

## Network and Edge Reference System Architectures Release 24.01 Overview



### Key Benefits

- Enabling cloud-native network transformation with simple provisioning and out-of-the box deployment
- Reliable, integrated, verified, and validated, with latest Intel® products and cloud-native source software targeting multiple deployment scenarios
- Continual innovation for forward-looking Kubernetes cluster supporting workloads deployed across network locations
- Flexible environment for developers to select HW and SW building blocks to optimize deployment

### Executive Summary

The Network and Edge Reference System Architectures (Reference Systems<sup>1</sup>) provide a foundational hardware and software platform that supports diverse edge-to-core use cases across public and private clouds and native deployments. They enable developers and deployment engineers to implement solutions easily and faster, based on predictable and validated system setups. This Solution Brief describes the content of the Reference Systems Release 24.01. The Reference Systems continue to support three Deployment Models that address native, private-cloud and public-cloud deployment scenarios: bare metal reference architecture (BMRA), virtual machine reference architecture (VMRA), and cloud reference architecture (Cloud RA). Workloads-oriented Reference System Architecture flavors defined by Configuration Profiles, are delivered for best-known system-level configuration. The Reference Systems are deployed automatically using Ansible\* scripts and offer comprehensive best-practice technical guidelines that simplify the path for delivering network and cloud solutions optimized with the latest Intel® hardware and software innovation and the latest license and open-source software releases. As a result, developers have the flexibility to choose the Reference System for their target deployment and realize the best experience from Intel® platforms.

Release 24.01 is built on the previous releases 23.10 and 23.10.01, adding the latest Intel hardware and software capabilities. The following are the key highlights of this release:

- Support for Intel® Core™ Ultra processor with NDA packages.
- Support for 5th Gen Intel® Xeon® Scalable processor for the Edge/IoT
- Support for Intel® Edge AI Box future release on 12th Gen Intel® Core™ desktop processors, 12th Gen Intel® Core™ processor for the Edge/IoT, and Intel® Core™ Ultra processor.
- Support for the Intel® In-Band Manageability Framework software to enable an administrator to perform critical Device Management operations.
- Supports Kubevirt\* by adding the ability to support VM and container workloads on the same cluster\*.
- Supports external access to services via Ingress controller for Kubernetes using NGINX\* as a reverse proxy and load balancer (ingress-nginx v4.8.3).
- Supports automated detection and configuration of SR-IOV and Intel® QAT devices for VMRA.
- Experience Kits collaterals including nine updated use-case oriented Reference System Quick Installation Guides.

<sup>1</sup> In this document, "Reference System" refers to the Network and Edge Reference System Architecture.

## Release 24.01 Highlights

The tables below list the key content elements of the Network and Edge Reference System Architectures Release 24.01.

### Use Cases Updates

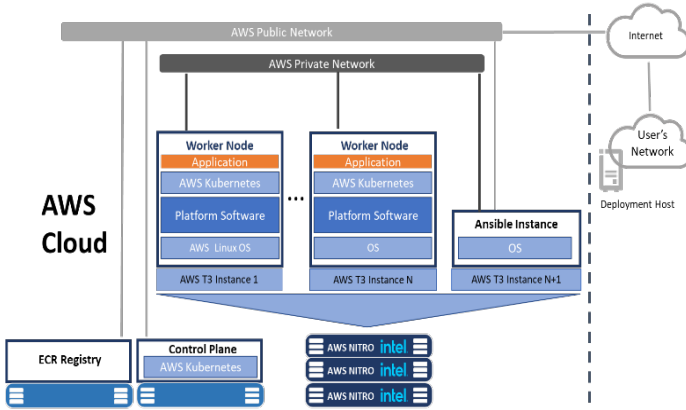
The following table lists the newly introduced and upgraded use-cases supported through Reference System 24.01.

