

Telcos Open Infrastructure towards Digitalization

Webinar

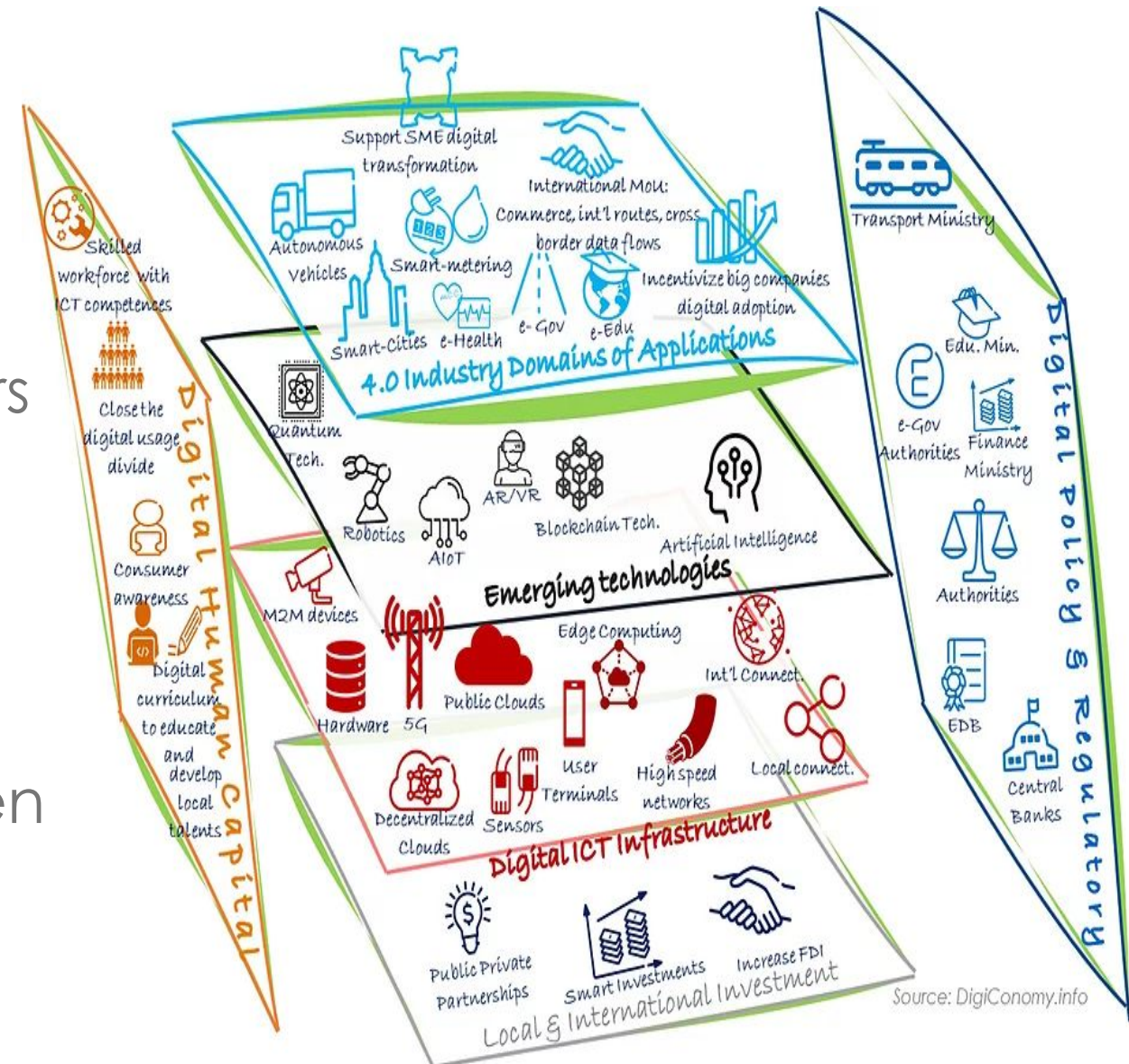
12 April 2021

Digitalization is here to bring a wave of innovation

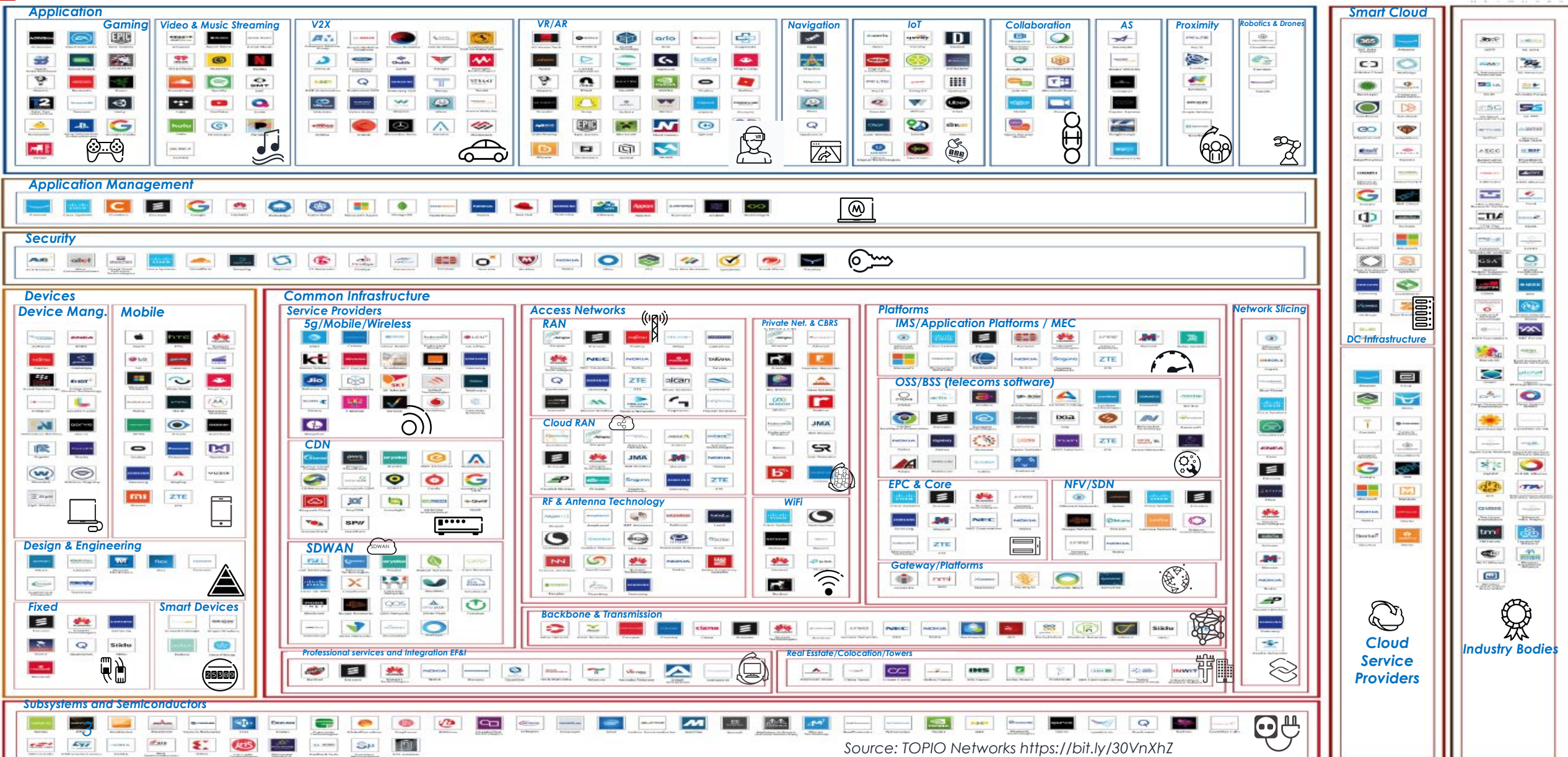
Open Industries

“Open-Sourcification”

- Connectivity is a major building blocks, along others
- Software-defined industries enabling user-centered innovation
- Transformation through open source, achieving faster development cycles, TTM and interoperability.

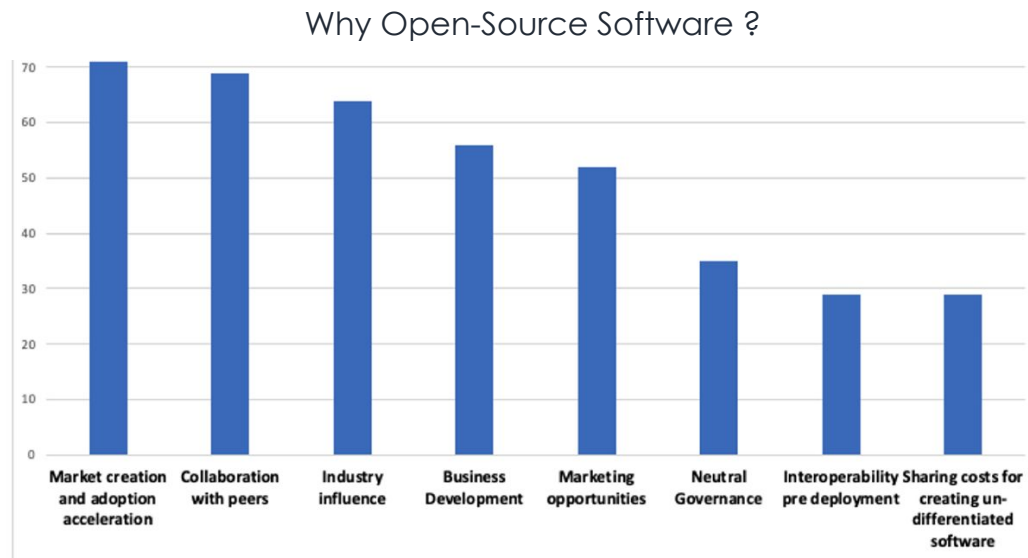


Industry Landscape



Why Open Networking?

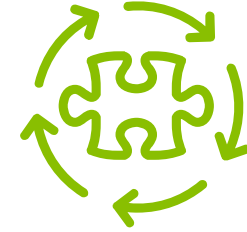
From Cost Savings



Source: LF Edge Community Survey, Sept 2020

Market Creation, Adoption Acceleration & Collaboration are the top reasons for adopting open-source

to Market Adoption



- Network is more important going forward, specifically closer to where the data is generated and consumed;
- Open source collaboration is the way forward, driven by faster innovation security, TTM and emerging use cases;
- Emerging Tech enabling new opportunities with 5G, AIOT and Cloud.

Embracing open architecture is key for TCO and new opportunities

Transforming the Telecom Infrastructure...



- How it is created
- How it is deployed
- How it is taken to market
- Introducing Ecosystem Acceleration Centers and Project groups

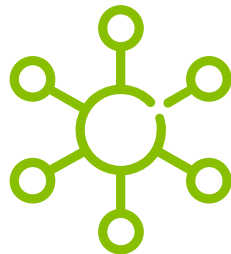
Accelerating Innovation



- Increasing Data Consumption and connected devices
- Within the entire ecosystem of the telecom supply chain
- Operator-led field trials and Tech prototypes across end-to-end network architecture

Disaggregated Networks and Infrastructure

- How vital it is to embrace, compared to the conventional approach for operators and industry players
- To truly capture the fruits of automation and virtualization.



Collaborate with Open Initiatives

- Operators and service integrators to deep dive into the relevant initiatives.
- Explore how to immerse within what you could be deploying in the near future.





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Thank you

In cooperation with the Telecom
Regulatory Authority (TRA) of Bahrain

هيئة تنظيم الاتصالات

TELECOMMUNICATIONS REGULATORY AUTHORITY
Kingdom of Bahrain - مملكة البحرين



Connect. Collaborate.
Accelerate.

