DGP01082AAA

SIMREPLAY EXAMPLE SCENARIO DESCRIPTIONS

ABSTRACT

This document describes in detail the current set of SimREPLAY Example Scenarios

N.B. Only documents bearing the Document Status 'APPROVED SPIRENT DOCUMENTATION' in the panel below are deemed official literature.

This Issue Originated by:	R West	Title: Staff Software Engineer
Approved by:	Paul Craven	Title: Senior Software Team Manager
Document Status:	**APPROVED SPIRENT DOCUMENTATION**	

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RECORD OF ISSUE

Issue	Date	Author	Reason for Change
1-00	27 Aug. 09	MAH	First Issue (based on DGP00902AAA SimPLEX Example Scenario Descriptions)
1-01	29 Sep 09	MAH	RTCM data corrected for web example scenarios (wasn't entered as an offset)
1-02	20 Sep. 11	MPH	Updated all scenarios to use current default constellation files as a starting point and also set current date/time and imported latest almanacs
1-03	03 Oct 11	MPH	Correction to System Time Offset value referenced in section 3
1-04	02 Aug. 12	MPH	- Scenario version number now reflects the version of PosApp they were first provided with - 'Dynamic' and Web Example 'Ship' scenarios have new eastern vehicle start location to increase number of scenarios with QZSS opportunity - Addition of QZSS for scenarios with an eastern vehicle location (note only QZSS capable systems can utilise QZSS signals) - New time/date and recent almanacs used for all scenarios
1-05	24 Jun. 13	MPH	- Interim update to scenario set. - Scenarios now include BeiDou constellation for qualifying user equipment - QZSS not included in this set - Majority of scenarios updated with vehicle locations to maximise visibility of BeiDou satellites
1-06	27 Sep 13	MPH	- Reintroducing QZSS only after resolution of bug8870 - All other scenario conditions identical to previous set (note that QZSS signals are simulated on GPS channels, hence if there are insufficient channels available some GPS SVs previously simulated will be replaced by QZSS SVs if they are in-view of the vehicle)
1-07	16 Dec. 14	MPH	Updated scenario set to accompany the release of PosApp v5-03
1-08	23 Jul. 15	CJY	Updated scenario set to accompany the release of PosApp v5-05 Updated reference and scenario start times and installed current GPS and GLN almanacs
1-09	04 Nov. 15	RW	Align GPS, GLONASS and Beidou satellite reference time and orbital parameter inconsistency in version 5-05.
1-10	17 Oct 16	MA	Updated scenario set to accompany the release of PosApp V6-00 and GSS7000; GSS6700 scenarios retained. Updated reference and scenario start times and installed current GPS and GLN almanacs
1-11	25 May 18	MM	Updated scenario set to accompany the release of PosApp V6-01-02 for GSS7000 and GSS6700. Updated reference and scenario start times and installed current GPS and GLN almanacs
1-12	31 May 18	RW	Updated scenario set version to 6-06 to include BeiDou Phase 3 B1C and B2A signals.
1-13	04 Jun. 18	RW	Typo correction.

1-14	18 Aug. 19	RW	Updated scenario set version to 6-06 to include BeiDou Phase 3 B3I signal.
1-15	04 Sep. 19	RW	Updated for PosApp V6.06

TABLE OF CONTENTS

GENERAL

1.1 SCOPE & APPLICABILITY

This document describes the v6-06 set of Example Scenarios that are delivered with SimREPLAY. The latest versions of these scenarios are also available to download from our Global Services CSC support website (http://support.spirent.com) for those customers with qualifying equipment; log into the CSC and refine the search using the 'Scenarios' category.

