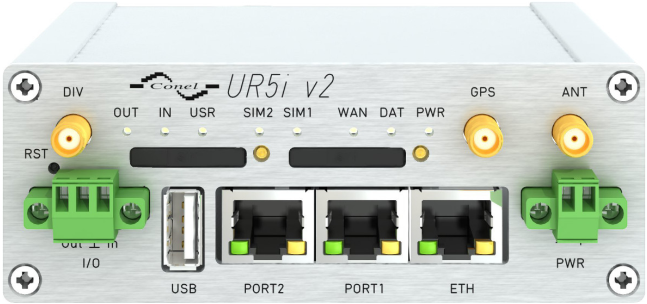
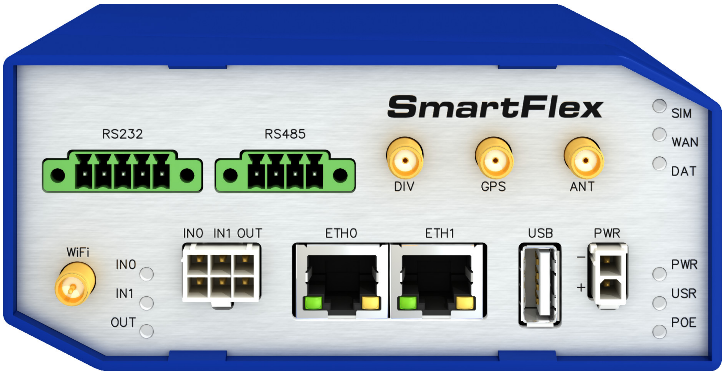
Firmware 6.1.5

RELEASE NOTES





B+B SMARTWORX

Powered by ADVANTECH

Abstract

This document describes:

- Firmware upgrade instructions.
- Description of all new features, fixes and other changes implemented in firmware 6.1.5.
- Known issues.

For detailed information about firmware 6.1.5, see the Configuration Manual for your router.

Firmware Details

- **Version**: 6.1.5
- **Release date**: December 19, 2017
- **Hardware compatibility**: This firmware is applicable to any router made by Advantech B+B SmartWorx s.r.o.

! Please note that not all new Advantech routers are produced and shipped with the latest release of the firmware. The reason usually is an existing certification made for a specific carrier or a region. For more information see document **Firmware Distribution Overview**.

Advantech B+B SmartWorx s.r.o., Sokolska 71, 562 04 Usti nad Orlici, Czech Republic
This document was issued on December 19, 2017

Part I

Firmware Upgrade Instructions

General Upgrade Instructions and Notices

HTTPS certificates: The HTTPS certificate creation in the router was updated in FW 5.3.5 in order to improve security. Existing HTTPS certificates on previously manufactured routers will not automatically be upgraded with the firmware upgrade! It is possible to upgrade HTTPS certificates by deleting the files within /etc/certs/https* in the router (e.g. via SSH). The certificates will be re-created automatically during the router's next start.

! **Python** user module is not uploaded by default to the produced routers with firmware of version 6.0.2 and later. To get the Python user module, please contact your local Sales Representative.

! The **SPECTRE v3 LTE** and **SPECTRE v3 ERT** routers were renamed to **SmartFlex**. You will find them under this name in the Changelog below.

Specific Upgrade Instructions – new filename

If the filename of a firmware for your router was changed recently, then you can have an issue during manual firmware updating or with automatic firmware update feature. Following warning message will appear during the firmware updating process: *"You are trying to upload file "xx.bin" but "yy.bin" is expected. Are you sure to continue?"*

To proceed with the firmware updating please follow these steps: Check the table below with details of recent firmware filename changes for routers and make sure you have the correct firmware file for your router. Go ahead with manual firmware updating and confirm displayed warning message.

To proceed with automatic firmware updating, rename new firmware files (*.bin and *.ver) to filenames valid before the filename change. This should allow the router to pass through the process of automatic firmware updating. Next time, the automatic firmware update feature will work as expected and no other file renaming will be required.

