2.0 System Configuration and Interface

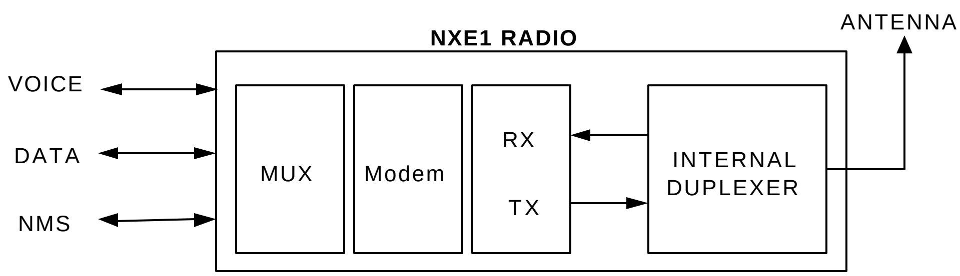
Table 1-1 provides basic data channel capabilities for the NXE1.

Table 1-1. NXE1 Data Channel Configurations

Data Rate	MUX Hardware	Channels	Interface(s)
2 Mbps-8 Mbps	4xE1/T1 MUX	4	G.703, E1/T1, V.35, RS-449
64 kbps-2 Mbps	Voice/Data MUX	4	V.35, RS-449, RS-232 Voice
64 kbps-8 Mbps	QAM Modem	1	V.35, RS-449, E1/T1

Standalone Operation

The NXE1 may be used as a standalone digital radio as depicted in Figure 1-2. NXE1 Standalone Configuration



The Transmit frequency is definened by the selection of VCO’s, Filter and Duplexers.

