

Course Notes
for
Introduction to Satellite Communications
Global VSAT Forum training course GVF500, Edition 2

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Provided as a supplement to Global VSAT Forum training course GVF500

prepared by




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1. Introduction



GVF500 Edition 2
Introduction to Satellite Communications




Introduction

In this lesson we will learn a little about the history of satellite communications, satellite communications today, the Global VSAT Forum, and the topics that we will be studying in this course.

TIP

We strongly recommend that you complete the short course **GVF599 before** starting this course. In GVF599, you will learn how to best use the learning system, how to access reference documents and the glossary, and other general information.




GVF500_ed2_TitlePage_Intro
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Sputnik - the first satellite

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- Sputnik was launched 4 October, 1957 into low earth orbit.
- The spacecraft was small: only 58 cm in diameter and 83.6 kg. Sputnik was battery powered but ran out of power after 3 weeks.
- It performed simple functions such as transmitted audio beeps indicating temperature. Sputnik had no receiver!
- Sputnik burned up in the atmosphere after about 4 months of orbit.



Turn on the audio on your computer to hear a recording of Sputnik's signal.

Satellites developed rapidly

Satcom23
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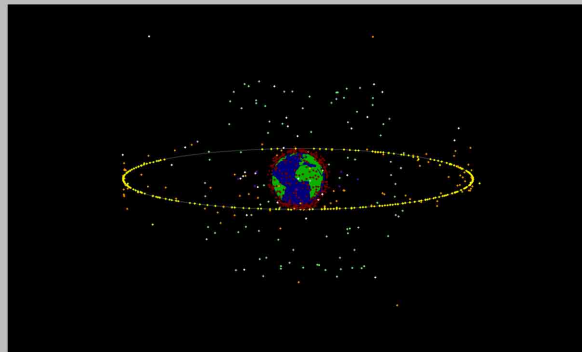
Thanks to the invention of the transistor and the development of high-powered rockets, satellite technology evolved quickly from simple experiments to the high-capacity, broadband delivery platforms we have today.

1945-1957	Concepts for satellite communications are formulated, but no rockets are available yet to make it a reality.
1957-1965	Experimental satellites pave the way for the birth of telecommunications via satellite.
1965 - 1980	Satellites become the major means of international telephone trunking and of video distribution in the U.S.
1980 - 1990	Terrestrial fiber optic links begin to take over the role of high-capacity voice trunking. Satellites are now being used more for large networks of small stations ("VSATs").
1990 - 2005	The next generation of high-power satellites deliver enormous numbers of TV channels to small dishes. Ground equipment costs fall dramatically and consumer satellite broadband is affordable.
2005 - present	High-Throughput Satellites and Ka-band satellites with many spot beams enter active service, further reducing ground terminal costs and increasing transmission speeds.

How many satellites are there now?

Constellation9
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Today there are over 1000 active satellites in orbit. Each dot in this animation represents one active communications satellite.



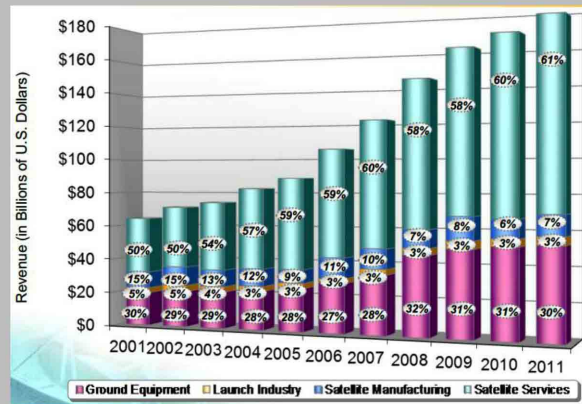
Time is accelerated so you can see how the satellites move around the earth.

We will learn more about the different kinds of orbits that you see here in a later lesson.

The satellite industry market

By 2011, the satellite industry had grown to over 177 billion US dollars.

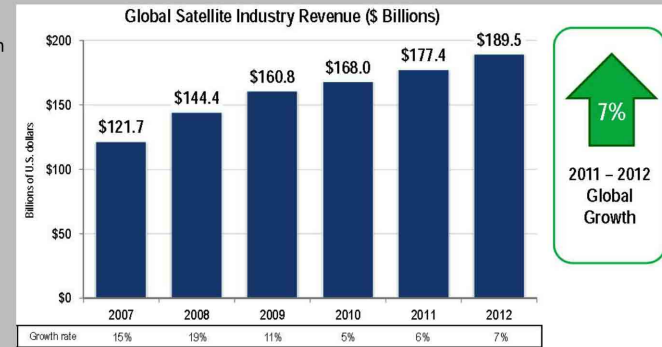
We will learn more about how the industry breaks down in upcoming lessons.



Source: Friends of Futron

Recent satellite industry growth

The global satellite industry grew 7% in 2012, outpacing both worldwide economic growth rate (2.3%) and US growth rate (2.2%).



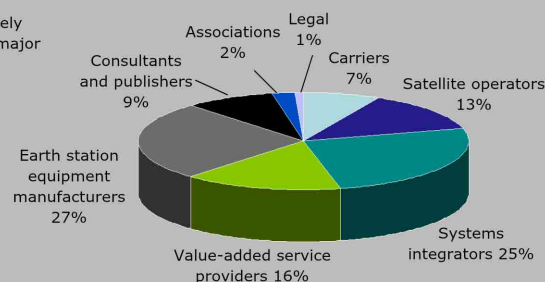
Source: Satellite Industry Association, 2013 State of the Satellite Industry Report

What is the GVF?

The Global VSAT Forum is an association of key companies involved in the business of delivering advanced digital fixed satellite systems and services to consumers, and commercial and government enterprises worldwide.

The GVF is independent and non-profit and has a global responsibility. It is also non-partisan: any companies or organizations with an interest in the VSAT industry are encouraged to join.

GVF members are organizations, not individual people. GVF has approximately 200 member organizations, including major satellite operators, equipment manufacturers, and VSAT integrators.



What will we learn in this course?

First, to give you a sense of how the world uses them, we will survey all the main applications for satellites.

Next, we will learn important fundamentals of satellite communications technology, starting with how wireless links work, all the way through launchers, ground equipment, and service architectures.

From there, we will examine how the satellite industry is structured, the sizes of the various markets, and who the major industry players are.

Finally, we will cover the many ways that satellite communications is regulated.

Terms you should know

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In the satellite industry, a lot of jargon, buzzwords, and acronyms are used. As you go through this course, we'll explain them to you. Here are a few to get you started:

Satellite	In general, satellite means any body orbiting another body in space. In this course satellite means an object orbiting the earth providing communications.
GEO	Geostationary Earth Orbit Satellite. This satellite's position appears almost fixed in the sky.
Inclined Orbit	A type of orbit such that the satellite's position slightly wanders around in the sky.
FSS	Fixed Satellite Service. Satellite communications between two fixed locations on the earth
MSS	Mobile Satellite Service. Satellite communications between mobile earth stations.
Ground Equipment	The general term for equipment used in satellite earth stations
VSAT	Very Small Aperture Terminal. A low cost set of ground equipment that provides two way voice and/or data services via a satellite. Usually a dish less than 2 M.
DTH	Direct To Home television program delivery via satellite.
C-band	Microwave radio frequencies in the 4 to 6 GHz (Giga Hertz) range
Ku-band	Microwave radio frequencies in the 12 to 14 GHz range
Ka-band	Microwave radio frequencies in the 20 to 30 GHz range

If you are ever unsure about the meaning of a word, please check the course Glossary (button at bottom of left column)