



CSN08704

Telecommunications

3. Modulation and Multiplexing

Data, Audio, Video and Images

<http://asecuritysite.com/comms>

Prof Bill Buchanan



CSN08704

Telecommunications

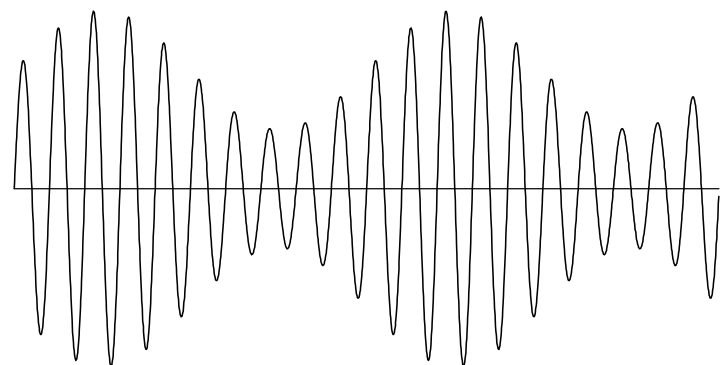
3. Modulation and Multiplexing: Modulation

Data, Audio, Video and Images

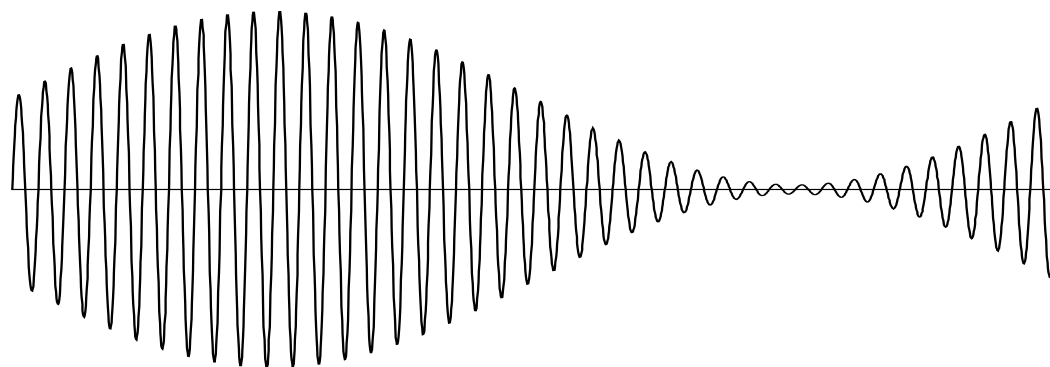
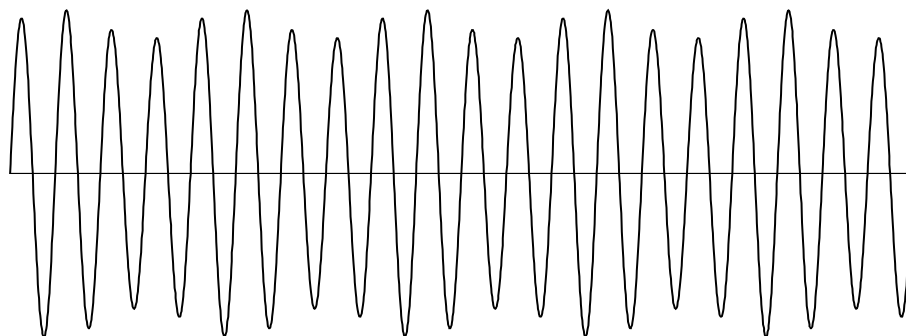
<http://asecuritysite.com/comms>

