□□□□

□□□□□□□ Benchee □ SMS-C □□□□□□□□□

□□□□□□

1. □□ SMS □□□□ (`raw_sms_bench.exs`)

□□□□ `submit_message_raw` API □□□□□□□□ SMS PDU□

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- □□□□□ 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`

□□

□□□□□□□□ Benchee□□□□□□□□

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

□□

HTML □□□□□□□□□ `benchmarks/output/` □□□□□

- □□□□□□□
- □□□□
- □□□□□□
- □□□□

SMS-C API [illegible]

← [illegible]

SMS-C REST API [illegible] (`config/config.exs`) [illegible]

[illegible] OpenAPI [illegible] Swagger UI[illegible]

```
GET /api/schema      # OpenAPI JSON [illegible]
GET /api/docs        # Swagger UI
```

[illegible]

- [illegible]
- [illegible]
- [illegible]
- [illegible]
- [illegible]
- [illegible]
- [illegible]
- [illegible]
- [illegible]
- [illegible]
- [illegible]
- HTTP [illegible]
- [illegible]
- [illegible]

[illegible]

[illegible] URL

```
https://<host>:8443/api
```

[illegible]: 8443 ([illegible] `config :api_ex, api: %{port: ...}` [illegible]) [illegible]: [illegible] `enable_tls` [illegible] true [illegible] HTTPS[illegible] `/api` [illegible]

[illegible]

[illegible] JSON[illegible]

```
Content-Type: application/json
```

[illegible] URL [illegible] API [illegible] `/api/schema` [illegible]

[illegible]

[illegible] API [illegible] OpenAPI [illegible] API [illegible]

[illegible]

- **TLS**: [illegible] `enable_tls` [illegible] true [illegible] `tls_cert_path` / `tls_key_path` [illegible] HTTPS[illegible]
- [illegible]: [illegible] API [illegible] IP[illegible] `X-Forwarded-For` [illegible]

[illegible] API [illegible]

[illegible]

[illegible] `data` [illegible]

□□□□□

```
{ "id": 12345, "status": "queued" }
```

□□□□□ JSON □□□□□

```
[ { "id": 12345 }, { "id": 12346 } ]
```

□□□□□□□□□□□ `error` □□□□

```
{ "error": "payload_hex is required. For plaintext, use POST
/api/messages_plaintext" }
```

□□□□□□□□□□□□□□□□□□□□□□

```
{ "status": "error", "response": "Not Found" }
```

□□

□□□□□□□□□□□□□□□

□□:

```
GET /api/status
```

□□ (200 OK):

```
{
  "status": "ok",
  "application": "OmniMessage",
  "timestamp": "2025-11-01T23:00:00Z"
}
```

□□:

```
curl https://host:8443/api/status
```

□□

□□□□□□□□□□□□□□□□ **`payload_hex`**□TP-User-Data □□□□□ **`dcs`**□□□□□□□□□□□□□□□ **`udh_hex`**□□□□□□□□□□□□□□□□□□□□ □□□□□□□□□□□□□□□□DCS □□□□□□□□□□

□□□□

□□□□□□□□□□□□ `ApiEx.Schemas.MessageSchema`□□

□□	□□	□□
`id`	integer	□□ ID
`source_msisdn`	string	□□□
`destination_msisdn`	string	□□□□
`payload_hex`	string	TP-User-Data □□□□□□□□□□□□□
`dcs`	string	□□□□□□□□□□□□□□`00`=GSM7, `08`=UCS2, `04`=8bit, `C8`=MWI□
`udh_hex`	string / null	□□□□□□□□□□□���
`message_text`	string / null	□□□□□□□□ UTF-8 □□□□□□□□□
`source_smsc`	string	□ SMSC □□□
`dest_smsc`	string / null	□□ SMSC □□□
`status`	string	□□□□ `queued`, `backoff`, `sent`, `delivered`, `expired`, `dropped`, `auto_replied`, `balance_rejected`, `deleted`
`send_time`	datetime	
`deliver_time`	datetime / null	
`expires`	datetime	
`delivery_attempts`	integer	

[illegible]	[illegible]	[illegible]
`deadletter`	boolean	
`message_parts`	integer / null	
`message_part_number`	integer / null	
`smsc_node_name`	string	[illegible]

[illegible]

[illegible]:

```
GET /api/messages
```

[illegible]:

- `smsc: <frontend_name>` - [illegible] SMSC [illegible]
- `include-unrouted: true|1` - [illegible]false[illegible]
- `x-decode: true|1` - [illegible]

[illegible] `smsc` [illegible]:

- `status` - [illegible]
- `limit` - [illegible] 100[illegible] 1000[illegible]
- `offset` - [illegible] 0[illegible]

[illegible] [illegible] `limit` [illegible] 100 [illegible]

[illegible] (200 OK) - [illegible] JSON [illegible]

[illegible]:

```
# □□□□□□□
curl -H "smsc: uk_gateway" https://host:8443/api/messages

# □□□□□□□□□□
curl -H "smsc: uk_gateway" -H "include-unrouted: true"
https://host:8443/api/messages

# □□□□□□□□
curl "https://host:8443/api/messages?status=delivered&limit=50"
```

□□□□

□□:

```
GET /api/messages/:id
```

□□□ `x-decode: true` □□□□□□□□□□

□□ (200 OK): □□□□□□□**404** □□□ `{"error": "Message not found"}` □□ ID □□□□

```
curl https://host:8443/api/messages/12345
```

□□□□

□□□□□□□□□□□**`payload_hex`** □□□□□□□□□□□□□□□□□□ 422□

□□:

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

□□:

```json
{
  "source_msisdn": "15555551234",
  "destination_msisdn": "15555555678",
  "payload_hex": "c8329bfd06dddf723619",
  "dcs": "00",
  "source_smsc": "api_client"
}
```

□□:

- `source_msisdn`, `destination_msisdn` - □□□
- `payload_hex` - □□□TP-User-Data □□□□□□□□
- `dcs` - □□□□□□□□□□□□□□□□□□□□□□
- `udh_hex` - □□□□□□□□□□□□□
- `source_smsc` - □□□□□□□
- `source_type` - □□□□□□□

□□ (201 Created): □□□□□□□□□□□□ 422 □ `error` □□□□□□□□□ `payload_hex`□□

```
curl -X POST https://host:8443/api/messages \
  -H "Content-Type: application/json" \
  -d '{
    "source_msisdn": "15555551234",
    "destination_msisdn": "15555555678",
    "payload_hex": "c8329bfd06dddf723619",
    "dcs": "00",
    "source_smsc": "api_client"
  }'
```

□□□□

□□□□ UTF-8 □□□□□ SMS-C □□□□□GSM7 □ UCS2□□DCS □□□□□□□□□

□□:

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

□□:

```json
{
  "source_msisdn": "15555551234",
  "destination_msisdn": "15555555678",
  "message": "Hello World",
  "source_smsc": "api_client"
}
```

□□□□□□□□ `message`□`text` □ `body` □□□`source_msisdn` □ `destination_msisdn` □□□□□

□□ (201 Created):

- □□□□□□□□□□□□
- □□□□`{ "parts": <n>, "messages": [ ... ] }`□

```
curl -X POST https://host:8443/api/messages_plaintext \
  -H "Content-Type: application/json" \
  -d '{
    "source_msisdn": "15555551234",
    "destination_msisdn": "15555555678",
    "message": "Hello World",
    "source_smsc": "api_client"
  }'
```

□□□□ PDU

□□□□□□ SMS PDU□□□□□□□□□□□□□□□□□□ SIP □□□

□□:

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

□□:

```json
{
  "message_body": "0001000B916407007009F0000004D4F29C0E",
  "source_smsc": "legacy_system"
}
```

□□:

- `message_body` - □□□□□□□□□□ SMS PDU□□ TPDU□□□□□□
- `source_msisdn` - □□□
- `source_smsc` / `smsc_node_name` - □□ TPDU □□□□□□
- `rp_originator_address`, `rp_destination_address` - □□□ TPDU □□□□□□RP □□□□□□

□□□ IP □ `X-Forwarded-For`□□□□□□□□□□□□□□□□□□□

□□:

- 201 Created□□□ `{ "status": "success", "response": { "id": <id> } }` □□□□□□ `rp_ack` □□□□□□□□
- 200 OK□□□ `{ "status": "success", "response": { "status": "delivery_report_received" } }` □ PDU □□□□□□□□□□□□□
- 422□□□□□/□□□□□□□□□□□□□ `error` □□□□

```
curl -X POST https://host:8443/api/messages_raw \
  -H "Content-Type: application/json" \
  -d '{
    "message_body": "0001000B916407007009F0000004D4F29C0E",
    "source_smsc": "legacy_system"
  }'
```

□□□□□ PDU□3GPP TS 23.040□□□□□□/□□/DCS□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□

□□□□ (PATCH)

□□□□□□□□□□□□□

□□:

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

□□□□□□□□□□□□□□ `dest_smsc`□`deliver_after`□`status`□□□□□□□□□□□□□□□□

□□ (200 OK): □□□□□□□□404 □□□□□□422 □□□□□□□

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

□□□□□□

□□□□□□□□□□□□□□□□□□□□□□□ `backoff`□□□□□□□□□□□□□□□

□□□□□□□□□

```
PUT  /api/messages/:id                  # □□□□□PUT = □□
POST /api/messages_increment_attempt        (id □□□□)
PUT  /api/messages_increment_attempt/:id    (id □ URL □)
```

`PUT /api/messages/:id` □ `PATCH /api/messages/:id` □□□□��PATCH □□□□□□□ PUT □□□□□□□□□ `keep_route=true` □□□□□□□□□□ `dest_smsc`□

□□ (200 OK): □□□□□□□□

```
{ "id": 12345, "status": "backoff", "delivery_attempts": 2 }
```

```
curl -X PUT https://host:8443/api/messages/12345
```

□□□□□□

□□□□□□□□□□□□□□□□□□□

```
POST /api/messages_mark_delivered           (id □□□□)
PUT  /api/messages_mark_delivered/:id        (id □ URL □)
```

□□□ `smsc` □□□□□ SMSC□□□□□□□□□□□□

□□ (200 OK): □□□□□□□□□404 □□□□□□

```
curl -X POST https://host:8443/api/messages_mark_delivered \
  -H "Content-Type: application/json" \
  -d '{ "id": 12345 }'
```

□□□□□□

□□□□□□□□□□□□□□□□□□ `dest_smsc`□

□□:

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

□□: `{ "id": 12345 }`

□□ (200 OK):

```
{ "message_id": 12345, "new_dest_smsc": "uk_gateway", "status":
"rerouted" }
```

□□□□□□□□□□ 404□□□□□□□□□□□□□ 422□

□□□□

□□□□□□□□��□ null��

□□:

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

[illegible]: `{ "id": 12345, "field": "dest_smsc" }`

`field` [illegible] `delivery_time`[illegible]`dest_smsc` [illegible] `deliver_after` [illegible] 400[illegible]

[illegible] (200 OK): [illegible]

[illegible]

[illegible]:

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

[illegible] (204 No Content)[illegible]404 [illegible]

```
curl -X DELETE https://host:8443/api/messages/12345
```

[illegible]

[illegible] MWI[illegible] 3GPP TS 23.038 [illegible] MWI PDU[illegible] `payload_hex` [illegible] `dcs`[illegible]

[illegible]:

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

[illegible]:

```json
{
  "source_msisdn": "12345",
  "destination_msisdn": "15555555678",
  "indication_type": "voicemail",
  "indication_active": true,
  "message_body": "You have 1 new voicemail",
  "source_smsc": "IMS_SMSC"
}
```

□□:

- `indication_type` - `voicemail`□□□□□`fax`□`email` □ `other`□
- `indication_active` - `true` □□□□□□`false` □□□□□□ `true`□□
- `message_body` - □□□□□□□□GSM7 □□□□
- `source_msisdn`□`destination_msisdn`□`source_smsc`□`dest_smsc`□

□□ (201 Created): □□□□□□□□422 □□□□□

□□

□□□□□□□□□□□□□□□□□ REST □□□`:id` □□□□ IMSI□

```
GET    /api/locations           # □□□□□□?limit=&offset=□x-total-
count □□
GET    /api/locations/:id       # □ IMSI □□
POST   /api/locations           # □□□□□□□ IMSI □□□
PATCH  /api/locations/:id       # □□□□
PUT    /api/locations/:id       # □□
DELETE /api/locations/:id       # □□
```

□□/□□□□:

```json
{
  "msisdn": "15555551234",
  "imsi": "001001000000001",
  "location": "msc1.region1.example.com",
  "ran_location": "cell_tower_12345",
  "imei": "123456789012345",
  "ims_capable": true,
  "csfb": false,
  "registered": true,
  "expires": "2025-11-01T23:30:00Z",
  "user_agent": "Samsung Galaxy"
}
```

`imsi` □ `msisdn` □□□□□□□□□□□□□□□□□□□□□□200/201□□□□□□□□ 422□□□□□□□□□□□□□□□□□□□□

□□

□□□□ SMSC □□□□□□□□□ □□□□□□□□□□□ `active`□`stats`□`history` □ `register` □□□□□

```
GET  /api/frontends           # □□□□□□
GET  /api/frontends/:id       # □□□□□□
POST /api/frontends           # □□□□□□□
```

□□□□ (`POST /api/frontends`):

```json
{
  "frontend_name": "smpp-gateway-1",
  "frontend_type": "SMPP",
  "ip_address": "10.0.1.5",
  "hostname": "smpp-gw-01",
  "uptime_seconds": 3600,
  "configuration": "{\"port\": 2775, \"system_id\":
\"smpp_user\"}"
}
```

`frontend_name` □□□□□□□□□ `ip_address`□□□□□□ IP (`X-Forwarded-For` □□□□) □□□□ □ `frontend_name` □□□□□□□□□□□□□□□□□□□□□□□□□□ 90 □□□□□□□□□□□□□□□□□□

□□ (201 Created): □□□□□

□□

□□□□□□□□□□□□□□□□□ ETS □□□□□□ TTL□

□□□□□□

□□:

```
GET /api/events/:id
```

`:id` □□□□□ ID□

□□ (200 OK):

```
{
  "message_id": 12345,
  "events": [
    { "event_epoch": 1698672000, "name": "message_inserted",
"description": "..." },
    { "event_epoch": 1698672005, "name": "message_delivered",
"description": "..." }
  ]
}
```

□□ ID □□□□□□□ 400□

□□□□

□□:

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

[illegible]:

```json
{
  "message_id": 12345,
  "name": "external_delivery_confirmed",
  "description": "Confirmed by downstream system"
}
```

`message_id`[illegible]`name` [illegible] `description` [illegible] IP [illegible]

[illegible] (201 Created):

```json
{
  "status": "success",
  "message": "Event recorded successfully",
  "event": {
    "message_id": 12345,
    "name": "external_delivery_confirmed",
    "description": "Confirmed by downstream system",
    "event_source": "smpp-gateway-1",
    "event_epoch": 1698672010
  }
}
```

[illegible]

[illegible] [illegible] / [illegible]

[illegible]

```
GET    /api/campaign_lists           # [illegible]
GET    /api/campaign_lists/:id       # [illegible] "recipients"
POST   /api/campaign_lists           # [illegible]
PATCH  /api/campaign_lists/:id       # [illegible]
DELETE /api/campaign_lists/:id       # [illegible]
```

[illegible]`var1`..`var4`[illegible] JSON [illegible] CSV [illegible]JSON [illegible] MSISDN [illegible] `var1`..`var4` [illegible]

```
{
  "name": "VIP customers",
  "description": "High value subscribers",
  "recipients": [
    { "msisdn": "12025550101", "var1": "Alice", "var2": "Gold" },
    "12025550102"
  ]
}
```

[illegible] CSV[illegible] `msisdn` / `destination_msisdn` / `number` / `phone` [illegible] MSISDN [illegible] `var1`..`var4`[illegible]

```
{ "name": "Imported", "csv":
"msisdn,first,plan\n12025550101,Alice,Gold\n" }
```

`PATCH` [illegible]

[illegible] (201 Created): `{ "id": 1, "name": "VIP customers", "recipient_count": 2 }`

□□

```
GET    /api/campaigns         # □□□□□□□□□□□□□
GET    /api/campaigns/:id     # □□□□□□□□□□□
POST   /api/campaigns         # □□□□□□□□□□□□□
DELETE /api/campaigns/:id     # □□□□□□□□□□
```

□□□□:

```json
{
  "name": "Maintenance notice",
  "message": "Planned maintenance tonight 02:00-03:00.",
  "source_msisdn": "12345",
  "source_smsc": "IMS_SMSC",
  "list_id": 1,
  "audience": "active_only",
  "drip_tps": 50
}
```

□□:

- `name`□`message`□`source_msisdn`□`source_smsc` - □□□`message` □□□□□□□□□□□□□□`{{ var1 }}`..`{{ var4 }}`□`{{ msisdn }}`□□
- `list_id` - □□□□□□□□□□□□□□□□□□□□□□□□
- `audience` - `active_only`□□□□□ `all`□□□ `list_id` □□□□
- `drip_tps` - □□□□□□□□□□□□□□□□□□□□
- `validity_hours` - □□□□□□□□□□□□□□□□□ `expires`□
- `deliver_after` - □□□ ISO 8601 □□□□□□□□□□□□□□□□

`DELETE` □□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□200□□□□□□□□ TTL □□□□□□

□□ (`GET /api/campaigns/:id`):

```
{
  "id": 7,
  "name": "Maintenance notice",
  "list_id": 1,
  "audience": "active_only",
  "status": "running",
  "drip_tps": 50,
  "total_targets": 1000,
  "stats": {
    "total": 1000, "pending": 600, "queued": 300,
    "delivered": 90, "failed": 10, "skipped_inactive": 0,
    "dispatched": 400, "progress_percent": 40, "delivery_percent":
22
  }
}
```

□□□□

□□:

```
POST /api/campaigns/control
Content-Type: application/json
```

□□: `{ "campaign_id": 7, "action": "start" }`

`action` □ `start`□`pause`□`resume`□`cancel` □□□□□□□□□□□□200□□□□□□□□□□□ `404`□□□□□□□□□□□□□□□□ `422`□

□□□□□□□

```
GET /api/campaign_targets/:id              # :id □□□ ID
GET /api/campaign_targets/:id?state=failed # □□□□□□□
```

□□ `limit`/`offset` □□□□□□□□□□ `state` □□□□□ `x-total-count` □□□□□□□□□□□□□□□ `state`□`pending` / `queued` / `delivered` / `failed` / `skipped_inactive`□□

[illegible]

[illegible] API [illegible]

[illegible]

```
GET    /api/routes              # [illegible]
GET    /api/routes/:id          # [illegible]
POST   /api/routes              # [illegible]
PATCH  /api/routes/:id          # [illegible]
PUT    /api/routes/:id          # [illegible]
DELETE /api/routes/:id          # [illegible]
GET    /api/routes/export       # [illegible]
POST   /api/routes/import       # [illegible]
POST   /api/routes/simulate     # [illegible]
```

[illegible] SMS [illegible]

[illegible]

```
GET    /api/translations             # [illegible]
GET    /api/translations/:id         # [illegible]
POST   /api/translations             # [illegible]
PATCH  /api/translations/:id         # [illegible]
DELETE /api/translations/:id         # [illegible]
GET    /api/translations/export      # [illegible]
POST   /api/translations/import      # [illegible]
POST   /api/translations/simulate    # [illegible]
```

[illegible]

□□

```
GET  /api/operations                    # □□□□
POST /api/operations/clear_messages     # □□□□□□
POST /api/operations/clear_routes       # □□□□
POST /api/operations/clear_translations # □□□□
POST /api/operations/clear_frontends    # □□□□□□
```

□□□□□□□□□□□□□□□□□ API □□□

□□

```
GET  /api/federation/status          # □□□□
GET  /api/federation/identity        # □□□□□□□□
POST /api/federation/health          # □□□□□□
POST /api/federation/registry        # □□□□
POST /api/federation/notify          # □□□□□□
POST /api/federation/delivery_status # □□□□□□
GET  /api/federation_messages        # □□□□□□
```

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Diameter□□□□ DNS

```
GET  /api/diameter   # Diameter Sh □□□/dip □□
GET  /api/logs       # □□□□□□□□
POST /api/naptr      # NAPTR □□□□
```

Diameter Sh □□□□□ HSS □□□□□□ □□□□

HTTP □□□

□□	□□	□□□□
200	OK	□□□□□□□
201	Created	□□□□□
202	Accepted	□□□□□□□□□
204	No Content	□□□□
400	Bad Request	□□□□□□□□□□□□□ ID□□□□□□
404	Not Found	□□□□
422	Unprocessable Entity	□□□□
500	Internal Server Error	□□□□□□□□

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□□□□□□□□□□□ `error` □□□□

```
{ "error": "Message not found" }
```

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```
{ "status": "error", "response": "Not Found" }
```

[illegible]

[illegible]

1. [illegible]: [illegible] TPDU [illegible] `payload_hex` [illegible] `/api/messages`[illegible] `/api/messages_plaintext` [illegible] SMS-C [illegible]
2. [illegible] **`source_smsc`** [illegible]
3. [illegible] **E.164** [illegible]
4. [illegible] **422**[illegible] `error` [illegible]

[illegible]

1. [illegible] **~90** [illegible] `POST /api/frontends`[illegible]
2. [illegible] **`smsc`** [illegible] [illegible] `include-unrouted`[illegible]
3. [illegible] **`/api/messages_mark_delivered`** [illegible]
4. [illegible] **`PUT /api/messages/:id`**[illegible] **`/api/messages_increment_attempt`**[illegible]
5. [illegible] [illegible]

[illegible]

1. [illegible] TLS [illegible] API [illegible]
2. [illegible] HTTP [illegible]
3. [illegible] Prometheus [illegible] METRICS.md[illegible]

ANSSI R226 [illegible]

[illegible] [illegible] R226-3 [illegible] R226-7 [illegible] ANSSI R226 [illegible] OmniMessage [illegible]SMSc[illegible]

[illegible] [illegible]

[illegible] [illegible]ANSSI[illegible]

[illegible] R226 - [illegible]

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1. [illegible]

1.1 [illegible]

[illegible] OmniMessage SMSc[illegible]
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[illegible] [illegible]
[illegible] REST API[illegible]HTTPS[illegible]SMPP[illegible]IMS[illegible]SS7/MAP [illegible]
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[illegible] Elixir/Erlang[illegible]Phoenix [illegible]Mnesia[illegible]MySQL/PostgreSQL

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- [illegible] REST API
- [illegible] SMPP[illegible]IMS[illegible]SS7/MAP [illegible]
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- **REST API**□ HTTPS□□□ 8443□□□□□□□□□
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1.2 □□□□

OmniMessage □□□ ETSI TS 103 221 □□□□□X1□X2□X3□□OmniMessage □□□□□□□□□□□□□□□□□□□ X1 □□□□□OmniMessage □□ X2 □ 3GPP TS 33.128 xIRI □□□□□□□□□□□□□□□□□□□□□□□□□ □□□□□X1/X2/X3□□

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- [illegible] [illegible]/[illegible] SQL [illegible]

[illegible] 2[illegible]CDR [illegible]MySQL/PostgreSQL[illegible]

- [illegible] [illegible]
- [illegible] [illegible] SQL [illegible]MySQL [illegible] PostgreSQL[illegible]
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- [illegible] [illegible]
- [illegible] SQL [illegible]REST API[illegible]CSV/JSON [illegible]

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1. [illegible] [illegible]��[illegible] SQL[illegible]
2. [illegible] Mnesia [illegible] SQL [illegible] 1,750+ [illegible]/[illegible]
3. [illegible] disc_copies [illegible]
4. [illegible] CDR [illegible]
5. [illegible] [illegible]

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```
1. [illegible] → [illegible] Mnesia[illegible]RAM + [illegible]
2. [illegible] → Mnesia [illegible]
3. [illegible]/[illegible] → CDR [illegible] SQL[illegible]
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5. CDR [illegible] SQL [illegible] → [illegible]
```

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□ □□□□□□□ **number_translation_guide.md**
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1.3 □□□□

1.3.1 □□□□□□

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- HTTPS/TLS □□ REST API □□
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- □□□□/□□□□
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- □□□□□□□□□□□□□□□

1.3.2 □□□□□□

□□□□□

- □□□□□□□□□□□□□
- □□□□□□□□□□ UI □
- □□□□□□□□□□□□□
- CDR □□□□□□□□□□□ NULL □□□□□

□□□□□□

- MySQL □□□□□□ENCRYPTION='Y'□

- PostgreSQL [illegible]
- [illegible]
- [illegible]
- [illegible]

[illegible]

- [illegible]
- TLS [illegible]
- [illegible]
- [illegible]
- [illegible] Erlang [illegible]

1.4 [illegible]Mnesia + SQL [illegible]

[illegible]

OmniMessage SMSc [illegible]��[illegible]

[illegible] 1[illegible]Mnesia [illegible]

[illegible] Mnesia[illegible]

- [illegible] Erlang/OTP [illegible]
- [illegible]
- ACID [illegible]
- [illegible]

[illegible]disc_copies

- [illegible] [illegible] RAM [illegible]
    - [illegible]/[illegible]
    - [illegible] I/O
    - [illegible] 1,750+ [illegible]/[illegible]
- [illegible] Mnesia [illegible] RAM [illegible]
    - [illegible]
    - [illegible]

    - [illegible]
    - [illegible] `Mnesia.*/` [illegible]

Mnesia [illegible]

1. [illegible] REST API [illegible] → [illegible] Mnesia RAM + [illegible]
2. [illegible] Mnesia → [illegible]
3. [illegible] → Mnesia [illegible]
4. [illegible] → Mnesia [illegible] + [illegible]
5. [illegible]/[illegible] → [illegible]
6. [illegible] 24 [illegible] → [illegible] Mnesia [illegible]

[illegible]

- [illegible]/[illegible] **SQL [illegible]**
- SQL [illegible]��[illegible]
- [illegible] SMS-C [illegible] I/O[illegible]

[illegible] 2[illegible] CDR [illegible]/[illegible] SQL [illegible]

[illegible] CDR[illegible]

- [illegible]
- [illegible] MySQL [illegible] PostgreSQL [illegible]
- [illegible]

[illegible] CDR[illegible] [illegible] CDR [illegible]

- [illegible] [illegible]
- [illegible] [illegible]
- [illegible] [illegible]
- [illegible] [illegible]

[illegible] CDR[illegible]

- [illegible] CDR [illegible]
- [illegible] [illegible] SQL [illegible]
- [illegible] [illegible] CDR [illegible] 100[illegible]

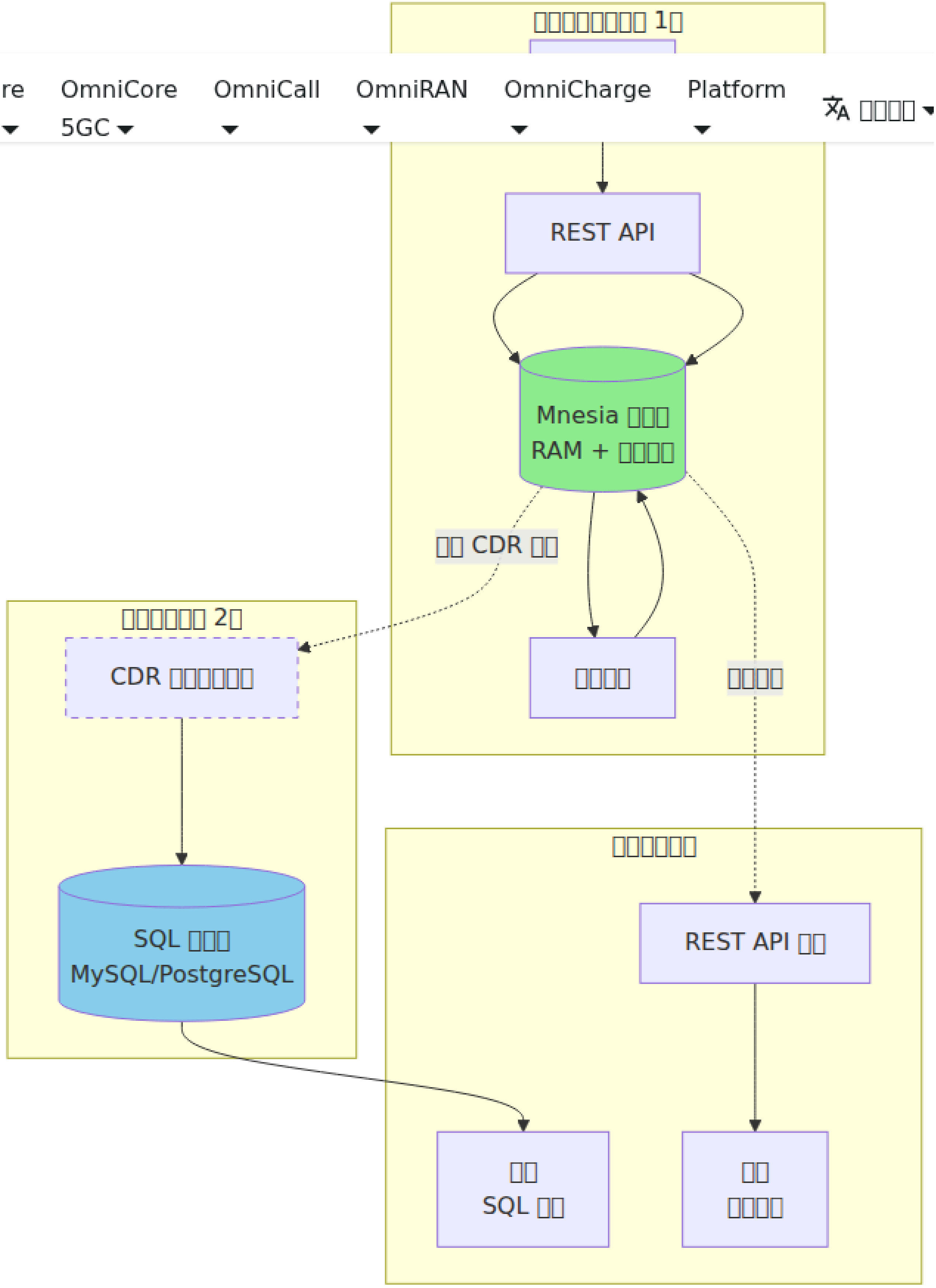
- [illegible] [illegible] 100ms[illegible]
- [illegible] [illegible] CDR [illegible]

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

SQL [illegible]

- [illegible] [illegible]
- [illegible] [illegible]
- [illegible] [illegible]
- [illegible] [illegible] CDR [illegible]
- [illegible] [illegible]���[illegible]/[illegible]
- [illegible] [illegible]

[illegible]


[illegible] 1[illegible]
REST API
Mnesia [illegible]
RAM + [illegible]
[illegible] CDR [illegible]
[illegible]
[illegible]
[illegible] 2[illegible]
CDR [illegible]
SQL [illegible]
MySQL/PostgreSQL
[illegible]
REST API [illegible]
[illegible]
SQL [illegible]
[illegible]
[illegible]

[illegible]

- [illegible]

- □□□□□□□□□□□
- □□□□□□□□□□□
- □□□□□□□□□ SQL□

□□□□□□□

□□□□□< 24 □□□□

- □□ Mnesia □□□REST API □□□
- □□□□
- □□□□□□□□□
- □□□□□□□

□□□□□> 24 □□□□

- □□ SQL □□□□□□CDR □□
- □□ SQL □□□□
- □□□□□□□□□□□□
- □□□□□□□□□□□□□□□□

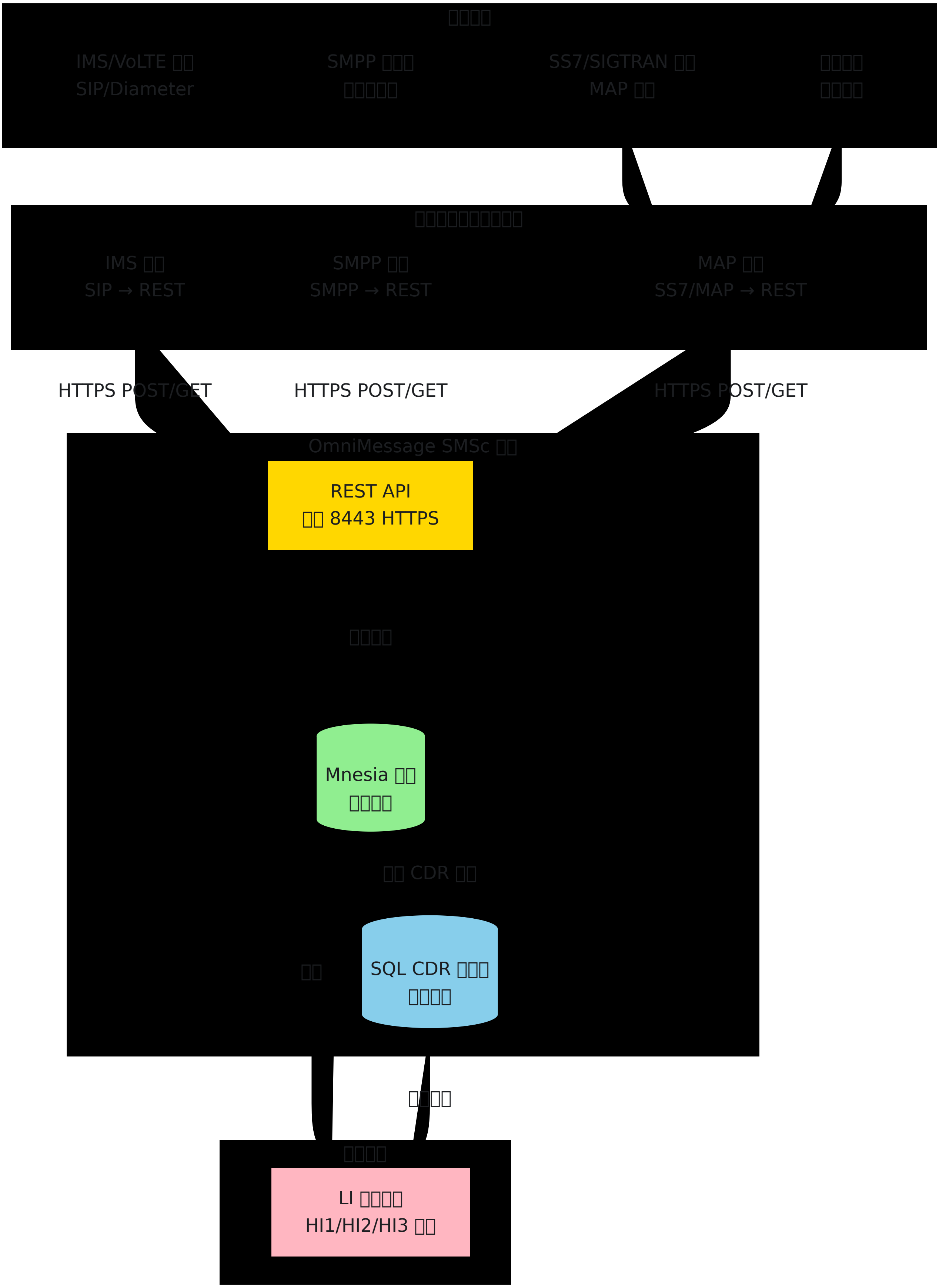
□□□□□□

1. □□□□□□ disc_copies □□□□□□□□□□□□
2. □□□□□□□ CDR □ SQL □□□□□□□□
3. □□□ □□□□□□□□□□□□□□
4. □□□□ □□□□□□Mnesia□+ □□□□□□SQL□□□□□

1.5 □□□□□□□□□

OmniMessage SMSc □□□□□□□□□□□□□□□□ REST API □□□□□□□□□□□□□□□□□□□□□□□ □□□□□□□□□□□□□□□□□□□□□□□

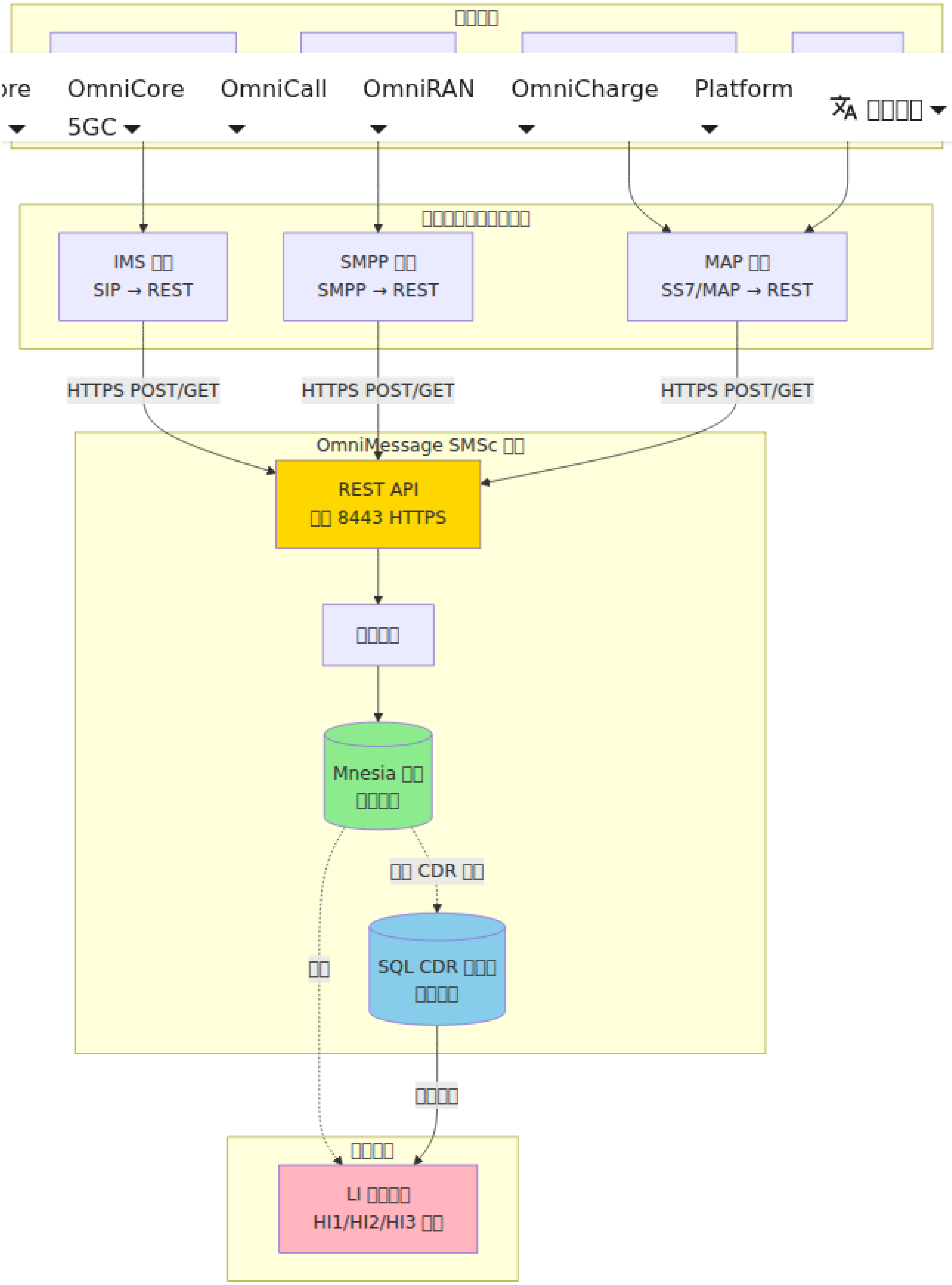
□□□□


IMS/VoLTE
SIP/Diameter
SMPP
SS7/SIGTRAN
MAP
IMS
SIP → REST
SMPP
SMPP → REST
MAP
SS7/MAP → REST
HTTPS POST/GET
HTTPS POST/GET
HTTPS POST/GET
OmniMessage SMSc
REST API
8443 HTTPS
Mnesia
CDR
SQL CDR
LI
HI1/HI2/HI3

[illegible]

1. IMS/SIP [illegible]

IMS [illegible] SIP [illegible] SMS-over-IP [illegible]IMS [illegible] SIP [illegible] SMSc REST API [illegible]


□□□□
ore
OmniCore 5GC
OmniCall
OmniRAN
OmniCharge
Platform
□□□□
□□□□□□□□□□
IMS □□
SIP → REST
SMPP □□
SMPP → REST
MAP □□
SS7/MAP → REST
HTTPS POST/GET
HTTPS POST/GET
HTTPS POST/GET
OmniMessage SMSc □□
REST API
□□ 8443 HTTPS
□□□□
Mnesia □□
□□□□
□□ CDR □□
SQL CDR □□□
□□□□
□□
□□□□
□□□□
LI □□□□
HI1/HI2/HI3 □□

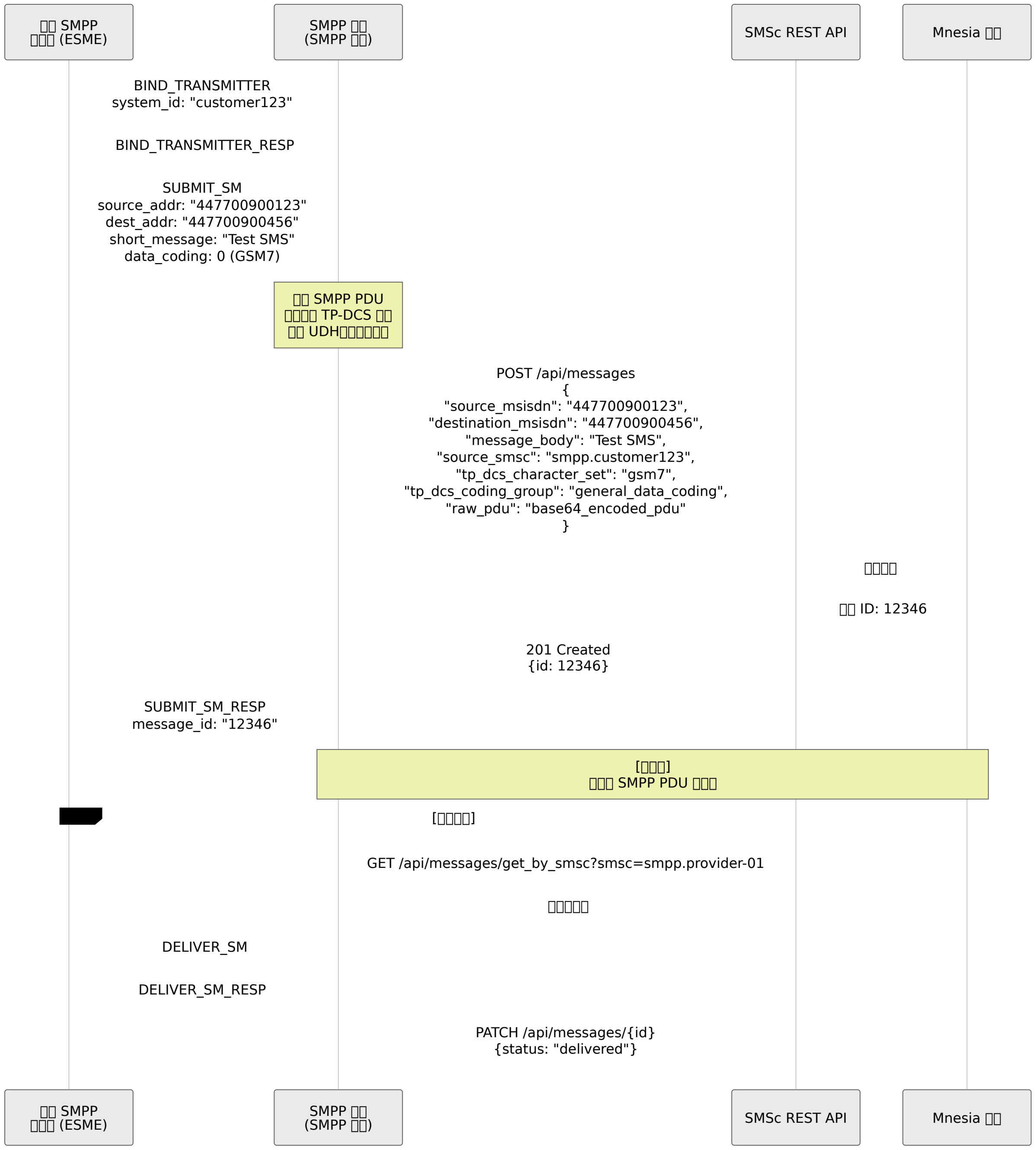
IMS □□□□□□□

- □/□□ IMSI□□□ IMS □□□

- P-Asserted-Identity SIP □
- SIP Call-ID □□□□
- IMS □□□□□P-Access-Network-Info□
- □□ IMS HSS □□□□□□□

2. SMPP □□□□

SMPP □ SMS □□□□□□□□□□□□□□□□□SMPP □□□□□ PDU □ SMPP □□□□□ REST API □□□

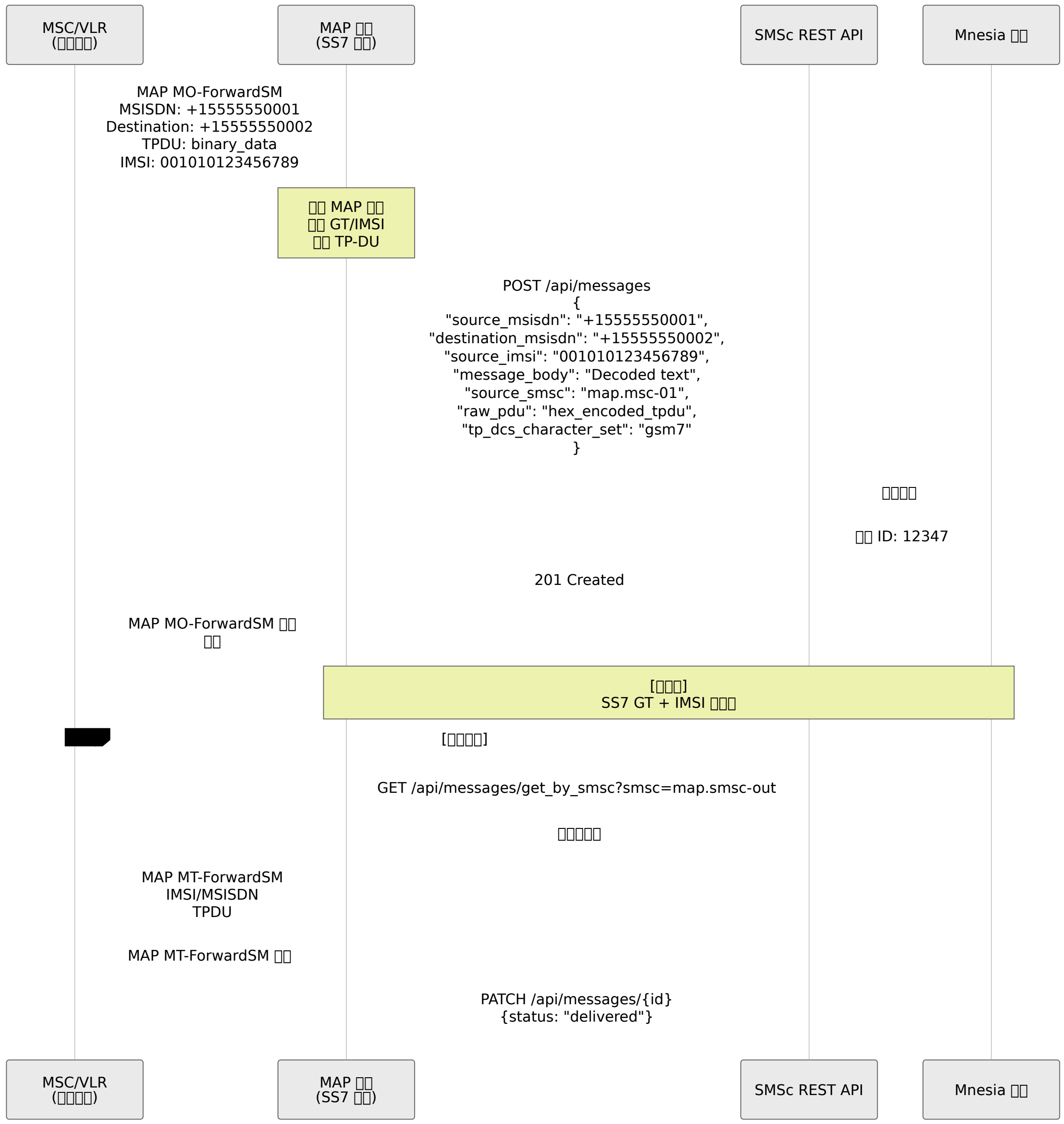

□□ SMPP
□□□ (ESME)
SMPP □□
(SMPP □□)
SMSc REST API
Mnesia □□
BIND_TRANSMITTER
system_id: "customer123"
BIND_TRANSMITTER_RESP
SUBMIT_SM
source_addr: "447700900123"
dest_addr: "447700900456"
short_message: "Test SMS"
data_coding: 0 (GSM7)
□□ SMPP PDU
□□□□ TP-DCS □□
□□ UDH□□□□□□
POST /api/messages
{
"source_msisdn": "447700900123",
"destination_msisdn": "447700900456",
"message_body": "Test SMS",
"source_smsc": "smpp.customer123",
"tp_dcs_character_set": "gsm7",
"tp_dcs_coding_group": "general_data_coding",
"raw_pdu": "base64_encoded_pdu"
}
□□□□
□□ ID: 12346
201 Created
{id: 12346}
SUBMIT_SM_RESP
message_id: "12346"
[□□□]
□□□ SMPP PDU □□□
[□□□□]
GET /api/messages/get_by_smsc?smsc=smpp.provider-01
□□□□□
DELIVER_SM
DELIVER_SM_RESP
PATCH /api/messages/{id}
{status: "delivered"}
□□ SMPP
□□□ (ESME)
SMPP □□
(SMPP □□)
SMSc REST API
Mnesia □□

SMPP □□□□□□□

- □□□ SMPP PDU□□□□□□□□□
- □□□□□□□DCS□□□□□
- □□□□□□□□□□□UDH□
- ESME system_id□□□□□□
- TON/NPI □□□□□□
- □□□□□□

3. SS7/MAP □□□□

□□□□□□□□□□ SS7 MAP □□□□ SMS□MAP □□□ SS7 □□□ REST API □□□□□□□


MSC/VLR
(□□□□)
MAP □□
(SS7 □□)
SMSc REST API
Mnesia □□
MAP MO-ForwardSM
MSISDN: +15555550001
Destination: +15555550002
TPDU: binary_data
IMSI: 001010123456789
□□ MAP □□
□□ GT/IMSI
□□ TP-DU
POST /api/messages
{
"source_msisdn": "+15555550001",
"destination_msisdn": "+15555550002",
"source_imsi": "001010123456789",
"message_body": "Decoded text",
"source_smsc": "map.msc-01",
"raw_pdu": "hex_encoded_tpdu",
"tp_dcs_character_set": "gsm7"
}
□□□□
□□ ID: 12347
201 Created
MAP MO-ForwardSM □□
□□
[□□□]
SS7 GT + IMSI □□□
[□□□□]
GET /api/messages/get_by_smsc?smsc=map.smsc-out
□□□□□
MAP MT-ForwardSM
IMSI/MSISDN
TPDU
MAP MT-ForwardSM □□
PATCH /api/messages/{id}
{status: "delivered"}
MSC/VLR
(□□□□)
MAP □□
(SS7 □□)
SMSc REST API
Mnesia □□

