ESR series service routers

ESR-10, ESR-12V, ESR-12VF, ESR-15, ESR-15R, ESR-15VF, ESR-20, ESR-21, ESR-30, ESR-31, ESR-100, ESR-200, ESR-1000, ESR-1200, ESR-1500, ESR-1511, ESR-1700, ESR-3100, ESR-3200, ESR-3200L, ESR-3300

Firmware version update guide

Firmware version 1.24

Contents

1 Introduction

1.1 Abstract

This guide provides instructions on how to update the firmware components of the ESR series service routers, considering the specific models and previous firmware versions of the device being updated.

1.2 Target audience

This guide is intended for technical personnel who perform device updates through the command line interface (CLI).

1.3 Document conventions

Typographic element	Description
[ ]	In the command line, optional parameters are shown in square brackets; when entered, they provide additional options.
{ }	In the command line, mandatory parameters are shown in curly braces. Select one of the parameters.
«,» **«-»**	In the command description, these characters are used to define ranges.
«|»	In the description of the command, this sign means "or".
<Semibold italic>	Keyboard keys are shown in bold italic within angle brackets.
`Text box`	Examples and results of the commands are given within the text boxes.

1.4 Notes and warnings

Notes contain important information, tips or recommendations on device operation and setup.

Warnings inform users about hazardous conditions which may cause injuries or device damage and may lead to the device malfunctioning or data loss.

The information contains information on the use of the device.

1.5 Files used for updating

Depending on the model and upgrade component, the following files should be used later in the instruction:

Device model	HW version	Firmware <firmware-file>	Secondary loader <uboot-file>	Primary loader <xload-file>
ESR-10	1v0 - 1vX	esr1x-1.24.9-build1.firmware	esr1x-1.24.5-build1.uboot	esr1x-1.24.5-build1.sbi
	2v0 - 2vX		esr1x-1.24.5-build1.spi_uboot	
ESR-12V	1v0 - 2v0	esr1x-1.24.9-build1.firmware	esr1x-1.24.5-build1.uboot	esr1x-1.24.5-build1.sbi
	2v1 - 5vX		esr1x-1.24.5-build1.spi_uboot	
ESR-12VF	1v0 - 2v0	esr1x-1.24.9-build1.firmware	esr1x-1.24.5-build1.uboot	esr1x-1.24.5-build1.sbi
	2v1 - 5vX		esr1x-1.24.5-build1.spi_uboot	
ESR-15	all	esr15-1.24.5-build5.firmware	esr15-1.24.5-build1.uboot	no
ESR-15R	all	esr15-1.24.5-build5.firmware	esr15-1.24.5-build1.uboot	no
ESR-15VF	all	esr15-1.24.5-build5.firmware	esr15-1.24.5-build1.uboot	no
ESR-20	all	esr2x-1.24.5-build5.firmware	esr2x-1.24.5-build1.uboot	esr2x-1.24.5-build1.bl1
ESR-21	all	esr2x-1.24.5-build5.firmware	esr2x-1.24.5-build1.uboot	esr2x-1.24.5-build1.bl1
ESR-30	all	esr3x-1.24.5-build5.firmware	esr3x-1.24.5-build1.uboot	no
ESR-31	all	esr3x-1.24.5-build5.firmware	esr3x-1.24.5-build1.uboot	no
ESR-100	all	esr200-1.24.5-build5.firmware	esr200-1.24.5-build1.uboot	esr200-1.24.5-build1.xload
ESR-200	all	esr200-1.24.5-build5.firmware	esr200-1.24.5-build1.uboot	esr200-1.24.5-build1.xload
ESR-1000	1v0 - 1v6	esr1000-1.24.5-build5.firmware	esr1000-1.24.5-build1.uboot	esr1000-1.24.5-build1.xload
	1v7 - 2vX			esr1000-1.24.5-build1.1v7.xload
ESR-1200	all	esr1200-1.24.5-build5.firmware	esr1200-1.24.5-build1.uboot	esr1200-1.24.5-build1.xload
ESR-1500	all	esr15xx-1.24.6-build3.firmware	esr15xx-1.24.6-build3.uboot	esr15xx-1.24.6-build3.xload

Device model	HW version	Firmware <firmware-file>	Secondary loader <uboot-file>	Primary loader <xload-file>
ESR-1511	all	esr15xx-1.24.6-build3.firmware	esr15xx-1.24.6-build3.uboot	esr15xx-1.24.6-build3.xload
ESR-1511 rev. B	all	esr15xx-1.24.6-build3.firmware	esr15xx-1.24.6-build3.uboot	esr15xx-1.24.6-build3.xload
ESR-1700	all	esr1700-1.24.5-build5.firmware	esr1700-1.24.5-build1.boot	no
ESR-3100	all	esr3100-1.24.5-build5.firmware	esr3100-1.24.5-build1.uboot	esr3100-1.24.5-build1.bdk
ESR-3200	all	esr3200-1.24.5-build5.firmware	esr3200-1.24.5-build1.uboot	esr3200-1.24.5-build1.bdk
ESR-3200L	all	esr3200-1.24.5-build5.firmware	esr3200-1.24.5-build1.uboot	esr3200-1.24.5-build1.bdk
ESR-3300	all	esr3300-1.24.5-build5.firmware	esr3300-1.24.5-build1.uboot	esr3200-1.24.5-build1.bdk

2 Creating a backup copy of the current configuration

Prior to initiating the firmware update on ESR service routers, it is necessary to create a backup of the current configuration.

Copying the current configuration from the ESR service router is possible both using remote file copying protocols and to locally connected USB/MMC storage.

When updating the firmware from version 1.0.1-1.1.0 it is important to use the "fs://running-config" section designation instead of "system:running config" section.

When updating from earlier versions of the firmware, the set of protocols for remote file copying and types of locally connected drives may differ.

When migrating from a newer version of the firmware to an older one (downgrade), it is possible that the older version of the firmware will not be able to apply the configuration saved in the newer version. As a result, the configuration will be lost and the ESR Service Router will boot with an empty configuration. With an empty configuration, you can only connect to the router using a console connection and the default login/password (admin/password).

