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ITU-T

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G.8040/Y.1340

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SERIES G: TRANSMISSION SYSTEMS AND MEDIA,
DIGITAL SYSTEMS AND NETWORKS

Ethernet over Transport aspects – General aspects

SERIES Y: GLOBAL INFORMATION
INFRASTRUCTURE, INTERNET PROTOCOL ASPECTS
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Internet protocol aspects – Transport

**GFP frame mapping into Plesiochronous Digital
Hierarchy (PDH)**

ITU-T Recommendation G.8040/Y.1340



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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 $N \times 1544$ kbit/s, $N \times 2048$ kbit/s, $N \times 44\,736$ kbit/s, and $N \times 34\,368$ kbit/s signals and is used in conjunction with the frame structures defined in ITU-T Recs G.704 and G.7043/Y.1343.

Source

ITU-T Recommendation G.8040/Y.1340 was approved on 6 September 2005 by ITU-T Study Group 15 (2005-2008) under the ITU-T Recommendation A.8 procedure.

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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 as well as the virtually concatenated PDH signals as defined in ITU-T Rec. G.7043/Y.1343.

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. The octet-wise mapping into octet-oriented transport containers originally defined for GFP is maintained.

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.832 (1998), *Transport of SDH elements on PDH networks – Frame and multiplexing structures*.
- ITU-T Recommendation G.7041/Y.1303 (2005), *Generic framing procedure (GFP)*.
- ITU-T Recommendation G.7042/Y.1305 (2004), *Link capacity adjustment scheme (LCAS) for virtual concatenated signals*.
- ITU-T Recommendation G.7043/Y.1343 (2004), *Virtual concatenation of plesiochronous digital hierarchy (PDH) signals*.

3 Definitions

This Recommendation does not define any terms.

4 Abbreviations

This Recommendation uses the following abbreviations:

GFP	Generic Framing Procedure
LCAS	Link Capacity Adjustment Scheme
PDH	Plesiochronous Digital Hierarchy
VCAT	Virtual Concatenation

5 Conventions

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

6 Mapping GFP frames into PDH signals

6.1 Mapping into $N \times 1544$ kbit/s

6.1.1 Frame and multiframe format

The 1544 kbit/s signal payload is typically arranged as 24 octets (i.e., time slots 1 to 24), as illustrated in Figure 6-1a.

The multiframe structure for the 24-frame multiframe as described in ITU-T Rec. G.704 shall be used. The first octet following the first framing bit of the multiframe is used to carry the concatenation overhead, as defined in ITU-T Rec. G.7043/Y.1343 and illustrated in Figure 6-1b. This octet is reserved for all values of N , ($N = 1 \dots 16$). For the non-VCAT/LCAS case (which implies one 1544 kbit/s signal), the concatenation overhead octet shall be set to a value of 0x00.

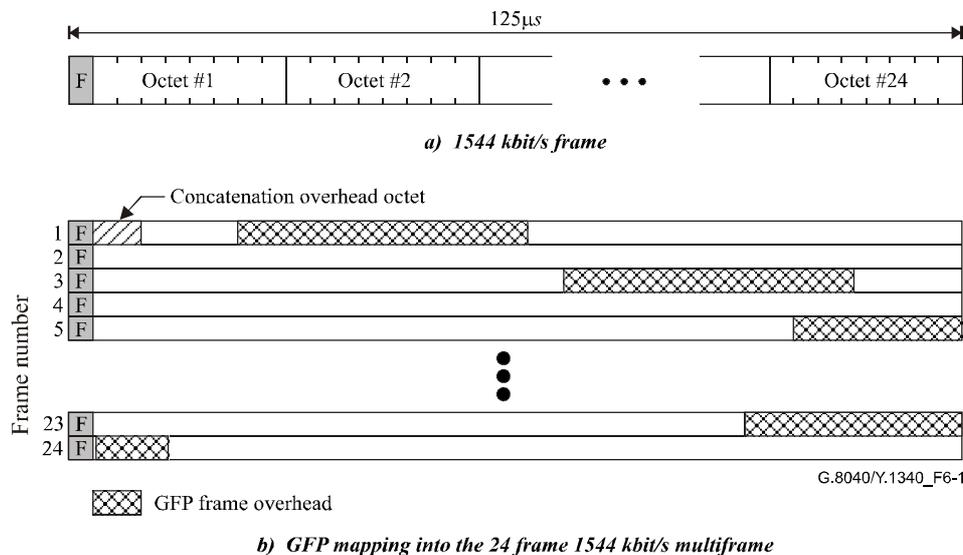


Figure 6-1/G.8040/Y.1340 – Octet-aligned mapping for GFP into the 1544 kbit/s signal

6.1.2 GFP frame rate adaptation

When neither GFP client data frames nor GFP client management frames are available from the GFP source adaptation process, GFP Idle frames shall be inserted in order to perform rate adaptation, filling the server capacity 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 Mapping into $N \times 2048$ kbit/s

6.2.1 Frame and multiframe format

The basic frame structure at 2048 kbit/s as described in ITU-T Rec. G.704 shall be used. Time slots 1-31 are used to carry the GFP octets.

