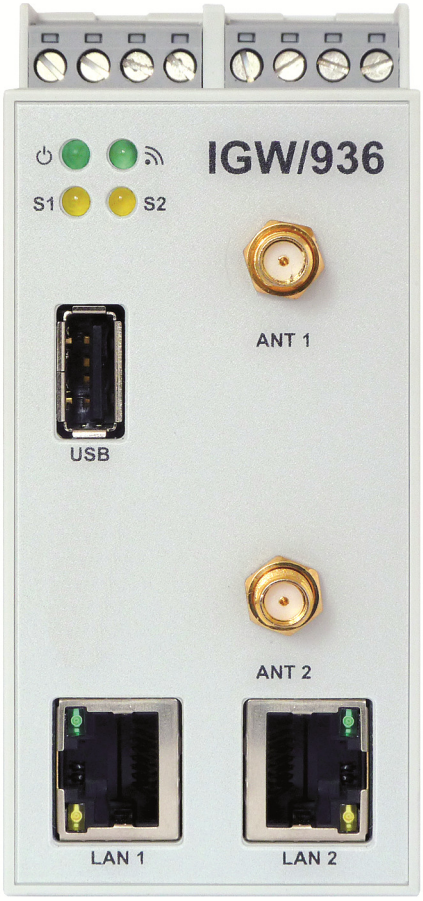
LTE ROUTER

IGW/936-L

with eSOM/3517



First Steps

SSV SOFTWARE SYSTEMS

Document Revision 1.6 // 2023-07-07

CONTENT

1 INTRODUCTION

This documentation gives you an overview about the initial operation and the first steps of use with the LTE Router IGW/936-L.

1.1 Checklist

Compare the content of your IGW/936-L start-up package with the checklist below.

If any item is missing or appears to be damaged, please contact SSV!

- ✓ LTE Router IGW/936-L
- ✓ 1x LTE antenna
- ✓ Adapter cable with power and RS232 connector
- ✓ Plug-in power supply
- ✓ Screwdriver
- ✓ Documentation
- ✓ CD-ROM for eSOM/3517

IMPORTANT!
You will need further equipment to operate the IGW/936-L! Please refer to **chapter 3**.

1.2 Conventions

Convention	Usage
bold	Important terms
`monospace`	Filenames, Pathnames, program code, command lines

Table 1: Conventions used in this document

2 SAFETY GUIDELINES

Please read the following safety guidelines carefully! In case of property or personal damage by not paying attention to this manual and/or by incorrect handling, we do not assume liability. In such cases any warranty claim expires.

- The power supply should be in immediate proximity to the device.
  - The power supply must provide a stable output voltage between 12 .. 24 VDC ±10%. The output power should be at least 10 W.
- Please pay attention that the power cord or other cables are not squeezed or damaged in any way when you set up the device.
- Do NOT turn on the power supply while connecting any cables, especially the power cables. This could cause damaged device components! First connect the cables and THEN turn the power supply on.
- The installation of the device should be done only by qualified personnel.
- Discharge yourself electrostatic before you work with the device, e.g. by touching a heater of metal, to avoid damages.
- Stay grounded while working with the device to avoid damage through electrostatic discharge.
- The case of the device should be opened only by qualified personnel.

3 REQUIRED EQUIPMENT

To operate the IGW/936-L the following hardware is required:

- a **valid SIM card** with an appropriate mobile tariff. Please refer to **chapter 4** to see how the SIM card is inserted.
- one Ethernet cross-over cable or two Ethernet patch cables and a switch.

To configure the IGW/936-L a PC with the following features is required:

- Windows 7 or higher
- Web browser (e.g. Firefox, Chrome)
- Telnet/SSH client (e.g. TeraTerm)
- FTP client (e.g. FileZilla)
- 10/100 Mbps Ethernet network controller and TCP/IP configuration
- CD-ROM drive

4 SIM CARD

The internal SIM card of the IGW/936-L can be changed through the **slot on the backside**.

To insert the SIM card just push it by hand as deep as possible into the slot.

Please note:
Pay attention to the correct orientation of the SIM card like shown in **fig. 1**!

Then use a screw driver to push it gently further into the slot until you here a soft "click".

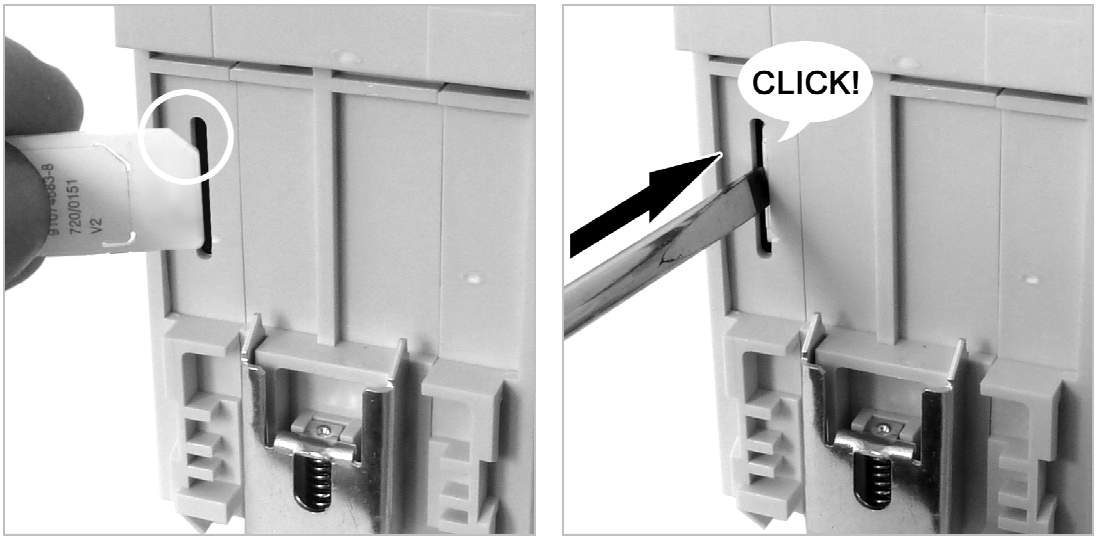


Figure 1: Inserting the SIM card

To remove the SIM card just push it gently with a screw driver until you hear a soft "click" (see **fig. 2**). The SIM card is ejected a few millimeters and can be pulled out easily by hand.

