High-Capacity Satellite

Technology Overview

Gigabytes is the inventory that broadband suppliers sell. Broadband service providers almost always advertise the speed of their connections, but when networks slow from congestion it is because the service provider has run out of gigabytes, not "speed."

A satellite with about 10 Gigabits per second of throughput (e.g., Spaceway) can deliver an inventory of only about 1 million gigabytes per month at best, to be divided among all subscribers during the busy hours. This lack of capacity has caused operators to over-subscribe their satellites causing congestion during peak hours and leading to the perception that "satellite broadband is not good."

Our new satellite can deliver over 10 times as much inventory, or about 10 million gigabytes per month. ViaSat high throughput satellite technology enables network operators to significantly increase the data volume and speed allocated per subscriber. And that enables each person to enjoy an online experience comparable to terrestrial (DSL and wireless) services and far better than a traditional satellite design.

How it Works

Satellites were initially designed to broadcast the same content to many users. To accomplish that mission, a single beam was formed by the satellite to cover as many potential users as possible. While a good choice for broadcast applications, using a single beam limits capacity.

Today's consumers want individual content, so the challenge is to deliver individual, high-bandwidth content to many subscribers. Not a good fit for traditional satellites.

The ViaSat high-capacity satellite architecture is able to produce a major increase in available bandwidth through two primary design elements:

- Use of higher frequency Ka-band, which has more spectrum available
- Extensive frequency reuse, through a multi spot beam architecture

Spot beam architecture for frequency reuse

Splitting the satellite frequency into small coverage areas called spot beams (similar to mobile phone cells) enables frequency and spectrum to be reused many times – by a factor of 18 for ViaSat-1 – increasing total satellite capacity. To avoid interference, adjacent beams use alternating signal frequencies and polarization.

Spot beam architecture is not a new technology. In fact, WildBlue-1, the satellite currently serving WildBlue satellite broadband to 400,000 subscribers in North America is a Ka-band spot beam satellite. The difference in ViaSat-1 is the refinement of the technology. Our new design optimizes spectrum reuse in every possible way to squeeze the maximum bandwidth out of the satellite.

ViaSat-1 spot beams are also focused on the 75% of the U.S. where the most subscribers are, so spectrum is not wasted in a uniform pattern of beams that disregards potential subscriber location. (Our other satellites, WildBlue-1 and Anik F2, cover the rest of the country.)

Our SurfBeam gateways and terminals increase the total satellite throughput even further through their ability to coordinate frequencies, efficiently allocate spectrum, and adapt to varying link conditions.

AcceleNet for an optimized online experience

In addition to creating low-cost, abundant bandwidth, ViaSat has embedded its AcceleNet® web acceleration technology into the new SurfBeam 2 modem. This network performance enhancing technology makes web applications run with the speed and responsiveness that compare to terrestrial broadband services. AcceleNet goes beyond simple TCP acceleration and contains advanced compression and application-aware enhancements that both reduce transmission requirements and improve the user experience. Compression engines in AcceleNet dramatically reduce both forward and return bandwidth use via format-specific compression techniques.

Latency is always a topic when satellite broadband is discussed. While there will be applications such as online fast-twitch gaming that are not suited to satellite, AcceleNet eliminates most of the latency that typical subscribers have encountered with satellite broadband. When combined with higher link speeds and more bandwidth allocation, AcceleNet creates a user experience that is indistinguishable from a good terrestrial broadband service.