

IQRF Cloud Server

Version 2.89

Technical guide

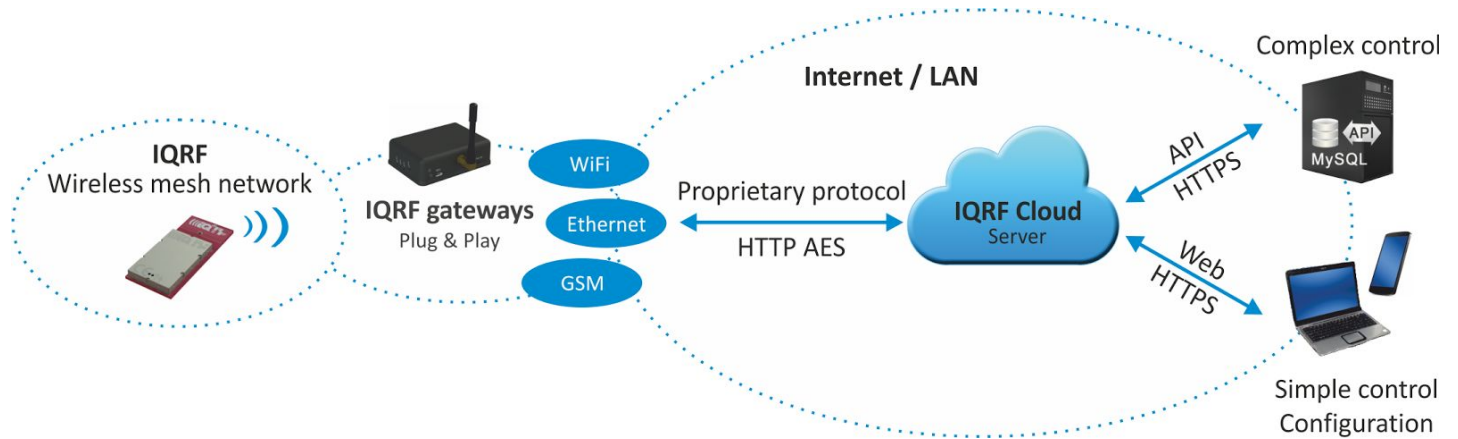


[IQRF Cloud characteristics](#)

The IQRF Cloud provides an effective way to exchange data between IQRF wireless device(s) and a user superordinary system implemented by a higher level platform (e.g. PHP, JavaScript or web interface) and connected via Internet or a LAN.

IQRF Cloud operates with IQRF gateways providing Internet connectivity (Ethernet, GPRS or WiFi).

An IQRF Cloud server is available on <https://cloud.iqrf.org> provided by CIS.



Features

- IQRF Cloud enables easy data access, processing and visualization.
- Thanks to the IQRF Cloud no or just a minimal configuration of data connection is required.
- Great emphasis is put on data security.

Target applications

IQRF Cloud is especially intended for WSN, AMR and similar telemetry applications primarily focused on collecting data from wireless end devices (forward channel from the GW to the Cloud). However, sending data backwards (from the Cloud to the GW), e.g. to setup parameters or deliver commands to end devices is also possible. The accent is put on the forward direction. The GW has full control of data propagation between the GW and the Cloud. It corresponds to higher data streams expected in forward direction and lower traffic and lower priority of data in the backward channel.

[IQRF Cloud parameters](#)

Forward channel

Payload data	64 B per record
Period (time interval for transferring data between the GW and the Cloud)	Selectable, see the User's guide of given GW for exact values.
Time stamps for data record transfers	
When copied from IQRF to GW	Accessible from API and web interfaces
When copied from GW to Cloud	Auxiliary, accessible from web interface only
Records per GW on Cloud server	
Server hosted by CIS (free version)	Up to 1000. When full, the oldest records are overwritten.
User's own server	Limited by disk space only
Records downloaded per one API function call	Up to 500 records

Backward channel

Payload data	64 B per record
Period	Shared with forward channel
Time stamps for data record transfers	
Received by Server	When uploaded to the Cloud
Received by GW	
When picked by GW	This time is used for records not confirmed by the GW yet (corresponds to status <i>Sent</i>)
When confirmed by GW	The „When picked by GW“ time is replaced by this time after confirmation (corresponds to status <i>Confirmed</i>)
Records per GW on Cloud server	
Server hosted by CIS	Up to 500 000. When full, the oldest records are overwritten.
User's own server	Limited by disk space only

Communication overview

IQRF Cloud provides a bidirectional channel between the TR module inside the GW and a user application, both connected via Internet or a LAN.

Forward channel

Data from TR module is transferred to the user application with respect to the following rules:

Sending data from TR module to GW buffer

Typically, TR module inside the GW communicates with other wireless device(s) via RF (often in IQMESH network, usually utilizing DPA framework), collects incoming data, accomplishes possible preprocessing and then provides results to the GW via SPI serial bus in the form of individual packets. This functionality completely depends on the application uploaded in the TR module utilizing SPI slave fully supported by IQRF operating system built in TR module and (optionally) easily accessible via the DPA protocol.

Once a data is ready from the TR, the SPI master implemented in the GW reads out the SPI packet as soon as possible, adds a time stamp to this and stores resulting record in internal data buffer inside the GW. This operation is completely provided by the GW and works quite transparently from the user point of view.

Transferring data from GW buffer to the Cloud

Data incoming to GW buffer from TR module is then forwarded from the GW buffer to the Cloud server in given time period. Another (auxiliary) time stamp is added on the Cloud server to the record at the time of the transfer. This is also completely arranged by GW firmware and Cloud software. The only parameter which is up to the user is to specify the period. It should be setup like other GW parameters, see chapter *Step by step* below. Records on the Cloud are indexed in ascending order.

Downloading data from the Cloud to the user application

The user can access data on the Cloud by two approaches:

- User application (written in PHP or JavaScript) accesses the Cloud server via an API interface which allows complete data management. For example, the user application can periodically poll incoming data, download all data received in the last hour etc. See chapter *API interface*.
- Simple control and visualization of data collected on the Cloud is also possible by the web interface. See chapter *Step by step*, step 6.

Backward channel

Data from the user application is transferred to TR module with in the following way:

Uploading data from the user application to the Cloud

The user can upload data on the Cloud by two approaches:

- By the user application (written in PHP or JavaScript) accessing the Cloud server via the API interface. See chapter *API interface*.
- A simpler way is to submit data just from the web interface. See chapter *Web interface*.

Records uploaded on the Cloud are also indexed (independently on the forward channel).

Transferring data from the Cloud to the GW

The data stored in the Cloud server (either via the API or the web interface) stays there until it is picked by the GW (stored in the GW buffer). The GW picks the data from the server in the same time period as which is used for transferring data from the GW to the Cloud. Thus, it depends just on the GW when the data is picked. The API as well as the web interfaces enable to inform the user about the state of the uploaded data. So it can be found out whether the data has already been forwarded to the GW.

The server classifies four states of data (commands) to be sent to the GW:

- Not picked Data uploaded to the Cloud but not picked by the GW yet.
- Expired Data not picked by the GW in 10 minutes and will not be transferred to GW
- Picked Data picked by the GW but not confirmed yet
- Confirmed Data receiving confirmed by the GW

Sending data from GW buffer to TR module

The data is then forwarded to the TR by SPI. It is controlled by the SPI master in the GW (transparently from the user point of view) but TR module has a capability (embedded in IQRF OS functions dedicated to SPI) to inform the GW whether it is ready to receive (which must be checked in case of TR application programmed under OS and is transparently arranged in case of DPA).

