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# Application of Futuristic Satellite Communication and Advancement

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**ABSTRACT:** A Satellite is physical object that rotates about some celestial body. Satellite occurs in nature and owns our whole solar system. Artificial Satellites are launched and orbited for verity of purposes; the most common application is communication in which the satellite is used as repeater. Satellite communication is well-being in global communication system. If communication takes place between some two bodies over a satellite then it is known as satellite communication. In this communication, electromagnetic waves as carriers signal. In this signal carries information such as voice, video or any other data between surface of earth and orbit. Though it has wide range of Applications, after making certain range of modern satellite, the futuristic view of uses of satellite communication can be modified which involve ocean resources searching, Mining, which can further used for knowing our heritage also time saving. Modern Satellite networks results in more manageable network performance.

**KEYWORDS:** Thrusters, TWTAs, Networking, system aspects ,TDMA

## I. INTRODUCTION

We know that Communication states to the altercation of information among two or more entities, through any medium or channel. In other words, it is nothing but generating signals transmitting, processing and receiving of information satellite is a smaller object that revolves around a larger object in space. For instance, moon is a natural satellite of earth. The world's first non-natural satellite named, Sputnik 1 had propelled by Soviet Union in 1957. India also launched the artificial satellite named, Aryabhata nearly after 18 years of first in 1975. If the communication takes place between any two earth stations through a satellite, then it is called as satellite communication. Television and Mobile communications are entrance to high bandwidth Internet data. Industry is implanting new technology into satellites at prompt pace. Recent examples includes on board processing and switching, more efficient solar cell, higher power components, more efficient heat dissipation techniques, electric-based station keeping thrusters, inter satellite links, large antennas, phased array antennas, antennas with several plug beams and enhanced TWTAs.

Following figure represents the mechanism of Internet Service provided using Satellite Communication. Satellite communication elements generally divided into two types is earth segment and space segment:



Figure 1 : Satellite Communication[1]

**Space segment:-**

In space segment it has a some major sub system like TTC system. Transponder, fuel tank called thrusters tank, control system and antenna system. Satellite role is to trans-pond to received signal in other form of signal to be transmitted to the ground station.

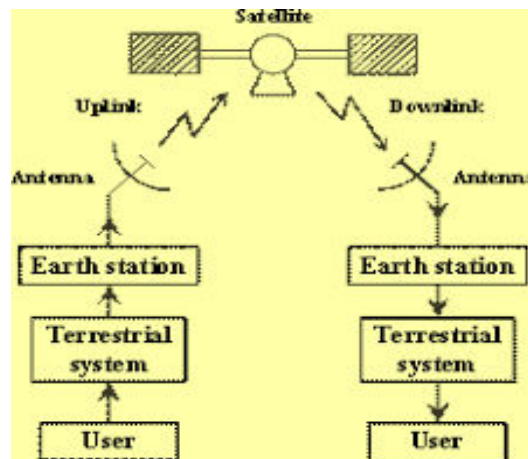


Figure 2: Satellite communication overview[2]

**Ground segment:-**

Earth segment has two fold roles. Transmitting station data of the uplink signals is in the form of base band signals which is passing through a base band processor, an up converter, a high power amplifier and through parabolic antenna towards the satellite. In receiving station this is exactly opposite, converting signals received through the parabolic antenna to based bad signals

**II. CHARACTERISTICS**

The antennas fixed at certain positions, and an uplink group (reverse band) of 1634.5 to 1660.5 MHz and a downlink group (forward band) in the form of 1530 to 1559 MHz. Some of superior antennas are used to provide tiny footprints and higher transmitting power. This involves a satellite in space that links countless earth stations on the ground. The user is accompanying the earth station through extraterrestrial network. This global network may be a cellular phone switch or enthusiastic link to the earth station. The user generates the base-band signal that is clarified and transmitted to the satellite at the earth station. Thus, the satellite may be consideration of as a large repeater in space that receives the modulate RF carrier in its up-link (earth to space) frequency range from all the earth stations in the network, amplifies these transports and re-transmits them back to the earth in the down-link (space to earth) regularity spectrum which is different from the up-link frequency spectrum in order to avoid the interference. The signal at the unloading earth station is administered to get back the baseband signal which is then sent to the user concluded a terrestrial network.

