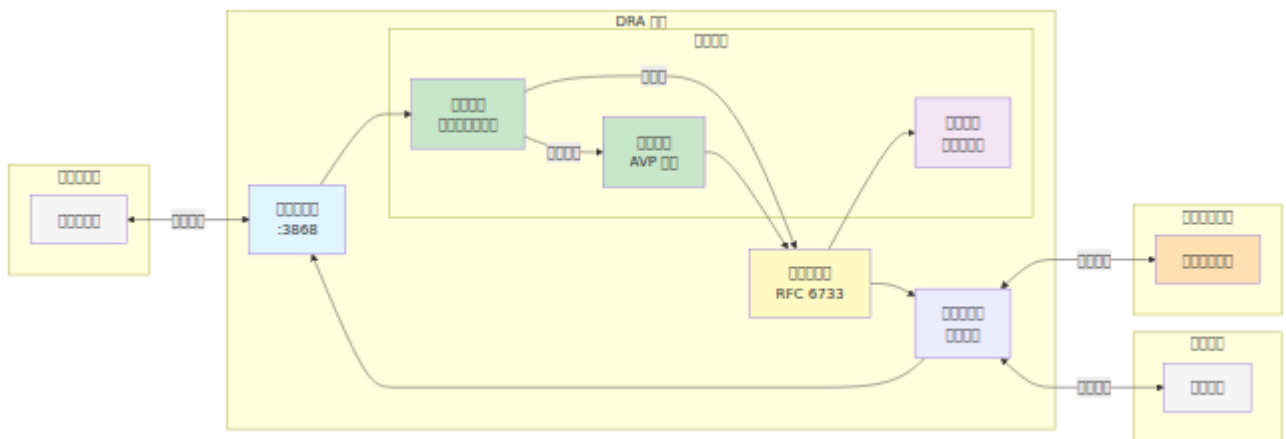


# DRA 架构图

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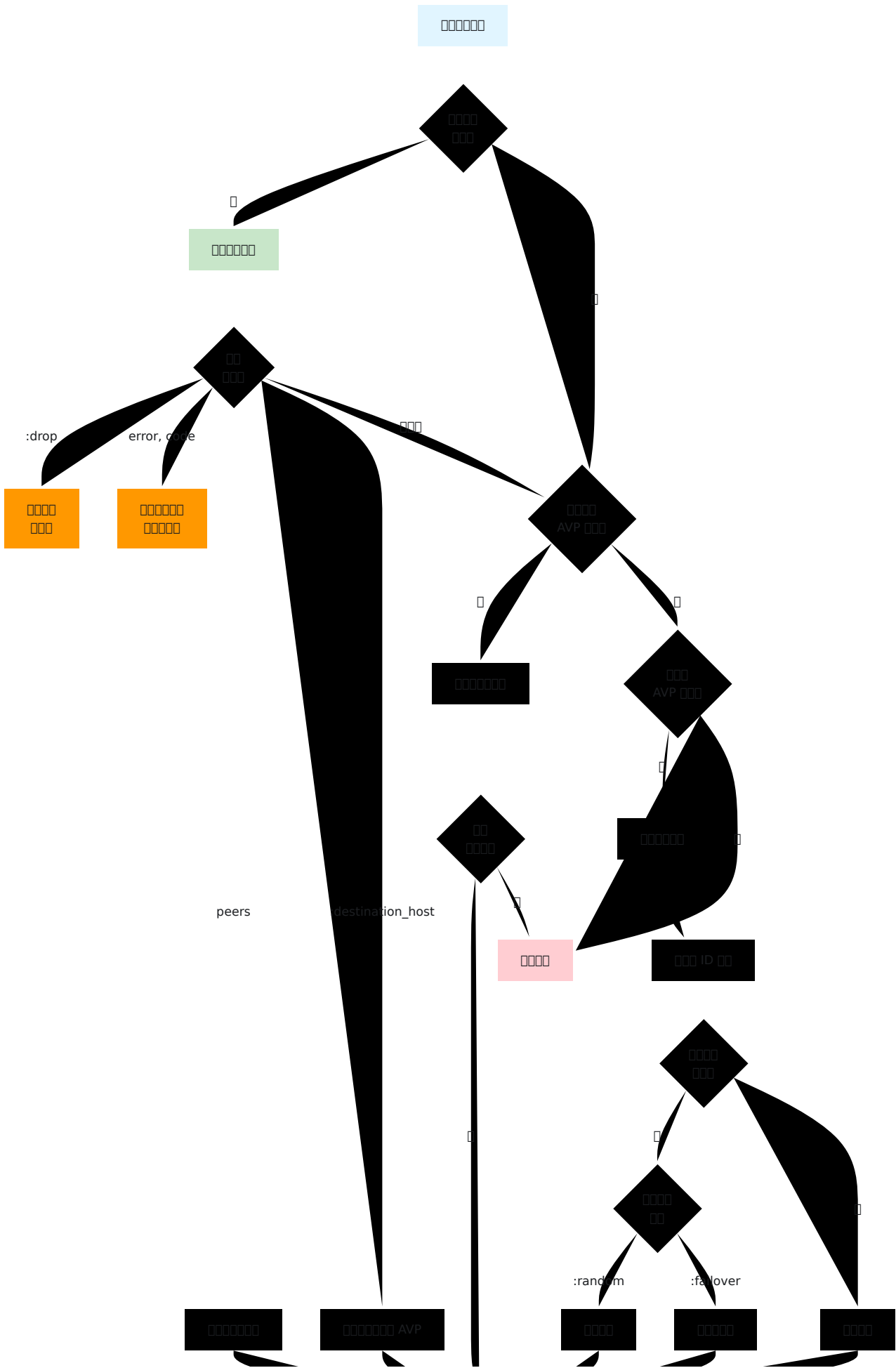
1. 背景介绍
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# DRA 架构图



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□□ □□□ □ □□□ □□□□□□DRA □□ □□□□□ (RFC 6733) □□□□□□□□