Uses Cases	New Feature
5G vRAN with FlexRAN™ Software	<ul style="list-style-type: none"> <li>Upgraded to FlexRAN™ software release 23.11 for <a href="#">4th Gen Intel® Xeon® Scalable processor with Intel® vRAN Boost</a>. Performance-per-watt optimized SKUs up to 32 cores suited for scaling up vRAN services for dense urban environments and massive MIMO deployments.</li> </ul>
Edge AI Box	<ul style="list-style-type: none"> <li>Added support for the Intel® Core™ Ultra processor, updated software versions required by Intel® Edge AI Box (upcoming release), and introduced support for the Intel® In-Band Manageability Framework software to enable an administrator to perform critical Device Management operations.</li> </ul>

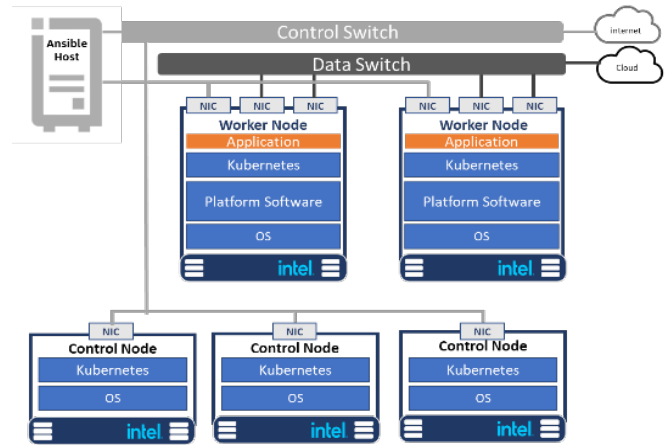
### Reference System Architecture Deployment Models Update

Reference System Architecture Deployment Models	Description
Containers Bare Metal Reference Architecture (BMRA)	<ul style="list-style-type: none"> <li>All use cases and platforms are supported and validated primarily on BMRA</li> <li>Support Kubernetes* to v1.28.3</li> <li>Support for the Intel® In-Band Manageability Framework software to enable an administrator to perform critical Device Management operations.</li> <li>Support VMs provision via Kubevirt</li> <li>Support external access to services via Ingress controller for Kubernetes using NGINX as a reverse proxy and load balancer (ingress-nginx v4.8.3).</li> <li>Update Data Plane Development Kit (DPDK*) to v23.11 LTS</li> </ul>
Virtual Machine Reference Architecture (VMRA)	<ul style="list-style-type: none"> <li>Support automated detection and configuration of SR-IOV and Intel® QAT devices.</li> <li>Support Kubernetes* to v1.28.3</li> <li>Update Data Plane Development Kit (DPDK) to v23.11 LTS</li> </ul>
Cloud Reference System Architecture (Cloud RA)	<ul style="list-style-type: none"> <li>Kubernetes to v1.28 for Cloud RA on Microsoft* Azure Kubernetes Service (AKS) and Amazon Elastic Kubernetes Service* (Amazon EKS*)</li> </ul>

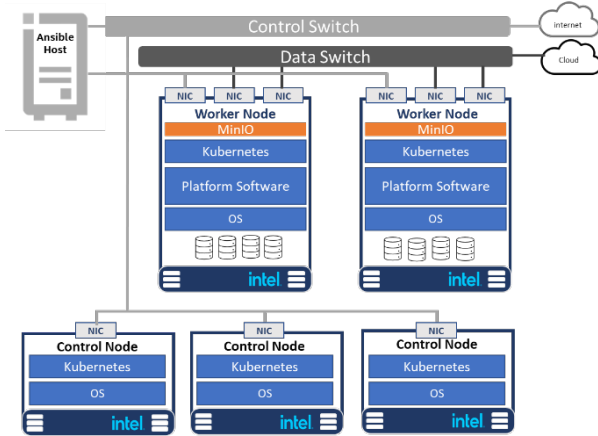
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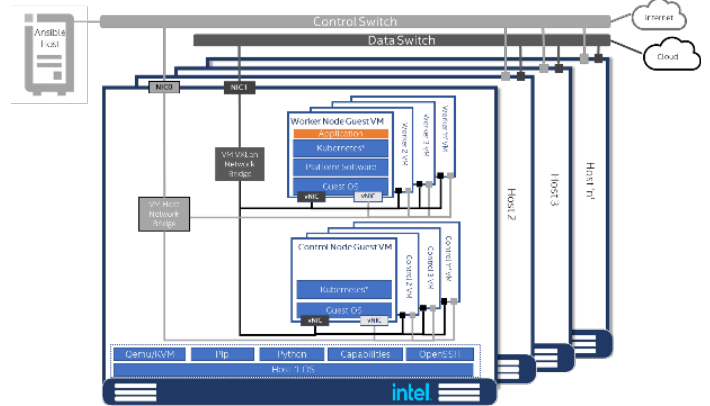
Cloud RA - Amazon EKS example  
Also available on AKS



