1   Scope

The Automatic Position Reporting System is better known by its abbreviation, APRS, and it does what it says, reporting your geographic coordinates to any receivers within radio range. Purpose of this document is to define the essential parameters you need to know to get your particular APRS to work.

We in the Tulsa Amateur Radio Club use APRS during public service events to monitor where operators are on safety patrol during events like bicycle events. If your APRS is anything like the Yaesu APRS built into the FTM-400, it has had featuritis, doing a lot more than mere reporting of position.

Not having used APRS before, I needed to know the essential parameters required to make the basic automatic position reporting work, and disable all the superfluous and distracting bells and whistles. Here is what I found out by reading the documentation and asking other operators.

1.1   Essential parameters

- Operating frequency
- Digipeater[1] route
- Transmission interval
- Baud rate

- Transmit power
- Beacon mode
- ID
- Alerts & warnings

1.1.1   Operating Frequency

Operating frequency is the one allocated for APRS use by general agreement, usually VHF. In my area, that frequency is 144.390 MHz simplex.

My radio is dual-band, so I set Band-B as the band on which APRS operates. This happens to be the default setting as it comes from the factory. Sometimes, radios permit split operation when APRS sends on one band and receives on the other. Since I need a band for voice communications, my rig sends and receives on the same band—*BAND-B FIX*.

1.1.2   Transmit Power

When I volunteered for safety patrol of the 2023 Dam J. A. M.[2] bike ride, I needed APRS. Usually, we are given a portable APRS unit, but at the 2023 event we decided to allow volunteers to use their own APRS, mainly because of the ability to transmit at higher powers than the portable units.

The Dam J. A. M. event is a very challenging ride both for the cyclists and for continuous mobile VHF/UHF radio communication. There is even a section of the 105-mile route where one loses the satellite GPS signal.

Consequently, I set the transmit-power of both the APRS and voice channels to the maximum of 50W on my transceiver.

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1   A digital data packet repeater extends APRS range like a VHF or UHF repeater does for voice.
2   J. A. M. = Jim And Marie (https://www.damjambicycletour.com/beginnings)

1.1.3 Digipeater Route

A digipeater is a station that relays APRS data packets such as beacon information, and it needs to know how to route the packet. Of the eight possible routes, the best selection is *WIDE 1-1, WIDE 2-1*, which is the default setting on my transceiver.

1.1.3.1 FTM-400DR APRS Manual Excerpts

When "WIDE 1-1, WIDE 2-1" is selected, the beacon is initially relayed to the digipeater station at the first location as specified in WIDE 1-1, and then it is relayed to the digipeater at the second location as specified in WIDE 2-1.

As of 2013, digipeater stations used in APRS are recommended to operate in the New-Paradigm format[3]. As the number of supporting digipeater stations is the largest, the default setting of this radio is therefore set to "WIDE 1-1, WIDE 2-1" when shipped from the factory on the assumption of a digipeater station operating in the New-Paradigm method. It is recommended that you operate the transceiver without changing the setting.

When using other relay methods, select either PATH 1 to PATH 4, FULL 1 or FULL 2, and enter the address of the digipeater used for that route.

CAUTION: When too many relay steps are set, multiple transmission beacons from the same station are relayed, resulting in congestion among the channels.

1.1.4 Beacon Mode

To report your position at regular intervals, it is best to set the beacon mode to *AUTO* and the interval between transmissions to a period relevant to your current activity.

When the beacon is on, it will transmit on the current operating frequency, which should be that assigned to APRS.

1.1.4.1 Smart Beacon

In principle, smart beaconing is a good idea; in practice, not so much. It can cause frequency congestion. On my transceiver, the default setting is off, and best left that way.

1.1.5 Transmission Interval

Default setting of my transceiver is 5 minutes, which is enough for casual activities. However, for an event like the Dam J. A. M. an interval of 2 minutes is better, since position is often changing more frequently when the control operators need to know what's happening on the course.

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3   Please refer to the following website for the description of the New-Paradigm format.
     http://aprs.org/fix14439.html

1.1.6 APRS ID

Any beacon signal needs a corresponding identification, which is your callsign, followed by the Secondary Station Identifier (SSID). There are 16 types of SSID, as shown in Figure 1. My ID is W5AWS-9.

Figure 1

SSID	Explanation	SSID	Explanation
NIL	Fixed stations that can exchange messages	-8	Marine mobile stations, land mobile stations
-1	1200 bps narrow-to-middle band digipeater	-9	Using the FTM-400DR etc. for mobile applications
-2	9600 bps digipeater	-10	I-Gate station, Internet connection station
-3	1200 bps broadband digipeater	-11	Balloons, aircraft, spacecraft, etc.
-4	Digipeater, mobile station, meteorological station, etc.	-12	1-way tracker station (messages cannot be exchanged)
-5	Operation station using mobile devices (smartphones etc.)	-13	Meteorological station (weather station)
-6	Operation station for satellite communications, events, etc.	-14	Tracking mobile stations
-7	Use of FT1DR etc. in handy terminals	-15	Digipeater, mobile station, meteorological station, etc.

1.1.7 Baud Rate

It is probably the default setting for your equipment, but 1200 bps is the baud-rate for digital data transmission.

1.1.8 Alerts & Warnings

To minimize distractions while driving, disable all alerts and warnings, and mute any transmit audio. On my transceiver, I have the audio volume turned to minimum on the APRS channel.

2 Testing

To verify that your APRS is working, use either of these two web-sites and look for your ID:

➢ https://aprs-map.info   ➢ https://aprs.fi

3 Conclusion

Obviously, since transceivers and APRS devices vary, the devil will be in the configuration details, which means that this document is an overview with enough detail to orient you, so that you can complete your specific configuration to obtain a basic

working system with reference to your APRS operating manual. In my case, I've ignored all the fancy features since I'm only interested in getting the system to silently report my geographic position to Net Control without distractions from piloting the vehicle.

4 Glossary

APRS..........Automatic Position Reporting System
bps.............bits per second
GPS............Global Positioning System
ID...............Identity
JAM............Jim And Marie
SSID...........Secondary Station Identifier
UHF............Ultra High Frequency
VHF............Very High Frequency
W...............Watts