0000

DRA 00 RFC 6733 0 6.1 0 00000000000000000000

1. 0000 AVP (293) - 000000DRA 0000000000

- 0 00000000000000
- 0 00000000000000
- 0 00000000000000

2. 000 AVP (283) - 0000000000000000

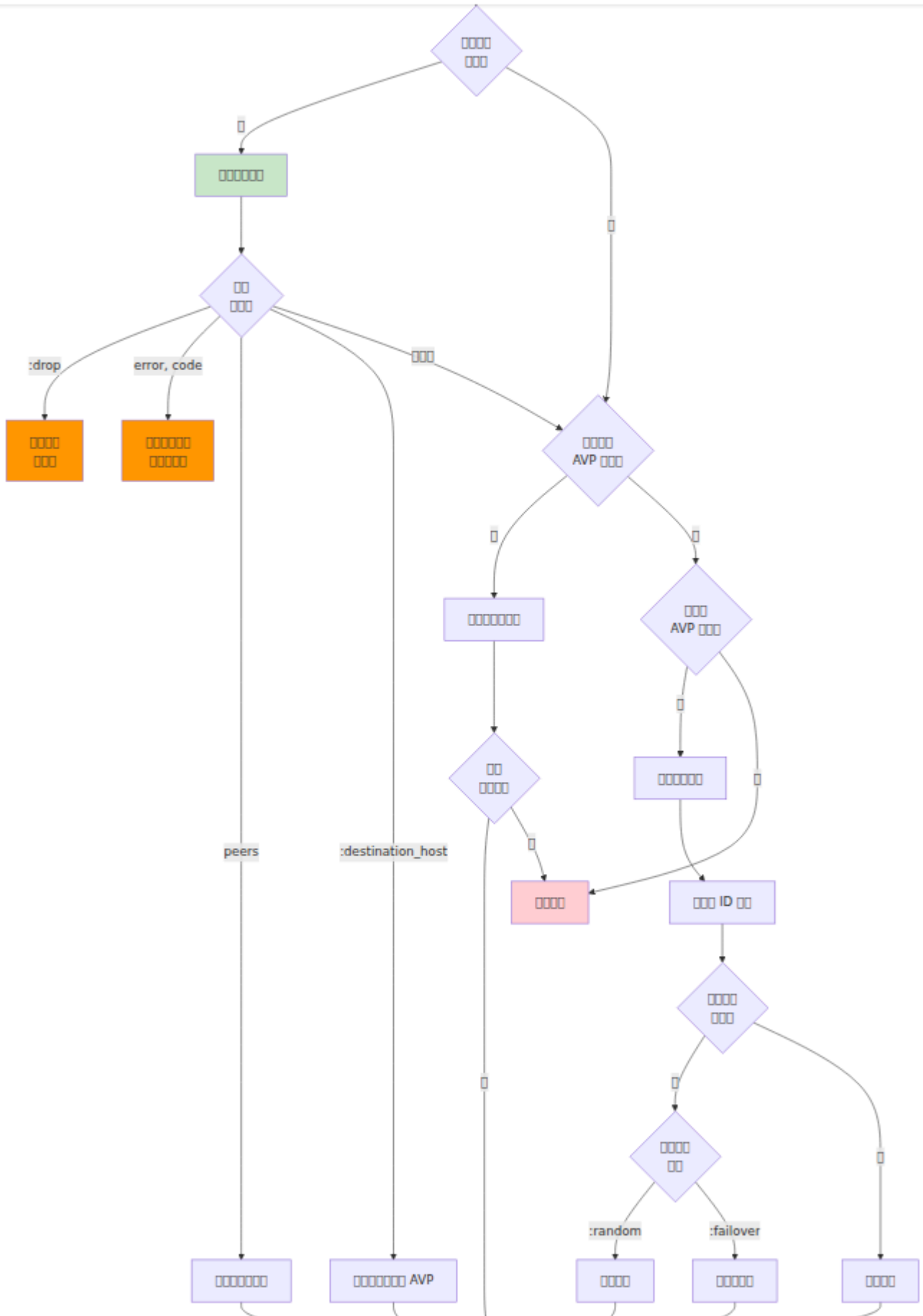
- 0 DRA 00000000000000000000
- 0 0000000000000000
- 0 00000000000000000000

3. 00 ID - 0000000000000000

- 0 000000000000 ID 000
- 0 0000000000000000 (CER/CEA)
- 0 00 00 3GPP 00 IDs 0000

0000

00000000000000000000







## □□□□

□□	□□	◀▶
<code>listen_ip</code>	□□□□□ □	DRA □□□ IP □□□□□ SCTP □□□□□ IP □□□□□□□□ <b>SCTP</b> □□□□
<code>listen_port</code>	□□	□□□□□ TCP/SCTP □□□□□□3868□
<code>service_name</code>	□□	□□ Erlang □□□□□
<code>request_timeout</code>	□□	□□/□□□□□□□□□□□□□□□□5000□

## □□□□□□

□□	□ □	□□
<code>peer_selection_algorithm</code>	□ □	□□□□□□□□ : <code>random</code> □□□□ □□□□ : <code>failover</code> □□□□□ □□□□□□
<code>allow_undefined_peers_to_connect</code>	□ □	□□□□□□□□□□□□□□□□□□ □□ <code>false</code> □
<code>log_unauthorized_peer_connection_attempts</code>	□ □	□□□□□□□□□□□□□□□□

## □□□□

`peers` □□□□□□□□□□□□□□□□□□

```
%{
  host: "mme01.operator.com",
  realm: "operator.com",
  ip: "192.168.1.20",
  port: 3868,
  transport: :diameter_tcp,
  tls: false,
  initiate_connection: false
}
```

□□□□

□□	□□	□□
host	□□□	□□□ □□□□□ FQDN - □□□□□□□□□□□□□□□□
realm	□□□	□□□□□□□
ip	□□□	□□□□□ IP □□□□□□□
ips	□□	SCTP □□□□ IP □□□□□□□□□□□□ SCTP □□□□□
port	□□	□□□□□□□□□□□□ 3868□
transport	□□	□□□□□ :diameter_tcp □ :diameter_sctp
tls	□□	□□ TLS □□□□□□□ true□□□□□□□□ 3869□
initiate_connection	□□	true□DRA □□□□□□□□ false□DRA □□□□□□□

□□□□

□□□□ (**initiate\_connection: true**)

- DRA □□□□□□□□
- DRA □□□□□□ TCP/SCTP □□
- □□□□ HSS□PCRF □□□□□□□□

- DRA

(`initiate_connection: false`)

