



Bursa Malaysia Infrastructure Services Standards

Exchange Participants, Information Vendors, Independent
Software Vendors, and Network Service Providers

Version 3a

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1.0 Introduction

Bursa Malaysia Berhad [30632-P] (“Bursa Malaysia”) provides infrastructure services to its clients with leading edge network capacity, resilience and performance to access the Exchange trading, clearing and settlement systems by leveraging on the same connectivity.

This guide outlines the technical information for the following clients on the standard infrastructure setup.

- Participation Organization “PO”
- Information Vendor “IV”
- Trading Participant “TP”
- Authorized Depository Member “ADM”
- Participating Member “PM”
- Independent Software Vendor “ISV”
- Network Service Provider “NSP”

“Authorised Direct Member” means a party appointed as an Authorised Direct Member under the Rules of Bursa Malaysia Depository.

“Participating Organisation” means a company admitted as a Participating Organisation under the Rules of Bursa Malaysia Securities.

“Participating Member” means either a party which is registered as a Trading Participating Member, Executing Participating Member or General Participating Member under the Rules of Bursa Malaysia Bonds.

“Trading Participant” means a corporation that has been admitted as a Trading Participant in accordance with the Rules of Bursa Malaysia Derivatives.

“Independent Software Vendor” means an independent software vendor that has been approved by Bursa Malaysia to provide services to market participants to enable them to access Bursa Malaysia’s trading system.

“Network Service Provider” means a 3rd party network service vendor that provides offshore network connectivity services to market participants to enable them to access Bursa Malaysia’s trading system.

“Information Vendor” means a company carrying on business as an information vendor and having entered into an Information Services License Agreement with Bursa Malaysia Information Services and/or Bursa Malaysia Derivatives

2.0 Bursa Malaysia Infrastructure Services

There are three (3) types of network accesses that can be subscribed by the client to access the Exchanges trading and post trading services:

1. Bursa Wide Area Network (“Bursa WAN”)
2. Co-Location
3. Bursa Trade Securities 2 (BTS2) Testing Environment

2.1 Bursa WAN

Below is the list of Exchange services that can be accessed via Bursa WAN.

Client	Service	Details	Connectivity
PO	BTS2, WebCDS, Armada, eFIX, Corporate Announcement	Direct access to BTS2 (Equities Trading), Equities Clearing & Settlement, Armada, eFIX Corporate Announcement.	Subscriber will connect to Bursa Malaysia via approved Telco* from own premises or 3 rd party data center providers.
PO (for those with TP & PM licenses)	BTS2, WebCDS, WebDCS, Armada, eFIX, ETP, Corporate Announcement	Direct access to BTS2, Equities and Derivative Clearing & Settlement, Armada, eFIX, ETP Bond trading and Corporate Announcement.	
IV	BTS2-Market Data, ETP-Market Data, Corporate Announcement	Direct access to BTS2 or ETP to receive FIX market data.	
ADM	WebCDS, Corporate Announcement	Direct access to WebCDS and Corporate Announcement.	Subscriber will connect to Bursa Malaysia via approved Telco only from customer’s premises.
TP	WebDCS, eFIX	Direct access to WebDCS and eFIX.	
PM	ETP	Direct access to ETP.	

Note: * For the approved Telco list, please refer 2.1.2 Technical Requirements: Telco Lines

2.1.1 Key Features

The key features of Bursa WAN are as follows:

- Fully managed network solution
- Support Metro E circuit
- Resilience, Scalable and Converged infrastructure

Bursa WAN are fully managed network solution where network equipment and connections are installed and managed by Bursa Malaysia. Bursa WAN only allow point-to-point circuit that connects the subscriber’s premise and the Exchange data centers. Bursa WAN can support point to point Metro Ethernet circuits with speed range from 1Mbps to 15Mbps.

2.1.2 Technical Requirements

Network Availability

The network availability is achieved by using dual routers and circuits configuration. Below is the requirement for each of the setup.

PO

Scenario 1: Order Management System ('OMS') active in PO main site and backup in PO DR

Site	Connection to Bursa WAN Main Site	Connection to Bursa WAN DR	Remark
PO Main Site	Yes	Yes	Dual Router configuration
PO DR	Yes	Optional	Single Router configuration

Scenario 2: PO with No OMS via Bursa WAN

Site	Connection to Bursa WAN Main Site	Connection to Bursa WAN DR	Remark
PO Main Site	Yes	Yes (ADSL)	Single router configuration
PO DR	Yes	Optional	Single Router configuration

* For scenario 2, PO Main site and PO DR does not host any OMS server. Furthermore, it is only use to support Post trading activities. E.g. WebCDS, Armada and eFIX

IV

Scenario 1: Direct Connection to Bursa WAN

Site	Connection to Bursa WAN Main Site	Connection to Bursa WAN DR	Remark
IV Main Site Router A	Yes		Dual Router configuration. Recommended Router A to Bursa Main Site & Router B to Bursa DR
Router B		Yes (Recommended)	

IV DR	Yes	Optional	Single Router configuration
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Scenario 2: Connection via 3rd Party NSP

Site	Connection to Bursa WAN Main Site	Connection to Bursa WAN DR	Remark
IV Main Site			
Router A	Yes		Dual Router configuration. Recommended Router A to Bursa Main Site & Router B to Bursa DR
Router B		Yes (Recommended)	

IV DR	Yes	Optional	Single Router configuration
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* Bursa Malaysia will be not managing the router and connection for IVs that using 3rd party network provider.

