

Monitoring via JSON-RPC linux RutOS

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The information on this page is updated in accordance with the **00.07.4** firmware version .

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Introduction

JSON-RPC is a remote procedure call protocol encoded in JSON. It is a very simple protocol (and very similar to XML-RPC), defining only a few data types and commands. JSON-RPC allows for notifications (data sent to the server that does not require a response) and for multiple calls to be sent to the server which may be answered out of order.

This article provides a guide on how to use JSON-RPC on RUTxxx routers.

Configuration overview and prerequisites

Before we begin, let's overview the configuration that we are attempting to achieve and the prerequisites that make it possible.

Prerequisites:

- A PC with HTTP request software.
- An Internet connection. (*This example is based on a local configuration, but also can be used via wired WAN or a remote installation with Public IP*)
- One RUTxxx series router.

Configuration scheme: 

Using JSON-RPC (Linux)

This section describes how to use JSON-RPC commands with a Linux OS system. To find the guide for Windows users, jump to this section [here](#).

Obtaining a session ID

To log in to the router via JSON-RPC you must first obtain a Session ID. To do so, you must send an **HTTP POST** request to the router. Open the Linux **Terminal** app and execute this command:

```
curl -d "{ \"jsonrpc\": \"2.0\", \"id\": 1, \"method\": \"call\", \"params\": [ \"0000000000000000000000000000000000000000000000000000000000000000\", \"session\", \"login\", { \"username\": \"admin\", \"password\": \"admin01\" } ] }" http://192.168.1.1/ubus
```

The section highlighted in orange is the router's admin password. admin01 is the default value, replace it with your router's password. The address highlighted in green is the router's IP address. Replace this value with your router's IP. If you're trying to reach the router from LAN, use the local IP address (default: 192.168.1.1), if you're trying to reach the router from WAN, use the router's WAN IP address.



The picture above depicts the process of obtaining a Session ID. The ID itself is encapsulated in a red rectangle. Copy this ID as you will need it to authenticate yourself when using other commands.

Getting router parameters

Now that you have obtained a Session ID, you can issue commands to the router. Lets start with commands that return information about the router.

Getting signal levels

This is a command that returns the router's signal levels value:

```
curl -d "{ \"jsonrpc\": \"2.0\", \"id\": 1, \"method\": \"call\", \"params\": [ \"a74c8e07646f0da2bfddce35bf3de1f3\", \"file\", \"exec\", { \"command\": \"gsmctl\", \"params\": [ \"-q\" ] } ] }" http://192.168.1.1/ubus
```

Highlighted in red is the Session ID. Replace it with the Session ID that was provided to you. Highlighted in orange is the command that we used for our query and highlighted in green is the parameter for the command: **gsmctl -q**.

The picture bellow is a visual representation of this example. Encapsulated in a red rectangle is the answer to the *gsmctl -q*:



You can issue almost any Linux command in a similar manner. For example, if you wish to get a list of file names contained in the config folder, the Linux command to do so would be **ls /etc/config**, which, translated to JSON-RPC, would be:

```
curl -d '{"jsonrpc": "2.0", "id": 1, "method": "call", "params": [{"a74c8e07646f0da2bfddce35bf3de1f3", "file", "exec", {"command": "ls", "params": ["/etc/config"]} ] }' http://192.168.1.1/ubus
```



The answer is encapsulated in an red rectangle.

Setting router parameters

This section will describe how to use **uci set** commands in order to set or change various router parameters via JSON-RPC. For more general information about the usage and syntax of UCI commands, check out our [UCI command usage](#) guide.

