

CyBox GW-P

Mobile Wireless Gateway

- Wi-Fi Access Point combined with Multiple LTE Interfaces and Link Aggregation
- EN 50155 Compliant
- Mobile Use



III Main Features

- Gateway for train-based Wi-Fi internet connectivity
- Up to 5 LTE interfaces for channel-bundled WAN access
- Overall bandwidth up to 1500 Mbps (DL 300 mbps, UL 50 Mbps per module)
- Up to 5 Wi-Fi interfaces with IEEE 802.11a/b/g/n/ac up to 1300 Mbps
- Optional 1 x Wave 2 / 4x4 multi-user MIMO with up to 1733 Mbps
- Simultaneous Wi-Fi operation on 2.4 GHz and 5 GHz frequencies possible
- Single or dual Gigabit Ethernet interfaces
- Optional internal SSD storage attached to SATA
- Designed for harsh industrial and mobile applications
- -40 to +70 °C operating temperature
- EN 50155 compliant
- Integrated firmware for management and configuration

III Description

The CyBox GW-P is a member of the CyBox family of robust Ethernet and wireless access points and routers. It offers an all-in-one approach with all interfaces needed: multiple LTE interfaces for parallel LTE channel use and thus maximized throughput, Wi-Fi interfaces to connect to client devices such as mobile phones, as well as single or dual 802.3 Gigabit Ethernet ports to attach the device to a backbone network. It also comprises a network-optimized System-on-a-chip (SoC) with a powerful CPU core that has the computing power needed to utilize the bandwidth offered by the multiple interfaces.

The CyBox GW-P is particularly designed to meet requirements of rolling stock and other mobile applications. With the assistance of the integrated access point, multiple mobile Wi-Fi-compatible devices in a passenger train, or subway can communicate with the Internet or access local data, such as time table information, videos, etc. The built-in configurable firewall ensures that mobile clients cannot gain access to other clients in the wireless LAN.

Multiple Radios

There is mounting space for up to five radio modules within the CyBox GW-P. Internet access is implemented via LTE interface modules. The radios can operate in different standards, including LTE and its predecessors. LTE provides a maximum data rate of 300 Mbps download and 50 Mbps upload on each interface module. Each LTE module can be provided with up to four SIM cards to enable best price routing in international traffic.

The CyBox GW-P is able to host independent Wi-Fi radios. The Wi-Fi interfaces are fully compliant to IEEE 802.11ac, allowing to connect clients at high data rates up to 1.3 Gbps on each interface. Each module uses three antennas for up to 3x3 MIMO-operation, enough for very fast Wi-Fi clients. One of the interfaces is prepared for Wave 2 modules with data rates up to 1.700 Mbps and multi-user MIMO (4x4).

Network Optimized CPU

The CyBox GW-P uses a CPU from the latest generation of QorIQ network-optimized systems-on-a-chip. This provides sufficient power even with an evolution of Wi-Fi standards over the time for more throughput. The SoC has two independent Gigabit Ethernet interfaces, both connected to robust M12

sockets. Thus, flexible uplink configurations can be used with redundant or link-aggregated channels to increase the bandwidth. By daisy-chaining wired backbones, the optional bypass relays between the Ethernet ports offer continuous backbone operation, even when the device is switched off.

Media server

To enhance the CyBox GW-P media server capabilities with internal storage, mounting space for a M.2 solid state disk is supplied for. It is attached to the CPU's dedicated SATA port. More than 1 TB capacity can be used for local, on-vehicle video and audio streaming data.

Rugged environment

The system is powered by a local 24 – 110 VDC wide-range power source. The power input supply is fully compliant to EN 50155, Class S2 and tolerates an input voltage range from 16.8 to 154 V as well as power interruptions up to 10 ms.

The robust IP40 housing is designed for industrial and mobile environments. The device will operate without forced air cooling in temperature ranges between -40 to +70 °C (EN 50155, Class TX) and has no parts inside that require maintenance. The device is especially suited for use in mobile environments with regard to shock and vibration. Its electrical and mechanical robustness is supported by industry-standard M12 connectors for Ethernet and power, as well as QLS connectors for the RF interfaces.

Open Firmware

The CyBox GW-P firmware, based on Linux and OpenWrt, provides a comfortable management interface by the use of the integrated web server. Besides global setup parameters, the software allows for the complete configuration of the Wi-Fi interfaces, such as channel selection, SSID, encryption keys, and firewall setup. VLANs can be used to separate client networks e.g. to enable internal employee communication with their headquarters. The SNMP protocol is supported.

