Exhibit 12 – Operational Description

Motorola Customer Premise Equipment (CPE)

FCC ID: MIJZEPCPE-USB-01

Model No. LT 20M-00

12.0 Operational Description

The hardware for FCC Certification submittal is the Motorola LMDS Zephyr Outdoor Unit (Zephyr ODU). In order to facilitate the operational description of the Zephyr ODU, other elements of the total LMDS system will be introduced. But these additional elements support the operational description and are not part of the FCC Certification submittal.

LMDS Systems utilize Customer Premise Equipment (CPE) to provide an interface for system subscribers to input data to and receive data from the system. The CPE functional block diagram is shown in Figure 12.0-1. Note that the Zephyr ODU is only one element of the Customer Premise Equipment and is that element that transmits and receives communications between other elements of the LMDS System.

In order to input user data to the LMDS system by RF transmission via the Zephyr ODU as follows:

- User data is input to the Indoor Unit (IDU).
- The IDU generates an upstream IF signal modulated with user data.
- The upstream IF is input to the Zephyr Outdoor Unit (ODU) at 17 MHz to 42 MHz through the Power Control Unit (PCU) interface (direct video cable hook-up).
- The ODU up converts the upstream IF to the upstream carrier frequency (31.225 GHz to 31.300 GHz) for over the air transmission to the LMDS hub.

In summary, the Zephyr ODU up converts the upstream IF (17 to 42 MHz) generated by the Indoor Unit for over the air transmission (31.225 to 31.200 GHz) to the LMDS Hub.

In order to receive data from the LMDS system:

- The ODU down converts the received over the air downstream signal (31.000 GHz to 31.075 GHz) to the downstream receive IF (495 MHz to 570 MHz).
- The downstream IF is input to the PCU which hands it off to the IDU.
- The IDU demodulates the IF signal and recovers the user data.
- Data is output to the user.
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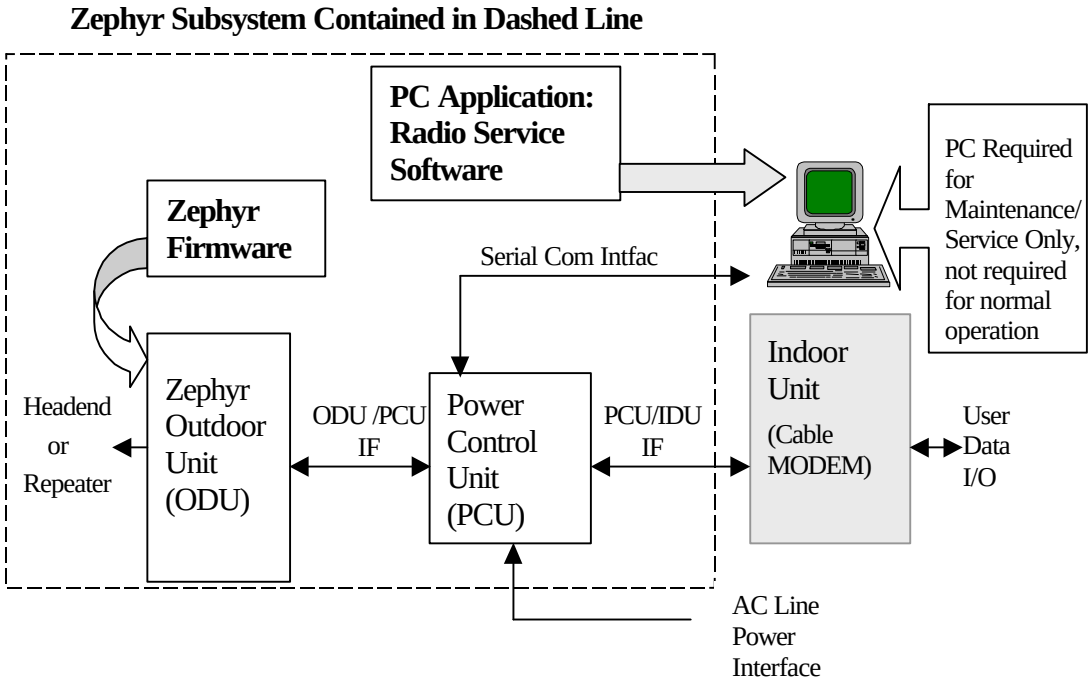

Figure 12.0-1 The Zephyr ODU is a component of the LMDS Customer Premise Equipment

In summary, the Zephyr ODU down converts over the air signals transmitted by the LMDS Hub (31.000 to 31.075 GHz) to a receive IF and outputs the IF signal (495 to 570 MHz) to the Indoor Unit (via the PCU) for demodulation and data recovery.

