

## Cellular Network Infrastructure - Feature #3587

### Possibility to route SMS messages over GSUP

09/24/2018 09:21 PM - fixeria

<b>Status:</b>	Resolved	<b>Start date:</b>	09/25/2018
<b>Priority:</b>	Normal	<b>Due date:</b>	
<b>Assignee:</b>	fixeria	<b>% Done:</b>	100%
<b>Category:</b>			
<b>Target version:</b>			
<b>Spec Reference:</b>	3GPP TS 29.002		
<b>Description</b>			
<p>At the moment there is only one way to route short messages between an Osmocom-based network and some external entity (e.g. SMSC) - SMPP interface. It's implemented in both <a href="#">OpenBSC</a> and <a href="#">OsmoMSC</a>, and can be optionally enabled during the build configuration (using --enable-smpp).</p> <p>The fundamental problem of SMPP is the need of transcoding between its primitives and pretty complex SMS protocol. Moreover, in some cases this transcoding is not desired.</p> <p>In commercial networks MAP (Mobile Application Part, see 3GPP TS 29.002) protocol is used for forwarding MO/MT short messages between different network entities. There is a special group of short message management services defined in MAP, see section 12.</p> <p>The problem of MAP comes from the protocol stack it belongs to - SS7, its complexity. Instead of SS7/MAP, Generic Subscriber Update Protocol (GSUP) is used in Osmocom CNI. Basically GSUP is an Osmocom-specific non-standard protocol designed around the same architecture as the MAP messages/operations, but without the complexity of SS7, and without the need for ASN.1 encoding.</p> <p>Implementing a possibility to route SMS messages over GSUP would facilitate the integration of Osmocom CNI with third-party networks and components. In general, this task would require us to replicate the SM-related messages and IEs in GSUP, and to implement proper message forwarding in <a href="#">OsmoMSC</a>.</p> <p>Draft message sequence charts can be found here: <a href="https://gerrit.osmocom.org/10604/">https://gerrit.osmocom.org/10604/</a></p>			
<b>Related issues:</b>			
Related to OsmoSGSN - Feature #1587: SMS over GPRS support		<b>Stalled</b>	<b>02/23/2016</b>

#### History

##### #1 - 09/24/2018 09:37 PM - fixeria

- Checklist item [ ] Extend libosmocom's GSUP implementation with SM-specific messages and IEs added

Checklist item [ ] Extend TTCN-3 library/GSUP\_Types.ttcn with SM-specific messages and IEs added

Checklist item [ ] Extend the Wireshark dissector with SM-specific messages and IEs added

- % Done changed from 0 to 10

Draft implementation (to be discussed) of the following messages:

- SRI\_FOR\_SM (a.k.a. MAP-SEND-ROUTING-INFO-FOR-SM):
  - <https://gerrit.osmocom.org/#/c/osmo-ttcn3-hacks/+11061/>
  - <https://gerrit.osmocom.org/#/c/libosmocom/+11068/>
- MO/MT FORWARD\_SM (a.k.a. MAP-\* -FORWARD-SHORT-MESSAGE):
  - <https://gerrit.osmocom.org/#/c/osmo-ttcn3-hacks/+11062/>
  - <https://gerrit.osmocom.org/#/c/libosmocom/+11069/>

have been sent for review (topic:gsup\_sms).

Please note that most likely we also need to replicate the following messages:

- MAP-REPORT-SM-DELIVERY-STATUS
- MAP-ALERT-SERVICE-CENTRE

- MAP-READY-FOR-SM

## #2 - 09/25/2018 07:22 PM - fixeria

- Related to Feature #1587: SMS over GPRS support added

## #3 - 10/06/2018 05:50 PM - fixeria

Hi Harald,

let's move this conversation from Gerrit. To give a bit more background to other potential participants, the following part of this message is my thoughts about the questions raised in <https://gerrit.osmocom.org/11068/>.

I think the big question is how the "Node address" IE contents is defined.

[...]

My question was more whether or not that would make sense in the context of Osmocom and GSUP, where neither VLR nor SGSN have global titles.

It depends on how are we going to evolve the Osmocom CNI in the future. If we will stick to the idea of isolating the CNI and having a single GSUP <-> MAP gateway to communicate with other networks, then for sure we don't need the "Node address" IE at all.