SS7/MAP □□□□□□□

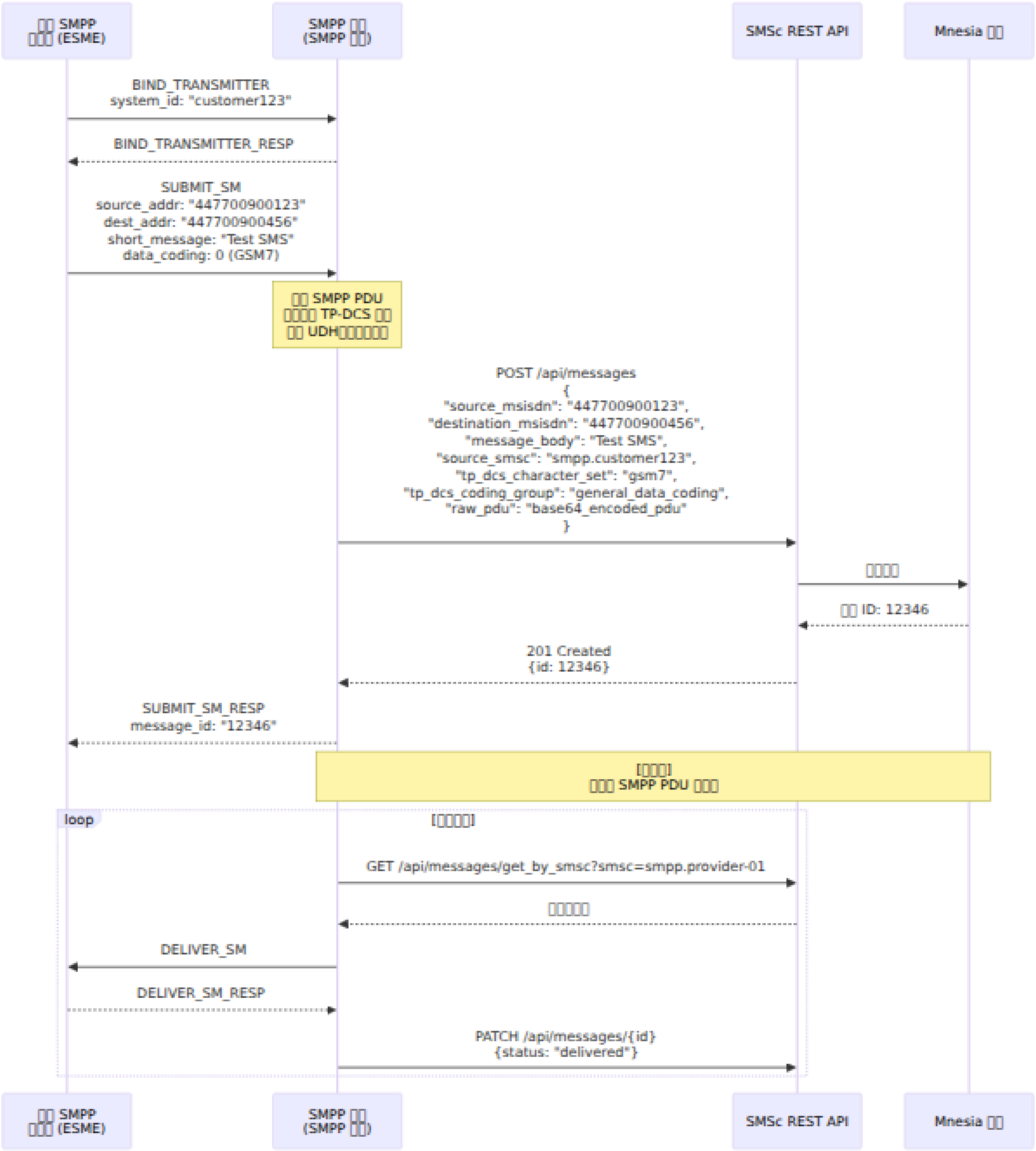
- MAP [illegible] IMSI
- [illegible]GT[illegible]
- MSC/VLR [illegible]
- SCCP [illegible]/[illegible]
- MAP [illegible]
- TP-[illegible]

[illegible]

[illegible] [illegible]IMS/SIP[illegible]SMPP [illegible] SS7/MAP[illegible] SMSc [illegible]

1. [illegible] [illegible]���[illegible]
2. [illegible] **CDR** [illegible] [illegible] CDR [illegible]
3. [illegible] [illegible]
4. [illegible] [illegible] CDR [illegible]

[illegible]


[illegible] SMPP
[illegible] (ESME)
SMPP [illegible]
(SMPP [illegible])
SMSc REST API
Mnesia [illegible]
BIND_TRANSMITTER
system_id: "customer123"
BIND_TRANSMITTER_RESP
SUBMIT_SM
source_addr: "447700900123"
dest_addr: "447700900456"
short_message: "Test SMS"
data_coding: 0 (GSM7)
[illegible] SMPP PDU
[illegible] TP-DCS [illegible]
[illegible] UDH[illegible]
POST /api/messages
{
"source_msisdn": "447700900123",
"destination_msisdn": "447700900456",
"message_body": "Test SMS",
"source_smsc": "smpp.customer123",
"tp_dcs_character_set": "gsm7",
"tp_dcs_coding_group": "general_data_coding",
"raw_pdu": "base64_encoded_pdu"
}
[illegible]
[illegible] ID: 12346
201 Created
{id: 12346}
SUBMIT_SM_RESP
message_id: "12346"
[[illegible]]
[illegible] SMPP PDU [illegible]
loop
[[illegible]]
GET /api/messages/get_by_smsc?smsc=smpp.provider-01
[illegible]
DELIVER_SM
DELIVER_SM_RESP
PATCH /api/messages/{id}
{status: "delivered"}
[illegible] SMPP
[illegible] (ESME)
SMPP [illegible]
(SMPP [illegible])
SMSc REST API
Mnesia [illegible]

CDR [illegible]

- `source_smsc` [illegible]“ims.gateway-01”[illegible]“smpp.customer123”[illegible]“map.msc-01”[illegible]
- [illegible]
- [illegible]

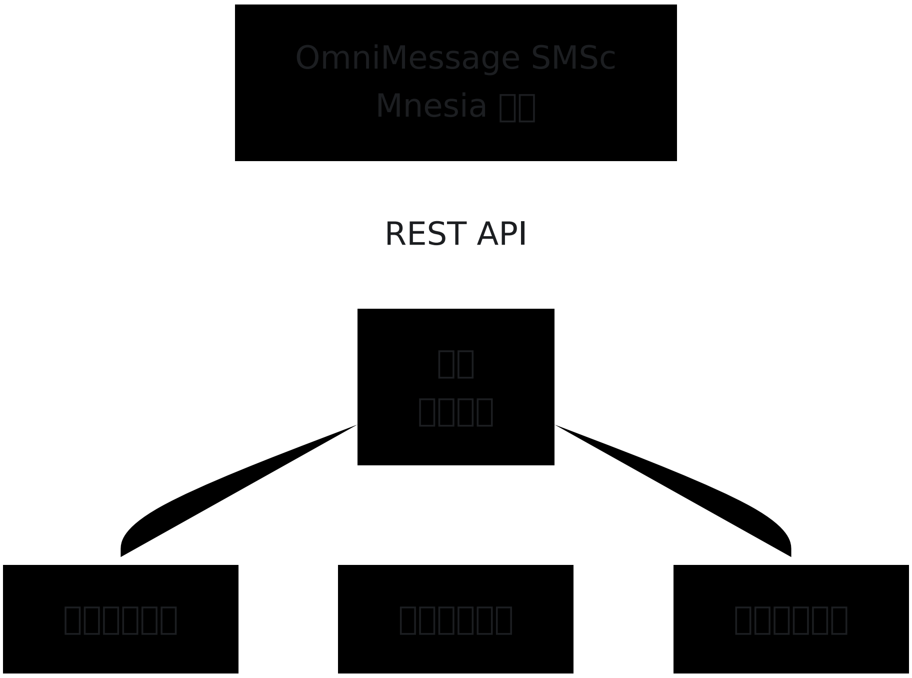
1.6 [illegible]

[illegible]

[illegible]Mnesia[illegible]SQL[illegible]

1. REST API [illegible]���[illegible]Mnesia[illegible]

[illegible] Mnesia [illegible] 24 [illegible]


OmniMessage SMSc
Mnesia
REST API

[illegible] API [illegible]

- `GET /api/messages` - [illegible]
- `GET /api/messages/{id}` - [illegible] Mnesia[illegible]
- `GET /api/messages/get_by_smsc?smsc=X` - [illegible]
- [illegible] Mnesia[illegible]

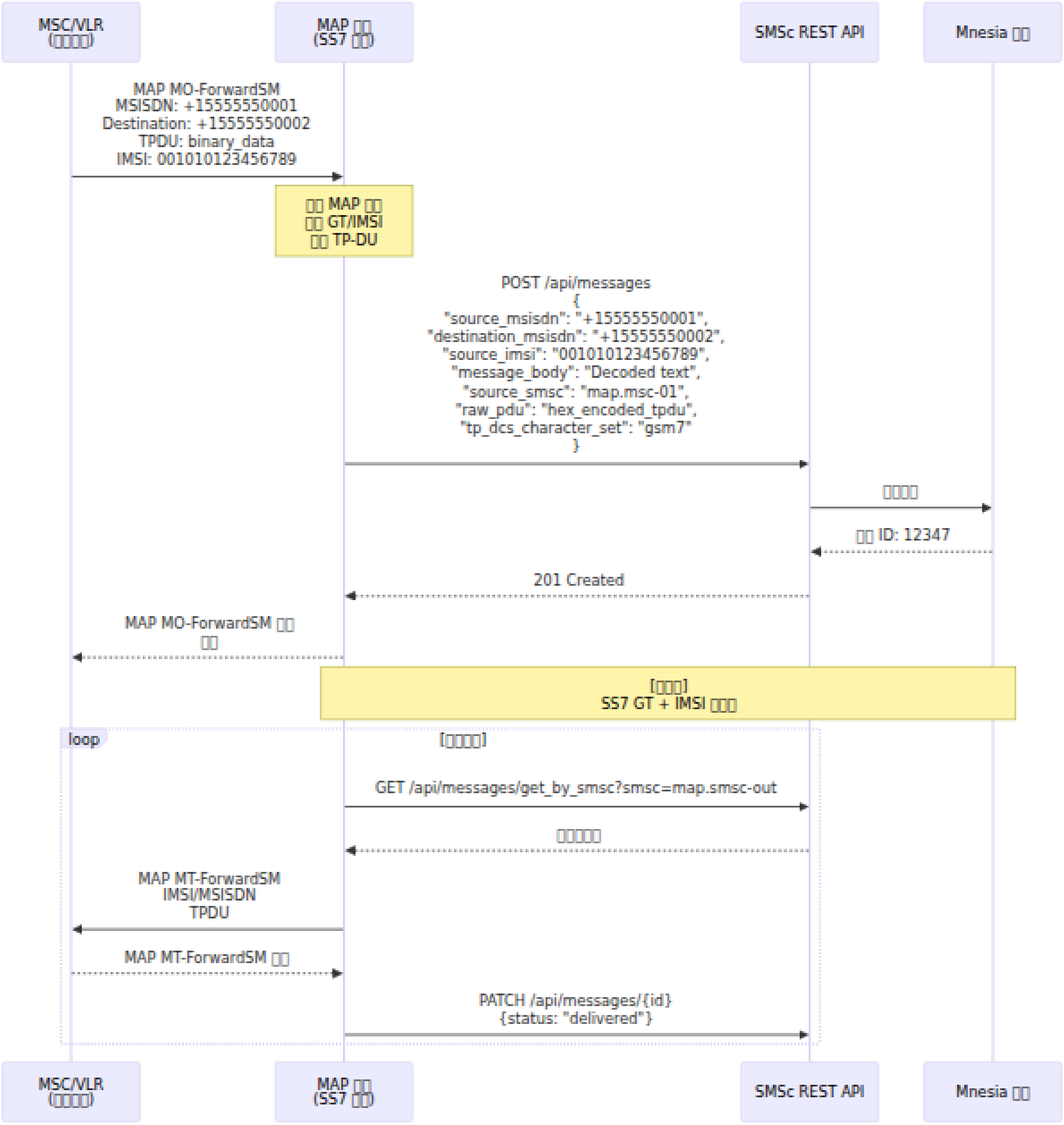
[illegible] [illegible] Mnesia [illegible]

[illegible]

- [illegible]/[illegible] MSISDN [illegible]
- [illegible]
- [illegible] SMSC [illegible]
- [illegible]
- [illegible]

2. CDR [illegible]SQL[illegible]

□□ SQL □□□□□□□□□□□□□□□/□□/□□□□□□□


MSC/VLR
(□□□□)
MAP □□
(SS7 □□)
SMSc REST API
Mnesia □□
MAP MO-ForwardSM
MSISDN: +15555550001
Destination: +15555550002
TPDU: binary_data
IMSI: 001010123456789
□□ MAP □□
□□ GT/IMSI
□□ TP-DU
POST /api/messages
{
"source_msisdn": "+15555550001",
"destination_msisdn": "+15555550002",
"source_imsi": "001010123456789",
"message_body": "Decoded text",
"source_smsc": "map.msc-01",
"raw_pdu": "hex_encoded_tpdu",
"tp_dcs_character_set": "gsm7"
}
□□□□
□□ ID: 12347
201 Created
MAP MO-ForwardSM □□
□□
[□□□]
SS7 GT + IMSI □□□
loop
[□□□□]
GET /api/messages/get_by_smsc?smsc=map.smsc-out
□□□□□
MAP MT-ForwardSM
IMSI/MSISDN
TPDU
MAP MT-ForwardSM □□
PATCH /api/messages/{id}
{status: "delivered"}
MSC/VLR
(□□□□)
MAP □□
(SS7 □□)
SMSc REST API
Mnesia □□

□□ SQL □□□

- □□□□□□□□□□□□□□□□
- SQL □□□□ `cdrs` □□□□□□□□□
- □□□□□ □□ SQL □□□□mysql□psql□DBeaver □□
- □□□□ □□□□□□□□□□□□□□
- □□□□□□□□□□□□□□
  - `calling_number`□□□□ - □□□□□
  - `called_number`□□□□ - □□□□□□
  - `message_id`□□□□ - □□□□□□□

    - `submission_time` [illegible] - [illegible]
    - `status` [illegible] - [illegible]
    - `dest_smsc` [illegible] - [illegible]

[illegible] CDR [illegible]/[illegible]

3. [illegible]PubSub[illegible]

- Phoenix PubSub [illegible]
- [illegible]
- [illegible]
- [illegible]
- [illegible]
- WebSocket [illegible]

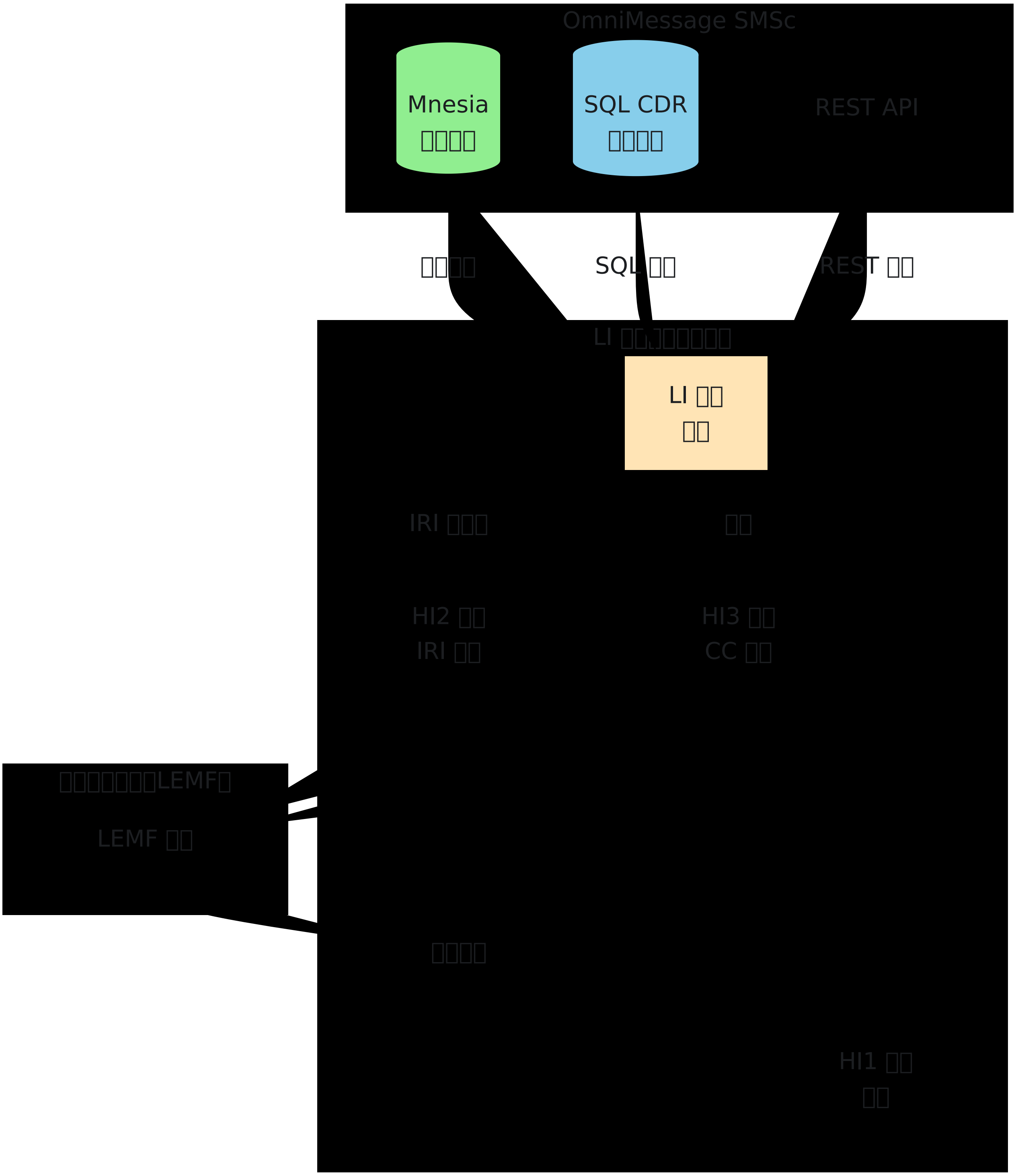
4. [illegible]

- CDR [illegible] CSV [illegible]
- [illegible] JSON [illegible]
- [illegible]
- [illegible]
- [illegible]

ETSI [illegible]

OmniMessage SMSc [illegible] ETSI [illegible]SMSc [illegible] HI1/HI2/HI3 [illegible]���[illegible]LIMF[illegible]

[illegible] ETSI LI [illegible]


OmniMessage SMSc
Mnesia
SQL CDR
REST API
SQL
REST
LI
LI
IRI
HI2
IRI
HI3
CC
LEMF
LEMF
HI1

[illegible]

HI1 [illegible] - [illegible]

- [illegible] [illegible]
- [illegible] LEMF → LIMF[illegible]
- [illegible]
  - [illegible]/[illegible]MSISDN[illegible]IMSI[illegible]

    - [illegible]
    - [illegible]
    - [illegible]
- [illegible] **SMSc** [illegible]
    - LIMF [illegible]
    - LIMF [illegible] SMSc CDR/API [illegible]
    - LIMF [illegible] HI1 [illegible]

HI2 [illegible] - IRI[illegible]

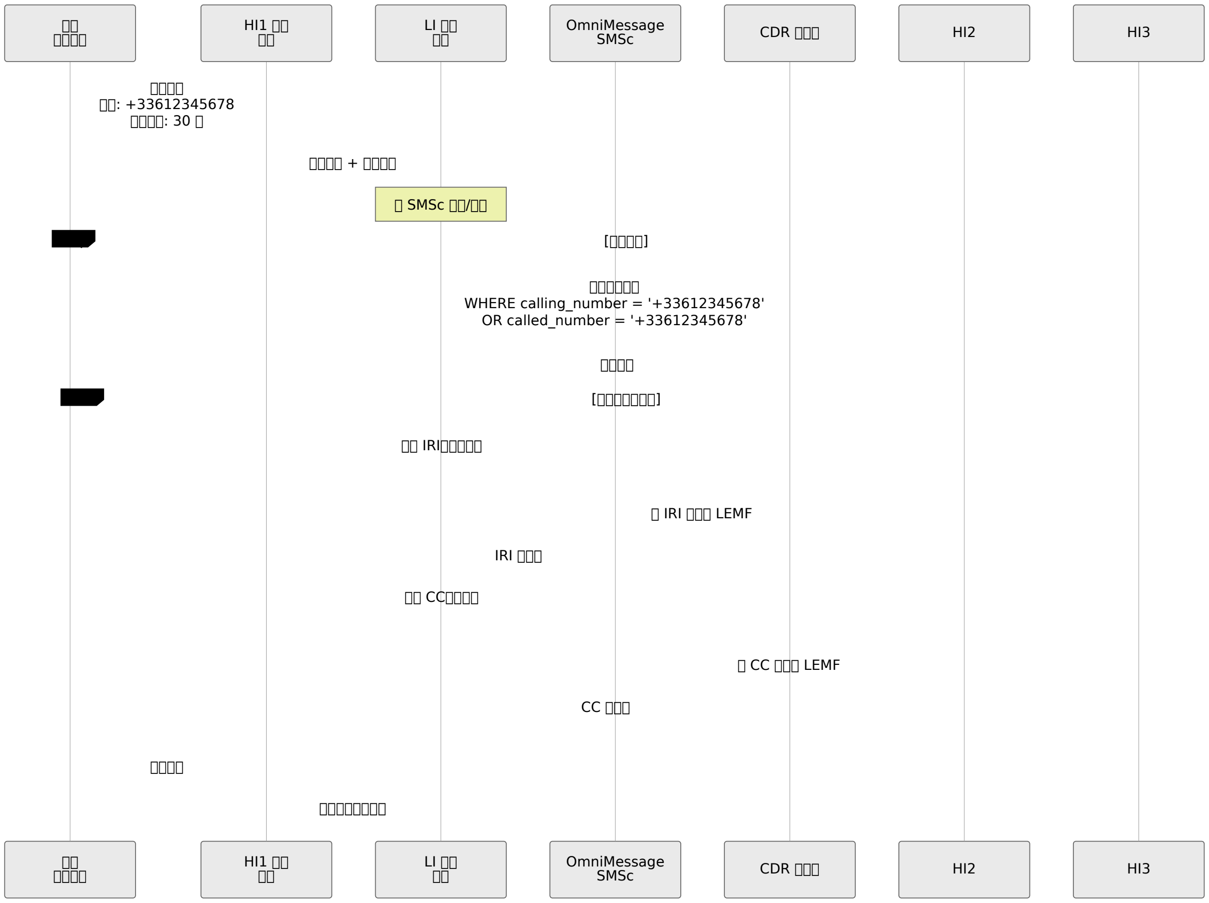
- [illegible] [illegible]
- [illegible] LIMF → LEMF[illegible]
- [illegible] [illegible] ETSI TS 102 232-x [illegible] XML/ASN.1
- [illegible] **SMSc CDR** [illegible]
    - [illegible] ID
    - [illegible] MSISDN[illegible]
    - [illegible] MSISDN[illegible]
    - IMSI[illegible]
    - [illegible]
    - [illegible]
    - [illegible]/[illegible]/[illegible]
    - [illegible]
    - SMSC [illegible]/[illegible]
    - [illegible]
- [illegible] **SMSc** [illegible]
    - LIMF [illegible] CDR [illegible]
    - LIMF [illegible] CDR [illegible] ETSI IRI [illegible]
    - LIMF [illegible] HI2 [illegible] IRI [illegible] LEMF

HI3 [illegible] - CC[illegible]

- [illegible] [illegible]
- [illegible] LIMF → LEMF[illegible]
- [illegible] [illegible] ETSI TS 102 232-x
- [illegible] **SMSc** [illegible]

    - □□□□□□□□□□
    - □□ PDU□□□□ SMS □□□
    - □□□□□□
    - □□□□□□
    - TP-DCS □□
    - □□□□□□UDH□
- □ **SMSc □□□□**
    - LIMF □ CDR `message_body` □□□□□□□□
    - LIMF □□□□□□□□□ PDU ��□
    - LIMF □□□□□□ ETSI CC □□
    - LIMF □□ HI3 □ CC □□□ LEMF

□□□□□


□□
□□□□
HI1 □□
□□
LI □□
□□
OmniMessage
SMSc
CDR □□□
HI2
HI3
□□□□
□□: +33612345678
□□□□: 30 □
□□□□ + □□□□
□ SMSc □□/□□
[□□□□]
□□□□□□
WHERE calling_number = '+33612345678'
OR called_number = '+33612345678'
□□□□
[□□□□□□□]
□□ IRI□□□□□
□ IRI □□□ LEMF
IRI □□□
□□ CC□□□□
□ CC □□□ LEMF
CC □□□
□□□□
□□□□□□□□

SMSc □□□□□ LI □□□

SMSc □□□□	HI2 (IRI)	HI3 (CC)	CDR □□
□□ ID	□ □□ ID	□ □□	`message_id`
□□□□	□ □□□ A	-	`calling_number`
□□□□	□ □□□ B	-	`called_number`
□□□□	□ □□□	-	`submission_time`
□□□□	□ □□	-	`delivery_time`
□□	□ □□	-	`status`
□□□□	-	□ □□	`message_body`
□□ PDU	-	□ □□□	(Mnesia/CDR)
□ SMSC	□ □□□□	-	`source_smsc`
□□ SMSC	□ □□□□	-	`dest_smsc`
IMSI	□ □□□ ID	-	(□□□□)

LIMF □□□□□

□□ 1□□□□□

- LIMF □□□□ CDR □□□□□ 1-60 □□
- SQL □□□□ HI1 □□□□□□□□□□□□□□□□
- □□□□□□□□□
- □□□□□□□ LI □□□□□□□□□

□□ 2□□□□□□□

- SMSc PubSub □□□□□□
- LIMF □□□□□□□

- LIMF [illegible]
- [illegible]
- [illegible]

[illegible] 3[illegible]

- [illegible] PubSub [illegible]< 24 [illegible]
- [illegible]CDR [illegible]
- [illegible]

[illegible]

[illegible]

- [illegible]MSISDN[illegible]
- [illegible] IMSI [illegible]
- [illegible]
- [illegible]���[illegible]
- [illegible] API [illegible]

[illegible]

- [illegible]/[illegible]
- [illegible] SMSC [illegible]
- [illegible]
- [illegible] ENUM [illegible]

[illegible]

- CDR [illegible]/[illegible]
- [illegible]
- [illegible]
- [illegible]

[illegible] SQL [illegible]

```
-- □□□□□□□□□□□
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;

-- □□□□□□□□□
SELECT * FROM cdrs
WHERE (calling_number = '+33612345678' AND called_number =
'+33687654321')
   OR (calling_number = '+33687654321' AND called_number =
'+33612345678')
ORDER BY submission_time;
```

---

2. □□□□□□□□□

2.1 □□□□□□

OmniMessage SMSc □□□□□□□□□□□□□□□□□□□□□□□ ANSSI □□□□□□□□□□□

2.2 □□□□□

2.2.1 TLS/SSL □□

□□□□□□

- TLS 1.2 (RFC 5246)
- TLS 1.3 (RFC 8446) - □□
- SSL 2.0/3.0: □□□□□□□□□

- TLS 1.0/1.1: □□□□□□□□

□□□

- Erlang/OTP SSL/TLS □□□□□□□□□□
- □□ TLS □ Cowboy Web □□□
- Phoenix □□ HTTPS □□

□□□□□

□□□□ Erlang/OTP □□□□□□□□□□□□□□□

□□ - TLS 1.3□

- TLS_AES_256_GCM_SHA384
- TLS_AES_128_GCM_SHA256
- TLS_CHACHA20_POLY1305_SHA256

□□ - TLS 1.2□

- 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 □□

TLS □□□□□

```
# 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**

□□□

- REST API □ HTTPS□□□ 8443□
- Web □□□□□ HTTPS□□□ 8086□
- □□□□□□MySQL/PostgreSQL □□ TLS□

2.3 □□□□□□

2.3.1 □□□□□

MySQL/MariaDB □□□

- □□□□□□
- AES-256 □□□□
- □□□□□□□TDE□

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

PostgreSQL □□□

- □□□□□□□□

- [illegible]
- [illegible]pgcrypto [illegible]

2.3.2 Mnesia [illegible]

Mnesia [illegible]

- [illegible]
- [illegible]LUKS[illegible]dm-crypt[illegible]
- [illegible] Erlang VM [illegible]

2.3.3 [illegible]

[illegible]

- [illegible]
- [illegible]0600[illegible]+ [illegible]
- [illegible]
- CDR [illegible]

[illegible]

- TLS [illegible] `priv/cert/`
- [illegible]
- [illegible]

2.4 [illegible]

2.4.1 API [illegible]

REST API [illegible]

- [illegible] HTTPS/TLS [illegible]
- [illegible]SMSc [illegible]
- [illegible] IP [illegible]���[illegible]
- [illegible]

[illegible]

- □□□□□□□□□□□□□□IP□□□□□
- □□□□□□□□□
- □□□□□□□□□□90 □□□□
- □□□□□□□

2.4.2 □□□□□□□

□□□□□□□□

- □□□/□□□□□□
- TLS/SSL □□□□
- □□ IP □□□□□
- □□□□□□□□□□RBAC□

□□□

```
# config/runtime.exs
config :sms_c, SmsC.Repo,
  username: "omnitouch",
  password: "omnitouch2024",  # □□□□□□□□□□□
  hostname: "localhost",
  ssl: true  # □□ TLS □□□□□□□
```

□□□□□□□

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

-- □□□□□□□□□□□□□□□□□
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.cdrs TO 'analytics'@'%';
```

2.5 □□□□□□□□

2.5.1 □□□□

□ Erlang/OTP □□□□

- SHA-256□SHA-384□SHA-512□□□□
- SHA-1□□□□□□□□□□□□□□
- MD5□□□□□□□□□□□
- BLAKE2□□□□ OTP □□□□□□

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- □□□□□□□
- □□□□□□□

2.5.2 □□□□

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- AES□□□□□□□□
  - AES-128-GCM
  - AES-256-GCM
  - AES-128-CBC
  - AES-256-CBC
- ChaCha20-Poly1305

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- 128 □□□□□
- 256 □□□□□

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- TLS □□□□
- □□□□□□□
- □□□□□□□□

2.5.3 □□□□□

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- RSA□2048 □□□□4096 □□□□
- ECDSA□□□□□□□□□□□□
  - P-256□P-384□P-521 □□
- Ed25519□EdDSA□

□□□□□

- TLS □□□□
- □□□□
- □□□□

2.6 SMS □□□□

2.6.1 SMS □□□□

□□□□□□□

- GSM 7 □□□□ SMS □□□
- UCS-2□Unicode□16 □□
- 8 □□□□□□
- Latin-1

TP-DCS□□□□□□□□□

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□□□□ **SMS** □□□

- SMS □□□□□□□□□□
- □□□□□ SMSc □□□□
- □□□□□□□□□□

2.6.2 □□□□□□

SMPP □□□���□□□□□

- SMPP □□□□□/□□□□
- □□ TLS□SMPP over TLS□
- □□□□

IMS □□□□□□□□□

- □□ SIP □□□□□
- SIP □□□□
- □ IMS □□□□□□□□□

SS7/MAP □□□□□□□□□

- SS7 □□□□
- MAP □□□□
- SCCP/TCAP □□□

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2.7 □□□□□□□□□□□

2.7.1 □□□□□□

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- □□□□□□
- □□□□□
- API □□/□□□□
- □□□□□□□
- □□□□□□□

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- □□□□□□□stdout/□□□
- □□□□□ PCAP □□□□

- □□□□□□□□□□
- Prometheus □□□□

2.7.2 □□□□□□

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- SMS □□□□□□□□□□□□□□□□□□□□□
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- □□□□□ TLS □□□□
- □□□□□□□□□
- □□□□□□□□□Vault□AWS Secrets Manager□
- □□□□ Erlang/OTP □□□□□□□□
- □ API □□□□□□□□□
- □□□□□ IP □□□

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- □□□□□□
- TLS □□□□
- □□□□□□□
- □□□□□□

2.8 □□□□□□□□

2.8.1 □□□□

TLS □□□□□

```
# [illegible]RSA 4096 [illegible]
openssl genrsa -out omnitouch.pem 4096

# [illegible]
openssl req -new -key omnitouch.pem -out omnitouch.csr

# [illegible]
openssl x509 -req -days 365 -in omnitouch.csr -signkey
omnitouch.pem -out omnitouch.crt

# [illegible] CA [illegible]
```

[illegible]

- Erlang/OTP CSPRNG[illegible]
- [illegible]/dev/urandom[illegible]
- [illegible]ID[illegible]

2.8.2 [illegible]

[illegible]

- [illegible]0600[illegible]
- [illegible] `priv/cert/` [illegible]
- PEM [illegible]
- [illegible]

[illegible]

- TLS [illegible]
- [illegible]
- API [illegible]

2.8.3 [illegible]

[illegible]

- [illegible] `priv/cert/`
- [illegible]

- □□□□ ACME □□□Let's Encrypt□

□□□□□□□

- □□□□□□□□□□□□
- TLS □□ Diffie-Hellman □□□□
- □□□□□□□□□

2.9 □□□□□□

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2.9.1 SMS □□ SS7/MAP □□□□□□

3GPP □ ETSI □□□

- **3GPP TS 23.040**□ □□□□□□SMS□□□□□□ - □□ SMS □□□□
- **3GPP TS 23.038**□ □□□□□□□□□□□ - □□□□□GSM7□UCS-2□
- **3GPP TS 29.002**□ □□□□□□□MAP□□□ - SMS □ SS7 □□
- **3GPP TS 23.003**□ □□□□□□□□ - MSISDN□IMSI □□
- **ETSI TS 100 901**□ □□□□□□□□□□
- **ETSI TS 100 902**□ □□□□□□□□□□□

SS7 □□□□□

- **ITU-T Q.711-Q.716**□ □□□□□□□□□SCCP□
- **ITU-T Q.771-Q.775**□ □□□□□□□□□TCAP□
- **ITU-T Q.701-Q.710**□ □□□□□□□MTP□□ 1-3 □
- **ETSI EN 300 356**□ □□□□ No.7 - ISDN □□□□□ISUP□

SS7/MAP □□□□□□

- **GSMA FS.07**□ SS7 □□□□□□□ - □□□□□□
- **GSMA FS.11**□ SS7 □□□□□□
- **3GPP TS 33.117**□ □□□□□□□□□□
- **ETSI TS 133 210**□ □□□□□ - IP □□□□□

SS7/MAP □□□□□□

- **ETSI TS 101 671**[illegible] [illegible]LI[illegible]
- **ETSI TS 102 232-1**[illegible] [illegible]��LI[illegible] - [illegible] 1 [illegible]LI [illegible]
- **3GPP TS 33.107**[illegible] 3G [illegible]

2.9.2 SMS [illegible] IMS [illegible]

3GPP IMS [illegible]

- **3GPP TS 23.228**[illegible] IP [illegible]IMS[illegible] - [illegible] 2 [illegible]
- **3GPP TS 24.229**[illegible] IP [illegible] - SIP [illegible] SDP [illegible]
- **3GPP TS 24.341**[illegible] [illegible] IP [illegible] SMS - [illegible] 3 [illegible]
- **3GPP TS 23.204**[illegible] [illegible] 3GPP IP [illegible]SMS[illegible] - [illegible] 2 [illegible]
- **3GPP TS 29.228**[illegible] IP [illegible]IM[illegible] Cx [illegible] Dx [illegible]

IMS [illegible]

- **3GPP TS 33.203**[illegible] 3G [illegible] IP [illegible]IMS AKA[illegible]
- **3GPP TS 33.210**[illegible] 3G [illegible]NDS[illegible]IP [illegible]IPsec[illegible]
- **3GPP TS 33.310**[illegible] [illegible]NDS[illegible]AF[illegible]
- **ETSI TS 133 203**[illegible] [illegible] IP [illegible]

SIP [illegible]

- **RFC 3261**[illegible] SIP[illegible] - [illegible]
- **RFC 3428**[illegible] SIP [illegible] - MESSAGE [illegible]
- **RFC 3325**[illegible] SIP [illegible]
- **RFC 5765**[illegible] [illegible]

IMS [illegible]

- **ETSI TS 102 232-5**[illegible] [illegible]LI[illegible] - [illegible] 5 [illegible]IP [illegible] LI
- **3GPP TS 33.107**[illegible] [illegible]
- **3GPP TS 33.108**[illegible] [illegible]LI[illegible]

2.9.3 SMPP [illegible]

SMPP [illegible]

- **SMPP v3.4**□ □□□□□□□□□ - □□□□
- **SMPP v5.0**□ □□□□□□□ SMPP □□

SMPP □□□□□

- **SMPP □□ TLS**□ SMPP □□□□□□□□□SMPP over TLS□
- **SMPP □□□□□**□□ ID □□□□□
- □□ **IP □□□□□□** □ SMPP □□□□□□□□

□□□□□□□

- **GSM 03.40**□**ETSI TS 100 901**□□ SMS □□□□PP□□□□□□
- **GSM 03.38**□**ETSI TS 100 900**□□ □□□□□□□□□□
- **GSM 04.11**□**ETSI TS 100 942**□□ □□□□□□□□□□□ SMS □□

□□□□□□□□

- **ITU-T T.50**□ □□□□□ No. 5□IA5□
- **ISO/IEC 8859-1**□ Latin-1 □□□□
- **ISO/IEC 10646**□ □□□□□□UCS-2/UTF-16□

2.9.4 □□□□□□□

TLS □□□□□□

- **NIST SP 800-52**□ TLS □□□□□□□□□□□□□
- **NIST SP 800-131A**□ □□□□□□□□□□□□
- **RFC 7525**□ TLS □ DTLS □□□□□□□
- **RFC 8446**□ □□□□□□TLS□□□□□ 1.3

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- **FIPS 197**□ □□□□□□□AES□
- **FIPS 180-4**□ □□□□□□□SHA-2 □□□
- **NIST SP 800-38D**□ □□□□□□□□□□□GCM □□
- **RFC 7539**□ IETF □□□ ChaCha20 □ Poly1305

□□□□□

- **NIST SP 800-57**□ □□□□□□
- **RFC 5280**□ □□□ X.509 □□□□□□□□□ CRL □□□□

2.10 □□□□□□□

2.10.1 □□□□

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- □□□□□□□GCM□Poly1305□

2.10.2 □□□□

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- TLS □□□□□□
- □□□□□□□□□ TLS □□□
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- □□□□□□
- TLS □□□□□□
- □□□□□□□□□
- □□□□□□

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3. □□□□□□□

3.1 □□□□□□□□□

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- □□□□□□□□□□□
- CDR □□□□□□□□□□□
- API □□□ IP/□□□□
- □□□□□□□□□

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- □□□□□□□□□SQL WHERE □□□
- □□□□□□□□□□

3.2 □□□□□□□

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- □□□□□□□□□□□□□ 24 □□□ Mnesia □□
- CDR □□□□□□□□□ 6 □□□ 2 □□
- □ Mnesia □ SQL □□□□□
- □□□□□ CDR□□□ cron□

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- □□□□□□□□□□□
- □□□□ UI/□□□□□
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- □□□□□□□□□
- □□□□□□□□

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

  # □□□□□□□□□□□□
  delete_message_body_after_delivery: false,  # □□□ true □□□□□□□

  # CDR □□□□
  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 □□□□

- [illegible]
- [illegible]

[illegible]

IRI[illegible]

- CDR [illegible]
  - [illegible] ID
  - [illegible]/[illegible]
  - [illegible]
  - [illegible]
  - [illegible]
  - SMSC [illegible]
  - [illegible]

CC[illegible]

- [illegible]
- [illegible] PDU [illegible]
- [illegible]
- [illegible]

[illegible]

```
# □□□ CSV □□
mysql -u li_readonly -p -D sms_c -e "
SELECT
  message_id,
  calling_number,
  called_number,
  message_body,
  submission_time,
  delivery_time,
  status
FROM cdrs
WHERE (calling_number = '+33612345678' OR called_number =
'+33612345678')
  AND submission_time BETWEEN '2025-11-01' AND '2025-11-30'
ORDER BY submission_time
" --batch --silent | sed 's/\t/,/g' > interception_report.csv
```

---

4. □□□□□□□□

4.1 □□□□

Elixir/Erlang □□□

- Erlang VM □□□□□
- □□□□□□□
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- □□□□□□□mix.lock□
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4.2 [illegible]

[illegible]

- [illegible]
  - 8443[illegible]HTTPS REST API[illegible]
  - 8086[illegible]HTTPS [illegible]
- [illegible]
- [illegible] IP [illegible]
- [illegible] DMZ [illegible]

[illegible]

- [illegible]
- [illegible]
- [illegible]
- [illegible]Erlang [illegible]

4.3 [illegible]

[illegible]

- [illegible]
- [illegible]
- [illegible]
- Syslog [illegible]
- [illegible] ELK [illegible]

[illegible]

- [illegible]
- [illegible]
- [illegible]
- TLS [illegible]
- [illegible]

[illegible]

- Prometheus □□□□
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- □□□□□□□

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4.4 □□□□□□□□□□

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- Erlang □□□□□□□
- Mnesia □□□□□□□□
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- □□□□□□□□ Mnesia disc_copies
- SQL □□□□□□MySQL/PostgreSQL □□□
- CDR □□□□
- □□□□

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- □□□□□□□□
- Mnesia □□□
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5. □□□□

5.1 □□□□

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- **README.md** - □□□□□□□□□□
- **CONFIGURATION.md** - □□□□□□
- **API_REFERENCE.md** - REST API □□
- **OPERATIONS_GUIDE.md** - □□□□□□□
- **CDR_SCHEMA.md** - □□□□□□□□□□□
- **sms_routing_guide.md** - SMS □□□□
- **number_translation_guide.md** - □□□□□
- **METRICS.md** - Prometheus □□□□□
- **TROUBLESHOOTING.md** - □□□□□□□□□

5.2 □□□□

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- **Erlang/OTP** □□□□□ □□□□□□□

5.3 □□□□□

- **ANSSI R226** □□□□□ □□□
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- □□□□□□□□ □□□□□ GDPR □□

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6. □□□□

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- □□□□□Omnitouch Network Services Pty Ltd
- □□□PO BOX 296, QUINNS ROCKS WA 6030, AUSTRALIA
- □□□□□□□□
- □□□□□compliance@omnitouch.com.au

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- □□□□□compliance@omnitouch.com.au

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- □□□□□compliance@omnitouch.com.au

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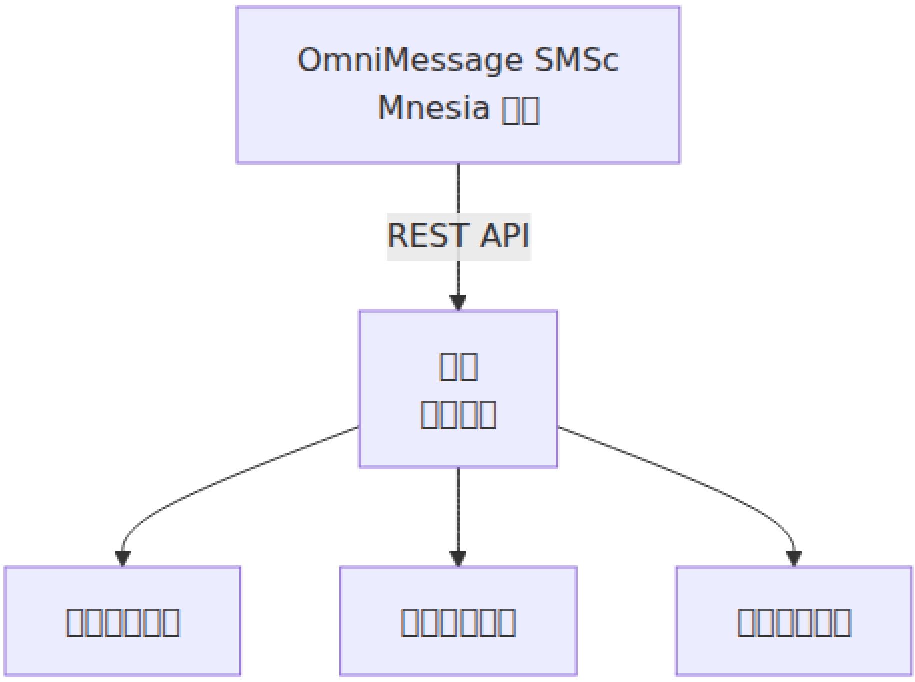
□□ A□□□□□□□ SMS □□□

A.1 □□ SMS □□□□□□□


OmniMessage SMSc
Mnesia □□
REST API
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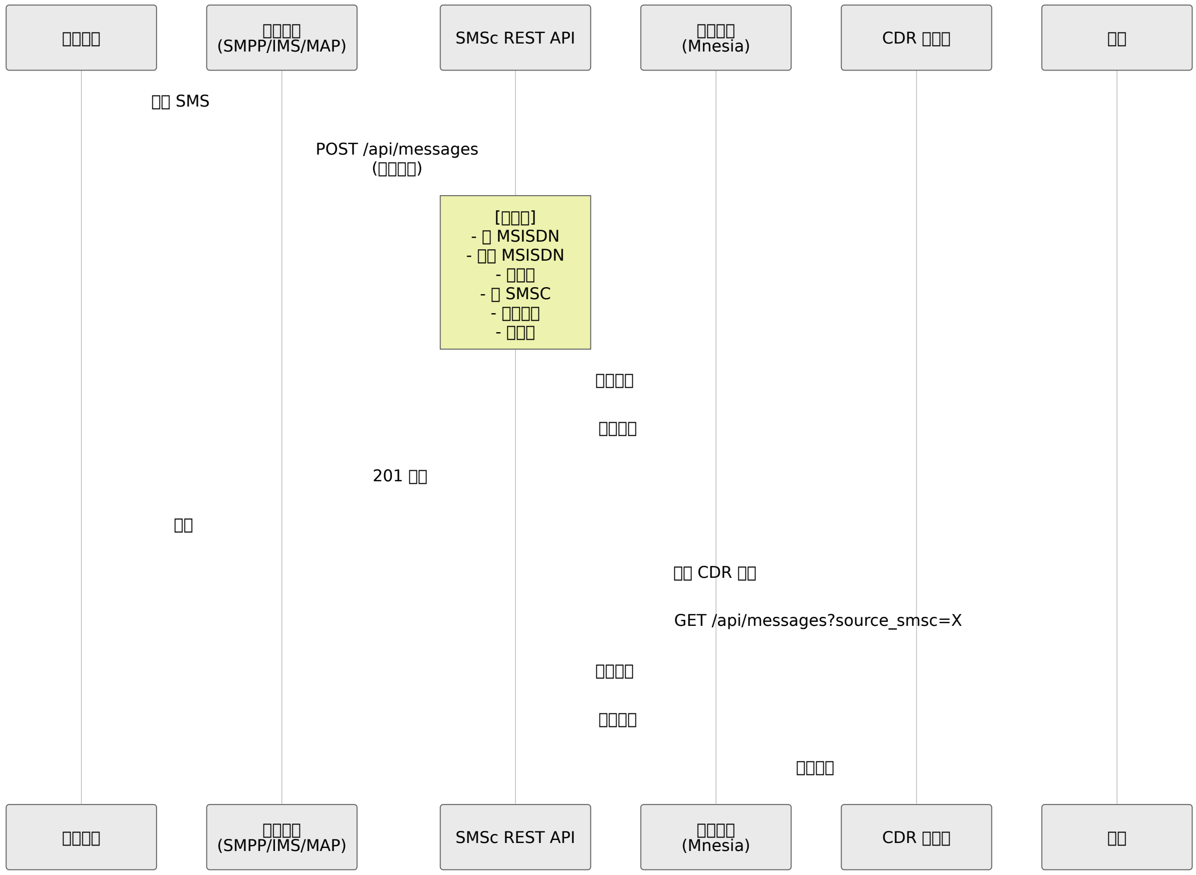
A.2 □□ SMS □□□□□□□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□□□□ (SMPP/IMS/MAP)
SMSc REST API
□□□□ (Mnesia)
CDR □□□
□□
□□ SMS
POST /api/messages (□□□□)
[□□□]
- □ MSISDN
- □□ MSISDN
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□□□□
201 □□
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□□ CDR □□
GET /api/messages?source_smsc=X
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□□ B□□□□□□ CDR □□

OmniMessage SMSc □ SQL □□□□MySQL □ PostgreSQL□□□□□□□□□□□□□□□□□□□□□□□□□

B.1 □□□□□□□ CDR □□

[illegible]	[illegible]	[illegible]	[illegible]
`id`	BIGINT	[illegible]	[illegible]
`message_id`	BIGINT	[illegible]	[illegible]
`calling_number`	VARCHAR(255)	[illegible] MSISDN	[illegible]
`called_number`	VARCHAR(255)	[illegible] MSISDN	[illegible]
`source_smsc`	VARCHAR(255)	[illegible]	[illegible]/[illegible]
`dest_smsc`	VARCHAR(255)	[illegible]	[illegible]
`origin_node`	VARCHAR(255)	Erlang [illegible]	[illegible]
`destination_node`	VARCHAR(255)	Erlang [illegible]	[illegible]
`submission_time`	DATETIME	[illegible]	[illegible]
`delivery_time`	DATETIME	[illegible]	[illegible]
`expiry_time`	DATETIME	[illegible]	[illegible]
`status`	VARCHAR(50)	[illegible]/[illegible]/[illegible]/[illegible]	[illegible]
`delivery_attempts`	INT	[illegible]	[illegible]
`message_parts`	INT	SMS [illegible]	[illegible]
`deadletter`	BOOLEAN	[illegible]	[illegible]
`message_body`	TEXT	SMS [illegible]	[illegible]
`inserted_at`	DATETIME	CDR [illegible]	[illegible]
`updated_at`	DATETIME	CDR [illegible]	[illegible]

□ □□□□□□□□ SQL □□□ CDR_SCHEMA.md

B.2 CDR □□□□□□□□□□

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```sql
SELECT * FROM cdrs
WHERE calling_number = '+33612345678'
   OR called_number = '+33612345678'
ORDER BY submission_time DESC;
```

□□□□□□□□□□□

```sql
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 □□□□□□

```sql
.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 □□□

- □□□□□□□ CDR □□□ REST API
- JSON □□□□
- □□□□□
- □□□□□□

3. □□□□□

- □□ mysql/psql □□□□□ CSV
- □□□□□□□
- □□ cron □□□□

B.4 CDR □□□□□

□□□□□

```
# config/runtime.exs
config :sms_c,
  # □□□□□□□□□□□□□□□
  delete_message_body_after_delivery: false,  # true □□□□

  # □□/□□ CDR □□
  cdr_enabled: true,

  # Mnesia □ CDR □□□□
  message_retention_hours: 24
```

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- □□□□□□□□□□□□□ NULL
- □□□□□□□MySQL ENCRYPTION='Y'□
- □□□□□□
- □□□□□□□□□

□□ C□□□□ REST API □□

C.1 □□□□□□

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```
GET /api/messages
Authorization: Bearer <token>
```

□ SMSC □□□□□

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

□□□□□□□

```
GET /api/messages/{id}
```

□□□□□

```json
{
  "status": "success",
  "data": [
    {
      "id": 12345,
      "message_id": 12345,
      "source_msisdn": "+33612345678",
      "destination_msisdn": "+33687654321",
      "message_body": "□□□□□□□",
      "source_smsc": "ims.gateway",
      "dest_smsc": "smpp.provider",
      "status": "delivered",
      "delivery_attempts": 1,
      "inserted_at": "2025-11-29T10:30:00Z",
      "deliver_time": "2025-11-29T10:30:05Z",
      "expires": "2025-11-30T10:30:00Z"
    }
  ]
}
```

□ □□□ API □□□ API_REFERENCE.md

C.2 □□□□□

□□□□□

- `source_smsc` - □□□□□□
- `dest_smsc` - □□□□□□□
- □□□□□□□□□ CDR □□□□□□
- □□□□□□□ CDR □□□□□□

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- □□ CDR □□□ REST API
- □□□□□□□□□□
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- □□□□□□□□□□

□□ D□□□□□

D.1 TLS □□□□

□□ TLS □□□

```
# □□ 4096 □ RSA □□
openssl genrsa -out priv/cert/omnitouch.pem 4096

# □□□□□□□□
openssl req -new -key priv/cert/omnitouch.pem -out
priv/cert/omnitouch.csr \
  -subj "/C=FR/ST=IDF/L=Paris/O=Omnitouch/CN=smsc.example.com"

# □□□□□□□□/□□□
openssl x509 -req -days 365 -in priv/cert/omnitouch.csr \
  -signkey priv/cert/omnitouch.pem -out priv/cert/omnitouch.crt

# □□□□ CSR □□□□□□□ 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"
  }
```

D.2 □□□□□□□

MySQL □□□□

```sql
-- □ CDR □□□□□
ALTER TABLE cdrs ENCRYPTION='Y';

-- □□□□□□
SELECT TABLE_NAME, CREATE_OPTIONS
FROM information_schema.TABLES
WHERE TABLE_SCHEMA = 'sms_c' AND TABLE_NAME = 'cdrs';
```

PostgreSQL □□□□□

```
# config/runtime.exs
config :sms_c, SmsC.Repo,
  username: "omnitouch",
  password: "secure_password",
  hostname: "localhost",
  database: "sms_c",
  ssl: true,
  ssl_opts: [
    verify: :verify_peer,
    cacertfile: "/path/to/ca.crt",
    certfile: "/path/to/client.crt",
    keyfile: "/path/to/client.key"
  ]
```

D.3 □□□□

□□□□□□□□□

```
# config/runtime.exs
config :sms_c,
  # [illegible]
  delete_message_body_after_delivery: true,

  # [illegible] UI [illegible]
  hide_message_body_in_ui: true,

  # [illegible]
  hide_message_body_in_export: true
```

