CONNECTIVITY GUIDE

HKEX Orion Market Data Platform
China Connect (Securities)

Version 1.2
21 April 2023

DOCUMENT HISTORY

Document Version	Date	Change Description
1.0	13 Dec 2016	First Distribution Version
1.1	19 Jan 2017	Revised Edition with the following updates - Revised Connectivity Details for Readiness test and End-to-End CCCG End to End environment - Revised the Channel ID of DR channel - Revised Short name for Shanghai Stock Exchange
1.2	21 April 2023	Housekeeping: - Sections 1, 3 & 4 – Rename as China Connect Exchange Participant - Sections 2.1.3, 2.2.3, 2.3.3 & 3.4 – Remove the wording "HKEX: - Sections 3.2.1 and 3.2.2 – Update bandwidth requirement and provide additional information for bandwidth allocation - Section 3.4 – Update examples for bandwidth requirement calculation - Section 4.1 – Remove additional login IDs related information - Appendix A – Remove HGC and replace Wharf T&T by HKBN - Appendix A – Update the link for the Price Information / Technical Specification / Service Level of SDNet/2

Contents

1. Overview

This document aims to provide network configuration information and guidance to assist China Connect Exchange Participants and Application Service Providers ("clients") in setting up their networks for making connection to testing and production environments for Orion Market Data Platform – China Connect (Securities) (OMD-CC).

This document contains:

- Configuration information, i.e. IP addresses of the channels assigned for each of the OMD-CC datafeed products in OMD-CC Production environment and Open/Readiness Test + CCCG End-to-End Test environment
- Guidelines / policies for SDNet/2 and HSN connection

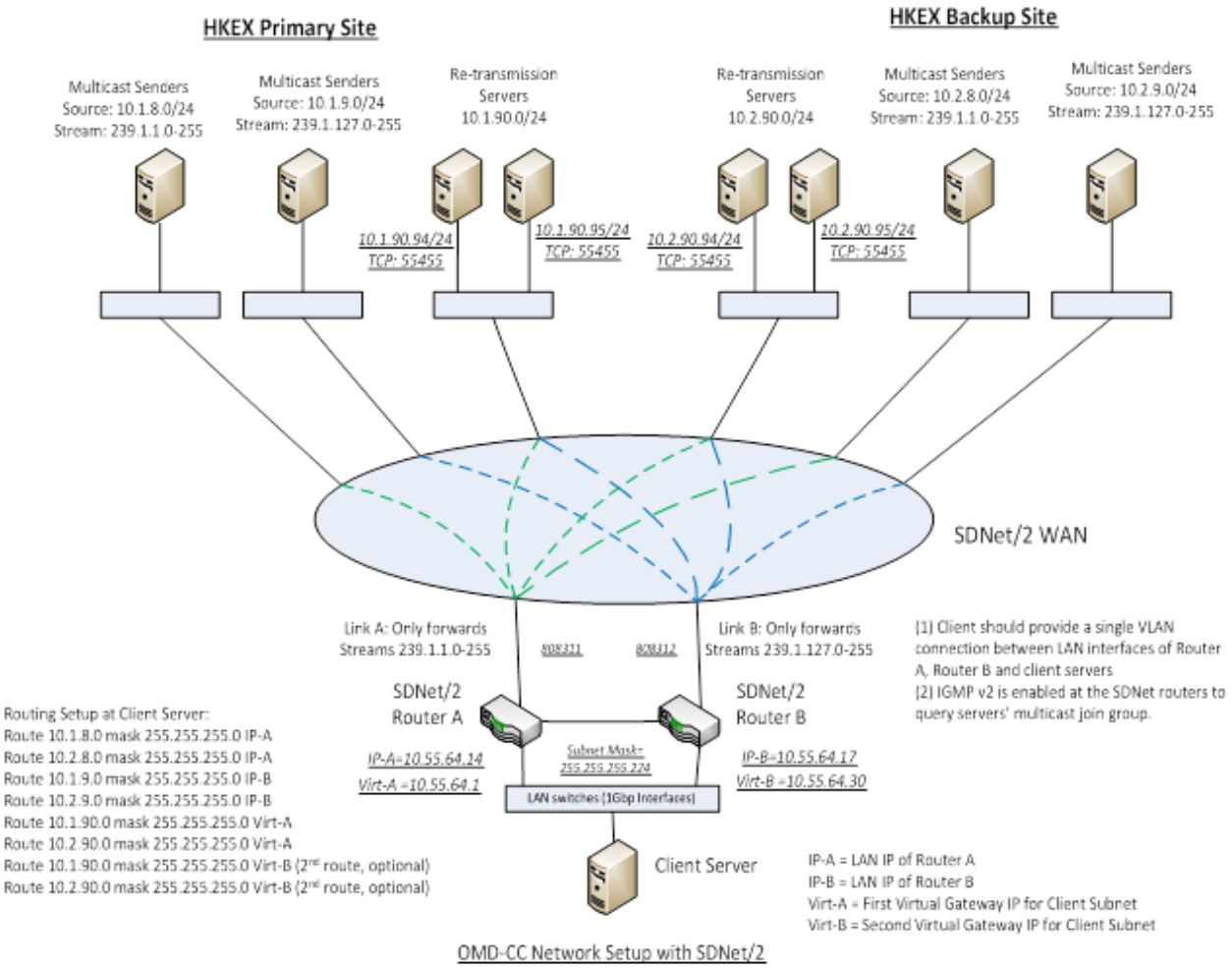
OMD-CC testing environment is available to serve different purposes:

