

# model: **Satellite-7000 with antenna**

## **Satellite communication system with antenna**

### **Overview**

Satellite-7000 with Antenna has two function as below ;

- 1) Satellite emulation  
: Satellite Translator is equipped for testing satellite communications links and simulate the satellite by band-translating the uplink frequencies to the corresponding downlink frequency.
- 2) Real Satellite communication  
: Satellite-7000 with Antenna can communicate with real satellite by subscribing to Satellite service company

So, the professor can teach their students with two methods.

- a) using Satellite Translator without connection to real Satellite Antenna & without subscription to satellite service company.
- b) using real Satellite Antenna + subscription to satellite service company.

Satellite-7000 with antenna is a integrated system to train a real satellite communication by using of main components including satellite modem, BUC, LNB and antenna.

This system utilizes worldwide popular top-level satellite modems so that operators(customers) can experience its feature-rich function and performance. The system is also designed to adopt Ku-band, the most common and reliable bandwidth, among available satellite frequency bandwidth and provide IP-based interface to accommodate various applications from customers. This system also utilizes 2.4M Ku-band Tx&Rx satellite antenna to train antenna pointing, such as Azimuth, Elevation and Polarization angles.

### **Feature**

- 1) Simple design & appearance using standard 19" rack
- 2) Low power consumption
- 3) Monitoring of uplink & downlink IF carrier characteristic from front monitoring panel
- 4) IP-based various application testing (Video, Data, VoIP)
- 5) Satellite telecommunication standard L-band interface(950~1,450MHz)
- 6) Monitoring and configuring of various satellite parameters from modem's front panel including
  - Tx Level
  - Tx Frequency
  - Eb/No
  - Data Rate
  - FEC
  - Modulation&Demodulation Type
- 7) Adjustment of antenna pointing
  - Azimuth
  - Elevation
  - Polarization
- 8) Lab activity
  - (1) Design and plan satellite communication links for a prescribed QoS.
  - (2) Perform and evaluate measurements in real satellitesystems.
  - (3) The students can obtain the skill of carrying out simulations / measurements of a satellite communication link using a commonly available and industry standard software package or measurement equipment.
  - (4) Report based on using the satellite system test bed.
  - (5) Familiarization with test equipment (Spectrum analyzer, BER test set etc.)
  - (6) Measurement for spectrum of various modulations and coding rates.
  - (7) Measurement of BER with changing C/N
  - (8) Assessment of impact of interference
  - (9) Analyze problems and apply measurements on the satellite test beds.
  - (10) Learn the ability to use the satellite test bed for performance measurements, evaluations and report.
  - (11) Evaluate the acquired technical skills and expertise required for performance characterization of satellite communication systems.
  - (12) Implement real satellite communication system by connecting 2.4 meter diameter satellite antenna, BUC, LNB,,, etc.

## Function

- 1) Satellite modem Tx parameter configuration (Data Rate, Modulation, FEC, IP etc.)
- 2) Satellite modem Rx frequency and level configuration
- 3) Transmitting and monitoring of L-band frequency
- 4) Frequency conversion and amplifying of L-band(950~1450 MHz) to Ku band(14.0~14.5 GHz)
- 5) RF frequency conversion (14.0~14.5 to 12.25~12.75 GHz)
- 6) Satellite modem Rx parameter configuration (Data Rate, Modulation, FEC, etc.)
- 7) Receiving and monitoring of L-band frequency
- 8) C/N measurement from spectrum analyzer
- 9) Test data transmit and receive
- 10) Antenna Pointing such as Azimuth, Elevation and Polarization

