WAPaprs: APRS on a Cell Phone

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http://w9if.net/cgi-bin/wapaprs/web_main.pl

ABSTRACT

WAPaprs is an application to display APRS information on a cell phone that supports the Wireless Application Protocol (WAP). It was written to provide useful APRS data within the size, memory, color, and bandwidth limitations of a wireless handheld device. The paper includes a description of all menu options and example displays.

KEYWORDS
APRS™, WAP, WML, Linux, Perl, Cellular Technology
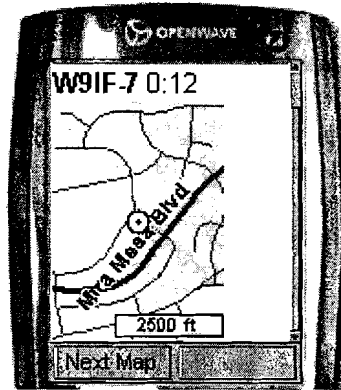
INTRODUCTION

Few could have imagined in the early 80s that cellular communication would enjoy the popularity that it does today. A cellular phone once thought of as a luxury is now considered by many to be a necessity. As of early 2001, one out of 10 people in the world (680 million) used a cellular phone. Many amateur radio operators have joined the ranks of cellular phone users and find they are legitimate devices to supplement amateur communication.

Cellular technology has come a long way in a brief time. First generation (1G) systems used analog technology. Although primitive and unreliable by today's standards due to poor voice quality and frequent call drops, 1G showed that mobile communication for the masses was technically feasible and economically viable. The late 90s introduced second generation (2G) systems using digital technology. This new generation brought substantial improvements to voice quality, call reliability, miniaturization, battery life, and heralded the beginning of data services. At the dawn of the new millennium, third generation (3G) advanced digital systems are being deployed worldwide. This latest generation is characterized by improvements to system capacity, reliability, extended services, and significantly higher data rates. For example, 1xEV-DO, which is a 3G standard, supports rates in excess of 2 Mbps. These higher speeds mean bandwidth hungry multimedia applications once limited to the desktop can be provided to the mobile user.

Cell phones today, even low-end phones, can be used for more than just talking. A user can send and receive email, surf the Internet, play MP3 music, and even send and receive color pictures using the latest generation of camera ready phones.

As an amateur radio operator and APRS aficionado, I was anxious to retrieve APRS data using a cell phone. WAPaprs is the result of my work. It provides the cell phone user the ability to retrieve information from the findu.com and aprsworld.net databases.

WAPAPRS ACCESS

Due to the relative difficulty to input text using a small cell phone keypad, the suggested method for using WAPaprs is to permanently bookmark call signs of interest. For example, if you often check the location of KC5PVL-9, permanently bookmark: http://w9if.net/cgi-bin/wapaprs/main?kc5-pvl-9. Using this method, very few keystrokes are required to obtain the desired information.

Alternatively, users can bookmark: http://w9if.net/cgi-bin/wapaprs/main; in which case the user will be prompted to supply just a call sign. This significantly reduces the number of keystrokes.

In the examples below, URLs are included to allow the user to access specific displays without first going to the main URL. I provide these URLs for completeness, but do not expect users to access WAPaprs in this manner. Generally, the user will start at the main WAPaprs display and navigate to other displays with single keystroke responses.

MAIN

http://w9if.net/cgi-bin/wapaprs/main
http://w9if.net/cgi-bin/wapaprs/main?w9if
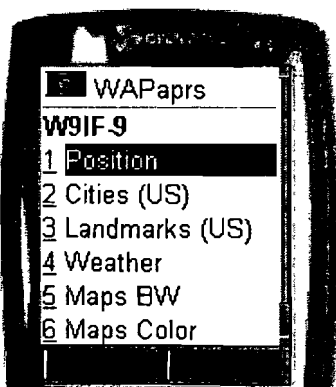
The "main" display can be accessed with or without a call sign. If a call sign is not provided, the user will be directed to another display and prompted to supply one. If a call sign is provided, a menu is provided to allow the user to select from one of seven options: Position, Cities, Landmarks, Weather, Maps (Black and White), Maps (Color), and New Call. The seventh option, New Call, is off the cell phone display in the figure to the left.

