



SDK API Manual

Version 2.5.10

NetModule AG, Switzerland

July 11, 2019



Contents

| | | |
|----------|--|----------|
| 1 | Introduction | 3 |
| 2 | API functions | 4 |
| 2.1 | Serial | 4 |
| 2.1.1 | nb_serial_getattr | 4 |
| 2.1.2 | nb_serial_setattr | 4 |
| 2.1.3 | nb_serial_write | 4 |
| 2.1.4 | nb_serial_read | 5 |
| 2.2 | Media | 5 |
| 2.2.1 | nb_media_mount | 5 |
| 2.2.2 | nb_media_umount | 5 |
| 2.2.3 | nb_media_getmount | 5 |
| 2.3 | Modbus | 6 |
| 2.3.1 | nb_modbus_register | 6 |
| 2.3.2 | nb_modbus_unregister | 6 |
| 2.3.3 | nb_modbus_set_slave | 6 |
| 2.3.4 | nb_modbus_flush | 7 |
| 2.3.5 | nb_modbus_last_error | 7 |
| 2.3.6 | nb_modbus_set_debug | 7 |
| 2.3.7 | nb_modbus_send_raw | 7 |
| 2.3.8 | nb_modbus_reply_raw_response | 7 |
| 2.3.9 | nb_modbus_extract_payload | 8 |
| 2.3.10 | nb_modbus_read_bits | 8 |
| 2.3.11 | nb_modbus_read_input_bits | 8 |
| 2.3.12 | nb_modbus_read_regs | 8 |
| 2.3.13 | nb_modbus_read_input_regs | 9 |
| 2.3.14 | nb_modbus_write_bits | 9 |
| 2.3.15 | nb_modbus_write_input_bits | 9 |
| 2.3.16 | nb_modbus_write_regs | 10 |
| 2.3.17 | nb_modbus_write_input_regs | 10 |
| 2.3.18 | nb_modbus_receive | 10 |
| 2.3.19 | nb_modbus_reply | 10 |
| 2.4 | SMS | 11 |

| | | |
|--------|----------------------------------|----|
| 2.4.1 | nb_sms_send | 12 |
| 2.4.2 | nb_sms_sendmsg | 12 |
| 2.4.3 | nb_sms_list | 12 |
| 2.4.4 | nb_sms_retrieve | 12 |
| 2.4.5 | nb_sms_header | 12 |
| 2.4.6 | nb_sms_body | 13 |
| 2.4.7 | nb_sms_delete | 13 |
| 2.5 | E-Mail | 13 |
| 2.5.1 | nb_email_send | 13 |
| 2.5.2 | nb_mail_list | 14 |
| 2.5.3 | nb_mail_delete | 14 |
| 2.5.4 | nb_mail_fetch | 14 |
| 2.5.5 | nb_mail_send | 15 |
| 2.6 | Digital I/O | 15 |
| 2.6.1 | nb_dio_get | 15 |
| 2.6.2 | nb_dio_set | 15 |
| 2.6.3 | nb_dio_count | 16 |
| 2.6.4 | nb_dio_summary | 16 |
| 2.7 | Configuration | 16 |
| 2.7.1 | nb_config_get | 16 |
| 2.7.2 | nb_config_set | 16 |
| 2.7.3 | nb_config_done | 17 |
| 2.7.4 | nb_config_summary | 17 |
| 2.8 | Status Information | 17 |
| 2.8.1 | nb_status | 17 |
| 2.8.2 | nb_status_summary | 18 |
| 2.9 | Network Scanning | 19 |
| 2.9.1 | nb_scan_networks | 19 |
| 2.10 | USSD Queries | 19 |
| 2.10.1 | nb_ussd_query | 19 |
| 2.11 | File Transfers | 19 |
| 2.11.1 | nb_transfer_get | 20 |
| 2.11.2 | nb_transfer_put | 20 |
| 2.11.3 | nb_transfer_post | 20 |
| 2.11.4 | nb_transfer_list | 21 |
| 2.11.5 | nb_transfer_delete | 21 |
| 2.12 | LED | 22 |
| 2.12.1 | nb_led_acquire | 22 |
| 2.12.2 | nb_led_release | 22 |
| 2.12.3 | nb_led_set | 22 |
| 2.13 | Config/Software Update | 23 |
| 2.13.1 | nb_update_status | 23 |

| | | |
|---------|----------------------------------|----|
| 2.13.2 | nb_update_config | 24 |
| 2.13.3 | nb_update_software | 24 |
| 2.13.4 | nb_update_sshkeys | 24 |
| 2.14 | Web Pages | 25 |
| 2.14.1 | nb_page_register | 25 |
| 2.14.2 | nb_userpage_register | 25 |
| 2.14.3 | nb_page_unregister | 25 |
| 2.14.4 | nb_page_request | 25 |
| 2.14.5 | nb_page_respond | 26 |
| 2.14.6 | nb_page_finish | 26 |
| 2.15 | Voice | 26 |
| 2.15.1 | nb_voice_event | 27 |
| 2.15.2 | nb_voice_endpoint_list | 28 |
| 2.15.3 | nb_voice_endpoint_get | 28 |
| 2.15.4 | nb_voice_call_list | 28 |
| 2.15.5 | nb_voice_call_get | 28 |
| 2.15.6 | nb_voice_call_dial | 29 |
| 2.15.7 | nb_voice_call_accept | 29 |
| 2.15.8 | nb_voice_call_route | 29 |
| 2.15.9 | nb_voice_call_hangup | 29 |
| 2.15.10 | nb_voice_call_volume | 30 |
| 2.16 | SNMP | 30 |
| 2.16.1 | nb_snmp_register | 30 |
| 2.16.2 | nb_snmp_link | 31 |
| 2.16.3 | nb_snmp_update | 31 |
| 2.16.4 | nb_snmp_listen | 31 |
| 2.16.5 | nb_snmp_unlink | 31 |
| 2.16.6 | nb_snmp_host | 31 |
| 2.16.7 | nb_snmp_get | 32 |
| 2.16.8 | nb_snmp_set | 32 |
| 2.16.9 | nb_snmp_traphost | 33 |
| 2.16.10 | nb_snmp_trap | 33 |
| 2.16.11 | nb_snmp_inform | 33 |
| 2.17 | MQTT | 34 |
| 2.17.1 | nb_mqtt_publish | 34 |
| 2.18 | CAN | 35 |
| 2.18.1 | nb_can_setattr | 35 |
| 2.18.2 | nb_can_open | 35 |
| 2.18.3 | nb_can_close | 35 |
| 2.18.4 | nb_can_setfilter | 35 |
| 2.18.5 | nb_can_sendonly | 36 |
| 2.18.6 | nb_can_recvmsg | 36 |

| | | |
|---------|-----------------------|----|
| 2.18.7 | nb_can_sendmsg | 36 |
| 2.19 | Network | 37 |
| 2.19.1 | nb_gethostbyname | 37 |
| 2.19.2 | nb_ifc_address | 37 |
| 2.19.3 | nb_ping | 37 |
| 2.19.4 | nb_arp_ping | 38 |
| 2.19.5 | nb_arp_gratuitous | 38 |
| 2.19.6 | nb_etherwake | 38 |
| 2.20 | OPC-UA | 38 |
| 2.20.1 | nb_opcua_connect | 39 |
| 2.20.2 | nb_opcua_browse | 39 |
| 2.20.3 | nb_opcua_search | 39 |
| 2.20.4 | nb_opcua_read | 39 |
| 2.20.5 | nb_opcua_write | 40 |
| 2.20.6 | nb_opcua_disconnect | 40 |
| 2.21 | Certificates | 40 |
| 2.21.1 | nb_cert_install | 40 |
| 2.21.2 | nb_cert_create | 41 |
| 2.21.3 | nb_cert_enroll | 41 |
| 2.21.4 | nb_cert_erase | 41 |
| 2.21.5 | nb_cert_read | 42 |
| 2.22 | Other | 42 |
| 2.22.1 | nb_syslog | 42 |
| 2.22.2 | nb_event_get | 42 |
| 2.22.3 | nb_event_msg | 42 |
| 2.22.4 | nb_reboot | 43 |
| 2.22.5 | nb_restart | 43 |
| 2.22.6 | nb_reset_factory | 43 |
| 2.22.7 | nb_reset_statistics | 43 |
| 2.22.8 | nb_wanlink_activate | 44 |
| 2.22.9 | nb_wanlink_deactivate | 44 |
| 2.22.10 | nb_wanlink_priorize | 44 |
| 2.22.11 | nb_wanlink_weight | 44 |
| 2.22.12 | nb_reset_debug_level | 45 |
| 2.22.13 | nb_set_debug_level | 45 |
| 2.22.14 | nb_get_debug_level | 45 |



1 Introduction

This manual describes the SDK API extensions to the standard library of version #SDK_VERSION### They provide a range of general-purpose extensions for the Arena scripting language.

