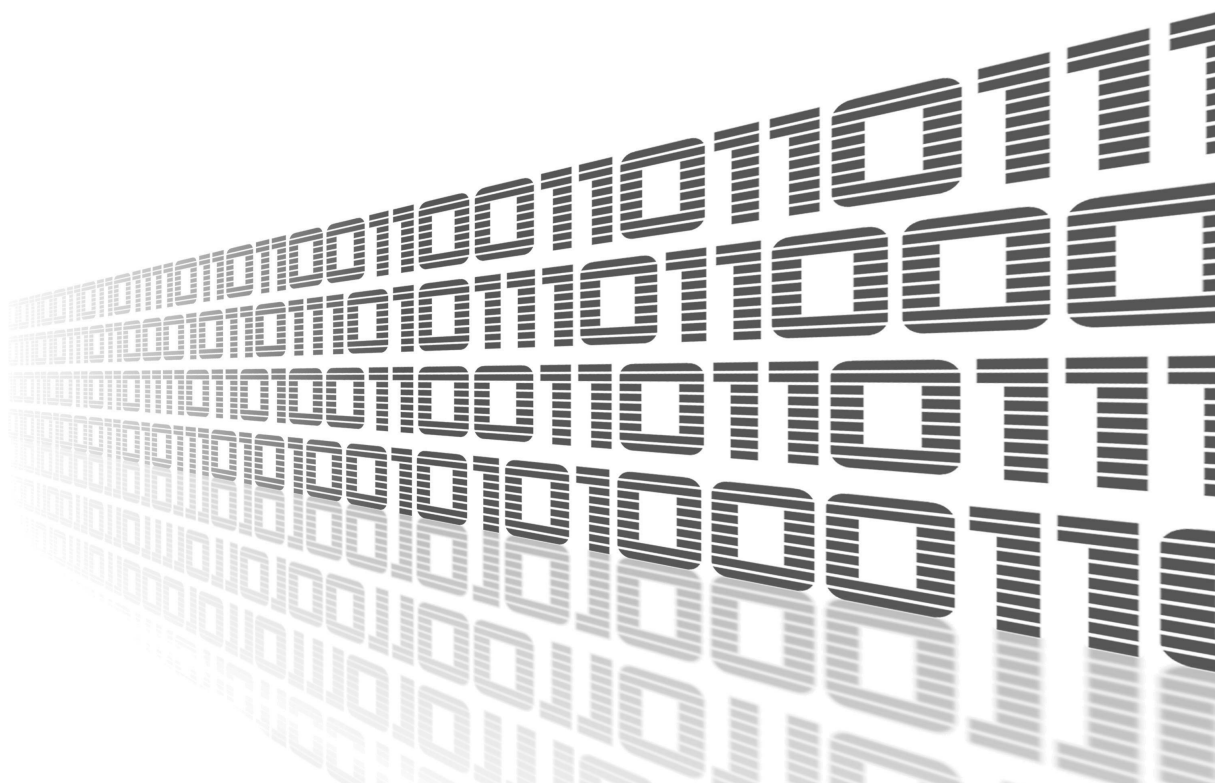




User Module

# Pinger

APPLICATION NOTE



**ADVANTECH**

## 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.



Advantech Czech s.r.o., Sokolska 71, 562 04 Usti nad Orlici, Czech Republic.

Document No. APP-0048-EN, revision from May 17, 2022. Released in the Czech Republic.

