18 GHz In, 6 GHz Out Satellite Transponders Without Local Oscillators or Mixers.

Dr. Rajan Bedi is the CEO & Founder of Spacechips Ltd,

RF, satellite-transceiver technology has evolved from the traditional superhetrodyne architecture used on the Inmarsat 4 and Alphasat telecommunication payloads, to a software-defined radio approach using undersampling, wideband ADCs to directly digitise S-band carriers and return-to-zero DACs to reconstruct the digital baseband up to almost 6 GHz. The next generation of transponder will exploit advances in analogue circuit design to directly digitise 18 GHz, communications traffic and output C-band IF/RF without the use of local oscillators or mixers.

Current, state-of-the-art, RF, transponder research is able to deliver higher performance than software-defined radio, mixed-signal transceivers by exploiting novel advances in wideband circuit design and SAW-based oscillators. The result is higher SNR and better SFDR due to improved linearity.

Future, RF transponders will be smaller, lighter, lower power consuming, higher performing, more reliable and significantly less expensive to manufacture, test and sell. Production testing and measurement will remain RF in nature, without the need to characterise traditional, individual IF stages.

All of the above benefits will allow OEMs to deliver the next generation of transceivers which will enable spacecraft operators to offer competitive Ku-band services overcoming the congested bandwidths at traditional, lower, satellite-communication frequencies.