- DRA
- DRA
- MME SGSN P-GW
- `allow_undefined_peers_to_connect: true`

□□□□

```
%{
  host: "dra01.mvno.example.com",
  realm: "mvno.example.com",
  listen_ip: "10.100.1.10",
  listen_port: 3868,
  service_name: :mvno_dra,
  product_name: "OmniDRA",
  vendor_id: 10415,
  request_timeout: 5000,
  peer_selection_algorithm: :random,
  allow_undefined_peers_to_connect: false,
  log_unauthorized_peer_connection_attempts: true,
  peers: [
    # MME - □□ MME □□
    %{
      host: "mme01.operator.example.com",
      realm: "operator.example.com",
      ip: "10.100.2.15",
      port: 3868,
      transport: :diameter_sctp,
      tls: false,
      initiate_connection: false
    },
    # HSS - DRA □□□□
    %{
      host: "hss01.mvno.example.com",
      realm: "mvno.example.com",
      ip: "10.100.3.141",
      port: 3868,
      transport: :diameter_tcp,
      tls: false,
      initiate_connection: true
    },
    # PCRF □ TLS - DRA □□□□□□
    %{
      host: "pcrf01.mvno.example.com",
      realm: "mvno.example.com",
      ip: "10.100.3.22",
      port: 3869,
      transport: :diameter_tcp,
      tls: true,
```

```
    initiate_connection: true
  }
]
}
```

## Options

- `host` option
- CER/CEA
- 3GPP `3GPP IDs`
- **ID 10415** 3GPP
- `TTL` + 5
- `peer_selection_algorithm`

## Options

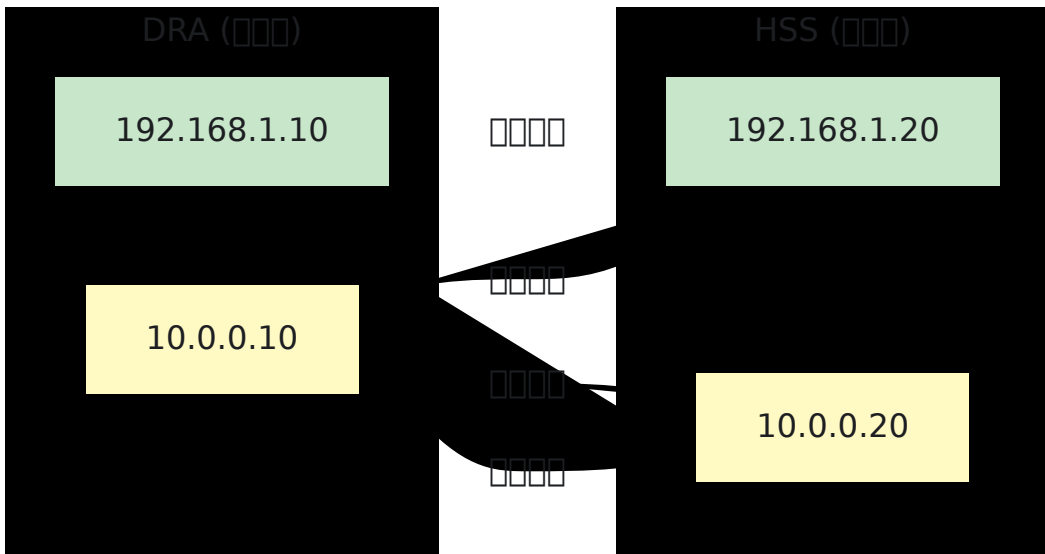
- `allow_undefined_peers_to_connect: false`
- `log_unauthorized_peer_connection_attempts: true`
- `listen_ip` `listen_port`
- TLS

---

## SCTP

SCTP IP SCTP

□□□□



- SCTP □□□□□□□□□□
- □□□□□□□□□□□□□□□□
- □□□□□□□□□□□□□□
- □□□□□□□□□□

□□

### DRA □□□□

□□□□□□ IP □□□□ DRA □□□□

```
%{  
  # □□ IP□□□□□□□□  
  listen_ip: "192.168.1.10",  
  
  # SCTP □□□□□□□□ IP  
  listen_ip: ["192.168.1.10", "10.0.0.10"],  
  
  listen_port: 3868,  
  ...  
}
```

□□□□

- TCP 配置 IP
- SCTP 配置 IP
- 配置 IP 地址

配置

配置 IP 地址

```
peers: [
  %{
    host: "hss01.example.com",
    realm: "example.com",
    ip: "192.168.1.20", # 配置 IP 地址
    additional_ips: ["192.168.1.20", "10.0.0.20"], # 配置 IP 地址
  }
  IP
  port: 3868,
  transport: :diameter_sctp,
  tls: false,
  initiate_connection: true
]
```

配置

- ip 配置 IP 地址
- ips 配置 IP 地址 ip
- 配置 SCTP 配置 ips 配置 IP
- 配置 TCP 配置 ip TCP 配置 IP

□□□□

```
config :dra,
  diameter: %{
    service_name: :omnitouch_dra,
    listen_ip: ["192.168.1.10", "10.0.0.10"], # □□□ DRA
    listen_port: 3868,
    host: "dra01",
    realm: "example.com",
    product_name: "OmniDRA",
    vendor_id: 10415,
    request_timeout: 5000,
    peer_selection_algorithm: :random,
    allow_undefined_peers_to_connect: false,
    peers: [
      # □□□ HSS □□
      %{
        host: "hss01.example.com",
        realm: "example.com",
        ip: "192.168.1.20",
        additional_ips: ["192.168.1.20", "10.0.0.20"],
        port: 3868,
        transport: :diameter_sctp,
        tls: false,
        initiate_connection: true
      },
      # □□□ MME□□□□□□□□
      %{
        host: "mme01.example.com",
        realm: "example.com",
        ip: "192.168.1.30",
        port: 3868,
        transport: :diameter_sctp,
        tls: false,
        initiate_connection: false
      }
    ]
  }
}
```

## □□

- □□□□ SCTP □□□□□Linux □□ `lksctp-tools` □□
- □□ IP □□□□□□□□/□□□□
- □□□□□□□□□□□□□□ IP □□ SCTP □□
- □□□□□□□□□□□□□□□□□□

## □□

- TCP □□□□□□□□□□□□□□ IP□
  - SCTP □□□□□ TLS □□□□□□□□□□
  - □□□□□□□□□□□□□□ SCTP □□
-

□□□

## □□ 3GPP □□ IDs

□□ ID	□□	□□
16777251	S6a/S6d	MME/SGSN □ HSS □□□□□□□□
16777252	S13/S13'	MME □ EIR □□□□□□
16777238	Gx	PCEF □ PCRF □□□□□□□□
16777267	S9	□ PCRF □□□ PCRF □□□□
16777272	Sy	PCRF □ OCS □□□□
16777216	Cx	I-CSCF/S-CSCF □ HSS IMS □□
16777217	Sh	AS □ HSS IMS □□□□
16777236	SLg	MME/SGSN □ GMLC □□□□
16777291	SLh	GMLC □ HSS □□□□□□
16777302	S6m	MTC-IWF □ HSS/HLR □□ M2M □□
16777308	S6c	SMS-SC/IP-SM-GW □ HSS SMS □□
16777343	S6t	SCEF □ HSS □□□□
16777334	Rx	AF □ PCRF □□□□

