BM&FBOVESPA
The New Exchange

BM&FBOVESPA TECHNOLOGY INFRASTRUCTURE ACCESS MANUAL

CONTENTS

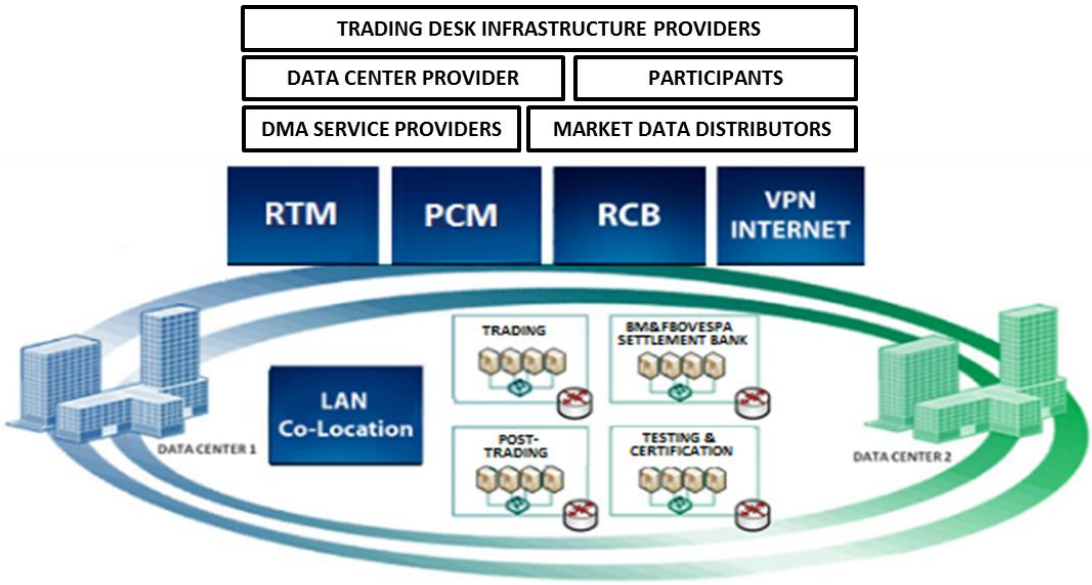
CHANGE LOG

Date	Version	Description	Area Responsible
9/11/2013	2.1	UOL DIVEO included as Annex 3 accredited telecommunications operator for RCB	DO/DRD-GDSE
9/22/2013	2.2	TIM/AES discontinued as BM&FBOVESPA-accredited operator	DO/DRD-GDSE
9/26/2013	2.2	Operator name change: Global Crossing now called Level 3	DO/DRD-GDSE
9/19/2014	3.0	LAN-to-LAN Internet VPN – Trading for Estação Mega Bolsa discontinued	DI-CSSR
9/19/2014	3.0	Embratel / Primesys contact details updated	DO/DRD-GDSE
9/19/2014	3.0	RCB – Way of Access 5 – included	DO-CMKD
9/19/2014	3.0	LAN-to-LAN Internet VPN included for shared access to BM&FBOVESPA's technology infrastructure	DO/DRD-GDSE
9/19/2014	3.0	Annex 5 – Access to Data Center 1 and Data Center 2 included	DI-CPRE
9/19/2014	3.0	RCB – Waym of Access 4 revised	DI-GSSR
9/19/2014	3.0	Chapter 7 revised and updated ("Provider of Technology Infrastructure for Connecting Trading Desks to the Trading System")	DI-GSSR
9/19/2014	3.0	Chapter 8 included ("Data Center Provider")	DI-GSSR
9/19/2014	3.0	Annexes 1 and 3 revised and updated	DO/DRD-GDSE
3/13/2015	3.0	Oi Telecomunicações discontinued as BM&FBOVESPA-accredited operator	DI-GSSR
3/13/2015	3.0	RCCF – Financial Community Communications Network discontinued.	DI-GSSR
3/13/2015	3.0	Annex 4: Post-trade and BM&FBOVESPA Market Data - BOVESPA Segment - minimum recommended bandwidth updated.	DI-GSSR
3/13/2015	3.0	New reference for BM&FBOVESPA Market Data Conflated, iBalcão, and ePUMA - minimum recommended bandwidth.	DI-GSSR
03/13/2015	3.0	Annex 6 included (access types discontinued - technician reference)	DI-GSSR
05/19/2015	3.0	SAMM included as Annex 3 accredited telecommunications operator for RCB	DI-GSSR
10/18/2016	4.0	Operators Contact Update	DO-DRD/GDSE

1. INTRODUCTION

This Manual explains how resident and nonresident institutions can access BM&FBOVESPA's technology infrastructure, and provides information designed to help them to choose the access type best suited to their technology requirements and budget.

As shown in the following figure, BM&FBOVESPA offers five access types to its technology infrastructure – RCB, Internet VPN, LAN Colocation (only for DMA 4), and PCM – as well as the BM&FBOVESPA-RTM agreement. The scopes, limits and other access characteristics vary according to the systems to be accessed, as detailed below in the respective sections of this Manual.



Regardless of how they access BM&FBOVESPA's technology infrastructure, institutions are responsible for acquiring the communications lines used as the physical way for data transport from telecommunications service providers authorized by Anatel, the Brazilian telecommunications regulator, and in the case of RCB listed by BM&FBOVESPA in Annex 3 to this Manual, permitting interconnection between their systems and those of BM&FBOVESPA.

Institutions must contract directly with accredited third parties at their own discretion to acquire the services offered for access to BM&FBOVESPA's technology infrastructure, including communications links provided by telecommunications operators for RCB, RTM, administrative access to Colocation and the internet, and the services offered by PCMs, trading desk infrastructure providers, data center providers, Market Data distributor, and DMA service providers. Accredited third parties must comply with the technological and security requirements established by BM&FBOVESPA.

Failure to comply with any such requirements may entail disqualifying of the third party concerned and does not exempt any service providers from the responsibilities established contractually with institutions.

2. RCB – BM&FBOVESPA COMMUNICATIONS NETWORK

2.1 DESCRIPTION OF ACCESS VIA RCB

RCB is a high-technology high-performance communications network that gives institutions direct access to trading systems, market data, post-trade systems, and BM&FBOVESPA Settlement Bank's systems. Access can be granted via communications lines or services acquired by institutions directly from the following providers of services and/or connections:

- DMA service providers (DMA 2 – trading systems);
- Providers of infrastructure for connecting brokerage house trading desks;
- Telecommunications operators (trading systems, post-trade systems, and BM&FBOVESPA Settlement Bank);
- Data center providers.

Institutions who access systems via RCB are free to choose service providers (from those listed in Annex 3), speed, technology and contingency backup level but must comply with the standards and criteria established by BM&FBOVESPA.

It is important to note that institutions who access the systems via DMA service providers, infrastructure providers or data center providers are responsible for deciding which network solution to use, together with the respective providers.

To access BM&FBOVESPA's technology infrastructure via RCB, the contracting party will need to check that the network solution offered by the provider complies with the following conditions:

- Low latency (directly linked to the technology used and bandwidth acquired);
- Various technological options to assure high availability;
- Scalability of access and bandwidth.

The contracting party is responsible for (i) acquiring communications channels and equipment, (ii) configuring and maintaining equipment, (iii) monitoring, (iv) managing capacity, and (v) technical support for the network solution used to access BM&FBOVESPA's technology infrastructure.

2.1.1 How to Contract for Access via RCB

Institutions that wish to contract for RCB access should contact BM&FBOVESPA's Service Development to make commercial arrangements, and consult Post-Trade Support to clarify technical issues.

Requirement	Contact
Sales & Other Services	Service Development Tel: +55 11 2565-7102 Email: bvmfsolution@bvmf.com.br
Technical Support	Post-Trade Support Tel: +55 11 2565-5000 – option 3 Email: ssp@bvmf.com.br

In order to use the RCB network, institutions must acquire telecommunications services between their premises and BM&FBOVESPA's data centers from operators that meet the technical requirements and are listed in Annex 3.

Important note: To mitigate the risks associated with a single point of failure, BM&FBOVESPA's specific participants (brokerage houses, broker-dealers and banks), DMA service providers and providers of technology infrastructure for connecting brokerage house trading desks to the Exchange must contract with two different network providers using different physical routes. This rule does not apply to geographical areas not covered by two or more providers with different routes or to access by Market Data distributor and DMA customers. DMA providers hosted by BM&FBOVESPA's data centers may have circuits without contingency backup that exclusively serve their backup infrastructure located outside the Exchange.

2.2 TECHNICAL CHARACTERISTICS OF ACCESS VIA RCB

The technologies used for access to BM&FBOVESPA's technology infrastructure have been selected on the basis of performance and availability. The operators recommended by BM&FBOVESPA offer services with these characteristics using the following technologies:

- Dark Fiber;
- DWDM;
- Ethernet over SDH (EoSDH);
- MetroEthernet.

The availability of each technology depends on the structure of an operator's service offering in the geographical area concerned.

Operators' networks and routers installed on institutions' premises (CPE) must support BGP dynamic routing protocol, high-availability functionality (HSRP, VRRP), and multicast traffic. CPE units for installation on institutions' premises can be supplied by operators or by the institutions themselves.

The Unified Market Data Feed (UMDF) requires the functionality provided by the multicast protocol. To this end it is important to implement a network design project that takes into account the availability characteristics of the institution's applications and information volume analysis based on the market data segments to be used. Regarding the support for multicast in the solution provided by the operator, broadcast or multicast filters must be disabled.

Market data in the UMDF format is generated by both of BM&FBOVESPA's data centers independently (with different logical addresses) but both feeds have the same information content and use the same protocols. The feed generated by Data Center 1 is called Feed A, and the feed generated by Data Center 2 is called Feed B. Because they are identical, customers can arbitrate between data feeds using both access circuits as active.

The following equipment specifications offer the capacity to support BM&FBOVESPA's systems, based on a specific network design to be developed by each institution:

- Support for BGP routing protocol;
- Support for hardware-based multicast;
- PIM v2 Sparse Mode and IGMP v2;
- Equipment throughput compatible with the link acquired;

- Interface modules compatible with the link acquired;
- FHRP – First Hop Redundancy Protocol (e.g. HSRP or VRRP)*;
- Feature Track;
- NAT, if applicable;
- Support for QoS (Quality of Service).

* If two routers are acquired, bear in mind that VRRP and HSPR are not compatible with each other. Use either one or the other.

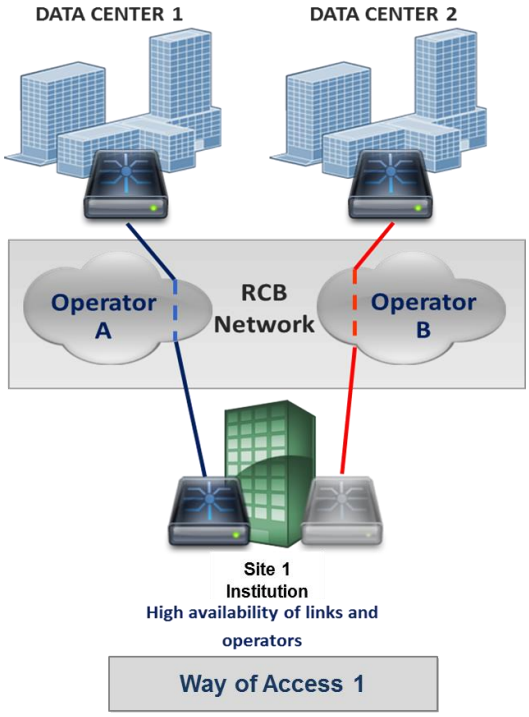
It is essential that the links used enable routes to be changed transparently via dynamic routing between BM&FBOVESPA's edge devices and CPE.

2.3 WAYS OF ACCESS VIA RCB

Access to BM&FBOVESPA's technology infrastructure via RCB can be established in different ways, with variations in availability, performance and latency depending on the characteristics of each way of access. These ways are designed to assure optimized levels of support, management and maintenance, including rapid identification and resolution of problems.

Important note: The ways of access using contingency backup described below are mandatory only for BM&FBOVESPA's specific participants (brokerage houses, broker-dealers and banks), DMA service providers and providers of technology infrastructure for connecting brokerage house trading desks to the Exchange. DMA and trading desk infrastructure providers hosted by BM&FBOVESPA's data centers may have circuits without contingency backup that exclusively serve their backup infrastructure. Market Data distributors and DMA customers are not obliged to use contingency backup to access the trading environment.

2.3.1 Way of Access 1 – High Availability of Links and Operators



This way of access uses two links: two routers on the institution's premises are connected to one link at Data Center 1 and another link at Data Center 2 via any two of the operators listed in Annex 3. Institutions are responsible for CPE routers, which they may purchase or lease from a partner or from one of the operators recommended by BM&FBOVESPA.

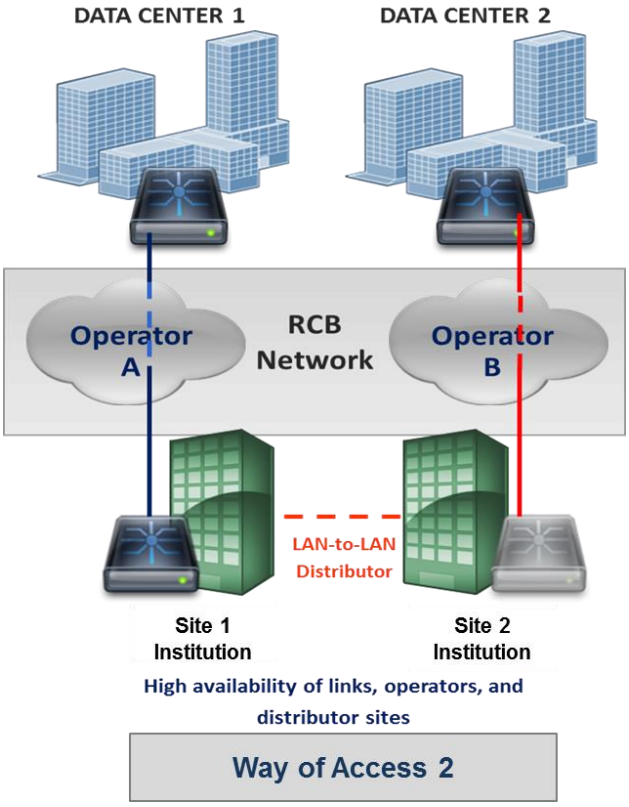
Important note: For trading participants this way of access cannot be acquired individually, given the obligation to have site redundancy, i.e. the primary site plus a backup site or branch location, with links provided by different operators for Data Center 1 and Data Center 2.

In this way of access, if the active CPE fails, the other CPE rapidly takes over and provides the necessary connectivity for the operation to continue.

For access to trading systems, the active link is installed at Data Center 1. In the case of access to post-trade systems and BM&FBOVESPA Settlement Bank, the active link is installed at Data Center 2. Both links (Data Center 1 and Data Center 2) can be used as active to receive the market data feed (UMDF).

This environment must be set up by contracting with two operators in order to prevent instability in one operator's network from degrading or interrupting access to the Exchange's technology infrastructure.

