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Teseo III

Server-based Assisted GNSS

Quick Testing Guide

May 2020



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Introduction

Teseo III ICs and Modules support three types of Assisted GNSS:

- **ST-AGNSS**
- **Predictive AGNSS**
- **Real-time AGNSS**

Predictive AGNSS and Real-time AGNSS are server-based solutions built on our partnership with RxNetworks.

Predicted

P-AGNSS predicts satellite data based on data downloaded by an assistance server

14-day prediction

Assistance server available for free for Teseo-Modules;

Please contact the ST sales office for more information.

TTFF ~ 1-4s

Real-Time

RT-AGNSS uses real-time satellite data downloaded by an assistance server

Continuous/Real-Time

Assistance server available for free for Teseo-Modules;

Please contact the ST sales office for more information.

TTFF <= 1s



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1. Request the Teseo III password

- Generate the server password using the command (API-v.8):

```
$PSTMSTAGPS8PASSGEN, <gpsTime>, <vendorId>, <modelId>* <checksum> \n\r
```

	vendorID	modelID
Teseo-LIV3F	ZYDLLXxEH94dEeX2	MYST
TeseoIII-ROM	ZYDLLXxEH94dEeX2	MYST
Standard Binary Image	Contact ST sales office	---



2. Acquire the password

- In response of \$PSTMSTAGPS8PASSGEN Teseo III sends a message with deviceID and password:

```
$PSTMSTAGPS8PASSRTN,<deviceID>,<passwd>*<checksum>\r\n
```

DeviceID and Password have to be used to fill the HTTP_POST_Req Header



3 trigger an HTTP_REQ_POST

Trigger an HTTP POST Request on the RxNetwork server with the required fields based on:

- Selected service (i.e.: Predictive or Real-Time)
- Selected constellation satellite data (i.e.: GPS, Glonass, Galileo, BeiDou, or QZSS)
- Your application needs (see the following slides)



3.A trigger an HTTP_REQ_POST

- **Predictive Assisted-GNSS**

- **Header:**

```
POST http://stm.api.location.io:80/rxn-api/locationApi HTTP /1.1 Accept:
application/json Content-Type:application/json Authorization: RXN-SP
cId=ZYDLLXxEH94dEeX2,mId=MYST,dId=<deviceID>,pw=<passwd>
```

- **Body is a JSON document (for all constellations):**

```
[{ "ee": { "version": 8, "constellations": ["gps", "glonass",
"beidou", "galileo"], "seedAge": 0} } ]
```



3.B trigger an HTTP_REQ_POST

- **Real-Time Assisted-GNSS (GPS)**

- **Header:**

```
POST http://stm.api.location.io:80/rxn-api/locationApi HTTP /1.1 Accept:
application/json Content-Type:application/json Authorization: RXN-SP
cId=ZYDLLXxEH94dEeX2,mId=MYST,dId=<deviceID>,pw=<passwd>
```

- **Body is a JSON document:**

```
[{ "rtAssistance": { "format": "byte", "msgs": [ "GPS:1NAC", "GPS:1ALM" ] } }]
```



3.C trigger an HTTP_REQ_POST

- **Real-Time Assisted-GNSS (Glonass)**

- **Header:**

```
POST http://stm.api.location.io:80/rxn-api/locationApi HTTP /1.1 Accept:
application/json Content-Type:application/json Authorization: RXN-SP
cId=ZYDLLXxEH94dEeX2,mId=MYST,dId=<deviceID>,pw=<passwd>
```

- **Body is a JSON document:**

```
[{ "rtAssistance": { "format": "byte", "msgs": [ "GLO:2NAC", "GLO:2NKC",
"GLO:2ALM" ] } } ]
```



3.D trigger an HTTP_REQ_POST

- **Real-Time Assisted-GNSS (Galileo)**

- **Header:**

```
POST http://stm.api.location.io:80/rxn-api/locationApi HTTP /1.1 Accept:
application/json Content-Type:application/json Authorization: RXN-SP
cId=ZYDLLXxEH94dEeX2,mId=MYST,dId=<deviceID>,pw=<passwd>
```