# Contents

<b>1</b>	<b>Description of User Module</b>	<b>1</b>
<b>2</b>	<b>Web Interface</b>	<b>2</b>
2.1	Tools . . . . .	3
2.2	Automatic Ping . . . . .	4
2.2.1	Description of Settings . . . . .	4
2.2.2	Sample Configuration . . . . .	10
2.2.3	Status . . . . .	13
2.2.4	SNMP . . . . .	13
<b>3</b>	<b>Related Documents</b>	<b>15</b>

## List of Figures

1	Functional Schema of Pinger Module . . . . .	1
2	Main Menu . . . . .	2
3	Manual Ping . . . . .	3
4	Traceroute . . . . .	4
5	Configuration of Automatic Ping . . . . .	5
6	Sample Configuration of Automatic Ping . . . . .	12
7	Status . . . . .	14
8	Example of SNMP Data in Terminal . . . . .	14

## List of Tables

1	Parameters of Manual Ping . . . . .	3
2	Parameters of Traceroute . . . . .	4
3	Common Parameters for Automatic Ping Test . . . . .	6
4	Parameters for Line-failing State . . . . .	7
5	Parameters for Line-lost State . . . . .	8
6	Parameters for Line-reestablish State . . . . .	8

# 1. Description of User Module



User module *Pinger* is not contained in the standard router firmware. Uploading of this user module is described in the Configuration manual (see Chapter [Related Documents](#)).

This module allows to verify manually or automatically the functionality of the connection between Advantech router and a device or two devices.

Manual mode is designed for testing connectivity of the router and a device. Automatic mode allows the same as in manual mode but for long term testing of current status. In this mode, automatic actions can be performed in case of a connectivity issue. Additionally it can target not only one, but also two devices.

When testing, IP datagrams are periodically sent to a device. A response from this device is expected to be received (see functional schema on figure 1. If a response from the device is received, the module calculates the connection parameters and a statistical summary in conclusion.

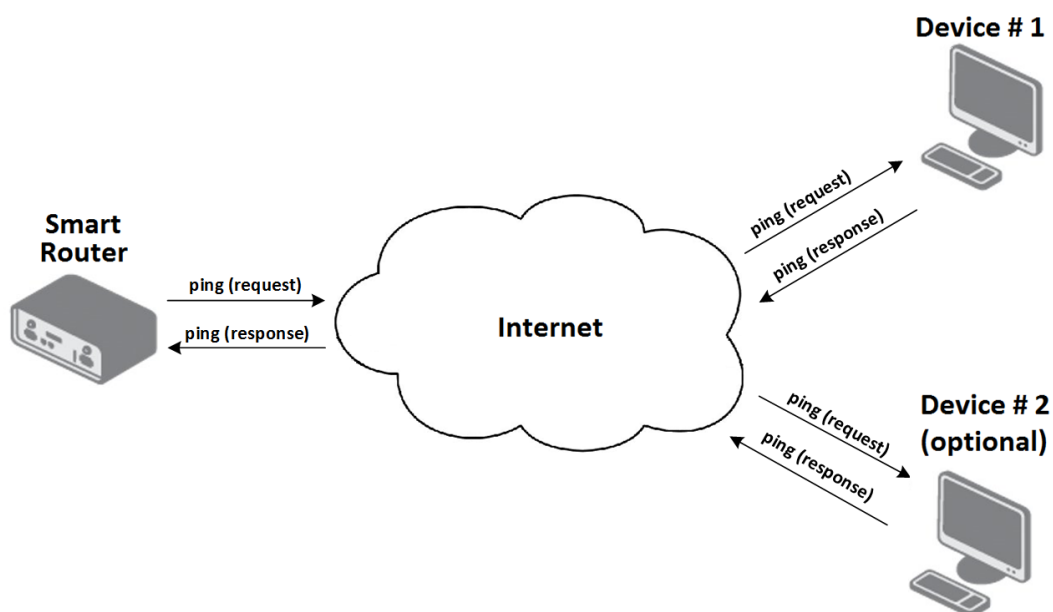


Figure 1: Functional Schema of Pinger Module



All addresses of devices and services, which can be set for manual or automatic mode, can be specified in IPv4, IPv6 format alternatively also by domain name. These settings must correspond with other settings of the router. For details please see Configuration manual.

## 2. Web Interface

A web interface is available for configuration of the *Pinger* user module. It can be invoked by pressing the module name on the *Router Apps* page of the router's web interface.