[illegible]

```
-- [illegible]
CREATE VIEW cdrs_metadata AS
SELECT
  id, message_id, calling_number, called_number,
  source_smsc, dest_smsc, origin_node, destination_node,
  submission_time, delivery_time, expiry_time,
  status, delivery_attempts, message_parts, deadletter,
  inserted_at, updated_at
FROM cdrs;

-- [illegible]
GRANT SELECT ON cdrs_metadata TO 'analytics'@'%';
```

[illegible] E[illegible]

[illegible]

- **ANSSI:** [illegible]
- **ETSI:** [illegible]
- **3GPP:** [illegible] - [illegible]
- **IETF:** [illegible] - [illegible]

[illegible]

- **SMSc:** [illegible] - [illegible]
- **SMPP:** [illegible] - [illegible]

- **ESME:** □□□□□□□ - SMPP □□□□□
- **IMS:** IP □□□□□□ - □□□□□□□□□ IP □□□□
- **SIP:** □□□□□□ - IMS □□□□□□□
- **P-CSCF:** □□□□□□□□□□ - IMS □□□□□
- **S-CSCF:** □□□□□□□□□□ - IMS □□□□
- **HSS:** □□□□□□□ - IMS □□□□□
- **SS7/MAP:** □□□□ 7 / □□□□□□ - □□□□□□□□
- **MSC:** □□□□□□ - □□□□□□□□
- **VLR:** □□□□□□ - □□□□□□□
- **GT:** □□□□ - SS7 □□□□
- **SCCP:** □□□□□□□□ - SS7 □□□
- **TCAP:** □□□□□□□□ - SS7 □□□
- **MSISDN:** □□□□□□□□□□□ - □□□□
- **IMSI:** □□□□□□□□ - □□□□□□□
- **E.164:** □□□□□□□□□□□
- **ENUM:** E.164 □□□□ - □□ DNS □□□□□□ URI □□
- **PDU:** □□□□□□ - □□□□□□□□□□
- **TP-DCS:** □□□□□□□□□□ - □□□□□□
- **TP-DU:** □□□□□□□□ - □□□□□ PDU □□
- **UDH:** □□□□□ - □□□□/□□□□□□□
- **TON/NPI:** □□□□ / □□□□□□□ - □□□□□□
- **GSM7:** GSM 7 □□□□□□ - □□□□□□□□
- **UCS-2:** □□□□□ 2 □□ - □□□ Unicode □□

□□□□

- **Mnesia:** Erlang □□□□□□□□ - □□/□□□□
- **CDR:** □□□□□□ - □□□□□□□□□□
- **REST API:** □□□□□□□ - □□ HTTP □ API □□
- **Phoenix:** Elixir □□□□
- **Cowboy:** Erlang HTTP □□□
- **Ecto:** Elixir □□□□□□□□□□
- **PubSub:** □□-□□□□□□

[illegible]

- **LI:** [illegible] - [illegible]
- **LIMF:** [illegible] - [illegible]
- **LEMF:** [illegible] - [illegible]
- **IRI:** [illegible] - [illegible]/[illegible]��[illegible]
- **CC:** [illegible] - [illegible]
- **HI1 [illegible]:** ETSI LI [illegible] - [illegible]
- **HI2 [illegible]:** ETSI LI [illegible] IRI [illegible] - [illegible]
- **HI3 [illegible]:** ETSI LI [illegible] CC [illegible] - [illegible]
- **R226:** [illegible] R226-3 [illegible] R226-7 [illegible]
- **ETSI:** [illegible] - [illegible] LI [illegible]
- **ETSI TS 102 232:** [illegible]

[illegible]

- **MT:** [illegible] - [illegible]
- **MO:** [illegible] - [illegible]
- **DLR:** [illegible] - [illegible]
- **[illegible]:** [illegible]
- **[illegible]:** [illegible]2[illegible]4[illegible]8[illegible]

[illegible]

- **TLS:** [illegible] - [illegible]
- **PFS:** [illegible] - [illegible]
- **AES:** [illegible]
- **RSA:** Rivest-Shamir-Adleman - [illegible]
- **ECDSA:** [illegible]
- **SHA:** [illegible]
- **X.509:** [illegible]
- **CA:** [illegible]
- **CSPRNG:** [illegible]

[illegible]

- **MySQL:** [illegible]
- **PostgreSQL:** [illegible]
- **TDE:** [illegible]
- **RBAC:** [illegible]

[illegible] 1.0
[illegible] 2025-11-29
[illegible] ANSSI R226 [illegible]
[illegible] [illegible] - [illegible]

[illegible] / [illegible]

← [illegible]

[illegible]

[illegible] SMSC [illegible] [illegible] [illegible]

[illegible]

[illegible]	[illegible]
[illegible]	[illegible] MSISDN[illegible]JSON [illegible] CSV[illegible]
[illegible]	[illegible] *[illegible]*[illegible]+ [illegible]

[illegible] HTTP API [illegible] Mnesia [illegible] SMSC [illegible]

[illegible]

[illegible]

- [illegible] (`list_id`) - [illegible]��� MSISDN[illegible]
- [illegible] - [illegible] [illegible] `list_id` [illegible] [illegible] - [illegible] MSISDN[illegible]“[illegible]”[illegible]

[illegible]

[illegible] - **`var1`**, **`var2`**, **`var3`**, **`var4`** - [illegible] `{{ var1 }}`…`{{ var4 }}`[illegible] `{{ msisdn }}`[illegible]

> [illegible] - [illegible]

[illegible] **CSV** [illegible] - MSISDN [illegible] `msisdn`/`destination_msisdn`/`number`/`phone` [illegible] `var1`…`var4`[illegible]

```
msisdn,first,last,plan
12025550101,Alice,Smith,Gold
12025550102,Bob,Jones,Silver
```

[illegible] **JSON** [illegible] - [illegible]

```json
{ "name": "VIPs", "recipients": [
  { "msisdn": "12025550101", "var1": "Alice", "var2": "Gold" }
] }
```

[illegible]

```
Hi {{ var1 }}, your {{ var2 }} plan renews soon. Reply STOP to opt
out.
```

[illegible] `12025550101`[illegible]`var1=Alice`, `var2=Gold`[illegible] `Hi Alice, your Gold plan renews soon. Reply STOP to opt out.`

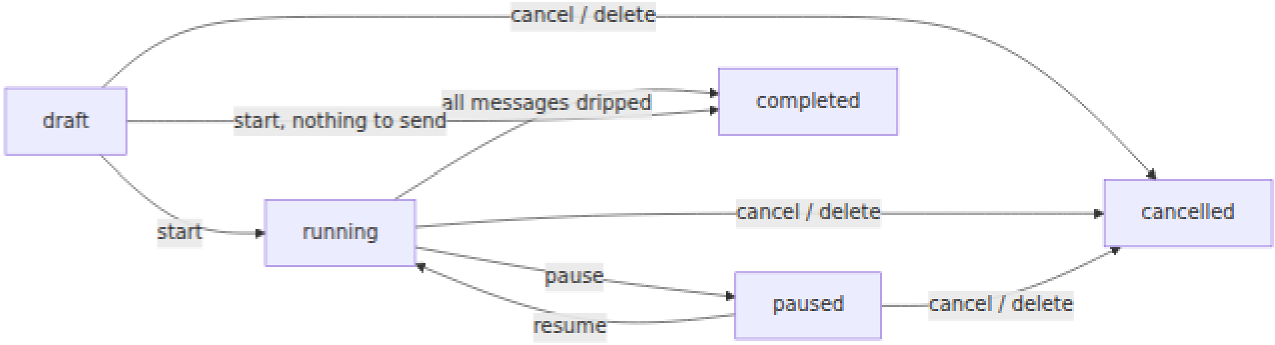
[illegible]

[illegible]`audience` [illegible]

[illegible]	[illegible]
`active_only`[illegible]	[illegible] `skipped_inactive`[illegible]
`all`	[illegible]

[illegible] [illegible] - [illegible] [illegible] [illegible] `audience` [illegible] `active_only`[illegible]

[illegible]



cancel / delete
draft
start, nothing to send
all messages dripped
completed
start
running
cancel / delete
cancelled
pause
resume
paused
cancel / delete

1. **draft** - [illegible]
2. **start** - [illegible]���[illegible] **running**[illegible] **completed**[illegible]
3. **running** - [illegible]
4. **pause / resume** - [illegible]/[illegible]
5. **completed** - [illegible]
6. **cancelled** - [illegible]

[illegible]

[illegible] [illegible] - [illegible] TTL [illegible]`campaign_retention_hours`[illegible] 7 [illegible]

[illegible]

[illegible] `drip_tps`[illegible] `drip_tps × interval` [illegible] - [illegible] [illegible]

[illegible]

[illegible] `stats` [illegible] `GET /api/campaigns/:id`[illegible]

□□	□□
`total`	□□□□□□□□□
`pending`	□□□□□□
`queued`	□□□□□□□□□□
`delivered`	□□□□□
`failed`	□��□□/□□
`skipped_inactive`	□□□□□□□□□□□□□
`dispatched`	`queued + delivered + failed`
`progress_percent`	□□ `pending` □□□□□□
`delivery_percent`	□□□□□□□□□

□□□□□□□□□□□□□□□□□□□□ SMSC □□ □□□□ `GET /api/campaign_targets/:id?state=failed` □□□

□□

```
config :sms_c, :campaigns,
  # □□□□□□□□□□□ false □□□□□□□□□□
  enabled: true,
  # □□□□□□□□□□□□□
  drip_tick_ms: 1000,
  # □□□□□□□□□ drip_tps □□□□□□□□□□□□
  default_drip_tps: 50,
  # □□□□□□ validity_hours □□□□□□□□□
  message_validity_hours: 72,
  # □□/□□□□□□□□□□□□□□□□□□□□
  campaign_retention_hours: 168
```

[illegible]

[illegible]

- **`validity_hours`** - [illegible] `expires` [illegible] `message_validity_hours`[illegible]
- **`deliver_after`** - [illegible] ISO8601 ��[illegible]

[illegible] `drip_tps` [illegible] *[illegible]* [illegible] `delta = deliver_after − started_at`[illegible] *t* [illegible] `send_time`/`deliver_after = t + delta` [illegible] `expires = t + delta + validity_hours`[illegible] `drip_tps` [illegible] `deliver_after` [illegible] **`deliver_after`** [illegible] **`drip_tps`** [illegible] - [illegible] `deliver_after`[illegible]`delta = 0`[illegible]

□□□□□□

```
# 1. □□□□□□□□□□□□□□□□□□□□□□□□CSV □ JSON□
curl -k -X POST https://smsc:8443/api/campaign_lists \
  -H 'Content-Type: application/json' \
  -d '{"name":"VIP customers",

"csv":"msisdn,first,plan\n12025550101,Alice,Gold\n12025550102,Bob,Sil
# => {"id": 1, "recipient_count": 2, ...}

# 2. □□□□□□□□□□□□□□□□□□□
curl -k -X POST https://smsc:8443/api/campaigns \
  -H 'Content-Type: application/json' \
  -d '{"name":"Renewal notice","message":"Hi {{ var1 }}, your {{ var2
renews soon.",
       "source_msisdn":"12345","source_smsc":"IMS_SMSC",
       "list_id":1,"audience":"active_only","drip_tps":50}'
# => {"id": 7, "status": "draft", ...}

# 3. □□□
curl -k -X POST https://smsc:8443/api/campaigns/control \
  -H 'Content-Type: application/json' \
  -d '{"campaign_id":7,"action":"start"}'

# 4. □□□□ / □□□□
curl -k https://smsc:8443/api/campaigns/7
# => {... "stats":
{"total":..,"delivered":..,"failed":..,"progress_percent":..}}
```

□□ □□□□□□□ □□□□□□□□□ 2 □□□ `list_id`□□□□□□□□ 1□□

□□□□

- □□ API □□
- SMS □□□□ - □□□□/□□□□□□□
- □□□□

CDR□□□□□□□□□□

← □□□□□□

□□□□□□□□□□□□□□□CDR□□□□□□□□□□

□□

- □□
- □□□
- □□□□
- SQL□□
- □□
- □□□□□□□□□
- □□□□
- □□□□□
- □□□□

□□

`cdrs` □□□□□□□□□□SMS□□□□□□□□□□□□□□□□□□□□CDR□`delivered`□`expired`□`failed`□`rejected`□□□□□□□□`balance_rejected`□□□`rejected`□□□□□□□□□□□□Mnesia□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□ CDR□□□□□□

CDR□□□□□Mnesia□□□□□□□□□□□□□□

- □□□□□
- □□□□□
- □□□□□
- □□Mnesia□□□□□□□□

□□□

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,

  -- □□
  UNIQUE KEY cdrs_origin_node_message_id_index (origin_node,
message_id),
  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)
);
```

> `(origin_node, message_id)` [illegible]CDR[illegible]CDR[illegible]
> ���[illegible] `ON CONFLICT DO NOTHING` [illegible]

PostgreSQL

```sql
CREATE TABLE cdrs (
  id BIGSERIAL 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 TIMESTAMP NOT NULL,
  delivery_time TIMESTAMP,
  expiry_time TIMESTAMP,

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

  -- □□□□□□□□□□□
  message_body TEXT,

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

-- □□
CREATE UNIQUE INDEX cdrs_origin_node_message_id_index ON
cdrs(origin_node, message_id);
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);
```

[illegible]

[illegible]

[illegible]	[illegible]	[illegible]	[illegible]
`id`	BIGINT	NO	CDR[illegible]

[illegible]

[illegible]	[illegible]	[illegible]	[illegible]
`message_id`	BIGINT	NO	[illegible]SMS-C[illegible] Mnesia[illegible] `(origin_node, message_id)` [illegible] - [illegible]/[illegible]

[illegible]

[illegible]	[illegible]	[illegible]	[illegible]
`calling_number`	VARCHAR(255)	NO	[illegible]MSISDN[illegible] E.164[illegible]+15551234567[illegible]
`called_number`	VARCHAR(255)	NO	[illegible]MSISDN[illegible] E.164[illegible]+15551234567[illegible]

SMSC□□

□□	□□	□□	□□
`source_smsc`	VARCHAR(255)	YES	□□□□□□SMSC□□□□□□□□□□□□API□□□□SMSC□□□□□□□NULL□
`dest_smsc`	VARCHAR(255)	YES	□□□���□□□□□□□□□□SMSC□□□□□□□□□□□□□□□□□□□NULL□

□□□□

□□□□□□□□□□□□□□□□□□

□□	□□	□□	□□
`origin_node`	VARCHAR(255)	YES	□□□□□□□Erlang□□□□□□□□“sms@node1.example.com”□ □□□□□□□□□□□□□□□□□□□
`destination_node`	VARCHAR(255)	YES	□□□□□Erlang□□□□□□□□□□□□□□□□ □□□□□□□□□□□□□□□NULL□

□□□

□□□□□□UTC□□□

[illegible]	[illegible]	[illegible]	[illegible]
`submission_time`	DATETIME	NO	[illegible]SMS-C[illegible]
`delivery_time`	DATETIME	YES	[illegible]NULL[illegible]
`expiry_time`	DATETIME	YES	[illegible]NULL[illegible]

[illegible]

```
TIMESTAMPDIFF(SECOND, submission_time, delivery_time) AS
delivery_duration_seconds
```

[illegible]

[illegible]	[illegible]	[illegible]	[illegible]
`status`	VARCHAR(50)	NO	[illegible]`delivered`[illegible]`expired`[illegible]`failed`[illegible]`rejected`
`delivery_attempts`	INT	NO	[illegible]0[illegible]0-255[illegible]
`message_parts`	INT	YES	[illegible]SMS[illegible]1[illegible]2[illegible]NULL[illegible]
`deadletter`	BOOLEAN	NO	[illegible]TRUE[illegible]FALSE

[illegible]

□□	□□	□□□	□□□□
`delivered`	□□□□□□□□	□	□□□
`expired`	□□□□□□□□	□□□□□□□	NULL
`failed`	□□□□□□□□□□□□□	□□□□□□□	NULL
`rejected`	□□□□□□□□□□	□	NULL

□□□

□□	□□	□□	□□
`message_body`	TEXT	YES	□□□SMS□□□□□□□□□□ `delete_message_body_after_delivery`□□□□□□□□□□NULL□□□□□□□□□□□□□□TEXT□□□65,535□□□□□

□□□□□

- □□□□□ □□□□□□CDR□□□□□/□��
- □□□□□ □`delete_message_body_after_delivery: true`□□□□□□□□NULL
- □□□□□ □□□□□□□□□□□□□□□□□□□□□□

□□□□□

□□	□□	□□	□□
`inserted_at`	DATETIME	NO	CDR□□□□□□□□□□□□□□□□ delivery_time/expiry_time□□□□□□
`updated_at`	DATETIME	NO	CDR□□□□□□□□□□□□□□□□□□□inserted_at□□□

SQL[illegible]

[illegible]

[illegible]**CDR**[illegible]

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

[illegible]

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

[illegible]

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

[illegible]

[illegible]**SMSC**[illegible]

```
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
WHERE submission_time >= DATE_SUB(NOW(), INTERVAL 30 DAY)
GROUP BY DATE(submission_time), dest_smsc
ORDER BY date DESC, message_count DESC;
```

□□□□□□□□□□□□□□□□□□

```
SELECT
  DATE(submission_time) AS date,
  COUNT(*) AS message_count,
  SUM(message_parts) AS total_segments,
  SUM(message_parts) * 0.01 AS total_cost
FROM cdrs
WHERE calling_number LIKE '+1555%'
  AND status = 'delivered'
  AND submission_time >= '2025-10-01'
  AND submission_time < '2025-11-01'
GROUP BY DATE(submission_time);
```

□□□□□□□

```sql
SELECT
  dest_smsc,
  COUNT(*) AS total_messages,
  SUM(CASE WHEN status = 'delivered' THEN 1 ELSE 0 END) AS delivered,
  ROUND(100.0 * SUM(CASE WHEN status = 'delivered' THEN 1 ELSE 0 END) / COUNT(*), 2) AS delivery_rate_pct,
  AVG(delivery_attempts) AS avg_attempts,
  AVG(TIMESTAMPDIFF(SECOND, submission_time, delivery_time)) AS avg_delivery_seconds
FROM cdrs
WHERE submission_time >= DATE_SUB(NOW(), INTERVAL 7 DAY)
  AND dest_smsc IS NOT NULL
GROUP BY dest_smsc
ORDER BY delivery_rate_pct DESC;
```

□□□□

□□□□□□□□□□□□□

```sql
SELECT
  HOUR(submission_time) AS hour,
  COUNT(*) AS message_count
FROM cdrs
WHERE submission_time >= DATE_SUB(NOW(), INTERVAL 7 DAY)
GROUP BY HOUR(submission_time)
ORDER BY hour;
```

□□□□□□□□

```
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;
```

[illegible]

```
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;
```

[illegible]

[illegible]

```
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;
```

□□□□□□□□□□CDR□□

```
-- □□□□□□□□□□□□□□2□□
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;  -- □□□□□□□□□
```

□□□□

□□□□□□□□□□□

```
SELECT
  origin_node,
  COUNT(*) AS message_count,
  SUM(CASE WHEN status = 'delivered' THEN 1 ELSE 0 END) AS
delivered_count
FROM cdrs
WHERE submission_time >= DATE_SUB(NOW(), INTERVAL 1 DAY)
GROUP BY origin_node;
```

□□

□□□□□□□□□□□□□□

□□□□	□	□□
`PRIMARY`	`id`	□□□□□□□□□
`cdrs_origin_node_message_id_index`	`origin_node, message_id`	□□□ □□□□□□□□□CDR□□□□□□□□□□□
`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`	□□□□□□

[illegible]

[illegible]

[illegible]��[illegible]

```sql
CREATE INDEX idx_cdrs_billing ON cdrs(calling_number,
submission_time, status);
```

[illegible]

```sql
CREATE INDEX idx_cdrs_route_perf ON cdrs(dest_smsc,
submission_time, status);
```

[illegible]

```sql
CREATE INDEX idx_cdrs_party_time ON cdrs(calling_number,
called_number, submission_time);
```

[illegible]**MySQL**[illegible]

```sql
ALTER TABLE cdrs ADD FULLTEXT INDEX idx_cdrs_message_body_ft
(message_body);

-- [illegible]
SELECT * FROM cdrs
WHERE MATCH(message_body) AGAINST('keyword' IN NATURAL LANGUAGE
MODE);
```

[illegible]

[illegible]

□□	**MySQL/MariaDB**	**PostgreSQL**	□□
`id`	BIGINT AUTO_INCREMENT	BIGSERIAL	64□□□□□□
`message_id`	BIGINT	BIGINT	64□□□
□□□□□	VARCHAR(255)	VARCHAR(255)	□□□□□□□□□255□□□
`message_body`	TEXT	TEXT	□□□□MySQL□□65,535□□□PostgreSQL□□
□□□	DATETIME	TIMESTAMP	□□□□UTC□□□
□□	INT	INTEGER	32□□□□□□
□□□	BOOLEAN (TINYINT(1))	BOOLEAN	MySQL□□□0/1

□□□□

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. [illegible]

[illegible]CDR[illegible]

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

-- [illegible]
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'@'%';
```

[illegible]

[illegible]

[illegible]

[illegible]	[illegible]	[illegible]
[illegible]	18-24[illegible]	FCC[illegible]
[illegible]	6[illegible] - 2[illegible]	GDPR[illegible]
[illegible]	5-7[illegible]	SOX[illegible]SEC
[illegible]	6[illegible]	HIPAA

[illegible]

1. [illegible]MySQL 8.0+[illegible]PostgreSQL 11+[illegible]

```sql
-- 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. □□□□□□

```sql
-- □□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
```

□□□□

□□□□□

□□□□□□□□□□□□□□□

```sql
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□□□□□□□

SMS-C□□□□□CDR□□□RFC 4180 CSV□□□□□□□□SQL□□□□□□□□□□□□□□□□□□

```
bin/omnimessage rpc
'SmsC.Messaging.CDR.export_csv_to_file("/tmp/cdrs-202607.csv",
since: ~U[2026-07-01 00:00:00Z], until: ~U[2026-08-01 00:00:00Z],
status: :delivered)'
```

□□□`:since`□`:until`□□□`DateTime`□□`:status`□□□/□□□□□□□□□`[:delivered, :failed]`□□`:limit`□□□□□ `{:ok, {path, row_count}}`□`message_body` □□□

`hide_message_body_in_export` □□ - □□□□□ `true` □□□ `[REDACTED]` □□□□□□□□□□□□□□□□□□□□□□CSV□□□□□□□□□□□□□□□□□□□□□□

□□SQL□□□□□□□□□□□□

```
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 [illegible]

← [illegible]

[illegible] SMS-C [illegible]

[illegible]

- [illegible]
- [illegible]
- API [illegible]
- Web UI [illegible]
- [illegible]
- [illegible]
- [illegible]
- Diameter Sh (HSS) [illegible]
- ENUM [illegible]
- [illegible]
- [illegible] (X1/X2/X3)
- [illegible]
- [illegible]
- [illegible]
- [illegible]

[illegible]

SMS-C [illegible]

config/config.exs

[illegible]

- [illegible]

- [illegible]
- [illegible]/[illegible]
- [illegible]

config/runtime.exs

[illegible]

- [illegible]
- [illegible]
- [illegible] (OCS, ENUM)
- [illegible]
- [illegible]

config/prod.exs ([illegible])

[illegible]

[illegible] `runtime.exs` [illegible] API [illegible]

SQL CDR [illegible]

SMS-C [illegible] **Mnesia** [illegible] **SQL** [illegible] [illegible] CDR[illegible]

[illegible] SQL [illegible]

[illegible] SQL [illegible] CDR [illegible]

[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
MySQL	8.0+	`Ecto.Adapters.MyXQL`	3306	[illegible]
MariaDB	10.5+	`Ecto.Adapters.MyXQL`	3306	[illegible] MySQL [illegible]
PostgreSQL	13+	`Ecto.Adapters.Postgres`	5432	[illegible] JSON

[illegible]Mnesia [illegible]SQL [illegible] [illegible] [illegible] CDR [illegible]

CDR [illegible]

CDR [illegible] SQL [illegible]

1. [illegible]��[illegible] - [illegible]`delivered`[illegible]`expired`[illegible]`failed`[illegible]`rejected` [illegible] `balance_rejected`[illegible]CDR [illegible]
2. [illegible] - [illegible] Mnesia [illegible] CDR[illegible] `expired`[illegible] CDR [illegible] CDR [illegible]

[illegible] CDR [illegible] `(origin_node, message_id)` [illegible] `ON CONFLICT DO NOTHING`[illegible]

[illegible] `message_id`[illegible] Mnesia [illegible]`message_id` [illegible] [illegible] SMS-C [illegible] CDR [illegible]`(origin_node, message_id)` [illegible] CDR [illegible] `cdr_enabled: false` [illegible] CDR [illegible]

CSV / [illegible]

CDR [illegible] SQL [illegible] RFC 4180 CSV [illegible]`mix` [illegible]

```
bin/omnimessage rpc
'SmsC.Messaging.CDR.export_csv_to_file("/tmp/cdrs-202607.csv",
since: ~U[2026-07-01 00:00:00Z], until: ~U[2026-08-01 00:00:00Z])'
```

[illegible]`:since`[illegible]`:until`[illegible] `DateTime`[illegible]`:status`[illegible]/[illegible] `:limit`[illegible] `message_body` [illegible] `hide_message_body_in_export` [illegible] `[REDACTED]`[illegible]

MySQL / MariaDB [illegible]

```
# 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 [illegible]

```
# 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")
```

[illegible] SQL [illegible]

MySQL/MariaDB - [illegible]

- [illegible] CDR [illegible]
- [illegible]
- [illegible]
- [illegible]

PostgreSQL - [illegible]

- [illegible] JSON/JSONB [illegible]
- [illegible] CDR [illegible]
- [illegible] PostgreSQL [illegible]
- [illegible] PostGIS

[illegible]

[illegible]SQL CDR [illegible] SMS-C [illegible] [illegible] [illegible]

[illegible]/[illegible]

```
┌──────────────────────────────┐
│   SMS-C [illegible]                │
│  ┌──────────┐  ┌──────────┐  │
│  │ SMS-C    │  │ SQL DB   │  │
│  │ [illegible]     │ │ (CDR)    │ │
│  └──────────┘  └──────────┘  │
│                              │
│  ┌─────────────────────┐     │
│  │ Mnesia ([illegible])       │    │
│  └─────────────────────┘     │
└──────────────────────────────┘
```

[illegible]��[illegible] - [illegible]

```
┌──────────────────────┐      ┌──────────────────────┐
│  SMS-C [illegible] 1    │       │  SMS-C [illegible] 2    │
│  ┌────────────────┐  │      │  ┌────────────────┐  │
│  │ SMS-C          │  │      │  │ SMS-C          │  │
│  │ [illegible]        │◄─┼──────┼─►│ [illegible]        │  │
│  └───────┬────────┘  │      │  └───────┬────────┘  │
│          │           │      │          │           │
│  ┌───────▼────────┐  │      │  ┌───────▼────────┐  │
│  │ Mnesia         │◄─┼──────┼─►│ Mnesia         │  │
│  │([illegible])       │  │      │  │([illegible])       │  │
│  └────────────────┘  │      │  └────────────────┘  │
└─────────┬────────────┘      └─────────┬────────────┘
          │                             │
          └──────────┬──────────────────┘
                     │ [illegible]
          ┌──���───────────���──────────┐
          │  [illegible] SQL [illegible]      │
          │  ┌──────────────────┐  │
          │  │  MySQL/MariaDB   │  │
          │  │  [illegible] PostgreSQL   │  │
          │  │  (CDR [illegible])       │  │
          │  └──────────────────┘  │
          └────────────────────────┘
```

[illegible] SQL [illegible]

- [illegible]CDR [illegible]
- [illegible]
- [illegible] SMS-C [illegible]
- [illegible] SMS-C [illegible] CDR [illegible]
- [illegible]

[illegible]

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

[illegible]`pool_size = ([illegible] DB [illegible]) * 1.5`

[illegible]

[illegible]

```
# [illegible]
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
```

[illegible]

```
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,
  api: %{
    port: 8443,
    listen_ip: "0.0.0.0",
    enable_tls: true,
    tls_cert_path: "priv/cert/omnitouch.crt",
    tls_key_path: "priv/cert/omnitouch.pem"
  }
```

API □□□□ `:api_ex` □□□□□ `:api` □□□□□□□□□`routes:`□□ `config/config.exs` □□□□□□□□□□□□□□□□

□□	□□	□□	□□	□□
`port`	□□	□	`8443`	REST API □ TCP □□□
`listen_ip`	□□□	□	`0.0.0.0`	API □□□□□□□□ `0.0.0.0` □□□□□□□
`enable_tls`	□□	□	`true`	□□ HTTPS □□ API□
`tls_cert_path`	□□□	□□ `enable_tls`	`priv/cert/omnitouch.crt`	TLS □□□□□□
`tls_key_path`	□□□	□□ `enable_tls`	`priv/cert/omnitouch.pem`	TLS □□□□□□

TLS/SSL □□

□ **TLS** □□□□□□□□□□

```
config :api_ex,
  api: %{
    port: 8443,
    listen_ip: "0.0.0.0",
    enable_tls: true,
    tls_cert_path: "priv/cert/omnitouch.crt",
    tls_key_path: "priv/cert/omnitouch.pem"
  }
```

[illegible] TLS [illegible]

```
config :api_ex,
  api: %{
    port: 8080,
    listen_ip: "127.0.0.1",
    enable_tls: false
  }
```

API [illegible]

[illegible]

```
# [illegible]
mkdir -p priv/cert

# [illegible]
openssl genrsa -out priv/cert/server.key 2048

# [illegible]
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"

# [illegible] 365 [illegible]
openssl x509 -req -days 365 -in priv/cert/server.csr \
  -signkey priv/cert/server.key -out priv/cert/server.crt

# [illegible]
chmod 600 priv/cert/server.key
chmod 644 priv/cert/server.crt
```

[illegible] CA[illegible]Let's Encrypt[illegible] CA [illegible]

API [illegible]

IP [illegible]

```
# □□ 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, ControlPanelWeb.Endpoint,
  https: [
    port: 443,
    keyfile: "priv/cert/omnitouch.pem",
    certfile: "priv/cert/omnitouch.crt"
  ]
```

Web UI □□□ Phoenix □□□TLS □□□□□ `https:` □□□□□□□□□□□ `tls_cert_path`/`tls_key_path`□□□□□ `config/config.exs` □□ `force_ssl` □□□□ HTTPS□

[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
`port`	[illegible]	[illegible]	`443`	[illegible]��[illegible] HTTPS [illegible]
`keyfile`	[illegible]	[illegible]	`priv/cert/omnitouch.pem`	TLS [illegible]
`certfile`	[illegible]	[illegible]	`priv/cert/omnitouch.crt`	TLS [illegible]

[illegible] Web UI [illegible]

```
config :control_panel, ControlPanelWeb.Endpoint,
  url: [host: "sms-admin.example.com", path: "/"],
  https: [
    port: 443,
    keyfile: "priv/cert/web.pem",
    certfile: "priv/cert/web.crt"
  ]
```

[illegible]

[illegible] Nginx [illegible] Apache [illegible]

Nginx [illegible]

```
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;
  }
}
```

[illegible]

OmniMessage [illegible] HTTP [illegible] DNS SRV [illegible] HTTPS [illegible]

[illegible] [illegible] [illegible]

[illegible]

```
# config/runtime.exs
config :sms_c, :federation,
  enabled: true,
  dns_srv_domain: "_smsc._tcp.smsc.example.com"
```

[illegible]

[illegible]	[illegible]	[illegible]	[illegible]
`enabled`	[illegible]	`false`	[illegible]
`dns_srv_domain`	[illegible]	`""`	[illegible] DNS SRV [illegible]
`dns_poll_interval_ms`	[illegible]	`30000`	DNS [illegible]
`health_check_interval_ms`	[illegible]	`10000`	[illegible]
`registry_sync_interval_ms`	[illegible]	`15000`	[illegible]
`forward_retry_interval_ms`	[illegible]	`5000`	[illegible]
`forward_max_retries`	[illegible]	`50`	[illegible]
`http_timeout_ms`	[illegible]	`5000`	[illegible] HTTP [illegible]
`api_port`	[illegible]	`8443`	[illegible] URL [illegible] API [illegible]
`static_peers`	[illegible]	`[]`	[illegible] DNS SRV[illegible]

[illegible]

[illegible] **8443**[illegible]HTTPS[illegible]Erlang [illegible] 4369 + 9100-9200[illegible]

```
# [illegible]
iptables -A INPUT -p tcp -s 10.0.1.0/24 --dport 8443 -j ACCEPT
iptables -A INPUT -p tcp -s 10.0.2.0/24 --dport 8443 -j ACCEPT
```

[illegible]

[illegible]

[illegible]

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

[illegible]

- **60** - 1 [illegible]/[illegible]
- **1440** - 24 [illegible]
- **4320** - 3 [illegible]
- **10080** - 7 [illegible]

[illegible]

[illegible]

[illegible]

```
[illegible] = 2^([illegible]) [illegible]
```

□□	□□
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**□□□□□□□□□□□□□□□10□
- **fingerprint_ttl_minutes**□□□□□□□□□□□5□
- **event_ttl_days**□□□□□□□□□□□7□

□□□□

□□□□□□ **Diameter Ro** □□□□□□□□□□RFC 4006□□□□□□□□□□□□□SMS-C □ OCS □□□□□ □□□□□□□□□`CC-Request-Type 4`□□□□□□□ □□□□OCS □□□□□□□□□□□□□□□□□□□ Diameter □□□□□□□□□ Diameter Sh□ - `:ro` □□□□□□□□□

□□□□

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

config :sms_c, :charging,
  # □□□□□□□□□□□□□□□
  #   :reject     - □□□□���□ :balance_rejected □□□□
  #   :auto_reply - □□□ SMS out_of_balance_reply_text □□□□□□
  out_of_balance_action: :reject,
  out_of_balance_reply_text: "□□□□□□□□□□□□□□□□",
  # □ OCS □□□ Diameter □□□□□□□□□□□
  # □□□□□□□□□□□□□□
  #   :allow  - □□□□□□□□□□□□□
  #   :reject - □□□□□□□□□□□
  on_charging_error: :allow,
  # □□□□□□□□□ OCS □□□□□□□□□□□□ CCR
  # Service-Context-Id □□□
  rating_profile: "sms@sms-c"
```

□□□□□□□ Diameter □□□□□□ `:ro` □□□□□□□□□□ IETF □□□□□□ 0□□

```
config :sms_c,
  diameter_enabled: true

config :diameter_ex,
  diameter: %{
    service_name: :omnimessage,
    host: "smsc01",
    realm: "epc.mnc001.mcc001.3gppnetwork.org",
    # ... □□□ Diameter Sh □□□□□□□□□□/□□ ...
    applications: [
      %{
        application_name: :ro,
        application_dictionary: :diameter_gen_3gpp_ro,
        vendor_specific_application_ids: [
          %{vendor_id: 0, auth_application_id: 4,
acct_application_id: nil}
        ]
      }
    ]
  }
```

□□□□□□

□□□□□ `charged` □□□□□□□□□□□□□□□

`charged`	□□
`:yes`	□□□□ OCS □□□□□□
`:no`	□□□□
`:default`	□□ `default_charging_enabled`

□□□□

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

□□□□□□□□`□default` □□□□□□□ OCS □□□□□□□□□□□□□□□□□□□□□□□ `charged: :yes`□

□□□□□□□□

`config :sms_c, :charging` □□□□□ - □□□□□□□□□□□□□□`out_of_balance_action: :reject`□□□□□□□□□□ `rating_profile: "sms@sms-c"`□□□ `default_charging_enabled` □□□□ `false`□

□□□□□□□□ □□□□□`on_charging_error: :allow`□□□□□□ HTTP □□□□□□□□□□□□□□□□□ □□□□□□

- □□□□□□□□□□□□ Diameter □□ □ □□/□□□□□□ □□□□□□□□□□□
- □□ OCS □□□□□□□□□□□□□□□ □□□□

□ `on_charging_error: :reject` □□□ □□□□ - OCS □□□□□□□□□□□□□□□□□□ `out_of_balance_action` □□□□

□□□□□□□□□ OCS □ □□□□□□□□□ □□□□□□□ `out_of_balance_action`□□□□□□□□□□□□ `:balance_rejected`□

Diameter Sh (HSS) □□

OmniMessage □□□□ Diameter Sh □□□□ HSS□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□ □□□□□□□□□□□ HSS □□□□□□□□

```
# □□□□□□□□ HSS dip
config :sms_c,
  diameter_enabled: true

# Diameter □□□□
config :diameter_ex,
  diameter: %{
    service_name: :omnimessage,
    listen_ip: "0.0.0.0",
    listen_port: 3868,
    decode_format: :map,
    host: "smsc01",
    realm: "epc.mnc001.mcc001.3gppnetwork.org",
    product_name: "OmniMessage",
    request_timeout: 5000,
    control_module: SmsC.Diameter.Control,
    processor_module: DiameterEx.Processor,
    vendor_id: 10415,
    supported_vendor_ids: [10415],
    applications: [
      %{
        application_name: :sh,
        application_dictionary: :diameter_gen_3gpp_sh,
        vendor_specific_application_ids: [
          %{vendor_id: 10415, auth_application_id: 16_777_217, acct_application_id: nil}
        ]
      }
    ],
    peers: [
      %{
        host: "dra01.epc.mnc001.mcc001.3gppnetwork.org",
        ip: "10.0.0.1",
        port: 3868,
        realm: "epc.mnc001.mcc001.3gppnetwork.org",
        tls: false,
        transport: :diameter_tcp,
        initiate_connection: true
      }
    ]
  }
```

□□	□□	□□	□□	□□
`diameter_enabled`	□□	□	`false`	□□□□□□□□□ HSS □□□ dip□□□□□ `:on_net`/`:off_net` □□□□□□□□ □ `false` □□□□□□□□□□
`hss_cache_ttl_seconds`	□□	□	`7200`	□□ HSS □□□□□ TTL□□□
`mock_sh`	□□	□	`false`	□□□□ HSS □□□□□□□□□□ Diameter □□□
`mock_sh_on_net_numbers`	□□	□	`[]`	□□□□□□□□□□□ MSISDN

□□□□□ Diameter □□□□□□□□□□□□□□□□□□□□□□□□□□ HSS □□□□□□□□

ENUM □□

□□ DNS □ E.164 □□□□□□□□□□□□

□□ ENUM□□□□

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

[illegible] DNS [illegible] ENUM

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

[illegible] DNS [illegible] ENUM

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

ENUM [illegible]

[illegible]

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

ENUM [illegible]

[illegible]

```
enum_timeout: 2000  # 2 [illegible]
```

□□□□□/□□□□□

```
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!" .
```

□□□□□□

□□□□□□□□□□□□□□□□□□□□□□

[illegible]

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

[illegible]

[illegible]

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

[illegible]

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

□□□□□□□

```
%{
  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: "□□□□□□□□□□□□□",
  enabled: true
}
```

□□□□□□□

□□□□□□□

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

[illegible]

[illegible]

```
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})$",
      calling_replace: "+1\1",
      called_match: "^(\d{10})$",
      called_replace: "+1\1",
      priority: 50,
      description: "□□ 10 □□□□□□",
      enabled: true
    }
  ]
```

□□□□ (X1/X2/X3)

OmniMessage □□□□□□□□□□ (POI)□OmniMessage □□□ ETSI TS 103 221 □□□□□ OmniMessage □□□□□□ (NE) □□□□□□□□□ (LEMF) □□ X1 □□□□□□□□□□□□□□□□□□□□ OmniMessage □□□□□□ 3GPP TS 33.128 xIRI □□□□□□OmniMessage □□ X2 □□□□□□ LEMF□

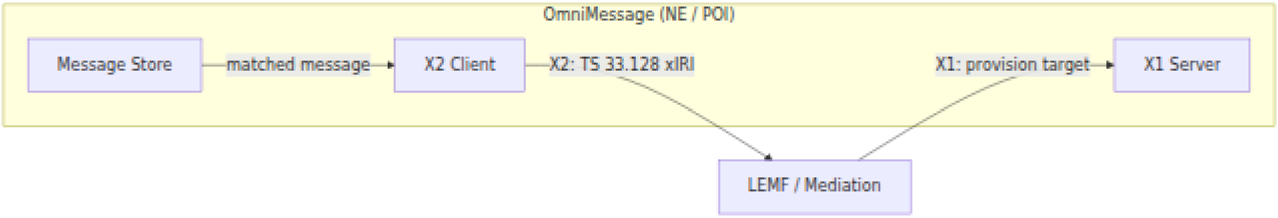
□□□□

□□	□□	**OmniMessage □□**	□□	□□
X1	□□□□□□□□□□□□	□□□	HTTPS □□ □ TLS	□
X2	□□□□□□□□□□□□□□ SMS □□ TS 33.128 xIRI□	□□□	TCP□□□ TLS	□
X3	□□□□□□□□□□	□□□	TCP	□□SMS □□□□□□□

□□□□□

□□	□□
ETSI TS 103 221-1	□□□□□□ X1□□□□
ETSI TS 103 221-2	□□□□□□ X2/X3□□□□
3GPP TS 33.128	□□□□□□□□□□

□□


OmniMessage (NE / POI)
Message Store
matched message
X2 Client
X2: TS 33.128 xIRI
X1: provision target
X1 Server
LEMF / Mediation

□□

□ `config :sms_c, :li` □□□□□□□□□□□□ `config/runtime.exs` □□□□□□□□□□□□□□□□ □□□□□□ `enabled: true` □□□□□□□□□□□□□□□□□□□□□□□□

```
config :sms_c, :li,
  enabled: true,
  ne_identifier: "smsc-poi-01",
  x1: [
    enabled: true,
    port: 8443,
    tls: [
      certfile: "/etc/omnimessage/li/x1-cert.pem",
      keyfile: "/etc/omnimessage/li/x1-key.pem",
      cacertfile: "/etc/omnimessage/li/lemf-ca.pem"
    ]
  ],
  x2: [enabled: true, address: "192.0.2.10", port: 12345, tls:
false]
```

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□□	□□	□□	□□	□□
`enabled`	□□	□	`false`	□□□□□□ `false` □□□□□□□□□□□□□□
`ne_identifier`	□□□	□	`"smsc-01"`	□□□□□□□□TS 103 221-2 □□ 18□□ OmniMessage □□□ X2 □□□□□□□□ LEMF □□□□□□□□□□□□□□□□ IP □□□
`x1`	□□□□□	□	`[]`	X1 □□□□□□□□□ X1 □□□
`x2`	□□□□□	□	`[]`	X2 □□□□□□□□□ X2 □□□
`x3`	□□□□□	□	`[]`	□□□□□□□□□□□□OmniMessage □□□ X3□ □□□□□ `[enabled: false]`□

X1 □□

OmniMessage □□ X1 □□□□LEMF □□□□□□□□□□□□TLS □□□□□□TS 103 221-1 □□ 7.2.2.1□□□□□□□ `allow_insecure: true`□□□□□□□□□□□□□□□□

□□	□□	□□	□□	□□
`enabled`	□□	□	`false`	□□ X1 □□□□
`port`	□□	□	`8443`	X1 □□□□ TCP □□□
`tls`	□��□ □□	□	-	X1 □□□□ TLS □□□□□□ X1 TLS □□□
`allow_insecure`	□□	□	`false`	□□□□ HTTP □□ X1 □□□□□□□□□□□□□ □□□□□□□□□□□□□□□□□

X1 TLS □□

□□	□□	□□	□□	□□
`certfile`	□□□	□	-	□□□□□□□□□□□□□PEM □□□
`keyfile`	□□□	□	-	□□□□□□□□□□□□□PEM □□□
`cacertfile`	□□□	□	-	□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□ TLS□□□□□□ □□□ TLS□

X2 □□

OmniMessage □□ X2 □□□□□□□□□□□ LEMF□□□□□□□□□ SMS □□ TS 33.128 xIRI □□□□□□ □□□□ SMS □□□□□□□□□□□□

□□	□□	□ □	□□	□□
`enabled`	□□	□	`false`	□□ X2 □□□□
`address`	□□□	□	-	LEMF X2 □□□ IP □□□□□□□
`port`	□□	□	-	LEMF X2 □□□ TCP □□□
`tls`	□□□□□ □□□	□	`false`	□□□ `true` □ TLS □□□□□□□□□□□□ TLS □□ X2□□□□ `false` □□□□□ TCP□

□□□

OmniMessage □□ OmniMessage □□□□□□□□□□□□OmniMessage □□□□□□□□□□□□□□

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□□□□□□□□□□□□□□ ANSSI R226 □□□□□□

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□□□□□□□□□□□□□□□□□□□□□□□□□□□□ SMS □□□□□

□□□□□□□

```
# config/runtime.exs
config :sms_c,
  sms_routes: [
    # □□□□□□
    %{
      calling_regex: nil,
      called_regex: ~r/^\+1/,
      source_smsc: nil,
      dest_smsc: "north_america_gateway",
      source_type: nil,
      enum_domain: nil,
      enum_result_domain: nil,
      action: :route,
      auto_reply_message: nil,
      charged: :default,
      originating_network: :any,
      terminating_network: :any,
      weight: 100,
      priority: 50,
      description: "□□□□",
      enabled: true
    },

    # □□□□□□□□
    %{
      calling_regex: nil,
      called_regex: ~r/^\+44/,
      source_smsc: nil,
      dest_smsc: "uk_gateway_1",
      source_type: nil,
      enum_domain: nil,
      enum_result_domain: nil,
      action: :route,
      auto_reply_message: nil,
      charged: :default,
      originating_network: :any,
      terminating_network: :any,
      weight: 70,
      priority: 50,
      description: "□□□□□□70%□",
      enabled: true
  },
  %{
    calling_regex: nil,
    called_regex: ~r/^\+44/,
    source_smsc: nil,
    dest_smsc: "uk_gateway_2",
    source_type: nil,
    enum_domain: nil,
    enum_result_domain: nil,
    action: :route,
    auto_reply_message: nil,
    charged: :default,
    originating_network: :any,
    terminating_network: :any,
    weight: 30,
    priority: 50,
    description: "□□□□□□□30%□",
    enabled: true
  },

  # □□□□ - □ SMPP □□□□□□□□□□
  %{
    calling_regex: nil,
    called_regex: nil,
    source_smsc: "carrier_smpp_bind",
    dest_smsc: "local_msc",
    source_type: :smpp,
    enum_domain: nil,
    enum_result_domain: nil,
    action: :route,
    auto_reply_message: nil,
    charged: :default,
    originating_network: :any,
    terminating_network: :on_net,
    weight: 100,
    priority: 50,
    description: "□□□ X - □□□□□□",
    enabled: true
  }
]
```

��[illegible]

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

[illegible]

[illegible]

[illegible]

```
# config/config.exs
config :sms_c,
  batch_insert_batch_size: 100,           # [illegible]
  batch_insert_flush_interval_ms: 100     # [illegible]
```

[illegible]

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

[illegible]

[illegible]

```
# 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]
```

[illegible] `:info` [illegible] `:warning` [illegible] `:debug`

[illegible]

[illegible]

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

[illegible]

```
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]
```

[illegible]

[illegible] **logrotate**[illegible]Linux[illegible]

```
# /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 omnimessage
    endscript
}
```

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```
# [illegible]
config :sms_c, SmsC.Repo,
  pool_size: 50

# [illegible]
config :sms_c,
  batch_insert_batch_size: 200,
  batch_insert_flush_interval_ms: 200

# [illegible]
config :sms_c,
  dead_letter_time_minutes: 1440  # 24 [illegible]

# [illegible]
config :sms_c,
  default_charging_enabled: false

# [illegible]
config :sms_c,
  cleanup_interval_minutes: 30
```

[illegible]

[illegible]< 20ms[illegible]

```
# □□□
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 □

# □□□□□□ - □□ Diameter Ro □□□□□□
# □□□□□□□□□□□ :charging + :diameter_ex □□
config :sms_c,
  default_charging_enabled: true
```

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□□□□□□□□□

```
# □□ 1 □□
export DB_NAME=sms_c_tenant1
export NODE_NAME=sms_tenant1@node1.example.com
# □□□□□ OCS □□□□ :charging rating_profile □□□□

# □□ 2 □□
export DB_NAME=sms_c_tenant2
export NODE_NAME=sms_tenant2@node1.example.com
```

□□□□

□□□□□□

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

[illegible]

[illegible]

```
# [illegible]
mix compile

# [illegible]
mix ecto.create
mix ecto.migrate

# [illegible] Diameter Ro [illegible] OCS [illegible]
#   :diameter.service_info(:omnimessage, :connections)

# [illegible]
iex -S mix phx.server
```

[illegible]

[illegible]

□□	□□	□□
`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`

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1. □□□□□□ □□□□□□□□□□API □□□
2. □□□□□□□□□□□ □□□□□□
3. □□□□□□□□□□□□□
4. □□□□□□□□□□□□□□□
5. □□□□□ □□□□
6. □□□□□□□□□
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8. □□□□□□□□□□□□□
9. □□□□□□□□□□□

10. □□□□ □□□□□□□□□

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□□□□□□□	□□/□□□□	□□ DB_* □□□□
API □□□□	□□/IP □□□□	□□ API_PORT □ listen_ip
□□□□□□□□	Cookie □□□□□□□	□□ ERLANG_COOKIE□□□□□ 4369, 9100-9200
□□□□	OCS/DRA □□□□	□□ Diameter Ro □□□□□□□□□□
ENUM □□□□	DNS □□□□□□□	□□ DNS □□□□□□□
□□□	□□□□□□□	□□□□□□□□□□□□□
□□□□□	□□□□□	□□ sms_routes □□□ Web UI

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□□□□□□□**Mnesia**□

□□□□

□□□□□ Mnesia □□□□□□□□□□□□□□□□□□□□□□

```
config :sms_c,
  # □ Mnesia □□□□□□□□□□□□
  # □□□□□□□□□□ 24□□□□ runtime.exs □□□ 168□7 □□□
  message_retention_hours: 168,

  # □□□□□□□□□□□
  retention_check_interval_minutes: 60
```

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- □□□□□ 24-72 □□□□□□□□□□□□□
- □□□□□ 4-8 □□□□□□□□□□□□□□
- □□□ 12-24 □□□□□□□□

□□□□□

- □□□□□~1KB
- 10,000 □□□~10MB
- 100,000 □□□~100MB

CDR□□□□□□□□□□□

□□□□□□□□□□□CDR □□□□□□□□ Ecto □□□□□□□□□□□□□□□□

```
config :sms_c,
  # □□/□□ CDR □□□□□□□□（false）
  cdr_enabled: true
```

CDR □□□□□

- □□ ID□□□/□□□□□
- □/□□□ SMSC
- □/□□□□□□□□□□□
- □□□□□□□□□□□
- □□□□□□□
- □□□□□□□□□□□□

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- □□□□□□□□ CDR
- □□□□□□□□□□□□□□

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```
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`	□□□□□□□□□□□

□□□□□

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```
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
```

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```
[info] □□□□□Mnesia□□□□24h□
[info] CDR □□□□□□
[info] □□□□□□□□□□□□
[info] OCS □□□□□□□url: http://..., tenant: ...□
```

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[illegible]

← [illegible] | [illegible] | [illegible]

[illegible]

