International Telecommunication Union

ITU-T

TELECOMMUNICATION
STANDARDIZATION SECTOR
OF ITU

G.709/Y.1331

Corrigendum 1

(07/2010)

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

Digital terminal equipments – General

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

Internet protocol aspects – Transport

Interfaces for the Optical Transport Network (OTN)

Corrigendum 1

Recommendation ITU-T G.709/Y.1331 (2009) – Corrigendum 1

ITU-T

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

Recommendation ITU-T G.709/Y.1331

Interfaces for the Optical Transport Network (OTN)

Corrigendum 1

Summary

Corrigendum 1 to Recommendation ITU-T G.709/Y.1331 (2009) removes the definition of OTLk-AIS (clause 16.4.2, Annex C), clarifies the minimum and maximum values of C_m and C_n (clauses 17.7.1, 17.7.2, 17.7.3, 19.6.1, 19.6.2, 19.6.3, clause D.2), clarifies that the GFP Payload FCS is not used in the mapping of 100BASE-X into OPU0 (clause 17.7.1.1), corrects the transcoding factor "T" descriptions in the notes in clauses 17.7.3, 17.7.4 and 17.7.5, renames some OPUflex overhead bytes associated with mapping of a CBR client signal (clause 17.9), corrects two typos in Table 19-4 (clause 19.1.4), corrects the $C_m(t)$ encoding and decoding text (clause D.3), corrects a typo in Figure D.7 (clause D.3) and corrects a typo in item 3 in clause D.4.

History

Edition	Recommendation	Approval	Study Group
1.0	ITU-T G.709/Y.1331	2001-02-09	15
1.1	ITU-T G.709/Y.1331 (2001) Amend. 1	2001-11-29	15
2.0	ITU-T G.709/Y.1331	2003-03-16	15
2.1	ITU-T G.709/Y.1331 (2003) Amend. 1	2003-12-14	15
2.2	ITU-T G.709/Y.1331 (2003) Cor. 1	2006-12-14	15
2.3	ITU-T G.709/Y.1331 (2003) Amend. 2	2007-11-22	15
2.4	ITU-T G.709/Y.1331 (2003) Cor.2	2009-01-13	15
2.5	ITU-T G.709/Y.1331 (2003) Amend. 3	2009-04-22	15
3.0	ITU-T G.709/Y.1331	2009-12-22	15
3.1	ITU-T G.709/Y.1331 (2009) Cor. 1	2010-07-29	15
3.2	ITU-T G.709/Y.1331 (2009) Amend. 1	2010-07-29	15

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

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

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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)

Corrigendum 1

1) Clause 16.4.2 OTLk alarm indication signal (OTLk-AIS)

Delete clause 16.4.2.

~~16.4.2 OTLk alarm indication signal (OTLk-AIS)~~

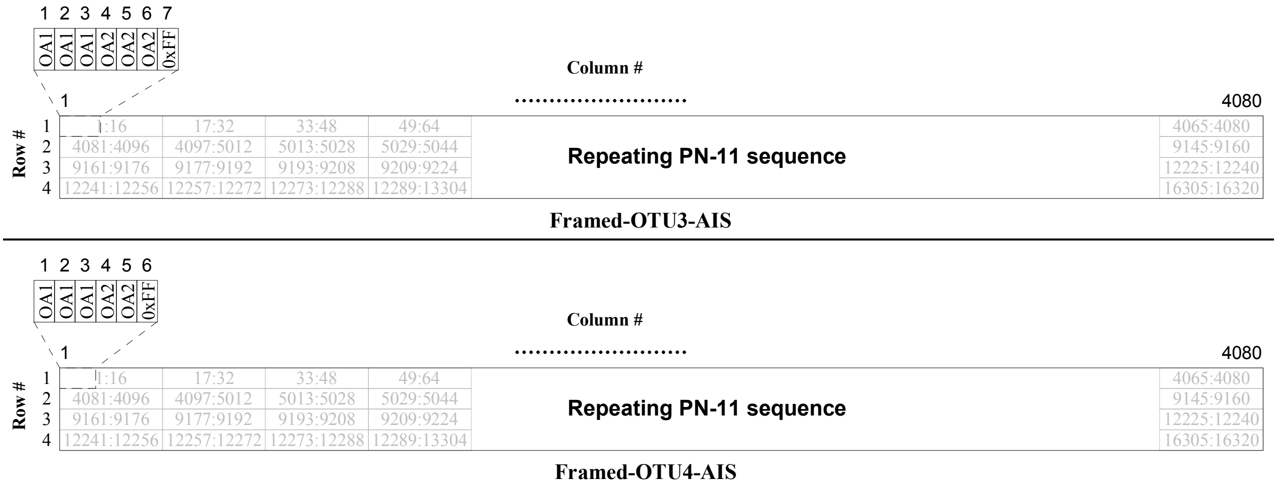
~~The Framed-OTU3-AIS (see Figure 16-2 top) is a generic-AIS signal (see clause 16.6.1) extended with a 7-byte AIS (multi)framing pattern consisting of 3 OA1 bytes, 3 OA2 bytes and a MFAS byte with value 0xFF. This (multi)framing pattern is inserted every 130560 (i.e., 4 x 4080 x 8) bits and replaces the original PN-11 bytes.~~

~~The Framed-OTU4-AIS (see Figure 16-2 bottom) is a generic-AIS signal (see clause 16.6.1) extended with a 6-byte AIS framing pattern consisting of 3 OA1 bytes, 2 OA2 bytes and a Logical Lane Marker byte with value 0xFF. This framing pattern is inserted every 130560 (i.e., 4 x 4080 x 8) bits and replaces the original PN-11 bytes.~~

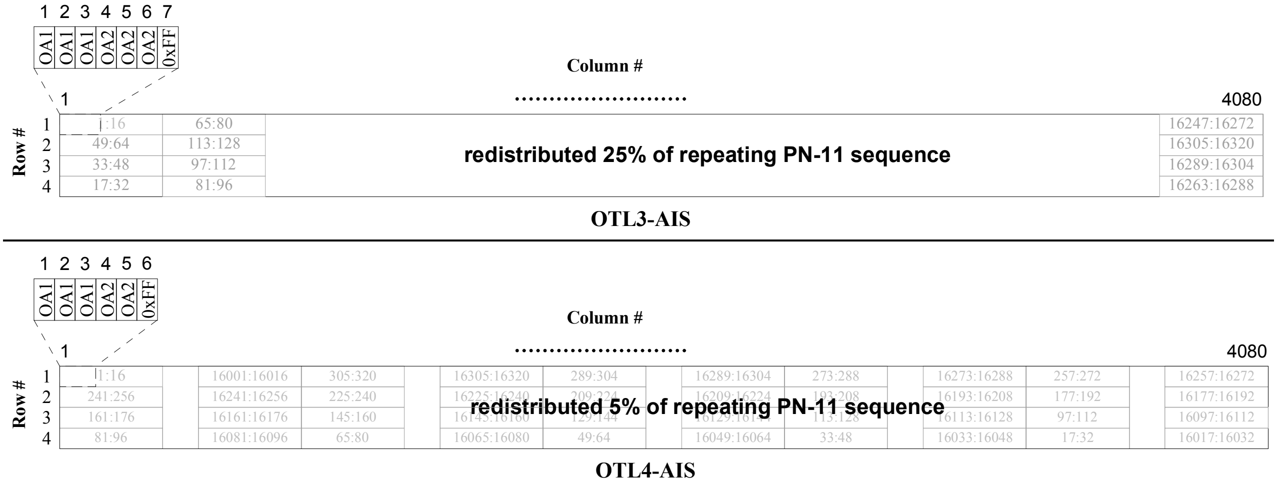
~~The Framed-OTUk-AIS pattern is distributed over the n logical lanes (n = 4 (OTU3), 20 (OTU4)) of an OTM-0.mvn as specified in Annex C. Optical channel transport lane (OTLk) AIS is the pattern present in a logical lane (see Figure 16-3).~~

