



SMS_C REST API SMSC SMPP IMS SS7/
MAP REST API

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???? (MT - ???)

???? (MO - ???)

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1. ?????

- SMS_C ????? API
- ????SMPP?IMS?SS7/MAP????
- ???? REST API ???
- ?????
- ?????

2. ???

- ?????
- ????/????
- SMSC ????IMS/???/SMPP?
- ?????
- ?????
- ???? Web UI
- ?????

??? [????](#) ?????

3. ?????

- ?????
- ????1???2???4???8???
- ?????
- ?????
- ?????

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????

- REST API: https://localhost:8443? http://localhost:8080???
- : https://localhost:8086
- API ?Swagger UI?: https://localhost:8443/api/docs

config/runtime.exs

config/runtime.exs

config/runtime.exs

- API 8443 HTTPS 0.0.0.0
- 80 HTTP 0.0.0.0

config/runtime.exs

- omnitouch
- omnitouch2024
- localhost
- 3306
- smsc_new
- 1

config/runtime.exs

- " -
- DNS nil

config/runtime.exs

- 1440 24

config/runtime.exs

- URL: http://localhost:2080/jsonrpc
- mnc057.mcc505.3gppnetwork.org
- 55512341234
- 00101900000257
- 00101900000257
- 00101900000257

{

```

"source_msisdn": "+1234567890",
"destination_msisdn": "+0987654321",
"message_body": "Hello, World!",
"source_smsc": "web-app",
"dest_smsc": "smpp-provider",          # ?? - ??????????
"tp_dcs_character_set": "gsm7",        # ?? : gsm7, 8bit, latin1,
ucs2
"tp_dcs_coding_group": "general_data_coding",
"expires": "2025-10-17T10:30:00Z"     # ?? - ??? 24 ???
}

```

????

- destination_msisdn - ?????
- message_body - ?????
- source_msisdn - ?????
- source_smsc - ?????

????

- dest_smsc - ?????????
- source_imsi, dest_imsi - IMSI ???
- tp_dcs_character_set - ?????gsm7, 8bit, latin1, ucs2
- tp_dcs_coding_group - DCS ???
- tp_dcs_compressed - ?????
- tp_dcs_has_message_class - ?????
- tp_dcs_message_class - ???
- tp_user_data_header - ?????
- message_part_number, message_parts - ?????
- expires - ????? 24 ???
- deliver_after - ?????
- deadletter, raw_data_flag, raw_sip_flag - ???

???

```

{
  "status": "success",
  "data": {
    "id": 123,
    "source_msisdn": "+1234567890",
    "destination_msisdn": "+0987654321",
    "dest_smsc": "smpp-provider",
    "message_body": "Hello, World!",
    "deliver_time": null,
    "delivery_attempts": 0,
    "expires": "2025-10-17T10:30:00Z",
    "inserted_at": "2025-10-16T10:30:00Z"
  }
}

```

```
GET /api/messages/get_by_smsc?smsc=my-smsc-name
```

- destination_smsc  null      SMSC    
-     
-      deliver_after  null     

```
{
  "status": "success",
  "data": [
    {
      "id": 123,
      "source_msisdn": "+1234567890",
      "destination_msisdn": "+0987654321",
      "message_body": "Hello",
      "destination_smsc": "my-smsc-name",
      "delivery_attempts": 0
    }
  ]
}
```

GET /api/messages

```
GET /api/messages
```

SMSc: my-smsc-name

SMSc

SMSc

- dest_smsc ???? dest_smsc ? null
- deliver_time ? null?????
- deliver_after ? null ??????/?????
- expires ????????
- ??????

[illegible]

?


```

  1 2^1 2 2 2
  2 2^2 4 6
  3 2^3 8 14
  4 2^4 16 30
  5 2^5 32 1
  6 2^6 64 2

```

```

  2

```

```

{
  "id": 123,
  "delivery_attempts": 1,
  "deliver_after": "2025-10-20T19:05:00Z",
  "deliver_time": null,
  "expires": "2025-10-21T19:03:00Z",
  ...
}

```

```

  deliver_after GET

```

```

  2

```

```

  2

```

```

PATCH /api/messages/{id}
Content-Type: application/json

```

```

{
  "dest_smsc": "updated-gateway",
  "status": "delivered"
}

```

```

  PUT PATCH

```

- **PUT** →
- **PATCH** →

```

  2

```

```

SMS_C

```

```

  dest_smsc

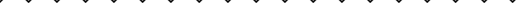
```



```
"ip_address": "10.0.1.5",
"hostname": "smpp-gw-01",
"uptime_seconds": 3600,
"status": "active",
"last_seen_at": "2025-10-20T10:30:00Z",
"expires_at": "2025-10-20T10:31:30Z",
"inserted_at": "2025-10-20T10:00:00Z"
}
```



```
GET /api/frontends
```



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```
GET /api/frontends/active
```



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```
GET /api/frontends/stats
```

```
{
  "active": 5,
  "expired": 12,
  "unique_frontends": 8
}
```

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```
GET /api/frontends/history/{frontend_name}
```

???

```
GET /api/frontends/history/smpp-gateway-1
```

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```
GET /api/frontends/{id}
```

- 
- 
- 
- 

API

```
#
```

```
curl https://localhost:8443/api/frontends/active
```

```
#
```

```
curl https://localhost:8443/api/frontends/history/smpp-gateway-1 | jq  
'.[0].status'
```

```
#
```

```
curl https://localhost:8443/api/frontends/stats
```

```
GET /api/status
```

```
GET /api/locations
```

```
POST /api/locations
```

```
GET /api/locations/{id}
```

```
PATCH /api/locations/{id}
```

```
DELETE /api/locations/{id}
```

SS7

```
GET /api/ss7_events
```

```
POST /api/ss7_events
```

```
GET /api/ss7_events/{id}
```

```
PATCH /api/ss7_events/{id}
```

```
DELETE /api/ss7_events/{id}
```

MMS

```
GET /api/mms_message_queues
```

```
POST /api/mms_message_queues
```

```
GET /api/mms_message_queues/{id}
```

```
PATCH /api/mms_message_queues/{id}
```

```
DELETE /api/mms_message_queues/{id}
```

```
SMS_C Mnesia SQL CDR
```








◇ Intel i7-8650U @ 1.90GHz ◇ 8 ◇ ◇ ◇ ◇ ◇ ◇ ◇ ◇

- insert_message 1,750 0.58
- insert_message 1,750 0.57
- ~1.5

- `get_messages_for_smsc`: 800 /  1.25 
- `list_message_queues`:     
-       62 KB

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- Mnesia +
- SQL CDR
- 24
- SQL SQL

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```

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```

```
config :sms_c,
  message_retention_hours: 24,      # 24
  batch_insert_batch_size: 100,     # SQL
  batch_insert_flush_interval ms: 100 # CDR
```

docs/PERFORMANCE_TUNING.md

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◆◆◆◆ - Web UI ◆ <https://localhost:8086>

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SmsC.Messaging.BatchInsertWorker.stats()

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```
%{
  total_enqueued: 10000,
  total_flushed: 9900,
  current_queue_size: 100,
  last_flush_duration_ms: 45
}
```

?? - ? ? ? ? ? ? ? ? stdout

```
tail -f log/dev.log
```














```
lsof -i :4000
```

```
kill -9 <PID>
```









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? ? ? ? ? API ? ? ?

```
curl http://localhost:4000/api/status
```



```
export API_BASE_URL="http://localhost:4000"
```

```
watch -n 5 'curl -s https://localhost:8443/api/messages | jq ".data | length"'
```



⬢⬢⬢⬢⬢⬢⬢⬢ Benchee ⬢ SMS-C ⬢⬢⬢⬢⬢⬢⬢⬢⬢⬢⬢



1. ⬢⬢ SMS ⬢⬢⬢⬢ (raw_sms_bench.exs)

⬢⬢⬢⬢ submit_message_raw API ⬢⬢⬢⬢⬢⬢⬢⬢⬢ SMS PDU⬢

⬢⬢⬢

- ⬢⬢⬢⬢⬢ SMS PDU⬢⬢⬢⬢ PDU ⬢⬢⬢⬢⬢⬢⬢⬢ @sample_pdus ⬢⬢⬢⬢
- ⬢⬢⬢⬢⬢⬢⬢⬢⬢⬢⬢⬢⬢⬢⬢⬢⬢⬢⬢⬢⬢⬢⬢⬢⬢⬢
- ⬢⬢⬢⬢⬢⬢⬢ HTML ⬢⬢

⬢⬢⬢

```
mix run benchmarks/raw_sms_bench.exs
```

⬢⬢⬢ benchmarks/output/raw_sms_benchmark.html

2. ⬢⬢ API ⬢⬢⬢⬢ (message_api_bench.exs)

⬢⬢⬢⬢⬢⬢⬢⬢⬢⬢ API ⬢⬢⬢⬢⬢⬢⬢⬢⬢⬢⬢⬢⬢⬢⬢⬢⬢⬢⬢⬢

⬢⬢⬢

- ⬢⬢ insert_message⬢⬢⬢⬢⬢⬢⬢⬢⬢⬢
- ⬢⬢ get_messages_for_smsc
- ⬢⬢ list_message_queues
- ⬢⬢⬢⬢⬢⬢⬢⬢⬢⬢⬢⬢⬢⬢⬢⬢⬢⬢⬢⬢⬢⬢⬢⬢⬢⬢

⬢⬢⬢

```
mix run benchmarks/message_api_bench.exs
```

⬢⬢⬢ benchmarks/output/message_api_benchmark.html



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- 2 2
- 10 2
- 2 2 2 2 2 2 2
- 2 2 2 2 2
- 2 2 2 2 HTML 2 2

2 2

HTML 2 2 2 2 2 2 2 2 2 benchmarks/output/ 2 2 2 2 2

- 2 2 2 2 2 2 2
- 2 2 2 2
- 2 2 2 2 2 2
- 2 2 2 2



SMS-C

SMS-C

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- **REST API** - 7 (HTTPS)
- **Web UI** - 10
- **Prometheus** - 9
- **OCS** - 2/2
- **DNS** - 4 ENUM/NAPTR 2

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- ◆◆◆◆◆◆ - ◆◆◆◆◆◆◆◆
- **Mnesia** ◆◆ - ◆◆◆◆◆◆◆◆
- ◆◆◆◆◆◆◆◆ - ◆◆◆◆◆◆◆◆
- ◆◆◆◆◆◆ - ◆◆◆◆◆◆◆◆

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- ◆◆◆◆◆ - ◆◆◆◆◆◆◆◆
- **CDR** ◆◆◆◆◆ - ◆◆◆ CDR ◆◆◆◆◆◆◆◆ SQL ◆◆

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- **CPU:** 2 ◆◆
- **RAM:** 4 GB
- ◆◆: 50 GB (◆◆◆◆◆◆◆◆)
- ◆◆◆◆: Linux (◆◆)◆macOS (◆◆)
- **Erlang/OTP:** 26.x ◆◆◆◆◆◆
- **Elixir:** 1.15.x ◆◆◆◆◆◆
- **SQL** ◆◆◆◆◆: MySQL 8.0+◆MariaDB 10.5+ ◆ PostgreSQL 13+ (◆◆ CDR ◆◆)

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- **CPU:** 8+ ◆◆
- **RAM:** 16+ GB
- ◆◆: 500+ GB SSD
- ◆◆: 1 Gbps+
- **SQL** ◆◆◆: ◆◆◆◆◆◆◆◆◆◆◆◆ (◆◆ CDR ◆◆)

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- **80/443** - Web UI (HTTP/HTTPS)
- **8443** - API (HTTPS)
- **4369** - Erlang ◆◆◆◆◆ (◆◆)
- **9100-9200** - Erlang ◆◆ (◆◆)
- **9568** - Prometheus ◆◆

2. [? ? ? ?](#): [? ?](#) Web UI [? ? ? ? ? ? ? ? ? ? ? ?](#) - [? ? ?](#) [SMS ? ? ? ?](#)
3. [? ? ? ? ? ?](#): [? ?](#) API [? ?](#) Web UI - [? ? ?](#) [API ? ?](#)
4. [? ?](#): [? ?](#) Prometheus [? ?](#) - [? ? ?](#) [? ? ? ?](#)

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[? ? ? ?](#) SMS-C [? ? ? ? ? ? ? ? ? ? ? ? ? ? ? ? ? ?](#) docs/ [? ? ? ?](#) markdown [? ? ?](#)



SMS-C API

[←](#) | [README](#)

SMS-C REST API /

- [API](#)
-
-
-
-
- [API](#)
- [SMS PDU API](#)
- [API](#)
- [API](#)
- [API](#)
- [MMS API](#)
- [SS7 API](#)
-
-
-

API

SMS-C REST API

URL

https://api.example.com:8443/api

: 8443 (
: HTTPS (TLS)

JSON

Content-Type: application/json

API

API 1 URL

https://api.example.com:8443/api/v2/...






TLS 

◆◆◆◆◆ TLS ◆◆◆◆◆

```
curl --cert client.crt --key client.key \
  https://api.example.com:8443/api/status
```

API

❖❖ X-API-Key ❖❖❖❖❖❖ API ❖❖❖❖❖❖❖

```
curl -H "X-API-Key: your_api_key_here" \
  https://api.example.com:8443/api/status
```

IP

API

IP








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```
{
  "data": {
    ...
  }
}
```

◆ ◆ ◆ ◆

```
{
  "errors": {
    "detail": "?? ? ? ? ? ? ? ? ? ? ? ? ?"
  }
}
```

◆ ◆ ◆ ◆

```
{
  "data": [
    {...},
    {...}
  ]
}
```


◆ ◆ ◆ ◆

API

???

```
GET /api/status
```

◆◆ (200 OK):

```
{
  "status": "ok",
  "application": "OmniMessage",
  "timestamp": "2025-10-30T12:34:56Z"
}
```

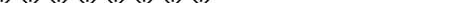
???

```
curl https://api.example.com:8443/api/status
```

???

- $\diamondsuit \spadesuit \spadesuit \spadesuit \spadesuit \spadesuit \spadesuit \spadesuit \spadesuit$
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❖❖❖❖ API



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???

```
GET /api/messages
```

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- smsc: frontend_name - ??? SMSC ??
- include-unrouted: true|false|1|0 - ?????????? false?

- false
- true

- status - pending delivered expired dropped
- source_smsc - SMSC
- dest_smsc - SMSC
- limit - 100 1000
- offset -

(200 OK):

```
{
  "data": [
    {
      "id": 12345,
      "source_msisdn": "+15551234567",
      "destination_msisdn": "+447700900000",
      "message_body": "Hello World",
      "source_smsc": "api_client",
      "dest_smsc": "uk_gateway",
      "status": "pending",
      "send_time": "2025-10-30T12:00:00Z",
      "deliver_time": null,
      "delivery_attempts": 0,
      "inserted_at": "2025-10-30T12:00:00Z"
    }
  ]
}
```

SMSC

```
curl -H "smsc: uk_gateway" \
  https://api.example.com:8443/api/messages
```

```
curl -H "smsc: uk_gateway" \
  -H "include-unrouted: true" \
  https://api.example.com:8443/api/messages
```

```
curl "https://api.example.com:8443/api/
messages?status=delivered&limit=50"
```

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◆◆◆◆◆◆◆◆◆◆◆◆

◆◆◆

GET /api/messages/:id

◆◆ (200 OK):

```
{
  "data": {
    "id": 12345,
    "source_msisdn": "+15551234567",
    "destination_msisdn": "+447700900000",
    "message_body": "Hello World",
    "source_smsc": "api_client",
    "dest_smsc": "uk_gateway",
    "source_imsi": null,
    "dest_imsi": null,
    "message_parts": 1,
    "message_part_number": 1,
    "tp_data_coding_scheme": "00",
    "tp_user_data_header": null,
    "status": "pending",
    "send_time": "2025-10-30T12:00:00Z",
    "deliver_time": null,
    "expires": "2025-10-31T12:00:00Z",
    "deadletter": false,
    "delivery_attempts": 0,
    "charge_failed": false,
    "deliver_after": "2025-10-30T12:00:00Z",
    "raw_data_flag": false,
    "raw_sip_flag": false,
    "raw_pdu": null,
    "inserted_at": "2025-10-30T12:00:00Z",
    "updated_at": "2025-10-30T12:00:00Z"
  }
}
```

◆◆◆

curl https://api.example.com:8443/api/messages/12345

◆◆◆◆◆◆◆◆◆◆

◆◆◆◆◆◆◆◆◆◆◆◆ ID◆


```
}'
```

~70 / 14

- ID
- /
-

```
POST /api/messages/create_async
Content-Type: application/json
```

(202 Accepted):

```
{
  "data": {
    "status": "accepted",
    "message": ""
  }
}
```

```
curl -X POST https://api.example.com:8443/api/messages/create_async \
-H "Content-Type: application/json" \
-d '{
  "source_msisdn": "+15551234567",
  "destination_msisdn": "+447700900000",
  "message_body": "",
  "source_smsc": "bulk_api"
}'
```

~4,650 / 0.22

100

- > 100 /
- API ID

- 1234567890

1234

12345678

123

```
PATCH /api/messages/:id
Content-Type: application/json
```

123

```
{
  "dest_smsc": "alternate_gateway",
  "deliver_after": "2025-10-30T14:00:00Z"
}
```

123456

- dest_smsc - 1234
- deliver_after - 1234
- message_body - 123456
- status - 1234

12 (200 OK):

```
{
  "data": {
    "id": 12345,
    "dest_smsc": "alternate_gateway",
    "deliver_after": "2025-10-30T14:00:00Z",
    ...
  }
}
```

123

```
curl -X PATCH https://api.example.com:8443/api/messages/12345 \
-H "Content-Type: application/json" \
-d '{
  "dest_smsc": "backup_gateway"
}'
```

12345678

1234567890

❖❖❖

```
POST /api/messages/:id/mark_delivered
Content-Type: application/json
```

❖❖❖

```
{
  "dest_smsc": "uk_gateway"
}
```

❖❖ (200 OK):

```
{
  "data": {
    "id": 12345,
    "status": "delivered",
    "deliver_time": "2025-10-30T12:05:30Z",
    "dest_smsc": "uk_gateway",
    ...
  }
}
```

❖❖❖

```
curl -X POST https://api.example.com:8443/api/messages/12345/
mark_delivered \
  -H "Content-Type: application/json" \
  -d '{
    "dest_smsc": "uk_gateway"
  }'
```

❖❖❖❖❖❖❖❖❖❖❖❖❖❖❖❖

❖❖❖❖❖❖❖

❖❖❖❖❖❖❖❖❖❖❖❖❖❖❖❖

❖❖❖

```
PUT /api/messages/:id
```

❖❖ (200 OK):

```
{
  "data": {
    "id": 12345,
    "delivery_attempts": 2,
    "deliver_after": "2025-10-30T12:08:00Z",
  }
}
```



```
deliver_after = now + 2^(delivery_attempts) minutes
```

?

```
curl -X PUT https://api.example.com:8443/api/messages/12345
```

◆ ◆ ◆ ◆



◆ ◆ ◆

```
DELETE /api/messages/:id
```

?? (204 No Content)

◆ ◆ ◆

```
curl -X DELETE https://api.example.com:8443/api/messages/12345
```


❖❖ SMS PDU API

[illegible]

◆◆◆◆ **SMS** ◆◆◆◆

◆ ◆ ◆

```
POST /api/messages_raw
Content-Type: application/json
```

◆ ◆ ◆

```
{
  "pdu": "0001000B916407007009F0000004D4F29C0E",
  "source_smsc": "legacy_system"
}
```


PDU SMS TPDU

(201 Created):

```
{
  "data": {
    "id": 12346,
    "source_msisdn": "+447700900000",
    "destination_msisdn": "+447700900000",
    "message_body": "Test",
    "source_smsc": "legacy_system",
    "raw_pdu": "0001000B916407007009F00000004D4F29C0E",
    ...
  }
}
```

```
curl -X POST https://api.example.com:8443/api/messages_raw \
-H "Content-Type: application/json" \
-d '{
  "pdu": "0001000B916407007009F00000004D4F29C0E",
  "source_smsc": "legacy_system"
}'
```

SMS

POST /api/messages_raw/async
Content-Type: application/json

(202 Accepted):

```
{
  "data": {
    "status": "accepted",
    "message": "PDU "
  }
}
```

```
curl -X POST https://api.example.com:8443/api/messages_raw/async \
-H "Content-Type: application/json" \
-d '{
  "pdu": "0001000B916407007009F00000004D4F29C0E",
  "source_smsc": "legacy_system"
}'
```

```
"source_smsc": "legacy_gateway"
}'
```

PDU

?

1. SMS 3GPP TS 23.040 PDU
2. DCS
3. CP-ACK RP-ACK
4. IMSI MSISDN
- 5.
6. PDU

?

- CP-ACK CP-ERROR -
- RP-ACK RP-ERROR RP-SMMA -
-

API

?

?

?

GET /api/locations

(200 OK):

```
{
  "data": [
    {
      "id": 1,
      "msisdn": "+15551234567",
      "imsi": "001001000000001",
      "location": "msc1.region1.example.com",
      "ran_location": "cell_tower_12345",
      "imei": "123456789012345",
      "ims_capable": true,
      "csfb": false,
      "registered": true,
      "expires": "2025-10-30T13:00:00Z",
      "user_agent": "Samsung Galaxy",
      "inserted_at": "2025-10-30T12:00:00Z",
      "updated_at": "2025-10-30T12:00:00Z"
    }
  ]
}
```

◆ ◆ ◆

```
curl https://api.example.com:8443/api/locations
```

?

```
GET /api/locations/:id
```

◆◆ (200 OK):

?

```
curl https://api.example.com:8443/api/locations/1
```

?? IMSI ??

?

```
POST /api/locations
Content-Type: application/json
```

?

```
{
  "msisdn": "+15551234567",
  "imsi": "001001000000001",
  "location": "mnc1.region1.example.com",
  "ran_location": "cell_tower_12345",
  "imei": "123456789012345",
  "ims_capable": true,
  "csfb": false,
```

```
"registered": true,
"expires": "2025-10-30T13:00:00Z",
"user_agent": "Samsung Galaxy"
}
```

◆◆◆◆◆

- imsi - ◆◆◆◆◆◆◆◆
- msisdn - ◆◆◆◆

◆◆◆◆◆

- location - MSC/VLR ◆◆
- ran_location - ◆◆/◆◆ ID
- imei - ◆◆◆◆◆
- ims_capable - IMS VoLTE ◆◆
- csfb - ◆◆◆◆◆◆◆◆
- registered - ◆◆◆◆◆◆◆◆
- expires - ◆◆◆◆◆◆◆◆
- user_agent - ◆◆◆◆◆/◆◆◆

◆◆ (201 Created ◆ 200 OK):

```
{
  "data": {
    "id": 1,
    "msisdn": "+15551234567",
    ...
  }
}
```

◆◆◆

```
curl -X POST https://api.example.com:8443/api/locations \
-H "Content-Type: application/json" \
-d '{
  "msisdn": "+15551234567",
  "imsi": "0010010000000001",
  "location": "msc1.region1.example.com",
  "ims_capable": true,
  "registered": true
}'
```

◆◆◆◆◆◆◆◆◆◆◆◆◆◆◆◆ HSS◆MME ◆◆◆◆◆

◆◆◆◆◆

◆◆◆

```
PATCH /api/locations/:id
Content-Type: application/json
```

❖❖❖❖❖❖❖❖❖❖❖❖❖❖❖❖

❖❖ (200 OK):

```
{
  "data": {
    "id": 1,
    ...
  }
}
```

❖❖❖

```
curl -X PATCH https://api.example.com:8443/api/locations/1 \
-H "Content-Type: application/json" \
-d '{
  "location": "msc2.region2.example.com",
  "ran_location": "cell_tower_67890"
}'
```

❖❖❖❖

❖❖❖

```
DELETE /api/locations/:id
```

❖❖ (204 No Content)

❖❖❖

```
curl -X DELETE https://api.example.com:8443/api/locations/1
```

❖❖❖❖❖❖❖❖❖❖❖❖❖❖❖❖

❖❖❖❖ **API**

❖❖❖❖❖❖❖❖ SMSC ❖❖❖

❖❖❖❖❖❖❖❖

❖❖❖

```
GET /api/frontends
```

❖❖ (200 OK):

```
{
  "data": [
    {
      "id": 1,
      "frontend_name": "uk_gateway_1",
      "frontend_type": "smpp",
      "ip_address": "10.0.1.50",
      "hostname": "gateway1.uk.example.com",
      "uptime_seconds": 86400,
      "configuration": {
        "max_throughput": 1000,
        "bind_type": "transceiver"
      },
      "status": "active",
      "expires_at": "2025-10-30T12:02:00Z",
      "last_seen_at": "2025-10-30T12:00:30Z",
      "inserted_at": "2025-10-29T12:00:00Z",
      "updated_at": "2025-10-30T12:00:30Z"
    }
  ]
}
```

❖❖❖

```
curl https://api.example.com:8443/api/frontends
```

❖❖❖❖❖❖❖❖

❖❖❖

```
GET /api/frontends/active
```

❖❖ (200 OK)❖❖❖❖❖❖❖❖❖❖❖❖

❖❖❖

```
curl https://api.example.com:8443/api/frontends/active
```

❖❖❖❖❖❖❖❖❖❖❖❖❖❖❖❖

❖❖❖❖❖❖❖❖❖❖❖❖

❖❖❖

```
GET /api/frontends/stats
```

❖❖ (200 OK):

```
{
  "data": {
    "active_count": 5,
    "expired_count": 2,
    "unique_frontends": 7,
    "total_registrations": 1523
  }
}
```

❖❖❖

```
curl https://api.example.com:8443/api/frontends/stats
```

❖❖❖❖❖❖❖❖

❖❖❖

```
GET /api/frontends/history/:name
```

❖❖ (200 OK):

```
{
  "data": [
    {
      "id": 1,
      "frontend_name": "uk_gateway_1",
      "status": "active",
      "inserted_at": "2025-10-30T12:00:00Z",
      ...
    },
    {
      "id": 2,
      "frontend_name": "uk_gateway_1",
      "status": "expired",
      "inserted_at": "2025-10-29T12:00:00Z",
      ...
    }
  ]
}
```

❖❖❖

```
curl https://api.example.com:8443/api/frontends/history/uk_gateway_1
```

❖❖❖❖

❖❖❖❖❖❖❖❖❖❖

???

```
POST /api/frontends/register
Content-Type: application/json
```

???

```
{
  "frontend_name": "uk_gateway_1",
  "frontend_type": "smpp",
  "ip_address": "10.0.1.50",
  "hostname": "gateway1.uk.example.com",
  "uptime_seconds": 86400,
  "configuration": {
    "max_throughput": 1000,
    "bind_type": "transceiver",
    "system_id": "gateway1"
  }
}
```

?????

- frontend_name - ?????????
- frontend_type - ???smpp?sip?http ??

?????

- ip_address - ?? IP
- hostname - ?????
- uptime_seconds - ?????????????
- configuration - ???????

