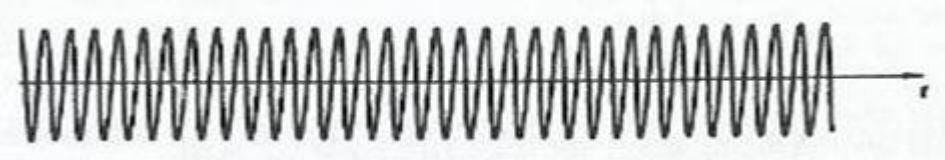
5. RADIO SIGNALS AND EQUIPMENT – NR6H

Chapter 5 Part 1 of 2

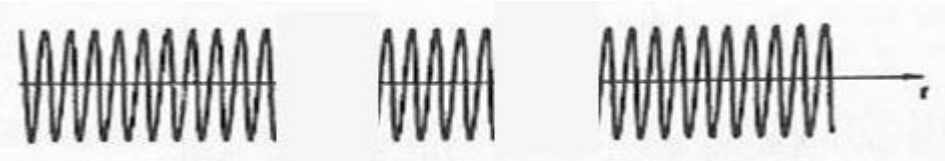
ARRL General Class Sections 5.1

Modulation

Carrier

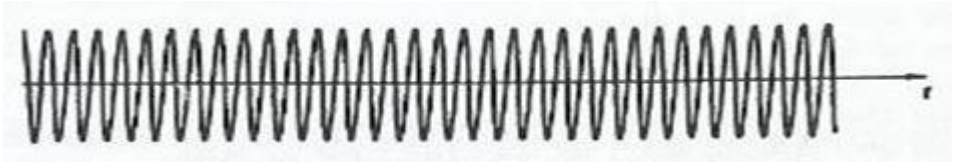


CW

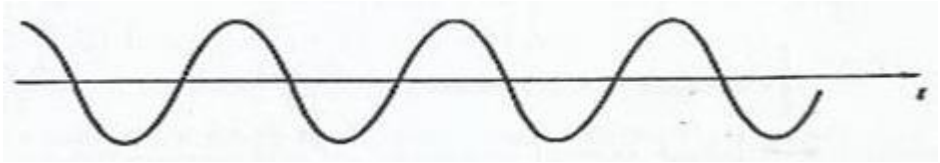


Modulation

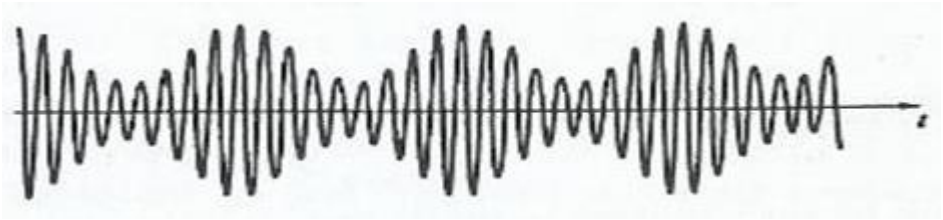
Carrier



Audio signal



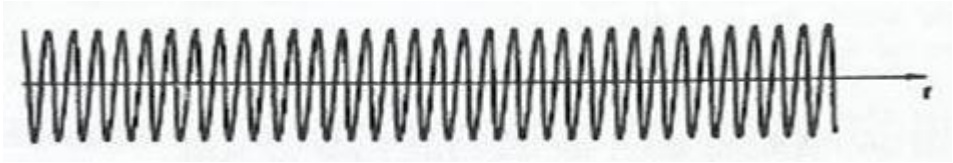
Amplitude Modulation



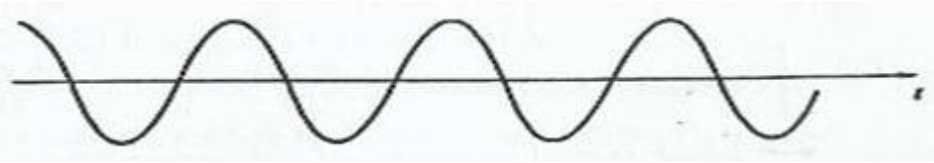
The **envelope** contains the information.
Reversing the process is called **detection**.

