

Effnet Modbus Header & Payload Compression™

Modbus has been and still is the de facto industrial communications protocol. The other most commonly used protocols are Common Industrial Protocol (CIP) and DNPv3.

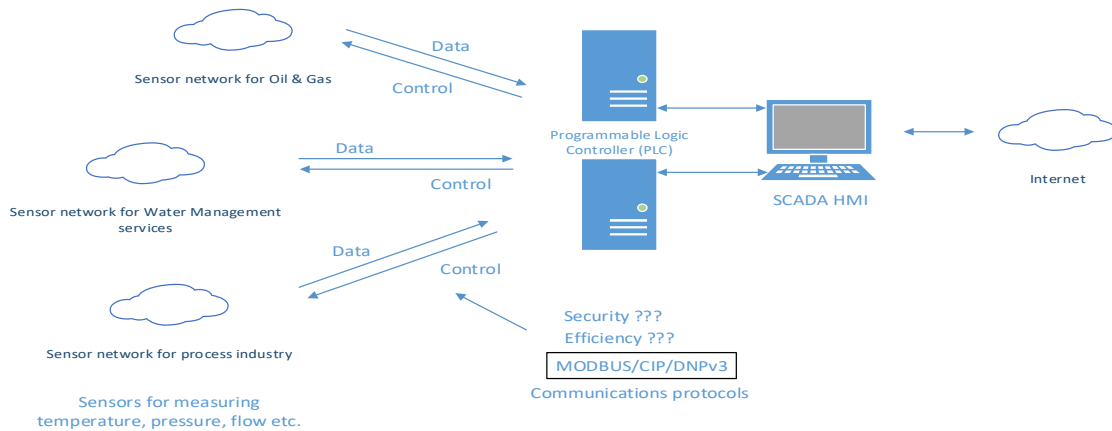


Figure 1. Examples of industrial communication networks

Modbus is a serial communications developed in 1979. With the transition to IP and Ethernet based communications, Modbus has been adapted to be carried over IP in the Modbus-TCP standard. As it is not feasible to simultaneously update all nodes of a legacy system based on serial communications to Modbus-TCP, there are intermediate solutions available which carry the legacy serial protocol encapsulated in the IP protocol, such as Modbus over TCP/IP and Modbus over UDP.

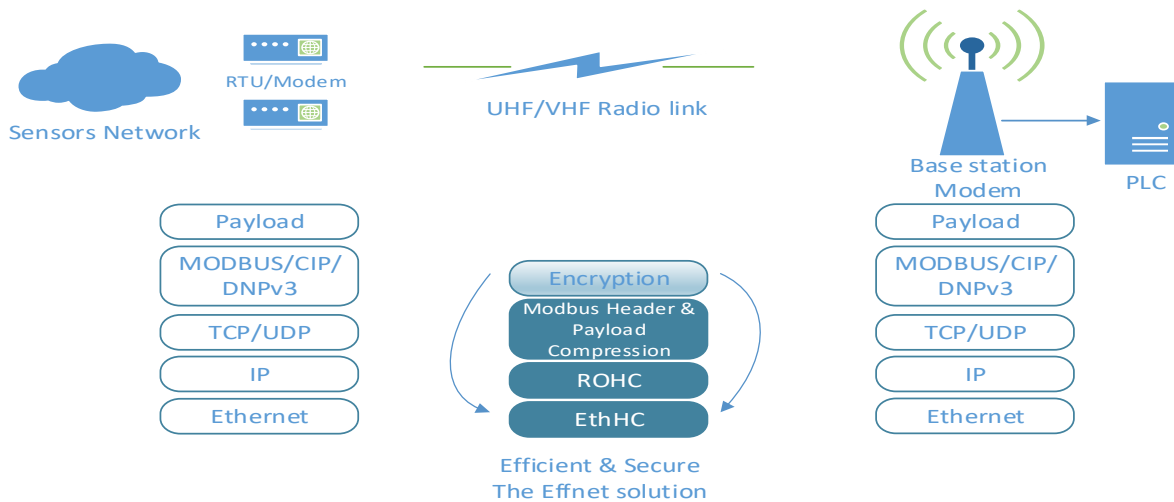


Figure 2. Effnet solutions for efficient and secure use of the network

Effnet Modbus Header & Payload Compression is an extension of the Effnet ROHC-TCP framework supporting compression of Modbus-TCP (both header & payload) to deliver additional value and higher bandwidth savings. The Modbus header is 7 bytes long and can carry a payload of up to 253 bytes. A Modbus header can be compressed efficiently based on the ROHC-TCP compression algorithm and the level of compression of payload depends on the degree of repetitive bit patterns in the payload.

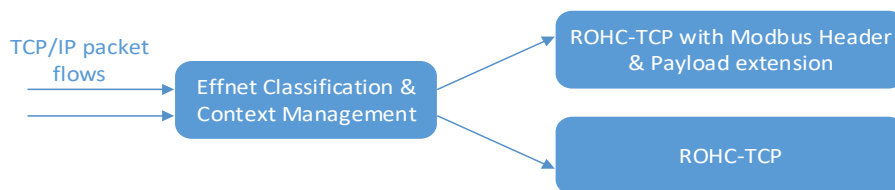


Figure 3. Effnet solution can handle both regular TCP/IP and Modbus-TCP traffic

The Effnet packet classification and context management (EFFRCCM™) module is able to detect TCP packets carrying Modbus header & payload and separate those into packet flows that are compressed separately from typical TCP flows, as depicted in Figure 3 above.

