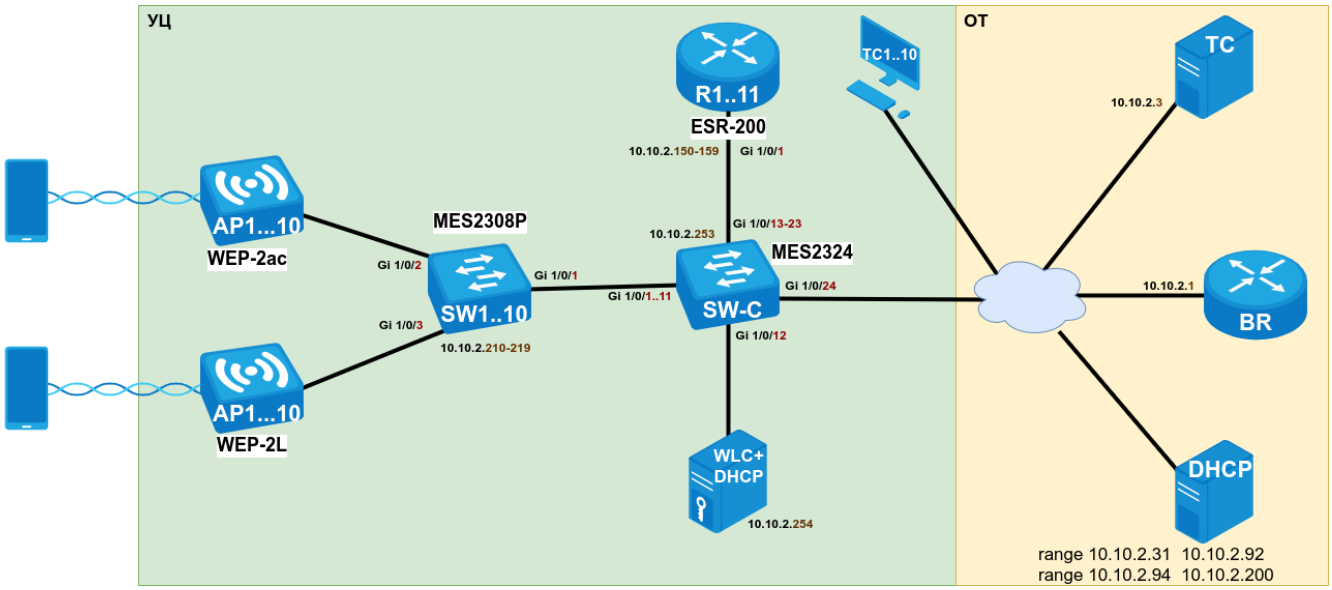


GRE:

	VLAN/subnet tunnel IP (MES)	VLAN/subnet GRE temination (ESR)	subnet AP MGMT (ESR)	subnet AP USER SSID1 (ESR)	VLAN/subnet AP USER SSID2 local-sw	admin (ESR)	admin (MES)
1	2001 / 192.168.101.0/24	2011 / 172.16.101.0/28	172.31.101.0/24	100.64.1.0/24	2021 / 100.64.101.0/24	10.10.2.151 /24	10.10.2.211 /24
2	2002 / 192.168.102.0/24	2012 / 172.16.102.0/28	172.31.102.0/24	100.64.2.0/24	2022 / 100.64.102.0/24	10.10.2.162 /24	10.10.2.2/24
3	2003 / 192.168.103.0/24	2013 / 172.16.103.0/28	172.31.103.0/24	100.64.3.0/24	2023 / 100.64.103.0/24	10.10.2.153 /24	10.10.2.213 /24
4	2004 / 192.168.104.0/24	2014 / 172.16.104.0/28	172.31.104.0/24	100.64.4.0/24	2024 / 100.64.104.0/24	10.10.2.154 /24	10.10.2.4/24
5	2005 / 192.168.105.0/24	2015 / 172.16.105.0/28	172.31.105.0/24	100.64.5.0/24	2025 / 100.64.105.0/24	10.10.2.155 /24	10.10.2.5/24
6	2006 / 192.168.106.0/24	2016 / 172.16.106.0/28	172.31.106.0/24	100.64.6.0/24	2026 / 100.64.106.0/24	10.10.2.156 /24	10.10.2.216 /24
7	2007 / 192.168.107.0/24	2017 / 172.16.107.0/28	172.31.107.0/24	100.64.7.0/24	2027 / 100.64.107.0/24	10.10.2.157 /24	10.10.2.7/24
8	2008 / 192.168.108.0/24	2018 / 172.16.108.0/28	172.31.108.0/24	100.64.8.0/24	2028 / 100.64.108.0/24	10.10.2.158 /24	10.10.2.218 /24
9	2009 / 192.168.109.0/24	2019 / 172.16.109.0/28	172.31.109.0/24	100.64.9.0/24	2029 / 100.64.109.0/24	10.10.2.159 /24	10.10.2.219 /24
10	2010 / 192.168.110.0/24	2020 / 172.16.110.0/28	172.31.110.0/24	100.64.10.0/24	2030 / 100.64.110.0/24	10.10.2.150 /24	10.10.2.210 /24
~~11~~	~~2011 / 192.168.111.0/24~~	~~2021 / 172.16.111.0/28~~	~~172.31.111.0/24~~	~~100.64.11.0/24~~	~~2031 / 100.64.111.0/24~~	~~10.10.2.160 /24~~	~~10.10.2.220 /24~~

