International Telecommunication Union

ITU-T G.709/Y.1331

TELECOMMUNICATION
STANDARDIZATION SECTOR
OF ITU

Amendment 4

(01/2015)

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Recommendation ITU-T G.709/Y.1331

Interfaces for the optical transport network (OTN)

Amendment 4

Summary

Amendment 4 to Recommendation ITU-T G.709/Y.1331 (2012) contains extensions related to the:

- addition of the OTSn OTN synchronization messaging channel (OSMC) overhead;
- addition of the OTUk OTN synchronization messaging channel (OSMC) overhead;
- modification of the OCh overhead transport over OTM-1 multi-vendor IaDI specification to align with the specifications in Recommendation ITU-T G.7712;
- addition of optional FEC processing in the FC-1600 client signal.

History

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* To access the Recommendation, type the URL http://handle.itu.int/ in the address field of your web browser, followed by the Recommendation's unique ID. For example, http://handle.itu.int/11.1002/1000/11830-en.

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As of the date of approval of this Recommendation, ITU had received notice of intellectual property, protected by patents, which may be required to implement this Recommendation. However, implementers are cautioned that this may not represent the latest information and are therefore strongly urged to consult the TSB patent database at http://www.itu.int/ITU-T/ipr/.

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Recommendation ITU-T G.709/Y.1331

Interfaces for the optical transport network (OTN)

Amendment 4

1) Introduction

This amendment contains extensions to the fourth version (02/2012) of Recommendation ITU-T G.709/Y.1331; these relate to the:

– addition of the OTSn OTN synchronization messaging channel (OSMC) overhead (clauses 7, 15, 15.3, 15.3.5);

– addition of the OTUk OTN synchronization messaging channel (OSMC) overhead (clauses 15, 15.7.1, 15.7.2.3, 15.7.2.4);

– modification of the OCh overhead transport over OTM-1 multi-vendor IaDI specification to align with the specifications in [ITU-T G.7712] (clause 15.5.4);

– addition of optional FEC processing in the FC-1600 client signal (clause 17.9.2).

2) Additions

2.1) Clause 7

Modify the text in this clause as follows:

The OTS (with optional OSMC), OMS, OCh and COMMS overhead is inserted into the OOS using mapping and multiplexing techniques which are outside the scope of this Recommendation.

2.2) Clause 15, Figure 15-1

Replace Figure 15-1 with the following figure that includes the OTSn OSMC overhead:

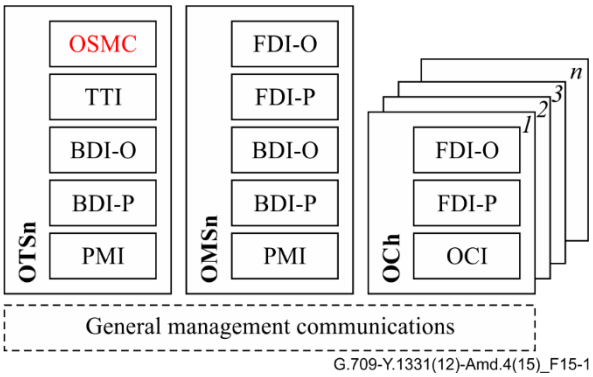

Figure 15-1 – OTSn, OMSn and OCh overhead as logical elements within the OOS

2.3) Clause 15, Figure 15-2

Replace Figure 15-2 with the following figure that includes the OTUk OSMC overhead in row 1, column 13 and modify the figure legend as shown:

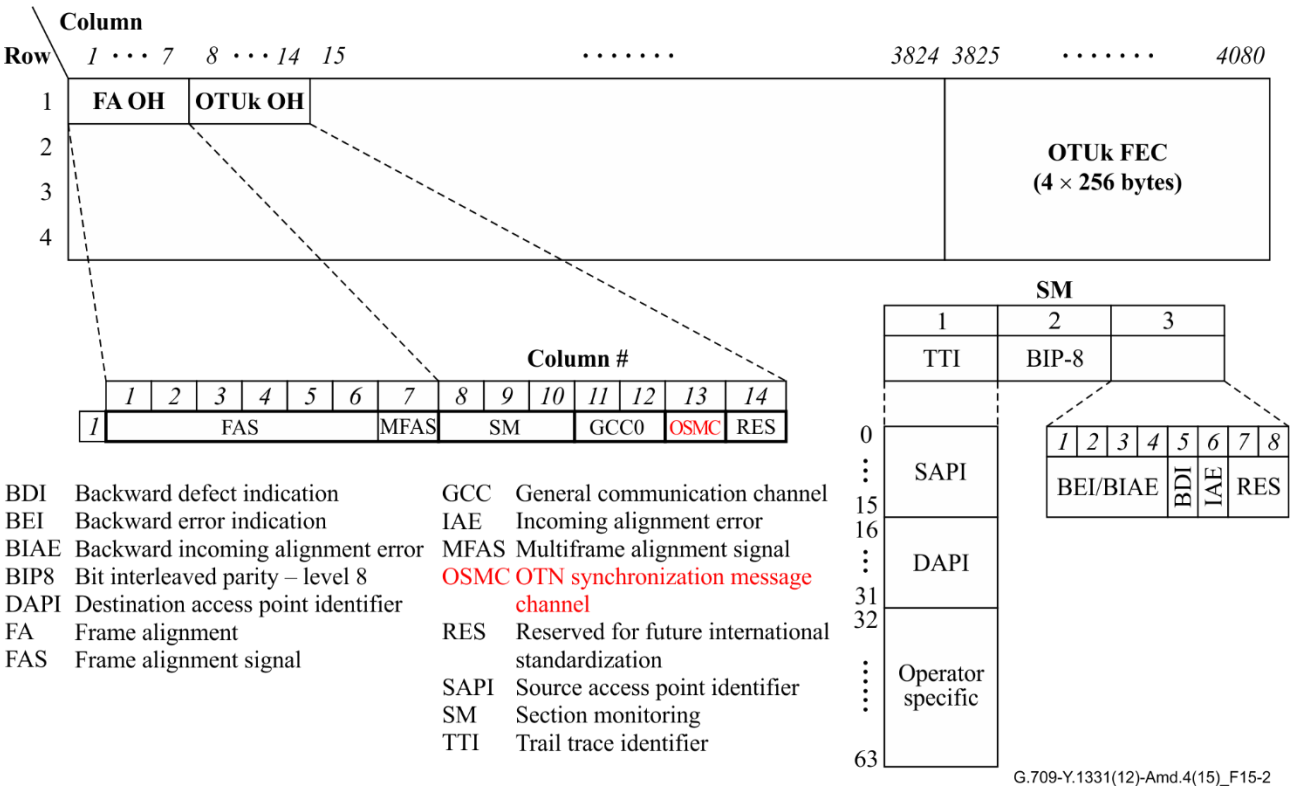

Figure 15-2 – OTUk frame structure, frame alignment and OTUk overhead

2.4) Clause 15.3

Extend the list of OTSn overhead in clause 15.3 with the OTSn OSMC overhead and add a new clause 15.3.5 'OTSn OSMC to clause 15.3 as presented hereafter':

15.3 OTS OH description

The following OTM-n OTSn overhead is defined:

– OTSn-TTI

– OTSn-BDI-P

– OTSn-BDI-O

– OTSn-PMI

– OTSn-OSMC.

•••

15.3.5 OTSn OTN synchronization message channel (OSMC)

For synchronization purposes, the OTSn OSMC signal is defined as an OTN synchronization message channel to transport SSM and PTP messages.

NOTE 1 – Support of OTSn OSMC in an OTM-n interface is optional.

NOTE 2 – Old equipment may not be able to support OTSn OSMC via their OTM-n interfaces.

