



OmniNRF

OmniNRF `config/runtime.exs` `:omninrf`

```
import Config

config :omninrf,
  sbi_addr: System.get_env("SBI_ADDR", "127.0.0.1"),
  sbi_port: String.to_integer(System.get_env("SBI_PORT", "7777")),
  mcc: System.get_env("MCC", "999"),
  mnc: System.get_env("MNC", "70"),
  heartbeat_timeout:
    String.to_integer(System.get_env("HEARTBEAT_TIMEOUT", "30000")),
  prometheus_metrics_port:
    String.to_integer(System.get_env("PROMETHEUS_PORT", "9568"))

config :logger, :default_formatter,
  format: {OmniLogger.JsonFormatter, :format},
  metadata: :all
```

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□□	□□	□ □	□□
sbi_scheme	string	□	http
sbi_addr	string	□	127.0.0.1
sbi_port	integer	□	7777
mcc	string	□	999
mnc	string	□	70
heartbeat_timeout	integer (ms)	□	30000

名前	型	デフォルト値	コメント
<code>cleanup_interval</code>	integer (ms)	<code>10000</code>	
<code>notification_max_attempts</code>	integer	<code>4</code>	
<code>notification_backoff_ms</code>	integer (ms)	<code>500</code>	
<code>discovery_validity_period</code>	integer (s)	<code>3600</code>	
<code>plmn_list</code>	list	<code>[%{mcc: mcc, mnc: mnc}]</code>	
<code>prometheus_metrics_port</code>	integer	<code>9568</code>	

項目	型	説明
mcc	string	3桁のMCC
mnc	string	2桁または3桁のMNC

plmn_list 項目は mcc/mnc 項目を複数指定して NRF を呼び出す

```
config :omninrf,
  plmn_list: [{mcc: "999", mnc: "70"}, %{mcc: "001", mnc: "01"}]
```

plmn-id 項目は NF 項目 plmnList 項目は plmn_list 項目 TS 29.510 NF 項目 plmnList 項目 NRF の PLMN 項目 plmn-id 項目

5G / OAM API

5G SBIのOmniNRF 項目 REST API項目は **HTTPS** の api_ex 項目 8443項目は JSON項目

Method	Path	Description
GET	/api/oam/config	Retrieve OAM configuration parameters: sbi_addr, sbi_port, heartbeat_timeout, cleanup_interval, plmn_list, log_level.
PATCH	/api/oam/config/:id	Update OAM configuration parameters: heartbeat_timeout, cleanup_interval, log_level. Returns 400 if invalid.
POST	/api/oam/log_level	Set log level for OAM components: emergency, alert, critical, error, warning, warn, notice, info, debug. Returns 400 if invalid.
POST	/api/oam/heartbeat	Send heartbeat to NF. Returns 404 if {"nf_instance_id": "..."} is not found.
GET	/api/oam/nf_uptime/:id	Retrieve NF uptime information. Returns 404 if not found.
POST	/api/oam/nf_purge	Purge NF instances from the system.
GET	/api/oam/resources	Retrieve BEAM VM resources and OTP/BEAM status.
GET	/api/oam/diagnostics	Retrieve BEAM VM diagnostics, including I/O and GC status.
PATCH	/api/oam/nf_status/:id	Update NF status. Returns 400 if invalid.

Additional API endpoints:

[/api/status/api](#)
[/api/status/license](#)
[/api/status/nrf](#)
[/api/status/nf](#)
[/api/api/nf_instances](#)
[/api/api/subscriptions](#)
[/api/api/statistics](#)

OmniNRF NF

GET /api/oam/nf_uptime/:id 获取 NF 实例心跳时间戳

参数	说明
last_heartbeat_ms_ago	NF 实例心跳时间戳
heartbeat_timeout	心跳超时时间
nf_type, nf_status	NF 实例类型和状态

返回 last_heartbeat_ms_ago 和 heartbeat_timeout 两个 NF 实例心跳时间戳和 NF 实例类型和状态

POST /api/oam/nf_purge 删除 NF 实例心跳时间戳和 NF 实例类型和状态
返回 NF 实例心跳时间戳和 NF 实例类型和状态
DELETE /api/api/nf_instances/:id 删除 NF 实例

接口

OmniNRF 使用 OmniLogger.JsonFormatter 记录日志，日志格式为 JSON，日志内容如下：
{"metadata": "all", "nf_id": "NF ID", "nf_status": "NF 实例状态"}

