INTERNATIONAL TELECOMMUNICATION UNION

ITU-T G.8040/Y.1340

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TELECOMMUNICATION
STANDARDIZATION SECTOR
OF ITU

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ITU-T Recommendation G.8040/Y.1340

GFP frame mapping into Plesiochronous Digital Hierarchy (PDH)

Summary

This Recommendation provides the mapping to be used for the transport of GFP frames over PDH at the various hierarchical bit rates defined in ITU-T Rec. G.702. This mapping covers the 44 736 kbit/s signals and is used in conjunction with the frame structures defined in ITU-T Rec. G.704. Mappings for other PDH signals are for further study.

Source

ITU-T Recommendation G.8040/Y.1340 was approved on 14 December 2003 by ITU-T Study Group 15 (2001-2004) under the ITU-T Recommendation A.8 procedure.

FOREWORD

The International Telecommunication Union (ITU) is the United Nations specialized agency in the field of telecommunications. The ITU Telecommunication Standardization Sector (ITU-T) is a permanent organ of ITU. ITU-T is responsible for studying technical, operating and tariff questions and issuing Recommendations on them with a view to standardizing telecommunications on a worldwide basis.

The World Telecommunication Standardization Assembly (WTSA), which meets every four years, establishes the topics for study by the ITU-T study groups which, in turn, produce Recommendations on these topics.

The approval of ITU-T Recommendations is covered by the procedure laid down in WTSA Resolution 1.

In some areas of information technology which fall within ITU-T's purview, the necessary standards are prepared on a collaborative basis with ISO and IEC.

NOTE

In this Recommendation, the expression "Administration" is used for conciseness to indicate both a telecommunication administration and a recognized operating agency.

Compliance with this Recommendation is voluntary. However, the Recommendation may contain certain mandatory provisions (to ensure e.g. interoperability or applicability) and compliance with the Recommendation is achieved when all of these mandatory provisions are met. The words "shall" or some other obligatory language such as "must" and the negative equivalents are used to express requirements. The use of such words does not suggest that compliance with the Recommendation is required of any party.

INTELLECTUAL PROPERTY RIGHTS

ITU draws attention to the possibility that the practice or implementation of this Recommendation may involve the use of a claimed Intellectual Property Right. ITU takes no position concerning the evidence, validity or applicability of claimed Intellectual Property Rights, whether asserted by ITU members or others outside of the Recommendation development process.

As of the date of approval of this Recommendation, ITU had not received notice of intellectual property, protected by patents, which may be required to implement this Recommendation. However, implementors are cautioned that this may not represent the latest information and are therefore strongly urged to consult the TSB patent database.

CONTENTS

Introduction

The Generic Framing Procedure (GFP), as defined in ITU-T Rec. G.7041/Y.1303, was developed for transport of data clients over Synchronous Digital Hierarchy (SDH) networks of ITU-T Rec. G.707/Y.1322 and optical transport networks (OTN) of ITU-T Rec. G.709/Y.1331. Interfaces from the plesiochronous digital hierarchy (PDH) are ubiquitous, especially in the access networks where there is a desire to carry client data signals. GFP has been identified as a suitable technique for mapping data frames into PDH signals of the hierarchies of ITU-T Rec. G.704.

ITU-T Recommendation G.8040/Y.1340

GFP frame mapping into Plesiochronous Digital Hierarchy (PDH)

1 Scope

This Recommendation provides the mapping of GFP-encapsulated data into PDH signals for transport over PDH trails. GFP was originally defined for an octet-wise mapping into octet-oriented transport containers. This octet-oriented mapping characteristic is maintained except that a nibble alignment is used for the 44 736 kbit/s signal similar to that specified for ATM in ITU-T Rec. G.804.

2 References

The following ITU-T Recommendations and other references contain provisions which, through reference in this text, constitute provisions of this Recommendation. At the time of publication, the editions indicated were valid. All Recommendations and other references are subject to revision; users of this Recommendation are therefore encouraged to investigate the possibility of applying the most recent edition of the Recommendations and other references listed below. A list of the currently valid ITU-T Recommendations is regularly published. The reference to a document within this Recommendation does not give it, as a stand-alone document, the status of a Recommendation.

– ITU-T Recommendation G.702 (1988), *Digital hierarchy bit rates*.

