OsmoBTS - Feature #4795
Uplink Repeated SACCH Support
10/09/2020 04:58 PM - laforge

Status: Resolved
Priority: Low
Assignee: dexter
Category:
Target version:
Spec Reference: 3GPP TS 44.006 Section 11.3

Description
In 3GPP Rel-7 (?) of GERAN, the concept of "repeated SACCH" was introduced.

The rationale for SACCH improvement can be found in 3GPP TDoc GP-042668 Section 1/2 (even though if later sections have not been implemented as suggested there): Particularly with AMR as a voice codec, the voice quality performance is better than that of control channels (and estimated 5dB).

So in the end, even though the voice channel would still be acceptable, calls fail due to signaling failure, both on SACCH and FACCH.

Uplink Repeated SACCH support basically replaces measurement reports on uplink SACCH (or even pending SAPI3 frames) with re-transmissions of SAPI0 frames. Due to some related logic (and signaling in the TS 44.004 header), the BTS can then even combine the bursts from multiple transmission to decode the SACCH block.

Related issues:
Related to OsmoBTS - Feature #4794: Downlink Repeated SACCH support

Associated revisions
Revision 7c87612b - 11/28/2020 09:35 PM - dexter
l1sap: add repeated uplink SACCH

3GPP TS 44.006, section 11 describes a method how the uplink SACCH transmission can be repeated to increase transmission reliability.

Change-Id: I7e4cc33cc010866e41e3b594351a77bf93e08ac
Related: OS#4795, SYS#5114

Revision 7ce4fa43 - 12/12/2021 04:03 PM - fixeria
osmo-bts-trx: fix a memleak in trx_sched_set_lchan()

An additional burst buffer is allocated in rx_data_in() for Uplink SACCH repetition, but unlike the main buffer it never gets free().

Change-Id: I93310e7aed91a49c0511e20e0044061795a
Fixes: I7e4cc33cc010866e41e3b594351a77bf93e08ac
Related: OS#4795, SYS#5114

History
#1 - 10/09/2020 05:00 PM - laforge
- Related to Feature #4794: Downlink Repeated SACCH support added

#2 - 10/12/2020 05:04 PM - laforge

#3 - 10/16/2020 09:00 AM - laforge

See also: Chapter 7.2 of "GSM/EDGE Evolution and Performance".

#4 - 11/11/2020 05:37 PM - dexter
I have started the implementation of repeated uplink SACCH. In my experiments I can see that I am able to turn the repetition at the MS side on and off by setting the SRO bit in the L1 SACCH header of the SACCH block I send. So this part works so far.

When it comes to try the decoding of the current SACCH block by also using the bits from the previous SACCH block I am not entirely sure what to do. The best method to combine the previous with the current transmission seems to be to take the soft bits and just add them. One could also try to combine the bursts separately, given that the SACCH bursts are very far apart from each other this even would even make sense.

However, the most interesting question at the moment is how do we decide if we start/stop the SACCH (and maybe also FACCH) repetition. I think the SACCH repetition is mostly needed when the MS is approaching the outer perimeter of the cell. The SACCH contains the measurement reports. And even if we only get half of them when the repetition is on this is still better then nothing. I think this is the case we should design this for. I would use the the bit errors as a criterion. SACCH is coded as 1/2 viterbi. Maybe turing on the repetition when 1/3 of the received bits is wrong makes sense.

I have already submitted the patch to gerrit, but it is still work in progress: https://gerrit.osmocom.org/c/osmo-bts/+/21185

WIP: l1sap: add repeated uplink SACCH