## System configuration

### 4.1 Main Components

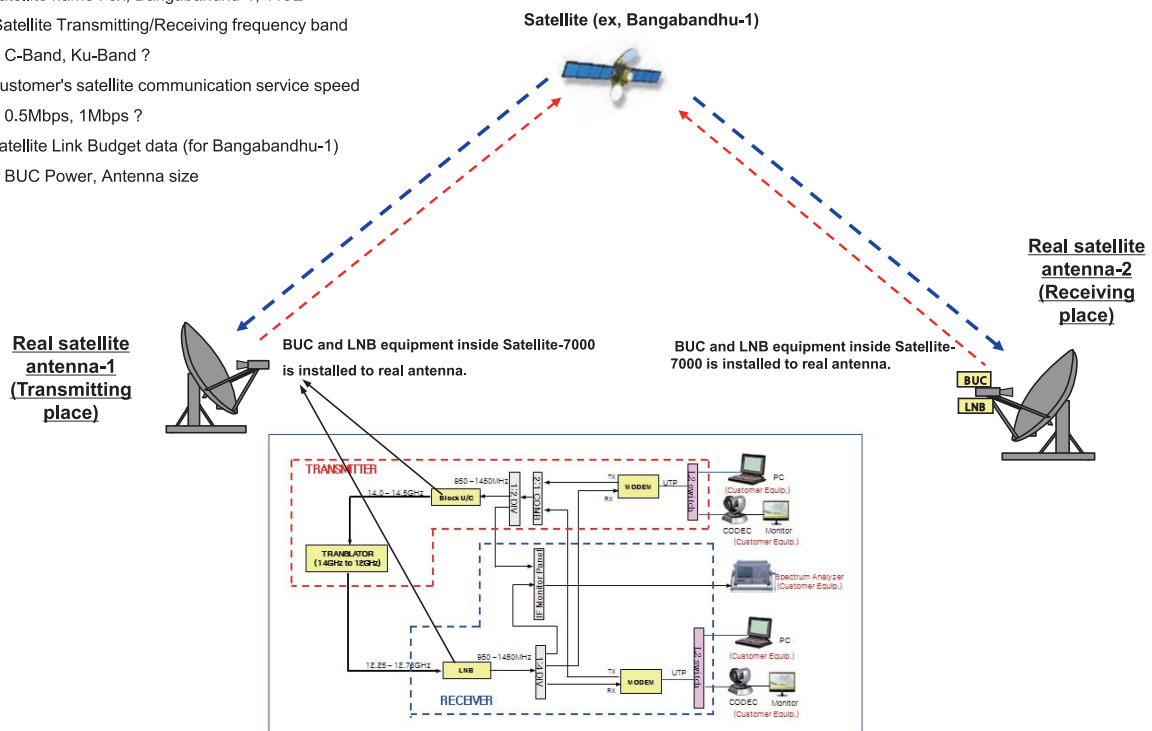


### 4.2 System block diagram

Block diagram for Satellite-7000 (real satellite communication system using satellite antenna)

#### ※ Pre-requisites to be checked

- 1) Satellite name : ex, Bangabandhu-1, 119E
- 2) Satellite Transmitting/Receiving frequency band  
: C-Band, Ku-Band ?
- 3) Customer's satellite communication service speed  
: 0.5Mbps, 1Mbps ?
- 4) Satellite Link Budget data (for Bangabandhu-1)  
: BUC Power, Antenna size



## Components

### 5.1 Transmitter

Equipment Rack	1 ea
L2 switch	1 ea
Satellite Modem with IP Interface	1 ea
BUC(Block Up-Converter)	1 ea
L-Bnad Combiner	1 ea
L-Band Divider	1 ea
Translator(TLT)	1 ea
RF cable Assy	1 ea
User's Manual	1 ea

### 5.2 Receiver

Equipment Rack	1 ea
L2 switch	1 ea
Satellite Modem with IP Interface	1 ea
LNB(Low Noise Block Down-Converter)	1 ea
IF Monitoring Panel	1 ea
L-Band Divider	1 ea
RF cable Assy	1 ea
User's Manual	1 ea

### 5.3 Satellite Antenna

Satellite Reflector	2 ea
Antenna HUB	2 ea
Feedhorn & TRF	2 ea
Antenna Post	2 ea
BUC(8W)	2 ea
LNB	2 ea
IF Cable assy, Tx&Rx	2 ea