Communication details

The GW transfers data from TR to GW buffer as soon as possible. When writing the application for TR module, the features of given GW should be taken into consideration too. The memory endurance should also be taken into account. Refer to the User's guide of given GW.

Once the time period elapsed, the bidirectional transfer between the GW and the Cloud is started and continues until there is no data to sent on both sides. Thus, more records can be transferred in a single period.

The GW data buffer is circular and allows to store thousands of records (the exact value depends on the GW type, FW version and RF packet size) with payload data up to 64 B each in both forward and backward channels. It is up to the user to set the period to avoid overflow. A proper value should be selected with respect to expected data streams and tolerable delays.

The Client – Server protocol type is used for communication between the GW and IQRF Cloud. The Cloud works as a server and the GW works as a client. Data between the GW and the Cloud server is transferred via a proprietary protocol above the HTTP application layer using the GET method. It is the most common type of communication, used e.g. by web browsers. Therefore minimal problems are expected when accessing the Cloud server in various Internet/intranet environment (with respect to various firewalls etc.). All data transfers between the GW and the Cloud server are always initiated by the GW (controlled by specified time period). The communication between the GW and the Cloud is completely secured by 128 b AES encryption.

Communication between the Cloud server and user application is carried out via HTTPS ensuring secure data transfers. The API interface for complete data management is implemented above this layer. See chapter *API interface*.

IQRF Cloud operated by CIS allows to store up to specified number of records in both forward and backward channels per gateway. When the space dedicated to given GW on the Cloud server is full, the oldest records are overwritten by new ones.

For access the Cloud via the web interface, a user account must be created on the Cloud server and the GW must be registered in this account first. The web interface is intended to configure the user account, for control and test purposes and for simple access to the Cloud data. Complete data is available but (unlike as via the API) the web interface provides also the auxiliary time stamps (see above) and does not enable any data filtration. Additionally, the data can be exported in the CSV format from the web interface. Refer to chapter *Web interface*.

GW registration on the server

- Every GW has a unique identification number ID (4 B) assigned by the manufacturer.
- Every GW contains a key (16 B) for AES encryption and a password (4 to 8 B) for secure access to GW data.
- After the GW (connected to Internet) is switched on for the first time or after changing of GW parameters, the GW performs registration on the server and sends its AES key, its password and its ID to the server (secured by the internal key specified by the factory). All following communication is secured by the newly sent key then. The password protects an access to data from the Cloud server side.
- When the password is changed, it must be updated also on the server side, otherwise the data access is denied (but the data is still being stored).

Web interface

- After the start-up, the GW performs the registration and starts to send a data. For access to the data it is necessary to create a user account on the IQRF Cloud server and then assign the desired GW to this account. The ID of the device and the password is requested for it.
- After changing the GW password, it must be changed also on the Cloud server (via the user account) otherwise the access will be denied.
- More GWs is allowed within a single user account.
- A single GW can be shared by more user accounts.

Controls of web interface

The picture below shows web interface of public IQRF Cloud. It is available on <https://cloud.iqrf.org> after login.

The screenshot shows the 'CISADMIN - IQRF Cloud' interface. At the top right, a user menu (8) shows 'test'. Below the navigation bar, there are tabs for 'DATA VIEW', 'GATEWAY REGISTRATION / EDITING' (1), and 'EDIT PROFILE'. The main area contains several control groups: 'EDIT' with a 'Register gateway' button (2); 'SEARCHING' with a search input field (3) and a 'Search' button; 'VIEWS' with a 'Save view' button (4); and 'EXPORT' with buttons for XLS, PDF, and CSV (5). Below these is a table with 9 items. The table has columns for 'Gateway ID', 'Name', and 'Assigned'. The first row (1) is highlighted. The table also has a 'Show all' button (1) and a 'Showing: 9 from 9 items' indicator. The table rows are numbered 1 through 6. The 'Name' column (6) contains entries like 'CO2+TEMP - Microrisc' and 'Martin Spiller'. The 'Assigned' column (9) shows dates and times. The table also has a 'Show all' button (1) and a 'Showing: 9 from 9 items' indicator.

	Gateway ID	Name	Assigned
1	ID: 0D00000F		22.1.2015 11:00:00
2	ID: 11000004		4.3.2015 10:27:19
3	ID: 12003F20	CO2+TEMP - Microrisc	13.3.2015 12:55:12
4	ID: 12003F1A	CO2+VLH+TEMP - Amper	13.3.2015 14:29:43
5	ID: 12003F78	Martin Spiller	16.3.2015 11:36:36
6	ID: 12003F19	Okno v Jiříně	20.5.2015 9:24:03

Almost all sections of the web interface have following controls:

1. **List of tables** – click to view data of devices, to manage gateways or to edit user account
2. **Editing commands** – create new gateway, send command to devices
3. **Data filtering** – search in text columns, filter data by specific rules
4. **Views** – you can save filter settings, sorting and column visibility to custom view for later use
5. **Export** – export actual data to Excel, PDF or CSV
6. **Data view** – table with actual data, one row = one record (gateway, data packet)
7. **Editing controls** – controls for edit or delete record
8. **User menu** – logout, change password
9. **Column controls** – sort data by column, hide column, click to column name to filter data