?? (201 Created):

```
{
  "data": {
    "id": 1,
    "frontend_name": "uk_gateway_1",
    "status": "active",
    "expires_at": "2025-10-30T12:01:30Z",
    ...
  }
}
```

???

```
curl -X POST https://api.example.com:8443/api/frontends/register \
-H "Content-Type: application/json" \
-d '{
```



```
"frontend_name": "uk_gateway_1",
"frontend_type": "smpp",
"ip_address": "10.0.1.50",
"hostname": "gateway1.uk.example.com"
}'
```

90 60-90

API

GET /api/events/:message_id

(200 OK):

```
{
  "data": [
    {
      "event_epoch": 1698672000,
      "name": "message_inserted",
      "description": "",
      "event_source": "node1@server.example.com"
    },
    {
      "event_epoch": 1698672001,
      "name": "message_routed",
      "description": " route_id=42 uk_gateway",
      "event_source": "node1@server.example.com"
    },
    {
      "event_epoch": 1698672005,
      "name": "message_delivered",
      "description": "",
      "event_source": "node2@server.example.com"
    }
  ]
}
```

curl https://api.example.com:8443/api/events/12345

◆◆◆◆◆

- message_inserted - ◆◆◆◆
- message_routed - ◆◆◆◆◆
- message_delivered - ◆◆◆◆
- message_failed - ◆◆◆◆
- message_dropped - ◆◆◆◆◆
- auto_reply_sent - ◆◆◆◆◆◆
- number_translated - ◆◆◆◆◆◆◆
- routing_failed - ◆◆◆◆◆
- charging_failed - ◆◆◆◆

◆◆◆◆

◆◆◆

```
POST /api/events
Content-Type: application/json
```

◆◆◆

```
{
  "message_id": 12345,
  "name": "custom_event",
  "description": "◆◆◆◆◆◆◆",
  "event_source": "external_system"
}
```

◆◆ (201 Created):

```
{
  "data": {
    "message_id": 12345,
    "name": "custom_event",
    "description": "◆◆◆◆◆◆◆",
    "event_source": "external_system",
    "event_epoch": 1698672010
  }
}
```

◆◆◆

```
curl -X POST https://api.example.com:8443/api/events \
-H "Content-Type: application/json" \
-d '{
  "message_id": 12345,
  "name": "external_delivery_confirmed",
  "description": "◆◆◆◆◆◆◆"
}'
```

7

MMS API

MMS

MMS

GET /api/mms_messages

(200 OK) SMS MMS

MMS

POST /api/mms_messages
Content-Type: application/json

```
{
  "source_msisdn": "+15551234567",
  "destination_msisdn": "+447700900000",
  "subject": "Photo",
  "content_type": "image/jpeg",
  "content_location": "https://cdn.example.com/media/12345.jpg",
  "message_size": 524288
}
```

(201 Created) MMS

SS7 API

SS7

SS7

GET /api/ss7_events

(200 OK):

{

```

    "data": [
      {
        "id": 1,
        "event_type": "MAP_UPDATE_LOCATION",
        "imsi": "001001000000001",
        "msisdn": "+15551234567",
        "timestamp": "2025-10-30T12:00:00Z",
        ...
      }
    ]
  }
}

```

SS7

POST /api/ss7_events
Content-Type: application/json

```

{
  "event_type": "MAP_UPDATE_LOCATION",
  "imsi": "001001000000001",
  "msisdn": "+15551234567"
}

```

(201 Created)

HTTP

200 OK	
201 Created	
202 Accepted	
204 No Content	
400 Bad Request	
401 Unauthorized	
403 Forbidden	
404 Not Found	
422 Unprocessable Entity	
429 Too Many Requests	
500 Internal Server Error	
503 Service Unavailable	

⬢⬢⬢⬢⬢⬢

```
{
  "errors": {
    "detail": "⬢⬢⬢⬢⬢⬢destination_msisdn ⬢⬢⬢⬢"
  }
}
```

⬢⬢⬢⬢⬢⬢

	⬢⬢	⬢⬢	⬢⬢⬢⬢
"destination_msisdn is required"	⬢⬢⬢⬢⬢⬢	⬢⬢⬢⬢⬢⬢	destination_msisdn
"Invalid phone number format"	⬢⬢⬢⬢⬢⬢⬢⬢	⬢⬢	E.164 ⬢⬢⬢+15551234567
"Message too long"	⬢⬢⬢⬢⬢⬢	⬢⬢⬢⬢⬢⬢⬢	
"No route found"	⬢⬢⬢⬢	⬢⬢⬢⬢⬢⬢⬢	
"Charging failed"	OCS ⬢⬢	⬢⬢⬢⬢⬢⬢⬢⬢⬢	
"Message not found"	⬢⬢⬢⬢⬢ ID	⬢⬢ ID	⬢⬢⬢⬢
"Frontend not registered"	⬢⬢ SMSC	⬢⬢⬢⬢⬢⬢⬢	

⬢⬢⬢⬢

⬢⬢⬢⬢

	⬢⬢	⬢⬢	⬢⬢
POST /api/messages	100 req/sec	⬢⬢	IP
POST /api/messages/create_async	1000 req/sec	⬢⬢	IP
POST /api/messages_raw	100 req/sec	⬢⬢	IP
GET /api/*	1000 req/sec	⬢⬢	IP

⬢⬢⬢⬢⬢

```
X-RateLimit-Limit: 100
X-RateLimit-Remaining: 95
X-RateLimit-Reset: 1698672060
```

⬢⬢⬢⬢⬢⬢

⬢⬢ (429 Too Many Requests):

```
{
  "errors": {
    "detail": "⬢⬢⬢⬢⬢⬢⬢⬢⬢⬢ 5 ⬢⬢⬢⬢⬢⬢"
  }
}
```

???

???

1. ???? > 100 ?/? /create_async
2. ?? **source_smsc** ?
3. ???? E.164 ?+?
4. ???? 5xx ?
5. ???? ?

???

1. ???? 60 ?
2. ???? smsc ?
3. ???? **include-unrouted** ? include-unrouted: true
4. ???? mark_delivered
5. ???? PUT ?
6. ???? ?

??

1. ???? HTTP ?
2. ???? ?
3. ???? API ?
4. ???? Prometheus ?
5. ???? API ? 30 ?

??

1. ?? **TLS** ? HTTPS
2. ???? ?
3. ?? **API** ?
4. **IP** ?
5. ?? **API** ?

???

1. ?? **5xx** ?
2. ???? **4xx** ?
3. ???? ?
4. ???? ?
5. ???? ?

?? Python?

import requests

```
import time

class SMSClient:
    def __init__(self, base_url, api_key=None):
        self.base_url = base_url
        self.session = requests.Session()
        if api_key:
            self.session.headers.update({"X-API-Key": api_key})

    def submit_message(self, from_num, to_num, text,
                      async_mode=False):
        endpoint = "/messages/create_async" if async_mode else
"/messages"
        url = f"{self.base_url}{endpoint}"

        payload = {
            "source_msisdn": from_num,
            "destination_msisdn": to_num,
            "message_body": text,
            "source_smsc": "python_client"
        }

        try:
            response = self.session.post(url, json=payload,
timeout=30)
            response.raise_for_status()
            return response.json()["data"]
        except requests.exceptions.RequestException as e:
            print(f"API Error: {e}")
            return None

    def get_pending_messages(self, smsc_name,
include_unrouted=False):
        url = f"{self.base_url}/messages"
        headers = {"smsc": smsc_name}

        # ??????????????????????????????????????
        if include_unrouted:
            headers["include-unrouted"] = "true"

        try:
            response = self.session.get(url, headers=headers,
timeout=30)
            response.raise_for_status()
            return response.json()["data"]
        except requests.exceptions.RequestException as e:
            print(f"API Error: {e}")
            return []
```

```

def mark_delivered(self, message_id, smsc_name):
    url = f"{self.base_url}/messages/{message_id}/mark_delivered"
    payload = {"dest_smsc": smsc_name}

    try:
        response = self.session.post(url, json=payload,
timeout=30)
        response.raise_for_status()
        return True
    except requests.exceptions.RequestException as e:
        print(f"API Error: {e}")
        return False

# 2222
client = SMSCClient("https://api.example.com:8443/api",
api_key="your_key")

# 222222
result = client.submit_message("+15551234567", "+447700900000",
"Hello")
print(f"ID: {result['id']}")

# 222222222222
for i in range(1000):
    client.submit_message("+15551234567", f"+44770090{i:04d}", f"Bulk
{i}", async_mode=True)

# 222222
while True:
    # 22222222222222222222
    messages = client.get_pending_messages("my_gateway")

    # 222 include_unrouted=True 222222222222
    # messages = client.get_pending_messages("my_gateway",
include_unrouted=True)

    for msg in messages:
        # 222222222222
        success = deliver_via_smpp(msg)

        if success:
            client.mark_delivered(msg["id"], "my_gateway")
        else:
            # 2222
            requests.put(f"{client.base_url}/messages/{msg['id']}")

    time.sleep(5) # 5 22222

```


API

1

- 
-  CRUD
-  PDU 
- 
- 
- 

- 
- 
-  API
-  Webhook
- GraphQL API 
- OAuth2 

 API 



CDR

[←](#) [?](#)[?](#)[?](#)[?](#)[?](#)[?](#) | [?](#) **README**

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CDR [?](#)[?](#)[?](#)[?](#) Mnesia [?](#)[?](#)[?](#)[?](#)[?](#)[?](#)[?](#)[?](#)[?](#)[?](#)[?](#)[?](#)[?](#)[?](#)

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[?](#)[?](#)[?](#)

MySQL / MariaDB

```
CREATE TABLE cdrs (  
  id BIGINT AUTO_INCREMENT PRIMARY KEY,  
  
  -- ????
```

```

message_id BIGINT NOT NULL,

-- 
calling_number VARCHAR(255) NOT NULL,
called_number VARCHAR(255) NOT NULL,

-- SMSC 
source_smsc VARCHAR(255),
dest_smsc VARCHAR(255),

-- 
origin_node VARCHAR(255),
destination_node VARCHAR(255),

-- 
submission_time DATETIME NOT NULL,
delivery_time DATETIME,
expiry_time DATETIME,

-- 
status VARCHAR(50) NOT NULL,
delivery_attempts INT DEFAULT 0,
message_parts INT,
deadletter BOOLEAN DEFAULT FALSE,

-- 
message_body TEXT,

-- 
inserted_at DATETIME NOT NULL,
updated_at DATETIME NOT NULL,

-- 
INDEX idx_cdrs_message_id (message_id),
INDEX idx_cdrs_calling_number (calling_number),
INDEX idx_cdrs_called_number (called_number),
INDEX idx_cdrs_status (status),
INDEX idx_cdrs_submission_time (submission_time),
INDEX idx_cdrs_dest_smsc (dest_smsc)
);

```

PostgreSQL

```

CREATE TABLE cdrs (
  id BIGSERIAL PRIMARY KEY,

  -- 
  message_id BIGINT NOT NULL,

```

```

-- 4
calling_number VARCHAR(255) NOT NULL,
called_number VARCHAR(255) NOT NULL,

-- SMSC 2
source_smsc VARCHAR(255),
dest_smsc VARCHAR(255),

-- 12
origin_node VARCHAR(255),
destination_node VARCHAR(255),

-- 3
submission_time TIMESTAMP NOT NULL,
delivery_time TIMESTAMP,
expiry_time TIMESTAMP,

-- 5
status VARCHAR(50) NOT NULL,
delivery_attempts INTEGER DEFAULT 0,
message_parts INTEGER,
deadletter BOOLEAN DEFAULT FALSE,

-- 12
message_body TEXT,

-- 4
inserted_at TIMESTAMP NOT NULL,
updated_at TIMESTAMP NOT NULL
);

-- 2
CREATE INDEX idx_cdrs_message_id ON cdrs(message_id);
CREATE INDEX idx_cdrs_calling_number ON cdrs(calling_number);
CREATE INDEX idx_cdrs_called_number ON cdrs(called_number);
CREATE INDEX idx_cdrs_status ON cdrs(status);
CREATE INDEX idx_cdrs_submission_time ON cdrs(submission_time);
CREATE INDEX idx_cdrs_dest_smsc ON cdrs(dest_smsc);

```

4

2

2 2 2 2

id BIGINT NO CDR 7 7 7 7 7 7 7

????

?? ? ? ? ? ? ?

message_id BIGINT NO SMS-C Mnesia ID

????

?? ? ? ? ? ? ?

calling_number VARCHAR(255) NO MSISDN E.164
+15551234567
called_number VARCHAR(255) NO MSISDN E.164
+15551234567

SMSC

?? ? ? ? ? ? ?

source_smsc VARCHAR(255) YES SMSC API
SMSC NULL
dest_smsc VARCHAR(255) YES SMSC
NULL

????

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?? ? ? ? ? ? ?

origin_node VARCHAR(255) YES Erlang
sms@node1.example.com
destination_node VARCHAR(255) YES Erlang
NULL

???

???? UTC

?? ? ? ? ? ? ?

submission_time DATETIME NO SMS-C
delivery_time DATETIME YES
NULL
expiry_time DATETIME YES

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	??	??	??	??
status	VARCHAR(50)	NO	delivered	expired
			failed	rejected
delivery_attempts	INT	NO	0	
			0-255	

message_parts INT YES 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80 81 82 83 84 85 86 87 88 89 90 91 92 93 94 95 96 97 98 99 100 101 102 103 104 105 106 107 108 109 110 111 112 113 114 115 116 117 118 119 120 121 122 123 124 125 126 127 128 129 130 131 132 133 134 135 136 137 138 139 140 141 142 143 144 145 146 147 148 149 150 151 152 153 154 155 156 157 158 159 160 161 162 163 164 165 166 167 168 169 170 171 172 173 174 175 176 177 178 179 180 181 182 183 184 185 186 187 188 189 190 191 192 193 194 195 196 197 198 199 200 201 202 203 204 205 206 207 208 209 210 211 212 213 214 215 216 217 218 219 220 221 222 223 224 225 226 227 228 229 230 231 232 233 234 235 236 237 238 239 240 241 242 243 244 245 246 247 248 249 250 251 252 253 254 255 256 257 258 259 260 261 262 263 264 265 266 267 268 269 270 271 272 273 274 275 276 277 278 279 280 281 282 283 284 285 286 287 288 289 290 291 292 293 294 295 296 297 298 299 300 301 302 303 304 305 306 307 308 309 310 311 312 313 314 315 316 317 318 319 320 321 322 323 324 325 326 327 328 329 330 331 332 333 334 335 336 337 338 339 340 341 342 343 344 345 346 347 348 349 350 351 352 353 354 355 356 357 358 359 360 361 362 363 364 365 366 367 368 369 370 371 372 373 374 375 376 377 378 379 380 381 382 383 384 385 386 387 388 389 390 391 392 393 394 395 396 397 398 399 400 401 402 403 404 405 406 407 408 409 410 411 412 413 414 415 416 417 418 419 420 421 422 423 424 425 426 427 428 429 430 431 432 433 434 435 436 437 438 439 440 441 442 443 444 445 446 447 448 449 450 451 452 453 454 455 456 457 458 459 460 461 462 463 464 465 466 467 468 469 470 471 472 473 474 475 476 477 478 479 480 481 482 483 484 485 486 487 488 489 490 491 492 493 494 495 496 497 498 499 500 501 502 503 504 505 506 507 508 509 510 511 512 513 514 515 516 517 518 519 520 521 522 523 524 525 526 527 528 529 530 531 532 533 534 535 536 537 538 539 540 541 542 543 544 545 546 547 548 549 550 551 552 553 554 555 556 557 558 559 560 561 562 563 564 565 566 567 568 569 570 571 572 573 574 575 576 577 578 579 580 581 582 583 584 585 586 587 588 589 590 591 592 593 594 595 596 597 598 599 600 601 602 603 604 605 606 607 608 609 610 611 612 613 614 615 616 617 618 619 620 621 622 623 624 625 626 627 628 629 630 631 632 633 634 635 636 637 638 639 640 641 642 643 644 645 646 647 648 649 650 651 652 653 654 655 656 657 658 659 660 661 662 663 664 665 666 667 668 669 670 671 672 673 674 675 676 677 678 679 680 681 682 683 684 685 686 687 688 689 690 691 692 693 694 695 696 697 698 699 700 701 702 703 704 705 706 707 708 709 710 711 712 713 714 715 716 717 718 719 720 721 722 723 724 725 726 727 728 729 730 731 732 733 734 735 736 737 738 739 740 741 742 743 744 745 746 747 748 749 750 751 752 753 754 755 756 757 758 759 760 761 762 763 764 765 766 767 768 769 770 771 772 773 774 775 776 777 778 779 780 781 782 783 784 785 786 787 788 789 790 791 792 793 794 795 796 797 798 799 800 801 802 803 804 805 806 807 808 809 810 811 812 813 814 815 816 817 818 819 820 821 822 823 824 825 826 827 828 829 830 831 832 833 834 835 836 837 838 839 840 841 842 843 844 845 846 847 848 849 850 851 852 853 854 855 856 857 858 859 860 861 862 863 864 865 866 867 868 869 870 871 872 873 874 875 876 877 878 879 880 881 882 883 884 885 886 887 888 889 890 891 892 893 894 895 896 897 898 899 900 901 902 903 904 905 906 907 908 909 910 911 912 913 914 915 916 917 918 919 920 921 922 923 924 925 926 927 928 929 930 931 932 933 934 935 936 937 938 939 940 941 942 943 944 945 946 947 948 949 950 951 952 953 954 955 956 957 958 959 960 961 962 963 964 965 966 967 968 969 970 971 972 973 974 975 976 977 978 979 980 981 982 983 984 985 986 987 988 989 990 991 992 993 994 995 996 997 998 999 1000 1001 1002 1003 1004 1005 1006 1007 1008 1009 1010 1011 1012 1013 1014 1015 1016 1017 1018 1019 1020 1021 1022 1023 1024 1025 1026 1027 1028 1029 1030 1031 1032 1033 1034 1035 1036 1037 1038 1039 1

deadletter BOOLEAN NO  TRUE
FALSE

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	2	2		2	2				2	2	2		2	2	2	2
delivered	2	2	2	2	2	2	2			2				2	2	2
expired	2	2	2	2	2	2	2			2	2	2	2	2	2	2
failed	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
rejected	2	2	2	2	2	2	2	2	2	2						












- [REDACTED] CDR [REDACTED]/[REDACTED]
- [REDACTED] delete_message_body_after_delivery: true [REDACTED]
NULL
- [REDACTED]

?????

??

??

?

??

inserted_at DATETIME NO CDR ?????????????????????? delivery_time/
expiry_time ??????
updated_at DATETIME NO CDR ?????????????????????? inserted_at
?????

SQL ??

?????

???????? CDR?

```
SELECT * FROM cdrs
WHERE calling_number = '+15551234567'
      OR called_number = '+15551234567'
ORDER BY submission_time DESC
LIMIT 100;
```

????????

```
SELECT status, COUNT(*) as count
FROM cdrs
GROUP BY status;
```

????????

```
SELECT AVG(TIMESTAMPDIFF(SECOND, submission_time, delivery_time)) AS
avg_delivery_seconds
FROM cdrs
WHERE status = 'delivered'
      AND delivery_time IS NOT NULL;
```

?????

???? SMSC ?????

```
SELECT
  DATE(submission_time) AS date,
  dest_smsc,
  COUNT(*) AS message_count,
  SUM(CASE WHEN status = 'delivered' THEN 1 ELSE 0 END) AS
delivered_count,
  SUM(message_parts) AS total_segments
FROM cdrs
```

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```

SELECT
    message_parts,
    COUNT(*) AS message_count,
    AVG(TIMESTAMPDIFF(SECOND, submission_time, delivery_time)) AS
avg_delivery_seconds
FROM cdrs
WHERE message_parts IS NOT NULL
    AND status = 'delivered'
GROUP BY message_parts
ORDER BY message_parts;

```

??????

```

SELECT
    called_number,
    COUNT(*) AS failure_count,
    AVG(delivery_attempts) AS avg_attempts,
    MAX(submission_time) AS last_failure
FROM cdrs
WHERE status IN ('failed', 'expired')
    AND submission_time >= DATE_SUB(NOW(), INTERVAL 7 DAY)
GROUP BY called_number
HAVING failure_count >= 5
ORDER BY failure_count DESC;

```

??????

??????

```

SELECT
    submission_time,
    calling_number,
    called_number,
    status,
    message_body,
    delivery_time
FROM cdrs
WHERE (
    (calling_number = '+15551234567' AND called_number =
'+15559876543')
    OR
    (calling_number = '+15559876543' AND called_number =
'+15551234567')
)
    AND submission_time >= '2025-10-01'
    AND submission_time < '2025-11-01'
ORDER BY submission_time;

```

```
-- --
SELECT COUNT(*) FROM cdrs
WHERE submission_time < DATE_SUB(NOW(), INTERVAL 2 YEAR);

-- 
DELETE FROM cdrs
WHERE submission_time < DATE_SUB(NOW(), INTERVAL 2 YEAR)
LIMIT 10000; --
```

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?

PRIMARY	id	
idx_cdrs_message_id	message_id	ID CDR
idx_cdrs_calling_number	calling_number	
idx_cdrs_called_number	called_number	
idx_cdrs_status	status	
idx_cdrs_submission_time	submission_time	
idx_cdrs_dest_smsc	dest_smsc	








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MySQL

— —   






CDR

1.

config/runtime.exs

```
config :sms_c,  
  # ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐  
  delete message body after delivery: true,
```

```
# UI
hide_message_body_in_ui: true,

#
hide_message_body_in_export: true
```

2.

```
-- 4
SELECT
  CONCAT(SUBSTRING(calling_number, 1, LENGTH(calling_number) - 4),
'XXXX') AS masked_calling,
  CONCAT(SUBSTRING(called_number, 1, LENGTH(called_number) - 4),
'XXXX') AS masked_called,
  COUNT(*) AS message_count
FROM cdrs
GROUP BY masked_calling, masked_called;
```

3.

MySQL

```
--
ALTER TABLE cdrs ENCRYPTION='Y';
```

PostgreSQL PostgreSQL TDE

4.

```
 CDR
```

```
--
CREATE USER 'billing_ro'@'%' IDENTIFIED BY 'secure_password';
GRANT SELECT ON sms_c.cdrs TO 'billing_ro'@'%';

--
CREATE USER 'analytics'@'%' IDENTIFIED BY 'secure_password';
GRANT SELECT (id, message_id, calling_number, called_number,
source_smsc,
dest_smsc, submission_time, delivery_time, status,
delivery_attempts, message_parts)
ON sms_c.cdrs TO 'analytics'@'%';
```

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◆◆◆◆◆◆◆ 18-24 ◆◆ FCC◆◆◆◆
◆◆◆◆◆◆◆ 6 ◆◆ - 2 ◆ GDPR◆◆◆◆◆
◆◆ 5-7 ◆ SOX◆SEC
◆◆ 6 ◆ HIPAA

◆◆◆◆

1. ◆◆◆◆◆MySQL 8.0+◆PostgreSQL 11+◆

```
-- MySQL ◆◆◆◆  
ALTER TABLE cdrs PARTITION BY RANGE (TO_DAYS(submission_time)) (  
  PARTITION p202510 VALUES LESS THAN (TO_DAYS('2025-11-01')),  
  PARTITION p202511 VALUES LESS THAN (TO_DAYS('2025-12-01')),  
  PARTITION p202512 VALUES LESS THAN (TO_DAYS('2026-01-01')),  
  PARTITION p_future VALUES LESS THAN MAXVALUE  
);  
  
-- ◆◆◆◆◆◆◆◆◆◆◆◆  
ALTER TABLE cdrs DROP PARTITION p202510;
```

2. ◆◆◆◆◆◆

```
-- ◆◆ CDR ◆◆◆◆◆◆  
CREATE TABLE cdrs_archive LIKE cdrs;  
  
INSERT INTO cdrs_archive  
SELECT * FROM cdrs  
WHERE submission_time < DATE_SUB(NOW(), INTERVAL 2 YEAR);  
  
-- ◆◆◆◆◆◆◆◆◆◆  
DELETE FROM cdrs  
WHERE submission_time < DATE_SUB(NOW(), INTERVAL 2 YEAR);
```

3. ◆◆◆◆◆◆

```
#!/bin/bash  
# cleanup_old_cdrs.sh - ◆◆ cron ◆◆  
  
MYSQL_USER="cleanup_user"  
MYSQL_PASS="secure_password"
```

```
MYSQL_DB="sms_c"
RETENTION_DAYS=730 # 2
```

```
#
mysql -u"$MYSQL_USER" -p"$MYSQL_PASS" "$MYSQL_DB" <<EOF
INSERT INTO cdrs_archive
SELECT * FROM cdrs
WHERE submission_time < DATE_SUB(NOW(), INTERVAL $RETENTION_DAYS DAY)
LIMIT 100000;

DELETE FROM cdrs
WHERE submission_time < DATE_SUB(NOW(), INTERVAL $RETENTION_DAYS DAY)
LIMIT 100000;
EOF
```

Cron

```
# 2
0 2 * * * /usr/local/bin/cleanup_old_cdrs.sh >> /var/log/sms_c/
cleanup.log 2>&1
```

```
CREATE TABLE billing_rates (
  id INT AUTO_INCREMENT PRIMARY KEY,
  destination_prefix VARCHAR(20) NOT NULL,
  description VARCHAR(255),
  rate_per_message DECIMAL(10, 6) NOT NULL,
  rate_per_segment DECIMAL(10, 6) NOT NULL,
  currency VARCHAR(3) DEFAULT 'USD',
  effective_date DATE NOT NULL,
  expiry_date DATE,
  INDEX idx_prefix (destination_prefix),
  INDEX idx_dates (effective_date, expiry_date)
);
```

```
--
```

```
INSERT INTO billing_rates (destination_prefix, description,
rate_per_message, rate_per_segment, effective_date) VALUES
('+1', ' / ', 0.0050, 0.0050, '2025-01-01'),
('+44', ' ', 0.0080, 0.0080, '2025-01-01'),
('+61', ' ', 0.0100, 0.0100, '2025-01-01'),
('+', ' ', 0.0150, 0.0150, '2025-01-01');
```

◆◆◆◆

◆ CDR ◆◆◆◆◆◆◆◆◆◆

```
SELECT
  DATE(c.submission_time) AS date,
  c.dest_smsc AS route,
  LEFT(c.called_number,
    CASE
      WHEN c.called_number LIKE '+1%' THEN 2
      WHEN c.called_number LIKE '+%' THEN
LENGTH(SUBSTRING_INDEX(c.called_number, '', 4))
      ELSE 0
    END
  ) AS destination_prefix,
  COUNT(*) AS message_count,
  SUM(c.message_parts) AS segment_count,
  COALESCE(r.rate_per_segment, 0.015) AS rate,
  SUM(c.message_parts) * COALESCE(r.rate_per_segment, 0.015) AS
total_cost
FROM cdrs c
LEFT JOIN billing_rates r ON c.called_number LIKE
CONCAT(r.destination_prefix, '%')
  AND c.submission_time >= r.effective_date
  AND (r.expiry_date IS NULL OR c.submission_time < r.expiry_date)
WHERE c.status = 'delivered'
  AND c.submission_time >= '2025-10-01'
  AND c.submission_time < '2025-11-01'
GROUP BY date, route, destination_prefix
ORDER BY date DESC, total_cost DESC;
```

◆◆◆◆◆◆◆◆

CSV ◆◆◆

```
mysql -u billing_ro -p -D sms_c -e "
SELECT
  id,
  message_id,
  calling_number,
  called_number,
  dest_smsc,
  submission_time,
  delivery_time,
  status,
  message_parts
FROM cdrs
WHERE submission_time >= '2025-10-01'
```

