TSG-RAN Meeting #13 ***RP-010510***
Beijing, China, 18 - 21 September 2001

(LS23/13, to TSG-RAN) LS on AAL Type 2 Resource Management

LS 23/13

QUESTIONS: 4/13, ETSI (3GPP TSG RAN)

SOURCE: ITU-T SG 13 (Caracas, 14-25 May 2001)

TITLE: AAL TYPE 2 RESOURCE MANAGEMENT

COMMUNICATION

TO: ETSI(3GPP TSG RAN)

APPROVAL: Agreed to at ITU-T SG 13 meeting

FOR: INFORMATION

DEADLINE: NONE

CONTACT: Susumu Yoneda, Q.4/13 Rapporteur
Japan Telecom
2-9-1 Hatchobori Chuo-ku
Tokyo, Japan 104-0032
Tel: +81 3 5540 8493
Fax: +81 3 5540 8485
e-mail: yone@japan-telecom.co.jp

Q4/13 would like to inform you that we have started work on a new draft recommendation I.371aal2 with the title "Traffic Control and Congestion Control at the ATM Adaptation Layer Type 2". We had announced in our last communication to you that we would begin this new work item. One intention of this new work is to improve the ALC parameters so that they are more suitable for bursty traffic (data).

A first draft of I.371aal2 was established during the Q4/13 meeting in Caracas. All sections of this document are under study. We include this draft for your information. Your comments are welcome.

We expect to continue this work at a Q4/13 Rapporteur's meeting in the September 2001 and we are planning to complete the work on this new recommendation at the next ITU-T SG 13 meeting in January 2002. We will keep you informed of the progress of work on I.371aal2.

We also include our new living list item 52 "How to achieve end-to-end delay for AAL2 connections". Q4/13 would like to receive you comments on the content of this living list item.

Attachments:

New draft recommendation I.371aal2: "Traffic Control and Congestion Control at the ATM Adaptation Layer Type 2"

New item 52 in I.371 living list: “How to achieve end-to-end delay for AAL2 connections”

Draft new Recommendation I.371aal2

Traffic Control and Congestion Control at the ATM Adaptation Layer Type 2

(All sections are under study.)

1 Scope

This Recommendation describes traffic control and congestion control procedures at the AAL2. Such control procedures are necessary in order to support AAL2 connections with QOS, where the QOS is negotiated between a user and the network.

AAL2 traffic control refers to all network actions aiming to meet the negotiated performance objectives at the AAL2 and to allow the avoidance of congested conditions.

AAL2 congestion control refers to all network actions to minimize the intensity, spread and duration of congestion.

This Recommendation provides a general description as well as objectives and procedures for traffic control and congestion control. It specifies AAL2 traffic parameters, an AAL2 conformance definition and defines AAL2 QOS commitments. Additionally, it describes the concepts of the traffic contract between an AAL2 user and the network.

2 References

The following ITU-T Recommendations and other references contain provisions which, through reference in this text, constitute provisions of this Recommendation. At the time of publication, the editions indicated were valid. All Recommendations and other references are subject to revision; all users of this Recommendation are therefore encouraged to investigate the possibility of applying the most recent edition of the Recommendations and other references listed below. A list of the currently valid ITU-T Recommendations is regularly published.

[1] ITU-T Recommendation I.371 (2000), *Traffic Control and Congestion Control in B-ISDN*.

[2] ITU-T Recommendation I.356 (2000), *B-ISDN ATM layer cell transfer performance*.

[3] ITU-T Recommendation I.363.2 (2000), *B-ISDN ATM Adaptation Layer (AAL) Type 2 Specification.*

[4] ITU-T Recommendation Q.2630.1 2000), AAL Type 2 Signalling Protocol (Capability Set 1)

3 Abbreviations and terminology

3.1 Abbreviations

This Recommendation uses the following abbreviations.