UCI SET

The *uci set* command is used to set router parameters. As an example, lets try to change the router's **LAN IP address**. The command to do so looks like this:

```
curl -d '{"jsonrpc": "2.0", "id": 1, "method": "call", "params": [{"590bde71578da2fabfe77ba86c00e4e5", "uci", "set", {"config": "network", "type": "interface", "match": {"ipaddr": "192.168.1.1"}, "values": {"ipaddr": "192.168.11.1"} } ] }' http://192.168.1.1/ubus
```

The sections highlighted in orange describe the config file's name and section (in this case, network config and interface section). Highlighted in red is the option in the config file that you wish to change (in this case, the router's LAN IP address, **ipaddr**). Finally, highlighted in green is the value that will to replace the old value (in this case, change the router's LAN IP address to 192.168.11.1). If the command was issued successfully, you should see a Response like this:



UCI COMMIT

In order to commit the changes from RAM to flash memory, you must execute a **uci commit** command. Continuing from the example above, lets commit the changes made to the *network* config. The command to do so looks like this:

```
curl -d '{"jsonrpc":"2.0", "id":1, "method":"call",
"params":["9704f676709d9dedc98d7718c4e3e7d2", "uci", "commit",
{"config":"network"} ] }' http://192.168.1.1/ubus
```

When committing changes, you will need to specify the name of the file where the changes took place (in this case, *network*, which is highlighted in orange). If the commit was successful, you should see the same message as before:

```
{"jsonrpc":"2.0","id":1,"result":[0]}
```

RELOAD_CONFIG

In order for the changes to take effect, use the **reload_config** command which restarts all of the router's services. The `reload_config` command looks like this:

```
curl -d '{"jsonrpc":"2.0","id":1, "method":"call",
"params":["428a9fa57f1a391db0bd1b865fa16bb5", "file", "exec",
{"command": "reload_config"} ] }' http://192.168.56.1/ubus
```

The command itself is highlighted in orange.

Setting Multiple Parameters

This next example describes how to set multiple parameters in a single config file with one command. Lets change the default configuration of the Ping Reboot function (ping_reboot config file):

```
curl -d '{"jsonrpc":"2.0", "id":1, "method":"call",
"params":["558a9b03c940e52f373f8c02498952e3", "uci", "set",
{"config":"ping_reboot", "match":{"enable":"0",
"host":"8.8.8.8", "packet_size":"56"}, "values":{"enable":"1",
"host":"8.8.4.4", "packet_size":"64"} } ] }' http://192.168.1.1/ubus
```

The command above will **enable** the Ping Reboot function, set the host to ping to **8.8.4.4** and ping packet size to **64**. The default values are highlighted in orange and the new ones are highlighted in green.

Note: Remember always to use the commands in the order (set, commit, reload_config)

Some Additional Commands

If the commands found in the guide above did not suffice your needs, this section provides a list of

additional ones. The commands presented in this section will be for both Linux and Windows operating systems. They should be used as syntax examples for your own purposes.

WiFi clients list

This command returns a list of devices connected to your WLAN and some additional information about the connection.

Windows:

```
{
  "jsonrpc": "2.0", "id": 1, "method": "call", "params":
  [
    "86fc586fa1471622473434ff0176fd66", "iwinfo", "assoclist",
    {
      "device": "wlan0"
    }
  ]
}
```

Linux:

```
curl -d "{ \"jsonrpc\": \"2.0\", \"id\": 1, \"method\": \"call\", \"params\":
[ \"86fc586fa1471622473434ff0176fd66\", \"iwinfo\", \"assoclist\",
{\"device\": \"wlan0\"} ] }" http://192.168.1.1/ubus
```

The response should look something like this:

```
{"jsonrpc": "2.0", "id": 1, "result": [0, {"results":
[{"mac": "E4:02:9B:XX:XX:XX", "signal": -32, "noise": -88, "inactive": 10, "rx":
{"rate": 1000, "mcs": 0, "40mhz": false, "short_gi": false}, "tx":
{"rate": 72200, "mcs": 7, "40mhz": false, "short_gi": true}},
{"mac": "D8:C7:71:XX:XX:XX", "signal": -12, "noise": -88, "inactive": 400, "rx":
{"rate": 1000, "mcs": 0, "40mhz": false, "short_gi": false}, "tx":
{"rate": 72200, "mcs": 7, "40mhz": false, "short_gi": true}}]]]}
```

To obtain these values, the Linux **iwinfo** command and **assoclist** parameter (red) are used. Highlighted in green are the devices connected to the router via WiFi as identified by their MAC addresses. The response information about the connection with the device, such as signal strength, noise, time of inactivity (idle time), rx, tx rate, etc., is highlighted in blue.