~~The presence of OTL3-AIS is detected by monitoring the MFAS field in an OTU3 lane for the persistent value 0xFF.~~

~~The presence of OTL4-AIS is detected by monitoring the Logical Lane Marker field in an OTU4 lane for the persistent value 0xFF.~~



~~Figure 16-2 – Framed-OTUk-AIS~~



~~Figure 16-3 – OTLk-AIS~~

2) Clause 17.7.1 Mapping a sub-1.238 Gbit/s CBR client signal into OPU0

Add a note to Tables 17-4A and 17-4B as follows:

Table 17-4A – C_m (m=8) for sub-1.238G clients into OPU0

Client signal	Nominal bit rate (kbit/s)	Bit rate tolerance (ppm)	Floor $C_{8,min}$ (Note)	Minimum c_8	Nominal c_8	Maximum c_8	Ceiling $C_{8,max}$ (Note)
Transcoded 1000BASE-X (see clause 17.7.1.1)	15/16 × 1 250 000	±100	14405	14405.582	14407.311	14409.040	14410
STM-1	155 520	±20	1911	1911.924	1912.000	1912.076	1913
STM-4	622 080	±20	7647	7647.694	7648.000	7648.306	7649
FC-100	1 062 500	±100	13061	13061.061	13062.629	13064.196	13065

NOTE – Floor $C_{m,min}$ (m=8) and Ceiling $C_{m,max}$ (m=8) values represent the boundaries of client/OPU ppm offset combinations (i.e., min. client/max. OPU and max. client/min. OPU). In steady state, given instances of client/OPU offset combinations should not result in generated C_m values throughout this range but rather should be within as small a range as possible. Under transient ppm offset conditions (e.g., AIS to normal signal), it is possible that C_m values outside the range $C_{m,min}$ to $C_{m,max}$ may be generated and a GMP demapper should be tolerant of such occurrences. Refer to Annex D for a general description of the GMP principles.

Table 17-4B – C_n (n=8 or 1) for sub-1.238G clients into OPU0

Client signal	Nominal bit rate (kbit/s)	Bit rate tolerance (ppm)	Floor $C_{8,min}$ (Note)	Minimum c_8	Nominal c_8	Maximum c_8	Ceiling $C_{8,max}$ (Note)
Transcoded 1000BASE-X (see clause 17.7.1.1)	15/16 × 1 250 000	±100	14405	14405.582	14407.311	14409.040	14410
FC-100	1 062 500	±100	13061	13061.061	13062.629	13064.196	13065
			Floor $C_{1,min}$ (Note)	**Minimum c_1**	**Nominal c_1**	**Maximum c_1**	**Ceiling $C_{1,max}$ (Note)**
STM-1	155 520	±20	15295	15295.338	15296.000	15296.612	15297
STM-4	622 080	±20	61181	61181.553	61184.000	61186.447	61187

NOTE – Floor $C_{n,min}$ (n=8,1) and Ceiling $C_{n,max}$ (n=8,1) values represent the boundaries of client/OPU ppm offset combinations (i.e., min. client/max. OPU and max. client/min. OPU). In steady state, given instances of client/OPU offset combinations should not result in generated C_n values throughout this range but rather should be within as small a range as possible. Under transient ppm offset conditions (e.g., AIS to normal signal), it is possible that C_n values outside the range $C_{n,\ min}$ to $C_{n,\ max}$ may be generated and a GMP demapper should be tolerant of such occurrences. Refer to Annex D for a general description of the GMP principles.

3) Clause 17.7.1.1 1000BASE-X transcoding

Modify the text as follows:

• • •

The mapping of the 1000BASE-X signal into GFP-T is performed as specified in [ITU-T G.7041] with the following parameters:

– Each GFP-T frame contains one superblock,

– The 65B_PAD character is not used,

– GFP Idle frames are not used.,

– The GFP frame pFCS is not used.

4) Clause 17.7.2 Mapping a supra-1.238 to sub-2.488 Gbit/s CBR client signal into OPU1

Add a note to Tables 17-6A and 17-6B as follows:

Table 17-6A – C_m (m=16) for supra-1.238 to sub-2.488G clients into OPU1

Client signal	Nominal bit rate (kbit/s)	Bit rate tolerance (ppm)	Floor $C_{16,min}$ (Note)	Minimum c_{16}	Nominal c_{16}	Maximum c_{16}	Ceiling $C_{16,max}$ (Note)
FC-200	2 125 000	±100	6503	6503.206	6503.987	6504.767	6505
NOTE – Floor $C_{m,min}$ (m=16) and Ceiling $C_{m,max}$ (m=16) values represent the boundaries of client/OPU ppm offset combinations (i.e., min. client/max. OPU and max. client/min. OPU). In steady state, given instances of client/OPU offset combinations should not result in generated C_m values throughout this range but rather should be within as small a range as possible. Under transient ppm offset conditions (e.g., AIS to normal signal), it is possible that C_m values outside the range $C_{m,min}$ to $C_{m,max}$ may be generated and a GMP demapper should be tolerant of such occurrences. Refer to Annex D for a general description of the GMP principles.							

Table 17-6B – C_n (n=8 or 1) for supra-1.238 to sub-2.488G clients into OPU1

Client signal	Nominal bit rate (kbit/s)	Bit rate tolerance (ppm)	Floor $C_{8,min}$ (Note)	Minimum c_8	Nominal c_8	Maximum c_8	Ceiling $C_{8,max}$ (Note)
FC-200	2 125 000	±100	13006	13006.412	13007.973	13009.534	13010
			Floor $C_{1,min}$ (Note)	Minimum c_1	Nominal c_1	Maximum c_1	Ceiling $C_{1,max}$ (Note)
For further study							
NOTE – Floor $C_{n,min}$ (n=8,1) and Ceiling $C_{n,max}$ (n=8,1) values represent the boundaries of client/OPU ppm offset combinations (i.e., min. client/max. OPU and max. client/min. OPU). In steady state, given instances of client/OPU offset combinations should not result in generated C_n values throughout this range but rather should be within as small a range as possible. Under transient ppm offset conditions (e.g., AIS to normal signal), it is possible that C_n values outside the range $C_{n, min}$ to $C_{n, max}$ may be generated and a GMP demapper should be tolerant of such occurrences. Refer to Annex D for a general description of the GMP principles.							

