Moseley

Event HD ODU
Operational Description

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Event HD ODU

1 Top Level Description

1.1 Operational Overview

The Moseley EVENT-HD is a digital microwave radio terminal operating in the 6.5 GHz band. It is composed of two functional units, a modem Indoor Unit (IDU) and RF Outdoor Unit (ODU). The transmit and receive terminals provide a wireless digital link for broadcast applications transporting DVB-ASI data (digital video) and Ethernet (IP traffic) at rates up to 155 Mbps from the origination end of the link to the destination end.

1.2 ODU Functional Detailed Overview

The ODU (outdoor unit), operates as either a transmitter or receiver. Its primary function is to provide a low loss interface between the antenna and the microwave transmit and receive circuitry. As such, it must be mounted in close proximity to the antenna, typically as a rooftop pole or tower mount configuration. Usually it is impractical to include all radio functions in the ODU, so there is a radio receive and transmit interface between the ODU and the Indoor Unit (IDU). This physical interface consists of a coaxial cable as shown in Figure 1-0.

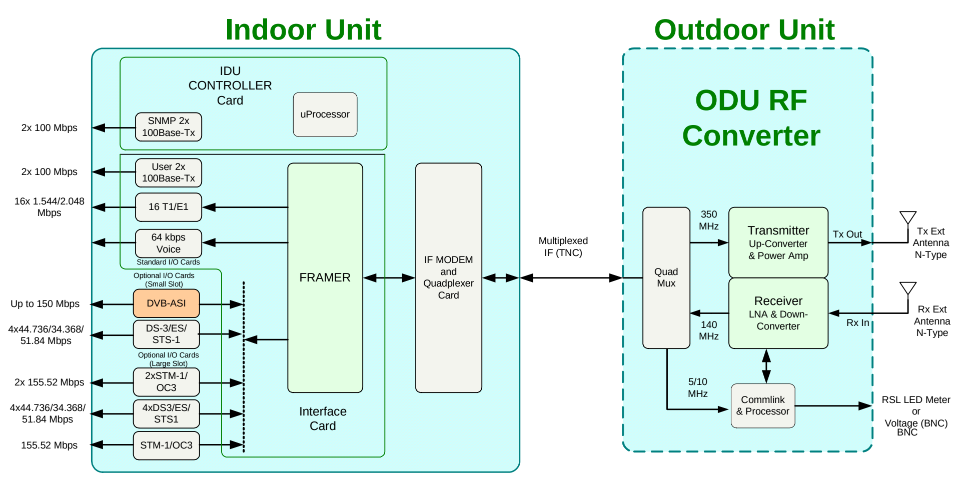

Figure 1-0 IDU-ODU Functional Relationship

The transmission frequency is too high to be carried between the ODU and IDU on a coaxial cable and are converted to lower Intermediate Frequencies (IFs) for ODU to IDU transmission.

As such, several ODU subsystems are required:

- Transmitter (Tx) chain: Translates the Tx IF, commonly 350 MHz, to the desired Tx frequency and controls Tx power

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- Receiver (Rx) chain: Translates the desired Rx frequency to a Rx IF, commonly 140 MHz.
- IF multiplexer: Separates the Rx IF, Tx IF, telemetry communication link in the range 5-20 MHz, and DC power on the ODU/IDU Coax
- RF Duplexer: Selects the FDD band pairs and combines Tx and Rx to a common antenna connector
- ODU controller: Communicates with the IDU and controls ODU functions
- Mechanical Housing: Provides mounting structure, thermal dissipation, environmental and RFI protection
- DC/DC converter: Converts –48V DC power on the IF cable to required ODU regulated voltages

1.3 Frequency Bands

Table 1-1 defines the frequency bands of operation for the ODU as sold for regions overseen by European ETSI and US FCC regulatory standards. Frequency band is firmware controlled and set by factory according to region of operation. The user does not have access to nor can change the band of operation. The user can however change the channel frequency within the bands defined in Table 1-1.