1.2 REFERENCED DOCUMENTS

a) MS3064 Spirent Support Service Datasheet (latest issue)
b) DGP01074AAA GSS6700, SimREPLAY and SimREPLAYplus User Manual (latest issue)

1.3 GLOSSARY OF TERMS

CEP	Circular Error Probable.
CSC	Customer Support Center website
ECEF	Earth Centred Earth Fixed. A Cartesian co-ordinate framework centred at the Earth's centre (WGS-84 earth model) and rotating with the Earth. The Z axis passes through the North Pole, the X axis cuts the equator at the Greenwich meridian and the Y axis cuts the equator at 90 degrees East.
EGNOS	The European implementation of SBAS
GPS	Global Positioning System.
ISCN	Intentional Satellite Clock Noise.
MSAS	The Japanese implementation of SBAS.
PVT	Position, Velocity and Time.
QZSS	Quasi-Zenith Satellite System
RTCM	Radio Technical Commission for Maritime Services.
SBAS	Satellite Based Augmentation System – A set of geostationary satellites broadcasting supplemental information to enhance GPS navigation.
SEP	Spherical Error Probable.
STANAG	Standardisation Agreement.
SV	GPS Satellite (Space Vehicle).
TTFF	Time To First Fix.
UTC	Universal Time Co-ordinated.
WAAS	Wide Area Augmentation System, the US implementation of SBAS.
WGS-84	World Geophysical Survey 1984 – The definition of the Earth ellipsoid used by the GPS system.

2 INTRODUCTION

The Example Scenario Set consists of three types of scenario.

1. **Web Server Scenarios**
   Generated by the Automated Web Server. These scenarios are intended to give the user an introduction to what the automated server can deliver.
2. **Special Scenarios**
   Scenarios that cannot be generated automatically by the web server because of the enhanced level of detail and customisation required during creation.
3. **Performance Scenarios**
   Combined with user action files they enable the user to measure some basic receiver performance characteristics.

Customers with a valid Spirent Support Service contract are able to request an unlimited number of automated scenarios via our website, see reference b) for details on how to do this. Further to this, they are also entitled to up to five hours development time in a one-year period on Special Scenarios for each qualifying GSS6700, please see reference a) for details.

3 THE SCENARIOS

There are 13 scenarios in all

- 4 Web Server scenarios
- 6 Special scenarios
- 1 Static scenario for testing multiple GPS performance characteristics (although any other scenario may be used as detailed in each case)
- 2 Dynamic Performance test scenarios.

There are 3 user action files along with 4 antenna pattern files which may be used with any scenario as the user deems appropriate and these are included for performance testing.

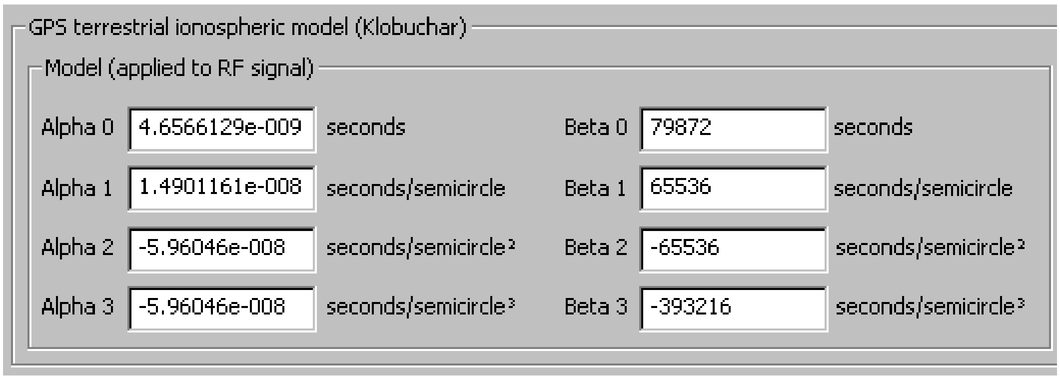
Unless otherwise stated the following parameters apply across all of the scenarios:

- GPS Start Time : 1st July 2017 22:00:00
- Duration : 30 minutes
- Almanac[1] : Week915
- GNSS to UTC Offset 18 seconds
- Atmospheric Effects : Modelled
- Signal Level : Modelled
- Global Offset Power level : +10 dB (with respect to -130dBm for GPS, SBAS and QZSS, -122dBm for Galileo, -131 for GLONASS, -133 for BeiDou B1I , B2I and B3I, -130 for BeiDou B1C and -127 for BeiDou B2A)
- Earth Obscuration : 5 degrees earth tangent
- GLONASS-M Enabled : Yes
- GPS-to-GLONASS System Time Offset : 100ns
- SBAS : Yes
- QZSS : No
- RTCM : Yes

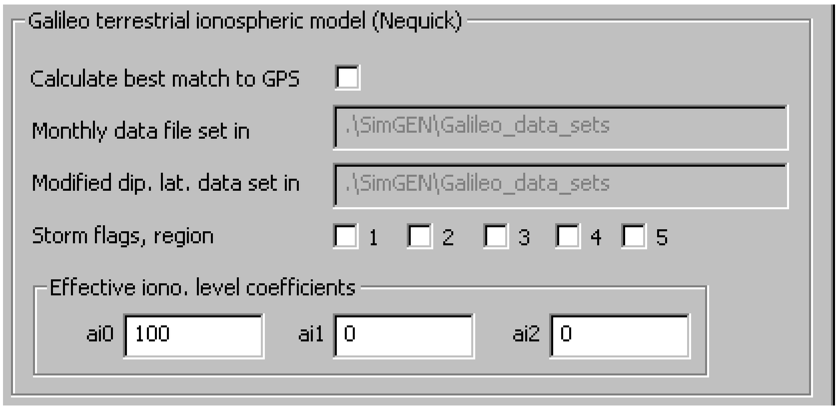
The atmospheric effects are modelled using the STANAG model for the Troposphere with a surface reflectivity index at mean sea level of 324.8. The Klobuchar model is used for the Ionosphere by the GPS

[1] Use of a real almanac only applies to GPS and GLONASS. The almanac for 7th March 2017 was downloaded and the orbital reference time advanced to 1st July 2017 in order to avoid unwanted errors in orbit propagation between the original orbital reference time and the scenario start time.
All web example scenarios use 'perfect orbits', i.e. circular orbits with zero eccentricity, perturbation terms and clock terms

and GLONASS constellations. Klobuchar Alpha and Beta Broadcast and Modelled Parameters are the same and are given below:



The Nequick model is used for the Ionosphere by the Galileo constellation. Settings for the Nequick model are given below:



SBAS signals are present giving WAAS, EGNOS or MSAS signals as appropriate.
RTCM monitoring stations are near the simulated vehicle's location.

For scenarios containing motion, the Motion Model version used is v2.71; this is the default option when creating new scenarios. Warning messages relating to the use of this Motion Model can be ignored.

3.1 WEB EXAMPLES

The Web Example Scenarios are listed below:

- Static
- Aircraft, 250mph
- Figure-of-8, 35mph
- Ship, Figure-of-8, 10knots, moderate swell

3.1.1 STATIC

Scenario Name : Web Example Static v6-06
Start Date : 01 July 2017
Start Time : 22 : 00 : 00(Hours : Minutes : Seconds)
Duration : 30 Minutes
Start Latitude : 38 Deg 53 Mins 22 Secs North
Start Longitude : 77 Deg 0 Mins 30 Secs West
Start Height : 0 Meters(WGS 84)
Static Start Period : 0 Minutes
Vehicle Motion : CAR – Static
Tropospheric Delay : Modelled
Ionospheric Delay : Modelled
Almanac : Perfect Orbits
System to UTC Offset : 18 Note Applies to GPS, Galileo and BeiDou only
GPS SPECIFIC OPTIONS
SBAS Signals : America
QZSS Signals : No
RTCM Differential Corrections : No
RTCM Ref. Station Latitude Offset **:** 40 Deg 0 Mins 0 Secs North
RTCM Ref. Station Longitude Offset : 78 Deg 0 Mins 0 Secs West