5) Clause 17.7.3 Mapping CBR client signals with bit rates close to 9.995G into OPU2

Modify the note as follows:

NOTE – The bit rate range for those CBR client signals is given by the following equation:

$$\left(\frac{7}{8}\right)\times \text{OPU2 payload bitrate(nom)} \times \left(\frac{238}{239}\right)\times\left(\frac{1-20[ppm]}{1+|\Delta f|[ppm]}\right) < \text{CBR client bitrate} \le T \times \text{OPU2 payload bitrate(nom)} \times \left(\frac{1-20[ppm]}{1+|\Delta f|[ppm]}\right)$$

where Δf is bit-rate tolerance of CBR client and T is transcoding factor. T=16/15 for 8B/10B encoded CBR clients, T=1027~~7~~4/10274 × 66/64 for 64B/66B encoded CBR clients and T=1 for other clients. If $\Delta f = \pm 100$ ppm, the bit rate range for CBR client signal is 8 708 228.746 to T×9 994 077.649 kbit/s; for T=16/15: 10 660 349.492 kbit/s, for T=1027~~7~~4/10247 × 66/64: 10 276 286.268 ~~10 023 357.173~~ kbit/s.

Add a note to Tables 17-8A and 17-8B as follows:

Table 17-8A – C_m (m=64) for CBR clients close to 9.995G into OPU2

Client signal	Nominal bit rate (kbit/s)	Bit rate tolerance (ppm)	Floor $C_{64,min}$ (Note)	Minimum c_{64}	Nominal c_{64}	Maximum c_{64}	Ceiling $C_{64,max}$ (Note)
For further study							
NOTE – Floor $C_{m,min}$ (m=64) and Ceiling $C_{m,max}$ (m=64) values represent the boundaries of client/OPU ppm offset combinations (i.e., min. client/max. OPU and max. client/min. OPU). In steady state, given instances of client/OPU offset combinations should not result in generated C_m values throughout this range but rather should be within as small a range as possible. Under transient ppm offset conditions (e.g., AIS to normal signal), it is possible that C_m values outside the range $C_{m,min}$ to $C_{m,max}$ may be generated and a GMP demapper should be tolerant of such occurrences. Refer to Annex D for a general description of the GMP principles.							

Table 17-8B – C_n (n=8 or 1) for CBR clients close to 9.995G into OPU2

Client signal	Nominal bit rate (kbit/s)	Bit rate tolerance (ppm)	Floor $C_{8,min}$ (Note)	Minimum c_8	Nominal c_8	Maximum c_8	Ceiling $C_{8,max}$ (Note)
For further study							
			Floor $C_{1,min}$ (Note)	Minimum c_1	Nominal c_1	Maximum c_1	Ceiling $C_{1,max}$ (Note)
For further study							
NOTE – Floor $C_{n,min}$ (n=8,1) and Ceiling $C_{n,max}$ (n=8,1) values represent the boundaries of client/OPU ppm offset combinations (i.e., min. client/max. OPU and max. client/min. OPU). In steady state, given instances of client/OPU offset combinations should not result in generated C_n values throughout this range but rather should be within as small a range as possible. Under transient ppm offset conditions (e.g., AIS to normal signal), it is possible that C_n values outside the range $C_{n, min}$ to $C_{n, max}$ may be generated and a GMP demapper should be tolerant of such occurrences. Refer to Annex D for a general description of the GMP principles.							

6) Clause 17.7.4 Mapping CBR client signals with bit rates close to 40.149G into OPU3

Modify the note as follows:

NOTE – The bit rate range for those CBR client signals is given by the following equation:

$$\left(\frac{31}{32}\right)\times \text{OPU3 payload bitrate(nom)}\times\left(\frac{238}{239}\right)\times\left(\frac{1-20[ppm]}{1+|\Delta f|[ppm]}\right) < \text{CBR client bitrate} \le T\times \text{OPU3 payload bitrate(nom)}\times\left(\frac{1-20[ppm]}{1+|\Delta f|[ppm]}\right)$$

where Δf is the bit-rate tolerance of CBR client and T is transcoding factor. T=16/15 for 8B/10B encoded CBR clients, T=10274/10247 × 66/64 for 64B/66B encoded CBR clients and T=1 for other clients. If Δf = ±100 ppm, the bit rate range for CBR client signal is 38 728 424.091 to T×40 145 701.741 kbit/s; for T=16/15: 42 822 081.857 kbit/s, for T=10274/10247 × 66/64: 41 279 319.415 ~~40 263 316.101~~ kbit/s.

7) Clause 17.7.5 Mapping CBR client signals with bit rates close to 104.134G into OPU4

Modify the note as follows:

NOTE – The bit rate range for those CBR client signals is given by the following equation:

$$\left(\frac{79}{80}\right)\times \text{OPU4 payload bitrate(nom)}\times\left(\frac{475}{476}\right)\times\left(\frac{238}{239}\right)\times\left(\frac{1-20[ppm]}{1+|\Delta f|[ppm]}\right) < \text{CBR client bitrate} \le T\times \text{OPU4 payload bitrate(typ)}\times\left(\frac{475}{476}\right)\times\left(\frac{1-20[ppm]}{1+|\Delta f|[ppm]}\right)$$

where Δf is the bit-rate tolerance of CBR client and T is transcoding factor. T=16/15 for 8B/10B encoded CBR clients, T=10244~~7~~/10247 × 66/64 for 64B/66B encoded CBR clients and T=1 for other clients. If Δf = ±100 ppm, the bit rate range for CBR client signal is 102 392 471.399 to T×104 124 244.929 ~~104 343 453.866~~ kbit/s; for T=16/15: 111 065 861.257 ~~111 299 684.124~~ kbit/s, for T=1027~~7~~4/10247 × 66/64: 107 064 462.166 ~~104 649 147.578~~ kbit/s.

8) Clause 17.9 Mapping a supra-2.488 CBR Gbit/s signal into OPUflex

Modify the fifth paragraph of clause 17.9 and Figure 17-19 as follows:

The OPUflex overhead for this mapping consists of a:

– payload structure identifier (PSI) including the payload type (PT) as specified in Table 15-8, the client signal fail (CSF) and 254 bytes plus 7 bits reserved for future international standardization (RES);

– three justification control (JC) bytes, consisting of two bits for justification control (with fixed 00 value) and six bits reserved for future international standardization;

– one negative justification opportunity (NJO) byte (carrying a justification byte); and

– ~~seven~~ three bytes reserved for future international standardization (RES).