2.1 Preparation

To create a backup copy of the current configuration of the service router using remote file copy servers, do the following:

1. Start the corresponding server on the PC/server in the network.
2. Provide the ability to save files in the server working directory.
3. Provide IP connectivity between the upgraded ESR service router and the remote file copy server (routing).
4. Ensure operation of the remote copy protocol between the ESR and the remote file copy server (intermediate firewalls).
5. If necessary (for FTP, SFTP, SCP, HTTP protocols), find out the username and password to write the required file.

To create a backup copy of the current configuration of the service router on a locally connected USB/MMC storage:

1. Format USB/MMC partition as FAT32.
2. Connect the USB/MMC storage to the appropriate ESR slot.

2.2 Copying configuration backup file

2.2.1 Using remote file copy protocols

Depending on the remote file copy protocol, one of the following commands must be executed in the CLI of the service router:

Configuration backup via TFTP protocol

```
esr# copy system:running-config tftp://<tftp-server-ip>:/<config-file-name>
```

Configuration backup via FTP protocol

```
esr# copy system:running-config ftp://<ftp-username>:<ftp-userpassword>@<ftp-server-ip>:/<config-file-name>
```

Configuration backup via SFTP protocol

```
esr# copy system:running-config sftp://<sftp-username>:<sftp-userpassword>@<sftp-server-ip>:/<config-file-name>
```

Configuration backup via SCP protocol

```
esr# copy system:running-config scp://<scp-username>:<scp-userpassword>@<scp-server-ip>:/<config-file-name>
```

Configuration backup via HTTP protocol

```
esr# copy system:running-config http://<http-username>:<http-userpassword>@<http-server-ip>:/<config-file-name>
```

- *<config-file-name>* — file name with which the current configuration of the service router will be saved;
- *<tftp-server-ip>* — IP address of the TFTP server in use;
- *<ftp-username>* — user name on the FTP server;
- *<ftp-userpassword>* — user password on the FTP server;
- *<ftp-server-ip>* — IP address of the FTP server in use;
- *<sftp-username>* — user name on the SFTP server;
- *<sftp-userpassword>* — user password on the SFTP server;
- *<sftp-server-ip>* — IP address of the SFTP server in use;
- *<scp-username>* — user name on the SCP server;
- *<ftp-userpassword>* — user password on the FTP server;
- *<scp-server-ip>* — IP address of the SCP server in use;
- *<http-username>* — user name on the HTTP server;
- *<http-userpassword>* — user password on the HTTP server;
- *<http-server-ip>* — IP address of the HTTP server in use.

2.2.2 To a locally connected USB/MMC storage

1. Define the volume label of the connected USB/MMC storage.

Defining the volume label name on a USB storage

```
esr# show storage-devices usb
Name                          Filesystem  Total, MB   Used, MB    Free, MB
----------------------------  ----------  ----------  ----------  ----------
<USB_DISK>                    vfat        7664.01     6391.69     1272.32
```

Defining the volume label name on an MMC storage

```
esr# show storage-devices mmc
Name                          Filesystem  Total, MB   Used, MB    Free, MB
----------------------------  ----------  ----------  ----------  ----------
<MMC_DISK>                    vfat        7664.01     6391.69     1272.32
```

2. Copy the file to the USB/MMC storage that is currently in use.

When executing copy commands to USB/MMC storage, instead of the <USB_DISK> or <MMC_DISK> fields, use the real volume labels defined in step 1.

Configuration backup to USB storage

```
esr# copy system:running-config usb://<USB_DISK>:/<config-file-name>
|****************************************| 100% (576B) Success!
```

Configuration backup to MMC storage

```
esr# copy system:running-config mmc://<MMC_DISK>:/<config-file-name>
|****************************************| 100% (576B) Success!
```

- *<config-file-name>* — file name with which the current configuration of the service router will be saved;
- *<USB_DISK>* — partition name on the USB storage;
- *<MMC_DISK>* — partition name on the MMC storage.

3 Restoring configuration from a backup

In case of configuration loss on the router due to operational issues, firmware update, or rollback to a previous firmware version, the router configuration can be restored using a previously created backup copy.

Copying a configuration backup to the ESR service router is possible both using remote file copying protocols and to locally connected USB/MMC storage.

When migrating from a newer version of the firmware to an older one (downgrade), it is possible that the older version of the firmware will not be able to apply the configuration saved in the newer version. As a result, the configuration will be lost and the ESR Service Router will boot with an empty configuration. With an empty configuration, you can only connect to the router using a console connection and the default login/password (admin/password).

3.1 Preparation

To restore the configuration of the service router from a backup copy using remote file copy servers, do the following:

1. Start the corresponding server on the PC/server on the network.
2. Place the file with the previously created backup copy of the router in the server working directory.
3. Configure the service router to establish IP connectivity with the remote file copy server.
4. Provide IP connectivity between the upgraded ESR service router and the remote file copy server (routing).
5. Ensure operation of the remote copy protocol between the ESR and the remote file copy server (intermediate firewalls).
6. If necessary (for FTP, SFTP, SCP, HTTP protocols), find out the username and password to write the required file.

To restore the service router configuration from a backup copy from a locally connected USB/MMC storage, do the following:

1. Format USB/MMC partition as FAT32.
2. File with a previously created backup copy of the service router configuration must be placed on the USB/MMC storage.
3. Connect the USB/MMC storage to the appropriate ESR slot.

