# SatCom Business Models

## New Space Economy

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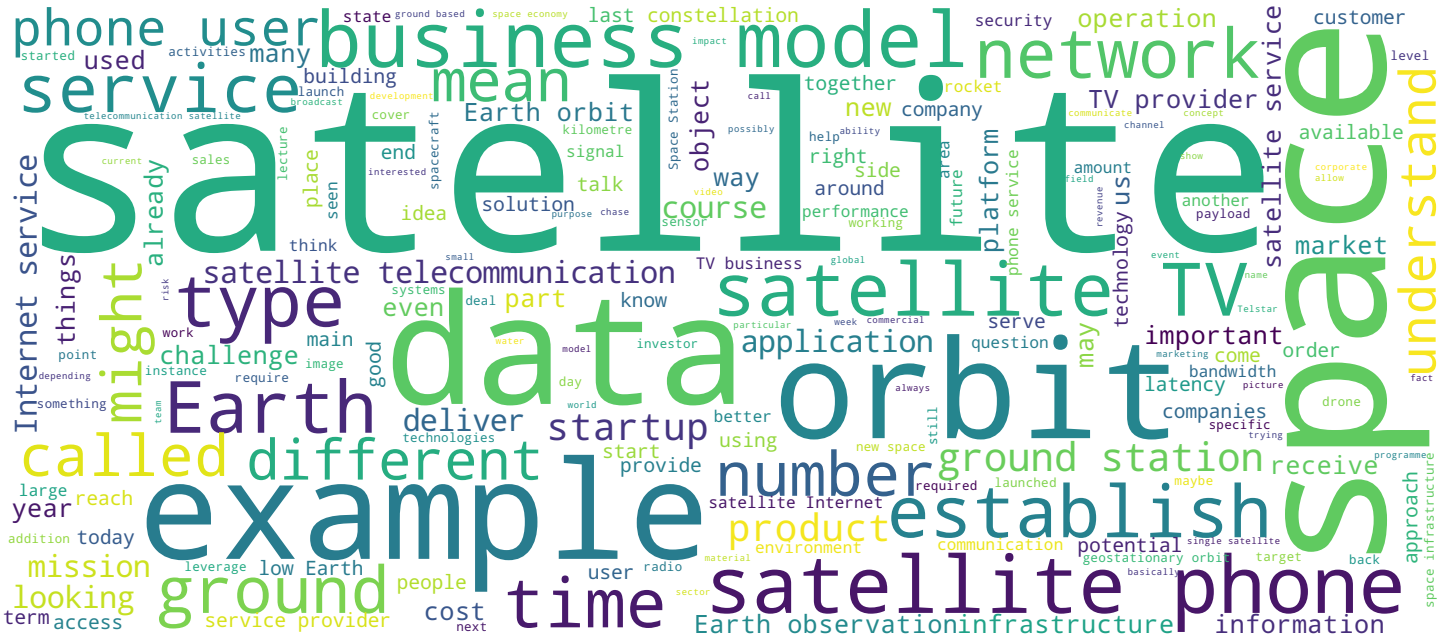
PMOD/WRC / Space4Impact

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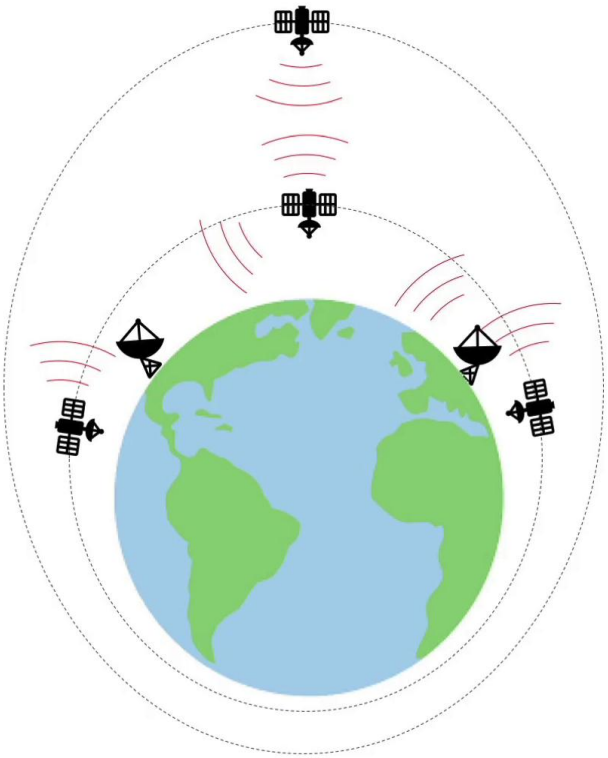
# SatCom



The ability to deliver telecommunication services from space is a combination of technology, of satellite orbit, and of the space infrastructure that we want to establish. In fact, depending on the type of services that we want to establish, the type of infrastructure, and the type of satellite that we need to place into orbit can highly vary. A telecommunication satellite alone can relay information through two or multiple points, either on the Earth or in space. So let's think together what are the typical satellite downstream services we perceive. Everybody will think about satellite TV and satellite radio. We have then what are called backhaul services, that is, the ability delivered from satellites to backup phone lines or Internet. We have then the dedicated satellite phone and satellite Internet services. Through the services, we are able to broadcast and network data that are nation or security or business-relevant. Now, let's make a jump into the past to understand how all this started.