- **Body is a JSON document:**

```
[{ "rtAssistance": {"format": "byte", "msgs": [ "GAL:2NAC", "GAL:2ALM" ] } } ]
```



3.E trigger an HTTP_REQ_POST

- **Real-Time Assisted-GNSS (Beidou)**

- **Header:**

```
POST http://stm.api.location.io:80/rxn-api/locationApi HTTP /1.1 Accept:
application/json Content-Type:application/json Authorization: RXN-SP
cId=ZYDLLXxEH94dEeX2,mId=MYST,dId=<deviceID>,pw=<passwd>
```

- **Body is a JSON document:**

```
[{"rtAssistance": {"format": "byte", "msgs": ["BDS:2NAC", "BDS:2ALM" ]}}]
```



4. Parse HTTP_RESPONSE

- **Status equal '200' means OK**
- **Body is a JSON document:** (see [AN5160](#) pag. 45)
- **Description under NDA**



An example with CURL and teseo-liv3f

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- HTTP POST cannot be raised with Google Chrome or Microsoft Internet Explorer
- In this example, CURL (command line tool and library for transferring data with URLs) is used as an HTTP program in command line mode
- Let's start with:
 - 1 Download and install CURL in your machine
 - 2 Connect your Teseo-LIV3F platform to the Teseo-Suite on PC



Generate the password 1/2

1 Evaluate GPS_Time: in Microsoft Excel

- In Excel, you can evaluate GPS_Time using the following the formula:

`"=DATEDIF("01/06/1980",TODAY(), "d")*24*60*60 + (NOW()-TODAY())*24*60*60"`

2 Use the value as GPS_time

A screenshot of the Microsoft Excel interface. The title bar reads 'Book1 - Excel'. The ribbon is set to 'Home'. The formula bar at the top shows the formula: `=DATEDIF("01/06/1980",TODAY(), "d")*24*60*60 + (NOW()-TODAY())*24*60*60`. A blue circle with the number '1' is placed over the formula bar. In the spreadsheet grid, cell A1 contains the numerical result '1228470223'. A blue circle with the number '2' is placed over cell A1. A pink rectangular box highlights both the formula bar and cell A1.



Generate the password 2/2

3 In the Teseo-Suite: Send to Teseo-LIV3F the command:

```
$PSTMSTAGPS8PASSGEN,<value_point_2>,ZYDLLXxEH94dEeX2,MYST
```

4 Acquire the DeviceID and Password from message:

```
$PSTMSTAGPS8PASSRTN,<deviceID>,<passwd>
```



Trigger the HTTP POST with CURL

- 1 Trigger the HTTP_POST command using CURL with all the parameters:

```
curl.exe --verbose --proxy http://<usr>:<psw>@<proxy_adr>:80
--header "Content-Type: application/json" --header "Accept: application/json"
--header "Authorization: RXN-SP cId=ZYDLLXxEH94dEeX2,mId=MYST,dId=<devID>,pw=<pass_wd>"
--data "[{\"ee\":{\"version\":8,\"constellations\":[\"gps\"],\"seedAge\":0}}]"
http://stm.api.location.io:80/rxn-api/locationApi
```