2.3.2 Way of Access 2 – High Availability of Links, Operators and Institution Sites



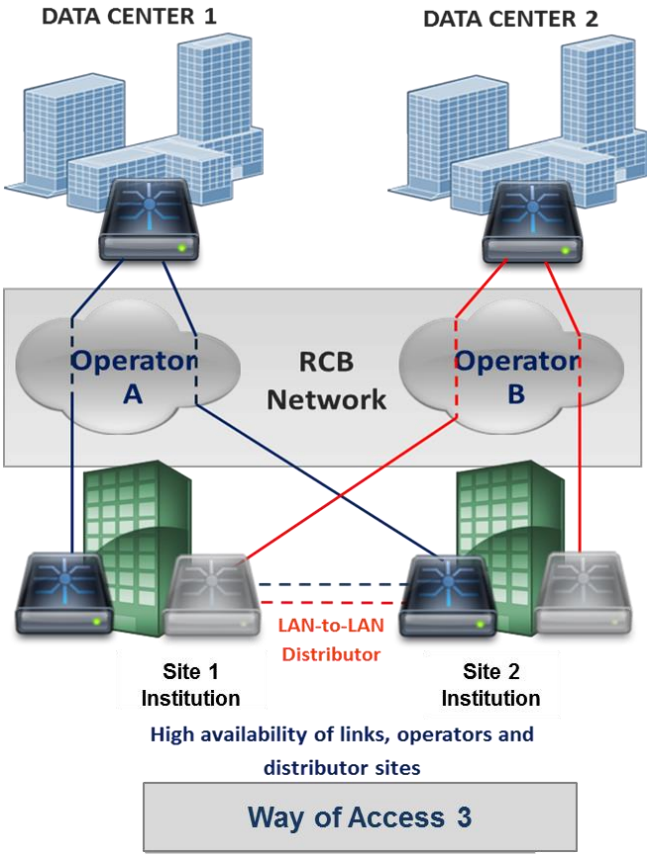
In this configuration, each of the institution's sites (main site and backup site or branch) has one link to Data Center 1 and another to Data Center 2. Links for different sites are provided by different operators. In addition to last-mile and operator backbone contingency backup, the institution can switch to an adjacent backup site in the event of main site failure. If the active CPE fails, the other CPE takes over immediately and provides the necessary connectivity for the operation to continue.

For access to trading systems, the active link is installed at Data Center 1. For access to post-trade systems and BM&FBOVESPA Settlement Bank, the active link is installed at Data Center 2. Both links (Data Center 1 and Data Center 2) can be used as active circuits to receive the market data feed (UMDF).

In order to guarantee the availability of the structure, the institution is responsible for implementing LAN-to-LAN links between its sites with appropriate redundancy, availability and capacity to handle the requisite transaction volumes. CPE requirements are as indicated in the preceding model.

This model is suitable for institutions with a primary site and backup site, and for institutions with a main site and branch site.

2.3.3 Way of Access 3 – High Availability of Links, Operators and Institution' Active Sites



In this configuration, each of the institution's sites has two links, one to Data Center 1 and another to Data Center 2. Links for the same sites must be provided by different operators. This is the most complete configuration: in addition to redundant access to BM&FBOVESPA's technology infrastructure and to the operator's backbone, institutions can operate via an adjacent active site if one of their sites is totally unavailable.

In order to guarantee the availability of the structure, the institution must implement LAN-to-LAN links between its sites with appropriate redundancy, availability and capacity to handle the requisite transaction volumes.

Through this option, each of the institution's sites is given an AS Number and IP address block, so that all sites operate independently. If the main link at one of the sites should fail, the backup link at the same site takes over, or the main link at the adjacent site provides the requisite access for operations to continue via the LAN-to-LAN connection.

For access to trading systems, the active link is installed at Data Center 1. For access to post-trade systems and the BM&FBOVESPA Settlement Bank, the active link is installed at Data Center 2. Both links (Data Center 1 and Data Center 2) can be used as active circuits to receive the market data feed (UMDF).

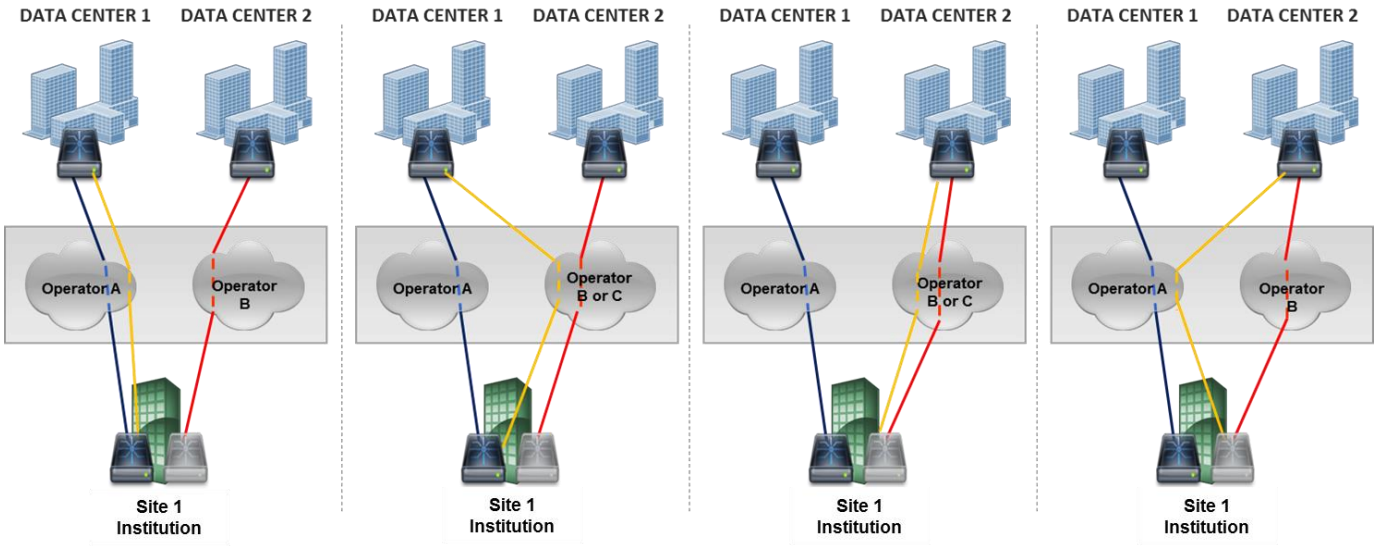
This model is suitable for institutions with more than one site operating in parallel. Under normal operating conditions, all transactions regardless of physical location are performed by the site and the adjacent site takes over via the institution's LAN-to-LAN connection in the event of a failure.

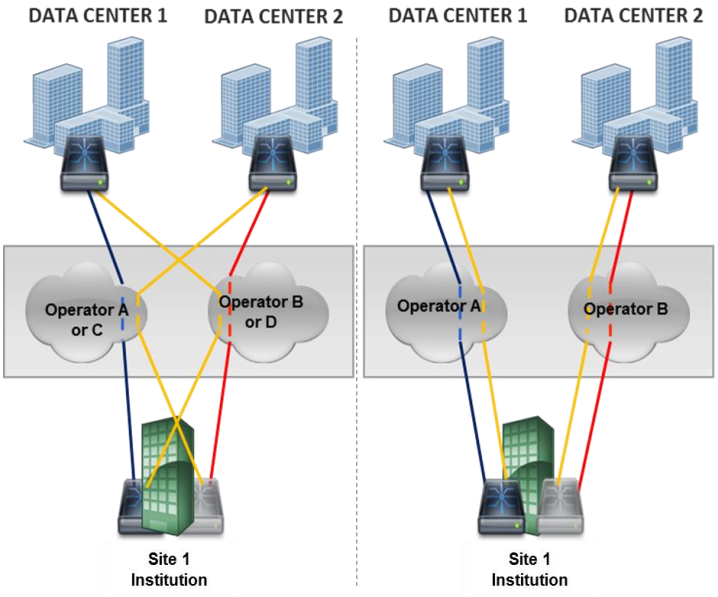
2.3.4 Way of Access 4 – Variants of Modes 1, 2 and 3

This way of access is based on the standard ways of access described above. Customers can install additional links per site at their discretion, provided the network bandwidth characteristics are the same between the institution's site and BM&FBOVESPA's site. A different operator for each link is recommended.

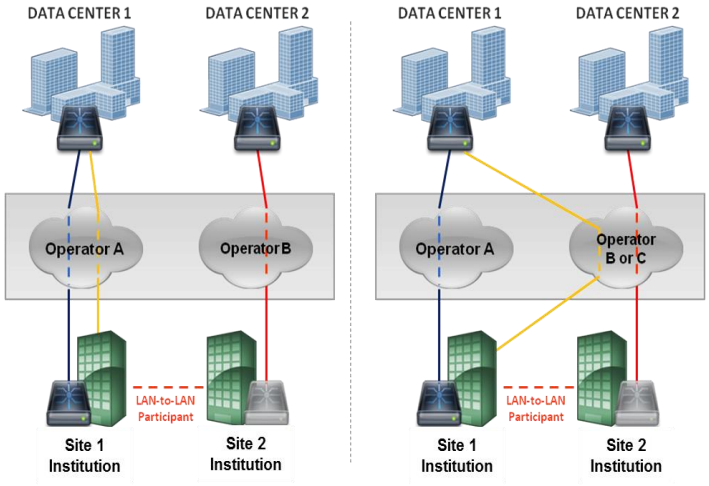
The authorized possibilities for Way of Access 4 are shown below.

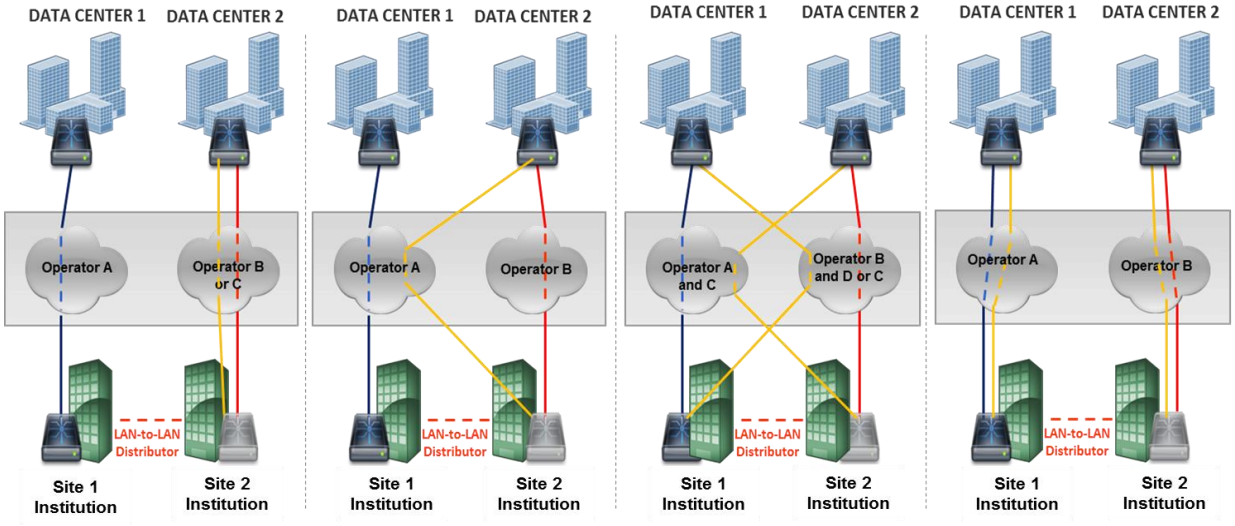
Variants of Way of Access 1



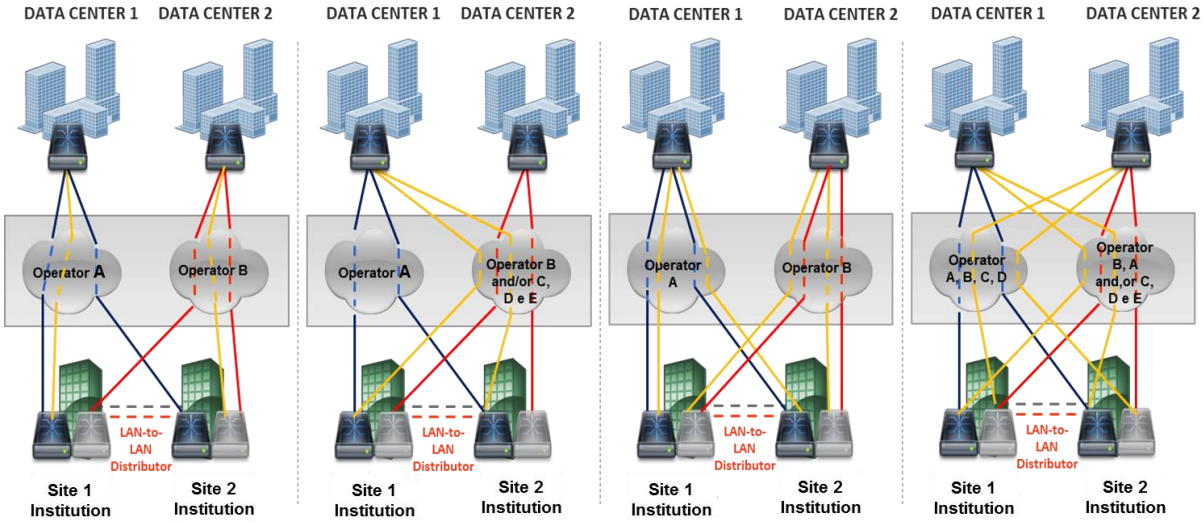


Variants of Way of Access 2





Variants of Way of Access 3



Because the point of this way of access is to add link contingency for the institution in the same CPE to the respective BM&FBOVESPA data center, it is important to bear in mind not only that sufficient bandwidth must be acquired for the additional links to be equal in capacity to the primary link and connected to the same CPE, but also that this configuration does not permit segmentation by type of traffic, service or load balancing between primary and secondary links.

2.3.5 Way of Access 5 – Access without Contingency

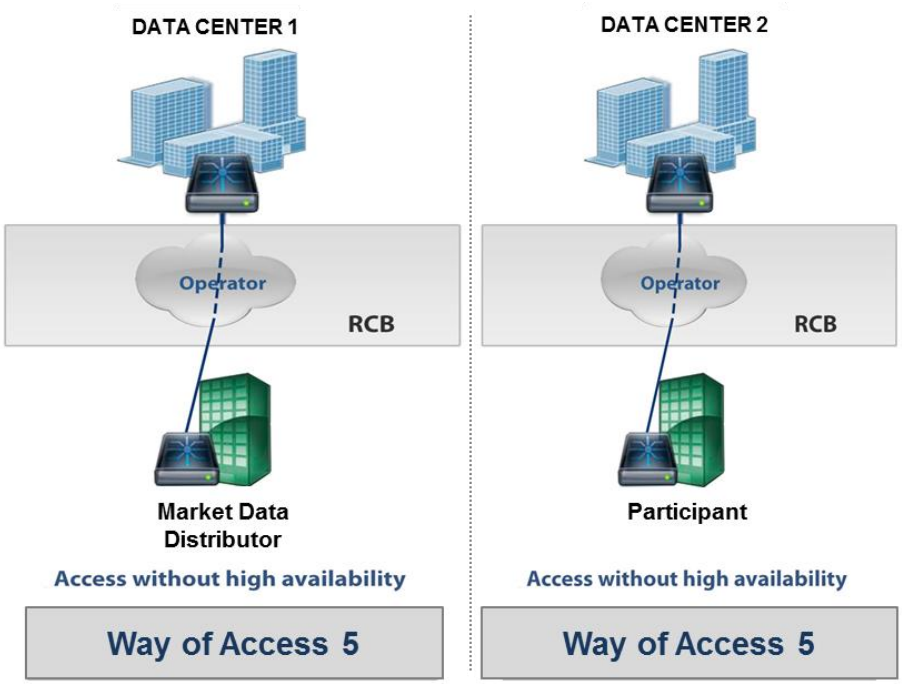
Way of Access 5 is aimed at Market Data distributor and DMA 3 customers who wish to obtain access without contingency to BM&FBOVESPA's market data and/or order routing platforms.

This way of access is also permitted to participants that work solely in the post-trade environment and those that have a Disaster Recovery (DR) site. However, the principal site must be in compliance with one of the ways of access contained in this manual. Contracting this modality will grant the participant access to Data Center 2 alone.

