

# OmniEIR

| | |

OmniEIR :omnieir (config/runtime.exs)

```
config :omnieir,
  # SBI  NRF 
  sbi_scheme: "http",
  sbi_addr: "127.0.0.23",
  sbi_port: 7777,

  # NRF 
  nrf_uri: "http://127.0.0.10:7777",
  heartbeat_interval: 10_000,

  #  PLMN
  mcc: "999",
  mnc: "70",

  #  EIR  OmniHSS REST API
  hss_api_base_url: "https://127.0.0.1:8443",

  # 
  unknown_equipment_status: "WHITELISTED"
```

配置

| 名称                       | 数据类型 | 默认值                      | 说明                           |
|--------------------------|------|--------------------------|------------------------------|
| sbi_scheme               | 字符串  | "http"                   | EIR_SBI_SCHEME               |
| sbi_addr                 | 字符串  | "127.0.0.23"             | EIR_SBI_ADDR                 |
| sbi_port                 | 整数   | 7777                     | EIR_SBI_PORT                 |
| nrf_uri                  | 字符串  | "http://127.0.0.10:7777" | EIR_NRF_URI                  |
| heartbeat_interval       | 整数   | 10_000                   |                              |
| mcc                      | 字符串  | "999"                    | EIR_MCC                      |
| mnc                      | 字符串  | "70"                     | EIR_MNC                      |
| hss_api_base_url         | 字符串  | "https://127.0.0.1:8443" | HSS_API_BASE_URL             |
| unknown_equipment_status | 字符串  | "WHITELISTED"            | EIR_UNKNOWN_EQUIPMENT_STATUS |

OmniHSS 使用 TLS 证书验证 verify\_none 禁用 HSS-REST 接口 OmniUDR 接口  
OmniHSS 使用 CA 证书

# OmniHSS

OmniEIR 通过 **API** 与 OmniHSS 交互，通过 4G S13 接口

```
curl -k -X POST https://<hss>:8443/api/eir/rule \
-H 'content-type: application/json' \
-d '{"action":"blacklist","regex":"^35316005"}'
```

- `action` 支持 `whitelist` `blacklist` `greylist`
- `regex` 支持正则表达式，OmniHSS 支持正则表达式

## AMF 配置

通过 **AMF** 配置，通过 `:omniamf` 配置

| 配置项                      | 配置值                    | 配置值                | 配置说明                                                  |
|--------------------------|------------------------|--------------------|-------------------------------------------------------|
| <code>eir_enabled</code> | 配置项                    | <code>false</code> | 配置 <code>true</code> 时，AMF 支持 5G-EIR 接口               |
| <code>eir_uri</code>     | 配置项   <code>nil</code> | <code>nil</code>   | 配置 5G-EIR SBI URI，配置 <code>nil</code> 时，AMF 支持 NRF 接口 |

```
config :omniamf,
  eir_enabled: true
  # eir_uri: "http://127.0.0.23:7777" # 配置 NRF 接口
```

# OmniEIR 部署ガイド

概要 | 前提条件 | インストール | 設定

## Prometheus 連携

OmniEIR は `TelemetryMetricsPrometheus` を `prometheus_metrics_port` の **9572** で Prometheus と連携します。

GET `http://<eir-host>:9572/metrics`

返されるメトリクスは `status / result / nf_type` の形式で提供されます。

### メトリクス

| メトリクス名                                        | タイプ     | タグ      | 説明                                     |
|-----------------------------------------------|---------|---------|----------------------------------------|
| <code>omni_eir_equipment_check_count</code>   | counter | status  | 設備のチェック回数<br>[WHITELISTED/BLACKLISTED] |
| <code>omni_eir_hss_request_count</code>       | counter | result  | OmniHSS GET /<br>[success/failure]     |
| <code>omni_eir_hss_request_duration_ms</code> | gauge   | result  | OmniHSS へのリクエスト時間                      |
| <code>omni_eir_nrf_registration_status</code> | gauge   | nf_type | NRF 登録ステータス (1 = 成功)                   |
| <code>beam_*</code>                           | gauge   | none    | BEAM VM の状態                            |

