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

EBU DVB®

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Foreword

This Technical Specification (TS) has been produced by 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 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".

Modal verbs terminology

In the present document "**shall**", "**shall not**", "**should**", "**should not**", "**may**", "**need not**", "**will**", "**will not**", "**can**" and "**cannot**" are to be interpreted as described in clause 3.2 of the ETSI Drafting Rules (Verbal forms for the expression of provisions).

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Introduction

As introduced in ETSI TS 102 606-1 [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 broadcast 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 IETF RFC 5795 [3], IETF RFC 3095 [4], IETF RFC 4815 [5], and IETF RFC 3843 [6] define a header compression scheme for unidirectional links, they make no specific provisions for use on broadcast bearers. ETSI TS 102 606-2 [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) ETSI TS 102 606-1 [1] protocol is used as the link layer for IP.

2 References

2.1 Normative 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 in the ETSI docbox.

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

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

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

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

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

[7] IEEE EtherType registry.

2.2 Informative 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.

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

The following referenced documents are not necessary for the application of the present document but they assist the user with regard to a particular subject area.

Not applicable.

3 Definition of terms, symbols and abbreviations

3.1 Terms

Void.

3.2 Symbols

Void.

3.3 Abbreviations

For the purposes of the present document, the abbreviations given in ETSI TS 102 606-1 [1] and the following apply:

CID	Context IDentifier
ESP	Encapsulating Security Payload
GSE	Generic Stream Encapsulation
IP	Internet Protocol
IPX	Internet Packet eXchange
IR	Intra-Refresh
IR-DYN	IR-Dynamic
LLC	Logical Link Control
MRRU	Maximum Received Reconstructed Unit
ROHC	RObust Header Compression
RTP	Real-time Transport Protocol
UDP/IP	User Datagram Protocol over Internet Protocol

4 Header compression and decompression for IP streams

4.0 Overview

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.

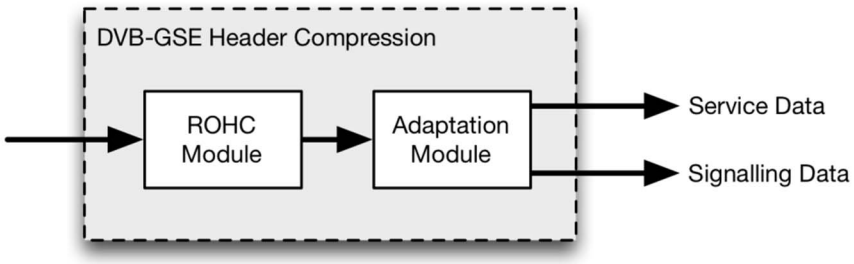

Figure 1: Header compression for IP streams

Header decompression (Figure 2) also consists of a Robust Header Compression (ROHC) module, and an Adaptation module, but in inverse order.

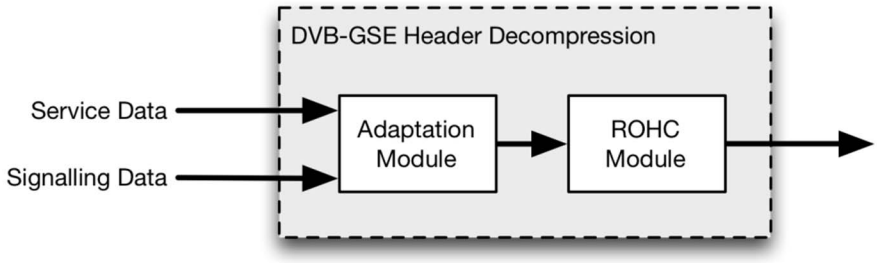

Figure 2: Header decompression for IP streams

4.1 ROHC module

4.1.0 Forewords

The ROHC module is responsible for reduction of overhead in IP flows by compressing the headers of IP datagrams. It shall operate in the unidirectional mode (ROHC-U) as specified in IETF RFC 5795 [3], section 4.4.1 of IETF RFC 3095 [4] and as amended by IETF 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	IETF RFC 3095 [4] and IETF RFC 4815 [5]
0x0002	UDP/IP	IETF RFC 3095 [4] and IETF RFC 4815 [5]
0x0003	ESP/IP	IETF RFC 3095 [4] and IETF RFC 4815 [5]
0x0004	IP	IETF RFC 3843 [6] and IETF 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 IETF 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, ETSI TS 102 606-2 [2]. When the ROHC is applied to multicast IP stream, the MAX_CID parameter is signalled by the max_CID field of the ROHC-U_multicast descriptor in GSE LLC, ETSI TS 102 606-2 [2].

