INTERNATIONAL TELECOMMUNICATION UNION

ITU-T G.8040/Y.1340

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TELECOMMUNICATION
STANDARDIZATION SECTOR
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SERIES G: TRANSMISSION SYSTEMS AND MEDIA, DIGITAL SYSTEMS AND NETWORKS

Digital networks – General aspects

SERIES Y: GLOBAL INFORMATION INFRASTRUCTURE, INTERNET PROTOCOL ASPECTS AND NEXT GENERATION NETWORKS

Internet protocol aspects – Transport

GFP frame mapping into Plesiochronous Digital Hierarchy (PDH)

ITU-T Recommendation G.8040/Y.1340

ITU-T G-SERIES RECOMMENDATIONS

TRANSMISSION SYSTEMS AND MEDIA, DIGITAL SYSTEMS AND NETWORKS

INTERNATIONAL TELEPHONE CONNECTIONS AND CIRCUITS	G.100–G.199
GENERAL CHARACTERISTICS COMMON TO ALL ANALOGUE CARRIER-TRANSMISSION SYSTEMS	G.200–G.299
INDIVIDUAL CHARACTERISTICS OF INTERNATIONAL CARRIER TELEPHONE SYSTEMS ON METALLIC LINES	G.300–G.399
GENERAL CHARACTERISTICS OF INTERNATIONAL CARRIER TELEPHONE SYSTEMS ON RADIO-RELAY OR SATELLITE LINKS AND INTERCONNECTION WITH METALLIC LINES	G.400–G.449
COORDINATION OF RADIOTELEPHONY AND LINE TELEPHONY	G.450–G.499
TESTING EQUIPMENTS	G.500–G.599
TRANSMISSION MEDIA CHARACTERISTICS	G.600–G.699
DIGITAL TERMINAL EQUIPMENTS	G.700–G.799
DIGITAL NETWORKS	G.800–G.899
DIGITAL SECTIONS AND DIGITAL LINE SYSTEM	G.900–G.999
QUALITY OF SERVICE AND PERFORMANCE - GENERIC AND USER-RELATED ASPECTS	G.1000–G.1999
TRANSMISSION MEDIA CHARACTERISTICS	G.6000–G.6999
DIGITAL TERMINAL EQUIPMENTS	G.7000–G.7999
DIGITAL NETWORKS	G.8000–G.8999
General aspects	**G.8000–G.8099**
Design objectives for digital networks	G.8100–G.8199
Quality and availability targets	G.8200–G.8299
Network capabilities and functions	G.8300–G.8399
SDH network characteristics	G.8400–G.8499
Management of transport network	G.8500–G.8599
SDH radio and satellite systems integration	G.8600–G.8699
Optical transport networks	G.8700–G.8799

For further details, please refer to the list of ITU-T Recommendations.

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 Recs G.704 and G.7043/Y.1343.

Source

ITU-T Recommendation G.8040/Y.1340 was approved on 13 June 2004 by ITU-T Study Group 15 (2001-2004) under the ITU-T Recommendation A.8 procedure.

FOREWORD

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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

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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 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. 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 (2004), *ATM cell mapping into plesiochronous digital hierarchy (PDH)*.

– ITU-T Recommendation G.832 (1998), *Transport of SDH elements on PDH networks – Frame and multiplexing structures*.

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

– ITU-T Recommendation G.7043/Y.1343 (2004), *Virtual concatenation of plesiochronous digital hierarchy (PDH) signals*.

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

LCAS Link Capacity Adjustment Scheme

PDH Plesiochronous Digital Hierarchy

VCG Virtual Concatenation Group

5 Conventions

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

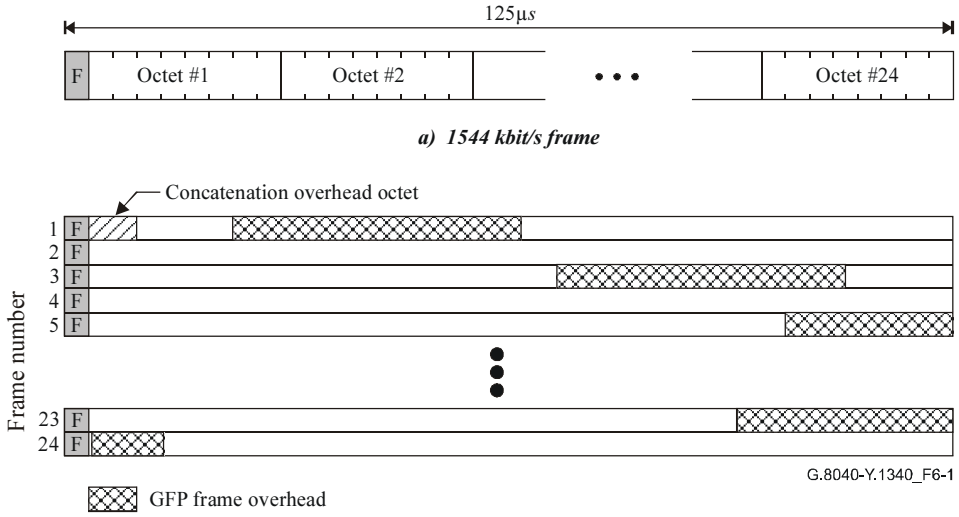
6 Mapping GFP frames into PDH signals

6.1 Mapping into *N* × 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…16).



a) 1544 kbit/s frame

b) GFP mapping into the 24 frame 1544 kbit/s multiframe

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 GFP client data frames are not available from the GFP source adaptation process, GFP idle frames (or Client Management 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 Mapping into *N* × 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...16).

