NVIS Antenna Configurations for Emergency Communications

Near Vertical Incidence Skywave

What is NVIS & Why for EMCOM?

NVIS uses high-angle HF radiation that reflects off the ionosphere and returns within ~0–400 miles. It fills the skip zone, works over mountains and foliage, and provides reliable regional coverage when VHF/UHF fails. Ideal for ARES nets, EOCs, and field teams needing area-wide communications without line-of-sight. Keep antenna low and horizontal (or with strong horizontal component) for best results.

KEY PRINCIPLES

Height: 0.1–0.25λ above ground (lower favors pure NVIS; ~0.15–0.20λ often optimal)
Polarization: Horizontal preferred. Verticals have an overhead null; Lazy-L and Sloper offer compromise.
Bands: 80 m (night) · 40 m (day) · 60 m / 30 m (transition). Stay below the critical frequency.
Goal: High takeoff angle (>70°) for local/regional coverage; minimize pure low-angle DX radiation.

PRACTICAL CONFIGURATIONS

1. Low Dipole



- Most common & effective
- Ht: 10–25 ft (40 m)
- 15–30 ft (30 m)
- 20–40 ft (80 m)
- Half-wave + center feed
- True omni high-angle
- Simple & reliable

2. Inverted-V



- Single center support
- Apex: 12–20 ft
- Ends 3–8 ft up
- Broader end-fire
- Easy field deploy
- Good portable use
- Watch end voltage

3. Crossed Inv-V



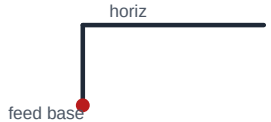
- Military AS-2259 style
- Crossed @ 90°
- 40 m + 80 m wires
- 15 ft mast common
- ~45×45 ft footprint
- Self-guying
- Proven EMCOM

4. Sloper



- Sloping half-wave wire
- High end 20–40 ft
- Low end near ground
- Some high-angle gain
- Directional tendency
- Easy single support
- Good compromise

5. Lazy-L / Inv-L



- Vertical + horizontal
- Horiz. section low
- Feed at vertical base
- Strong NVIS component
- Needs counterpoise
- Compact footprint
- Tuner often helpful

APPROXIMATE HALF-WAVE LENGTHS

Formula: Length (ft) ≈ 468 / f (MHz)

80 m (3.6–3.9 MHz): ~120–130 ft total

60 m (5.3 MHz): ~88 ft total

40 m (7.1–7.2 MHz): ~65–66 ft total

30 m (10.1 MHz): ~46–47 ft total

Cut long; prune for lowest SWR at height

Insulated wire; consider velocity factor

FIELD & SAFETY TIPS

- Prefer fiberglass / non-conductive mast
- Keep ends ≥8–10 ft from people/animals
- Add Mix 31 or Mix 43 RF Chokes on both ends of coax
- Tuner helps multi-band or imperfect height
- Lower antenna = less noise + more NVIS
- Sloper & Lazy-L still need horizontal span
- 30 m bridges day/night transition periods
- Manually re-tune after every frequency change

QUICK RULE: 80 m night · 40 m day · 60/30 m transition · Keep antenna low & horizontal · Match the ionosphere

All stations in the net should use NVIS-capable antennas for reliable two-way paths. Practice setup before the emergency.

J. Stephen Grant – Duval AEC – 11/2026