Bloomberg

Bloomberg Network Connectivity Guide

Technical Guide

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1. Overview

This document provides network and connectivity specifications for Bloomberg products and services. The information given is intended to make the process of configuring a client system and network easy and reliable, for both initial setup and regular maintenance. It is intended for desktop, systems and network administrators, as well as home and/or standalone users.

Bloomberg also provides a range of other supplemental documentation on setting up, configuring and maintaining the Bloomberg Terminal®. These are available on the Documentation Support page of the <u>Bloomberg Professional Services website</u>. For further information on procedures, technical questions, and common troubleshooting steps, visit the <u>Frequently A sked Questions</u> section.

For any additional clarification or assistance regarding any of the topics covered here or in other documents, Bloomberg Customer Support is available 24/7 for any queries.

Please note that the information provided in this document is for informational purposes only, is subject to change, and is provided without any representation or warranty, express or implied, as to the accuracy or completeness of such information. Provision of applicable services is subject to agreement to the terms and conditions of a definitive final contract. In the event of any inconsistency between this information and the terms of a final contract, the terms of the final contract shall govern.

2. Bloomberg Network Access Requirements

2.1. Access to the Bloomberg Infrastructure via Network Access services

Access to the Bloomberg infrastructure includes defined connectivity protocols and standards. All applicable configuration parameters are fully tested to work with Bloomberg applications and services and are optimized for failover scenarios.

Configurations are deployed using automated provisioning tools to eliminate any manual errors. Bloomberg is unable to support or store any bespoke configurations or modified parameters.

Bloomberg offers 24/7 customer support that is dedicated to providing a fast and efficient service. By following this model, Bloomberg is able to provide the best possible technical assistance to our clients.

Figure 1. below, shows customer access to Bloomberg's infrastructure using Bloomberg's Network Access service. This access includes connectivity to Bloomberg's network, and its data centers.

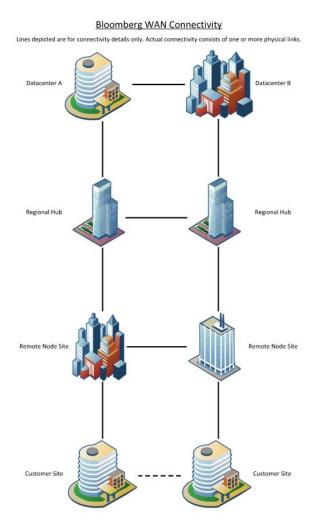


Figure 1. Overview of Bloomberg's Network Access service

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Bloomberg provisions redundant communication circuits among Bloomberg's data centers. Connectivity to a given customer site requires yet another set of private/leased circuits from Bloomberg's data centers (usually from the remote node sites depending on geographical locations) to customer locations.

Figure 1. Depicts a model where a Network Access services customer site is connected to the nearest Bloomberg nodes utilizing two redundant circuits. More detailed diagrams can be found in the appendix.

2.2. Capacity and Bandwidth Requirements - Bloomberg Terminal

Bloomberg support teams determine the size/capacity of these circuits based on the number of Terminals at a given customer location. Table 1 below, shows Bloomberg's Network Access quideline.

Bloomberg Terminal Network Guideline													
Terminal Count	Router Quantity	Bloomberg Appliances	LAN Interface*	Access Capacity									
< 10	1	-	1Gb	5 - 10 Mbps									
10 - 30	2 2		1Gb 5 - 10 Mbps										
31 – 40	2	2	1Gb	10 - 20 Mbps									
41 – 50	2	2	1Gb	20 - 50 Mbps									
51- 100	2	2	1Gb	50 - 100 Mbps									
100-250	2	2	10Gb	100 - 1000 Mbps									
250+	2	4**	10Gb	100 - 1000 Mbps									

- The bandwidth guideline table is based on statistical analysis of network utilization of existing Bloomberg terminals
 across the global Bloomberg customer base as well as circuit size offering by various telecom service providers.
 Individual customer connectivity and bandwidth capacity recommendations are made based on continual automated
 monitoring as well as evaluation by Bloomberg customer support personnel.
- The actual Network Access capacity is subject to availability at the time of the order.
- For customer sites with 1-9 Terminals a single router and circuit with backup through the Internet may be acceptable. All other customer sites are required to have multiple diverse circuits and dual routers.
- The bandwidth (bps) recommendations are for a single router. Dual router sites will require double the stated bandwidth.
- (*) LAN interface duplex set on client's request OR Auto/Auto if client doesn't have a preference.
- (**) more Bloomberg Appliances may be required.