# 요구사항

| 요청                                          | 응답                                              | 필드                                                                                                                                                                | 설명                                                                |
|---------------------------------------------|-------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------|
| <code>[ :omnieir, :equipment_check ]</code> | <code>count</code>                              | <code>status</code>                                                                                                                                               | OmniEIR 장비 상태<br>확인                                               |
| <code>[ :omnieir, :hss, :request ]</code>   | <code>count,</code><br><code>duration_ms</code> | <code>endpoint,</code><br><code>result</code>                                                                                                                     | OmniEIR HSS<br>GET<br><code>/api/eir/rule</code><br>OmniHSS<br>결과 |
| <code>[ :omniamf, :eir, :check ]</code>     | <code>count</code>                              | <code>result</code><br><code>:whitelisted  </code><br><code>:greylisted  </code><br><code>:blacklisted  </code><br><code>:unknown  </code><br><code>:error</code> | AMF EIR<br>결과                                                     |

요청 PEI 응답 AMF 응답 `[ :omniamf, :registration, :result ]` 결과  
`result: :rejected` `[ :omniamf, :eir, :check ]` 결과 **AMF** Prometheus 결과  
결과 OmniEIR 결과

# 요구사항

- `[ :omnieir, :hss, :request ]` 결과 `result: :failure` 결과 OmniEIR 결과  
OmniHSS AMF 결과
- `[ :omniamf, :eir, :check ]` 결과 `result: :blacklisted` 결과 `:error` 결과  
AMF 결과

# 요청

OmniEIR AMF 결과

- AMF: 5G-EIR 결과 BLACKLISTED 결과 PEI <pei> (<supi>); 결과

- AMF: 5G-EIR `<supi> (<reason>);`
- OmniEIR: HSS EIR: `<reason>`

# OmniEIR

API | Overview | Features | Support

## Overview

OmniEIR is a 5G Network Function (NF) that provides Equipment Identity Management (EIM) services. It interacts with the AMF (Access and Mobility Management Function) to manage the status of User Equipment (UE) based on their PEI (IMEI/IMEISV). OmniEIR can be configured to whitelist, blacklist, or greylist devices. It also interacts with the OmniHSS (Home Subscriber System) for subscriber data.

## API

SBI (Service Based Interface) N5g-eir\_EquipmentIdentityCheck (TS 29.511):

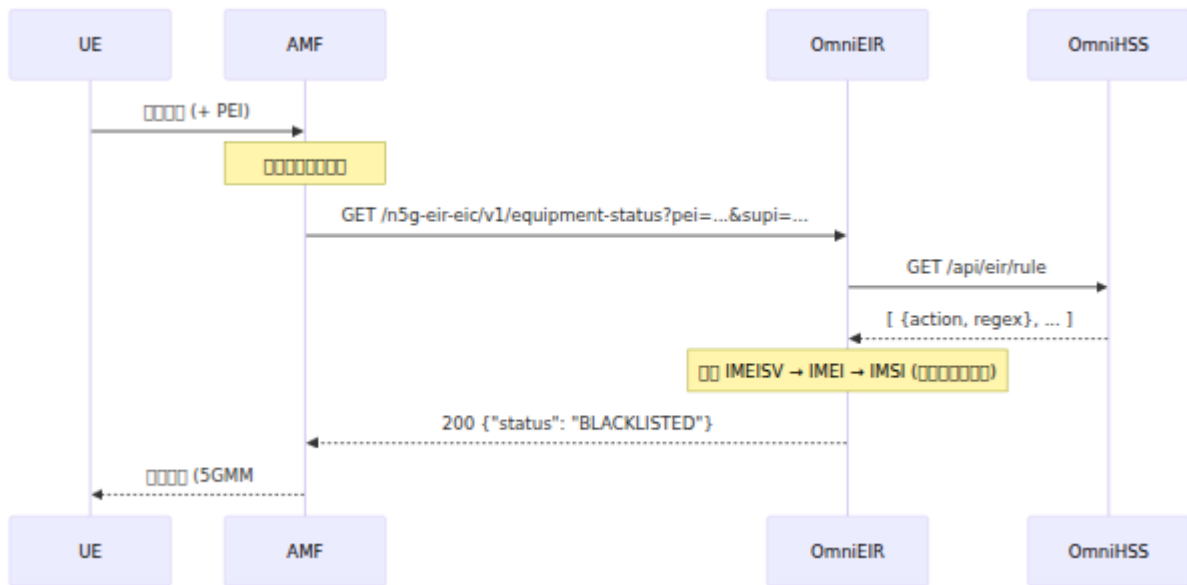
| Method | Path                                                   | Response                                                                       |
|--------|--------------------------------------------------------|--------------------------------------------------------------------------------|
| GET    | /n5g-eir-eic/v1/equipment-status?pei={pei}&supi={supi} | <code>EirResponseData: {"status": "&lt;EquipmentStatus&gt;"} pei {supi}</code> |
| GET    | /n5g-eir-eic/v1/status                                 | <code>{ "status": "UP" }</code>                                                |

