MultiWAN

-
- basic
- extended
- failover
- "cellular-multiwan"

MultiWAN ESR - (ISP). .

- , ISP **wan load-balance**. , next-hop'a. ICMP- next-hop (IP- ISP), , **target-list**. , **Active** MultiWAN, **FIB**.

Target-list 50 (25 ESR-10) **target** - , . , , . **enable**, MultiWAN:

```
wan load-balance target-list Target
  target 1
    <...>
    enable
  exit
exit
```

target :

- basic
- extended

basic ICMP-, ICMP-, . ICMP.

extended ICMP-:

- ICMP-
- jitter
-
- ICMP-
-
- ICMP-

MultiWAN :

-
-

, **MultiWAN** **Active**, FIB. , **show ip route** . **multipath** , :

```
esr # show ip
route

 Codes: C - connected, S - static, R - RIP
derived,

        O - OSPF derived, IA - OSPF inter area
route,

        E1 - OSPF external type 1 route, E2 - OSPF external type 2
route

        B - BGP derived, D - DHCP derived, K - kernel route, V - VRRP
route
        i - IS-IS, L1 - IS-IS level-1, L2 - IS-IS level-2, ia - IS-IS inter
area
        * - FIB
route



S     * 0.0.0.0/0          [1/0]             multipath                         [static 10:04:
36]
                                    via 10.0.0.1 on pppoe 1 weight
40

                                    via 198.18.0.1 on gi1/0/2 weight
40

                                    via 192.0.1.1 on gi1/0/1 weight 20
```

- **weight**. , FIB, .

Active next-hop , Inactive next-hop'a FIB. , FIB , . **weight** , .

4 MultiWAN:

- **basic**
- **extended**
- **failover**
- "**cellular-multiwan**"

basic

:

:

, ESR Border : **IPoE**, **DHCP PPPoE**. (**Active**), **next-hop**.

:

- **ISP** (Internet service provider) - -,
- - , **DNS Server**, -
- **Border** - ESR,
- **DNS Server** - ,
- **LAN**- - ,
- **WAN**- - ,
- **Gi 1/0/1** - ,
- **192.168.0.0/24** - ,
- **.10** - IP-,

:

:

-
- (Trust, Untrust)
- NAT (Source NAT)

:

1. **target-list** , ICMP. 6 :

```
wan load-balance target-list Targets
  target 1
    description "Ya DNS"
    resp-time 6
    ip address 77.88.8.1
    enable
  exit
  target 2
    description "Ya DNS-2"
    resp-time 6
    ip address 77.88.8.2
    enable
  exit
  target 3
    description "Ya DNS-3"
    resp-time 6
    ip address 77.88.8.3
    enable
  exit
exit
```

2. MultiWAN:

- **gigabitethernet 1/0/1,** - IPoE (,) :
  - nexthop- ISP-1
  - 6
  - source-address
  - 4
  - **target-list Targets**,
  - MultiWAN

```
interface gigabitethernet 1/0/1
  security-zone Untrust
  ip address 192.0.1.10/24
  ip address 192.0.1.2/24
  wan load-balance nexthop 192.0.1.1
  wan load-balance failure-count 6
  wan load-balance source-address 192.0.1.2
  wan load-balance success-count 4
  wan load-balance target-list Targets
  wan load-balance enable
exit
```

- **gigabitethernet 1/0/2,** - DHCP ( ) :
  - **nexthop**- **DHCP**
  - **6**
  - **4**
  - **target-list Targets**,
  - MultiWAN

```
interface gigabitethernet 1/0/2
  security-zone Untrust
  ip address dhcp
  wan load-balance nexthop dhcp enable
  wan load-balance failure-count 6
  wan load-balance success-count 4
  wan load-balance target-list Targets
  wan load-balance enable
exit
```

- ISP-3 **tunnel pppoe 1** (.. ,):

- **nexthop- tunnel**
- **6**
- **4**
- **target-list Targets**,
- MultiWAN

```
tunnel pppoe 1
  authentication method mschap
  authentication method mschap-v2
  authentication method eap
  authentication method pap
  interface gigabitethernet 1/0/3
  security-zone Untrust
  ignore-default-route
  username <username> password ascii-text <password>
  enable
  wan load-balance nexthop tunnel enable
  wan load-balance failure-count 6
  wan load-balance success-count 4
  wan load-balance target-list Targets
  wan load-balance enable
exit
```