Table 1. - Network Access Guideline

Connectivity from Bloomberg node sites to customer locations terminate at Bloomberg supplied routers installed at the customer sites. These are referred to as **CPE** (Customer Premises Equipment) routers. Bloomberg support teams work with customer IT staff to install and connect up these routers.

Figure 1. Depicts a redundant circuit installation, which in turn requires two Bloomberg CPE routers. Bloomberg CPE routers may also come with an attached server module (except in a very few cases). The combination of the router and server are known as the **Bloomberg Appliance**. The server modules are Linux based and are designed to fan out Bloomberg data services locally for better WAN circuit utilization. Bloomberg Appliances are installed in pairs when there are 10 or more Terminals and are always attached to a pair of CPE routers. Single Bloomberg Appliance deployment (not in pairs) may be implemented for a client's Disaster Recovery (DR) site.

Prior to shipping CPE routers and/or Bloomberg Appliances to a customer site, customers will receive a "Router Survey Document". In this survey, the customer's IT personnel specify the IP addresses of the LAN ports (the router Ethernet ports that connect to the client's LAN infrastructure) of the Bloomberg CPE routers for configuration. Additional technical information is also discussed and decided on, such as the routing protocols; eBGP (with BFD support), HSRP, VRRP and Static routes for use between Bloomberg CPE routers and the customer's network environment. It is important to note that the Bloomberg CPE routers and Bloomberg Appliances are entirely owned and operated by Bloomberg and customers must not access or attempt to access the equipment's configuration.

2.3. Network Address Specifications – Bloomberg Terminal

Customers must provide IP addresses on which the Bloomberg CPE routers will reside within the customer network. These IP addresses, along with any other used to connect to Bloomberg, do not necessarily have to be IANA registered.

Table 2. The required IP address ranges to which customers must be able to connect in order to access Bloomberg Terminal services. Customers must ensure they can route to these IP addresses, and more specific subnets within these ranges.

Bloomberg IP Address Ranges:
208.134.161.0/24
205.183.246.0/24
199.105.176.0/21
199.105.184.0/23
69.184.0.0/16

Table 2. Bloomberg IP address ranges

2.4. Network Ports - Bloomberg Terminal

In addition to the required IP address ranges, it is also necessary for specific UDP and TCP port ranges to be allowed through customer access lists and firewalls. Table 3. Below shows Bloomberg's specific ports. It should be noted that the destination ports specified are the port numbers that Bloomberg servers listen on at the Bloomberg data centers.

The Bloomberg Terminal uses the following source and destination port numbers. Please note, destination is from the client (Terminal) perspective.

UDP Source Ports	UDP Destination Ports
48129 – 48137 & 49152 - 655351	48129 — 48137

TCP Source Ports	TCP Destination Ports
8194-8395 & 49152 - 655351	8194 — 8198
8194-8395 & 49152 - 655351	8209 — 8220
8194-8395 & 49152 - 655351	8290 — 8294

¹ Denotes the Microsoft default ephemeral port range used by Windows Vista and later Operating Systems.

Table 3. Bloomberg Private Network UDP and TCP Ports

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2.5. Network Address Specifications – Enterprise and Feeds Products

Bloomberg offers a wide range of Enterprise solutions for business needs, which extend beyond the Bloomberg Terminal. Specific Enterprise solutions are offered in seven business areas: Content and Technology, Decision Support, Client Management, Liquidity and Trading, Risk and Pricing, Operations, Regulations and Compliance. For more information on Bloomberg Enterprise products please visit:

https://www.bloomberg.com/professional/products/data/data-connectivity/enterprise-ipaas/

In addition, we also offer electronic trading solutions for equities (including futures and options), fixed income, foreign exchange, commodities and many more.

For the list of products, please refer to the Bloomberg website. Alternatively, on the Terminal you may visit BPS<GO> and browse the left-hand menu to understand more about the different solutions we offer our customers.