TP: Direct Connection to Bursa WAN

Site	Connection to Bursa WAN Main Site	Connection to Bursa WAN DR	Remark
TP / CP Main Site	Yes	*Yes	Dual Router configuration Setup
TP / CP DR	Yes	Optional	Single Router configuration

*The leased line as backup with same router is allowed for TP. As for ADSL as backup, it is for subscriber that using for post trading activities only. i.e. for Clearing Participant only.

ADM & PM: Direct Connection to Bursa WAN

Site	Connection to Bursa WAN Main Site	Connection to Bursa WAN DR	Remark
ADM / PM Main Site	Yes	* Yes	Single Router configuration Setup
ADM / PM DR	Yes	Optional	Single Router configuration

*Backup connection is using ADSL.

General notes about Bursa WAN resilience setup:

- The backup connection remains in an active running state and are proactively monitored by Bursa Malaysia. Bursa Malaysia will follow up with respective Telco for any outages and errors to the connection. Both connections are active / active and backup each other, the network traffics will auto switchover to another connection in the event of any connection failure. The switchover time for the network traffics is within seconds.

- Bursa Malaysia only allows point to point connection that has same bandwidth sizing to both primary and backup connections for POs & IVs. For other subscribers' site without online trading services, the ADSL can be used as the backup to primary line.

Network Bandwidth

The subscribers must have sufficient bandwidth to ensure acceptable response time especially for online trading services. For Equities trading, the minimum required bandwidth is 1Mbps for Continuous Trading phase. However, the **recommended bandwidth is 4Mbps** (for 5 Market Depth & 8Mbps for 10 Market Depth) for better performance and response time especially during preopening & closing due to higher market data information that is being disseminated.

Note:

1. For the Equities market opening, the required bandwidth can go as high as 8Mbps per market data feed connection. This bandwidth is required to ensure minimum delay in receiving of market data feed.
2. Bandwidth sizing is subject to review from time to time by POs and IVs to meet their business requirements needs.

For other Exchanges services, the table below shows the recommended bandwidth requirement for each of the terminal. Subscribers need to multiply number of concurrent terminals to be used plus the other services bandwidth in order to estimate the bandwidth capacity for the Telco line to be subscribe to connect to Exchange:

No.	Description	Required Bandwidth (per terminal)
1.	WebCDS Terminal	64Kbps
2.	ETP Bond Terminal	128Kbps
3.	ARMADA Terminal	64Kbps
4.	SBL Terminal	64Kbps
5.	WebDCS Terminal	128Kbps

Bursa Malaysia Derivatives (BMD) product is hosting in CME Globex. Customer can connect to any CME Globex Hub to access market data and trade BMD futures and option. Customer required minimum 7Mbps bandwidth (subject to change without period notice) to access market data and trade BMD Futures and Option product. For more information, you can refer to CME group <http://www.cmegroup.com/> or contact Bursa Customer service to enquiry more accurate information.

Telco Lines

Bursa WAN provides nationwide connectivity through Bursa Malaysia's approved Telcos to allow network access to Exchange systems. Only four (4) major local Telcos listed below have been approved by Bursa Malaysia and have their own infrastructures installed at both Bursa HQ and DRC:

- i. Telekom Malaysia
- ii. TIME
- iii. Maxis
- iv. Celcom

The subscribers MUST apply dedicated point to point communication line from Bursa Malaysia approved Telco and NOT through 3rd party provider which is under Wholesale account. This is to ensure that Bursa Malaysia network team able to fully manage the circuits directly with the respective Telco's.

The line need to connect from subscribers' premise/3rd party data center provider to Bursa Malaysia data centers. The Bursa Malaysia Data Centers addresses will be provided upon request.

Note:

- a. Kindly contact Bursa Network Operations for the Telco Account Manager's contact details.
- b. Telco requires between 6 to 8 weeks installation process upon receiving the order application, and depending on Telco infrastructure availability at subscriber's site. Subscriber to include this timeline on their plan date to go live.

IP Addresses Scheme

The subscriber can use own IP address within their internal systems. However, the subscriber must use private IP address from the RFC1918 IP address range (i.e. 10.X.X.0/24) provide by Bursa Malaysia when connecting to Exchange systems. This can be achieved by configuring the subscriber's internal router or firewall to use network address translation ('NAT').

2.1.3 Subscriber Infrastructure Readiness

Bursa Malaysia will supply and install the router(s) for Bursa WAN connection with exceptional for IV, as they require to outright purchase.

Bursa Malaysia' router is logically secure with security standard best practice configuration. To enhance it, subscriber is responsible to properly secured Bursa Malaysia network equipment physically from unauthorized access. The router must be installed in a secure communications cabinet at the registered site as indicate in the formal request letter to Bursa IT.

Subscriber will need to allocate cabinet space and appropriate power access for Bursa WAN network equipment. The requirements are as follows:

- 1U rack space is required for 1 router setup: and 3U rack space for 2 routers setup.
- Communications cabinet with different power distribution box and back up by UPS.

Bursa Network Operations team will liaise directly with subscriber site contact person to coordinate the installation of the Telco line(s) and network equipment. The installation process will be as the following steps:

- i. Telco line(s) installation at subscriber premises and Bursa Data Centers end by Telco.
- ii. End to end line testing to Bursa development network by Bursa.
- iii. Network equipment and connectivity installation to Bursa WAN Production by Bursa.
- iv. Connectivity testing to Bursa production network by Bursa.
- v. Connectivity testing to Bursa systems production servers by Subscriber's IT team.

Local Area Network (LAN) connection readiness

Subscribers must ensure the readiness on all internal LAN connection between the systems server and Bursa router(s).