Table 1-1. Event HD Frequency Bands of Operation

Band	**Min Freq (GHz)**	**Max Freq (GHz)**	**Channel Spacing (MHz)**	**Duplexer Spacing (MHz)**	**Regulatory Standard***
6M	6.425	6.525	25	50	FCC 74.601a, 74.602, 78.18, 101.147j
6U	6.425	7.125	30	340	ETSI* EN 302 217-2-2 V1.1.3 Annex B ITU-R F.384-10

* ETSI standards delineate spectrum classes and broad frequency band families of annexes:

Annexes described above are as follows:

- B Frequency bands from 3 GHz to 11 GHz (Channel separation up to 30 MHz)

Spectrum efficiency classes addressed by this product are as follows:

- Class 4: equipment spectral efficiency based on typical 16 or 32-states modulation scheme. (e.g. 16 or 32-QAM, or equivalent);
- Class 5A: equipment spectral efficiency based on typical 64 or 128-states modulation scheme. (e.g. 64 or 128-QAM, or equivalent), for cross-polar adjacent channel (ACAP) operation;

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2 RECIEVER

2.1 Receiver Functional Overview

Figure 2-1 below presents the ODU assembly for the receiver. It is composed of an RF bandpass filter and pre-amplifier followed by an RF PCB assembly. The PCB assembly converts the RF input signal to a lower frequency IF signal at 140 MHz for transmission through the IF cable to the Indoor Unit. This function is described in further detail in the next section.

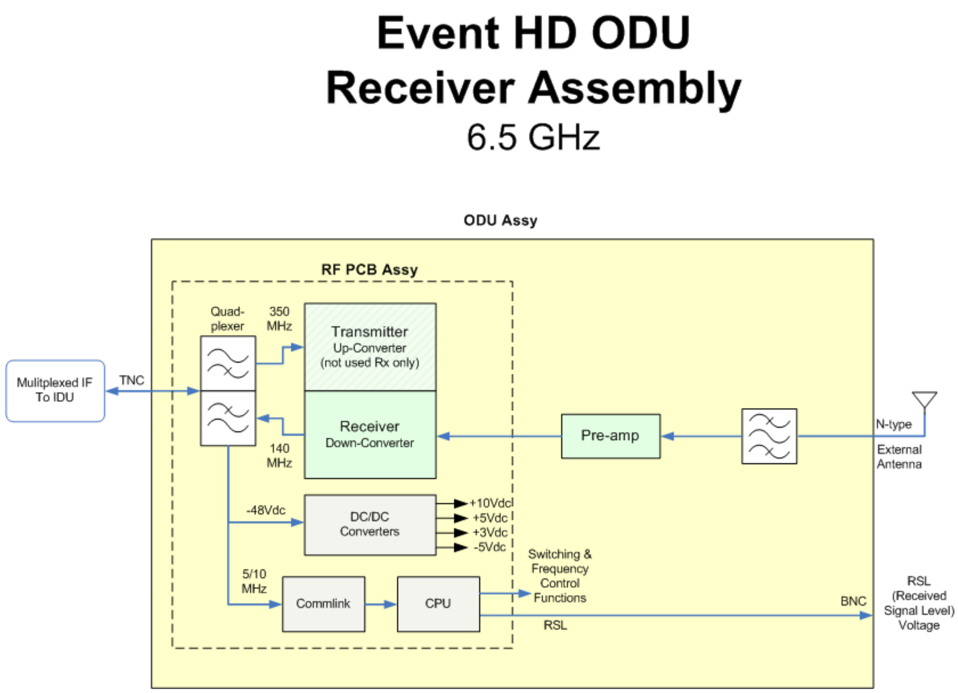

Figure 2-1. ODU Receiver Assembly

2.2 Receiver Detailed Overview

Figure 2-2 below presents the receiver PCB block diagram. A double conversion architecture converts the RF input signal from 6.5 GHz down to the 1st IF of 1675 MHz. A second conversion to the 2nd IF of 140 MHz is made prior to transmission down the IF cable to the Indoor Unit.

The RF synthesizer operates at approximately 4.8 GHz with a low side mix (6.5 GHz – 1.7 GHz = 4.8 GHz). Step size is 1 MHz. The 1st IF is generally fixed at 1.675 GHz but can be moved within a +/- 50 MHz range to avoid spurious mixing products that might otherwise degrade performance. Frequency selection is controlled by an internal microcontroller that stores an internal lookup table and sets the IF as required to avoid spurious.

The IF synthesizer is generally fixed at 1.535 GHz (1.675 GHz – 0.140 GHz). Step size is 100 kHz and its frequency may be programmed to resolve channel steps less than 1 MHz.

