SAREX2 SOFTWARE FUR THE TUCSON AMATEUR PACKET RADIO TERMINAL NUDE CONTROLLER TNC 2

Howard Goldstein, N2WX
681 Cardinal Street SE
Palm Bay, Florida 32907-4116

Abstract

The custom modifications of the Tucson Amateur Packet Radio TNC 2 software for the Shuttle Amateur Radio Experiment 2 (SAREX2), and the associated operating modes (robot, meta beacon, logging functions) are discussed.

Background

When Tom Clark W3IWI, president of the Amateur Satellite Corporation, told me of the possiblity of a "Ham in Space" experiment involving packet radio and then held out the opportunity to make use of the TNC 2, I jumped at the opportunity to get involved. We spoke an the phone a few times and arrived at some basic specifications for minimal functionality. Towards the end of the next month (November 1985) I finally had a version suitable for release and simultaneously placed it on the air in Florida and forwarded a copy to the president of the Tucson Amateur Packet Radio Corporation (TAPR) Lyle Johnson WA7GXD, the man responsible fur getting flight-ready hardware together,

Special Operating Modes

ROBOT Mode

Since it was most unlikely that the astronaut ham would be able to devote his or her entire time ta working amateurs, one specification called for an unattended QSO machine, comparable perhaps with the ROBOT mode that was MI some of the Soviet RS satellites. Such a feature would maximize the potential number of amateurs who could make a confirmable, two way contacts with the vehicle,

The package permits up to nine automated contacts to take place simultaneously using AX.25 link layer (version 2.0 or earlier versions). Upon hearing a request to connect from a ground station, the ROBOT assigns a QSO number, and builds a packet which contains the hexadecimal serial number concatenated with a brief, astronaut-settable message. The ROBOT acknowledges the connect request and proceeds to send this packet ten times, or until it correctly receives an acknowledgment frame from the station connecting.

The pint at which the acknowledgement for the serial number and message are received is the point at which the contact is considered a valid two way and logged appropriately. Then the ROBOT will enter the disconnect-attempt state with the calling station, but success or failure on getting the disconnect acknowledgement is not significant to the two way logging function,

Logging

Part of the specification also made it clear that the local terminal (i.e. the one on the shuttle) would not be available for logging the contacts and "heard" data, In this case how on earth (pun intended) can the ground crew ever reconcile claimed contacts with what really happened? How could the lagging data be recovered? At this point it was decided to have the TNC transmit two special kind5 of frames every three minute5 that the ground stations could collect and forward to a central paint for the reconciliation.

One kind of lugging frame is of the format "WA4SIR>WORKED". The information field of this frame contains the last seventeen unique callsigns worked and their associated serial numbers,

The other logging frame, "WA4SIR>HEARD" is similar to the ">WORKED" frame except there is a serial number associated with each distinct transmission of the ">HEARD" frame, and of course there are no contact serial number5 appended to callsigns since only the fact that the station was heard from orbit is significant.

The log types are similar in the respect that a callsign worked or heard that is already logged will not cause a re-ordering of log, This "no update unless needed" philosophy should ease the data reduction chores of those who will be processing the hundreds or thousands of log frames the flight TNC will generate.

Meta Beacons

As the name implies, "Meta" beacon mode provide5 a way for the astronaut to downlink relatively large amounts - 1,792 characters - of information at regular intervals for the packet community at large. Once set up "Meta" beacon mode will continue to retransmit the data indefinitely.

This customization was the simplest, requiring only that a dummy link with the callsign WORLD be recognized internally as one that will always transmit packetized data yet ignore any retry counters (or received frames from WURLD for that matter), Meeting specifications should always be this easy!

Conclusion

Despite popular belief, it IS possible to balance the interests of the programmer (who wants to minimize complexity) with the interest5 of the user (i.e. maximize performance). A thorough specification of objectives goes a long way towards insuring the software delivered does what it was assumed it would be capable of, And a specification developed jointly between programmer and requestor is one usually capable of being met by the desired delivery date,