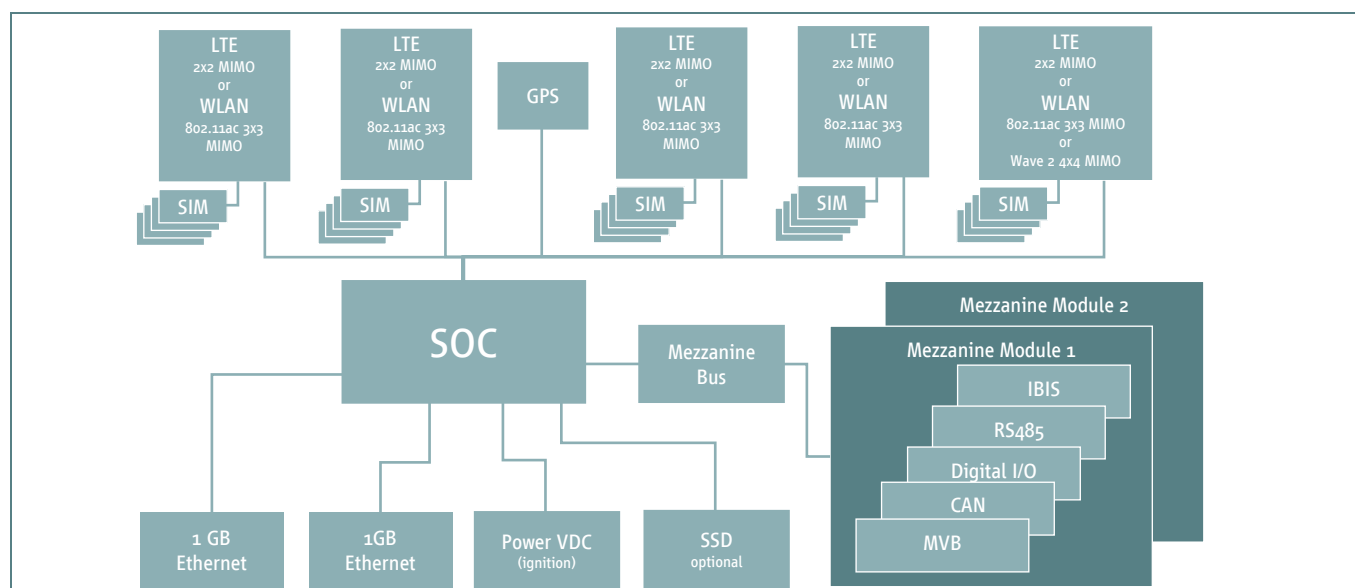
Upgradeable

The CyBox GW-P provides the possibility to access its configuration data from a USB memory device that can be attached via M12 connector; a prerequisite for quick and easy installation in the field. The complete management firmware is field-upgradeable, thus offering the foremost building block for continuous security against attacks.

Through its M12 interface, the USB offers a basic protection against tampering, the additional RS-232 interface routed over the same connector adds further flexibility.

A unique feature of the firmware is provided with the Inter Carriage Connection Protocol ICCP, developed by ELTEC, which uses a bridging algorithm to automatically establish and maintain a wireless LAN backbone for trains. Such wireless backbones can be used in retrofit applications, where no Ethernet cables can be inserted between the cars. This connection can be sustained even when exposed to external disturbances, such as train re-configuration, connection losses, or trains on neighboring tracks.

III Block Diagram showing a configuration example of five LTE modules



III Standards and Specifications

EMC (RED - 2014/53/EU)

- EN 50121-3-2
- EN 301 489-1
- EN 301 489-17
- EN 301 489-19
- EN 301 489-52

Health & Safety (RED - 2014/53/EU)

- EN 62311
- EN 62368-1

Fire protection requirements

EN 45545-2 (HL 1 to HL 3)

Radio spectrum (RED - 2014/53/EU)

- EN 300 328
- EN 301 893
- EN 301 502
- EN 301 908-1
- EN 301 908-2
- EN 301 908-13
- EN 303 413

WLAN Interface (Complex WLE900VX-I)