So basically we're talking about the question of who is sending this message? Is it a MAP message originated from the external MAP world directed to a GSUP-MAP gateway?

Yep, it's usually being sent to HLR by sending SMSC, but in our case the request would be processed by GSUP-MAP gateway, and forwarded to OsmoHLR.

In this case, we don't need a GSUP encoding for it, because I expect the MAP gateway would always respond with its Global Title, no matter which VLR/SGSN inside the GSUP domain is currently "hosting" the subscriber.

Right, makes sense in case of the "isolated" CNI. If all communication is routed through a single gateway, there is no need to encode this field.

Or is it a message between one (future) OsmoSMSC and another OsmoSMSC in a roaming situation between two Osmocom networks? In that case, the (IP?) address of the OsmoHLR should be returned, as it is the central router/gateway for GSUP at this point, and individual VLRs/SGSNs are not able to manage multiple GSUP connections and route between them.

AFAIR, it's only used between an external SMSC and the "target" HLR.

So my preliminary analysis is that we don't appear to need this message in the Osmocom/GSUP world. It only exists in the MAP domain and I don't think we want to replicate the direct communication of external MAP entities with our VLRs/SGSNs. This is what major operators have been working to fix by home-routed SMS in the past 5+ years for security reasons.

This message is also used to obtain the IMSI of a subscriber, so then IMSI will be used in MT-ForwardSM message. How would we make it work without that? AFAIK, some operators do indicate random IMSI values, for security reasons I guess. Maybe, such random IMSIs are actually mapped somewhere to the real IMSIs, I am not sure here...

## #4 - 11/25/2018 07:52 PM - fixeria

- Checklist item [x] Extend libosmocore's GSUP implementation with SM-specific messages and IEs set to Done  
Checklist item [x] Extend TTCN-3 library/GSUP\_Types.ttcn with SM-specific messages and IEs set to Done  
Checklist item [x] Extend the Wireshark dissector with SM-specific messages and IEs set to Done

- % Done changed from 10 to 40

libosmocore (ready for review):

<https://gerrit.osmocom.org/#/c/libosmocore/+11069/> - GSUP/SMS: introduce MO-/MT-FORWARD-SM messages

<https://gerrit.osmocom.org/#/c/libosmocore/+11751/> - GSUP/SMS: introduce READY-FOR-SM message

TTCN-3 (WIP):

<https://gerrit.osmocom.org/#/c/osmo-ttcn3-hacks/+11062/> - library/GSUP\_Types.ttcn: add MO-/MT-FORWARD-SM messages

<https://gerrit.osmocom.org/#/c/osmo-ttcn3-hacks/+11752/> - library/GSUP\_Types.ttcn: add READY-FOR-SM message

Wireshark (WIP):

<https://code.wireshark.org/review/#/c/30586/> - GSUP/SMS: add MO-/MT-FORWARD-SM message decoding

<https://code.wireshark.org/review/#/c/30587/> - GSUP/SMS: add READY-FOR-SM message decoding

#### #5 - 11/25/2018 07:59 PM - fixeria

- Checklist item [ ] OsmoMSC: introduce kill-switch for routing SMS over GSUP added

Checklist item [ ] OsmoMSC: forward MO SMS messages over GSUP added

Checklist item [ ] OsmoMSC: accept MT SMS messages over GSUP added

Checklist item [ ] TTCN-3: testing coverage for MO SMS / SMMA added

Checklist item [ ] TTCN-3: testing coverage for MT SMS added

Checklist item [ ] TTCN-3: test case for multi-part SMS added

As was asked by Harald, the new GSUP IEs and message types have been documented:

<https://gerrit.osmocom.org/#/c/osmo-gsm-manuals/+11836/> - chapters/gsup.adoc: document MO-/MT-forwardSM messages

<https://gerrit.osmocom.org/#/c/osmo-gsm-manuals/+11837/> - chapters/gsup.adoc: document READY-FOR-SM message

Neels wrote a few recommendations and warnings, which I am going to address soon.

