Application Note

Uploading Almanac and Ephemeris Data to the CLAW, RSR Transcoder and Micro Transcoder Revision 1.1

Uploading of almanac and ephemeris data to the CLAW GPS Simulator™, RSR Transcoder™ and Micro Transcoder™ allows simulation of current or past GPS constellations. Simulation of current or past GPS constellations is useful for duplicating conditions seen during an event or when simulating or transcoding to a target receiver with stored ephemeris or almanac from live sky signals.

VIAVI provides the simnav command line utility that installs with the SimCon program files folder that allows uploading of RINEX ephemeris data to the unit. This command line utility converts the RINEX ephemeris data to the format required in the SIMulation:LNAV... commands described below.

The following command is used to provide ephemeris data:

SIMulation:LNAV:EPHemeris <prn> <subframe> <word> <data> for up to 32 satellite PRN numbers.

Similarly, ionospheric correction data is provided with the following command:

SIMulation:LNAV:IONosphere <subframe> <word> <data>

All the required words in a subframe must be received together since the entire subframe is assembled in volatile memory. To store the completed subframe in non-volatile memory for use in the simulation enter the SIM:LNAV:WRITE command.

To use the simnav command line utility, first download a RINEX navigation file. NASA currently maintains an archive of RINEX navigation files including recent files that are available on their website:

cddis.nasa.gov/archive/gnss/data/daily/

Login and registration are required to access the site.

The folder and filename using the following naming convention:

YYYY/DDD/YYn/brdcDDD0.YYn.gz

where

YYYY is the 4-digit year,
DDD is the current day of the year, and
YY is the 2-digit year

The CLAW GPS Simulator, RSR Transcoder and Micro Transcoder can extrapolate the provided ephemeris set to create a valid ephemeris set for the simulation epoch, but to duplicate the constellation as accurately as possible, it is best to use a RINEX navigation file with the same day as being simulated. The RINEX navigation file is in a .gz compressed format that can be extracted in Windows with WinZip, WinRAR or other compression programs. The file locations and availability of the NASA RINEX archive are current as the release of this document but are subject to change.

Next, copy the extracted brdcDDD0.YYn file to the SimCon installation folder (C:\Program Files\Jackson Labs\SimCon by default). Open a Command Prompt window and change directory to the SimCon installation folder. At the command prompt, enter "simnav" without any command line options to see a full list of available options.

Make sure that SimCon and other programs are disconnected from the CLAW GPS Simulator's USB COM port. To upload the RINEX file that was downloaded, enter the following:

simnav /port:COMX /eph:brdcDDD0.YYn /epoch:eph

where X is the COM port number, and DDD and YY are defined above.

The simnav utility will display the commands being sent and provide status of the transfer. When the transfer is complete, connect to the simulator's COM port in SimCon and send the "SIM:LNAV:SEL USER" command to select the ephemeris data that was just uploaded and stored. The ephemeris data is stored in non-volatile memory and will still be available after a reset or power cycle. Please note that any running simulation should be restarted for change in constellation data to take effect immediately. Also the target receiver may require a power cycle or cold start reset when the simulated constellation is changed.