The New Open "Edge"
IOT+Telecom+Cloud+Enterprise
Topics

1. LF Edge formation announcement
2. Why Edge, killer apps & defining the Edge
3. LF Edge Summary
Why Edge and Defining the Edge
Emerging Edge Applications & Convergence of Technologies are demanding & fueling lower latency + accelerated processing

- NFV Edge Infrastructure
- Wireless (vRAN,vEPC)
- Wireline (PON)
- uCPE (SD-WAN)
- IP Enterprise Services
- Autonomous Devices
- Drones
- Autonomous Vehicles
- Industry Robots
- Medical
- Immersive Experiences
- Virtual Reality
- Augmented Reality
- 360 Video
- Wearable Cognitive Assistance
- IoT & Analytics
- Industrial Sensors
- Home Devices
- Retail
- Healthcare
- On-Demand NFV
- Hardware Acceleration
- A.I.
- Microservices
- 5G
Edge Killer Apps: Non-traditional video + Connected things that move

Q: What are the top 5 (or more) edge services?

- Many metro IX locations within 20ms of parts of populations...
- Telcos have advantage of COs, cell sites, cell backhaul aggregation, fixed backhaul, street cabinets, etc. much closer to users
- Edge enhanced apps include many elements: natural language, facial recognition, immersive experience, swarming
- Big (too much) bandwidth top driver
- Our categories are a grouping of several applications; can be user delivered

Source: IHS Markit. NFV Strategies: Global Service Provider Survey, June 2017; Respondents control 61% of global telecom capex
Market Opportunity for LF Edge

Industrial, Enterprise and Consumer use cases in complex environments spanning multiple edges and domains.

Examples:

- Industrial Manufacturing
- Energy (Oil & Gas, Utilities)
- Commerce
- Homes (including B2B2C use cases)
- Automotive
- Fleet/Transportation
- Logistics
- Building Automation
- Cities and Government
- Healthcare

![Graph showing billions of M2M connections from 2017 to 2022 with a CAGR of 19% from 2017 to 2022.](source: Cisco VNI Global IP Traffic Forecast, 2017-2022)
Where are the edges?

Distributed cloud, edge compute, AI/ML, IoT, 5G, VNFs/NFV, FMC

EDGE
Enterprise & IoT

EDGE
MEC server, AI/ML, IoT, 5G

EDGE
97% of operators plan VNF execution in Smart CO

EDGE
VNFs, vEPC, MEC, distributed RAN, vRAN, BBU hotel, FMC, vCPE, AI/ML, IoT go here

PARTIAL EDGE
85% of operators plan VNF execution in DC Near CO

NOT EDGE
70% of operators plan VNF execution in DC Not Near CO

EDGE
82% of operators plan VNF execution on uCPE at customer sites

EDGE
MEC server, AI/ML, IoT, 5G

20msecs

IoT G/W

uCPE

Enterprise & IoT

20msecs

Data Center Near CO [Regional DC]

Data Center Not Near CO [Central DC]

Smart CO with Mini DC/CDN+ [Edge DC]

Source: IHS Markit. NFV Strategies: Global Service Provider Survey, June 2017: Respondents control 61% of global telecom capex
Introducing LF Edge
LF Anchor projects for Edge

Akraiio and EdgeX Foundry are complementary open source projects addressing Telecom, Enterprise and IOT edge.

EDGE VIRTUALIZATION

- Validated Blueprint

EDGE X FOUNDRY

- FLEDGE
  - IOT Interoperability framework
  - Vertical
  - Retail
  - O&G
  - Industry
  - Agriculture
  - Vertical
  - Vertical
  - Vertical
  - Vertical
  - Validated Blueprint
  - Validated Blueprint

EDGE STACK

- Validated Blueprint

EDGE VNFs, vEPC, MEC, distributed RAN, vRAN, BBU hotel, PMCE, vCPE, AI/ML, IoT

PARTIAL EDGE

- 85% of operators plan VNF execution in DC Near CO

EDGE

- 97% of operators plan VNF execution in Smart CO

MEC server, AI/ML, IoT, 5G

EDGE VNFs, vEPC, MEC, distributed RAN, vRAN, BBU hotel, PMCE, vCPE, AI/ML, IoT

goto here

IOT G/W

EDGE

- 82% of operators plan VNF execution on uCPE at customer sites

Enterprise & IOT Edge

Use Cases & Blueprints

- Agriculture
- Industry
- O&G
- Retail
- Vertical
- Vertical
- Vertical
- Vertical
- Vertical

Interoperability

Validated Blueprint

Validated Blueprint

Validated Blueprint

Validated Blueprint

Validated Blueprint

Validated Blueprint

Validated Blueprint

Validated Blueprint

Data Center Near CO
[Regional DC]

Data Center Not Near CO
[Central DC]

NOT EDGE

- 70% of operators plan VNF execution in DC Not Near CO
Scope of LF Edge

Interoperability between IoT devices and applications

API coordination for intelligent orchestration of IoT edge workloads
Open Source LF Edge

**IIoT Today**
Vertical data silos & platform lock-in
Data/edge sovereignty & control issues
Hardware-defined & unmanaged edge

**IIoT with LF Edge**
Open IoT data architecture, no lock-in
Data & edge belong to the enterprise
Software-defined & ubiquitous edge
LF Edge – New umbrella for Edge Projects