i. for clients to perform Readiness Test on OMD-CC so as to enable them to test the full capability of their OMD-CC feed handler.

ii. for China Connect Exchange Participants (CCEPs) to perform the End-to-End Test on the HKEX China Connect Central Gateway (CCCG), to facilitate loop test (input order and receive market data) by CCCG EPs who plan to receive market data via direct connection to OMD-CC.

2. Configuration Information

OMD-CC adopts multicast transmission protocol for real-time data transmission with retransmission recovery service running on Unicast. Clients are required to set correct network configurations in order to establish proper connection to the corresponding OMD-CC multicast server and retransmission server. Below is a sample connection diagram which provides an overview of SDNet/2 network connection to OMD-CC for reference.



OMD-CC Network Setup with SDNet/2

For OMD-CC connection via SDNet/2, a client system has to set up routing to the HKEX host subnets as the diagram depicted. To receive multicast stream, IGMP version 2 is employed at the SDNet/2 routers to query the multicast groups which the client system subscribes. The client system should enable the IGMP function and issue join messages to the SDNet/2 routers for the entitled multicast groups.

For OMD-CC connection by co-location at HKEX Host Data Centre (HDC), clients are required to provide their own routers to connect to the HKEX network. The protocols used in HDC network are BGP4 and Multicast PIM sparse mode. For details, please refer to the Interface Specification on Connectivity Services and Timing Service of HKEX Hosting or contact HKEX Hosting Services team via email hostingservices@hkex.com.hk .

Since the physical speed of an SDNet/2 circuit is 1Gbps, therefore, the interface of a client end LAN switch and client end servers have to be 1Gbps in order to prevent packet drops of multicast packet burst. To connect with SDNet/2 routers, interface of the LAN switch should be configured with speed as “auto-sense” and duplex mode as “auto-sense” and “auto-negotiation”. Then, when the link comes up, the corresponding interface of the LAN switch should learn 1Gbps and full duplex.

The client systems are required to subscribe to the multicast addresses and port IDs for the subscribed OMD-CC products according to multicast channel subscriptions as listed in Section 2.1 for production environment or as listed in Section 2.2 for Open/Readiness Test environment. Clients should not subscribe to other multicast addresses and port IDs not specified in this Connectivity Guide or else it could result in receiving non-OMD-CC packets. Clients should ignore any multicast packets outside the channels subscribed to.

The following 2 subsections 2.1 and 2.2 provide connection details of the OMD-CC Production Environment and OMD-CC Open/Readiness Test + CCCG End-to-End Test Environment respectively.