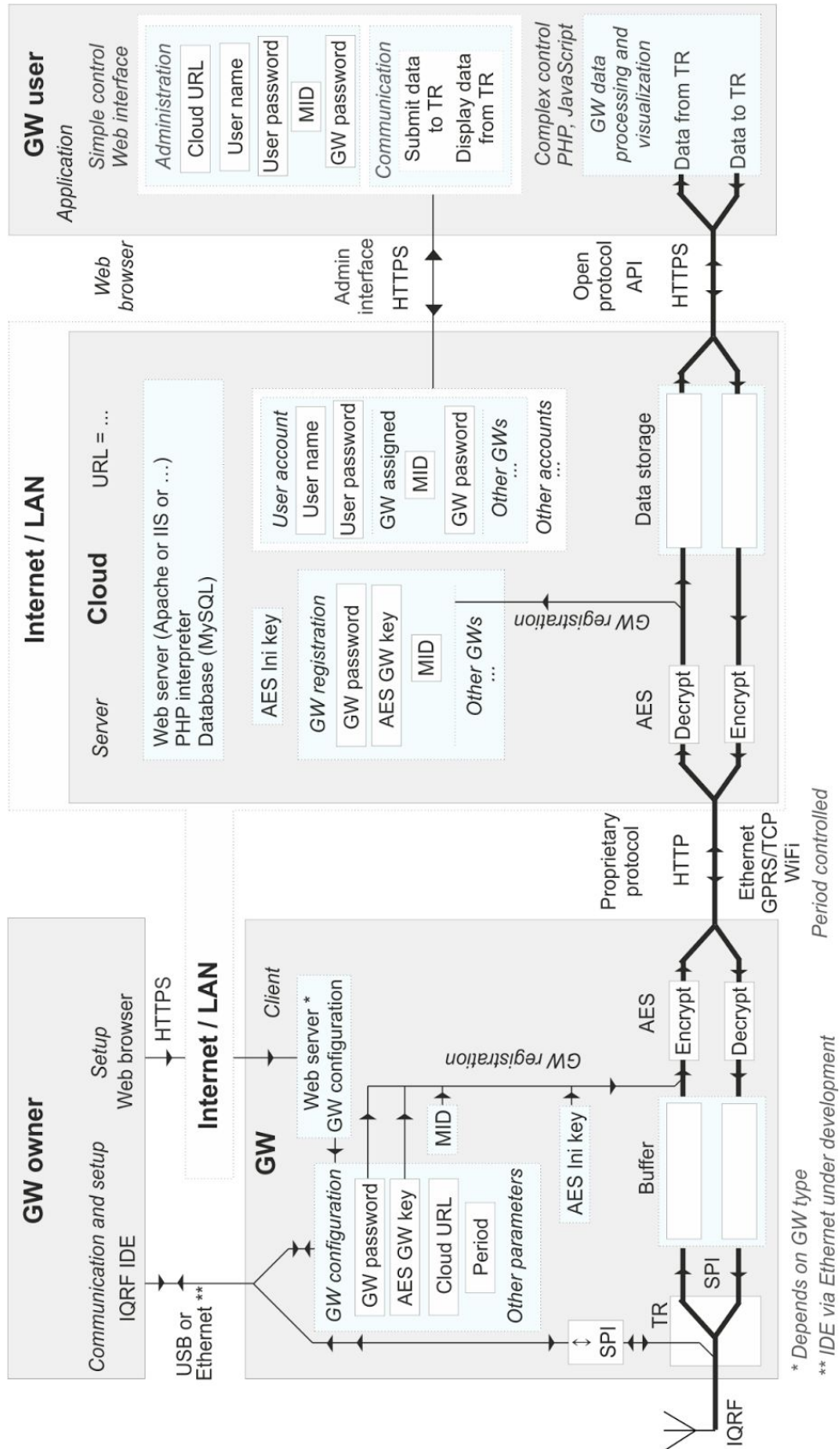
GW configuration

- IQRF gateways allow basic configuration:
 - For Ethernet and WiFi gateways: using the web server inside the GW and using *GW Tool* in IQRF IDE
 - For GSM gateway: using *GW Tool* in IQRF IDE

Refer to the User's guide of given GW and chapter *Step by step* in this document.

- GW configuration enables to setup the period for communication with the server, change the password, etc.

IQRF Cloud – block diagram



API interface

API interface allows three basic operations to user application:

- Read data from the Cloud (incoming from the GW)
- Write data to the Cloud
- Read data from the Cloud (written from the API interface)

Options to read data from the Cloud:

- Pick a new data (not ever being picked)
- Pick a data according to the index
- Pick a data according to the time
- Pick a specified number of data

The query string must contain the login data for the user account (user name) and login data for the GW (gateway ID) and signature, see below. Moreover, the type of the operation must be specified as well. As optional parameters, the date, data volume and record indexes can also be specified.

Optional parameters can be combined each other to determine the way of picking the data for specific purposes.

Refer to the next chapter (*API functions*) for detailed description.

API functions

The original Cloud API (version 1) has been redesigned and initial design may not be supported in the future. Actual version is 2.

The API interface can easily be utilized by various platforms (PHP, JavaScript etc.). When a defined string sent to the Cloud server is recognized, the API generates corresponding response.

The format of API functions (an example for PHP and the Cloud server operated by CIS):

<https://cloud.iqrf.org/api/api.php?parameter=value¶meter=value...>

URL address must be valid according to URL encoding reference (<https://en.wikipedia.org/wiki/Percent-encoding>).

Required parameters

<code>ver</code>	Version of API.
<code>uid</code>	Username for login to IQRF Cloud
<code>gid</code>	Gateway identification (the ID of the GW)
<code>gpw</code>	Password for given gateway. For the <code>add</code> function only.
<code>cmd</code>	Specification of the operation: <code>dnld</code> , <code>uplc</code> or <code>dnlc</code> , see below.
<code>data</code>	Data to be uploaded to the Cloud (max. 64 B per record, data format see below). For the <code>uplc</code> function only.
<code>signature</code>	String to authenticate the sender, see below.

Optional parameters

Functions for download may have also optional parameters. If omitted, the default values are predefined to transfer the maximum possible amount of data (up to 500 records). Only predefined combinations of parameters are allowed.

<code>from</code>	Index (start address) in data buffer.
<code>to</code>	Index (end address) in data buffer
<code>count</code>	Number of records to be downloaded (up to 500 records)
<code>time_from</code>	To download records stored from specified time.
<code>time_to</code>	To download records stored up to specified time.
<code>new</code>	To continue downloading from the last downloaded record. If used, this parameter must always be set <code>new=1</code> otherwise an error is issued.
<code>last</code>	To download very last records. If used, this parameter must always be set <code>last=1</code> otherwise an error is issued.

Date / time format

In optional parameters `time_from` and `time_to` (see above), the time should be specified as follows:

YYYYMMDDHHmmSS

Where: YYYY – year, MM – month, DD – day, HH – hour, mm – minute, SS – second.

If a string is shorter it is resized to 14 characters by filling of zeroes from the right.

Example: 20130823125200 or 201308231252 means 23 Aug 2013, 12:52:00.

Data stamps are returned as follows:

YYYY-MM-DD HH-mm-SS

Example: 2013-08-23 12:52:00 means 23 Aug 2013, 12:52:00.

Data format

All data transferred via API interface must be in ASCII format. Thus, every byte of binary data must be converted to 2 bytes corresponding to its hexadecimal value in ASCII representation.

Example:

- 1 (01 in hexadecimal) is coded as a pair of ASCII values 30 31
- 171 (AB in hexadecimal) is coded as a pair of ASCII values 61 62

Signature

Parameter `signature` ensures security of API request against unauthorized person. It depends on time and public IP address of client's computer. Generated URL address of API request can not be used from another public IP address and URL address is valid only for ten minutes.

Scheme of signature value:

```
md5(parameter_part + '|' + api_key + '|' + ip_address + '|' + timestamp)
```

where ...

- `parameter_part` is part of URL without parameter signature. For example underlined section in URL <https://cloud.iqrf.org/api/api.php?ver=2&uid=xxx&gid=xxx&cmd=dnld&signature=xxx>
- `api_key` can be obtained from user profile in cloud. See picture below.
- `ip_address` is public IPv4 address of client's computer. See <https://www.whatismyip.com/> about your IP address.
- `timestamp` is the number of seconds that have elapsed since January 1, 1970 (midnight UTC/GMT) divided by six hundred. For example time Wednesday, 09-Sep-15 14:16:28 UTC is 1441808188 seconds and value of `timestamp` is $1441808188 / 600 = 2403014$. See <http://www.unixtimestamp.com/>.
- `md5` is cryptographic hash function. See <https://en.wikipedia.org/wiki/MD5>.

Edit:

Id: 256

Name: Complete Internet Services s.r.o.

Username:

Password: fill to change, otherwise leave blank

Password again: fill to change, otherwise leave blank

User role: Administrator choose user's role

E-mail:

Company: Complete Internet Services s.r.o.

