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ITU-T G.7041/Y.1303

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Amendment 1
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SERIES G: TRANSMISSION SYSTEMS AND MEDIA, DIGITAL SYSTEMS AND NETWORKS

Data over Transport – Generic aspects – General

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

Internet protocol aspects – Transport

Generic framing procedure (GFP)

Amendment 1

CAUTION !

PREPUBLISHED RECOMMENDATION

This prepublication is an unedited version of a recently approved Recommendation. It will be replaced by the published version after editing. Therefore, there will be differences between this prepublication and the published version.

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ITU-T Recommendation G.7041/Y.1303

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Summary

This amendment to G.7041 adds mappings associated with carrying IEEE 802.3 10GBASE-R signals in a manner that preserves the Ethernet frame preamble and Ordered Set information. This information was previously covered in ITU-T G.Sup43.

Amendment text and figures

Modify Table 6-3 as follows:

Table 6-3/G.7041/Y.1303 – User payload identifiers for GFP client frames

PTI = 000 and 101 (See Notes 2 and 3.)	
Type bits <7:0>	**GFP frame payload area**
0000 0000 1111 1111	Reserved and not available
0000 0001	Frame-Mapped Ethernet
0000 0010	Frame-Mapped PPP
0000 0011	Transparent Fibre Channel
0000 0100	Transparent FICON
0000 0101	Transparent ESCON
0000 0110	Transparent Gb Ethernet
0000 0111	Reserved for future
0000 1000	Frame-Mapped Multiple Access Protocol over SDH (MAPOS)
0000 1001	Transparent DVB ASI
0000 1010	Framed-Mapped IEEE 802.17 Resilient Packet Ring
0000 1011	Frame-Mapped Fibre Channel FC-BBW
0000 1100	Asynchronous Transparent Fibre Channel
0000 1101	Frame-Mapped MPLS (Unicast) and Frame-Mapped T-MPLS
0000 1110	Frame-Mapped MPLS (Multicast)
0000 1111	Frame-Mapped OSI Network Layer Protocols (IS-IS, ES-IS, CLNP)
0001 0000	Frame-Mapped IPv4
0001 0001	Frame-Mapped IPv6
0001 0010	Frame-mapped DVB-ASI
0001 0011	Frame mapped 64B/66B encoded Ethernet, including the Ethernet frame preamble (See Note 4)
0001 0100	Frame mapped 64B/66B encoded Ethernet Ordered Set information(See Note 5)
0001 0101	Transparent transcoded FC1200 (See G.709 clause 17.7.2)
0001 ~~0011~~0110 through 1110 1111	Reserved for future standardization
1111 0000 through 1111 1110	Reserved for proprietary use (See Note 1.)
NOTE 1 – The use of proprietary code values is described in Annex A/G.806. NOTE 2 – The UPI value applies to the PDU in the Payload Area of that GFP frame. NOTE 3 – Not all of these UPI types are applicable with PTI = 101. NOTE 4 – The former G.Sup43 description of this mapping recommended using UPI = 1111 1101 NOTE 5 – The former G.Sup43 description of this mapping recommended using UPI = 1111 1110	

Add new clause 7.9:

7.9 Transporting Ethernet 10GBASE-R payloads with preamble transparency and Ordered Set information

The mapping of this sub-clause is defined for applications where there is a requirement to preserve the Ethernet frame preamble and Ordered Set information when the 10GBASE-R signal is carried by GFP-F in addition to the Ethernet frames. This preamble and Ordered Set information is not defined to be part of the Ethernet frame by IEEE 802.3, and consequently is not carried by GFP-F in the Ethernet frame-based mapping defined in sub-clause 7.1.

