THE FREQUENCY AGILE MESSAGE SYSTEM (FAMS)

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Abstract

With the increasing traffic appearing on local two meter packet radio channels, computer packet radio message systems appear to the casual conversationalist typer as channel hogs. The message systems interfere in two modes. First, a typer user connects with it and downloads large packets of file data, help messages, directory etc. Second, a semi-automatic store and forward mode is invdked periodically to forward messages further up the network to other messages systems. The service these message systems provide more than justifies their existence, so the answer is not to ban them. A new method might alleviate the interference and retain their useful features. This method involves frequency agility, the ability to switch frequencies on command, to pass traffic.

Introduction

In the coming year, 9600 baud packet radio backbone network traffic passing on 220 MHz will remove the message computer interlinking from the main local area channel. This will alleviate interference only slightly. The casual typer will still want to read the bulletin board output and thus cause heavy contention for other typer-to-typer conversations. The basic concept is then that the casual typer, upon connecting to one of these message systems, commands the system to switch frequency to work with the typer. The message system automatically returns to the local area calling channel upon disconnect or timeout for lack of typer user activity.

The Basic System

The Xerox 820 has proved itself to be a valuable addition to the packet radio inventory. A small hardware addition (see AMRAD Newsletter, Nov/Dec 84) allows packets to be sent and received from the onboard SIO. Using software developed by Phil Karn, KA9Q, it serves as a Terminal Node Controller (TNC) and digipeater. Using software developed by Jon Bloom, KE3Z, it serves as a two port digipeater, a novel device linking two packet channels. Various amateurs have written good message system software, the most famous includes interlinking provisions for middle of the night transfers between systems. Software and hardware have been developed to change the frequency of a two meter transceiver using the Xerox 820 user PIO parallel port (see Amrad Newsletter, February 85). A marriage of some of this software would allow a frequency agile message system which would help alleviate congestion on the local area two meter packet channel.

Concept of Operation

Picture the scenario in which packet radio user David wishes to communicate with user Howard. Using standard packet techniques a connection with user Howard is requested on the local 145.01 MHz two meter local area frequency. Howard is working late and thus does not answer David's SABM frames which fall on the ground unserviced. David is not thwarted however. He connects with Tom's message system, intending to leave a message for Howard to be read later. Instead of the usual carriage return from David producing the torrent of characters from Tom's message system, the system requests David to indicate the desired frequency of operation. The frequency is entered by David and Tom's message system shifts frequency there to pass and receive traffic from David. David then commands the message system to switch frequency to 145.03, one of the coordinated alternate packet frequencies in David's area. The message system changes to the new frequency and so does David. When David is done using Tom's system, he disconnects and the system reverts to the local area frequency 145.01 to await the next user. Old NTS users will recognize this classic scheme where a user checks into the net on net frequency and moves off frequency to pass traffic, returning when finished. Congestion on the local area typer-to-typer frequency is thus reduced.

Hardware Required

To put this concept into operation requires the following hardware:

(2) Xerox 820 Computer Boards.
(2) 5 1/4 inch Floppy Disk Drives (one each board)
(2) Power supplies
(2) Keyboards
(2) CRT Monitors
(1) Packet Interface Board (State Machine)
(1) Frequency Control Interface Board (optional)
(1) ICOM IC-2AT Transceiver modified
(1) Bell Standard 202 Modem and ICOM interface: (600 ohm transformer, resistor and transistor)

The packet interface board contains a state machine (prom and latch) for receiveing NRZI encoded frames and recovering clock as well as a divider and flip flop for transmitting NRZI encoded data. It is completly described in the referenced article. The cost of this device is about $15 and several have been built in the Washington area. A printed circuit board is planned and may be available in the future from Tom Clark, W3IWI.

The frequency control interface board is optional as all that is really required is to add a socket to the ICOM IC-2AT and a cable to the Xerox 820 acting as the TNC. The board contains a frequency display which shows the new frequency selected by the computer.

The interconnection of this hardware is as follows: The packet interface board is connected between the modem and the Xerox 820 TNC SIO port A; The frequency control interface board (or just a cable) is connected between the Xerox 820 TNC user PIO port and the ICOM IC-2AT; A serial cable connects Xerox 820 TNC SIO port B and the Xerox 820 Message System SIO port A; One power supply and one floppy disk drive is provided for each Xerox and each has a CRT and keyboard.

Software Required

The FAMS requires each Xerox run the CP/M disk operating system. AMRAD modified Phil Karn TNC code runs in the *Xerox 820* TNC. Any message system software you desire runs in the Xerox 820 Message System computer. The modifications to Phil Karns code allow command of the PIO port and setting of the ICOM frequency. In addition, Port B software of the Xerox TNC has been modified to allow terminal operations and this connects to the Xerox820 Message System computer when a packet connection is achieved on Port A.

Complete Further Details

Articles and software mentioned in this paper are obtainable from AMRAD, P.O. Drawer 6148, McLean, VA USA 22106-6148. Requests for software should be accompanied by two 5 1/4 inch floppy disks or one 8 inch floppy. Each month, AMRAD publishes a newsletter containing information on packet radio topics and other amateur radio technical pursuits, such as spread spectrum digital speech and deaf communication. Contact the above address for details on membership and newsletter.