NOTE – To allow the use of a common asynchronous/bit-synchronous demapper circuit for CBR client signals into ODUk (k=1,2,3 and flex), JC, NJO and PJO fields are assumed to be present in the OPUflex frame structure for the mapping of a supra-2.488G CBR client signal (Figure 17-19). This OPUflex frame structure is now compatible with the OPUk frame structure for the mapping of a CBR2G5, CBR10G or CBR40G signal (Figure 17-1). As a CBR signal is mapped into the OPUflex without justification, the NJO field contains a justification byte (stuff), the PJO field contains a data byte (D), and the JC bits are fixed to 00.

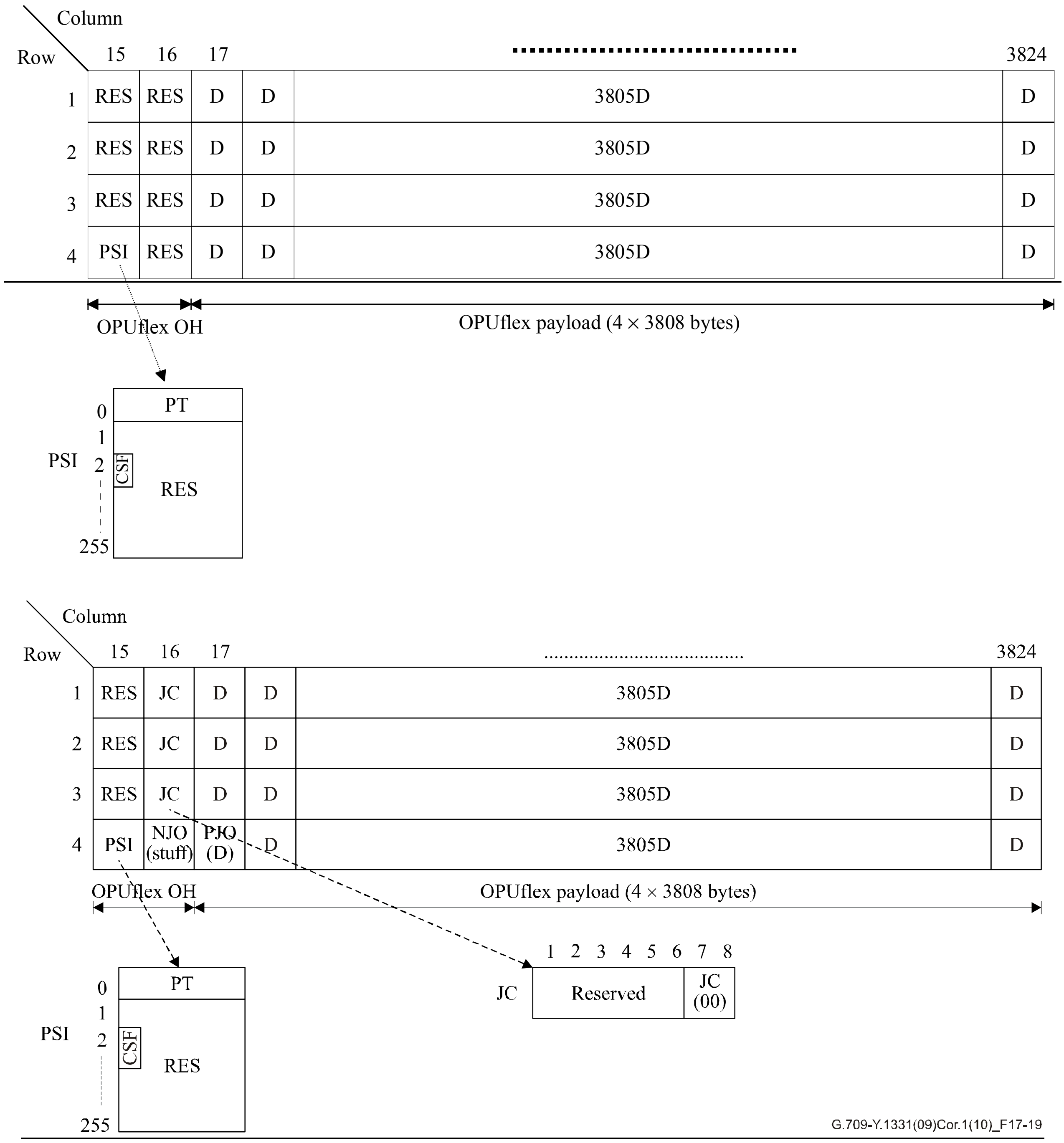


Figure 17-19 – OPUflex frame structure for the mapping of a supra-2.488 Gbit/s client signal

9) Clause 19.1.4 OPU4 tributary slot allocation

Modify the OMFI bit patterns for TS33 and TS70 in Table 19-4 as follows:

Table 19-4 – OPU4 tributary slot OH allocation

OMFI bits 2 3 4 5 6 7 8	TSOH 1.25G TS	OMFI bits 2 3 4 5 6 7 8	TSOH 1.25G TS	OMFI bits 2 3 4 5 6 7 8	TSOH 1.25G TS	OMFI bits 2 3 4 5 6 7 8	TSOH 1.25G TS
...		...		...		...	
0 0 0 1 0 0 1	10	0 0 1 1 1 0 1	30	0 1 1 0 0 0 1	50	**1 0 ~~1~~ 0 0 1 0 1**	70
...		...		...		...	
0 0 0 1 1 0 0	13	**0 1 ~~1~~ 0 0 0 0 0**	33	0 1 1 0 1 0 0	53	1 0 0 1 0 0 0	73
...		...		...		...	

10) Clause 19.6.1 Mapping ODUj into ODTU2.M

Add a note to Table 19-8 as follows:

Table 19-8 – C_m and C_n (n=8) for ODUj into ODTU2.M

ODUj signal	M	m=8×M	Floor $C_{m,min}$ (Note)	Minimum c_m	Nominal c_m	Maximum c_m	Ceiling $C_{m,max}$ (Note)
ODU0	1	8	15167	15167.393	15168.000	15168.607	15169
ODUflex(GFP), n=1..8	n	8 × n	ODUflex(GFP) rate dependent				
ODUflex(CBR)	ODUflex(CBR) dependent						
			Floor $C_{8,min}$ (Note)	Minimum c_8	Nominal c_8	Maximum c_8	Ceiling $C_{8,max}$ (Note)
ODU0	1	8	15167	15167.393	15168.000	15168.607	15169
ODUflex(GFP), n=1..8	n	8 × n	ODUflex(GFP) rate dependent				
ODUflex(CBR)	ODUflex(CBR) dependent						

NOTE – Floor $C_{m,min}$, Floor $C_{n,min}$ (n=8), Ceiling $C_{m,max}$ and Ceiling $C_{n,max}$ (n=8) values represent the boundaries of ODUj/ODTU2.M ppm offset combinations (i.e., min. ODUj/max. ODTU and max. ODUj/min. ODTU). In steady state, given instances of ODUj/ODTU offset combinations should not result in generated C_n and C_m values throughout this range but rather should be within as small a range as possible. Under transient ppm offset conditions (e.g., AIS to normal signal), it is possible that C_n and C_m values outside the range $C_{n,min}$ to $C_{n,max}$ and $C_{m,min}$ to $C_{m,max}$ may be generated and a GMP demapper should be tolerant of such occurrences. Refer to Annex D for a general description of the GMP principles.