3.1.2 AIRCRAFT 250MPH

Scenario Name : Web Example Aircraft 250mph v6-06
Start Date : 01 July 2017
Start Time : 22 : 00 : 00(Hours : Minutes : Seconds)
Duration : 30 Minutes
Start Latitude : 35 Deg 30 Mins 22 Secs North
Start Longitude : 5 Deg 10 Mins 00 Secs West
Start Height : 10000 Meters(WGS 84)
Static Start Period : 0 Minutes
Vehicle Motion : AIR - straight and level 250mph
Tropospheric Delay : Modelled
Ionospheric Delay : Modelled
Almanac : Perfect Orbits
System to UTC Offset : 18 Note Applies to GPS, Galileo and BeiDou only
GPS SPECIFIC OPTIONS
SBAS Signals : Europe
QZSS Signals : No
RTCM Differential Corrections : Yes
RTCM Ref. Station Latitude Offset **:** 36 Deg 6 Mins 10 Secs North
RTCM Ref. Station Longitude Offset : 5 Deg 20 Mins 57 Secs West

3.1.3 FIGURE OF 8 35MPH

Scenario Name : Web Example Figure of 8 35mph v6-06
Start Date : 01 July 2017
Start Time : 22 : 00 : 00(Hours : Minutes : Seconds)
Duration : 30 Minutes
Start Latitude : 25 Deg 5 Mins 14 Secs North
Start Longitude : 121 Deg 33 Mins 16 Secs East
Start Height : 20 Meters(WGS 84)
Static Start Period : 0 Minutes
Vehicle Motion : CAR – figure of eight 35mph
Tropospheric Delay : Modelled

Ionospheric Delay : Modelled
Almanac : Perfect Orbits
System to UTC Offset : 18 Note Applies to GPS, Galileo and BeiDou only
GPS SPECIFIC OPTIONS
SBAS Signals : Asia
QZSS Signals : No
RTCM Differential Corrections : No
RTCM Ref. Station Latitude Offset **:** 0 Deg 0 Mins 0 Secs North
RTCM Ref. Station Longitude Offset : 0 Deg 0 Mins 0 Secs East

3.1.4 SHIP FIGURE OF 8 10KNOTS MODERATE SWELL

Scenario Name : Web Example Ship Fig8 10nts Mod Swell v6-06
Start Date : 01 July 2017
Start Time : 22 : 00 : 00(Hours : Minutes : Seconds)
Duration : 30 Minutes
Start Latitude : 33 Deg 48 Mins 0 Secs North
Start Longitude : 142 Deg 18 Mins 0 Secs East
Start Height : 0 Meters(WGS 84)
Static Start Period : 0 Minutes
Vehicle Motion : SHIP – straight 10 knots moderate swell
Tropospheric Delay : Modelled
Ionospheric Delay : Modelled
Almanac : Perfect Orbits
System to UTC Offset : 18 Note Applies to GPS, Galileo and BeiDou only
GPS SPECIFIC OPTIONS
SBAS Signals : Asia
QZSS Signals : No
RTCM Differential Corrections : Yes
RTCM Ref. Station Latitude Offset **:** 35 Deg 18 Mins 0 Secs North
RTCM Ref. Station Longitude Offset : 138 Deg 42 Mins 0 Secs East

3.2 SPECIAL SCENARIOS

The following examples of Special Scenarios have been included.

- Leap second event
- Bad health
- Multipath
- 4SV's
- Circular Motion
- Pseudorange Ramp

Often customers will provide user motion via captured receiver NMEA data for Spirent to convert and use in a bespoke scenario.

3.2.1 LEAP SECOND EVENT

- GPS Start Time : 30th June 2017 23:30:00
- Duration : 1 Hour
- Static Position : Tokyo, Japan
- SBAS : None

At the time of writing no new bulletin was available to indicate when the next UTC leap second insertion event will be. A dummy event has been configured for midnight of 30th June to 1st July 2017[2].
The Leap Second Event scenario uses the Leap Second event of the 30th June 2015 23:59:59, where the GPS & Galileo UTC offset changes from 17 to 18 seconds and the BeiDou to UTC offset from 2 to 3 seconds.

