



**Exhibit 12 – Operational Description**

**SpectraPoint Wireless LLC  
Customer Premises Equipment Roof Unit**

**FCC ID: NNSRTU2000-99**

**Model Number : RTU2000-28-2**

**Information Provided in this Exhibit:**

**Operational description of CPE Roof Unit**

## Operational Description of CPE Roof Top Unit

The SpectraPoint® LMDS system is designed to transport a variety of broadband wireless services to customers. This LMDS system is capable of delivering up to 240 MHz of contiguous bandwidth of data services to customers in an area of up to 5 Km radius from a central base station. The same frequency spectrum may be reused in similar sectors throughout a given metropolitan area.

The two basic parts that make up the SpectraPoint® LMDS system are the Base Station and Subscriber Terminal equipment. The block diagram in Figure 1 shows the relationship of the Customer Premises Equipment (CPE) Roof Top Unit to the total system. In the diagram, the downstream direction is defined from the RF Transmitter to the Roof Top Unit. The reverse signal direction is defined as upstream. In operation, the

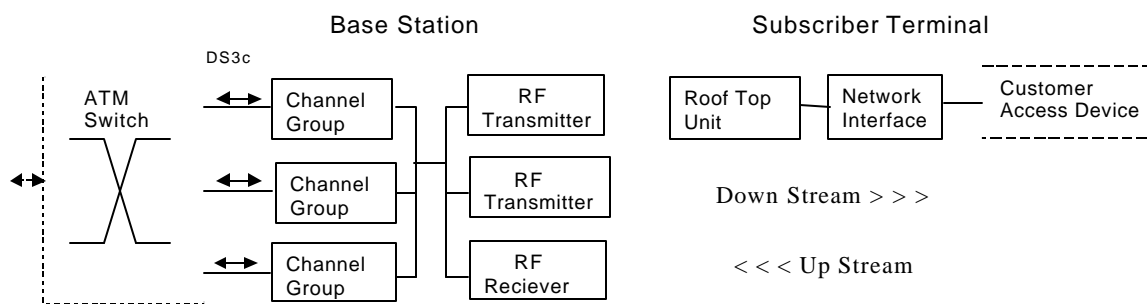


Figure 1: LMDS Block Diagram

DS3 data interface to the Channel Group is Quadrature Phase Shift Key (QPSK) modulated onto an L-Band intermediate frequency carrier. The I/F is input to the RF Transmitter where it is upconverted to the 27.5-28.35 GHz authorized LMDS frequency band. The RF is transmitted downstream through one of 4 orthogonal sectors. Each sector reuses the same frequency spectrum analogous to a cellular phone system that has no moving components. In the upstream direction, the customer interface to the Network Interface Unit (NIU) may be a combination of multiple T1 data lines, 10BaseT local area network data, or digital video data. The NIU combines the data into a single data stream and modulates an at L-Band IF carrier. This IF carrier is then input to the transmit side of the CPE Roof Unit Transceiver. The CPE Roof Unit upconverts the L-Band signal to the 27.5-28.35 GHz authorized LMDS frequency band for transmission to the Sector RF Receiver. The RF Receiver then down converts the RF to the L-band frequency in a reverse of the Base Station downstream process. Finally data is reassembled into a DS3 format for interfacing with the Central Office equipment.

The CPE roof unit serves as a transceiver at the customer premises location for the subscriber terminal equipment. The CPE roof unit receives a downstream carrier and down converts the RF signal from 27.5-28.35 GHz to L-Band in the 950 to 1390 MHz range. Frequency stability of the CPE roof unit is maintained through reception of a highly stable pilot tone transmitted by the Base Station RF Transmitter. The pilot tone is

made up of a 960 MHz CW signal that is upconverted to 27.510 GHz for transmission within the authorized LMDS frequency band. The high stability pilot tone is used to phase lock a local oscillator on the CPE Roof Unit.

Power to the CPE roof unit is supplied through the RF coaxial cable interface to the receiver IF connector. The CPE operates from 12 VDC nominal at a maximum current of 2 amps. A transmitter enable voltage of +5 VDC is supplied through the RF coaxial cable interface to the transmitter IF connector.

The transmitter up converter accepts inputs from 1550-1800 MHz and produces a transmitter output of 28.10 – 28.35 GHz. The receiver accepts inputs of 27.50 – 27.94 GHz and down converts to 950 – 1390 MHz.

The transmitter operates in a power control mode with power levels controlled through a closed loop with the Base Station. This loop senses signal strength variations due to changes in path parameters and adjusts power levels of the CPE roof unit. In case of total loss of the link, loss of pilot tone phase lock, or oscillator not ready condition, the transmitter portion of the CPE Roof Top Unit will be disabled.