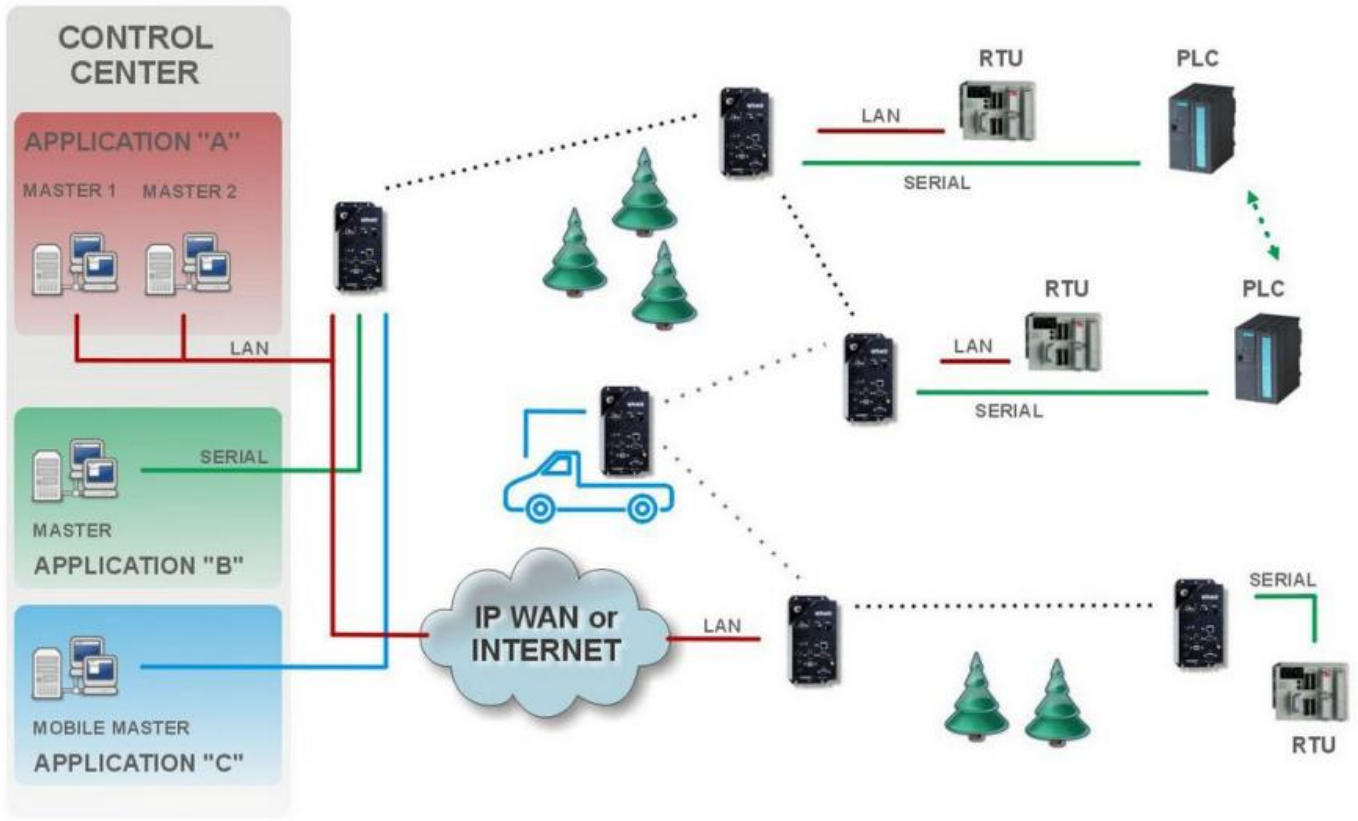




- ✓ Lottery
- ✓ Weather
- ✓ Transportation
- ✓ Others

AT





### Data speed & Network throughput

- ✓ 132 kbps / 200 kHz
- ✓ 22 kbps / 25 kHz
- ✓ 11 kbps / 12,5 kHz
- ✓ Polling, Report-by-exception, Mesh 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

### User protocols

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

- ✓ No Linux
- ✓ No Windows
- ✓ Extremely fast booting (3 sec.)