Table 4. lists the IP ranges used for Bloomberg Enterprise / Feeds Product Servers connecting via Bloomberg Leased/Dedicated lines. Customers must ensure they can route to these networks and more specific subnets within these ranges.

Enterprise / Feed Bloomberg Network Address Ranges:
69.184.0.0/16
160.43.13.0/24
160.43.14.0/23
160.43.16.0/23
160.43.24.0/24
160.43.90.0/23
160.43.92.0/22
160.43.96.0/23
160.43.98.0/24
160.43.166.0/24
160.43.172.0/24

Table 4. Bloomberg Enterprise / Feed IP Ranges

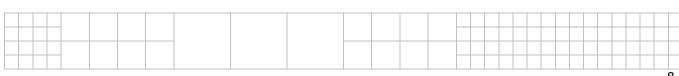
2.6. Network Ports – Enterprise and Feeds Products

Feeds products that use FIX connectivity utilize TCP- 8228; SFTP utilize TCP- 22. The Majority of Enterprise / Feeds products establish connectivity via the ports listed below in Table 5.

TCD Destination Borts	8194-8198
TCP Destination Ports	8228

Table 5. Bloomberg Enterprise / Feed TCP Ports

^{**} For detailed source and destination IP/ports information, please contact the product representative or visit the Bloomberg website for more info https://www.bloomberg.com/professional/



^{**} Some of the ports requires Bloomberg Server whitelisting

2.7. Bloomberg CPE Router

This section outlines customer network requirements to access the Bloomberg Terminal service via our Network Access services and CPE router:

- Ethernet network that supports IP
- Minimum CAT5e UTP cable from the customer switch, router or firewall to the Bloomberg Access Router for 1Gbps connections
- Multimode fiber **only** for 10Gbps connections
- IP address and subnet mask for the local Ethernet interface on the Bloomberg Access Router. (Bloomberg will provide an IP address for customers without an existing IP Address scheme).

One or more Bloomberg CPE Routers may be installed at each customer site. These routers provide the following benefits:

Enhanced Data Delivery

The Bloomberg CPE router uses the IP network protocol and addressing scheme along with a dynamic access list to receive and deliver data.

Seamless Integration

Installing a Bloomberg CPE router requires minimal configuration changes and will not impact the customer network topology or performance. At least a CAT5e/6 UTP cable must be run from the customer switch, router or firewall to distribute data to and via the Bloomberg services.

Security

The Bloomberg CPE Router communicates only to the private Bloomberg Network. This is ensured through dynamic access lists on each Bloomberg CPE Router in addition to fixed virtual circuit path definitions based on the underlying Data-Link protocol TLS.

The Bloomberg CPE router may reside outside LAN firewalls to further ensure LAN integrity.

The Bloomberg Terminal Software utilizes both UDP and TCP connections (see *Table 3*. *Bloomberg Private Network UDP and TCP Ports*) and contains various components and applications such as Bloomberg API, Tradebook, FX and multimedia that utilize multiple ports.

In the event of a failure, an alternate path is established on the host end to transport Bloomberg data. For locations with multiple Bloomberg CPE Routers and redundant circuits, Bloomberg supports BGP, HSRP, VRRP and static routes for redundancy, provided there is a crosslink connection between the two devices. In a split site scenario where there is no crosslink between the two Bloomberg routers, Bloomberg will only support BGP for failover.

3. Internet and BRIN (Bloomberg over Reliable Internet)

3.1. Network Address Specifications

For Internet and BRIN connections, the customer's PC must have Internet connectivity and the ability to resolve DNS names in the following domains:

*.bloomberg.net
*.bloomberg.com
*.blpprofessional.com
*.btogo.com

Table 6. Bloomberg Domains

- For Internet connections, the customer PC must be able to connect to the following Bloomberg subnets. (See Table 7. Internet and BRIN IP Ranges).
- **BRIN** (Bloomberg over Reliable Internet). Bloomberg utilizes various 3rd party Internet presence providers to improve the Internet connectivity experience and reliability for the Terminal. The customer PC must be able to connect to ANY IP address via Bloomberg specified ports. (See Table 8. Bloomberg Internet UDP and TCP Ports). Customers must also ensure they can route to these networks and more specific subnets within these ranges:

Internet / BRIN Bloomberg Network Address Ranges:
69.187.16.0/20
69.187.32.0/19
69.187.72.0/21
69.191.176.0/20
69.191.192.0/18
103.251.205.0/24
160.43.250.0/24
160.43.251.0/24
160.43.252.0/24
160.43.253.0/24
205.216.112.0/24
206.156.53.0/24
208.22.56.0/24
208.22.57.0/24

Table 7. Internet and BRIN IP Ranges

3.2. Network Ports

The customer PC must be able to connect to the following Bloomberg ports:

UDP Destination Ports	48129-48137
	8194-8198
TCP Destination Ports	8209-8220, 8228
	8290-8294

Table 8. Bloomberg Internet UDP and TCP Ports

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\vdash	+								-	+	+	-	+	\vdash	+	+	+	+-	\vdash
														ш					
																			10

4. Bloomberg DCA Add-In

4.1. Bloomberg DCA Network Address Specifications

Bloomberg DCA is an Excel add-in used by clients to publish their own data to the Bloomberg Terminal. The add-in requires one pair of the following IPs to be whitelisted on the client's firewall to ensure data transmission. Please confirm with your Contributions Account Manager which pair of IPs will be used for your firm. No whitelisting of client IPs is required on the Bloomberg side for this application.

TCP Destination Port										
11011										
Leased Line Network Addresses	Internet Network Addresses									
EMEA:	Internet:									
69.184.36.14/32	69.191.193.148/32									
69.184.37.18/32	69.191.229.73/32									
AMER:	Internet2:									
69.184.4.23/32	69.191.193.174/32									
69.184.5.15/32	69.191.229.119/32									
APAC:	Internet3:									
69.184.68.18/32	69.191.193.175/32									
69.184.69.28/32	69.191.229.120/32									

Table 9. Bloomberg DCA Port and Network Addresses

5. SFTP Connectivity

5.1. Bloomberg SFTP Connectivity Overview

BB-SFTP enables a set of Bloomberg-provided SFTP accounts to be used for transferring files. Access to BB-SFTP is restricted to SFTP Users. SFTP Users may use the Bloomberg Network access or the Internet to access BB-SFTP.

Access to BB-SFTP is only permitted from an IP address previously provided by SFTP Users to Bloomberg; that IP address will be used to create an account-specific IP address whitelist. SFTP Users are responsible for configuration changes within their own environments and for ensuring that they make any necessary changes to their firewalls to enable BB-SFTP access.

For further details on this topic and a FULL connectivity breakdown; Including DNS and IP details, please see the 'Help' section of the Enterprise Console (Login Required).

https://console.bloomberg.com

For Internet connectivity, customers are advised to use the DNS **sftp.bloomberg.com** or **sftp.blpprofessional.com** (China), not use IP addresses directly.

Customers connecting via Bloomberg Network Access services should connect to the Virtual IP in the region they are connecting from. Customers not directly targeting a specific site should connect to the Virtual IP listed in our SFTP documentation. If the customer relies on site specific file locations, they should target the server IP of that data center. Customers choosing to target server IPs in either of our Data Centers directly over Bloomberg Network Access services need to handle failover themselves. Automatic failover will only be handled if clients target the VIP.

5.2. BVault SFTP

URL	Addresses	Port	Region
ftpcom.bloomberg.com	69.191.251.78 69.191.212.14	30206	Global

Table 10. BVault SFTP

6. Additional Network Requirements

6.1. Requirements to Access Content from Web Links on the Terminal

The Bloomberg Terminal service provides links to selected webpages and this functionality will utilize the default browser on the customer's PC or otherwise within the customer's corporate environment. The customers locally installed browsers and corporate proxies will govern service and display of the web content. The computer must, at minimum have:

- Internet Access
- HTTP Port 80 must be allowed to access any proxy server or firewall
- HTTPS Port 443 must be allowed to access any proxy server or firewall

Bloomberg news articles from Terminal functions such as NH NS1<GO> which load web content inside the Bloomberg application, will use Bloomberg's browser engine implemented by blpwebview.exe and blpbrowser.exe. Bloomberg's browser engine technology is based on a subset of Google's Chromium project web browser. Each function that requires the display of web content may create one or more instances of blpwebview.exe and blpbrowser.exe.

