Akraino Edge Stack Overview

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TSC-Chair, Akraino Edge Stack
Why Edge Computing?

Emerging technologies are demanding lower latency and accelerated processing at the edge.

**Edge Cloud**
- Performs data processing at the edge of the network, near data sources

**Central Cloud**
- Highly centralized computing resources of cloud service providers

**Low-Latency**
- < 20 ms
  - Optimal

**High-Latency**
- ~25-200 ms
  - Not Optimal

- NFV Edge Infrastructure
- Autonomous Devices
- Immersive Experiences
- Industrial IOT

**Emerging technologies** are demanding lower latency and accelerated processing at the edge.
Emerging Technologies in IOT and Networks are demanding lower latency and accelerated processing at the edge

<table>
<thead>
<tr>
<th>NFV Edge Infrastructure</th>
<th>Wireless (vRAN,vEPC)</th>
<th>Wireline (PON)</th>
<th>uCPE (SD-WAN)</th>
<th>IP Enterprise Services</th>
</tr>
</thead>
<tbody>
<tr>
<td>Autonomous Devices</td>
<td>Drones</td>
<td>Autonomous Vehicles</td>
<td>Industry Robots</td>
<td>Medical</td>
</tr>
<tr>
<td>Immersive Experiences</td>
<td>Virtual Reality</td>
<td>Augmented Reality</td>
<td>360 Video</td>
<td>Wearable Cognitive Assistance</td>
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<tr>
<td>IoT &amp; Analytics</td>
<td>Industrial Sensors</td>
<td>Home Devices</td>
<td>Retail</td>
<td>Healthcare</td>
</tr>
<tr>
<td>On-Demand NFV</td>
<td>Hardware Acceleration</td>
<td>A.I.</td>
<td>Microservices</td>
<td>5G</td>
</tr>
</tbody>
</table>
New Edge Requires End-to-End Automation & Interworking
Edge Use Cases & Akraino Edge Stack in Context of Open Source Landscape
Use Case 1: Operator’s Owned Network Edge
Optimal Zone For Edge Placement

### Device*
- Mobile
- AR/VR
- End User
- Drones
- Autonomous Vehicles

### Optimal Zone For Edge Placement
- **Access**
  - 5G
  - LTE
  - WiFi
  - Wireline
- **Backbone**
  - 5G
  - LTE
  - WiFi
  - Wireline

### Edge Placement
- **Device** ~2 ms
- **Last Mile Network** <5 ms
- **Access** 1-3 ms
- **Edge Computing** ~5-20 ms

### Non-Accelerated Processing
- **Backbone** ~2-100
- **Non-Accelerated Processing** ~5-50 ms

* Estimates

- **Device**
- **Last Mile Network**
- **Access**
- **Edge Computing**
- **Backbone**
Use Case 2: IOT Driving the New Edge for Enterprise
Retail, Transportation, Healthcare...

Cloud Automation

Network Automation

Edge/ IOT Automation

Retail
Hospitality
Healthcare
Manufacturing
Transportation & Logistics

Enterprises
Public Buildings

Enterprise & Data Centers

“Southbound” Devices, Sensors and Actuators
Why Akraino Edge Stack?
The Akraino Edge Stack community delivers fully integrated, “ready and proven” Edge Stacks

Multiple Opensource but no integrated solution to address Edge use cases

Before Akraino Edge Stack

After Akraino Edge Stack

Real use case driven & Architecture Agnostic

- **Edge Use Case Driven**
  - Development of features to support fully functional Edge Solution.

- **Integration of Multiple Opensource Software**
  - Fully Integrated Edge Stack

- **Production Readiness**
  - Multiple Validations with declarative stack

- **Standardize Edge Features and APIs**
  - Compliant and Secure

- **Vendor Support Eco-system**
  - Suppliers and Users upfront collaboration

Akraino Blueprints
Where is the Akraino Community is Focused?

Akraino Release 1 Highlights

- 8+ Blueprint Families with 19+ Blueprints under development to support variety of Edge use cases.

- Community Development started in Jan’19 and 1st release targeted in 2Q2019

- Upcoming Conference:

  April 3 - 5, 2019
  San Jose McEnery Convention Center
  San Jose, California
  #opennetsummit
LF Edge - Founding projects
Bringing several Edge verticals and domains under one umbrella

1. Akraino Edge Stack is creating an open source software stack that supports high-availability cloud services optimized for edge computing systems and applications;
2. EdgeX Foundry is focused on building a common open framework for IoT edge computing.
3. Home Edge Project, seed code contributed by Samsung Electronics, is a new project that concentrates on driving and enabling a robust, reliable, and intelligent home edge computing framework, platform and ecosystem running on a variety of devices in our daily lives.
4. Open Glossary of Edge Computing provides a concise collection of terms related to the field of edge computing.
5. Project EVE (Edge Virtualization Engine), contributed by ZEDEDA, will create an open and agnostic standard edge architecture that accommodates complex and diverse on- and off-prem hardware, network and application selections.