**Working of Satellite Communication:**

The satellite communication system block diagram mainly includes essential mechanisms of a satellite communication system like the earth or ground base & space component. This communication arrangement works on the principles of these components. In this type of communication, the satellite is organized at the space to get the signals from the globe by using an antenna. These signals are improved to the best level and after that, they have communicated again back to the globe using transponders. Then the earth station gets the signals from the satellite, fluctuations again and assists in communication. As a result in this type of communication, the satellite assists in the signal transmission from the globe and consequently back to the globe.

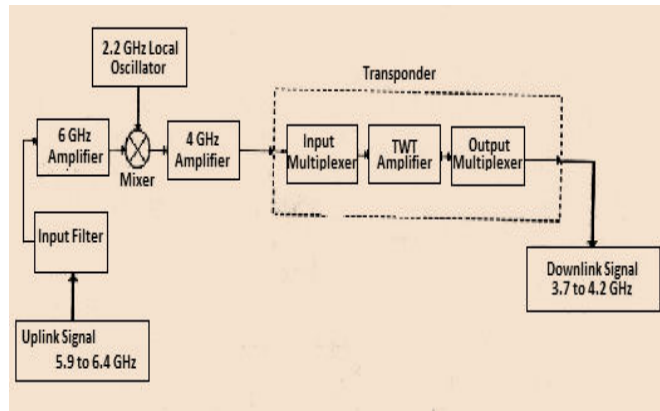


Fig.3 Block-diagram Satellite communication[3]

**Development of Satellite Communication:**

The first simulated satellite, Sputnik 1, was propelled effectively by the Soviet Union on October 4, 1957. Sputnik 1 was only 58 cm (23 inches) in distance with four antennas spreading low-frequency radio signals at regular intervals. It orbited Earth in aoblique orbit, taking 96.2 minutes to complete one rebellion. It communicated signals for only 22 days until its battery ran out and was in orbit for merely three months, but its launch glowed the opening of the space compete between the United States and the Soviet Union.

**Types of Satellites:**

There is different type of satellite for a different type of purpose:-

- Communications Satellite
- Remote Sensing Satellite
- Navigation Satellite

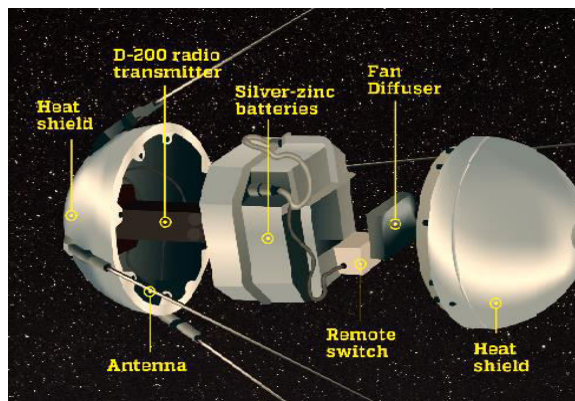


Fig.4 Sputnik 1[4]

- Geocentric Trajectory type satellites - LEO, MEO, HEO
- Global Positioning System (GPS)
- Geostationary Satellites (GEOS)
- Drone Satellite
- Ground Satellite
- Polar Satellite
- Nano Satellites, Cube Sates and Small Sats.

**Future of global satellite communication:**

Rudimentary necessity right now is to use a collective bandwidth for satellite communication link of multiple satellites. Hence saving fuel for external maneuvers using burns of boost motors.



Increasing the signal strengths to be received by satellite or an Earth station as it is affected by troposphere and ionosphere.

A satellite or an orbiter is heavily affected by the radiations from a celestial body, mainly destroying its very much necessary electronics and transponders. So possibly this is an area which requests to improvement.

There are graveyard orbits which are used when a satellite is no longer of use. possibly, there should be a mechanism by which that unexploited satellite can be bring back to use. possibly there is one, although I am not aware on it.