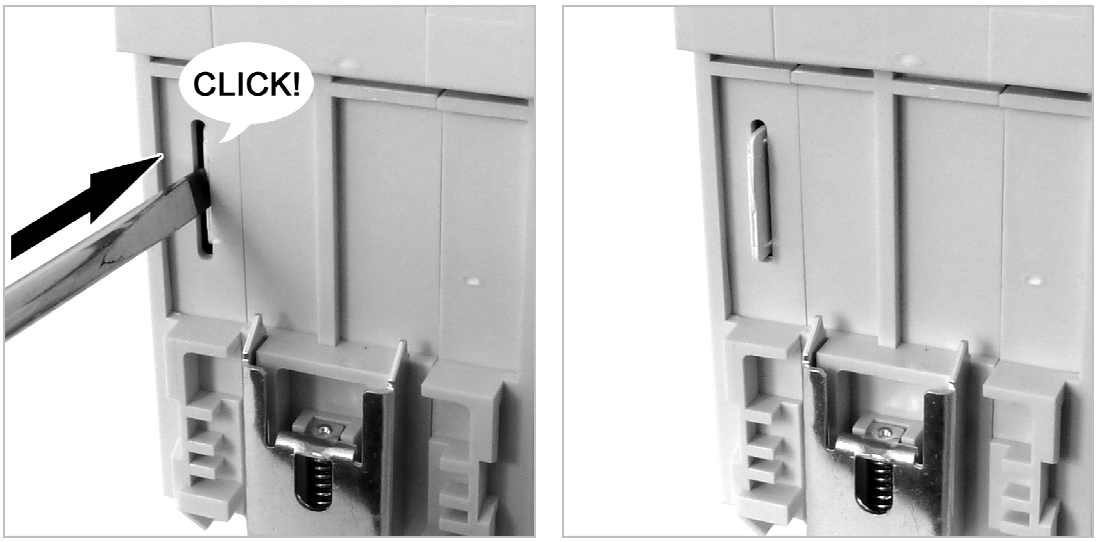


Figure 2: Removing the SIM card

5 CONNECTIONS

For a quick and easy start with the IGW/936-L there are a few cable connections necessary.

The following chapters describe how these connections have to be made.

5.1 LTE Antenna

Connect the LTE antenna with the IGW/936-L like shown in **fig. 3** and place it where the LTE signal strength is high.

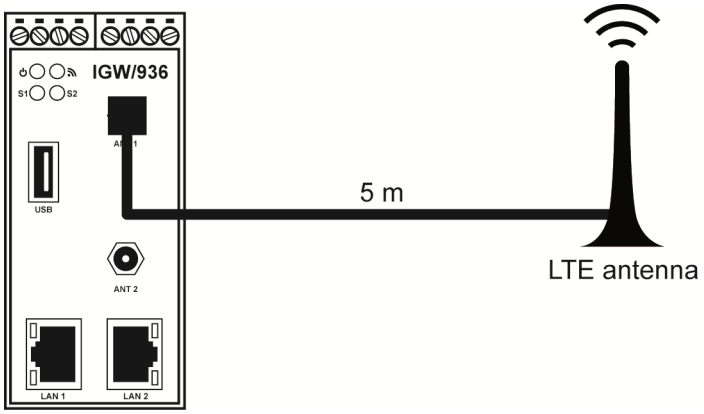


Figure 3: Connecting the LTE antenna

Please note:
The best LTE signal strength is achieved by using two antennas. Please contact SSV if you want to order a second LTE antenna.

5.2 Ethernet Link

The Ethernet link between the PC and **LAN1** of the IGW/936-L can be made on two ways:

- Direct with an Ethernet cross-over cable like shown in **fig. 4**.
- With two standard Ethernet patch cables over a hub or switch like shown in **fig. 5**.

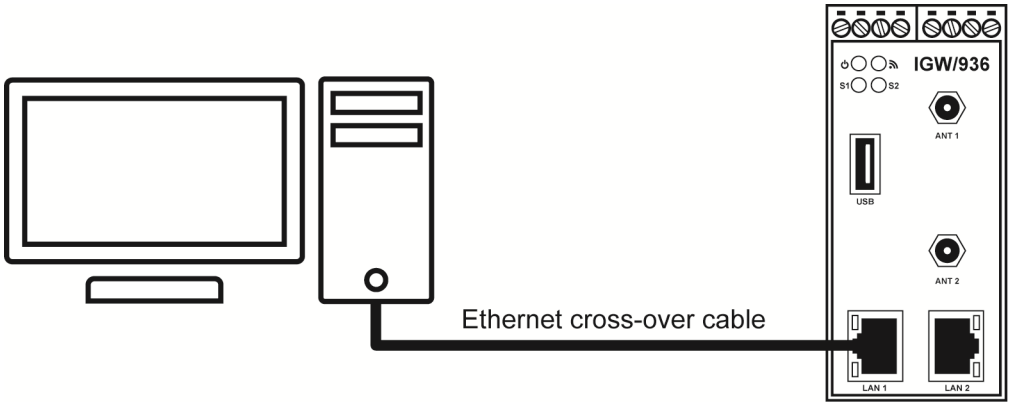


Figure 4: Ethernet link with cross-over cable

Please note:
For the Ethernet connection in **fig. 4** it is absolutely required to use a **cross-over cable**. Do not use an ordinary patch cable. Ethernet patch and cross-over cables are in most cases visual indistinguishable. But the internal wiring is fully different. Mixing up these types of cables leads to LAN errors. Hence pay attention to the label of the cable or packing.

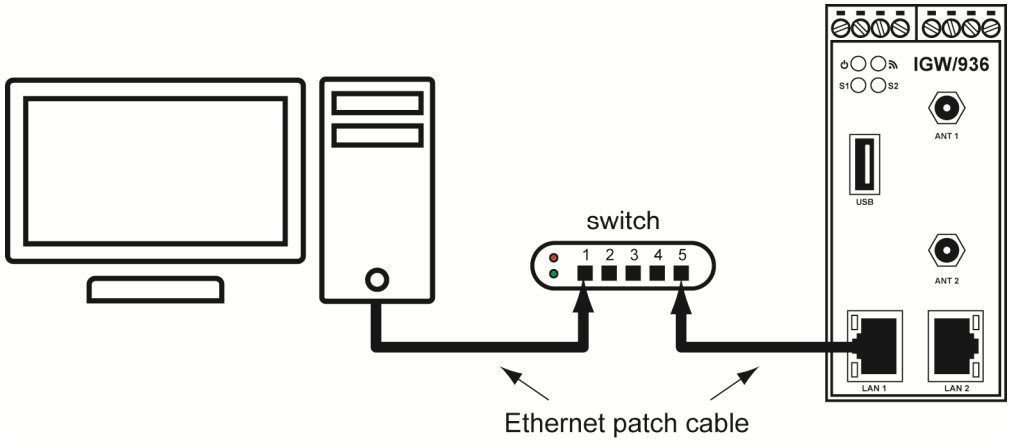


Figure 5: Ethernet link with hub or switch

The IP address of the LAN1 interface is ex-factory set to **192.168.0.126**.

