chi-x®
AUSTRALIA

Technical Connectivity Guide

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VERSION HISTORY

VERSION	DESCRIPTION	DATE
1.0	Initial Release	18th April 2011
1.1	Updated to include Multicast Market Data IP Addressing Section 4.1 updated to include Cross Connect orders	9th June 2011
1.2	Updated to include Multicast Market Data IP addressing for test and production	20th July 2011
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2.6	Added NTP service info, intersite link info, removed hsrp options	10th September 2019
2.7	Removed Telnet test in testing section	7th December 2020
2.8	Added Binary Market Data Feed Addressing	11th August 2021
2.9	Added missing RP information and updated Prod binary feed recovery port.	19th August 2021

1 Introduction

This document summarises the options for technical connectivity to the market operated by Chi-X Australia ("**Chi-X**"). The intended audience are those involved in establishing connectivity to Chi-X such as; network administrators, technical/solution architects, infrastructure managers and project managers. This document may not contain all the required information and as such, the reader should contact Chi-X support for further clarification. The term *participant* used in this document covers anyone connecting to Chi-X, unless otherwise specified.

If you have any further queries, please contact Chi-X Customer Support:

Email: au.support@chi-x.com or

Tel: +61 2 8078 1701

2 Overview

Chi-X has established a fully redundant trading system in the Equinix Data Centre at Mascot and in Global Switch Data Centre at Pyrmont. The primary/production facility is housed in the Equinix data centre and backup/recovery facility is housed at the Global Switch data centre. Participants may choose to connect to the primary data centre only or both data centres at their discretion.

Chi-X supports the following network connectivity options:

- Co-Location cross connects
- Extranets
- Direct carrier connection
- Global Switch / Equinix Chi-X Wan (connectivity from Global Switch to Equinix only)
- Internet Connection (for qualification and test only)

3 Chi-X Services

The bandwidth requirements for each participant will be dependent on the Chi-X services that are taken. The range of services include:

- Access to the trading interface for order entry
- Market data
- Trade feed / 3rd Party Cons Feed / Cross Session Order Management
- SFTP reports

Set out below are bandwidth examples for the first two to assist participants when evaluating their bandwidth requirements. Please contact Chi-X Customer Support to discuss if you have any further queries.

3.1.1 Order Entry

Chi-X supports FIX 4.2 and OUCH (CHIXOE) for order entry. Connectivity options include:

- Direct connection to Chi-X, which enables participants to send orders to Chi-X from, by way of example, their trade blotter, order entry engine or other proprietary or third party software applications; and
- Indirect connections using, for example, a vendor or EMS that maintains its own direct connection to Chi-X and provides facilities to route orders to Chi-X on behalf of participants.

For guidance purposes, bandwidth for submitting orders via FIX is determined by reference to a participants anticipated order volume:

Bandwidth	256kbps	512kbps	1.5Mbps
FIX message rate	75/sec	150/sec	450/sec

These figures are provided for illustrative purposes only. Participants should confirm their own messaging requirements.

3.2 Market Data

Chi-X provides a real-time unicast market data feed ("**CHIXMD**") and multicast market data feed ("**CHIXMMD**"). The market data feed disseminates data concerning all visible orders and all trades on the Chi-X market in real-time. The unicast feed is a series of sequenced and unsequenced variable length messages built on a simple session layer on top of TCP/IP sockets. The market data content and message format is identical for CHIXMD and CHIXMMD, however a single multicast UDP packet may contain multiple market data messages whereas a single unicast UDP packet will normally only contain a single market data message.

Please note that this difference in message processing means that the multicast protocol can present market data more efficiently. As a result, customers can expect CHIXMMD to provide a lower latency solution on average compared to CHIXMD.

CHIXMD/CHIXMMD feeds are similar to the CHIXMD/CHIXMMD feeds implemented by Chi-X Japan. They also share many similarities to the ITCH protocol implemented by other exchanges and trading platforms globally.