Modulation

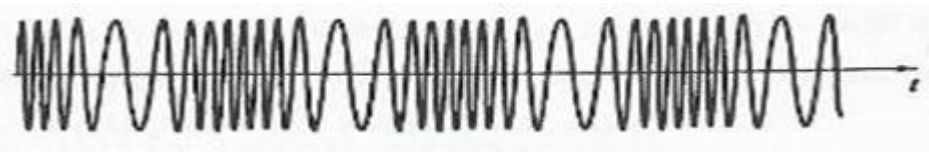
Carrier



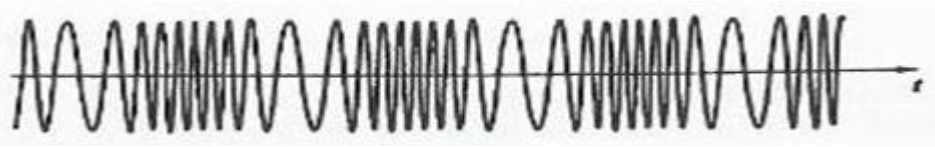
Audio signal



Frequency Modulation



Phase Modulation



FM and PM has **constant power**.

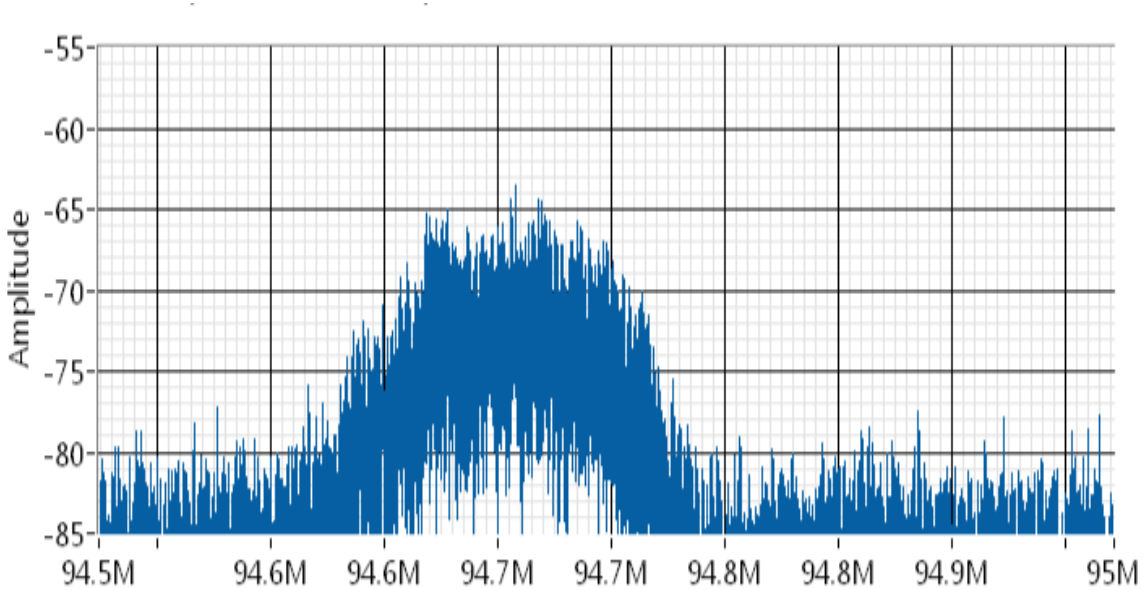
Bandwidth

Time/power graph

- What you would see on an **Oscilloscope**

Frequency/power graph

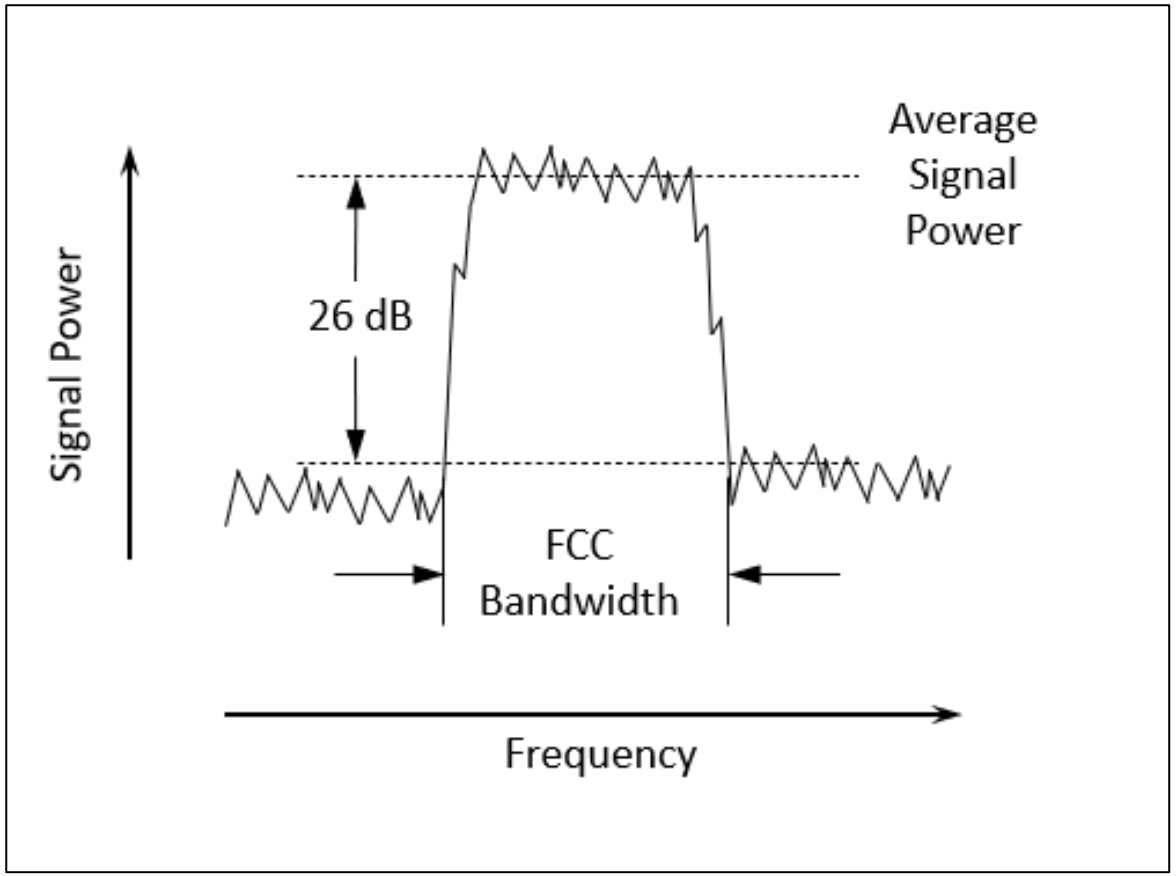
- What you would see on a **Spectrum Analyzer**