Bloomberg's recommendations for successful use of "In Terminal web content" are as follows:

- Customers should configure Anti-Virus / Security software not to interfere with launching and execution of Bloomberg's blpwebview.exe and blpbrowser.exe process.
- TCP/IP Communication from blpwebview.exe and blpbrowser.exe to external networks should be permitted on the firewall or security software, similar to the policy for the default desktop web browser.
- Customers should permit a user agent similar to Google Chrome desktop browser to send HTTP requests from clients' PCs. If this is restricted, please contact Bloomberg support teams for further assistance.

6.2. Network requirements for Bloomberg Lab

LAB <GO> launches the Bloomberg Lab that you can use to analyze financial markets with modern developer tooling. To use Bloomberg Lab for Desktop, your system administrator must configure your network to allow the following domain:

URL	Port	Purpose	Direction
*.blpprofessional.com	HTTPS / 443	Wildcard URL required to access the Bloomberg Lab for Desktop Platform and the Bloomberg Lab Help Center	Egress (Outbound)

									Т	Т	Т		Т	Т	Т	Т	П	Т	
							Н	\forall		\top	+		\dashv		+			+	٦
									\top	\top	+		\dashv	\top	\top			\top	٦
							П		\top	\top	+		\dashv	\top	\top			\top	٦
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In addition, the following HTTP request methods must be allowed:

- GET
- HEAD
- POST
- PUT
- DELETE
- CONNECT (Used by browser to make connections to your internal proxy only)
- OPTIONS
- TRACE
- PATCH

Bloomberg Lab for Desktop also relies on your network's ability to allow WebSockets and HTTP cookies from Bloomberg. Firewalls and similar endpoint protection software must not display intermediary warning pages before visiting Bloomberg Lab for Desktop in your browser.

For Bloomberg Lab for Enterprise, your system administrator must also configure your network to allow the following domains:

URL	Port	Purpose	Direction
<cluster_subdomain_name>.bloomberg-quant.com</cluster_subdomain_name>	HTTPS / 443	URL for external traffic to your cluster. The <cluster_subdomain_name> is randomized by default. Ask your technical account manager to supply you with this subdomain.</cluster_subdomain_name>	Egress (Outbound)
bsso.blpprofessional.com	HTTPS / 443	A single sign-on authentication mechanism to create secure connections to Bloomberg resources.	Egress (Outbound)
help.bquant.blpprofessional.com	HTTPS / 443	The Bloomberg Lab Center. This site includes product information, tutorials, API references, and other documentation for Bloomberg Lab.	Egress (Outbound)
service.blpprofessional.com	HTTPS / 443	The Customer Service Center for Bloomberg Enterprise products. You can use this to activate users' data entitlement permissions.	Egress (Outbound)

6.3. Firewalls

Most customer networks with an outside connection to the Internet will have some form of security in place, such as a firewall. A firewall may be installed either locally on the customer PC, on the network, or both. In order for customers to access the Bloomberg Terminal with full functionality, their firewall must be set to assume all incoming and outgoing activity from the Bloomberg services are safe. The customer's firewall must allow connectivity on all the ports and addresses provided in the relevant sections of this document.

Should a customer experience any connection loss or slowness to and from the Bloomberg services, the customer firewall will be considered as a likely factor and should be verified in the first instance.

Bloomberg Terminal's TLS connections are secured using both Client and Server Certificates. Bloomberg servers do not allow TLS connections from any device which does not have a valid Client Certificate. SSL interception is not supported.

For Terminal Connect product, local firewall must allow listening on localhost port range:

Localhost port range	9000-9020
----------------------	-----------

6.4. Virtual Private Network (VPN)

Traveling Bloomberg Anywhere users can remotely access the Bloomberg Terminal service on their usual desktop PC by remoting into their corporate network using an Internet connection. To configure the application software to connect over a VPN connection, type CONN <Go> within the Bloomberg application to open the **Advanced Connection Options**. Under the *Settings* tab, check the <u>Use any local IP address</u> box. The VPN server must be configured to forward the network traffic to the Bloomberg routers on the private network. In some cases, the VPN connection must also pass through a proxy server; therefore, the proxy settings need to be configured as well. The details for this are given in section 6.5.

6.5. Socks5 Proxy Server - Bloomberg Terminal Services

For customers using a SOCKS5 Proxy Server, the Bloomberg Terminal services will communicate with the proxy server and the proxy server will in turn communicate to the Bloomberg servers.