2.1 QAM Modulator/IF Upconverter

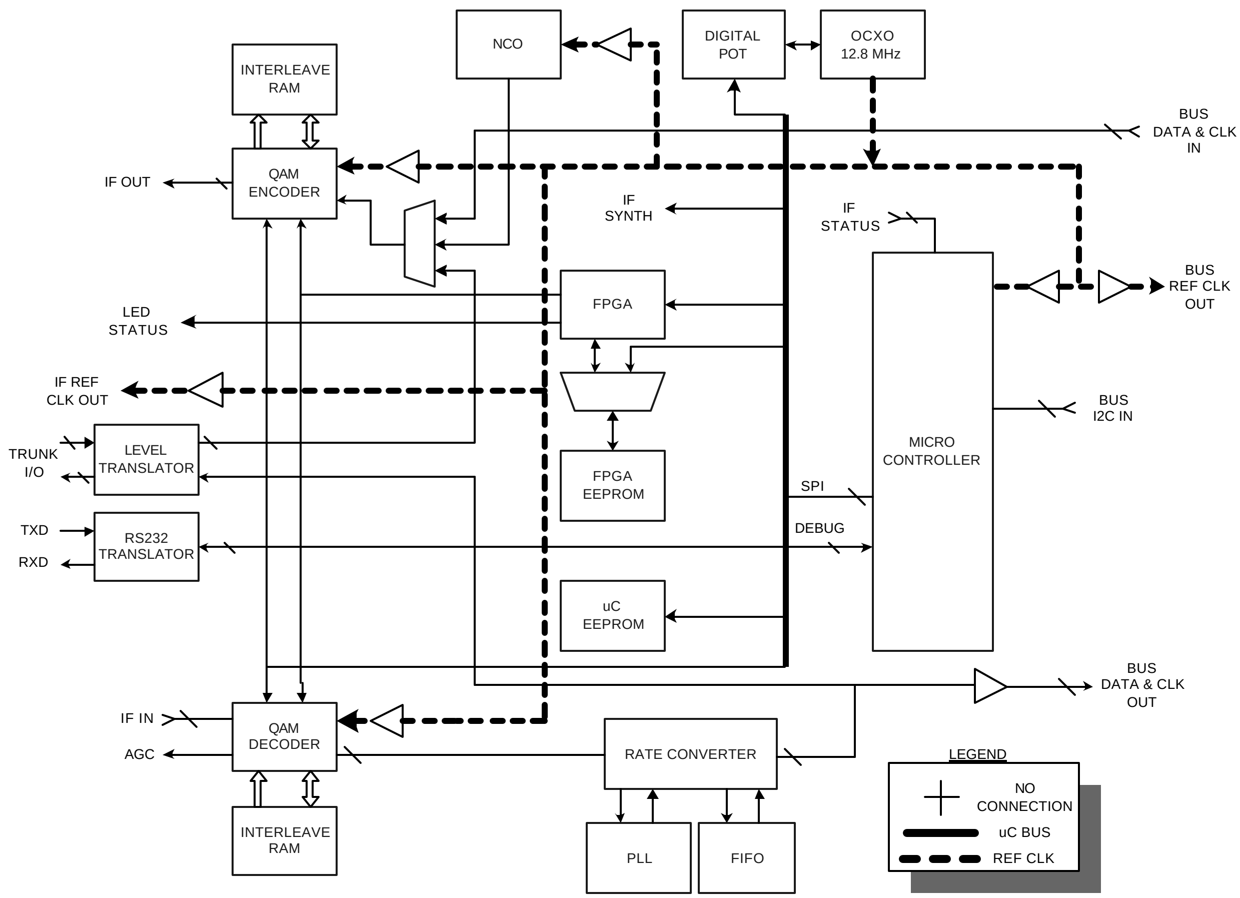


Figure 1-14. QAM Modem Block Diagram

The QAM (Quadrature Amplitude Modulation) Modulator is the transmit portion of the QAM Modem card. The QAM Modem also houses the IF Up/Down Converter. The QAM Modulator utilizes the upconverter portion of the IF daughter card.

The QAM Modulator accepts the aggregate data stream via the backplane (see Figure 1-14 above). The module performs up to 64 QAM (6 bits/symbol) modulation at a carrier frequency of 6.4 MHz, adding FEC (Forward Error Correction) bits while interleaving the blocks of data. The result is a very spectrally efficient, yet robust linear modulation scheme. This process requires an ultra-stable master clock provided by an OCXO (oven controlled crystal oscillator) that is accurate to within 0.1 ppm.

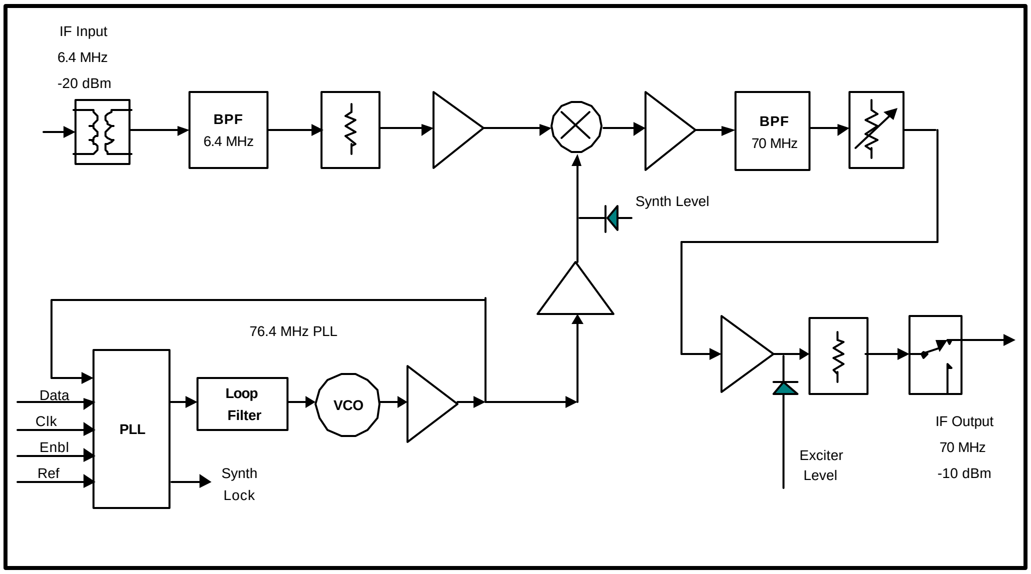


Figure 1-15. IF Upconverter Block Diagram

The resultant carrier is translated up to 70 MHz by the IF Upconverter (see Figure 1-15). This is accomplished by a standard mixing of the carrier with a phase-locked LO. A 70 MHz SAW filter provides an exceptional, spectrally-clean output signal.

