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# Simoco Xm Ethernet Radio

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Xm is a best in class radio modem renowned for overall data throughput and reliability. The software defined radio is a native IP device allowing for both Ethernet and Serial communications.

## Resilient Communications

The Simoco Xm Ethernet Radio provides resilient communications for mission critical applications for Utilities such as SCADA & Telemetry, SmartGrids & Smart Cities.

## Flexibility and Scalability

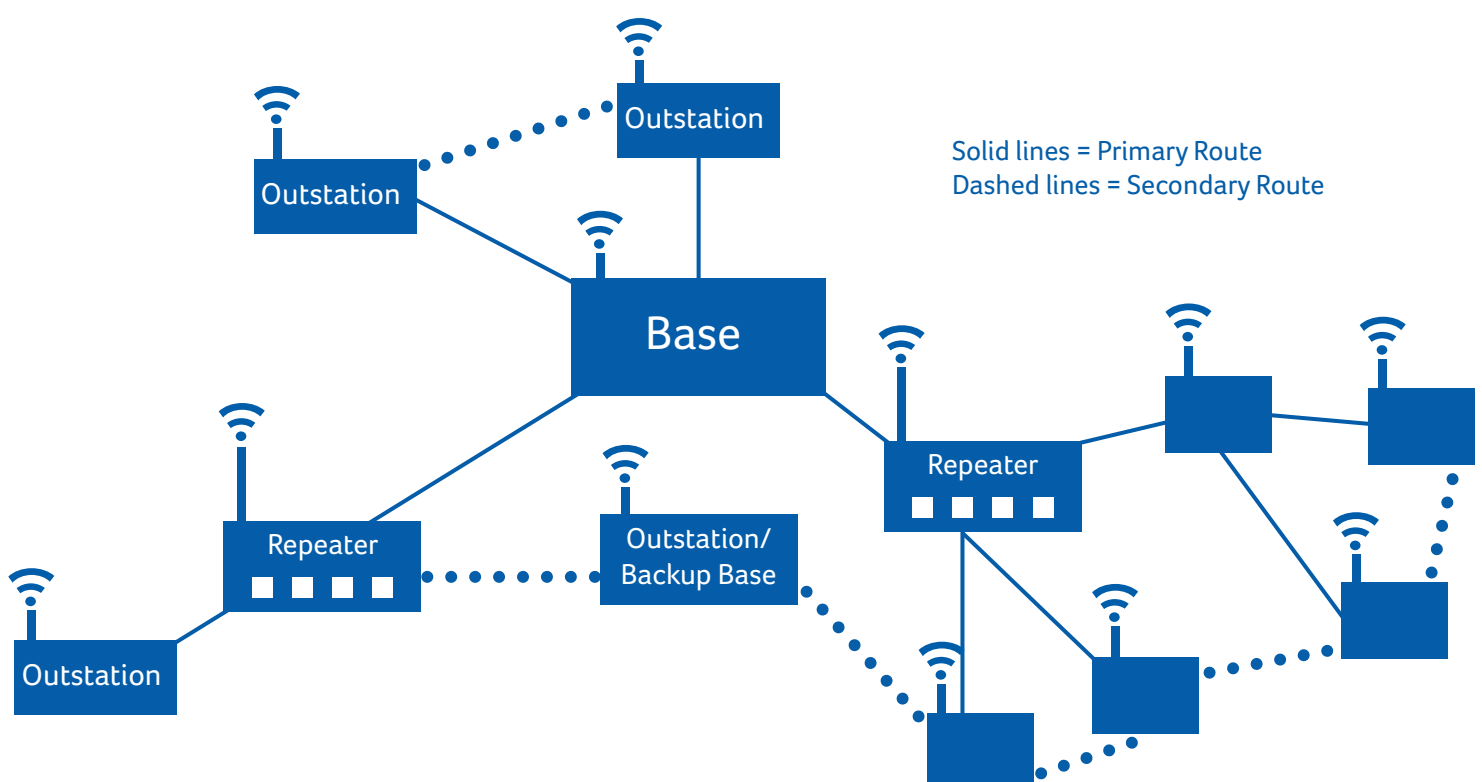
Within a Xm network every unit can serve as the central master, a repeater, a remote terminal or all of these simultaneously. These various configurations allow a variety of network topologies such as point-to-point, point-to-multipoint, and mesh, allowing for scalability and ease of deployment.

