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AUTOMATED PACKET RADIO BULLETIN BOARD SYSTEM

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Introduction

The SKYWARN network, consisting of volunteer Amateur Radio operators, has proven extremely beneficial to the NWS over the years. "Hams" play a vital role in the warning and verification process. One tool used by Amateur Radio operators to aid in the SKYWARN effort is packet radio. Packet radio is digital error-free communication between two or more computers using Amateur Radio. The NWSFO in Portland, Oregon has recently put into operation a fully automated Packet Bulletin Board System (PBBS) and Node (digital repeater). This system operates around the clock providing two functions. First, it allows Amateur Radio operators the ability to download selected NWS text products via packet. These include short- and long-term forecasts, marine forecasts, hourly observations, winter weather statements, river information, flood statements, and radar coded messages for viewing WSR-88D Doppler radar imagery. In addition, during severe weather, the PBBS allows Amateur Radio operators a means of sending weather spotter reports to the NWS using packet. Spotter reports are uploaded to the PBBS and are automatically routed through a local area network (LAN) to AFOS, where they alarm at the forecaster's console and can be viewed. This Technical Attachment will describe how this PBBS works, and provides guidelines for development of a similar system.

Background

Packet radio was first utilized in 1970, when the University of Hawaii used the mode to exchange data with remote sites around the islands. The FCC legalized packet radio for Amateur Radio operators in 1980, and during the second half of the decade, its popularity increased dramatically. The packet network today consists of thousands of nodes, and messages are transferred around the globe. Many nodes also act as PBBSs allowing Amateur Radio operators to upload or download files and send or receive messages.

Discussion

A. Configuration

NWSFO Portland, Oregon utilizes a personal computer (PC) based ethernet LAN for product generation. PCs are running OS/2 Warp (version 3.0) and are networked using Novell Netware (version 3.12). One of the OS/2 computers is running a program developed by Paul Flatt (NWSFO Tucson), known as AcommPM. This program allows file transfer between AFOS and the LAN through an asynchronous port. There are similar programs being utilized at other NWSFOs across Western Region. A database within the AcommPM program determines how products are distributed. PC generated products are sent to AFOS, and products from AFOS are stored on the LAN using AcommPM.

The PBBS uses software developed by Hank Oredson, Amateur Radio call sign W0RLI. The software runs under Desqview (version 2.6), developed by Quarterdeck. Desqview is a multitasking software that operates under PC or MS DOS (version 3.0 or higher). The packet system consists of the following hardware:

Compaq 386-20MHz (13 meg RAM)
Alinco DR-610 VHF/UHF Transceiver
Multicom MFJ-1270C TNC 2 Data Controller
Cushcraft AR-270B 144/440 MHZ Vertical Antenna

B. Procedure

As mentioned earlier, the PBBS provides two functions. First, it allows Amateur Radio operators access to a variety of NWS weather products. Special directories were set up on the LAN to hold copies of selected products. When a new product is issued or generated, AcommPM copies the product to selected packet directories.

There are various configuration files used by W0RLI's PBBS software. One, known as "dirs.mb", is used to create "upload" and "download" directories for files on the PBBS (see Fig. 1). Several download directories on the PBBS each point to a corresponding network path created on the LAN where products are kept. When the PBBS PC first "boots-up", it establishes a LAN connection using a special login with restricted rights to prevent users from accessing files in directories other than those set up for the PBBS. Once connected to the LAN, users can access these files through the PBBS. When a new product is created, AcommPM copies it to the specified location on the LAN, which corresponds with the PBBS download directory setup in the "dirs.mb" file. In addition, the PBBS software prevents uploading into a directory that has been designated as download only in "dirs.mb". Furthermore, W0RLI's software is designed to provide full mailbox services, in other words, storing and forwarding messages of all types. However, since these features

are not needed, they have been disabled, (refer to *.doc files with the PBBS software for further details). Any non-weather related messages received are forwarded to a designated full-service mailbox for dissemination. W0RLI's software is free to use and is available over the Internet at various addresses including the following: http://www.tapr.org

Note: WSR-88D Radar Coded Message Display software developed by Larry J. Hinson (NWSFO Tulsa) is also available from this site, file name "RCM.ZIP".