```
AND submission_time < '2025-11-01'  
AND status = 'delivered'  
" --batch --silent | sed 's/\t/,/g' > billing_export_202510.csv
```

◆◆◆◆

- [◆◆◆◆](#) - ◆◆ CDR ◆◆◆◆
- [◆◆◆◆](#) - CDR ◆◆◆◆
- [API ◆◆](#) - ◆◆ REST API ◆◆ CDR



SMS-C

[!\[\]\(919a2cb85b99741a73c0c31a427236a8_img.jpg\) !\[\]\(c9cd5a1c35167a83f09a35036fe5dcbd_img.jpg\)!\[\]\(ae1936640fabdea8c18f922ca69733fe_img.jpg\)!\[\]\(e81307241bb070bc7c1be4e4328b2244_img.jpg\)!\[\]\(5145ac5c495d0d3391897543e0ba7223_img.jpg\)!\[\]\(c54e412b04b5328aafba8694cbbf005c_img.jpg\)!\[\]\(bd2b6ac7b99de9813666552a602ceeab_img.jpg\)](#) | [!\[\]\(d80b2390f0f7822c04f60d5c3d16d9a9_img.jpg\) **README**](#)

 SMS-C 



- [!\[\]\(30a147af384f9f71632c2ff17bc706c8_img.jpg\)!\[\]\(9b33568d5c136f08ca688ce48be37574_img.jpg\)!\[\]\(8c93063dab026f10e159986b27c41c64_img.jpg\)!\[\]\(8a17676a8da87a4e59299223a765e613_img.jpg\)](#)
- [!\[\]\(f7fdc7cc047b770fc5fdd2c2137c07d9_img.jpg\)!\[\]\(3ca549f0313858650ddae522dc3cfea6_img.jpg\)!\[\]\(b6026cac39735f17b6ea8953e5327900_img.jpg\)!\[\]\(7e162357375a287a75d78d6b99984a4b_img.jpg\)!\[\]\(17fbc2f440f4c1d85c1121a996c73050_img.jpg\)!\[\]\(e100ad62ff00cad3ca348f6415824aa9_img.jpg\)](#)
- [**API** !\[\]\(1fff0a586fa7d27b010d64add4cf3680_img.jpg\)!\[\]\(bb22b2107892007540cc435057e4c165_img.jpg\)](#)
- [**Web UI** !\[\]\(16441054f664d301882ef8e39209b9d7_img.jpg\)!\[\]\(de549fc12e3be9e4997f0e7923c57939_img.jpg\)](#)
- [!\[\]\(40a4d8461f296a8628f9012feced50b1_img.jpg\)!\[\]\(a46e2710be12eace1aba8fca52435d9c_img.jpg\)!\[\]\(7ec07b4f2cb6a93820ac076ff6467f86_img.jpg\)!\[\]\(3bef4187f3fb23c4b59ca307c68c8afe_img.jpg\)](#)
- [!\[\]\(e88bce2ef78f7b03c29df7924e3467c3_img.jpg\)!\[\]\(6c2ae3d74fdca8a8bb9901f2a6690e04_img.jpg\)!\[\]\(d4ae9bb291a4cfd12030e8d300c85239_img.jpg\)!\[\]\(df527b79be19a2aa675e4c6cac17441f_img.jpg\)!\[\]\(35bc9821de54ccb6fa05c02ce04636bf_img.jpg\)!\[\]\(219e8a42ac7cb5431795433b64bc6993_img.jpg\)](#)
- [!\[\]\(bc8c36442032bb78689cc18050ea67bd_img.jpg\)!\[\]\(0a1b412fba0ca2d320c414f2947fc40d_img.jpg\)!\[\]\(7cadf233dcd3295ffef3be119ebc1152_img.jpg\)!\[\]\(303fa59aa1f4f67ce68537ff548f8e20_img.jpg\)](#)
- [**ENUM** !\[\]\(da88350b84ffdfde3077de1fa9143978_img.jpg\)!\[\]\(394c2a8104fd26c1a3b6ccc235272013_img.jpg\)](#)
- [!\[\]\(c8f7873209981b8b213eea3be186bb8f_img.jpg\)!\[\]\(0854d449332ab49ab3320e359370c94f_img.jpg\)!\[\]\(fe72043a841d998aea23fd418b5dcc44_img.jpg\)!\[\]\(dc24c0584691f1ee6d9b656a56d01ae8_img.jpg\)!\[\]\(369bf214c70869101be24681360b6c6e_img.jpg\)!\[\]\(12738b364c9fc7797d87c60fcf605202_img.jpg\)](#)
- [!\[\]\(3627a6029fb11e4d2d43d81c6b012292_img.jpg\)!\[\]\(6f4b8cde95629e0dcce1ea9a28cf4ac4_img.jpg\)!\[\]\(826d198aa47618b554eb9cc2b1bb2d8d_img.jpg\)!\[\]\(2232964526237fe5ba9e209a75b146b5_img.jpg\)](#)
- [!\[\]\(98cb5f74033094b367332274f0f7b11a_img.jpg\)!\[\]\(8f7b7b66c8d54e736ad0349b2917b488_img.jpg\)!\[\]\(f11342ca2a51aea7cdf02c1aa4921e7e_img.jpg\)!\[\]\(aed214b3d1c7674d68442845520b8a11_img.jpg\)!\[\]\(b72f1c1140730d330c91c149260ba9fa_img.jpg\)!\[\]\(53be05edb30837b70d8c292be5126091_img.jpg\)](#)
- [!\[\]\(8bf0855fcfa3bce57ff848fe895cbc3a_img.jpg\)!\[\]\(d4563baca7cf104aed0bdc65078cea91_img.jpg\)!\[\]\(40c04beb4619928517fa1a5d9445096e_img.jpg\)!\[\]\(e7da46ef6ba6cc8da35fe4d21840a501_img.jpg\)](#)
- [!\[\]\(e5662b41472b11859a18ed86ff4635e8_img.jpg\)!\[\]\(5938a6c2c1a01f6efe5c9e5d553a53b2_img.jpg\)!\[\]\(7e5d59b7bc3c2482c19a52680e05cf6d_img.jpg\)!\[\]\(3be108a41822726714f08fd3df8a4baa_img.jpg\)!\[\]\(d86e58e61d00b8126ffd2efdf3ca9855_img.jpg\)!\[\]\(38a05adf6a86c1812f08922fc0deec4c_img.jpg\)](#)



SMS-C 

config/config.exs



- 
- 
- 
- 

config/runtime.exs



- 
- 
- 
- 

- `config/prod.exs`

`config/prod.exs`

`runtime.exs`

`runtime.exs` `API`

SQL CDR

SMS-C **Mnesia** `SQL`
`CDR`

SQL

`SQL` `CDR`

<code>MySQL</code>	<code>8.0+</code>	<code>Ecto.Adapters.MyXQL</code>	<code>3306</code>	<code>MySQL</code>
<code>MariaDB</code>	<code>10.5+</code>	<code>Ecto.Adapters.MyXQL</code>	<code>3306</code>	<code>MySQL</code>
<code>PostgreSQL</code>	<code>13+</code>	<code>Ecto.Adapters.Postgres</code>	<code>5432</code>	<code>JSON</code>

`Mnesia` `SQL` `CDR`

MySQL / MariaDB

```
# config/runtime.exs
config :sms_c, SmsC.Repo,
  adapter: Ecto.Adapters.MyXQL,
  username: System.get_env("DB_USERNAME") || "sms_user",
  password: System.get_env("DB_PASSWORD") || "secure_password",
  hostname: System.get_env("DB_HOSTNAME") || "localhost",
  port: String.to_integer(System.get_env("DB_PORT") || "3306"),
  database: System.get_env("DB_NAME") || "sms_c_prod",
  pool_size: String.to_integer(System.get_env("DB_POOL_SIZE") ||
"20")
```

PostgreSQL

```
# config/runtime.exs
config :sms_c, SmsC.Repo,
  adapter: Ecto.Adapters.Postgres,
  username: System.get_env("DB_USERNAME") || "sms_user",
  password: System.get_env("DB_PASSWORD") || "secure_password",
  hostname: System.get_env("DB_HOSTNAME") || "localhost",
  port: String.to_integer(System.get_env("DB_PORT") || "5432"),
```

```

database: System.get_env("DB_NAME") || "sms_c_prod",
pool_size: String.to_integer(System.get_env("DB_POOL_SIZE") ||
"20")

```

SQL

MySQL/MariaDB -

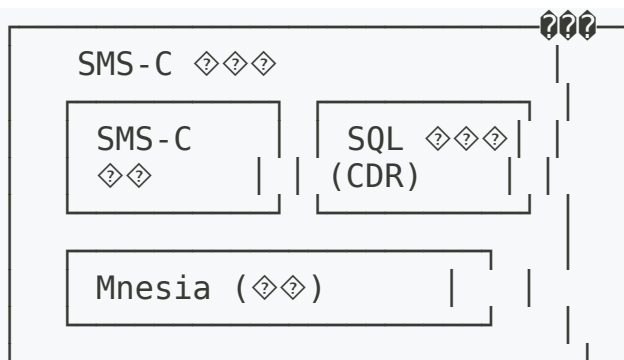
- CDR
-
-
-

PostgreSQL -

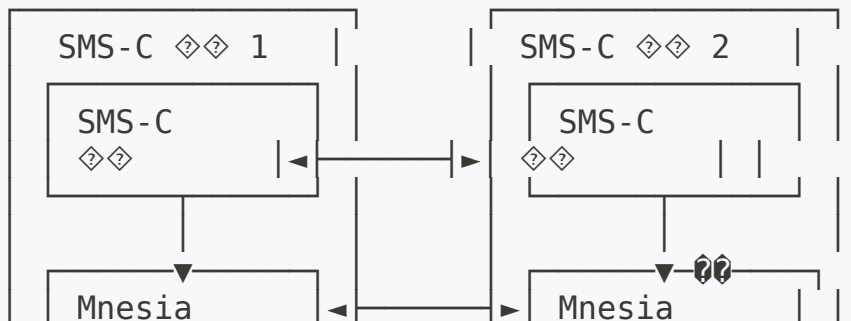
- JSON/JSONB
- CDR
- PostgreSQL
- PostGIS

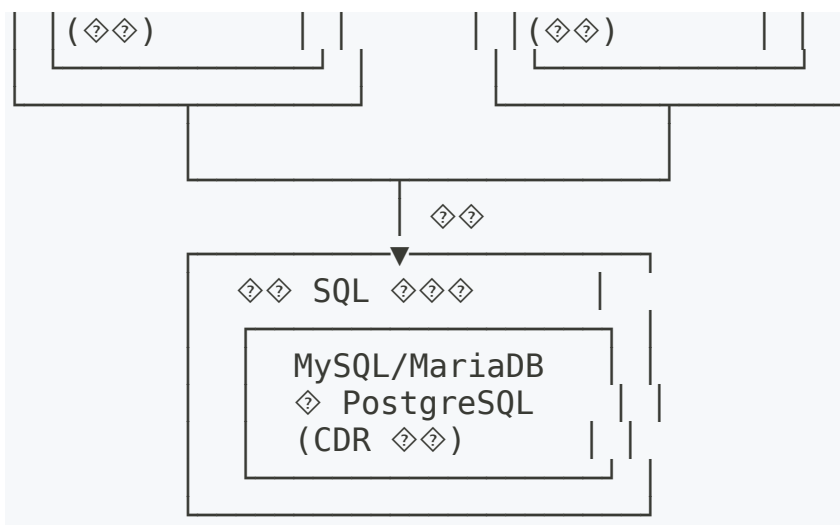
SQL CDR SMS-C

/



-





SQL

- CDR
-
- SMS-C
- SMS-C CDR
-

	5-10		
(< 100 msg/sec)	10-15		
(100-1000 msg/sec)	20-30		
(> 1000 msg/sec)	40-100		

pool_size = (DB) * 1.5

#

```
export DB_USERNAME=sms_prod_user
export DB_PASSWORD=strong_password_here
export DB_HOSTNAME=db-primary.internal.example.com
export DB_PORT=3306
export DB_NAME=sms_c_production
export DB_POOL_SIZE=30
```

config :sms_c, SmsC.Repo,

```
username: "dev_user",
password: "dev_password",
hostname: "localhost",
database: "sms_c_dev",
pool_size: 5
```

◆◆◆◆◆

◆◆ Prometheus ◆◆◆◆◆◆◆◆◆◆

- ecto_pools_queue_time - ◆◆◆◆◆◆◆
- ecto_pools_query_time - ◆◆◆◆◆◆
- ecto_pools_connected_count - ◆◆◆◆◆

◆◆◆◆◆◆◆◆◆◆ 100ms◆◆◆◆◆◆◆ - ◆◆◆◆◆◆◆◆◆◆

API ◆◆

REST API ◆◆◆◆◆◆◆◆◆◆

◆◆ API ◆◆

```
# config/runtime.exs
config :api_ex,
  port: String.to_integer(System.get_env("API_PORT") || "8443"),
  listen_ip: System.get_env("API_LISTEN_IP") || "0.0.0.0",
  enable_tls: System.get_env("API_ENABLE_TLS") != "false"
```

TLS/SSL ◆◆

◆◆◆◆◆ TLS ◆◆◆◆◆

```
config :api_ex,
  port: 8443,
  listen_ip: "0.0.0.0",
  enable_tls: true,
  tls_cert_path: "/etc/sms_c/certs/server.crt",
  tls_key_path: "/etc/sms_c/certs/server.key"
```

◆◆◆◆◆◆◆ TLS◆

```
config :api_ex,
  port: 8080,
  listen_ip: "127.0.0.1",
  enable_tls: false
```

API

```
mkdir -p priv/cert
```

```
openssl genrsa -out priv/cert/server.key 2048
```



```
openssl req -new -key priv/cert/server.key -out priv/cert/server.csr \
  -subj "/C=US/ST=State/L=City/O=Organization/CN=sms-api.example.com"
```

? ? ? ? ? ? ? ? ? ? 365 ? ?

```
openssl x509 -req -days 365 -in priv/cert/server.csr \
    -signkey priv/cert/server.key -out priv/cert/server.crt
```

? ? ? ?

```
chmod 600 priv/cert/server.key
```

```
chmod 644 priv/cert/server.crt
```

CA Let's Encrypt CA

API

IP

iptables Linux

```
iptables -A INPUT -p tcp --dport 8443 -s 10.0.0.0/8 -j ACCEPT
```

```
iptables -A INPUT -p tcp --dport 8443 -j DROP
```

```
#  firewalld  Red Hat/CentOS 
```

```
firewall-cmd --permanent --add-rich-rule='rule family="ipv4" source
address="10.0.0.0/8" port protocol="tcp" port="8443" accept'
firewall-cmd --reload
```

API

Web UI

Web 

◆◆ Web UI ◆◆

```
# config/runtime.exs
config :control_panel,
  port: String.to_integer(System.get_env("WEB_PORT") || "80"),
  hostname: System.get_env("WEB_HOSTNAME") || "localhost",
  enable_tls: System.get_env("WEB_ENABLE_TLS") == "true"
```

◆◆ Web UI ◆◆

```
config :control_panel,
  port: 443,
  hostname: "sms-admin.example.com",
  enable_tls: true,
  tls_cert_path: "/etc/sms_c/certs/web.crt",
  tls_key_path: "/etc/sms_c/certs/web.key"
```

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◆◆ Nginx ◆ Apache ◆◆◆◆◆◆◆◆◆◆◆◆◆◆◆◆

Nginx ◆◆◆◆◆

```
upstream sms_web {
  server 127.0.0.1:4000;
  keepalive 32;
}

server {
  listen 80;
  server_name sms-admin.example.com;
  return 301 https://$server_name$request_uri;
}

server {
  listen 443 ssl http2;
  server_name sms-admin.example.com;

  ssl_certificate /etc/letsencrypt/live/sms-admin.example.com/
fullchain.pem;
  ssl_certificate_key /etc/letsencrypt/live/sms-admin.example.com/
privkey.pem;
  ssl_protocols TLSv1.2 TLSv1.3;
  ssl_ciphers HIGH:!aNULL:!MD5;

  # ◆◆◆◆◆◆◆◆◆◆
  auth_basic "SMS-C Admin";
  auth_basic_user_file /etc/nginx/.htpasswd;
```

```

location / {
    proxy_pass http://sms_web;
    proxy_http_version 1.1;
    proxy_set_header Upgrade $http_upgrade;
    proxy_set_header Connection "upgrade";
    proxy_set_header Host $host;
    proxy_set_header X-Real-IP $remote_addr;
    proxy_set_header X-Forwarded-For $proxy_add_x_forwarded_for;
    proxy_set_header X-Forwarded-Proto $scheme;
}

#  WebSocket LiveView
location /live {
    proxy_pass http://sms_web;
    proxy_http_version 1.1;
    proxy_set_header Upgrade $http_upgrade;
    proxy_set_header Connection "upgrade";
    proxy_read_timeout 86400;
}
}

```

?

SMS-C

?

```

# config/runtime.exs
config :sms_c,
  cluster_nodes: [], #  = 
  smsc_node_name: "node1"

```

?

```

# 1: config/runtime.exs
config :sms_c,
  cluster_nodes: [
    : "sms@node1.internal.example.com",
    : "sms@node2.internal.example.com",
    : "sms@node3.internal.example.com"
  ],
  smsc_node_name: "node1"

```

```

# 2: config/runtime.exs
config :sms_c,
  cluster_nodes: [

```



```
      "sms@node1.internal.example.com",
      "sms@node2.internal.example.com",
      "sms@node3.internal.example.com"
    ],
    smsc_node_name: "node2"
```

?? DNS ? ? ? ?

```
config :sms_c,  
  dns_cluster_query: "sms-cluster.internal.example.com",  
  smsc_node_name: System.get_env("NODE_NAME") || "node1"
```

DNS

```
# ? ? ? ? ? ? ? SRV ? A ? ?
# SRV ? ? ? ? ? ? ?
_sms._tcp.sms-cluster.internal.example.com. IN SRV 0 0 0
node1.internal.example.com.
_sms._tcp.sms-cluster.internal.example.com. IN SRV 0 0 0
node2.internal.example.com.
_sms._tcp.sms-cluster.internal.example.com. IN SRV 0 0 0
node3.internal.example.com.
```

```
# A 2 2 2 2 2 2
sms-cluster.internal.example.com. IN A 10.0.1.10
sms-cluster.internal.example.com. IN A 10.0.1.11
sms-cluster.internal.example.com. IN A 10.0.1.12
```

Erlang

◆ ◆ ◆ ◆ ◆ ◆ ◆ ◆ ◆ ◆ ◆ ◆

```
# 1
export NODE_NAME=sms@node1.internal.example.com
export ERLANG_COOKIE=shared_secret_cookie_here
elixir --name $NODE_NAME --cookie $ERLANG_COOKIE -S mix phx.server
```

```
# 2
export NODE_NAME=sms@node2.internal.example.com
export ERLANG_COOKIE=shared_secret_cookie_here
elixir --name $NODE_NAME --cookie $ERLANG_COOKIE -S mix phx.server
```

Erland cookie










4369 TCP Erlang EPMD
9100-9200 TCP Erlang

```
#  
iptables -A INPUT -p tcp -s 10.0.0.0/8 --dport 4369 -j ACCEPT  
iptables -A INPUT -p tcp -s 10.0.0.0/8 --dport 9100:9200 -j ACCEPT
```

```
# config/runtime.exs  
config :sms_c,  
  dead_letter_time_minutes: 1440 # 24
```

- **60** - 1 /
- **1440** - 24
- **4320** - 3
- **10080** - 7

$2^{()}$

1	2
2	4
3	8
4	16
5	32
6	64
7	128
8	256

dead_letter_time_minutes

```
# config/config.exs
config :sms_c,
  cleanup_interval_minutes: 10,
  fingerprint_ttl_minutes: 5,
  event_ttl_days: 7
```

- **cleanup_interval_minutes**
- **fingerprint_ttl_minutes**
- **event ttl days**

◆ ◆ ◆ ◆

```
# config/runtime.exs
config :sms_c,
  default_charging_enabled: true,
  ocs_url: "http://ocs.internal.example.com:2080/jsonrpc",
  ocs_tenant: "sms.example.com",
  ocs_destination: "default",
  ocs_source: "sms_platform",
  ocs_subject: "sms_user",
  ocs_account: "default_account"
```

```
# config/runtime.exs
config :sms_c,
  default_charging_enabled: false
```









```
config :sms_c,  
  ocs_url: System.get_env("OCS_URL") || "http://localhost:2080/  
jsonrpc",  
  ocs_tenant: System.get_env("OCS_TENANT") || "tenant1.example.com",  
  ocs_account: System.get_env("OCS_ACCOUNT") || "default"
```

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```
# 1
export OCS_TENANT=tenant1.example.com
export OCS_ACCOUNT=tenant1_account
```

```
# 2
export OCS_TENANT=tenant2.example.com
export OCS_ACCOUNT=tenant2_account
```

1

2

```
config :sms_c,
  charging_failure_action: :allow # :deny
```

- **:allow** - 1
- **:deny** - 2

OCS 1

1 OCS 1

```
# 1 OCS API
curl -X POST http://ocs.internal.example.com:2080/jsonrpc \
-H "Content-Type: application/json" \
-d '{
  "method": "SessionSv1.AuthorizeEvent",
  "params": [{
    "Tenant": "sms.example.com",
    "Account": "test_account",
    "Destination": "1234567890",
    "Usage": 100
  }],
  "id": 1
}'
```

1

```
{
  "id": 1,
  "result": {
    "Attributes": {},
    "MaxUsage": 100,
    ...
  }
}
```

ENUM

  DNS  E.164        

ENUM

```
# config/runtime.exs
config :sms_c,
  enum_enabled: false
```

ENUM DNS

```
config :sms_c,
  enum_enabled: true,
  enum_domains: ["e164.arpa", "e164.org"],
  enum_dns_servers: [], #      DNS
  enum_timeout: 5000 # 5 
```

ENUM DNS

```
config :sms_c,
  enum_enabled: true,
  enum_domains: ["e164.internal.example.com", "e164.arpa"],
  enum_dns_servers: [
    {"10.0.1.53", 53}, #   DNS  
    {"8.8.8.8", 53}, # Google   DNS  
    {"1.1.1.1", 53} # Cloudflare DNS   
  ],
  enum_timeout: 3000 # 3        
```

ENUM

```
config :sms_c,
  enum_domains: [
    "e164.internal.example.com", #    
    "e164.carrier.net", #    
    "e164.arpa" #    
  ]
```

ENUM

```
enum_timeout: 2000 # 2 
```

#####/#####

```
enum_timeout: 10000 # 10
```

ENUM DNS

ENUM ##### BIND9

```
; e164.internal.example.com  
$ORIGIN e164.internal.example.com.  
$TTL 300
```

```
; +1-555-0100 0.0.1.0.5.5.5.1.e164.internal.example.com  
0.0.1.0.5.5.5.1.e164.internal.example.com. IN NAPTR 100 10 "u"  
"E2U+sip" "!.*!sip:15550100@voip-gateway.example.com!" .  
0.0.1.0.5.5.5.1.e164.internal.example.com. IN NAPTR 100 20 "u"  
"E2U+pstn" "!.*!pstn:gateway-a.example.com!" .
```

```
; +1-555-0200  
0.0.2.0.5.5.5.1.e164.internal.example.com. IN NAPTR 100 10 "u"  
"E2U+sip" "!.*!sip:15550200@voip-gateway.example.com!" .
```

ENUM

```
# ##### ENUM  
dig @10.0.1.53 NAPTR 0.0.1.0.5.5.5.1.e164.internal.example.com  
  
# ##### NAPTR  
# 0.0.1.0.5.5.5.1.e164.internal.example.com. 300 IN NAPTR 100 10 "u"  
"E2U+sip" "!.*!sip:15550100@voip-gateway.example.com!" .
```

#####

#####

#####

```
# config/runtime.exs  
config :sms_c,  
  translation_rules: []
```

#####

#####

```
config :sms_c,  
  translation_rules: [
```

```
%{
  calling_prefix: nil,
  called_prefix: "",
  source_smsc: nil,
  calling_match: "^(\\d{10})$",
  calling_replace: "+1\\1",
  called_match: "^(\\d{10})$",
  called_replace: "+1\\1",
  priority: 100,
  description: "10 +1",
  enabled: true
}
]
```

10 +1

```
%{
  calling_prefix: nil,
  called_prefix: nil,
  source_smsc: nil,
  calling_match: "^00(\\d+)$",
  calling_replace: "+\\1",
  called_match: "^00(\\d+)$",
  called_replace: "+\\1",
  priority: 10,
  description: "00 +",
  enabled: true
}
```

00 +

```
%{
  calling_prefix: nil,
  called_prefix: nil,
  source_smsc: nil,
  calling_match: "^\\+?1?[\\s\\-\\.\\(\\)]*(\\d{3})[\\s\\-\\.\\(\\)]*(\\d{3})[\\s\\-\\.\\(\\)]*(\\d{4})$",
  calling_replace: "+1\\1\\2\\3",
  called_match: "^\\+?1?[\\s\\-\\.\\(\\)]*(\\d{3})[\\s\\-\\.\\(\\)]*(\\d{3})[\\s\\-\\.\\(\\)]*(\\d{4})$",
  called_replace: "+1\\1\\2\\3",
  priority: 50,
  description: "+1\\1\\2\\3",
  enabled: true
}
```

???????

??????

```
%{
  calling_prefix: nil,
  called_prefix: "101",
  source_smsc: "carrier_a",
  calling_match: nil,
  calling_replace: nil,
  called_match: "^101(\\d+)$",
  called_replace: "\\1",
  priority: 5,
  description: "?????????????????",
  enabled: true
}
```

???? 101 ??
????
????
?? 101 ????

????

????????????????????

```
config :sms_c,
  translation_rules: [
    # ??? 1?????
    %{
      calling_prefix: "1555",
      called_prefix: nil,
      source_smsc: nil,
      calling_match: "^(1555\\d{7})$",
      calling_replace: "+\\1",
      called_match: nil,
      called_replace: nil,
      priority: 1,
      description: "?????",
      enabled: true
    },

    # ??? 50????
    %{
      calling_prefix: nil,
      called_prefix: nil,
      source_smsc: nil,
      calling_match: "^(\\d{10})$",
      calling_replace: "+\\1",
      called_match: "^(\\d{10})$",
      called_replace: "+\\1",
      priority: 50,
      description: "? ? 10 ?????"
    },
  ],
end
```



```
    enabled: true
  }
]
```

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```
# config/runtime.exs
config :sms_c,
  sms_routes: [
    # 111111
    %{
      calling_prefix: nil,
      called_prefix: "+1",
      source_smsc: nil,
      dest_smsc: "north_america_gateway",
      source_type: nil,
      enum_domain: nil,
      auto_reply: false,
      auto_reply_message: nil,
      drop: false,
      charged: :default,
      weight: 100,
      priority: 50,
      description: "111111",
      enabled: true
    },

    # 11111111
    %{
      calling_prefix: nil,
      called_prefix: "+44",
      source_smsc: nil,
      dest_smsc: "uk_gateway_1",
      source_type: nil,
      enum_domain: nil,
      auto_reply: false,
      auto_reply_message: nil,
      drop: false,
      charged: :default,
      weight: 70,
      priority: 50,
      description: "1111111170%",
      enabled: true
    },
  ],
```

```
%{
  calling_prefix: nil,
  called_prefix: "+44",
  source_smsc: nil,
  dest_smsc: "uk_gateway_2",
  source_type: nil,
  enum_domain: nil,
  auto_reply: false,
  auto_reply_message: nil,
  drop: false,
  charged: :default,
  weight: 30,
  priority: 50,
  description: "???????30%?",
  enabled: true
}
]
```

???????

```
# ?????? Web UI ???
config :sms_c,
  sms_routes: []
```

????????????????????

??????

????????? ???????

?????????

```
# config/config.exs
config :sms_c,
  batch_insert_batch_size: 100,      # ??????
  batch_insert_flush_interval_ms: 100 # ?????????
```

??????

????	??	????	??
200	200ms	~5,000 msg/sec	200ms
100	100ms	~4,500 msg/sec	100ms
50	20ms	~3,000 msg/sec	20ms
10	10ms	~1,500 msg/sec	10ms

❖❖❖❖

❖❖❖❖

```
# config/config.exs
config :logger, :console,
  level: :info, # :debug, :info, :warning, :error
  format: "$time $metadata[$level] $message\n",
  metadata: [:request_id, :message_id, :route_id]
```

❖❖❖❖❖:info ❖ :warning ❖❖❖❖❖:debug

❖❖❖❖❖❖❖❖

❖❖❖❖❖❖❖❖❖

```
config :logger,
  backends: [:console]
```

❖❖❖❖❖❖❖❖❖

```
config :logger,
  backends: [:console, {LoggerFileBackend, :file_log}]
```

```
config :logger, :file_log,
  path: "/var/log/sms_c/application.log",
  level: :info,
  format: "$time $metadata[$level] $message\n",
  metadata: [:request_id, :message_id]
```

❖❖❖❖

❖❖ **logrotate**❖Linux❖❖

```
# /etc/logrotate.d/sms_c
/var/log/sms_c/*.log {
    daily
    rotate 30
    compress
    delaycompress
    notifempty
    create 0644 sms_user sms_group
    sharedscripts
    postrotate
        # ❖❖❖❖❖❖❖❖❖❖❖❖❖❖❖❖
        systemctl reload sms_c
    endscript
}
```

```
}
```

```
#####
```

```
#####
```

```
#####5,000+ ##/###
```

```
# ###
```

```
config :sms_c, SmsC.Repo,  
  pool_size: 50
```

```
# #####
```

```
config :sms_c,  
  batch_insert_batch_size: 200,  
  batch_insert_flush_interval_ms: 200
```

```
# ####
```

```
config :sms_c,  
  dead_letter_time_minutes: 1440 # 24 ##
```

```
# #####
```

```
config :sms_c,  
  default_charging_enabled: false
```

```
# #####
```

```
config :sms_c,  
  cleanup_interval_minutes: 30
```

```
#####
```

```
#####< 20ms##
```

```
# ###
```

```
config :sms_c, SmsC.Repo,  
  pool_size: 20
```

```
# #####
```

```
config :sms_c,  
  batch_insert_batch_size: 20,  
  batch_insert_flush_interval_ms: 10
```

```
# ####
```

```
config :sms_c,  
  dead_letter_time_minutes: 4320 # 3 #
```

```
# #####
```

```
config :sms_c,
```

```
default_charging_enabled: true,  
ocs_url: "http://ocs.local:2080/jsonrpc"
```

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◆◆◆

```
config :sms_c, SmsC.Repo,  
  pool_size: 5
```

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```
config :sms_c,  
  batch_insert_batch_size: 1,  
  batch_insert_flush_interval_ms: 10
```

◆◆◆◆◆◆

```
config :logger, :console,  
  level: :debug
```

◆◆◆◆◆◆◆

```
config :sms_c,  
  dead_letter_time_minutes: 60 # 1 ◆◆
```

◆◆◆◆◆◆

```
config :sms_c,  
  default_charging_enabled: false
```

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◆◆ 1 ◆◆

```
export DB_NAME=sms_c_tenant1  
export OCS_TENANT=tenant1.example.com  
export OCS_ACCOUNT=tenant1_account  
export NODE_NAME=sms_tenant1@node1.example.com
```

◆◆ 2 ◆◆

```
export DB_NAME=sms_c_tenant2  
export OCS_TENANT=tenant2.example.com  
export OCS_ACCOUNT=tenant2_account  
export NODE_NAME=sms_tenant2@node1.example.com
```

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◆◆◆◆◆◆◆◆◆◆

```
#
config :sms_c,
  cluster_nodes: [
    : "sms@us-east-1a.example.com",
    : "sms@us-east-1b.example.com",
    : "sms@us-west-1a.example.com" #
  ],
  smsc_node_name: "us-east-1a"
```

```
#
mix compile

#
mix ecto.create
mix ecto.migrate

# OCS
curl -X POST http://localhost:2080/jsonrpc -H "Content-Type:
application/json" \
  -d '{"method":"SessionSv1.Ping","params":[],"id":1}'

#
iex -S mix phx.server
```

DB_USERNAME		sms_prod_user
DB_PASSWORD		strong_password
DB_HOSTNAME		db.internal.example.com
DB_PORT		3306
DB_NAME		sms_c_production
DB_POOL_SIZE		30
API_PORT	API	8443
API_LISTEN_IP	API IP	0.0.0.0
WEB_PORT	Web UI	443
NODE_NAME	Erlang	sms@node1.example.com
ERLANG_COOKIE		shared_cookie_value
OCS_URL	OCS API URL	http://ocs.local:2080/jsonrpc
OCS_TENANT	OCS	sms.example.com