Additionally, the ODU provides a serial communication interface to a personal computer attached through the PCU. The personal computer is used for service or ODU equipment programming. It is not required for normal operation.

The physical interface between the PCU and ODU is a single video co-axial cable. Upstream IF, Downstream IF, Power supply voltage and the serial communication interface to the ODU are multiplexed over the coaxial cable connection. The cable provides both the power input as well as the communications path between the PCU and the ODU. The IDU is a DOCSIS compliant cable MODEM.

In order to communicate with the Outdoor Unit to perform service or installation tasks, a serial communication path is provided from the ODU through the PCU to an attached personal computer. The PC executes an application program known as Radio Service Software. Based on operator selections, the PC can query the ODU to determine health status, configuration, etc.

The transceiver will typically be located outdoors and must operate in various harsh environments.

Figure 12.0-2 is a top-level system block diagram of the Zephyr ODU Transceiver. It shows the frequencies transmitted and received at the Zephyr ODU antenna and the frequencies routed via the direct connection video cable interfacing the Zephyr ODU to the user via the Power Control Unit (PCU).

Figure 12.0-3 is a block diagram of the Millimeter Wave Converter portion of the top level block diagram shown in Figure 12.0-2. The Millimeter Wave Converter translates the millimeter wave antenna signals for transmit and receive to IF domain signals for additional processing and conversion in the IF section of the Zephyr ODU.

Figure 12.0-4 is a block diagram of the IF portion of the Zephyr ODU. The IF section translates the user connection terminal signals via the co-axial video cable to the IF domain for interface to the Millimeter Wave Converter section of the Zephyr ODU.

The attenuation of spurious emissions is provided by the following means:

a) Filtering after mixers to reduce local oscillator leakage and harmonics
b) Careful attention to mixer drive levels to reduce low order spurious signals
c) Output filtering to restrict emissions to the designated band

Frequency stability is controlled by the following means:

a) Power supply voltages are stable over a wide range of input voltage with frequency controls independent of absolute voltage levels
b) The reference oscillator is phase locked to an input pilot signal to hold the output frequency to the same tolerance as the transmitting signal received by this unit

The transmitted output power level is controlled by the receiver AGC as a function of the received pilot level. The AGC limits full output transmit power (+12dBm) when the received pilot signal reaches –75dBm maximum operational signal level. The transmitted output power goes into compression at +18dBm, with a maximum power output power of +20dBm. The maximum output power is a function of compression on the power amplifier stage.