POSITION

http://w9if.net/cgi-bin/wapaprs/posit?w9if
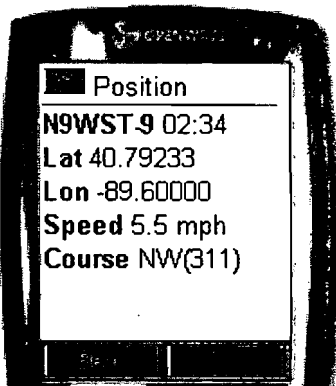
The "position" display shows the latitude, longitude, speed, and course of an APRS object. All information displayed comes from the findu.com database. The age of the packet is displayed in hours and minutes. In this example, the packet is 2 hours and 34 minutes old. Showing seconds was deemed to be unnecessary and of little value given the time for the transaction. The limited display on a cell phone was also a consideration in dropping the seconds information.
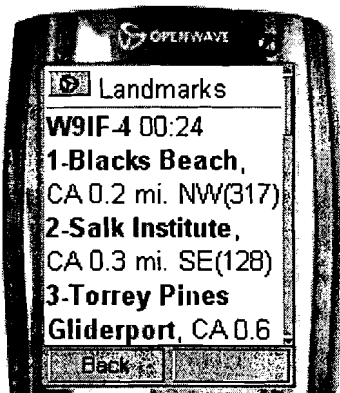
CITIES

http://w9if.net/cgi-bin/wapaprs/cities?w9if
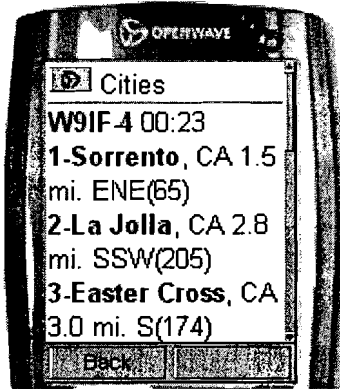
The "cities" display allows the user to locate an APRS object in reference to nearby cities. The term cities is used loosely. Many of the locations are not cities but populated areas. The information displayed comes from two sources. First, the findu.com database is accessed to obtain the latitude and longitude. From there, the aprsworld.net database is accessed to determine a nearby city. WAPaprs does this by calculating a "box" around the APRS object. If ten or more cities are located within the box, WAPaprs displays the closest ten cities. If there are less than ten cities nearby, the box is expanded until ten or more objects are located. The objects along with the distance and direction are computed and displayed.

LANDMARKS

http://w9if.net/cgi-bin/wapaprs/lmarks?w9if

The "landmarks" display is similar to the cities display. Both access the findu.com database to determine the latitude and longitude of the APRS object. They both access aprsworld.net, but use different databases. The landmarks database differs from the cities database in that the locations are non-populated areas but geographical locations of interest. For example, in the display to the left, Blacks Beach is a clothing optional beach in San Diego. The Salk Institute is the world famous institution founded by Jonas Salk, who was responsible for curing polio in the 50's. Like the cities display, the ten closest landmarks are shown along with the distance and direction to each landmark.

WEATHER
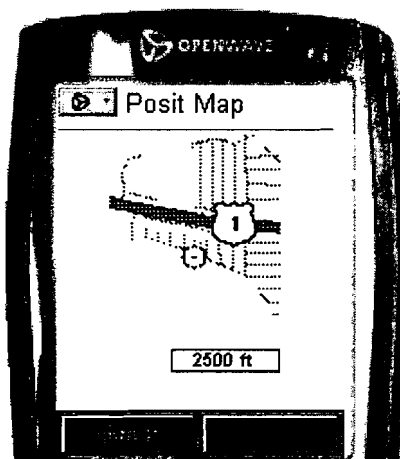

http://w9if.net/cgi-bin/wapaprs/wx?w9if-4
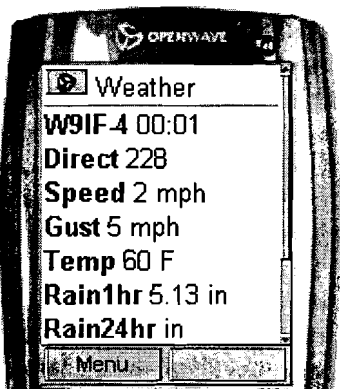
The "weather" display shows weather conditions for APRS weather stations. The findu.com database is accessed for this information. The data displayed includes:

- Age of packet
- Wind Direction
- Wind Speed
- Wind Gust
- Temperature
- Rain
- Humidity
- Pressure

MAPS (B&W)

The "maps" (B&W) display shows three map resolutions: 500', 2,500', and 2 miles to the scale shown. One may question the usefulness of the small maps. However, the usefulness of the map really depends on the users requirements. In the example shown, the names of the street are not available, but the APRS object (shown as a circle) can be seen a few streets south of I1. There are many situations where that level of detail is useful and sufficient. The size of the map is approximately 70 x 90 pixels. Most Internet users are familiar with GIF and JPEG images. However, WAPaprs maps are WBMP (Wireless Bit Map) graphic files. WBMP images are used since they are the standard format supported by most WAP cell phones.

