Gateway Reference Manual

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1 Overview

This reference manual targets application developers. It provides complete information on how to configure and use the communication protocols and communication interfaces of IQ Home gateway families.

1.1 Supported models

The table below shows the list of supported devices described in this document. The table contains the Model ID, the product name and the main features.

Model ID	Product name	WiFi	ETH	4G/LTE	GPS
GW-IOT-01	IoT Smart Gateway with WiFi connection	✔			
GW-IND-01	Industrial Gateway with Ethernet connection		✔		
GW-IND-01-4GO	Industrial with 4G support only			✔	
GW-IND-01-4G	Industrial with Ethernet + 4G/LTE connection		✔	✔	
GW-IND-01-4GL	Industrial with Ethernet + 4G & GPS support		✔	✔	✔
GW-IND-01-4GLO	Industrial with 4G & GPS support only				✔

1.2 Supported firmwares

This document cover devices with the following firmware versions:

unid: 2.7.x

2 Configuration files

The configuration files determine the operation of the gateway.

CAUTION!

The device can become inoperable because of improper configuration!

2.1 Service configuration

Configuration file path: */etc/unid/conf.s0/unid.conf*

Name	Type	Default value	Options		Description
mqtt					
enable	Boolean	false			Enable/Disable MQTT service.
host	String	mqtt.iqhome.org			Hostname or IP address of the MQTT broker.
port	Integer	8883			MQTT Broker service port
username	Null,String				Username
password	Null,String				Password
clientid_source	String	auto	auto	Auto	Set client ID automatically from selected source or set manually.
			manual	Manual	
clientid	String	serial			Client ID used by the MQTT service and further can be used to insert this id into topic names.
keepalive_interval_sec	Integer	60			The number of seconds after which the broker should send a PING message to the client if no other messages have been exchanged in

					that time.
cleansession	Boolean	true			Set to true to instruct the broker to clean all messages and subscriptions on disconnect, false to instruct it to keep them.
version	String	mqtt311	mqtt31	MQTT v3.1	MQTT protocol version.
			mqtt311	MQTT v3.1.1	
will_topic	Null,String				The topic on which to publish the will.
will_payload	Null,String				The will message.
will_qos	Integer	0	0	0 - at most once	The quality of service for will messages.
			1	1 - at least once	
			2	2 - exactly once	
will_retain	Boolean	false			Set to true to make the will a retained message.
queue_size	Integer	1000			MQTT publish queue size for network messages.
queue_overwrite	Boolean	true			Enable/Disable queue to overwrite the oldest item when the queue is full.
mqtt > tls					
enable	Boolean	true			Enable MQTT TLS
type	String	ca_signed	ca_signed	CA signed server certificates	TLS type

			ca_file	CA certificate file	
			self_signed	Self-signed certificates	
capath	Null,String	/etc/ssl/certs			Certificate folder path for CA signed server certificates.
cafile	Null,String	/etc/unid/conf.k0/rootCA.pem			CA certificate file path
certfile	Null,String	/etc/unid/conf.k0/certificate.pem.crt			Self-signed certificate private key file path
keyfile	Null,String	/etc/unid/conf.k0/private.pem.key			Self-signed certificate file path
version	String	tlsv1.2	tlsv1	TLS v1.0	TLS Version.
			tlsv1.1	TLS v1.1	
			tlsv1.2	TLS v1.2	
verify_hostname	Boolean	true			Configure verification of the server hostname in the server certificate. This can be useful to disable in initial server testing but must be enabled in a real system!.
scheduler					
enable	Boolean	false			Enable/Disable scheduler.
iqrfide_interface					
enable	Boolean	true			Enable IQRF IDE interface
port	Integer	55300			IQRF IDE UDP port
enable_reset_module	Boolean	true			Enable/Disable TR module reset from IDE.

enable_reset_gateway	Boolean	true	Enable/Disable gateway reboot from IDE.
enable_remote_access	Boolean	false	Enable direct access from IQRF IDE.
application_interface			
enable	Boolean	false	Enable/Disable UDP user application interface.
port_listen	Integer	55001	User Network Interface service port.
port_send	Integer	55000	User Network Interface service port.
enable_remote_access	Boolean	false	Enable direct access by other devices on the network.
filemanager			
enable_download	Boolean	true	Enable/Disable remote access for download (read) files in the service folders.
enable_upload	Boolean	true	Enable/Disable remote access for upload (write) files in the service folders.
enable_create	Boolean	true	Enable/Disable remote access for create files in the service folders.
enable_remove	Boolean	true	Enable/Disable remote access for remove files in the service folders.
script			
enable_exec	Boolean	true	Enable/Disable remote execute scripts in the service folder.

