

Hop Devil Support Loopback Bandwidth Request

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Description

This describes the first of two demonstrations to be performed in support of the Hop Devil Proposal. After our team wins, we are required to have a SATCOM system in place with 30-45 days of contract initiation. The objective of this test is to connect a full duplex link, transmitting and receiving from the same antenna at Raytheon – Sunnyvale, CA. Once the link is setup, various tests will be conducted.

The second demonstration will be performed at Raytheon and will be documented after this has been reviewed.

Diagram

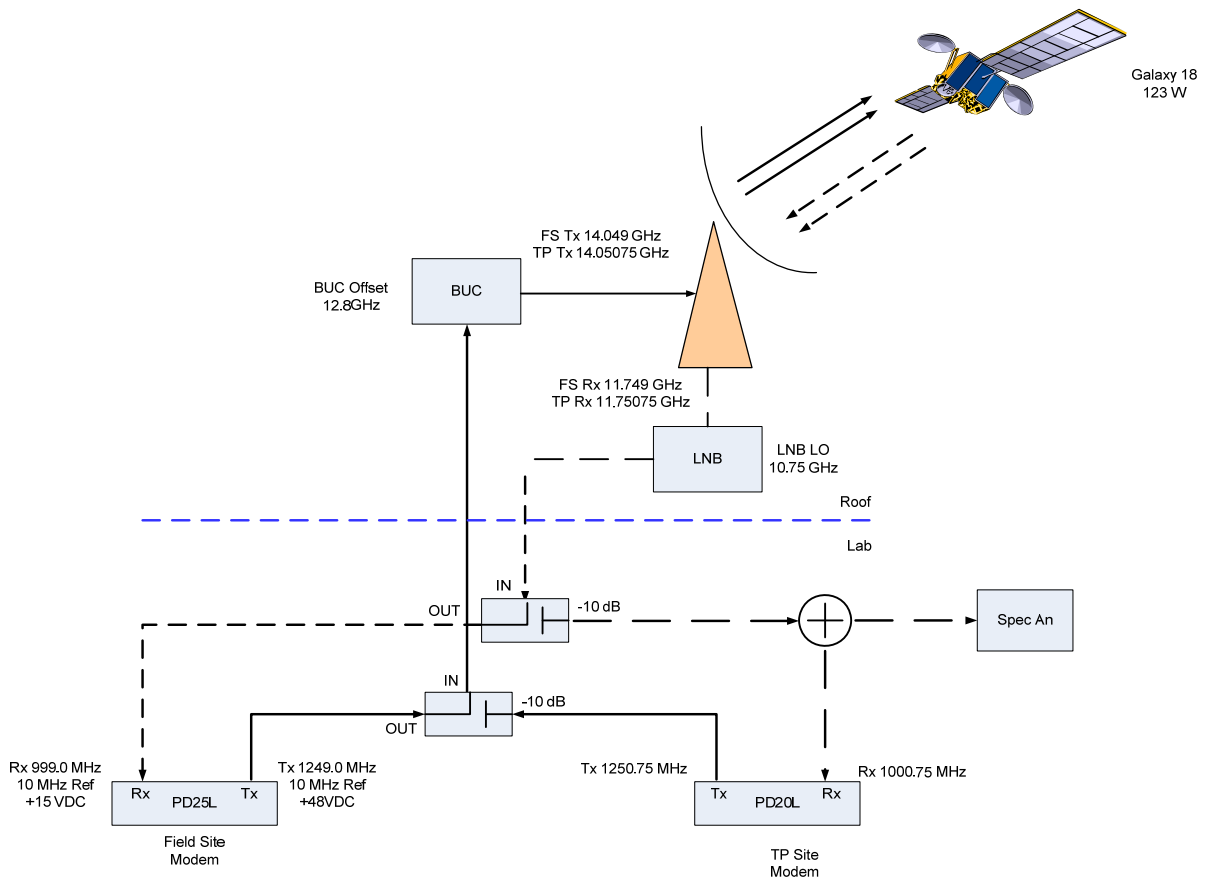


Figure 1 Test Diagram

Parameters

Following are the uplink and downlink parameters for the full duplex link:

Tx Location	R-AST SVO Lat 37.3811 deg Long -122.0361 deg Elevation ~175 ft above sea level
Tx Antenna	1.8 Meter
Tx Antenna Gain	46.5 dBi
Tx Band	Ku
Tx Frequencies	14.0 – 14.5 GHz F1 Field Site Tx F2 TP Tx
Modulations	QPSK
Tx HPA Power	25 Watts max.
Modem	Paradise PD20L
Tx Data Rates	2048 kbps
Tx FEC types	TPC
Tx FEC Rates	R7/8
Tx Symbol Rates	1170.287 ksps
Tx Occupied BWs	1.2 MHz
Tx Allocated BWs	1.65 MHz (OBW x 1.4)??
Rx Location	R-AST SVO Lat 37.3811 deg Long -122.0361 deg Elevation ~175 ft above sea level
Rx Antenna	Same 1.8 Meter
Rx Antenna Gain	45 dBi
Rx Band	Ku
Rx Frequencies	11.7 – 12.2 GHz F3 Field Site Rx F4 TP Rx
Modulations	QPSK
Rx Modem	Paradise PD25L
Rx Data Rates	2048 kbps
Rx FEC types	TPC
Rx FEC Rates	R7/8
Rx Symbol Rate	1170.287 ksps
Rx Occupied BWs	1.2 MHz
Rx Allocated BWs	1.65 MHz (OBW x 1.4)??
Satellite	Currently pointed at Galaxy 18 123 W

Schedule

We request 2 days for configuration with Intelsat support, plus 2 contiguous days between June 11 and June 22, 2012 for testing with Intelsat support.

Day 1-2: Link configurations, pointing to satellite, polarizations,

Day 3-4: Transmitting: Antenna/RF/Modem Verification plus data path testing.

Test Plan

Link Setup

1. Point (re-point) to correct Satellite (assume Galaxy 18)
2. Find Horizontal, Vertical beacon frequencies
Do at L band on roof
3. Optimize H or V polarization
L band on roof
Use beacon freq's or designated other signals?
4. Configure uplink for CW (FS Tx, TP Tx)
Set FS, TP Tx modems to Test CW mode
Tune to Intelsat designated frequencies
Bring modem, BUC powers up while Intelsat monitors power (estimate +5 dBw, +35 dBm)
5. Tune to designated operational frequencies (if necessary).
6. Turn on modulation.
7. Tune Rx modems to translated downlink frequencies.
8. Confirm Rx modems lock.
9. Ping from both directions to confirm full duplex link closed.

RF tests

1. RF Characterization
Characterize uplink parameters (modem settings, BUC settings)
Characterize downlink parameters (Rx level, Ebno's on both Rx modems)
Take snapshots of both downlinks.
Other?

Data Path Tests

Raytheon Link Calculations

The following link calculations were assumed are for transmitting and receiving from Raytheon Sunnyvale and assume the satellite is Galaxy 18 123 W.

ID	Uplink carrier	From FS	Units
1	Power	5.1	(dBW)
2	Carrier frequency	14.30	(GHz)
3	Antenna diameter	1.8	(m)
4	Antenna efficiency	0.61	(fraction)
5	Antenna gain	46.5	(dBi)
6	EIRP uplink	51.5	(dBW)
7	Range	37722	(km)
8	Path loss	-207.1	(dB)
9	Sat. flux density	-111.0	(dBW/m ²)
10	G/T satellite	2.6	(dB/K)

11	C/No uplink	75.6	(dBHz)
12	Data rate	2.048	(Mbps)
13	FEC rate	0.875	(fraction)
14	Mod. bits/sym	2	(bits/sym)
15	Noise bandwidth	60.7	(dBHz)
16	C/N uplink	15.0	(dB)

ID	Downlink carrier	To TP	Units
17	EIRP downlink	26.5	(dBW)
18	Range	37722	(km)
19	Path loss	-205.9	(dB)
20	Carrier frequency	12.50	(GHz)
21	Antenna diameter	1.8	(m)
22	Antenna efficiency	0.65	(fraction)
23	Antenna gain	45.6	(dBiL)
24	Noise temp system	110.0	(K)
25	G/T earth station	25.2	(dB/K)
26	C/No downlink	74.3	(dB)
27	Noise bandwidth	60.7	(dBHz)
28	C/N downlink	13.7	(dB)

ID	System overall	At TP	Units
29	C/I adjacent SAT	20.0	(dB)
30	C/I cross polar.	24.0	(dB)
31	C/N overall	10.5	(dB)
32	Eb/No	8.1	(dB)
33	Eb/No threshold	4.5	(dB)
34	Link margin	3.6	(dB)

Raytheon Needs before starting the Verifications

Satellite information and the Intelsat POC for 4 days.

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