Router model	FW ver.	New filename	Original filename
SmartMotion ST352 SmartMotion ST355	6.0.2	SPECTRE-v3T-LTE.bin	BIVIAS-v3LL.bin
SmartStart SL302	6.0.3	SPECTRE-v3L-LTE-US.bin	SPECTRE-v3L-LTE-AT.bin

Table 1: Recent firmware filename changes

Specific Instructions for Upgrading from Firmware Older than 5.3.0

It is necessary to follow specific upgrade instructions below only if you are upgrading from firmware older than 5.3.0.

Due to a (now fixed) bug in the firewall when a WAN device is part of a bridged interface, caution should be taken when upgrading in following case:

Condition: When a WAN device is part of a bridged interface, access to that WAN device (HTTPS, SSH) is always granted regardless of configuration.

Problem: If this is your configuration, it is highly likely that you are not aware of this, so the undesired effect of the bridge firewall fix may render the router inaccessible.

Recommended Action: Enable access to both the web and ssh services before upgrading if you want to retain the current behavior (access to the WAN interface). This can be done on the *NAT* page in the *Configuration* section of the router's Web interface.

Changing the password

It is necessary to change the password for user "root" (or enter it again) when upgrading to firmware version 5.3.0. or newer. The reason for this is an upgrade of the authentication system (encryption algorithm *crypt* was changed to *MD5*; passwords are now stored in the /etc/shadow file instead of /etc/passwd). Changing of the password is required before it is possible to set up remote access on the *NAT Configuration* page.

Please note that when downgrade from 5.3.0+ to previous firmware versions, the password for user *root* is reset to default (“root”).

Part II

Changelog

Legend: Affected routers are marked as shown below for every changelog item:

Affected router version Router version not affected

Protocols for firewall configuration

ER75i SPECTRE 3G SPECTRE RT SPECTRE LTE-AT SPECTRE LTE-VZ
ER75i v2 UR5i v2 XR5i v2 LR77 v2 CR10 v2 UR5i v2L RR75i v2 LR77 v2L XR5i v2E
Bivias v2HC Bivias v2LC Bivias v2LL Bivias v2LH Bivias v2HH
SmartFlex SR300 SmartFlex SR303 SmartFlex SR305 SmartFlex SR306 SmartFlex SR307
SmartStart SL302 SmartStart SL304 SmartMotion ST352 SmartMotion ST355

Enhanced list of protocols for firewall rules configuration on *Configuration/Firewall* page of router's web GUI. GRE and ESP protocols can now be selected from the protocol drop down menu.

Emergency reboot

ER75i SPECTRE 3G SPECTRE RT SPECTRE LTE-AT SPECTRE LTE-VZ
ER75i v2 UR5i v2 XR5i v2 LR77 v2 CR10 v2 UR5i v2L RR75i v2 LR77 v2L XR5i v2E
Bivias v2HC Bivias v2LC Bivias v2LL Bivias v2LH Bivias v2HH
SmartFlex SR300 SmartFlex SR303 SmartFlex SR305 SmartFlex SR306 SmartFlex SR307
SmartStart SL302 SmartStart SL304 SmartMotion ST352 SmartMotion ST355

Added periodic checking of an unrecoverable state of the router. The principle is to look for a few specific strings in the Kernel log indicating the unrecoverable state. If the state of the router is evaluated as unrecoverable, the emergency reboot of the router is performed.

SIM cards switching

ER75i SPECTRE 3G SPECTRE RT SPECTRE LTE-AT SPECTRE LTE-VZ
ER75i v2 UR5i v2 XR5i v2 LR77 v2 CR10 v2 UR5i v2L RR75i v2 LR77 v2L XR5i v2E
Bivias v2HC Bivias v2LC Bivias v2LL Bivias v2LH Bivias v2HH
SmartFlex SR300 SmartFlex SR303 SmartFlex SR305 SmartFlex SR306 SmartFlex SR307
SmartStart SL302 SmartStart SL304 SmartMotion ST352 SmartMotion ST355

The time of SIM cards switching in case of different APN was reduced. We have also fixed issues with switching between two SIM cards for *SmartStart SL304* router with *Telit LE910-EU V2* cellular module firmware version 20.00.403 or newer.