3.2 Copying configuration backup file

3.2.1 Using remote file copy protocols

Depending on the protocol for remote file copying, run one of the following commands in the CLI of the service router:

Configuration backup via TFTP protocol

```
esr# copy tftp://<tftp-server-ip>:/<config-file-name> system:candidate-config
```

Configuration backup via FTP protocol

```
esr# copy ftp://<ftp-username>:<ftp-userpassword>@<ftp-server-ip>:/<config-file-name> system:candidate-config
```

Configuration backup via SFTP protocol

```
esr# copy sftp://<sftp-username>:<sftp-userpassword>@<sftp-server-ip>:/<config-file-name> system:candidate-config
```

Configuration backup via SCP protocol

```
esr# copy scp://<scp-username>:<scp-userpassword>@<scp-server-ip>:/<config-file-name> system:candidate-config
```

Configuration backup via HTTP protocol

```
esr# copy http://<http-username>:<http-userpassword>@<http-server-ip>:/<config-file-name> system:candidate-config
```

- *<config-file-name>* — name of the service router configuration backup file;
- *<tftp-server-ip>* — IP address of the TFTP server in use;
- *<ftp-username>* — user name on the FTP server;
- *<ftp-userpassword>* — user password on the FTP server;
- *<ftp-server-ip>* — IP address of the FTP server in use;
- *<sftp-username>* — user name on the SFTP server;
- *<sftp-userpassword>* — user password on the SFTP server;
- *<sftp-server-ip>* — IP address of the SFTP server in use;
- *<scp-username>* — user name on the SCP server;
- *<ftp-userpassword>* — user password on the FTP server;
- *<scp-server-ip>* — IP address of the SCP server in use;
- *<http-username>* — user name on the HTTP server;
- *<http-userpassword>* — user password on the HTTP server;
- *<http-server-ip>* — IP address of the HTTP server in use.

3.2.2 From locally connected USB/MMC storage

1. Define the volume label of the connected USB/MMC storage.

Defining the volume label name on a USB storage

```
esr# show storage-devices usb
Name                          Filesystem  Total, MB   Used, MB    Free, MB
----------------------------  ----------  ----------  ----------  ----------
<USB_DISK>                    vfat        7664.01     6391.69     1272.32
```

Defining the volume label name on a MMC storage

```
esr# show storage-devices mmc
Name                          Filesystem  Total, MB   Used, MB    Free, MB
----------------------------  ----------  ----------  ----------  ----------
<MMC_DISK>                    vfat        7664.01     6391.69     1272.32
```

2. Copy the file to the USB/MMC storage that is currently in use:

⚠ **When executing copy commands to USB/MMC storage, instead of the <USB_DISK> or <MMC_DISK> fields, use the real volume labels defined in step 1.**

Configuration backup to USB storage

```
esr# copy usb://<USB_DISK>:/<config-file-name> system:candidate-config
|****************************************| 100% (576B) Success!
```

Configuration backup to MMC storage

```
esr# copy mmc://<MMC_DISK>:/<config-file-name> system:candidate-config
|****************************************| 100% (576B) Success!
```

- *<config-file-name>* — name of the service router configuration backup file;
- *<USB_DISK>* — partition name on the USB storage;
- *<MMC_DISK>* — partition name on the MMC storage.

3.3 Applying and confirming the loaded configuration

To apply and confirm operation of the configuration loaded earlier in the "system:candidate-config" section, run the following commands:

Configuration backup to MMC storage

```
esr# commit
Configuration has been successfully applied and saved to flash. Commit timer started, changes will be.
esr# confirm
Configuration has been confirmed. Commit timer canceled.
```

4 Checking the current firmware version and secondary bootloader (U-boot) version

Currently used secondary bootloader (U-Boot) and main firmware versions can be checked:

- in the CLI of the main firmware;
- in the console interface output when loading the service router.

4.1 Checking current software version and version of the secondary bootloader (U-boot) in the main firmware CLI

To check the current firmware version and the version of the secondary bootloader (U-boot) in the CLI of the main software, execute the "**show version**" command:

Obtaining secondary bootloader and main firmware versions in CLI

```
esr# show version
Boot version:
 1.17.3.11 (date 14/11/2022 time 13:30:27)                    <-- secondary
bootloader (U-boot) version
SW version:
 1.17.3 build 11[a813b5c65] (date 14/11/2022 time 13:20:25) <-- active image
version of the service router main firmware
HW version:
 1v2                                                          <-- hardware
version of the service router
```

4.2 Checking the current firmware version and version of the primary (X-Loader, sbi, bl1) and secondary (U-boot) loaders in the output of the console interface when loading the service router

To check the current firmware version and the version of the secondary bootloader (U-boot) in the output of the console interface when loading the service router, do the following:

1. Connect to the ESR service router via the Console interface on the front panel of the router using the following parameters of the PC RS-232 interface:

- Baud rate: 115200 bps;
- Data bits: 8 bits;
- Parity: no;
- Stop bits: 1;
- Flow control: no.

2. Reboot the router using one of the following methods:

- Switch the power off and then switch it back on. The interval between switching off and on must be at least 20 seconds.
- Briefly press the function button F on the front panel of the router (on the side panel for ESR-10).
- Execute the "**reload system**" command in the CLI of the main firmware of the router.

Reboot using a command in the main firmware CLI

```
esr-21# reload system
Do you really want to reload system ? (y/N): y
```

3. During the loading, information about the versions will be displayed in the console:
   - Primary loader (sbi, bl1 or X-loader depending on the router model):

Primary bootloader version on ESR-10/12v/12vf/15

```
SBI:1.17.3.11  (14/11/2022 - 12:55:55)
  Chip is NSP B1
  Booting from SPI-NOR
```

Primary bootloader version on ESR-20/21/30

```
INFO: mdio_update: phy_id 4, addr 9, value 0x120c
INFO: mdio_update: phy_id 2, addr 0, value 0x808
BL1:1.17.3.9  (01/11/2022 - 18:40:36)
INFO: BL1: RAM 0x6517a800 - 0x65180000
INFO: Using crypto library 'mbed TLS'
```

Primary bootloader version on ESR-100/200/1000/1200/1500/1511/1700/3100/3200

```
BRCM XLP Stage 1 Loader (X-Loader:1.17.3.11) [Big-Endian] (14/11/2022 -
13:21:58)
XLP316B2: Node 0 frequency: CPU=1400MHz, SOC=1999MHz, REF=133MHz
POWER ON RESET CFG:43F94FA8,VRM: 0x6868, PRID: 0xC1104
```

- Secondary bootloader (U-boot):

Secondary bootloader version

```
INFO: Entry point address = 0x85000000
INFO: SPSR = 0x3c9
U-Boot:1.17.3.9 (01/11/2022 - 18:40:36)
       Watchdog enabled
```

- Main firmware version:

Main firmware version

```
[ 0.000000] Initializing cgroup subsys cpu
[ 0.000000] Initializing cgroup subsys cpuacct
[ 0.000000] Software version: 1.14.5 build 6[596cabe53] date 20/04/2022 time
11:37:10
```

5 Firmware update via CLI of the ESR main firmware

5.1 Firmware update from version 1.17.2 to 1.23.8

The firmware of the current version is cumulative (it contains updated versions of the primary and secondary loaders). Firmware versions 1.17.2 and later support cumulative updating of all software components, so it will be enough to:

- Upload the firmware (firmware file) to the ESR service router.
- Select the firmware image of the updated version for the next upload.

