

Ka band beacon receiver for radio wave propagation experiment



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To extend the satellite communications to the Ka band, ISRO has launched two beacons one at 20.2GHz and other at 30.5GHz in GSAT 14 satellite. NARL, as part of propagation experimentation established 20.2GHz receiver in collaboration with Space Application Center, Ahmadabad team. The development of the new receiver at 30.5GHz is carried out along with the development of 4 channel digital receiver.

In order to establish the 30.5GHz system, a new development of 4 channel digital receiver is carried out to cater for both the frequencies and both polarizations (V and H) as the existing digital receiver was obsolete w.r.to FPGA and other components. The receiver takes 20.2 and 30.5GHz signals and down converts to 70MHz IF which is obtained after down conversion from K and Ka band to L band. This basically estimates the beacon power along with frequency and noise floor. The block diagram of the beacon receiver, board of digital receiver, the subsystems placement and specifications of the same are as per below and the paper explains about the development of the 4-channel beacon receiver including digital receiver.

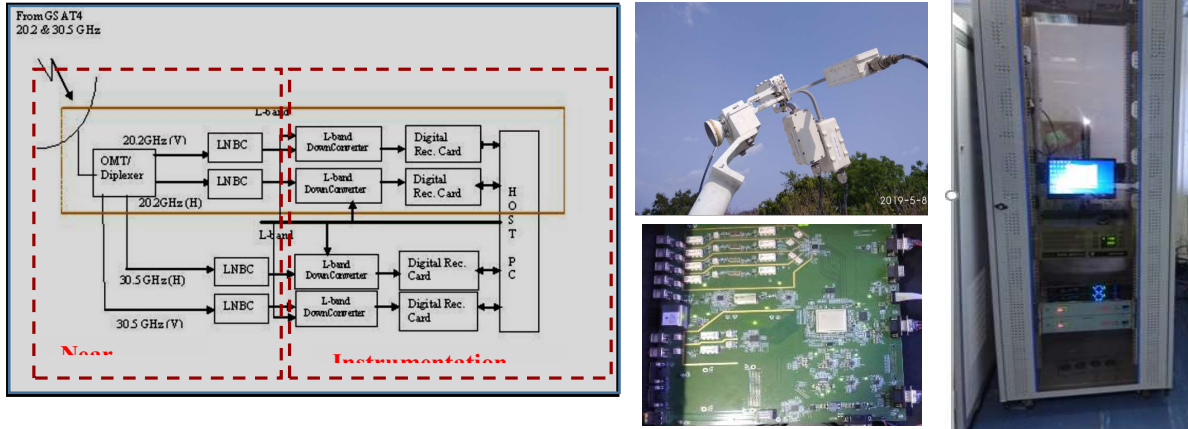


Figure 1. Block diagram of beacon receiver (left), antenna feed and digital receiver board (middle) and the receiver subsystems rack(right)

1	Input Frequency	20.2 and 30.5GHz
2	Polarization	H and V
3	Cross polarization	30dB
4	LNB gain	60dB
5	Receiver dynamic range	25 dB
6	Input Impedance	50 Ohm
7	Down Conversion	LNB, L band and DDC with programmable down conversion
8	Host interface	GbE Interface, RS232 and RS485
9	Data rate for logging	Up to 20Hz programmable
10	Display parameters	3 separate data files for Signal Strength, Frequency and Noise floor
11	Sensitivity of the receiver	-90dBm
12	Beacon power estimation accuracy/ amplitude stability	+/-0.5dB

1. Kikkert C.J, B. Bowthorpe, G.H.Allen, "Satellite beacon receiver improvement using digital signal processor", ISSPA '96,Gold Coast, Australia, Aug 1996,pp 517-520.
2. Chandra Prakash, K.A. Bhatt, S.S Valdiya, K.S Dasgupta, "Design and Development of Ka Band Digital Beacon Receiver for Ka Band Propagation studies Experiment". International journal of systems and Technologies, Vol.2, No.2, pp.167-177.