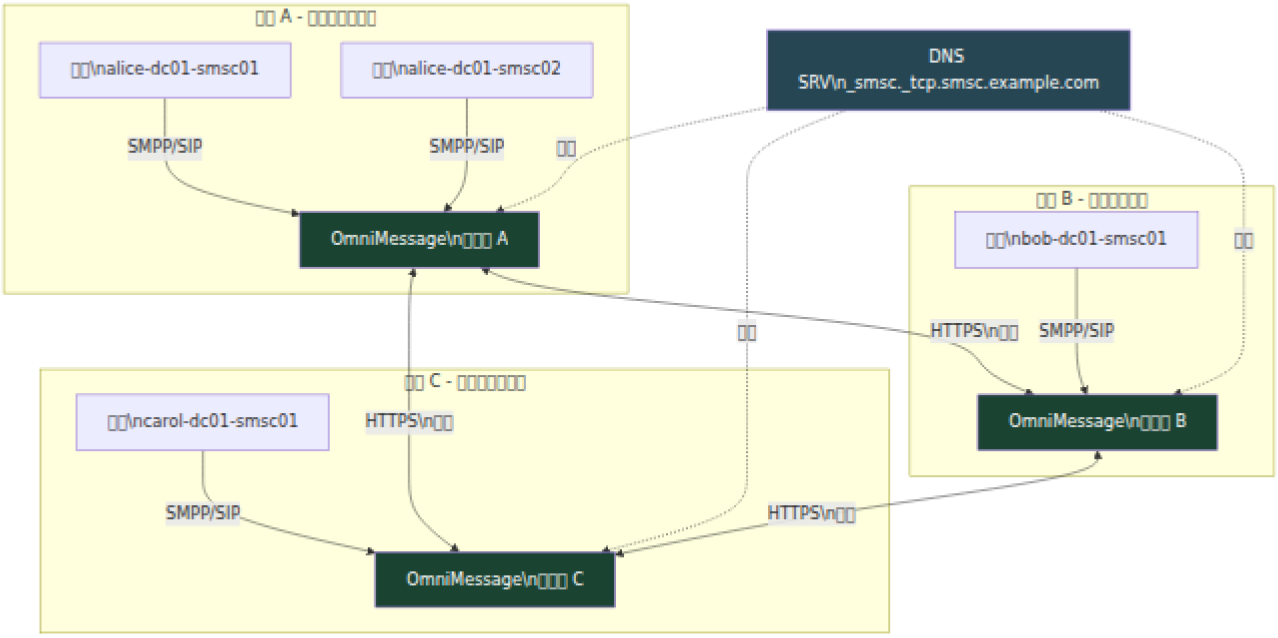
OmniMessage [illegible] [illegible] **HTTP** [illegible] [illegible] [illegible] [illegible] - [illegible] DNS SRV [illegible] HTTPS [illegible]

[illegible] [illegible] **Mnesia** [illegible] FederationPoller [illegible]

[illegible]

[illegible]	[illegible]
[illegible]	[illegible] WAN [illegible]
[illegible]	��� - [illegible]
[illegible]	[illegible]
[illegible]	[illegible] HTTPS [illegible] TLS
[illegible]	[illegible] HTTPS [illegible]8443[illegible]
[illegible]	5-20 [illegible]
[illegible]	[illegible] - [illegible]

[illegible]



[illegible] A - [illegible]
[illegible]\nalice-dc01-smsc01
[illegible]\nalice-dc01-smsc02
SMPP/SIP
SMPP/SIP
[illegible]
OmniMessage\n[illegible] A
DNS
SRV\n_smsc._tcp.smsc.example.com
[illegible] B - [illegible]
[illegible]\nbob-dc01-smsc01
[illegible]
[illegible]
HTTPS\n[illegible]
SMPP/SIP
OmniMessage\n[illegible] B
[illegible] C - [illegible]
[illegible]\ncarol-dc01-smsc01
HTTPS\n[illegible]
SMPP/SIP
HTTPS\n[illegible]
OmniMessage\n[illegible] C

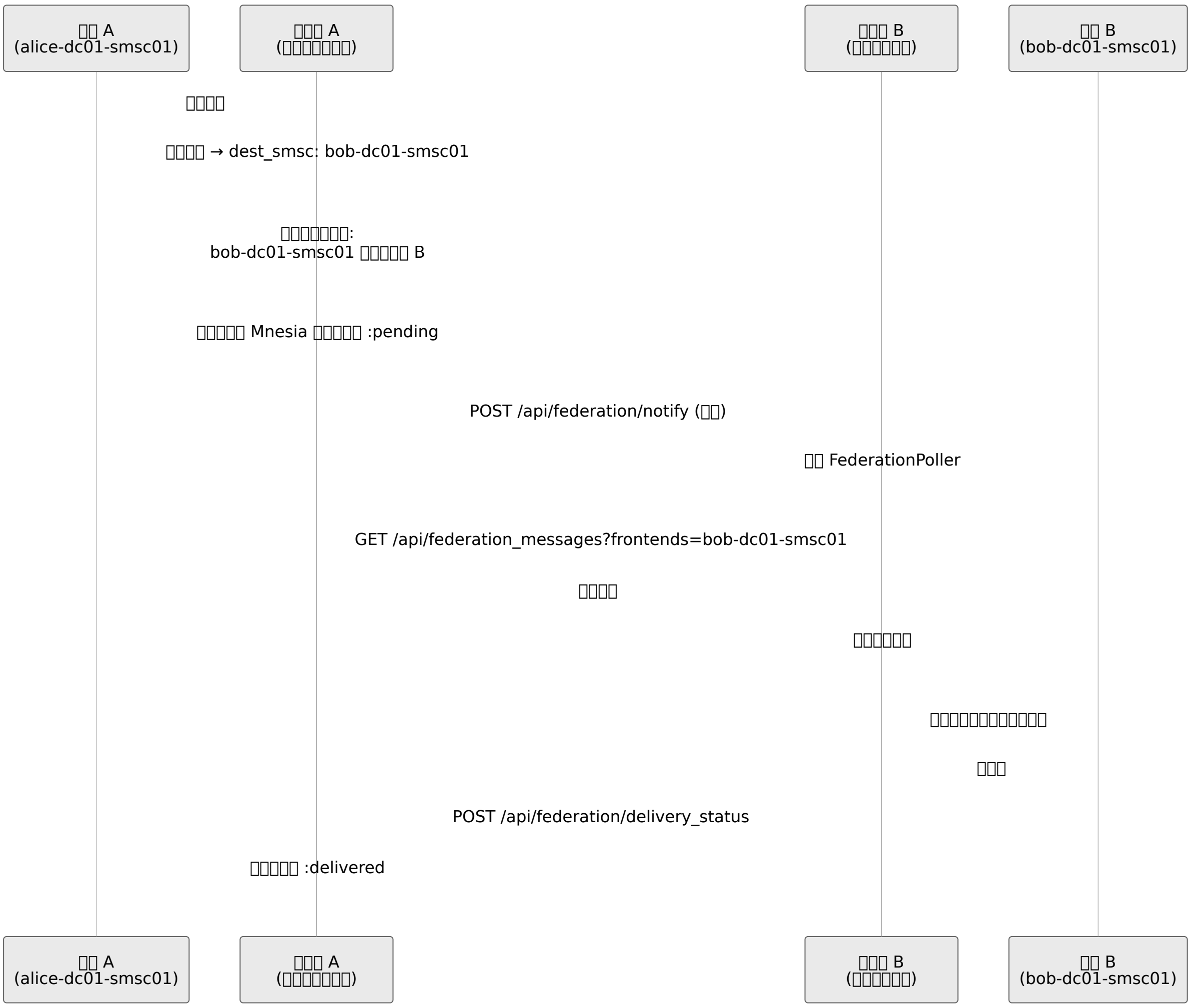
[illegible]

- [illegible]
- [illegible]
- [illegible]
- [illegible]
- [illegible]DNS SRV [illegible] DNS [illegible]

[illegible]

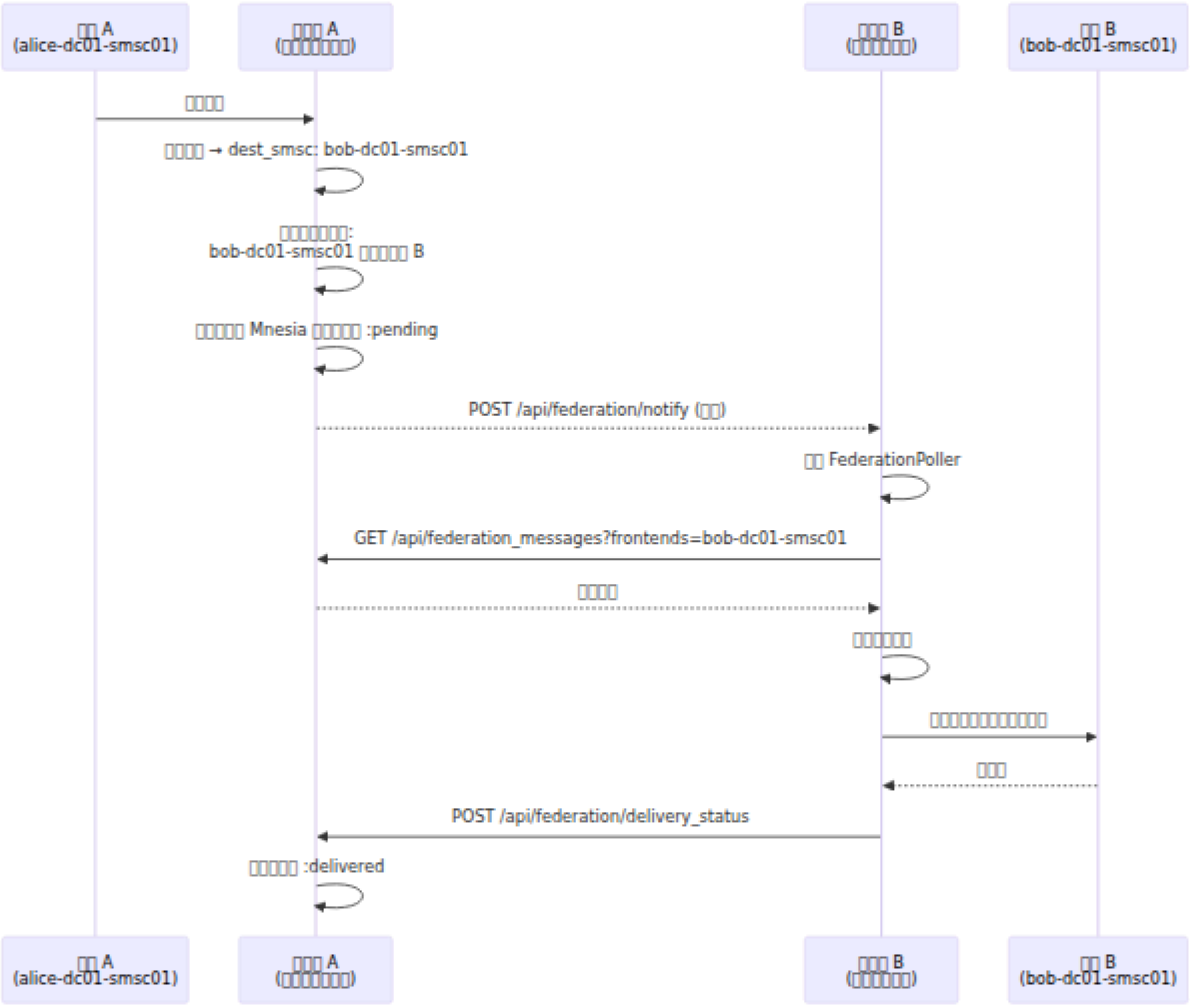
[illegible]

1. [illegible] Mnesia [illegible] `:pending`
2. [illegible]
3. [illegible] FederationPoller [illegible] GET /api/federation_messages [illegible]
4. [illegible]
5. [illegible]


□□ A
(alice-dc01-smsc01)
□□□ A
(□□□□□□□)
□□□ B
(□□□□□□)
□□ B
(bob-dc01-smsc01)
□□□□
□□□□ → dest_smsc: bob-dc01-smsc01
□□□□□□□:
bob-dc01-smsc01 □□□□□ B
□□□□□ Mnesia □□□□□ :pending
POST /api/federation/notify (□□)
□□ FederationPoller
GET /api/federation_messages?frontends=bob-dc01-smsc01
□□□□
□□□□□□
□□□□□□□□□□□□
□□□
POST /api/federation/delivery_status
□□□□□ :delivered
□□ A
(alice-dc01-smsc01)
□□□ A
(□□□□□□□)
□□□ B
(□□□□□□)
□□ B
(bob-dc01-smsc01)

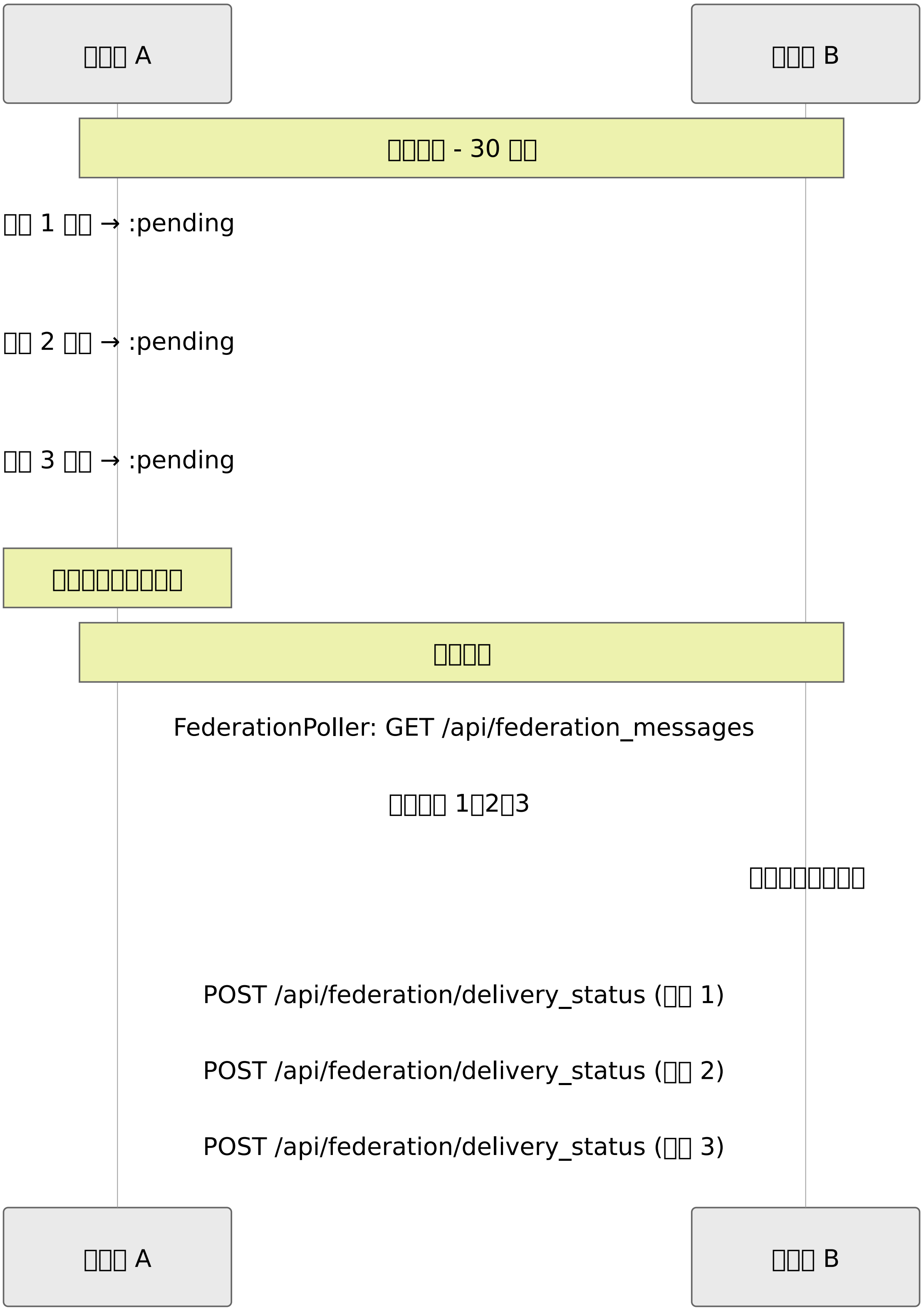
□□□□□□ - □□□□

□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□ `:pending` □□□□□□□□□□□□□□ FederationPoller □□□□□□□□□□□□□□□□□□□□□□□□ 5 □□□□□□□□□□


□□ A (alice-dc01-smsc01)
□□□ A (□□□□□□□□)
□□□ B (□□□□□□□)
□□ B (bob-dc01-smsc01)
□□□□
□□□□ → dest_smsc: bob-dc01-smsc01
□□□□□□□□: bob-dc01-smsc01 □□□□□ B
□□□□□ Mnesia □□□□□ :pending
POST /api/federation/notify (□□)
□□ FederationPoller
GET /api/federation_messages?frontends=bob-dc01-smsc01
□□□□
□□□□□□
□□□□□□□□□□□□
□□□
POST /api/federation/delivery_status
□□□□□ :delivered

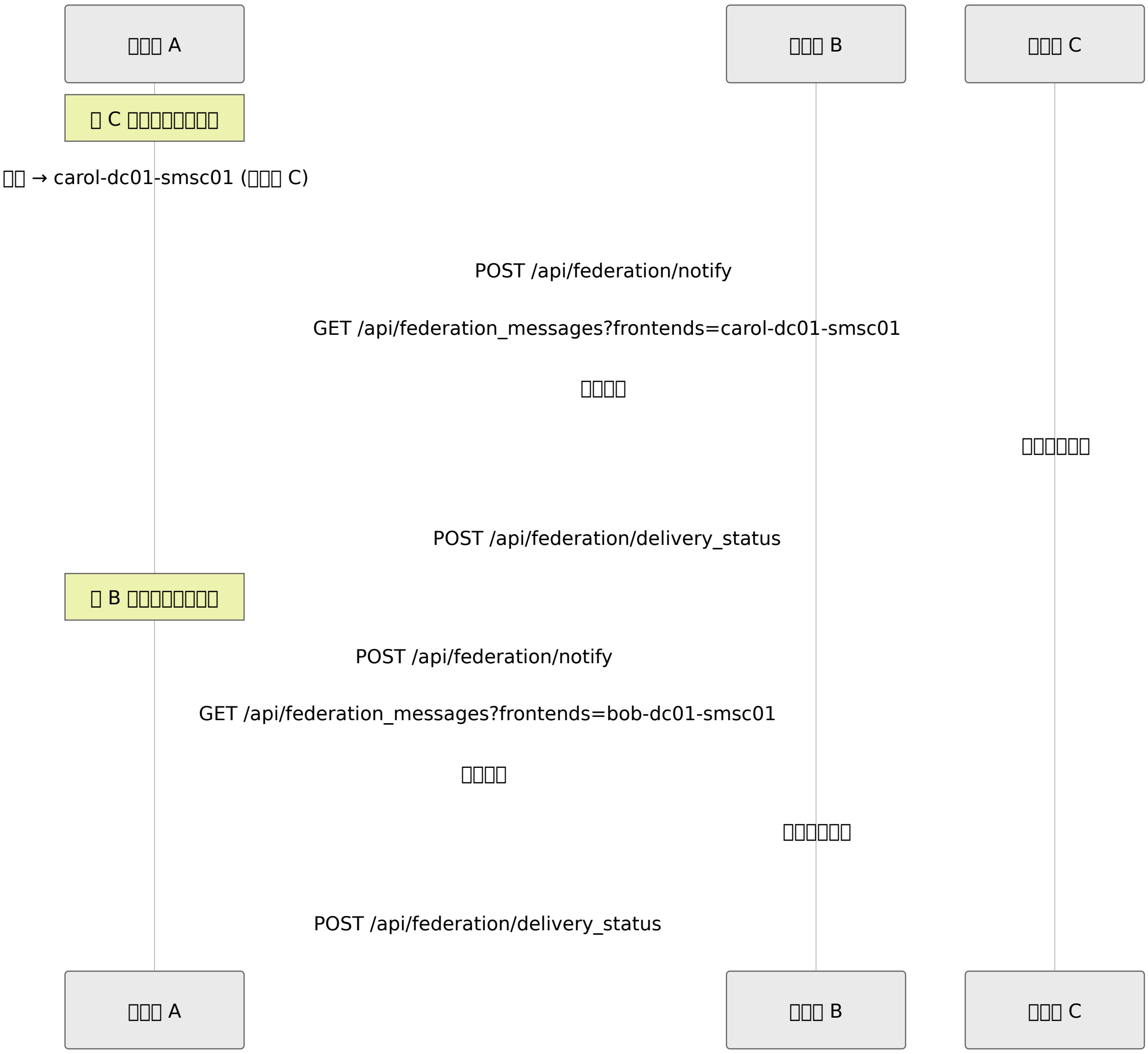
□□□□ - □□□□□□

□□□□□□□□□□□□□□□□□□□□□□□□□□□□FederationPoller □□□□□ - □□□□□□□□□□□□□□□□□


[illegible] A
[illegible] B
[illegible] - 30 [illegible]
[illegible] 1 [illegible] → :pending
[illegible] 2 [illegible] → :pending
[illegible] 3 [illegible] → :pending
[illegible]
[illegible]
FederationPoller: GET /api/federation_messages
[illegible] 1[illegible]2[illegible]3
[illegible]
POST /api/federation/delivery_status ([illegible] 1)
POST /api/federation/delivery_status ([illegible] 2)
POST /api/federation/delivery_status ([illegible] 3)
[illegible] A
[illegible] B

[illegible]

[illegible]


□□□ A
□□□ B
□□□ C
□ C □□□□□□□□
□□ → carol-dc01-smsc01 (□□□ C)
POST /api/federation/notify
GET /api/federation_messages?frontends=carol-dc01-smsc01
□□□□
□□□□□□
POST /api/federation/delivery_status
□ B □□□□□□□□
POST /api/federation/notify
GET /api/federation_messages?frontends=bob-dc01-smsc01
□□□□
□□□□□□
POST /api/federation/delivery_status
□□□ A
□□□ B
□□□ C

□□□□□□□□□□

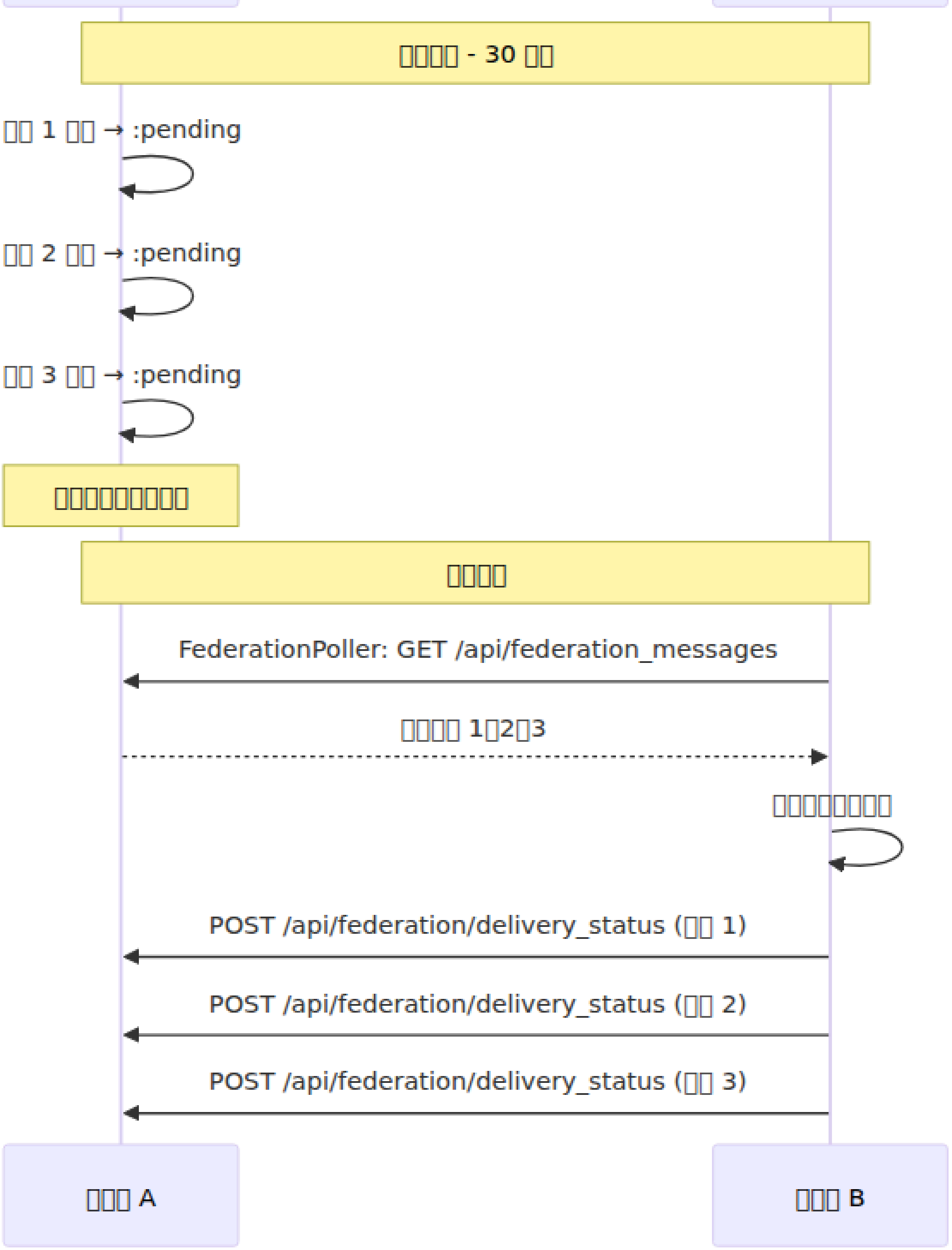
□□□□□□□□□□□□□□□□□□□□

□□□□□□

□ 10 □□□□□□□□□□□□□□□□ `POST /api/federation/health`□□□□□ - □□ □□□□□□□□□□□□□□□□□□□ 3 □□□□□ □□□

□□□□□□

□ 15 □□□□□□□□□□□□□□□□ `POST /api/federation/registry`□□□□□□□ - □□□□□□□□□□□□□□□□□□□□□□□□□□□□□□


□□□□ - 30 □□
□□ 1 □□ → :pending
□□ 2 □□ → :pending
□□ 3 □□ → :pending
□□□□□□□□□□
□□□□
FederationPoller: GET /api/federation_messages
□□□□ 1□2□3
□□□□□□□□□
POST /api/federation/delivery_status (□□ 1)
POST /api/federation/delivery_status (□□ 2)
POST /api/federation/delivery_status (□□ 3)
□□□ A
□□□ B

□□□□□□□□□□□□□□□□

[illegible]	[illegible]	**FederationPoller**	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	1-2 [illegible]	[illegible]	[illegible]
[illegible]	3 [illegible]	[illegible]	[illegible]

[illegible]

[illegible] `config/runtime.exs` [illegible] `:federation` [illegible] [illegible]

[illegible]DNS SRV [illegible]

```
# config/runtime.exs
config :sms_c, :federation,
  enabled: true,
  dns_srv_domain: "_smsc._tcp.smsc.example.com"
```

□□□□□□

```
# config/runtime.exs
config :sms_c, :federation,
  # □□□ - □□ false □□□□□□□□□
  enabled: true,

  # □□□□□□□□ DNS SRV □□□□□□□ static_peers□
  dns_srv_domain: "_smsc._tcp.smsc.example.com",

  # □□□□ DNS SRV □□□□□□□□□
  dns_poll_interval_ms: 30_000,

  # □□□□□□□□□□□□□□□□□□□□□
  health_check_interval_ms: 10_000,

  # □□□□□□□□□□□□□□□□□□□
  registry_sync_interval_ms: 15_000,

  # FederationPoller □□□□□□□□□□□□□□□□□□□
  poll_interval_ms: 5_000,

  # □□□□□ API □□□ HTTP □□□□□□
  http_timeout_ms: 5_000,

  # □ DNS SRV □□□□□□□ URL □□□□ API □□
  api_port: 8443,

  # □□□□□□□ - □ dns_srv_domain □□□□□
  static_peers: []
```

□□□□

□□	□□	□□	□□	□□
`enabled`	□□	□	`false`	□□□□□□ `false` □□□□□□□□□□□□□□□□□□□
`dns_srv_domain`	□□□	□	`""`	□□□□□□□□□□ DNS SRV □□□□□□□□□ `static_peers`□
`dns_poll_interval_ms`	□□	□	`30000`	DNS SRV □□□□□□□□□□□□□□□□□□□□□□□□□□□□ DNS □□□
`health_check_interval_ms`	□□	□	`10000`	□□□□□□□□□□□□□□□□□□□□□□□□
`registry_sync_interval_ms`	□□	□	`15000`	□□□□□□□□□□□□□□□□□□□□□□□□□□
`poll_interval_ms`	□□	□	`5000`	FederationPoller □□□□□□□□□□□□□□□□□□□□□□□□□
`http_timeout_ms`	□□	□	`5000`	□□□□□ HTTPS □□□□□□□□□□□□□□□□□□□□□□□□□□□□
`api_port`	□□	□	`8443`	□ DNS SRV □□□□□□□ URL □□□□ API □□□□□□ `config:api_ex` □□□□ API □□□□□
`static_peers`	□□	□	`[]`	□□□ DNS SRV □□□□□□□□□□□□□□□□□□□□□□□□ `host` □ `port` □□□□□

□□□□□□□

□□□□ DNS SRV □□□□□□□□□□□□□□

```
config :sms_c, :federation,
  enabled: true,
  dns_srv_domain: "",
  static_peers: [
    %{host: "10.0.1.2", port: 8443},
    %{host: "10.0.2.2", port: 8443},
    %{host: "10.0.3.2", port: 8443}
  ]
```

□□	□□	□□	□□	□□
`host`	□□□	□	-	□□□□□□ IP □□□□□□□
`port`	□□	□	`8443`	□□□□□□ HTTPS API □□□

DNS SRV □□□□

DNS SRV □□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□/□□□□□□□□□

DNS □□□□□

```
; □□□ □□ □□ □□
_smsc._tcp.smsc.example.com. 86400 IN SRV 10 100 8443 smsc-
alice.smsc.example.com.
_smsc._tcp.smsc.example.com. 86400 IN SRV 10 100 8443 smsc-
bob.smsc.example.com.
_smsc._tcp.smsc.example.com. 86400 IN SRV 10 100 8443 smsc-
carol.smsc.example.com.

; □□□ A □□
smsc-alice.smsc.example.com.    86400 IN A 10.0.1.2
smsc-bob.smsc.example.com.    86400 IN A 10.0.2.2
smsc-carol.smsc.example.com.  86400 IN A 10.0.3.2
```

□□□□□□□ DNS □□□□ SRV □□□□□□□□□□□□□□ `dns_poll_interval_ms` □□□□□ 30 □□□□□□□□□

□□□□□□ DNS □□□ SRV □□□□□□□□□□□□□□□□□□□□□□□□□□□

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□□□□□□□□□□□□□ HTTPS □□□

□□	□□	□□	□□
8443	TCP/TLS	□□	□□□□□□□□□□□□□□□□□□□□□□□□
53	UDP/TCP	□□	DNS SRV □□□□□□□ DNS □□□

□□□□□□□□□□□□

```
# □□□□□□□□□ IP □□□□□
iptables -A INPUT -p tcp -s 10.0.1.0/24 --dport 8443 -j ACCEPT
iptables -A INPUT -p tcp -s 10.0.2.0/24 --dport 8443 -j ACCEPT
iptables -A INPUT -p tcp -s 10.0.3.0/24 --dport 8443 -j ACCEPT
```

□□ API □□

□□□□□□ API □□□8443□□□ `/api/federation/` □□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□

[illegible]	[illegible]	[illegible]
`/api/federation/identity`	GET	[illegible]
`/api/federation/health`	POST	[illegible] - [illegible]
`/api/federation/registry`	POST	[illegible]
`/api/federation/notify`	POST	[illegible]
`/api/federation/delivery_status`	POST	[illegible]
`/api/federation_messages`	GET	[illegible] FederationPoller [illegible]

[illegible] JSON[illegible] `X-Federation-Node` [illegible]

[illegible]

[illegible] 1[illegible] DNS SRV [illegible]

[illegible]��[illegible]DNS SRV [illegible]

```
# [illegible] A - [illegible] (config/runtime.exs)
config :sms_c,
  smsc_node_name: "alice-dc01-smsc01"

config :sms_c, :federation,
  enabled: true,
  dns_srv_domain: "_smsc._tcp.smsc.example.com"
```

```
# □□ B - □□□□□□ (config/runtime.exs)
config :sms_c,
  smsc_node_name: "bob-dc01-smsc01"

config :sms_c, :federation,
  enabled: true,
  dns_srv_domain: "_smsc._tcp.smsc.example.com"
```

```
# □□ C - □□□□□□□ (config/runtime.exs)
config :sms_c,
  smsc_node_name: "carol-dc01-smsc01"

config :sms_c, :federation,
  enabled: true,
  dns_srv_domain: "_smsc._tcp.smsc.example.com"
```

□□□□□□ □□□□□□□□□□□□□□ SRV □□ □□□□□□□□□□□□□□□□ `bob-dc01-smsc01` □□□□□□□□□□□□□□□□□□□□□□□ B□□□□□□□□□□□□ B □ FederationPoller □□□□□□ A□□□□□□□□□□□□□□□□

□□ 2□□□□□□□□□□□□□□-□□

□□□□□□□□□□□□□□□□□□□□□□ DNS SRV □□□

```
# □□□□□ (config/runtime.exs)
config :sms_c,
  smsc_node_name: "primary-smsc01"

config :sms_c, :federation,
  enabled: true,
  dns_srv_domain: "",
  static_peers: [
    %{host: "10.200.1.5", port: 8443}
  ]
```

```
# [illegible] (config/runtime.exs)
config :sms_c,
  smsc_node_name: "secondary-smsc01"

config :sms_c, :federation,
  enabled: true,
  dns_srv_domain: "",
  static_peers: [
    %{host: "10.100.1.5", port: 8443}
  ]
```

[illegible] [illegible] IP [illegible] FederationPoller [illegible]

[illegible] 3[illegible]

[illegible]

```
config :sms_c, :federation,
  enabled: true,
  dns_srv_domain: "_smsc._tcp.cluster.internal",
  health_check_interval_ms: 5_000,
  registry_sync_interval_ms: 5_000,
  poll_interval_ms: 1_000,
  http_timeout_ms: 2_000
```

[illegible] [illegible] RTT [illegible] 10 [illegible]

[illegible]

[illegible] Prometheus [illegible] 9568 [illegible]

[illegible]: `sms_c_federation_message_received_count` [illegible]: [illegible] [illegible]: [illegible] [illegible]:

- `origin_node` - [illegible]

[illegible]: `sms_c_federation_health_check_count` [illegible]: [illegible] [illegible]: [illegible] [illegible]:

- `peer` - □□□□□
- `result` - `ok` □ `failed`

□□□□:

```
# □□□□□□
rate(sms_c_federation_message_received_count[5m]) * 60

# □□□□□□□□□□□□□
sum by (peer)
(rate(sms_c_federation_health_check_count{result="failed"}[5m]))
```

□□□□□□

□□□□	□□	□□□□
□□□□□□□	`GET /api/federation/status` □ Web UI	□□□□□□□□□□□□
□□□□□□□	`GET /api/federation/identity` □□□□□□□	□□□□□□□□ > 5 □□
□□□□□□	□□□□□□	> 2 □□□□□□□

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□□□□□□

□□: □□□□□□□□□□□□□□□`cluster_status` □□□□□

□□□□:

- DNS SRV □□□□□□□□□
- DNS □□□□□□□□□□□□□
- SRV □□□□□□
- □□□□□□`enabled: false`□

□□□□:

1. □□□□□□□□□ DNS SRV □□□`dig SRV _smsc._tcp.smsc.example.com`
2. □□□□□□□□□□□□ `enabled: true`
3. □□□□□□□□□□□□“□□ DNS □□”□□
4. □□□□□□□□□□□□ `static_peers` □□□□□□□□□□□/□□□□

□□□□□□□□□

□□: □□□□□□□□□□□□□□□□□□□“□□□□□□”□□□

□□□□:

- □□□□□□□□
- □□□□□□□□□□ 8443 □□
- TLS □□□□
- □□□□□□□□□

□□□□:

1. □□□□□□□□□□□□□□`curl -k https://<peer-host>:8443/api/federation/identity`
2. □□□□□□□□□□□□□□□□□□ IP □ 8443 □□□□
3. □□□□□□□□□□□□□□ TLS □□□□□
4. □□□□□□□□□□□

□□□□□□□□□□

□□: □□□□□□□□□□ `:pending` □□□□□□□□□□□□□□□□ 0□

□□□□:

- □□□□□□□□□FederationPoller □□□□□□□□□
- FederationPoller □□□
- □□□□□□□□□□□□□□□□□□□□□□

□□□□:

1. [illegible]
2. [illegible] FederationPoller [illegible]“Federation poller started”[illegible]
3. [illegible]`GET /api/federation/status` - [illegible]
4. [illegible] federation_messages [illegible]`curl -k 'https://<origin>:8443/api/federation_messages?frontends=<frontend_name>&include_unrouted=false'`

HSS [illegible] (Diameter Sh)

← [illegible] | **SMS [illegible]**

[illegible]

OmniMessage [illegible] Diameter Sh [illegible] (HSS)[illegible] MSISDN [illegible] [illegible]

[illegible] [illegible] - [illegible] *[illegible]*[illegible] `originating_network` [illegible] `terminating_network` [illegible] `:on_net` [illegible] `:off_net` [illegible] `:any`[illegible] HSS [illegible]

OmniMessage [illegible] [illegible] **(UDR)** [illegible] HSS [illegible] 2001[illegible] HSS [illegible] *[illegible]*[illegible] 5001[illegible] [illegible]���[illegible] SMS [illegible] → [illegible] / [illegible][illegible]

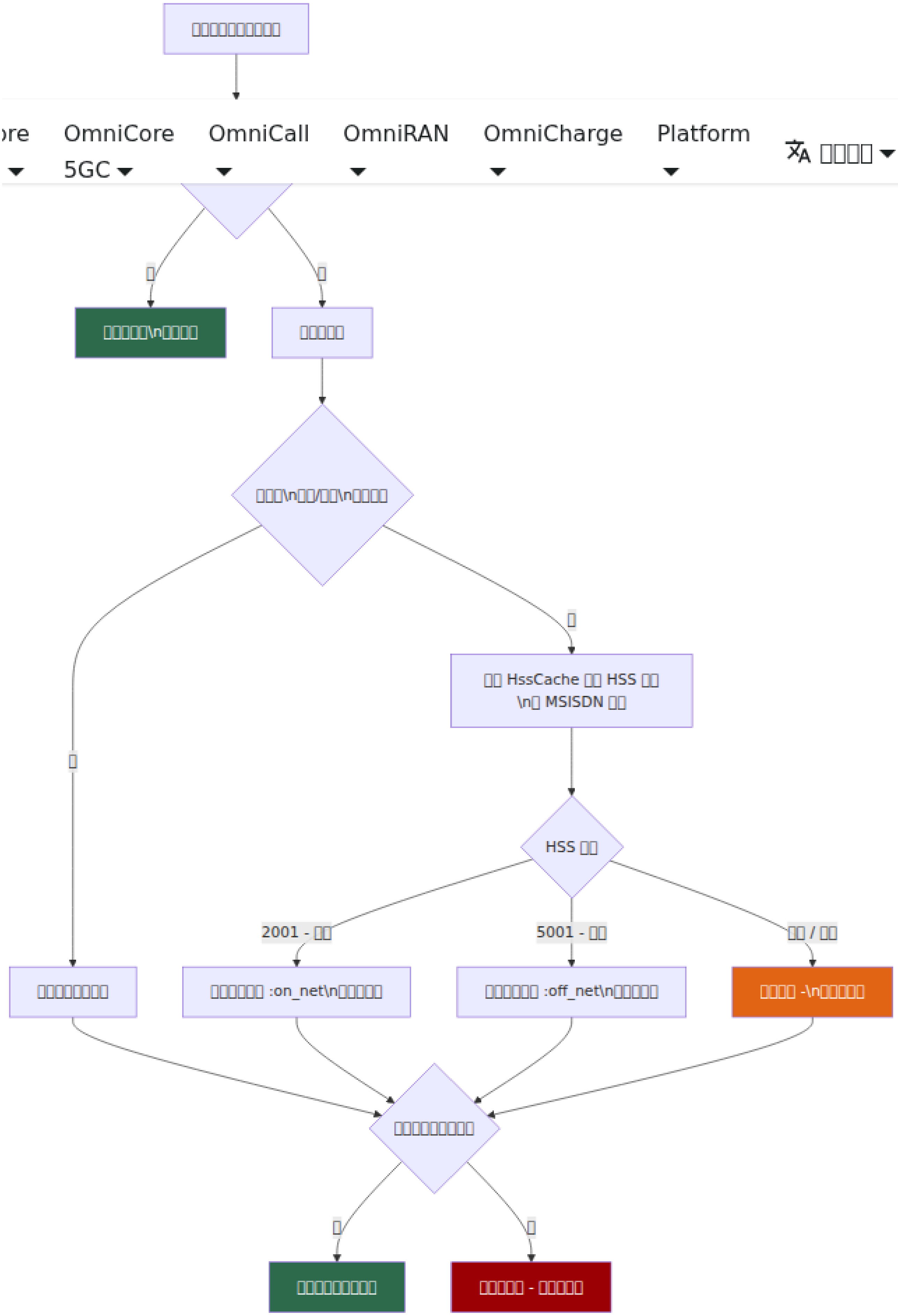
> [illegible] - **HSS [illegible] ENUM**[illegible] HSS (Sh) [illegible]“[illegible] *[illegible]* HSS [illegible]”[illegible]/[illegible]ENUM (DNS NAPTR) [illegible]“[illegible]”[illegible]/[illegible] HSS [illegible] Sh[illegible]/[illegible] ENUM[illegible] SMS [illegible] → ENUM [illegible][illegible]

[illegible]

[illegible]	[illegible]
3GPP TS 29.329	[illegible] Diameter [illegible] Sh [illegible]
3GPP TS 29.328	IMS Sh [illegible] - [illegible]
RFC 6733	Diameter [illegible]

HSS [illegible]

OmniMessage [illegible]


HssCache HSS
\n MSISDN
HSS
2001 -
5001 -
/
\n
:on_net\n
:off_net\n
-\n
\n/\n\n
-

[illegible]

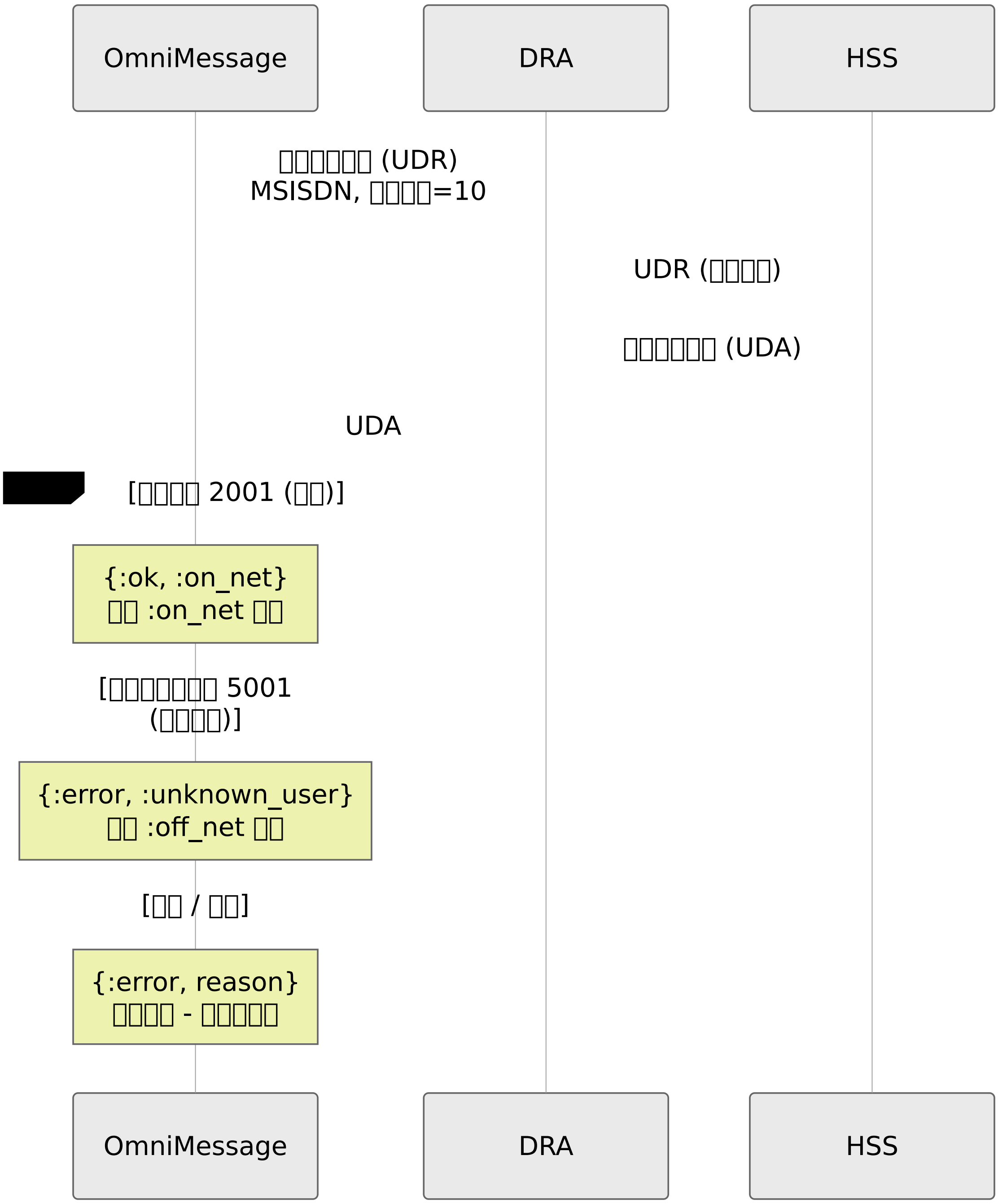
[illegible]/[illegible] MSISDN[illegible] HSS [illegible] [illegible][illegible]

[illegible] + [illegible] HSS [illegible]

[illegible] `originating_network`/`terminating_network` [illegible] `:on_net` [illegible] `:off_net` [illegible] HSS [illegible] Diameter [illegible] HSS [illegible]

[illegible] [illegible] [illegible]��[illegible]`:saf` ���[illegible] *[illegible]* [illegible] HSS [illegible] [illegible][illegible]

Diameter Sh □□□


OmniMessage
DRA
HSS
□□□□□□ (UDR)
MSISDN, □□□□=10
UDR (□□□□)
□□□□□□ (UDA)
UDA
[□□□□ 2001 (□□)]
{:ok, :on_net}
□□ :on_net □□
[□□□□□□□ 5001
(□□□□)]
{:error, :unknown_user}
□□ :off_net □□
[□□ / □□]
{:error, reason}
□□□□ - □□□□□
OmniMessage
DRA
HSS

UDR □□

AVP	□	□□
Session-Id	□□□□	□□□□□□□
Auth-Session-State	1 (NO_STATE_MAINTAINED)	□□□□□□□□□
Data-Reference	10	□□□□□□□□
Origin-Host	□□□□□ + □	OmniMessage □ Diameter □□
Origin-Realm	□□□□	OmniMessage □ Diameter □
Destination-Realm	□□□□	HSS □□□□ DRA □□□
User-Identity	TBCD □□□ MSISDN	□□□□□□
Server-Name	"OmniMessage"	□□□□□□□
Vendor-Specific-Application-Id	Auth: 16777217, Vendor: 10415	□□ 3GPP TS 29.329 □ Sh □□□□□

UDA □□□□

□□□□□□□□□ UDA □□□□□□□□□□

□□	□□	□□	□□□□□□□□
2001	□□□□	`{:ok, :on_net}`	□□ - □□ `:on_net`□□□□ `:off_net`
5001	□□□□□ □□	`{:error, :unknown_user}`	□□ - □□ `:off_net`□□□□ `:on_net`
□□ / □□ / □□ □□	-	`{:error, reason}`	□□□□ - □□□□□□□□□□□□

□□

□□ HSS □□

`config/runtime.exs` □□□□□□□□□□ HSS □□□

1. `:sms_c` □□ `diameter_enabled` □□ - □□□□□□□□□□□□□□□□ HSS □□□□□□ `false` □□□□□□ □ `:on_net`/`:off_net` □□□□□□□□□□□□□□□□□□□□□□
2. `:diameter_ex` □□ - □□ Diameter □□□□□□□□□□□□□□□□□□□□□

□□□□

```
# □□□□□□□□□ HSS □□
config :sms_c,
  diameter_enabled: true

# Diameter □□□□
config :diameter_ex,
  diameter: %{
    service_name: :omnimessage,
    listen_ip: "0.0.0.0",
    listen_port: 3868,
    decode_format: :map,
    host: "smsc01",
    realm: "epc.mnc001.mcc001.3gppnetwork.org",
    product_name: "OmniMessage",
    request_timeout: 5000,
    peer_selection_algorithm: :random,
    allow_undefined_peers_to_connect: true,
    log_unauthorized_peer_connection_attempts: true,
    control_module: SmsC.Diameter.Control,
    processor_module: DiameterEx.Processor,
    auth_application_ids: [],
    acct_application_ids: [],
    vendor_id: 10415,
    supported_vendor_ids: [10415],
    applications: [
      %{
        application_name: :sh,
        application_dictionary: :diameter_gen_3gpp_sh,
        vendor_specific_application_ids: [
          %{
            vendor_id: 10415,
            auth_application_id: 16_777_217,
            acct_application_id: nil
          }
        ]
      }
    ],
    peers: [
      %{
        port: 3868,
        host: "dra01.epc.mnc001.mcc001.3gppnetwork.org",
        ip: "10.0.0.1",
        realm: "epc.mnc001.mcc001.3gppnetwork.org",
        tls: false,
        transport: :diameter_tcp,
        initiate_connection: true
      }
    ]
  }
```

OmniMessage [illegible]

[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
`diameter_enabled`	[illegible]	[illegible]	`false`	[illegible]�� [illegible] HSS [illegible] `false` [illegible] `:on_net`/`:off_net` [illegible]
`hss_cache_ttl_seconds`	[illegible]	[illegible]	`7200`	[illegible] HSS [illegible] TTL[illegible] `runtime.exs` [illegible] YAML [illegible]
`mock_sh`	[illegible]	[illegible]	`false`	[illegible] HSS [illegible] Diameter [illegible]
`mock_sh_on_net_numbers`	[illegible]	[illegible]	`[]`	[illegible] `mock_sh` [illegible] `true` [illegible] MSISDN [illegible]

Diameter □□□□

□□	□□	□□	□□	
`service_name`	□□	□	-	Diam
`listen_ip`	□□□	□	`"0.0.0.0"`	□□□□□
`listen_port`	□□	□	3868	□□□□ 6733
`decode_format`	□□	□	-	Diam
`host`	□□□	□	-	Omni □□□□□
`realm`	□□□	□	-	Omni 3GPP `epc.`
`product_name`	□□□	□	-	□ Dia
`request_timeout`	□□	□	5000	□□ HS
`peer_selection_algorithm`	□□	□	`:random`	□□□□□ `:rou`

[illegible]	[illegible]	[illegible]	[illegible]	
`allow_undefined_peers_to_connect`	[illegible]	[illegible]	`true`	[illegible]
`log_unauthorized_peer_connection_attempts`	[illegible]	[illegible]	`true`	[illegible]
`control_module`	[illegible]	[illegible]	-	Diam `SmsC`
`processor_module`	[illegible]	[illegible]	-	Diam `Diame`
`auth_application_ids`	[illegible]	[illegible]	`[]`	[illegible] ID[illegible]
`acct_application_ids`	[illegible]	[illegible]	`[]`	[illegible]
`vendor_id`	[illegible]	[illegible]	-	3GPP
`supported_vendor_ids`	[illegible]	[illegible]	-	[illegible]

[illegible]

`applications` ��[illegible] Diameter [illegible] HSS [illegible] Sh [illegible]

[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
`application_name`	[illegible]	[illegible]	-	[illegible] HSS [illegible] `:sh` [illegible]
`application_dictionary`	[illegible]	[illegible]	-	Erlang Diameter [illegible] `:diameter_gen_3gpp_sh` [illegible]
`vendor_specific_application_ids`	[illegible]	[illegible]	-	[illegible]

[illegible] ID (Sh)[illegible]

[illegible]	[illegible]	[illegible]	[illegible]
`vendor_id`	[illegible]	`10415`	3GPP [illegible] ID
`auth_application_id`	[illegible]	`16_777_217`	[illegible] 3GPP TS 29.329 [illegible] Sh [illegible] ID
`acct_application_id`	-	`nil`	[illegible] Sh [illegible]

[illegible]

`peers` [illegible] OmniMessage [illegible] Diameter [illegible] DRA [illegible] HSS [illegible]

[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
`host`	[illegible]	[illegible]	-	[illegible] Diameter [illegible]FQDN[illegible]
`ip`	[illegible]	[illegible]	-	[illegible] TCP [illegible] IP [illegible]
`port`	���[illegible]	[illegible]	3868	[illegible] Diameter [illegible]
`realm`	[illegible]	[illegible]	-	[illegible] Diameter [illegible]
`tls`	[illegible]	[illegible]	`false`	[illegible] TLS[illegible]
`transport`	[illegible]	[illegible]	`:diameter_tcp`	[illegible] `:diameter_tcp` [illegible] `:diameter_sctp`[illegible]
`initiate_connection`	[illegible]	[illegible]	`true`	[illegible] `true`[illegible] OmniMessage [illegible] TCP [illegible] `false`[illegible] OmniMessage [illegible]