CHIXMD bandwidth examples:

Bandwidth	5Mbps	10Mbps	20Mbps	50Mbps	100Mbps	200Mbps
CHIXMD message rate	5600/sec	11200/sec	22400/sec	56000/sec	112000/sec	22400/sec

CHIXMMD bandwidth examples:

Bandwidth	5Mbps	10Mbps	20Mbps	50Mbps	100Mbps	200Mbps
CHIXMMD message rate	6300/sec	12600/sec	25200/sec	63000/sec	126000/sec	252000/sec

As volumes on Chi-X grow, the volume of messages will also grow, increasing the market data bandwidth requirement. Chi-X will keep bandwidth utilisation under review and endeavour to notify participants of any material changes to message traffic as they arise. The above figure should NOT be considered minimum requirements. As of date 28/08/2019 in year 2019 only, CXA has seen a peak burst of 54.5Mbps on one CHIXMMD stream measured at a 50 microsecond burst interval.

4 Network Connectivity

There are multiple ways to connect to Chi-X:

- Co-Location cross connects
- Extranets
- Direct carrier connection
- Global Switch / Equinix Chi-X Wan
- Internet Connection (for qualification and test only)

4.1 Network Connectivity Options

Co-location cross connects

Trading participants may co-locate and cross connect directly to Chi-X for an ultra-low latency solution. Cross-connects need to be ordered by trading participants through Equinix for installation to the Chi-X racks. Subject to availability, vendors may also be able to co-locate.

At Global Switch the cross connect must be ordered directly from Global Switch and not through a 3rd party contractor.

Extranets

Participants may choose to connect to Chi-X via an extranet provider.

Direct Carrier Connection

Participants may choose to connect directly to Chi-X via a network carrier. Both Chi-X data centres have a large choice of carriers available. Participants need to ensure that the carrier connection also includes a cross-connect from the Telco MMR (Meet-me-room) to the Chi-X racks.

If you are connecting to the data centre via a carrier and require a cross connect from the data centres MMR to the Chi-X racks it is the responsibility of the carrier to order the cross connect.

Global Switch Proximity Access Solution

For participants located at Global Switch, Chi-X offers, access to Chi-X's primary infrastructure via direct cross connection from the Chi-X Disaster Recovery facility located at Global Switch to the primary site located at Equinix. Participants are able to connect to high speed Chi-X local routers at Global Switch and then utilise the Chi-X direct 10GbE fibre connection to access the production Chi-X infrastructure located at Equinix. Please note that there is limited capacity so you should check availability with Chi-X at an early stage in your planning.

Internet Connection

Secure internet connections are designed for qualification and test only. Further details on this service can be found in the *Chi-X Test Environment Setup Guide*.

4.2 Physical Layer

At a physical layer, the participant has the option of connecting via copper or fibre Ethernet cross connect. Participants should order these cross-connects via the data centre provider. The method of connection must be agreed with Chi-X before the participant orders the cross-connect from the Data Centre provider. Please contact Chi-X Customer Support.

At each data centre, the participant will be offered up to 2 connections/per service as standard. If a participant requires more than 2 connections please contact Chi-X Customer Support to discuss your requirements.

The following standards and media types are offered.

Media	Standard	Port Settings	
		Speed (Mbps)	Duplex
Cat 6 UTP	10BASE-T	10	Full
Cat 6 UTP	100BASE-TX	100	Full
Cat 6 UTP	1000BASE-T	1000	Full
Multimode Optical Fibre	1000BASE-SX	1000	Full
Single mode Optical Fibre	1000BASE-LX	1000	Full
Single mode Optical Fibre	1000BASE-EX	1000	Full
Single mode Optical Fibre	1000BASE-ZX	1000	Full
Multimode Optical Fibre	10GBASE-SR	10000	Full
Single mode Optical Fibre	10GBASE-LR	10000	Full
Single mode Optical Fibre	10GBASE-ER	10000	Full
Single mode Optical Fibre	10GBASE-ZR	10000	Full

Please note that fibre optic connections and additional ports are available at an additional fee.

