**Network Management Policy – WildBlue Network[1]**

I.      OVERVIEW

        WildBlue'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.  WildBlue 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, WildBlue 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.

        WildBlue's congestion management practices are employed only during those occasions when the network experiences congestion.  Generally, traffic levels on the WildBlue network are well below the point at which congestion would have a significant impact on the user experience.  WildBlue does not use congestion management practices during these periods; rather, traffic flows on a "first come, first served" basis.  WildBlue 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 WildBlue network.  At such times, the temporary use of WildBlue'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:

        (i)      WildBlue gives preference to transmissions based on the sensitivity to delay of the underlying application.  WildBlue gives first preference to Internet browsing and video streaming applications, next preference to email, FTP and similar applications, and lowest preference to software updates, large file transfers, and similar applications.

        (ii)     WildBlue gives preference to subscribers that do not exceed predefined "Quota Management Thresholds" within a given 30-minute evaluation period, relative to subscribers that do exceed such thresholds.

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[1]     This policy applies to internet services provided on the WildBlue-1, Anik F2 and AMC-15 satellites using first generation SurfBeam equipment.  A different policy will apply to internet services provided using next generation SurfBeam equipment, including all services provided through the ViaSat-1 satellite.  WildBlue 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.

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In addition to its congestion management practices, WildBlue utilizes a number of other techniques designed to enhance the user experience, network security, and the reliability of the WildBlue network. For example, WildBlue 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, WildBlue's Terms of Service (defined below) describe certain limitations on the use of the SurfBeam service. This Network Management Policy does not separately address the treatment of traffic that is inconsistent with the intended use of the WildBlue 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

WildBlue's SurfBeam 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 WildBlue 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.[2]

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). Subscribers cannot be reassigned dynamically from one channel to another, but WildBlue 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, but do not share bandwidth with subscribers located in other spot beams or on other channels within the same spot beam.
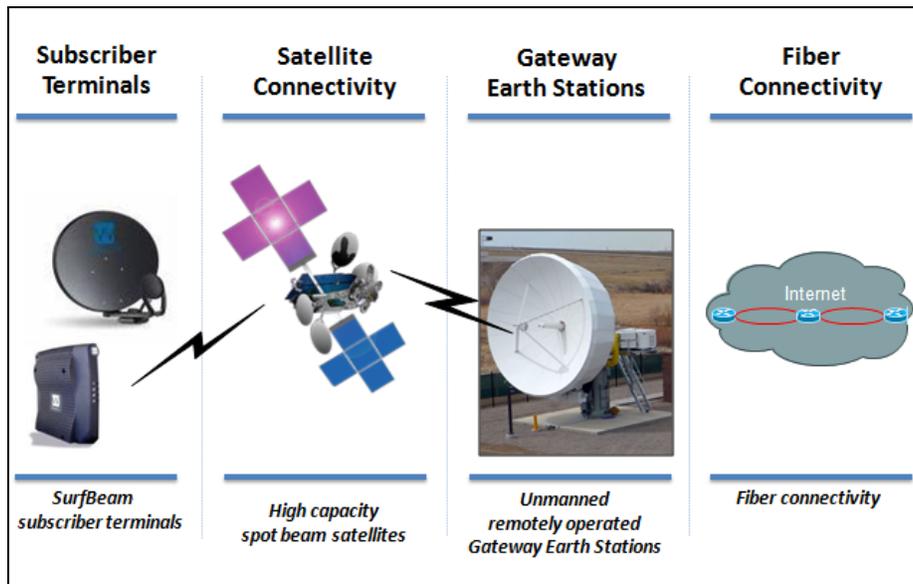
Subscribers are required to utilize certain WildBlue equipment, including an antenna and modem, in order to obtain a WildBlue network connection at their location. Once they have that network connection, almost any computer device with an Ethernet port can be connected to the WildBlue modem. WildBlue does not restrict the ability of subscribers to connect devices of their choice to the WildBlue network in this fashion (other than as described in WildBlue's Terms of Service).

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[2]    This network architecture allows WildBlue 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.

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Subscriber traffic is routed to and from the Internet (and other public networks) through one of thirteen ground-based facilities known as "gateway" earth stations. 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.

WildBlue uses Cisco's SCE 2020 and 8000 traffic management devices for its SurfBeam network management. These devices are deployed in WildBlue's gateways and allow WildBlue to manage traffic over its entire network.

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



## III. CONGESTION MANAGEMENT PRACTICES

### A. Congestion Management Generally

WildBlue 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, WildBlue continuously monitors the use of each spot beam channel, and identifies those channels with atypically high levels of traffic. WildBlue then manages the use of those channels to: (i) give preference to subscriber applications with greater sensitivity to delay; and (ii) help to avoid any given subscriber using more than his or her "fair share" of network resources.

