

# **Shanghai International Energy Exchange Co., Ltd. (INE) Market Data Platform, SMDP2.0 Connectivity Guide**

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## I. Records of Revision, Verification and Review

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# 1. Overview

Shanghai International Energy Exchange Co., Ltd. (INE) launched a new INE Market Data Platform (SMDP2.0) to enable more efficient market data transmission. This new platform adopts techniques such as data encoding and compression and multicast transmission to further improve the service quality of data feed.

This Guide introduces the INE Market Data Platform (SMDP2.0), and specifies its technical requirements, suggested network models, application procedure, etc. To connect to the Platform, all vendors are advised to follow this Guide.

## 2. Platform Introduction

Below is the SMDP2.0 system architecture diagram:

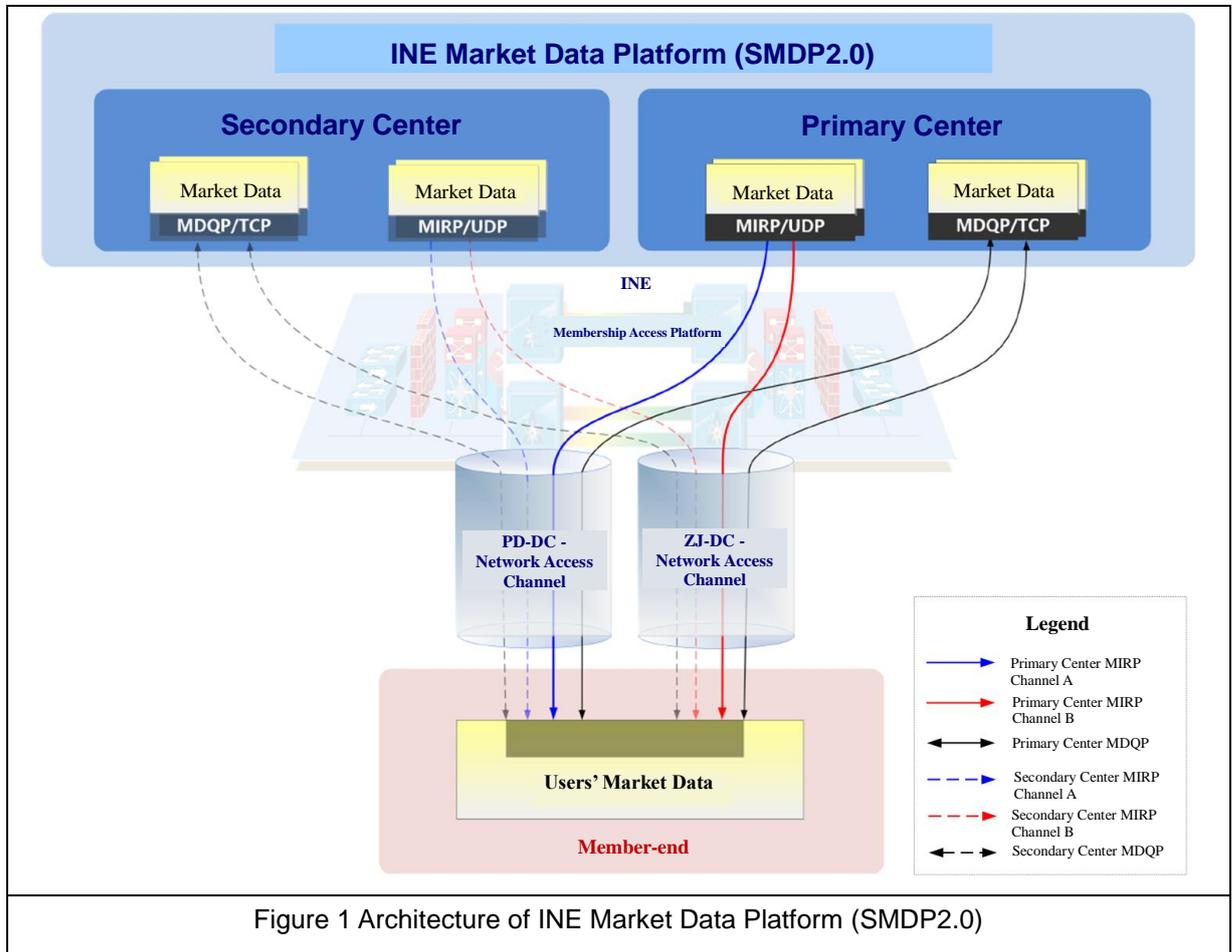


Figure 1 Architecture of INE Market Data Platform (SMDP2.0)

### 2.1. Services

The Platform provides market data query service in TCP and incremental data feed service in UDP. For more details, please refer to the <API Specification for SHFE Market Data Platform, SMDP2.0>.

