ELIOT Architecture Document

Blueprint overview/Introduction

ELIOT is "Enterprise Edge Lightweight and IOT" project under Akraino approved blueprint family and part of Akraino Edge Stack, which intends to develop a fully integrated edge network infrastructure and running edge computing applications on lightweight Edge Nodes. ELIOT targets on making the edge node a lightweight software stack which can be deployed on edge nodes which have limited hardware capacity by leveraging lightweight OS, a container running environment and container orchestration applications.

In addition, ELIOT stack focuses to have an infrastructure for edge computing which will enable high performance, high availability, security and reduce latency.

Use Case

IOT Gateway and uCPEs (universal CPE) are the use cases which will be covered

1. IOT Gateway - Many diverse business applications require a converged IoT gateway. In this use case, the plan is to support the following scenarios:

- IOT sensor application
- OPC-UA over TSN application
- AI Camera Application

2. uCPE (SD-WAN) - Enterprise WAN edge use of SD-WAN solutions or universal CPU (uCPE). In this use case, plan is to support following scenarios:

- Integrate tungsten fabric (vRouter in Node and controller in manager)
- SD- WAN demo

Industry Sector: WAN edge, enterprise, diverse IoT applications in various vertical market segments, Carrier

Where on the Edge

Many diverse business applications require a converged IoT gateway. Enterprise WAN edge use of SD-WAN solutions or universal CPU (uCPE)

Business use cases:

1. IoT gateway

- Smart cities
- Smart homes
- Connected vehicles
- Connected farming, agriculture
- Logistics
- Industrial, IIoT

2. SD-WAN, WAN edge, uCPE

- Hybrid WAN
- Hybrid cloud deployment
- BYOD

Overall Architecture

ELIOT Architecture consists of an ELIOT Manager and multiple ELIOT Nodes. The scale of ELIOT (edge) Nodes can range from 1 single node to 10, 100, 10K or more.

ELIOT Manager is the central controller which manages the orchestration, life cycle, management and networking of edge nodes. It can be installed on a bare metal server or cloud VM with Ubuntu 16.04 /18.04 or Cent OS 7.5 version.
The node Kubernetes Master (kubeadm, kubectl, kubelet), Kubeedge-EdgeController, Istio Controller to facilitate auto deploy, high availability, orchestration, self-healing of the ELiot Edge nodes.

ELIOT Nodes are Edge compute processing nodes which can be on an IOT Gateway or uCPE hardware or VM's. As the edge nodes can have restricted hardware resources of CPU , Memory etc, ELIOT blueprint will use
lightweight OS, Lightweight Kubelet -- KubeEdge , lightweight container runtime interface -- like containerd. By this we can leverage the core features of OS, K8S, CRI and make the edge node lightweight and efficient edge computing node by executing edge applications on node and reducing the interaction between Central Controller (Cloud Node) and the Edge Node devices.

To manage the service Istio or Kubeedge-edgemesh can be used.
Many cloud native monitoring applications can be used to collect container matrix and show them in a graphical manner, like cadvisor, grafana , prometheus.
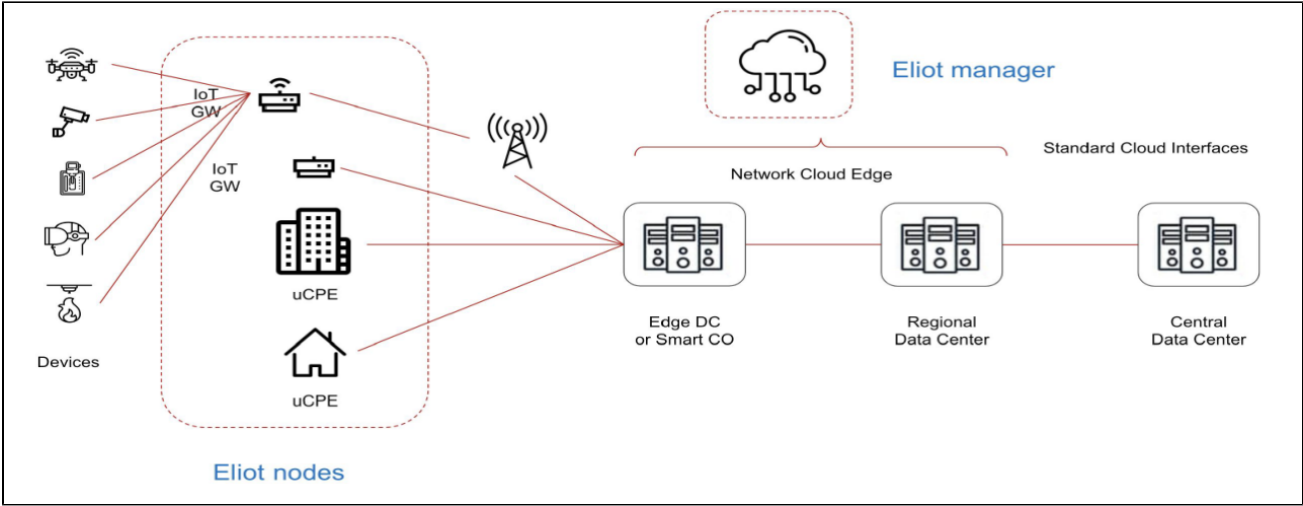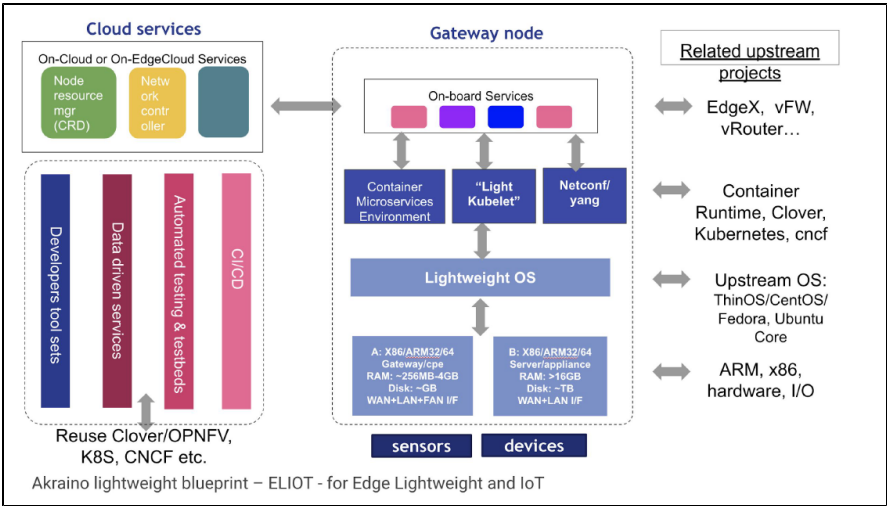
Platform Architecture

<Hardware components should be specified with model numbers, part numbers, etc>

Software Platform Architecture

S. No.	Software Name	Category	Version Number	Node
1.	Ubuntu	OS	16.04 or 18.04	Eliot Manager
2.	Docker	CRI	18.06	Eliot Manager and Eliot Edge Node
3.	Kubernetes	Orchestration	1.13	Eliot Manager
4.	Kubeedge	Orchestration/ Lightweight Kubelet	0.3	Eliot Manager and Eliot Edge Node

APIs

Not Applicable

Hardware and Software Management

Licensing

- GNU/common license