2.5) Clause 15.5.4

Modify the text in clause 15.5.4 as follows:

~~Figure 15-5bis illustrates the information and representation to be used when the OCh overhead is to be transferred across a multi-vendor IaDI. This information consists of OCh overhead primitives and of additional information including an OH type field, a trail trace identifier field to check for misconnections over the OCN and a field indicating the nominal central frequency of the associated OCh payload.~~ In the case of single-vendor IaDI, the coding and method of OCh overhead information transfer is vendor specific. For multi-vendor IaDI, the OCh overhead is transferred over the overhead communication network (OCN) as described in [ITU-T G.7712].

NOTE – A multi-vendor IaDI which transfers OCh overhead over an OCN cannot provide fate-sharing of the OCh overhead with the OCh payload across this interface.

~~Each OCh overhead primitive is represented by a bit that is set to one if the respective condition is present, and will be set to zero when it is not.~~

The OCh FDI-P, FDI-O and OCI overhead primitives are communicated over the OCN. The specification of the encapsulation, identification and transmission of this information is outside the scope of this Recommendation and specified in [ITU-T G.7712]. This information must be communicated with the peers such that the OCh overhead primitives come into sync within one second in the absence of changes to OCh FDI-P, FDI-O or OCI. In the event of changes to any OCh overhead primitive, the update must be sent within 10 ms of the change and with a mechanism to guarantee receipt in the event of packet loss.

~~Size~~	~~Contents~~
~~2 octets~~	~~OH type, 0x0001=OCh overhead~~
~~64 octets~~	~~Trail trace identifier (TTI):~~ ~~16 octets SAPI~~ ~~16 octets DAPI~~ ~~32 octets operator specific~~
~~4 octets~~	~~Nominal central frequency (NCF)~~ ~~Encoded as a "DWDM Wavelength Label" per Section 3.2 of [b-IETF RFC 6205]~~
~~1 octet~~	~~OAM bits~~

~~The OAM bits are represented as follows:~~

~~1~~	~~2~~	~~3~~	~~4~~	~~5~~	~~6~~	~~7~~	~~8~~
~~FDI-P~~	~~FDI-O~~	~~OCI~~	~~Reserved~~				

~~Figure 15-5bis – OCh overhead information elements to be used for multi-vendor~~

~~15.5.4.1 Trail trace identifier (TTI)~~

~~The TTI is defined to transport a 64-byte TTI as specified in clause 15.2 over a multi-vendor IaDI to ensure there are no misconnections across the OCN.~~

~~15.5.4.2 Nominal central frequency (NCF)~~

~~The NCF encodes the nominal central frequency of the intended OCh payload. This is sent explicitly across a multi-vendor IaDI to ensure there are no misconnections across the OCN. The coding for this information for a multi-vendor IaDI is specified in clause 15.5.4.~~

2.6) Clause 15.7.1

Replace Figure 15-9 with the following figure that includes OTUk OSMC overhead in row 1, column 13:

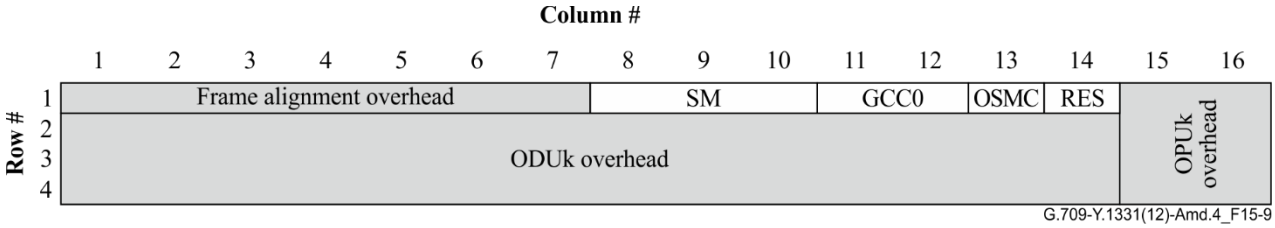

Figure 15-9 – OTUk overhead

2.7) Clause 15.7.2.3

Modify the text in clause 15.7.2.3 as follows:

~~Two~~ One byte~~s~~ of ~~an~~ the OTUk overhead ~~are~~ is reserved for future international standardization. The~~i~~s~~e~~ byte~~s~~ ~~are~~is located in row 1, column~~s~~ ~~13 and~~ 14. The~~i~~s~~e~~ byte~~s~~ ~~are~~is set to all-0s.