2.2 RF Upconverter

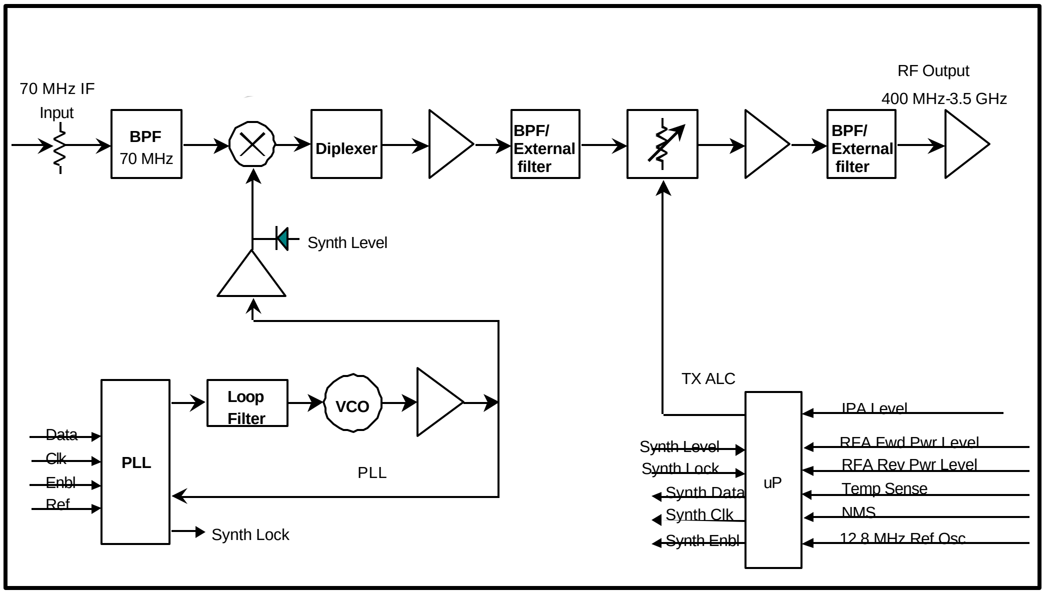


Figure 1-16. RF Upconverter Block Diagram

The IF output carrier of the IF Upconverter daughter card is fed to the transmit portion of the RF Module via an external (rear panel) semi-rigid SMA cable. This module performs the necessary upconversion to the RF carrier (see Figure 1-16). There is an on-board CPU for independent control of the critical RF parameters of the system.

Since this is a linear RF processing chain, an automatic leveling control loop (ALC) is implemented here to maintain maximum available power output (and therefore maximum system gain). The ALC monitors the PA forward power (FWD) output sample, and controls the upconverter gain per an algorithm programmed in the CPU. The ALC also controls the power-up RF conditions of the transmitter output.

