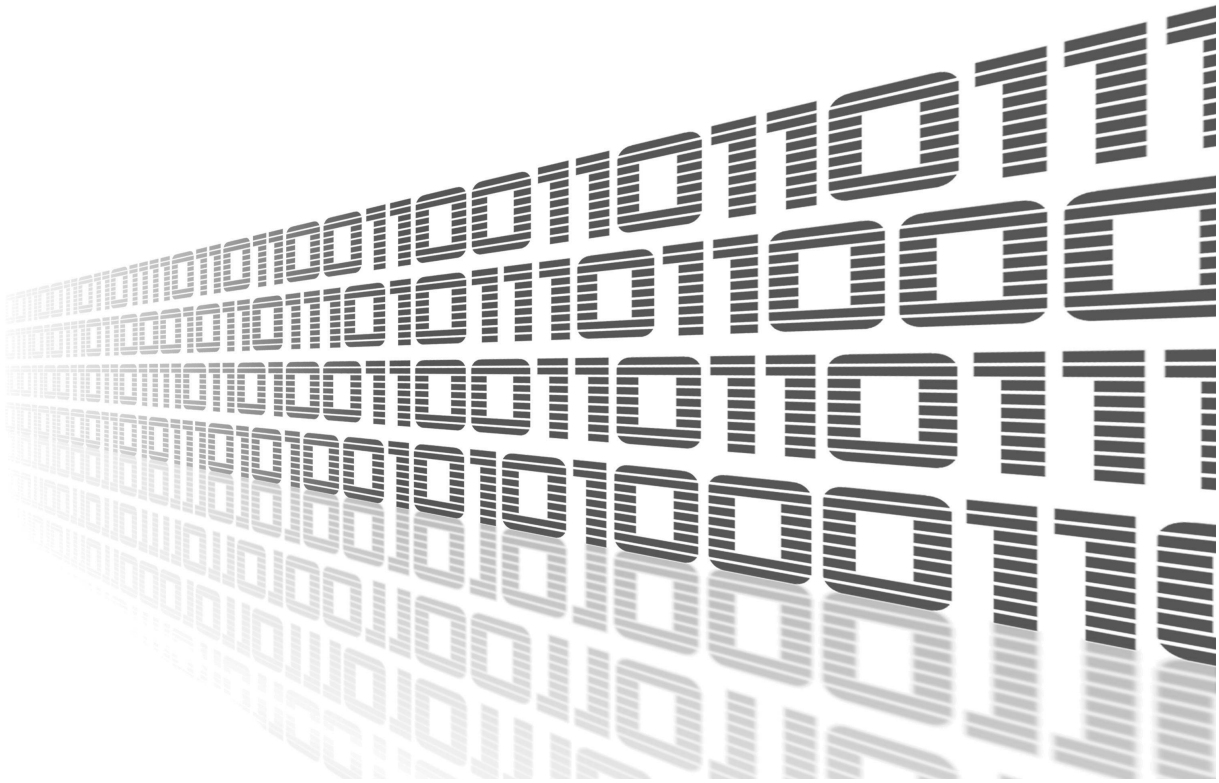
RouterApp

MQTT Manager

APPLICATION NOTE



ADVANTECH

Used symbols

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

Attention – Problems that may arise in specific situations.

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

Example – Example of function, command or script.

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Contents

List of Figures

1. Description of the module

This Router app is not contained in the standard router firmware. Uploading of this router app is described in the Configuration manual (see Chapter Related Documents).

MQTT Manager is router app for controlling and monitoring Advantech routers via the MQTT protocol. It is possible to send through a specific MQTT message which can, for example, change binary output. User can track status of the router by subscribing to a specific topic.

2. Web Interface

Once the installation of the module is complete, the module's GUI can be invoked by clicking the module name on the Router apps page of router's web interface.

The left part of this GUI contains the menu with General menu section. Return menu item switches back from the module's web page to the router's web configuration pages. The main menu of the module's GUI is shown on Figure 1.

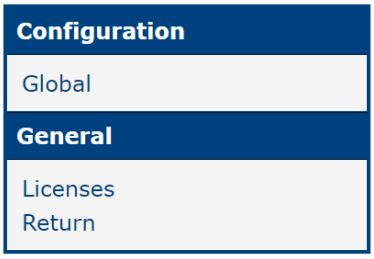

Figure 1: Menu

2.1 Global Configuration

Configuration of this router app can be done on the Settings page, under the Router menu section. All configuration items for the Settings configuration page are described in the table below.

