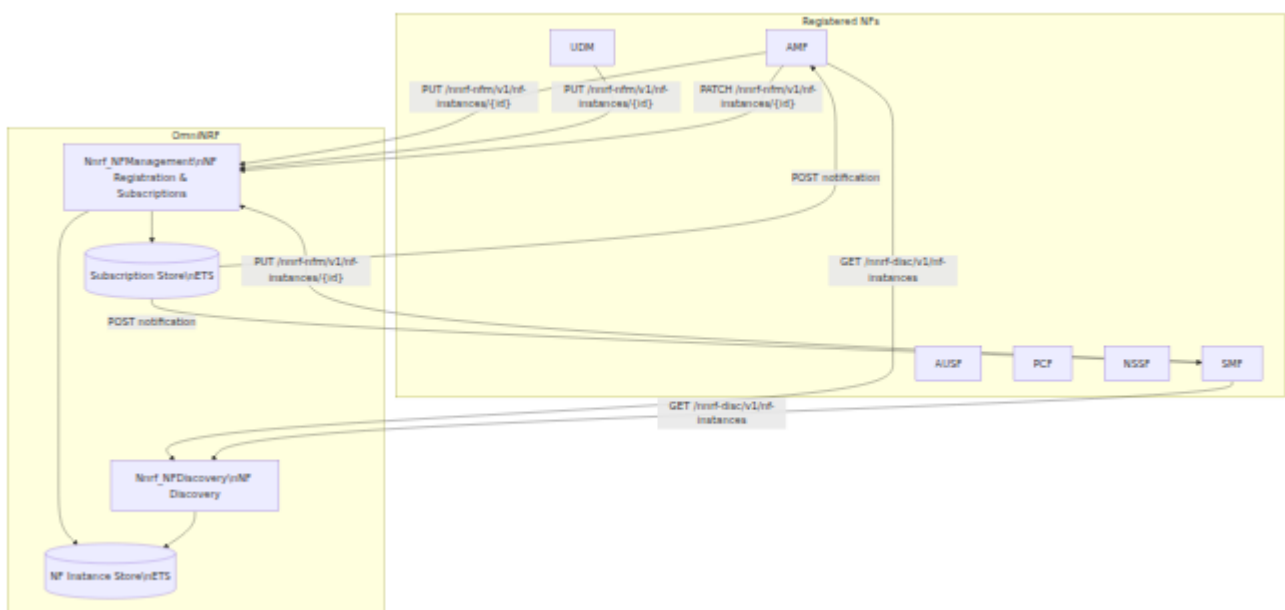


OmniNRF

1. Overview

OmniNRF is Omnitouch 5G Network Repository Function (NRF) that 5GC Network Functions (NFs) register and discover each other. OmniNRF is a Network Repository Function (NRF) that provides a centralized database of Network Functions (NFs) and their capabilities. It is used by other NFs to discover and communicate with each other. SBI (Service Based Interface) is the interface used by NFs to interact with the NRF. The diagram shows the interaction between the NRF and various NFs, including the UDM, AUSF, PCF, NSSF, and SMF.



2. 3GPP

API	Spec
NRF	TS 23.501 6.2.6
Nnrf_NFManagement	TS 29.510 5.2
Nnrf_NFDiscovery	TS 29.510 5.3
NFProfile	TS 29.510 6.1
NF	TS 29.510 5.2.2.8
	TS 29.510 5.2.2.4
SearchResult	TS 29.510 6.2

OmniNRF TS 29.510 Nnrf_NFManagement Nnrf_NFDiscovery SBI

3. SBI

HTTP/1.1Content-Type: application/json

Nnrf_NFManagement (TS 29.510 5.2)

