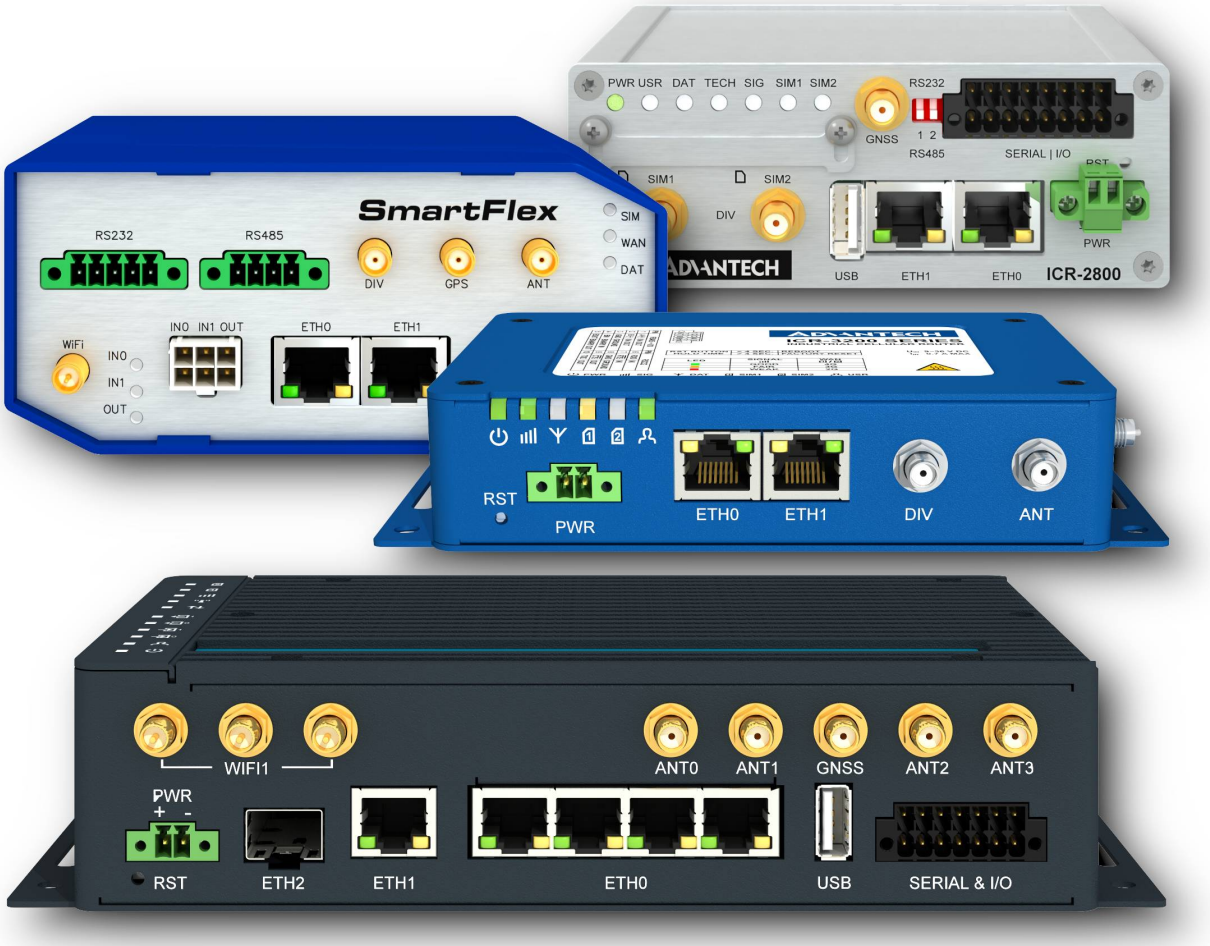
ADVANTECH

Monitoring System

R-SeeNet

APPLICATION NOTE



Used Symbols

Danger – Information regarding user safety or potential damage to the router.

Attention – Problems that can arise in specific situations.

Information, notice – Useful tips or information of special interest.

Example – Example of function, command or script.

Source codes under GPL or other open source license are available free of charge by sending an email to:

techSupport@advantech-bb.com

Please see https://icr.advantech.cz/devzone for more information.

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Contents

1 Description of Monitoring System 1

1.1 Introduction . . . 1
1.2 Hardware Requirements . . . 1
1.3 Data Traffic Demand . . . 2
1.4 SNMP v3 Support Limitation . . . 2
1.5 Router Identification and MAC Address Handling . . . 2
1.5.1 MAC Address Not Found in the Database (Polling) . . . 2
1.6 Supported Systems for Installation . . . 3

2 Installation 4

2.1 Database and upgrade to higher version . . . 4
2.2 Windows . . . 4
2.3 CentOS . . . 9
2.3.1 VirtualBox Image . . . 9
2.3.2 Automatic Startup . . . 12
2.3.3 RPM Packages . . . 13
2.4 Debian . . . 14

3 Running Service Window 19

4 How to Connect Router to R-SeeNet 20

5 Description of the Web Interface 22

5.1 Menu . . . 22
5.2 Device List . . . 22
5.2.1 Selected Devices . . . 26
5.3 Device Status . . . 28
5.3.1 System Information . . . 28
5.3.2 Stats . . . 31
5.3.3 Notes . . . 36
5.3.4 Device Parameters . . . 36
5.4 Group List . . . 38
5.4.1 Example of Unavailability Message Configuration . . . 39
5.5 Report . . . 40
5.5.1 Latency . . . 41
5.5.2 Packet Loss . . . 42
5.5.3 Availability . . . 43
5.5.4 Signal Strength . . . 44
5.5.5 Routers Online . . . 45

5.5.6 All . . . 45
5.5.7 Daily Report . . . 45
5.6 Add Device . . . 46
5.7 Add Group . . . 49
5.8 Add Company . . . 51
5.9 Add User . . . 51
5.10 Options . . . 53
5.10.1 General . . . 53
5.10.2 Appearance . . . 54
5.10.3 Snmp . . . 55
5.10.4 Email & Sms . . . 55
5.10.5 Warnings . . . 58
5.10.6 Report . . . 59
5.11 Logout & Login . . . 60
5.12 Companies . . . 60
5.13 Users . . . 61
5.14 Sms . . . 62
5.15 Log . . . 64
5.16 About . . . 64
5.17 License . . . 65
5.17.1 Online Activation . . . 65
5.17.2 Offline Activation . . . 65

6 Database 66

6.1 Description of Database . . . 66
6.2 Backing up the Database . . . 66
6.3 Restoring the database . . . 67

7 Automatic Update of Routers 68

7.1 Location of Configuration and Firmware . . . 68
7.2 Monitoring System Settings . . . 68
7.3 Router Settings . . . 68

8 Related Documents 69

List of Figures

1 Installation – choice of language . . . 4
2 Installation – version . . . 4
3 Installation – choice of parts . . . 5
4 Installation – select destination location . . . 5
5 Installation – ready to install . . . 6
6 Installation – progress . . . 6
7 Installation – parameters . . . 7
8 Registration of license . . . 8
9 Installation – completion . . . 8
10 Settings – Network card . . . 9
11 Settings – hardware virtualization . . . 10
12 Running virtualization . . . 10
13 Network configuration . . . 11
14 Device configuration . . . 11
15 DNS configuration . . . 12
16 Debian: turn off CD-ROM installation in apt sources . . . 14
17 Debian: R-SeeNet server asks for MySQL database hostname . . . 15
18 Debian: R-SeeNet server asks for MySQL database admin user . . . 15
19 Debian: R-SeeNet server asks for MySQL database user password . . . 15
20 Debian: Make a note of a password in etc/snmpmon.ini file . . . 16
21 Debian: R-SeeNet frontend asks for MySQL database hostname . . . 16
22 Debian: R-SeeNet frontend asks for MySQL database user . . . 17
23 Debian: R-SeeNet frontend asks for MySQL database user password . . . 17
24 Debian: R-SeeNet frontend asks for R-SeeNet server hostname . . . 17
25 R-SeeNet login form after installation . . . 18
26 Running Service Window . . . 19
27 SNMP Confifguration in router . . . 20
28 Enable remote SNMP access in NAT . . . 21
29 Main menu . . . 22
30 Ping . . . 24
31 Device List . . . 25
32 Header after routers selected . . . 26
33 Selected Devices . . . 27
34 Device Information . . . 29
35 Mobile Network Information . . . 29
36 System Information . . . 30
37 Traffic . . . 31
38 Signal Strength . . . 32
39 Signal Strength graph . . . 33
40 Signal Quality . . . 33

41 Latency . . . 34
42 Tested Packet Loss . . . 35
43 Router Availability . . . 35
44 Notes . . . 36
45 Device Parameters . . . 37
46 Group List . . . 38
47 Calendar . . . 40
48 Top part of each Report window . . . 40
49 Latency . . . 41
50 Latency graph . . . 41
51 Latency – limit exceeded . . . 41
52 Packet Loss . . . 42
53 Packet Loss graph . . . 42
54 Packet Loss – unfulfilled criterion . . . 42
55 Router Availability . . . 43
56 Router Availability graph . . . 43
57 Router Availability – unfulfilled criterion . . . 43
58 Signal Strength . . . 44
59 Signal Strength – unfulfilled criterion . . . 44
60 Routers online graph . . . 45
61 Add Device – Manually . . . 47
62 CSV file example . . . 47
63 Add Device – CSV import . . . 48
64 Add Group . . . 50
65 Add Company . . . 51
66 Add User . . . 52
67 Add User – Group Settings . . . 52
68 Options . . . 53
69 Options – General . . . 53
70 Options – Own Logo . . . 54
71 Options – Device List . . . 54
72 Options – Color Scheme . . . 54
73 Options – User Link . . . 55
74 Options – Snmp . . . 55
75 Options – SMS Gateway . . . 56
76 Options – Email Account . . . 56
77 Options – Sending information time . . . 56
78 Options – Event Strings . . . 58
79 Options – Router Identification . . . 59
80 Options – Report . . . 59
81 Options – Daily report items . . . 59
82 Login . . . 60
83 Companies . . . 60
84 Users . . . 62

85 Send SMS 63
86 Predefined SMS 63
87 Log 64
88 Page About 64
89 Online activation 65
90 Offline activation 65
91 Automatic Update 68

List of Tables

1 Význam položek záznamového souboru . . . 3
2 Device List description . . . 24
3 Background color of *Hostname* items . . . 24
4 Selected Devices . . . 27
5 Device Information . . . 28
6 Mobile Network Information . . . 29
7 System Information . . . 30
8 Traffic . . . 31
9 Signal Strength . . . 32
10 Signal Quality . . . 33
11 Latency . . . 34
12 Device Parameters . . . 37
13 Group List . . . 38
14 Add Device . . . 46
15 Group List . . . 49
16 Add Company . . . 51
17 Add User . . . 52
18 Options – General . . . 53
19 SMS Gateway . . . 55
20 Email account . . . 56
21 Event Strings . . . 58
22 Router Identification . . . 59
23 Companies . . . 60
24 Users . . . 61
25 Send SMS . . . 62

1. Description of Monitoring System

1.1 Introduction

R-SeeNet is a software system used for monitoring of status and functions of Advantech routers. It continuously collects information from individual routers in the network and records this information into the SQL database. For reading of data, SNMP protocol is used and traps are sent under this protocol. System then creates a visual form of this information – for the user, the network administrator. It is possible to find information about the amount of data transferred, signal strength, router availability, number of connections, router temperature, supply voltage and much more.

This system consists of two separate parts (programs). First one takes care of reading out statistics from routers. This program runs as a service and uses SNMP protocol (for reading out statistics). These data are saved in SQL database. The database of monitoring system consists of two main tables. *Devices* table contains the data about individual routers. *Stats* table contains one statistic for each router. This table is updated whenever the data are read from the routers. Reading period can be configured for every router separately. Chosen period during installation will be used only if no period is set at the device. Consider the overall number of routers in the system when setting the reading period. The second part of R-SeeNet system is a Web interface that is used to present the statistical data and contains configuration forms.

To manage the monitoring system and display data collected from monitored routers, the Web interface is used. Users of this Web interface can have different user permissions. By default there is a user with administrative privileges (administrator) and a normal user (user). Only the administrator has the right to add a new user and assign administrative privileges (to new or existing users). There is also a user account known as superadmin, which is used for managing multiple companies. In this case, R-SeeNet is operated by one of the companies and other companies perceive it as a cloud. Individual companies can not be interconnected. The R-SeeNet database management within the all companies is allowed only for superadmin. Other users (administrator and user) have access to tables and statistics within the company where they belong.

1.2 Hardware Requirements

Hardware requirements for the computer to run R-SeeNet are depending on the number of monitored routers. For common number of routers (to one thousand) an office PC with 2 to 4 GB of operating memory and processor Intel Core i5 is sufficient. For larger numbers of monitored routers a server computer with at least 2 processors, 10 GB of operating memory and large fast disks due to frequent access to the database is recommended. Tens of GBs of storage is recommended for database backup. E.g. daily created backup will take several GBs when thousands of routers are added to R-SeeNet.

1.3 Data Traffic Demand

When monitoring system is reading the router via SNMP protocol, the router sends approximately 500 B and receives approximately 500 B (amount may differ a bit based on type of the router and reading settings). This means that one router sends approximately 3 MB per month, when the R-SeeNet reads out the router every 15 minutes.

1.4 SNMP v3 Support Limitation

Protocol SNMP in version 3 is supported, but note that only polling access mode for reading data from routers can be used. Traps can not be used. This limitation is caused by combination of database structure, encryption in SNMP v3 and MAC address of routers sent in traps. Please, use polling access mode only in case of SNMP v3.

1.5 Router Identification and MAC Address Handling

MAC addresses of routers are crucial for identification in R-SeeNet. Problems with identification that can arise (e.g. SIM card changed) are prevented the way described below:

Polling In case of SNMP polling, the IP address of the router is used as destination, but when the answer arrives, the MAC address is inspected, whether it is identical with one kept in database (the first time it is just saved to the database). If the MAC address does not match, records of other routers are examined to see if the MAC address belongs to another router. If the MAC address is not found, steps are taken described below in section 1.5.1

Traps In case of SNMP traps, the MAC address in the received message is checked against the database – the router where data belongs is looked up according to matching MAC address. If MAC address is found in the database, the received data are assigned to that router. If the MAC address is not found and if there is only one company in R-SeeNet, the new record for that router is made – supposing that this feature is enabled in R-SeeNet. See section 5.10.3 for enabling or disabling.

1.5.1 MAC Address Not Found in the Database (Polling)

In case of SNMP polling: When data arrive from another SIM card and the MAC address does not match with the one kept in database for that router, R-SeeNet will try to look up the received MAC address in the database and it will assign the data to another router if that MAC is found at another router. If MAC address is not found at all, the received data are not saved in database. In both these cases the Error file is created with the record of this situation. This file is named ErrYYYYMMDD.CSV, where YYYYMMDD is the recent date. This file is created in subdirectory LOG in the directory of R-SeeNet installation in Windows. In Linux the file is created in /var/log/snmpmon/ directory. Every day the new file is created in case the error remains. After 30 days the file is deleted, so the history older than 30 days is not kept.

Error file structure is the following. Meaning of the items is described in the Table below.
`Time;SrcHostname;SrcMAC;DestHostname;DestMac`

Example of the Error file containing only one line of record:

```
22.6.2016 11:39:11;;00:0A:14:84:40:C6;62.141.23.118;68:C9:0B:A5:08:A4
```

Item	Meaning
Time	Recent time and date
SrcHostname	IP address of the polled router
SrcMAC	MAC address saved in database for the polled router
DestHostname	IP address of the router, where the data were saved, which means that the MAC address was found at different router in database than expected. If the MAC was not found, there will be "-" symbol on this place.
DestMac	MAC address of the router received in the answer to polling

Table 1: Význam položek záznamového souboru

Every day the SMS (or e-mail) can be sent as notice that the Error file was created. If the file is not created, the message will not be sent. Configuration of sending this message is described in section 5.10.4 at the end.

1.6 Supported Systems for Installation

The monitoring system is provided in versions for Windows and Linux. In case of Linux, R-SeeNet can be provided as an image for VirtualBox software (CentOS) or as RPM or DEB packages.

Proper functionality of the R-SeeNet system was tested on the following OS:

- Windows Server 2016
- Windows 10
- CentOS 6.x (32 bit)
- CentOS 7.x (32 bit)
- Debian (latest and previous LTS versions, 64 bit)
- Ubuntu (latest and previous LTS versions, 32 bit)

2. Installation

2.1 Database and upgrade to higher version

For the proper function of R-SeeNet, the database system is necessary. MariaDB database system is provided as part of the R-SeeNet installation package. MySQL database system is compatible with R-SeeNet also, but it is not included in the installation. If you decide to use MySQL, you must install it and run before you start the installation process of R-SeeNet.

When upgrading to higher version (reinstalling), the original database is preserved and all the configuration made by user, too. Also the license is used from the previous version. **When upgrading to higher version**, choose only these parts to be installed: ***R-SeeNet-web***, ***R-SeeNet-kernel*** and ***R-SeeNet-modification mysql tables***, see Figure 3.

2.2 Windows

After the installation is started, the choice of installation language is displayed.

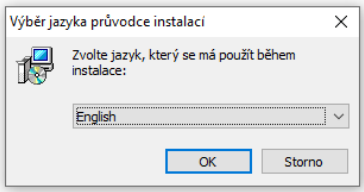

Figure 1: Installation – choice of language

Pressing *OK* the next page with the Welcome wizard and information about the R-SeeNet version will appear. To continue installation, click *Next* button.

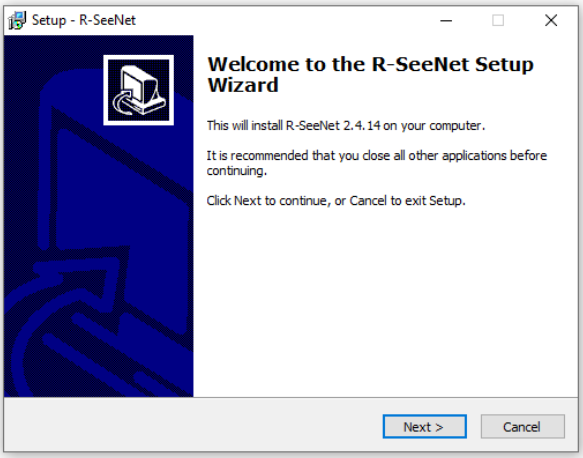

Figure 2: Installation – version

Now the installation components can be selected. *PHP & Apache* item has to be installed if you have not installed *Apache* server before. R-SeeNet will not work properly without this part. If you have not installed MySQL database system before, it is necessary to check the *MariaDB Server* item. *R-SeeNet-modification mysql tables* item represents the modification of MySQL database for R-SeeNet and it's necessary, if MySQL is installed on another server. **Note:** when upgrading to higher version, choose only items specified in section 2.1!

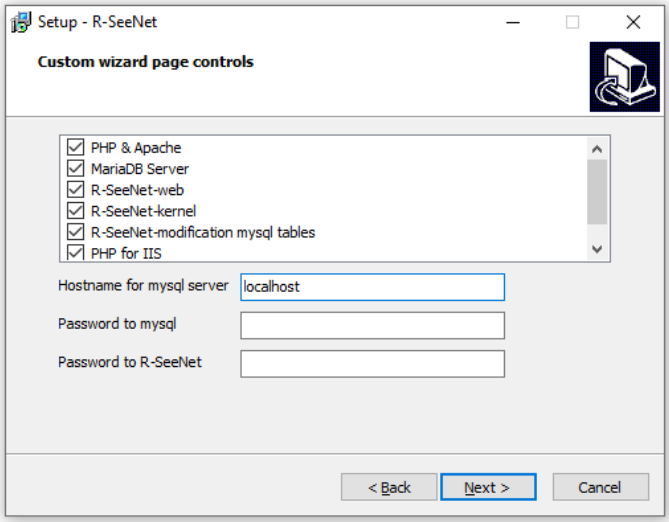

Figure 3: Installation – choice of parts

The next step is to choose a location for the installation of R-SeeNet. If you don't want to use the default (root) directory, a new location can be selected using the *Browse* button.

