State of Open Source Networking & Edge

5G+Cloud+AI+Edge+IOT
& Implications on Vertical Industries

Arpit Joshipura

GM, Networking, Edge & IOT

The Linux Foundation







Open Networking, Edge & IOT are critical in the new normal across vertical industries

Open Compliance, Standards + OSS Harmonization & Use Case driven deployments gaining traction

3 Edge is the next Cloud

THE LINUX FOUNDATION

Open Industries

"Open-Sourcification"

Telecom at the forefront

+

Automotive

+

Motion Pictures

+

Fintech

+

Public Health

+

Energy

Software-defined vertical industries: transformation through open source

How open collaboration enables user-centered innovation, achieving faster development cycles, time to market, and increased interoperability and cost savings.

A Publication of The Linux Foundation | September 2020



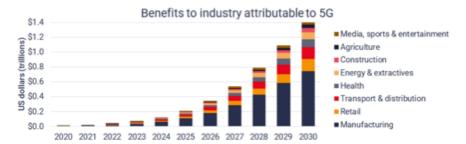
5G and Edge Critical in the Next Battle, a new normal! Edge is 4X the Size* of Cloud Market!

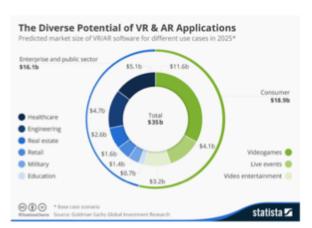
"As businesses and governments establish their own new normal, **5G and Edge computing** will be necessary to deliver the automation, performance and cognitive insight required by many industries—including manufacturing, healthcare, energy and utilities, among others. Telecom operators will need to embrace open ecosystems to externalize innovation and accelerate new services."



http://www.chetansharma.com/publications/edge-internet-economy/





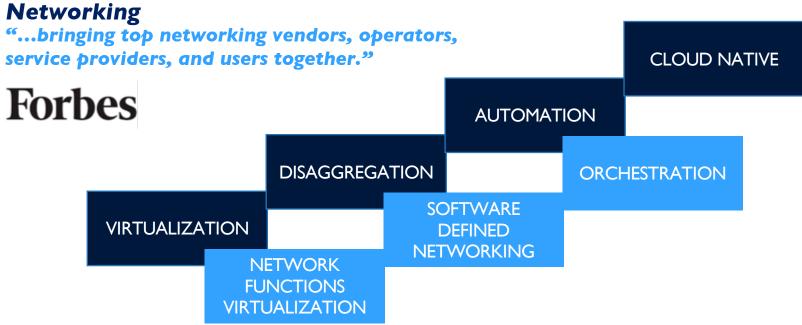


How VR and AR will be used in 2025

Image: Statista

Technology Disruption, enabled by Open Source

The LF is Changing the Fabric of Networking

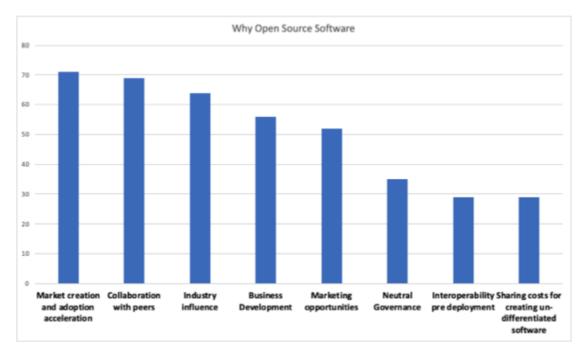




Why Open

Networking & Edge

"From Cost Savings to Market Adoption"



Source: LF Edge Community Survey, Sept 2020

Top Reasons Market Creation, Adoption Acceleration & Collaboration

Open Networking (5G & Automation), Edge & IOT are critical in the new normal across vertical industries

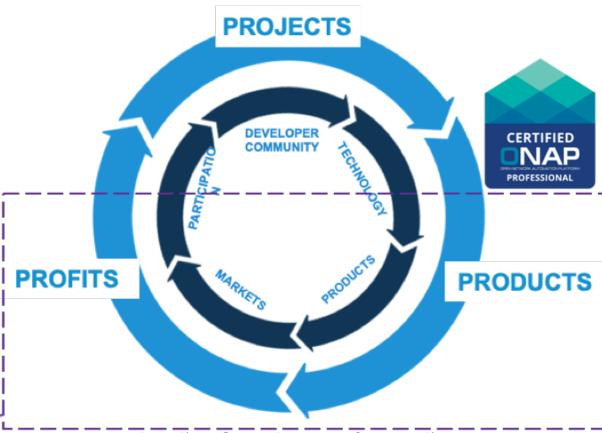
Open Compliance, Standards + OSS Harmonization & Use Case driven deployments gaining traction

3 Edge is the next Cloud

THE LINUX FOUNDATION

Beyond Code POC to Production

Open Compliance & Verification
Open Interop & Testing
Open Training & Certification



Leading Open Interop & compliance
LF Networking's Anuket (OPNFV + CNTT)
LF Edge's Akraino Blueprints

SDO or OSS

Is it Standards OR Open Source?

