

General

MR400 is a well proven **radio modem**, on the market for over a decade and undisputably well established. Tens of thousands units serve reliably around the world, from the poles to the equator.

MR400 uses a sophisticated anti-collision protocol on the Radio channel. Its unbeatable network performance is boosted by the unique implementaion of proprietary SCADA protocols from all significant vendors on the SCADA market.

Thanks to MR400 extraordinary intelligence, speed and switching time, they are suitable for all types of networks where emphasis is placed on speed and reliability, such as SCADA & Telemetry for utility distributions (water, electricity, oil&gas), SmartGrid power networks, Transaction networks like lottery, ATM or POS, mobile networks including mission-critical fleet management and many other applications.



MR400

Radio modem

70, 160, 300, 400 MHz 22 kbps/25 kHz 5 or 25 W 1x ETH, 4x COM, I/O Automatic back-up routes Mobile networks Network management SW

Applications

Water Oil & Gas Electricity Smart grid POS & ATM Lottery Weather Transportation Others



MR400



Data speed & Network throughput

- Y 132 kbps / 200 kHz
- Ϋ 22 kbps / 25 kHz
- Y 11 kbps / 12,5 kHz
- Ÿ Polling, Report-by-exception, Mesh
- Y Throughput limits for 22 kbps/25 kHz:
 - 600 Bytes/sec. in collision environment of all units within one radio coverage area
 - 10 packets/sec. (for packets shorter than 60 Bytes)
 - 15 kbps user data rate for point-to-point link

Ultimate OS

- Ÿ No Linux
- Y No Windows
- Ϋ́ Extremely fast booting (3 sec.)

Coverage

- Y 70, 160, 300, 400 MHz bands, no direct line of sight required
- Y Carrier output power 0,1-5 W or 0,1-25 W
- Y Exceptional data sensitivity: -105 dBm / 22 kbps / 25 kHz
- Y Max. distance more than 50 km
- Y High resistance to multi path propagation and interference (CPFSK modulation)
- Y Every can work simultaneously as a repeater
- Y Hybrid networks: any IP network (Internet,3G/GPRS etc.) can interconnect MR400 units
- Ÿ Unlimited number of radio hops

User protocols

- Y More than 70 protocols Modbus, IEC101, DNP3, Comli, DF1, Profibus, Modbus TCP, IEC104....
- Y Cache mode speeds up polling protocols
- Y SCADA serial protocol addresses are mapped to MR400 addresses
- Y TCP (UDP) protocols (e.g. IEC104) are handled transparently
- Ÿ Each packet is acknowledged on Radio channel
- Y Sophisticated anti-collision protocol on Radio channel => report by exception from remotes, simultaneous multi master polling

Modular

 Š slots for modules: Ethernet, GPS, M-BUS
2x RS232, 1x RS232, 1x RS232i, 1x RS422/485i,
I/O - 2xDI, 2xDO, 2xAI, 2xAO,

Mobile network

- Y Connection-less Mobile mode in Radio protocol
- Ϋ Every stationary unit can serve simultaneously as a Base station for mobiles
- Y Cell architecture: automatic instant hand-over, each individual packet from mobile is delivered via the best Base station at the moment
- Y Central MR400 maintains a list of "mobile-base" connections, updated with every packet, to enable communication from the centre to mobiles

Radio Modem

Fast to configure and diagnose

- Y Setr special Windows or Linux application for configuration
- Y The fastest and most robust remote access with minimum data over the network
- Y Monitoring of User interfaces and Radio channel, either locally or remotely
- Ŷ On line as well as historical statistics for all interfaces and Radio channel

Security

- Y Licensed radio bands
- Ϋ́FEC, interleaving, proprietary data compression
- Ÿ CRC32 data integrity control on Radio channel
- Proprietary protocol on Radio channel with packet acknowledgement
- Ÿ Blowfish 160 encryption
- Y Netlock application which enables/disables remote access to the unit for three level of users

Energy savings

- **Sleep mode** 2.5 mA, controlled via a digital input
- Y Power down unit boots within 3 sec. after power up