3.2.2 BAD HEALTH

- Static Position : Beijing, China.

The following health changes have been made; note these changes have no effect on the actual RF signal.

GPS Satellites:

SVID	Signal Health	Nav Data Health
2	All Signals Weak(00001)	Parity Failure(001)
5	L1 Signal Weak(10110)	Z count in handover bad (011)
15	More than 1 combination(11111)	All Data bad in Words 1-10(111)

GLONASS Satellites

SVID	Signal Health
1	Bad
10	Bad
24	Bad

QZSS Satellites

SVID	Signal Health
4	Bad

GALILEO Satellites

SVID	Health Status
1	IF/SISMA = 15
8	All signals health set to 'out of service' All signal validities set to 'working without guarantee'
18	C Band 1 minute planned disconnection 15 minutes into scenario

BEIDOU Satellites

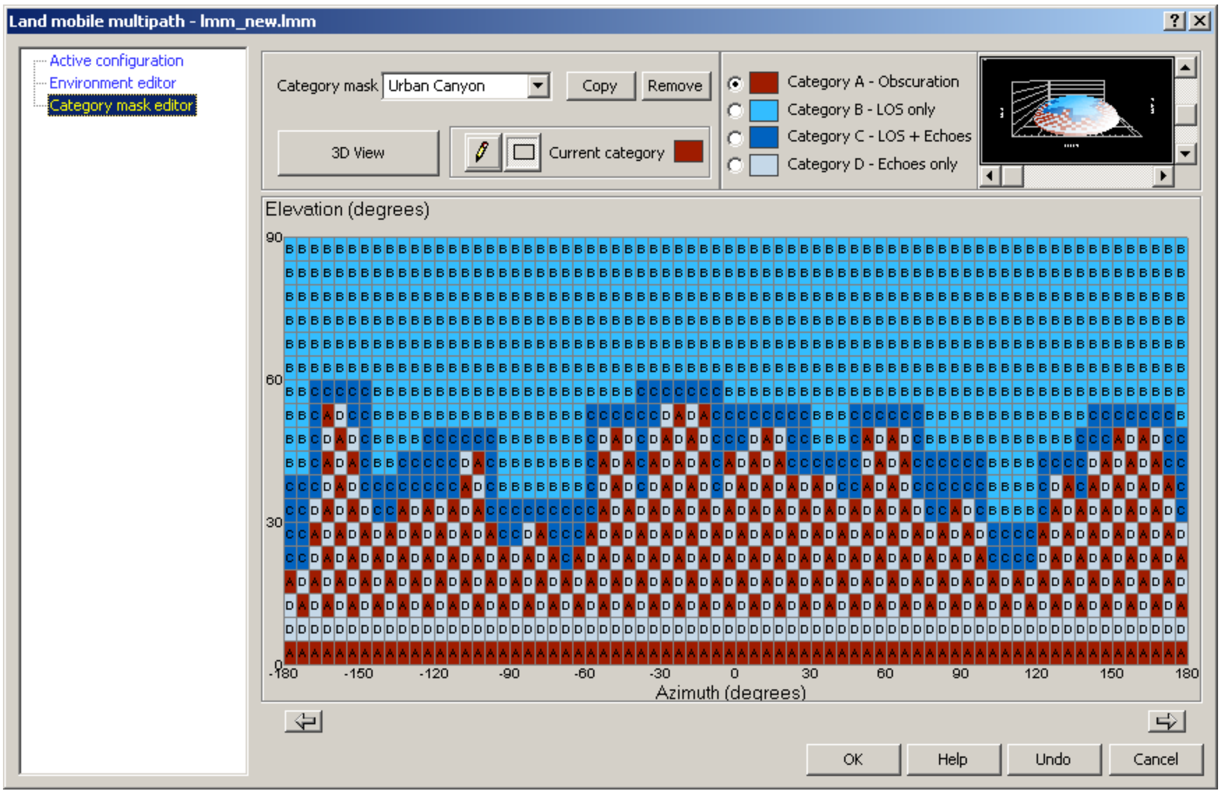
[2] see http://hpiers.obspm.fr/iers/bul/bulc/bulletinc.dat for the latest leap second bulletin