2.1.4 New Subscriber Application

Organizations that want to subscribe connection to Bursa WAN are advice to contact Bursa IT prior to get the details and requirement of the subscription. Once organization have decided on the connection setup and Telco lines subscription kindly do the following:

Kindly write-in officially in letter format to Bursa Malaysia:-

Attention to:
Head of Information Technology Operations Services
Group Technology
4th Floor, Bursa Malaysia Berhad
Exchange Square, Bukit Kewangan,
50200 Kuala Lumpur

Do include the following details:

1. Installation Site Address.
2. Telco Name
3. Circuit Bandwidth
4. Site Contact person
5. Tentative date for installation activity (must be on Friday).

Please submit through post OR fax the letter to: 603-20722567, AND email a scan copy to:
CustomerService@bursamalaysia.com

Network Access And Infrastructure Services ('NAIS') Form

Upon confirmation from Bursa IT on the installation of telco lines and routers. Organization need to fill in and submit the Network Access and Infrastructure Services (NAIS) Subscription Form.

(Note: Form and all related document can be downloaded from Bursa Malaysia website:
https://www.bursamalaysia.com/trade/our_products_services/)

2.1.5 MRTG (Multi Router Traffic Grapher) Add on Service

Subscribers to Bursa WAN will have option to access to the MRTG service to monitor their line(s) utilization. This added service is free and will only be provided upon subscriber request.

Below are the features and limitation to on this service:-

Features:

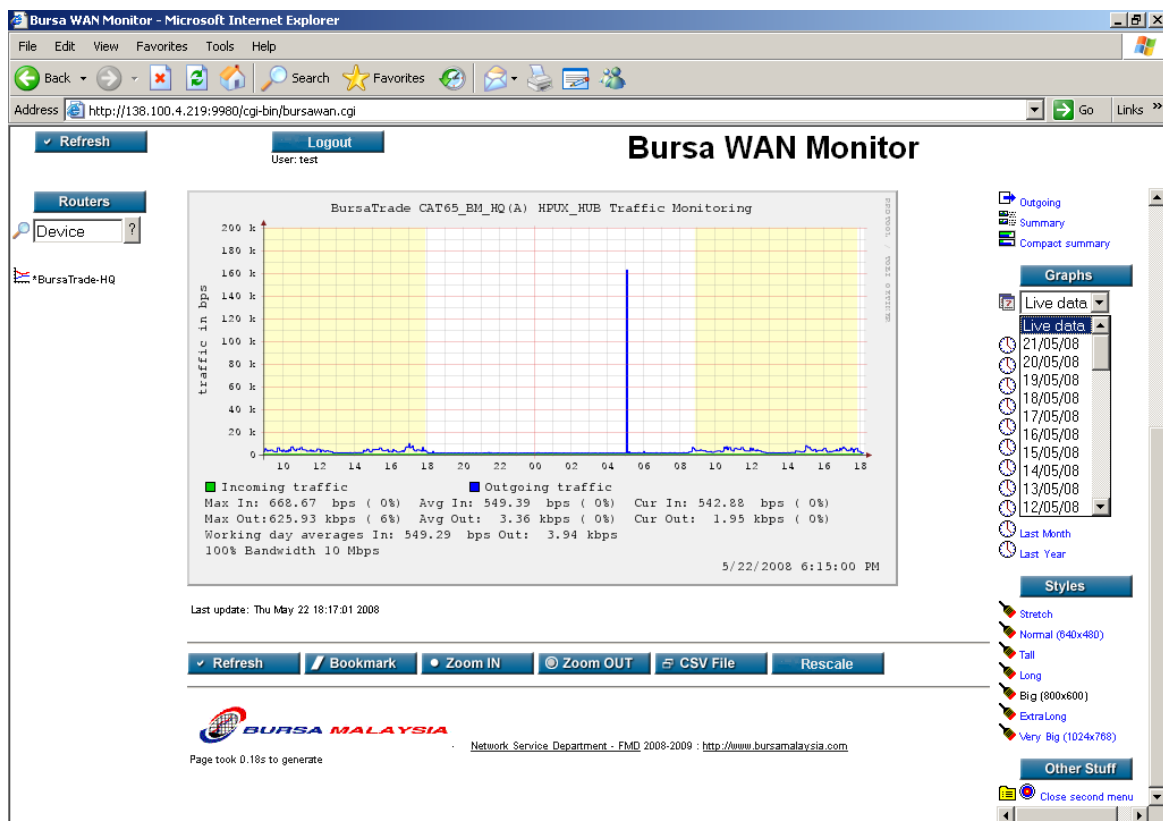
- Web-based on-line lines utilisation for all sites
- 1-min graph (6-hour) for leased lines & ping response time
- The data is able to export to .csv format
- Daily graph archival of 31 days & monthly archival for up to 36 months (every 1st day of the month)

Limitations:

- No customization is allowed
- No threshold alert send from MRTG
- Graph format is fixed & cannot be changed
- Accessing via Bursa Wide Area Network (“Bursa WAN”)

Further instruction on the guideline and requirement to setup the connection to access this MRTG service will be provided upon request by subscriber. If subscriber choose not to setup the MRTG service, ad hoc request on the line utilization can be done by contacting Bursa Network Operations team.

Figure 1.5: Example screenshot of the MRTG



2.1.6 Post Go-Live Activity And Change Request

The subscriber of Bursa WAN must obtain approval from Bursa Malaysia for all changes to the network setup and configuration.

