

# MC2X8-E

## Industrial cellular router (3G/4G/5G) + WiFi 6e (802.11ax)

### Description:

The MC2X8-E connects components that communicate via Ethernet LAN or serial interfaces to other networks via WLAN or 5G (LTE).

The typical usage area for the MC2X8-E is machine-to-machine communication, locally over WLAN as well as remotely connected over mobile networks (5G).

### Properties:

#### Hardware:

- Processor: iMX8 (NXP)
- Memory: 512MByte DDR4-RAM and 4GB Flash
- WiFi: 802.11ax for 2.4 + 5 GHz WiFi6 + 6GHz WiFi6e
- Cellular: 5G/4G/3G multi-mode
- Navigation: Multi-constellation GNSS
- Ethernet: 2 x Gigabit LAN interface
- Serial: 1 x RS232 or RS485 serial interface
- USB: 1 x USB2 Port also for interface extensions
- IO: 1 x relay switch (dependent on power connector)  
1 x aux input (dependent on power connector)
- Power supply: 12-60V or 802.3af PoE via LAN Port 1
- Housing: Robust aluminum housing with various mounting options

#### Functions:

- Configuration via website, REST-API or by using the MC-Config program.
- Different bridge modes to connect the LAN clients.
  - NAT
  - Single Client NAT
  - VPN (openVPN, Wireguard or IPSec)
- WEP, 802.11i WPA-WPA2-WPA3-AES-TKIP-PSK
- WPA Enterprise 802.1x PEAP LEAP TLS TTLS
- Certificate management for authentication via 802.1x
- SCEP (Simple Certificate Enrollment Protocol)
- MQTT-Client
- Connects worldwide to 3G, 4G or 5G networks
- Precedence selection to prefer WLAN over LTE and vice versa
- Serial-Client via TCP or UDP or MQTT
- ipv6 + ipv4



### Device Options:

#### Mounting:

- 1) side mounting brackets (MC2X8-E-SL...)
- 2) DIN rail mounting clip (MC2X8-E-SC...)

#### Power supply connection:

- 1) 5 pol. M12 connector (MC2X8-E-Sx-M12)  
- always with relay
- 2) 8pol terminal block (MC2X8-E-Sx-WK8)  
- always with relay and auxiliary input

#### Antenna connector WLAN:

- 1) 2 x RP-SMA

#### Antenna connector 5G:

- 1) 4 x LTE antenna SMA

#### Serial Interface:

- 1) 1 x RS232 (Standard)
- 2) 1 x RS485
- 3) 1 x RS422

**Technical data:**

<b>Specification:</b>	
Ethernet	2 x 10/100/1000 MBit Auto MDI/MDIX
Serial	1 x RS232, 300-460,8 KBit/s, RTS, CTS, DSR, DTR or RS485
USB	1 x USB 2.0 to connect printers or USB adapter with various other interfaces
Relay	1 x change-over switch max 1A@24V, max 125VAC
AUX-Input	1 x galv. isolated 10 – 60V
Antenna connectors	2 x RPSMA (WiFi) 4 x SMA (5G )
Sim card slot	1 x Standard/Mini-SIM slot
Power supply	12 – 60 VDC or 802.3af PoE via the LAN Port
Energy consumption	max 15W (4.5W idle)
Operating temperature range	0-60°C
Dimensions	105x125x35mm
Weight	ca. 500g

**WLAN-Interface:**

<b>IEEE 802.11b Section</b>	
Radio and Modulation Schemes	DQPSK , DBPSK and CCK with DSSS
Operating Frequency	2400 ~ 2483.5MHz ISM band
Channel Numbers	13 channels for Worldwide
Data Rate	at most 11Mbps
Media Access Protocol	CSMA/CA with ACK
Transmitter Output Power at Antenna Connector	Typical RF Output Power at each RF chain and at room Temp. 25°C 20.5±2 dBm at 11Mbps
Receiver Sensitivity at Antenna Connector	Typical Sensitivity at each RF chain. @Frame (1000-byte PDUs) Error Rates≤8% at room Temp 25°C -83 dBm for 11Mbps