Street and number:

City:

Zipcode:

State:

Phone:

Fax:

API key: 1324567890123456789012

Created: 8.9.2015 21:12:51

Updated: 8.9.2015 21:12:51

API key in user account in IQRF Cloud

Example in PHP

Example below shows how to generate URL address of API request in PHP language.

```
// API request parameters
$requestParams = array(
    'ver' => 2,
    'cmd' => 'dnld',
    'uid' => 'johnsmith',
    'gid' => '12000001',
);

// API key obtained from user account
$apiKey = '12345678901234567890123456789012';

// see https://www.whatismyip.com/
$publicIp = '213.168.181.80';

// unix timestamp divided by 600
$timestamp = round(time() / 600);

// source string of signature
$strForSignature = http_build_query($requestParams).'|'.$apiKey.'|'.$publicIp.'|'.$timestamp;

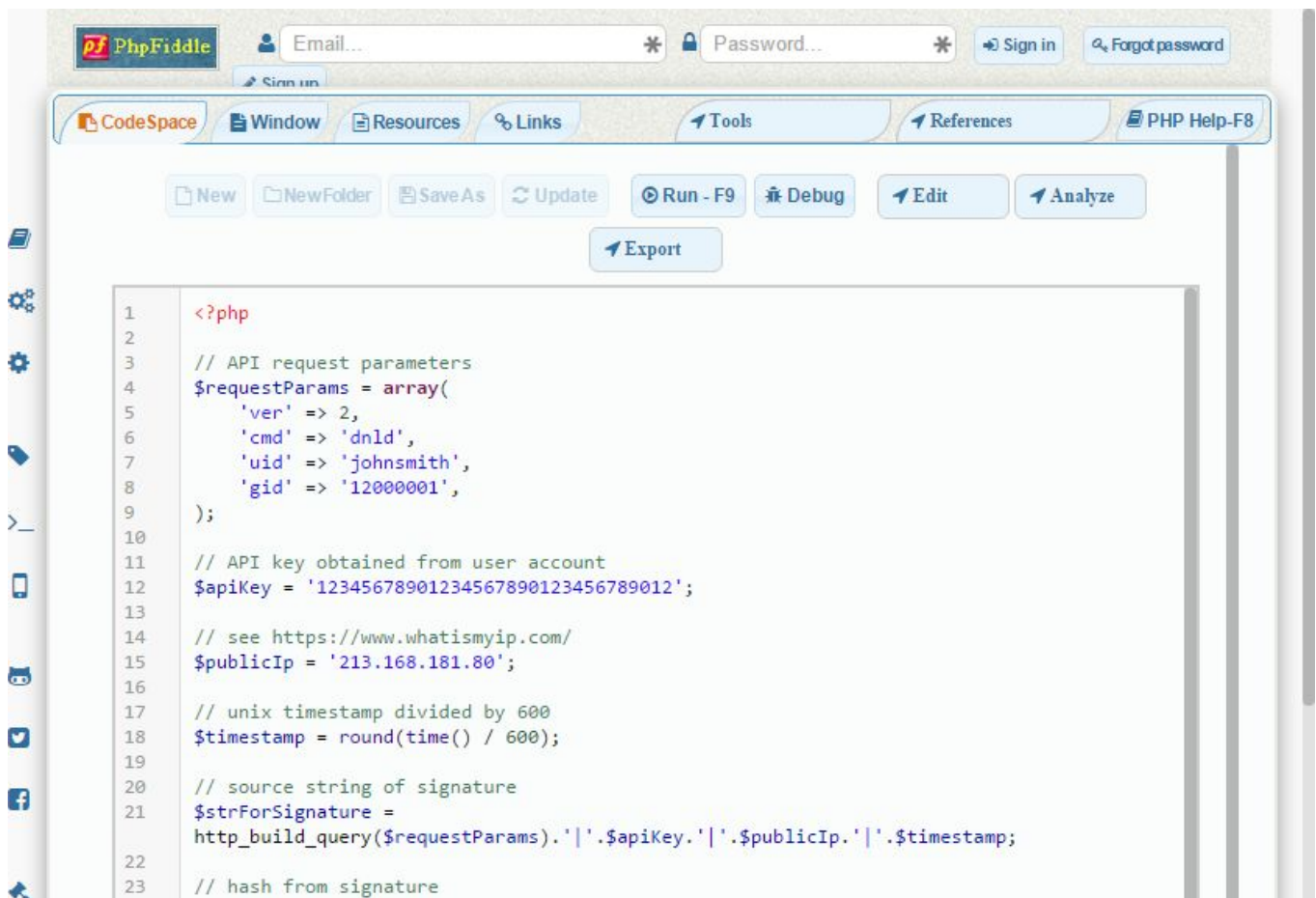
// hash from signature
$requestParams['signature'] = md5($strForSignature);

// final URL address
$url = 'https://cloud.iqrf.org/api/api.php?'.http_build_query($requestParams);
echo $url;
```

Testing playground

You can use site <http://phpfiddle.org/> for testing of API request URL generating.

1. Open site <http://phpfiddle.org/>.
2. Click on CodeSpace tab.
3. Copy code of PHP example above and paste it into text-field in PhpFiddle site.
4. Edit `$requestParams`, `$apiKey` and `$publicIp` according to your settings.
5. Click “Run - F9” button.
6. You should see URL address of API request in tab Window.
7. Use URL address in your Internet browser.



[Download data from the Cloud \(incoming from the GW\)](#)

Required parameters

ver, uid, gid, cmd=dnld, signature

Optional parameters

from, to, count, time_from, time_to, new, last

Both times relate to the stamp generated by GW.

Allowed combinations of optional parameters

- from count
- from to
- to count
- new count
- last count
- time_from count
- time_from time_to
- time_to count

Example

The API function call

<https://cloud.iqrf.org/api/api.php?ver=2&uid=xxx&gid=xxx&cmd=dnld&from=100&count=3&signature=xxx>

returns the following string:

```
XX;;; \r\nindex;time;data\r\nindex;time;data\r\nindex;time;data\r\n
```

Where:

XX Total number of records matching the call.
\r ASCII character CR
\n ASCII character LF
index Numerical order of the record on the Cloud
time Time of transferring the record from the GW to the Cloud
data Record of data from the GW

E.g.:

```
25;;;  
100;2014-03-26 19:10:31;74657374  
101;2014-03-26 19:11:31;74657374206275727374  
102;2014-03-26 19:11:32;74657374206275727374
```

Upload data to the Cloud

Required parameters

ver, uid, gid, cmd=uplc, data, signature

Optional parameters

None.

Example

The API function call

<https://cloud.iqrf.org/api/api.php?ver=2&uid=test&gid=0d000001&cmd=uplc&data=616263&signature=xxx>

returns:

- OK If no error occurs
- ERROR – *description of the error* If an error occurs

[Download data from the Cloud \(uploaded to the Cloud via the API\)](#)

Required parameters

ver, uid, gid, cmd=dnlc, signature

Optional parameters

from, to, count, time_from, time_to, new, last

Both times relate to the moment of data uploading.

Allowed combinations of optional parameters

The same as for the dnld function.