Notes

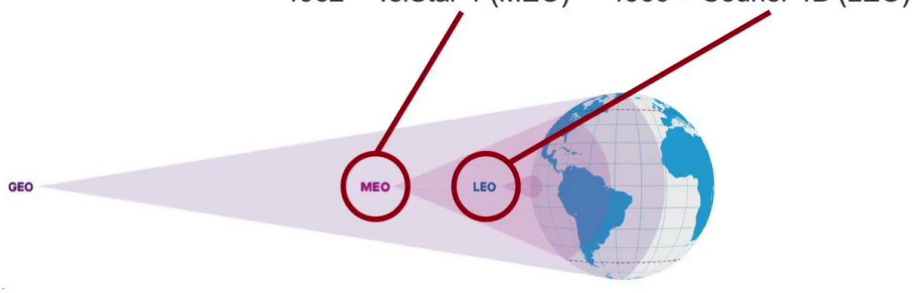
Summary

0m 05s

# SatCom: First Steps

1962 – TelStar 1 (MEO)


1960 – Courier 1B (LEO)



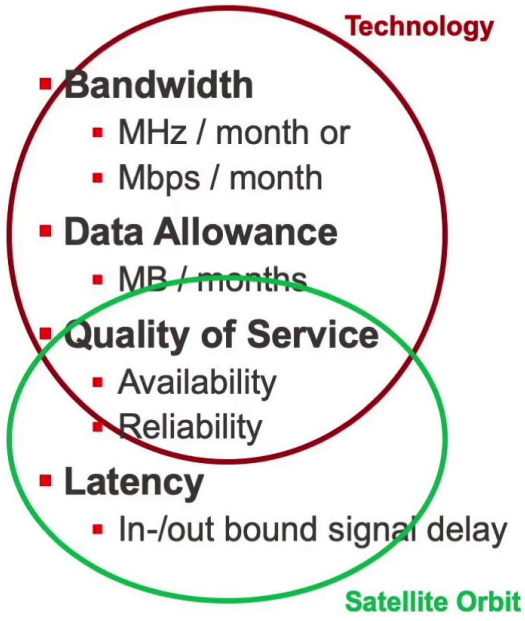

In 1960, the Courier 1B, the first active telecommunication satellite, was launched. It had merely demonstrative purposes. It was orbiting the Earth in what is called a low-Earth orbit. completing a round trip of the Earth every 90 minutes approximately. But already in 1962, the Telstar 1, the first telecast satellite for commercial purposes, was launched. The Telstar 1 had the purpose of establishing phone connections between different continents. The Telstar 1 was designed to orbit the Earth in what is called a medium-Earth orbit, an orbit that takes about 2.5 hours to perform a full trip around the Earth. What was soon discovered was that a satellite operating in MEO would have delivered an active link for 20 minutes each orbit, and each orbit lasted 2.5 hours. Now, just imagine you're trying to convey a very important message to your family or to your business partners, and your communication link is broken and you have to wait 2.5 hours to restart. It was then understood that depending on the type of orbit and the type of services that we are looking at, different type of infrastructure would have had to be established.

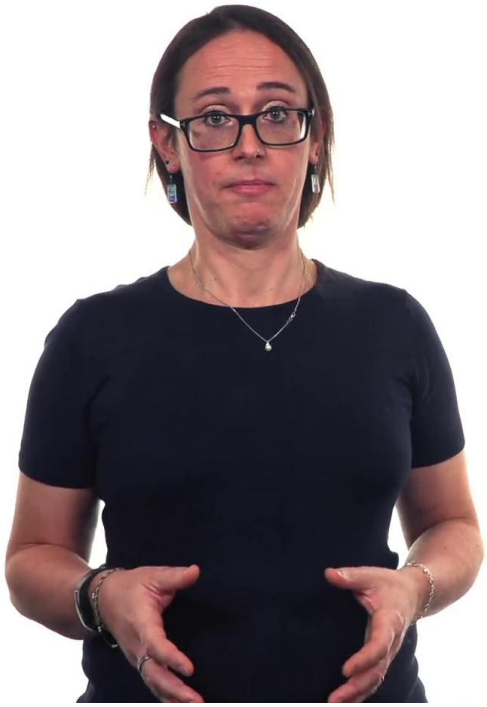
Notes

Summary

1m 42s

# SatCom: What does It do?



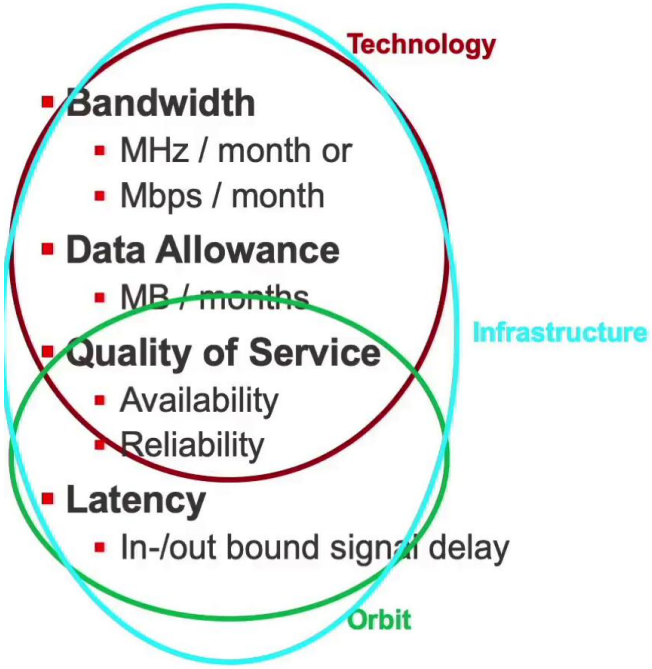
With this flashback, we got introduced into some of the basic drivers of the satellite telecommunication performance, the orbit, and the duration of the link. Now, the downstream services and the products delivered by satellite telecommunication providers must deal with four main areas of operation. Much alike the provider of your mobile-phone services, the satellite telecommunication operator deal with bandwidth or how fast you can receive your data. They deal with data allowance, that is, how much data you can receive over a period, typically a month. And they want to deliver to you reliability and availability of their services. And finally, an important aspect of the telecommunication satellites is the latency, that is, the delay between my outbound and my inbound signal. Some of these performance areas that are influencing the services that we receive from satellite telecommunication service providers are driven by the specific telecommunication technology adopted from the on-ground and the space infrastructure. Some other areas of performance are influenced by the satellite orbits.