3. , :

```
ip route 0.0.0.0/0 wan load-balance rule 1
```

4. **wan load-balance** MultiWAN. interface gigabitethernet 1/0/2 **weight** 40, tunnel pppoe 1 **weight** 40 interface gigabitethernet 1/0/1 **weight** 20. :

```
wan load-balance rule 1
  description "Default gateway"
  outbound interface gigabitethernet 1/0/2 40
  outbound tunnel pppoe 1 40
  outbound interface gigabitethernet 1/0/1 20
  enable
exit
```

- **wan load-balance** MultiWAN , .

show wan rules < *rules*> :

```
esr # show wan rules 1
Rule 1 detailed information:
    VRF:          default
    Failover:     Disabled
    Network: 0.0.0.0/0 Metric: 0
        gi1/0/1 Weight: 20 Nexthop: 192.0.1.1 [Active]
        gi1/0/2 Weight: 40 Nexthop: 198.18.0.1 [Active]
        pppoe 1 Weight: 40 Nexthop: 10.0.0.1 [Active]
```

MultiWAN **show wan interfaces status**:

```
esr # show wan interfaces status
Interface              Nexthop                  Status     Uptime/Downtime
--------------------   ----------------------   --------   ----------------------------------------
gi1/0/1                192.0.1.1                Active     26 minutes and 36 seconds
gi1/0/2                198.18.0.1 (dhcp)        Active     26 minutes and 34 seconds
```

MultiWAN **show wan tunnel status**:

```
esr # show wan tunnels status
Tunnel                 Nexthop                  Status     Uptime/Downtime
--------------------   ----------------------   --------   ----------------------------------------
pppoe 1                10.0.0.1 (tunnel)        Active     30 minutes and 2 seconds
```

, MultiWAN **show wan interfaces status** *<if-name>*:

```
esr # show wan interfaces status gigabitethernet 1/0/2
Interface 'gigabitethernet 1/0/2' detailed information:
    VRF:               default
    State:             Active
    Nexthop address:   198.18.0.1 (dhcp)
    Last time success: 0 secs
    Last time failure: 7 seconds
    Uptime:            6 seconds
    Targets:
        77.88.8.1 Test/Ping State: pass Attempts: 3/3
        77.88.8.2 Test/Ping State: pass Attempts: 3/3
        77.88.8.3 Test/Ping State: pass Attempts: 3/3
```

extended

:

, ESR Border : **IPoE**, **DHCP** **PPPoE**. (**Active**), **next-hop**. , : **jitter**, **rtt**, .

, , , **basic** . **target-list** .

:

target-list , ICMP.

:

- ICMP- - 15
- ICMP- - 700
- - 60%
- jitter - 200
- ICMP- - 15
- -250

```
wan load-balance target-list Targets
  target 1
    description "Ya DNS"
    mode extended
    extended count 15
        extended timeout 700
    extended loss 60
    extended jitter 200
         extended period 15
    extended rtt 250
    ip address 77.88.8.1
    enable
  exit
  target 2
    description "Ya DNS-2"
    mode extended
    extended count 15
        extended timeout 700
    extended loss 60
    extended jitter 200
         extended period 15
    extended rtt 250
    ip address 77.88.8.2
    enable
  exit
  target 3
    description "Ya DNS-3"
    mode extended
    extended count 15
        extended timeout 700
    extended loss 60
    extended jitter 200
         extended period 15
    extended rtt 250
    ip address 77.88.8.3
    enable
  exit
exit
```

show wan interfaces status *<if-name>*:

```
esr # show wan interfaces status gigabitethernet 1/0/1
Interface 'gigabitethernet 1/0/1' detailed information:
    VRF:               default
    State:             Active
    Nexthop address:   192.0.1.1
    Last time success: 0 secs
    Last time failure: 55 minutes and 16 seconds
    Uptime:            55 minutes and 15 seconds
    Targets:
        77.88.8.1 Test/Ping State: pass Attempts: 3/3
                  Loss: 0/60% RTT: 1/900 Jitter: 0/800
        77.88.8.2 Test/Ping State: pass Attempts: 3/3
                  Loss: 0/60% RTT: 1/900 Jitter: 0/800
        77.88.8.3 Test/Ping State: pass Attempts: 3/3
                  Loss: 0/60% RTT: 1/900 Jitter: 0/800
```

show wan tunnels status *<tun-name>*:

```
esr # show wan tunnels status pppoe 1
Tunnel 'pppoe 1' detailed information:
    VRF:               default
    State:             Active
    Nexthop address:   10.0.0.1 (tunnel)
    Last time success: 0 secs
    Last time failure: 55 minutes and 23 seconds
    Uptime:            55 minutes and 22 seconds
    Targets:
        77.88.8.1 Test/Ping State: pass Attempts: 3/3
                  Loss: 0/60% RTT: 1/900 Jitter: 0/800
        77.88.8.2 Test/Ping State: pass Attempts: 3/3
                  Loss: 0/60% RTT: 1/900 Jitter: 0/800
        77.88.8.3 Test/Ping State: pass Attempts: 3/3
                  Loss: 0/60% RTT: 1/900 Jitter: 0/800
```

failover

:

:

, **ESR Border** : **IPoE PPPoE**. (**Active**), **next-hop**. , **FIB** .