[illegible]

[illegible]OmniMessage [illegible] `peer_selection_algorithm` [illegible]

```
peers: [
  %{
    port: 3868,
    host: "dra01.epc.mnc001.mcc001.3gppnetwork.org",
    ip: "10.0.0.1",
    realm: "epc.mnc001.mcc001.3gppnetwork.org",
    tls: false,
    transport: :diameter_tcp,
    initiate_connection: true
  },
  %{
    port: 3868,
    host: "dra02.epc.mnc001.mcc001.3gppnetwork.org",
    ip: "10.0.0.2",
    realm: "epc.mnc001.mcc001.3gppnetwork.org",
    tls: false,
    transport: :diameter_tcp,
    initiate_connection: true
  }
]
```

□□□□

□□□□□□ HSS □□□□□□□□□□□□□

```
config :sms_c,
  diameter_enabled: true,
  mock_sh: true,
  mock_sh_on_net_numbers: [
    "15555550001",
    "15555550002"
  ]
```

□□□□□□□`mock_sh_on_net_numbers` □□□□□□ MSISDN □□□□ `{:ok, :on_net}`□□□□□ □□□ 2001□□□□□□ MSISDN □□□□ `{:error, :unknown_user}`□□□□□□□□ 5001□□□□□ □ Diameter □□□□□□□□□□□□□

HSS □□□□

HSS □□□□ `SmsC.Diameter.HssCache` □ MSISDN □□□□□□□□□ Diameter □□□

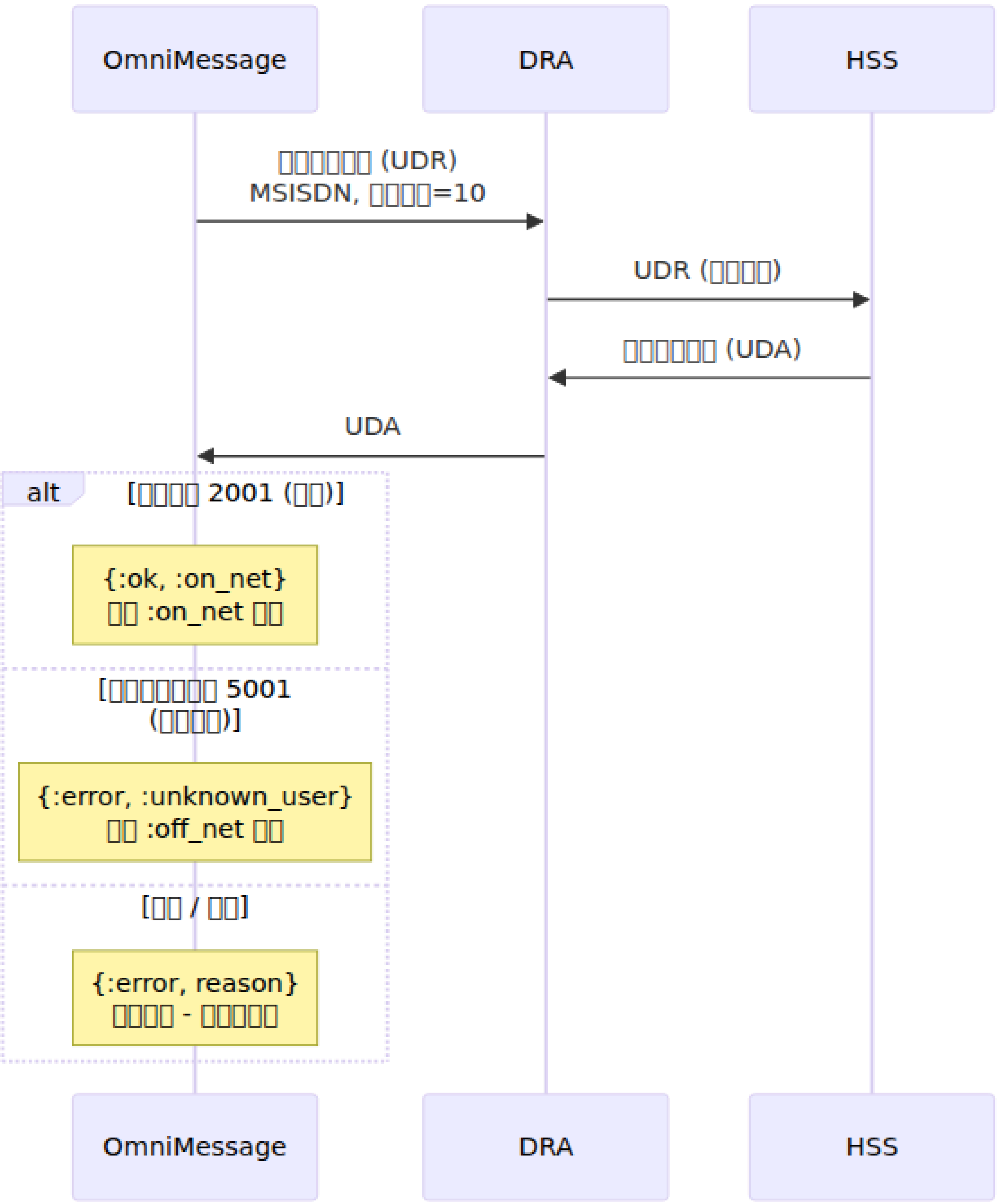
- **TTL**□`hss_cache_ttl_seconds`□□□ 7200 = 2 □□□
- □□□□□□□□□□□□□ MSISDN □□□□□□□□□□□□□
- □□□□□□□□□□□□□□□□□□□□□□□□□□□□□□
- □□□□□□□ `{:ok, :on_net}` □□□□□□□□ `{:error, :unknown_user}` □□□□□□□□□□ □□□□□ Diameter □□□□□ `nil`□□□□□□□ - □□□□□□□□□□□□□□□

□□□□□□

`:saf` □□ □□ □□□□□□□□□□ HSS □□□□□ `action: :saf` □□□□□□□□□□□□□□□□□□□□□□□□ □□□□□□ `:saf` □ `terminating_network: :on_net` □□□□□□□□□□□□□□□□ SMS □□□□ → `saf`□□

□□□□□□□□□ SAF □□□□□□□ Mnesia ���□□□□□`dest_smsc` □□□□□□□□□□□□□□□□□□□□ □□□□□□□ MSISDN □□□□□□□□□□□□□□□□□

□□ `dead_letter_time_minutes` □□□□□□□□


OmniMessage
DRA
HSS
□□□□□□ (UDR)
MSISDN, □□□□=10
UDR (□□□□)
□□□□□□ (UDA)
UDA
alt
[□□□□ 2001 (□□)]
{:ok, :on_net}
□□ :on_net □□
[□□□□□□□ 5001
(□□□□)]
{:error, :unknown_user}
□□ :off_net □□
[□□ / □□]
{:error, reason}
□□□□ - □□□□□
OmniMessage
DRA
HSS

□□□□□□

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OmniMessage □□□□□□ Diameter Sh □□□

- □□□`Diameter Sh (HSS): ENABLED (host: smsc01, realm: epc.mnc001.mcc001.3gppnetwork.org, peers: 2)`

- □□□`Diameter Sh (HSS): DISABLED`

□□□□□□

□□ HSS □□□□□□□□□□ - □□□□□□□□□□□□□□□□□□□□□□□□□□□□ - `subscriber_exists?/1` □□ `{:error, reason}`□□□□□ `:on_net` □ `:off_net` □□□□□□□ □ □□□□□□□ □□□□□□□□□□□□ □□□□□□

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□ **Diameter** □□□□□□□`diameter_enabled: false`□□□□□□□□□□ `nil`□□□□□□□□□□□□□□□ □□□□□ `:on_net`/`:off_net` □□□□□□□□□□□□□□□□□ `:any` □□□□□□□□□

□□□□

HSS □□□□□□□□□□□□□□

- □□□□□□□□□□ - □□□□□ `route_evaluated` □□□□□□□□□□□□ `term_network: ✓ (terminating requires on_net, +15551234 is on-net)` □ `✗ (... is off-net)`□□□□□□□□□□□□□□□□ API □□□□
- **Diameter Sh ���**□ - `SmsC.Telemetry` □□□□□□□□□□□□□□□□□□□□□□□□□□□□ METRICS.md□□
- □□□□ - `HSS dip: <msisdn> is ON-NET (2001)` / `is NOT in HSS (5001)` □□□ `SmsC.Diameter.Sh`□

□□□□

□□□□□□□□□□□□□□□□ `expires` □□□ □□□□□□□□□□□□□□□□□□□□□□□□□□□ HSS □□□

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[illegible]	[illegible]	[illegible]	[illegible]
`originating_network`	`:any` | `:on_net` | `:off_net`	[illegible]	[illegible] MSISDN [illegible] HSS [illegible]
`terminating_network`	`:any` | `:on_net` | `:off_net`	[illegible]	[illegible] MSISDN [illegible] HSS [illegible]

[illegible] `:any` [illegible] HSS [illegible] `:on_net` [illegible] 2001[illegible] `:off_net` [illegible] 5001[illegible]���[illegible]

[illegible]

```
config :sms_c, :sms_routes, [
  # [illegible] - [illegible]
  %{
    calling_regex: nil,
    called_regex: ~r/^1555/,
    source_smsc: nil,
    dest_smsc: "local-gateway",
    source_type: nil,
    action: :route,
    charged: :default,
    weight: 100,
    priority: 10,
    description: "[illegible] - [illegible]",
    originating_network: :any,
    terminating_network: :on_net,
    enabled: true
  },

  # [illegible] - [illegible]
  %{
    calling_regex: nil,
    called_regex: nil,
    source_smsc: nil,
    dest_smsc: "external-gateway",
    source_type: :ims,
    action: :route,
    charged: :default,
    weight: 100,
    priority: 255,
    description: "[illegible] - [illegible]",
    originating_network: :any,
    terminating_network: :any,
    enabled: true
  }
]
```

[illegible] [illegible]

1. [illegible] - [illegible]
2. [illegible] - [illegible]

3. P10 "local-gateway" [illegible] `terminating_network: :on_net`[illegible] HSS [illegible] HSS [illegible] 2001[illegible] `local-gateway`[illegible] 5001[illegible]
4. P255 "external-gateway" [illegible] `terminating_network: :any`[illegible] HSS [illegible]

[illegible] [illegible]HSS[illegible]*[illegible]/*[illegible]P10[illegible]`action`[illegible]`:saf`[illegible]

[illegible]

[illegible]

[illegible]/[illegible]

[illegible]

- `diameter_enabled`[illegible]`false` - `:on_net`[illegible]
- [illegible]Diameter[illegible]
- HSS[illegible]Sh[illegible]“HSS dip”[illegible]
- [illegible]HSS[illegible]

[illegible]

1. [illegible]`runtime.exs`[illegible]`diameter_enabled: true`
2. [illegible]Diameter[illegible]`Diameter Sh (HSS): ENABLED (... peers: N)`[illegible]
3. [illegible]`HSS dip:`[illegible]Sh[illegible]
4. [illegible]HSS[illegible]E.164[illegible]`+`[illegible]

[illegible]��[illegible]

[illegible]`:saf`[illegible]

[illegible]

- [illegible]OmniMessage

- [illegible]MSISDN[illegible]`destination_msisdn`[illegible]
- [illegible]

[illegible]

1. [illegible]/[illegible]
2. [illegible]MSISDN[illegible]
3. [illegible]`dead_letter_time_minutes` - [illegible]

Diameter[illegible]

[illegible]Diameter[illegible]

[illegible]

- [illegible]IP[illegible]
- [illegible]3868
- [illegible]`host`[illegible]Diameter[illegible]
- OmniMessage[illegible]

[illegible]

1. [illegible]IP[illegible]
2. [illegible]TCP[illegible]
3. [illegible]`host`[illegible]
4. [illegible]OmniMessage[illegible]`realm`[illegible]

SMS-C Prometheus [illegible]

← [illegible]

[illegible]

[illegible] SMS-C [illegible] Prometheus [illegible]

[illegible]

Prometheus [illegible]

```
http://localhost:9568/metrics
```

[illegible] Prometheus [illegible]Prometheus [illegible]

[illegible]

[illegible]`sms_c.<category>.<metric_name>.<type>`

[illegible]

- `license` - [illegible]
- `message` - [illegible]
- `routing` - [illegible]
- `enum` - ENUM/NAPTR [illegible]
- `delivery` - [illegible]
- `queue` - [illegible]
- `charging` - [illegible]/[illegible]
- `mnesia` - [illegible]

- `frontend` - □□□□□□
- `location` - □□/□□□□
- `phoenix.endpoint` - HTTP API □□□□
- `vm` - Erlang VM □□□□

□□□□□

sms_c_license_status

□□: Gauge

□□: OmniMessage SMS-C □□□□□□□□□□□

��:

- `1` - □□□□□
- `0` - □□/□□□□□

□□: □

□□□□: `omnimessage`

□□: □□ "NOLICENCE"□□□□□□ □□□

□□□□□□□□□:

- □□□□□□ □□ □□□
- □□□□□ (`dest_smsc`) □□□□□ **"NOLICENCE"**
- □□□□ □□□
- UI □□□□□ □□□
- □□□□□□□□□□ □□□□

□□:

```
- alert: SMS_C_License_Invalid
  expr: sms_c_license_status == 0
  for: 1m
  labels:
    severity: critical
  annotations:
    summary: "SMS-C □□□□□□□□"
    description: "□□□□□□□ - □□□□□□ NOLICENCE"
```

□□ Prometheus □□:

```
# □□□□□□□□□
sms_c_license_status == 1

# □□□□□□□□□□
sms_c_license_status == 0

# □□□□□ NOLICENCE □□□□□□□□□□□□□□
sms_c_routing_route_matched_count{dest_smsc="NOLICENCE"}
```

□□□□□

sms_c_message_received_count

□□: Counter

□□: SMS-C □□□□□□□□□□□□□□

□□:

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

□□: □□

[illegible]: [illegible]/[illegible]

---

sms_c_message_validated_count

[illegible]: Counter

[illegible]: [illegible]

[illegible]:

- `valid`: [illegible]true [illegible] false[illegible]

[illegible]: [illegible]/[illegible]

[illegible]: [illegible]> 5% [illegible]

---

sms_c_message_processing_stop_duration

[illegible]: Histogram

[illegible]: [illegible]

[illegible]: [illegible]

[illegible]: 10, 50, 100, 250, 500, 1000, 2500, 5000 ms

[illegible]:

- `success`: [illegible]true [illegible] false[illegible]

[illegible]: [illegible]

[illegible]: [illegible] p95 [illegible] p99 [illegible] SLA [illegible]

□□□□

sms_c_routing_route_matched_count

□□: Counter

□□: □□□□□□□���□□□□□□□□□□□□

□□:

- `route_id`: □□□□□□□□□□
- `dest_smsc`: □□□□□□□ SMSC
- `priority`: □□□□□□□□□

□□: □□□

□□: □□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□

---

sms_c_routing_failed_count

□□: Counter

□□: □□□□□□□□□□□□□□□

□□:

- `reason`: □□□□□no_route_found, validation_failed □□

□□: □□□□□□□□□□□□□□□□□□□□□□

□□: □□□□□□□□□□□□□□□□□□□□□□□□□

---

sms_c_routing_action_count

□□: Counter

□□: □□□□□□□□□□□□

[illegible]:

- `action`: [illegible]drop, auto_reply, forward[illegible]
- `route_id`: [illegible]

[illegible]: [illegible]

[illegible]: [illegible]

---

sms_c_routing_stop_duration

[illegible]: Histogram

[illegible]: [illegible]���[illegible]

[illegible]: [illegible]

[illegible]: 1, 5, 10, 25, 50, 100, 250, 500 ms

[illegible]:

- `dest_smsc`: [illegible] SMSC

[illegible]: [illegible]

[illegible]: [illegible]p95 > 50ms[illegible]

ENUM/NAPTR [illegible]

sms_c_enum_cache_hit_count

[illegible]: Counter

[illegible]: [illegible] ENUM [illegible] DNS [illegible]

[illegible]:

- `domain`: [illegible] ENUM [illegible]

[illegible]: [illegible] DNS [illegible]

[illegible]: [illegible]

---

sms_c_enum_cache_miss_count

[illegible]: Counter

[illegible]: [illegible] DNS [illegible] ENUM [illegible]

[illegible]:

- `domain`: [illegible] ENUM [illegible]

[illegible]: [illegible]

[illegible]: `cache_hit_rate = hits / (hits + misses)`

---

sms_c_enum_cache_size_size

[illegible]: Gauge

[illegible]: ENUM [illegible]

[illegible]: [illegible] TTL [illegible]

[illegible]: [illegible]���[illegible]

---

sms_c_enum_lookup_stop_duration

[illegible]: Histogram

[illegible]: [illegible] ENUM [illegible] DNS [illegible]

[illegible]: [illegible]

□: 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_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_delivery_time_delta_delta_ms

□□: Histogram

□□: □□□□□□□□□□□□□□□□□□□□□□□□ SMS-C □□

□□: □□

□: 50, 100, 250, 500, 1000, 2000, 5000, 10000, 20000, 60000, 600000 ms (50ms □ 10 □□)

□□:

- `source_smsc`: □□□□□□ SMSC
- `dest_smsc`: □□□□□□□ SMSC
- `delivery_attempts`: □□□□□□□□□□0 = □□□□□□□□

□□: □□-□□□□□□□□□□□□□□□□□□□□□□ SMSC □□□□□□□□□□□□□□□□□ SLA □□□□□□□□□□□□

□□:

- □ p95 □□□□□/□□□□□ SLA □□□□□□□
- □□□□□□□□□□□□□□□□

□□ Prometheus □□:

```
# □□□□□ SMSC □ P95 □□□□
histogram_quantile(0.95,
  sum by (source_smsc, dest_smsc, le) (
    rate(sms_c_delivery_time_delta_delta_ms_bucket[5m])
  )
)

# P99 □□□□□□
histogram_quantile(0.99,
  sum by (le) (
    rate(sms_c_delivery_time_delta_delta_ms_bucket[5m])
  )
)

# □□ SMSC □□□□□□□
sum by (source_smsc) (rate(sms_c_delivery_time_delta_delta_ms_sum[5m]
/
sum by (source_smsc)
(rate(sms_c_delivery_time_delta_delta_ms_count[5m]))

# □□□□□□□□□□□□□□□□□□□□□□□□□
histogram_quantile(0.95,
  sum by (le)
(rate(sms_c_delivery_time_delta_delta_ms_bucket{delivery_attempts="0
[5m]))
)
histogram_quantile(0.95,
  sum by (le)
(rate(sms_c_delivery_time_delta_delta_ms_bucket{delivery_attempts!="
[5m]))
)

# □□□□-□□□□□ p95□
topk(10,
  histogram_quantile(0.95,
    sum by (source_smsc, dest_smsc, le) (
      rate(sms_c_delivery_time_delta_delta_ms_bucket[1h])
    )
  )
)

# □ 2 □□□□□□□□□□
sum(rate(sms_c_delivery_time_delta_delta_ms_bucket{le="2000"}[5m])) /
sum(rate(sms_c_delivery_time_delta_delta_ms_count[5m])) * 100

# □□□□□□□ 2 □□□□□□□□
sum by (dest_smsc)
(rate(sms_c_delivery_time_delta_delta_ms_bucket{le="2000"}[5m])) /
sum by (dest_smsc) (rate(sms_c_delivery_time_delta_delta_ms_count[5m]
* 100
```

---

sms_c_delivery_time_by_smsc_delta_ms

□□: Histogram

□□: □□□□□□□□□□□□□□□□□□□□ SMSC □□□□□ `sms_c_delivery_time_delta_delta_ms` □□□□□□□□ - □□□□ `delivery_attempts` □□□□□□□□□□□□□□/□□□□□□□□□□□□□□□□□□□□□□□□□□□□ `[:sms_c, :delivery, :time_delta]` □□□□□□

□□: □□

□: 50, 100, 250, 500, 1000, 2000, 5000, 10000, 20000, 60000, 600000 ms (50ms □ 10 □□)

□□:

- `source_smsc`: □□□□□□ SMSC
- `dest_smsc`: □□□□□□□ SMSC

□□: □□□□□□□□/□□□□□□□□□□□□□□□□□/SLA □□□□□□□□□□□□□□ `sms_c_delivery_time_delta_delta_ms`□□□□□□□□□□□□□□□□□□□□□□□□□□□□ `_delta` □□□

□□ Prometheus □□:

```
# □□/□□ SMSC □□□□□□□□□□□
sum by (source_smsc, dest_smsc)
(rate(sms_c_delivery_time_by_smsc_delta_ms_sum[5m])) /
sum by (source_smsc, dest_smsc)
(rate(sms_c_delivery_time_by_smsc_delta_ms_count[5m]))

# □□□□□□□□
sum(rate(sms_c_delivery_time_by_smsc_delta_ms_sum[5m])) /
sum(rate(sms_c_delivery_time_by_smsc_delta_ms_count[5m]))

# □□/□□ SMSC □ P95 □□□□
histogram_quantile(0.95,
  sum by (source_smsc, dest_smsc, le) (
    rate(sms_c_delivery_time_by_smsc_delta_ms_bucket[5m])
  )
)
```

□□□□

sms_c_queue_size_size

□□: Gauge

□□: □□□□□□□□□□□□□□□□□□

□□:

- `queue_type`: □□□□□message_queue, dead_letter□

□□: □□□□□□□□□□□□□□□□

□□: □□□□□□□□□□□□□□□□

---

sms_c_queue_size_pending

□□: Gauge

[illegible]: [illegible]

[illegible]:

- `queue_type`: [illegible]

[illegible]: [illegible]

[illegible]: [illegible]

---

sms_c_queue_size_failed

[illegible]: Gauge

[illegible]: [illegible]

[illegible]:

- `queue_type`: [illegible]

[illegible]: [illegible]

[illegible]: [illegible]

---

sms_c_queue_size_delivered

[illegible]: Gauge

[illegible]: [illegible]/[illegible]

[illegible]:

- `queue_type`: [illegible]

[illegible]: [illegible]

[illegible]: [illegible]

---

sms_c_queue_oldest_message_age_seconds

[illegible]: Gauge

[illegible]: [illegible]

[illegible]:

- `queue_type`: [illegible]

[illegible]: [illegible] SLA [illegible]

[illegible]: [illegible] SLA [illegible]> 300 [illegible]

[illegible]

[illegible] **Diameter Ro** [illegible]`account` [illegible] MSISDN[illegible]`reason: :no_credit`[illegible] OCS [illegible]/[illegible]��[illegible] `charging_failed` [illegible] `:no_credit` [illegible] `:balance_rejected`[illegible]OCS [illegible]

sms_c_charging_requested_count

[illegible]: Counter

[illegible]: [illegible] OCS [illegible]Diameter Ro CCR [illegible]

[illegible]:

- `account`: [illegible] MSISDN[illegible]

[illegible]: [illegible]

---

sms_c_charging_succeeded_count

[illegible]: Counter

[illegible]: [illegible]

[illegible]:

- `account`: [illegible]

[illegible]: [illegible]

[illegible]: `success_rate = succeeded / requested`

---

sms_c_charging_failed_count

[illegible]: Counter

[illegible]: [illegible]

[illegible]:

- `account`: [illegible]
- `reason`: [illegible]

[illegible]: [illegible]

[illegible]: [illegible]

---

sms_c_charging_succeeded_duration

[illegible]: Histogram

[illegible]: [illegible]

[illegible]: [illegible]

[illegible]: 10, 50, 100, 250, 500, 1000, 2500, 5000 ms

[illegible]:

- `account`: [illegible]

[illegible]: [illegible]���[illegible]

□□: □ p95 □□□□□□□□□□□□□□

□□□□□□

sms_c_mnesia_table_size_record_count

□□: Gauge

□□: □□ Mnesia □□□□□□□□□□□□□□ 10 □□□□□□

□□:

- `table`: □□

□□□□:

- `sms_route` - SMS □□□□
- `message_store` - □□□□□□□□□□□□□□□□□□□
- `location_store` - □□□□/□□□□
- `frontend_store` - □□/SMSC □□
- `translation_rule` - □□□□□□
- `cell_tower_store` - □□□□□□
- `message_events` - □□□□□□

□□: □□□□□□□□□□□□□□□□□□□□□□

□□: □□□□□□□□□□□□□□□□□□□□□□

□□ **Prometheus** □□:

```
# [illegible]
sms_c_mnesia_table_size_record_count

# [illegible]
sms_c_mnesia_table_size_record_count{table="message_store"}

# [illegible]
sms_c_mnesia_table_size_record_count{table="location_store"}

# [illegible]
sms_c_mnesia_table_size_record_count{table="sms_route"}
```

---

sms_c_frontend_status_count

[illegible]: Gauge

[illegible]: [illegible]

[illegible]:

- `frontend_name`: [illegible]
- `status`: [illegible]connected, disconnected[illegible]

[illegible]: [illegible]

[illegible]: [illegible]

---

sms_c_location_registered_count

[illegible]: Counter

[illegible]: [illegible]/[illegible]

[illegible]:

- `location`: [illegible]/SMSC [illegible]
- `ims_capable`: [illegible] IMS[illegible]true/false[illegible]

[illegible]: [illegible] IMS [illegible] IMS [illegible]

[illegible]: [illegible]

- [illegible]
- [illegible]
- [illegible] IMS [illegible]

[illegible]:

```
# [illegible]
rate(sms_c_location_registered_count[1m])

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

---

sms_c_location_active_registrations_count

[illegible]: Gauge

[illegible]: [illegible]/SMSC[illegible] IMS [illegible] 10 [illegible]

[illegible]:

- `location`: [illegible]/SMSC [illegible]
- `ims_capable`: [illegible] IMS[illegible]true/false[illegible]

[illegible]: [illegible]���[illegible] IMS [illegible] SMSC [illegible]

[illegible]: [illegible]

- [illegible]
- [illegible]
- [illegible]

[illegible] **Prometheus** [illegible]:

```
# [illegible]
sum(sms_c_location_active_registrations_count)

# [illegible]
sum by (location) (sms_c_location_active_registrations_count)

# [illegible] IMS [illegible]
sum by (location)
(sms_c_location_active_registrations_count{ims_capable="true"})

# [illegible] IMS [illegible]
sum by (location)
(sms_c_location_active_registrations_count{ims_capable="true"}) /
sum by (location) (sms_c_location_active_registrations_count) *
100

# [illegible] IMS [illegible] IMS [illegible]
sum by (ims_capable) (sms_c_location_active_registrations_count)

# [illegible]
topk(10, sum by (location)
(sms_c_location_active_registrations_count))

# [illegible]
sum by (location) (sms_c_location_active_registrations_count) /
sum(sms_c_location_active_registrations_count) * 100
```

HTTP API [illegible]

phoenix_endpoint_stop_duration

[illegible]: Distribution (Histogram)

[illegible]: HTTP [illegible]��[illegible]

[illegible]:

- `method`: HTTP [illegible]`GET`, `POST`[illegible]

- `path`: □□□□□□□□□□□UUID□□□ ID□□□□ `/:id`□□□□`/api/messages`, `/api/messages/:id`□

□: 10ms, 50ms, 100ms, 250ms, 500ms, 1s, 2.5s, 5s

□□: □□ API □□□□□□□□□□□□□□□ SLA□

□□: □□□□□□□□

- □□□□□ P95 □□ > 500ms
- □□□□□ P99 □□ > 1s
- □□□□□□

□□□□:

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

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

---

phoenix_endpoint_stop_count

□□: Counter

□□: □□□□□□□ HTTP □□□□□□□□□ HTTP □□□□□

□□:

- `method`: HTTP □□□□□□`GET`, `POST`□
- `path`: □□□□□□□□□□□□ `/:id`□
- `status`: HTTP □□□□200, 201, 400, 404, 500 □□

□□: □□ API □□□□□□□□□□□□□□□□□

□□: □□□□□□□□

- □□□□□□□□ > 5%
- □□□□□ 5xx □□
- □□□□□□□□

□□□□:

```
# □□□□□□□□
sum by (path) (rate(phoenix_endpoint_stop_count[5m]))

# □□□□□□□
sum by (path) (rate(phoenix_endpoint_stop_count{status=~"5.."}
[5m])) /
sum by (path) (rate(phoenix_endpoint_stop_count[5m]))

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

---

phoenix_router_dispatch_exception_count

□□: Counter

□□: □ HTTP □□□□□□□□□□□/□□□□□

□□:

- `route`: □□□□□ API □□□□
- `kind`: □□□□□error, exit, throw□

□□: □□□□□□□□□□□□□□□□□□□□□□□□

□□: □□□□□□□□□□□□□□□□□

□□□□:

```
# [illegible]
rate(phoenix_router_dispatch_exception_count[5m])

# [illegible]
increase(phoenix_router_dispatch_exception_count[1h])
```

Diameter Sh [illegible]

SMS-C [illegible] **Diameter Sh** [illegible]3GPP TS 29.329[illegible] HSS[illegible] Diameter [illegible]

sms_c_diameter_peer_status

[illegible]: Gauge

[illegible]: Diameter [illegible]`1`[illegible]`0`[illegible]

[illegible]:

- `origin_host`: [illegible] Diameter Origin-Host
- `ip`: [illegible] IP [illegible]

[illegible]:

```
# [illegible]
sms_c_diameter_peer_status == 0
```

---

sms_c_diameter_sh_request_count

[illegible]: Counter

[illegible]: [illegible] Diameter Sh[illegible]HSS[illegible]UDR[illegible]

---

sms_c_diameter_sh_response_count

□□: Counter

□□: □□□□□□ Diameter Sh □□□□□□□UDA□□

□□:

- `result`: □□□□□□□□`on_net`, `unknown_user`, `error`□
- `result_code`: Diameter Experimental-Result / Result-Code□□□□`2001`, `5001`□

□□□□:

```
# Sh □□□□□□
sum(rate(sms_c_diameter_sh_response_count{result="error"}[5m]))
  / sum(rate(sms_c_diameter_sh_response_count[5m]))
```

---

sms_c_diameter_sh_response_duration_ms

□□: Distribution (Histogram)

□□: Diameter Sh □□□□□□□□□□

□□:

- `result`: □□□□

□: 5, 10, 25, 50, 100, 250, 500, 1000, 2500 ms

□□□□:

```
# P95 Sh □□□□
histogram_quantile(0.95,
rate(sms_c_diameter_sh_response_duration_ms_bucket[5m]))
```

---

sms_c_diameter_sh_error_count

□□: Counter

□□: Diameter Sh □□□□□□□□□/□□/□□□□□□□ UDA □□□□

□□:

- `reason`: □□□□

□□□□

□□□ SMS-C □□□□□□□□□□□□□□□□□□□□□□ □□□

sms_c_federation_forward_attempted_count

□□: Counter

□□: □□□□□□□□□□□□□□

□□:

- `dest_controller`: □□□□□□□

---

sms_c_federation_forward_completed_count

□□: Counter

□□: □□□□□□□□□□□□□□□□

□□:

- `dest_controller`: □□□□□□□

---

sms_c_federation_forward_queued_count

[illegible]: Counter

[illegible]: [illegible]

[illegible]:

- `dest_controller`: [illegible]

---

sms_c_federation_forward_failed_count

[illegible]: Counter

[illegible]: [illegible]

[illegible]:

- `dest_controller`: [illegible]

---

sms_c_federation_message_received_count

[illegible]: Counter

[illegible]: [illegible]

[illegible]:

- `origin_node`: [illegible]

---

sms_c_federation_health_check_count

[illegible]: Counter

[illegible]: [illegible]

[illegible]:

- `peer`: [illegible]
- `result`: [illegible]���[illegible]`healthy`, `unhealthy`[illegible]

---

sms_c_federation_peer_status_count

[illegible]: Gauge

[illegible]: [illegible]

[illegible]:

- `status`: [illegible]`healthy`, `degraded`, `unhealthy`[illegible]

---

sms_c_federation_queue_depth_count

[illegible]: Gauge

[illegible]: [illegible]

[illegible]:

```
# [illegible]
sms_c_federation_queue_depth_count > 1000
```

Erlang VM [illegible]

vm_memory_total

[illegible]: Gauge

[illegible]: Erlang VM [illegible]

[illegible]: [illegible]

□□: □□□□□□ > 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_time_delta_delta_ms` (□□)

□□: □□□□□□□□□□□□

ENUM □□□□□

□□ ENUM □□□□□□

[illegible]: `(sms_c_enum_cache_hit_count) / (sms_c_enum_cache_hit_count + sms_c_enum_cache_miss_count)`

[illegible]: [illegible] > 80% [illegible] TTL [illegible]

[illegible]

[illegible]

��[illegible]: `sms_c_routing_route_matched_count` [illegible] `route_id` [illegible]

[illegible]: [illegible]

[illegible]

[illegible]

[illegible]:

- `sms_c_queue_size_pending` ([illegible])
- `sms_c_queue_oldest_message_age_seconds` ([illegible])

[illegible]: [illegible] + [illegible] = [illegible]

[illegible]

[illegible]

[illegible]: `sms_c_delivery_succeeded_attempt_count` [illegible]

[illegible]: [illegible] p95 > 1[illegible]

□□□□

□□	□□	□□□	□□
□□□□□□	`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	□□□□

[illegible]

[illegible]

[illegible]: [illegible]

[illegible]:

1. [illegible]/[illegible]/[illegible]
2. [illegible]
3. [illegible]
4. p95 [illegible]
5. [illegible]
6. [illegible]

[illegible]

[illegible]: [illegible]

[illegible]:

1. [illegible]
2. [illegible]
3. ENUM [illegible]
4. [illegible]
5. [illegible]
6. [illegible]

[illegible]

[illegible]: [illegible]

[illegible]:

1. [illegible] SMSC [illegible]
2. [illegible] SMSC [illegible]
3. [illegible]
4. [illegible]
5. ENUM [illegible]
6. [illegible]

[illegible]

[illegible] Prometheus [illegible]

- [illegible]: 15 [illegible]
- **5** [illegible]: 90 [illegible]
- **1** [illegible]: 2 [illegible]

[illegible]���[illegible]

[illegible]

[illegible]

[illegible]

1. [illegible] `sms_c_message_received_count` - [illegible]
2. [illegible] `sms_c_routing_failed_count` - [illegible]
3. [illegible] `sms_c_delivery_queued_count` - [illegible]
4. [illegible] `sms_c_delivery_failed_count` - [illegible]
5. [illegible] `dest_smsc` [illegible]

□□□□□□□□□

□□□□□

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_time_delta_delta_ms` - □□□□□□□□□□□
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_time_delta_delta_ms_bucket)
```

□□□□□**p99**□:

```
histogram_quantile(0.99,
sms_c_delivery_time_delta_delta_ms_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. □□□□□□□□□
    - □□: `rate(sms_c_message_received_count[5m])`
    - □□: `rate(sms_c_delivery_succeeded_count[5m])`
    - □□: □□/□
    - □□: {{source_type}}

2. [illegible]

   - [illegible]: `(rate(sms_c_delivery_succeeded_count[5m]) / rate(sms_c_delivery_queued_count[5m])) * 100`
   - [illegible]: [illegible]0-100[illegible]
   - [illegible]:
     - [illegible]: < 90
     - [illegible]: 90-95
     - [illegible]: > 95

3. [illegible]

   - [illegible]: `sms_c_queue_size_pending`
   - [illegible]: `sms_c_queue_size_failed`
   - [illegible]: [illegible]
   - [illegible]: {{queue_type}}

4. [illegible]

   - [illegible]: `sms_c_queue_oldest_message_age_seconds / 60`
   - [illegible]: [illegible]
   - [illegible]:
     - [illegible]: < 5
     - [illegible]: 5-10
     - [illegible]: > 10

5. [illegible]

   - [illegible]: `sum(sms_c_frontend_status_count{status="connected"})`
   - [illegible]: [illegible]
   - [illegible]: [illegible]

6. [illegible]

   - [illegible]: `rate(sms_c_routing_failed_count[5m]) * 60`
   - [illegible]: [illegible]/[illegible]
   - [illegible]: > 0

□□□ 2: ���□□□

□□: □□□□□□□□□□□□

□□:

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)
   - □□: □□
   - □□: □□□□
2. □□□□□□□□□□
   - □□: `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_time_delta_delta_ms_bucket)`
   - □□: □□
   - □□□
3. □□□□□□□□□□
   - □□: `sms_c_delivery_succeeded_attempt_count_bucket`
   - □□□□□□□□□□□□
   - □□□□: □□□1 □□□□□□□□□□□□□
4. **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]))`
  - □□□□: `sms_c_enum_cache_size_size`
  - □ Y □□□□□□□□

5. □□□□□□□□□

  - □□: `(rate(sms_c_message_processing_stop_duration_count{success="true"}[5m]) / rate(sms_c_message_processing_stop_duration_count[5m])) * 100`
  - □□: □□□
  - □□:
    - □□: < 95
    - □□: 95-99
    - □□: > 99

□□□ 3: □□□□

□□: □□□□□□□□□□□□□□

□□:

1. □□□□□□□□□□□

  - □□: `sum by (source_type) (increase(sms_c_message_received_count[1h]))`
  - □□□□: IMS □ CS □ SMPP

2. □□ **SMSC** □□□□□□□□

  - □□: `sum by (source_smsc) (rate(sms_c_message_received_count[1h]))`
  - □ 10 □□
  - □□□

3. □□□□□□□□□

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

4. [illegible]

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

5. [illegible]/[illegible]

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

6. [illegible]

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

[illegible] 4: [illegible]

[illegible]: [illegible]

[illegible]:

1. [illegible]

    - □□: `sms_c_queue_size_size`
    - □□□: □□□□□□□□□□
    - □□□□□□□

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 □□
    - □□: □□/□

5. □□□□□□□□□

    - □□: `(rate(sms_c_message_received_count[5m]) / MAX_CAPACITY) * 100`
    - □ MAX_CAPACITY □□□□□□□□□
    - □□: □□□
    - □□:
        - □□: < 70
        - □□: 70-85
        - □□: > 85

□□□ 5: SLA □□□

□□: □□ SLA □□□□□□□

□□:

1. **SLA □□□□□□□**
   - □□□□: `(rate(sms_c_delivery_succeeded_count[1h]) / rate(sms_c_delivery_queued_count[1h])) * 100`
   - □□□□ 99%
   - □□:
     - □□: < 95
     - □□: 95-99
     - □□: >= 99

2. □ **SLA** □□□□□□□□□□
   - □□: `count(sms_c_delivery_time_delta_delta_ms_bucket{le="5000"}) / count(sms_c_delivery_time_delta_delta_ms_bucket)`
   - □□□ 5 □□□□□□□□
   - □□: □□□

3. **SLA □□□□□□□**
   - □□ 5 □□□□□: `increase(sms_c_queue_oldest_message_age_seconds{} > 300)[24h:]`
   - □□ 0

4. □□□□□□□□□□
   - □□: `up{job="sms-c"}`
   - □□□: 1 = □□□0 = □□
   - □□□□□□

5. □□□□□□□□□□□
   - □□: `avg_over_time((rate(sms_c_delivery_succeeded_count[1h]) / rate(sms_c_delivery_queued_count[1h]))[24h:1h])`

  - □□□□: □□ 30 □
  - SLA □□ 99%

□□□□□□

□□□□

□□□□:

```yaml
alert: RoutingFailuresDetected
expr: increase(sms_c_routing_failed_count[5m]) > 0
for: 2m
labels:
  severity: critical
annotations:
  summary: "{{ $value }} □□□□□□□ 5 □□□"
  description: "□□□□□□□□□□□□□□□□"
```

□□□□:

```yaml
alert: MessageQueueBacklog
expr: sms_c_queue_size_pending > 10000
for: 5m
labels:
  severity: critical
annotations:
  summary: "□□□□□ {{ $value }} □□□□□□"
  description: "□□□□□□□□□□□□□□□□"
```

□□□□□□□:

```yaml
alert: OldMessagesInQueue
expr: sms_c_queue_oldest_message_age_seconds > 300
for: 2m
labels:
  severity: critical
annotations:
  summary: "□□□□□□□□ {{ $value }} □"
  description: "□□□□□□□□□□□□"
```

□□□□□□□□:

```yaml
alert: NoActiveFrontends
expr: sum(sms_c_frontend_status_count{status="connected"}) == 0
for: 1m
labels:
  severity: critical
annotations:
  summary: "□□□□□□"
  description: "□□□□□□□□□□□□□□□□□□"
```

□□□□□□:

```yaml
alert: DeadLetterMessagesIncreasing
expr: rate(sms_c_delivery_dead_letter_count[10m]) > 0
for: 5m
labels:
  severity: critical
annotations:
  summary: "{{ $value }} □□□□□□□□□"
  description: "□□□□□□□□□□□□□□"
```

□□□□

□□□□□□:

```
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: "□□□□□□ {{ $value | humanizePercentage }}"
  description: "□□□□□ 95%□□□□□□□□"
```

□□□□:

```
alert: HighDeliveryRetryRate
expr: histogram_quantile(0.95,
sms_c_delivery_succeeded_attempt_count_bucket) > 2
for: 15m
labels:
  severity: warning
annotations:
  summary: "95th □□□□□□□□□□□: {{ $value }}"
  description: "□□□□□□□□□□□□□□□□□□□□□"
```

□□□□□□□:

```
alert: SlowMessageProcessing
expr: histogram_quantile(0.95,
sms_c_message_processing_stop_duration_bucket) > 1000
for: 10m
labels:
  severity: warning
annotations:
  summary: "95th □□□□□□□□□: {{ $value }}ms"
  description: "□□□□□□□□□□□□□□□□□"
```

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 □□□□□: {{ $value }}"
  description: "DNS □□□□□□□ DNS □□□□"
```

□ **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
for: 30m
labels:
  severity: warning
annotations:
  summary: "ENUM □□□□□: {{ $value | humanizePercentage }}"
  description: "□□□□□□□□□□□□□□□□□"
```

□□□□:

```
alert: ChargingFailuresDetected
expr: rate(sms_c_charging_failed_count[10m]) > 0.05
for: 10m
labels:
  severity: warning
annotations:
  summary: "□□□□□: {{ $value }}"
  description: "□□□□□□□□□ OCS □□□□"
```

□□□□

- □□□□□□□□□□□□□□□□□□□□□□□□□□□□

- [illegible] Prometheus [illegible] `rate()` [illegible] `increase()` [illegible]
- Gauge [illegible]
- Histogram [illegible]p50, p95, p99[illegible]
- [illegible] Prometheus [illegible]
- [illegible]5m [illegible]1h [illegible]24h+ [illegible]
- [illegible] Prometheus [illegible]
- [illegible] Grafana [illegible] dest_smsc[illegible]source_smsc [illegible]

MMS [illegible] (MMSc)

← [illegible] | [illegible] | **API [illegible]**

[illegible]

- [illegible]
- [illegible]
- [illegible]
- [illegible]
- MMS [illegible]
- [illegible]/[illegible]
- [illegible]
- [illegible]
- [illegible]
- [illegible]
- [illegible]

[illegible]

OmniMessage [illegible] **MMS [illegible] (MMSc)**[illegible] 3GPP TS 23.140 [illegible] MMS [illegible]**MM1** [illegible] (HTTP/WAP) [illegible] **MM4** [illegible] (SMTP)[illegible]

MMSc [illegible] OmniMessage [illegible] Web [illegible] MMS [illegible]MMSc[illegible]

1. [illegible] MMS [illegible] Mnesia [illegible]
2. [illegible] **MMS** [illegible]���[illegible] SMS [illegible] SMS [illegible]
3. [illegible] URL [illegible] MM1 [illegible] MMS [illegible]

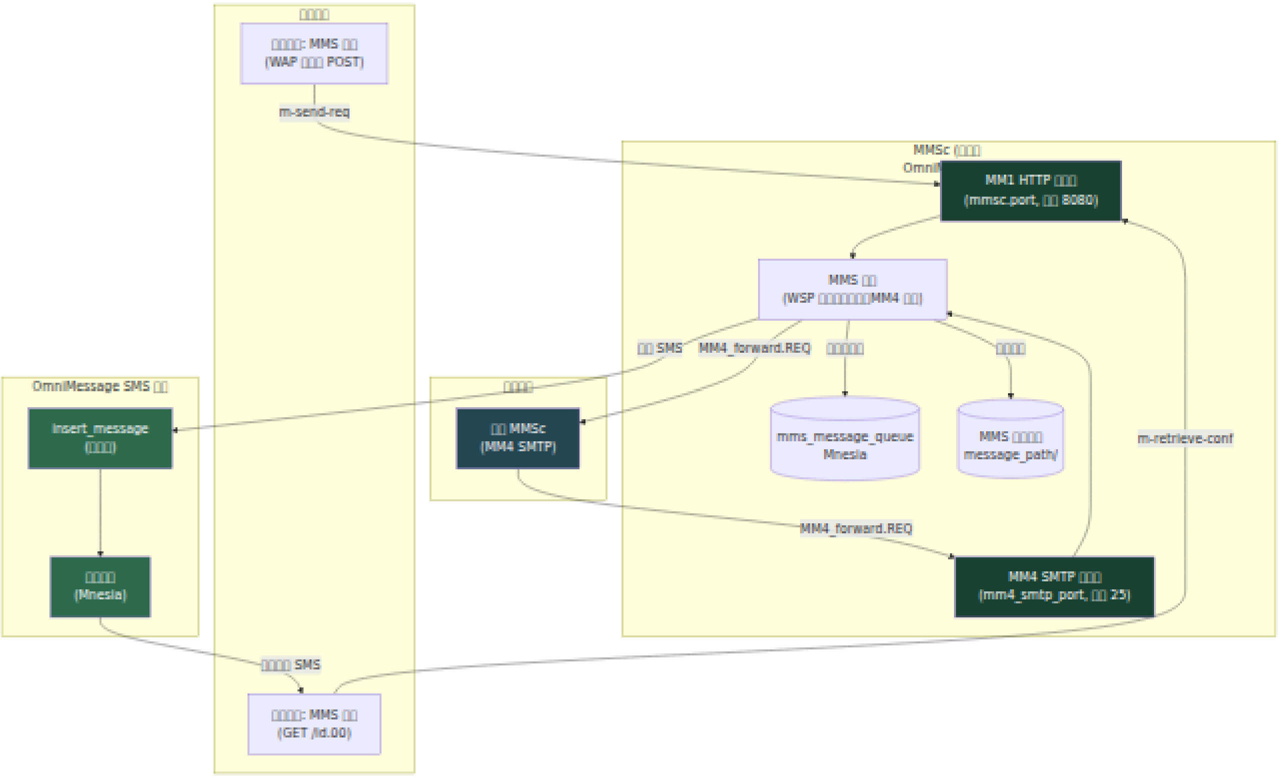
[illegible] SMS [illegible]MMS [illegible] SMS [illegible] HTTP [illegible]

□□□□

□□	□□
3GPP TS 23.140	□□□□□□□ (MMS)□□□□□
3GPP TS 26.140	MMS□□□□□□□□□□
OMA MMS □□□□	MM1 WAP □□□□□

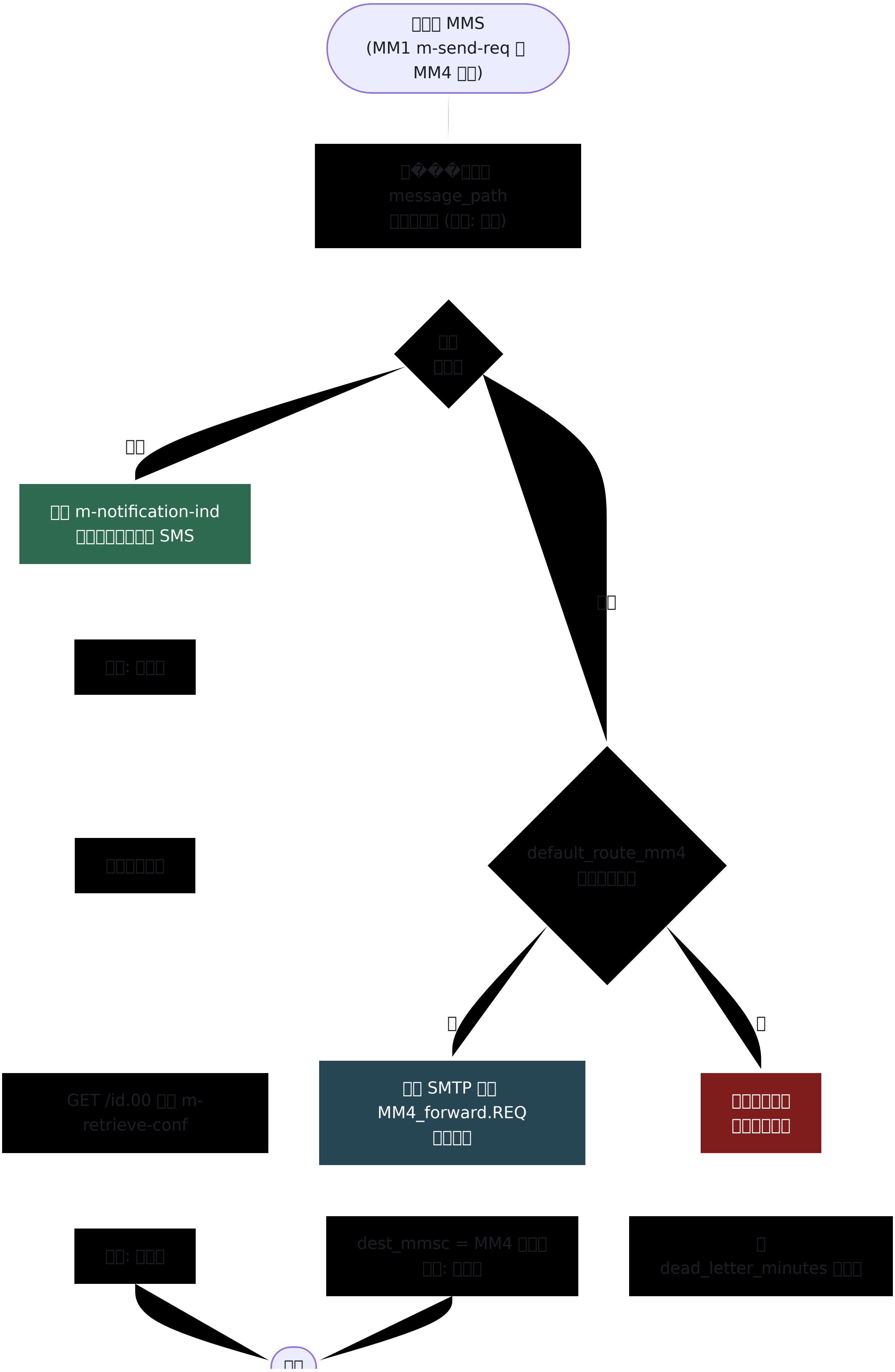
□□

MM1 (□□ HTTP) □ MM4 (□□□□ SMTP) □□□□□□□□□□□□□□□ OmniMessage API □□□ MMS □□□□□□ Mnesia □□□ SMS □□□□□□□MMSc □□□ MMS □□□□□□□□□□□□□□□□□□□□□□□□□□□□□□


□□□□
□□□□: MMS □□
(WAP □□□ POST)
m-send-req
MMSc (□□□
Omni
MM1 HTTP □□□
(mmsc.port, □□ 8080)
MMS □□
(WSP □□□□□□□MM4 □□)
□□ SMS
MM4_forward.REQ
□□□□□
□□□□
mms_message_queue
Mnesia
MMS □□□□
message_path/
m-retrieve-conf
MM4_forward.REQ
MM4 SMTP □□□
(mm4_smtp_port, □□ 25)
OmniMessage SMS □□
insert_message
(□□□□)
□□□□
(Mnesia)
□□□□
□□ MMSc
(MM4 SMTP)
□□□□ SMS
□□□□: MMS □□
(GET /id.00)

[illegible]

