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Abstract

Satellite phone services use cutting-edge technology to provide phone service to customers anywhere around the globe. Despite their sophisticated technological capabilities, Satellite phone firms have not been able to acquire a significant portion of the highly competitive mobile phone industry, nor have they been able to provide major returns to investors. The purpose of this case study is to investigate the factors that contributed to Iridium, a prominent satellite phone service provider, falling short of the expectations of analysts and failing to attain profitability. We show how the capacity of satellite phone firms to compete with traditional mobile phone providers is hindered by factors such as excessive cost structures, a lack of critical mass, the "threat of replacement services," and bad market positioning. This story indicates that even having supportive investors, worldwide collaboration, and alliances with other companies may not be enough to lead to market success, even if the technology in question is considered to be state-of-the-art.

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CHAPTER ONE

INTRODUCTION

When Operation Iraqi Freedom took place in 2003, satellite phone services made it possible to provide continuous television coverage of the battlefront. Because the traditional wireless or cable connectivity infrastructures were not available, embedded journalists were required to use videophones that were fitted with a tiny satellite antenna to provide live reports from the frontline. Viewers were able to witness live footage of forces engaged in action and missiles striking Baghdad thanks to satellite communications. The coverage of the war in the press demonstrated how satellite phone services have the potential to revolutionize how news is transmitted across national boundaries and from locations that are now experiencing violence. The firms that make satellite phones have had a hard time turning a profit, even though these phones have the potential to revolutionize communication. Numerous well-known firms, including Motorola, Sprint, and Kyocera, amongst others, have offered financial and/or technical assistance to assist in the development of satellite phone networks. Because of the abundance of available resources, the climate in which satellite phone businesses operated was conducive to the development of mature technologies that enabled consumers to send voice and data communications from any location on the planet. Leading satellite firms like Iridium have resorted to filing for bankruptcy protection or reorganizing their debt even though they have significant resources. In this particular instance, we make use of iridium, the very first satellite phone service, to demonstrate why subsequent satellite phone services have been unable to live up to the expectations of investors or capture significant market share. Iridium encountered significant difficulties as a result of several issues, including its poor market positioning, its expensive cost structure, and its lack of critical mass. This story demonstrates how even the most advanced technological capabilities may not be enough to help businesses increase their market share or increase their earnings. The events of this case take place in the following order: first, we discuss the opportunities and problems that were offered by the mobile phone marketplace throughout the 1990s. Following that, we will discuss in general terms how satellite phone systems function. Next, we will identify and explain the services offered by Iridium's rivals in the telecommunications business. A discussion of the takeaways Iridium was able to glean from its ordeal serves as the final component of the case.

Figure 1: Images of satellite phones

CHAPTER TWO

LITERATURE REVIEW

Sridhar said that in order to pass the rigorous certification standards, the satellite phone had to be portable and pass both mechanical and radio frequency interference tests. The phone will also be subjected to the infiltration of dust, water, and solid objects as part of the physical testing. The mobile device had silicon chips, several CPUs, user interface software, software device drivers, protocol stacks, and more. To accomplish this task successfully needed a high level of skill in both hardware and software(Sridhar & Vadivelu, 2017).

According to Giovani Giambene, Satellite phone systems are an important part of the solution to the problem of how to deliver communication services to mobile users in sparsely inhabited areas, in disaster zones, and when they are traveling by airplane, train, or ship. In every one of these scenarios, satellite systems provide capabilities that are unparalleled in terms of their resiliency, large area coverage, and broadcasting and multicasting capacities(Chini et al., 2010).

Carsten Willems said that Satellite communications systems are connected to terrestrial cellular networks. Therefore, the work that has been done on the study of cellular systems may be used for our research of security. The GSM standard, for instance, was the basis for the development of the GMR-1 standard, which in turn was developed from the GSM standard(Driessen et al., 2012).

As has been demonstrated by different authors, is real that Satellite Phone is very important and powerful nowadays.

CHAPTER THREE

METHODOLOGY

3.1 Introduction

The satellites that make up a satellite network are responsible for sending and receiving signals between the various nodes in the network. For instance, the Iridium satellite network is made up of 66 satellites that orbit the planet in a position known as low earth orbit (LEO). Because each satellite travels at a speed of 16,832 miles per hour, they are able to complete one full rotation of the earth every one hundred minutes. These satellites provide the same function as mobile phone towers but in space. The Iridium network enables voice and data communications to be transmitted to any location on the planet(Barkhuus, 2000).