The left part of the Pinger module web interface contains a menu with sections *Tools*, *Automatic Ping* and *General*, see the figure 2. The general section contains only the *Return* item that switches the module's web interface back to the main interface of the router.

Tools
Ping
Traceroute
Automatic Ping
Configuration
Status
General
Return

Figure 2: Main Menu

## 2.1 Tools

There is a *Ping* page in the *Tools* section, see figure 3. Here you can manually check the availability of a device with a specified address (*Target Address*). It is also possible to set a number of requests to be sent (*Count*) and data size for testing (*Data size*). A description of these items is listed in table 1.

Figure 3: Manual Ping

Item	Description
Target address	IP address of device to be tested .
Count	Number of requests to be sent (1 to 60).
Data Size*	Data load for sending packets (by default 56 B)

\* - can be blank

Table 1: Parameters of Manual Ping

The second item in the *Tools* section is intended for *Traceroute*. This is a computer network diagnostic tool for displaying the route (path) and measuring transit delays of packets across a IP network. The configuration form allows the user to specify target address and maximum number of hops. The CLI command `traceroute` is invoked for this test and a test report has the form of a traceroute command output.

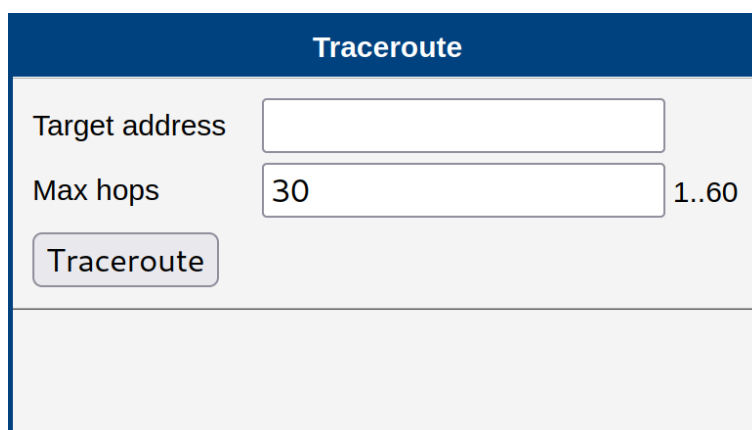


Figure 4: Traceroute

Položka	Význam
Target address	IP address of the target device to which you want to find the path.
Max hops	The maximum number of routers that a packet passes through from its source to its destination.

Table 2: Parameters of Traceroute

## 2.2 Automatic Ping

### 2.2.1 Description of Settings

The parameters of an automatic ping test can be specified in the form on the *Configuration* page in *Automatic Ping* section, see figure 5. Parameters on this page can be grouped into four groups:

- Initial (common) settings
- Setting for *Line-failing* state
- Setting for *Line-lost* state
- Setting for *Line-reestablished* state
- Availability monitor setting



