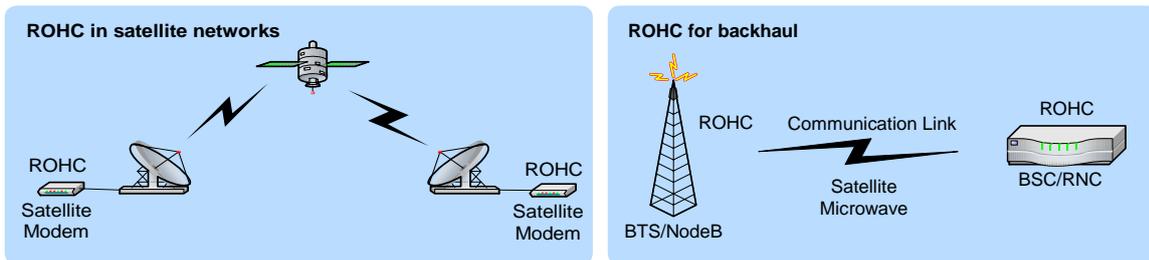


The Effnet ROHC Product Portfolio for Satellite Communication

The Effnet ROHC product portfolio includes Effnet header compression software products based on RFCs which define RObust Header Compression (ROHC). ROHC is a header compression algorithm and protocol standardized by the IETF. The Effnet ROHC product portfolio will provide significant improvements in link efficiency for TCP traffic e.g. web, file transfers etc., RTP and UDP traffic e.g. real time, interactive and streaming applications and ESP traffic e.g. secure traffic over high BER, long RTT links.

ROHC supports both unidirectional and bidirectional modes of operation. The unidirectional mode of operation is suitable for broadcast and multicast applications and the bidirectional mode of operation is suitable for interactive applications including web, email, file transfer, Voice over IP and Video over IP.



There are many advantages of using Effnet ROHC on satellite links:

- Enables efficient use of VoIP and data traffic over satellite links.
- Reduces header overhead saving costly satellite bandwidth.
- Reduces packet loss rate and interactive response time which improves user experience of the application.
- Enables more users on the same satellite link.

The following table shows some examples of bandwidth savings for various voice codecs:

Codec	Sample size (bytes)	Packet size (w/o ROHC) (bytes)	Bandwidth (w/o ROHC) (Kbps)	Packet size (w ROHC) (bytes)	Bandwidth (w ROHC) (Kbps)	Savings (%)
G.711 (64Kbps)	80	120	96	83	66	31
G.729 (8Kbps)	10	50	40	13	10	74
GSM FR (13.2 Kbps)	33	73	29	36	14	51
GSM EFR/AMR (12.2Kbps)	30.5	70.5	28	33.5	13	52
AMR (4.75Kbps)	11.875	51.875	20.75	14.875	5.95	71

ROHC framework and profiles implemented in the form of various Effnet products are as follows:

Product	Usage	Profile Identifiers	References
Effnet ROHC™	Uncompressed, RTP/UDP/IP, UDP/IP, ESP/IP	0x0000, 0x0001, 0x0002, 0x0003	RFC 3095, RFC 4815
Effnet ROHC-IP™	IP	0x0004	RFC 3843, RFC 4815
Effnet ROHC-TCP™	TCP/IP	0x0006	RFC 4996

The Effnet ROHC product portfolio can be optionally complemented with a test environment, *Effnet HC-Sim™*, which can simulate IP traffic on configurable link conditions, e.g. bit errors, packet loss, reordering etc.

Portability and ease of integration

Effnet's ROHC product portfolio has been ported to and integrated on many different platforms. The operating systems include VxWorks, Nucleus, Linux, Windows (2000/XP), Solaris, FreeBSD and processors include PowerPC, MIPS, ARM, SPARC and x86. The products are easily ported to other operating systems, both real-time and generic as well as to other processors, both 32- and 64-bit regardless of byte-order.

- Highly portable code. The Effnet ROHC product portfolio...
 - ...is written in ANSI C, alignment safe and endianness independent.
 - ...has variable types defined such that the variables behave the same way across different compilers.
 - ...does not require OS timers and does not have OS dependencies.
- A well defined Application Programming Interface (API)...
 - ...provides control of memory management.
 - ...provides control over multi-threading of the application with re-entrant functions.
- Small memory footprint and low CPU power requirement makes it suitable for terminals, modems as well as earth stations.
- Interoperable. The Effnet ROHC product portfolio...
 - ...has been extensively tested during field tests by customers
 - ...has participated in all the ROHC interoperability tests conducted by IETF
 - ...is continuously verified and tested in an internal rigorous quality process

Additional features

In addition to the features specified in the standards, the Effnet ROHC product portfolio has the following efficiency and robustness improving features:

- Fully featured and efficient classification and context management module.
- Highly efficient compression and decompression using field pattern change detection algorithms and link layer information when available.
- Support for handover via context re-initialization.
- Support for AT reboot via feedback options, the decompressor reinstates the compressor context information.
- Mechanisms to reduce usage of feedback channel.
- Support for chained memory buffer.
- Interactive statistics and callback functions.
 - User can read and/or reset statistical information at desired time intervals. The callback functions provide useful state information.
- Dynamic channel parameter configuration.
- Adaptive mechanisms for improved compression efficiency and context damage detection under various channel conditions.
- List compression parameters and many of the channels and flow specific parameters are highly configurable.

All additional features above are transparent with regard to interoperability.

Effnet Classifier and context manager

Packet classification and context management is essential to header compression. Effnet provides this additional module together with the Effnet ROHC product portfolio.

Effnet ROHC™

The VoIP enabler on wireless networks! Effnet ROHC™ is an important component to run VoIP services efficiently over wireless networks. Most of the RTP applications use UDP for signaling purposes and there are many stand-alone UDP applications, so the support for IP/UDP compression adds further to the efficiency. There is significant demand for secure exchange of information which leads to increased header overhead. The capability to compress IP/ESP, the header overhead in secure connections, makes it possible to run secure networks without additional bandwidth.

Effnet ROHC-IP™

As more and more networks are moving to support IP based communications, the number of nodes that require an IP address are increasing rapidly. The introduction of IPv6 should alleviate this concern but at least during transition time, a lot of traffic will be sent via tunnels across networks. Effnet ROHC-IP™ is capable of compressing layers of IP headers thus making it possible to run tunneled traffic without need for additional bandwidth.

Effnet ROHC-TCP™

Multiple Internet packet size studies¹ are in agreement that at least 40% of all IPv4 packets carry no or only a few bytes of payload i.e. packet sizes are at or very near to header size (IPv4+TCP). One study of IPv6 packets shows the same trend. Even more remarkable in that study is that for IPv6, 60-80% of the packets carry more header data than packet data. Effnet ROHC-TCP™ would be very beneficial in these cases.

	Average packet size (w/o ROHC) (bytes)	Average packet size (w ROHC) (bytes)	Savings (%)
TCP Ack (w/o options)	40	10	75
TCP Ack (Timestamp)	52	13	75

¹Packet size studies at www.caida.org

Maintenance and support

The Effnet ROHC product portfolio is offered with a full range of support services, including problem reporting, bug fixes, updates, training, consulting and integration services. A team of engineers experienced in standardization of header compression technology, implementation and testing of the product portfolio is available for support and consulting services.

Licensing

For licensing of the Effnet ROHC product portfolio, complete or individual products, please contact us at info@effnet.com.

