Integrated Edge Cloud (IEC) Blueprint Family

Supporting companies:

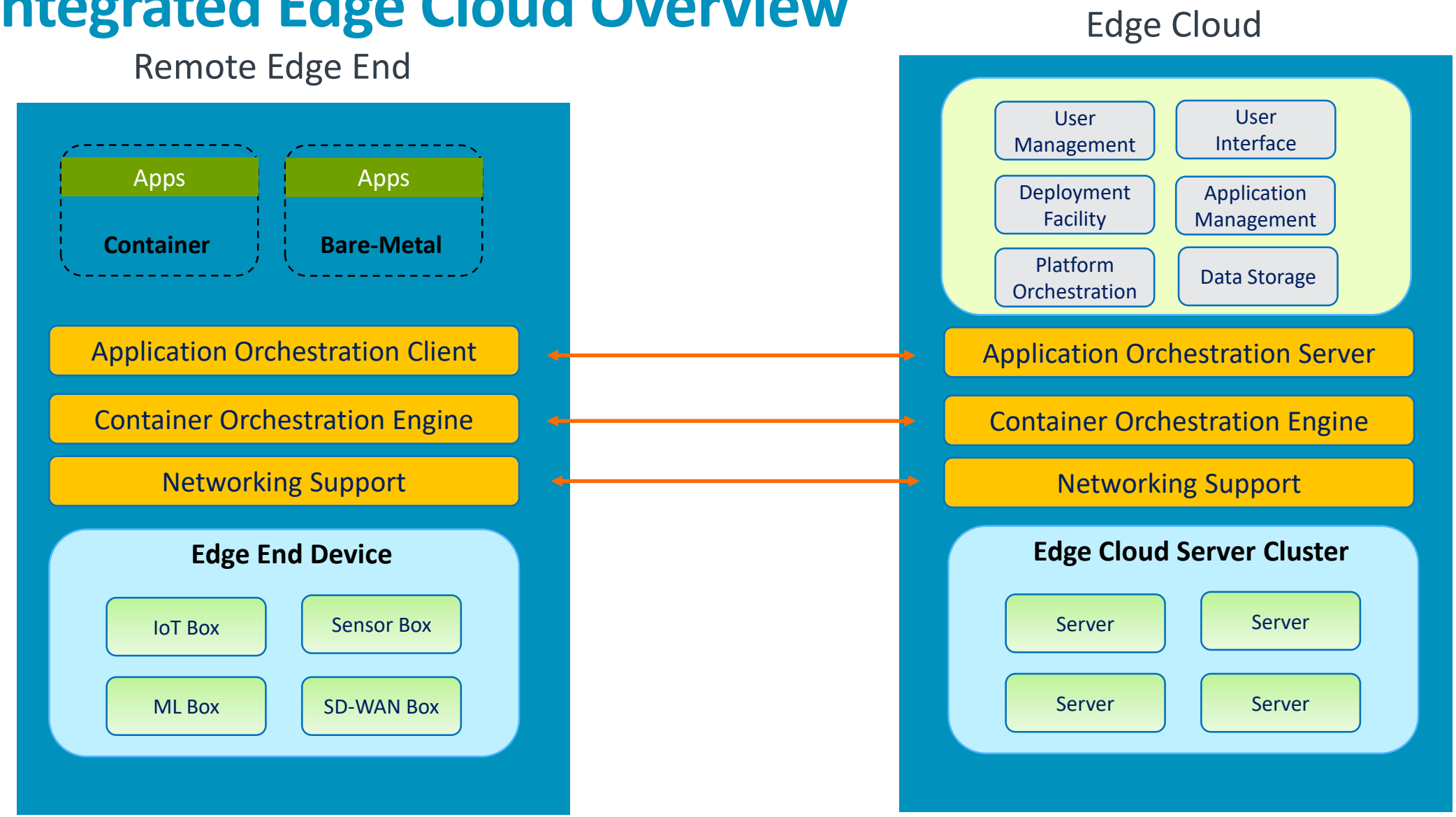
Arm, Huawei

2018/12/06

Edge Use Cases to address

- Telco/enterprise Edge cloud – for example, MEC or branch office data center…
- Telco/enterprise remote edge locations – edge platform with limited resources, for example, SD-WAN, IoT gateway…

