infinitive group

ramus | Ramus

Purpose-built IoT Edge server

Today, rolling stock owners and train operating companies are forced to make a choice between underpowered IoT gateways and PCs, or overpowered and non-ruggedized datacentre centric servers.

With the advent of Infinitive Group's Ramus edge compute server platform, there is now a credible alternative in the industry space—Ramus has passed rigorous testing procedures, and strictly adheres to industry standards to ensure it can provide an elegant, resilient, futureproof solution in the harshest of railway environments. As such, Ramus is the perfect solution for on-vehicle edge computing, AI, data analytics, and data storage applications in the rail industry.

The Ramus Edge Server from Infinitive Group is an Intel® Xeon® D-2100-based, 1U height, half-width, and short-depth Edge server that can go almost anywhere. It can be hung on a rail, mounted on a plate, or located in a rack. This rugged Edge server can handle temperatures from -20°C to 60°C, as well as tolerating environments with high-dust and vibration considerations.

Ramus is designed to virtualize traditional IT and OT applications, as well as provide new, transformative, IoT and AI systems, providing the processing power, storage, and networking required for today's edge workloads.

Secure, Connected and Reliable

At Infinitive Group, security begins with design, and continues through the supply chain, delivery, installation, management, and the full lifecycle of the system.

Ramus uses advanced digital watermarking to detect corrupt data or malicious intrusions in real time, enabling digital transformation through innovation and insight without comprising security.

The Ramus Edge Server provides numerous connectivity options, with wired and secure Wi-Fi and LTE connection capabilities. Reliability features such as network failover, redundant boot and data drives, high temperature components, and support for hyperconverged clustering keep critical Edge workloads running.

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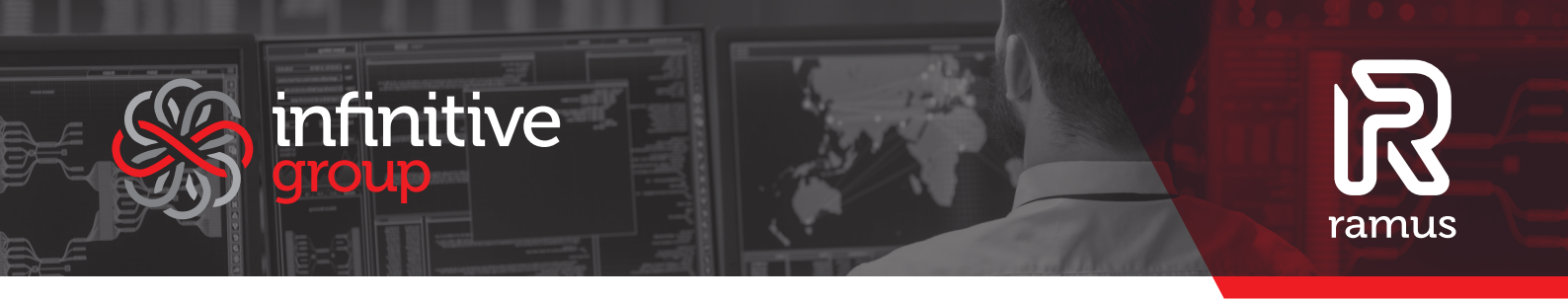

Agility and Remote Manageability

It is costly and time consuming to send IT staff to rollingstock assets. Remote server management which is needed in order to minimise OPEX expense servicing hardware in production is provided through industry-standard interfaces:

- Intelligent Platform Management Interface (IPMI) Version 2.0
- Simple Network Management Protocol (SNMP) Version 3 (no SET commands; no SNMP v1)
- Common Information Model (CIM-XML)
- Representational State Transfer (REST) support
- Redfish support (DMTF compliant)
- Web browser - HTML 5-based browser interface (Java and ActiveX not required) using a responsive design (content optimized for device being used - laptop, tablet, phone) with NLS support

Remote management is available via the following connections:

- Via the dedicated Ethernet ports for management. The wireless and wired network modules both have a dedicated RJ45 Ethernet port for remote management.
- Via Port 1 of the 10 GbE SFP+ ports supports NC-SI to allow sharing of the Ethernet port between the operating system and remote management.
- Via a wireless connection (Wireless Network Module only). This connection is disabled by default but can be enabled and configured in the XCC via the BMC Network Bridge setting.