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

The WildBlue 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 WildBlue to employ congestion management practices.  That said, while network capacity is abundant, it is not unlimited.  Stated differently, WildBlue 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 WildBlue network can experience congestion, resulting in reduced network performance.  Congestion most typically occurs during the network's "peak" usage hours (which generally can 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 WildBlue network will respond to mitigate the adverse impact of that congestion on the user experience.  WildBlue manages congestion through two principal methods:

**1.      Application Preferences**

Network congestion, and the resulting transmission delay, impacts the user experience with respect to some types of applications more than others.  For example, even a minor delay in the rendering of a web page will be noticeable to a subscriber.  On the other hand, a subscriber downloading a bulk file (*e.g.,* a software application) will not be impacted significantly if the download takes several seconds longer than it otherwise would.

WildBlue's goal is to manage its network to minimize the qualitative impact of any network congestion on traffic that otherwise is consistent with WildBlue's Terms of Service.  To accomplish this objective, WildBlue 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 sensitive to delay.  WildBlue determines the nature of relevant traffic using deep-packet inspection, including hardware-based capabilities native to the Cisco SCE traffic management devices discussed above.  More specifically, during periods of congestion:

- WildBlue gives first preference to Internet browsing and video streaming applications to ensure that web pages are rendered as quickly as possible ("Level 1 Traffic").

- WildBlue gives second preference to email, FTP and similar applications ("Level 2 Traffic") where buffers allow for millisecond delays with little or no impact on application performance.

- WildBlue gives lowest preference to software updates, large file transfers, and similar applications ("Level 3 Traffic") where a few seconds of delay should have little or no impact on application performance.

WildBlue implements these preferences by instructing the network to use "best efforts" to provide a minimum rate (*i.e.*, Best Efforts Minimum Rate or "BEMR") of at least: (i) 70 percent of Peak Information Rate (PIR) for Level 1 Traffic; (ii) 30 percent of PIR for Level 2 Traffic; and (iii) 10 percent of PIR for Level 3 Traffic.

WildBlue does not intentionally block any particular form of traffic or reset a subscriber connection that otherwise complies with WildBlue's Terms of Service.

### 2.     Quota Management Thresholds

During periods of downstream congestion, WildBlue also takes measures to ensure that no subscriber uses more than his or her "fair share" of network capacity. WildBlue evaluates each subscriber's usage during successive 30-minute periods (the evaluation periods for different subscribers may begin and end at different times). Within any given evaluation period, WildBlue measures subscriber usage (in MB) against a defined Quota Management Threshold ("QMTs"). Subscriber usage beyond the applicable QMT indicates disproportionately high network consumption by that subscriber that is inconsistent with fair, shared use of the network during period of congestion. The applicable QMT is defined based on the service level chosen by a given subscriber (Value, Select, or Pro/Pro Plus), such that a subscriber purchasing a higher service level may consume more capacity without exceeding the applicable QMT.

