



## **Network Management Policy – Exede by ViaSat<sup>1</sup>**

### **I. OVERVIEW**

ViaSat's Internet access network is a shared network; at any given time, subscribers within a given geographic area must share available network capacity with each other. ViaSat aims to provide each subscriber with a "fair share" of that capacity, while providing all subscribers with a high-quality online experience. To achieve these goals, ViaSat employs certain network management practices, designed to prevent any subscriber from placing a disproportionate demand on network resources. Certain of these techniques are used only when the network is congested; others are used more generally.

This policy applies to ViaSat's Exede broadband network. This network was placed into service only recently. As such, ViaSat has limited data with respect to network performance, and cannot predict at this time the network practices that will prove most effective in providing high-quality service performance to subscribers. The initial practices described in this policy are based on ViaSat's experience operating its first-generation WildBlue network, and will be updated from time to time as ViaSat gains greater operational experience with its Exede network. As ViaSat's network management practices evolve, we will post updates to this policy.

ViaSat's congestion management practices are employed only during those occasions when the network experiences congestion. Generally, traffic levels on the Exede network will be well below the point at which congestion would have a significant impact on the user experience. ViaSat does not use congestion management practices during these periods; rather, traffic flows on a "first come, first served" basis. ViaSat has designed its network carefully to achieve this result while ensuring that subscriber prices remain reasonable.

Nevertheless, on occasion, simultaneous transmissions from multiple subscribers result in a total demand for capacity exceeding that available on the Exede network. During these times, the temporary use of ViaSat's congestion management practices ensures that traffic is treated in a manner that minimizes any adverse impact on the user experience while ensuring that no subscriber exceeds his or her "fair share" of available capacity.

More specifically, during periods of congestion, ViaSat gives preference to transmissions based on the sensitivity to delay of the underlying application. ViaSat gives first

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<sup>1</sup> This policy applies to internet services provided on the ViaSat-1, WildBlue-1, Anik F2 and AMC-15 satellites using second generation SurfBeam 2 equipment. ViaSat reserves the right to adopt new or different network management practices (subject to transparency requirements) in response to changes in the market, available technology, and Internet usage.

preference to VoIP traffic, Internet browsing and video streaming applications, second preference to email, file attachments, and similar applications, and third preference to software updates, large file transfers, and similar applications

In addition to its congestion management practices, ViaSat utilizes a number of other techniques designed to enhance the user experience, network security, and the reliability of the Exede network. For example, ViaSat attempts to: (i) suspend accounts to block outbound transmissions of spam; (ii) manage the risk of viruses, worms, and similar intrusions harming the network; (iii) thwart denial-of-service attacks; and (iv) reduce the risk of an intruder gaining access to a subscriber's computer system. In addition, the Exede Terms of Service (defined below) describe certain limitations on the use of the Exede service. This Network Management Policy does not separately address the treatment of traffic that is inconsistent with the intended use of the Exede network as reflected in the Terms of Service.

The net result of these measures is that subscribers, on the whole, enjoy a better overall service experience than they otherwise would.

## II. NETWORK ARCHITECTURE

ViaSat's SurfBeam 2 network incorporates space-based components (*i.e.*, satellites) and ground-based components (*e.g.*, subscriber terminals, "gateway" earth stations). The communications links between space-based and ground-based components use a pre-defined amount of radiofrequency spectrum to communicate without wires.

The satellites incorporated into the Exede network utilize a "bent-pipe" spot-beam architecture. Signals are transmitted from ground facilities to the satellite through a wireless link. The satellite then operates as a "bent pipe" and retransmits those signals back to the ground, through another wireless link. Transmissions occur within individual "spot" beams, each of which covers a defined geographic area.<sup>2</sup>

Each subscriber location is associated with a single spot beam. More specifically, each subscriber location is associated with a given spot beam channel (a subdivision of the capacity available on a spot beam). ViaSat strives to load its system so that at any given time traffic patterns across different channels within a given spot beam are roughly the same. Available capacity within any given spot beam or beam channel is fixed; subscribers assigned to a given channel share the available bandwidth in channel.