2.1 Production Environment Connectivity Details

2.1.1 OMD-CC SSE

		Real-time Market Data Services		Refresh Snapshot Data Services	
Multicast Service	**Contents**	**Channel ID**	**Multicast Channel Subscriptions**	**Channel ID**	**Multicast Channel Subscriptions**
Reference Data Channel	Market Definition (610) Security Definition (611)	301	A: 239.1.1.101:51000 B: 239.1.127.101:51000	801	A: 239.1.1.101:61000 B: 239.1.127.101:61000
Status and Price Data Channel	Security Status (621) Statistics (660) Top Of Book (655)	302	A: 239.1.1.101:51001 B: 239.1.127.101:51001	802	A: 239.1.1.101:61001 B: 239.1.127.101:61001
DR Signal Channel	Disaster Recovery Signal (105)	399	A: 239.1.1.105:51008 B: 239.1.127.105:51008		

2.1.2 OMD-CC SZSE

		Real-time Market Data Services		Refresh Snapshot Data Services	
Multicast Service	**Contents**	**Channel ID**	**Multicast Channel Subscriptions**	**Channel ID**	**Multicast Channel Subscriptions**
Reference Data Channel	Market Definition (610) Security Definition (611)	311	A: 239.1.1.111:51000 B: 239.1.127.111:51000	811	A: 239.1.1.111:61000 B: 239.1.127.111:61000
Status and Price Data Channel	Security Status (621) Statistics (660) Top Of Book (655)	312	A: 239.1.1.111:51001 B: 239.1.127.111:51001	812	A: 239.1.1.111:61001 B: 239.1.127.111:61001
DR Signal Channel	Disaster Recovery Signal (105)	399	A: 239.1.1.105:51008 B: 239.1.127.105:51008		

2.1.3 HKEX OMD-CC Retransmission Unicast Connectivity

A Retransmission Service is provided to recover lost multicast packet. Functional details of the Retransmission Service are provided in the Interface Specification. Find below the Unicast Addresses to connect to the OMD-CC Retransmission Servers in **OMD-CC Production Environment**.

Retransmission Server	IP Unicast Address
Primary server in primary site	10.1.90.94:55455
Secondary server in primary site	10.1.90.95:55455
Primary server in DR site	10.2.90.94:55455
Secondary server in DR site	10.2.90.95:55455

2.2 Readiness Test Environment Connectivity Details

2.2.1 OMD-CC SSE

		Real-time Market Data Services		Refresh Snapshot Data Services	
Multicast Service	**Contents**	**Channel ID**	**Multicast Channel Subscriptions**	**Channel ID**	**Multicast Channel Subscriptions**
Reference Data Channel	Market Definition (610) Security Definition (611)	301	A: 239.1.1.108:52300 B: 239.1.127.108:52300	801	A: 239.1.1.108:62300 B: 239.1.127.108:62300
Status and Price Data Channel	Security Status (621) Statistics (660) Top Of Book (655)	302	A: 239.1.1.108:52301 B: 239.1.127.108:52301	802	A: 239.1.1.108:62301 B: 239.1.127.108:62301
DR Signal Channel	Disaster Recovery Signal (105)	399	A: 239.1.1.110:52308 B: 239.1.127.110:52308		

2.2.2 OMD-CC SZSE

		Real-time Market Data Services		Refresh Snapshot Data Services	
Multicast Service	**Contents**	**Channel ID**	**Multicast Channel Subscriptions**	**Channel ID**	**Multicast Channel Subscriptions**
Reference Data Channel	Market Definition (610) Security Definition (611)	311	A: 239.1.1.118:52300 B: 239.1.127.118:52300	811	A: 239.1.1.118:62300 B: 239.1.127.118:62300
Status and Price Data Channel	Security Status (621) Statistics (660) Top Of Book (655)	312	A: 239.1.1.118:52301 B: 239.1.127.118:52301	812	A: 239.1.1.118:62301 B: 239.1.127.118:62301
DR Signal Channel	Disaster Recovery Signal (105)	399	A: 239.1.1.110:52308 B: 239.1.127.110:52308		

2.2.3 HKEX OMD-CC Retransmission Unicast Connectivity

A Retransmission Service is provided to recover multicast packet loss. Functional details of the Retransmission Service are provided in the Interface Specification. Find below the Unicast Addresses to connect to the OMD Retransmission Servers in **OMD-CC Readiness Test Environment**.