For any post installation activity that involving the connection to Bursa WAN such as:

- i. Telco line upgrade, new installation or termination
- ii. Site/data center relocation
- iii. Subscription termination

Subscribers are **MUST** inform Bursa Malaysia by write-in official letter prior to any action or order submission to Telco or vendor:

Attention to:

Head of Information Technology Operations Services

Group Technology

4th Floor, Bursa Malaysia Berhad

Exchange Square, Bukit Kewangan,

50200 Kuala Lumpur

Fax: 603-20722567, scan and email to: CustomerService@bursamalaysia.com

Site or Data Center Relocation: Appointment of Bursa Network Vendor

For any relocation activity that involve Bursa WAN network equipment, subscribers **MUST** appoint Bursa Malaysia's authorized network vendor. This is to ensure that movement of Bursa Malaysia's network equipment are in proper manner. Quotation by the authorized vendor will be provided to subscriber upon submission of the relocation request of letter to Bursa IT.

2.2 Co-location

The co-location hosting service offers robust network infrastructure, the solution offers high bandwidth connectivity with high speed direct access to Bursa Malaysia markets. Bursa Malaysia's Co-Location service introduced in year 2009 offers low latency connectivity into its markets. This service allows the Exchange's customers to host their own "black box" trading systems within Bursa Malaysia's data centre, thus ensuring the fastest routes between those systems and the exchange's market data services and trading engines.

With low latency direct access to Bursa Malaysia markets, the subscribers will be able to get market updates instantly and able to execute trading transaction faster than clients over wide area network. In addition, this allows clients to react to market movements within a short time and hence mitigating trading risk.

Bursa Malaysia Co-Location services offers the following benefits:

- Environmental control, such as constant temperature and humidity maintenance
- Redundant Cooling Systems
- Fire suppression systems
- Redundant power sources and uninterruptible power supplies (UPS) backup
- Carrier neutral with wide choice of network service providers
- Around-the-clock physical security such as card entry and video monitoring of the facilities
- Standard 21 meters cable length to all customers' racks

Below is the list of Exchange services that can be accessed via Co-location.

Client	Service	Details	Connectivity
POs	BTS2, WebCDS, Armada, eFIX & BTS2 Certification, Corporate Announcement	Customers have direct access to: <ul style="list-style-type: none"> • BTS2 • Equities Clearing & Settlement • Armada • eFIX • BTS2 Certification environment • Corporate Announcement 	Domestic customer connect to Bursa Malaysia via approved Telco providers
POs (for those have TP & PM licenses)	BTS2, WebDCS, Armada, eFIX, ETP & BTS2 Certification, Corporate Announcement	Customers have direct access to: <ul style="list-style-type: none"> • BTS2 • Equities Clearing & Settlement • Armada • eFIX • ETP Bond trading • BTS2 Certification environment • Corporate Announcement 	

Client	Service	Details	Connectivity
IVs	BTS2-Market Data, ETP-Market Data, Corporate Announcement	Customers direct access to BTS2, Corporate Announcement and/or ETP to receive FIX market data.	
ISVs	BTS2	Customers direct access to BTS2	Domestic/international customers will connect to Bursa Malaysia via approved Telco providers
NSPs	BTS2	Customers direct access to BTS2	

2.2.1 Colocation Facilities

The locations are as per below table:

Main Site	DRC Site
Bursa Malaysia 3 rd Floor, Exchange Square, Bukit Kewangan 50200 Kuala Lumpur	Bursa Malaysia 3 rd Floor, Wisma Chase Perdana Off Jalan Semantan Damansara Heights 50490 Kuala Lumpur

Data Centre facilities are summarized as below:

No.	Facilities	Availability	Redundancy
1	Uninterrupted Power System (UPS)	24 x 7	Redundant UPS 1 + 2. Back-up by generator set
2	Air-Conditioner/ Chiller	24 x 7	Redundant chiller 1 + 2. Back-up by generator set
3	Hi Fog – Fire suppression system	24 x 7	On standby mode. Back-up by battery and generator set
4	Smoke Detector System	24 x 7	On standby mode. Back by battery and generator set
5	Water detection system	24 x 7	Back-up by generator set
6	Physical Security Card Access System	24 x 7	Back-up by battery and generator set
7	CCTV system	24 x 7	Back-up by generator set

No.	Facilities	Availability	Redundancy
8	Environment Monitoring System	24 x 7	Back up by generator set

Service Provisioning and Lead-Time

The provisioning process for a standard order usually takes 14 calendar days from the time an order is confirmed and accepted by Bursa Malaysia.

Estimated Lead Time of Service Provisioning		
Items	Lead Time	Remarks
Racks	20 calendar days	If require, Bursa Malaysia to procure. <i>(Note: Dedicated racks are to be purchased by subscriber.)</i>
Power to racks	14 calendar days	Power amperage provided is 20 Amps or 32 Amps
Connectivity Services	14 Calendar days	Connectivity to Bursa Malaysia 's firewall and Trading Machine

Note: For more information on Co-Lo Subscription form and Terms and Conditions, please refer to the URL below:

https://www.bursamalaysia.com/trade/our_products_services/co_location_services

2.2.2 Network

Network Availability

The network availability is achieved by using dual access points configuration. Those running with single connection setup will be running without the backup. Below is the requirement for PO colocation setup.

***For PO:* OMS hosted in Bursa Colocation**

Site	Connection to Bursa Colo Access Point A	Connection to Bursa Colo Access Point B	Remark
Bursa Colocation (Main site)	Yes	Yes	PO must install its own circuit to Bursa DR Co-location to enable their replication and system

high availability purpose		
Bursa Colocation (DR)	Yes	Optional

Bursa Malaysia backhaul line is for Bursa Malaysia internal use to link between Bursa Malaysia Main Data Centre and Bursa Malaysia Disaster Recovery Data Centre. Subscribers must install its own circuit to Bursa DR Co-location to enable their replication and system high availability purpose.

