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China 2018

Handle Edge Cloud Network with KubeBus

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Agenda



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- Edge sample user scenarios
- Edge network characteristics
- Related work for edge
- KubeBus target user scenario
- KubeBus architecture
- Summary

User Sample Scenarios

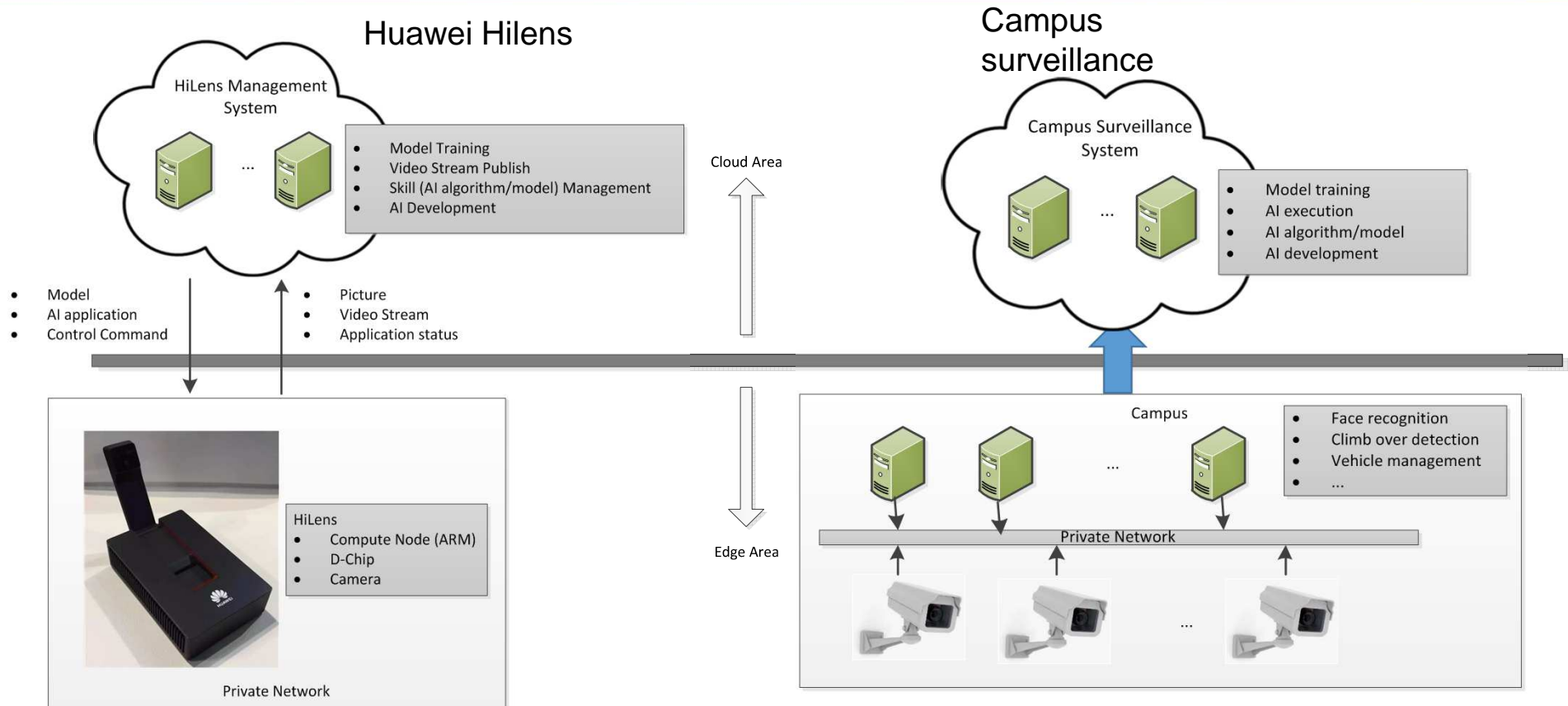


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Edge network characteristics

