ESR-Series. . 1.8.7

-
  -
  -
  -
-
  -
  -
    -
    - MAC–
    - OSI
    - OSI
    -
    -
    -
  -
  -
    - ESR-1700
    - ESR-1510, ESR-1500
    - ESR-1200, ESR-1000
    - ESR-200, ESR-100
    - ESR-21
    - ESR-20
    - ESR-14VF, ESR-12VF
    - ESR-12V
    - ESR-10
    -
  -
-
  -
  -
  - ESR-1000, ESR-1200, ESR-1500, ESR-1510, ESR-1700
  -
  - SFP-
    -
    -
-
  - (CLI)
  -
  -
-
  - ESR
    -
  -
    -
    -
    -
-
  -
  -
  - (U-Boot)

. , .

ESR (SMB), . , .

, , , , , ESR ( ).

, , (CLI), . TCP/IP, Ethernet.

⚠ , .

, , .

ESR . , .

- , , .

. .

1 .

1 –

(Auto MDI/MDIX)	– . • **MDI** (Medium Dependent Interface –) – ; • **MDIX** (Medium Dependent Interface with Crossover –) – .
(Backpressure)	. .
(IEEE 802.3X)	. PAUSE, .
(LAG, Linkaggregation)	() . . LACP .

MAC–

2 MAC-.

2 – MAC-

MAC-	MAC- MAC- . 128k MAC- MAC- .
	MAC- , , . MAC- VLAN. . MAC- , . MAC- , , , L2 .

OSI

3 (2 OSI).

3 – (2 OSI)

VLAN	VLAN (Virtual Local Area Network) – L2. VLAN , . VLAN: • VLAN , IEEE 802.1Q; • VLAN (port-based); • VLAN (policy-based).
(SpanningTreeProtocol) [1]	Spanning Tree . .

1 ESR-1000

OSI

4 (3 OSI).

4 – (Layer 3)

IP-	.
	. : RIP, OSPFv2, OSPFv3, BGP.
ARP	**ARP** (Address Resolution Protocol) – . ARP . , .
DHCP	DHCP (Dynamic Host Configuration Protocol) . DHCP DHCP-. , (WAN).
DHCP	DHCP . DHCP- . DHCP-, , IP- – , .
(NAT, Network Address Translation)	– , IP- . NAT IP-, IP- IP-. NAT . NAT: • **Source NAT** (SNAT) – , ; • **Destination NAT** (DNAT) – , (NAT).

5 –

	– , , . , , . : • **GRE** – IP- IP- c GRE (General Routing Encapsulation) ; • **IPv4-IPv4** – , IP- IP- ; • **L2TPv3** – L2- IP-; • **IPsec** – ; • **L2TP, PPTP** – , -.

6 –

	, , . TFTP, FTP, SCP.
(CLI)	CLI RS-232 Telnet, SSH. (CLI) . CLI .

Syslog	Syslog .
ping, traceroute	*ping traceroute* – IP-.
–	. . 1 15, 15 .
	– . : • – , ; • – . RADIUS TACACS.
SSH **Telnet**	SSH Telnet .
	, . – .

7 , .

7 –

	. , , .
	, , . .

8.

8 –

	ESR-1700	Broadcom XLP780
	ESR-1510	Broadcom XLP532
	ESR-1500	Broadcom XLP516
	ESR-1200 ESR-1000	Broadcom XLP316L
	ESR-200	Broadcom XLP204
	ESR-100	Broadcom XLP104
	ESR-21 ESR-20	Broadcom NorthStar2
	ESR-14VF ESR-12V(F) ESR-10	Broadcom NS+ (BCM58625)
	ESR-1700	4 x Ethernet 10/100/1000BASE-T/1000BASE-X Combo 8 x 10GBASE-R/1000BASE-X (SFP+/SFP)
	ESR-1510	4 x Ethernet 10/100/1000BASE-T 4 x Ethernet 10/100/1000BASE-T/1000BASE-X Combo 4 x 10GBASE-R/1000BASE-X (SFP+/SFP)

	ESR-1500	4 x Ethernet 10/100/1000BASE-T 4 x Ethernet 10/100/1000BASE-T/1000BASE-X Combo 4 x 10GBASE-R/1000BASE-X (SFP+/SFP)
	ESR-1200	12 x Ethernet 10/100/1000BASE-T 4 x Ethernet 10/100/1000Base-T/1000BASE-X Combo 8 x 10GBASE-R/1000BASE-X (SFP+/SFP)
	ESR-1000	24 x Ethernet 10/100/1000BASE-T 2 x 10GBASE-R/1000BASE-X (SFP+/SFP)
	ESR-200	4 x Ethernet 10/100/1000BASE-T/1000BASE-X Combo 4 x Ethernet 10/100/1000BASE-T
	ESR-100	4 x Ethernet 10/100/1000BASE-T/1000BASE-X Combo
	ESR-21	8 x Ethernet 10/100/1000BASE-T 4 x 1000BASE-X (SFP) 3 x RS-232
	ESR-20	2 x Ethernet 10/100/1000BASE-T 2 x Ethernet 10/100/1000BASE-T/1000BASE-X Combo
	ESR-14VF	8 x Ethernet 10/100/1000BASE-T 1 x 1000BASE-X (SFP) 4 x FXS
	ESR-12VF	8 x Ethernet 10/100/1000BASE-T 1 x 1000BASE-X (SFP) 3 x FXS 1 x FXO
	ESR-12V	8 x Ethernet 10/100/1000BASE-T 3 x FXS 1 x FXO
	ESR-10	4 x Ethernet 10/100/1000BASE-T 2 x 1000BASE-X
	ESR-1700 ESR-1510 ESR-1500 ESR-1200 ESR-1000	1000BASE-X SFP 10GBASE-R SFP+
	ESR-200 ESR-100 ESR-21 ESR-20 ESR-14VF ESR-12V(F) ESR-10	1000BASE-X SFP

		• •
L2 ( )	ESR-1700 ESR-1510 ESR-1500 ESR-1200	160 /
	ESR-1000	88 /
	ESR-1700 ESR-1510 ESR-1500 ESR-1200 ESR-1000	• 10/100/1000 / • 1/10 /
	ESR-200 ESR-100 ESR-21 ESR-20 ESR-14VF ESR-12V(F) ESR-10	• 10/100/1000 / • 1 /
MAC-	ESR-1700 ESR-1510 ESR-1500 ESR-1200	128k
	ESR-1000	16k
	ESR-200 ESR-100 ESR-21 ESR-20 ESR-14VF ESR-12V(F) ESR-10	2k
VLAN		4k VLAN 802.1Q

L3	ESR-1700 ESR-1510 ESR-1500 ESR-1200 ESR-1000 ESR-200 ESR-100 ESR-21 ESR-20	4000
	ESR-14VF ESR-12V(F) ESR-10	200
BGP	ESR-1700 ESR-1510 ESR-1500 ESR-1200 ESR-1000	2,8M
	ESR-200 ESR-100 ESR-21 ESR-20	1,5M
	ESR-14VF ESR-12V(F) ESR-10	800k
OSPFv2/OSPFv3/ISIS	ESR-1700 ESR-1510 ESR-1500 ESR-1200 ESR-1000	500k
	ESR-200 ESR-100 ESR-21 ESR-20	300k
	ESR-14VF ESR-12V(F) ESR-10	30k
RIP		10k

	ESR-1700 ESR-1510 ESR-1500 ESR-1200 ESR-1000 ESR-200 ESR-100 ESR-21 ESR-20	11k
	ESR-14VF ESR-12V(F) ESR-10	1k
FIB	ESR-1700	3,0M
	ESR-1510 ESR-1500 ESR-1200 ESR-1000	1,7M
	ESR-200 ESR-100 ESR-21 ESR-20	1,4M
	ESR-14VF ESR-12V(F) ESR-10	800k
		IEEE 802.3 10BASE-T Ethernet IEEE 802.3u 100BASE-T Fast Ethernet IEEE 802.3ab 1000BASE-T Gigabit Ethernet IEEE 802.3z Fiber Gigabit Ethernet ANSI/IEEE 802.3 IEEE 802.3x IEEE 802.3ad LACP IEEE 802.1Q VLAN IEEE 802.1v IEEE 802.3ac IEEE 802.3ae IEEE 802.1D IEEE 802.1w IEEE 802.1s
		CLI

		TELNET, SSH
	ESR-1700 ESR-1510 ESR-1500 ESR-1200 ESR-1000	: 220+-20%, 50 : -36 .. - 72 : • ; • , .
	ESR-200 ESR-100 ESR-21 ESR-20 ESR-14VF ESR-12V(F)	: 220+-20%, 50
	ESR-10	220
	ESR-1700	250
	ESR-1510 ESR-1500	125
	ESR-1200	85
	ESR-1000	75
	ESR-200	25
	ESR-100	20
	ESR-21	32
	ESR-20	25
	ESR-14VF ESR-12V(F)	22
	ESR-10	9
	ESR-1700	12
	ESR-1510 ESR-1500	7
	ESR-1200	5,5
	ESR-1000	3,6
	ESR-200 ESR-100	2,5
	ESR-21	3,15
	ESR-20	2
	ESR-14VF ESR-12V(F) ESR-10	1
(xx)	ESR-1700	440x490x88

	ESR-1510 ESR-1500	430x425x44
	ESR-1200 ESR-1000	430x352x44
	ESR-200 ESR-100	31024044
	ESR-21	43022544
	ESR-20	26721244
	ESR-14VF ESR-12V(F)	267x160,5x43,6
	ESR-10	185x118x32
	ESR-1700 ESR-1510 ESR-1500 ESR-1200 ESR-1000 ESR-200 ESR-100 ESR-21 ESR-20	-10 +45
	ESR-14VF ESR-12V(F) ESR-10	0 +40
		-40 +70
( )		80%
( )		10% 95%
		15

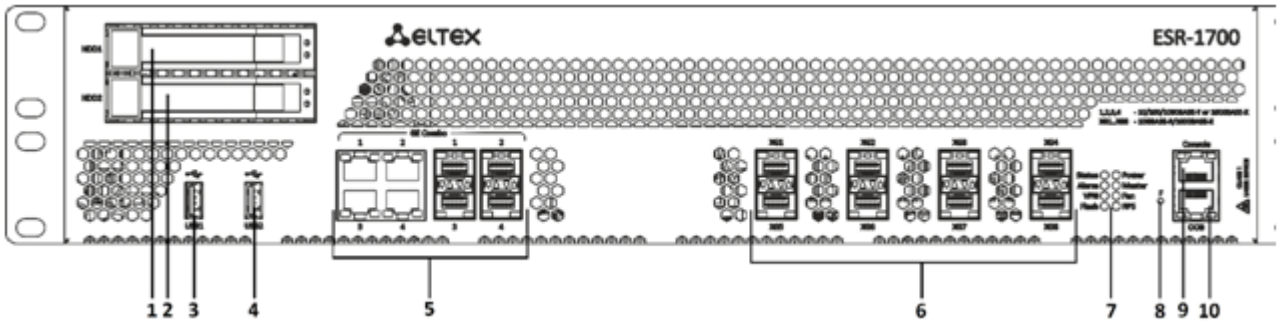
. , . , .