Use of repeaters to improve the signal strength.

#### **Advantages of satellite communication:**

Finished satellite statement, coverage over geographical area is quite large mainly for meagerly.

Populated areas

High bandwidth

Wireless and telephone communication applications can be easily time-honored by satellite communication self-governing of location.

Security in satellite transmission is usually delivered by the coding and decoding equipment.

Service from one single provider is easy to obtain and uniform service is available.

Over long distances, it can be cheaper. The setting and conservation is easy and low-priced in satellite communication for that reason it is best substitute.

During life-threatening condition, each Earth Station may be removed fairly quickly from a location and re-installed somewhere else.

Ground station sites are easy to install and maintain.

#### **Issues and Challenges:-**

New High power platform: One of the key technical trends in response to the deployment of LEO and MEO satellites has been the -design of large aperture GEO system with very high power system. previous commercial Satellite Power generated was limited to 7 to 12kW. But New generation originators have initiated to discuss large bendable of floppy solar an array producing 50-60kW. Also exhaustive efforts are underway to recover Solar cell presentation by using Gallium Arsenide/Germanium. Multijunction cells with promise of solar cell efficiency above 30%. There are similar efforts to improve battery i.e. lithium ion and fuel cell technology in order to produce higher & higher power-driven satellites.

#### **Policies and Regulatory issues:**

In international satellite trade landing rights settlements, annual authorizing fees for terminals, non tariff barriers, allocation of frequencies and orbital slots, capability and helpfulness of inter system coordination technique, security and privacy of information presence relayed on satellite System etc. Most significant of all is the need to established protocol all-in-one interconnection of satellite, wireless and terrestrial fiber Networks. In the 21st century interconnection of satellite systems, for the most part inter satellite links will be a key challenge, Joining them to low potential terrestrial network is truly a challenge.

#### **Future application of satellite communication:**

Use of spot Beam concept and its application:-

NASA's Satellite ACTS uses bounding beam technique to combine the improvement of frequency reuse, spot beams and TDMA, concept of multiple spot beams is also planned in future generation Satellite of Italy, Halsat with six spot beam operating at 30Hz uplink and 20Hz downlink, the Satellite interconnects TDMA transmissions between ground stations in all the major economic country of Italy.

As the world financial prudence turn out to be increasingly global and as all global parts, the atmosphere, and the oceans are discouraged by mankind, the need for proficient wireless interlinks through satellite and terrestrial wireless communication will increase. Furthermore, the increase training of space systems (planetary, manned, and unmanned bodies) will give enlargement to the need for heightened space communication systems. The upcoming of the satellite communication space be contingent upon how successful the present satellite networks are. Continuous inter functioning with terrestrial core networks and terrestrial wireless access networks is of utmost consequence for the satellite networks' achievement. With innovatory advancements in satellite communication, it's imaginable to bring several space-age fictions to life.



#### Other Applications:

Telecommunication facilities comprise phone calls and services provided by handset companies, as well as wireless, mobile and cellular network. Providers, mobile satellite equipment can be deployed to disaster areas do make available emergency communication services use of constellation of space craft and Inter satellite links for telecommunication Purpose etc.

#### Expectations about the Upcoming of Small Satellites and New Space:

- An increase in the number of small satellite launches
- A more prominent role for larger sized CubeSats (6U & 12U)
- Larger constellations and improved coordination between CubeSats
- The transformation on its way thanks to artificial intelligence
- Greater data processing and transmission capacity
- Increased use of propulsion systems for CubeSats
- .Improvements in active and passive de-orbiting systems
- .Origami and new high-tech solutions for antennas
- Increased use of CubeSats for space exploration

### III. CONCLUSIONS

If future application system will operates modern technology and gives more advantages. Details study of frequency apply in satellite and mobile cellular is matter of research in our future works. The satellite communication, the future application and present application are discussed. Each day mane and more uses far the satellites Cue being discovered. The same feature enables Satellites to provides communication links to Remote communities.

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