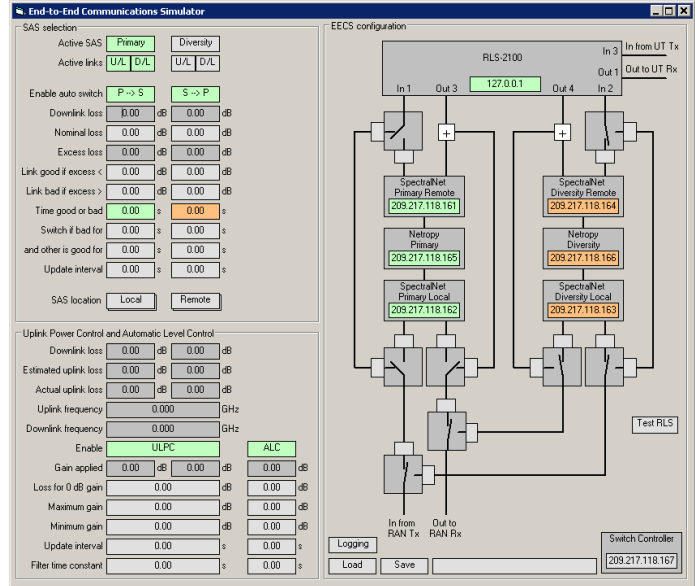


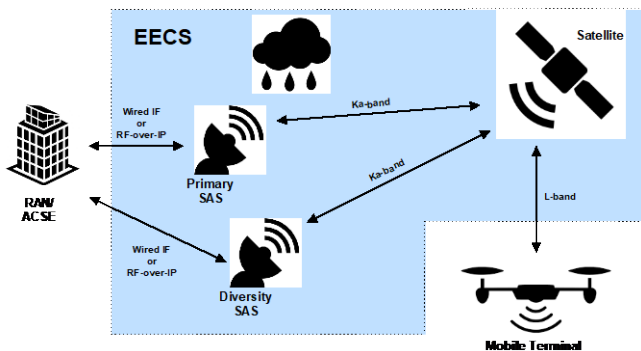
End-to-End Communications Simulator (EECS)



OVERVIEW

Square Peg Communications Inc.'s End-to-End Communications Simulator (EECS) provides a platform for evaluating the impact of Satellite Access Station (SAS) switchovers on network or terminal operation.

The EECS models the network depicted in the diagram below. A Radio Access Node (RAN) connects to a mobile terminal via satellite normally through a Primary SAS. However, when rain fading severely attenuates the satellite feederlink, service can be diverted through a geographically distanced Diversity SAS if conditions there are clear.



The RAN may be collocated with or remote from either SAS. A local RAN/SAS configuration uses a wired RF connection. A remote RAN/SAS configuration uses an RF-over-IP connection. The EECS can be configured to model either of these options.

Using Square Peg's RLS-2100 Radio Link Simulator, the EECS imparts the key satellite propagation characteristics onto the radio link signals passing through it. This includes rain fading, Doppler, delay, AWGN, phase noise, interference, multipath fading and more.

For an RF-over-IP RAN/SAS connection, the EECS includes emulation of WAN effects such as packet delay, jitter and loss.

The EECS provides a configurable algorithm that automatically triggers SAS switchover in response to rain fading events. SAS switchover can also be operated manually.

The EECS includes configurable satellite ALC and Uplink Power Control (ULPC) algorithms that automatically adjust signal levels during tests.

To conduct tests with the EECS, a user connects a RAN (or equivalent) and a user terminal to the EECS interface panel. The user configures the various algorithms and channel characteristics and then executes a set of planned experiments.

TEST SERVICES

Square Peg provides a variety of services to support the evaluation of a user's application in the presence of channel impairments (e.g., phase noise, rain fade and AWGN), and over SAS site switches. Testing can be performed at Square Peg or at the customer's site.

In a typical test, users will establish a nominal link between their hub (RAN) and their UT. The user's equipment would be configured to capture the behaviour of the end-to-end application; e.g., by logging bit error rate, or recording audio for voice calls. The behaviour would be captured for various scenarios (e.g., light rain, moderate rain, severe rain causing a site switch), and the collected user data correlated with logs from the EECS to determine how the user's application performs in various scenarios, and its overall robustness to site switches.

Square Peg can assist in the preparation of the test plan, the execution of the tests, and the interpretation of the results.

SPECIFICATIONS

RAN INTERFACE

Connections	Separate RF Input and Output
Connector	N,
Interface frequencies	950 – 2150 MHz
RF input level	0 dBm max
RF output level	-10 dBm max

UT INTERFACE

Connections	Antenna Port
Connector	Separate Tx / Rx RF N: Antenna SMA: Separate Tx / Rx
Interface frequencies	To UT: 1518 to 1525 MHz From UT: 1626.5 to 1675 MHz
RF input level	Antenna: +47 dBm max Separate Tx: +16 dBm max
RF output level	Antenna: -41 dBm max Separate Rx: -10 dBm max Rotary knob style 0 to 70 dB variable attenuator (10 dB steps)

USER INTERFACE

Hardware	Laptop PC running Windows 10
Software	Custom EECS Controller Application

KEY COMPONENTS

Radio link simulation	SPCI RLS-2100
RF-over-IP	Kratos SpectralNet
WAN emulation	Apposite Netropy N91

KEY CAPABILITIES

SASs modelled	Two, Primary and Diversity
SAS locations	Configurable, specified by lat/long
RAN/SAS connections	Wired RF or RF-over-IP
SAS switchover	Automatic or manual Automatic based on rain fading attenuation thresholds Configurable switchover attenuation thresholds Configurable
Feederlink frequencies	Configurable
Uplink power control (ULPC)	Configurable
Satellite ALC	Configurable
Rain Fading	User provided by file, or random using internal configurable ITU-R 1853-2 model Full RLS-2100 capabilities
Other satellite channel characteristics	Ability to quickly restore a saved configuration for convenient test replication
Configuration save/restore	

MECHANICAL/ENVIRONMENTAL

Form factor	19" / 14U rack, 20" deep
Size (Covers Off)	W 24" x D 25" x H 31"
(Covers On)	W 24" x D 30.5" x H 31"
(Covers + wheels)	W 24" x D 30.5" x H 37.25"
Weight	77 kg
Power connector	IEC 320 male
Voltage	100-240 VAC, 50/60 Hz
Current (typical)	≈ 3.5 A rms at 115 VAC
Operating temperature	10°C to 35°C

CONTACT US

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