



# Integrated Edge Cloud (IEC) for Network Cloud Blueprint Family

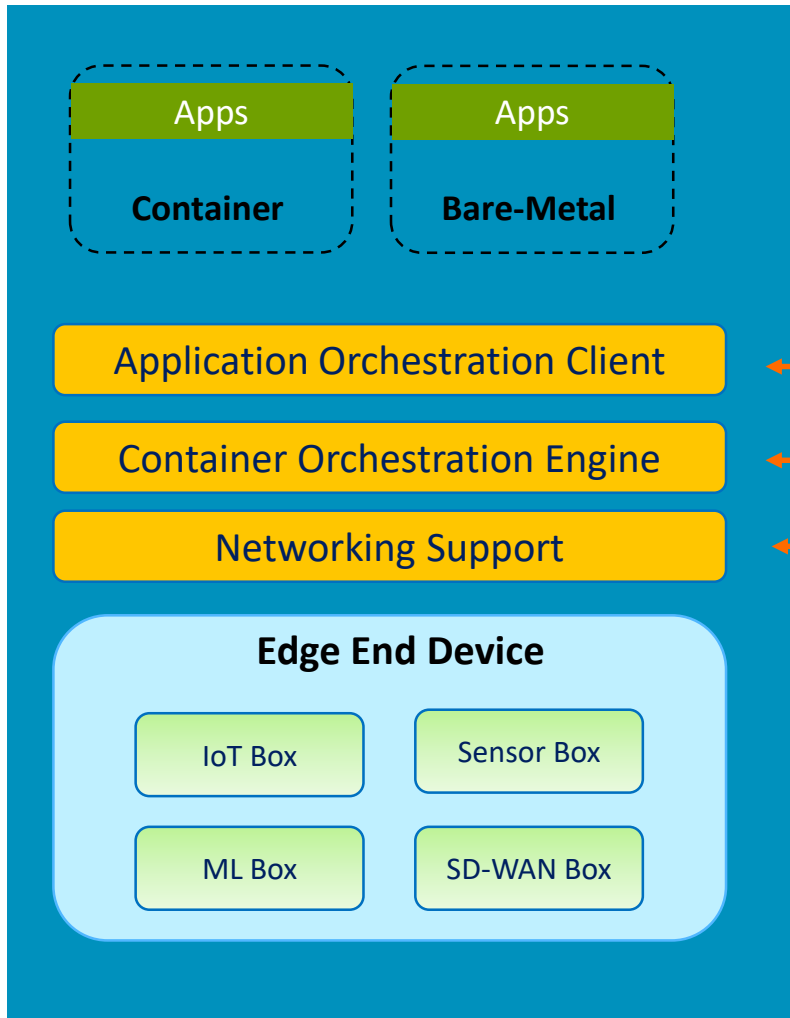
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# Edge Use Cases to address