Example

The API function call

<https://cloud.iqrf.org/api/api.php?ver=2&uid=test&gid=0d000001&cmd=dnlc&signature=xxx>

returns:

```
Index;data;date_of_uploading;status;date_of_picking_or_confirmation;\r\n
```

The `date_of_picking_or_confirmation` depends on data status:

- not-picked No date is returned
- expired No date is returned
- sent Date of picking is returned
- confirmed Date of confirmation is returned

E.g.:

```
15;616263;2013-09-09 11:49:59;not-picked;;  
14;616263;2013-09-09 11:49:34;not-picked;;  
13;68656c6c6f207065747261;2013-08-30 18:59:04;sent;2013-08-30 19:10:51;  
12;68656c6f6f32;2013-08-29 19:43:22;sent;2013-08-30 19:05:45;  
11;68656c6c6f;2013-08-29 07:27:48;sent;2013-08-29 07:45:17;  
10;68656c6c6f;2013-08-29 07:24:38;sent;2013-08-29 07:25:03;  
9;74657374;2013-08-27 18:48:53;confirmed;2013-08-27 18:48:53;
```

Cloud user account management

Additionally, the API interface enables to manage the user interface similarly to the web interface.

Read list of GWs

The command enables to read the list of gateways registered to the user account.

Required parameters

`ver, uid, cmd=list, signature`

Optional parameters

None.

Example

The API function call

<https://cloud.iqrf.org/api/api.php?ver=2&uid=test&cmd=list&signature=xxx>

returns:

- “GW₁ ID”,”GW₁ alias”,”GW_n ID”,”GW_n alias”;
 - ERROR – *Description of the error*
- If no error occurs
If an error occurs

E.g.:

```
0F003023;;  
1100000A;GW-GSM-02A;  
0F003039;iqrf;
```

Add GW

The command enables to add a new gateway to the user account.

Required parameters

ver, uid, gid, gpw, cmd=add, signature

Optional parameters

None.

Example

The API function call

<https://cloud.iqrf.org/api/api.php?ver=2&uid=test&qid=0d000001&qpw=iqrf&cmd=add&signature=xxx>

returns:

- OK If no error occurs
- ERROR – *Description of the error* If an error occurs

Remove GW

The command enables to remove specified gateway from the user account.

Required parameters

ver, uid, gid, cmd=rem, signature

Optional parameters

None.

Example

The API function call

<https://cloud.iqrf.org/api/api.php?ver=2&uid=test&gid=0d000001&cmd=rem&signature=xxx>

returns:

- OK If no error occurs
- ERROR – *Description of the error* If an error occurs

Edit GW

The command enables to assign an alias to the specified gateway.

Required parameters

ver, uid, gid, cmd=edit, alias=some_alias, signature

Optional parameters

None.

Example

The API function call

<https://cloud.iqrf.org/api/api.php?ver=2&uid=test&gid=0d000001&cmd=edit&alias=MyGateway&signature=xxx>

returns:

- OK If no error occurs
- ERROR – *Description of the error* If an error occurs

Read Info

The command enables to read version of the Cloud firmware or information about specified gateway.

Required parameters

ver, uid, cmd=info, signature

Optional parameters

gid

Example

The API function call

<https://cloud.iqrf.org/api/api.php?ver=2&uid=test&cmd=info&signature=xxx>

returns:

- Version of IQRF Cloud; If no error occurs
- ERROR – *Description of the error* If an error occurs

E.g.:

1.04;

The API function call

<https://cloud.iqrf.org/api/api.php?ver=2&uid=test&gid=0d000001&cmd=info&signature=xxx>

returns:

- Date of last communication;Date of the registration of the GW;Date of the change of the GW password;Acces1#Acces2#Acces_n;IP; If no error occurs
- ERROR – *Description of the error* If an error occurs

E.g.:

2014-09-26 21:07:15;
2014-10-01 11:10:36;
2014-11-03 20:48:23;
test@microrisc.com#test@unitbv.ro#test@epi.ro#;
160.218.191.9;

List of possible errors

- ERROR 1;Data string exceeds 64B.
- ERROR 2;Unfilled required fields. Required parameter(s) missing.
- ERROR 3;No data sent. Writing error, data has not been written.
- ERROR 4;Data access denied. The user has no access to given GW.
- ERROR 5;Incorrect username or password.
- ERROR 6;No data for specified request.
- ERROR 7;Error issued by MySQL server when attempting to write to the database.
- ERROR 8;Incorrectly completed parameter new.
- ERROR 9;Incorrect data format. Every byte of binary data must be converted to 2 bytes corresponding to its hexadecimal value in ASCII representation.
- ERROR 10;Device is already assigned
- ERROR 11;Incorrect password to GW
- ERROR 12;Incorrect user
- ERROR 13;The device can not be changed. Device is not assigned to a given user account.
- ERROR 14;The device can not be changed. Incorrect password.
- ERROR 15;The device can not be added.
- ERROR 16;Maximum count of GW is reached according to user's license.
- ERROR 17;User does not have API key
- ERROR 18;Incorrect signature

Step by step

Step 1 – Switch the GW on

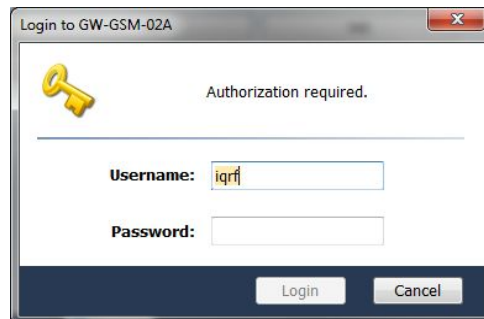
- Install the IQRF IDE to a PC.
- Connect GW to the PC via USB.
- The GW will be turned on when connecting the USB cable to PC USB port.

Step 2 – Application in TR module

- If the GW is connected to IQRF IDE, it works as a USB gateway and the communication with the Cloud is disabled.
- In this case all IDE functions are available:
 - Terminal (displaying of incoming data)
 - TR module programmer and configurator
 - IQMESH network manager etc.
- IQRF gateway is delivered with a default application in the TR module inside. See the User's guide of given GW. It can be modified by a user specific configuration or completely replaced by another application.
- In case of network application, the user should also set up the IQRF network in this step.

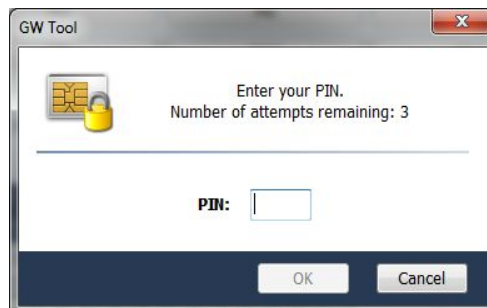
Step 3 – GW setup

- Invoke the GW Tool in the *Tool* menu of IQRF IDE.
- Log in the GW Tool by setting username and password. Default values are `iqrf/iqrf`.