The current version ships with the following features:

- Send and retrieve SMS
- Send E-mail
- Read or write from or to a serial device
- Control digital input/output ports
- Run TCP/UDP servers
- Run IP/TCP/UDP clients
- Access files of mounted media (e.g. an USB stick)
- Retrieve status information from the system
- Get or set configuration parameters
- Write to syslog
- Transfer files over HTTP/FTP
- Perform config/software updates
- Control LEDs
- Get system events, restart services or reboot system
- Scan for networks in range
- Create your own web pages
- Voice control functions
- SNMP functions
- CAN socket functions
- Various network-related functions
- OPC-UA functions
- Other system-related functions

2 API functions

2.1 Serial

2.1.1 nb_serial_getattr

```
struct nb_serial_getattr (string dev)
```

The nb_serial_getattr function retrieves the current attributes of a serial device.

| | |
|-----|---|
| dev | serial device (e.g. serial0 for first device) |
|-----|---|

Returns a struct containing values for baudrate, databit, stopbit, parity, flowctl or void on error.

2.1.2 nb_serial_setattr

```
int nb_serial_setattr (string dev, int b, int d, int s, int p, int f)
```

The nb_serial_setattr function can be used to set the attributes of a serial device.

| | |
|-----|---|
| dev | serial device (e.g. serial0 for first device) |
| b | baudrate (e.g. 9600, 19200, 38400, 57600, 115200) |
| d | number of data bits (5, 6, 7, 8) |
| s | number of stop bits (1, 2) |
| p | parity (0=no parity, 1=odd parity, 2=even parity) |
| f | flow control (0=none, 1=xon/xoff, 2=hardware) |

Returns -1 on error, otherwise zero.

2.1.3 nb_serial_write

```
int nb_serial_write (string dev, string msg)
```

The nb_serial_write function can be used for writing a message directly to a serial device.

| | |
|-----|---|
| dev | serial device (e.g. serial0 for first device) |
| msg | message to be written |

Returns number of bytes written or -1 on error.

2.1.4 nb_serial_read

```
string nb_serial_read (string dev)
```

The nb_serial_read function can be used to read a message from a serial device.

dev serial device (e.g. serial0 for first device)

Returns the string received from the serial port or an empty string in case of errors.

2.2 Media

2.2.1 nb_media_mount

```
int nb_media_mount (string dev)
```

The nb_media_mount function mounts the specified media device.

dev device name

Returns 0 on success and -1 on error. The media will be mounted to /mnt/media/usb0 for instance. You may use any IO functions afterwards to operate on it.

Available media devices:

| | |
|----------|-------------------------------|
| usb0 | first USB device |
| storage0 | first extended storage device |

2.2.2 nb_media_umount

```
int nb_media_umount (string dev)
```

The nb_media_umount function unmounts the specified media device.

dev device name (e.g usb0, storage0)

Returns -1 on error.

2.2.3 nb_media_getmount

```
string nb_media_getmount (void)
```


The `nb_media_getmount` function returns a list of any currently mounted media including the corresponding mountpoint (i.e. in the form "<media> on <path>"). If nothing is mounted (or in case of an error) an empty string will be returned.

2.3 Modbus

2.3.1 nb_modbus_register

```
int nb_modbus_register (int fd, int type)
```

This function will register a file descriptor (as returned by `open` or `accept`) to the modbus subsystem.

| | |
|-------------------|--|
| <code>fd</code> | file descriptor |
| <code>type</code> | can be either <code>MODBUS_TYPE_TCP</code> or <code>MODBUS_TYPE_RTU</code> |

On success, the function returns 0. Otherwise -1.

2.3.2 nb_modbus_unregister

```
int nb_modbus_unregister (int fd)
```

This function unregisters a previously registered file descriptor.

| | |
|-----------------|-----------------|
| <code>fd</code> | file descriptor |
|-----------------|-----------------|

On success, the function returns 0. Otherwise -1.

2.3.3 nb_modbus_set_slave

```
int nb_modbus_set_slave (int fd, int slave)
```

The `nb_modbus_set_slave` function applies the local slave identifier number which is required when communicating in RTU mode or communicating via Modbus-TCP - RTU Gateway.

| | |
|--------------------|------------------|
| <code>fd</code> | file descriptor |
| <code>slave</code> | slave identifier |

The function will return zero if successful. Otherwise it returns -1, the error can be figured out using `nb_modbus_last_error`.

2.3.4 nb_modbus_flush

```
int nb_modbus_flush (int fd)
```

The nb_modbus_flush function will discard any data received without reading from the file descriptor.

| | |
|----|-----------------|
| fd | file descriptor |
|----|-----------------|

The function will return zero or the number of flushed bytes in case of success. Otherwise it returns -1, the error can be figured out using nb_modbus_last_error.

2.3.5 nb_modbus_last_error

```
string nb_modbus_last_error (void)
```

The nb_modbus_last_error function show the last occurred error.

2.3.6 nb_modbus_set_debug

```
void nb_modbus_set_debug (int fd, bool flag)
```

The nb_modbus_set_debug function enables or disables the debug mode.

| | |
|------|--|
| fd | file descriptor |
| flag | true for enabled or false for disabled |

2.3.7 nb_modbus_send_raw

```
array nb_modbus_send_raw (int fd, array request)
```

The nb_modbus_send_raw function sends the request to the associated descriptor and receives the confirmation.

| | |
|---------|--------------------|
| fd | file descriptor |
| request | modbus raw request |

The functions returns the modbus confirmation if successful. Otherwise it will return void.

2.3.8 nb_modbus_reply_raw_response

```
int nb_modbus_reply_raw_response (int fd, array response)
```

The `nb_modbus_replay_raw_response` function will reply to a modbus request.

| | |
|-----------------------|-------------------------|
| <code>fd</code> | file descriptor |
| <code>response</code> | the raw modbus response |

The `nb_modbus_replay_raw_response` function will return the number of bytes sent on success. Otherwise it will return -1.

2.3.9 `nb_modbus_extract_payload`

```
array nb_modbus_extract_payload (int fd, array request)
```

The `nb_modbus_extract_payload` function extracts the payload from a given request.

| | |
|----------------------|-----------------|
| <code>fd</code> | file descriptor |
| <code>request</code> | modbus request |

It returns the extracted payload from the request if successful, otherwise void.

2.3.10 `nb_modbus_read_bits`

```
array nb_modbus_read_bits (int fd, int addr, int len)
```

The `nb_modbus_read_bits` function reads the status of the bits from the remote device.

| | |
|-------------------|-------------------------|
| <code>fd</code> | file descriptor |
| <code>addr</code> | address of bits to read |
| <code>len</code> | length of data to read |

The function returns the number of read status bits/registers if successful, otherwise it returns -1.

2.3.11 `nb_modbus_read_input_bits`

```
array nb_modbus_read_input_bits (int fd, int addr, int len)
```

The `nb_modbus_read_input_bits` function reads the input bits from the remote device.

| | |
|-------------------|-------------------------|
| <code>fd</code> | file descriptor |
| <code>addr</code> | address of bits to read |
| <code>len</code> | length of data to read |

The function returns the number of read input bits if successful, otherwise it returns -1.

