

# BRAS/BRAS vrf. L3 WiFi -

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## 1. BRAS.

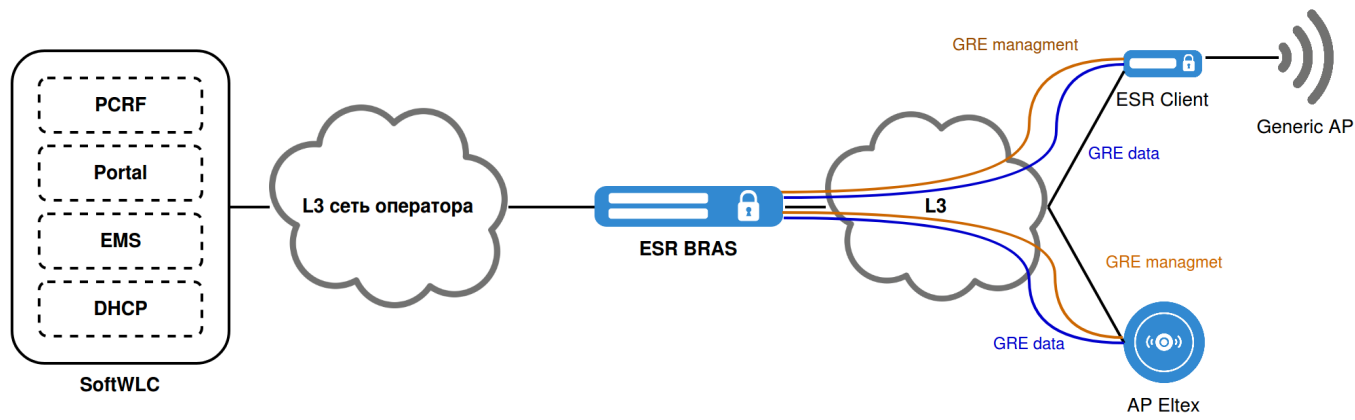
BRAS L3 ESR-100/200/1000/1200/1500/1700. Wi-Fi, . BRAS :

- , WiFi ;
- WiFi, . , ( SMS, );
- , WiFi , BRAS , WiFi ;
- WiFi BRAS .

BRAS , WiFi , SoftWLC, , BRAS. SoftWLC BRAS WiFi Eltex-PCRF.

### 1.1 .

, WiFi , ESR BRAS , . MAC- WiFi, . , BRAS , MAC- . WiFi BRAS L2-, WiFi BRAS VPN L3-. VPN ESR-10/20/100/200, GRE- ESR-100/200/1000/1200/1500/1700, Wireless-Controller( ESR L3 ( WiFi L3) ESR wireless-controller " "). Eltex GRE-, BRAS L3- ESR-10/20/100/200. , . 1.1.1 :



### . 1.1.1.1.

ESR:

- ESR BRAS, GRE BRAS - **"ESR BRAS L3"**.
- ESR, , GRE ESR BRAS L3 - ESR **"ESR Client"**.

, 1.1.1 ESR :

| ESR      | ESR BRAS L3 | ESR Client |
|----------|-------------|------------|
| ESR-10   | -           | +          |
| ESR-20   | -           | +          |
| ESR-100  | +           | +          |
| ESR-200  | +           | +          |
| ESR-1000 | +           | +          |
| ESR-1200 | +           | +          |
| ESR-1500 | +           | +          |
| ESR-1700 | +           | +          |

### 1.1.1.

:

1. , WiFi : "" **"ISP"**.
2. , WiFi, - "".
3. : **"Generic AP"**.
4. , WiFi : " **WiFi** " "".
5. generic AP L3 ESR Client GRE: "", **"Interop"**.

## 1.2. generic AP, WiFi

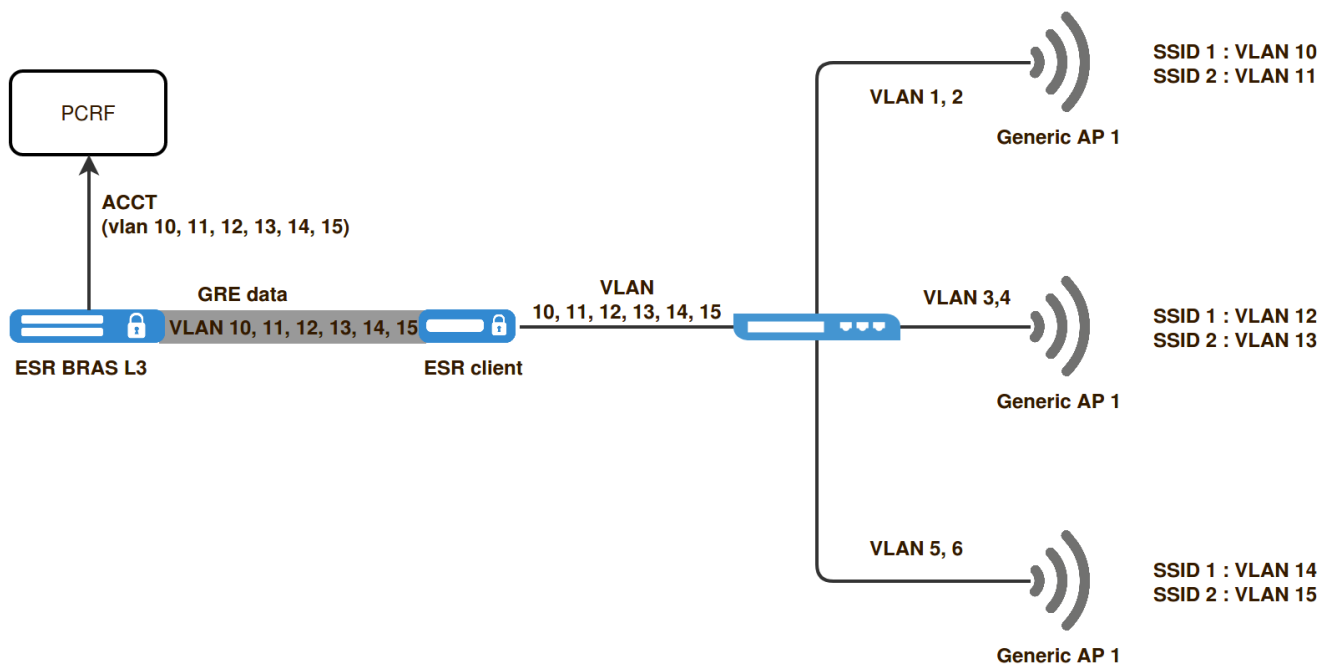
WiFi BRAS, , SSID generic AP . .

generic AP WiFi:

1. vlan.
2. c option 82.

### **vlan**

SSID generic AP vlan. , 1.2.1 ( GRE- ).



. 1.2.1.

. 1.2.1, generic AP, WiFi, vlan, ESR BRAS.

:

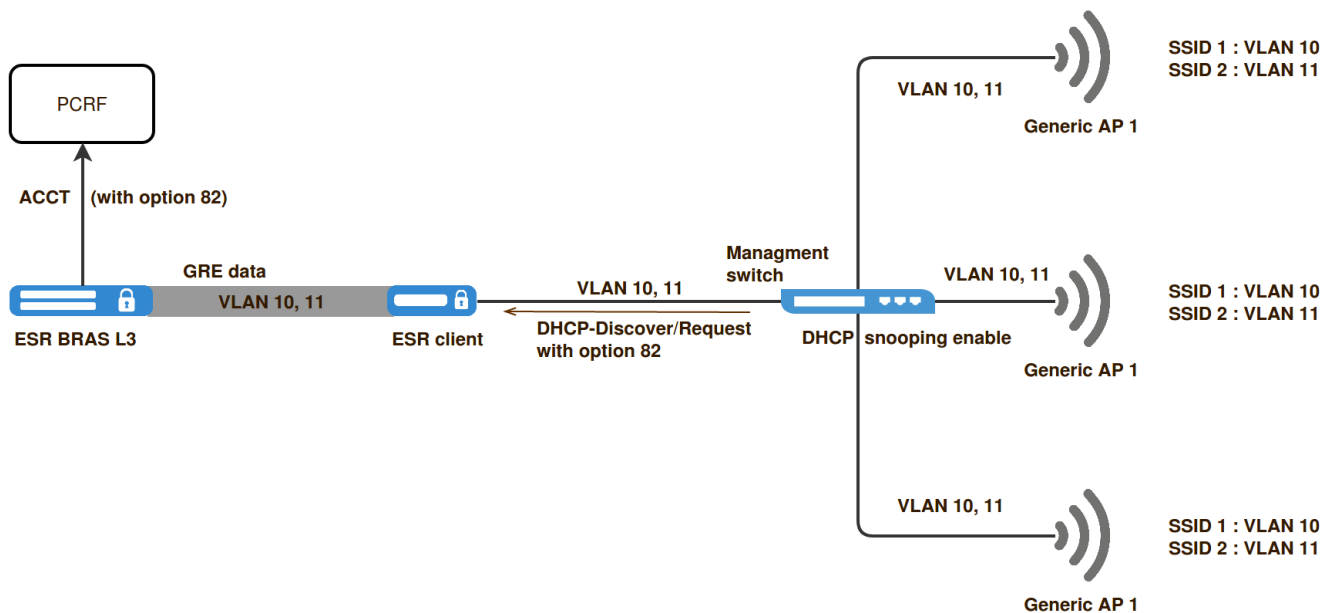
- 1) generic AP;
- 2) generic AP.

:

- 1) - generic AP vlan, 2 SSID generic AP 6 vlan. . SoftWLC, 20 vlan, GRE- ESR-client.

## option 82

ESR BRAS WiFi, option82, DHCP, SSID vlan, generic AP, generic AP option 82 DHCP- (DHCP snooping). , DHCP WiFi option 82 c /vlan, generic AP. generic AP SSID, . BRAS radius option 82, DHCP- ( 1.11.2 ESR). radius , RFC4679. , . 1.2.2.



. 1.2.2.

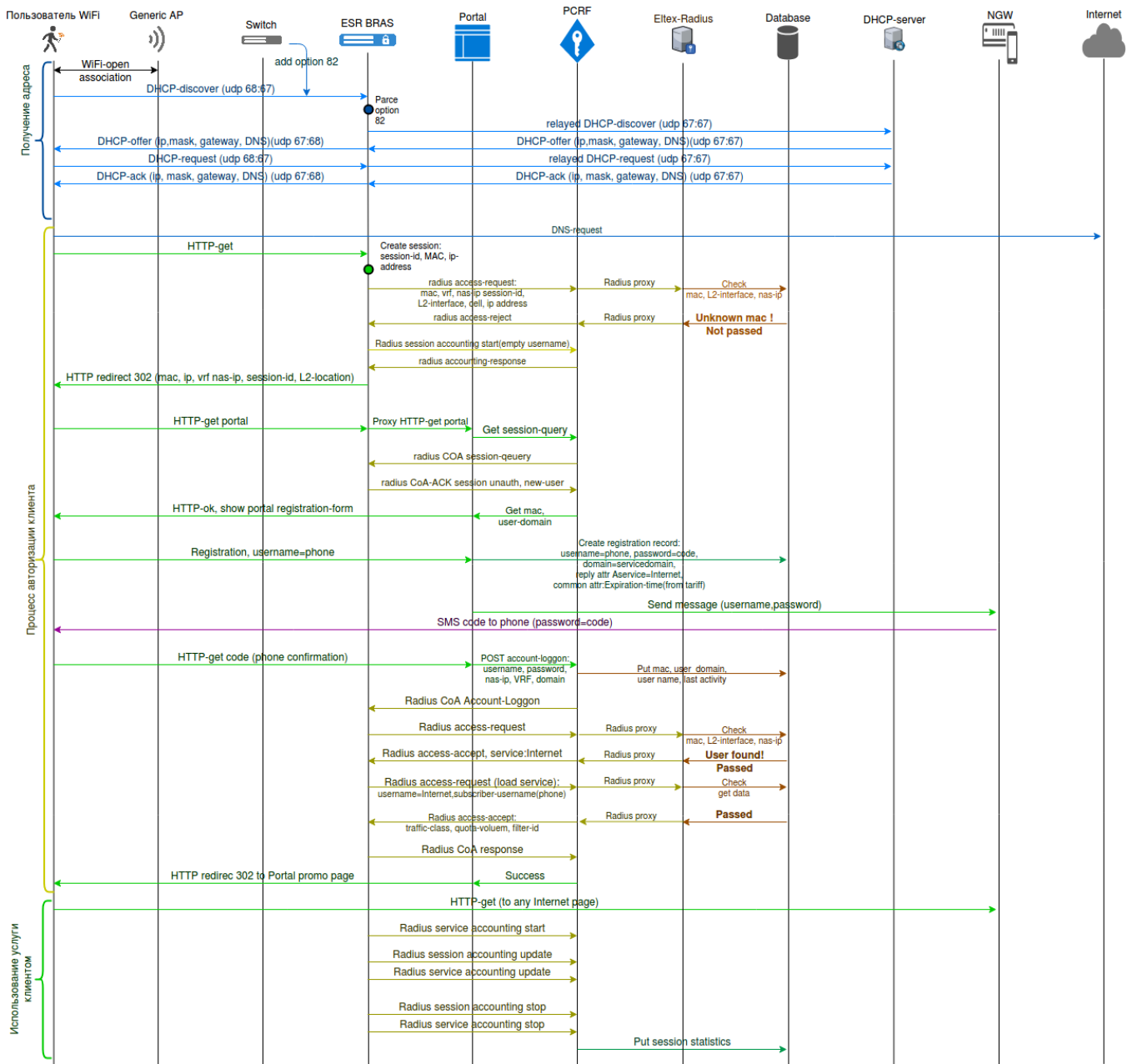
:

1) generic AP, ... SSID vlan, generic AP.

1) generic AP , "DHCP snooping" .

## 1.3

WiFi, genericAP, BRAS SoftWLC ( 1.3.1). WiFi.



. 1.3.1.

BRAS , DHCP (udp port 67,68) DNS (udp 53). , DNS HTTP-.

1. WiFi, generic AP, DHCP-discover.
2. generic AP, , generic AP option 82 - /vlan/ DHCP .
3. L2 ESR client ( , ... L2 ESR BRAS L3), GRE ESR BRAS L3, DHCP- option 82 ( ), mac-/option 82 ( ) DHCP-relay, DHCP , WiFi giaddr field. gateway ESR. , WiFi IP , « ». WiFi ( - ).
4. WiFi «», DHCP DNS.
5. WiFi , ESR BRAS L3 HTTP , HTTP 302 Redirect, . Eltex-Portal . nas-ip L2-interface. , , .
6. , WiFi «». / , . Notification GW (NGW) SMS , .

7. , PCRF, Account-Loggon ESR BRAS L3. , , WiFi, access-request .. (//), - radius PCRF. PCRF , WiFi.
8. ESR BRAS L3 , /, URL, . WiFi , .
9. WiFi URL, IP .
10. ESR accounting .
11. WiFi , ESR BRAS L3 idle-timeout, accounting stop PCRF, / .

, HTTP WiFi ESR BRAS L3 , source (USER IP) ESR BRAS L3 (PROXY IP). ESR BRAS L3 SoftWLC HTTP(S) IP ESR BRS L3 . USER IP .

, WiFi URL - HTTP(S) WiFi ESR BRAS L3 , Source (USER IP) ESR BRAS L3 (PROXY IP). ESR NAT HTTP(S) IP ESR BRAS L3 . USER IP source-. NAT, «» IP NAT.

ESR 1.11.2 SoftWLC 1.18 BRAS VRF. BRAS VRF BRAS VRF, CoA- BRAS VRF VRF. BRAS CoA .