In addition to the above, the subscribers must have different carrier connection from Bursa Malaysia Co-location to their network.

Please refer to Appendix 1 - Summary of Guidelines on Minimum IT Facilities For Participating Organisations (POs).

Carrier Services and Networking Cabling

a. Carrier available onsite: -

Local carrier

- Time DotCom
- Telekom
- Maxis
- Celcom

International carrier

- BT Radianz
- TNSI
- IPC
- Avelacom

b. Network cabling interface type available: -

- RJ-45 for 100/1000Mbps
- SFP+ 10Gigabits (future)

Note: - Standard 21 meters' cable length to all customers' racks

IP Addresses Scheme

The subscribers must configure their network router or firewall for their server (i.e. 10.1.240.0/20 or 10.2.240.0/20) appears to have a private IP address from the RFC1918 IP address range provide by

Bursa. This can be achieved by configuring the router or firewall to use network address translation ('NAT').

2.3 Bursa Malaysia Infrastructure Services Standards

Below is the summary table of Bursa Malaysia Infrastructure Services Standards for all NAIS subscribers to follow which including subscriber’s internal network and systems that related to Exchange trading activities.

1.0	Infrastructure Requirement	NAIS Subscribers						
		PO	ADM	PM	TP	IVs	ISV*	NSV
1.1	Subscribers must have minimum of two (2) sites connected to BMB. i.e. Main and DRC.	M	R	R	R	R	M	M
1.2	Disaster recovery plan and technology risk management must be in place to resume continuity.	M	M	M	M	M	M	M
1.3	Subscriber’s Main Site must have minimum of two (2) connections from 2 different <u>Telco</u> to Bursa HQ and Bursa DRC.	M	M	M	M	M	M	M
1.4	Subscriber’s Backup/Secondary Site must have a minimum single connection to Bursa HQ.	M	M	M	M	M	N/A	N/A
1.5	Subscriber’s Backup/Secondary should have 2 nd connection (i.e. from different Telco) to Bursa DRC.	R	R	R	R	R	N/A	N/A
1.6	The capacity and performance of subscriber’s system and network must be reviewed periodically and to upgrade when necessary.	M	M	M	M	M	M	M
1.7	Subscribers must prioritise the real-time sensitive traffics (i.e. trading & market data) on their system and network.	M	N/A	R	M	M	M	M
1.8	Subscribers must closely monitor their internal network lines utilization where the average peak threshold should not be more than 70% during trading hours.	M	M	M	M	M	M	M
1.9	The system must be setup in redundant (i.e. active/active or active/backup)	M	R	N/A	R	R	M	M
1.10	The subscription of the connection to Exchange must be direct subscription from Bursa approved Telco. i.e not through Wholesale or via 3 rd Party.	M	M	M	M	R	R	R

2.0	Security and Risk Control Requirement	PO	ADM	PM	TP	IVs	ISV*	NSV
2.1	Subscribers to ensure all systems and information are properly secured physically and logically.	M	M	M	M	M	M	M
2.2	Subscribers to ensure all systems are protected by unauthorized access. Access control must be in place to grant authorized users.	M	M	M	M	M	M	M
2.3	Subscribers to ensure appropriate logging and monitoring systems.	M	M	M	M	M	M	M
2.4	Subscribers to ensure production systems is isolated from testing environment.	M	M	M	M	M	M	M
3.0	Management and Support Requirement	PO	ADM	PM	TP	IVs	ISV*	NSV
3.1	The network and systems diagram must be maintained and any changes to be updated.	M	M	M	M	M	M	M
3.2	The network and systems monitoring tools must have capabilities to track and report health status or errors.	M	M	M	M	M	M	M

Legends: M = Mandatory, R = Recommended, N/A = Not Applicable.

2.4 Bursa Trade Securities (BTS2) Testing Environment

A simulation of the Bursa Malaysia BTS2 is available in the Test Environment. The Test Environment is a replication of the BTS2 to allow participants to test the new release of software and for the purpose of certification. POs have the options of either developing an in-house OMS via FIX Protocol or engaging an Independent Software Vendor (ISV) from the list of certified ISVs.

ISVs or POs may develop their own customised OMS and connect directly to the Exchange Test Environment gateways using FIX protocol via Internet IPSEC VPN for development and certification testing.

This section is meant to guide the test participants on how to configure and to manage their own network connection and connect to the Bursa Malaysia Trade Securities 2 FIX Certification environment herewith known as 'BTS2 FIX CERT'.

The test participant users must have a high-speed connection to Internet for this Site to Site Virtual Private Network ('VPN') connection setup and connect to BTS2 FIX CERT environment.