- 4-8
-  12-24 

◆ ◆ ◆ ◆ ◆

- $10^3 \sim 1\text{KB}$
- $10^7 \sim 10\text{MB}$
- $10^8 \sim 100\text{MB}$

CDR


```
config :sms_c,  
  # ??/? CDR ??  
  cdr_enabled: true
```

CDR

- ID/
- SMSC
- /
-
-
-







- $\diamond \diamond \diamond$ CDR $\diamond \diamond \diamond \diamond \diamond$
- $\diamond \diamond \diamond \diamond \diamond \diamond \diamond \diamond \diamond \diamond \blacksquare \blacksquare \blacksquare \diamond \diamond \diamond \diamond$






```
config :sms_c,
  # Mnesia
  delete_message_body_after_delivery: false,

  # Web UI
  hide_message_body_in_ui: false,

  # CSV
  hide_message_body_in_export: false
```

?

delete_message_body_after_delivery: true Mnesia
hide_message_body_in_ui: true
hide_message_body_in_export: true

```
config :sms_c,  
  delete_message_body_after_delivery: true,  
  hide_message_body_in_ui: true,  
  hide_message_body_in_export: true,  
  cdr_enabled: true # CDR
```

```
config :sms_c,  
  delete_message_body_after_delivery: false,  
  hide_message_body_in_ui: false,  
  hide_message_body_in_export: false,  
  cdr_enabled: true
```

```
[info] Mnesia  
[info] CDR  
[info]  
[info] OCS url: http://..., : ...
```



SMS-C Prometheus

[←](#) | [README](#)

SMS-C Prometheus

Prometheus

<http://localhost:9568/metrics>

Prometheus Prometheus

sms_c.<category>.<metric_name>.<type>

- message -
- routing -
- enum - ENUM/NAPTR
- delivery -
- queue -
- charging - /
- mnesia -
- frontend -
- location - /
- phoenix.endpoint - HTTP API
- vm - Erlang VM

sms_c_message_received_count

: Counter

: SMS-C

:

- source_smsc: SMSC
- source_type: (ims, circuit_switched, smpp)
- message_type: (sms, mms)

:

:

sms_c_routing_failed_count

🔍🔍: Counter

🔍🔍: 🔍🔍🔍🔍🔍🔍🔍🔍🔍🔍🔍🔍🔍🔍

🔍🔍:

- reason: 🔍🔍🔍🔍 (no_route_found, validation_failed, 🔍)

🔍🔍: 🔍🔍🔍🔍🔍🔍🔍🔍🔍🔍🔍🔍🔍🔍🔍🔍🔍🔍

🔍🔍: 🔍🔍🔍🔍🔍🔍🔍🔍🔍🔍🔍🔍🔍🔍🔍🔍🔍🔍🔍🔍

sms_c_routing_action_count

🔍🔍: Counter

🔍🔍: 🔍🔍🔍🔍🔍🔍🔍🔍🔍🔍

🔍🔍:

- action: 🔍🔍🔍🔍 (drop, auto_reply, forward)
- route_id: 🔍🔍🔍🔍🔍🔍

🔍🔍: 🔍🔍🔍🔍🔍🔍🔍🔍🔍🔍🔍🔍🔍🔍🔍🔍🔍🔍🔍🔍

🔍🔍: 🔍🔍🔍🔍🔍🔍🔍🔍🔍🔍🔍🔍🔍🔍🔍🔍🔍🔍🔍🔍

sms_c_routing_stop_duration

🔍🔍: Histogram

🔍🔍: 🔍🔍🔍🔍🔍🔍🔍🔍🔍🔍🔍🔍🔍🔍🔍🔍

🔍🔍: 🔍🔍

🔍: 1, 5, 10, 25, 50, 100, 250, 500 ms

🔍🔍:

- dest_smsc: 🔍🔍🔍🔍🔍 SMSC

🔍🔍: 🔍🔍🔍🔍🔍🔍🔍🔍🔍🔍🔍🔍🔍🔍🔍🔍🔍🔍🔍🔍

🔍🔍: 🔍🔍🔍🔍🔍🔍🔍🔍🔍🔍🔍🔍🔍🔍🔍🔍p95 > 50ms🔍🔍

ENUM/NAPTR 🔍🔍🔍🔍

sms_c_enum_cache_hit_count

🔍🔍: Counter

🔗: 🔗🔗🔗🔗🔗 ENUM 🔗🔗🔗🔗🔗🔗 DNS 🔗🔗🔗

🔗🔗:

- domain: 🔗🔗🔗 ENUM 🔗

🔗🔗: 🔗🔗🔗🔗🔗🔗🔗🔗🔗🔗🔗🔗🔗🔗 DNS 🔗🔗🔗🔗🔗🔗

🔗🔗: 🔗🔗🔗🔗🔗🔗🔗🔗🔗🔗🔗🔗🔗🔗🔗🔗🔗🔗🔗🔗🔗🔗🔗🔗🔗🔗🔗

📞_c_enum_cache_miss_count

🔗🔗: Counter

🔗🔗: 🔗🔗 DNS 🔗🔗🔗 ENUM 🔗🔗🔗🔗🔗🔗🔗🔗🔗🔗

🔗🔗:

- domain: 🔗🔗🔗 ENUM 🔗

🔗🔗: 🔗🔗🔗🔗🔗🔗🔗🔗🔗🔗🔗🔗🔗🔗🔗🔗🔗🔗🔗🔗🔗🔗🔗🔗🔗🔗🔗

🔗🔗: $\text{cache_hit_rate} = \text{hits} / (\text{hits} + \text{misses})$

📞_c_enum_cache_size_size

🔗🔗: Gauge

🔗🔗: ENUM 🔗🔗🔗🔗🔗🔗🔗🔗🔗🔗

🔗🔗: 🔗🔗🔗🔗🔗🔗🔗🔗🔗🔗🔗🔗🔗🔗🔗🔗🔗🔗🔗🔗🔗🔗 TTL 🔗🔗🔗

🔗🔗: 🔗🔗🔗🔗🔗🔗🔗🔗🔗🔗🔗🔗🔗🔗🔗🔗🔗🔗🔗🔗🔗🔗

📞_c_enum_lookup_stop_duration

🔗🔗: Histogram

🔗🔗: 🔗🔗 ENUM 🔗🔗🔗🔗🔗🔗🔗🔗🔗🔗🔗🔗🔗 DNS 🔗🔗🔗🔗

🔗🔗: 🔗🔗

🔗: 10, 50, 100, 250, 500, 1000, 2500, 5000 ms

🔗🔗:

- domain: 🔗🔗🔗 ENUM 🔗
- success: 🔗🔗🔗🔗🔗 (true 🔗 false)
- cache_hit: 🔗🔗🔗🔗🔗🔗 (true 🔗 false)

🔗🔗: 🔗🔗 ENUM 🔗🔗🔗🔗🔗🔗🔗🔗🔗 DNS 🔗🔗🔗🔗🔗🔗🔗🔗

🔗🔗: 🔗 p95 🔗🔗🔗🔗🔗🔗🔗🔗🔗🔗🔗🔗🔗🔗🔗

sms_c_enum_naptr_records_record_count

?? : Histogram

?? : ??? ENUM ??? NAPTR ???

?: 0, 1, 2, 3, 5, 10

?? :

- domain: ??? ENUM ?

?? : ?? ENUM ?????????? 1-3 ?

?? : ????? 0 ?????DNS ?

????

sms_c_delivery_queued_count

?? : Counter

?? : ????? SMSC ?

?? :

- dest_smsc: ?? SMSC ?

?? : ?????????????????

?? : ????/????????

sms_c_delivery_attempted_count

?? : Counter

?? : ?????????????

?? :

- dest_smsc: ?? SMSC ?

?? : ?????????????????

sms_c_delivery_succeeded_count

?? : Counter

?? : ????? SMSC ?

?? :

- dest_smsc: ?? SMSC ?

🔗🔗: 🔗🔗🔗🔗🔗🔗🔗🔗🔗🔗🔗🔗🔗🔗🔗🔗

🔗🔗: 🔗🔗🔗🔗🔗🔗 SLA 🔗🔗🔗🔗🔗🔗

🔗🔗: success_rate = succeeded / queued

📱 sms_c_delivery_failed_count

🔗🔗: Counter

🔗🔗: 🔗🔗🔗🔗🔗🔗🔗🔗🔗🔗🔗🔗🔗🔗🔗

🔗🔗:

- dest_smsc: 🔗🔗 SMSC 🔗🔗
- reason: 🔗🔗🔗🔗

🔗🔗: 🔗🔗🔗🔗🔗🔗🔗🔗🔗🔗🔗🔗🔗🔗🔗🔗

🔗🔗: 🔗🔗🔗🔗🔗🔗🔗🔗🔗🔗🔗🔗🔗🔗🔗🔗

📱 sms_c_delivery_dead_letter_count

🔗🔗: Counter

🔗🔗: 🔗🔗🔗🔗🔗🔗🔗🔗🔗🔗🔗🔗🔗🔗🔗

🔗🔗:

- reason: 🔗🔗🔗🔗 (🔗🔗🔗max_retries_exceeded, expired)

🔗🔗: 🔗🔗🔗🔗🔗🔗🔗🔗🔗🔗🔗🔗🔗🔗

🔗🔗: 🔗🔗🔗🔗🔗🔗🔗🔗🔗🔗🔗🔗🔗🔗🔗🔗🔗🔗🔗🔗

📱 sms_c_delivery_succeeded_duration

🔗🔗: Histogram

🔗🔗: 🔗🔗🔗🔗🔗🔗🔗🔗🔗🔗🔗🔗🔗🔗

🔗🔗: 🔗🔗

🔗: 100, 500, 1000, 5000, 10000, 30000, 60000 ms

🔗🔗:

- dest_smsc: 🔗🔗 SMSC 🔗🔗

🔗🔗: 🔗🔗🔗🔗🔗🔗🔗🔗🔗🔗🔗🔗🔗🔗🔗

🔗🔗: 🔗 p95 🔗🔗🔗🔗🔗 SLA 🔗🔗🔗🔗🔗🔗🔗

sms_c_delivery_succeeded_attempt_count

🔍🔍: Histogram

🔍🔍: 🔍🔍🔍🔍🔍🔍🔍🔍🔍🔍🔍🔍🔍🔍

🔍: 1, 2, 3, 5, 10

🔍🔍:

- dest_smsc: 🔍🔍 SMSC 🔍🔍

🔍🔍: 🔍🔍🔍🔍🔍🔍🔍🔍🔍🔍🔍🔍🔍🔍🔍🔍🔍🔍

🔍🔍: 🔍🔍🔍🔍🔍🔍🔍🔍🔍 2 🔍🔍🔍🔍🔍🔍🔍🔍🔍🔍🔍🔍🔍

sms_c_delivery_failed_attempt_count

🔍🔍: Histogram

🔍🔍: 🔍🔍🔍🔍🔍🔍🔍🔍🔍🔍🔍🔍🔍🔍

🔍: 1, 2, 3, 5, 10

🔍🔍:

- dest_smsc: 🔍🔍 SMSC 🔍🔍

🔍🔍: 🔍🔍🔍🔍🔍🔍🔍🔍🔍🔍🔍🔍

🔍🔍🔍🔍

sms_c_queue_size_size

🔍🔍: Gauge

🔍🔍: 🔍🔍🔍🔍🔍🔍🔍🔍🔍🔍🔍🔍🔍🔍🔍

🔍🔍:

- queue_type: 🔍🔍🔍🔍 (message_queue, dead_letter)

🔍🔍: 🔍🔍🔍🔍🔍🔍🔍🔍🔍🔍🔍🔍🔍🔍

🔍🔍: 🔍🔍🔍🔍🔍🔍🔍🔍🔍🔍🔍🔍🔍🔍

sms_c_queue_size_pending

🔍🔍: Gauge

🔍🔍: 🔍🔍🔍🔍🔍🔍🔍🔍🔍🔍🔍🔍🔍🔍

🔍🔍:

- queue_type:

 :

:

sms_c_queue_size_failed

$\diamond\diamond$: Gauge

:

◆ ◆ :

- queue_type: ☐ ☐ ☐ ☐

:

:

sms_c_queue_size_delivered

◆◆: Gauge

:

/

◆ ◆ :

- queue_type: ☐ ☐ ☐ ☐

? ? : ? ? ? ? ? ? ? ? ? ? ? ? ? ? ? ? ? ?

sms_c_queue_oldest_message_age_seconds

◆◆: Gauge

:

◆ ◆ :

- queue_type:

???: ? ? ? ? ? ? ? ? ? ? ? ? ? ? SLA ? ? ? ? ? ? ? ?

?? : ? ? ? ? ? ? ? ? ? ? SLA ? ? ? ? ? ? ? ? ? ? > 300 ? ? ?

sms_c_charging_requested_count

:


```
❖❖: success_rate = succeeded / requested
```

[illegible]

◇: 10, 50, 100, 250, 500, 1000, 2500, 5000 ms

??:

- account: ?????

?: ?????????????????????????????

?: p95 ?????????????????

??????

sms_c_mnesia_table_size_record_count

?: Gauge

?: ? Mnesia ?????????????????

?:

- table: ??? (???sms_route)

?: ?????????????????????????

?: ?????????????????

sms_c_frontend_status_count

?: Gauge

?: ?????????????????

?:

- frontend_name: ?????
- status: ???? (connected, disconnected)

?: ?????????????????

?: ?????????????????

sms_c_location_registered_count

?: Counter

?: ??????????/?

?:

- location: ??????/SMSC ?
- ims_capable: ?????? IMS (true/false)

?: ?????????? IMS ? IMS ?????????

?: ?????

- ```
rate(sms_c_location_registered_count[1m])

IMS IMS
sum(rate(sms_c_location_registered_count{ims_capable="true"}[5m])) /
sum(rate(sms_c_location_registered_count[5m]))
```

```
P95
histogram_quantile(0.95,
 rate(phoenix_endpoint_stop_duration_bucket[5m]))

1
sum(rate(phoenix_endpoint_stop_duration_bucket{le="1000"}[5m]))
```

- route: API    
- status: HTTP    (200, 201, 400, 404, 500, )

🔗: 🔗 API 🔗🔗🔗🔗🔗🔗🔗🔗🔗🔗🔗🔗🔗🔗

🔗: 🔗🔗🔗🔗

- 🔗🔗🔗🔗🔗🔗 > 5%
- 🔗🔗🔗🔗 5xx 🔗
- 🔗🔗🔗🔗🔗🔗

🔗🔗🔗:

```
🔗🔗🔗🔗🔗🔗
sum by (route) (rate(phoenix_endpoint_stop_count[5m]))

🔗🔗🔗🔗🔗
sum by (route) (rate(phoenix_endpoint_stop_count{status=~"5.."}[5m])) /
sum by (route) (rate(phoenix_endpoint_stop_count[5m]))

🔗🔗
sum(rate(phoenix_endpoint_stop_count{status=~"2.."}[5m])) /
sum(rate(phoenix_endpoint_stop_count[5m]))
```

---

## 🔗🔗\_router\_dispatch\_exception\_count

🔗: Counter

🔗: 🔗 HTTP 🔗🔗🔗🔗🔗🔗🔗🔗🔗🔗/🔗🔗🔗🔗

🔗:

- route: 🔗🔗🔗🔗 API 🔗🔗🔗
- kind: 🔗🔗🔗 (error, exit, throw)

🔗: 🔗🔗🔗🔗🔗🔗🔗🔗🔗🔗🔗🔗🔗🔗🔗🔗🔗🔗

🔗: 🔗🔗🔗🔗🔗🔗🔗🔗🔗🔗🔗🔗🔗

🔗🔗🔗:

```
🔗🔗🔗🔗🔗
rate(phoenix_router_dispatch_exception_count[5m])

🔗🔗🔗🔗🔗🔗
increase(phoenix_router_dispatch_exception_count[1h])
```

---

## Erlang VM 🔗🔗

### vm\_memory\_total

🔗: Gauge

🔗: Erlang VM 🔗🔗🔗🔗🔗🔗🔗🔗🔗🔗🔗🔗🔗

🔗: 🔗🔗🔗🔗🔗🔗🔗🔗🔗🔗🔗🔗🔗🔗🔗🔗🔗🔗

💎💎: 💎💎💎💎 > 80% 💎💎💎💎💎💎💎💎💎💎

---

## vm\_memory\_processes

💎💎: Gauge

💎💎: Erlang 💎💎💎💎💎💎💎💎💎💎💎💎💎💎

💎💎: 💎💎💎💎💎💎💎💎💎💎💎💎💎💎💎💎💎💎

💎💎: 💎💎💎💎💎💎💎💎💎💎💎💎💎

---

## vm\_total\_run\_queue\_lengths\_total

💎💎: Gauge

💎💎: 💎💎 CPU 💎💎💎💎💎💎💎💎💎💎💎💎💎💎

💎💎: 💎💎💎💎💎💎💎💎💎💎💎💎 CPU 💎💎💎

💎💎: 💎💎💎 > 10 \* CPU 💎💎💎💎💎💎💎💎💎💎💎

---

## vm\_system\_counts\_process\_count

💎💎: Gauge

💎💎: 💎💎💎 VM 💎💎💎💎💎💎💎💎💎

💎💎: 💎💎💎💎💎💎💎💎💎💎💎💎💎💎💎💎💎💎

💎💎: 💎💎💎💎💎💎💎💎💎💎💎💎 262,144💎💎💎💎💎💎💎💎

---

💎💎💎💎💎💎💎💎💎

💎💎💎 10 💎💎💎💎💎💎💎💎💎💎💎

- 💎💎💎💎💎💎💎
- Mnesia 💎💎💎
- ENUM 💎💎💎💎

💎💎💎💎💎💎💎💎💎💎💎💎💎💎💎💎💎💎💎💎💎💎💎💎💎💎💎💎

💎💎💎💎💎💎💎💎💎

💎💎💎💎💎💎💎💎💎💎💎💎

💎💎💎💎💎💎 SMSC 💎💎💎💎💎💎💎💎💎💎

💎💎: (sms\_c\_delivery\_succeeded\_count) / (sms\_c\_delivery\_queued\_count)

💎💎: 💎💎💎💎💎 > 95%💎💎💎💎💎💎💎💎💎💎💎💎💎💎💎💎

---

???

???

?:

- sms\_c\_message\_processing\_stop\_duration (??)
- sms\_c\_delivery\_succeeded\_duration (??)

?: ?

---

## ENUM ?

?? ENUM ?

?: (sms\_c\_enum\_cache\_hit\_count) / (sms\_c\_enum\_cache\_hit\_count + sms\_c\_enum\_cache\_miss\_count)

?: ? > 80% ? TTL ?

---

???

???

?: sms\_c\_routing\_route\_matched\_count ? route\_id ?

?: ?

---

???

???

?:

- sms\_c\_queue\_size\_pending (???)
- sms\_c\_queue\_oldest\_message\_age\_seconds (???)

?: ? + ? = ?

---

??

???

?: sms\_c\_delivery\_succeeded\_attempt\_count histogram percentiles

?: ? p95 > 1 ?

---

◆◆◆◆

|            |                                                  |          |          |    |
|------------|--------------------------------------------------|----------|----------|----|
| ◆◆◆◆◆◆     | ◆◆                                               | ◆◆◆◆◆◆   | ◆◆◆◆     | ◆◆ |
| ◆◆◆◆◆◆     | routing_failed_count ◆◆                          | Critical | ◆◆◆◆◆◆   |    |
| ◆◆◆◆◆      | queue_size_pending > ◆◆                          | Warning  | ◆◆◆◆◆    |    |
| ◆◆◆◆◆◆◆◆   | queue_oldest_message_age_seconds > 300           | Critical | SLA ◆◆   |    |
| ◆◆◆◆◆◆◆    | delivery_failed_count ◆◆                         | High     | ◆◆◆◆◆    |    |
| ◆◆◆◆◆      | delivery_dead_letter_count > 0                   | High     | ◆◆◆◆◆◆◆◆ |    |
| ENUM ◆◆◆◆◆ | enum_lookup_stop_duration p95 > 5000ms           | Warning  | DNS ◆◆   |    |
| ◆◆◆◆◆◆◆    | ENUM ◆◆◆◆◆◆ < 0.7                                | Warning  | ◆◆◆◆◆    |    |
| ◆◆◆◆◆◆◆    | frontend_status_count{status="disconnected"} > 0 | High     | ◆◆◆◆◆    |    |
| ◆◆◆◆◆      | charging_failed_count > ◆◆                       | High     | ◆◆◆◆◆    |    |
| ◆◆◆◆◆◆◆    | message_processing_stop_duration p95 > 1000ms    | Warning  | ◆◆◆◆◆    |    |

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◆◆◆◆◆◆

◆◆: ◆◆◆◆◆◆◆◆

◆◆:

1. ◆◆◆◆◆◆◆◆◆◆◆◆/◆◆/◆◆◆
  2. ◆◆◆◆◆◆◆◆◆◆◆◆◆◆◆◆
  3. ◆◆◆◆◆◆◆◆◆
  4. p95 ◆◆◆◆◆◆◆◆
  5. ◆◆◆◆◆◆◆
  6. ◆◆◆◆◆
- 

◆◆◆◆◆◆

◆◆: ◆◆◆◆◆◆◆

◆◆:

1. ◆◆◆◆◆◆◆◆◆◆◆◆◆◆◆◆
  2. ◆◆◆◆◆◆◆◆◆◆◆
  3. ENUM ◆◆◆◆◆◆◆◆◆◆◆
  4. ◆◆◆◆◆◆◆◆◆◆◆
  5. ◆◆◆◆◆◆◆
  6. ◆◆◆◆◆◆
- 

◆◆◆◆◆◆

◆◆: ◆◆◆◆◆◆◆◆

◆◆:

1. ◆◆ SMSC ◆◆◆
2. ◆◆◆ SMSC ◆◆◆
3. ◆◆◆◆◆◆◆
4. ◆◆◆◆◆◆◆◆◆◆◆◆◆



- ◆ ◆ ◆ ◆

- $\diamond \diamond \diamond \diamond : 15 \diamond$
- $5 \diamond \diamond \diamond \diamond : 90 \diamond$
- $1 \diamond \diamond \diamond \diamond : 2 \diamond$

◆ ◆ ◆ ◆ ◆ ◆ ◆ ◆ ◆ ◆











◆ ◆ ◆ ◆ ◆

1. `sms_c_message_received_count` - ?????
2. `sms_c_routing_failed_count` - ?????
3. `sms_c_delivery_queued_count` - ?????
4. `sms_c_delivery_failed_count` - ?????
5. `dest smsc` ?????

◆ ◆ ◆ ◆ ◆ ◆ ◆ ◆ ◆

◆ ◆ ◆ ◆ ◆

1. `sms_c_message_processing_stop_duration` -
2. `sms_c_routing_stop_duration` -
3. `sms_c_enum_lookup_stop_duration` - ENUM
4. `sms_c_charging_succeeded_duration` -
- 5.











◆ ◆ ◆ ◆ ◆

1. `?? sms_c_queue_size_pending ?? - ???? ?`
2. `?? sms_c_delivery_attempted_count - ???? ?`
3. `?? sms_c_delivery_failed_count - ???? ?`
4. `?? sms_c_delivery_succeeded_duration - ???? ?`
5. `?? dest smsc ???? ?`

# Prometheus

🔍🔍🔍🔍

🔍🔍🔍🔍🔍🔍5 🔍🔍🔍🔍:

```
rate(sms_c_message_received_count[5m])
```

🔍🔍🔍🔍🔍🔍🔍1 🔍🔍🔍🔍:

```
rate(sms_c_message_received_count[1h]) * 60
```

🔍🔍🔍🔍🔍:

```
increase(sms_c_message_received_count[24h])
```

🔍🔍🔍🔍🔍🔍:

```
sum by (source_type) (rate(sms_c_message_received_count[5m]))
```

🔍🔍 **SMSC** 🔍🔍:

```
sum by (source_smsc) (rate(sms_c_message_received_count[5m]))
```

🔍🔍🔍🔍

🔍🔍🔍🔍🔍🔍🔍🔍:

```
(rate(sms_c_delivery_succeeded_count[5m]) / rate(sms_c_delivery_queued_count[5m])) * 100
```

🔍🔍🔍🔍🔍🔍🔍🔍:

```
(rate(sms_c_delivery_failed_count[5m]) / rate(sms_c_delivery_queued_count[5m])) * 100
```

🔍🔍🔍🔍🔍🔍**p95**:

```
histogram_quantile(0.95, sms_c_delivery_succeeded_attempt_count_bucket)
```

🔍🔍🔍🔍🔍🔍🔍:

```
sum by (dest_smsc) (rate(sms_c_delivery_succeeded_count[5m]))
```

🔍🔍🔍🔍🔍:

```
sum by (reason) (rate(sms_c_delivery_failed_count[5m]))
```

🔍🔍🔍🔍**p95**:

```
histogram_quantile(0.95, sms_c_delivery_succeeded_duration_bucket)
```

🔍🔍🔍🔍**p99**:

```
histogram_quantile(0.99, sms_c_delivery_succeeded_duration_bucket)
```

????

??????:

sms\_c\_queue\_size\_pending

??????:

sms\_c\_queue\_size\_failed

??????:

sms\_c\_queue\_oldest\_message\_age\_seconds / 60

??????:

rate(sms\_c\_queue\_size\_size[1h]) \* 3600

??????:

rate(sms\_c\_delivery\_queued\_count[5m])

??????:

rate(sms\_c\_delivery\_succeeded\_count[5m]) + rate(sms\_c\_delivery\_failed\_count[5m])

????? - ???:

rate(sms\_c\_delivery\_queued\_count[5m]) - (rate(sms\_c\_delivery\_succeeded\_count[5m]) + rate(sms\_c\_delivery\_failed\_count[5m]))

???

?????:

(1 - (rate(sms\_c\_routing\_failed\_count[5m]) / (rate(sms\_c\_routing\_route\_matched\_count[5m]) + rate(sms\_c\_routing\_failed\_count[5m])))) \* 100

?????:

topk(10, sum by (route\_id, dest\_smsc) (rate(sms\_c\_routing\_route\_matched\_count[1h])))

????p50, p95, p99:

histogram\_quantile(0.50, sms\_c\_routing\_stop\_duration\_bucket)  
histogram\_quantile(0.95, sms\_c\_routing\_stop\_duration\_bucket)  
histogram\_quantile(0.99, sms\_c\_routing\_stop\_duration\_bucket)

?????:

rate(sms\_c\_routing\_failed\_count[5m]) \* 60

?????:

increase(sms\_c\_routing\_action\_count{action="drop"}[1h])

🔍🔍🔍🔍🔍🔍🔍🔍:

```
increase(sms_c_routing_action_count{action="auto_reply"}[1h])
```

**ENUM 🔍🔍**

**ENUM 🔍🔍🔍🔍🔍:**

```
rate(sms_c_enum_cache_hit_count[5m]) / (rate(sms_c_enum_cache_hit_count[5m]) +
rate(sms_c_enum_cache_miss_count[5m]))
```

**ENUM 🔍🔍🔍🔍🔍🔍:**

```
(rate(sms_c_enum_cache_hit_count[5m]) / (rate(sms_c_enum_cache_hit_count[5m]) +
rate(sms_c_enum_cache_miss_count[5m]))) * 100
```

**ENUM 🔍🔍🔍🔍🔍p95🔍:**

```
histogram_quantile(0.95, sms_c_enum_lookup_stop_duration_bucket)
```

🔍🔍 **ENUM 🔍🔍🔍🔍🔍🔍🔍🔍🔍🔍🔍:**

```
🔍🔍🔍🔍🔍
rate(sms_c_enum_cache_hit_count[5m])

🔍🔍🔍🔍🔍 DNS 🔍🔍
rate(sms_c_enum_cache_miss_count[5m])
```

🔍🔍🔍🔍 **NAPTR 🔍🔍:**

```
rate(sms_c_enum_naptr_records_record_count_sum[5m]) /
rate(sms_c_enum_naptr_records_record_count_count[5m])
```

**ENUM 🔍🔍🔍🔍:**

```
sms_c_enum_cache_size_size
```

🔍🔍🔍🔍

🔍🔍🔍🔍🔍🔍**p95🔍:**

```
histogram_quantile(0.95, sms_c_message_processing_stop_duration_bucket)
```

🔍🔍🔍🔍🔍🔍**p99🔍:**

```
histogram_quantile(0.99, sms_c_message_processing_stop_duration_bucket)
```

🔍🔍🔍🔍:

```
rate(sms_c_message_processing_stop_duration_count{success="false"}[5m])
```

🔍🔍🔍🔍🔍:

```
rate(sms_c_message_validated_count{valid="false"}[5m]) /
rate(sms_c_message_validated_count[5m])
```

????

?????:

```
rate(sms_c_charging_succeeded_count[5m]) /
rate(sms_c_charging_requested_count[5m])
```

?????:

```
rate(sms_c_charging_failed_count[5m]) * 60
```

????p95:

```
histogram_quantile(0.95, sms_c_charging_succeeded_duration_bucket)
```

?????:

```
sum by (account) (rate(sms_c_charging_requested_count[1h]))
```

????