Notes

Summary

3m 27s

# SatCom: What does It do?



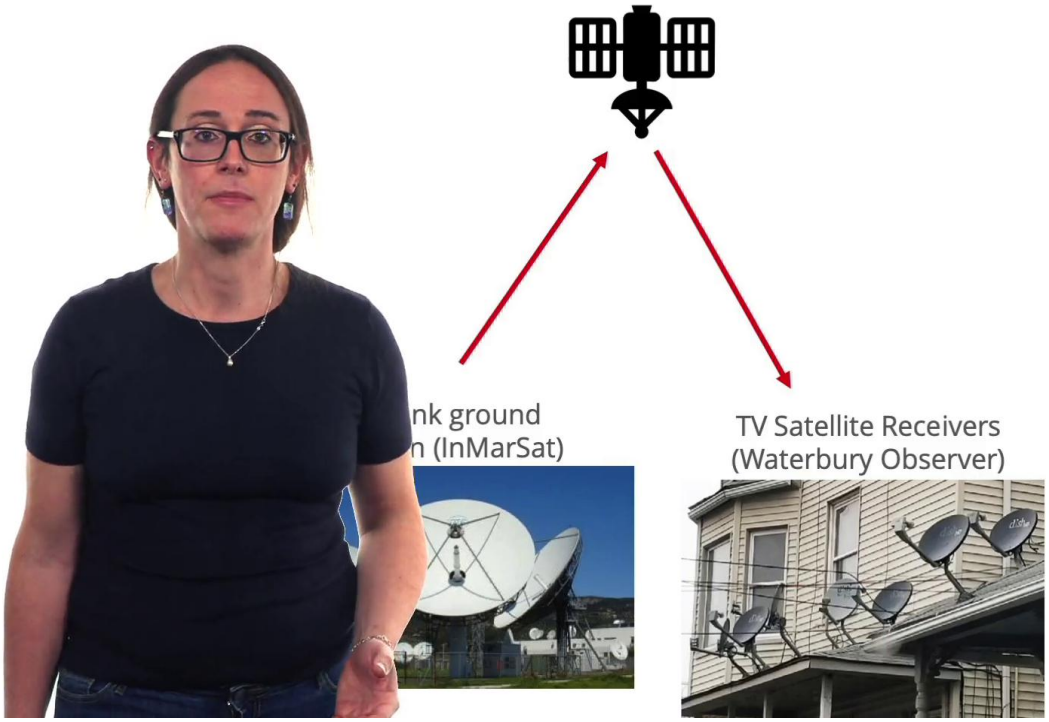

And finally, all the performances and the services that a satellite service provider wants to deliver to you are influenced by the type of infrastructure that is planned, whether it is a single satellite or whether it's a network of satellites. Now, to understand this concept, let's explore together two of the main business models of the satellite telecommunications: the satellite TV and the satellite phone.

Notes

Summary

5m 13s

# SatCom Business Models: Satellite TV and Radio



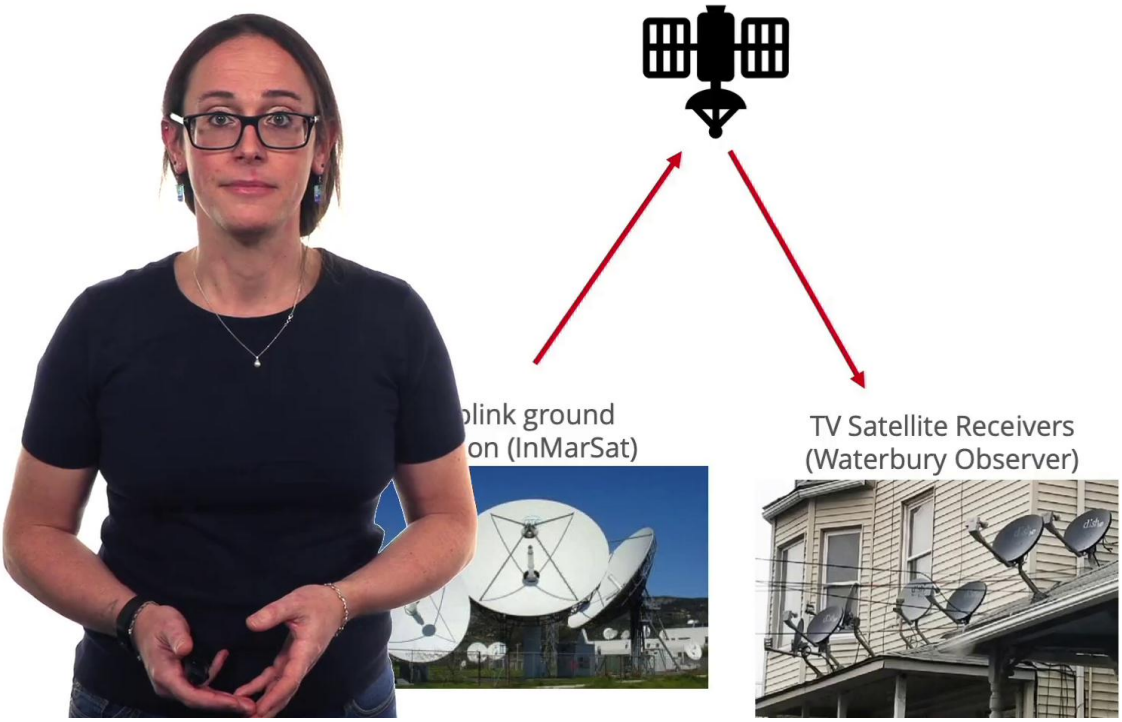

Satellite TV is possibly the first commercial application of SatCom really reaching out the wide public, namely your grandparents. In fact, already in 1963, the first geostationary satellite was deployed to broadcast the Tokyo Olympiads from Japan to US. In the satellite TV business model, the TV provider delivered its signal to the satellite ground station. The TV signals of multiple TV providers are encoded and transmitted to a satellite in the orbit. The TV signals are then broadcasted back onto the Earth to the satellite dish that you might see on the building in your neighborhood. Now, the real specificity of the satellite TV business model is that it is a mono-directional communication from the TV provider to a ground station to the satellite to a TV receiver. So when we sit in our living room and we switch the channel on our satellite TV receiver, what we effectively do is that we chase a different frequency in the received spectrum, but we do not interact actively with the satellite. We just chase for a specific signal. Secondly, when we look at satellite TV, we are interested in enjoying our favorite show. But my question is, do we really care if we receive the broadcast instantaneously, immediately?

