# 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 evaluare measurements in real satellitesystems.
(3) The students can obtain the skill of carrying out simulations / measurements of a satellite communication link using a commenly 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 cinfiguration

## 4.1 Main Components

Transmitter

Receiver

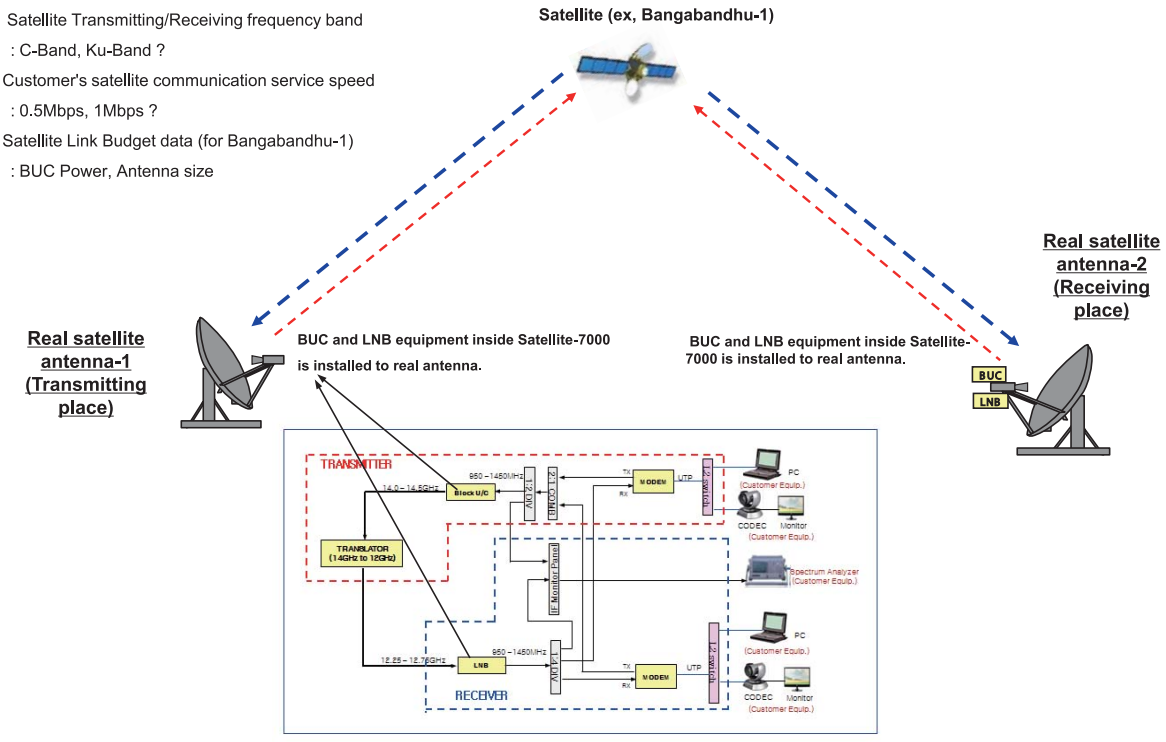
Antenna

## 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<br>7/8QPSK/OQPSK, 2/3QPSK/OQPSK |
| M&C Interface | EIA-232, EIA-485(2- or 4-wire) |
| Input/Output Impedance | 50Ω, 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<br>11.70 to 12.00 GHz at LO 2 Frequency 2300 MHz<br>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<br>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<br>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)<br>-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<br>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 | 50Ω, 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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