The math is called Fast Fourier Transform (FFT)

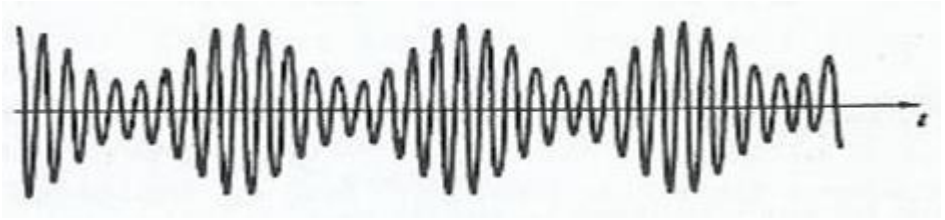
Bandwidth Definition

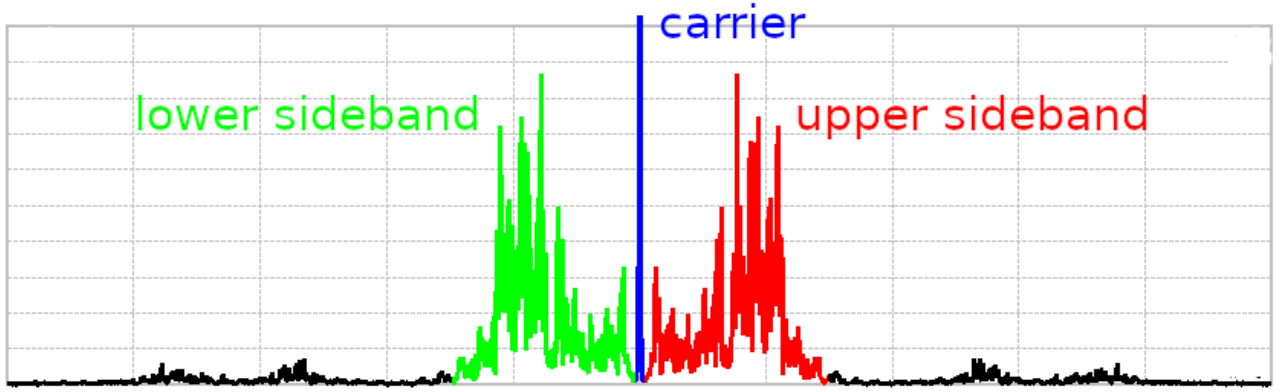
The FCC defines bandwidth as *the width of a frequency band outside of which the mean [average] power of the transmitted signal is attenuated at least 26 dB below the mean power.*



Bandwidth – AM and SSB

Amplitude modulated signals also has bandwidth





Observation:

FM/PM - deviation increase with *amplitude* of modulated signal

AM/SSB - deviation increase with *frequency* of modulated signal

Amateur Signal Bandwidths

Most Common Amateur Signals

Type of Signal	Typical Bandwidth
AM voice	6 kHz
Amateur television	6 MHz
SSB voice	2 to 3 kHz
Digital using SSB	50 to 3000 Hz (0.05 – 3 kHz)
CW	100 to 300 Hz (0.1 – 0.3 kHz)
FM voice	5 to 16 kHz

Link Budget / Link Margin

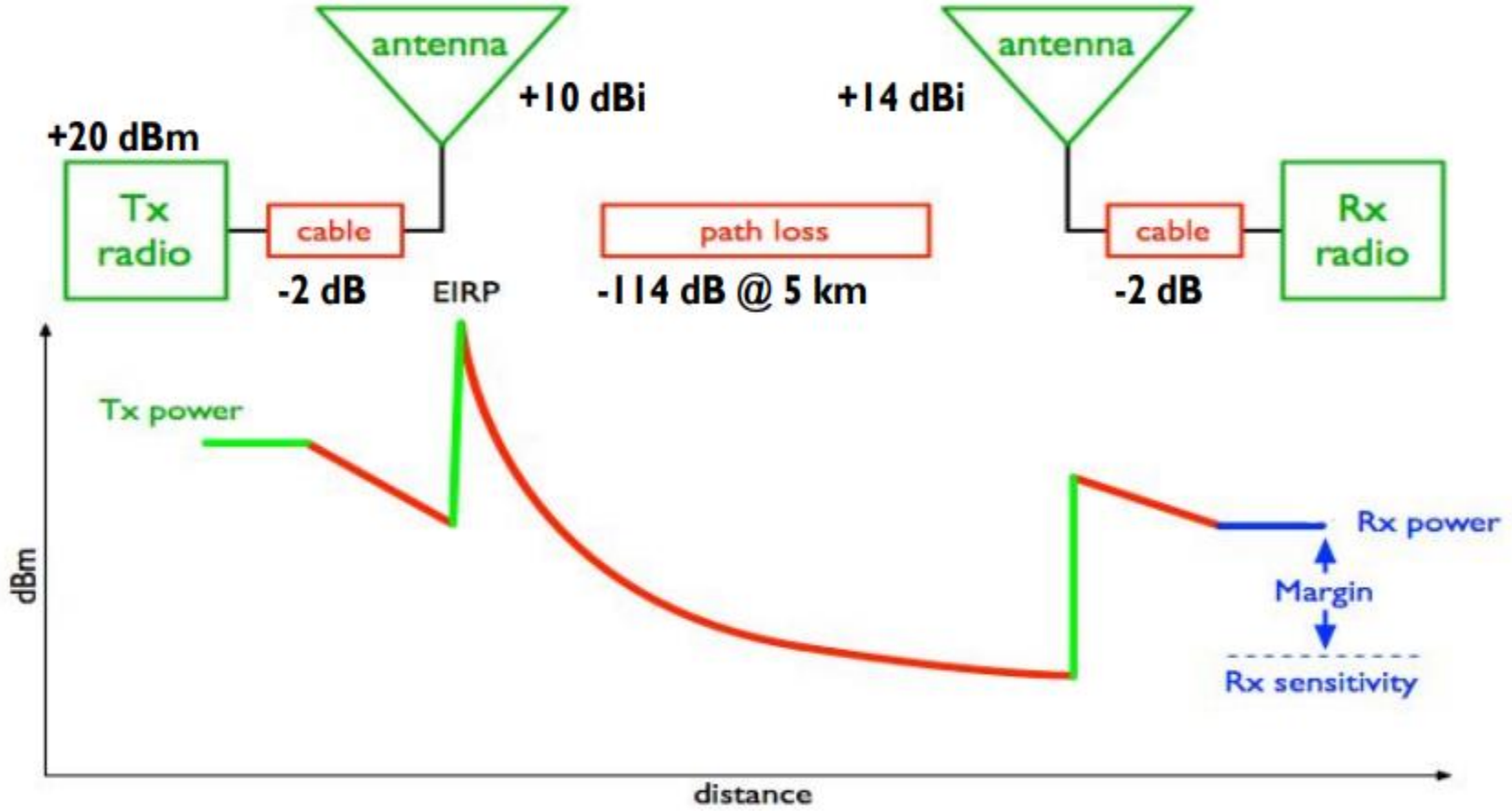
Link Budget

- Sum of all gains and losses between transmitter and receiver
- https://www.pasternack.com/t-calculator-link-budget.aspx

Link Margin

- Difference between received signal and the minimum required signal (in dB)

Link Budget / Link Margin



QUESTIONS?

ONLINE EXAM REVIEW AND PRACTICE QUESTIONS:

http://www.arrl.org/examreview