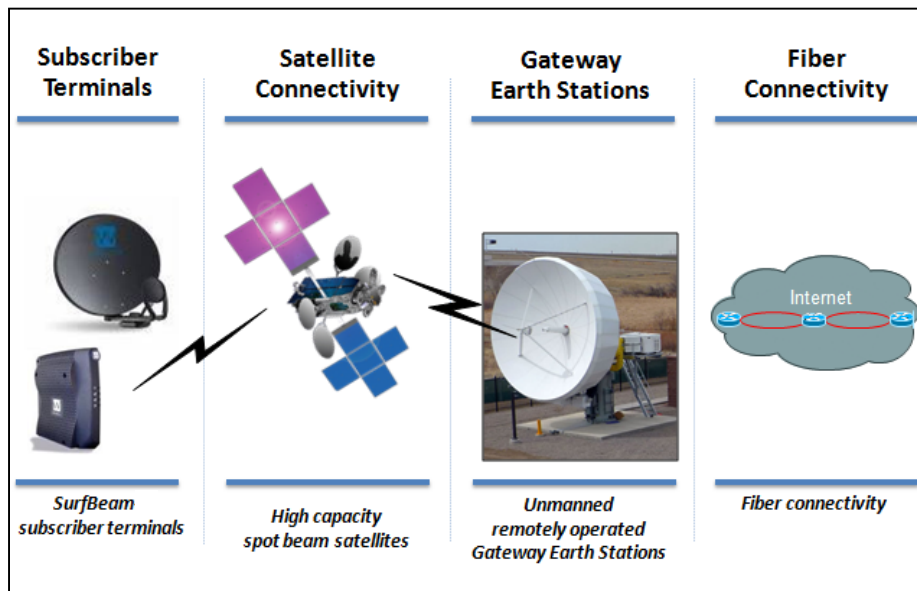
Subscribers are required to utilize certain ViaSat equipment, including an antenna and modem, in order to obtain a network connection at their location. Once they have that network connection, almost any computer device with an Ethernet port can be connected to the Exede modem. Exede does not restrict the ability of subscribers to connect devices of their choice to the Exede network in this fashion (other than as described in the Terms of Service).

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<sup>2</sup> This network architecture allows Exede to increase aggregate capacity dramatically relative to the capacity that would be possible without the use of spot beams, since the same radiofrequency spectrum can be re-used across in different spot beams serving other geographic areas.

Subscriber traffic is routed to and from the Internet (and other public networks) through a designated ground-based facility known as a “gateway” earth station. At each gateway, traffic is processed through a satellite modem termination system (“SMTS”) and other terrestrial networking equipment, which then interconnects with a terrestrial fiber optic network and, eventually, the Internet.

The following illustration shows a simplified version of the SurfBeam architecture:



### III. CONGESTION MANAGEMENT PRACTICES

#### A. Congestion Management Overview

ViaSat manages its network to minimize the adverse impact, if any, that occasional network congestion may have on the user experience. Congestion typically occurs in the link between the subscriber terminal and the satellite, where network capacity is most limited. In order to determine whether congestion has reached unacceptable levels, Exede continuously monitors the use of each spot beam channel, and identifies those channels with atypically high levels of traffic. ViaSat then manages the use of those channels to give preference to subscriber applications with greater sensitivity to delay.

#### B. Mitigating the Impact of Network Congestion on the User Experience

The Exede network is designed to ensure that it generally does not experience congestion. Normally, traffic is routed between the subscriber terminal and the satellite on a “first-come, first-served” basis, and it is not necessary for ViaSat to employ congestion management practices. That said, while network capacity is abundant, it is not unlimited. Stated differently, ViaSat has determined that occasional congestion can be tolerated so that it can provide service at reasonable rates.

Internet traffic is “bursty” in nature; traffic flows generally are not continuous, but rather are characterized by staccato “bursts” of data. On occasion, simultaneous transmissions from multiple subscribers in a given spot beam channel result in a total instantaneous demand for capacity exceeding, on a temporary basis, that available within the channel. On such occasions, the Exede network can experience congestion. Congestion most typically occurs during the network’s “peak” usage hours (which generally can be expected to be from about 5:00 PM to 10:30 PM local time at the subscriber location, depending on the day of the week).

