

FCC ID: 9900RB

Operational Description

Alcatel 9900 LMDS Base Station

This is a summary of the operational description for the Alcatel 9900 LMDS Base Station transmitter as required for type certification under FCC Part 101.

System Overview

The Alcatel 9900 is a Local Multipoint Distribution System (LMDS) that provides transport of packet data and telephony services between a central hub (base station) and multiple subscribers (terminal stations). The system operates in the 28000-28350 MHz and 29100-29250 MHz LMDS bands for downstream communications (hub to subscriber). The system operates in the 27500-28000 LMDS band for upstream communications (subscriber to hub).

The base station is composed of two units, an indoor Digital Base Station (DBS) and an outdoor Radio Base Station (RBS). The DBS receives digital ATM and E1/T1 signals and modulates them to an IF TDM signal that is sent to the RBS. The RBS converts the IF signal to the downstream RF transmit frequency. The RBS receives burst TDMA signals from the terminal stations and converts them to IF receive signals. The DBS demodulates the IF signals and generates to digital data to be returned on the ATM and E1/T1 ports. Each RBS provides service for one quadrant of the LMDS cell. Each DBS provides support for up to four RBS transceivers for full cell coverage.

The terminal station is also composed of two units, an indoor Network Termination (NT) and an outdoor Radio Termination (RT). The RT receives the RF signal from the base station and converts it to the receive IF frequency. The NT demodulates the IF signal and recovers the digital data to be provided to the subscriber interfaces. The NT also receives the digital data from the subscriber interfaces and modulates it into the transmit IF signal. This signal is only generated for specific time periods as authorized by the base station. The transmit IF signals are converted to the upstream RF frequency by the RT and transmitted as a narrow beam signal to the base station.

Base Station Transmitter Description

The DBS receives ATM packet data and E1/T1 telephony data and multiplexes it together into a TDM data stream. Reed-Solomon error correction is added to the TDM data. This data is then Viterbi and QPSK encoded and modulated to generate analog I/Q signals at 20.185 Mbaud. The I/Q modulator uses digital shaping filters with an α of 0.35. This results in a 27.25 MHz full power bandwidth signal. The I/Q signals are combined to generate a 130 MHz transmit IF signal. This signal is sent on a coaxial cable to the RBS along with 55 VDC for power and internal sub-carriers for RBS communication and control.

The IF signal from the DBS is first amplified in the RBS using a programmable fixed gain stage to compensate for cable losses. It is then mixed to an IF frequency of 430 MHz. Filtering is used to remove unwanted sidebands and the signal is mixed to a second IF of 1340 MHz. This signal is amplified by a variable gain amplifier to maintain a programmed RF transmit level. This level is provisioned by the operator and has a 10 dB range. The IF signal is then filtered and mixed to the final RF transmit frequency.

All local oscillator frequencies are generated from programmable synthesizers that are phase locked to a 10 MHz TCXO reference. The frequencies are programmed by the DBS. An on-off control is provided to inhibit the transmit signal whenever any of the synthesizers are out-of-lock.

The RF transmit signal is sent through a waveguide diplexer to the integral transmit antenna. This is a 90° sector antenna that has 15 dB of gain.

Base Station Receiver Description

The waveguide diplexer also directs the receive RF signals to the RBS receive circuits. The receive signals are amplified by an LNA and mixed to 840 MHz by the same LO as the final transmit stage. This IF is then filtered and mixed to 380 MHz. The IF signals are amplified by a programmable fixed gain amplifier to compensate for IF cable losses.

The DBS receives the IF signals and recovers them using a burst TDMA demodulator. Up to four simultaneous signals may be received in each quadrant. Information about the receive signal level and frequency error is retained and used to signal the terminal stations for fine adjustment of their transmitter power and frequency. The digital data packets from the demodulator are buffered and routed as needed to the ATM and E1/T1 interface ports.