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1 ABSTRACT

This contribution presents an alternative to the General Overload Control Algorithm, based on the GPRS flow control mechanism.

2 INTRODUCTION

In [1], section 9.2.5 : Overload Control describes a general philosophy for handling overload control and the cases of CN and UTRAN Overload. This algorithm is strictly equivalent to the GSM algorithm described in [2] section 3.1.12 : Timers (T(igOC), T(igOR), T(inTC), T(inTR)) are replacing T5, T17, T6 and T18. UTRAN, CN are replacing BSS, MSC.

This algorithm mainly performs Overload control between two nodes but is more difficult to adapt to the UMTS case where multiple Nodes and Multiples flows between Nodes are involved.
Amongst the flows across Iu we can already identify the following flows :

- RANAP flow between the MSC and the RNC
- RANAP flow between the SGSN and the RNC
- User data flow between the MSC and the RNC
- User data flow between the SGSN and the RNC
- Transparent signalling (similar to DTAP) between the MSC and the RNC
- Transparent signalling (similar to DTAP) between the SGSN and the RNC
- Etc.

All these flows need to be controlled. Some of them may be coordinated, but other may be quite decorrelated.

In [3] relative to GPRS services, more powerful algorithms, based on traffic throughput control are used to control the signalling flow between the SGSN and the BSS.

This contribution explains the philosophy of the GPRS algorithm and to shows the benefits of this approach used on the Iu interface. A proposal is made to replace the existing algorithm description.

3 GPRS ALGORITHM

The GPRS algorithm makes the following assumption : Flow control is only needed in the downlink direction . Because the radio resource is rare : *"Buffers and link capacity shall be dimensioned to avoid loss of data"*, the flow control is only relative to the downlink direction.

The algorithm is located both in the SGSN and in the BSS. Its basic idea is to prevent overload to occur by controlling the traffic throughput at source. Several queues are provided by the SGSN(BSS) and associated

either to a class of service (delay, precedence) or to a mobile. The SGSN schedules the downlink traffic of each queue according to the associated QoS.

The scheduling algorithm is implementation dependent and the message throughput can be change by flow control messages.

4 BENEFITS

The main benefit of the GPRS algorithm is that it **prevents overload** to occur by introducing the notion of QoS and traffic throughput. The algorithm of GSM 08.08 describes a way to handle the overload, but doesn't prevent it : Messages are ignored, with no way to sort messages according to priority or delay class.
With the GPRS algorithm, overload should never occur, therefore **optimal network functioning** and **security** can be provided. On top the GPRS algorithm can be applied to the different flows across the Iu interface.
The GPRS algorithm, by making the assumption that there will be no uplink overload (due to an adequate network dimensioning) **optimises the radio resource** and limits implementation impact to the downlink.

The notion of QoS is compatible with main transport network technology such as ATM and IP, which is in line with the separation of Transport and Application layers.

The proposed text is adapted from [3], section 12.4.3.4 :

5 FLOW CONTROL BETWEEN UTRAN AND CN

A flow control mechanism controls the loading of the UTRAN queues per transport bearer and per UE data or signalling flow between the CN and the UTRAN in the downlink direction.

The need for flow control in the uplink direction is not identified as necessary, but otherwise a similar mechanism could be used. Buffers and link capacity shall be dimensioned to avoid loss of uplink data.

The downlink flow control mechanism is based on the following principles:

- In the CN, queues are provided per transport bearer. These queues may be split further, e.g., per UE, per flow type (e.g. per functional flow across Iu, per QoS delay class or precedence class). The CN shall pass flow messages to the UTRAN over Iu interface as long as the allowed throughput is not exceeded. The allowed throughput is given per transport bearer and for a single UE on that bearer. The CN schedules the downlink traffic of all UEs of a transport bearer according to both throughput parameters and to the QoS profile related to each flow. The scheduling algorithm is implementation dependent.

- In the UTRAN, message queues are provided per transport bearer. These queues may be split further, e.g., per UE, per flow type (e.g. per functional flow across Iu, per QoS delay class or precedence class). Depending on the queuing conditions and the available radio resource capacity in the cell, the UTRAN indicates the allowed throughput per transport bearer and the default allowed throughput for each individual UE of that transport bearer by flow control messages to the CN. Additionally, the UTRAN may change the allowed throughput for an individual UE by a flow control message.

The meaning of throughput can be adapted to each flow. For instance, for a user data flow it can be a throughput in bits per second whereas for a signalling flow it can be a throughput in procedures per second.

6 PROPOSAL

It is proposed to replace the current text the ARC EG document [1], Description of Iu Interface, section 9.2.2.5 by section 5 of this contribution.

7 REFERENCES

[1] ZZ.11, Description of Iu Interface
[2] GSM 08.08, Mobile-services Switching Centre - Base Station System (MSC - BSS) interface;

[3] GSM 03.60, General Packet Radio Service (GPRS); Service description;