Notes

Summary

5m 50s

# SatCom Business Models: Satellite TV and Radio



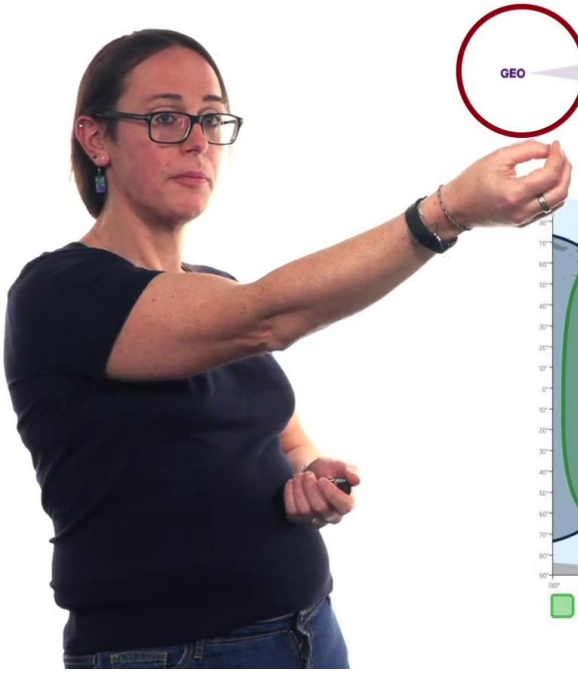

Well, unless you're looking at the world final event of your favorite sport, and your team is leading and winning, in general, we do not perceive as relevant for us whether the broadcast is a few seconds or even minutes delayed.

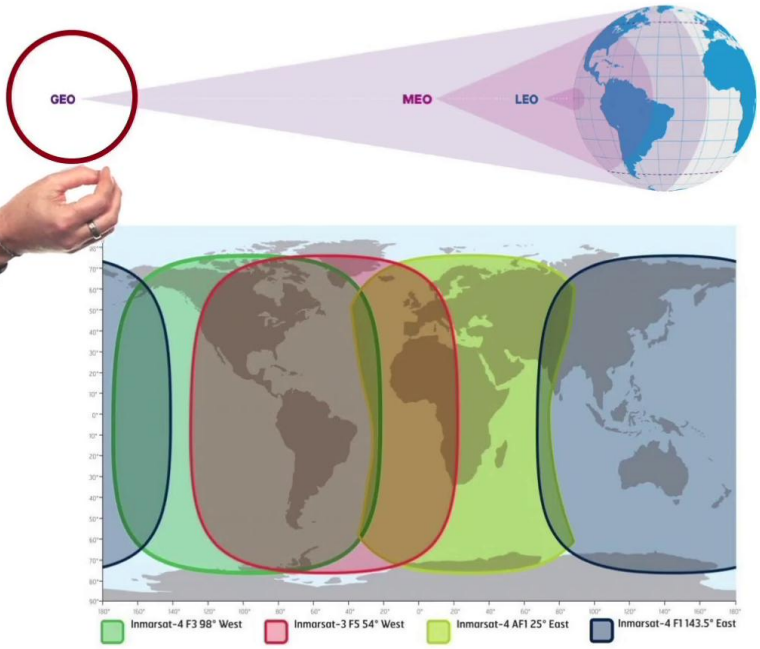
Notes

Summary

7m 41s

# SatCom Business Models: Satellite TV and Radio






https://www.satellitetoday.com/content-collection/ses-hub-geo-meo-and-leo/
https://hansael.eu/2018/04/16/global-changes-of-inmarsat-c-coverage/

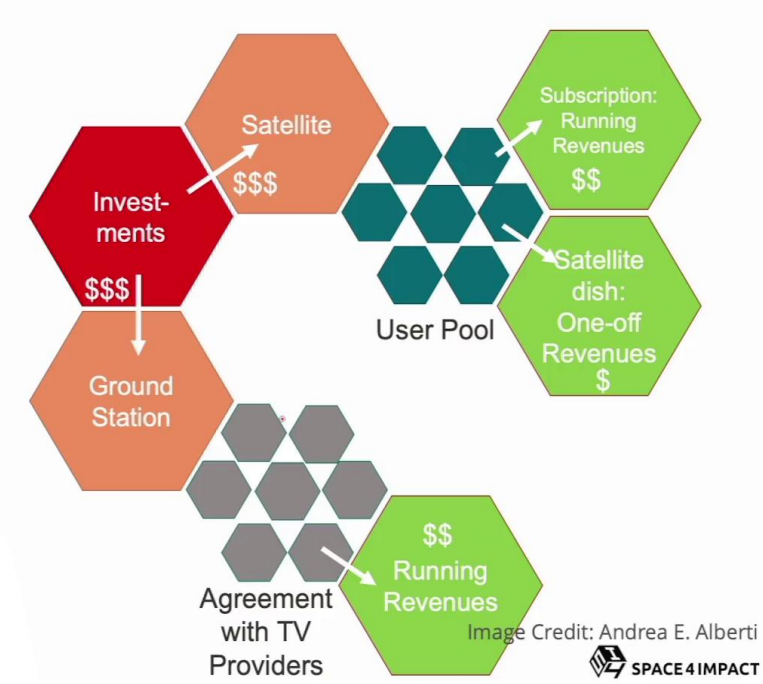
Therefore, TV broadcast satellites find their ideal position in what is called a geostationary orbit. This orbit stands at about 36,000 kilometres from ground. The unique characteristic of this orbit is that it's synchronized with the Earth's rotation. This means that the satellite is apparently static with our position, and we will see the satellite in a fixed position across our day. By choosing this orbit, the satellites have the ideal coverage of the Earth both in terms of visible area and in terms of transmission quality. In this representation, we see how few satellites are effectively able to cover a large portion of the Earth's surface. The antennas, both transmitting and receiving, can be substantially static as they are looking to a target that is fixed with respect to the observer.