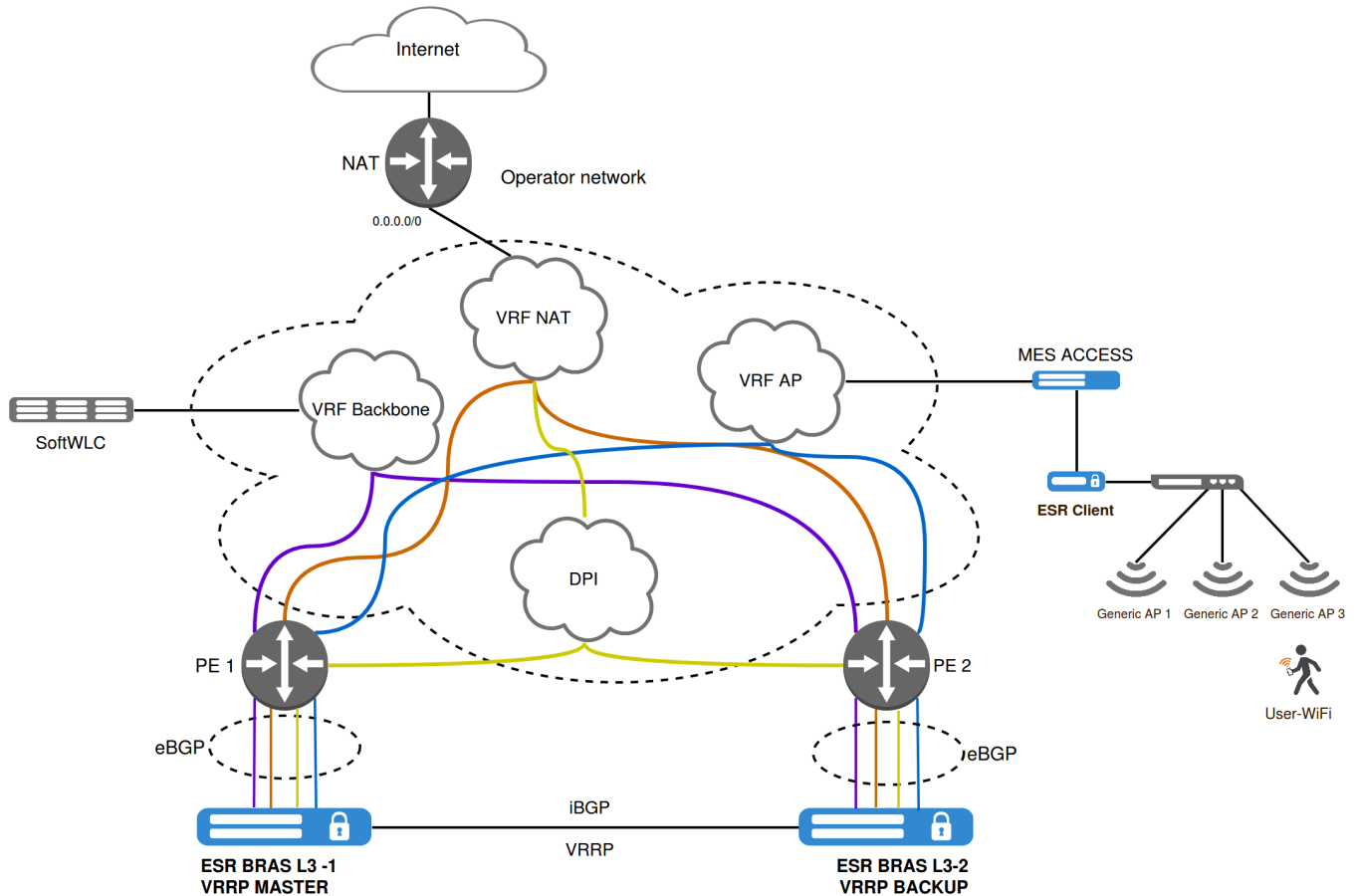
## 2.

### 2.1

, 2.1.1. ESR BRAS L3, Active/Standby. " " (PE). ESR BRAS L3 4 eBGP PE VRF:

- VRF Backbone - ;
- VRF AP - ESR Client, GRE- ESR BRAS L3;
- VRF NAT - WiFi , VRF ;
- VRF DPI - VRF ESR BRAS L3. VRF NAT DPI.

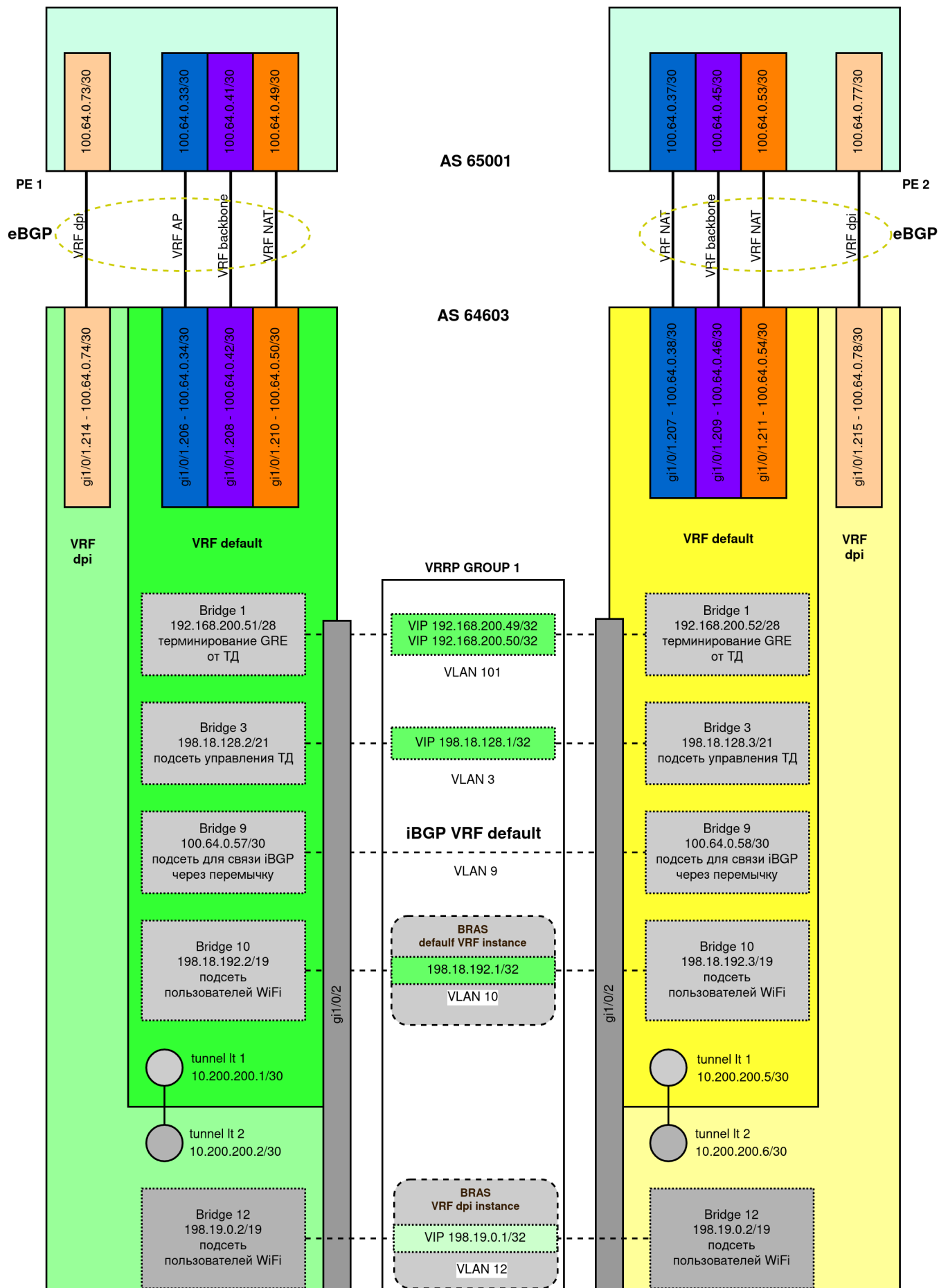
PE iBGP ESR BRAS L3. VRRP GRE , ESR client WiFi. VRF iBGP VRF.

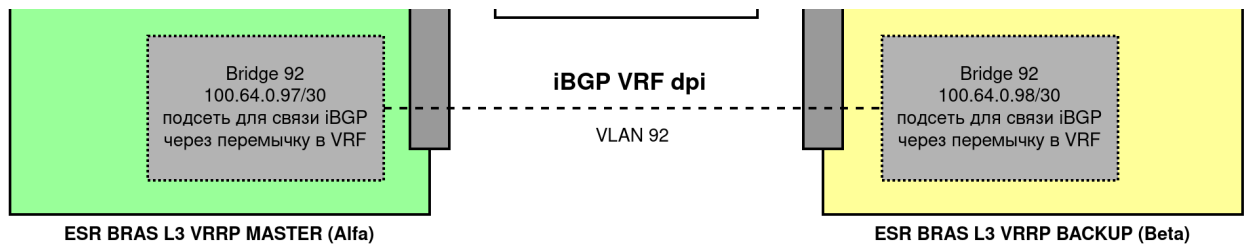


. 2.1.1.

## 2.2 ESR BRAS L3

ESR , . 2.2.1:





. 2.2.1.



ESR BRAS L3 VRRP MASTER "Alfa", ESR BRAS L3 VRRP BACKUP - "Beta".

, 2.2.1:

| AS 64603               | VRF     | Alfa           |                   |                                        | Beta           |                   |
|------------------------|---------|----------------|-------------------|----------------------------------------|----------------|-------------------|
|                        |         | / vlan         | IP                | VRRP IP                                | / vlan         | IP                |
| VRF AP (eBGP)          | default | gi1/0/1.206    | 100.64.0.34/30    | n/a                                    | gi1/0/1.207    | 100.64.0.38/30    |
| VRF backbone (eBGP)    | default | gi1/0/1.208    | 100.64.0.42/30    | n/a                                    | gi1/0/1.209    | 100.64.0.46/30    |
| VRF NAT (eBGP)         | default | gi1/0/1.210    | 100.64.0.50/30    | n/a                                    | gi1/0/1.211    | 100.64.0.54/30    |
| VRF DPI                | default | lt 1           | 10.200.200.1/30   | n/a                                    | lt 1           | 10.200.200.5/30   |
| GRE ESR-client         | default | bridge 1 / 101 | 192.168.200.51/28 | 192.168.200.49/32<br>192.168.200.50/32 | bridge 1 / 101 | 192.168.200.52/28 |
| ESR-client             | default | bridge 3 / 3   | 198.18.128.2/21   | 198.18.128.1/32                        | bridge 3 / 3   | 198.18.128.3/21   |
| ESR (iBGP)             | default | bridge 9 / 9   | 100.64.0.57/30    | n/a                                    | bridge 9 / 9   | 100.64.0.58/30    |
| WiFi VRF               | default | bridge 10 / 10 | 198.18.192.2/19   | 198.18.192.1/32                        | bridge 10 / 10 | 198.18.192.3/19   |
| VRF DPI (eBGP VRF dpi) | dpi     | lt 2           | 10.200.200.2/30   | n/a                                    | lt 2           | 10.200.200.6/30   |
| VRF                    | dpi     | gi1/0/1.214    | 100.64.0.74/30    | n/a                                    | gi1/0/1.215    | 100.64.0.78/30    |
| WiFi VRF (dpi)         | dpi     | bridge 12 / 12 | 198.19.0.2/19     | 198.19.0.1/32                          | bridge 12 / 12 | 198.19.0.3/19     |
| c ESR (iBGP VRF dpi)   | dpi     | bridge 92 / 92 | 100.64.0.97/30    | n/a                                    | bridge 92 / 92 | 100.64.0.98/30    |

2.2.1.

1. VRF VRF NAT.
2. , SoftWLC DHCP- VRF backbone. ESR , bridge 3.
3. ESR client IP VRF AP GRE-. VRF VRF AP.
4. WiFi, VRF dpi bridge 12, VRF DPI.
5. DHCP WiFi VRF dpi VRF backbone VRF. IP- VRF lt-, .

## 3. BRAS VRF

BRAS VRF :

1. VRF ESR BRAS.
2. BRAS RADIUS-, VRF.
3. BRAS das-server VRF, RADIUS- CoA- , BRAS .

RADIUS-, BRAS , Eltex-PCRF SoftWLC. Eltex-PCRF :

- UDP:31812 - (access-request)
- UDP:31813 - (accounting-request)
- UDP:3799 - CoA BRAS (CoA-request) VRF

BRAS VRF VRF, CoA , VRF. :

- UDP:30799 - CoA BRAS VRF dpi

VRF, CoA-, ESR 3.1 :

| VRF | CoA port | secret     |
|-----|----------|------------|
| 1   | 3799     | testing123 |
| dpi | 30799    | testing123 |

3.1.

,, ESR VRF das-server/secret.



BRAS ESR radius- das-server CoA-. VRF , BRAS. ESR, SoftWLC, .

4. ESR BRAS L3.

4.1. ESR BRAS L3.

ESR BRAS L3 BRAS-WiFi. ESR( ).

```
esr# show licence
Licence information
-----
Name:      eltex
Version:   1.0
Type:      ESR-1000
S/N:       NP01000415
MAC:       A8:F9:4B:AA:34:99
Features:
WIFI - Wi-Fi controller
BRAS - Broadband Remote Access Server
```

ESR 1.11.3.

ip-, BGP, wirelees-controller.



!

- (ip firewall disable) ip- , .