pei is TS 23.003 PEI imei- <15 digits> imeisv- <16 digits> supi is imsi- <15 digits>

## Example

```
curl 'http://127.0.0.23:7777/n5g-eir-eic/v1/equipment-status?pei=imei-353160051234567'  
# -> {"status": "WHITELISTED"}
```

## Sequence Diagram



WHITELISTED GREYLISTED EIR AMF

## Sequence Diagram

OmniEIR 4G S13 regex

1. IMEISV IMEI +
2. IMEI
3. IMSI SUPI

unknown\_equipment\_status

## Sequence Diagram

AMF EIR UE PEI  
 BLACKLISTED EIR HSS OmniEIR  
 unknown\_equipment\_status: "BLACKLISTED"  
 EIR AMF

## □□□□□□

1. □ OmniHSS □□□□ (POST /api/eir/rule)□
2. □□ OmniEIR□□□□□ 5G\_EIR □□□ NRF□
3. □□ config :omniamf, eir\_enabled: true □□□ AMF□
4. □□□□□ / UE □□□□□□□□□□ AMF □□□□ 5G-EIR □□□□

# OmniEIR 部署

简介 | 部署 | 配置 | 故障排除

## 部署

部署前准备

部署步骤

1. **AMF** 配置 `config :omniamf, eir_enabled: true` 并  
在 AMF 配置文件中添加 OmniEIR
2. **OmniEIR** 通过 **OmniHSS** 的 `GET /api/eir/rule` 接口获取 EIR 规则  
OmniEIR 返回 `Could not read EIR rules from HSS` 错误信息 `[{:omnieir, :hss, :request} result: :failure hss_api_base_url]`
3. 配置 **UE** 的 **PEI** 信息，例如 IMEI 14 和 IMEI 15  
在 `imei-pei` 配置文件中添加 PEI 信息
4. **AMF** 通过 **PEI** 接口向 UE 提供 PEI 信息，AMF 返回 `EIR enabled but UE ... presented no PEI; allowing`

## AMF 配置

- 配置 `regex` 规则，例如 `^3531` 匹配 TAC 信息
- 配置 `unknown_equipment_status` 为 `BLACKLISTED`，或配置 `whitelist` 为 `WHITELISTED`

## 400 MANDATORY\_QUERY\_PARAM\_INCORRECT

配置 `pei` 接口，例如 `/n5g-eir-eic/v1/equipment-status`，参考 TS 29.511

## OmniEIR 500 SYSTEM\_FAILURE

OmniEIR 通过 OmniHSS 接口获取 HSS 配置，AMF 返回 `2xx` 响应，OmniHSS  
配置 `hss_api_base_url`

# 概要

OmniEIR は、API 経由で IMEI の取得/登録/削除を行う OmniHSS と 4G S13 の連携を実現する。  
OmniEIR は HSS REST API を介して AMF と連携し、N5g-eir と連携する。  
TS 29.511 の SBI を介して TLS 接続を行う。

