TRACe-G40x-SR

Data Processing Gateway for Smart Rail Applications

- EN50155 multi network rail computer (LTE, Wi-Fi, GNSS, Wired ETH)
- Fast and secure deployment of network centric edge applications
- Cryptorouter/firewall protection of edge application & IoT stacks
- Secure routing and filtering layer, with autonomous counter-measures (HIDS)
- OpCenter™ console for fleet level management
TRACe-G40x-SR

Kontron TRACe-G40x-SR edge data processing gateway uniquely combines a field-proven multi-network rail computer with EDGE-Line, an innovative approach to delivering data-center grade processing and networking to rolling stock which answers major challenges of smart transportation projects:

**Digital Independence:** No vendor lock in! TRACe-G40x-SR Virtual Layer can run any existing 64bit x86 Linux based software (we mean complete stacks: OS + Applications). This allows complete freedom of choice for IOT solutions, while legacy operational software is also supported.

**Security and Connectivity:** Kontron TRACe-G40x-SR firmware is based on OpenWRT™ augmented with leading edge network security features. Vulnerabilities are addressed via secure updates of the encrypted firmware triggered from the fleet management console OpCenter™. This software foundation hides the complexity of low level handling for wireless and wired networks as well as routing between them. The operational software thus sees the world as a simple collection of generic TCP/IP sockets.

**Tampering Detection:** Kontron uses measured boot technology in the enrollment process of TRACe-40x-SR computers. This enables remote attestation, a method that can remotely detect unwanted changes made to the computer software. This EDGE-Line feature implemented in with OpCenter™ allows the fleet manager to discard the computer and its data and trigger physical verification of the unit.

**Control and Monitoring:** While IOT is all about remote monitoring of devices and processes thanks to deployed computers, most IOT stacks know very little about the underlying computer which powers them. Kontron designs TRACe-G40x-SR with a extendible monitoring engine which continuously reports to OpCenter™, allowing unparalleled granularity in the surveillance of edge computers.

**Hardware Consolidation:** On top of the routing and firewalls modules, EDGE-Line virtualization layer allows TRACe-G40x-SR to simultaneously run existing software and modern IOT stacks in isolation of each other. This approach allows the consolidation of multiple use cases in one computer.

**Security AND Agility:** With Kontron EDGE-Line, each actor retains its key responsibility in the deployment. OT personnel manages operational software while IT can stay in control of the network architecture and security via OpCenter™. At the same time, business applications can leverage DevOps-friendly techniques to achieve continuous deployment of modular software deep into the field.

**Time-to-market:** Deploying existing software stacks in a computer hardware already certified for rolling stock deployments is the shortest route to success. TRACe-G40x-SR and EDGE-Line allow innovative solutions to be built quickly with a much simpler code base, since security and counter measures are handled by the lower level software maintained and deployed via OpCenter™.

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**BENEFITS**

Products leveraging Kontron EDGE-Line such as TRACe-G40x-SR solve all connectivity and security problems while letting customers in complete control of their operational software and data. Fleet management tools allow rapid deployments, easy device cloning and replacement from within the security bubble of the customer private cloud. Continuous monitoring and remote secure updates allow long term peace of mind for the most embedded use case deployments.
**TECHNICAL INFORMATION**

**ENVIRONMENT**
- Ingress Protection (Dust & Water)
  - IP50, Optional IP54
- Operating Temperature
  - -40 °C to +55 °C EN50155 Class OT2 by default
  - On request: -40 °C to -70 °C (max.) 85 °C EN50155 Class OT4/ST1
  - 273 without ears (300 with ears) x 190 x 87 mm
- Dimensions (W x D x H)
- Options
- Standards
  - EN50155 (including EN 50121-3-2, EN 61373, EN60068), EN 50155 power Class 12 (10ms holdup), EN45545-5-2 (Fire protection on railway vehicles), CE / FCC part 15, RoHS

**COMPUTING**
- Processors
  - Intel® Core™ i7-6600U, Core™ i3-6100U or Intel Atom® E3940
- Memory
  - 8 GByte up to 24 GByte depending on processor
- Storage
  - 32 GByte SLC SSD, up to 8 TByte using two 2.5” drives

**NETWORK AND SECURITY**

**LONG RANGE NETWORKING**
- LTE/4G/3G
  - Cat. 6 modem (300 Mb/s download, 50 Mb/s upload) with DC-HSPA+ HSPA+ HSPA UMTS fallback
  - 2x2 MIMO support
  - Multiple bands supported
  - LTE: 1,2,3,4,5,6,7,8,12,13,20,25,26,29,30,41
  - DC-HSPA+: HSPA+ HSPA UMTS: 1,2,3,4,5,8

**POSING**
- GPS, GLONASS, BeiDou, and Galileo

**SHORT RANGE NETWORKING**
- WIFI
  - IEEE802.11 ac/a/b/g/n with overall throughput up to 2.67 Mb/s
  - 2x2 MIMO support
  - Supports 2.4 GHz and 5 GHz bands
  - Enhanced wireless security supporting 64/128-bit WEP, WPA, WPA2, 802.1X
  - 2x independent Gigabit Ethernet on M12 connectors

**ROUTING/FIREFWALLING**
- Based on OpenWrt last stable release managed through HTTPS, SSH and SNMPv3
- VLAN, bridging, firewall, load balancing, QoS, GRE, IPSec, OpenVPN...

**VIRTUALISATION**
- Easy setup and run of Virtual Machine based on existing embedded OS (Linux 64bit) or 3rd party appliances (turn key VM images)

**MULTILEVEL SECURITY LAYERS**
- Secure Boot
  - HW Root-of-Trust
  - Measured Boot
  - Containerisation
- Monitoring Access Control
  - Host Intrusion Detection Service
  - OSSEC can autonomously react to intrusions detections; avoiding most brute force attempts

**CONTINUOUS SECURITY**
- Vulnerability Watch
  - Software Updates
  - Continuous analysis of the CVEs versus the deployed code base
  - Functional and security patches at least once per year

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![Diagram of Virtualization Layer](image.png)

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EDGE-Line software running in TRACE-G40x-SR
OPCenter™

FLEET MANAGEMENT

OPCenter™, the EDGE-Line fleet management interface, offers modular features

Global Headquarters

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CONTINUOUS SERVICE

COMPUTER MANAGEMENT
PAYLOAD MANAGEMENT
HEALTH/EBIT
VULNERABILITY WATCH

A single GUI which includes several tools to operate on remote computers
Remote control of computers and their attached Devices / Peripherals
(example LoRa devices), FW/SW updates
VM images / Containers orchestration...
Computer health monitoring engine (KEHM)
Continuous analysis of the CVEs versus the deployed code base