Problem 10.15. Write the defining equation for a QAM-modulated signal. Based on the discussion of QPSK and multi-level PAM, draw the block diagram for a coherent QAM receiver.

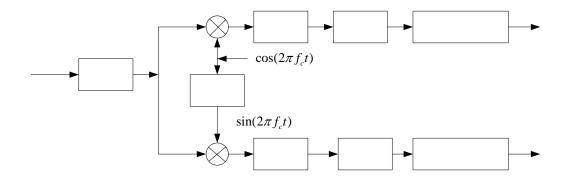
Solution

The QAM modulated signal can be defined as:

$$s(t) = \sum_{k} \left[b_{kt} h(t - kT) \cos(2\pi f_c t) + b_{kQ} h(t - kT) \sin(2\pi f_c t) \right],$$

where b_{kI} , b_{kQ} are different modulation levels on the I and Q channels, respectively. T is the QAM symbol duration, h(t) is the pulse shape and is nonzero during $0 \le t < T$, and f_c is the carrier frequency.

The block diagram for a coherent QAM receiver is



Matched filter

Received signal *r*(*t*)

x(t)

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