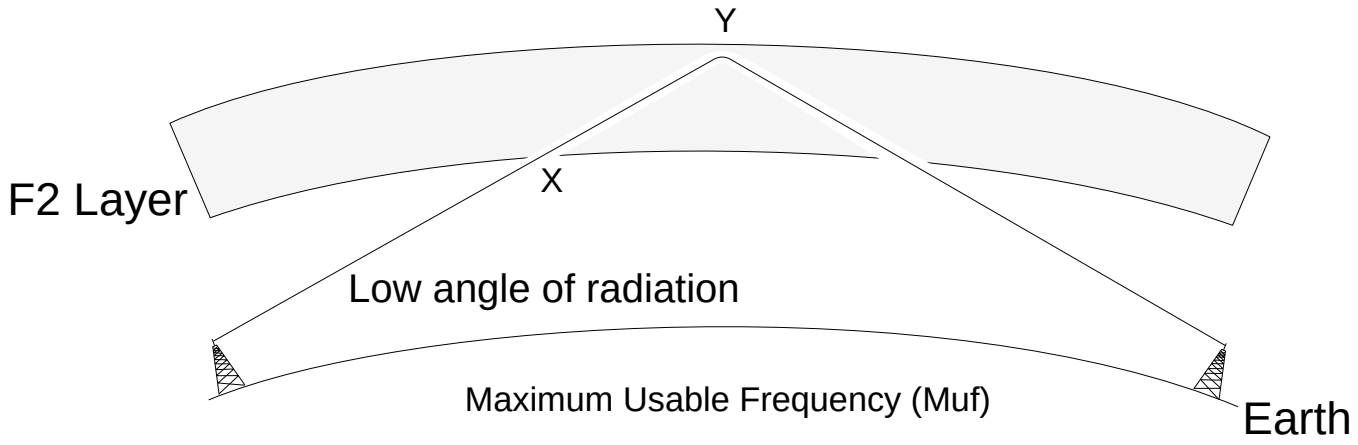
Maximum Usable Frequency and Critical Frequency

Maximum Usable Frequency

For any given transmission distance and any given ionised layer, there is a maximum frequency above which the transmitted wave will not be received. The signal will pass through the ionised layers and be lost in space. This maximum frequency which is reflected back to earth is known as the Maximum Usable Frequency (Muf).

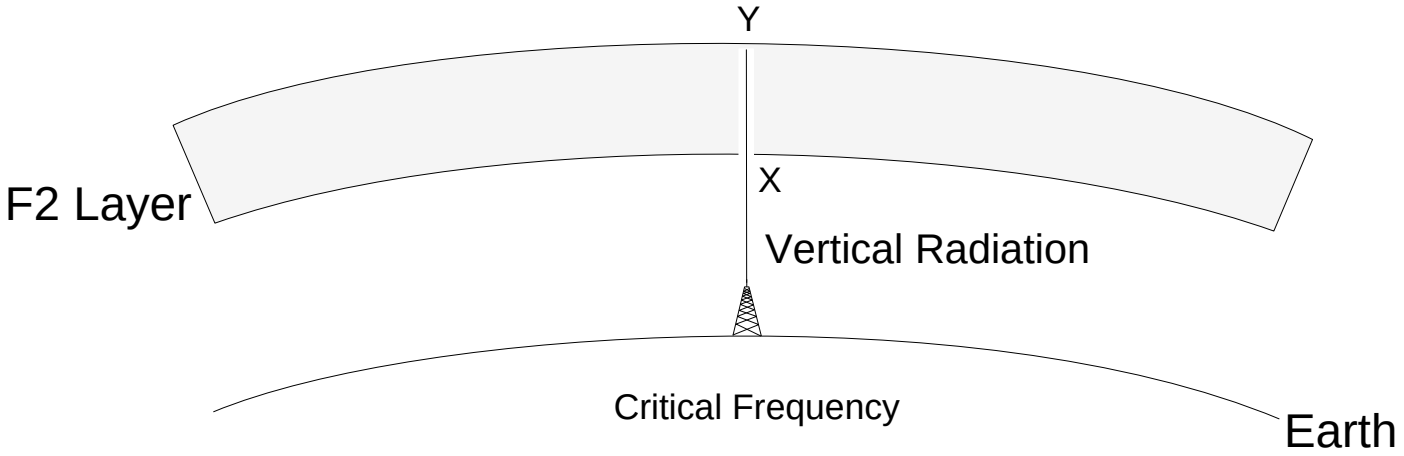
When an amateur radio station transmitts a signal around the world, the operator must choose the correct amateur band and frequency to reach a distant station. The actual frequency chosen will depend on the country to be contacted and propagation conditions.



Signals are transmitted using horizontal aerial systems which give the lowest possible angle of radiation. This means that when the wave reaches the ionised layer, the layer is effectively wider (points X to Y in drawing) which allows the use of a higher frequency than would be possible using a higher angle of radiation.

Critical Frequency

A signal directed vertically into the ionosphere will be reflected back to the transmission point. The ionised layer is effectively narrower (points X to Y on the diagram below).



However, if the frequency of this signal is progressively increased, a point is reached where reflection just fails to take place. The frequency at this point is known as the Critical Frequency (for the layer under consideration). The critical frequency is normally lower than the maximum usable frequency.