Integrated Edge Cloud Overview



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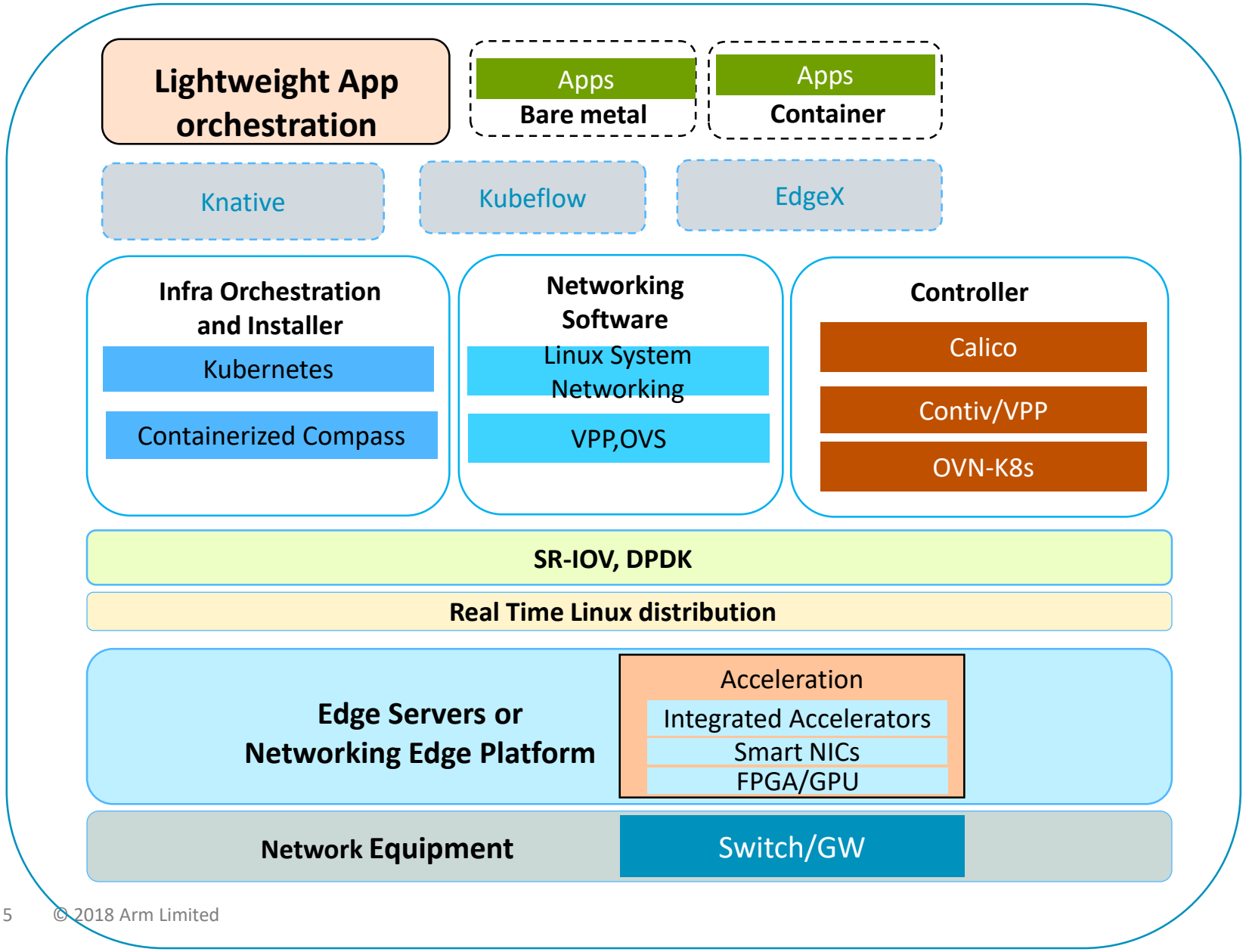
Containerized Integrated Edge Cloud Environment

- The edge applications run as containers with container orchestration engine and high performance networking support;
- The integrated edge cloud platform provides management interface and programming interface to deploy/manage edge applications quickly and conveniently
- The platform supports the applications of IoT gateway, SD-WAN, edge AI and etc.