2.3.12 `nb_modbus_read_regs`

```
array nb_modbus_read_regs (int fd, int addr, int len)
```

The `nb_modbus_read_regs` function reads the status of the registers from the remote device.

| | |
|------|------------------------------|
| fd | file descriptor |
| addr | address of registers to read |
| len | length of data to read |

The function returns the number of read status registers if successful, otherwise -1.

2.3.13 nb_modbus_read_input_regs

```
array nb_modbus_read_input_regs (int fd, int addr, int len)
```

The `nb_modbus_read_input_regs` function reads the input registers from the remote device.

| | |
|------|------------------------------|
| fd | file descriptor |
| addr | address of registers to read |
| len | length of data to read |

The function returns the number of read input registers if successful, otherwise -1.

2.3.14 nb_modbus_write_bits

```
int nb_modbus_write_bits (int fd, int addr, int length, array data)
```

The `nb_modbus_write_bits` function writes the status of bits to the remote device.

| | |
|--------|--------------------------|
| fd | file descriptor |
| addr | address of bits to write |
| length | length of array |
| data | array to write |

The function returns the number of bits written if successful, otherwise -1.

2.3.15 nb_modbus_write_input_bits

```
int nb_modbus_write_input_bits (int fd, int addr, int length, array data)
```

The `nb_modbus_write_input_bits` function writes the status of input bits to the remote device.

| | |
|--------|--------------------------------|
| fd | file descriptor |
| addr | address of input bits to write |
| length | length of array |
| data | array to write |

The function shall return the number of written bits if successful, otherwise -1.

2.3.16 nb_modbus_write_regs

```
int nb_modbus_write_regs (int fd, int addr, int length, array data)
```

The nb_modbus_write_regs function writes the status of the registers to the remote device.

| | |
|--------|-------------------------------|
| fd | file descriptor |
| addr | address of registers to write |
| length | length of array |
| data | array to write |

The function returns the number of written bits if successful, otherwise -1.

2.3.17 nb_modbus_write_input_regs

```
int nb_modbus_write_input_regs(int fd, int addr, int length, array data)
```

The nb_modbus_write_input_regs function writes the status of the input registers to the remote device.

| | |
|--------|-------------------------------------|
| fd | file descriptor |
| addr | address of input registers to write |
| length | length of array |
| data | array to write |

The function returns the number of written bits if successful, otherwise -1.

2.3.18 nb_modbus_receive

```
int nb_modbus_receive (int fd)
```

The nb_modbus_receive function will receive an indication request from the specified descriptor. This function is used by a modbus slave/server to receive and analyze indication requests sent by the masters/clients.

| | |
|----|-----------------|
| fd | file descriptor |
|----|-----------------|

The function returns the received indication request.

2.3.19 nb_modbus_reply

```
int modbus_reply (int fd, array req, struct resp)
```

The `nb_modbus_reply` function sends a response for a received request (as returned by `nb_modbus_receive`) to the specified descriptor.

| | |
|-------------------|-------------------------------------|
| <code>fd</code> | file descriptor |
| <code>req</code> | request |
| <code>resp</code> | response struct made up as follows: |

```
resp = mkstruct(
    "bits", mkarray
    (
        0, 0, 0, 1, 1, 1, 1,
        0, 0, 0, 1, 1, 1, 1
    ),
    "ibits", mkarray
    (
        1, 0, 1, 0, 1, 0, 1,
        1, 0, 1, 0, 1, 0, 1
    ),
    "regs", mkarray
    (
        0x0000 0x0001, 0x0002, 0x0003, 0x0004, 0x0005, 0x0006, 0x0007,
        0x0008, 0x0009, 0x000A, 0x000B, 0x000C, 0x000D, 0x000E, 0x000F
    ),
    "iregs", mkarray
    (
        0xFF00, 0xFF01, 0xFF02, 0xFF03, 0xFF04, 0xFF05, 0xFF06, 0xFF07,
        0xFF08, 0xFF09, 0xFF0A, 0xFF0B, 0xFF0C, 0xFF0D, 0xFF0E, 0xFF0F
    )
);
```

Representation:

```
"bits" => Discrete Output Coils
"ibits" => Discrete Input Contacts
"regs" => Analog Output Holding Registers
"iregs" => Analog Input Registers
```

2.4 SMS

Please note that the SMS daemon must be properly configured prior to using the functions below.

2.4.1 nb_sms_send

```
string nb_sms_send (string number, string msg)
```

The nb_sms_send function can be used to send an SMS to the specified number.

| | |
|--------|--------------------------|
| number | recipient's phone number |
| msg | the message to be sent |

Returns the resulting message identifier on success or an empty string on error.

2.4.2 nb_sms_sendmsg

```
string nb_sms_sendmsg (struct msg)
```

The nb_sms_send function can be used to send an SMS with parameters specified in the struct msg which includes the following fields:

| | |
|---------|--|
| number | recipient's phone number |
| report | request delivery report (if set to yes) |
| gateway | the SMS gateway used for sending the message |
| sim | the SIM over which the message shall be sent |
| modem | the modem used for sending (deprecated) |
| msg | the message to be sent |

Returns the resulting message identifier on success or an empty string on error.

2.4.3 nb_sms_list

```
array nb_sms_list (void)
```

The nb_sms_list function can be used to retrieve the list of messages in the inbox. Returns an array of message identifiers.

2.4.4 nb_sms_retrieve

```
string nb_sms_retrieve (string id)
```

The nb_sms_retrieve function returns the message text of the specified message identifier.

| | |
|----|------------------------|
| id | the message identifier |
|----|------------------------|

2.4.5 nb_sms_header

```
string nb_sms_header (string id, string tag)
```

The nb_sms_header function returns the headers of a given message identifier.

| | |
|-----|--|
| id | the message identifier |
| tag | a specific header tag (such as "From") |

Returns the value of the specified header tag or all headers (if tag omitted) or an empty string on error.

2.4.6 nb_sms_body

```
string nb_sms_body (string id)
```

The nb_sms_body function returns the body of a given message identifier.

| | |
|----|------------------------|
| id | the message identifier |
|----|------------------------|

Returns the message's body text or an empty string on error.

2.4.7 nb_sms_delete

```
int nb_sms_delete (string id)
```

The nb_sms_delete function can be used to delete a message from the inbox.

| | |
|----|------------------------|
| id | the message identifier |
|----|------------------------|

Returns zero on success or -1 on error.

2.5 E-Mail

2.5.1 nb_email_send

```
int nb_email_send (string rcpt, string subj, string msg)
int nb_email_send (string rcpt, string subj, string msg, string att)
```

The nb_email_send function can be used to send an E-Mail to a particular address.

| | |
|------|--|
| rcpt | recipient's email address (e.g. abc@abc.com) |
| subj | email subject |
| msg | email content |
| att | an optional file to be sent as attachment |

Returns zero on success or any error code. The attachment file will be deleted upon success. Please note that the E-Mail client must be properly configured prior to using

this function.

The following functions can be used to send or manage E-Mails on a remote server.

Supported protocols are:

| | |
|-------|---------------|
| smtp | SMTP |
| smtps | SMTP over SSL |
| imap | IMAP |
| imaps | IMAP over SSL |
| pop3 | POP3 |
| pop3s | POP3 over SSL |

2.5.2 nb_mail_list

```
int nb_mail_list (string usr, string pwd, string url)
```

The nb_mail_list function can be used to get the number of existing mails at a remote IMAP/POP3 server.

| | |
|-----|---|
| usr | the username used for authentication (can be empty) |
| pwd | the password used for authentication (can be empty) |
| url | IMAP/POP3 server URL (e.g. imap://mail.example.com) |

Returns number of available mails or -1 on error. Please note that IMAP functions are limited to the INBOX folder.

2.5.3 nb_mail_delete

```
int nb_mail_delete (string usr, string pwd, string url, int index)
```

The nb_mail_delete function can be used to delete an E-Mail from a remote IMAP/POP3 server.

| | |
|-------|---|
| usr | the username used for authentication (can be empty) |
| pwd | the password used for authentication (can be empty) |
| url | IMAP/POP3 server URL (e.g. imap://mail.example.com) |
| index | the mail index to be deleted |

Returns 0 on success.