Notes

Summary

8m 01s

# SatCom Business Models: Satellite TV and Radio



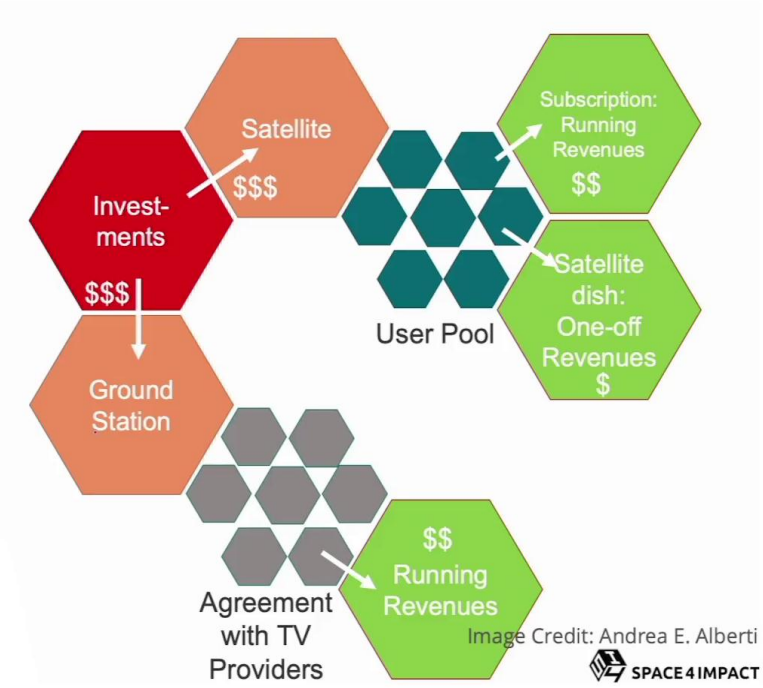

As mentioned, the satellite TV is possibly the first commercial business model to have appeared onto the space market. And the business approach is relatively simple. Now, to understand the business model of satellite TV, we will not leverage on the traditional business model canvases but rather on a very simplistic relational schematic. In addition, we will look at the satellite TV business model like if we would like to own the full supply chain from the satellites to the service delivered. This might not be the most adequate way to establish a profitable business. To establish a satellite TV and radio business, we have to place our investments in order to build satellites and ground stations. Now, we have to act on both sides. The ground station must receive the signal from the TV provider. That means that we need to establish a relationship with each and any of the TV provider that we want to serve. Depending on the type of relationship, we could have a revenue because the TV provider want to have their channels broadcasted through satellites, or we would have to chase them and we would have to pay them. So this side could be a running revenue or a running cost.

Notes

Summary

9m 09s

# SatCom Business Models: Satellite TV and Radio



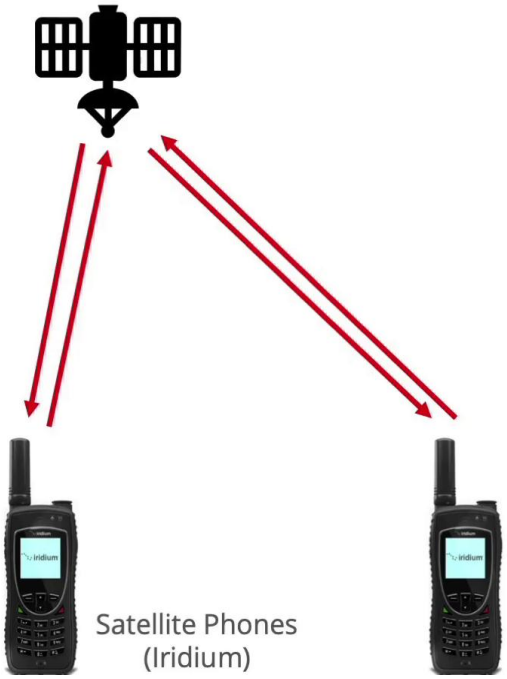

Let's look now at the satellite part of the business. We establish one satellite. One satellite is able to cover a large portion of the Earth. It means that I am able to serve an amount of potential customers. Each and any of these potential customers have to do two things. They have to buy a satellite dish that is a one-off revenue for my satellite business, and I have to establish a running subscription that is a running revenue for my business model. So from investment to revenues or potential revenues, one satellite, and potentially, one ground station are sufficient.

Notes

Summary

11m 00s

# SatCom Business Models: Satellite Phone



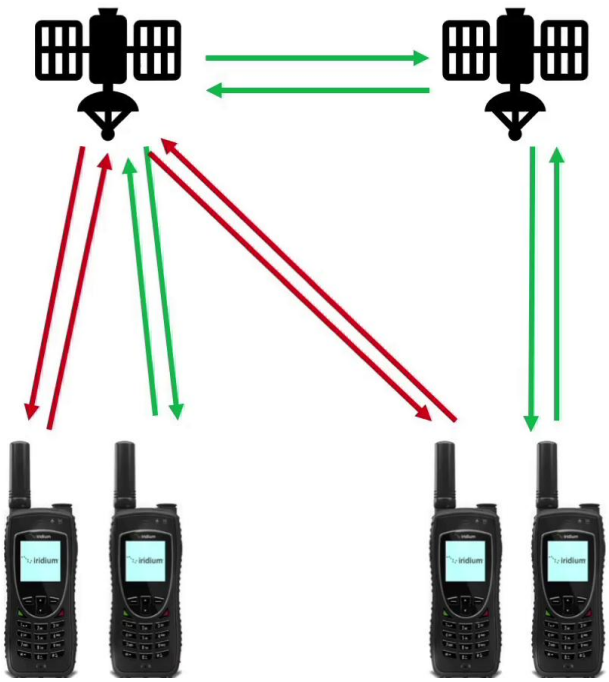

Now that we understood together how the TV satellite business model is working, let's look at the second commercial business model of SatCom. Operators, as Iridium, conceived to deliver satellite mobile services as telephone or small data packets. In this case, and in contrast to the satellite TV model, the telecommunication must be bidirectional from outbound phone to the satellite to the inbound phone and vice versa, because we want to establish a working communication.