Retransmission Server IP Unicast Address	IP Unicast Address
Primary server in primary site	10.1.90.41:55655
Secondary server in primary site	10.1.90.42:55655
Primary server in DR site	10.2.90.41:55655
Secondary server in DR site	10.2.90.42:55655

2.3 CCCG End-to-End Test Environment Connectivity Details

2.3.1 OMD-CC SSE

		Real-time Market Data Services		Refresh Snapshot Data Services	
Multicast Service	**Contents**	**Channel ID**	**Multicast Channel Subscriptions**	**Channel ID**	**Multicast Channel Subscriptions**
Reference Data Channel	Market Definition (610) Security Definition (611)	301	A: 239.1.1.107:51000 B: 239.1.127.107:51000	801	A: 239.1.1.107:61000 B: 239.1.127.107:61000
Status and Price Data Channel	Security Status (621) Statistics (660) Top Of Book (655)	302	A: 239.1.1.107:51001 B: 239.1.127.107:51001	802	A: 239.1.1.107:61001 B: 239.1.127.107:61001
DR Signal Channel	Disaster Recovery Signal (105)	399	A: 239.1.1.110:51008 B: 239.1.127.110:51008		

2.3.2 OMD-CC SZSE

		Real-time Market Data Services		Refresh Snapshot Data Services	
Multicast Service	**Contents**	**Channel ID**	**Multicast Channel Subscriptions**	**Channel ID**	**Multicast Channel Subscriptions**
Reference Data Channel	Market Definition (610) Security Definition (611)	311	A: 239.1.1.117:51000 B: 239.1.127.117:51000	811	A: 239.1.1.117:61000 B: 239.1.127.117:61000
Status and Price Data Channel	Security Status (621) Statistics (660) Top Of Book (655)	312	A: 239.1.1.117:51001 B: 239.1.127.117:51001	812	A: 239.1.1.117:61001 B: 239.1.127.117:61001
DR Signal Channel	Disaster Recovery Signal (105)	399	A: 239.1.1.110:51008 B: 239.1.127.110:51008		

2.3.3 HKEX OMD-CC Retransmission Unicast Connectivity

A Retransmission Service is provided to recover multicast packet loss. Functional details of the Retransmission Service are provided in the Interface Specification. Find below the Unicast Address to connect to the OMD-CC Retransmission Servers in **CCCG End-to-End Test Environment**.

Retransmission Server IP Unicast Address	10.1.90.98:55455

2.4 Individual Client Configuration Details

Individual clients will be provided with the following configuration details for each set of product feed subscription:

- One Retransmission User ID (Username)
- The subnet and subnet mask of the client segment
- Two unicast client allowable IP addresses for connection with re-transmission servers[1]
- Two physical IP addresses and two Virtual IP address of SDNet/2 routers[2]
- HSRP/VRRP groups used by SDNet/2 routers

Individual client testing configuration information will be provided separately prior to the Readiness Test or CCCG End-to-End Test whilst the client specific production configuration information will be provided upon the client's successful completion of the Readiness Test and prior to the Market Rehearsals/Post Release Test. Please refer to Appendix B for an example of Client Configuration information.

[1] Only one unicast client allowable IP addresses for connection with re-transmission servers will be assigned for clients connecting to the Readiness Test + CCCG End-to-End Test environment

[2] Only one physical IP addresses and one Virtual IP address of SDNet/2 routers will be assigned for clients connecting to the Readiness Test + CCCG End-to-End Test environment

3. Guidelines on SDNet/2 lines / HSN connection

3.1 Mode of OMD-CC connection

- For resilience purpose, at least 2 SDNet/2 or HSN lines are required for OMD-CC connection either for individual OMD-CC datafeed product or sharing among different OMD-CC datafeed products.
- The set of 2 SDNet/2 lines is required to locate in the same location. If clients require receiving OMD-CC data in multiple locations, 1 set of 2 SDNet/2 lines are required to install in each location.

3.2 Bandwidth Requirement

3.2.1 Production SDNet/2 / HSN and Testing SDNet/2 / HSN for Readiness Test

Full suite of OMD-CC datafeed products and respective estimated bandwidth requirements are as follows.