BMRA as a K8s cluster example  
Also available on Bare Metal without Kubernetes



BMRA with MinIO\* Object Storage example  
Also available with other local/remote Storage options



VMRA Multi-Node example  
Also available as a single-server cluster

## Reference System Architecture Configuration Profiles Supported

Configuration Profile	Description
Network Location Category	<p>Predefined optimized configuration profiles that are aligned with use cases supported across edge to 5G Core network locations:</p> <p><b>Existing, updated Configuration Profiles:</b> On-Premises AI Box, On-Premises VSS; On-Premises SW Defined Factory, On-Premises Edge; Access Edge (for example, vRAN at the Far Edge); Remote Central Office Forwarding (for example, 5G UPF, vBNG, vCMTS, Access Gateway Function); Regional Data Center (for example, Video Production, Media Transcoding focused, CDN)</p>
Generic Category (developer choice)	<p>Flexible options for developers to deploy Basic and Build-Your-Own Configuration Profile with a "Cleanup" function to reset the deployed profile</p>

## Key Hardware Elements Supported

Hardware Element	Description
Processors	<ul style="list-style-type: none"> <li>4th, and 5th Gen Intel® Xeon® Scalable processors and Intel® Xeon® D processors</li> <li>4th Gen Intel® Xeon® Scalable processors with Intel® vRAN Boost</li> <li>5th Gen Intel® Xeon® Scalable processors for Edge/IoT</li> <li>Intel® Core™ Ultra processors</li> <li>12th Gen Intel® Core™ desktop processors</li> <li>12th Gen Intel® Core™ mobile processors</li> <li>12th Gen Intel® Core™ processor for Edge/IoT</li> <li>13th Gen Intel® Core™ mobile processors</li> <li>Intel Atom® x6000e series processors</li> </ul>
Platforms Supported	<ul style="list-style-type: none"> <li>1x Intel® Xeon® D-2700 processor on Intel reference platform (code named Moro City)</li> <li>1x Intel® Xeon® D-1700 processor on Intel reference platform (code named Brighton City)</li> <li>2x 4th or 5th Gen Intel® Xeon® Scalable processors on the Intel reference platform (code named Archer City)</li> <li>2x 4th or 5th Gen Intel® Xeon® Scalable processors on Intel® SDP S2EG4SEQ5Q</li> <li>1x 4th Gen Intel® Xeon® Scalable processors with Intel® vRAN Boost on Intel® SDP S2EG4SEQ5Q</li> </ul>
Network	<ul style="list-style-type: none"> <li>Intel® Ethernet 700 and 800 Series</li> <li>Integrated Ethernet ports for the Intel® Xeon® D, Intel® Core™ and Intel Atom® processors</li> </ul>
SmartNIC	<ul style="list-style-type: none"> <li>Intel® Infrastructure Processing Unit (Intel® IPU) ASIC E2000 card</li> </ul>
QAT	<ul style="list-style-type: none"> <li>Intel® QuickAssist Adapter 8960 or 8970 (PCIe*) AIC or equivalent third-party Intel® C620 Series Chipset</li> </ul>
FEC Accelerator	<ul style="list-style-type: none"> <li>Intel® vRAN Accelerator ACC100 Adapter</li> <li>Intel® vRAN Boost</li> </ul>
GPU	<ul style="list-style-type: none"> <li>Intel® Data Center GPU Flex 140, Intel® Data Center GPU Flex 170</li> <li>Intel® Arc™ A380 Graphics</li> </ul>
FPGA	<ul style="list-style-type: none"> <li>Intel® FPGA SmartNIC WSN6050 Platform</li> </ul>