IPsec tunnel fixes

ER75i SPECTRE 3G SPECTRE RT SPECTRE LTE-AT SPECTRE LTE-VZ
ER75i v2 UR5i v2 XR5i v2 LR77 v2 CR10 v2 UR5i v2L RR75i v2 LR77 v2L XR5i v2E
Bivias v2HC Bivias v2LC Bivias v2LL Bivias v2LH Bivias v2HH
SmartFlex SR300 SmartFlex SR303 SmartFlex SR305 SmartFlex SR306 SmartFlex SR307
SmartStart SL302 SmartStart SL304 SmartMotion ST352 SmartMotion ST355

Improved IPsec tunnel stability. Fixed compatibility of VPN checkpoint for IKEv2 protocol.

Hidden sensitive information

ER75i SPECTRE 3G SPECTRE RT SPECTRE LTE-AT SPECTRE LTE-VZ
ER75i v2 UR5i v2 XR5i v2 LR77 v2 CR10 v2 UR5i v2L RR75i v2 LR77 v2L XR5i v2E
Bivias v2HC Bivias v2LC Bivias v2LL Bivias v2LH Bivias v2HH
SmartFlex SR300 SmartFlex SR303 SmartFlex SR305 SmartFlex SR306 SmartFlex SR307
SmartStart SL302 SmartStart SL304 SmartMotion ST352 SmartMotion ST355

Hidden all passwords and pre-shared keys on router's web GUI. From now, each character of these strings is represented as dot on the screen.

In addition to that, some sensitive information about the *Radius* setting, that should not be visible to the ordinary users, were hidden. This fix was made for *LAN Configuration* and *WiFi Configuration* pages on router's web GUI.

LAN GUI configuration

ER75i SPECTRE 3G SPECTRE RT SPECTRE LTE-AT SPECTRE LTE-VZ
ER75i v2 UR5i v2 XR5i v2 LR77 v2 CR10 v2 UR5i v2L RR75i v2 LR77 v2L XR5i v2E
Bivias v2HC Bivias v2LC Bivias v2LL Bivias v2LH Bivias v2HH
SmartFlex SR300 SmartFlex SR303 SmartFlex SR305 SmartFlex SR306 SmartFlex SR307
SmartStart SL302 SmartStart SL304 SmartMotion ST352 SmartMotion ST355

Fixed an issue when the value of *Lease Time* for IPv6 was required even though the IPv6 protocol has not been used. Affected were *LAN Configuration* and *WLAN Configuration* pages on router's web GUI. If IPv6 addresses are not configured, the *Lease Time* value is not mandatory any more.

WiFi WPA2 vulnerability

ER75i SPECTRE 3G SPECTRE RT SPECTRE LTE-AT SPECTRE LTE-VZ
ER75i v2 UR5i v2 XR5i v2 LR77 v2 CR10 v2 UR5i v2L RR75i v2 LR77 v2L XR5i v2E
Bivias v2HC Bivias v2LC Bivias v2LL Bivias v2LH Bivias v2HH
SmartFlex SR300 SmartFlex SR303 SmartFlex SR305 SmartFlex SR306 SmartFlex SR307
SmartStart SL302 SmartStart SL304 SmartMotion ST352 SmartMotion ST355

Fixed WiFi WPA2 vulnerability by upgrading *hostapd* and *wpa_supplicant* programs to version 2.6 along with applying of security patches.