ESR ESR wireless-controller "" ESR -softgre Bridge VRF. ESR ( BRAS) , VRF, 3.1.

```
#!/usr/bin/clish
#18
hostname Alfa

object-group network gre_termination
ip prefix 192.168.200.48/28
exit
object-group network mgmt_AP
ip prefix 198.18.128.0/21
ip prefix 198.18.192.0/19
ip prefix 100.64.0.56/30
ip prefix 198.19.0.0/19
exit
object-group network clients_AP
ip prefix 198.18.192.0/19
ip prefix 198.18.128.0/21
exit
object-group network clients_dpi
ip prefix 198.19.0.0/19
exit
object-group network SoftWLC
ip prefix 100.123.0.0/24
```

```
exit

ip vrf dpi
  ip protocols bgp max-routes 250
exit

radius-server retransmit 2
radius-server host 100.123.0.2
  key ascii-text testing123
  timeout 5
  priority 20
  source-address 198.18.128.2
  auth-port 31812
  acct-port 31813
  dead-interval 10
exit
aaa radius-profile PCRF
  radius-server host 100.123.0.2
  exit
  das-server COA
  key ascii-text testing123
  port 3799
  clients object-group SoftWLC
exit
aaa das-profile COA
  das-server COA
exit

vlan 3
  force-up
exit
vlan 10
  force-up
exit
vlan 12
  force-up
exit
vlan 101
  force-up
exit
vlan 9,92
exit

security zone trusted
exit
security zone untrusted
exit
security zone gre
exit
security zone neighbour
exit
security zone user
exit
security zone trusted_dpi
  ip vrf forwarding dpi
exit
security zone untrusted_dp
  ip vrf forwarding dpi
exit
security zone neighbour_dpi
  ip vrf forwarding dpi
exit
security zone user_dpi
  ip vrf forwarding dpi
exit

route-map out_BGP_GRE
  rule 1
    match ip address object-group gre_termination
    action set as-path prepend 64603 track 1
    action set metric bgp 1000 track 1
```

```
        action permit
    exit
exit
route-map out_BGP_AP
    rule 1
        match ip address object-group mgmt_AP
        action set as-path prepend 64603 track 1
        action set metric bgp 1000 track 1
        action permit
    exit
exit
route-map out_BGP_NAT
    rule 1
        match ip address object-group clients_AP
        action set as-path prepend 64603 track 1
        action set metric bgp 1000 track 1
        action permit
    exit
exit
route-map in_PREF
    rule 1
        action set local-preference 90
        action permit
    exit
exit
route-map out_BGP_DPI
    rule 1
        match ip address object-group clients_dpi
        action set as-path prepend 64603 track 1
        action set metric bgp 1000 track 1
        action permit
    exit
exit
router bgp 64603
    neighbor 100.64.0.33
        remote-as 65001
        update-source 100.64.0.34
        address-family ipv4 unicast
            route-map out_BGP_GRE out
            enable
        exit
        enable
    exit
    neighbor 100.64.0.41
        remote-as 65001
        update-source 100.64.0.42
        address-family ipv4 unicast
            route-map out_BGP_AP out
            enable
        exit
        enable
    exit
    neighbor 100.64.0.49
        remote-as 65001
        update-source 100.64.0.50
        address-family ipv4 unicast
            route-map out_BGP_NAT out
            enable
        exit
        enable
    exit
    neighbor 100.64.0.58
        remote-as 64603
        update-source 100.64.0.57
        address-family ipv4 unicast
            route-map in_PREF in
            next-hop-self
            enable
        exit
        enable
    exit
```

```
address-family ipv4 unicast
 redistribute connected
 redistribute static
exit
enable
vrf dpi
 neighbor 100.64.0.73
  remote-as 65001
  update-source 100.64.0.74
  address-family ipv4 unicast
   route-map out_BGP_DPI out
   enable
  exit
 exit
exit
 neighbor 100.64.0.98
  remote-as 64603
  update-source 100.64.0.97
  address-family ipv4 unicast
   route-map in_PREF in
   next-hop-self
   enable
  exit
 exit
exit
address-family ipv4 unicast
 redistribute connected
exit
enable
exit
exit

tracking 1
 vrrp 3 not state master
enable
exit

bridge 1
 description "GRE_termination"
 vlan 101
 security-zone gre
 ip address 192.168.200.51/28
 vrrp id 1
 vrrp ip 192.168.200.49/32
 vrrp ip 192.168.200.50/32 secondary
 vrrp priority 200
 vrrp group 1
 vrrp preempt disable
 vrrp preempt delay 150
 vrrp timers garp delay 1
 vrrp timers garp repeat 10
 vrrp
 protected-ports local
 protected-ports exclude vlan
 ports vrrp filtering enable
 ports vrrp filtering exclude vlan
 enable
exit
bridge 3
 description "mgmt_AP"
 vlan 3
 security-zone trusted
 ip address 198.18.128.2/21
 ip helper-address 100.123.0.2
 ip helper-address 100.123.0.3
 ip helper-address vrrp-group 1
 vrrp id 3
 vrrp ip 198.18.128.1/32
 vrrp priority 200
 vrrp group 1
 vrrp preempt disable
```

```
vrrp preempt delay 150
vrrp timers garp delay 1
vrrp timers garp repeat 10
vrrp
ip tcp adjust-mss 1400
protected-ports local
protected-ports exclude vlan
ports vrrp filtering enable
ports vrrp filtering exclude vlan
enable
exit
bridge 9
description "neighbour"
vlan 9
security-zone neighbour
ip address 100.64.0.57/30
ip tcp adjust-mss 1400
enable
exit
bridge 10
description "data1_AP"
vlan 10
unknown-unicast-forwarding disable
security-zone user
ip address 198.18.192.2/19
ip helper-address 100.123.0.2
ip helper-address vrrp-group 1
vrrp id 10
vrrp ip 198.18.192.1/32
vrrp priority 200
vrrp group 1
vrrp preempt disable
vrrp preempt delay 150
vrrp timers garp delay 1
vrrp timers garp repeat 10
vrrp
ip tcp adjust-mss 1400
location data10
protected-ports radius
protected-ports exclude vlan
enable
exit
bridge 12
ip vrf forwarding dpi
vlan 12
unknown-unicast-forwarding disable
security-zone user_dpi
ip address 198.19.0.2/19
ip helper-address 100.123.0.2
ip helper-address vrrp-group 1
vrrp id 12
vrrp ip 198.19.0.1/32
vrrp priority 200
vrrp group 1
vrrp preempt disable
vrrp preempt delay 150
vrrp timers garp delay 1
vrrp timers garp repeat 10
vrrp
ip tcp adjust-mss 1400
location data12
protected-ports radius
protected-ports exclude vlan
ports vrrp filtering enable
ports vrrp filtering exclude vlan
enable
exit
bridge 92
ip vrf forwarding dpi
description "neighbour for VRF dpi"
vlan 92
```

```
security-zone neighbour_dpi
ip address 100.64.0.97/30
ip tcp adjust-mss 1400
enable
exit

interface gigabitethernet 1/0/1
description "UpLink"
mode hybrid
exit
interface gigabitethernet 1/0/1.206
description "VRF_AP"
security-zone gre
ip address 100.64.0.34/30
exit
interface gigabitethernet 1/0/1.208
description "VRF_CORE"
security-zone trusted
ip address 100.64.0.42/30
ip tcp adjust-mss 1400
exit
interface gigabitethernet 1/0/1.210
description "VRF_NAT"
security-zone untrusted
ip address 100.64.0.50/30
ip tcp adjust-mss 1400
exit
interface gigabitethernet 1/0/1.214
ip vrf forwarding dpi
description "br12_vrf"
security-zone untrusted_dp
ip address 100.64.0.74/30
ip tcp adjust-mss 1400
exit
interface gigabitethernet 1/0/2
description "neighbour"
mode hybrid
switchport general acceptable-frame-type tagged-only
switchport general allowed vlan add 3,9-10,12,92,101 tagged
exit
tunnel lt 1
peer lt 2
security-zone trusted
ip address 10.200.200.1/30
enable
exit
tunnel lt 2
peer lt 1
ip vrf forwarding dpi
security-zone trusted_dpi
ip address 10.200.200.2/30
enable
exit
tunnel softgre 1
description "mgmt"
mode management
local address 192.168.200.49
default-profile
enable
exit
tunnel softgre 1.1
bridge-group 3
enable
exit
tunnel softgre 2
description "data"
mode data
local address 192.168.200.50
default-profile
enable
exit
```

```
snmp-server
snmp-server system-shutdown
snmp-server community "public11" ro
snmp-server community "private1" rw
```

```
snmp-server host 100.123.0.2
source-address 198.181.128.2
exit
```

```
snmp-server enable traps config
snmp-server enable traps config commit
snmp-server enable traps config confirm
snmp-server enable traps environment
snmp-server enable traps environment pwrin
snmp-server enable traps environment pwrin-insert
snmp-server enable traps environment fan
snmp-server enable traps environment fan-speed-changed
snmp-server enable traps environment fan-speed-high
snmp-server enable traps environment memory-flash-critical-low
snmp-server enable traps environment memory-flash-low
snmp-server enable traps environment memory-ram-critical-low
snmp-server enable traps environment memory-ram-low
snmp-server enable traps environment cpu-load
snmp-server enable traps environment cpu-dp-critical-temp
snmp-server enable traps environment cpu-dp-overheat-temp
snmp-server enable traps environment cpu-dp-supercooling-temp
snmp-server enable traps environment cpu-mgmt-critical-temp
snmp-server enable traps environment cpu-mgmt-overheat-temp
snmp-server enable traps environment cpu-mgmt-supercooling-temp
snmp-server enable traps environment board-overheat-temp
snmp-server enable traps environment board-supercooling-temp
snmp-server enable traps environment sfp-overheat-temp
snmp-server enable traps environment sfp-supercooling-temp
snmp-server enable traps environment switch-overheat-temp
snmp-server enable traps environment switch-supercooling-temp
snmp-server enable traps wifi
snmp-server enable traps wifi wifi-tunnels-number-in-bridge-high
snmp-server enable traps wifi wifi-tunnels-operation
snmp-server enable traps file-operations
snmp-server enable traps file-operations successful
snmp-server enable traps file-operations failed
snmp-server enable traps file-operations canceled
snmp-server enable traps interfaces
snmp-server enable traps interfaces rx-utilization-high
snmp-server enable traps interfaces tx-utilization-high
snmp-server enable traps interfaces number-high
snmp-server enable traps screen
snmp-server enable traps screen dest-limit
snmp-server enable traps screen source-limit
snmp-server enable traps screen icmp-threshold
snmp-server enable traps screen udp-threshold
snmp-server enable traps screen syn-flood
snmp-server enable traps screen land
snmp-server enable traps screen winnuke
snmp-server enable traps screen icmp-frag
snmp-server enable traps screen udp-frag
snmp-server enable traps screen icmp-large
snmp-server enable traps screen syn-frag
snmp-server enable traps screen unknown-proto
snmp-server enable traps screen ip-frag
snmp-server enable traps screen port-scan
snmp-server enable traps screen ip-sweep
snmp-server enable traps screen syn-fin
snmp-server enable traps screen fin-no-ack
snmp-server enable traps screen no-flag
snmp-server enable traps screen spoofing
snmp-server enable traps screen reserved
snmp-server enable traps screen quench
snmp-server enable traps screen echo-request
snmp-server enable traps screen time-exceeded
```

```
snmp-server enable traps screen unreachable
snmp-server enable traps screen tcp-all-flags
snmp-server enable traps entity
snmp-server enable traps entity config-change
snmp-server enable traps entity-sensor
snmp-server enable traps entity-sensor threshold
snmp-server enable traps envmon
snmp-server enable traps envmon fan
snmp-server enable traps envmon shutdown
snmp-server enable traps envmon supply
snmp-server enable traps envmon temperature
snmp-server enable traps flash
snmp-server enable traps flash insertion
snmp-server enable traps flash removal
snmp-server enable traps snmp
snmp-server enable traps snmp authentication
snmp-server enable traps snmp coldstart
snmp-server enable traps snmp linkdown
snmp-server enable traps snmp linkup
snmp-server enable traps syslog
```

```
security passwords history 0
```

```
ip dhcp-relay
```

```
ip route vrf dpi 100.123.0.0/24 10.200.200.1
ip route 198.19.0.0/19 10.200.200.2
```

```
wireless-controller
  peer-address 100.64.0.58
  nas-ip-address 198.18.128.2
  vrrp-group 1
  data-tunnel configuration radius
  keepalive mode reactive
  aaa das-profile COA
  aaa radius-profile PCRF
  enable
exit
ip telnet server
ip ssh server
```

```
ntp enable
ntp server 100.123.0.2
exit
```

```
#!/usr/bin/clish
#18
hostname Beta

object-group network gre_termination
  ip prefix 192.168.200.48/28
exit
object-group network mgmt_AP
  ip prefix 198.18.128.0/21
  ip prefix 198.18.192.0/19
  ip prefix 100.64.0.56/30
  ip prefix 198.19.0.0/19
exit
object-group network clients_AP
  ip prefix 198.18.192.0/19
  ip prefix 198.18.128.0/21
exit
object-group network clients_dpi
  ip prefix 198.19.0.0/19
exit
object-group network SoftwLC
  ip prefix 100.123.0.0/24
exit
```

```
ip vrf dpi
  ip protocols bgp max-routes 250
exit

radius-server retransmit 2
radius-server host 100.123.0.2
  key ascii-text testing123
  timeout 11
  source-address 198.18.128.3
  auth-port 31812
  acct-port 31813
  retransmit 2
  dead-interval 10
exit
aaa radius-profile PCRF
  radius-server host 100.123.0.2
exit
das-server COA
  key ascii-text testing123
  port 3799
  clients object-group SoftWLC
exit
aaa das-profile COA
  das-server COA
exit

vlan 3
  force-up
exit
vlan 10
  force-up
exit
vlan 12
  force-up
exit
vlan 101
  force-up
exit
vlan 9,92
exit

security zone trusted
exit
security zone untrusted
exit
security zone gre
exit
security zone neighbour
exit
security zone user
exit
security zone trusted_dpi
  ip vrf forwarding dpi
exit
security zone untrusted_dp
  ip vrf forwarding dpi
exit
security zone neighbour_dpi
  ip vrf forwarding dpi
exit
security zone user_dpi
  ip vrf forwarding dpi
exit

route-map out_BGP_GRE
  rule 1
    match ip address object-group gre_termination
    action set as-path prepend 64603 track 1
    action set metric bgp 1000 track 1
    action permit
  exit
```

```
exit
route-map out_BGP_AP
  rule 1
    match ip address object-group mgmt_AP
    action set as-path prepend 64603 track 1
    action set metric bgp 1000 track 1
    action permit
  exit
exit
route-map out_BGP_NAT
  rule 1
    match ip address object-group clients_AP
    action set as-path prepend 64603 track 1
    action set metric bgp 1000 track 1
    action permit
  exit
exit
route-map in_PREF
  rule 1
    action set local-preference 20
    action permit
  exit
exit
route-map out_BGP_DPI
  rule 1
    match ip address object-group clients_dpi
    action set as-path prepend 64603 track 1
    action set metric bgp 1000 track 1
    action permit
  exit
exit
router bgp 64603
  neighbor 100.64.0.37
    remote-as 65001
    update-source 100.64.0.38
    address-family ipv4 unicast
      route-map out_BGP_GRE out
      enable
    exit
  enable
exit
neighbor 100.64.0.45
  remote-as 65001
  update-source 100.64.0.46
  address-family ipv4 unicast
    route-map out_BGP_AP out
    enable
  exit
  enable
exit
neighbor 100.64.0.53
  remote-as 65001
  update-source 100.64.0.54
  address-family ipv4 unicast
    route-map out_BGP_NAT out
    enable
  exit
  enable
exit
neighbor 100.64.0.57
  remote-as 64603
  update-source 100.64.0.58
  address-family ipv4 unicast
    route-map in_PREF in
    next-hop-self
    enable
  exit
  enable
exit
address-family ipv4 unicast
  redistribute connected
```

```
    redistribute static
exit
enable
vrf dpi
    neighbor 100.64.0.77
        remote-as 65001
        update-source 100.64.0.78
        address-family ipv4 unicast
            route-map out_BGP_DPI out
            enable
        exit
    enable
exit
neighbor 100.64.0.97
    remote-as 64603
    update-source 100.64.0.98
    address-family ipv4 unicast
        route-map in_PREF in
        next-hop-self
        enable
    exit
    enable
exit
address-family ipv4 unicast
    redistribute connected
exit
enable
exit
exit

tracking 1
    vrrp 3 not state master
    enable
exit

bridge 1
    description "GRE_termination"
    vlan 101
    security-zone gre
    ip address 192.168.200.52/28
    vrrp id 1
    vrrp ip 192.168.200.49/32
    vrrp ip 192.168.200.50/32 secondary
    vrrp priority 190
    vrrp group 1
    vrrp preempt disable
    vrrp preempt delay 150
    vrrp timers garp delay 1
    vrrp timers garp repeat 10
    vrrp
    enable
exit
bridge 3
    description "mgmt_AP"
    vlan 3
    security-zone trusted
    ip address 198.18.128.3/21
    ip helper-address 100.123.0.2
    ip helper-address vrrp-group 1
    vrrp id 3
    vrrp ip 198.18.128.1/32
    vrrp priority 190
    vrrp group 1
    vrrp preempt disable
    vrrp preempt delay 150
    vrrp timers garp delay 1
    vrrp timers garp repeat 10
    vrrp
    ip tcp adjust-mss 1400
    protected-ports local
    protected-ports exclude vlan
```

```
ports vrrp filtering enable
ports vrrp filtering exclude vlan
enable
exit
bridge 9
description "neighbour"
vlan 9
security-zone neighbour
ip address 100.64.0.58/30
ip tcp adjust-mss 1400
enable
exit
bridge 10
description "data1_AP"
vlan 10
unknown-unicast-forwarding disable
security-zone user
ip address 198.18.192.3/19
ip helper-address 100.123.0.2
ip helper-address vrrp-group 1
vrrp id 10
vrrp ip 198.18.192.1/32
vrrp priority 190
vrrp group 1
vrrp preempt disable
vrrp preempt delay 150
vrrp timers garp delay 1
vrrp timers garp repeat 10
vrrp
ip tcp adjust-mss 1400
location data10
protected-ports radius
protected-ports exclude vlan
ports vrrp filtering enable
ports vrrp filtering exclude vlan
enable
exit
bridge 12
ip vrf forwarding dpi
vlan 12
unknown-unicast-forwarding disable
security-zone user_dpi
ip address 198.19.0.3/19
ip helper-address 100.123.0.2
ip helper-address vrrp-group 1
vrrp id 12
vrrp ip 198.19.0.1/32
vrrp priority 190
vrrp group 1
vrrp preempt disable
vrrp preempt delay 150
vrrp timers garp delay 1
vrrp timers garp repeat 10
vrrp
ip tcp adjust-mss 1400
location data12
protected-ports radius
protected-ports exclude vlan
ports vrrp filtering enable
ports vrrp filtering exclude vlan
enable
exit
bridge 92
ip vrf forwarding dpi
description "neighbour for VRF dpi"
vlan 92
security-zone neighbour_dpi
ip address 100.64.0.98/30
ip tcp adjust-mss 1400
enable
exit
```

```
interface gigabitethernet 1/0/1
  mode hybrid
  switchport forbidden default-vlan
exit
interface gigabitethernet 1/0/1.207
  description "VRF_AP"
  security-zone gre
  ip address 100.64.0.38/30
exit
interface gigabitethernet 1/0/1.209
  description "VRF_CORE"
  security-zone trusted
  ip address 100.64.0.46/30
  ip tcp adjust-mss 1400
exit
interface gigabitethernet 1/0/1.211
  description "VRF_NAT"
  security-zone untrusted
  ip address 100.64.0.54/30
  ip tcp adjust-mss 1400
exit
interface gigabitethernet 1/0/1.215
  ip vrf forwarding dpi
  description "dpi_vrf"
  security-zone untrusted_dp
  ip address 100.64.0.78/30
  ip tcp adjust-mss 1400
exit
interface gigabitethernet 1/0/2
  description "neighbour"
  mode hybrid
  switchport forbidden default-vlan
  switchport general acceptable-frame-type tagged-only
  switchport general allowed vlan add 3,9-10,12,92,101 tagged
exit
tunnel lt 1
  peer lt 2
  security-zone trusted
  ip address 10.200.200.5/30
  enable
exit
tunnel lt 2
  peer lt 1
  ip vrf forwarding dpi
  ip address 10.200.200.6/30
  enable
exit
tunnel softgre 1
  description "mgmt"
  mode management
  local address 192.168.200.49
  default-profile
  enable
exit
tunnel softgre 1.1
  bridge-group 3
  enable
exit
tunnel softgre 2
  description "data"
  mode data
  local address 192.168.200.50
  default-profile
  enable
exit

snmp-server
snmp-server community "public11" ro
snmp-server community "private1" rw
```

```
snmp-server host 100.123.0.2
  source-address 198.18.128.3
exit
```

```
snmp-server enable traps config
snmp-server enable traps config commit
snmp-server enable traps config confirm
snmp-server enable traps environment
snmp-server enable traps environment pwrin
snmp-server enable traps environment pwrin-insert
snmp-server enable traps environment fan
snmp-server enable traps environment fan-speed-changed
snmp-server enable traps environment fan-speed-high
snmp-server enable traps environment memory-flash-critical-low
snmp-server enable traps environment memory-flash-low
snmp-server enable traps environment memory-ram-critical-low
snmp-server enable traps environment memory-ram-low
snmp-server enable traps environment cpu-load
snmp-server enable traps environment cpu-dp-critical-temp
snmp-server enable traps environment cpu-dp-overheat-temp
snmp-server enable traps environment cpu-dp-supercooling-temp
snmp-server enable traps environment cpu-mgmt-critical-temp
snmp-server enable traps environment cpu-mgmt-overheat-temp
snmp-server enable traps environment cpu-mgmt-supercooling-temp
snmp-server enable traps environment board-overheat-temp
snmp-server enable traps environment board-supercooling-temp
snmp-server enable traps environment sfp-overheat-temp
snmp-server enable traps environment sfp-supercooling-temp
snmp-server enable traps environment switch-overheat-temp
snmp-server enable traps environment switch-supercooling-temp
snmp-server enable traps wifi
snmp-server enable traps wifi wifi-tunnels-number-in-bridge-high
snmp-server enable traps wifi wifi-tunnels-operation
snmp-server enable traps file-operations
snmp-server enable traps file-operations successful
snmp-server enable traps file-operations failed
snmp-server enable traps file-operations canceled
snmp-server enable traps interfaces
snmp-server enable traps interfaces rx-utilization-high
snmp-server enable traps interfaces tx-utilization-high
snmp-server enable traps interfaces number-high
snmp-server enable traps screen
snmp-server enable traps screen dest-limit
snmp-server enable traps screen source-limit
snmp-server enable traps screen icmp-threshold
snmp-server enable traps screen udp-threshold
snmp-server enable traps screen syn-flood
snmp-server enable traps screen land
snmp-server enable traps screen winnuke
snmp-server enable traps screen icmp-frag
snmp-server enable traps screen udp-frag
snmp-server enable traps screen icmp-large
snmp-server enable traps screen syn-frag
snmp-server enable traps screen unknown-proto
snmp-server enable traps screen ip-frag
snmp-server enable traps screen port-scan
snmp-server enable traps screen ip-sweep
snmp-server enable traps screen syn-fin
snmp-server enable traps screen fin-no-ack
snmp-server enable traps screen no-flag
snmp-server enable traps screen spoofing
snmp-server enable traps screen reserved
snmp-server enable traps screen quench
snmp-server enable traps screen echo-request
snmp-server enable traps screen time-exceeded
snmp-server enable traps screen unreachable
snmp-server enable traps screen tcp-all-flags
snmp-server enable traps entity
snmp-server enable traps entity config-change
snmp-server enable traps entity-sensor
snmp-server enable traps entity-sensor threshold
```

```

snmp-server enable traps envmon
snmp-server enable traps envmon fan
snmp-server enable traps envmon shutdown
snmp-server enable traps envmon supply
snmp-server enable traps envmon temperature
snmp-server enable traps flash
snmp-server enable traps flash insertion
snmp-server enable traps flash removal
snmp-server enable traps snmp
snmp-server enable traps snmp authentication
snmp-server enable traps snmp coldstart
snmp-server enable traps snmp linkdown
snmp-server enable traps snmp linkup
snmp-server enable traps syslog

security passwords history 0

ip dhcp-relay

ip route vrf dpi 100.123.0.0/24 10.200.200.5
ip route 198.19.0.0/19 10.200.200.6

wireless-controller
peer-address 100.64.0.57
nas-ip-address 198.18.128.3
vrrp-group 1
data-tunnel configuration radius
aaa das-profile COA
aaa radius-profile PCRF
enable
exit
ip telnet server
ip ssh server

ntp enable
ntp server 100.123.0.2
exit