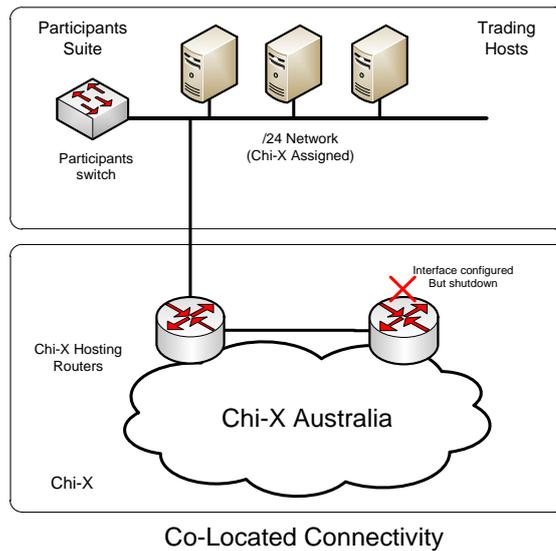## 4.3   Ethernet Connectivity Options

The participant has 3 main possibilities with respect to Ethernet connectivity options:

1. Single or dual port
2. Single or dual subnets
3. Use of router or not.

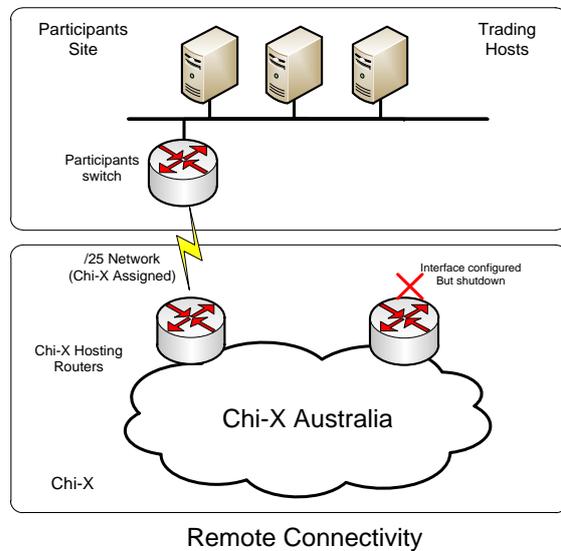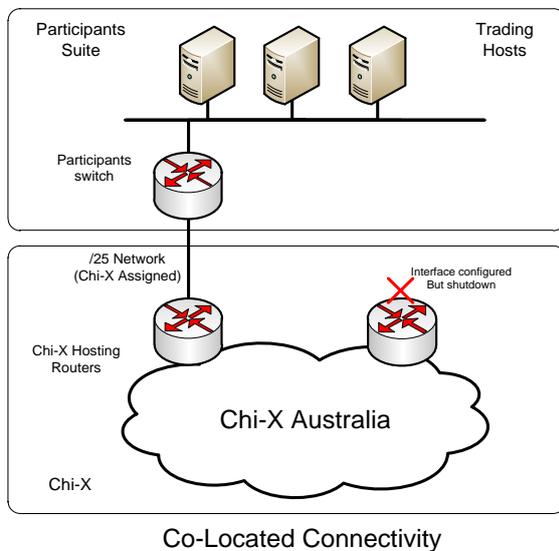The main possibilities translate to the following options:

Option 1: Single Port Single subnet Connections

It is possible for a participant to connect using only a single cross connect. As far as Chi-X is concerned, singly connected participants will be configured identically to a standard dual connected participant, albeit with one link permanently shut down. All ports, addresses etc will be allocated/reserved as per a dual connection in order to allow future upgrades. The participant should specify whether they would rather be provided with a single or dual subnet (to allow for a future resilient setup). Please note that this setup is not recommended over a wan.

Interface configured
But shutdown

Participants
Suite

Trading
Hosts

/24 Network
(Chi-X Assigned)

Participants
switch

Chi-X Hosting
Routers

Chi-X Australia

Chi-X

Co-Located Connectivity

Option 2: Single Port Single Subnet with Router Connections

This is a likely option for participants who may want to upgrade to resilient router connections in the future. The participant will be allocated one /25 address range on one hosting router, and will be delivered one layer-3 port. It is the participant's responsibility to provide the switch for their equipment, and to ensure that all connections are addressed from the assigned address space. The participant can choose to add routing functionality with this option.