SoftWLC, ISC-DHCP 10.10.2.254.

MES admin / admin

ESR admin / password

MES

:

```
vlan database
 vlan 10
exit
!
hostname MES09
!
interface gigabitethernet1/0/1
 switchport mode general
 switchport general allowed vlan add 10 untagged
 switchport general pvid 10
 switchport forbidden default-vlan
exit
!
interface gigabitethernet1/0/2
 switchport mode general
 switchport general allowed vlan add 10 untagged
 switchport general pvid 10
 switchport forbidden default-vlan
exit
!
interface gigabitethernet1/0/3
 switchport mode general
 switchport general allowed vlan add 10 untagged
 switchport general pvid 10
 switchport forbidden default-vlan
exit
!
interface vlan 1
 no ip address dhcp
exit
!
interface vlan 10
 ip address 10.10.2.219 255.255.255.0
exit
!
!
end
```

:

```
no spanning-tree

ip dhcp relay address 10.10.2.254
ip dhcp relay enable
vlan database
  vlan 2009, 2019, 2029
exit

interface gigabitethernet1/0/1
 switchport mode general
 switchport general allowed vlan add 2019 tagged
exit

interface gigabitethernet1/0/2
 switchport mode general
 switchport general allowed vlan add 2029 tagged
 switchport general allowed vlan add 2009 untagged
 switchport general pvid 2009
 switchport forbidden default-vlan
exit

interface gigabitethernet1/0/3
 switchport mode general
 switchport general allowed vlan add 2029 tagged
 switchport general allowed vlan add 2009 untagged
 switchport general pvid 2009
 switchport forbidden default-vlan
exit

interface vlan 2009
 ip address 192.168.109.1 /24
 ip dhcp relay enable
exit
interface vlan 2019
 ip address 172.16.109.5 /28
 ip dhcp relay enable
exit
interface vlan 2029
 ip address 100.64.109.1 /24
 ip dhcp relay enable
exit
```

ESR

:

```
hostname ESR09

vlan 10
exit

bridge 1
  description "UpLink"
  vlan 10
  ip firewall disable
  ip address 10.10.2.159/24
  enable
exit

interface gigabitethernet 1/0/1
  mode switchport
  switchport forbidden default-vlan
  switchport mode trunk
  switchport trunk native-vlan 10
exit
security passwords history 0
ip telnet server
ip ssh server
```

:

```
4# show system id
Serial number:
  NP15008778
4# copy tftp://10.10.2.254:/NP15008778.lic system:licence
4# reload system
```

:

```
ESR11# show licence
Licence information
-------------------
Name:    eltex
Version: 1.0
Type:    ESR-200
S/N:     NP15008778
MAC:     E4:5A:D4:00:AA:9B
Features:
 WIFI - Wi-Fi controller
 BRAS - Broadband Remote Access Server
```