11) Clause 19.6.2 Mapping ODUj into ODTU3.M

Add a note to Table 19-9 as follows:

Table 19-9 – C_m and C_n (n=8) for ODUj into ODTU3.M

ODUj signal	M	m=8×M	Floor $C_{m,min}$ (Note)	Minimum c_m	Nominal c_m	Maximum c_m	Ceiling $C_{m,max}$ (Note)
ODU0	1	8	15103	15103.396	15104.000	15104.604	15105
ODU2e	9	72	14026	14026.026	14027.709	14029.392	14030
ODUflex(GFP), n=1..32	n	8 × n	ODUflex(GFP) rate dependent				
ODUflex(CBR)	ODUflex(CBR) dependent						
			Floor $C_{8,min}$ (Note)	**Minimum c_8**	**Nominal c_8**	**Maximum c_8**	**Ceiling $C_{8,max}$** (Note)
ODU0	1	8	15103	15103.396	15104.000	15104.604	15105
ODU2e	9	72	126234	126234.232	126249.381	126264.532	126265
ODUflex(GFP), n=1..32	n	8 × n	ODUflex(GFP) rate dependent				
ODUflex(CBR)	ODUflex(CBR) dependent						
NOTE – Floor $C_{m,min}$, Floor $C_{n,min}$ (n=8), Ceiling $C_{m,max}$ and Ceiling $C_{n,max}$ (n=8) values represent the boundaries of ODUj/ODTU3.M ppm offset combinations (i.e., min. ODUj/max. ODTU and max. ODUj/min. ODTU). In steady state, given instances of ODUj/ODTU offset combinations should not result in generated C_n and C_m values throughout this range but rather should be within as small a range as possible. Under transient ppm offset conditions (e.g., AIS to normal signal), it is possible that C_n and C_m values outside the range $C_{n,min}$ to $C_{n,max}$ and $C_{m,min}$ to $C_{m,max}$ may be generated and a GMP demapper should be tolerant of such occurrences. Refer to Annex D for a general description of the GMP principles.							

12) Clause 19.6.3 Mapping ODUj into ODTU4.M

Add a note to Table 19-10 as follows:

Table 19-10 – C_m and C_n (n=8) for ODUj into ODTU4.M

ODUj signal	M	m=8×M	Floor $C_{m,min}$ (Note)	Minimum c_m	Nominal c_m	Maximum c_m	Ceiling $C_{m,max}$ (Note)
ODU0	1	8	14527	14527.419	14528.000	14528.581	14529
ODU1	2	16	14588	14588.458	14589.042	14589.626	14590
ODU2	8	64	14650	14650.013	14650.599	14651.185	14652
ODU2e	8	64	15177	15177.527	15179.348	15181.170	15182
ODU3	31	248	15186	15186.673	15187.280	15187.888	15188
ODUflex(GFP), n=1..80	n	8 × n	ODUflex(GFP) rate dependent				
ODUflex(CBR)	ODUflex(CBR) dependent						
			Floor $C_{8,min}$ (Note)	**Minimum c_8**	**Nominal c_8**	**Maximum c_8**	**Ceiling $C_{8,max}$** (Note)
ODU0	1	8	14527	14527.419	14528.000	14528.581	14529
ODU1	2	16	29176	29176.917	29178.084	29179.251	29180
ODU2	8	64	117200	117200.105	117204.793	117209.482	117210
ODU2e	8	64	121420	121420.214	121434.786	121449.359	121450
ODU3	31	248	470786	470786.863	470805.695	470824.528	470825
ODUflex(GFP), n=1..80	n	8 × n	ODUflex(GFP) rate dependent				
ODUflex(CBR)	ODUflex(CBR) dependent						
NOTE – Floor $C_{m,min}$, Floor $C_{n,min}$ (n=8), Ceiling $C_{m,max}$ and Ceiling $C_{n,max}$ (n=8) values represent the boundaries of ODUj/ODTU4.M ppm offset combinations (i.e., min. ODUj/max. ODTU and max. ODUj/min. ODTU). In steady state, given instances of ODUj/ODTU offset combinations should not result in generated C_n and C_m values throughout this range but rather should be within as small a range as possible. Under transient ppm offset conditions (e.g., AIS to normal signal), it is possible that C_n and C_m values outside the range $C_{n,min}$ to $C_{n,max}$ and $C_{m,min}$ to $C_{m,max}$ may be generated and a GMP demapper should be tolerant of such occurrences. Refer to Annex D for a general description of the GMP principles.							

13) Annex C Adaptation of OTU3 and OTU4 over multichannel parallel interfaces

Delete the "OTUk AIS handling" text:

~~**OTUk AIS handling**~~

~~The additional sequence to be handled is OTU3-AIS or OTU4-AIS, which is an unframed PN-11 sequence at the OTU3 or OTU4 rate, respectively. The source function for this adaptation will detect OTUk-AIS by recognizing the PN-11 sequence after which it inserts a framing and multi-framing pattern into the OTUk AIS bit stream as specified in 16.4.2. This (multi)framed OTUk AIS signal can now be distributed as any non-AIS OTUk signal.~~

~~When the sink function sees the MFAS (OTU3) or LLM (OTU4) fixed at 0xFF on any lane, it will generate a PN-11 sequence at the OTUk rate in the egress direction.~~

14) Clause D.2 Applying GMP in OTN

Modify the paragraph above Figure D.5, and Figure D.5 as follows:

$C_n(t)$ has to be determined first, then it has to be inserted into the overhead as $C_m(t)$ and $\Sigma C_{nD}(t)$ and afterwards $C_m(t)$ client data entities have to be inserted into the payload area of the server as shown in Figure D.5.

The $C_n(t)$ value determines the $C_m(t)$ and $C_{nD}(t)$ values; $C_m(t)$ = floor $(n/m \times C_n(t))$ and $C_{nD}(t) = C_n(t) - (m/n \times C_m(t))$. The values of $C_{nD}(t)$ are accumulated and if $\Sigma C_{nD}(t) \geq m/n$ then m/n is subtracted from $\Sigma C_{nD}(t)$ and $C_m(t)$ is incremented with +1. These latter two values are then encoded in the overhead bytes. This $C_m(t)$ value is applied as input to the Sigma/Delta process.

