

# QoS

- QoS
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QoS (Quality of Service) – . QoS , .

## QoS

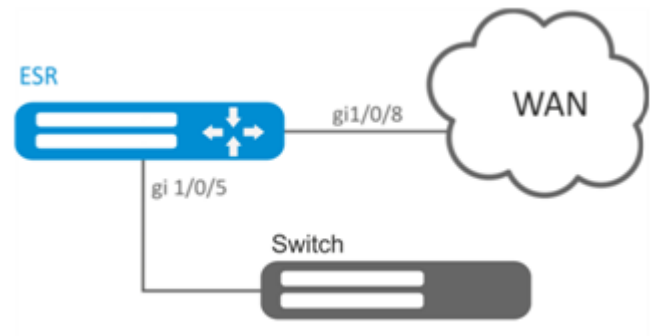
ESR ( ) ( QoS)

| 1 | QoS // .<br>QoS, BasicQoS.  | <b>esr(config-if-gi)# qos enable</b>                                 |   |
|---|-----------------------------|--|---|
| 2 | 802.1p DSCP . ( )           | <b>esr(config)# qos trust &lt;MODE&gt;</b>                           | <MODE> – 802.1p DSCP, : <ul style="list-style-type: none"><li>• <b>dscp</b> – DSCP IP-. IP- .</li><li>• <b>cos</b> – 802.1p 802.1q. .</li><li>• <b>cos - dscp</b> – DSCP IP- 802.1p .</li></ul>   |
| 3 | DSCP<br>//, QoS ( ).        | <b>esr(config)# qos map dscp-queue &lt;DSCP&gt; to &lt;QUEUE&gt;</b> | <DSCP> – IP-, [0..63];<br><QUEUE> – , [1..8].<br>: <ul style="list-style-type: none"><li>• DSCP: (0-7), 1</li><li>• DSCP: (8-15), 2</li><li>• DSCP: (16-23), 3</li><li>• DSCP: (24-31), 4</li><li>• DSCP: (32-39), 5</li><li>• DSCP: (40-47), 6</li><li>• DSCP: (48-55), 7</li><li>• DSCP: (56-63), 8</li></ul> |
| 4 | 802.1p .<br>//, QoS. ( )    | <b>esr(config)# qos map cos-queue &lt;COS&gt; to &lt;QUEUE&gt;</b>   | <COS> – 802.1q , [0..7];<br><QUEUE> – , [1..8].<br>: <ul style="list-style-type: none"><li>• CoS: (0), 1</li><li>• CoS: (1), 2</li><li>• CoS: (2), 3</li><li>• CoS: (3), 4</li><li>• CoS: (4), 5</li><li>• CoS: (5), 6</li><li>• CoS: (6), 7</li><li>• CoS: (7), 8</li></ul>                                    |
| 5 | DSCP DSCP . ( )<br>//, QoS. | <b>esr(config)# qos map dscp-queue &lt;DSCP&gt; to &lt;DSCP&gt;</b>  | <DSCP> – IP-, [0..63].  |
| 6 | DSCP DSCP-<br>Mutation. ( ) | <b>esr(config)# qos dscp mutation</b>                                |   |
| 7 | , IP DSCP-.                 | <b>esr(config)# qos queue default &lt;QUEUE&gt;</b>                  | <QUEUE> – , [1..8].   |
| 8 | . . ( )                     | <b>esr(config)# priority-queue out num-of-queues &lt;VALUE&gt;</b>   | <VALUE> – , [0..8], : <ul style="list-style-type: none"><li>• <b>0</b> – WRR (WRR – );</li><li>• <b>8</b> – «strictpriority» (strictpriority – , ).</li></ul> , 8-, .<br>: 8  |

|    |                          |  |   |
|----|--------------------------|--|---|
| 9  | .                        | <b>esr(config)# qos wrr-queue &lt;QUEUE&gt; bandwidth &lt;WEIGHT&gt;</b>   | <QUEUE> – , [1..8];<br><WEIGHT> – , [1..255].<br>: 1 .  |
| 10 | BasicQoS- .<br>QoS, .( ) | <b>esr(config-if-gi)# traffic-shape { &lt;BANDWIDTH&gt; [BURST]   queue &lt;QUEUE&gt;&lt;BANDWIDTH&gt; [BURST] }</b> | <QUEUE> – , [1..8];<br><BANDWIDTH> – /, [3000..10000000] TenggabitEthernet [64..1000000] ;<br><BURST> – , [4..16000]. 128 .<br>:. |
| 11 | .( )                     | <b>esr(config-if-gi)# rate-limit &lt;BANDWIDTH&gt; [BURST]</b>   | <BANDWIDTH> – /, [3000..10000000] TenggabitEthernet [64..1000000] ;<br><BURST> – , [4..16000]. 128 .<br>:.                        |

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gigabitethernet 1/0/8: DSCP 22 , DSCP 14 , 60 / .