– ITU-T Recommendation G.704 (1998), *Synchronous frame structures used at 1544, 6312, 2048, 8448 and 44 736 kbit/s hierarchical levels*.

– ITU-T Recommendation G.804 (1998), *ATM cell mapping into Plesiochronous Digital Hierarchy (PDH)*.

– ITU-T Recommendation G.7041/Y.1303 (2003), *Generic Framing Procedure (GFP)*.

3 Definitions

This Recommendation defines the following term:

3.1 **nibble**: A group of four bits.

4 Abbreviations

This Recommendation uses the following abbreviations:

GFP Generic Framing Procedure

PDH Plesiochronous Digital Hierarchy

5 Conventions

The octets of the GFP frames are mapped into the PDH nibbles in transmission bit order. Specifically, bit 1 of a GFP octet is the first bit to be transmitted in the PDH nibble into which it is mapped.

6 Mapping GFP frames into PDH signals

6.1 Mapping into 44 736 kbit/s

6.1.1 Frame format

The multiframe format at 44 736 kbit/s, as described in ITU-T Rec. G.704, shall be used. As illustrated in Figure 6-1, each 44 736 kbit/s subframe (M-subframe) contains 672 bits, which may be regarded as 168 nibbles, with 21 nibbles between each frame overhead bit position. GFP octets are mapped into the nibbles of the subframe with the GFP octet boundaries corresponding to a nibble boundary. At the receiver, the GFP frame delineation must be performed for each of the two possible nibble alignments of the octets in order to identify the proper alignment. Individual GFP frames can cross subframe boundaries, as illustrated in Figure 6-2. This mapping is similar to the HEC-based mapping of ATM into 44 736 kbit/s signals described in ITU-T Rec. G.804, which also uses an octet to nibble mapping.

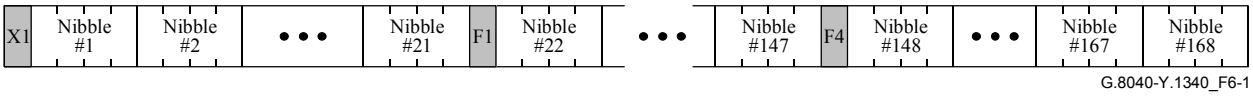

Figure 6-1/G.8040/Y.1340 – Nibble structure for the 44 736 kbit/s signal subframe

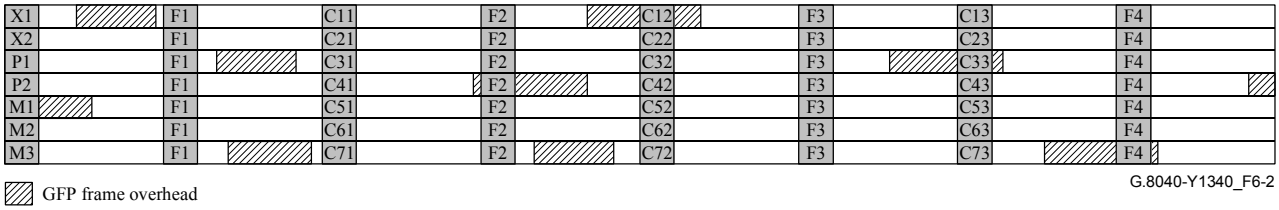

Figure 6-2/G.8040/Y.1340 – GFP mapping into a 44 736 kbit/s signal frame

6.1.2 GFP frame rate adaptation

When GFP client data frames are not available from the GFP source adaptation process, GFP Idle frames shall be inserted in order to perform rate adaptation as described in ITU-T Rec. G.7041/Y.1303.

6.1.3 Scrambling of the GFP payload

GFP frames are scrambled consistent with ITU-T Rec. G.7041/Y.1303.

6.1.4 GFP frame delineation

GFP frame delineation is performed in the manner described in ITU-T Rec. G.7041/Y.1303.

6.2 Mappings into other PDH signals

Mappings into other PDH signals are for further study. The additional PDH signals may include the following:

- 1544 kbit/s.
- 2048 kbit/s.
- 34 368 kbit/s.
- $n \times 1544$ kbit/s.
- $n \times 2048$ kbit/s.

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Geneva, 2004