Participants
Suite

Trading
Hosts

Participants
switch

/25 Network
(Chi-X Assigned)

Interface configured
But shutdown

Chi-X Hosting
Routers

Chi-X Australia

Chi-X

Co-Located Connectivity

Participants
Site

Trading
Hosts

Participants
switch

/25 Network
(Chi-X Assigned)

Interface configured
But shutdown

Chi-X Hosting
Routers

Chi-X Australia
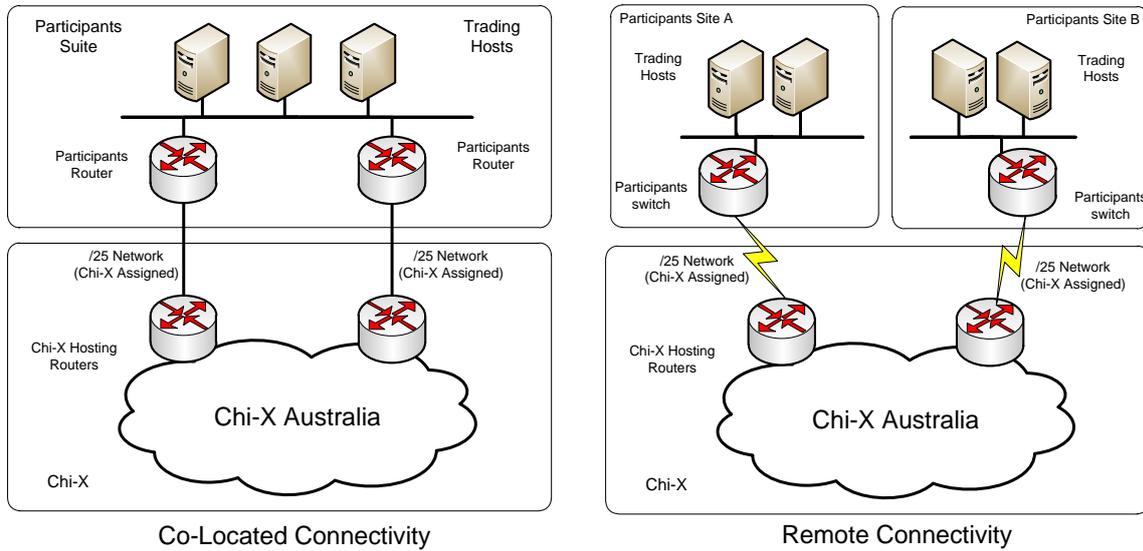
Chi-X

Remote Connectivity

Option 3: Dual Port Dual Subnet Connections

This is a likely configuration for participants who want to connect from 2 separate suites or sites. The participant will be allocated two /25 address ranges, one from each hosting router. The ports will be delivered as layer-3 ports, one in each subnet. It is the participant's responsibility to provide the switch for their equipment, and to ensure that all connections are addressed from the assigned address space.

Co-Located Connectivity

Remote Connectivity
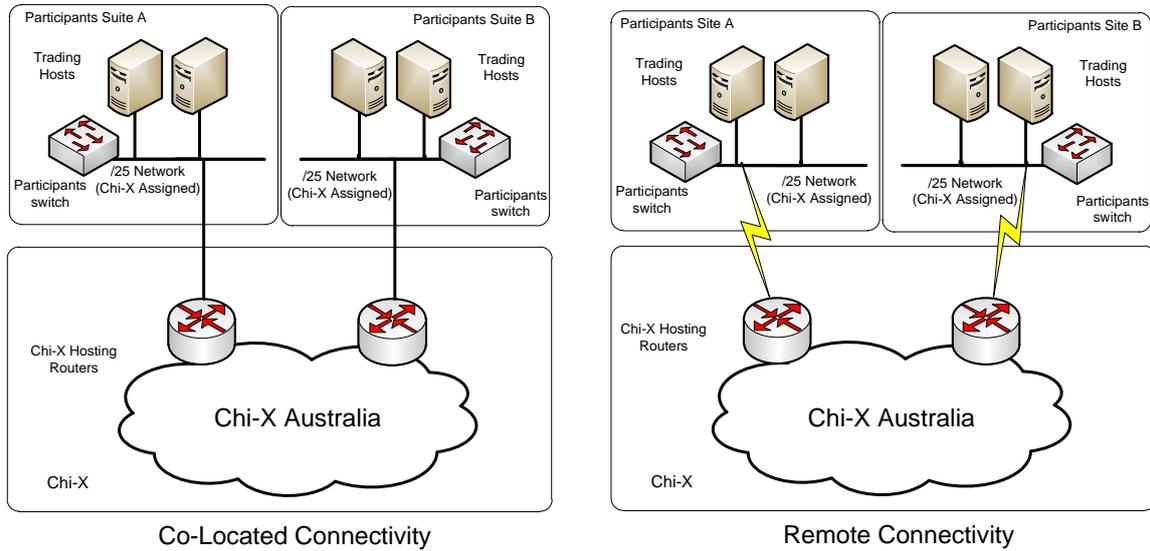
Option 4: Dual Port Dual Subnet with Router Connections