Datafeed	Alone	SDNet/2 High Performance Option
OMD-CC SSE	1 Mbps	Not necessarily required
OMD-CC SZSE	1 Mbps	Not necessarily Required

Minimum Bandwidth Allocation Between Multicast and Unicast in Each Datafeed

Datafeed	Total	Multicast (i.e. Real Time & Refresh)	Unicast[3] (i.e. Retransmission)
SSE	1 Mbps	0.9 Mbps	0.1 Mbps
SZSE	1 Mbps	0.9 Mbps	0.1 Mbps

3.2.2 Testing SDNet/2 / HSN for CCCG End-to-End Test

Datafeed	Alone	SDNet/2 High Performance Option
OMDCC SSE and SZSE	1 Mbps	Not necessarily required

Minimum Bandwidth Allocation Between Multicast and Unicast in Each Datafeed

Datafeed	Total	Multicast (i.e. Real Time & Refresh)	Unicast (i.e. Retransmission)
SSE + SZSE	1 Mbps	0.9 Mbps	0.1 Mbps

[3] If subscribe more than 1 datafeed in Production or Readiness Test Environment, the minimum bandwidth for unicast is 0.1Mbps

3.3 Sharing of SDNet/2 lines or HSN port set

Clients may opt to use separated sets or same set of SDNet/2 lines/ HSN ports for receiving data of different OMD-CC datafeed products but should note the following policies on sharing of SDNet/2 for OMD-CC datafeed products:

- Sharing of same set of production SDNet/2 circuits for **OMD-CC and other OMD datafeed products is allowed**.
- Sharing of the same SDNet/2 / HSN circuits for both product and testing purposes is **NOT ALLOWED**.
- **China Connect Exchange Participants** who would like to **share the same SDNet/2 circuits with trading traffic (orders and trades) and market data traffic** are however **only** allowed to do so if all the traffic **on** the circuits belongs to **the same market**. For example, China Connect Exchange Participants of HKEX securities market may use the same SDNet/2 circuits for their access to OCG, CCCG, OMD-C SS and OMD-CC but **cannot** use the same SDNet/2 circuits for their access to OMD-D and HKATS.

- Clients should note and consider the followings if they are going to adopt shared line mode:
  i) In case of failure/interruption of the shared circuits, all datafeed products using this set of circuits will be affected.
  ii) Troubleshooting for network related issues (e.g. performance, latency or packet loss etc.) will be much more difficult and time consuming and assistance from network carriers and HKEX will be limited in such troubleshooting. Clients must accept this risk in making the line sharing decision.

3.4 Bandwidth for shared SDNet/2 lines or HSN port set

i) Shared SDNet/2 / HSN circuits must have sufficient bandwidth to support the data transmission of multiple products/devices. Please see below examples for reference:

   Example: Sharing of a set of SDNet/2 lines for OMD-C SS and OMD-CC SSE in Production Environment:
   The estimated bandwidth requirements for Multicast of OMD-C SS is 15Mbps and 0.9 for OMD-CC SSE, minimum bandwidth for unicast of datafeeds is 0.2 Mbps for OMD-C datafeed and 0.1 Mbps for OMD-CC datafeed. a set of SDNet/2 lines with 20Mbps will be required.
   (Actual bandwidth requirement is 16.2Mbps and minimum incremental bandwidth threshold is 10Mbps for SDNet/2 lines of 10Mbps-100Mbps)

ii) Clients can allocate bandwidth of the shared lines to different products as they wish as long as the bandwidth allocated to each datafeed product meets the estimated bandwidth requirement specified.

4. Other Guidelines on OMD-CC Connections

4.1 Login IDs/Client IP addresses for Unicast Retransmission Service

Direct connection clients will get one set of login ID with two IP addresses for retransmission service per OMD-CC circuit set. That means, clients subscribing to one set of SSE feed and one set of SZSE feed on one circuit set will get one login ID with two IP addresses. The login ID can be used to recover either the SSE or SZSE missing data.

China Connect Exchange Participants who are entitled to receive two sets of complimentary SSE/SZSE feed via two different pairs of circuits when migrating to CCCG would also be entitled to one complimentary login ID per circuit set .

Please note that additional Login ID is not applicable to OMD-CC.

4.2 Installation of SDNet/2 and HSN lines

4.2.1 SDNet/2 lines

Clients are required to contact the SDNet/2 Accredited Vendors for installation of SDNet/2 lines for OMD-CC connection. Details of the SDNet/2 Accredited Vendors and reference costs charged by different SDNet/2 Accredited Vendors can be found in Appendix A.

4.2.2 HSN lines

Clients who will use HKEX's Hosting Service for OMD-CC connection should contact our Hosting Service team directly for details on the HSN lines.