5.3 Serial Ports COM2 and COM3

You can create an RS485 serial link on port COM2 and COM3 of the IGW/936-L.

An RS232 serial link is only possible on port COM3.

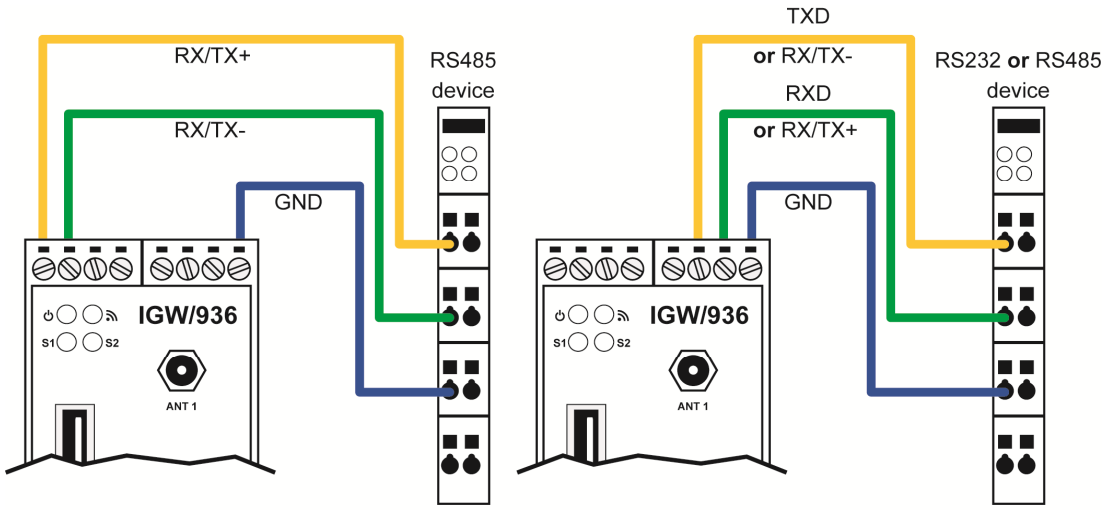


Figure 6: Serial links on COM2 and COM3

Terminal	Signal
A1	COM2 RS485 Serial Port RX /TX+
A2	COM2 RS485 Serial Port RX /TX-
B4	Signal Ground

Table 2: Screw terminals COM2

Terminal	Signal
B2	COM3 Serial Port: TXD (RS232), RX/TX- (RS485)
B3	COM3 Serial Port: RXD (RS232), RX/TX+ (RS485)
B4	Signal Ground

Table 3: Screw terminals COM3

Please note:
The RS485 (officially called TIA/EIA-485-A) connection between your IGW/936-L and the field devices needs termination resistors on both ends for proper operation. The IGW/936-L **does not offer internal termination resistors**. Please make sure, that the RS485 cable connection is equipped with external termination resistors.

5.4 Power Supply

The IGW/936-L needs a supply voltage of 12 – 24 VDC to work.

Connect the cables of an appropriate power supply to provide the system with the necessary power like shown in **fig. 7**.

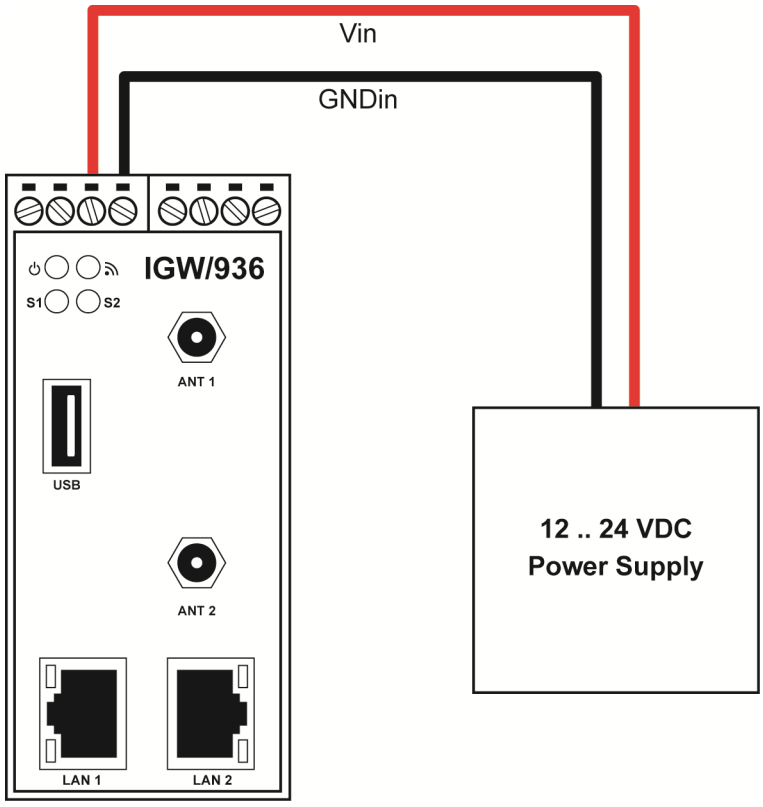
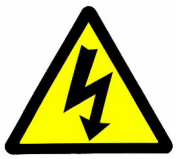


Figure 7: Power supply for the IGW/936-L

Terminal	Signal
A3	Vin + (12 .. 24 VDC)
A4	Vin -

Table 4: Screw terminal power



CAUTION!
Providing the IGW/936-L with a higher voltage than the regular 12 .. 24 VDC could cause damaged device components!

Do **NOT** turn on the power supply while connecting it with the IGW/936-L. This could cause damaged device components! First connect the power supply and **THEN** turn it on.

6 OPERATION

6.1 Booting the IGW/936-L

Just power up the IGW/936-L and the boot process starts immediately. The IGW/936-L boots thereby an embedded Linux out of its Flash memory. This may take up to one minute.