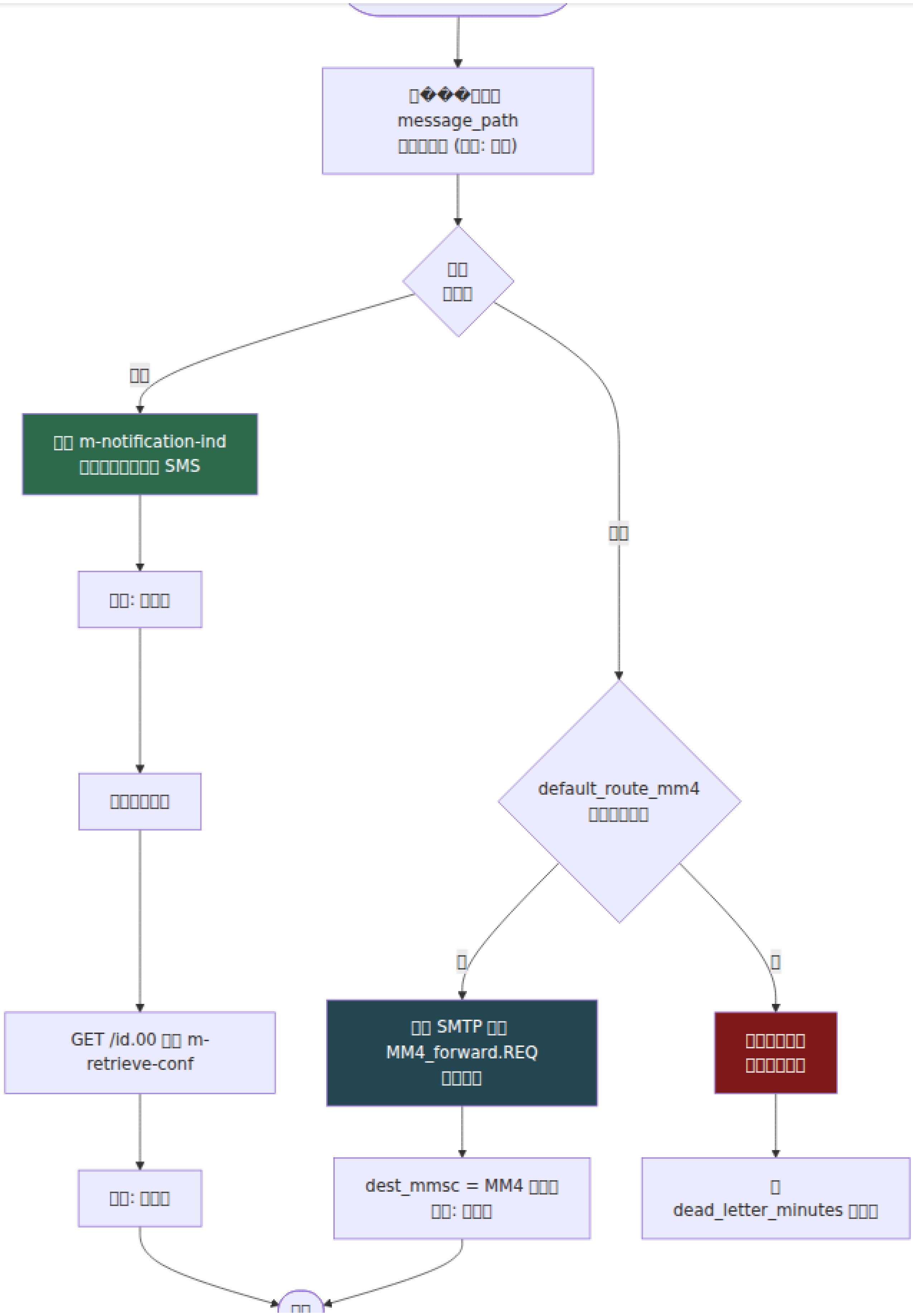
[illegible] MMS[illegible] MM1[illegible] MM4[illegible]


MMS
(MM1 m-send-req
MM4
message_path
m-notification-ind
SMS
default_route_mm4
GET /id.00 m-retrieve-conf
SMTP
MM4_forward.REQ
dest_mmsc = MM4
dead_letter_minutes

[illegible]

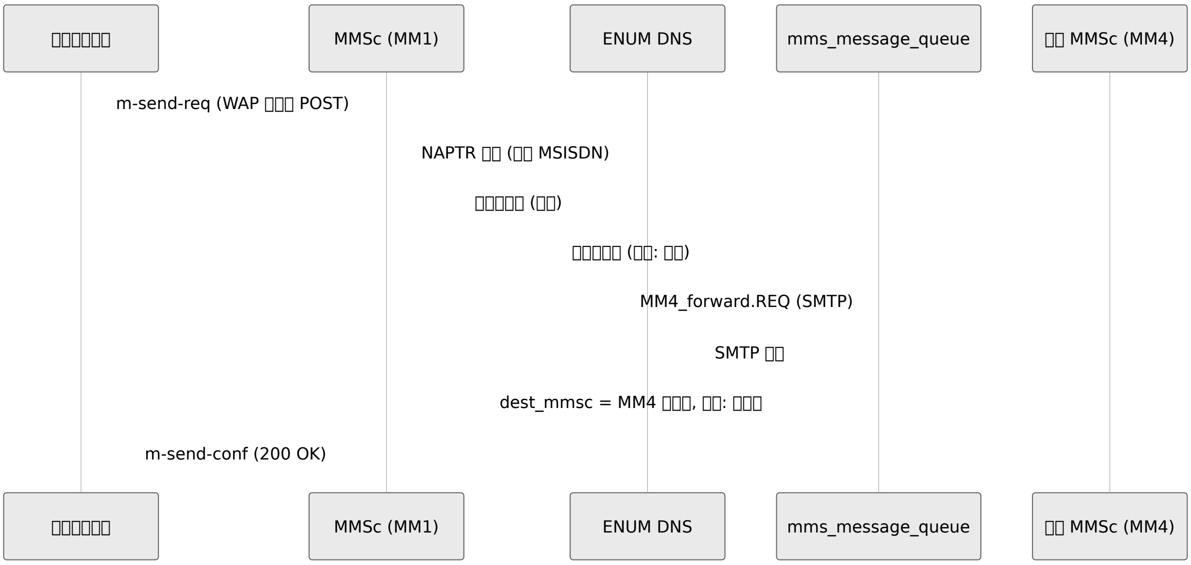
[illegible] (MM1)

[illegible] MMS[illegible]


message_path
m-notification-ind
SMS
GET /id.00 m-retrieve-conf
default_route_mm4
SMTP
MM4_forward.REQ
dest_mmsc = MM4
dead_letter_minutes

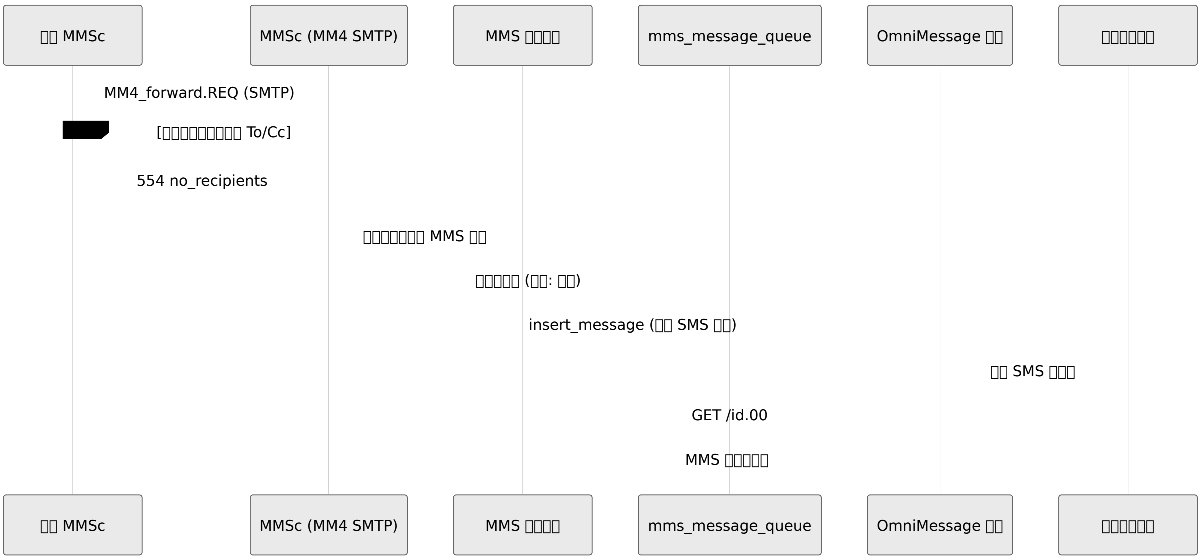
[illegible] (MM4)

[illegible] MMS[illegible]


[illegible]
MMSc (MM1)
ENUM DNS
mms_message_queue
[illegible] MMSc (MM4)
m-send-req (WAP [illegible] POST)
NAPTR [illegible] ([illegible] MSISDN)
[illegible] ([illegible])
[illegible] ([illegible]: [illegible])
MM4_forward.REQ (SMTP)
SMTP [illegible]
dest_mmsc = MM4 [illegible], [illegible]: [illegible]
m-send-conf (200 OK)
[illegible]
MMSc (MM1)
ENUM DNS
mms_message_queue
[illegible] MMSc (MM4)

[illegible] MM4 ([illegible])

[illegible] MMS[illegible]

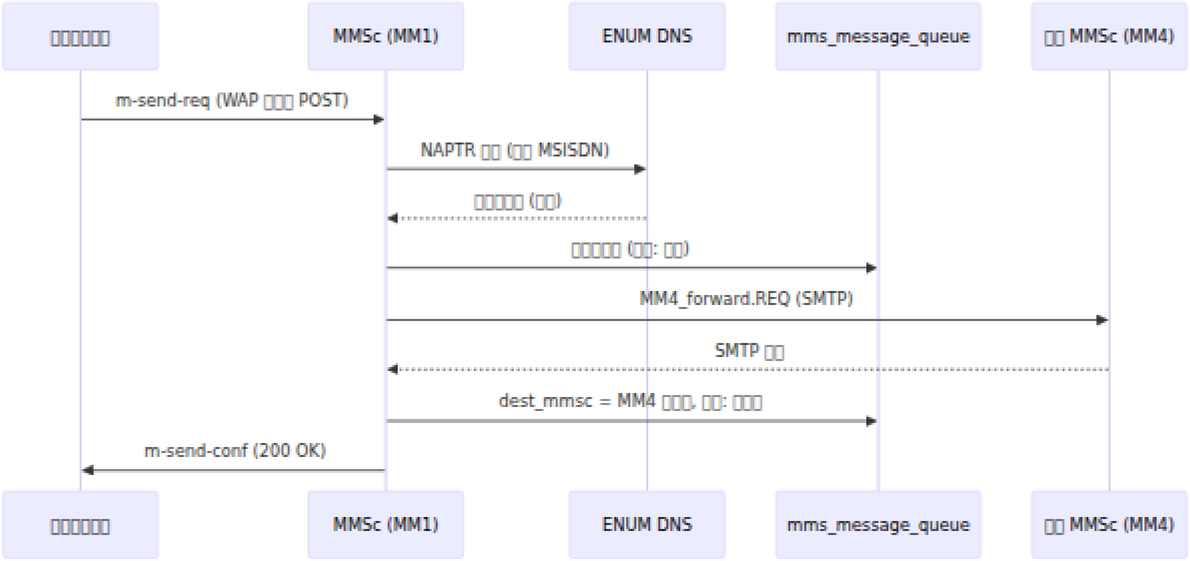

[illegible] MMSc
MMSc (MM4 SMTP)
MMS [illegible]
mms_message_queue
OmniMessage [illegible]
[illegible]
MM4_forward.REQ (SMTP)
[[illegible] To/Cc]
554 no_recipients
[illegible] MMS [illegible]
[illegible] ([illegible]: [illegible])
insert_message ([illegible] SMS [illegible])
[illegible] SMS [illegible]
GET /id.00
MMS [illegible]
[illegible] MMSc
MMSc (MM4 SMTP)
MMS [illegible]
mms_message_queue
OmniMessage [illegible]
[illegible]

- [illegible] [illegible] SMTP [illegible] (`RCPT TO`); [illegible] `To`/`Cc` [illegible]
- [illegible] `To` + `Cc` [illegible] `recipient_list` [illegible] `m-retrieve-conf` [illegible] MMS[illegible]

- □□□MIME □□□□□□ SMIL □□□□□□□□□□□□□□□□□□□□□□ WSP □□□□□□□□□□□□□□□□□□ UTF-8□
- □□□□ `To`/`Cc` □□���□□□□□□□□□□□□ `554` □□□□□□□□□

MMS □□

MMS □□□□□□□□ SMS□□□ **WSP** □□□ **`m-notification-ind`** PDU□□□□ 8 □□□□□ (DCS `0x44`)□□□□□□□□ SMS □□□□□□□ MT SMS □□□□□□□□□□□□□□□□□□□□□□ SMS □□□□□□□□ □□□□□□□□□


□□□□□□
MMSc (MM1)
ENUM DNS
mms_message_queue
□□ MMSc (MM4)
m-send-req (WAP □□□ POST)
NAPTR □□ (□□ MSISDN)
□□□□□ (□□)
□□□□□ (□□: □□)
MM4_forward.REQ (SMTP)
SMTP □□
dest_mmsc = MM4 □□□, □□: □□□
m-send-conf (200 OK)
□□□□□□
MMSc (MM1)
ENUM DNS
mms_message_queue
□□ MMSc (MM4)

□□□□□□□□□□□□

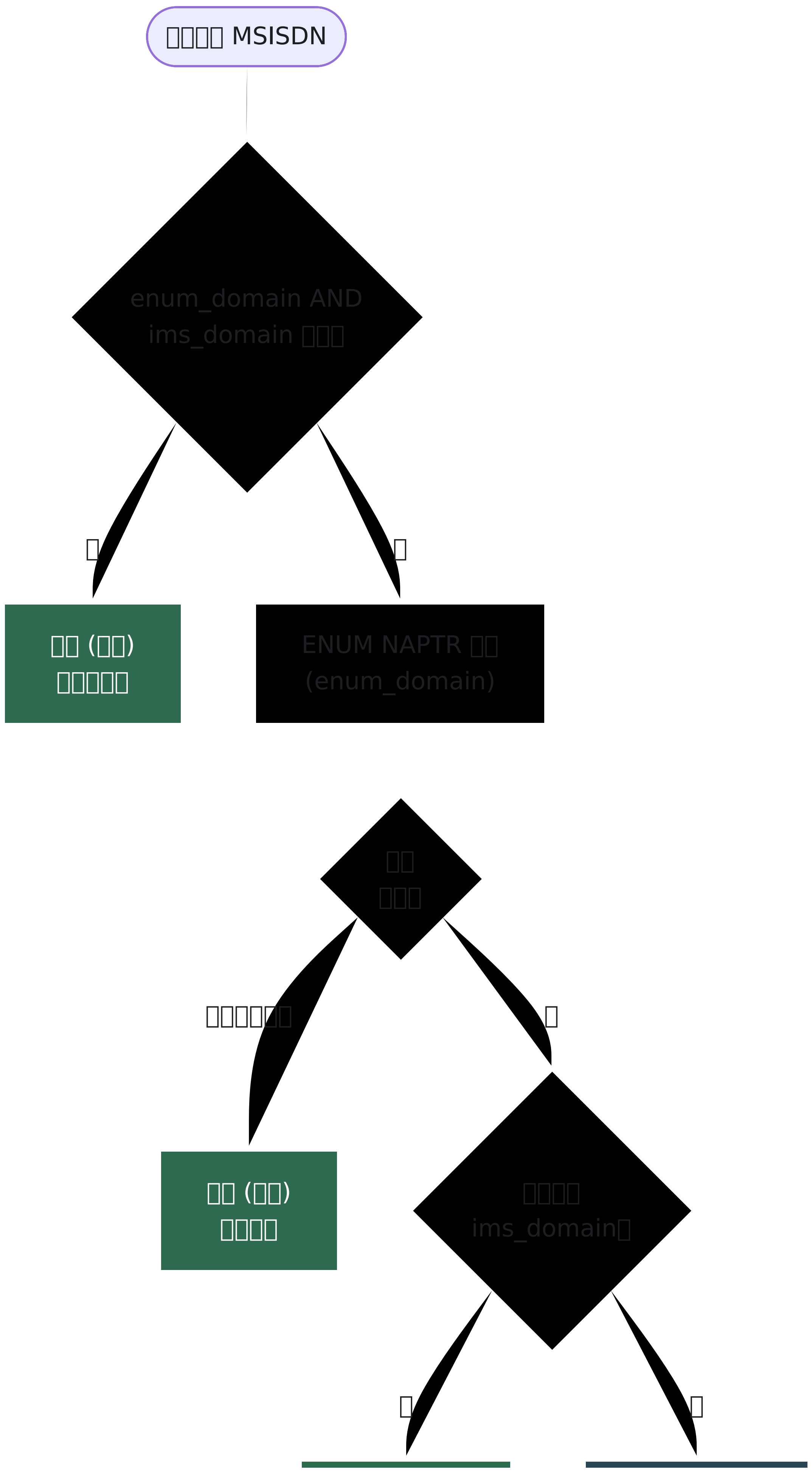
```
http://<mms_domain>/<unique_id>.00
```

- `mms_domain` □□□□ `mmsc.mms_domain`□
- `<unique_id>.00` □□□□□□MM1 □□□□□□ `.00` □□□□□□□□□□□

□□□□□□ MM1 □□□ URL □□□ MMS □□ `m-retrieve-conf`□

□□/□□□□

□ MMSc □□□□□□□□□□□ MM4 □□□□□□□□ SMS-C ��� ENUM (NAPTR) □□□□□□□□□□ ENUM □□□□□□□□□□□/□□□□□□□□ `ims_domain`□□□□□□□□


MSISDN
enum_domain AND
ims_domain
(
)
ENUM NAPTR
(enum_domain)
(
)
(
)
ims_domain

[illegible]	[illegible]	[illegible]
`ims_domain` [illegible] `enum_domain` [illegible]	[illegible] ([illegible])	[illegible] SMS
ENUM NAPTR [illegible] `ims_domain`	[illegible]	[illegible] SMS
ENUM NAPTR [illegible] `ims_domain`	[illegible]	[illegible] MM4 [illegible]
ENUM [illegible]	[illegible] ([illegible])	[illegible]���

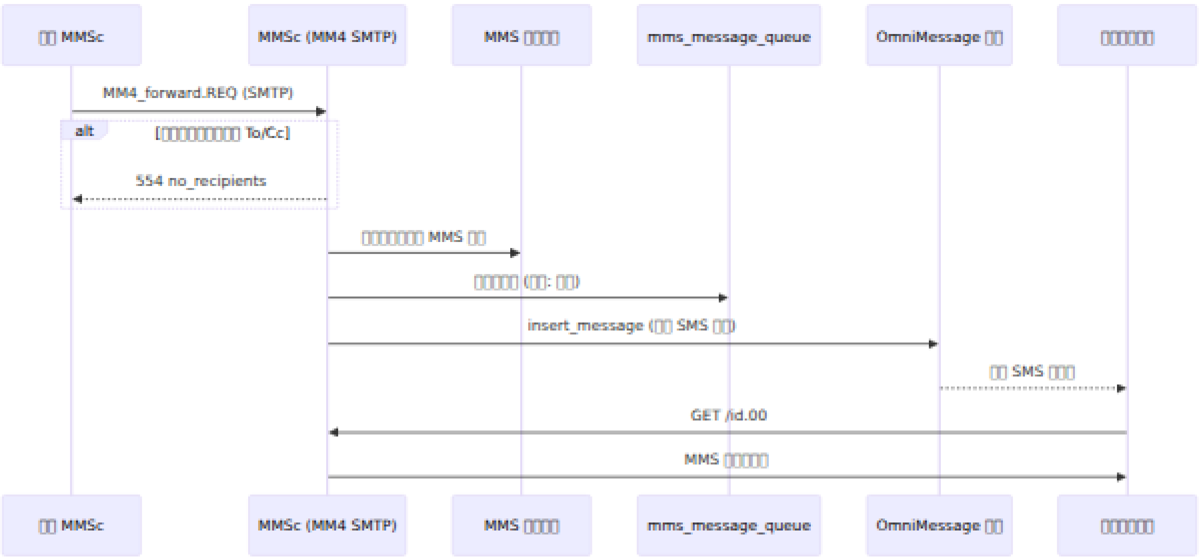
[illegible] ENUM [illegible] ([illegible])[illegible] MM4 [illegible]

[illegible]

[illegible] `runtime.exs` [illegible] `:sms_c` [illegible] `:mmsc` [illegible] MMSc[illegible] `:mmsc` [illegible] MMSc [illegible]

[illegible]

[illegible] MMSc [illegible]


[illegible] MMSc
MMSc (MM4 SMTP)
MMS [illegible]
mms_message_queue
OmniMessage [illegible]
[illegible]
MM4_forward.REQ (SMTP)
alt
[[illegible] To/Cc]
554 no_recipients
[illegible] MMS [illegible]
[illegible] ([illegible]: [illegible])
insert_message ([illegible] SMS [illegible])
[illegible] SMS [illegible]
GET /id.00
MMS [illegible]

□□□□

```
# config/runtime.exs
config :sms_c, :mmsc,
  # □□
  enabled: true,
  port: 8080,
  host: "0.0.0.0",
  mms_domain: "mms.example.com",
  message_path: "/var/lib/omnimessage/stored_mms",
  notify_source_msisdn: "6675",
  dead_letter_minutes: 1440,

  # □/□□ (ENUM) □□
  enum_domain: "e164.arpa",
  ims_domain: "ims.mnc001.mcc001.3gppnetwork.org",

  # □□□□□ (MM1 □□□ IP □ MSISDN)
  subscriber_ip_api_urls: ["https://10.0.0.10:8443",
"https://10.0.0.11:8443"],
  pcrf_api_url: nil,
  hss_api_url: nil,

  # □□/□□ MM4 (□□□□)
  mm4_enabled: false,
  mm4_smtp_port: 25,
  mm4_domain: "mms.example.com",
  default_route_mm4: nil
```

`:mmsc` □□

□□	□□	□□	□□
`enabled`	□□□	□	`false`
`port`	□□	□	`8080`
`host`	□□□	□	`0.0.0.0`
`mms_domain`	□□□	□□□□□□□	-
`message_path`	□□□	□	`/var/lib/omnimessage/stored_mms`
`notify_source_msisdn`	□□□	□	`6675`
`dead_letter_minutes`	□□	□	`1440`
`enum_domain`	□□□	□	-

[illegible]	[illegible]	[illegible]	[illegible]	
`ims_domain`	[illegible]	[illegible]	`""`	[illegible]
`subscriber_ip_api_urls`	[illegible]	[illegible]	`[]`	[illegible]
`pcrf_api_url`	[illegible]	[illegible]	`nil`	[illegible]
`hss_api_url`	[illegible]	[illegible]	`nil`	[illegible]
`mm4_enabled`	[illegible]	[illegible]	`false`	[illegible]
`mm4_smtp_port`	[illegible]	[illegible]	`25`	[illegible]
`mm4_domain`	[illegible]	[illegible]	[illegible] `mms_domain`	[illegible]
`default_route_mm4`	[illegible]	[illegible]	`nil`	[illegible]

MM4 □□□

□□ MM4 □□□□□□□□□□□□□□□□□□□□/□□/□□□□□□□□□□□□

```
# config/runtime.exs
config :sms_c, :mmsc_mm4_peers, %{
  "carrier-a" => [
    %{host: "mm4.carrier-a.example.net", port: 25, mms_domain:
"mms.carrier-a.example.net"}
  ]
}
```

`mmsc.default_route_mm4` □□

MM4 □□□□□

□□	□ □	□ □	□□	□□
`host`	□□□	□	-	□□ MM4 SMTP □□□□ IP□□□ SMTP □□□ HELO □□□□
`port`	□□	□	`25`	□□ MM4 SMTP □□□
`mms_domain`	□□□	□	`""`	□□□□ MMS □□□□□□ RCPT □□ (`+<msisdn>/TYPE=PLMN@<mms_domain>`) □□□□ `dest_mmsc`□

□□

MMS □□□ □□□ Mnesia □ `:mms_message_queue` □□□□□□□□□□□□□□ SMS □□□□□□□□□□□□□□□□□□□□□□ MMS □□ □□□ `.mms` □□□ `message_path` □□□□□□□□□□□□□□□□

`mms_message_queue` □□

□□	□□
`mms_id`	□□ Mnesia □□□□□□□□□
`unique_id`	□□□□ URL □□□□□□□□□ (`<unique_id>.00`)□
`source_msisdn`	□□□□□ MSISDN□
`destination_msisdn`	□□□□□□ MSISDN□
`recipient_list`	□ MMS □□□□□□□□ To/Cc □□ (CSV)□
`subject`	MMS □□□□
`file_path`	□□□ `.mms` □□□ `message_path` □□□□□
`source_mmsc`	□□□□□ MMSc □ MM4 □□□□□□□
`dest_mmsc`	□□□□□□□□□ `MM4_<peer>`□□□□□□□□□□□□□□□□□
`on_net`	MMSc □□□□□□□□□□□
`notify_message_ids`	□□□□□□ SMS □□ ID□□□□ SMS □□□□□□
`send_time`	□ MMSc □□ MMS □□□□
`notify_time`	□□□□□□ SMS □□□□
`retrieve_time`	□□□□□ MMS □□□□
`expires`	MMS □□□□□□□□□□
`status`	□□□□□□□□□□□□
`deadletter`	□□□□□□□□□□□□□

□□	□□
`inserted_at` / `updated_at`	□□□□□□□□□□

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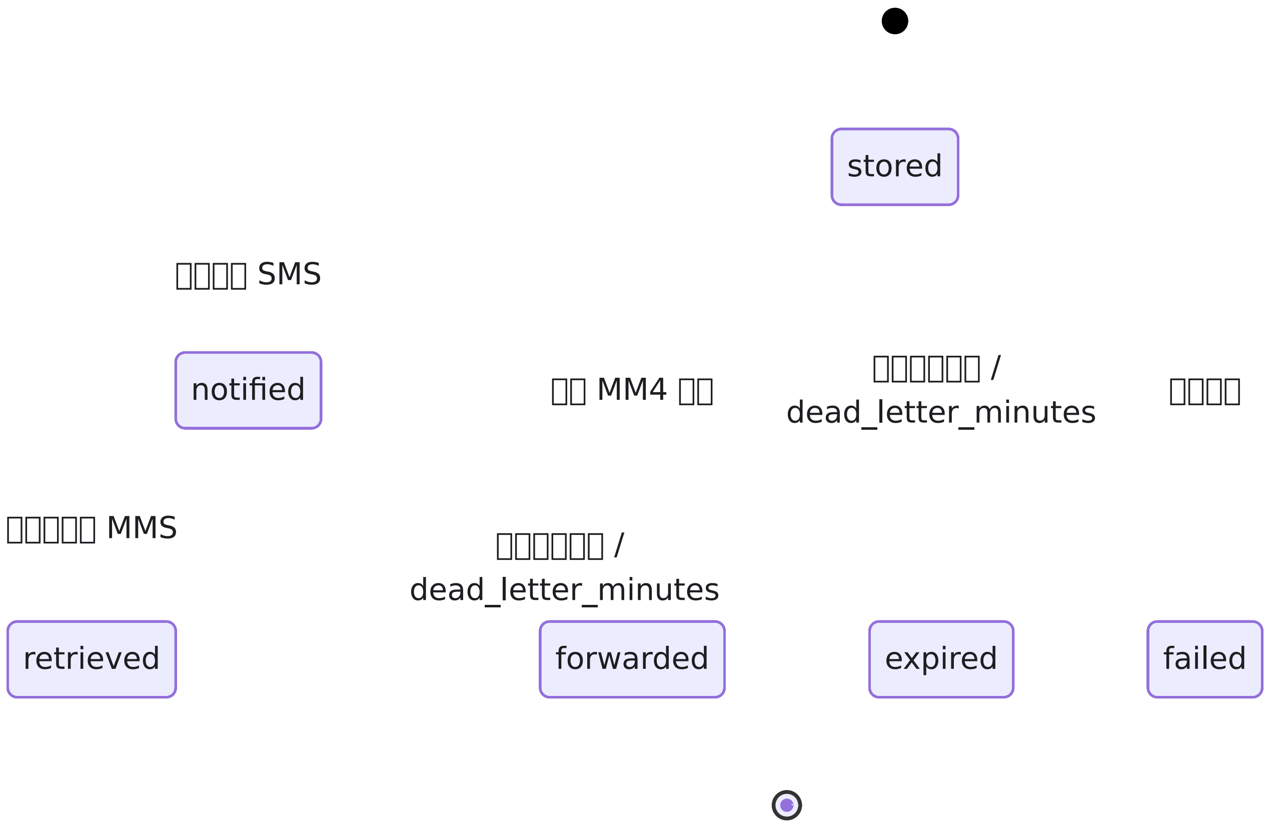
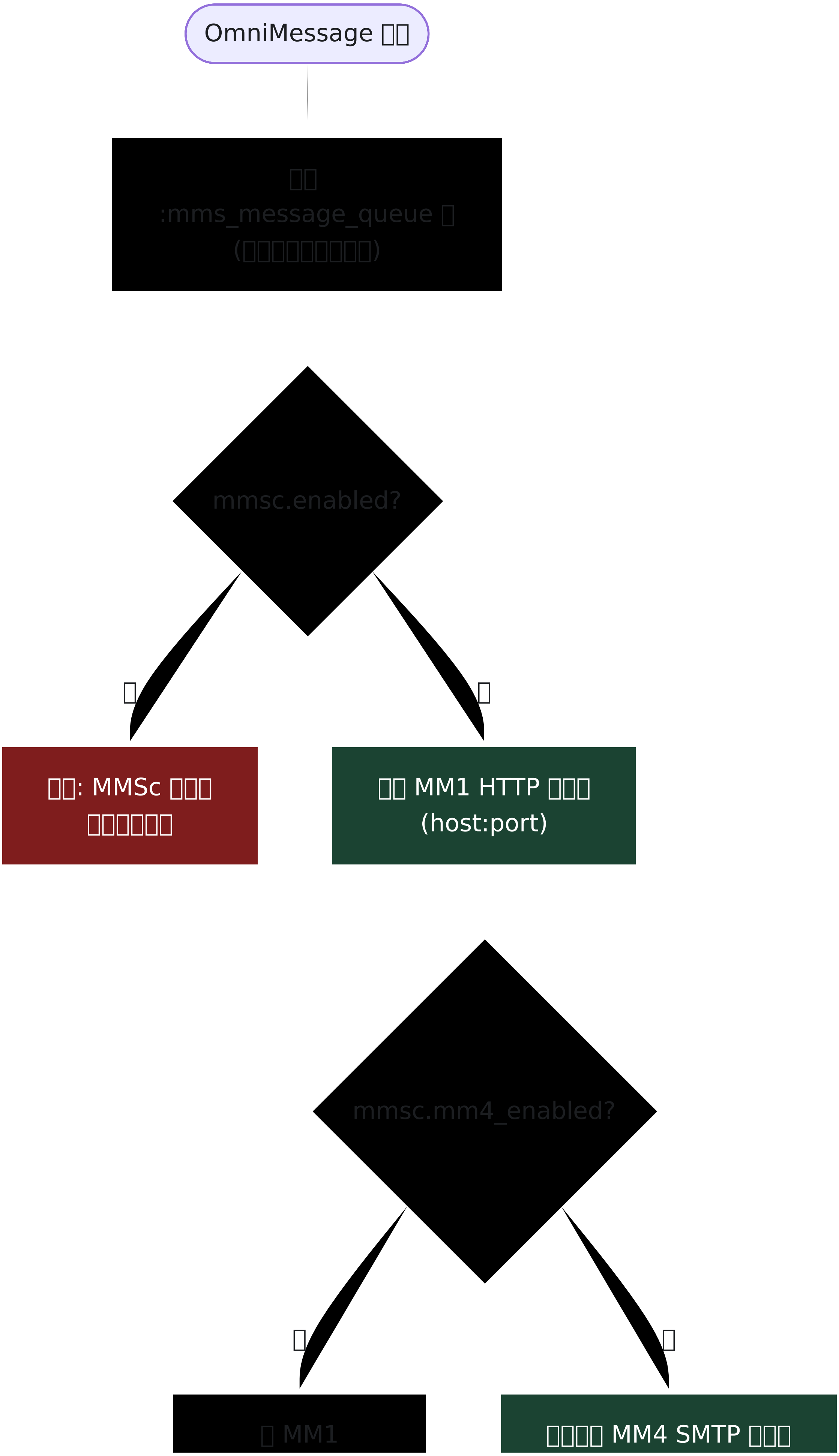

stored
□□□□ SMS
notified
□□ MM4 □□
□□□□□□ / dead_letter_minutes
□□□□
□□□□□ MMS
□□□□□□ / dead_letter_minutes
retrieved
forwarded
expired
failed

□□	□□
`stored`	□□□□□□□□□□□□□□□□□□□□□□
`notified`	□□ SMS □□□□□□□□□□□□□□□
`retrieved`	□□□□□ MM1 □□□ MMS□
`forwarded`	□□ MM4 □□□□□□□□□
`expired`	□□□□□□□□ `dead_letter_minutes` □□□□□
`failed`	□□□□□□□□

[illegible]

MMSc [illegible] OmniMessage [illegible]


OmniMessage
:mms_message_queue
mmsc.enabled?
MMSc
MM1 HTTP
(host:port)
mmsc.mm4_enabled?
MM1
MM4 SMTP

(□□ MM4 □□□)
(mm4_smtp_port)

- **MM1 HTTP** □□□ □□ `mmsc.enabled` □ `true` □□□□□□□ `mmsc.host:mmsc.port` □□□□□□□□`m-send-req`□□□□□□□`m-notifyresp-ind`□□□□□`m-acknowledge-ind`□□□□□`GET /<unique_id>.00`□□
- **MM4 SMTP** □□□ □□ `mmsc.enabled` □ `mmsc.mm4_enabled` □□ `true` □□□□□□□ `mmsc.mm4_smtp_port` □□□□□□□□□□□□□ `MM4_forward.REQ` □□□
- □□ **MM4** □□ □□□□□□□□□□□□□□□□□□□□□ SMTP □□□□□□□□□□□□□□□□□□□□□□
- □□□ □□□□□□□□□□ MMSc □□□□□□□□□□□□□□ `:mms_message_queue` □□□□□□□□

□□□□□ □□□ MM4 □□□25□□□□□□□OmniMessage □□□□□□□□□□□□□□□□□□`CAP_NET_BIND_SERVICE`□□□□□□□□□□□□□□ `mm4_smtp_port`□MM1 □□□□□□□□□□□□8080□

TLS□ MM1 □□□□□□□ HTTP□□□□□□□□□□□□□□ `mmsc.port` □□□□□□□□□ TLS□

□□□□

MMSc □□□□□□□□ MMS Prometheus □□□□□□□���□□□□ SMS □□□□□□□□□□□□□OmniMessage □□□□□□ MMS □□□□□□□□□□□□□ CDR □□□□□□□□ SMS □□□□□□ □□□□□

□□□□□□□□□□□□□□□□ `status`□`send_time`□`notify_time` □ `retrieve_time` □□□□□□□□□□□□

□□□□

MMSc □□□

□□□ □□□□□□□ MM1 □□□□□□□□□□ `MMSc: DISABLED`□

□□□□□

- `runtime.exs` □□□ `:mmsc` □□
- `mmsc.enabled` □ `false`□

□□□□□

1. □□ `:mmsc` □□□□□□ `enabled: true`□
2. □□□□□□□□□□□□□ `MMSc: ENABLED`□□□□□□□□□□□□

□□□□□□ MMS

□□□ □□ SMS □□□□□□□□□□□□□□

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- `mms_domain` □□□□□□□□□□□ MMS APN □□□
- □□□□□□□□□□□ `mmsc.port`□
- □□□ `.mms` □□□ `message_path` □□□□

□□□□□

1. □□□□ URL □□□`mms_domain`□□□□□□□□□□ MMS APN □□□
2. □□□ `mmsc.host:mmsc.port` □□□□□□□□□□ TLS □□□□□□
3. □□□□ `status` □□□ `.mms` □□□□□ `file_path`□

□□□ MMS □□□

□□□ MMS □□□□□□□□□□□□□□□`status` □□□ `stored`□

□□□□□

- `default_route_mm4` □□□□□□□□□□□□□
- `:mmsc_mm4_peers` □□□□□□□□□□□□□/□□□
- □□ `ims_domain`/`enum_domain` □□□□□□□□□□□□□□□□□□□□□□□□□□□

□□□□□

1. □ `default_route_mm4` □□□ `:mmsc_mm4_peers` □□□□□□
2. □□□□□□ `host`/`port` □□□□□□□ SMTP□
3. □□ `enum_domain` □ `ims_domain` □□□□□□□□□□□□

□□ MM4 □□□□□□□

□□□ □□□□□□□□□ MM4 □□□□□

□□□□□

- `mm4_enabled` □ `false`□□□ SMTP □□□□□□□
- □□□ SMTP □□□ `To`/`Cc` □□□□□□□□□□□□□□□□□□ `554 no_recipients`□
- □□□□□□□□□□□ 25□
- □□□□□□□□ SMTP□

□□□□□

1. □□ `mm4_enabled: true` □□□□
2. □□ `CAP_NET_BIND_SERVICE` □□□□□□□□□ `mm4_smtp_port` □□□□□□□
3. □□□□□□□□□□□□□□□□□ `mm4_smtp_port`□

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□□□□□

- `subscriber_ip_api_urls` □ `pcrf_api_url` / `hss_api_url` □□□□□□□□□□□□□□ □□□□□□ MSISDN□
- □□□□□ HSS □□□□□□□ IP □□□UE □□□□□□□□ HSS □□□□
- HSS/PCRF □□□□□□□□□□ 200 □□□

□□□□□

1. □□ `subscriber_ip_api_urls`□□□□□ HSS □□□□□□□□ `pcrf_api_url` □ `hss_api_url`□□□□□□□□□□□□□□□
2. □□□□□□□□□□□□□□□□/MSISDN □□□

SMS-C[illegible]

← [illegible]

[illegible]

SMS-C[illegible]Mnesia[illegible]

[illegible]

- [illegible]
- [illegible]
- [illegible]**SMSC**[illegible]
- [illegible]1-255[illegible]
- [illegible]
- [illegible]/[illegible]
- [illegible]`runtime.exs`[illegible]
- [illegible]
- **Web UI**[illegible]CRUD[illegible]
- [illegible]
- [illegible]/[illegible]
- [illegible]

[illegible]

[illegible]

[illegible]

[illegible]	[illegible]	[illegible]	[illegible]
`rule_id`	[illegible]	[illegible]	[illegible]
`calling_prefix`	[illegible]/nil	[illegible]nil = [illegible]	[illegible]
`called_prefix`	[illegible]/nil	[illegible]nil = [illegible]	[illegible]
`source_smsc`	[illegible]/nil	[illegible]SMSC[illegible]nil = [illegible]	[illegible]
`calling_match`	[illegible]/nil	[illegible]TON/NPI[illegible]	[illegible]
`calling_replace`	[illegible]/nil	[illegible]	[illegible]
`called_match`	[illegible]/nil	[illegible]	[illegible]
`called_replace`	[illegible]/nil	[illegible]	[illegible]
`source_ton`	[illegible]/nil	[illegible]/[illegible] = [illegible]	[illegible]
`source_npi`	[illegible]/nil	[illegible]/[illegible] = [illegible]	[illegible]
`priority`	[illegible]	[illegible]1-255[illegible]	[illegible]
`description`	[illegible]	[illegible]	[illegible]
`enabled`	[illegible]	[illegible]/[illegible]	[illegible]
`continue`	[illegible]	[illegible]false[illegible]	[illegible]

[illegible]

[illegible]`source_ton`[illegible]`source_npi`[illegible]TON[illegible]NPI[illegible]

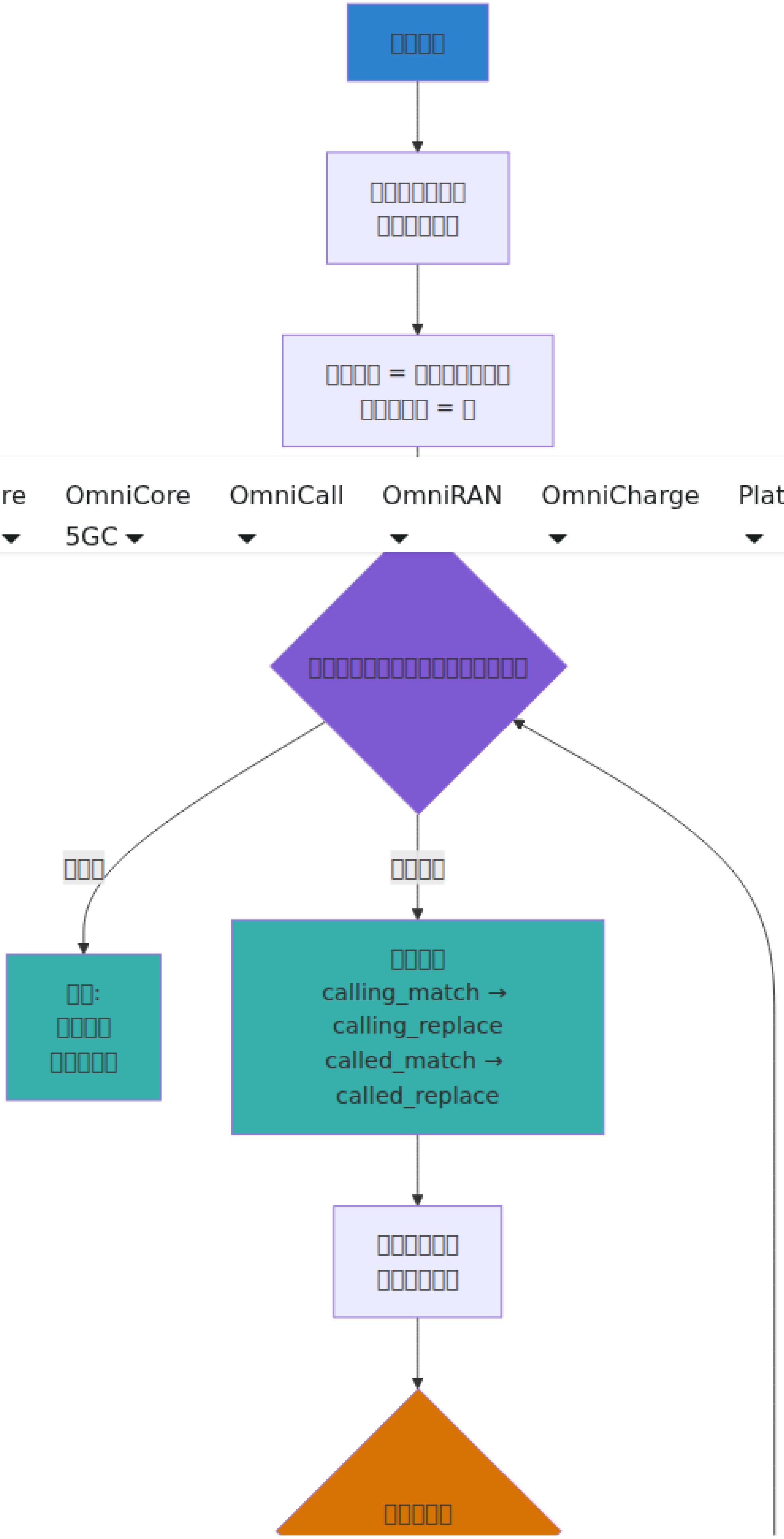
[illegible]

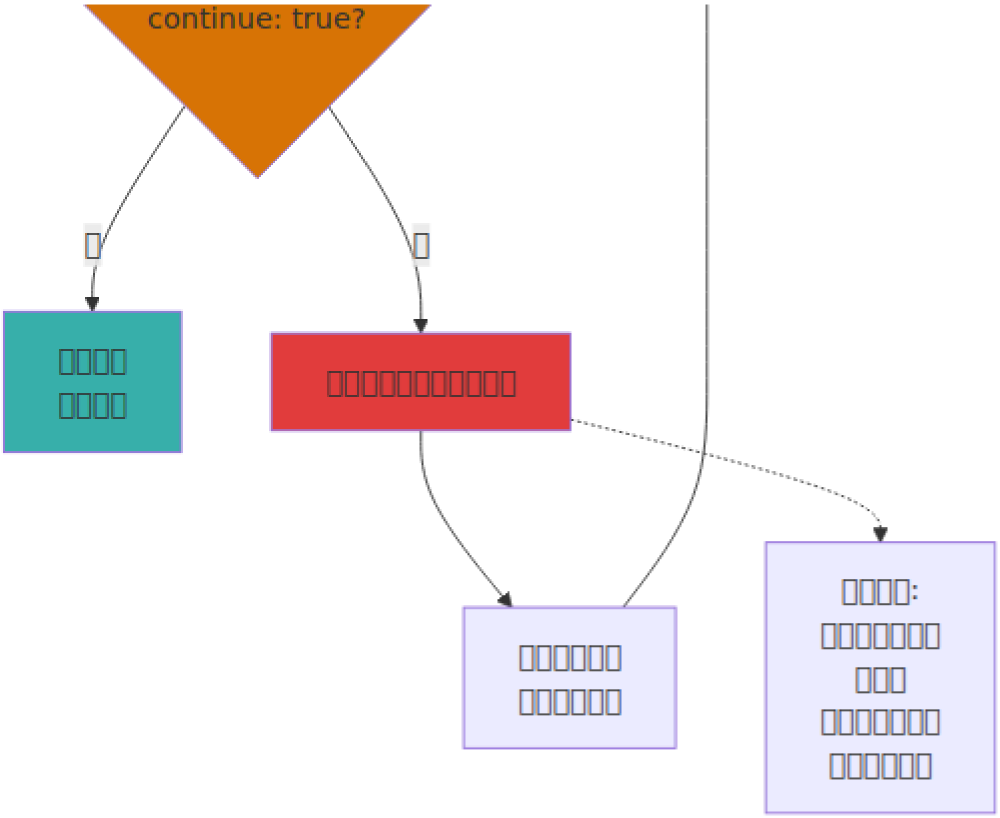
[illegible]

1. [illegible]
2. [illegible]
    - [illegible]`calling_prefix`[illegible]
    - [illegible]`called_prefix`[illegible]
    - [illegible]`source_smsc`[illegible]
3. [illegible]
    - [illegible]`calling_match`[illegible]`calling_replace`[illegible]
    - [illegible]`called_match`[illegible]`called_replace`[illegible]
4. [illegible]
    - [illegible]`continue: false` → [illegible]
    - [illegible]`continue: true` → [illegible]2
5. [illegible]

[illegible]

`continue`[illegible]


calling_match →
calling_replace
called_match →
called_replace



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- `nil`□□□□□□□□□□□□□□
- □□□□□□□□□□□□□□□□□□
- □□□□□□□nil□□/□□□□□□□□□□□□□

□□□□□□□□□□□

```
Parse error on line 20: ...] style R1 fill:#38B2AC style R ----------------------^
Expecting 'SOLID_OPEN_ARROW', 'DOTTED_OPEN_ARROW', 'SOLID_ARROW',
'BIDIRECTIONAL_SOLID_ARROW', 'DOTTED_ARROW',
'BIDIRECTIONAL_DOTTED_ARROW', 'SOLID_CROSS', 'DOTTED_CROSS',
'SOLID_POINT', 'DOTTED_POINT', got 'TXT'
```

□□

□□□□□□□TON□□□□□□□□□□NPI□

□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□TON□□□□□□□□□□NPI□□□`unknown`/`unknown`□□□□□□□□□□□□□□□

□□□□□□□□□��□□□□□□□□□□□□□□□□□□□□TON/NPI□

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□□	□□□□	□□
`source_ton`	□□□□□□□	□□□□□SMS-DELIVER□□□□□TPDU□□□□□□
`source_npi`	□□□□□□□	□□□□□SMS-DELIVER□□□□□TPDU□□□□□□□□□

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> □□□ `source_ton`/`source_npi`□□□□□□□**TPDU**□□□□□□□IMS/SS7□□□□□SMS-DELIVER□□□□□□□□□□TPDU□ - □□□□□□□□□□□□□□□□□□□TON/NPI□□□SMS-DELIVER TPDU□□□□□□□□□□□□□□□□□□□

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□□□□□TON□□

[illegible]	[illegible]
`unknown`	[illegible]
`international`	[illegible]E.164[illegible]
`national`	[illegible]
`network_specific`	[illegible]
`subscriber`	[illegible]
`alphanumeric`	[illegible]ID[illegible]
`abbreviated`	[illegible]

[illegible]NPI[illegible]

[illegible]	[illegible]
`unknown`	[illegible]
`isdn`	ISDN/[illegible]E.164[illegible]
`data`	[illegible]X.121[illegible]
`telex`	Telex[illegible]
`land_mobile`	[illegible]E.212[illegible]
`national`	[illegible]
`private`	[illegible]
`ermes`	ERMES[illegible]

[illegible]

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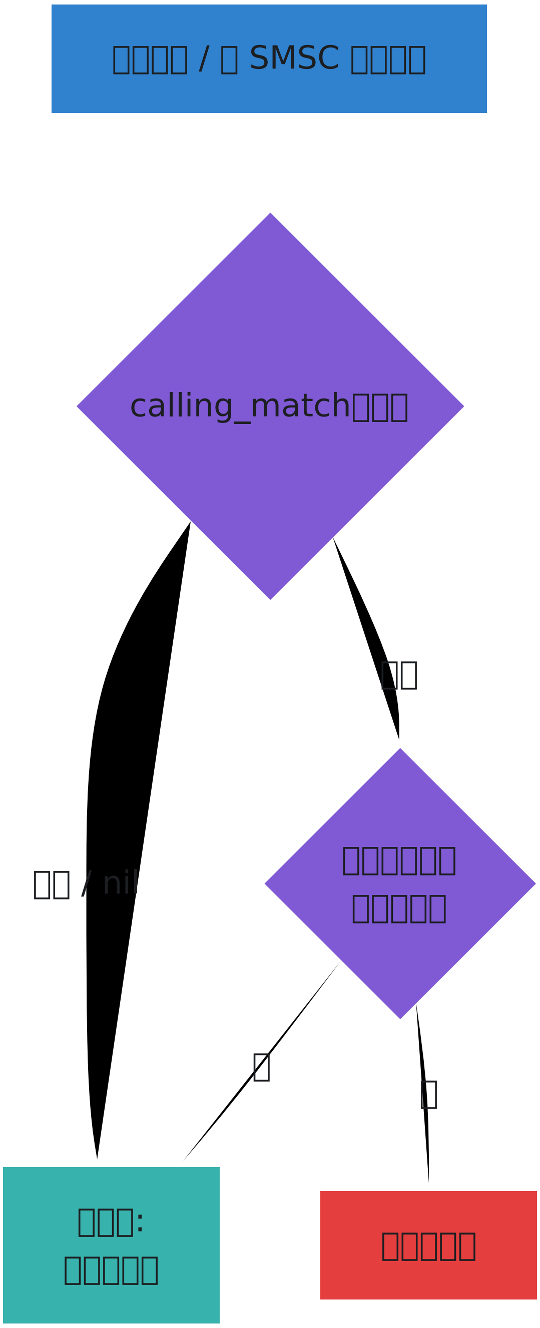
□□□□□□□**□□□□□□□`calling_match`□**□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□

- □□□□□□`calling_match`□□□□□□□□□□□□□□□□□`source_ton`/`source_npi`□□□□□□□
- □□□□□□□□ - □□□□□□□□□□□□□□□□□□/□□SMSC□□□□□□□□□

□□□□□□□□`calling_match`□□□□□□□`calling_replace`□□□□□□□□□□□□□□□□□□□□□□□□
□□□□□TON/NPI□□□□□□□□□□□□□□□□□□□


□□□□ / □ SMSC □□□□
calling_match□□□
□□
□□ / nil
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□`continue: true`□□□□□□□□□□TON/NPI□□

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□□	□□**TON**	□□**NPI**
□□□≥ 5□	`international`	`isdn`
□□□< 5□	`national`	`isdn`
□□□□□□□□□□□□□□`Acme`□	`alphanumeric`	`unknown`

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□□**TON/NPI**□□

□□□□□□□□□□□□□□□□□

- **Web UI** - □□□□□□□□□□□□TON□□NPI□□□□□□□□“□□□”□
- **REST API** - `/api/translations`□□□□`source_ton`□`source_npi`□□□□□□□□□□□
- □□ - `config :sms_c, :translation_rules`□□□□□□□□□□□□□□□□□□□□□□□□

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□□3-6□□□□□□□□□□□□TON/NPI `unknown`/`unknown`□□□□□□□□□□□`calling_match`□□□□□□`calling_replace`□□

□□□**`config/runtime.exs`**□□

```
config :sms_c, :translation_rules, [
  %{
    calling_match: "^\d{3,6}$",
    calling_replace: nil,
    source_ton: "unknown",
    source_npi: "unknown",
    priority: 5,
    continue: true,
    description: "□□□□3-6□□=> unknown/unknown TON/NPI",
    enabled: true
  }
]
```

□□□□□□ □□□□□□□□□□□□□□□□□□`calling_prefix`□`called_prefix`□`source_smsc`□□□□ `calling_match`□□□□□`^\d{3,6}$`□□□□□□□□□`source_ton`/`source_npi`□□□□□□□□□□□3□6□□□□□□□□□□□□`unknown`/`unknown`□□□`calling_replace`□`nil`□□□□□□□□□□□ `continue: true`□□□□□□□□□□