<b>IEEE 802.11g Section</b>	
Radio and Modulation Schemes	QPSK , BPSK , 16QAM ,64QAM with OFDM
Operating Frequency	2400 ~ 2483.5MHz ISM band
Channel Numbers	13 channels for Worldwide
Data Rate	at most 54 Mbps
Media Access Protocol	CSMA/CA with ACK
Transmitter Output Power at Antenna Connector	Typical RF Output Power at each RF chain and at room Temp. 25°C 17±2 dBm at 54Mbps
Receiver Sensitivity at Antenna Connector	Typical Sensitivity at each RF chain. @Frame (1000-byte PDUs) Error Rates≤10% at room Temp 25°C -71 dBm for 11Mbps

<b>IEEE 802.11a Section</b>	
Radio and Modulation Schemes	QPSK , BPSK , 16QAM ,64QAM with OFDM
Operating Frequency	5.15~5.25 GHz 5.25~5.35 GHz 5.47~5.725 GHz 5.725~5.825 GHz
Data Rate	at most 54 Mbps
Media Access Protocol	CSMA/CA with ACK
Transmitter Output Power at Antenna Connector	Typical RF Output Power at each RF chain and at room Temp. 25°C 17±2 dBm at 54Mbps
Receiver Sensitivity at Antenna Connector	Typical Sensitivity at each RF chain. @Frame (1000-byte PDUs) Error Rates≤10% at room Temp 25°C -71 dBm for 11Mbps

<b>IEEE 802.11n Section</b>	
Radio and Modulation Schemes	QPSK , BPSK , 16QAM ,64QAM with OFDM
Operating Frequency	2.4GHz :2400 ~ 2483.5MHz for ISM band 5.15~5.25 GHz 5.25~5.35 GHz; 5.47~5.725 GHz 5.725~5.825 GHz;
Data Rate	at most 300 Mbps
Media Access Protocol	CSMA/CA with ACK
Transmitter Output Power at Antenna Connector	Typical RF Output Power at each RF chain and at room Temp. 25°C 2.4 GHz Band: 16.5±2dBm at HT20 MCS7 16±2dBm at HT40 MCS7 5 GHz Band: 16±2dBm at HT20 MCS7 16±2dBm at HT40 MCS7
Receiver Sensitivity at Antenna Connector	Typical Sensitivity at each RF chain. @Frame (1000-byte PDUs) Error Rates≤10% at room Temp 25°C 2.4 GHz Band: -69dBm at HT20 MCS7 -66dBm at HT40 MCS7 5 GHz Band: -69dBm at HT20 MCS7 -66dBm at HT40 MCS7

<b>IEEE 802.11ac Section</b>	
Radio and Modulation Schemes	QPSK, BPS, 16QAM, 64QAM, 256QAM with OFDM
Operating Frequency	2.4GHz :2400 ~ 2483.5MHz for ISM band 5.15~5.25 GHz 5.25~5.35 GHz; 5.47~5.725 GHz 5.725~5.825 GHz;
Data Rate	2.4 GHz: at most 400Mbps 5 GHz: at most 1732Mbps
Media Access Protocol	CSMA/CA with ACK