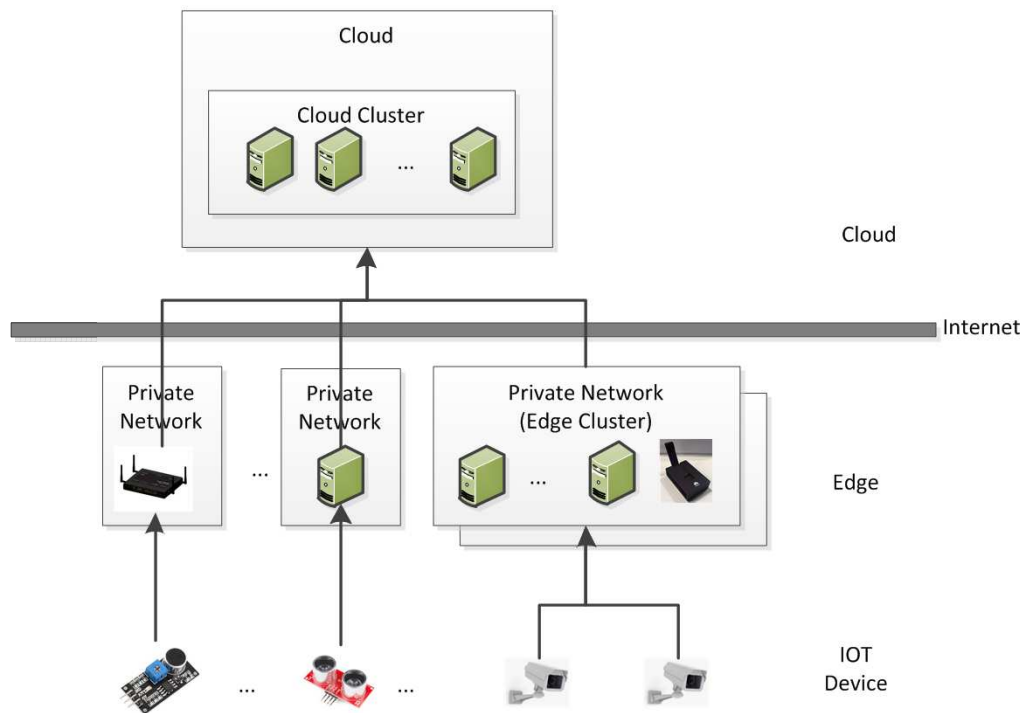


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- Edge Nodes running at private network
 - Connect to Cloud behind NAT gateway
 - Mightn't have direct connection between Edges
- Edge Nodes connect to Cloud with Internet
 - Low bandwidth
 - High latency

Related Work

--Edge/Cloud collaboration



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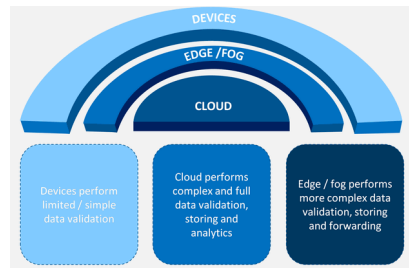


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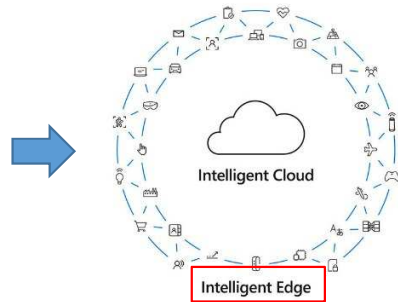
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IOT Device → Cloud