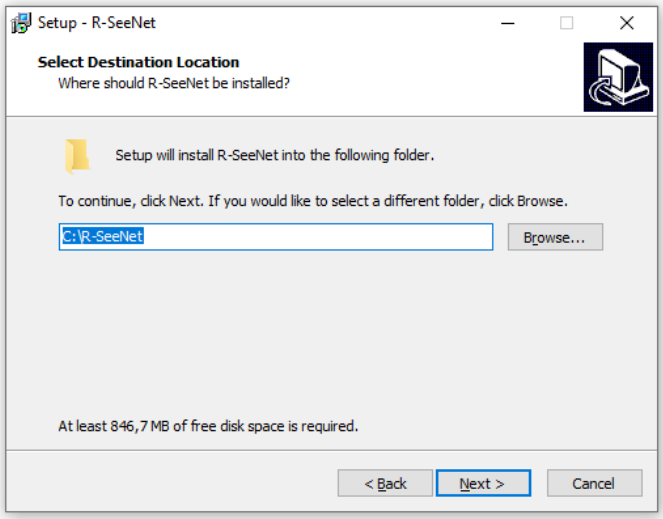

Figure 4: Installation – select destination location

At this moment, the installation is ready to run. To start it, press the *Install* button. Use the *Back* button if you want to return to the previous steps.

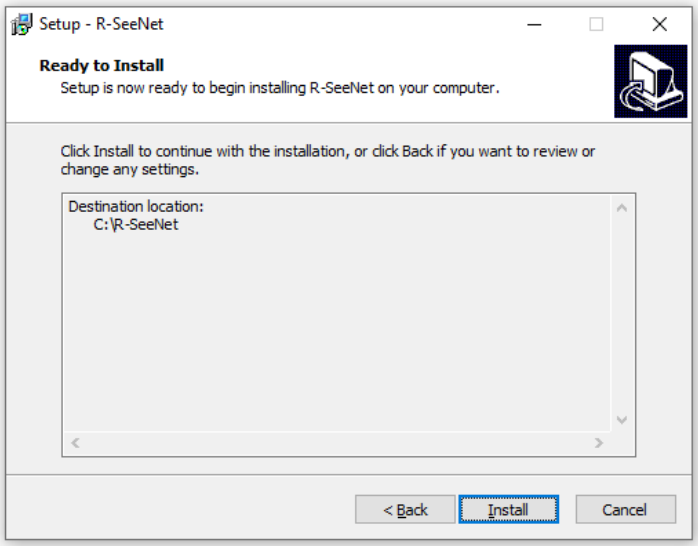

Figure 5: Installation – ready to install

Now the installation is running. The progress of the installation process can be seen in the middle of the window.

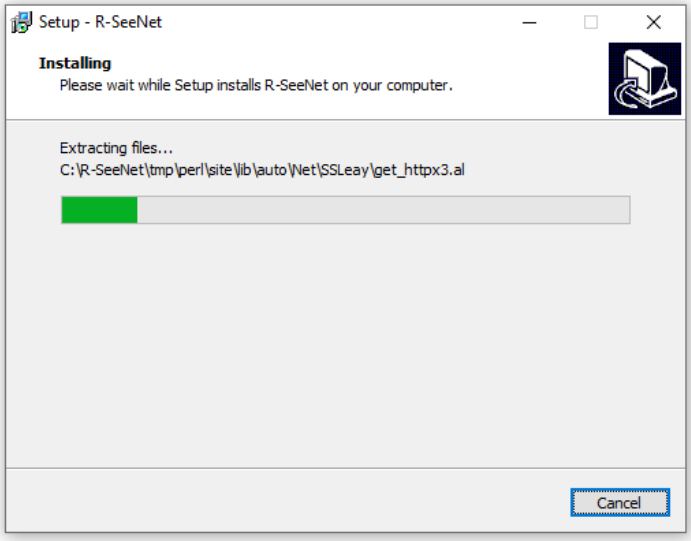

Figure 6: Installation – progress

After successful installation, it is necessary to set basic parameters of the R-SeeNet:

- *Backup Time HH:MM* – Time, when a backup of the database is made regularly.
- *Number of attempts* – Number of attempts to read data from router.
- *Monitoring Period [min]* – Period of reading data from router.
- *Timeout [s]* – Waiting time for a response from a router.
- *Start delay [s]* – Delay of reading data from routers after the start of monitoring system.
- *Default community* – This SNMP community is default when adding a new router.
- *Timezone* – Local time zone.
- *Ping length* – Number ping messages sent when the ping is started from the monitoring system.

To confirm the parameters set, press the *Continue* button.

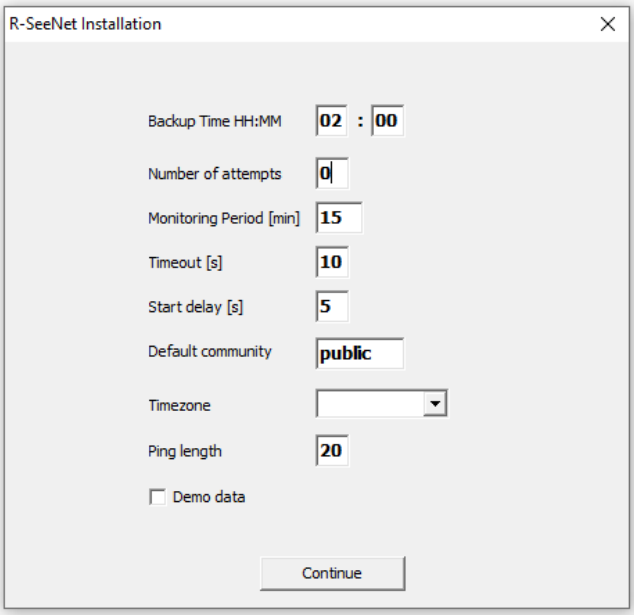

Figure 7: Installation – parameters

Now, it is possible to activate R-SeeNet offline using the license key you have purchased, or select the DEMO license of R-SeeNet.

For offline activation (R-SeeNet is not connected to Internet), enter the license key and the Installation Key will be generated in *Code 1* item. Send this Installation Key to Advanech company via e-mail cellular.info@advantech.cz. You will obtain Activation Key (valid for one day!) that you will enter into the *Code 2* field and click *Register offline* button. Both offline and online activation can be done any time later in Web interface on About page.

It is recommended to select **Demo version** during the installation and then register online (with Internet access), or offline in Web interface on the About page, see section 5.16.

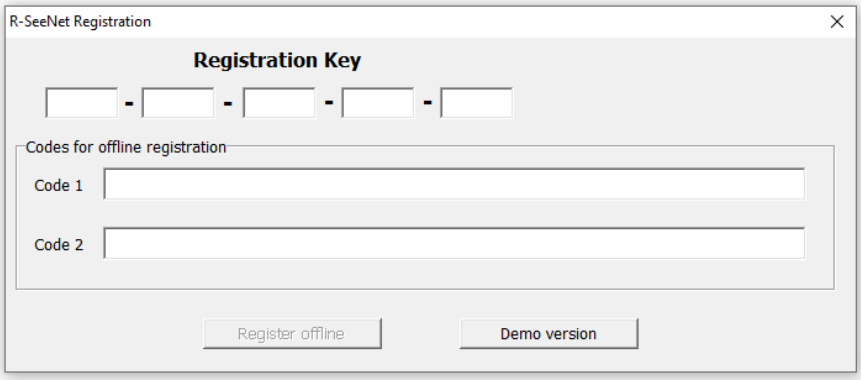

Figure 8: Registration of license

To complete the installation of R-SeeNet, press *Finish* button.

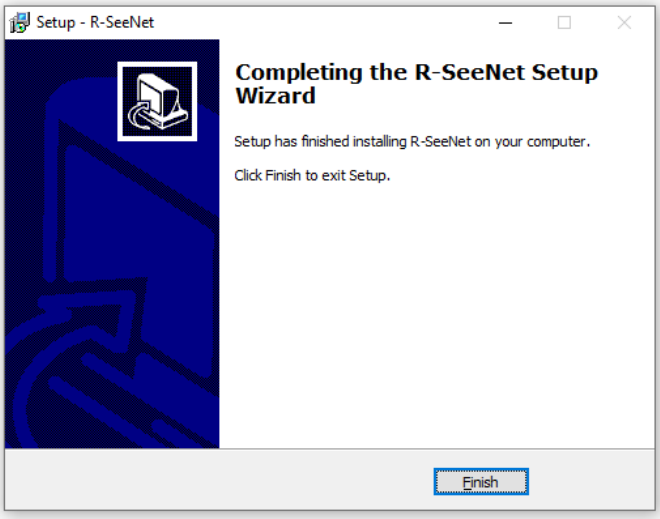

Figure 9: Installation – completion

2.3 CentOS

2.3.1 VirtualBox Image

Installation of VirtualBox is required including **Extension Pack**.

In case of Linux, the R-SeeNet is supplied as an image for virtual box. After clicking on the image file, the VirtualBox window will be opened. It is necessary to choose the network card in *Settings* item (*Network* section) before the start of the virtual machine.

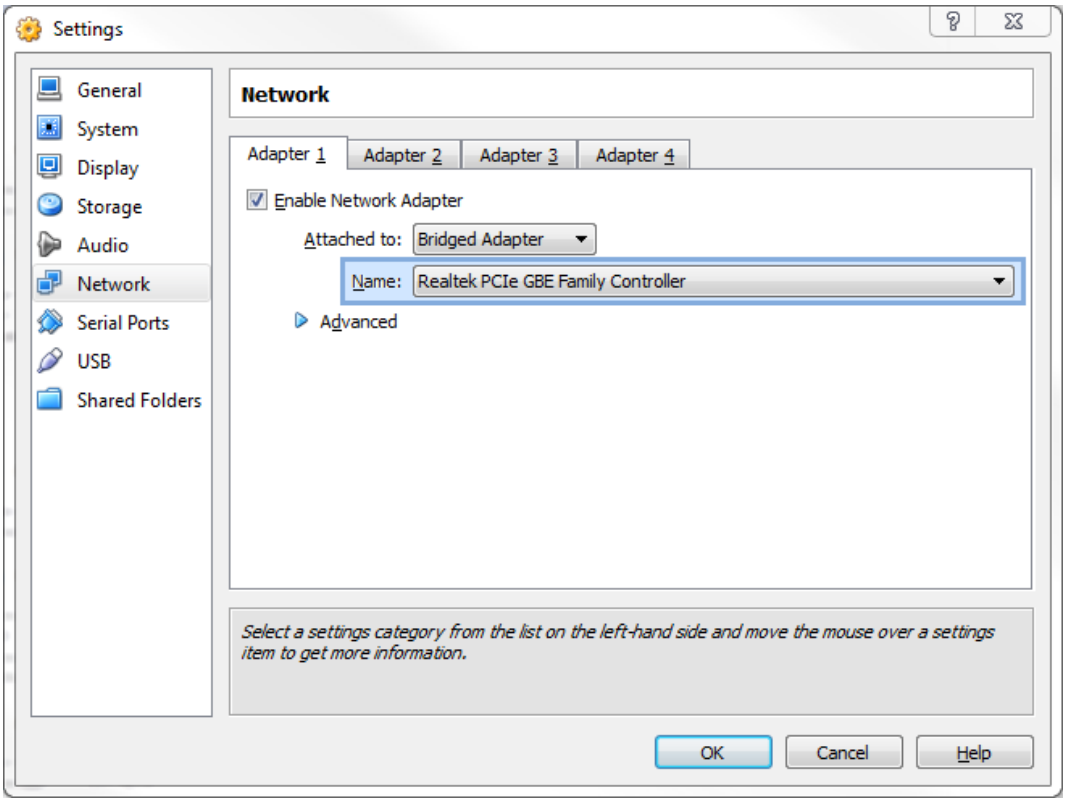

Figure 10: Settings – Network card

If hardware virtualization is not enabled in the BIOS, it is necessary to disable it in the VirtualBox and set the number of processors to one (see Figure below).

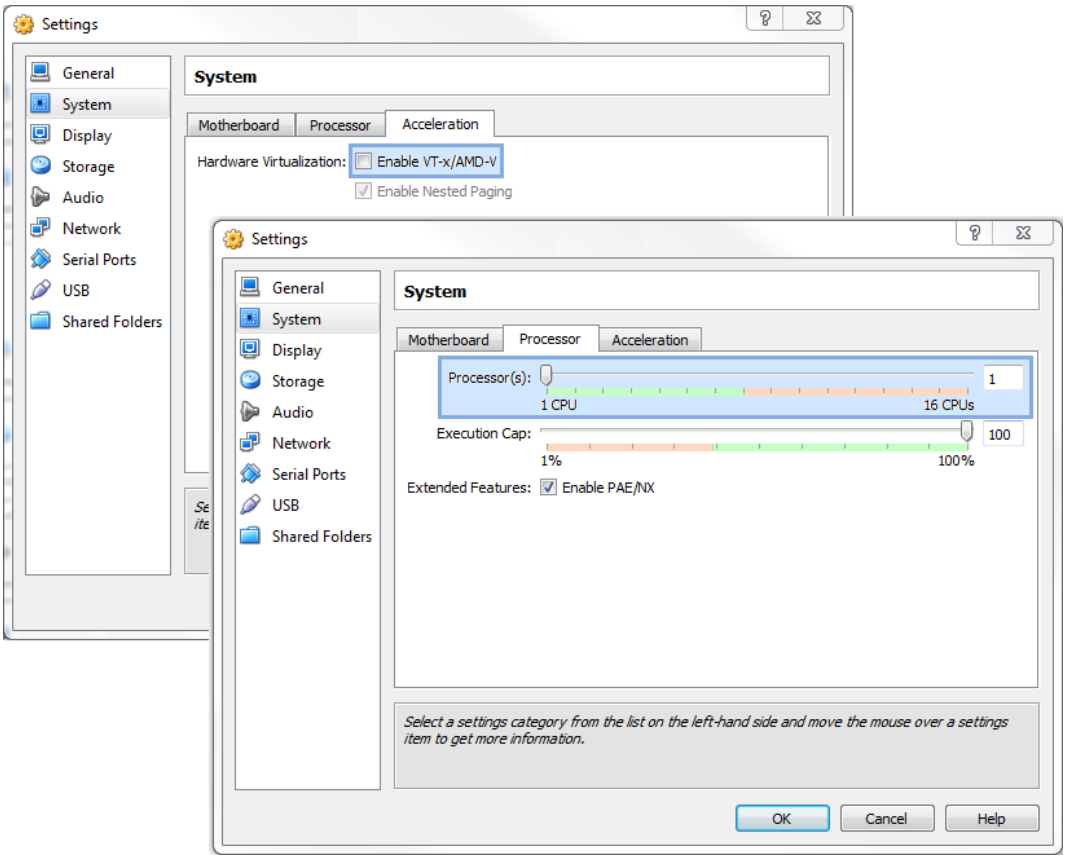

Figure 11: Settings – hardware virtualization

Now the process of virtualization can be started by clicking the green arrow titled *Start*.

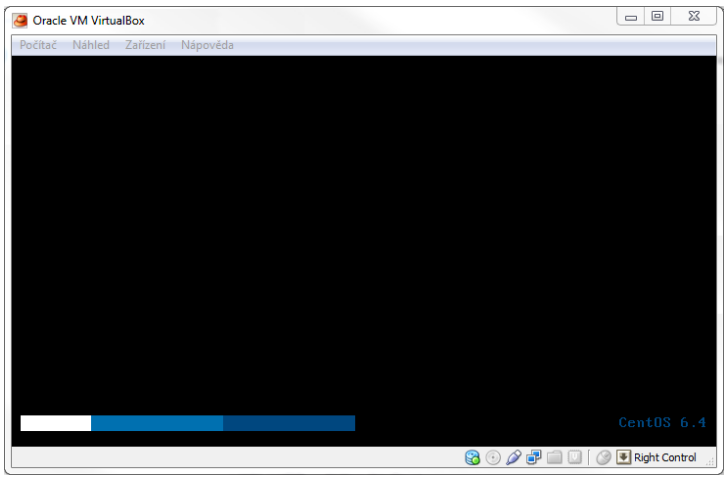

Figure 12: Running virtualization

After the Cent OS is launched (It is the Linux distribution based on Rad Hat Enterprise), you are prompted to enter username and password. It's set to **root** (username) and **rootroot** (password) by default. At this moment it is necessary to configure the network settings. Run the following command:

```
system-config-network
```

Following window with the network configuration will appear:

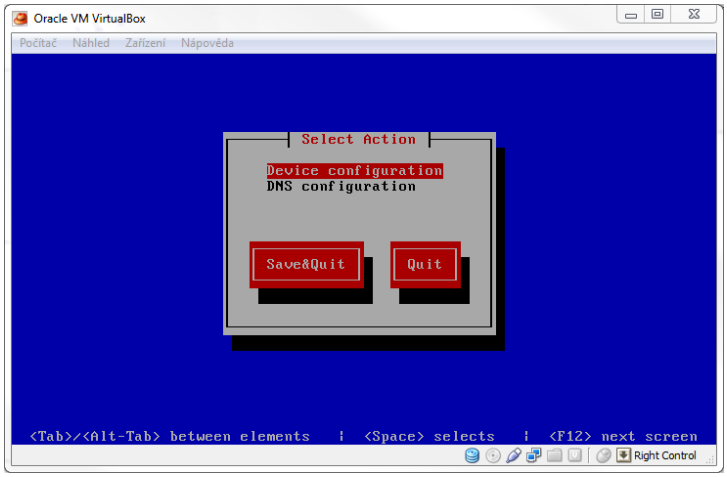

Figure 13: Network configuration

The first step in configuration is to set the name and IP address of the device the monitoring system will be located on. By clicking on the *Device configuration* item and then *eth0* item the corresponding form is displayed. To save your changes, you click on the *OK* button and on the *Save* button in the level up.

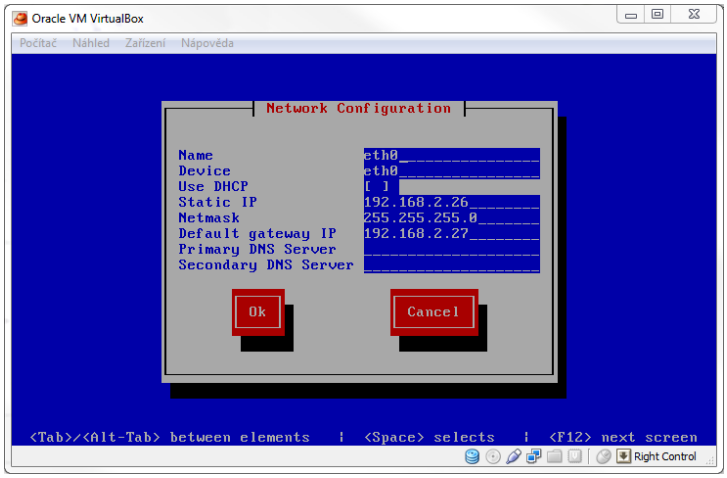

Figure 14: Device configuration

The second step in configuration is to set the DNS. It can be done via the *DNS configuration* menu item. There are items *Hostname* for an identification name and primary to tertiary DNS. To save all the changes it is necessary to click the *OK* button and *Save&Quit* button in the level up. Now you can exit the configuration window.

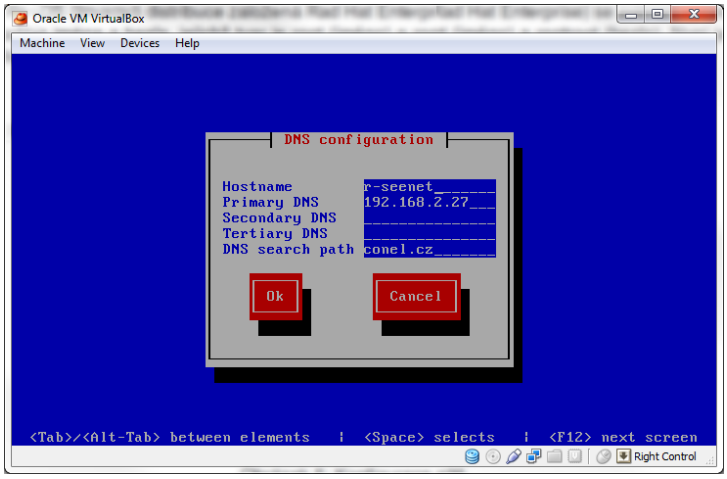

Figure 15: DNS configuration

2.3.2 Automatic Startup

A detailed description of how to run the VirtualBox automatically and select and run the virtual machine when operating system boots is explained in the user manual for VirtualBox. By default, it is stored in the c:\Program Files\Oracle\VirtualBox\doc\ directory, created during the installation.