Notes

Summary

11m 58s

# SatCom Business Models: Satellite Phone



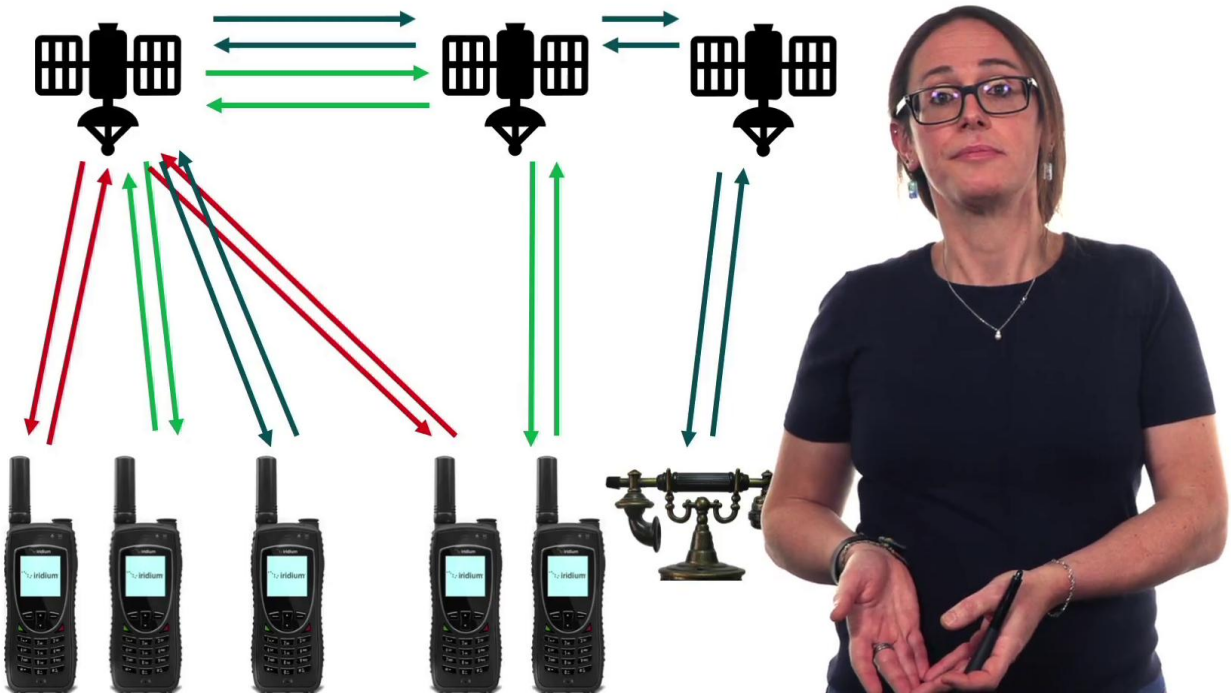
And in difference to the satellite TV business model, multiple satellite telephone users might want to interact with other users at the same time.

Notes

Summary

12m 42s

# SatCom Business Models: Satellite Phone



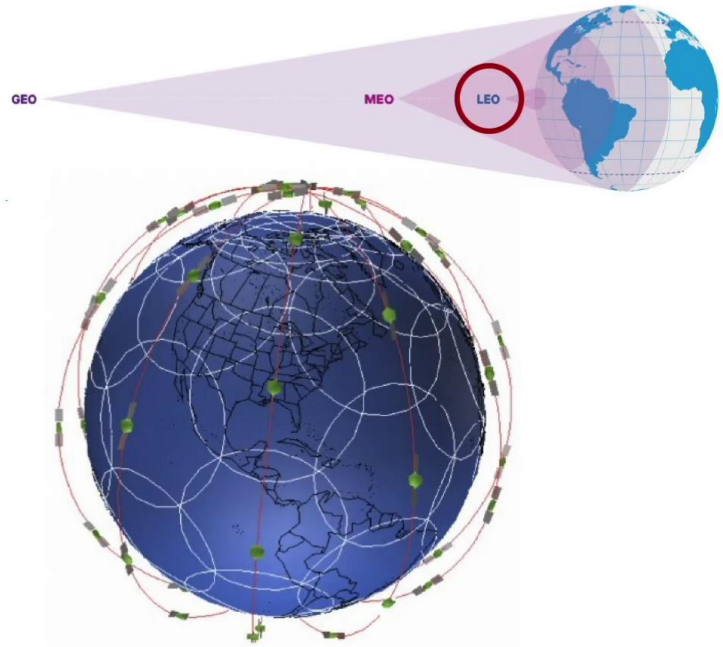
Not only a satellite phone user does not only want to reach out for other satellite phone users, but might also want to reach out for traditional landline or traditional mobile phone users.

Notes

Summary

12m 54s

# SatCom Business Models: Satellite Phone




https://www.satellitetoday.com/content-collection/ses-hub-geo-meo-and-leo/
Muri, McNair "A Survey of Communication Sub-systems for Intersatellite Linked Systems and CubeSat"

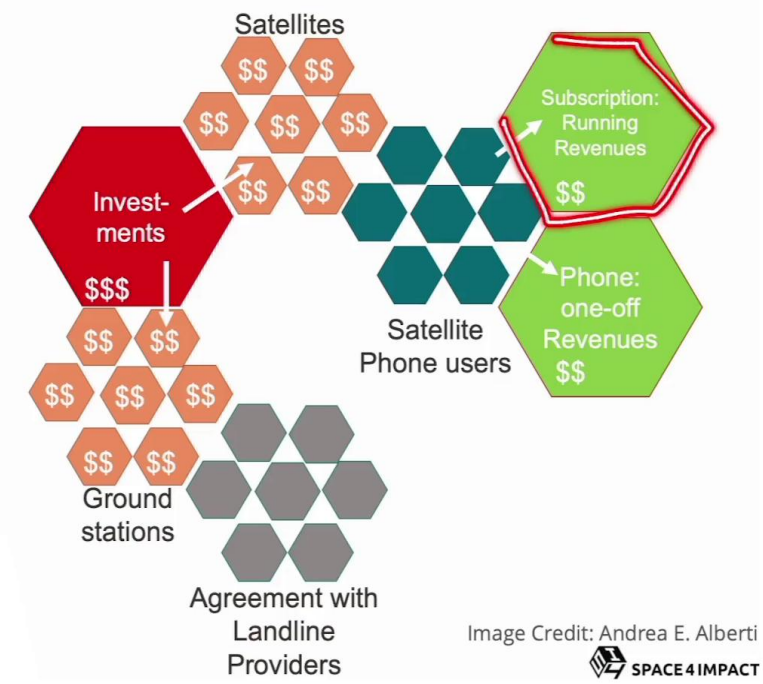
This translates into a differently complex infrastructure than that of a satellite TV. Firstly, we want to reduce the latency of communication for an effective conversation with our counterparts, and therefore, we are going to place our satellites in what is called a low-Earth orbit that is much closer to the Earth. But a LEO satellite might help reduce the latency of the communication from the ground to the space and back to the ground, but its orbit is dynamic with respect to a ground observer. In fact, a LEO satellite performs a full orbit around the Earth in about 90 to 100 minutes. And therefore, if I want to establish an available and reliable satellite phone service, one satellite alone does not suffice. If we want to build a phone network that leverages on space infrastructure, we need a network of satellites. And this network of satellites must deliver a number of different functionalities. First, we want to communicate bilaterally with the ground satellite phone users. Secondly, the satellite must communicate among each other to effectively establish a spaceport communication network. And thirdly, we want the satellites to communicate with the ground phone infrastructure, with the landline phones to enable satellite phone users to be reached and to reach the most traditional customership.