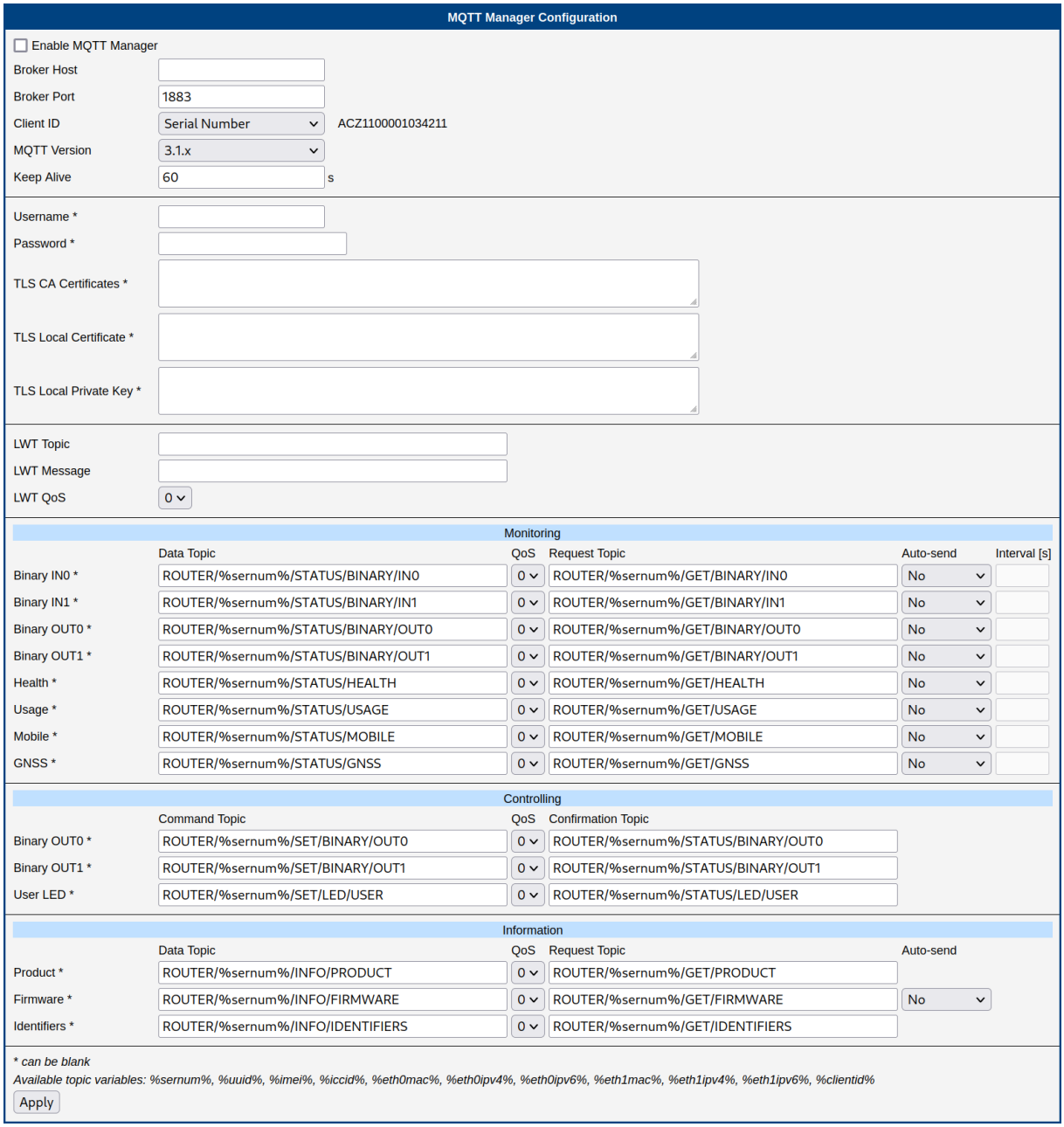

Figure 2: Configuration

Item	Description
Enable MQTT Manager	Enabled, MQTT Manager functionality of the module is turned on.
Broker Host	Enter IP address or domain name of MQTT broker.
Broker Port	Enter Broker Server Port Number (1-65535).
Client ID	String used as the client identifier to the broker. You can choose from the router unique IDs or insert your own.
MQTT Version	Select MQTT version.
Keep Alive	Enter MQTT Keep-Alive interval (1-3600).
Username	Enter username to connect to the broker if it is required.
Password	Enter password to connect to the broker if it is required.
TLS CA Certificates	If you use TLS connection, enter Certificate Authority certificate.
TLS Local Certificate	If you use TLS connection, enter the router local certificate.
TLS Local Private Key	If you use TLS connection, enter the router local private key.
LWT Topic	Enter topic of the message that will broker send to connected subscribers, when one of the routers will disconnect or stop to communicate. (so called Last Will and Testament feature)
LWT Message	Enter content of the message that will broker send to connected subscribers, when one of the routers will disconnect or stop to communicate. (so called Last Will and Testament feature)
LWT QoS	Select Quality of Service level of the message that will broker send to connected subscribers, when one of the routers will disconnect or stop to communicate. (so called Last Will and Testament feature)
Monitoring	See chapter 2.1.1
Controlling	See chapter 2.1.2
Information	See chapter 2.1.3