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□□□**REST API**□□ - `POST /api/translations`□

```json
{
  "calling_match": "^\d{3,6}$",
  "calling_replace": null,
  "source_ton": "unknown",
  "source_npi": "unknown",
  "priority": 5,
  "continue": true,
  "description": "□□□□□□□3-6□□=> unknown/unknown TON/NPI",
  "enabled": true
}
```

API□□□□□□□□□□□□□□□□`rule_id`□□TON/NPI□□□□□□□□□□

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□□□□□□□□□□□□□□□□□`national`/`isdn`□□□□□□□□

□□□**`config/runtime.exs`**□□

```
%{
  calling_prefix: "07",
  calling_match: "^07\d{8}$",
  calling_replace: nil,
  source_ton: "national",
  source_npi: "isdn",
  priority: 20,
  continue: false,
  description: "□□07xxxxxxxx□□ => national/isdn",
  enabled: true
}
```

□□□□□ `calling_prefix: "07"`□□□□□□□`07`□□□□□□`calling_match`□□□□□□□□□□□□□□`07`□□8□□□□□□□□□□□□□□□□`national`/`isdn`□□□□□□□`international`/`isdn`□□□□□□□□□□□≥ 5□□□□□□□□□□

□□□ □□□□□□□□□□□□□□□□□□□□□□□`national` TON□□□□□□□□□□□□□□□

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□□□□□□□`config/runtime.exs`□□□□□□□□□□□□□□□□□

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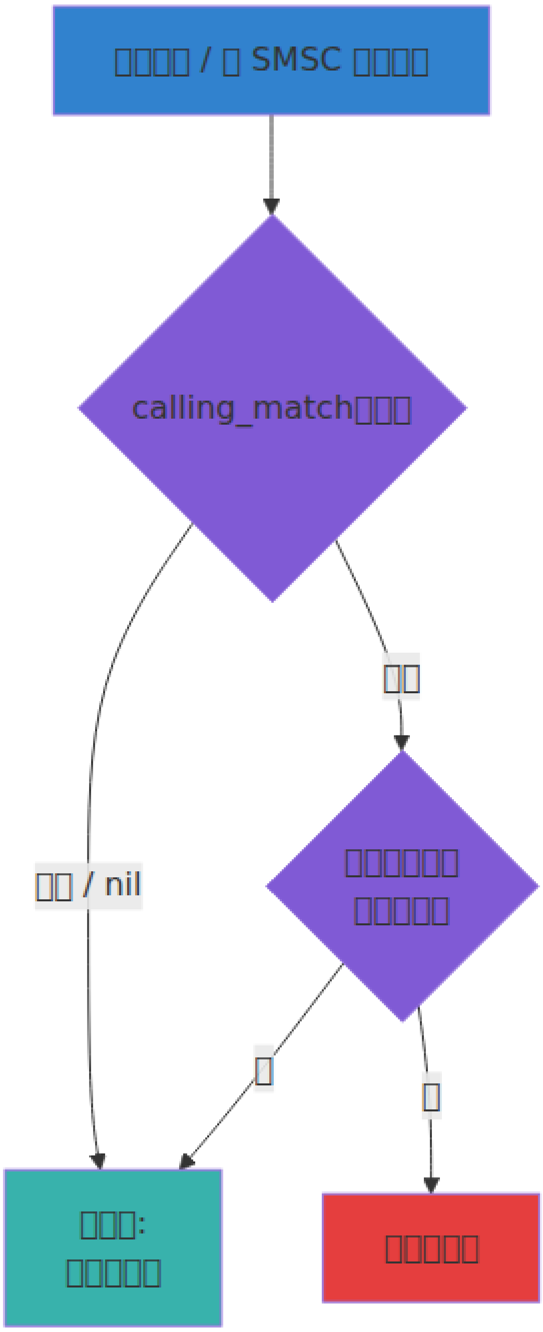
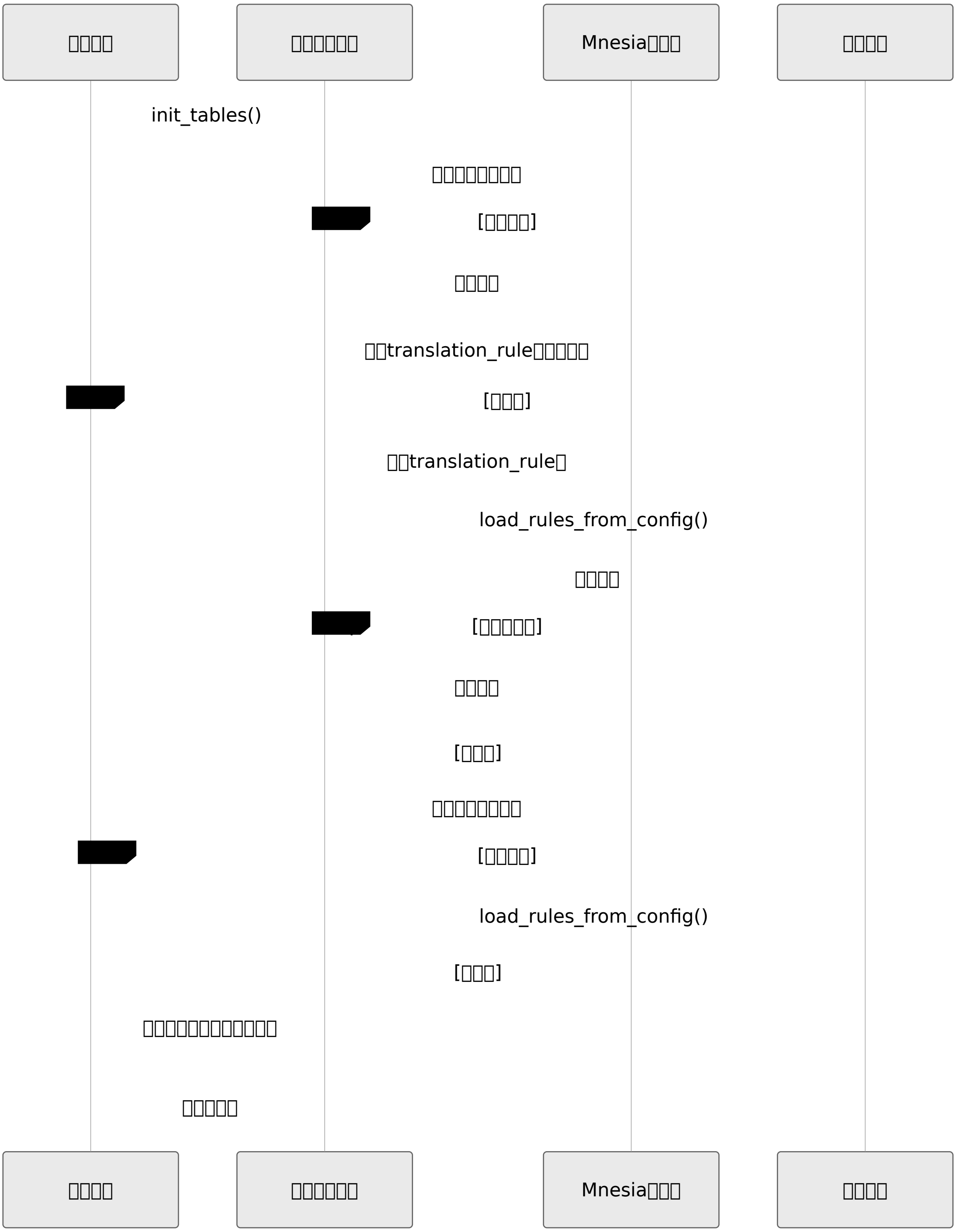

[illegible] / [illegible] SMSC [illegible]
calling_match[illegible]
[illegible] / nil
[illegible]:

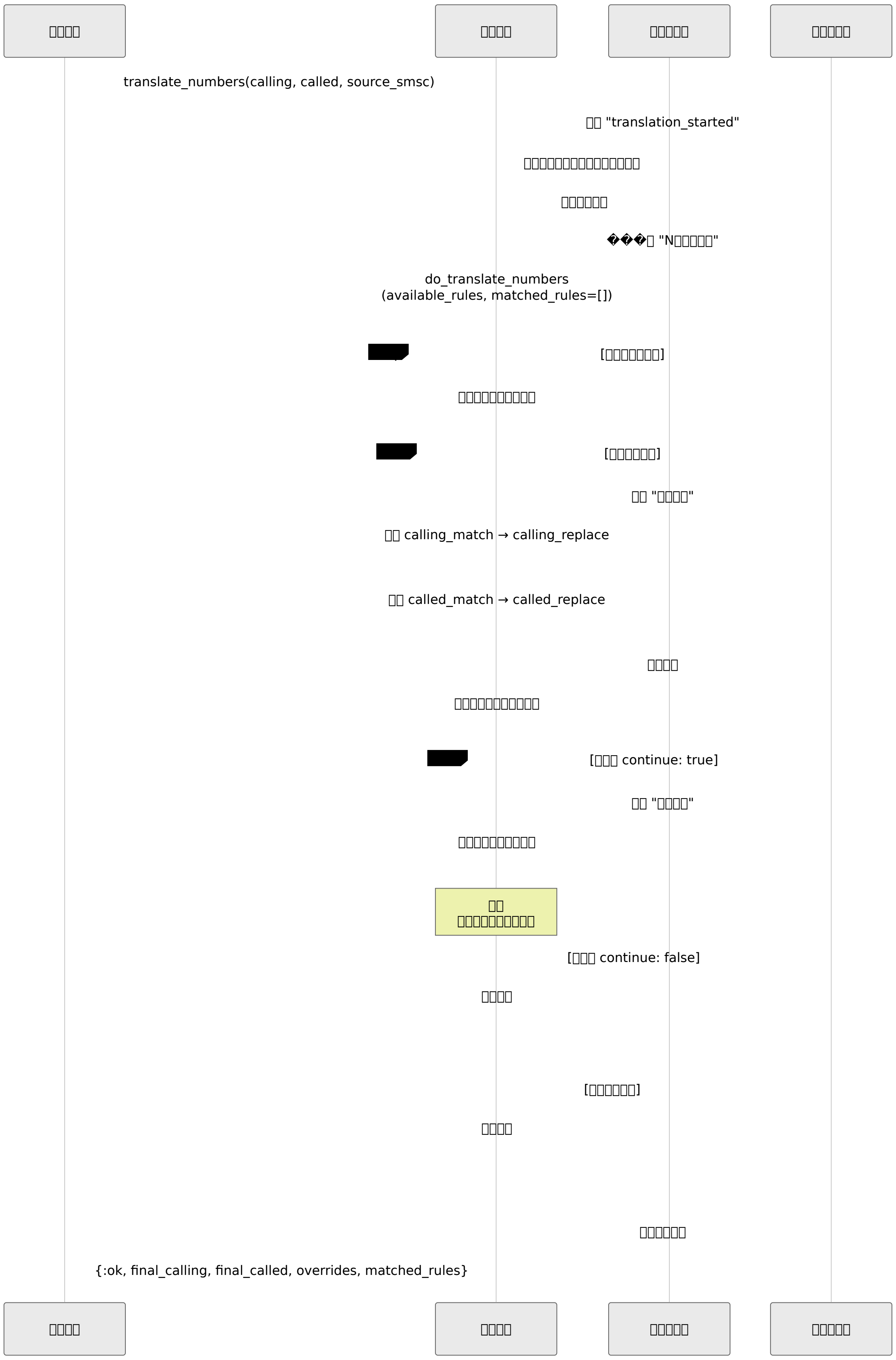
[illegible]

```
# 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: "□□□□□SMSC□10□□□□□□□+1",
    enabled: true,
    continue: false
  },

  # □□□□□□□□□□□
  %{
    calling_prefix: "00",
    called_prefix: nil,
    source_smsc: nil,
    calling_match: "^00(.+)$",
    calling_replace: "+\1",
    called_match: nil,
    called_replace: nil,
    priority: 5,
    description: "□00□□□□□□□+",
    enabled: true,
    continue: true  # □□□□□□□□
  },

  # □□□□□□□□□unknown/unknown TON/NPI□□□□□□□□□
  %{
    calling_match: "^\d{3,6}$",
    calling_replace: nil,
    source_ton: "unknown",
    source_npi: "unknown",
    priority: 6,
    description: "□□□□3-6□□=> unknown/unknown TON/NPI",
    enabled: true,
    continue: true
  },
  # □□□□□□□□□□□□
  %{
    calling_prefix: "+44",
    called_prefix: "+44",
    source_smsc: nil,
    calling_match: "^\+44(.*)$",
    calling_replace: "0044\1",
    called_match: "^\+44(.*)$",
    called_replace: "0044\1",
    priority: 20,
    description: "□□□□□□□□□□□□",
    enabled: true,
    continue: false
  }
]
```

[illegible]

[illegible]


Mnesia
init_tables()
translation_rule
translation_rule
load_rules_from_config()
load_rules_from_config()
Mnesia


translate_numbers(calling, called, source_smsc)
"translation_started"
"N
do_translate_numbers
(available_rules, matched_rules=[])
calling_match → calling_replace
called_match → called_replace
continue: true]
continue: false]
{:ok, final_calling, final_called, overrides, matched_rules}

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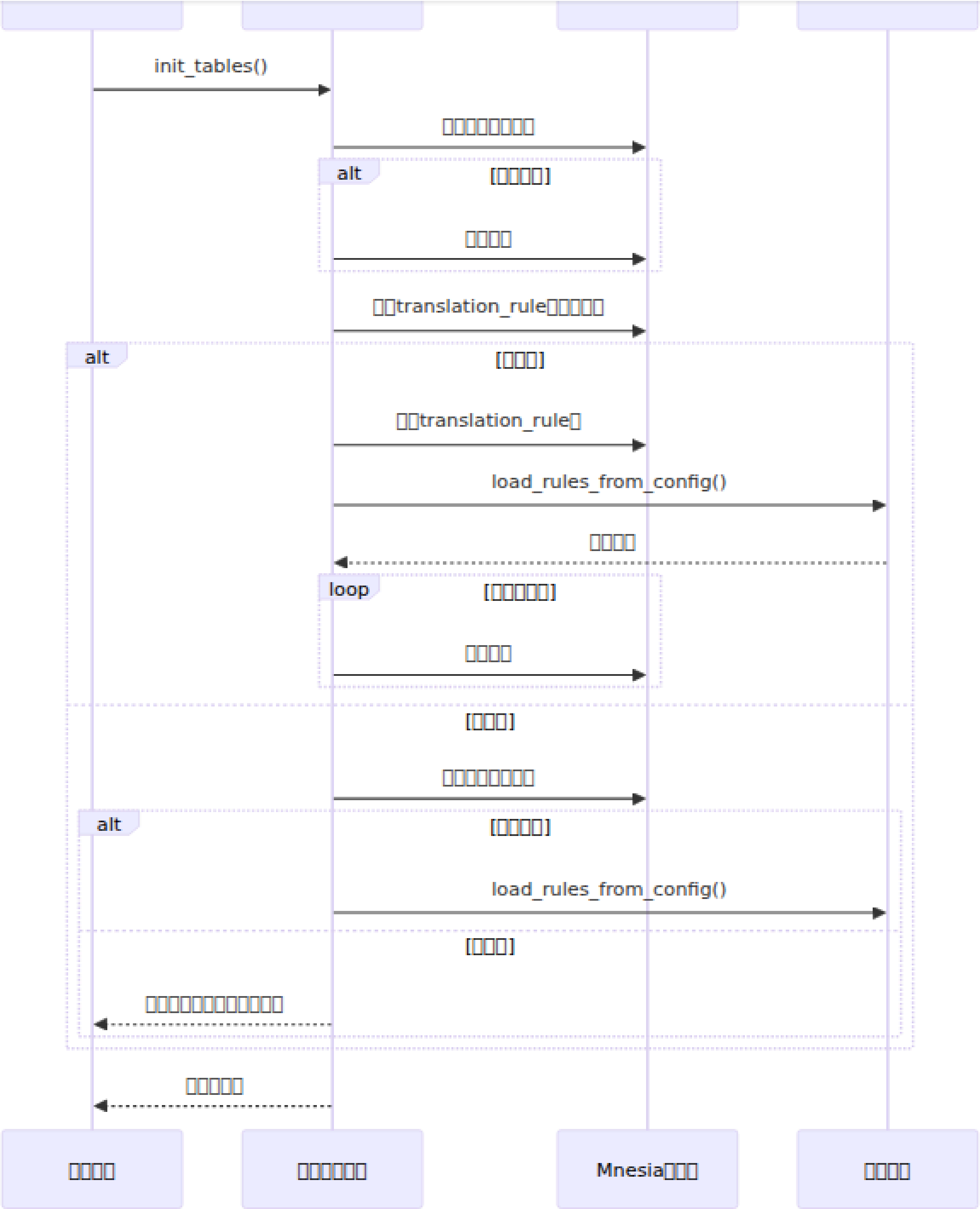
□□□□□□□□□□□□E.164□


init_tables()
□□□□□□□□
alt
[□□□□]
□□□□
□□translation_rule□□□□□
alt
[□□□]
□□translation_rule□
load_rules_from_config()
□□□□
loop
[□□□□□]
□□□□
[□□□]
□□□□□□□□
alt
[□□□□]
load_rules_from_config()
[□□□]
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Mnesia□□□
□□□□

[illegible]

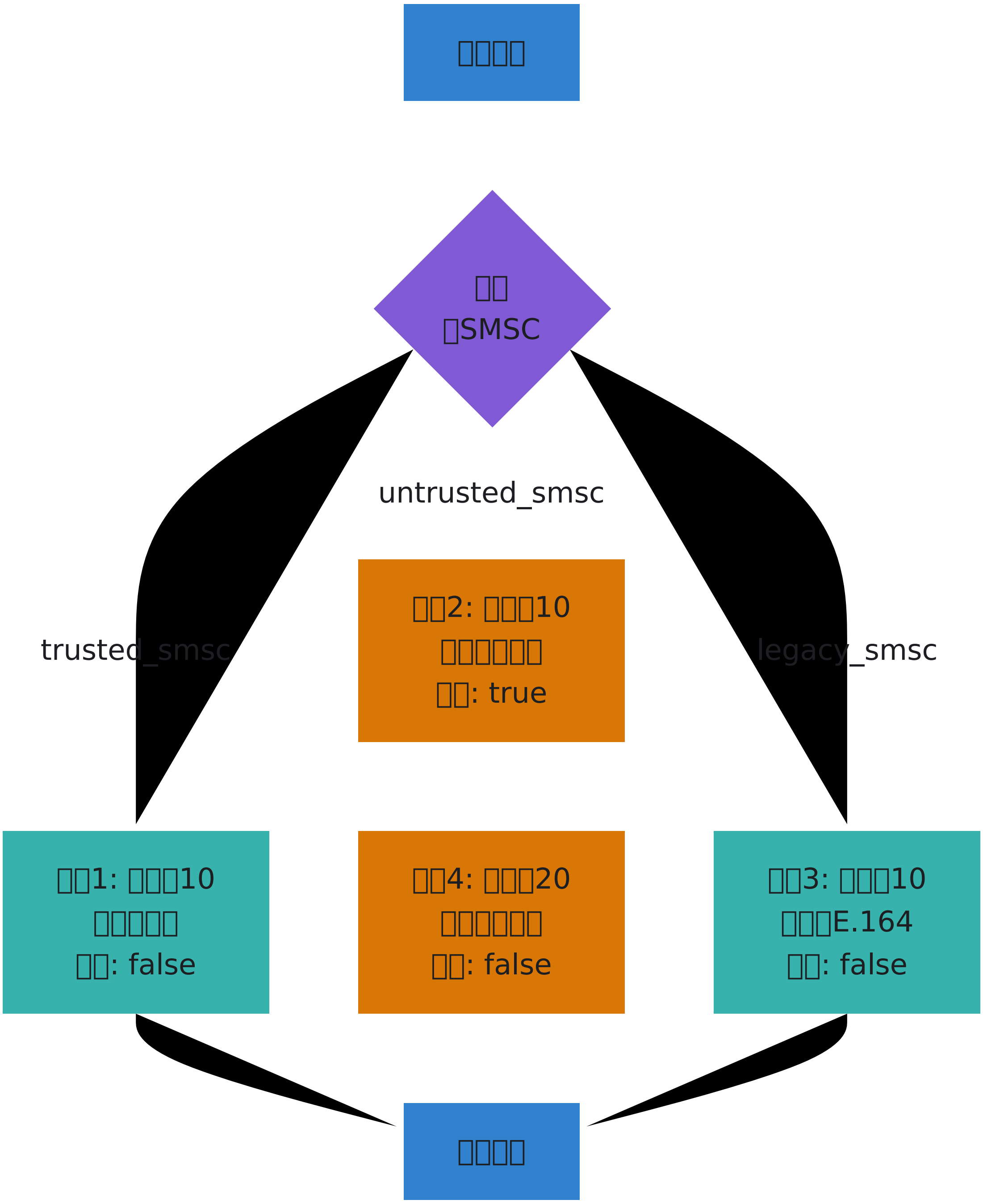
[illegible]

```
Parse error on line 2: ...chart TD I[[illegible]: "5551234567"] --> S1[ ----------------------
^ Expecting 'SQE', 'DOUBLECIRCLEEND', 'PE', '-)', 'STADIUMEND',
'SUBROUTINEEND', 'PIPE', 'CYLINDEREND', 'DIAMOND_STOP', 'TAGEND',
'TRAPEND', 'INVTRAPEND', 'UNICODE_TEXT', 'TEXT', 'TAGSTART', got 'STR'
```

[illegible]

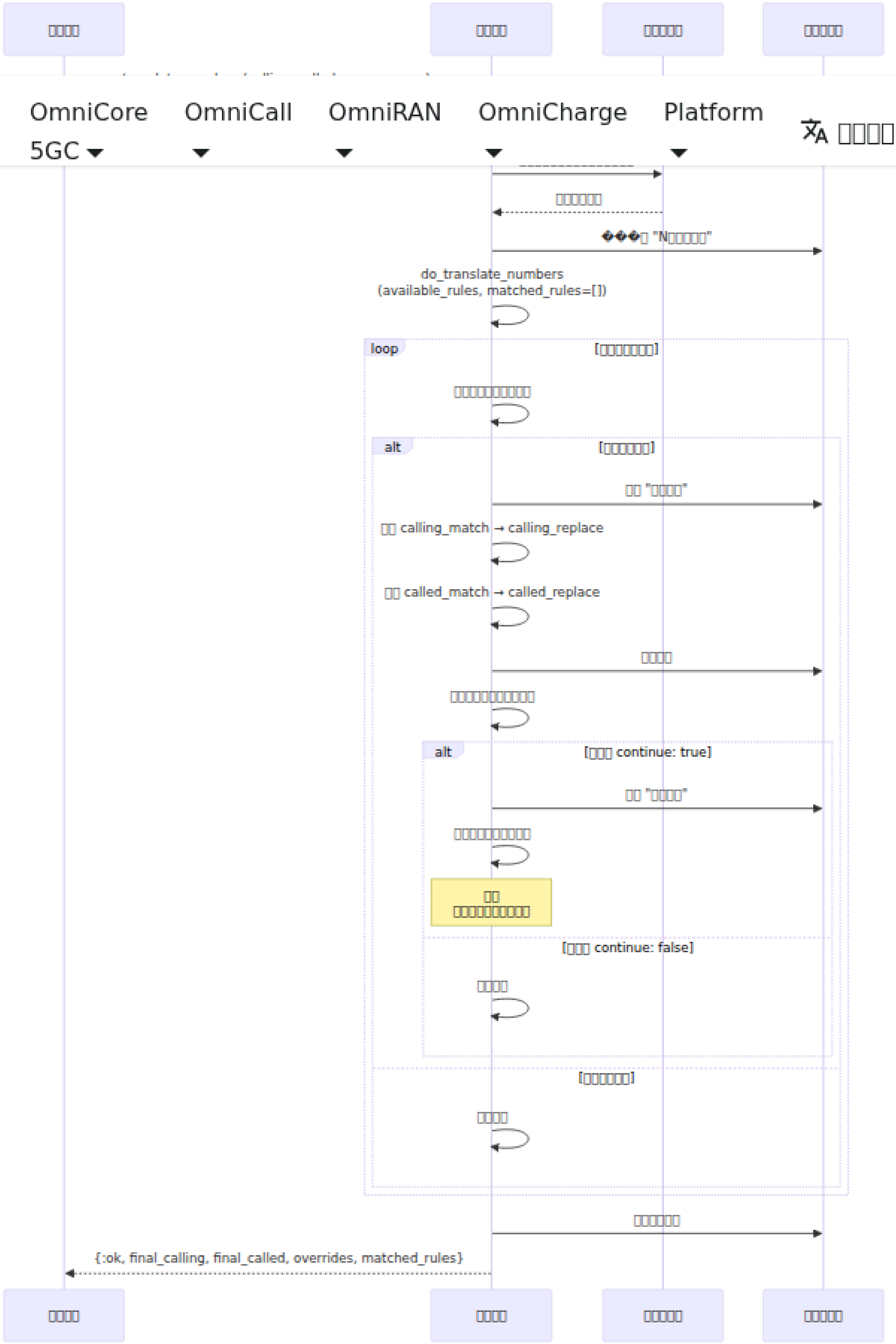
SMSC[illegible]

[illegible]


[illegible]
[illegible]
[illegible]SMSC
untrusted_smsc
trusted_smsc
legacy_smsc
[illegible]2: [illegible]10
[illegible]
[illegible]: true
[illegible]1: [illegible]10
[illegible]
[illegible]: false
[illegible]4: [illegible]20
[illegible]
[illegible]: false
[illegible]3: [illegible]10
[illegible]E.164
[illegible]: false
[illegible]

[illegible]

[illegible]


do_translate_numbers
(available_rules, matched_rules=[])
loop
alt
calling_match → calling_replace
called_match → called_replace
alt
continue: true
continue: false
{:ok, final_calling, final_called, overrides, matched_rules}

□□□□□□□��

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Parse error on line 18: ... style Input fill:#3182CE style R ----------------------^ Expecting 'SOLID_OPEN_ARROW', 'DOTTED_OPEN_ARROW', 'SOLID_ARROW', 'BIDIRECTIONAL_SOLID_ARROW', 'DOTTED_ARROW', 'BIDIRECTIONAL_DOTTED_ARROW', 'SOLID_CROSS', 'DOTTED_CROSS', 'SOLID_POINT', 'DOTTED_POINT', got 'TXT'

□□

Web□□

□□□□□□UI

□`/number_translation`□□□□□□□□□□□□□□□□□

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- □□□□□□
- □□/□□□□□□□
- □□□□□□□
- □□`continue: true`□□□□□□□□□□
- □JSON□□□□/□□□□

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1. □□□□□□□□□□□
    - □□□��□□□□“+1”□“44”□
    - □□□□□□□□□□“+639”□“1555”□
    - □SMSC□□□□□□□□
2. □□□□□□□□□
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3. □□□□□□□□□□□□
    - □**TON / □NPI**□□□ - □□□□□□□□□□□/□□□□□□□□□□TPDU□□□□□□□□□□□□□□□□□□
    - □□□□□□□□□□□□□□□□□□□□□□□□□□□TON□□□□□□□□□□NPI□□
4. □□□□□□1-255□□□□□□□□□□□
5. □□□□□
    - □□□□□□□□□□□
    - □□□□□□□□□□□□□□□□□□□
6. □□□□
7. □□“□□□□”□“□□□□”

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- □□□□□□□□□□□□□□□“↓ □□”□□

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1. □□□□□□□“□□”
2. □□□□□□□□
3. □□“□□□□”

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- □□/□□□□□□□□□□
- ↓ □□□□□□□□□□□□□□
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□`/translation_simulator`□□□□□□□□□□□□□

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- □□□□□□□□□□□

- [illegible]
- [illegible]
- [illegible]
- [illegible]
- [illegible]10[illegible]

[illegible]

1. [illegible]
    - [illegible]
    - [illegible]
    - [illegible]SMSC[illegible]
2. [illegible]“[illegible]”
3. [illegible]
    - [illegible]
    - [illegible]
    - [illegible]
        - [illegible]
        - [illegible]
        - [illegible]
        - [illegible]“↓ [illegible]”[illegible]
        - [illegible]
        - [illegible]“[illegible]”
4. [illegible]
5. [illegible]

[illegible]

```
□□□□
═══════════════════════════════════════════
□□□□:  5551234567 → +1-555-123-4567
□□□□:   5558720155 → +1-555-872-0155
✓ □3□□□□□

□□□□
═══════════════════════════════════════════
┌─ □□1 ────────────────────────────────┐
│ □□ #1 (□□□10)         ↓ □□ │
│ □10□□□□□□□□□         │
│                                          │
│ □□: 5558720155 → +15558720155       │
└──────────────────────────────────────────┘


┌─ □□2 ────────────────────────────────┐
│ □□ #2 (□□□20)         ↓ □□ │
│ □□□□□□□□□             │
│                                          │
│ □□: +15558720155 → +1-555-8720155   │
└──────────────────────────────────────────┘


┌─ □□3 ────────────────────────────────┐
│ □□ #3 (□□□30)                    │
│ □□□□□□□□             │
│                                          │
│ □□: +1-555-8720155 → +1-555-872-0155│
└──────────────────────────────────────────┘
```

API□□

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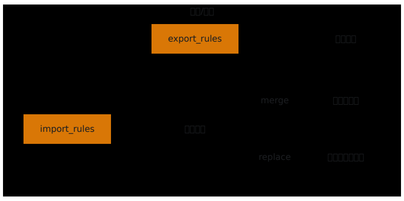
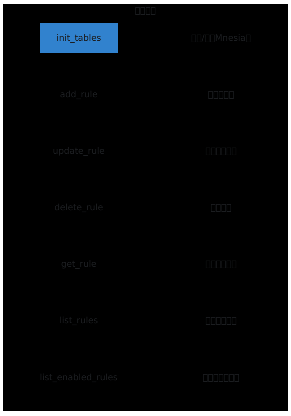


export_rules
import_rules
merge
replace

translate_numbers
□SMSC



init_tables
Mnesia
add_rule
update_rule
delete_rule
get_rule
list_rules
list_enabled_rules

□□□□

translate_numbers□□□□□□□

- `calling_number`□□□□□□□□□□□
- `called_number`□□□□□□□□□□□
- `source_smsc`□□□□□□SMSC□□□
- `message_id`□□□□□□□□□□□

□□□

- `{:ok, translated_calling, translated_called, overrides, [rules_applied]}` - □□□□
- `overrides`□□□□□`%{source_ton:, source_npi:}`□□□□□□□□□□□□□□□□`nil`□□□□□□□□□□□□□□□□□□
- □□□□□□□□□□□□□□□□□□□□
- □□□□□□□□□□□□□□□□

```
# □□□□
{:ok, new_calling, new_called, _overrides, rules} =
  NumberTranslation.translate_numbers(
    calling_number: "5551234567",
    called_number: "5558720155",
    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,
  source_smsc: "gateway1",
  calling_match: "^(\d{10})$",
  calling_replace: "+1\1",
  called_match: "^(\d{10})$",
  called_replace: "+1\1",
  priority: 10,
  description: "□10□□□□□+1",
  enabled: true,
  continue: false
})

# □□□□
{:ok, updated_rule} = NumberTranslation.update_rule(rule_id, %{
  enabled: false,
  description: "□□□□□"
})

# □□□□
:ok = NumberTranslation.delete_rule(rule_id)

# □□□□□□
rule = NumberTranslation.get_rule(rule_id)

# □□□□□□
all_rules = NumberTranslation.list_rules()

# □□□□□□□□□□□□□□□□
enabled_rules = NumberTranslation.list_enabled_rules()
```

[illegible]/[illegible]

```
# [illegible]
backup = NumberTranslation.export_rules()
# [illegible]: %{
#   version: "1.0",
#   exported_at: ~U[2024-01-15 10:30:00Z],
#   count: 5,
#   rules: [...]
# }

# [illegible]JSON[illegible]
json = Jason.encode!(backup, pretty: true)
File.write!("translation_rules_backup.json", json)

# [illegible]
{:ok, %{imported: 3, failed: 0}} =
  NumberTranslation.import_rules(backup, mode: :merge)

# [illegible]
{:ok, %{imported: 5, failed: 0}} =
  NumberTranslation.import_rules(backup, mode: :replace)
```

[illegible]

[illegible]

1. [illegible]
    - **1-10**[illegible]
    - **11-50**[illegible]
    - **51-100**[illegible]
    - **101+**[illegible]
2. [illegible]
    - [illegible]`continue: true`
    - [illegible]`continue: false`

   - [illegible]3-4[illegible]

3. [illegible]

   - [illegible]
   - [illegible]“5551234567 → +15551234567”[illegible]
   - [illegible]/[illegible]

4. [illegible]

   - [illegible]
   - [illegible]\1[illegible]\2[illegible]
   - [illegible]

[illegible]

1. [illegible]

   - [illegible]
   - [illegible]
   - [illegible]

2. [illegible]

   - [illegible]
   - [illegible]
   - [illegible]

3. [illegible]

   - [illegible]5[illegible]
   - [illegible]
   - [illegible]Telemetry[illegible]���[illegible]

���[illegible]

1. [illegible]

   - [illegible]

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    - □□□□□□□□

2. □□□□□

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    - □□□□□□□□□
    - □□□□□□□□□□□

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    - □□□□□□□

4. □□□□□

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    - □□□□□
    - □□□□□□□□

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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. □□□□□□□

    - [illegible]`\.`
    - [illegible]`\+`
    - [illegible]`\(`[illegible]`\)`

[illegible]

[illegible]

[illegible]

[illegible]

- [illegible]
- [illegible]SMSC[illegible]
- [illegible]
- [illegible]���[illegible]
- [illegible]continue: false[illegible]

[illegible]

1. [illegible]
2. [illegible]/[illegible]
3. [illegible]
4. [illegible]
5. [illegible]

[illegible]

[illegible]

[illegible]

- [illegible]
- [illegible]
- [illegible]\1[illegible]\2[illegible]

[illegible]

1. [illegible]
2. [illegible]
3. [illegible]
4. [illegible]
5. [illegible]

[illegible]/[illegible]

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- [illegible]
- [illegible]

[illegible]

1. [illegible]
2. [illegible]continue: true[illegible]
3. [illegible]
4. [illegible]
5. [illegible]

[illegible]

[illegible]

[illegible]

- [illegible]continue: true
- [illegible]
- [illegible]

[illegible]

1. [illegible]
2. [illegible]continue[illegible]
3. [illegible]
4. [illegible]continue: false

[illegible]

[illegible]

[illegible]

- [illegible]
- [illegible]
- [illegible]

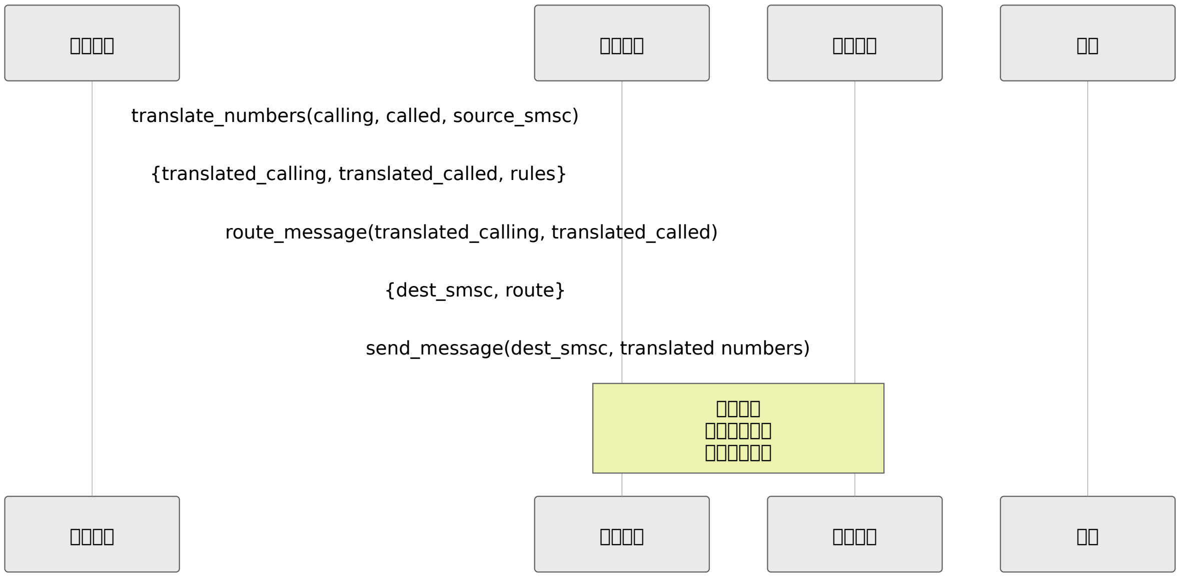
[illegible]

1. [illegible]
2. [illegible]
3. [illegible]
4. [illegible]translate_numbers

[illegible]

[illegible]

[illegible]


□□□□
□□□□
□□□□
□□
translate_numbers(calling, called, source_smsc)
{translated_calling, translated_called, rules}
route_message(translated_calling, translated_called)
{dest_smsc, route}
send_message(dest_smsc, translated numbers)
□□□□
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□□EventLogger□□□□□□□

- `translation_started`: □□□□
- `translation_candidates`: □□□□□□□
- `translation_matched`: □□□□□□□□
- `translation_calling`: □□□□□□
- `translation_called`: □□□□□□
- `translation_continue`: □□□□continue=true□□□□□
- `translation_none`: □□□□□□

□□□`message_id`□□□`translate_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
)
```

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- □□□□□□□p50□p95□p99□
- □□□□□□□□□
- □□□□□□□□□□□□
- continue□□□□□□□

□□

Mnesia□□□□□□□□□□□□□□□□□□□□□□□□□□□□□

```
Parse error on line 25: ... style New fill:#3182CE style P ---------------------^
Expecting 'SOLID_OPEN_ARROW', 'DOTTED_OPEN_ARROW', 'SOLID_ARROW',
'BIDIRECTIONAL_SOLID_ARROW', 'DOTTED_ARROW',
'BIDIRECTIONAL_DOTTED_ARROW', 'SOLID_CROSS', 'DOTTED_CROSS',
'SOLID_POINT', 'DOTTED_POINT', got 'TXT'
```

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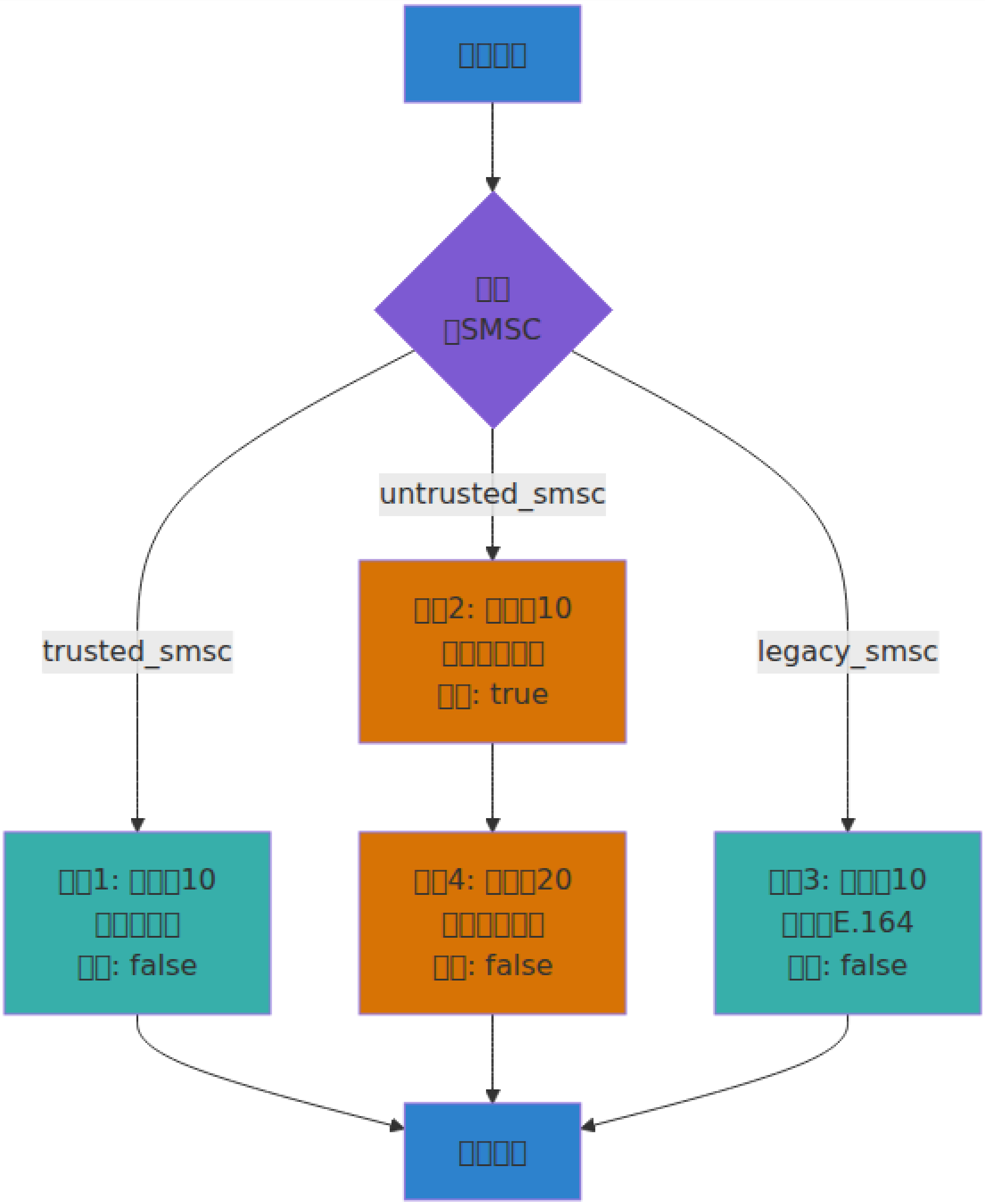

□□□□
□□
□SMSC
trusted_smsc
untrusted_smsc
legacy_smsc
□□2: □□□10
□□□□□□
□□: true
□□1: □□□10
□□□□□
□□: false
□□4: □□□20
□□□□□□
□□: false
□□3: □□□10
□□□E.164
□□: false
□□□□

□□

□□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
}
```

[illegible]4[illegible]

[illegible] → [illegible] → [illegible]

```
# □□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□□□□
# [illegible]: "+1-555-123-4567"
# [illegible]: [[illegible]1, [illegible]2, [illegible]3]
```

[illegible]

[illegible]

- [illegible]
- [illegible]
- [illegible]Mnesia[illegible]`:mnesia.table_info(:translation_rule, :size)`
- [illegible]Telemetry[illegible]

SMS-C [illegible]

← [illegible]

SMS-C [illegible]

[illegible]

- [illegible]
- [illegible]
- [illegible]
- [illegible]
- [illegible]
- [illegible]
- [illegible]
- [illegible]
- [illegible]
- [illegible]

[illegible]

[illegible]

[illegible]

1. [illegible]

```
# API [illegible]
curl https://api.example.com:8443/api/status

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

2. [illegible] Prometheus [illegible]

[illegible] Prometheus [illegible]

- [illegible] 24 [illegible]
- [illegible] < 1%[illegible]
- [illegible] < 1000 [illegible]
- [illegible] > 95%[illegible]
- [illegible]

3. [illegible]

[illegible] Web UI: `https://sms-admin.example.com/message_queue`

[illegible]

- [illegible]
- [illegible] < 5 [illegible]
- [illegible] > 3 [illegible]
- [illegible]

4. [illegible]

[illegible] Web UI: `https://sms-admin.example.com/frontend_status`

[illegible]

- [illegible]
- [illegible]
- [illegible] 24 [illegible]

5. [illegible]

[illegible] Web UI: `https://sms-admin.example.com/logs` [illegible]

[illegible]

- [illegible]
- [illegible]

- [illegible]
- [illegible]
- [illegible]

[illegible]

[illegible]

[illegible] Prometheus [illegible]

```
# [illegible]
increase(sms_c_message_received_count[1h])

# [illegible]
increase(sms_c_delivery_succeeded_count[1h])

# [illegible]
rate(sms_c_delivery_succeeded_count[1h]) /
rate(sms_c_message_received_count[1h])
```

[illegible]

- [illegible]
- [illegible]/[illegible]
- [illegible] > 95%

[illegible]

- [illegible]> 50% [illegible]
- [illegible]> 200% [illegible]
- ��[illegible] 90% [illegible]

[illegible]

[illegible]

[illegible]

□□□□□□ (`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`)□

- □□□□□□□□□□
- □□□□□ > 10,000
- □□□ `sms_c_queue_size_size`

□□□□□□ (`sms_c_queue_oldest_message_age_seconds`)□

- □□□□□□□□□□□□□
- □□□□□ > 300 □
- □□□ `sms_c_queue_oldest_message_age_seconds`

□□□□□

□□□□□□□□

1. □□□□□□□□□
    - □□□□□□5 □□□□
    - □□□□□□5 □□□□
    - □□□□□□□ 24 □□
2. □□□□□□□□□□
    - □□□□□□□
    - □□□□□□
    - □□□□□□
3. □□□□□□□□
    - □□□□□□□□
    - □□□□□□□□

    - □□□□□□□24□□

4. □□□□□□□□

    - □□ID
    - □□□□□□□□□□□
    - □□SMSC
    - □□□

5. □□□□□□□□

    - □□□□
    - □□□□□/□□□
    - □□□□
    - □□□□□□□□□□□

6. □□□□□□□□□□

    - API □□□□□p95□
    - □□□□□□□□p95□
    - ENUM □□□□□p95□

□□□□

□□□□□□□□□□□□□

```yaml
# ��□□□□ - □□□□□□
- alert: RoutingFailures
  expr: increase(sms_c_routing_failed_count[5m]) > 0
  severity: critical
  description: "{{ $value }} □□□□□ 5 □□□□□□□"

# □□□□ - □□□□
- alert: QueueBacklog
  expr: sms_c_queue_size_pending > 10000
  severity: critical
  description: "□□□ {{ $value }} □□□□□□"

# □□□□ - □□□□
- alert: OldMessagesInQueue
  expr: sms_c_queue_oldest_message_age_seconds > 300
  severity: critical
  description: "□□□□□ {{ $value }} □"

# □□□□ - □□□□□
- alert: FrontendDisconnected
  expr: sms_c_frontend_status_count{status="disconnected"} > 0
  severity: critical
  description: "{{ $value }} □□□□□□"
```

□□□□□□□□□□□

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

# □□□□□□
- alert: HighRetryRate
  expr: histogram_quantile(0.95,
sms_c_delivery_succeeded_attempt_count) > 2
  severity: warning
  description: "95th □□□□□□□□□{{ $value }}"

# ENUM □□□□□□□
- alert: SlowEnumLookups
  expr: histogram_quantile(0.95, sms_c_enum_lookup_stop_duration)
> 5000
  severity: warning
  description: "ENUM □□□□ > 5 □"

# 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
  severity: warning
  description: "ENUM □□□□□□{{ $value }}"
```

□□□□

□□□□□

□□□ ID□

1. **Web UI**□□□□ `/message_queue`
2. □□□□□□□□□ ID
3. □□□□□□□□□□□□□

[illegible] API[illegible]

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

[illegible]

1. **Web UI**[illegible] `/message_queue`
2. [illegible]
3. [illegible]

[illegible]

[illegible]

1. **Web UI**[illegible]“[illegible]”[illegible]
2. **API**[illegible] `GET /api/events/12345`

[illegible]

```
1. message_inserted - [illegible]
   ↓
2. number_translated - [illegible]
   ↓
3. message_routed - [illegible]
   ↓
4. charging_attempted - [illegible]
   ↓
5. message_delivered - [illegible]
```

[illegible]

```
1. message_inserted
   ↓
2. message_routed
   ↓
3. delivery_attempt_1 - □□□□□□□
   ↓
4. delivery_attempt_2 - □□□□□□□□2□□□□□
   ↓
5. delivery_attempt_3 - □□□□□□□□4□□□□□
   ↓
6. message_dead_letter - □□□□□□
```

□□□□□□

□□□□□

- □□□“queued”□□□□□□□□□“backoff”□□□□□□
- deliver_after□□□ `queued` □ nil/□□□□□ `backoff` □□□□□□
- delivery_attempts□□□□□□ `queued` □□□ 0□□□ `backoff` □□□□□

□□□□□□

- □□□“delivered”□□□□□□□“sent”□□□□□□□ DLR□
- deliver_time□□□□□□
- dest_smsc□□□□□□

□□□/□□□□□□

- □□□“backoff”□ delivery_attempts □□ - □□□□□□ 30 □□□□□□□□□□□□□ `expires` □□□□
- □□□“expired”□“dropped”□“balance_rejected”□“auto_replied” - □□□□
- □□□□□□□□□□□□□

□□□□□□□□□

SMS-C □□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□

□□□□□

[illegible] `get_messages_for_smsc(smsc_name)` [illegible]��[illegible]

1. [illegible] - `dest_smsc` [illegible]
2. [illegible] - [illegible]
   - `dest_smsc` [illegible] `null`[illegible]
   - `destination_msisdn` [illegible]
   - [illegible] `location` [illegible]
   - [illegible]

[illegible]

[illegible] MSISDN [illegible] `+447700900123` [illegible] `uk_gateway` [illegible]

```
# [illegible]
POST /api/locations
{
  "msisdn": "+447700900123",
  "imsi": "234150123456789",
  "location": "uk_gateway",
  "expires": "2025-11-01T12:00:00Z"
}
```

[illegible]

```
# [illegible] dest_smsc
POST /api/messages
{
  "source_msisdn": "+15551234567",
  "destination_msisdn": "+447700900123",
  "message_body": "Hello",
  "source_smsc": "api"
  # [illegible]dest_smsc [illegible] null
}
```

`uk_gateway` [illegible]

```
# □□□□□□
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. □□□□□
   - □□□□□□□□□□□□□□
   - □□□□□□□□□□□□□□□□□□□
   - □ **SMSC**□□□□□□□□□□□□□
   - □□ **SMSC**□□□□□□□□□□□□/□□□□□□□□
   - □□□□□□□□□□□□□□□□□□□□□□ Diameter/HSS□
   - □□□□□□□□□□1-255□□□□□□□□□□□
   - □□□□□□□□□□1-100□
   - □□□□□□□□□□
   - □□□□□□□□□□
4. □□“□□□□”

□□□□□□□□

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

□□□□□□□□□□

□□□□□□□□□□□□□□□□□□□

□□ 1□

- □□□□□ `+44`

- □□ SMSC□ `uk_primary`
- □□□□ 50
- □□□ 70
- □□□ "□□□□□□70%□"

□□ 2□

- □□□□□ `+44`
- □□ SMSC□ `uk_backup`
- □□□□ 50
- □□□ 30
- □���□ "□□□□□□□30%□"

□□□□□□□□□□□

□□□

- □ SMSC□ `carrier_smpp_bind`
- □□ SMSC□ `local_msc`
- □□□□□□□□□
- □□□□ 50
- □□□ 100
- □□□ "□□□ X - □□□□□"

□□□□□ Diameter/HSS□□□ HSS □□□□□□□□□□□□□□□□□

□□□□

□□□□□□

1. □□□ `/simulator`
2. □□□□□□□
    - □□□□□ `+15551234567`
    - □□□□□ `+447700900000`
    - □ SMSC□□□□□
    - □□□□□□□□

3. [illegible]“[illegible]”
4. [illegible]
    - [illegible]
    - [illegible]
    - [illegible]

[illegible]

- [illegible]
- [illegible]
- [illegible]
- [illegible]

[illegible]

Web UI[illegible]

1. [illegible] `/sms_routing`
2. [illegible]
3. [illegible]“[illegible]”
4. [illegible]
5. [illegible]“[illegible]”

[illegible]

- [illegible]“[illegible]”[illegible]
- [illegible]��[illegible]
- [illegible]
- [illegible] SMSC

[illegible]

Web UI[illegible]

1. [illegible] `/sms_routing`
2. [illegible]
3. [illegible]“[illegible]”

4. [illegible]

[illegible]

[illegible]/[illegible]

[illegible]

1. [illegible] `/sms_routing`
2. [illegible]“[illegible]”
3. [illegible] JSON [illegible]

[illegible]

1. [illegible] `/sms_routing`
2. [illegible]“[illegible]”
3. [illegible] JSON [illegible]
4. [illegible]
    - [illegible]
    - [illegible]

[illegible]

- [illegible]
- [illegible]
- [illegible]
- [illegible]

[illegible]

[illegible]

Web UI[illegible] `/frontend_status`

[illegible]

- [illegible]“[illegible]”

- [illegible]< 90 [illegible]
- [illegible]

[illegible] API[illegible]

