Custom Integration gives 80% reduction in footprint

For many years, `Dialog have been designing and manufacturing custom integrated circuits (ICs) that ensure seamless integration of analog and digital subsystems within wired and wireless communication systems.

Mobile satellite services (MSS), a more niche area of wireless communications, provides two-way voice and data communications to users worldwide who are mobile or in remote locations. The terminals range in size from handheld to laptop-size units and can be mounted in a vehicle, with communications maintained while the vehicle is moving. Today's solutions that incorporate satellite terrestrial modems are generally ASSP based. As a result, they tend to be large, falling between either not being optimized or over specified, are noisy with poor signal integrity, have poor blocker performance, are inefficient and costly.

Meanwhile, customers are demanding greater asset tracking, monitoring and control. And all of this with the request for increased broadband speed and no disruption in remote locations. A satellite customer that services the MSS Industry, had heard through integration they could offer many benefits for their next generation modem product and with enhanced connectivity they could introduce new functionality to their product, which in turn could introduce new service centric revenue streams.

A meeting was arranged with the customer to review their product features and understand their product roadmap and preferring to take a holistic view of the discovery process so that future proofing can be allowed for in the early development stages, if possible. The key criteria for the customer became apparent and they were:

- Footprint that was <<10% of the current discrete solution
- Integrated L-band transceiver that could support multiple modulation schemes
- Choice of converter line-ups
- Low power
- Economic semiconductor integration node
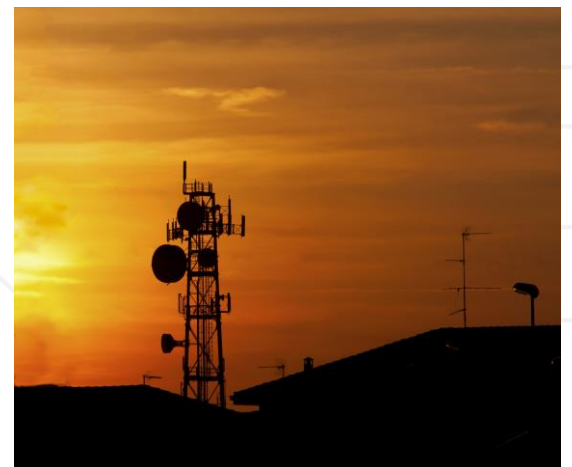
Machine to Machine Case Study

The development schedule was 12 months, and the final custom ASIC was developed on time and on cost. The final product included:

- Embedded algorithms for DC offset correction
- RC Time constant calibration
- IP2 Calibration
- IQ Gain/Phase Calibration
- Image Rejection Calibration for low IF, AGC and AFC
- Integrated RX for RF LNA, splitter, quad-mixer, RF VGA, poly-phase filter, 14-bit IQ ADC, IQ & LO Calibration
- Integrated TX 12-bit IQ DAC, low pass filter, RF VGA and driver amplifier, digital pre-distortion to optimize PA performance, RF power detector
- BIST, Analog-test multiplexer, SPI with DSP communication
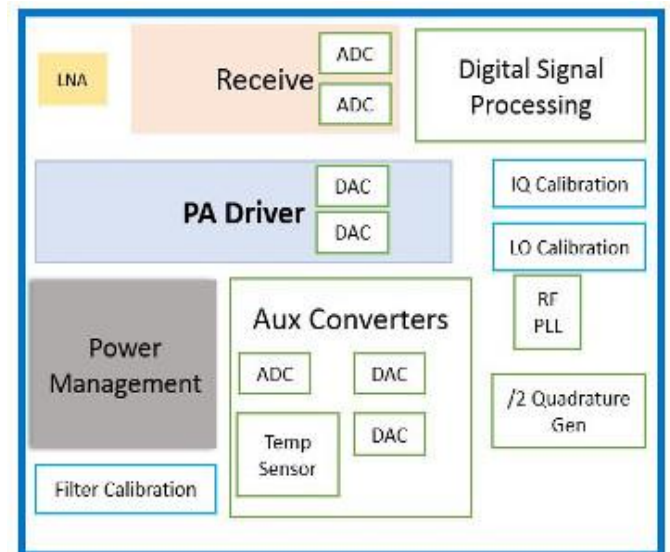
When the final solution was compared versus the previous solution (see photo comparison), achieved:

- 80% reduction in size
- Improved signal integrity & reliability
- Reduced power
- Large saving in electronics BOM