max_exectime_sec	Integer	900	Max execute time for each script in seconds.
iqrf			
queue_size	Integer	100	RF network request queue size.
queue_overwrite	Boolean	false	Enable/Disable queue to overwrite the oldest item when the queue is full.
queue_maxpriority	Integer	2	Number of max priority level. e.g.: 2 → priority levels: 0,1,2.
async_response_topic	Null,String		Response topic for asynchronous IQRF messages.
timeout_coordinator_discovery_sec	Integer	5400	Timeout in seconds for discovery requests
timeout_coordinator_sec	Integer	90	Timeout in seconds for coordinator requests: Bonding, FRC.
timeout_node_sec	Integer	3	Timeout in seconds for every nodes.
frc_extraresult_autorequest	Boolean	true	Enable/Disable auto request for extra result. If enabled the response forwarded as one concatenated packet.
packet_sniffing	Boolean	true	Enable/disable packet sniffing. If enabled the RF network packets forwarded to the IQRF IDE for debug purposes if the IQRF is IDE connected to the GW.
message			

show_type	Boolean	false	Add message type to MQTT payloads response: Response messages error: Error messages.
message > response			
dpa_request	Boolean	true	Add dpa_request to response message.
dpa_confirm	Boolean	true	An explanation about purpose of this instance.
timestamp_mqtt_receive	Boolean	true	Add timestamp_mqtt_receive to response message. Timestamp when MQTT request message received.
timestamp_rfnet_send	Boolean	true	Add timestamp_rfnet_send to response message. Timestamp when request sent to RF network.
timestamp_rfnet_receive	Boolean	true	Add timestamp_rfnet_receive to response message. Timestamp when MQTT message received from broker.
timestamp_mqtt_send	Boolean	true	Add timestamp_mqtt_send to response message. Timestamp when MQTT message published.
localization			
enable	Boolean	true	Enable/Disable localization.
tcp_proxy			

enable	Boolean	true			Enable/Disable TCP forwarding over MQTT.
max_socket_num	Integer	50			Number of maximum opened sockets.
max_payload_size_kib	Integer	120			Maximum payload size in KiB. Larger messages will splitted into multiple messages with the size of the set value.
enabled_ports	Array	22			Comma separated list of enabled ports.
modbus_tcp					
enable	Boolean	false			Enable/Disable Modbus TCP interface.
port	Integer	502			Modbus TCP server port
max_client	Integer	64			Maximum number of connected clients.
acknowledge_response	Boolean	false			Enable acknowledge response (0x05 Modbus TCP exception code). WARNING: Not supported by all Modbus devices!
enable_remote_access	Boolean	false			Enable remote access for Modbus TCP server.
service					
enable_restart	Boolean	true			Enable/Disable service restart.
enable_reboot	Boolean	true			Enable/Disable gateway reboot.
loglevel	Integer	0	0	Warning & Error	Service log level.
			1	Info	

			2	Debug	
			3	Trace	
ping_host	String	8.8.8.8			Ping host to check active internet connection.
ping_interval_min	Integer	1			Ping interval in minutes.
ping_timeout_sec	Integer	5			Ping timeout in seconds.
service > logsource					
iqrf	Boolean	false			Enable/Disable log messages.
mqtt	Boolean	false			Enable/Disable log messages.
control	Boolean	false			Enable/Disable log messages.
scheduler	Boolean	false			Enable/Disable log messages.
iqrfide_interface	Boolean	false			Enable/Disable log messages.
application_interface	Boolean	false			Enable/Disable log messages.
modbus_tcp	Boolean	false			Enable/Disable log messages.

2.2 Subscribe configuration

Configuration file for automatically subscribe MQTT topics and determine the target of the received request messages and setup default response behaviour for each topic.

Configuration file path: */etc/unid/conf.s0/subscribe.conf*

Name	Type	Default value	Options		Description
topics					
subscribe_topic	String	iqhome/gateway/%c/network/request			Subscribe topic name.
subscribe_qos	Integer	0	0	0 - at most once	Subscribe QoS.

			1	1 - at least once	
			2	2 - exactly once	
message_topic	String	$GW/sensnet			The target topic of request messages.
topics > publish					
publish_topic	String				Use $GW/application or any MQTT topic name
publish_qos	Integer	1	0	0 - at most once	Publish QoS.
			1	1 - at least once	
			2	2 - exactly once	
retain	Boolean	false			Retain.
broadcast_request_topic	String				Broadcast request topic.
broadcast_response_topic	String				Broadcast response topic.

