INTERNATIONAL TELECOMMUNICATION UNION

ITU-T

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STANDARDIZATION SECTOR
OF ITU

I.378

Amendment 1
(08/2003)

SERIES I: INTEGRATED SERVICES DIGITAL NETWORK

Overall network aspects and functions – General network requirements and functions

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Traffic control and congestion control at the ATM Adaptation Layer type 2

Amendment 1: New Appendix IV: Deriving AAL 2 traffic parameters from AAL 2 link characteristics

ITU-T Recommendation I.378 (2002) – Amendment 1

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ITU-T Recommendation I.378

Traffic control and congestion control at the ATM Adaptation Layer type 2

Amendment 1

New Appendix IV: Deriving AAL 2 traffic parameters from AAL 2 link characteristics

Source

Amendment 1 to ITU-T Recommendation I.378 (2002) was agreed by ITU-T Study Group 13 (2001-2004) on 1 August 2003.

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.

ITU-T Recommendation I.378

Traffic control and congestion control at the ATM Adaptation Layer type 2

Amendment 1

New Appendix IV: Deriving AAL 2 traffic parameters from AAL 2 link characteristics

Appendix I contains a method for deriving the peak CPS byte rate from the AAL 2 Link Characteristics (ALC) defined in ITU-T Rec. Q.2630.1 for the case of periodic AAL 2 traffic sources. The following is a more general approach that does not rely on the assumption of a periodic traffic pattern:

In ITU-T Rec. Q.2630.1, the ALC parameter fields are defined as follows (the same definition is valid in ITU-T Rec. Q.2630.2, only the parameter naming was changed from AAL type 2 Link Characteristics (ALC) to Link Characteristics (LC)):

- The **maximum CPS-SDU bit rate** is defined as the maximum bandwidth, available to the AAL type 2 served user in the specified direction. The maximum bandwidth is the maximum ratio of the amount of bits transported during the inter-departure time between two subsequent CPS-SDUs, and that inter-departure time. Allowed values are 0 to 2048 kbit/s. The granularity is 64 bit/s.
- The **average CPS-SDU bit rate** is defined as the total expected amount of bits transported in the specified direction during the holding time of the connection, divided by the holding time of the connection. The average bit rate is also expected to be valid for the time interval between any two active periods. Allowed values are 0 to 2048 kbit/s. The granularity is 64 bit/s.
- The **maximum CPS-SDU size** is defined as the largest CPS-SDU size, in octets, allowed to be sent in the specified direction during the holding time of the connection. Allowed values are 1 to 45.
- The **average CPS-SDU size** is defined in the specified direction as the expected number of transported octets divided by the number of transported CPS-SDUs during the holding time of the connection. The average CPS-SDU size is also expected to be valid for the time interval between any two active periods. Allowed values are 1 to 45.

NOTE 1 – All four ALC parameter field definitions above do not include the CPS packet header of 3 bytes length.

For AAL 2 traffic sources with constant CPS-SDU size (maximum CPS-SDU size = average CPS-SDU size = CPS-SDU size), the number of CPS packets per second is at most equal to:

$$\frac{maximum\ CPS\text{-}SDU\ bit\ rate}{8 \times CPS\text{-}SDU\ size}$$

NOTE 2 – The ALC rate parameters have units of bit/s, while the CPS-SDU parameters have units of bytes.

Since each of these CPS packets has a 3-byte CPS header, the following holds for PRcps in case of constant CPS-PDU size:

$$PRcps[byte/s] \leq \frac{maximum\ CPS\text{-}SDU\ bit\ rate}{8} + \frac{maximum\ CPS\text{-}SDU\ bit\ rate\,[bit/s]}{8 \times CPS\text{-}SDU\ size\,[byte]} \times 3\,[\text{byte}]$$

To be on the safe side, PRcps should be at least as large as the right side of the inequality above.

In case that the CPS-SDU size is not constant, using the minimum value of the CPS-SDU size instead of CPS-SDU size in the above inequality would result in a PRcps value that is on the safe side. However this value for PRcps would be unnecessarily large, because the source cannot send with the minimum CPS-SDU size for long time periods. Also the minimum value of the CPS-SDU size is not provided in the ALC. However, the source could send CPS packets with a CPS-SDU length equal to the average CPS-SDU size for time periods up to the duration of the connection. Therefore the following formula for an approximate derivation for PRcps from ALC parameters is recommended:

$$PRcps[byte/s] = \frac{maximum\ CPS\text{-}SDU\ bit\ rate}{8} + \frac{maximum\ CPS\text{-}SDU\ bit\ rate\,[bit/s]}{8 \times average\ CPS\text{-}SDU\ size\,[byte]} \times 3\,[\text{byte}]$$

In case of the sustainable CPS byte rate SRcps, a similar approach can be followed if the CPS token bucket size BScps associated with SRcps is chosen as large as the amount of data sent during one activity period. The following approximate value for SRcps would then be:

$$SRcps[byte/s] = \frac{average\ CPS\text{-}SDU\ bit\ rate}{8} + \frac{average\ CPS\text{-}SDU\ bit\ rate\,[bit/s]}{8 \times average\ CPS\text{-}SDU\ size\,[byte]} \times 3\,[\text{byte}]$$

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