## Connectivity

Combining both IP and serial connectivity, Xm modems are suitable for use with the latest SCADA technology, also providing a clear migration path from serial based infrastructure thanks to the modems inbuilt "migration solution software" which allows the phased replacement of legacy radio modems.

## Benefits

- IP routing capability allows for Mesh networks and alternate routes
- Easy configuration through web browser
- Inbuilt migration solution for legacy serial networks
- Sophisticated anti-collision protocol on Radio channel - simultaneous report by exception and multi-master polling
- 166 kbps/50 kHz, 42 kbps/12.5kHz, 11kbps/6.25kHz





# Features and Benefits

## Native IP device

- **Router mode** - Xm works as a standard IP Router with 2 interfaces (Radio and Ethernet) and 2 COM port devices without any compromise. There is a sophisticated anti-collision protocol on Radio channel, where every single packet is acknowledged. Moreover, each unit can simultaneously work as a store-and-forward repeater.
- **Bridge mode** - Packets received on any interface are broadcast to the respective interfaces on all units. Packets received on COM are broadcast to both COM1 and COM2 at remote sites, allowing you to connect 2 RTU's to each remote unit.
- **IP specialities** ;
  - **Terminal Server**: encapsulates serial protocol to TCP (UDP) and vice versa, eliminating a transfer of TCP overhead over Radio channel, 5 independent sessions
  - **TCP proxy**: converts TCP to UDP, eliminates transfer of TCP overhead
  - **Subnets**: unlimited number of virtual Ethernet interfaces (IP aliases)
  - **VLAN**: unlimited number of VLANs assigned to Subnets
  - **ARP proxy**: any IP address simulating (for RTU's without routing capabilities within the same subnet)

## Easy to configure and maintain

- Basic IP knowledge is sufficient
- Web interface or CLI via SSH
- Service access via ETH, USB/ETH or Wifi Adapter
- Wizards - fast and simple setup
- All configuration parameters within one page
- Fast remote access - only the effective data is transferred over the air, html page downloaded from the local unit
- External flash disc - automatic configuration, SW keys and FW upgrade

## Data speed & throughput

- 166 kbps/50 kHz, 42 kbps/12.5kHz, 11kbps/6.25kHz
- Optimization - embedded optimization triples throughput on the Radio channel
- Stream mode - transmitting starts immediately on the Radio channel, without waiting for the end of the received frame on COM means zero latency
- Auto-speed - receiver is automatically adjusted to the data rate of the incoming frame

## SW feature keys

- Advanced features only when and where needed;
  - Router mode
  - 166/83 kbps
  - COM2, 10W
  - Backup routes
- Free Master-key trial - for 30 days in every Xm

## Energy savings

- Sleep mode - 0.1 W, triggered by Digital input
- Save mode - 2 W, wake up by a received packet from Radio channel or by Digital input

# Features and Benefits



## Long range

- One radio hop over 50 km, Line of sight is not required
- Carrier output power 0.1 - 10W
- Exceptional data sensitivity:
  - 99dBm/83kbps/25kHz/BER 10e-6
  - 115dBm/10kbps/25kHz/BER 10e-6
- Any unit can work simultaneously as a repeater
- Unlimited number of repeaters on the way
- Any IP network can interconnect Xm units
- Backup routes
  - Tested alternative paths between two Xm units
  - Automatic switchover to backup gateway
  - Unlimited number of alternative paths
  - Alternative path priorities

## SCADA protocols

- Modbus, IEC 60870-5-101, DNP3, Comli, DF1, Profibus, SLIP, Siemens 3964 (R), IEC104, DNP3/TCP, Modbus TCP and others
- SCADA serial protocol addresses are mapped to Xm addresses
- TCP (UDP) protocols can be handled transparently or using Terminal server or TCP proxy
- Each packet is transferred as an acknowledged unicast
- Sophisticated anti-collision protocol on Radio channel - simultaneous report by exception and multi-master polling
- Embedded Modbus RTU/Modbus TCP converter