???:

```
sum(sms_c_frontend_status_count{status="connected"})
```

?????:

```
sum(sms_c_frontend_status_count{status="disconnected"})
```

????:

```
sum by (frontend_name) (sms_c_frontend_status_count{status="connected"})
```

????

**Mnesia** ???:

```
sms_c_mnesia_table_size_record_count
```

???:

```
sms_c_mnesia_table_size_record_count{table="sms_route"}
```

????:

```
sms_c_mnesia_table_size_record_count{table="translation_rule"}
```

## Grafana ? ? ? ? ?

??? 1: ? ? ? ?

?: ? ? ? ? ? ? ? ? ? ?

?:

1. ? ? ? ? ? ? ? ?

- ◊◊: histogram\_quantile(0.50, sms\_c\_message\_processing\_stop\_duration\_bucket) (p50)
- ◊◊: histogram\_quantile(0.95, sms\_c\_message\_processing\_stop\_duration\_bucket) (p95)
- ◊◊: histogram\_quantile(0.99, sms c message processing stop duration bucket) (p99)

- $\diamond\diamond$ : milliseconds
- $\diamond\diamond$ : Percentile

## 2. $\diamond\diamond\diamond\diamond\diamond\diamond\diamond\diamond$

- $\diamond\diamond$ : histogram\_quantile(0.95, sms\_c\_routing\_stop\_duration\_bucket)
- ENUM: histogram\_quantile(0.95, sms\_c\_enum\_lookup\_stop\_duration\_bucket)
- $\diamond\diamond$ : histogram\_quantile(0.95, sms\_c\_charging\_succeeded\_duration\_bucket)
- $\diamond\diamond$ : histogram\_quantile(0.95, sms\_c\_delivery\_succeeded\_duration\_bucket)
- $\diamond\diamond$ : milliseconds
- $\diamond\diamond\diamond\diamond$

## 3. $\diamond\diamond\diamond\diamond\diamond\diamond\diamond\diamond$

- $\diamond\diamond$ : sms\_c\_delivery\_succeeded\_attempt\_count\_bucket
- $\diamond\diamond\diamond\diamond\diamond\diamond\diamond\diamond\diamond$
- $\diamond\diamond\diamond\diamond$ :  $\diamond\diamond\diamond 1 \diamond\diamond\diamond\diamond\diamond\diamond\diamond\diamond\diamond\diamond$

## 4. ENUM $\diamond\diamond\diamond\diamond\diamond\diamond$

- $\diamond\diamond\diamond$ :  $\text{rate}(\text{sms\_c\_enum\_cache\_hit\_count}[5\text{m}]) / (\text{rate}(\text{sms\_c\_enum\_cache\_hit\_count}[5\text{m}]) + \text{rate}(\text{sms\_c\_enum\_cache\_miss\_count}[5\text{m}]))$
- $\diamond\diamond\diamond\diamond$ : sms\_c\_enum\_cache\_size\_size
- $\diamond Y \diamond\diamond\diamond\diamond\diamond\diamond\diamond$

## 5. $\diamond\diamond\diamond\diamond\diamond\diamond\diamond$

- $\diamond\diamond$ :  $(\text{rate}(\text{sms\_c\_message\_processing\_stop\_duration\_count}\{\text{success}=\text{"true"}\}[5\text{m}]) / \text{rate}(\text{sms\_c\_message\_processing\_stop\_duration\_count}[5\text{m}])) * 100$
- $\diamond\diamond$ : percent
- $\diamond\diamond$ :
  - $\diamond\diamond$ : < 95
  - $\diamond\diamond$ : 95-99
  - $\diamond\diamond$ : > 99

## $\diamond\diamond\diamond$ 3: $\diamond\diamond\diamond\diamond$

$\diamond\diamond$ :  $\diamond\diamond\diamond\diamond\diamond\diamond\diamond\diamond\diamond\diamond\diamond$

$\diamond\diamond$ :

## 1. $\diamond\diamond\diamond\diamond\diamond\diamond\diamond\diamond$

- $\diamond\diamond$ : sum by (source\_type) (increase(sms\_c\_message\_received\_count[1h]))
- $\diamond\diamond\diamond\diamond$ : IMS vs CS vs SMPP

## 2. $\diamond\diamond$ SMSC $\diamond\diamond\diamond\diamond\diamond\diamond\diamond$

- $\diamond\diamond$ : sum by (source\_smsc) (rate(sms\_c\_message\_received\_count[1h]))
- $\diamond 10 \diamond\diamond$
- $\diamond\diamond\diamond\diamond$

## 3. $\diamond\diamond\diamond\diamond\diamond\diamond\diamond$

- $\diamond$ :

- `?? ID`
- `?? SMSC`
- `??1h?: sum by (route_id, dest_smsc)`  
`(increase(sms_c_routing_route_matched_count[1h]))`
- `???`
- `???`
- `???`

4. `???`

- `?: sum by (dest_smsc) (rate(sms_c_delivery_succeeded_count[5m]))`
- `?: messages/second`
- `???`
- `?: {{dest_smsc}}`

5. `??/??`

- `?: increase(sms_c_routing_action_count{action="drop"}[1h])`
- `?: increase(sms_c_routing_action_count{action="auto_reply"}[1h])`
- `???`

6. `???`

- `?: rate(sms_c_message_received_count[1h]) * 3600`
- `?: 7`
- `???`

**4: ?**

`?: ?`

`?:`

1. `???`

- `?: sms_c_queue_size_size`
- `?: 11111111111111`
- `???`

2. `???`

- `?: sms_c_mnesia_table_size_record_count{table="sms_route"}`
- `?: sms_c_mnesia_table_size_record_count{table="translation_rule"}`
- `?: 30`

3. `???`

- `?: rate(sms_c_delivery_queued_count[5m]) -`  
`(rate(sms_c_delivery_succeeded_count[5m]) +`  
`rate(sms_c_delivery_failed_count[5m]))`
- `?? =`
- `?? =`

4. `???`

- `?: max_over_time(rate(sms_c_message_received_count[5m])[24h:])`
- `?: 24 5m`



- $\diamond\diamond$ : messages/second

## 5. $\diamond\diamond\diamond\diamond\diamond\diamond\diamond\diamond$

- $\diamond\diamond$ :  $(\text{rate}(\text{sms\_c\_message\_received\_count}[5\text{m}]) / \text{MAX\_CAPACITY}) * 100$
- $\diamond$  MAX\_CAPACITY  $\diamond\diamond\diamond\diamond\diamond\diamond\diamond$
- $\diamond\diamond$ : percent
- $\diamond\diamond$ :
  - $\diamond\diamond$ : < 70
  - $\diamond\diamond$ : 70-85
  - $\diamond\diamond$ : > 85

## $\diamond\diamond\diamond$ 5: SLA $\diamond\diamond\diamond$

$\diamond\diamond$ :  $\diamond\diamond$  SLA  $\diamond\diamond\diamond\diamond\diamond\diamond\diamond$

$\diamond\diamond$ :

### 1. SLA $\diamond\diamond\diamond\diamond\diamond\diamond$

- $\diamond\diamond\diamond\diamond$ :  $(\text{rate}(\text{sms\_c\_delivery\_succeeded\_count}[1\text{h}]) / \text{rate}(\text{sms\_c\_delivery\_queued\_count}[1\text{h}])) * 100$
- $\diamond\diamond\diamond\diamond$  99%
- $\diamond\diamond$ :
  - $\diamond\diamond$ : < 95
  - $\diamond\diamond$ : 95-99
  - $\diamond\diamond$ : >= 99

### 2. $\diamond$ SLA $\diamond\diamond\diamond\diamond\diamond\diamond\diamond\diamond$

- $\diamond\diamond$ :  $\text{count}(\text{sms\_c\_delivery\_succeeded\_duration\_bucket}\{\text{le}="5000"\}) / \text{count}(\text{sms\_c\_delivery\_succeeded\_duration\_bucket})$
- $\diamond\diamond\diamond$  5  $\diamond\diamond\diamond\diamond\diamond\diamond\diamond$
- $\diamond\diamond$ : percent

### 3. SLA $\diamond\diamond\diamond\diamond\diamond\diamond$

- $\diamond\diamond$  5  $\diamond\diamond\diamond\diamond\diamond$ :  $\text{increase}(\text{sms\_c\_queue\_oldest\_message\_age\_seconds}\{\} > 300)[24\text{h}:]$
- $\diamond\diamond$  0

### 4. $\diamond\diamond\diamond\diamond\diamond\diamond\diamond\diamond$

- $\diamond\diamond$ :  $\text{up}\{\text{job}="sms-c"\}$
- $\diamond\diamond\diamond$ :  $1 = \diamond\diamond\diamond 0 = \diamond\diamond\diamond$
- $\diamond\diamond\diamond\diamond\diamond$

### 5. $\diamond\diamond\diamond\diamond\diamond\diamond\diamond\diamond$

- $\diamond\diamond$ :  $\text{avg\_over\_time}((\text{rate}(\text{sms\_c\_delivery\_succeeded\_count}[1\text{h}]) / \text{rate}(\text{sms\_c\_delivery\_queued\_count}[1\text{h}]))[24\text{h}:1\text{h}])$
- $\diamond\diamond\diamond\diamond$ :  $\diamond\diamond$  30  $\diamond$
- SLA  $\diamond\diamond$  99%

◆◆◆◆◆◆

◆◆◆◆

◆◆◆◆:

```
alert: RoutingFailuresDetected
expr: increase(sms_c_routing_failed_count[5m]) > 0
for: 2m
labels:
 severity: critical
annotations:
 summary: "{{ $value }}" routing failures in last 5 minutes"
 description: "Messages cannot be routed. Check routing configuration."
```

◆◆◆◆:

```
alert: MessageQueueBacklog
expr: sms_c_queue_size_pending > 10000
for: 5m
labels:
 severity: critical
annotations:
 summary: "Message queue has {{ $value }}" pending messages"
 description: "Queue is backing up. Check delivery performance."
```

◆◆◆◆◆◆:

```
alert: OldMessagesInQueue
expr: sms_c_queue_oldest_message_age_seconds > 300
for: 2m
labels:
 severity: critical
annotations:
 summary: "Oldest message is {{ $value }}" seconds old"
 description: "Messages not being delivered. Check frontends."
```

◆◆◆◆◆◆◆:

```
alert: NoActiveFrontends
expr: sum(sms_c_frontend_status_count{status="connected"}) == 0
for: 1m
labels:
 severity: critical
annotations:
 summary: "No frontends connected"
 description: "No delivery path available. Check frontend connectivity."
```

◆◆◆◆◆◆:

```
alert: DeadLetterMessagesIncreasing
expr: rate(sms_c_delivery_dead_letter_count[10m]) > 0
for: 5m
labels:
 severity: critical
annotations:
 summary: "{{ $value }}" messages moved to dead letter queue"
```

```
description: "Messages are becoming undeliverable. Investigate failures."
```

◆◆◆◆

◆◆◆◆◆◆:

```
alert: LowDeliverySuccessRate
expr: (rate(sms_c_delivery_succeeded_count[10m]) /
rate(sms_c_delivery_queued_count[10m])) < 0.95
for: 10m
labels:
 severity: warning
annotations:
 summary: "Delivery success rate is {{ $value | humanizePercentage }}"
 description: "Success rate below 95%. Investigate delivery failures."
```

◆◆◆◆:

```
alert: HighDeliveryRetryRate
expr: histogram_quantile(0.95, sms_c_delivery_succeeded_attempt_count_bucket) > 2
for: 15m
labels:
 severity: warning
annotations:
 summary: "95th percentile delivery attempts: {{ $value }}"
 description: "Messages requiring multiple attempts. Check destination reliability."
```

◆◆◆◆◆◆:

```
alert: SlowMessageProcessing
expr: histogram_quantile(0.95, sms_c_message_processing_stop_duration_bucket) >
1000
for: 10m
labels:
 severity: warning
annotations:
 summary: "95th percentile processing time: {{ $value }}ms"
 description: "Message processing is slow. Check system resources."
```

**ENUM** ◆◆◆◆:

```
alert: HighEnumFailureRate
expr: rate(sms_c_enum_lookup_stop_duration_count{success="false"}[10m]) > 0.1
for: 10m
labels:
 severity: warning
annotations:
 summary: "ENUM lookup failure rate: {{ $value }}"
 description: "DNS lookups failing. Check DNS servers."
```

◆ **ENUM** ◆◆◆◆◆◆:

```
alert: LowEnumCacheHitRate
expr: rate(sms_c_enum_cache_hit_count[10m]) /
(rate(sms_c_enum_cache_hit_count[10m]) + rate(sms_c_enum_cache_miss_count[10m])) <
0.70
```





# SMS-C

[← !\[\]\(2e897e890e69d81eae4503a8342c36b0\_img.jpg\)!\[\]\(ce4e2504c7100a62a9a9496b2e01b6e4\_img.jpg\)!\[\]\(d6653e1cf2c96f17cfd897a08e4b2bd5\_img.jpg\)!\[\]\(2a4acc7e9f5aa18684d23855a44c15c0\_img.jpg\)!\[\]\(e6ed905df0a758e5645da36bf994d184\_img.jpg\)!\[\]\(b17fad2871bf579f1566443f2e74b16b\_img.jpg\)](#) | [!\[\]\(6593059412dec8fc0b838e310b4cae8d\_img.jpg\) README](#)

SMS-C 



- [!\[\]\(8c4dca64662d21542001ca0ed7eeb688\_img.jpg\)!\[\]\(3de35c640e7147a3fb61ee393128d2ae\_img.jpg\)!\[\]\(d1438aeefda19c86ae7477bf1fb30796\_img.jpg\)!\[\]\(dc4d2c544087998b6f093f485f5119d7\_img.jpg\)](#)
- [!\[\]\(f26ab61dd00ea7e5f19553908ec3fa6b\_img.jpg\)!\[\]\(ecf85e064bcd351a8999f71bf3f405e7\_img.jpg\)](#)
- [!\[\]\(b7205a03f3dd3fe6f731085a326bb0d6\_img.jpg\)!\[\]\(fea63d7e313047478d89177e38e2c72d\_img.jpg\)!\[\]\(3098c5e72378a1b0482fcc457c248f36\_img.jpg\)!\[\]\(bdd076fceb1bd6f84cb17f8d6a04e32c\_img.jpg\)](#)
- [!\[\]\(df648e0ad6c7cc181c595a3b5826b4ad\_img.jpg\)!\[\]\(880be622b9312c3384b9a4cbb8f9cbc6\_img.jpg\)!\[\]\(e6398acab1fe106e24dc02668e12cda8\_img.jpg\)!\[\]\(6a3b43ae489ad1dcd297f9ad18207726\_img.jpg\)](#)
- [!\[\]\(9b8a9ba24565936df26cc20ac543b607\_img.jpg\)!\[\]\(8de32407a9832a2555fc0f815caf21f4\_img.jpg\)!\[\]\(cb0818baa2223f811ba631b5cdc3b2e5\_img.jpg\)!\[\]\(115410a3686c6bfcbd312a1b9781b823\_img.jpg\)](#)
- [!\[\]\(5112d96b163ef8d66015fa29116fd4e8\_img.jpg\)!\[\]\(aee93707ae98a6c5f7ca9e7b45c19929\_img.jpg\)!\[\]\(68eb328c8e1a562366fc121effce1290\_img.jpg\)!\[\]\(b4f86d620bcf70d2c80865aa7b0cbc3c\_img.jpg\)!\[\]\(e7e5ef6e716dcffae84457b3e07ebc88\_img.jpg\)](#)
- [!\[\]\(abaa68a62cc87b2cd3c26981a7f9d1a0\_img.jpg\)!\[\]\(5d9bdb5059fae1818a1de33c465530e1\_img.jpg\)!\[\]\(ff9554f459ea181d23300b49da4df793\_img.jpg\)!\[\]\(334fca8c7de4b38e4110f8bf720785e7\_img.jpg\)](#)
- [!\[\]\(bf6679e1277ad456c7c4c08c70db3511\_img.jpg\)!\[\]\(d5e4bd1ad0acbeeb580c4dc8ab0c3523\_img.jpg\)!\[\]\(cd9d948b023472c03de7a2c07d3b18a2\_img.jpg\)!\[\]\(f63783c7f9a3982e28553b56870f4c13\_img.jpg\)!\[\]\(25ade056a0715a18e27843ac0028d210\_img.jpg\)](#)
- [!\[\]\(4d9e34ba5afc4f1470a075aeb3b165e8\_img.jpg\)!\[\]\(9550339012d8590f7e6ecf8ea72bc39d\_img.jpg\)!\[\]\(fba8b7ff3f54bcc4648f15e8a0f0aa14\_img.jpg\)!\[\]\(326fdd0af5819e54134b5c8d3868b981\_img.jpg\)](#)
- [!\[\]\(291617a49c38945ef39eb9b9b8c3417e\_img.jpg\)!\[\]\(35540858f698412facb71ec07dcd0505\_img.jpg\)!\[\]\(8c64eaa2f27ba3e84678f38c75b4ce7e\_img.jpg\)!\[\]\(032c8d713b7dea9d3e6867410259080e\_img.jpg\)](#)







## 1.

```
API 
curl https://api.example.com:8443/api/status



{ "status": "ok", "application": "OmniMessage", "timestamp": "2025-10-30T08:00:00Z" }
```

## 2. Prometheus

 Prometheus 

- 
- 
- 
- 
- 

## 3.

 Web UI: [https://sms-admin.example.com/message\\_queue](https://sms-admin.example.com/message_queue)



- 1000000000000000000
- 1000000000000000000 < 5000000000000000000
- 10000000000000000000 > 3000000000000000000
- 10000000000000000000

#### 4. 1000000000000000000

100 Web UI: [https://sms-admin.example.com/frontend\\_status](https://sms-admin.example.com/frontend_status)

1000000000000000000

- 1000000000000000000
- 1000000000000000000
- 100 24 1000000000000000000

#### 5. 1000000000000000000

100 Web UI: <https://sms-admin.example.com/logs> 1000000000000000000

1000000000000000000

- 1000000000000000000
- 1000000000000000000
- 1000000000000000000
- 1000000000000000000
- 1000000000000000000

1000000000000000000

1000000000000000000

100 Prometheus 1000000000000000000

```
1000000000000000000
increase(sms_c_message_received_count[1h])

1000000000000000000
increase(sms_c_delivery_succeeded_count[1h])

1000000000000000000
rate(sms_c_delivery_succeeded_count[1h]) /
rate(sms_c_message_received_count[1h])
```

1000000000000000000

- 1000000000000000000
- 100/1000000000000000000
- 1000000000000000000 > 95%

1000000000000000000

- 1000000000000000000 > 50% 1000000000000000000
- 1000000000000000000 > 200% 1000000000000000000
- 1000000000000000000 90% 1000000000000000000



◆◆◆◆◆◆◆

◆◆◆◆◆◆◆

◆◆◆◆◆◆◆ (sms\_c\_message\_received\_count)◆

- ◆◆◆◆◆◆◆◆◆◆◆◆◆◆◆◆
- ◆◆◆◆◆◆◆◆◆◆◆◆◆◆◆◆
- ◆◆◆ rate(sms\_c\_message\_received\_count[5m])

◆◆◆◆◆◆◆◆◆◆ (sms\_c\_message\_processing\_stop\_duration)◆

- ◆◆◆◆◆◆◆◆◆◆◆◆◆◆◆◆
- ◆◆◆ p95 > 1000ms
- ◆◆◆ histogram\_quantile(0.95, sms\_c\_message\_processing\_stop\_duration)

◆◆◆◆◆

◆◆◆◆◆ (sms\_c\_routing\_failed\_count)◆

- ◆◆◆◆◆◆◆◆◆◆◆◆◆◆◆◆
- ◆◆◆◆◆◆◆◆◆◆◆◆◆◆◆◆ > 0◆
- ◆◆◆ increase(sms\_c\_routing\_failed\_count[5m])

◆◆◆◆◆ (sms\_c\_routing\_route\_matched\_count)◆

- ◆◆◆◆◆◆◆◆◆◆◆◆◆◆◆◆
- ◆◆◆◆◆◆◆◆◆◆◆◆◆◆◆◆
- ◆◆◆ sms\_c\_routing\_route\_matched\_count

◆◆◆◆◆

◆◆◆◆◆◆◆◆

- ◆◆◆◆◆◆◆◆◆◆◆◆◆◆◆◆
- ◆◆◆◆◆ < 95%
- ◆◆◆ rate(sms\_c\_delivery\_succeeded\_count[5m]) / rate(sms\_c\_delivery\_queued\_count[5m])

◆◆◆◆◆ (sms\_c\_delivery\_succeeded\_attempt\_count)◆

- ◆◆◆◆◆◆◆◆◆◆◆◆◆◆◆◆
- ◆◆◆ p95 > 2◆◆◆◆◆◆◆◆◆◆◆◆◆◆◆◆
- ◆◆◆ histogram\_quantile(0.95, sms\_c\_delivery\_succeeded\_attempt\_count)

◆◆◆◆◆

◆◆◆◆◆ (sms\_c\_queue\_size\_size)◆

- ◆◆◆◆◆◆◆◆◆◆◆◆◆◆◆◆

- `size > 10,000`
- `size > sms_c_queue_size`

`(sms_c_queue_oldest_message_age_seconds)`

- `size > 300`
- `size > sms_c_queue_oldest_message_age_seconds`

`size`

`size`

1. `size`

- `size > 5`
- `size > 5`
- `size > 24`

2. `size`

- `size > 5`
- `size > 5`
- `size > 5`

3. `size`

- `size > 5`
- `size > 5`
- `size > 24`

4. `size`

- `ID`
- `size`
- `SMSC`
- `size`

5. `size`

- `size`
- `size / 5`
- `size`
- `size`

6. `size`

- `API p95`
- `p95`
- `ENUM p95`

`size`

`size`



```

22222 - 222222
- alert: RoutingFailures
 expr: increase(sms_c_routing_failed_count[5m]) > 0
 severity: critical
 description: "{{ $value }}" 22222 5 22222222

2222 - 2222
- alert: QueueBacklog
 expr: sms_c_queue_size_pending > 10000
 severity: critical
 description: "222 {{ $value }}" 22222

2222 - 2222
- alert: OldMessagesInQueue
 expr: sms_c_queue_oldest_message_age_seconds > 300
 severity: critical
 description: "222222 {{ $value }}" 2

2222 - 2222222
- alert: FrontendDisconnected
 expr: sms_c_frontend_status_count{status="disconnected"} > 0
 severity: critical
 description: "{{ $value }}" 2222222

```

```

2222222222222

```

```

2222222
- alert: LowDeliveryRate
 expr: rate(sms_c_delivery_succeeded_count[10m]) /
rate(sms_c_delivery_queued_count[10m]) < 0.90
 severity: warning
 description: "222222 {{ $value }}"

222222
- alert: HighRetryRate
 expr: histogram_quantile(0.95, sms_c_delivery_succeeded_attempt_count) > 2
 severity: warning
 description: "952222222222{{ $value }}"

ENUM 2222222
- alert: SlowEnumLookups
 expr: histogram_quantile(0.95, sms_c_enum_lookup_stop_duration) > 5000
 severity: warning
 description: "ENUM 2222 > 5 2"

ENUM 2222222
- alert: LowEnumCacheHitRate
 expr: rate(sms_c_enum_cache_hit_count[10m]) /
(rate(sms_c_enum_cache_hit_count[10m]) +
rate(sms_c_enum_cache_miss_count[10m])) < 0.70
 severity: warning
 description: "ENUM 222222{{ $value }}"

```

◆ ◆ ◆ ◆








◆◆◆ ID ◆

1. **Web UI**  /message\_queue
2.  ID
3. 

**◇◇ API ◇**

```
curl https://api.example.com:8443/api/messages/12345
```








1. **Web UI** /message\_queue
- 2.
- 3.

◆ ◆ ◆ ◆ ◆ ◆ ◆ ◆









1. **Web UI**  " 
2. **API**  GET /api/events/12345









1. message\_inserted - 5
2. number\_translated - 15
3. message\_routed - 7
4. charging\_attempted - 10
5. message\_delivered - 4









- ```

1. message_inserted
  ↓
2. message_routed
  ↓
3. delivery_attempt_1 - 
  ↓
4. delivery_attempt_2 -  2 
  ↓
5. delivery_attempt_3 -  4 
  ↓
6. message dead letter - 

```



```
"destination_msisdn": "+447700900123",
"message_body": "Hello",
"source_smsc": "api"
# dest_smsc null
}
```

uk_gateway

```
#
GET /api/messages/queue?smsc=uk_gateway
```

```
# dest_smsc null
# uk_gateway
```

- locations destination_msisdn
- location SMSC
- expires

```
# API
GET /api/locations/{msisdn}
```

```
#
# expires >
```

-
- location
-

```
# delivery_attempts deliver_after
curl -X PATCH https://api.example.com:8443/api/messages/12345 \
-H "Content-Type: application/json" \
-d '{
  "delivery_attempts": 0,
  "deliver_after": "2025-10-30T12:00:00Z"
}'
```

```
# SMSC
curl -X PATCH https://api.example.com:8443/api/messages/12345 \
```

```
-H "Content-Type: application/json" \
-d '{
  "dest_smsc": "backup_gateway"
}'
```



```
curl -X DELETE https://api.example.com:8443/api/messages/12345
```

◆ ◆ ◆ ◆

Web UI /sms_routing

API

```
# curl https://api.example.com:8443/api/routes
```


Prometheus

```
# increase(sms_c_routing_route_matched_count[1h])
```

◆ ◆ ◆ ◆ ◆

Web UI

- ```

1. ? ? ? /sms_routing
2. ? ? " ? ? ? ? ? "
3. ? ? ? ? ?
 o ? ? ? ? ? ? ? ? ? ? ? ? ? ? ? ?
 o ? ? ? ? ? ? ? ? ? ? ? ? ? ? ? ? ? ?
 o ? SMSC ? ? ? ? ? ? ? ? ? ? ? ?
 o ? ? SMSC ? ? ? ? ? ? ? ? ? ? ? ? ? ? ? ? / ? ? ? ? ? ? ? ? ? ?
 o ? ? ? ? ? ? ? ? ? ? ? ? 1-255 ? ? ? ? ? ? ? ? ? ? ? ?
 o ? ? ? ? ? ? ? ? ? ? ? ? 1-100 ?
 o ? ? ? ? ? ? ? ? ? ? ? ?
 o ? ? ? ? ? ? ? ? ? ? ? ?
4. ? ? " ? ? ? ? ? "

```










- `?? ?? +44`
- `?? SMSC? uk_gateway`
- `?? ?? 50`
- `?? ?? 100`
- `?? ? "?? ? ?"`

◆ ◆ ◆ ◆ ◆ ◆ ◆ ◆ ◆ ◆



- 12345678901234567890
- 12345678901234567890
- 12345678901234567890 SMSC

1234

Web UI

1. 123 /sms\_routing
2. 1234567890
3. 12 "34"
4. 1234

1234567890123456789012345678901234567890

12/34567

1234567890

1. 123 /sms\_routing
2. 12 "3456"
3. 12 JSON 34

123456

1. 123 /sms\_routing
2. 12 "3456"
3. 12 JSON 34
4. 1234567890
  - 1234567890123456
  - 1234567890123456

123

- 1234567890
- 1234567890123456
- 1234
- 1234567890

1234

1234567

Web UI1234 /frontend\_status

123

- 1234567890 "34"
- 1234567890123456 < 90 34
- 1234567890123456

12 API

```
curl https://api.example.com:8443/api/frontends/active
```

```
curl https://api.example.com:8443/api/frontends/stats
```














1. 
2.  SMS-C 
3. 
4.  60 








1.  POST /api/frontends/register
2.  API 
3.  JSON 
4.  curl 









```
curl -X POST https://api.example.com:8443/api/frontends/register \
-H "Content-Type: application/json" \
-d '{
 "frontend_name": "test_gateway",
 "frontend_type": "smpp",
 "ip_address": "10.0.1.50",
 "hostname": "gateway.example.com"
}'
```








## Web UI

1. `???` `/frontend_status`
2. `???????`
3. `??` `"??"`
4. `???????`

**API**

```
curl https://api.example.com:8443/api/frontends/history/uk_gateway
```

◆ ◆ ◆

- 
- 
- 



◆◆◆◆◆◆

◆◆◆◆◆◆◆ config/runtime.exs ◆◆◆◆◆◆◆◆◆◆◆◆◆◆◆◆

◆◆◆◆◆◆◆◆

◆◆◆◆◆◆◆

```
cat config/runtime.exs | grep -A 20 "translation_rules:"
```

◆◆◆◆◆◆◆

◆◆◆◆◆◆◆◆◆◆◆◆◆◆◆◆

◆◆ config/runtime.exs◆

```
%{
 calling_prefix: nil,
 called_prefix: nil,
 source_smsc: nil,
 calling_match: "^(\\d{10})$",
 calling_replace: "+1\\1",
 called_match: "^(\\d{10})$",
 called_replace: "+1\\1",
 priority: 100,
 description: "◆ 10 ◆◆◆◆◆◆◆◆ +1",
 enabled: true
}
```