Specifications

Components

Processor	One Intel Xeon D-2100 Series processor. Supports processors up to 16 cores, core speeds of up to 2.2 GHz, and TDP ratings of up to 100W. Processor is soldered onto system board.
Memory	4 DIMM slots. The processor has 4 memory channels, with 1 DIMM per channel. Lenovo TruDDR4 DIMMs operating at 2666 MHz. RDIMMs and LRDIMMs are supported
Memory maximum	Up to 256GB with 4x 64GB LRDIMMs
Memory protection	ECC, SDDC (for x4-based memory DIMMs)

Components

Drive bays	Internal storage is implemented using M.2 drives (no 2.5-inch drive bays). Up to 3x M.2 adapters (1x boot adapter, 2x data adapters) can be installed with a total of 10x M.2 drives. • 1x Single M.2 Adapter (1 drive) or 1x Dual M.2 Adapter (2 drives) installed in dedicated slot, for boot • 1x 4-bay PCIe x16 adapter in dedicated bay, for 4x M.2 drives, NVMe or SATA, for data • 1x 4-bay PCIe x16 adapter in PCIe riser slot, for 4x M.2 adapters, NVMe only, for data
Maximum data storage	NVMe drives: 16 TB using 8x 2TB NVMe drives SATA & NVMe drives: 15.68 TB using 4x 1.92 TB SATA drives + 4x 2TB NVMe drives
Storage controller	• Boot drives: o Single-drive adapter: SATA controller of the processor (no RAID) o Dual-drive adapter: Marvell 88SE9230 6 Gbps SATA controller - RAID-0 or RAID-1 (UEFI Boot mode only) • Data drives: o SATA/NVMe Adapter: Onboard SATA controller supporting RAID 0, 1, 5, 10 (Intel RSTe) o SATA RAID Adapter: Two Marvell 88SE9230 controllers each connected to two drives; RAID-0 or RAID-1
Network interfaces	Networking depends the network module selected: • Wireless network module (Wireless enabled LOM package): 802.11ac Wi-Fi and LTE, 2x 10GbE SFP+, 2x 1GbE SFP, 2x 1GbE RJ45 (support 10/100 Mbps), dedicated port for remote management. Port 1 of the 10GbE ports can be shared with the XCC management processor for Wake-on-LAN and NC-SI support. • Wired SFP+ network module (10G SFP+ LOM package): 2x 10GbE SFP+, 2x 1GbE RJ45 (support 10/100 Mbps), 2x dedicated ports for remote management (redundant connections or daisy-chain capable). Port 1 of the 10GbE ports can be shared with the XCC management processor for Wake-on-LAN and NC-SI support. • Wired BASE-T network module (10GBASE-T LOM package): 2x 10GBASE-T RJ45, 2x 1GbE RJ45 (support 10/100 Mbps), 2x dedicated ports for remote management (redundant connections or daisy-chain capable). Port 1 of the 10GbE ports can be shared with the XCC management processor for Wake-on-LAN and NC-SI support. The PCIe 3.0 x16 slot can also be used for an additional network card if desired.

Components

PCI Expansion slots	One PCIe 3.0 x16 slot
Ports	Front: Two USB 3.1 G1 (5 Gb/s) ports, VGA port, One or two dedicated RJ-45 1GbE systems management port (depends on network module selected), dedicated mini-USB port for local systems management including initial activation. Rear: Two USB 2.0 ports, one RJ-45 serial port
Cooling	Three non-hot-swap 40 mm fans (all 3 standard), N+1 redundant in most configurations.
Power supply	Two choices for power input: • 12V DC using one or two external AC power adapters with plugged inputs. Two adapters form a redundant pair in most configurations. Power source is 100-127 V AC (3.2A) or 200-240V AC (1.6A) for each adapter. • -48V DC using a hardwired Telco connection.
Video	G200 graphics with 16 MB memory with 2D hardware accelerator, integrated into XClarity Controller. Maximum resolution is 1920x1200 32bpp at 60Hz.
Systems management	Operator panel with status LEDs. Dedicated ports for local management (mini USB for use with mobile app) and remote management (RJ45 Ethernet ports). Remote management can also be performed from a wireless connection (disabled by default).
Security features	Trusted Platform Module, supporting TPM 2.0. In China only, optional Nationz TPM 2.0. Front locking bezel, Kensington cable slot with intelligent lock position switch, G-sensor trigger for motion detection, intrusion detection, self-encrypting drive (SED) support, power-on password, administrator's password.
Operating systems supported	Microsoft Windows Server, Red Hat Enterprise Linux, SUSE Linux Enterprise Server, VMware ESXi. Ubuntu Server certification.
Mounting options	Horizontal or vertical orientation. Bookshelf mount (3 servers), DIN rail wall mount, ceiling mount, 1U rack mount (2 servers), 2U short-depth rack mount (2 servers). Available locking bezel with dust filter.
Weight	Maximum: 3.75 kg (8.3 lb)