:

:

-
- (Trust, Untrust)
- NAT (Source NAT)

:

1. wan load-balance target-list Targets basic:

```
wan load-balance target-list Targets
  target 1
    description "Ya DNS"
    resp-time 6
    ip address 77.88.8.1
    enable
  exit
  target 2
    description "Ya DNS-2"
    resp-time 6
    ip address 77.88.8.2
    enable
  exit
  target 3
    description "Ya DNS-3"
    resp-time 6
    ip address 77.88.8.3
    enable
  exit
exit
```

2. **basic**-:

```
interface gigabitethernet 1/0/1
  security-zone Untrust
  ip address 192.0.1.10/24
  ip address 192.0.1.2/24
  wan load-balance nexthop 192.0.1.1
  wan load-balance failure-count 6
  wan load-balance source-address 192.0.1.2
  wan load-balance success-count 4
  wan load-balance target-list Targets
  wan load-balance enable
exit

tunnel pppoe 1
  authentication method mschap
  authentication method mschap-v2
  authentication method eap
  authentication method pap
  interface gigabitethernet 1/0/2
  security-zone Untrust
  ignore-default-route
  username <username> password ascii-text <password>
  enable
  wan load-balance nexthop tunnel enable
  wan load-balance failure-count 6
  wan load-balance success-count 4
  wan load-balance target-list Targets
  wan load-balance enable
exit
```

3. MultiWAN:

```
ip route 0.0.0.0/0 wan load-balance rule 1
```

4. **wan load-balance rule 1** **failover**. **gigabitethernet 1/0/1** **weight 80**, **gigabitethernet 1/0/1** , **tunnel pppoe 1** :

```
wan load-balance rule 1
  description "Default gateway"
  failover
  outbound tunnel pppoe 1 20
  outbound interface gigabitethernet 1/0/1 80
  enable
exit
```

5. **show ip route** , **gigabitethernet 1/0/1**:

```
esr # show ip route
 Codes: C - connected, S - static, R - RIP derived,
        O - OSPF derived, IA - OSPF inter area route,
        E1 - OSPF external type 1 route, E2 - OSPF external type 2 route
        B - BGP derived, D - DHCP derived, K - kernel route, V - VRRP route
        i - IS-IS, L1 - IS-IS level-1, L2 - IS-IS level-2, ia - IS-IS inter area
        * - FIB route

S     * 0.0.0.0/0          [1/0]             via 192.0.1.1 on gi1/0/1          [static 18:01:32]
```

MultiWAN:

```
esr # show wan interfaces status
Interface              Nexthop                  Status     Uptime/Downtime
--------------------   ----------------------   --------   ----------------------------------------
gi1/0/1                192.0.1.1                Active     4 hours, 24 minutes and 3 seconds
esr # show wan interfaces status gigabitethernet 1/0/1
Interface 'gigabitethernet 1/0/1' detailed information:
    VRF:               default
    State:             Active
    Nexthop address:   192.0.1.1
    Last time success: 0 secs
    Last time failure: 4 hours, 24 minutes and 7 seconds
    Uptime:            4 hours, 24 minutes and 6 seconds
    Targets:
        77.88.8.1 Test/Ping State: pass Attempts: 3/3
        77.88.8.2 Test/Ping State: pass Attempts: 3/3
        77.88.8.3 Test/Ping State: pass Attempts: 3/3
```

```
esr # show wan tunnels status
Tunnel                 Nexthop                  Status     Uptime/Downtime
--------------------   ----------------------   --------   ----------------------------------------
pppoe 1                10.0.0.1 (tunnel)        Active     4 hours, 32 minutes and 40 seconds
esr # show wan tunnels status pppoe 1
Tunnel 'pppoe 1' detailed information:
    VRF:               default
    State:             Active
    Nexthop address:   10.0.0.1 (tunnel)
    Last time success: 0 secs
    Last time failure: 4 hours, 32 minutes and 44 seconds
    Uptime:            4 hours, 32 minutes and 43 seconds
    Targets:
        77.88.8.1 Test/Ping State: pass Attempts: 3/3
        77.88.8.2 Test/Ping State: pass Attempts: 3/3
        77.88.8.3 Test/Ping State: pass Attempts: 3/3
```

"cellular-multiwan"

:

:

, , ISP, , (//). MultiWAN , ICMP- . , Extended-, . - , MultiWAN, . , MultiWAN, **FIB** , **RIB**, .. , . (,) , MultiWAN Inactive **FIB**, **RIB** .