RF	3 RF signal inputs, 3T3R MIMO technology
Operating Frequency	11b/g/n ISM band: 2.400 ~ 2.4835 GHz 11a ISM band: 5.180 GHz ~ 5.825 GHz
Transmission Rates	802.11b: 1, 2, 5.5, 11 Mbps 802.11a/g: 6, 9, 12, 18, 24, 36, 48, 54 Mbps 802.11n: 6.5 to 450 Mbps 802.11ac: up to 1300 Mbps
Output Power	802.11a: 17 dBm \pm 2 dBm@54 Mbps 802.11b: 21 dBm \pm 2 dBm@11 Mbps 802.11g: 18 dBm \pm 2 dBm@54 Mbps 802.11gn HT20: 16 dBm \pm 2 dBm @ MCS7 802.11gn HT40: 16 dBm \pm 2 dBm @ MCS7 802.11an/ac HT20: 16 dBm \pm 2 dBm @ MCS7 802.11an/ac HT40: 15 dBm \pm 2 dBm @ MCS7 802.11ac HT80: 15 dBm \pm 2 dBm @ MCS7
Receive Sensitivity	802.11a: -80 dBm \pm 2 dBm @ 54 Mbps 802.11b: -94 dBm \pm 2 dBm @ 11 Mbps 802.11g: -80 dBm \pm 2 dBm @ 54 Mbps 802.11gn HT20: -77 dBm \pm 2 dBm @ MCS7 802.11gn HT40: -75 dBm \pm 2 dBm @ MCS7 802.11an/ac HT20: -75 dBm \pm 2 dBm @ MCS7 802.11an/ac HT40: -75 dBm \pm 2 dBm @ MCS7 802.11ac HT80: -72 dBm \pm 2 dBm @ MCS7
Encryption	AES, TKIP, WEP
Security	Visible / invisible SSID 64-bit and 128-bit WEP encryption, WPA / WPA2-personal and enterprise Firewall

LTE Interface (Sierra Wireless MC7455)

Technology	Bands	Diversity
LTE	B30 (2300 WCS) B41 (TDD 2500) B29 (US 700de Lower) B26 (US 850 Ext) B25 (1900) B5 (850) B20 (800DD) B13 (700c) B12 (700ac) B7 (2600) B4 (AWS) B3 (1800) B2 (1900) B1 (2100)	Yes (MIMO)
UMTS (WCDMA)	B5 (850) B3 (1800) B4 (1700) B8 (900) B2 (1900) B1 (2100)	Yes

GNSS Interface

Frequency Band	GPS (L1) GLONASS (L1, FDMA) Galileo (E1)
Protocol Standards	NMEA RTCM 104
Performance	Accuracy: 1.5 m Time-to-first-fix: cold start < 35 s Warm start/aided start: 1 s

III Technical Data

Physical Interfaces

Antenna	QLS connectors
LAN	10/100/1000BaseT(X), M12 X-coded
USB Port and Serial Port	M12 8-pin A-coded, alternative 9-pin D-Sub, USB-A
Power Input	24 to 110 VDC local supply on M12 A-coded
LED Indicators	Power, fault, status, LAN 1 Act/1000 MB, LAN 2 Act/1000MB, module Act 1-5, mezzanine indicator 1 and 2
Reset Switch	Available on the front panel (paper-clip)

Mechanical Specifications

Dimensions: 284 mm x 79 mm x 260 mm (w h d)

Weight: up to 4000 g

Aluminum IP40 housing, prepared for screw-mounting

Electrical Specifications

Local supply voltage: 24 to 110 VDC nominal (16.8 V min. to 154 V max.),
Compliant to EN 50155, Class S2.

Power consumption typ. 40/50 W and max. 60/75 W for order no. 10xx and 11xx, respectively.

Environmental Conditions

Temperature range (operation): -40..+70 °C (+85 °C for 10 min., according to EN 50155, Class TX)

Temperature range (storage): -40..+85 °C

Relative humidity (operation): max. 90 % non-condensing

Relative humidity (storage): max. 90 % non-condensing

Altitude: up to + 2000 m

Climatic tests according to EN 60068-2

Shock and vibration tested according to EN 61373, Category 1, Class B

Conformal coating

MTBF

→ Approx. ~220.000 h



Picture of a CyBox GWP configuration. Depending on the product version, front panels and connectors may vary.

Options

- Various combinations of Wi-Fi and LTE modules
- SMA antenna connectors
- CAN interface
- IBIS Interface (t.b.d.)
- MVB Interface ESD, EMD
- RS-485 Interface (t.b.d.)
- Digital I/O (t.b.d.)

Standard Configurations

Article No.	Description
CYGWP-1005Vo	2 x Wi-Fi + 3 x LTE, 2 ETH (M12X), CPU T1042, m.2 SSD, 2 GB DDR3 RAM, 64 MB Flash
CYGWP-1100Vo	2 x Wi-Fi + 3 x LTE, 2 ETH (M12X), faster CPU T2081 (4C/8T), 2 GB DDR3 RAM, 64 MB Flash

Related Products

- CyBox LTE 2-W – LTE Router for wall mounting
- CyBox AP 2-W – Access Point for wall mounting

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