The multiframe structure for the 16-frame multiframe as described in ITU-T Rec. G.704 shall be used. Time slot 1 of the first frame of the multiframe is used to carry the concatenation overhead, as defined in ITU-T Rec. G.7043/Y.1343 and illustrated in Figure 6-2. This octet is reserved for all

values of N , ($N = 1 \dots 16$). For the non-VCAT/LCAS case (which implies one 2048 kbit/s signal), the concatenation overhead octet shall be set to a value of 0x00.

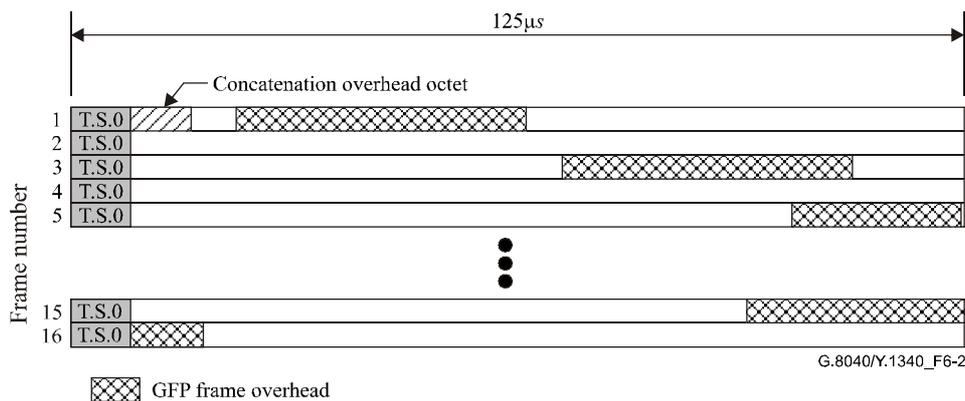


Figure 6-2/G.8040/Y.1340 – Octet-aligned mapping for GFP into the 2048 kbit/s signal

6.2.2 GFP frame rate adaptation

When neither GFP client data frames nor GFP client management frames are available from the GFP source adaptation process, GFP Idle frames shall be inserted in order to perform rate adaptation, filling the server capacity as described in ITU-T Rec. G.7041/Y.1303.

6.2.3 Scrambling of the GFP payload

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

6.2.4 GFP frame delineation

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

6.3 Mapping into $N \times 44\,736$ kbit/s

6.3.1 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 6-3, each 44 736 kbit/s subframe (M-subframe) contains 672 bits, which may be regarded as 84 octets, with octets #11, #32, #53 and #74 straddling the F1, F2, F3, and F4 bits, respectively. The first octet (two nibbles) following the first framing bit (X1) of the multiframe is used to carry the concatenation overhead, as defined in ITU-T Rec. G.7043/Y.1343 and illustrated in Figure 6-4. This octet is reserved for all values of N , ($N = 1 \dots 8$). For the non-VCAT/LCAS case (which implies one 44 736 kbit/s signal), the concatenation overhead octet shall be set to a value of 0x00.