This is a likely configuration for participants who want to connect via resilient router connections. The participant will be allocated two /25 address ranges, one from each hosting router. The ports will be delivered as layer-3 ports, one in each subnet. It is the participant's responsibility to provide the switch for their equipment, and to ensure that all connections are addressed from the assigned address space. The participant can choose to add routing functionality with this option.

Co-Located Connectivity

Remote Connectivity

4.4 IP Addressing

Chi-X Unicast Addressing

Chi-X uses a registered range of IP addresses for its production and test servers. This range is composed of 1 x /23 covering both its data centres.

The following table shows the IP addresses used:

	Primary DC	**Backup DC**
Aggregate Range	**202.94.78.0/24**	**202.94.79.0/24**
Production IP's		
Primary FIX Trading / Cross-Session Order Management IP	202.94.78.1	202.94.79.1
Standby FIX Trading / Cross-Session Order Management IP	202.94.78.2	n/a
Primary Market Data IP	202.94.78.3	202.94.79.3
Secondary Market Data IP	202.94.78.4	n/a
Primary 3rd Party Cons/Trade Feed IP	202.94.78.5	202.94.79.5
Standby 3rd Party Cons/Trade Feed IP	202.94.78.6	n/a
SFTP service IP	202.94.78.8	202.94.79.8
Primary CHIXOE Trading IP	202.94.78.25	n/a
Standby CHIXOE Trading IP	202.94.78.26	n/a
Test IP's		
Test FIX/ CHIXOE Trading IP	202.94.78.224	n/a
Test Standby FIX/ CHIXOE Trading IP	202.94.78.225	n/a
Test Market Data IP	202.94.78.226	n/a
Test 3rd Party Cons/Trade Feed IP	202.94.78.227	n/a
Test Multicast MD retransmission IP	202.94.78.228	n/a
Test SFTP Service IP	202.94.78.229	n/a

Production TCP Port Ranges	Low Port	High Port
Trading FIX	30001	30999
Trading CHIXOE	31001	31999
Trade Feed	35001	35999
3rd Party Consolidated Feed	36001	36999
Cross Session Order Management	37001	37999
Market Data	38001	38999
Market Data Retransmission	39001	39099

Chi-X Multicast Addressing

Multicast Market Data Feed Components		Multicast distribution				Recovery				Site
						Unicast Retransmission		Snaphot		
Production										
Description	Identifier	Multicast Group	Destination Port	Source IP	Rendezvous Point (RP)	IP address	TCP Port	IP Address	TCP Port	
ASCII Feed Primary	CMPA1	233.218.133.1	6001	202.94.78.51	202.94.78.14	202.94.78.7	39001	202.94.78.7	n/a	Primary DC (Equinix)
ASCII Feed Secondary	CMPA2	233.218.133.2	6002	202.94.78.59	202.94.78.15	202.94.78.7	39002	202.94.78.7	n/a	Primary DC (Equinix)
ASCII Feed Backup	CMPA3	233.218.133.65	7001	202.94.79.51	202.94.79.14	202.94.79.7	39001	202.94.79.7	n/a	Backup DC (Global Switch)
Binary Feed Primary	CMPB1	233.218.133.3	6003	202.94.78.52	202.94.78.14	202.94.78.7	39005	202.94.78.7	39033	Primary DC (Equinix)
Binary Feed Secondary	CMPB2	233.218.133.4	6004	202.94.78.60	202.94.78.15	202.94.78.7	39006	202.94.78.7	39034	Primary DC (Equinix)
Test Environment (PTE)										
ASCII Feed Primary	CMQA1	233.218.133.51	16001	202.94.78.201	202.94.78.14	202.94.78.228	22089	202.94.78.228	n/a	Primary DC (Equinix)
ASCII Feed Secondary	CMQA2	233.218.133.52	16002	202.94.78.208	202.94.78.15	202.94.78.228	22090	202.94.78.228	n/a	Primary DC (Equinix)
Binary Feed Primary	CMQB1	233.218.133.53	16003	202.94.78.201	202.94.78.14	202.94.78.228	22091	202.94.78.228	22095	Primary DC (Equinix)
Binary Feed Secondary	CMQB2	233.218.133.54	16004	202.94.78.208	202.94.78.15	202.94.78.228	22092	202.94.78.228	22096	Primary DC (Equinix)