"Harmonize" was a hot word 3 years ago

Unification well beyond Standards - now Open Source communities, Markets, Verticals are taking direction from the LFN playbook







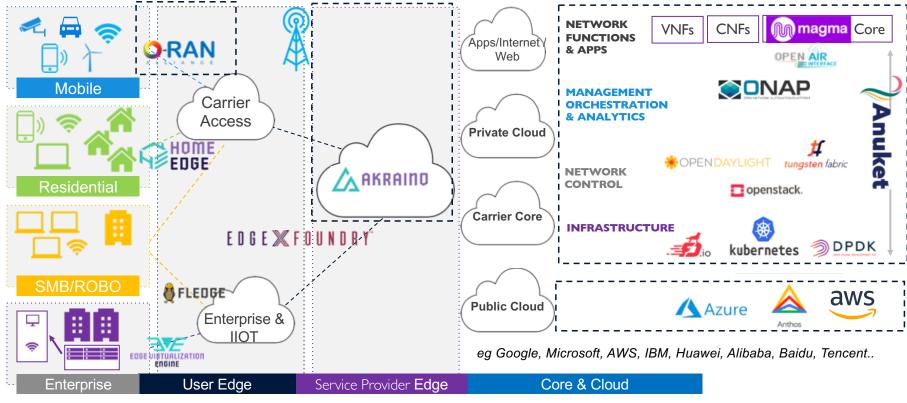




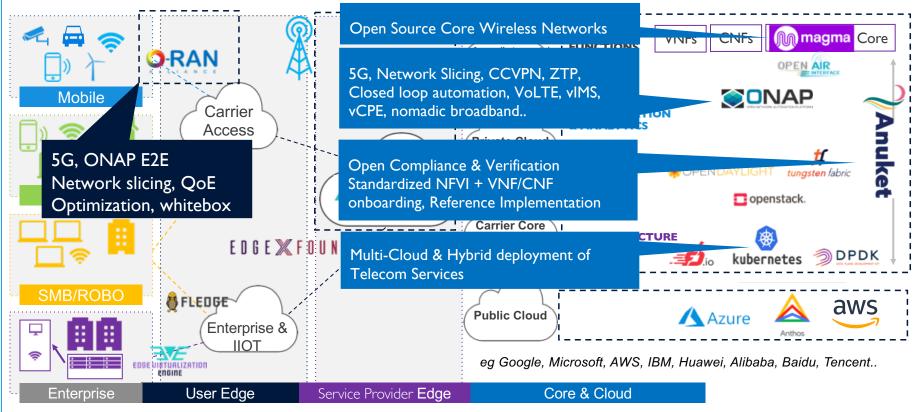


Linux Foundation Projects are harmonized with Standards

End to End Open Source Software Collaboration



End to End Open Source Software Collaboration



Open Networking (5G & Automation), Edge & IOT are critical in the new normal across vertical industries

Open Compliance, Standards + OSS Harmonization & Use Case driven deployments gaining traction

3 Edge is the next Cloud

Edge Applications

New Vertical Industries Enabled by Edge

New Applications

New Revenue

New Use Cases





LF Edge Projects



Infrastructure













At Large Projects Stage 1:

Baetyl, Open Horizon, Secure

Device

Onboard

Growth Projects Stage 2:

EVE, Fledge, Home Edge, State of

the Edge

Stage 3: **Impact Projects**

Akraino Edge Stack, EdgeX Foundry



Research and Reports





Distributed Devices and Systems







Buildings / Factories / Smart Homes

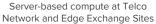
MCU-based devices

Embedded compute

Smartphones, PCs, ruggedized IoT gateways and servers in accessible to semi-secure areas