- Market Data Query Service – user credentials are required to access this service, this service allows users to query specific quote snapshots and data completion from incremental data. This service uses MDQP (Market Data Query Protocol), built on TCP, to communicate with users.
- Incremental Data Feed Service - all data, including incremental data

within the same theme, will be pushed to the corresponding subscribers in real-time. This service uses MIRP (Market data Incremental Refresh Protocol) to push data to subscribers with multicast technology. The protocol is built on UDP.

## 2.2. Deployment

- INE deployed the SMDP2.0 platform in 3 locations in 2 cities, including the Shanghai Futures Building Data Center (PD-DC) and the Zhangjiang Data Center (ZJ-DC), both located in Pudong, Shanghai, and the Beijing Offsite Disaster Recovery Data Center (BJ-DC) located in Beijing. The platform is running in a hot-swapping mode among the data centers.
- Each center contains multiple front-end servers for providing the services (refer to 2.1).
- Only the primary data center will provide the services (refer to 2.1), the secondary data center is not enabled (dotted lines in figure 1) until further notice.
- For query service, users can access front-end servers in the primary data center to request data snapshots and data completion with TCP.
- For incremental service, the primary data center provides 2 UDP multicast channels (channel A and channel B) to push the market data, users can choose either one as needed. The channel A source is PD-DC and channel B sources data from ZJ-DC.

### 3. Technical Requirements

Item	Requirement	Remarks
Network	Type: MSTP leased line direct access to INE or cross-connect in Shanghai Futures Building.	Multicast transmission not supported for non-direct access members.
	Access method: Dual-mode access (1 at PD-DC, 1 at ZJ-DC).	
Network Devices	Layer 3: 1) PIM-SSM; 2) IGMP v3.	It is recommended to use PIM-SSM + IGMP v3 for multicast. For the alternatively, ASM mode is allowed as well: 1) PIM Sparse Mode + IGMP v2; 2) Configure static RP points to the Exchange.
	Layer 2: IGMP Snooping.	
Host/ Application	IGMP v3.	

Remark 1: For hosting members, please refer to the manuals released by the hosting department.

Remark2: SSM mode is recommended, compared with ASM mode it does not require any RP related configuration, so it can construct a shortest-paths tree (SPT), which is more efficient.

## 4. Security Requirements

To ensure the trading network is secure and reliable, members should isolate the transaction network and separate it from the internet and office intranet network, then set up the security access rules below:

Data Center	Query Service Front-end		Incremental Service Front-end	
	Network Segment	Port	Network Segment	Port
PD-DC	192.168.11.0/24	TCP 33022	192.168.32.0/24 192.168.64.0/24	UDP port; please visit INE website for more details
ZJ-DC	192.168.12.0/24		192.168.48.0/24 192.168.80.0/24	