POST /api/oam/log_level 设置日志级别
PATCH /api/oam/config/:id 设置 log_level



OmniNRF

Prometheus `http://{host}:{prometheus_metrics_port}/metrics`
 `9568`

NRF Metrics

Metric	Type	Description	Labels
omni_nrf_nf_registered_count	Gauge	Number of registered NF instances	nf_type
omni_nrf_active_nf_instances_count	Gauge	Number of active NF instances	nf_type
omni_nrf_registration_requests_count	Counter	Number of registration requests	(none)
omni_nrf_nf_registrations_total	Counter	Total number of NF registrations	nf_type
omni_nrf_nf_deregistrations_total	Counter	Total number of NF deregistrations	nf_type
omni_nrf_heartbeats_total	Counter	Total number of heartbeats	nf_type

項目	単位	説明	備考
		NF 検索 ???	
omni_nrf_discovery_requests_count	Counter	検索回数 検索回数 検索	(none)
omni_nrf_discovery_requests_total	Counter	検索回数 NF 検索	target_nf_

BEAM VM

메트릭	유형	설명
beam_memory_total	Gauge	BEAM 메모리 총량
beam_memory_processes	Gauge	Erlang 프로세스 메모리
beam_memory_processes_used	Gauge	프로세스 메모리 사용량
beam_memory_system	Gauge	시스템 메모리 사용량
beam_memory_atom	Gauge	원자 메모리
beam_memory_atom_used	Gauge	원자 메모리 사용량
beam_memory_binary	Gauge	이진 데이터 메모리
beam_memory_code	Gauge	코드 메모리
beam_memory_ets	Gauge	ETS 테이블 메모리 NF 메모리
beam_processes_count	Gauge	Erlang 프로세스 수
beam_ports_count	Gauge	Erlang 포트 수
beam_atom_count	Gauge	원자 수
beam_vm_uptime	Gauge	VM 실행 시간

PromQL

메트릭 NF

```
omni_nrf_nf_registered_count
```

5

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

NF

```
sum by (target_nf_type)
(rate(omni_nrf_discovery_requests_total[5m]))
```

NF NF

```
sum by (nf_type) (rate(omni_nrf_heartbeats_total[5m]))
```

NF nf_type

```
sum by (nf_type) (rate(omni_nrf_nf_registrations_total[5m]))
- sum by (nf_type) (rate(omni_nrf_nf_deregistrations_total[5m]))
```

NF nf_type

```
sum by (nf_type) (rate(omni_nrf_nf_registrations_total[5m]))
```

```
omni_nrf.nf.registered.count
/metrics
```

OmniNRF

OmniNRF は 5G ネットワーク (NRF) と NRF サービス (SBA) を統合して、NF (NF) として NRF を提供し、NRF を提供し、NF を提供

OmniNRF は SBI を提供

- **Nnrf_NFManagement** (`nnrf-nfm/v1`): NF を管理し、NF を提供
- **Nnrf_NFDiscovery** (`nnrf-disc/v1`): S-NSSAI、DNN、PLMN、NF を提供

NF (NF) (ETS) は、NRF を提供し、NF を提供

3GPP

Item	Details
TS 23.501	NRF (6.2.6)
TS 29.510	Nnrf_NFManagement、Nnrf_NFDiscovery、NFProfile / SearchResult / SubscriptionData
TS 29.510 §5.2	Nnrf_NFManagement: (heartBeatTimer)
TS 29.510 §5.3	Nnrf_NFDiscovery: NF SearchResult
TS 29.510 §6.2.3.2.3.1	

OmniNRF 〇 Nnrf_NFManagement 〇 Nnrf_NFDiscovery 〇 SBI 〇〇〇〇〇〇〇〇〇〇〇〇 NRF
〇〇〇〇〇〇〇〇〇〇〇〇〇〇〇〇〇〇〇〇〇〇〇〇〇〇〇〇〇〇〇 nrf_uri 〇

SBI 〇〇

SBI 〇〇〇〇〇 **HTTP/2** (〇〇, **h2c**) 〇〇〇〇〇〇〇〇 http://{sbi_addr}:{sbi_port} 〇〇〇〇〇〇〇
〇〇〇 JSON〇PATCH 〇〇〇〇 application/json-patch+json 〇NF 〇〇〇〇〇〇
application/3gppHal+json 〇〇〇