19” , 1U.

ESR-1700

ESR-1700

1.



1 – ESR-1700

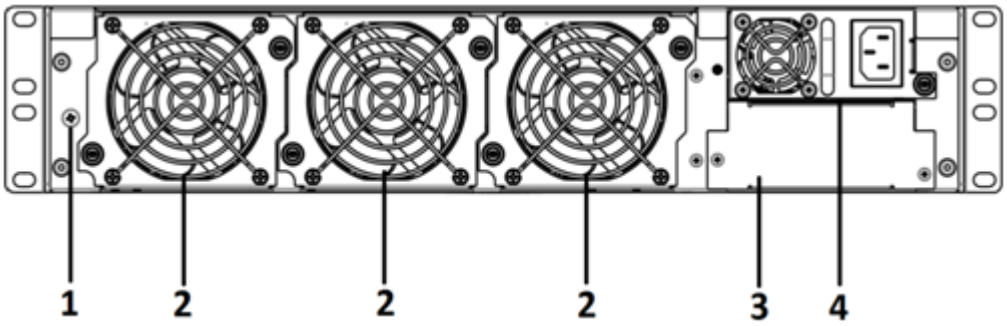
9 , , ESR-1700.

9 – , ESR-1700

1	HDD1	.
2	HDD2	.
3	USB1	USB-.
4	USB2	USB-.
5	Combo Ports [1 .. 4]	4 Gigabit Ethernet 10/100/1000BASE-X (SFP).
6	XG1 – XG8	10G SFP+/1G SFP.
7	Status	.
	Alarm	.
	VPN	VPN . ( )
	Flash	– SD- USB Flash.
	Power	.
	Master	failover-. ( )
	Fan	.
	RPS	.
8	F	: • 10 ; • 10 .
9	Console	RS-232 .
10	OOB	Ethernet .

ESR-1700

ESR-1700 .



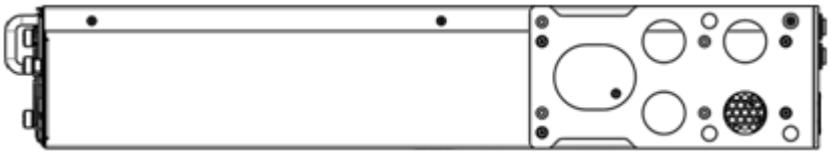
2 – ESR-1700

10 , .

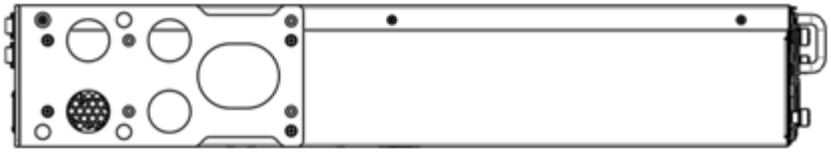
10 –

1	.
2	.
3	.
4	.

ESR-1700



3 – ESR-1700



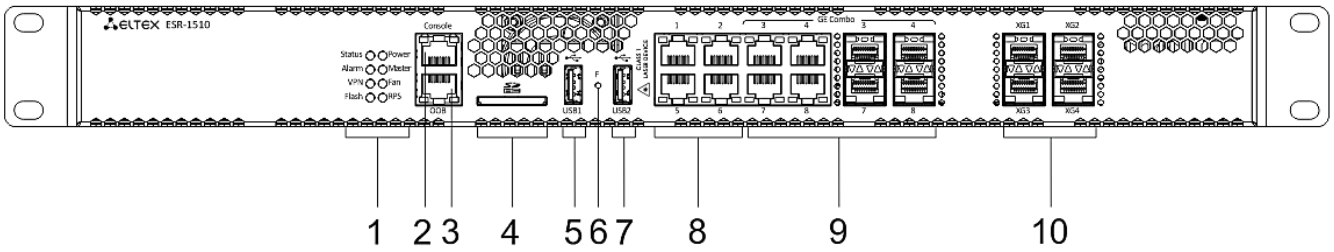
4 – ESR-1700

, ...

ESR-1510, ESR-1500

ESR-1510, ESR-1500

5.



5 – ESR-1510, ESR-1500

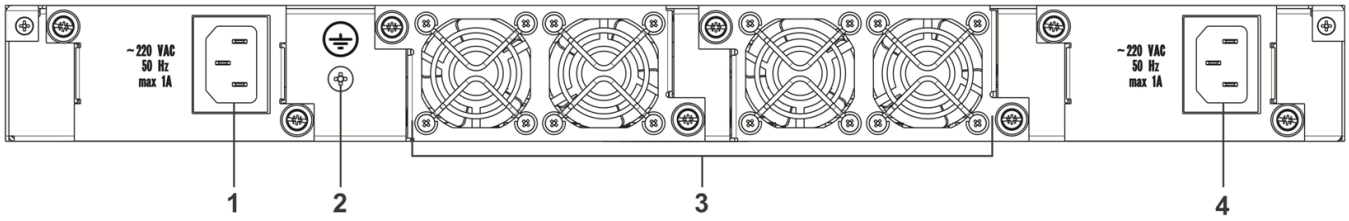
11 , , ESR-1510, ESR-1500.

11 – , ESR-1510, ESR-1500

1	Status	.
	Alarm	.
	VPN	VPN ( ).
	Flash	– SD- USB Flash.
	Power	.
	Master	failover- ( ).
	Fan	.
	RPS	.
2	Console	RS-232 .
3	OOB	Ethernet .
4	SD	SD- .
5	USB1	USB-.
6	F	: • 10 ; • 10 .
7	USB2	USB-.
8	Ethernet	4 Ethernet 10/100/1000BASE-T.
9	Combo Ports [1 .. 4]	4 Gigabit Ethernet 10/100/1000BASE-X (SFP).
10	XG1 – XG4	10G SFP+/1G SFP.

ESR-1510, ESR-1500

ESR-1510, ESR-1500 6.



6 – ESR-1510, ESR-1500

12 , .

12 –

1	.
2	.
3	.
4	.

ESR-1510, ESR-1500

7 – ESR-1500, ESR-1510

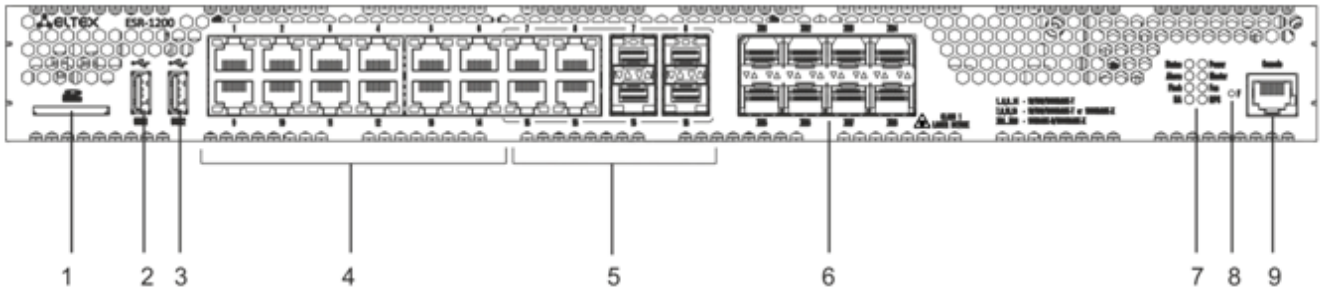
8 – ESR-1500, ESR-1510

, ...

ESR-1200, ESR-1000

ESR-1200

9.



9 – ESR-1200

13 , , ESR-1200.

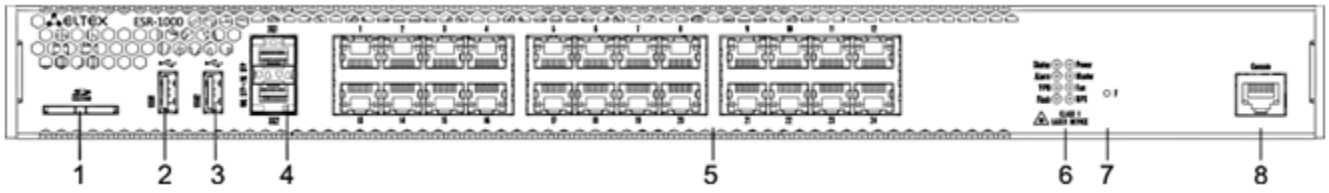
13 – , ESR-1200

1	SD	SD- .
2	USB1	USB-.
3	USB2	USB-.
4	[1 .. 12]	12 Gigabit Ethernet 10/100/1000BASE-T (RJ-45).
5	Combo Ports	4 Gigabit Ethernet 10/100/1000BASE-X (SFP).
6	XG1 – XG8	10G SFP+/ 1G SFP.
7	Status	.
	Alarm	.
	HA	.
	Flash	– SD- USB Flash.
	Power	.
	Master	failover-.
	Fan	.
	RPS	.
8	F	: • 10 ; • 10 .

9	Console	RS-232 .

ESR-1000

10.



10 – ESR-1000

14 , , ESR-1000.

