TSG-RAN Working Group 3 meeting #6
Sophia Antipolis, France, August 23-27, 1999

TSGR3#6(99)851

Agenda Item: **14.3**

Source: **Alcatel**

Title: **Flow Control mechanisms between MAC-d and MAC-c/MAC-sh**

Document for: **Approval**

---

1 Introduction

At Helsinki meeting, two contributions on flow control have been discussed: Siemens contribution R3-99699 and Ericsson contribution R3-99734.

2 Discussion

[1] compares two mechanisms:

Mechanism 1 is a congestion-based mechanism, i.e. MAC-PDUs are transferred to the CRNC until the SRNC receives a Congestion Indication from the CRNC. No additional information (e.g. on RLC queue status) is provided. In the DRNC these PDUs are queued and scheduled according to priorities and possibly also based on their origin.

Mechanism 2 is a credit-based mechanism on a per UE basis, i.e. the SRNC has to ask the CRNC for a credit before sending MAC-PDUs.

Ericsson contribution [2] proposes to use mechanism 2 for FACH.
Siemens contribution [1] proposes to use mechanism 1 for FACH and mechanism 2 for DSCH.
The Siemens rationale for using mechanism 1 for FACH is the excessive added signalling needed for credit-based mechanism.

Mechanism 1, based on Congestion Indication, is not safe. It may lead to loss of MAC-PDUs since the SRNC continues to send MAC-PDUs as long as the Congestion Indication sent from the CRNC has not been received. There is no guarantee that this message is received on time, it also may be lost. In this case, the CRNC queues overflow.

Mechanism 2, based on Credit, may lead to significant additional flow control signalling in case of low rate traffic per UE.
Furthermore, the total credit that can be allocated by the CRNC has to be shared among all the UEs. For example, if the total credit is 100, and if there are 50 UEs, the average credit per UE will be 2. And some UEs will not use that credit (because there is no data to transmit) while some other UEs will have a too small credit.

A variant of mechanism 2 may solve these issues while being as safe as mechanism 2:
Mechanism 3, proposed here, consists in a Credit-based mechanism, **but on a per "group" of users or "group" of user flows**. With this mechanism, flow control signalling becomes insignificant compared to the user traffic. Furthermore, the credit may be higher and given with a better repartition.
For example, if the FACH is used by users coming from 2 SRNCs, with 2 groups of user flows

each (e.g. high priority and low priority), each group has a credit of 100 / (2x2) = 25.

A group may be a SRNC or a group of user flows having the same QOS.
As FACH data are carried over one AAL2 connection over the Iur, therefore with a unique priority, it is proposed that the group is all the user flows destined to the given FACH.
With the same rationale, all the user flows destined to a given DSCH will belong to the same group. . It is then up to the SRNC receiving the credit to share it among the users using that FACH or DSCH, according to their demands.

Therefore, it is proposed to have the Credit-based mechanism per Common Transport Channel.

3 Proposal

It is proposed to update TS 25.425 [3] with the following text:

5.2 Control frame structure

Structure of the Control Frame

The table below shows the data sent in a control frame:

	3.1.1.1.1 Information element	**Description**
Header	Frame type	See reference [5].
Payload	NAME	See reference [5].
	Parameters	See reference [5].
Tail	Control frame checksum	See reference [5].

Usage of the Control Frame

Flow control: The CRNC needs to be able to control the downlink user data stream on a per Common Transport Channel basis. The flow control mechanism is credit based. The need for an uplink control frame and a downlink control frame has been identified for this purpose. The SRNC has an initial credit (window) and can send user frames as long as the credit is positive. According to its instantaneous buffer capacity, the CRNC automatically can allocate a new window to the SRNC by sending a UL control frame even if the old window is not closed. A new window can be asked by the SRNC at any time by sending a DL control frame to the CRNC even if the old window is not closed. The CRNC indicates to the SRNC the size of the window for the Transport Channel via an UL control frame.

The table below shows the structures of the payload for the uplink and downlink control frames used for flow control.

NAME	FLOW CONTROL CREDIT REQUEST
Parameters	Common Transport Channel Identity

NAME	FLOW CONTROL CREDIT ALLOCATION
Parameters	Common Transport Channel Identity
	Credit (in octets)

4 References

[1] R3-99699 Mechanisms for the support of Common Transport Channels over Iu, Siemens

[2] R3-99734 Common Transport Channel Data Streams (RACH/FACH) o/Iur, Ericsson

[3] 25.425 v.0.2.0, UTRAN Iur Interface User Plane Protocols for Common Transport Channel Data Streams