Automatic Ping				
<input checked="" type="checkbox"/> Enable Automatic Ping				
	Ping 1	Ping 2		
Address	<input type="text"/>	<input type="text"/>		
Interval	<input type="text" value="10"/>	<input type="text" value="10"/>	1..3600 s	
Data size*	<input type="text" value="56"/>	<input type="text" value="56"/>	B	
Router ID*	<input type="text"/>			
Start Time (HH:MM)*	<input type="text"/>			
Stop Time (HH:MM)*	<input type="text"/>			
Log all ping attempts to syslog	<input type="checkbox"/>			
Short-term statistic for	<input type="text" value="60"/>	pings		
<input type="checkbox"/> Line-failing check by automatic ping				
If no response on last	<input type="text" value="10"/>	pings		
or on last	<input type="text"/>	seconds		
Log to system log	<input checked="" type="checkbox"/>			
Send SNMP trap*	<input type="text"/>			
Send e-mail*	<input type="text"/>	<input type="text"/>	<input type="text"/>	
<input type="checkbox"/> Line-lost check by automatic ping				
If no response on last	<input type="text" value="20"/>	pings		
or on last	<input type="text"/>	seconds		
Log to system log	<input checked="" type="checkbox"/>			
Send SNMP trap*	<input type="text"/>			
Send e-mail*	<input type="text"/>	<input type="text"/>	<input type="text"/>	
Send SMS*	<input type="text"/>	<input type="text"/>	<input type="text"/>	
	<input type="text"/>	<input type="text"/>	<input type="text"/>	
	<input type="text"/>	<input type="text"/>	<input type="text"/>	
Restart mobile connection	<input type="checkbox"/>			
Reboot router	<input type="checkbox"/>			
<input type="checkbox"/> Line-reestablished check by automatic ping				
Log to system log	<input checked="" type="checkbox"/>			
Send e-mail*	<input type="text"/>	<input type="text"/>	<input type="text"/>	
Send SMS*	<input type="text"/>	<input type="text"/>	<input type="text"/>	
	<input type="text"/>	<input type="text"/>	<input type="text"/>	
	<input type="text"/>	<input type="text"/>	<input type="text"/>	
* can be blank				
<input type="checkbox"/> Expose statistics about availability via SNMP				
<input type="button" value="Apply"/> Ping will start immediately or at Start Time if is set.				

Figure 5: Configuration of Automatic Ping

The automatic Ping test (*Enable Automatic Ping*) can be activated in the common group of parameters. Device addresses (*Address*), time interval (*Interval*) and the size of data to be sent (*Data size*) can be set for this test. These parameters can be set independently for one or two devices (parameters column *Ping 1* and *Ping 2*).

If the parameters for both devices are specified, the test is executed by the following scenario: The test starts running toward the device specified in column *Ping 1* by default. If there is no response from this device, the test is switched to the device specified in column *Ping 2*. The test remains on this device until no response appears. If a response does not appear the test is switched back to the first device again. The time interval, after which the request is sent to the device, matches the interval defined for the device that is going to be actually tested.

The next parameter recommended to be set is *Router ID*, which is used for the router's identification. This identification is used in error messages sent by an automatic ping test.

Parameters *Start Time* and *Stop Time* can declare the time interval for the execution of an automatic ping test. These two parameters are common for both the device set in column *Ping 1* and the device set in column *Ping 2*. If these parameters are not specified, the automatic ping test is running continuously.

Description of common group parameters is listed in table 3.

Item	Description
Enable Automatic Ping	Activates of automatic Ping test.
Ping 1	Columns with parameters for configuration of the first device.
Ping 2*	Columns with parameters for configuration of the second device.
Address	IP address of a device used in the test.
Interval	Interval between ping tests (maximum is 3600 seconds).
Data size*	Size of data to be sent (by default 56 B).
Router ID*	Router identification (used for error messages).
Start Time (HH:MM)*	Start time of automatic ping (24-hour format).
Stop Time (HH:MM)*	Stop time of automatic ping (24-hour format).
Short-term statistics for x ping	Number of pings used for calculating short-term statistics. See chapter 2.2.3.

\* - can be blank

Table 3: Common Parameters for Automatic Ping Test

*Line-failing* state can be set in the next group of parameters. This state is evaluated if either the number of missing responses reaches a specified quantity or the time interval in which a missing response from the tested device has passed.

If this state appears following actions can be performed. These actions can be: logging into the router's system log, sending an SNMP message or sending of an email. Description of *Line-failing* parameters is listed in table 4.

Item	Description
Line-failing check by automatic ping	Activate evaluation of line failing state, which will be evaluated based on the setting of the next two parameters.
If no response on last x pings	Number of missing responses for line failing state evaluation.
or on last x seconds	Time interval of missing responses for line failing state evaluation.
Log to system log	Activation of logging to the router's system log.
Send SNMP trap*	SNMP server address where to send error message.
Send e-mail*	Email address for error messages (up to three different addresses).

