The Effnet ROHC Product Portfolio for Cellular IoT

3GPP has introduced support for Internet of Things (IoT) via Cellular IoT (EC-GSM, LTE-M and NB-IoT) standards in its Rel 13 specifications. The aim is to efficiently support billions of devices which vary widely in terms of their processing power, battery life, cost and need for extended coverage. Cellular IoT will support numerous services including utility meters/smart meters, vending machines, automotive (fleet management, traffic management etc), security monitoring and reporting, medical monitoring and alarms/alerts. Depending on services provided, some of these devices will send/receive data infrequently at large intervals (e.g. various sensors/meters in the field) or frequently at regular intervals (e.g. cameras or security appliances).

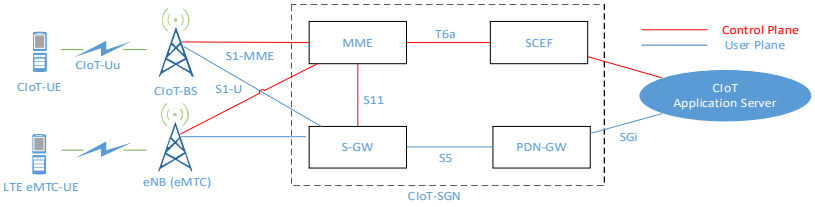

Figure 1: 3GPP Cellular IoT network architecture

Cellular IoT supports multiple methods of data transfer between a CIoT-UE and CIoT-Application Server/Services which include the conventional method of data transfer via user plane and new methods such as infrequent and small data transfer via control plane or non-IP data transfer (NIDD) for the efficient use of control plane messaging.

The standards TS 23.401 v13.7.0 and TS 24.301 v13.6.0 (sections 6.2A, 9.9.4.22) define Control Plane CIoT EPS optimization, User Plane CIoT optimization and Non-IP Data Delivery. These methods are appropriate for the transmission of infrequent and small data packets.

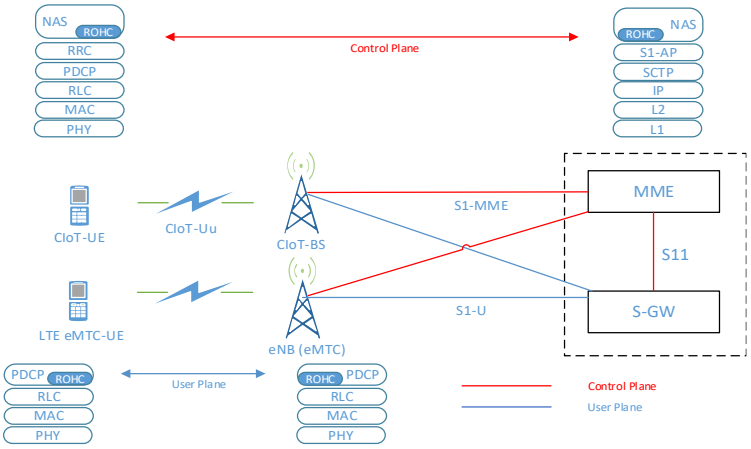

Figure 2: ROHC in control plane via NAS at UE and MME (Data over NAS Convergence Protocol) and in user plane via PDCP at UE and eNB

For the Control Plane CIoT EPS optimization, data exchange between UE and eNB is done on RRC level and between UE and MME is done at NAS level. 3GPP has recommended ROHC for efficient use of radio resources since Release 4 onwards for WCDMA and since Rel 8 for LTE, mainly for VoIP and other applications on the user plane via PDCP. Now in Rel 13, 3GPP has recommended ROHC for Cellular IoT for NB-IoT services via control plane optimization. The UE and the MME support robust header compression (ROHC) framework if control plane CIoT EPS optimization is supported for PDN connections of IP PDN type.

Figure 3: ROHC in uplink and downlink between UE and MME

Stationsgatan 69, SE-972 34 Luleå, Sweden
Phone: +46 920 60918, Email: info@effnet.com

For uplink IP data, UE implements ROHC compressor, and MME implements the ROHC decompressor. For downlink IP data, MME implements the ROHC compressor, and UE implements the ROHC decompressor. The uplink and downlink ROHC channels are bound by UE and MME to support ROHC feedback. The configurations for the header compression are established during the PDN connection establishment procedure.

The Effnet ROHC product portfolio consists of software products based on various IETF standards which define RObust Header Compression (ROHC).

- Effnet ROHC™ (ROHC Uncompressed 0x0000, RTP 0x0001, UDP 0x0002 and ESP 0x0003 profiles).
  - Fully compliant with RFC 3095 and RFC 4815
- Effnet ROHC-IP™ (IP 0x0004 profile).
  - Fully compliant with RFC 3843
- Effnet ROHC-TCP™ (ROHC-TCP 0x0006 profile).
  - Fully compliant with RFC 4996
- Effnet ROHCv2™ (ROHC Uncompressed 0x0000, RTPv2 0x0101, UDPv2 0x0102, ESPv2 0x0103 and IPv2 0x0104 profiles).
  - Fully compliant with RFC 4995 and RFC 5225

For NB-IoT terminal/chipset/protocol stack:

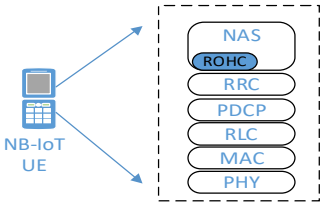

Figure 4: Integration point of ROHC in NAS in UE

Effnet ROHC portfolio is integrated in a terminal at NAS level. This proven implementation that has already been integrated into terminals via chipset and protocol stack vendors is highly system efficient, making it possible to run on devices with limited capacity and battery.

For SGSN-MME:

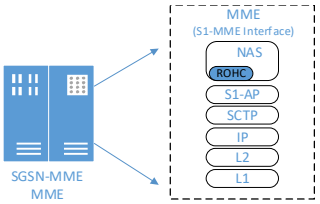

Figure 5: Integration point of ROHC in NAS in MME

Effnet ROHC portfolio is integrated in SGSN-MME at NAS level. This proven implementation that has already been integrated into products, like macro eNB, C-RAN eNB (vBBU), PDSN (from CDMA2000), ASN-GW (WiMAX), is highly system efficient making it possible to scale support for millions of connections/UEs.

For Test and measurement/service assurance:

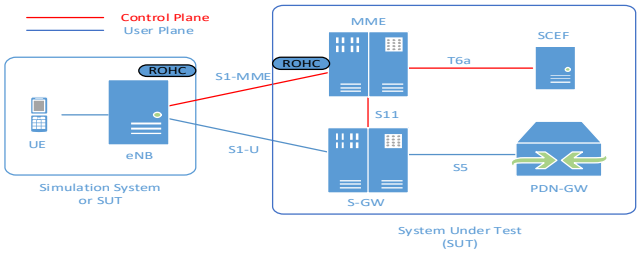

Figure 6: Integration point of ROHC in a test system and a system under test

Effnet ROHC portfolio is integrated in UE-eNB simulator which supports S1-MME interface testing. This proven implementation that has already been integrated into products, like multi-UE test systems, is highly system efficient making it possible to scale support for millions of simulated connections/UEs.

For more information about Effnet ROHC portfolio, our maintenance services and licensing, visit: www.effnet.com/solutions/cellular_iot

Stationsgatan 69, SE-972 34 Luleå, Sweden
Phone: +46 920 60918, Email: info@effnet.com