IOT Device → Edge → Cloud



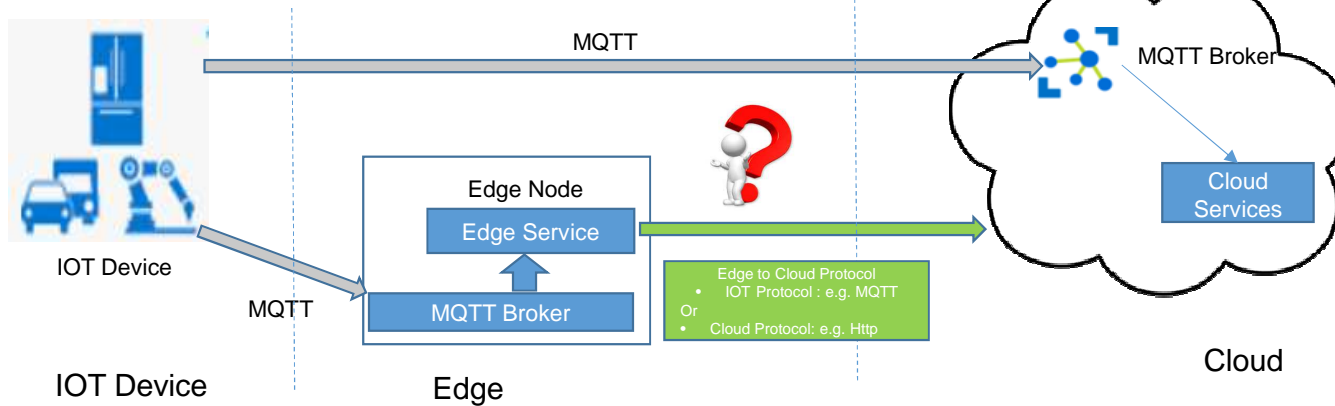
Intelligent Edge + Intelligent Cloud

Some of services are moved from Cloud to Edge

• Sample Scenarios

- IOT
 - Edge: Data local filter/aggregation
 - Cloud: Global aggregation
- AI
 - Cloud: Model training, face recognition
 - Edge: Face detect

Can the Cloud services running at Edge without change?



Communication	Protocol
Device → Cloud	MQTT
Device → Edge	MQTT
Edge → Cloud	MQTT or Http?