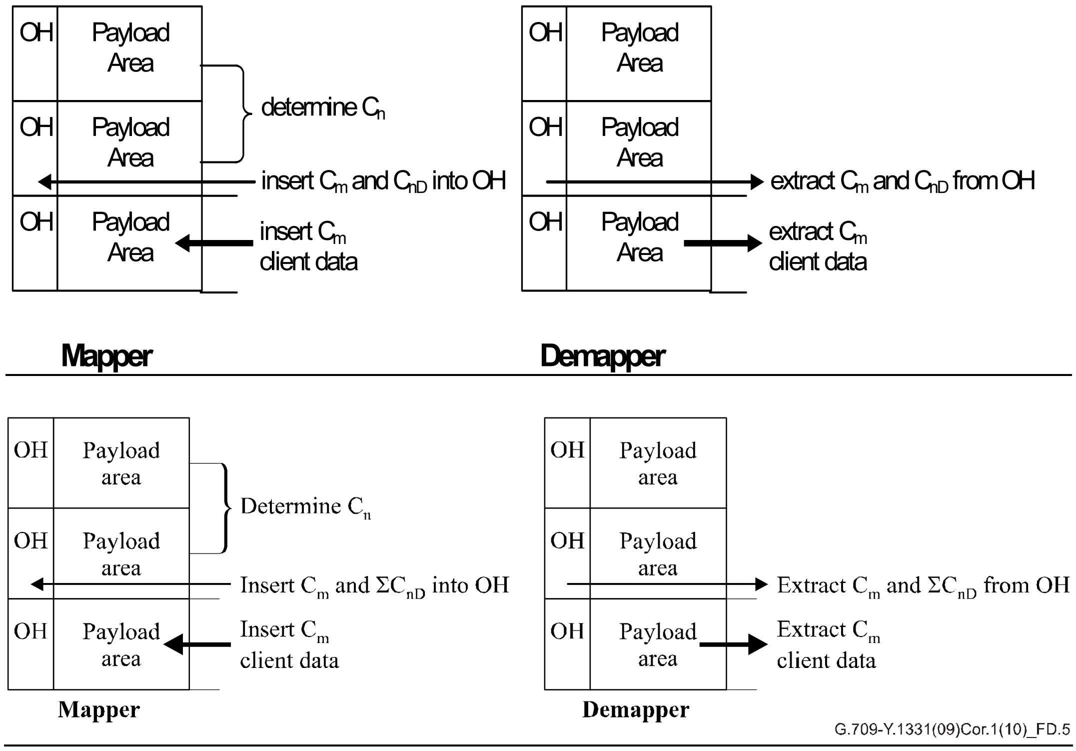


Figure D.5 – Processing flow for GMP in OTN

Modify the fourth paragraph after Figure D.5 as follows:

In steady state periods, $C_n(t)$ is a value in the range $C_{n,min}$ to $C_{n,max}$. A value outside this range indicates that there is a misalignment between the expected client bit rate and the actual client bit rate. During transient periods after, e.g., a frequency step, $C_n(t)$ may be temporarily outside the range $C_{n,min}$ to $C_{n,max}$.

15) Clause D.3 $C_m(t)$ encoding and decoding

Modify the second and third paragraphs as follows:

$C_m(t)$ is a binary count of the number of groups of m LO OPU payload bits that carry m client bits; it has values between Floor($C_{m,min}$) and Ceiling($C_{m,max}$), which values are client specific. The Ci (i=1..14) bits that comprise $C_m(t)$ are used to indicate whether the $C_m(t)$ value is incremented or decremented from the value in the previous frame, that is indicated by $C_m(t-1)$. Table D.2 shows the inversion patterns for the Ci bits of $C_m(t-1)$ that are inverted to indicate an increment or decrement of the $C_m(t)$ value. A "I" entry in the table indicates an inversion of that bit.

The bit inversion patterns apply to the current $C_m(t-1)$ value, prior to the increment or decrement operation that is signalled by the inversion pattern when $|C_m(t) - C_m(t-1)| \leq 2$ (except $C_m(t) - C_m(t-1) = 0$). The incremented or decremented $C_m(t)$ value becomes the base value for the next GMP overhead transmission.

– When $0 < C_m(t) - C_m(t-1) \leq 2$, indicating an increment of +1 or +2the value of the $C_m(t)$ is incremented with +1 or +2, a subset of the Ci bits containing $C_m(t-1)$ is inverted as specified in Table D.2 is inverted and the increment indicator (II) bit is set to 1.

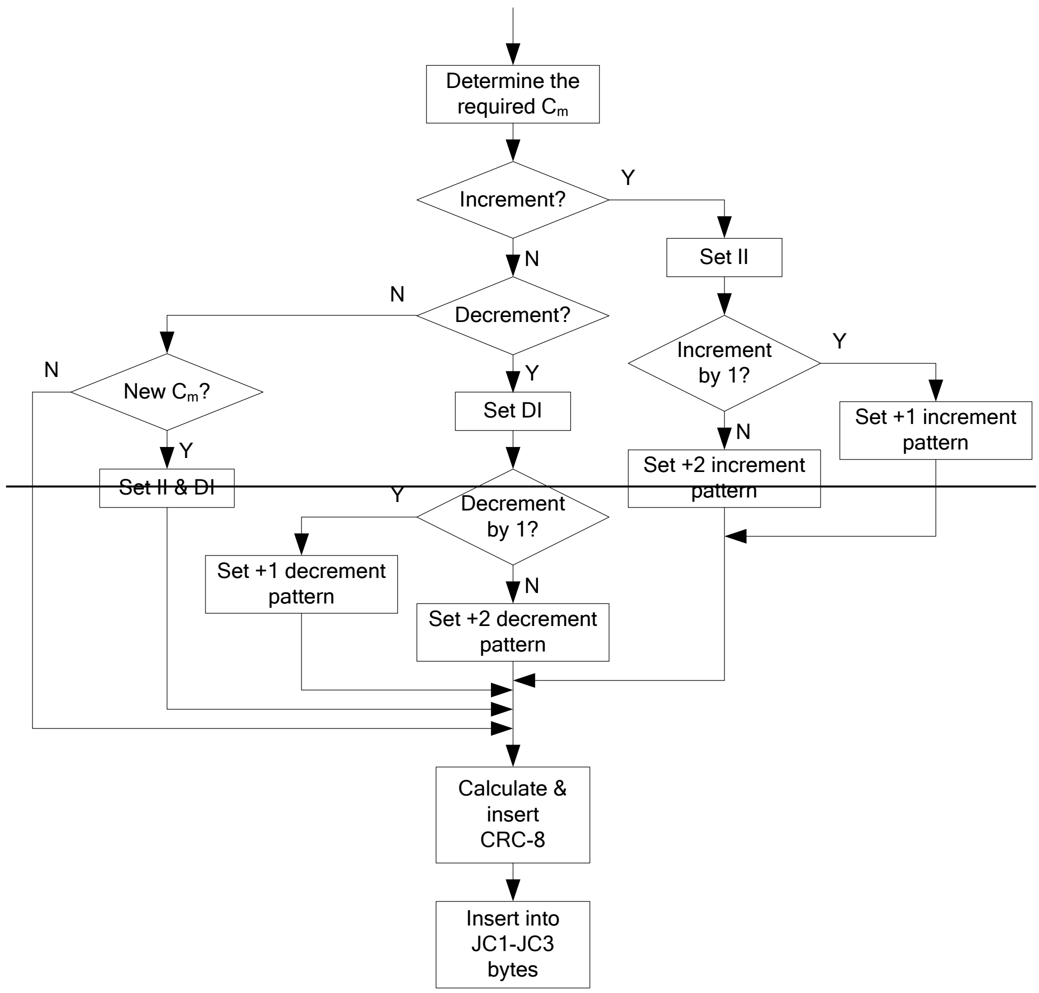
– When $0 > C_m(t) - C_m(t-1) \geq -2$, indicating a decrement of –1 or –2the value of the $C_m(t)$ is decremented with -1 or -2, a subset of Ci bits containing $C_m(t-1)$ is inverted as specified in Table D.2 is inverted and the decrement indicator (DI) bit is set to 1.