2.3.3 RPM Packages

First, import the key using command:

```
rpm --import key.gpg
```

Then install *r-seenet-server-x.rpm* package (kernel of monitoring) using this command:

```
yum localinstall r-seenet-server-x.rpm
```

When installing the package for the first time, the password is generated automatically. After installation, follow the instructions and insert the password to the following file:

`/usr/share/r-seenet/www/config.inc.php to parameter DB_PASS`

You can also find the password in this file: /etc/snmpmon.ini.

After the kernel of monitoring system is installed, run SQL scripts written out by installer on the screen during the installation of the *r-seenet-server-x.rpm* package. Commands to run the scripts are following:

```
mysql -uroot -f < /usr/share/r-seenet/r-seenet.sql

mysql -uroot -e "GRANT ALL PRIVILEGES ON snmpmon.* to SNMPMON@'%'
identified by 'password'"

mysql -uroot -e "GRANT ALL PRIVILEGES ON snmpmon.* to SNMPMON@'localhost'
identified by 'password'"
```

Attention! Instead *password* insert the real password, written out by installer. Insert the entire SQL query, written out by installer on the screen.

Next, install the package for the Web application. Use command:

```
yum localinstall r-seenet-php-frontend-x.rpm
```

Important notes:

- For the proper operation must be disabled SELINUX parameter in /etc/selinux/config file: `SELINUX=disabled`
- If the *snmpmon* service (mentioned kernel) doesn't start, you must start it manually: `/etc/init.d/snmpmon start`

2.4 Debian

To install R-SeeNet on clean Debian Linux system, take the steps described below.

64 bit system is supported only. R-SeeNet was tested up to Debian ver. 10, 64 bit. Current release can be downloaded from: https://cdimage.debian.org/debian-cd/current/i386/iso-cd/

After installing Debian (e. g. in VirtualBox), first turn off the installation from CD-ROM in file **etc/apt/sources.list** by commenting the line with number sign: "# deb cdrom:[Debian GNU/Linux ...."

Figure 16: Debian: turn off CD-ROM installation in apt sources

Before installation itself, run the following command (most probably run also "su root" before this command to switch to installation authorized user).

```
apt-get update
```

Now install the database packages using these commands:

```
apt-get install mysql-server mysql-client
apt-get install libmariadb-dev
apt-get install libmariadb-dev-compat
apt-get install libmariadbclient-dev-compat
```

Install the R-SeeNet server using the command below. You can download DEB packages from https://icr.advantech.cz/products/software/r-seenet (with wget or curl, then unzip).

```
dpkg -i r-seenet-server.deb
```

During the server installation, you will be asked to provide the following information – see Figures below.

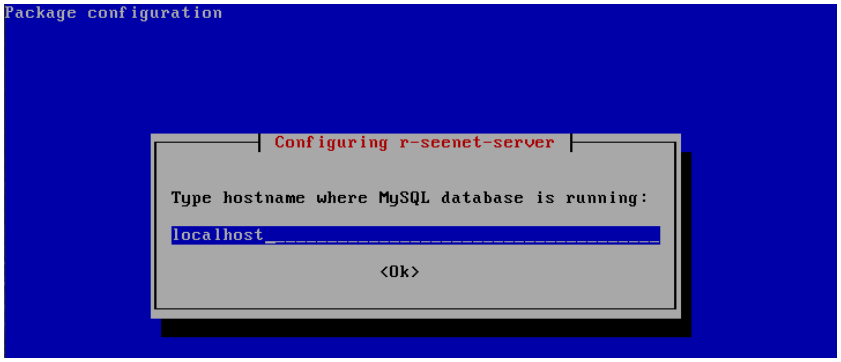

Figure 17: Debian: R-SeeNet server asks for MySQL database hostname

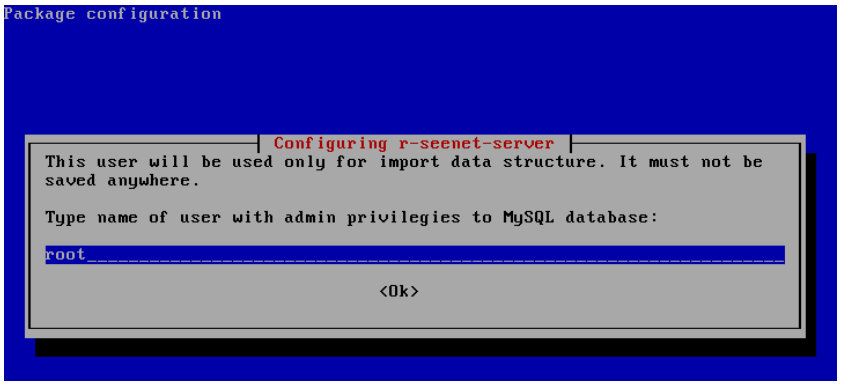

Figure 18: Debian: R-SeeNet server asks for MySQL database admin user

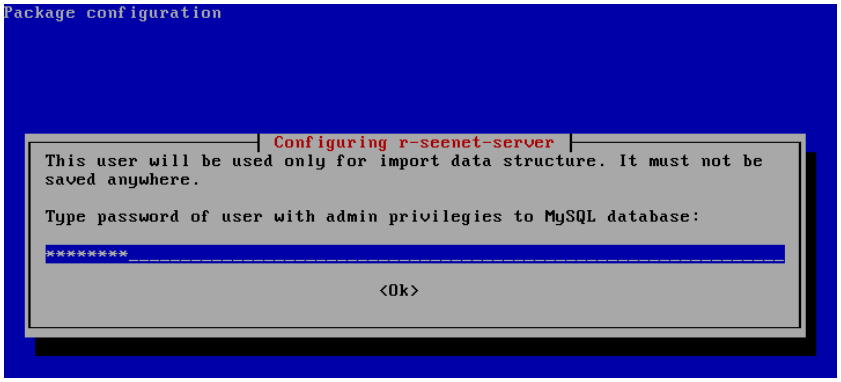

Figure 19: Debian: R-SeeNet server asks for MySQL database user password

After the R-SeeNet server installation, view the **etc/snmpmon.ini** file and make a note of a password for SNMPMON user. You will need it later on when installing R-SeeNet frontend package.

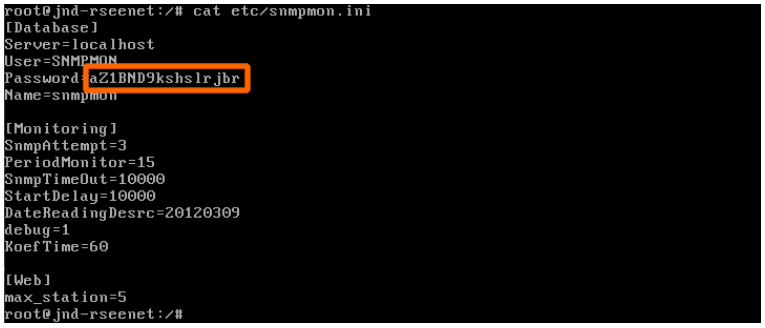

Figure 20: Debian: Make a note of a password in etc/snmpmon.ini file

Now install php packages using following commands:

```
apt-get install php
apt-get install php7.0-curl php7.0-gd php7.0-mysql
apt-get install php7.0-mbstring
```

Install the second R-SeeNet package – the frontend – using the command below:

```
dpkg -i r-seenet-php-frontend.deb
```

During the frontend installation, you will be asked to provide the following information – see Figures below.

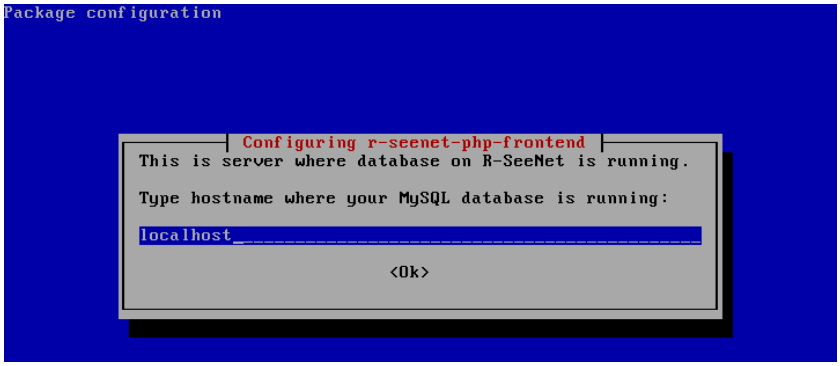

Figure 21: Debian: R-SeeNet frontend asks for MySQL database hostname

Fill-in "SNMPMON" here:

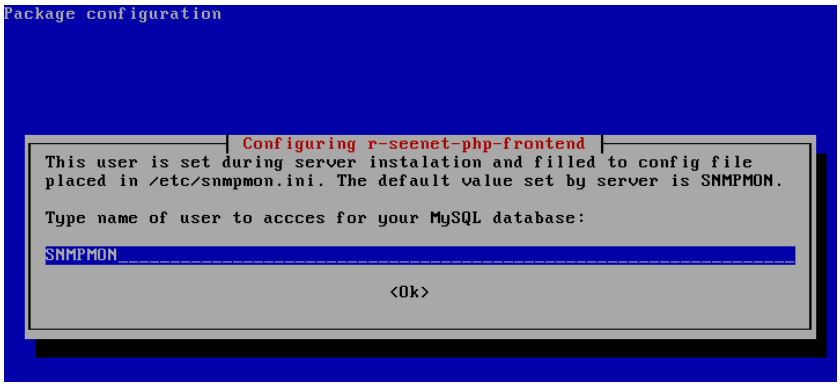

Figure 22: Debian: R-SeeNet frontend asks for MySQL database user

Fill-in the password from etc/snmpmon.ini file:

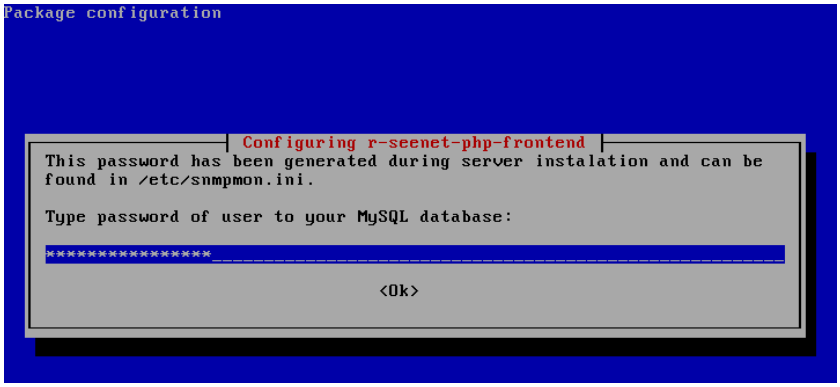

Figure 23: Debian: R-SeeNet frontend asks for MySQL database user password

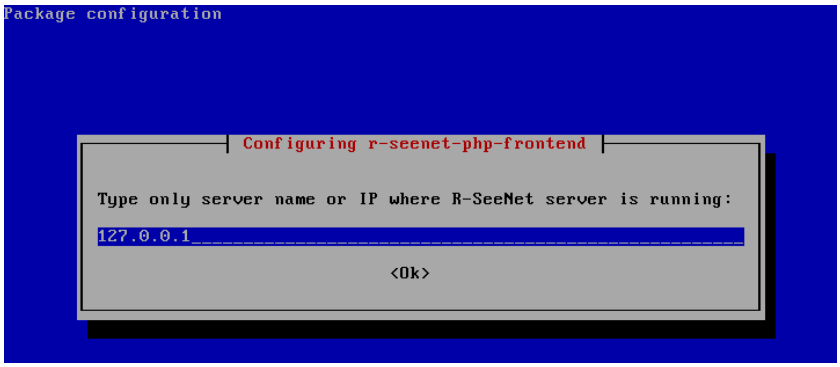

Figure 24: Debian: R-SeeNet frontend asks for R-SeeNet server hostname

Now when you run "snmpmon", the R-SeeNet will start. You can add this as a service the standard way using `systemctl` and run R-SeeNet on the background and after system startup.

```
snmpmon
```

When the R-SeeNet is running, go to the Web browser to
<R-SeeNet-IP-or-hostname-address>/r-seenet/index.php
and you will see the login form. Default credentials can be found in Chapter 5.

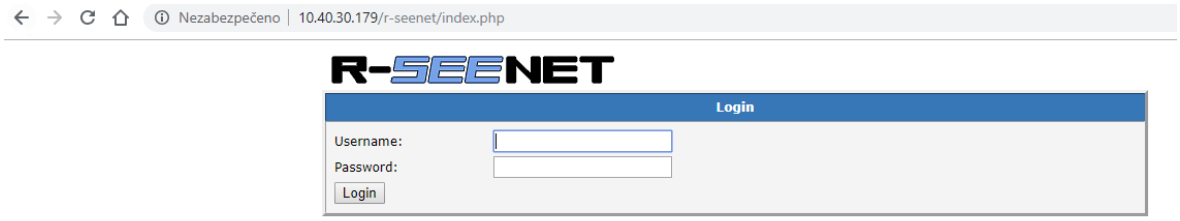

Figure 25: R-SeeNet login form after installation

3. Running Service Window

Windows systems only. This window is not displayed in server systems.

Number of devices – Total number of monitored devices.

Status – Current status of service:

- *0* – Start of service, basic initialization is running, reading of the *Stats* table.
- *1* – Waiting for the start of the first monitoring round (it's possible to add a few second delay – parameter start delay in SNMPMOON.ini).
- *2* – Initial start of each round.
- *3* – Waiting for responses from individual devices and broadcasting other requests.
- *4* – Waiting for an answer from remaining devices (all devices have been contacted).
- *5* – Idle state before the next round.
- *100* – Error during reading of the *Devices* table or zero number of devices.
- *101* – Error during the first reading of the *Stats* table.

Next monitor – Time to start the next monitoring round.

TCPStat – State of establishing a TCP communication with the parent web application. The core acts as a TCP server.

- *1* – Initialization state after start of the service.
- *12* – Successful assignment of the communication port (65031). Waiting for the connection request from a client on this port.
- *2* – Connection with the client successfully established.

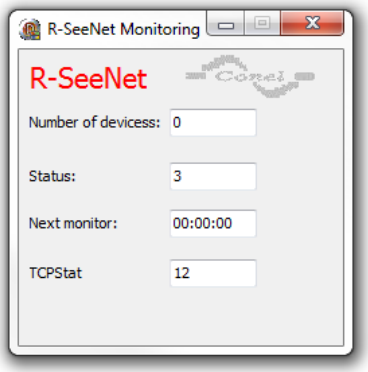

Figure 26: Running Service Window

4. How to Connect Router to R-SeeNet

After login to Advantech router, go to *Services* in *Configuration* section of the router's menu and choose *SNMP*. Enable SNMP agent, enable SNMPv1/v2 or SNMPv3 access and fill in the appropriate details (find more in Configuration Manual for your router, see Chap. 8).

If you want to use **traps** (the router itself contacts R-SeeNet) for reading of data, enable option *Enable reporting to supervisory system* at the bottom and fill in the IP address of R-SeeNet server and period of sending regular traps. In some conditions it is also possible to add routers to R-SeeNet database automatically using traps, see section 5.6 at the end.

If using **polling** for reading data from routers, there is no need to enable reporting (router will be contacted by R-SeeNet). Click *Apply* button.

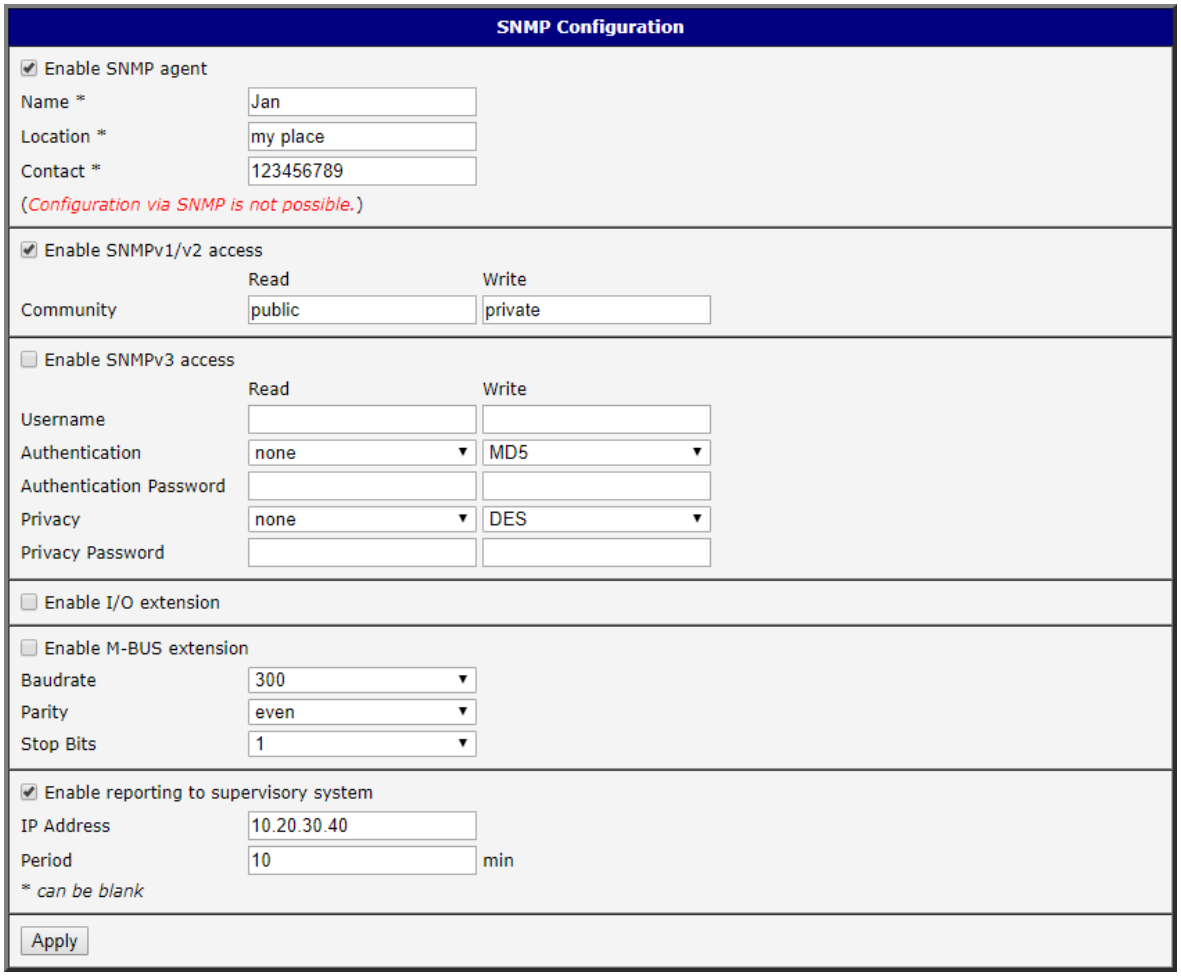

Figure 27: SNMP Confifguration in router

Do not forget to enable the remote SNMP access on NAT Configuration page! Navigate to *NAT* in *Configuration* section and enable SNMP remote access as you can see on the Figure below. This is neccesary for both polling and traps access modes since the devices are communicating in Internet.

Figure 28: Enable remote SNMP access in NAT

Now when adding the device in R-SeeNet, the router will respond or communicate with R-SeeNet via SNMP. You can verify the visibility of device in Internet via Ping button from R-SeeNet (after device added). The router will be visible as online in R-SeeNet after the first reading of data via SNMP is made, wait for the set reading period time to see the status of the router.

5. Description of the Web Interface

To access the monitoring system, use a Web interface. It can be accessed by entering the IP address or domain name of the computer the R-SeeNet is installed on.

For the first login, use the default credentials **admin** (Username), **conel** (Password) for user with administrative privileges, or **root** (Username) and **conel** (Password) for superadmin user (in case of monitoring multiple companies) – and press *Login* button. We strongly recommended to change the credentials as soon as possible.

5.1 Menu

Main menu is located at the top of each page. In the upper right corner logged-in user's username and company information are displayed. The menu is divided into three blocks. The first one – *Status* – contains items to display information about monitored devices (routers). Items in the *Configuration* part can be used to edit, add and delete monitored routers. In the *Administration* part of the main menu the items for logging out of the system, users management and other information can be found.

Figure 29: Main menu

5.2 Device List

List of monitored devices (routers) can be displayed by clicking on the *Device List* item in the *Status* part of the main menu. This page is also displayed as the home page after logging into the monitoring system. Each user can choose columns displayed in the *Device List* table (see section 5.10.2 *Appearance*). The meaning of each column is described in the following table.

