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# **TWIG GPRS INTERFACE MODULE API Specification**

**Version 1.13**

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## 1 Related documents

TWIG Integrator Kit data sheet  
TWIG MPTP Specification

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### 3 General

TWIG GPRS Interface Module is a middleware software module for helping to connect TWIG devices to customer's Central Station system over GPRS.

TWIG devices communicate with Central Station using MPTP text strings (see MPTP Specification). The Central Station is expected to have a MPTP parser module, which can transmit and receive message strings to and from TWIG mobile devices in MPTP format.

Simplest way is to send and receive MPTP strings as SMS messages. The phone number (MSISDN) of the Mobile Station (TWIG device + SIM card) is used for addressing, identification and authentication. The Central Station transmits and receives SMS messages either through a SMS modem or through a connection to Mobile Operator's SMS gateway.

When MPTP messages are transferred over GPRS bearer, TWIG devices add a layer of GPRS control information in the MPTP text string, resulting in GPRS text string.

TWIG GPRS Interface module manages the layer of GPRS control information specific to TWIG devices:

- Abstraction of device identity
- Transmission acknowledgements
- GPRS connection control

The Central Station –system is expected to implement generic GPRS connection functions:

- Queuing of mobile terminated (MT) messages
- TCP connections management, including a connection identifier (example code available)
- A fixed IP address and port for TCP access from the Mobile Operator's GPRS gateway

TWIG GPRS Interface –module exchanges MPTP message strings with the MPTP parser – module of the Central Station. The API also passes permanent device identity. The Central Station is expected to implement the permanent device identity system. Mobile Station's phone number (MSISDN) or IMEI or another appropriate identity can be used as permanent device identity.

TWIG GPRS Interface –module exchanges GPRS message strings (MPTP string + GPRS control information) with the Customer GPRS Connection Layer –module of the Central Station. The API also passes connection identifier, to disambiguate between devices having connections open at the same time. The Customer GPRS Connection layer is expected to implement the dynamic connection identifier (example code available).

GPRS connection can generally be opened only by the Mobile Station. Mobile terminated (MT) messages thus have to be queued at the Central Station, until a GPRS connection is opened by the Mobile Station. The Central Station is expected to implement this MT GPRS messages queue function.

## 4 Definitions

Term	Description
GPRS Fixed Device Id	8 last digits of IMEI (received in GPRS messages from a device).
GPRS User Device Id	An Id configured to the device, (received in GPRS messages from a device). This can be e.g. MSISDN.
GPRS Connection Id	Identification of a GPRS connected device generated by GPRS connections layer. Used to identify the correct connection in GPRS connections layer when getting messages from TWIG GPRS Interface layer.

## 5 Windows

### 5.1 Files in TWIG GPRS Interface

This section describe the files and directories in the TWIG GPRS Interface – package.

1. TWIG GPRS Interface Core.dll
  - TWIGGPRSInterface.cs : Interfaces and parsing of incoming and outgoing GPRS messages
  - def.cs : signal definitions.
2. TWIG GPRS Interfaces Examples project
  - \* \_example.cs files correspond to each of the interfaces described in the block diagram in section [8] and can be used to test TWIG GPRS Interface as a separate module. Project references TWIG GPRS Interface Core.dll in the directory /bin/release.

In the interfaces Customer UI layer -> TWIG GPRS Interface layer and GPRS connection layer -> TWIG GPRS Interface layer function calls are used as shown in GPRS\_to\_TWIGGPRSInterface\_API\_example.cs and UI\_to\_TWIGGPRSInterface\_API\_example.cs correspondingly.

In the interfaces TWIG GPRS Interface layer -> Customer UI layer and TWIG GPRS Interface layer -> GPRS connection layer receiving side registers to listen newgprsmesssage and newuimessage - events as shown in TWIGGPRSInterface\_to\_GPRS\_API\_example.cs and TWIGGPRSInterface\_to\_UI\_API\_example.cs correspondingly.

TWIG GPRS Interface saves device specific data to the directory in which the DLL resides.

## 6 Unix

## 6.1 Directories and files in TWIG GPRS Interface

1. Main directory is TWIG\_GPRS\_Interface. You can put this to the html – directory.

2. AGPS – directory

Receiving of AGPS data.

