Agenda Item: 14.1

Source: Ericsson

Title: **Merge of system information procedures**

Document for: Decision

_____

1   Introduction

This contribution proposes a merge of the system information procedures in 25.331 into one procedure applicable for both idle mode- and connected mode UEs. Further we propose to only use the BCCH for broadcast of system information. The BCCH can be mapped onto a BCH or a FACH.

2   Discussion

2.1   Merge of procedures

Today we have one procedure specifying the broadcast of system information in idle mode and another procedure for sending of system information in RRC connected mode. However, the broadcast of system information as well as the actions taken by the network when system information is modified will not be related to any specific UE mode (idle mode or connected mode).

On the UE side, the same mechanisms are often used to read and update system information in idle mode as well as in connected mode. Both idle mode UEs and connected mode UEs in substate PCH will for instance acquire new system information on the BCCH and monitor the PCCH in order to receive a notification from the network when system information has been updated. The only difference is the combination of system information blocks acquired in idle mode and in connected mode.

By merging the idle mode- and connected mode procedures we can avoid having the same information duplicated into two different sections of TS 25.331.

2.2   Mapping of BCCH onto a FACH transport channel

In 25.331 it is stated that it shall be possible to broadcast system information on a CCCH mapped onto a FACH transport channel. This option was included since the DRAC procedure requires that some system information elements are transmitted on the FACH. We also found out that the master information block, specifying e.g. the value tags and the scheduling information for other system information blocks, must be broadcast on the FACH in order to reach all UEs in only listening to the FACH when system information is modified.

The natural solution is to broadcast all system information blocks using the same logical channel, the BCCH. To achieve this we propose that it should be allowed to map the BCCH onto a FACH transport channel. The BCCH can be mapped together with the DCCH and DTCH onto the same transport channel or use a separate FACH reserved only for the broadcast of system information.

Currently the mapping of a BCCH onto a FACH is not specified in 25.301 and 25.321. However, a change request can be created and presented in order to include the necessary changes into the specifications.

3   Proposal

We propose to make the following changes in TS 25.331[1]:
- Remove section 8.3.9.2 (Sending of system information in RRC connected mode).
- Replace section 8.1.1 (Broadcast of system information) with the text below:

8.1.1 Broadcast of system information
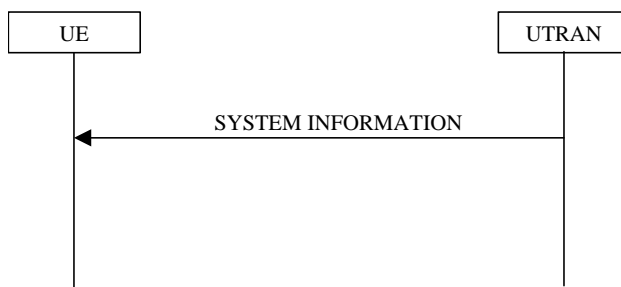
Figure 5) Procedure for broadcast of system information

This procedure is used for broadcasting system information from the network to idle mode- and connected mode ~~all~~ UEs in a cell. ~~Only UEs that listen to the logical channel BCCH can be reached by this procedure~~. The system information is repeated on a regular basis and it includes information from both the access stratum and the non-access stratum. The initiative to change the system information can come from both the access stratum and non-access stratum.

The system information elements are broadcast in *system information blocks*. A system information block groups together system information elements of the same nature. Different system information blocks may have different characteristics, e.g. regarding their repetition rate and the requirements on UEs to re-read the system information blocks. Idle mode- and connected mode UEs may acquire different combinations of system information blocks.

The system information is organised as a tree. A *master information block* gives references to a number of system information blocks in a cell, including scheduling information for those system information blocks. The master information block is scheduled with a fixed pre-defined repetition rate.
The system information blocks contain the actual system information and/or references to other system information blocks including scheduling information for those system information blocks.

Note: A system information block may be segmented and carried in several transport blocks, but this mechanism is FFS.

Figure 6 illustrates the relationship between the master information block and the system information blocks in a cell.
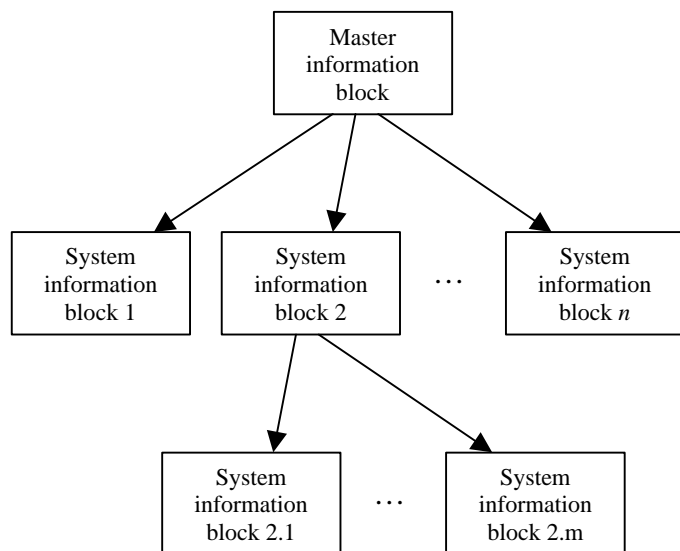
Figure 6) The overall structure of system information.

The information may be grouped into the following classes:

- information giving unique identification of the current network, location area, UTRAN registration area and cell
- information used for candidate cell measurements for handover and cell selection procedures
- information describing the current control channel structure
- information for controlling the random access channel utilisation
- information defining different options supported within the cell
- protocol information

[Note: The actual grouping will be defined when the complete set of system information blocks have been specified. However, basically the same elementary procedure can be applied for all messages.]

All system information blocks are broadcast on the BCCH. The BCCH is either mapped onto a BCH transport channel or a FACH transport channel.

[Note: The DCCH might also be used to send modified system information blocks directly to the UE. This is FFS]

~~Three ways have been identified by which this signalling can be conveyed:~~

~~- On DCCH~~ *[Note: This is FFS. The DCCH might be used to send modified system information blocks directly to the UE.]*
~~- On BCCH~~ *[Editors note, the BCCH may be used to convey information to a UE even when a DCCH exists. The current assumption is that where a DCH exists the BCCH is not used]*
~~- On CCCH mapped onto a FACH or a DSCH control transport channel (provided the DSCH control transport channel exists).~~ *[Editors note ,the CCCH may be used to convey information to a UE even when a DCCH exists].*

~~When a system information block on the BCCH is modified, the message PAGING TYPE 1 can be sent on the PCCH to inform UE's about the changes. The message includes the information element~~ *BCCH Modification Information.*

The UTRAN can notify the UE when system information blocks carried on the BCCH are modified. There are two ways to notify the UE:

- On PCCH. The message PAGING TYPE 1 can be sent to all UE's on the PCCH to indicate that the system information has been modified. The message includes the information element *BCCH Modification Information*.

- On B~~C~~CCH mapped onto a FACH transport channel. When system information is modified, the updated master information block can be broadcast ~~on CCCH~~ to all UEs listening to the FACH.

[Note that other options will also be available to force the UE to re-read SYSTEM INFORMATION, for example timers in the UE could be used to trigger the UE into re-reading frequently changing SYSTEM INFORMATION].

4   References

[1]   TS 25.331 v1.2.0, RRC Protocol Specification