> Turning off the power before the **boot system {mage-1|image-2}** command completes may cause the router to malfunction.

- Reboot the service router.

5.1.1 Configuration preparation when updating from versions 1.13.x - 1.23.x

Before updating firmware from versions 1.13.x to 1.20.x to versions 1.23.6 to 1.24.9, it is necessary to consider the change in the mode of operation of IPsec tunnels in DMVPN circuits.

Up to and including version 1.20.x, IPsec in DMVPN schemes could be used in both tunnel and transport modes. However, starting with version 1.23.6, the transport mode of IPsec becomes the only mode supported in DMVPN schemes.

Accordingly, when updating the software, the **mode transport** command will be added to the "security ipsec vpn" configuration objects specified in the GRE tunnel configurations in multipoint mode, changing the IPsec tunnel operation mode. In case the command was already present in the IPsec VPN configuration, there will be no change. An example of a configuration update is shown below, other GRE and IPsec VPN tunnel settings are omitted:

Configuration on firmware versions 1.13.x-1.20.x	**Configuration on firmware versions 1.23.6-1.24.9**

`tunnel gre 1`
`  ip nhrp ipsec IPSEC_VPN_SPOKES dynamic`
`  ip nhrp ipsec IPSEC_VPN_HUB_1 static`
`  ip nhrp ipsec IPSEC_VPN_HUB_2 static`
`exit`
 	
`security ipsec vpn IPSEC_VPN_HUB_1`
`  enable`
`exit`
`security ipsec vpn IPSEC_VPN_HUB_2`
`  enable`
`exit`
`security ipsec vpn IPSEC_VPN_SPOKES`
`  enable`
`exit`
	`tunnel gre 1`
	`  ip nhrp ipsec IPSEC_VPN_SPOKES dynamic`
	`  ip nhrp ipsec IPSEC_VPN_HUB_1 static`
	`  ip nhrp ipsec IPSEC_VPN_HUB_2 static`
	`exit`
	
	`security ipsec vpn IPSEC_VPN_HUB_1`
	`  type transport`
	`  enable`
	`exit`
	`security ipsec vpn IPSEC_VPN_HUB_2`
	`  type transport`
	`  enable`
	`exit`

Configuration on firmware versions 1.13.x-1.20.x	Configuration on firmware versions 1.23.6-1.24.9

	security ipsec vpn IPSEC_VPN_SPOKES
	  type transport
	  enable
	exit

tunnel gre 1
  ip nhrp ipsec IPSEC_VPN_SPOKES dynamic
  ip nhrp ipsec IPSEC_VPN_HUB_1 static
  ip nhrp ipsec IPSEC_VPN_HUB_2 static
exit
 	
security ipsec vpn IPSEC_VPN_HUB_1
  type transport
  enable
exit
security ipsec vpn IPSEC_VPN_HUB_2
  type transport
  enable
exit
security ipsec vpn IPSEC_VPN_SPOKES
  type transport
  enable
exit
	tunnel gre 1
	  ip nhrp ipsec IPSEC_VPN_SPOKES dynamic
	  ip nhrp ipsec IPSEC_VPN_HUB_1 static
	  ip nhrp ipsec IPSEC_VPN_HUB_2 static
	exit
	
	security ipsec vpn IPSEC_VPN_HUB_1
	  type transport
	  enable
	exit
	security ipsec vpn IPSEC_VPN_HUB_2
	  type transport
	  enable
	exit
	security ipsec vpn IPSEC_VPN_SPOKES
	  type transport
	  enable
	exit

Therefore, before updating an ESR running as part of the DMVPN cloud, you must:

1. Update the ESR routers in the DMVPN cloud to versions 1.23.6-1.24.9.
2. Reconfigure the IPsec used in the DMVPN cloud to transport mode of operation on those ESRs that will not be updated to versions 1.23.6-1.24.9.
3. Reconfigure the IPsec used in the DMVPN cloud to work in transport mode on third-party equipment.

5.1.2 Preparation for firmware upload

When uploading firmware using remote file copy servers, it is necessary:

1. Start the corresponding server on the network (TFTP/FTP/SFTP/HTTP/HTTPS/SCP).
2. Copy the firmware file (<firmware-file>) to the working section of the Remote File Upload Server. The required file names, depending on the router model and hardware version, are listed in the "Files used for updating" section.
3. Provide IP connectivity between the upgraded ESR service router and the remote file copy server (routing).
4. Ensure operation of the remote copy protocol between the ESR and the remote file copy server (intermediate firewalls).
5. If necessary (for FTP, SFTP, SCP, HTTP protocols), find out the username and password to download the required file.

When loading the software using a USB/MMC storage:

1. Format USB/MMC storage partition as FAT32 or exFAT.
2. Copy firmware file (<firmware-file>) to the root directory of the USB/MMC storage. The required file names, depending on the router model and hardware version, are listed in the "Files used for updating" section.
3. Connect the USB/MMC storage to the appropriate ESR slot.
4. Define the volume label of the connected USB/MMC storage.