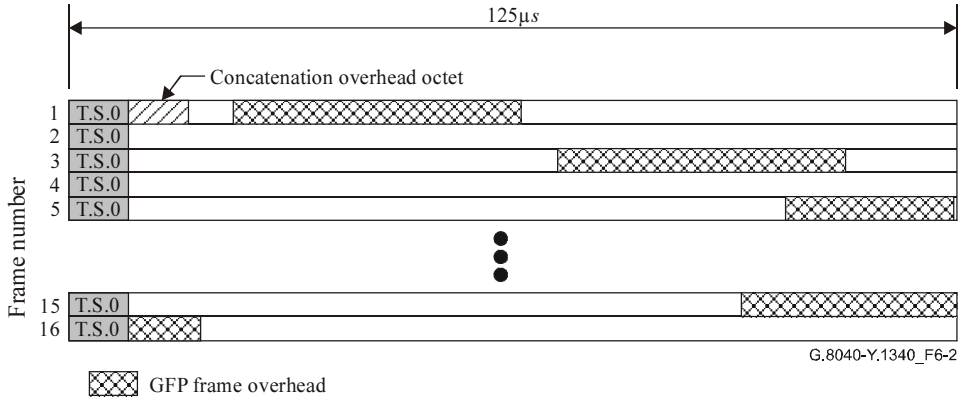


Figure 6-2/G.8040/Y.1340 – Octet-aligned mapping for GFP into the 2048 kbit/s signal

6.2.2 GFP frame rate adaptation

When GFP client data frames are not available from the GFP source adaptation process, GFP idle frames (or Client Management frames) shall be inserted in order to perform rate adaptation 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* × 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 168 nibbles, with 21 nibbles between each frame overhead bit position. 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…16).

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 6-4. 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.

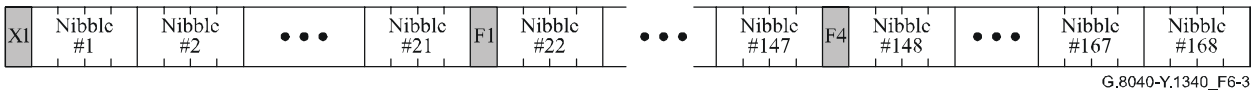


Figure 6-3/G.8040/Y.1340 – Nibble structure for the 44 736 kbit/s signal subframe

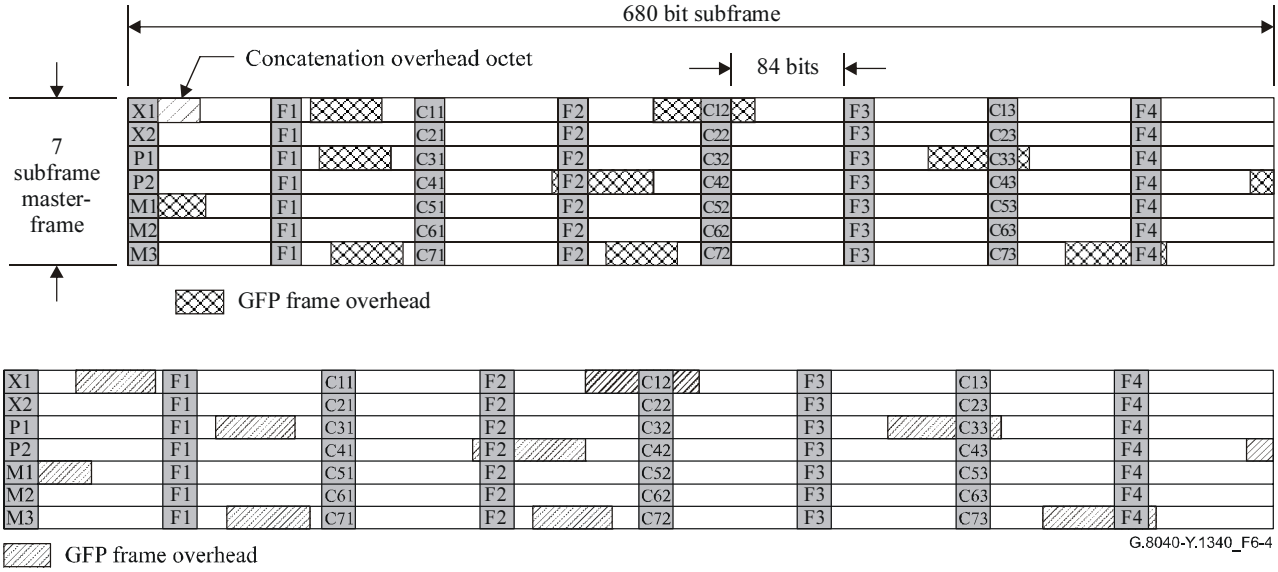


Figure 6-4/G.8040/Y.1340 – GFP mapping into a 44 736 kbit/s signal frame

6.3.2 GFP frame rate adaptation

When 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.