Transmitter Output Power at Antenna Connector	<p>Typical RF Output Power at each RF chain and at room Temp. 25°C</p> <p>2.4 GHz Band:</p> <ul style="list-style-type: none"> <li>15±2dBm at VHT20 MCS8</li> <li>14.5±2dBm at VHT40 MCS9</li> </ul> <p>5 GHz Band:</p> <ul style="list-style-type: none"> <li>15±2dBm at VHT20 MCS8</li> <li>15±2dBm at VHT40 MCS9</li> <li>15±2dBm at VHT80 MCS9</li> <li>15±2dBm at VHT160 MCS9</li> </ul>
Receiver Sensitivity at Antenna Connector	<p>Typical Sensitivity at each RF chain. @Frame (1000-byte PDUs) Error Rates≤10% at room Temp 25°C</p> <p>2.4 GHz Band:</p> <ul style="list-style-type: none"> <li>-64 dBm at VHT20 MCS8</li> <li>-58 dBm at VHT40 MCS9</li> </ul> <p>5 GHz Band:</p> <ul style="list-style-type: none"> <li>-64 dBm at VHT20 MCS8</li> <li>-58 dBm at VHT40 MCS9</li> <li>-55 dBm at VHT80 MCS9</li> <li>-53 dBm at VHT160 MCS9</li> </ul>

<b>IEEE 802.11ax Section</b>	
Radio and Modulation Schemes	QPSK, BPS, 16QAM, 64QAM, 256QAM, 1024QAM with OFDMA
Operating Frequency	<p>2.4 GHz :2400 ~ 2483.5MHz for ISM band</p> <p>5.15~5.25 GHz</p> <p>5.25~5.35 GHz;</p> <p>5.47~5.725 GHz</p> <p>5.725~5.825 GHz;</p>
Data Rate	<p>2.4 GHz: at most 573.5Mbps</p> <p>5 GHz: at most 2402Mbps</p>
Media Access Protocol	CSMA/CA with ACK
Transmitter Output Power at Antenna Connector	<p>Typical RF Output Power at each RF chain and at room Temp. 25°C</p> <p>2.4 GHz Band:</p> <ul style="list-style-type: none"> <li>14±2dBm at VHT20 MCS11</li> <li>13.5±2dBm at VHT40 MC11</li> </ul> <p>5 GHz Band:</p> <ul style="list-style-type: none"> <li>13±2dBm at HE20 MCS11</li> <li>13±2dBm at HE40 MCS11</li> <li>12.5±2dBm at HE80 MCS11</li> <li>12.5±2dBm at HE160 MCS11</li> </ul>
Receiver Sensitivity at Antenna Connector	<p>Typical Sensitivity at each RF chain. @Frame (1000-byte PDUs) Error Rates≤10% at room Temp 25°C</p> <p>2.4 GHz Band:</p> <ul style="list-style-type: none"> <li>-58 dBm at HE20 MCS11</li> <li>-55 dBm at HE40 MCS11</li> </ul> <p>5 GHz Band:</p> <ul style="list-style-type: none"> <li>-57 dBm at HE20 MCS11</li> <li>-55 dBm at HE40 MCS11</li> <li>-50 dBm at HE80 MCS11</li> <li>-47 dBm at HE160 MCS11</li> </ul>

<b>IEEE 802.11ax Section (6GHz)</b>	
Radio and Modulation Schemes	QPSK, BPS, 16QAM, 64QAM, 256QAM, 1024QAM with OFDMA
Operating Frequency	6 GHz : 5.930~7.110GHz
Data Rate	at most 2402Mbps
Media Access Protocol	CSMA/CA with ACK
Transmitter Output Power at Antenna Connector	Typical RF Output Power at each RF chain and at room Temp. 25°C  6 GHz Band: 11±2dBm at HE20 MCS11 11±2dBm at HE40 MCS11 10.5±2dBm at HE80 MCS11 10.5±2dBm at HE160 MCS11
Receiver Sensitivity at Antenna Connector	Typical Sensitivity at each RF chain. @Frame (1000-byte PDUs) Error Rates≤10% at room Temp 25°C  6 GHz Band: -55 dBm at HE20 MCS11 -52 dBm at HE40 MCS11 -48 dBm at HE80 MCS11 -46 dBm at HE160 MCS11

