

Satellite Communication: A Review

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Abstract— Satellite communication is the applications of satellite technology in the field of communication systems. This paper provides a brief non-technical description about the satellite communication systems. Various types of satellites, the need to implement the satellite communication has been also described. This paper also discusses about the no of satellite required and their heights. This paper also contains the effect of time delay on satellite communication system. This paper also shed light on the future of satellite communication system and type of equipments used in satellite communication system. In this paper ground, station aerial design and low noise receiver techniques are also mentioned.

Keywords: Satellite, Communication, Orbit, Noise, Time delay

I. INTRODUCTION

Communication in simple terms is the process of sharing or exchanging information, ideas, or feelings. There are various means through which we communicate with each other. Now the interesting question is that are satellites needed for communication? The answer is no. We can perform communication process through various means like cables, wireless networks etc.

Satellite Communication is the use of satellite technology to carry out communication process. We can perform different types of communications by the use of satellite communication like voice and video calling, internet, fax, television and radio channels as well. It has the advantage of spanning the communication capabilities over longer distances and it can be operated under the conditions where other forms of communication are nor operational.

II. PASSIVE & ACTIVE SATELLITES

The Echo-I is the first artificial passive satellite, which was launched on 12th August 1960. It was a 100 ft in diameter like a balloon. Many Experiments were carried out through it, and all the results were quite successful. It still exists in the orbit but its shape has become distorted and hence its efficiency has been reduced. The big disadvantage of the passive satellites is that the power transmitted from the earth to the satellite is reflected back.

Active Satellites, on the other hand uses amplifiers which makes it efficient for various applications.

III. ORBITS

An orbit is defined as the repeating and regular path of an object in space. Orbits come different shapes. Satellites for communication can be launched in two different orbits. The first one is circular or elliptic. There are lot of opinions which enhances the use of circular equatorial orbit because it offers various advantages for worldwide satellite communication system. Talking about the effect of orbits on

the height and the number of satellites required. In order to cover more area, the height of a satellite should be very high. The higher the satellites are orbiting, more will be the area coverage and fewer will be required. Also, higher heights have advantage that it reduces the orbital periods of satellites and thus, satellites are available for longer periods. It has been observed that the height of a circular satellite is 22,300 miles, travelling in the same direction as earth. As mentioned that higher the satellites fewer are required. However, the launching cost of increases rapidly.

IV. TIME-DELAY EFFECT

Following is the process which describes the effect of Time delay. Let us consider that there are two points of communication on the earth say A and B. Suppose A is talking to B; When A stops the talking, he expects the reply from B. However, owing to the time delay A does not hear B until half of second. Now A impatiently begins to talk again, and he hears the reply from B. B again hears the A second time. This “double-talk” is extremely annoying and can last for several seconds.

V. CONTINUITY

Another interesting factor which is also responsible for the number of satellites required is the need of continuity in the process of communication. As a satellite moves down to the horizon, there should be another in order to switch the circuit for maintaining the continuity. Keeping this in mind, we can determine the minimum number of satellites required which can be evenly and neatly spaced around the orbit. By this it is supposed that the regular spacing also termed as “Station Keeping” can be achieved. This process is very complicated and costs much amount of money. Hence there we are having choice of launching more low-level satellites with fairly low launching cost or few high level satellites costing launching money plus the cost of station keeping.

By keeping the stations, ground station arrangements can simplified. The ultimate development is probably the synchronous station keeping satellite in order to take the world coverage.

The need for switching may affect the data transmission more than any other form of communication. Since there are different path lengths for different satellites needed for switching and thus the transmission times are unlikely to be equal. However, if the time of switching is known in advance, then the communication can be stopped for very shorter periods of time during communication and can be more effective.

VI. RECEIVERS & AERIALS

Luckily in satellite systems, we are having low noise at receiver end, and it is very essential for ground stations

having large bandwidths, such as television etc and also amplifiers can be used.

With such low noise receivers, the noise picked up by the Aerials become very important. Some of this originates from outer space termed as "Cosmic Noise", and some originates in the earth's atmosphere and the earth itself. When the aerial is pointed straight up, the noise picked up is less. Cosmic noise decreases as the operating frequency is increased and atmospheric absorption increases with frequency; the optimum frequency is ranging from about 2000 Mc/s to 10,000 Mc/s.

The amount of noise picked up depends largely on the aerial design. Various efforts have been made to improve the aerial system and the most spectacular design is one developed at Bell Telephone Laboratories. This design is a horn reflector and was used for echo experiments. It is very advantageous over orthodox aerials.

VII. THE FUTURE

Now, the question is what is future? It is expected that more system will be designed in order to launch the Echo type balloons i.e. these are slightly larger and 24 hour satellite is being prepared. There is also the small of economies. The uncertainties of satellite launching and reliability are such that it is difficult to make sound cost system of satellites. They will be very expensive.

VIII. CONCLUSION

Satellite Communication is very advantageous over classical methods of transmission of information. It can be concluded that in order to use minimum number of satellites for communication purposes, we need maximum coverage. This is possible by launching the satellites at relatively higher heights. However it is very expensive but provides lot of advantages.

IX. REVIEW

Satellite Communication is the use of satellite technology to carry out communication process. We can perform different types of communications by the use of satellite communication like voice and video calling, internet, fax, television and radio channels as well. In order to make the use of satellites in communication effectively, it should be launched at maximum height. This provides maximum coverage. Also circular orbits provide more advantages over other type of orbits in the process of communication.

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