Table 1: Settings Example Items Description

2.1.1 Monitoring

These are messages that contain a value of some change of a data. A message like this will be sent to the user on request using a *special message* (see more in chapter 3). It can also be sent when the value changes or in regular intervals. If it is sent based on a change of data it should be noted that the state is a sample at some frequency so very fast changes may not be detected (E.g. when the state of a binary input changes for only a millisecond). In addition the user can set the topic of the message being sent (Data Topic) and the topic of the message the user can request (Request Topic) for each monitored data.

2.1.2 Controlling

These are messages that the user can use to control the router. For example, the user LED can be turned on / off by sending the correct message. "Command Topic" is the topic of the message the user sends to the router. "Confirm Topic" is the topic of the message sent by the router to confirm that the command has been done.

2.1.3 Information

These are messages similar to Monitoring but these are just data that do not change (e.g. product name), therefore it is not necessary to send them multiple times. They are only sent on request. The exception is the firmware version, which changes during the update, thus it can be set to be sent automatically.

For all topics the message can be disabled by omitting the topic field empty. In this case, the related message is not sent. For example, if the user leaves "Data Topic" blank at "Binary IN0" this information will not be sent and the user cannot request it. It is simply forbidden. Another example: If the user does not fill in "Confirmation Topic" in Controlling he can send a command that will be executed but he will not receive confirmation of the successful result.

The user can use variables in message topics (see Table 2).

Variable	Example
%sernum%	Will be replaced by device serial number. Example: "ACZ1199000000652"
%suuid%	Will be replaced by router UUID. Example: "a13cf7db-810f-4cec-afa8-bcbda3c285a8"
%imei%	Will be replaced by IMEI number. Example: "861536030196001"
%iccid%	Will be replaced by identification number of SIM card. Example: "89442001023880434 68"
%eth0mac%	Will be replaced by eth0 MAC address. Example: "02:AD:FF:00:00:65"
%eth0ipv4%	Will be replaced by eth0 IPv4 address. Example: "192.168.1.1"
%eth0ipv6%	Will be replaced by eth0 IPv6 address. Example: "fd00:a40::65"
%eht1mac%	Will be replaced by eth1 MAC address. Example: "02:AD:FF:01:00:65"
%eth1ipv4%	Will be replaced by eth1 IPv4 address. Example: "192.168.1.2"
%eth1ipv6%	Will be replaced by eth1 IPv6 address. Example: "fd00:a41::65"
%clientid%	Will be replaced by client ID of the router.

Table 2: Variables Description

2.2 licenses

This section covers information about licenses listed below in the Figure 3. By clicking on the specific *License* button the user will open up a text file which describes copyright terms and agreements of the specific license. The user can find more information about specific items online.

MQTT Manager Licenses

Project	License	More Information
gpsd	BSD	License
json-c	MIT	License
OpenSSL	OpenSSL and SSLeay	License
Paho	EDL 1.0 and EPL 2.0	License

Figure 3: Licenses

3. Format of Messages

This section describes and includes examples of the MQTT messages used in communication between the MQTT Manager and customer's MQTT client.

3.1 Monitoring Examples

Binary IN0

- *Data message:*
  `{"binary": {"in0": B}}`

  Where *B* is binary value 0 or 1.

  Example:
  `{"binary": {"in0": 1}}`

- *Request message:*
  Empty message, choose the correct topic how it is defined in the settings.

Binary IN1

- *Data message:*
  `{"binary": {"in1": B}}`

  Where *B* is binary value 0 or 1.

  Example:
  `{"binary": {"in1": 1}}`

- *Request message:*
  Empty message, choose the correct topic how it is defined in the settings.

Binary OUT0

- *Data message:*
  `{"binary": {"out0": B}}`

  Where *B* is binary value 0 or 1.

  Example:
  `{"binary": {"out0": 1}}`

- *Request message:*
  Empty message, choose the correct topic how it is defined in the settings.

Binary OUT1

- *Data message:*
  `{"binary": {"out1": B}}`

  Where *B* is binary value 0 or 1.

  Example:
  `{"binary": {"out1": 1}}`

- *Request message:*
  Empty message, choose the correct topic how it is defined in the settings.