This way of access uses a circuit with a router at the participant's premises and a connection to BM&FBOVESPA's Data Center 1 through any of the operators listed in Annex 3 of this Manual. Participants are responsible for CPE routers, which they may purchase or lease from a partner or from one of the operators recommended by BM&FBOVESPA.

In this configuration there is no contingency backup, so that if the active CPE fails there is no convergence to BM&FBOVESPA's Data Center 2, which does not provide the necessary connectivity for operations to continue.

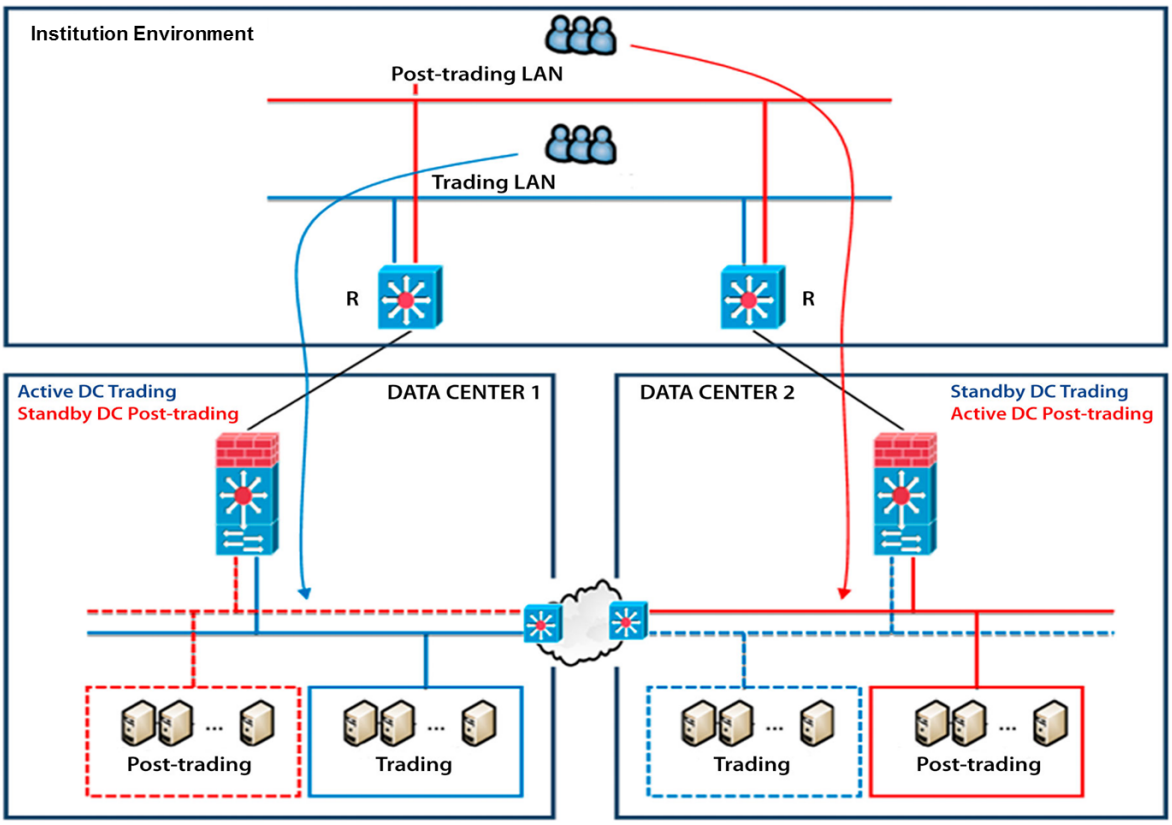
It is important to note that UMDF is BM&FBOVESPA's native market feed platform. It is a dual feed available in a hot-hot configuration, i.e. market data is supplied by both Data Center 1 (Feed A) and Data Center 2 (Feed B). This way of access therefore gives the participant access only to Data Center 1 (Feed A).



2.3.6 Characteristics of RCB – Post-Trade

RCB Post-Trade uses the same ways of access as for trading. However, there are some different characteristics:

- Use of a different LAN range for the participant;
- Routing of active post-trade traffic via Data Center 2 so as not to compete with the trading traffic transported via Data Center 1. The next figure illustrates the RCB post-trade scenario.



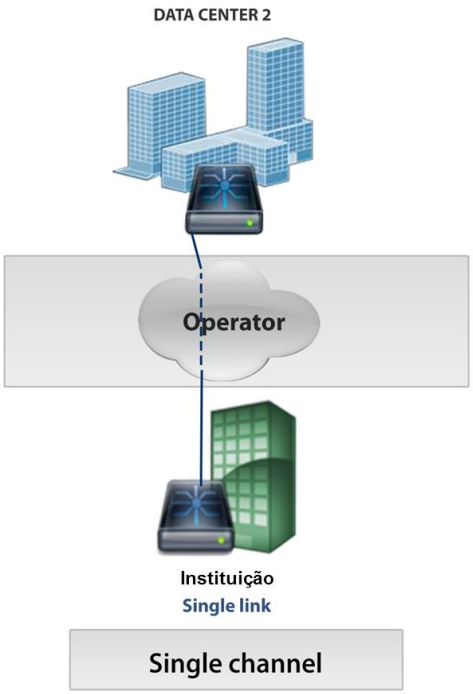
Given that bandwidth is subject to throttling during trading hours, it is important to stress that the institution's equipment must use network time protocol (NTP) clock synchronization. The NTP used may be the same as for the institution's internal network. Please note that the Exchange does not provide NTP services.

Bandwidth requirements must be complied with in accordance with Annex 4 (Bandwidth Provisioning Requirements).

2.3.7 Characteristics of RCB – Certification

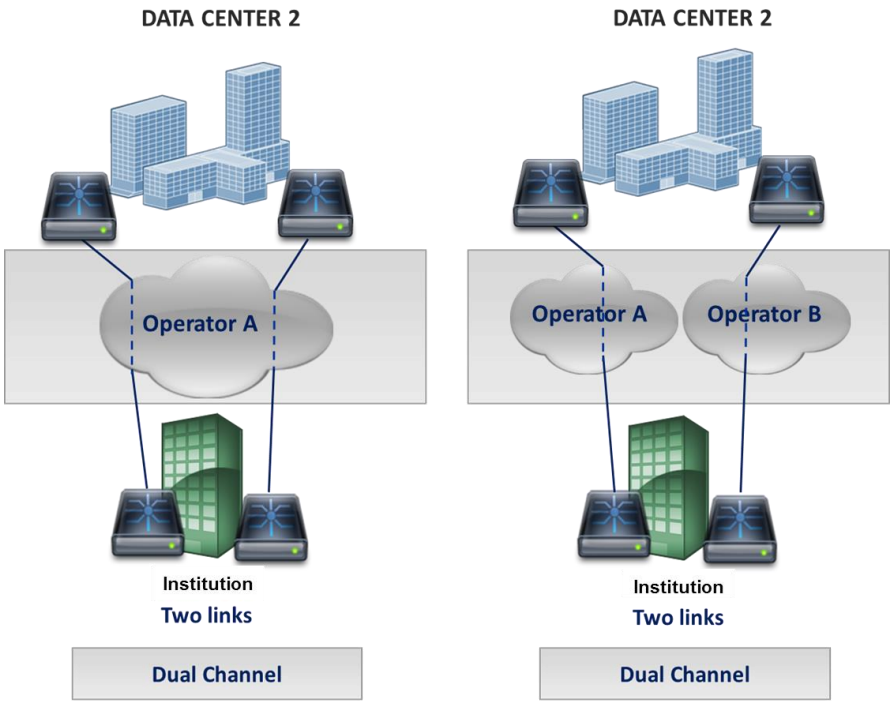
RCB for certification, unlike RCB for the production environment, is available only from BM&FBOVESPA's Data Center 2. The infrastructure available for this purpose is exclusive and segregated from the production environment, comprising the following ways of access:

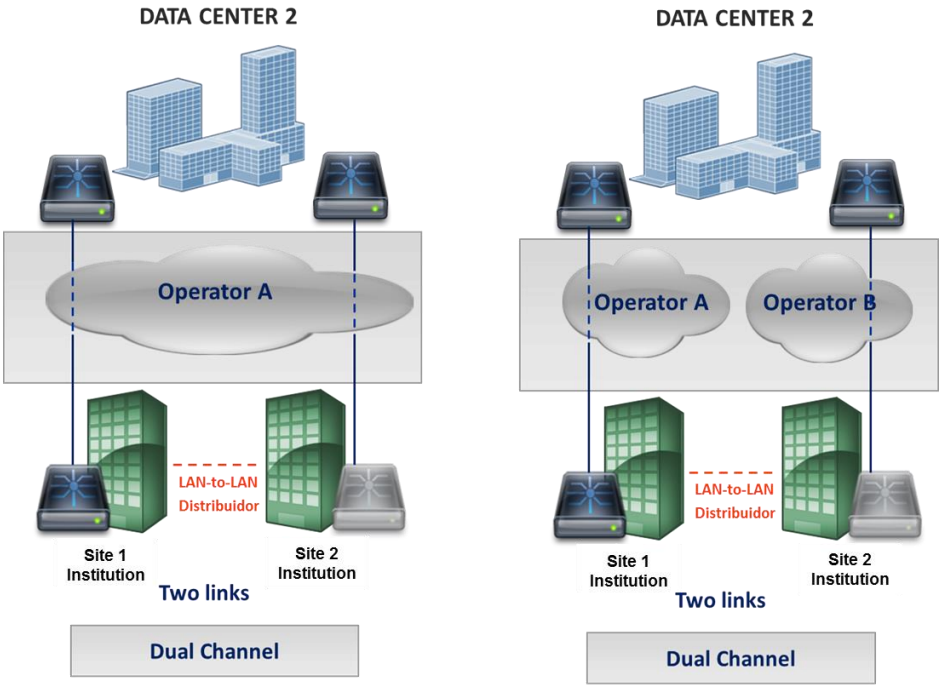
2.3.7.1 Access via a Single Communication Channel (One Link)



2.3.7.2 Access via a Dual Communication Channel (Two Links)

This way of access can be structured in various ways, such as:





2.4 SYSTEMS AND ENVIRONMENTS

BM&FBOVESPA's systems and environments can be accessed via RCB using the same communication link, which will logically segregate trading and market data systems from post-trade and BM&FBOVESPA Settlement Bank systems, as described in Annex 1.

2.5 MANAGEMENT, MONITORING AND TECHNICAL SUPPORT SERVICES

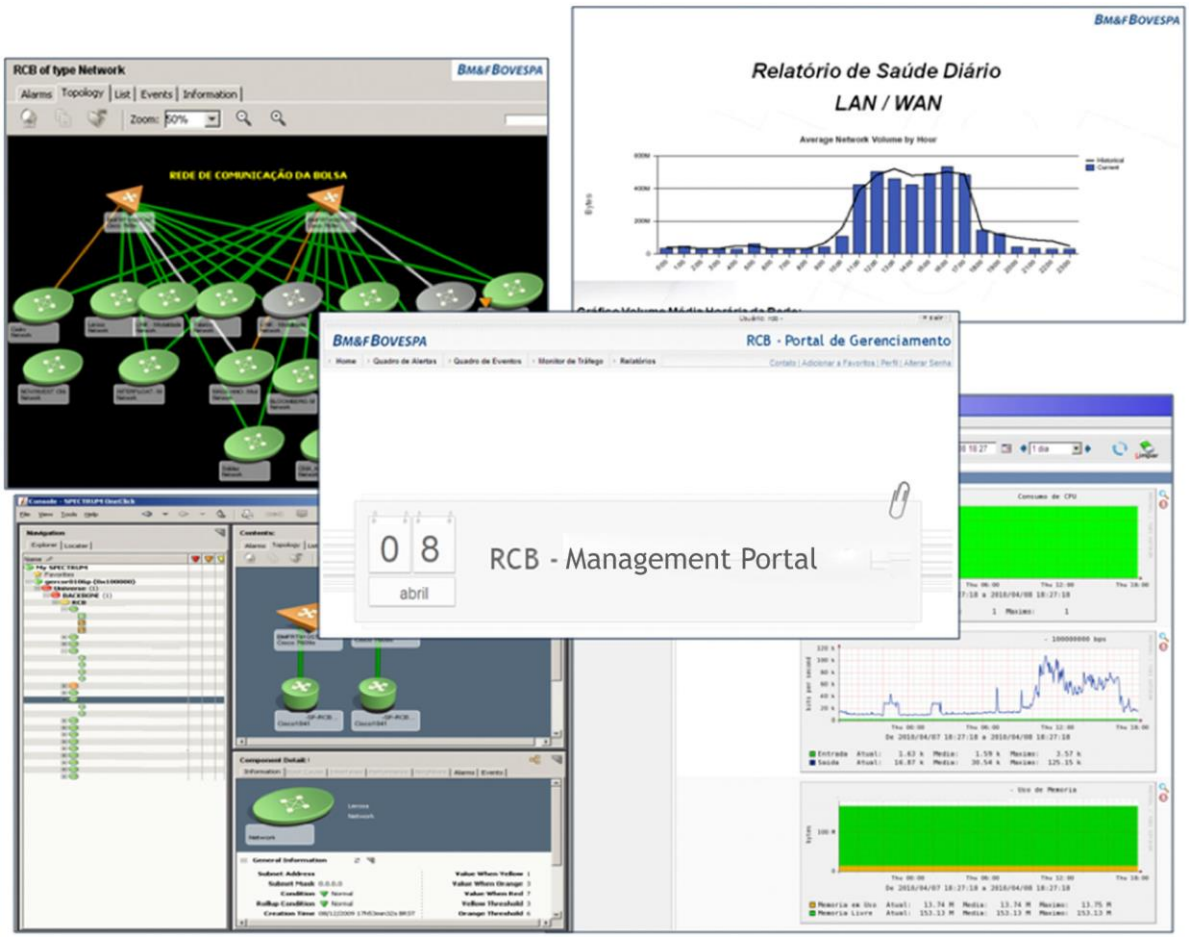
Institutions can acquire the services detailed below from BM&FBOVESPA regardless of the way chosen to access its technology infrastructure via RCB. These services relate directly to the structure of each way of access and not to the communications lines offered by operators. Services relating to the communications lines must be acquired from the operator.

Management, monitoring and technical support services can be acquired for the production and certification environment, but it is important to note that in the case of an incident priority will be given to institutions who have acquired these services for RCB in the production environment.

2.5.1 Management and Monitoring

The RCB management and monitoring service offered by BM&FBOVESPA is run by technical staff, is an optional service and has the following scope:

- Management of availability and status (online supervision of connectivity and RCB-interfacing equipment);
- Alarm history;
- Failure alerts;
- Traffic volume measurement;
- Bandwidth and equipment upgrade recommendations, when deemed necessary.



2.5.2 Remote Technical Support

RCB Remote Technical Support is an optional service available from BM&FBOVESPA and run by technical staff that can solve problems relating to access by institutions to the Exchange's technology infrastructure via one of the RCB Ways of Access. The scope of the service is confined to the institution's internal infrastructure up to and no further than the CPE router installed on the institution's premises.

Requirement	Contact
Sales & Other Services	Service Development Tel: +55 11 2565-7102 Email: bvmfsolution@bvmf.com.br
Technical Support	Post-Trade Support Tel: +55 11 2565-5000 – option 3 Email: ssp@bvmf.com.br

3. VPN – VIRTUAL PRIVATE NETWORK

3.1 DESCRIPTION OF ACCESS VIA INTERNET VPN

Internet VPN is an access type to BM&FBOVESPA's technology infrastructure. This type is an option that uses encryption between two points connected to the internet to create secure communications "tunnels".

VPNs can access all of BM&FBOVESPA's internet-based systems and environments except BM&FBOVESPA Settlement Bank's systems, which are accessible without the establishment of a VPN but requires a specific process of encryption over the internet. Customers' drop copy messages will also be allowed via this type of access but must be contracted for separately.