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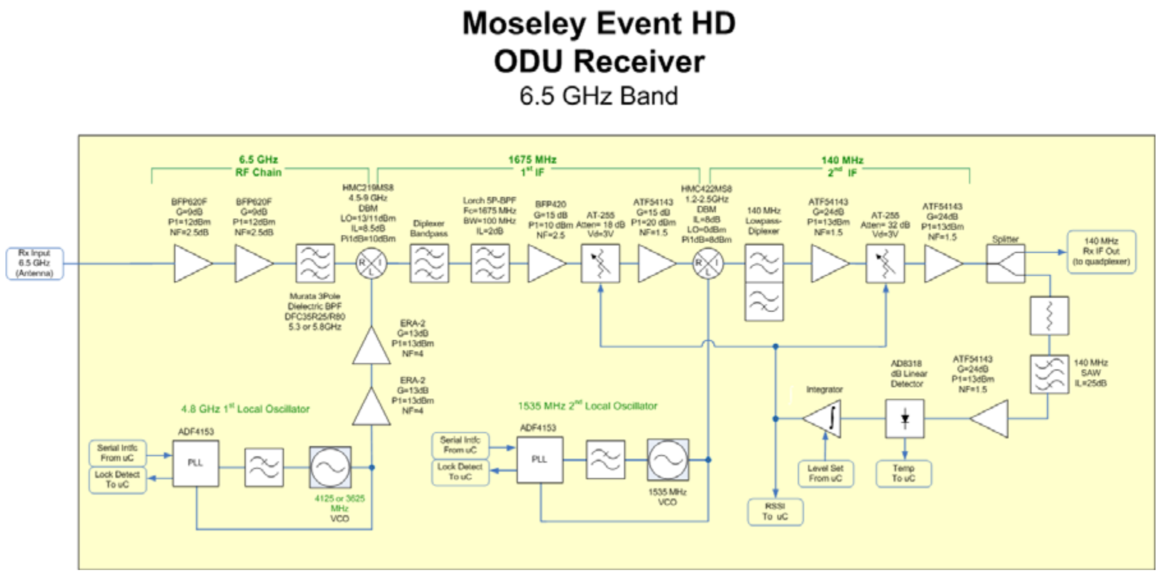

Figure 2-2. Receiver Architecture

IF output level control at 140 MHz is set by an AGC loop to -10 dBm. The AGC loop is composed of a detector, analog integrator loop, and microcontroller lookup table. This loop also derives a receive signal level (RSL) indication accurate to within +/- 0.5 dB over temperature.

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3 TRANSMITTER

3.1 Transmitter Functional Overview

Figure 3-1 below presents the ODU assembly for the transmitter. It is composed of an RF PCB assembly that converts the IF signal from the IDU at 350 MHz to the RF frequency 6.5 GHz. That signal is filtered and further amplified to final power level prior to transmission. The PCB assembly function is described in further detail in the next section.

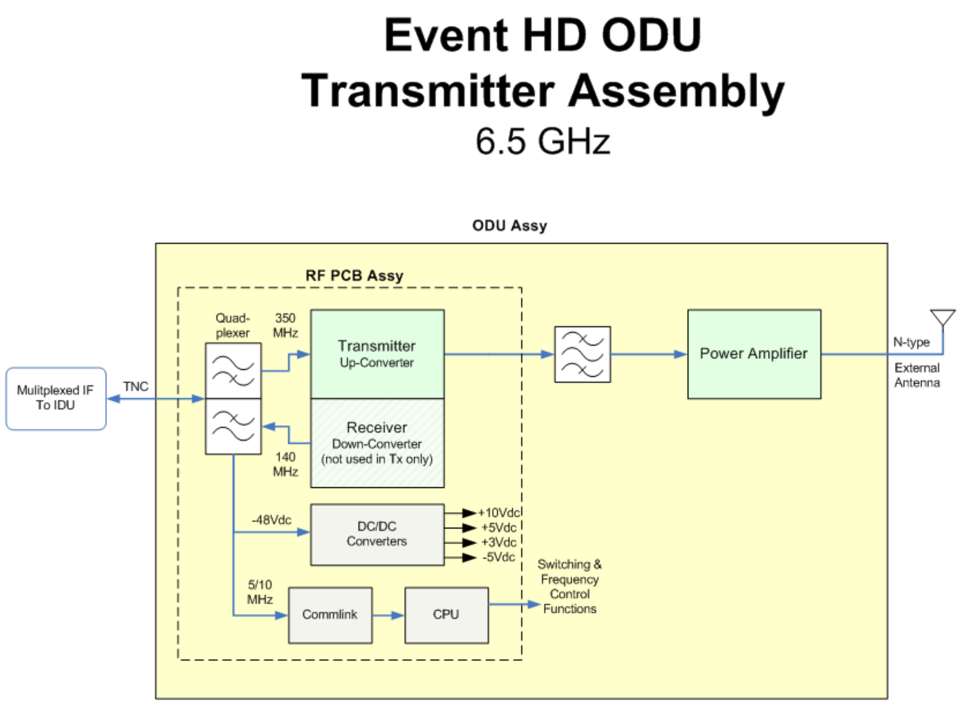

Figure 3-1. ODU Transmitter Assembly

3.2 Transmitter Functional Overview

Figure 3-2 below presents the transmitter PCB block diagram. A double conversion architecture converts the IF input signal from the Indoor Unit at 350 MHz up to the 1st IF of 2375 MHz. A second conversion to the RF at 6.5 GHz is made followed by bandpass filtering and power amplification prior to transmission.