In addition to being utilized for the transmission and receipt of user signals, the earth stations that make up the ground network are also employed for command and control functions. The earth stations also serve the function of Hubs, which allow them to communicate with a variety of different communication systems. Iridium gateways, for instance, connect the iridium constellation to the public switched telephone network. This makes it possible for iridium phones to communicate with any other telephone in the globe.

3.2 Feactures of satellite phones

Features of satellite telephone communication over terrestrial communication are:

(i) Satellite phones provide a solution during communication when all systems of communication are limited.
(ii) The coverage area of satellite greatly exceeds that of a terrestrial system.
(iii) Transmission cost of a satellite is independent of the distance from the center of the coverage area.
(iv) Higher bandwidths are available for use.

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mobile phone towers but in space. The Iridium network enables voice and data communications to be transmitted to any location on the planet(Gudd, n.d.).

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3.3 The advantages of the use of the satellite phone

You only need one phone and one subscription if you have a satellite phone so you can take it everywhere in the globe. An advantage of using a satellite phone is that its communication capabilities are not restricted to regions that are covered by terrestrial coverage near cell towers; rather, a satellite phone may be used to communicate in the vast majority of or even all geographic places on the surface of the Earth(Driessen et al., 2012).

(i) Performing operations at sea as well as in the most remote environments on land, including hilly regions, woodlands, deserts, and the polar ice caps.

(ii) Devices that are dependable and robust can survive high temperatures, shocks, and other situations that are considered to be extremely harsh.

(iii) The vast majority of the most effective gadgets give users the ability to send text messages (SMS), transmit data, and access the internet from any location on the planet.

(iv) It is possible to send an SOS message, make and receive phone calls, and send and receive short SMS messages anywhere in the world.

(v) It is cannot depend on a terrestrial GSM antenna to operate.

3.4 The disadvantages of satellite phone

(i) Only work outside.
(ii) Having a direct line of sight (LOS) to the satellites in the sky is required.
(iii) A low data bandwidth affects things like internet access.
(iv) Severe weather may cause service delays.
(v) The high cost of the phone as well as the call cost.
(vi) Charges per minute are frequently greater than those of mobile phones.
(vii) Large antenna size.
(viii) Because of regulations imposed by the local government, using satellite phones without first obtaining authorization may be illegal.
(ix) There is a delay in the conversion of audio communications, particularly when employing networks based on geosynchronous orbits.

3.5 How does a satellite phone work

3.5.1 Satellite communication systems

There are three distinct categories of satellite communication systems, which are distinguished from one another by the orbit they use and the intensity of their signals.

(i) Satellites in low earth orbit, often known as LEO satellites, provide coverage for just a limited region and orbit at a distance of less than approximately 1,800 miles from the surface of the planet.
(ii) Satellites in medium earth orbit (MEO), which have a maximum altitude of 9,000 miles, are frequently utilized in navigational systems such as GPS.
(iii) Satellites in geosynchronous earth orbit (GEO) circle the planet at a distance of 22,300 miles and are positioned such that they are directly over the equator.
(iv) A satellite's lifespan has a positive connection with the distance of orbit from the earth, whereas signal strength has an inverse relationship with that distance.

Strong signals may be received from low Earth orbit (LEO) satellites because of their proximity to our planet. Satellite phone services make the most frequent use of both LEO and MEO satellites(Lim & Thatcher, 2005).

