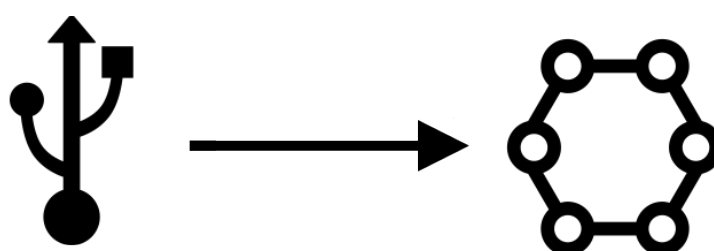


USB to Network firmware upgrade quick guide

Author:

DD




SUMMARY

This document is a comprehensive guide to upgrading 4EVAC system devices in order to enable firmware updates over network.

REVISION AND APPROVAL

Rev.	Date	Nature of Changes	Approved By
01	18-12-2017	Original draft	DD

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1. Firmware update

Every once in a while, 4EVAC releases new version of system firmware, where bugfixes and new functionality is implemented. In order to improve system stability and enable new features, users should update 4EVAC firmware, according to a simple procedure.

All 4EVAC devices are by default programmed with capability to update firmware via USB port. Firmware update procedure via USB is very straightforward, but requires direct physical access of the user to every device's USB port, as well as full power-down/power-up cycle (physical unplugging network cables).

In order to improve firmware update process, especially in case of large system setups, 4EVAC created alternative software, which enables each device to be programmed via L-Net (Local network). Network firmware update has access from any point in the network (single L-Net port) to all devices in the network, simultaneously. Firmware update over network can improve system service and maintenance by reducing time and effort spent for firmware updates.

2. Bootloader explained

4EVAC devices are equipped with flash memory for storing program executable code. There are two programs in every device stored in two different protected sections of flash memory:

- **Firmware:** it is the main program which the device is executing while running in normal operation mode;
- **Bootloader:** it is the initiating program. It serves two purposes:
 - o Booting firmware: load and run firmware program from firmware section of flash memory upon device start up (firmware booting);
 - o Updating firmware: listen to an interface for PC connection and enable firmware section of flash memory to be overwritten.


There are two types of bootloader available for each device:

- USB bootloader: listens to USB port for PC connection;
- Network bootloader: listens to L-Net port for PC connection (available from software version 5.2 and up).

All 4EVAC devices before shipping are factory-flashed with USB bootloader + USB Firmware (unless instructed otherwise by customer). Customers / users can easily perform upgrade procedure by themselves, following this instruction.


Main benefit of USB to Network upgrade is that every next firmware update can take place over network for all devices simultaneously, instead of replacing firmware file via USB, for each device separately.

NOTE: Both types of devices (with USB bootloader and Network bootloader) work together in the same network normally and are configured in normal way, using 4EVAC Manager. It's only firmware update procedure that is different for those two types.

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CAUTION: Upgrade from USB bootloader to Network bootloader is a one-time operation and cannot be reversed!

If a device was unintendedly upgraded to Network bootloader, or failed during upgrade procedure, it must be returned to 4EVAC. Please contact 4EVAC support in such case.

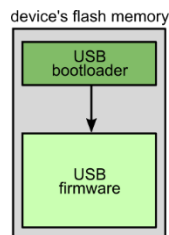
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3. Instruction for USB to Network firmware upgrade

Make sure you have following prepared:

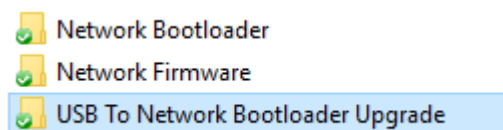
- PC running Windows OS
- USB A-B cable (i.e. printer cable)
- USB A -mini B cable (i.e. mini USB cable)
- 4EVAC USB to L-Net RS422 adapter (little black box)
 - o L-Net adapter must be recognized by your Windows as a COM port. In case of problem with driver, please contact 4EVAC;
- Latest 4EVAC software pack (ZIP archive, ver. 5.2 or higher), including following folders with binary files:
 - o USB to Network Bootloader Upgrade
 - o Network Bootloader
 - o Network Firmware


We begin with a factory USB-enabled device, which can be flashed only via USB.