## AVP

AVP	AVP		
1		UTF8String	IMSI 3GPP
264	Origin-Host	DiameterIdentity	
268	Result-Code	Unsigned32	
283	Destination-Realm	DiameterIdentity	
293	Destination-Host	DiameterIdentity	
296	Origin-Realm	DiameterIdentity	
297	Experimental-Result	Grouped	

AVP



```

dra_module_advanced_routing:
  enabled: True
  rules:
    - rule_name: <rule_name>
      match: <match>
      filters: [<filters>]
      route:
        peers: [<peers>]

```

□□

□□	□□
enabled	□□□ True □□□□□
rule_name	□□□□□□□□□□
match	□□□□□□ :all AND □□ - □□□□□□□□□□ :any OR □□ - □□□□□□□□□□ :none NOR □□ - □□□□□□□□□□
filters	□□□□□□□□□ □□□□□□
route	□□□□□□□ □□□□□

□□□□

route □□□□□□□□□□

□□□□□

```

route:
  peers: [peer01.example.com, peer02.example.com]

```

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- DRA □□□□□□□□□□□□

- 3002 - DIAMETER\_UNABLE\_TO\_DELIVER
- 3003 - DIAMETER\_REALM\_NOT\_SERVED

## AVP

```
route: :destination_host
```

AVP (293) AVP

drop

```
route: :drop
```

drop

- 3002 - DIAMETER\_UNABLE\_TO\_DELIVER
- 3003 - DIAMETER\_REALM\_NOT\_SERVED
- 3004 - DIAMETER\_TOO\_BUSY

drop

- DRA
- Erlang Diameter :discard
- `diameter_advanced_routing_drop_count_total` Prometheus

drop

```
route: {:error, 3004}
```

drop

- 3002 - DIAMETER\_UNABLE\_TO\_DELIVER
- 3003 - DIAMETER\_REALM\_NOT\_SERVED
- 3004 - DIAMETER\_TOO\_BUSY
- 5012 - DIAMETER\_UNABLE\_TO\_COMPLY

□□□

- DRA □□□□□□□□□□□□□□□□
- □□□□ Origin-Host□Origin-Realm□Session-Id□□□□□□□□□□
- □□□□□□□□□□□□
- □□ Erlang Diameter `{:protocol_error, code}` □□□□ `{:answer_message, code}` □
- □□□ `diameter_advanced_routing_error_count_total` □□□ Prometheus □□□

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□ □□□□ □ □□□□ □□□□□□

- `:application_id` - □□□□□□ ID□□□□ □□ ID □□□□
  - □□□□ `{:application_id, 16777251}` □S6a/S6d□
  - □□□□ `{:application_id, [16777251, 16777252]}` □S6a □ S6b□
- `:command_code` - □□□□□□□□□□
  - □□□□ `{:command_code, 318}` □AIR □□□□
  - `{:command_code, [317, 318]}` □ULR □ AIR□
- `:avp` - □□ AVP □□□□ AVP □□□□□□
  - □□□□□□ `{:avp, {296, "epc.mnc001.mcc001.3gppnetwork.org"}}`
  - □□□□□□ `{:avp, {1, ~r"999001.*"}}`
  - □□□□□□ `{:avp, {1, ["505057001313606", ~r"999001.*", ~r"505057.*"]}}`
  - □□□□□□□□□□□□□□ `{:avp, {264, :any}}`

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- `:via_peer` - □□□□□□□□□□□□

- `{:via_peer, "omnitouch-lab-dra01.epc.mnc001.mcc001.3gppnetwork.org"}`
- `{:via_peer, ["omnitouch-lab-dra01.epc.mnc001.mcc001.3gppnetwork.org", "omnitouch-lab-dra02.epc.mnc001.mcc001.3gppnetwork.org"]}`
- `{:via_peer, :any}`

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- **`:to_peer`** - □□□□□□□□□□□□□□□□
  - `{:to_peer, "dra01.omnitouch.com.au"}`
  - `{:to_peer, ["dra01.omnitouch.com.au", "dra02.omnitouch.com.au"]}`
- **`:from_peer`** - □□□□□□□□□□□□□□□□
  - `{:from_peer, "hss-01.example.com"}`
  - `{:from_peer, ["hss-01.example.com", "hss-02.example.com"]}`
- **`:packet_type`** - □□□□□□□□
  - `{:packet_type, :request}`
  - `{:packet_type, :answer}`

□□□□□□□□

- **AVP** □□□□□□□□□□ AVP□□□□□□□□□□Origin-Host□Destination-Realm □□
  - □□ AVP □□□□□□□□□□
  - □□□□□□□□ □□□□
  - `{:avp, {code, value}}`
- □□□□□□□□□□□□□□□□□□□□ `:packet_type`□□□□
  - □□□□□□□□□□ **OR** □□ □□□□
  - `{:command_code, [317, 318]}` □□□□□□□□ 317 □ 318

- `any`
  - `:any` - 任意 AVP
  - `{:avp, {264, :any}}` Origin-Host AVP

## 設定

### 1. 設定

#### DRM DRA 設定

```
dra_module_advanced_routing:
  enabled: True
  rules:
    - rule_name: temporary_until_cutover_s6a_via_to_local_hss
      match: ":all"
      filters:
        - '{:application_id, 16777251}'
        - '{:via_peer, ["omnitouch-lab-
dra01.epc.mnc001.mcc001.3gppnetwork.org", "omnitouch-lab-
dra02.epc.mnc001.mcc001.3gppnetwork.org"]}'
        - '{:avp, {296, "epc.mnc001.mcc001.3gppnetwork.org}}}'
      route:
        peers: [omnitouch-lab-
hss01.epc.mnc001.mcc001.3gppnetwork.org, omnitouch-lab-
hss02.epc.mnc001.mcc001.3gppnetwork.org]
```

#### DRM DRA S6a 設定 HSS 設定

### 2. 設定

#### IMSI 設定

```

dra_module_advanced_routing:
  enabled: True
  rules:
    - rule_name: inbound_s6a_roaming_to_dcc
      match: ":all"
      filters:
        - '{:application_id, 16777251}'
        - '{:avp, {296, "epc.mnc001.mcc001.3gppnetwork.org}}}'
        - '{:avp, {1, ["505571234567", ~r"999001.*"]}}}'
      route:
        peers: [dra01.omnitouch.com.au, dra02.omnitouch.com.au]