◆◆◆◆◆◆◆◆◆◆

```
%{
 calling_prefix: nil,
 called_prefix: nil,
 source_smsc: nil,
 calling_match: "^00(\\d+)$",
 calling_replace: "+\\1",
 called_match: "^00(\\d+)$",
 called_replace: "+\\1",
 priority: 10,
 description: "◆ 00 ◆◆◆◆◆◆ +",
 enabled: true
}
```

◆◆◆◆◆◆◆◆◆◆◆◆◆◆◆◆

```
%{
 calling_prefix: nil,
 called_prefix: "101",
 source_smsc: "carrier_a",
 calling_match: nil,
 calling_replace: nil,
 called_match: "^101(\\d+)$",
 called_replace: "\\1",
}
```

```
priority: 5,
description: "A",
enabled: true
}
```

- 1.
2. /
3. number\_translated
- 4.

enabled: false

```
%{
...
enabled: false
}
```

CDR

- MySQL/MariaDB information\_schema.tables
- PostgreSQL pg\_database\_size() psql \l+

CDR

CDR

- 30-90
- 
- 

- MySQL/MariaDB OPTIMIZE TABLE
- PostgreSQL VACUUM ANALYZE autovacuum

## Mnesia

### Mnesia

```
IEx
:mnesia.table_info(:sms_route, :size)
:mnesia.table_info(:translation_rule, :size)
```

### Mnesia

```
Web UI
/sms_routing
" "

Mnesia
:mnesia.backup("/var/backups/sms_c/mnesia_backup.bup")
```

### Mnesia

```
Web UI
#
:mnesia.restore("/var/backups/sms_c/mnesia_backup.bup", [])
```

### 

### logrotate

```
/etc/logrotate.d/sms_c
/var/log/sms_c/*.log {
 daily
 rotate 30
 compress
 delaycompress
 notifempty
 create 0644 sms_user sms_group
 sharedscripts
 postrotate
 systemctl reload sms_c || true
 endscript
}
```

### 

### 

```
#
systemctl restart sms_c
```

```
#
#
```

### 

```
systemctl restart sms_c
```

◆◆◆◆

- ◆◆◆◆◆◆◆◆◆◆
- ◆◆ Prometheus ◆◆◆◆◆◆◆◆◆◆
- ◆◆◆◆◆◆◆◆◆◆
- ◆◆◆◆◆◆◆◆◆◆

◆◆◆◆◆

◆◆◆◆

1. ◆◆◆◆◆

- config/runtime.exs
- config/config.exs
- config/prod.exs◆◆◆◆◆◆

2. ◆◆◆◆Mnesia◆◆

- ◆◆ Web UI ◆◆
- ◆ Mnesia ◆◆◆◆

3. **SQL CDR** ◆◆◆◆

- ◆◆◆◆
- ◆◆◆◆◆◆◆◆◆◆

4. **TLS** ◆◆◆

- priv/cert/\*.crt
- priv/cert/\*.key

◆◆◆◆

◆◆◆◆◆◆◆◆

```
#!/bin/bash
/opt/sms_c/scripts/backup_config.sh

BACKUP_DIR="/var/backups/sms_c/$(date +%Y%m%d)"
mkdir -p $BACKUP_DIR

◆◆◆◆
cp -r /opt/sms_c/config $BACKUP_DIR/

◆◆◆◆
cp -r /opt/sms_c/priv/cert $BACKUP_DIR/

◆◆◆◆
chmod 600 $BACKUP_DIR/cert/*

echo "◆◆◆◆◆◆◆◆$BACKUP_DIR"
```

◆◆◆◆◆◆◆

```
#!/bin/bash
/opt/sms_c/scripts/backup_database.sh

BACKUP_DIR="/var/backups/sms_c/database"
DATE=$(date +%Y%m%d_%H%M%S)

mkdir -p $BACKUP_DIR

SQL CDR
MySQL/MariaDB mysqldump --single-transaction
PostgreSQL pg_dump -F c

#
- mysqldump pg_dump
-
-
- 30

#
find $BACKUP_DIR -name "sms_c_*.gz" -mtime +30 -delete

echo "sms_c_${DATE}"
```

```
#!/bin/bash
/opt/sms_c/scripts/backup_routes.sh

BACKUP_DIR="/var/backups/sms_c/routes"
DATE=$(date +%Y%m%d)

mkdir -p $BACKUP_DIR

API
curl https://api.example.com:8443/api/routes/export \
 > $BACKUP_DIR/routes_${DATE}.json

echo "routes_${DATE}.json"

crontab
```

```
2
0 2 * * * /opt/sms_c/scripts/backup_config.sh
0 2 * * * /opt/sms_c/scripts/backup_database.sh
0 2 * * * /opt/sms_c/scripts/backup_routes.sh
```

```
#
systemctl stop sms_c
```

```
#
```

```
cp -r /var/backups/sms_c/20251030/config/* /opt/sms_c/config/

配置
cp -r /var/backups/sms_c/20251030/cert/* /opt/sms_c/priv/cert/

启动服务
systemctl start sms_c
```

## SQL CDR

配置

- **MySQL/MariaDB** mysql
- **PostgreSQL** pg\_restore

SMS-C

配置

1. Web UI /sms\_routing
2. “ ”
3. JSON
4. “ ”
- 5.

配置

配置

配置

Prometheus 30

```
avg_over_time(sms_c_message_received_count[30d])
```

配置

-- 配置

```
SELECT
 DATE_FORMAT(inserted_at, '%Y-%m') AS month,
 COUNT(*) AS message_count,
 ROUND(SUM(LENGTH(message_body)) / 1024 / 1024, 2) AS data_mb
FROM message_queues
GROUP BY month
ORDER BY month DESC
LIMIT 12;
```

配置

## CPU

- < 50%
- > 70%
- > 90%

❖❖❖❖❖❖

- ❖❖❖ < 70% ❖❖
- ❖❖ > 80%
- ❖❖❖ > 90%

❖❖❖❖❖❖

- ❖❖❖ < 60% ❖❖
- ❖❖ > 75%
- ❖❖❖ > 85%

❖❖❖❖❖

- ❖❖❖ < 1000 ❖❖❖
- ❖❖ > 5000 ❖❖❖
- ❖❖❖ > 10,000 ❖❖❖

❖❖❖❖

❖❖❖❖❖❖❖❖❖❖❖❖❖

- CPU ❖❖ > 70%
- ❖❖❖❖ > 80%
- ❖❖❖❖❖

❖❖❖❖❖❖❖❖❖❖❖❖❖

- ❖❖❖❖ CPU > 50%
- ❖❖❖ > 5000 msg/sec
- ❖❖❖❖❖❖
- ❖❖❖❖❖❖❖

❖❖❖❖❖❖

- ❖❖❖❖❖❖❖❖❖❖❖
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- ❖❖❖❖❖❖❖
- ❖❖❖❖❖❖❖
- API ❖❖❖❖

❖❖1 ❖❖❖❖❖❖❖❖❖

- ❖❖❖❖❖❖ < 80%

- 2 2 2 2 2 2
- 2 2 2 2 > 10%
- 2 2 2 2 2 2

2 2 4 2 2 2 2 2 2

- 2 2 2 2 2 2
- 2 2 2 2 2 80-95%
- 2 2 2 2 2 2
- ENUM 2 2 2 2

2 2 24 2 2 2 2 2 2

- 2 2 2 2 2 2
- 2 2 2 2 2 2
- 2 2 2 2 2 2 2

2 2 2 2 2 2

1. 2 2 2 2 2 2

- 2 2 Prometheus 2 2
- 2 2 2 2 2 2 2
- 2 2 2 2 2 2 2 2
- 2 2 2 2 2 2

2. 2 2 2 2 2

- 2 2 2 2 2 2 2 2
- 2 2 2 2 2 2
- 2 2 2 2 2 2 2 OCS 2 DNS 2 2
- 2 2 2 2 2 2 2 2 2

3. 2 2 2 2 2

- 2 2 2 2 2 2 2 2 2
- 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2
- 2 2 2 2 2 2 2 2 2 2 2 2
- 2 2 2 2 2

4. 2 2 2

- 2 2 2 2 2 2
- 2 2 2 2 2 2 2 2 2 2
- 2 2 2 2 2 2 2
- 2 2 2 2 2 2

5. 2 2 2 2 2

- 2 2 2 2
- 2 2 2 2 2 2 2
- 2 2 2 2 2
- 2 2 2 2 2 2

6. 2 2 2 2



- 1 2 3 4 5
- 1 2 3 4 / 5
- 1 2 3 4 5
- 1 2 3 4 5

1 2 3 4

1 2 3 4 5

1. 1 2 3 4 5
2. 1 2 3 4 5 6 7 8 9
3. 1 2 3 4 5
4. 1 2 Prometheus 3 4 5 6
5. 1 2 3 4 5 6 7 8 / 9

1 2 3 4

1. 1 2 3 4 5
2. 1 2 3 4 5 6 7 8
3. 1 2 3 4 5 6
4. 1 2 3 4 5 6 7 8 9 10
5. 1 2 3 4 5 6 7 8 9 10

1 2 3 4

1. 1 2 3 4 5 6 7
2. 1 2 3 4 5
3. 1 2 3 4 5
4. 1 2 3 4 API 5
5. 1 2 3 4 5 6

1 2 3 4 5 6

1. 1 2 3 4 5 6 7 8
2. 1 2 3 4 5 6 7 8 9
3. 1 2 3 4 5 6 7 8 CPU / 9
4. 1 2 ENUM 3 4 5
5. 1 2 3 4 5 6 7

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18



SMS-C

◆ ◆ ◆ ◆








Intel i7-8650U @ 1.90GHz

| ??                   | ???           | ??????? | ??              |
|----------------------|---------------|---------|-----------------|
| ?? ?? ?? ?? ?? ?? ?? | 1,750 msg/sec | 0.58ms  | ?? SQL ?? 21 ?? |
| ?? ?? ?? ?? ?? ?? ?? | 1,750 msg/sec | 0.57ms  | ?? SQL ?? 21 ?? |
| ?? SMSC ?? ??        | 800 msg/sec   | 1.25ms  | ?? ?? ?? ??     |
| ?? ?? ?? ?? ?? ??    | 62 KB         | -       | ?? ?? 50%       |

$$\diamond \diamond \diamond \sim \diamond \diamond 1.5 \diamond \diamond \diamond \diamond \diamond \diamond \diamond \diamond$$


- ?? ? ? ? ?
- Mnesia ? ?
- CDR ? ? ? ?
- ? ? ? ?
- ? ? ? ?

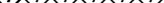







SMS-C 

◆◆◆◆◆◆◆**Mnesia**◆

- 
-  disc\_copies 
-  1,750  0.58ms 
-  24 
-  Mnesia 

## CDR???SQL????

- ????????????
- ???SQL???MySQL/MariaDB?PostgreSQL??????
- ????????????
- ????????????
- ????????

???

## Mnesia??

?????

```
config/runtime.exs
config :sms_c,
 message_retention_hours: 24 # ???24??
```

????

- ????>1M msg/day??12-24????
  - ???Mnesia??
  - ????
  - ???????MySQL
- ????100K-1M msg/day??24-48????
  - ????????????
  - ????????
- ????<100K msg/day??48-168????
  - ????????????
  - ????????

## Mnesia???

MessageStore????????

- status - ?????/??????
- dest\_smsc - ??SMSC???
- expires - ?????
- destination\_msisdn - ???????
- source\_msisdn - ???????

## Mnesia

disc\_copies

- 
- 
- 
- 

## CDR

BatchInsertWorker CDR MySQL

```
config/runtime.exs
config :sms_c,
 batch_insert_batch_size: 100, # CDR
 batch_insert_flush_interval_ms: 100 #
```

## CDR

```
batch_insert_batch_size: 200
batch_insert_flush_interval_ms: 200
```

- MySQL
- CDR

```
batch_insert_batch_size: 100
batch_insert_flush_interval_ms: 100
```

- 
- CDR100ms

## CDR

```
batch_insert_batch_size: 20
batch_insert_flush_interval_ms: 20
```

- CDR
- MySQL





```
last_flush_count: 100,
last_flush_duration_ms: 45
}
```



1. `current_queue_size - batch_size`
2. `last_flush_duration_ms - batch_size=100 < 100ms`
3. `flush_errors - 0`
4. `total_flushed / uptime`

?

- 
- 
- 
- 

◆ ◆ ◆ ◆















- ```

1.  ? ? ? ? ? ? ? ? ? ? pool_size
2.  ? ? ? ? ? ? ? ? ? ? ? ? ? ?
3.  ? ? ? ? ? ? ? ? ? ? ? ? ? ?
4.  ? ? ? ? ? ? ? ? ? ? batch_insert_batch_size

```

◆ ◆ ◆ ◆ ◆ ◆







1.  batch_insert_flush_interval_ms
2.  batch_insert_batch_size
3.  I/O 
4.  API 









◆ ◆ ◆ ◆ ◆

1. `???`
2. `???` `batch_insert_batch_size`
3. `???` `flush errors`

4. `Supervisor.terminate_child/2`

?

1. `100/100ms`
2. `1`
3.
4.
5.
6.
7. `-`

?

?

```
# config/prod.exs
config :sms_c,
  batch_insert_batch_size: 200,
  batch_insert_flush_interval_ms: 200

config :sms_c, SmsC.Repo,
  pool_size: 50
```

?

```
# config/prod.exs
config :sms_c,
  batch_insert_batch_size: 20,
  batch_insert_flush_interval_ms: 10

config :sms_c, SmsC.Repo,
  pool_size: 20
```

?

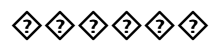
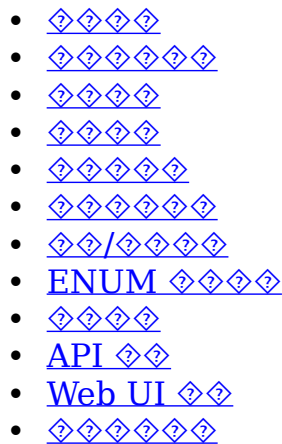
```
# config/dev.exs
config :sms_c,
  batch_insert_batch_size: 10,
  batch_insert_flush_interval_ms: 50

config :sms_c, SmsC.Repo,
  pool_size: 5
```


???

- [Ecto](#)???
- [Benchee](#)??
- [Phoenix](#)???





```
# 1. API
curl https://api.example.com:8443/api/status

# 2. Prometheus
curl https://api.example.com:9568/metrics | grep sms_c

# 3.
tail -f /var/log/sms_c/application.log

# 4.
systemctl status sms_c

# 5. SQL CDR (MySQL/MariaDB)
mysql -u sms_user -p -h db.example.com -e "SELECT 1"

# PostgreSQL:
# psql -U sms_user -h db.example.com -d sms_c_prod -c "SELECT 1"
```

◆◆◆◆

◆◆◆◆◆◆◆◆

```
# ◆◆ 100 ◆◆◆◆◆◆◆◆◆◆
```

```
tail -1000 /var/log/sms_c/application.log | grep "\[error\"]"
```

```
# ◆◆◆◆◆◆◆◆
```

```
grep "routing_failed" /var/log/sms_c/application.log
```

```
# ◆◆ SQL ◆◆◆◆◆◆
```

```
grep -i "database\|sql\|ecto" /var/log/sms_c/application.log | grep  
error
```

◆◆◆◆◆◆◆◆

```
# ◆◆◆◆◆◆◆◆◆◆
```

```
tail -f /var/log/sms_c/application.log | grep -E  
"(error|warning|critical)"
```

◆◆◆◆

◆◆◆◆◆◆◆◆◆◆

```
# ◆◆◆◆◆◆
```

```
rate(sms_c_message_received_count[5m])
```

```
# ◆◆◆◆◆◆
```

```
rate(sms_c_delivery_succeeded_count[5m]) /  
rate(sms_c_delivery_queued_count[5m])
```

◆◆◆◆◆◆◆◆

```
# ◆◆◆◆◆◆◆◆
```

```
sms_c_queue_size_pending
```

```
# ◆◆◆◆◆◆◆◆◆◆
```

```
sms_c_queue_oldest_message_age_seconds
```

◆◆◆◆◆◆◆◆

```
# ◆◆◆◆◆◆◆◆p95◆
```

```
histogram_quantile(0.95,  
sms_c_message_processing_stop_duration_bucket)
```

```
# ◆◆◆◆◆◆p95◆
```

```
histogram_quantile(0.95, sms_c_routing_stop_duration_bucket)
```


测试 API

```
curl -k https://api.example.com:8443/api/status
```

注册

```
curl -X POST https://api.example.com:8443/api/frontends/register \
-H "Content-Type: application/json" \
-d '{
  "frontend_name": "test_gateway",
  "frontend_type": "smpp",
  "ip_address": "10.0.1.50"
}'
```

测试 SMSC

- 测试
- 测试
- 测试
- 测试 dest_smsc

测试

- 测试 deliver_after
- 测试

```
curl -X PATCH https://api.example.com:8443/api/messages/12345 \
-H "Content-Type: application/json" \
-d '{"deliver_after": "2025-10-30T12:00:00Z"}'
```

测试

测试

- delivery_attempts
- 测试 > 3
- 测试

测试

1. 测试

```
curl https://api.example.com:8443/api/events/12345
```

测试

- 测试
- 测试
- 测试

2. 测试

- `?? ? ? ? ? ? ? ? ?`
- `?? ? ? ? ?`
- `?? ? ? ? ?`
- `?? ? ? ? ? ? ? ?`

`?? ? ? ? ?`

`?? ? ? ? ? ? ?`

- `?? ? ? ? ? ? ? ?`
- `?? ? ? ? ? ?`

`?? ? ? ? ?`

`?? ? ? ? ? ? ?`

```
curl -X PATCH https://api.example.com:8443/api/messages/12345 \
-H "Content-Type: application/json" \
-d '{"dest_smsc": "backup_gateway"}'
```

`?? ? ? ? ? ?`

```
curl -X PATCH https://api.example.com:8443/api/messages/12345 \
-H "Content-Type: application/json" \
-d '{"delivery_attempts": 0, "deliver_after":
"2025-10-30T12:00:00Z"}'
```

`?? ? ? ? ? ? ? ?`

- `?? ? ? ? ? ?`
- `?? ? ? ? ? ? ? ?`
- `?? ? ? ? ? ? ? ? ? ? ? ? ?`

`?? ? ? ?`

`?? ?`

- `?? ? ? ? ? deadletter: true`
- `?? ? ? ? ? ? ? ? ?`
- `?? ? ? ? "?? ? ?"`

`?? ? ? ? ?`

1. `?? ? ? ? ? ? ?`

`??` Web UI: `/message_queue`

- `?? ? ? ? ? ? ?`
- `?? ? ? ? ? ? ? ?`

2. `?? ? ? ? ? ? ?`

□□□□□□□

□□□□□□□□

□□□□: (□)
□□□□: (□)
□ SMSC: (□)
□□ SMSC: default_gateway
□□□: 255
□□: 100
□□: ✓
□□: □□□□□□□

□□□□□□□

□□□□□□□□

□□□□: +
□□ SMSC: international_gateway
□□□: 200
□□: 100
□□: ✓
□□: □□□□□

□□□□□□□□

- □□ Web UI □□□□□□□
- □□□□□□□□□□□□

□□□□□□□

□□□

- □□□□□□□□□□□
- □□□□□□□□□
- □□□□□□□□□□□

□□□□□

1. □□□□□□□□

□□ Web UI: /simulator

- □□□□□□□□□□□□
- □□“□□□□”□□
- □□□□□□□□□□□

2. □□□□□□□□

- $2^{22} = 2^{22}$
- $2^{22} = 2^{22}$
- $2^{22} = 2^{22}$

3. $2^{22} = 2^{22}$

$2^{22} = 2^{22}$

- $2^{22} = 2^{22} + 100$
- $2^{22} = 2^{22} + 50$
- $2^{22} = 2^{22} + 25$
- $2^{22} = 2^{22} + 10$
- $2^{22} = 2^{22} + 15$

$2^{22} = 2^{22}$

$2^{22} = 2^{22}$

$2^{22} = 2^{22}$

$2^{22} = 2^{22}$:
 $2^{22} = 2^{22} + 1555$
 $2^{22} = 2^{22} + 10$

$2^{22} = 2^{22}$:
 $2^{22} = 2^{22} + 1$
 $2^{22} = 2^{22} + 50$

$2^{22} = 2^{22}$

$2^{22} = 2^{22}$

$2^{22} = 2^{22}$ (70%):
 $2^{22} = 2^{22} + 70$

$2^{22} = 2^{22}$ (30%):
 $2^{22} = 2^{22} + 30$

$2^{22} = 2^{22}$

$2^{22} = 2^{22}$

$2^{22} = 2^{22}$:
 $2^{22} = 2^{22} + 15551234$
 $2^{22} = 2^{22} + \text{dedicated_gateway}$
 $2^{22} = 2^{22} + 1$

$2^{22} = 2^{22}$:
 $2^{22} = 2^{22} + 1$

❖❖ SMSC: general_gateway
❖❖❖: 50

❖❖❖❖❖❖❖

❖❖❖

- ❖❖❖❖❖❖❖❖❖❖❖❖❖❖❖
- ❖❖❖❖❖❖❖❖❖❖❖
- ❖❖❖❖❖❖❖❖❖❖❖❖❖❖❖

❖❖❖❖❖❖

1. ❖❖❖❖❖❖❖❖

- auto_reply: true
- auto_reply_message ❖❖❖❖
- ❖❖❖❖❖❖
- ❖❖❖❖❖❖❖❖❖❖❖

2. ❖❖❖❖❖❖❖❖❖

- ❖❖❖❖❖❖❖❖❖❖❖
- ❖❖❖❖❖❖❖"auto_reply"❖❖

3. ❖❖❖❖❖❖❖❖

curl https://api.example.com:8443/api/events/12345 | grep auto_reply

❖❖❖❖❖❖

❖❖❖❖❖❖❖❖

- ❖❖❖❖❖❖❖❖❖❖❖❖❖❖
- ❖❖❖❖❖❖❖❖❖❖❖❖❖❖❖❖❖❖❖❖
- ❖❖❖❖❖❖❖❖

❖❖❖❖❖❖❖❖

❖❖❖❖❖❖❖❖❖❖❖❖

❖❖❖❖❖❖: ✓

❖❖❖❖❖❖❖❖: "❖❖❖❖❖❖❖❖❖❖❖❖❖❖❖❖❖❖❖❖"

❖❖❖❖❖❖❖❖

❖❖❖❖❖❖❖❖❖❖❖❖❖❖❖❖❖❖❖❖❖❖❖❖❖❖❖❖

❖❖❖❖❖❖❖❖:

???: 10

????:

???: 50

????

??????

???

- sms_c_message_processing_stop_duration p95 > 1000ms
- API ?????
- ?????

?????

1. ???????

?????

histogram_quantile(0.95, sms_c_routing_stop_duration_bucket)

ENUM ?????

histogram_quantile(0.95, sms_c_enum_lookup_stop_duration_bucket)

?????

histogram_quantile(0.95, sms_c_charging_succeeded_duration_bucket)

?????

histogram_quantile(0.95, sms_c_delivery_succeeded_duration_bucket)

2. ???????

CPU ?????

top -b -n 1 | grep sms_c

?????

ps aux | grep beam.smp

?????

?????????

- ????????
- ?????
- ?????

ENUM ?????

- DNS
-
- / DNS
- ENUM

- OCS
- OCS
-
-

-
-
-
-

```
# config/config.exs
#
config :sms_c,
  batch_insert_batch_size: 200,
  batch_insert_flush_interval_ms: 200

#
config :sms_c, SmsC.Repo,
  pool_size: 50
```

- < 100 msg/sec
- API
- API

1.

```
# (iex)
SmsC.Messaging.BatchInsertWorker.stats()
```

- current_queue_size

- flush_errors > 0
- last_flush_duration_ms 

2.     



ecto_pools_query_time



ecto_pools_queue_time









```
config :sms_c, SmsC.Repo,  
  pool_size: 50 # ? 20 ??
```




```
config :sms_c,  
  batch_insert_batch_size: 200, # ??????  
  batch_insert_flush_interval_ms: 200 # ?????
```









```
# curl -X POST https://api.example.com:8443/api/messages/create_async
```

```
# NOT: /api/messages (??)
```








?

- sms_c_queue_size_pending  
-        
-            







1.         

? ? ? ?

```
rate(sms_c message received count[5m])
```

```
# rate sms_c_delivery_succeeded_count[5m]
```

2. rate sms_c_delivery_succeeded_count[5m]

- rate sms_c_delivery_succeeded_count[5m]
- rate sms_c_delivery_succeeded_count[5m]
- rate sms_c_delivery_succeeded_count[5m]

3. rate sms_c_delivery_succeeded_count[5m]

```
rate sms_c_delivery_succeeded_count[5m] /  
rate sms_c_delivery_attempted_count[5m]
```

rate sms_c_delivery_succeeded_count[5m]

rate sms_c_delivery_succeeded_count[5m]

- rate sms_c_delivery_succeeded_count[5m]
- rate sms_c_delivery_succeeded_count[5m] 5-10 rate sms_c_delivery_succeeded_count[5m]
- rate sms_c_delivery_succeeded_count[5m]

rate sms_c_delivery_succeeded_count[5m]

- rate sms_c_delivery_succeeded_count[5m]
- rate sms_c_delivery_succeeded_count[5m]
- rate sms_c_delivery_succeeded_count[5m]

rate sms_c_delivery_succeeded_count[5m]

- rate sms_c_delivery_succeeded_count[5m]
- rate sms_c_delivery_succeeded_count[5m]
- rate sms_c_delivery_succeeded_count[5m]

rate sms_c_delivery_succeeded_count[5m]

- rate sms_c_delivery_succeeded_count[5m]
- rate sms_c_delivery_succeeded_count[5m]
- rate sms_c_delivery_succeeded_count[5m]

rate sms_c_delivery_succeeded_count[5m]

rate sms_c_delivery_succeeded_count[5m]

rate sms_c_delivery_succeeded_count[5m]

- rate sms_c_delivery_succeeded_count[5m]

- API 500
-

1. SQL CDR

```
# MySQL/MariaDB
systemctl status mysql

# PostgreSQL
systemctl status postgresql

# MySQL/MariaDB
mysql -u sms_user -p -h db.example.com -e "SELECT 1"

# PostgreSQL
psql -U sms_user -h db.example.com -d sms_c_prod -c "SELECT 1"
```

2.

```
# Ping
ping db.example.com

# MySQL/MariaDB: 3306, PostgreSQL: 5432
telnet db.example.com 3306
#
telnet db.example.com 5432
```

3.

```
#
echo $DB_USERNAME
echo $DB_HOSTNAME
echo $DB_PORT

# MySQL/MariaDB
mysql -u $DB_USERNAME -p$DB_PASSWORD -h $DB_HOSTNAME

# PostgreSQL:
# psql -U $DB_USERNAME -h $DB_HOSTNAME -d sms_c_prod
```

```
# MySQL/MariaDB
systemctl start mysql
```

```
# PostgreSQL
systemctl start postgresql
```

```
~~~~~
```

```
~~~~~
```

```
export DB_USERNAME=correct_user
export DB_PASSWORD=correct_password
```

```
# 
systemctl restart sms_c
```

```
~~~~~
```

- ~~~~~
- ~~~~~
- ~ VPN/~~~~

```
~~~~~
```

```
~~~~~
```

```
config :sms_c, SmsC.Repo,
  pool_size: 50 # ~~~~~
```

```
~~~~~
```

```
~~~~~
```

- ~~~~~
- API ~~~~~
- ~~~~~

```
~~~~~
```

```
1. ~~~~~
```

```
-- MySQL/MariaDB: ~~~~~
SET GLOBAL slow_query_log = 'ON';
SET GLOBAL long_query_time = 1; -- ~ > 1 ~~~~~
```

```
-- ~~~~~MySQL/MariaDB
SELECT * FROM mysql.slow_log ORDER BY query_time DESC LIMIT 10;
```

```
-- PostgreSQL: postgresql.conf ~~~~~
-- log_min_duration_statement = 1000 # ~
-- ~ PostgreSQL ~
```


2. 22222222

```
-- 22222
SHOW INDEX FROM message_queues;
```

```
-- 22222
-- - source_smsc
-- - dest_smsc
-- - send_time
-- - inserted_at
```

3. 22222222

```
-- 2222MySQL/MariaDB
SELECT
    table_name,
    table_rows,
    ROUND(data_length / 1024 / 1024, 2) AS data_mb,
    ROUND(index_length / 1024 / 1024, 2) AS index_mb
FROM information_schema.tables
WHERE table_schema = 'sms_c_prod';
```

```
-- 2222PostgreSQL
-- SELECT schemaname, tablename,
--
pg_size_pretty(pg_total_relation_size(schemaname||'.'||tablename)) AS
size
-- FROM pg_tables WHERE schemaname = 'public';
```

22222

22222

```
CREATE INDEX idx_message_queues_source_smsc ON
message_queues(source_smsc);
CREATE INDEX idx_message_queues_dest_smsc ON
message_queues(dest_smsc);
CREATE INDEX idx_message_queues_send_time ON
message_queues(send_time);
CREATE INDEX idx_message_queues_status ON message_queues(status);
```

2222

```
-- MySQL/MariaDB
OPTIMIZE TABLE message_queues;
OPTIMIZE TABLE frontend_registrations;
```

```
-- PostgreSQL
-- VACUUM ANALYZE message_queues;
```

```
-- VACUUM ANALYZE frontend_registrations;
```

◆◆◆◆◆

◆◆◆◆◆◆

```
-- ◆◆◆◆ 30 ◆◆◆◆◆◆◆◆
```

```
DELETE FROM message_queues
WHERE status = 'delivered'
AND deliver_time < DATE_SUB(NOW(), INTERVAL 30 DAY)
LIMIT 10000;
```

◆◆◆◆◆◆◆

◆◆◆

- ◆◆◆◆“◆◆◆◆”
- ◆◆◆◆◆◆◆◆
- ◆◆◆◆◆◆◆

◆◆◆◆◆

1. ◆◆◆◆◆◆◆◆◆

```
df -h
```

```
# ◆◆ SQL ◆◆◆◆◆◆MySQL/MariaDB◆
du -sh /var/lib/mysql
```

```
# ◆◆ SQL ◆◆◆◆◆◆PostgreSQL◆
du -sh /var/lib/postgresql
```

2. ◆◆◆◆◆◆

```
# ◆◆◆◆◆◆MySQL/MariaDB◆
find /var/lib/mysql -type f -exec du -h &#123;&#125; + | sort -rh |
head -20
```

```
# ◆◆◆◆◆◆PostgreSQL◆
find /var/lib/postgresql -type f -exec du -h &#123;&#125; + | sort
-rh | head -20
```

```
# ◆◆◆◆◆◆
du -sh /var/log/sms_c/*
```

◆◆◆◆◆

◆◆◆◆◆◆

-- 1 2 3 4 5

```
DELETE FROM message_queues
WHERE inserted_at < DATE_SUB(NOW(), INTERVAL 90 DAY)
LIMIT 100000;
```

1 2 3 4 5

1 2 3 4 5 6

```
logrotate -f /etc/logrotate.d/sms_c
```

1 2 3 4 5 6 7

```
find /var/log/sms_c -name "*.log.*" -mtime +30 -delete
```

1 2 3 4 5

- 1 2 3 4 5 6 7 8
- 1 2 3 4 5 6 7 8 9
- 1 2 3 4 5 6 7 8 9 10

1 2 3 4 5 6

1 2 3 4 5 6 7 8

1 2 3

- 1 2 3 4 5 6 "1 2"
- 1 2 3 4 5 6 7 8 9
- 1 2 3 4 5 6 7 8 9

1 2 3 4 5

1. 1 2 3 4 5

```
curl https://api.example.com:8443/api/frontends/active | grep
frontend_name
```

2. 1 2 3 4 5 6 7

- 1 2 3 4 5 6 7 /api/frontends/register
- 1 2 3 API 1 2 3 4
- 1 2 3 4 5 6 7 80 1 2 3 4

3. 1 2 API 1 2 3

```
grep "frontend.*register" /var/log/sms_c/application.log | tail -20
```

1 2 3 4 5


```
# netstat -s | grep -i reset
```

3.