6.2 Accessing the SSV/WebUI

To open the login page of the SSV/WebUI enter the ex-factory IP address and port number of LAN1 of the IGW/936-L manually in a web browser:

`http://192.168.0.126:7777`

Enter the username **admin** and the password **ssvadmin** and click on **[Login]**.

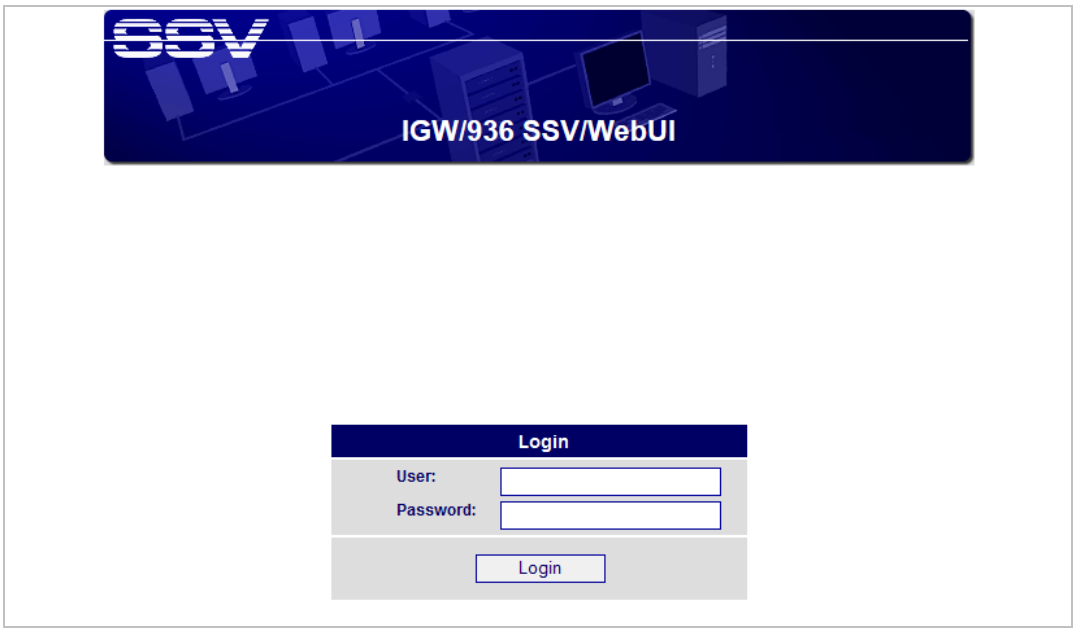


Figure 8: Login page of the SSV Web WebConfig

6.3 Accessing the SSV/WebUI with DHCP enabled

If the automatic IP address configuration of LAN1 via DHCP is enabled, you have to check the assigned IP address, which is necessary to access the IGW/936-L via a Telnet client or a web browser.

Therefore open in Windows **Control Panel > Network and Internet > View network computers and devices**. The IGW/936-L should show up in this list.

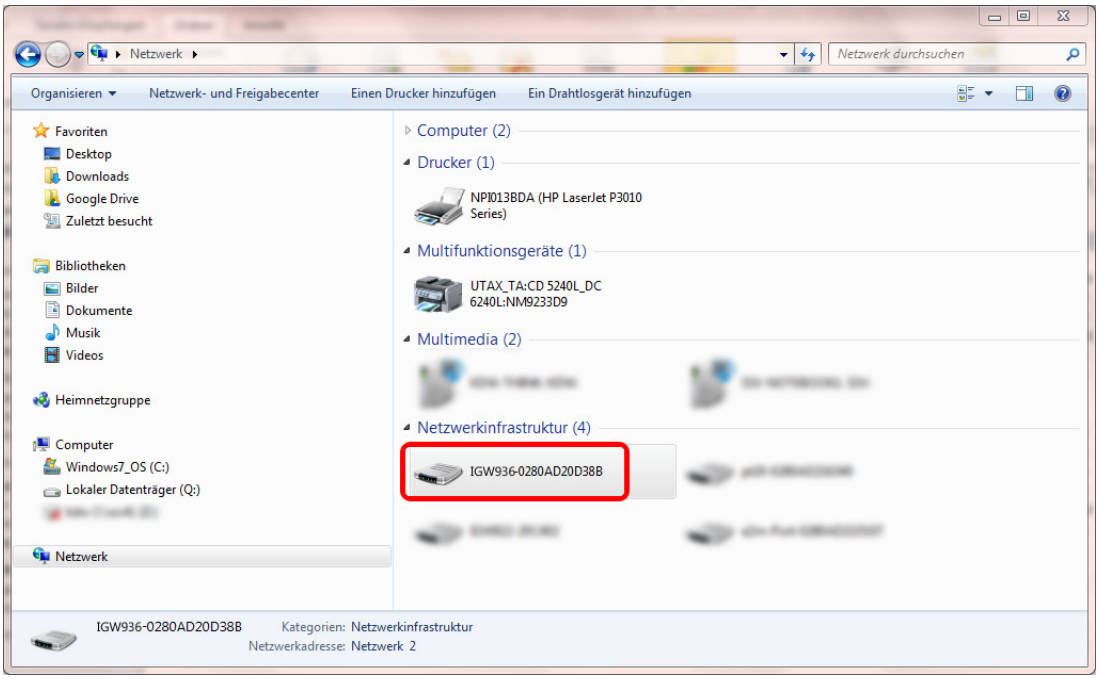


Figure 9: Selecting the IGW/936-L

Just **right-click** on the IGW/936-L to open the properties dialog, where you can see the current IP address of the IGW/936-L like shown in **fig. 10**.

A **double-click** on the IGW/936-L opens the **SSV/WebUI** in a web browser.

Please note:
To access the SSV/WebUI, it is important to add the port number **7777** to the current IP address of the IGW/936-L, e.g.: `http://192.168.0.126:7777`!