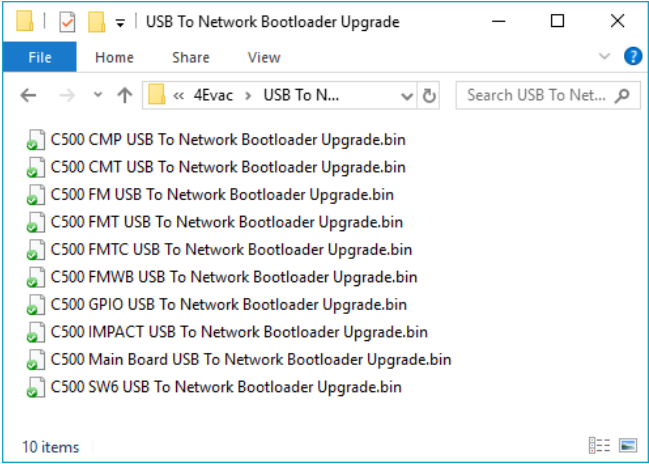


1. Replace USB firmware with upgrade file via USB

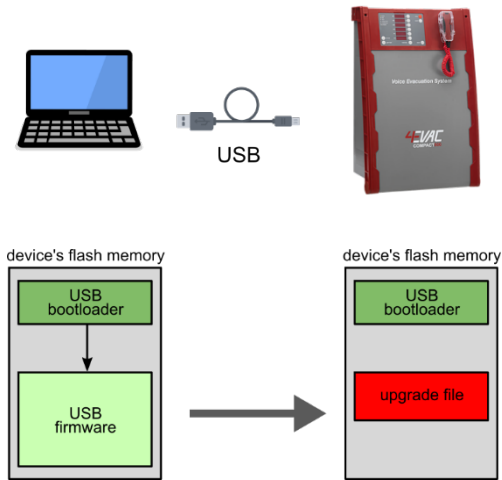
- a. Locate and open *USB to Network Bootloader Upgrade*



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- b. Follow the normal procedure for updating firmware via USB (described in USB firmware flashing instruction), except that instead of *USB firmware*, use *USB to Network Upgrade file*.
 - i. Make sure you copy proper files according to the device model.



As result, the device flashed with *USB to Network Upgrade file* can be now connected via L-Net in order to overwrite *USB Bootloader* with *Network Bootloader*.

NOTE: At this point the procedure is reversible. USB bootloader is still there, so you can simply flash the device back to the actual USB firmware via USB.

- c. Repeat step a. for each device you want to upgrade.

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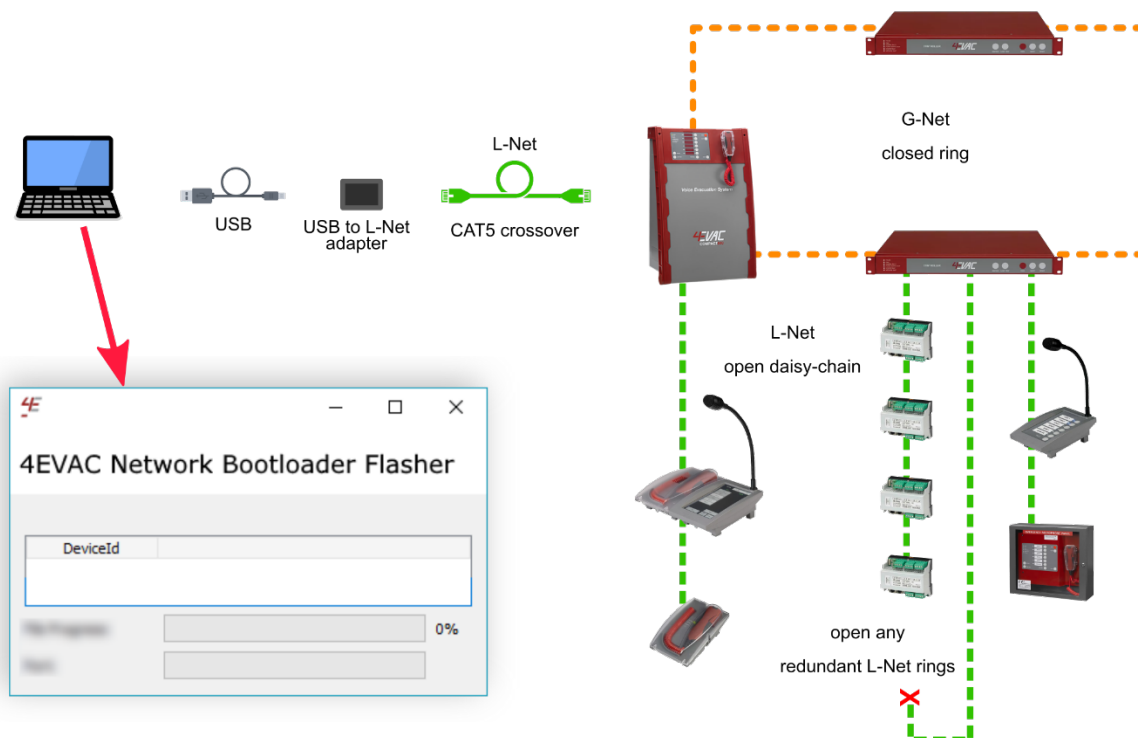
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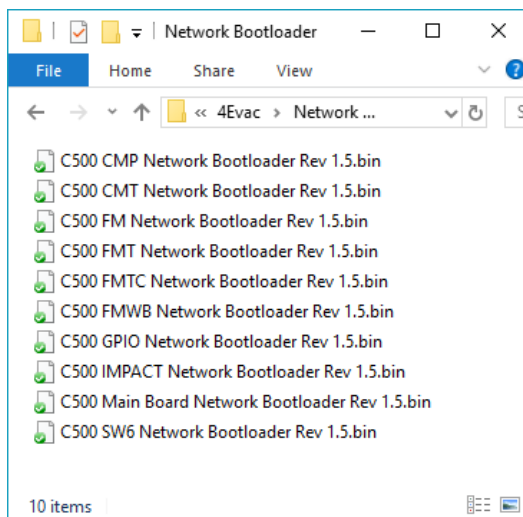
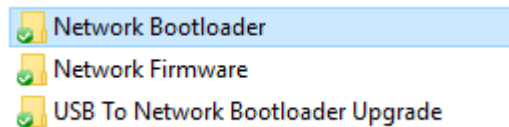
2. Replace USB bootloader with Network bootloader via L-Net

