International Telecommunication Union

ITU-T G.7042/Y.1305

TELECOMMUNICATION
STANDARDIZATION SECTOR
OF ITU

Amendment 2

(08/2005)

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ITU-T Recommendation G.7042/Y.1305

Link capacity adjustment scheme (LCAS) for virtual concatenated signals

Amendment 2

Summary

This amendment clarifies the G.7042/Y.1305 LCAS wait-to-restore and hold-off SDL diagrams.

Source

Amendment 2 to ITU-T Recommendation G.7042/Y.1305 (2004) was approved on 22 August 2005 by ITU-T Study Group 15 (2005-2008) under the ITU-T Recommendation A.8 procedure.

FOREWORD

The International Telecommunication Union (ITU) is the United Nations specialized agency in the field of telecommunications. The ITU Telecommunication Standardization Sector (ITU-T) is a permanent organ of ITU. ITU-T is responsible for studying technical, operating and tariff questions and issuing Recommendations on them with a view to standardizing telecommunications on a worldwide basis.

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 not received notice of intellectual property, protected by patents, which may be required to implement this Recommendation. However, implementors are cautioned that this may not represent the latest information and are therefore strongly urged to consult the TSB patent database.

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ITU-T Recommendation G.7042/Y.1305

Link capacity adjustment scheme (LCAS) for virtual concatenated signals

Amendment 2

1) Summary

Change the Summary:

This Recommendation specifies a methodology for dynamically and hitlessly change (i.e., increase and decrease) the capacity of a container that is transported in a generic transport network (e.g., over SDH or OTN network using Virtual Concatenation). In addition, the methodology also provides survivability capabilities, automatically decreasing the capacity if a member experiences a failure in the network, and increasing the capacity when the network fault is repaired.

With the following text:

This Recommendation specifies a methodology for dynamically changing (i.e., increasing and decreasing) the capacity of a container that is transported in a generic transport network (e.g., over SDH or OTN network using Virtual Concatenation). In general, this change of capacity does not affect the traffic. In addition, the methodology also provides survivability capabilities, automatically decreasing the capacity if a member experiences a failure in the network, and increasing the capacity when the network fault is repaired.

2) Clause 6.1 Methodology

Change clause 6.1:

LCAS in the virtual concatenation source and sink adaptation functions provides a control mechanism to hitless increase or decrease the capacity of a VCG link to meet the bandwidth needs of the application. It also provides the capability of temporarily removing member links that have experienced a failure. The LCAS assumes that in cases of capacity initiation, increase or decrease, the construction or destruction of the end-to-end path of each individual member is the responsibility of the Network and Element Management Systems. A VCG capacity increase or decrease can be initiated at either end. However, the initiation of a VCG capacity decrease at the Sk may result in temporary loss of data, see 6.5.

With the following text:

LCAS in the virtual concatenation source and sink adaptation functions provides a control mechanism to hitlessly increase or decrease the capacity of a VCG link to meet the bandwidth needs of the application. Hitless bandwidth modification can only be achieved when the transmission of the active members belonging to the VCG, before and after the bandwidth modification, is error-free (see Appendix II for details). It also provides the capability of temporarily removing member links that have experienced a failure. The LCAS assumes that in cases of capacity adjustment (i.e., creation, increase, decrease or deletion), the construction or destruction of the end-to-end path of each individual member is the responsibility of the Network and Element Management Systems. A VCG capacity increase or decrease can be initiated at either end. However, the initiation of a VCG capacity decrease at the Sk may result in temporary loss of data, see 6.5.

3) Clause A.1 LCAS Protocol

Change first paragraph of clause A.1:

The operation of LCAS is unidirectional. This means that in order to bidirectionally add or remove members, the procedure has to be repeated in the opposite direction. Note that these actions are independent of each other and are, therefore, not required to be synchronized. The scheme allows hit-less addition and removal of bandwidth under control of a management system. Additionally, LCAS will autonomously remove failed members temporarily from the group. When the failure condition is remedied. LCAS will add the member back into the group. The removal of a member due to path layer failures will, in general, not be hit-less for the service carried over the virtual concatenated group. The autonomous addition, after a failure is repaired, is hit-less.

With the following text:

The operation of LCAS is unidirectional. This means that in order to bidirectionally add or remove members, the procedure has to be repeated in the opposite direction. Note that these actions are independent of each other and are, therefore, not required to be synchronized. When the transmission of members belonging to the VCG is error-free, the scheme allows hit-less addition and removal of bandwidth under control of a management system. Additionally, LCAS will autonomously remove failed members temporarily from the group. When the failure condition is remedied, LCAS will add the member back into the group. The removal of a member due to path layer failures will, in general, not be hit-less for the service carried over the virtual concatenated group. The autonomous addition, after a failure is repaired, is hit-less.

4) Clause A.3 Procedures state diagrams

Add the following note under Figure A.6 (HO procedure):

NOTE – There are particular circumstances that cause non-hit-less bandwidth modifications under hold-off periods. A description of the issue is described in Appendix II.

5) New Appendix II

Add the following new appendix:

Appendix II

Non-hit-less bandwidth modifications during hold-off periods

II.1 Introduction

SDL diagram for the hold-off procedure described in clause A.3 shows as possible input signal the MI-REMOVE command only, causing other inputs, that are not explicitly depicted, to be discarded. The LCAS state machine will, therefore, not act on CTRL words received during the hold-off periods, thus impacting the traffic.