```

## 4.2. BRAS ESR

BRAS [BRAS. L2 WiFi -](#) , .

RADIUS- das-server ESR VRF 4.1,.. SoftWLC softGRE -.

3.1 das-server BRAS VRF dpi. Alfa Beta:

```

das-server COA_dpi
key ascii-text testing123
port 30799
clients object-group SoftWLC
exit
aaa das-profile COA_dpi
das-server COA_dpi
exit

```

access-list, BRAS. ESR.

```

ip access-list extended WELCOME
rule 1
action permit
match protocol tcp
match destination-port 443
enable
exit
rule 2
action permit
match protocol tcp

```

```

        match destination-port 8443
        enable
    exit
    rule 3
        action permit
        match protocol tcp
        match destination-port 80
        enable
    exit
    rule 4
        action permit
        match protocol tcp
        match destination-port 8080
        enable
    exit
exit

ip access-list extended INTERNET
    rule 1
        action permit
        enable
    exit
exit

ip access-list extended unauthUSER
    rule 1
        action permit
        match protocol udp
        match source-port 68
        match destination-port 67
        enable
    exit
    rule 2
        action permit
        match protocol udp
        match destination-port 53
        enable
    exit
exit

```

BRAS :

```

object-group network bras_users
    ip address-range 198.18.192.4-198.18.223.254
    ip address-range 198.19.0.4-198.19.31.254
exit

bridge 10
    service-subscriber-control object-group bras_users
    location data10
exit
bridge 12
    service-subscriber-control object-group bras_users
    location data12
exit

```



!

BRAS , , , ESR,VRRP . ESR VRRP.

BRAS. ESR nas-ip-address ip proxy source-address. Alfa, () Beta.

```

subscriber-control filters-server-url http://100.123.0.2:7070/filters/file
subscriber-control
    aaa das-profile COA
    aaa sessions-radius-profile PCRF
    aaa services-radius-profile PCRF

```

```

backup traffic-processing transparent
nas-ip-address 198.18.128.2 (198.18.128.3)
session mac-authentication
bypass-traffic-acl unauthUSER
vrrp-group 1
default-service
  class-map unauthUSER
  filter-name remote gosuslugi
  filter-action permit
  default-action redirect http://100.123.0.2:8080/eltex_portal/
exit
enable
exit

```

:

1) vrrp-group 1 - BRAS VRRP ESR.

2) backup traffic-processing transparent - , BRAS- , VRRP ESR BACKUP. "".

### 4.3. BRAS VRF

VRF BRAS, VRF: "subscriber-control vrf <VRF>". ESR BRAS.

```

subscriber-control vrf dpi
aaa das-profile COA_dpi
aaa sessions-radius-profile PCRF
aaa services-radius-profile PCRF
backup traffic-processing transparent
nas-ip-address 198.18.128.2 (198.18.128.3)
session mac-authentication
bypass-traffic-acl unauthUSER
vrrp-group 1
default-service
  class-map unauthUSER
  filter-name remote gosuslugi
  filter-action permit
  default-action redirect http://100.123.0.2:8080/eltex_portal/
exit
enable
exit

```

, BRAS VRF aaa das-profile - , BRAS VRF.



!

.. BRAS URL- - BRAS VRF - VRF, BRAS. , , lt 2, VRF dpi VRF.

### 4.3. option 82

option 82 genericp AP, WiFi BRAS .

```

subscriber-control peer-address 100.64.0.58
subscriber-control
  dhcp-option-82-include enable
exit
subscriber-control vrf dpi
  dhcp-option-82-include enable
exit

```

```

subscriber-control peer-address 100.64.0.57
subscriber-control

```

```

    dhcp-option-82-include enable
exit
subscriber-control vrf dpi
    dhcp-option-82-include enable
exit

```

option 82:

- subscriber-control peer-address <IP-> - , option 82
- dhcp-option-82-include enable - option 82 DHCP- WiFi
- dhcp-option-82-include lease-time - option 82 , 60-86400, 3600. DHCP-
- dhcp-option-82-include accept-time - option 82 , 10-3600, 60. , DHCP-ack .
- dhcp-option-82-include size - option 82, BRAS, ESR.

## 4.4. ESR

VRF ESR, VRF c... , security-zone VRF, . VRF . object-group VRF VRF. ESR Alfa/Beta, BGP-.

(security-zone) :

```

security zone trusted
exit
security zone untrusted
exit
security zone gre
exit
security zone neighbour
exit
security zone user
exit
security zone trusted_dpi
ip vrf forwarding dpi
exit
security zone untrusted_dp
ip vrf forwarding dpi
exit
security zone neighbour_dpi
ip vrf forwarding dpi
exit
security zone user_dpi
ip vrf forwarding dpi
exit

```

object-group, . , BGP-. object-group network cross Alfa Beta .

```

object-group service dhcp_server
    port-range 67
exit
object-group service dhcp_client
    port-range 68
exit
object-group service redirect
    port-range 3128-3142
    port-range 3143-3157
exit
object-group service bgp
    port-range 179
exit
object-group service dns
    port-range 53
exit
object-group network Admnet
    ip prefix 100.123.0.0/24
    ip prefix 192.168.0.0/16
exit

#Alfa

```

```

object-group network cross
  ip address-range 100.64.0.33
  ip address-range 100.64.0.41
  ip address-range 100.64.0.49
  ip address-range 100.64.0.58
  ip address-range 100.64.0.73
  ip address-range 100.64.0.98
exit

#Beta
object-group network cross
  ip address-range 100.64.0.37
  ip address-range 100.64.0.45
  ip address-range 100.64.0.53
  ip address-range 100.64.0.57
  ip address-range 100.64.0.77
  ip address-range 100.64.0.97
exit
object-group network nets
  ip prefix 10.0.0.0/8
  ip prefix 192.168.0.0/16
  ip prefix 172.16.0.0/12
  ip prefix 100.64.0.0/10
exit

```

VRF.

```

security zone-pair gre self
  rule 1
    action permit
    match protocol gre
    enable
  exit
  rule 2
    action permit
    match protocol vrrp
    enable
  exit
  rule 3
    action permit
    match protocol icmp
    enable
  exit
  rule 4
    action permit
    match protocol tcp
    match source-address cross
    match destination-port bgp
    enable
  exit
exit
security zone-pair gre gre
  rule 1
    action permit
    enable
  exit
exit
security zone-pair trusted self
  rule 1
    action permit
    match protocol vrrp
    enable
  exit
  rule 2
    action permit
    match protocol udp
    match source-port dhcp_server
    match destination-port dhcp_server
    enable
  exit

```

```
rule 3
    action permit
    match protocol udp
    match source-port dhcp_client
    match destination-port dhcp_server
    enable
exit
rule 4
    action permit
    match protocol icmp
    enable
exit
rule 5
    action permit
    match source-address SoftWLC
    enable
exit
rule 6
    action permit
    match source-address Admnet
    enable
exit
rule 7
    action permit
    match protocol tcp
    match source-address cross
    match destination-port bgp
    enable
exit
exit
security zone-pair trusted trusted
    rule 1
        action permit
        enable
    exit
exit
security zone-pair trusted user
    rule 1
        action permit
        enable
    exit
exit
security zone-pair trusted untrusted
    rule 1
        action permit
        enable
    exit
exit
security zone-pair trusted gre
    rule 1
        action permit
        enable
    exit
exit
security zone-pair trusted neighbour
    rule 1
        action permit
        enable
    exit
exit
security zone-pair user self
    rule 1
        action permit
        match protocol icmp
        enable
    exit
    rule 2
        action permit
        match protocol udp
        match source-port dhcp_client
        match destination-port dhcp_server
```

```
    enable
exit
rule 3
    action permit
    match protocol tcp
    match destination-port redirect
    enable
exit
rule 4
    action permit
    match protocol vrrp
    enable
exit
rule 5
    action permit
    match protocol udp
    match source-port dhcp_server
    match destination-port dhcp_server
    enable
exit
exit
security zone-pair user untrusted
    rule 1
        action permit
        enable
    exit
exit
security zone-pair user trusted
    rule 1
        action permit
        match protocol udp
        match source-port dhcp_client
        match destination-port dhcp_server
        enable
    exit
    rule 2
        action permit
        match protocol udp
        match destination-port dns
        enable
    exit
exit
security zone-pair user neighbour
    rule 1
        action permit
        match protocol udp
        match destination-port dns
        enable
    exit
    rule 2
        action permit
        match not source-address nets
        enable
    exit
exit
security zone-pair untrusted self
    rule 1
        action permit
        match protocol tcp
        match source-address cross
        match destination-port bgp
        enable
    exit
exit
security zone-pair neighbour self
    rule 1
        action permit
        match protocol tcp
        match destination-port bgp
        enable
    exit
```

```

rule 2
    action permit
    match protocol gre
    enable
exit
rule 3
    action permit
    match protocol icmp
    enable
exit
rule 4
    action permit
    match protocol udp
    match source-port dhcp_client
    match destination-port dhcp_server
    enable
exit
rule 5
    action permit
    match protocol udp
    match source-port dhcp_server
    match destination-port dhcp_server
    enable
exit
rule 6
    action permit
    match source-address SoftwLC
    enable
exit
rule 7
    action permit
    match source-address Admnet
    enable
exit
security zone-pair neighbour trusted
    rule 1
        action permit
        enable
    exit
exit
security zone-pair neighbour untrusted
    rule 1
        action permit
        enable
    exit
exit
security zone-pair neighbour gre
    rule 1
        action permit
        enable
    exit
exit
security zone-pair neighbour user
    rule 11
        action permit
        enable
    exit
exit

