

# Inclined Orbit Tracking

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## **I Introduction**

Established in 1997, C-COM Satellite Systems Inc. is a leader in the development and deployment of mobile satellite-based technology for the delivery of 2-way high-speed communication services into vehicles or other mobile structures as well as a leading service provider of reliable 2-way high-speed broadband satellite based Internet services. C-COM designs, develops and manufactures proprietary mobile self-pointing (iNetVu™) antenna systems, intelligent 'One-Button' controllers and accessories that allow the delivery of high-speed communication services into mobile environments, while stationary; virtually anywhere one can drive. The iNetVu™ antenna system can be activated with the simple push of a button or with the click of mouse. Once activated, it deploys automatically in a few minutes, locks on to the selected satellite and delivers broadband Internet access, VoIP and Video services.

C-COM's product development team utilizes in-house expertise in electronics and software to bring the latest industry features to its iNetVu™ controller technology. Field feedback and specific requests can be rapidly developed into working customer solutions. This customization makes the iNetVu™ family of advanced mobile antenna systems the number one choice in thousands of global applications.

There are more than 2,200 iNetVu™ products deployed across the globe and are considered indispensable to many of our customers who rely on this product to deliver essential connectivity.

iNetVu™ is a registered trademark of C-COM Satellite Systems Inc.

## **II Problem Statement**

Over time, all satellites reach a point in their life where the fuel used to keep a satellite in geo-stationary orbit is exhausted and as such the satellite begins to 'wander' in its orbit. These types of satellites are called Inclined Orbit satellites and due to the fact that they are no longer in a fixed orbit location, they become unusable by standard fixed antennas. Consequently the bandwidth available from these satellites is priced below average market value and can offer a competitive advantage to service providers.

In an effort to extend the life of these satellites, motorized antenna solutions exist that allow tracking of the satellite along its wandering path. This ability to track

Inclined Orbit Satellites provides a stable connection and a cost-effective satellite service.

### **III Previous Options**

There have been a number of solutions devised to have fixed antennas track Inclined Orbit satellites, but few mobile antenna systems have offered a workable solution to accomplish this effectively.

### **IV The C-COM Solution**

The C-COM engineering team has developed a proprietary algorithm that allows the iNetVu™ antennas to track inclined orbit satellites. This algorithm, in conjunction with one of the four methods below used by C-COM to locate the satellite, makes it possible for the iNetVu™ mobile antenna system to effectively use an inclined orbit satellite for connectivity.

#### ***IV.I Search Method using DVB***

In this search method a correctly polarized DVB signal is chosen and used as the signal that verifies the correct satellite. This DVB can be any DVB signal on the same satellite. A good choice is a TV station that broadcasts 24 hours per day, 7 days per week.

#### ***IV.II Search Method using RF***

In this search method a modem that is directly supported by the iNetVu™ controller is used for verification of the correct satellite. This method operates by looking for a signal sent from a satellite and then asking the modem to verify if that exact frequency is found. This frequency is the operation frequency for that particular modem and client.

#### ***IV.III Search Method using Reference Satellite***

In this search method there is no DVB signal available on the target satellite. In this case a DVB signal is used from an adjoining satellite to locate and verify the position. Once it has been confirmed that this satellite is the correct reference satellite, the platform automatically moves a controlled number of degrees in azimuth, elevation and polarization to the target satellite. The target satellite is then verified by the modem and the Controller can then peak on that signal.

#### ***IV.IV Search Method using Beacon***

In this search method an iNetVu™ BR300L Beacon Receiver is employed to verify that the satellite located is in fact the target satellite. This feature can be used in situations where there is no DVB, no direct modem interface and no reliable reference satellite.

The BR300L can be programmed through the iNetVu™ 7000 controller to any available frequency and can then positively identify the appropriate satellite.

### **V Implementation**

The C-COM inclined orbit algorithm uses the received signal to track the satellites movements. By making very small angular adjustments when certain receive signal conditions occur, the antenna is able to track the satellite at all times. In this methodology, there is no loss of communication with the satellite while the tracking antenna operates.

### **VI Summary**

The C-COM inclined orbit solution will offer resellers a cost effective and reliable communication option over these near end-of-life satellites.