

Network and Cloud Edge Reference System Architectures Release 22.05 Overview



Key Benefits

- Easing the path to cloud native network transformation
- Continual innovation for forward-looking Kubernetes cluster supporting workloads deployed across network locations
- Reliable integrated, verified, and validated latest Intel® products and cloud native open-source software targeting multiple deployment scenarios
- Friendly and flexible environment for developers to select hardware and software building blocks and generate recipes of their choice

Executive Summary

The Network and Cloud Edge Reference System Architectures (RA) provide a common hardware and software platform that supports diverse edge to 5G-core use cases. The RAs offer comprehensive technical guidelines that simplify the path for delivering Network and Cloud solutions optimized with the latest Intel® hardware and software innovation.

This document highlights the content of Network and Cloud Edge RA Release 22.05, which builds upon the previous RA releases. Release 22.05 delivers integrated, tested, and validated Reference Architecture flavors that support edge to 5G core use cases such as vRAN, 5G-Core, Access Gateway Function, and Media Transcoding. As with previous RA releases, 22.05 incorporates the most recent available Intel innovations including support for 4th Generation Intel® Xeon® Scalable processors (code named Sapphire Rapids), Intel® Xeon® D processors, and Cloud Native SW innovation such as the Cloud Native Data Plane (CNDP) framework software, new investments in Service Mesh, power management, secure Key Management and more.

Enhanced Ansible playbooks enable automatic and simple provisioning and installation of diverse RA use-cases saving time and reducing the risk of installation errors. These Ansible playbooks implement Configuration Profiles that are based on Best Known Configurations (BKC) and optimization recommended by Intel experts.

In addition, to ease the developer journey, RA 22.05 introduces the Build-Your-Own Configuration Profile that allows engineers to pick and choose the hardware and software building blocks necessary for their job, while maintaining system integrity. Along with the “Cleanup” function, developers can now easily and quickly build, clear, and build again their RA environment.

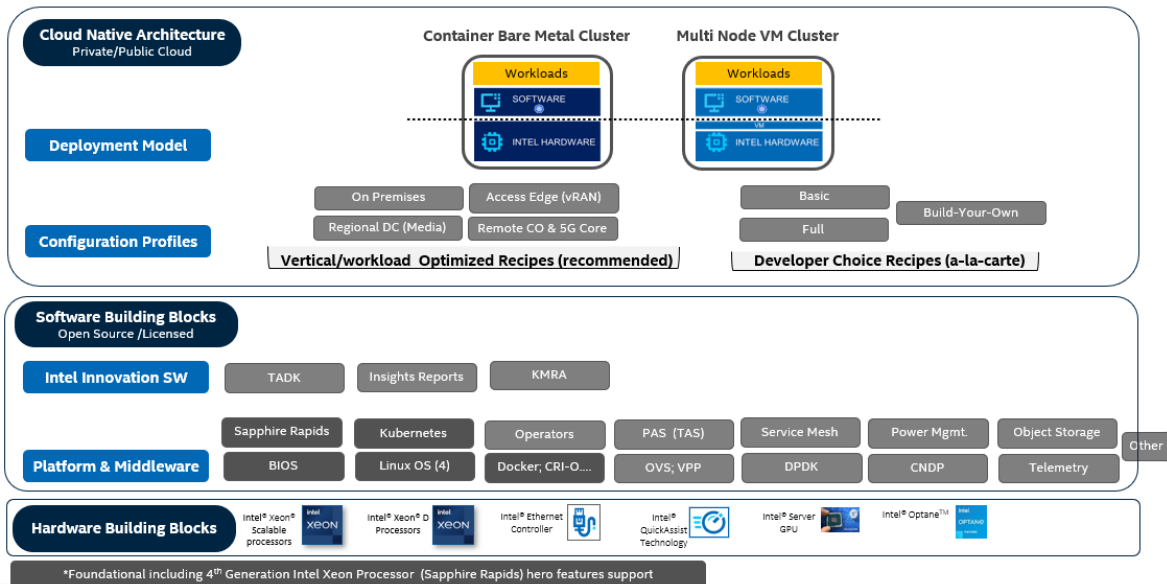


Figure 1. A common cloud native Network and Cloud Edge Reference System Architecture with multiple configuration options

Release 22.05 Highlights

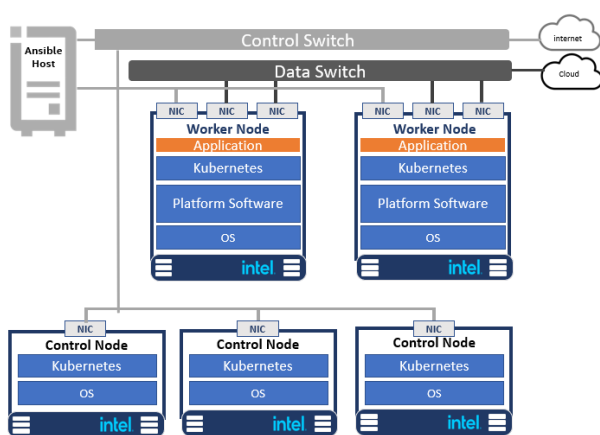
The tables below list the key content elements of the Network and Cloud Edge Reference System Architectures Release 22.05.