3.5.2 Working on a satellite phone

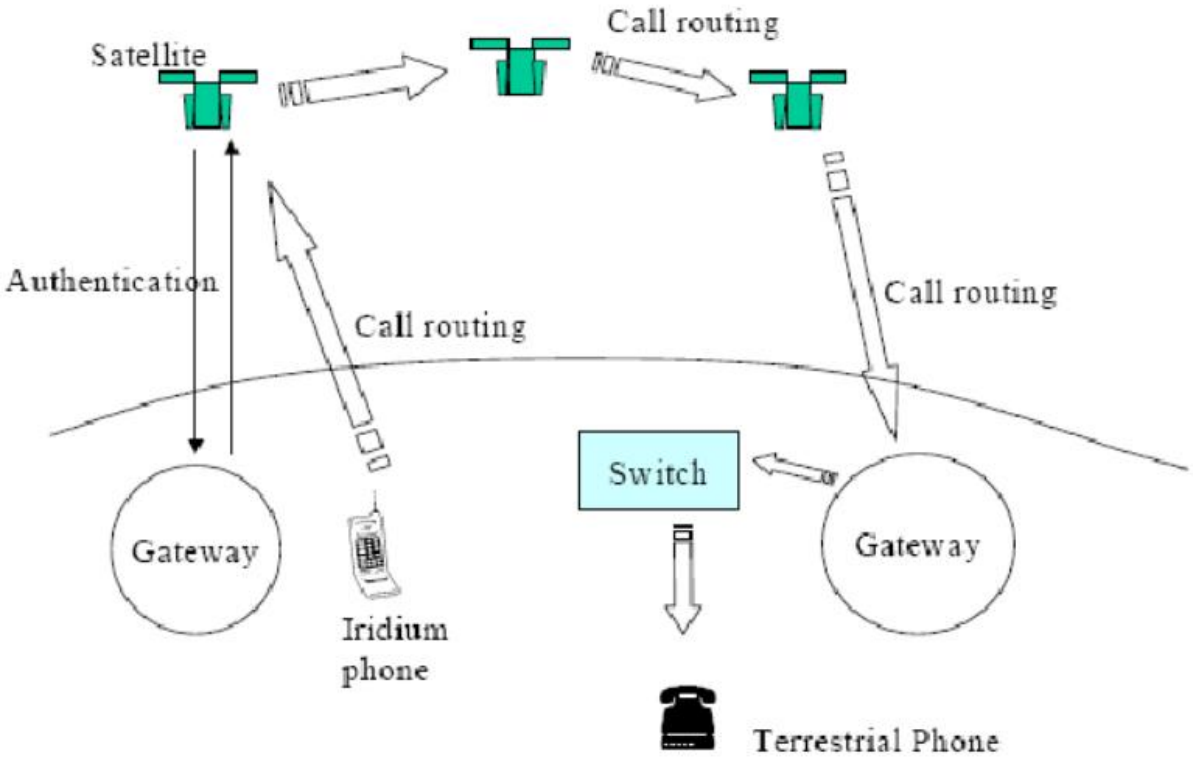
All that a satellite phone is a radio transceiver in disguise. It communicates with a satellite in a direct manner (part of a network of satellites). When the user activates their satellite phone, the signal is sent out into space, where it is received by any number of satellites that are part of a suitable constellation and is then registered with the constellation.

After that, such signals are transmitted to a station on earth where they are received. Call processing and switching are now handled not by the satellite network but rather by the earth station known as the Gateway. The call is subsequently routed to either the Public Switched Telephone Network (PSTN) or a cellular network via this station(Driessen et al., 2012).

When making a call to a satellite phone from a mobile phone or landline phone, the system operates oppositely. Consider another scenario in which a satellite phone is used to contact another satellite phone. The signal travels in a zigzag pattern, first ascending to a satellite, then returning to earth, and finally ascending once again to a satellite(Sridhar & Vadivelu, 2017).

The range of frequencies that can be transmitted by a satellite phone is 626.5 to 1660.5 MHz, while the range of frequencies that can be received is 1525.0 to 1559.0 MHz.

Diagramme



3.5.3 Security of satellite phone

All current satellite phone networks encrypt voice transmission to avoid eavesdropping. In 2012, a team of academic security experts reverse-engineered the two primary proprietary encryption algorithms in use. One algorithm (used in GMR-1 phones) is a variation of the algorithm used in GSM (used in popular mobile phones), and both are subject to cipher-text only assaults. The GMR-2 standard offered a new encryption technique which the same research team also cryptanalysed successfully. Thus satellite phones require further encryption if used for high-security purposes(DHS, 2015).

3.5.4 Components of the satellite phone

The two main components are:

(i) The Ground segment, which is consisting of fixed or mobile transmission, reception and ancillary equipment.

(ii) The Space segment, that primary is the satellite itself.

