CTHINGS.CO®
EDGE IOT SOLUTIONS

EDGE IOT GATEWAY (M OUTDOOR)

Datasheet. Release 1.0

Remote monitoring of critical infrastructure with edge computing

Pervasive computing systems are capable of collecting, processing and communicating data, they can adapt to the data's context and activity. That means, in essence, a network that can understand its surroundings and improve the human experience and quality of life.

CTHINGS.CO® Edge IoT Gateway (M Outdoor) connects whatever data customer needs to process directly at the edge, reducing latency and relieving connectivity networks, with full support of Orchestra Platform.

The gateway is based on Linux. It provides tremendous possibilities opening up the entire embedded applications ecosystem. It supports industry standard specifications like mission-critical operation in temperatures ranging between -40°C and 85°C.

The design provides the flexibility needed while still keeping it simple! Based on the concept of modularity, it may operate with many wireless technologies without PCB redesign requirements. As of now, support for major cellular and other radio connectivity standards like Bluetooth 5.x, LTE Cat. 4, Wirepas 2.4GHz Mesh, Wirepas 5G NR+, Wi-Fi 802.11 a/b/g/n/ac, Zigbee, etc. are assured that will open up tremendous possibilities.

To ease deployment of use cases and solutions, the Edge IoT Gateway (M Outdoor) is designed alongside CTHINGS.CO® Orchestra, a state-of-the-art networking solution making provisioning and maintenance of private networks as simple as a few clicks. Additionally, we open the possibility for curated backend systems including open APIs for connecting external systems, as well as data visualisation capabilities through our interfaces and supported protocols.

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PROPERTY	VALUE
Hardware Features	Industrially certified hardware for enhanced Edge Computing • Efficient passive cooling & rugged aluminium casing • NXP i.MX8MP Quad-Core ARM® v8 Cortex®-A53 64bit, 1.8 GHz • ARM® Cortex®-M7 real-time co-processor, 800 MHz • AI/ML Neural Processing Unit (NPU) up to 2.3 TOPS • Integrated 2D/3D Vivante GC7000UL GPU • LPDDR4 RAM*: 4 GB • Built-in eMMC flash storage* up to 32 GB • Up to 2 TB industrial-grade SDXC UHS-I class µSD • Configurable* with LTE Cat. 4 or LTE Cat. M1/NB2 cellular mini-PCIe Cards • Configurable* with CTHINGS.CO® Wirepas® MESH M.2./mini-PCIe Cards • Configurable* with Zigbee/Thread/Wi-Fi/Bluetooth M.2./mini-PCIe Cards • On-board hardware watchdog & support for secure boot • Supports DIN-rail & wall mounting • Operating temperature range: -40 °C to +80 °C • RoHS compliant device
Physical Interfaces	Gateway • 1x USB 3.0 SuperSpeed Ports; Type-A • 2x USB 2.0 High-Speed Ports; Type-A • 2x 1000 Mbps Ethernet port; • 1x 802.3af Type-1 PoE; RJ-45 (optional) • Optional* 3x RS-232; galvanic isolation • Optional* 3x half-duplex RS-485; galvanic isolation • Optional* 1x CAN bus port; galvanic isolation • Optional* 2x 24 V compliant digital inputs; galvanic isolation • Optional* 2x 24 V compliant digital outputs; galvanic isolation • 2x general-purpose user-controlled LEDs • 1x USB 2.0 Console Serial Interface; USB Type-B Micro • 1x Nano-SIM Card • 1x M.2 Key-E Expansion Slot with PCIe 3.0 and USB 2.0 • 1x Mini-PCIe Socket with USB 2.0 • 1x DVI-D (digital) HDMI-compliant display up to 1080p60 • Proprietary connector; add-on boards: LVDS, SDIO, USB, SPI, I2C, GPIOs*