3.1.1 How to Contract for Access via Internet VPN

To contract for Internet VPN access (LAN-to-LAN VPN or LAN-to-client VPN), contact BM&FBOVESPA's Service Development.

Requirement	Contact
Sales & Other Services	Service Development Tel: +55 11 2565-7102 Email: bvmfsolution@bvmf.com.br
Technical Support	Post-Trade Support Tel: +55 11 2565-5000 – option 3 Email: ssp@bvmf.com.br

3.2 TECHNICAL CHARACTERISTICS OF ACCESS VIA INTERNET VPN

BM&FBOVESPA is connected to the internet via redundant links, different access providers and high-availability equipment. BM&FBOVESPA also has its own autonomous systems (AS) to guarantee secure access. The following table shows the recommended minimum bandwidths and ways of access available for Internet VPN access to each system and environment:

Systems and environments	Minimum bandwidth (bps)	LAN-to-LAN	LAN-to-client	Web [3]
Trading – government & private bonds [1]	**1M**	✓	✓	
Trading – Tesouro Direto	**1M**	✓	✓	
Registration – iBalcão [5]	**1M**	✓	✓	
Drop copy	**1M** [4]	✓		
Post-trade	**1M**	✓	✓	
Colocation management	**256 K**	✓		
Certification & testing environments [2]	**512 K**	✓		
BM&FBOVESPA Settlement Bank	**512 K**	✓	✓	✓
(1) In compliance with External Communication 029/2010-DN, trading in government bonds via VPN is permitted only for the categories PLC and PLM.				
(2) VPN devices must support multicast protocols in the case of UMDF certification.				
(3) Secure SSL connection for access to web applications.				
(4) Although the recommended minimum bandwidth to receive drop copies via a VPN is 1Mbps, actual bandwidth consumption will depend on trading volume by customers whose trading messages are transported by the VPN.				
(5) iBalcão registration is for Registration Participants.				

Institutions should negotiate the technical characteristics of their internet connections, such as bandwidth and availability, with their access providers as required.

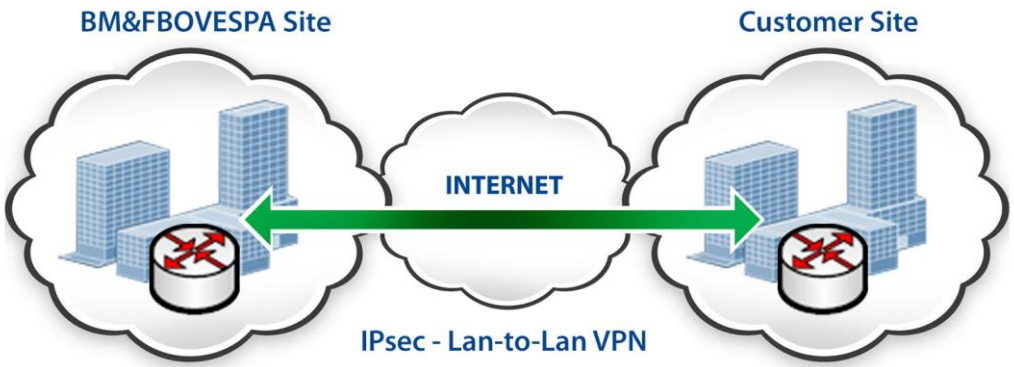
Institutions must have the infrastructure, IPsec capable equipment, encryption and internet connections appropriate to their business needs.

3.3 WAYS OF ACCESS VIA VPN

3.3.1 Production Environment

Internet VPN access can be established via LAN-to-LAN VPN or LAN-to-client VPN.

3.3.1.1 LAN-to-LAN VPN



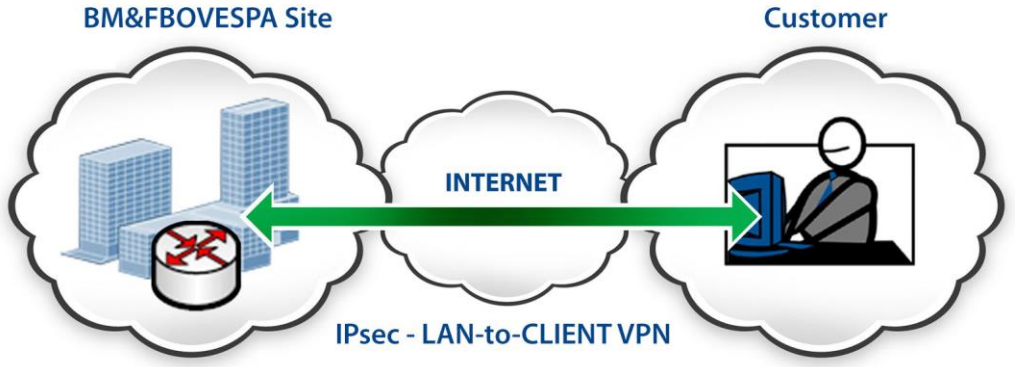
LAN-to-LAN VPN access is available for all the systems and environments listed in Annex 1, guaranteeing greater scalability for institutions. Access is authorized only using the address block supplied by BM&FBOVESPA. Other network addresses may have to be translated to the address supplied using NAT. In this way of access, customers are responsible for equipment configuration, management, internet access and security.

The basic technical requirements for establishing LAN-to-LAN VPN access are as follows:

- IPsec support;
- NAT support;
- 3DES and AES encryption support;
- MD5 and SHA-1 support;
- GRE support*.

* A GRE tunnel is necessary for multicasting in the certification environment.

3.3.1.2 LAN-to-Client VPN



LAN-to-client VPN access is available only for the systems and environments listed in Annex 1. BM&FBOVESPA provides installation software (via download), as well as a VPN username and

password allowing one connection per login. LAN-to-client VPN access is recommended for up to five connections. Customers with more than five connections should use LAN-to-LAN VPN access.

3.3.2 Certification Environment

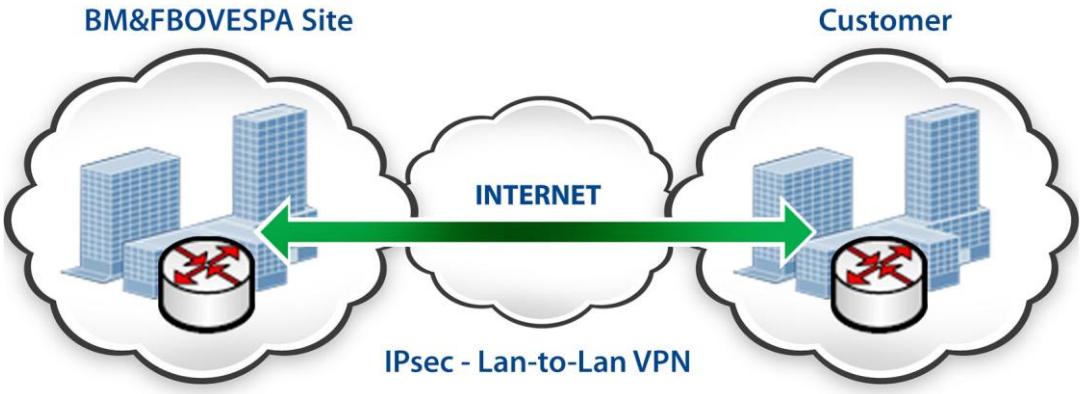
3.3.2.1 Unicast LAN-to-LAN VPN

LAN-to-LAN VPN access is available for all the systems and environments listed in Annex 1, guaranteeing greater scalability for institution. Access is authorized only using the address block supplied by BM&FBOVESPA. Other network addresses may have to be translated to the address supplied using NAT. In this way of access, customers are responsible for equipment configuration, management, internet access and security.

The basic technical requirements for establishing LAN-to-LAN VPN access are as follows:

- IPsec support;
- NAT support;
- 3DES encryption support;
- MD5 and SHA-1 support;
- GRE support*.

* A GRE tunnel is necessary for multicasting in the certification environment.



3.3.2.2 Multicast LAN-to-LAN VPN

The Internet LAN-to-LAN VPN way of access is available for functional testing certification and qualification of applications. The available systems are listed on the extranet. This tunnel is segregated from production, i.e. this is a network solution segregated from the production infrastructure.

To receive the Unified Market Data Feed (UMDF) in the certification environment via Internet LAN-to-LAN VPN, institutions require the functionality provided by the multicast protocol. To this end, in addition to using the GRE protocol it is important to implement a network design project that takes into account the availability characteristics of the institution's applications and information volume analysis based on the market data segments to be used. Regarding support for multicast in the solution provided by the operator, broadcast or multicast filters must be disabled.

3.4 MANAGEMENT, MONITORING AND SUPPORT

BM&FBOVESPA's technology infrastructure is managed and monitored by specific tools used internally to mitigate the risk of unavailability of VPNs and VPN access.

The VPN client software supplied by BM&FBOVESPA comes with an installation manual.

Requirement	Contact
Technical Support	Post-Trade Support Tel: +55 11 2565-5000 – option 3 E- mail: ssp@bvmf.com.br

4. LAN COLOCATION

4.1 DESCRIPTION OF ACCESS VIA LAN COLOCATION

Access via LAN Colocation offers institutions the lowest level of network infrastructure latency for electronic trading on BM&FBOVESPA, because their equipment is physically installed in the same network infrastructure (LAN) as the trading gateways.

Institutions must comply with the following conditions for this access type:

- Layer 3 access (routed to provide logical isolation);
- Dual connections for high availability;
- Optimized routing for rapid convergence;
- High performance with bandwidth of 1 Gbps.

4.1.1 How to Contract for LAN Colocation

To contract for access via LAN colocation, institutions (brokerage houses and investors) must sign the respective agreement ("Adhesion Term for Direct Access via BM&FBOVESPA Colocation") and send it to Market Data & Colocation.

For Investor Colocation, each brokerage firm through which the investor plans to send orders via Colocation must sign the respective agreement ("Adhesion Term for Direct Access via BM&FBOVESPA Colocation – Investor Modality").

These agreements ("Adhesion Term for Direct Access via BM&FBOVESPA Colocation – Brokerage House Modality", and "Adhesion Term for Direct Access via BM&FBOVESPA Colocation – Investor Modality") must be requested directly from Market Data & Colocation by calling +55 11 2565-7105 or sending an email to marketdata@bvmf.com.br.

Requirement	Contact
Sales & Other Services	Market Data & Colocation Tel: +55 11 2565-7105 Email: marketdata@bvmf.com.br
Technical Support	Post-Trade Support Tel: +55 11 2565-5000 – option 3 Email: ssp@bvmf.com.br
IT Services	Production & Colocation Tel: +55 11 2565-4444 Email: colocation@bvmf.com.br
Operational Support	Trading Support Tel: +55 11 2565-5000 – option 2 Email: suporteanegociacao@bvmf.com.br

4.2 TECHNICAL CHARACTERISTICS OF ACCESS VIA LAN COLOCATION

The automated trading system (ATS) software used for algorithmic trading requires specific levels of performance, availability and latency. The access option that satisfies such conditions is direct access to BM&FBOVESPA's trading environment via Gigabit Ethernet technology.

The colocation service offered by BM&FBOVESPA provides physical space (half-rack units) for institutions to install their equipment (servers, network, security, monitoring etc.) in accordance with predetermined technical limits and facilities.

Because the institution's equipment is installed inside BM&FBOVESPA's environment, BM&FBOVESPA furnishes two UTP cables for physical connection of the institution's infrastructure to its systems, as well as the necessary IP address and routing parameters.

Institutions are responsible for installing, maintaining and providing support for their equipment.

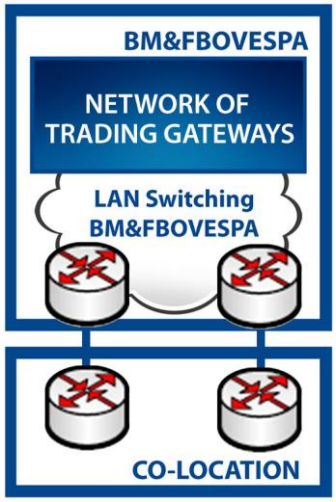
Institutions can manage their environment remotely via one of the following access types: RCB or Internet VPN.

Important note: Internet VPN access is provided by BM&FBOVESPA. Institutions must acquire RCB access, installation, maintenance and support from authorized service providers.

4.3 SYSTEMS AND ENVIRONMENTS

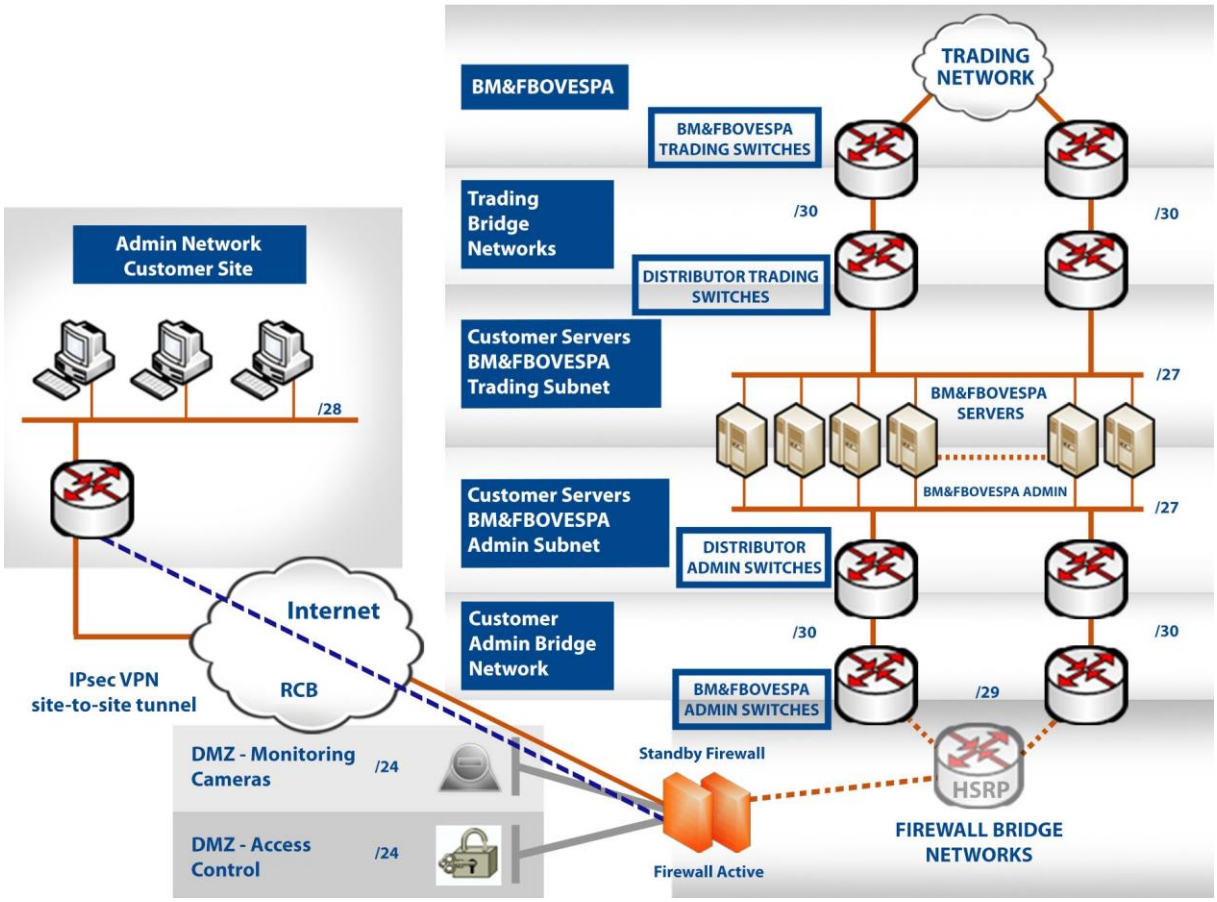
Access via LAN Colocation is for trading under DMA Model 4 (DMA via Direct Connection – Colocation), a type of electronic trading whereby the customer's orders are entered directly to BM&FBOVESPA's trading systems by ATS software running on equipment hosted in BM&FBOVESPA's data center. The systems and environments that can be accessed via LAN Colocation are described in Annex 1.