WiFi information

This command returns information on your WiFi Access Point.

Windows:

```
{
  "jsonrpc": "2.0", "id": 1, "method": "call", "params":
```

```
[
  "a70ceebe344b6046625d8bcec132796c", "iwinfo", "info",
  {
    "device": "wlan0"
  }
]
```

Linux:

```
curl -d "{ \"jsonrpc\": \"2.0\", \"id\": 1, \"method\": \"call\", \"params\": [ \"a70ceebe344b6046625d8bcec132796c\", \"iwinfo\", \"info\", {\"device\": \"wlan0\"} ] }" http://192.168.1.1/ubus
```

Response:

```
{"jsonrpc": "2.0", "id": 1, "result": [0,
{"phy": "phy0", "ssid": "HAL9000", "bssid": "00:1E:42:XX:XX:XX", "country": "00", "mode": "Master", "channel": 6, "frequency": 2437, "txpower": 20, "quality": 22, "quality_max": 70, "signal": 22, "noise": -61, "bitrate": 72200, "encryption": {"enabled": false}, "hwmodes": ["b", "g", "n"], "hardware": {"name": "Generic MAC80211"}}]}
```

As with the clients list command described above, to obtain this information the Linux **iwinfo** command is used, but this time with the **info** parameter (red). The relevant information, such as WiFi SSID, WiFi MAC address, WiFi channel, Encryption type, etc., is highlighted in blue

Manufacturing information

This command returns information about the device's manufacturing details like device's Product Code, Serial Number MAC Address, etc.

Windows:

```
{
  "jsonrpc": "2.0", "id": 1, "method": "call", "params": [
    "805725a19ab0fba6c2b44ecf2f952fb9", "file", "exec",
    {
      "command": "mnf_info", "params": ["--name", "--batch"]
    }
  ]
}
```

Linux:

```
curl -d "{ \"jsonrpc\": \"2.0\", \"id\": 1, \"method\": \"call\", \"params\": [ \"805725a19ab0fba6c2b44ecf2f952fb9\", \"file\", \"exec\", {\"command\": \"mnf_info\", \"params\": [\"--name\", \"--batch\"] } ] }"
```

http://192.168.1.1/ubus

Response:

```
{"jsonrpc": "2.0", "id": 1, "result": [0, {"code": 0, "stdout": "RUT955003XXX\n0105\n001e4216d666\n"}]}
```

To obtain the manufacturing information the **mnf_info** (highlighted in red) command is used. In this case a query was sent asking for the device's Product Code (name), Serial Number (sn) and MAC Address (mac) (highlighted in red in the query; returned values highlighted in blue). Using *mnf_info*, you can "ask" the router for any type of manufacturing information. Here is the list of possible *mnf_info* parameters:

- **--mac** - returns the router's LAN MAC address
- **--maceth** - returns the router's WAN MAC address
- **--name** - returns the router's Product Code
- **--wps** - returns the router's WPS PIN number
- **--sn** - returns the router's Serial number
- **--batch** - returns the router's Batch number
- **--hwver** - returns the router's Hardware Revision number
- **--simpin** - returns the router's SIM card's PIN (as it is specified in the [Mobile](#) section)
- **--blver** - returns the router's Bootloader version

GPS Data

This command returns the device's GPS latitude and longitude.