Open Compute Project

Telco Open Infrastructure towards Digitalisation

April 12th, 2021 – Kingdom of Bahrain

Steve Helvie – VP of Channel (OCP)
steve@opencompute.org

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Open Software + Open Hardware



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OEM

(Original Equipment Manufacturer)

Buys platform components from the manufacturer

Resells those components under their own brand name

Create products that can server the broadest possible market

Support and managed services

ODM/White Box

(Original Design Manufacturer or White Box)

Manufactures platform components

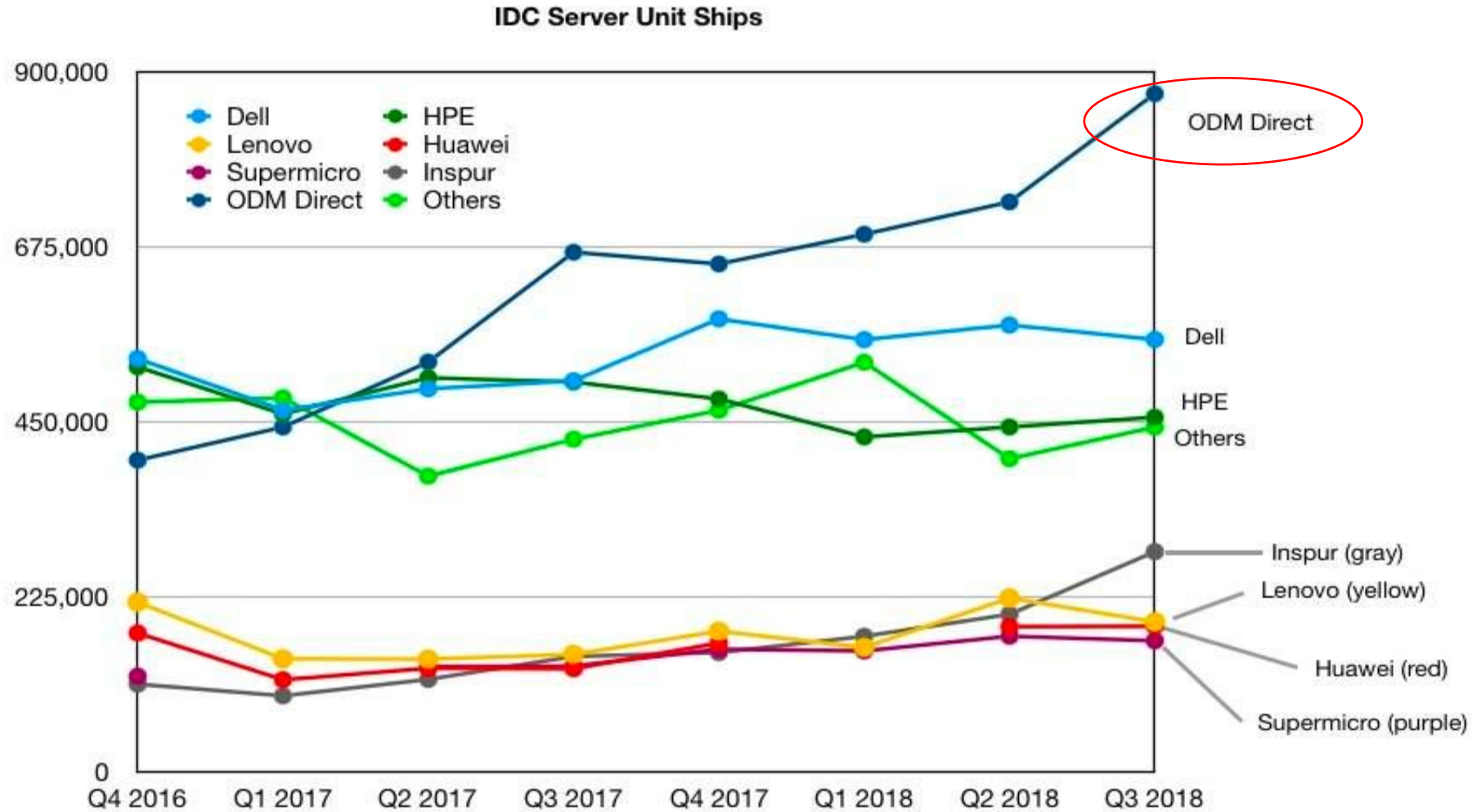
Provide full product development services

Can manufacture specialised solutions

Support centred on product and managed services



Server Shipments Trends



Server Trends - 2020

Top 5 Companies, Worldwide Server Unit Shipments, Market Share, and Growth, Second Quarter of 2020

Company	2Q20 Unit Shipments	2Q20 Market Share	2Q19 Unit Shipments	2Q19 Market Share	2Q20/2Q19 Unit Growth
T1. HPE/New H3C Group ^{a*}	456,642	14.3%	443,632	16.5%	2.9%
T1. Dell Technologies*	432,556	13.6%	479,941	17.8%	-9.9%
3. Inspur/Inspur Power Systems ^b	353,329	11.1%	231,404	8.6%	52.7%
4. Lenovo	193,086	6.1%	181,165	6.7%	6.6%
T5. Supermicro*	152,411	4.8%	139,289	5.2%	9.4%
T5. Huawei*	138,849	4.4%	116,994	4.3%	18.7%
ODM Direct	1,096,765	34.4%	678,940	25.2%	61.5%
Rest of Market	364,257	11.4%	420,092	15.6%	-13.3%
Total	3,187,894	100.0%	2,691,457	100.0%	18.4%

Source: IDC Worldwide Quarterly Server Tracker, September 8, 2020



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ODM/White Box + Open Source



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ONP Market

Revenue \$11B in 2023

2020 YoY Growth 46%
5 Year CAGR of 36%

Open Networking \$1.35B in 2023
(Non Hyperscale) – CAGR 33%

Telco, CSP, Gaming, HPC,
Fintech, Retail, Oil & Gas, Public
Sector



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200+ companies
8K engineers
190+ contributions

Our Projects



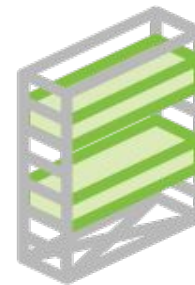
Networking



Server



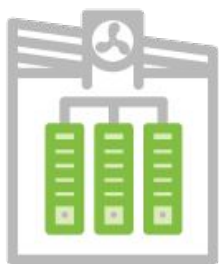
Storage



Rack & Power



Advanced
Cooling



Data
Center

↓
Modular DC



Telco

↓
openEDGE



HW Mgmt



Open
System
Firmware



HPC



Security

OCP Tenets



Efficiency



Growth

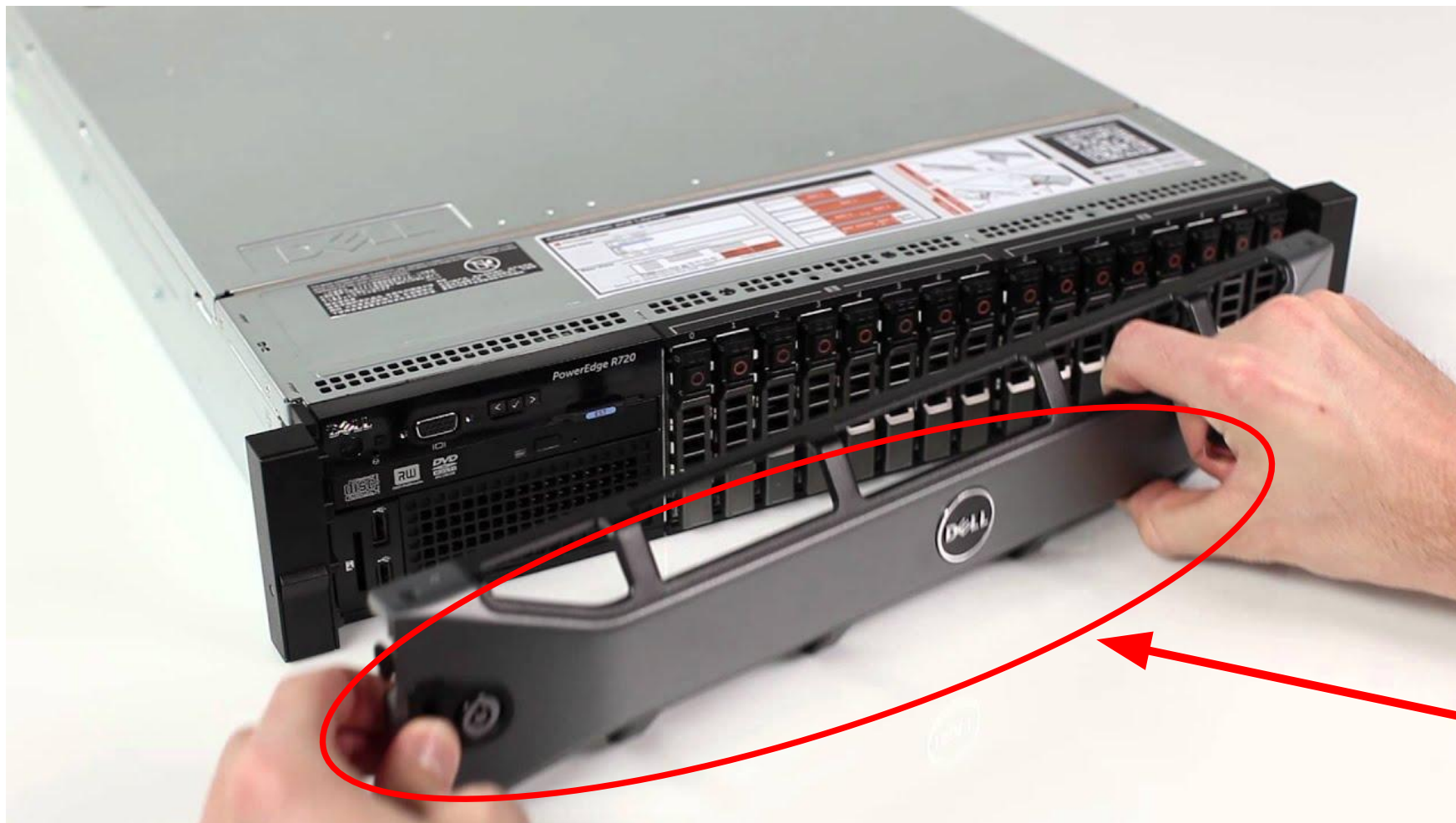


Scale



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Server Bezel

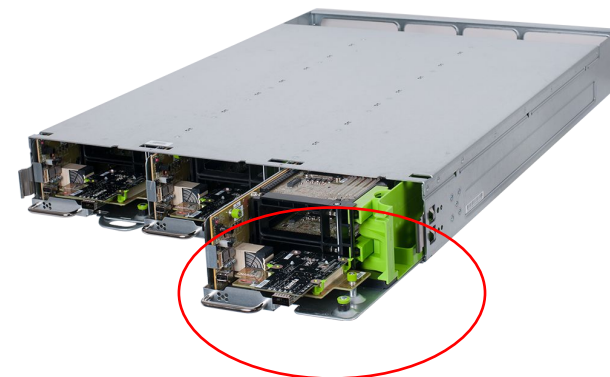
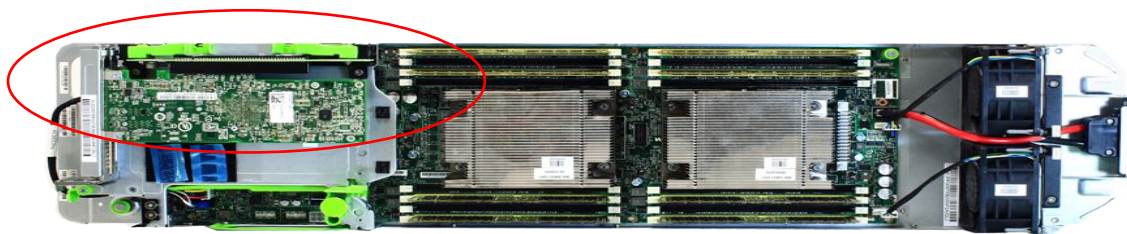
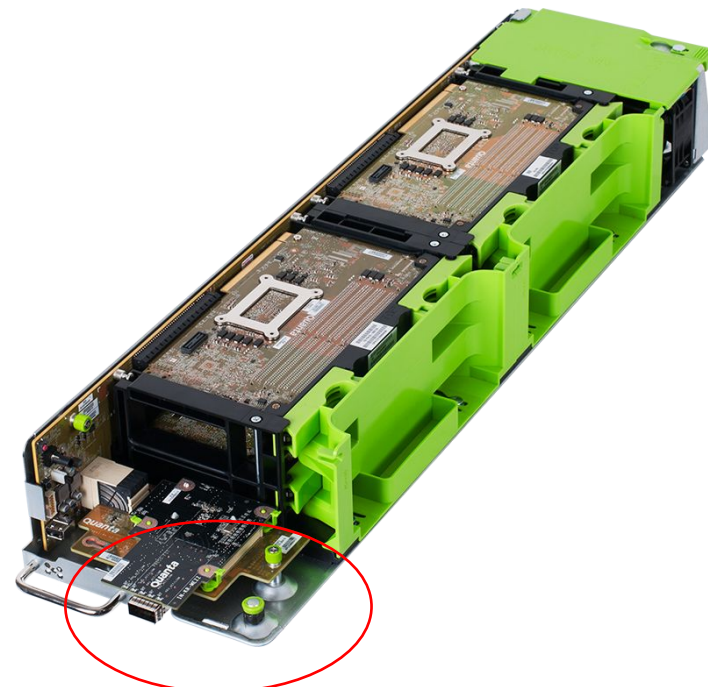
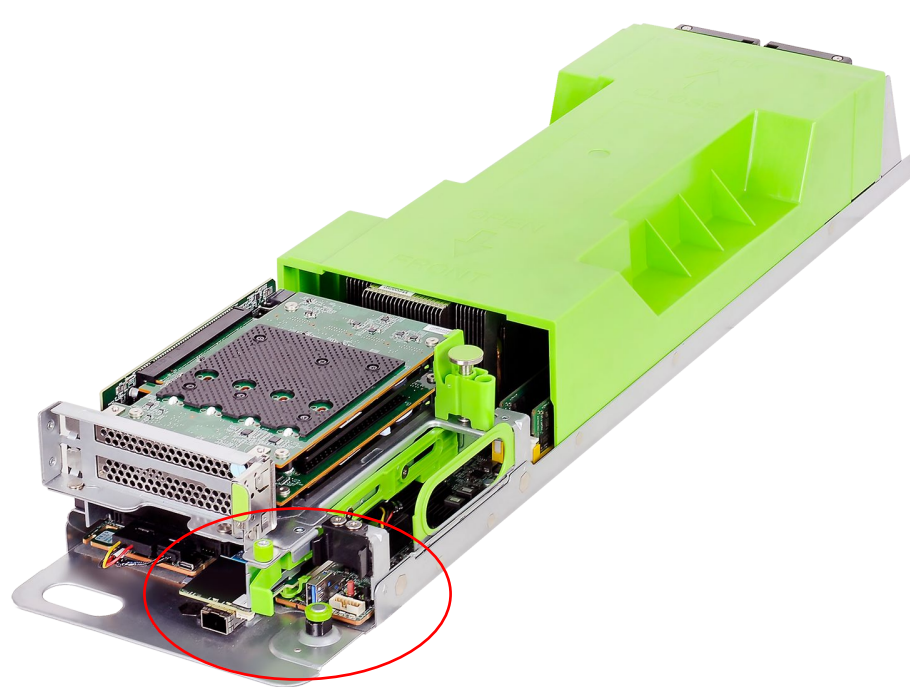


Connect. Collaborate. Accelerate.