WildBlue applies the QMTs reflected in the table below. If a subscriber exceeds the applicable QMT within a given 30-minute period, he or she will be placed into a "Reduced Priority" state on a temporary basis, until his or her level of usage returns to a normal level. If a subscriber in a "Reduced Priority" state exceeds the QMT again during the subsequent 30-minute period, he or she will be placed into a "Low Priority" state on a temporary basis, until his or her level of usage returns to a normal level. WildBlue has defined its QMTs such that they are expected to have primary impact on only the top 10 percent of bandwidth consumers on the WildBlue network, based on empirical analysis of historical traffic patterns.
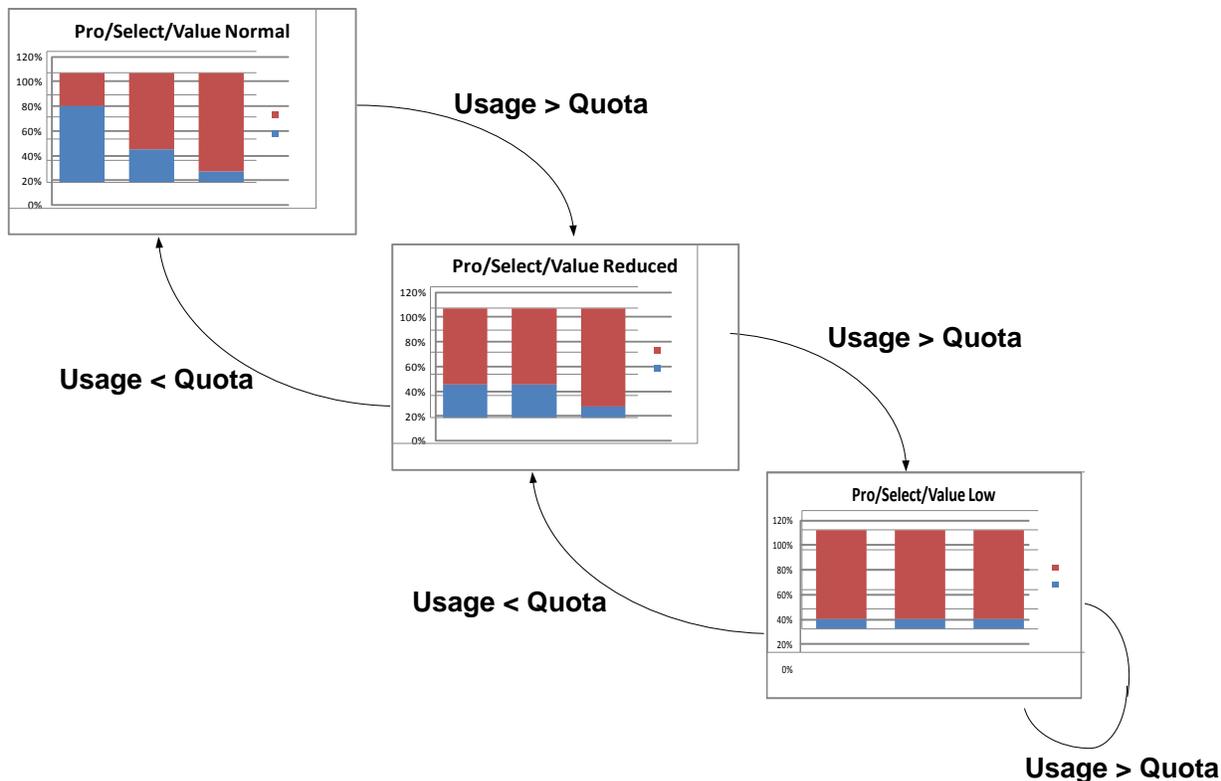
### Quota Measurement Thresholds

| Service Level | Quota Measurement Threshold (QMT) | Estimated Web Page Downloads Possible without Exceeding QMT* |
|---|---|---|
| Value | 30 MB | Over 90 in a 30 minute period |
| Select | 45 MB | Over 135 in a 30 minute period |
| Pro/Pro Plus | 67.5 MB | Over 200 in a 30 minute period |

   * Based on Google analytics estimate that a web page averages 320 KB in size.

Traffic to or from subscribers in a "Normal Priority" state (*i.e.*, those subscribers that have not exceeded the applicable QMT) receives a preference as compared to traffic to or from subscribers in a "Reduced Priority" or "Low Priority" state. WildBlue implements these preferences by adjusting the BEMRs applicable to that subscriber, as reflected in the diagram

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below (note that applicable BEMRs also vary based on the nature of the underlying application, as discussed above).

**<u>Application of Quota Management Thresholds</u>**



Subscribers in a "Reduced Priority" or "Low Priority" state may experience slower web page loading, reduced performance during streaming activities, and/or reduced transmission speeds.

If a subscriber in a "Reduced Priority" or "Low Priority" state materially reduces his or her use of the WildBlue network, such that usage during a subsequent 30-minute evaluation period is below the applicable QMT, the subscriber will be moved from a "Low Priority" state to a "Reduced Priority" state, or from a "Reduced Priority" state to a "Low Priority" state. Thus, a subscriber in a "Low Priority" state must maintain usage under the QMT for two successive 30-minute evaluation periods in order to return to a "Normal Prioity" state. Based on traffic projections, we expect about 4-6.5 percent of subscribers on the network to be moved to a "Reduced Priority" state during a given "peak" usage period, and about 2.5 percent of subscribers to be moved to a "Low Priority" state during a given "peak" usage period.

IV.     OTHER FORMS OF NETWORK MANAGEMENT

In addition to its congestion management practices, WildBlue utilizes a number of other techniques designed to enhance the user experience, security, and the reliability of the WildBlue network. For example, WildBlue actively works to: (i) suspend accounts to block outbound transmissions of spam; (ii) manage the risk of viruses, worms and similar intrusions

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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 WildBlue are not disclosed here, in order to ensure that these practices remain effective and cannot be deliberately circumvented.

In addition, each of WildBlue's 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 WildBlue's network management practices is contained in the following documents (referred to collectively herein as WildBlue's "Terms of Service"), which are available on the WildBlue website at www.wildblue.com/legal:

- Customer Agreement

- Subscriber Privacy Policy

- Fair Access (or Data Allowance) Policy

- Acceptable Use Policy

WildBlue incorporates the substance of these documents by reference.

## VI.     QUESTIONS AND COMMENTS

If you have any questions about WildBlue's broadband Internet access services or any network management practices, please visit WildBlue's website at www.wildblue.com or contact WildBlue customer service at 1-866-WILDBLUE.

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