

- proxy
 -
 -
- base
 -
 -
 - — authorize
 -
 -
 - — authenticate
 -
 - — post_auth
 - — accounting
 - : Start, Stop, Interim-Update
 -
 - Accounting-On Accounting-Off
 -
 -
 - «»
 - Accounting-On Accounting-Off
 -



. plugins <plugin_name> <plugin_instance_name>, <plugin_name> — , <plugin_instance_name> — .

proxy

. Perl- hard.pm FreeRADIUS proxy, .

plugins proxy <plugin_instance_name> routes

:-

- — , ;
- — , ;

, . , , **plugins proxy <plugin_instance_name> default .**

```
plugins:
  proxy:
    dhcp:
      routes:
        base/dhcp-082: $request.RAD_REQUEST.try("DHCP-Relay-Circuit-Id").present?()
        base/dhcp-ip-private: $request.RAD_REQUEST.DHCP-Client-IP-Address.private_ip4?()

    default: "base/dhcp-ip-public"
```

HARD **base**, . FreeRADIUS DHCP-. **proxy/dhcp** HARD. **proxy/base** :

1. DHCP-Relay-Circuit-Id, **dhcp-082 base**. FreeRADIUS.
2. DHCP-Client-IP-Address(DHCP-Relay-Circuit-Id) IP-, **dhcp-082 base**. FreeRADIUS.

base

, FreeRADIUS.

plugins base <plugin_instance_name> call_stack

- :
1. (), after-
 2. :, .
 3. (), before-

— IPoE- IP- Cisco ISG

```
plugins:
  base:
    isg-ipoe-by-ip:
      call_stack:
        #
        - set_tag_before/request_type

        #
        - reject_on_error/main

        #
        - check_attr_before/finish_processing_of_unnecessary_accounting

        #
        - set_tag_before/base-session-accounting

        # ISG- IPOE-SC-INET-<Rate>-<Burst>
        - set_tag_before/auth-internet-access-isg-service
        - match_before/get_speed_limit_values_for_internet-access-isg-service
        - format_after/set_cisco-service-info_attr_for_internet-access-isg-service

        #
        - map_after/add_prefix_to_isg-services
```

plugins base <plugin_instance_name> actions

, . 4 FreeRADIUS:

1. .
2. .
3. -.
4. .

, FreeRADIUS : <http://wiki.freeradius.org/guide/Concepts>.

— authorize

RADIUS- HARD :

1. , , .
 2. RADIUS- .
- :
1. .
 2. .

plugins base <plugin_instance_name> actions authorize customer_profile plugins base <plugin_instance_name> actions authorize provider_profile . \$customer_profile \$provider_profile, — \$bind_id.

:

set_by	search_cache	(MongoDB). , query. () . , , . — IPoE-, . , \$bind_id() , plugins base <plugin_instance_name> actions authorize de fault_bind_type.

	set_first_from_customer_profile	. filter , .
	set_first_from_provider_profile	. filter , . , , , : DHCP Option 82, Q-in-Q VLAN .. MAC- , , .
query	key:value	. search_cache set_by. key:value . , , . , . key : (, MAC-), (, IP-). value . , : \$in. , , IP- , . map_before IP- .
filter	key:value	. set_first_from_customer_profile set_first_from_provider_profile set_by. , ..

— IPoE- VLAN' MAC-

```
plugins:
  base:
    jmx5-qinq:
      actions:
        authorize:
          customer_profile: &customer_profile
          set_by: search_cache
          query:
            MAC-Address: $request.RAD_REQUEST.User-Name.normalize_mac()

          provider_profile: &provider_profile
          set_by: search_cache
          query:
            Switch-VLAN: $var.Remote-Circuit-Ids.Remote_Id
            Switch-Port-Code: $var.Remote-Circuit-Ids.Circuit_Id

          default_bind_type: network_connection
```

