Description

Navini Networks Wireless Integrated Solution (WINS) BTS consists of two major parts: RF front-end unit that will be placed on the tower top, and tower base unit (see Fig.1). The RF front-end unit contains an antenna assembly of 8 dipole antennas, a calibrator board for calibration, and a distributor for T/R switch signal and RF _LO distribution. As per the FCC requirement each transmitter has its own power amplifier - Multiple transmitters do not share a common amplifier. Tower base unit contains 8 transceivers, an IF module, a synthesizer, and base band modules. The distance between RF front-end unit and tower base units varies from 10 ft to 200 ft depending on the deployment scenarios. The modulated transmit and receive IF signals flow between the tower top and tower base units. The IF signal center frequency is 140MHz.

During the transmission period, a total of 8 sets of I and Q data are generated from the base band modules where they have been weighted for the purpose of beam forming. They are then fed into the IF module and quadrature modulated. The resulting IF spectrum is 5 MHz wide centered at 140MHz. The signals are then up-converted to 2.4GHz ISM band and amplified to the FCC limit. Finally the signals are sent to the antennas and radiated into the air. Each of the signals is a separate signal. Multiple signals may be from/for one user or one signal from/for each user. They are dynamically configurable.

During the receive period, 8 sets of signals received from 8 antennas are first amplified and then down-converted to the 140MHz IF frequency. Then they are sent to the IF module and quadrature demodulated to 8 sets of I and Q data, which are then sent to the base band unit for further processing.

The synthesizer generates the RF_LO and IF_O signals and distributes them to IF and RF front-end modules. It also facilitates the calibration by generating the calibration signals. The base band unit controls the Tx/Rx switch system timing.

The Navini Networks BTS is almost identical to conventional spread spectrum devices except that we transmit the sum of multiple spread spectrum signals modulated (or spread) on multiple pseudo random codes. Our modulation method is analogous to that of IEEE 802.11b, which modulates 8 co-channel signals with 8 CCK sequences.

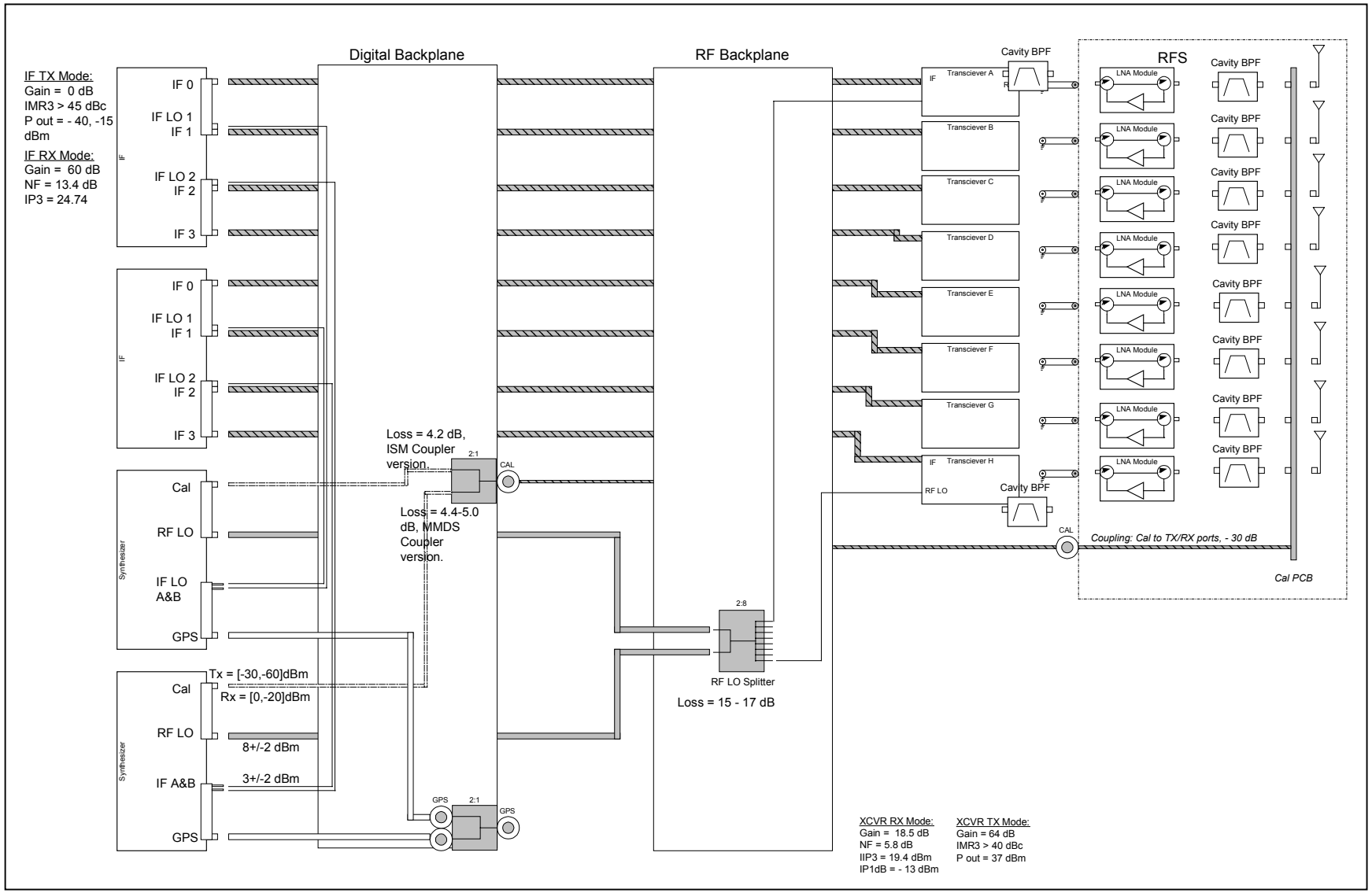
IF TX Mode:
Gain = 0 dB
IMR3 > 45 dBc
P out = - 40, -15 dBm
IF RX Mode:
Gain = 60 dB
NF = 13.4 dB
IP3 = 24.74
Digital Backplane
RF Backplane
IF 0
IF LO 1
IF 1
IF LO 2
IF 2
IF 3
Cal
RF LO
IF LO A&B
GPS
Synthesizer
Loss = 4.2 dB, ISM Coupler version.
Loss = 4.4-5.0 dB, MMDS Coupler version.
2:1
CAL
Tx = [-30,-60]dBm
Rx = [0,-20]dBm
8+/-2 dBm
3+/-2 dBm
2:8
RF LO Splitter
Loss = 15 - 17 dB
Transceiver A
Transceiver B
Transceiver C
Transceiver D
Transceiver E
Transceiver F
Transceiver G
Transceiver H
Cavity BPF
RFS
LNA Module
Coupling: Cal to TX/RX ports, - 30 dB
Cal PCB
XCVR RX Mode:
Gain = 18.5 dB
NF = 5.8 dB
IIP3 = 19.4 dBm
IP1dB = - 13 dBm
XCVR TX Mode:
Gain = 64 dB
IMR3 > 40 dBc
P out = 37 dBm

Figure 1