** depending on system configuration*

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PROPERTY	VALUE
Casing	• Widely certified, IP68 protection class • 2 x LTE internal antennas embedded • 1 x 2.4 GHz (WIFI, Wirepas, Zigbee, Bluetooth, etc) internal antennas embedded • Internal Power Supply embedded • Dimensions: 270 x 270 x 80 mm • Waterproof cable glands available upon request
Electrical Specification	• AC supply voltage: 100 V to 240 V 50-60 Hz • IEEE 802.3af Type-I Power over Ethernet (PoE) supply* • Ultra-low power consumption: typically 5W • EMI/ESD protected device; power supply protection features • FCC, CE, UK CA; EMC EN 55032/5, EN 61000-6-3 certification • EN/UL/IEC 62368-1 safety certification • RoHs compliant
Connectivity	Full flexibility which allows plug and play exchange of connectivity modules to meet requirements: Bandwidth overview per connectivity technology: • Rel. 8 **LTE** Cat. 4: LTE-FDD: 150 Mbps (DL); 50 Mbps (UL) LTE-TDD: 130 Mbps (DL); 30 Mbps (UL) • Rel. 7 **HSPA+**: WCDMA: Max. 42 Mbps (DL); Max. 5.76 Mbps (UL) • **EDGE**: 296kbps (DL), Max. 236.8kbps (UL) • **GPRS**: 107kbps (DL), Max. 85.6kbps (UL) • **GPS**, GLONASS, Galileo, BeiDou/Compass, QZSS, Cell ID/Wi-Fi positioning • **Wi-Fi 6E** (a/b/g/n/ac/ax 2.4/5/**6** GHz): Max. 2.4 Gbps • **Bluetooth Low Energy (BLE) 5.0 / 5.3** • **Wirepas 2.4 GHz MESH** • **Wirepas 5G NR+** • **Zigbee / Thread**

** depending on system configuration*

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Other features

PROPERTY	VALUE
Use Cases	The gateways supports vast range of usage across industries. Application examples: • Smart Retail: monitoring stock, goods rotation, sales • Smart Logistics: tracking distribution and transport • Smart Product: embedded intelligence and compute • Industry 4.0: digital retrofitting, enhanced maintenance, remote operations, automation • Smart Metering: remote and wireless data collection
Software Features	• **Linux® OS** • **Ubuntu® Server** • **Debian®** • Yocto • OpenWRT capable • Flexible I/O operations • Upgrade Over-The-Air (OTA) • Support for CTHINGS.CO® Orchestra

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Supported Frequencies

LTE / HSPA+ subsystem*

Band name	Transmit (MHz)	Receive (MHz)	LTE-FDD	LTE-TDD	UMTS	GSM
IMT (2100)	1920-1980	2110-2170	B1	–	B1	–
PCS (1900)	1850-1910	1930-1990	B2	–	B2	PCS1900
DCS (1800)	1710-1785	1805-1880	B3	–	B3	DCS1800
AWS	1710-1755	2110-2155	B4	–	B4	–
Cell (850)	824-849	869-894	B5	–	B5	GSM850
UMTS 800	830-840	875-885	–	–	B6	–
IMT-E	2500-2570	2620-2690	B7	–	–	–
EGSM (950)	880-915	925-960	B8	–	B8	EGSM900
700 low A-C	699-716	729-746	B12	–	–	–
700 upper C	777-787	746-756	B13	–	–	–
700 upper D	788-798	758-768	B14	–	–	–
B18	815-830	860-875	B18	–	–	–
B19	830-845	875-890	B19	–	–	–
EU800	832-862	791-821	B20	–	–	–
PCS + G	1850-1915	1930-1995	B25	–	–	–
B26	814-849	859-894	B26	–	–	–
700 APAC	703-748	758-803	B28	–	–	–
IMT-E (B38)	2570-2620	2570-2620	–	B38	–	–
S-band	2300-2400	2300-2400	–	B40	–	–
BRS (US)	2555-2655	2555-2655	–	B41	–	–
B66	1710-1780	1710-1780	B66	–	–	–
B71	663-698	617-652	B71	–	–	–