– When the value of $C_m(t)$ is changed with a value larger than +2 or –2 from the value of $C_m(t-1)$, both the II and DI bits are set to 1 and the Ci bits contain the new $C_m(t)$ value. The CRC-8 verifies whether the $C_m(t)$ value has been received correctly, and provides optional single error correction.

– When the value of $C_m(t)$ is unchanged from the value of $C_m(t-1)$, both the II and DI bits are set to 0.

The above encoding process is illustrated in Figure D.6.

Modify Figure D.6 as follows:



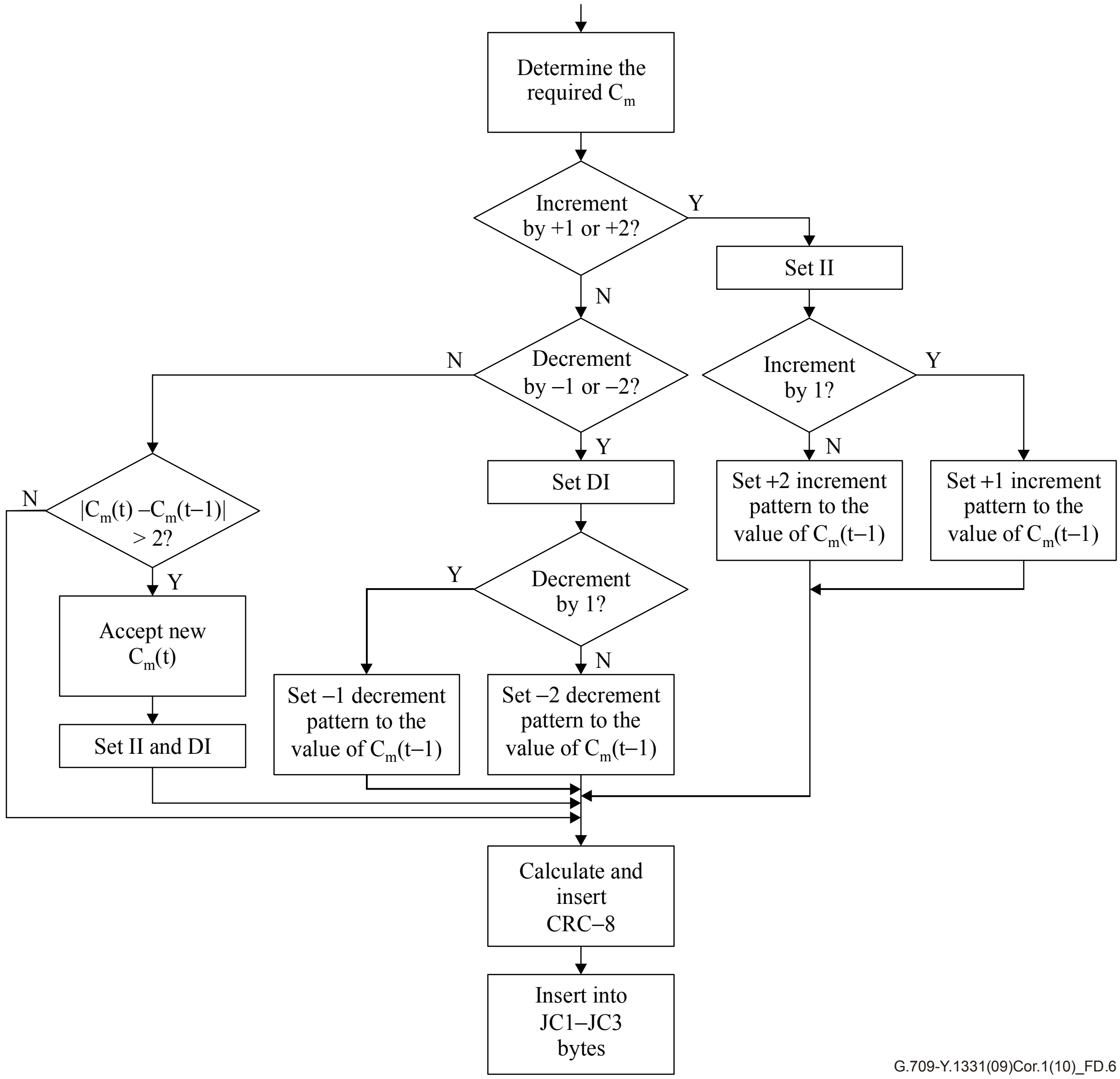
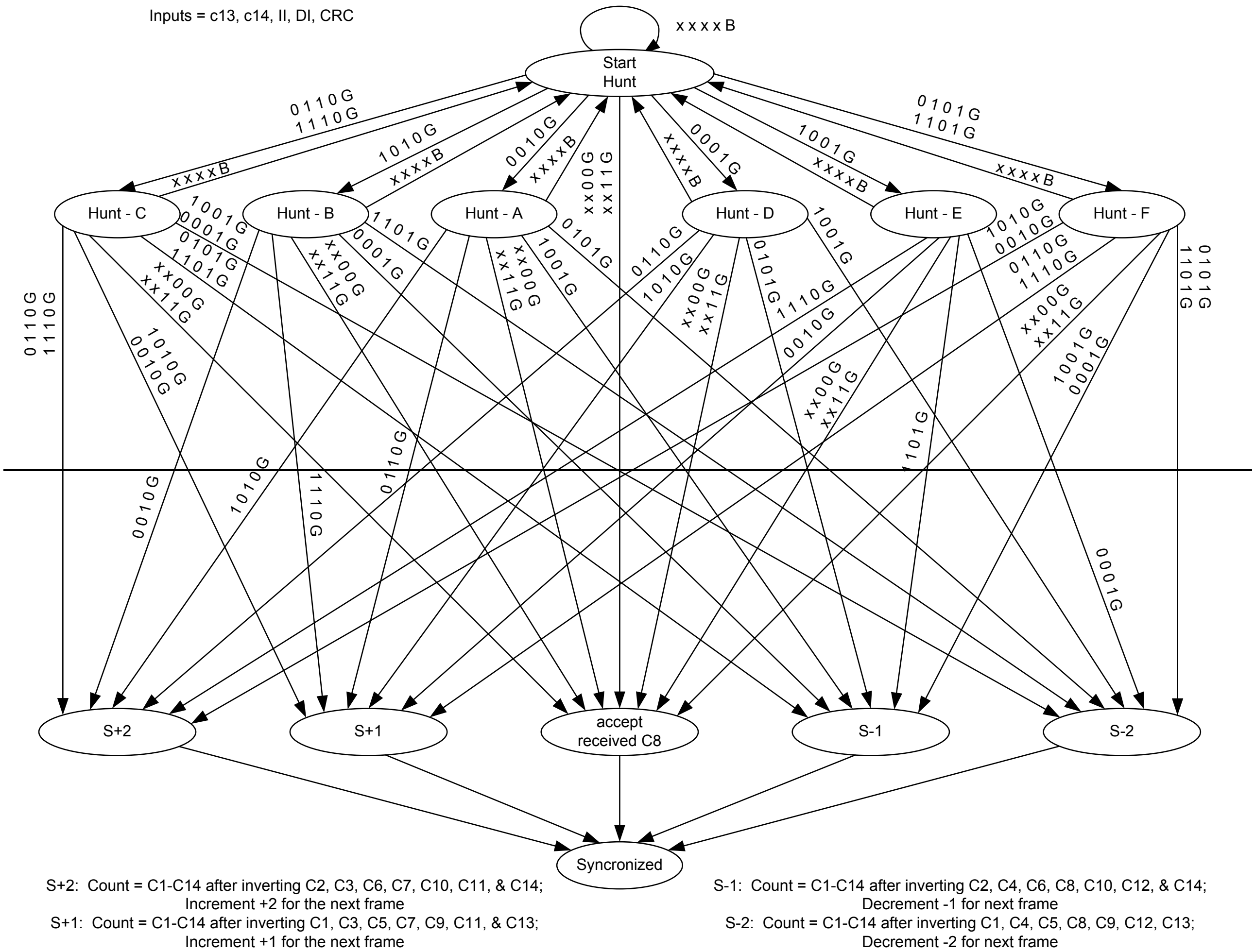
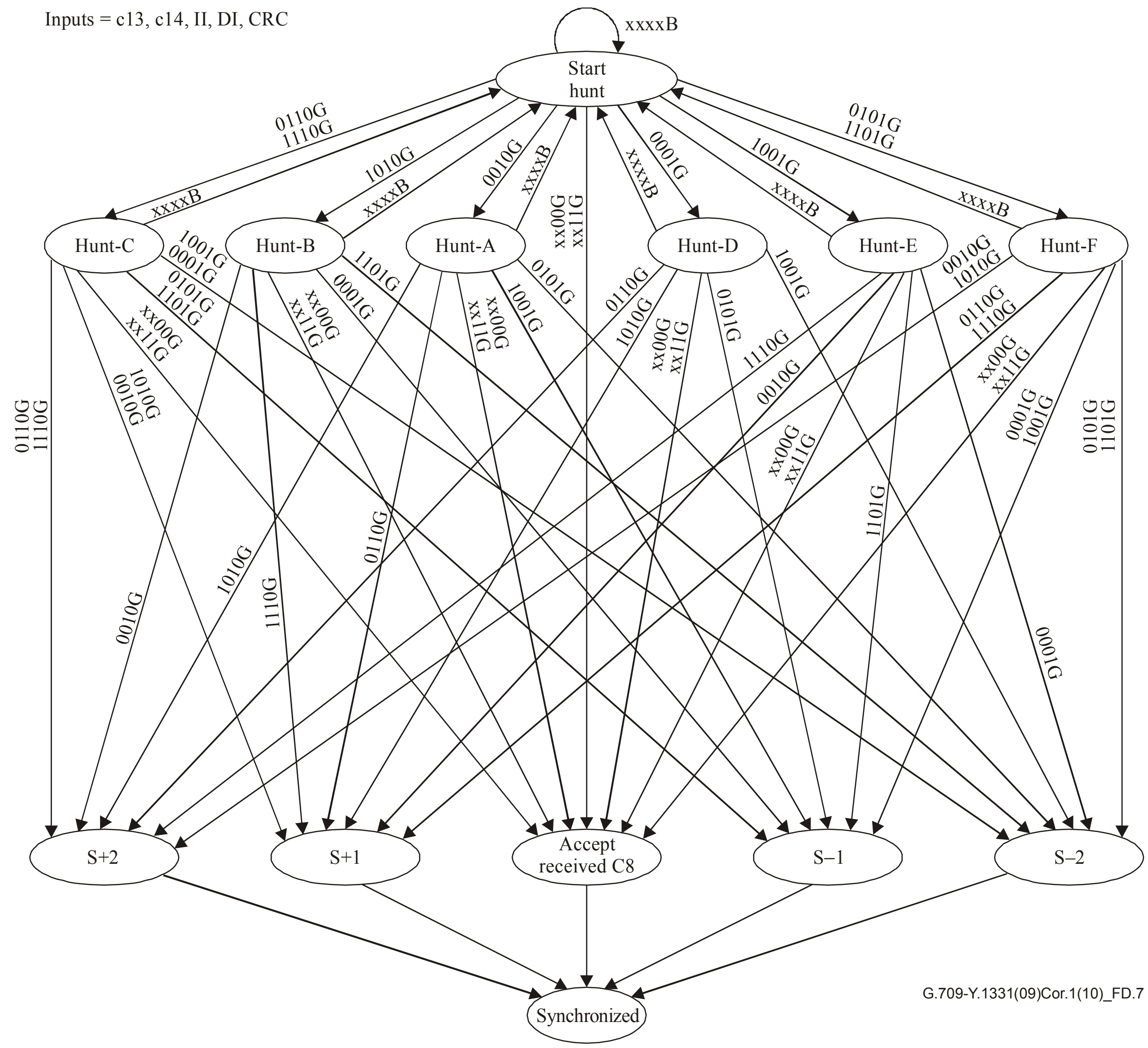


Figure D.6 – JC1, JC2 and JC3 generation

Modify Figure D.7 as follows:





S+2: Count = C1−C14 after inverting C2, C3, C6, C7, C10, C11 and C14; increment +2 for the next frame.

S+1: Count = C1−C14 after inverting C1, C3, C5, C7, C9, C11 and C13; increment +1 for the next frame.

S−1: Count = C1−C14 after inverting C2, C4, C6, C8, C10, C12 and C14; decrement −1 for the next frame.

S−2: Count = C1−C14 after inverting C1, C4, C5, C8, C9, C12 and C13; decrement −2 for the next frame.

Figure D.7 – GMP sink count synchronization process diagram

16) Clause D.4 $\Sigma C_{nD}(t)$ encoding and decoding

Modify item 3) as follows:

3) The coefficients of *R(x)* are considered to be a~~n~~ ~~8~~5-bit sequence, where x^4 is the most significant bit.

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