

Agenda Item: 6.5
Source: France Telecom
Title: Prioritization and Queue management for DSCH, addition to InterDigital contribution
Document for: Decision

1. Introduction

As stated in [1] RAN WG3 has requested some clarification about interaction between MAC-d and MAC-c. [1] proposes a clear survey of prioritization, queue management and multiplexing issues at MAC-c. FT's view is that the MAC-c mechanisms are not different as those at MAC-sh on this topic although these mechanisms will be handled differently and involve different logical channels. However we think that modifications proposed in [1] can be extended to MAC-sh.

2. Reference

[1] TSG-RAN WG2 Tdoc R2-99400

3. Discussion

At MAC-sh flows that are received from MAC-d are prioritized within MAC-d and are multiplexed at MAC-sh level. MAC-sh can possibly re-organize priorities of flows coming from different MAC-sh (through Iur interfaces). The way priorities are transmitted to MAC-sh is FFS.

Flow control is needed between MAC-sh and MAC-d to avoid congestion at MAC-sh and to allow to manage relative quality of service for the traffic channels mapped on shared channels. As stated in [1] this may be achieved either by a reservation mechanism or by a window/credit mechanism at each MAC-d. The choice of one of the two solutions or a combination of both is FFS.

It is however believed that a reservation mechanism shall be needed to handle QoS on the shared channels in some cases.

4. Conclusion and proposal

This raises the issue of QoS management within the UTRAN. This should be clarified in order to allow to define requirements on signalling on the Iur.

In order to provide some guidance to RAN WG3 it is proposed to state in an answer liaison to RAN WG3 that:

- RAN WG2 is currently working on defining clearer interaction between MAC-d, MAC-c and MAC-sh.
- Some RNSAP signalling will be likely needed to handle flow control and reservation mechanisms between different MAC entities.

It is proposed to add corresponding additions in 25.321 ([1] has been taken as a reference for better understanding):

Proposed addition to 25.321:

Figure 4.2.4.3 shows the UTRAN side MAC-d entity. The following functionality is covered:

- Dynamic transport channel type switching is performed by this entity, based on decision taken by RRC.

- The C/T MUX box is used when multiplexing of several dedicated logical channels onto one transport channel is used. For common channels this function exists in the MAC-c so that scheduling prioritisation between traffic and control logical channels can be performed.
- Each MAC-d entity using common channels is connected to a MAC-c entity that handles the scheduling of the common channels to which the UE is assigned and DL (FACH) priority identification to MAC-c (priority identification of each PDU for DTCH NRT data is FFS).
- Each MAC-d entity using downlink shared channel is connected to a MAC-sh entity that handles the shared channels to which the UE is assigned and indicates the level of priority of each PDU to MAC-sh.
- In the downlink, scheduling and priority handling of transport channels is performed within the allowed transport format combinations of the TFCS assigned by the RRC. This function supports the TFCI insertion in Node B .
- FAUSCH Handling indicates the function in the MAC-d supports the FAUSCH, details are ffs.
- A flow control function exists toward MAC-c and MAC-sh to limit buffering between MAC-d and MAC-c or MAC-sh entities. This function is intended to limit layer 2 signalling latency and reduce discarded and retransmitted data as a result of FACH or DSCH congestion. It also allows to handle quality of service if MAC-d requires it.

