**OsmoPCU - Bug #2406**

**CS-PAGING not implemented**

07/29/2017 09:06 AM - laforge

<table>
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<th>Start date:</th>
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<td></td>
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<tr>
<td>Assignee:</td>
<td>laforge</td>
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<td>Spec Reference:</td>
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**Description**

BSSGP PAGING CS is used to deliver a circuit-switched paging request to a MS while it is engaged in transferring GPRS data. The related paging request is not sent via Broadcast/PCH, but via PACCH to that MS.

**Related issues:**

- Related to OsmoPCU - Bug #3927: Missing PCU_Tests.ttcn Paging tests
  Resolved 04/15/2019
- Related to OsmoPCU - Bug #2403: PS-PAGING and CS-PAGING not implemented on PT...
  Resolved 07/29/2017
- Related to OsmoBSC - Feature #4485: osmo-bsc: We should be announcing NMO I i...
  Rejected 04/06/2020

**Associated revisions**

**Revision 17933347 - 06/21/2020 01:33 PM - laforge**

bts_features.h: Introduce BTS_FEAT_PAGING_COORDINATION

This feature indicates if the given BTS supports paging coordination, that is the transmission of CS paging (received on Abis) to be sent via PACCH/PCU in PS domain fro MS with active TBF.

Change-Id: Ifb2e83eaf05dd36e5b203ed2de1a74864b039e38
Related: OS#2406

**Revision df60b51f - 06/21/2020 04:09 PM - laforge**

system_information: Set BSS_PAGING_COORDINATION in SI13 for osmo-bts

osmo-bts (in combination with osmo-pcu) has been supporting paging for CS services via PCU/PACCH for a very long time. Let's make sure this is reflected by the correct BSS_PAGINGCOORDINATION bit.

Change-Id: l0e80ca5afcd6737273d6699bdec6e6325e454b57f6
Requires: libosmocore.git Ifb2e83eaf05dd36e5b203ed2de1a74864b039e38
Related: OS#2406

**History**

1. 10/29/2017 06:51 PM - laforge
   - Priority changed from Normal to Low

2. 10/02/2018 03:43 PM - laforge

3. 10/17/2018 10:24 AM - laforge
   - Assignee changed from laforge to msuraev

4. 04/15/2019 07:52 AM - laforge
   - Assignee changed from msuraev to lynxis

5. 09/10/2019 11:55 AM - laforge
   - Assignee changed from lynxis to osmith

Please note this is mostly relevant with other core networks than osmocom. In osmocom, the MSC pages the BSC and the BSC pages the BTS, which then passes it to the PCU for transmission. This works.
However, when using a non-osmocom core with Gs interface between MSC and SGSN for paging coordination, the SGSN will likely send us CS-PAGING and we have to implement it in the PCU for interoperability.

#6 - 09/24/2019 12:22 PM - osmith
- Status changed from New to In Progress

#7 - 12/09/2019 07:26 PM - pespin
- Related to Bug #3927: Missing PCU_Tests.ttcn Paging tests added

#8 - 12/09/2019 07:46 PM - pespin

While developing some TTCN3 PCU tests (#3927) I also tried to understand better this scenario. Some references I could find:

- TS 23.060 sec 6.3.3 CS Paging (A/Gb mode)
- TS 48-008 sec 3.1.10 Paging
- TS 24.008 sec 4.7.9 Paging procedure
- TS 44.018 sec 3.2.2.2 paging
- TS 48.018 sec 5.2.4.7.1
- PAGING-PS: TS 48.018 10.3.1
- PAGING-CS: TS 48.018 10.3.2

Specially important are the last 2, where the SGSN->PCU PDUs requesting the paging are described.