Participant Addressing

Chi-X can offer 3 types of participant IP addressing connectivity.

1. The participant uses their own globally unique addressing and this is accepted by Chi-X.
2. The participant uses one of the allocated LAN IP addresses as a source IP address for connectivity to Chi-X servers. Using this model, the participant can also hide their infrastructure using NAT.
3. The participant is allocated a private /24 address range by Chi-X to be used on the participant's infrastructure.

Chi-X is unable to integrate with the participants' internal RFC1918 IP address ranges.

4.5   NTP service

Chi-X synchronizes its time servers to the Australian National Measurement Institute (NMI) via the NTP protocol. Chi-X offers a NTP based time service for Customers to synchronize to their systems. The NTP service requires the Customer to connect to the Chi-X infrastructure and poll nominated Chi-X servers using the NTP protocol. A service subscription allows the customer to poll the below NTP server IPs.

NTP service IPs	Primary DC	Backup DC
Primary IP	202.94.78.129	202.94.79.129
Secondary IP	202.94.78.130	202.94.79.130

Each NTP service subscription entitles the Customer to configuration of up to 4 source IP addresses which collectively poll Chi-X on average no more than once per second measured over any one hour period (24x7).

4.6   Routing

The routing options are only available in the Ethernet options with a router.

BGP

Chi-X is able to offer the use of BGP to enable dynamic routing. Chi-X will advertise the address range shown below from the respective data centre.

BGP Advertised IP address ranges:

Primary DC: 202.94.78.0/24

Backup DC: 202.94.79.0/24

Normally there will be one BGP peering per physical link. Chi-X has BGP **ASN 55941**. Chi-X will use med to indicate which link the participant should use for incoming traffic.

Chi-X will not accept customer internal RFC1918 addressing.

Static Routes

The participant may opt to use static routes in preference to using BGP. Chi-X and the participant must agree on how these static routes will work before such an arrangement is finalized.

Multicast

Multicast Market Data is available by subscribing to the relevant groups via pim sparse mode or igmp on the links to Chi-X. The correct RP needs to be used to subscribe to multicast via PIM as per the multicast addressing table. The participant can subscribe to one or multiple streams over the same link.

4.7 Demarcation

The demarcation point for all connections to Chi-X is the patch panel in the Chi-X racks. Since the participant will arrange any cross-connects to Chi-X, it is the responsibility of the participant to own any issues that may arise on the path up to the demarcation point.

If you are connecting to the data centre via a carrier and require a cross connect from the data centres meet-me room to the Chi-X racks it is the responsibility of the carrier to order the cross connect.

Before ordering cross connects please contact Chi-X Support to confirm rack and port allocations.

4.8 Intersite Link Connectivity

The "intersite link" is a chargeable network connectivity option that can be requested on Global Switch connected network links ONLY. The service allows access from participant network links connected the Chi-X Global Switch backup site to connect to the Chi-X Equinix site over the Chi-X wan. From a network perspective participants will be allowed to connect to services in the 202.94.78.0/24 range (Chi-X Equinix site) as well as services in the 202.94.79.0/24 range (Chi-X Global Switch Site) on the Global Switch link.

Note that the reverse connectivity option from Equinix to Global Switch is NOT available due to the fact that if Chi-X started operating primary production from Global Switch, the most likely reason would be a large site failure in Equinix and hence the service would not be operational.