- a. Connect all devices being upgraded into a network and power the system up.
- b. Make sure all devices you are upgrading are connected in the network and all connections follow these rules:
 - i. All network connections are made with CAT5e (or higher) crossover twisted pair with RJ45 connectors.
 1. If optical fibre transceivers are used – it's OK to leave them in.
 - ii. All devices featuring G-Net port are connected via G-Net in a closed redundant ring (applies only to Compact500 and Impact Controller)
 - iii. All L-Net peripheral devices are connected to a single-ended daisy chain. **Any redundant L-Net link (ring) must be disconnected during any flashing via L-Net.**
 - iv. Every device in this network has a unique ID.
- c. Connect your PC to the system through any available L-Net port
 - i. For most stable connection we recommend to connect directly to one of G-Net devices (Compact 500 or Impact Controller)



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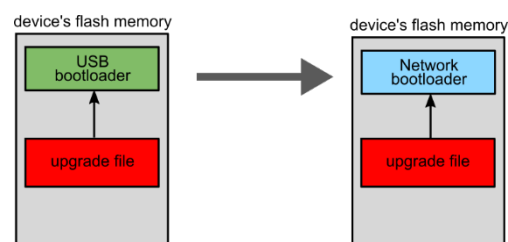
- a. Locate “*Network Bootloader*” folder:



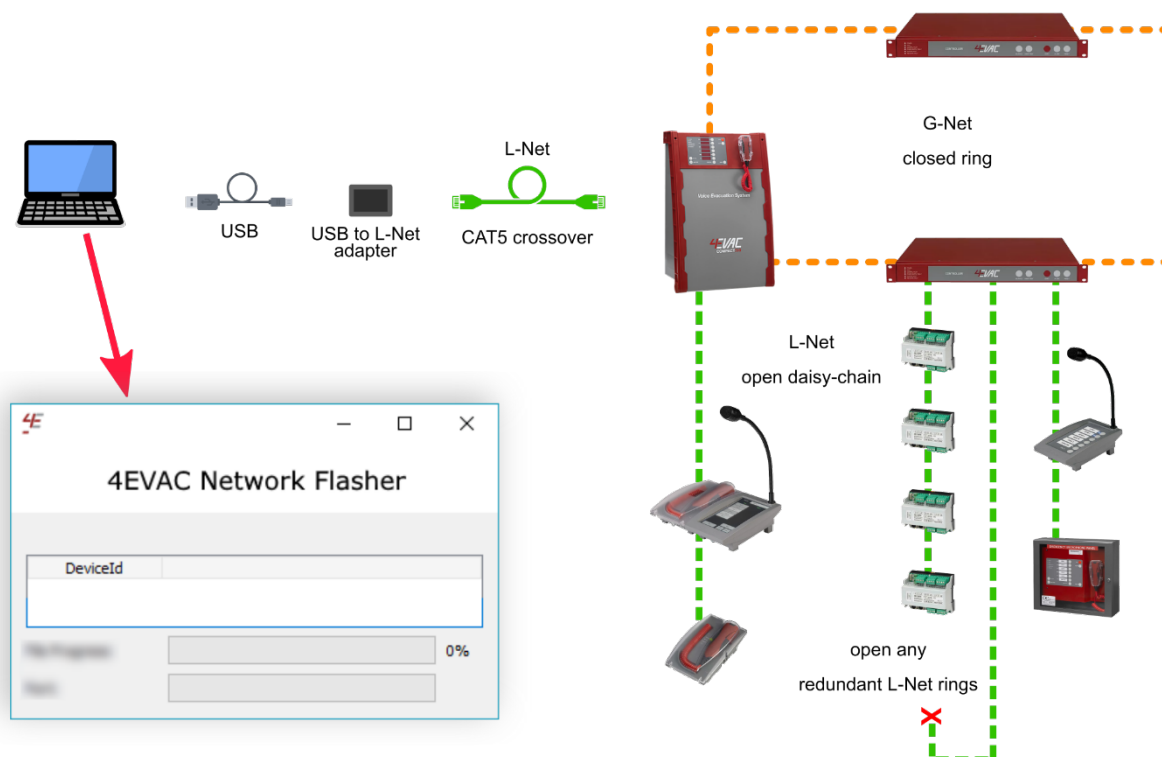
- b. Use **Network bootloader flasher** application on your PC.
- In **Network bootloader flasher**, establish serial connection via the COM port (L-Net interface).
 - Updating the bootloader of each device type by selecting the binary file and press “Write Bootloader”
 - When the “Ok” button is pressed, the upload process starts. Disconnect from the system when finished.

Note: When disconnecting an error message is shown, that the devices could not be switched back to normal mode. This message can be ignored.

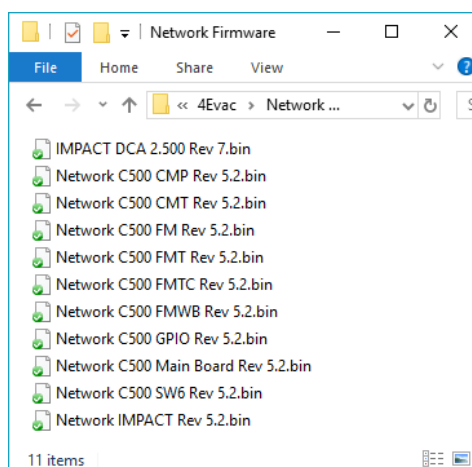
Note: If writing the bootloader fails, do not power down or disconnect the application till writing was successful.




- a. Make sure that all devices you are flashing with new Network Firmware are connected as in previous step.



- Network Bootloader
- Network Firmware
- USB To Network Bootloader Upgrade

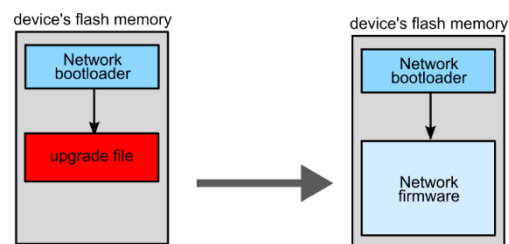



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NOTE: only devices with Network Bootloader will be updated

- i. Establish connection to the system via the COM port of L-Net interface.
- ii. Once devices are shown in the list, press the “Write User Flash Memory” button and select the “Network Firmware” folder. Pressing the “Ok” Button starts the firmware update for all connected devices.
- iii. When updating of all devices is finished the “Disconnect” button should be pressed. This returns the system to the normal operation mode. The RS-422 interface can also be disconnected from the system.

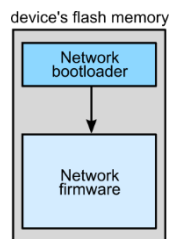


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4. Instruction for Network firmware update

Devices using Network Bootloader will not open USB port for firmware updates. Firmware update is for them possible only via L-Net.