Following CVE IDs have been assigned to these vulnerabilities in the WPA2 protocol:

- CVE-2017-13077: reinstallation of the pairwise key in the Four-way handshake,
- CVE-2017-13078: reinstallation of the group key in the Four-way handshake,
- CVE-2017-13079: reinstallation of the integrity group key in the Four-way handshake,
- CVE-2017-13080: reinstallation of the group key in the Group Key handshake,
- CVE-2017-13081: reinstallation of the integrity group key in the Group Key handshake,
- CVE-2017-13082: accepting a retransmitted Fast BSS Transition Reassociation Request and reinstalling the pairwise key while processing it,
- CVE-2017-13084: reinstallation of the STK key in the PeerKey handshake,
- CVE-2017-13086: reinstallation of the Tunneled Direct-Link Setup (TDLS) PeerKey (TPK) key in the TDLS handshake,
- CVE-2017-13087: reinstallation of the group key (GTK) when processing a Wireless Network Management (WNM) Sleep Mode Response frame,
- CVE-2017-13088: reinstallation of the integrity group key (IGTK) when processing a Wireless Network Management (WNM) Sleep Mode Response frame.

USB device speed detection

ER75i **SPECTRE 3G** **SPECTRE RT** **SPECTRE LTE-AT** **SPECTRE LTE-VZ**

ER75i v2 **UR5i v2** **XR5i v2** **LR77 v2** **CR10 v2** **UR5i v2L** **RR75i v2** **LR77 v2L** **XR5i v2E**

Bivias v2HC **Bivias v2LC** **Bivias v2LL** **Bivias v2LH** **Bivias v2HH**

SmartFlex SR300 SmartFlex SR303 SmartFlex SR305 SmartFlex SR306 SmartFlex SR307

SmartStart SL302 SmartStart SL304 SmartMotion ST352 SmartMotion ST355

Fixed detection of speed for an USB device communication. This issue caused that the communication was running at lower speed level than supported by the USB device.

MWAN registration status

ER75i SPECTRE 3G SPECTRE RT SPECTRE LTE-AT SPECTRE LTE-VZ

ER75i v2 UR5i v2 XR5i v2 LR77 v2 CR10 v2 UR5i v2L RR75i v2 LR77 v2L XR5i v2E

Bivias v2HC Bivias v2LC Bivias v2LL Bivias v2LH Bivias v2HH

SmartFlex SR300 SmartFlex SR303 SmartFlex SR305 SmartFlex SR306 SmartFlex SR307

SmartStart SL302 **SmartStart SL304** SmartMotion ST352 SmartMotion ST355

Fixed process of getting the registration status for mobile connection. This issue was caused by new format of *AT#RFSTS* response on *Telit* cellular modules.
Affected cellular modules are:

- *Telit LE910-EU V2* module with firmware version 20.00.403 or newer,
- *Telit LE910-NA1* module with firmware version 20.00.014 or newer.

Mobile uptime

ER75i **SPECTRE 3G** SPECTRE RT **SPECTRE LTE-AT** **SPECTRE LTE-VZ**

ER75i v2 **UR5i v2** XR5i v2 **LR77 v2** **CR10 v2** **UR5i v2L** **RR75i v2** **LR77 v2L** XR5i v2E

Bivias v2HC **Bivias v2LC** **Bivias v2LL** **Bivias v2LH** **Bivias v2HH**

SmartFlex SR300 **SmartFlex SR303** **SmartFlex SR305** **SmartFlex SR306** **SmartFlex SR307**

SmartStart SL302 **SmartStart SL304** **SmartMotion ST352** **SmartMotion ST355**

Fixed uptime value of mobile connection reported by SNMP protocol.