Example

```
{
    "topics": [
        {
            "subscribe_topic": "iqhome/gateway/%c/network/request",
            "subscribe_qos": 1,
            "message_topic": "$GW/iqrf",
            "publish": [
                {
                    "publish_topic": "iqhome/gateway/%c/network/response",
                    "publish_qos": 1,
                    "retain": false
                }
            ]
        },
        {
            "subscribe_topic": "iqhome/gateway/%c/linkit/request",
            "subscribe_qos": 1,
```

```
            "message_topic": "$GW/control",
            "publish": [
                {
                    "publish_topic": "iqhome/gateway/%c/linkit/response",
                    "publish_qos": 1,
                    "retain": false
                }
            ],
            "broadcast_request_topic": "iqhome/gateway/broadcast/linkit/request",
            "broadcast_response_topic": "iqhome/gateway/broadcast/linkit/response"
        }
    ]
}
```

2.3 Scheduler configuration

Scheduler configuration file determine the automatically scheduled request messages as scheduled jobs. The defined scheduled jobs in the same matching cron expression will be sent in the same order as defined in the configuration file.

Configuration file path: */etc/unid/conf.s0/scheduler.conf*

Name	Type	Default value	Options		Description
scheduler					
cron_expression	String,Array	0 */15 * * * *			Cron expression when the request should be sent.
cron_expression_except	Null,String,Array				Cron expression when the request should be skipped.
scheduler > request					
message_topic	String	$GW/sensne t			Target message topic.
scheduler > request > message					
id	String,Number				Message ID
dpa_request	String				DPA request
timeout	Integer	2			Node timeout in seconds
priority	Integer	2			Message priority
type	String	sensor	sensor	Sensor	Request type
			modbus	Modbus	
command	String	read	read	Read	Request type
			send	Send	
			calibration	Calibration	
option	String	sensor	all	All values	Request type
			temperature	Temperature [°C]	

			relative_humidity	Relative Humidity [%rH]	
			co2	CO2 [ppm]	
mbslave	Integer	1			Modbus slave address
mbpdu	String				Modbus PDU Hex String. Example read 2 holding registers from address 0x6000: '03.60.00.00.02'
device_address	Null,String,Integer		all	All	Device Address
			1-63	1-63	
sleep	Integer	true			Enable node deep sleep with automatic sleep time calculation
scheduler > request > message > publish					
publish_topic	String				Publish topic
publish_qos	Integer	1	0	0 - at most once	Publish QoS
			1	1 - at least once	
			2	2 - exactly once	
retain	Boolean	false			Publish retain

Example

```
{
    "scheduler": [
        {
           "cron_expression": "*/15 * * * * *",
           "request": {
              "message_topic": "$GW/iqrf",
              "message": {
                 "id": 1,
                 "dpa_request": "0000.0D.00.FFFF.F0.00.00",
                 "timeout": 0,
                 "priority": 0,
                 "publish": [
```

```
                    {
                        "publish_topic": "iqhome/sensor/%c/response",
                        "publish_qos": 1,
                        "retain": false
                    }
                ]
            }
        }
    },
    {
        "cron_expression": "*/15 * * * * *",
        "cron_expression_except": ["0 0 0 * * *", "0 0 4 * * *"],
        "request": {
            "message_topic": "$GW/iqrf",
            "message": {
                "id": "string-id",
                "dpa_request": "0000.0D.00.FFFF.F0.00.00",
                "timeout": 0,
                "priority": 0,
                "publish": [
                    {
                        "publish_topic": "$GW/application"
                    },
                    {
                        "publish_topic": "iqhome/sensor/%c/response",
                        "publish_qos": 1,
                        "retain": false
                    }
                ]
            }
        }
    }
  ]
}
```

2.4 LTE configuration

Only for GW-IND-01-4G models.*

/etc/unid/conf.s0/lte.conf

Name	Type	Default value	Options		Description
apn	String	internet			APN
username	String				Username
password	String				Password
pin	String				PIN code. Leave blank if it is disabled.
roaming	String	auto	auto	Auto	Enable/Disable roaming.
			enable	Enable	
			disable	Disable	
scanmode	String	auto	auto	Auto	Scanmode
			2g	2G only	
			3g	3G only	
			4g	4G only	
ping_host	String	8.8.8.8			Hostname that use to check network connection.
ping_timeout_sec	Integer	5			Check network connection ping timeout.
ping_count	Integer	3			Check network connection ping count.
ping_interval_min	Integer	5			Check network connection interval.
use_gps	Boolean	false			Enable GPS on GPS capable devices.
loglevel	Integer	0	0	Warning & Error	Loglevel
			1	Debug	

Example

```
{
    "version": "1.0",
```

```
    "apn": "internet",
    "username": "",
    "password": "",
    "pin": "",
    "roaming": "auto",
    "scanmode": "auto",
    "ping_host": "8.8.8.8",
    "ping_timeout_sec": 5,
    "ping_count": 3,
    "ping_interval_min": 5,
    "use_gps": false,
    "loglevel": 0
}
```

3 IQRF network topic message payloads

Target gateway topic: $GW/iqrf

Request

Name	Type	Default	Options		Description
id	Number ,String				Message ID The same ID will be sent in the response messages
dpa_request	String				
timeout	Number		0	Set the default timeout values from unid.conf	Timeout value means the maximum processing time for each node. The full timeout calculated from network parameters (hops and time slot values) and added to the timeout value. Default values: ● coordinator (addr: 00000): 90sec ● node(each) (addr: 0100-F900): 5sec
			1-65535		
priority	Number	0	0-255		Priority of message queue
publish (Array)					
publish_topic	String			topic	Override of the default response topic name.
publish_qos	Number		0,1,2		Override default response publish_qos parameter.
retain	Boolean	false			Override default response retain parameter.

