

Objectives:

- Definition
- Modulation
- Demodulation
- Phase and frequency mismatch
- Advantages and disadvantages of QAM

Part 5:

QUADRATURE AMPLITUDE MODULATION (QAM)





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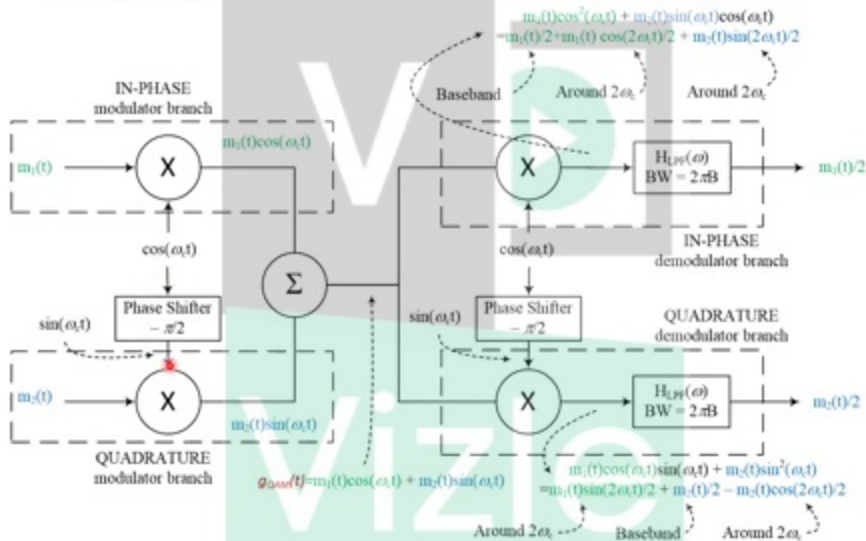
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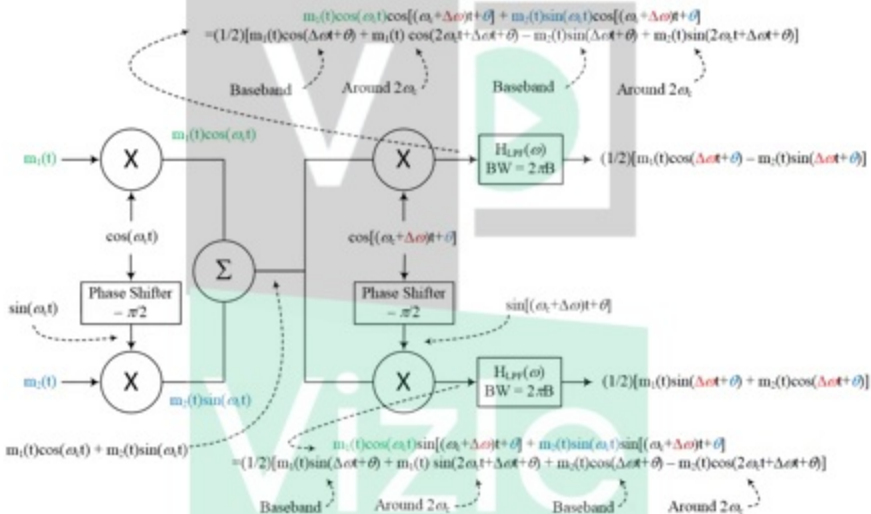
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QAM Modulation and Demodulation



QAM Modulator/Demodulator

Demodulation: Carrier Phase and/or Frequency Mismatch



QAM Modulator/Demodulator with Demodulator Carrier Phase and/or Frequency Error

Dr. Ali Muqailbel

Carrier Phase and/or Frequency Mismatch

$$r_1(t) = \frac{1}{2} [m_1(t) \cos(2\pi \Delta f_c t + \theta) - m_2(t) \sin(2\pi \Delta f_c t + \theta)]$$

$$r_2(t) = \frac{1}{2} [m_1(t) \sin(2\pi \Delta f_c t + \theta) + m_2(t) \cos(2\pi \Delta f_c t + \theta)]$$

If the carrier at the receiver has a small frequency error Δf (but a phase error $\theta = 0$), the two output signal become

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Advantages and Disadvantages of QAM

- Advantages and disadvantages of QAM
 - + Bandwidth Efficiency: Transmit two signals (each of bandwidth B) at $2B$.
 - - Requires coherent demodulation with exact phase and frequency.

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