## Diagnostics & Network Management

- Statistic logs for interfaces and communication links
- Historical and on-line values displayed graphs
- 20 periods (e.g days) of history
- Watched values (RSS, Ucc, Temp, PWR, etc) also from neighbouring units
- SNMP including TRAP alarms
- HW Alarm input, HW Alarm output
- Monitoring - on-line analysis of communication over any of the interfaces


## Security & Integrity

- Licensed radio bands
- FEC, interleaving, proprietary data compression
- CRC32 data integrity control on Radio channel
- Proprietary protocol on Radio channel with packet acknowledgement
- AES256 encryption
- Firewall: Layer 2 - MAC, Layer 3 - IP, Layer 4 - TCP/UDP
- Secured Management - https, ssh, access password
- SSL (own) certificate up to 2048 bits for https

## Reliability

- Units tested in a climatic chamber as well as in real traffic
- Heavy-duty or industrial components
- Industrial rugged die-cast aluminium cse
- -40 to +70°C
- 2 years warranty

## Others

- Removable sticker plate for your notes
- DIN rail, flat, vertical or 19" rack mounting
- Separated Rx and Tx antenna connectors\*
- Integrated GPS\*
- Hazardous locations:  II 3G Ex ic IIC T4 Gc
- Vibration and shock: EN 61373:1999

\*Optional

# Technical Specifications

## General Specification

<b>Frequency Bands</b>	135-154; 154-174; 215-240; 300-320; 320-340; 340-360; 368-400; 400-432; 432-470; 470-512; 928-960 MHz						
<b>Channel spacing</b>	6.25 / 12.5 / 25 / 50 kHz						
<b>Frequency stability</b>	+/- 1.0 ppm						
<b>Modulation</b>	Linear: 16DEQAM, D8PSK, $\pi/4$ DQPSK, DPSK Exponential (FM): 4CPFSK, 2CPFSK						
<b>RF Data rate - CE (kbps)</b>	<b>Bandwidth</b>	Linear				Exponential	
		16DEQAM	D8PSK	$\pi/4$ DQPSK	DPSK	4CPFSK	2CPFSK
	50 kHz	138	104	69.4	34.7	41.6	20.8
	25 kHz	83.3	62.4	41.6	20.8	20.8	10.4
	12.5 kHz	41.6	31.2	20.8	10.4	10.4	5.2
<b>RF Data rate - FCC (kbps)</b>	<b>Bandwidth</b>	Linear				Exponential	
		16DEQAM	D8PSK	$\pi/4$ DQPSK	DPSK	4CPFSK	2CPFSK
	50 kHz	138	104	69.4	34.7	41.6	20.8
	25 kHz	69.4	52.0	34.7	-	20.8	-
	12.5 kHz	34.7	26.0	17.3	-	10.4	-
<b>RF Data rate - Unlimited (kbps)</b>	<b>Bandwidth</b>	Linear				Exponential	
		16DEQAM	D8PSK	$\pi/4$ DQPSK	DPSK	4CPFSK	2CPFSK
	50 kHz	166	125	83.3	41.6	41.6	20.8

## Interfaces

<b>Ethernet</b>	10/100 Base-T Auto MDI/MDIX	RJ45
<b>COM1</b>	RS232 300-115 200 bps	DB9F
<b>COM2</b>	RS232/RS485 SW configurable 300-115 200 bps	DB9F
<b>USB</b>	USB 1.1	Host A
<b>Antenna</b>	50 Ohms	TNC female

## Environmental

<b>IP Code</b>	IP40
<b>Temperature</b>	-40 to +70°C / -40 to +158 °F
<b>Humidity</b>	5 to 95% non-condensing