When a particular channel becomes congested, the Exede network will respond to mitigate the adverse impact of that congestion on the user experience. Network congestion, and the resulting transmission delay, impacts the user experience with respect to some types of applications more than others. For example, a delay in the rendering of a web page can be noticeable to a subscriber who is waiting for the content to appear on their screen. On the other hand, a subscriber downloading a bulk file (*e.g.* a software update) may be less impacted if the download takes longer during congestion than it otherwise would, since the subscriber may already know that the download requires some time to complete.

ViaSat’s goal is to manage its network to minimize the qualitative impact of any network congestion on traffic that otherwise is consistent with the Exede Terms of Service. To accomplish this objective, ViaSat utilizes an algorithm that reduces the throughput of all traffic, but gives a preference to (*i.e.*, has a lesser effect on) transmissions involving applications that are more sensitive to delay. ViaSat determines the nature of relevant traffic using deep-packet inspection. More specifically, during periods of congestion:

- The network gives high preference for VOIP, video/audio streaming/progressive downloads, and Internet browsing (both HTTP and HTTPS) applications (“Level 1 Traffic”).
- The network gives second preference to email, small file attachments or transfers, and similar applications (“Level 2 Traffic”), which are less time-sensitive. In general, small files are files less than 50 MBs, although ViaSat may vary the size of file it considers to be “small” from time to time in order to best optimize network performance. Under congestion, the subscriber may experience somewhat lower speeds for Level 2 Traffic than for Level 1 Traffic transmitted during this time.
- The network gives lowest preference to software updates, large file transfers, and similar applications (“Level 3 Traffic”) where, due to the longer duration of the overall transaction, longer delays are more acceptable than for the other levels of traffic (above). During congestion, subscribers may experience longer transfer times for large downloads.

In addition, during times of congestion, ViaSat may “weight” the priority of Level 1 -3 Traffic by using various network settings. For example, ViaSat may direct the network to try to achieve a higher minimum speed for Level 1 Traffic than for Level 3 Traffic. ViaSat anticipates allocating portions of the total available bandwidth to each type of traffic, where that type of traffic would be prioritized over the other traffic levels. For example, ViaSat might allocate the

total available bandwidth among the three levels of traffic in a 65-25-10 ratio. In that scenario, Level 1 Traffic would have the highest priority for 65% of the bandwidth, Level 2 Traffic would receive highest priority for 25% of the bandwidth, and Level 3 Traffic would have highest priority for 10% of the bandwidth. ViaSat will be testing various system settings and making adjustments to achieve the best possible performance.

ViaSat does not intentionally block any particular form of traffic or reset a subscriber connection that otherwise complies with the Exede Terms of Service, except that ViaSat may block NetBios, TCP/UDP port 135-139 at the user terminal. These services allow file sharing over networks. When improperly configured, they can expose critical system files or give system access to any malicious intruder connected to the network. Further, from time to time, ViaSat may block additional ports that it reasonably believes may be a security risk to the network.

#### **IV. OTHER FORMS OF NETWORK MANAGEMENT**

In addition to its congestion management practices, Exede utilizes a number of other techniques designed to enhance the user experience, security, and the reliability of the Exede network. For example, ViaSat actively works to: (i) suspend accounts to block outbound transmissions of spam; (ii) manage the risk of viruses, worms and similar intrusions from harming the network; (iii) thwart denial-of-service attacks; and (iv) reduce the risk of an intruder gaining access to a subscriber's computer system. The specific techniques used by ViaSat are not disclosed here, in order to ensure that these practices remain effective and cannot be deliberately circumvented.

In addition, each of the Exede service plans incorporates a Data Allowance Policy, which limit the amount of data a subscriber can transmit and receive each month for a given service level, before speeds and/or access are curtailed.

#### **V. OTHER TERMS OF SERVICE**

Additional information relevant to Exede network management practices is contained in the following documents (referred to collectively as the Exede "Terms of Service"), which are available on the Exede website at [www.exede.com/legal](http://www.exede.com/legal):

- Customer Agreement
- Subscriber Privacy Policy
- Data Allowance Policy
- Acceptable Use Policy

Exede incorporates the substance of these documents by reference.

#### **VI. QUESTIONS AND COMMENTS**

If you have any questions about Exede broadband Internet access services or any network management practices, please visit the Exede website at [www.exede.com](http://www.exede.com) or contact customer service at 1-855-GOEXEDE.