

EE 567

Handout 1

Envelope Detection for AM Signals

Refer to the envelope detection for AM signals shown in class.

During the positive going portion of the input signal the diode conducts and the capacitor charges up to the peak value of the input signal. When the input falls below the voltage on the capacitor the diode becomes reverse-biased and the input disconnects from the output and the capacitor discharges slowly thru the load resistor R . On the next cycle the diode again conducts when the signal exceeds the voltage across the capacitor. The capacitor again charges up to the peak value of the input signal. This process repeats. The time constant RC must be selected to follow the variations in the envelope of the signal. If RC is too small the output of the detector will fall very rapidly after each peak and will not follow the envelope of the modulated signal very well. This is like saying the bandwidth of the LPF is too large. If RC is too large the discharge of the capacitor is too slow and again will not follow the envelope very well. This is like saying the bandwidth of the LPF is too small.

For good performance we want

$$\frac{1}{f_c} \ll RC \ll \frac{1}{W}$$

where W is the bandwidth of the signal.