Method	URI	Request	Response
PUT	/nnrf-nfm/v1/nf-instances/{nfInstanceId}	Registration Request NF	201 Created / 200 OK
PATCH	/nnrf-nfm/v1/nf-instances/{nfInstanceId}	Registration Request JSON Patch	204 No Content / 200 OK
DELETE	/nnrf-nfm/v1/nf-instances/{nfInstanceId}	Registration Request NF	204 No Content
GET	/nnrf-nfm/v1/nf-instances/{nfInstanceId}	Registration Request NF	200 OK
GET	/nnrf-nfm/v1/nf-instances	Registration Request NF	200 OK
POST	/nnrf-nfm/v1/subscriptions	Registration Request NF	201 Created
DELETE	/nnrf-nfm/v1/subscriptions/{subscriptionId}	Registration Request	204 No Content

Nnrf_NFDiscovery (TS 29.510 5.3)

Method	URI	Request	Response
GET	/nnrf-disc/v1/nf-instances	Registration Request NF	200 OK

Registration Request

필드	타입	설명
target-nf-type	string	대상 NF 타입 (UDM, SMF 등)
requester-nf-type	string	요청자 NF 타입 (AMF 등)
service-names	string	서비스 이름 목록
plmn-id	string	JSON 형식의 PLMN ID 목록 { "mcc": "999", "mnc": "70" }
limit	integer	제한 개수

4. 테스트

OmniNRF는 Elixir로 개발되었으며 `:omnirf` 모듈을 사용하여 실행할 수 있습니다.
`config/runtime.exs` 파일을 열어보겠습니다.

예제

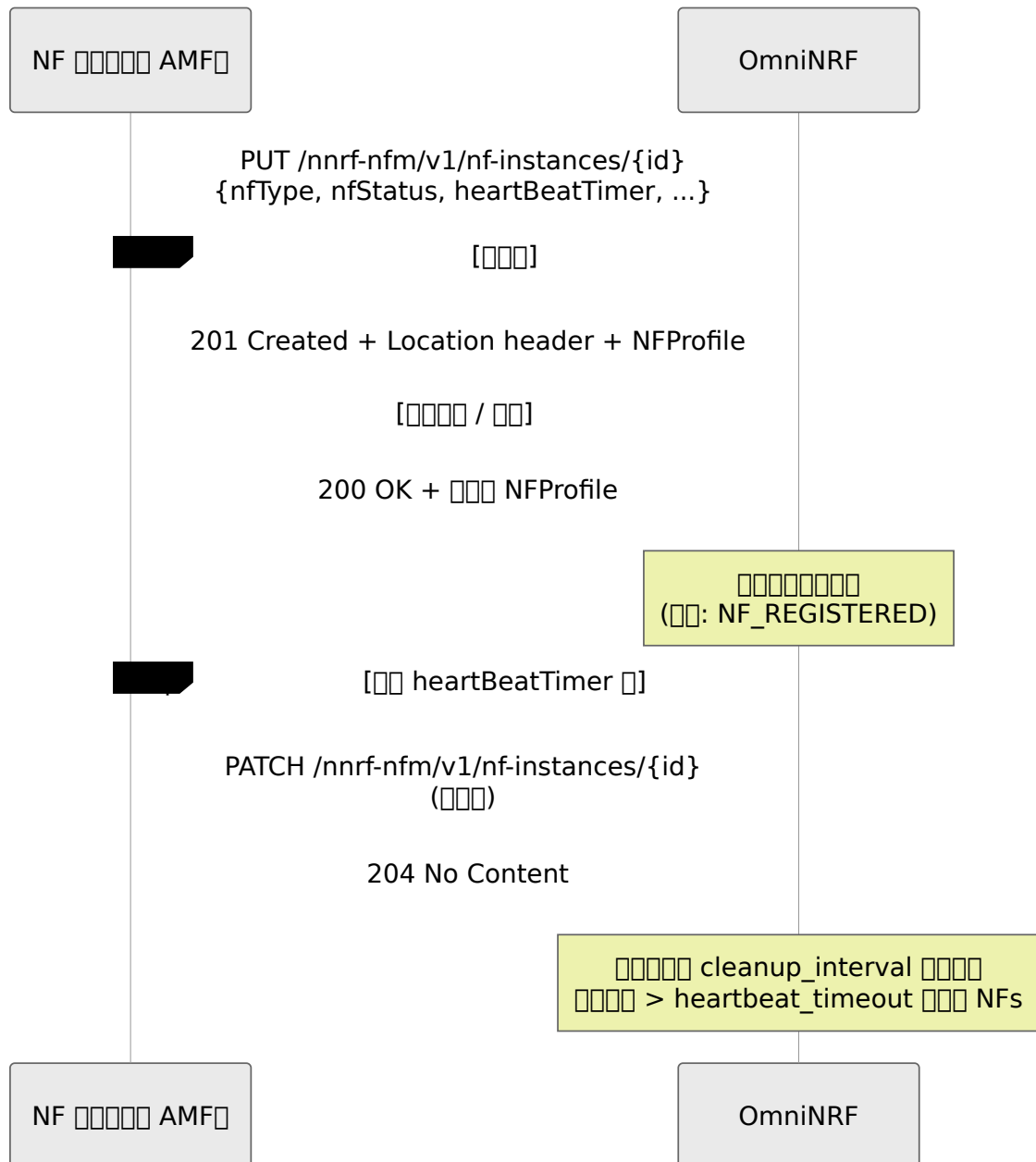
```
config :omnirf,
  sbi_scheme: "http",
  sbi_addr: "127.0.0.10",
  sbi_port: 7777,
  mcc: "999",
  mnc: "70",
  heartbeat_timeout: 30_000,
  cleanup_interval: 10_000,
  plmn_list: [%{mcc: "999", mnc: "70"}]
```

