Public Cloud Interfacing at Telco Edge
Akaino API Whitepaper Proposal (TSC Review)

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Why is this whitepaper needed?

“Public Cloud Interfacing at Telco Edge” addresses:

› What are challenges in Telco and OTT collaboration? Where the interfaces can be?

› How are APIs from SDOs adopted (or not) in Akraino’s edge stack projects?

› Edge Enabler functions: Access Gateway and Connect Gateway

We need opinions on these open questions. Akraino projects express their opinions with stack and solution designs. There are technical considerations as well as business. The white paper presents thoughts from telco operators and Hyperscalers on Telco Edge.
What is the white paper about?

“All Public Cloud Interfacing at Telco Edge”

- Analyzing various challenges
- Identifying interface options
- Comparing leading solutions
- Open Source community efforts to date

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The paper shall cover both 4G and 5G scenarios. On carrier premises and enterprise premises will be included. Technical internals of Telco network and webscalers are not included unless when necessary to explain interfacing solutions. Telco edge represents mobile and fixed edge access.

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1. Introduction
   1. Background
   2. Scope and assumptions
   3. Relevance to Akraino community

2. Challenges
   1. Expectations from both sides and gaps
   2. Technical challenges:
      1. 4G vs. 5G, strategy and capability differences
      2. Inter edge
         - Device mobility and service continuity
         - Inter public cloud
         - Inter Telco network
         - Fixed wifi access
         - Transport layer and overlay network for global reach
      3. Intro edge
         - Edge aware device w.r.t. not-edge-aware
         - AF-influenced traffic steering
         - Available ETSI MEC APIs
         - Measurable KPIs for latency
         - Context
         - Observability
   3. Business challenges:
      1. Regulatory concerns on CT and IT differences
      2. Taxation
      3. SLAs on CT and IT (KPIs)
      4. Operational challenges
         - Organization within Telco responsibilities
         - Labor/Union
   4. Where the interface can be?
      1. Anatomy of the OTT edge stack
      2. UPF and DNN - 5GPP standards
      3. Shim layer of edge enabler - Open UPF?
      4. On-prem enterprise, RAN break out
      5. Highlight APIs that may be developer facing or have DF counterparts

3. Solutions (by examples) and evaluations

4. Conclusion

5. References

The summary of the evaluation and recommendation in Section 5 should be captured in this conclusion

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Microsoft Word Document
Collaborating with “Public Cloud Edge Interfacing” blueprint families

Two (2) blueprints are planned under this family: Google Anthos and Tencent ECM.

With other edge stack platform projects: reveal gaps, identify new opportunities.

Marketing Akraino community’s technical strength and deep domain understanding
Telco vs. OTT Edge Stack (2 BPs from Akraino)

- The Left is a Telco Edge function stack; Below is from Baidu as an OTT edge stack for AI applications.
- Can these stacks share common layers at the infrastructure level?
- Telco stacks orchestration and management vs. OTT stack service management
Upstream projects and standards

• ONAP’s Edge APIs
• CNTT
• ORAN-SC
• ETSI MEC, 3GPP SA2, 3GPP SA6
• How are these leveraged (or not) in Akraino Projects?
• Gap analysis
Some observations of edge stacks

An Edge Node Stack

- Telco Appliances (RIC, Core, Routing) on NFV Platform
- NFVI (Container, VM, Bare metal) (Airship)
- Mobile Network Service
- Edge Enabler
- Edge Applications (Gaming, Driverless car, Video streaming)
- PaaS
- Hardware (IaaS)

Edge Applications and Services

- Telco Operators’ ownership and responsibility
- Non-Telco ownership and responsibility

APIs consumable to Edge Application and Services

- UPF reselection
- Local routing and traffic steering
- Session and service continuity
- AF influenced traffic steering
- Network capability exposure
- QoS and charging
- LADN

Edge Stack Strategies

<table>
<thead>
<tr>
<th>Edge Stack Strategies</th>
<th>Typical Deployments</th>
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<tbody>
<tr>
<td>Telco MEP based (ETSI MEC)?</td>
<td>Operator centric, UPF+, Mission Critical edge</td>
</tr>
<tr>
<td>Share common HW only</td>
<td>Some operators, xxx?</td>
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<tr>
<td>Independent vertical stacks; IP interconnect</td>
<td>Public Cloud Interfacing at Telco CO</td>
</tr>
<tr>
<td>Telco Appliances and Edge applications share common Edge platform</td>
<td>Private Network, LADN</td>
</tr>
<tr>
<td>Non-telco with spectrum has its own RAN and Core services</td>
<td>CBRS, Industrial Spectrum</td>
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Ideas: Edge Access GW and Connect GW

- Can functions from Edge Connector and Edge GW be provided via a 5G slice? If not, what's missing?
- Are there specific requirements from OTT applications not provided by a 5G slice? Or is it a business consideration to do it this way? If so, what's the Biz drive?
- From Telco side, apart from the biz consideration to agree with this or not, are there technical challenges in this architecture?

- From Tencent BP project
- What can be exposed in these GWs?
- How can these be exposed (APIs)?
- Consumption of these APIs?
Example: Microsoft Azure Edge Zone (2 Types)

**Type 1: Edge Zone with Carriers (In Telco DC)**

- **Telco Appliances** (RIC, Core, Routing) on NFV Platform
- **NFVI** (Container, VM, Bare metal) (Airship)

**AT&T**

**Azure Edge Zone**

- Telco Operators’ ownership and responsibility
- Non-Telco ownership and responsibility

**Edge Applications** (Gaming, Driverless car, Video streaming)

- **PaaS**
- **Hardware (IaaS)**

**RAN Sharing; Slicing, eNodeB physical splitter**

**CBRS, Industrial Spectrum**

**Azure Edge Stack** (Cloud Native platform managed by Azure)

**Azure Edge Zone at various Telco DC locations**

**Discussion topics**

- Application aware of edge vs. not aware of edge
- Application makes edge placement decisions vs. gives declarative placement requirements
- Device aware of edge vs. not aware of edge
- APIs to reflect device mobility and service continuity
- AF influenced traffic steering (AF proxy?)
- Capability exposure (ETSI MEC 0016)
Thank You!