3. api – directory

HTTP-interfaces

- a. GPRS\_TWIGGPRSInterfaceAPI.php – Interface from GPRS Connection layer to TWIG GPRS Interface layer (messages from device).
- b. TWIGGPRSInterface\_UIAPI.php - Interface from TWIG GPRS Interface layer to (messages from device).
- c. UI\_TWIGGPRSInterfaceAPI.php - Interface from UI layer to TWIG GPRS Interface layer (messages to device).
- d. TWIGGPRSInterface\_GPRSAPI.php - Interface from TWIG GPRS Interface layer to GPRS Connection layer (messages to device).

Files named \*\_testbench. These correspond to each of the above mentioned interfaces and can be used to test TWIG GPRS Interface as a separate module.

4. data – directory

TWIG GPRS Interface will write device information here.

5. include – directory

Configuration and logging.

6. daemon – directory

Implements GPRS daemon for handling connections to / from devices.

## 6.2 Using PhpExpress for compiled files

Some of the files have been precompiled to make execution faster.

1. Open php.ini (you can find this by executing phpinfo()).
2. Add line zend\_extension="/full/path/to/phpexpress-php-5.1.so" ( e.g. "/usr/local/lib/php/modules/phpexpress-php-5.1.so" pointing to the php extensions directory).
3. Put phpexpress-php-5.1.so PhpExpress library (from License management directory) to the directory specified above.
4. Stop and start Apache if you are running PHP as Apache module.
5. Execute phpinfo() and check that PhpExpress was properly installed (there will be a new section 'NuSphere PhpExpress').
6. Put TWIG\_GPRS\_Interface.lic TWIG GPRS Interface license file (from License management directory) to a directory in your PHP include path (phpinfo() : include\_path).

## 6.3 AGPS

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Once in a week you should run /GPS\_visible/update\_tle to get fresh ephemeris almanac.

2 functions and Cust\_ReadAGPSDataFromDb ( like in cust\_db\_testbench.php ) should be implemented on customer side to cache AGPS data.

#### Cust\_WriteAGPSDataToDb

saves the parameters

- *satellite* – number between 1 – 32
- *agps\_data* – string of length 120
- *timestamp* – number which is currently about 10 digits, space should be reserved for some digits more

#### Cust\_ReadAGPSDataFromDb

returns *agps\_data* and *timestamp* based on parameter *satellite* as saved by Cust\_WriteAGPSDataToDb

## 7 Signal definitions

All signals are sent by http requests. The signal names below are not themselves used in the code. Only the data they define is passed.

### 7.1 GPRS Connection layer -> TWIG GPRS Interface layer

#### 7.1.1 NewGPRSMessagesInd

GPRS connection layer sends this signal to TWIG GPRS Interface layer when a new GPRS message is received from a device.

Field type	Field name	Comments
string	signal	"NewGPRSMessagesInd"
string	gprsConnectionId	[4]
string	gprsMessage	GPRS message

### 7.2 TWIG GPRS Interface layer -> Customer UI layer

#### 7.2.1 NewMPTPMessageInd

TWIG GPRS Interface layer sends this signal to Customer UI layer when a new GPRS message is received from GPRS Connection layer.

Field type	Field name	Comments
string	signal	"NewMPTPMessageInd"
string	gprsFixedDeviceId	[4]
string	gprsUserDeviceId	[4]
string	mptpMessage	MPTP message

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## 7.2.2 DeviceOnlineInd

TWIG GPRS Interface layer sends this signal to Customer UI layer when a device makes a connection or when it is already connected but it sends a Heartbeat message to the server.

Field type	Field name	Comments
string	signal	"DeviceOnlineInd"
string	gprsFixedDeviceId	[4]
string	gprsUserDeviceId	[4]

## 7.3 Customer UI layer -> TWIG GPRS Interface layer

### 7.3.1 SendMPTPMessageReq

Customer UI layer sends this signal to TWIG GPRS Interface layer when it needs to send a new MPTP message.

Field type	Field name	Comments
String	signal	"SendMPTPMessageReq"
String	gprsFixedDeviceId	[4]
String	mptpMessage	MPTP message.
Integer	messagePending	1 when there is more messages in the pending queue otherwise 0.

### 7.3.2 SendMPTPMessageCnf

TWIG GPRS Interface layer sends this signal to Customer UI layer as a response to SendMessageReq.

Field type	Field name	Comments
string	signal	"SendMPTPMessageCnf"
string	gprsFixedDeviceId	[4]
string	gprsUserDeviceId	[4]
integer	messageSentStatus	1 when message was delivered to device, 0 when device was not connected.