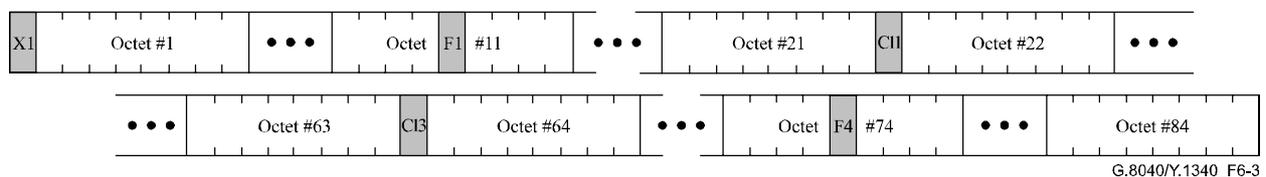


Figure 6-3/G.8040/Y.1340 – Octet structure for the 44 736 kbit/s signal subframe

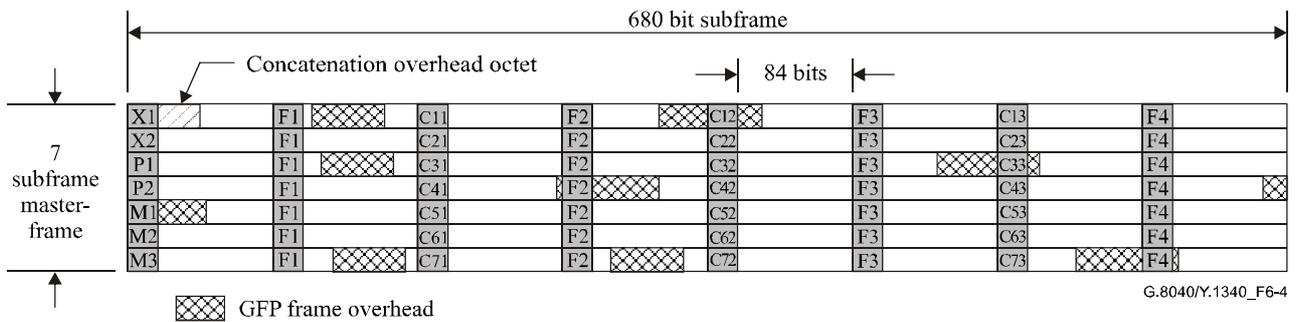


Figure 6-4/G.8040/Y.1340 – GFP mapping into a 44 736 kbit/s signal frame

6.3.2 GFP frame rate adaptation

When neither GFP client data frames nor GFP client management frames are available from the GFP source adaptation process, GFP Idle frames shall be inserted in order to perform rate adaptation, filling the server capacity as described in ITU-T Rec. G.7041/Y.1303.

6.3.3 Scrambling of the GFP payload

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

6.3.4 GFP frame delineation

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

6.4 Mapping into $N \times 34\,368$ kbit/s

6.4.1 Frame format

The basic frame and multiframe structure at 34 368 kbit/s as described in ITU-T Rec. G.832 shall be used. As defined in ITU-T Rec. G.7043/Y.1343 and illustrated in Figure 6-5, the first octet following the FA2 octet of the multiframe is used to carry the concatenation overhead. This octet is reserved for all values of N , ($N = 1..8$). For the non-VCAT/LCAS case (which implies one 34 368 kbit/s signal), the concatenation overhead octet shall be set to a value of 0x00.

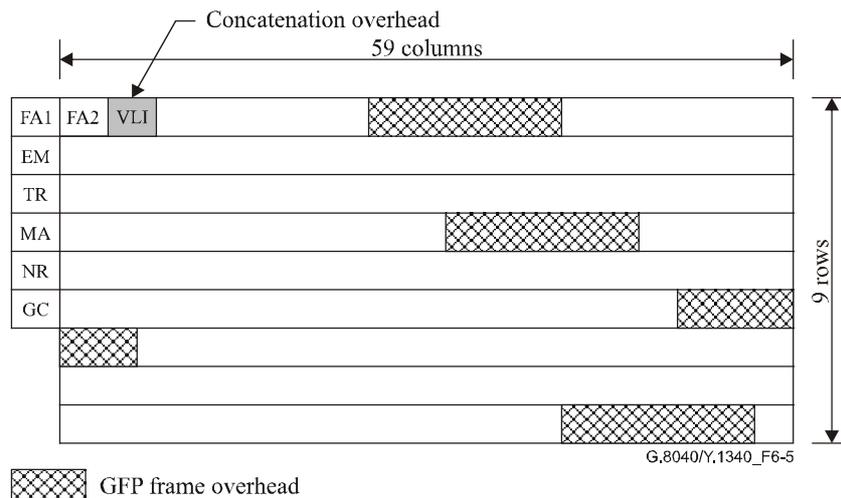


Figure 6-5/G.8040/Y.1340 – Octet-aligned mapping for GFP into the 34 368 kbit/s signal

6.4.2 GFP frame rate adaptation

When neither GFP client data frames nor GFP client management frames are available from the GFP source adaptation process, GFP Idle frames shall be inserted in order to perform rate adaptation, filling the server capacity as described in ITU-T Rec. G.7041/Y.1303.

6.4.3 Scrambling of the GFP payload

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

6.4.4 GFP frame delineation

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

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