Server bezels...gratuitous differentiation

Tool-less OCP open source servers



Connect. Collaborate. Accelerate.

Open Rack Unit Innovations - Server Fans “Cube Law”



EIA
“U”

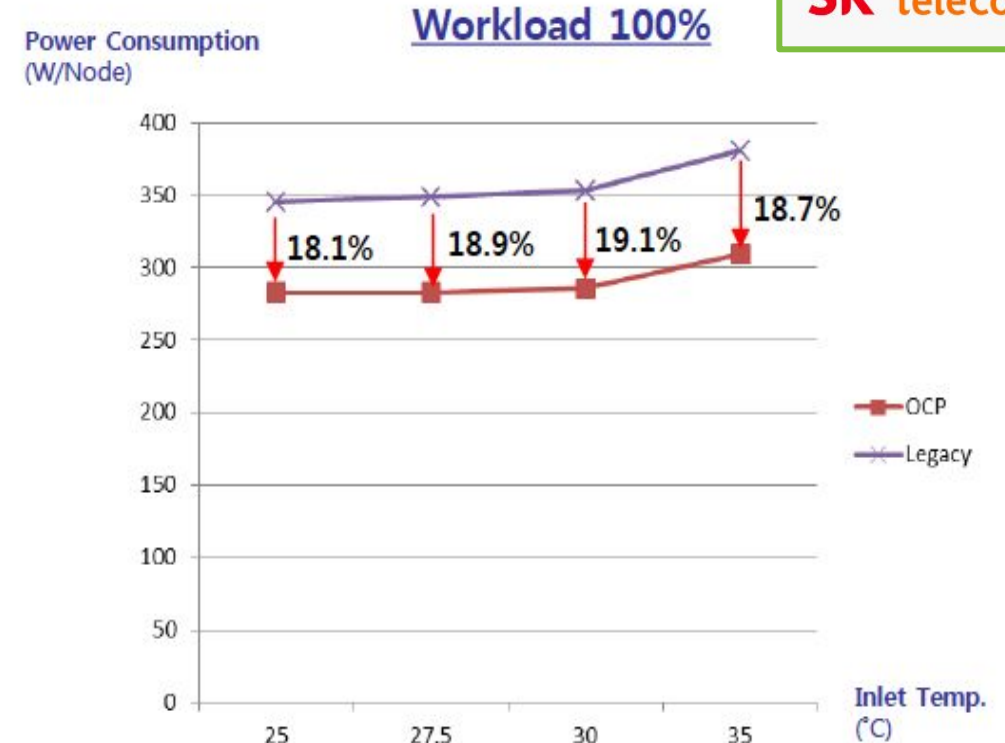
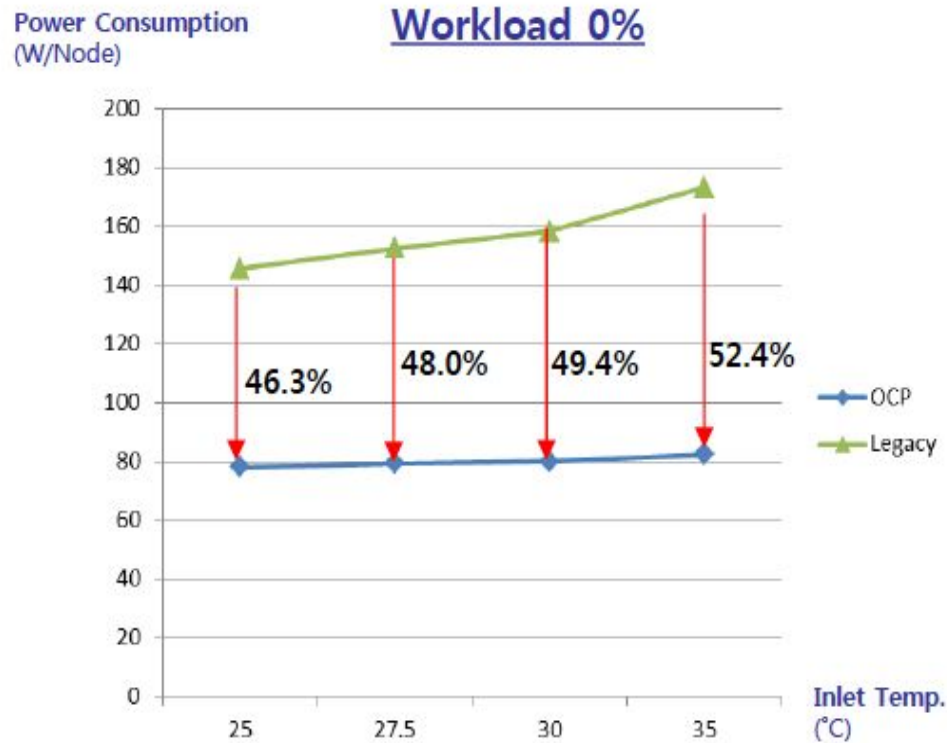
40 mm
Fans



80 mm
Fans

OCP
“OU”

Server Efficiency of Open Source Hardware



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Why?

End User – Adopter

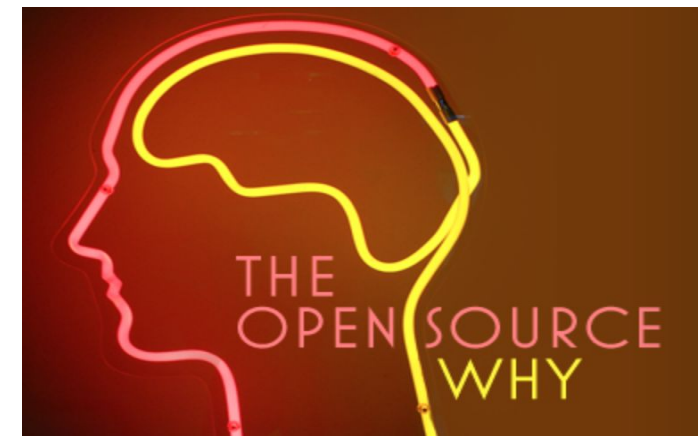
Multi-sourcing based on one specification

Pace of innovation and ability to influence technology roadmap

Vendor - Supplier

Access and speed to market

Broader perspective on customer requirements and market direction



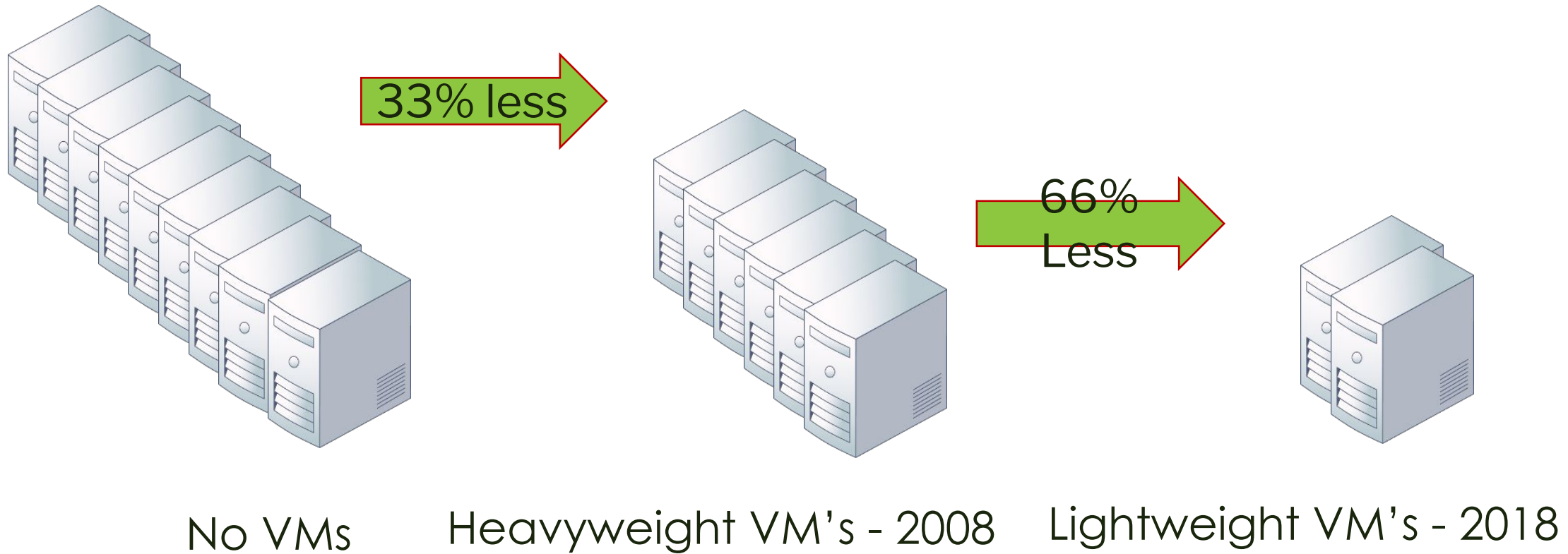


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Open Software + Open Hardware

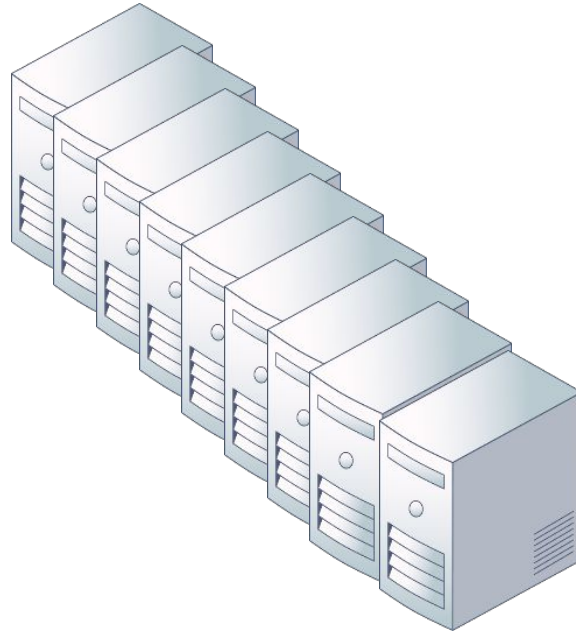
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Software eats Hardware Virtual Machines

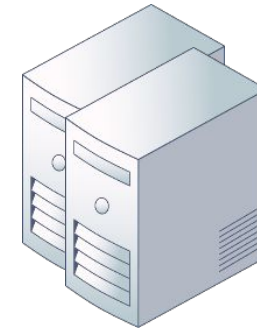


Software eats web servers

Hip Hop Virtual Machine & Hack



80% less



No Hip Hop VM's

With Hip Hop
VM's

[https://en.wikipedia.org/wiki/HH
VM](https://en.wikipedia.org/wiki/HH_VM)





85% of their apps on just 20% of
their physical servers

≈ 2/3 reduction in server hardware



<https://www.youtube.com/watch?v=SPRUJ5Z-Aew&feature=youtu.be>

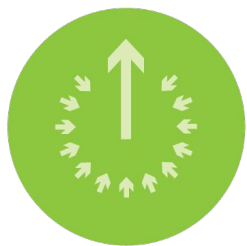


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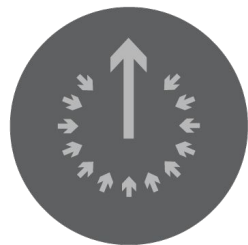
About ▾ Marketplace ▾

Integrated Solutions
Products & Data Centers
Circular Economy

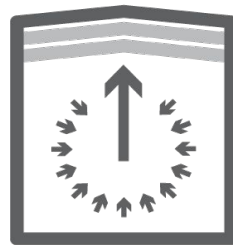
🏠 > Marketplace > Integrated Solution



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INSPIRED™



OCP
READY™

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Servers
Storage
Networking
Edge Devices
Data Centers

Full Integrated
Solutions with
Enterprise Software

<https://www.opencompute.org/solutions>



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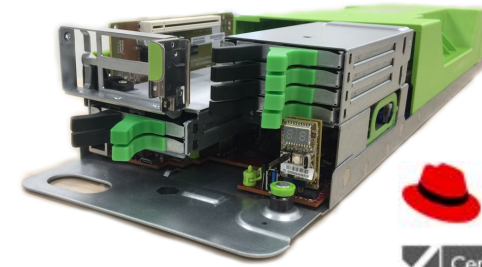
APS Networks