Appendix A – SDNet/2 Accredited Vendors Information

SDNet/2 services are provided by Accredited Vendors for the provision of circuits from CCEP/ASP locations to HKEX's data centres.

To become an Accredited Vendor, the Vendor's SDNet/2 service must comply with the technical requirements set out by HKEX. The compliance of these technical requirements ensures the Accredited Vendor will deliver a stable, reliable and high quality networking services to the CCEPs/ASPs.

Two Accredited Vendors have been selected and accredited to provide SDNet/2 network services. These vendors are (in alphabetical order):

- Hong Kong Telecommunications (HKT) Limited (also known as PCCW)
- HKBN Enterprise Solutions HK Limited (HKBNES)

For details of SDNet/2 circuit price information / technical specification / service level, please refer to Price Information / Technical Specification / Service Level of SDNet/2 posted on HKEX website.

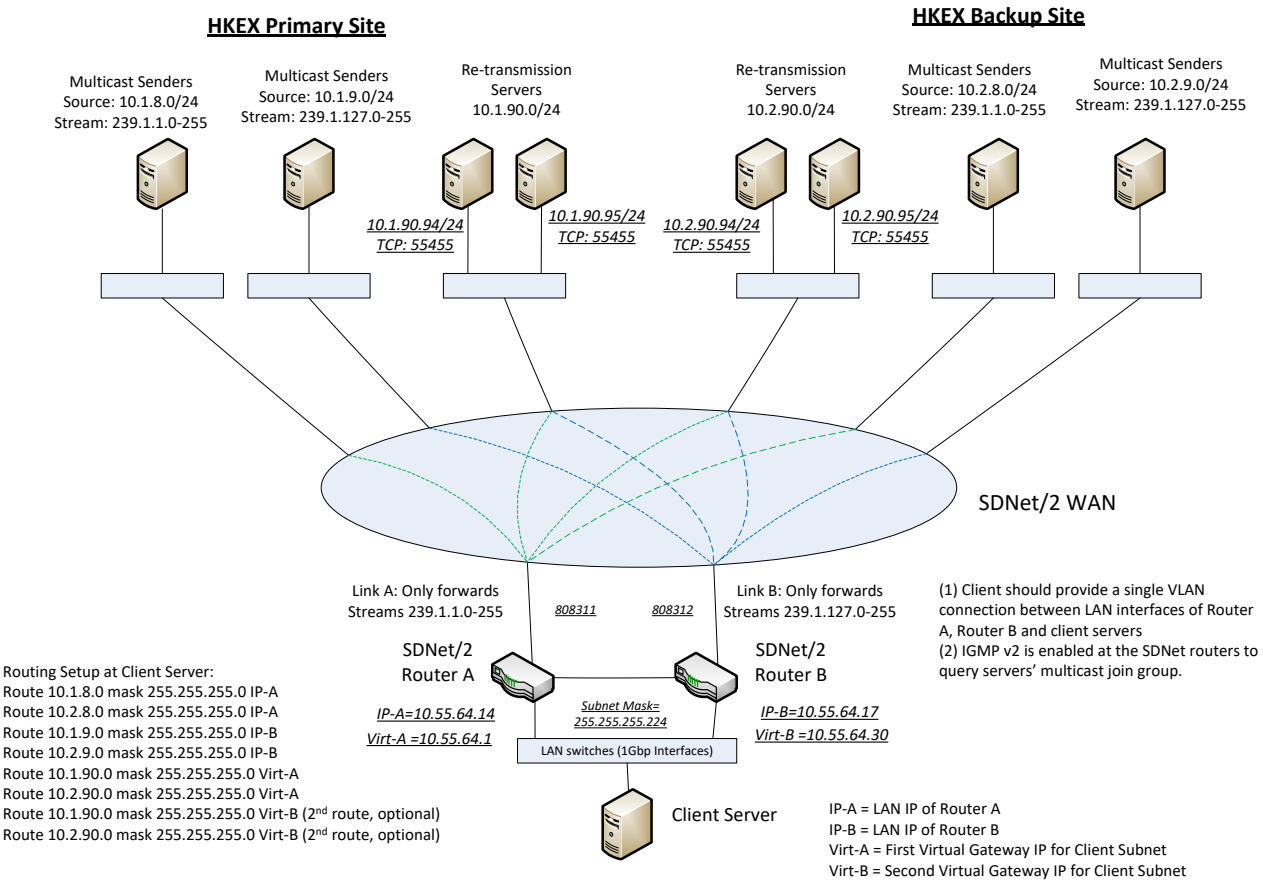
Appendix B Sample Client Configuration Information

