

eCall – GSG SIMULATOR configuration for eCall GNSS DEVICE TESTING

European Standard regulation for eCall (ANNEX VI – GNSS testing)

Pendulum solution provides GSG simulators with configuration for eCall devices, a testing tool and dedicated scenarios (option “OPT-ECL”).

Recommended Configurations

- GSG 5-ES Model + 16 Channels + OPT-ECL (minimum configuration)
- GSG 62-ES Model + OPT-ECL (32 Channels ready for future purposes)
- Other useful option : GLONASS (OPT-GLO) for ERA-GLONASS application



Simulated signals	Galileo (E1 frequency band OS); GPS (L1 frequency band C/A code); Combined Galileo/GPS/SBAS.	Number of simulated satellites:	at least 6 Galileo satellites; at least 6 GPS satellites; at least 2 SBAS satellites;
--------------------------	--	--	---

Extract from 2.2.1.3 - Table 2 - Main parameters of simulation script for static scenario

European Standard regulation for eCall

European Standard regulation : Main articles

- 2.2.1. NMEA-0183 messages output test (static).
- 2.2.2. Assessment of positioning accuracy in autonomous static mode (static).

Especially

- 2.2.2. 2 – STATIC COMBINED GALILEO / GPS / SBAS (EGNOS) SIGNALS
- 2.2.2.15 – STATIC GALILEO SIGNAL ONLY TEST
- 2.2.2.16 - STATIC GPS SIGNAL ONLY TEST
- 2.2.3. Assessment of positioning accuracy in autonomous dynamic mode (dynamic).
- 2.2.4. Movement in shadow areas, areas of intermittent reception of navigation signals and urban canyons (dynamic).
- 2.2.5. Cold Start time to first fix test (Static).

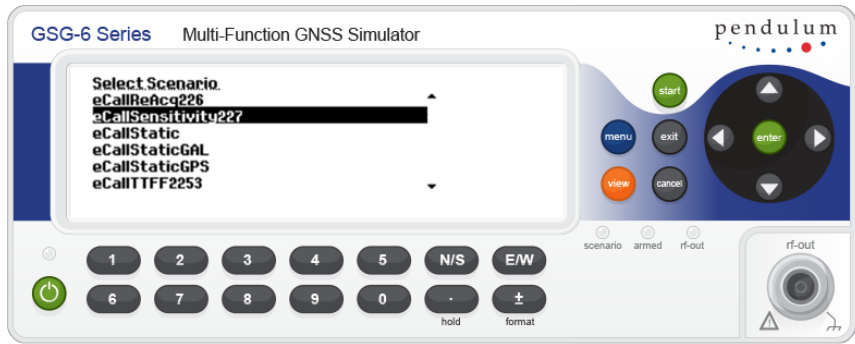
Especially :

- 2.2.5.3 – Time to First Fix -130dBm
- 2.2.5.8 - Time to First Fix -140dBm
- 2.2.6. Test of re-acquisition time of tracking signals after block out of 60 seconds (static).
- 2.2.7. Test of GNSS receiver sensitivity in cold start mode, tracking mode, and re-acquisition scenario (static).

eCall solution & list of tests

OPT-ECL

GSG unit with OPT-ECL option comes with pre-installed eCall scenarios for GNSS testing (only ANNEX VI of EU 2017/079 regulation). No need to configure anything!



Front panel of the GSG-6 unit.

Available list of test that can be conducted :