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Open Edge Server



Compute Servers



SARDINA



Network Devices



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LIN^{STOR}

Storage

<https://www.opencompute.org/products>

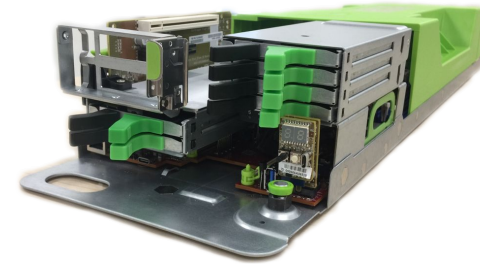


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Open Edge Server



Access Edge – Central Office



Network Devices

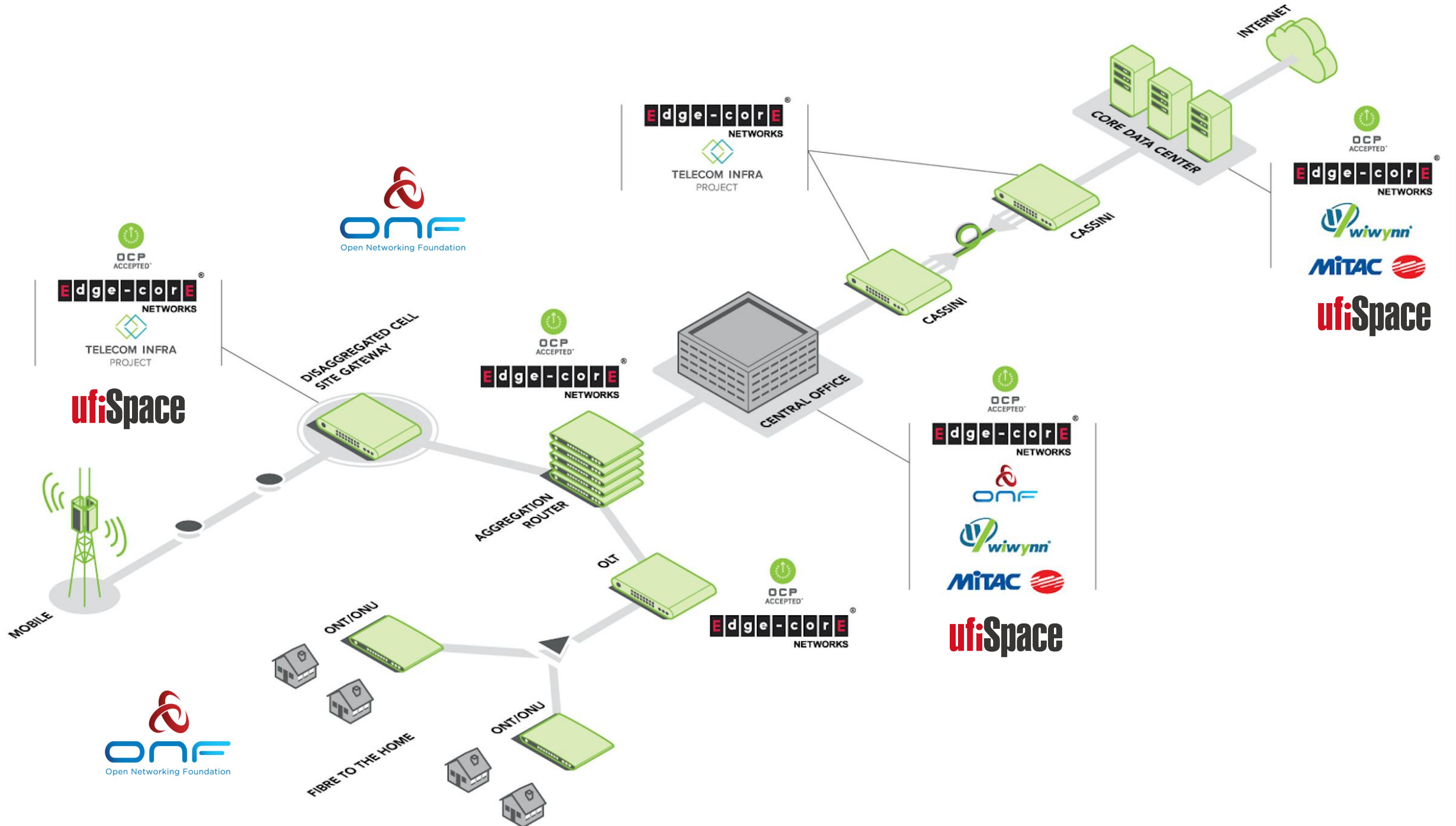


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<https://www.opencompute.org/products>



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News

ONF, OCP Join Forces, Add Certification to CI/CD



The [Open Networking Foundation \(ONF\)](#), working with the [Open Compute Project \(OCP\)](#), today launched a program that will continually test and certify compliance with ONF [open source](#) software [projects](#) and OCP-recognized open hardware.



<https://opennetworking.org/marketplace/>

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ONF PROJECT

- ☒ Any
- ☐ Stratum (2)
- ☐ VOLTHA (5)

PRODUCT CATEGORY

- ☐ OLT (2)
- ☐ ONU (0)
- ☐ RAN Software (0)
- ☐ Small Cell (0)
- ☐ Switch (4)

VENDOR

- ☐ Accelleran (2)
- ☒ Edgecore Networks (6)
- ☐ Inventec (1)
- ☐ Sercomm (2)

OCP RECOGNIZED

- ☐ OCP Accepted™ (4)

1 – 6 of 6 results



[More Info](#)

EDGECORE – 6712-32X

Category: Switch

Overview: The Edgecore AS6712-32X is a Top-Rack or spine switch for high-performance data centers. In a compact 1RU form factor, the switch provides line-rate L2 and...



[More Info](#)

EDGECORE – AS5712-54X

Category: Switch

Overview: The Edgecore AS5710-54X/AS5712-54X





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How Open Hardware is affecting 5G and Edge?

5G breaks from proprietary systems, embraces open source RANs

diginomica

Your story library 

Home

Core tech

Future tech

Policy & practice

Vertical markets

dbooks

Partners

5G represents the rise of open infrastructure



By **Kurt Marko** February 13, 2019

9 min reading

SUMMARY: 5G is coming and the early to market players are all using open source hardware and software for the foundational infrastructure.

Open Source and the Race to 5G

Mobile

Open source

Connect. Collaborate.
Accelerate.



Rakuten

5G Transformation with Open Source

ONF SPOTLIGHT

September 8th, 2020 Keynote



Oguz Sunay
ONF



Igal Elbaz
AT&T



Tareq Amin
Rakuten

gsi lab AT&T OPEN Compute Project® VECTOR DATA 5G

0:03 / 27:08

<https://www.youtube.com/watch?v=CY3gr2pLN2g>

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HOME TECHNOLOGY ▾ BUSINESS ▾ GLOBAL ▾

Rakuten and Telefonica join forces in support of Open RAN

By **Harry Baldock**, Total Telecom
Wednesday 16 September 20

The two operators have signed a deal to develop open-platform 5G network tech, as well as collaborating on 5G core and operational systems





Rakuten using open architecture for 5G

Network deployment CAPEX saving; traditional vs. Rakuten Communications Platform

	Traditional	RCP	Cost saving
Total CAPEX	100	60	-40%
Software	30	30	0%
Hardware	45	17.5	-60%
Deployment	25	12.5	-50%

<https://telecoms.com/506005/rakuten-still-sailing-smoothly-on-its-disruptive-mission/>

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Telefonica's use of OCP for Central Office (12 min mark in the video)
<https://www.youtube.com/watch?v=zyGP62EQXE4&t=720s>



To connect and control the network in its 60,000 wireless towers, AT&T is ditching the past practice of buying proprietary hardware and **replacing routers from the likes of Cisco with white box products built to its specification.**

AT&T's use of OCP networking
https://about.att.com/story/2019/open_compute_project.html



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How to get involved?

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Please visit the OCP Marketplace
(<https://www.opencompute.org/solutions>)

Contact me for any questions on specific solutions or Solution Providers
(steve@opencompute.org)

Become an OCP member

Join a Project, Collaborate and Contribute

Connect. Collaborate. Accelerate.

**(OPEN SOURCE) WILL
JUST BE PART OF HOW
YOU DO BUSINESS.**

Tim O'Reilly

Thank You



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Telco Open Infrastructure towards Digitalization

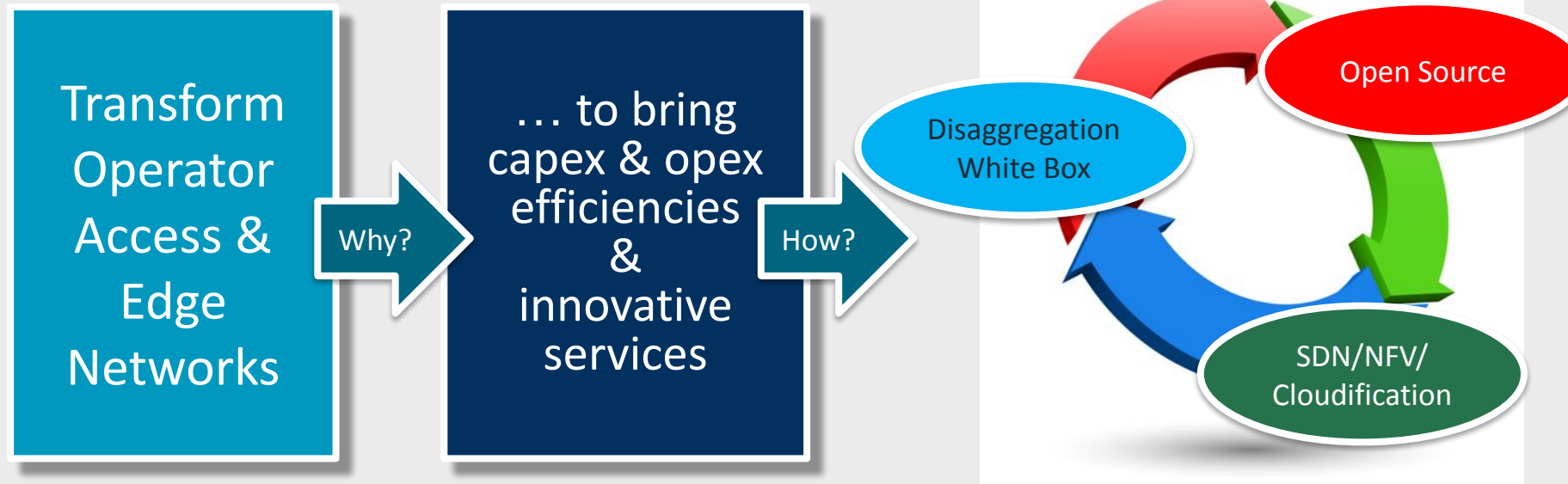
Monday, Apr 12th, 2021- Kingdom of Bahrain