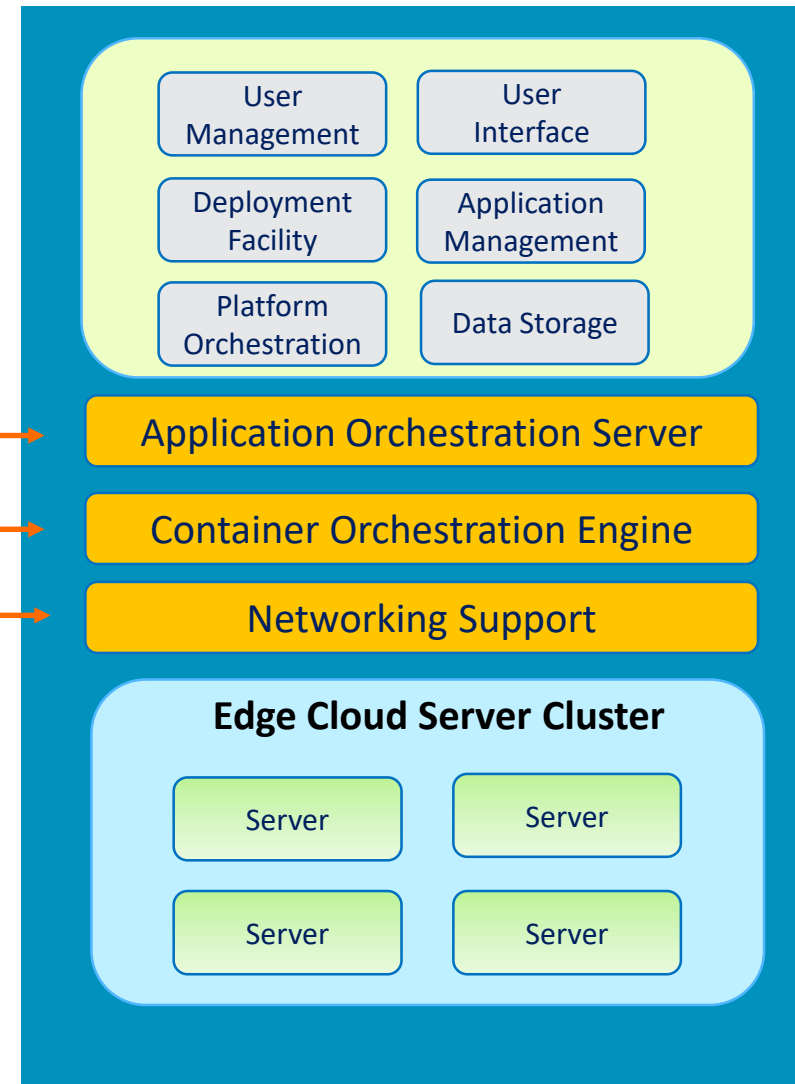
- Telco/enterprise Edge cloud – for example, MEC or branch office data center...
- Telco/enterprise remote edge locations – edge platform with limited resources, for example, SD-WAN, IoT gateway...