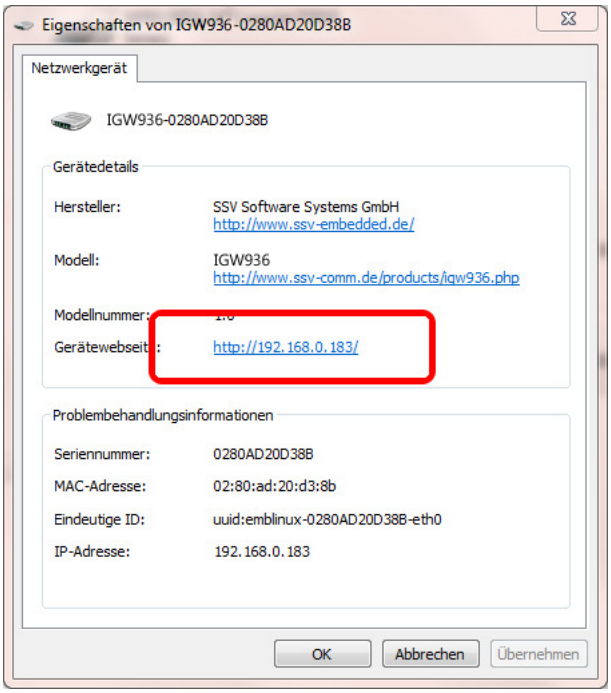


Figure 10: The properties dialog shows the current IP address

Now you are able to access the IGW/936-L via a Telnet client or a web browser.

6.4 LTE Modem Configuration

To configure the modem settings choose from the menu **Network > Mobile**.

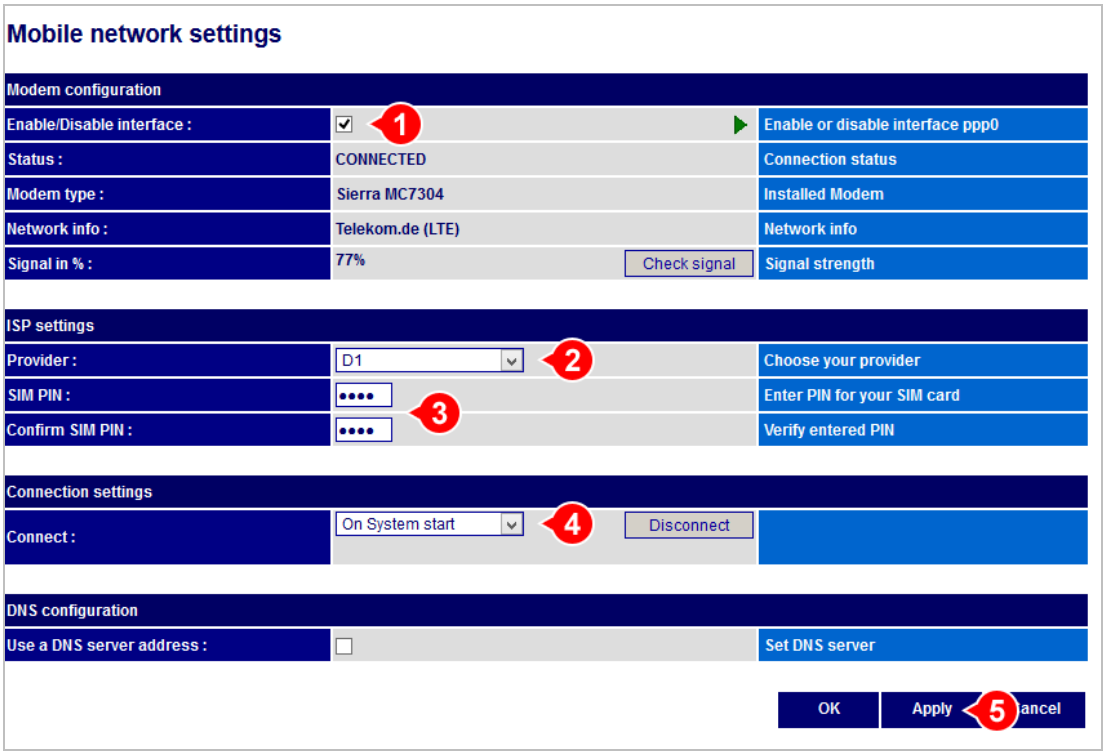


Figure 11: Mobile network settings

1. In the section **Modem configuration** enable the checkbox.
2. In the section **ISP settings** choose your provider.
3. Enter the PIN of the SIM card.
4. In the section **Connection settings** choose **On System start**.
5. Click on **[Apply]**.

In the section **DNS configuration** you can enter a DNS server if needed.

6.5 WAN Configuration

To use the IGW/936-L as an LTE router the WAN (Wide Area Network) settings need to be configured.

Choose from the menu **Network > WAN**.

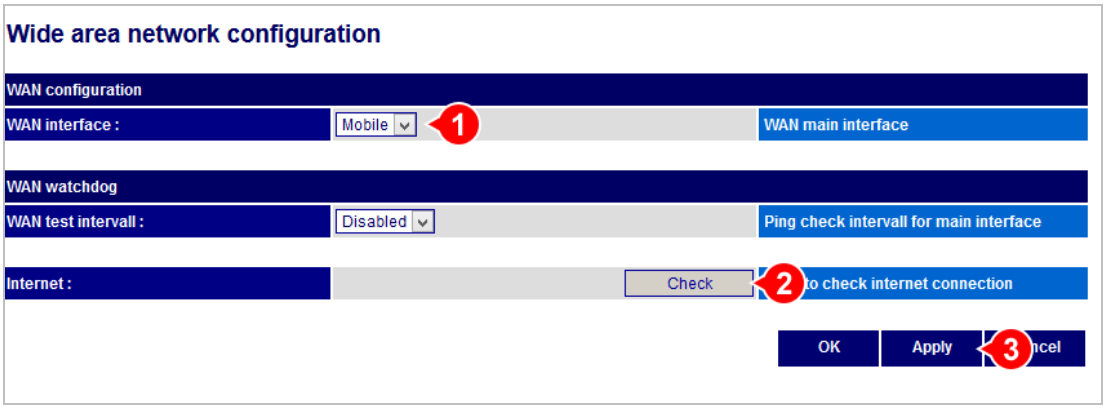


Figure 12: WAN settings

1. In the section **WAN configuration** choose **Mobile**.
2. In the section **Internet** click on **[Check]** to test the Internet connection.
3. Click on **[Apply]**.

6.6 Firewall Configuration

Choose from the menu **Services > Firewall and NAT**.

