

## Functional Description of The ACS40 Wireless Local Loop

While reading this description please refer to a separated block diagram:

The ACS40 consists of two major units, the control board, U1 and the RF board, which consists of U2 through U12.

### A. Control Unit, U1:

This unit performs three major functions:

1. Generate timing signal for the RF unit, this timing signal is used to realize the TDMA feature of the Wireless Local Loop signal.
2. Generate I/Q signal for the transmitter. This I/Q signal carries down link information and it is in analog form, it is delivered to U2, the I/Q modulator on the RF unit.
3. Demodulate the received signal: After being down converted to a 10.8 MHz IF output by U2 on the RF unit, the received signal is then passed on to U1, where final demodulation and detection take place and the original information is extracted.

### B. RF Unit: There are three sub-units on this board, namely transmitter, receiver and the frequency synthesizer.

1. Frequency Synthesizer: It is responsible for generating two LO signals for U2, the modulator/demodulator, and U3, the up converter, and U10, the down converter, respectively. The reference clock for the synthesizer comes from a 19.2 MHz TCXO, whose temperature stability is 2 PPM ranging from -45C to 55C. The phase locked loop is utilized to generate all the LO signals. The control signals of the PLL come from the control unit.
2. Transmitter: The transmitter consists of U2, 3, 4, 5, 6, 12 and the antenna. The U2 has the modulation function, the I/Q signal from the control unit enters this IC and is being modulated to a 233.15 MHz IF signal, whose modulation scheme is Pi/4 QPSK and its occupied bandwidth is 288 KHz. This IF signal is further up converted to the range of Wireless Local Loop frequency band, which is from 1880.15 MHz to 1909.85 MHz. The up converted signal is then amplified by U4, U6 and filtered by U5 before going to the antenna through circulator U12. There are two identical antennas, Ant 1 and Ant 2, at any given time only one antenna is connected to the transceiver circuitry, a detection circuit is used to decide which antenna has the best transmission characteristic before it is being chosen as the TX/RX antenna.

3. Receiver: The receiver consists of U2, 7, 8, 9, 10, 11 and 12. The incoming signal is first being filtered by U7 before it is amplified by the low noise amplifiers, U8 and U9. The amplified signal is then fed to the down converter, U10 where its frequency is translated to a 243.95 MHz IF signal, this IF is filtered before being sent to U2, where it is further down converted to a 10.8 MHz signal. This final IF signal will be demodulated and detected within the control unit.