```

Origin-Realm S6a IMSI DRA

3 **:destination\_host**

AVP

```

dra_module_advanced_routing:
  enabled: True
  rules:
    - rule_name: route_to_specified_destination_host
      match: ":all"
      filters:
        - '{:avp, {1, [~r"90199.*"]}}}' # IMSI
      route: :destination_host

```

- AVP (293)
- AVP
- 

4

IMSI

```
dra_module_advanced_routing:
  enabled: True
  rules:
    - rule_name: drop_test_subscribers
      match: ":all"
      filters:
        - '{:application_id, 16777251}' # S6a
        - '{:avp, {1, [~r"999999.*"]}}' # IMSI
      route: :drop
```

□□□□

- 999999 S6a IMSI
- □□□□□□□□□□□□□□
- □□□□□□□□□□□□□□□□
- Prometheus □□ □□□□□□□□

□□ 5□□□□□□□□□□□□□□

□□□□□□□□□□ DIAMETER\_TOO\_BUSY□

```
dra_module_advanced_routing:
  enabled: True
  rules:
    - rule_name: rate_limit_high_volume_peer
      match: ":all"
      filters:
        - '{:via_peer, "mme-overloaded-01.example.com"}'
        - '{:application_id, 16777251}'
      route: {:error, 3004}
```

□□□□

- □□□□□□□□□□ S6a □□
- □□ DIAMETER\_TOO\_BUSY (3004) □□□□
- □□□□□□□□□□□□□□
- □□□□□□□□□□□□□□
- □□ Prometheus □□ □□□□□□□□

## ❖❖❖ 6

```
dra_module_advanced_routing:  
  enabled: True  
  rules:  
    - rule_name: block_purge_requests  
      match: ":all"  
      filters:  
        - '{:application_id, 16777251}' # S6a  
        - '{:command_code, 321}'       # PUR ( UE )  
      route: {:error, 5012}
```

- S6a UE
- DIAMETER\_UNABLE\_TO\_COMPLY (5012)
- 
- 

AVP



- `dictionary` `:diameter_gen_3gpp_s6a`

AVP

- `:remove` - AVP
- `:overwrite` - AVP
  - `dictionary`

AVP

## AVP

AVP

- `{:avp, {<code>, <new_value>}}` - AVP

AVP

- `{:avp, {<code>, :any}}` - ID AVP
- `avp_id` AVP

AVP

```
transform: %{
  action: :overwrite,
  dictionary: :diameter_gen_3gpp_s6a,
  avps: [{:avp, {"s6a_Supported-Features", {"s6a_Supported-Features", 10415, 1, 3221225470, []}}}]
}
```

AVP

AVP 1

AVP

```

dra_module_advanced_transform:
  enabled: True
  rules:
    - rule_name: rewrite_s6a_destination_realm_for_operator_X
      match: ":all"
      filters:
        - '{:to_peer, ["dra01.omnitouch.com.au",
"dra02.omnitouch.com.au"]}'
        - '{:avp, {296, "epc.mnc001.mcc001.3gppnetwork.org"}}'
        - '{:avp, {1, [~r"9999999.*"]}}'
      transform:
        action: ":edit"
        avps:
          - '{:avp, {283, "epc.mnc999.mcc999.3gppnetwork.org"}}'

```

Operator S6a destination realm DRA IMSI destination realm X

2 destination realm

```

dra_module_advanced_transform:
  enabled: True
  rules:
    - rule_name:
rewrite_s6a_destination_realm_for_roaming_partner_ausie
      match: ":all"
      filters:
        - '{:to_peer, ["dra01.omnitouch.com.au",
"dra02.omnitouch.com.au"]}'
        - '{:avp, {296, "epc.mnc057.mcc505.3gppnetwork.org"}}'
        - '{:avp, {1, [~r"50557.*"]}}'
      transform:
        action: ":edit"
        avps:
          - '{:avp, {283, "epc.mnc030.mcc310.3gppnetwork.org"}}'

```

IMSI destination realm IMSI destination realm

3 MVNO

```

dra_module_advanced_transform:
  enabled: True
  rules:
    - rule_name: rewrite_s6a_destination_realm_for_single_sub
      match: ":all"
      filters:
        - '{:to_peer, ["dra01.omnitouch.com.au",
"dra02.omnitouch.com.au"]}'
        - '{:avp, {296, "epc.mnc001.mcc001.3gppnetwork.org}}}'
        - '{:avp, {1, ["505057000003606"]}}}' # IMSI
      transform:
        action: ":edit"
        avps:
          - '{:avp, {283, "epc.mnc001.mcc001.3gppnetwork.org}}}'

```

□□□□□□□□ MVNO □□□□□□□□□□□□□□□□

□□ **4**□□□□□□□□□□□□□□□□

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```

dra_module_advanced_transform:
  enabled: True
  rules:
    - rule_name: Tutorial_Rule_AIR
      match: ":all"
      filters:
        - '{:application_id, 16777251}'
        - '{:command_code, 318}'
        - '{:packet_type, :request}'
        - '{:avp, {1, "9999990000000001}}}'
        - '{:avp, {264, :any}}}' # Origin-Host □□□□□□□□□□
      transform:
        action: ":edit"
        avps:
          - '{:avp, {1, "9999990000000002}}}'

```

□□□□□

- □□□ S6a AIR □□ □□□□□□□□□□□□

- AVP 1 "9999990000000001"
- Origin-Host AVP 264
- AVP "9999990000000002"
- AVP

## 5 AVP

AVP

```
dra_module_advanced_transform:
  enabled: True
  rules:
    - rule_name: remove_user_name_avp
      match: ":all"
      filters:
        - '{:application_id, 16777251}'
      transform:
        action: ":remove"
        avps:
          - '{:avp, {1, :any}}' #
```

S6a AVP 1

## 6 AVP

AVP

```

dra_module_advanced_transform:
  enabled: True
  rules:
    - rule_name: add_sos_apn_to_ula
      match: ":all"
      filters:
        - ':{application_id, 16777251}'          # S6a/S6d
        - ':{command_code, 316}'                # ULA (□□□□□□)
        - ':{packet_type, :answer}'            # □□□□□□
        - ':{avp, {296, "epc.mnc001.mcc001.3gppnetwork.org"}}' #

```

Origin-Realm