\* - can be blank

Table 4: Parameters for Line-failing State

*Line-lost* state can be set in the next group of parameters. This state is evaluated if either the number of missing responses reaches a specified quantity or the time interval in which a missing responses from the tested device has passed.

If this state appears follow-up actions can be performed. These actions can be: logging into the router's system log, sending an SNMP message, sending an email, sending an SMS message, restarting the router's mobile interface and restarting the router. A description of *Line-lost* parameters is listed in table 5.



If an automatic ping test appears in one of the two mentioned states, it stays in this state until a successful response from the device is received.

The *Line-reestablished* state can be set in the last group of parameters. This state is evaluated if automatic ping starts getting responses again after line-failing or line-lost.

If this state appears follow-up actions can be performed. These actions can be: logging into the router's system log, sending an email and sending an SMS. A description of *Line-reestablish* parameters is listed in table 6.



For functionality of email and SMS message sending, the appropriate router configuration must be set. For details please see Configuration manual.

The user should use the *Expose statistics about availability via SNMP* checkbox if he/she wishes to have router accessibility statistics in the SNMP tree. This statistics are also displayed on the *Status* page.

If the module is stopped, available statistics are discarded and are not exposed in SNMP. Upon the next start, the module initializes new counting of availability statistics, as the module doesn't know what's going on while it is down. If you upgrade the module, it is stopped and started in the background, but this doesn't break statistics.

Item	Description
Line-lost check by automatic ping	Activates evaluation of line-lost state, which will be evaluated based on the setting of following two parameters.
If no response on last x pings	Count of missing responses for line lost state evaluation.
or on last x seconds	Time interval of missing responses for line lost state evaluation.
Log to system log	Activates of logging to router's system log.
Send SNMP trap*	SNMP server address where to send error message.
Send e-mail*	Email address for error messages (up to three different addresses).
Send SMS*	Phone number for error message via SMS (up to twelve different numbers).
Restart mobile connection	Activates mobile interface restart.
Reboot router	Activates router restart.

\* - can be blank

Table 5: Parameters for Line-lost State

Item	Description
Line-reestablished checkby automatic ping	Activates evaluation of reestablishing state.
Log to system log	Activates logging to router's system log.
Send e-mail*	Email address for notification messages (up to three different address).
Send SMS*	Phone number for notification message via SMS (up to twelve different numbers).

\* - can be blank

Table 6: Parameters for Line-reestablish State

If the ping interval is set to 61 seconds or more, the following warning will be displayed on the Pinger page (red): "Availability data will not be reliable. Set the interval to 60 seconds or shorter."

A test of automatic ping will be started immediately after pressing the Apply button. If the Start Time parameter is set, the execution will be postponed to the specified time.



Before the execution of automatic ping test by pressing the *Apply* button, the user must make sure that the automatic test is enabled (item *Enable Automatic Ping*), and/or if state of line-failing is enabled (item *Line-failing check by automatic ping*), and/or if state of line-lost is enabled (item *Line-lost check by automatic ping*).

## 2.2.2 Sample Configuration

In figure 6 is an example of the setting for an automatic ping test. Lets assume the user wants to test the availability of a device with IP address 192.168.0.10 and a device with IP address 192.168.0.20. These addresses have to be entered into row *Address* in column *Ping 1* and *Ping 2* respectively. The availability will be checked every minute with the data size of 56 B (i.e. *Ping Interval* is set to 60 and *Data size* stays on the default value).

For easy distinction in error messages sent from the router, identification of the router is set in the *Router ID* field. In life of the fact that the user is interested in the availability only between 8:00 and 12:00 o'clock (24-hour format), the *Start Time* field is set to 8:00 and the *Stop Time* to 12:00.

