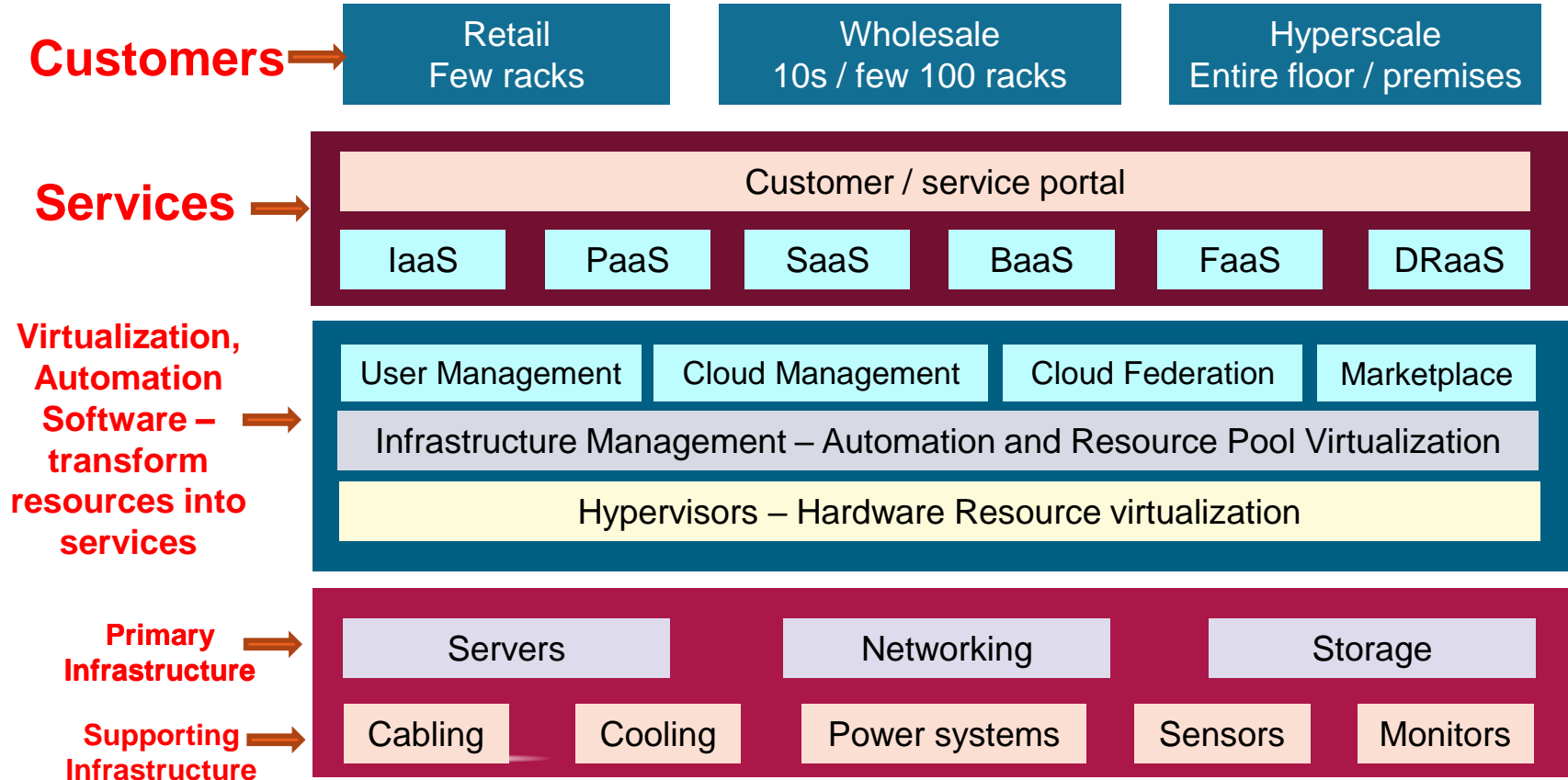
Number of DCs (Million)
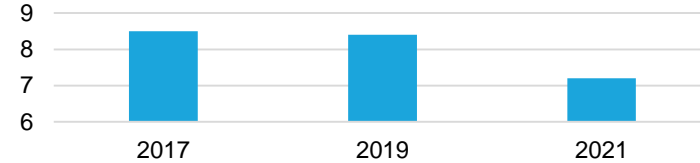
DC expenditure (Billion $)
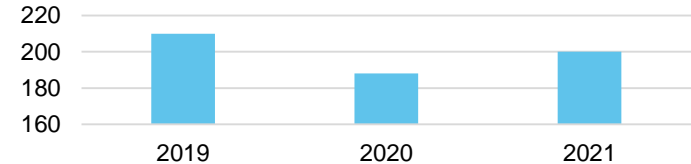
DC capacity (W) per TB mobile traffic