4.3.1 Ways of Access via LAN Colocation



By definition, there is only one way of access via LAN Colocation, comprising two 1 Gbps UTP cables. Each cable is connected to a different device in BM&FBOVESPA's data center so as to assure high availability of physical resources and network equipment.

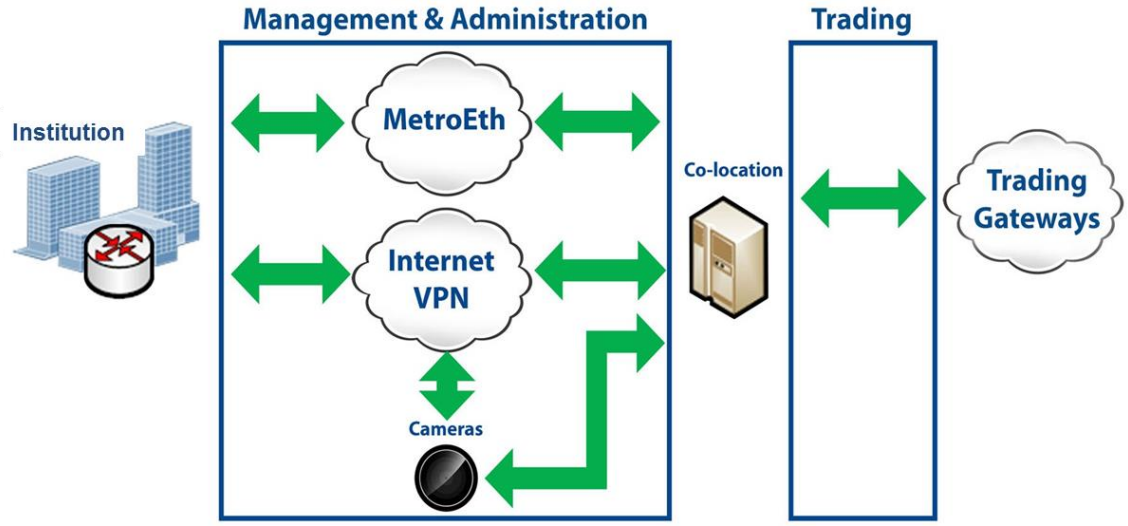
The physical layout of the solution is shown in the connectivity diagram below.



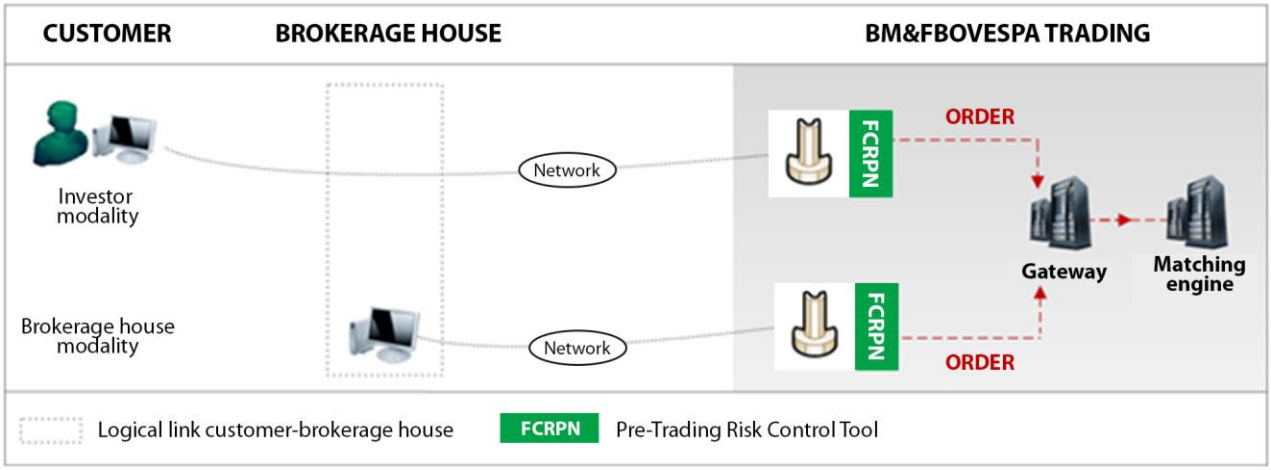
From the logical standpoint, the two connections to the trading bridge networks are point-to-point with IP addressing parameters supplied by BM&FBOVESPA and /30 netmasks. Since November 2013, customers have had the option of enabling a dynamic protocol (BGP) on the bridging perimeter using BM&FBOVESPA's trading switches.

4.4 MANAGEMENT, MONITORING AND SUPPORT

All infrastructure (platforms) supplied by BM&FBOVESPA from its own network assets (edge connections) is monitored in real time by three platforms: Security Management, Infrastructure Availability Management, and Application Management.



Institutions are responsible for managing and monitoring co-located equipment. This can be done via the remote management system.



Any anomalous behavior detected by BM&FBOVESPA's security management platforms or support staff may result in temporary suspension of access to the Exchange's technology infrastructure until the institution concerned has taken the necessary action to mitigate or eliminate the problem.

Requirement	Contact
Technical Support	Post-Trade Support Tel: +55 11 2565-5000 – option 3 Email: ssp@bvmf.com.br
IT Services	Production & Colocation Tel: +55 11 2565-4444 Email: colocation@bvmf.com.br
Operational Support	Trading Support Tel: +55 11 2565-5000 – option 2 Email: suporteanegociacao@bvmf.com.br

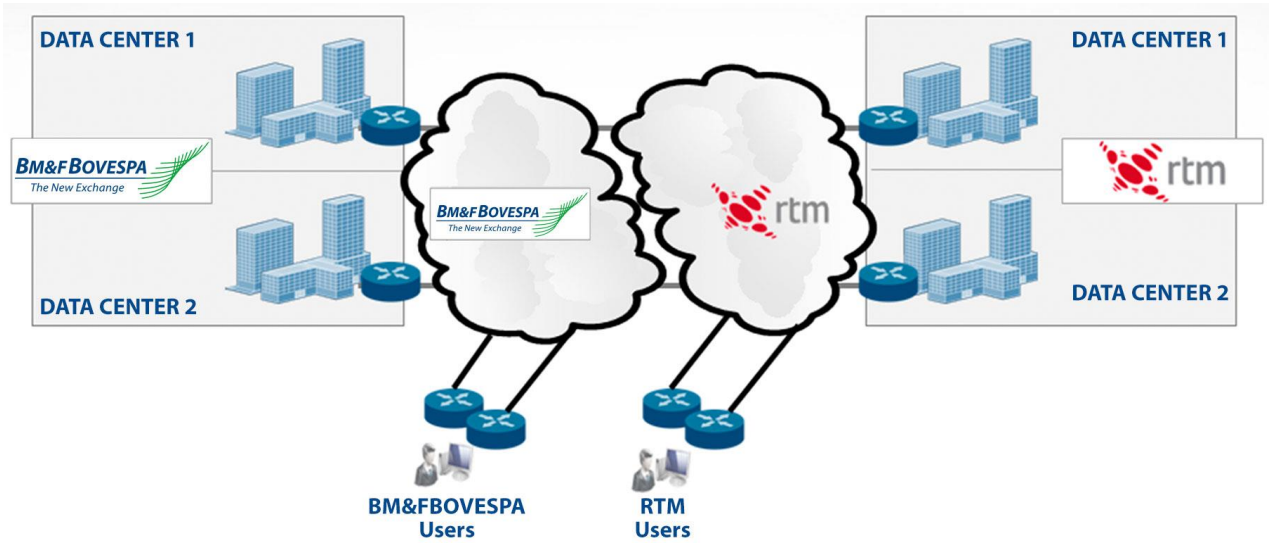
5. BM&FBOVESPA-RTM AGREEMENT

5.1 DESCRIPTION OF ACCESS VIA RTM

BM&FBOVESPA S.A. – Bolsa de Valores, Mercadorias e Futuros and RTM – Rede de Telecomunicações para o Mercado Ltda. have established an agreement to interconnect the technology infrastructures maintained and administered by BM&FBOVESPA and RTM respectively, in order to enable:

a) RTM's participants to access the services and information offered by BM&FBOVESPA via their connections to RTM (RTM Users); and

b) BM&FBOVESPA's participants to access the services and information offered by RTM through their connections to RCB (BM&FBOVESPA Users).



5.1.1 How to Contract for Access

Requirement	Contact
Sales & Services (BM&FBOVESPA)	Service Development Tel: +55 11 2565-7102 Email: bvmfsolution@bvmf.com.br
Sales & Services (RTM)	São Paulo – Tel: +55 11 2102-7860 Rio de Janeiro – Tel: +55 21 2102-7860 http://www.rtm.net.br/institucional/fale_conosco.asp

More information can be found at http://www.rtm.net.br.

5.2 SYSTEMS AND ENVIRONMENTS

I. Services and information offered by RTM

1) Sisbacen
2) Cetip
3) Selic

II. Services and information offered by BM&FBOVESPA

Post-trade*

- BM&FServiços
- BM&FServiços Web
- CBLCNet
- COLD
- MTA-XFB
- iMercado
- SAF IAN
- CAU
- Serviços IPN

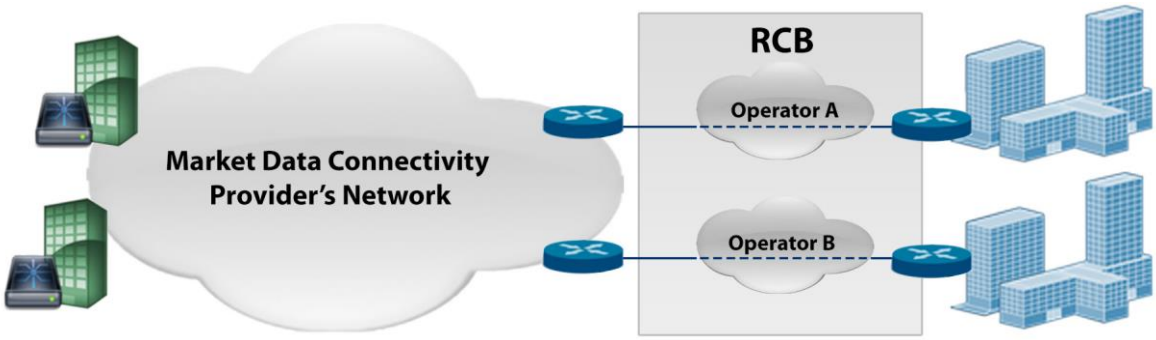
* SMP and STM systems not available.

6. MARKET DATA CONNECTIVITY PROVIDERS

6.1 DESCRIPTION OF ACCESS

Market data connectivity providers use their own networks to provide means of communicating with BM&FBOVESPA for the purposes of distributing market data feeds.

The figure below illustrates the technological model for this connectivity, which integrates the networks of the provider and the Exchange to allow access to the market data infrastructure.



It is important to note that these providers supply the means of communication (networks) for access to the infrastructure that generates BM&FBOVESPA's market data. Customers can obtain market data only if they contract with BM&FBOVESPA for access to the market data feed. Connectivity via RCB is necessary only for customers who use the market data package recovery system provided by BM&FBOVESPA (TCP Recovery or TCP Historical Replay).

6.2 ACCREDITED PROVIDER

Requirement	Contact
Sales & Services	BT Communications do Brasil Ltda. Sales | BT Global Services Tel: +55 11 4700-9804 Cell: +55 11 97681-7783 Email: latin.america@bt.com URL.: www.bt.com/globalservices

6.3 HOW TO CONTRACT FOR MARKET DATA

Requirement	Contact
Market Data Sales & Services	Market Data & Colocation Tel: +55 11 2565-7105 Email: marketdata@bvmf.com.br
RCB Sales & Access Services	Service Development Tel: +55 11 2565-7102 Email: bvmfsolution@bvmf.com.br

7. PROVIDER OF TECHNOLOGY INFRASTRUCTURE FOR CONNECTING TRADING DESKS TO THE TRADING SYSTEM

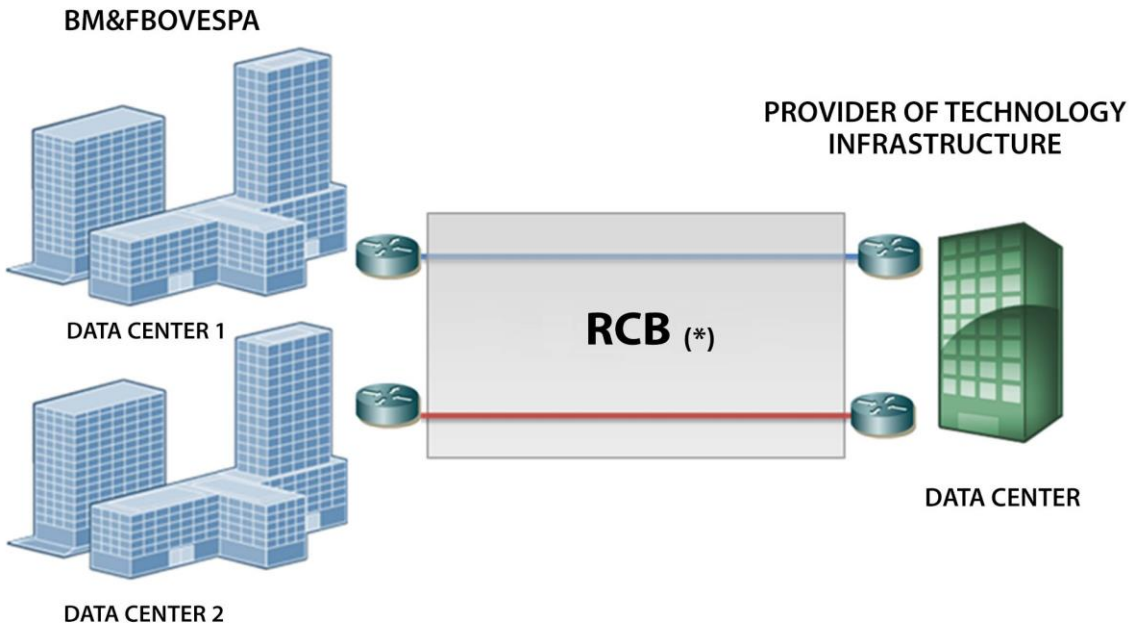
7.1 DESCRIPTION OF ACCESS VIA TRADING DESKS

Brokerage houses may use the technology infrastructure supplied by an independent provider to send trading messages to the Exchange. This infrastructure comprises all the components for generating and transmitting orders, potentially including market data, the trading screen, the order management system (OMS), the risk and trading limit control system, connectivity with the Exchange's trading environment, and drop copy.

In terms of infrastructure and connectivity, this access type is basically identical to direct market access via a provider (DMA 2), with the difference that it is not for final investors but for traders on the trading desks of trading participants in accordance with Circular Letter 032/2013-DP, dated April 24, 2013. Each trading participant connects technologically to a provider who is directly connected to BM&FBOVESPA's trading and/or market data platforms via RCB.

The technology infrastructure can be installed and processed in the independent provider's data center or BM&FBOVESPA's data center.

The use of this infrastructure is permitted only if it complies with all the requirements described in Circular Letter 032/2013-DP.