Arm Edge Cloud Reference Stack



- Heterogeneous Architecture
  - VM, container, bare metal
  - Servers and customized Edge platforms
  - Virtualized NFs and Physical NFs
  - Accelerator interface
- Resource constraints
  - Kubernetes
  - SDN Controller for K8s
- HW Accelerations
  - Integrated accelerators
  - PCIe/CCIX attached accelerator (Smart NICs…)

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Edge Reference Stack Components

Categories	Components	Descriptions
Edge HW platforms	Networking edge platforms	Arm Cortex 8.x-A cores Integrated HW accelerators Next gen Arm CPUs and custom CPUs
	Cloud edge servers	Arm cloud edge servers Accelerator expansion via CCIX/PCIe (Smart NICs) Next gen Arm CPUs and custom CPUs
Linux Distribution	Real time Linux distro Tiny Linux distro	Linux distribution with real-time open source kernel Tiny Linux distro in resource constraint edge environment
Data Plane Solutions	DPDK	A set of open source libraries to accelerate packet processing workloads running on Arm SoCs
	Open vSwitch	An open-source implementation of a virtual switch accelerated by HW offloading
	VPP	A high performance, open source virtual switching/routing solutions

Edge Reference Stack Components – Cont'd

Categories	Components	Descriptions
SDN controllers and CNI	CNIs and Container Networking Solutions	Calico, Contiv/VPP, OVN(OVS)-Kubernetes
Infrastructure Orchestration	Kubernetes	An open source container orchestration system with NFD
Installer	Containerized Compass	Automatic deployment and management of Kubernetes
Apps Orchestration	Lightweight App orchestration	Orchestration and automation of physical and virtual network functions
Test framework & CI/CD	Edge application and reference stack test suites	Testing methodology, test suites and test cases to test and verify platform functionality

Use Case

Use Case Attributes	Description	Informational
Type	New	
Industry Sector	Telco networks, especially network edge and edge cloud	
Business driver	The Integrated Edge Cloud (IEC) will enable new functionalities and business models on the network edge. The benefits of running applications on the network edge are 1. Better latencies for end users 2. Less load on network since more data can be processed locally 3. Fully utilize the computation power of the edge devices	
Business use cases	The IEC has several deployment models that each support different business cases: 1. Telco/enterprise Edge cloud – for example, MEC or branch office data center… 2. Telco/enterprise remote edge locations – edge platform with limited resources, for example, SD-WAN, IoT gateway…	
Business Cost - Initial Build	The cost of the IEC consists of the following parts: 1. The cost of remote edge end devices 2. The cost of the edge cloud servers and networking devices 3. The software maintenance cost 4. Other cost not so explicit right now	

Business Cost - Operational	The IEC device software should be fully manageable remotely with automation. The automation should also support zero touch provisioning and management tools to keep operational cost lower.	
Operational need	The IEC must be fully operable remotely with automation. It should be able to recover from network failures by reverting to a known good network configuration.	
Security need	The solution should have granular access control and should support periodic scanning.	
Regulations	The IEC should meet all the industry regulations of data privacy, security, and environmental conditions.	
Other restrictions	Depending on the IEC deployment scenarios and environment, there can be other requirements.	
Additional details	There are typical edge end applications running on the edge end devices which provides fast network functions and responses to the end users.	