Example

```
Basic
{
    "dpa_request": "0000.0D.00.FFFF.F0.00.00",
}

Extended
{
```

```
    "id": "messageid",
    "dpa_request": "0000.0D.00.FFFF.F0.00.00",
    "timeout": 0,
    "priority": 0,
    "publish":[
        {
             "publish_topic":"$GW/application"
        },
        {
             "publish_topic": "iqhome/sensor/%s/%n/response" ,
             "publish_qos":1,
             "retain":false
        }
    ]
}
```

Response

Name	Type	Default value	Options	Description
id	Number, String			Message ID
message_type	String	response	Available only if *showType* enabled in unid.conf	IQRF DPA request HEX string
status	String		Can be disabled in unid.conf	Status message
dpa_request			Can be disabled in unid.conf	IQRF DPA request
dpa_confirm	String		Can be disabled in unid.conf	IQRF coordinator DPA confirm HEX string
dpa_response	String			IQRF node DPA response HEX string
timestamp_mqtt_receive	Number		Can be disabled in unid.conf	Timestamp at enqueue message into RF network queue, when put into IQRF message queue.
timestamp_rfnet_send	Number		Can be disabled in unid.conf	Timestamp at dequeue message from RF network queue, when send to IQRF network.
timestamp_rfnet_receive	Number		Can be disabled in unid.conf	Timestamp at enqueue message into cloud queue, when received from IQRF network.

timestamp_mqtt_send	Number	Can be disabled in unid.conf	Timestamp at dequeue message from MQTT queue, when publish the message.

Example

```
{
    "id": 123456,
    "message_type": "response",
    "status": "ok",
    "dpa_response": "010020A11202002903",
    "dpa_request": "01002021FFFF0202",
    "dpa_confirm": "01002021FFFFFF38010801",
    "timestamp_mqtt_receive": 1451642400,
    "timestamp_rfnet_send": 1451649604,
    "timestamp_rfnet_receive": 1451649608,
    "timestamp_mqtt_send": 1451649610
}
```

4 MQTT control topic message payloads

Target gateway topic: $GW/control

4.1 Gateway info

Request

Name	Type	Value	Description
id	String		Message ID
command	String	system	
option	String	info	

Response

Name	Type	Value	Description
id	String		Message ID
message_type	String		Available only if *showType* enabled in unid.conf
command	String	system	
option	String	info	
status	String		Status message
timestamp_mqtt_send	Integer		Available only if *timestamp_mqtt_send* enabled in unid.conf
info			
serial	String		Message ID
mid	String		MID (Module ID) of RF module
hostname	String		Gateway hostname
model	String		Model name
interface	String		Active network interface connected to internet
mac	String		MAC address of active network interface connected to internet
ipv4	String		IPv4 address of active network interface
ipv6	String		IPv6 address of active network interface

firmware	Object		Installed gateway packages version
control_request_topic	String		Name of the gateway's unique request MQTT topic
control_response_topic	String		Name of the gateway's unique response MQTT topic
tcp_proxy_ports	Array		Enabled TCP Proxy ports
tcp_proxy_max_size_kib	Integer		Maximum size of TCP proxy payloads in KiB
uptime_seconds			Gateway uptime in seconds
current_timestamp			Gateway UNIX Epoch timestamp
timezone_numeric			UTC offset numeric e.g.: "+0100"
timezone_alphabetic			Time zone abbreviations e.g.: "CET"
info > monitoring*			
voltage_1v8	Float		Voltage of the gateway 1.8V
voltage_3v3	Float		Voltage of the gateway 3.3V
voltage_5v0	Float		Voltage of the gateway 5.0V
voltage_powerin	Float		Voltage of the gateway power
powerin_online	Boolean		Power source of the gateway. If false the gateway powered from battery, otherwise from power line.
temperature_board	Float		Temperature of the gateway main board
temperature_core	Float		Temperature of the gateway CPU
info > wwan**			
model	String		Model of WWAN interface device
version	String		Version of WWAN interface device
rssi	Integer		LTE RSSI value
operator	String		Operator name
access_mode	Integer		Access mode value
		0,3	2G
		2,4,5,6	3G
		7	4G
info > location*	Object		Location inforamtion