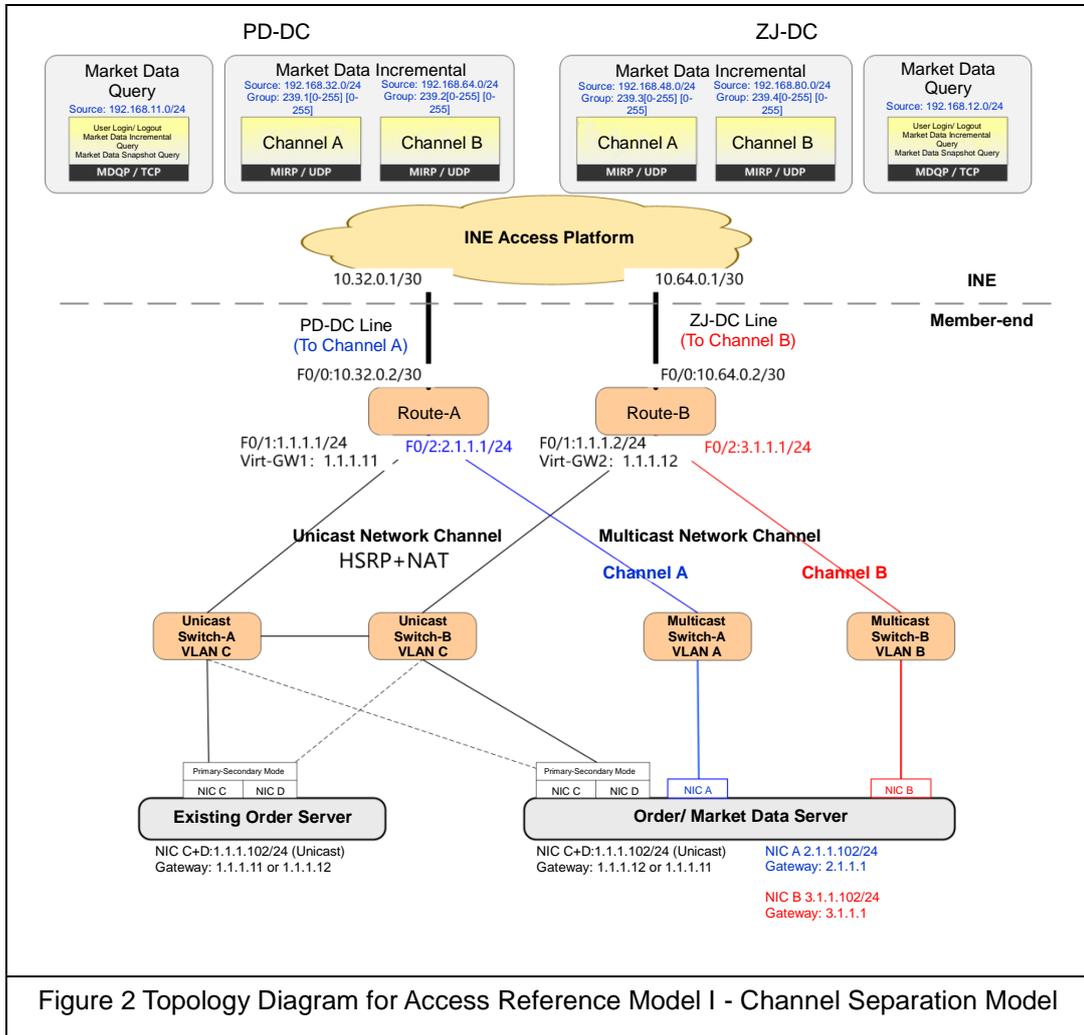
Remarks: Please visit INE website for latest updates.

## 5. Example for Reference

SMDP2.0 utilizes UDP multicast transmissions to send the market data, therefore it is essential for the members' network environments to support multicast transmissions. To help our members understand the network deployment requirements in more detail, we provided a multicast network plan example in this section.

**The configuration examples in this chapter is for demonstration and reference only. Members should adapt the configuration for their own environment. Cisco 3825 routers (IOS version c3825-adventerprisek9-mz.150-1.M2.bin) are used in examples.**

## 5.1. Separated Tunnel Model



As shown in figure 2, the “Separated Tunnel Model reduces the impact on members’ unicast networks. This model applies a new multicast network in parallel without affecting the existing unicast network architectures. This model is recommended to members who already deployed the HSRP+NAT mode, below are the details of the deployment:

- Sharing the existing leased line-Members can use the existing leased line to receive the multicast market data. The primary center contains 2 market data channels - Channel A and Channel B. Both channels transmit the same content. PD-DC line is channel A, while ZJ-DC line is channel B. As multicast market data will increase the bandwidth

usage, members are advised to check the bandwidth capacity before applying the model.

- Creating a multicast network - We suggest to allocate an Ethernet interface to each of the two routers, this interface will be used as a multicast port. Then install an independent switch for Channel A and Channel B respectively. The existing unicast service will not be affected.
- The market data server - The server will be equipped with 4 NICs, NIC A for connecting the switch of channel A, NIC B for connecting the switch of Channel B, while NIC C/D are for the redundancy of the original unicast network.

