Reduction of Phase Ambiguity in an Offset-QPSK Receiver

Ambiguity would be reduced to twofold at no cost in power efficiency.

NASA’s Jet Propulsion Laboratory, Pasadena, California

Proposed modifications of an offset-quadri-phase-shift keying (offset-QPSK) transmitter and receiver would reduce the amount of signal processing that must be done in the receiver to resolve the QPSK fourfold phase ambiguity. Resolution of the phase ambiguity is necessary in order to synchronize, with the received carrier signal, the signal generated by a local oscillator in a carrier-tracking loop in the receiver. Without resolution of the fourfold phase ambiguity, the loop could lock to any of four possible phase points, only one of which has the proper phase relationship with the carrier.

Figure 1. This Carrier-Tracking Loop of an offset-QPSK receiver differs from a maximum a posteriori (MAP) carrier-tracking loop of a non-offset-QPSK receiver by incorporating a unit that imposes a delay of one symbol period (T).