KubeBus target user scenario

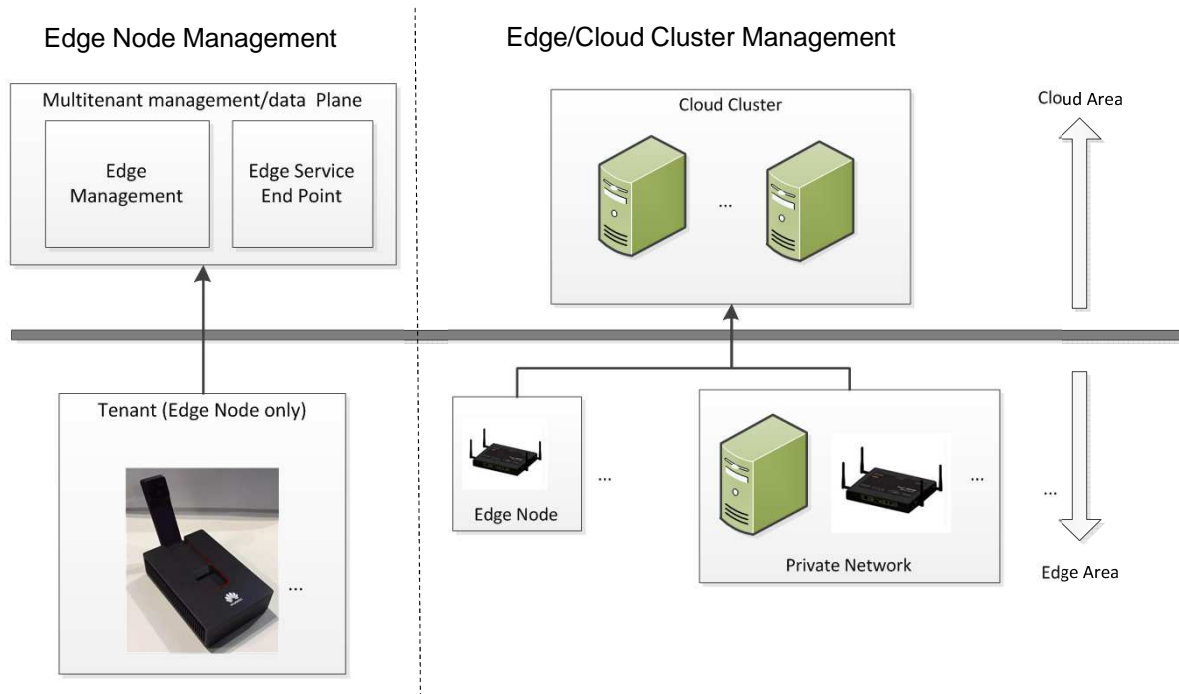


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- Edge Node Management

- **Small numbers Edge nodes** needs to be managed from Cloud, such as HiLens,
- Services running in Edge nodes needs **Service Publishing** to Internet
- Services running at Edge nodes needs **little orchestration**
- Edge nodes count per tenants is so small so needs **multi-tenant** management/data plane to save cost

- Edge/Cloud Cluster Management

- There is cloud cluster, **edge cluster**, i.e. multiple nodes running in private network
- Edge nodes, Edge cluster and cloud cluster needs acting as a **single cluster**

KubeBus Architecture

--Edge Node Management

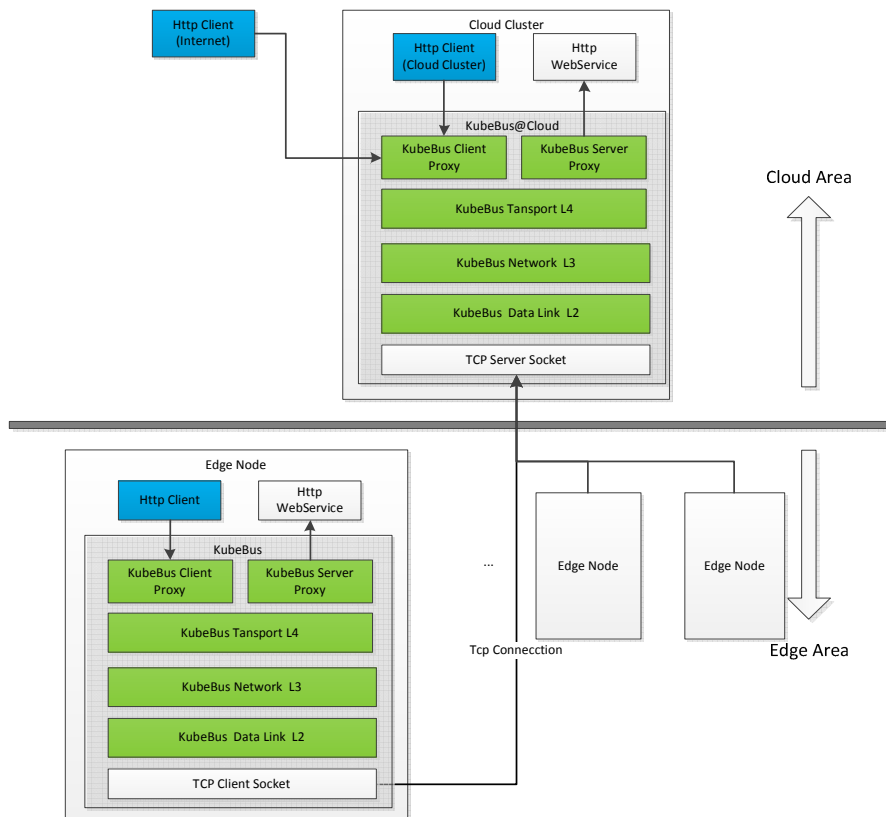


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- KubeBus Protocol Stack

- L2/L3/L4 over TCP
- KubeBus Client/Server Proxy to proxy Http packets
- Multiplex https connections over TCP connection, i.e. "L7 tunnel"