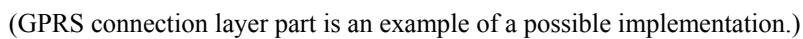
## 7.4 TWIG GPRS Interface layer -> GPRS connection layer



### 7.4.1 SendGPRSMessagesReq

TWIG GPRS Interface layer sends this signal to GPRS connection layer when it has received a new MPTP message from Customer UI layer.

Field type	Field name	Comments
string	signal	"SendGPRSMessagesReq"
string	gprsConnectionId	[4]
string	gprsMessage	GPRS message



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## 9 TWIG GPRS Q&A

Q: Cannot get GPRS connection. What is wrong?

A: Please check that the mobile operator's APN, DNS1, DNS2, username and password settings (Protector Configure #12, #15, #16, #17 and #18) are correct. You can get the settings from your mobile operator. For many operators, only APN needs to be defined and other parameters can be left blank.

A: Also check that GPRS connection instead of SMS is selected (Protector configure #22).

Q: I replaced the GPRS access point IP address and port by that of our server's (Protector Configure settings #14 and #13). But no data is sent by the device. What is wrong?

Inverted G symbol appears on display, so GPRS connection is on. After powering off and on, the IP setting is changed back to default TWIG IP (192.83.5.99).

A: Please check that your devices were purchased with custom IP address option (e.g. TWIG Protector: sales code SW3008). You can also field upgrade a device with custom IP address option, by using the HW Tool PC application to program in the license key.

Q: Why does my TWIG device send location updates to server always with SMS? I have selected GPRS connection and it works.

A: When you send ?LOC or ?TRG commands to a TWIG device over SMS or GPRS, it responds in kind. So to activate e.g. GPRS tracking, please send ?TRG command with GPRS!

Q: Why does my TWIG device sometimes send location updates to server with SMS? I have selected GPRS connection and it works.

A: Have you enabled SMS backup for GPRS connections? If SMS backup (Protector Configure #19) is enabled, then messages are sent using SMS if GPRS connection for some reason is not available.

Q: Can I use phone number (MSISDN) to identify and address the mobile devices in my tracking application?

Q: Can I use the IMEI number to identify and address the mobile devices in my tracking application?

A: Yes, it's ok to identify and address mobiles by IMEI, or MSISDN, or any other unique identifier.

TWIG GPRS air protocol has two identifiers for mobile station:

- GPRSDeviceFixedID: 8 last digits of the device IMEI. Read automatically from the device.
- GPRSDeviceUserID: Unique identifier programmed to the device by system administrator (Protector Configure #11). Typically this is the MSISDN, but it could be also the IMEI, or another unique identifier, or it could be blank.

The TWIG GPRS Interface layer passes to the host application both identifiers. The host application addresses mobile device by passing GPRSDeviceFixedID to the TWIG GPRS Interface layer.

Q: What is GPRSConnectionID?

A: GPRSConnectionID is a unique identifier assigned for each new GPRS connection by the Customer GPRS Connection layer. TWIG GPRS Interface layer supports two alternative ways to implement GPRSConnectionID:

- GPRSConnectionID can be equal to GPRSDeviceFixedID (8 last digits of IMEI). In this case, the Customer GPRS Connection layer needs to have a parser module which reads GPRSDeviceFixedID value from the incoming GPRS message and gives this value to the new GPRS connection.

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- GPRSConnectionID can be any unique connection identifier, assigned by the Customer GPRS Connection layer. The TWIG GPRS Interface layer uses this identifier to address mobile device when sending message to Customer GPRS Connection layer.

Q: What is the Customer GPRS Connection layer?

A: We assume that your system has a GPRS/TCP/IP connections management module which connects with the TWIG GPRS Interface module. The task of the GPRS connections management module is to provide a point of contact (with fixed IP address & port) for the mobile unit's GPRS/TCP/IP connections, to assign a unique dynamic identity to each new connection, and to exchange the TCP/IP messages between mobile unit and GPRS Interface.

Q: How do I implement the GPRS Connection layer?

A: If you have previously used GPRS devices with your server, you should have the necessary software components ready, and you connect to them with the TWIG GPRS Interface APIs.

If you have not previously implemented GPRS connections to your server, we have some example code, implementing the GPRS connections management module (daemon).

Q: What happens when my host application sends a GPRS message but there is no GPRS connection on?

A: If there is no GPRS connection then the outgoing messages stay in a queue waiting until next connection is made. The host application needs to implement a queue for outgoing GPRS messages. The MessagePending –signal of the API tells to the TWIG GPRS Interface layer whether GPRS connection should be kept open for further messages, or if the device is given permission to close connection.