```

VRF dpi.

```

security zone-pair trusted_dpi self
    rule 1
        action permit
        enable
    exit
exit
security zone-pair trusted_dpi user_dpi
    rule 1
        action permit

```

```
        enable
    exit
exit
security zone-pair trusted_dpi neighbour_dpi
    rule 1
        action permit
        enable
    exit
exit
security zone-pair user_dpi self
    rule 1
        action permit
        match protocol icmp
        enable
    exit
    rule 2
        action permit
        match protocol udp
        match source-port dhcp_client
        match destination-port dhcp_server
        enable
    exit
    rule 3
        action permit
        match protocol tcp
        match destination-port redirect
        enable
    exit
    rule 4
        action permit
        match protocol vrrp
        enable
    exit
    rule 5
        action permit
        match protocol udp
        match source-port dhcp_server
        match destination-port dhcp_server
        enable
    exit
exit
security zone-pair user_dpi untrusted_dp
    rule 1
        action permit
        enable
    exit
exit
security zone-pair user_dpi trusted_dpi
    rule 1
        action permit
        match protocol udp
        match source-port dhcp_client
        match destination-port dhcp_server
        enable
    exit
    rule 1
        action permit
        match protocol udp
        match source-port dhcp_server
        match destination-port dhcp_server
        enable
    exit
exit
security zone-pair user_dpi neighbour_dpi
    rule 1
        action permit
        match protocol udp
        match destination-port dns
        enable
    exit
    rule 2
```

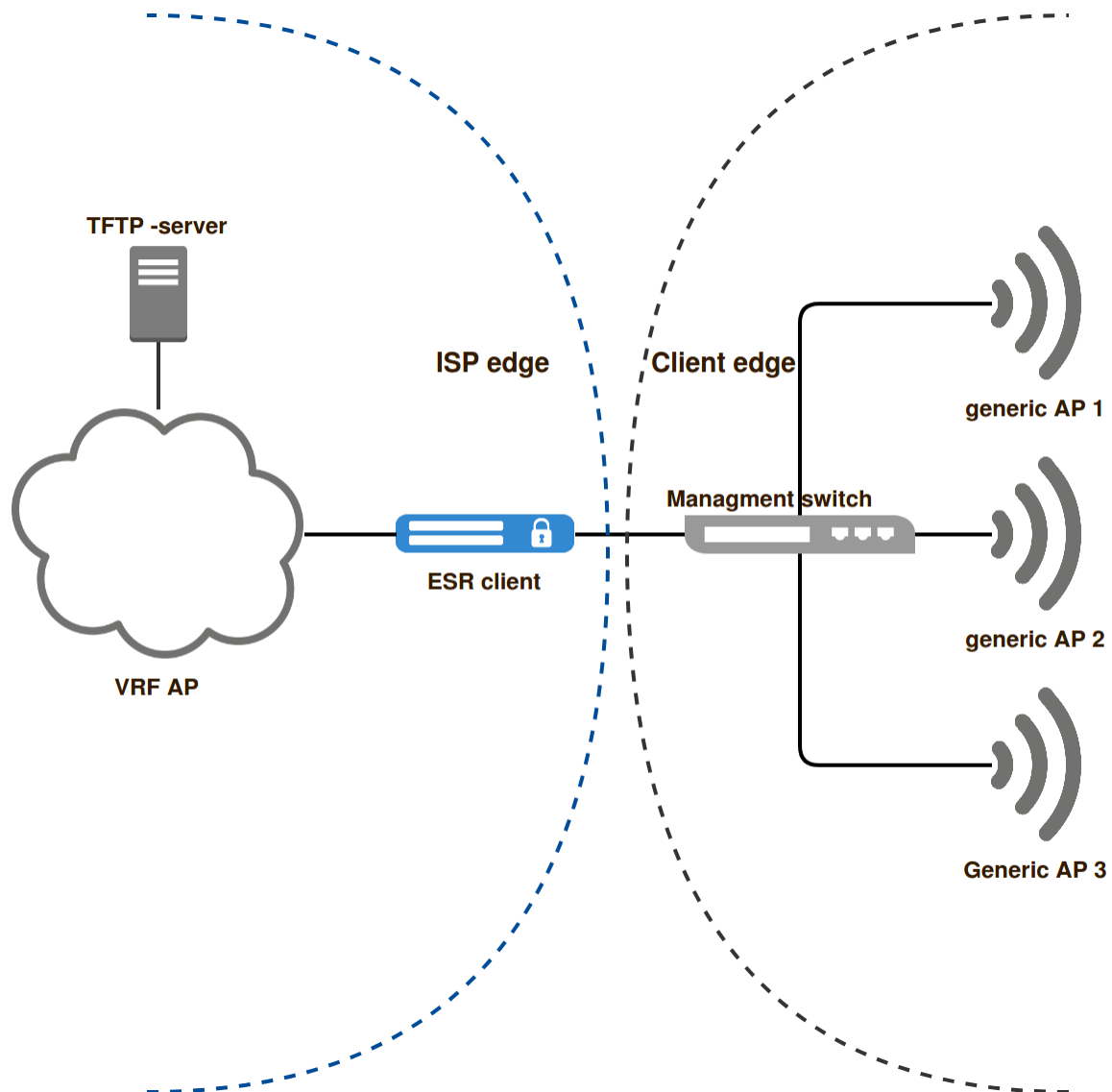
```
        action permit
        match not source-address nets
        enable
    exit
exit
security zone-pair untrusted_dp self
    rule 1
        action permit
        match protocol tcp
        match source-address cross
        match destination-port bgp
        enable
    exit
exit
security zone-pair neighbour_dpi self
    rule 1
        action permit
        match protocol tcp
        match destination-port bgp
        enable
    exit
    rule 2
        action permit
        match protocol gre
        enable
    exit
    rule 3
        action permit
        match protocol icmp
        enable
    exit
    rule 4
        action permit
        match protocol udp
        match source-port dhcp_client
        match destination-port dhcp_server
        enable
    exit
    rule 5
        action permit
        match protocol udp
        match source-port dhcp_server
        match destination-port dhcp_server
        enable
    exit
    rule 6
        action permit
        match source-address SoftWLC
        enable
    exit
    rule 7
        action permit
        match source-address Admnet
        enable
    exit
security zone-pair neighbour_dpi trusted_dpi
    rule 1
        action permit
        enable
    exit
exit
security zone-pair neighbour_dpi untrusted_dp
    rule 1
        action permit
        enable
    exit
exit
security zone-pair neighbour_dpi user_dpi
    rule 11
        action permit
        enable
```

```
exit
exit
```

## 5. ESR client

### 5.1.

ESR client , , GRE VLAN ESR BRAS L3 , c. 5.1.1 ESR client.



. 5.5.1.

ESR factory . GRE- . , tftp- DHCP ESR client. ESR client ESR client.

### 5.2.

ESR-client 192.168.250.0/24. ESR-client. Alfa / Beta VRF AP.

ESR client ESR-10 1.11.0:

```
#!/usr/bin/clish
#18
hostname ESR-10GRE
```

```
object-group service telnet
  port-range 23
exit
object-group service ssh
  port-range 22
exit
object-group service dhcp_server
  port-range 67
exit
object-group service dhcp_client
  port-range 68
exit
object-group service ntp
  port-range 123
exit

object-group network MNG
  ip prefix 100.123.0.0/24
  ip prefix 192.168.200.48/28
  ip prefix 192.168.250.0/24
exit

vlan 2,10-11
exit

security zone trusted
exit
security zone GRE
exit

bridge 1
  description "Tunnel-IP"
  vlan 2
  security-zone GRE
  ip address dhcp
  ip dhcp client ignore router
  enable
exit
bridge 2
  description "userDATA"
  enable
exit
bridge 3
  description "mgmt_ESR10"
  security-zone trusted
  ip address dhcp
  enable
exit

interface gigabitethernet 1/0/1
  mode switchport
  switchport access vlan 2
exit
interface gigabitethernet 1/0/2
  mode switchport
  switchport mode trunk
  bridge-group 2
exit
interface gigabitethernet 1/0/3
  mode switchport
  switchport access vlan 10
  bridge-group 2 tagged
exit
interface gigabitethernet 1/0/4
  mode switchport
  switchport access vlan 11
  bridge-group 2 tagged
exit
interface gigabitethernet 1/0/5
  mode switchport
  switchport mode trunk
```

```
    bridge-group 2
exit
interface gigabitethernet 1/0/6
    mode switchport
    switchport access vlan 2
exit

tunnel gre 1
    mtu 1462
    keepalive dst-address 10.255.252.1
    keepalive dhcp dependent-interface bridge 1
    keepalive dhcp dependent-interface bridge 3
    keepalive enable
    mode ethernet
    local interface bridge 1
    remote address 192.168.200.49
    enable
exit
tunnel gre 1.1
    bridge-group 3
    mtu 1458
    snmp init-trap
    enable
exit
tunnel gre 2
    mtu 1462
    mode ethernet
    local interface bridge 1
    bridge-group 2
    remote address 192.168.200.50
    enable
exit

snmp-server
snmp-server system-shutdown
snmp-server community "private1" rw
snmp-server community "public11" ro

snmp-server host 100.123.0.2
    source-interface bridge 3
exit

snmp-server enable traps config
snmp-server enable traps config commit
snmp-server enable traps config confirm
snmp-server enable traps environment
snmp-server enable traps environment memory-flash-critical-low
snmp-server enable traps environment memory-flash-low
snmp-server enable traps environment memory-ram-critical-low
snmp-server enable traps environment memory-ram-low
snmp-server enable traps environment cpu-load
snmp-server enable traps environment cpu-critical-temp
snmp-server enable traps environment cpu-overheat-temp
snmp-server enable traps environment cpu-supercooling-temp
snmp-server enable traps file-operations
snmp-server enable traps file-operations successful
snmp-server enable traps file-operations failed
snmp-server enable traps file-operations canceled
snmp-server enable traps interfaces
snmp-server enable traps interfaces rx-utilization-high
snmp-server enable traps interfaces tx-utilization-high
snmp-server enable traps interfaces number-high
snmp-server enable traps screen
snmp-server enable traps screen dest-limit
snmp-server enable traps screen source-limit
snmp-server enable traps screen icmp-threshold
snmp-server enable traps screen udp-threshold
snmp-server enable traps screen syn-flood
snmp-server enable traps screen land
snmp-server enable traps screen winnuke
snmp-server enable traps screen icmp-frag
```

```

snmp-server enable traps screen udp-frag
snmp-server enable traps screen icmp-large
snmp-server enable traps screen syn-frag
snmp-server enable traps screen unknown-proto
snmp-server enable traps screen ip-frag
snmp-server enable traps screen port-scan
snmp-server enable traps screen ip-sweep
snmp-server enable traps screen syn-fin
snmp-server enable traps screen fin-no-ack
snmp-server enable traps screen no-flag
snmp-server enable traps screen spoofing
snmp-server enable traps screen reserved
snmp-server enable traps screen quench
snmp-server enable traps screen echo-request
snmp-server enable traps screen time-exceeded
snmp-server enable traps screen unreachable
snmp-server enable traps screen tcp-all-flags
snmp-server enable traps entity
snmp-server enable traps entity config-change
snmp-server enable traps entity-sensor
snmp-server enable traps entity-sensor threshold
snmp-server enable traps envmon temperature
snmp-server enable traps flash
snmp-server enable traps flash insertion
snmp-server enable traps flash removal
snmp-server enable traps snmp
snmp-server enable traps snmp authentication
snmp-server enable traps snmp coldstart
snmp-server enable traps snmp linkdown
snmp-server enable traps snmp linkup
snmp-server enable traps syslog

```

```
security zone-pair trusted self
```

```
rule 10
```

```
action permit
```

```
match source-address MNG
```

```
enable
```

```
exit
```

```
exit
```

```
security zone-pair GRE self
```

```
rule 10
```

```
action permit
```

```
match source-address MNG
```

```
enable
```

```
exit
```

```
exit
```

```
security passwords history 0
```

```
ip telnet server
```

```
ip ssh server
```

```
ntp enable
```

```
ntp server 100.123.0.2
```

```
exit
```

- 1) gi 1/0/1 () gi1/0/6 (), , .
  - 2) gi1/0/2 gi1/0/5 vlan, GRE, vlan. .
  - 3) gi1/0/3 gi1/0/4 vlan, , gi1/0/3 - 10, gi1/0/4 - 11. vlan GRE , . .
  - 4) bridge 1 ip dhcp client ignore router. DHCP . , (bridge 3), GRE ... bridge 1 - GRE ESR BRAS L3 c tftp- option 121.
- :
- 1) ESR-10, 6 . ESR-20/100/200 , .
  - 2), .

3) "#18", ESR, (#18 1.11). ESR client - . DHCP, ESR client, [1.4.3 ESR-10 - 1.4.3](#).

DHCP ESR-client ISC-DHCP-server:

```
authoritative;
ddns-update-style none;

enable-binary-leases;

default-lease-time 86400;
max-lease-time 87000;

log-facility local7;

## MS routes: adds extras to supplement routers option
option ms-classless-static-routes code 249 = array of unsigned integer 8;

## RFC3442 routes: overrides routers option
option rfc3442-classless-static-routes code 121 = array of unsigned integer 8;

subnet 192.168.250.0 netmask 255.255.255.0 {
    pool {
        option routers 192.168.250.1;
        range 192.168.250.10 192.168.250.254;
        option ms-classless-static-routes 28, 192,168,200,48, 192,168,250,1;
        option rfc3442-classless-static-routes 28, 192,168,200,48, 192,168,250,1;
        option tftp-server-name "192.168.250.2";
        option bootfile-name "ESR10conf-1.11.txt";
    }
}
```

, ESR10conf-1.11.txt ESR tftp 192.168.250.2.

object-group, , .. ESR client ESR BRAS L3.

## 6. SoftWLC

SoftWLC , ESR BRAS; - , ; , .

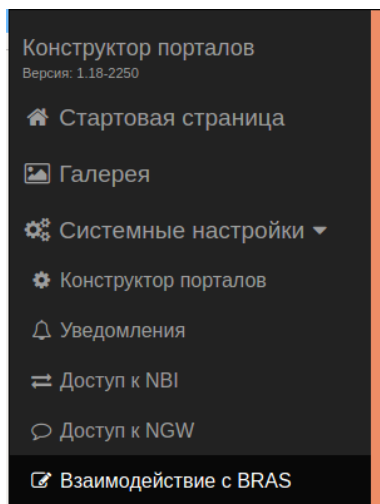
### 6.1.