Data center infrastructure – transforming resources into services

Customers

Retail	Wholesale	Hyperscale
Few racks	10s / few 100 racks	Entire floor / premises

Services

Customer / service portal

IaaS	PaaS	SaaS	BaaS	FaaS	DRaaS

Virtualization, Automation Software – transform resources into services

User Management	Cloud Management	Cloud Federation	Marketplace

Infrastructure Management – Automation and Resource Pool Virtualization

Hypervisors – Hardware Resource virtualization

Primary Infrastructure

Servers	Networking	Storage

Supporting Infrastructure

Cabling	Cooling	Power systems	Sensors	Monitors

Data Center Connectivity – Mature Technology

- Most popular model today - leaf spine architecture

- Tenant networks realized using technology like VxLAN

- BGP-VxLAN-EVPN provides DCI (Data Center Interconnect)

- Fabric manager SW manages / automates the connectivity

- Fairly mature now

- Network speeds increase, need upgrade every few years

VMs and Containers running on different compute nodes

Private Cloud

| COMPUTE NODE | COMPUTE NODE | COMPUTE NODE |

| NETWORK AGENT | NETWORK AGENT | NETWORK AGENT |

NETWORK NODE

SDN Controller

APPLICATION SPECIFIC TO PRIVATE CLOUD

SDN CONTROLLER

Spine - 1   Spine - 2

Border Leaf – 1-0   Leaf – 2-0   Leaf – 3-0   Border-Leaf – 4-0

Leaf – 1-1   Leaf – 2-1   Leaf – 3-1   Leaf – 4-1

- Border-leaf - provides connectivity to external world, distributed to 2 different rack for redundancy

- Servers – dual connectivity to leaf switches for redundancy

- Expensive to upgrade every few years, both software and hardware are thrown away and replaced

- Whitebox networking / disaggregated networking is changing this model

White box / disaggregated networking – promise of the future

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The concept

- Buy white box hardware (like a bare PC)
- Buy software separately (like downloading OS)
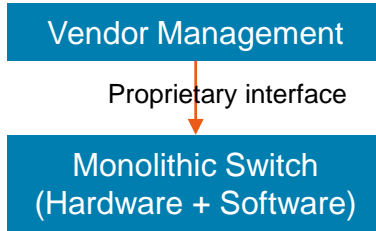- Install to have your switch

Why?

- Largest Cloud providers save Millions of $$ every year with this model
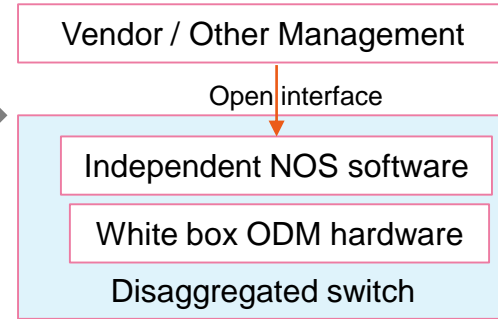- Network innovation is much faster

How?