SVID	SatH1	SatH2	Health
1	Bad	Iono Grid Check Bad	Some or all clock data are bad
2	Bad	-	Some or all B2I signal data are bad
8	Good	-	Some or all clock data are bad Some or all nav are bad

3.2.3 MULTIPATH

- Static Position : Singapore
- SBAS : None

The following multipath environment and category mask is applied in the scenario to define the effect on received signals relative to SV sky position throughout the scenario:



3.2.4 4 SV'S

- GPS Start Time : 1st July 2017 09:30:00
- Static Position : Australia (25S 134E, Height = 20m)
- SBAS : None
- RTCM : None

Each constellation has only 4 SV's present. The orbits are perfect, i.e. no eccentricity and also have no clock errors. Atmospheric conditions are also not modelled, resulting in no signal delay due to the atmosphere.

3.2.5 CIRCULAR MOTION

- Circle Centre : 0N 150W, Height = 100m
- Circle Radius : 500m
- Vehicle Speed : $10ms^{-1}$
- Vehicle Direction : Clockwise

3.2.6 PSEUDO RANGE RAMP

A Pseudo Range Ramp on an SV results in a Pseudo Range error for that particular SV (in effect an undeclared clock offset or Delta Af0 term). After 5 minutes all SV's to the West of the vehicle have their Pseudo Range increased by 200m (this change in Pseudo Range happens over a 30 second period). This Pseudo Range error then remains constant for the rest of the scenario.

- Static Position : Hawaii, USA

3.2.7 ANTENNA PATTERNS

There are 4 patterns supplied in the 'Shared' folder, making them directly selectable from the scenario tree. These can be used (or modified as necessary) with any scenario. To change the antenna pattern right-click on the default isotropic pattern '*default_v1-0.ant_pat'* and choose 'Select' in order to view 'Files available from the shared directory:'.

The 4 patterns supplied attenuate the signal by 46dB (this is the maximum amount) in each of the 4 cardinal directions. For example, "South_view.ant_pat" attenuates all signals with an azimuth of between -90 through 0 to +90 (provided the vehicle heading is currently North).

3.3 GPS RECEIVER PERFORMANCE CHARACTERISTICS

The basic receiver characteristics we consider are Cold Start TTFF, Warm Start TTFF, Hot Start TTFF, Acquisition Sensitivity, Reacquisition Sensitivity, Tracking Sensitivity, Static Position Accuracy and Dynamic Position Accuracy. The table below details the characteristics and the supplied test.

Performance Characteristic	Supplied Scenario	Supplied User Action File
COLD Start TTFF	*24 Hours Static v6-06*	N/A
WARM Start TTFF	*24 Hours Static v6-06*	N/A
HOT Start TTFF	*24 Hours Static v6-06*	N/A
Acquisition Sensitivity	N/A	*acqu_sens.act*
Re-acquisition Sensitivity	N/A	*re-acqu_time.act*
Tracking Sensitivity	N/A	*track_sens.act*
Static Position Accuracy	*24 Hours Static v6-06*	N/A
Dynamic Position Accuracy	*Dynamic Slow v6-06*	N/A
	Dynamic Fast v6-06	N/A

3.3.1 COLD START TTFF

- Duration : 24 Hours
- Static Position : Seoul, S. Korea
- SBAS : None

A receiver is said to 'Cold Start' when the following conditions are met:

- Time unknown

- Almanac unknown
- Ephemeris unknown
- Position unknown

The time taken for a receiver to calculate a PVT solution when the above conditions are met is its Cold Start TTFF. Due to the stochastic nature of the process several TTFF's should be obtained with different satellite geometries and then averaged. A scenario named *24 Hours Static v6-06* has been included so that a great number of TTFF samples can be taken. Once the TTFF time has been established a reset of the receiver NVRAM should take place and the receiver allowed to restart its acquisition process without the scenario being restarted. Depending on test requirements allow the scenario to run for a short period with the receiver disconnected so that the satellite geometry changes by as little or as much as required between each NVRAM reset.