:

- 1) BRAS ;
- 2) BRAS VRF ;
- 3) URL - welcome gosuslugi ;
- 4) WELCOME ;
- 5) ESR BRAS EMS .

, - ESR BRAS.

« BRAS» 6.1.1).



## Взаимодействие с BRAS

Взаимодействие с BRAS



Сохранить

. 6.1.1.

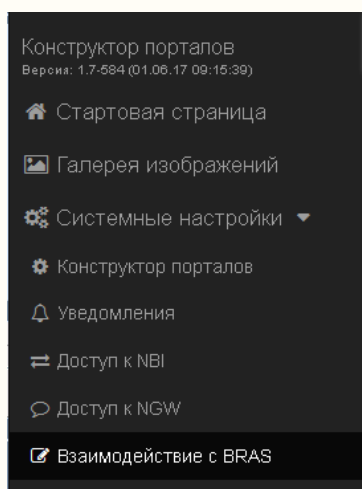
- "1.18 SoftWLC ESR BRAS - PCRF."



!

SoftWLC 1.17 CoA ESR BRAS:

RADIUS COA, ESR/BRAS SoftWLC (PCRF), ESR BRAS PCRF (. 6.1.2):



## Настройка доступа BRAS

Взаимодействие с BRAS



Секретный ключ RADIUS

password



Секретный ключ BRAS

password



Порт CoA

3799



Таймаут подключения (сек)

10



Размер пула подключений

5



Сохранить

. 6.1.2.

PCRF - (. 6.1.3):

Конструктор порталов

Версия: 1.18-2250

Стартовая страница

Галерея

Системные настройки ▾

Конструктор порталов

Уведомления

Доступ к NBI

Доступ к NGW

Взаимодействие с BRAS

Доступ к PCRF

Доступ к PCRF

Хост

100.123.0.2

Порт

7070

Таймаут чтения

11

Таймаут записи

11

Сохранить

. 6.1.3.

IP- PCRF localhost.

" PCRF" "BRAS VRF" ""(. 6.1.4):

Добавить BRAS VRF

VRF \*

dpi

?

Port \*

30799

?

Secret \*

testing123

?

Сохранить

Отменить

. 6.1.4.

BRAS VRF, 3.1 "", BRAS VRF .

(. 6.1.5), BRAS VRF dpi.

Статистика SMS

Статистика Hotspot

Статистика Enterprise

Сервисы и тарифы

Пользователи Wi-Fi

Точки доступа

Беспроводные сети

Журнал событий

Операции по расписанию

Отчеты

Конструктор порталов

Рекламная платформа

Настройки

Настройки PCRF

Подсети L2

BRAS VRF

Информация PCRF

CoA log

MAC адреса

Списки url

Обновить

Добавить

Редактировать

Удалить

Экспорт

| <input type="checkbox"/> | VRF | Port  | Secret     |
|--------------------------|-----|-------|------------|
| <input type="checkbox"/> | 1   | 3799  | testing123 |
| <input type="checkbox"/> | dpl | 30799 | testing123 |

. 6.1.5.

BRAS VRF ". Port Secret. VRF - .

VRF "1" - PCRF.

"" , "" URL PCRF ( localhost 7070). PCRF (. 6.1.6):

Система

Дерево доменов

Системные пользователи

Системные роли

Серверные адреса

RADIUS клиенты

COPM-2

Сохранить

Система

Интеграция

Таблицы

Отображение статистики

Уведомления

Уведомления клиентам B2B

Клиентские настройки

Обратная связь от клиентов B2B

PCRF url

http://100.123.0.27070

?

. 6.1.6.

" PCRF" " URL" "" (. 6.1.7):

Создать список URL

Имя \*

welcome

Домен \*

root

Тип

White

URL: Шаблоны: IP/MASK: IP/MASK (TCP):

+

-

Импорт из файла

Кликните дважды для редактирования

Url

Поиск

... http://100.123.0.2:8080/eltex\_portal/

Save Cancel

Сохранить

Отменить

. 6.1.7.

:

- "" - welcome;
- "" - root;
- "" - white;
- "URL" - 

+

 "http://<ip >:8080/eltex\_portal ".

"Save" "" .

gosuslugi (. 6.1.8), BRAS filter-name remote gosuslugi:

Создать список URL

×

Имя \*

gosuslugi

Домен \*

root

Тип

White

URL:

Шаблоны:

IP/MASK:

IP/MASK (TCP):

+

−

Импорт из файла

Кликните дважды для редактирования

☐

Url

Поиск

☐

^((https | http):\V\)(.+\.)?gosuslugi\.ru

☐

^((https | http):\V\)(.+\.)?gu-st\.ru

☐

^http://esia-portal1\.test\.gosuslugi\.ru/

☐

^http://esia\.gosuslugi\.ru/

☐

^https://esia-portal1\.test\.gosuslugi\.ru/

☐

^https://esia\.gosuslugi\.ru/

Сохранить

Отменить

. 6.1.8

SoftWLC .

" " , " PCRF" "" (. 6.1.9):

Создать новый сервис

+

×

Имя сервиса \*

WELCOME ?

Домен \*

root ?

Класс трафика \*

WELCOME ?

Квота по времени

? Секунды

Квота по трафику

? Байт

Сброс по часовому поясу домена

Не задан ?

Интервал отправки аккаунтинга, с \*

300 ?

Приоритет \*

4 ?

Возможность прохождения IP потоков

Разрешить IP поток в оба нап ?

Фильтры URL

Действие по умолчанию \*

redirect

URL по умолчанию \*

http://100.123.0.2:8080/eltex\_portal/welcome

Имя фильтра

welcome

Добавить

Удалить

Действие

permit

Выбранные фильтры

| Имя фильтра | Действие | URL |
|-------------|----------|-----|
| welcome     | permit   |     |

Сохранить

Отменить

. 6.1.9.

:

- " " - WELCOME;
- "" - root;
- " " - WELCOME.

!

!

!

ESR ip access-list extended WELCOME, , .. access-list ESR . / BRAS ;

- " , " - 600;
- "" - 4;
- " IP " - IP ;
- " " - redirect;
- "URL " - http://<ip >:8080/eltex\_portal/welcome;
- " " - welcome ( ) ;
- "" - permit;
- "" - " " .

"" , " " .

## EMS

EMS, r54 ( ), (  ) ESR ( . 6.1.10):

Имя объекта

Alfa

Тип

ESR1000

IP адрес

198.18.128.2

Домен

Добавить

Отменить

. 6.1.10.

:

- " " - Alfa ( );
- " " - , ESR1000;
- "IP" - IP , SoftWLC.

" ".

ESR (  EMS) " " , " " (. 6.1.11):

|                                 |                                     |
|---------------------------------|-------------------------------------|
| Описание                        | нет                                 |
| IP адрес                        | 198.18.128.2                        |
| SNMP порт                       | 161                                 |
| SNMP транспорт                  | UDP                                 |
| Файловый протокол               | TFTP                                |
| Таймаут обмена, мс              | 60000                               |
| Read community / User v3        | public11                            |
| Write community / Password v3   | private1                            |
| Версия SNMP                     | v2c                                 |
| Регистрация трапов              | Accept                              |
| Выведено из обслуживания        | <input type="checkbox"/>            |
| Дата 'Выведено из обслуживания' | 02.12.2020 15:18:11                 |
| Статус                          | AVAILABLE                           |
| Время статуса                   | 07.12.2020 21:16:39                 |
| Telnet/SSH login                | admin                               |
| Telnet/SSH password             | password                            |
| SSH порт                        | 22                                  |
| MAC адрес                       |                                     |
| Получение статуса VRRP          | <input checked="" type="checkbox"/> |
| BRAS сервис                     | <input checked="" type="checkbox"/> |
| Режим ESR                       | Station                             |
| ОТТ (Over-the-top)              | None                                |
| Режим кластера                  | None                                |
| Дата инициализации устройства   | 02.12.2020 15:18:11                 |

☒ Принять   ☒ Заполнить местоположение   ☒ Заполнить геокоординаты   ☒ Отменить

. 6.1.11.

:

- " " - FTP;
- "Read community / User v3" - public11;
- "Write community / Password v3" - private1;
- " VRRP" - ;
- "BRAS " - .



ESR-100/200 " ESR" "StationCE".

"Station", ESR - .

" ".

EMS radius, ESR SoftWLC. "RADIUS" " " , ESR ( - IP) , (. 6.1.12):

| Изменить поля Обновить Добавить Редактировать Удалить |              |          |                 |     |                  |                                         |
|-------------------------------------------------------|--------------|----------|-----------------|-----|------------------|-----------------------------------------|
| Фильтр: 198.18.128.2                                  |              |          | Страница: 1 / 1 |     | на странице: 100 | Всего записей:1550 Найдено по фильтру:1 |
| ID                                                    | Адрес        | Домен    | Имя             | Тип | Ключ             | Описание                                |
| 2                                                     | 198.18.128.2 | r54.root | ESR-14656       | ESR | testing123       |                                         |

. 6.1.12.

"" testing123 "", " RADIUS".

ESR (Beta), 198.18.128.3.

6.2.

. . . . .

. PCRF ( ), .

" " "PCRF" - " " (. 6.2.1):

Создать новый сервис

Имя сервиса \*

INTERNET ?

Домен \*

root ?

Класс трафика \*

INTERNET ?

Квота по времени

? Секунды

Квота по трафику

? Байт

Сброс по часовому поясу домена

Не задан ?

Интервал отправки аккаунтинга, с \*

300 ?

Приоритет \*

10 ?

Возможность прохождения IP потоков

Разрешить IP поток в оба нап

Фильтры URL

Действие по умолчанию \*

permit

Имя фильтра

?

Добавить

Удалить

Действие

permit

Выбранные фильтры

| Имя фильтра | Действие | URL |
|-------------|----------|-----|
|-------------|----------|-----|

Сохранить

Отменить

. 6.2.1.

:

- " " - INTERNET ( , , " \_");
- "" - root;
- "" - INTERNET.

!

! , ESR ip access-list extended INTERNET, ... access-list ESR . / BRAS ;

- " , " - 300;
- "" - 10;
- " IP " - IP ;
- " " - permit;
- URL .

"".

" " "" "PCRF/BRAS", BRAS (. 6.2.2):

Статистика Hotspot

Статистика Enterprise

Сервисы и тарифы

Тарифы

Сервисы PCRF

PCRF сценарии

Фильтр:

PCRF/BRAS

Имя

Домен

Обновить

Очистить

Добавить

Редактировать

Удалить

Экспорт

. 6.2.2.

"" - " " (. 6.2.3):

Создать новый тариф

Наименование \*

internet ?

Описание

?

Код тарифа \*

internet ?

Домен \*

root ?

Время жизни сессии

12 ? Часы ?

Время жизни сессии при бездействии пользователя \*

15 ? Минуты ?

Интервал отправки аккаунтинга, с \*

300 ?

Количество одновременных сессий с одним логином и паролем

?

Цена, руб.

?

Состав услуг

Сценарии

Сервисы

☒ INTERNET
☐ WELCOME

Сохранить

Отменить

. 6.2.3.

:

- "" - internet ( , , " ");
- " " - internet ( , , " ");
- "" - root;
- " " - 12. , . BRAS , mac ;
- " " - 15 ;
- "" - "INTERNET".



!

! "WELCOME" ! - BRAS .

"C".

### 6.3. ,

, SSID, ESR client. , . SSID . SSID . :

- 1) ( - );
- 2) SSID EMS;
- 3) ESR client, generic AP .

<http://<ip>:8080/epadmin> **Создать новый портал** (.6.3.1):

Create a new virtual portal

Virtual portal name

r54

Domain

r54.root

Save

Cancel

. 6.3.1.

:

- " " - r54;
- " " - r54.root.

"".

, "eltex" "" "default", (. 6.3.2):

Тарифы

Русский  admin 

Тарифы

Тарифы для BRAS (реклама, опросы)

| Тариф         | Код     | Домен | Название тарифа на портале |                    |
|---------------|---------|-------|----------------------------|--------------------|
| ▼ Работа с ТД |         |       |                            |                    |
| default       | default | root  | <div>Default</div>         | <div>Удалить</div> |

. 6.3.2.

BRAS, " BRAS" - , Eltex - "" .

"" (. 6.3.3)

Выберите тарифы

Найти

☐

Тариф

Код

Домен

▼

Работа с ТД

☐

Hotspot Default

default

root

▼

Работа через BRAS

☐

LOADINTERNET

LOADINTERNET

root

☒

INTERNET

INTERNET

root

Добавить

Отмена

. 6.3.3.

"internet", "" , " BRAS".

"" (. 6.3.4):

Тарифы

Русский

admin

Тарифы

Специальные тарифы BRAS

Тариф

Код

Домен

Название тарифа на портале

▼

Работа через BRAS

INTERNET

INTERNET

root

Удалить

. 6.3.4.

, -. SMS-, call SoftWLC Notification GW .

EMS

SSID generic AP - vlan option 82.

SSID vlan

, 6.3.1, SSID vlan, .1.2.1.

| generic AP   | SSID  | vlan |
|--------------|-------|------|
| generic AP 1 | SSID1 | 10   |
| generic AP 1 | SSID2 | 11   |
| generic AP 2 | SSID1 | 12   |
| generic AP 2 | SSID2 | 13   |
| generic AP 3 | SSID1 | 14   |
| generic AP 4 | SSID2 | 15   |

6.3.1.

EMS "Wireless" " SSID" " SSID" " SSID" - SSID (. 6.3.5):

|                                    |                                                                                                            |
|------------------------------------|------------------------------------------------------------------------------------------------------------|
| Тип                                | Hotspot                                                                                                    |
| Имя                                | ★ SSID1                                                                                                    |
| Описание                           |                                                                                                            |
| Domain                             | ★ r54.root                                                                                                 |
| Статус SSID                        | Operational                                                                                                |
| Дата создания                      | 2020-12-08 16:36:47                                                                                        |
| Дата изменения                     | 2020-12-08 16:36:47                                                                                        |
| ----- Оpciones -----               |                                                                                                            |
| Bridge Location                    | data10                                                                                                     |
| VRF                                | 1                                                                                                          |
| Switch Community                   | <input type="checkbox"/>                                                                                   |
| Требовать наличие Opt82            | <input type="checkbox"/>                                                                                   |
| Статус VAP                         | Up                                                                                                         |
| Режим трафика VAP (только для GRE) | Tunnel                                                                                                     |
| Broadcast SSID                     | <input checked="" type="checkbox"/>                                                                        |
| Radio                              | All                                                                                                        |
| Режим безопасности                 | Без шифрования                                                                                             |
| MAC Auth Type                      | Disable                                                                                                    |
| Статус Client QoS                  | on                                                                                                         |
| VLAN-ID                            | <input checked="" type="checkbox"/> 10,12,14                                                               |
| QoS method (down link)             | 802.1p                                                                                                     |
| VLAN trunk                         | <input type="checkbox"/>                                                                                   |
| General Mode                       | <input type="checkbox"/>                                                                                   |
| General VLAN-ID                    | 1                                                                                                          |
| 802.1p priority (up link)          | 0                                                                                                          |
| Изоляция клиентов                  | <input type="checkbox"/>                                                                                   |
| Band steer                         | <input checked="" type="checkbox"/>                                                                        |
| Support 802.11k                    | <input type="checkbox"/>                                                                                   |
| Wireless Multicast Forwarding      | <input type="checkbox"/>                                                                                   |
| Hotspot 2.0                        | <input type="text"/>  |
| DiffServ Policy Up                 | <input type="text"/>  |
| DiffServ Policy Down               | <input type="text"/>  |
| Bandwidth Limit Up, kbps           | 0                                                                                                          |
| Bandwidth Limit Down, kbps         | 0                                                                                                          |
| VAP Limit Up, kbps                 | 0                                                                                                          |
| VAP Limit Down, kbps               | 0                                                                                                          |
| DPI (Step Logic)                   | <input type="checkbox"/>                                                                                   |
| ----- Minimal signal -----         |                                                                                                            |
| Enabled                            | <input type="checkbox"/>                                                                                   |
| ----- Captive portal -----         |                                                                                                            |
| Enabled                            | <input type="checkbox"/>                                                                                   |
| Virtual portal name                | r54                                                                                                        |
| ----- Расписание работы ----- ?    |                                                                                                            |
| Включить                           | <input type="checkbox"/>                                                                                   |

✓ Принять
✗ Отменить

. 6.3.5.