Column	Description
:.	Identifier of the router (sequence number of added router)
Hostname	IP address of primary SIM card. Details below the table.
2nd Hostname	IP address of secondary SIM card. Details below the table.
3rd Hostname	IP address of tertiary SIM card. Details below the table.

Continued on next page

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Column	Description
Description	Description of the router (can be changed by the *Edit* operation, see line at the bottom)
Device	Type of the router
Note	Any user-defined note about the router
Location	Location of the router (can be changed by the *Edit* operation, see line at the bottom). If *Read location* box on the *Options* page is checked, R-SeeNet reads the location set in the router.
Tx, 2nd Tx, 3rd Tx	Total size of transmitted data for accounting period (for active SIM card)
Rx, 2nd Rx, 3rd Rx	Total size of received data for accounting period (for active SIM card)
Total	Total size of transferred data for accounting period (transmitted and received)
Level	Signal quality of the currently selected cell
Data service	Type of transmission technology
Uptime	How long the device is active
Firmware	Current firmware version loaded in the router
Temperature	Temperature in the router
Supply voltage	Supply voltage
Report	Clicking this button, the report of selected router will be shown
Enabled	If checked, reading from the router via SNMP is enabled
Autoupdate	Enables automatic update of router firmware and configuration
Access mode	Informs about the way of reading the data from the router: • Polling – reading from the router in a standard way • SNMP trap – reading from the router via SNMP traps
SN	Serial number of the router
MAC	MAC address of the router
IMEI	IMEI number of cellular module in the router (if available)
ESN	ESN number of cellular module in the router (if available)
Group	Name of the group the router belongs to
Company	Company that owns this router
SNMP Protocol	Version of SNMP currently used (V1, V2 or V3)
Operation – Edit	Edit information about the router (pencil icon)

Continued on next page

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Column	Description
Operation – Remove	Removes the router from the list (red cross icon)
Device Selection	Use to change the properties or delete multiple routers in a bulk. Routers that require change can be selected using the check boxes in this column. Routers will be added to the *Selected Device* list using the *Checked* button. To add all of the routers, use *All* button.

Table 2: Device List description

Features in the *Operation* column (*Edit* and *Remove*) are available to users with administrative privileges only.

Properties of *Hostname*, *2nd Hostname* and *3rd Hostname* items:

- Place the cursor on any IP address to see the date and time of the last router reading. Press the IP address to display statistics for this router (*Device Status*).
- Click on the *Ping* button to ping the routert. After the ping is finished, the result is displayed in a new window.

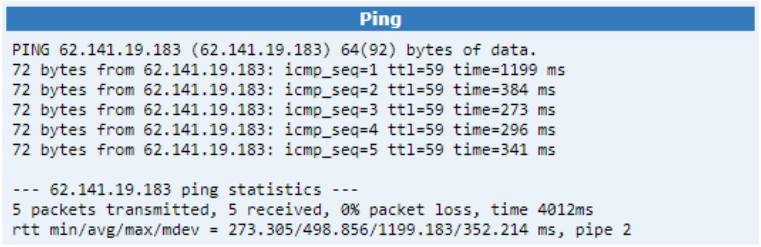

Figure 30: Ping

- The background of each cell is colored according to accessibility of the router:

Color	Description
Green	Router was read in the last reading round
Orange	Router could not be read only in the last reading round
Red	Router could not be read several times consecutively
Grey	Router is not allowed to be read (*Enabled* isn't checked)
Blue	Newly added router. Blue color disappears after the first edit.

Table 3: Background color of *Hostname* items

Automatic update of routers configuration is not provided by R-SeeNet itself. It only enables or disables downloading of the configuration file from a computer with monitoring system. The update must be set in the configuration of every router where automatic update is desired.

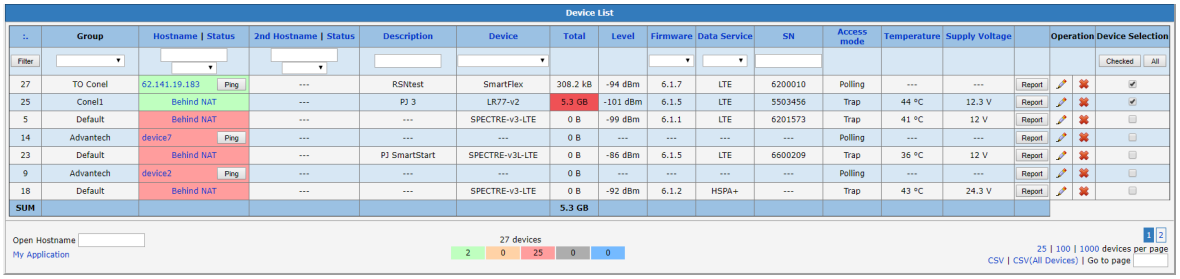

Figure 31: Device List

Tips for working with *Device List*:

- Number of routers displayed on one page can by specified by the numbers in the lower right corner (25, 100 or 1000). To browse between the pages, use pagination. It is also possible to write page number into the *Go to page* field and press Enter.
- Routers can be sorted by any column. Click on the column name to sort the routers. Click again to sort the routers in reverse order.
- Routers can be filtered in most of columns. Specify the filter criterion into the text box below the name of the column and then press the *Filter* button or Enter key.

The *Open Hostname* item can be found in the lower left corner. Any router's *Hostname* (name or IP address) can be written into this field and the *Device Information* page will load after pressing Enter.

Below this item a link to user-defined application can be found (if defined). This link can be defined in the system settings (*Options*), subpage *Appearance*, in the *User link* part.

5.2.1 Selected Devices

Use *Selected Devices* to change the properties or delete multiple routers in a bulk. First, the routers has to be added using the check box in the *Device Selection* column of *Device List* table. Checked routers are added to the *Selected Devices* list using the *Checked* button. To add all of the routers, use *All* button. If selected routers are added successfully, the link with number of routers will be displayed in the upper-right corner (see Figure below).

Figure 32: Header after routers selected

Selected Devices page for editing properties of multiple routers in a bulk can be displayed by pressing the new link in the header. On the left side of this page there is a table with selected routers list and their basic properties. On the right side there are options for change of listed routers properties. Their meanings are described in the table below.

Only one property of selected routers can be changed at the same time!

Item	Description
Change description to	Changes description of selected routers
Change community to	Changes SNMP community for access to selected routers
Change location to	Changes location caption of selected routers
Change note to	Changes note of selected routers
Change read period to	Changes the read period for selected routers
Enable monitoring	Enables monitoring of routers
Disable monitoring	Disables monitoring of routers
Enable AutoUpdate	Enables automatic update of router firmware and configuration
Disable AutoUpdate	Disables automatic update of router firmware and configuration
Enable reading GPS	Enables reading of GPS data
Disable reading GPS	Disables reading of GPS data
Enable reading Voltage & Temperature	Enables reading of temperature and supply voltage
Disable reading Voltage & Temperature	Disables reading of temperature and supply voltage
Enable SNMP V3 Access	Enables SNMP V3. Fill in *Username* and optionally *Authentication*, *Password* and encryption using *Privacy* items.

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Item	Description
Disable SNMP V3 Access	Disables SNMP V3 access.
Remove devices	Removes selected routers from the *Device List*)
Clear selection	Clears the *Selected Devices* list after clicking *Apply*

Table 4: Selected Devices

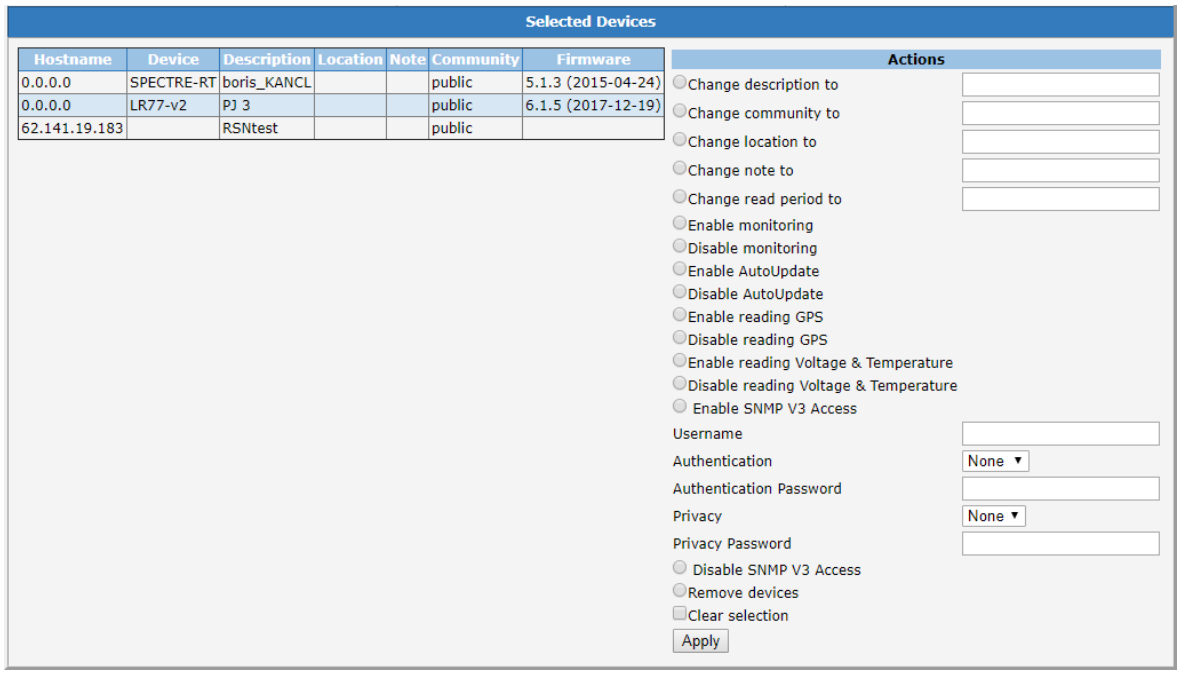


Figure 33: Selected Devices

5.3 Device Status

Device Status page shows information and statistics about the selected router. This page can be accessed by pressing the IP address of the selected router on the *Device List* page or by entering its IP address to the *Open Hostname* item at the bottom left corner.

5.3.1 System Information

On this subpage the information about the router system are displayed in three separate parts. The first part contains the (*Device Information*).

Item	Description
Device	Type of the router. After pressing the *Refresh* button, type of the router is deleted from the database and it is updated again during the next SNMP update.
IP Address	IP address of primary SIM card
2nd IP Address	IP address of secondary SIM card
3rd IP Address	IP address of tertiary SIM card
Phone Number	Phone number for sending of SMS message
Alt. Phone Number	Alternative phone number for sending of SMS message
SN	Serial number of the router
MAC address	Router MAC address
IMEI	IMEI number of cellular module in the router
ESN	Electronic serial number (ESN) of cellular module in the router
Firmware	Current version of firmware loaded in the router
Description	Router description defined by user
Location	Router location defined by user
Note	Note about the selected router
Group	Name of the group the router belongs to
Supply voltage	Supply voltage
Temperature	Temperature inside the router
Uptime	Time since Mobile WAN connection was established

Table 5: Device Information

Clicking on IP address, you will be redirected to the Web interface of the selected router. Use Ping button to start ping to the router. Color of the router's IP address field has the same meaning as in the Device List. Press *Map* button to open a window with router location on Google map (GPS coordinates of the router has to be filled in). *Send SMS* button can be used to send a message to the router, phone number has to specified (see section 5.14 *Sms*).

Device Information		
Device	LR77-v2	Refresh
IP Address	Behind NAT	
2nd IP Address	---	
3rd IP Address	---	
Phone Number	---	
Alt. Phone Number	---	
SN	5503456	
MAC address	00:0A:14:82:6B:DA	
IMEI	358178042219438	
ESN	---	
Firmware	6.1.5 (2017-12-19)	
Description	PJ 3	
Location	---	
Note	---	
Group	Conel1	
Supply Voltage	12.343 V	
Temperature	43 °C	
Uptime	23 d, 1 h, 26 m	

Figure 34: Device Information

This is followed by a block of information about mobile network.

Item	Description
Technology	Transmission technology currently used in the router
PLMN	Provider code
Cell	Cell
Channel	Channel of the cell
Signal Strength	Signal strength of the selected cell
Signal Quality	Signal quality of the selected cell

Table 6: Mobile Network Information

Mobile Network Information	
Technology	LTE
PLMN	23001
Cell	11CB215
Channel	1579
Signal Strength	-101 dBm
Signal Quality	-7 dB

Figure 35: Mobile Network Information

In the third part, the information about system and SNMP V3 protocol are available.

Item	Description
Community	SNMP community (password) for access to routers
Enabled	If checked, reading from the router via SNMP is enabled
Access mode	Informs about the way of reading from the router: • Polling – router is read the standard way • SNMP trap – router is read via SNMP traps
Poll period/Trap period	Reading period, name of the item dependent on the *Access mode*.
Last Read Time	Date and time of last read of the router
Update configuration	Date of last configuration update

Table 7: System Information

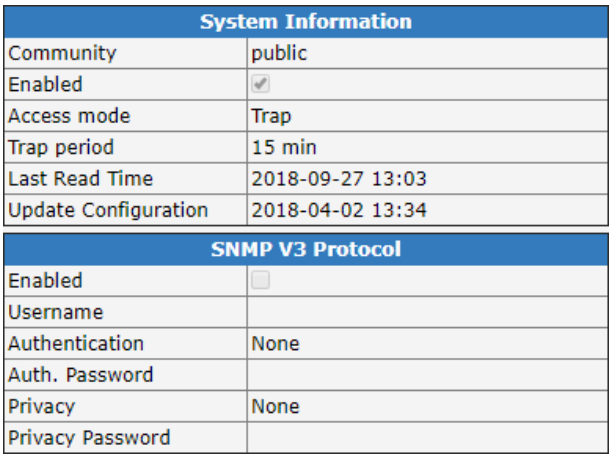


Figure 36: System Information

SNMP V3 Protocol block shows if SNMP V3 is enabled in the router and its user, authentication and privacy (encryption) parameters.

5.3.2 Stats

Information and statistics about selected router are shown on this subpage. Information are associated with the selected SIM card. They are separated into five blocks – *Traffic*, *Signal Strength*, *Latency*, *Tested Packet Loss* and *Router Availability*.

Traffic

Statistics of data transmitted and the number of established Mobile WAN connections for selected SIM card are displayed in the *Traffic* section.

Column	Description
Traffic	Period the data are displayed for
Total data	Size of the data transmitted in this period
Received	Size of the data received in this period
Sent	Size of the data sent in this period
Connections	Number of Mobile WAN connections established in this period

Table 8: Traffic

If the number of established Mobile WAN connections in the period is zero, the router didn't lose Mobile WAN connection in the period.

Traffic

Traffic	Total Data	Received	Sent	Connections
Today	312.7 kB	136.9 kB	175.8 kB	0
Yesterday	206.1 MB	194.3 MB	11.8 MB	0
Current Week	660.7 MB	607.3 MB	53.4 MB	0
Current Period	4.9 GB	4.7 GB	259.4 MB	0
Last Period	5.7 GB	5.3 GB	379.8 MB	3

Figure 37: Traffic

Signal Strength

The *Signal Strength* part shows the signal strength statistics for a certain period (today, yesterday, this and last week, this and last month) for selected SIM card. Statistics are provided separately for each technology. In a smaller table on the right side there is information about the minimum and maximum signal strength shown with time when they occurred.

Column	Description
technology name	Period the data are displayed for
Average	Average signal strength
Minimum	Minimum signal strength
Maximum	Maximum signal strength
Cells	Number of switching events between cells. When cursor is placed on this number, the cells numbers between the router switched are shown.
Services	Indicates how many times the router switched between different technologies. When cursor is placed on this number, the transmission technologies used in the period are shown.

Table 9: Signal Strength

Number of cells between the router switches has only informative character. Router can switch either between neighbouring cells or between different cells. If the number of switching is large, the antenna of the router is probably not placed very well.

The number of switching between cells may be different from the actual value recorded in the routers ER75i, UR5i and UR5. This is due to fact that the R-SeeNet detects whether the cell was changed between two readings from the router. If your router will change the cell to another and back between two readings, the monitoring system doesn't recognize.

Signal Strength

LTE	Average	Minimum	Maximum	Cells	Services
Today	-98 dBm	-101 dBm	-98 dBm	0	1
Yesterday	-98 dBm	-98 dBm	-98 dBm	0	1
Current Week	-98 dBm	-101 dBm	-94 dBm	0	1
Current Period	-98 dBm	-109 dBm	-94 dBm	2	1
Last Period	-96 dBm	-104 dBm	-91 dBm	2	1

Current	Average	Minimum	Maximum
-101 dBm	-90 dBm	-109 dBm	-73 dBm
		23.09.2018 22:18	26.03.2018 17:13

Figure 38: Signal Strength

A graph of the signal strength course in certain period can be shown by pressing the graph image in a cell with the name of the selected period.

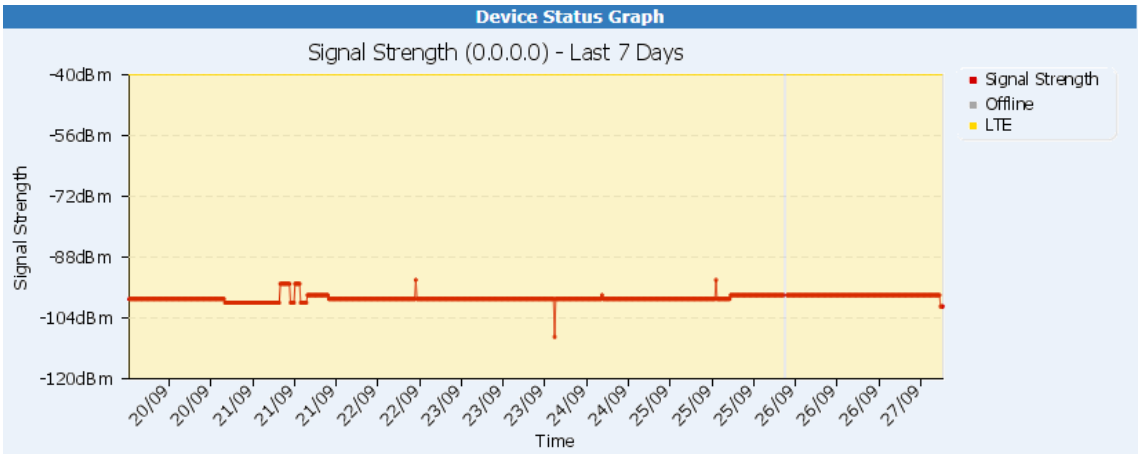


Figure 39: Signal Strength graph

Signal Quality

The *Signal Quality* part shows signal quality statistics for a certain period (today, yesterday, this and last week, this and last month) for selected SIM card. In a smaller table on the right side, the information about the minimum and maximum signal quality are shown with time when they occurred.

Column	Description
technology name	Period the data are displayed for
Average	Average signal quality
Minimum	Minimum signal quality
Maximum	Maximum signal quality

Table 10: Signal Quality

Signal Quality

LTE	Average	Minimum	Maximum
Today	-7 dB	-10 dB	-5 dB
Yesterday	-6 dB	-10 dB	-5 dB
Current Week	-6 dB	-12 dB	-5 dB
Current Period	-7 dB	-15 dB	-4 dB
Last Period	-6 dB	-12 dB	-4 dB

Current	Average	Minimum	Maximum
-8 dB	-8 dB	-19 dB	-3 dB
		08.03.2018 19:54	07.03.2018 05:54

Figure 40: Signal Quality

A graph of the signal quality course in certain period can be shown by pressing the graph image in a cell with the name of the selected period.

Latency

The *Latency* part shows latency statistics for a certain period (today, yesterday, this and last week, this and last month) for both SIM cards. The table on the right contains information about the minimum and maximum latency with the time when occurred.

Column	Description
Latency	Period the data are displayed for
Average	Average latency
Minimum	Minimum latency
Maximum	Maximum latency

Table 11: Latency

Latency is determined from a ping, which is sent to the individual routers by monitoring system core during reading.

Latency

LTE	Average	Minimum	Maximum
Today	37 ms	31 ms	51 ms
Yesterday	37 ms	30 ms	54 ms
Current Week	37 ms	22 ms	58 ms
Current Period	37 ms	22 ms	170 ms
Last Period	37 ms	22 ms	485 ms

Current	Average	Minimum	Maximum
39 ms	42 ms	22 ms	530 ms
		12.03.2018 21:58	22.07.2018 08:12

Figure 41: Latency

A graph of the latency course in certain period can be shown by pressing the graph image in a cell with the name of the selected period.

