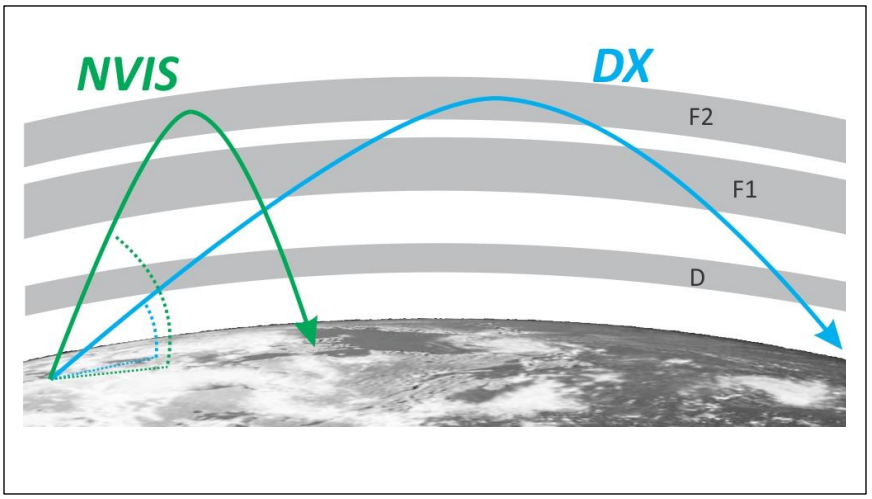
MERT
Marion County Emergency Radio Team

NVIS 101

What is NVIS?[1] Near Vertical Incidence Skywave Antenna?

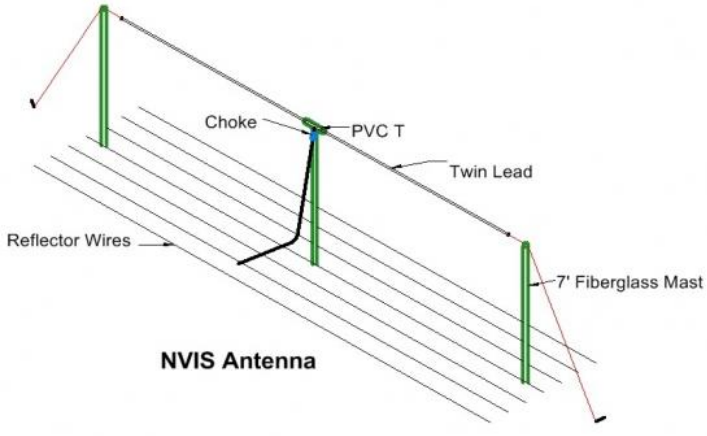
NVIS is a skywave radio-wave propagation path that provides usable signals in the near-field distance range up to 400 miles. It is used for military and paramilitary communications, broadcasting (especially in the tropics), and by HAM radio amateurs for nearby contacts circumventing line-of-sight barriers.

The radio waves travel near-vertically upwards into the ionosphere, where they are refracted back down and can be received within a circular region up to 400 miles away.



NVIS vertical propagation vs. traditional horizontal HF propagation.

If the frequency is too high (that is, above the critical frequency of the ionospheric F layer), refraction fails to occur and if it is too low, absorption in the ionospheric D layer may reduce the signal strength. There is no fundamental difference between NVIS and conventional skywave propagation; the practical distinction arises from different desirable radiation patterns of the antennas (near vertical for NVIS, near horizontal for conventional long-range skywave propagation).



Two types of effective Near Vertical Incidence Skywave (NVIS) antennas. Others exist.

[1] Wikipedia (https://en.wikipedia.org/wiki/Near_vertical_incidence_skywave)

What Bands are best?