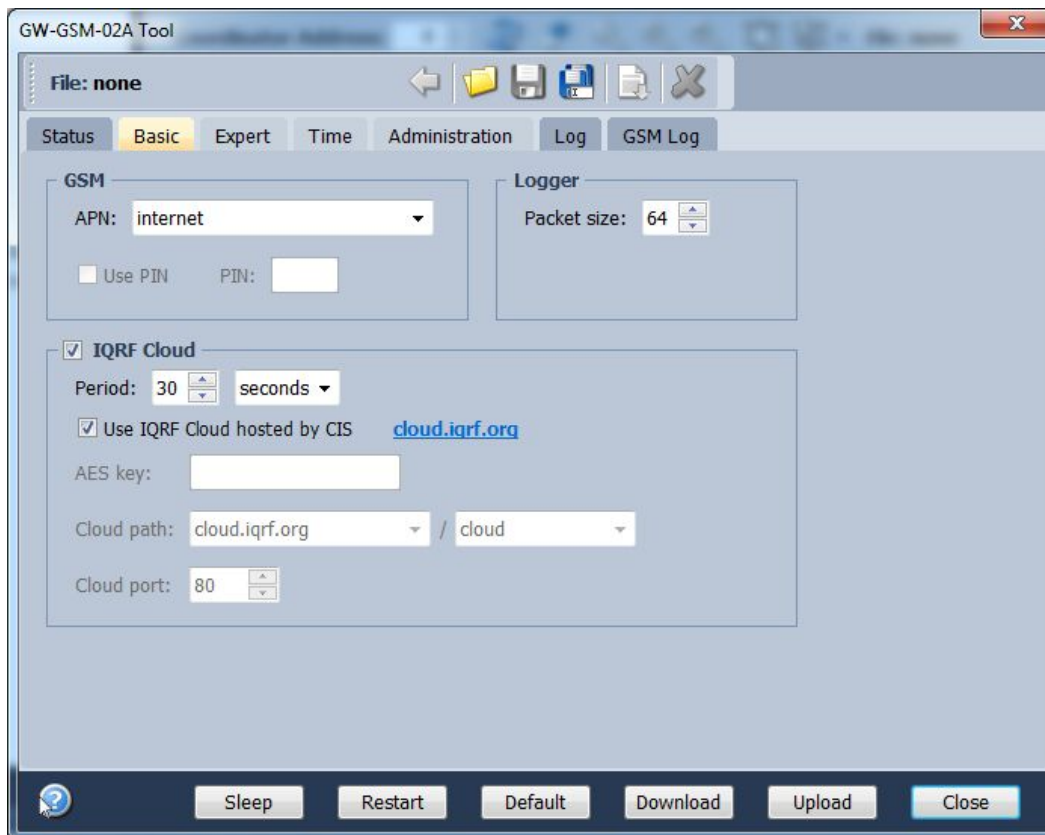


For GW-GSM-02A

- If your SIM card is protected, a dialog window for specifying the PIN code will appear



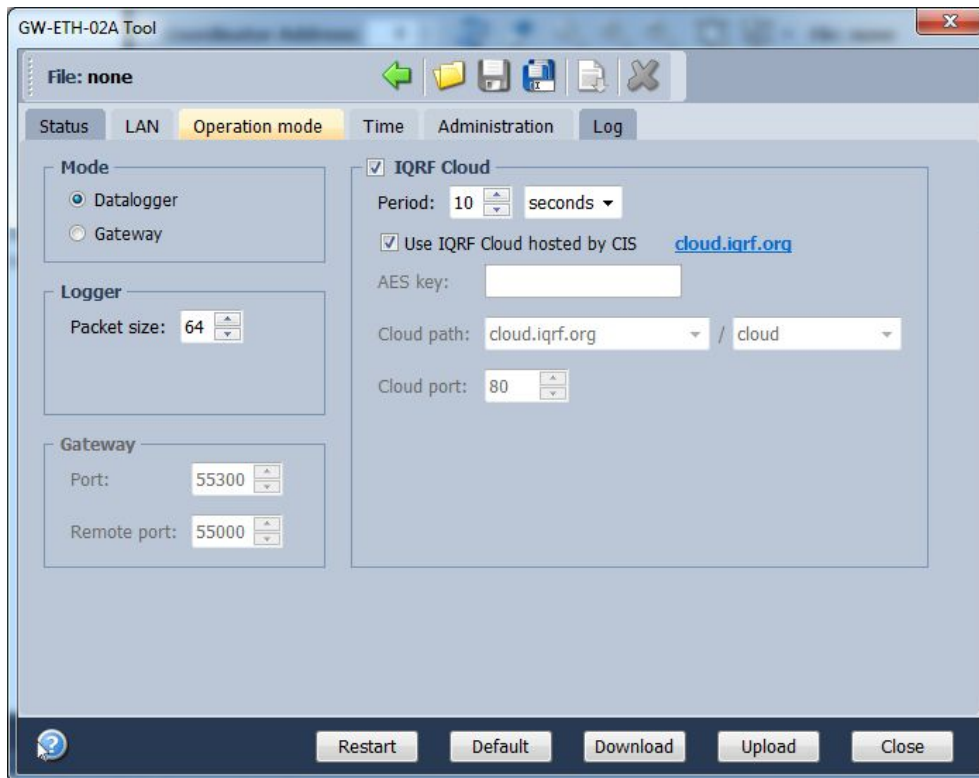
- When logged in the GW Tool, open the *Basic tab*.



- Specify the *APN*. The value depends on your GSM provider.
- Make sure that the *IQRF Cloud* check box is checked.
- The *Period* specifies the time delay between individual data transfers.
- *Use IQRF Cloud server hosted by CIS* should be selected unless the user operates one's own licensed IQRF Cloud server.
- For licensed IQRF Cloud server:
 - *AES ini key* – a 16 B long code used for crypted data transfers between the GW and the Cloud server when the connection is initialized (after the first GW start-up or changing the GW configuration).
 - *Cloud path* – The URL address where the IQRF Cloud server is hosted. The `'/cloud'` substring must follow.
 - *Cloud port* – the TCP port.
- For detailed information about GW-GSM-02A settings, please refer to the GW-GSM-02A User's guide.
- To store the changes made, press the *Upload* button.

For GW-ETH-02A and GW-WIFI-01

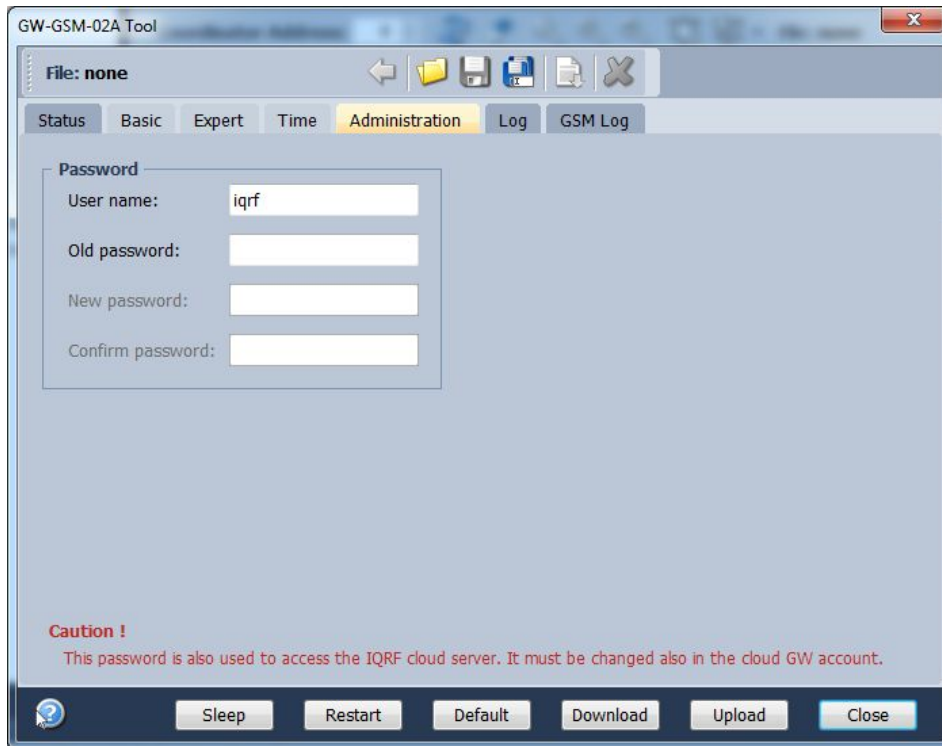
- In case of GW-WIFI-01, open the WLAN tab first. Connect the gateway to your WiFi network and follow the instructions in User's guide of given gateway.



