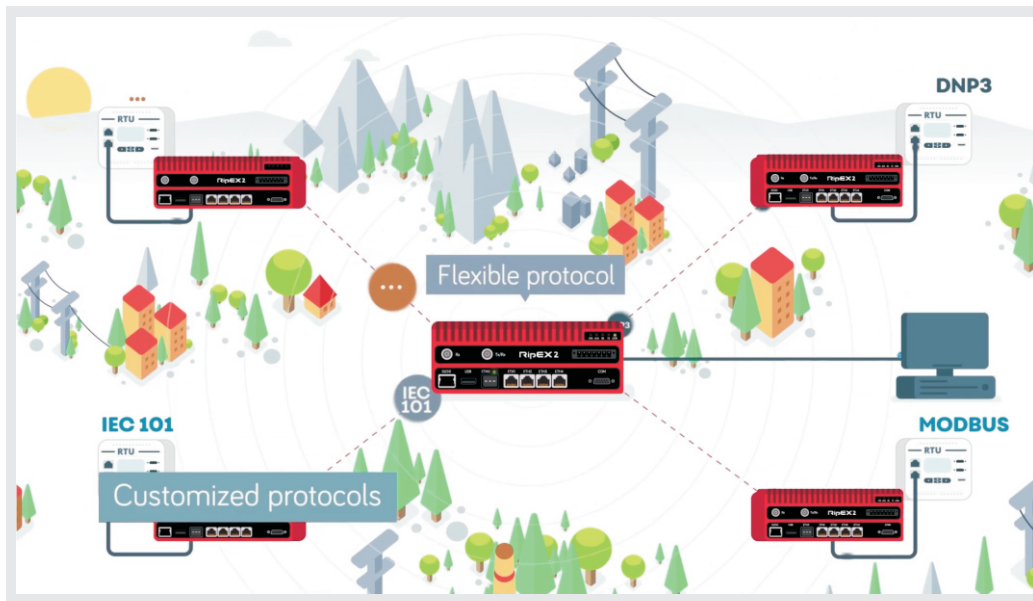# RipEX

Modulation data speed (Gross data rate) typically listed in data sheets is frequently misinterpreted as Network performance. **The only valid parameter** for performance is the service quality of a network as seen by the user, measured by **Network throughput** (User data speed) - **How many packets/bytes of payload data successfully delivered** in a given time period.

RACOM has a global reputation for delivering networks with the highest Network throughput. Below, we describe three of the ways in which we achieve this; all created by our innovative in-house development team using feedback we receive from the fields.

RipEX2
- 1.1 Mbps / 200 kHz / 256QAM
- 6.25 - 200 kHz
- 4×ETH,1×SFP,1×COM,1×USB

RipEX
- 166 kbps / 50 kHz / 16DEQAM
- 6.25 - 50 kHz
- 1× ETH, 2× COM, 1× USB

Common features
- 0.1 - 10 watts, - 40 to +70 °
- Solar ready
- Wifi management
- Customized protocols
- Fast remote access
- IPsec

RipEX networks
- Future proofed
- Exceptional Data throughput
- Optimized Radio protocols
- Unlimited Network design
- Backup routes
- Native IP environment
- 3 year warranty

Modulation data speed

High order (**QAM**) modulations **increase Data speed** but **also increase** the number of **errors** in the network especially in difficult environments with low signals, interference, multipath propagation, fading etc. **RACOM** developed a unique algorithm using **very low overhead** to **correct** modulation **errors**, used **since 2011** in RipEX networks. More recently, we have improved and adapted this algorithm for use with **256 QAM** modulation. **RipEX2** is the only modem on the market with these features, taking network performance to the **next level.**

Radio protocols

Protocol on the Radio channel is the **key element** for Network throughput. When **collisions** and **access** to Radio channel are **not** solved **efficiently, Network throughput** can easily **drop by 50%** or more. RACOM has placed particular focus on Radio protocols since its first radio modem launched in 1992 and now, we can even offer a **solution for TCP/IP** applications. Only RACOM provides **different** sophisticated **protocols** for **different applications.** These resolve collisions efficiently or can manage all traffic from the base station to completely avoid collisions. RipEX protocols provide **fair distribution** of channel **capacity** amongst **all remotes** in the network regardless of their signal strength.