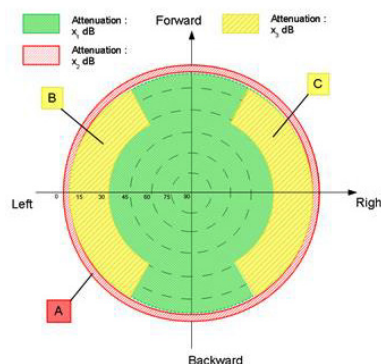
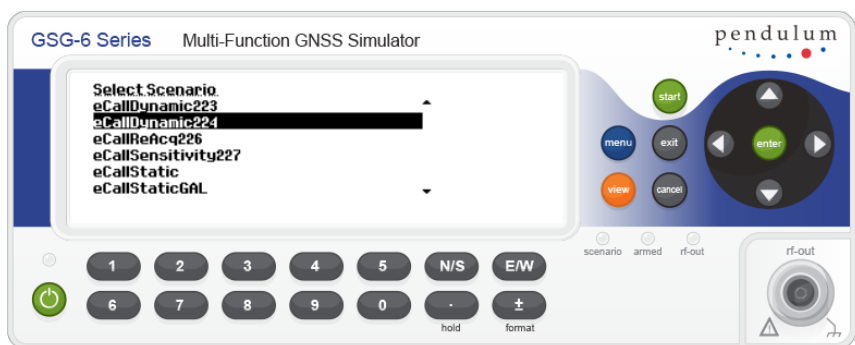
- 2.2.1. NMEA-0183 messages output test (static).
- 2.2.2. Assessment of positioning accuracy in autonomous static mode (static).
- 2.2.3. Assessment of positioning accuracy in autonomous dynamic mode (dynamic).
- 2.2.4. Movement in shadow areas, areas of intermittent reception of navigation signals and urban canyons (dynamic).
- 2.2.5. Cold Start time to first fix test (static)
- 2.2.6. Test of re-acquisition time of tracking signals after block out of 60 seconds (static)
- 2.2.7. Test of GNSS receiver sensitivity in cold start mode, tracking mode, and re-acquisition scenario (static).

User can manually (locally or remotely) launch individually each scenario to generate RF signals on the GSG output (RF-OUT connector).

User can use GSG StudioView™ software (see next slides) to performs all the tests automatically.

Example : Typical request for urban canyon configuration

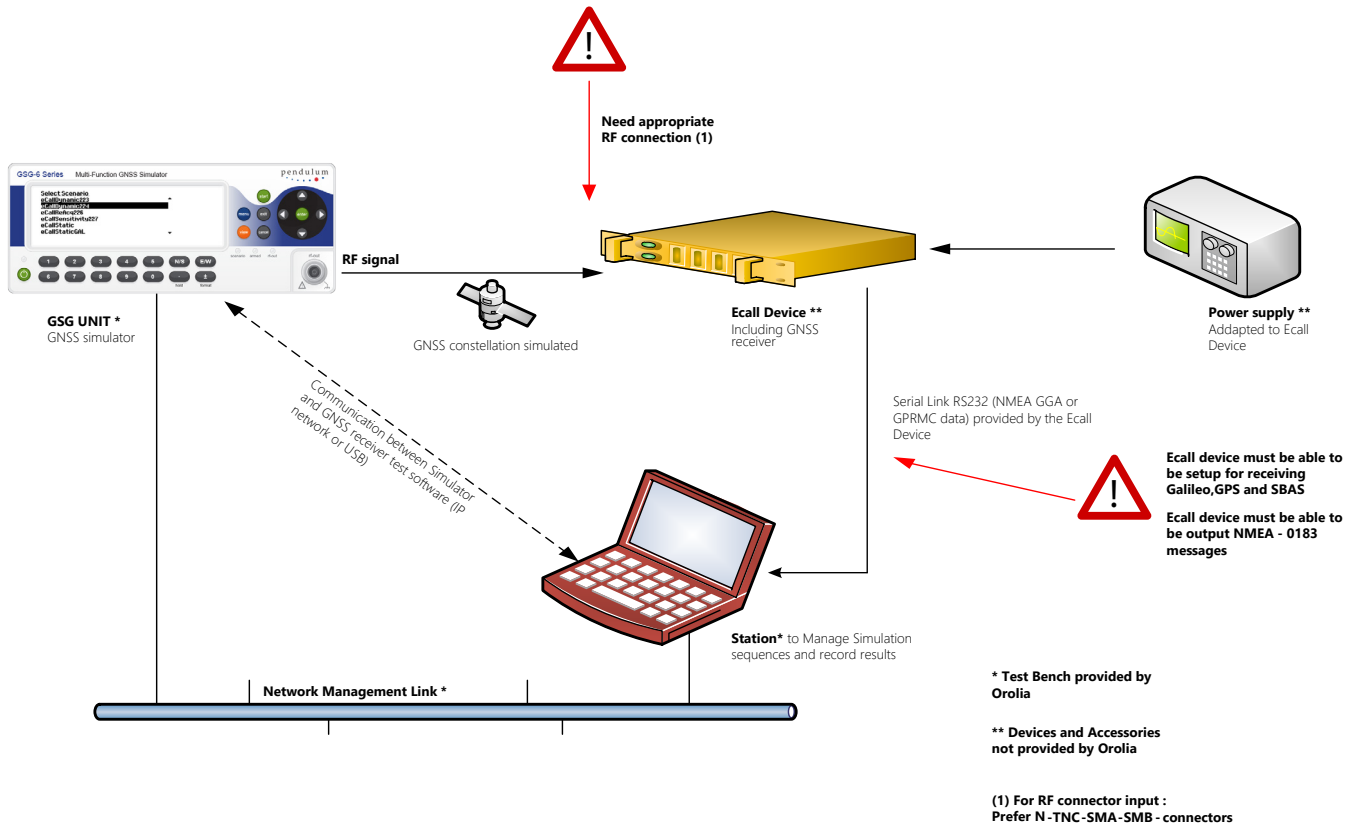
With OPT-ECL option, the GSG simulator contains “eCallDynamic224” scenario file that includes event files and antenna pattern (Figure 3 – chapter 2.2.4) to simulate the urban canyon conditions without any other specific action required by the user.