AAL2	ATM Adaptation Layer Type 2
ATC	ATM Transfer Capability
ATM	Asynchronous Transfer Mode
CPS	Common Part Sublayer
NPC	Network Parameter Control

QOS	Quality of Service
UPC	Usage Parameter Control
VCC	Virtual Channel Connection

3.2 Terminology

To be determined.

4 Introduction

The AAL2 type 2 was defined in ITU-T Recommendation I.363.2. An AAL2 connection uses one or several contiguous ATM VCCs called AAL2 paths. An AAL2 path can be shared by up to 248 AAL2 user connections.

QOS for an AAL2 connection is then determined by

- the QOS associated with the AAL2 paths (the ATM VCCs) along the connection
- the QOS supported by AAL2 multiplexing where the AAL2 connection is put inside an AAL2 path.

The primary role of traffic control and congestion control procedures at the AAL2 is to protect the AAL2 traffic when it is multiplexed onto an AAL2 path. The goal is to achieve the AAL2 performance objectives and AAL2 QOS commitments. Traffic and congestion control allows the use of AAL2 path to be optimised.

Congestion at the AAL2 is defined as a state of network elements (e.g. AAL2 multiplexers) in which the network is not able to meet the AAL2 performance objectives and the negotiated AAL2 QOS commitments for the established AAL2 flows. Congestion is to be distinguished from the state where buffer overflow causes CPS packet loss, but the negotiated quality of service is still met.

This Recommendation defines a set of traffic control and congestion control capabilities at the AAL2. It may be appropriate to consider additional sets of such capabilities, for which additional traffic control mechanisms will be used to achieve increased network efficiency.

It should be noted that traffic control procedures apply to AAL2 connections. For some AAL2 connections, the network commits to meet QOS objectives, assuming the AAL2 connection conforms to a traffic contract.

5 AAL2 traffic parameters and descriptors

5.1 Definitions

5.1.1 AAL2 traffic parameter

An AAL2 traffic parameter describes one aspect of an AAL2 connection. It may be qualitative or quantitative. An AAL2 traffic parameter may for example describe the peak bit rate, the average bit rate, the average or maximum CPS packet size, the burst length of an AAL2 connection, etc.

5.1.2 AAL2 traffic descriptor

An AAL2 traffic descriptor is the set of AAL2 traffic parameters that is used to capture the traffic characteristics of an AAL2 connection at a given standardized interface as part of the AAL2 Traffic Contract.

5.1.3 AAL2 traffic contract

For a given AAL2 connection, the AAL2 traffic descriptor, the AAL2 conformance definition at a given interface and the AAL2 QOS class define the AAL2 Traffic Contract at that interface.

5.2 Requirements on AAL2 traffic parameters and AAL2 traffic descriptors

Any AAL2 traffic parameter to be involved in an AAL2 traffic descriptor should:

– have the same interpretation on both sides of an interface

– be meaningful in resource allocation schemes to meet network performance requirements,

– be enforceable by the parameter control (PC)

Whether an AAL2 parameter should be enforced is for further study.

5.3 AAL2 traffic parameter specifications

5.3.1 AAL2 reference configuration

To be determined.

5.3.2 AAL2 traffic parameter description

To be determined.

Editors note: The parameters in section 7.4.11 and 7.4.12 of ITU-T Recommendation Q.2630.1 like maximum CPS-SDU bit rate may be used as a basis. At the minimum, one bit rate and one algorithm similar to a GCRA seems to be needed.

6 AAL2 transfer capabilities

An AAL2 transfer capability is a set of network capabilities provided for an AAL2 connection. For an AAL2 transfer capability, the AAL2 service model, the AAL2 traffic descriptor, the AAL2 conformance definition and any AAL2 QOS commitments are defined. An AAL2 transfer capability is supported by a set of AAL2 traffic control and AAL2 congestion control functions.

In this recommendation only one AAL2 transfer capability is defined. Further AAL2 transfer capabilities may be extended in the future.