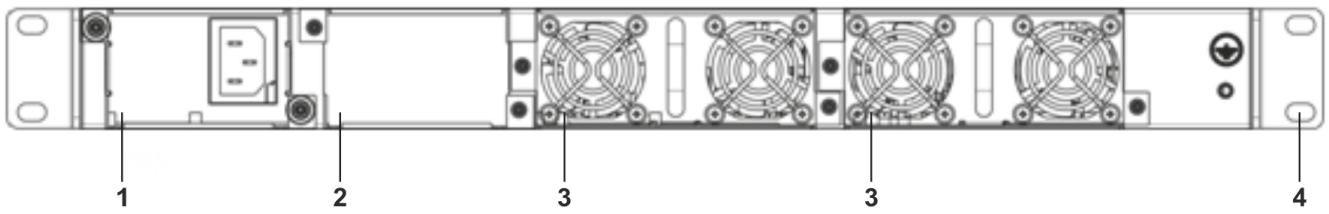
14 – , ESR-1000

1	SD	SD- .
2	USB1	USB-.
3	USB2	USB-.
4	XG1, XG2	10G SFP+/1G SFP.
5	[1 .. 24]	24 Gigabit Ethernet 10/100/1000BASE-T (RJ-45).
6	Status	.
	Alarm	.
	VPN	VPN-.
	Flash	– SD- USB Flash.
	Power	.
	Master	failover-.
	Fan	.
	RPS	.
7	F	: • 10 ; • 10 .
8	Console	RS-232 .

ESR-1200,1000

ESR-1000 .

⚠ .



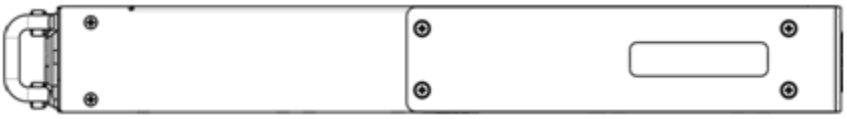
11 – ESR-1000

15 , .

15 –

1	.
2	.
3	.
4	.

ESR-1200, ESR-1000



12 – ESR-1200, 1000

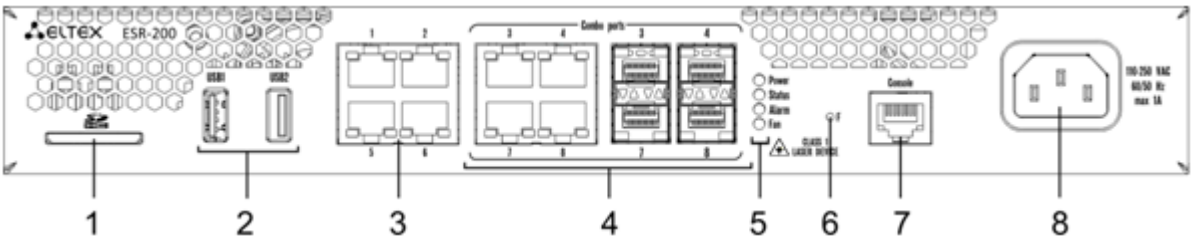
13 – ESR-1200, 1000

, ...

ESR-200, ESR-100

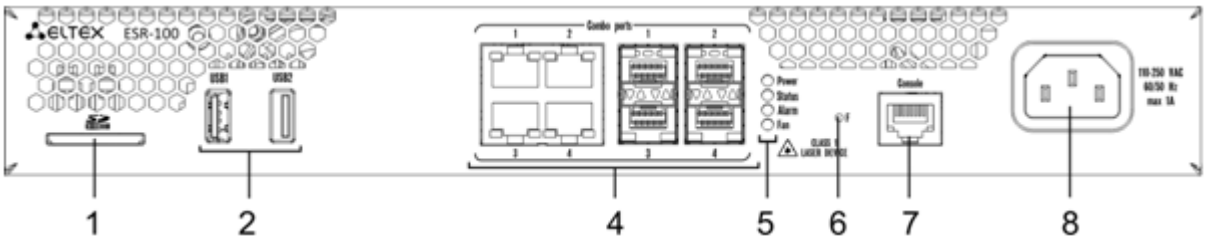
ESR-200, ESR-100

ESR-200 14.



14 – ESR-200

ESR-100 15.



15 – ESR-100

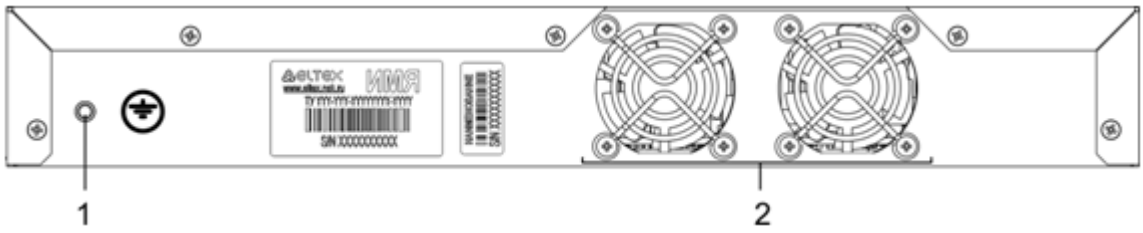
16 , , ESR-200, ESR-100.

16 – , ESR-200, ESR-100

1	SD	SD- .
2	USB1, USB2	2 USB-.
3	[1 .. 4]	4 Gigabit Ethernet 10/100/1000BASE-T (RJ-45).
4	Combo Ports	4 Gigabit Ethernet 10/100/1000BASE-X (SFP).
5	Power	.
	Status	.
	Alarm	.
	Fan	.
6	F	: • 10 ; • 10 .
7	Console	RS-232 .
8	110-250 VAC 60/50 Hz max 1A	.

ESR-200, ESR-100

ESR-200, ESR-100 16.



16 – ESR-200, ESR-100

17 , .

17 –

1	.
2	.

ESR-200, ESR-100

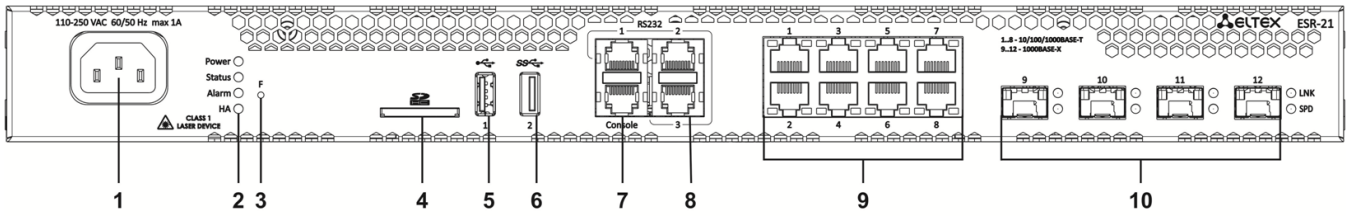
17 – ESR-200, ESR-100

ESR-21

19” , 1U.

ESR-21

19.



19 – ESR-21

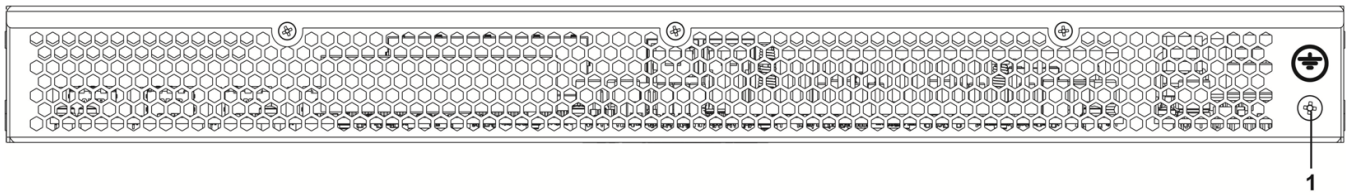
18 , , ESR-21.

18 – , ESR-21

1	220V C	
2	Power	
	Status	
	Alarm	
	HA	HA ( )
3	F	: 10 ; 10 .
4	SD	SD-
5	USB1	USB2.0 USB-
6	USB2	USB3.0 USB-
7	Console	
8	RS-232	3
9	[1 .. 8]	8 Gigabit Ethernet 10/100/1000BASE-T (RJ-45)
10	Optical Port	4 Gigabit Ethernet 10/100/1000BASE-X (SFP)

ESR-21

ESR-21 20.



20 – ESR-21

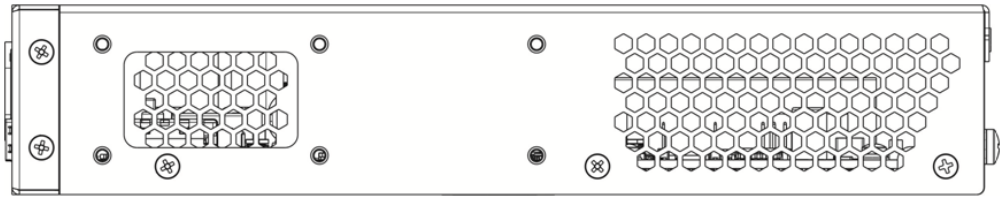
19 , .

19 –

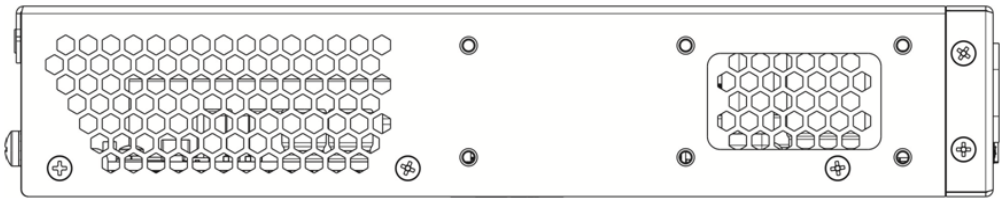
1	.

ESR-21

ESR-21 21 22.



21 – ESR-21



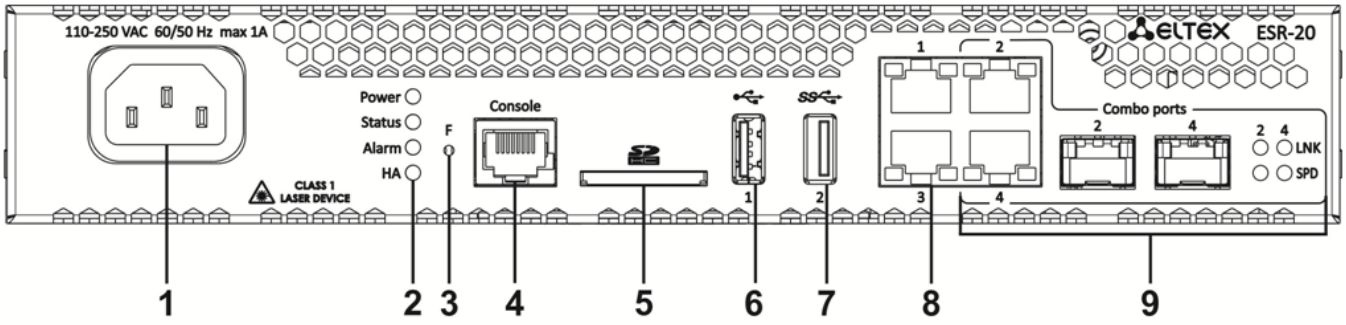
22 – ESR-21

ESR-20

19” , 1U.