Ahmed Abdelaziz
ONF Ambassador

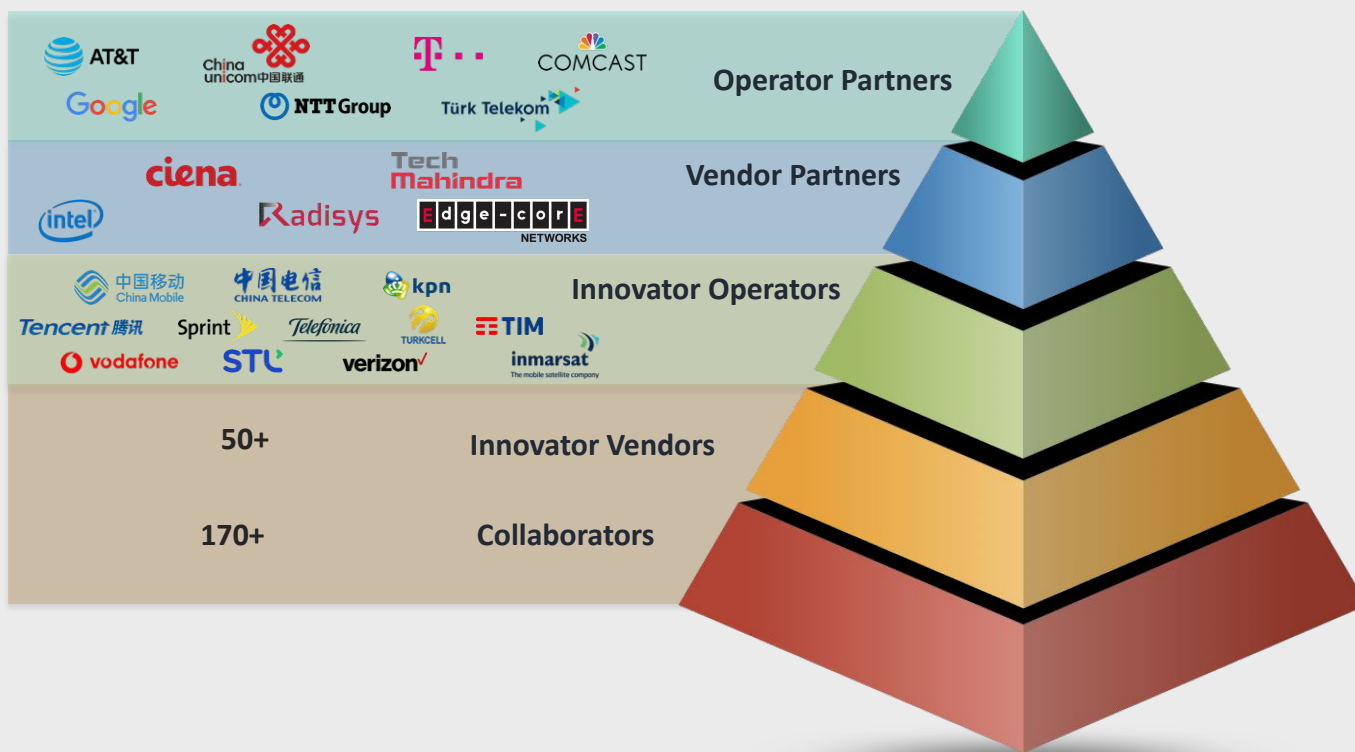
ONF – Open network Foundation



by leveraging



ONF – Membership Program



ONF BOARD



Andre Feutsch – CTO
& ONF Chair



Jochen Appel - VP



Amin Vahdat - Fellow



Dai Kashiwa - VP



Rob Howald - VP



Tang Xiongyan - CS



George Tchapanian - CEO



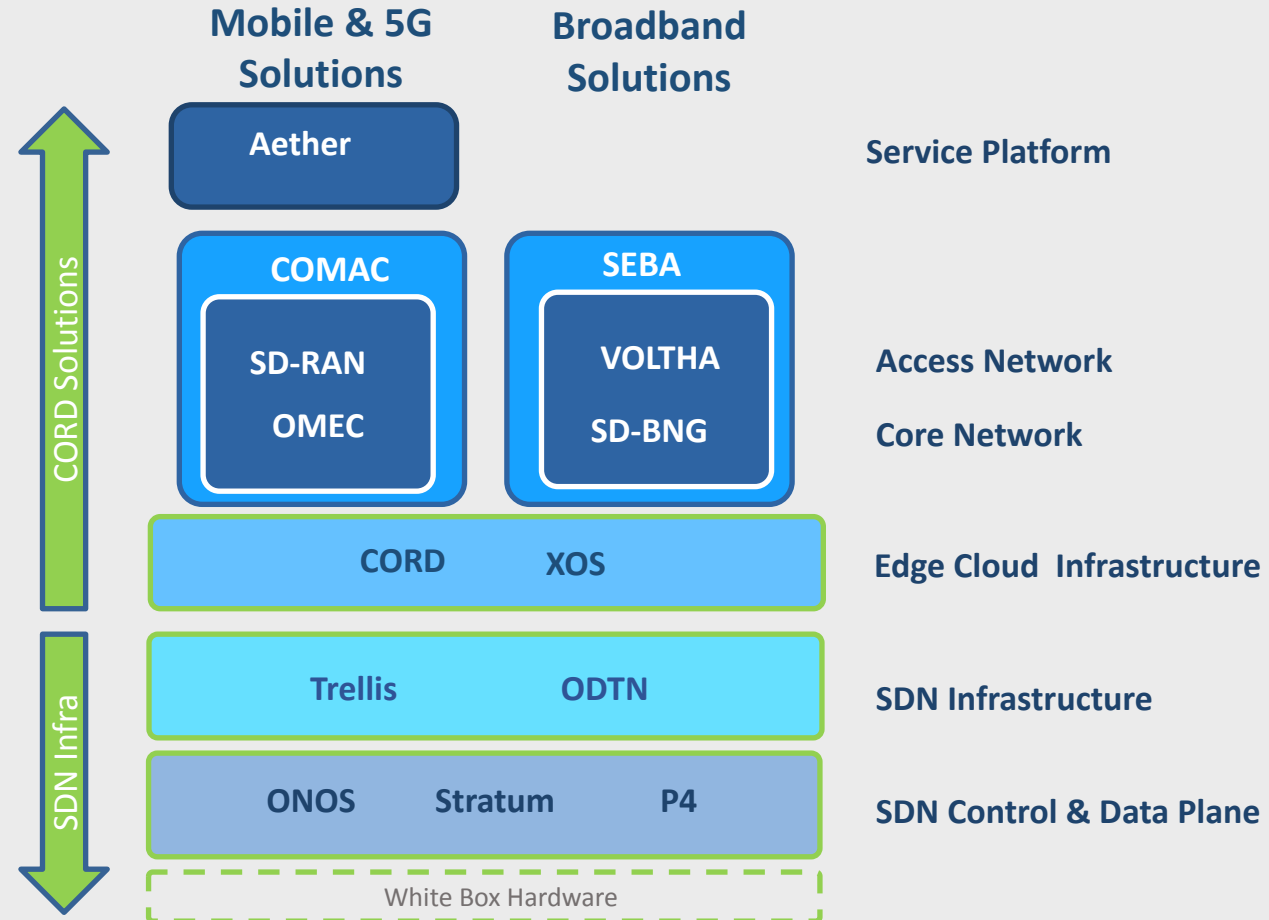
Yusuf Kırac - CTO



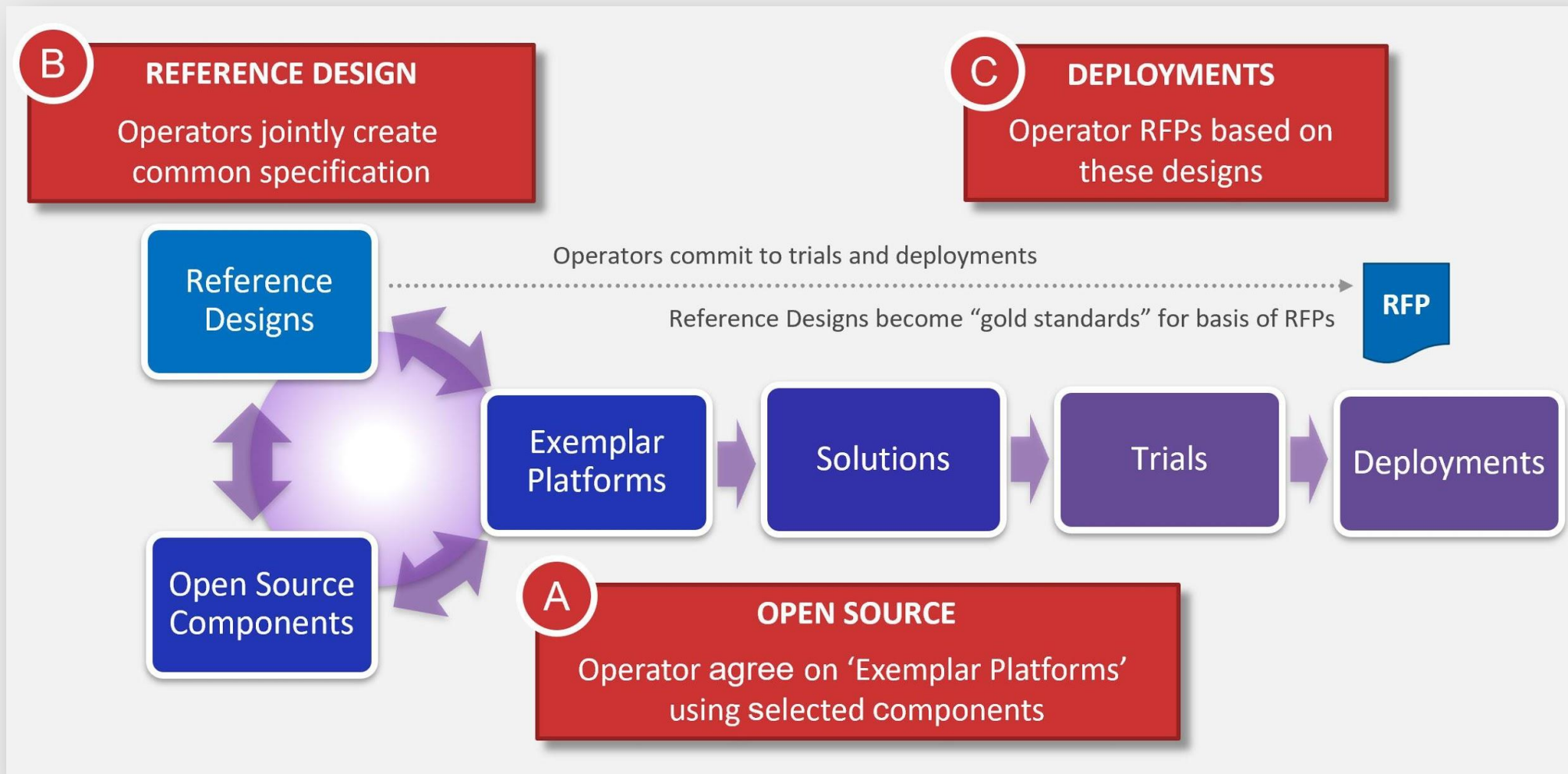
Nick McKeown - Prof

Guru Parulkar, Exec Dir

ONF projects



Reference Designs (How ONF work)



ONF impact the industry economically

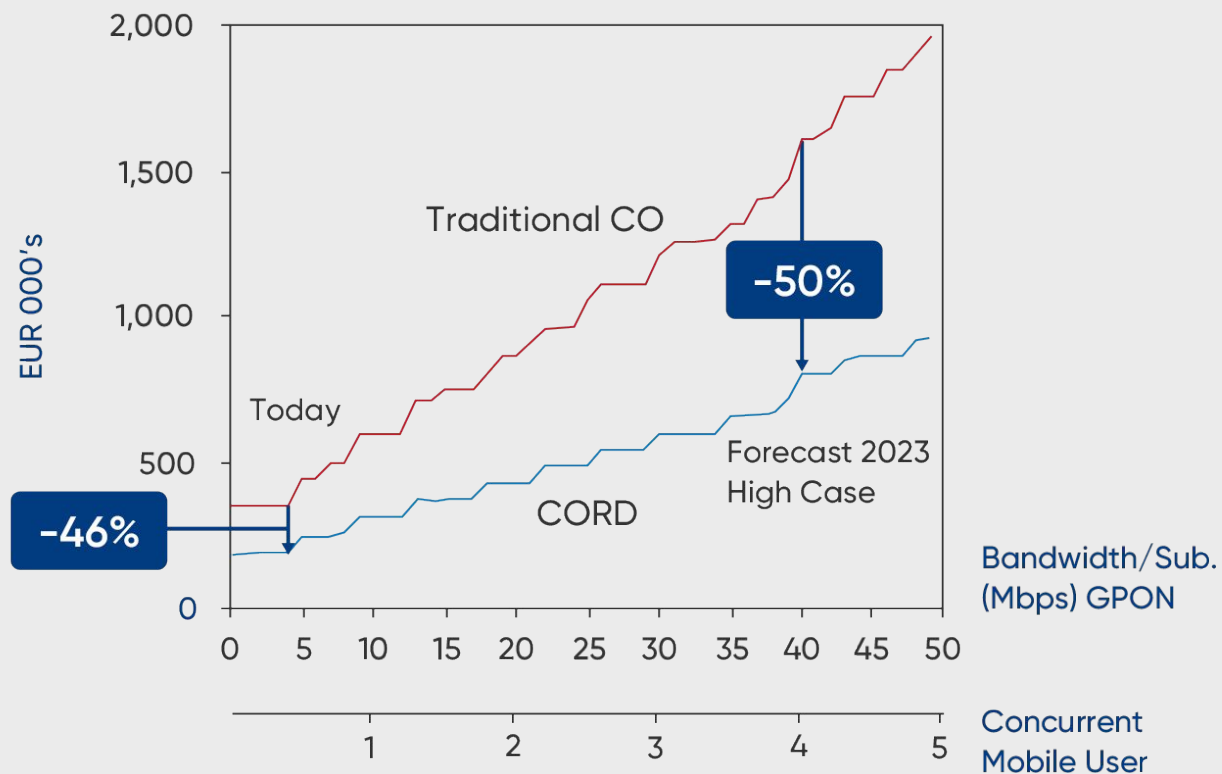


40%
CAPEX savings

25%
OPEX savings

11%
top line revenue growth

Cost Efficient and Scalable



Source: Operator Viewpoint Report by
ADLittle, AT&T, Deutsche Telekom, Telefonica

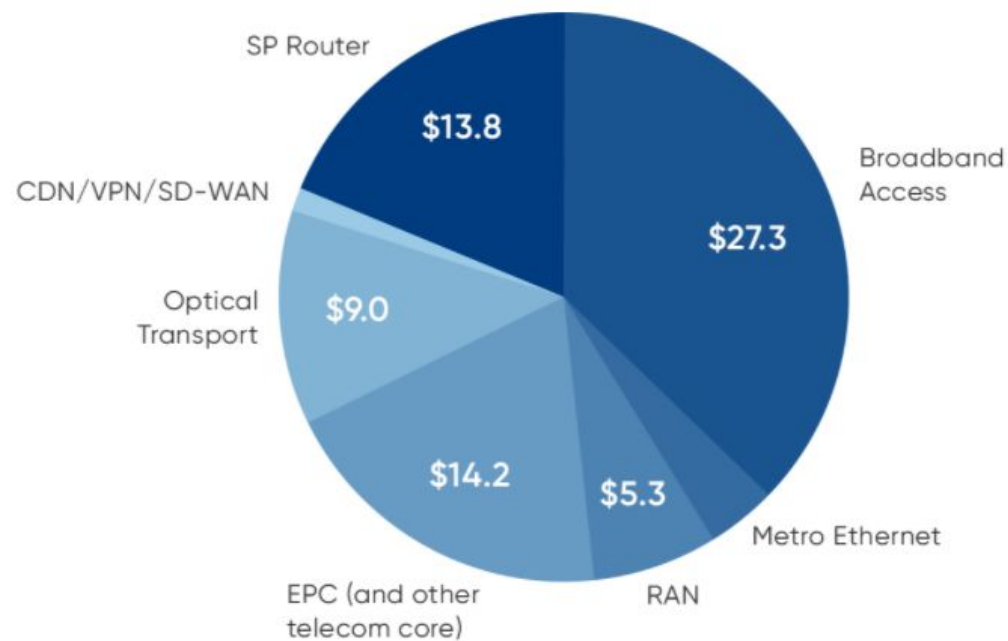
ONF impact the industry economically



“ \$490 billion dollars of market share are being directly impacted by ONF's projects. ”