- ODMs / bare metal switch vendors give you the hardware (white box)
- Software providers (like Altran) give you the software that runs readily on white box

Traditional Networking – Closed (black) box

Vendor Management

Proprietary interface

Monolithic Switch (Hardware + Software)

Disaggregated Networking

Vendor / Other Management

Open interface

Independent NOS software

White box ODM hardware

Disaggregated switch

Cost savings with disaggregated networking

	Capex	5 year Opex
Monolithic	1	1
Disaggregated	~0.5	~0.49

■ Monolithic ■ Disaggregated
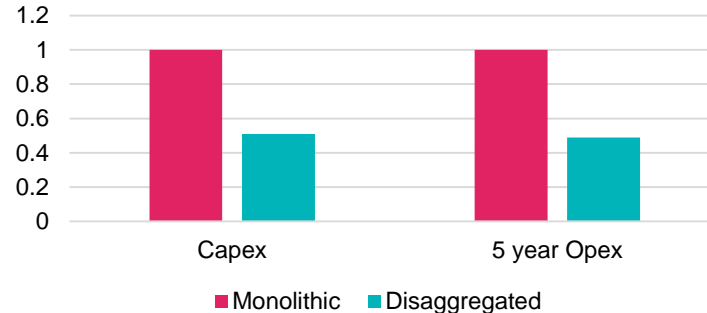
Benefits of white box / disaggregated networking
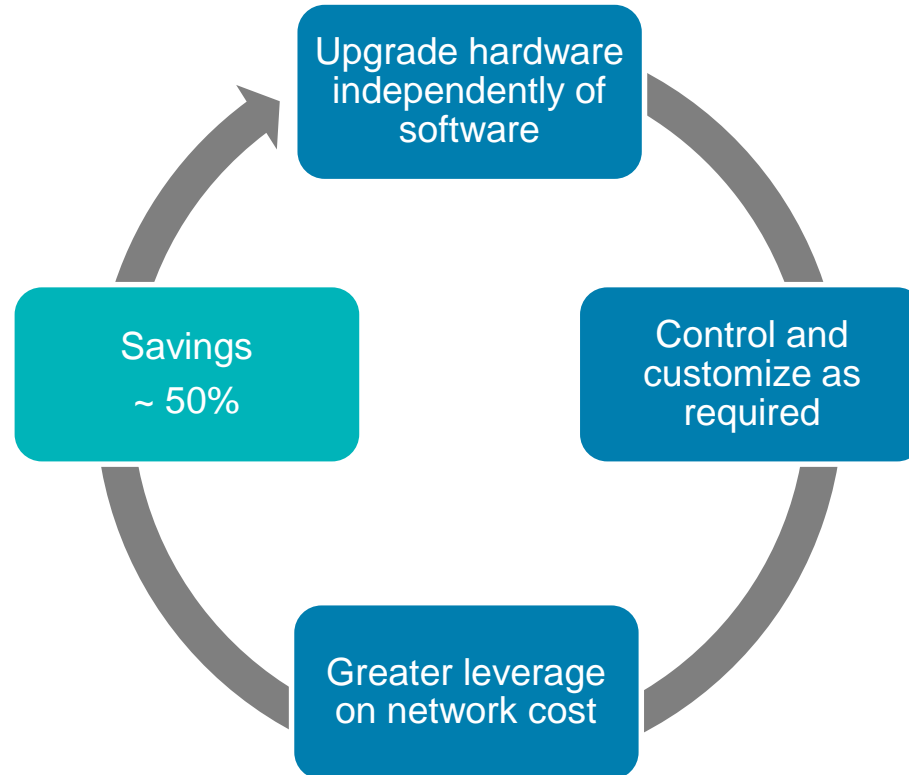
What does Altran do ?

- Altran **NetAnticipate** - analytics for insight and continuous improvements → **ANALYTICS**

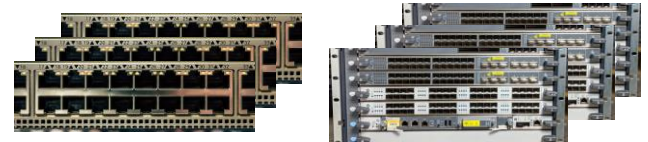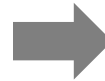- Altran **SAMS** - management of DC network → **FABRIC MANAGEMENT**

- Altran's **NOS** (Network Operating System) provides the software for such white boxes