Optimization

RACOM benefits from **20 years of experience** in implementing optimization. We use **packet compression, stream compression** and **short packet combination.** Excessive **TCP overhead** is **eliminated by TCP proxy** optimized for Radio channel. Our optimization can typically **increase** network throughput **over 200%**. Tests have shown RACOM optimization algorithms are **the best on the market** by a wide margin.

RACOM
www.racom.eu

PRACTICAL TEST / 25 kHz channel

OVERHEADS – always reduce Data speed

Modulation data speed

This is **always reduced** in the **real environment**, i.e. the number from the data sheet is never reached in practice. There are two main factors which limit Modulation data speed:

- **Physical layer**
  - Always involved, even in laboratory environment
  - Rx/Tx Switching time, Synchronization, FEC...
- **Data integrity**
  - Some packets must be repeated in real environment
  - Low RSS, interference, multipath propagation, fading...

Radio protocol

User applications use communication networks in different ways, most in a collision environment. A radio protocol, managing all traffic and its efficiency, is the **most critical part of Network performance:**

- **Radio channel access** (LBT, access algorithm...)
- **Collision avoidance** (channel sharing - CSMA, TDMA...)
- **Collision resolving** (acknowledgement and retransmissions...)

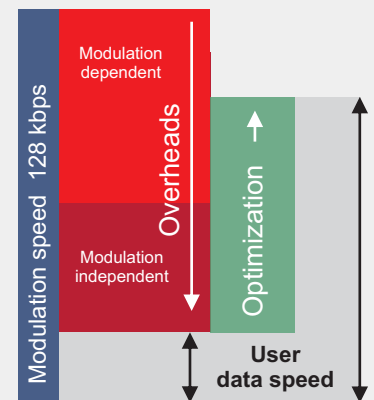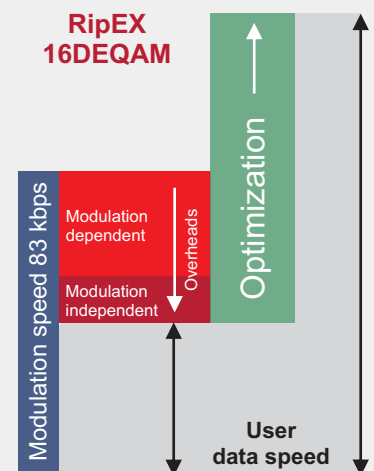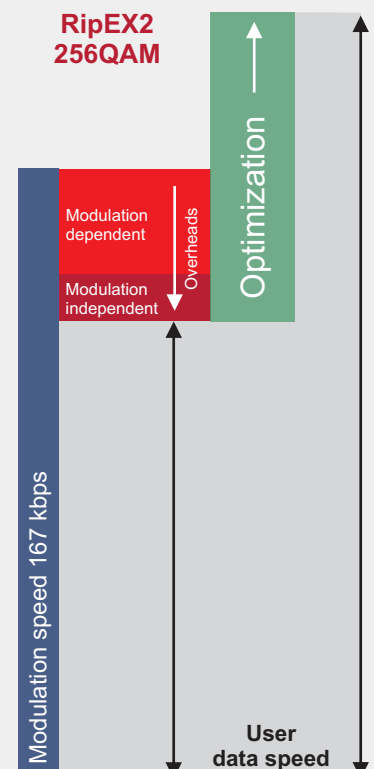### OPTIMIZATION – can increase Data speed over 200%

Good data **optimization** algorithms can **increase** the **Network throughput dramatically:**

- Compression effectiveness is **dependent on data compressibility**
- **All packets including headers are compressed**
- **TCP/IP overhead elimination**
- **Packet and Stream compression**; libraries of data repeated inside packets (only pointers transmitted)
- **Short packets combined** for transmission reducing number of packets on the link

CONCLUSION

Network throughput measurements from field tests, is the only parameter to express Network performance. It is affected by Modulation data speed, Overheads, Optimization, Network design and Application type.
Tests show RACOM radio modems are the best on the market.

Typical radiomodem 64QAM

Modulation speed 128 kbps | Modulation dependent / Modulation independent | Overheads | Optimization | User data speed

RipEX 16DEQAM

Modulation speed 83 kbps | Modulation dependent / Modulation independent | Overheads | Optimization | User data speed

RipEX2 256QAM

Modulation speed 167 kbps | Modulation dependent / Modulation independent | Overheads | Optimization | User data speed

To scale based on test results

ver. 1.1