Prof Bill Buchanan

Amplitude Modulation

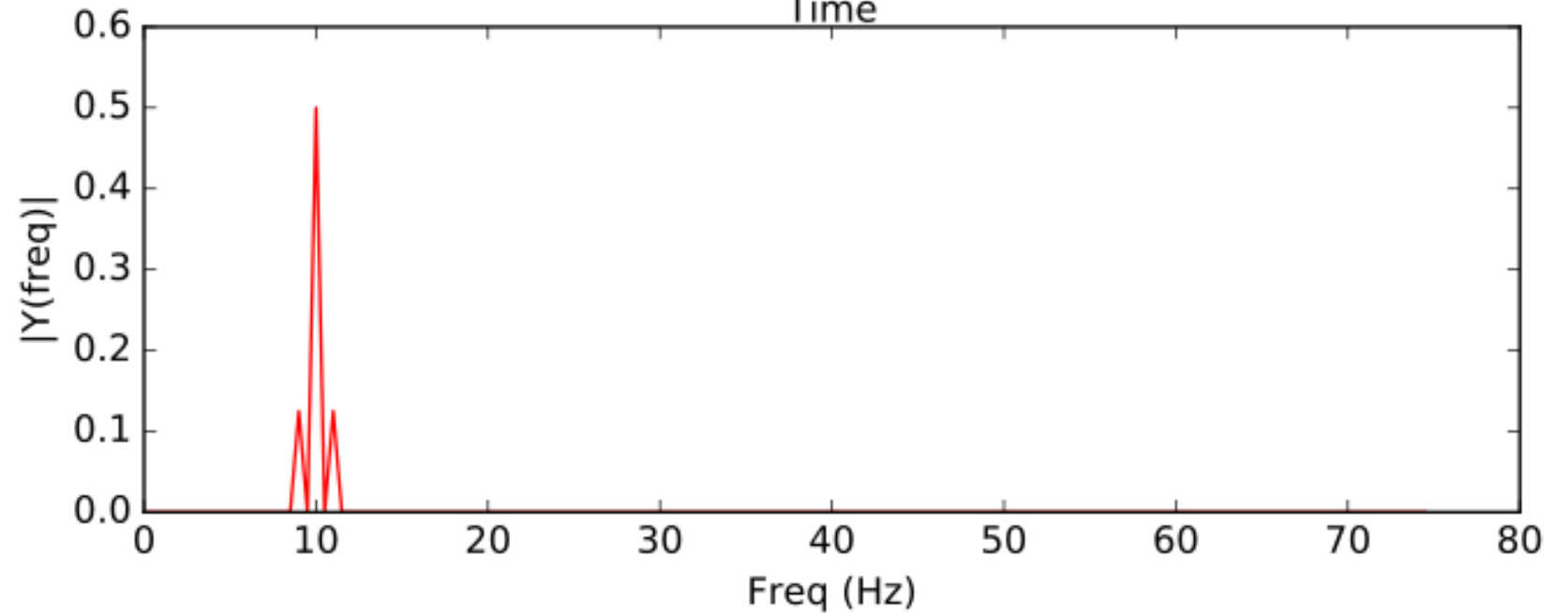
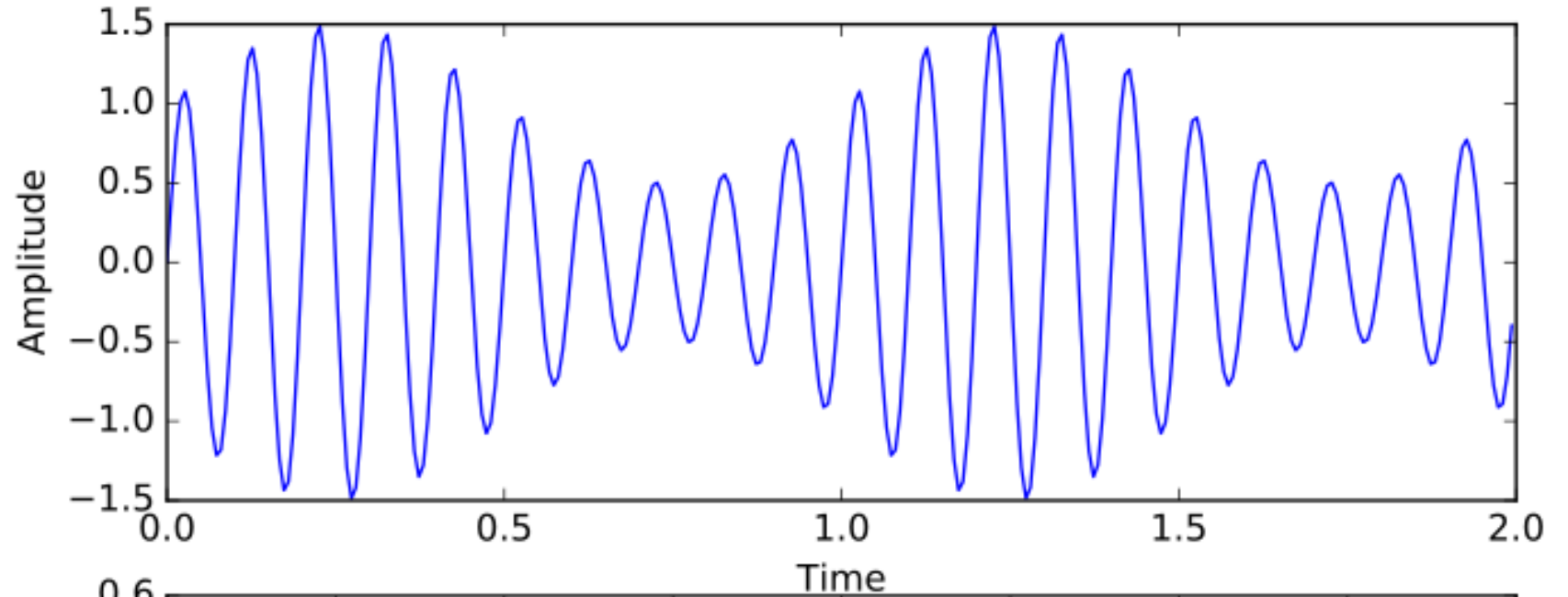