Tested Packet Loss

The *Tested Packet Loss* part shows lost packets statistics for a certain period. The value of packet loss rate is the ratio of lost packets to all packets sent during the reading data from the router by monitoring system core.

Tested Packet Loss

Tested Packet Loss	
Today	0 %
Yesterday	1 %
Current Week	0.3 %
Current Period	0.1 %
Last Period	0.2 %

Figure 42: Tested Packet Loss

A table and a graph of the packet loss course in certain period can be shown by pressing the table or graph image icon in a cell with the name of the selected period.

Router Availability

The *Router Availability* part shows router availability statistics for a certain period. The availability is determined from real answers during polling or from periodicity of incoming traps. Statistics are influenced by *Max fails for avail* parameter (configurable for group of routers, see section 5.4) and message can be sent when the router is unavailable. The availability percentage value is calculated either as a ratio of received polling answers to sent polling requests, or ratio of received traps to expected traps (according to period).

Router Availability

Router Availability	
Today	100 %
Yesterday	100 %
Current Week	100 %
Current Period	100 %
Last Period	99.9 %

Figure 43: Router Availability

A graph of the router availability course in certain period can be shown by pressing the graph image in a cell with the name of the selected period.

5.3.3 Notes

Notes regarding the router can be added on this page. New notes can be added by any logged in user by writing the text to the text field and clicking the *Add* button.

Figure 44: Notes

5.3.4 Device Parameters

Form on the *Device Parameters* page allows you to edit information and parameters of the router. It is also accessible by pressing the pencil icon (*Edit*) in *Device List*.

Column	Description
Hostname	IP address of primary SIM card
2nd Hostname	IP address of secondary SIM card
3rd Hostname	IP address of tertiary SIM card
Description	Description of the router
Location	Location of the router. If *Read location* checkbox on the *Options* page is checked, R-SeeNet reads the location that is set in the router.
Coordinates	GPS Coordinates of the router, so the *Map* button is active. Syntax example (no space after comma): 49.969732399999998,16.369322866666668. Coordinates are taken from GPS router app if available in the router.
Note	Any user-defined note about the router
Community	SNMP community (password) for access to the router
Group	Name of the group the router belongs to
Read period	Defines read period (in minutes)
Phone	Phone number for sending SMS message
Phone Alt	Alternative phone number for sending SMS message
Enabled	If checked, reading from the router via SNMP is enabled
Autoupdate	Enables auto-update of router firmware and configuration
Read location	Enables (or disables) reading location info, which is set in the router

Continued on next page

Continued from previous page

Column	Description
Read GPS	Enables (or disables) reading of GPS data from the router
Read Voltage & Temperature	Enables (or disables) reading temperature and supply voltage
Access mode	Sets the way of reading data from the router: • Polling – router is read the standard way • SNMP trap – router is read via SNMP traps. This mode is not applicable when SNMP V3 is used for reading the data from routers.
Accounting Start	Specifies the start of accounting period (day in a month). Can be set separately for every SIM card.
Enable SNMP V3	Enables (or disables) usage of SNMP V3 protocol
Username	User of SNMP V3
Authentication	Authentication type of SNMP V3. *None*, *MD5*, or *SHA1*
Authentication Password	Password. if *Authentication* is *None*, can be blank
Privacy	Encryption of SNMP V3. Can be *None*, *DES*, or *AES*
Privacy Password	Encryption password. If *Privacy* is *None*, can be blank

Table 12: Device Parameters

The changes will be applied after pressing the *Apply* button.

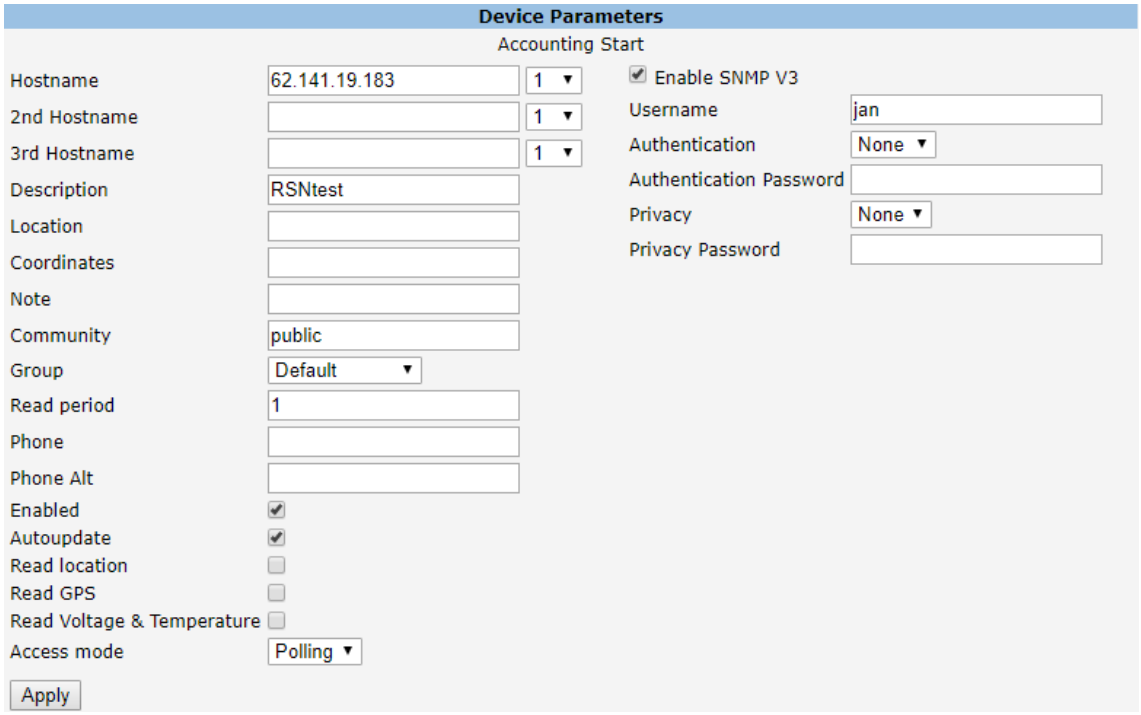


Figure 45: Device Parameters

5.4 Group List

Monitored routers can be divided into groups. An overview of these groups can be accessed by pressing the *Group List* item in *Status* section of main menu.

Column	Description
:.	Identifier of the group (sequence number of added group)
Name	Group name
Level Limit	Limit of signal level
Quality Limit	Limit of signal quality
Traffic Limit	Limit of transmitted data for primary SIM card
2nd Traffic Limit	Limit of transmitted data for secondary SIM card
3rd Traffic Limit	Limit of transmitted data for tertiary SIM card
Min Temp Limit	Lower temperature limit
Max Temp Limit	Upper temperature limit
Min Voltage Limit	Lower voltage limit
Max Voltage Limit	Upper voltage limit
Max fails avail	Condition of how many following fails lead to unavailability of the router (router marked red in the Device List)
Max fails email/sms	Limit of failures the message is sent after. Condition of how many following fails lead to sending of sms or email warning about unavailability of the router.
Delay email/sms	Delay of message sending on failure. This time has to expire so the message can be sent. It can prevent sending of message when the router becomes available again during the delay. See example 5.4.1 below.
Operation – Edit	Editing information about the group (pencil icon)
Operation – Remove	Removes the group from the list (red cross icon)

Table 13: Group List

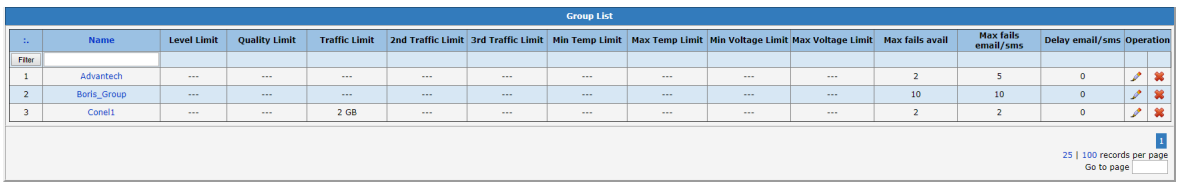


Figure 46: Group List

Features in the *Operation* column (*Edit* and *Remove*) are available to users with administrative privileges only.

Tips for working with the *Group List*:

- Click on the name of the group to see *Device List* with routers belonging to this group.
- Number of groups displayed on one page can by specified by the numbers in the lower right corner (25 and 100). To browse between pages use pagination in the corner. It is also possible to write the page number into the *Go to page* field and press Enter.
- Groups can be sorted by identifier (*:.*) or group name (*Name*). Sorting can be done by clicking on the column title. Press the title again to sort the groups in reverse order.
- Groups can be filtered. Specify the filter criterion into the text box below the name of the column and press the *Filter* button.

5.4.1 Example of Unavailability Message Configuration

Sending of messages on router unavailability can be configured for group of routers. Parameters can be changed clicking on pencil symbol icon (*Operation – Edit*).

- Period of reading is 5 minutes (can be set individually for the router),
- *Max fails fo avail* for the group is 3,
- *Max fails for msg* for the group is 6,
- *Delay for msg* for the group is 60 minutes.

Let's suppose 3 unsuccessful attempts of polling, so after 15 minutes (3x5) the router is considered as unavailable and is marked red in the Device List.

If the unavailability takes longer, then after 30 minutes (6x5) the message (sms or email) of unavailability would be sent, but it is still blocked for another 30 minutes by *Delay for msg* parameter (30+30 minutes in sum from the first failure).

Every router can have individual period of reading set, but the *Delay for msg* is set for the whole group. It serves as prevention of excessive amount of unavailability messages and increases the unavailability tolerance.

5.5 Report

The *Report* page shows statistics for a selected period relating to all routers listed in the R-SeeNet database. There are three possible types of period – day, week and month. This page has several subpages, where you can see statistics about *Latency*, *Packet Loss*, *Availability*, *Signal Strength* and *Routers Online*. Everything can be displayed on a single page (*All*).

- Month – Month can be selected by pressing **M** in blue box at the bottom left corner of the calendar.
- Week – Week can be selected by pressing week number in the first column (orange-colored).
- Day – Day can be selected by pressing number of day in green box. The selected day is blue-colored.
- Use symbols **<** and **>** to scroll through calendar by months.
- Use symbols « and » to scroll through calendar by years.

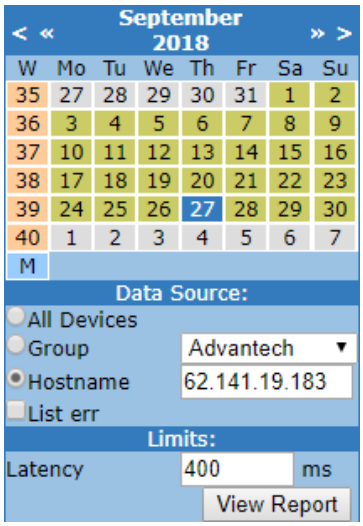


Figure 47: Calendar

It is possible to select the routers the statistics will be displayed for in the section bellow the calendar (*Data Source*). The following options are available:

- *All Devices* – Statistics are displayed for all routers
- *Group* – Statistics are displayed only for selected group of routers
- *Hostname* – Statistics are displayed only for one router. IP address or domain name has to be filled in the text field

There is a *List err* check box in the bottom part, which enables the additional table providing information about cases of exceeding the limit that can be specified in the following section – *Limits*. The statistics for pre-selected period are displayed using the *View Report* button.

All displayed statistics can be exported to PDF or CVS file using the link in the *Export report* item located at the top of each page with statistics (right from the calendar). The save file dialog will be prompted with the filename R_SeeNet_Report. On the next line there is a time range indicating the period for which the statistics are displayed and will be saved.

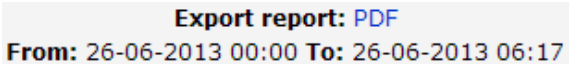


Figure 48: Top part of each Report window

It is **not** required to install any PDF printer for export to PDF.

5.5.1 Latency

Average Latency for the selected time period is shown at the beginning of this page. The following table lists the average values in chosen times spread over the chosen time period.

Time	Latency	Time	Latency	Time	Latency
00:03	56 ms	02:18	33 ms	06:34	509 ms
00:18	36 ms	02:49	1885 ms	06:49	699 ms
00:33	32 ms	04:19	1476 ms	07:04	697 ms
00:48	32 ms	04:34	2764 ms	07:20	651 ms
01:03	33 ms	05:04	2178 ms	07:35	489 ms
01:18	36 ms	05:34	1911 ms	07:50	507 ms
01:33	42 ms	05:49	1500 ms	08:05	489 ms
01:48	100 ms	06:04	32 ms	13:21	32 ms
02:03	32 ms	06:19	887 ms	---	--- ms

Figure 49: Latency

Average Latency over the time range of the chosen period is shown in the graph below.

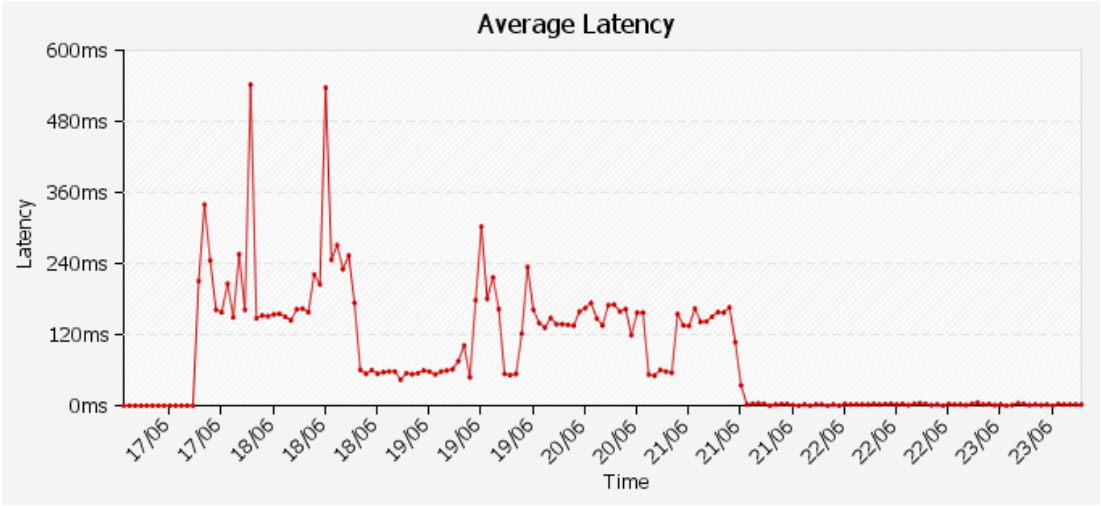


Figure 50: Latency graph

A table with IP addresses of routers with the latency higher than specified value in selected time period is shown at the bottom part of the page.

Date	Latency	Hostname	Description	Location	Device	Firmware	SN
2018-10-02	38 ms	0.0.0.0	PJ 3	---	LR77-v2	6.1.5 (2017-12-19)	5503456
2018-10-02	90 ms	62.141.19.183	RSNtest	---	SmartFlex	6.1.7 (2018-07-25)	6200010

Figure 51: Latency – limit exceeded

Maximum number of entries in the table of exceeded values is 30.

5.5.2 Packet Loss

Average *Packet Loss* for the selected time period is shown at the beginning of this page. The following table lists the average values in chosen times spread over the chosen time period.

Time	Packet Loss	Time	Packet Loss	Time	Packet Loss
00:00	0 %	05:00	0 %	10:00	100 %
01:00	25 %	06:00	0 %	11:00	100 %
02:00	100 %	07:00	75 %	12:00	50 %
03:00	50 %	08:00	100 %	13:00	0 %
04:00	25 %	09:00	100 %	---	--- %

Figure 52: Packet Loss

Average Packet Loss over the time range of the chosen period is shown in the graph below.

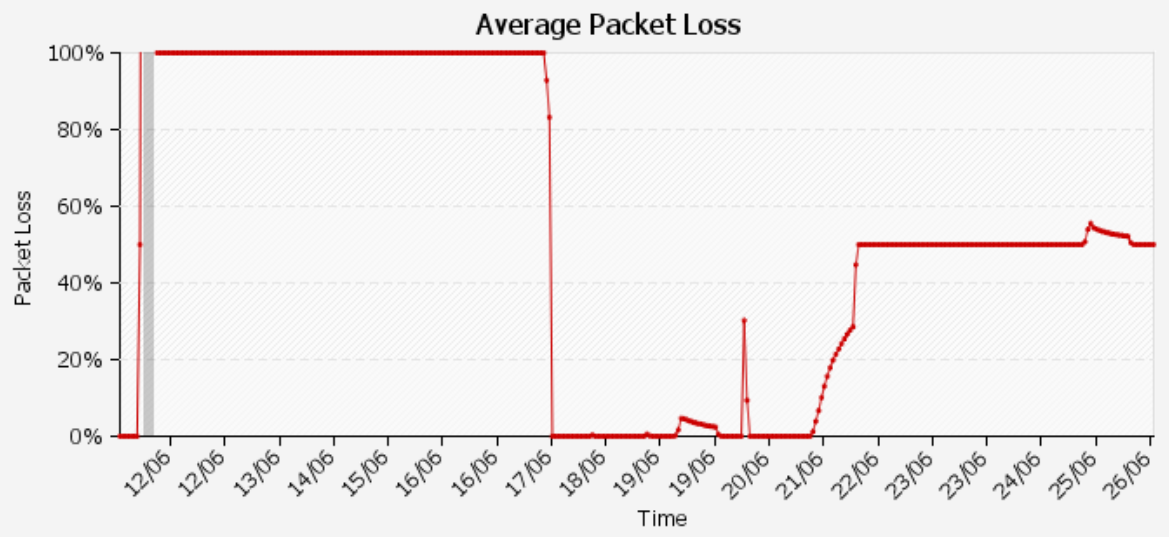


Figure 53: Packet Loss graph

A table with IP addresses of routers with the packet loss higher than specified value in selected time period is shown at the bottom part of the page.

Date	Packet Loss	Hostname	Description	Location	Device	Firmware	SN
2018-10-01	100.0 %	device4	---	---	---	---	---
2018-10-01	100.0 %	0.0.0.0	PJ SmartStart	---	SPECTRE-v3L-LTE	6.1.5 (2017-12-19)	6600209
2018-10-01	100.0 %	0.0.0.0	---	---	SPECTRE-v3-LTE	6.1.1 (2017-01-21) BETA	---

Figure 54: Packet Loss – unfulfilled criterion

Maximum number of entries in the table of exceeded values is 30.

5.5.3 Availability

Average *Availability* for the selected time period is shown at the beginning of this page. The following table lists the average values in chosen times spread over the chosen time period.

Time	Availability	Time	Availability	Time	Availability
00:03	100 %	02:18	100 %	06:34	95 %
00:18	100 %	02:49	100 %	06:49	95 %
00:33	100 %	04:19	92 %	07:04	96 %
00:48	100 %	04:34	93 %	07:20	96 %
01:03	100 %	05:04	93 %	07:35	96 %
01:18	100 %	05:34	94 %	07:50	96 %
01:33	100 %	05:49	94 %	08:05	96 %
01:48	100 %	06:04	94 %	13:21	79 %
02:03	100 %	06:19	95 %	13:51	79 %

Figure 55: Router Availability

Average Availability over the time range of the chosen period is shown in the graph below.

