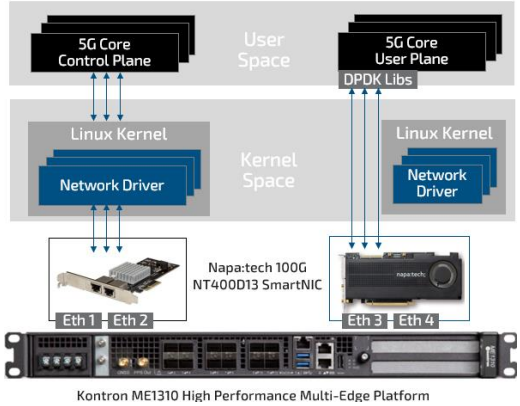
Kontron 5G Core on ME1310: Accelerated by Napatech SmartNIC

In today's fast-paced digital landscape, the demand for coverage with ultra-low latency, high-speed data processing, and reliable mobile connectivity is at an all-time high. The Kontron ME1310 Edge High-Performance Server, paired with Kontron 5G Core, delivers a next-generation solution that ensures seamless deployment of 5G capabilities at the edge. Accelerated by Napatech SmartNIC it is designed to meet the rigorous demands of the Campus networks, the ME1310 as multi-access edge rugged platform offers unmatched computing power, long-life, and energy efficiency. By deploying the Kontron 5G Core on the ME1310, in combination with Napatech SmartNIC enterprises can achieve optimal network performance, enhanced payload processing, and reduced operational costs, all while maintaining flexibility for future advancements in 5G technologies. Whether you're building robust, private networks or you need temporary access for ensuring mission-critical applications, the Kontron 5G Core on ME1310 + NT400D13-SCC SmartNIC is the ideal choice to bring the power of 5G to the edge.

The Kontron 5G Core, combined with the intuitive 5G Core Element Manager, is seamlessly integrated into a single Kontron ME1310 Multi-Access Edge Server as a package. Equipped with Napatech accelerating SmartNIC card this streamlined solution reduces deployment complexity while optimizing the cost in "tough" edge conditions. Leveraging the full potential of 5G technology, Kontron Private 5G delivers ultra-low latency and high bandwidth, enabling real-time communication for mission-critical applications and supporting a wide range of data-intensive use cases.

At the heart of your Private 5G Network is the 5G Standalone (SA) Core, the central component that drives this advanced system. Kontron's 5G SA Core, compliant with 3GPP Release 16, includes all essential network functions from both the control and user plane perspectives. Built on a cloud-native architecture, the solution is perfectly incorporated with ME1310 hardware platform, which is specifically designed for harsh environment.



Kontron ME1310 High Performance Multi-Edge Platform

The 5G Core solution embodies flexibility, programmability, and a distributed architecture, delivering the agility needed to accelerate time-to-market while optimizing performance and efficiency.

On-premise network installations face different challenges to cloud data centres. To ensure deployments are as cost-effective as possible, Kontron runs 5GC software on servers that are optimized for edge use cases.

The Kontron high-performance ME1310 multi-access edge server is a rugged, long-life, power-efficient, and multi-purpose system designed to decrease network complications and improve the performance of applications by getting task processing closer to the user. Powered by Intel Xeon D-2700 family processors, the ME1310 enables applications such as virtual Core and RAN, Artificial Intelligence (AI), data caching, and other ultra-low latency and high-bandwidth edge applications.

The Kontron ME1310 has a built in 12-port, 200 Gbps switch for fibre optic front haul connections. The switch features four SFP28 and eight SFP+ ports to

support fibre-optic connections at 25 GbE or 10 GbE. To maximize the performance of the User Plane Function (UPF) subsystem in our private network packet core, Kontron utilizes a DPDK-based UPF solution with software acceleration. The performance of the **Napatech NT400D13 SmartNIC** is impressive. In rigorous testing, we achieved **37.5 million packets per second (Mpps)** using **98-byte packets**, which was actually the maximum throughput limit of the traffic generator instance running on the other NIC. Despite this demanding scenario, the Napatech SmartNIC, combined with the UPF (User Plane Function), handled the traffic effortlessly without any packet loss or performance degradation. Details of the performance testing are presented in the table below.

