

Source : Motorola

General View of OS2 Operation

1. Introduction

This document provides a general view of the operation in OS2. It is based on [4] and [5], i.e. the current working assumptions for OS2, but it makes use of the proposals conveyed in [7] (where a mechanism for transmission of FACCH during silence periods is proposed) and [8] (where the use -conforming to the standards- of TFI is proposed for OS2).

2. Transmission Needs during Talkspurts

The following information flows may need transmission during a talkspurt:

- SACCH blocks.
- RR signaling.
- Speech frames (AMR blocks).
- High priority RLC data (SIP signaling).
- Possibly, RRC signaling blocks.

During speech activity periods the radio blocks are diagonally interleaved.

SACCH blocks are transmitted in preallocated slots, specified by the structure of the DPSCH.

RR signaling is coded using LAPDm and conveyed in the FACCH logical channel.

Speech and FACCH frames are distinguished by means of the stealing bits (SB), all 0s for AMR blocks and all-1s for FACCH.

If during a talkspurt there is a need for transmission of high-priority data like SIP signaling, a change of state in the physical layer occurs. Speech frames are blanked and no comfort noise will be sent either. In prior proposals this is marked by the FORCE_SILENCE marker, which ends the talkspurt. High-priority data is then RLC coded and block interleaved in a FORCE_SILENCE physical state.

We would like to question in this contribution the need for the FORCE_SILENCE marker and the FORCE_SILENCE state in the physical layer. Instead, the SID-FIRST marker could be used and a SILENCE state would be entered. The receiving physical layer could just switch between SPEECH and SILENCE states and detect whether or not the SID-UPDATE frames are present during silence periods (see Section 4).

In the case that RRC signaling need be transmitted, it will be treated according to its priority. RRC signaling is mapped on different RBs and coded using RLC. Thus, it can be processed as any other RLC based traffic generated by the MS. If it is RRC high priority traffic it will force a silence period, blanking the speech, by means of a FORCE_SILENCE or SID_FIRST marker (if the FORCE_SILENCE frame is eliminated). If, on the contrary, the RRC traffic has low priority associated, it will be queued and transmitted whenever a speech silence period takes place.

3. Transmission Needs during Speech Silences

The following information flows may need transmission during a speech silence:

- RR signaling.
- Best effort RLC data.
- RLC control blocks for best effort RLC data
- High priority RLC data (SIP signaling).
- RLC control blocks for high priority RLC data.
- RRC signaling blocks.

The proposal is to use the TFI field to identify the different RLC flows.

Thus, a unique TFI (TFI_{be}) is used for both data and control RLC blocks associated with the best-effort flow.

Analogously, a unique TFI_{hp} is used for both data and control RLC blocks associated with the high-priority SIP flow.

RR signaling is coded using LAPDm. By setting the first two bits of the packet to 1 (see [7]) the packet can be unambiguously detected by the receiving physical entity and delivered to the receiving DLC entity. The transmitting physical layer will set the bits to 1 and the receiving physical layer will reset these two bits, keeping the whole process transparent to DLC. Thus, FACCH during silence periods is detected by the first two bits of the packet header. The stealing bits sequence used for FACCH is the associated with CS1 RLC packets.

Each of the existing RRC signaling RBs have associated a unique TFI which permits the routing (as proposed in [8]).

4. Blanking of SID-UPDATE Frames during Silence Periods

With the proposed scheme, there are two situations in which the SID-UPDATE frames containing noise comfort parameters for speech are blanked:

- During high-priority data transmission. This can be either SIP or high-priority RRC signaling. Each of these RLC-based flows has a unique RB and TFI associated.
- During FACCH transmission conveying e.g. handover information.

The stealing bits of high-priority data are set according to the MCS used, while the SB combination used for the SID-UPDATE frames containing comfort noise is the all-0 sequence, reserved for speech. Thus, high-priority data blocks can not be mistaken with SID-UPDATE frames.

In summary and for all cases, the receiving physical entity detects the absence of SID-UPDATE frames (expected every 8 radio blocks) by decoding the Stealing Bits (SB) sequence, which is

- the all-0 SB sequence for the SID-UPDATE frames,
- the SB sequence associated with the used MCS for SIP or RRC signaling and
- the SB sequence associated with CS1 for FACCH.

5. Conclusions

In this contribution a general view of a possible operation of OS2 is described, taking into account not only the existing working assumptions for OS2 but also the proposals described in [7] and [8].

Although the elimination of the FORCE_SILENCE marker and its associated physical layer state is not the main goal of the contribution (both could be actually preserved), we do question the need for them.

6. References

[1] Proposal of GERAN Data Link Control Signaling in Dedicated MAC Mode. Tdoc GP-000886. Lucent 6-10 November 2000, Norrtalje, Sweden.

[2] GERAN Voice and Data Multiplexing on Dedicated Physical Sub-channels. Tdoc GP-000926. Ericsson, Lucent, Nokia 6-10 November 2000, Norrtalje, Sweden.

[3] OS2 solution using AMR procedures - Detailed description. Tdoc GERAN 0660/00. AT&T, Ericsson 6-10 November 2000, Norrtalje, Sweden.

[4] Working assumption on OS2 concept. Tdoc GERAN 0661/00. AT&T, Ericsson, Lucent, Nokia, Nortel Networks 6-10 November 2000, Norrtalje, Sweden.

[5] Physical Layer Multiplexing Concept. Tdoc GAHW-00165/00. Ericsson 11-15 December 2000, Orlando, Florida.

[6] Layer 1 Scheme for Speech and Data Multiplexing. Tdoc GAHW-000221. Nortel 11-15 December 2000, Orlando, Florida.

[7] FACCH Transmission during Silence Periods in OS2. Tdoc GP 01-0272. Motorola 15-19 January 2001, Boston, US.

[8] RB Re-Configuration onto DPSCH. Tdoc GAHW-000196. Lucent 11-15 December 2000, Orlando, Florida.