b) **LARGE_CIDS:** The value of this Boolean parameter can be inferred from the context_id field of the ROHC-U descriptor in GSE LLC, ETSI TS 102 606-2 [2]. When the ROHC is applied to multicast IP stream, the LARGE_CIDS parameter is inferred from the max_CID field of the Multicast ROHC-U descriptor in GSE LLC, ETSI TS 102 606-2 [2]. If max_CID is equal or less than '15', LARGE_CIDS is considered as 'FALSE'. And if max_CID is larger than '15', LARGE_CIDS is considered as 'TRUE' in the decompressor.

c) **PROFILES:** This value is a profile identifier (see clause 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 or ROHC-U_multicast descriptor in GSE LLC, ETSI TS 102 606-2 [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 and entire context in the ROHC channel needs to be initialized by the ROHC compressor, then the ROHC compressor shall perform context re-initialization (CONTEXT_REINITIALIZATION signal is triggered as described in section 6.3.1 of IETF RFC 3095 [4] and the new value of the Context ID (CID) shall be assigned to the compressed IP stream. The new CID value shall be unique for the ROHC channel and be not used by any other instance of ROHC compressors operated in the system.

b) When multiple IP streams are compressed in the same ROHC channel, different CID shall be assigned to each compressed streams. In this case, if any change in the static fields of individual IP stream is detected by the ROHC compressor in the ROHC channel, then new value of the CID shall be assigned to the compressed IP stream. The new CID value shall be unique for the ROHC channel and be not used by any other instance of ROHC compressors operated in the ROHC channel.

c) Any ROHC compressor and decompressor used with DVB-GSE, shall always operate in unidirectional mode as described in IETF RFC 3095 [4].

d) Either small CID or large CID can be configured in each ROHC channel as described in section 5.1.3 of IETF RFC 3095 [4]. If the large CID is used in ROHC channel, only the 1-byte large CID shall be configured for DVB-GSE. Therefore, the maximum value of CID that can be assigned to a compressed IP stream is 127 and up to 128 compressed flows are allowed in each ROHC channel for DVB-GSE (see section 4.5.6 of IETF RFC 3095 [4]).

4.2 Adaptation Module

4.2.0 Objectives

The Adaptation module conveys the necessary decompressor configuration parameters to receivers by inserting them into the ROHC-U descriptor or ROHC-U multicast descriptor in the LLC data (see ETSI TS 102 606-2 [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.

If LLC data is conveyed in the same path with the ROHC packet flow, no additional operation has to be performed on the original ROHC packet stream by the Adaptation module. The Adaptation module may operate as a buffer and there is no static chain byte in LLC data. In this case, adaptation_flag field in ROHC-U multicast descriptor shall be set to '0'.

If the separated LLC data path is present outside of the ROHC packet flow, static chain byte has to be extracted and configured as a part of the LLC data by compressor side Adaptation module as described in clause 4.2.1, and static chain byte has to be merged with the ROHC compressed flow by decompressor side Adaptation module as described in clause 4.2.2. In this case, adaptation_flag field in ROHC-U multicast descriptor containing the static chain byte shall be set to '1'.

4.2.1 Compressor side

The Adaptation module shall extract the static chain bytes (see section 5.7.7.1 of IETF 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 ETSI TS 102 606-2 [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 ETSI ATS 102 606-1 [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 IETF RFC 3095 [4] 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 or ROHC-U multicast descriptor shall be transmitted in the LLC data as defined in ETSI TS 102 606-2 [2].

History

Document history		
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