5.1.3 Firmware upload

5.1.3.1 Using one of the remote file upload protocols

Firmware upload via TFTP

```
esr# copy tftp://<tftp-server-ip>:/<firmware-file> system:firmware
|****************************************| 100% (0B) Firmware updated
successfully.
```

Firmware upload via FTP

```
esr# copy ftp://<ftp-username>:<ftp-userpassword>@<ftp-server-ip>:/<firmware-
file> system:firmware
|****************************************| 100% (0B) Firmware updated
successfully.
```

Firmware upload via SFTP

```
esr# copy sftp://<sftp-username>:<sftp-userpassword>@<sftp-server-ip>:/
<firmware-file> system:firmware
|****************************************| 100% (0B) Firmware updated
successfully.
```

Firmware upload via SCP

```
esr# copy scp://<scp-username>:<scp-userpassword>@<scp-server-ip>:/<firmware-file> system:firmware
```

```
|****************************************| 100% (0B) Firmware updated successfully.
```

Firmware upload via HTTP

```
esr# copy http://<http-username>:<http-userpassword>@<http-server-ip>:/<firmware-file> system:firmware
```

```
|****************************************| 100% (0B) Firmware updated successfully.
```

Firmware upload via HTTPS

```
esr# copy https://<https-username>:<https-userpassword>@<http-server-ip>:/<firmware-file> system:firmware
```

```
|****************************************| 100% (0B) Firmware updated successfully.
```

- *<tftp-server-ip>* — IP address of the TFTP server in use;
- *<ftp-username>* — user name on the FTP server;
- *<ftp-userpassword>* — user password on the FTP server;
- *<ftp-server-ip>* — IP address of the FTP server in use;
- *<sftp-username>* — user name on the SFTP server;
- *<sftp-userpassword>* — user password on the SFTP server;
- *<sftp-server-ip>* — IP address of the SFTP server in use;
- *<scp-username>* — user name on the SCP server;
- *<ftp-userpassword>* — user password on the FTP server;
- *<scp-server-ip>* — IP address of the SCP server in use;
- *<http-username>* — user name on the HTTP server;
- *<http-userpassword>* — user password on the HTTP server;
- *<http-server-ip>* — IP address of the HTTP server in use.

Rules for using firmware files for different models are listed in the "Preparation for firmware upload" section.

5.1.3.2 Using a USB/MMC srorage

1. Define the volume label of the connected USB/MMC storage:

Defining the volume label name of the USB storage

```
esr# show storage-devices usb
Name                          Filesystem  Total, MB   Used, MB    Free, MB
----------------------------  ----------  ----------  ----------  ----------
<USB_DISK>                    vfat        7664.01     6391.69     1272.32
```

Defining the volume label name of the MMC storage

```
esr# show storage-devices mmc
Name                          Filesystem  Total, MB   Used, MB    Free, MB
----------------------------  ----------  ----------  ----------  ----------
<MMC_DISK>                    vfat        7664.01     6391.69     1272.32
```

2. Copying file from the USB/MMC storage:

⚠ **When executing copy commands to USB/MMC storage, instead of the <USB_DISK> or <MMC_DISK> fields, use the real volume labels defined above.**

Upload software from USB

```
esr# copy usb://<USB_DISK>:/<firmware-file> system:firmware
|****************************************| 100% (73786kB) Firmware updated
successfully
```

Upload software from MMC

```
esr# copy mmc://<MMC_DISK>:/<firmware-file> system:firmware
|****************************************| 100% (73786kB) Firmware updated
successfully.
```

- *<USB_DISK>* – partition name on the USB storage;
- *<MMC_DISK>* – partition name on the MMC storage.

5.1.4 Selecting the firmware image of the updated version for the next upload

ESR service routers store two firmware images (image-1 and image-2) at the same time.

1. Check the contents of the firmware images uploaded to the service router:

```
esr# show bootvar
Image  Version                    Date                  Status        After
reboot
-----  -------------------------  --------------------  ------------
------------
1      1.24.5 build               date 05/12/2024 time  Not Active
       5[b61a52dfa0]              10:37:19
2      1.17.3 build               date 14/11/2022 time  Active        *
       11[a813b5c65]              12:51:54
```

When loading a firmware file into the system:firmware partition, the upload is always made to the currently inactive (`Not Active`) partition.

2. Select the partition containing the updated version firmware as the boot partition:

Select firmware section for boot

```
esr# boot system image-1
This command cannot be interrupted, do not turn off device during process.
Continue? (y/N): y
2000-01-07T18:51:19+00:00 %FILE_MGR-I-INFO: operation started: 'boot system
image-1' (index: 4, origin : CLI)
2000-01-07T18:51:22+00:00 %FIRMWARE-I-INFO: Writing data...
2000-01-07T18:51:31+00:00 %FIRMWARE-I-INFO: Writing data...
2000-01-07T18:51:37+00:00 %FILE_MGR-I-INFO: operation is finished: 'boot
system image-1' (index: 4, or igin: CLI)
Boot image set successfully.
```

Do not power off the router while the **boot system {mage-1|image-2}** command is being executed. Turning off the power before the **boot system {mage-1|image-2}** command is finished may cause the router to malfunction.

3. Check that the image containing the updated firmware version is selected for boot:

```
esr# show bootvar
Image  Version                    Date                  Status        After
reboot
-----  -------------------------  --------------------  ------------
------------
1      1.24.5 build               date 05/12/2024 time   Not Active    *
       5[b61a52dfa0]              10:37:19
2      1.17.3 build               date 14/11/2022 time  Active
       11[a813b5c65]              12:51:54
```

If a firmware version older than the firmware currently in use is chosen to be uploaded at a later time, then after rebooting, it will not be possible to convert the current configuration, and an empty configuration (without factory settings) will be applied. With an empty configuration, the router can only be accessed using the console connection and the default login/password (admin/password).

5.1.5 Rebooting the service router

Reboot the service router using the following command:

Reboot the router via CLI of the main firmware

```
esr# reload system
Do you really want to reload system ? (y/N): y
```

5.2 Firmware update from versions 1.4.4–1.17.1 (for ESR-1500/1511 1.8.7–1.17.1)

Firmware update from versions 1.4.4-1.17.1 for ESR-2x is performed via intermediate version 1.20.4. It is necessary to update secondary bootloader (U-boot) and firmware (firmware-file) to version 1.20.4. The firmware (U-boot, firmware) is available on the official web-site in the Documents and files tab.