Health

- *Data message:*
  `{"health": {"temperature": T, "voltage": V, "battery": B}}`

  Where *T* is the temperature in Celsius degrees as an integer, *V* is the current supply voltage in Volts as a decimal number, and *B* is the RTC battery status as "OK" or "Empty".

  Not all routers have all the information available, for example v2i type of routers does not communicate the temperature. In this case, the relevant information is skipped.

  Example:
  `{"health": {"temperature": 36, "voltage": 11.7, "battery": "OK"}}`

- *Request message:*
  Empty message, choose the correct topic how it is defined in the settings.

Usage

- *Data message:*
  `{"usage": {"cpu": C, "ram": {"total": T, "used": U, "percentage": P}}}`

  Where *C* is the CPU usage in percentage as a decimal number, *T* is the total amount of RAM in bytes as an integer, U is the used RAM in bytes as an integer, and *P* is the used RAM in percent as a decimal number.

  Example:
  `{"usage": {"cpu": 10.3, "ram": {"total": 521654272, "used": 28209152, "percentage": 5.4}}}`

- *Request message:*
  Empty message, choose the correct topic how it is defined in the settings.

Mobile

- *Data message:*
  `{"mobile": [{"sim": S, "technology": T, "operator": O, "plmn": P, "cell": C, "lac": L, "channel": H, "signal": {"strength": R, "quality": Q}, "uptime": U, "ipv4: I4," ipv6 ", I6}, ...]}`

  Where *S* is the number of the currently selected SIM cards 1 or 2, *T* is mobile technology as a string, *O* is operator as a string, *P* is PLMN as an integer, *C* is a cell number as an integer, *H* is a channel number as an integer, *R* is a signal strength in dBm as an integer, *Q* is the signal quality in dB as an integer, *U* is the uptime connection as a string, *I4* is the IPv4 address as a string, and *I6* is the IPv6 address as a string. "*Mobile*" is an array due to multiple cellular modules. With Smart Motion, there will be two items in the field. The "*sim*" data should always be present, other data only when the connection is active. IP addresses do not have to be set both.

  Example:
  `{"mobile": [{"sim": 1, "technology": "LTE", "operator": "T-Mobile","plmn": 23003, "cell": 10804, "lac": 947, "channel": 1849, "signal": {"strength": -91, "quality": -6}, "uptime": "0 days, 11 hours, 18 minutes","ipv4": "10.80.0.27"}]}`

- *Request message:*
  Empty message, choose the correct topic how it is defined in the settings.

3.2 Controlling Examples

Binary OUT0

- *Controlling message:*
  `{"binary": {"out0": B}}`

  Where *B* is binary value 0 or 1.

  Example:
  `{"binary": {"out0": 1}}`

- *Confirmation message:*
  It's the same, but with a different topic.

Binary OUT1

- *Controlling message:*
  `{"binary": {"out1": B}}`

  Where *B* is binary value 0 or 1.

  Example:
  `{"binary": {"out1": 1}}`

- *Confirmation message:*
  It's the same, but with a different topic.

User LED

- *Controlling message:*
  `{"led": {"user": B}}`

  Where *B* is binary value 0 or 1.

  Example:
  `{"led": {"user": 1}}`

- *Confirmation message:*
  It's the same, but with a different topic.

3.3 Information Examples

Product

- *Data message:*
  `{"info": {"series": S, "partnum": P}}`

  Where *S* is the model line as a string and *P* is the product number as a string.

  Example:
  `{"info": {"series": "ICR-324x", "partnum": "ICR-3241W"}}`

- *Request message:*
  Empty message, choose the correct topic how it is defined in the settings.

Firmware

- *Data message:*
  `{"info": {"firmware": F}}`

  Where *F* is firmware version.

  Example:
  `{"info": {"firmware": "6.3.2 (2021-09-30)"}}`

- *Request message:*
  Empty message, choose the correct topic how it is defined in the settings.

Identifiers

- *Data message:*
  `{"info": {"sernum": S, "uuid": U, "module": [{"imei": I, "iccid": C, "esn": E, "meid": M}, ...]}}`

  Where *S* is the serial number and *U* is the universally unique identifier. *I*, *C*, *E*, and *M* are identifiers used in mobile networks. All items are strings. If the router has two cellular modules, the module array will contain two entries, if it has no cellular module, module information will be omitted. Also *UUID* may not be presented.

  Example:
  `{"info": {"sernum": "ACZ1199000000736", "module": [{"imei": "863305040213851", "iccid": "89420310201221227 79" }]}}`

- *Request message:*
  Empty message, choose the correct topic how it is defined in the settings.

4. Related Documents

You can obtain product-related documents on *Engineering Portal* at *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.