
APRS™ SETTINGS FOR HIGH ALTITUDE BALLOONS

The APRS™ network is a shared resource and should not be abused. Due to the large radio footprint of High Altitude Balloons (HAB) you should be conservative when you set up your APRS tracker. Here are the recommended settings to use above 5000 feet above the ground.

- Path: WIDE2-1 is acceptable. No path is preferred.
- Transmit rate: 60 seconds or longer between transmissions.

DO NOT USE the following:

- Never use a 2 part path (WIDE1-1, WIDE2-1)
- Never use WIDE2-2 or WIDE3-3 in your path.
- Never transmit more than twice per minute.

These recommendations apply to trackers using the standard APRS frequencies (144.39 MHz in the US). Another option is to change to a different frequency. This will eliminate the terrestrial traffic and permit much higher transmission rates. The downside is that you will not have the benefit of the APRS infrastructure. You will have to provide the reception hardware as well as the gateway to APRS-IS.

BASIC APRS NETWORK OPERATION

For ground based operation, here is the basic flow of a message from the originating tracker to the internet (APRS-IS). For this example the path is WIDE1-1, WIDE2-2.

1. The originating tracker sends a packet with a WIDE1-1, WIDE2-2 path.
2. A local home based digipeater picks up the packet and retransmits it with a WIDE1*, WIDE2-2 path
 - Home based digipeaters repeat packets based on the WIDE1 part of the path. Changing the -1 to * prevents other home repeaters from responding to the repeated packet.
3. The packet repeated in step 2 is heard by a high level (mountain top) digipeater and retransmitted with the path WIDE1*, WIDE2-1.
 - The high powered digipeaters respond to the WIDE2 portion of the path. They will decrement the suffix of the WIDE2 path. They may also respond to the WIDE1 portion if they receive the packet directly.
4. The packet repeated in step 3 is heard by a high level (mountain top) digipeater and retransmitted with the path WIDE1*, WIDE2*.
5. Finally the packet is received by an I-GATE. The I-GATE will send the packet on to the APRS internet servers (APRS-IS) . At this point the packet is available for use on the various APRS internet sites (aprs.fi, FindU.com, aprsworld.net, etc.).

Receivers can receive the packet from any of the steps above. Any of the above steps can be skipped in the path from the tracker to the I-GATE. If you look at the raw packets on a site such as aprs.fi you can see what part of the path was unused to reach the closest I-GATE.

Now look at a balloon at 60,000 feet. It has a radio horizon of over 300 miles with very few obstacles in the path. Suddenly every home based and mountain top digipeater in that 280,000 square mile are receive and repeat the packet. All of those packets are then repeated again. These direct and repeated packets have a significant impact

on the APRS infrastructure. At the same time all of the I-GATES within the area will also receive the packet and forward it to the internet without needing any digipeters in the path.

WHAT TO LOOK FOR IN A BALLOON TRACKER

Just about any tracker can be used for tracking a balloon however there are a few features that you may find useful.

- Light Weight. This one is pretty obvious.
- Variable Frequency. You may want to send more data than is advised on the standard APRS frequencies. Being able to change the frequency will give you the flexibility to do this.
- Change Profile based on Altitude. This option allows you to use a wider path at lower altitudes and switch to an altitude friendly path at altitude.
- Time Slotting. This allows you to set the transmission to occur at a specific number of seconds after 00 based on the GPS time. If you ever plan on launching multiple balloons or participate in group launches such as GPSL this will allow the trackers to work on the same frequency.

ACKNOWLEDGEMENTS

APRS is a registered trademark of APRS Software and Bob Bruninga, WB4APR.

The following resources were used in creating this document

<http://www.californianearspaceproject.com/>

<http://www.aprs.net/>

<http://wa8lmf.net/DigiPaths/>

<http://arhab.org/>

<http://www.eoss.org/>

As well as the members of GPSL group <http://groups.yahoo.com/group/GPSL/>

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