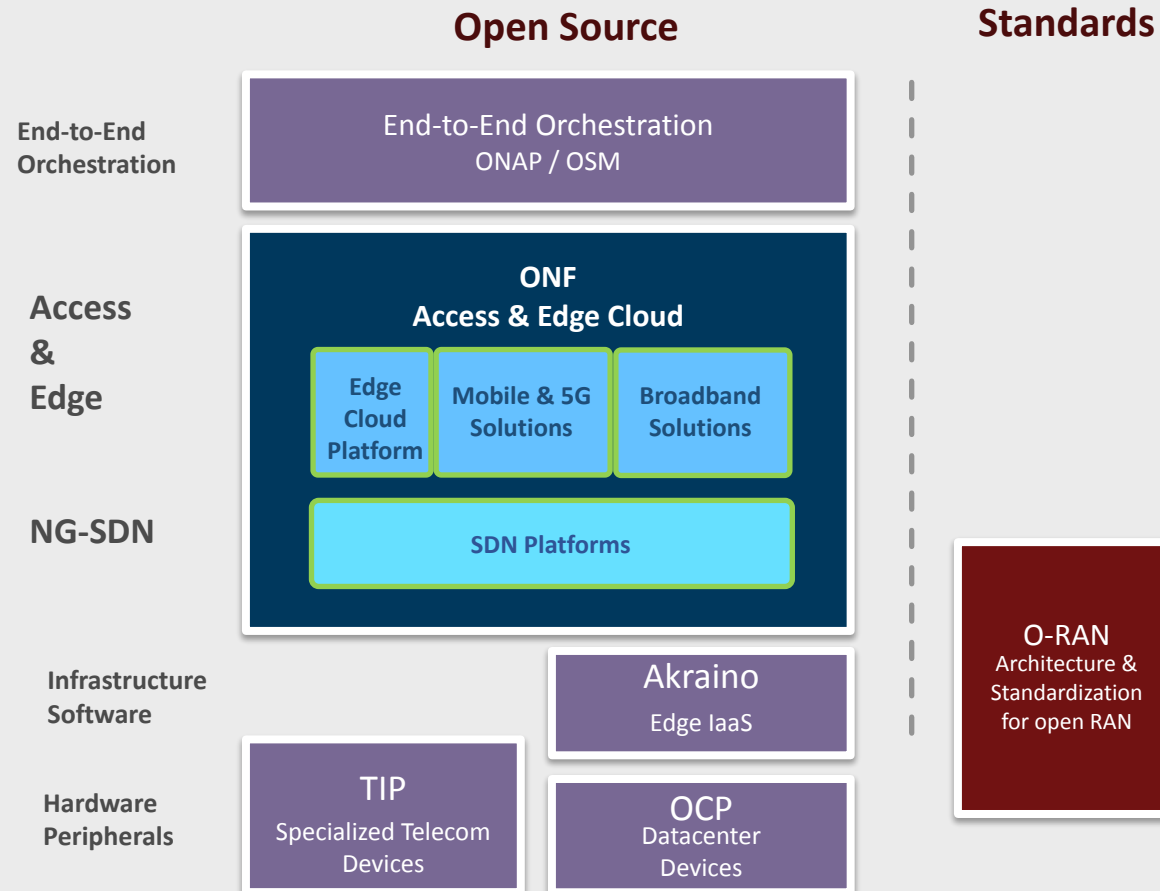


\$73B in revenue expected to shift to vendors delivering ONF-based solutions to operators

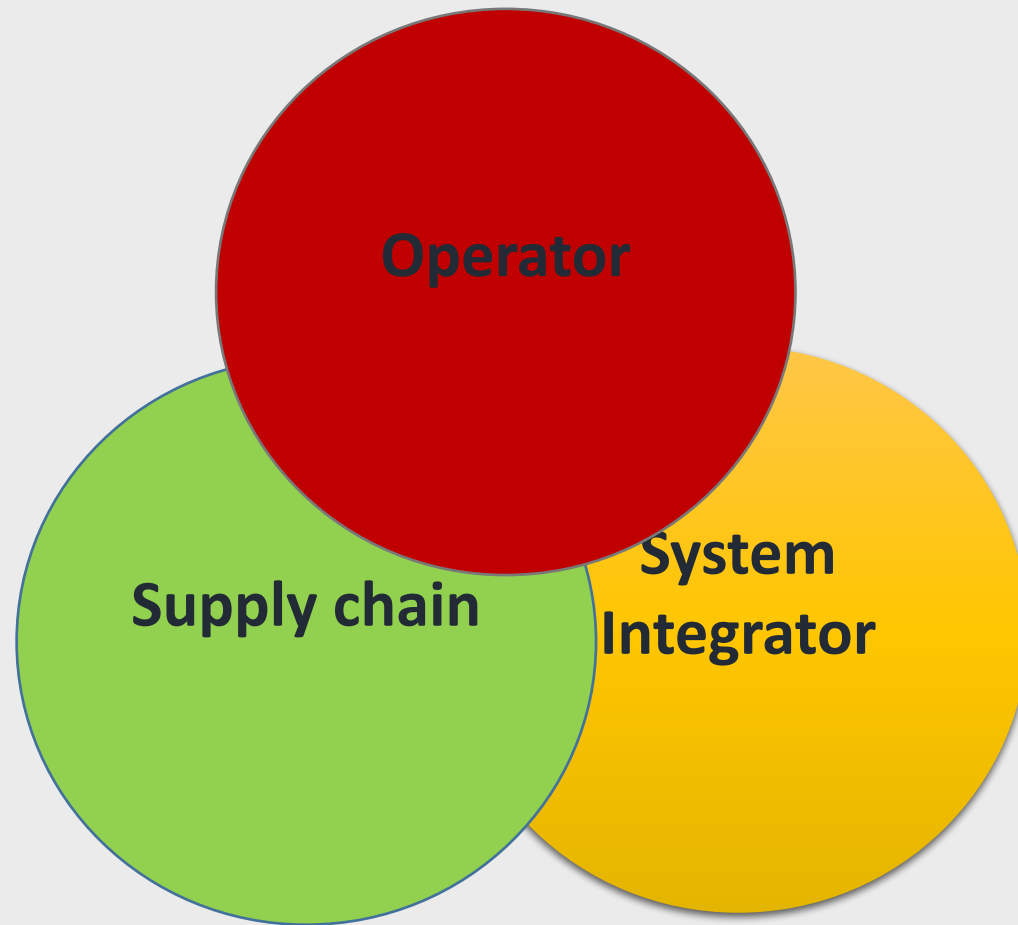


Source: 650 Group

ONF in Context of Open Source Ecosystem



Benefits for ONF Ecosystem





Aether Project

Private 5G/LTE Edge-Cloud-as-a-Service

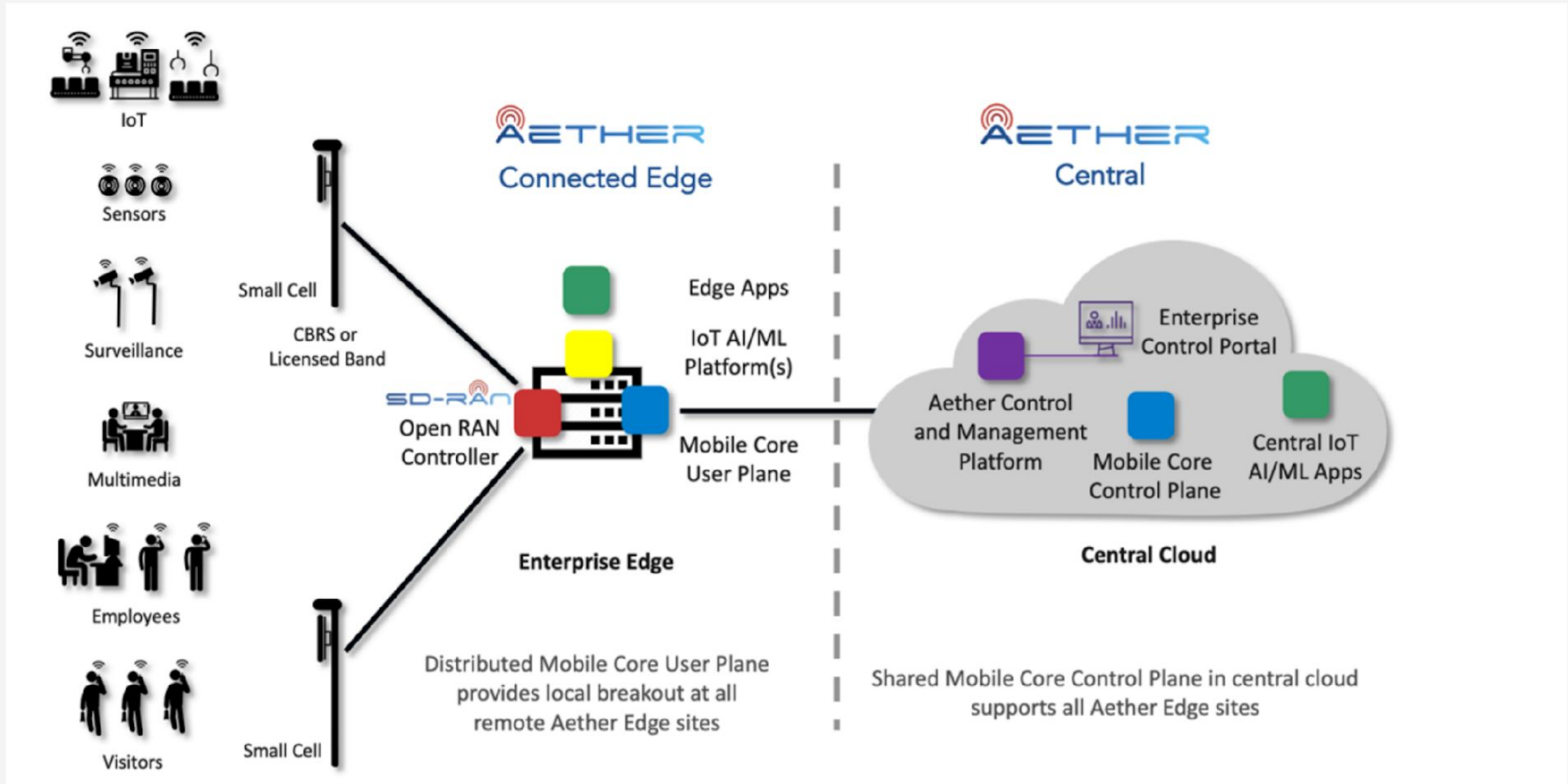
What is Aether



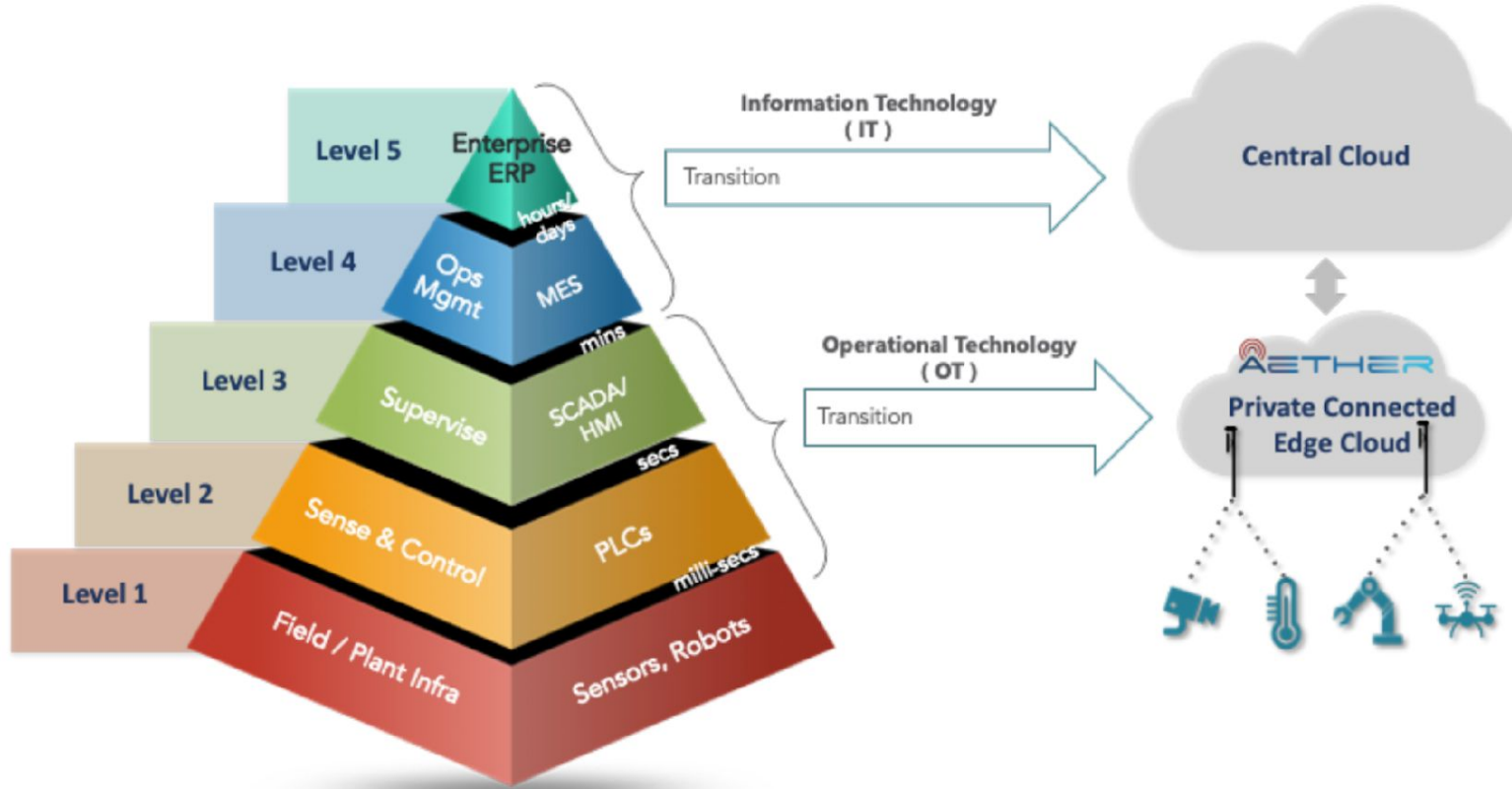
ENTERPRISE-5G/LTE-EDGE-CLOUD-AS-A-SERVICE

- Aether is first open source platform designed for **Edge Cloud (EC)** capabilities to enabling the smart enterprise with **private 5G connectivity**
- It has been selected as the software layer for a new \$30 million project funded by the Defense Advanced Research Projects Agency (DARPA)

Aether deployment



Enabling Digital Transformation



- The communication and compute required for levels 1, 2 and 3 have much stricter latency constraints (sub-second).
- These mission critical technology components are generally termed as operational technology (OT), as opposed to the IT components like manufacturing execution system (MES) and enterprise resource planning (ERP) systems.