II.2 Removal of a group member at source

The removal action at source does not require synchronization between source and sink state machines and is, therefore, already performed at the source before signalling the change to the sink. Since the source already excluded the member from carrying payload, the sink should be able to react to this change immediately, even if it is currently in the hold-off state. If not, client payload will be lost until the timer expires.

II.3 TSD conditions raised while performing ADD commands

When performing a member's addition at Sink, a CTRL=ADD is received. Sink state will, therefore, move to the OK state and signal MST=OK to the source. The source will then move the member to the NORM state, signals CTRL=NORM/EOS and starts sending payload on this member. If, meanwhile, TSD is raised at the sink, the sink will have started a hold-off timer and is not able to react to the CTRL=NORM/EOS. Client payload will be lost until the timer expires.

II.4 Proposed enhanced HO procedure

Even if the above-mentioned events are very limited in time and are characterized by a very low probability of occurrence, the HO procedure described in clause A.3 could optionally be enhanced in order to allow hit-less capacity adjustments also in particular cases affected by transmission errors. The HO procedure SDL diagram to override the issue is reported below.

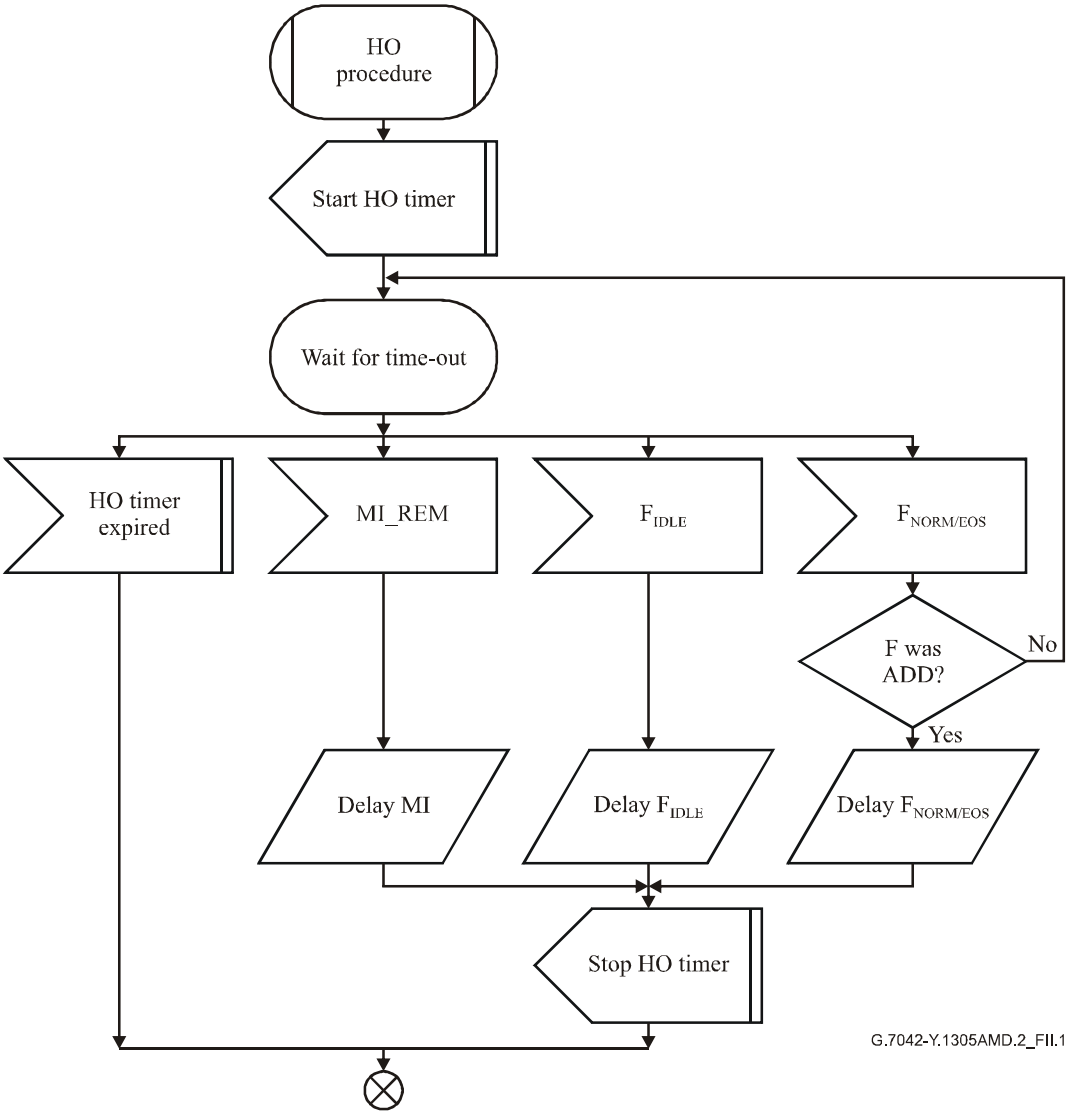

Figure II.1/G.7042/Y.1305 – Optionally enhanced hold-off procedure SDL diagram

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