** depending on system configuration*

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Supported Frequencies

LTE Cat. M1 / Cat. NB1 / Cat. NB2 / EGPRS subsystem*

Band name	Transmit (MHz)	Receive (MHz)	LTE-FDD	GSM
IMT (2100)	1920-1980	2110-2170	B1	–
PCS (1900)	1850-1910	1930-1990	B2	PCS1900
DCS (1800)	1710-1785	1805-1880	B3	DCS1800
AWS	1710-1755	2110-2155	B4	–
Cell (850)	824-849	869-894	B5	GSM850
EGSM (950)	880-915	925-960	B8	EGSM900
700 lower A-C	699-716	729-746	B12	–
700 upper C	777-787	746-756	B13	–
B18	815-830	860-875	B18	–
B19	830-845	875-890	B19	–
EU800	832-862	791-821	B20	–
PCS + G	1850-1915	1930-1995	B25	–
B26	814-849	859-894	B26**	–
B27	807-824	852-869	B27**	–
700 APAC	703-748	758-803	B28	–
B31	452.5-457.5	462.5-467.5	B31*	–
B66	1710-1780	2110-2180	B66	–
B71	663-698	617-652	B71***	–
B72	451-456	461-466	B72*	–
B73	450-455	460-465	B73*	–
B85	698-716	728-746	B85	–

LTE-FDD RF bandwidth

LTE Cat. M1	1.4 MHz
LTE Cat. NB2	200 kHz

Maximum throughput

LTE Cat. M1	588 kbps (DL); 1119 kbps (UL)
LTE Cat. NB2	127 kbps (DL); 158.5 kbps (UL)
EDGE	296 kbps (DL); 236.8 kbps (UL)
GPRS	107 kbps (DL); 85.6 kbps (UL)

Transmit power class:

LTE-FDD bands	Class 5 (21 dBm +1.7/-3 dB)*
GSM850	Class 4 (33 dBm ± 2 dB)
EGSM900	Class 4 (33 dBm ± 2 dB)
DCS1800	Class 1 (30 dBm ± 2 dB)
PCS1900	Class 1 (30 dBm ± 2 dB)

** depending on system configuration*
*** support for Cat. M1 only*
**** support for Cat. NB2 only*

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GNSS subsystem*

Type	Frequency (MHz)
GPS	1575.42 ± 1.023 (L1)
Galileo	1575.42 ± 2.046 (E1)
QZSS	1575.42 (L1)
GLONASS	1597.5-1605.8
BeiDou / COMPASS	1561.098 ± 2.046

GNSS acquisition performance:	
Cold start (open sky)	18.9 seconds typical
Warm start (open sky)	1.5 seconds typical
Hot start (open sky)	1.1 seconds typical
CEP-50 accuracy (open sky)	1 metre typical

** depending on system configuration; external antenna required*

Certifications

The CTHINGS.CO® Edge IoT Gateway Is CE Class-A & EU RoHS Directive Compliant. The Device Has Been Tested To Meet The Following Electromagnetic Compatibility Standards:

Electromagnetic emissions	• Conducted emission: EN 55022, EN 55014-1, EN 55011 • Radiated emission up to 6 GHz • Harmonic current emission: EN 61000-3-2 • Voltage fluctuations and flicker: EN 61000-3-3
Immunity to electromagnetic interference (EMI):	• Electrostatic discharge (ESD) immunity: EN 61000-4-2 • Radiated electromagnetic field immunity: EN 61000-4-3 • Electrical fast transient / burst immunity: EN 61000-4-4 • Surge immunity: EN 61000-4-5 • Conducted disturbance immunity: EN 61000-4-6 • Power frequency magnetic field immunity: EN 61000-4-8 • Pulse magnetic field immunity: EN 61000-4-9 • Voltage dips & short interruptions: EN 61000-4-11

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Extensive Connectivity	Wireless connectivity via: LTE, M1, NB-IoT, 3G, EGPRS, Wi-Fi 6E, BLE 5.3, Wirepas 2.4/5G, Zigbee, Thread
Vast IoT Protocol Suite	Native support of modern IoT Protocols: i.e. MQTT/-SN, Modbus RTU, Modbus TCP, etc.
Localisation	GPS, GLONASS, Galileo, BeiDou, COMPASS, Cell ID/Wi-Fi positioning, Wirepas MESH
Interfaces	Vast integration of sensors network on common data bus: i.e. USB 3.0, 2x USB 2.0, CAN bus, up to 3x RS485 or RS232, industrial digital I/O, etc.
Rich Software Ecosystem	Linux® OS (Yocto® and Debian®), Mainline Linux, FreeRTOS®, Ubuntu® Server, OpenWRT
OA&M Linux OS	Remote operations, administration, and maintenance
RESTful	Ease of data access via REST Web APIs
MPU	Multipurpose computing, hybrid data processing in edge, public or private cloud

External appearance

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