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, , 1:

```
esr(config)# priority-queue out num-of-queues 1
```

DSCP 22 :

```
esr(config)# qos map dscp-queue 22 to 8
```

DSCP 14 :

```
esr(config)# qos map dscp-queue 14 to 7
```

QoS LAN:

```
esr(config)# interface gigabitethernet 1/0/5
esr(config-if-gi)# qos enable
esr(config-if-gi)# exit
```

QoS WAN :

```
esr(config)# interface gigabitethernet 1/0/8
esr(config-if-gi)# qos enable
```

60/ :

```
esr(config-if)# traffic-shape queue 7 60000
esr(config-if)# exit
```

QoS :

```
esr# show qos statistics gigabitethernet 1/0/8
```

## QoS

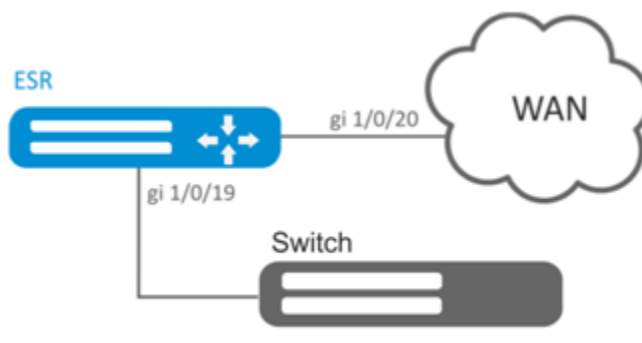
ESR .

| 1  | , QoS.                                  |   | . (ACL).  |
|----|---|---|---|
| 2  | QoS .                                   | <b>esr(config)# class-map &lt;NAME&gt;</b>  | <NAME> – , 31 .   |
| 3  | QoS ( ).                                | <b>esr(config-class-map)# description &lt;description&gt;</b>                             | <description> – 255 .   |
| 4  | (ACL).                                  | <b>esr(config-class-map)# match access-group &lt;NAME&gt;</b>                             | <NAME> – , 31 .   |
| 5  | DSCP, IP-,<br>( IP Precedence CoS). ( ) | <b>esr(config-class-map)# set dscp &lt;DSCP&gt;</b>                                       | <DSCP> – DSCP, [0..63].   |
| 6  | IP Precedence, IP-, ( DSCP CoS). ( )    | <b>esr(config-class-map)# set ip-precedence &lt;IPP&gt;</b>                               | <IPP> – IP Precedence, [0..7].  |
| 7  | 802.1p, , ( DSCP IP Precedence). ( )    | <b>esr(config-class-map)# set cos &lt;COS&gt;</b>   | <COS> – 802.1p, [0..7].   |
| 8  | QoS .                                   | <b>esr(config)# policy-map &lt;NAME&gt;</b><br><b>esr(config-policy-map)#</b>             | <NAME> – , 31 .   |
| 9  | QoS ( ).                                | <b>esr(config-policy-map)# description &lt;description&gt;</b>                            | <description> – 255 .   |
| 10 | .                                       | <b>esr(config-policy-map)# shape average &lt;BANDWIDTH&gt; [BURST]</b>                    | <BANDWIDTH> – /, [64..10000000];<br><BURST> – , [128..16000]. 128 .   |
| 11 | , , ( ).                                | <b>esr(config-policy-map)# shape auto-distribution</b>                                    |   |
| 12 | QoS- .                                  | <b>esr(config-policy-map)# class &lt;NAME&gt;</b><br><b>esr(config-class-policy-map)#</b> | <NAME> – , 31 . «class-default»<br>.  |
| 13 | QoS QoS QoS.                            | <b>esr(config-class-policy-map)# service-policy &lt;NAME&gt;</b>                          | <NAME> – , 31 . .   |
| 14 | .( ).                                   | <b>esr(config-class-policy-map)# shape average &lt;BANDWIDTH&gt; [BURST]</b>              | <BANDWIDTH> – /, [64..10000000];<br><BURST> – , [4..16000]. 128 .   |
| 15 | . , ( ).                                | <b>esr(config-class-policy-map)# shape peak &lt;BANDWIDTH&gt; [BURST]</b>                 |   |
| 16 | ( ).                                    | <b>esr(config-class-policy-map)# mode &lt;MODE&gt;</b>                                    | <MODE> – :<br><ul style="list-style-type: none"> <li>• <b>fifo</b> – FIFO (First In, First Out);</li> <li>• <b>gred</b> – GRED (Generalized RED);</li> <li>• <b>red</b> – RED (Random Early Detection);</li> <li>• <b>sfq</b> – SFQ ( SFQ ).</li> </ul> : <b>FIFO</b> . |
| 17 | WRR- ( ).                               | <b>esr(config-class-policy-map)# priority class &lt;PRIORITY&gt;</b>                      | <PRIORITY> – WRR-, [1..8].<br>.   |
| 18 | StrictPriority ( ).                     | <b>esr(config-class-policy-map)# priority level &lt;PRIORITY&gt;</b>                      | <PRIORITY> – StrictPriority-, [1..8].<br>. : WRR, .   |
| 19 | ( ).                                    | <b>esr(config-class-policy-map)# fair-queue &lt;QUEUE-LIMIT&gt;</b>                       | <QUEUE-LIMIT> – , [16..4096].<br>: 16.  |
| 20 | ( ).                                    | <b>esr(config-class-policy-map)# queue-limit &lt;QUEUE-LIMIT&gt;</b>                      | <QUEUE-LIMIT> – , [2..4096].<br>: 127.  |