□□□

□□	□□	□□□	□□
sbi_scheme	□□ □	"http"	SBI □□□□ URI □□□ http □ https□
sbi_addr	□□ □	"127.0.0.10"	SBI HTTP □□□□□□ IP □□
sbi_port	□□	7777	SBI HTTP □□□□□□ TCP □□
mcc	□□ □	"999"	□□□ PLMN □□□□□□□□
mnc	□□ □	"70"	□□□ PLMN □□□□□□□□
heartbeat_timeout	□□ □□ □□	30000	□□□□□□□□□□NF □□□□□□□□□□□□ □□□□NRF □□□□□□□ NFProfile □ □□ heartBeatTimer□□□□□□□ NF □□□□□□□
cleanup_interval	□□ □□ □□	10000	□□□□□□□□□□□□□□
plmn_list	□□ □□	[%{mcc: mcc, mnc: mnc}]	□□ NRF □□□ PLMN □□□□□□□□□□ □ PLMN □□

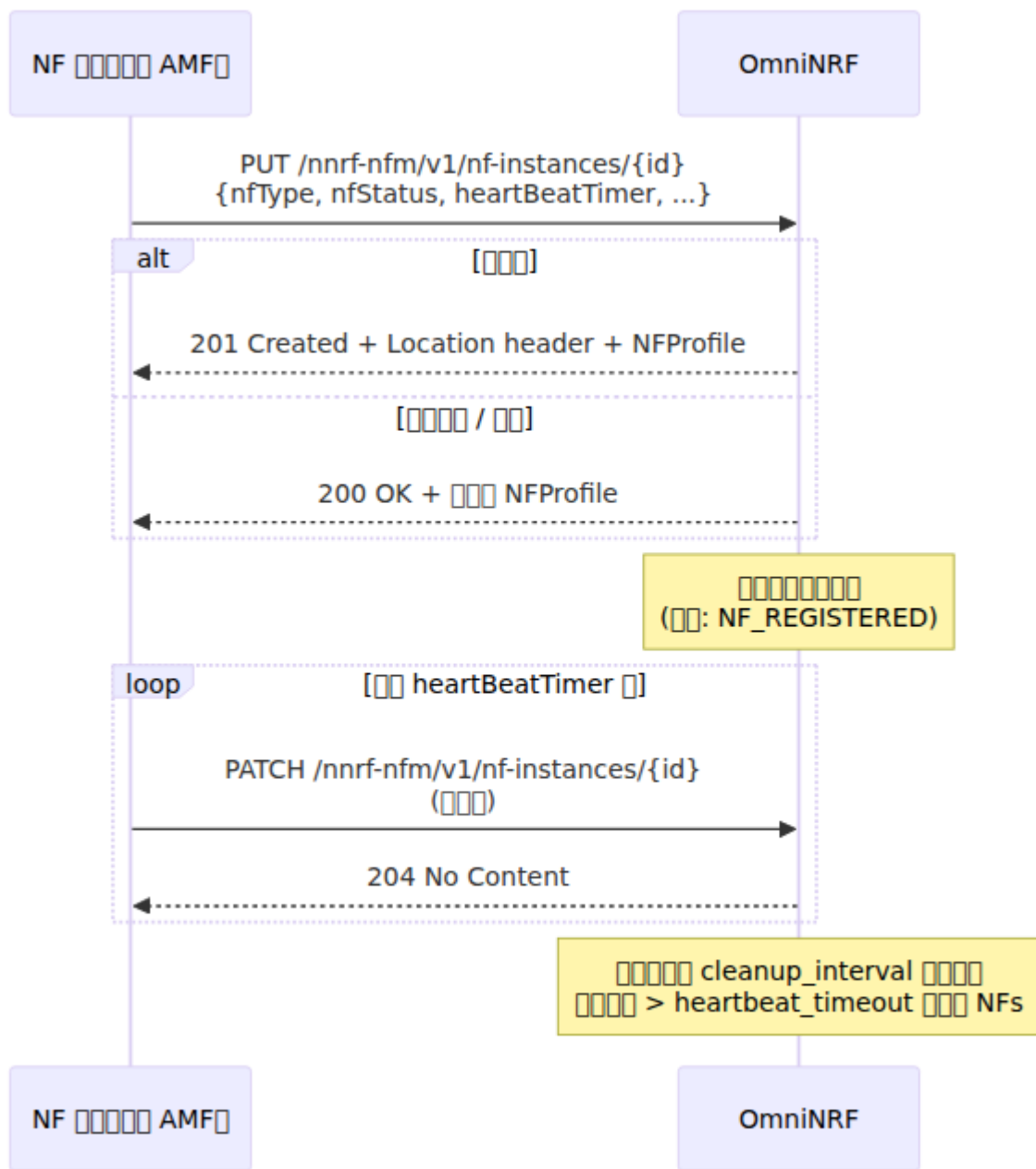
5.