Nnrf_NFManagement (nnrf-nfm/v1)

Method	URI	Request	Response
PUT	/nnrf-nfm/v1/nf-instances/{nfInstanceId}	Creates NF (NFProfile)	201 Created (NFProfile) / 200 OK (NFProfile)
PATCH	/nnrf-nfm/v1/nf-instances/{nfInstanceId}	Updates NF (NFProfile) with JSON-Patch	204 No Content (NFProfile) / 200 OK (NFProfile)
DELETE	/nnrf-nfm/v1/nf-instances/{nfInstanceId}	Deletes NF	204 No Content
GET	/nnrf-nfm/v1/nf-instances/{nfInstanceId}	Retrieves NFProfile	200 OK
GET	/nnrf-nfm/v1/nf-instances	Retrieves NF instances (UriList; nf-type, limit, page-number, page-size)	200 OK
POST	/nnrf-nfm/v1/subscriptions	Creates NF subscription	201 Created
GET	/nnrf-nfm/v1/subscriptions/{subscriptionId}	Retrieves NF subscription	200 OK

Method	URI	Request	Response
PATCH	/nnrf-nfm/v1/subscriptions/{subscriptionId}	JSON-Patch	200 OK
DELETE	/nnrf-nfm/v1/subscriptions/{subscriptionId}		204 No Content

PUT/PATCH/GET requests for NF instances support ETag and If-Match headers. If-Match is used to prevent updates when the resource has been modified by another client. If the resource has been modified, the server returns 412 Precondition Failed.

Nnrf_NFDiscovery (nnrf-disc/v1)

Method	URI	Request	Response
GET	/nnrf-disc/v1/nf-instances	Optional: limit, link	200 OK

The GET response includes a limit header indicating the number of instances returned. The response also includes a Link header with a next link if there are more instances. The response body contains a list of NF instances.

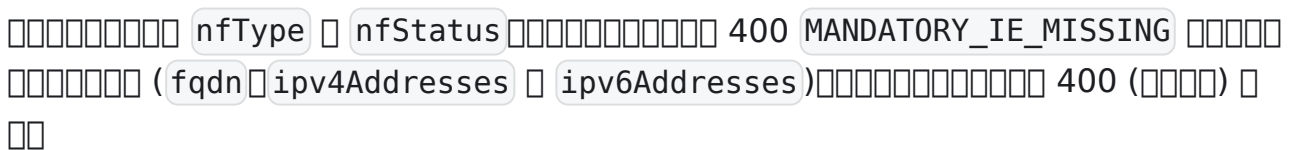
필드명	타입	설명
target-nf-type	string	대상 NF 타입 (예: UDM, SMF, PCF)
requester-nf-type	string	요청자 NF 타입 (예: AMF)
service-names	string	서비스 이름 목록
plmn-id	string	JSON 형식 PLMN ID 목록: {"mcc": "999", "mnc": "70"} plmnList 필드에서 NF가 등록된 PLMN
snssais	string	JSON 형식 S-NSSAI (Subscription Network Slice Access Information) [{"sst": 1, "sd": "000001"}] 필드에서 NF가 sNssais allowedNssais 필드에서 allowedNssais 목록
dnn	string	데이터 네트워크 이름 목록 allowedDnns 필드
limit	integer	제한
offset	integer	오프셋

SearchResult (validityPeriod, nfInstances, numNfInstComplete) 필드
nfStatus = REGISTERED NF