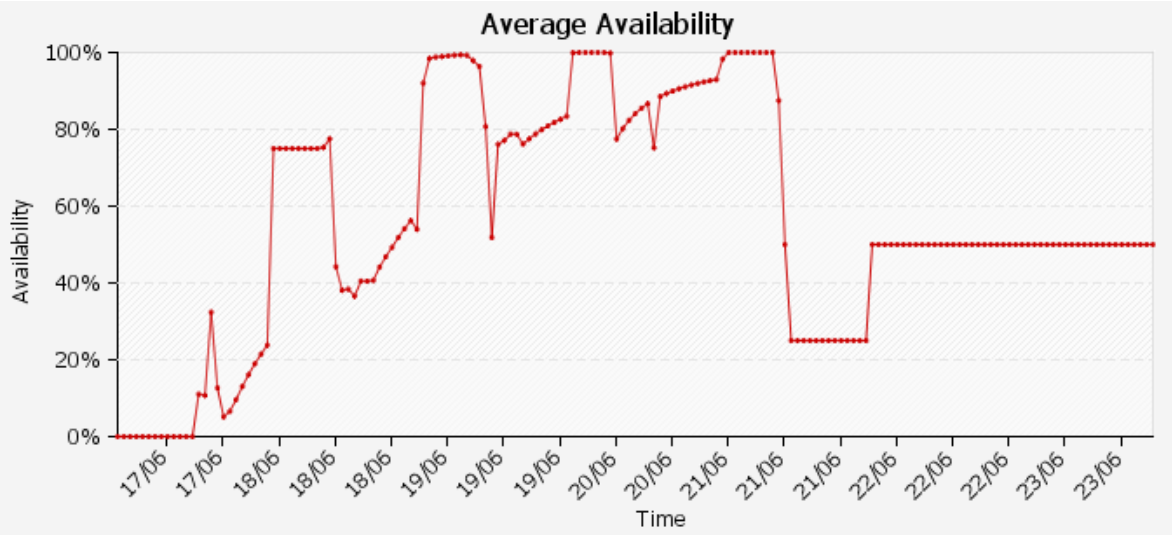


Figure 56: Router Availability graph

A table with IP addresses of routers with availability lower than specified value in selected time period is shown at the bottom part of the page.

Date	Availability	Hostname	Description	Location	Device	Firmware	SN
2018-10-01	0.0 %	device4	---	---	---	---	---
2018-10-01	0.0 %	0.0.0.0	PJ SmartStart	---	SPECTRE-v3L-LTE	6.1.5 (2017-12-19)	6600209
2018-10-01	0.0 %	0.0.0.0	---	---	SPECTRE-v3-LTE	6.1.1 (2017-01-21) BETA	---

Figure 57: Router Availability – unfulfilled criterion

Maximum number of entries in the table of exceeded values is 30.

5.5.4 Signal Strength

Percentage of *Signal Strength* better then specified limit (below the calendar on the left) for the selected time period is shown at the beginning of this page. The following table lists the average values in chosen times spread over the chosen time period.

Day	signal strength > -95 dBm	Day	signal strength > -95 dBm	Day	signal strength > -95 dBm
2018-09-05	0 %	2018-09-15	0 %	2018-09-25	0 %
2018-09-06	0 %	2018-09-16	0 %	2018-09-26	0 %
2018-09-07	0 %	2018-09-17	0 %	2018-09-27	0 %
2018-09-08	0 %	2018-09-18	0 %	2018-09-28	0 %
2018-09-09	0 %	2018-09-19	0 %	2018-09-29	0 %
2018-09-10	0 %	2018-09-20	0 %	2018-09-30	0 %
2018-09-11	0 %	2018-09-21	0 %	2018-10-01	33.3 %
2018-09-12	0 %	2018-09-22	0 %	2018-10-02	33.3 %
2018-09-13	0 %	2018-09-23	0 %	2018-10-03	0 %
2018-09-14	0 %	2018-09-24	0 %	2018-10-04	0 %

Figure 58: Signal Strength

A table with IP addresses of routers with signal strength lower than specified value in selected time period is shown at the bottom part of the page.

Date	Signal Strength	Hostname	Description	Location	Device	Firmware	SN
01-10-2018	-101 dBm	0.0.0.0	PJ 3	---	LR77-v2	6.1.5 (2017-12-19)	5503456
02-10-2018	-101 dBm	0.0.0.0	PJ 3	---	LR77-v2	6.1.5 (2017-12-19)	5503456
03-10-2018	-101 dBm	0.0.0.0	PJ 3	---	LR77-v2	6.1.5 (2017-12-19)	5503456
04-10-2018	-101 dBm	0.0.0.0	PJ 3	---	LR77-v2	6.1.5 (2017-12-19)	5503456

Figure 59: Signal Strength – unfulfilled criterion

Maximum number of entries in the table of exceeded values is 30.

5.5.5 Routers Online

The number of *Routers Online* for the selected time period is shown at the beginning of this page. The maximum and minimum values are shown. The following graph shows the number of online routers during the chosen time period.

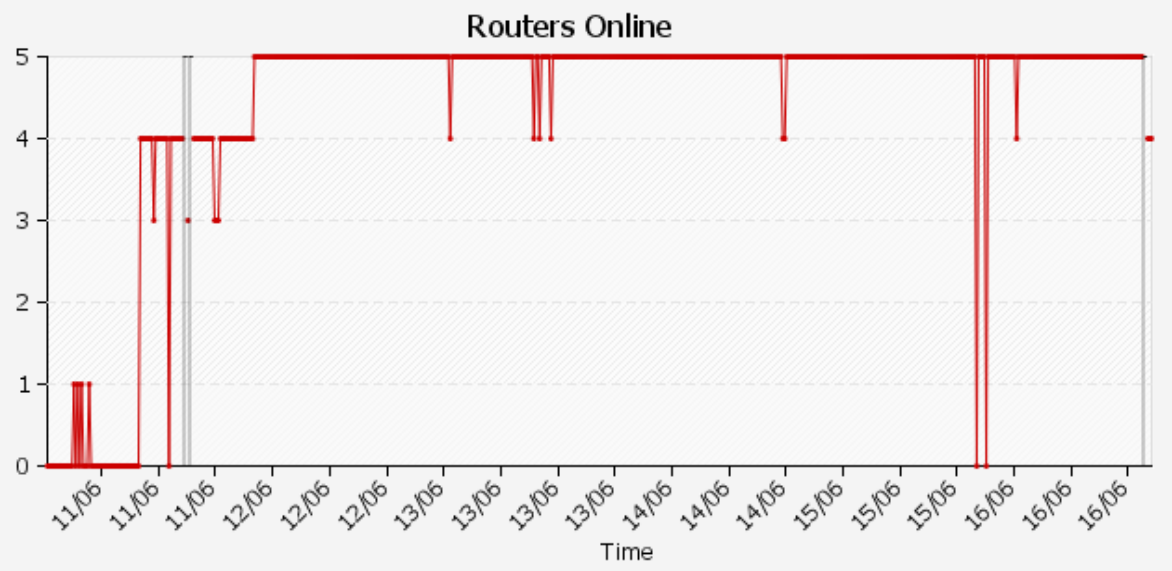


Figure 60: Routers online graph

5.5.6 All

Clicking on the *All* subpage, all available statistics for the selected time period can be displayed on single page.

5.5.7 Daily Report

Brief statistics are shown on the *Daily Report* page. These relate to the number of online routers, routers availability, latency and packet loss. Statistical data are shown for the previous day. The following information are shown at the top of the page:

- *Online network access routers* – Number of online routers
- *Average availability over period* – Average availability of monitored routers
- *Average Latency over period* – Average latency of monitored routers
- *Average packet loss over period* – Average packet loss of monitored routers

These information are followed by graphs relating to the above properties.

5.6 Add Device

The *Add Device* item from the *Configuration* part of the main menu is available when the *Device List* page is displayed. It is available for users with administrator privileges only.

Routers can be added in **three ways** to the R-SeeNet database. Generally a router with duplicated *Hostname* can not be added. **The first way** is to manually fill in the form and submit it by clicking on the *Add Device* button. The items in the form have the following meaning:

Item	Description
Hostname	IP address of primary SIM card
2nd Hostname	IP address of secondary SIM card
3rd Hostname	IP address of tertiary SIM card
MAC Address	MAC address of the router being added
Description	Description of the router being added
Community	Password for SNMP access to routers
Location	Location info for the router being added
Note	Any user-defined note about the router being added
Phone	Phone number for sending SMS message
Phone Alt	Alternative phone number for sending SMS message
Group	Name of the group the router belongs to
Read period	Defines reading period
Access mode	Defines the way of reading the router: • Polling – router is read the standard way • SNMP trap – router is read via SNMP traps. This mode is not applicable when SNMP V3 is used for reading the data from routers.
Enable SNMP V3	Enables (or disables) usage of SNMP V3 protocol
Username	User of SNMP V3
Authentication	Authentication type of SNMP V3. *None*, *MD5*, or *SHA1*
Authentication Password	Password. if *Authentication* is *None*, can be blank
Privacy	Encryption of SNMP V3. Can be *None*, *DES*, or *AES*
Privacy Password	Encryption password. If *Privacy* is *None*, can be blank
Accounting Start	Specifies when the accounting period starts (day in a month)

Table 14: Add Device

Items marked with an asterisk (see Figure on the next page) can be blank.

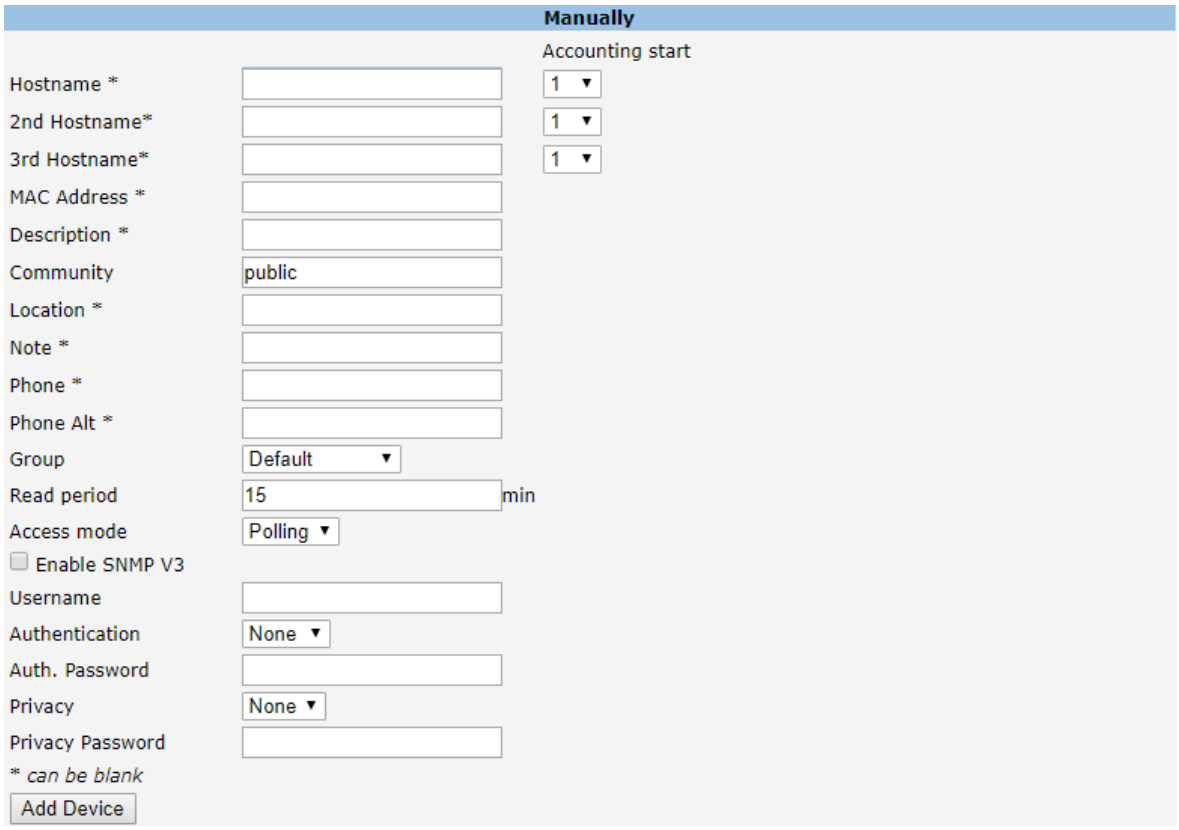


Figure 61: Add Device – Manually

Another way to add new routers into the monitoring system is importing a list of routers from a CSV file.

First, select the CSV file with a list of routers (*File*) and choose the delimiter used in the CSV file (*Delimiter*), either comma, or semicolon.

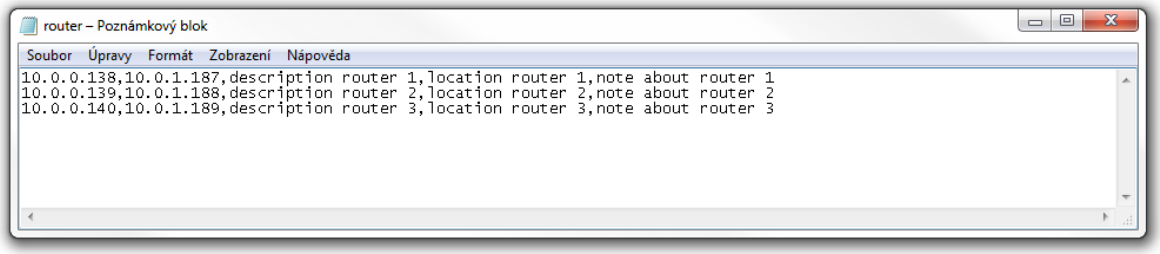


Figure 62: CSV file example

For items from *Hostname* to *Phone Alt* it is necessary to specify the column in the selected CSV file, where the item is located. Option *None* corresponds to the situation when the item is not listed in the CSV file. The following items – *Community*, *Group*, *Read Period*, *Access mode* and SNMP V3 items – has to be filled in. The meaning of all items is described in the table above. Finally press the *Import Devices* button to start the import.

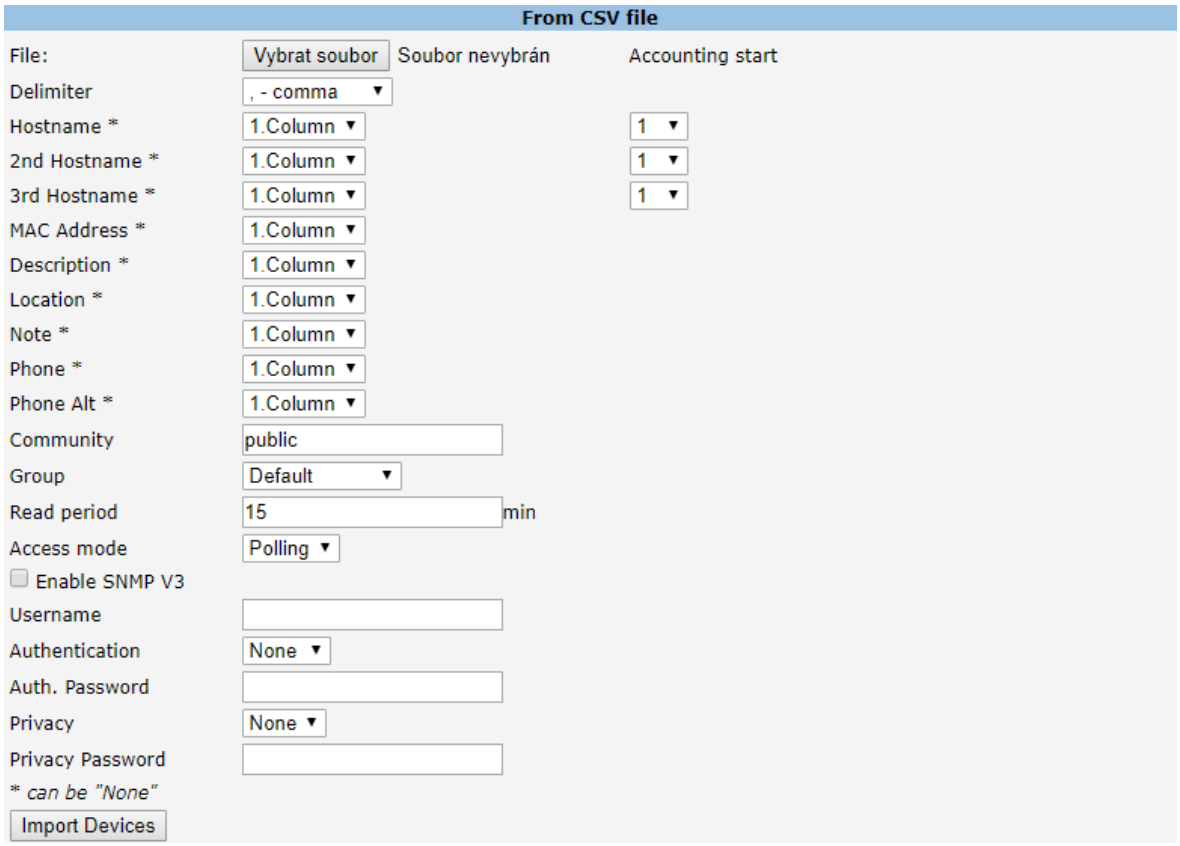


Figure 63: Add Device – CSV import

The third way to add routers to R-SeeNet is available only when there is single company added to R-SeeNet. In this circumstance the routers can be added automatically with traps. This has to be enabled on *Options – Snmp* page using item *Add unknown trap devices to group* and choosing the group for automatically added routers. See section 5.10.3.

Attention: When adding routers in Trap access mode via this form (manually or importing CSV file), always fill in the MAC address for proper identification of routers. The reasons are described in section 1.5.1.

5.7 Add Group

The *Add Group* item from the *Configuration* part of the main menu is available when the *Group List* page is displayed. It is available for users with administrator privileges only.

Groups can be added to R-SeeNet database using this form. Group can contain any number of routers. Following parameters can be defined for every group of routers:

Item	Description
Name	Group name
Level Limit	Limit of signal level
Quality Limit	Limit of signal quality
Traffic Limit	Limit of data transmitted for the primary SIM card
2nd Traffic Limit	Limit of data transmitted for the secondary SIM card
3rd Traffic Limit	Limit of data transmitted for the tertiary SIM card
Min Temp Limit	Lower temperature limit
Max Temp Limit	Upper temperature limit
Min Voltage Limit	Lower voltage limit
Max Voltage Limit	Upper voltage limit
Report group window	Period of updating information about the group of routers for *Report* statistics (in minutes). **This value has to be higher than the *Read period* value of all routers!**
Max fails avail	Condition of how many following fails lead to unavailability of the router (router marked red in the Device List)
Max fails for msg	Limit of failures the message is sent after. Condition of how many following fails lead to sending of sms or email warning about unavailability of the router.
Max Delay for msg	Delay of message sending on failure. This time has to expire so the message can be sent. It can prevent sending of message when the router becomes available again during the delay. See example 5.4.1.

Table 15: Group List

The new group is added to the monitoring system by clicking the *Add Group* button at the bottom of the page.

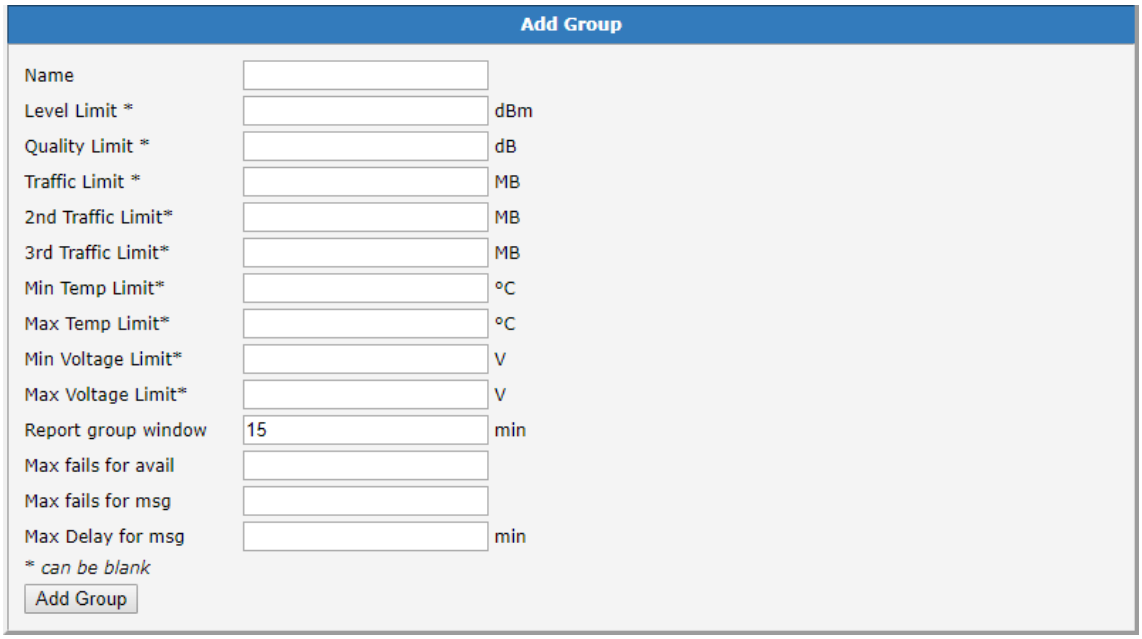


Figure 64: Add Group

5.8 Add Company

The *Add Company* item from the *Configuration* part of the main menu is available when the *Companies* page is displayed. It is available for users with superadmin privileges only.