Unprocessed SNMP requests

ER75i SPECTRE 3G SPECTRE RT SPECTRE LTE-AT SPECTRE LTE-VZ
ER75i v2 UR5i v2 XR5i v2 LR77 v2 CR10 v2 UR5i v2L RR75i v2 LR77 v2L XR5i v2E
Bivias v2HC Bivias v2LC Bivias v2LL Bivias v2LH Bivias v2HH
SmartFlex SR300 SmartFlex SR303 SmartFlex SR305 SmartFlex SR306 SmartFlex SR307
SmartStart SL302 **SmartStart SL304** SmartMotion ST352 SmartMotion ST355

Fixed an issue in the cellular module driver. This issue caused that the *SmartStart* router was processing less than 50% of incoming SNMP requests.

RS485 initialization issue

ER75i **SPECTRE 3G** **SPECTRE RT** **SPECTRE LTE-AT** **SPECTRE LTE-VZ**
ER75i v2 **UR5i v2** **XR5i v2** **LR77 v2** **CR10 v2** UR5i v2L **RR75i v2** LR77 v2L XR5i v2E
Bivias v2HC **Bivias v2LC** **Bivias v2LL** **Bivias v2LH** **Bivias v2HH**
SmartFlex SR300 SmartFlex SR303 SmartFlex SR305 SmartFlex SR306 SmartFlex SR307
SmartStart SL302 SmartStart SL304 SmartMotion ST352 SmartMotion ST355

Fixed issue of incorrect initial state for RS485 interface. This issue caused that the RS485 interface was not able to receive any data when acting as RS485 SLAVE device. Functionality of RS485 MASTER role was not affected by this issue.

Fixed memory leak

ER75i **SPECTRE 3G** **SPECTRE RT** **SPECTRE LTE-AT** **SPECTRE LTE-VZ**
ER75i v2 **UR5i v2** **XR5i v2** **LR77 v2** **CR10 v2** **UR5i v2L** **RR75i v2** **LR77 v2L** **XR5i v2E**
Bivias v2HC **Bivias v2LC** **Bivias v2LL** **Bivias v2LH** **Bivias v2HH**
SmartFlex SR300 SmartFlex SR303 SmartFlex SR305 SmartFlex SR306 SmartFlex SR307
SmartStart SL302 SmartStart SL304 SmartMotion ST352 SmartMotion ST355

Applied patch to Kernel to fix router's memory leak. This issue was observed during processing of fragmented packets.

Second Ethernet fixes

ER75i **SPECTRE 3G** **SPECTRE RT** **SPECTRE LTE-AT** **SPECTRE LTE-VZ**
ER75i v2 **UR5i v2** **XR5i v2** **LR77 v2** **CR10 v2** **UR5i v2L** **RR75i v2** **LR77 v2L** **XR5i v2E**
Bivias v2HC **Bivias v2LC** **Bivias v2LL** **Bivias v2LH** **Bivias v2HH**
SmartFlex SR300 SmartFlex SR303 SmartFlex SR305 SmartFlex SR306 SmartFlex SR307
SmartStart SL302 SmartStart SL304 SmartMotion ST352 SmartMotion ST355

Fixed issues for second Ethernet interface. These issues could cause that the communication through this interface gets stuck.

Third Ethernet fixes

ER75i SPECTRE 3G SPECTRE RT SPECTRE LTE-AT SPECTRE LTE-VZ
ER75i v2 UR5i v2 XR5i v2 LR77 v2 CR10 v2 UR5i v2L RR75i v2 LR77 v2L XR5i v2E
Bivias v2HC Bivias v2LC Bivias v2LL Bivias v2LH Bivias v2HH
SmartFlex SR300 **SmartFlex SR303** **SmartFlex SR305** **SmartFlex SR306** **SmartFlex SR307**
SmartStart SL302 SmartStart SL304 SmartMotion ST352 SmartMotion ST355

Fixed issues for third Ethernet interface. These issues could cause that the communication through this interface gets stuck.