$$m = \frac{V_{signal}}{V_{carrier}}$$



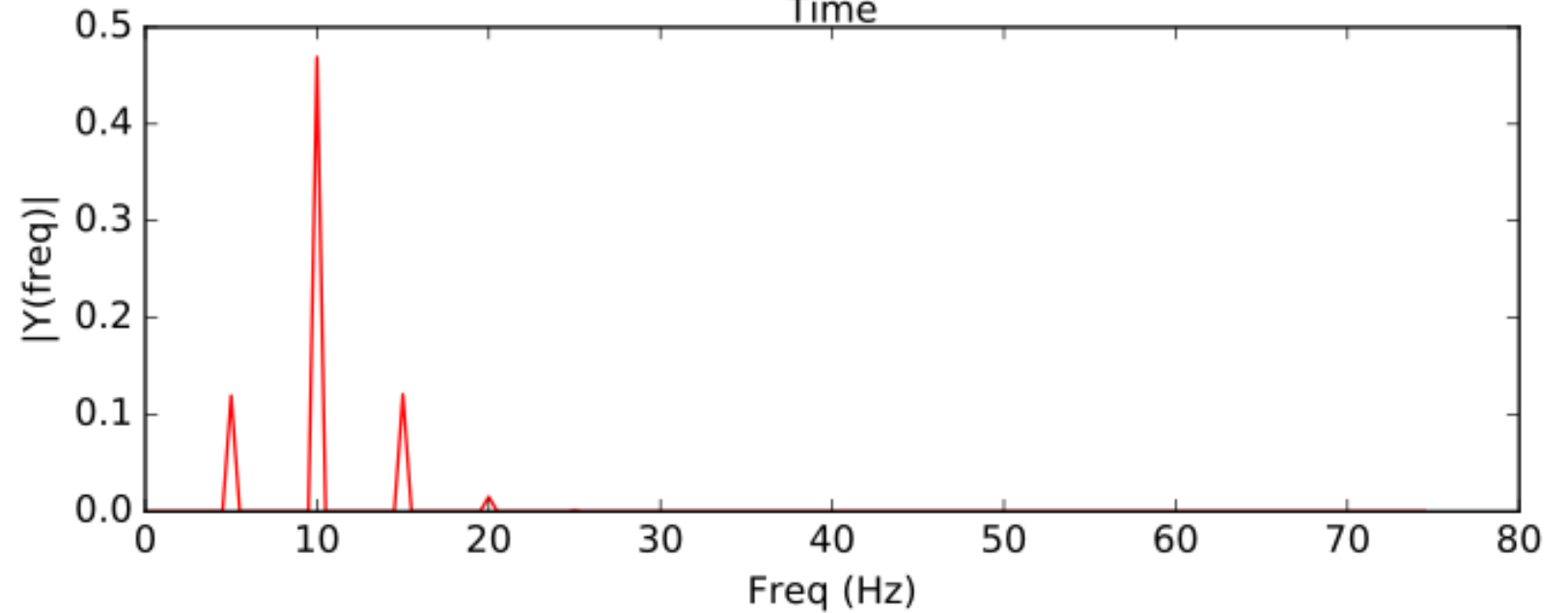
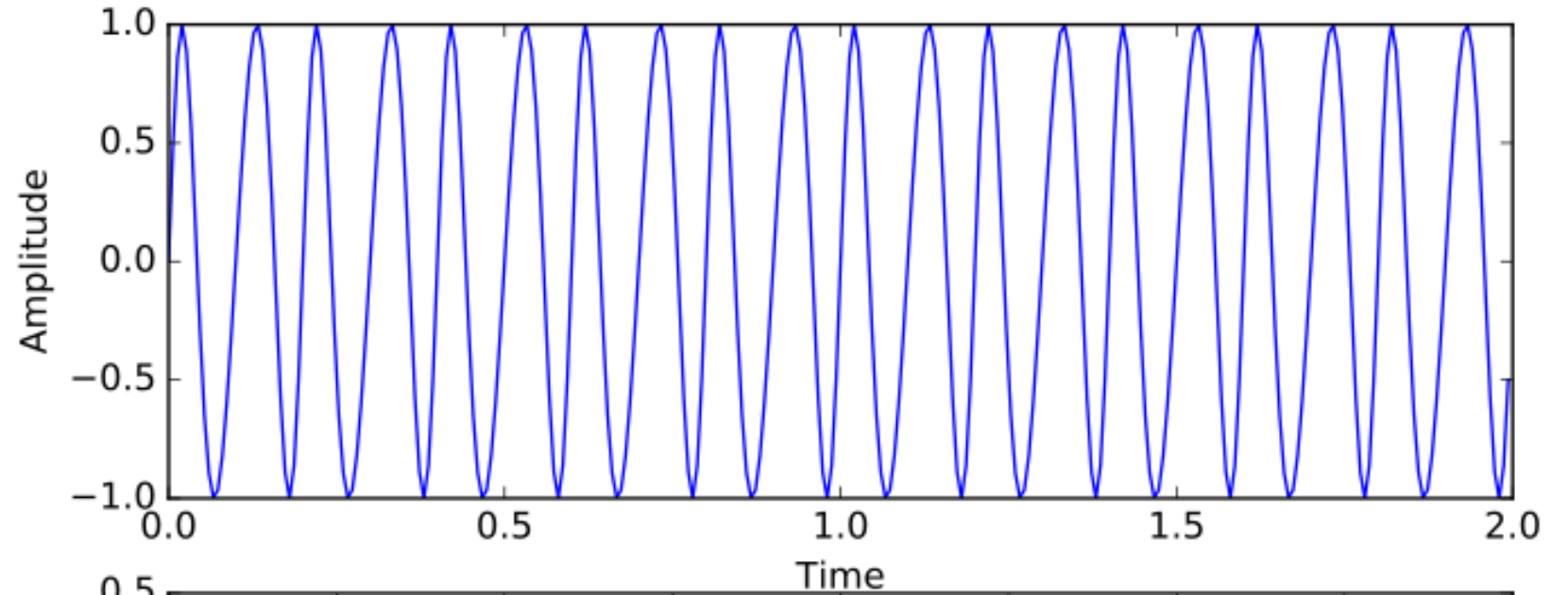
AM

- 10Hz carrier.
- 1Hz signal.
- $m=0.5$.
- [Link](#).



FM

- 10Hz carrier.
- 1Hz signal.
- [Link.](#)





CSN08704

Telecommunications

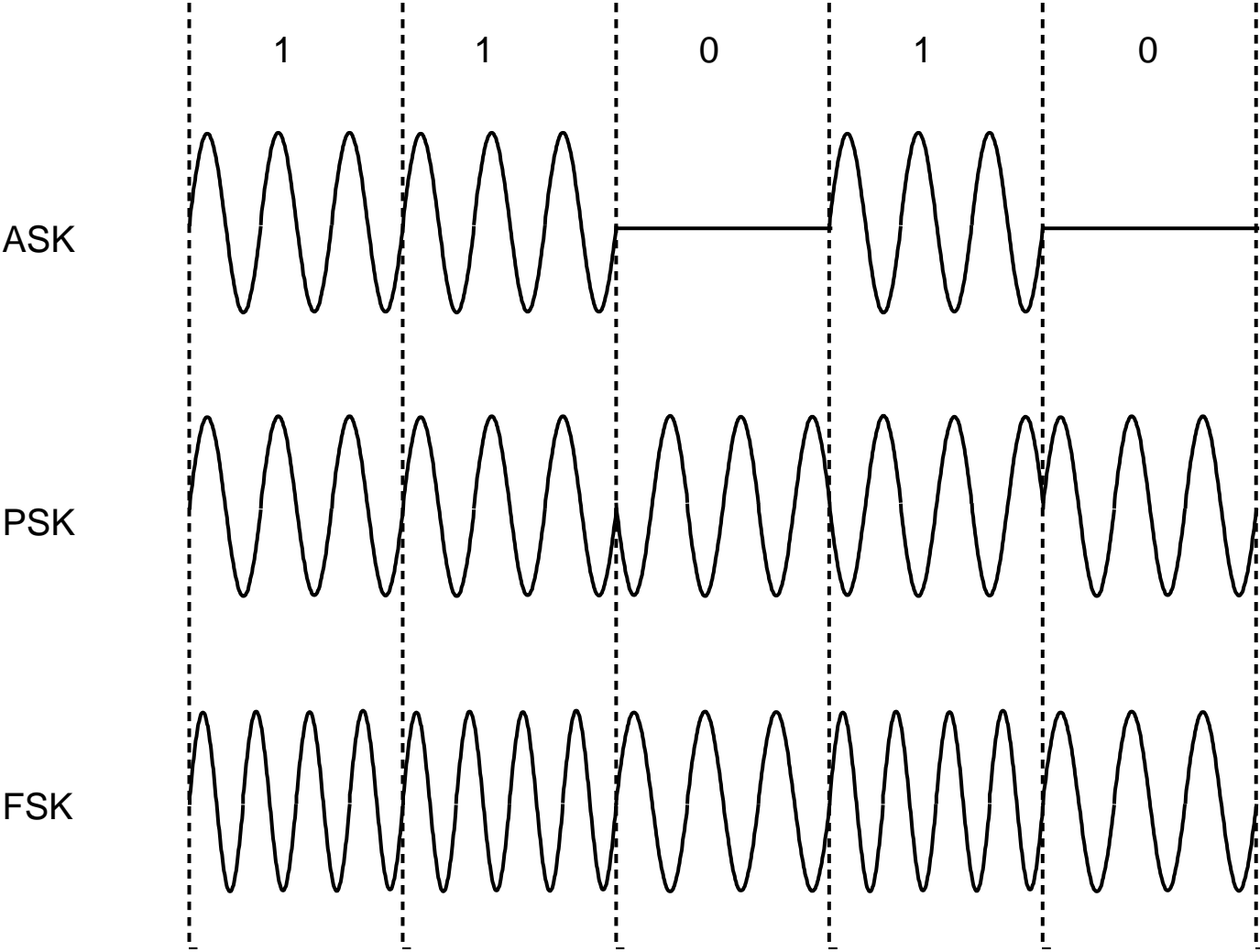
3. Modulation and Multiplexing: Digital Modulation