— DHCP Option 82

```
plugins:
  base:
    se-ipoe-by-o82:
      actions:
        authorize:
          provider_profile:
            set_by: search_cache
            query:
              Switch-IP: $request.RAD_REQUEST.Agent-Remote-Id.substring(6).unhex()
              Switch-Port-Code: $request.RAD_REQUEST.Agent-Circuit-Id.substring(12).to_i(16)

          customer_profile:
            set_by: set_first_from_provider_profile
            filter:
              Auth-Scheme: '"DHCP+L2TP"'
```

```
—

plugins:
  base:
    l2tp-by-login:
      actions:
        authorize:
          customer_profile: &customer_profile
          set_by: search_cache
          query:
            L2TP-Login: $request.RAD_REQUEST.User-Name.lower().regex_replace("@.*$|\\\\\\t|\\s")
            Auth-Scheme: "DHCP+L2TP"

          provider_profile: {}
```

- , . :
- \$request.
 - \$customer_profile.
 - \$provider_profile.
 - \$bind_id.
 - before- \$var \$context.

plugins base <plugin_instance_name> actions authorize reply . :

condition		: , , .
template RAD_CHECK	key:value .	RAD_CHECK , key — RADIUS-, value — , . value , . , . RAD_CHECK FreeRADIUS : • Cleartext-Password . • Pool-Name IP-. • Auth-Type Reject Accept .
template RAD_REPLY	key:value .	RAD_REPLY , key — RADIUS-, value — , . value , . , , ,Cisco-AVPair.
template result	\$rlm	. FreeRADIUS. : • \$rlm.OK — . • \$rlm.REJECT — .

() : , , — .

 , , , render_reply_after. , , . after- .

 RAD_CHECK RAD_REPLY ' * ' . , « RADIUS- — » . , . , except.

```

plugins:
  base:
    isg-ipoe-by-ip:
      actions:
        authorize:
          reply: &default_reply
          # ISG- IPOE-SC-INET-<Rate>-<Burst>
          - condition: $context.has_tag?("auth-internet-access-isg-service") and $request.RAD_REQUEST.User-
            Name.like?("^IPOE-SC-INET(-\d+){2}$")
            template:
              RAD_CHECK: &default_rad_check
              #      RAD_CHECK , «»
              '*': $request.RAD_CHECK.except("Cleartext-Password")
              #      IP-, .
              #      FreeRADIUS «» .
              Cleartext-Password: $request.RAD_REQUEST.User-Password

              RAD_REPLY:
                Cisco-AVPair:
                  - '"subscriber:accounting-list=HYDRA-IPOE"'
                  - '"ip:traffic-class=in access-group name IPOE-ACL-ALL-TRAFF priority 1000"'
                  - '"ip:traffic-class=out access-group name IPOE-ACL-ALL-TRAFF priority 1000"'
                Acct-Interim-Interval: '"300"'

              result: $rlm.OK

          #      -
          - condition: $customer_profile.null?()
            template:
              RAD_CHECK:
                Auth-Type: '"Reject"'

              RAD_REPLY:
                Reply-Message: '"Incorrect IP address"'

              result: $rlm.NOTFOUND

          #
          - condition: $customer_profile.attributes.try("Internet-Access-Service-State") ==
            "SERV_STATE_Provision"
            template:
              RAD_CHECK:
                <<: *default_rad_check

              RAD_REPLY: &ok_rad_reply
              Cisco-AVPair: '"subscriber:accounting-list=HYDRA-IPOE"'
              Acct-Interim-Interval: '"300"'
              Idle-Timeout: '"86400"'
              Cisco-Account-Info: $customer_profile.attributes.ISG-IPoE-Services.split(",")

              result: $rlm.OK

          #
          - template:
              RAD_CHECK:
                <<: *default_rad_check

              RAD_REPLY:
                <<: *ok_rad_reply
                Cisco-Account-Info:
                  - '"IPOE-SC-REDIRECT"'
                  - '"IPOE-SC-OPENGARDEN"'

              result: $rlm.OK

```

— **authenticate**

RADIUS- HARD , pap, eap, mschap .. :

- 1. .
- 2. .
- 3. .

authorize. , , **authorize—** , YAML- .

