

Shanghai International Energy Exchange

Member Access Guideline

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www.INE.cn

上海國際能源交易中心
Shanghai International Energy Exchange

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1. Overview

Online trading is a principal trading medium for China's futures market, and a special trading line facilitating online trading is an important infrastructure for the safe, reliable and steady operation of futures markets. In view of the importance of online trading, Shanghai International Energy Exchange (“INE”) has planned and built a special trading line of "two places three centers" architecture, providing a reliable trading access platform for its Members and Overseas Special Participants (hereafter referred to as “OSPs”). The Members and OSPs may apply for a leased line to access INE specific trading network for trading business.

The guideline describes INE united access platform and focuses on its access mode, technical requirement, safety rules and leased line application process for Members and OSPs to access INE specific trading network. The access of information service vendors shall be subject to this guideline.

2. Introduction to the United Access Platform

Presently, INE has three data centers and two hubs, namely, Shanghai Futures Tower Data Center (PD-DC), Zhangjiang Data Center(ZJ-DC), Beijing Data Center (BJ-DC, backup system for disaster recovery), Hong Kong Hub (HK-Hub) and Singapore Hub (SG-Hub). These three data centers and two hubs have accessible resources, which combine into a united access platform to provide leased line connectivity to Members and OSPs.

2.1. Description of Network Topology

The united access platform has a network topology as shown in the figure below:

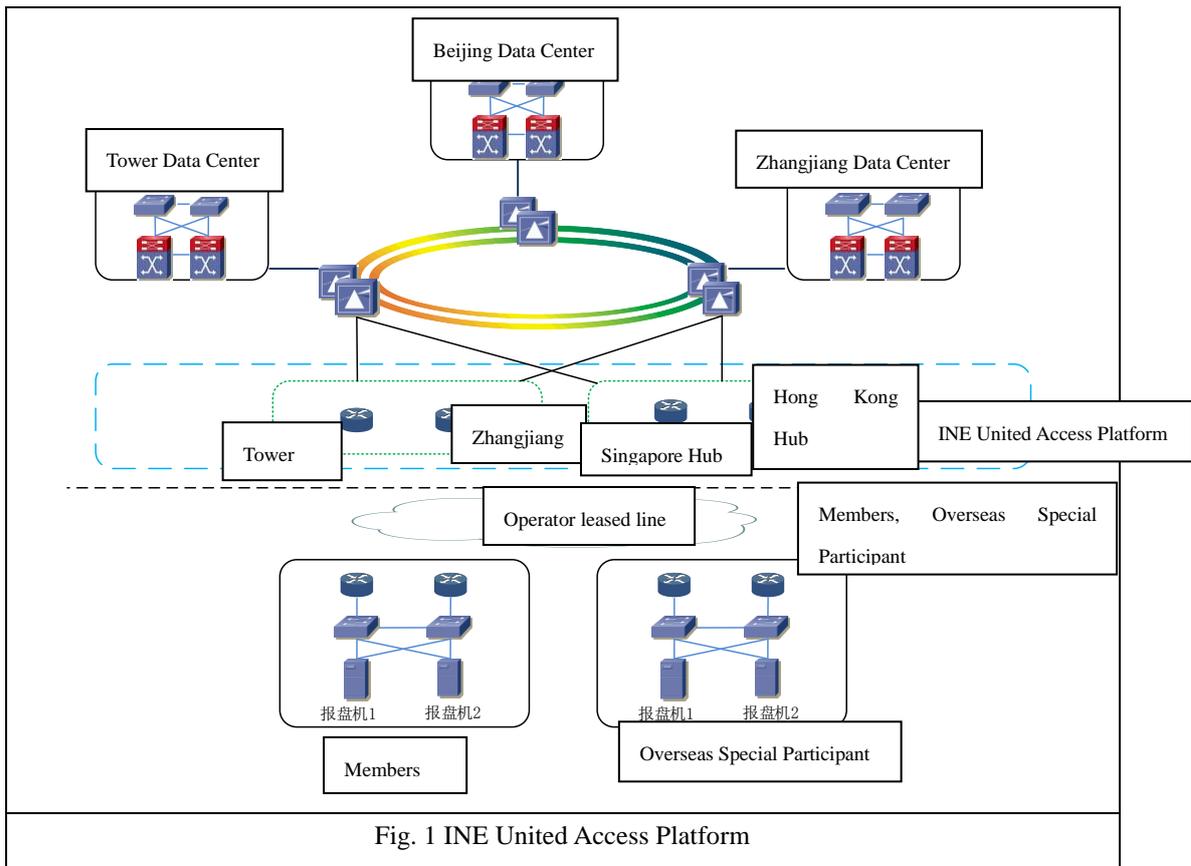


Fig. 1 INE United Access Platform

Description of network topology:

- Data centers backbone interconnection: the data centers constitute an

interconnection channel via redundancy fiber links and form a trading backbone ring net, allowing for interconnection among data centers.

- Hong Kong and Singapore Hub points: each hub point accesses to Shanghai Futures Tower Data Center and Zhangjiang Date Center via redundancy IEPL links by two high speed channels of different carriers.
- Single-gateway access and multi-point accesses: a Member or an OSP that connects any single gateway of the united access platform may access the trading front-end servers of each data center of INE.

2.2. Addresses of Data Centers and Hubs

Name	City	Address
PD-DC	Shanghai, China	4F, Futures Tower, No. 500, Pudian Road, Pudong New Area, Shanghai
ZJ-DC	Shanghai, China	2F, Bldg. 3, No. 996, Lai'an Road, Pudong New Area, Shanghai
BJ-DC	Beijing, China	7F, Telecommunication Tower, No. 106, Majiapu East Road, Fengtai District, Beijing
HK-Hub	Hong Kong, China	Equinix IBX-HK1, 17/F Global Gateway 168 Yeung Uk Road Tsuen Wan, N.T. Hong Kong
SG-Hub	Singapore	Equinix IBX-SG1, 20 Ayer Rajah Crescent, Ayer Rajah Industrial Park Singapore, 139964,

2.3. Leased Line Resources of Data Centers and Hubs

Access point	Line type	bandwidth	Carrier	Remark
PD-DC	MSTP	2Mbps/10Mbps	China Telecom China Unicom	GE aggregating port at INE side
ZJ-DC	MSTP	2Mbps/10Mbps	China Telecom China Unicom China Mobile	GE aggregating port at INE side
HK-Hub	IEPL	2Mbps/10Mbps	PCCW	GE aggregating port at INE side
SG-Hub	IEPL	2Mbps/10Mbps	SingTel	GE aggregating port at INE side

Note:

MSTP: Ethernet over SDH-based Ethernet Private Line

IEPL: International Ethernet Private Line

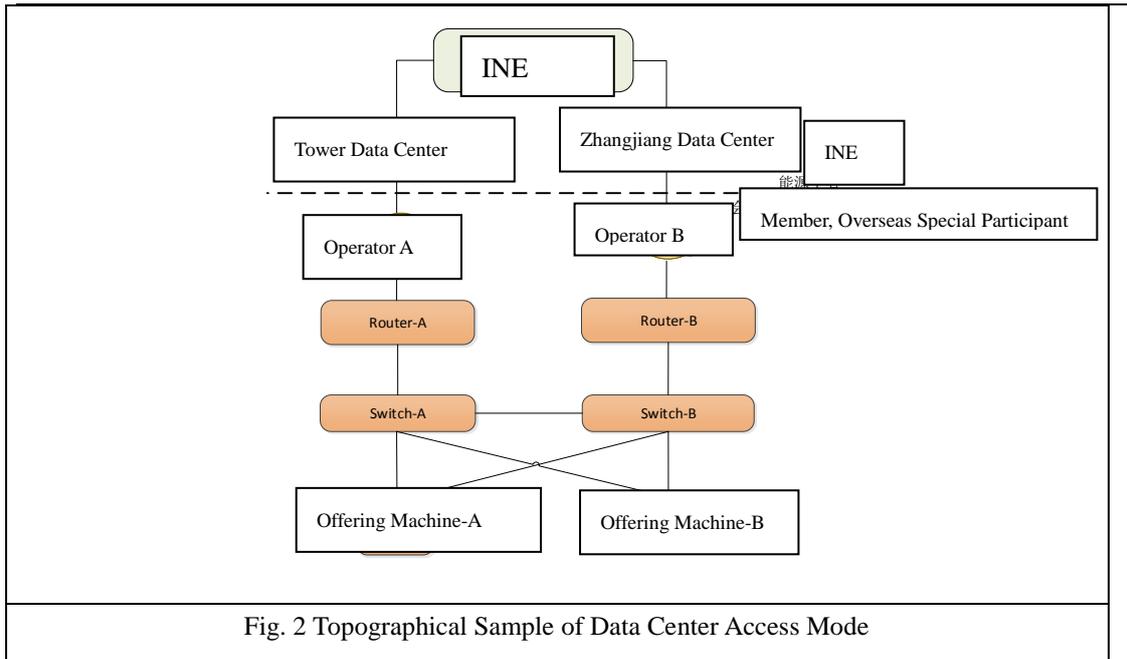
3. Access Mode

To guarantee reliable access to INE trading network by Members and OSPs, it is recommended to adopt the following two access modes, namely data center access mode and hub point access mode.

- Data centers access mode: refers to access PD-DC and ZJ-DC by two leased lines, respectively, primary and secondary; when the primary leased line breaks down, access will be quickly switched to the secondary leased line, thus guaranteeing the continuity of trading business. This access mode is for Members and OSPs.
- Hub point access mode: refers to access to different gateways by two leased lines, where the primary line accesses PD-DC or ZJ-DC and the secondary line accesses to HK-Hub or SG-Hub; when the primary leased line breaks down, access will be quickly switched to the secondary leased line, thus guaranteeing the continuity of trading business. This access mode is only for OSPs.

3.1. Data Center Access Mode

The topological graph is as follows:

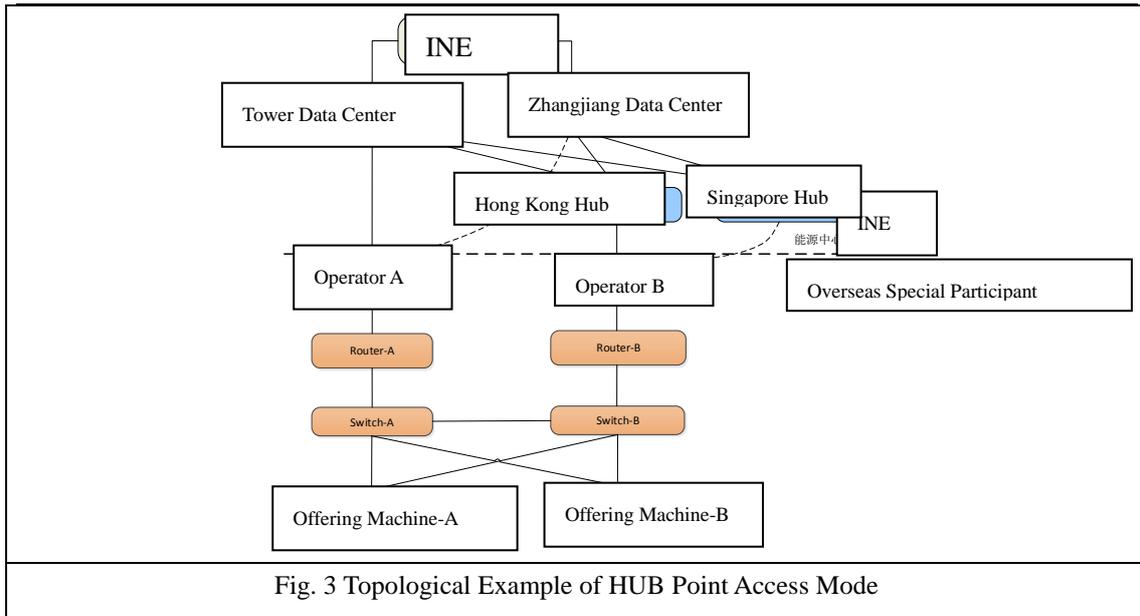


This mode is suitable for Members and OSPs, and the access shall be subject to the following rules:

- Use dual lines (of different carriers) to access PD-DC and ZJ-DC, respectively;
- Devices such as router and offering server shall have redundancy backup;
- Isolate the Member/OSP network from INE network by applying security technology ;
- Members and OSPs shall carry out regular failover test of primary and secondary leased lines;
- Members and OSPs shall maintain their relevant network devices and applied leased lines so as to guarantee their normal operation.

3.2. HUB Point Access Mode

The topological graph is as follows:



This mode is designed for OSPs, and the access shall be subject to the following rules:

- Use dual lines (of different carriers), access PD-DC/ZJ-DC by the primary leased line and access HK-Hub / SG-Hub by the secondary leased line;
- Devices such as router and offering server shall have redundancy backup;
- Isolate the OSP network from the INE network ;
- Overseas special participants shall carry out regular failover test of primary and secondary leased lines;
- Overseas special participants shall maintain their relevant network equipment and applied leased lines so as to guarantee their normal operation.

4. Technical Requirements

	Key point	Requirement
Line	Line type	1) MSTP is used for Members to access DCs; 2) IEPL is used for OSPs to access DCs or hubs;
	Line capability of businesses	1) Capable of transmitting unicast traffic; 2) Capable of transmitting multicast traffic
	Line fault detection	1) Capable of enabling BFD (bidirectional forwarding detection) for line connectivity and realizing redundancy failover
Device	Interface type	1) Router with Ethernet interfaces.
	Technical characteristics	1) support QoS and traffic shaping; 2) support BFD (bidirectional forwarding detection) feature; 3) support multicast protocols, including PIM-SM, PIM-SSM, IGMP V2/V3, etc. for receiving multicast market data in the future.

5. IP Address Specification

5.1. Distribution of Business System Subnets

The Exchange has distributed different subnets for trading through three data centers and member service system:

Data center	Trading front-end servers	Member service servers
PD-DC	192.168.11.0/24	192.168.9.0/24
ZJ-DC	192.168.12.0/24	192.168.13.0/24
BJ-DC	192.168.16.0/24	192.168.17.0/24

5.2. Distribution of Access IP Addresses

1) LAN IP addresses for Members and OSPs

- INE assigns a class C subnet to each leased line as LAN addresses;
- A Member or an OSP shall use an Exchange-assigned IP address to access the Exchange. Members or OSPs may choose to configure NAT on one's own network perimeter to adapt to the design requirements of own network.

2) WAN IP addresses for Members and OSPs

- INE assigns a 30-bit mask subnet address to each leased line as WAN address for connecting the Member or OSP's leased line interconnecting with the Exchange;
- Of the available subnet addresses, the first IP (odd number) is used by INE and the other (even number) is used by Members or OSPs.

6. Routing Specification

Static routing shall be used between INE and Members or OSPs. The Trading Front-end systems of three data centers and the member service system of the Exchange use different network segment addresses. Therefore, the Members or OSPs shall configure the following static routing entries on routers:

Data center	Routing entry
PD-DC	192.168.11.0/24, 192.168.9.0/24。
ZJ-DC	192.168.12.0/24, 192.168.13.0/24。
BJ-DC	192.168.16.0/24, 192.168.17.0/24。
China Futures Market Monitoring Center ¹	15.9.11.0/24。

¹The routing of China Futures Market Monitoring Center is mainly used for unified account opening and data reporting relevant businesses.