2.5.4 nb_mail_fetch

```
struct nb_mail_fetch (string usr, string pwd, string url, int index)
```

The nb_mail_fetch function can be used to fetch an E-Mail from a remote IMAP/POP3

server.

| | |
|-------|---|
| usr | the username used for authentication (can be empty) |
| pwd | the password used for authentication (can be empty) |
| url | IMAP/POP3 server URL (e.g. imap://mail.example.com) |
| index | the mail index to be fetched |

Returns void on error, otherwise a struct with the following fields:

| | |
|---------|-----------------------------|
| from | sender's address |
| to | recipient's address |
| subject | subject of the mail |
| date | when the mail has been sent |
| body | content of the mail |

2.5.5 nb_mail_send

```
int nb_mail_send (string usr, string pwd, string url, struct mail)
```

The nb_mail_send function can be used to send an E-Mail via a remote SMTP server.

| | |
|------|---|
| usr | the username used for authentication (can be empty) |
| pwd | the password used for authentication (can be empty) |
| url | SMTP server URL (e.g. smtp://mail.example.com) |
| mail | a struct containing the fields from, to, subject and body |

Return -1 on error, otherwise zero.

2.6 Digital I/O

2.6.1 nb_dio_get

```
int nb_dio_get (string port)
```

The nb_dio_get function retrieves the status of a digital I/O port.

| | |
|------|---|
| port | DIO port to be queried (in1, in2, out1, out2) |
|------|---|

Returns the DIO status (0 = off, 1 = on) or -1 on error.

2.6.2 nb_dio_set

```
int nb_dio_set (string port, int state)
```

The `nb_dio_set` function can be used to turn on/off the status of a digital output port.

| | |
|--------------------|---|
| <code>port</code> | digital output port to be configured (out1, out2) |
| <code>state</code> | new output status (0 = off, 1 = on) |

Returns -1 on error.

2.6.3 nb_dio_count

```
int nb_dio_count (string port)
```

The `nb_dio_count` function can be used to get the number of toggles of the specified input port.

| | |
|-------------------|-------------------------------|
| <code>port</code> | digital input port (in1, in2) |
|-------------------|-------------------------------|

Returns the number of toggles since the last measurement.

2.6.4 nb_dio_summary

```
string nb_dio_summary (void)
```

The `nb_dio_summary` function retrieves the status of all digital I/O ports.

Returns a string holding the status of all ports or an empty string on error.

2.7 Configuration

2.7.1 nb_config_get

```
string nb_config_get (string key)
```

The `nb_config_get` function returns the currently configured value of a particular config parameter.

| | |
|------------------|---------------------------------|
| <code>key</code> | config key (e.g. "config.info") |
|------------------|---------------------------------|

Returns the config value or an empty string on error.

2.7.2 nb_config_set

```
int nb_config_set (string config)
```

The `nb_config_set` function can be used to set system configuration parameters.

`config` config to be set in the form key=value (e.g. sdk.status=0)

Returns -1 on error. The config values will be immediately applied to the system.

2.7.3 nb_config_done

```
int nb_config_done (void)
```

The nb_config_done function can be used to check if all modify scripts have completed after a config change.

Returns 0 on ready, 1 on busy and -1 on error.

2.7.4 nb_config_summary

```
string nb_config_summary (void)
```

The nb_config_summary function returns the current system configuration which corresponds to the delta of the factory configuration and the currently active configuration.

2.8 Status Information

2.8.1 nb_status

```
struct nb_status (string section)
```

The nb_status function will return various status values (as available through cli).

`section` the status section which shall be queried

The following sections can be specified:

| | |
|---------------|-------------------------------|
| info | System and config information |
| config | Current configuration |
| system | System information |
| configuration | Configuration information |
| license | License information |
| wwan | WWAN module status |
| wlan | WLAN module status |
| gnss | GNSS (GPS) module status |
| eth | Ethernet interface status |
| lan | LAN interface status |
| wan | WAN interface status |
| openvpn | OpenVPN connection status |
| ipsec | IPsec connection status |
| pptp | PPTP connection status |
| gre | GRE connection status |
| dialin | Dial-In connection status |
| mobileip | MobileIP status |
| dio | Digital IO status |
| audio | Audio module status |
| can | CAN module status |
| uart | UART module status |
| ibis | IBIS module status |
| redundancy | Redundancy status |
| sms | SMS status |
| firewall | Firewall status |
| qos | QoS status |
| neigh | Neighborhood status |
| location | Current Location |

Returns a struct holding the relevant status values (see 'status.are' example).

2.8.2 nb_status_summary

```
string nb_status_summary (void)
```

The nb_status_summary function will return a short summary about the current system status or an empty string on error.

2.9 Network Scanning

2.9.1 nb_scan_networks

```
struct nb_scan_networks (string ifc)
```

The `nb_scan_networks` function can be used to scan for available networks.

`ifc` the interface to scan (e.g. WLAN1 or Mobile1)

Returns a struct holding the relevant networks (see examples).

Please note that scanning a mobile interface will tear down any running WWAN connections. Same applies to WLAN interfaces operating in access-point mode. Therefore the scan interval is limited to 30 seconds.

2.10 USSD Queries

2.10.1 nb_ussd_query

```
string nb_ussd_query (string modem, string msg)
```

The `nb_ussd_query` function can be used to send Unstructured Supplementary Service Data messages to a particular modem. A typical USSD message starts with an asterisk (*) followed by digits that comprise commands or data. Groups of digits may be separated by additional asterisks. The message is terminated with a number sign (#).

`modem` the modem to query (e.g. Mobile1)

`query` the USSD message (e.g. *135#)

Returns a string holding the response of the USSD query.

2.11 File Transfers

The file transfer functions can be used to transfer files from or to a remote server using an URL according to RFC 3986.

Supported protocols are:

| | |
|-------|---------------|
| http | HTTP |
| https | HTTP over SSL |
| ftp | FTP |
| ftps | FTP over SSL |
| tftp | TFTP |
| sftp | SSH FTP |

Please note that all functions operate on files in the SDK sandbox (which is /mnt/sdk on the host system).

2.11.1 nb_transfer_get

```
int nb_transfer_get (string usr, string pwd, string url, string path)
```

The nb_transfer_get function can be used to get a file from a remote server. If both, username and password are specified, the function will perform authentication based on the relevant methods of HTTP or FTP.

| | |
|------|---|
| usr | the username used for authentication (can be empty) |
| pwd | the password used for authentication (can be empty) |
| url | the URL where to get the file from |
| path | the local path where the file should be stored |

Returns -1 on error.

2.11.2 nb_transfer_put

```
int nb_transfer_put (string usr, string pwd, string url, string path)
```

The nb_transfer_put function can be used to transfer a file to a remote server. The usr/pwd arguments can be applied in order to perform authentication.

| | |
|------|---|
| usr | the username used for authentication (can be empty) |
| pwd | the password used for authentication (can be empty) |
| url | the URL where to put the file to |
| path | the path to the local file which should be sent |

Returns -1 on error.

2.11.3 nb_transfer_post

```
int nb_transfer_post (string usr, string pwd, string url, string path,
string pp)
int nb_transfer_post (string usr, string pwd, string url, string path,
```

```
string pp, string resp)
```

The `nb_transfer_post` function can be used to transfer a file to a remote HTTP server. By using the POST method, additional parameters may be passed. The `usr/pwd` arguments can be applied in order to perform authentication.

| | |
|-------------------|---|
| <code>usr</code> | the username used for authentication (can be empty) |
| <code>pwd</code> | the password used for authentication (can be empty) |
| <code>url</code> | the URL where to put the file to |
| <code>path</code> | the path to the local file which should be sent |
| <code>pp</code> | additional POST parameters |
| <code>resp</code> | the path to response file |

Returns -1 on error.