# Integrated Edge Cloud Overview

Remote Edge End



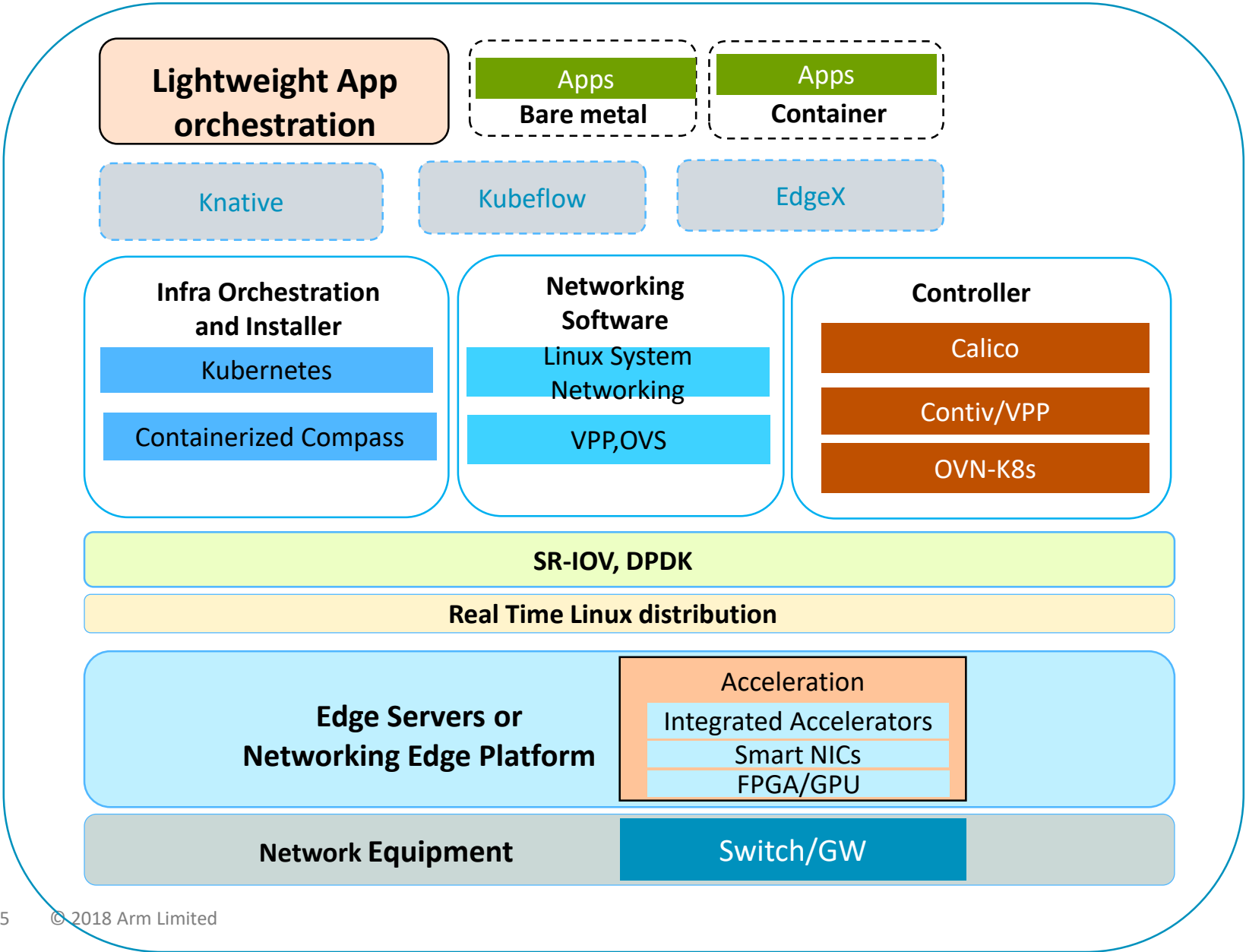
Edge Cloud



# 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...)

# 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
<b>SDN controllers and CNI</b>	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	<p>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</p> <ol style="list-style-type: none"> <li>1. Better latencies for end users</li> <li>2. Less load on network since more data can be processed locally</li> <li>3. Fully utilize the computation power of the edge devices</li> </ol>	
Business use cases	<p>The IEC has several deployment models that each support different business cases:</p> <ol style="list-style-type: none"> <li>1. Telco/enterprise Edge cloud – for example, MEC or branch office data center...</li> <li>2. Telco/enterprise remote edge locations – edge platform with limited resources, for example, SD-WAN, IoT gateway...</li> </ol>	
Business Cost - Initial Build	<p>The cost of the IEC consists of the following parts:</p> <ol style="list-style-type: none"> <li>1. The cost of remote edge end devices</li> <li>2. The cost of the edge cloud servers and networking devices</li> <li>3. The software maintenance cost</li> <li>4. Other cost not so explicit right now</li> </ol>	



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	Network Cloud	
Use Case	Small deployment of edge end and cloud environment.	
Blueprint proposed Name	Integrated Edge Cloud (IEC) - IEC Type 1	
Initial POD Cost (capex)	<ul style="list-style-type: none"><li>• The defining factor is power consumption &lt; 50 W</li><li>• The cost of the POD will depend on peripherals and case</li></ul>	
Scale & Type	<ul style="list-style-type: none"><li>• A single-board computer that meets the power limit</li></ul>	
Applications	IEC applications	

Power and memory restrictions	<ul style="list-style-type: none"> <li>• Less than 10 W for the SoC</li> <li>• Less than 1024MB of memory</li> </ul>	
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	<ul style="list-style-type: none"> <li>• Containers</li> </ul>	
Additional Details	Submitter to provide additional use case details	

# Blueprint Species

Use Case Attributes	Description	Informational
Type	New	
Blueprint Family - Proposed Name	Network Cloud	
Use Case	Medium deployment of Edge Cloud	
Blueprint proposed Name	Integrated Edge Cloud (IEC) - IEC Type 2	
Initial POD Cost (capex)	<ul style="list-style-type: none"> <li>• The defining factor is power consumption &lt; 3000 W</li> <li>• The cost of the POD will depend on peripherals and case</li> </ul>	
Scale & Type	<ul style="list-style-type: none"> <li>• A single-board computer that meets the power limit</li> </ul>	
Applications	IEC applications	
Power and memory restrictions	<ul style="list-style-type: none"> <li>• Less than 100 W for the SoC</li> <li>• Less than 32GB of memory</li> </ul>	

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	