International Telecommunication Union

ITU-T G.7041/Y.1303

TELECOMMUNICATION
STANDARDIZATION SECTOR
OF ITU

Amendment 2

(10/2012)

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Recommendation ITU-T G.7041/Y.1303

Generic framing procedure

Amendment 2

Summary

Amendment 2 to Recommendation ITU-T G.7041/Y.1301 contains text for a new generic framing procedure (GFP) frame delineation algorithm alternative and a modification to the timing requirements for the initial transmission of client signal fail (CSF), forward defect indication (FDI) and reverse defect indication (RDI) frames.

History

Edition	Recommendation	Approval	Study Group
1.0	ITU-T G.7041/Y.1303	2001-12-14	15
1.1	ITU-T G.7041/Y.1303 (2001) Amd. 1	2002-06-13	15
1.2	ITU-T G.7041/Y.1303 (2001) Cor. 1	2003-03-16	15
1.3	ITU-T G.7041/Y.1303 (2001) Amd. 2	2003-03-16	15
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2.2	ITU-T G.7041/Y.1303 (2003) Amd. 2	2004-06-13	15
2.3	ITU-T G.7041/Y.1303 (2003) Cor. 1	2005-01-13	15
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3.1	ITU-T G.7041/Y.1303 (2005) Amd. 1	2006-03-29	15
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3.3	ITU-T G.7041/Y.1303 (2005) Amd. 2	2007-07-29	15
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4.2	ITU-T G.7041/Y.1303 (2008) Amd. 2	2010-07-29	15
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5.1	ITU-T G.7041/Y.1303 (2011) Amd. 1	2012-02-13	15
5.2	ITU-T G.7041/Y.1303 (2011) Amd. 2	2012-10-29	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.

Compliance with this Recommendation is voluntary. However, the Recommendation may contain certain mandatory provisions (to ensure, e.g., interoperability or applicability) and compliance with the Recommendation is achieved when all of these mandatory provisions are met. The words "shall" or some other obligatory language such as "must" and the negative equivalents are used to express requirements. The use of such words does not suggest that compliance with the Recommendation is required of any party.

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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/.

Recommendation ITU-T G.7041/Y.1303

Generic framing procedure

Amendment 2

Modifications to Recommendation ITU-T G.7041/Y.1301

1) 6.3.1 GFP frame delineation algorithm

Modify clause 6.3.1 and subclauses as follows:

GFP uses a modified version of the HEC algorithm specified in clause 7.3.3.2 of [ITU-T I.432.1] to provide GFP frame delineation. The frame delineation algorithm used in GFP differs from that in [ITU-T I.432.1] in two basic ways:

a) the algorithm uses the payload length indicator field of the GFP core header to find the end of the GFP frame; and

b) HEC field calculation uses a 16-bit polynomial and, consequently, generates a two-octet cHEC field.

GFP frame delineation is performed based on the correlation between the first two octets of the GFP frame and the embedded two-octet cHEC field. There are two alternative frame delineation methods.

6.3.1.1 Frame delineation alternative using only the Core header

Figure 6-13 shows the state diagram for the GFP frame delineation method based on only using the Core header.

The state diagram works as follows:

1) In the HUNT state, the GFP process performs frame delineation by searching, octet-by-octet, for a correctly formatted core header over the last received sequence of four octets. The core header single error correction is disabled while in this state. Once a correct cHEC match is detected in the candidate PLI and cHEC fields, a candidate GFP frame is identified and the receive process enters the PRESYNC state.

2) In the PRESYNC state, the GFP process performs frame delineation by checking, frame-by-frame, for a correct cHEC match in the presumed core header of the next candidate GFP frame. The PLI field in the core header of the preceding GFP frame is used to find the beginning of the next candidate GFP frame. Core header single error correction remains disabled while in this state. The process repeats until DELTA consecutive correct cHECs are confirmed, at which point the process enters the SYNC state. If an incorrect cHEC is detected, the process returns to the HUNT state. The total number of consecutive correct cHECs required to move from the HUNT state to the SYNC state is therefore DELTA + 1.

