Satellite Channel Simulator / Recorder-Player / Noise Generator

Multiple function system providing the following key features:

- Satellite Channel Simulator
- RF recorder and RF player
- Programmable Noise generator
- Integrated spectrum analyzer

The system is an advanced, Software Defined Radio (SDR) for real time simulation of a satellite channel, operating with L-band or Ku band frequency band. The system provides one or two channels, with 50MHz of bandwidth. Providing real time simulation of satellite channel transfer function including:

- Delay
- Doppler
- Noise
- Attenuation

The system provides the capability to record long samples of an RF channel, with bandwidth of 50MHz or 100MHz, for long durations up to 20 or 10 minutes (and can be extended by ordering optional larger storage)
The system provide digital noise generation, with 40dB control range, with bandwidth of between 50 to 100 MHZ (dual or single channel)

Operational Modes

The system has three operational modes:

- Satellite channel simulator

  Full simulation of a satellite channel, can be operated in two modes:
  - Static Mode
    Generation of constant Delay, attenuation, noise and frequency offset
  - Dynamic Mode
    The system is configured with the parameters periodically (normally once per second) and generates a continuous modification of the channel transfer functions, including increasing and decreasing of the propagation path, thus automatically modifying the attenuation, noise and doppler. In this mode the system can accept instead of the channel transfer function parameters, a location of a satellite, earth station and target platform.
- RF recorder
  In this mode the system will record the RF signals at its inputs, and will save the sample to the disk. These samples can be copied from the system for offline analysis. Or played (one time or continuously) by the system to generate the original signal for various purposes.
- Noise Generator
  In this mode the system is generating noise, to be used by the user for emulating AWGN. Noise can be outputted on both system outputs with bandwidth of 50MHz, or on a single output with bandwidth of 100MHz.

Supported bands

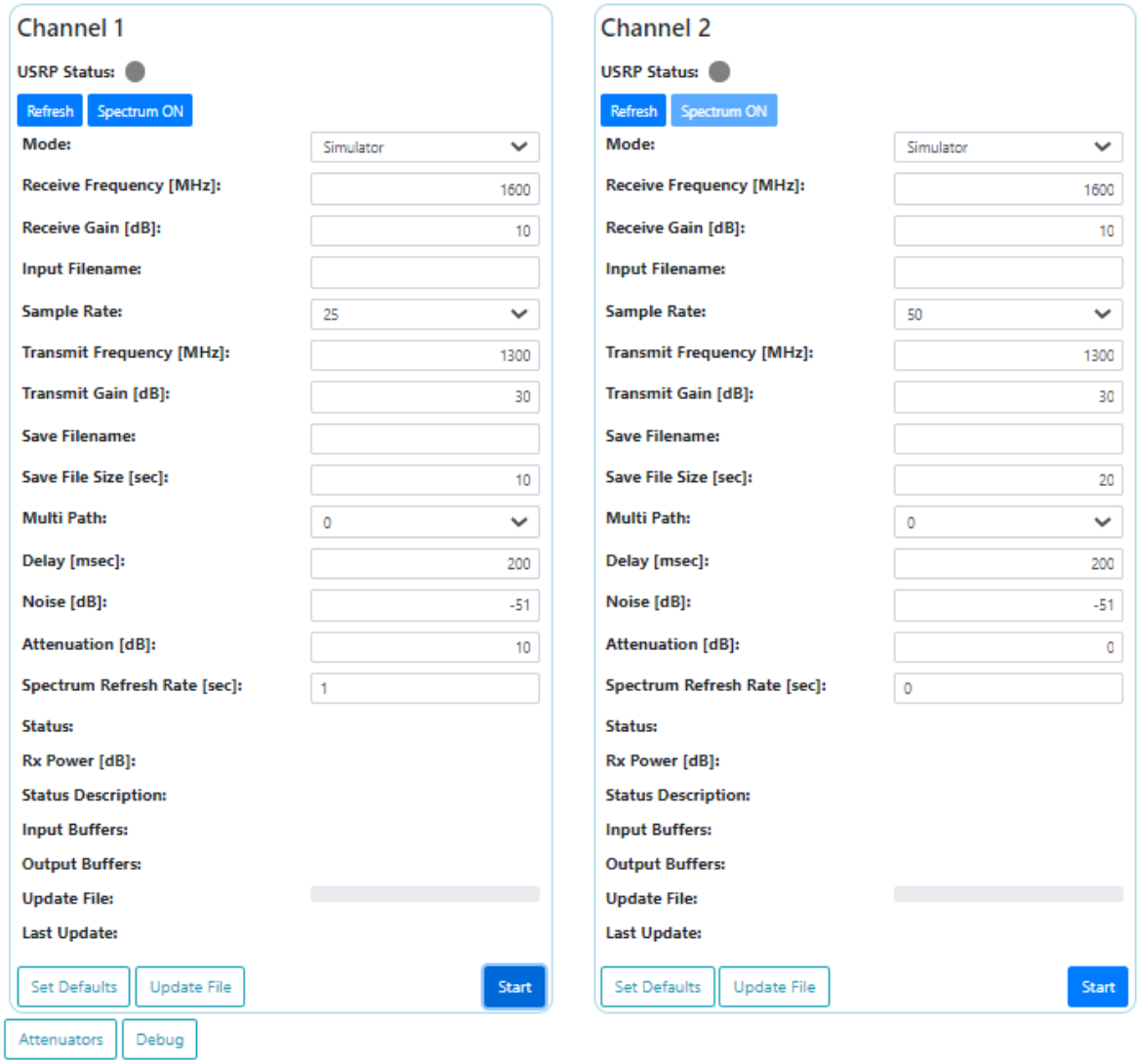
The system basic interfaces are in the L-band, the system further provides one Ku/L and L/Ku converter, enabling interfacing the system in the Ku band.