* Only at industrial models
** Only at 4G/LTE models

Example

Request	Response

{
"id": "jctKZwRx1ZpiJh",
"command": "system",
"option": "info"
}
	{
	"id": "jctKZwRx1ZpiJh",
	"command": "system",
	"option": "info",
	"info": {
	"serial": "GW-3E70000",
	"model": "GW-IND-01-4G",
	"mid": "811018AF",
	"hostname": "raspberrypi",
	"interface": "eth0",
	"mac": "B8:27:EB:C6:78:30",
	"ipv4": "192.168.6.164",
	"ipv6": "fe80::81b0:b2b4:c4fd:c2ba",
	"firmware": "2.3.4-0",
	"control_request_topic": "iqhome/gateway/GW-3E70000/linkit/request",
	"control_response_topic": "iqhome/gateway/GW-3E70000/linkit/response",
	"uptime_seconds": 6555,
	"current_timestamp": 1520421349,
	"timezone_numeric": "+0000",
	"timezone_alphabetic": "UTC",
	"monitoring": {
	"voltage_3v3": 3.28,
	"voltage_1v8": 1.83,
	"voltage_5v0": 5.05,
	"voltage_powerin": 13.67,
	"powerin_online": true,
	"temperature_board": 33.06,
	"temperature_core": 41.16
	},
	"wwan": {
	"model": "EC20",
	"version": "EC20EQAR02A11E2G",
	"rssi": 19,
	"operator": "T-Mobile H Telekom HU",
	"access_mode": 7
	},
	"location": {
	"timestamp": 0,
	"latitude": 0,

	"longitude": 0, "type": "cbsp", "valid": true } }, "status": "ok", "timestamp_mqtt_send": 1520421350 }

4.2 Ping

Request

Name	Type	Value	Description
id	String		Message ID
command	String	system	
option	String	ping	

Response

Name	Type	Value	Description
id	String		Message ID
message_type	String		Available only if *showType* enabled in unid.conf
command	String	system	
option	String	ping	
status	String		Status message
timestamp_mqtt_send	Integer		Available only if *timestamp_mqtt_send* enabled in unid.conf

Example

Request	Response

{
"id": 1,
"command": "system",
"option": "ping"
}
	{
	"id": 1,
	"command": "system",
	"option": "ping",
	"status": "ok"
	}

4.3 Reset RF module

Request

Name	Type	Value	Description
id	String		Message ID
command	String	system	
option	String	reset_rf_module	

Response

Name	Type	Value	Description
id	String		Message ID
message_type	String		Available only if *showType* enabled in unid.conf
command	String	system	
option	String	reset_rf_module	
status	String		Status message
timestamp_mqtt_send	Integer		Available only if *timestamp_mqtt_send* enabled in unid.conf

Example

Request	Response
`{ "id": 1, "command": "system", "option": "reset_rf_module" }`	`{ "id": 1, "command": "system", "option": "reset_rf_module", "status": "ok" }`

4.4 Restart unid service

Request

Name	Type	Value	Description
id	String		Message ID
command	String	system	
option	String	restart	

Response

Name	Type	Value	Description
id	String		Message ID
message_type	String		Available only if *showType* enabled in unid.conf
command	String	system	
option	String	restart	
status	String		Status message
timestamp_mqtt_send	Integer		Available only if *timestamp_mqtt_send* enabled in unid.conf

Example

Request	Response
`{ "id": 9, "command": "system", "option": "restart" }`	`{ "id": 9, "command": "system", "option": "restart", "status": "ok" }`

4.5 Reboot gateway

Request

Name	Type	Value	Description
id	String		Message ID
command	String	system	
option	String	reboot	

Response

Name	Type	Value	Description
id	String		Message ID
message_type	String		Available only if *showType* enabled in unid.conf
command	String	system	
option	String	reboot	
status	String		Status message
timestamp_mqtt_send	Integer		Available only if *timestamp_mqtt_send* enabled in unid.conf

Example

Request	Response
`{ "id": 9, "command": "system", "option": "reboot" }`	`{ "id": 9, "command": "system", "option": "reboot", "status": "ok" }`

4.6 File manager

Request

Name	Type	Options		Description
info <Object>				
id	String			Message ID
command	String	filemanager		
option	String	upload		Create/Modify/Remove files
		download		Read file contents
		list		List files
folders <Array>				
name	String	dynamic	/etc/unid/conf.d0	Dynamically modified config files e.g. scheduler.conf
		static	/etc/unid/conf.s0	Static config files e.g. unid.conf
		log	/var/log/unid	Log files
files <Object Array, String [* - all files]>				
name	String	log	/var/log/unid	Log files
content	String	log	/var/log/unid	Log files
action	String	modify		Modify file contents
		create		Create file with content (only script)
		remove		Remove file (only script or log)

Response

Name	Type	Options	Description
info <Object>			
id	String		Message ID
command	String	filemanager	
option	String	upload	
		download	
		list	

status	String			Request status Status message
folders <Array>				
name	String	dynamic	/etc/unid/conf.d0	Dynamically modified config files e.g. scheduler.conf
		static	/etc/unid/conf.s0	Static config files e.g. unid.conf
		log	/var/log/unid	Log files
		script	/etc/unid/script	Script files
status	String			Folder status action Status message
files <Array, String [* - all files]>				
name	String	log	/var/log/unid	Log files
content	String	log	/var/log/unid	Log files
action	String	modify		Modify file contents
		create		Create file with content (only script)
		remove		Remove file (only script or log)
status	String			File action status Status message
encode	String	none		Optional encode field. Default is not encode as equal with no encode field defined.
		base64		Base64 encode for example for gz log files.