3.3.2 WARM START TTFF

A receiver is said to 'Warm Start' when the following conditions are met:

- Time is known
- Almanac is known
- No ephemeris (or stale > 4 hours old)
- Position within 100km of last fix

The supplied scenario *24 Hours Static v6-06* may be used to establish the receiver's Warm Start TTFF. Once the receiver has acquired the full almanac for each GNSS constellation, e.g. at least 12 ½ minutes for GPS, the ephemeris data needs to be cleared and the receiver restarted. The time then taken to get a PVT solution is its Warm Start TTFF. Again, due to the stochastic nature of the process several TTFF's should be obtained with different satellite geometries and then averaged.

3.3.3 HOT START TTFF

A receiver is said to 'Hot Start' when the following conditions are met:

- Time is known
- Almanac is known
- Ephemeris is known
- Position within 100km of last fix

Again, the supplied scenario *24 Hours Static v6-06* may be used to establish the receiver's Hot Start TTFF. Once the receiver has acquired the full almanac for each GNSS constellation, e.g. at least 12 ½ minutes for GPS, the receiver is restarted. The time then taken to get a PVT solution is its Hot Start TTFF. Again, due to the stochastic nature of the process several TTFF's should be obtained with different satellite geometries and then averaged.

3.3.4 ACQUISITION SENSITIVITY

The Acquisition Sensitivity of a GNSS receiver is defined as the minimum signal level that is required to obtain a PVT solution. A user action file called *acqu_sens.act* is supplied for testing this performance criterion. It can be used with any SimREPLAY scenario by right-clicking on the 'User actions file' in the 'Options' area of the scenario tree and choosing 'Select' in order to view 'Files available from the shared directory:'.

When this user action file is selected within a scenario, all satellites are set to have their signal strength at -30dB below the normal reference level for each constellation (-130dBm for GPS, SBAS and QZSS, -122dBm for Galileo, -131 for GLONASS, -133 for BeiDou B1I, B2I, -130 for BeiDou B1C and -127 for BeiDou B2A) at the start of the scenario. Once running, every 30 seconds the signal strength of each satellite is increased by 0.5dB. After running for 40 minutes the signal strength of all satellites will be

+10dB above the normal reference level for each constellation. Acquisition Sensitivity testing may take place under Cold, Warm and Hot starting conditions – although the Hot start version of the test is similar to the re-acquisition test below. Some receivers (particularly those that utilise AGPS) may be able to acquire signals below the -150 dBm level. In order to test these types of receivers' additional external attenuation may be inserted to reduce the initial signal levels.

3.3.5 RE-ACQUISITION TIME

Re-acquisition time is the time necessary for a receiver to regain a PVT solution after total loss of all received signals. A user action file called *re-acqu_time.act* is supplied for testing this performance criterion. It can be used with any SimREPLAY scenario by right-clicking on the 'User actions file' in the 'Options' area of the scenario tree and choosing 'Select' in order to view 'Files available from the shared directory:'

When this user action file is selected within a scenario the scenario runs as normal for the first 5 minutes then a sequence of on / off commands are used which gradually increase the duration for which all signals are turned off. In between the 'off' period's signals are turned on for a fixed duration of 60s, which should provide sufficient time for the receiver to complete reacquisition.

Time Into Run	'Off' Period Duration
From 5:00 minutes into the run to 15:55 minutes into the run	Off periods increase in 1 second steps from a duration of 1s to 10s
From 15:55 minutes into the run to 22:15 minutes into the run	Off periods increase in 2 second steps from a duration of 10s to 20s
From 22:15 minutes into the run to 39:10 minutes into the run	Off periods increase in 5 second steps from a duration of 20s to 70s

With both of the above tests satellite geometry is a factor that can be considered and is easily achieved since the user action file can be used with any scenario.