```
# [illegible]
curl https://api.example.com:8443/api/frontends/active

# [illegible]
curl https://api.example.com:8443/api/frontends/stats
```

[illegible]

[illegible]

1. [illegible]
2. [illegible] SMS-C [illegible]
3. [illegible]
4. [illegible]��[illegible] 60 [illegible]

[illegible]

1. [illegible] POST `/api/frontends/register`
2. [illegible] API [illegible]
3. [illegible] JSON [illegible]
4. [illegible] curl [illegible]

[illegible]

```
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: "[illegible] A [illegible]",
  enabled: true
}
```

[illegible]

[illegible]

1. [illegible]
2. [illegible]/[illegible]
3. [illegible] `number_translated` [illegible]
4. [illegible]

[illegible]

[illegible] `enabled: false`[illegible]

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

[illegible]

[illegible]

[illegible]

[illegible]���[illegible]

[illegible] CDR [illegible]

- **MySQL/MariaDB**[illegible] `information_schema.tables` [illegible]
- **PostgreSQL**[illegible] `pg_database_size()` [illegible] psql [illegible] `\l+` [illegible]

[illegible] CDR [illegible]

[illegible]CDR [illegible]

- [illegible] 30-90 [illegible]
- [illegible]
- [illegible]

[illegible]

[illegible]

- **MySQL/MariaDB**[illegible] `OPTIMIZE TABLE` [illegible]
- **PostgreSQL**[illegible] `VACUUM ANALYZE`[illegible] autovacuum[illegible]

[illegible]

Mnesia [illegible]

[illegible] Mnesia [illegible]

```
# [illegible] IEx [illegible]
:mnesia.table_info(:sms_route, :size)
:mnesia.table_info(:translation_rule, :size)
```

[illegible] Mnesia [illegible]

```
# □□□□□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 omnimessage || true
    endscript
}
```

□□□□□□

□□□□□□□□□□□□□□□

```
# □□□□□□□□
systemctl restart omnimessage

# □□□□□□□□
# □□□□□□□
```

□□□□□□□□□□

```
systemctl restart omnimessage
```

□□□□

- □□□□□□□□□□
- □□ Prometheus □□□□□□
- □□□□□□□□□
- □□□□□□□□

□□□□□

□□□□

1. □□□□□
   - `config/runtime.exs`
   - `config/config.exs`
   - `config/prod.exs`□□□□□□
2. □□□□Mnesia□□
   - □□ Web UI □□
   - □ Mnesia □□□□
3. **SQL CDR** □□□□
   - □□□□□□
   - □□□□□□□□□□

4. **TLS** [illegible]
    - `priv/cert/*.crt`
    - `priv/cert/*.key`

[illegible]

[illegible]

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

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

# [illegible]
cp -r /opt/omnimessage/config $BACKUP_DIR/

# [illegible]
cp -r /opt/omnimessage/priv/cert $BACKUP_DIR/

# [illegible]
chmod 600 $BACKUP_DIR/cert/*

echo "[illegible]$BACKUP_DIR"
```

[illegible]

```
#!/bin/bash
# /opt/omnimessage/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/omnimessage/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□□

```
# [illegible] 2 [illegible]
0 2 * * * /opt/omnimessage/scripts/backup_config.sh
0 2 * * * /opt/omnimessage/scripts/backup_database.sh
0 2 * * * /opt/omnimessage/scripts/backup_routes.sh
```

[illegible]

[illegible]

```
# [illegible]
systemctl stop omnimessage

# [illegible]
cp -r /var/backups/sms_c/20251030/config/*
/opt/omnimessage/config/

# [illegible]
cp -r /var/backups/sms_c/20251030/cert/*
/opt/omnimessage/priv/cert/

# [illegible]
systemctl start omnimessage
```

[illegible] SQL CDR [illegible]

[illegible]

- **MySQL/MariaDB**[illegible] mysql [illegible]
- **PostgreSQL**[illegible] pg_restore [illegible]

[illegible] SMS-C [illegible]

[illegible]

1. [illegible] Web UI `/sms_routing`
2. [illegible]“[illegible]”
3. [illegible] JSON [illegible]
4. [illegible]“[illegible]”[illegible]

5. □□□□

□□□□

□□□□□□

□□□□□□

Prometheus □□□30 □□□□□

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

□□□□□□□

```sql
-- □□□□□□
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;
```

□□□□

CPU □□□□

- □□□< 50% □□
- □□> 70% □□
- □□□> 90%

□□□□□□

- □□□< 70% □□
- □□> 80%

- □□□> 90%

□□□□□□

- □□□< 60% □□
- □□> 75%
- □□□> 85%

□□□□□

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

□□□□

□□□□□□□□□□□□□□□

- CPU □□ > 70%
- □□□□ > 80%
- □□□□□

□□□□□□□□□□□□□□□

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

□□□□□□

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

[illegible]

[illegible]

[illegible]

- [illegible]
- [illegible]
- [illegible]
- API [illegible]

[illegible]1 [illegible]

- [illegible] < 80%
- [illegible]
- [illegible] > 10%
- [illegible]

[illegible]4 [illegible]

- [illegible]
- [illegible]�� 80-95%
- [illegible]
- ENUM [illegible]

[illegible]24 [illegible]

- [illegible]
- [illegible]
- [illegible]

[illegible]

1. [illegible]

- [illegible] Prometheus [illegible]
- [illegible]

- [illegible]
- [illegible]

2. [illegible]

- [illegible]
- [illegible]
- [illegible]OCS[illegible]DNS[illegible]
- [illegible]

3. [illegible]

- [illegible]
- [illegible]
- [illegible]
- [illegible]

4. [illegible]

- [illegible]
- [illegible]
- [illegible]
- [illegible]

5. [illegible]

- [illegible]
- [illegible]
- [illegible]
- [illegible]

6. [illegible]

- [illegible]
- [illegible]/[illegible]
- [illegible]
- [illegible]

[illegible]

[illegible]

1. [illegible]
2. [illegible]
3. [illegible]
4. [illegible] Prometheus [illegible]
5. [illegible]/[illegible]

[illegible]

1. [illegible]
2. [illegible]
3. [illegible]
4. [illegible]
5. [illegible]���[illegible]

[illegible]

1. [illegible]
2. [illegible]
3. [illegible]
4. [illegible] API [illegible]
5. [illegible]

[illegible]

1. [illegible]
2. [illegible]
3. [illegible]CPU/[illegible]
4. [illegible] ENUM [illegible]
5. [illegible]

[illegible] [illegible].

[illegible]

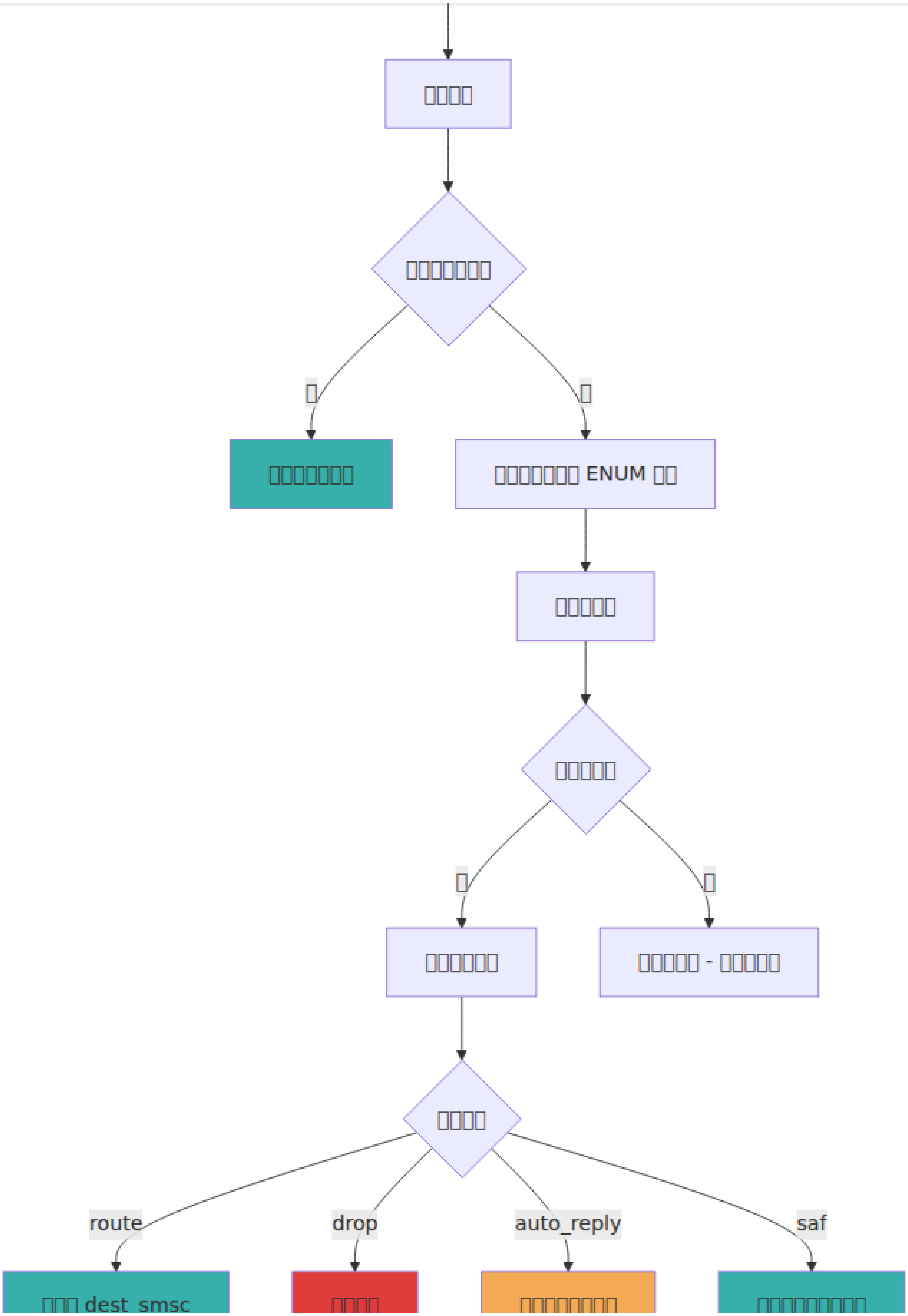
← [illegible]

[illegible]

SMS-C [illegible]Mnesia [illegible] API [illegible]ENUM[illegible]DNS NAPTR[illegible] HSS [illegible]/[illegible]

[illegible]

[illegible]


ENUM
route
drop
auto_reply
saf
dest_smsc

[illegible]/[illegible]*[illegible]*[illegible]`originating_network` / `terminating_network`[illegible] - [illegible] [illegible] / [illegible][illegible]

[illegible]

1. [illegible] - [illegible]
2. [illegible] - [illegible]/[illegible] HSS [illegible]/[illegible]
3. [illegible] - [illegible]

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□□	□□	□□
`route_id`	□□	□□□□□□□□□□
`calling_regex`	□□□	□□□□□□□□□□`nil` = □□□□
`called_regex`	□□□	□□□□□□□□□□□`nil` = □□□□
`source_smsc`	□□□	□ SMSC □□□`nil` = □□□□
`dest_smsc`	□□□	□□ SMSC□□□ `route` □□□□□□□ `saf` □□□□□ `drop`/`auto_reply` □□□
`source_type`	□□□	□□□□□□□`ims`□`circuit_switched`□`smpp` □ `nil`
`enum_domain`	□□□	□□□ ENUM □□□□`nil` = □□□□□□□□□□□□□□□□□□□□ DNS □□□□□□ `enum_domains` □□ - □□□ ENUM □□
`enum_result_domain`	□□□	□□□□□□□□ ENUM NAPTR □□□□□□□□□□□□□□□`nil` = □□□□

□□	□□	□□
`action`	□□□	□□□□□`route`□`drop`□`auto_reply`□`saf`
`auto_reply_message`	□□□	□□□□□□□□□□ `auto_reply` □□□□
`charged`	□□□	□□□`yes`□`no`□`default`
`weight`	□□	□□□□□□□1–100□
`priority`	□□	□□□□1–255□□□□□□□□□□□
`description`	□□□	□□□□□□□
`enabled`	□□□	□□/□□□□□
`originating_network`	□□	□ MSISDN HSS □□□□□□□□`:any` | `:on_net` | `:off_net`□□□ `:any`□
`terminating_network`	□□	□□ MSISDN HSS □□□□□□□□`:any` | `:on_net` | `:off_net`□□□ `:any`□

□□□□

`action` □□□□□□□□□`:route`□`:drop`□`:auto_reply`□`:saf`□

`route`□□□□

□□□□□□ `dest_smsc`□□□□□□□□□□□

```
{
  "action": "route",
  "called_regex": "^61",
  "dest_smsc": "australia-gw",
  "priority": 100,
  "description": "□□□□□□□□□□ AU □□"
}
```

`drop`

□□□□□□□ `dest_smsc`□

```
{
  "action": "drop",
  "called_regex": "^900",
  "priority": 5,
  "description": "□□□□□□□"
}
```

`auto_reply`

□ `auto_reply_message` □□□□□□□□□□□□□□□□□□□□

```
{
  "action": "auto_reply",
  "called_regex": "^911$",
  "auto_reply_message": "□□□□□□□□□□□ 911□□□□ 911□",
  "priority": 1,
  "description": "911 □□□□"
}
```

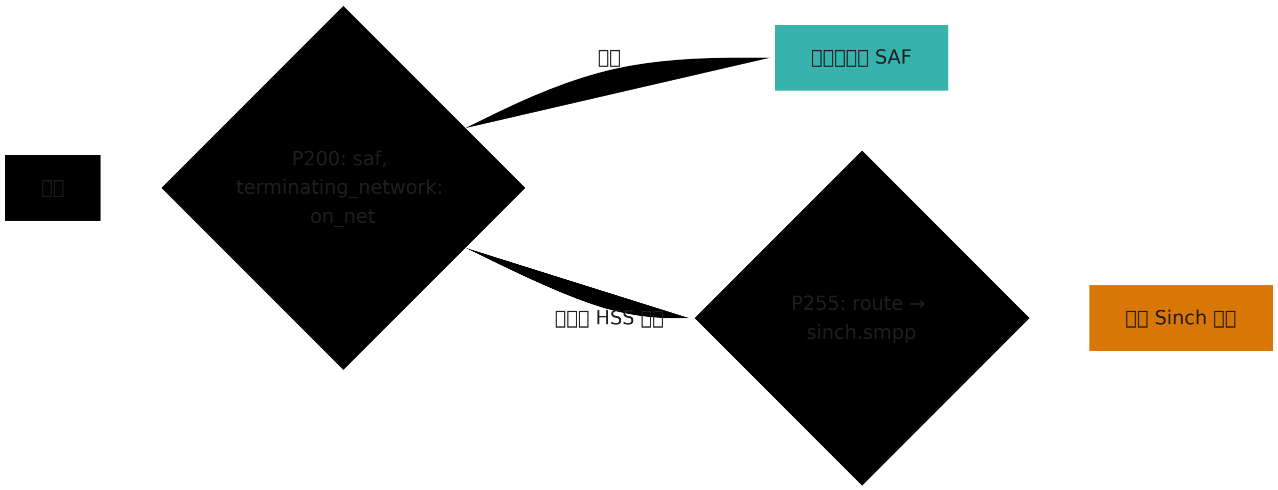
`saf`

□□□□□□□□□□□□□□□□□□□□□□□□□`dest_smsc` □□□□□□□□□□□□□□□□□□□□□□□□□□□

`saf` □□□□□□□ - □□□□ HSS □□□□□□□□□□□□□□□□□□□□ `saf` □ `terminating_network::on_net` □□□□□□□□□□□□□□□□□□□□□□□□

```
{
  "action": "saf",
  "terminating_network": "on_net",
  "priority": 200,
  "description": "□□□□□□□□□□□□□"
}
```

□□□□□□□□□ + □□□□


□□
P200: saf,
terminating_network:
on_net
□□
□□□□□ SAF
□□□ HSS □□
P255: route → sinch.smpp
□□ Sinch □□

P200 □□□□□□□□□□□*□□*□□□□□□□□□□□□□□ SAF□□□□□□□ HSS □□ - □□□□□□□□□□□□□□□□
P255 □□□□□□□□□□□□□□□□□□□□□

ENUM □□

ENUM □□□□□□□□□□□□□□ DNS E.164 NAPTR □□□□□□□□□□□□□□□□□□□□□□□□□□□ DNS □□□□□□ HSS□□□□□□□□□□□□□

□□□□

1. □□□□□ □□□ `enum_enabled: true` □ `enum_domains` □□□□ENUM □□□□□□□□□□□□ □□□□□□□□□□□□□□□□□□□ - □□□□□□□□
2. □□□ □□□□□□□□□□ ENUM □□□`+15551234` → `4.3.2.1.5.5.5.1.e164.arpa`□□□□□ NAPTR □□□`enum_domains` □□□□□□□□□□□□□□□□□□□□□□□□□□□
3. □□□□□□ □□□□□ NAPTR □□□□□□□□□ `result_domain` - `replacement` □□□□□□□□ □□□□ `sip:user@host` □□���□□□□`sip:+15551234@ims.example.com` → `example.com`□□
4. □□□ □□□ `enum_result_domain` □□□□□□□□□□ NAPTR □□□ `result_domain` □□□□ □□□□□□□□`enum_result_domain: nil` □□□□□□□□□□□□□□□□□ ENUM □□□□
5. □□□ □□□ ETS □□□ 15 □□□□ `(number, domain)`□□□□□□□□□□□□□□□□□□□□□ DNS □ □□□□

□ ENUM □□□□/□□

ENUM □□□□□□□□/□□□□ - □□□□□□□□□□□□□□ `enum_result_domain` □□□□□□ IMS/□□□□ □□□“□□”□□□□□□□□□□□□□□□□□□ HSS □□□□□□□□□□□□□□□□□□□□□/□□□□□

ENUM □□□□□

- □□ NAPTR □□□`enum_result`□□□□□□□□□□□□□□□□□□□ URI □□□□□□□□ - □□□□□□□□□ □ `route.dest_smsc` □□□□□□□□□□□□□□□□□□ ENUM □□□
- □□□□ `enum_domain` □□□□□ DNS □□□□□□□□□□□ `enum_domains` □□□□□□□□□□□□□ □□□ □□□□□ □□□

□□

ENUM DNS □□□`enum_enabled`□`enum_domains`□`enum_dns_servers`□ `enum_timeout`□□□□□□□ - □□□ CONFIGURATION.md → ENUM □□□

□□ / □□□□

Diameter Sh dip □ HSS □□□ □□□□□□□□□□□□□□□□□□/SMSC/□□□□□□□□□□□□□□□□□□□□□□□□□

`originating_network` / `terminating_network`

□□□□□□□□□

□	□□
`:any`	□ HSS □□□□□□□□□□□□□□
`:on_net`	□□ MSISDN □□□□□□□□□□，HSS □□□□□□□□□ 2001□
`:off_net`	□□ MSISDN □□□□□□□□□□，HSS □□ *□□□□*□□□□□ 5001□

- `originating_network` □□□□□□□`terminating_network` □□□□□□□
- □□□□□□□□□□□□□□□□`terminating_network: :on_net`□□□□ SMPP □□□□□□□□□ □□□□□□□□`originating_network: :on_net`□□□□□□□□□□□□□□□ □`terminating_network: :off_net`□□

□□□□□

□□□□□ `:any` □□��□□□ HSS □□□□□□□□□□□□□□□□□□□□□□□□□□□□

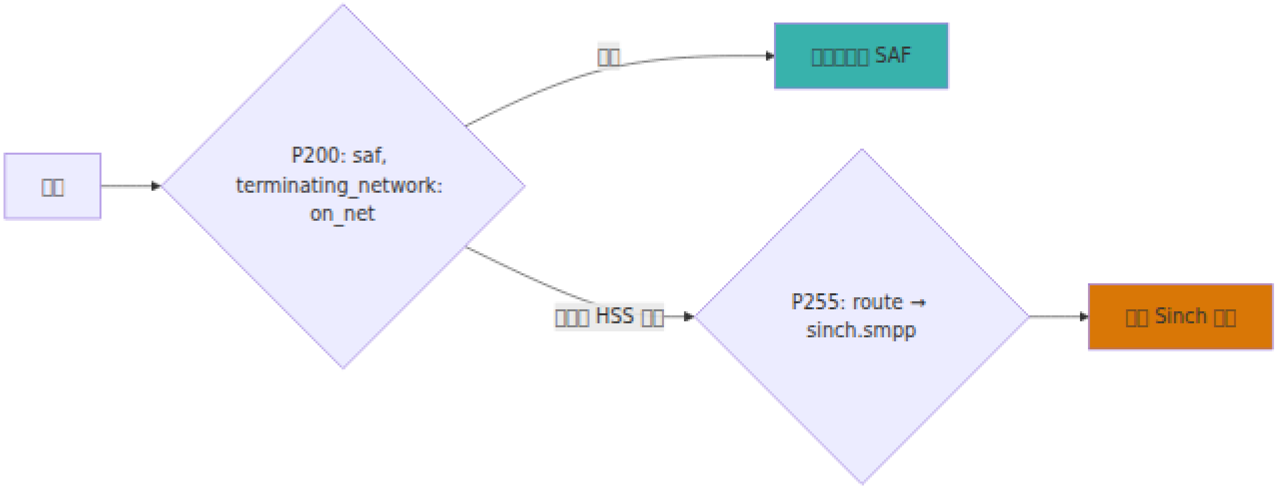
- Diameter □□ → □□□□□
- HSS □□□□ / □□ / □□□□ → □□□□□
- HSS □□□ *□□□□* □□□□□ → □□□□□

□□□□□□□ `:off_net` □□□□□□□□□□□□□ *□□□□*□5001□□□□□□□□□□□□□□□□□□□□□ HSS □□□ □□□□□□□□□□□□□

HSS □□□□

HSS □□□□□□□□□ Diameter □□□□□□□ MSISDN □□□□□□□□□□□□

- □□ **TTL**□2 □□□□□□ `hss_cache_ttl_seconds` □□□
- □□□□□□□□□□□□□□□ `originating_network` □ `terminating_network` □□□ `:on_net` □ `:off_net` □□□□□ HSS□□□□□□□ `:any` □□□□□□□□□□
- □□□□□□□□□□□□□□□□ MSISDN □□□□□□□□□□ HSS □□
- □□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□


□□
P200: saf, terminating_network: on_net
□□
□□□□□ SAF
□□□ HSS □□
P255: route → sinch.smpp
□□ Sinch □□

□□□□□□

□□□□□□□□□□□□□□□□□□ `route_evaluated` □□□□□□□□

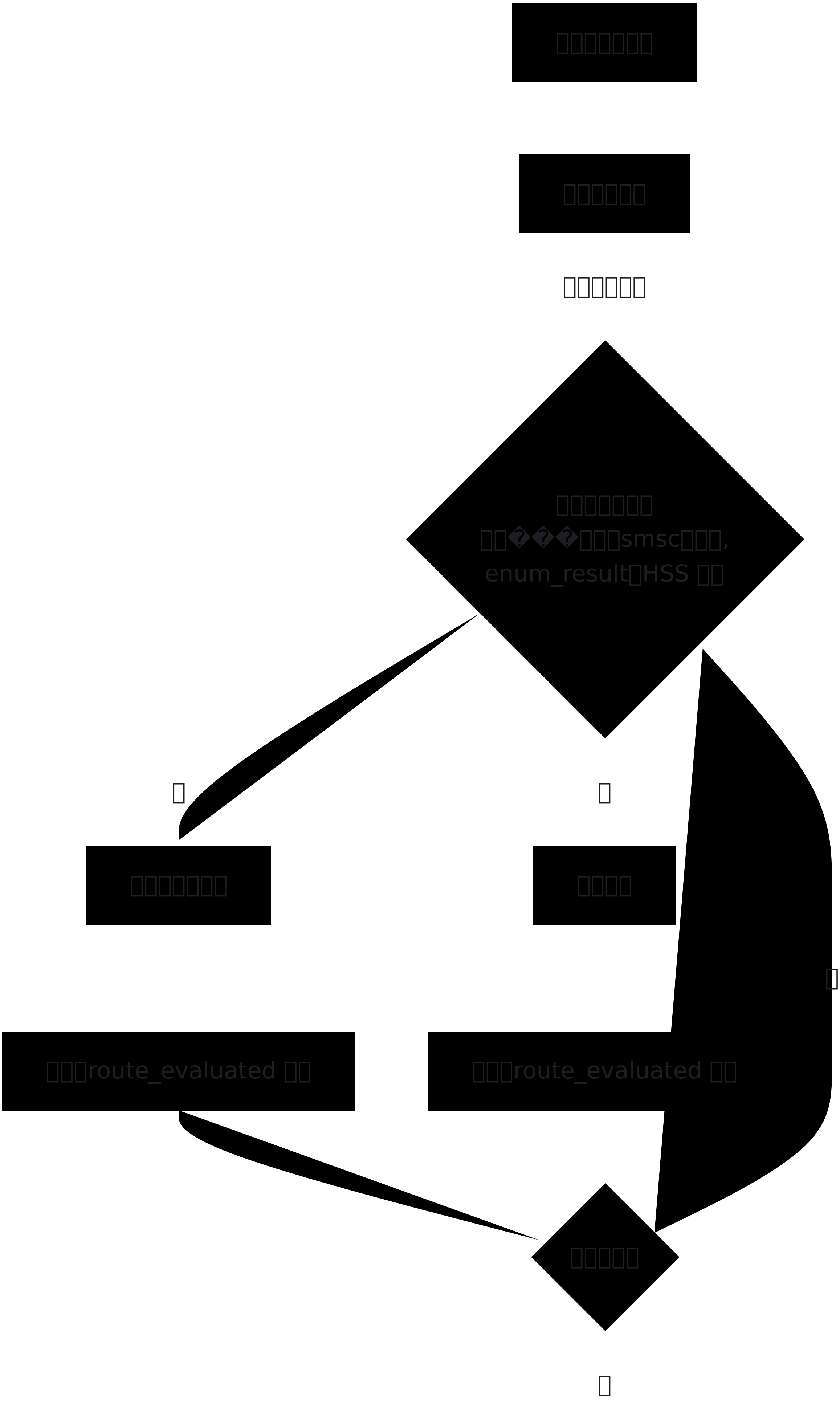
- □□ ID□□□□□□□
- □□□□□□□□□/□□□□□□□ `enum_result` □ `orig_network`/`term_network` HSS □□□
- □□□□□□□□□□□□□□□□□□□SMSC □□□□□□□□□□□□ HSS □□□□

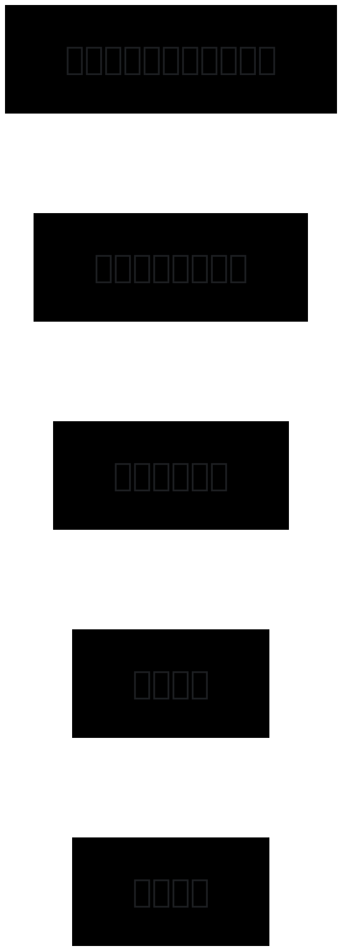
□□□□□□□□□

```
□□ #4 [saf] □□□P200 "□□□□" |
  calling_regex: ✓ (□□□), called_regex: ✓ (□□□),
  source_smsc: ✓ (□□□), source_type: ✓ (□□□),
  enum_result: ✓ (□□□),
  term_network: ✓ (□□□□□□□+15551234 □□)

□□ #3 [route] □□□P255 "Sinch □□" → sinch.smpp |
  calling_regex: ✓ (□□□), called_regex: ✓ (□□□),
  source_smsc: ✓ (□□□), source_type: ✗ (ims vs circuit_switched),
  enum_result: ✓ (□□□), term_network: ✓ (□□)
```

[illegible] API [illegible]


smsc
enum_result HSS
route_evaluated
route_evaluated



HSS [illegible]/[illegible] - [illegible] HSS [illegible]

[illegible]

[illegible]

[illegible]	[illegible]
`called_regex` [illegible]	[illegible] × 100
`calling_regex` [illegible]	[illegible] × 50
`source_smsc` [illegible]	+25
`enum_result_domain` [illegible]	+15
`source_type` [illegible]	+10
`enum_domain` [illegible]	+5

[illegible]

[illegible]

[illegible]

[illegible] `config/runtime.exs` [illegible] API [illegible]

```
config :sms_c, :sms_routes, [
  %{
    called_regex: ~r/^15555/,
    dest_smsc: "example-gw",
    action: :route,
    priority: 100,
    description: "□□□□□□"
  },
  %{
    action: :saf,
    terminating_network: :on_net,
    priority: 200,
    description: "□□□□□□□□□□□□"
  },
  %{
    action: :auto_reply,
    called_regex: ~r/^911$/,
    auto_reply_message: "□□□□□□ 911□",
    priority: 1,
    description: "911 □□□□"
  }
]
```

[illegible]

[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
`action`	[illegible]/[illegible]	[illegible]	`:route`	[illegible] [illegible]`:route`[illegible]`:drop`[illegible]`:auto_repl`
`calling_regex`	[illegible]	[illegible]	`nil`	[illegible]`nil` [illegible]
`called_regex`	[illegible]	[illegible]	`nil`	[illegible]`nil` [illegible]
`source_smsc`	[illegible]	[illegible]	`nil`	[illegible] SMSC [illegible]`nil` [illegible]
`dest_smsc`	[illegible]	[illegible]	`nil`	[illegible] `route` [illegible] `saf` [illegible] `drop`/`auto_reply` [illegible]
`source_type`	[illegible]	[illegible]	`nil`	[illegible] [illegible]`:ims`[illegible]`:circuit_switched`[illegible]
`enum_domain`	[illegible]	[illegible]	`nil`	[illegible] ENUM [illegible]

□□	□□	□□	□□	□□
`enum_result_domain`	□□□	□	`nil`	□□ ENUM NAPTR □□□□□□□□□`n` □□
`auto_reply_message`	□□□	□□□	`nil`	□□□□ `:auto_reply` □□□
`charged`	□□	□	`:default`	□□□□□`:yes`□`:no`□`:default`
`weight`	□□	□	`100`	□□□□□□1–100□
`priority`	□□	□	`100`	□□□□□1–255□□□□□□□□□
`description`	□□□	□	`""`	□□□□□□
`enabled`	□□□	□	`true`	□□□□□□□□
`originating_network`	□□	□	`:any`	□ MSISDN HSS □□□ □□`:any`□`:on_net`□`:off_net`
`terminating_network`	□□	□	`:any`	□□ MSISDN HSS □□□ □□`:any`□`:on_net`□`:off_net`

HSS [illegible]

[illegible]	[illegible]	[illegible]	[illegible]
`hss_cache_ttl_seconds`	[illegible]	`7200`	[illegible] HSS [illegible] `runtime.exs` [illegible]

API

[illegible]

```
POST /api/routes
```

```
{
  "action": "saf",
  "terminating_network": "on_net",
  "priority": 200,
  "description": "[illegible]"
}
```

[illegible]��[illegible]

```
GET /api/routes
```

[illegible]

```
PUT /api/routes/:id
```

□□□□

```
DELETE /api/routes/:id
```

□□/□□

```
POST /api/routes/import
GET /api/routes/export
```

□□□□ `merge`□□□□□□□□ `replace`□□□□□□□□□□□□

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□□□□□□□□□□□□□`dest_smsc: null`□□□□□□□ `sms_routing_failed`

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- □□□□□□□□□□□□□
- □□□□□□□□□□□□□□□□□□□□□□□□□□□□
- □□□□□□□□□□ HSS □□□□ `terminating_network`/`originating_network` □□□□□□□□□□□□□□ HSS □□□□□□□□□ `:any` □□□□

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1. □□□□□□□□□ - □□□□□□□□□□□□□□□□□□/□□□□□ HSS □□□□□
2. □□□□□□□□□□□□□□□□□□□□
3. □□□□□□□□□□□□□`originating_network: :any`□`terminating_network: :any`□□□□□□□□□□□□ 255□

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- □□□□ `terminating_network: :on_net` □□□□□□□□□□
- □□□□□□□□*□□*□□□□□□□□□□□□□□□
- HSS □□□□□□□ `hss_dip_error` / Sh □□□ - □□□□□□□□□□□□□□□□□□□□□□
- □□□□□□ Diameter

□□□□□

1. □□□□□□□□□□□□□□□□ `terminating_network: :on_net` □□
2. □□□□□□□□ Diameter □□□□□HSS □□□□□□□□
3. □□ HSS □□□□□□□□□□□□□□□□□

HSS □□□□

□□□□□□□□□□□□□□□□□□□□□□/□□□□□□□□

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1. □□ API □□□□□□ - □□□□□□□□ HSS □□
2. □□□□ TTL □□□□□□ 2 □□□
3. □□□□□□□□□□□□□ `hss_cache_ttl_seconds`

SMS-C [illegible]

← [illegible]

[illegible] SMS-C [illegible]

[illegible]

- [illegible]
- [illegible]
- [illegible]
- [illegible]
- [illegible]
- [illegible]
- [illegible]/[illegible]
- ENUM [illegible]
- [illegible]
- API [illegible]
- Web UI [illegible]
- [illegible]

[illegible]

[illegible]

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

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

# 3. [illegible]
tail -f /var/log/sms_c/application.log

# 4. [illegible]
systemctl status omnimessage

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

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

[illegible]

[illegible]

```
# [illegible] 100 [illegible]
tail -1000 /var/log/sms_c/application.log | grep "\[error\]"

# [illegible]
grep "routing_failed" /var/log/sms_c/application.log

# [illegible] SQL [illegible]
grep -i "database\|sql\|ecto" /var/log/sms_c/application.log |
grep error
```

[illegible]

```
# □□□□□□□□
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)
```

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□□□□□□

□□□

- □□□□ "queued"/"backoff" □□
- □□□□□□□□
- □□□□□□

□□□□□

1. □□□□□□□

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

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□□□□□□□□□□□□□□

2. □□□□□□□

□□ Web UI: `/message_queue`

- □□□□□□ "queued" □ "backoff"
- □□ `dest_smsc` □
- □□ `deliver_after` □□□□

3. □□□□□

□□ Web UI: `/simulator`

- □□□□□□□□□□□□
- □□□□□□□□□□□

4. □□□□□□□

□□□□□□□□□

- □□□□□□□ `/api/messages`□

- [illegible] `smsc` [illegible]

[illegible]

[illegible]

```
# [illegible]
systemctl status frontend_service

# [illegible] API
curl -k https://api.example.com:8443/api/status

# [illegible]
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"
  }'
```

[illegible] **SMSC**[illegible]

- [illegible]
- [illegible]
- [illegible]
- [illegible]���[illegible] `dest_smsc` [illegible]

[illegible]

- [illegible] `deliver_after` [illegible]
- [illegible]

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

[illegible]

[illegible]

- `delivery_attempts` [illegible]
- [illegible]> 3[illegible]
- [illegible]

[illegible]

1. [illegible]

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

[illegible]

- [illegible]
- [illegible]
- [illegible]

2. [illegible]

- [illegible]
- [illegible]
- [illegible]
- [illegible]

[illegible]

[illegible]

- [illegible]
- [illegible]

[illegible]

```
# □□□□□□□
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"}'
```

□□□□□□□□

- □□□□□□
- □□□□□□□□
- □□□□□□□□□□□□

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- □□□□ `deadletter: true`
- □□□□□□□□
- □□□□ "queued"/"backoff"□□□□□□□□□□□□□□□□□□□ `expires`□□□□□□□□□

□□□□□

1. □□□□□□□

□□ Web UI: `/message_queue`

- □□□□□□□
- □□□□□□□

2. □□□□□□□

- □□□□□□
- □□□□□□□□
- □□□□□□□□

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```
# □□□□□□□ 24 □□
curl -X PATCH https://api.example.com:8443/api/messages/12345 \
  -H "Content-Type: application/json" \
  -d '{"expires": "2025-10-31T12:00:00Z", "deadletter": false}'
```

□□□□

□□□□□

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- □□□ `no_route_found`
- `sms_c_routing_failed_count` □□□□
- □□□□□□ "routing_failed"

□□□□□

1. □□□□□□□□□

□□ Web UI: `/sms_routing`

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- □□□□□□□□□□□□□

2. □□□□□

□□ Web UI: `/simulator`

- □□□□□□□□□□□□□□□□□□ SMSC□
- □□□□□□
- □□□□□□□□□

3. □□□□□□□

- [illegible]
- [illegible] SMSC [illegible]
- [illegible]

[illegible]

[illegible]

[illegible]

```
[illegible]: ([illegible])
[illegible]: ([illegible])
[illegible] SMSC: ([illegible])
[illegible] SMSC: default_gateway
[illegible]: 255
[illegible]: 100
[illegible]: ✓
[illegible]: [illegible]
```

[illegible]

[illegible]

```
[illegible]: +
[illegible] SMSC: international_gateway
[illegible]: 200
[illegible]: 100
[illegible]: ✓
[illegible]: [illegible]
```

[illegible]

- [illegible] Web UI [illegible]
- [illegible]

[illegible]

[illegible]

- □□□□□□□□□□□
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- □□□□□□□□□□

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1. □□□□□□□□

□□ Web UI: `/simulator`

- □□□□□□□□□□□□
- □□ "□□□□" □□
- □□□□□□□□□□□

2. □□□□□□□□

- □□□□ = □□□□□
- □□□□□□□□□□
- □□□□□□□□□□□□

3. □□□□□□□□

□□□□□□

- □□□□□□□□□□□□ +100 □
- □□□□□□□□□□□□ +50 □
- □□□ SMSC□+25 □
- □□□□□□+10 □
- □□ ENUM □□+15 □

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```
[illegible]:
  [illegible]: +1555
  [illegible]: 10 ([illegible])

[illegible]:
  [illegible]: +1
  [illegible]: 50 ([illegible])
```

[illegible]

[illegible]

```
[illegible] (70%):
  [illegible]: 70

[illegible] (30%):
  [illegible]: 30
```

[illegible]

[illegible]

```
[illegible]:
  [illegible]: +15551234
  [illegible] SMSC: dedicated_gateway
  [illegible]: 1

[illegible]:
  [illegible]: +1
  [illegible] SMSC: general_gateway
  [illegible]: 50
```

[illegible]

[illegible]

- [illegible]
- [illegible]

- [illegible]

[illegible]

1. [illegible]

- `action: :auto_reply`
- `auto_reply_message` [illegible]
- [illegible]
- [illegible]

2. [illegible]

- [illegible]
- [illegible] "auto_reply" [illegible]

3. [illegible]

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

[illegible]

[illegible]

- [illegible]
- [illegible]
- [illegible]

[illegible]

��[illegible]

```
[illegible]: ✓
[illegible]: "[illegible]"
```

[illegible]

□□□□□□□□□□□□□□□□□□□

```
□□□□□□:
  □□□: 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 [illegible]
top -b -n 1 | grep sms_c

# [illegible]
ps aux | grep beam.smp
```

[illegible]

[illegible]

- [illegible]
- [illegible]
- [illegible]

ENUM [illegible]

- [illegible] DNS [illegible]
- [illegible]
- [illegible]/[illegible] DNS [illegible]
- [illegible] ENUM

[illegible]

- [illegible] OCS [illegible]
- [illegible] OCS [illegible]
- [illegible]���[illegible]
- [illegible]

[illegible]

- [illegible]
- [illegible]
- [illegible]
- [illegible]

[illegible]

```
# 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. □□□□□

```
# [illegible]
ecto_pools_query_time

# [illegible]
ecto_pools_queue_time
```

[illegible]

[illegible]

[illegible]

```
config :sms_c, SmsC.Repo,
  pool_size: 50  # [illegible] 20 [illegible]
```

[illegible]

[illegible]

```
config :sms_c,
  batch_insert_batch_size: 200,  # [illegible]
  batch_insert_flush_interval_ms: 200  # [illegible]
```

[illegible]

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

# NOT: /api/messages ([illegible])
```

[illegible]

[illegible]

- `sms_c_queue_size_pending` [illegible]
- [illegible]

- [illegible]

[illegible]

1. [illegible]

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

# [illegible]
rate(sms_c_delivery_succeeded_count[5m])
```

2. [illegible]

- [illegible]
- [illegible]
- [illegible]

3. [illegible]

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

[illegible]

[illegible]

- [illegible]
- [illegible] 5-10 [illegible]
- [illegible]

[illegible]

- [illegible]
- [illegible]
- [illegible]

[illegible]

- □□□□□□
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- □□□ "unable to connect to database"
- 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

# [illegible]
systemctl restart omnimessage
```

[illegible]

- [illegible]
- [illegible]
- [illegible] VPN/[illegible]

[illegible]

[illegible]

```
config :sms_c, SmsC.Repo,
  pool_size: 50  # [illegible]
```

[illegible]

[illegible]

- [illegible]
- API [illegible]
- [illegible]

[illegible]

1. [illegible]

```
-- 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. □□□□□□□□

```
-- □□□□□
SHOW INDEX FROM message_queues;

-- □□□□□
-- - source_smsc
-- - dest_smsc
-- - send_time
-- - inserted_at
```

3. □□□□□□□□

```
-- □□□ (MySQL/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';

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

[illegible]

[illegible]

```sql
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);
```

[illegible]

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

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

[illegible]

[illegible]

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

[illegible]

[illegible]

- [illegible] "Disk full"
- [illegible]

- □□□□□□

□□□□□

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 {} + | sort -rh | head -20

# □□□□□□ (PostgreSQL)
find /var/lib/postgresql -type f -exec du -h {} + | sort -rh |
head -20

# □□□□□□
du -sh /var/log/sms_c/*
```

□□□��□

□□□□□□

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

□□□□□

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

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

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- □□□□□□□□
- □□□□□□□□□
- □□□□□□□□□□□

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□□□□□□□□

□□□

- □□□□□□ "expired"
- □□□□□□□□□
- □□□□□□□□

□□□□□

1. □□□□□

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

2. □□□□□□□

- □□□□□□□ `/api/frontends/register`□
- □□□ API □□□□
- □□□□□□□ 60 □□□□

3. □□ **API** □□□

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

□□□□□

□□□□□□

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

□□□□□□□□□□□□□/□□□□

□□□□□

□□□ 90 □□□□□□□□ 60 □□□□□□

```
# □□□□ 60 □□□□□
while True:
    register_with_smsc()
    time.sleep(60)
```

□□□□□

- □□□□□□ API □□□□□□
- □□ DNS □□
- □□□□□□□□ curl

□□□□□□/□□

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- □□□□□□□/□□□□□□
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1. □□□□□□□

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- □□□□□□□□
- □□□□□CPU/□□□□

2. □□□□□□□□

```
# □□□□
ping -c 100 api.example.com

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

3. □□□□□□□

- □□□□□□□□□□□□
- □□□□□□□□□> 90 □□

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- □□□□□□□□□□
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□□□□□□

```
REGISTRATION_INTERVAL = 60  # □
```

□□□□ **Diameter Ro**□□□□□□□□□□□□□□ □□□□□OCS □□□□□□□ Diameter □□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□ `:balance_rejected`□□

□□□

- `sms_c_charging_failed_count` □□
- □□□□□□ "charging_failed" □ "balance_rejected"
- □□□□□□□ `:balance_rejected`□□□□□□□□□□□□□□ Diameter □□□□□

□□□□□

1. □□ **Diameter Ro** □□□□□□CER/CEA □□□□ DRA/OCS□□

```
# □□□□□□□
:diameter.service_info(:omnimessage, :connections)
```

2. □□□□□□□□ `:ro` □□□□□□

```
grep -E "diameter_enabled|application_name: :ro"
config/runtime.exs
```

□□□ `Charging requested but the Diameter Ro stack is not enabled/configured` □□□□□□□□□□□□□□ - □□□□□

3. □□□□□□□□□□□ OCS □□□□□□□□□□□□

```
grep rating_profile config/runtime.exs
```

□□□□□

OCS / DRA □□□□□

- □□ IP □□□□□□□ DRA □□□□□□□□ Diameter □□□□Origin-Host/Realm□□
- □□ CCR `Service-Context-Id`□`rating_profile`□□ OCS □ SMS □□□□□□□□□

□□□□□□□`config :sms_c, :charging`□□

```
config :sms_c, :charging,
  out_of_balance_action: :reject,    # □ :auto_reply
  out_of_balance_reply_text: "...",
  rating_profile: "sms@sms-c"
```

□□□□□□□

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

□□□□□□□

□□□□□

- □□□□□□□□□ OCS
- □□□□□□□□□
- □□□□□□□□□□□

□□□□

□□□

- `sms_c_charging_succeeded_duration` p95 > 500ms
- □□□□□□□□□□□
- □□□□□□□

□□□□□

1. □□□□□□□

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

2. □□ **OCS / DRA** □□□Diameter Ro □□□□□ `sms_c_charging_succeeded_duration` □□□□ OCS □□□□□□□□/□□□□ DRA □□□□

3. □□□ **DRA** □□□□□□

```
# Ping DRA / OCS □□
ping -c 10 dra01.example.com
```

□□□□□

OCS □□��

- □□ OCS □□
- □□ OCS □□
- □□□□□□□□□

□□□□□

- □ OCS □□□□□□ SMS-C
- □□□□□□□□
- □□□□□□□ VPN/□□

□□□□□□□

□□□□□

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

ENUM □□□□

ENUM □□□□

□□□

- `sms_c_enum_lookup_stop_duration` □□□□

- [illegible] ENUM [illegible]
- [illegible] `enum_result_domain` [illegible]

[illegible]

1. [illegible] **ENUM** [illegible]

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

2. [illegible] **DNS** [illegible]

```
# [illegible] DNS [illegible]
dig @8.8.8.8 e164.arpa

# [illegible] ENUM [illegible]
# [illegible] +15551234567[illegible]
dig @8.8.8.8 NAPTR 7.6.5.4.3.2.1.5.5.5.1.e164.arpa
```

3. [illegible] **DNS** [illegible]

```
# [illegible] DNS [illegible]
ping 10.0.1.53

# [illegible]
nc -zv 10.0.1.53 53
```

[illegible]

DNS [illegible]

[illegible] DNS[illegible]

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

ENUM [illegible]

[illegible]

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

[illegible]

[illegible]

```
config :sms_c,
  enum_timeout: 10000  # 10 [illegible]
```

[illegible] **ENUM**[illegible]

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

ENUM [illegible]

[illegible]

- [illegible]< 70%[illegible]
- [illegible]
- [illegible]

[illegible]

1. [illegible]

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

# [illegible]
sms_c_enum_cache_size_size
```

2. [illegible]

- [illegible]
- [illegible] TTL [illegible]

[illegible]

[illegible]

- [illegible]
- [illegible] < 70% [illegible]

[illegible]

[illegible] NAPTR [illegible]

[illegible]

- [illegible]
- [illegible]
- [illegible] TTL

[illegible]

[illegible]

[illegible]

- [illegible]
- [illegible]

- Erlang □□□□

□□□□□

1. □□□□□□□

```
# □ IEx □□□□
Node.self()
# □□□:sms@node1.example.com

Node.list()
# □□□□□□□□□□
```

2. **□□ Erlang Cookie□**

```
# □□ cookie □□
cat ~/.erlang.cookie

# □���□□□□□□□□
```

3. □□□□□

```
# □□□□□□□□□□□□
ping node2.example.com

# □□□□
nc -zv node2.example.com 4369
nc -zv node2.example.com 9100-9200
```

□□□□□

Cookie □□□□

□□□□□□□□□□□ cookie□

```
export ERLANG_COOKIE=same_secret_value_here

# [illegible] ~/.erlang.cookie
echo "same_secret_value_here" > ~/.erlang.cookie
chmod 400 ~/.erlang.cookie
```

[illegible]

[illegible]

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

# Erlang [illegible]
iptables -A INPUT -p tcp --dport 9100:9200 -j ACCEPT
```

DNS [illegible]

[illegible] IP [illegible]

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

[illegible]

[illegible]

- [illegible]
- [illegible]
- Mnesia [illegible]

[illegible]

1. [illegible]

```
# □□□□□□□IEx□
Node.list()
```

2. □□ **Mnesia□**

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

□□□□□

□□□□□□□

```
# □□□□□□
systemctl stop omnimessage

# □□□□□□□□
systemctl start omnimessage  # □ node1 □

# □□□□□□□□□□□□□□□□
systemctl start omnimessage  # □ node2 □
systemctl start omnimessage  # □ node3 □
```

Mnesia □□□□

- □□□□□□□□□□
- □□□□□□
- □□ Mnesia □□
- □□□□
- □□□□

API □□

API □□□□

□□□

- □□□□

- □□□□□
- □□□

□□□□□

1. □□ **API** □□□

```
# □□□□□□□□□□□
systemctl status omnimessage

# □□□□□□
netstat -tlnp | grep 8443
```

2. □□□□□□

```
# □□ iptables
iptables -L -n | grep 8443

# □□□□□□
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 omnimessage
```

□□□□□□

```
# [illegible] API [illegible]
iptables -A INPUT -p tcp --dport 8443 -j ACCEPT
```

[illegible]

[illegible]

[illegible]

[illegible]

```
grep "port:" config/runtime.exs
```

API [illegible] 500 [illegible]

[illegible]

- [illegible]���[illegible]
- 500 [illegible]
- [illegible]

[illegible]

1. [illegible]

```
tail -100 /var/log/sms_c/application.log | grep "\[error\]"
```

2. [illegible]

```
mysql -u sms_user -p -e "SELECT 1"
```

3. [illegible]

```
# □□
free -h

# CPU
top -b -n 1

# □□
df -h
```

□□□□□

□□□□□□□

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Web UI □□

□□□ Web UI

□□□

- □□□□
- 404 □□□
- □□□□□□

□□□□□

1. □□□□□□□□□

```
systemctl status omnimessage
```

2. □□□□□

```
netstat -tlnp | grep 80
```

3. □□ **URL□**

- □□□□□□□
- □□□□□□
- HTTP □ HTTPS□

□□□□□

□□□□□

□□□□□

```
grep "control_panel" config/runtime.exs
```

□□□□□□□□□□□□80 □ 4000□□

□□□□□□□□

```
systemctl start omnimessage
```

□□□□

```
iptables -A INPUT -p tcp --dport 80 -j ACCEPT
```

LiveView [illegible]

[illegible]

- [illegible]
- [illegible]
- [illegible] WebSocket [illegible]

[illegible]

1. [illegible]

- [illegible]F12[illegible]
- [illegible] WebSocket [illegible]
- [illegible]

2. [illegible]

[illegible] WebSocket[illegible]

```
location /live &#123;
    proxy_http_version 1.1;
    proxy_set_header Upgrade $http_upgrade;
    proxy_set_header Connection "upgrade";
&#125;
```

[illegible]

WebSocket [illegible]

- [illegible] WebSocket
- [illegible]
- [illegible]

[illegible]

- [illegible]Ctrl+F5[illegible]
- [illegible]

[illegible]

CPU [illegible]

[illegible]

- CPU [illegible] > 80%
- [illegible]
- [illegible]

[illegible]

1. [illegible]

```
top -b -n 1 | grep beam.smp
```

2. [illegible]

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

# [illegible]
rate(sms_c_routing_route_matched_count[5m])
```

[illegible]

[illegible]

- [illegible]
- [illegible] CPU[illegible]

[illegible]

- [illegible]
- [illegible]

ENUM [illegible]

- ��[illegible]
- [illegible]

[illegible]

[illegible]

- [illegible] > 90%
- [illegible]
- [illegible]

[illegible]

1. [illegible]

```
free -h

ps aux | grep beam.smp
```

2. [illegible]

```
sms_c_enum_cache_size_size
```

[illegible]

ENUM [illegible]

- [illegible]
- [illegible] TTL
- [illegible] ENUM

[illegible]

```
# [illegible]IEx[illegible]
SmsC.Messaging.BatchInsertWorker.stats()
```

[illegible]

[illegible]

- [illegible]
- [illegible]

[illegible]

- [illegible]
- [illegible]

[illegible]

- [illegible] - [illegible]
- [illegible] - [illegible]
- [illegible] - [illegible]
- [illegible] - `/var/log/sms_c/application.log`