Client End Network Information (Sample):

1	Username	*CLIENT1*
2	OMD-CC LAN Subnet	*10.55.64.0*
3	OMD-CC LAN Subnet Mask	*255.255.255.224*
4	Vendor Allowable IP Address 1 for retransmission	*10.55.64.2*
5	Vendor Allowable IP Address 2 for retransmission	*10.55.64.29*
6	SDNet/2 Primary Circuit Number	*808311*
7	SDNet/2 Router A LAN IP Address (IP-A)	*10.55.64.14*
8	SDNet/2 Secondary Circuit Number	*808312*
9	SDNet/2 Router B LAN IP Address (IP-B)	*10.55.64.17*
10	SDNet/2 OMD-CC LAN 1st Virtual Gateway IP Address (Virt-A)	*10.55.64.1*
11	HSRP/~~VRRP~~ Group Number used by SDNet/2 Router for Virt-A	*14*
12	SDNet/2 OMD-CC LAN 2nd Virtual Gateway IP Address (Virt-B)	*10.55.64.30*
13	HSRP/~~VRRP~~ Group Number used by SDNet/2 Router for Virt-B	*17*
14	Multicast Protocol used by SDNet/2 Routers	*IGMPv2*
15	SDNet/2 Router Physical Interface for OMD-CC	*Gi0/0*
16	SDNet/2 Router Port Speed for OMD-CC	*Auto Sense up to 1Gbps*
17	SDNet/2 Router Port Duplex Mode for OMD-CC	*Auto Negotiation*
18	IP address ranges usable by Vendors (IP addresses outside these ranges are used and reserved by HKEX) Note: Vendors can use same set of addresses for Unicast retransmission for the multicast transmission)	*10.55.64.9-13* *10.55.64.18-22*

Host End Network Information (Sample):

1	Multicast Source Segment of Stream A in Primary Site forwarded by Vendor SDNet/2 Router A	*10.1.8.0/24*
2	Multicast Source Segment of Stream A in Backup Site forwarded by Vendor SDNet/2 Router A	*10.2.8.0/24*
3	Multicast Source Segment for multicast stream B in Primary Site forwarded by Vendor SDNet/2 Router B	*10.1.9.0/24*
4	Multicast Source Segment for multicast stream B in Backup Site forwarded by Vendor SDNet/2 Router B	*10.2.9.0/24*
5	Primary Site Primary Retransmission Server IP Address	*10.1.90.94/24*
6	Primary Site Primary Retransmission Server TCP Port Number	*55455*
7	Primary Site Secondary Retransmission Server IP Address	*10.1.90.95/24*
8	Primary Site Secondary Retransmission Server TCP Port Number	*55455*
9	Backup Site Primary Retransmission Server IP Address	*10.2.90.94/24*
10	Backup Site Primary Retransmission Server TCP Port Number	*55455*
11	Backup Site Secondary Retransmission Server IP Address	*10.2.90.95/24*
12	Backup Site Secondary Retransmission Server TCP Port Number	*55455*



(1) Client should provide a single VLAN connection between LAN interfaces of Router A, Router B and client servers
(2) IGMP v2 is enabled at the SDNet routers to query servers' multicast join group.

Routing Setup at Client Server:
Route 10.1.8.0 mask 255.255.255.0 IP-A
Route 10.2.8.0 mask 255.255.255.0 IP-A
Route 10.1.9.0 mask 255.255.255.0 IP-B
Route 10.2.9.0 mask 255.255.255.0 IP-B
Route 10.1.90.0 mask 255.255.255.0 Virt-A
Route 10.2.90.0 mask 255.255.255.0 Virt-A
Route 10.1.90.0 mask 255.255.255.0 Virt-B (2nd route, optional)
Route 10.2.90.0 mask 255.255.255.0 Virt-B (2nd route, optional)

IP-A = LAN IP of Router A
IP-B = LAN IP of Router B
Virt-A = First Virtual Gateway IP for Client Subnet
Virt-B = Second Virtual Gateway IP for Client Subnet

OMD-CC Network Setup with SDNet/2