WiFi driver issues

ER75i SPECTRE 3G SPECTRE RT SPECTRE LTE-AT SPECTRE LTE-VZ
ER75i v2 UR5i v2 XR5i v2 LR77 v2 CR10 v2 UR5i v2L RR75i v2 LR77 v2L XR5i v2E
Bivias v2HC Bivias v2LC Bivias v2LL Bivias v2LH Bivias v2HH
SmartFlex SR300 **SmartFlex SR303** **SmartFlex SR305** **SmartFlex SR306** **SmartFlex SR307**
SmartStart SL302 SmartStart SL304 **SmartMotion ST352** **SmartMotion ST355**

Backported new WiFi driver from newer Kernel and updated firmware of WiFi module. These updates were done to prevent freezing of the WiFi driver and to fix some security issues including the Key Reinstallation Attacks (KRACK) for WPA2.

WiFi module upgrade

ER75i SPECTRE 3G SPECTRE RT SPECTRE LTE-AT SPECTRE LTE-VZ
ER75i v2 UR5i v2 XR5i v2 LR77 v2 CR10 v2 UR5i v2L RR75i v2 LR77 v2L XR5i v2E
Bivias v2HC Bivias v2LC Bivias v2LL Bivias v2LH Bivias v2HH
SmartFlex SR300 **SmartFlex SR303** **SmartFlex SR305** **SmartFlex SR306** **SmartFlex SR307**
SmartStart SL302 SmartStart SL304 **SmartMotion ST352** **SmartMotion ST355**

Firmware of the WiFi module was upgraded to version 8.9.0.0.76.

WiFi module upgrade

ER75i **SPECTRE 3G** **SPECTRE RT** **SPECTRE LTE-AT** **SPECTRE LTE-VZ**
ER75i v2 **UR5i v2** **XR5i v2** **LR77 v2** **CR10 v2** **UR5i v2L** **RR75i v2** **LR77 v2L** **XR5i v2E**
Bivias v2HC **Bivias v2LC** **Bivias v2LL** **Bivias v2LH** **Bivias v2HH**
SmartFlex SR300 SmartFlex SR303 SmartFlex SR305 SmartFlex SR306 SmartFlex SR307
SmartStart SL302 **SmartStart SL304** SmartMotion ST352 SmartMotion ST355

Firmware of the WiFi module was upgraded to version 0.36.

OpenSSL library upgrade

ER75i **SPECTRE 3G** **SPECTRE RT** **SPECTRE LTE-AT** **SPECTRE LTE-VZ**
ER75i v2 **UR5i v2** **XR5i v2** **LR77 v2** **CR10 v2** **UR5i v2L** **RR75i v2** **LR77 v2L** **XR5i v2E**
Bivias v2HC **Bivias v2LC** **Bivias v2LL** **Bivias v2LH** **Bivias v2HH**
SmartFlex SR300 **SmartFlex SR303** **SmartFlex SR305** **SmartFlex SR306** **SmartFlex SR307**
SmartStart SL302 **SmartStart SL304** **SmartMotion ST352** **SmartMotion ST355**

Upgraded *OpenSSL* library to version 1.0.2n. This update has fixed CVE-2017-3735 and CVE-2017-3737.

OpenSSH library upgrade

ER75i SPECTRE 3G SPECTRE RT SPECTRE LTE-AT SPECTRE LTE-VZ
ER75i v2 UR5i v2 XR5i v2 LR77 v2 CR10 v2 UR5i v2L RR75i v2 LR77 v2L XR5i v2E
Bivias v2HC Bivias v2LC Bivias v2LL Bivias v2LH Bivias v2HH
SmartFlex SR300 SmartFlex SR303 SmartFlex SR305 SmartFlex SR306 SmartFlex SR307
SmartStart SL302 SmartStart SL304 SmartMotion ST352 SmartMotion ST355

Upgraded *OpenSSH* library to version 7.6p1. This update has fixed CVE-2017-15906.