7.9.1 Using 64B/66B information to delimit data and Ordered Sets

A 10GBASE LAN signal is made up of several layers:

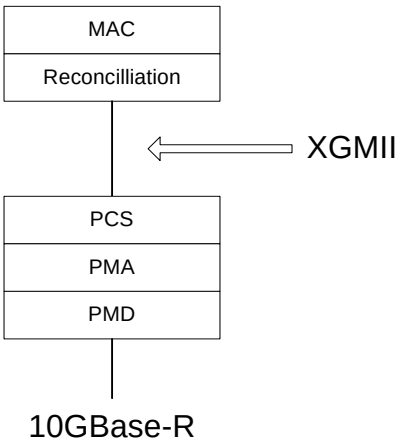

Figure 5: 10GBASE-R LAN model

The PCS sublayer is described in clause 49.2 of IEEE 802.3 (2005), including the delimiting of data frames and Ordered Sets.

7.9.2 GFP-F Encapsulation

As shown in IEEE 802.3 Figure 46-3, the Ethernet data stream at the XGMII consists of: <inter-frame><preamble><sfd><data><efd>. For the purposes of these mappings, the client data frames include the <preamble><sfd><data> information, and the Ordered Sets include specific information carried in the <inter-frame> characters. The mapping of both client data frames and Ordered Sets into GFP-F frames is described in this sub-clause. Each GFP-F frame uses the Core Header and Type Header. The GFP Type field is shown in Figure 6-5. The UPI field indicates data or Ordered Sets. The rest of the fields are static:

- PTI = 000 (Client Data)
- PFI = 0 (No FCS)
- EXI = 0000 (Null Extension Header)

The functional model of the mapping is illustrated in Figure 7-9. EthPP represents the Ethernet PDU with its preamble, and EthOS represents the Ethernet Ordered Set information. Note that there is no Ethernet MAC termination function. Consequently, since no error checking is performed on the Ethernet MAC frames, errored MAC frames are forwarded at both the ingress and egress to the GFP adaptation functions.

NOTE – Since no MAC function exists at the GFP source or sink, Ethernet auto-negotiation is performed between Ethernet terminals across the GFP link rather than between the Ethernet terminal and the GFP source/sink equipment.

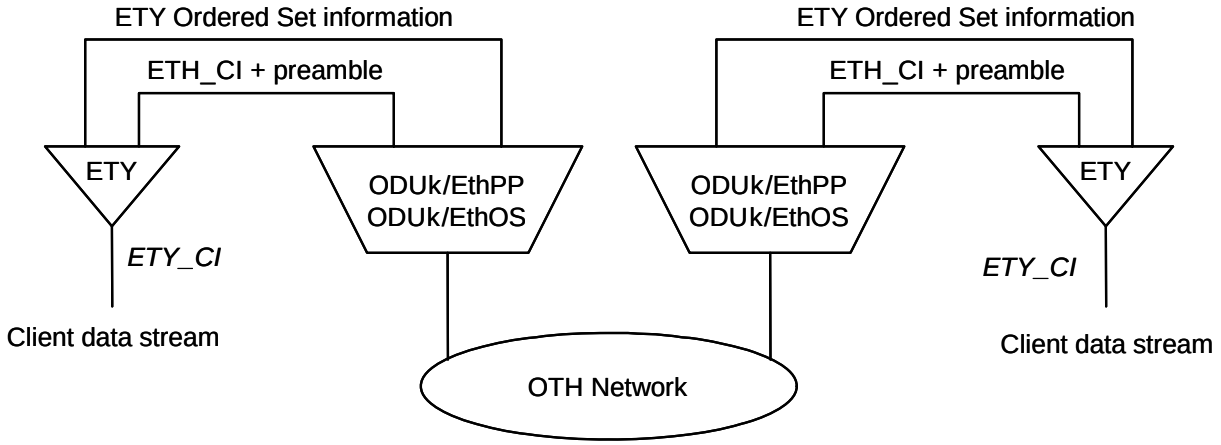

Figure 7-9/G.7041 – Functional model for mapping 10GBASE-R information into the ODUk

NOTE – The Ethernet control codes such as Idle, Error and the reserved codes are not transferred.

At the egress from the GFP sink adaptation process, the IEEE 802.3 rules shall be observed in the reconstituted Ethernet data stream, including the appropriate insertion of inter-frame gap characters.