:

- 1. **Simultaneous-Use** . , .
- 2. . , , :.
- 3. , **simultaneous-limit-exceeded.**

, after-. , , «», .

```

plugins:
  base:
    l2tp-by-login:
      actions:
        authorize:
...
      authenticate:
        customer_profile:
          #          authorize
          <<: *customer_profile

        provider_profile: {}

      reply:
        #
        - condition: $context.has_tag?('simultaneous-limit-exceeded')
          template:
            RAD_REPLY:
              Reply-Message: '"You are already logged in"'

              result: $rlm.REJECT

        # IP-
        - condition: ' $customer_profile.attributes.try("Internet-Access-Service-Status") ==
"SERV_STATE_Provision"
          and $customer_profile.attributes.Real-IP-Address.ip4?()'
          template:
            RAD_REPLY:
              Acct-Interim-Interval: '"300"'
              Cisco-AVPair:
                - '"ip:vrf-id=REAL"'
                - '"ip:ip-unnumbered=loopback221"'
              Class: $customer_profile.attributes.L2TP-Class.coalesce("7")
              Framed-IP-Address: $customer_profile.attributes.Real-IP-Address
              Idle-Timeout: '"86400"'

              result: $rlm.OK

        # IP-
        - condition: $customer_profile.attributes.try("Internet-Access-Service-Status") ==
"SERV_STATE_Provision"
          template:
            RAD_REPLY:
              Acct-Interim-Interval: '"300"'
              Cisco-AVPair:
                - '"ip:vrf-id=NAT"'
                - '"ip:ip-unnumbered=loopback220"'
              Class: $customer_profile.attributes.L2TP-Class.coalesce("5")
              Framed-Pool: '"NAT-1"'
              Idle-Timeout: '"86400"'

              result: $rlm.OK

        # ( )
        - template:
          RAD_REPLY:
            Acct-Interim-Interval: '"600"'
            Cisco-AVPair:
              - '"ip:vrf-id=NOPAY"'
              - '"ip:ip-unnumbered=loopback222"'
            Cisco-Service-Info: '"QU;256000;9600;9600;D;256000;9600;9600"'
            Framed-Pool: '"FREE-DNAT"'
            Idle-Timeout: '"86400"'
            mpd-limit:
              - '"out#100=all shape 256000 pass"'
              - '"in#100=all shape 256000 pass"'
            Session-Timeout: '"86400"'

            result: $rlm.OK

```

-- post_auth

```
FreeRADIUS HARD, , DHCP-c. FreeRADIUS.  
 , IP-, FreeRADIUS. IP- RADIUS-, -. , IP-, , .
```

, authorize:

1. .
2. .

authorize.

-- FreeRADIUS DHCP- 82

```
plugins:  
  base:  
    dhcp-by-082:  
      actions:  
        post_auth:  
          provider_profile:  
            set_by: search_cache  
            query:  
              Switch-IP: $request.RAD_REQUEST.DHCP-Relay-Remote-Id.substring(6).unhex()  
              Switch-Port-Code: $request.RAD_REQUEST.DHCP-Relay-Circuit-Id.substring(12).to_i(16)  
  
          customer_profile:  
            set_by: set_first_from_provider_profile  
            filter:  
              Auth-Scheme: "DHCP+L2TP"  
  
          reply:  
            #  
            - condition: '      $customer_profile.present?()  
                          and $customer_profile.attributes.DHCP-IP-Address.ip4?()  
                          and $customer_profile.attributes.DHCP-Gateway-IP.ip4?()  
                          and $customer_profile.attributes.DHCP-Subnet-Mask.ip4_mask?()'  
  
            template:  
              RAD_REPLY:  
                DHCP-Domain-Name-Server:  
                  - "192.168.11.15"  
                  - "192.168.11.16"  
                DHCP-IP-Address-Lease-Time: "86400"  
                DHCP-Router-Address: $customer_profile.attributes.DHCP-Gateway-IP  
                DHCP-Subnet-Mask: $customer_profile.attributes.DHCP-Subnet-Mask  
                DHCP-Your-IP-Address: $customer_profile.attributes.DHCP-IP-Address  
  
            result: $rlm.OK  
  
            #  
            - condition: $customer_profile.null?()  
            template:  
              RAD_REPLY: {}  
              reject_reason: "Customer equipment profile not found // Option 82"  
              result: $rlm.REJECT  
  
            # // -  
            - template:  
              RAD_REPLY: {}  
              reject_reason: "Not valid customer equipment profile // Option 82"  
              result: $rlm.REJECT
```

-- accounting

.
Event-Timestamp , Acct-Delay-Time. plugins base <plugin_instance_name> actions accounting event_timestamp fo
rmat en_US.UTF-8. datetime.strptime Python.