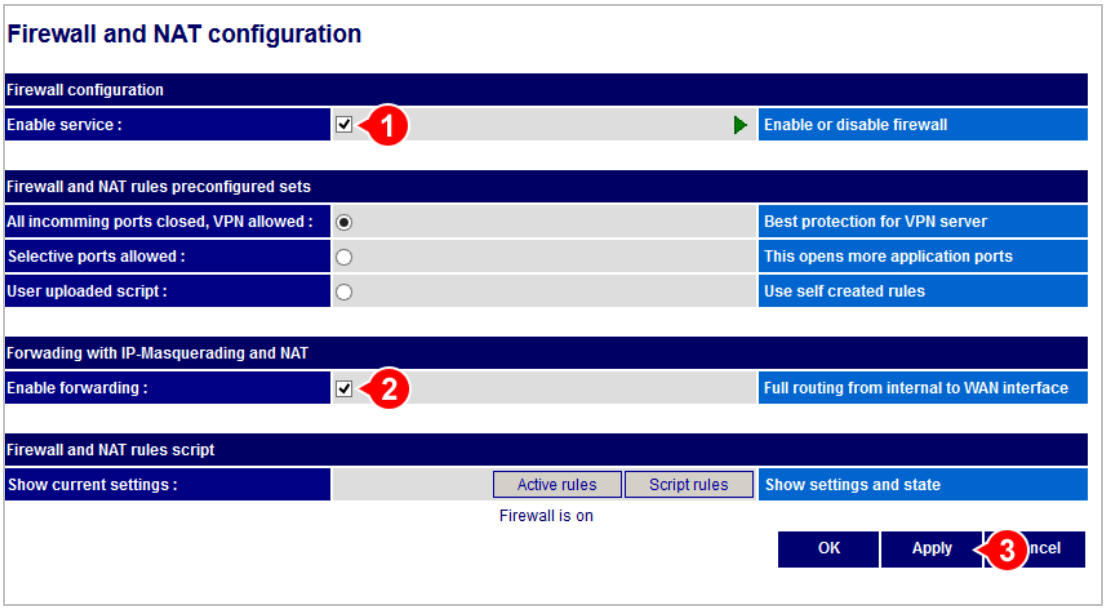


Figure 13: Firewall and NAT settings

1. In the section **Firewall configuration** enable the checkbox.
2. In the section **Forwarding with IP-Masquerading and NAT** enable the checkbox.
3. Click on **[Apply]**.

6.7 LAN1 Configuration

The IP address of the LAN1 interface is ex-factory set to **192.168.0.126**.

To configure the LAN1settings choose from the menu **Network > LAN1**.

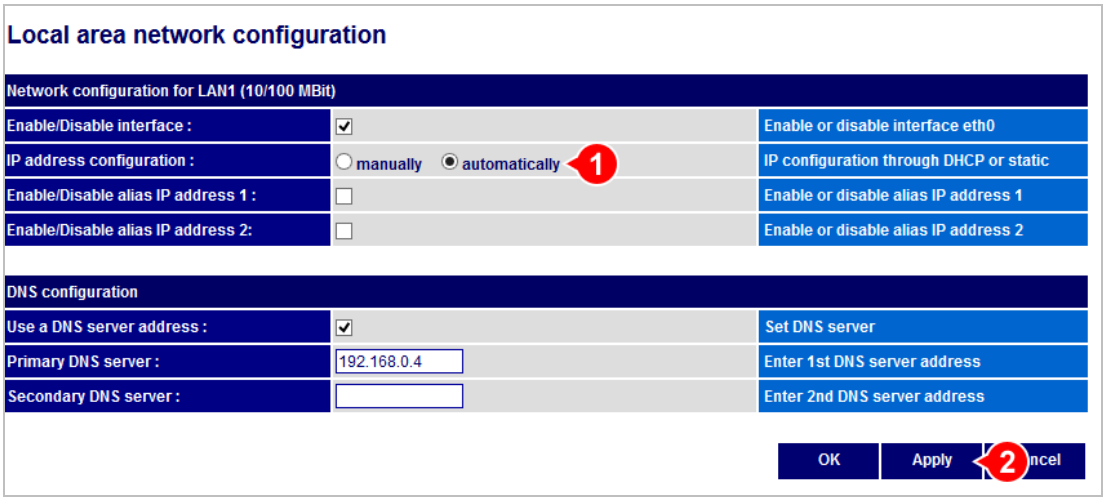


Figure 14: LAN1 settings

To enable the automatic IP address assignment via DHCP follow these steps:

1. In the section **IP address configuration** enable the radio button **automatically**.
2. Click on **[Apply]**.

Please note:
After DHCP was enabled, it is necessary to re-log into the SSV/WebUI with the new assigned IP address of LAN1. Please refer to **chapter 6.3** to find out the current IP address.

6.8 LAN2 Configuration

The LAN2 interface is ex-factory disabled.

To enable LAN2 choose from the menu **Network > LAN2**.

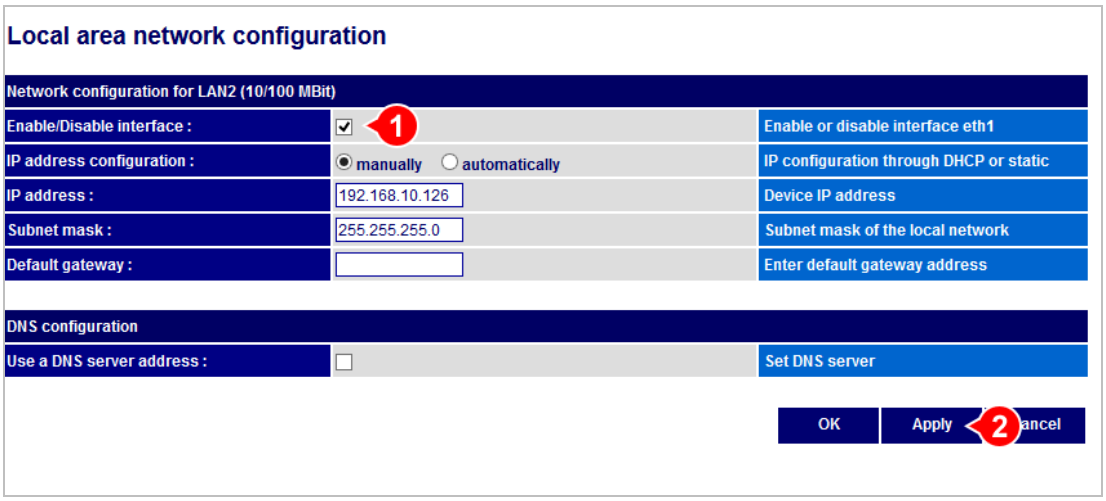


Figure 15: LAN2 settings

1. In the section **Network configuration for LAN2** enable the checkbox. The IP address is preset to `192.168.10.126`.

2. Click on **[Apply]**.

6.9 Access via Telnet

To access the IGW/936-L via Telnet please open a Telnet client program (like **TeraTerm**) on your host PC and enter the current IP address* of the IGW/936-L to activate a Telnet session.