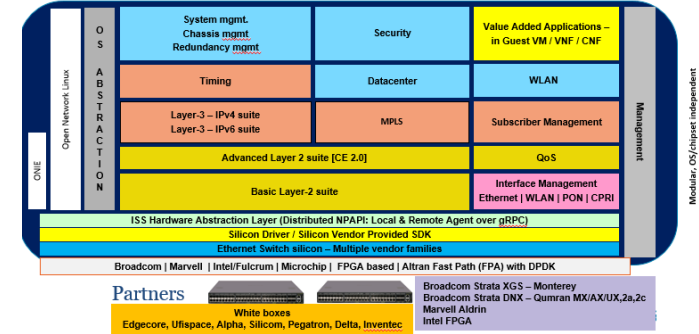# Your Partner for Disaggregation in Networking

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Context & Challenges

- Innumerable combination of options for network architecture
- Need to innovate rapidly while maintaining continuity and interoperability
- Variety of platforms to choose from, many form factors
- Brownfield and greenfield requirements
- Shrinking time window to upgrade network and add new products
- Need to **ensure QoS, SLA, Service Availability**

Altran approach

- **Production grade, supported, mature, reliable and interoperable Software for access & Transport network elements**
- Extensive Ethernet, IPv4, IPv6, BGP, VxLAN, MPLS, MPLSTP, AAA, High Availability capabilities
- **Support white box and custom platforms**
- **Open, uniform, simple and extensive management interfaces**
- **Innovative Business Models:** Engineering services, flexible pricing

System mgmt. Chassis mgmt Redundancy mgmt	Security	Value Added Applications – in Guest VM / VNF / CNF
Timing	Datacenter	WLAN
Layer-3 – IPv4 suite Layer-3 – IPv6 suite	MPLS	Subscriber Management
Advanced Layer 2 suite [CE 2.0]		QoS
Basic Layer-2 suite		Interface Management Ethernet	WLAN	PON	CPRI

ISS Hardware Abstraction Layer (Distributed NPAPI: Local & Remote Agent over gRPC)
Silicon Driver / Silicon Vendor Provided SDK
Ethernet Switch silicon – Multiple vendor families
Broadcom | Marvell | Intel/Fulcrum | Microchip | FPGA based | Altran Fast Path (FPA) with DPDK

Partners
White boxes
Edgecore, Ufispace, Alpha, Silicom, Pegatron, Delta, Inventec

Broadcom Strata XGS – Monterey
Broadcom Strata DNX – Qumran MX/AX/UX,2a,2c
Marvell Aldrin
Intel FPGA