Q: How should my host application's outgoing GPRS messages queue work?

A: Twig GPRS protocol is now designed so that every mobile terminated (MT) message is acknowledged by the mobile before next one is sent by server. As long as host application keeps the MessagePending –signal on, the TWIG GPRS Interface layer asks mobile to keep connection on by sending the appropriate GPRS termination code.

As an example the host application has a message '?LOC' to send. Device makes GPRS connection and the message is sent. Host application waits for the acknowledgement. When it gets SendMPTPMessageCnf containing the identifiers for the device, it can send another message in the queue if there is one and so on.

Q: Can I send several messages to the mobile? Can the GPRS queue be several messages long?

A: Yes, it is ok to have more than 1 pending message. One message at a time is sent from the queue, and then system waits for response from the mobile, and then next message is sent and so on. The GPRS queue shall be implemented in the host application.

Q: How can I control GPRS connections?

A: GPRS connection strategy is controlled by the device GPRS parameters:

- Connection mode (Protector Configure #20)
  - Always: GPRS connection is always on
  - Only reconnect: GPRS connection is always disconnected after transfer of pending messages. Connection is reopened when time [reconnect interval] (Protector Configure #21) has elapsed since last connection.
  - When in charger: connection always on when in charger, and reconnect when battery powered
- Reconnect interval (Protector Configure #21): Shorter time gives faster average delivery time for mobile terminated (MT) messages. Longer time gives better battery life and less data cost.
- International roaming block (Protector Configure #23): Allow GPRS connections only when mobile device is in its home network. International GPRS roaming is usually charged per kB and can be outrageously expensive, compared to domestic flat data rates. Care should be taken to control data cost when roaming.

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Q: Is it possible to access the IMEI number of a TWIG device?

A: The GPRSDeviceFixedID always contains the 8 last digits of IMEI, automatically read from the device.

Q: Why would GPRSConnectionID not necessarily be the IMEI number?

A: The TWIG GPRS Interface layer is intended to be easy to integrate in existing systems with also other GPRS devices. The GPRS tranceiver might assign a dynamic identifier to each new GPRS connection, before GPRS message is parsed and device identity can be found out.

Q: What happens if at the moment of alert there is no GPRS connection?

A: Whenever the mobile device has information to send to server, the device tries to open GPRS connection.

Q: What happens if no GPRS connection can be made?

A: If no GPRS connection with server can be established, the TWIG device will make a new attempt after reconnect interval time (Protector Configure #21).

If GPRS SMS backup (Protector Configure #19) is enabled, then the device will send SMS if GPRS connection is not available.

TWIG Protector and TWIG Discovery Pro always send emergency messages using SMS.

Q: Are messages that cannot be sent now sent later? Does the the Twig Protector have a memory that saves messages not sent?

A: TWIG devices generally do not store messages. If a message cannot be transmitted to server, it will be discarded.

TWIG Protector and TWIG Discovery Pro always send emergency messages using SMS. For emergency messages, several parallel SMS numbers can be specified.

Some TWIG devices can store location history in the device.

## 10 Change history

Date	Rev	Author	Description
23.10.2009	1.06	ETa	NewGPRSMessagesInd : field names fixed gprsId -> gprsConnectionId, message -> gprsMessage.
23.10.2009	1.06	ETa	Field 'signal' added to all signals.
23.10.2009	1.06	ETa	Field 'gprsConnectionId' added to all signals from Twig GPRS Interface layer to Customer UI layer.
23.10.2009	1.07	ETa	Definitions section added.
23.10.2009	1.07	ETa	Changed: gprsDeviceId -> gprsUserDeviceId.
23.10.2009	1.07	ETa	Changed: Field 'gprsFixedDeviceId' used in all signals from Twig GPRS Interface layer to Customer UI layer instead of gprsConnectionId.
26.10.2009	1.07b	JN	Q&A added
03.11.2009	1.08	ETa	Customer GPRS connection layer details added to block diagram.
10.11.2009	1.09	ETa	Visual changes to block diagram.
11.11.2009	1.10	ETa	Added sections 'Using PhpExpress for compiled files' and 'Directories and files in TWIG GPRS Interface'.
02.12.2009	1.11	ETa	Added Windows-section. Removed 'HTTP-interface's from

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			block diagram.
14.12.2009	1.12	ETa	Windows section updated.
11.05.2010	1.13	ETa	AGPS feed added. Directories section fixed. AGPS updated to block diagram.