Servers in secure on-prem data centers, MDCs

> On-Prem Data Center Edge



Access

Networks

Aggregation

Hubs/COs

Server-based compute at Regional Telco and Direct Peering Sites

Regional Data

Centers

Servers in traditional cloud data centers

Centralized Data Centers

Access Edge

Regional Edge

Constrained Device Edge

Smart Device Edge

Service Provider Edge

LF Edge Projects











Stage 1: **At Large Projects** Baetyl, Open Horizon, Secure Device

Onboard



Growth Projects

EVE, Fledge, Home Edge, State of the Edge

Stage 3:

Impact Projects

Akraino, EdgeX Foundry



Research and Reports











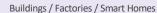
Infrastructure



Distributed Devices and Systems







MCU-based devices

Embedded compute

Smartphones, PCs, ruggedized IoT gateways and servers in accessible to semi-secure areas

Servers in secure on-prem data centers, MDCs

Constrained Device Edge

Smart Device Edge

On-Prem Data Center Edge







Aggregation Hubs/COs

Server-based compute at Telco Network and Edge Exchange Sites



Regional Data Centers

Server-based compute at

Servers in traditional Regional Telco and Direct cloud data centers

Centralized Data Centers

Access Edge

Regional Edge

Peering Sites

User Edge

Service Provider Edge

Dedicated, Operated

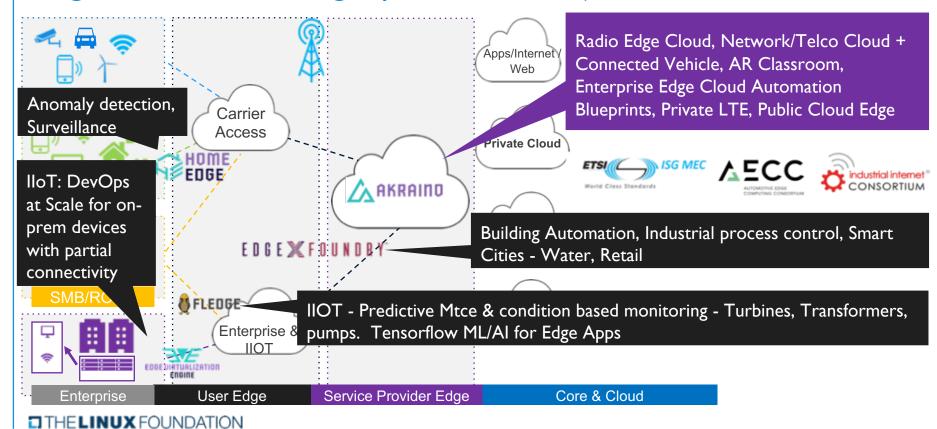
Shared, XaaS

AKRAINO Akraino R4 Blueprints – To be approved R4 Blueprints (New) **Applications** R1/R2/R3 enhanced **Blueprints** KubeEdge IIoT - Predictive Maintenance Public Cloud Edge Interface 5G MEC - Enterprise The AI Edge - Security, Autonomous Vehicle, Federated Infrastructure Learning Network Cloud Family 5G MEC - Cloud Gaming **ELIOT** Private 5G IOT GW/uCPF Telco Appliance -Radio Edge IEC - Type 2-5 Cloud (REC) Micro-MEC IEC - Type I KNI Provider Access Connected Vehicle Edge (PAE) & Industrial □《母〉℃ Centralized Data Centers Aggregation Regional Data Access **Distributed Devices and Systems** Buildings / Factories / Smart Homes Centers Networks Hubs/COs Smartphones, PCs, ruggedized Server-based compute at MCU-based Embedded Servers in secure on-prem Server-based compute at Telco Servers in traditional IoT gateways and servers Network and Edge Exchange Sites Regional Telco and Direct devices cloud data centers compute data centers. MDCs in accessible to semi-secure areas **Peering Sites** On-Prem Data Access Edge Regional Edge Constrained Device Edge Smart Device Edge Center Edge

User Edge
Dedicated, Operated

Service Provider Edge
Shared, XaaS

Edge Use Cases Driving Open Source Projects



Observations

Network is even <u>more</u> important in the new world! End Users (Enterprises, Governments, Countries) have a vast array of open options using "infra/software" right near their premises

- 2. Open Source Collaboration (beyond code) is the way to go. Driven by faster innovation, security and time to revenue & deployment Use Cases
- 3. Edge is new Cloud and is enabled with technologies like 5G+Cloud+Al+IOT

What's Next

- Upcoming LF Events: ONEEF (Open Networking & Edge Executive Forum, March 10-12)
 - https://events.linuxfoundation.org/opennetworking-and-edge-exec-forum/