- "" - Hotspot;
- "" - SSID1;
- "Domain" - r54.root;
- "Bridge, Location" - data10 - location, ESR;
- "VRF" - 1, .. SSID VRF.
- "Vlan-ID" - 10,12,14 (vlan SSID, 6.3.1);
- "Virtual portal name" - 54 - , .

...

.. SSID - SSID (. 6.3.6):

|                                    |                                              |
|------------------------------------|----------------------------------------------|
| Тип                                | Hotspot                                      |
| Имя                                | ★ SSID2                                      |
| Описание                           |                                              |
| Domain                             | ★ r54.root                                   |
| Статус SSID                        | Operational                                  |
| Дата создания                      | 2020-12-08 17:05:32                          |
| Дата изменения                     | 2020-12-08 17:05:32                          |
| ----- Опции -----                  |                                              |
| Bridge Location                    | data12                                       |
| VRF                                | dpi                                          |
| Switch Community                   | <input type="checkbox"/>                     |
| Требовать наличие Opt82            | <input type="checkbox"/>                     |
| Статус VAP                         | Up                                           |
| Режим трафика VAP (только для GRE) | Tunnel                                       |
| Broadcast SSID                     | <input checked="" type="checkbox"/>          |
| Radio                              | All                                          |
| Режим безопасности                 | Без шифрования                               |
| MAC Auth Type                      | Disable                                      |
| Статус Client QoS                  | on                                           |
| VLAN-ID                            | <input checked="" type="checkbox"/> 11,13,15 |
| QoS method (down link)             | 802.1p                                       |
| VLAN trunk                         | <input type="checkbox"/>                     |
| General Mode                       | <input type="checkbox"/>                     |
| General VLAN-ID                    | 1                                            |
| 802.1p priority (up link)          | 0                                            |
| Изоляция клиентов                  | <input type="checkbox"/>                     |
| Band steer                         | <input checked="" type="checkbox"/>          |
| Support 802.11k                    | <input type="checkbox"/>                     |
| Wireless Multicast Forwarding      | <input type="checkbox"/>                     |
| Hotspot 2.0                        | <input type="text"/>                         |
| DiffServ Policy Up                 | <input type="text"/>                         |
| DiffServ Policy Down               | <input type="text"/>                         |
| Bandwidth Limit Up, kbps           | 0                                            |
| Bandwidth Limit Down, kbps         | 0                                            |
| VAP Limit Up, kbps                 | 0                                            |
| VAP Limit Down, kbps               | 0                                            |
| DPI (Step Logic)                   | <input type="checkbox"/>                     |
| ----- Minimal signal -----         |                                              |
| Enabled                            | <input type="checkbox"/>                     |
| ----- Captive portal -----         |                                              |
| Enabled                            | <input type="checkbox"/>                     |
| Virtual portal name                | r54                                          |
| ----- Расписание работы -----      | <input type="text"/>                         |
| Включить                           | <input type="checkbox"/>                     |

. 6.3.6.

SSID , vlan ... ridge ESR, VRF - SSID: "VRF" - dpi.

SSID option 82

generic AP, WiFi, SSID vlan, generic AP , 6.3.2 vlan/SSID 1.2.2.

| generic AP         | SSID  | vlan |
|--------------------|-------|------|
| generic AP 1, 2, 3 | SSID1 | 10   |
| generic AP 1, 2, 3 | SSID2 | 11   |

6.3.2.

EMS "Wireless" " SSID" " SSID" " SSID" - SSID (. 6.3.7):

|                                    |                                                                                                            |
|------------------------------------|------------------------------------------------------------------------------------------------------------|
| Тип                                | Hotspot                                                                                                    |
| Имя                                | ★ SSID1                                                                                                    |
| Описание                           |                                                                                                            |
| Domain                             | ★ r54.root                                                                                                 |
| Статус SSID                        | Operational                                                                                                |
| Дата создания                      | 2020-12-08 16:36:47                                                                                        |
| Дата изменения                     | 2020-12-08 16:36:47                                                                                        |
| ----- Опции -----                  |                                                                                                            |
| Bridge Location                    | data10                                                                                                     |
| VRF                                | 1                                                                                                          |
| Switch Community                   | <input type="checkbox"/>                                                                                   |
| Требовать наличие Opt82            | <input checked="" type="checkbox"/>                                                                        |
| Статус VAP                         | Up                                                                                                         |
| Режим трафика VAP (только для GRE) | Tunnel                                                                                                     |
| Broadcast SSID                     | <input checked="" type="checkbox"/>                                                                        |
| Radio                              | All                                                                                                        |
| Режим безопасности                 | Без шифрования                                                                                             |
| MAC Auth Type                      | Disable                                                                                                    |
| Статус Client QoS                  | on                                                                                                         |
| VLAN-ID                            | <input checked="" type="checkbox"/> 10                                                                     |
| QoS method (down link)             | 802.1p                                                                                                     |
| VLAN trunk                         | <input type="checkbox"/>                                                                                   |
| General Mode                       | <input type="checkbox"/>                                                                                   |
| General VLAN-ID                    | 1                                                                                                          |
| 802.1p priority (up link)          | 0                                                                                                          |
| Изоляция клиентов                  | <input type="checkbox"/>                                                                                   |
| Band steer                         | <input checked="" type="checkbox"/>                                                                        |
| Support 802.11k                    | <input type="checkbox"/>                                                                                   |
| Wireless Multicast Forwarding      | <input type="checkbox"/>                                                                                   |
| Hotspot 2.0                        | <input type="text"/>  |
| DiffServ Policy Up                 | <input type="text"/>  |
| DiffServ Policy Down               | <input type="text"/>  |
| Bandwidth Limit Up, kbps           | 0                                                                                                          |
| Bandwidth Limit Down, kbps         | 0                                                                                                          |
| VAP Limit Up, kbps                 | 0                                                                                                          |
| VAP Limit Down, kbps               | 0                                                                                                          |
| DPI (Step Logic)                   | <input type="checkbox"/>                                                                                   |
| ----- Minimal signal -----         |                                                                                                            |
| Enabled                            | <input type="checkbox"/>                                                                                   |
| ----- Captive portal -----         |                                                                                                            |
| Enabled                            | <input type="checkbox"/>                                                                                   |
| Virtual portal name                | r54                                                                                                        |
| ----- Расписание работы -----      |                         |
| Включить                           | <input type="checkbox"/>                                                                                   |

 **Принять**     **Отменить**

. 6.3.7.

- "" - Hotspot;
- "" - SSID1;
- "Domain" - r54.root;
- "Bridge, Location" - data10 - location, ESR;
- "Opt82" - option 82 WiFi;
- "Vlan-ID" - 10 (vlan SSID, 6.3.2);
- "Virtual portal name" - 54 - , .

SSID, .6.3.8:

|                                    |                                                                                                            |
|------------------------------------|------------------------------------------------------------------------------------------------------------|
| Тип                                | Hotspot                                                                                                    |
| Имя                                | ★ SSID2                                                                                                    |
| Описание                           |                                                                                                            |
| Domain                             | ★ r54.root                                                                                                 |
| Статус SSID                        | Operational                                                                                                |
| Дата создания                      | 2020-12-08 17:05:32                                                                                        |
| Дата изменения                     | 2020-12-08 17:05:32                                                                                        |
| ----- Опции -----                  |                                                                                                            |
| Bridge Location                    | data12                                                                                                     |
| VRF                                | dpi                                                                                                        |
| Switch Community                   | <input type="checkbox"/>                                                                                   |
| Требовать наличие Opt82            | <input checked="" type="checkbox"/>                                                                        |
| Статус VAP                         | Up                                                                                                         |
| Режим трафика VAP (только для GRE) | Tunnel                                                                                                     |
| Broadcast SSID                     | <input checked="" type="checkbox"/>                                                                        |
| Radio                              | All                                                                                                        |
| Режим безопасности                 | Без шифрования                                                                                             |
| MAC Auth Type                      | Disable                                                                                                    |
| Статус Client QoS                  | on                                                                                                         |
| VLAN-ID                            | <input checked="" type="checkbox"/> 11                                                                     |
| QoS method (down link)             | 802.1p                                                                                                     |
| VLAN trunk                         | <input type="checkbox"/>                                                                                   |
| General Mode                       | <input type="checkbox"/>                                                                                   |
| General VLAN-ID                    | 1                                                                                                          |
| 802.1p priority (up link)          | 0                                                                                                          |
| Изоляция клиентов                  | <input type="checkbox"/>                                                                                   |
| Band steer                         | <input checked="" type="checkbox"/>                                                                        |
| Support 802.11k                    | <input type="checkbox"/>                                                                                   |
| Wireless Multicast Forwarding      | <input type="checkbox"/>                                                                                   |
| Hotspot 2.0                        | <input type="text"/>  |
| DiffServ Policy Up                 | <input type="text"/>  |
| DiffServ Policy Down               | <input type="text"/>  |
| Bandwidth Limit Up, kbps           | 0                                                                                                          |
| Bandwidth Limit Down, kbps         | 0                                                                                                          |
| VAP Limit Up, kbps                 | 0                                                                                                          |
| VAP Limit Down, kbps               | 0                                                                                                          |
| DPI (Step Logic)                   | <input type="checkbox"/>                                                                                   |
| ----- Minimal signal -----         |                                                                                                            |
| Enabled                            | <input type="checkbox"/>                                                                                   |
| ----- Captive portal -----         |                                                                                                            |
| Enabled                            | <input type="checkbox"/>                                                                                   |
| Virtual portal name                | r54                                                                                                        |
| ----- Расписание работы ----- ?    |                                                                                                            |
| Включить                           | <input type="checkbox"/>                                                                                   |

✓ Принять
✗ Отменить

. 6.3.8.

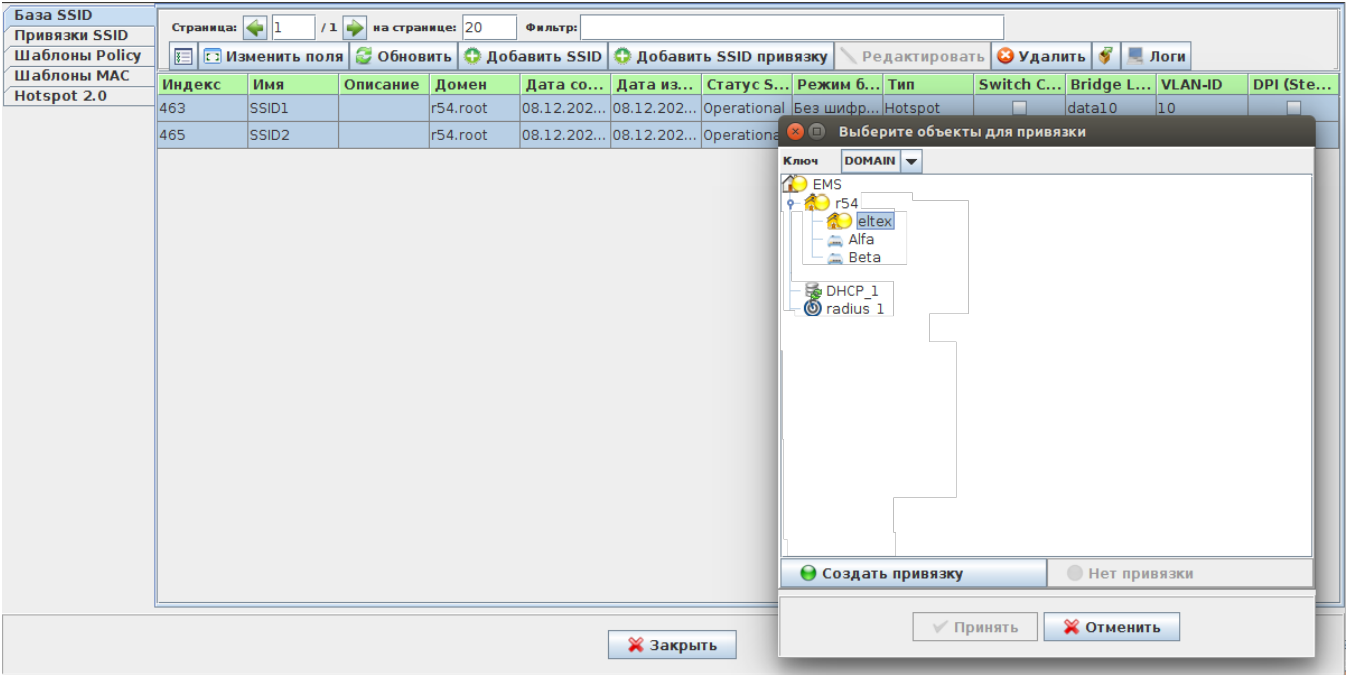
SSID , vlan. ... ESR, VRF - SSID: "VRF" - dpi.



SSID " opt82" - WiFi, DHCP- option 82, .

r54 Eltex ( , ... ).

SSID - SSID1 SSID2 " SSID (. 6.3.9):



. 6.3.9.

"" - DOMAIN, "EMS r54 Eltex", SSID "". "" - .

- " SSID" - "", .. Eltex SSID.

ESR client. "wireless" " " "" "" (. 6.3.10):

Главное

Тип устройства

★ ESR-10

Имя правила

★ esr-10-client

Домен правила

★ root

Описание

RADIUS

Добавить ТД в RADIUS

☐

Ключ

★

Обновление ПО

Протокол загрузки ПО

FTP

Доступ

SNMP транспорт

UDP

SNMP Community (только чтение)

★ public11

SNMP Community (чтение/запись)

★ private1

Режим ESR

Client

Сервис BRAS

☐

Принять

Отменить

. 6.3.10.

:

- " " - ESR-10 ( ESR, ESR client);
- " " - "esr-10-client";
- " " - root;
- " " - FTP;
- "SNMP " - "UDP";
- "SNMP Community ( )" - public11 ( ESR client);
- "SNMP Community (/) " - private1 ( ESR client);
- " ESR" - "Client";
- " BRAS" - , .

"".

ESR , ESR.

ESR client , - . "" - " Wi-Fi", "EMS" EMS.

