

ReGen simulator engine for high-end GNSS RF simulator (v.07-2026)

No	Item	Spec	Details	Comments	Testing
1	GNSS signals high-fidelity coherent code and carrier simulation	Signals			
		GPS L1	L1 C/A	Disaster resilience testing	uBlox 8, 9, Novatel OEM-7, Trimble Copernicus-II, Septentrio Mosaic
		GPS L2	L2CL		uBlox 9, Novatel OEM-7, Septentrio Mosaic
		GPS L2	L2CM		uBlox 9, Novatel OEM-7, Septentrio Mosaic
		GPS L5	L5I		Novatel OEM-7, Septentrio Mosaic
		GPS L5	L5Q		Novatel OEM-7, Septentrio Mosaic
		QZSS	L1C/A		uBlox 9
		QZSS	L1S		uBlox 9
		SBAS L1	WAAS,EGNOS,GAGAN,Luch, MSAS		uBlox 9 Only signal tested
		SBAS L5	WAAS,EGNOS,GAGAN,Luch, MSAS		Septentrio Mosaic
		Galileo E1	E1B, E1C		uBlox 8, 9, Novatel OEM-7, Septentrio Mosaic
		Galileo E5	E5a-I, E5a-Q	Novatel OEM-7 E5a,E5b,AltBOC	Novatel OEM-7, Septentrio Mosaic
		Galileo E5	E5b-I, E5b-Q		uBlox 9, Novatel OEM-7, Septentrio Mosaic
		NavIC L5	L5		Novatel OEM-7, ARAMIS
		NavIC L1	L1		ARAMIS
		NavIC S-band	S		ARAMIS, BEL
		BeiDou L1	B1I		uBlox 8, 9, Novatel OEM-7, Septentrio Mosaic
		BeiDou L2	B2I		uBlox 9, Novatel OEM-7, Septentrio Mosaic
		GLONASS L1	G1		uBlox 8, 9, Novatel OEM-7, Septentrio Mosaic
		GLONASS L1	G2	uBlox 9, Novatel OEM-7, Septentrio Mosaic	
		NAV Messages			

2

NAV DATA	L1CA SBAS L1S CNAV INAV FNAV BeiDou B1I,B2I GLONASS G1, G2			uBlox 8, 9 N/A N/A Septentrio Mosaic Septentrio Mosaic Septentrio Mosaic Septentrio Mosaic Septentrio Mosaic
Content	orbital parameters almanac parameters time parameters Complete nav message editable Bitwise editable	Cross-system synchronization	JAXA toolset for L1S NavData	
Implementation	Binary file Memory buffer Memory Mapped			
Dynamic Trajectory				
Scenario update rate		up to 1,000 Hz		
Vehicle Type	Aircraft trajectory generator Satellite trajectory generator Trajectory file	10 ms sampling	up to 1ms	
Dynamics	relative linear velocity	20 km/sec		ESA validation with spaceborne receiver up to 7.5 km/sec(uBlox 7.5)
Satellite orbits	Altitude up to GEO orbit	76,000 km		

3

4	Satellite orbits	super synchronous transfer orbits			
	Antenna Simulation conditions				
	Multi-vehicle / multi-antenna	Simulation of two antennas on a vehicle Simulation of two vehicles			
	6-DOF antenna motion				
	Negative cut-off mask angle	user devined mask Earth tangent from sat Local horison from sat			
	Additional				
	Obstructions simulation	opaque semi-transparent			
	Antenna pattern	Receiver antenna pattern Satellite antenna pattern			
	Signal power				
	Power	Diapason Accuracy	-15 : +30 dB per satellite Real-time power adjustment per signal ±0.5 dB	Expandable	uBlox 9,Septentrio Mosaic uBlox 9,Septentrio Mosaic uBlox 9,Septentrio Mosaic
6	Accuracy				
		code phase, carrier phase	On cm level, subject to memory trade-off	uBlox 8, 9 shows residuals < ±0.9 meter.	

7	Accuracy	Positioning	positioning accuracy ± 0.5 meter High accuracy in high-dynamic scenarios.	uBlox 8, 9, Novatel OEM-7, Trimble Copernicus-II, Septentrio Mosaic Horizontal positioning accuracy ± 0.5 meter. (GLONASS ± 1.5). Memory trade-off
	Error models			
	User defined	Step, Ramp, Acceleration of Pseudorange and Carrier Phase Errors.		
	Satellite orbits	All orbital parameters for broadcast and true ephemerides Input from Yuma, GUI, RINEX (deprecated)	Including orbit perturbations Cuc, Cus, Cic, Cis, Crc, Crs.	
	Tropospheric error models (true and broadcast)	Saastamoinen Hopfield Black MOPS RTCA 96-98 STANAG	applic for LEO, GEO: applic for LEO, GEO:	
8	Ionospheric error models (true and broadcast)	Klobuchar GPS NeQuick Galileo grid NavIC grid SBAS scintillation simulation, ionospheric bubble simulation	applic for LEO, GEO: applic for LEO, GEO: applic for LEO: applic for LEO:	Allows for reliable dual-frequency ionosphere corrections. Consistent ionospheric models through multi-GNSS (besides GLONASS due to absence of broadcast ephemeris model)

9		fault scenarios (RTCA LAAS ICD and FAA CAT-1 LAAS spec).			
	Multipath simulation	att, doppler, phase for each MP chan Ground reflection model statistical MP model			
	Satellite clock degradation models.	drift Af0,Af1,Af2 divergence dAf0,dAf1,dAf2			
	Advanced testing requirements				
	Hardware Interface	Cypress SuperSpeed USB-3	Real-time simulation of nine signals on four central frequencies.	Our hardware currently is limited to four RF channels, hence four central frequencies. Expandable with more or wider hardware RF channels hardware channles. Embedded system PCI interface has potentially higher bandwidth	For example, real-time simultaneous simulation of GPLS L1C/A L2C, ,L5 (I+Q), Galileo E1(B+C), E5a (P+D), E5b(P+D) , NvIC L5
	HILS	provisions	latency for embedded Linux should be minimum		
	INS simulator.	coherent with GNSS			
	RF I/O support	1PPS Out	70 nanosec	software generated	uBlox 9