For enabling line-failing state, *Line-failing check by automatic ping* checkbox is checked. This state will be evaluated if the number of lost responses (consecutively followed) reaches 10 (*If no response on last x pings = 10*) or the last response was received five minutes prior (*or on last x seconds = 300*). If this state occurs, the following actions will be performed:

1. Error message will be logged into the router's system log (item *Log to system log* enabled).
2. SNMP error message will be sent to address 192.168.0.1 (item *Send SNMP trap*).
3. Error message to *support@mail.com* e-mail address will be sent (item *Send e-mail*).

For enabling line-lost state, *Line-lost check by automatic ping* checkbox is checked. This state will be evaluated if the number of lost responses (consecutively followed) reaches 20 (*If no response on last x pings = 20*) or the last response was received ten minutes prior (*or on last x seconds = 600*). If this state occurs, the following actions will be performed:

1. Error message will be logged into the router's system log (item *Log to system log* enabled).
2. SNMP error message will be sent to address 192.168.0.1 (item *Send SNMP trap*).
3. Error message to *support@mail.com* and *hotline@mail.com* email addresses will be sent (item *Send email*).
4. Error Error SMS message to phone number 123 456 789 will be sent (item *Send SMS*).
5. Restart of the router will be performed (item *Reboot router* enabled).

For enabling reestablished state, *Line-reestablished check by automatic ping* checkbox is checked. This state will be evaluated if a successful response is received after line-failing or line-lost check. If this state occurs, the following actions will be performed:

1. Error message will be logged into the router's system log (item *Log to system log* enabled).

2. Error message to support@mail.com and hotline@mail.com email addresses will be sent (item *Send email*).
3. Error SMS message to phone number 123 456 789 will be sent (item *Send SMS*).

Automatic Ping				
<input checked="" type="checkbox"/> Enable Automatic Ping				
	Ping 1	Ping 2		
Address	192.168.0.10	192.168.0.20		
Interval	60	60	1..3600 s	
Data size*	56	56	B	
Router ID*	MainRouter			
Start Time (HH:MM)*	08:00			
Stop Time (HH:MM)*	12:00			
Log all ping attempts to syslog	<input type="checkbox"/>			
Short-term statistic for	60	pings		
<input checked="" type="checkbox"/> Line-failing check by automatic ping				
If no response on last	10	pings		
or on last	300	seconds		
Log to system log	<input checked="" type="checkbox"/>			
Send SNMP trap*	192.168.0.1			
Send e-mail*	support@mail.com			
<input checked="" type="checkbox"/> Line-lost check by automatic ping				
If no response on last	20	pings		
or on last	600	seconds		
Log to system log	<input checked="" type="checkbox"/>			
Send SNMP trap*	192.168.0.1			
Send e-mail*	support@mail.com	hotline@mail.com		
Send SMS*	123 456 789			
Restart mobile connection	<input type="checkbox"/>			
Reboot router	<input checked="" type="checkbox"/>			
<input checked="" type="checkbox"/> Line-reestablished check by automatic ping				
Log to system log	<input checked="" type="checkbox"/>			
Send e-mail*	support@mail.com	hotline@mail.com		
Send SMS*	123 456 789			
* can be blank				
<input type="checkbox"/> Expose statistics about availability via SNMP				
<input type="button" value="Apply"/> Ping will start immediately or at Start Time if is set.				

Figure 6: Sample Configuration of Automatic Ping



### 2.2.3 Status

Statistical information related to the automatic ping test can be reviewed on the page *Status*, in the section Automatic Ping, see the figure 7. This page has two sections. The first is intended for automatic ping statistics and the second for availability statistics.

The first part *Total...* of the first section of the statistics is calculated for the entire time Pinger is installed and enabled on the router, while the *Current...* statistics are calculated from the last few pings. The user can configure the number of these pings on the Configuration page in the Short-term statistic for x ping field.

This example illustrates the situation in which 111 packets were transmitted. A relevant response was received for all of them, therefore no packet was lost. In addition, there are content values for the minimum, maximum and average times at which individual responses were received and the average of the differences between these successive times (so called jitter).