Deployed Use Case Updates

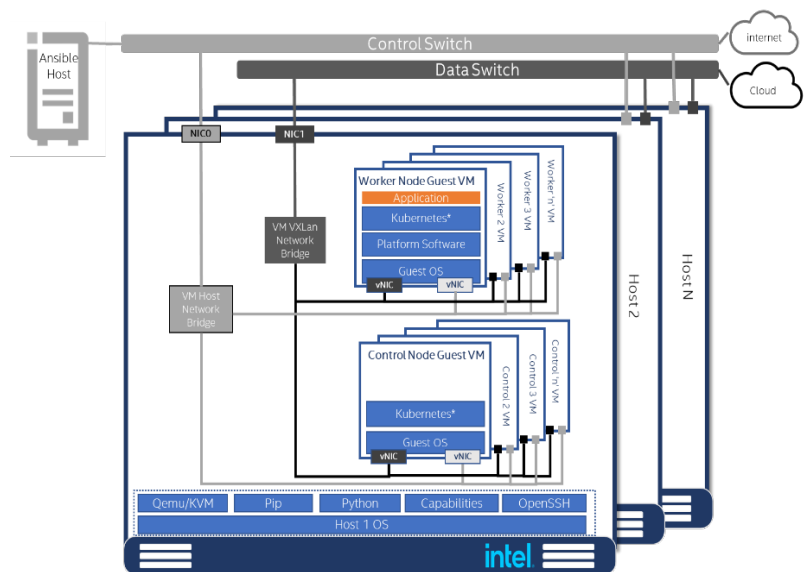
Uses Cases	New Feature
5G vRAN	An Access Edge (Far Edge) configuration profile is introduced to expedite vRAN enablement on BMRA. This initial implementation allows the deployment of Distributed Unit (DU) on Ubuntu and Kubernetes and is using the Forward Error Correction (FEC) accelerator.
5G Core	Introducing 5G Security. Implement Service Mesh with automatic Key Management based on Intel® Software Guard Extension (Intel® SGX) for enabling capability to comply with 3GPP security standards in a service base architecture.
Sustainability	Power Management to drive optimized resources utilization and power saving available for all deployment use-cases. See capability table for new power management features.

RA Deployment Models Supported

RA Deployment Models	Description
Containers Bare Metal Reference Architecture (BMRA)	Updated the BMRA to support additional use cases models and software capabilities.
Virtual Machine Reference Architecture (VMRA)	Introducing the Multi-node Virtual Cluster RA . The previous RA release supported a single node virtual cluster. This release supports multiple nodes enabling scaling up and out. This deployment model abstracts the Intel® platform mimicking the cloud for testing features and performance of the latest Intel platform relative to the existing platform.
Container Bare Metal with Object Storage (BMRA for Storage)	Updated the BMRA flavor that supports a MinIO Object Storage.



Contain Bare Metal Reference Architecture



Virtual Machine Reference Architecture Multi Node

RA Configuration Profiles Supported

Configuration Profile	Description
Vertical and workloads recommended recipes	Predefined optimized configurations for edge to 5G Core workload: On Premises Edge; Access Edge (vRAN at the Far Edge); Remote Central Office Forwarding (e.g., vBNG, vCMTS, Access Gateway Function); Regional Data Center (Media Transcoding focused; CDN)
Developer choices recipes	Flexible options for developers to deploy: Full, Basic, and Build-Your-Own Configuration Profile; In addition, have a "Cleanup" function to reset the deployed profile

Key Hardware Elements Supported

Hardware Element	Description
Processors	2nd, 3rd, and 4th Generation Intel® Xeon® Scalable processors and Intel® Xeon® D processors (code named ICX-D). Release includes software supporting the features available through these processors. See below details on the 4th Generation Intel Xeon Scalable processor (SPR-SP) features.
Platforms Supported	Moro City (1S-ICX-D 2700), Brighton City (1S-ICX-D 1700), Archer City (2S-SPR XCC, MCC) Quanta S6Q SDP (2S-SPR XCC, MCC), DSG's Fox Creek Pass (2S-SPR XCC, MCC), Ruby Pass (1S-SPR XCC, MCC), Taylors Falls (1S-ICX-D 1700)
Network Controllers	Intel® 700 and 800 Series Ethernet Controllers
Plug-in Cards	Intel Server Graphic Processing Unit (GPU), ACC100