-
- > 90

-
-
-

-
-
-

```
REGISTRATION_INTERVAL = 60 #
```

- sms_c_charging_failed_count
- "charging_failed"
- charge_failed: true

1. **OCS**

```
# OCS API
curl -X POST http://ocs.example.com:2080/jsonrpc \
-H "Content-Type: application/json" \
-d '{"method": "SessionSv1.Ping",
```

```
"params": [],  
"id": 1  
&#125;'
```

```
{ "result": "Pong" }
```

2. OCS

```
tail -f /var/log/ocs/ocs.log
```

3.

```
# OCS URL  
grep ocs_url config/runtime.exs
```

OCS

```
# OCS  
systemctl status ocs
```

```
#  
systemctl start ocs
```

```
config :sms_c,  
  ocs_url: "http://correct-host:2080/jsonrpc",  
  ocs_tenant: "correct_tenant"
```

```
config :sms_c,  
  default_charging_enabled: false
```

- OCS
-
-

- sms_c_charging_succeeded_duration p95 > 500ms
- 22222222222222
- 22222

22222

1. 22222222

```
histogram_quantile(0.95, sms_c_charging_succeeded_duration_bucket)
```

2. 22 **OCS** 222

```
# OCS 2222
curl -w "%#123;time_total}\n" -X POST
http://ocs.example.com:2080/jsonrpc \
-H "Content-Type: application/json" \
-d '{"method": "SessionSv1.Ping", "params": [], "id": 1}'
```

3. 22222222

```
# Ping OCS 22
ping -c 10 ocs.example.com
```

22222

OCS 222

- 22 OCS 22
- 22 OCS 22
- 22222222222222

22222

- 2 OCS 22222222 SMS-C 222
- 22222222222222
- 22222222 VPN/22

22222

22222

```
config :sms_c,
  ocs_timeout: 5000 # 5 2
```

ENUM

ENUM



- sms_c_enum_lookup_stop_duration 
-  ENUM 
-  enum_result_domain 



1. ENUM

```
grep -A 10 "enum_" config/runtime.exs
```

2. DNS

```
#  DNS   
dig @8.8.8.8 e164.arpa  
  
#  ENUM   
#  +15551234567:  
dig @8.8.8.8 NAPTR 7.6.5.4.3.2.1.5.5.5.1.e164.arpa
```

3. DNS

```
#  DNS   
ping 10.0.1.53  
  
#   
nc -zv 10.0.1.53 53
```



DNS

 DNS

```
config :sms_c,  
  enum_dns_servers: [  
    &#123;"8.8.8.8", 53&#125;;, # Google  DNS  
    &#123;"1.1.1.1", 53&#125;; # Cloudflare DNS  
  ]
```

ENUM




```
config :sms_c,  
  enum_domains: ["e164.arpa"] # ? ? ? ? ?
```

? ? ? ? ?

? ? ? ? ?

```
config :sms_c,  
  enum_timeout: 10000 # 10 ?
```

? ? **ENUM** ? ? ? ? ? ? ? ?

```
config :sms_c,  
  enum_enabled: false
```

ENUM ? ? ? ?

? ? ?

- ? ? ? ? ? ? ? < 70% ?
- ? ? ? ? ? ? ? ?
- ? ? ? ? ?

? ? ? ? ?

1. ? ? ? ? ? ? ?

```
# ? ? ? ? ?  
rate(sms_c_enum_cache_hit_count[5m]) /  
(rate(sms_c_enum_cache_hit_count[5m]) +  
rate(sms_c_enum_cache_miss_count[5m]))
```

```
# ? ? ? ? ?  
sms_c_enum_cache_size_size
```

2. ? ? ? ? ? ? ?

- ? ? ? ? ? ? ? ?
- ? ? TTL ? ? ? ? ?

? ? ? ? ?

? ? ? ? ? ? ? ? ? ?

- ? ? ? ? ? ? ? ? ? ? ?
- ? ? ? ? ? < 70% ? ? ? ? ?

? ? ? ? ?

Cookie

```
export ERLANG_COOKIE=same_secret_value_here
```

```
# ??? ~/.erlang.cookie
echo "same_secret_value_here" > ~/.erlang.cookie
chmod 400 ~/.erlang.cookie
```





EPMD

```
iptables -A INPUT -p tcp --dport 4369 -j ACCEPT
```

Erlang

```
iptables -A INPUT -p tcp --dport 9100:9200 -j ACCEPT
```

DNS



 IP
 








```
config :sms_c,  
  cluster_nodes: [  
    "sms@10.0.1.10",  
    "sms@10.0.1.11"  
  ]
```







?

- 
- 
- Mnesia 

◆ ◆ ◆ ◆ ◆

1.       

? ? ? ? ? ? IEx ?

```
Node.list()
```

2. Mnesia

```
:mnesia.system_info(:running_db_nodes)
```

◆ ◆ ◆ ◆ ◆

```
# systemctl stop sms_c

# systemctl start sms_c # node1

# systemctl start sms_c # node2
systemctl start sms_c # node3
```

- 
- 
-  Mnesia 
- 
- 

- 
- 
- 

```
# curl -k https://localhost:8443/api/status
```

3. TLS

```
#  
ls -l priv/cert/server.crt priv/cert/server.key  
  
#  
openssl x509 -in priv/cert/server.crt -noout -dates
```

```
systemctl start sms_c
```

```
# API  
iptables -A INPUT -p tcp --dport 8443 -j ACCEPT
```

```
grep "port:" config/runtime.exs
```

API 500

-
- 500
-

1.

```
tail -100 /var/log/sms_c/application.log | grep "\[error\]"
```

2.

```
mysql -u sms_user -p -e "SELECT 1"
```

3.

```
# ??  
free -h  
  
# CPU  
top -b -n 1  
  
# ??  
df -h
```

?????

???????

- ??????
- ??????

?????

- ??????
- ??????
- ??????

???????

- ????????
- ??????
- ??????

Web UI ??

???? Web UI

???

- ?????
- 404 ???
- ??????

?????

1. ????????

```
systemctl status sms_c
```

2. ??????

```
netstat -tlnp | grep 80
```

3. **URL**

-       
-      
- HTTP  HTTPS 

◆ ◆ ◆ ◆ ◆

◆ ◆ ◆ ◆ ◆

◆ ◆ ◆ ◆ ◆

```
grep "control_panel" config/runtime.exs
```


80

4000


```
systemctl start sms_c
```

◆ ◆ ◆ ◆

```
iptables -A INPUT -p tcp --dport 80 -j ACCEPT
```

LiveView

???

- 
- 
-  WebSocket 

◆ ◆ ◆ ◆ ◆

1.

-  F12 
-  WebSocket 
- 

2. $\diamondsuit ? \diamondsuit ? \diamondsuit ? \diamondsuit ? \diamondsuit ? \diamondsuit ? \diamondsuit ?$

?? ?? ?? ?? ?? ?? ?? ?? ?? ?? ?? ?? WebSocket?

```
location /live &#123;
    proxy_http_version 1.1;
    proxy_set_header Upgrade $http_upgrade;
    proxy_set_header Connection "upgrade";
&#125;
```

?????

WebSocket ???? ?

- ???? ???? WebSocket
- ???? ?
- ???? ? ? ? ?

???? ?

- ???? Ctrl+F5 ?
- ???? ? ? ? ?

??????

CPU ???? ?

???

- CPU ?? > 80%
- ???? ?
- ???? ? ? ? ?

???? ?

1. ???? ? ?

```
top -b -n 1 | grep beam.smp
```

2. ???? ? ?

```
# ???? ? ? ? ? ?  
rate(sms_c_message_received_count[5m])  
  
# ???? ? ?  
rate(sms_c_routing_route_matched_count[5m])
```

???? ?

???? ?

- ???? ? ? ? ? ? ? ? ?
- ???? ? ? ? ? ? ? CPU ?

???? ? ? ? ?

- ???? ? ? ? ?
- ???? ? ? ? ? ?

ENUM

-
-

- > 90%
-
-

1.

free -h

ps aux | grep beam.smp

2.

sms_c_enum_cache_size_size

ENUM

-
- TTL
- ENUM

IEx
SmsC.Messaging.BatchInsertWorker.stats()

-
-

-
-

?? ? ? ? ? ? ? ? ? ? ?

- ?? ? ? ? - ? ? ? ?
- ?? ? ? ? - ? ? ? ?
- ?? ? ? ? - ? ? ? ?
- ? ? ? ? ? ? - /var/log/sms_c/application.log



ANSSI R226

OmniMessage SMS R226-3
R226-7 ANSSI R226

ANSSI

R226 -

1.

1.1

OmniMessage SMS
REST API HTTPS SMPP IMS SS7/MAP
Elixir/Erlang Phoenix Mnesia MySQL/PostgreSQL

- REST API
- SMPP IMS SS7/MAP
-
-
-
- CDR
- 1,750 / 1.5

- Mnesia
 - RAM
 - disc_copies
 -
 - 24
- CDR MySQL/PostgreSQL

- CDR
- SQL CDR/ SQL
-
- 1,750 SQL
- CDR/ SQL
- SQL
- Mnesia

- **REST API** HTTPS 8443
- HTTPS 8086 Web
- SMPP IMS SS7/MAP
- MySQL/PostgreSQL CDR

-
-
- SMSC
-
-
- ENUM E.164 DNS
-
- CGRates

[README.md](#)

1.2

1.2.1

- OmniMessage SMS
- - MSISDN
 - MSISDN
 - IMSI
 - IMSI
 -
 - PDU
 - TP-DCS
 - GSM7 UCS-2 8 Latin-1
 -
 - UDH

- 2022/2023
- 2022 24
- 2022 CDR Mnesia
- 2022
- 2022/2023 SQL

CDR MySQL/PostgreSQL

- 2022
- 2022 SQL MySQL PostgreSQL
- 2022 CDR
 - 2022
 - 2022
 - 2022
 - 2022
- 2022
- 2022
- 2022
- 2022 SQL REST API CSV/JSON

1. 2022 SQL
2. 2022 Mnesia 1,750 SQL
3. 2022 disc_copies
4. 2022 CDR
5. 2022

1. 2022 → Mnesia RAM + 2022
2. 2022 → Mnesia
3. 2022/2023 → CDR SQL
4. 24 2022 → Mnesia
5. CDR SQL → 2022

- 2022
- 2022 PDU Mnesia CDR
- 2022 CDR
- 2022 CDR

- 2022 SMSC SMPP IMS MAP
- 2022
- 2022/2023
- 2022/2023

- IP 
- 

1.2.3

- Web UI
 -
 -
 -
 -
 -
- Prometheus
-

[OPERATIONS_GUIDE.md](#)








[METRICS.md](#)

- CDR
 - ? ? ? ?
 - ? ? / ? ? ? ?
 - ? ? ? ?
 - SMSC ? ?
 - ? ? ? ?
 - ?
- - ? ? ? ? ? ? ? ?
 - ? ? ? ? / ? ? ? ? ? ?
 - ? ? ? ? ? ? ? / ? ? ? ?
 - ? ? ? ? ? ? ? ?
 - ? ? ? ? ? ? ? ? ? ?
 - ? ? ? ? ? ? ? ?








-  MSISDN 
-  IMSI  IMS/MAP 
- 
- 
- 

- 
- 
- 

-            
-      
-      

- E.164     
-            
-        
- ENUM DNS        
-        

        [number_translation_guide.md](#)
       [sms_routing_guide.md](#)

1.3

1.3.1

- HTTPS/TLS   REST API  
-       
-              
-              

- Web UI    
- API      
-       
-       

-        
-        
-      
-      
-             

1.3.2

-             
-      UI         
-             

1. REST API → Mnesia RAM +
2. Mnesia →
3. → Mnesia
4. → Mnesia +
5. / →
6. 24 → Mnesia

- / SQL
- SQL
- SMS-C I/O

SQL CDR /

CDR

-
- MySQL PostgreSQL
-

CDR CDR

-
-
-
-

CDR

- CDR
- SQL
- CDR 100
- 100ms
- CDR

```
# config/runtime.exs
```

```
config :sms_c,
```

```
  batch_insert_batch_size: 100,
```

```
  batch_insert_flush_interval_ms: 100
```

```
# CDR
```

```
#
```

SQL

-
-
-
- CDR
- /

- 2 3 4 5 6 7 8 9 10 11 12

2 3 4

2 3 4

- 2 3 4 5 6 7 8 9 10 11
- 2 3 4 5 6 7 8 9 10 11
- 2 3 4 5 6 7 8 9 10 11
- 2 3 4 5 6 7 8 9 10 SQL

2 3 4 5 6 7

2 3 4 5 6 < 24 7 8 9 10

- 2 3 Mnesia 4 5 6 REST API 7 8 9
- 2 3 4 5 6
- 2 3 4 5 6 7 8 9
- 2 3 4 5 6 7 8

2 3 4 5 6 > 24 7 8 9 10

- 2 3 SQL 4 5 6 7 8 9 CDR 10 11
- 2 3 SQL 4 5 6 7 8
- 2 3 4 5 6 7 8 9 10 11
- 2 3 4 5 6 7 8 9 10 11 12 13 14 15

2 3 4 5 6 7 8

1. 2 3 4 5 6 7 disc_copies 8 9 10 11 12 13 14 15 16 17
2. 2 3 4 5 6 7 8 CDR 9 SQL 10 11 12 13 14 15
3. 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16
4. 2 3 4 5 6 7 8 9 10 11 Mnesia 12 + 13 14 15 16 SQL 17 18 19 20 21

1.5 2 3 4 5 6 7 8 9 10

OmniMessage SMSc 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 REST API 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80 81 82 83 84 85 86 87 88 89 90 91 92 93 94 95 96 97 98 99 100

2 3 4 5

2 3 4 5 6 7 8 9 10

1. IMS/SIP 2 3 4 5 6

IMS 2 3 4 5 6 SIP 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80 81 82 83 84 85 86 87 88 89 90 91 92 93 94 95 96 97 98 99 100

IMS

- / IMSI IMS
- P-Asserted-Identity SIP
- SIP Call-ID
- IMS P-Access-Network-Info
- IMS HSS

2. SMPP

SMPP PDU SMPP PDU SMPP PDU REST API

SMPP

- SMPP PDU
- DCS
- UDH
- ESME system_id
- TON/NPI
-

3. SS7/MAP

SS7 MAP MAP SS7 REST API

SS7/MAP

- MAP IMSI
- GT
- MSC/VLR
- SCCP
- MAP
- TP-

IMS/SIP SMPP SS7/MAP SMSc

- 1.
2. CDR CDR
- 3.
4. CDR

CDR

- source_smsc "ims.gateway-01"
"smpp.customer123" "map.msc-01"
-
-

1.6

Mnesia SQL

1. REST API Mnesia

Mnesia 24

API

- GET /api/messages -
- GET /api/messages/{id} - Mnesia
- GET /api/messages/get_by_smsc?smsc=X -
- Mnesia

Mnesia

- / MSISDN
-
- SMSC
-
-

2. CDR SQL

SQL

SQL

-
- SQL cdrs
- SQL mysql psql DBEaver
-
- - calling_number -
 - called_number -
 - message_id -
 - submission_time -

- status[?] - [?]
- dest_smsc[?] - [?]

[?] CDR [?/?] [?/?]

3. [?]PubSub[?]

- Phoenix PubSub [?]
- [?]
- [?]
- [?]
- [?]
- WebSocket [?]

4. [?]

- CDR [?] CSV [?]
- [?] JSON [?]
- [?]
- [?]
- [?]

ETSI [?]

OmniMessage SMSc [?] ETSI [?] SMSc [?] X1/X2/X3 [?] LIMF [?]

[?] ETSI LI [?]

[?]

X1 [?] - [?]

- [?]
- [?] LEMF → LIMF [?]
- [?]
 - [?]/[?]MSISDN[?]IMSI[?]
 - [?]
 - [?]
 - [?]
- [?] SMSc [?]
 - LIMF [?]
 - LIMF [?] SMSc CDR/API [?]
 - LIMF [?] X1 [?]

X2 [?] - IRI [?]

- 12345678901234567890
- 1234 LIMF → LEMF1234
- 1234567890 123 ETSI TS 102 232-x 123 XML/ASN.1
- 123 **SMSc** 12345
 - 123 ID
 - 1234567890 MSISDN123
 - 1234567890 MSISDN123
 - IMSI12345678901234567890
 - 12345678
 - 12345678
 - 12345678901234567890/123/123456
 - 12345678
 - SMSC 1234567890/123456
 - 12345678901234567890
- 123 **SMSc** 123456
 - LIMF 123 CDR 12345678901234567890
 - LIMF 123 CDR 1234567 ETSI IRI 123
 - LIMF 123 X2 123 IRI 12345 LEMF

X3 123 - CC1234567890123

- 123456789012345678901234567890
- 1234 LIMF → LEMF1234
- 1234567890 123 ETSI TS 102 232-x 1234
- 123 **SMSc** 123456
 - 12345678901234567890
 - 123 PDU123456 SMS 1234
 - 12345678
 - 1234567890
 - TP-DCS 123
 - 1234567890UDH123
- 123 **SMSc** 123456
 - LIMF 123 CDR message_body 12345678901234567890
 - LIMF 12345678901234567890 PDU 123
 - LIMF 123 ETSI CC 1234567890
 - LIMF 123 X3 123 CC 12345 LEMF

1234567890

SMSc 1234567890 LI 12345

SMSc 1234567890	X2123	IRI123	X3123	CC123	CDR 123
123 ID	123 ID	123			message_id
123456	123 A	-			calling_number
123456	123 B	-			called_number
123456	123456	-			submission_time
123456	12345	-			delivery_time
123	12345	-			status

SMSc ? ? ? ?	X2 ?	IRI ?	X3 ?	CC ?	CDR ? ?
? ? ? ?	-		? ? ?		message_body
? ? PDU	-		? ? ? ?		(Mnesia/CDR)
? SMSC	? ? ? ? ?	-			source_smsc
? ? SMSC	? ? ? ? ?	-			dest_smsc
IMSI	? ? ? ?	ID-			(? ? ? ?)

LIMF ? ? ? ? ?

? ? 1 ? ? ? ? ?

- LIMF ? ? ? ? CDR ? ? ? ? ? 1-60 ? ?
- SQL ? ? ? ? X1 ?
- ? ? ? ? ? ? ? ? ? ?
- ? ? ? ? ? LI ? ? ? ? ? ? ? ? ? ?

? ? 2 ? ? ? ? ? ? ?

- SMSc PubSub ? ? ? ? ? ?
- LIMF ? ? ? ? ? ? ? ?
- LIMF ? ? ? ? ? ? ? ? ? ? ?
- ? ? ? ? ? ? ? ? ? ? ?
- ? ? ? ? ? ? ? ? ? ? ?

? ? 3 ? ? ? ? ?

- ? ? ? ? ? ? ? PubSub ? ? ? < 24 ? ? ?
- ? ? ? ? ? CDR ? ? ? ? ? ? ? ?
- ? ? ? ? ? ? ? ? ? ? ? ?

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? ? ? ? ? ? ? ? ?

- ? ? ? ? ? ? ? ? MSISDN ?
- ? ? IMSI ? ? ? ? ? ? ? ? ? ?
- ? ? ? ? ? ? ? ? ? ?
- ? ? ? ? ? ? ? ? ? ? ? ?
- ? ? ? ? ? ? ? ? ? API ? ?

? ? ? ? ? ? ? ? ?

- ? ? ? ? ? ? ? ? ? ? ? ?
- ? ? ? ? ? SMSC ? ? ? ? ? ?
- ?
- ? ? ? ? ? ? ? ? ? ENUM ? ? ? ? ? ? ?

? ? ? ? ? ? ? ? ?

- TLS 1.2  RFC 5246 
- TLS 1.3  RFC 8446  -  
- SSL 2.0/3.0         
- TLS 1.0/1.1         

- Erlang/OTP SSL/TLS 
- Cowboy Web  TLS
- Phoenix  HTTPS 



 Erlang/OTP
 
















- TLS_AES_256_GCM_SHA384
- TLS_AES_128_GCM_SHA256
- TLS_CHACHA20_POLY1305_SHA256

- ECDHE-RSA-AES256-GCM-SHA384
- ECDHE-RSA-AES128-GCM-SHA256
- DHE-RSA-AES256-GCM-SHA384
- DHE-RSA-AES128-GCM-SHA256

-   ECDHE/DHE                PFS 
-    Diffie-Hellman   2048    
-        
-                   SNI 

- **X.509**
- **RSA 2048 4096**
- **ECDSA**
- **CA**

```
# config/runtime.exs
config :api_ex,
  api: %{
    enable_tls: true,
    tls_cert_path: "priv/cert/omnitouch.crt",
    tls_key_path: "priv/cert/omnitouch.pem"
  }
```

 [CONFIGURATION.md](#)

◆ ◆ ◆

- HTTPS $\diamond\diamond$ REST API $\diamond\diamond\diamond$ 8443 $\diamond$
- HTTPS $\diamond\diamond$ Web $\diamond\diamond\diamond\diamond\diamond\diamond$ 8086 $\diamond$
- $\diamond\diamond\diamond\diamond\diamond$ MySQL/PostgreSQL $\diamond\diamond$ TLS $\diamond$

2.3

2.3.1

MySQL/MariaDB

- 
- AES-256 
-  TDE 

```
-- CDR ALTER TABLE cdrs ENCRYPTION='Y';
```

PostgreSQL

- 
- 
-  pgcrypto 

2.3.2 Mnesia

Mnesia

- 
-  LUKS  dm-crypt 
-  Erlang VM 

2.3.3

- 
-  0600  + 
- 
- CDR 

- TLS  priv/cert/
- 

- 2222222222222222

2.4 2222222222

2.4.1 API 2222

REST API 2222

- HTTPS/TLS 2222222222
- 2222222222222222SMS 2222222222
- 22 IP 2222222222222222
- 2222222222222222222222222222

222222

- 2222222222222222222222IP 22222222
- 2222222222222222
- 222222222222222222222222222290 222222
- 222222222222

2.4.2 2222222222

2222222222

- 2222/2222222222
- 22 TLS/SSL 22
- 22 IP 22222222
- 2222222222222222222222RBAC2

222

```
# config/runtime.exs
config :sms_c, SmsC.Repo,
  username: "omnitouch",
  password: "omnitouch2024", # 2222222222222222
  hostname: "localhost",
  ssl: true # 2222222222222222 TLS
```

2222222222

```
-- 2222222222222222
CREATE USER 'li_readonly'@'%' IDENTIFIED BY 'secure_password';
GRANT SELECT ON sms_c.cdcs TO 'li_readonly'@'%';

-- 2222222222222222222222222222
CREATE USER 'analytics'@'%' IDENTIFIED BY 'secure_password';
GRANT SELECT (id, message_id, calling_number, called_number,
  source_smsc, dest_smsc, submission_time, delivery_time,
```

```
status, delivery_attempts)
ON sms_c.cdrcs TO 'analytics'@'%';
```

2.5

2.5.1

Erlang/OTP

- SHA-256  SHA-384  SHA-512   
- SHA-1            
- MD5         
- BLAKE2     OTP     

-        
-      
-      

2.5.2

- AES        
 - AES-128-GCM
 - AES-256-GCM
 - AES-128-CBC
 - AES-256-CBC
- ChaCha20-Poly1305

- 128     
- 256     

- TLS    
-      
-        

2.5.3

- RSA  2048     4096    
- ECDSA           

- P-256 P-384 P-521
- Ed25519 EdDSA

- TLS
-
-

2.6

2.6.1

- GSM 7
- UCS-2 Unicode 16
- 8
- Latin-1

TP-DCS

-
-
-
-

-
- SMSc
-

2.6.2

SMPP

- SMPP /
- TLS SMPP TLS
-

IMS

- SIP
- SIP
- IMS

SS7/MAP

- SS7
- MAP
- SCCP/TCAP

SMSc

2.7

2.7.1

-
-
- API
-
-

- stdout/
- PCAP
-
- Prometheus

2.7.2

-
-
-

- TLS
-
- VaultAWS Secrets Manager
- Erlang/OTP
- API
- IP

-
-
- TLS
-

- `openssl req -x509 -key key.pem -out cert.pem`

2.8 `openssl`

2.8.1 `openssl`

TLS `openssl`

```
# openssl genrsa -out omnitouch.pem 4096

# openssl req -new -key omnitouch.pem -out omnitouch.csr

# openssl x509 -req -days 365 -in omnitouch.csr -signkey omnitouch.pem -out omnitouch.crt

# openssl ca -CA omnitouch.crt
```

`openssl`

- Erlang/OTP CSPRNG `openssl rand 32`
- `/dev/urandom`
- `openssl rand 32`

2.8.2 `openssl`

`openssl`

- `openssl genrsa -out key.pem 2048`
- `openssl req -new -key key.pem -out req.pem`
- PEM `openssl x509 -req -in req.pem -signkey key.pem -out cert.pem`
- `openssl x509 -in cert.pem -out cert.pem`

`openssl`

- TLS `openssl s_server -accept 443 -cert cert.pem -key key.pem`
- `openssl s_client -connect 127.0.0.1:443`
- API `openssl.cnf`

2.8.3 `openssl`

`openssl`

- `openssl req -x509 -key key.pem -out cert.pem`
- `openssl x509 -in cert.pem -out cert.pem`
- ACME `openssl x509 -in cert.pem -out cert.pem`

3. 配置

3.1 配置

配置

- 配置
- CDR 配置
- API 配置 IP/配置
- 配置

配置

- 配置
- 配置
- 配置 SQL WHERE 配置
- 配置

3.2 配置

配置

- 配置 Mnesia 24 配置
- CDR 配置 6 配置 2 配置
- 配置 Mnesia 配置 SQL 配置
- 配置 CDR 配置 cron 配置

配置

- 配置
- 配置 UI/配置
- 配置
- 配置
- 配置

配置

```
# config/runtime.exs
config :sms_c,
  # Mnesia 配置
  message_retention_hours: 24,

  # 配置
  delete_message_body_after_delivery: false, # 配置 true 配置

  # CDR 配置
  cdr_enabled: true,
```

```
#
batch_insert_batch_size: 100,
batch_insert_flush_interval_ms: 100
```

[CONFIGURATION.md](#)

3.3

1. REST API

- HTTPS
- JSON
-
-

2.