The RF synthesizer operates at approximately 4.1 GHz with a low side mix (6.5 GHz – 2.4 GHz = 4.1 GHz). Step size is 1 MHz. The 1st IF is generally fixed at 2.375 GHz but can be moved within a +/- 50 MHz range to avoid spurious mixing products that might cause the unit to fail the emissions mask. Frequency selection is controlled by an internal microcontroller that stores an internal lookup table and sets the IF as required to avoid spurious mixing products.

The IF synthesizer is generally fixed at 2.025 GHz (2.375 GHz – 0.350 GHz). Step size is 100 kHz and its frequency may be programmed to resolve channel steps less than 1 MHz.

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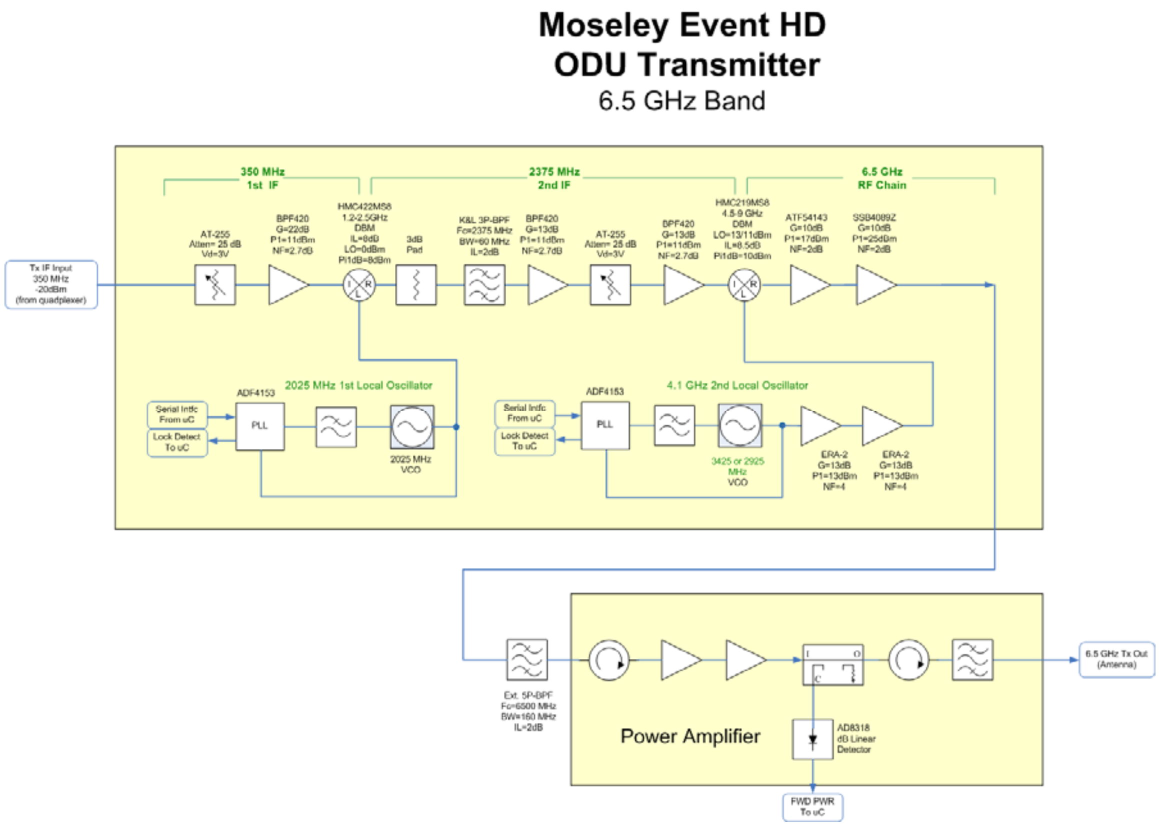

Figure 3-2 Transmitter Architecture

RF output level control at 6.5 GHz is set by an ALC (automatic level control) loop calibrated in 1 dB increments from 20 dBm to 30 dBm. The ALC loop is composed of a temperature compensated detector, analog integrator loop, and microcontroller lookup table. This loop maintains output power accuracy to within +/- 0.3 dB over temperature.

Transmit output is disabled during synthesizer loss-of-lock failure conditions and loss of IF from IDU. Fault operation is controlled by the onboard microcontroller.

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