Digital Video Broadcasting (DVB);
Generic Stream Encapsulation (GSE);
Part 3: Robust Header Compression (ROHC) for IP

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Contents

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Foreword

This Technical Specification (TS) has been produced by the Joint Technical Committee (JTC) Broadcast of the European Broadcasting Union (EBU), Comité Européen de Normalisation ELECtrotechnique (CENELEC) and the European Telecommunications Standards Institute (ETSI).

NOTE: The EBU/ETSI JTC Broadcast was established in 1990 to co-ordinate the drafting of standards in the specific field of broadcasting and related fields. Since 1995 the JTC Broadcast became a tripartite body by including in the Memorandum of Understanding also CENELEC, which is responsible for the standardization of radio and television receivers. The EBU is a professional association of broadcasting organizations whose work includes the co-ordination of its members' activities in the technical, legal, programme-making and programme-exchange domains. The EBU has active members in about 60 countries in the European broadcasting area; its headquarters is in Geneva.

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The Digital Video Broadcasting Project (DVB) is an industry-led consortium of broadcasters, manufacturers, network operators, software developers, regulatory bodies, content owners and others committed to designing global standards for the delivery of digital television and data services. DVB fosters market driven solutions that meet the needs and economic circumstances of broadcast industry stakeholders and consumers. DVB standards cover all aspects of digital television from transmission through interfacing, conditional access and interactivity for digital video, audio and data. The consortium came together in 1993 to provide global standardisation, interoperability and future proof specifications.

The present document is part 3 of a multi-part deliverable covering the Digital Video Broadcasting (DVB); Generic Stream Encapsulation (GSE), as identified below:

Part 1: "Protocol";

Part 2: "Logical Link Control (LLC)";

Part 3: "Robust Header Compression (ROHC) for IP".

Introduction

As introduced in part 1 [1], the Generic Stream Encapsulation (GSE) protocol is a link layer which provides multiplexing mechanisms that make it possible for several network protocols (for example IP, IPX, Decnet, and Appletalk) to coexist within a multipoint network and to be transported over the same network media. GSE is designed to be deployed across all DVB broadcast bearers which provide a Generic Stream mode.

Due to the use of GSE on broadcast bearers, making efficient use of the available link capacity is an important factor for a cost effective deployment. An additional. special property of broadcast links is the possible presence of non-negligible error rates and long round-trip times. Other existing header compression schemes generally do not perform well when used over links with these properties.

To complement the payload compression offered by some application layer protocols, and enable the use over broadcst links, the present document defines a highly robust and efficient header compression scheme for RTP/UDP/IP (Real-Time Transport Protocol, User Datagram Protocol, Internet Protocol), UDP/IP, and ESP/IP (Encapsulating Security Payload) headers.

While the IETF RFC documents [4], [6], [5], and [3] define a header compression scheme for unidirectional links, they make no specific provisions for use on broadcast bearers. Part 2 [2] defines a link layer mechanism to supply the additional information needed for using header compression on DVB broadcast bearers.

1   Scope

The present document specifies a Robust Header Compression (ROHC) method to be used on DVB streams where the Generic Stream Encapsulation (GSE) [1] protocol is used as the link layer for IP.

2   References

References are either specific (identified by date of publication and/or edition number or version number) or non-specific. For specific references,only the cited version applies. For non-specific references, the latest version of the referenced document (including any amendments) applies.

Referenced documents which are not found to be publicly available in the expected location might be found at http://docbox.etsi.org/Reference.

NOTE: While any hyperlinks included in this clause were valid at the time of publication, ETSI cannot guarantee their long term validity.

2.1   Normative references

The following referenced documents are necessary for the application of the present document.

[1]   ETSI TS 102 606-1: "Digital Video Broadcasting (DVB); Generic Stream Encapsulation (GSE); Part 1: Protocol".

[2]   ETSI TS 102 606-2: "Digital Video Broadcasting (DVB); Generic Stream Encapsulation (GSE); Part 2: Logical Link Control (LLC)".

[3]   RFC 5795: "The RObust Header Compression (ROHC) Framework".

[4]   RFC 3095: "RObust Header Compression (ROHC): Framework and four profiles: RTP, UDP, ESP, and uncompressed".

[5]   RFC 4815: "RObust Header Compression (ROHC): Corrections and Clarifications to RFC 3095".

[6]   RFC 3843: "RObust Header Compression (ROHC): A Compression Profile for IP".

[7]   IEEE EtherType registry: http://standards.ieee.org/develop/regauth/ethertype/eth.txt

3 Abbreviations

3.1 Abbreviations

For the purposes of the present document, the abbreviations given in [1] and the following apply:

CID	Context Identifier
ESP	Encapsulating Security Payload
GSE	Generic Stream Encapsulation
IP	Internet Protocol
IR	Intra-Refresh
IR-DYN	IR-Dynamic
LLC	Logical Link Control
ROHC	RObust Header Compression
RTP	Real-time Transport Protocol

# 4 Header compression and decompression for IP streams

Header compression for the IP Profile of DVB-GSE (Figure 1) is composed of two sub-modules: the Robust Header Compression (ROHC) module, and the Adaptation module. Header compression may be used in the IP Profile of DVB-GSE and, if used, shall be applied to IP streams.

Figure 1: Header compression for IP streams
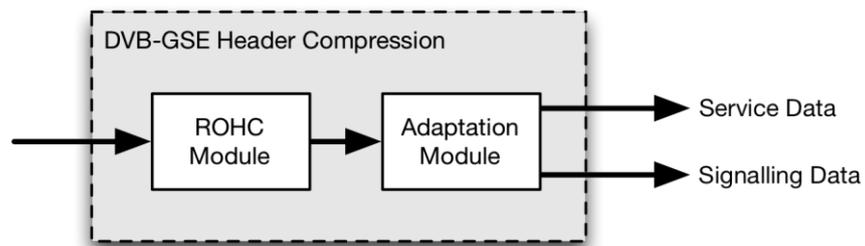
Header decomprerssion (Figure 2) also consists of a Robust Header Compression (ROHC) module, and an Adaptation module, but in inverse order.

