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Proposal for Congestion Management Algorithm

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SUMMARY

This document presents a proposal for requirements and recommendations for congestion management in the transport and the network entity. It should be contained in Sections 5 and 6 of the CNS/ATM-1 Package SARPs. The proposal consists of a congestion avoidance algorithm that will be activated by the receiving transport entity.
At the network layer ISs set the *congestion experienced* flag in packets traversing them when their buffers are loaded. When a destination network entity receives a packet with the *congestion experienced* flag set, it must inform the transport entity.
The receiving transport entity monitors the network load by counting the number of received packets which had the *congestion experienced* flag set and by counting the number of received packets without the *congestion experienced* flag set. It then adjusts the size of the window that it advertises to the sending transport entity according to the network load.

PROPOSAL FOR CONGESTION MANAGEMENT ALGORITHM

1. NETWORK ENTITY CONGESTION NOTIFICATION

1. The *congestion experienced* flag in the QoS maintenance parameter in the options part of an NPDU header shall initially be set to zero by the originator of the NPDU.

2. If an NPDU arrives at an ATN IS, the IS shall examine the depth of the output queue selected for that NPDU. If the depth of the selected output queue exceeds a known threshold, the ATN IS shall set the *congestion experienced* flag in the QoS maintenance parameter in the options part of the NPDU header. The threshold shall not be greater than 10% of the capacity of the queue.

3. Once the *congestion experienced* flag in the QoS maintenance parameter in the options part of an NPDU header is set, it shall not be reset by any ATN IS traversed by the NPDU further along to the path towards the destination.

4. When a destination network entity receives an NPDU of which the *congestion experienced* flag is set in the QoS maintenance parameter in the options part of the header of the NPDU, it shall convey the congestion experienced information to the destination transport entity by local means.

Note.— This can be done by using the N-REPORT primitive.

2. TRANSPORT ENTITY CONGESTION AVOIDANCE

The transport entity shall implement congestion avoidance algorithms that interact with the transport protocol for the purpose of reducing load on network resources.

2.1 Advertised window

A transport entity that is receiving TPDUs shall provide the transport entity that is sending the TPDUs with the lower window edge and the size of the *advertised window* by using the explicit flow control mechanism specified in ISO/IEC 8073.

*Note.- The **advertised window** is the window advertised by the receiver of the data to the sender of the data. It indicates the amount of data that the receiver is willing to accept.*

2.2 Receiving Transport Entity Congestion Avoidance

2.2.1 Initialisation of the advertised window

The initial value of the dynamic value of the window that is going to be advertised to the sending transport entity (W_0) shall have a locally configurable upper bound. This window shall be sent to the sending transport entity in the next CDT field transmitted.

2.2.2 Sampling Period

All receiving transport entities shall maintain a fixed value for the size of the advertised window until the next *2*size(advertised window)* DT TPDUs arrive since the last CDT field was transmitted by the receiving transport entity.

2.2.3 Counting of Received TPDUs in a Sampling Period

All receiving transport entities shall maintain a count, *N*, equal to the number of TPDUs received, and a count, *NC*, equal to the total number of TPDUs received with an indication that congestion is experienced. All types of TPDUs shall be included in the counts for *N* and *NC*.

2.2.4 Action upon the end of a Sampling Period

All receiving transport entities shall take the following action at the end of each sampling period:

1. If the count *NC* is less than 50% of the count *N*, the receiving transport entity shall increase the size of the advertised window by adding 1 up to a maximum based on the local buffer management policy. Otherwise, it shall decrease the size of the advertised window by multiplying by β. β shall be a value between 0.5 and 1. The size of the advertised window shall not go to a value smaller than 1.

2. The counts *N* and *NC* shall be reset.

3. The new size of the advertised window shall be transmitted in the next CDT field sent to the sending transport entity.