ODM

- OCP compliant White box
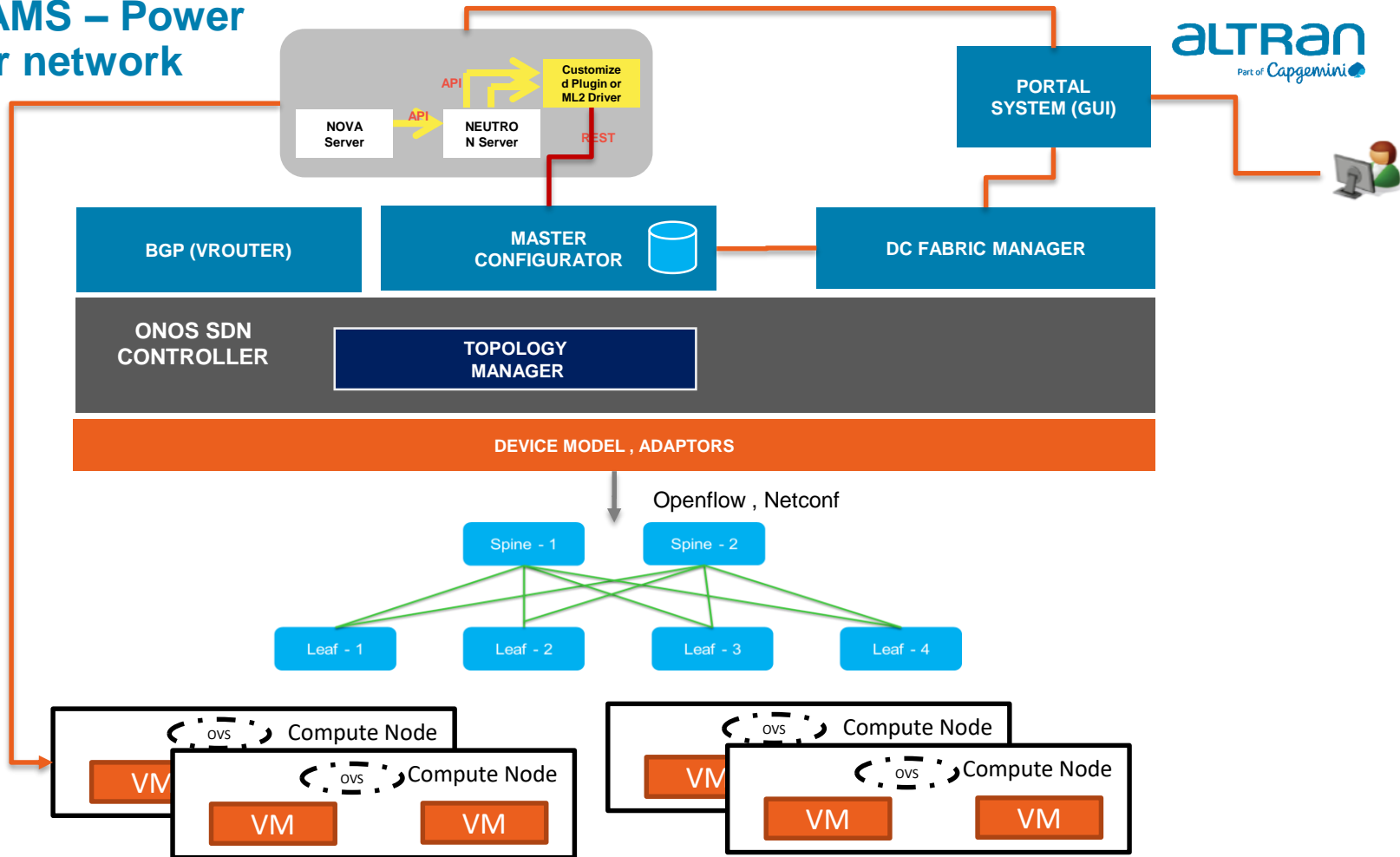- Hardware Support
- Back end Field Support

Altran

- NOS on White box –
- AMC based Software Support with SLAs
- Enhancement / Upgrade / Customizations

Altran SAMS – Power over your network

NOVA Server

API

NEUTRON Server

API

Customized Plugin or ML2 Driver

REST

PORTAL SYSTEM (GUI)

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BGP (VROUTER)

MASTER CONFIGURATOR

DC FABRIC MANAGER

ONOS SDN CONTROLLER

TOPOLOGY MANAGER

DEVICE MODEL , ADAPTORS

Openflow , Netconf

Spine - 1   Spine - 2

Leaf - 1   Leaf - 2   Leaf - 3   Leaf - 4

OVS   Compute Node

OVS   Compute Node

VM

OVS   Compute Node

OVS   Compute Node

VM

VM   VM

VM   VM

Altran NetAnticipate Framework – analytics using AI / ML

For Intent Based Self Driving Network

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Award winning, self-driving-network platform for realizing zero-human touch network operation. It analyses substantial number of hidden and hierarchical influencers to predict potential network anomalies, build autonomous decisions and takes preventive actions. Autonomous feedback loop ensures the network self-learns to improve actions it takes over time.

1

Acquire and Learn
Learn from historical dataset, build models and publish in distributed **AI Market Place**

2

Assess Current State
High velocity **Streaming Telemetry** based on push semantics and network policies.

Close Loop Automation

4

Act and Prevent
Intent Based Networking to tell "what" to be done and the "how" is taken care by the network.

3

Anticipate Anomalies
Using advanced **AI & ML algorithms**, and move away from traditional rule based approach.

Predictive Maintenance	**Network Security**	**NoC Automation**	**Intelligent Service Rollout**	**Intelligent Orchestration**	**Network Slicing**
Prevent Complex Faults & Performance Issues	DDoS Attack, BotNets Prevention	Root Cause Analytics & Guided Diagnostics	Radio & Fiber Optics Network Planning	Scaling & Healing of Network Services	Intent Based Dynamic Network Slicing

Top Use Cases