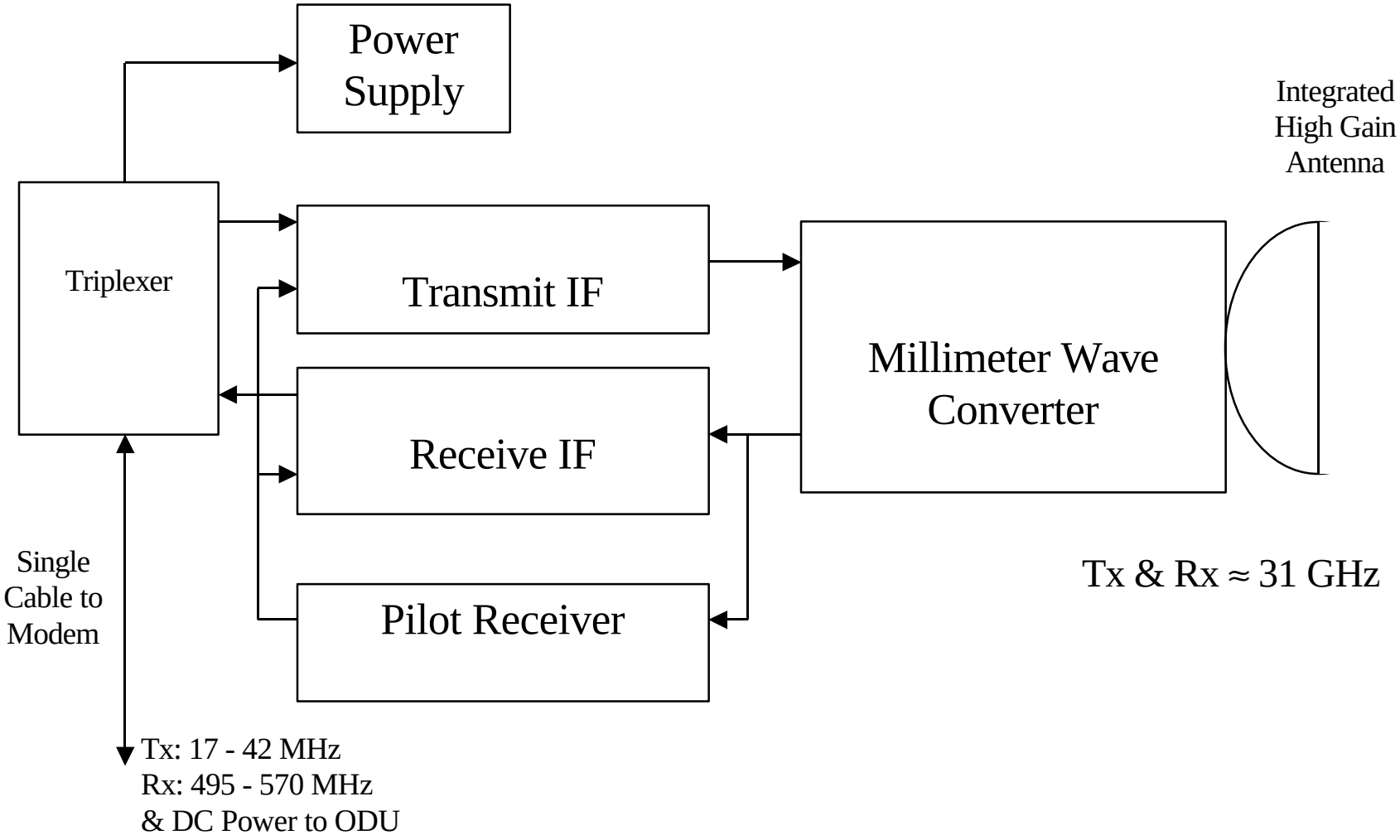

Figure 12.0-2 At the cable connection and at RF, communication signal flow is bi-directional for the Zephyr ODU

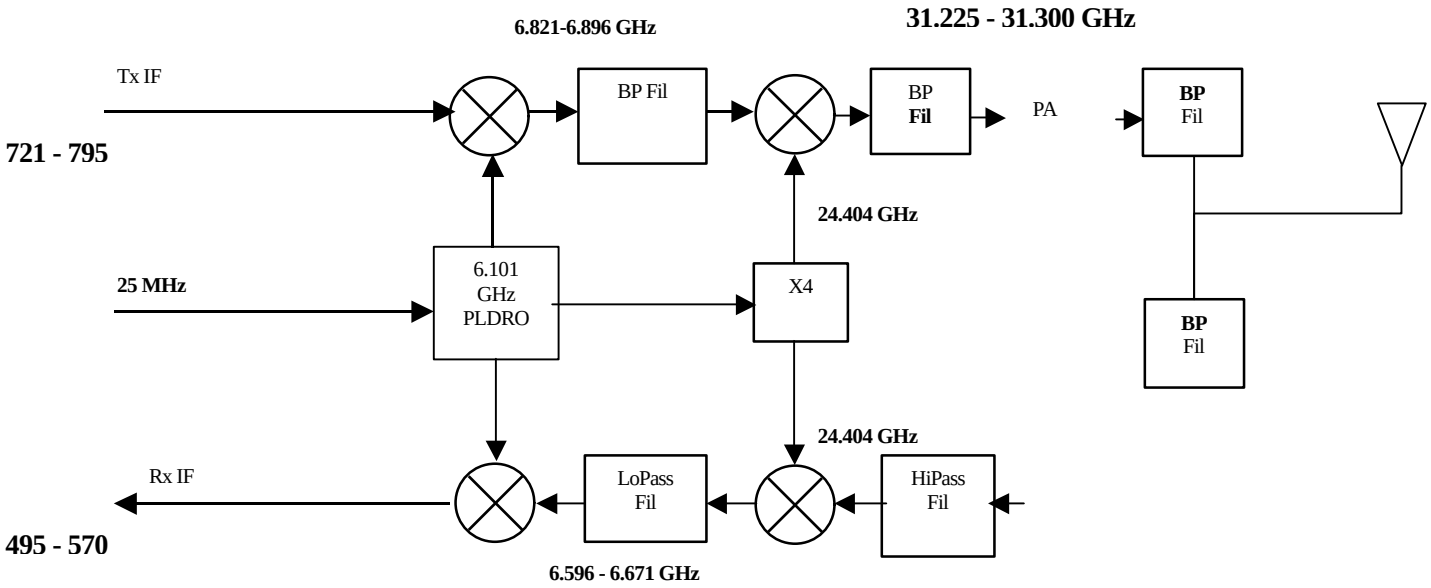

Figure 12.0-3 The Millimeter Wave Converter subsystem for the Zephyr ODU translates the antenna signals to and from the IF domain.

