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SATELLITE TELEPHONE

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Executive Summary

A mobile phone that connects to circling satellites rather than terrestrial cell sites is known as a satellite telephone, satellite phone, or satphone. They offer similar capabilities to terrestrial mobile phones; most systems enable voice, SMS, and low-bandwidth Internet access. Coverage may include the entire Earth or only particular parts, depending on the architecture of a given system. The mobile equipment, often called a terminal, comes in a variety of forms. Early satellite phones were around the size and weight of a mobile phone from the late 1980s or early 1990s, nonetheless, frequently with a sizable retractable antenna. While some prototype satellite phones have no discernible differences from a typical smartphone, more contemporary satellite phones are similar in size to a standard mobile phone. Expeditions into remote locations without terrestrial cellular service are common places to use satphones. Large, tough, rack-mounted electronics with a steerable microwave antenna on the mast that automatically tracks the overhead satellites may be found in a fixed installation, such as one seen on a ship.

Introduction

A satellite phone is a phone that uses satellites instead of terrestrial wires to communicate (receive and deliver signals). [1]These phones offer communication everywhere in the world, regardless of location, in contrast to regular cell phones, which require enough terrestrial network coverage to support conversation.

Due to cost and other constraints, such as governmental usage restrictions, satellite phones are mostly utilized in locations without access to a telephone or cellular network.



Figure 2. Satellite Mobile Phones: (a) Inmarsat IsatPhone 2 and (b) Iridium Extreme 9575

Photo courtesy of Groundcontrol.com

How it works

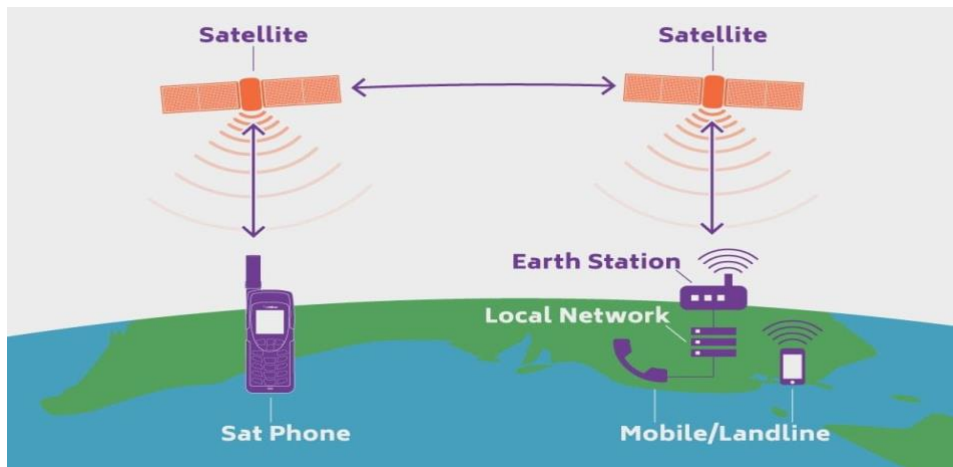
In contrast to mobile phones, satellite phones, as their name suggests, use satellites to broadcast and receive signals rather than terrestrial cell towers. International networks for ground-based communication are established by companies involved in satellite communications by launching satellites into Earth's orbit.

On a satellite phone, you send a signal up to a satellite, which then beams it down to the person you wish to call. If the person you are calling is using a normal mobile device, a station on the ground will patch the signal into a local network.

When phoning a satellite phone from a cell or landline phone, the mechanism works backwards. Another satellite phone could be called from a satellite phone. The signal moves

from Earth to a satellite in an upward and downward motion before returning to Earth in the same manner.

The frequency ranges of a satellite phone are 626.5 to 1660.5 MHz for the transmitter and 1525 to 1559 MHz for the receiver [2].



Components of satellite networks

Typical satellite phone networks are made up of various parts. which are

1. The subscriber goods,
2. The ground stations, and
3. The satellite network (The satellite phones and data units)

A satellite network transmits signals from the source to the destination using one or more satellites. In low earth orbit (LEO), the Iridium satellite network, for instance, contains 66 satellites. The speed of each satellite is 16,832 mph,

A satellite can complete one full orbit of the planet every 100 minutes. These satellites act as mobile phone towers in the sky. Voice and data transmissions can be routed globally thanks to the Iridium network.

The earth stations that make up the ground network are utilized for command and control as well as the transmission and receipt of user signals. The earth stations also act as connecting points to numerous communication networks.

In order to facilitate communication between iridium phones and any other phone in the world, iridium gateways, for example, connect the iridium constellation to the public switched telephone network.

Features of satellite telephone

Features of Satellite communication against terrestrial communications are:

- When all other modes of communication are broken or limited during events like earthquakes, floods, and other natural disasters, satellite phones provide a communication alternative[3].
- The service area of a satellite far exceeds that of a terrestrial system.
- The distance from the geographic center of the region has no bearing on the cost of a satellite's transmission.
- Satellite communications are incredibly precise.
- Greater bandwidths may be used.