#### Modular

- ✓ 5 slots for modules:
  - ✓ Ethernet, GPS, M-BUS
  - ✓ 2x RS232, 1x RS232i, 1x RS422/485i,
  - ✓ I/O - 2×DI, 2×DO, 2×AI, 2×AO,

#### Coverage

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

#### Mobile network

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

#### Fast to configure and diagnose

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

#### RANEC - Network Management

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

#### Security

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

## Reliability

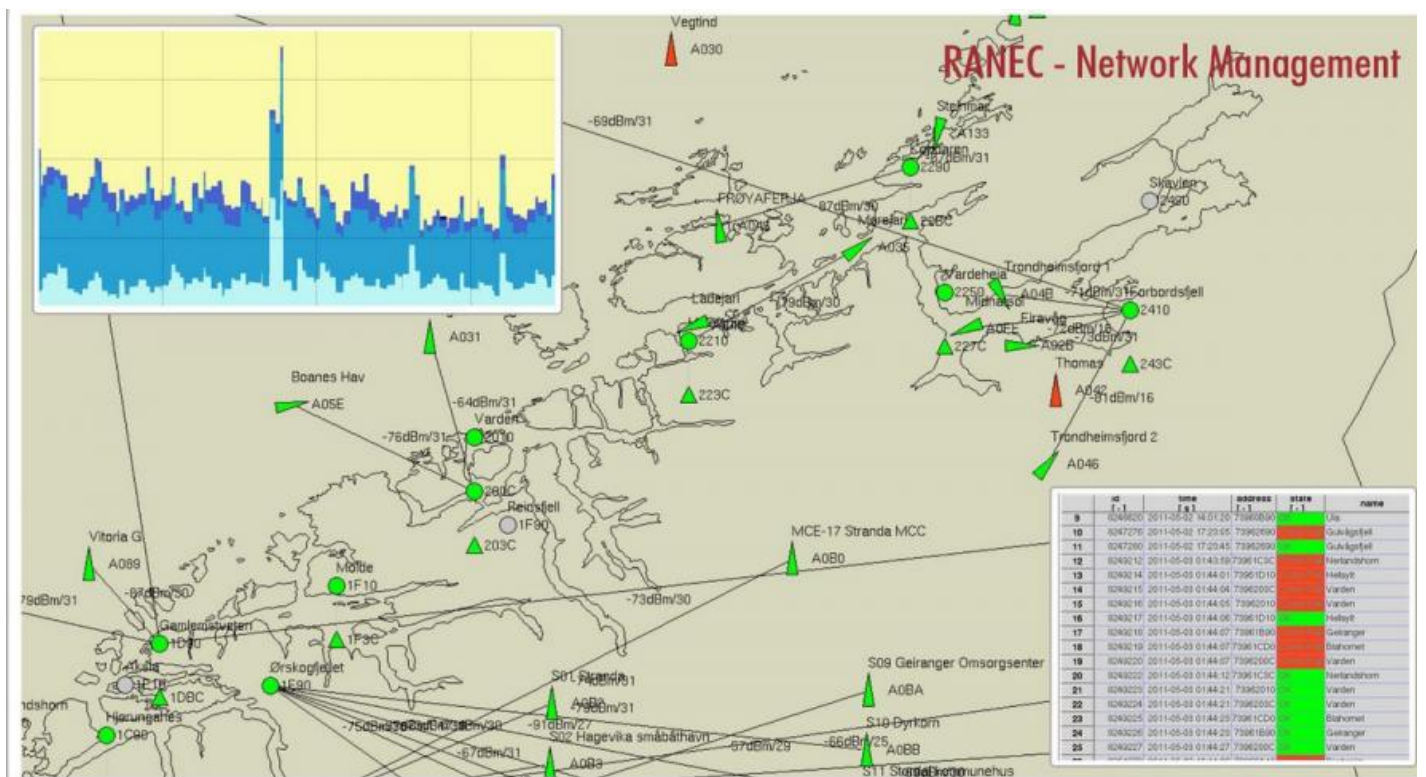
- ✓ Every single unit tested in a climatic chamber as well as in real traffic
- ✓ Military or industrial grade components are used
- ✓ Industrial die cast aluminum case
- ✓ -30°C to 70°C (-22°F to +158°F)