```

  transform:
    action: ":overwrite"
    dictionary: ":diameter_gen_3gpp_s6a"
    avps:
      - ':{avp, {"s6a_APN-Configuration-Profile",
        {"s6a_APN-Configuration-Profile", 1, 0, [
          {"s6a_APN-Configuration", 1, 0, "internet", [],
            [{"s6a_EPS-Subscribed-QoS-Profile", 9,
              {"s6a_Allocation-Retention-Priority", 1, [0],
[0], [], []]},
[1], [], [], [1], ["0800"],
[{:s6a_AMBR, 4200000000, 4200000000, [], [],
[]]},
[], [], [], [], [], [], [], [], [], [], [], [], [],
[1], [], [1]},
{"s6a_APN-Configuration", 2, 0, "ims", [],
[{:s6a_EPS-Subscribed-QoS-Profile", 5,
  {"s6a_Allocation-Retention-Priority", 1, [0],
[1], [], [1]},
[0], [], [], [1], ["0800"],
[{:s6a_AMBR, 4200000000, 4200000000, [], [],
[]]},
[], [], [], [], [], [], [], [], [], [], [], [], [],
[1], [], [1]},
{"s6a_APN-Configuration", 3, 0, "sos", [],
[{:s6a_EPS-Subscribed-QoS-Profile", 5,
  {"s6a_Allocation-Retention-Priority", 1, [0],
[1], [], [1]},
[1], [], [], [1], ["0800"],
[{:s6a_AMBR, 4200000000, 4200000000, [], [],
[]]},
[], [], [], [], [], [], [], [], [], [], [], [], [],

```



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□□ 1

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□□ 2

□□□□□□

□□ 3

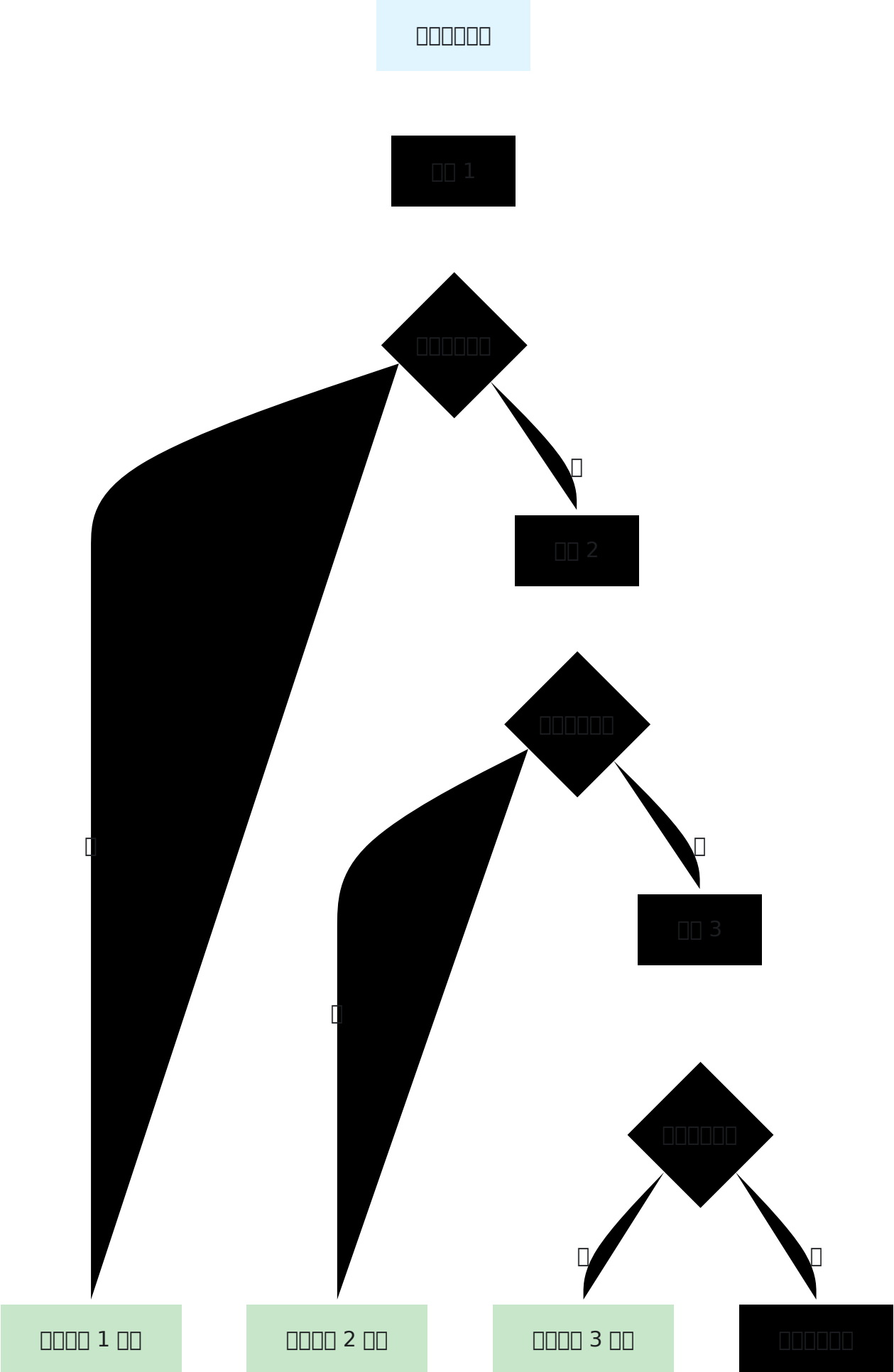
□□□□□□

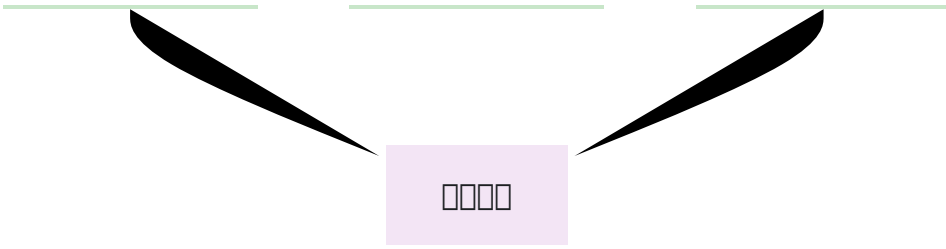