Drivers

› Complementary and aligned vision on multiple LF projects
› Fuels faster adoption and deployment
› Edge market is fragmented and creating a larger entity provides leadership

Projects
Bringing It All Together – LF Open Source Edge
With Complementary Standards, Ref Arch and Ref Implementations

Standards & Orgs for Edge

IoT Alliances & Consortia

Other Edge Activities
Automating Cloud, Network & IOT/Edge Services

Services
- Cloud Services
- Residential Services
- Enterprise Services
- IOT/Edge/Al Services

Software & Automation
- Cloud Automation
- Telecom Network Automation
- Edge Automation

Infrastructure
- Enterprise Software Defined Data Centers (SDDC)
- Data Centers
- Carrier Network
- Cloud Network

Service Providers
- MSO/CableCo

Public/ Hybrid
- Cloud Service Providers
- Cloud Hosting Providers
- Private Cloud Providers
- Web Service Providers
Premier Members

altran arm at&t Baidu dell EMC Dianomic
ericsson fujitsu ge hp Hewlett Packard Enterprise
ibm intel inwinstack juniper networks MobiledgeX
netsia
nokia ntt osisoft Qualcomm radisys redhat
samsung seagate Tencent wind wipro zededa

THE LINUX FOUNDATION  LF EDGE
 LF Edge: Key Takeaways

1. Harmonizing Open Source Edge Communities across IOT, Enterprise, Cloud & Telecom

2. Keeping LF Edge Open & Interoperable with
   › Hardware, Silicon, Cloud, OS, Protocol independence
   › Bringing the best of telecom, cloud and enterprise – location, latency & mobility
   › In collaboration with Consortiums/SDO (IIC, AECC, OEC, ETSI)

3. Hosted by the Linux Foundation similar to other Open Source Communities like CNCF (Kubernetes), LF Networking (ONAP) and many more.
The Linux Foundation Launches New LF Edge to Establish a Unified Open Source Framework for the Edge

More than 60 global founding members across enterprise, IoT, telecom and cloud collaborate on open source framework for edge computing and future of IoT

SAN FRANCISCO, January 24, 2019 – The Linux Foundation, the nonprofit organization enabling mass innovation through open source, today announced the launch of LF Edge, an umbrella organization to establish an open, interoperable framework for edge computing independent of hardware, silicon, cloud, or operating system. LF Edge is initially comprised of five projects that will support emerging edge applications in the area of non-traditional video and connected things that require lower latency, faster processing and mobility.

LF Edge includes Akraino Edge Stack, EdgeX Foundry, and Open Glossary of Edge Computing, formerly stand-alone projects at The Linux Foundation and new projects EVE (Edge Virtualization Engine), Home Edge.

LF Edge Momentum continues with Project EVE seed code, project demonstrations at IOT World and new members

• IOT OnPrem Edge Virtualization Engine seed code contributed by Zededa to LF Edge
• Four new members join existing community of 70+ LF Edge organizations
• LF Edge on Display at IoT World, with Akraino Edge Stack, EdgeX Foundry and Project EVE demonstrations

SANTA CLARA, Calif. – IoT World – May 14, 2019 – LF Edge, an umbrella organization within the Linux Foundation that aims to establish an open, interoperable framework for edge computing independent of hardware, silicon, cloud, or operating system, today announced continued project momentum. Project Edge Virtualization Engine (EVE) receives initial seed code from LF Edge founding member ZEDEDA, as the community showcases a range of edge/IoT application demonstrations, from connected cars to wind turbines, on-site at IoT World.
Akraino Edge Stack Issues Premier Release, Sets Framework to Enable 5G, IoT Edge Application Ecosystem

- Inaugural release unifies multiple sectors of the edge across disciplines, including IoT, Enterprise, Telecom, and Cloud
- Delivers tested and validated deployment-ready blueprints
- Creates framework for defining and standardizing APIs across stacks, via upstream/downstream collaboration

SAN FRANCISCO – June 6, 2019 – LF Edge, an umbrella organization within the Linux Foundation that aims to establish an open, interoperable framework for edge computing independent of hardware, silicon, cloud, or operating system, today announced the availability of Akraino Edge Stack Release 1 (“Akraino R1”). Created via broad community collaboration, Akraino’s premiere release unlocks the power of intelligent edge with deployable, self-certified blueprints for a diverse set of edge use cases.

EdgeX Foundry Announces Production Ready Release Providing Open Platform for IoT Edge Computing to a Growing Global Ecosystem

- Enables IoT digital transformation for Enterprise, Industrial, Retail and Consumer
- Supports complementary products and services from global open ecosystem including commercial support, training and customer pilot programs
- Deployed in many end user projects; EdgeX also collaborates with IIC on AI testbeds and is the foundation for the Open Retail Initiative (ORI)

SAN FRANCISCO – July 11, 2019 – EdgeX Foundry, a project under the LF Edge umbrella organization within the Linux Foundation that aims to establish an open, interoperable framework for edge IoT computing independent of hardware, silicon, application cloud, or operating system, today announced the availability of its “Edinburgh” release. Created collaboratively by a global ecosystem, EdgeX Foundry’s new release is a key enabler of digital transformation for IoT use cases and is a platform for real-world applications both for developers and end users across many vertical markets.
LF Edge
(www.lfedge.org)

Bringing Edge Initiatives Together

IOT | Telecom | Cloud | Enterprise