MAPS (COLOR)
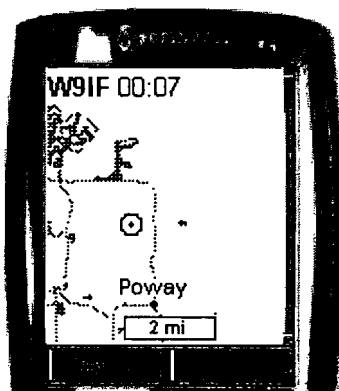
The "maps" color display shows three map resolutions identical to the B&W maps: 500', 2,500', and 2 miles. However, there are two major differences. First, the maps are in color. Second, the images are in GIF format rather than WBMP. While most WAP compliant cell phones support WBMP graphics, there is no guarantee the phone will support GIF images. For this reason, some users may find color maps are not displayed. However, today's high end cell phones that support GIF images will be tomorrow's low end phones. So I suspect it is just a matter of time before most users will be able to see these color maps.

NEW CALL
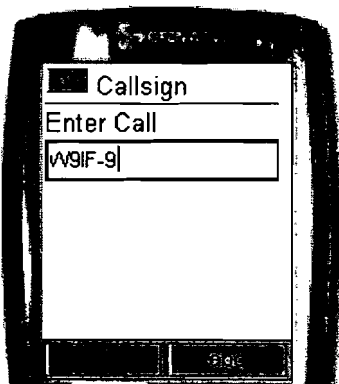
The "new call" display allows the user to input a new call sign. I wish to emphasize again that few users will access this display or any of the other displays mentioned directly, with the exception of the main display. When a user accesses the main display, he/she can easily navigate to all other pages including the "new call" display. Note that WAPaprs does not support wild cards such as W9IF* or W9IF-*. The limited viewing area of a cell phone makes displaying more than one APRS object impractical.

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TERMINOLOGY

This section includes WAPaprs background information and nomenclature. It describes some of the unique terminology of WML and the WAPaprs architecture.

WML (Wireless Markup Language) was used to create WAPaprs. WML is a formatting language similar to HTML. It is defined as an XML (Extensible Markup Language) document that is optimized for small screens and memory size. Although WML is similar to HTML, WML cannot be displayed directly on a desktop web browser such as Internet Explorer or Netscape because these desktop browsers support HTML not WML. A WAP enabled cell phone or WML emulator is the best way to correctly render WML.

A WML document is called a "deck". A deck is similar to an HTML web page and is identified by a single URL (Universal Resource Locator). This means a deck shows a single screen on a cell phone. A deck consists of one or more "cards". Of the seven WAPaprs displays, all are a single deck with the exception of the B&W and color map decks. The B&W map deck is made up of three cards. Each card displays a different map resolution. The same is true for the color map deck; it also consists of three cards. Each card displays a different color map.

SOFTWARE DEVELOPMENT

I include this section for those that may be interested in the WAPaprs software development process and tools used. This will aid those wishing to develop their own cell phone application.

All WAPaprs displays use the Wireless Markup Language (WML). The language is very similar to HTML, in fact, many of the tags are identical. However, the language has been specifically created for wireless applications where bandwidth and transfer rates are critical requirements and need to be understood. As an example, while normal HTML source code is sent from a web server to a client as plain text that the user can read, WML source code is complied by a WAP gateway into a compressed binary file. The binary is more transmission efficient than sending plain text and therefore reduces airtime and substantially increases throughput.

It is possible to develop a WAP application using only a cell phone, but it is uneconomical due to the airtime required. It is also an inefficient use of development time. Fortunately, there are several options. The most popular WAP development tool is the Openwave Software Development Kit (SDK) available free of charge at: http://www.openware.com. This web site also serves as a great resource for cell phone development software and information.

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CAVEAT

Please do not use WAPaprs while driving!