<b>5G-Interface:</b>																			
Module:	Quectel RM520N-GL																		
Technologies / Bands	<table border="1"> <tr> <td rowspan="2">5G NR</td> <td>NSA</td> <td>n1/n2/n3/n5/n7/n8/n12/n13/n14/n20/n25/n26/n28/n29/n30/n38/n40/n41/n48/n66/n71/n75/n76/n77/n78/n79</td> </tr> <tr> <td>SA</td> <td>n1/n2/n3/n5/n7/n8/n12/n13/n14/n20/n25/n26/n28/n29/n30/n38/n40/n41/n48/n66/n71/n75/n76/n77/n78/n79</td> </tr> <tr> <td rowspan="3">LTE</td> <td>LTE-FDD</td> <td>B1/B2/B3/B4/B5/B7/B8/B12/B13/B14/B17/B18/B19/B20/B25/B26/B28/B29/B30/B32/B66/B71</td> </tr> <tr> <td>LTE-TDD</td> <td>B34/B38/B39/B40/B41/B42/B43/B48</td> </tr> <tr> <td>LAA</td> <td>B46 (only support 2 × 2 MIMO)</td> </tr> <tr> <td>UMTS</td> <td>WCDMA</td> <td>B1/B2/B4/B5/B8/B19</td> </tr> <tr> <td>GNSS</td> <td></td> <td>GPS/GLONASS/BeiDou (Compass)/Galileo</td> </tr> </table>	5G NR	NSA	n1/n2/n3/n5/n7/n8/n12/n13/n14/n20/n25/n26/n28/n29/n30/n38/n40/n41/n48/n66/n71/n75/n76/n77/n78/n79	SA	n1/n2/n3/n5/n7/n8/n12/n13/n14/n20/n25/n26/n28/n29/n30/n38/n40/n41/n48/n66/n71/n75/n76/n77/n78/n79	LTE	LTE-FDD	B1/B2/B3/B4/B5/B7/B8/B12/B13/B14/B17/B18/B19/B20/B25/B26/B28/B29/B30/B32/B66/B71	LTE-TDD	B34/B38/B39/B40/B41/B42/B43/B48	LAA	B46 (only support 2 × 2 MIMO)	UMTS	WCDMA	B1/B2/B4/B5/B8/B19	GNSS		GPS/GLONASS/BeiDou (Compass)/Galileo
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Antennas:	Up to 4 Antennas																		
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Data rates (max.)	<table border="1"> <thead> <tr> <th>Mode</th> <th>Data rate</th> </tr> </thead> <tbody> <tr> <td>5G SA Sub-6</td> <td>DL 2.4 Gbps; UL 900 Mbps</td> </tr> <tr> <td>5G NSA Sub-6</td> <td>DL 3.3 Gbps; UL 600 Mbps</td> </tr> <tr> <td>LTE</td> <td>DL 1.6 Gbps; UL 200 Mbps</td> </tr> <tr> <td>WCDMA</td> <td>DL 42 Mbps; UL 5.76 Mbps</td> </tr> </tbody> </table>	Mode	Data rate	5G SA Sub-6	DL 2.4 Gbps; UL 900 Mbps	5G NSA Sub-6	DL 3.3 Gbps; UL 600 Mbps	LTE	DL 1.6 Gbps; UL 200 Mbps	WCDMA	DL 42 Mbps; UL 5.76 Mbps								
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WCDMA	DL 42 Mbps; UL 5.76 Mbps																		

**Order codes:**

	<b>Option</b>	<b>Order code</b>
<b>Housing</b>		
	Housing with mounting brackets	MC2X8-E-SL....
	Housing with DIN-rail-clip	MC2X8-E-SC....
<b>Power supply connection</b>		
	M12 connector	MC2X8-E-Sx-M12....
	8pol. Weidmüller terminal block	MC2X8-E-Sx-WK8....
<b>IO-Option</b>	optional, if not included in connector	
	Aux-Input	MC2X8-E-Sx-.....-INP
<b>Serial</b>	Standard: 1 x RS232	MC2X8-E-Sx-....
	1 x RS422	MC2X8-E-Sx-xx- <b>RS422</b>
	1 x RS485	MC2X8-E-Sx-xx- <b>RS485</b>