Unlike firmware version 1.17.2 and later, earlier versions do not support cumulative updating. Therefore, in addition to the main firmware, in some cases it is necessary to update the secondary bootloader. As a result, the update process will be as follows:

- Upload the secondary bootloader (U-boot) to the ESR service router.
- Load firmware (firmware file) to the ESR service router.
- Select the firmware image of the updated version for the next upload.
- Reboot the service router.

Updating the secondary bootloader (Uboot) is required if the current version of the secondary bootloader is in the range 1.0.0 - 1.12.x
If the current version of the secondary bootloader (U-boot) is in the range 1.13.0 - 1.23.6 it is not required to update the secondary bootloader (U-boot).

When updating from earlier versions of the firmware, the set of protocols for remote file copying and types of locally connected drives may differ.

To update the firmware of ESR-3100 routers from version 1.14.x it is necessary to open a request to the technical support service using the platform https://servicedesk.eltex-co.ru/ or application form on the official website https://eltex-co.ru/support/.

5.2.1 Preparing the configuration when updating from versions 1.4.x and earlier

Before updating firmware from versions 1.0.1 - 1.4.x to version 1.6.x - 1.24.9, it is necessary to take into account changes in operation modes of physical interfaces.

For physical interfaces starting from firmware version 1.6.2, the default routed port mode is:

```
interface gigabitethernet 1/0/1
  mode routerport
exit
```

During firmware update, the switched port modes will be removed from the physical ports, for example:

Configuration on firmware versions 1.0.1 - 1.4.x	Configuration on firmware versions 1.6.2 - 1.24.9

interface gigabitethernet 1/0/1
  description "WAN"
  switchport mode trunk
  switchport trunk allowed vlan add 150
exit
interface gigabitethernet 1/0/1.200
  ip firewall disable
exit
	interface gigabitethernet 1/0/1
	  description "WAN"
	exit
	interface gigabitethernet 1/0/1.200
	  ip firewall disable
	exit

interface gigabitethernet 1/0/1
  description "WAN"
  switchport forbidden default-vlan
  switchport access vlan 10
exit
interface gigabitethernet 1/0/1.200
  bridge-group 1
exit
	interface gigabitethernet 1/0/1
	  description "WAN"
	exit
	interface gigabitethernet 1/0/1.200
	  bridge-group 1
	exit

5.2.2 Preparation for firmware upload (firmware and secondary bootloader)

When uploading firmware using remote file copy servers, it is necessary:

1. Start the corresponding server on the network (TFTP/FTP/SFTP/HTTP/HTTPS/SCP).
2. Copy the firmware and secondary bootloader files (<firmware-file> and <uboot-file>) to the working directory of the remote file copy server. The required file names, depending on the router model and hardware version, are listed in the "Files used for updating" section.
3. Provide IP connectivity between the upgraded ESR service router and the remote file copy server (routing).
4. Ensure operation of the remote copy protocol between the ESR and the remote file copy server (intermediate firewalls).
5. If necessary (for FTP, SFTP, SCP, HTTP protocols), find out the username and password to write the required file.

When loading the software using a USB/MMC storage:

1. Format USB/MMC storage partition as FAT32 or exFAT (supported starting from 1.13.0 firmware version).
2. Copy the firmware and secondary bootloader files (<firmware-file> and <uboot-file>) to the root directory of the USB/MMC storage. The required file names, depending on the router model and hardware version, are listed in the"Files used for updating" section.
3. Connect the USB/MMC storage to the appropriate slot on the service router.
4. Define the volume label of the connected USB/MMC storage.

5.2.3 Firmware files and secondary bootloader upload (<firmware-file> and <uboot-file>)

5.2.3.1 Using one of the remote file upload protocols

Firmware upload via TFTP

```
esr# copy tftp://<tftp-server-ip>:/<firmware-file> system:firmware
|****************************************| 100% (0B) Firmware updated
successfully.
esr# copy tftp://<tftp-server-ip>:/<uboot-file> system:boot-2
|****************************************| 100% (697kB) Bootloader updated
successfully.
```

Firmware upload via FTP

```
esr# copy ftp://<ftp-username>:<ftp-userpassword>@<ftp-server-ip>:/<firmware-
file> system:firmware
|****************************************| 100% (0B) Firmware updated
successfully.
```

```
esr# copy ftp://<ftp-username>:<ftp-userpassword>@<ftp-server-ip>:/<uboot-file> system:boot-2
|****************************************| 100% (697kB) Bootloader updated successfully.
```

Firmware upload via SFTP

```
esr# copy sftp://<sftp-username>:<sftp-userpassword>@<sftp-server-ip>:/<firmware-file> system:firmware
|****************************************| 100% (0B) Firmware updated successfully.
esr# copy sftp://<sftp-username>:<sftp-userpassword>@<sftp-server-ip>:/<uboot-file> system:boot-2
|****************************************| 100% (697kB) Bootloader updated successfully.
```

Firmware upload via SCP

```
esr# copy scp://<scp-username>:<scp-userpassword>@<scp-server-ip>:/<firmware-file> system:firmware
|****************************************| 100% (0B) Firmware updated successfully.
esr# copy scp://<scp-username>:<scp-userpassword>@<scp-server-ip>:/<uboot-file> system:boot-2
|****************************************| 100% (697kB) Bootloader updated successfully.
```

Firmware upload via HTTP

```
esr# copy http://<http-username>:<http-userpassword>@<http-server-ip>:/<firmware-file> system:firmware
|****************************************| 100% (0B) Firmware updated successfully.
```

```
esr# copy http://<http-username>:<http-userpassword>@<http-server-ip>:/
<uboot-file> system:boot-2
```

```
|****************************************| 100% (697kB) Bootloader updated
successfully.
```

Firmware upload via HTTPS

```
esr# copy https://<https-username>:<https-userpassword>@<http-server-ip>:/
<firmware-file> system:firmware
```

```
|****************************************| 100% (0B) Firmware updated
successfully.
```

```
esr# copy https://<https-username>:<https-userpassword>@<http-server-ip>:/
<uboot-file> system:boot-2
```

```
|****************************************| 100% (697kB) Bootloader updated
successfully.
```