Example

Download all available files

Request

```
{
    "id": 100,
    "command": "filemanager",
    "option": "download",
    "folders": [
        {
            "name": "static",
            "files": "*"
        },
        {
```

Response

```
{
    "id": 100,
    "command": "filemanager",
    "option": "download",
    "status": "ok",
    "folders": [
        {
            "name": "static",
            "status": "ok",
            "files": [
```

```
                "name":
"dynamic",
                "files": "*"
        },
        {
                "name": "log",
                "files": "*"
        },
        {
                "name": "script",
                "files": "*"
        }
    ]
}
```

```
                {
                    "name": "unid.conf",
                    "content": "<content>",
                    "status": "ok"
                }
            ]
        },
        {
            "name": "dynamic",
            "status": "ok",
            "files": [
                {
                    "name": "scheduler.conf",
                    "content": "<content>",
                    "status": "ok"
                }
            ]
        },
        {
            "name": "log",
            "status": "ok",
            "files": [
                {
                    "name": "unid.log",
                    "content": "<content>",
                    "status": "ok"
                }
            ]
        },
        {
            "name": "script",
            "status": "ok",
            "files": [
                {
                    "name": "sysinfo.sh",
                    "content": "<content>",
                    "status": "ok"
                }
            ]
        }
    ]
}
```

Example

Upload/modify files

Request	Response
`{ "id": 7, "command": "filemanager", "option": "upload", "folders": [ { "name": "script", "files": [ { "name": "test.sh", "action": "create", "content": "<content>" } ] } ] }`	`{ "id": 7, "command": "filemanager", "option": "upload", "status": "ok", "folders": [ { "name": "script", "status": "ok", "files": [ { "name": "test.sh", "action": "create", "status": "ok" } ] } ] }`

4.7 Run scripts

Request

Name	Type	Value	Description
id	String		Message ID
command	String	script	
option	String	run	
script	String		Script name in the gateway script folder
arg	String		Script argument list

Response

Name	Type	Value	Description
id	String		Message ID
message_type	String		Available only if *showType* enabled in unid.conf
command	String	script	
option	String	run	
echo	String	ping	Output of script
status	String		Status message
timestamp_mqtt_send	Integer		Available only if *timestamp_mqtt_send* enabled in unid.conf

Example

Request

```
{
    "id": 14123,
    "command": "script",
    "option": "run",
    "command": "script",
    "script": "test.sh"
    "arg": "-t now"
}
```

Response

```
{
    "id": 14123,
    "command": "script",
    "option": "run",
    "status": "ok",
    "echo": "<stdout>"
}
```

4.8 Scheduler pause

Request

Name	Type	Value	Description
id	String		Message ID
command	String	scheduler	
option	String	pause	Pause scheduler
timeout	Integer		Timeout value in seconds. The maximum timeout should be 90 minutes. If the timeout is greater than 5400 (90 min) the scheduler automatically set the timeout to 90 minute.

Response

Name	Type	Value	Description
id	String		Message ID
message_type	String		Available only if *showType* enabled in unid.conf
command	String	scheduler	
option	String	pause	
status	String		Status message
timestamp_mqtt_send	Integer		Available only if *timestamp_mqtt_send* enabled in unid.conf

Example

Request

```
{
    "id": 8,
    "command": "scheduler",
    "option": "pause",
    "timeout": 300
}
```

Response

```
{
    "id": 8,
    "command": "scheduler",
    "option": "pause",
    "status": "ok"
}
```

4.9 Scheduler force resume

Request

Name	Type	Value	Description
id	String		Message ID
command	String	scheduler	
option	String	resume	Pause scheduler

Response

Name	Type	Value	Description
id	String		Message ID
message_type	String		Available only if *showType* enabled in unid.conf
command	String	scheduler	
status	String		Status message
timestamp_mqtt_send	Integer		Available only if *timestamp_mqtt_send* enabled in unid.conf

Example

Request

```
{
    "id": 9,
    "command": "scheduler",
    "option": "resume"
}
```

Response

```
{
    "id": 9,
    "command": "scheduler",
    "option": "resume",
    "status": "ok"
}
```

4.10 Scheduler info

Request

Name	Type	Value	Description
id	String		Message ID
command	String	scheduler	
option	String	info	Pause scheduler

