Solar – Satellite Interference

By Brian B Donaldson

Twice a year due the inclination of the earth and its orbital position with the sun causes our local star to appear to cross the equator. For 2010, this happened on March 20th at 5:32 pm and September 23rd at 3:09 am (both time UTC). Twice a year the sun appears to move from one hemisphere and then back to the other. Twice a year during this crossing of the equator the sun travels along the portion of the sky where communication satellites are observed from one's own latitude. And twice a year, the sun causes interference to one's reception of those satellite signals.

This paper is a discussion of why this happens, the Solar – Satellite Interference. Is there a remedy, a solution to this phenomenon? We will look at what is happening and when this occurs during the year. The target audience for this paper is any user of Direct to Home satellite systems, and larger users of communication satellites.

What is happening?

During our life time, we have witnessed events of the Sun, the Moon, and the Earth. These events are called eclipses. They are predictable and one can find information on when the next eclipse will occur. The types of eclipse we see are when the Moon comes between the Sun and the Earth. That is called a Lunar Eclipse. As the Moon moves in front of the sun a shadow is casted somewhere on the surface of the Earth.

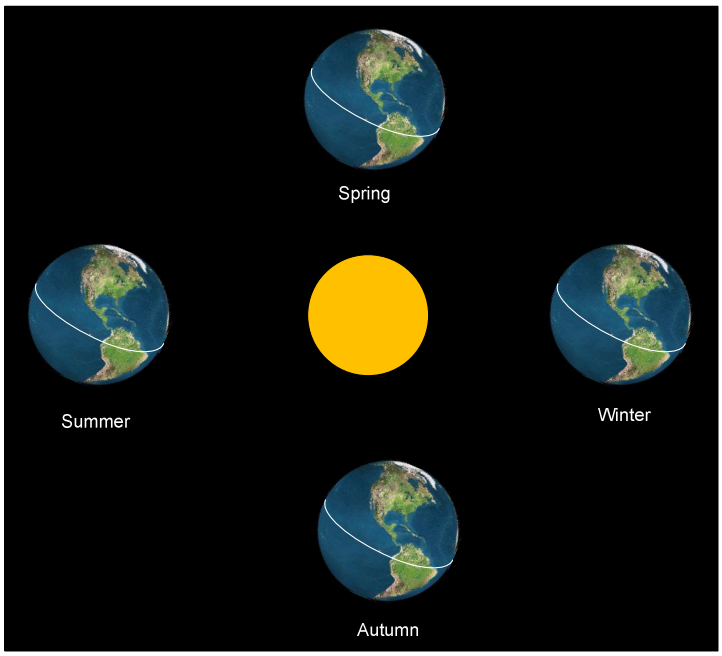
The other type of eclipse is a Solar Eclipse, where the Earth moves between the Sun and the Moon. The results we see, depending on where we are on the earth, will be the shadow of the Earth on the surface of the Moon.

During a Solar – Satellite eclipse, incorrectly referred to as a Solar Conjunction, the sun will move directly behind the satellite. This alignment of sun and satellite causes interference with the satellite receiver. During this time one may experience complete loss of communications such as satellite television reception or even internet via satellite access. The outage will usually last just a few minutes. You as the user of the system should do nothing and just let the event take its course.

Why this happens

The earth is tilted on an access of 23.45 degrees. As the earth orbits the sun, the tilt never changes. This why we have four seasons. When we are enjoy a nice summer here in the US, the northern hemisphere is leaning toward the sun. But in six months, it will be out turn to have to turn on the heaters. By this time, the earth would have moved to the other side of the sun thus exposing the southern hemisphere to the warm sun.

There are two times during the year that the sun crosses the equator. When this happens, we move into spring and autumn. These are known as the Equinox and the day is divided into equal parts of light and darkness. These happen in March and September. During winter and summer we have the Solstice which in summer has the longest daylight, usually around June 21st, and in winter December 21st, the shortest day of the year. In the southern hemisphere the dates are reversed with the shortest being June 21st and the longest December 21st.



The Interference

The sun is a source of immense energy. We are just now beginning to harness the power of the sun to provide clean energy on earth. But the sun is also a source of destructive energy. It can produce violent storms and emit massive waves of radiation that could very well end life as we know it. However, this energy spans the entire spectrum of sound, light, and beyond.

During the solar – satellite transition period, the sun moves behind the satellite. When this happens, all that energy strikes the face of the satellite dish. The satellite receiver sees this energy as broadband noise. As the sun moves, the noise changes in strength from weak to strong to weak again. This happens for about five or six days depending on the size of your satellite dish. The signals coming off the satellite are always present but the noise produced by the sun literally covers those signals.

Small dishes such as satellite TV dishes are the most susceptible to this interference. As the dish become larger, the noise becomes weaker. This is due to the dish's beamwidth. That is how much of the sky the dish can "see". That could be 1.9^{o} for a small TV dish to $.06^{o}$ for a satellite dish that is 30m in size. For 1.9^{o} that is a lot of sky to be looking at.

Isn't this really a Solar Conjunction?

For some unknown reason, this transition has been called a solar conjunction. This is not the correct term to use. The definition of a solar conjunction is when the sun moves between the earth and another celestial object. In astronomy, when the sun is between the earth and Jupiter, it is known as a Superior Conjunction with Jupiter. When a planet such as Venus or Mercury moves between the earth and the sun, this is called an Inferior Conjunction with which ever planet. If the term solar conjunction were true in this regard, then the sun would move between the earth and the satellite. Highly not recommended, besides, the sun is 870,000 miles in diameter and the satellite is a mere 27,000 miles away.

Conclusion

There is not much one can do during the solar – satellite interference period but just sit it out and wait. If one has an auto tracking system on their antenna, it is advisable to turn it off during this period. Since the sun is a very strong source of energy, the tracking system may think this is a signal to track and will follow the sun.

Enjoy your satellite experience but just be aware that twice a year the system will not be available for a very short period of time.

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