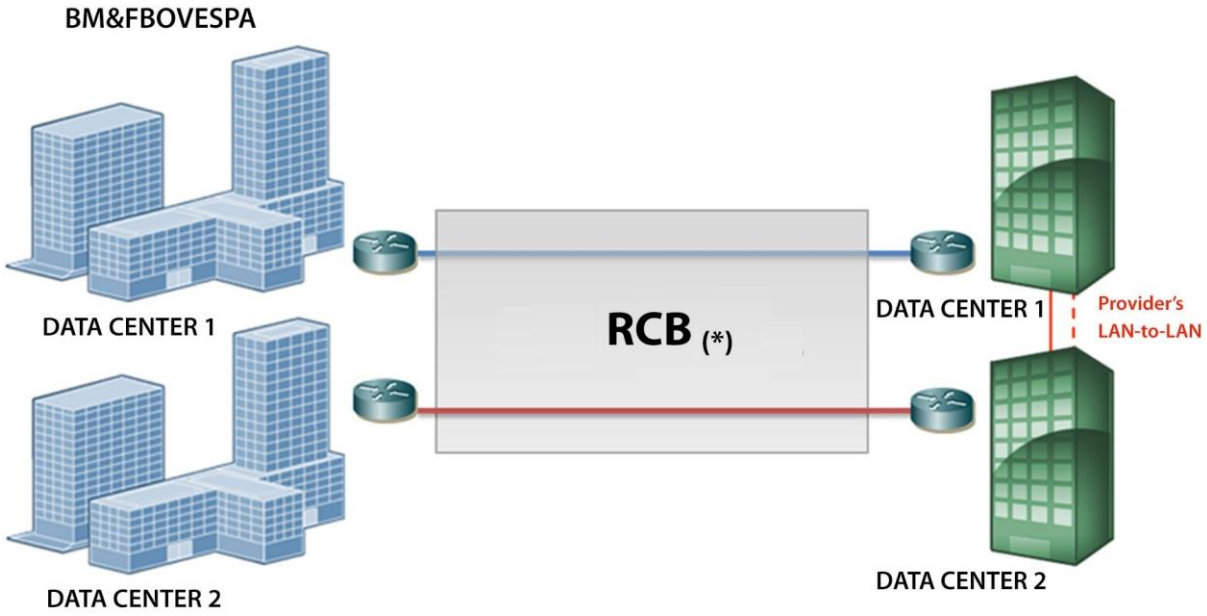


* Minimum requirement: Way of Access 1 (RCB). However, the provider may opt for Way of Access 4 (RCB). More details on ways of access via RCB can be found in Chapter 2 of this Manual.

The figures show only the circuits of providers hosted outside BM&FBOVESPA's data centers. For infrastructure providers co-located in BM&FBOVESPA's data centers, the RCB circuits that connect their servers to the electronic trading system will be provided by the Exchange after the technology

infrastructure provider signs with BM&FBOVESPA the hosting contract or any other contract that may replace it, to be signed between the technology infrastructure provider and the Exchange.

All technology infrastructure providers are responsible for acquiring the dedicated circuits or other ways of connectivity that assure access to their applications by customers. In addition, the provider must acquire circuits that connect to both of BM&FBOVESPA's data centers. Such circuits are not illustrated in this Manual but must be sufficient to assure compliance with all terms and conditions established by BM&FBOVESPA for reliable connection to its technological environments and communication with its systems and activities associated with trading in its markets.



* Minimum requirement: Way of Access 2 (RCB). However, the provider may opt for Way of Access 3 or Way of Access 4 (RCB). More details on ways of access via RCB can be found in Chapter 2 of this Manual.

Independent providers must sign the Agreement to Authorize the Provision of Electronic Order Routing Services for Participants in the Markets Managed by BM&FBOVESPA. Any technology infrastructure provider that is also an order routing service provider for the DMA trading environment must comply with the rules established by Circular Letters 021/2008-DP, 088/2008-DP and 030/2010-DP, dated July 8, 2008, December 3, 2008 and August 9, 2010 respectively.

7.2 HOW TO CONTRACT FOR THIS SERVICE

Requirement	Contact
Market Data Sales & Services	Market Data & Colocation Tel: +55 11 2565-7105 Email: marketdata@bvmf.com.br
RCB Sales & Access Services	Service Development Tel: +55 11 2565-7102 Email: bvmfsolution@bvmf.com.br
Technical Support	Trading Support Tel: +55 11 2565-5000, option 2 Email: suporteanegociacao@bvmf.com.br

8. DATA CENTER PROVIDER

8.1 DESCRIPTION OF ACCESS VIA DATA CENTER PROVIDERS

Data center providers offer participants and Market Data distributors a wide array of aggregated services, sparing them the need to acquire links (internal or external), manage IT resources etc. In addition to these characteristics, because they provide a specialized and centralized service they offer multicast and other forms of sharing that reduce bandwidth consumption by downstream links (additional customers), as well as optimizing infrastructure resources for internal networks and external links thanks to VLAN logic segregation.

It is important to note that data center providers supply the means of communication (networks) for access to BM&FBOVESPA's infrastructure but cannot operate without connectivity via RCB, BM&FBOVESPA's network, which must be acquired by the distributor.

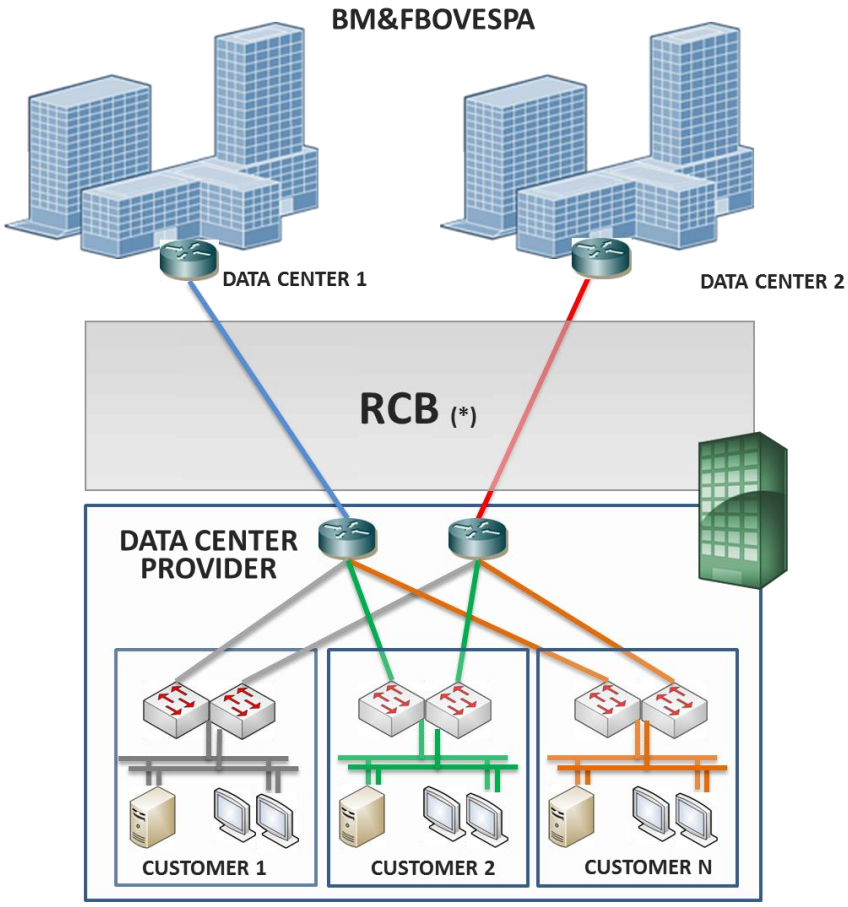
8.2 TECHNICAL CHARACTERISTICS OF ACCESS VIA DATA CENTER PROVIDERS

As customers of data center providers, each institution receives a specific network to access BM&FBOVESPA's systems and environments. This exclusivity permits segregated access security and traceability. The key premise is that no customer can access any network except its own.
Contracting with a data service provider does not exempt the institution from having an alternative primary or backup site. This is because depending on the institution's operational choice the provider's data center can be its primary or backup site. This applies to access via a provider with only one data center.

If the data center provider has more than one data center providing these services, the institution may contract it to operate as primary and/or backup site. BM&FBOVESPA requires compliance from the institution with the complete operational qualification process (PQO). The institution is responsible for evaluating compliance by the services acquired from the provider.

8.3 SERVICE TYPES

8.3.1 Provider with a Single Data Center

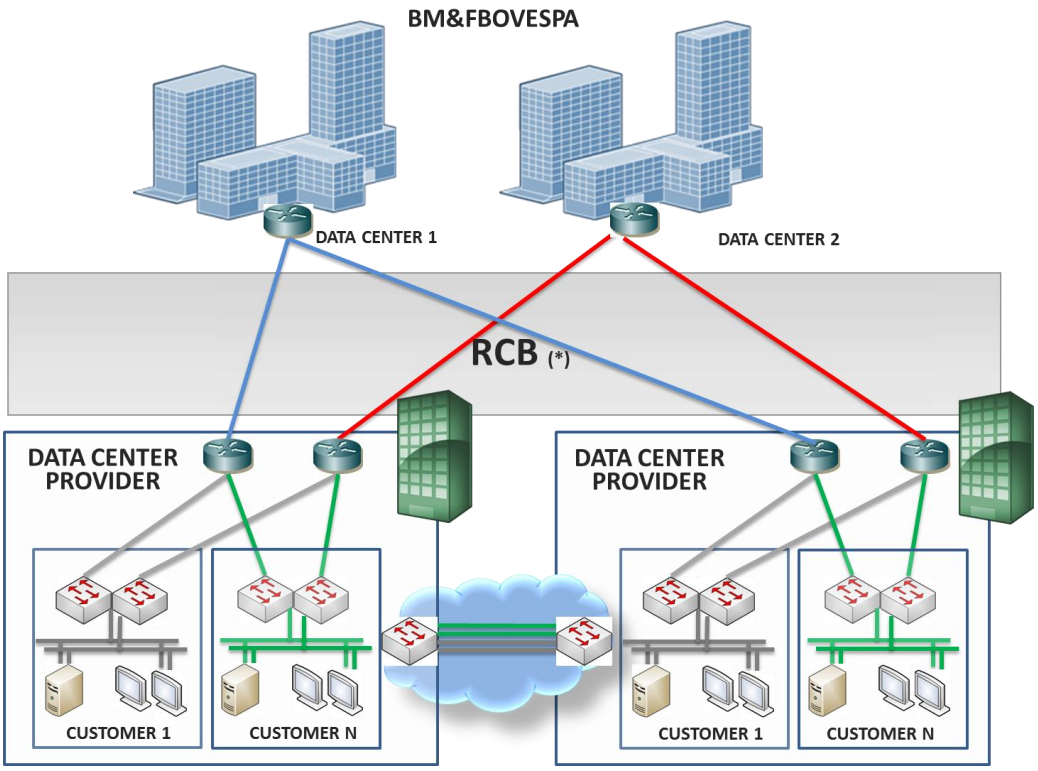


*Links can be installed in one or more data centers on the data center provider's side, varying according to its structure.

Data center providers may permit administrative or remote access to IT resources by distributors, but this is not shown in the above diagram. Ask your provider for technical details.

Interconnection of the distributor's primary or secondary (backup) site is likewise not specified by the above diagram. The interconnection process must be designed and developed by the distributor's technical team (in house or external) in collaboration with the provider.

8.3.2 Provider with Two Data Centers



*Links can be installed in one or more data centers on the data center provider's side, varying according to its structure.

Data center providers may permit administrative or remote access to IT resources by distributors, but this is not shown in the above diagram. Ask your provider for technical details.

8.4 ACCREDITED DATA CENTER PROVIDER

Requirement	Contact
Sales & Services	UOL DIVEO TECNOLOGIA LTDA. – Anderson Junqueira Lima Tel: + 55 11 3092-6636 Cell: +55 11 99115-0872 Email: alima@uoldiveo.com

8.5 HOW TO CONTRACT FOR THIS SERVICE

Requirement	Contact
Sales & Services	Service Development Tel: +55 11 2565-7102 Email: bvmfsolution@bvmf.com.br

9. DIRECT MARKET ACCESS (DMA) MODELS

9.1 DEFINITION OF BM&FBOVESPA'S DMA MODEL

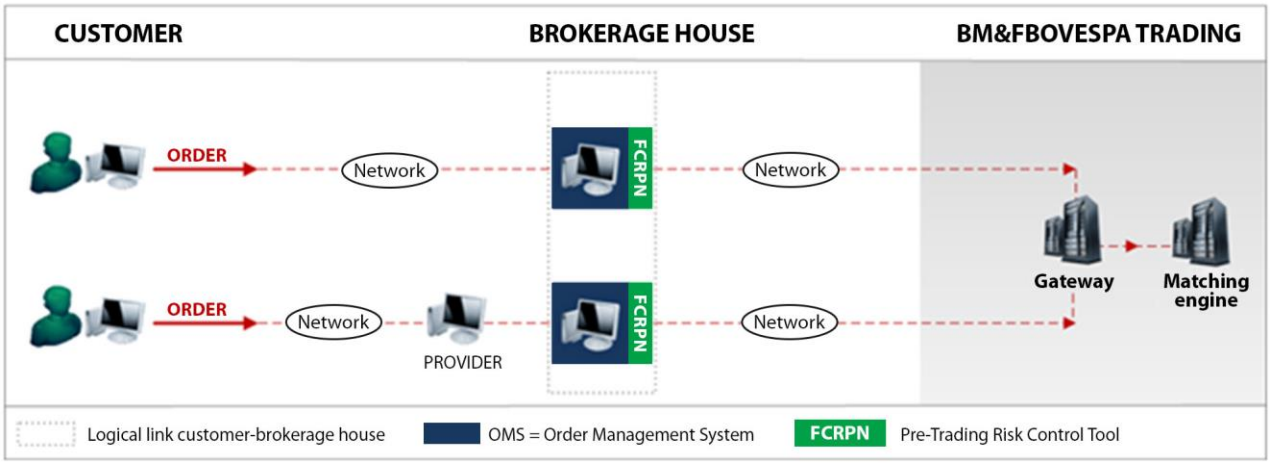
The DMA model enables end-customers to access the Exchange's electronic trading environment directly, authorized by a brokerage house and under its responsibility. Customers can use DMA to enter orders to the trading system, receive market data and view the electronic trading system's order book in real time.

Access to BM&FBOVESPA's technology infrastructure for trading via DMA is provided for the following systems and environments:

- Derivatives trading;
- Equities trading.

9.2 MODEL 1 – TRADITIONAL DMA

This model consists of the routing of orders via the brokerage house's physical technology infrastructure: i.e. the orders entered by the customer are conveyed to the electronic trading system by the brokerage house's technology infrastructure before reaching the trading platform of the BM&F segment or BOVESPA segment. The model for access to BM&FBOVESPA's technology infrastructure is shown in the figure below.



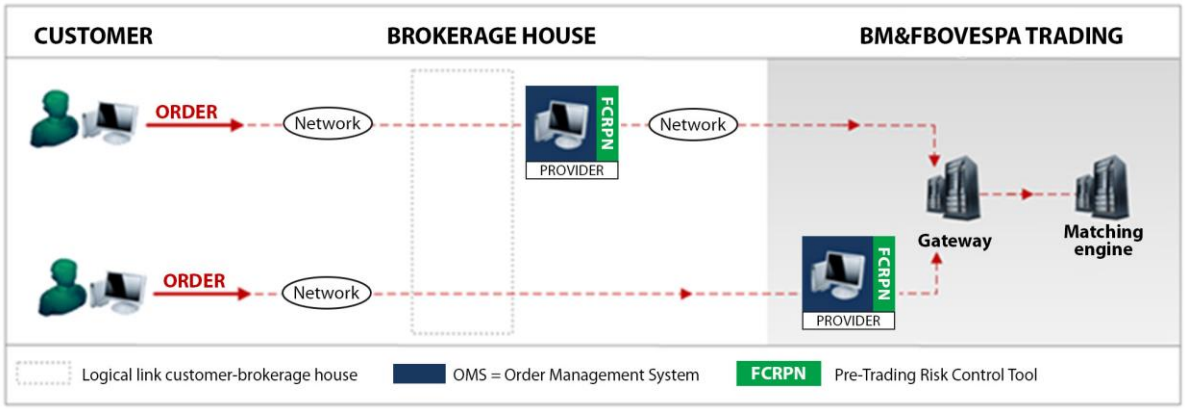
The figure illustrates the situation in which a customer connects directly to the technology infrastructure of the brokerage house, which then accesses BM&FBOVESPA. It also illustrates the situation in which the customer connects to a DMA service provider (Market Data distributor, ISV etc.), which in turn connects to the brokerage house, which then connects to BM&FBOVESPA.