POST parameters have to be provided as follows:

```
<key1>=<val1>&<key2>=<val2>&<keyN>=<valN>
```

If provided, the server's response will be stored in the `resp` file.

2.11.4 nb_transfer_list

```
array nb_transfer_list (string usr, string pwd, string url)
```

The `nb_transfer_list` function can be used to retrieve the list of files from a remote server. The `usr/pwd` arguments can be applied in order to perform authentication.

| | |
|------------------|---|
| <code>usr</code> | the username used for authentication (can be empty) |
| <code>pwd</code> | the password used for authentication (can be empty) |
| <code>url</code> | the URL specifying the directory to be listed |

Returns an array of struct describing the directory files. They are made up of:

| | |
|--------------------|--|
| <code>name</code> | name of the file |
| <code>size</code> | file size in bytes |
| <code>mode</code> | file mode and permission (see <code>chmod</code>) |
| <code>user</code> | owner username |
| <code>group</code> | owner groupname |
| <code>time</code> | modification time |
| <code>tm</code> | time struct of modification time |

2.11.5 nb_transfer_delete

```
int nb_transfer_delete (string usr, string pwd, string url)
```


The `nb_transfer_delete` function can be used to delete a file from a remote FTP server. The `usr/pwd` arguments can be applied in order to perform authentication.

| | |
|------------------|---|
| <code>usr</code> | the username used for authentication (can be empty) |
| <code>pwd</code> | the password used for authentication (can be empty) |
| <code>url</code> | the URL specifying the path of the file to be deleted |

Returns -1 on error.

2.12 LED

2.12.1 `nb_led_acquire`

```
int nb_led_acquire (int led)
```

The `nb_led_acquire` function will acquire the specified LED for a particular script. Any associated system indication on that LED will be stopped until the LED is released again.

| | |
|------------------|--|
| <code>led</code> | the LED number to be acquired (starting from left/top) or <code>LED_ALL</code> for all LEDs |
|------------------|--|

Returns -1 on error, otherwise zero. Please note that the status LED cannot be acquired.

2.12.2 `nb_led_release`

```
int nb_led_release (int led)
```

The `nb_led_release` function will release an acquired LED again.

| | |
|------------------|--|
| <code>led</code> | the LED number to be released or <code>LED_ALL</code> for all LEDs |
|------------------|--|

Returns -1 on error, otherwise zero.

2.12.3 `nb_led_set`

```
int nb_led_set (int led, int mode)
```

The `nb_led_set` function will set the specified LED to a specific mode.

| | |
|-------------------|--|
| <code>led</code> | the LED number to be released or <code>LED_ALL</code> for all LEDs |
| <code>mode</code> | the LED mode to be applied |

Returns -1 on error, otherwise zero.

LED modes can be specified by OR'ing the following colors and types:

| | |
|------------------|-----------------------|
| LED_OFF | turn off LED |
| LED_COLOR_GREEN | color is green |
| LED_COLOR_RED | color is red |
| LED_COLOR_YELLOW | color is yellow |
| LED_SOLID | type is solid |
| LED_BLINK_FAST | type is fast blinking |
| LED_BLINK_SLOW | type is slow blinking |

2.13 Config/Software Update

The following functions can be used to trigger a configuration or software update of the system. An Uniform Resource Locator (URL) can have the following format:

```
http://<username>:<password>@<host>:<port>/<path>
https://<username>:<password>@<host>:<port>/<path>
ftp://<username>:<password>@<host>:<port>/<path>
sftp://<username>:<password>@<host>:<port>/<path>
tftp://<host>/<path>
file:///<path>
```

Please bear in mind that calling `nb_update_software` will result in a system reboot. The `nb_update_config` call will restart the SDK which will terminate your scripts. Thus, it is recommended to exit the script after calling this function and check the result later on via `nb_update_status`.

If a file URL is used, the path must correspond to an absolute path to the root directory. Using `/tmp` for update tasks is currently not possible.

2.13.1 nb_update_status

```
string nb_update_status (void)
```

The `nb_update_status` function returns the status of the last or currently running update operation.

The following strings can be returned:

no update is running

```
xy update has started
xy update is running
xy update has succeeded
xy update has failed
xy is up-to-date
```

With xy being one of:

```
config
software
license
firmware
sshkeys
```

2.13.2 nb_update_config

```
int nb_update_config (string url)
int nb_update_config (string url, bool incremental)
```

The `nb_update_config` function will perform a configuration update from the specified URL. If `incremental` is false configuration parameters which are not included in the new configuration will be reset to factory defaults. Otherwise they will be omitted.

| | |
|--------------------------|----------------------------|
| <code>url</code> | the URL of the config file |
| <code>incremental</code> | perform incremental update |

Returns zero on success.

Please note that any running SDK script will be terminated during the update process. Thus, the script must exit after `nb_update_config()` has been called.

2.13.3 nb_update_software

```
int nb_update_software (string url)
```

The `nb_update_software` function will perform a software update from the specified URL.

| | |
|------------------|-------------------------------|
| <code>url</code> | the URL of the software image |
|------------------|-------------------------------|

Returns zero on success.

2.13.4 nb_update_sshkeys

```
int nb_update_sshkeys (string url)
```

The `nb_update_sshkeys` function will perform an update of the SSH authorized keys.

| | |
|------------------|--------------------------|
| <code>url</code> | the URL of the keys file |
|------------------|--------------------------|

Returns zero on success.

2.14 Web Pages

The following functions can be used to implement your own pages within the Web Manager. Such a page will appear under the SDK menu as soon as it has been registered.

2.14.1 nb_page_register

```
int nb_page_register (int id, string title)
int nb_page_register (int id, string title, string submenu)
```

The nb_page_register function registers a new page with the specified identifier and title. If submenu is specified it will be hooked into the specified menu.

| | |
|---------|------------------|
| id | identifier |
| title | page title |
| submenu | submenu for page |

Returns -1 on error, otherwise a page struct which can be used for other page functions.

2.14.2 nb_userpage_register

Registers a new page which is also accessible by non-admin users, see nb_page_register().

2.14.3 nb_page_unregister

```
int nb_page_unregister (struct page)
```

The nb_page_unregister function can be used to unregister a page again.

| | |
|------|-------------|
| page | page struct |
|------|-------------|

Returns -1 on error, otherwise zero.

2.14.4 nb_page_request

```
struct nb_page_request (struct page)
```

The nb_page_request function listens for incoming requests.

| | |
|------|-------------|
| page | page struct |
|------|-------------|

Returns void on error, otherwise a request struct which holds possible GET and POST parameters.

2.14.5 nb_page_respond

```
int nb_page_respond (struct page, string fmt, ...)
```

The nb_page_respond function can be used to echo back a string to the request and can be called multiple times until nb_page_finish is called. It supports a format string and additional arguments that are formatted accordingly. Please refer to the printf function for more information about formatting options.

| | |
|------|---------------|
| page | page struct |
| fmt | format string |

Returns -1 on error and zero on success.

2.14.6 nb_page_finish

```
int nb_page_finish (struct page)
```

The nb_page_finish function can be used to finish a request. Any data will be passed to the client then.

| | |
|------|-------------|
| page | page struct |
|------|-------------|

Returns -1 on error and zero on success.

2.15 Voice

The voice control functions mentioned below can be used to control the behaviour of the voice gateway which is responsible for dispatching calls between Voice-Over-Mobile, SIP and Audio endpoints.

Calls are represented as structs which may look like:

```
struct(5): {
  .id = int: 12345
  .state = string[7]: "dialing"
  .calling = string[24]: "sip://user@192.168.1.254:5060"
  .called = string[22]: "vom://+123456789@Vom1"
};
```

The following states are possible:

| | |
|----------|---------------------------|
| routing | call is in routing state |
| dialing | call is in dialing state |
| alerting | call is in alerting state |
| active | call is active |

```
hungup          call had hung up
```

In common, the functions can operate with either a call identifier or the call struct itself (e.g. if further parameters need to be provided).