7.9.2.1 Client Data Frame Encapsulation

Unlike the Ethernet frame mapping specified in sub-clause 7.1, this mapping includes the Ethernet frame preamble information in the GFP-F payload area along with the client Ethernet data frame. See Figure 7-10. As specified in IEEE 802.3 subclause 46.2, the preamble consists of seven octets beginning with the /S/ (Start) control character and followed by the SFD (Start of Frame Delimiter) character. Since the /S/ control character is always present at the beginning of the preamble, as shown in Figure 7 it is mapped as a fixed value of 0x55 when it is inserted into the GFP-F frame. The SFD character is included, however, to insure there is no ambiguity regarding the beginning of the client data frame. Specifically, the six preamble octets and the SFD are pre-pended to the Ethernet data frame in their network octet transmission order. Consistent with the Ethernet data mapping into GFP, the bit order of each octet is mapped such that preamble/SFD octet bit 7 corresponds to GFP octet bit 1 and preamble/SFD octet bit 0 corresponds to GFP octet bit 8.

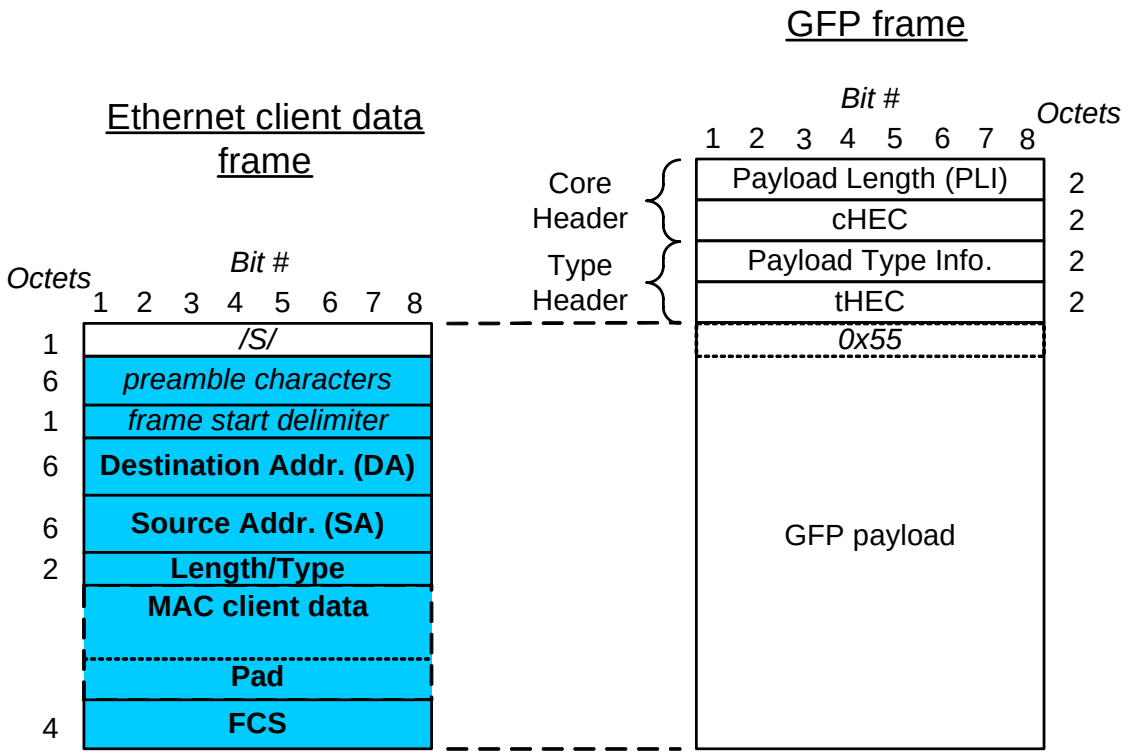

Figure 7-10/G.7041 – Ethernet client data frame and preamble mapping into GFP-F

7.9.2.2 Ordered Set Encapsulation

The 10 Gigabit/s Ethernet Ordered Set is defined in IEEE 802.3 subclause 49.2.4. An Ordered Set consists of four octets, beginning with a special character (/O/) followed by three data octets. Each Ordered Set is mapped into its own GFP-F frame, as shown in Figure 7-11. The first octet of the ordered set has the four most significant bits set to all zero and the four least significant bits equal to the O Code. This way both Sequence Ordered Sets (O Code = 0000) and Signal Ordered Sets (O Code = 1111) can be transferred. The next three octets contain the three Data