ESR:

```
hostname ESR01

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

```
exit

object-group network MGMT
  ip prefix 10.10.2.0/24
  ip prefix 172.31.109.0/24
  ip prefix 172.16.109.0/28
exit
object-group network nat_users
  ip prefix 100.64.9.0/24
exit

radius-server timeout 10
radius-server host 10.10.2.254
  key ascii-text testing123
  timeout 11
  source-address 10.10.2.159
  auth-port 31812
  acct-port 31813
  retransmit 2
  dead-interval 10
exit
aaa radius-profile PCRF
  radius-server host 10.10.2.254
exit
das-server COA
  key ascii-text testing123
  port 3799
  clients object-group MGMT
exit
aaa das-profile COA
  das-server COA
exit

vlan 10,2019
exit

no spanning-tree

domain lookup enable
domain name-server 77.88.8.8

security zone trusted
exit
security zone untrusted
exit
security zone user
exit
security zone gre
exit


bridge 1
  description "UpLink"
  vlan 10
  security-zone untrusted
  ip firewall disable
  ip address 10.10.2.159/24
  enable
exit
bridge 2
  description "GRE_termination"
  vlan 2019
  security-zone gre
  ip firewall disable
  ip address 172.16.109.1/28
  ip address 172.16.109.2/28
  enable
exit
bridge 3
  description "AP_MANAGMENT"
  security-zone trusted
```

```
  ip firewall disable
  ip address 172.31.109.1/24
  ip helper-address 10.10.2.254
  ip tcp adjust-mss 1418
  protected-ports local
  enable
exit
bridge 10
  description "AP_SSID1_USERS"
  security-zone user
  ip firewall disable
  ip address 100.64.9.1/24
  ip helper-address 10.10.2.254
  ip tcp adjust-mss 1418
  location data10
  protected-ports local
  enable
exit

interface gigabitethernet 1/0/1
  mode switchport
  switchport forbidden default-vlan
  switchport mode trunk
  switchport trunk native-vlan 10
  switchport trunk allowed vlan add 2019
exit
tunnel softgre 1
  description "managment"
  mode management
  local address 172.16.109.1
  default-profile
  enable
exit
tunnel softgre 1.1
  bridge-group 3
  enable
exit
tunnel softgre 2
  description "data"
  mode data
  local address 172.16.109.2
  default-profile
  enable
exit

snmp-server
snmp-server system-shutdown
snmp-server community "public" ro
snmp-server community "private" rw

snmp-server host 10.10.2.254
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 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-critical-temp
snmp-server enable traps environment cpu-overheat-temp
snmp-server enable traps environment cpu-supercooling-temp
snmp-server enable traps environment board-overheat-temp
snmp-server enable traps environment board-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
snmp-server enable traps envmon fan
snmp-server enable traps envmon shutdown
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 gre self
  rule 1
    action permit
    match protocol gre
    enable
  exit
  rule 2
    action permit
    match protocol icmp
    enable
  exit
exit
security zone-pair trusted self
  rule 1
    action permit
    match source-address MGMT
    enable
  exit
exit
security zone-pair trusted trusted
```

```
  rule 1
    action permit
    match source-address MGMT
    enable
  exit
exit
security zone-pair trusted user
  rule 1
    action permit
    enable
  exit
exit
security zone-pair trusted gre
  rule 1
    action permit
    enable
  exit
exit
security zone-pair user self
  rule 1
    action permit
    match protocol udp
    match source-port dhcp_client
    match destination-port dhcp_server
    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
exit
security zone-pair user untrusted
  rule 1
    action permit
    enable
  exit
exit
security zone-pair untrusted self
  rule 1
    action permit
    match source-address MGMT
    enable
  exit
exit

security passwords history 0

nat source
  ruleset nat_ALL
    to interface bridge 1
    rule 1
      match source-address nat_users
      match not destination-address MGMT
      action source-nat interface
      enable
    exit
  exit
exit

ip dhcp-relay

ip route 0.0.0.0/0 10.10.2.1
ip route 192.168.109.0/24 172.16.109.5

wireless-controller
  nas-ip-address 10.10.2.159
```

```
  data-tunnel configuration radius
  aaa das-profile COA
  aaa radius-profile PCRF
  enable
exit
ip telnet server
ip ssh server

ntp enable
ntp server 10.10.2.254
exit
```

DHCP-server

:

```

```

```
default-lease-time 300;
max-lease-time 310;

log-facility local7;

#listening subnet
subnet 10.10.2.0 netmask 255.255.255.0 {}

#  ,
class "ELTEX-DEVICES" {
        match if (
                (substring (option vendor-class-identifier, 0, 14)="ELTEX_WEP-12AC") or
                (substring (option vendor-class-identifier, 0, 14)="ELTEX_WOP-12AC") or
                (substring (option vendor-class-identifier, 0, 13)="ELTEX_WEP-2AC") or
                (substring (option vendor-class-identifier, 0, 12)="ELTEX_WOP-2L") or
                (substring (option vendor-class-identifier, 0, 12)="ELTEX_WEP-2L") or
                (substring (option vendor-class-identifier, 0, 12)="ELTEX_WEP-1L")
        );
}
```

( ):

```
#-----------------------Stend 1-----------------------------------------------
#     vlan 2009
subnet 192.168.109.0 netmask 255.255.255.0 {
        pool {
                option routers 192.168.109.1;
                range 192.168.109.10 192.168.109.254;
                option vendor-encapsulated-options 0B:0C:31:37:32:2E:31:36:2E:31:30:39:2E:31:0C:0C:31:37:32:2E:
31:36:2E:31:30:39:2E:32;
                allow members of "ELTEX-DEVICES";
 }
}

#    ESR09
subnet 172.31.109.0 netmask 255.255.255.0 {
        pool {
                option routers 172.31.109.1;
                range 172.31.109.10 172.31.109.254;
                option vendor-encapsulated-options 0A:0B:31:30:2E:31:30:2E:32:2E:32:35:34;
                allow members of "ELTEX-DEVICES";
                option domain-name-servers 172.31.109.1;
        }
}

#   SSID1 ESR09 (in GRE)
subnet 100.64.9.0 netmask 255.255.255.0 {
        pool {
                option routers 100.64.9.1;
                range 100.64.9.10 100.64.9.254;
                option domain-name-servers 100.64.9.1;
        }
}

#   SSID2 (local switching)
subnet 100.64.109.0 netmask 255.255.255.0 {
        pool {
                option routers 100.64.109.1;
                range 100.64.109.10 100.64.109.254;
                option domain-name-servers 100.64.109.1;
        }
}
```

SoftWLC ( ):

```
#ip route stend 1
ip route add 192.168.109.0/24 via 10.10.2.219
ip route add 172.31.109.0/24 via 10.10.2.159
ip route add 100.64.9.0/24 via 10.10.2.159
ip route add 100.64.109.0/24 via 10.10.2.159
```

, IP-

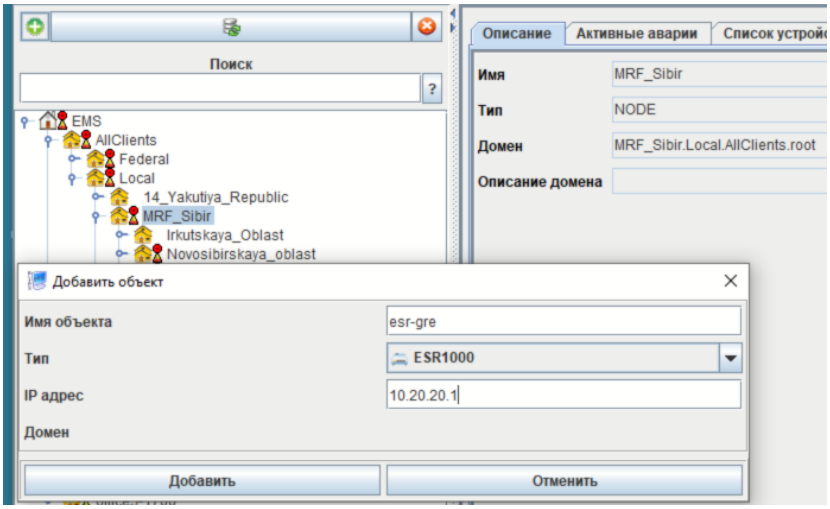
```
MES11#show arp
Total number of entries: 4