Platinum Members:

60 + Members already
# Akraino Blueprints - Incubation Projects

## IOT & Far Edge Use Cases

<table>
<thead>
<tr>
<th>Company</th>
<th>Use Case</th>
<th>Target Industry</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Nokia</strong></td>
<td>Micro MEC</td>
<td>Can be installed on light poles, vehicles, etc… Target Industry: Smart City, Far Edge Cloud</td>
</tr>
<tr>
<td><strong>Huawei</strong></td>
<td>Edge Light &amp; IoT</td>
<td>uCPE use cases, IoT appliances Target Industry: Manufacturing &amp; Customer Premise</td>
</tr>
<tr>
<td><strong>Intel</strong></td>
<td>Time Critical Edge Compute</td>
<td>IoT use cases, appliances Target Industry: Manufacturing, IoT &amp; Safety</td>
</tr>
<tr>
<td><strong>Arm</strong></td>
<td>Integrated Edge Cloud</td>
<td>IoT use cases, appliances Target Industry: Remote Edge Locations</td>
</tr>
</tbody>
</table>

## Telco Use Cases

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<tr>
<th>Company</th>
<th>Use Case</th>
<th>Target Industry</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>AT&amp;T</strong></td>
<td>Radio Edge Cloud</td>
<td>Cloud appliance to address ORAN RIC requirements Target Industry: Telco – Radio Edge</td>
</tr>
<tr>
<td><strong>Nokia</strong></td>
<td>SDN Enabled Broadband Access</td>
<td>Virtual broadband access – higher bandwidth, symmetric version of GPON Target Industry: Telco – Access</td>
</tr>
<tr>
<td><strong>AT&amp;T</strong></td>
<td>Network Cloud</td>
<td>Telco 5G use cases and beyond Target Industry: Telco – 5G and generic use cases, Airship Based</td>
</tr>
<tr>
<td><strong>Juniper Networks</strong></td>
<td>Tungsten Fabric Integration</td>
<td>Enhancement to NC blueprint to support Contrail Tungsten Fabric</td>
</tr>
</tbody>
</table>

## Other Use Cases

<table>
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<tr>
<th>Company</th>
<th>Use Case</th>
<th>Target Industry</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Ericsson</strong></td>
<td>OVS-DPDK Integration</td>
<td>Enhancement to NC blueprint to support OVS-DPDK</td>
</tr>
<tr>
<td><strong>arm</strong></td>
<td>ARM Servers/Appliance</td>
<td>Enhancement to NC blueprint to support ARM Servers &amp; Appliances</td>
</tr>
<tr>
<td><strong>Red Hat</strong></td>
<td>Kubernetes Native Infrastructure</td>
<td>Focused on Native Container workloads Target Industry: Industrial Automation</td>
</tr>
<tr>
<td><strong>Wind River</strong></td>
<td>StarlingX Edge Cloud</td>
<td>Addresses Industrial Edge Usecases Target Industry: Far Edge Automation</td>
</tr>
</tbody>
</table>

## Connected Car Use Case

- **Tencent** (Connected Car use case)
Upcoming Talks

OpenStack Summit @ Denver

- Mon 29, 2:00pm - 2:40pm
- Akraino BoF Session - Bring your questions
- Working Groups & BoF

ONS Summit @ San Jose

**Wednesday, April 3**
- 5:10pm: Panel Discussion: Edge Open Source Synergy to Deliver Value-added End-to-end Services - Ramki Krishnan, VMware; Kandan Kathirvel, AT&T; Rolf Muralt, MobiledgeX; Srin Addepalli, Intel; and Tina Tsou, Arm (Description: akraino)

**Thursday, April 4**
- 11:10am: Arm at the New Edge - Shai Tsur, Arm (Description: akraino)
- 3:40pm: StarlingX - Driving Compute to the Edge - Project Overview - Ian Jolliffe, Wind River Systems (Description: akraino)
- 4:20pm: O-RAN & The Open Source Community - Hank Kafka & Oliver Spatscheck, AT&T; Don Fendrick, Nokia (Description: akraino)
- End to End Broadband Access for Service Providers - Aaron Byrd, AT&T & Larry Peterson, Open Networking Foundation (Description: akraino)
- 5:00pm: Your Path to Edge Computing - Akraino: Edge Stack - Tapio Tallgren, Nokia, Kandan Kathirvel, AT&T & Tina Tsou, Arm

**Friday, April 5**
- 11:50am: Securing the Smart Cities Edge with OP-TEE and Arm TrustZone - Tapio Tallgren, Nokia (Description: akraino)
Additional materials

1. https://www.lfedge.org

Akriano Community Calendar

https://wiki.akraino.org/display/AK/Akraino+TSC+Group+Calendar