3) In the SYNC state, the GFP process performs frame delineation by checking for a correct cHEC match on the next candidate GFP frame. The PLI field in the core header of the preceding GFP frame is used to find the beginning of the next candidate GFP frame. Single-bit core header error correction is enabled while in this state. Frame delineation is lost whenever multiple bit errors are detected in the core header by the cHEC. In this case, a GFP loss of frame delineation event is declared, the framing process returns to the HUNT state, and a client server signal failure (SSF) is indicated to the client adaptation process.

4) Idle GFP frames participate in the delineation process and are then discarded.

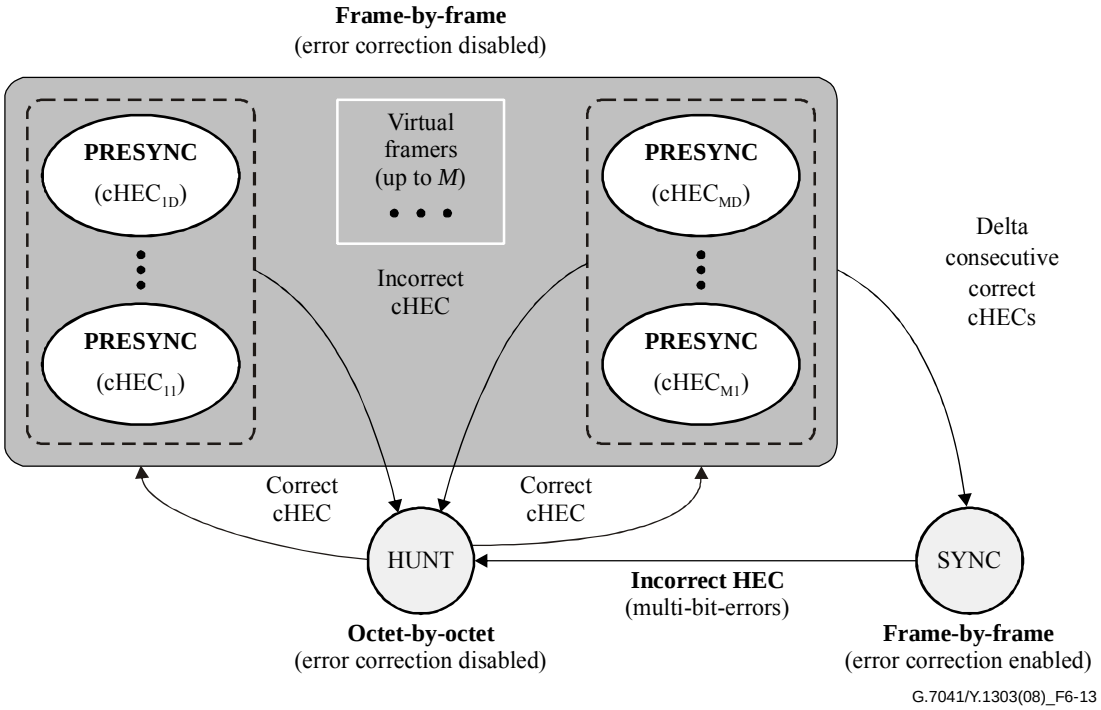

Figure 6-13 – GFP frame delineation state diagram

Robustness against false delineation in the re-synchronization process depends on the value of DELTA. A value of DELTA = 1 is suggested.

Frame delineation acquisition speed can be improved by the implementation of multiple "virtual framers", whereby the GFP process remains in the HUNT state and a separate PRESYNC sub-state is spawned for each candidate GFP frame detected in the incoming octet stream, as depicted in Figure 6-13.

6.3.1.2 Frame delineation alternative using both the Core and Type headers

An alternative algorithm uses both the Core and Type headers, as illustrated in Figure 6-13*bis*. This algorithm can be advantageous for high-speed interfaces that are typically protected by FEC and where circuit implementations often use wide data bus structures. The state machine works the same as the one shown in Figure 6-13, except for the PRESYNC state operation. That operation works as follows:

- In the PRESYNC state, the four octets following the candidate cHEC are checked.
  - If the candidate cHEC corresponds to a GFP Idle frame (i.e., PLI=0), and the subsequent four octets contain a valid cHEC, proceed to the SYNC state.
  - If the candidate cHEC does not correspond to a GFP Idle frame (i.e., PLI≠0), and the subsequent four octets contain a valid tHEC, proceed to the SYNC state.
  - Otherwise, go back to the HUNT state.