It should be noted that the user can create their own user actions files to meet any special testing requirement e.g. create a power level change of 0.1dB every minute for all SV's or change the ON/OFF timings as necessary. Further instruction is given in reference b).

3.3.6 TRACKING SENSITIVITY

The Tracking Sensitivity of a GPS receiver is defined as the minimum signal level that allows the receiver to maintain a PVT solution. Once a receiver has a lock on an SV it can continue to track it below the acquisition sensitivity threshold. A user action file called *track_sens.act* is supplied for testing this performance criterion. It can be used with any SimREPLAY scenario by right-clicking on the 'User actions file' in the 'Options' area of the scenario tree and choosing 'Select' in order to view 'Files available from the shared directory:'

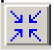
When this user action file is selected within a scenario, the scenario runs as normal for the first 5 minutes but with the power levels of all SV's at +10dB above the normal reference level for each constellation (-130dBm for GPS, SBAS and QZSS, -122dBm for Galileo, -131 for GLONASS, -133 for BeiDou B1I, B2I, -130 for BeiDou B1C and -127 for BeiDou B2A). After 5 minutes the power level of all SV's is decreased to +5dB above the normal reference level for each constellation and at 5:30 they are all reduced by a further 5dB. Thereafter the power level is decreased in 0.5dB steps every 30 seconds. The user action file has no further actions once the power level on all channels reaches -30dB below the normal reference level for each constellation, i.e. after 00:35:30 of scenario runtime.

3.3.7 STATIC POSITION ACCURACY

Any Static scenario may be used to measure this characteristic. Satellite geometry plays a significant role in the accuracy reported by a receiver. There are several different measures of positional accuracy i.e. CEP, SEP, 3DRMS, 67% error and 95% error.

We will only consider the 3D RMS error in metres. This can be simply found by applying the equation below (the ECEF WGS-84 ellipsoidal co-ordinate system must be used):

$$3D_{error} = \sqrt{(X_{sim} - X_{GPS})^2 + (Y_{sim} - Y_{GPS})^2 + (Z_{sim} - Z_{GPS})^2}$$

The ECEF positional values may be easily obtained within SimREPLAY s/w if the Position Details window is selected . Many receivers have the ability to display their position in ECEF co-ordinates, if not it will be necessary to convert from the WGS-84 Latitude-Longitude-Altitude co-ordinate system to the ECEF system using the following set of equations:

$$X = (N + h)\cos\varphi\cos\lambda$$
$$Y = (N + h)\cos\varphi\sin\lambda$$
$$Z = \left(\frac{b^2}{a^2}N + h\right)\sin\varphi$$

where:

φ = latitude (radians)
λ = longitude (radians)
h = height above ellipsoid (geodetic)
N = radius of curvature, defined as:

$$= \frac{a}{\sqrt{1 - e^2\sin^2\varphi}}$$

The WGS-84 parameters are as follows:

a = 6378137
b = 6356752.31424518

and

$$e^2 = \frac{a^2 - b^2}{a^2}$$

3.3.8 DYNAMIC ACCURACY

There are two scenarios provided to measure this performance parameter. A similar approach as outlined above should be taken by using the logged RX data compared to the SimREPLAY truth data (please read reference b) to learn how to log truth data).

1. ***Dynamic Slow v6-06***
   - Static period = 5 minutes
   - Speed increases from stationary to 30ms^{-1} in 1ms^{-1} steps
   - Acceleration between steps occurs every minute and is at 1ms^{-2} (1 second duration).
2. ***Dynamic Fast v6-06***
   - Static period = 5 minutes
   - Speed increases from stationary to 300ms^{-1} in 10ms^{-1} steps.
   - Acceleration between steps occurs every minute and is at 5ms^{-2} (2 seconds duration).

- Duration : 40 Minutes
- Start Location : 1S 112E, Height = 100m