As an example, once the service is enabled, if a client has BGP configured on a Global Switch connected link and was receiving 202.94.79.0/24, an additional route of 202.94.78.0/24 will also be received afterwards. If the participant is also directly connected in Equinix and already receiving the 202.94.78.0/24 route then they have the option of using the global switch connection as a backup link.

5 Market Access Connections

The FIX and CHIXOE order entry connections are configured in a redundant fashion. This means that if there is a Chi-X internal issue which causes the participant's order entry port to malfunction, a standby order entry port is available for re-connection. The standby port will only become active if there has been a failure of the primary order entry port. Therefore, if a trading participant is disconnected they should first try reconnecting to their primary order entry port. If that fails, only then try reconnecting to the standby port. Contact Chi-X Customer Support if connectivity issues persist.

The backup data centre has backup order entry ports. However, these are always disabled and will only be enabled manually by Chi-X Market Operations and the participant will be informed by Market Operations if such an event takes place.

6 Example Connections

6.1 Direct Connected Servers

The trading participant has a set of servers and wants the lowest latency possible to connect. In this case, the trading participant puts all their servers on the same subnet spread over 2 switches. The switches are then connected directly to the Chi-X network in a redundant fashion.

In this example, Chi-X would allocate 1 x /24 IP address range for the participant. The trading participant will use some of those addresses on their servers. The servers default gateway will be the HSRP address configured on the edge switches.
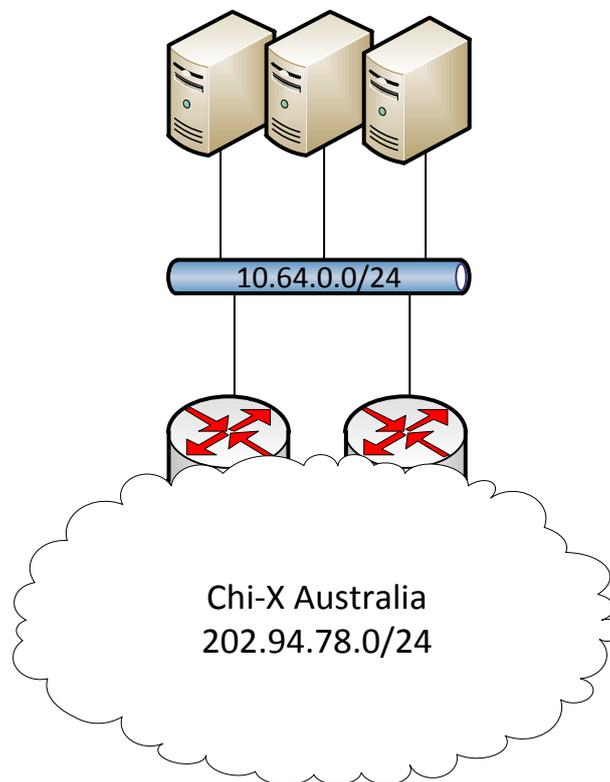
6.2 Dual subnet connection with GUA addressing

The participant (Corporation Z) wants to connect their entire infrastructure to Chi-X such that any internal unit can connect directly. In this case it makes sense to peer with the organisation since they have their own portable address space. In this example, the participant is given 2 subnets, one for each physical link with an allocation of /25 for each link.