## Energy savings

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

## Other Highlights

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



## Technical parameters

| Radio parameters           |  |             |               |
|----------------------------|--|-------------|---------------|
| Types 1)                   | Half-duplex  | Full-duplex | Frequency     |
|                            | MR070  | MR070*      | 69 - 85 MHz   |
|                            | MR160  | MR160       | 135 - 175 MHz |
|                            | MR300  | MR300*      | 290 - 350 MHz |
|                            | MR400  | MR400*      | 350 - 470 MHz |
| Tuning range               | 3.2 MHz  |             |               |
| Channel spacing 3)         | 12,5 / 25 / 200 kHz  |             |               |
| Frequency stability        | +/- 1.0 ppm  |             |               |
| Modulation                 | 4CPFSK / 12,5 and 25 kHz; 2CPFSK / 200 kHz                           |             |               |
| Data rate                  | 10.84 kbps / 12.5 kHz<br>21.68 kbps / 25 kHz<br>132.0 kbps / 200 kHz |             |               |
| Carrier output power 1) 3) | 0.1 W - 5 W; 0.1 W - 25 W  |             |               |
| Sensitivity for BER 10e-6  | -110 dBm / 10.84 kbps / 12.5 kHz                                     |             |               |



|                                  |  |
|----------------------------------|--|
|                                  | -105 dBm / 21.68 kbps / 25 kHz<br>-100 dBm / 132.0 kbps / 200 kHz                                      |
| <b>Electrical</b>                |  |
| Primary power                    | 13.8 V (10.8 - 15.6 V)   |
| Rx 2)                            | 380 mA (Eth +40 mA, I/O +50 mA, GPS +15 mA)  |
| Tx 2)                            | 1.6 A / 1 W; 2.0 A / 5 W; 5.5 A / 25 W   |
| Sleep mode                       | 2.5 mA   |
| <b>Interfaces</b>                |  |
| 5 slots                          | Ethernet<br>2x RS232, 1x RS232i, 1x RS422/485i,<br>GPS, M-BUS, I/O - 2×DI, 2×DO, 2×AI, 2×AO,           |
| <b>Environmental</b>             |  |
| Temperature                      | -30°C to 70°C (-22°F to +158°F)  |
| Humidity                         | 5% to 95% non-condensing   |
| <b>Mechanical</b>                |  |
| Casing                           | Rugged die-cast aluminium  |
| Dimensions                       | 208 W x 108 D x 63 H mm (8.19 x 4.25 x 2.48 in)  |
| Weight                           | 1.2 kg (2.65 lbs)  |
| <b>SW</b>                        |  |
| User protocols on COM            | More than 70 protocols - Modbus, IEC101, DNP3,Comli, DF1, Profibus                                     |
| User protocols on Ethernet       | Modbus TCP, IEC104...  |
| Multi master applications        | Yes  |
| Report by exception              | Yes  |
| Collision Avoidance Capability   | Yes  |
| Repeaters                        | Store-and-forward; Every unit; Unlimited number  |
| <b>Diagnostic and Management</b> |  |
| Radio link testing               | RSS, DQ, Homogeneity   |
| Statistic                        | Rx/Tx packets on User interfaces and for User data and Radio protocol (Repeats, etc.) on Radio channel |
| Network management               | RANEC software   |
| <b>Approvals</b>                 |  |
| 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

## MR400 - Radio Modem