: Start, Stop, Interim-Update

: MD5- (Acct-Session-Id) , plugins base <plugin_instance_name> actions accounting session unique_id_attributes.

sessions . , , — .



t1 - . t1 (t1-... accounting session lookup hours)() (,), t1 (t1-... accounting session lookup timed_out_days)() . -, batch , - (-). batch , , , accounting session lookup additional_hours () .

, customer_profile provider_profile plugins base <plugin_instance_name> actions accounting. . auth orize. , , authorize— , YAML- .

new-session. , , , . , .

. plugins base <plugin_instance_name> actions accounting session templates . :

condition		: , , .
attributes	key: value	, . key — , value — , . value , . , , Stop- Acct-Terminate-Cause, .
template	key: value.	, key — RADIUS-, value — , . value , . , , , Cisco-AVPair.
services	: • service_id • value • unit	, : • service_id — . • value — , . • unit — . : bytes, kilobytes, megabytes, gigabytes, seconds, minutes, hours, days, months, bits_per_second, kilobits_per_second, megabits_per_second. , : . Acct-Input-Octets, Acct-Output-Octets, Acct-Input-Gigawords Acct-Output-Gigawords, , : • \$request.RAD_REQUEST.Acct-Input-Octets.to_i() + 4 * \$request.RAD_REQUEST.Acct-Input-Gigawords.to_i().gigabytes() • \$request.RAD_REQUEST.Acct-Output-Octets.to_i() + 4 * \$request.RAD_REQUEST.Acct-Output-Gigawords.to_i().gigabytes()
service_profile template_id		, . , . .
load_to_hydra	true, false	, . — «», .

() : , , — .

, \$session. , , , .

accounting — L2TP- -

```
plugins:
  base:
    l2tp-by-login:
      actions:
        authorize:
...
        authenticate:
...
      accounting:
        #
        customer_profile:
          <<: *customer_profile

        #
        provider_profile: {}

      session:
        #
        unique_id_attributes: [User-Name, NAS-IP-Address, Framed-IP-Address, NAS-Port]

        #
        templates:
          #

          - condition: '  $customer_profile.attributes.try("Service-State-Code") == "SERV_STATE_Provision"
                        or $session.attributes.try("Service-State-Code") == "SERV_STATE_Provision"'

          attributes: &session_attributes
            Calling-Station-Id: $request.RAD_REQUEST.try("Calling-Station-Id")
            Called-Station-Id: $request.RAD_REQUEST.try("Called-Station-Id")
            Framed-IP-Address: $request.RAD_REQUEST.try("Framed-IP-Address")
            NAS-Identifier: $request.RAD_REQUEST.NAS-Identifier
            NAS-IP-Address: $request.RAD_REQUEST.NAS-IP-Address
            Service-State-Code: $customer_profile.attributes.try("Service-State-Code")
            Session-Template: '"Full access session"'
            User-Name: $request.RAD_REQUEST.User-Name

          #
          #      -
          services:
            # «- .»
            - service_id: 40213701
              value: $request.RAD_REQUEST.try("Acct-Output-Octets", "0").to_i() + 4 * $request.
RAD_REQUEST.try("Acct-Output-Gigawords", "0").to_i().gigabytes()
              unit: bytes

            # «- .»
            - service_id: 40213501
              value: $request.RAD_REQUEST.try("Acct-Input-Octets", "0").to_i() + 4 * $request.RAD_REQUEST.
try("Acct-Input-Gigawords", "0").to_i().gigabytes()
              unit: bytes

          #      -
          - condition: '  $customer_profile.null?()
                        and $session.customer_profile_id.empty?()'
            attributes:
              <<: *session_attributes
              Session-Template: '"Guest session"'
              load_to_hydra: false

          #      -
          - attributes:
              <<: *session_attributes
              Session-Template: '"Restricted session"'

          services: {}
```

```

plugins:
  base:
    isg-ipoe-by-ip:
      actions:
        authorize:
...
        authenticate:
...
      accounting:
        #      ,      : IP-
        customer_profile:
          <<: *customer_profile

        #
        provider_profile: {}

      session:
        templates:
          #
          - condition: $request.RAD_REQUEST.try("Cisco-Service-Info").empty?()

          attributes: &session_attributes
            User-Name: $request.RAD_REQUEST.User-Name
            NAS-IP-Address: $request.RAD_REQUEST.NAS-IP-Address
            NAS-Port-Id: $request.RAD_REQUEST.NAS-Port-Id
            Cisco-AVPair: $request.RAD_REQUEST.Cisco-AVPair
            Cisco-Service-Info: $request.RAD_REQUEST.try("Cisco-Service-Info")

          #
          - condition: $request.RAD_REQUEST.Cisco-Service-Info.like?("^NIPOE-SC-(INET|NIGHT)-.+$")
          attributes:
            #      ,
            <<: *session_attributes

          services:
            # «- .»
            - service_id: 40213501
              value: $request.RAD_REQUEST.try("Acct-Input-Octets", "0").to_i() + 4 * $request.RAD_REQUEST.
try("Acct-Input-Gigawords", "0").to_i().gigabytes()
              unit: bytes

            # «- .»
            - service_id: 40213701
              value: $request.RAD_REQUEST.try("Acct-Output-Octets", "0").to_i() + 4 * $request.
RAD_REQUEST.try("Acct-Output-Gigawords", "0").to_i().gigabytes()
              unit: bytes

          service_profile:
            #      «IPoE -      »
            template_id: 25244901

          #
          - condition: $request.RAD_REQUEST.Cisco-Service-Info.like?("^NIPOE-SC-(LOCAL|PRIVATE)$")
          attributes:
            #      ,
            <<: *session_attributes

          services:
            # « .»
            - service_id: 40214001
              value: $request.RAD_REQUEST.try("Acct-Input-Octets", "0").to_i() + 4 * $request.RAD_REQUEST.
try("Acct-Input-Gigawords", "0").to_i().gigabytes()
              unit: bytes

            # « .»
            - service_id: 40214201
              value: $request.RAD_REQUEST.try("Acct-Output-Octets", "0").to_i() + 4 * $request.

