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# *Chelmsford Amateur Radio Society*

# **Foundation Course (6) Propagation**



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# Mechanisms & Effects

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- **Waves Nominally Travel in Straight Lines**
  - **Diffraction - Waves can spread out/around hills and obstacles. Such as after passing through narrow gaps and around corners**
  - **Reflection - Waves (esp at UHF+) can bounce off buildings**
  - **Refraction - VHF+ can be bent by high/low pressure - often termed lifts or ducting. HF is bent by the Ionosphere**
  - **Other mechanisms include Meteor Scatter, Aurora, multipath, fading and Rain/Aircraft Scatter for microwaves.**
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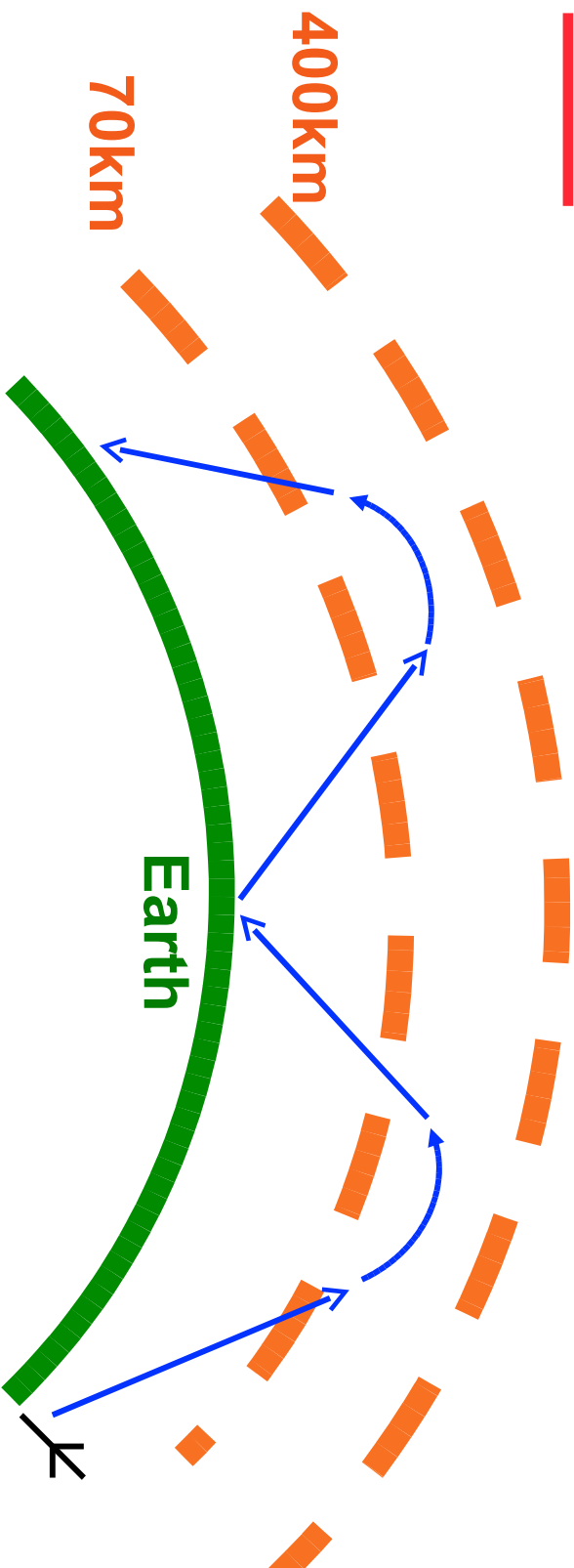
# VHF/UHF

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- VHF/UHF has almost line of sight propagation
  - A clear path is much more effective to get a good signal than a 10 or 100 times increase in power.
    - For example Satellites can be accessed with low power at great distances if there are no obstructions
  - Refraction/Diffraction over the Horizon does occur but is limited. Buildings/Hills will cause shadows and path loss
  - In towns UHF+ reflects/scatters off buildings better.
  - Higher antennas are better than high power, and outdoor antennas perform much better than indoor ones
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# HF and the Ionosphere



- Ionosphere is layers of Ionised air 70-400km above earth
- Layers vary day to night - and with sunspot cycles etc
- HF is bent by ionosphere (refraction) - VHF+ passes through