Aether Ecosystem



- **Aether is enabling new business models**
 - Telco operators extending footprint using licensed spectrum
 - Public cloud operators deploying Edge Cloud
 - New businesses building private networks for enterprises
 - Enterprises building their own private networks
- **Aether is enabling many new forms of partnering opportunities**
 - Bringing telco and cloud operators together
 - Creating open source ecosystem to help bring the industry together

Operator Backers



Supply Chain Backers



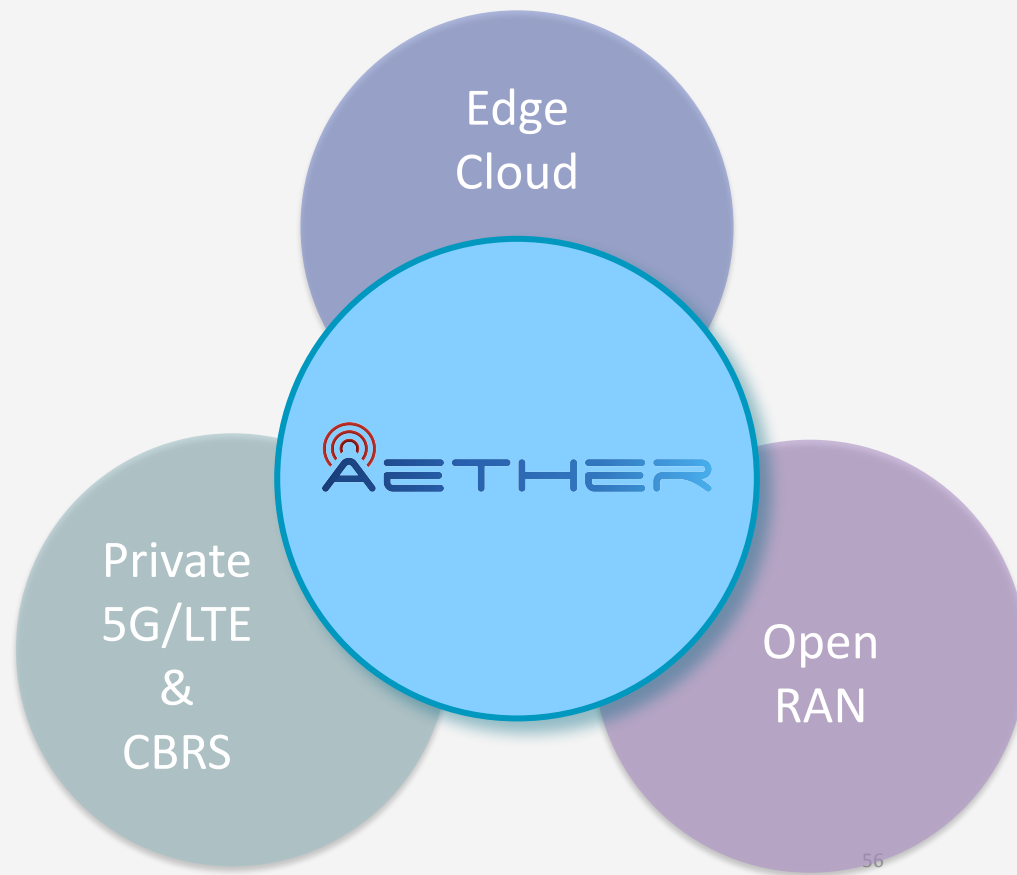
Pilot Network Contributors



The innovation



Aether™ – Only Platform Bringing Edge & RAN Together



ONF has been a leading innovator in 3 major areas:(Edge Cloud, Mobile Edge, Open RAN)

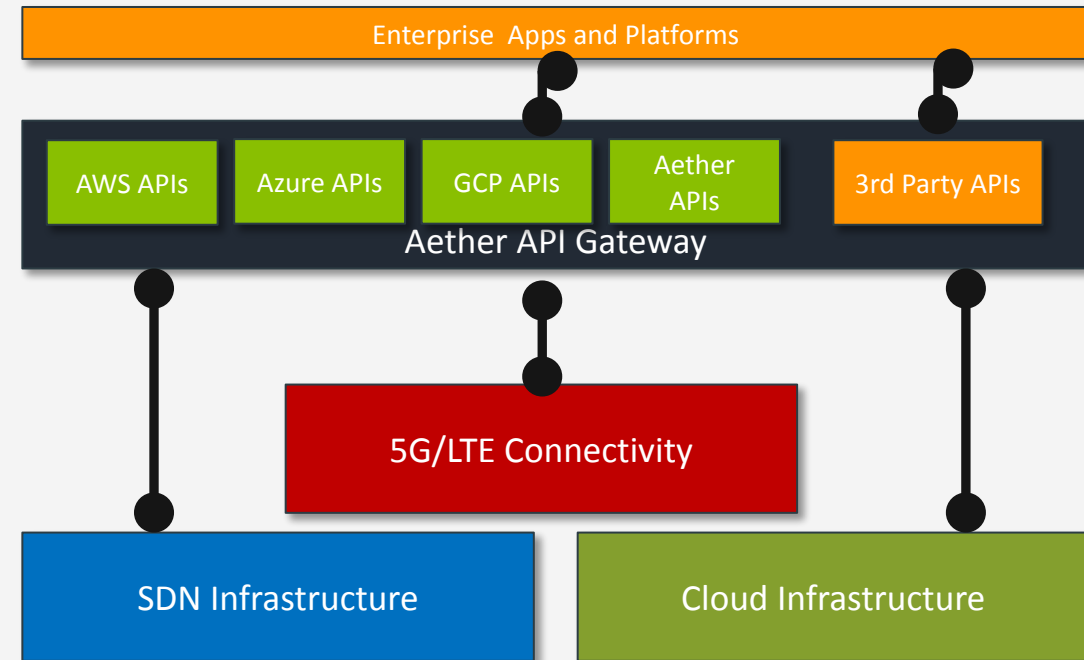
- 1. Aether uniquely blends all three of these important technologies**
- 2. Combining all three creates unique platform enabling Enterprise Digital Transformation**
All available in open source, enabling collaboration and new business models

Edge Cloud Services

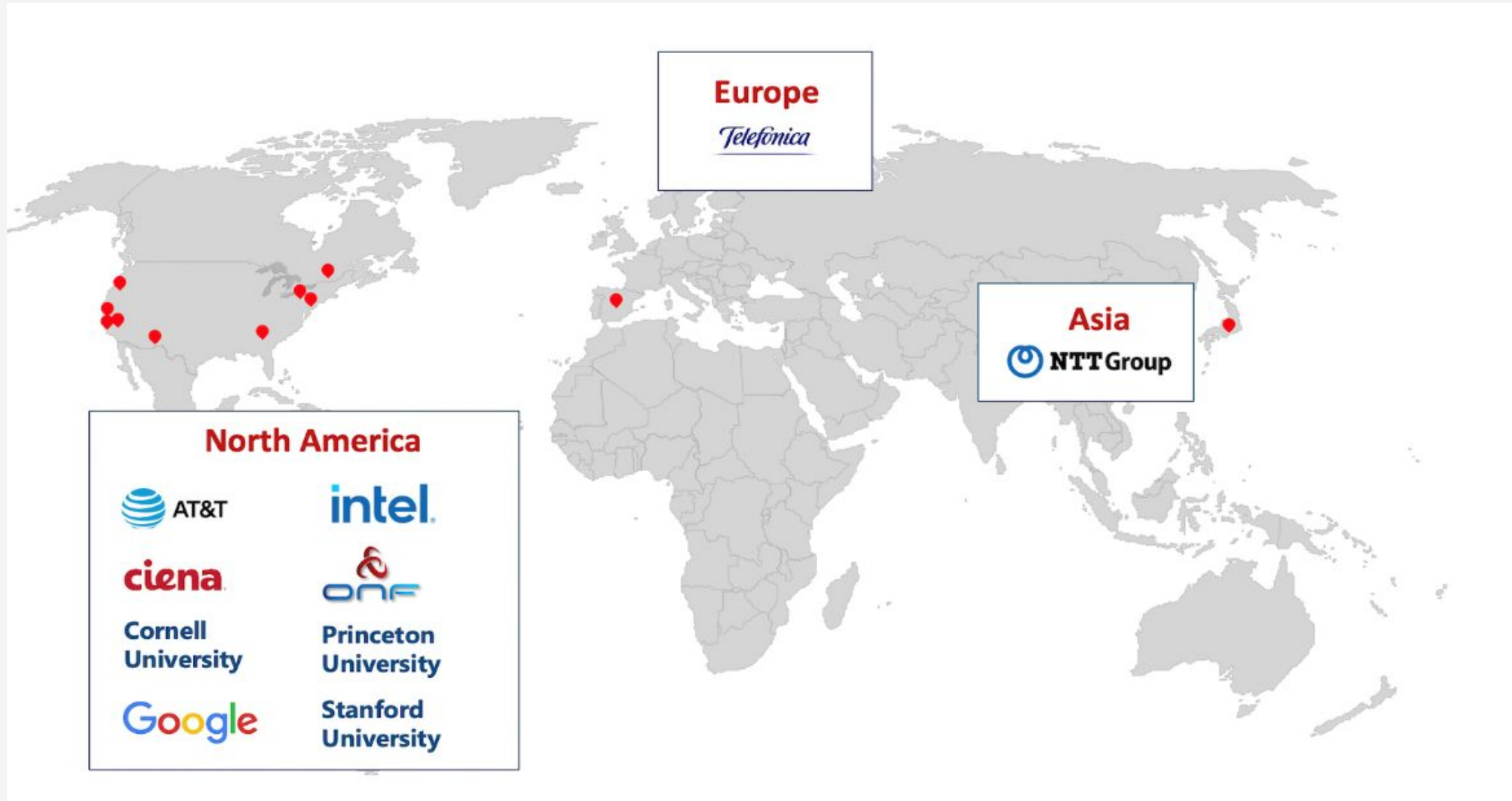


- Public Cloud Apps can run at Edge

- Amazon AWS (future)
- Google Cloud
- Microsoft Azure
- Tencent (future)



Aether implementation (ACE)



F&Q



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TELECOM INFRA PROJECT

The Telecom Infra Project (TIP) is a global community of companies and organizations working together to accelerate the development and deployment of *open, disaggregated, and standards-based technology* solutions.