This model requires brokerage houses to have their own order management system (OMS) to control their customers' access to BM&FBOVESPA's technology infrastructure and trading platforms.

9.3 MODEL 2 – DMA VIA A PROVIDER

This model consists of the routing of orders via the technology infrastructure of an order routing service provider (DMA provider). The "logical link" between customer and brokerage house is controlled by the Exchange's and DMA provider's systems: the messages sent by the customer are not transported by

the brokerage house's technology infrastructure but by that of the DMA provider. Model 2 is illustrated in the next figure.



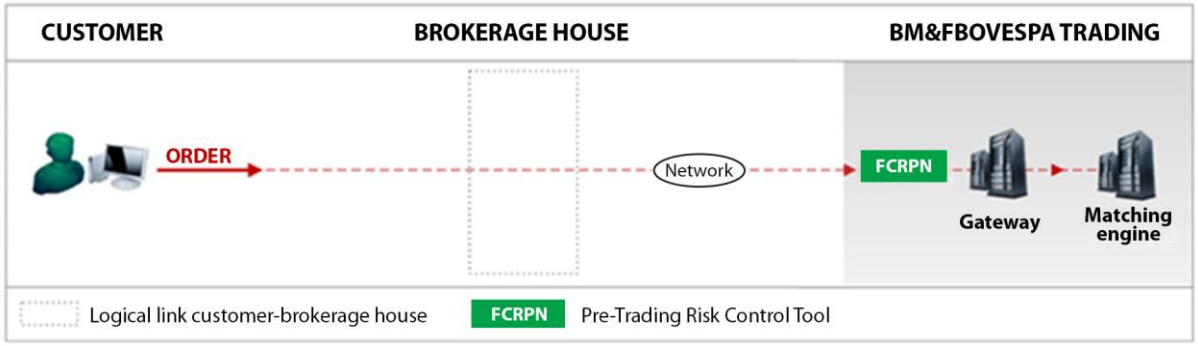
As shown in the figure, customers connect to the DMA provider, which is connected to BM&FBOVESPA's system. DMA providers may have their hardware and software structure co-located within BM&FBOVESPA's data center, as indicated.

In this model, through the system functionality offered by BM&FBOVESPA and DMA providers, brokerage houses must be capable of authorizing and suspending customer access to BM&FBOVESPA's technology infrastructure, setting customer trading limits for verification before orders are accepted, and monitoring customers' orders and trades in real time.

DMA customers are not obliged to have backup equipment for access to DMA providers, but BM&FBOVESPA recommends the use of backup equipment by customers to assure uninterrupted operations.

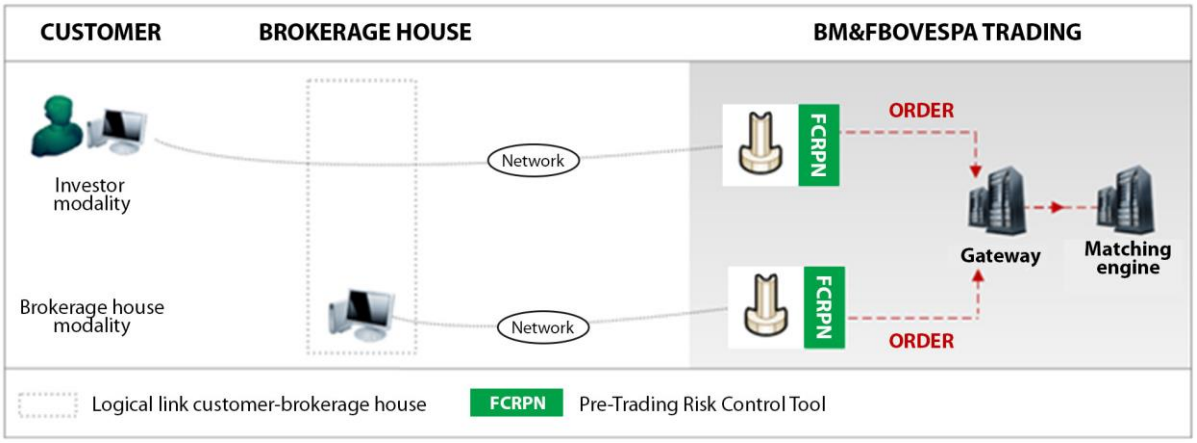
9.4 MODEL 3 – DMA VIA DIRECT CONNECTION

This model consists of the transmission of orders via a direct connection between the customer and BM&FBOVESPA without using the technology infrastructure of a brokerage house or DMA provider. As in Model 2, the logical link is maintained between the customer and the brokerage house that grants the customer access to BM&FBOVESPA's technology infrastructure, sets operational limits, and monitors the customer's transactions. Model 3 is illustrated in the next figure.



9.5 MODEL 4 – DMA VIA DIRECT CONNECTION – COLOCATION

This model does not really represent an order routing process, since customer orders are generated by ATS software running in computer equipment hosted in a physical space made available by BM&FBOVESPA. The customer on whose behalf orders are sent has remote access to its equipment to set parameters, manage and monitor the equipment, and carry out any maintenance required. Model 4 is illustrated in the next figure.



To implement a DMA model, institutions must contact BM&FBOVESPA's Market Data & Colocation Unit. Post-Trade Support or Trading Support will clarify technical questions:

Requirement	Contact
Sales & Services	Market Data & Colocation Tel: +55 11 2565-7105 Email: marketdata@bvmf.com.br
Technical Support	Post-Trade Support Tel: +55 11 2565-5000 – option 3 Email: ssp@bvmf.com.br
Operational Support	Trading Support Tel: +55 11 2565-5000 – option 2 Email: suporteanegociacao@bvmf.com.br

10. CERTIFICATION AND TESTING ENVIRONMENT

A dedicated link completely segregated from the production environment is required to access BM&FBOVESPA's certification and testing environment.

The following ways of access to BM&FBOVESPA's certification and testing environment are available:

- RCB – see item 2 of this Manual for details;
- Internet LAN-to-LAN VPN – see item 3 of this Manual for details.

11. SHARED ACCESS TO BM&F&BOVESPA'S TECHNOLOGY INFRASTRUCTURE

BM&FBOVESPA recommends a segregation to each way of access to its technology. However, institutions belonging to the same economic group may share the following ways of access:

- RCB;
- Internet LAN-to-LAN VPN.

The institutions that grant and use shared access ("grantors" and "grantees" respectively) are responsible for arranging the appropriate bandwidth provisioning for the circuits acquired for this purpose from the operators accredited by BM&FBOVESPA.

When opting for shared access, institutions declare that they are conversant with and undertake to abide by all the conditions established by BMF&FBOVESPA in its manuals, rulebooks, circular letters, communications, notices and other guidelines relating to contracted-for access, including the provisions of the Access Agreement, and assume sole liability for the obligations arising from improper and/or criminal use of access to BM&FBOVESPA's technology infrastructure, including any damage or loss sustained by the grantor, grantee or third parties owing to negligence, imprudence or malpractice, as well as losses due to unforeseeable circumstances or force majeure.

Institutions accept and recognize that any alteration made by the grantor to the way and/or access type to BM&FBOVESPA shall entail the grantee's automatic adherence to and strict observance of all the conditions established by BMF&FBOVESPA in its manuals, rulebooks, circular letters, communications, notices and other guidelines relating to the contracted-for way or access type.

Regardless of whether access is shared, the Exchange reserves the right to charge all member institutions of the same economic group that access BM&FBOVESPA's technological infrastructure in accordance with the current price list.

In order to obtain authorization for shared access, the grantor must enter into a joint and several liability agreement with each grantee belonging to the same economic group, with BM&FBOVESPA as consenting party.

Requests for shared access to BM&FBOVESPA's technology infrastructure by institutions belonging to the same economic group, as well as questions about DMA 2 services, DMA 3 customers and technology infrastructure connectivity for connecting brokerage houses' trading desks to the Exchange, must be sent by email to bvmfsolution@bvmf.com.br.

ANNEX 1. SYSTEMS AND ENVIRONMENTS X ACCESS TYPES

SYSTEMS & ENVIRONMENTS	ACCESS TYPES							
	RCB	RTM	PCM[3]	PROVIDER OF TECHNOLOGY INFRASTRUCTURE [4]	DATA CENTER PROVIDER[4]	LAN COLOCATION	INTERNET LAN-TO-CLIENT VPN	INTERNET LAN-TO-LAN VPN
DERIVATIVES TRADING	✓			✓	✓	✓		
FOREIGN EXCHANGE TRADING	✓			✓	✓			
EQUITIES & CORPORATE BONDS TRADING	✓			✓	✓	✓		
GOVERNMENT BONDS TRADING	✓			✓	✓		✓	✓
TESOURO DIRETO TRADING	✓			✓	✓		✓	✓
REGISTRATION IBALCÃO	✓	✓		✓	✓		✓	✓
BM&FBOVESPA MARKET DATA	✓		✓	✓	✓	✓		
CME MARKET DATA	✓			✓	✓	✓		
DROP COPY	✓			✓	✓	✓		✓
POST-TRADE	✓	✓[2]		✓	✓		✓	✓
BM&FBOVESPA SETTLEMENT BANK	✓	✓		✓	✓		✓	✓
CERTIFICATION & TESTING ENVIRONMENT [1]	✓							✓

(1) Environment to be used exclusively for certification and testing, i.e. via connections totally segregated from the production environment.
(2) Exception: STM and SMP systems not available.
(3) PCM = market data connectivity provider.
(4) Depends on services contracted for.

ANNEX 2. LOGICAL ADDRESSES FOR ACCESS TO SYSTEMS AND ENVIRONMENTS

The table of IP addresses and access ports for access to servers and systems can be obtained from Post-Trade Support.

For institutions that are already participants in BM&FBOVESPA, the table is available in Portuguese on the extranet at:

http://www.bvmfnet.com.br/pt-br/downloads/downloads-conectividade.aspx?idioma=pt-br

Requirement	Contact
Technical Support	Post-Trade Support Tel: +55 11 2565-5000 – option 3 Email: ssp@bvmf.com.br

ANNEX 3. TELECOMMUNICATIONS OPERATORS RECOMMENDED FOR RCB

Institutions who use RCB to access BM&FBOVESPA's technology infrastructure must acquire access ports and the Exchange's management services, monitoring services and technical support services, as well as telecommunications between their premises and BM&FBOVESPA's data centers via the ways of access described in item 2.3.

The following telecommunications operators meet the minimum technical requirements established by BM&FBOVESPA for access via RCB.

Operator	Business Manager	Tel.	Email
Algar Telecom	Eduardo dos Santos Medici	(+55 11) 3512-1285	medici@algartelecom.com.br
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Embratel / Primesys	Luciana Paranhos Macedo Coelho	(+55 11) 2121-6837	luciana@embratel.com.br COMLBMF@embratel.com.br
Level 3	Cristano Oliveira dos Santos	(+55 11) 3957-1939	cristiano.santos@level3.com
UOLDIVEO	Francisco Moura	(+55 11) 98162-0985	Fmoura.almeida@uoldiveo.com
SAMM	Wagner Aparecido de Almeida	(+55 11) 97450-4739	wagner.almeida@grupoccr.com.br
VIVO (Telefonica)	Fernanda Rezende Teixeira	(+55 11) 99269-5640	fernanda.teixeira@telefonica.com

ANNEX 4. BANDWIDTH PROVISIONING REQUIREMENTS BY ACCESS TYPES

		RECOMMENDED MINIMUM BANDWIDTHS FOR ACCESS TO SYSTEMS AND ENVIRONMENTS [2]							
		Dedicated link	256Kbps	512Kbps	1Mbps	2Mbps	10Mbps	40Mbps	50Mbps
RCB	Equities and private bonds trading [1]					X			
	Derivatives trading [1]					X			
	Foreign exchange trading [1]			X					
	Government bonds trading				X				
	ePuma (equities and derivatives)						X		
	Tesouro Direto trading				X				
	Registration iBalcão				X				
	BM&FBOVESPA Market Data – BM&F Segment [8]						X		
	BM&FBOVESPA Market Data – BOVESPA Segment [8]								X
	BM&FBOVESPA Market Data Conflated (equities and derivatives)						X		
	CME Market Data [3]							X	
	Drop Copy [7]				X				
	Post-trade					X			
	BM&FBOVESPA Settlement Bank			X					
	Management in co-location	X	X						
	Certification and testing environment [4]	X		X					

		Segregated link	256Kbps	512Kbps	1Mbps	2Mbps	10Mbps	40Mbps	50Mbps
VPN[5]	Government bonds trading				X				
	Tesouro Direto trading				X				
	Registration iBalcão				X				
	Management in co-location	X	X						
	Drop Copy [7]				X				
	Post-trade					X			
	Certification and testing environment [4]			X					
	BM&FBOVESPA Settlement Bank			X					

		Segregated link	256Kbps	512Kbps	1Mbps	2Mbps	10Mbps	40Mbps	50Mbps
RTM	Registration iBalcão				X				
	Post-trade					X			

		Segregated link	256Kbps	512Kbps	1Mbps	2Mbps	10Mbps	40Mbps	50Mbps
PCM	BM&FBOVESPA Market Data – BM&F Segment [6]						X		
	BM&FBOVESPA Market Data – BOVESPA Segment [6]								X

1 Recommended bandwidth for trading does not include a unicast or multicast market data session.

2 Minimum recommended bandwidth. May vary depending on number of stations, trades and shared services in the link or VPN.

3 Assumes subscription to all market data feed channels.

4 Minimum recommended bandwidth considering only functional tests.

5 In this access mode, verify way of access available (LAN-to-LAN or LAN-to-client) for systems and environments as per ANNEX 1.

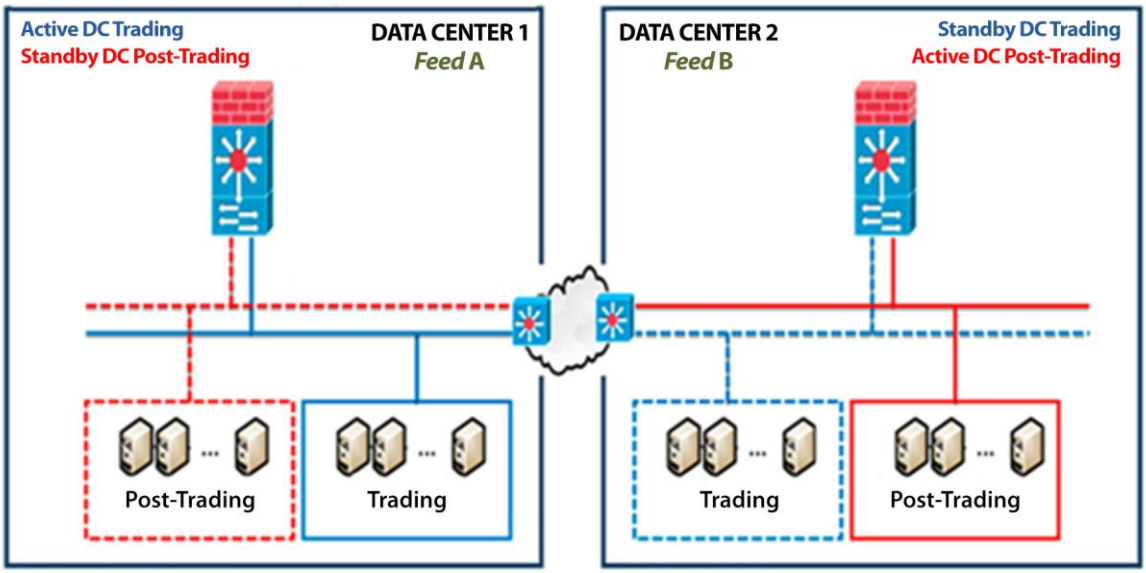
6 Market data via PCM (Market Data Connective Provider).