ESR client. tftp- ( , ) " Wi-Fi" (. 6.3.11):

| Wireless                                                                            |                                                                                     |                |                                     |                                                                                     |                  |                                                                                     |                    |                                                                                     |                  |                 |
|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|----------------|-------------------------------------|-------------------------------------------------------------------------------------|------------------|-------------------------------------------------------------------------------------|--------------------|-------------------------------------------------------------------------------------|------------------|-----------------|
| Инициализация ТД Wi-Fi                                                              |                                                                                     |                | Инициализация ТД сторонних вендоров |                                                                                     |                  | Статистика RRD                                                                      |                    | Доступ                                                                              |                  |                 |
| Описание                                                                            |                                                                                     |                | Активные аварии                     |                                                                                     | Список устройств |                                                                                     | Пользователи Wi-Fi |                                                                                     |                  | Мониторинг коня |
| Фильтр:                                                                             |                                                                                     |                |                                     |                                                                                     | H-scroll         | <input type="checkbox"/>                                                            | Автообновление     | <input checked="" type="checkbox"/>                                                 | Записей: 3       |                 |
|  |  | Изменить поля  |                                     |  | Обновить         |  | Экспорт            |  | Инициализировать |                 |
| Unique ID                                                                           | Тип устройс...                                                                      | Имя хоста      | Информаци...                        | IP адрес                                                                            | Tunnel IP        | MAC адрес                                                                           | Серийный н...      | Версия ПО                                                                           | Время обна...    | Стат            |
| 1393                                                                                | ESR-10                                                                              | ESR-10GRE      |                                     | 10.255.252.8                                                                        | 192.168.240...   | a8:f9:4b:ac:9...                                                                    | NP05005383         | 1.11.x build 1...                                                                   | 2020-12-08T1...  | FAILE           |
| 1379                                                                                | WEP-12ac-RevC                                                                       | WEP-12ac_rev_C | Sovetskaya-1...                     | 198.18.135.36                                                                       | 192.168.250...   | e0:d9:e3:70:5...                                                                    | WP1E003922         | 1.19.0.22                                                                           | 2020-12-08T1...  | FAILE           |
| 1384                                                                                | WEP-2L                                                                              | WEP-2L         | cohovineyard...                     | 10.2.6.72                                                                           | 198.18.24.3      | e8:28:c1:d7:3...                                                                    | WP23000033         | 1.1.4 build 5                                                                       | 2020-12-08T1...  | FAILE           |

. 6.3.11.

(ESR-10) , " " , (. 6.3.12):

|                          |                          |
|--------------------------|--------------------------|
| Имя устройства           |                          |
| Ключ                     | MAC                      |
| Имя правила              | ★ esr-10-client          |
| Домен правила            | root                     |
| Домен узла               | ★ eltex.r54.root         |
| OTT (Over-the-top)       | <input type="checkbox"/> |
| OTT индивидуальная конф. |                          |
| ФИО                      |                          |
| Номер заявки             |                          |
| Почтовый индекс          | 630020                   |
| Номер региона            | 54                       |
| Страна                   | Россия                   |
| Область                  | Новосибирская            |
| Район                    | -                        |
| Город                    | Новосибирск              |
| Улица                    | Окружная                 |
| Номер дома               | 29А                      |
| ИНН                      |                          |
| Корпус                   |                          |
| Этаж                     |                          |
| Офис                     |                          |
| Широта                   | 55.088512                |
| Долгота                  | 82.9442                  |
| WipsWids service         | <input type="checkbox"/> |
| DPI (Step Logic)         | <input type="checkbox"/> |

✓ Заполнить местоположение  
✓ Заполнить геокоординаты  
✓ Принять ✗ Отменить

. 6.3.12.

:

- "" - "MAC";
- "" -  "esr-10-client";
- "" - ;
- "" -  , .

( , EMS).

"".

ESR-10, "" (. 6.3.13.):

| Wireless                                                                                          |               | Инициализация ТД Wi-Fi                                                                       |              | Инициализация ТД сторонних вендоров                                                         |                | Статистика RRD                                                                                       |                  | Доступ                                         |                 |                 |       |
|---------------------------------------------------------------------------------------------------|---------------|----------------------------------------------------------------------------------------------|--------------|---------------------------------------------------------------------------------------------|----------------|------------------------------------------------------------------------------------------------------|------------------|------------------------------------------------|-----------------|-----------------|-------|
| Описание                                                                                          |               | Активные аварии                                                                              |              | Список устройств                                                                            |                | Пользователи Wi-Fi                                                                                   |                  | Мониторинг конку                               |                 |                 |       |
| Фильтр: <input type="text"/>                                                                      |               |                                                                                              |              | <input type="checkbox"/> H-scroll                                                           |                | <input type="checkbox"/> Автообновление                                                              |                  | <input checked="" type="checkbox"/> Зависей: 3 |                 |                 |       |
|  Изменить поля |               |  Обновить |              |  Экспорт |                |  Инициализировать |                  |                                                |                 |                 |       |
| Unique ID                                                                                         | Тип устрой... | Имя хоста                                                                                    | Информаци... | IP адрес                                                                                    | Tunnel IP      | MAC адрес                                                                                            | Серийный н...    | Версия ПО                                      | Время обна...   | Стат            |       |
| 1473                                                                                              | ESR-10        | ESR-10GRF                                                                                    |              | 10.255.252.8                                                                                | 192.168.240... | a8:f9:4b:ac:9...                                                                                     | NP05005383       | 1.11.x build 1...                              | 2020-12-08T1... | FAILE           |       |
| 1460                                                                                              | WEP-12ac-RevC | WEP-12ac                                                                                     |              |                                                                                             |                | 0...                                                                                                 | e0:d9:e3:70:5... | WP1E003922                                     | 1.19.0.22       | 2020-12-08T1... | FAILE |
| 1463                                                                                              | WEP-2L        | WEP-2L                                                                                       |              |                                                                                             |                |                                                                                                      | 000033           | 1.1.4 build 5                                  | 2020-12-08T1... | FAILE           |       |

Инициализировать

Добавить привязку инициализации

Копировать выделенную ячейку

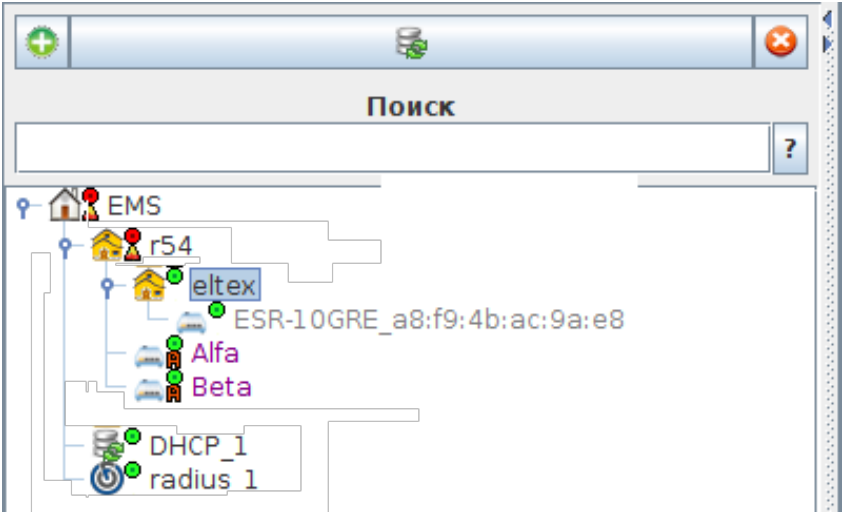
Копировать выделенные строки

Копировать выделенную колонку

Выделить все Ctrl-A

. 6.3.13.

EMS. EMS, "" . ( 6.3.14):



. 6.3.14.

generic AP vlan SoftWLC BRAS , vlan , . BRAS : [BRAS Troubleshooting Guide](#)

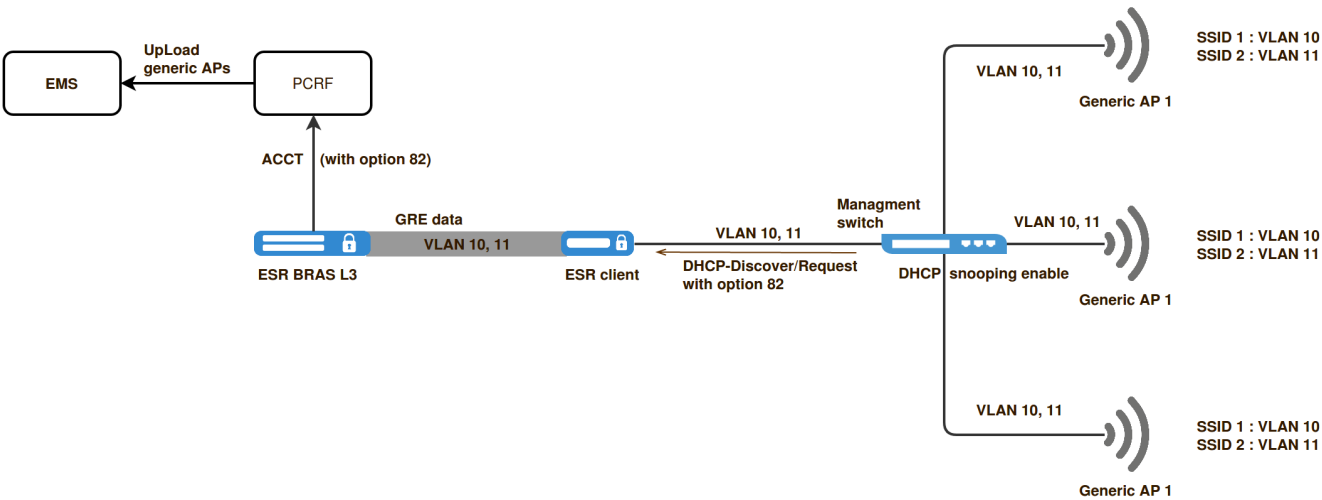
generic AP option 82 . .

## 7. generic AP option 82

### 7.1.

generic AP, WiFi . generic AP option 82, , .

, . 7.1.1. :



. 7.1.1.

1. WiFi BRAS, PCRF, option 82.
2. PCRF , EMS
3. EMS, , , "" - " " .



!

SSID " Opt82", . 6.3.7 6.3.8.

, generic AP option 82 vlan WiFi.





option 82 dhcp-relay WiFi - IP- MAC- WiFi .

, dhcp- - , ( 7.1.2):

×

✓

v2325

Connect automatically ☒

Русский

English



FREE WiFi ))

Выберите способ входа

По номеру телефона

По учетной записи

Вход через Госуслуги

SSID2 - в доступе отказано, требуется наличие option 82

Авторизуясь на портале, Вы принимаете условия пользовательского соглашения.

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. 7.1.2

: "SSID - , option 82".

## 7.2. PCRF

PCRF EMS - generic AP. PCRF /etc/eltex-pcrf/eltex-pcrf.json, "generic.ap.registrar" :

```
"generic.ap.registrar": {
  "max_aps_in_queue": 30,
  "ap_register_interval_ms": 600000,
  "added_ap_cache_ttl_ms": 600000,
  "host": "localhost",
  "port": 8080,
  "worker_pool_size": 8
}
```

:

- "max\_aps\_in\_queue" - generic AP , EMS ( 30);
- "ap\_register\_interval\_ms" - , generic AP EMS (, 600000);
- "added\_ap\_cache\_ttl\_ms" - generic AP, EMS (, 600000);
- "host" - IP-, EMS;
- "port" - , EMS;

- "worker\_pool\_size" - ( 8).

PCRF sudo systemctl restart eltex-pcrf. PCRF - .

7.3. generic AP

"Wireless" " " "" "" (. 7.3.1):

Главное

Тип устройства

★

GenericAp

▼

Имя правила

★

GenericAP

Домен правила

★

root

🌐

Описание

✓Принять

✗Отменить

. 7.3.1.

- " " - "Generic Ap";
- " " - "GenericAP";
- " " - "root";
- "" - , .

"".

generic AP "", EMS. "" " " " " "WirelessCommon" (. 7.3.2):

GenericAp

airtune

apb

dhcp

esr

ftpserver

linuxServerCommon

monitoring

mysql

netconf

passwordGenerator

pcrf

portal

radius

softwlc.nbi

system

tftpserver

tl1

wb

wep

wirelessCommon

wop

Максимальное время хранения информации о ТД (s).

Путь к файлам статических IP адресов DHCP серверов.

Автоматическая инициализация

Удалять ТД из дерева при неудачной инициализации

Ключи привязок инициализации

Разрешить установку SSID на WDS радиоканалы

Выключать SSID не имеющие привязки

Собирать статистику по количеству пользователей

Собирать статистику загрузки uplink

Шаг отправки алерта AssociateClients, в сек.

Запретить назначать WPA2 Personal на VAP, если не заполнены параметры для RADIUS accounting

Период актуализации данных динамических туннелей, в сек.

----- Доступ к Личному Кабинету -----

604800

/etc/dhcp/static/hosts.conf

☒

☒

☒ MAC ☐ IP 

☒ Location

☐ Parent ☐ IP Range

☐

☒

☐

☐

3

☐

60

. 7.3.2.

, " " "Location". - .

"" - " " (. 7.3.3):

| Wireless                                                                                                                                                                    | Инициализация ТД Wi-Fi     | Инициализация ТД сторонних вендоров | Статистика RRD     | Доступ                      |        |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------|-------------------------------------|--------------------|-----------------------------|--------|
| Описание                                                                                                                                                                    | Активные аварии            | Список устройств                    | Пользователи Wi-Fi | Мониторинг конку            |        |
| Фильтр: <input type="text"/> H-scroll <input type="checkbox"/> Автообновление <input checked="" type="checkbox"/> Записей: 1                                                |                            |                                     |                    |                             |        |
| <input type="button" value="Изменить поля"/> <input type="button" value="Обновить"/> <input type="button" value="Экспорт"/> <input type="button" value="Инициализировать"/> |                            |                                     |                    |                             |        |
| Уникальный идентификатор                                                                                                                                                    | Домен правила инициализ... | CELL                                | MAC ESR            | Option 82 (Hex)             | Стату  |
| 51                                                                                                                                                                          | eltex.r54.root             | 52906facf97838aeeb8428cf3...        | a8:f9:4b:aa:36:59  | 73773120657468203130302F... | FAILED |

. 7.3.3.

- generic AP, .  
, .. generic AP , ESR client. " " "" ""' (. 7.3.4) :

Имя устройства

Ключ

Имя правила

Домен правила

Домен узла

ОТТ (Over-the-top)

ОТТ индивидуальная конф.

ФИО

Номер заявки

Почтовый индекс

Номер региона

Страна

Область

Район

Город

Улица

Номер дома

ИНН

Корпус

Этаж

Офис

Широта

Долгота

WipsWids service

DPI (Step Logic)

eltex.r54.root

GenericAP

root

eltex.r54.root

☐

630020

54

Россия

Новосибирская

-

Новосибирск

Окружная

29А

55.088512

82.9442

☐

☐

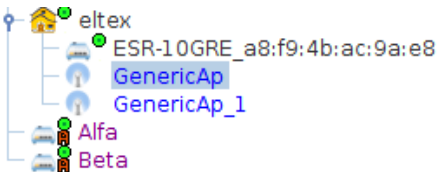
☒ Заполнить местоположение

☒ Заполнить геокоординаты

. 7.3.4.

• "" - "eltex.r54.root";  
• " " - "GenericAP";  
• " " - ;  
• , " " .  
"".

, -WiFi generic AP (. 7.3.5).



## 7.4. generic AP

generic AP "" (. 7.4.1).

. 7.4.1.

"Generic Ap " , :

- "Cell" - , option 82 l2location;
- "NAS MAC" - NAS MAC ESR BRAS, WiFi, generic AP. (.. ESR BRAS - Alfa Beta);
- "Hex" - option 82.

"Hex" option 82 , , , :

- **ASCII-1** - 1- ASCII, 2- : swl eth 100/23:2325-E0D9E3EB6440 ( )
- **Оригинал** - 1- 2- : 73773120657468203130302F32333A32333235-E0D9E3EB6440
- **ASCII-2** - 1- , 2- ASCII: 73773120657468203130302F32333A32333235-àÛäëd@
- **ASCII-all** - 1- 2- ASCII: swl eth 100/23:2325-àÛäëd@

option 82, , vlan , generic AP. , option 82 .

generic AP, , .

generic AP, option 82 .

generic AP .



!

generic AP, EMS , "".

8.

ESR BRAS L3 generic AP, WiFi .

[ESR wireless-controller](#) "".