2.3 Power Amplifier (PA)

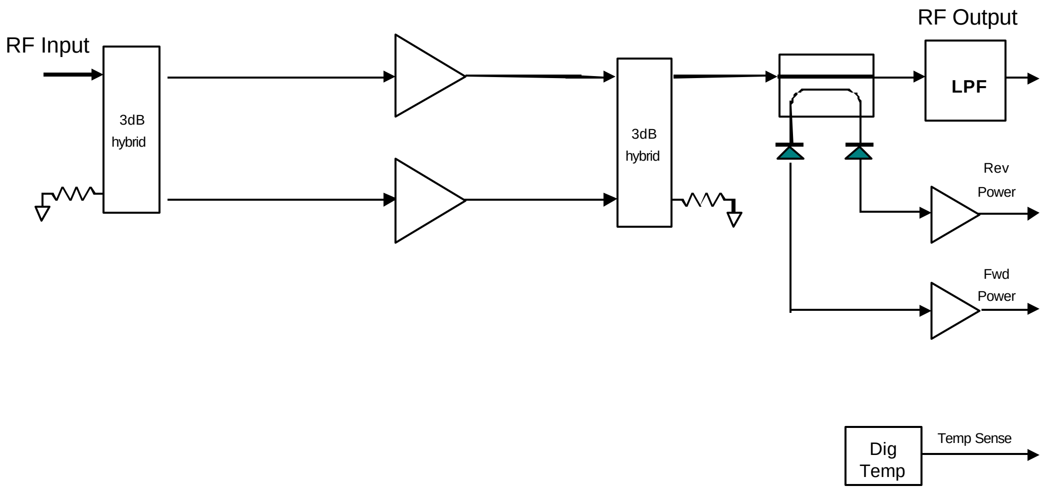


Figure 1-17. RF Power Amplifier Block Diagram

The Power Amplifier (PA) is a separate module that is mounted to a heat sink and is fan-cooled for reliable operation (see Figure 1-17). The PA is a design for maximum linearity in an amplitude modulation-based system. The "divide and combine" design is inherently stable and well matched even when looking at an adverse antenna impedance mismatch. The amplifier utilizes gain modules that are easily replaceable, and if one amplifier does fail, the link will still perform at a reduced power level. This provides a built-in redundancy for the PA, which is traditionally the weak link of any microwave radio system.