- 0 dB
- B • -40 dB
- C • -40 dB
- A • -100 dB or signal is switched off

Testing condition

Diagram of Test Stand principle (eCall requirement)



eCall compliance testing tool

GSG StudioView™ software is normally used to build trajectories and scenarios that will be uploaded and executed on the GSG unit.

GSG StudioView™ software also provides eCall Compliance Testing Tool, based on the EU 2017/079 regulation, featuring:

- Automatic execution of one or several tests (according to the regulation clauses).
- Automatic pass/fail reporting after each executed test.
- Possibility to export reports.

GSG unit needs to have OPT-ECL installed.

	RTCM Transmission
	Data recorder
	Realtime scenario player
	GSG web interface
	Console
	File Manager
	Uploader
	Scenario generator
	Trajectory converter
	RINEX editor
	Antenna pattern editor
	Spoofing test
	eCall compliance testing
	Settings...

OPT-ECL

- Automatic execution of one or several tests (according to the regulation clauses).
- You can select tests to be executed individually.
- You can select the whole sequence of all the tests that will be executed automatically by the tool.
- “Override defaults” checkbox allows to change some parameters (for example reduce a one hour test to only 5 minutes for debug purposes or preliminary test).
- Additional option allows to get more verbose logs (like all position errors).

GSG:
Connection: TCPIP::10.32.1.202:inst0:INSTR

Receiver:
COM port: COM7
Receiver: Other

Assessment of positioning accuracy in autonomous static mode (2.2.2)
Static GPS/Galileo/SBAS (2.2.2):
Static Galileo (2.2.2.15):
Static GPS (2.2.2.16):
Override defaults:
Scenario duration: 00:01:00

Assessment of positioning accuracy in autonomous dynamic mode (2.2.3)
Dynamic (2.2.3):
Override defaults:
Scenario duration: 00:05:00

Movement in shadow areas, areas of intermittent reception of navigation signals and urban canyons (2.2.4)
Dynamic (2.2.4):
Override defaults:
Scenario duration: 00:01:00

Cold start time to first fix test (2.2.5)
Time to first fix, -130 dBm (2.2.5.3):
Time to first fix, -140 dBm (2.2.5.8):
Override defaults:
Iterations: 1,0

Test of re-acquisition time of tracking signals after block out of 60 seconds (2.2.6)
Re-acquisition test (2.2.6):
Override defaults:
Iterations: 1,0
Time to wait for solution (2.2.6.3): 00:00:00

Test of GNSS receiver sensitivity in cold start mode, tracking mode, and re-acquisition scenario (2.2.7)
Sensitivity test (2.2.7):
Override defaults:
Time to monitor for solution available (2.2.7.9): 00:00:00

Start

“Parameters” page of the eCall Compliance Test Tool.