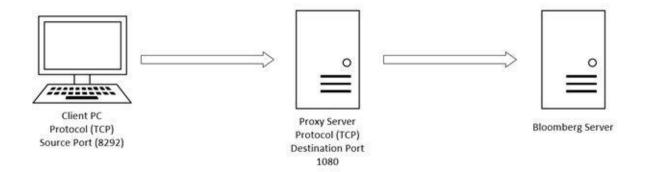


Figure 2. Client to Proxy Server Communication Example

The Bloomberg Terminal will send TCP communication by default to port 1080 on the SOCKS5 Proxy Server. Upon initial connection, the Terminal will select the source port for this connection. This destination port 1080 may be different if the proxy server administrator has configured the proxy server to run on a different port. The source ports will be the same as the standard Bloomberg source ports (See *Table 3. Bloomberg Private Network UDP and TCP Ports and Table 8. Bloomberg Internet UDP and TCP Ports).*

In order for the Bloomberg software to connect with the proxy server, type CONN<GO> within the Bloomberg application to open the "Advanced Connection Options". Under the Settings tab, there are two sets of SOCKS5 Proxy Server settings, one for connections using Bloomberg Network Access services and one for connections using the Internet.

To allow API connectivity, ensure that "API settings follow Terminal settings" in the Advanced Connection Options, CONN<GO> is checked. SOCKS 5 Proxy settings can be customized for BBComm in the BBComm Configuration tool. This can be accessed by clicking; Start – Programs – Bloomberg – BBComm Configuration to open the configuration window. Click the SOCKS5 button and enter the appropriate DNS or IP addresses.

The communication between the SOCKS5 server and Bloomberg is the same as defined in this document for Bloomberg Network Access services and Internet connectivity for the relevant Source and Destination Ports sections. The Source ports used however, will be defined and limited by the server administrator.