Notes

Summary

13m 12s

# SatCom Business Models: Satellite Phone



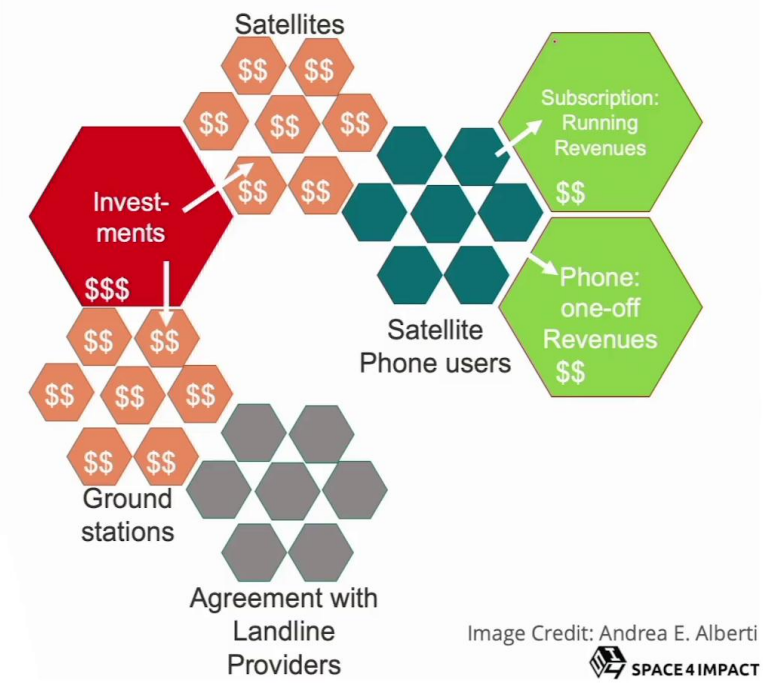

And now the business model of satellite phone looks more complex. My initial investment goes into establishing a network of satellites that need to be coordinated and managed. In the case of Iridium, the first case of satellite phones, 95 satellites needed to be established in order to shape the first fully working constellation. Not only, but while my goal is to establish a self-standing spaceport network of satellites that will serve my satellite phone users, I also need to reach out for the landline infrastructure. I need to establish agreements with landline phone service providers, and I must do it by establishing a number of ground stations and to adapt the ground segment according to the interfaces that the landline providers will provide me. So, while I seek for service testers of my satellite phone services, I can only advertise my services to the user base only once I am able to convince them that I have a functional network, a functional infrastructure that is able to communicate from satellite phone user to satellite phone user and from satellite phone user to landline users. Therefore, my challenge is not only at establishing revenues from the sales of phones and from subscriptions.

Notes

Summary

15m 08s

# SatCom Business Models: Satellite Phone



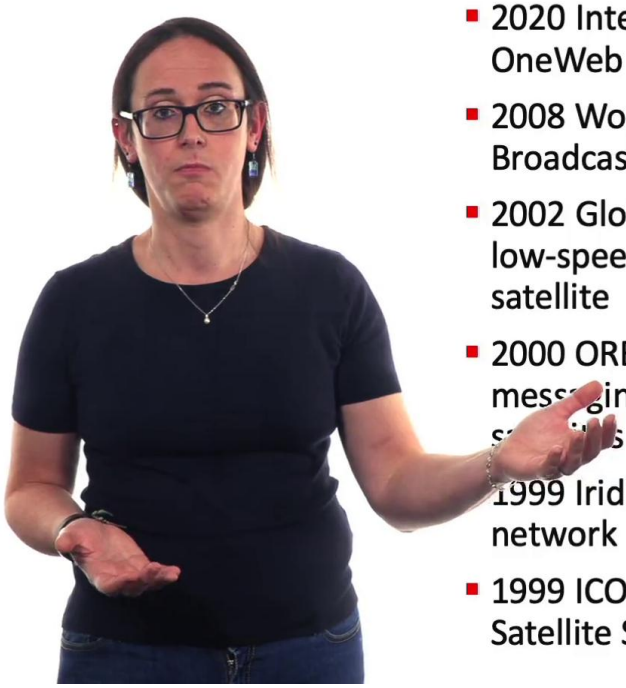

My challenge is trying to establish a customer base that is successful, that is able to cross the chasm between the tech-driven enthusiast, the early adopters, the testers, and what is the mainstream market, the consumers.

Notes

Summary

17m 09s

# SatCom Business Models: Famous Bankrupcies



- 2020 Intelsat, Speedcast International and OneWeb
- 2008 World Space: GEO Digital Radio Broadcasting, 2 satellites
- 2002 Globalstar, LEO satellite phone and low-speed data communications, 48+ satellite
- 2000 ORBCOMM, LEO satellite data and mess[illegible]ging communications services, 35+ s[illegible]s
- 1999 Iridium: Satellite Phone, 77 satellites network
- 1999 ICO Global Communication: Mobile Satellite Services, 12 satellites

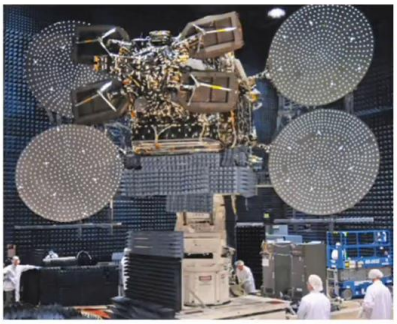
All this translates into a series of difficulties in winning enough market until a steady and sufficient revenue stream starts to pay off the initial and necessary investment that was required to establish my network of satellites and my network of ground stations. The history of the last 20 years of satellite telecommunication has seen a number of filing for bankruptcies, in particular from satellite operators that aspired to establish low-latency network infrastructure for bidirectional communication.