We begin with a device that is already flashed with Network Bootloader + Network Firmware.



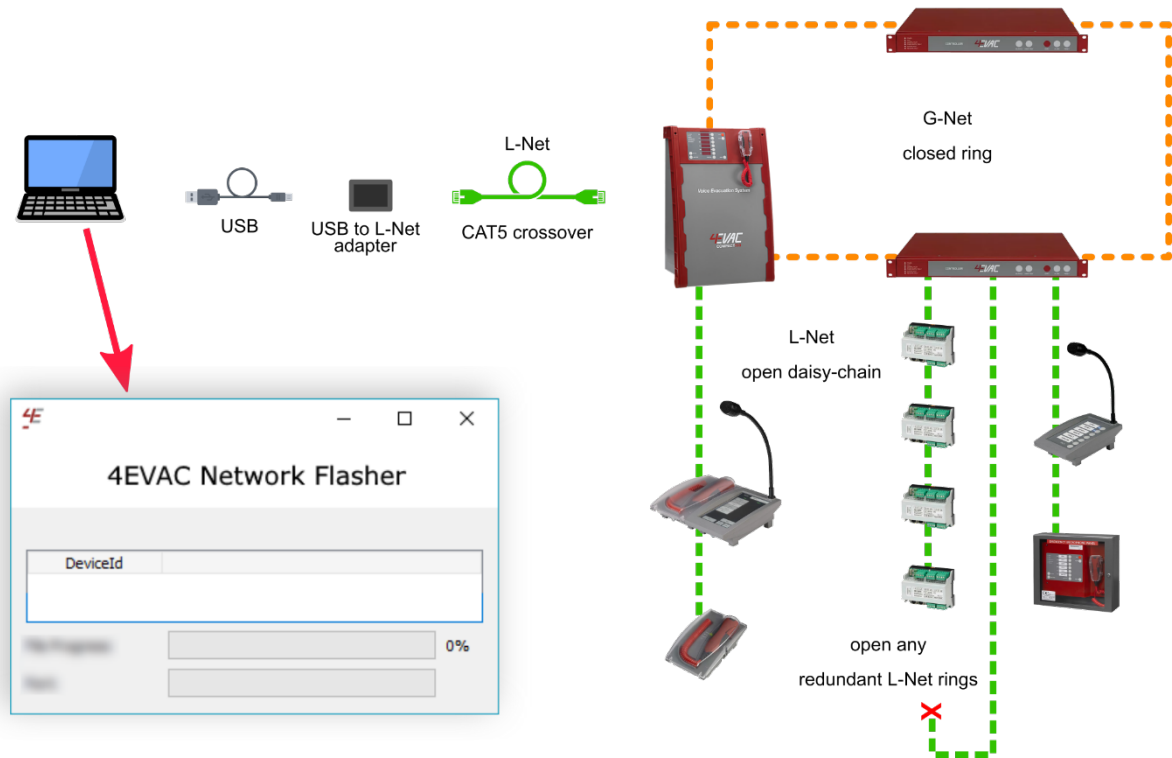
1. Make sure that all devices you are flashing with new firmware are connected as follows:
 - a. All network connections are made with CAT5e (or higher) crossover twisted pair with RJ45 connectors.
 - i. If optical fibre transceivers are used – it's OK to leave them in.
 - b. All devices featuring G-Net port are connected via G-Net in a closed redundant ring (applies only to Compact500 and Impact Controller)
 - c. All L-Net peripheral devices are connected to a single-ended daisy chain. Any redundant L-Net link (ring) must be disconnected during any flashing via L-Net.
 - d. Every device in this network has a unique ID.

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2. Connect your PC to L-Net through any available port
 - a. For most stable connection we recommend to connect directly to one of G-Net devices (Compact 500 or Impact Controller)



3. Use **Network flasher** application on your PC.

NOTE: only devices with Network Bootloader will be updated

 - i. Establish connection to the system via the COM port of L-Net interface.
 - ii. Once devices are shown in the list, press the “Write User Flash Memory” button and select the “Network Firmware” folder. Pressing the “Ok” Button starts the firmware update for all connected devices.
 - iii. When updating of all devices is finished the “Disconnect” button should be pressed. This returns the system to the normal operation mode. The RS-422 interface can also be disconnected from the system.
4. Done! System is now updated!

NOTE: prepare also configuration file in new version 4EVAC Manager.