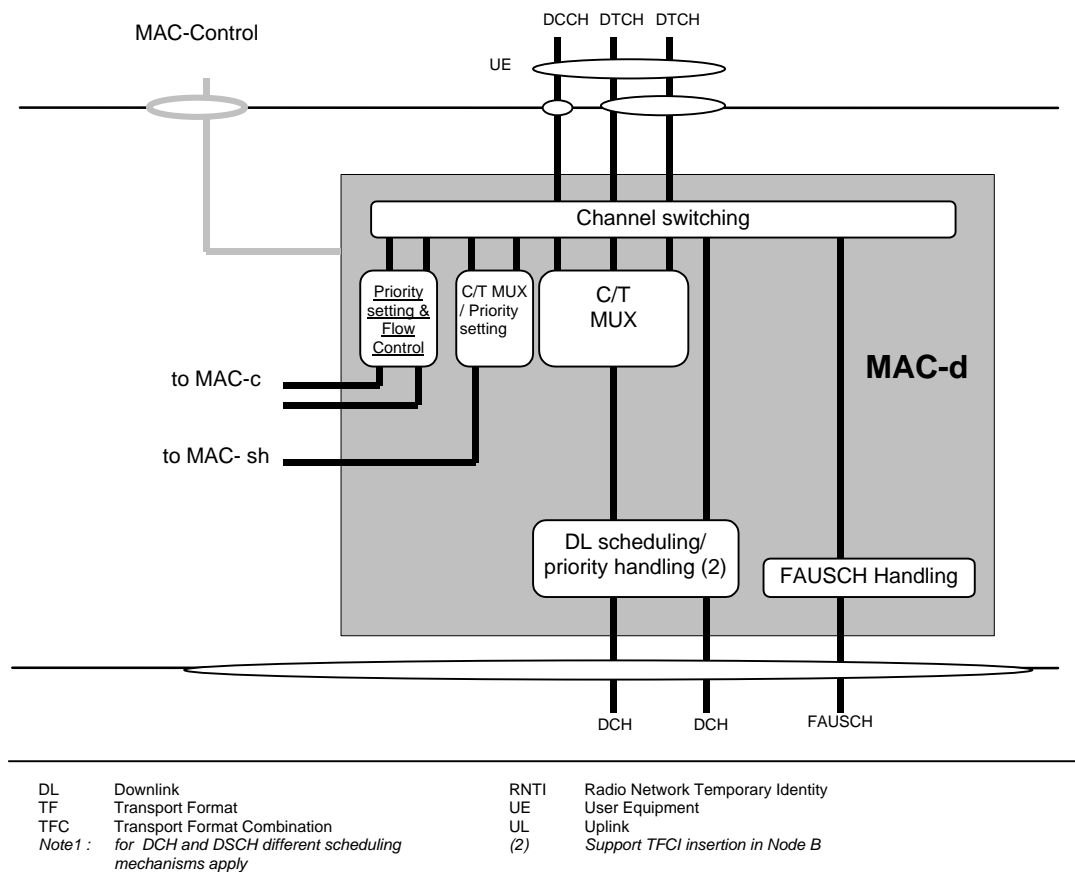


Figure 4.2.4.3 UTRAN side MAC architecture / MAC-d details

Figure 4.2.4.4 shows the UTRAN side MAC-sh entity. The following functionality is covered:

- A specific UE ID is needed when using the DSCH Control Channel to identify the UE on the DSCH. This specific UE ID may be optimised for DSCH and will be allocated when a RAB is mapped onto a DSCH. Additionally, some timing information is needed to tell the UE when to listen to DSCH.

- The scheduling /priority handling box in MAC-sh shares the DSCH resources between the UEs and between data flows according to their priority. *DL flow control is also provided to MAC-d data sources to limit congestion at MAC-sh and to allow QoS management.* For TDD operation the demultiplex function is used to support the USCH and the connection to the MAC-c.
- The scheduling/priority handling box also prioritises between UL & DL capacity allocation indications when the FACH is used for both DSCH and USCH control channels (FACH is used for TDD – FDD is FFS).
- DL code allocation is used to indicate the code used on the DSCH and the appropriate Transport format on the DSCH.
- A flow control function exists toward MAC-c, so that capacity allocation signaling is synchronized (not delayed in respect to) DSCH/USCH transmissions.

The RLC has to provide RLC-PDU's to the MAC which fits into the available transport blocks on the transport channels respectively.

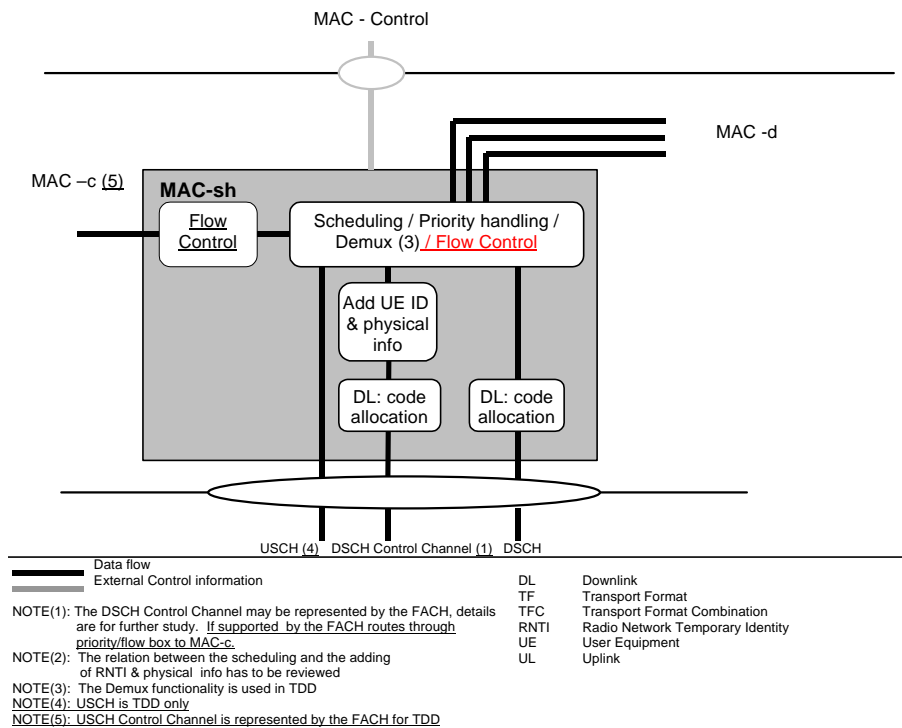


Figure 4.2.4.4 UTRAN side MAC architecture / MAC-sh details