In the upcoming Telnet window you can login with the username **root** and the password **root**.

Now you can enter any Linux commands, which will be executed by the IGW/936-L operating system.

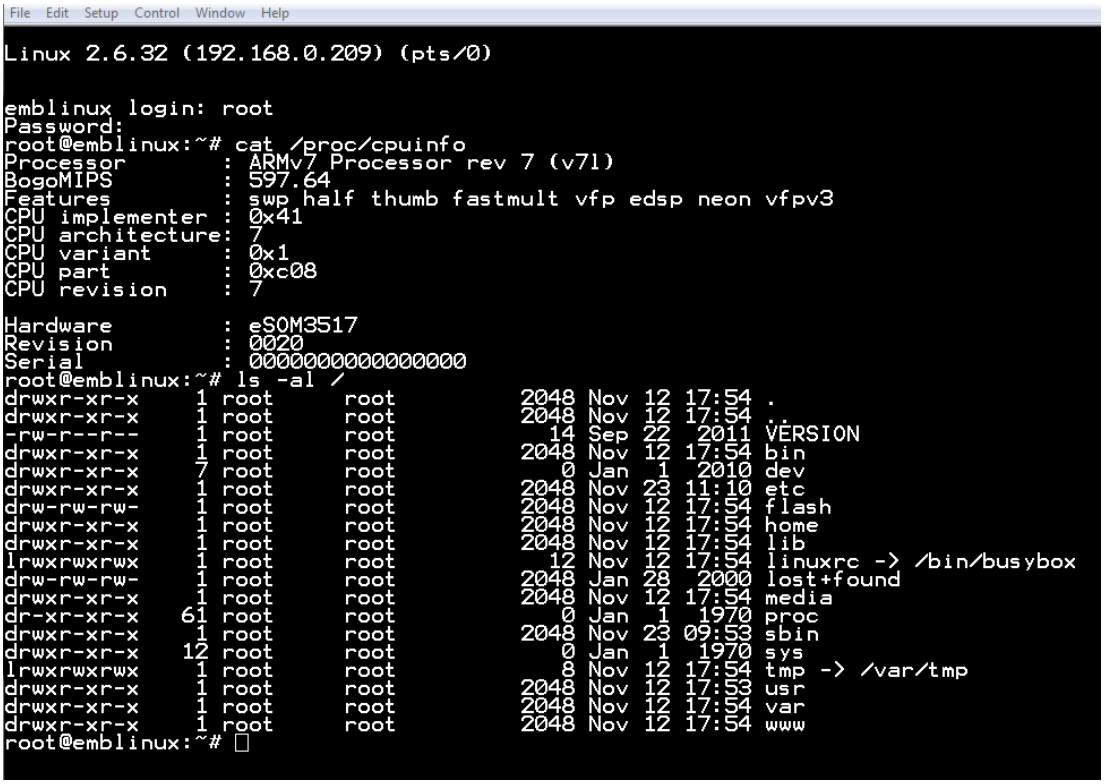


Figure 16: Access via Telnet client

***Please note:**
The ex-factory IP address of the LAN1 interface is **192.168.0.126**. If DHCP is enabled, please refer to **chapter 6.3** to find out the current IP address.

6.10 Access via FTP

The IGW/936-L comes with a pre-installed FTP server, which allows the file transfer via Ethernet between a PC and the IGW/936-L. To access the IGW/936-L via FTP use an FTP client like e.g. **FileZilla**.

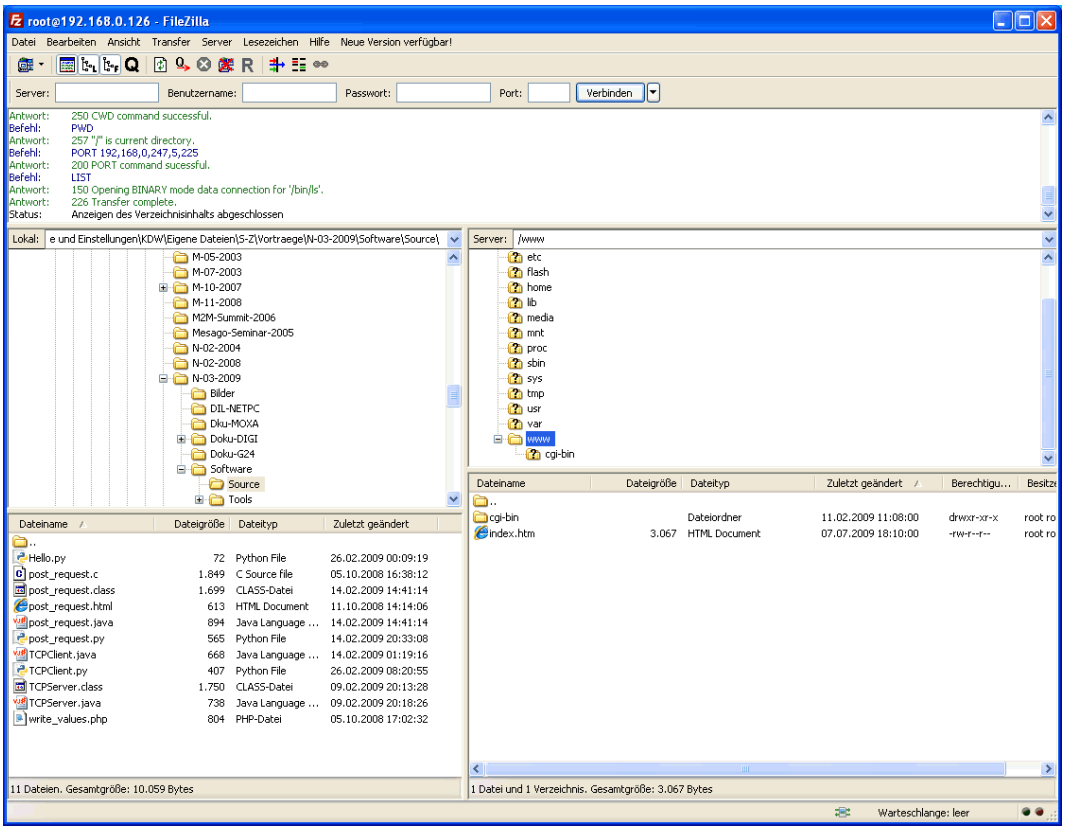


Figure 17: FileZilla as FTP client to access the FTP server

Use for the FTP login the current IP address* of the IGW/936-L, the username **root** and the password **root**. With this login you have FTP read/write permission in the file system.