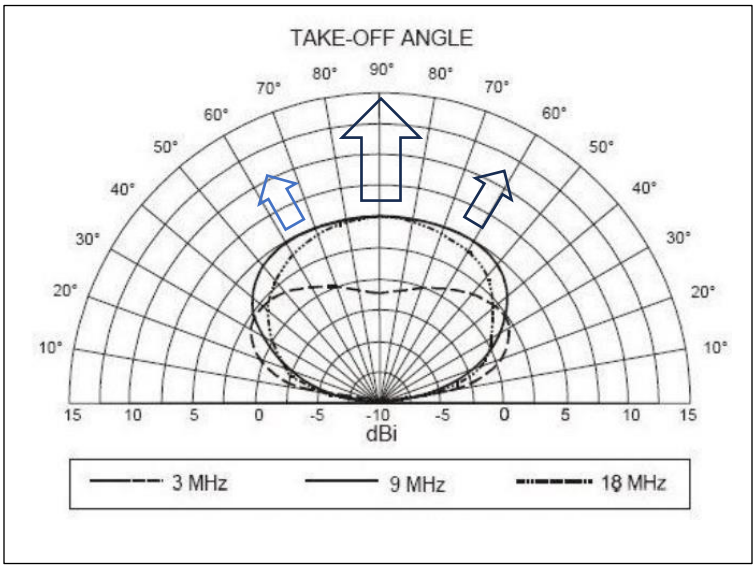
The most reliable frequencies for NVIS communications are between 1.8 MHz and 8 MHz (160 Meters to 40 Meters). Above 8 MHz, the probability of success begins to decrease, dropping to near zero at 30 MHz. Usable frequencies are dictated by local ionospheric conditions, which have a strong systematic dependence on geographical location.

Common bands used in amateur radio at mid-latitudes are 3.5 MHz (80 Meter) at night and 7 MHz (40 Meter) during daylight, with experimental use of 5 MHz (60 Meter) frequencies. During winter nights at the bottom of the sunspot cycle, the 1.8 MHz band (160 Meter) may be required.

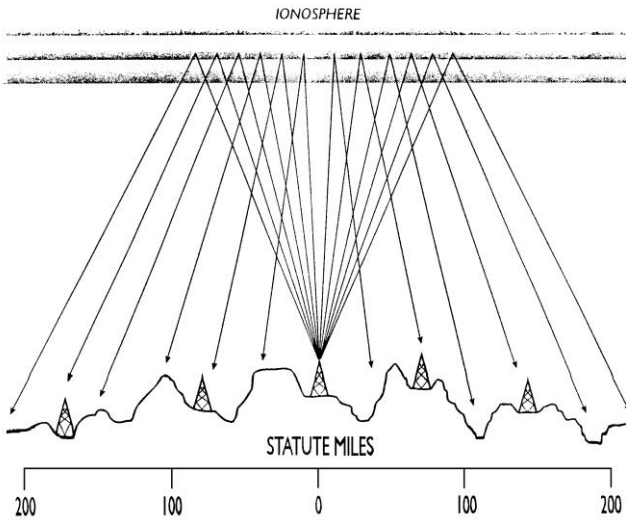
Broadcasting uses the tropical broadcast bands between 2.3 and 5.06 MHz, and the international broadcast bands between 3.9 and 6.2 MHz Military NVIS communications mostly take place on 2–4 MHz at night and on 5–7 MHz during daylight.

What does the NVIS antenna radiation pattern look like?

The antenna name accurately describes the radiation pattern for most NVIS antennas. With the high take-off angle, the majority of the radiated energy is directed vertically and near-vertically towards the ionosphere.



What does that look like in real life?



The effective result of the antenna is shown on the drawing.

This mode of operation makes it ideal **for in-state communications during disasters or other emergency situations.**

This is the reason it is a critical antenna resource for MERT and our need to communicate with the Florida Department of Emergency Management (FDEM) in Tallahassee, FL.

MERT NVIS Antenna Test

Annually, MERT conducts a NVIS test for all members education and experience. MERT thanks past Coordinator Roger Staley (K4ZFW) for selling his NVIS antenna and past Coordinator Leon Jurcyszyn (K8ZAG) for donating it to MERT.