## Key Software Capabilities Updates

Capability	
Latest Software Support Summary	<p>New:</p> <ul style="list-style-type: none"> <li>• Intel® In-Band Manageability Framework software v4.1.4</li> <li>• Kubvert* v1.1.0</li> <li>• ingress-nginx v4.8.3</li> </ul> <p>Updated: Version upgraded for the vast majority of Reference System components (See User Guide for complete BOM and versions) Notable updates:</p> <ul style="list-style-type: none"> <li>• Kubernetes* to v1.28.3</li> <li>• Rancher* to 2.7.9</li> <li>• Intel® Power Manager to v2.3.1</li> <li>• Intel Node Feature Discovery (NFD) to 0.14.3</li> <li>• Data Plane Development Kit (DPDK*) to v23.11</li> <li>• Open Vswitch with DPDK* to 3.2.1</li> <li>• SRIOV FEC Operator to 2.8.0</li> <li>• FlexRAN™ software to 23.11</li> <li>• Intel® Multi-Buffer Crypto for IPsec library to v1.5</li> <li>• Intel® QAT Engine for OpenSSL to v1.4</li> <li>• OpenSSL* to 3.1.4</li> <li>• Istio* Service Mesh to v1.20.1</li> </ul>

## Reference Documentation

The Network and Edge Reference System Architectures ease your path for delivering solutions based on Intel’s most advanced cloud-native platform. The Reference System is delivered with supporting Experience Kits, which include a wealth of collaterals, training videos, and demos available on [Intel Network Builders Network & Edge Platform Experience Kits](#).

Features available only under NDA can be accessed through links in the User Guides.

The Network and Edge Reference System Architectures guides:

- [Network and Edge Reference System Architectures Portfolio User Manual](#)
- [Network and Edge Container Bare Metal Reference System Architecture User Guide](#)
- [Network and Edge Virtual Machine Reference System Architecture User Guide](#)
- [Network and Edge Cloud Reference System Architecture User Guide](#)
- [Network and Edge Reference System Architectures - Single Server Quick Start Guide](#)
- [Network and Edge Reference System Architectures - Edge Analytics Video Structuring Server \(VSS\) Quick Start Guide](#)
- [Network and Edge Reference System Architectures - Industrial Controller Quick Start Guide](#)
- [Network and Edge Reference System Architectures - vRAN Setup with FlexRAN™ Software Quick Start Guide](#)
- [Network and Edge Reference System Architectures - 5G vRAN Security Quick Start Guide](#)
- [Network and Edge Reference System Architectures - 5G Core UPF Quick Start Guide](#)
- [Network and Edge Reference System Architectures - CDN Quick Start Guide](#)
- [Network and Edge Reference System Architectures - Video Production Quick Start Guide](#)
- [Network and Edge Reference System Architectures - On Premises Edge AI Box Quick Start Guide](#)

## Document Revision History

REVISION	DATE	DESCRIPTION
001	May 2022	Initial release.
002	June 2022	Updated figure 1.
003	June 2022	Added new reference in the More Information section and updated figure 2.
004	July 2022	Updated for Reference System Architecture Release 22.06; added support for FlexRAN™ software.
005	October 2022	Updated for Reference System Architecture Release 22.08; added information about the new Cloud Reference System Architecture (Cloud RA) deployment model.
006	December 2022	Updated for Reference System Architecture Release 22.11.
007	March 2023	Updated for Reference System Architecture Release 23.02.
008	July 2023	Updated for Reference System Architecture Release 23.07.
009	October 2023	Updated for Reference System Architecture Release 23.10.
010	January 2024	Updated for Reference System Architecture Release 24.01.



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