5.1 NF ☐☐☐☐☐



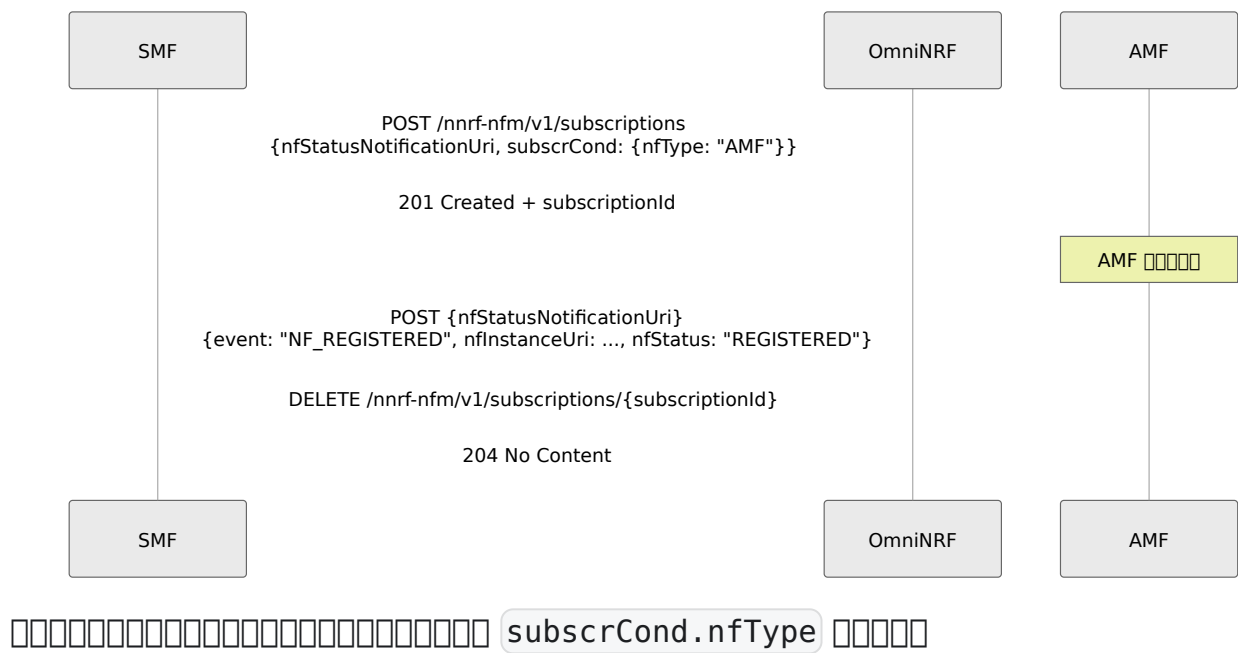
0000 NF 00000NRF 000000000000 NF_DEREGISTERED 000