ESR-20

23.



23 – ESR-20

20 , , ESR-20.

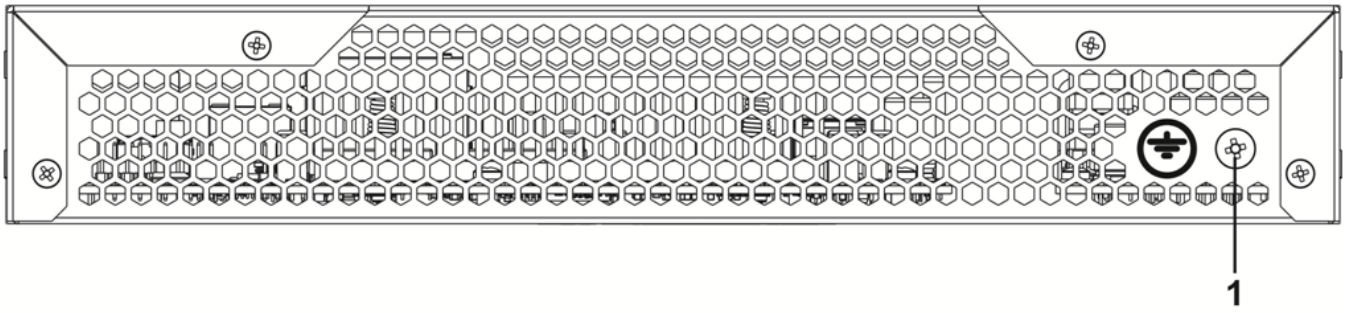
20 – , ESR-20

1	110-250 VC	.
2	Power	.
	Status	.
	Alarm	.
	HA	HA ( ).
3	F	: 10 ; 10 .
4	Console	.

5	SD	SD- .
6	USB1	USB2.0 USB-.
7	USB2	USB3.0 USB-.
8	1, 2	2 Gigabit Ethernet 10/100/1000BASE-T (RJ-45).
9	[1 .. 4]	2 Combo- Ethernet 10/100/1000BASE-X/10/100/1000BASE-T.

ESR-20

ESR-20 24.



24 – ESR-20

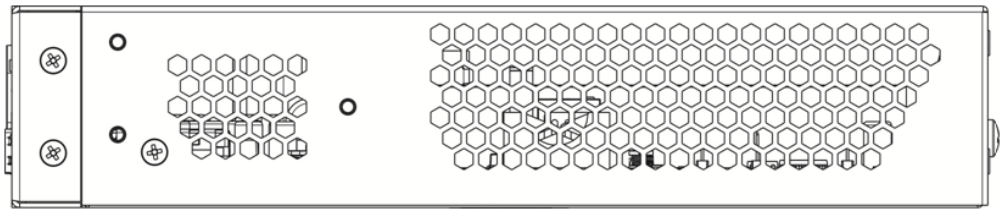
21 , .

21 –

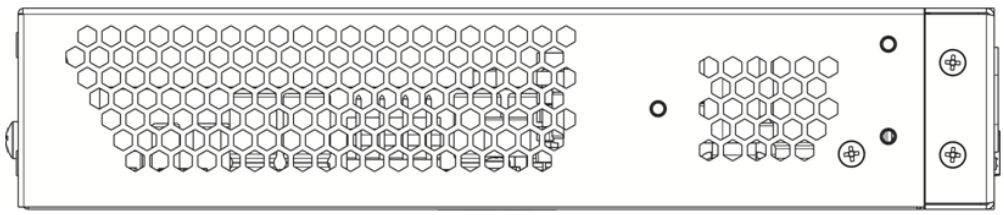
1	.

ESR-20

ESR-20 25 26.



25 – ESR-20



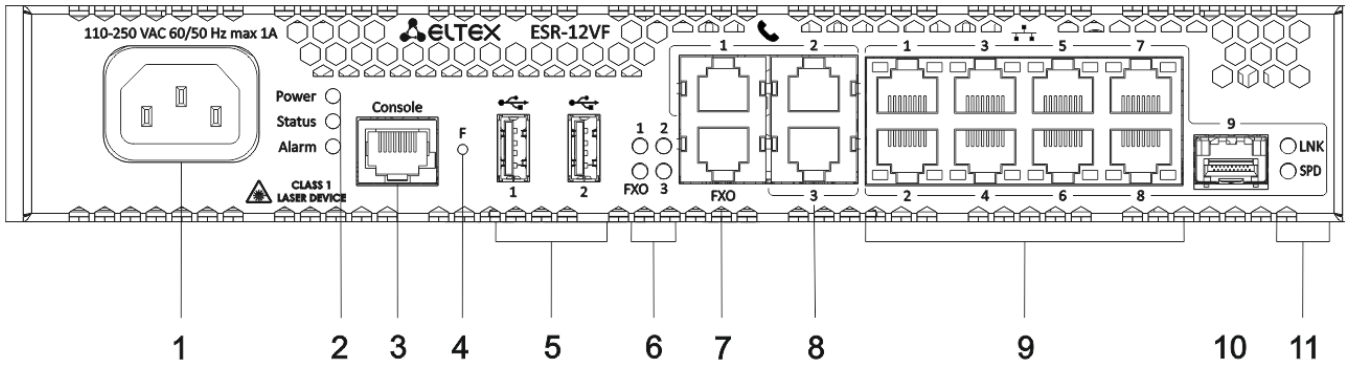
26 – ESR-20

ESR-14VF, ESR-12VF

19” , 1U.

ESR-12VF, ESR-14VF

27.



ESR-14VF, ESR-12VF

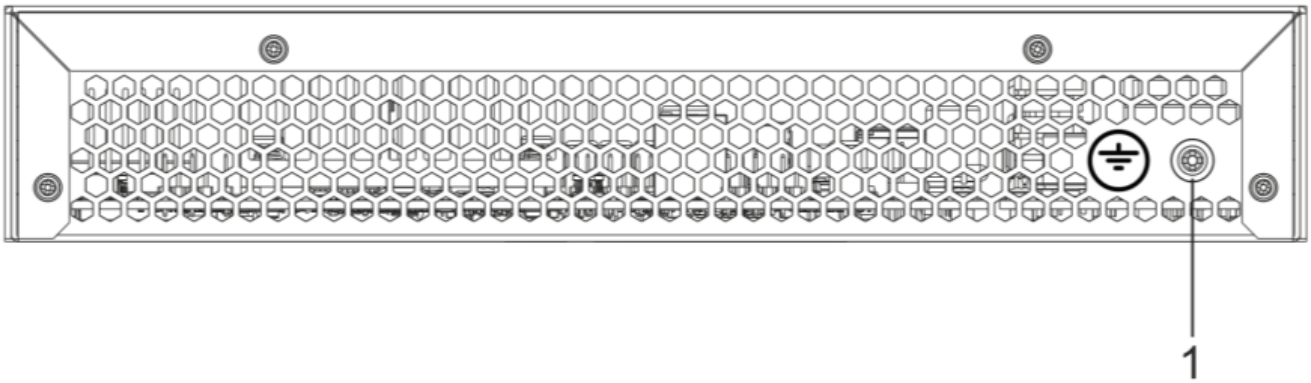
22 , , ESR-12VF, ESR-14VF.

22 – , ESR-12VF, ESR-14VF

1	220V C	.
2	Power	.
3	Console	RS-232 .
4	F	: 10 ; 10 .
5	USB1, USB2	2 USB USB-.
6	FXO	.
	1,2,3	.
7	FXO	1 FXO (ESR-12VF).
8	FXS 1, FXS 2, FXS 3	3 (ESR-12VF).
	FXS 1, FXS 2, FXS 3	4 (ESR-14VF).
9	[1 .. 8]	8 Gigabit Ethernet 10/100/1000BASE-T (RJ-45).
10	Optical Port	1 Gigabit Ethernet-100/1000BASE-X (SFP)
11	1,2	

ESR-14VF, ESR-12VF

ESR-12VF, ESR-14VF 28.



28 – ESR-12VF, ESR-14VF

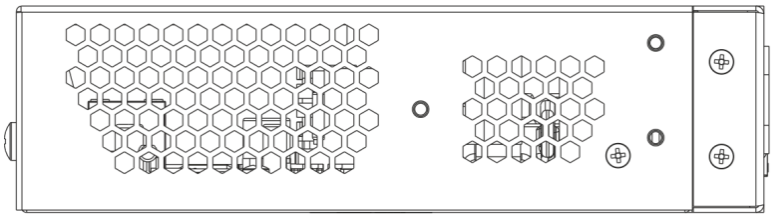
23 , .

23 –

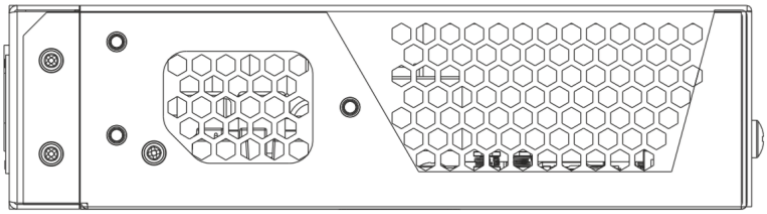
1	.

ESR-12VF, ESR-14VF

ESR-12VF, ESR-14VF 29 30.



