

1.0 Principles for BridgeLink Broadband Network Management

BridgeLink strives to provide its customers with non-discriminatory broadband Internet access at high speeds and at a reasonable price. In order to meet this goal, BridgeLink employs a number of reasonable network management practices.

This document describes the reasonable network management practices that apply to services and usage provided on BridgeLink's network. BridgeLink is not responsible for delays, congestion or any network management techniques that occur on the Internet or the networks of other carriers. Subject to the reasonable network management practices, BridgeLink does not block the ability of its customers to access lawful websites nor will BridgeLink block applications that provide voice or video services.

2.0 Service Description

BridgeLink offers a variety of Internet access options for residential consumers. The offerings vary by download and upload speeds. BridgeLink uses 5G Fixed Wireless technology deployed in a given geographical area that determines the speed tiers that are available to consumers. Not all speed tiers are available in all areas.

2.1 Service Technology

BridgeLink operates a 5G Fixed Wireless network platform to provide Internet access. This technology utilizes a number of macrocellular towers over the Citizens Broadband Radio Service (CBRS) spectrum over the 3.5 GHz range. This service is designed for fixed broadband usage and does not support mobile devices.

2.2 Service Performance

While BridgeLink categorizes each offering based on maximum speeds, the actual speed a customer experiences will vary depending upon numerous factors, many of which are beyond BridgeLink's control. Common factors that can affect the actual speeds that a consumer receives include, but are not limited to:

- the capabilities or limitations of the customer's computer or other device;
- the number of computers or other devices in use in the customer's home network;
- the means of connecting to the BridgeLink network (e.g., the condition of the home's inside wire or the type and condition of WiFi router);
- the distance of the home from the BridgeLink broadband network aggregation point;
- the performance of the content and application providers the consumer is accessing as well as their host network; and
- the use of specialized services, such as IPTV, over last mile facilities.

Performance can also vary depending upon the level of congestion on the network at a given time. For example, consumers may experience slower speeds during peak usage times when many users are accessing the Internet simultaneously. The peak congestion period is typically between 7:00 pm – 11:00 pm Monday through Friday for fixed broadband Internet access.

Estimated median download and upload speeds and latency for each speed tier offered by BridgeLink is shown below in Table 1. The performance was derived from performance tests conducted in a lab environment during the design and build of the BridgeLink product as production environment data is unavailable at this time. Individual subscriber’s experiences will likely vary.

Table 1

**Performance of BridgeLink
5G Fixed Wireless Service Offerings**

Speed Tier	Download Speed	Upload Speed	Latency
25 Mbps x 3 Mbps (5G Fixed Wireless)	20	2.4	40
50 Mbps x 5 Mbps (5G Fixed Wireless)	40	4	40
100 Mbps x 20 Mbps (5G Fixed Wireless)	80	16	40
* Estimated download and upload speeds based on an estimated 80% of maximum bandwidth availability.			

3.0 Network Management Practices

3.1 Congestion Management

Network congestion is similar to traffic congestion -- it is the result of an excessive amount of traffic (data packets) making simultaneous use of limited infrastructure (broadband networks). All ISPs rely upon some shared facilities to deliver services to the end user. ISPs cannot guarantee that the full bandwidth of each user’s connection will always be available on demand.

Congestion can be caused either by long-term trends, such as increased demand for Internet services, or by short-term and unexpected demand surges. Significant new developments, popular content releases, and even computer virus outbreaks can drive short-term spikes in utilization that can significantly affect bandwidth consumption. BridgeLink is constantly analyzing traffic patterns and upgrading services and facilities to keep up with this demand. BridgeLink’s goal is to provide the highest possible speeds to the largest number of consumers at a reasonable price and on a non-discriminatory basis.

3.1.1 Congestion Management on the BridgeLink 5G Fixed Wireless Network

Congestion typically occurs in the aggregation layer of the network. The aggregation layer is found at the location where the facility to a customer premise joins the larger network and where traffic is routed over shared network facilities. For 5G-based services aggregation begins at the part of the network called the radio and gNodeB of each macrocellular service the uplink speeds and specific topologies at the aggregation points vary based on demand, availability, and the limitations of the particular radio equipment.

Although BridgeLink continually upgrades its facilities to address the long-term increases in Internet traffic, these upgrades cannot alleviate congestion caused by short-term spikes in demand that consumers may experience. During such periods of congestion when the amount

of traffic attempting to traverse the network exceeds the available capacity at an aggregation point, all traffic passing through that aggregation point will be slowed until demand decreases. In other words, all traffic is treated the same and no consumers or applications are given priority. This is often referred to as Best Effort routing.

