GENSO – A Ground Station is a Terrible Thing to Waste

by Craig Kief, KE5VSH, craig.kief@cosmiac.org

The average AMSAT ground station operator uses his or her equipment a limited number of hours each day. Once their spouses yell at them they power down and go become part of the family again. We would ask instead that you consider leaving that equipment on and join a rapidly growing community working on GENSO. The Global Educational Network for Satellite Operations (GENSO) system is a software networking standard which allows a user to communicate with a spacecraft by using a remote ground station which has a clear view of the spacecraft. Communications between the client computer (a mission control computer) and the ground station server (your groundstation computer) are conducted across the Internet.

There are three major components to the GENSO system

- GSS – The Ground Station Server is the ground station like mine here in Albuquerque. During the days I often do research and other "fun" things with my ham equipment. When I get ready to go home for the evening, I switch on GENSO. Until I come in the next day, my ground station is actively working tracking low earth orbit satellites and downloading AX.25 packets.

- MCC – The Mission Control Client is the control station for a satellite. Each satellite will have one MCC. A GSS will see a snapshot of the satellite but only MCC will have the entire picture.

- AUS – The Authentication Server is the server that mediates communication between MCCs and GSSs on the GENSO network. When a ground station wants to join the network, the AUS permits them and then assigns them bookings to accomplish. The current AUS is located in Vigo, Spain and the backup is at Cal Poly: San Luis Obispo.

One of the major factors driving programs such as GENSO is something called a CubeSat. These small satellites are about the size of a standard coffee cup box. NASA has recently announced that under their Educational Launch of Nanosatellites (ELaNa) program that they will be launching more than 20 of these educational satellites in the next two years. These satellites often operate in the UHF and VHF bands. Many of these satellites are often placed in very low orbits (<340 Km) with mission lives of less than six months. For these, the average ground station can see a satellite for 10-20 minutes, 4-5 times a day. Many of these satellites are almost constantly transmitting health and status information via AX.25 packets.

My ground station is representative of a typical GSS. There are also three main components that the GENSO system remotely controls:
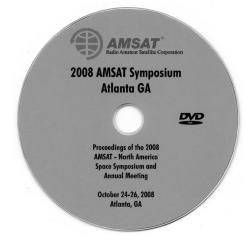
- Rotator Controller – I have my 2 meter and 70 centimeter antennas being controlled via a Yaesu GS-232B controller.

- TNC – I use a Kantronics KPC3+ to modulate and demodulate my AX.25 packets.

- Radio Controller – I use a CT-17 to remotely control my ICOM IC-910 radio.

To run these three devices, I connect them with serial cable to my 4-year old Windows PC. The GENSO software is written in Java. GENSO was developed and is currently maintained under the auspices of the European Space Agency. GENSO is currently running under release RIE. Version R2 should become available in 2011.

The critical need right now for GENSO is for ground stations and developers. The beauty of GENSO is that any hardware can be utilized to perform the three functions listed above. The downside is that there are very few drivers currently developed. If your ground station looks like mine, we could bring you into the GENSO family very quickly. As an educational institution (University of New Mexico) that is building a CubeSat to launch later this year, I can tell you that you would have the undying gratitude of all of us small satellite folks.

If your ground station isn't configured like mine, that is still interesting. In that case we would like to talk to you about developing Java drivers for the equipment you have so that we can continue to grow the GENSO library of available modules.

If you would like more information about GENSO please consider attending the August CubeSat workshops (www.cubesat.org) or contact Craig Kief at craig.kief@cosmiac.org or Connor Lange at rclange@calpoly.edu. ⊕