Effnet has developed its header and payload compression portfolio consisting of Effnet EthHC, Effnet ROHCv2 and Effnet ROHC-TCP with extended support for compression of Modbus headers and payload. This enables compression of Ethernet, IP, UDP, TCP and Modbus headers together with Modbus payload data.

There are many advantages of using the Effnet header and payload compression portfolio:

- Supports compression of both IPv4 and IPv6 (future-proof)
- Supports compression of Ethernet, TCP, UDP, ESP and IP headers together with the Modbus header and payload
- Significantly reduces header overhead and payload size leading to
 - Bandwidth savings
 - Reduced latency
 - Reduced bit errors and packet loss
 - More users and/or terminals on the same link
- Robust and compression efficient operation even in bit error, packet loss and reordering conditions.
- Highly modular implementation; possible to add further products from the portfolio with minimal additional integration work

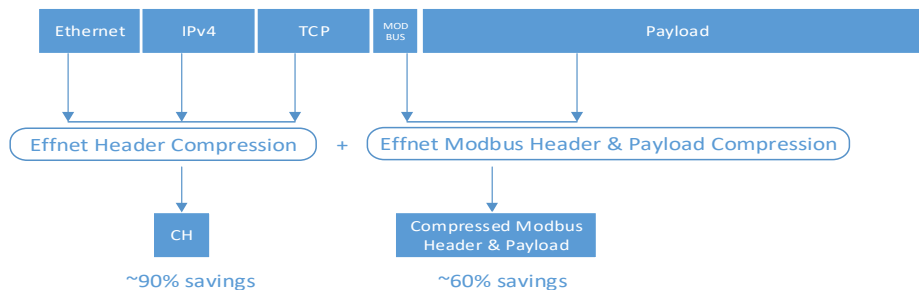


Figure 4. Complete packet which carries Ethernet/IP/TCP/Modbus/Payload, is compressed

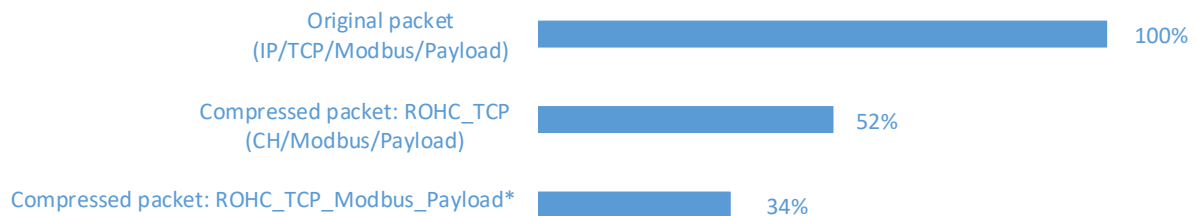


Figure 5. Packet size is significantly reduced after the application of header & payload compression

*These savings are based on sample traffic containing a small Modbus payload. The compression efficiency would be higher for a larger Modbus payload and the degree of repetitive bit patterns in the payload.

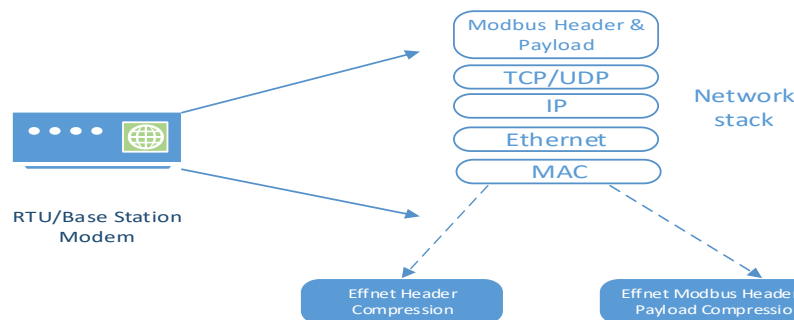


Figure 6. A modular implementation with well-defined API for quick integration

The Effnet header compression portfolio comprises Effnet ROHCv2, Effnet ROHC-TCP (Effnet Header Compression) and Effnet Modbus Header & Payload Compression. It is a modular implementation, so it is

possible to start with one module or software product and add further modules or products as and when necessary with minimal integration efforts and maximum additional benefits.

General features

- 100% transparent compression
- Lightweight implementation suitable for low-end devices
- Highly portable ANSI C code with no operating system dependencies
- Platform, endianness and byte-order independent
- Highly configurable with compile and run-time options
- Highly modular with external memory management

Services

Effnet provides support and maintenance services covering problem reporting, bug fixes, updates, training, consulting and integration. A sample application code together with detailed documentation covering well defined and easy to use API is provided to speed up the process of integration. A team of engineers experienced in standardization of header compression technology, implementation and testing of product portfolio is available for support and consulting services.