2.8) Clause 15.7.2.4

Add the following new clause, clause 15.7.2.4 OTUk OTN synchronization message channel (OSMC), after clause 15.7.2.3:

15.7.2.4 OTUk OTN synchronization message channel (OSMC)

For synchronization purposes, one byte is defined in the OTUk overhead as an OTN synchronization message channel to transport SSM and PTP messages within OTM-0 and OTM-nr inter-domain interfaces. The OSMC bandwidth is listed in Table 15-1bis.

NOTE 1 – OTUk OSMC is not defined for OTM-n and OTM-1 intra-domain interfaces.

NOTE 2 – Support of OTUk OSMC in an OTM-0 and OTM-nr inter-domain interface is optional.

NOTE 3 – Old equipment may not be able to support OTUk OSMC via their OTM-0 and OTM-nr interfaces.

NOTE 4 – OTM-0 and OTM-nr single-vendor intra-domain interfaces may support an OSMC function. The encapsulation of the messages and overhead location are then vendor specific.

Table 15-1bis – OSMC bandwidth

OTUk	OSMC bandwidth (kbit/s)
OTU1	163.361
OTU2	656.203
OTU3	2635.932
OTU4	6851.101

The SSM and PTP messages within an OTM-0 and OTM-nr inter-domain interface are encapsulated into GFP-F frames as specified in [ITU-T G.7041]. GFP frames arrive as a continuous bit stream with a capacity that is identical to the OSMC overhead bandwidth, due to the insertion of idle frames at the GFP encapsulation stage. The GFP frame stream is not scrambled during encapsulation.

NOTE 5 – There is no rate adaptation or scrambling required at the mapping stage; this is performed by the GFP encapsulation process.

The mapping of generic framing procedure (GFP) frames is performed by aligning the byte structure of every GFP frame with the byte of the OSMC overhead field. Since the GFP frames are of variable length and longer than one byte, a frame crosses the OTUk (k=1,2,3,4) frame boundary.

2.9) Clause 17.9.2

Modify the text in this clause as follows:

17.9.2 FC-1600

The characteristic information of the mapped FC-1600 client signal consists of a sequence of 64B/66B encoded blocks with a nominal bit-rate of 14 025 000 kbit/s, ±100 ppm.

In case the FC-1600 interface at the mapper has FEC enabled, the mapper must recover the FEC code word synchronization, extract the FEC parity bits, perform error correction and transdecode the 64B/65B blocks to 64B/66B blocks as specified in [b-INCITS 470].

In case the FC-1600 interface at the demapper has FEC enabled, the demapper must recover 66B block lock from the demapped CBR signal, transcode the 64B/66B blocks to 64/65B blocks, generate and insert the FEC parity bits as specified in [b-INCITS 470].

NOTE – FC-1600 interface ports designed prior to this amendment may not be able to support termination of the FEC or transdecoding of 64B/65B blocks.

During a signal fail condition of the incoming FC-1600 signal (e.g., in the case of a loss of input signal), this failed incoming FC-1600 signal is replaced by a NOS primitive sequence as specified in [b-INCITS 470].

During signal fail condition of the incoming ODUflex signal (e.g., in the case of an ODUflex-AIS, ODUflex-LCK, ODUflex-OCI condition), NOS primitive sequence ordered sets as specified in [b-INCITS 470] are generated as a replacement signal for the lost FC-1600 signal.

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