□□□□ 1 □□

□□□□ 2 □□

□□□□ 3 □□

□□□□□□





IPsec:  
 IPsec  
 IPsec

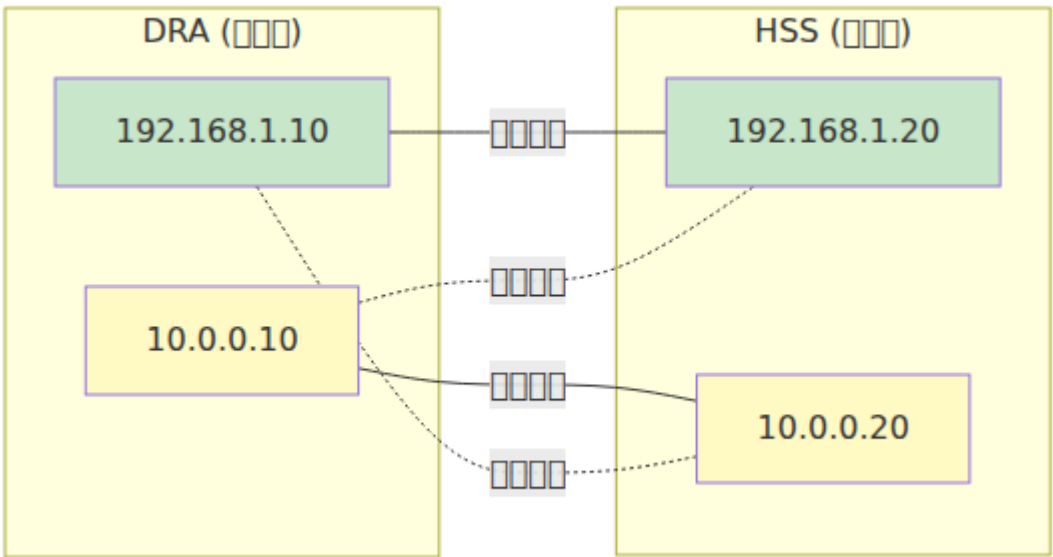
1. IPsec IPsec IPsec IPsec
2. IPsec IPsec match IPsec IPsec :all IPsec :any IPsec :none IPsec
3. IPsec IPsec - IPsec IPsec
4. IPsec IPsec IPsec IPsec IPsec IPsec / IPsec

IPsec

match IPsec IPsec IPsec IPsec IPsec

**match: :all (AND IPsec)**

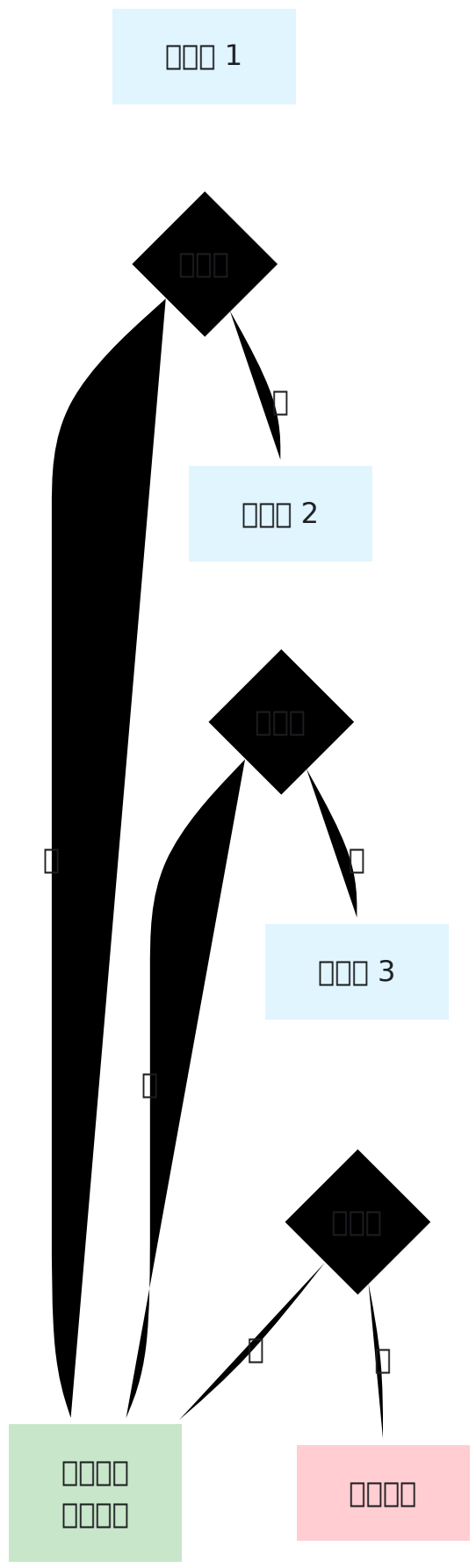
IPsec IPsec IPsec IPsec IPsec IPsec



IPsec 3 IPsec filter1 AND filter2 AND filter3 IPsec IPsec

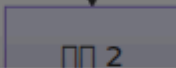
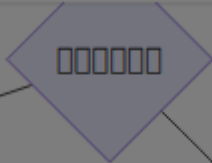
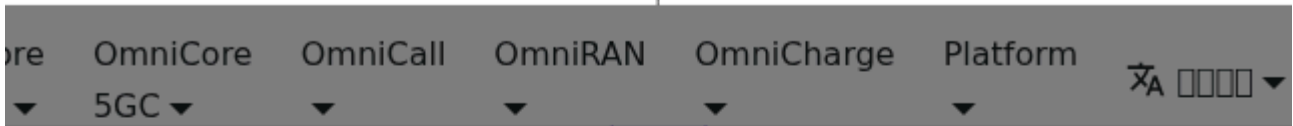
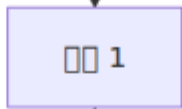
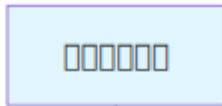
**match: :any (OR IPsec)**

IPsec IPsec IPsec IPsec IPsec IPsec



filter1 OR filter2 OR filter3



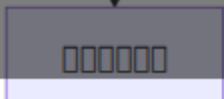
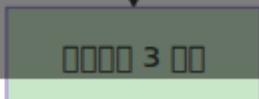
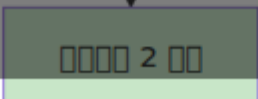
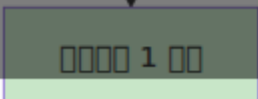


## Sizing your network?

Get a deployment estimate in 60 seconds. Pick a workload size, see the topology, and get pricing — no sales call needed.

[Size my network](#)

[Talk to engineering](#)





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```
module_extended_metrics:
  enabled: true
  attach_attempt_reporting_enabled: true
```