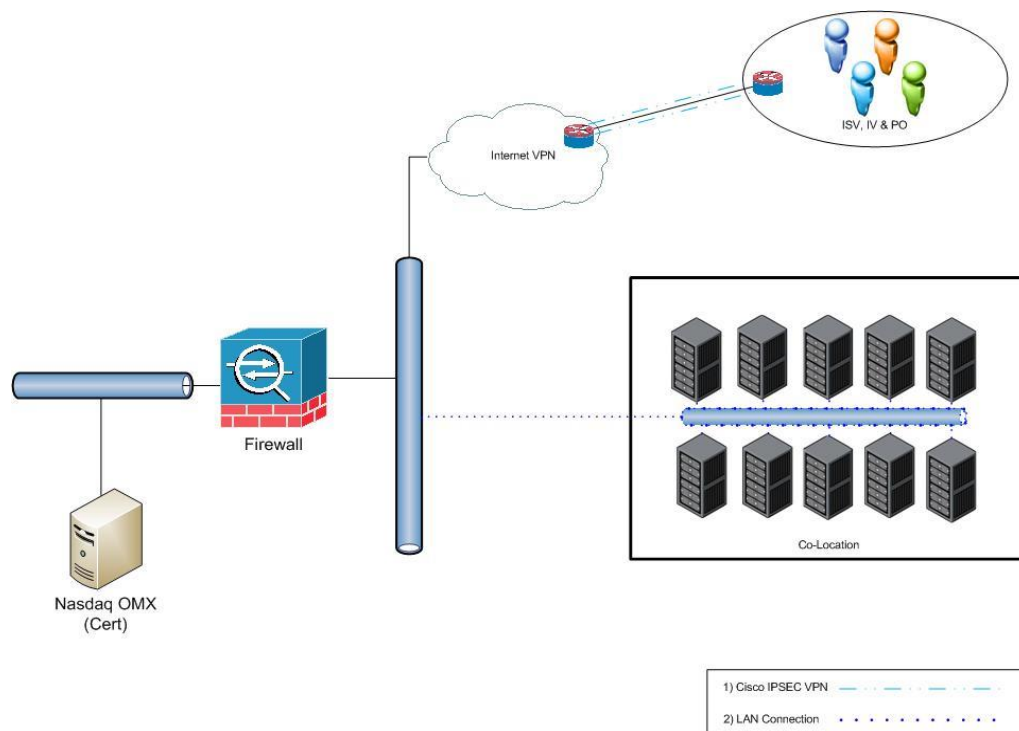


Figure 2.3 above illustrates the high level connectivity diagram for Internet VPN setup

2.4.1 Requirements

1. New and existing Bursa test participants who require access to BTS2 FIX CERT environments must complete and submit the BTS2-A1 form to Bursa Malaysia. Kindly fax and e-mail completed form to Bursa Malaysia Customer Service, Fax: +603-20722567; Email CustomerService@bursamalaysia.com. All of the information requested on the form must be provided and please note the missing or ambiguous information may cause delays to the above request. Please contact Bursa Customer Service at +603-20265099 with additional questions regarding an existing VPN or a new VPN setup.

See appendix for the subscription form.

2. The VPN connection setup must meet the following requirements:

- 1024 Kbps is the recommended connection speed.
- The registered Public IP address must be static and routable on the Internet.

The test participant Internet service provider (ISP) must support VPN protocols routing and switching.

3. IP Addresses Scheme – The test participant must configure their router or firewall for their server (i.e. 10.1.0.0/16) appears to have a private IP address from the RFC1918 IP address range provide by Bursa. This can be achieved by configuring the router or firewall to use network address translation ('NAT').
4. Hardware – Below is the minimum configuration:

NO.	PRODUCT	DESCRIPTION
	CODE	
	Router & Module	
1.	Cisco Router with Security license	Cisco Router with SEC License PAK
2.	CAB-ACU	Power Cord UK
3.	UTP CABLE	UTP Cable, 10 feet (**x 2)
	Optional item	
5.	Switch	Switch to connect the router & application server.

The test participant may opt for other model of Cisco router or to use Cisco ASA firewall. Please note the Cisco router to be installed must come with the security features set for enabling the IPSEC VPN connection to BTS2 FIX CERT environment. Please note we are not able to provide any support if the test participant setup is other than the Cisco router or Cisco firewall.

5. Software - The CISCO- Router with **SEC/K9'** software shall come with the following encryption requirements:
 - PSK for Internet Security Association and Key Management Protocol (ISAKMP)/IKE

- 3DES Encryption for ISAKMP/IKE
- MD5 Encryption for IPSec
- 3DES Encryption for IPSec

2.4.2 Procedure to Setup the VPN Connection

1. Upon receipt of the BTS2-A1 form, Bursa Network Services engineer will review and evaluate the provided information. The engineer will send the following information to be used in configuring the test participant network:
 - A range of private addresses (i.e. RFC 1918) for test participant to assign addresses to testing hosts
 - A sample remote VPN router configuration
 - A unique pre-shared key (PSK) for authenticating devices and encrypting/decrypting packets
2. After Configuring the VPN Connection, the test participant can verify the connection by ping the BTS2 FIX CERT server network gateway IP address 10.1.117.1, and using a source IP address from the Bursa assigned private address range. Kindly ensure there should not have packet loss across the VPN connection by running the extended pings. This will verify basic network connectivity to BTS2 FIX CERT environments.

Note: You will not be able to ping the Bursa public IP VPN peer address 211.25.178.10 from anywhere on the Internet because we do not permit this traffic.

3. The following Cisco IOS commands are helpful in troubleshooting issues that may arise when turning up new VPN connections:
 - sh crypto isakmp sa | i 211.25.178.10 (a good output should show "QM_IDLE" state)
 - sh crypto ipsec sa | b 10.1.117.0 (a good output will show packets being encapsulated and decapsulated with no errors)

See appendix for the sample router configuration for this IPSEC VPN setup.

2.4.3 General Guidelines

1. All requests must be submitted at least five (5) working days before the proposed test period. Bursa will revert on the acceptance of the request to the Test Participants on the following working day.
2. The BTS2 FIX CERT environment will be available on daily basis. Each session will occupy from 8:30am to 5:00pm from Monday to Friday. However, Bursa reserves the right to change the testing dates and times without giving prior notice.