7 Minimum recommended bandwidth. May vary depending on number of trades executed and number of services shared in VPN.

8 This is a minimum bandwidth recommended for simultaneous subscription to all market data feed channels. For more details on bandwidth provisioning requirements in specific markets (channels) we recommend that you access http://www.bmfbovespa.com.br/market-data/estatistica.aspx?idioma=en-us, which has statistics about each channel.

9. Important: Any change of band contracted with the operators, BM & FBOVESPA should be informed immediately

ANNEX 5. ACCESS TO DATA CENTER 1 & DATA CENTER 2



For access to BM&FBOVESPA's trading systems, the active link is installed in Data Center 1. In the case of access to post-trade systems and BM&FBOVESPA Settlement Bank, the active link is installed in Data Center 2. For reception of the market data feed (UMDF), both access links (Data Center 1 and Data Center 2) can be used as active links.

ANNEX 6. PHYSICAL ADDRESS DATA CENTER

BM&FBOVESPA has Data Center in the following locations:

Data Center XV: Rua XV de Novembro, 275 – CEP 01013-001 – São Paulo – SP
Data Center SPA: Rua Ricardo Prudente de Aquino, 85, Tamboré – CEP 06543-004 - Santana do Parnaíba – SP

ANNEX 7. GLOSSARY

A

Access
The term **access types** used in this manual refers to the following networks for access to BM&FBOVESPA's systems and environments: RCB, LAN Colocation, Internet VPN, PCM, and RTM.

The term **ways of access** used in this manual refers to the various configurations of each **access type**. For example, the RCB access type has five ways of access: 1, 2, 3, 4 and 5.

AES
Advanced **E**ncryption **S**tandard. An encryption algorithm for symmetric key exchange.

AS
Autonomous **S**ystem: A group of IP networks managed by one or more network operators with a single clearly defined routing policy. Each AS is associated with a number (AS identifier, or ASN) used to exchange routes with other external systems. External routing protocols such as BGP are used to exchange routes between AS.

ASN
Autonomous **S**ystem **N**umber. Each AS is associated with a number (AS identifier, or ASN) used to exchange routes with other external systems. External routing protocols such as BGP are used to exchange routes between AS.

ATM
Asynchronous **T**ransfer **M**ode. Technology for transmitting any kind of information (data, voice, image and video) over computer networks at speeds that may range from 2 Mbps to 1 Gbps or more.

ATS
Automated **T**rading **S**ystem. Software responsible for securities trading in the Colocation environment.

B

Backbone
A number of mostly high-speed circuits forming the main segments of a communications network and connected to the secondary segments.

Bandwidth
The amount of data that can be transmitted over a communication channel in a given period of time.

BGP
Border **G**ateway **P**rotocol. Exterior gateway protocol, which performs routing between multiple autonomous systems in TCP/IP networks.

Bps

Bits **p**er **s**econd. Measures a communications line's real data transfer rate.

CE
Customer **E**dge routers and other network devices (hosts, switches etc.) that belong to a customer's site.

Client Server
See Client.

Client
Process or program that requests services from a server. See also Server.

Colocation
For the purposes of this document, BM&FBOVESPA's colocation environment is a segregated area of the data center with restricted and controlled access and the physical and logical infrastructures required to enable ATS to access the Exchange's trading systems.

Communications line
A physical medium for data transmission provided by a telecommunications operator.

CoS
Class **o**f **S**ervice. Mechanism for treating packets in a network with QoS, identified by a 3-bit field in an Ethernet frame header, which specifies a priority value between 0 and 7. See QoS.

CPE
Customer **P**rovided **E**quipment. Network element installed on the customer's premises.

Cryptography (Encryption)
The science and art of secret writing using codes and ciphers. Encryption changes data so that it is unrecognizable and useless to an unauthorized person. Decryption changes it back to its original form. Used to authenticate users and banking transactions, protect the integrity of electronic funds transfers, and guarantee the secrecy of personal and commercial communications, among other things.

Dark Fiber
Optical fiber infrastructure (cabling and repeaters) put in place by telecommunications companies that offer access without value-added services. In this case, all the equipment belongs to the customer.

Data Center
Infrastructure offering large-scale data processing and storage resources.

DiffServ

Differentiated **Serv**ices. Mechanism for treating packets in a network with QoS. While CoS operates only at the data link layer, other QoS mechanisms, such as DiffServ, operate at the network layer and higher. See QoS.

DMA
Direct **M**arket **A**ccess. Functionality that enables customers (investors such as hedge funds or investment banks) to access BM&FBOVESPA's electronic trading system directly.

DNS
Domain **N**ame **S**ystem. The service that translates domain names into IP addresses and vice-versa.

Drop Copy
Mechanism for copying and sending messages relating to orders (acceptance, modification, cancellation or execution). Messages are sent from the trading system for parallel monitoring by brokerage houses.

DS3
European standard used in Brazil for digital transmission links with a capacity of 44.736 Mbps (cf. T3 in the U.S.).

DWDM
Dense **W**avelength **D**ivision **M**ultiplexer. Technology generally used in fiber optic networks to enable network equipment to use different frequencies (light wavelengths) at the same time.

E

Ethernet
Standard for the physical connection of LANs, describing protocol, cabling, topology and transmission mechanisms.

EoSDH
Ethernet over SDH (EoS or EoSDH). Refers to a set of protocols used to transmit Ethernet traffic efficiently and flexibly over SDH (Synchronous Digital Hierarchy) networks.

F

Facilities
Electricity and air conditioning infrastructure.

Firewall
Hardware and/or software used to control access to a computer or network and protect its resources from intruders or hackers.

Ways of Access

See Access.

G

Gateway
A device or set of devices that converts protocols among different types of communications networks and applications.

Gbps
Giga**b**its **p**er **s**econd. See bps.

GRE
Generic **R**outing **E**ncryption.

H

Host
A computer or similar device connected to a network.

Hub
For the purposes of this document, the term hub refers to the server responsible for concentrating market data feed connections.

HSRP
Hot **S**tandby **R**outer **P**rotocol. Provides high network availability and transparent network topology changes.

I

IDS
Intrusion **D**etection **S**ystem. Hardware and/or software that detects malicious or anomalous activity.

Internet
A global system of interconnected computer networks that use the standard Internet Protocol Suite (TCP/IP) enabling users to access, exchange and transfer information. Originally created in the United States.

Institution
Institutions connected to BM&FBOVESPA's technology infrastructure, whether the trading environment (brokerage houses; DMA providers; providers of infrastructure for connecting brokerage house trading desks to BM&FBOVESPA; banks; broker dealers) or post-trade environment (brokerage houses, banks, broker-dealers), or for receiving market data (Market Data Distributor) or for the development/certification of software for the market (ISVs).

IP
Internet **P**rotocol. Responsible for routing packets across network boundaries between systems that use the TCP/IP protocol suite. The primary protocol that establishes the internet. See also IP Address.

IP address
A standardized numerical label that identifies any device in a network using IP. See also IP.

IPsec
Internet **P**rotocol **S**ecurity. A protocol suite enabling VPNs to use the issuer's authentication and cryptography.

K

KB
Kilobyte (also kB).

Kbps
Kilo**b**its **p**er **s**econd. See bps.

L

LAN
Local **A**rea **N**etwork. A computer network usually confined to a building or group of buildings used by the same organization.

LAN-to-client VPN
Virtual networking solution to connect a host computer or server to a LAN via secure tunnels over an internet connection. See also VPN.

LAN-to-LAN VPN
Virtual networking solution to connect LANs in different physical locations via secure tunnels over an internet connection. See also VPN.

Last mile
The telecommunications infrastructure between the telecommunications operator and the user (e.g. institutions, the Exchange).

Latency
Latency (or delay) is an expression of the time between the moment a data packet is transmitted and the moment it reaches its destination. Together with bandwidth, it defines the maximum capacity and speed of a network.

Link
A logical representation of a physical connection between locations, sites or hosts.

MAN
Metropolitan **A**rea **N**etwork. A high-speed computer network spanning a city or large campus.

Market data
Quotes, prices, latest trades, volumes and other market information associated with equities, bonds, derivatives, currencies and other investment instruments, for use in evaluating market opportunities.

Market Data Distributor
A Market Data **DISTRIBUTOR** is considered to be any organization that distributes or displays BM&FBOVESPA Market Data, including Trading Participants and/or clearing institutions. The classification encompasses **distributors** (which capture BM&FBOVESPA Market Data, directly from the Exchange's infrastructure in real time) and **redistributors** (which, via a market data distributor, capture BM&FBOVESPA market data in real time or with a 15-minute delay).

Mb
Megabit (as opposed to megabyte, which is abbreviated MB). See bps.

Mbps
Mega**b**its **p**er **s**econd. See bps.

MetroEthernet
An approach to using Ethernet networks in metropolitan areas or distributed across multiple remote locations. The concept arose in response to the growth of MAN data traffic, which overtook that of voice traffic, leading to a preference for data transmission infrastructure over Time Division Multiplex (TDM), created for voice transmission.

MPLS
Multi **P**rotocol **L**abel **S**witching. Data transport mechanism belonging to the family of packet switching networks. Standardized by the Internet Engineering Task Force (IETF) in RFC-3031. Operates at an OSI Model layer that lies between traditional definitions of Layer 2 (Data Link Layer) and Layer 3 (Network Layer), and thus is often referred to as a "Layer 2.5" protocol.

Multicast
An address for a specific node collection in a network or a message sent to a specific node collection.

NAT
Network **A**ddress **T**ranslation. Process of modifying IP addresses in packet headers while in transit across routers or firewalls for the purpose of remapping one IP address space into another so that a local (private) network device can access a public network.

Netmask

See VLSM.

NTP
Network **T**ime **P**rotocol. Protocol used to synchronize the clock in a client (computer, server or other network host) with the clock in a server.

P

Participant
Financial Institutions (securities brokerage houses, securities broker-dealers, commodity brokerage houses, and banks) that BM&FBOVESPA authorizes to operate in the markets that it manages and which are linked to BM&FBOVESPA's technology infrastructure in the trading or post-trade environment.

PCM
In this Manual, PCM stands for market data connectivity provider (***P**rovedor de **C**onectividade de **M**arket Data*).

PE
Provider **E**dge. Routers and other network devices that belong to the service provider and are connected directly to Customer Edge (CE) devices.

PLC
In this Manual, PLC stands for Centralized Settlement Participant (***P**articipante com **L**iquidação **C**entralizada*).

PLM
In this Manual, PLM stands for Master Centralized Settlement Participant (***P**articipante com **L**iquidação Centralizada **M**aster*).

Protocol
A formal description of digital message formats and the rules for exchanging those messages in or between computing systems. A standardized set of specifications covering format, synchronization, sequencing and error detection and correction in data communications. The basic protocol for the internet is TCP/IP.

Q

QoS
Quality **o**f **S**ervice. Techniques that provide different priority to different data flows such as voice, video and other sensitive applications. Includes bandwidth reservation and latency control as required by the various applications involved, as well as reducing packet loss. DiffServ and CoS are packet treatment mechanisms used in QoS.

R

RCB
***R**ede de **C**omunicação **B**M&FBOVESPA* (BM&FBOVESPA Communications Network). High-availability network with high scalability, high performance and low latency that provides access to BM&FBOVESPA's trading and post-trade environment.

Router
An electronic device that forwards data packets within a network or between networks. When using the internet, an organization requires a router to connect its LAN to the nearest point of presence.

Routing protocol
Sends and receives routing information packets to and from other routers to build a routing table and determine the appropriate path over which packets are transmitted. The routing protocol also specifies how routers in a network share information with each other.

RTM
Rede de **T**elecomunicações para o **M**ercado Ltda.

S

Scalability
Property of a system, network or process that indicates its ability to handle growing amounts of work in a uniform manner.

SDH
Synchronous **D**igital **H**ierarchy. International standard for high-speed telecommunications over fiber-optic networks capable of transporting digital signals at variable capacities. Direct access to lower-speed tributaries within a synchronous signal avoids the need to multiplex/demultiplex the entire high-speed signal. SDH and SONET have the same specification but different channel layouts.

Server
1. In the client-server model, a client is a program that responds to client requests for a specific service, such as email and www.
2. A computer or similar device running systems that provide resources such as data storage, printing and access for users of a computer network.

SHA
Secure **H**ash **A**lgorithm. An algorithm used for encryption.

Site
1. An institution where computers and servers are installed and operated.
2. A host computer on the internet.

SMP

In this Manual, SMP stands for Proprietary Network Messaging System (***S**istema de **M**ensageria de Rede **P**rópria*).

SONET
Synchronous **O**ptical **Net**work. Standard for fiber-optic telecommunications transport. Synchronous system controlled by a high-precision master clock (approximately one failure per billion hours) to which all clocks in the network are locked. The bits in a SONET line are transmitted at extremely precise intervals controlled by the master clock. Created by Bellcore (USA) in 1985 and now in worldwide use.

SSL
Secure **S**ocket **L**ayer. An open standard and commonly used protocol for managing the security of message transmission to prevent interception of critical infomration such as credit card numbers. One of the main advantages of SSL is that it guarantees the security of online financial transactions, although it was originally developed for other web services.

STM
In this Manual, STM stands for Messaging Transfer System (***S**istema de **T**ransferência de **M**ensagens*).

Switch
A computer networking device that connects network segments and switches packets between hosts on the network.

T

T1
Data circuit running at 1.544 Mbps. A T1 line can carry 24 channels, each encoded in 64 kbps streams.

TCP/IP
Transmission **C**ontrol **P**rotocol/**I**nternet **P**rotocol. A suite of protocols for internetworking data communications, originally developed for the ARPANET. TCP/IP is the de facto standard for open networks, widely used in the U.S. and globally.

TDM
Time **D**ivision **M**ultiplex. Multiplexing technique in which two or more signals are transferred simultaneously in one communication channel. The time domain is divided into several recurrent timeslots of fixed length (in bps), one for each sub-channel.

Topology
Layout of the various elements (links, nodes etc.) in a LAN or other communications system.

U

UMDF
Unified **M**arket **D**ata **F**eed. Solution for distribution of market data via multicast channels.

UTP cable

Unshielded **T**wisted **P**air. Type of wiring in which two conductors are twisted together. Used extensively in Ethernet networks, LANs and telephone systems.

V

VLSM [Netmask]
Variable **L**ength **S**ubnet **M**asks. Subnet masking replaces the two-level IP addressing scheme with a more flexible three-level method, segmenting the network so as to optimize use of the IP addresses available.

VPN
Virtual **P**rivate **N**etwork. A private network that uses public infrastructure such as the internet and security mechanisms such as encryption to provide secure access to an organization's network for authorized users only and prevent interception of data while on the public network.

VRRP
Virtual **R**outer **R**edundancy **P**rotocol. Like HSRP, VRRP also provides high network availability and enables transparent network topology changes.

W

WAN
Wide-**A**rea **N**etwork. Geographically dispersed telecommunications or computer network, such as the internet.

3DES
Also known as Triple DES, a mode of the DES encryption algorithm that encrypts data three times.