7. Appendix

7.1. Connectivity Diagrams

Single Customer Site - Single CPE

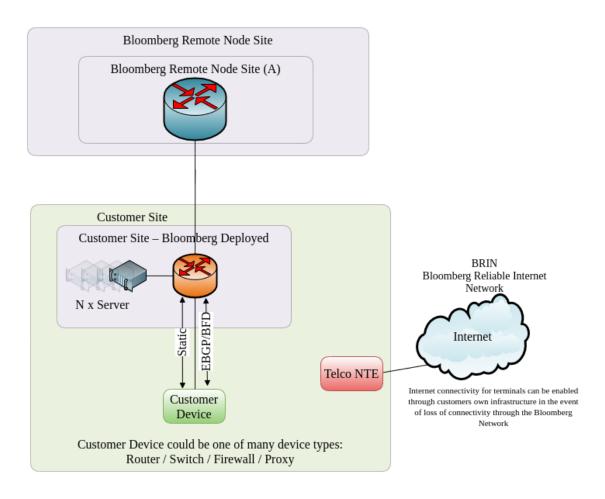


Figure 3. Single Site – Single CPE Network Diagram

Single Customer Site - Dual CPE

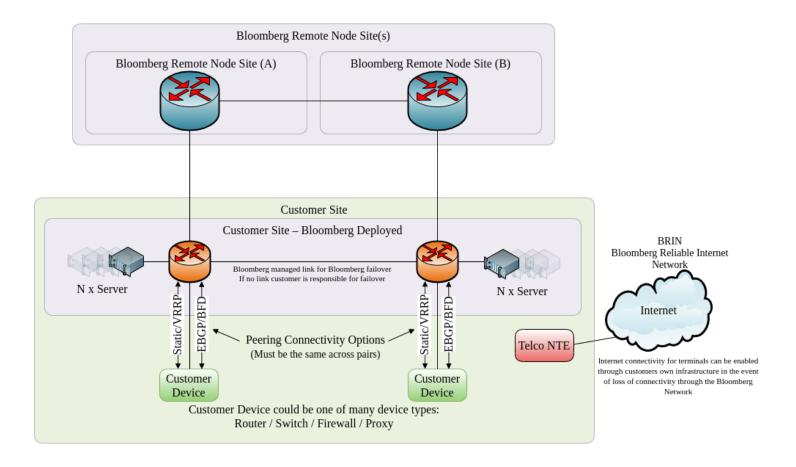


Figure 4. Single Site - Dual CPE Network Diagram

Dual Customer Site - Single CPE

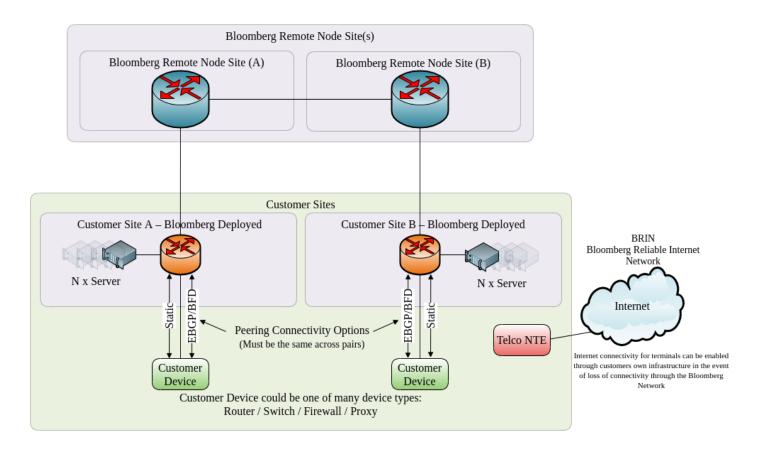


Figure 5. Dual Site - Single CPE Network Diagram

Dual Customer Site - Dual CPE

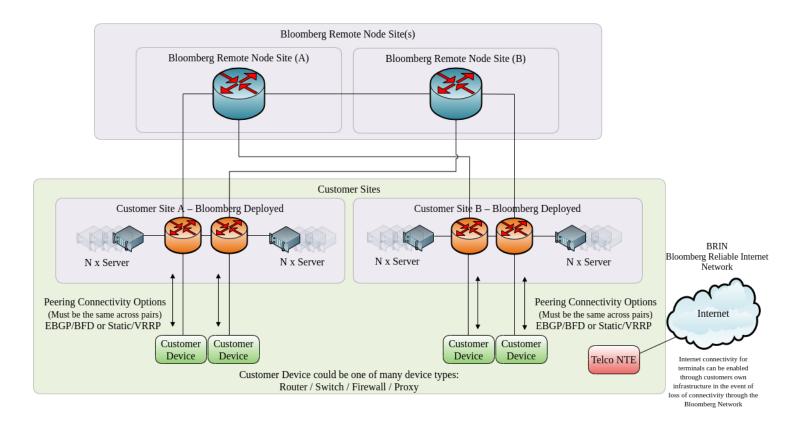


Figure 6. Dual Site – Dual CPE Network Diagram

Connectivity via Internet

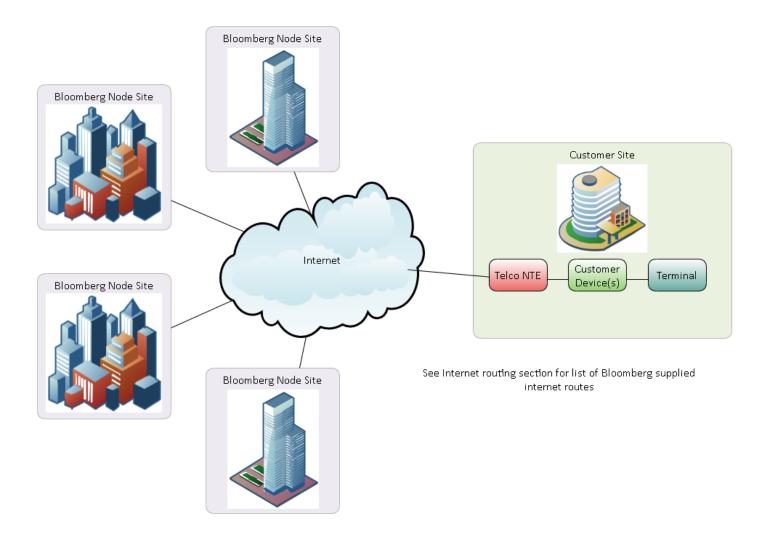


Figure 7. Connectivity via Internet Network Diagram