BridgeLink does not discriminate against any particular traffic type or source/destination nor does it block or rate-control any specific protocols on its 5G Fixed Wireless network.

3.3 Device Attachment Rules

BridgeLink provides all Internet Access subscribers with the appropriate equipment, CBSD on the exterior of the home and gateway(s) in the interior of the home, configured to provide optimal performance with their service. BridgeLink requires using a BridgeLink provided CBSD radio to provide Internet access as this device must register with a Spectrum Access System to function. BridgeLink recommends using a BridgeLink provided gateway, which is specially configured to provide optimum service allowing the best support possible. However, BridgeLink does not prohibit the use of lawful, non-harmful, third-party supplied routers or gateways on the BridgeLink network. If a customer connects his or her own device, BridgeLink cannot guarantee the service will work and may not be able to provide support in the event of a problem.

3.4 Security

BridgeLink monitors network performance 24 hours a day, 365 days a year to quickly detect and respond to service degradation or impairment. Threats to network health can take many forms such as port scanning, wherein one customer attempts to open multiple sessions with hundreds or thousands of other users in hopes of discovering exploitable vulnerabilities, or Denial of Service (DOS) attacks in which one or more users direct an unreasonably high amount of traffic at a particular destination in an effort to overwhelm its capacity to respond. In many cases, this type of malicious traffic originates from a customer whose computer has itself been compromised or infected with a virus. When such a threat is detected, BridgeLink engineers will evaluate the impact or the potential for impact and take appropriate steps to mitigate damage to the network and BridgeLink's customers.

4.3 Redress Options

Questions or concerns regarding BridgeLink's broadband Internet service should be directed to 1-866-725-9029, on-line via: <https://www.bridgelinkinternet.com/contact/>. Consumers may also utilize the FCC's informal or formal complaint process by contacting the FCC at 1-888-225-5322 or on-line via: <https://consumercomplaints.fcc.gov>.

5.0 Law Enforcement Obligations

Nothing in these network management practices supersedes or limits the ability of BridgeLink to address the needs of emergency communications or law enforcement, public safety or national security authorities, consistent with or as permitted by applicable law.

6.0 Glossary

5G Fixed Wireless - is a broadband service that uses 5G wireless technology, from the 3GPP organization, to deliver internet connectivity to homes and businesses.

Aggregation device - various methods of combining multiple network connections in parallel to increase throughput beyond what a single connection could sustain, and to provide redundancy in case one of the links fails.

Citizens Band Radio Service (CBRS) – is a shared spectrum in the 3.5 GHz band, designated for a mix of commercial and government use.

Citizens Broadband Service Device (CBSD) - is an outdoor radio device designed to operate within the CBRS band, providing wireless connectivity by transmitting and receiving signals to and from user devices and other network nodes.

Congestion - is a period during which customer demand exceeds network capacity. Congestion can occur due to high usage or consumer demand during certain times of the day (*i.e.* during peak times), particularly in highly populated locations.

Download - is the speed of the connection when receiving data from the Internet to your computer.

Gateway/Router - is a home networking device, used as a gateway to connect devices in the home to the Internet or other WAN.

gNodeB – is the base station in a 5G mobile network, responsible for managing radio communications between the 5G core network and the CBSD at the subscriber's location.

Latency - is commonly measured as the time it takes for a data packet to travel back and forth over the broadband provider's network. Lower latency means better quality, but a small amount of latency associated with the distance travelled is unavoidable. It is measured either *one-way* (the time from the source sending a packet to the destination receiving it), or *round-trip* (the one-way latency from source to destination plus the one-way latency from the destination back to the source).

Packet Loss - is commonly measured as the percentage of packets that enter the broadband provider's network but are not delivered. The most common cause of packet loss is network congestion. Lower packet loss means better quality, but a small amount of packet loss is expected, and some applications adjust their sending rate by measuring packet loss.

Spectrum Access System (SAS) - is a dynamic spectrum management system that coordinates the use of the CBRS band to prevent interference among different users, including incumbent users, Priority Access License (PAL) holders, and General Authorized Access (GAA) users. It automates the allocation and reassignment of spectrum resources in real-time, ensuring efficient and fair access to the band while protecting higher-priority users.

Throughput - is the sum of the data rates that are delivered to all terminals in a network.

Upload – is the speed of the connection when sending data from your computer to the Internet.