- SQL
- SQL
- CDR
-

3.

- CSV
- JSON
-
-

IRI

- CDR
 - ID
 - /
 -
 -
 -
 -
 - SMSC
 -

CC

-
- PDU

- ◆ ◆ ◆ ◆ ◆

4.         

Elixir/Erlang

-

- ## 4.2

◆ ◆ ◆ ◆ ◆

- 8443 HTTPS REST API
- 8086 HTTPS

- 3306/5432 -
-
- IP
- DMZ

-
-
-
- Erlang

4.3

-
-
-
- Syslog
- ELK

-
-
-
- TLS
-

- Prometheus
-
-
-
-

[OPERATIONS_GUIDE.md](#) [METRICS.md](#)

4.4

- Erlang
- Mnesia
-
-







- Mnesia  disc_copies
- SQL  MySQL/PostgreSQL 
- CDR 
- 

◆ ◆ ◆ ◆ ◆

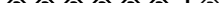
- 
- Mnesia 
- 
- 

5.

5.1

- [README.md](#) - 📖📖📖📖📖📖📖📖📖
- [CONFIGURATION.md](#) - 📖📖📖📖📖📖
- [API_REFERENCE.md](#) - REST API 📖📖
- [OPERATIONS_GUIDE.md](#) - 📖📖📖📖📖📖📖
- [CDR_SCHEMA.md](#) - 📖📖📖📖📖📖📖📖📖
- [sms_routing_guide.md](#) - 📖📖📖📖📖📖
- [number_translation_guide.md](#) - 📖📖📖📖📖📖
- [METRICS.md](#) - Prometheus 📖📖📖📖📖
- [PERFORMANCE_TUNING.md](#) - 📖📖📖📖
- [TROUBLESHOOTING.md](#) - 📖📖📖📖📖📖📖📖📖

5.2

-  []
-  []
-  []
- **Erlang/OTP**     

5.3

- **ANSSI R226**     
-               
-           **GDPR**  

6.

◆◆◆/◆◆◆◆◆◆◆◆◆◆

- OmniTouch Network Services Pty Ltd
- PO BOX 296, QUINNS ROCKS WA 6030, AUSTRALIA
- 
- compliance@omnitouch.com.au

◆ ◆ ◆ ◆ ◆ ◆ ◆ ◆

-       
- compliance@omnitouch.com.au

/

-       
-      compliance@omnitouch.com.au



A

A.1

[illegible]

A.2

?? B ?? ? ? ? CDR ??

OmniMessage SMS SQL MySQL PostgreSQL

B.1 CDR

id	BIGINT		
message_id	BIGINT		
calling_number	VARCHAR(255)	MSISDN	
called_number	VARCHAR(255)	MSISDN	
source_smsc	VARCHAR(255)		
dest_smsc	VARCHAR(255)		

origin_node	VARCHAR(255)	Erlang		
destination_node	VARCHAR(255)	Erlang		
submission_time	DATETIME			
delivery_time	DATETIME			
expiry_time	DATETIME			
status	VARCHAR(50)			
delivery_attempts	INT			
message_parts	INT			
deadletter	BOOLEAN			
message_body	TEXT			
inserted_at	DATETIME	CDR		
updated_at	DATETIME	CDR		

SQL [CDR_SCHEMA.md](#)

B.2 CDR

```
SELECT * FROM cdrs
WHERE calling_number = '+33612345678'
      OR called_number = '+33612345678'
ORDER BY submission_time DESC;
```

```
SELECT * FROM cdrs
WHERE (calling_number = '+33612345678' OR called_number =
'+33612345678')
      AND submission_time BETWEEN '2025-11-01 00:00:00' AND '2025-11-30
23:59:59'
ORDER BY submission_time;
```

CSV

```
.mode csv
.output /tmp/interception_report.csv
SELECT message_id, calling_number, called_number, message_body,
      submission_time, delivery_time, status
FROM cdrs
WHERE calling_number = '+33612345678'
ORDER BY submission_time DESC;
```


B.3 CDR ◇◇◇◇◇◇◇◇

1. ◇◇ SQL ◇◇◇

- ◇◇◇◇◇◇◇◇
- ◇◇ SQL ◇◇
- JDBC/ODBC ◇◇
- ◇◇◇◇◇◇◇◇◇◇MySQL Workbench◇pgAdmin◇

2. REST API ◇◇◇



SMS-C

[←](#) | [README](#)

SMS-C Mnesia

-
-
- SMSC**
- 1-255
-
- /
- runtime.exs
-
- Web UI** CRUD
-
- /
-

rule_id			
calling_prefix	/nil	nil =	
called_prefix	/nil	nil =	
source_smsc	/nil	SMSC nil =	
calling_match	/nil		
calling_replace	/nil		
called_match	/nil		
called_replace	/nil		
priority		1-255	

??????

????

```
# config/runtime.exs
config :sms_c, :translation_rules, [
  # 10?????+1
  %{
    calling_prefix: nil,
    called_prefix: nil,
    source_smsc: "us_domestic_smsc",
    calling_match: "^(\\d{10})$",
    calling_replace: "+1\\1",
    called_match: "^(\\d{10})$",
    called_replace: "+1\\1",
    priority: 10,
    description: "SMSC10?????+1",
    enabled: true,
    continue: false
  },

  # 0000000000
  %{
    calling_prefix: "00",
    called_prefix: nil,
    source_smsc: nil,
    calling_match: "^00(.+)$",
    calling_replace: "+\\1",
    called_match: nil,
    called_replace: nil,
    priority: 5,
    description: "0000000000+",
    enabled: true,
    continue: true # 0000000000
  },

  # 000000000000
  %{
    calling_prefix: "+44",
    called_prefix: "+44",
    source_smsc: nil,
    calling_match: "^\\+44(.*)$",
    calling_replace: "0044\\1",
    called_match: "^\\+44(.*)$",
    called_replace: "0044\\1",
    priority: 20,
    description: "000000000000",
    enabled: true,
```

```
    continue: false
  }
]
```

??

?????

??????

????

??????

??????E.164?

??????

??????

SMSC???

??????

??????

??????

??????

??????

Web??

?????UI

?????/number_translation?

???

- ??????
- ??????
- ?????
- ??/????
- ??????

- continue: true
- JSON/

1.
 - "+1" "44"
 - "+639" "1555"
 - SMSC
2.
 -
 -
3. 1-255
4.
 -
 -
- 5.
6. " " " "

-
-
- "↓ " "

1. " "
- 2.
3. " "

- /
- ↓
-
-

/translation_simulator

-
-
-
-
-

📞📞: +1-907-8720155 → +1-907-872-0155 |

📞📞

API📞📞

📞📞📞📞📞📞

📞📞📞📞

translate_numbers📞📞📞📞📞📞📞

- calling_number📞📞📞📞📞📞📞📞📞📞📞📞📞📞
- called_number📞📞📞📞📞📞📞📞📞📞📞📞📞📞
- source_smsc📞📞📞📞📞📞SMSC📞📞📞
- message_id📞📞📞📞📞📞📞📞📞📞📞📞📞📞

📞📞📞

- {:ok, translated_calling, translated_called, [rules_applied]} - 📞
📞📞📞
- 📞📞📞📞📞📞📞📞📞📞📞📞📞📞📞📞
- 📞📞📞📞📞📞📞📞📞📞📞📞📞📞📞📞

📞📞📞📞

```
{:ok, new_calling, new_called, rules} =  
  NumberTranslation.translate_numbers(  
    calling_number: "5551234567",  
    called_number: "9078720155",  
    source_smsc: "domestic_gateway",  
    message_id: "msg_123"  
  )
```

📞📞📞📞📞📞📞📞📞📞📞📞

```
if rules != [] do  
  Logger.info("📞📞📞 #{length(rules)} 📞📞📞📞📞")  
  Enum.each(rules, fn rule ->  
    Logger.info("  - 📞📞 ##{rule.rule_id}: #{rule.description}")  
  end)  
end
```

📞📞📞📞📞📞

📞📞📞📞📞

```
{:ok, rule} = NumberTranslation.add_rule(%{  
  calling_prefix: nil,  
  called_prefix: nil,
```



```
# ? ? ? ? ? ? ? ? ? ? ? ? ? ?
{:ok, %{imported: 5, failed: 0}} =
  NumberTranslation.import_rules(backup, mode: :replace)
```

? ? ? ?

? ? ? ?

1. ? ? ? ? ? ? ? ?

- **1-10** ?
- **11-50** ? ? ? ? ? ? ? ? ? ?
- **51-100** ? ? ? ? ?
- **101+** ? ? ? ? ? ? ? ? ? ?

2. ? ? ? ? ? **continue** ?

- ? continue: true
- ? ? ? ? ? ? ? ? ? ? ? ? ? ? ? ? continue: false
- ? ? ? ? ? ? ? ? **3-4** ? ? ? ? ? ? ? ? ? ?

3. ? ? ? ? ?

- ? ? ? ? ? ? ? ? ? ?
- ? ? ? ? ? ? ? ? ? ? ? ? ? ? ? ? "5551234567 → +15551234567" ?
- ? ? ? ? ? ? ? ? ? ? ? ? ? ? / ? ?

4. ? ? ? ? ? ? ? ? ? ?

- ? ? ? ? ? ? ? ? ? ? ? ? ? ? ?
- ? ? ? ? ? ? ? ? \1 ? \2 ? ? ? ? ? ? ? ? ? ?
- ?

? ?

1. ? ? ? ? ? ? ? ? ? ?

- ? ? ? ? ? ? ? ? ? ?
- ? ? ? ? ? ? ? ? ? ? ? ? ? ? ? ? ? ?
- ? ? ? ? ? ? ? ? ? ? ? ? ? ? ? ?

2. ? ? ? ? ? ? ? ? ? ?

- ?
- ? ? ? ? ? ? ? ? ? ? ? ? ? ? ?
- ? ? ? ? ? ? ? ? ? ?

3. ? ? ? ? ? ? ? ? ? ?

- 5
- Telemetry

1.

- continue

2.

-

3.

- message_id

4.

-

1.

- 10^(\d{10})\$
- ^{\+(\d+)}\$
- ^{0+(\.+)}\$
- ^{(\d{3})(\d{3})(\d{4})}\$ → \1-\2-\3

2.

- ^{(\d{3})(\d{7})}\$
- ^{+1\1\2}
- ^{\+(\d{1,3})(\d+)}\$ → 00\1\2

3.

- $\diamond \diamond \diamond \diamond \backslash$
- $\diamond \diamond \diamond \diamond \diamond \backslash +$
- $\diamond \diamond \diamond \diamond \diamond \backslash (\diamond \backslash)$

◆ ◆ ◆ ◆

◆ ◆ ◆ ◆ ◆

◆ ◆ ◆ ◆ ◆

-
- SMSC
-
-
- continue: false

◆ ◆ ◆ ◆ ◆

1. 
2. 
3. 
4. 
5. 









◆ ◆ ◆ ◆ ◆

- 
- 
- 

◆ ◆ ◆ ◆ ◆

1. 
2. 
3. 
4. 
5.  continue 

◆◆◆◆/◆◆◆◆

?? ?

?? ? ? ? ?

- ? ? ? ? ? ? ? ? ? ?
- ? ? ? ? ? ? ? ? ? ? ? ?
- ? ? ? ? ? ? ? ?

?? ? ? ? ?

1. ? ? ? ? ? ? ? ? ? ? ? ?
2. ? ? ? ? continue: true ? ? ?
3. ? ? ? ? ? ? ? ? ? ?
4. ? ? ? ? ? ? ? ? ? ?
5. ? ? ? ? ? ? ? ? ? ? ? ? ? ?

?? ? ? ? ? ? ? ? ? ?

?? ? ? ? ? ? ? ? ? ? ? ?

?? ? ? ? ?

- ? ? ? ? ? ? ? ? ? continue: true
- ? ? ? ? ? ? ? ? ? ? ?
- ? ? ? ? ? ? ? ? ? ? ? ?

?? ? ? ? ?

1. ? ? ? ? ? ? ? ? ? ? ? ? ?
2. ? ? ? ? ? ? ? continue ? ?
3. ? ? ? ? ? ? ? ? ? ?
4. ? ? ? ? ? ? ? ? ? continue: false

?? ? ? ? ? ? ? ? ? ? ?

?? ? ? ? ? ? ? ? ? ? ? ? ?

?? ? ? ? ?

- ? ? ? ? ? ? ? ? ? ?
- ? ? ? ? ? ? ? ? ?
- ? ? ? ? ? ? ? ? ?

?? ? ? ? ?

1. ? ? ? ? ? ? ? ? ? ? ? ? ? ? ?
2. ? ? ? ? ? ? ? ?
3. ? ? ? ? ? ? ? ? ? ? ? ? ?

4. translate_numbers

???

????

????????????????

?????

?????EventListener?

- translation_started: ?
- translation_candidates: ?
- translation_matched: ?
- translation_calling: ?
- translation_called: ?
- translation_continue: ?continue=true?
- translation_none: ?

message_idtranslate_numbers/1?

Telemetry

Telemetry?

```
:telemetry.attach(  
  "number-translation-handler",  
  [:sms_c, :number_translation, :translate, :stop],  
  fn _event_name, measurements, metadata, _config ->  
    # measurements: %{duration: ?}  
    # metadata: %{rules_applied: ?, ...}  
  end,  
  nil  
)
```

?????

- p50p95p99
- ?
- ?
- continue?

?

Mnesia????????????????

◆◆◆◆

◆◆◆◆◆◆◆◆◆◆

◆◆

◆◆ **1**◆◆◆◆◆◆◆◆◆◆

◆◆◆◆◆◆◆◆◆◆◆◆◆◆◆◆E.164 (+1XXXXXXXXXX)

```
# ◆◆ 1: 10◆◆◆◆◆◆◆◆◆◆
%{
  calling_match: "^(\\d{10})$",
  calling_replace: "+1\\1",
  called_match: "^(\\d{10})$",
  called_replace: "+1\\1",
  priority: 5,
  description: "◆◆◆◆10◆◆◆◆◆◆◆◆+1",
  enabled: true,
  continue: false
}

# ◆◆ 2: 1 + 10◆◆◆◆◆◆◆◆◆◆
%{
  calling_match: "^1(\\d{10})$",
  calling_replace: "+1\\1",
  called_match: "^1(\\d{10})$",
  called_replace: "+1\\1",
  priority: 10,
  description: "◆1XXXXXXXXXX◆◆◆+1XXXXXXXXXX",
  enabled: true,
  continue: false
}

# ◆◆◆◆◆
# "5551234567" → "+15551234567"◆◆◆ 1◆
# "15551234567" → "+15551234567"◆◆◆ 2◆
# "+15551234567" → "+15551234567"◆◆◆◆◆◆◆◆◆◆◆◆◆◆◆◆
```

◆◆ **2**◆◆◆◆◆◆◆◆◆◆◆◆◆◆◆◆

◆◆◆◆00◆◆◆◆◆◆◆◆◆◆◆◆◆◆◆◆

```
# ◆◆ 1: ◆00◆◆◆◆◆◆◆◆◆◆◆◆◆◆◆◆
%{
  calling_match: "^00(.+)$",
  calling_replace: "+\\1",
```

```

called_match: "^00(.+)$",
called_replace: "+\1",
priority: 5,
description: "00?????+",
enabled: true,
continue: true #
}

# 2:
%{
calling_match: "^\\+(\\d+)$",
calling_replace: "00\1",
called_match: "^\\+(\\d+)$",
called_replace: "00\1",
priority: 10,
description: "+????00????",
enabled: true,
continue: false #
}

```

```

#
# 1: "00441234567890" → "+441234567890" 1
# 2: "+441234567890" → "00441234567890" 2
# : "00441234567890"
# : [1, 2]

```

3 SMSC

SMSC

```

# 1: SMSC - 5
%{
source_smsc: "trusted_gateway",
calling_match: nil, #
calling_replace: nil,
called_match: nil,
called_replace: nil,
priority: 5,
description: "?????????",
enabled: true,
continue: false
}

# 2: SMSC - 10
%{
source_smsc: "untrusted_gateway",
calling_match: "^(.*)$",
calling_replace: "+VALIDATE\1",

```



```
called_match: "^(.*)$",
called_replace: "+VALIDATE\\1",
priority: 10,
description: "???",
enabled: true,
continue: false
}
```

```
# 3: SMSC 100%{
  source_smsc: nil, #
  calling_match: "^(\\d{10})$",
  calling_replace: "+1\\1",
  called_match: "^(\\d{10})$",
  called_replace: "+1\\1",
  priority: 100,
  description: "? ? ? ? 10 ? ? ? ? +1"
  enabled: true,
  continue: false
}
```

◆ ◆ 4 ◆ ◆ ◆ ◆ ◆ ◆ ◆ ◆

? ? 1 : ? ? ? ? ? ? ? ?

```
%{
  calling_match: "^0+(.)$",
  calling_replace: "\\1",
  called_match: "^0+(.)$",
  called_replace: "\\1",
  priority: 5,
  description: "❖❖❖❖",
  enabled: true,
  continue: true
}
```

2:

```
%{
  calling_match: "^(\\d{10})$",
  calling_replace: "+1\\1",
  called_match: "^(\\d{10})$",
  called_replace: "+1\\1",
  priority: 10,
  description: "??10???+1",
  enabled: true,
  continue: true
}
```

```
# 3:
%{
  calling_match: "^\\+1(\\d{3})(\\d{3})(\\d{4})$",
  calling_replace: "+1-\\1-\\2-\\3",
  called_match: "^\\+1(\\d{3})(\\d{3})(\\d{4})$",
  called_replace: "+1-\\1-\\2-\\3",
  priority: 15,
  description: "+1-XXX-XXX-XXXX",
  enabled: true,
  continue: false
}

#
# : "005551234567"
# 1: "005551234567" → "5551234567" 1
# 2: "5551234567" → "+15551234567" 2
# 3: "+15551234567" → "+1-555-123-4567" 3
# : "+1-555-123-4567"
# : [ 1, 2, 3]
```

?

test/sms_c/messaging/number_translation_test.exs

- test/sms_c/messaging/number_translation_test.exs
-
-
-
- Mnesia:nesia.table_info(:translation_rule, :size)
- Telemetry



SMS-C

[←](#) | [README](#)

SMS-C SMSC
SMS Mnesia

-
- **SMSC**
- **SMPP**
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-
-
-
-
-
- **runtime.exs**
-
- **Web UI** **CRUD**
-
-
- **ENUM** **DNS**

route_id	integer		
calling_prefix	string/ nil	nil =	
called_prefix	string/ nil	nil =	
source_smsc	string/ nil	SMSC nil =	
dest_smsc	string/ nil	SMSC auto_reply drop	

	??	??	??	??
source_type	atom/ nil	?? ?:ims?:circuit_switched?:smpp? ? nil		
enum_domain	string/ nil	????? DNS ENUM ?	?	
auto_reply	boolean	????????????????	??????????	
auto_reply_message	string/ nil	????????????? auto_reply ? ???????	???	
drop	boolean	??????????????????	??????????	
charged	atom	?????:yes?:no ? :default	???	?:default?
weight	integer	????????1-100??? 100?	?	
priority	integer	????????1-255????????	?	
description	string	???????	?	
enabled	boolean	??/?	?	

????????????????

1. ????auto_reply=false?drop=false??? dest_smsc
2. ????auto_reply=true??? auto_reply_message
3. ????drop=true????

????

????????????????

??? **1**????????

1. ?????????? MSISDN ?????
2. ?????????????????????????????????
3. ?????????????????????????????

??? **2**????????

1. ?????????
2. ?????????
 - ????? = ?????×100 ??
 - ????? = ?????×50 ??
 - ??? SMSC = +25 ?
 - ?? ENUM ??? = +15 ?
 - ????? = +10 ?
 - ?? ENUM ? = +5 ?
3. ?????????
4. ?????????
5. ?????
 - ????? SMSC ?????

- ?

- 















◆ ◆ ◆ ◆ ◆

- 1.
- 2.
3. MSISDN
- 4.
- 5.
- 6.

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- $\diamondsuit \diamondsuit \diamondsuit \diamondsuit \heartsuit \heartsuit \heartsuit \heartsuit \heartsuit \heartsuit \heartsuit \heartsuit \heartsuit \heartsuit \heartsuit \heartsuit \heartsuit \heartsuit$
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???

-    IMS     IMS/VoLTE  
-      MSC    
-            SIP  

◆ ◆ ◆ ◆

[illegible]

SMSC


















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Web

UI

         /sms_routing      

-            
-            
-      
-          
-      
-      5   

1.   "     "
2.          SMSC    
3.      1-100   100     1-255   100
4.   "   "    
5.   "     "

1.        "   "
2.        
3.   "     "

-   "   "       
-   "   "     

      /simulator       

-           
-               
-              
-          
-         
-        10   

??/????

???

???

1. ???1-10???
2. ???
3. ???
4. ???

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1. ???
2. ???
3. ???

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1. ???
2. ???
3. ???
4. ???

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1. ???
2. ???
3. ???

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???

???:error, :no_route_found}

???

- ???
- ???
- ???
- ???

???

1. ???SmsRouting.list_enabled_routes()

2. `add_route(%{dest_smsc: "debug_smsc",`
3. `priority: 255})`
4. `add_route(%{dest_smsc: "debug_smsc",`

`add_route(%{dest_smsc: "debug_smsc",`

`priority: 255})`

`add_route(%{dest_smsc: "debug_smsc",`

- `add_route(%{dest_smsc: "debug_smsc",`
- `priority: 255})`
- `add_route(%{dest_smsc: "debug_smsc",`
- `priority: 255})`

`add_route(%{dest_smsc: "debug_smsc",`

1. `add_route(%{dest_smsc: "debug_smsc",`
2. `priority: 255})`
3. `add_route(%{dest_smsc: "debug_smsc",`
4. `priority: 255})`

`add_route(%{dest_smsc: "debug_smsc",`

`priority: 255})`

`add_route(%{dest_smsc: "debug_smsc",`

- `add_route(%{dest_smsc: "debug_smsc",`
- `priority: 255})`
- Mnesia `init_tables`

`add_route(%{dest_smsc: "debug_smsc",`

1. `add_route(%{dest_smsc: "debug_smsc",`
2. `priority: 255})`
3. `add_route(%{dest_smsc: "debug_smsc",`
4. `priority: 255})`

`add_route(%{dest_smsc: "debug_smsc",`

ENUM/NAPTR

ENUM E.164 DNS NAPTR SMS-C
ENUM DNS ENUM

ENUM

ENUM E.164 DNS

- +1-212-555-1234
- **ENUM** 4.3.2.1.5.5.5.2.1.2.1.e164.arpa
- **DNS** NAPTR
- SIP URI

ENUM config/runtime.exs

ENUM

enum_enabled: true ENUM DNS ENUM

ENUM

ENUM

ENUM

- e164.arpa - IETF ENUM
- e164.org - ENUM
- ENUM

DNS

ENUM DNS {ip_address, port}

[] DNS

DNS

- Google DNS {"8.8.8.8", 53} {"8.8.4.4", 53}
- Cloudflare DNS {"1.1.1.1", 53} {"1.0.0.1", 53}
- ENUM DNS {"10.0.0.53", 53}

DNS 5000ms

ENUM

ENUM  





ENUM




15




















DNS

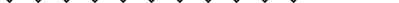



-   DNS    
-      
-     DNS                   

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-  NAPTR                             
-   Prometheus                            
-                              

◆ ◆ ◆ ◆ ◆

- 
- 
- 
- 

◆◆◆◆◆ **ENUM**

```
enum_result_domain ENUM
```


◇ +1-555-0100 ◇ ENUM ◇◇◇◇◇ NAPTR ◇◇◇◇◇

- **???**E2U+sip
- **???**sip:customer@voip-carrier.com
- **???**voip-carrier.com







```
enum_result_domain: "voip-carrier.com" ENUM
```

◆ ◆ ◆ ◆ ◆

- `enum_result_domain: nil` - `enum_result_domain` is nil
- `enum_result_domain: "specific.com"` - `enum_result_domain` is "specific.com"
- `enum_result_domain: "specific.com"` - `enum_result_domain` is "specific.com"

???

ENUM +15

ENUM

NAPTR /naptr_test

??

- DNS ENUM
- NAPTR
- NAPTR
-
-

???

1. +
2. ENUM e164.arpa
3. "
4.
 - NAPTR
 -
 - E2U+sipE2U+tel
 -
 -
 -

???

- DNS "
-
-
-

???

NAPTR

-
-
- u=s=
- E2U+sipE2U+tel
-
-
-

ENUM

1. VoIP

ENUM SIP/VoIP VoIP

- ENUM SIP URI sip:number@voip-carrier.com
- voip-carrier.com
- enum_result_domain: "voip-carrier.com"
- VoIP

2.

- ENUM
- carrier-a.com
- A
-

3.

- ENUM
-
-

4.

ENUM

- ENUM
-
-

5.

911 112

- ENUM
-
-

ENUM

1. ENUM 1-10

- 1 ENUM VoIP
- 2 VoIP
- 3

2. 50-100

- 1
- 2 ENUM
- 3

3. 200+

- 1
- 2

1

- 1 enum_result_domain: "sip.carrier.com" → VoIP
- 10 enum_result_domain: "tel.carrier.com" → PSTN
- 50 called_prefix: "+1" →
- 100 called_prefix: "+" →
- 200 →

2

DNS

ENUM DNS

- < 1ms
- 10-100ms DNS

3

- DNS
- 5000ms
- > 80%
-

4

5

-
- ETS
- TTL
-

6

ENUM [?][?][?][?][?][?][?][?][?][?][?][?]

- DNS [?][?] → [?][?][?][?][?][?][?]
- [?] NAPTR [?][?] → [?][?][?][?][?][?][?][?][?]
- NAPTR [?][?][?][?] → [?][?][?][?][?][?][?][?][?]
- DNS [?][?][?][?][?][?] → [?][?][?][?][?][?][?][?][?]

[?][?] **ENUM** [?][?]

[?][?] Prometheus [?][?][?] ENUM [?][?][?]

- sms_c_enum_lookup_stop_duration - [?][?][?][?]
- sms_c_enum_cache_hit_count - [?][?][?][?]
- sms_c_enum_cache_miss_count - [?][?][?][?][?]
- sms_c_enum_cache_size_size - [?][?][?][?][?]
- sms_c_enum_naptr_records_record_count - [?][?][?][?][?] NAPTR [?][?]

[?][?][?][?][?][?][?]

- [?][?][?][?][?][?][?][?][?] > 70%
- [?][?][?][?][?] **p95**[?][?] < 1000ms
- [?][?][?][?][?][?][?] DNS [?][?]

[?][?][?] docs/METRICS.md [?][?][?][?][?][?][?][?][?]

[?][?][?] **ENUM**

[?][?][?][?][?] **NAPTR** [?][?]

- [?][?] ENUM [?][?][?]
- [?][?] DNS [?][?][?][?][?]
- [?][?][?][?][?][?][?][?] ENUM [?][?][?]
- [?][?][?] ENUM [?][?][?][?]e164.org[?]
- [?][?] NAPTR [?][?][?][?][?][?][?][?]

[?][?][?] **ENUM** [?][?]

- [?][?] DNS [?][?][?][?][?]
- [?][?][?][?][?][?]
- [?][?][?][?][?][?][?][?]
- [?][?][?][?][?][?][?][?] DNS [?][?][?]
- [?][?][?][?][?][?][?][?]

[?][?][?] **ENUM** [?][?][?][?][?][?][?][?][?]

- [?][?][?][?][?] enum_result_domain [?][?]
- [?][?][?][?][?][?][?][?][?][?][?][?]
- [?][?][?][?][?][?][?][?][?][?][?]

- `enum_domains NAPTR`

`enum`

- `enum_enabled: true` `config/runtime.exs`
- `enum_domains`
- `enum_domains`
- `enum_domains ENUM`

`enum`

`DNS`

- `DNS`
- `DNSSEC`
- `NAPTR`
- `DNS`

`DNS`

- `DNS`
- `DNS`
- `DNS`

`DNS`

- `ENUM DNS`
- `DNS`
- `VPN/DNS`

`DNS`

`EventLogger`

- `sms_routing_started`
- `sms_routing_candidates`
- `sms_routing_matches`
- `sms_routing_selected`
- `sms_routing_failed`

`message_id` `route_message/1`

`DNS`

Mnesia

??

test/sms_c/messaging/sms_routing_test.exs

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-
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-
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???

???

1. ?

- Mnesia
-

2. ?

- →
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- →

3. ?

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4. ?

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- route_message/1 API
-

5. ?

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6. ?

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- ? ? ? ?

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- ? ? ? ? ? ? ? ? ? ?
- ? ? ? ? ? ? ? ? ? ?
- ? ? ? ? ? ? ? ? ? ? ? ?
- ? ? Mnesia ? ? ? ? :mnesia.table_info(:sms_route, :size)