Windows:

```
{
  "jsonrpc": "2.0", "id": 1, "method": "call", "params":
  [
    "456f77f6b686bf5972daa3a26bee60b0", "file", "exec",
    {
      "command": "gpsctl", "params": ["-ix"]
    }
  ]
}
```

Linux:

```
curl -d
"{\"jsonrpc\": \"2.0\", \"id\": 1, \"method\": \"call\", \"params\": [\"5363304b3ed4
ee0806f101295fc52e93\", \"file\", \"exec\", {\"command\": \"gpsctl\", \"params\": [
\"-ix\"]}]}" http://192.168.1.1/ubus
```

Response:

```
{"jsonrpc": "2.0", "id": 1, "result": [0, {"code": 0, "stdout": "-23.612625\n-46.62635
5\n"}]}
```

The blue part in the code are the Latitude and Longitude.

Firmware number

This command returns the device's Firmware version number.

Windows:

```
{
  "jsonrpc": "2.0", "id": 1, "method": "call", "params":
  [
    "85ea4cb00398d8387b22d8fa6f75f753", "file", "read",
    {
      "path": "/etc/version"
    }
  ]
}
```

Linux:

```
curl -d "{ \"jsonrpc\": \"2.0\", \"id\": 1, \"method\": \"call\", \"params\":
[ \"85ea4cb00398d8387b22d8fa6f75f753\", \"file\", \"read\", {
\"path\": \"\"/etc/version\"\" } ] }" http://192.168.1.1/ubus
```

Response:

```
{"jsonrpc": "2.0", "id": 1, "result": [0, {"data": "RUTXXX_R_00.07.02.0\n"}]}
```

This command (**file**, **read**, highlighted in red) is an alternative to the Linux **cat** command. All you need is to specify the path (in this case **/etc/version**, highlighted in red) to the file that you wish to read.

Reboot

Windows:

```
{
  "jsonrpc": "2.0", "id": 1, "method": "call", "params":
  [
    "5cd4b143b182c07bc578ae3310d6280e", "file", "exec",
    {
      "command": "reboot", "params": ["config"]
    }
  ]
}
```

Linux:

```
curl -d
```



```
"{\\"jsonrpc\\":\\"2.0\\",\\"id\\":1,\\"method\\":\\"call\\",\\"params\\":[\\"5cd4b143b182c07bc578ae3310d6280e\\",\\"file\\",\\"exec\\",{\\"command\\":\\"reboot\\",\\"params\\":[\\"config\\"]}]}" http://192.168.1.1/ubus
```

Response: The success response for this command is an empty message. If the response contains no data, the command was executed successfully.

Set SIM card information

In this last example we'll try to change the mobile connection's MTU and Service mode values.

Windows:

```
{
  "jsonrpc": "2.0", "id": 1, "method": "call", "params":
  [
    "558a9b03c940e52f373f8c02498952e3", "uci", "set",
    {
      "config": "simcard", "type": "sim1", "match":
      {
        "service": "auto",
        "mtu": "1500"
      },
      "values":
      {
        "service": "lte-only",
        "mtu": "1476"
      }
    }
  ]
}
```

Linux:

```
curl -d "{\\"jsonrpc\\":\\"2.0\\", \\"id\\":1, \\"method\\":\\"call\\",
\\"params\\":[\\"558a9b03c940e52f373f8c02498952e3\\", \\"uci\\", \\"set\\",
{\\"config\\":\\"simcard\\", \\"type\\":\\"sim1\\", \\"match\\":{\\"service\\":\\"auto\\",
\\"mtu\\":\\"1500\\"}, \\"values\\":{\\"service\\":\\"lte-only\\", \\"mtu\\":\\"1476\\"} }
]" http://192.168.1.1/ubus
```

Response:

```
{"jsonrpc": "2.0", "id": 1, "result": [0]}
```

The command used is *uci set* (highlighted in red). The config file name is **simcard**, section **sim1**, options **mtu** and **service** (configs, sections and options highlighted in orange). The response shown above is a positive response, but don't forget to execute *uci commit* and *reload_config* afterwards or else your changes will not take effect.

See Also

You may learn more about UCI commands [here](#).