:

:

-
- (Trust, Untrust)
- NAT (Source NAT)

:

1. **wan load-balance target-list Targets basic**:

```
wan load-balance target-list Targets
  target 1
    description "Ya DNS"
    resp-time 6
    ip address 77.88.8.1
    enable
  exit
  target 2
    description "Ya DNS-2"
    resp-time 6
    ip address 77.88.8.2
    enable
  exit
  target 3
    description "Ya DNS-3"
    resp-time 6
    ip address 77.88.8.3
    enable
  exit
exit
```

2. gigabitethernet 1/0/1 :

```
interface gigabitethernet 1/0/1
  security-zone Untrust
  ip firewall disable
  ip address 192.0.1.10/24
  ip address 192.0.1.2/24
  wan load-balance nexthop 192.0.1.1
  wan load-balance failure-count 4
  wan load-balance source-address 192.0.1.2
  wan load-balance success-count 6
  wan load-balance target-list Experimental
  wan load-balance enable
exit
```

3. cellular modem 1 :

```
cellular profile 1
  APN internet.beeline.ru
exit


cellular modem 1
  device 3-1
  ip firewall disable
  profile 1
  allowed-mode 3g
  allowed-mode 4g
  enable
exit
```

4. MultiWAN (1):

```
ip route 0.0.0.0/0 wan load-balance rule 1
ip route 0.0.0.0/0 interface modem 1 1
```

5. wan load-balance rule 1 gigabitethernet 1/0/1 - :

```
wan load-balance rule 1
  description "Default gateway"
  outbound interface gigabitethernet 1/0/1
  enable
exit
```

show ip route , **gigabitethernet 1/0/1** :

```
esr # show ip route
 Codes: C - connected, S - static, R - RIP derived,
        O - OSPF derived, IA - OSPF inter area route,
        E1 - OSPF external type 1 route, E2 - OSPF external type 2 route
        B - BGP derived, D - DHCP derived, K - kernel route, V - VRRP route
        i - IS-IS, L1 - IS-IS level-1, L2 - IS-IS level-2, ia - IS-IS inter area
        * - FIB route

S     * 0.0.0.0/0          [1/0]             via 192.0.1.1 on gi1/0/1          [static 22:37:32]
```

(RIB) **show ip route all** , - **gigabitethernet 1/0/1** **modem 1**:

```
esr # show ip route all
 Codes: C - connected, S - static, R - RIP derived,
        O - OSPF derived, IA - OSPF inter area route,
        E1 - OSPF external type 1 route, E2 - OSPF external type 2 route
        B - BGP derived, D - DHCP derived, K - kernel route, V - VRRP route
        i - IS-IS, L1 - IS-IS level-1, L2 - IS-IS level-2, ia - IS-IS inter area
        * - FIB route

S     * 0.0.0.0/0          [1/0]             via 192.0.1.1 on gi1/0/1          [static 22:33:13]
S       0.0.0.0/0          [1/1]             via 10.64.64.64 on modem 1        [static 15:57:12]
```

gigabitethernet 1/0/1 Adminstrative Down, :

```
esr # configure
esr (config)# interface gigabitethernet 1/0/1
esr (config-if-gi)# shutdown
esr (config-if-gi)# end
esr # commit
```

show ip route , **modem 1 1**:

```
ESR-100-Balancer# sh ip route
 Codes: C - connected, S - static, R - RIP derived,
        O - OSPF derived, IA - OSPF inter area route,
        E1 - OSPF external type 1 route, E2 - OSPF external type 2 route
        B - BGP derived, D - DHCP derived, K - kernel route, V - VRRP route
        i - IS-IS, L1 - IS-IS level-1, L2 - IS-IS level-2, ia - IS-IS inter area
        * - FIB route

S     * 0.0.0.0/0          [1/1]             via 10.64.64.64 on modem 1        [static 15:57:12]
```

, MultiWAN .