Corp Z
98.54.20.0/21

10.64.0.0/25

BGP
Peerings

10.64.0.128/25

Chi-X Australia
202.94.78.0/24
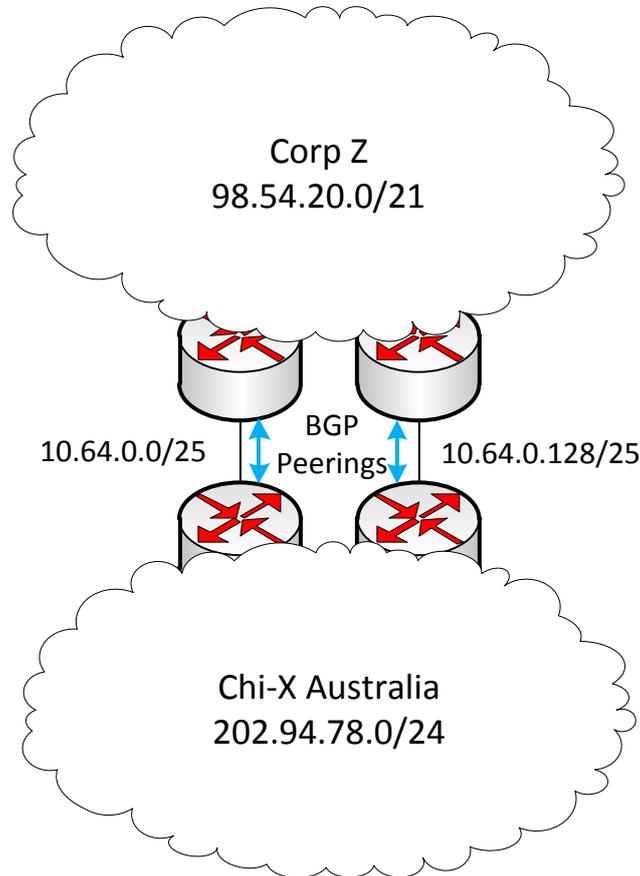
Chi-X will in this case send the /24 range to Corp Z and Chi-X will receive the /21 range from Corp Z. Chi-X will set the BGP metric on one route to be preferred such that one link is utilized and the other is for backup.

7   Connectivity Testing

It should first be noted that

- The Production environment is NOT available at the weekend so it is NOT possible to test connectivity to individual FIX gateways, CHIXOE gateways,, and or Market Data ports etc.

- The Participant Test Environment (PTE) IS available at the weekend and can be used to test connectivity (Further details can be found in the "Test Environment Setup Guide")

- Each FIX and CHIXOE gateway supports ONE TCP session and will NOT respond to telnet test if another session is already established.

Alternatively Chi-X Australia suggests the following for network connectivity testing.

For connectivity testing to Equinix the participant can do the following:

- Ping 202.94.78.13

For connectivity testing to Global Switch, the participant can do the following:

- Ping 202.94.79.13

Prior to any change, remember to check that connectivity to above services works BEFORE the change takes place.

Make sure to check that the routing does NOT go via the internet because the http port is available via the internet as well.

8 Data Centre and Cross-Connect Information

8.1 Equinix Information

The Chi-X racks in Equinix Sydney are in the SY2 data centre. The address of the racks is:
Chi-X Australia
Equinix Data Centre
SY2 Racks 207,212
639C Gardeners Road
Mascot NSW 2020

The SY2 data centre is located adjacent to the SY1 data centre. (SY3/SY4 data centres are more than 800meters away)

The meet me room for SY2 is located in the adjacent SY1 data centre.

Before ordering a cross-connect to Chi-X, you **MUST** confirm with Chi-X to which rack the cross-connect is to be ordered before placing the order with Equinix.

If you do not have a presence in Equinix then you will need to contact Equinix to arrange with them how to place orders.

Cross-connect should be ordered to the "next available" port for the rack. All fibre connections are terminated with SC connectors in the Chi-X racks.

8.2 Global Switch Information

The Chi-X racks in Global Switch are in the Indicium suite on level 6. Address is
Chi-X Australia c/o
Indicium
Suite FS06-14 Racks A11, A14
Level 6 @ Global Switch
400 Harris Street
Ultimo NSW 2007

There are 2 meet me rooms (MMRs) in Global Switch, north and south. All cross-connects to Chi-X will need to be quoted to be able to accurately determine the cross-connect length.

Before ordering a cross-connect to Chi-X, you **MUST** confirm with Chi-X to which rack the cross-connect is to be ordered, before placing the order with Global Switch. Cross-connects will require an authorized permit to work from the Chi-X side. Contact Chi-X to arrange this.

Wording required on the cross-connect ordering form for the "Chi-X B-end" of the link

Fibre:

"Terminate the SC connectors. Leave fibre coiled up on rack A<> with 1.5 meter of slack"

Copper (Cat 5 or Cat 6):

"Terminate the cable with RJ45 connector. Leave the cable coiled up on rack A<> with 1.5 meter of slack"