Endpoints are represented as structs which may look like:

```
struct(3): {
  .id = int: 54321
  .desc = string[5]: "vom://Vom1"
  .state = string[4]: "busy"
  .volume = int: 7
};
```

Endpoints can be specified by ID or a descriptor which can be made up as follows:

| | |
|------|-------------------------|
| Sip1 | First SIP subscriber |
| Vom1 | First Voice-Over-Mobile |
| Aud1 | First Audio device |

The following URLs are valid descriptors as well:

| | |
|-------------------------------|----------------------------------|
| 54321 | endpoint ID |
| vom://++123 | Voice-Over-Mobile number |
| vom://++123@Vom1 | Voice-Over-Mobile number on Vom1 |
| sip://user@192.168.1.254:5060 | SIP address |
| sip://user | SIP user (must be subscribed) |
| aud://Aud1 | Audio device |
| nil://Nil1 | Null device |

The following states are possible:

| | |
|-----------|------------------------------------|
| busy | endpoint is already holding a call |
| available | endpoint is ready to take a call |

2.15.1 nb_voice_event

```
struct nb_voice_event (int timeout)
```

The nb_voice_event function listens for any new voice events.

```
timeout          timeout in seconds
```

Returns void on error, otherwise a struct holding the event type and the according call:

```
struct(2): {
  .type = string[8]: "dispatched"
```

```
.call = struct(5): {
  .id = int: 12345
  .state = string[7]: "alerting"
  .calling = string[24]: "sip://user@192.168.1.254:5060"
  .called = string[22]: "vom://+123456789@Vom1"
}
};
```

The following event types are possible:

| | |
|------------|--|
| incoming | call is coming in from calling endpoint (ready to route) |
| outgoing | call is going out to calling endpoint (ready to route) |
| dialing | call is dialing the called endpoint |
| dispatched | call has been dispatched (alerting the called endpoint) |
| connected | call is connected to the called endpoint |
| hungup | call has hung up |

2.15.2 nb_voice_endpoint_list

```
array nb_voice_endpoint_list (void)
```

The `nb_voice_endpoint_list` function lists all currently known endpoints. Returns void on error, otherwise an array holding the endpoint structs.

2.15.3 nb_voice_endpoint_get

```
struct nb_voice_endpoint_get (endpoint)
```

The `nb_voice_endpoint_get` function can be used to lookup or update a specific endpoint.

| | |
|----------|-----------------------------------|
| endpoint | endpoint struct, ID or descriptor |
|----------|-----------------------------------|

Returns void on error, otherwise the corresponding endpoint struct.

2.15.4 nb_voice_call_list

```
array nb_voice_call_list (void)
```

The `nb_voice_call_list` function lists all currently known calls. Returns void on error, otherwise an array holding the call struct.

2.15.5 nb_voice_call_get

```
struct nb_voice_call_get (call)
```

The nb_voice_call_get function can be used to lookup or update a specific call.

```
call    call struct or id
```

Returns void on error, otherwise the corresponding call struct.

2.15.6 nb_voice_call_dial

```
int nb_voice_call_dial (call)
```

The nb_voice_call_dial function can be used to dial a new call.

```
call    call struct
```

Returns -1 on error, otherwise the corresponding result.

2.15.7 nb_voice_call_accept

```
int nb_voice_call_accept (call)
```

The nb_voice_call_accept function can be used to accept calls in dispatch state.

```
call    call struct or id
```

Returns -1 on error, otherwise the result.

Remark: This function can be used to take a call for audio endpoints.

2.15.8 nb_voice_call_route

```
int nb_voice_call_route (call, endpoint)
```

The nb_voice_call_route function can be used to route incoming or outgoing calls to a dedicated endpoint.

```
call          call struct or id
endpoint      endpoint struct, ID or descriptor
```

Returns -1 on error, otherwise the result.

2.15.9 nb_voice_call_hangup


```
int nb_voice_call_hangup (call)
```

The nb_voice_call_hangup function can be used to hangup or drop a call.

```
call    call struct or id
```

Returns -1 on error, otherwise the result.

2.15.10 nb_voice_call_volume

```
int nb_voice_call_volume (endpoint, int level)
```

The nb_voice_call_volume function can be used to adjust the volume level of a call.

```
endpoint    endpoint struct, ID or descriptor
level      volume level (0 to 7)
```

Returns -1 on error, otherwise the result.

2.16 SNMP

The SNMP functions below offer facilities to

- expose certain OIDs to the SNMP agent
- extend the list of MIB entities
- run SET or GET commands
- issue SNMP traps

Only integer and octet string entities are currently supported.

2.16.1 nb_snmp_register

```
int nb_snmp_register (string name, int ext, string type, string mode)
```

The nb_snmp_register function will register a MIB entity.

```
name    name of entity
ext     the OID extension number of the entity
type    type of entity (i for integer, s for octet string)
mode    mode of entity
```

Returns -1 on error. Please note that only scalars are currently supported.

2.16.2 nb_snmp_link

```
int nb_snmp_link (void)
```

The nb_snmp_link function will link any registered MIB entities to the agent. The entities will be accessible from an SNMP client over .1.3.6.1.4.1.<vendor>.10.90 after this function has been called. The default values are 0 for integers and an empty string for octet strings.

Returns -1 on error.

2.16.3 nb_snmp_update

```
int nb_snmp_update (string name, string value)
```

The nb_snmp_update function will update the specified MIB entity to the given value.

| | |
|-------|-----------------|
| name | name of entity |
| value | value to be set |

Returns -1 on error.

2.16.4 nb_snmp_listen

```
int nb_snmp_listen (int timeout)
```

By using the nb_snmp_listen function it is possible to get notified as soon as an entity has been set by a client.

| | |
|---------|----------------------------|
| timeout | timeout to wait in seconds |
|---------|----------------------------|

Returns a struct containing the name and value of the set entity. Otherwise, void will be returned

2.16.5 nb_snmp_unlink

```
int nb_snmp_unlink (void)
```

The nb_snmp_unlink function disconnects any MIB entities from the agent. Returns -1 on error.

2.16.6 nb_snmp_host

```
int nb_snmp_host (string host, int port, int version, string community)
```

```
int nb_snmp_host (string host, int port, int version, string user,
                 string password, string auth, string priv)
int nb_snmp_host (string host, int port, int version, string user,
                 string password, string auth, string priv, string engine)
```

The nb_snmp_host function will set the SNMP host for running SET or GET requests. For an SNMPv1/v2 host the parameters are:

| | |
|-----------|-----------------------|
| host | hostname or address |
| port | trap port |
| version | SNMP version (1 or 2) |
| community | community string |

For an SNMPv3 host the parameters are:

| | |
|---------|--------------------------------------|
| host | hostname or address |
| port | port |
| version | SNMP version (3) |
| user | username |
| pass | password |
| auth | authentication protocol (MD5 or SHA) |
| priv | privacy protocol (DES or AES) |
| engine | engine ID |

Returns -1 on error.

2.16.7 nb_snmp_get

```
void nb_snmp_get (string oid)
```

The nb_snmp_get function will perform a GET request for the specified OID. An SNMP host has to be set with nb_snmp_host prior to using that function.

| | |
|-----|-----------------|
| oid | the queried OID |
|-----|-----------------|

This function returns void in case an error occurred, an integer value if OID represent an integer or a string value if OID represents an octet string.

2.16.8 nb_snmp_set

```
int nb_snmp_set (string oid, string type, string value)
```

The nb_snmp_set function will perform a SET request for the specified OID. An SNMP host has to be set with nb_snmp_host prior to using that function.

| | |
|-----|-------------------|
| oid | the OID to be set |
|-----|-------------------|

```
type    the OID type ("i" for integer or "s" for octet string)
value   the value to be set
```

Returns -1 on error.

2.16.9 nb_snmp_traphost

```
int nb_snmp_traphost (string host, int port, int version, string
community)
int nb_snmp_traphost (string host, int port, int version, string user,
string password, string auth, string priv)
int nb_snmp_traphost (string host, int port, int version, string user,
string password, string auth, string priv, string engine)
```

The nb_snmp_traphost function will set the host for sending SNMP traps. The same parameters as for nb_snmp_host apply. Returns -1 on error.