bytes of the Ordered Set. The Ordered Set octets are mapped into the GFP payload area in network octet transmission order. Consistent with the Ethernet data mapping into GFP, the bit order of each octet is mapped such that Ordered Set octet bit 7 corresponds to GFP octet bit 1 and Ordered Set octet bit 0 corresponds to GFP octet bit 8.

During a link fault condition, IEEE 802.3 subclause 46.3.4 specifies that the fault be signaled by continuously transmitting the appropriate fault status Ordered Set. The additional bandwidth required for the GFP encapsulation prevents all of the Ordered Sets from being transmitted. However, since the stream of Ordered Sets is continuous, 802.3 allows discarding some of these Ordered Sets as long as some are passed to the Ethernet sink to communicate the link status. GFP source adaptation process shall encapsulate and transmit these link status Ordered Sets as bandwidth allows, and discard others. In the same manner as for all Ordered Sets, the GFP sink adaptation process shall convert the Ordered Set information it receives in a GFP frame into an Ordered Set that is transmitted on the 10GBASE-R egress link.

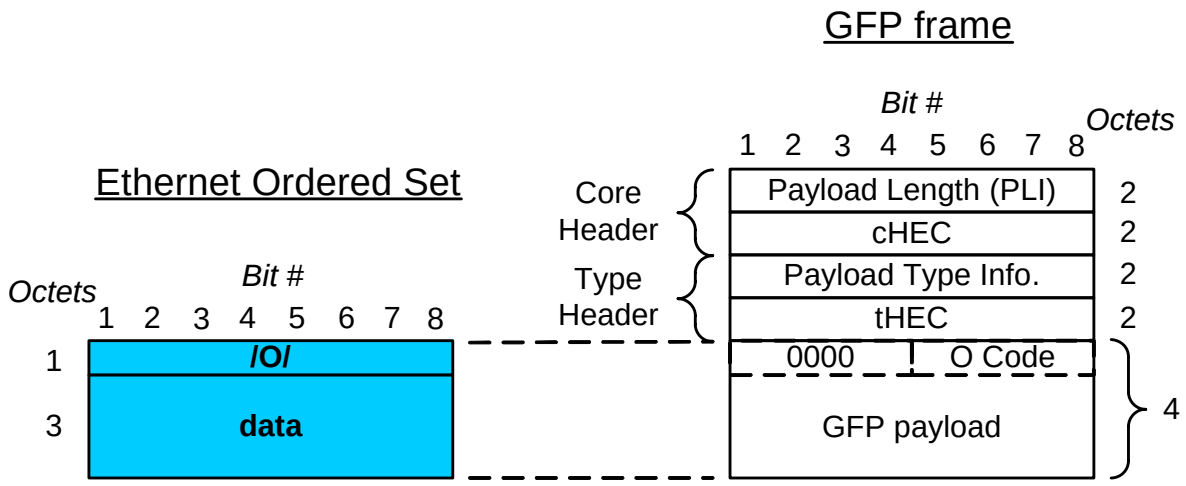

Figure 7-11/G.7041 – Ethernet Ordered Set mapping into GFP-F

7.9.2.3 Fault handling

There are three types of Ethernet PCS faults that can be detected at the ingress to the GFP source adaptation process:

- Loss of signal
- Loss of codeword synchronization
- High bit error rate

When any of these conditions is detected, GFP Client Signal Fail frames are sent from the GFP source to the GFP sink as specified in sub-clause 6.3. The consequent action of the 10GBASE-R source at the egress of the GFP sink adaptation function is for further study.

NOTE – The response to the reception of /E/ Error Termination characters is not defined.