2.4 RF Downconverter

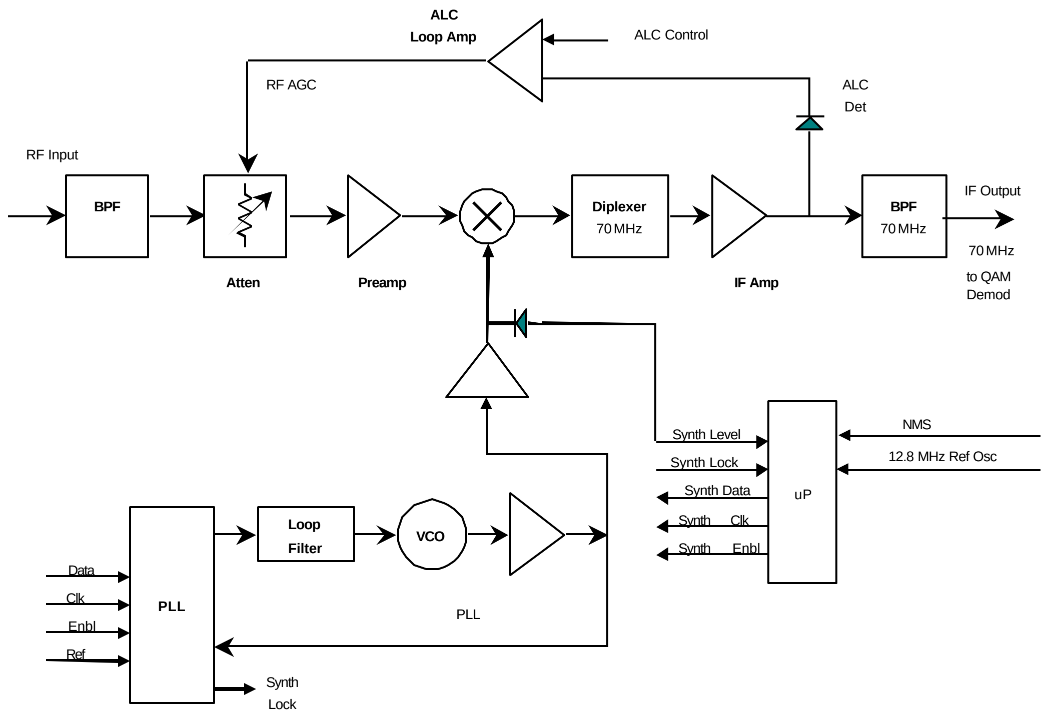


Figure 1-18. RF Downconverter Block Diagram

The receiver handles the traditional RF to IF conversion from the carrier to 70 MHz (see Figure 1-18). Considerations are given to image rejection, intermodulation performance, dynamic range, agility, and survivability. A separate AGC loop was assigned to the RF front end to prevent intermodulation and saturation problems associated with reception of high level undesirable interfering RF signals resulting from RF bandwidth that is much wider than the IF bandwidth. The linear QAM scheme is fairly intolerant of amplifier overload. These problems are typically related to difficult radio interference environments that include high power pagers, cellular phone sites, and vehicle location systems.

2.5 QAM Demodulator/IF Downconverter

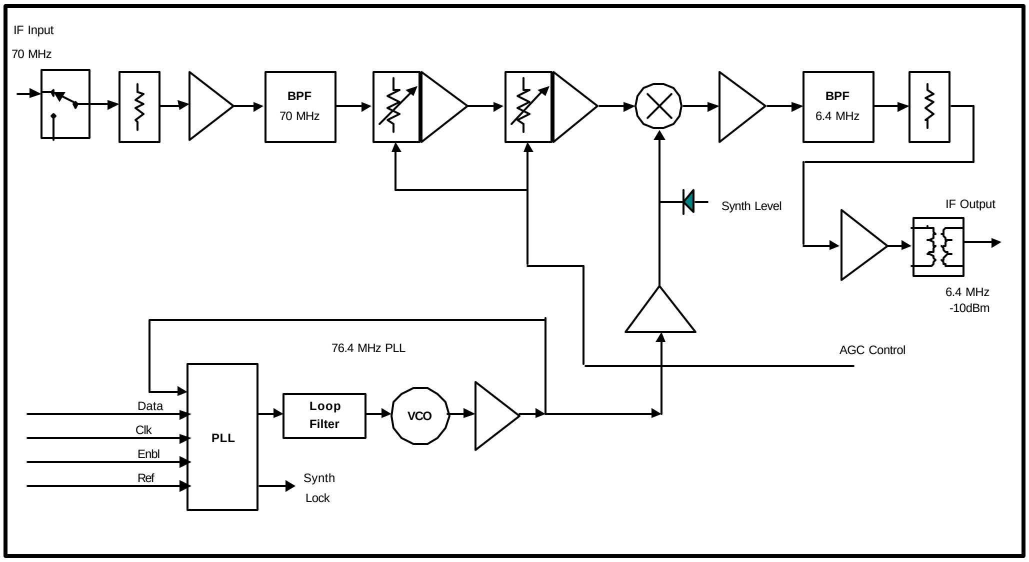


Figure 1-19. IF Downconverter Block Diagram

The QAM (Quadrature Amplitude Modulation) Demodulator is the receive portion of the QAM Modem card. The QAM Modem also houses the IF Up/Down Converter. The QAM Demod utilizes the downconverter portion of the IF daughter card.

The IF Downconverter receives the 70 MHz carrier from the receiver portion of the RF Module via an external semi-rigid cable and directly converts the carrier to 6.4 MHz by mixing with a low-noise phase-locked LO (see Figure 1-19). System selectivity is achieved through the use of a 70 MHz SAW filter.

The QAM Demod receives and demodulates the 6.4 MHz carrier (see Figure 1-16). The demodulation process includes the FEC implementation and de-interleaving that matches the QAM modulator in the transmitter, and the critical "data assisted recovery" of the clock. This process requires an ultra-stable master clock provided by an OCXO (oven controlled crystal oscillator) that is accurate to within 0.1 ppm.

The output is an aggregate data stream that is distributed to the trunk port or to the backplane for connection to the multiplexer connected on the backplane.