  VLAN    Interface     IP address        HW address          status
--------------------- -------------- ------------------- ---------------
vlan 10    gi1/0/1    10.10.2.3       56:6f:3d:7f:00:51   dynamic
vlan 10    gi1/0/1    10.10.2.254     d8:5e:d3:aa:02:98   dynamic
vlan 2011  gi1/0/3    192.168.111.253 cc:9d:a2:e9:d6:50   dynamic
vlan 2011  gi1/0/2    192.168.111.254 cc:9d:a2:e9:73:40   dynamic
```

MAC- +1 MAC- (50+1 40+1)

```
ESR11# show arp bridge 3
Interface          IP address         MAC address          State              Age(min)
---------------    ---------------    -----------------    ---------------    ----------
bridge 3           172.31.111.1       e4:5a:d4:00:aa:9b    --                 --
bridge 3           172.31.111.10      cc:9d:a2:e9:73:41    permanent          --
bridge 3           172.31.111.11      cc:9d:a2:e9:d6:51    permanent          --
```

ESR EMS

EMS, , ESR "+", :



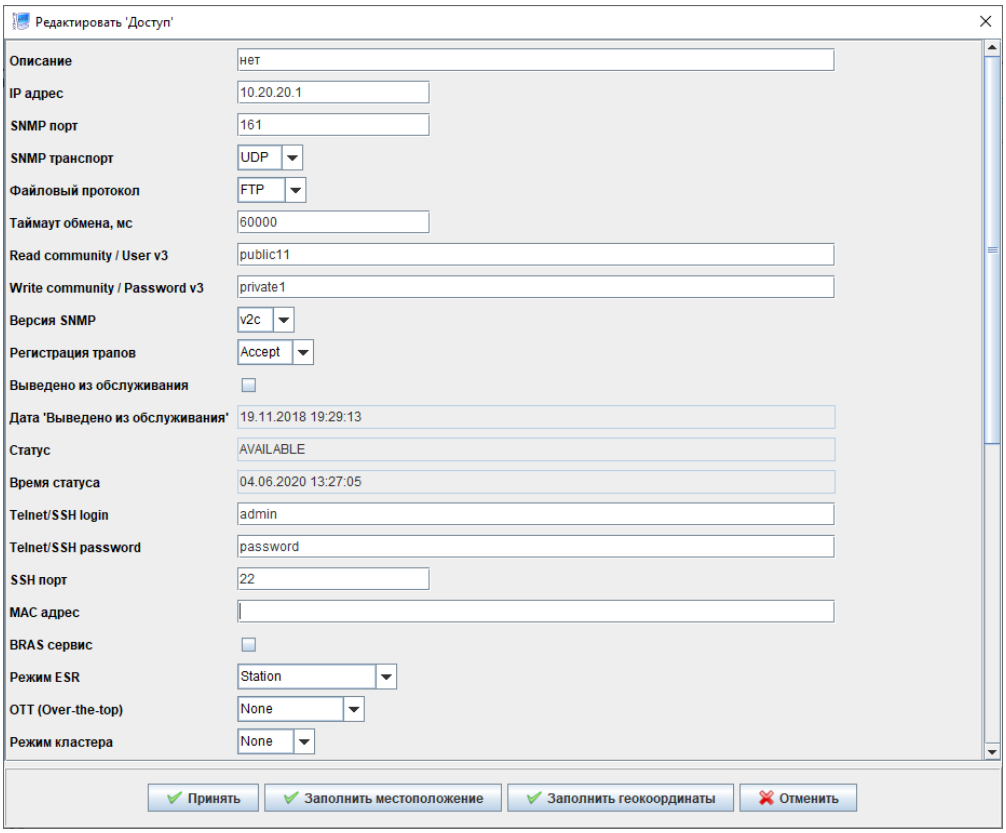
. 3.

, :

- " " - ESR "esr-gre".
- "" - , ESR "ESR200".
- "IP " - ESR "10.10.2.151".

"".

ESR (- " ") "":

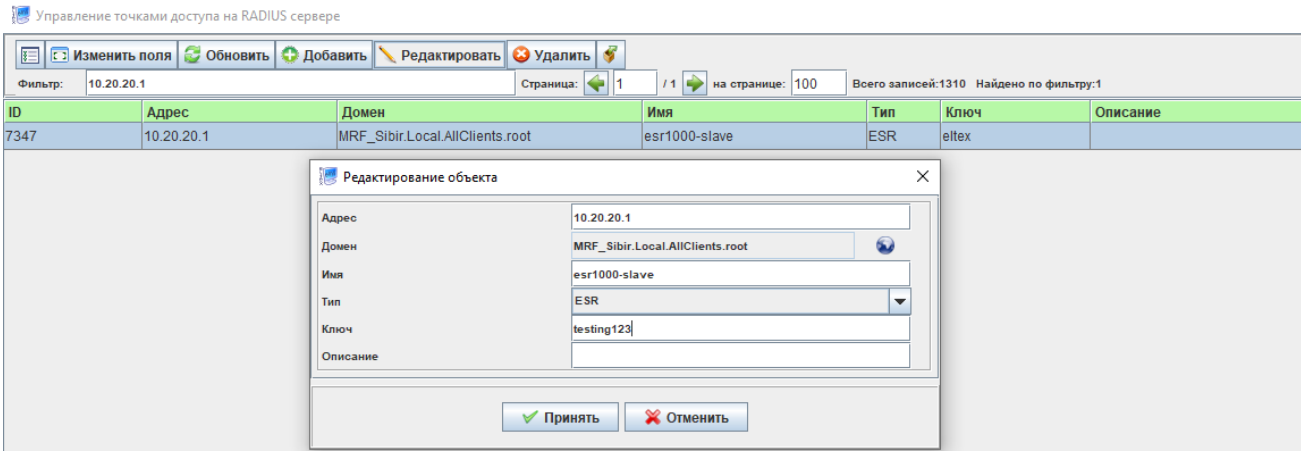


. 4.

:

- " " - "FTP".
- "Read community" - SNMP RO community, (- testing123).
- "Write community" - SNMP RW community, (- testing123).

radius, ESR. EMS "RADIUS" " ". ESR (IP ESR) "":



. 5.

, "" ESR (- testing123) "".

SoftGRE ESR

SoftGRE :