curl program upgrade

ER75i SPECTRE 3G SPECTRE RT SPECTRE LTE-AT SPECTRE LTE-VZ
ER75i v2 UR5i v2 XR5i v2 LR77 v2 CR10 v2 UR5i v2L RR75i v2 LR77 v2L XR5i v2E
Bivias v2HC Bivias v2LC Bivias v2LL Bivias v2LH Bivias v2HH
SmartFlex SR300 SmartFlex SR303 SmartFlex SR305 SmartFlex SR306 SmartFlex SR307
SmartStart SL302 SmartStart SL304 SmartMotion ST352 SmartMotion ST355

Upgraded *curl* program to version 7.57.0. This update has fixed CVE-2016-9586, CVE-2016-9952, CVE-2016-9953, CVE-2017-7407, CVE-2017-8816, CVE-2017-8817, CVE-2017-8818, CVE-2017-1000254, CVE-2017-1000101 and CVE-2017-1000100.

dnsmasq program upgrade

ER75i SPECTRE 3G SPECTRE RT SPECTRE LTE-AT SPECTRE LTE-VZ
ER75i v2 UR5i v2 XR5i v2 LR77 v2 CR10 v2 UR5i v2L RR75i v2 LR77 v2L XR5i v2E
Bivias v2HC Bivias v2LC Bivias v2LL Bivias v2LH Bivias v2HH
SmartFlex SR300 SmartFlex SR303 SmartFlex SR305 SmartFlex SR306 SmartFlex SR307
SmartStart SL302 SmartStart SL304 SmartMotion ST352 SmartMotion ST355

Upgraded *dnsmasq* program to version 2.78. This update has fixed CVE-2017-13704, CVE-2017-14491, CVE-2017-14492, CVE-2017-14493, CVE-2017-14494, CVE-2017-14495 and CVE-2017-14496.

Part III

Known Issues

5 GHz band for WiFi

The first one hundred v3 routers produced (with serial number from 6200000 to 6200099) contain a WiFi chip which does not support the 5 GHz band. There is no way of detecting this, the 5 GHz ranges on these devices will simply not work and the router will not be able to detect this.

Python user module

Python user module versions earlier than 2014-11-25 have lacked SSL functionality since firmware version 5.3.4. **The Python user module needs to be upgraded** to version from 2016-05-03 or later. This user module upgrade can be done safely either before or after upgrading the firmware. The Python interpreter version 2.7.12 is included in the latest version of the user module (2016-09-30).

Warning during WiFi configuration update

During a WiFi configuration update a warning may appear in syslog. This has no other known effects other than the appearance of the warning message.

Firmware Update – unexpected filename

If the filename of a firmware for your router was changed recently, you can have an issue during manual firmware updating or with Automatic Update feature. Following warning message will appear: *"You are trying to upload file "xx.bin" but "yy.bin" is expected. Are you sure to continue?"* To fix this issue follow instructions in Part I (Firmware Upgrade Instructions) in this document.

SmartStart – cellular network registration

It is necessary to use router's firmware of version 6.1.5 or higher if the *Telit* cellular module installed in your SmartStart router has following version the firmware:

- *Telit LE910-EU V2* cellular module with firmware version 20.00.403 or newer,
- *Telit LE910-NA1* cellular module with firmware version 20.00.014 or newer.

Note: The model name and firmware version of the cellular module can be found on router's web GUI at *Mobile WAN Status* page in *Mobile Network Information* section.

SmartStart SL302 – -cellular network authentication

It is not possible to use username and password when connecting to Mobile WAN network (on *Mobile WAN Configuration* page) if your SmartStart SL302 router has the 20.00.522 firmware version inside the Telit LE910-NA1 cellular module. The version of cellular module firmware can be found at *Mobile WAN Status* page in *Mobile Network Information* section.

SmartStart SL302 – SMS in Verizon network

SmartStart SL302 router (equipped with the *Telit* modules *LE910-SV1* or *LE910-NA1*) supports sending and receiving of SMS in *Verizon* cellular network since the firmware version 6.1.4. Please note that to support SMS receiving, cellular module with Verizon firmware of version higher than 20.00.012 is required.