Response

Name	Type	Value	Description
id	String		Message ID
message_type	String		Available only if *showType* enabled in unid.conf
command	String	info	
timestamp			UNIX Epoch timestamp when info requested
timeout			Remaining timeout seconds until scheduler will be resumed
status	String		Status message
timestamp_mqtt_send	Integer		Available only if *timestamp_mqtt_send* enabled in unid.conf

Example

Request

```
{
    "id": 9,
    "command": "scheduler",
    "option": "info"
}
```

Response

```
{
    "id": 9,
    "command": "scheduler",
    "option": "info",
    "paused": true,
    "timestamp": 1506414303,
    "timeout": 292,
    "status": "ok"
}
```

5 SensNet sensor data

This section describes the SensNet data output formats. The SensNet data output format is only available for IQ Home sensors.
The request automatically can be generated by Scheduler Wizard.

Request

Name	Type	Value	Description
id	String		Message ID
type	String	sensor	
command	String	read	
option	String	stored	
device_address	String, Integer	all	Requested sensor address 1-63: requested individually all: requested all sensor at the same time (default)
refresh	Array		Array of refreshed data types all - all data type temperature - Temperature relative_humidity - Relative humidity co2 - Carbon dioxide
sleep	Boolean	true	Automatic sensor deep sleep enable
publish (Array)			
publish_topic	String		Response topic name.
publish_qos	Number		Response publish_qos parameter. For MQTT only: 0,1,2
retain	Boolean	false	Response retin fla. For MQTT only

Response

Name	Type	Value	Description
id	String		Message ID
type	String	sensor	
command	String	read	
option	String	stored	
device_address	String, Integer	all	Requested sensor address 1-63: requested individually all: requested all sensor at the same time (default)
refresh	Array		Array of refreshed data types all - all data type temperature - Temperature relative_humidity - Relative humidity co2 - Carbon dioxide
sleep	Boolean	true	Automatic sensor deep sleep enable
values (Array) - Sensor values			
device_address	Integer		Sensor address
battery_low	Boolean		Battery_low true appears in the object if the sensor detects low battery state
temperature	Float		Temperature sensor value, if the sensor can measure temperature
relative_humidity	Float		Relative humidity sensor value, if the sensor can measure relative humidity
co2	Float		CO2 sensor value, if the sensor can measure co2

Example

Request	Response

{
"id": "scheduled-sensor-data",
"type": "sensor",
"command": "read",
"option": "stored",
"device_address": "all",
"refresh": [
"all"
],
"sleep": true,
"publish": [
{
"publish_topic": "$GW/application"
},
{
"publish_topic": "sensnet/data/pub/%u/sensor/acces token",
"publish_qos": 1,
"retain": false
}
]
}
	{
	"id": "scheduled-sensor-data",
	"type": "sensor",
	"command": "read",
	"status": "ok",
	"option": "stored",
	"refresh": [
	"all"
	],
	"device_address": "all",
	"values": [
	{
	"device_address": 1,
	"temperature": 25.5,
	"relative_humidity": 47.5,
	"co2": 1400
	},
	{
	"device_address": 2,
	"temperature": 25.5,
	"relative_humidity": 47.5,
	"co2": 1400
	}
	]
	}

6 UDP Application interface message payloads

Target gateway topic: *$GW/application*

Request

Name	Type	Description
message_topic	String	Source topic of the message
message	Object	Response message from GW or custom object via MQTT

Response

Name	Type	Description
message_topic	String	Target topic of the message
message	Object	Valid Request message object or custom message for only MQTT
publish_qos		Only for MQTT target topic. Quality of Service for publish QoS
retain		Only for MQTT target topic

Example

Request	Response
`{ "message_topic": "topic_received", "message": "msg" }`	`{ "message_topic": "topic_publish", "message": "msg", "publish_qos":1, "retain":false }`

7 Appendix

7.1 Status messages

Request	Response
ok	Status ok
error	General error
empty_payload	empty message payload
invalid_target	Request interface target is missing or invalid
invalid_command	control command is missing or invalid
invalid_option	control option is missing or invalid
invalid_action	control action is missing or invalid
request_format_error	Request message payload invalid format
content_format_error	Request content error
folder_access_error	File download/upload no access to folder
file_access_error	File download/upload no access to file
file_read_error	File read error
file_write_error	File write error
store_nofreespace	No free space left on storage (only with eeRAID)
store_hwerror	Storage hardware error (only with eeRAID)
interface_busy	Interface busy
interface_blocked	Interface blocked (IQRF IDE Network management mode active)
script_exceeds_limit	Number of running scripts is exceeds limit
network_queue_full	RF network queue is full
feature_disabled	Requested feature is disabled in configuration file
timeout	$GW/iqrf request timeout
communication_error	$GW/iqrf communication error
framework_error	$GW/iqrf DPA framework error

modbus_timeout_error	$GW/iqrf Modbus device timeout error
modbus_response_too_long_error	$GW/iqrf Modbus device response too long
modbus_frame_error	$GW/iqrf Modbus device frame error

7.2 QoS - Quality of Service

- 0: The broker/client will deliver the message once, with no confirmation.
- 1: The broker/client will deliver the message at least once, with confirmation required.
- 2: The broker/client will deliver the message exactly once by using a four step handshake.