#### #6 - 11/25/2018 08:00 PM - fixeria

- Checklist item [ ] Document the new SM-related GSUP extensions added

#### #7 - 11/25/2018 08:03 PM - fixeria

- Checklist item [x] OsmoMSC: introduce kill-switch for routing SMS over GSUP set to Done

Checklist item [x] OsmoMSC: forward MO SMS messages over GSUP set to Done

Checklist item [x] OsmoMSC: accept MT SMS messages over GSUP set to Done

<https://gerrit.osmocom.org/#/c/osmo-msc/+11918/> - libmsc/VTY: introduce kill-switch for routing SMS over GSUP

<https://gerrit.osmocom.org/#/c/osmo-msc/+11919/> - libmsc/gsm\_04\_11.c: forward MO SMS messages over GSUP

<https://gerrit.osmocom.org/#/c/osmo-msc/+11920/> - libmsc/gsm\_04\_11.c: accept MT SMS messages over GSUP

#### #8 - 11/25/2018 08:06 PM - fixeria

- Checklist item [x] TTCN-3: testing coverage for MO SMS / SMMA set to Done

Checklist item [x] TTCN-3: testing coverage for MT SMS set to Done

- Status changed from New to In Progress

- % Done changed from 40 to 80

<https://gerrit.osmocom.org/#/c/osmo-ttcn3-hacks/+11718/> - MSC\_Tests.ttcn: introduce TC\_gsup\_mo\_sms for MO SMS over GSUP

<https://gerrit.osmocom.org/#/c/osmo-ttcn3-hacks/+11776/> - MSC\_Tests.ttcn: introduce TC\_gsup\_mo\_smma for MO SMMA over GSUP

<https://gerrit.osmocom.org/#/c/osmo-ttcn3-hacks/+11924/> - MSC\_Tests.ttcn: introduce TC\_gsup\_mt\_sms\_{ack|err} for MT SMS over GSUP

#### #9 - 12/19/2018 06:56 PM - fixeria

- Checklist item [x] Document the new SM-related GSUP extensions set to Done

Checklist item [x] TTCN-3: test case for multi-part SMS set to Done

- Status changed from In Progress to Feedback

- % Done changed from 80 to 90

Everything seems to be done:

- libosmocore was extended with SM extensions (patches merged);
- all SM extensions were documented in osmo-gsm-manuals (patches merged);
- GSUP dissector in Wireshark was updated (patches merged);
- GSUP implementation in TTCN-3 was also extended with SM extensions (patches merged);
- Patches for OsmoMSC were rebased and waiting for review now;
- TTCN-3 test cases to be merged as soon as OsmoMSC patches are merged.

**#10 - 12/19/2018 09:27 PM - fixeria**

- Checklist item [ ] Add MSC diagrams to osmo-gsm-manuals added

There is an initial version by Harald:

<https://gerrit.osmocom.org/#/c/osmo-gsm-manuals/+/10604/>

which still needs to be updated.

**#11 - 12/19/2018 10:17 PM - fixeria**

- Checklist item [x] Add MSC diagrams to osmo-gsm-manuals set to Done

Updated, please see:

<https://gerrit.osmocom.org/#/c/osmo-gsm-manuals/+/10604/>

**#12 - 01/11/2019 10:54 PM - fixeria**

- Checklist item [ ] OsmoMSC: properly handle MMS indication added

- Checklist item [ ] Add MSC diagrams to osmo-gsm-manuals set to Not done

All patches, excluding <https://gerrit.osmocom.org/#/c/osmo-gsm-manuals/+/10604/> have been finally merged. [laforge](#), please let me know if I am missing something, or let's finally merge it.

OsmoMSC is now capable to forward both MO and MT messages over GSUP. But we still don't handle MMS indication in OsmoMSC, so in case of multi-part SMS, every message would cause the channel establishment and release... The proposed approach in <https://gerrit.osmocom.org/#/c/osmo-msc/+/12059/> is still to be discussed, but it makes the corresponding test case pass.

**#13 - 04/14/2019 11:31 AM - fixeria**

- Checklist item [x] Add MSC diagrams to osmo-gsm-manuals set to Done

- Status changed from Feedback to Stalled

- Priority changed from High to Normal

**#14 - 05/08/2019 01:58 PM - laforge**

It's confusing to still have this ticket open. Maybe move the MMS related checklist item to a separate ticket and close this one?

**#15 - 05/19/2019 07:46 AM - fixeria**

- Checklist item [x] OsmoMSC: properly handle MMS indication set to Done

- Status changed from Stalled to Resolved

- % Done changed from 90 to 100

It's confusing to still have this ticket open. Maybe move the MMS related checklist item to a separate ticket and close this one?

Since the patch has been merged, we can finally close this ticket.