- Multitenant service publishing

- Global namespace URL definition

`Http(s)://{hostname}/{Tenant Name}/{Edge Node Name}/{Http webservice Name}/...`

- Host Name

- Edge Node Http client access: Localhost
- Internet access Http client access: EIP

- Sample scenario

- Edge remote login: Shellinabox
- Edge file remote access: Http File Server
- Edge video streaming: Http video server

KubeBus Architecture

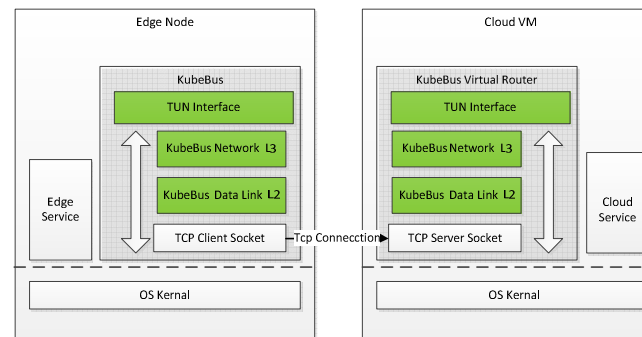
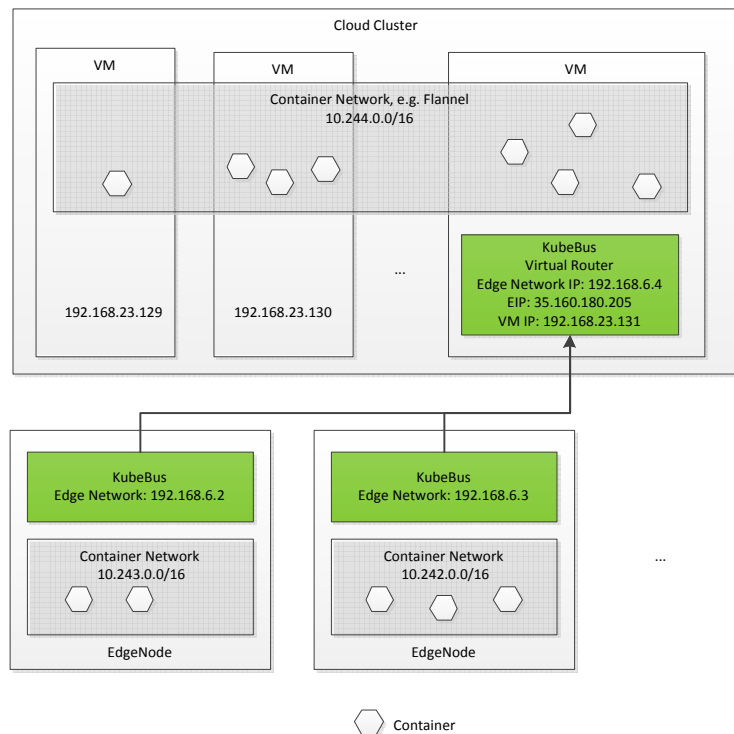


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--Edge/Cloud Cluster



- L3 tunnel
 - over KubeBus L3/L2
 - Build edge nodes subnet
- Virtual Cluster Network
 - Edge nodes subnet: 192.168.6.0/24
 - VM subnet: 192.168.23.0/24
 - Container subnets: 10.244.0.0/16, 10.243.0.0/16, 10.242.0.0/16

Summary



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- Edge network characters (Vs data center network)
 - Topology: Edge nodes running behind NAT
 - Performance: Connect to Cloud through Internet
 - Low throughput
 - High latency
- Edge Scenario:
 - Some services moved from Cloud to Edge
 - Can cloud services be deployed to and run at Edge without change
- KubeBus
 - Link Edge node/Edge cluster/Cloud cluster as single cluster with VPN
 - Support multitenant management/data plane for tenants with few edge nodes



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