Use the form on this page to add a new company to the monitoring system database.

Item	Description
Name	Name of the added company
Address	Contact address
Email	Contact email
Phone	Contact phone number
Note	Any superadmin defined note about this company
DevCount	The maximum number of routers belonging to this company. Number displayed behind this box indicates the available number of routers in the license.

Table 16: Add Company

Note: Items *Address*, *E-mail*, *Phone* and *Note* can be blank.

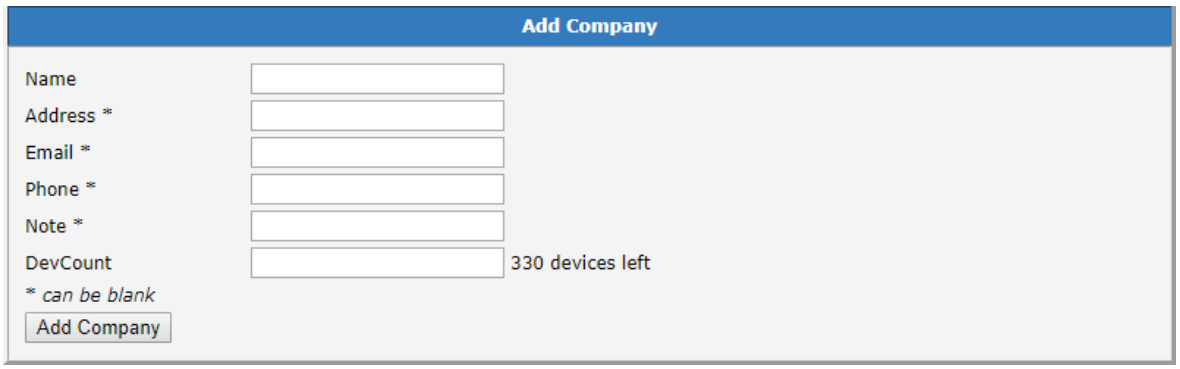


Figure 65: Add Company

5.9 Add User

The *Add User* item from the *Configuration* part of the main menu is available when the *Users* page is displayed. It is available for users with administrator privileges only.

Use the form on this page to add a user to R-SeeNet database. User can access the Web interface of monitoring system.

Item	Description
Username	Name for login into the Web interface
Password	Password for login into the Web interface
Confirm Password	Password confirmation
Name	Real name of the added user
Surname	Surname of the added user
E-mail	E-mail of the added user
Phone	Phone number of the added user
Role	Type of user account: • *Guest* – common user, *Can edit device* box can be checked to allow editing of the devices in the groups enabled below • *Admin* – user with administrator privileges • *Superadmin* – user with superadministrator privileges
Company	Company the user belongs to. Available to superadmins only.

Table 17: Add User

Note: Items *Name*, *Surname*, *E-mail* and *Phone* can be blank.

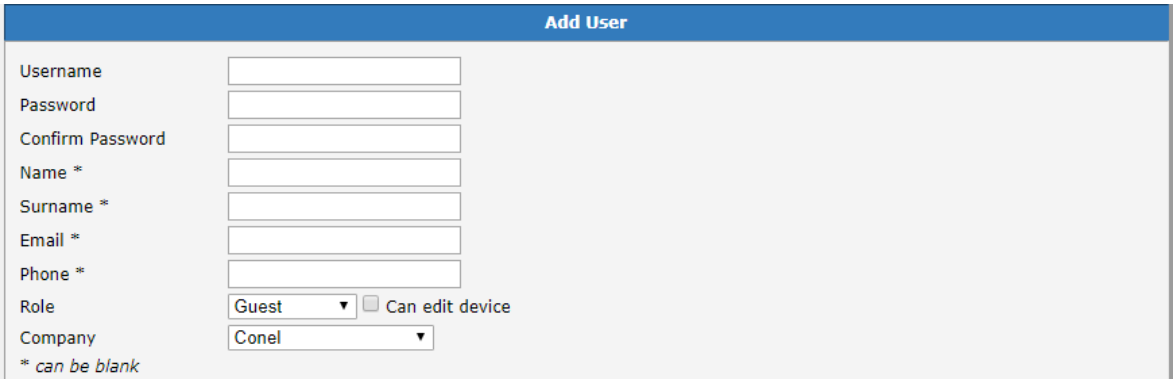


Figure 66: Add User

In the bottom part there is a section (*Group settings*), where availability of existing groups to a new user can be defined (*Enabled* item). Also the way of sending information about events and which information will be send to new user can be defined for every group separately.

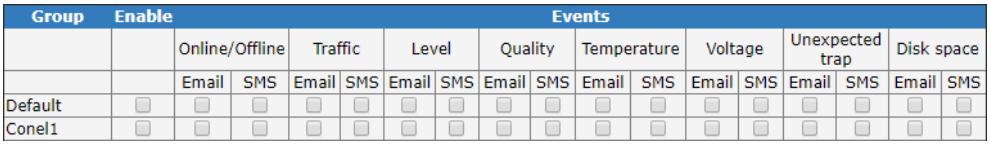


Figure 67: Add User – Group Settings

The user is added to the database by clicking the *Add User* button at the bottom of the *Add User* form.

5.10 Options

(*Options*) page offers six different subpages that allow you to modify the properties of R-SeeNet. These are the following: *General*, *Appearance*, *Snmp*, *Email & Sms*, *Warnings* and *Report*. For common user (without administrative privileges) only *General*, *Appearance* and *Report* subpages are accessible.

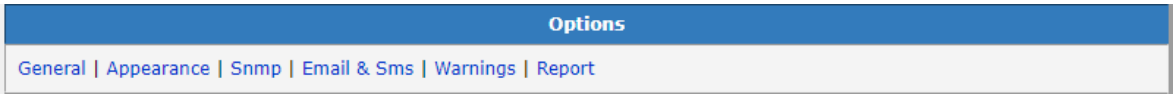


Figure 68: Options

5.10.1 General

The *General* subpage allows you to set system properties of the monitoring system.

Item	Description
Ping count	Number of ping messages sent when pinging from the *Device list* page.
Automatic logout	Automatic logout after inactivity longer than 15 minutes.
Automatic refresh (min)	The time period of automatic Web interface page refresh. Values: 1, 3, 10 and 30 minutes are available. The *Disabled* value disables the feature.
Timezone	Setting of the local timezone.

Table 18: Options – General

Timezone may be changed by user with administrator privileges only.

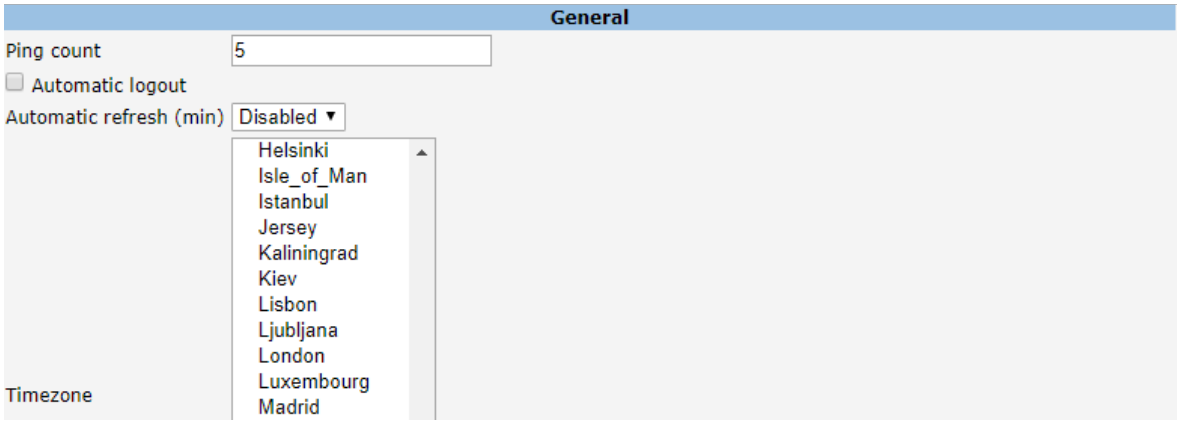


Figure 69: Options – General

5.10.2 Appearance

The *Appearance* subpage allows you to modify appearance of the monitoring system. The subpage is divided into four blocks. The first of them – *Own Logo* – allows you to insert your own logo to the header of the Web interface. Delete the current logo with the *Delete* button.

The logo edit block is available for users with administrator privileges only.

Figure 70: Options – Own Logo

Appearance of the *Device List* can be set in this part of the page. Items in the *Selected* list will be displayed on the *Device List* page as a table columns. Items in the *Avaible* list will not be displayed. Items can be moved between the lists using the buttons with arrows. The *Up* button moves the selected item up in the list, *Down* button moves it downward. Meaning of each item is described in the section 5.2 *Device List*.

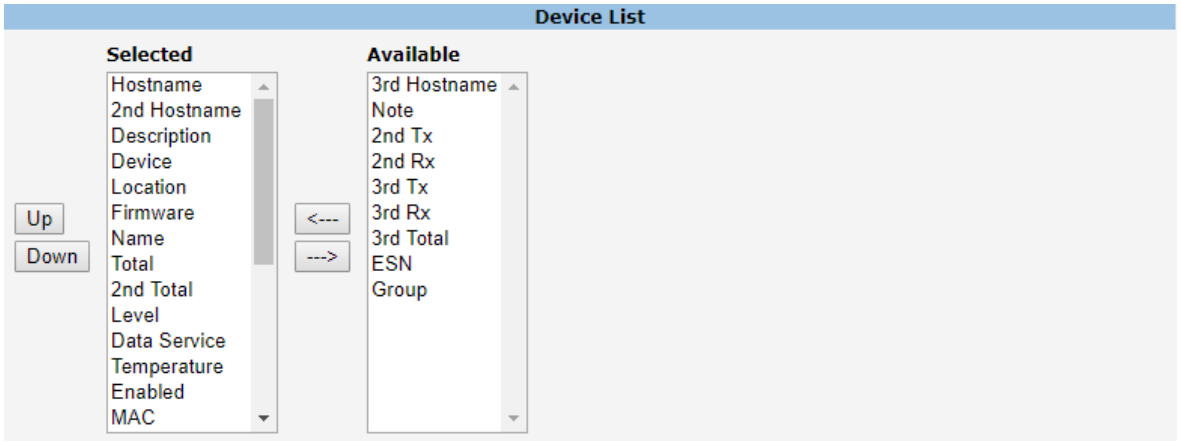


Figure 71: Options – Device List

The *Color Scheme* part allows you to set the color scheme of the monitoring system.

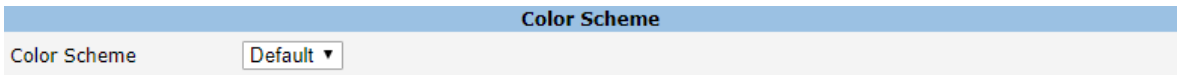


Figure 72: Options – Color Scheme

The last part of the page (*User Link*) allows you to define the link and text of this link to the user application displayed on the *Device List* and *Device Status* page under the *Hostname* field at the bottom (see Figure 31).

Figure 73: Options – User Link

5.10.3 Snmp

The *Snmp* subpage is available to users with administrator privileges only.

The SNMP community (password) entered in *Default community* box is used as preset when adding new devices. To enable automatic adding of routers using SNMP traps, check the *Add unknown trap devices to group* item and choose the default group the routers will be added to. This item is available only when there is single Company in R-SeeNet.

Figure 74: Options – Snmp

5.10.4 Email & Sms

The *Email & Sms* subpage is available to users with administrator privileges only.

Configuration of SMS gateway and email account can be done on this subpage so the information reports can be sent by the monitoring system. In the first part – *SMS Gateway* – you can set the SMS gateway used to send SMS messages from R-SeeNet. Advantech router has to be used as the SMS gateway. Following items has to be specified:

Item	Description
IP Address	IP address of router used as SMS gateway
TCP Port	TCP port number
Max. SMS's per day	The maximum number of SMS messages sent per a day. If zero entered, the number of messages is unlimited.

Table 19: SMS Gateway

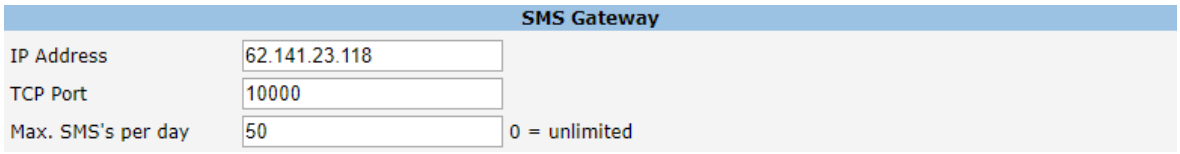


Figure 75: Options – SMS Gateway

The second part – *Email Account* – allows you to set an email account used for sending information reports.

Item	Description
SMTP server	IP address of SMTP server
Port	Port the SMTP server is running on (usually 25)
Email Address	Email address the message is sent from
Email Subject	Subject of sent emails
Username	Username of email account
Password	Password of email account
Max. Email's per day	The maximum number of emails sent per a day. If zero entered, the number of messages is unlimited.

Table 20: Email account

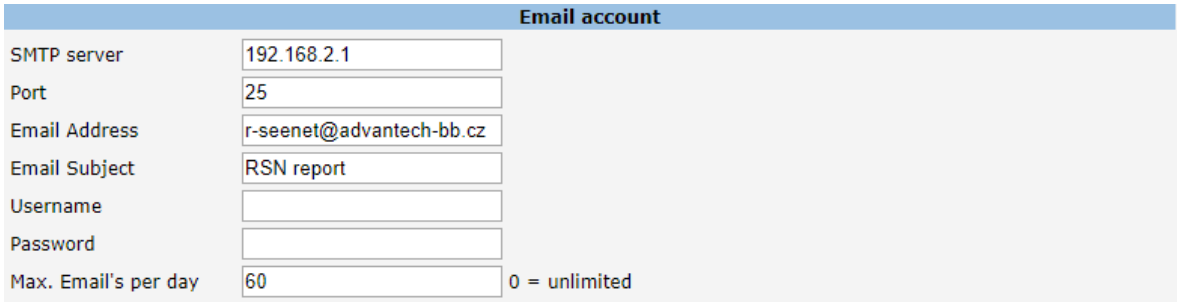


Figure 76: Options – Email Account

Time of *Sending information* has to be set at the bottom of the page to enable the regular daily sending of reports.

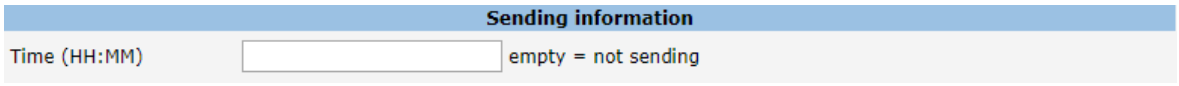


Figure 77: Options – Sending information time

Configuration of Message Sending When MAC Not Found

Every day the SMS (or e-mail) can be sent as notice that the Error file of not matching MAC address was created, described in section 1.5.1. If the file is not created, the message will not be sent.

Here is listed the configuration needed for sending e.g. SMS message on this event:

- In *Options – Email & Sms* fill in these items:
  - In SMS Gateway part:
    - *IP Address*
    - *TCP Port*
  - At the bottom in Sending information part fill in hour and minute:
- Next, in *Users* menu in user editing (pencil icon):
  - Fill in phone number where to send the SMS – item *Phone*.

5.10.5 Warnings

The *Warnings* subpage is available to users with administrator privileges only.

At the top of this subpage the *Warnings enabled* checkbox is available. It enables (or disables) use of warning messages. It is possible to define a form of *Event Strings* below as warning messages for various events. The limits can be defined in the Groups settings.

Item	Event description
On offline	Offline mode
On online	Online mode
On traffic limit	Reaching the limit of transferred data for primary SIM card
On level limit	Exceeding the limit of signal level
On quality limit	Exceeding the limit of signal quality
On min temp limit	Exceeding the lower limit of temperature
On max temp limit	Exceeding the upper limit of temperature
On min voltage limit	Exceeding the lower limit of voltage
On max voltage limit	Exceeding the upper limit of voltage
On unexpected trap	Receiving unexpected trap

Table 21: Event Strings

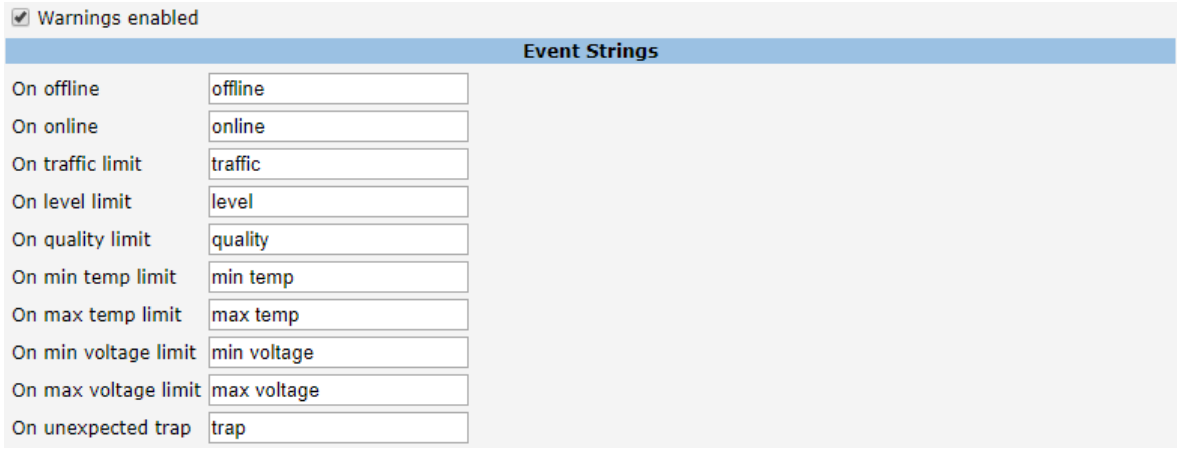


Figure 78: Options – Event Strings

The second part of the page (*Router Identification*) allows yout to choose the properties of router that will appear in message so it will be possible to identify the affected router.

Item	Description
Description	Description of the router
Location	Location of the router
Hostname	IP address of primary SIM card
MAC Address	MAC address of the router

Table 22: Router Identification

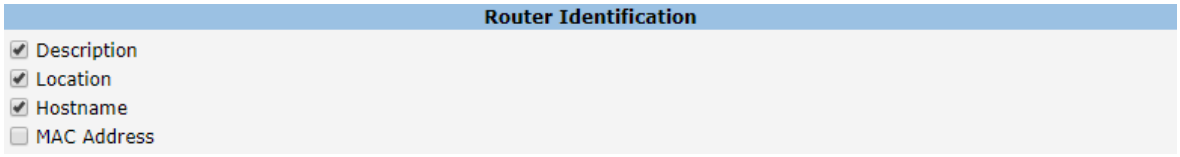


Figure 79: Options – Router Identification

5.10.6 Report

The *Daily reports generate from XX to XX hour* item specifies the time range for generating the daily report, which can be downloaded from the *Report* page.

Figure 80: Options – Report

It is possible to choose the items contained in the report in the *List* part of the page. Items that in the *Selected* list will be part of the report. Items in the *Available* list will not be part of the report. Items can be moved between lists using the buttons with arrows. The *Up* button moves the selected item up in the list, *Down* button moves it downward. Meaning of every item is described in the 5.2 *Device List* section.

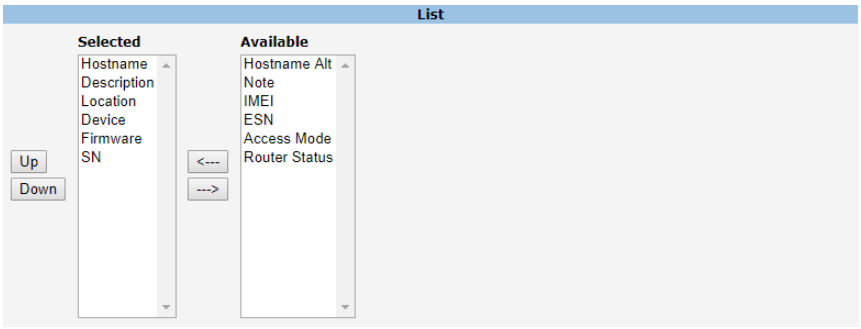


Figure 81: Options – Daily report items

5.11 Logout & Login

The *Logout* item in the administration part of the main menu logs out the user from the Web interface of monitoring system. Redirection to *Login* page (see Figure below) is performed after logout.

