

Digital Cancellation is a cost-effective solution to suppress the interference a transmitter presents to a co-located receiver, thus enabling full-duplex communication. Digital Cancellation can operate standalone, especially in millimeter wave frequencies where large upfront antenna isolation is possible. Alternatively, Digital Cancellation can augment any of Kumu Networks' Analog Self-Interference Cancellation solutions.

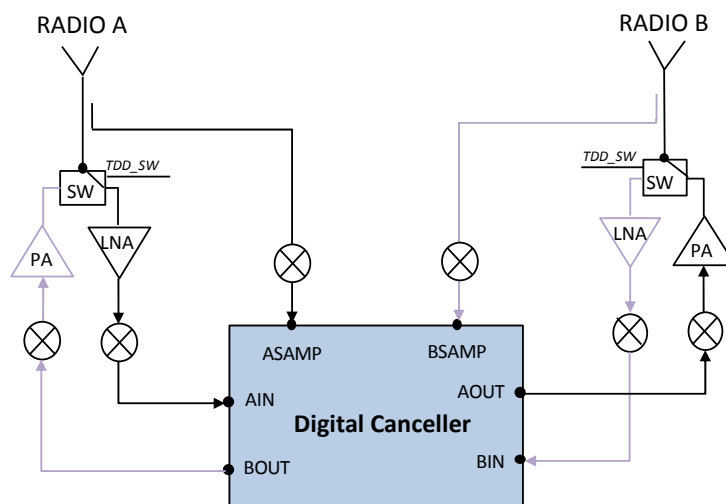


Figure 1: Cancellation block within Repeater/IAB application

Digital Cancellation in millimeter wave frequencies is particularly useful for maximizing repeater gain and building full-duplex Integrated Access Backhaul (IAB) – solutions that are critical for cost-effective 5G coverage. Figure 1 depicts, as a simplistic example, how the Digital Cancellation Logic fits within a 5G Repeater architecture, to maximize its gain.

Features and Benefits

- Digital Self-Interference Cancellation >40dB
- Up to 512MHz instantaneous bandwidth
- Wide IF center frequency range (10Mhz – 4GHz)
- 500ns delay spread support @ 512MHz bandwidth
- Configurable for smaller bandwidths with corresponding increase in delay spread
- Max ADC input power of +0 dBm
- Max DAC output power of +1 dBm
- SFDR > 80dB for <2GHz input, >70dB for 2GHz – 4GHz input
- Effective input noise density -149dBm/Hz
- Gain Range/Resolution -47dB to + 49dB using programmable gain blocks
- 128-Tap FIR Channel Filter
- Real-time tuning so cancellation is maintained even in presence of wireless channel variations
- Front-end existing radios without need for radio modifications
- Works with TDD or FDD radios
- Support for 2Tx 2Rx MIMO or SISO radios

Digital Cancellation, by its very nature, is frequency-agnostic. However, parameters such as number of taps, delay spread, speed of tuning, etc can be optimized for the particular channel behavior at different frequency bands. Figure 2 depicts the performance of Kumu Networks’ Digital Cancellation Logic at the popular 5G Band of 28GHz with a typical 5G channel bandwidth of 400MHz.

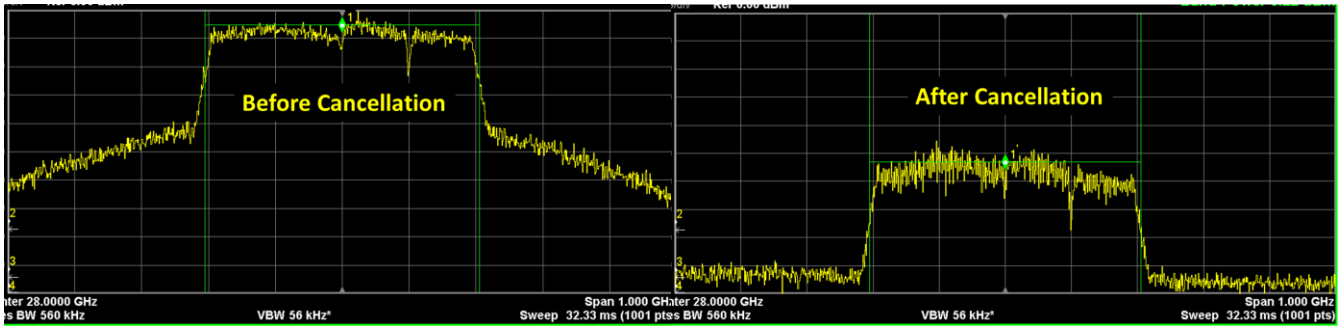


Figure 2: 40dB Cancellation of 400MHz at 28GHz

Block Diagram

Digital Cancellation is offered either as an IP block, or in conjunction with one of Xilinx’s RFSOC Eval Boards (~6” x 4”).

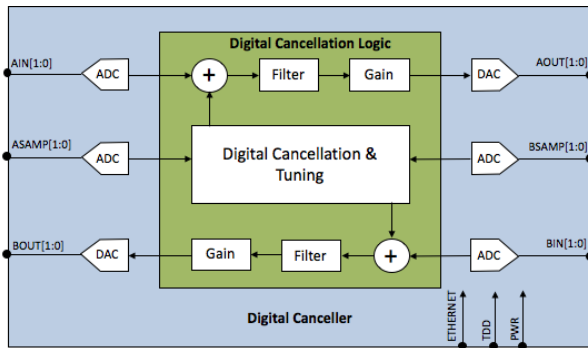


Figure 3: Digital Cancellation IP Fit Diagram

Interfaces

Interfaces are identified in the context of the Block Diagram identified in Figure 3, whether the solution is provided as IP or a Xilinx board.

Interface	Purpose
AIN [1:0]	Radio #1 Input
AOUT [1:0]	Radio #1 Output
BIN [1:0]	Radio #2 Input
BOUT [1:0]	Radio #2 Output
ASAMP [1:0]	Radio #1 Sample Input
BSAMP [1:0]	Radio #2 Sample Input
TDD	TDD direction
ETHERNET	Ethernet Control interface*
POWER	12V Power Supply*

- Assuming Xilinx Board package