Data, Audio, Video and Images

<http://asecuritysite.com/comms>

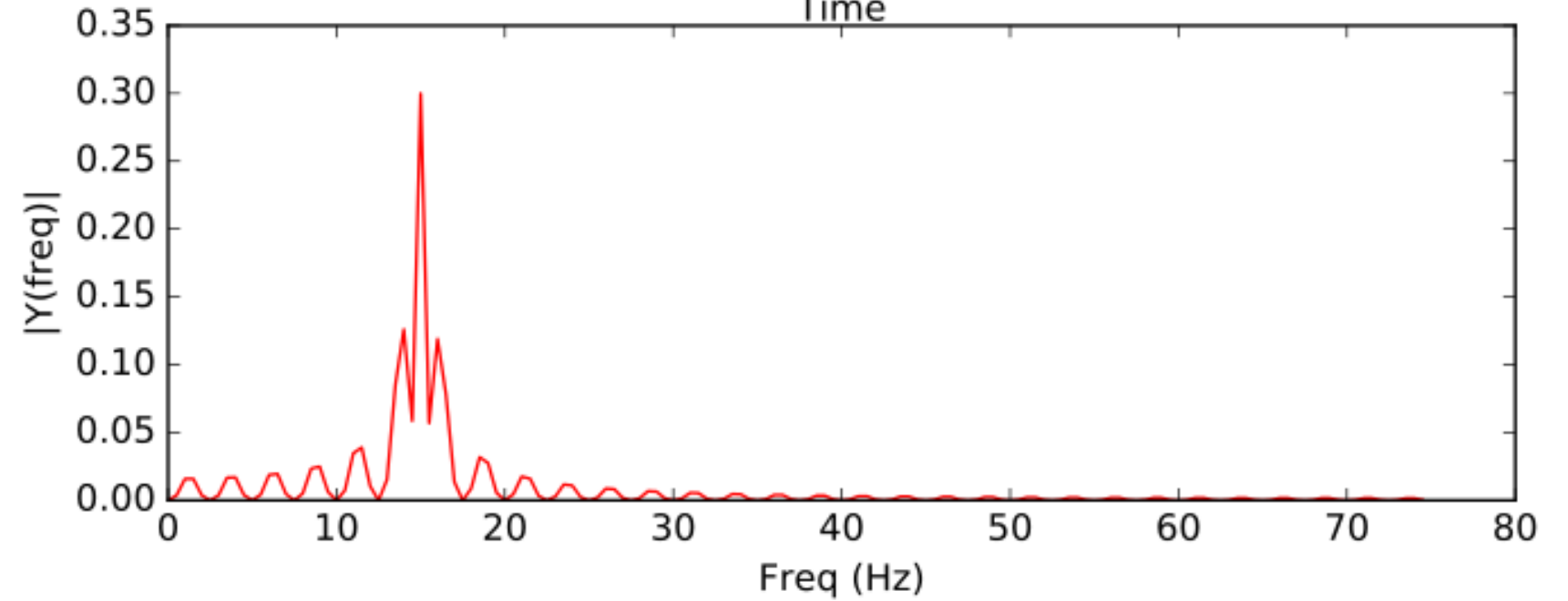
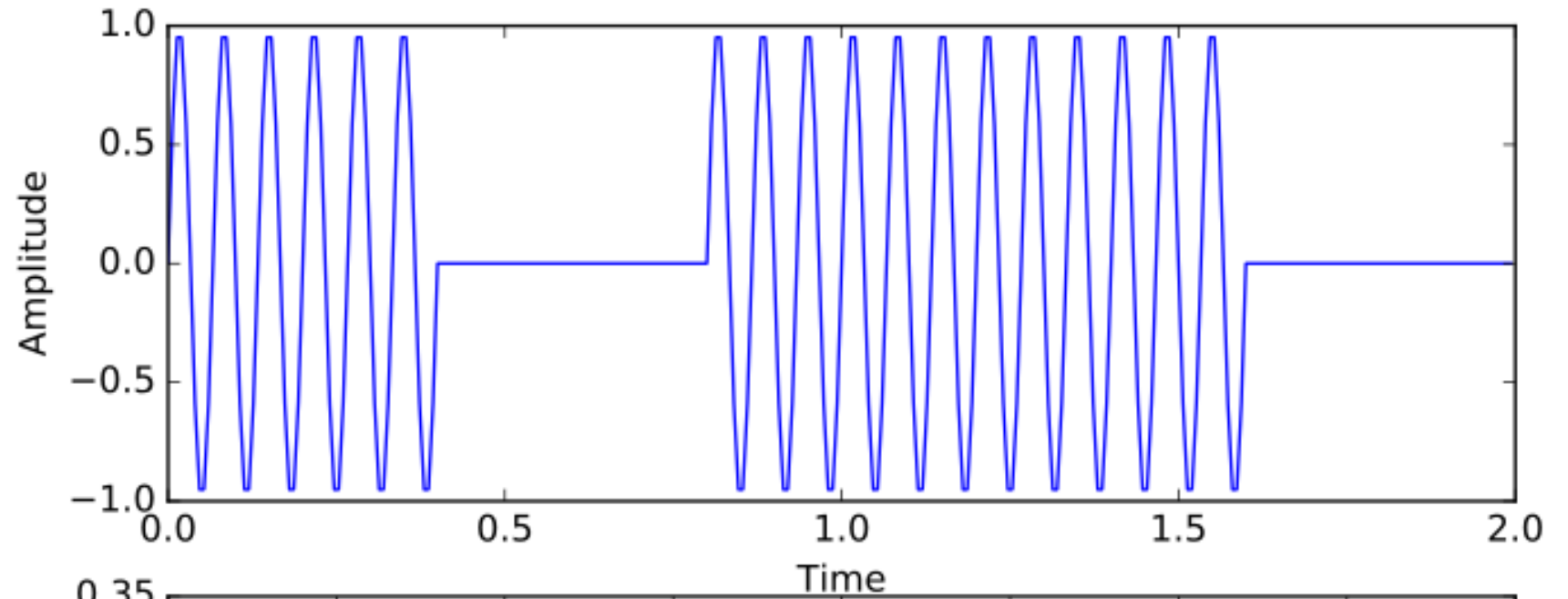
Prof Bill Buchanan

