How to Get Usable Data from a TLE

When your application receives its location information from the Station Support Computer (SSC), it can come in in either State Vector or TLE format. Both of these formats will require a conversion into a different format so the data can be more readily used by your program. In order to get the location data from the Two Line Element (TLE) Format into usable data (Latitude, Longitude, Altitude), a conversion process has to take place. There are several applications already within programming software that can be used to convert a TLE into usable data, or you can attempt to code the converter by hand.

An example of software you can use to accomplish this is Pyephem, a Python library that can be used to convert TLEs into Latitude and Longitude coordinates. This process needs to be conducted immediately after the application receives the data in a TLE format from the SSC via a TCP/IP connection. This way, the information will be in the appropriate format before your application begins to plot coordinate data. The below link explores the math behind getting a TLE into LLA format, but doesn’t cover much in regards to the actual programming of the code.

<http://web.mit.edu/2.14/www/Handouts/StateSpace.pdf>

An additional example that goes further into the conversion process of a TLE into LLA format is the below link. This converter will more than likely not display the code in your respective programming language, but it should be able to be converted into the language you feel most comfortable programming in.

<http://www.stltracker.com/resources/equations>

It would be beneficial for your program for you to conduct research into the different applications available for conducting this conversion process. As different ones are available for different languages, we cannot provide a universal converter.

Should you be unable to find a converter that will work with your language, there is the possibility of writing your own converter by hand. In order to do this, we recommend that you explore further how to convert a TLE to LLA format, and then attempt to code this relation yourselves.

We are open to alternate ideas as to how to get the proper location information into the correct format, but regardless, the information needs to eventually end up in LLA format before your application plots position coordinates. This way, we can guarantee the coordinates are in relation to Earth’s orbital rotation.

If you have any questions regarding the ISS Location App, please feel free to contact [john.l.sammons@nasa.gov](mailto:john.l.sammons@nasa.gov) for further assistance.