Key Software Capabilities Updates

Capability	Updates
Service Mesh with Security	<p>Service Mesh Integrated with Key Management (KMRA 22.01). Dynamic KMRA provisioning is possible through introduction of two additional Service Mesh features:</p> <ul style="list-style-type: none"> • The Trusted Certificate Issuer, a container image, which implements Trusted Certificate Service for Kubernetes platform • The Containers for the trusted certificate issuer, an external cert-manager, which supports SGX enclaves <p>Additional Service Mesh features are available under RA NDA version (e.g. acceleration using QuickAssist (QAT for BMRA only).</p>
Telemetry	New image of the Telegraf release 1.1 and support for Performance Monitoring Unit (PMU) platform telemetry.
Cloud Native Data Plane (CNDP)	Deliver a data plane framework to meet the requirements of high-performance, cloud native packet processing applications.
Operators	<p>Intel® Ethernet Operator orchestrates and manages the configuration of the capabilities exposed by the Intel E810 Series NICs.</p> <p>Forward Error Correction (FEC) operator orchestrates and manages the resources/devices exposed by a range of Intel's vRAN FEC acceleration devices/hardware within the Kubernetes cluster.</p>
OS	Supports Rocky Linux version 8.5 developed by Rocky Enterprise Software Foundation.

4th Generation Intel® Xeon® Scalable Processor Key Features

Both VMRA and BMRA are enabled on the 4th Generation Intel Xeon Scalable processors. The various features of this processor were verified in this release for the BMRA. A summary of their validation is shown in the following table. Description of the features can be found in the [Network and Cloud Edge Reference System Architectures Portfolio User Manual](#).

	Feature	Kernel Intercept		Commercial Linux Distro Intercept (Trend)		BMRA Status	
		Kernel	KVM / Host & Guest	RHEL	Ubuntu	BMRA Support in 22.05	Status / Next Release updates
CPU / Accelerator	IAX	5.11	5.16	RHEL 8.5+	22.04	Yes	RA OS includes the kernel support since RA 21.09 release.
	QAT	5.11	5.14	RHEL 8.4+	22.04	Yes (NDA)	Supported and tested. Also validated as part of the NGINX workload since RA 21.09 release
	DLB	TBC	TBC	TBC	TBC	Yes(NDA)	Available as userspace library in DPDK since RA 21.09 release. DLB is not up-streamed in a Linux kernel yet, drivers available from 01.org
	DSA	5.14	5.16	RHEL 8.5+	22.04	Yes (NDA)	DSA supported and tested, including support for the DSA operator since RA 21.09 release
Power Mgmt	New: SST-PP/ SST-TF (inc. SST-BF, SST-CP)	5.3		RHEL 8.3	22.04	Yes	SST-BF and SST-PP were available in previous generation. New SST-CP and SST-TF are supported and tested since RA release 21.09.
Security	SGX	5.11	5.13	RHEL 8.5	22.04	Yes	Supported and tested, including the SGX device plugin since BMRA 21.09 release Not yet supported in VMRA.
	CryptoDev and CryptoNI	N/A	N/A	N/A	N/A	No	Supported and tested through DPDK since RA release22.01
RAS	RAS	5.11		RHEL 8.5		Yes	collectd and telegraf include RAS plugins since RA 21.09 release
ISA	FP-16 (5G ISA)	5.11		RHEL 8.4		Yes	BMRA OS includes the kernel support since RA 21.09 release
	AMX (TMUL)	5.16		RHEL 9.0+	TBC	No	Not yet supported
	VP2INTERSECT	5.4		RHEL 8.4		Yes	BMRA OS includes the kernel support since RA 21.09 release
	AIA (MOVDIRi, Power Instrs.)	5.10		RHEL 8.4	22.04	Yes	Supported and tested as part of the DPDK 21.08 release since RA 21.09 release
I/O	CXL 1.1	5.11		RHEL 8.5		Yes	Supported as part of the DPDK 21.08 release and since RA 21.09 release (Not tested in RA)
	PCIe Gen5	5.3		RHEL 8.4		Yes	BMRA OS includes the kernel support since RA 21.09 release
Virtualization	SIOV	TBC	TBC	TBC	TBC	Yes (NDA)	BMRA OS includes the kernel support since RA 21.09 release
	SVM	TBC		TBC	TBC	No	Not yet supported

**Generic SPR is supported by VMRA outside of SGX. SPR Hero features support will be added in future releases

Figure 2. 4th Generation Intel Xeon Scalable processors key features

Where to Get More Information

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

The Network and Cloud Edge Reference System Architectures guides:

- [Network and Cloud Edge Reference System Architectures Portfolio User Manual](#)
- [Network and Cloud Edge Container Bare Metal Reference System Architecture User Guide](#)
- [Network and Cloud Edge Virtual Machine Reference System Architecture User Guide](#)
- [Network and Cloud Edge Reference System Architectures on a Single Server 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.



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