- Open the *Operation Mode* tab
- Make sure that *Datalogger* is selected in *Mode* setting and the *IQRf Cloud* check box is checked
- Rest of the settings is the same as described in case of the GW-GSM-02A
- For detailed information about GW-ETH-02A settings refer to GW-ETH-02A User's guide
- For detailed information about GW-WIFI-01 settings, please refer to GW-WIFI-01 User's guide
- An alternative way to setup both gateways is through their internal web servers. To do so, follow the instructions in User's guide of given gateway.
- To store the changes made, press the *Upload* button.

For all gateways

- To change the password, open the *Administration* tab



- Password* is a code allowing the access to the data. The length must be from 4 to 8 characters. It is case sensitive. Default value is "iqr". It is highly recommended to change the default value immediately.
- The *User name* can be also be changed here. Default value is "iqr".
- To store the changes made, press the *Upload* button.

Step 4 – IQRF Cloud account creating

- Specify access codes for your newly created account on: <https://cloud.iqrf.org>

Sign in

Username

Password

[Forgot your password?](#)
[Create account](#)

- Click the *Create account* link.
- Fill the registration form. Minimal password length is 6 characters and should not contain diacritics.
- Press button *Register*.
- Then an e-mail will be sent on specified address.
- Click the link in this e-mail to complete the registration.

Step 5 – Pairing the GW with user account on IQRF Cloud

- Log in your IQRF Cloud account
- Form for gateway registration will be active if no gateway is registered yet. Otherwise click on *Gateway registration / editing* link and then *Register gateway* link.

CISADMIN - IQRF Cloud

DATA VIEW GATEWAY REGISTRATION / EDITING EDIT PROFILE

Back Save

Add:

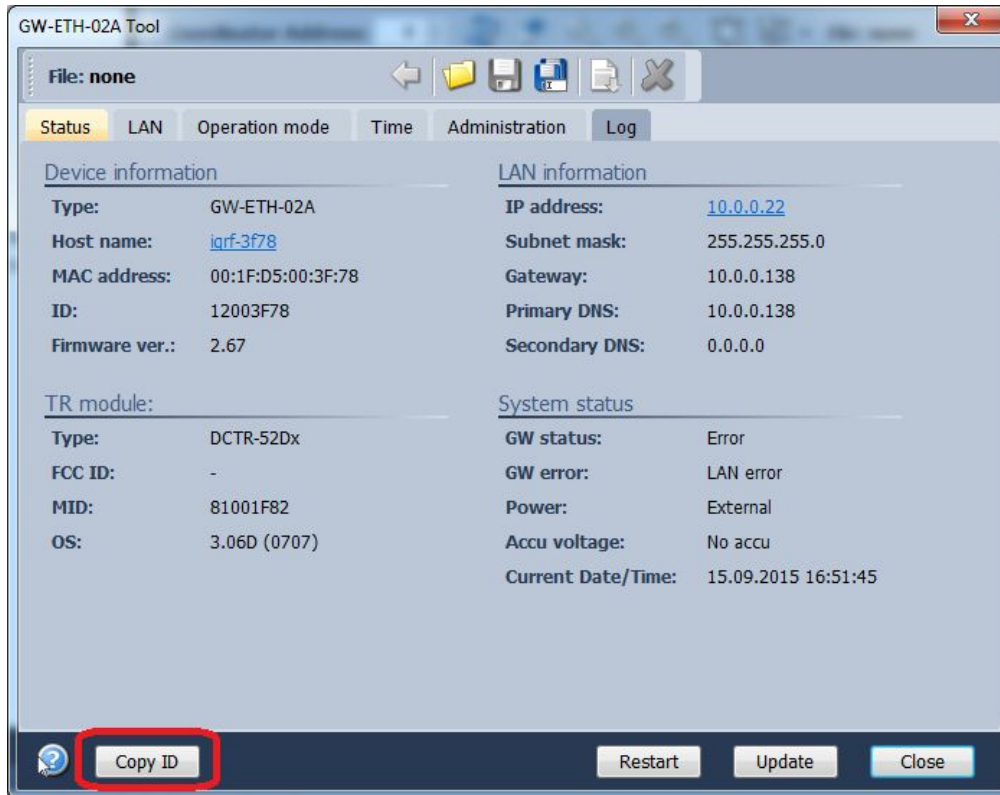
Gateway ID:

Name:

Password:

Save

- Specify the ID code of given gateway
The ID can be shown:
 - By GW Tool in IQRF IDE in the *Status*



- By internal web server (for GW-ETH and GW-WIFI).
- Setup custom nickname for gateway.
- Setup the password of the gateway (the value specified in step 3).
- Click the Save button to finish the pairing.
- List of assigned devices appears. Records of devices can be edited or deleted by appropriate icons.

Step 6 – Data displaying

- After pairing the GW with the account on IQRF Cloud, go to section *GATEWAYS*. There is list of devices assigned to given account.

The screenshot shows the 'GATEWAYS' section of the IQRF Cloud interface. At the top, there are tabs for 'GATEWAY REGISTRATION / EDITING' and 'EDIT PROFILE'. Below this, there are sections for 'SEARCHING' (with a search box and 'Search' button), 'VIEWS' (with 'Default' and 'Save view' options), and 'EXPORT' (with 'XLS', 'PDF', and 'CSV' options). A 'Show filter' button is also present.

The main content area displays a table of gateways. The table has columns for 'Id', 'Name', 'Data', 'Macros', and 'Redirect'. There are three gateways listed:

Id	Name	Data	Macros	Redirect
0F003038	old eth	Invalid password	Edit macros	Redirect
11000018	GW-GSM-02A-v3.03	Show data / send command	Edit macros	
12003F78	GW-ETH-02A	Show data / send command	Edit macros	Redirect

At the bottom of the table, there are 'Show all' buttons and a count of 'Showing: 3 from 3 items'.

- The *Show data / send command* link displays transferred data and allows to send data to gateways.
- The *Edit macros* link refers to management of templates for sending the data.
- The *Redirect* link enables to connect to the internal web server of the GW. The firewall and NAT must be configured on the LAN router for given GW first.
- By clicking *Show data / send command* the window for communication is opened.

The screenshot shows the 'Data' view for a specific gateway (GW-GSM-02A-v3.03, ID:11000018) in the IQRF Cloud interface. The interface includes tabs for 'EDIT', 'SETTINGS', 'SEARCHING', 'VIEWS', and 'EXPORT'. The 'EDIT' tab is active, showing options like 'Send command to gateway', 'Always show edit form and printout.', 'Refresh page automatically.', and 'Data format: Hexa / Ascii'. There is also a 'Show gateway info' link.

