APRS Messaging

Spurpoint

Version 1.1

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Introduction

In 2015, I was invited to provide communication support for the Teton Dam Marathon. Race officials were not certain what our complete role would be, but they knew there was spotty cell phone coverage in some areas of the course.
I organized a team of amateur radio operators to staff about eight of the 13 checkpoints along the course and established a control station at the finish line. The plan: When runners passed a checkpoint, radio operators would call the control station and report the bib numbers. The operators at the control station would keep track of those bibs. When race officials asked about lead or last runners, we could review our logs and report where and when the runners were last spotted.
Paper was messy. The writing was sloppy. It took too long to decipher which runners were where. Even before the end of the seven hour event, I knew there had to be a better way. And now there is!

Spurpoint is the product of many years and many iterations of software to track runners. You configure the event with courses (e.g. 5K, 25K, marathon, etc.) and a list of checkpoints. When communicators report bib numbers, they are recorded in the Sightings page. You can then view reports of the runners by checkpoint (which runners were last seen at what checkpoints) and by course (runners and checkpoints).

Recently, some local amateur radio operators began using the Automatic Packet Reporting System (APRS). It is similar to GPS, but it uses amateur radio frequencies for beaconing. They can use APRS like a texting system. They send an APRS “text” and the message is stored on an Internet server.

Early on, APRS Messaging was integrated with Spurpoint. However, in order to remain compliant with the APRS API usage agreement, I have created Spurpoint APRS Messaging as a separate application which can be freely distributed.

APRS Messaging can poll the servers for APRS messages and display them in a table. Users can then copy and paste messages into the Spurpoint Sightings screen or messages window.

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Installation

One of the strengths of Spurpoint APRS Messaging is that it does not need to be installed. You can run it from a USB thumb drive, if you want. Simply download the appropriate zip, dmg, or tar file, extract the files into a directory of your choice. Then launch the executable.

APRS Messaging can be downloaded from https://spurpoint.rexburghams.org/.

Windows

APRS Messaging for Windows has been tested on Windows 10 and Windows 11.

Hardware recommendations:
64 bit processor
1 GB of RAM
50 MB storage (minimum)

Download the Windows version of APRS Messaging.
Create a folder such as c:\SP_Messaging.
Copy the downloaded zip file to the new folder.
Extract the files into the current folder.

Linux

Spurpoint APRS Messaging has been tested on Ubuntu 24.04, Fedora Workstation 41, and Mint 22.1, but will likely run on most all distros.

Hardware recommendations:
64 bit processor
1 GB of RAM
50 MB storage (minimum)

Download the tar file from https://spurpoint.rexburghams.org/
Extract the downloaded file into the directory of your choice.
> tar -xvf spmessaging_linux_1.1_tar.gz

Change “1.1” to the version number of the file you downloaded..

The folder should contain the Spurpoint APRS Messaging executable and documentation files.

Raspberry Pi

[***Future Feature***] Spurpoint has been tested on Raspbian [TODO version] on a Raspberry Pi 3B v1.2, but will likely run on most all RPi environments..

Hardware requirements:
64 bit processor
1 GB of RAM
50 MB storage (minimum)

Download the tar file from https://spurpoint.rexburghams.org/
Extract the downloaded file into the directory of your choice.
> tar -xvf spmessaging_arm_1.1_tar.gz

Change “1.1” to the version number of the file you downloaded..

The folder should contain the Spurpoint APRS Messaging executable and documentation file.

Mac

[Not yet available for distribution.]

Hardware requirements:
32 bit processor
1 GB of RAM
50 MB storage (minimum)

Download the .DMG file from https://spurpoint.rexburghams.org/

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Automatic Position Reporting System

The Automatic Position Reporting System or APRS is an amateur radio system that utilizes a combination of GPS satellites, amateur radio frequencies and the Internet for tracking radio operators. This system requires APRS capable radios.

Amateur Radio operators can utilize APRS to send text-like messages. Spurpoint APRS Messaging is designed specifically to retrieve those messages and utilize them as a secondary means of communication. *Note: This APRS Messaging application requires an Internet connection. Without an Internet connection, you can view and manage existing messages, but you will not be able to retrieve new messages.*

In order to send APRS messages, the sender must be a licensed amateur radio operator. However, a license is not required to retrieve the messages from the Internet as APRS Messaging does.

Two things are required to use the APRS messaging system: an APRS API key and an Internet connection.

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APRS API Key

In order to acquire an APRS API key, open a browser and go to https://aprs.fi. Click on the Login link in the upper right corner of the screen. If you already have an aprs.fi account, login. If not, click the Sign up button and follow the directions for creating an account.

Once you are logged in to aprs.fi, from the main screen, click on My account in the right hand navigation bar under Other Views. Copy the API key.
Now launch APRS Messaging. On the main menu, click the Messages and then select “Enter APRS API Key”.

A dialog box will appear. If you have previously entered an API key, the key will appear in the text field. If not, the field will be blank. Paste the key you copied from the APRS.fi website into the text field and click Ok.

