Any Ham Can Have A 400' Tower!

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Why and When Might We **NOT** Want High Antennas?

- To optimize routine HF (high angle) QSOs
- For “Locals” on HF bands
- To minimize VHF-microwave terrestrial interference, e.g. garage repeaters
VHF vs HF WSPR
Take-Off Angle

Foliage or other environmental obstructions, .25-.5 dB/foot

Handset

High Level Base

Low Level Base

HF Radio

VHF Radio Path
Take-Off Angle Vs. Antenna Height

V_Dipole at \(0.25\lambda\), \(2.5\lambda\) and \(25\lambda\) above real ground
Take-Off Angle Vs. Antenna Height

H_Dipole at \(0.25\lambda\), \(2.5\lambda\) and \(25\lambda\) above real ground
Why and When Do We Want High Antennas?

- To optimize VHF-microwave terrestrial propagation, most comes from horizon
- To optimize long/DX HF propagation
- For the Joy of it!
SAQ, 250 kW 17.2 kHz

SAQ's six 127-meter high freestanding steel pylons, Grimeton, Sweden
Skyhooks

• We don't really need the tower, just a good feedline to an antenna that is held up high

• Aerostats
  – Kites must have wind
  – Balloons Wind is BAD!
  – Helicopters Wind is manageable
Practical Aerostats: Kites

- Marconi
Practical Aerostats: Balloons

Initial 2011 “Flying Antenna” 70 cm Tests

Helium balloon

Transmit / Receive antenna

unobstructed radio path,
High bandwidth communications

Surface Wave Transmission
Line (SWTL) & tether, #24 wire

SWTL Launcher

Obstructed radio path - w/o communications
70cm – 3cm Flying Antenna
YouTube Video of 70cm Test

https://youtu.be/-VWBUDJv2n0
Practical Aerostats: Balloons
2m WSPR Test, Sept 2015
Practical Aerostats: Balloons
Halo@160' Vs. 4 el. Yagi@24'

N6GN 2m WSPR as Spotted at KI6STW

Sept. 6 2015 Balloon supported Halo/SWTL Test

Halo Test Period
Practical Aerostats: Helicopters
Practical Aerostats: Helicopters

- 10m test - being published soon in QEX

2014 10M Quadcopter Tests

Signal Strength (path loss) measurement vs. antenna Elevation in the presence of Ground and clutter. Measurements plotted vs. free space Values for the same distance and antenna Orientations.
Practical Aerostats: 10m test

- 10m test - QEX May/June 2016
Practical Feed Line: SWTL

- Pacificon 2011 Antenna Forum
- QEX May-June 2012
- Patented but available to hams
70 cm Winder/Launcher
Practical Aerostats: Helicopters

Problem!

Flight time 10-20 minutes Maximum
Practical Aerostats: Helicopters

Solution

Power a quad-copter from the ground over the **same** SWTL used as a feedline. Transmit flight power up as RF and rectify it!
Antenna and SWTL/tether are supported by **Quadcopter** which is powered from the **ground**, not by the flight battery. This allows **CONTINOUS OPERATION**, it doesn't need to come down for recharge. All special (heavy) electronics on ground.

**Surface Wave Transmission Line** transports flight power, control, and communications.

**Obstacles** that would otherwise block LOS communication and prevent operation.

**LOS Radio Path**

**DX Station** HF through microwave

100-400w RF power source

**Normal Ham Station**
Quadcopter Power Source

1.2 kW (1.5 hp) LDMOS 2m Amplifier & Power Supply
Result: An “Active Tower” at 400'

- Can support a variety of ham antennas and bands at the same time it is being ground powered.
- Can Fly Continuously
- High Antennas can provide dramatic improvement for low-angle HF through VHF/microwave DX
- Uses normal ground equipment
Summary

- Tethered by an SWTL, Kites, Balloons and Helicopters can all provide a high platform for supporting and feeding amateur antennas on all amateur bands.
- Antennas supported at these heights can greatly increase signals and DX QSOs.
- Position instability caused by wind can be overcome by using a GPS-enabled helicopter, powered from the ground.
- Any amateur can do this.
Thanks for Listening!

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