As far as I understand, we already implement paging (not sure if correctly) in the SGSN: it uses libosmocore's `bssgp_tx_paging()`. In libosmocore, we also have a symbol which ifafiu we should use in osmo-pcu and which I think is not yet use by anybody:

```c
/* Parse a single GMM-PAGING.req to a given NSEI/NS-BVCI */
int bssgp_rx_paging(struct bssgp_paging_info *pinfo,
                    struct msgb *msg)
```

It seems PS-PAGING is already supported by osmo-pcu, while CS-PAGING is not:

```c
case BSSGP_PDUT_PAGING_PS:
    gprs_bssgp_pcu_rx_paging_ps(msg, tp);
...
case BSSGP_PDUT_PAGING_CS:
    case BSSGP_PDUT_FLUSH_LL:
    case BSSGP_PDUT_SGSN_INVOKE_TRACE:
        LOGP(DBSSGP, LOGL_INFO, "%s BSSGP BVCI=%d (SIGN) PDU type %s not implemented\n",
             bvc1, bssgp_pdu_str(pdu_type));
        break;
```

If I understand correctly, what's missing here is to do something similar to what we do when PCU receives a struct gsm_pcu_if_pag_req with type PCU_IF_MSG_PAG_REQ on pcu_rx_pag_req() from BTS. That path is already covered by PCU_Tests_RAW.TC_paging_cs_from_bts, where a DL_PACKET_PAGING_REQUEST is sent over PACCH. The only difference in this scenario is that the PAGING_REQUEST must be retrigged on reception of the CS-PAGING message from SGSN in gprs_bssgp_pcu.cpp.

So mainly calling libosmocore's `bssgp_rx_paging()` and then calling similar to what `pcu_rx_pag_req()` does:

```c
return BTS::main_bts()->add_paging(pag_req->chan_needed,
                                     pag_req->identity_lv);
```

#9 - 12/10/2019 05:25 PM - pespin
- Related to Bug #2403: PS-PAGING and CS-PAGING not implemented on PTP-BVCI added

#10 - 12/10/2019 07:17 PM - pespin
- Status changed from In Progress to Feedback
- % Done changed from 0 to 90

Done so far:
remote: https://gerrit.osmocom.org/c/osmo-pcu/+/16536 Allow Gb PAGING-PS without P-TMSI
remote: https://gerrit.osmocom.org/c/osmo-pcu/+/16537 Support Gb PAGING-CS

Can be tested with TTCN3 PCU test TC_paging_cs_from_sgsn.
#11 - 12/23/2019 01:53 PM - pespin
- Assignee changed from osmith to pespin

Testing is done here:
https://gerrit.osmocom.org/c/osmo-tcn3-hacks/+/16528 pcu: Introduce tests for CS and PS paging from SGSN/Gb

#12 - 01/21/2020 04:14 PM - pespin
- Status changed from Feedback to Resolved
- % Done changed from 90 to 100

#13 - 04/06/2020 12:17 PM - fixeria
- Status changed from Resolved to Feedback

BTW, there is BSS_PAGING_COORDINATION in SI13 / GPRS Cell Options IE (see 3GPP TS 44.060, table 12.24.2):

This field indicates the network support of CS paging co-ordination in packet transfer mode during network mode of operation II and III. [...] It is coded as follows:

<table>
<thead>
<tr>
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<th>Description</th>
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<tr>
<td>0</td>
<td>The cell does not support Circuit-Switched paging coordination</td>
</tr>
<tr>
<td>1</td>
<td>The cell supports Circuit-Switched paging coordination</td>
</tr>
</tbody>
</table>

OsmoBSC currently hard-codes this option to 0. Should we make it configurable?

As per section 6.1.3 "Paging initiation using PACCH", "if such indication is received, a mobile station in packet transfer mode shall expect the paging messages to be received on the PACCH". So does it mean that otherwise (if BSS_PAGING_COORDINATION is set to 0) the MS would ignore our paging messages?

#14 - 04/06/2020 07:39 PM - fixeria
- Related to Feature #4485: osmo-bsc: We should be announcing NMO I instead of NMO II added

#15 - 06/21/2020 01:42 PM - laforge
- Status changed from Feedback to In Progress
- Assignee changed from pespin to laforge

fixeria wrote:

BTW, there is BSS_PAGINGCOORDINATION in SI13 / GPRS Cell Options IE (see 3GPP TS 44.060, table 12.24.2):


#16 - 06/21/2020 05:46 PM - laforge
- Status changed from In Progress to Resolved

laforge wrote:

fixeria wrote:

BTW, there is BSS_PAGINGCOORDINATION in SI13 / GPRS Cell Options IE (see 3GPP TS 44.060, table 12.24.2):


patch merged.