RANEC - Network Management

- Y Collects statistics from all units and save them in database
- Ÿ Extra load generated by RANEC is automatically regulated based on user traffic
- Υ One server + unlimited number of graphical clients
- Ÿ Possible to display all statistics in graphs
- Ÿ Displays the network topology on a background map
- Y Network planning it calculates the coverage using digital model of the terrain

Reliability

- Y Every single unit **tested in a climatic chamber** as well as in real traffic
- Y Military or industrial grade components are used
- Ÿ Industrial die cast aluminum case
- Ÿ -30 to +70 °C (-22 to +158 °F)

Other Highlights

- Y DIN rail, flat or 19" rack mounting
- Y CE, FCC approvals
- Y Vibration EN 61 373



Technical parameters

Radio parameters

Types ¹⁾	Half-duplex	Full-duplex	Frequency	
	MR070	MD070*	69 - 85 MHz	
	MR160	MD160	135 - 175 MHz	
	MR300	MD300*	290 - 350 MHz	
	MR400	MD400*	350 - 470 MHz	
Tuning range	3.2 MHz			
Channel spacing 3)	12,5 / 25 / 200 kH	Z		
Frequency stability	+/- 1.0 ppm			
Modulation	4CPFSK / 12,5 ar	nd 25 kHz; 2CPFSK / 2	00 kHz	
Data rate	10.84 kbps / 12.5 kHz			
	21.68 kbps / 25 kl	Ηz		
	132.0 kbps / 200 l	kHz		
Carrier output power ^{1) 3)}	0.1 W - 5 W; 0.1 \	N - 25 W		
Sensitivity for BER 10e-6	-110 dBm / 10.84	kbps / 12.5 kHz		
	-105 dBm / 21.68	kbps / 25 kHz		
	-100 dBm / 132.0	kbps / 200 kHz		
Flectrical				
Primary power	13.8 V (10.8 - 15.	6 V)		
Rx ²⁾	380 mA (Ftb +40 mA 1/O +50 mA GPS +15 mA)			
	16A/1W 20A/5W 55A/25W			
Sleep mode	2.5 mA	, o iii, olo , ii 20 ii		
	210			
Interfaces				
5 slots	Ethernet			
	2x RS232, 1x RS2	232, 1x RS232i, 1x RS4	422/485i,	
	GPS, M-BUS, I/O	- 2×DI, 2×DO, 2×AI, 2	×AO,	
Enviromental				
Temperature	-30 to +70 °C (-22	to +158 °F)		
Humidity	5 to 95% non-con	densina		
Mechanical		5		
Casing	Ruggod dia cast	luminium		
Dimonsions	208 W × 108 D ×	62 H mm (8 10 x 4 25 x	< 2.48 in)	
Weight	1.2 kg (2.65 lbs)	031111111 (0.19 x 4.23)	(2.40 iii)	
weight	1.2 kg (2.03 lbs)			
ŚW				
511				
User protocols on COM	More than 70 prot	ocols - Modbus, IEC1	01, DNP3,Comli, DF1, Profibus,	
User protocols on Ethernet	Modbus TCP, IEC	104		
Multi master applications	Yes			
Report by exception	Yes			
Collision Avoidance Capability	Yes			
Repeaters	Store-and-forward	t; Every unit; Unlimited	number	
Diagnostic and Management				
Radio link testing	RSS, DQ, Homog	enity		

reado min tooting	Roo, Da, Homogomy	
Statistic	Rx/Tx packets on User interfaces and for User data	
	and Radio protocol (Repeats, etc.) on Radio channel	
Network management	RANEC software	
Approvals		

Radio parameters	CE, FCC part 90, RSS119
Use in automotive environments	ECE Regulation 010.00
Vibrations	EN 61 373

¹⁾ Please contact us to check availability of specific types and frequencies. Types marked * can be manufactured individually when ordered in significant volumes.

²⁾ Values depend on frequency and modem type.

³⁾ HW option