Blueprint Species

Use Case Attributes	Description	Informational
Type	New	
Blueprint Family - Proposed Name	Integrated Edge Cloud (IEC)	
Use Case	Small deployment of edge end and cloud environment.	
Blueprint proposed Name	Integrated Edge Cloud (IEC) - IEC Type 1	
Initial POD Cost (capex)	• The defining factor is power consumption < 50 W • The cost of the POD will depend on peripherals and case	
Scale & Type	• A single-board computer that meets the power limit	
Applications	IEC applications	

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Power and memory restrictions	• Less than 10 W for the SoC • Less than 1024MB of memory	
Infrastructure orchestration	ONAP Edge Automation/Kubernetes Edge Cloud orchestration	
SDN	Calico container networking, or SR-IOV, OVS-DPDK or VPP-DPDK (Contiv/VPP)	
Workload Type	• Containers	
Additional Details	Submitter to provide additional use case details	

Blueprint Species

Use Case Attributes	Description	Informational
Type	New	
Blueprint Family - Proposed Name	Integrated Edge Cloud (IEC)	
Use Case	Medium deployment of Edge Cloud	
Blueprint proposed Name	Integrated Edge Cloud (IEC) - IEC Type 2	
Initial POD Cost (capex)	• The defining factor is power consumption < 3000 W • The cost of the POD will depend on peripherals and case	
Scale & Type	• A single-board computer that meets the power limit	
Applications	IEC applications	
Power and memory restrictions	• Less than 100 W for the SoC • Less than 32GB of memory	

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Infrastructure orchestration	ONAP Edge Automation/Kubernetes Edge Cloud orchestration	
SDN	Calico container networking, or SR-IOV, OVS-DPDK or VPP-DPDK(Contiv/VPP)	
Workload Type	Container-based Network Function (CNF)	
Additional Details	Submitter to provide additional use case details	

Blueprint Proposal Details for TSC

Criteria	Integrated Edge Cloud Blueprint
Each initial blueprint is encouraged to take on at least two Committers from different companies	Arm, Huawei
Complete all templates outlined in this document	Detailed in this slide
A lab with exact configuration required by the blueprint to connect with Akraino CI and demonstrate CD. User should demonstrate either an existing lab or the funding and commitment to build the needed configuration.	Validation Lab hosted by Arm and Huawei
Blueprint is aligned with the Akriano Edge Stack Charter	All Opensource, Edge use case, Aligned with the Akraino Charter
Blueprint code that will be developed and used with Akraino repository should use only Open Source software components either from upstream or Akriano projects.	Yes, all Opensource
For new blueprints submission, the submitter should review existing blueprints and ensure it is not a duplicate blueprint and explain how the submission differs . The functional fit of an existing blueprint for a use case does not prevent an additional blueprint being submitted.	Multiple blueprints under this IEC family to support Telco use cases

Criteria	IEC Blueprint
Name of the project is appropriate (no trademark issues etc.); Proposed repository name is all lower-case without any special characters	IEC Type 1 and 2
Project contact name, company and email are defined and documented	Tina Tsou, Arm tina.tsou@arm.com
Description of the project goal and its purpose are defined	Multiple blueprints under this IEC family to support Telco/Enterpriese use cases
Scope and project plan are well defined	Targeted for release 1
Resources committed and available	There is a team, resources and lab in place
Contributors identified	Arm, Huawei, Enea
Initial list of committers identified (elected/proposed by initial contributors)	Arm, Enea
Meets Akraino TSC Policies	The Project will operate in a transparent, open, collaborative, and ethical manner at all times
Proposal has been socialized with potentially interested or affected projects and/or parties	Proposal has been reviewed by the TSC
Cross Project Dependencies (XPDs). In the case where a project will require changes in other projects, those projects are listed in the proposal, and a sponsoring developer in the project has been identified	Airship, OpenStack, K8, Docker, OS
Tools have been identified and discussed with relevant partners (Linux Foundation, IT). Once the project passes the review, the tools chain must be created within one week. Tools encompass Configuration Management, CI/CD, Code Review, Testing, Team Wiki, End Users documentation (not exhaustive)	Initial Code will be submitted for Akraino CI