### 5.1.1. SSM Mode Configuration Example

✧ Router: (To ensure the reliable reception of market data, it is required to configure relevant parameters of the multicast market data in INE's primary and secondary centers at the same time)

! Enable multicast routing

```
ip multicast-routing
```

! Define SSM address range; Must be configured!

```
ip pim ssm range 239.0.0.0/13
```

! Enables multicast routing protocol on external interface

```
interface F0/0
ip pim sparse-mode
```

! Enables multicast routing protocol and IGMP on internal interface

```
interface F0/2
ip pim sparse-mode
ip igmp version 3
```

! Add static routes to multicast source for RPF detection in order to build a multicast distribution tree (for Router-A configuration only)

```
ip route 192.168.48.0/24 F0/0 10.32.0.1 name ZJ-FeedA
ip route 192.168.32.0/24 F0/0 10.32.0.1 name PD-FeedA
```

! Add static routes to multicast source for RPF detection in order to build a multicast distribution tree (for Router-B configuration only)

```
ip route 192.168.80.0/24 F0/0 10.64.0.1 name ZJ-FeedB
ip route 192.168.64.0/24 F0/0 10.64.0.1 name PD-FeedB
```

✧ Switch:

! Enable IGMP snooping, forward multicast on demand to avoid floods

```
ip igmp snooping
```

- ✧ The host system and application and enable IGMP v3 and join in corresponding multicast group (S,G).

## 5.1.2. ASM Mode Configuration Example

- ✧ Router (To ensure the reliable reception of market data, it is required to configure relevant parameters of the multicast market data for both INE's primary and secondary centers) :
  - ! Enable multicast routing

```
ip multicast-routing
```
  - ! Enables multicast routing protocol on external interface

```
interface F0/0
    ip pim sparse-mode
```
  - ! Enables multicast routing protocol and IGMP on internal interface

```
interface F0/2
    ip pim sparse-mode
    ip igmp version 2
```
  - ! Configure a static RP towards Channel A (for Router-A configuration only)

```
ip pim rp-address 192.168.32.250
```
  - ! Configure a static RP towards Channel A (for Router-B configuration only)

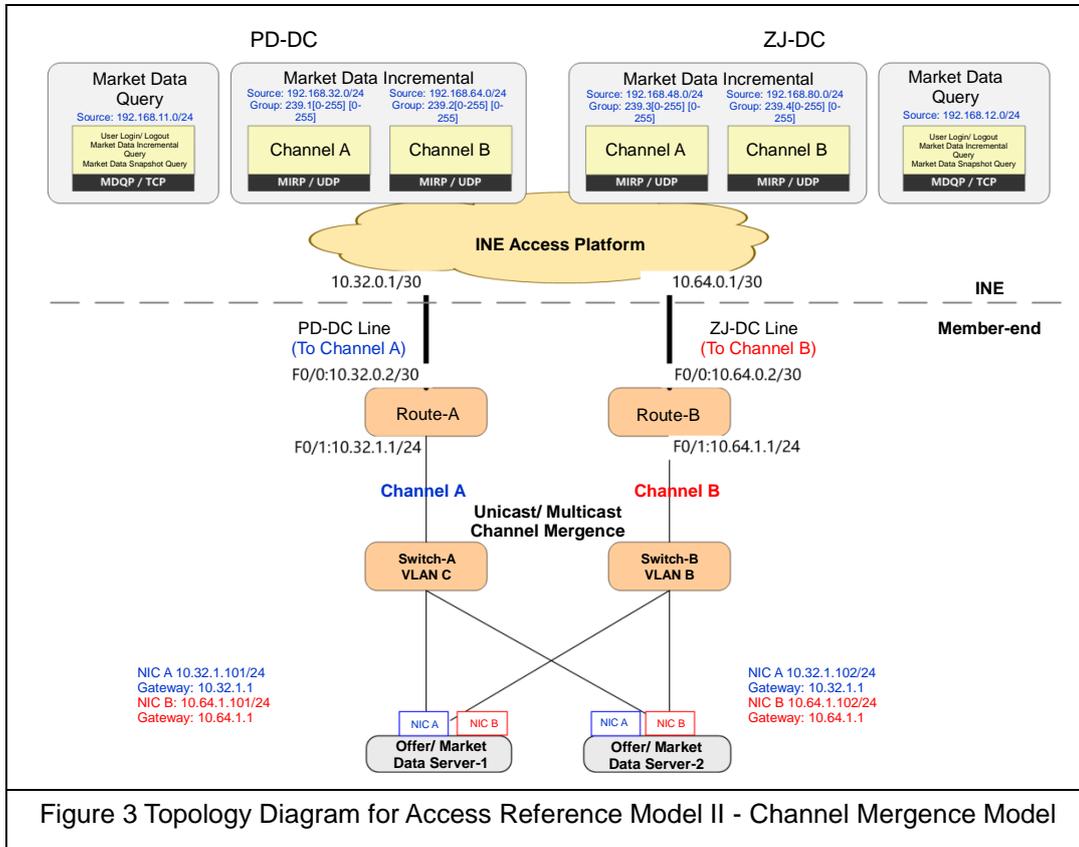
```
ip pim rp-address 192.168.64.250
```
  - *The Exchange does not provide RP connectivity testing*
  - ! Configure a multicast source of Channel A and a unicast static route of PR, and build a multicast tree (for Router-A configuration only)

```
ip route 192.168.48.0/24 F0/0 10.32.0.1 name ZJ-FeedA
ip route 192.168.32.0/24 F0/0 10.32.0.1 name PD-FeedA
```
  - ! Configure a multicast source of Channel A and a unicast static route of PR, and build a multicast tree (for Router-B configuration only)

```
ip route 192.168.80.0/24 F0/0 10.64.0.1 name ZJ-FeedB
ip route 192.168.64.0/24 F0/0 10.64.0.1 name PD-FeedB
```
- ✧ Switch:
  - ! Enable IGMP snooping, forward multicast on demand to avoid floods

```
ip igmp snooping
```
- ✧ The host system and application and enable IGMP v2 and join in corresponding multicast group.