ASK, PSK and FSK



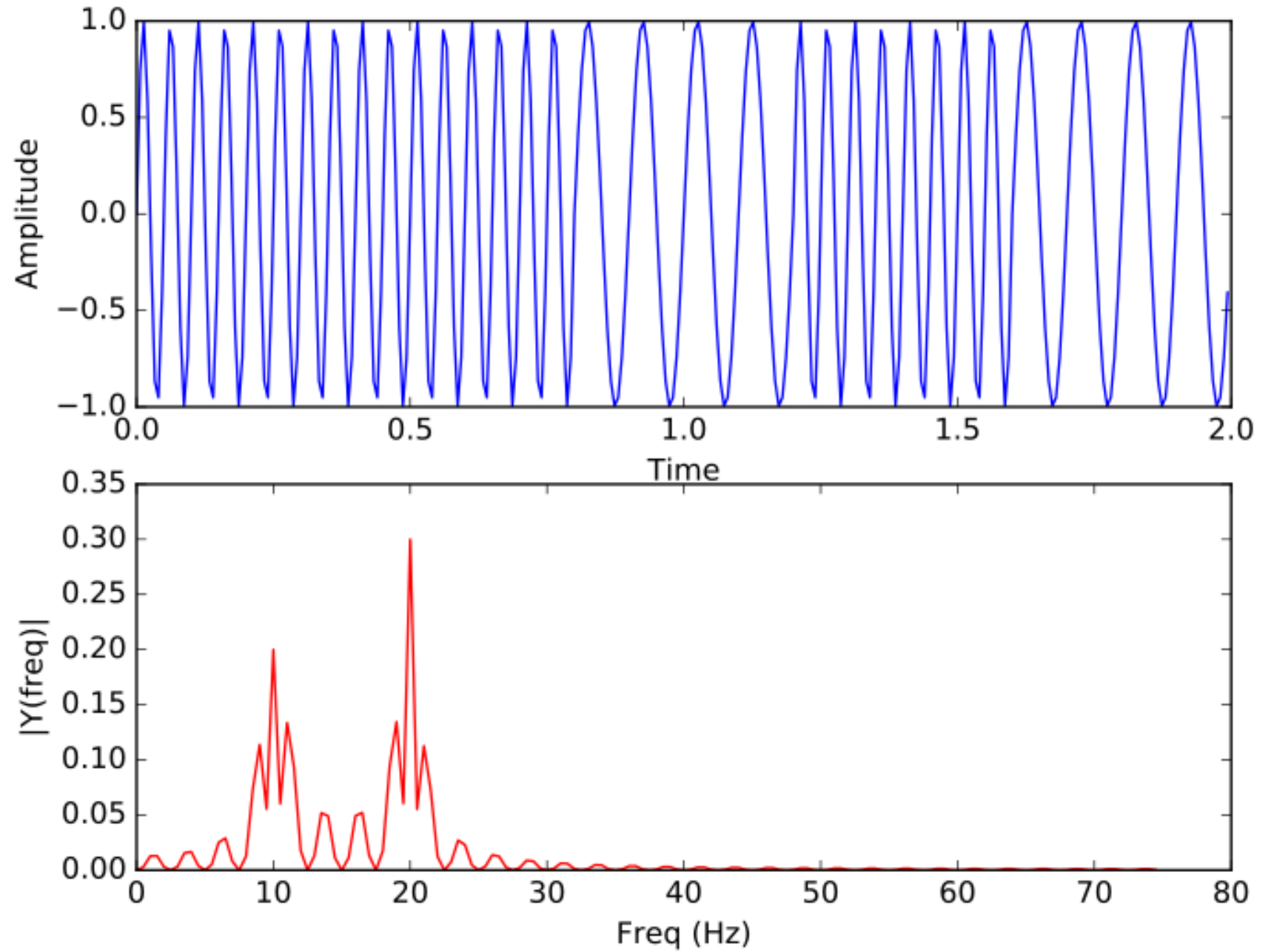
ASK

- 15Hz.
- [Link.](#)