Connect your receiver or GNSS device

- 1 Enter the link (Ethernet / USB) to your GSG simulator
- 2 Select the COM port of your GNSS device to get NMEA 0183 messages from
- 3 Optionally create receiver profile (see next page)

Parameters Status

GSG:
Connection: [Field]

Receiver:
COM port: [Dropdown]
Receiver: RECEIVER

Assessment of positioning accuracy in autonomous static mode (2.2.2)
Static GPS/Galileo/SBAS (2.2.2):
Static Galileo (2.2.2.15):
Static GPS (2.2.2.16):
Override defaults:
Scenario duration: 00:01:00

Create a profile for your receiver:

- ④ Specify receiver profile name
- ⑤ Specify "cold start" command to automatically be send by the tool each time it is needed.
- ⑤ ASCII and binary commands supported
- ⑥ Try "cold start" command with your receiver before using the tool.

Receiver name:

Cold start configuration

Cold start message parameters

```
# Receiver initialization script example
# Send text message
send_ascii some ascii message to receiver

# Send binary message
send_binary A0B1C2D3E4F5

Init script:

# Wait few seconds
sleep 5
```

ASCII line termination:

Try with receiver

COM port:

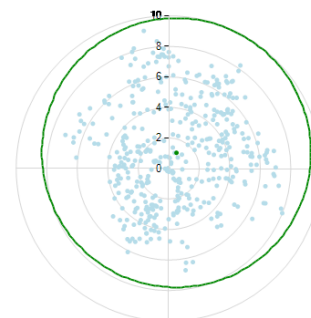
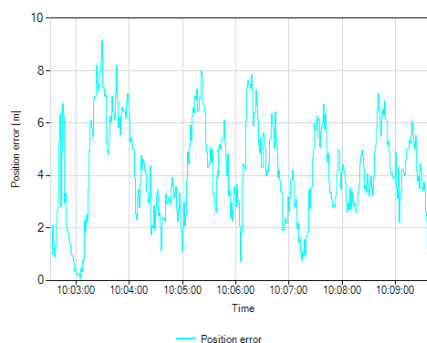
Send message:

- ⑦ Observe executed sequence during the test
- ⑦ Log the measurements (position errors in this example)
- ⑦ Reports can be exported.
- ⑧ Example: see your TTFF (Time To First Fix) information during the test sequence

GSG StudioView. eCall compliance test

```
[11/10/2017 09:27:54] Assessment of positioning accuracy in autonomous dynamic mode (2.2.3)
[11/10/2017 09:27:54] Cold starting receiver
[11/10/2017 09:27:59] Receiver cold started
[11/10/2017 09:27:59] Starting scenario eCallDynamic223.scen
[11/10/2017 09:28:34] Scenario started
[11/10/2017 09:28:34] Waiting for navigation solution...
[11/10/2017 09:31:25] Navigation solution received in 2 minutes 36 seconds [scen. time: 04/10/2017 10:02:50]
[11/10/2017 09:31:25] Collecting position errors...
[11/10/2017 09:31:25] Position errors:
[11/10/2017 09:31:25] dB[m] dL[m]
[11/10/2017 09:31:26] 0.700 -0.694 [04/10/2017 10:02:33]
[11/10/2017 09:31:27] 1.172 -1.712 [04/10/2017 10:02:34]
[11/10/2017 09:31:28] 1.335 -0.683 [04/10/2017 10:02:35]
[11/10/2017 09:31:28] 0.887 -0.661 [04/10/2017 10:02:36]
```

- Automatic passed/failed indication after each executed test
- Reports can be exported. (example for article 2.2.2. - Assessment of positioning accuracy in autonomous static



[11/10/2017 09:38:44] Horizontal position error: 9.96 m. Expected <= 15.00
[11/10/2017 09:38:44] Test passed

"Status" page of the eCall Compliance Test Tool – provided in the final report.

SOLUTION : OPT-ECL – eCall SCENARIOS & Compliance TESTING tool

OPT-ECL

- eCall EU 2017/079 Annex VI compliant
- Set of scenarios for eCall built in GSG unit.
- Automatic Passed/Failed indication after each test Reports can be exported.
- Prepare your device for Certification