29 – ESR-12VF, ESR-14VF



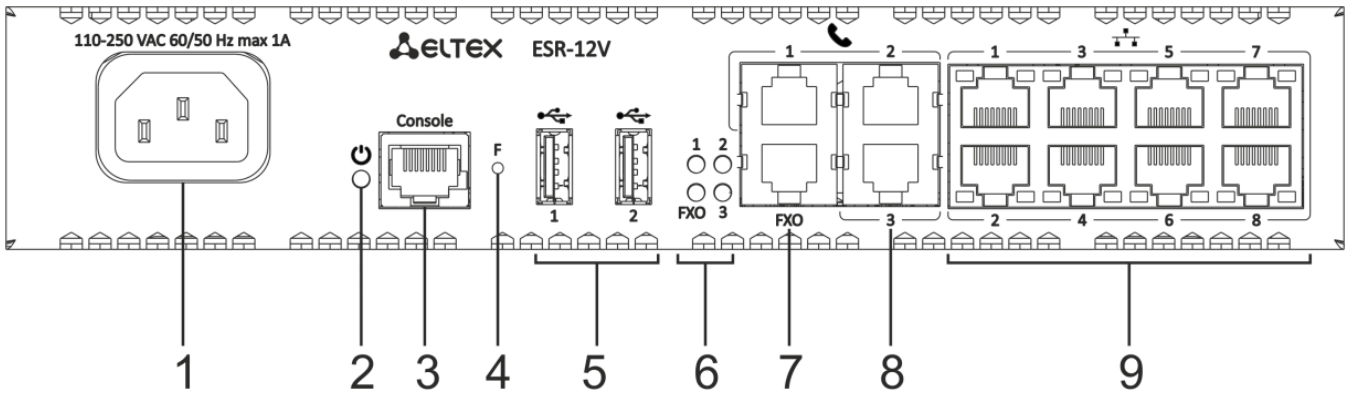
30 – ESR-12VF, ESR-14VF

ESR-12V

19” , 1U.

ESR-12V

31.



31 – ESR-12V

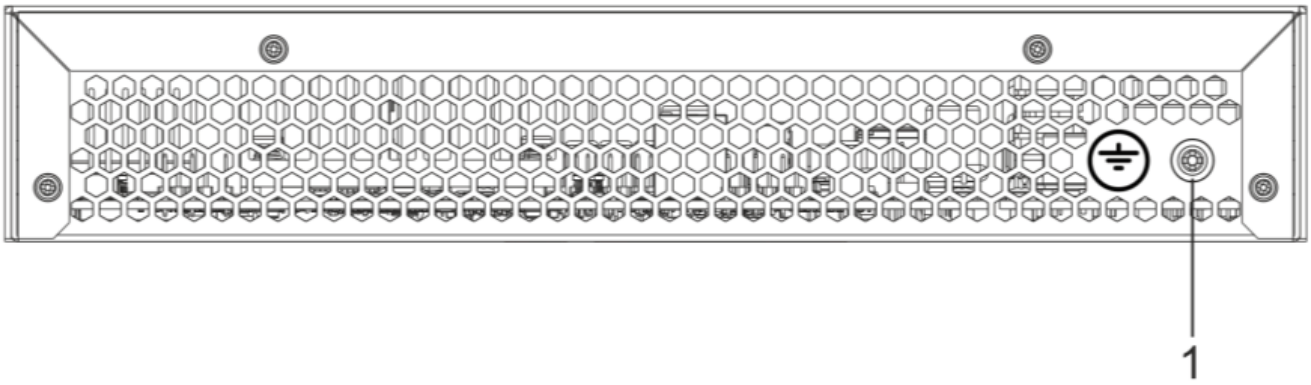
24 , , ESR-12V.

24 – , ESR-12V

1	220V C	.
2	Power	.
3	Console	RS-232 .
4	F	: 10 ; 10 .
5	USB1, USB2	2 USB USB-.
6	FXO	.
	1,2,3	.
7	FXO	1 FXO .
8	FXS 1, FXS 2, FXS 3	3 .
9	[1 .. 8]	8 Gigabit Ethernet 10/100/1000BASE-T (RJ-45).

ESR-12V

ESR-12V 32.



32 – ESR-12V

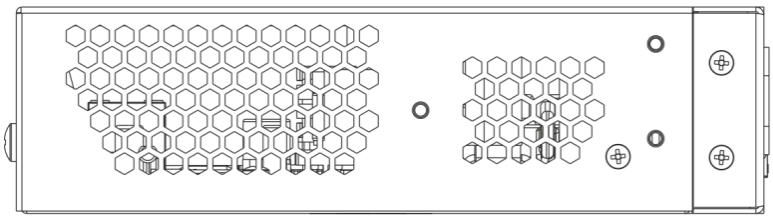
25 , .

25 –

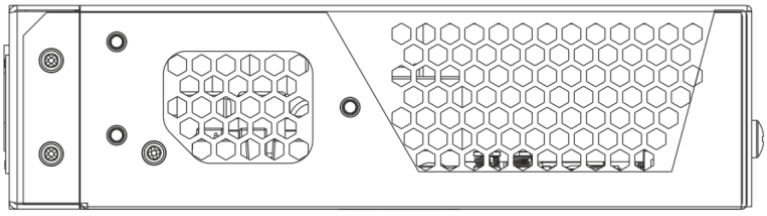
1	.

ESR-12V

ESR-12V 33 34.



33 – ESR-12V

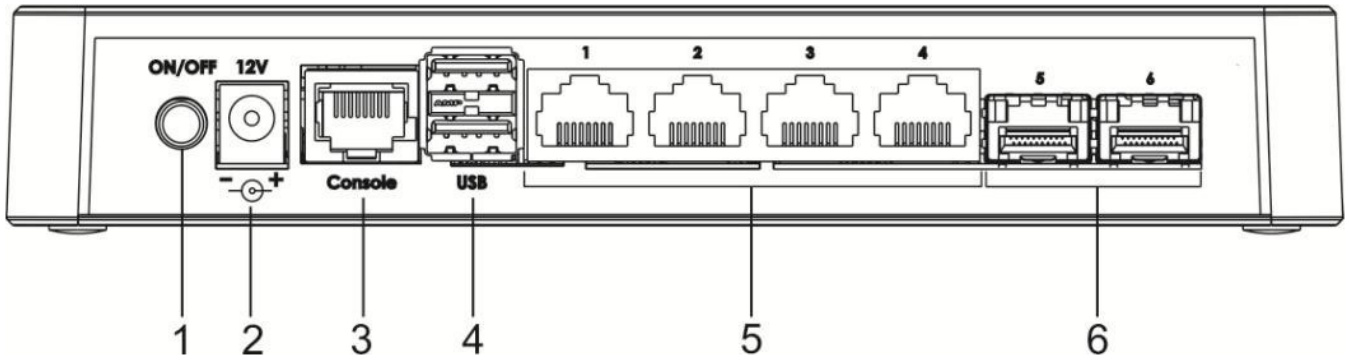


34 – ESR-12V

ESR-10

ESR-10

35.



35 – ESR-10

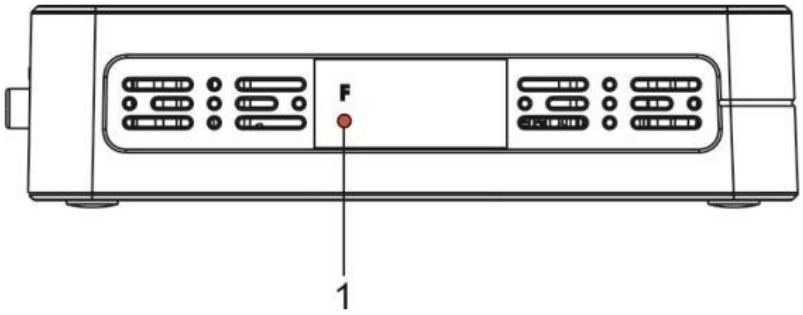
26 , , ESR-10.

26 – , ESR-10

1	ON/OFF	/
2	12V DC	
3	Console	RS-232
4	USB1, USB2	2 USB-
5	[1 .. 4]	4 Gigabit Ethernet – 10/100/1000BASE-T (RJ-45)
6	Optical Ports	2 Gigabit Ethernet-100/1000BASE-X (SFP)

ESR-10

ESR-10 36.



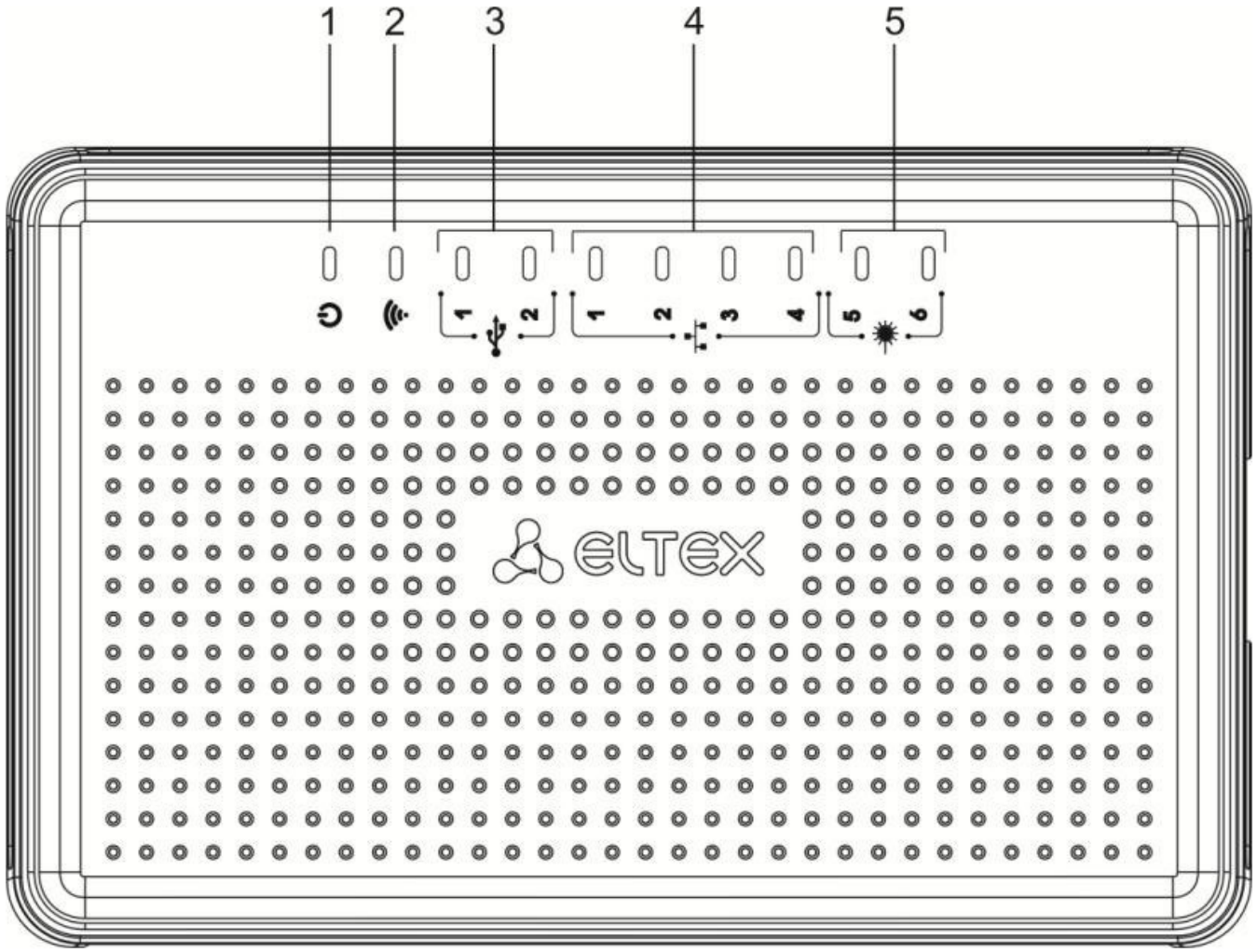
27 , .