Specifications

Number of Channels	1 or 2 channels
RF In Frequency Range	L-band version: 950 – 2150 MHz Ku version: 13.75 – 14.5 GHz
RF Out Frequency Range	L-band version: 950 – 2150 MHz Ku version: 10.75 – 11.7 GHz or 11.7 – 12.75 GHz
Input RF Signal Power Range	-40 dBm to 0 dBm
Output RF Signal Power Range	-40 dBm to 0 dBm in steps of 0.1dB
Reference IN clock	Sine, 10MHz,
Reference IN clock input power	0 dBm +/- 3dB
1PPS IN (Optional)	1 PPS
Supported Bandwidth	Up to 50 MHz in dual channel mode.
Attenuation/Fading Range	Up to 40 dB in steps of 0.1dB
In band spurious suppression	< -50dBc
Output Signal Propagation Delay – Static	From 70 mSec up to 1000 mS in steps of 40 uSec
Output Signal Propagation delay – Dynamic	1uS per Sec max.
Output Signal Doppler Shift Range - Static	1 KHz in Steps of 0.1Hz
Output Signal Doppler Shift Range - Dynamic	Up to ±1 KHz per Sec
Interference Generator	AWGN (on single channel)
Recording length	20 minutes for a 50MHz channel. 10 minutes for a 100MHz channel.
Server	High end 1RUI DELL server
Chassis	19” 3U, 75cm depth
Interfaces	
Management port	Ethernet: 10/100/1000
Power input (nominal)	230 VAC / 50Hz
RF CH1 IN	SMA
RF CH1 OUT	SMA
RF CH2 IN	SMA
RF CH2 OUT	SMA
10MHz IN	SMA
1PPS IN	SMA
Operating Temperature Range	+10°C to +40°C

User interface

The user interface is a web client running on the operator PC, connecting to the system web server over the LAN.



Ordering information

AYECKA part number	Product name	Description
AY5020	SATSIM - HW	Channel simulator hardware system supporting single channel Including Ku band
AY5021	SATSIM Channel	Additional Channel
AY5002	SATSIM - UDC	Ku to L and L to Ku converter indoor unit