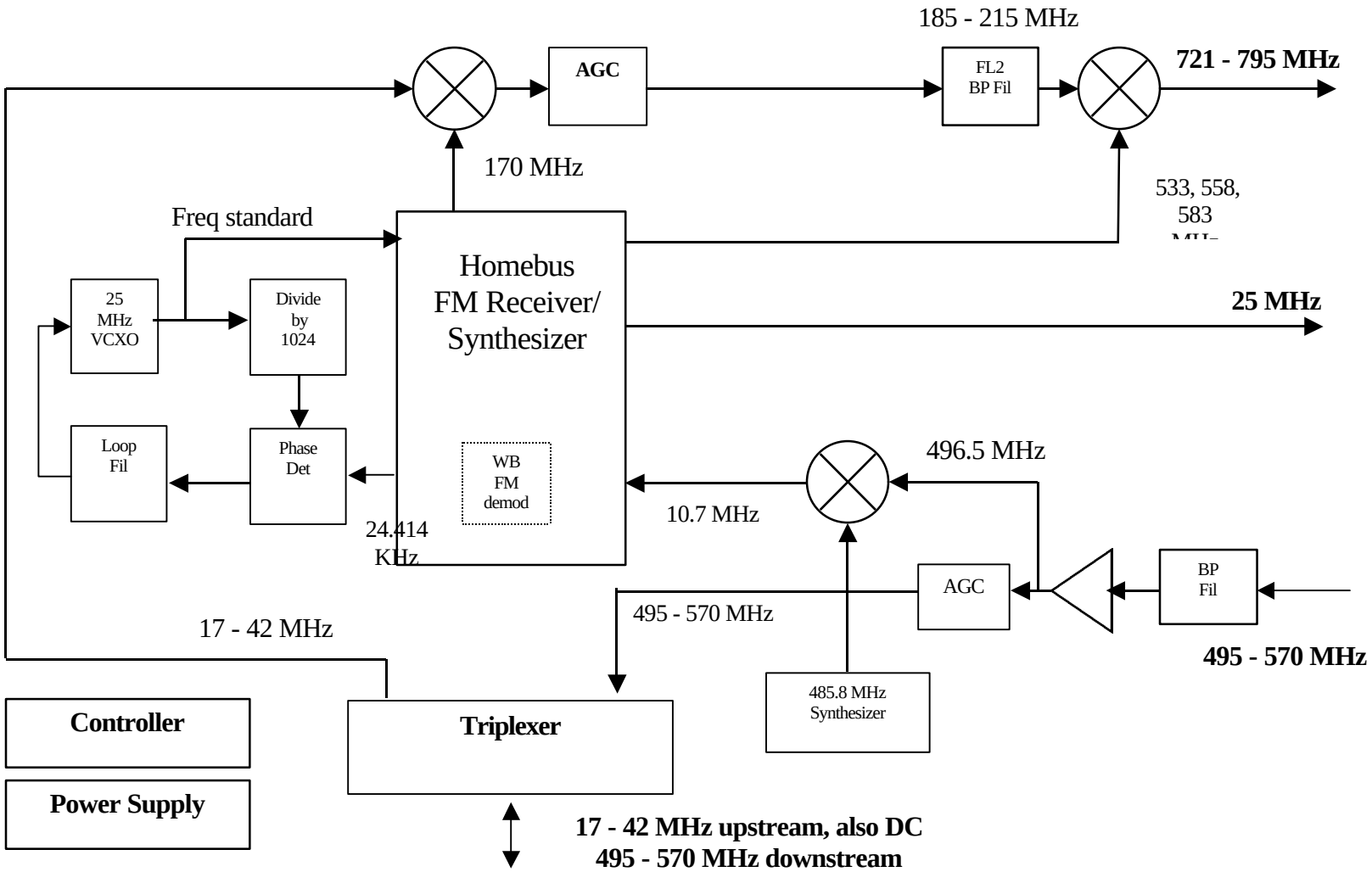

Figure 12.0-4 The IF section of the Zephyr ODU interfaces the user interface domain to the IF frequencies subsequently converted to millimeter wave