3. Each Test Participant will be allowed to use the BTS2 FIX CERT environment a period of maximum **three month** at one time. Any further request to use the facility must be made again, as in (a) above and subject to availability and it is based on a first-come-first-served basis.
4. Bursa reserves the right to reject, reschedule or limit the requests.
5. Bursa Malaysia reserves the right to reject any request if Test Participant breaches any of Bursa Policies.
6. Bursa Malaysia provides this facility to assist Test participants to test the interface between the systems and the functionality of the FIX application. This service provided should not be misused as a stress test facility.
7. Bursa Malaysia will provide the necessary network configuration and the Test Participants are expected to configure the test servers accordingly. The Test Participants are required to use the assigned network configuration and are responsible for the network configuration of the FIX systems and networking equipment.
8. Bursa Malaysia will not be responsible for any failure or delay of the testing activity of the Test Participants.
9. Bursa Malaysia reserved the right to claim against any damages caused by Test Participants.

2.5 Operational Support Matrix

Team	Support	Support Description	KL Hours	Phone	Email
Network Operations	Network	Technical support	07:00 – 19:30	603 20263587	nsdops@bursamalaysia.com
Customer Service	General Support	General Information	07:00 – 18:30	603 2056 5099	customerservice@bursamalaysia.com

APPENDIX

3.1 Guidelines on Minimum IT Facilities For Participating Organisations (POs)

No	Facilities	Head Office	Branch Designated as Disaster/Secondary Site	Co-location at Bursa Premise	OMS Hosting at ISV (i.e. ASP model)
1.	Order Management System /DropCopy/Market Data/Risk Mgmt Servers	<p>Minimum of two (2) servers forming a Master & Slave (i.e. Active/Backup or Active/Active) setup.</p> <p>Each server must have connection to Bursa HQ and DRC.</p>	<p>Minimum of one (1) server setup.</p> <p>POs must have the necessary backup plan when there is a failure to POs System located in designated branch</p>	<p>Minimum of two (2) servers forming a Master & Slave (i.e. Active/Backup or Active/Active) setup.</p> <p>Each POs server must have connection to Bursa HQ and DRC.</p>	<p>Minimum of two (2) servers forming a Master & Slave (i.e. Active/Backup or Active/Active) setup.</p> <p>Each POs server must have connection to Bursa HQ and DRC.</p>
2.	eFIX Terminals	<p>Minimum one eFIX terminal. Prefer to have standby eFIX terminal to backup production eFIX terminal.</p>	<p>Not Applicable.</p>	<p>Minimum one eFIX terminal. Prefer to have standby eFIX terminal to backup production eFIX terminal.</p>	<p>Not Applicable.</p>
3.	WebCDS Terminals	<p>Minimum two (2) CDS terminals of which one is used for the CDS file transfer.</p> <p>However, POs are to use their discretion depending on their needs and ensure that the number is sufficient in case of failure.</p>	<p>Minimum of one (1) CDS terminal.</p> <p>However, POs are to use their discretion depending on their needs and ensure that the number is sufficient in case of failure.</p>	<p>Minimum two (2) CDS terminals of which one is used for the CDS file transfer.</p> <p>However, POs are to use their discretion depending on their needs and ensure that the number is sufficient in case of failure.</p>	<p>Not Applicable.</p>

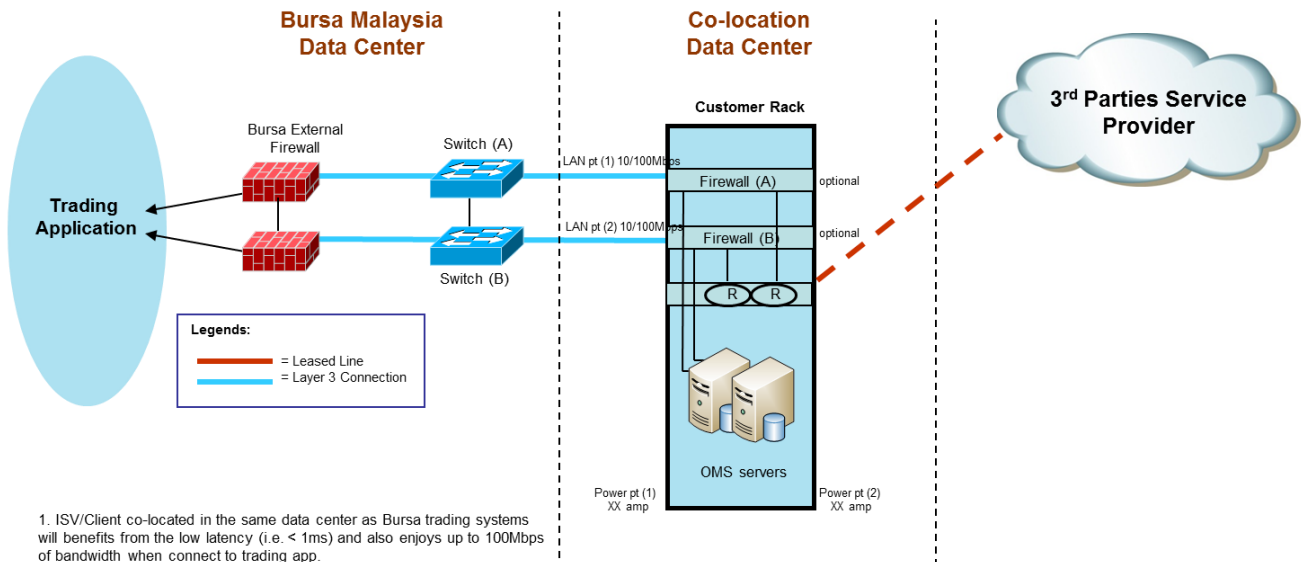
No	Facilities	Head Office	Branch Designated as Disaster/Secondary Site	Co-location at Bursa Premise	OMS Hosting at ISV (i.e. ASP model)
4.	Wide Area Network ('WAN')	<p><u>Bursa WAN:</u></p> <p>Minimum of two routers with <u>two lines from different carriers</u> of which one is to be linked to the Bursa HQ while the other is linked to Bursa DRC.</p>	<p><u>Bursa WAN</u></p> <p>Minimum of one router with one line; Recommended to have two routers with two lines.</p>	<p><u>3rd Party Service Provider</u></p> <p>Minimum subscribe two (2) network access point in Bursa HQ Co-location and one (1) network access point in Bursa DRC. POs must have different carrier connection from HQ Co-location to their network.</p>	<p><u>3rd Party Service Provider</u></p> <p>Minimum subscribe two (2) network access point in Bursa HQ Co-location and one (1) network access point in Bursa DRC. POs must have different carrier connection from HQ Co-location to their network.</p>
5.	Backup procedures	<p>The Head Office site must put in place a backup procedure that to be activated in the event of failure that disrupts the operation to ensure the investors are not affected.</p>	<p>The branch must put in place a backup procedure to be activated in the event of failure that disrupts the operation to ensure the investors are not affected.</p>	<p>The Co-location setup must put in place a backup procedure to be activated in the event of failure that disrupts the operation to ensure the investors are not affected.</p>	<p>The Co-location setup must put in place a backup procedure to be activated in the event of failure that disrupts the operation to ensure the investors are not affected.</p>