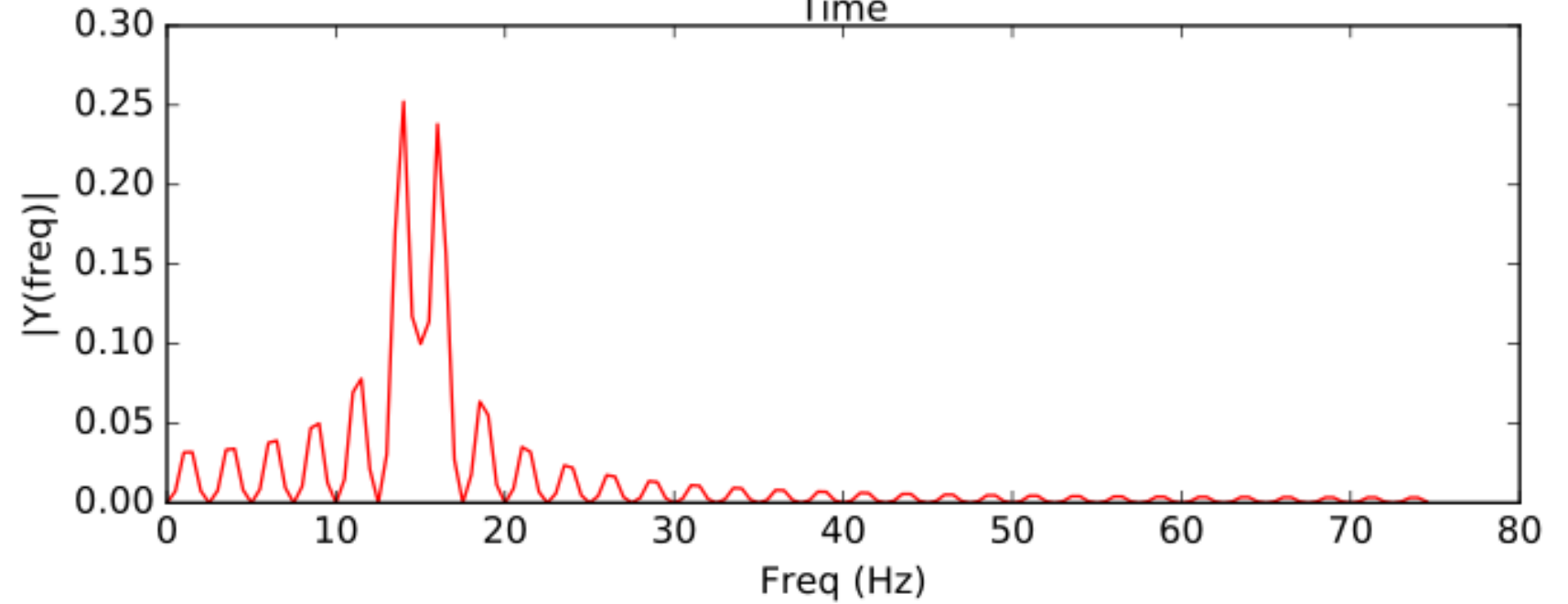
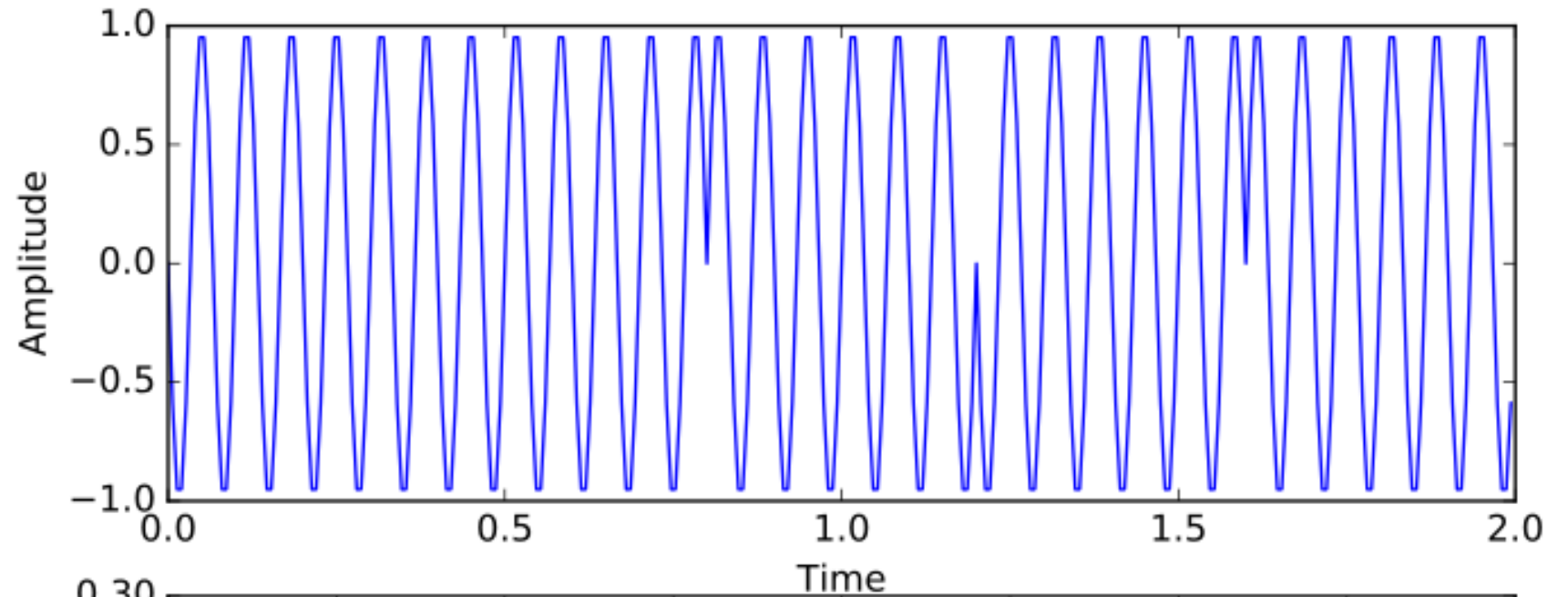
FSK

- 15Hz.
- [Link.](#)