7.3 Cron expression

```
┌──────────────  sec (0-59)
│ ┌────────────── min (0 - 59)
│ │ ┌──────────────── hour (0 - 23)
│ │ │ ┌─────────────────── day of month (1 - 31)
│ │ │ │ ┌──────────────────── month (1 - 12)
│ │ │ │ │ ┌─────────────────── day of week (0 - 6)(0to 6 are Sunday to
│ │ │ │ │ │                     Saturday 7 is Sunday, the same as 0)
│ │ │ │ │ │
│ │ │ │ │ │
* * * * * *
```

Valid cron expression examples:

Expression	Meaning	Example	Run job at
Number	In every Xth unit	`0 5 * * * *`	Every hour 5 minute
*	In every unit	`0 * * * * *`	Every minute
*/5	In every 5th unit	`*/10 * * * * *`	Every 10th second
1,2,3	In every 1,2,3 unit	`0 0 0,12 * * *`	Twice per day (midnight and noon)
1-10	In every unit in the 1-10 interval	`0 0-5 * * * *`	Every hour 0,1,2,3,4,5th minute

7.4 Topics

Topics start with $GW/ reserved for gateway specific topics.

Name	Description	Request Topic	Response Topic
$GW/iqrf	IQRF network	✓	x
$GW/sensnet	SensNet, IQ Home devices	✓	x
Any topic that does not start with $GW	MQTT	✓	✓
$GW/control	Gateway control	✓	x
$GW/application	UDP Application	✓	✓

Automatic replacements in topics

Name	Description
%h	Hostname (GW Hostname)
%s	Serial ID of the gateway
%m	Module ID of the RF module
%c	Client ID from MQTT config
%u	Username from MQTT config

Example:
`iqhome/gateway/%s/response` used as `iqhome/gateway/GW-3E70000/response`

7.5 Location information

Location information available only for 4G/LTE models.

Name	Type	Description
timestamp	Integer	Timestamp of the location information
latitude	Float	Latitude coordinate
longitude	Float	Longitude coordinate
type	String	Invalid - Invalid position information cbsp - Location information by Cell Base Station Positioning gnss - Location information by GPS+GLONASS
valid	Boolean	If true the last request for location information was valid

7.8 MQTT payload string content

```
<content> - ASCII strings with escape characters

E.g.:
1. JSON content

      Original:

      {
            "key":"value"
      }

      Encoded:

      "{\n\"key\": \"value\"}\n"

2. Plain text
      Orinigal:

      Test text.
      Another line.

      Encoded:

      "Test text.\nAnother line."
```

7.9 Login

The default credentials can be found on the sticker on the side of the gateways.

7.10 LTE RSSI value

Value	dBm	Description
0	-113	Bad
1	-111	Bad
2	-109	Marginal
3	-107	Marginal
4	-105	Marginal
5	-103	Marginal
6	-101	Marginal
7	-99	Marginal
8	-97	Marginal
9	-95	Marginal
10	-93	OK
11	-91	OK
12	-89	OK
13	-87	OK
14	-85	OK
15	-83	Good
16	-81	Good
17	-79	Good
18	-77	Good
19	-75	Good
20	-73	Excellent
21	-71	Excellent
22	-69	Excellent
23	-67	Excellent
24	-65	Excellent
25	-63	Excellent
26	-61	Excellent
27	-59	Excellent
28	-57	Excellent
29	-55	Excellent
30	-53	Excellent
31	-51	Excellent
99		Not known or not detectable
255		Can’t read from LTE module

7.11 Ports

Following table shows the listening ports used by gateway services.

Listening ports		
Service	**Port**	**Protocol**
SSH service	22	TCP
Modbus TCP	502	TCP
Gateway zconf service	1313	UDP
Gateway local connection	13013	TCP

The following table shows the ports used by services in the gateway. These outgoing ports should be enabled to device in the network firewall.

Outgoing ports		
Service	**Port**	**Protocol**
NTP client	123	UDP
MQTT client	1883/8883	TCP

7.12 USB drive automount

The gateway can automount USB drives. The hotplugged USB drive mounted to */run/media/[LABEL|UUID]* folder. The folder created by the LABEL of the USB drive otherwise it will use the UUID of the drive.
For example in case of USB flash drive labeled with *MyDrive* the mount point will be */run/media/MyDrive*

Supported automount filesystems:
FAT16
FAT32