Figure 2: Header decompression for IP streams
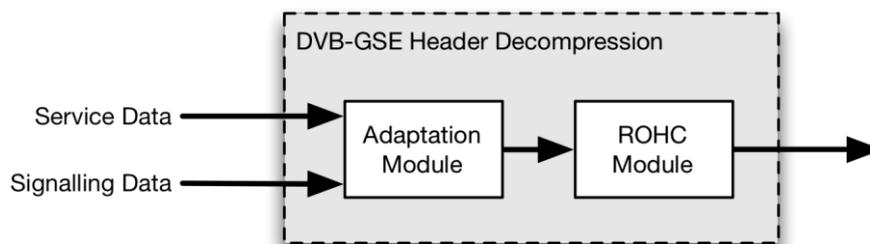
4.1 ROHC module

The ROHC module is responsible for reduction of overhead in IP flows by compresing the headers of IP datagrams. It shall operate in the unidirectional mode (ROHC-U) as specified in RFC 5795 [3], section 4.4.1 of RFC 3095 [4], and as amended by RFC 4815 [5].

4.1.1 Header compression algorithms

The ROHC framework defines multiple header compression algorithms, called profiles. Each profile is specific to the particular network layer, transport layer, or upper layer protocol combination. In DVB-GSE, only the system profiles listed in Table 1 shall be used and shall be supported by receivers.

Table 1: ROHC profiles for DVB-GSE

Profile identifier	Used for	Reference
0x0001	RTP/UDP/IP	RFC 3095 [4] and RFC 4815 [5]
0x0002	UDP/IP	RFC 3095 [4] and RFC 4815 [5]
0x0003	ESP/IP	RFC 3095 [4] and RFC 4815 [5]
0x0004	IP	RFC 3843 [6] and RFC 4815 [5]

4.1.2 ROHC parameters

The ROHC framework defines per channel configuration parameters that are configured in a coherent way in the compressor and decompressor to allow them to interoperate (see section 5.1.1 of RFC 3095 [4]). To ensure interoperability between compressors and decompressors for DVB-GSE, the following rules shall apply:

a) **MAX_CID:** This parameter indicates the maximum CID value that is in use. The MAX_CID parameter can be inferred from the context_id field of the ROHC-U descriptor in GSE LLC [2].

b) **LARGE_CIDS:** The value of this booelan parameter can be inferred from the context_id field of the ROHC-U descriptor in GSE LLC [2].

c) **PROFILES:** This value is a profile identifier (see 4.1.1) that indicates which profile is used by the compressor. The list of profiles is defined in clause 4.1.1. The PROFILES parameter is conveyed in the context_profile field of the ROHC-U descriptor in GSE LLC [2].

d) **FEEDBACK_FOR:** This parameter shall not be used.

e) **MRRU:** Segmentation shall not be used.

4.1.3   ROHC rules of operation

DVB-GSE imposes additional restriction to the operation of ROHC framework. The following rules shall apply:

a) If any change in the static fields of the input IP stream is detected by the ROHC compressor, then the ROHC compressor must perform context re-initialization (CONTEXT_REINITIALIZATION signal is triggered as described in section 6.3.1 of RFC 3095 [4] and the new value of the Context ID (CID) must be assigned to the compressed IP stream. The new CID value shall be unique for the system and be not used by any other instance of ROHC compressors operated in the system.

b) Any ROHC compressor and decompressor used with DVB-GSE, shall always operate in unidirectional mode as described in [RFC3095].

4.2   Adaptation Module

The Adaptation module conveys the necessary decompressor configuration parameters to receivers by inserting them into the ROHC-U descriptor in the LLC data (see part 2 [2]); also see clause 5 for details. It thereby allows to minimize the impact of the header compression mechanism on zapping delay, and improve the error robustness of compressed flows.

4.2.1   Compressor side

The Adaptation module shall extract the static chain bytes (see section 5.7.7.1 of RFC 3095 [4]) from the each IR packet transmitted in the ROHC compressed data flow. After extracting the static chain bytes, each IR packet shall be converted to an IR-DYN packet type by the Adaptation module. The newly created IR-DYN packet shall transmitted inside the ROHC compressed flow, replacing the original IR packet. The extracted static chain data shall be transmitted together with signalling data outside the ROHC compressed flow as specified in part 2 [2].

4.2.2   Decompressor side

The Adaptation module shall detect IR-DYN type packets in the ROHC compressed data flow. All IR-DYN packets from the received data flow shall be converted by the Adaptation module to IR packet type, using the corresponding static chain bytes received in the GSE LLC signalling. The newly created IR packet shall be transmitted in the ROHC compressed flow, replacing the original IR-DYN packet.

5   Transport in DVB-GSE

Protocols carried in GSE streams are identified by the Protocol Type field in the GSE header [1]. GSE streams carrying ROHC-U compressed IP streams according to the present document, shall use the EtherType value assigned by IEEE [7] to Robust Header Compression according to RFC 3095 in the Protocol_Type field of the GSE header.

To enable receivers to correctly process GSE streams carrying ROHC-U compressed IP streams according to the present document, the ROHC-U descriptor shall be transmitted in the LLC data as defined in part 2 [2].

History

This clause shall be the last one in the document and list the main phases (all additional information will be removed at the publication stage).

Document history		
<Version>	<Date>	<Milestone>