5.2 NF

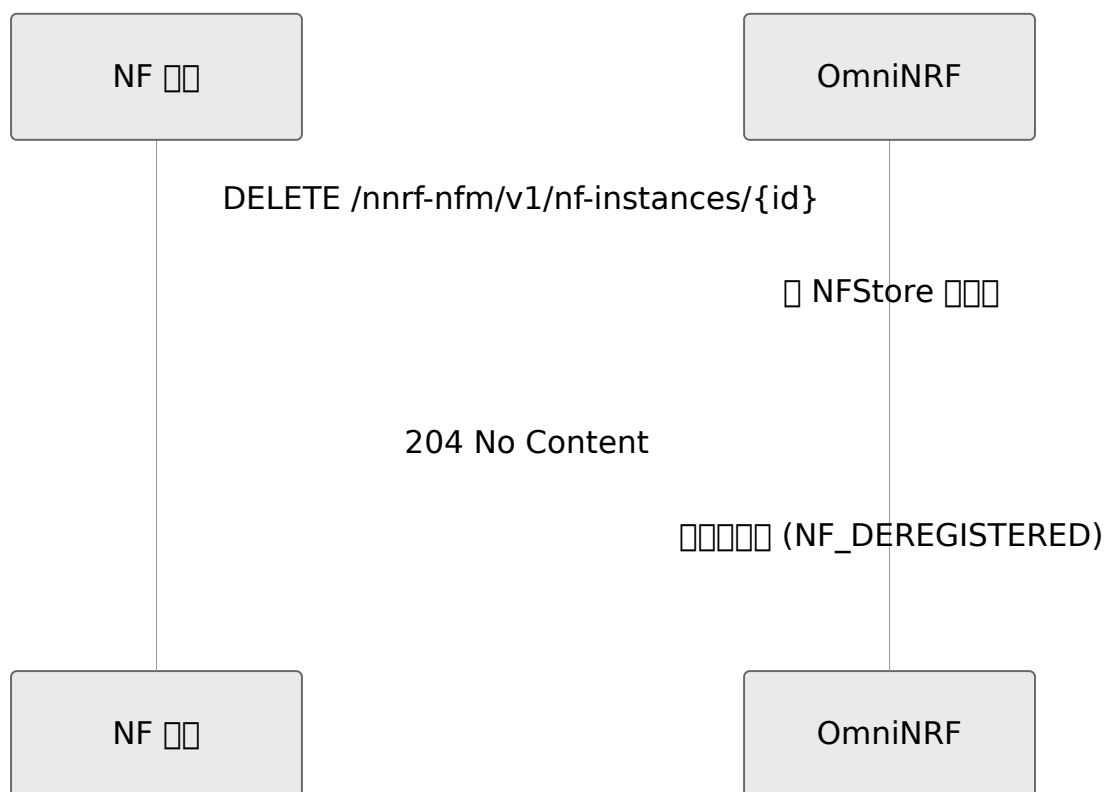


validityPeriod 3600 NRF-L5

5.3 NF 등록



5.4 NF deregister



6. Prometheus

NRF

메트릭	타입	레이블	단위
omni_nrf.nf.registered.count	gauge	nf_type	개 개 개 NF 개 개
omni_nrf.discovery.requests.count	counter	--	개 개 개
omni_nrf.registration.requests.count	counter	--	개 개 개
omni_nrf.nf_registrations.total	counter	nf_type	개 NF 개 개
omni_nrf.nf_deregistrations.total	counter	nf_type	개 NF 개 개
omni_nrf.discovery_requests.total	counter	target_nf_type	개 개 개 개 NF

名称	类型	单位	备注
			单位 单位 单位
omni_nrf.heartbeats.total	counter	nf_type	单位 NF 单位 单位 单位
omni_nrf.active_nf_instances.count	gauge	nf_type	单位 单位 单位 NF 单位 单位

BEAM VM 項目

項目	単位	説明
beam.memory.total	gauge	BEAM 全体のメモリ使用量
beam.memory.processes	gauge	Erlang プロセスのメモリ使用量
beam.memory.processes_used	gauge	プロセスのメモリ使用量
beam.memory.system	gauge	システムメモリ使用量
beam.memory.atom	gauge	アトムメモリ使用量
beam.memory.atom_used	gauge	アトムメモリ使用量
beam.memory.binary	gauge	バイナリメモリ使用量
beam.memory.code	gauge	コードメモリ使用量
beam.memory.ets	gauge	ETS メモリ使用量
beam.processes.count	gauge	Erlang プロセス数
beam.ports.count	gauge	Erlang ポート数
beam.atom.count	gauge	アトム数