Note: Enter the entire command on a single line



Acquire the JSON document

- 1 Status equals 200 means OK
- 2 The body is the JSON document requested

```
C:\curl-7.62.0-win64-mingw\bin>curl.exe
--verbose
--proxy http://[redacted]:[redacted]
--header "Content-Type: application/json"
--header "Accept: application/json"
--header "Authorization: RXN-SP
cId=ZYDLLXxEH94dEeX2,mId=MYST,dId=00513730383638361600A27F,pw=1MT6r0430AxEEhrUin
ed10X7lfkveUCRtsc3soWnsFw=" --data "[{\"ee\":{\"version\":8,\"constellations
\":[\"gps\"],\"seedAge\":0}}]\" http://stm.api.location.io:80/rx
n-api/locationApi
* Trying [redacted]...
* TCP_NODELAY set
* Connected to [redacted] port 80 (#0)
* Proxy auth using Basic with user '[redacted]'
> POST http://stm.api.location.io:80/rxn-api/locationApi HTTP/1.1
> Host: stm.api.location.io
> Proxy-Authorization: Basic dmlybGluemk6MDFBbGVTaW1vKw==
> User-Agent: curl/7.62.0
> Proxy-Connection: Keep-Alive
> Content-Type: application/json
> Accept: application/json
> Authorization: RXN-SP cId=ZYDLLXxEH94dEeX2,mId=MYST,dId=00513730383638361600A2
7F,pw=1MT6r0430AxEEhrUinEd10X7lfkveUCRtsc3soWnsFw=
> Content-Length: 59
>
1 upload completely sent off: 59 out of 59 bytes
HTTP/1.1 200 OK
Content-Type: application/json
Date: Thu, 29 Nov 2018 13:41:38 GMT
Content-Length: 6978
Cache-Control: proxy-revalidate, proxy-revalidate
Proxy-Connection: Keep-Alive
Connection: Keep-Alive
2 {"ee":{"body":{"eol":"2099-12-31T23:59:59","leap":{"nextSecs":19,"nextGpsTime":
,"currSecs":18},"gps":{"timeModel":"","u":"","v":"","w":"","x":"","y":"","z":"","AAkADtABIAIQAHABI=","seed
":"AAQAJJU2iCSUU6IAAAAJJU2iaCjpf12Hhx+Bjoz6T5DSOuQCQ7jCyI5KwyW1RAxov8n\3Y\EA
LX2UgAKlf11ugAAaf9\RF+Jbf\3hgAKbgB2CAHfcgBuegdD0m\8539krPfxyk\jngioAZQAABH\
/y\6cACp7nQZrgBL\Qf\zgyoAAeAAAAAAAAAXuAAAAAAAAAAAAAAAAAEEUgAAAAIAAAAAAAAAAFGgAAAA4AA
AAB\8AAGNGhxQQ7ACINT8HMNIh0v0fTgf1cPF7DWUAC9E0Lf+8xIP\14DgAAxKAPU6AAAAB\0fh\
/gR7\8B4ABRF\zR\gSD\8Dh\veGcG\fx3ToMDI8Z+mP0COYBBgCiAKk\dgWIAI\usjhJAAK4
BP\Ua5wAAEwAAAAAAAABDgAAAABgAAAAAAAAARcAAAAAAAAAgAAAAAAAAAPqAAAAAKgAAAAH\wAA2CuESub
c1CH+N5ztDOY8PN4\00KD60K1rLLOPLX3\8M36f85GMAL\ACG3oAAAABoxwBj8n\4zWABNH\hg
4BU6oACWbCnIUnA5RIn1ZQAafWu3bf6uAM\+gAHSBa4Av\MvEYAAggLuAYyJ0AAAABgAAAAAAAAAD+YA
AAAAIAAAAAAAAA5oAAAAACAAAAAAAFAF\oAAAAAAAAAAAF\AAACj7af+EC5NsUcFWAAuW6RxsYalSLLNq
fpdJA6jsAP\wJE1\5KK7F\Yl\3okAAAAf8AvAF4F\91Rf\BzACJ5gFNZ\41JAJM691JEc+Lb\
rDBAUSifcn\4af\50AU6uADKGIxhMADJ\Zf\ZLXEAAHOAAAAABb6gAAAAAAAAAAAAAEEAAAA
AIAAAAAAAAAA6gAAAAAAAAAAB\8AAFB+ihJC9w61huYUbbzTQhYfUxhJL8hMcIA0DJW5rf\U60oAKQ
CU\+1F\2RcAAAAAUs4AvvJ\4jr\QP\7wx\pcB\srP\jYUvaAKFTs+Cwop+KBb92H+ggCN\
/HgDU\pgAG4ZJdgyAGoAPf6T10wAAS4AAAAAABzv\+gAAAAAAAAAPuAAAAAABAAAAAUAUKAAA
AFgAAAAH\wAAqKeGALHthjN8+g8iOU\R8W9KqcTUV3saWOHgL1Ge9\7kN0\9\3uv\1rP\sa4
AAAAABq+P+AQ\JIAnof\UA B40IAFQAAIeAnuU4a3pwA5f4D\woI\gB6ANQCftv+ggAdA0p7
pIAc\9L\sy8C\9XgAAMgAAFo4AAAAAAAAAAAAAAAABFAAAAAAAACAAAAAAAAABOYAAAAKAAAAAf\AAA
```



JSON specification is under NDA

- The internal JSON file description is under NDA
- For further information, please contact the ST Sales Office

Teseo-LIV3F's STM32 driver (X-CUBE-GNSS1) provides a precompiled library to support a server-based Assisted-GNSS ready for use on the customer's STM32 application.