|    |  |  |  |
|----|--|--|--|
| 21 | RED (Random Early Detection) ( ).              | <b>esr(config-class-policy-map)# random-detect &lt;LIMIT&gt; &lt;MAX&gt; &lt;MIN&gt; &lt;PROBABILITY&gt;</b>                           | <LIMIT> – , [1..1000000];<br><MAX> – , [1..1000000];<br><MIN> – , [1..1000000];<br><PROBABILITY> – , [0..100].<br>:<br>• <MAX>> 2 * <MIN><br>• <LIMIT>> 3 * <MAX>  |
| 22 | GRED (Generalized Random Early Detection) ( ). | <b>esr(config-class-policy-map)# random-detect precedence &lt;PRECEDENCE&gt;&lt;LIMIT&gt;&lt;MAX&gt;&lt;MIN&gt;&lt;PROBABILITY&gt;</b> | <PRECEDENCE> – IPPrecedence [0..7];<br><LIMIT> – , [1..1000000];<br><MAX> – , [1..1000000];<br><MIN> – , [1..1000000];<br><PROBABILITY> – , [0..100].<br>:<br>• <MAX>> 2 * <MIN><br>• <LIMIT>> 3 * <MAX> |
| 23 | tcp ( ).                                       | <b>esr(config-class-policy-map)# compression header ip tcp</b>   |  |
| 24 | QoS // .                                       | <b>esr(config-if-gi)# qos enable</b>   |  |
| 25 | QoS // (input) (output) .                      | <b>esr(config-if-gi)# service-policy { input   output } &lt;NAME&gt;</b>   | <NAME> – QoS-, 31 .  |

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(10.0.11.0/24, 10.0.12.0/24), DSCP (38 42) (40 / 60 /), 250 /, SFQ.



:

, :

```

esr(config)# ip access-list extended fl1
esr(config-acl)# rule 1
esr(config-acl-rule)# action permit
esr(config-acl-rule)# match protocol any
esr(config-acl-rule)# match source-address 10.0.11.0 255.255.255.0
esr(config-acl-rule)# match destination-address any
esr(config-acl-rule)# enable
esr(config-acl-rule)# exit
esr(config-acl)# exit
esr(config)# ip access-list extended fl2
esr(config-acl)# rule 1
esr(config-acl-rule)# action permit
esr(config-acl-rule)# match protocol any
esr(config-acl-rule)# match source-address 10.0.12.0 255.255.255.0
esr(config-acl-rule)# match destination-address any
esr(config-acl-rule)# enable
esr(config-acl-rule)# exit
esr(config-acl)# exit

```

fl1 fl2, , :

```

esr(config)# class-map fl1
esr(config-class-map)# set dscp 38
esr(config-class-map)# match access-group fl1
esr(config-class-map)# exit
esr(config)# class-map fl2
esr(config-class-map)# set dscp 42
esr(config-class-map)# match access-group fl2
esr(config-class-map)# exit

```

:

```

esr(config)# policy-map fl
esr(config-policy-map)# shape average 250000

```

, :

```

esr(config-policy-map)# class fl1
esr(config-class-policy-map)# shape average 40000
esr(config-class-policy-map)# exit
esr(config-policy-map)# class fl2
esr(config-class-policy-map)# shape average 60000
esr(config-class-policy-map)# exit

```

SFQ:

```

esr(config-policy-map)# class class-default
esr(config-class-policy-map)# mode sfq
esr(config-class-policy-map)# fair-queue 800
esr(config-class-policy-map)# exit
esr(config-policy-map)# exit

```

QoS , gi 1/0/19 gi1/0/20 SFQ :

```
esr(config)# interface gigabitethernet 1/0/19
esr(config-if-gi)# qos enable
esr(config-if-gi)# service-policy input fl
esr(config-if-gi)# exit
esr(config)# interface gigabitethernet 1/0/20
esr(config-if-gi)# qos enable
esr(config-if-gi)# service-policy output fl
esr(config-if-gi)# exit
```

:

```
esr# do show qos policy statistics gigabitethernet 1/0/20
```