

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

属性	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，配置 AMF 配置项：`omniamf`

配置项	类型	默认值	说明
<code>eir_enabled</code>	布尔	<code>false</code>	是否启用 AMF 5G-EIR 功能
<code>eir_uri</code>	字符串 空	<code>nil</code>	5G-EIR SBI URI，AMF 通过 NRF 获取 EIR 信息

```
config :omniamf,
  eir_enabled: true
  # eir_uri: "http://127.0.0.23:7777"  # 5G-EIR 地址
```

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` の形式で表示されます。

例

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 [WHITELISTED/BLACKLISTED]
<code>omni_eir_hss_request_count</code>	counter	result	OmniHSS GET / [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

Table

Path	Method	Response	Description
<code>[:omnieir, :equipment_check]</code>	<code>count</code>	<code>status</code>	OmniEIR equipment check
<code>[:omnieir, :hss, :request]</code>	<code>count, duration_ms</code>	<code>endpoint, result</code>	OmniEIR GET <code>/api/eir/rule</code> from OmniHSS
<code>[:omniamf, :eir, :check]</code>	<code>count</code>	<code>result</code> <code>:whitelisted :greylisted :blacklisted :unknown :error</code>	AMF check

PEI AMF `[ :omniamf, :registration, :result ]` `result: :rejected` AMF Prometheus OmniEIR

Table

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

Table

OmniEIR AMF

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

- 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": "<EquipmentStatus>"} 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- <16 digits>

Example

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

```
sequenceDiagram
    participant UE
    participant AMF
    participant OmniEIR
    participant OmniHSS

    UE->>AMF: [ ] (+ PEI)
    Note over AMF: [ ]
    AMF->>OmniEIR: GET /n5g-eir-eic/v1/equipment-status?pei=...&supi=...
    AMF->>OmniHSS: GET /api/eir/rule
    Note over OmniHSS: [ {action, regex}, ... ]
    OmniHSS-->>OmniEIR: [ ]
    Note over OmniEIR: [ ] IMEISV → IMEI → IMSI ( )
    OmniEIR-->>AMF: 200 { "status": "BLACKLISTED" }
    AMF-->>UE: [ ] (5GMM)
```

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1. **IMEISV** = IMEI + SV
2. **IMEI**
3. **IMSI** = SUPI

--	--	--	--	--	--

AMF 0000000000 00000000 EIR 000000000000 UE 000 PEI00000???

BLACKLISTED 0000000000000000 EIR 0 HSS 0000000000000000000000 OmniEIR

000 unknown_equipment_status: "BLACKLISTED" 000000000000000000000000

EIR 00000 AMF 00000000

□□□□□□

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`] 返回 `result: :failure` 并返回 `hss_api_base_url`
3. 配置 **UE** 的 **PEI** 信息，例如 IMEI 14 和 IMEI 15
在 `imei-` PEI 信息中配置 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` 信息

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
返回 `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。