## Specification

### 1) Transmitter

#### 1.1) Satellite Modem

Frequency Range	950 to 2000MHz, 100Hz resolution
Data Interface	10/100base-T Ethernet
Data Rate Range	2.4 kbps to 5Mbps
Modulation&FEC Type	1/2BPSK, 1/2QPSK/OQPSK, 3/4QPSK/OQPSK 7/8QPSK/OQPSK, 2/3QPSK/OQPSK
M&C Interface	EIA-232, EIA-485(2- or 4-wire)
Input/Output Impedance	50 $\Omega$ , female Type N Connector
Modulator Output power	0 to -40dBm, 0.1dB steps
Power supply	100 to 240 VAC, 50/60Hz, 37W
Display Size	20/L x 93/H mm

#### 1.2) Block Up Converter

Output Frequency	14.0 to 14.5 GHz
LO Frequency	13.05 GHz
Input Frequency	950 to 1450 MHz
Output Power(P1dB)	39dBm min, 8Watt Linear
Linear gain	65dB min.
Input connector	F-type, Female
Output connector	WR75
Power	+18 to + 60 VDC
Power consumption	80W Typ. @ P1dB
Demension	180/L x 130/W 80/H mm

### 1.3) Translator

Frequency Input range	14.0 to 14.5 GHz
Frequency Output range	12.25 to 12.75 GHz at LO 1 Frequency 1750 MHz 11.70 to 12.00 GHz at LO 2 Frequency 2300 MHz 10.95 to 11.45 GHz at LO 3 Frequency 3050 MHz
Maximum Input Power	10Watt, continuous
Insertion Loss	40dB min, 75dB max.
Level Control	25dB min. 1dB steps
LO Selection	3 Bands, Front Panel Selectable Band 1: 1750MHz, Band 2: 2300 MHz, Band 3: 3050MHz
Input/Output connector	SMA, Female
Power	90 to 250VAC, 47-63Hz
Display Size	Frequency : 12/L x 43/H mm Attenuation : 12/L x 20/H mm

### 1.4) Rack

Size	600(W) x 500(H)x 600(D) mm
Prime Power Socket	90 - 250VAC, 8hole

## 2) Receiver

### 2.1) Satellite Modem

Frequency Range	950 to 2000MHz, 100Hz resolution
Input power range	-130 +10 log symbol rate dBm (minimum) -90 +10 log symbol rate dBm (maximum)
Data Interface	10/100base-T Ethernet,
Data Rate Range	2.4 kbps to 5Mbps
Demodulation&FEC Type	1/2BPSK, 1/2QPSK/OQPSK, 3/4QPSK/OQPSK 7/8QPSK/OQPSK, 2/3QPSK/OQPSK
Monitor Fuction	Eb/No, Frequency offset, BER, Rx Signal level
M&C Interface	EIA-232, EIA-485(2- or 4-wire)
Input/Output Impedance	50 , female Type N Connector
Power supply	100 to 240 VAC, 50/60Hz, 37W
Display Size	20/L x 93/H mm

### 2.2) Block Down Converter

Input Frequency	12.25 to 12.75GHz
LO Frequency	11.30 GHz
Output Frequency	950 to 1450 MHz
Conversion gain	55dB min
Noise Figure	0.8 Typ., 1.0 dB max
Input connector	WR75
Output connector	F-Type, Female
Power	18VDC (+12 to +24VDC, over IF Coaxial cable)

### 2.3) Monitoring Panel

Frequency	RX IF : 950 to 1450MHz TX RF : 14.0 - 14.5 GHz
Port Interface	RX IF : F-type/Female, TX RF : SMA/Female
Panel size	1 U

### 2.4) Rack

Size	600(W) x 500(H)x 600(D) mm
Prime Power socket	90 - 250VAC, 8 hole

### 3) Antenna

Antenna Size	2.4m
Receive Frequency	10.95 ~ 12.25 GHz
Transmit Frequency	13.75 ~ 14.50 GHz
Receive Gain(Midband)	47.8 dBi
Transmit Gain(Midband)	49.1 dBi
Polarization	Linear
XPD(on Axis)	35 dB
Reflector Material	Steel
Antenna Type	Ring focus
Elevation Pointing Range	0° ~ 90° Continuous
Azimuth Pointing Range	0° ~ 360° Continuous
Polzrization Pointing Range	360° Continuous
Feed Interface	WR75
Operational Wind	72km/h to Gusting to 97km/h
Temperature	-40° ~ +60°C

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