The second function of the PBBS is to allow Amateur Radio operators to send spotter reports using packet. Users either connect directly to the PBBS or through a minimal number of nodes to reach the PBBS. Once connected, they can send reports into a special directory designated as a upload only in the "dirs.mb" file (see Fig. 1). Procedures have been provided to spotters on how to send reports. Spotter reports are transmitted using a unique filename and are in the form of an AFOS work (WRK) product (see Fig. 2). Since reports are received as work products, they can be edited, if necessary, and distributed as an administrative message (ADM) or local storm report (LSR).

Incoming reports are uploaded to a local directory on the packet computer. A simple BASIC program (see Fig. 3), running on the PBBS, checks the received file to ensure it has the proper AFOS header and trailer. If the file is valid, the program copies it to the LAN with a special file name. When AcommPM sees this unique file on the LAN, it immediately sends it to AFOS. The BASIC program also copies the spotter report to an archive directory on the packet computer. It then deletes the file from the upload directory to prevent the PBBS from not accepting another report with the same file name. If the file is not in the correct format, the BASIC program copies it to a directory on the packet computer for review and deletes it from the upload directory. The BASIC program ensures that the file has the correct name and is in the proper format prior to sending it to the LAN.

Conclusion

During severe weather, phone lines quickly become saturated with incoming spotter reports. The PBBS at NWSFO Portland provides an alternative for receiving spotter reports. Since the system is fully automated, it does not require staff or outside volunteers to gather reports. For those interested in developing a similar system, here are some recommendations and guidelines: First, offices that do not have knowledge of packet radio should seek help from local Amateur Radio clubs. They usually are quite interested in assisting, and have the technical background to develop a system. They will, often times, provide the necessary hardware and software. This, in conjunction with the staff's knowledge of how their LAN system works, will allow the PBBS to be developed.

The following are guidelines to operating a PBBS **at a NWS office**, based on FCC rules. Operation of an PBBS requires a licensed Amateur Radio operator to act as the system operator (SYSOP) or control operator. This person is responsible for the operation of the PBBS, but does not have to be present (i.e., at the station) continuously. NWS employees who are licensed Amateur Radio operators should not use their call sign to operate a PBBS. Since they are paid employees of the NWS, this situation could be interpreted as being compensated to operate an Amateur Radio station, which is illegal (refer to FCC Rules and Regulations, Part 97). Also, a PBBS should not be used by the NWS to gather reports on a regular basis. The FCC realizes the NWS has other means of receiving data (e.g., phone lines and modems) and should not rely on Amateur Radio to gather data on a routine basis. However, during severe weather, when life and property may be in jeopardy, receiving spotter reports using packet is acceptable.

Security should always be a concern with such a system, since users have access to the LAN. First of all, the PBBS will only accept uploaded text or ASCII files. At this time, there are no known viruses that are contained within a text file. However, for safety, spotter reports should be uploaded to the local computer running the PBBS, and then checked using a security program (similar to the one in Fig. 3) before being copied to the LAN. The program should verify the contents of the file to ensure it has the correct AFOS header. Using a WRK product will keep the report "in house". By designating directories where NWS products are available for viewing as download only in the "dirs.mb" file, the PBBS software will prevent any upload attempts. In addition, a special login with restricted rights should be used for the PBBS to prevent writing or viewing other files or directories on the LAN. Furthermore, special directories should be created on the LAN that contain only the products meant for public viewing. Finally, a disclaimer should be mentioned on the PBBS stating that the NWS is not responsible for the timeliness of products on the PBBS, and that these products should not be altered in anyway and presented as "official NWS products". By keeping weather information solely on the PBBS and not transferring it to other PBBS's, the likelihood of third party modification and dissemination is reduced.

As a final note, the Amateur Radio community primarily consists of people whose intent is to assist the public and provide emergency communication for local, state, and federal agencies during disasters. Those who maliciously use the airwaves are often times unlicensed "pirate" operators and represent a small percentage.

NWSFO at Portland, Oregon is looking forward to utilizing their PBBS during severe weather events. We are actively providing weather spotter training to Amateur Radio clubs within our county warning area to increase the number of packet capable weather spotters. Once trained, they are provided instructions on how to send packet spotter reports. It is believed that these trained Amateur Radio spotters will utilize the PBBS to provide weather information vital for the protection of life and property.