```
ESR11# show tunnels status
Tunnel             Admin    Link     MTU      Local IP           Remote IP          Last change
                   state    state
----------------   -----    -----    ------   ----------------   ----------------   ------------------------
softgre 1          Up       Up       1462     172.16.111.1       192.168.111.254    59 minutes and 19 seconds
softgre 1.1        Up       Up       1458     --                 --                 59 minutes and 19 seconds
softgre 2          Up       Up       1462     172.16.111.1       192.168.111.253    58 minutes and 53 seconds
softgre 2.1        Up       Up       1458     --                 --                 58 minutes and 53 seconds
softgre 3          Up       Up       1462     172.16.111.2       192.168.111.254    2 minutes and 44 seconds
softgre 3.225      Up       Up       1458     --                 --                 2 minutes and 44 seconds
softgre 4          Up       Up       1462     172.16.111.2       192.168.111.253    2 minutes and 44 seconds
softgre 4.225      Up       Up       1458     --                 --                 2 minutes and 44 seconds
```

"Bridge" SoftGRE :

```
ESR11# show interfaces bridge
Bridges      Interfaces
----------   ------------------------------------------------------------------
bridge 1     vlan 10
bridge 2     vlan 2021
bridge 3     softgre 1.1, softgre 2.1
bridge 10    softgre 3.225, softgre 4.225
```

- L3 SSID ,
- DATA- ESR Station. ESR-20 – Client, ESR-200 – StatinCE, ESR-1000 – Station. , . ESR-200, EMS ESR Station
- SSID VLAN-ID ( ), . [ ], (> > shaper... > SSID shaper)
  - ESR-1200 , SoftGRE, . .. SoftGRE .
  - , , ESR .
- - , , . " ", , " " " data-tunnel ESR" ""
- (testing123) COA ESR (das-server COA) (PCRF > BRAS VRF). RADIUS ESR (radius-server host 10.10.2.254), EMS (RADIUS >).