The second part of the first section on this example illustrates the situation in which currently received packets are calculated for the maximum of the last 60 pings. In addition, there are content values for the lost packets, minimum, maximum and average latency, including the current jitter value.

The second section contains availability information. It is possible to find the date and time when the ping monitoring was started (*Monitored from*) and the last check was done (*Last check*). There are also statistics indicating the total time of ping monitoring (*Total time*), how long the router has been available (*Up time*) and how long the routers has been connected to the network (*On-line time*).

The user can use the *Save details* button to save detailed reports. The file will include statistical data and other information about the ping process. After reaching over 10,000 pings, the oldest statistics are discarded. The same statistics can be accessible via SNMP, see *Expose statistics about availability via SNMP* configuration item in chapter 2.2.1.

It is necessary to update the web interface page in the given web browser to update the listing on this page.

### 2.2.4 SNMP

If the option *Expose statistics about availability via SNMP* is enabled, the user can access all Pinger statistics via the SNMP protocol. The pinger daemon must be running (enabled) to have this SNMP data accessible. It is also necessary to have enabled SNMP service in the router configuration. For details see more in Configuration manual.

The user can use any SNMP client application for reading SNMP data with settings according to the router SNMP service configuration.

Statistics	
Pings	
Total transmitted packets	: 111
Total received packets	: 111 (100.0000 %)
Total lost packets	: 0 (0.0000 %)
Total min. latency	: 0.5 ms
Total max. latency	: 0.7 ms
Total average latency	: 0.5 ms
Total jitter	: 0.0 ms
Current received packets	: 60 (100.0000 %)
Current lost packets	: 0 (0.0000 %)
Current min. latency	: 0.5 ms
Current max. latency	: 0.6 ms
Current average latency	: 0.5 ms
Current jitter	: 0.0 ms
The current statistic values are calculated for the max. Last 60 pings.	
Availability	
Monitored from	: 2021-12-14 08:59:14
Last check	: 2021-12-14 09:17:34
Total time	: 0 days, 0 hours, 18 minutes, 20 seconds
Up time	: 0 days, 0 hours, 18 minutes, 20 seconds (100.0000 %)
On-line time	: 0 days, 0 hours, 18 minutes, 20 seconds (100.0000 %)
<input type="button" value="Save details"/>	

Figure 7: Status

All of the Advantech router SNMP data is published in a private SNMP tree. The MIB file is necessary to get this data correctly. You can download the related MIB file with the definitions for Pinger statistics on our portal:

<https://icr.advantech.cz/products/software/user-modules#pinger>

Other MIB files are accessible in the public repository here:

<https://bitbucket.org/bbsmartworx/snmp-mib>.

The example image bellow shows how to get the SNMP statistics in a Linux terminal.

```
[marek@notebook /]$ snmpget -c public -v 2c -m ./UM-PINGER-MIB.my 192.168.1.1 .1.3.6.1.3.1001.11.0
UM-PINGER-MIB::umPingerTotalPctRx.0 = INTEGER: 93.9394 %
[marek@notebook /]$ snmpget -c public -v 2c -m ./UM-PINGER-MIB.my 192.168.1.1 .1.3.6.1.3.1001.24.0
UM-PINGER-MIB::umPingerCurJitter.0 = Gauge32: 36 µs
```

Figure 8: Example of SNMP Data in Terminal

## 3. Related Documents

- [1] Advantech Czech: **Application note SNMP Object Identifiers**  
(APP-0010-CZ)

You can obtain product-related documents on *Engineering Portal* at [icr.advantech.cz](http://icr.advantech.cz) address.

To get your router's *Quick Start Guide*, *User Manual*, *Configuration Manual*, or *Firmware* go to the [Router Models](#) page, find the required model, and switch to the *Manuals* or *Firmware* tab, respectively.

The *Router Apps* installation packages and manuals are available on the [Router Apps](#) page.

For the *Development Documents*, go to the [DevZone](#) page.