

RLS-2100 Radio Link Simulator



OVERVIEW

The Square Peg Communications Inc. RLS-2100 Radio Link Simulator supports hardware-in-the-loop physical layer and end-to-end network performance testing of wideband satellite, aeronautical and terrestrial radio communications systems. 5G NTN channel models and hybrid satellite/terrestrial systems are supported.

The simulated signal paths include the RF characteristics of the transmitter, uplink, satellite/relay, downlink, and receiver, with realistic modelling of characteristics such as path delay, Doppler, and fading. A touch-screen or keyboard/mouse user interface allows real-world scenarios to be mapped directly to the applicable elements in the signal paths.

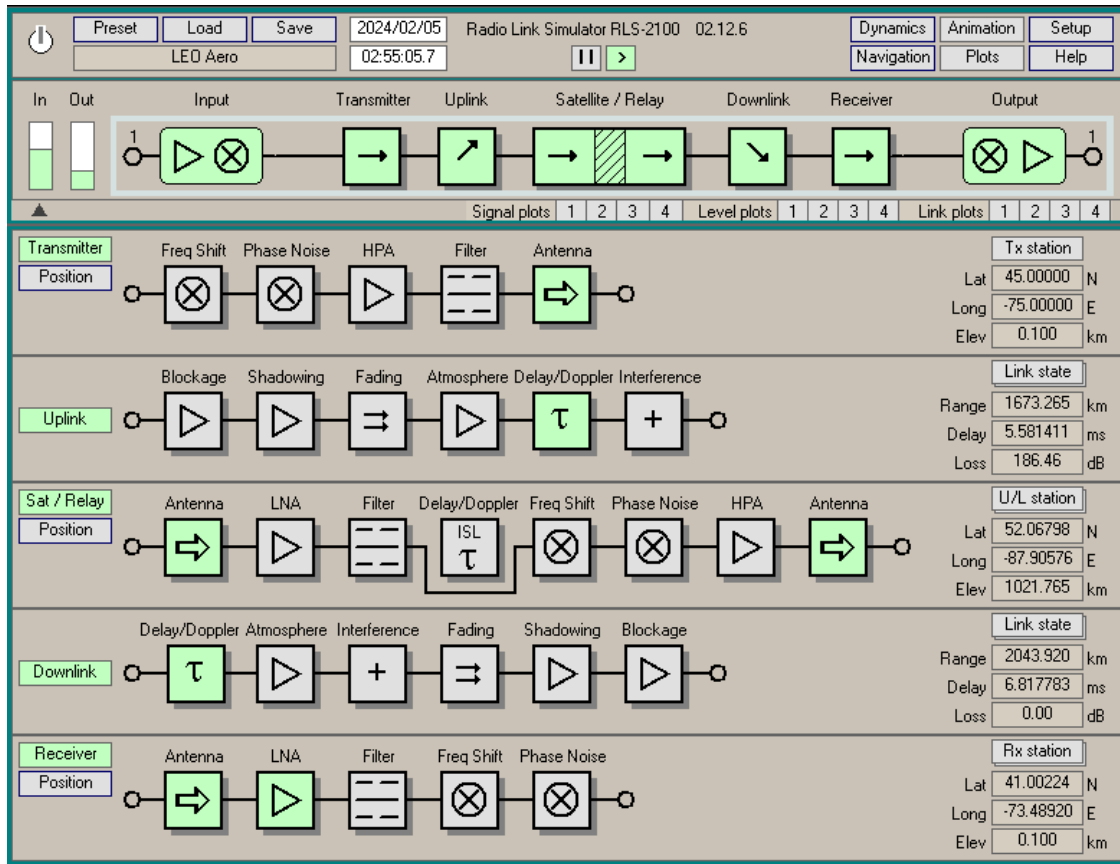
All stations (Transmitter, Satellite/Relay, Receiver) can be in motion, with the affected simulation parameters updated dynamically. The RLS-2100 includes integrated real-time multi-satellite orbit calculation and display for modelling LEO, MEO, HEO, GEO, and mixed satellite constellations. Routes can be specified for mobile platforms such as vehicles, ships, aircraft, UAVs, HAPs or rockets. Dual independent integrated GNSS simulators can provide station position to user equipment.

Graphical displays of signal spectrum, signal power profile, station positions, and link parameters facilitate verification of test setups and allow simple visualization of the effects of the applied impairments.

SPECIFICATIONS

FUNCTIONAL CAPABILITIES

Channels	1 x 1200 or 1000 MHz, or 2 x 600, 500 or 400 MHz, or 4 x 300, 200, 150 or 100 MHz
Frequency	Std: 700 to 2150 MHz (independent input/output) Opt: internal 5G FR1 (400 to 7125 MHz) Opt: external 5G FR2 (10.7 to 31 GHz)
Input level	-40 to +16 dBm
Output level	-40 to -10 dBm (Std), -40 to 0 dBm (Opt)
Models	Satellite, Terrestrial, Aero and hybrids
Impairments	<ul style="list-style-type: none"> ▪ Path loss, delay and Doppler (fixed, position-based or user file) ▪ Additive wideband noise ▪ Phase noise density (spectrum, level) ▪ Phase noise discrete (level, frequency offset) ▪ Interference (type, level, frequency) ▪ Multi-tap fading (model, bandwidth, C/M ratio, differential delay/Doppler) ▪ Blockage, shadowing ▪ Antenna gain pattern ▪ Antenna phase and amplitude jumps (probability distribution, interval) ▪ HPA non-linearity ▪ Phase and amplitude frequency response ▪ Atmospheric effects including ITU rain fading ▪ 5G fading and path loss models
Other capabilities	<ul style="list-style-type: none"> ▪ Orbital dynamics (LEO/MEO/HEO/GEO) ▪ Terrestrial/aeronautical station dynamics ▪ Dual independent GNSS simulators



SYSTEM VIEW OF RADIO LINK SIMULATOR (SINGLE CHANNEL)

GPS SIMULATOR

Channels	2, derived from station positions
Connector	SMA(F)
Impedance	50 ohms nominal
Frequency	1575.42 MHz (GPS L1)
Level	-90 to -50 dBm

ADDITIONAL CAPABILITIES

Cooperative units	4
Remote control	Ethernet, via Python API
Station position output	Ethernet, ARINC 429
Ephemeris output	Ethernet
Antenna emulation	OpenAMIP or custom
Visualization	Orbit and route animation
Spectral display	4 independent plots, at input or output
Power profile display	4 independent plots, at input or output
Link parameter display	4 independent plots of range, loss, delay, delay rate, Doppler or Doppler rate, for uplink, downlink, ISL or composite path

MONITOR & CONTROL INTERFACES

Sync and 1 pps	TTL, configurable as input or output
Reference	100 MHz internal, external or disciplined
Ethernet	10/100/1000 Base T
Serial	RS-232/422/485
USB	USB 2.0, USB 3.0
Video	DisplayPort, HDMI, VGA

MECHANICAL/ENVIRONMENTAL

Form factor	19" / 2.5U rack mount
Size (with bumpers)	L 51 cm x W 51.75 cm x H 12.07 cm L 20 in x W 20.38 in x H 4.75 in
Weight	≈ 7 kg (15 lb)
Power connector	IEC 320 male
Voltage	100-240 VAC, 50/60 Hz
Current (typical)	≈ 1.8 A rms at 115 VAC
Operating temperature	10°C to 35°C
Operating humidity	20% to 75% relative humidity, non-condensing
Regulatory	FCC, CE and RoHS compliant Safety: EN61010-1 Emissions & immunity: EN61326-1 Class A

CONTACT US

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