beam.vm.uptime	gauge	VM 稼働時間

7. 参考資料

TS 29.510 に関する資料

ID	項目	説明
NRF-C2	登録	target-nf-type requester-nf-type service-names plmn-id limit TS 29.510 6.2.3.2.3.1 snssai dnn tai guami preferred-collocated-nf-types
NRF-H2	登録	NfProfile subscriptionId TS 29.510 5.2.2.8
NRF-H3	登録	validityTime reqPeriodicRegTimer
NRF-H4	NFProfile	nfType nfInstanceId nfStatus PLMN
NRF-H5	PATCH	PATCH /nnrf-nfm/v1/subscriptions/{subscriptionId}
NRF-M1	JSON Patch	PATCH replace add remove JSON /nfServices/0/serviceStatus
NRF-M2		ETag / If-Match / If-None-Match
NRF-M4	GET	GET /nnrf-nfm/v1/subscriptions/{subscriptionId}
NRF-L5		validityPeriod 3600 NF
NRF-L6		Link

8. 問題

NF 400 Bad Request

nfType NFProfile PUT

NF

NF heartbeat_timeout 30 NF PATCH
NRF heartBeatTimer heartbeat_timeout / 1000

nfInstances

- NF GET /nnrf-nfm/v1/nf-instances/{id} nfStatus: "REGISTERED"
- target-nf-type NFProfile nfType
- plmn-id JSON NFProfile plmnList NFProfile
plmnList PLMN

- nfStatusNotificationUri NRF
- Failed to send status notification to
- subscrCond.nfType NF

cleanup_interval heartbeat_timeout
heartbeat_timeout NF info NRF: Expiring
stale NF instance {id}