6.1 Fixed Bandwidth (FBW) AAL2 transfer capability

6.1.1 Description

The Fixed Bandwidth (FBW) transfer capability is intended to support applications which require a fixed AAL2 bandwidth. The burstiness may differ from AAL2 connection to AAL2 connection. The delay requirements depend on the AAL2 QOS class.

6.1.2 Service model

The FBW transfer capability can be used by applications that characterize the traffic at the AAL2 with a single rate and a burst size by way of an algorithm similar to a GCRA (to be determined).

The commitment made by the network is that the negotiated AAL2 QOS is assured to all CPS packets when all CPS packets are conforming to the conformance test.

6.1.3 Traffic descriptor

To be determined.

6.1.4 Conformance definition

To be determined.

6.1.5 QOS commitments

If all CPS packets are conforming, the QOS commitments apply to all CPS packets. If not all CPS packets are conforming, the network may choose to commit QOS to some of the CPS packets, for example to a volume of CPS packets that is conforming.

7 Functions for AAL2 traffic control and AAL2 congestion control

AAL2 traffic control is a set of functions that control the flow of CPS packets via a series of functions such as AAL2 admission control, AAL2 network resource management, AAL2 traffic parameter control. The main objective of AAL2 traffic control is to satisfy user requirements such as QOS while still supporting efficient AAL2 path utilization.

As opposed to traffic engineering, AAL2 traffic control is accomplished in a short time scale. Therefore, a well-established and automated mechanism is to be provided to control the flow of AAL2 traffic into the AAL2 path and out of the AAL2 path.

7.1 Introduction to AAL2 traffic control and AAL2 congestion control functions

T.b.d.

7.1.1 AAL2 traffic control functions

The following functions are identified for traffic control functions:

i) AAL2 path resource management

ii) AAL2 admission control

iii) AAL2 usage/network parameter control (to be decided on)

v) CPS packet discard control

vi) AAL2 traffic shaping

vi) AAL2 scheduling control

7.1.2 AAL2 congestion control functions

The following functions are identified for congestion control functions:

i) CPS packet discard control

ii) AAL2 scheduling control

8 Methods and tools for AAL2 path resource management

An AAL2 path may be an ATM DBR VCC. In this case, there is a PCR associated with each direction of the AAL2 path. When AAL2 connections are multiplexed onto such an AAL2 path, the AAL2 path has to be shaped according to the PCR so that the ATM cells of the resulting ATM VCC are conforming.

If the AAL2 path is an SBR VCC, then shaping with respect to the PCR and SCR is required. A similar shaping requirement holds for other ATM Transfer Capabilities (ATCs) if they are used for an AAL2 path.

I.371 Living List 53-- Handling of Resource Management (RM) cells with undefined code points in the Protocol ID field

_____

Description of the problem

The ATM Forum reported that the presence of Resource Management (RM) cells with undefined code points in the Protocol ID field, which upon investigation by the operator appear to be associated with an equipment supplier's proprietary congestion control mechanism, can cause conflicting actions within the network and that the processing of such cells has lead in several instances to severe performance degradation; even to the extent of shutting down the affected switches.

Discussion

- I.371 defines in detail the treatment of RM cells with PID =1 on ABR connections and RM cells with PID= 2 or 3 on ABT connections. There is little discussion on the treatment of RM cells with other values for the Protocol ID (PID).
- There is a need to clarify how these RM cells are to be treated for traffic management purposes. Without such a clarification, incompatibility problems may arise, particularly when proprietary closed loop congestion control methods are employed in customers' networks
- The proposed solution should address all kind of connections. On connections not using RM cells, irrespective of the PID, it should be clarified if for traffic management purposes, the RM cells described above are to be considered part of the user data cell flow. Furthermore, on ABR connections, the network element should count RM-cells with Protocol ID not equal to 1 against the appropriate allocated rate ACR.