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Documents & related resources

All documents are available on:
www.st.com

- Teseo III: [Webpage](#)
 - Datasheet of all PNs;
- Teseo Modules: [Webpage](#)
 - Datasheet of all PNs;
- Teseo-Suite: [Webpage](#)
 - Datasheet
 - Install program

GNSS ICs

ST's Teseo family of Global Navigation Satellite System (GNSS) ICs combines high positioning accuracy and indoor sensitivity with powerful processing capabilities, to simultaneously support multiple global navigation systems (BeiDou, Galileo, GLONASS, GPS, and QZSS).

Teseo III is the latest generation of GNSS ICs, and compared to Teseo II offers reduced power consumption, carrier-phase tracking for higher accuracy, and support for Ready-only Memory (ROM).

Our product offering includes standalone positioning chips (SAL) and configurable system-on-chips (SoCs). The standalone devices are offered with GNSS firmware embedded, to perform all positioning operations including tracking, acquisition, navigation and data output. The SoCs offer power processing and spare memory to enable customers and partners to easily and efficiently merge their code or specific IPs with ST's GNSS library to create a highly optimized platform.

Both solutions come with different package options and memory size, and are compatible with the TESEO-DRAW sensor fusion firmware for dead-reckoning and assisted navigation.

Teseo devices address e-call and telematics systems, personal navigation in PNDs and handheld devices, as well as marine and in-car navigation systems.

Package	GNSS library solutions (SoC)
WL32P77 4x4 mm	STAN00BCW (Standalone) Smallest footprint and lowest cost
	STAN00BFG (Stacked Flash, Automotive grade option available)
GN06 7x7 mm	STAN00 (Low cost PCB design)
	STAN00GAT (Automotive grade)
GN06 9x9 mm	STAN00GAT (Wearable Flask QFN 3-Spacer, Automotive grade)
BGA109 8x5 mm	STAN00GAT (SoC) with GNSS library (SoC)
BGA109 9x9 mm	STAN00GAT (SoC)

TESEO-SUITE

PC software tool to manage, configure and evaluate the performance of ST Teseo GNSS solution. It is able to manage GNSS solutions in parallel.

On each ST TESEO GNSS solution the Teseo Suite is able to read, modify and save the configuration.

NMEA sentences logging and analysis supported. NMEA message-list configurable per port.

Key Features

- Multiple GNSS tracer
- Multiple protocol support
- GNSS firmware configuration tool
- GNSS flashing tool
- Dead reckoning panel
- NMEA diagnostic tool
- Satellites signal monitoring viewer
- Map viewer
- Log viewer

RESOURCES

Quick Links

Technical Documentation

Product Specifications		
Description	Version	
DB3224 PC GUI software to control, configure and performance analyze of Teseo GNSS family	1.0	

Legal

License Agreement		
Description	Version	Size
SLA056 Software license agreement	1.0	59 KB

EVb-T3

TESEO III evaluation board

Teseo EVb board is a complete standalone evaluation platform for Teseo III GNSS ST solution.

Teseo III embeds the high performance ARM946 microprocessor with dedicated SRAM and several serial communication interfaces, including USB, SPI, PC, UART and CAN.

Performance and configuration can be analyzed using the ST TESEO-SUITE PC Tool.

Key Features

- ST Teseo III GNSS platform
- Multiconstellation GNSS: GPS, Galileo, Glonass, BeiDou, QZSS are supported
- USB Power Supply and battery charge
- Internal battery for standalone usage
- ON/OFF and Reset buttons available
- NMEA over

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Technical Documentation

Product Specifications		
Description	Version	Size
DB3223 Teseo III GNSS evaluation board	1.0	137 KB