In contrast to the space segment and the user segment, the ground segment of a space system is made up of all of the ground-based components that are utilized by the operators and support people of the system. The ground segment makes it possible to control a spacecraft and to disseminate payload data and telemetry to various parties on the ground that are interested in receiving them. The following are the key components that make up a ground segment:

(i) Ground stations, often known as Earth stations, are responsible for providing radio interfaces with spacecraft.

(ii) Mission control (or operations) centers, which are locations from which spacecraft are controlled and operated 20

(iii) Remote terminals, which are utilized by support personnel.

(iv) Spacecraft integration and test facilities.

(v) Launch facilities.

Networks on the ground, which make it possible for other ground elements to communicate with one another(Saravanakumar et al., 2018).

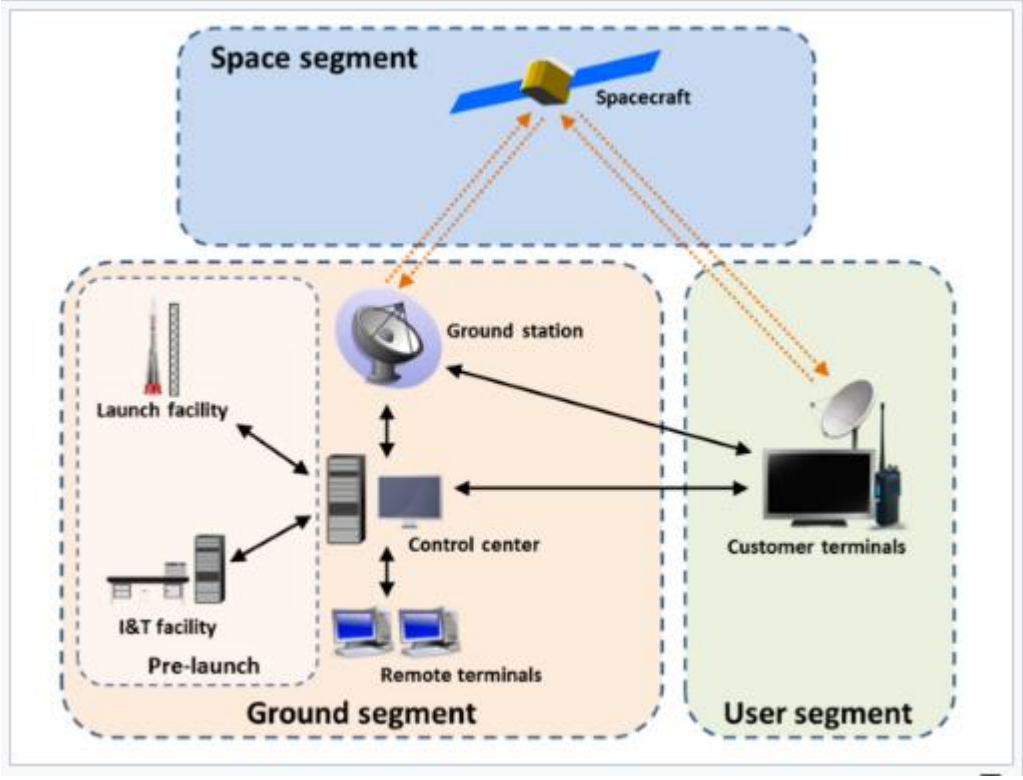


Figure 2: Ground Segment circuit

CHAPTER FOUR

CONCLUSION AND RECOMMENDATIONS

4.1 Conclusion

Satellite telephony is being spread in the world due to its best features. In this system users of satellite phones spend less time and more succefully. But also users use less money than the other systems. Satellite systems are in different generations such as GEO (Geostationary Earth Orbit) at 36,000 km above the earth's surface, LEO (Low Earth Orbit) at about 500-1,500 km above the earth's surface, and MEO (Medium Earth Orbit) or ICO (Intermediate Circular Orbit) at about 6,000-20,000 km above the earth's surface.

According to the envisioned future challenges and trends for MSSs, we can conclude that even if satellite phone services represent a niche part of the whole satellite communication market, there are now new opportunities that can be exploited to increase the diffusion of these sevices.

4.2 Recommendation

(i) Governments have to encourage and motivate companies to spread this system according to its features.

(ii) Satellite telephony companies have to be reassured of strong security.

(iii) According to its features, users are requested to join to this system in the area the system is already implemented.

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