Far Edge Cloud – Akraino Blueprint:

Project overview information:

Project contributors:

Wind River – Ian Jolliffe

Intel – Jenny Koerv

Committers will be identified once the project is approved.

Project plan – to be developed once the proposal is accepted

Resourcing – will be established once the proposal is accepted.

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Proposed Blueprint: Far Edge Cloud

Use Case Attributes	The Edge Cloud blueprint is designed far edge and Edge applications that require ultra-low latency, small footprint, scalability, reliability, edge security, and high throughput.	Informational
Type	New	
Industry Sector	Far Edge – vRAN, Hi density stadium/event WiFi, MEC, Industrial Automation	
Business driver	Address edge and far edge use case at high density locations such as malls, airports and sports stadiums to support value added services at these events and locations. –Enables new revenue opportunities for operators In addition, industrial automation use cases require similar topologies With many sub locations and far edge sites, remote deployment and management is critical to ensure day 2 operational costs are minimized. Small physical foot print and low physical security are constraints in these environments	

	Target cost – TBD	
Business use cases	The Far Edge use case enables a number of new use cases. A small far edge cloud could be deployed in a stadium, airport, or cell tower to support new workloads. Caching data, processing data, analyzing data in order to minimize network backhaul while maximizing the end user customer experience.	
Business Cost - Initial Build	TBD :	
Business Cost - Operational	Operational costs will be minimized by providing a single pane of glass solution along with support for north bound API's to ONAP and other orchestrators. A distributed edge cloud architecture is enabled by StarlingX to drive down day 2 operations, by providing a central point for deploying and managing patches and looking after upgrades to future releases as required of a large number of geographically distributed edge clouds.	
Operational need	Operational needs will be addressed by providing the capability to update needed components without a full redeploy of the stack. Security vulnerabilities can be deployed asynchronously to the needed components. A distributed cloud infrastructure supported by redundant hyper converged sub-clouds, based on OCP hardware, allows the use of minimal hardware at the far underpinned by a centralized cloud infrastructure management framework.	
Security need	In addition to standard role based access control the following security needs are required:	

	TPM for storing certificates vTPM support for applications Base OS tuned for minimum attack surface Monitoring of critical files for tampering (IMA)	
Regulations	As required in deployment environment.	
Other restrictions	Far Edge power envelop will be decided based on the OCP platform selected – minimal power consumption is an important consideration. Target below X Watts	
Additional details	A geographically distributed solution that scales to manage 1000s of sub clouds from a single pane of glass.	

3.3.2.2.2.2 Far Edge family

Use Case Attributes	The Edge Cloud blueprint is designed far-edge and Edge applications that require ultra-low latency, small footprint, scalability, reliability, edge security, and high throughput.	Informational
Type	New	
Blueprint Family - Proposed Name	Far Edge Cloud Family	
Use Case	Far Edge – vRAN, Hi density stadium/event WiFi, MEC, Industrial Automation	
Blueprint proposed	Distributed cloud – see topology in Appendix A	
Initial POD Cost (capex)	Estimated at ~$25K, TBC	
Scale	Hyper converged nodes at the edge managed from a single pane of glass – See Figure 1 and 2 in Appendix A	

Applications	EdgeX Foundry vRAN Content Caching Industrial automation	
Power Restrictions	TBD – low power is a key consideration	
Preferred Infrastructure orchestration	StarlingX is core infrastructure orchestrator, leveraging OpenStack, K8s, and other open source projects from the linux foundation and CNCF. See stack definition in Appendix A: Figure 3	
Additional Details	**Security support:** TPM for storing certificates vTPM support for applications Base OS tuned for minimum attack surface Monitoring of critical files for tampering (IMA) **Low latency for networking and interrupts** –vSwitch based Packet latency below 50us SRIOV ~10us –Interrupt latency variation 99.999% within 7us	

3.3.2.2.2.3 Far Edge species

Use Case Attributes	The Edge Cloud blueprint is designed far edge and Edge applications that require ultra-low latency, small footprint, scalability, reliability, edge security, and high throughput.	Informational
Type	New	
Blueprint Family - Proposed Name	Far Edge Cloud Species	
Use Case	Far Edge – vRAN, Hi density stadium/event WiFi, MEC, Industrial Automation	
Blueprint proposed Name	Far Edge – Distributed Cloud	

Initial POD Cost (capex)	TBD	
Scale & Type	Proposed test configuration: Central cloud (2 nodes) and 3 sub clouds with each having 2 nodes. Total 8 servers for testing the configuration. In production the configuration would scale to thousands of sub clouds	
Applications	EdgeX Foundry vRAN Content Caching Industrial automation	
Power Restrictions	TBD – low power is a key objective	
Infrastructure orchestration	See Appendix A – Figure 3	
SDN	SR-IOV & OVS-DPDK, SDN controller such as ODL or Tungsten fabric could be included at a later date.	
Workload Type	VMs and Containers	
Additional Details	**Security support:** TPM for storing certificates vTPM support for applications Base OS tuned for minimum attack surface Monitoring of critical files for tampering (IMA) **Low latency for networking and interrupts** –vSwitch based Packet latency below 50us SRIOV ~10us –Interrupt latency variation 99.999% within 7us	

Appendix A:

Figure 1: System topology

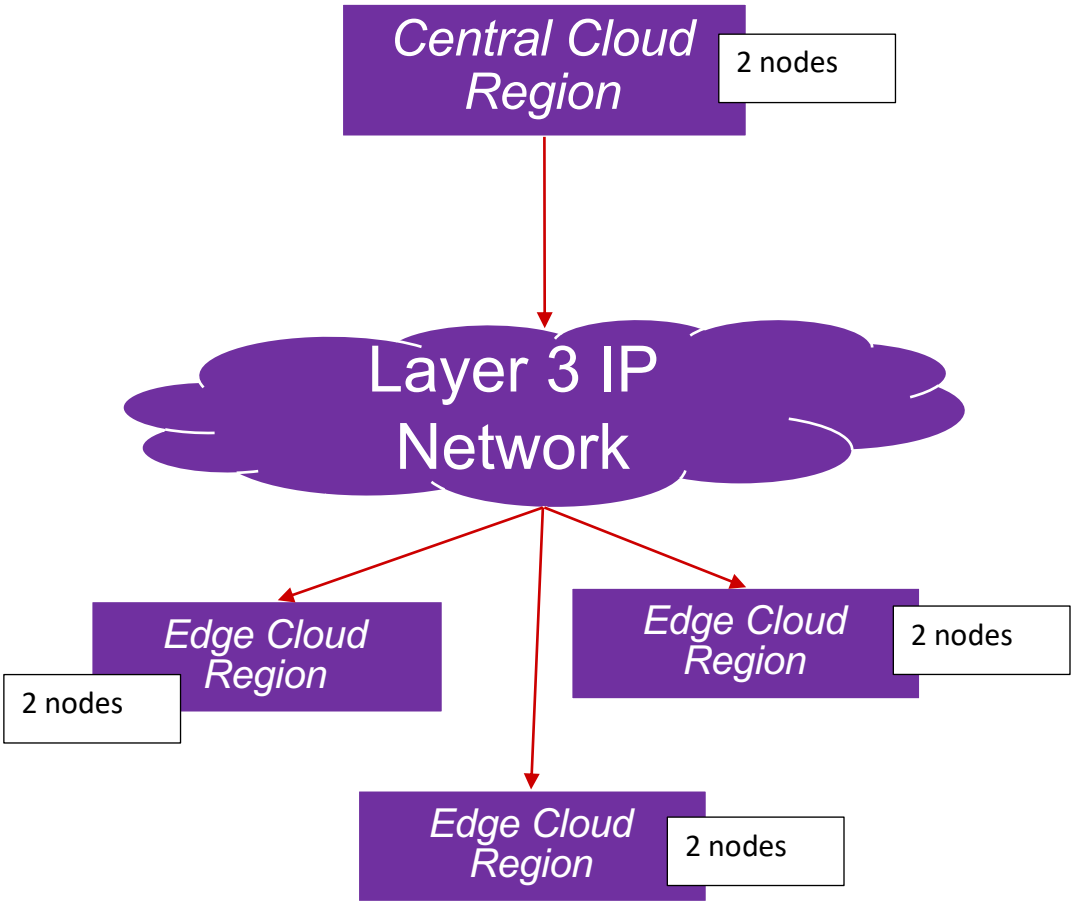
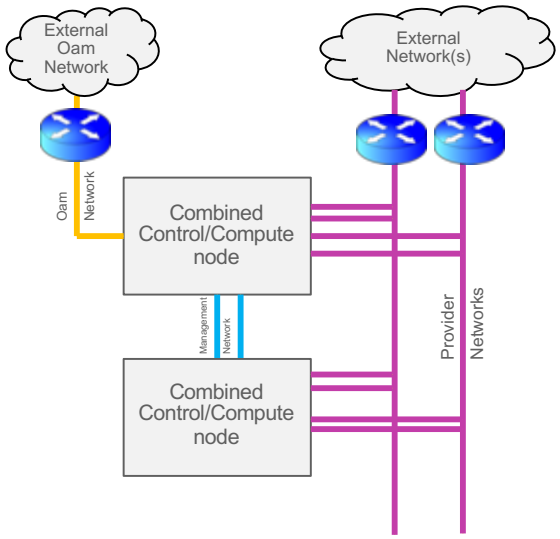
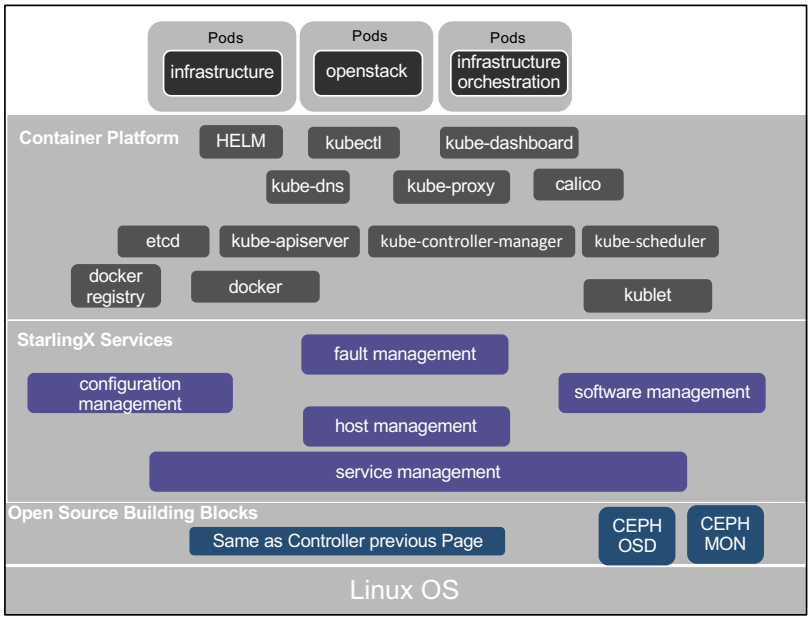


Figure 2: Hyper converged duplex configuration topology for Sub Clouds



Platform – 2 x 2U Servers OCP
Network
–10G TOR Switch
TOR optional
–LAG interfaces
–Direct connect for inter control network

Figure 3: Far Edge Blueprint Software Stack



Full Support for VMs and Containers