Notes

Summary

17m 30s

# SatCom Business Models: Satellite Internet



Hughes EchoStar 17/Jupiter High Throughput Satellite

Terminals on an aircraft (stackexchange.com)

Terminals on a cruise ship

Satcube Ku portable terminal (Satcube)

Now that we have analyzed together the main two types of business models in satellite telecommunications, let's look quickly together at the satellite Internet services. The model has mixed elements of the television satellite and the phone satellites. The satellite Internet and network capabilities are nowadays deployed on a number of ground-based civil and commercial assets. For example, aircrafts, ships, and deliver connectivity to remote locations or rural areas. Depending on our use, we might want to require a slow or a fast connection, and we might want to require a large or small data allowance. With respect to ideal satellite phone performances for effective phone communication, we are possibly willing to sacrifice something on the latency. In this case, a single satellite in geostationary orbit can serve a large area of the Earth and will be able to adapt to a number of services delivered. Many satellite operators are deploying what are called fixed satellite services, high-throughput satellite services, and mobile satellite services.

Notes

Summary

18m 15s

# SatCom Business Models: Satellite Internet

DSCS-III military satellite in the Atlantis satellite (Wikipedia)


Mobile Earth Stations (STS)

VSAT (Comtech Systems)

Much similar needs are required by military and defense applications with the addition of the due security and confidentiality aspects.

Notes

Summary

19m 52s

# SatCom Business Models: Satellite Internet

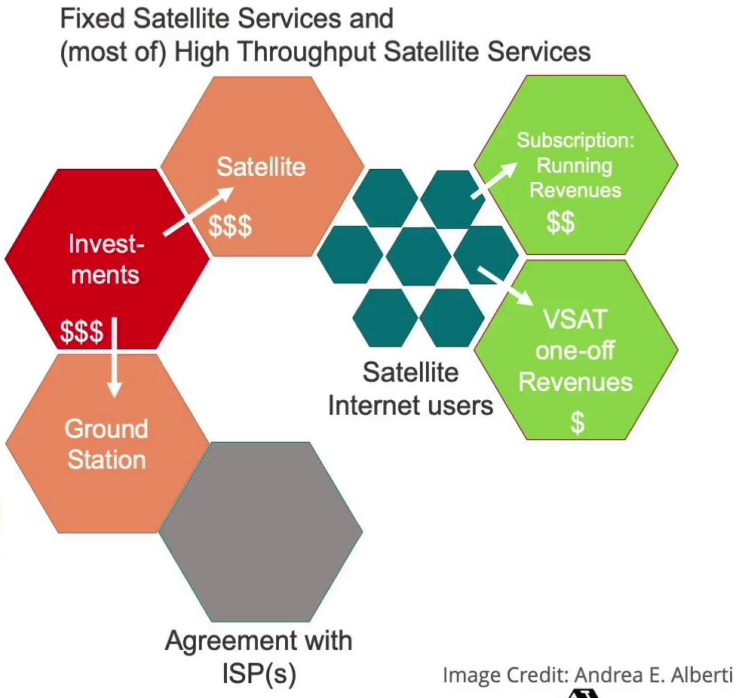



Image Credit: Andrea E. Alberti

SPACE 4 IMPACT

In this case, our simplistic business model representation looks quite similar to that of satellite TV. Eventually, with the further simplification that instead of requiring multiple agreements with TV providers, it might be sufficient to install an agreement with a single Internet service provider.

Notes

Summary

20m 05s

# SatCom Business Models: Satellite Internet


Starlink 60 satellites stack (Reddit)

Starlink groundstation (SpaceX)

Starlink Terminal (SpaceX)

The previous example was looking at how a single satellite in geostationary orbit is able to deliver Internet services for a number of ground-based applications. The approach that instead Starlink, OneWeb, or O3b are taking is instead recalling much more the approach of the satellite phones in particular for the type of infrastructure established. In fact, Starlink, OneWeb, or O3b aim at delivering an available and an effective satellite Internet service with reduced latency. And to do so, they establish a network of satellites that are communicating with ground, with the users, and among each other.

Notes

Summary

20m 29s

# SatCom Business Models: Satellite Internet

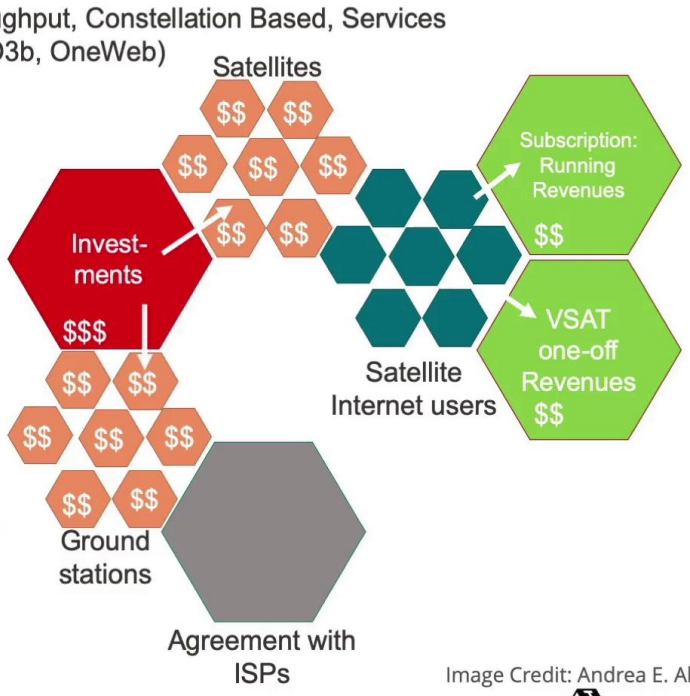



Image Credit: Andrea E. Alberti

SPACE 4 IMPACT

In this case, in the case of constellation-based Internet services, the representation of the business model is looking much more alike that of satellite phones. Eventually again, the simplification is that we will have to deal with a single Internet service provider. Also possibly, the amount of ground station could be simplified depending on the type of network that we establish.

Notes

Summary

21m 25s