Packet Size	Tx[Gbps]	Tx[Mpps]	Rx[%]
878	97.5	13.8	100.00
678	97.1	17.8	99.99
478	95.9	24.9	100.00
278	75.9	33.6	99.99
98	30.7	37.5	100.00

KEY FEATURES AND BENEFITS

- Fast Deployment: Pre-packed and pre-integrated solution 5G HW&SW designed for rapid installation.
- Kontron ME1310 HW: Multi-access edge rugged, long-life, power-efficient, and multi-purpose server with improved performance for 5G and edge application
- Napatech SmartNIC: High-throughput packet processing with ultra-low latency, enabling seamless 5G Core performance. Efficient offloading reduces CPU load, boosting scalability and reliability.
- Use Cases 1: HD video production over 5G benefits from Napatech's SmartNIC with acceleration, enabling high uplink throughput and low-latency performance in bandwidth-intensive scenarios such as live multi-camera event streaming.
- Use case 2: FWA over 5G leverages Napatech's SmartNIC acceleration to deliver high-throughput, connectivity for homes and enterprises, ensuring consistent performance in dense urban deployments and under heavy uplink/downlink traffic loads.
- End-to-End Solution: Enjoy a complete end-to-end solution that encompasses 5G Core SW, Server and SmartNIC plus 5G Radio components, reducing complexity, enhancing interoperability, and facilitating rapid deployment.

TECHNICAL DATA

Kontron 5G Core - Control Plane Function

- 3GPP R15/R16 Standards compliant
- Service Based Architecture (SBA): AMF, SMF, UDM, UDR, AUSF, NRF and PCF
  - AMF Access and Mobility Management Function
  - SMF Session Management Function
  - UDM Unified Data Management
  - UDR Unified Data Repository
  - AUSF Authentication Server Function
  - NRF Network Repository Function
  - PCF Policy Control Function

Kontron 5G Core - User Plane Function

- UPF – general purpose User Plane Function HW agnostic
- DPDK-UPF – high performance UPF with acceleration
- Edge-UPF – distributed UPF on customer premisses

Kontron 5G Core Key Functionalities

- Registration Management
  - Registration, Deregistration (UE, Network)
- Connection Management
  - UE triggered, Network triggered (Paging), AN Release
- Mobility Management
  - Xn based HO
- Security
- SBA architecture; Release 16
  - Using NRF
  - NF Service discovery and selection
- Specific use cases
  - Subscribed UE data manipulation
  - RAT restriction
  - Reregistration required
  - Subscription withdrawn
  - Framed Routing Support

Kontron ME1310 Multi-Edge Platform

- Processor
  - 3rd Gen Intel® Xeon® D Processor memory: 96 GB
- Memory
  - 8x DDR4 DIMM sockets, 4 channels @ up to 3200 MHz support up to 512 GByte (8x 64 GByte)
- Storage
  - 4x M.2-2230 (up to 512GB each) NVMe, or
  - 2x M.2-2230 (up to 512GB each) NVMe and 2x M.2-2280 (up to 2TB each) NVMe4x M.2-2230 (up to 512GB each) RAID 1 and 10 (Intel vROC)1
- Networking
  - 4x SFP28 and 8x SFP+ Ports (4x 25Gb or 2x 25G + 7x 10G or 12x 10G firmware configurations)
  - Integrated Microchip 200Gb switch (VSC7558TSN)
  - 4X 25GE connections to 3rd Gen Intel® Xeon® D Processor integrated NIC controller
- Environmental
  - PSU options: - AC: 115/230 V, 50/60 Hz - DC: -48 V (-40 VDC to -57 VDC)
  - Temperature: - DC: -40 °C to 65 °C - AC: -5 °C to 65 °C
  - Certification: UL/CSA, CE, BIS, UKCA, VCCI and CCC (on demand) 10-year lifecycle support

Napatech NT400D13-SCC SmartNIC

- Hight Speed up to 2x200G in 1U Server, PCIe4x16 intf.
- Nanosecond time sync with 2xMCX connectors
- Heat exhaust and double cooling
- Tunneling protocols: GTP, IP-in-IP, NVGRE and VxLAN.
- Link-Capture™ Software

Some features are hardware dependent.
Some features might not be included in dedicated software releases.

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