## 5.2. Shared Tunnel Model



As shown in Figure 3, the shared tunnel model will use the existing network architecture, we simply need to enable the multicast function within this architecture, so the existing network is compatible with unicast/multicast transmission. This model is recommended to members who already deployed a non-HSRP+NAT mode, below are the details of the deployment:

- Sharing the existing leased line – Like with the separated tunnel model, members can use the existing leased line to receive the multicast market data. The primary data center contains 2 market data channels - Channel A and Channel B. Both channels transmit the same content, PD-DC is channel A, while ZJ-DC is channel B. As multicast market data will increase the bandwidth usage, members are advised to check the bandwidth capacity before applying the model.
- Sharing the network equipment – Both routers will receive

unicast/multicast market data from both channel A/B, and both switches will forward those market data.

- The market data server – The server will be equipped with 2 NICs, NIC A for channel A and NIC B for channel B.

## 5.2.1. SSM Mode Configuration Example

```
✧ Router: (To ensure the reliable reception of market data, it is required to configure relevant parameters of the multicast market data in INE's primary and secondary centers at the same time)
! Enable multicast routing
ip multicast-routing
! Define SSM group address range; must be configured
ip pim ssm range 239.0.0.0/13
! Enables multicast routing protocol on external interface
interface F0/0
    ip pim sparse-mode
! Enables multicast routing protocol and IGMP on internal interface
interface F0/1
    ip pim sparse-mode
    ip igmp version 3
! Add static routes to multicast source for RPF detection in order to build a multicast distribution tree (for Router-A configuration only)
ip route 192.168.48.0/24 F0/0 10.32.0.1 name ZJ-FeedA
ip route 192.168.32.0/24 F0/0 10.32.0.1 name PD-FeedA
! Add static routes to multicast source for RPF detection in order to build a multicast distribution tree (for Router-B configuration only)
ip route 192.168.80.0/24 F0/0 10.64.0.1 name ZJ-FeedB
ip route 192.168.64.0/24 F0/0 10.64.0.1 name PD-FeedB

✧ Switch:
! Enable IGMP snooping, forward multicast on demand to avoid floods
ip igmp snooping

✧ The host system and application and enable IGMP v3 and join in corresponding multicast group (S,G).
```

## 5.2.2. ASM Mode Configuration Example

- ✧ Router: (To ensure the reliable reception of market data, it is required to configure relevant parameters for receiving the multicast market data in INE's primary and secondary centers at the same time)
  - ! Enable multicast routing:

```
ip multicast-routing
```
  - ! Enables multicast routing protocol on external interface

```
interface F0/0
  ip pim sparse-mode
```
  - ! Enables multicast routing protocol and IGMP on internal interface

```
interface F0/1
  ip pim sparse-mode
  ip igmp version 2
```
  - ! Configure a static RP towards Channel A (for Router-A configuration only)

```
ip pim rp-address 192.168.32.250
```
  - ! Configure a static RP towards Channel A (for Router-B configuration only)

```
ip pim rp-address 192.168.64.250
```