- *<tftp-server-ip>* — IP address of the TFTP server in use;
- *<ftp-username>* — user name on the FTP server;
- *<ftp-userpassword>* — user password on the FTP server;
- *<ftp-server-ip>* — IP address of the FTP server in use;
- *<sftp-username>* — user name on the SFTP server;
- *<sftp-userpassword>* — user password on the SFTP server;
- *<sftp-server-ip>* — IP address of the SFTP server in use;
- *<scp-username>* — user name on the SCP server;
- *<ftp-userpassword>* — user password on the FTP server;
- *<scp-server-ip>* — IP address of the SCP server in use;
- *<http-username>* — user name on the HTTP server;
- *<http-userpassword>* — user password on the HTTP server;
- *<http-server-ip>* — IP address of the HTTP server in use.

Rules for using firmware and secondary bootloader (U-boot) for different models see in section "Preparation for firmware upload (firmware and secondary bootloader)".

5.2.3.2 Using USB/MMC storage

1. Define the volume label of the connected USB/MMC storage:

Defining the volume label name on a USB storage

```
esr# show storage-devices usb
Name                          Filesystem  Total, MB   Used, MB    Free, MB
----------------------------  ----------  ----------  ----------  ----------
<USB_DISK>                    vfat        7664.01     6391.69     1272.32
```

Defining the volume label name of the MMC storage

```
esr# show storage-devices mmc
Name                          Filesystem  Total, MB   Used, MB    Free, MB
----------------------------  ----------  ----------  ----------  ----------
<MMC_DISK>                    vfat        7664.01     6391.69     1272.32
```

2. Copying file from the USB/MMC storage

⚠ **When executing copy commands to USB/MMC storage, instead of the <USB_DISK> or <MMC_DISK> fields, use the real volume labels defined above.**

Load firmware from USB

```
esr# copy usb://<USB_DISK>:/<firmware-file> system:firmware
|****************************************| 100% (73786kB) Firmware updated successfully
esr# copy usb://<USB_DISK>:/<uboot-file> system:boot-2
|****************************************| 100% (697kB) Bootloader updated successfully.
```

Load firmware from MMC

```
esr# copy mmc://<MMC_DISK>:/<firmware-file> system:firmware
|****************************************| 100% (73786kB) Firmware updated successfully.
```

```
esr# copy usb://<MMC_DISK>:/<uboot-file> system:boot-2
|****************************************| 100% (697kB) Bootloader updated
successfully.
```

- *<USB_DISK>* — partition name on the USB storage;
- *<MMC_DISK>* — partition name on the MMC storage.

5.2.4 Selecting the firmware image of the updated version for the next upload

ESR service routers store two firmware images (image-1 and image-2) at the same time.

1. Check the contents of the firmware images uploaded to the service router:

```
esr# show bootvar
Image  Version                    Date                  Status        After
reboot
-----  -------------------------  --------------------  ------------
------------
1      1.24.5 build               date 05/12/2024 time  Not Active
       5[b61a52dfa0]              10:37:19


2      1.14.5 build 5[596cabe53]  date 20/04/2022 time  Active        *
                                  11:37:26
```

When loading a firmware file to the system:firmware partition, the upload is always made to the currently inactive partition.

2. Select the partition containing the updated version firmware as the boot partition:

Selecting firmware section to upload

```
esr# boot system image-1
Do you really want to set boot system image? (y/N): y
```

3. Check that the image containing the updated version firmware is selected for uploading:

```
esr# show bootvar
Image  Version                    Date                  Status        After
reboot
-----  -------------------------  --------------------  ------------
------------
```

```
1       1.24.5 build                date 05/12/2024 time  Not Active    *
        5[b61a52dfa0]               10:37:19

2       1.14.5 build 5[596cabe53]   date 20/04/2022 time  Active
                                    11:37:26
```

If a firmware version older than the firmware currently in use is chosen to be uploaded at a later time, then after rebooting, it will not be possible to convert the current configuration, and an empty configuration (without factory settings) will be applied. With an empty configuration, the router can only be accessed using the console connection and the default login/password (admin/password).

5.2.5 Rebooting the service router

Reboot the service router using the command:

Reboot the router via CLI of the main firmware

```
esr# reload system
Do you really want to reload system ? (y/N): y
```

5.3 Firmware update from version 1.4.3 (for ESR-1500/1511 1.8.6) and earlier to an intermediate version

When updating from earlier versions of the firmware, the set of protocols for remote file copying and types of locally connected drives may differ.

Table of models and firmware versions that require update via an intermediate version:

Device model	Firmware version
ESR-10	1.0.1 - 1.4.3
ESR-12V	1.0.1 - 1.4.3
ESR-12VF	1.0.1 - 1.4.3
ESR-100	1.0.1 - 1.4.3
ESR-200	1.0.1 - 1.4.3
ESR-1500	1.0.1 - 1.8.6

When updating firmware on service routers of models and firmware versions listed in the table above, the new firmware version will not be loaded, resulting in an error of the following type:

```
esr-12vf# copy tftp://<tftp-server-ip>:/<firmware-file> system:firmware
|****************************************| 100% (71907kB) Unsupported
board.
```

The problem is explained by the fact that in versions 1.6.0 (for ESR-10/12V/12VF/100/200) and 1.9.0 (for ESR-1500/1511) there was a merge of firmware images and bootloaders for service router models of similar hardware platforms.

To update service router firmware from versions listed in the table above, first update the firmware to an intermediate version. In this case, there is no need to update the loaders.

The update process will be the same as the one described in the "Firmware update version 1.17.2-1.23.8" section with the following differences:

- The following files must be used as firmware files when booting:
  - *For ESR-10* — esr10-1.4.4-build8.firmware;
  - *For ESR-12V* — esr12v-1.4.4-build5.firmware;
  - *For ESR-12VF* — esr10vf-1.4.4-build5.firmware;
  - *For ESR-100* — esr100-1.4.4-build4.firmware;
  - *For ESR-200* — esr200-1.4.4-build5.firmware;
  - *For ESR-1500* — esr1500-1.8.7-build4.firmware.
- If the current firmware version on service router in the range 1.0.1 - 1.1.0, then use the "fs://firmware" section designation instead of the "system:firmware" section.