2.16.10 nb_snmp_trap

```
string nb_snmp_trap (string oid, string type, string value)
```

The nb_send_trap function will send an SNMP trap with the specified OID to a remote traphost.

| | |
|-------|---|
| oid | SNMP object identifier of the trap |
| type | type of value to be sent ('n' for null, 'i' for integer and 's' for octet string) |
| value | value to be sent |

Please note that a traphost has to be set with nb_snmp_traphost prior to using this function.

Returns -1 on error.

2.16.11 nb_snmp_inform

```
string nb_snmp_inform (string oid, string type, string value)
```

The nb_send_inform function will send an SNMPv3 inform with the specified OID to a remote traphost.

| | |
|-------|--|
| oid | SNMP object identifier of the trap |
| type | type of value to be sent ('e' for empty, 'i' for integer and 's' for octet string) |
| value | value to be sent |

Please note that a traphost has to be set with `nb_snmp_traphost` prior to using this function.

Returns -1 on error.

2.17 MQTT

2.17.1 nb_mqtt_publish

```
int nb_mqtt_publish (string host, int port, string username, string password, string topic, int qos, int retain, string message)
```

The `nb_mqtt_publish` function can be used to publish a mqtt message on a specified topic.

| | |
|----------|---|
| host | IP-address or hostname of the broker to connect to |
| port | network port to connect to (default value is 1883) |
| username | necessary if the mqtt broker requires authentication |
| password | optional password for the username mentioned above |
| topic | the topic the message will be published to topics are case sensitive and must consist of at least one character / is used as topic level separator topics shouldn't start with / because it wastes one layer + and # are wildcard characters and are not valid in publish topics \$ is a character reserved for mqtt system messages and can not be used |
| qos | quality of service used for the message 0 = publish at most one (fire and forget) 1 = publish at least once (message can also be delivered more than once) 2 = publish exactly once (guarantees that each message is received only once) higher qos levels result in more traffic |
| retain | is used to make the broker store the last message sent to a specific topic 0 = the message will not be stored 1 = the message will be stored and send to a new subscriber of that topic |
| message | the message that is going to be published |

Returns -1 on error, otherwise zero.

2.18 CAN

The following functions can be used to communicate with the CAN interface.

2.18.1 nb_can_setattr

```
int nb_can_setattr (string ifc, int bitrate, int listenonly, int restart)
```

The nb_can_setattr function can be used to set the attributes of a CAN interface.

| | |
|------------|---|
| ifc | name of interface (e.g. can0) |
| bitrate | bitrate (e.g. 500000) |
| listenonly | sets ctrlmode listenonly |
| restart | restart timeout in case of a bus-off (0 = disabled) |

Returns -1 on error, otherwise zero.

2.18.2 nb_can_open

```
int nb_can_open (string ifc)
```

| | |
|-----|-------------------------------|
| ifc | name of interface (e.g. can0) |
|-----|-------------------------------|

The nb_can_open function enables the specified interface and returns a raw socket descriptor. Please note that the attributes (e.g. bitrate) have to be set in advance before opening any interface.

Returns -1 on error.

2.18.3 nb_can_close

```
int nb_can_close (int socket)
```

| | |
|--------|-------------------|
| socket | socket descriptor |
|--------|-------------------|

The nb_can_close function closes the specified socket descriptor and disables the associated interface. Returns -1 on error.

2.18.4 nb_can_setfilter

```
int nb_can_setfilter (int socket, int id, int mask)
```

The nb_can_setfilter function can be used to specify which CAN frames shall be filtered out and which shall be passed to the upper layers.

| | |
|--------|-------------------|
| socket | socket descriptor |
| id | CAN filter ID |
| mask | CAN filter mask |

Returns -1 on error.

A filter matches if received-id & mask == id & mask. The filter can also be inverted (CAN_INV_FILTER bit set in id) or it can filter for error frames (CAN_ERR_FLAG bit set in mask).

2.18.5 nb_can_sendonly

```
int nb_can_sendonly (int socket)
```

The nb_can_sendonly function can be used to disable the reception of CAN frames on the selected socket.

| | |
|--------|-------------------|
| socket | socket descriptor |
|--------|-------------------|

Returns -1 on error.

2.18.6 nb_can_recvmsg

```
struct nb_can_recvmsg (int socket, int timeout)
```

| | |
|---------|--|
| socket | socket descriptor |
| timeout | timeout to wait for a message (0 means infinite) |

The nb_can_recvmsg function can be used to receive a raw message from the CAN bus. Returns void on error, otherwise it returns a msg struct containing the fields:

| | |
|------|-----------------------------------|
| id | 32 bit CAN ID + EFF/RTR/ERR flags |
| data | received data (max. 8 bytes) |
| len | size of received data |

The ID can be examined using the following bit operators:

| | |
|--------------|-----------------------------|
| CAN_EFF_FLAG | EFF/SFF is set in the MSB |
| CAN_RTR_FLAG | remote transmission request |
| CAN_ERR_FLAG | error frame |
| CAN_SFF_MASK | standard frame format (SFF) |
| CAN_EFF_MASK | extended frame format (EFF) |
| CAN_ERR_MASK | omit EFF, RTR, ERR flags |

2.18.7 nb_can_sendmsg

```
int nb_can_sendmsg (int socket, struct msg)
```

| | |
|--------|----------------------------|
| socket | socket descriptor |
| msg | message struct (id + data) |

The nb_can_sendmsg function can be used to send a raw message to the CAN bus. Returns -1 on error, otherwise zero.

2.19 Network

2.19.1 nb_gethostbyname

```
array nb_gethostbyname (string host)
```

The nb_gethostbyname function performs a DNS lookup for the given hostname and returns an array of resolved IP addresses.

| | |
|------|-------------------------|
| host | the to be resolved host |
|------|-------------------------|

Returns an empty array if host could not be resolved. Please note that a valid DNS server must be available when using this function.

2.19.2 nb_ifc_address

```
string nb_ifc_address (string interface)
```

The nb_ifc_address function can be used to obtain the first address of an interface.

| | |
|-----------|-------------------------------------|
| interface | internal interface name (e.g. lan0) |
|-----------|-------------------------------------|

Returns the interface address or an empty string on error.

2.19.3 nb_ping

```
int nb_ping (string host)
int nb_ping (string host, int timeout)
```

The nb_ping function will send ICMP ping packets to the specified host and returns whether the host correctly responded or not.

| | |
|---------|---|
| host | the host to ping |
| timeout | timeout waiting for a reply (in milliseconds) |

Returns 1 in case the host is alive, 0 if down and -1 on error.

2.19.4 nb_arp_ping

```
int nb_arp_ping (string host)
```

The nb_arp_ping function will send an ARP request for the specified host and returns whether the host address has been successfully resolved.

| | |
|------|--------------------------|
| host | the host address to ping |
|------|--------------------------|

Returns 1 in case the specified host could be resolved, 0 if not and -1 on error.

2.19.5 nb_arp_gratuitous

```
int nb_arp_gratuitous (string ifc)
int nb_arp_gratuitous (string ifc, string host)
```

The nb_arp_gratuitous function will send an gratuitous ARP advert for the address of the specified interface (or the host address provided). This can be used to update the ARP tables of your neighbors.

| | |
|------|--|
| ifc | the interface on which the packet should be sent |
| host | the host address to advert |

Returns 1 in case the packet has been sent or -1 on error.

2.19.6 nb_etherwake

```
int nb_etherwake (string hwaddr, string ifc)
```

The nb_etherwake function will send a WakeOnLan magic packet to wake up sleeping hosts.

| | |
|--------|---|
| hwaddr | the Ethernet MAC address of the host |
| ifc | the interface on which the packet is sent |

Returns 0 in case the packet has been successfully sent or -1 on error.