**— The Exchange does not provide RP connectivity testing**
  - ! Configure a multicast source of Channel A and a unicast static route of PR, and build a multicast tree (for Router-A configuration only)

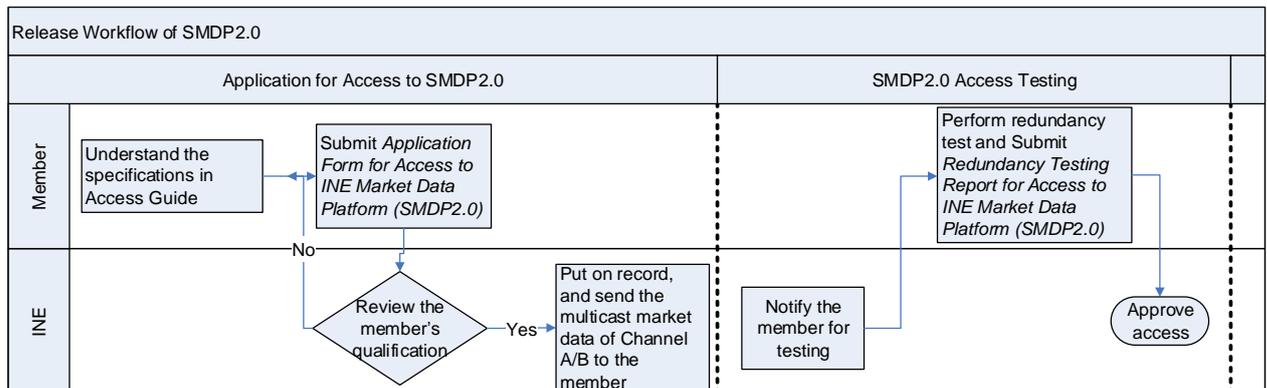
```
ip route 192.168.48.0/24 F0/0 10.32.0.1 name ZJ-FeedA
ip route 192.168.32.0/24 F0/0 10.32.0.1 name PD-FeedA
```
  - ! Configure a multicast source of Channel A and a unicast static route of PR, and build a multicast tree (for Router-B configuration only)

```
ip route 192.168.80.0/24 F0/0 10.64.0.1 name ZJ-FeedB
ip route 192.168.64.0/24 F0/0 10.64.0.1 name PD-FeedB
```
- ✧ Switch:
  - ! Enable IGMP snooping, forward multicast on demand to avoid floods

```
ip igmp snooping
```
- ✧ The host system and application and enable IGMP v2 and join in corresponding multicast group

## 6. Access Application Workflow

### 6.1. Application Procedure



#### Here are the steps for applying the access to SMDP2.0:

1. Application for Access to SMDP2.0 – The applicant should fully understand the connectivity guide before filling out the application form and sending it to INE. INE will check if the applicant's materials are complete. Once the application is approved, the applicant will be allowed to access the multicast data on channels A and B. For more details on the parameters, please visit the official INE website.
2. Connectivity Testing – After an applicant deployed their network environment, they can ask INE to start sending the market data for the test run. They are required to perform a redundancy test, fill out the Redundancy Testing Report and send it to INE.

### 6.2. Application Related Information

- Application Form – This form is available in the INE member service portal, members can download the form there. For non-member vendors, please contact the Information Management Department of INE.
- Contacts – Please visit the official INE website for contacts. Website URL: [www.ine.com.cn](http://www.ine.com.cn).

# 7. Troubleshooting

## 7.1. Generals

Multicast troubleshooting can be separated into 2 parts: the data stream level and the protocol level:

- DataStream level – Users should pay attention at the multicast source. Check if it is transmitting the data normally, if the first-hop->middle-hop->last-hop is forwarding the packet properly and if the data replication from the last-hop is correct and the packet data arriving at the market data server are correct.
- Protocol level – Users should pay attention to multicast group management and the structure of the multicast distribution tree.

## 7.2. Examples

These examples are based on Cisco route 3825 (firmware version c3825-adventerprisek9-mz.150-1.M2.bin) and for reference only. Users should refer to their equipment and firmware.