27 –

1	F	: • 10 ; • 10 .

ESR-10

ESR-10 37.



37 – ESR-10

28 , ESR-10.

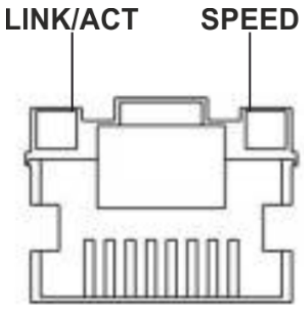
28 –

1	Power	
2	-	
3	USB1, USB2	USB-

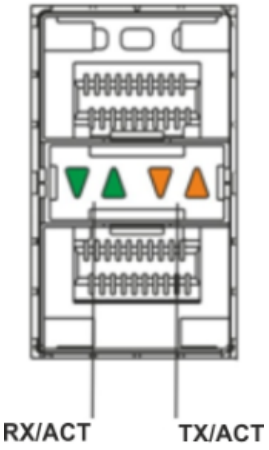
4	[1 .. 4]	Ethernet-
5	[5 .. 6]	

ESR-1700, ESR-1510, ESR-1500, ESR-1200, ESR-1000

Gigabit Ethernet – *LINK/ACT* *SPEED* . 38. SFP- RX/ACT TX/ACT 39. 29 30, .



38 – RJ-45



39 –

29 –

SPEED	LINK/ACT	Ethernet
		.
		10 100 /.
		1000 /.
X		.

30 – SFP/SFP+

RX/ACT	TX/ACT	Ethernet
		.
		.
	X	.
X		.

.

31 –

Status	.		.
			.
Alarm	.	-	-
VPN	VPN-.	-	-
Flash	: SD- USB Flash.		/ «copy».
Power	.		. , , .
			, .
			.
Master	failover-.	-	-
Fan	.		.
			. – .
RPS	.		.
			.
			.

ESR-200/ESR-100

Gigabit Ethernet SFP- – *LINK/ACT* *SPEED* . 38. SFP- 40. 32.

40 –

32 – SFP-

SPEED	LINK/ACT	Ethernet
		.
		10 100 /.
		1000 /.
X		.

.

33 –

Status	.		.
			.

Alarm	[1] .	-	-
Power	.		. , , .
			, .
			.
Fan	.		.
			. – .

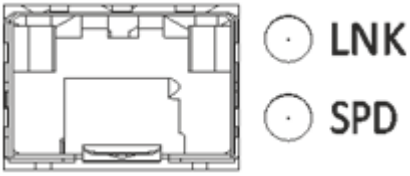
1

ESR-21/ESR-20

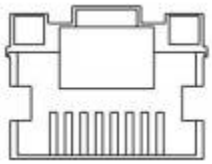
Gigabit Ethernet – LINK/ACT SPEED .

34 – SFP-

SPEED	LINK/ACT	Ethernet
		.
		10 100/.
		1000/.
X		.



41 – SFP



42 – RJ-45

.

35 –

Power	.		. , .
			.
			.
Status	.		.
			.
Alarm	.	-	-
HA	HA ( )	-	-

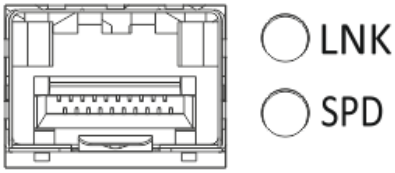
ESR-12V(F)

Gigabit Ethernet – LINK/ACT SPEED .

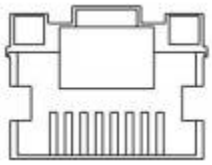
36 – SFP-

SPEED	LINK/ACT	Ethernet

		10 100/
		1000/
X		



43 – SFP (ESR-12VF, ESR-14VF)



44 – RJ-45

.

37 –

Power	.		. , .
			.

ESR-10

Gigabit Ethernet SPEED .

38 –

SPEED	Ethernet
	1000/

ESR-10 :

- ESR-10;
- 12;
- .

ESR-12V :

- ESR-12V;
- ;
- 19”;
- .

ESR-12VF :

- ESR-12VF;
- ;
- 19”;
- .

ESR-14VF :

- ESR-14VF;
- ;
- 19”;
- .

ESR-20 :

- ESR-20;
- ;
- 19”;
- .

ESR-21 :

- ESR-21;
- ;
- 19”;
- .

ESR-100 :

- ESR-100;
- ;
- 19”;
- .

ESR-200 :

- ESR-200;
- ;
- 19”;
- .

ESR-1000 :

- ESR-1000;
- 19”;
- .

ESR-1200 :

- ESR-1200;
- 19”;
- .

ESR-1500 :

- ESR-1500;
- 19”;
- .

ESR-1510 :

- ESR-1510;
- 19”;
- .

ESR-1700 :

- ESR-1700;
- 19”;
- .

⚠ ESR-1000, ESR-1200 (PM160-220/12 PM100-48/12).

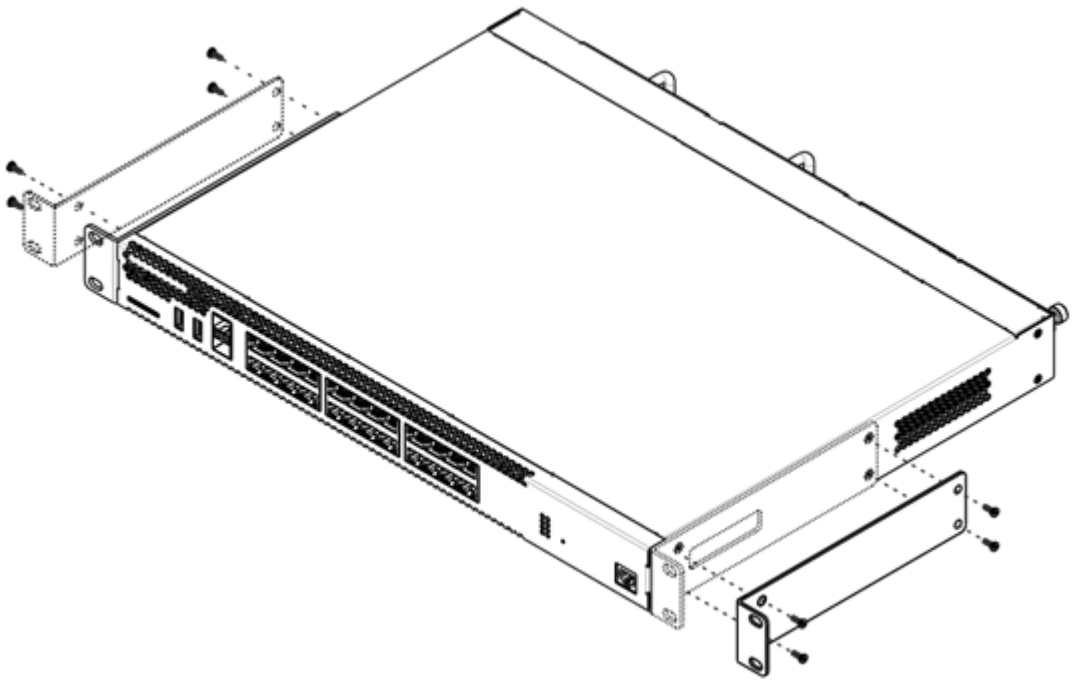
ESR-1500, ESR-1510 (PM160-220/12).

ESR-1700 (PM350-220/12 PM350-48/12).

⚠ SFP/SFP+-.

.

. :

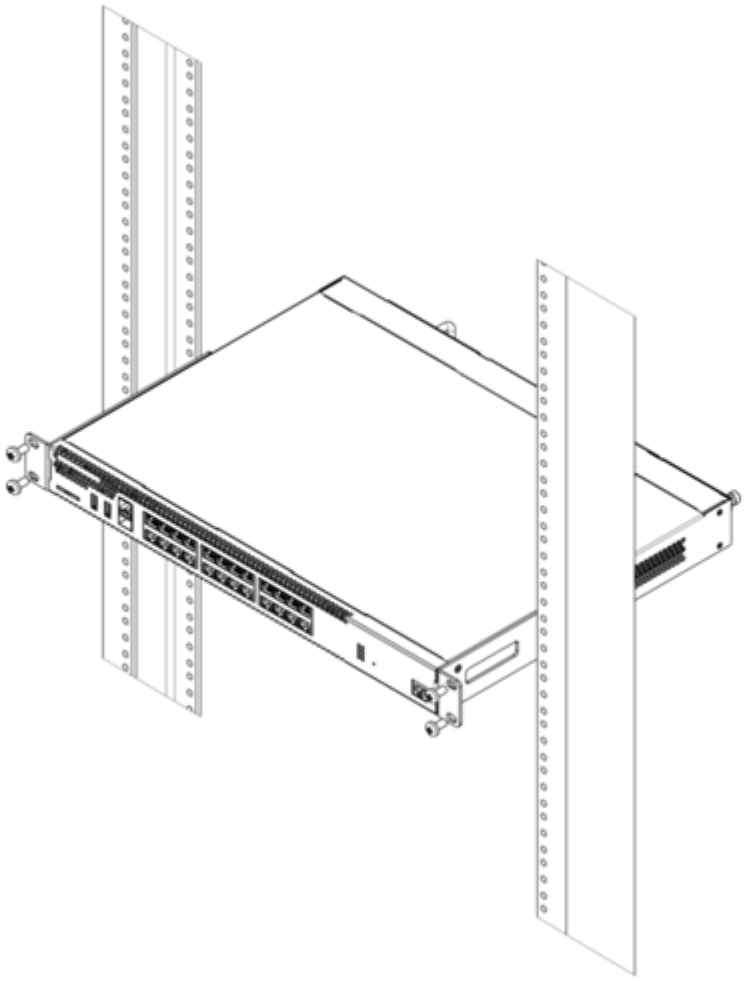


45 –

1. .
2. .
3. 1, 2 .