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References

Ford, S., 1991: *The ARRL Operating Manual, Fourth Edition.* The American Radio Relay League, Chap 10.

Wolfgang et al., 1991: *The ARRL Handbook for Radio Amateurs.* The American Radio Relay League, Chap 19.

; User file areas.
AD f:\data\packet\zones Oregon and Washington Forecasts
BD f:\data\packet\obs Oregon Hourly Weather Observations
CD f:\data\packet\marine Coastal Marine Forecasts
DD f:\data\packet\weather Forecast Discussion and Weather Summary
EU c:\spotter NWS Weather Spotter Reports
FD f:\data\packet\radar NWS Doppler Radar Imagery

Fig. 1. Example of dirs.mb configuration file. "A" through "F" designate the different directories available on the PBBS. "D" indicates download only, "U" indicates upload. The path after the "D" or "U" shows where data are located (c=local drive, f=LAN drive). The information after the path are titles of each directory the user sees when connected to the PBBS.

ZCZC PDXWRKHAM PDX
TTAA00 KPDX DDHHMM
Preliminary Amateur Radio Weather Spotter Report
National Weather Service Portland Oregon
1030 am PST Feb 07 1997

Time	1000 am
Date	Feb 07
Callsign	KK6KX
Spotter Number	Lane 17
Location	Eugene, OR
Elevation	250 ft msl
Report	Received 3.24 inches of rain over the last 24 hours.

End/CH

Fig. 2. Example of a WRKHAM Amateur Radio spotter report.

```
1       CLS
2       SLEEP 10
3       ON ERROR GOTO 0
4       LOCATE 1, 1
5       PRINT " WAITING FOR A FILE " + TIME$ + "                    "
6       ON ERROR GOTO 21
7       OPEN "\SPOTTER\SPOTTER.RPT" FOR INPUT AS #1
8       DO WHILE NOT EOF (1)
9       LINE INPUT #1, HEADER1$
10      PRINT HEADER1$
11      IF LEFT$ (HEADER1$,  18) = "ZCZC PDXWRKHAM PDX" THEN 14
12      LOOP
13      GOSUB BOGUS
14      DO WHILE NOT EOF(1)
15      LINE INPUT #1,  HEADER2$
16      PRINT HEADER2$
17      IF LEFT$ (HEADER2$,  4) = "NNNN" THEN GOSUB VALID
18      LOOP
19      CLOSE
20      GOSUB BOGUS
21      RESUME 2

BOGUS:
            CLOSE
            C$ = "COPY C:\SPOTTER\SPOTTER.RPT C:\BOGUS\B" +
            LEFT$(DATE$, 2) + MID$(DATE$, 4, 2) + RIGHT$(DATE$, 1) +
            LEFT$(TIME$, 2) + "." + MID$(TIME$, 4, 2)
            SHELL C$
            KILL "C:\SPOTTER\SPOTTER.RPT
            PRINT "FILE WAS BOGUS"
            RETURN  2
VALID:
            CLOSE
            C$ = "COPY C:\SPOTTER\SPOTTER.RPT F:\DATA\AFOS\SEND.ME"
            SHELL C$
            D$ = "COPY C:\SPOTTER\SPOTTER.RPT C:\ARCHIVE\S" + LEFT$(DATE$, 2) +
            MID$(DATE$, 4, 2) + RIGHT$(DATE$, 1) + LEFT$(TIME$, 2) + "." +
            MID$(TIME$, 4, 2)
            SHELL D$
            KILL "C:\SPOTTER\SPOTTER.RPT"
            PRINT "FILE WAS VALID"
            RETURN 2
```

Fig. 3. An example of a simple BASIC program to check incoming spotter reports. Lines 8-17 check for a valid AFOS header and trailer. If the file does not contain the proper header, the BOGUS subroutine copies it to specified directory on the PBBS PC and deletes it from the upload directory. If the file is valid, the VALID subroutine copies it to the LAN and also to an archive directory on the PBBS PC before deleting it from the upload directory.