Retrieving Messages

The APRS Messaging feature requires an active Internet connection. If you do not have an Internet connection when APRS Messaging is launched, the Fetch Messages button will be greyed out.

To retrieve messages, enter an amateur radio call sign and click Fetch Messages. For example, if you want to retrieve all of the messages sent to N7TMS, enter N7TMS in the Call Sign field and click Fetch Messages. APRS messages are serialized and APRS Messaging keeps track of the message serial numbers so that duplicate messages are not recorded in the database.

Only messages that were sent to the call sign within the last 14 days will be retrieved. This is a limitation of the APRS.fi system

In order to understand the power of APRS, consider the following scenario. In the middle of the Teton Dam Marathon event, there are a lot of runners on the course and there is a lot of radio traffic between the checkpoint volunteers and the net control station. Even with two radios running, some sightings go unreported. APRS gives the operators another avenue for reporting their sightings. They send an APRS message to a designated call sign (e.g. N7TMS). The message begins with their checkpoint name or assignment designation followed by the bib numbers they sighted. When the message is retrieved at net control, a Spurpoint operator can copy and paste the information from the message into the Sighting form.

After an APRS message has been handled, you can click on the checkbox in the ACKed column. (ACKed = Acknowledged).

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Deleting Messages

It may be advantageous to delete messages from the database. Or maybe you want to use the messaging system for a different event and you want to purge all of the messages from the database.

To delete the acknowledged messages, click Messages from the main menu and select “Delete ACK’d Messages”. You will be prompted with a warning message asking you to confirm this action. Note: This action cannot be undone. If you are sure, click Yes.

In reality, the messages are not actually deleted from the database, but a purge flag is set which prevents them from appearing in the messages table. This prevents the deleted messages from being retrieved again from APRS.fi.

In order to truly purge all of the deleted messages -- meaning the messages that have had their purge flag set -- click Messages from the main menu and select “Purge Deleted Messages”. Again, you will be prompted with a warning message asking you to confirm the delete action. This cannot be undone. If you are sure, click Yes.

If you retrieve messages using the same call sign as the messages that were purged, the messages may be retrieved from APRS.fi again, but that is dependent on the age of the messages. According to APRS.fi, APRS messages are stored for 14 days.

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Glossary of terms

APRS (Automatic Packet Reporting System) – A digital communication protocol used by amateur radio operators to transmit real-time data, such as participant locations, weather conditions, and status reports. In an event setting, APRS can be used for live tracking and coordination.

Assignment – A designated role or responsibility given to a volunteer or staff member during an event. Assignments may include checkpoint monitoring, participant tracking, radio communications, or other operational duties to ensure smooth event execution.

Bib – A unique identifier assigned to each participant, typically printed on a race bib worn during the event. This number is used for tracking and reporting purposes.

Checkpoint – A designated location along a course where participants are recorded as they pass. Checkpoints are used to track progress and provide real-time updates on a participant’s last known position.

Course – A predefined route within an event that participants follow from start to finish. Courses may vary in distance and difficulty, such as Marathon, 10K, or 5K.

Event – A structured race or competition that consists of one or more courses. An event includes organizational details such as the date, location, and participant registration.

Last Seen Location – The most recent checkpoint where a participant was sighted, used to track progress and determine their position on the course.

Message – A specific piece of communication or transmitted information. In an event setting, messages typically involve participant sightings, checkpoint status updates, or other operational instructions.

Net Control – The central communication hub responsible for coordinating event operations, relaying checkpoint updates, and managing volunteer reports. Net Control ensures efficient information flow between checkpoints, race headquarters, and event staff to facilitate real-time participant tracking.

Participant – An individual registered in an event who competes in one of the available courses. Participants are identified by unique bib numbers.

Race Headquarters – The central location where event organizers monitor participant progress, manage data from checkpoints, and generate reports.

Radio Operator – A trained individual who uses amateur (ham) or other radio communication systems to support event operations. Radio operators facilitate reliable communication between checkpoints, Net Control, and race headquarters, especially in areas with limited cellular coverage.

Relay – A race format in which a team of runners or participants takes turns completing different segments (legs) of a course.

Report – A dynamically generated summary of participant data, typically organized by course, to provide event staff with real-time tracking information.

Sighting – The recorded observation of a participant at a checkpoint. A sighting includes the participant's bib number, the checkpoint location, and the timestamp when they passed, providing real-time tracking data for event organizers.

Spurpoint – The runner tracking application designed to log participant sightings at checkpoints and provide event organizers with real-time updates and reports.

Timing System – A separate system from Spurpoint that records official race times. Spurpoint focuses on participant tracking rather than race timing.

Tracking – The process of recording participant progress along a course using checkpoint sightings to determine their last known location.

Traffic – A term used in radio communication to refer to the transmission of messages or data. It can include routine updates, requests for information, or emergency communications. In the context of an event, traffic refers to the flow of information between checkpoints, Net Control, and other event participants.

Volunteer – A person assisting with event operations, including checkpoint management, participant tracking, and administrative support.

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