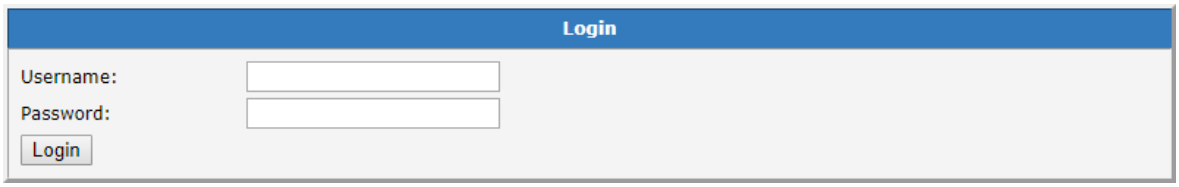


Figure 82: Login

Automatic logout will be performed after 15 minutes of inactivity of a user.

5.12 Companies

The *Companies* page is available to users with super-administrative privileges only.

The list of companies using R-SeeNet for monitoring of routers is shown on this page. Meaning of every column is described in the following table.

Item	Description
:.	Identifier of the company (sequence number)
Name	Company name
DevCount	Licensed number of devices the company can monitor
Address	Contact address
Email	Contact email address
Phone	Contact phone number
Note	Any note about the company
Operation – Edit	Edit information about the company (pencil icon)
Operation – Remove	Remove company from the list (red cross icon)

Table 23: Companies

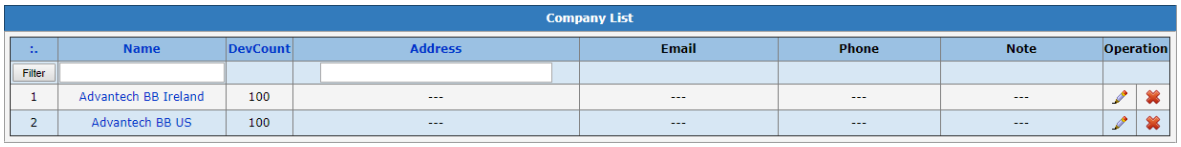


Figure 83: Companies

Tips for working with *Companies* table:

- The number of companies shown on one page can by specified by the numbers in the lower right corner (25 and 100). Use pagination to browse between the pages. It is possible to write the page number into *Go to page* field and then press Enter.
- Companies can be sorted by any column with blue name (link). For sorting, click on the column name. Press it again to sort in reverse order.
- Companies can be filtered. Specify the filter criterion into the text box below the name of the column and then press the *Filter* button or Enter.

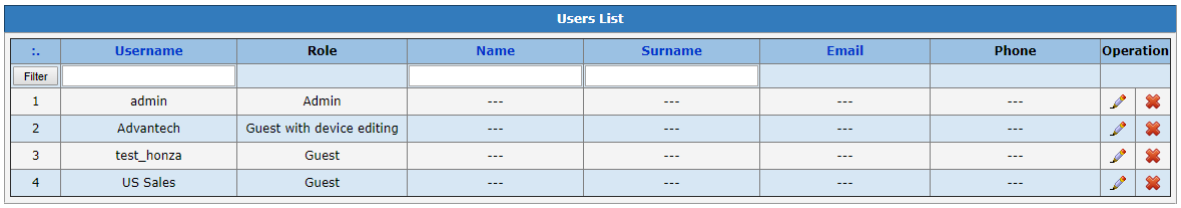
5.13 Users

The *Users* page is available to users with administrative privileges only.

The list of users authorized to use R-SeeNet Web interface is shown on this page. Meaning of every column is described in the following table.

Column	Description
:.	Identifier of the user (sequence number of added user)
Username	Name for login into the Web interface
Role	Type of user account: • *Guest* – common user • *Guest with device editing* – common user that can edit devices in enabled groups • *Admin* – user with administrator privileges • *SuperAdmin* – user with super-administrator privileges
Name	Name of the added user
Surname	Surname of the added user
E-mail	E-mail of the added user
Phone	Phone number of the added user
Operation – Edit	Edit information about the user (pencil icon)
Operation – Remove	Remove user from the list (red cross icon)

Table 24: Users



Users List

:.	Username	Role	Name	Surname	Email	Phone	Operation
Filter							
1	admin	Admin	---	---	---	---	
2	Advantech	Guest with device editing	---	---	---	---	
3	test_honza	Guest	---	---	---	---	
4	US Sales	Guest	---	---	---	---	

Figure 84: Users

Tips for working with *Users* table:

- Number of users shown on one page can by specified by the numbers in the lower right corner (25 and 100). Use pagination to browse between the pages. It is possible to write page number into the *Go to page* field and then press Enter.
- Users can be sorted by any column with the clickable name (link). For sorting, click on the column name. Press it again to sort the column in reverse order.
- Users can be filtered. Specify the filter criterion into the text box below the name of the column and then press the *Filter* button or Enter.

5.14 Sms

The *Sms* page is available to users with administrator privileges only.

Use this page for sending SMS message through SMS gateway that can be set on the *Options* page (see section 5.10.4 *Email & Sms*).

Item	Description
Phone Number	Phone number of SMS message recipient
Message	Text of the SMS message
Predefined SMS	List of predefined SMS messages

Table 25: Send SMS

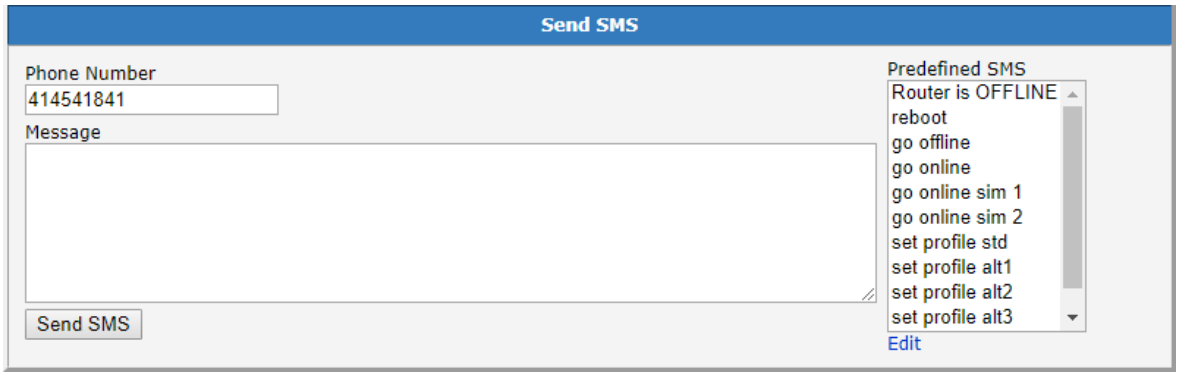


Figure 85: Send SMS

List of predefined SMS messages can be edited by pressing the *Edit* button. A red cross in the *Operation* column can be used to delete predefined messages. A new message can be added to the list by entering the text to the text box at the bottom of the page. Press the *Add* button to add the message to the list. *For all users* check box can be selected so the message is added to the lists of predefined SMS messages of all the users.

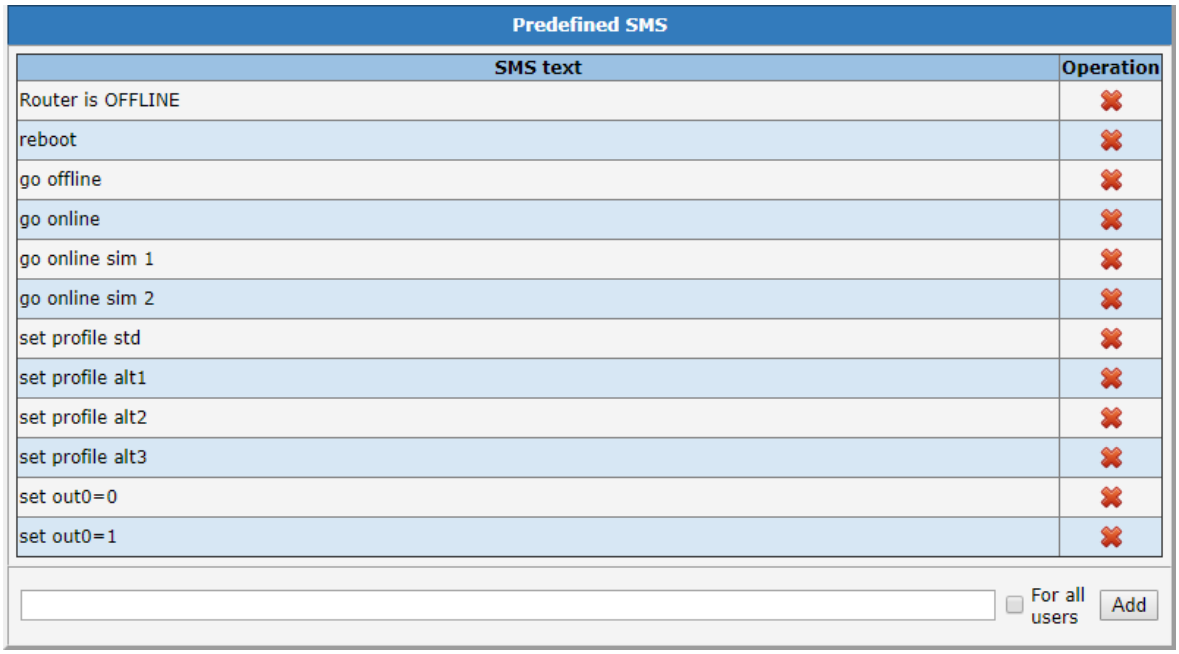


Figure 86: Predefined SMS

5.15 Log

The *Log* page is available to users with administrator privileges only.

The *Log* contains information about all accesses and changes made in the Web interface of the R-SeeNet monitoring system.

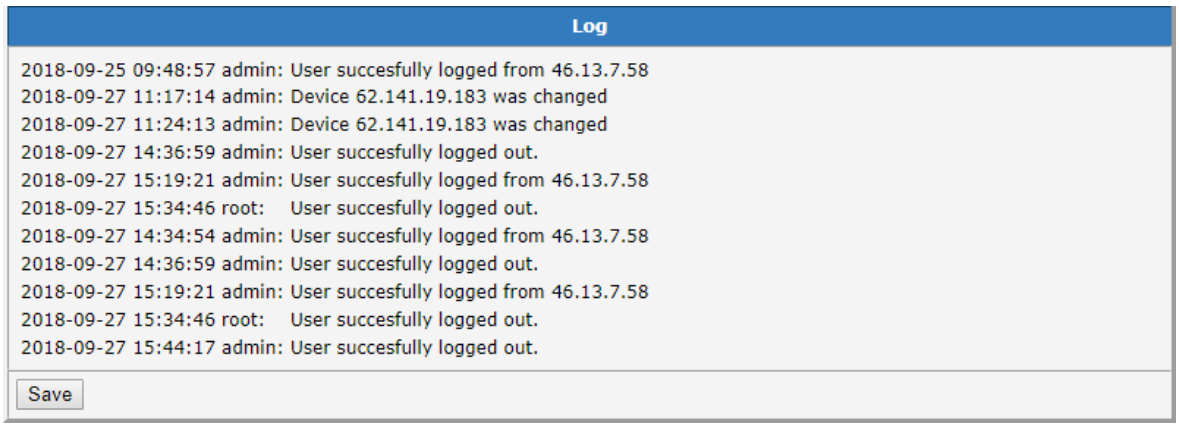


Figure 87: Log

5.16 About

Information about the current version of R-SeeNet are provided on the left side of the *About* page. There are also information about the license and the current state of the R-SeeNet core. Superadmin user also has the ability to perform online or offline activation in the *License* section. Information about the Advantech Czech company are displayed on the right side of the page.

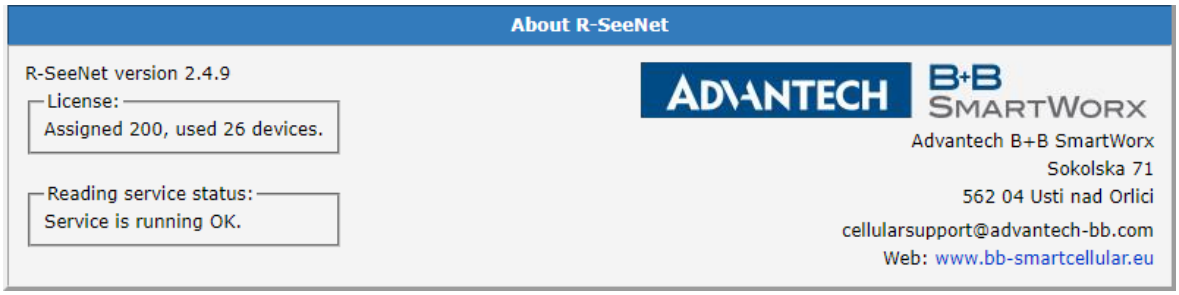


Figure 88: Page About

5.17 License

5.17.1 Online Activation

In case of online activation, it is necessary to enter the License Key obtained and press the *Activate* button.

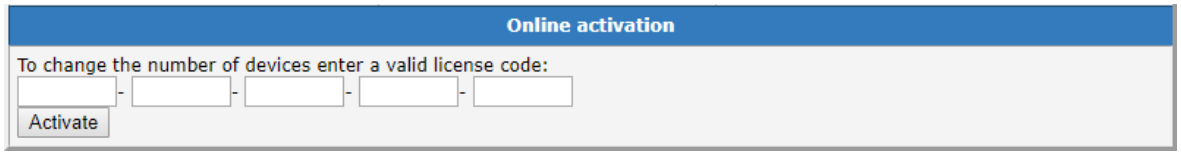


Figure 89: Online activation

5.17.2 Offline Activation

In case of offline activation, it is necessary to enter the License Key and press *Generate* button. After pressing the button, R-SeeNet generates Installation Key in the *License key* field (Step 2 section). This Installation Key has to be sent to Advantech company on cellular.info@advantech.cz e-mail. You will obtain the Activation Key, which has to be entered into the *Activation key* field and the *Activate* button has to be pressed.

Please note that the Activation Key is valid for one day.

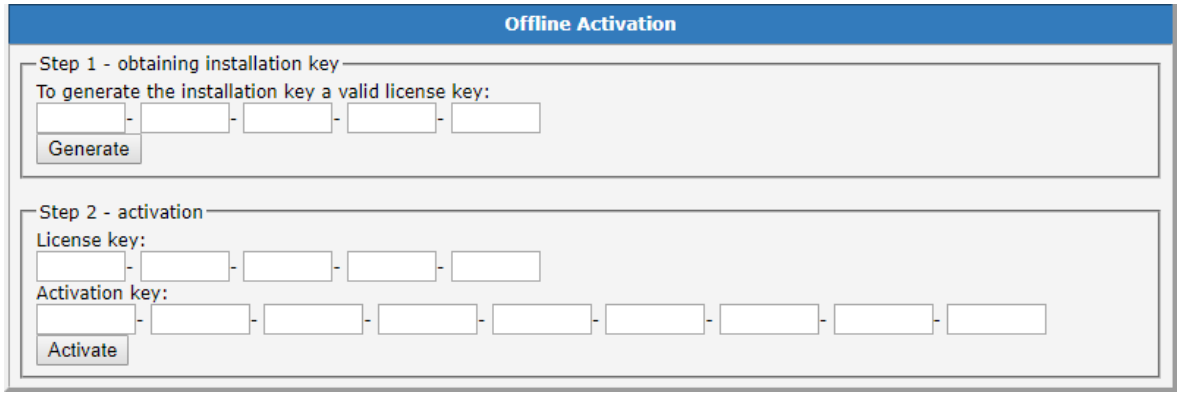


Figure 90: Offline activation

6. Database

6.1 Description of Database

R-SeeNet database consists of 16 tables. Brief description of every table:

- comp_cfg – auxiliary table for companies settings
- companies – companies data
- day – statistics of every router for the single day
- device_notes – notes are saved here
- devices – information about individual monitored stations and the last states
- fails – routers that were unavailable in at least one monitoring cycle
- groups – groups data
- log – list of events
- predef_sms – list of predefined SMS messages
- selection – selected routers information
- stats – statistics for every router data read during one monitoring cycle
- summary – summary information of single monitoring cycle
- user_cfg – users individual settings
- user_group – users relations and groups relations
- users – users properties
- wd_info – log of monitoring for watchdog application

6.2 Backing up the Database

Database of monitoring system is backed up daily at the hour specified in the installation process. Backups are stored in the directory where R-SeeNet is installed (C:\R-SeeNet\ as standard). Directory name is in the YYYYMMDD form (year, month, day). Backup from the previous day is deleted, when a new daily backup is created. Every first day of month the monthly backup directory is created in the form YYYYMM, which is held to the next first day of next month.

To create a database backup successfully, add at least one router to the monitoring system.

Time of backup creation and backup location can be changed additionally in *snmpmon.ini* file. This file is located in root directory of R-SeeNet installation (in case of Windows), or in /etc/ directory in Linux.

Example: Backups are filed to *d:\r-seenet-bak* directory and they are made every night at 2:30 am. These lines are in the snmpmon.ini file:

```
DestBackup=d:\r-seenet-bak
BackupTime=2:30
```

6.3 Restoring the database

In Windows

It is necessary to stop the MySQL and snmomonsvc services before restoring the database.

Move the backup, you want to restore, to the following directory:

R-SeeNet/mysql/data/snmpmon

In Linux

It is necessary to stop the MySQL and snmpmon service before restoring the database.

It can be stopped using this command:

```
/etc/init.d/snmpmon stop
```

In Linux, the directory to move the backup, you want to restore, is typically:

/var/lib/mysql/snmpmon

7. Automatic Update of Routers

7.1 Location of Configuration and Firmware

Files with the firmware and configuration for routers has to be placed in this directory of monitoring system:

R-SeeNet/httpdocs/temp_update

7.2 Monitoring System Settings

If you want to enable automatic update of router's configuration, check the *Autoupdate* item on the *Device List* page (see (see section 5.2 *Device List*)). To change the properties of the router, login into the monitoring system is necessary.

7.3 Router Settings

Automatic Update of firmware (and/or configuration) has to be enabled in the router. Choose HTTP server as a *Source*. Fill in the address of server where R-SeeNet is installed into the *Base URL* field. Name of the downloaded configuration can be specified (*Unit ID*) and the frequency of regular check whether there is a new configuration on the server (*Update Hour*).

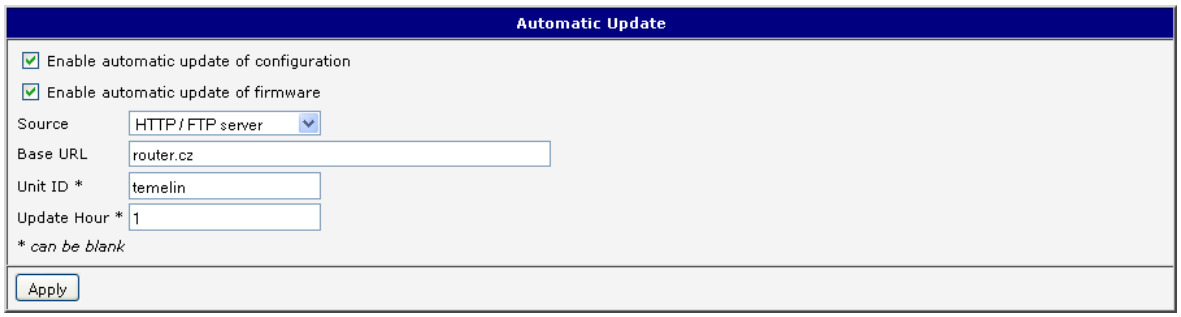


Figure 91: Automatic Update

Detailed description of the *Automatic Update* settings in routers can be found in the Configuration Manual of the router, (see Chapter 8).

8. Related Documents

[1] Advantech Czech: **v2 Routers Configuration Manual** (MAN-0021-EN), available from: icr.advantech.cz

[2] Advantech Czech: **SmartStart Configuration Manual** (MAN-0022-EN), available from: icr.advantech.cz

[3] Advantech Czech: **SmartFlex Configuration Manual** (MAN-0023-EN), available from: icr.advantech.cz

[4] Advantech Czech: **SmartMotion Configuration Manual** (MAN-0024-EN), available from: icr.advantech.cz

[5] Engineering Portal: **icr.advantech.cz**