:

1. .
2. . , .
3. .



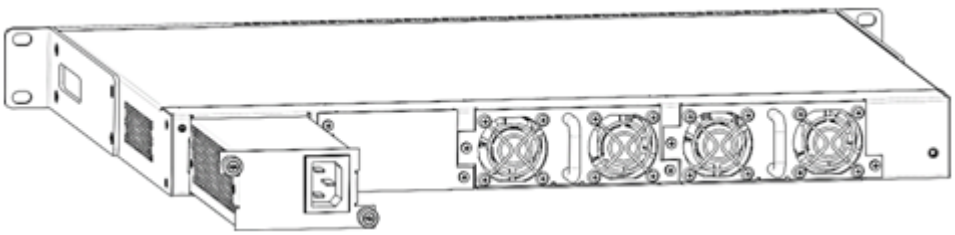
46 –

-. , . .

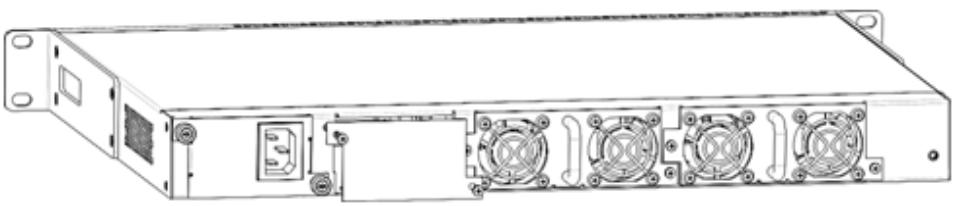
ESR-1000, ESR-1200, ESR-1500, ESR-1510, ESR-1700

ESR-1000/1200/1500/1510/1700 . , .

. , , , , – . . .



47 –



, .

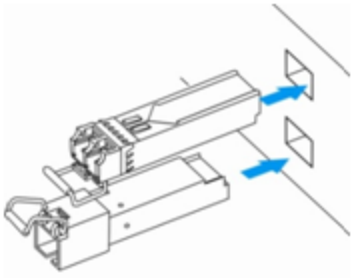
(.) , .

1. , , . . ().
2. , .
3. . , . , . 1 2.
4. .

SFP-

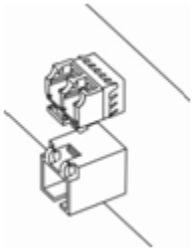
, .

1. SFP- , SFP- – .



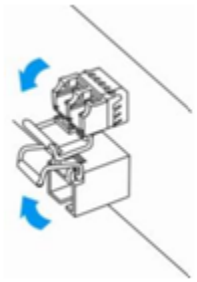
49 – SFP-

2. .



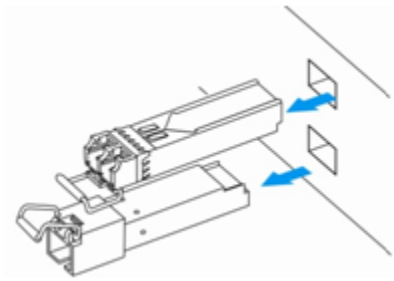
50 – SFP-

1. , .



51 – SFP-

2. .



52 – SFP-

.

Telnet SSH , RS-232. Telnet, SSH .

⚠ trusted IP- – 192.168.1.1/24.

:

ESR-10: GigabitEthernet 1/0/2-6;
ESR-12V(F), ESR-14VF: GigabitEthernet 1/0/2-8;
ESR-20: GigabitEthernet 1/0/2-4;
ESR-21: GigabitEthernet 1/0/2-12;
ESR-100: GigabitEthernet 1/0/2-4;
ESR-200: GigabitEthernet 1/0/2-8;
ESR-1000: GigabitEthernet 1/0/2-24;
ESR-1200: GigabitEthernet 1/0/2-16, TengigabitEthernet 1/0/3-8.
ESR-1500, ESR-1510: GigabitEthernet 1/0/2-8, TengigabitEthernet 1/0/2-4;
ESR-1700: GigabitEthernet 1/0/2-4, TengigabitEthernet 1/0/3-12.

«admin» «password».

. , , , .

(CLI)

(Command Line Interface, CLI) – , , . , Telnet, SSH (, HyperTerminal).

, .

, .

, – . . – .

.

. . .

39 –

	. **<UNIT>/<SLOT>/<PORT>**, : • <UNIT> – , • <SLOT> – 0 , • <PORT> – .
1/	gigabitethernet <UNIT>/<SLOT>/<PORT>

	: gigabitethernet 1/0/12 : , gi1/0/12.
10/	tengigabitethernet <UNIT>/<SLOT>/<PORT> : tengigabitethernet 1/0/2 : , te1/0/2.
	: port-channel <CHANNEL_ID> : port-channel 6 ⚠ , , po1.
	(VLAN) , . : • gigabitethernet 1/0/12.100 • tengigabitethernet 1/0/2.123 • port-channel 1.6 : [1..4094].
Q-in-Q	Q-in-Q , VLAN VLAN, . : • gigabitethernet 1/0/12.100.10 • tengigabitethernet 1/0/2.45.12 • port-channel 1.6.34 : VLAN [1..4094].
E1-	E1- . E1- **<UNIT>/<SLOT>/<STREAM>**, • <UNIT> – , • <SLOT> – E1- , • <STREAM> – E1-. : e1 1/0/1
E1-	E1- : multilink <CHANNEL_ID> : multilink <CHANNEL_ID>
	: : • loopback 4 • bridge 60 • service-port 1
	. E1- **<UNIT>/<SLOT>/<STREAM>**, - <UNIT> – [1..1], - <SLOT> – 0 , - <PORT> – .

	: serial 1/0/1
USB-	USB- : modem <MODEM-NUM> : modem 1
FXS/FXO	FXS/FXO : interface voice-port <NUM> : voice-port 1

1. .
2. . unit 1.
3. . «-».

:

interface gigabitethernet 1/0/1, gigabitethernet 1/0/5

interface tengigabitethernet 1/0/1-2

interface gi1/0/1-3,gi1/0/7,te1/0/1

. . .

40 –

L2TPv3-	L2TPv3- : l2tpv3 <L2TPV3_ID> : l2tpv3 1
GRE-	GRE- : gre <GRE_ID> : gre 1
SoftGRE-	SoftGRE- , , , VLAN ID : softgre <GRE_ID>[.<VLAN>] : softgre 1, softgre 1.10
IPv4-over-IPv4-	IPv4-over-IPv4- : ip4ip4 <IPIP_ID> : ip4ip4 1
IPsec-	IPsec : vti <VTI_ID> : vti 1
(VRF)	: lt <LT_ID> : lt 1

.

ESR

, . SNAT . , , .

2 «Trusted» «Untrusted» . :

1. **«Untrusted»** (WAN). DHCP- IP- . .

   :

   ESR-10/12V: GigabitEthernet 1/0/1

   ESR-12VF/ESR-14VF: GigabitEthernet 1/0/1; GigabitEthernet 1/0/9

   ESR-20: GigabitEthernet 1/0/1

   ESR-21: GigabitEthernet 1/0/1;

   ESR-100/200: GigabitEthernet 1/0/1;

   ESR-1000/1500/1510: GigabitEthernet 1/0/1, TengigabitEthernet 1/0/1-2;

   ESR-1200/1700: GigabitEthernet 1/0/1, TengigabitEthernet 1/0/1, TengigabitEthernet 1/0/2.

   L2- *Bridge 2*.
2. **«Trusted»** (LAN). Telnet SSH , ICMP- , DHCP- IP- . «Untrusted» .

   :

   ESR-10: GigabitEthernet 1/0/2-6;

   ESR-12V(F)/ESR-14VF: GigabitEthernet 1/0/2-8;

   ESR-20: GigabitEthernet 1/0/2-4;

   ESR-21: GigabitEthernet 1/0/2-12;

   ESR-100: GigabitEthernet 1/0/2-4;

   ESR-200: GigabitEthernet 1/0/2-8;

   ESR-1000: GigabitEthernet 1/0/2-24;

   ESR-1200: GigabitEthernet 1/0/2-16, TengigabitEthernet 1/0/3-8;

   ESR-1500/1510: GigabitEthernet 1/0/2-8, TengigabitEthernet 1/0/3-4;

   ESR-1700: GigabitEthernet 1/0/2-4, TengigabitEthernet 1/0/3-12.

   L2- *Bridge 1*.

Bridge 2 DHCP- IP- . *Bridge 1* IP- 192.168.1.1/24. IP- . DHCP 192.168.1.2-192.168.1.254 255.255.255.0. Internet Source NAT.

:

41 –

,	,		
Trusted	Untrusted	TCP, UDP, ICMP	
Trusted	Trusted	TCP, UDP, ICMP	
Trusted	self	TCP/22(SSH), ICMP, UDP/67 (DHCP Server), UDP/123(NTP)	
Untrusted	self	UDP/68(DHCP Client)	

‘admin’. .

IP- Bridge 1 – 192.168.1.1/24.

ESR .

:

- IP- ( ) , ;
- ;
- , ;
- , (NAT, Firewall).

.

:

Ethernet

. ESR .

(-) , « ***Trusted*** », , .

DHCP- IP- **192.168.1.0/24**.

.

IP- - , , , 192.168.1.1, 192.168.1.0/24.