After updating to an intermediate version of the firmware, make sure that the update was successful. Next, update the firmware according to the procedure described in the section "Firmware update from versions 1.4.4–1.17.1 (for ESR-1500/1511 1.8.7–1.17.1)".

6 Firmware update on ESR-1000 from version 1.0.1 - 1.0.6

When updating ESR-1000 from version 1.0.6 and earlier, the version of the primary loader (X Loader) must be taken into account. Check the current X-loader version using the method described in the section "Checking the current firmware version and the version of the primary (X-Loader) and secondary (U-boot) loaders in the output of the console interface when loading the service router".

If the current X-Loader version is 1.0.5 or earlier, the update is only possible using CLI of the secondary bootloader (U-boot):

1. Disconnect cables from all ESR-1000 interfaces.
2. Connect a PC with an installed TFTP server to the gi 1/0/1 interface.
3. Create a subdirectory named "esr1000" in the working directory of the TFTP server.
4. Copy the following files to the "esr1000" subdirectory "Files used for updating" and rename them:

- rename the <firmware-file> file to firmware;
- rename the <uboot-file> file to u-boot.bin;
- rename the <xload-file> file required for the corresponding HW version of the router to xload.bin.

5. Connect to the ESR service router via console port on the front panel of the router using the following RS-232 interface parameters on PC:

- Baud rate: 115200 bps;
- Data bits: 8 bits;
- Parity: no;
- Stop bits: 1;
- Flow control: no.

6. Reboot the router using one of the following methods:

- Switch the power off and then switch it back on. The interval between switching off and on must be at least 20 seconds.
- Briefly press the function button F on the front panel of the router (on the side panel for ESR-10).
- Execute the **reload system** command in the CLI of the main firmware of the router.

Reboot using a command in the main firmware CLI

```
esr-21# reload system
Do you really want to reload system ? (y/N): y
```

7. After appearance of a message of the following type:

```
Temp: MAX6657 temperature (int) 38 C
Temp: MAX6657 temperature (ext) 64 C
Temp: LM75/0 temperature (PHYs 1G) 33 C
Temp: LM75/1 temperature (SFP+ 10G) 31 C
Temp: LM75/2 temperature (Switch) 43 C
Hit any key to stop autoboot: 0
```

Press the "Esc" button.

8. Configure the IP parameters to establish communication with the connected PC in the CLI of the secondary bootloader (U-boot).

Assign IP address to the router

```
BRCM.XLP316Lite Rev B2.u-boot# setenv ipaddr 192.0.2.1
```

Specify IP address assigned on the interface connected to gi1/0/1 of the router

```
BRCM.XLP316Lite Rev B2.u-boot# setenv serverip 192.0.2.2
```

IP addresses of the PC and the router may differ from those shown in the example above, but must be from the same /24 subnet.

9. Load files of primary (X-Loader) and secondary (U-boot) bootloaders and main firmware:

Loading secondary bootloader (U-boot)

```
BRCM.XLP316Lite Rev B2.u-boot# run tftp_update_uboot
Using nae-0-1 device
TFTP from server 192.0.2.2; our IP address is 192.0.2.1
Filename 'esr1000/u-boot.bin'.
Load address: 0xa800000078020000
Loading: TftpStart:TftpTimeoutMsecs = 10000, TftpTimeoutCountMax = 6
#################################################################
done
Bytes transferred = 981776 (efb10 hex)
SF: Detected MX25L12805D withpagesize 256, total 16777216 bytes
0x4000 KiB MX25L12805D at 0:0 isnowcurrentdevice
U-Boot update OK
```

Loading primary loader (X-Loader)

```
BRCM.XLP316Lite Rev B2.u-boot# run tftp_update_xload
Using nae-0-1 device
TFTP from server 192.0.2.2; our IP address is 192.0.2.1
Filename 'esr1000/xload.bin'.
Load address: 0xa800000078000000
```

```
Loading: Tftp Start: Tftp Timeout Msecs = 10000, Tftp Timeout Count Max = 6
#########
done
1. Bytes transferred = 123096 (1e0d8 hex)
SF: Detected MX25L12805D with page size 256, total 16777216 bytes
0x4000 KiB MX25L12805D at 0:0 is now current device
X-Loader update OK
```

Loading main firmware

```
BRCM.XLP316Lite Rev B2.u-boot# run tftp_update_image1
Using nae-0-1 device
TFTP fromserver 115.0.0.10; our IP address is 115.0.0.1
Filename 'esr1000/firmware'.
Load address: 0xa800000060000000
Loading: Tftp Start:Tftp Timeout Msecs = 10000, Tftp Timeout Count Max =
6#################################################################
.........
########################################
done
Bytes transferred = 59767378 (38ffa52 hex)
Device 0: MT29F8G08ABBCAH4 ... is now current device
NAND erase: device 0 offset 0x1440000, size 0x6400000
Erasingat 0x7800000 -- 1895825408% complete..
OK
NAND write: device 0 offset 0x1440000, size 0x6400000
104857600 bytes written: OK
Firmware update OK
```

10. Specify the first image to boot:

```
BRCM.XLP316Lite Rev B2.u-boot# run set_bootpart_1
SF: Detected MX25L12805D with page size 256, total 16777216 bytes
0x4000 KiB MX25L12805D at 0:0 is now current device
```

11. Reboot the router by switching the power off and then on. The interval between switching off and on must be at least 20 seconds.

TECHNICAL SUPPORT

For technical assistance in issues related to handling Eltex Ltd. equipment, please, address to Service Center of the company:

http://www.eltex-co.com/support

You are welcome to visit Eltex official website to get the relevant technical documentation and software, to use our knowledge base or consult a Service Center Specialist in our technical forum.

http://www.eltex-co.com/

http://www.eltex-co.com/support/downloads/