```

```

RAD_REQUEST.try("Acct-Output-Gigawords", "0").to_i().gigabytes()
    unit: bytes

    service_profile:
      # «IPoE - »
      template_id: 25245101

# ,
- attributes:
  # ,
  <=: *session_attributes

service_profile:
  # «IPoE - »
  template_id: 25245101

```

Accounting-On Accounting-Off

, **Acct-Status-Type** Accounting-On Accounting-Off, . RADIUS- .

on/off- **plugins** base <plugin_instance_name> actions accounting on_off_attributes key:value, key — , value — .

 on/off- , on_off_attributes plugins base <plugin_instance_name> actions accounting session templates at tributes.

, . accounting , .

on/off- —	NAS-IP-Address	on/off-
-----------	----------------	---------

```

plugins:
  base:
    ran-by-login:
      actions:
        authorize:
...
        authenticate:
...
      accounting:
        session:
          templates:
            - attributes:
                NAS-IP-Address: $request.RAD_REQUEST.NAS-IP-Address
                User-Name: $request.RAD_REQUEST.User-Name

    on_off_attributes:
      NAS-IP-Address: $request.RAD_REQUEST.NAS-IP-Address

```

plugins base <plugin_instance_name> actions <action_name> hooks , .

<hook_type>/<hook_instance_name>, <hook_type> — , <hook_instance_name> — .

 :.

HARD **batch**. , , ,3:

/etc/cron.d/hard

```
# HARD RADIUS accounting loader
*/3 * * * * hard /opt/hydra/hard/init/hard.sh -f /etc/hydra/hard batch &>/dev/null
```



, , .

sessions — , . . , , . **service_profile template_id** , .

EP_SESSIONS . , , **EX_DATA_COLLECT**, « RADIUS- ».

load_seances . , HARD , .

«»

, **plugins base <plugin_instance_name> actions accounting session lookup hours** , , . , , .



RADIUS- RADIUS- :

- , RADIUS- **Accounting-On Accounting-Off**. — .
- . 1.5-2.5 (**Acct-Interim-Interval**), . , .
- , - RADIUS- , , RADIUS-, RADIUS-.

Accounting-On Accounting-Off

accounting . , :

- , .
- on/off-.
- on/off-, , , .

, **plugins base <plugin_instance_name> actions accounting session lookup timed_out_days**, . , , .

, :

- .
- , .
- Accounting-On Accounting-Off.
- .