**Table 1: Check the Forwarding of Multicast Data Flow**

Scenarios	Command	Troubleshoot
Whether multicast data is received from SHFE (source inspection)	show interface	Check multicast packet counts on the interface
	show ip accounting	Check the multicast stream forwarding counts
	show ip traffic	Check the statistics on the traffic forwarding
Whether multicast data is forwarding normally (Tunnel inspection)	show ip mroute active	Check the packet rate
	show ip mroute count	Check the multicast stream forwarding packet loss counts

Whether multicast data is received (Receiving-end inspection)	ifconfig	Check the NIC packet receive counts
	netstat - tunlp	Check the snooping at the port
	Packets capture	Check the content of the packets

**Table 2: check the status of the multicast transmission**

Scenarios	Command	Troubleshoot
Multicast transmission first-hop/middle-hop/last-hop	show ip multicast	Check whether the multicast function is enabled
	show ip route	Check whether the unicast routing of source is configured correctly
	show ip rpf <ip_addr>	Check whether the multicast RPF detection is correct
	show ip pim neighbor	Detect neighbors of the multicast routing within the internal network(not between SHFE and member)
	show ip pim interface	Check whether the interface is enabled and DR election status
	show ip mroute	Check the multicast routing table (whether IIF/OIF/RPF/Flag and other information is correct)
	show ip igmp group	Check the information when terminal in and out the groups
	show ip igmp interface	Check IGMP version, the timer and other related information
	show ip igmp snooping group	Check IGMP snooping, and the ports are correct
Receiver	IGMP version	Make sure the host/ application system has adopted Version 3
	Others	

Note: If no irregularities are found in the above inspections, please further investigate at the application level.

## 8. Member Application Form

### INE Market Data Platform (SMDP2.0) Access Application Form

Company Name (stamp)				
Member/Vendor No.		Seat Username		
Access Information				
Software Supplier and Version		Fax		
Technical Contact Person		Tel		
Mobile		Email		
Access Address				
Leased Information	Line	PD-DC Line No.	Operator <input type="checkbox"/> Telecom <input type="checkbox"/> Unicom	
			Internal LAN <input type="checkbox"/>	
			Rate	
		WAN IP	LAN IP	
	ZJ-DC Line No.	Operator <input type="checkbox"/> Telecom <input type="checkbox"/> Unicom <input type="checkbox"/> China Mobile		
		Rate		
	WAN IP	LAN IP		
Multicast Mode	<input type="checkbox"/> PIM-SSM + IGMPv3 <input type="checkbox"/> PIM-ASM + IGMPv2			
Topic of Multicast Market Data	(Please fill out the topics of multicast market data as needed. For details, refer to the parameters of the multicast market data topics released by the INE.)			
Remarks:				

**Notice:**

**1) The overlapping traffic of both unicast and multicast transmission will increase the bandwidth usage, please ensure sufficient leased line capacity before applying.**

- 2) Please fill out this form and email the stamped original and scanned PDF copy to INE.**
- 3) Please name the file “Application Form for Access to INE Market Data Platform (SMDP2.0)+<Member No.>+<Shortname of the Company>+<Line No.>”.**

## INE Market Data Platform (SMDP2.0) Redundancy Testing Report

Company Name (stamp)			
Member/Vendor No.		Seat Username	
Member/Vendor Datacenter Address			
Leased Line 1			
Access Point	<input type="checkbox"/> PD-DC <input type="checkbox"/> ZJ-DC		
Type		Operator Name	
Line No.		Bandwidth	
WAN Router Model		WAN Router Name	
VAN Interface Address		Market Data Server IP	
Leased Line 2			
Access Point	<input type="checkbox"/> PD-DC <input type="checkbox"/> ZJ-DC		
Type		Operator Name	
Line No.		Bandwidth	
WAN Router Model		WAN Router Name	
VAN Interface Address		Market Data Server IP	
Test Methods			
1	Check whether Channel A can receive market data normally	Result:	
2	Check whether Channel B can receive market data normally	Result:	
3	Enable Channel A/B at the same time, and then disable Channel A, check whether Channel B can receive market data normally	Result:	
4	Enable Channel A/B at the same time, and then disable Channel B, check whether Channel A can receive market data normally	Result:	
5	Check whether market data query services can operate normally	Result:	

Remarks	
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**Notice:**

- 1) Please fill out this form and email the original copy and the stamped PDF copy to INE.**
- 2) Please name the file “Redundancy Testing Report for Access to INE Market Data Platform (SMDP2.0)+<Member No.>+<Shortname of the Company>+<Line No.>”**