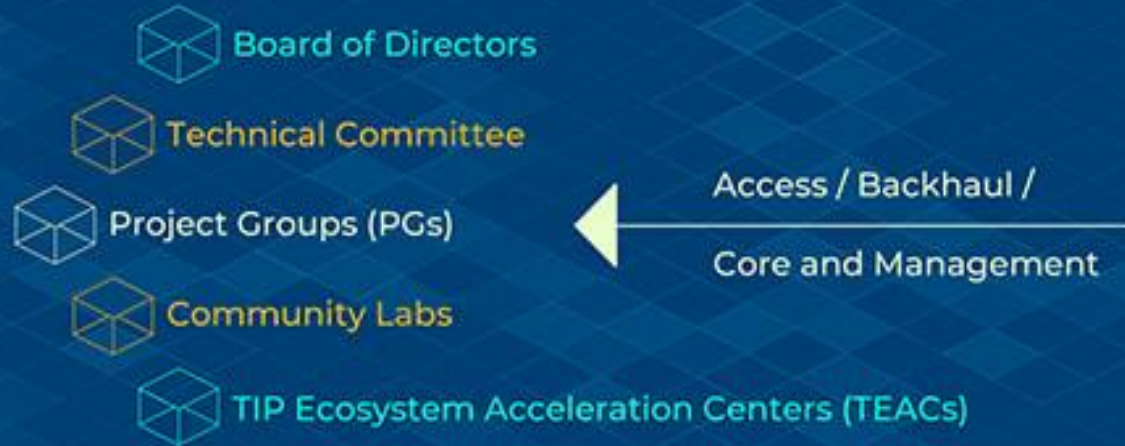
<https://telecominfraproject.com/>



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Telecom Infra Project (TIP)



Product Groups

mmWave Networks

Non-Terrestrial Connectivity Solutions

Open Cellular

Open Core Network

Open Optical & Packet Transport

OpenRAN

Wireless Backhaul

Wi-Fi

Solution Groups

Connected City Infrastructure

Network as a Service

Open Automation

5G Private Networks

Software Groups

Open Converged Wireless

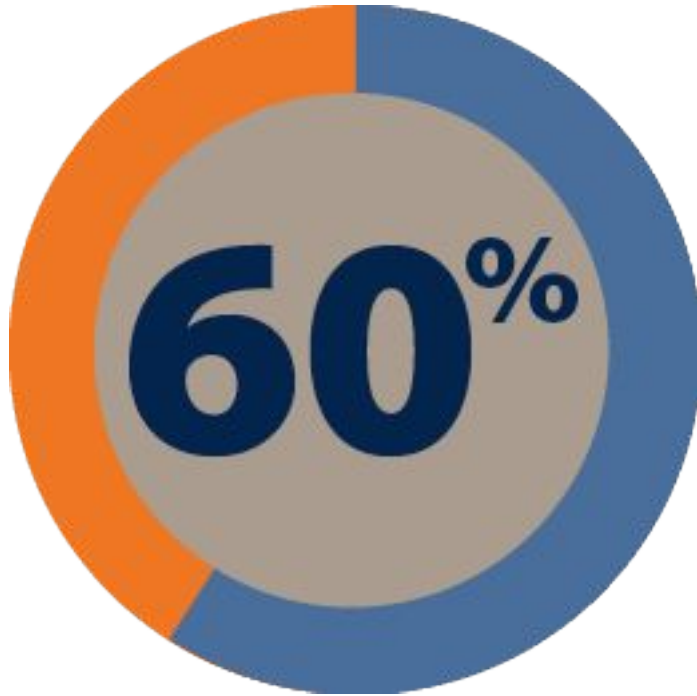
<https://telecominfraproject.com/>

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Why OPEN RAN?



RAN is 60% of CAPEX and OPEX



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<https://www.youtube.com/watch?v=kIV1PSGjPmM>

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Streamlined OpenRAN PG

I. Component Subgroups

1. RU

Whitebox
(4G/5G)



2. DU & CU

Whitebox
(4G/5G)



3. Radio Intelligence & Automation (RIA)

AI/ML use cases for
MaMIMO, RRM and SON



II. Segment Subgroups

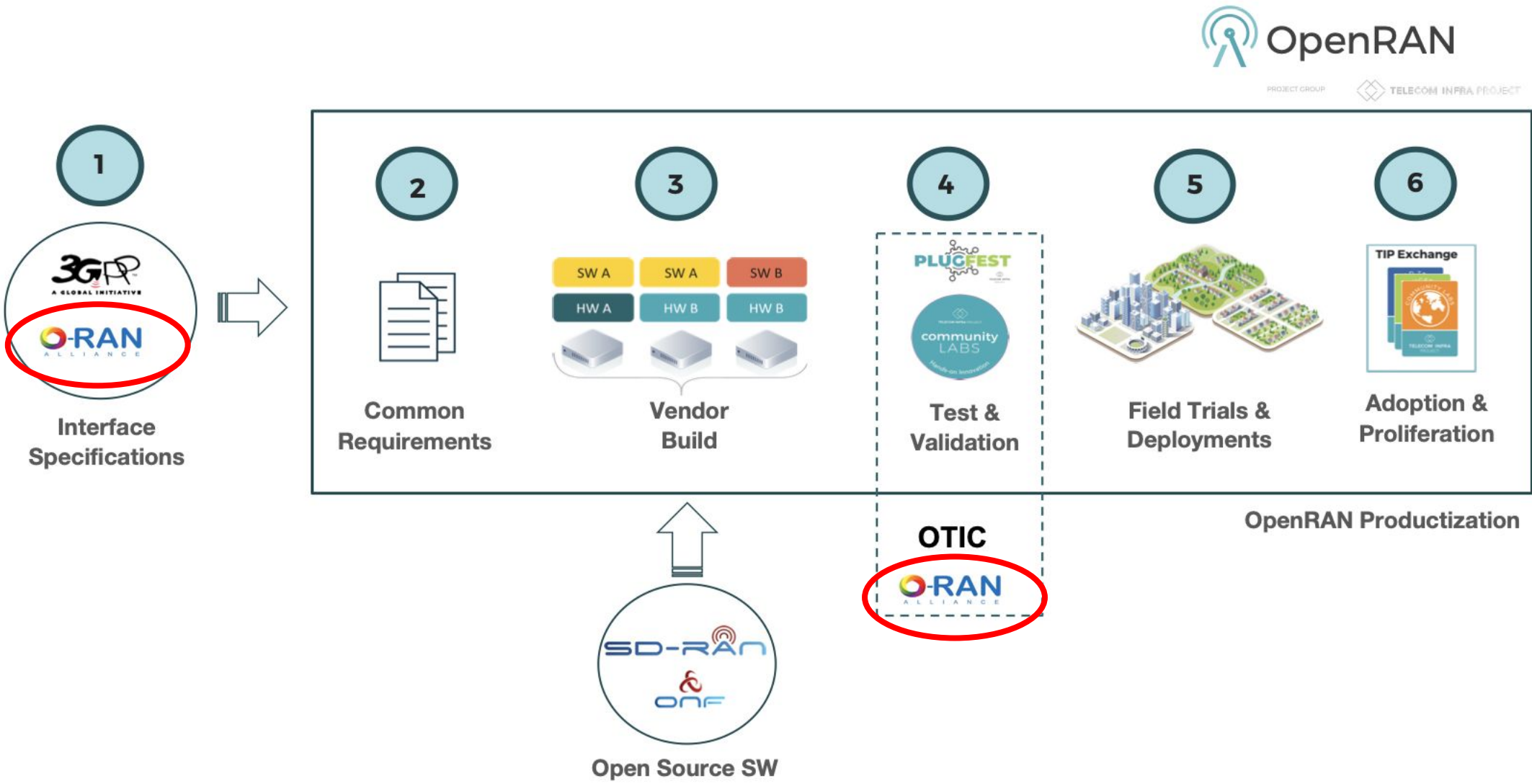
1. Outdoor



2. Indoor



OpenRAN And Industry Collaboration



Global OpenRAN deployments and trials



TELECOM INFRA PROJECT



China
Operators

C-RAN Alliance

N. American,
European and other
APAC Operators



Founding members – AT&T, China
Mobile, DT, NTT Docomo & Orange



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<https://www.youtube.com/watch?v=klV1PSGjPmM>

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O-RAN Alliance

Drives standards to ensure interoperability

Creates standards where none exist

Create profiles for interoperability

TIP OpenRAN

More deployment & execution focused

Enable ecosystem and interoperability

Trials, field tests, deployment

<https://www.youtube.com/watch?v=kIV1PSGj>

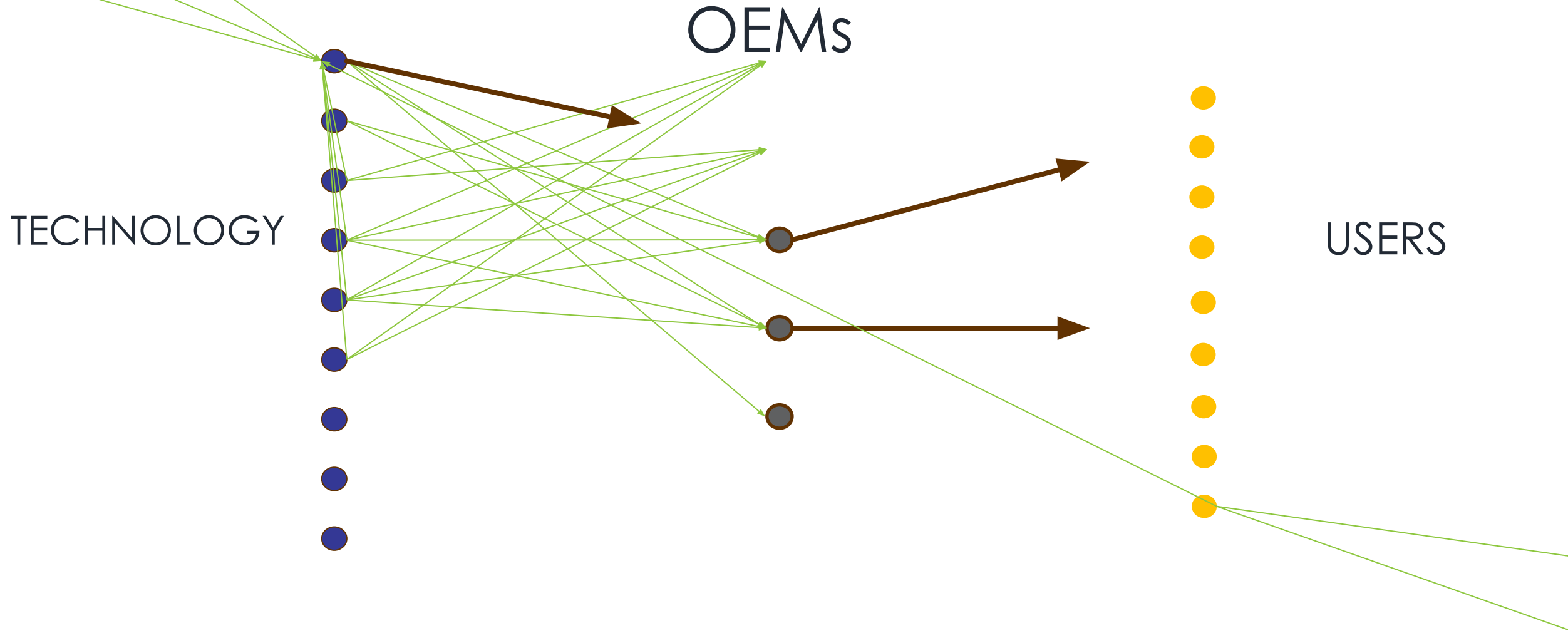
PmM

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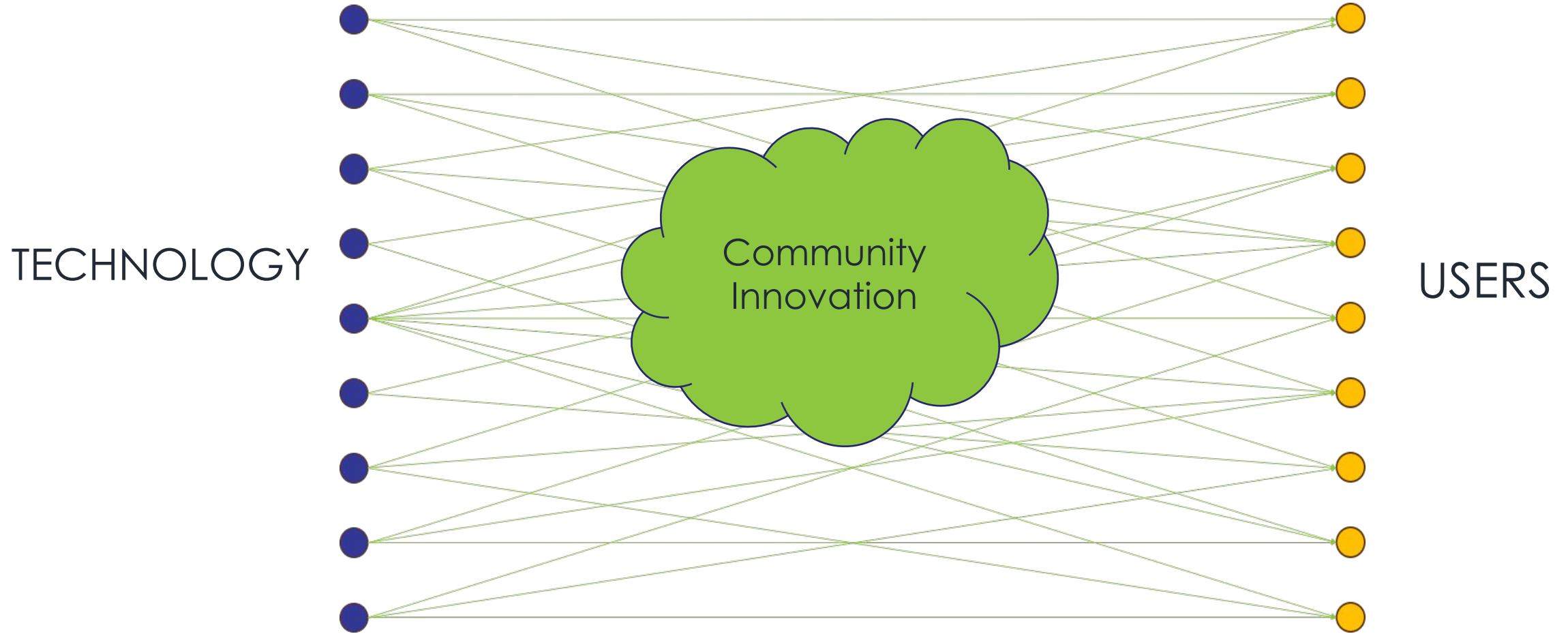


Open Communities are
at the core of business
in the future.

The Old Innovation Pipeline



Open Source Innovation Model



Q&A

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