Note:

1. If there are any variations to the recommended guidelines above, Member Companies are to seek Bursa Malaysia's approval.
2. No testing platform is allowed running on the production environment. The testing platform should be in an isolated environment which is to connect Bursa Test Environment using IPSEC VPN.

3.2 Generic Co-location Hosting Connectivity Diagram

Generic Colocation Hosting Connectivity Diagram



Data center facilities	Trading Network Access Only	Colocation Cabinets	Client Colo Servers & Network Equipments	Client site Cross-connect ⁽¹⁾
Included	Basic/HA option	Client responsibility	Client responsibility	Client responsibility (i.e. 3 rd party SP)

Note:
 1. In no event shall Bursa responsible for Internet security setup for ISV/Client OMS and/or connectivity for OMS to Bursa Malaysia DR Systems

3.3 Sample VPN Router Config

Test Participant Cisco Router Configuration

```

!
crypto isakmp policy 2
  encr 3des
  hash md5
  authentication pre-share
!
! #(The pre-shared key will be provided upon new setup of VPN connection)
crypto isakmp key XXXXXXXXXXXX address 211.XX.XXX.XX
!
crypto ipsec transform-set bursavpn esp-3des esp-md5-hmac
!
crypto map bursavpn 1 ipsec-isakmp
  set peer 211.XX.XXX.XX
  set transform-set bursavpn
  match address 100
!
! #(Please use the IP address provided by Bursa)
interface g0/0
  ip address 10.1.19X.X 255.255.255.224
  duplex auto
  speed auto
  no cdp enable
!
interface g0/1
  ip address 211.XX.XXX.XX 255.255.255.x #(Customer public interface)
  crypto map bursavpn
  ip access-group 199 in
!
! #(the following route statements can be replaced with a default route statement)
ip route 10.X.XX.0 255.255.255.0 (ip address of corporate internet router)
!
ip classless
no ip http server
no ip http secure-server
!
! #(the following ACL statement will permit the encryption/decryption traffic in IPSEC tunnel)
access-list 100 permit ip 10.1.19X.X 0.0.0.31 10.X.XX.0 0.0.0.255
!
access-list 199 permit ip 10.X.XX.0 0.0.0.255 10.1.19X.X 0.0.0.31
access-list 199 permit udp any any eq isakmp
access-list 199 permit ahp any any
access-list 199 permit esp any any

```

3.3 BTS2-A1 Form

See next page

ACCESS REQUEST TO CERTIFICATION ENVIRONMENT BURSA TRADE SECURITIES 2

Fax and e-mail completed form to Technical Operations Services, Fax: 603-20722567 email: bts2@bursamalaysia.com

Part I ... to be completed in full by the applicant

Organisation (Please mark only one)

Participating Organisation
 Independent Software Vendor
 Information Vendors

Company Name

Fax Number

Company Stamp & Authorised Signatory

Date :

Details of Individual(s) managing and/or conducting the tests on Development Platform

1	<input type="text"/>	Tel	<input type="text"/>	email	<input type="text"/>
2	<input type="text"/>	Tel	<input type="text"/>	email	<input type="text"/>
3	<input type="text"/>	Tel	<input type="text"/>	email	<input type="text"/>

Development Platform Test Period (90 days only)

to

Request New Extension

Network Connectivity

Colocation at Bursa

Internet IPsec VPN

Other

Peer IP:

/ Gateway IP:

TWO order-routing FIX IDs will be provided and if more are needed, state the reason(s) below.

Part II ... for internal use only.

FIX Username	FIX SenderCompID	FIX TargetCompID	FIX SenderSubID

Work completed by: Date/Time: Signature:

Note : Please resubmit this form, for extension of Fix Certification Environment Test Period.