6.3.3 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* × 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…16).

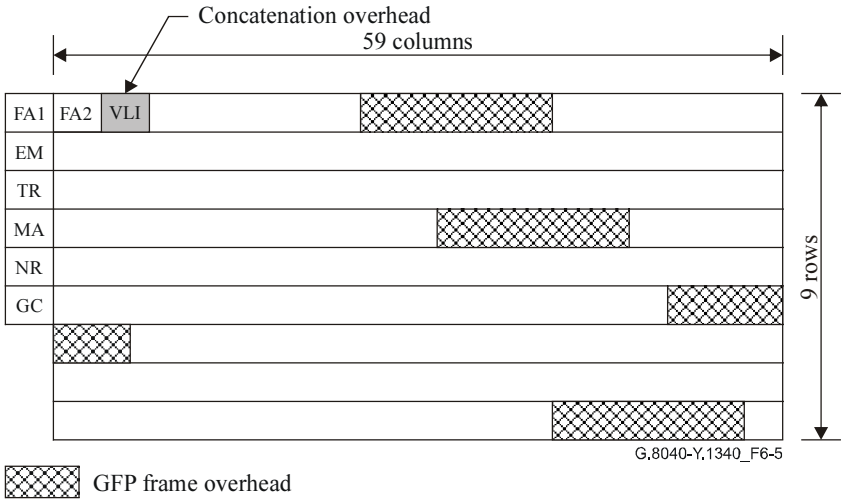


Figure 6-5/G.8040/Y.1340 – Octet-aligned mapping for GFP into the 34 368 kbit/s signal

6.4.2 GFP frame rate adaptation

When GFP client data frames are not available from the GFP source adaptation process, GFP idle frames (or Client Management frames) shall be inserted in order to perform rate adaptation 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.

ITU-T Y-SERIES RECOMMENDATIONS

GLOBAL INFORMATION INFRASTRUCTURE, INTERNET PROTOCOL ASPECTS AND NEXT GENERATION NETWORKS

GLOBAL INFORMATION INFRASTRUCTURE	
General	Y.100–Y.199
Services, applications and middleware	Y.200–Y.299
Network aspects	Y.300–Y.399
Interfaces and protocols	Y.400–Y.499
Numbering, addressing and naming	Y.500–Y.599
Operation, administration and maintenance	Y.600–Y.699
Security	Y.700–Y.799
Performances	Y.800–Y.899
INTERNET PROTOCOL ASPECTS	
General	Y.1000–Y.1099
Services and applications	Y.1100–Y.1199
Architecture, access, network capabilities and resource management	Y.1200–Y.1299
Transport	**Y.1300–Y.1399**
Interworking	Y.1400–Y.1499
Quality of service and network performance	Y.1500–Y.1599
Signalling	Y.1600–Y.1699
Operation, administration and maintenance	Y.1700–Y.1799
Charging	Y.1800–Y.1899
NEXT GENERATION NETWORKS	
Frameworks and functional architecture models	Y.2000–Y.2099
Quality of Service and performance	Y.2100–Y.2199
Service aspects: Service capabilities and service architecture	Y.2200–Y.2249
Service aspects: Interoperability of services and networks in NGN	Y.2250–Y.2299
Numbering, naming and addressing	Y.2300–Y.2399
Network management	Y.2400–Y.2499
Network control architectures and protocols	Y.2500–Y.2599
Security	Y.2700–Y.2799
Generalized mobility	Y.2800–Y.2899

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SERIES OF ITU-T RECOMMENDATIONS

Series A	Organization of the work of ITU-T
Series B	Means of expression: definitions, symbols, classification
Series C	General telecommunication statistics
Series D	General tariff principles
Series E	Overall network operation, telephone service, service operation and human factors
Series F	Non-telephone telecommunication services
Series G	**Transmission systems and media, digital systems and networks**
Series H	Audiovisual and multimedia systems
Series I	Integrated services digital network
Series J	Cable networks and transmission of television, sound programme and other multimedia signals
Series K	Protection against interference
Series L	Construction, installation and protection of cables and other elements of outside plant
Series M	TMN and network maintenance: international transmission systems, telephone circuits, telegraphy, facsimile and leased circuits
Series N	Maintenance: international sound programme and television transmission circuits
Series O	Specifications of measuring equipment
Series P	Telephone transmission quality, telephone installations, local line networks
Series Q	Switching and signalling
Series R	Telegraph transmission
Series S	Telegraph services terminal equipment
Series T	Terminals for telematic services
Series U	Telegraph switching
Series V	Data communication over the telephone network
Series X	Data networks and open system communications
Series Y	**Global information infrastructure, Internet protocol aspects and Next Generation Networks**
Series Z	Languages and general software aspects for telecommunication systems

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