## Electrical

<b>Primary Power</b>	10 to 30 VDC, negative GND
<b>Rx</b>	5 W @ 13.8 V; 4.8 W @ 24 V; (Radio part < 2 W)
<b>Tx</b>	5W RF: 33.1 W @ 13.8 V; 31.2 W @ 24V 10W RF: 41.4 W @ 13.8 V; 38.4 W @ 24V
<b>Sleep mode</b>	0.1 W
<b>Save mode</b>	2W

## Transmitter

<b>RF Output Power (Carrier and Modulated)</b>	Linear: Programmable 0.5 - 2W Exponential (FM): Programmable 0.1 - 10W
<b>Duty Cycle</b>	Continuous
<b>Rx to Tx Time</b>	< 1.5 ms
<b>Intermodulation Attenuation</b>	> 40 dB
<b>Spurious Emissions (Conducted)</b>	< -36dBm
<b>Spurious Emissions (Radiated)</b>	< -36dBm
<b>Adjacent channel power</b>	< -60dBc
<b>Transient adjacent channel power</b>	< -60dBc

## Receiver

<b>Sensitivity</b>	-90dBm to -122dBm (depending on bandwidth, modulation, FEC level, BER level and regulatory method & mask)
<b>Anti-aliasing Selectivity</b>	50kHz @ -3dB BW
<b>Tx to Rx Time</b>	< 1.5 ms
<b>Maximum Receiver Input Power</b>	20 dBm (100 mW)
<b>Rx Spurious Emissions (Conducted)</b>	< -57dBm
<b>Radiated Spurious Emissions</b>	< -57 dBm
<b>Blocking or Desensitization</b>	-21 dB to 7dB
<b>Spurious response rejection</b>	> 70dB

## Mechanical

<b>Casing</b>	Rugged die-cast aluminum
<b>Dimensions</b>	150 W x 118 D x 50 H mm (5.90 x 4.65 x 1.97 in)
<b>Weight</b>	1.1kg (2.4lbs)

## Diagnostics and Management

<b>Radio Link Testing</b>	Yes (ping with RSS, Data Quality, Homogeneity)
<b>Watched Values</b>	Device-Ucc, Temp, PWR, VSWR, HW Alarm Input. Radio channel-RSScom, DQcom, TXLost[%] User interfaces-ETH[Rx/Tx], COM1[Rx/Tx], COM2[Rx/Tx]
<b>Statistics</b>	For Rx/Tx Packets on User interfaces (ETH, COM1, COM2) and for User data and Radio protocol (Repeats, Lost, ACK etc.) on Radio channel
<b>Graphs</b>	For Watched values and Statistics

## Certifications

CE, FCC, ATEX, IECEx

## SW

<b>Operating modes</b>	Bridge/Router
<b>User Protocols on COM</b>	Modbus, IEC60870-5-101, DNP3, UNI, Comli, DF1, RP570, Profibus
<b>User Protocols on Ethernet</b>	Modbus TCP, IEC60870-5-104, DNP3 TCP, Comli TCP, Terminal server
<b>Multi master applications</b>	Yes
<b>Report by exceptions</b>	Yes
<b>Collision Avoidance Capability</b>	Yes
<b>Repeaters</b>	Store-and-forward; Every unit; Unlimited number

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## wireless solutions

Specifications based on standard operating conditions. Not all combinations of frequency bands and options are permissible for every market area. See Simoco Wireless Solutions Product Catalogue for a full list of specifications. All specifications are subject to change without prior notice. Simoco Wireless Solutions does not accept liability for any error or omission in this document.

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### UKHQ

Field House  
Uttoxeter Old Road  
Derby  
DE1 1NH  
Tel UK: 08717 411 050  
Tel International: +44 (0) 1332 375 500  
customer.service@simocowirelessolutions.com

### AUSHQ

1270 Ferntree Gully Rd  
Scoresby, VIC 3179  
Tel: +61 (0) 3 9730 3999  
Fax: +61 (0) 3 9730 3964  
vic@simocowirelessolutions.com

### AMERICAS

1835 E. Hallandale Beach Blvd.  
Hallandale Beach  
FL 33009, USA  
americas@simocowirelessolutions.com