The default setting of the root file system after the boot process is **read-only**. There are only three exceptions, which are shown in **table 5**:

Directory	Remark
`/flash`	R/W directory, non-volatile memory within Flash
`/home/root`	R/W directory, RAM disk, volatile memory
`/var/volatile`	R/W directory, RAM disk, volatile memory

Table 5: R/W directories in the file system

The read-only restriction protects all files of the file system. Under ordinary operating conditions it is not possible to overwrite or delete a file which is necessary for the eSOM/3517 within the IGW/936-L.

To disable the write protection just login with the username **root** and the password **root** and enter the following command:

```
mount / -o remount,rw
```

This command „mounts„ the file system as **read/write**. All files are now writable and deletable. Please pay attention not to damage important system files! With the command

```
mount / -o remount,ro
```

the system is set back to the read-only initial condition after the boot process.

***Please note:**
The ex-factory IP address of the LAN1 interface is **192.168.0.126**. If DHCP is enabled, please refer to **chapter 6.3** to find out the current IP address.

7 TECHNICAL DATA

Supply voltage ..... 12 – 24 VDC

Power consumption ..... < 15 W

Weight ..... < 0,5 kg

Mechanical Dimensions (LxWxH) ..... 112 mm x 46 mm x 100 mm

Temperature range ..... 0° C – 60° C

Rel. air himudity ..... max. 85%

8 PINOUT SCREW TERMINALS

The **table 6** shows the pinout of the screw terminals of the IGW/936-L.

Terminal	Signal
A1	COM2 Serial Port: RS485 RX/TX+
A2	COM2 Serial Port: RS485 RX/TX-
A3	Vin + (12 .. 24 VDC)
A4	Vin -
B1	---
B2	COM3 Serial Port: TXD (RS232), RX/TX- (RS485)
B3	COM3 Serial Port: RXD (RS232), RX/TX+ (RS485)
B4	Signal Ground

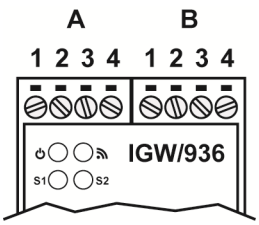


Table 6: Pinout of the screw terminals

Please note:
The RS485 (officially called TIA/EIA-485-A) connection between your IGW/936-L and the field devices needs termination resistors on both ends for proper operation. The IGW/936-L **does not offer internal termination resistors**. Please make sure, that the RS485 cable connection is equipped with external termination resistors.

9 LED FUNCTIONS

LED	Description	Off	Flash	On
⏻	Power	No Power	---	Power On
📶	Wireless	Always Off	---	---
S1	System	Not ready	Booting	Ready
S2	Modem/VPN	Off	Connecting	Ready

Table 1: LED functions

The **LED S2** shows the modem state by different flashing provided the modem is used.

After the modem connection is established and VPN is enabled, the **LED S2** shows the state of the VPN connection.

The following table describes the functions of the particular LED signals.

On Time	Off Time	Description
Permanent	---	Modem connected or/and VPN connected
0.9 s	**0.1 s**	Good mobile signal (20 ASU - 31 ASU)
0.3 s	**0.3 s**	Normal mobile signal quality (13 ASU - 19 ASU)
0.1 s	**0.9 s**	Bad mobile signal quality (0 ASU - 12 ASU)
1 s	**1 s**	VPN-client tries connecting the VPN-server
2 s	**2 s**	Modem in init sequence, missing antena, unknown signal
---	**Permanent**	Unknown state, modem disabled, wrong PIN, VPN disconnected

Table 1: LED S2 functions

10 TROUBLE SHOOTING IP ADDRESS PROBLEMS

If the IP addresses of LAN1 and LAN2 are not configured properly it is possible, that the SSV/WebUI (the configuration user interface) of the IGW/936-L cannot be accessed anymore.

In that case it is necessary to restore the factory settings of the IGW/936-L. To do so please follow these steps:

1. Connect the LAN1 interface of the IGW/936-L via a cross-over-cable with the LAN interface of a Windows PC. Disconnect (if present) the cable from the LAN2 interface of the IGW/936-L. If not already running turn on the IGW/936-L.

2. Make sure that DHCP (IP address is obtained automatically) is enabled within the network settings of the Windows PC for the LAN interface.

3. Take a USB memory stick and format it under Windows with FAT16 or FAT32.

4. Create a new simple text file on the memory stick, name it **`factoryreset`** and remove the file extension.

Please note:
Keep in mind that Windows hides file extensions by default!

5. At first unmount the memory stick over the USB symbol in the Windows system tray before removing it from the PC.

6. Now plug the memory stick into the USB port of the (running) IGW/936-L.

7. The IGW/936-L makes a reboot and the LED S1 turns off after 15 to 30 seconds.

8. Remove the memory stick (at the latest when the LED S1 begins to blink).

9. The Windows PC shows the message **Network restricted** after 30 to 60 seconds.

10. The IGW/936-L answers via UPnP with its new IP address within the AutoIP range of `169.254.x.x`. It can now be found as an icon within the Windows network environment. A double click on this icon opens the IGW/936-L's login page in a browser. The URL of the login page looks like this: **`http://169.256.x.x:7777`**.

11 HELPFUL LITERATURE

- IGW/936 hardware reference manual
- eSOM/3517 hardware reference manual

CONTACT

SSV SOFTWARE SYSTEMS GmbH
Dünenweg 5
30419 Hannover

Phone: +49 (0)511 ▪ 40 000-0
Fax: +49 (0)511 ▪ 40 000-40
Email: info@ssv-embedded.de

Internet: www.ssv-embedded.de
Forum: www.ssv-comm.de/forum
Social: www.linkedin.com/company/ssv-software-systems

DOCUMENT HISTORY

Revision	Date	Remarks	Name	Review
1.0	2014-05-07	First version	WBU	ENE
1.1	2015-08-26	Edited chapter 1.1	WBU	ENE
1.2	2016-02-03	Edited chapter 6.1 and 6.2, added chapter 6.3 and 6.7	WBU	KDW
1.3	2016-06-15	Edited chapter 5.3, added chapter 9	WBU	HNE
1.4	2018-08-29	Added chapter 10	WBU	HNE
1.5	2020-09-15	Added power consumption in chapter 7	WBU	HNE
1.6	2023-07-07	Removed information about DVI interface	WBU	ENE