RS-232

RJ-45/DBF9, , **«Console»** RS-232 .

(, HyperTerminal Minicom) . VT100.

RS-232:

```
: 115200 /
 : 8
:
 : 1
 :
```

, , :

```
esr# commit
Configuration has been successfully committed
```

"" . "" :

```
esr# confirm
Configuration has been successfully confirmed
```

"" – 600 . :

```
esr(config)# system config-confirm timeout <TIME>
```

<TIME> – , [120..86400].

:

- «admin».
- .
- (Hostname).
- .
- .
- .

«admin»

«admin».

techsupport ;

remote – RADIUS, TACACS+, LDAP;

admin, techsupport, remote . .

.

«admin» :

```
esr# configure
esr(config)# username admin
esr(config-user)# password <new-password>
esr(config-user)# exit
```

– , , , – :

```
esr(config)# username <name>
esr(config-user)# password <password>
esr(config-user)# privilege <privilege>
esr(config-user)# exit
```

1-9 , . 10-14 , . 15 , .

«fedor» c **«12345678»** **15** **«ivan»** **«password»** **1**:

```
esr# configure
esr(config)# username fedor
esr(config-user)# password 12345678
esr(config-user)# privilege 15
esr(config-user)# exit
esr(config)# username ivan
esr(config-user)# password password
esr(config-user)# privilege 1
esr(config-user)# exit
```

1-9 , . 10-14 , . 15 , .

«fedor» c **«12345678»** **15** **«ivan»** «**password»** **1**:

```
esr# configure
esr(config)# username fedor
esr(config-user)# password 12345678
esr(config-user)# privilege 15
esr(config-user)# exit
```

```
esr(config)# username ivan
esr(config-user)# password password
esr(config-user)# privilege 1
esr(config-user)# exit
```

:

```
esr# configure
esr(config)# hostname <new-name>
```

, **<new-name>**.

, – IP-, .

IP- **GigabitEthernet 1/0/2.150** **VLAN 150**.

:

- IP- – 192.168.16.144;
- – 255.255.255.0;
- IP- – 192.168.16.1.

```
esr# configure
esr(config)# interface gigabitethernet 1/0/2.150
esr(config-subif)# ip address 192.168.16.144/24
esr(config-subif)# exit
esr(config)# ip route 0.0.0.0/0 192.168.16.1
```

, , :

```
esr# show ip interfaces

IP address            Interface                         Type
-------------------   -------------------------------   -------
192.168.16.144/24     gigabitethernet 1/0/2.150          static
```

. IP- DHCP, DHCP.

, IP- DHCP- **GigabitEthernet 1/0/10**:

```
esr# configure
esr(config)# interface gigabitethernet 1/0/10
esr(config-if)# ip address dhcp
esr(config-if)# exit
```

, , :

```
esr# show ip interfaces

IP address            Interface                         Type
-------------------   -------------------------------   -------
192.168.11.5/25       gigabitethernet 1/0/10             DHCP
```

Telnet SSH **«trusted»**. , , , firewall.

:

- **source-zone** – , ;

- **self** – , .

:

```
esr# configure
esr(config)# security zone-pair <source-zone> self
esr(config-zone-pair)# rule <number>
esr(config-zone-rule)# action permit
esr(config-zone-rule)# match protocol tcp
esr(config-zone-rule)# match source-address <network object-group>
esr(config-zone-rule)# match destination-address <network object-group>
esr(config-zone-rule)# match destination-port <service object-group>
esr(config-zone-rule)# enable
esr(config-zone-rule)# exit
esr(config-zone-pair)# exit
```

«untrusted» IP- **132.16.0.5-132.16.0.10** IP- **40.13.1.22** SSH:

```
esr# configure
esr(config)# object-group network clients
esr(config-addr-set)# ip address-range 132.16.0.5-132.16.0.10
esr(config-addr-set)# exit
esr(config)# object-group network gateway
esr(config-addr-set)# ip address-range 40.13.1.22
esr(config-addr-set)# exit
esr(config)# object-group service ssh
esr(config-port-set)# port-range 22
esr(config-port-set)# exit
esr(config)# security zone-pair untrusted self
esr(config-zone-pair)# rule 10
esr(config-zone-rule)# action permit
esr(config-zone-rule)# match protocol tcp
esr(config-zone-rule)# match source-address clients
esr(config-zone-rule)# match destination-address gateway
esr(config-zone-rule)# match destination-port ssh
esr(config-zone-rule)# enable
esr(config-zone-rule)# exit
esr(config-zone-pair)# exit
```

: TFTP, FTP, SCP. , .

. , .

.

, , .

, , .

, , .

1. . , .
2. . TFTP/FTP/SCP ICMP . .
3. Console , Telnet SSH.
   , *ping* . – .
4. . *< server>* IP- . FTP SCP- (*< user>*) (*< password>*). *< file_ name>* , (SCP – *<folder>*). , .

TFTP:

```
esr# copy tftp://<server>:/<file_name> system:firmware
```

FTP:

```
esr# copy ftp://[<user>[:<password>]@]<server>:/<file_name> system:firmware
```

SCP:

```
esr#  scp://[<user>[:<password>]@]<server>://<folder>/<file_name> system:firmware
```

SCP:

```
esr#  scp://adm:password123@192.168.16.168://home/tftp/firmware system:firmware
```

5. , . *show bootvar* , .

```
esr# show bootvar
Image   Version                      Date                   Status         After reboot
-----  --------------               --------------------    ------------   ------------
1       1.0.7 build 141[f812808]     date 18/02/2015 time    Active          *
                                     16:12:54

2       1.0.7 build 141[f812808]     date 18/02/2015 time   Not Active
                                     16:12:54
```

```
esr# boot system image-[1|2]
```

6. (U-Boot) . <*server*> IP- . FTP SCP- (<*user*>) (<*password*>). <*file_ name*> , (SCP – <*folder*>). , .
TFTP:

```
esr# copy tftp://<server>:/<file_name> system:boot
```

FTP:

```
esr# copy ftp://<server>:/<file_name> system:boot
```

SCP:

```
esr# copy scp://[<user>[:<password>]@]<server>://<folder>/<file_name> system:boot
```

:

1. U-Boot, **<Esc>**.

```
Configuring PoE...
distribution 1 dest_threshold 0xa drop_timer 0x0
Configuring POE in bypass mode
NAE configuration done!
initializing port 0, type 2.
initializing port 1, type 2.
SMC Endian Test:b81fb81f
```

```
nae-0, nae-1
  =======Skip: Load SYS UCORE for old 8xxB1/3xxB0 revision on default.
Hit any key to stop autoboot:  2
```

2. IP- TFTP-:

```
BRCM.XLP316Lite Rev B0.u-boot# setenv serverip 10.100.100.1
  1.5  : BRCM.XLP316Lite Rev B0.u-boot# serverip 10.100.100.1
```

3. IP- :

```
BRCM.XLP316Lite Rev B0.u-boot# setenv ipaddr 10.100.100.2
  1.5  : BRCM.XLP316Lite Rev B0.u-boot# ipaddr 10.100.100.2
```

4. TFTP-:

```
  1.5  : BRCM.XLP316Lite Rev B0.u-boot# firmware_file firmware
```

5. «saveenv» .
6.

BRCM.XLP316Lite Rev B0.u-boot# **run tftp_update_image1**

```
Using nae-0-3 device
TFTP from server 10.100.100.1; our IP address is 10.100.100.2
Filename 'esr1000/firmware'.
Load address: 0xa800000060000000
Loading: TftpStart:TftpTimeoutMsecs = 10000, TftpTimeoutCountMax = 6
#################################################################
#################################################################
#################################################################
#########################
####################################
done
Bytes transferred = 64453909 (3d77d15 hex)
Device 0: MT29F8G08ABBCAH4 ... is now current device

NAND erase: device 0 offset 0x1440000, size 0x6400000
Bad block table found at page 262080, version 0x01
Bad block table found at page 262016, version 0x01
Erasing at 0x7800000 -- 1895825408% complete..
OK

NAND write: device 0 offset 0x1440000, size 0x6400000
104857600 bytes written: OK
```

7. :

BRCM.XLP316Lite Rev B0.u-boot# **run set_bootpart_1**

1.5 : BRCM.XLP316Lite Rev B0.u-boot# **boot_system image1**

BRCM.XLP316Lite Rev B0.u-boot# **reset**

(U-Boot)

NAND . flash .

, , «version» CLI U-Boot, **:**

BRCM.XLP316Lite Rev B0.u-boot# **version**

BRCM.XLP.U-Boot:1.1.0.47 (29/11/2016 – 19:00:24)

:

1. U-Boot, **<Esc>**.

```
Configuring PoE...
distribution 1 dest_threshold 0xa drop_timer 0x0
Configuring POE in bypass mode
NAE configuration done!
initializing port 0, type 2.
initializing port 1, type 2.
SMC Endian Test:b81fb81f
nae-0, nae-1
  =======Skip: Load SYS UCORE for old 8xxB1/3xxB0 revision on default.
Hit any key to stop autoboot:  2
```

2. IP- TFTP-:

   BRCM.XLP316Lite Rev B0.u-boot# **setenv serverip 10.100.100.1**

   1.5 : BRCM.XLP316Lite Rev B0.u-boot# **serverip10.100.100.2**

3. IP- :

   BRCM.XLP316Lite Rev B0.u-boot# **setenv ipaddr 10.100.100.2**

   1.5 : BRCM.XLP316Lite Rev B0.u-boot# **ipaddr 10.100.100.2**

4. TFTP-:

   1.5 : BRCM.XLP316Lite Rev B0.u-boot# **uboot_file u-boot.bin**

5. «saveenv» .
6. :

   BRCM.XLP316Lite Rev B0.u-boot# **run upd_uboot**

   1.5 : BRCM.XLP316LiteRevB0.u-boot# **run tftp_update_uboot**

```
Using nae-1 device
TFTP from server 10.100.100.1; our IP address is 10.100.100.2
Filename 'esr1000/u-boot.bin'.
Load address: 0xa800000078020000
Loading: ##############################################################
done
Bytes transferred = 852648 (d02a8 hex)
SF: Detected MX25L12805D with page size 256, total 16777216 bytes
16384 KiB MX25L12805D at 0:0 is now current device
```

7. :

   BRCM.XLP316Lite Rev B0.u-boot# **reset**