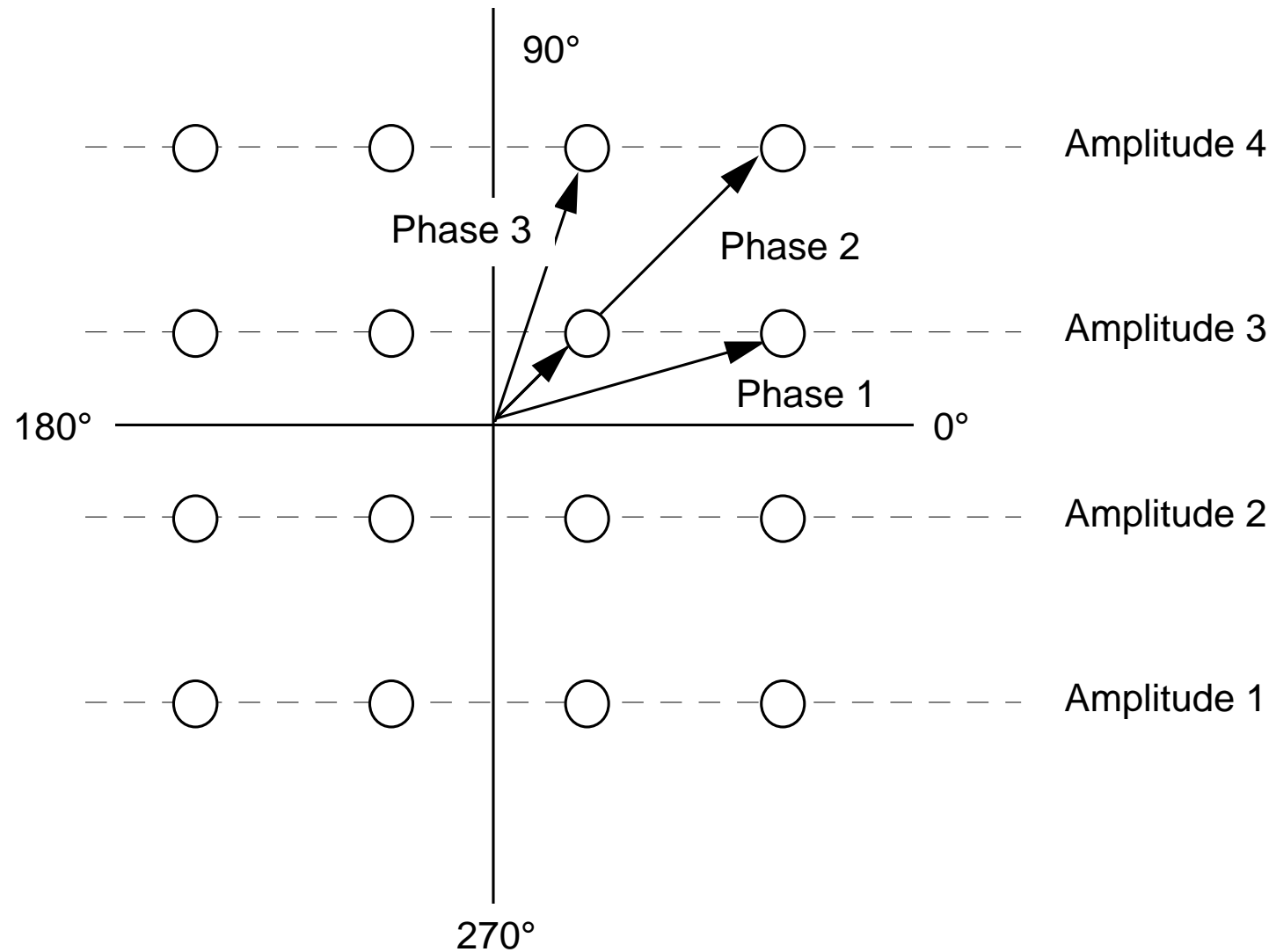


PSK

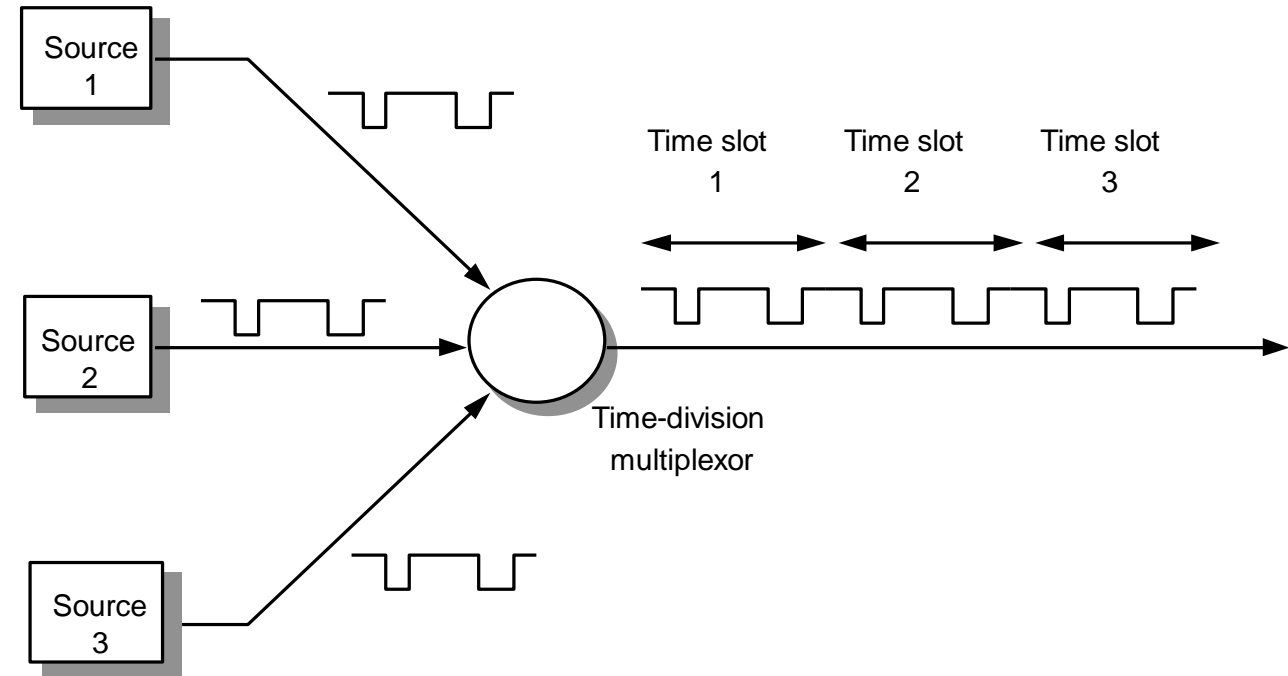
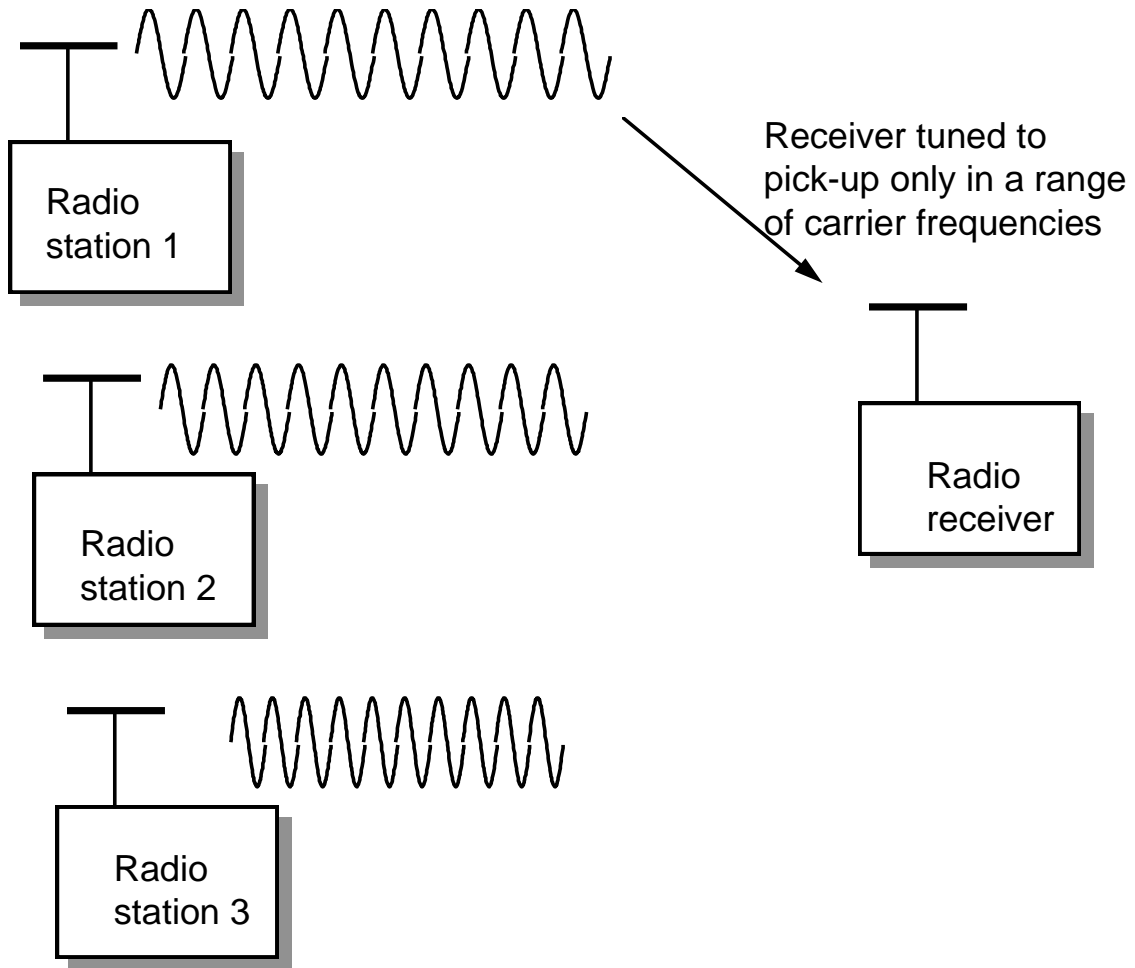
- 15Hz.
- [Link.](#)



M-ary modulation



FDM and TDM





CSN08704

Telecommunications

3. Modulation and Multiplexing: Digital Carrier Frequencies

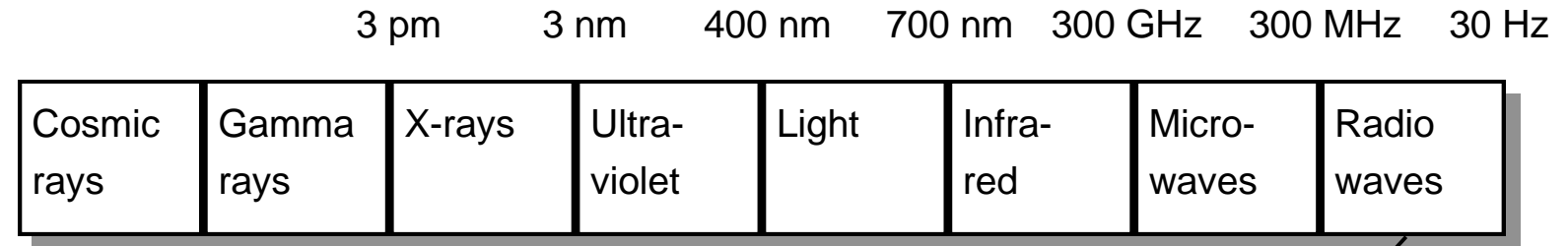
Data, Audio, Video and Images

<http://asecuritysite.com/comms>

Prof Bill Buchanan

Carrier Frequencies

$$\lambda = \frac{u}{f} \quad u = \frac{c}{\sqrt{\epsilon_r}}$$



0.3-3 GHz UHF (ultra-high frequencies)
3-30 MHz SHF (super-high frequencies)
30-300 GHz EHF (extremely high frequencies)

30-300 Hz ELF (extremely low frequencies)
0.3-3 kHz VF (voice frequencies)
3-30 kHz VLF (very low frequencies)
30-300 kHz LF (low frequencies)
0.3-3 MHz MF (medium frequencies)
3-30 MHz HF (high frequencies)
30-300 MHz VHF (very high frequencies)



CSN08704

Telecommunications

3. Modulation and Multiplexing

Data, Audio, Video and Images

<http://asecuritysite.com/comms>

Prof Bill Buchanan