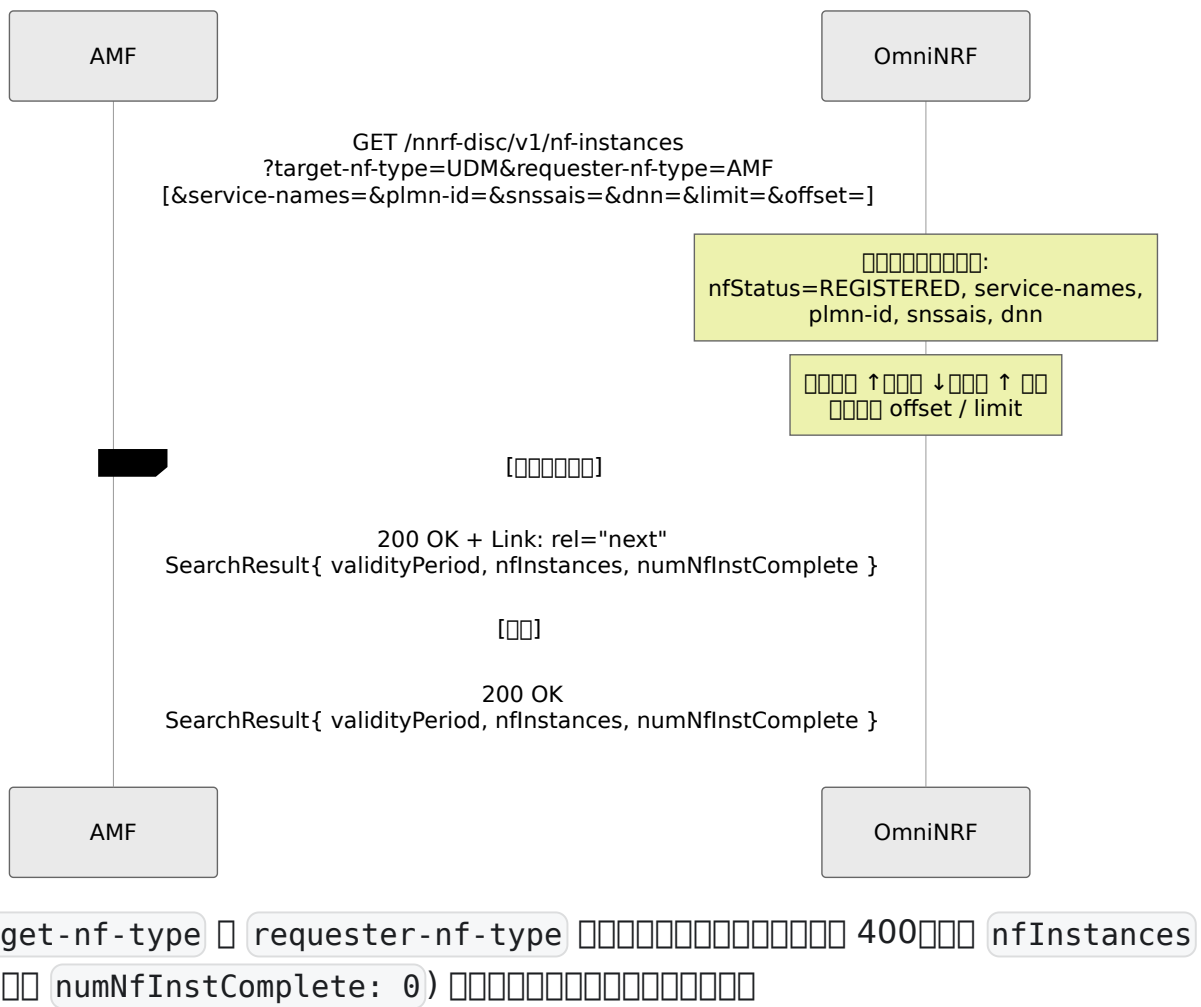
필드명

NF 목록에서 nfInstances[0] 필드에서 NF 목록

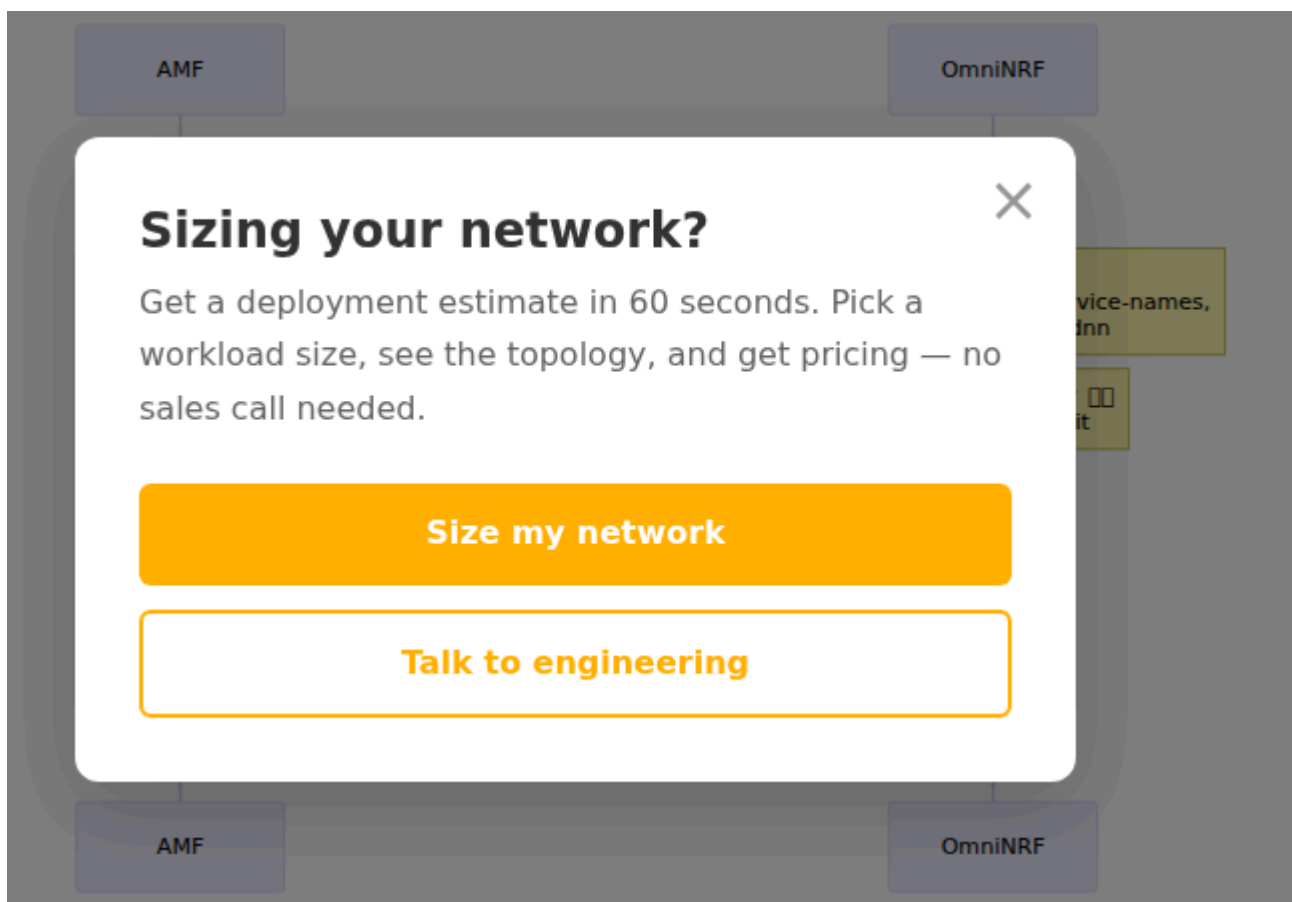
NF □□□□□

[illegible]

NF 分页



NF



AMF SBI HTTP/2

`notification_max_attempts` (4) `notification_backoff_ms` (500 ms) 2xx NRF `NRF` (TS 29.510 5.2.2.8) `NF` `REGISTERED` `NF_REGISTERED` `nfProfile` `DEREGISTERED/SUSPENDED` `NF_DEREGISTERED` `NF_PROFILE_CHANGED` `subscrCond.nfType` `NF` `validityTime` (ISO 8601)

NF

OmniNRF

NF

NF heartbeat_timeout 30 PATCH NRF: Expiring stale NF instance {id} HEARTBEAT_TIMEOUT NF heartbeatTimer

400

NFProfile nfType fqdn ipv4Addresses ipv6Addresses 400 MANDATORY_IE_MISSING nfType/nfStatus PUT 400

NF MANDATORY_IE_INCORRECT TS 29.510

- nfServices serviceInstanceId serviceName scheme nfServiceStatus versions apiVersionInUri
- sNssais 0 255 sst 6 sd
- plmnList PLMN
- capacity priority 0 65535 load 0 100

400 detail

PATCH 415

PATCH Content-Type application/json-patch+json JSON-Patch Content-Type

404

nfInstanceId NF PUT

PUT/PATCH 412

If-Match ETag GET ETag

nfInstances

- nfStatus REGISTERED NFs
- target-nf-type nfType
- plmn-id snssais dnn NF
- requester-nf-type 400

- nfStatusNotificationUri NRF
- notification_max_attempts 4 notification_backoff_ms 500 NRF: Retrying status notification to ... NRF: Giving up status notification to ... after N attempts NRF
- subscrCond.nfType NF

NRF □□□□□□□□

NF **ETS** **NFs** /

