Sharing Space Situational Awareness Information

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PURPOSE:

It is my aim to pick up the discussion where my predecessor, Edward Fienga, left it in his remarks, paper 3.1, and delve into further detail.

BACKGROUND:

Edward Fienga mentioned the review of the conjunction assessment process that USSTRATCOM undertook following the Iridium-COSMOS collision early last year. As he said, the immediate changes were to our internal processes, the acquisition of additional computational capability, and increase of the personnel. In the latter half of 2009, Congress passed legislation allowing USSTRATCOM, in essence, to provide SSA services and information to, and to obtain SSA data and information from, non-US government entities, or as we refer to them, mission partners. There are two restrictions on sharing SSA information; first, the mission partner must agree in writing to pay an amount that may be charged and secondly, they must agree not to transfer any data or technical information to a third party without approval. Once an agreement is signed, the mission partner and the JSpOC can start working together. We currently have 16 mission partners who pre-coordinate routine maneuvers and have defined when they wish to be notified of a pending close approach with another space object.

CURRENT OPERATIONS:

But since space flight safety is in everyone’s interest, we have established criteria for notifying satellite owner/operators with whom we have not signed an agreement. Anytime a payload above low-Earth orbit is predicted to approach within 5 km of another space object within the next 72 hrs, we will attempt to contact the owner/operator. When a payload in low-Earth orbit is predicted to approach within 1 km overall and within 200 m in the radial direction within the next 72 hrs, we will also attempt to contact the owner/operator. There are approximately 1,100 active satellites on orbit. In January of last year, the Joint Space Operations Center, or JSpOC, was only screening < 200 payloads, considered to be the highest priority for conjunctions, none of which were commercial or foreign satellites. Today, due to enhancements in the computational capabilities and improved internal processes, the JSpOC screens all active satellites using its most accurate data, known as special perturbation, or SP, and notifies the owner/operators with basic orbital data on the
pending conjunction, to include common name, time of closest approach, overall miss
distance and the component miss distances, as well as the error in the radial direction.
However, we realize that that information alone is not enough to confidently decide
whether to maneuver a satellite or how much of a maneuver to conduct. By the end of
next month, we hope to be sharing Conjunction Summary Messages with all
owner/operators whose satellites have met the JSpOC’s close approach criteria.
These messages are a fixed-format ASCII formatted message containing the position and
velocities of both conjuncting objects and the covariance matrices computed from the
position and velocity vectors. These messages will be posted on an encrypted area of the
spacetrack.org website. Mission partners may choose to write a script to automate the
retrieval process for their CSMs.

FUTURE OPERATIONS:

Although the JSpOC uses its best data to calculate whether two objects are approaching
too closely or not, if those particular objects have not been tracked recently, maybe due to
weather or maintenance at a sensor, the position may be off by a bit. One way to improve
the accuracy of the positions of the objects is to collect observations for other sensors. In
fact, most satellite owner/operators have highly accurate positional data on their own
satellites and are willing to make it available. Unfortunately, the computer system used
by the JSpOC was not designed to handle external data. However, over the past couple
years, technology has improved to such a point that it is now conceivable for us to accept
external data within the next year or so.
Another improvement to our conjunction assessment process is to investigate the
screening criteria, (5 km for MEO and above and 1 km/200m for LEO). NASA’s
Goddard Space Flight Center has recently begun performing analysis to determine what
screening criteria would be appropriate to more accurately identify high probability
conjunctions. The results are expected this summer.
The Air Force recently reaffirmed its commitment to replace the antiquated hardware
known as the SPADOC currently in use at the JSpOC, with the acquisition of the JSpOC
Mission System, or JMS. With the incremental delivery schedule, we will start seeing
infrastructure improvements in the next six months. Over the next five years, we expect
to make orbital information available to others net-centrically by implementing a service-
oriented architecture at the JSpOC.

WRAP-UP:

Thank you for the opportunity to share about the progress USSTRATCOM has
made over the last 18 months and how we intend to improve in the next couple years.
We look forward to taking part in further discussions and taking advantage of
collaborative opportunities that will result in preservation of the space domain for all.