Error correction continues to be disabled for both the Core and Type Headers during this state. The tHEC check requires retaining the 43 data bits immediately prior to the candidate cHEC so that the tHEC value can be properly descrambled.

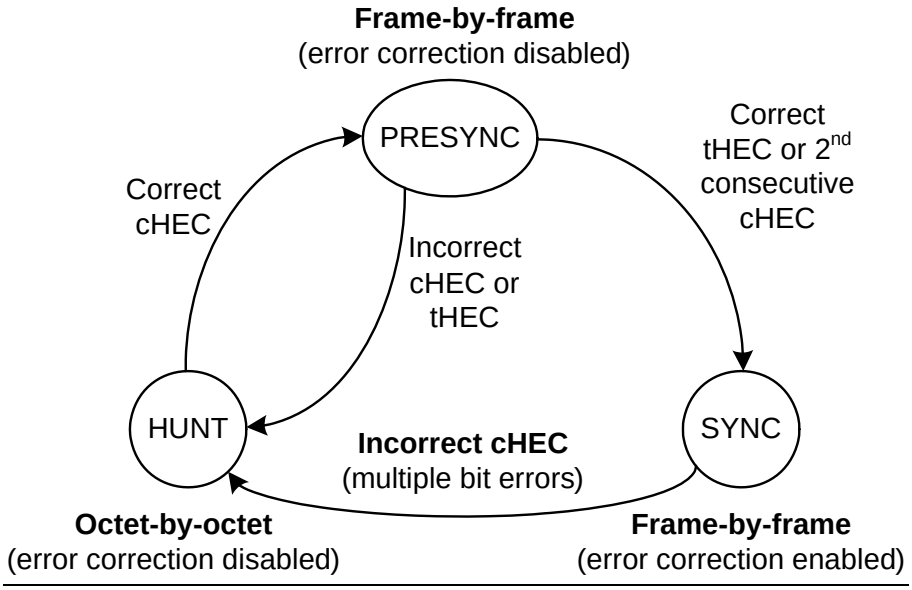

Figure 6-13*bis* – GFP frame delineation state diagram using cHEC and tHEC

NOTE – The choice between the frame delineation algorithm alternatives is left to the implementer, and shall not be a provisional option. Equipment developed prior to the 2012 version of this Recommendation used the frame delineation algorithm method based on only using the Core header. Equipment developed subsequently may use either alternative.

2) 6.3.3.1 Client signal fail indication

Modify the second full paragraph of clause 6.3.3.1 (after the dashes) as follows:

Upon detection of the CSF condition, the GFP client-specific source adaptation process should send CSF indications to the far-end GFP client-specific sink adaptation process once every 100 ms ≤ T ≤ 1000 ms, beginning ~~at the next GFP frame~~ as soon as possible. ~~Interim frames shall be GFP idle frames.~~ When no client frames are available, GFP idle frames shall be transmitted before and between CSF frames.

3) 6.3.3.2 Client link fault status indications

Modify the second full paragraph of 6.3.3.2 (after the dashes) with the following text:

Detection rules for local and remote defect indications are client-specific and specified in clause 7. The format of these client link fault status signals is specified in the associated standards for the client signal. Upon detection of the explicit forward (reverse) client link fault status signal, the GFP client-specific source adaptation process should send an FDI (RDI) signal to the far-end GFP client-specific sink adaptation process. The FDI/RDI signal shall be sent once every 100 ms ≤ T ≤ 1000 ms, beginning as soon as possible. ~~at the next GFP frame as soon as possible. Interim frames with FDI or RDI shall be GFP idle frames when no client data frames are available.~~ When no client frames are available, GFP idle frames shall be transmitted before and between FDI and RDI frames.

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