Types of Satellite networks

For coverage of either a narrowly focused area or the entire planet, communications businesses utilize one of two types of satellite systems[4].

1. Geostationary (GEO) Satellite

Geostationary satellites rotate at a pace equal to that of the Earth's orbit because they are fixed to a place roughly 37,000 kilometres above the equator. This suggests that a single satellite may be able to reach several countries from where it is now.

Once connected to one, a satellite phone is very unlikely to lose connection to a geostationary network. This network's sat phones are also more likely to pick up a signal when in a gully or canyon than an LEO sat phone (see below). Unfortunately, neither the north nor the south poles are currently covered by satellite coverage due to the satellites' current placements.

2. Low Earth Orbit (LEO) Satellite

Low Earth Orbit (LEO) satellites are not anchored to a certain height above the Earth. Because they orbit a few hundred kilometers above the earth, they can make a full circle every 90 minutes or so. LEO satellites work together to provide a signal to satellite phone users on the ground since they have a much larger network than geostationary satellites. Since their orbits circle the entire planet, they can pick up signals in remote locations like the north and south poles, but when the signal approaches closer to the equator, they have more difficulty picking it up.

Manufactures of Satellite systems

The four satellite networks Inmarsat, Iridium, Thuraya, and Globalstar have all seen an increase in popularity. They are all trying to fulfill the same desire, but they all go about it in different ways.

Inmarsat

Inmarsat was the first satellite communications system to be created and deployed. Despite having created satellite phones for the maritime industry initially, Inmarsat currently provides phone services to a wide range of businesses [5].

Inmarsat operates four geostationary satellites that are positioned at various points along the equator. Inmarsat provides phone, fax, real-time ISDN, and MPDS data services to its customers.

Disadvantage:

Because of the satellite's great distance, a huge antenna system is required for both signal transmission and receiving (about 22,000 miles).

Globalstar

The 48 Low Earth Orbit (LEO) satellite based Globalstar satellite phone system was created for regular travelers.

As a result, a tiny tri-band phone that can operate on cellular CDMA, AMPS, and Globalstar networks was created.

Advantage:

The Globalstar LEO constellation, which is only 700 miles above the ground, enables higher-quality communications.

Thuraya

Thuraya is a cutting-edge geosynchronous mobile satellite system that provides satellite phone and data services to over 120 countries across Europe, the Mediterranean, Northern Africa, and the Middle East.

Advantage:

Thuraya satellite phones allow for free data usage and Internet connectivity.

Disadvantage:

The use geostationary satellites by Thuraya results in the potential for voice conversation to lag.

Iridium

The Iridium System is a satellite-powered wireless personal communications network that offers a variety of speech functionalities to virtually any point on the planet.

Iridium employs 66 satellites across six different orbital planes. Because the satellites are in low earth orbit, there is very minimal signal latency when chatting (LEO). Every 100 minutes, an Iridium satellite circles the Earth[6].

Advantage:

Iridium handsets make it possible to make satellite phone calls from any location on Earth, enabling dependable connections.

Advantages and disadvantages

The advantages of satellite phones are as follows:

- Numerous network connections. It can establish a connection to civilization from locations where none else exists.

Satellite Telephone

- Consistent performance wherever it occurs. A satellite phone can be used to communicate from a clearing deep inside a South African jungle, the summit of Mount Everest, or the Sahara Desert.
- It can also be used as a backup communication system in emergencies when cellular towers or landlines may not be available.
- Consistency in phone numbers
- It is a necessary instrument for all types of remote excursions and enables clear air and ocean communication.
- No installation or setup is necessary.
- Highly beneficial for responding to disasters.
- Additionally, it enables family members to stay in touch, as is the case for researchers, explorers, and members of the military.

The disadvantages of satellite phones include:

- Exorbitant call and phone bill costs. Satellite minutes are more expensive than mobile minutes. These issues are unimportant, though, when you consider the purpose of a satellite phone[7].
- Large-sized antenna
- Voice communications discussions that use networks based on geosynchronous orbits have delays. Prior to being forwarded to the recipient, the signal must first go to the satellite and then to an earthbound gateway. The reply from the receiver will travel the same path backward and take a similar amount of time to get to the caller.
- Low data bandwidths, such as those used for Internet access.
- One may also be prohibited from using satellite phones without permission due to local government rules.

Conclusion and Recommendations

Satellite telephony is the most reliable method of ensuring continuous connectivity for worldwide use. Because there is no terrestrial contact, it is a superior technique to safeguard a network from various types of catastrophes (natural or human-caused). The only thing it requires is electricity to keep the network running. And everyone knows that there is a lot of solar energy resource in space.

Because of the dependability of this type of network, various organizations employ it, such as Apple with his iPhone 14, which demonstrated that everything is possible by launching a phone without a sim card but using a satellite connection.

And we hope that other telephone companies would follow suit and create something new based on what is already there.

We urge that various companies utilize this technology because it will be the most effective approach to give good and secure communication between different people and nations without the need for internet activation (which is currently the most used). If everyone can enjoy telecommunication without worrying about location, the future will be hilarious.

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