□□

□□	□□
enabled	□□ true □□□□□□□□
attach_attempt_reporting_enabled	□□□□□□ LTE □□□□□□S6a AIR/AIA□

□□□□

□□□□□□

□□□□□□□□□□ (AIR) □□□ (AIA) □□□□□□ LTE □□□□□□□□

Parse error on line 36: ... style Metrics fill:#f3e5f5 style E -----^  
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'

□□

□□□ attach\_attempt\_count

□□□

- imsi - □□□ IMSI□□□□□□ AVP - □□ AVP □□□

□□□

- `origin_host` - 318S6a 16777251 - IMSI ID
- `result_code` - HSS 2001

Configuration

1. 318S6a 16777251 - IMSI ID
  - IMSI/AVP 1
  - Origin-Host AVP 264
2. ETS TTL
3. AIA
  - IMSI ID
  - AVP 268 AVP 297
  - IMSI origin host result code

Code

- `origin_host` - 318S6a 16777251 - IMSI ID
- **IMSI** - 505057000000001
- `result_code` - MME/SGSN 2001
- `attach_attempt_count` - 1

Code

InfluxDB write

```
DRA.Metrics.InfluxDB.write({
  measurement: "attach_attempt_count",
  fields: {imsi: "505057000000001"},
  tags: {origin_host: "mme-01.example.com", result_code: 2001}
})
```

Result

- `2001` - DIAMETER\_SUCCESS
- `5001` - DIAMETER\_AUTHENTICATION\_REJECTED

- 5004 - AVP
- RFC 6733

## Configuration

- S6a AIR/AIA ID 16777251 318
- + 5
- 
- 

# Prometheus

DRA Prometheus `/metrics`

## Configuration

Example

`diameter_peer_status` Gauge 1 0

- `origin_host` -
- `ip` - IP

Example

```
#
diameter_peer_status{origin_host="hss01.example.com"}

#
count(diameter_peer_status == 0)
```

Example

`diameter_peer_message_count_total` Counter

- `origin_host` -

- `received_from` - 00000000
- `application_id` - 0000 ID 00 ID 000
- `cmd_code` - 000000000 0000???
- `application_name` - 000000000000"3GPP\_S6a"
- `cmd_name` - 000000000000"AIR"
- `direction` - "request" 0 "response"

000

```
# 0000 MME 0 S6a AIR 0000
rate(diameter_peer_message_count_total{
  cmd_code="318",
  direction="request",
  origin_host="mme01.example.com"
}[5m])

# 0000000000
sum by (application_name)
(rate(diameter_peer_message_count_total[5m]))
```

0000000

000 `diameter_peer_message_result_code_count_total` 000Counter 0000000000  
000000000 000

- `origin_host` - 000000
- `routed_to` - 00000000
- `application_id` - 0000 ID
- `cmd_code` - 0000000
- `application_name` - 0000
- `cmd_name` - 0000
- `result_code` - 000000000000000

000

```

# S6a AIR
rate(diameter_peer_message_result_code_count_total{
  cmd_code="318",
  result_code="2001"
}[5m])

#
sum by (result_code) (
  rate(diameter_peer_message_result_code_count_total{
    result_code!="2001"
  }[5m])
)

```

2001-5012

- 2001 - DIAMETER\_SUCCESS
- 3002 - DIAMETER\_UNABLE\_TO\_DELIVER
- 3003 - DIAMETER\_REALM\_NOT\_SERVED
- 3004 - DIAMETER\_TOO\_BUSY
- 5001 - DIAMETER\_AUTHENTICATION\_REJECTED
- 5004 - DIAMETER\_INVALID\_AVP\_VALUE
- 5012 - DIAMETER\_UNABLE\_TO\_COMPLY

318

diameter\_peer\_last\_response\_delay Gauge DRA →  
 → DRA

- origin\_host -
- routed\_to -
- application\_name -
- cmd\_name -

318

```
# HSS 平均遅延
avg(diameter_peer_last_response_delay{routed_to="hss01.example.com"})

# S6a の P95 遅延
histogram_quantile(0.95,
  rate(diameter_peer_last_response_delay{application_name="3GPP_S6a"}
    [5m])
)
```

フィルタ

メトリック `diameter_peer_unanswered_request_count_total` Counter のラベル

- `origin_host` - ホスト名
- `routed_to` - 宛先ホスト
- `application_id` - アプリケーション ID
- `cmd_code` - コマンドコード
- `application_name` - アプリケーション名
- `cmd_name` - コマンド名

クエリ

```
# 平均遅延
rate(diameter_peer_unanswered_request_count_total[5m])

# 遅延が長いものを上位5つ
topk(5, sum by (routed_to) (
  rate(diameter_peer_unanswered_request_count_total[5m])
))
```

フィルタ

メトリック `diameter_peer_unauthorized_connection_count_total` Counter のラベル

- `origin_host` - ホスト名
- `supported_applications` - サポートされているアプリケーション



- Erlang Diameter `:discard`
- `ignore` `ignore`

Counter

`diameter_advanced_routing_error_count_total` Counter `ignore`  
`{:error, result_code}` `ignore`

- `result_code` - `ignore`
- `application_id` - `ignore` ID
- `cmd_code` - `ignore`
- `application_name` - `ignore`
- `cmd_name` - `ignore`

Code

```
# ignore
sum by (result_code) (
  rate(diameter_advanced_routing_error_count_total[5m])
)

# DIAMETER_T00_BUSY ignore
rate(diameter_advanced_routing_error_count_total{
  result_code="3004"
}[5m])

# ignore
diameter_advanced_routing_error_count_total{
  result_code="3004"
} > 100
```

Code

- `ignore` `route: {:error, result_code}`
- DRA `ignore`
- `ignore`
- Erlang Diameter `{:protocol_error, code}` `ignore` `{:answer_message, code}`

- `3000` - DIAMETER\_UNABLE\_TO\_DELIVER

## 3000

- `3002` - DIAMETER\_UNABLE\_TO\_DELIVER
- `3003` - DIAMETER\_REALM\_NOT\_SERVED
- `3004` - DIAMETER\_TOO\_BUSY
- `5012` - DIAMETER\_UNABLE\_TO\_COMPLY

## 3000

- `/metrics` Prometheus
  - S6a `3000`
  - **BEAM/Erlang** `rate()`
  - IMSI
- 

## 3000

## 3000

- AVP