KVH TracPhone®

Understanding Satellite Communications Data Rates

The TracPhone® V7 and the mini-VSAT Broadband℠ service offer a powerful communications solution with outstanding bandwidth and associated data rates at an affordable cost. Here are a few quick and easy things to remember when it comes to bandwidth and data rates for your TracPhone V7, or other satellite communication systems.

Q&A:

### When I subscribe to mini-VSAT Broadband, what do I get?

The mini-VSAT Broadband service is a shared service that allows you to transmit and receive data (e.g., e-mail, Internet pages, VoIP calls, etc.) via a channel with bandwidth allocated based on your selected rate plan. Other popular services like Inmarsat mini-M, Fleet, FleetBroadband and iDirect-based VSAT options are also shared services, meaning that you are sharing the total bandwidth of the channel with other users in your region. The maximum bandwidth currently available via mini-VSAT Broadband is 512 Kbps (kilobits per second) uploads and 2 Mbps (megabits per second) downloads.

How many people am I sharing the channel with?

The ratio of users sharing a single source of bandwidth is expressed as the contention ratio. While mini-VSAT Broadband airtime service operates in a different manner from legacy VSAT and other satellite communication systems, you will experience the equivalent to a traditional contention ratio of no more than 8 users per channel (8:1).

Will I experience any delays in my transmissions due to contention?

Not with mini-VSAT Broadband. Other networks share bandwidth among users through the use of fixed time interval assignments in which your transmission is delayed while everyone in line ahead of you goes first. With mini-VSAT Broadband, KVH and ViaSat use a new approach called Code Reuse Multiple Access (CRMA) to reduce the delays experienced by other services by sending information immediately in "bursts" at the fastest possible data rate.

VSAT Systems using Fixed-assignment TDMA   mini-VSAT Broadband Systems
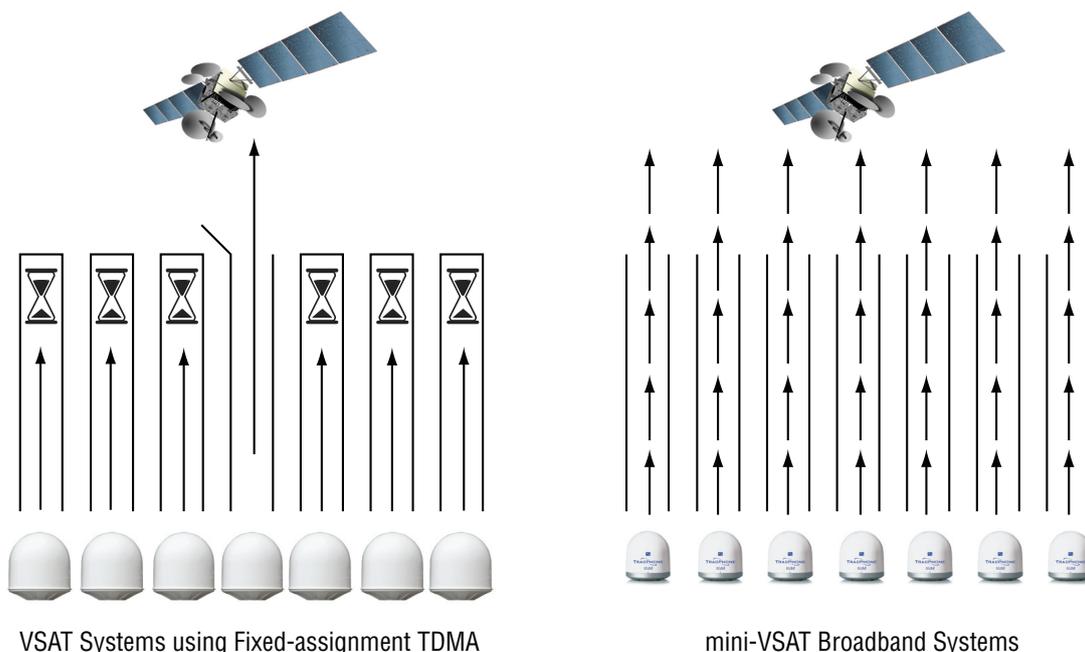
Where other satcom services divide their bandwidth into time slots and allow one transmission at a time, mini-VSAT Broadband's CRMA technology enables users to transmit a constant stream of data bursts, eliminating delays in transmission.

Q&A continued:

Are there other factors that affect actual data rates?

Delivery of mini-VSAT Broadband communications services over a satellite uses an uplink technology known as asynchronous transfer mode (ATM), which uses a portion of the dedicated bandwidth. The data transmissions themselves rely on the Transmission Control Protocol/Internet Protocol (TCP/IP). All satellite communications systems are also affected by latency, which is caused by the distance to and from the satellites.

How does latency affect my communications?

As with all geo-stationary satellite services, mini-VSAT Broadband uses satellites that are 36,000 km above the Equator. Even at the speed of light, the travel time from the boat to the satellite and to the ground station is about ¼ second, a delay known as latency. As a result, sending a message from ship to shore and receiving a reply experiences a ½ second transmission delay. While that doesn't sound like much, it can cause issues with TCP/IP communications, which interpret transmission delays as signals to slow down the data rate.

What is TCP/IP and why is it important when talking about data rates and satellite communications?

TCP/IP is the basic communications language of the Internet, converting a message or file into smaller packets that are transmitted over the Internet and received and reassembled at the correct destination. Each data packet is assigned a header with identifying information that also increases the size of the file to be transmitted.

Designed for use with land-based connections, TCP/IP automatically adjusts based on feedback from the network. This means that a PC sending data will transmit a few packets and then wait for confirmation that the data was received before it sends any more. The transmission rate will increase until the PC no longer receives a confirmation, an indicator of the maximum network speed, and new transmissions will be sent at that speed.

In the eyes of the transmitting PC's TCP/IP connection, however, the delays caused by latency in satellite communications can appear to be a very slow, congested network. When the PC doesn't get the confirmation in a specific time, it will slow down the transmission rate and try again, even though the network is not experiencing any congestion. To overcome some of these TCP/IP issues, the mini-VSAT Broadband service uses acceleration tools that strip off the TCP/IP-created header, reducing the file size and minimising the slowdowns within the TCP/IP process.

So what does all this mean with regard to the upload speeds I'll enjoy?

Taking into account the shared channel, ATM, and TCP/IP, the end result is that you can expect upload speeds 70-80% of the maximum channel bandwidth when using mini-VSAT Broadband, providing you with data connections equivalent to a DSL connection while at sea.

How can I measure the data rates I'm getting using TracPhone V7?

Most online "speed test" sites like SpeedTest.com aren't designed to account for the issues faced by satellite communications. We recommend TPTEST: http://tptest.sourceforge.net/about.php

Please note that if you're in the U.S., the numbers might be a bit lower than expected because the speed server is in Sweden. We also find that speed tests of the simpler UDP provide more accurate data than TCP/IP in these tests.

It's also useful to recognise how Internet traffic and congestion may affect data rates for all users. Here's a good resource: http://www.internettrafficreport.com/

Other Resources

Want to know more about the TracPhone V7 and mini-VSAT Broadband technology? Download our free paper, "TracPhone V7 and mini-VSAT Broadband Service: What Broadband at Sea was Meant to Be" from: http://www.kvh.com/whitepapers

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