2.20 OPC-UA

The OPC-UA functions below offer facilities to

- connect to an OPC-UA server
- browse the node store
- search for nodes
- read/write values from/to nodes

Please note that only integer, string, double and boolean values are currently supported. A node struct is usually represented as struct with the following fields:
 namespace-index the namespace index node-id the node identifier browse-name the name shown when browsing display-name the display name

2.20.1 nb_opcua_connect

```
int nb_opcua_connect (string url)
```

The nb_opcua_connect function will connect to an OPC-UA server.

| | |
|-----|--|
| url | the server URL ("opc.tcp:// . . . : . . . ") |
|-----|--|

Returns a client session descriptor or -1 on error.

2.20.2 nb_opcua_browse

```
int nb_opcua_browse (int client, int nindex, value nid, int depth)
```

The nb_opcua_browse function will browse recursively the children of the specified node.

| | |
|--------|--|
| client | the descriptor of the client session |
| nindex | the namespace index of the node |
| nid | the node identifier from where browsing starts |
| depth | specifies how deep the node tree will be descended |

Returns an array of node structs or void on error.

2.20.3 nb_opcua_search

```
int nb_opcua_search (int client, value pattern)
```

The nb_opcua_search function will search in the entire namespace at the server for nodes matching the given pattern.

| | |
|---------|--------------------------------------|
| client | the descriptor of the client session |
| pattern | the pattern to search for |

Returns an array of node structs with found nodes or void on error.

2.20.4 nb_opcua_read

```
value nb_opcua_read (int client, int nindex, int nid)
```

The `nb_opcua_read` function will read the value of the given node.

| | |
|---------------------|--------------------------------------|
| <code>client</code> | the descriptor of the client session |
| <code>nindex</code> | the namespace index of the node |
| <code>nid</code> | the node identifier |

Returns the value of the given node or void on error.

2.20.5 `nb_opcua_write`

```
int nb_opcua_write (int client, int nindex, int nid, value val)
```

The `nb_opcua_write` function will change the value of the given node.

| | |
|---------------------|--------------------------------------|
| <code>client</code> | the descriptor of the client session |
| <code>nindex</code> | the namespace index of the node |
| <code>nid</code> | the node identifier |
| <code>val</code> | the new value for the node |

Returns zero or -1 on error.

2.20.6 `nb_opcua_disconnect`

```
int nb_opcua_disconnect (int client)
```

The `nb_opcua_disconnect` function will disconnect the client from the server

| | |
|---------------------|--------------------------------------|
| <code>client</code> | the descriptor of the client session |
|---------------------|--------------------------------------|

Returns -1 on error.

2.21 Certificates

2.21.1 `nb_cert_install`

```
int nb_cert_install (string cert, string password, string url)
```

The `nb_cert_install` function installs a certificate from the given URL.

Valid certificate identifiers are:

- `root`
- `webserver`

```

- sshd
- openvpn-tunnel1, openvpn-tunnel2, ...
- openvpn-tunnel1-client0, ...
- wlan1, ...
- wlan1-1-client1, ...
- ipsectunnel1
- other
    
```

| | |
|----------|--|
| cert | Certificate to be installed |
| password | Password to decrypt the certificate file (Empty-String if no password is needed) |
| url | URL to read from (see Config/Software Update for examples of valid URL strings) |

Returns -1 on error.

2.21.2 nb_cert_create

```
int nb_cert_create (string cert)
```

The nb_cert_create function creates a certificate and installs it to the system. For valid certificate identifiers look at nb_cert_install.

| | |
|------|-----------------------------|
| cert | Certificate to be installed |
|------|-----------------------------|

Returns -1 on error.

2.21.3 nb_cert_enroll

```
int nb_cert_enroll (string cert)
```

The nb_cert_enroll function installs a certificate from a SCEP server. For valid certificate identifiers look at nb_cert_install. The SCEP context has to be configured to use this function.

| | |
|------|-----------------------------|
| cert | Certificate to be installed |
|------|-----------------------------|

Returns -1 on error.

2.21.4 nb_cert_erase

```
int nb_cert_erase (string cert)
```

The nb_cert_erase function removes an installed certificate from the system. For valid certificate identifiers look at nb_cert_install.

cert Certificate to be removed

Returns -1 on error.

2.21.5 nb_cert_read

```
string nb_cert_read (string cert)
```

The nb_cert_read reads an installed certificate from the system. For valid certificate identifiers look at nb_cert_install.

cert Certificate to read

Returns string holding the certificate as ASCII text. If there is no certificate installed for the requested certificate identifier, an empty string is returned.

2.22 Other

2.22.1 nb_syslog

```
int nb_syslog (string fmt, ...)
```

The nb_syslog function creates a message in the system log. Please refer to sprintf for more information about the format string and additional arguments.

msg message to be written to syslog

Returns -1 on error.

2.22.2 nb_event_get

```
string nb_event_get (int timeout)
```

The nb_event_get function will poll for system events.

timeout max. number of seconds to wait for an event

Returns the received event as string or an empty string in case the specified timeout has been reached.

2.22.3 nb_event_msg

```
struct nb_event_msg (int timeout)
```

The `nb_event_msg` function will poll for system events.

`timeout` max. number of seconds to wait for an event

Returns void in case case the specified timeout has been reached or a struct with the event string and optional parameters:

```
struct(2): {
    .event = string: "call-incoming"
    .param = string[10]: "+123456789"
};
```

2.22.4 `nb_reboot`

```
void nb_reboot (int delay)
```

The `nb_reboot` function will trigger a system reboot.

`delay` the delay in seconds

2.22.5 `nb_restart`

```
int nb_restart (string service)
```

The `nb_restart` function will restart the specified service.

`service` the service to be restarted

Returns -1 on error, otherwise zero.

2.22.6 `nb_reset_factory`

```
int nb_reset_factory ()
```

The `nb_reset_factory` function will reset the box to factory defaults. Returns -1 on error, otherwise zero. Please note that the system will reboot after this function has been called.

2.22.7 `nb_reset_statistics`

```
int nb_reset_statistics (string wanlink)
```

The `nb_reset_statistics` function will reset all statistics (e.g. link data counters).

`wanlink` the WAN link to reset (e.g. WANLINK1)

All interfaces will be reset if an empty wanlink (or "all" keyword) is used. Returns -1 on error, otherwise zero.

2.22.8 nb_wanlink_activate

```
int nb_wanlink_activate (string wanlink)
```

The nb_wanlink_activate function will activate a deactivated WAN link.

wanlink the WAN link to activate (e.g. WANLINK1)

Returns -1 on error, otherwise zero.

2.22.9 nb_wanlink_deactivate

```
int nb_wanlink_deactivate (string wanlink)
```

The nb_wanlink_deactivate function will deactivate an active WAN link.

wanlink the WAN link to deactivate (e.g. WANLINK1)

Returns -1 on error, otherwise zero.

2.22.10 nb_wanlink_priorize

```
int nb_wanlink_priorize (string wanlink, int prio)
```

The nb_wanlink_priorize function can be used to change the priority of a WAN link.

wanlink the WAN link to prioritize (e.g. WANLINK1)

prio the new priority

Returns -1 on error, otherwise zero.

2.22.11 nb_wanlink_weight

```
int nb_wanlink_weight (string wanlink, int weight)
```

The nb_wanlink_weight function can be used to change the weight of a WAN link.

wanlink the WAN link to prioritize (e.g. WANLINK1)

weight the new weight

Returns -1 on error, otherwise zero.

2.22.12 nb_reset_debug_level

```
int nb_reset_debug_level (string service)
```

The nb_reset_debug_level function will reset the debug level of the given service.

service the service to reset (e.g. link-manager)

Returns -1 on error, otherwise zero.

2.22.13 nb_set_debug_level

```
int nb_set_debug_level (string service, int level)
```

The nb_set_debug_level function will set the debug level of the given service.

service the service to set (e.g. link-manager)

level the debug level to set (0-7)

Returns -1 on error, otherwise zero.

2.22.14 nb_get_debug_level

```
int nb_get_debug_level (string service)
```

The nb_get_debug_level function can be used to get the debug level of the given service.

service the service to set (e.g. link-manager)

Returns the requested level or -1 on error.