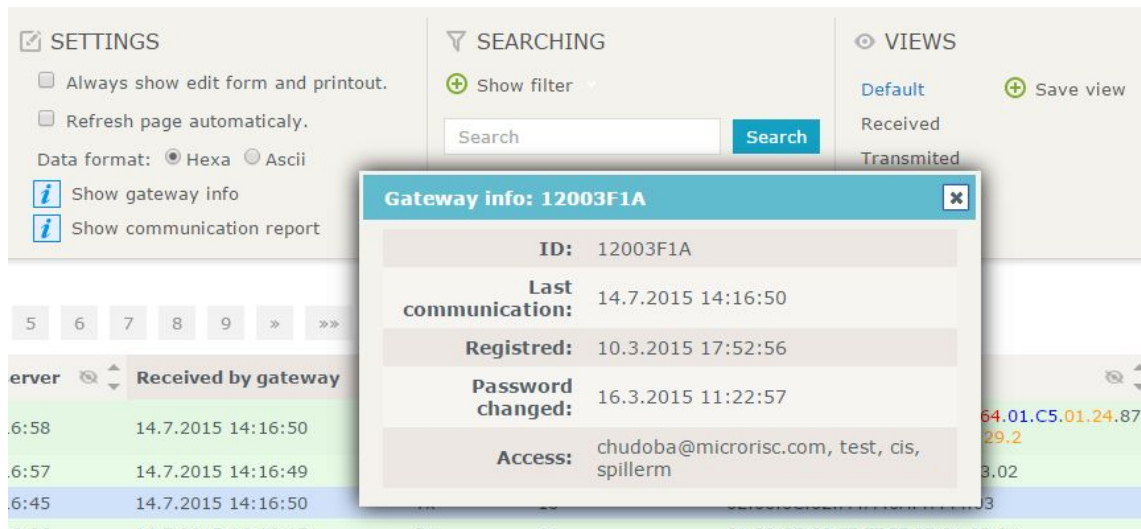
The main content area displays a table of data transfers. The table has columns for 'Index', 'Received by server', 'Received by gateway', 'Type', 'Data length', 'Data', 'Status', and 'DB index'. There are 14 data entries listed:

Index	Received by server	Received by gateway	Type	Data length	Data	Status	DB index
1 23	10.9.2015 10:53:04	10.9.2015 10:52:56	Rx	20	00.00.FF.3F.00.00.00.00.13.02.00.FD.26.00.00.00.00.00.00.01		210998
2 22	10.9.2015 10:24:16	10.9.2015 10:24:11	Rx	8	00.00.07.80.00.00.00.00		208013
3 21	10.9.2015 10:24:03	10.9.2015 10:23:58	Rx	8	00.00.07.81.00.00.00.00		207991
4 20	10.9.2015 10:23:51	10.9.2015 10:23:46	Rx	8	00.00.07.80.00.00.00.00		207972
5 9	10.9.2015 10:23:47	10.9.2015 10:24:06	Tx	6	00.00.07.00.FF.FF	Confirmed	207966
6 8	10.9.2015 10:23:44	10.9.2015 10:23:53	Tx	6	00.00.07.01.FF.FF	Confirmed	207961
7 19	10.9.2015 10:23:38	10.9.2015 10:23:33	Rx	8	00.00.07.81.00.00.00.00		207953
8 7	10.9.2015 10:23:28	10.9.2015 10:23:42	Tx	6	00.00.07.00.FF.FF	Confirmed	207934
9 6	10.9.2015 10:23:23	10.9.2015 10:23:29	Tx	6	00.00.07.01.FF.FF	Confirmed	207926
10 18	10.9.2015 10:19:03	10.9.2015 10:18:59	Rx	8	00.00.07.80.00.00.00.00		207515
11 17	10.9.2015 10:18:50	10.9.2015 10:18:46	Rx	8	00.00.07.81.00.00.00.00		207495
12 5	10.9.2015 10:18:34	10.9.2015 10:18:53	Tx	6	00.00.07.00.FF.FF	Confirmed	207474
13 4	10.9.2015 10:18:29	10.9.2015 10:18:39	Tx	6	00.00.07.01.FF.FF	Confirmed	207464
14 16	10.9.2015 10:16:49	10.9.2015 10:16:44	Rx	8	00.00.07.80.00.00.00.00		207298

At the bottom of the table, there are 'Show all' buttons and a count of 'Showing: 32 from 32 items'.

- The user can display either the Rx (data sent from the GW to the Cloud) or Tx (data sent from the Cloud to the GW).

- It is possible to switch between *ASCII* and *HEX* formats, show detailed gateway information and show report about data communication.



- Data can be exported to various formats.
- By clicking *Send command to gateway* a form for sending data to GW appears.

Macros

Macros: Turn On Turn Off

Add macro

Add:

Index: _____

Data:

Gateway password:

Format: Hex ▼

Save

- The user needs to specify the *Data* field and also fill the *Gateway password*.
- Data can be entered as hexadecimal value or as simple text. Choose right *Format* option.
- The user can also create one's own macros by clicking *Add macro*.
- By clicking *Save* button the data is loaded on the Cloud to be picked up by the GW.
- For every record, the index, date and times (when received by IQRF Cloud server and when received by the GW) are displayed.
- For Tx data a status of transferring the data is also displayed.
- The status values:
 - Not picked Data uploaded to the Cloud but not picked by the GW yet
 - Expired Data not picked by the GW in 10 minutes and will not be transferred to GW
 - Sent Data picked by the GW but not confirmed yet
 - Confirmed Data receiving confirmed by the GW

Step 7 - API interface

- API allows complex working with IQRF Cloud data, e.g. incoming data download (filtration possible), outgoing data upload and outgoing data check.
- To utilize the API, steps 1 to 5 should be done first.
- API call contains requested and (possibly) optional parameters, see chapter API functions above.
- API call is sent as a parameter of the GET method via HTTPS to <https://cloud.iqrf.org/api/api.php?> (an example for IQRF Cloud hosted by CIS).
- Example: sending the "123" string to the GW with ID 0D000004:

<https://cloud.iqrf.org/api/api.php?ver=2&uid=xxx&gid=0d000004&cmd=uplc&data=313233&signature=xxx>

- Example: downloading all new data from the GW with ID 0D000004:

<https://cloud.iqrf.org/api/api.php?ver=2&uid=test&mid=0d000004&cmd=dnld&new=1&signature=1>

Supported devices

	Firmware
GW-ETH-02	v2.49 or higher
GW-ETH-02A	any
GW-GSM-02	v2.02 or higher
GW-GSM-02A	any
GW-WIFI-01	any

Supported IQRF IDE: v4.20 or higher.

Document history

- 150921 For IQRF Cloud v2.89. Developed and provided by CIS s.r.o.
New look of web interface.
API request are protected by **signature**.
API supports command last.
Old not picked data are marked as **expired**.
- 150127 For IQRF Cloud v1.05.
User parameters in API call examples unified.
Minor bugs fixed: Read Info Example format, ERROR 5 description and some links to API function calls.
- 141208 For IQRF Cloud v1.03.
Preliminary, released in EAP (Early Adopter Program).
- 140522 For IQRF Cloud v1.01. Developed and provided by MICRORISC s.r.o. Preliminary.

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Partners and distribution

please visit <http://www.iqrf.org/partners>

Quality management

ISO 9001 : 2009 certified

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