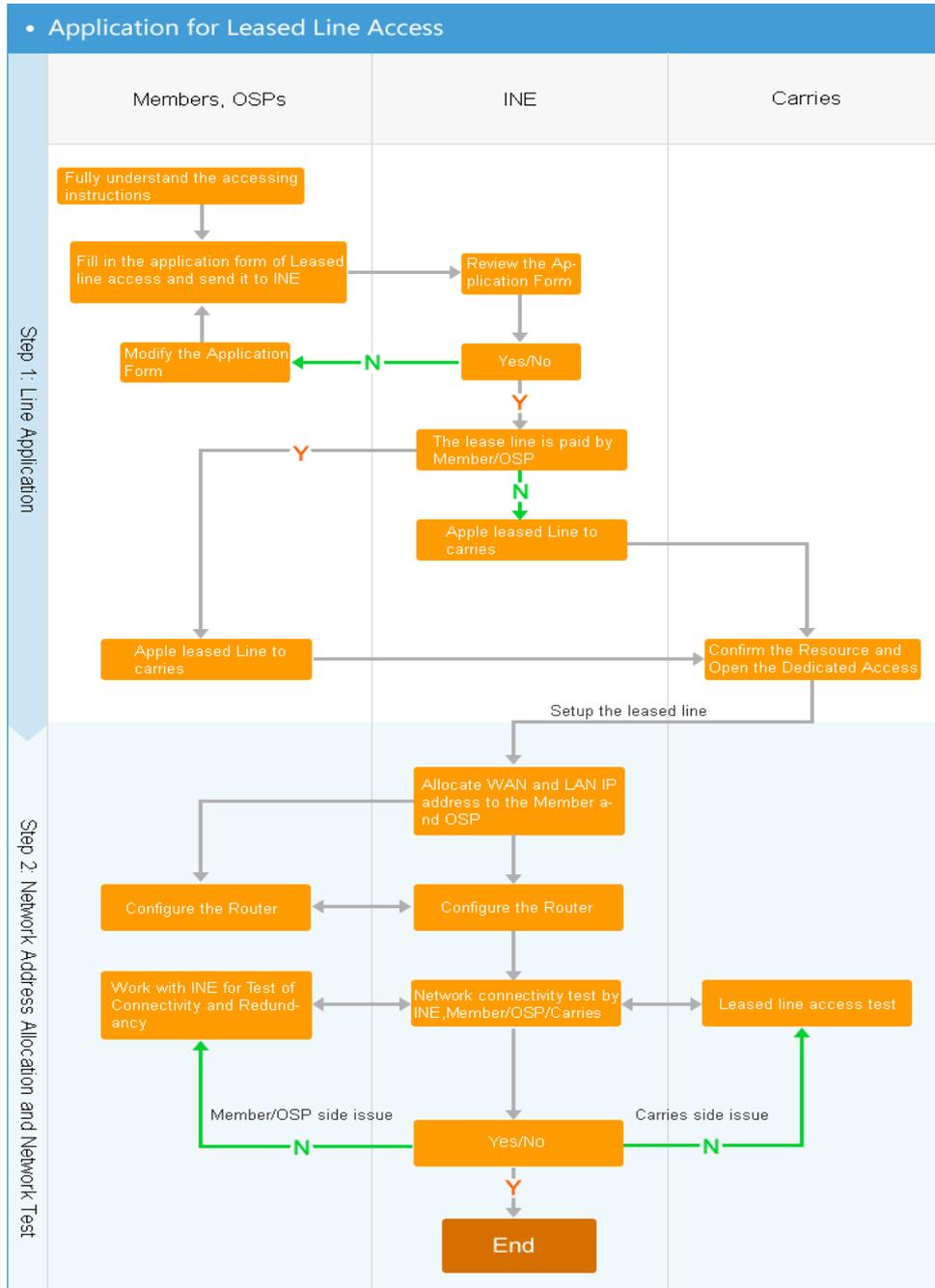
7. Security Specification

To guarantee the trading net safety and reliability, the relevant trading networks and systems at the end of the Members and OSPs shall be effectively isolated from non-trading networks and systems such as Internet and office networks. Security technology shall be deployed between the end of Members or OSPs and the end of INE, and the following access strategies shall be adopted:

Data center	Trading Front-end servers		Member Service servers	
	subnet	Open port	subnet	Open port
PD-DC	192.168.11.0	TCP 4901 TCP 4903 TCP 33005	192.168.9.0/24	TCP 443 TCP 80
ZJ-DC	192.168.12.0	TCP 33011 TCP 4911 TCP 4913 TCP 44305	192.168.13.0/24	
BJ-DC	192.168.16.0	TCP 44311 TCP 32005 TCP 32011	192.168.17.0/24	

8. Access Application

8.1. Leased Line Application Process



The main processes for leased line application by Members or OSPs:

- Step 1: Leased line application

1. A Member or an OSP shall understand the connectivity guideline requirements, fill out the "INE Application Form for Leased Line Access" and submit the application form to INE.

2. INE will put the application on record and check if the Member or OSP meet the application requirements. If not, INE will provide a feedback and require the Member or OSP to supplement materials. If yes, INE will confirm the application of the Member or OSP.

3. If the paying party for the leased line is a Member or an OSP, the Member or OSP shall submit the application to the carrier; if the paying party for the leased line is INE, INE shall submit the application to the carrier.

4. The carrier accepts the business application and setups the leased line.

- Step 2: Troubleshooting

5. Troubleshooting of Leased line connectivity: when the leased line construction is completed, the carrier will provide a line completion form to INE and the Member or OSP. INE will assign IP addresses for the leased line and contact the Member or OSP for leased line access testing.

6. Testing of leased line connectivity: the Member or OSP shall carry out the testing of leased line access, fill out the "INE Test Report on Leased Line Access" and send it to INE.

7. Redundancy test of INE leased line access: when the dual lines of a Member or an OSP are established, it is necessary to carry out testing on leased line quality and redundancy failover, and fill out and send the "Shanghai International Energy Exchange Redundancy Test Report on Leased Line Access" to INE.

8. Access confirmation: when the above tests are completed, upon INE confirmation, the leased lines can be normally used in production environment.

8.2. Acceptance of Leased Line Application

- Entry for leased line application

The Members and OSPs may access INE website, download the relevant application form, fill the form and email it to INE. Website: www.ine.cn

- Contact information for leased line application and operation maintenance

The Members and OSPs may access INE website to get the contact information.

Website: www.ine.cn

9. Configuration Examples

This chapter describes by examples the routing configuration for the Members to access PD-DC and ZJ-DC so as to facilitate a better understanding of the technical requirements for access to the unified platform.

Overseas special participants may refer to these configuration examples to access.

These configuration examples are only for reference for the purpose of description. The Members shall make customized configuration in light of their own equipment, software and line conditions. The router used in this example is Cisco 3825(IOS c3825- advenenterprise9 -mz.150-1.M2.bin).

9.1. Access Configuration Example 1 (multihomed Mode)

The offering machine adopts dual-NIC with dual-IP mode for access, as shown in the figure below:

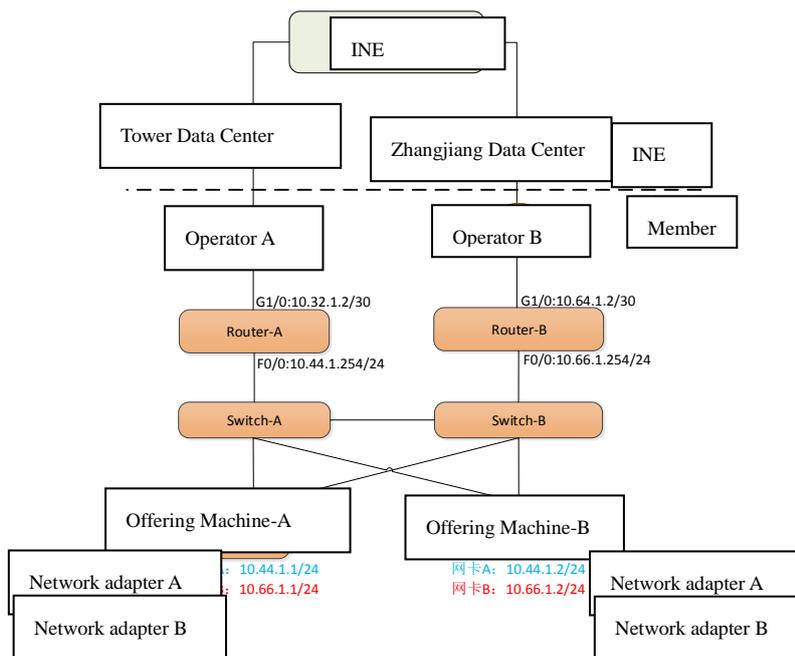


Fig. 4 Network Topology of Offering Machine in multi-homed Mode

- Redundancy line: apply for two leased lines of different carriers for accessing INE PD-DC and ZJ-DC, respectively
- Multi-homed machines (multiple network adapters): each offering machine access adopts multiple network adapters (Adapter 1 for access to PD-DC and Adapter 2 for access to ZJ-DC). A secondary offering machine shall be configured as standby.
- Multiple routers and switches: each router connects with different leased lines; switches are connected by routers and offering machines, respectively.

It is assumed that the remote Member trading seat accesses PD-DC via Router-A and ZJ-DC via Router-B.

9.1.1. IP Address Assignment

Member router	Member WAN interface address distribution	Member LAN address distribution
ROUTER-A	10.32.1.0/30	10.44.1.0/24
ROUTER-B	10.64.1.0/30	10.66.1.0/24

9.1.2. Router Configuration

The configuration of Router-A is as follows:

```
Hostname ROUTER-A
!
Interface G1/0
  Description To_SHFE_QHDS_Carrier-line number
  Ip address 10.32.1.2 255.255.255.252
!
Interface F0/0
  Description To_SwitchA_xxx
  Ip address 10.44.1.254 255.255.255.0
! Routing configuration
Ip route 192.168.11.0 255.255.255.0 G1/0 10.32.1.1 name SHFE-DS-FRONT
Ip route 192.168.9.0 255.255.255.0 G1/0 10.32.1.1 name SHFE-DS-MEMBER
Ip route 192.168.12.0 255.255.255.0 G1/0 10.32.1.1 name SHFE-ZJ-FRONT
Ip route 192.168.13.0 255.255.255.0 G1/0 10.32.1.1 name SHFE-ZJ-MEMBER
IP route 192.168.16.0 255.255.255.0 G1/0 10.32.1.1 name SHFE-BJ-FRONT
Ip route 192.168.17.0 255.255.255.0 G1/0 10.32.1.1 name SHFE-BJ-MEMBER
IP route 15.9.11.0 255.255.255.0 G1/0 10.32.1.1 name CFMMC
!BFD configuration
ip route static bfd G1/0 10.32.1.1
Interface G1/0
bfd interval 500 min_rx 500 multiplier 3
No bfd echo
!GTS configuration
policy-map MSTP-10M
  class class-default
    shape average 10000000
!
Interface G1/0
  service-policy output MSTP-10M
```

The configuration of Router-B is as follows:

```
Hostname ROUTER-B
!
Interface G1/0
  Description To_SHFE_Zhangjiang_Carrier-line number
  Ip address 10.64.1.2 255.255.255.252
!
Interface F0/0
  Description To_SwitchB_xxx
```

```
Ip address 10.66.1.254 255.255.255.0
! Routing configuration
Ip route 192.168.11.0 255.255.255.0 G1/0 10.64.1.1 name SHFE-DS-FRONT
Ip route 192.168.9.0 255.255.255.0 G1/0 10.64.1.1 name SHFE-DS-MEMBER
Ip route 192.168.12.0 255.255.255.0 G1/0 10.64.1.1 name SHFE-ZJ-FRONT
Ip route 192.168.13.0 255.255.255.0 G1/0 10.64.1.1 name SHFE-ZJ-MEMBER
IP route 192.168.16.0 255.255.255.0 G1/0 10.64.1.1 name SHFE-BJ-FRONT
Ip route 192.168.17.0 255.255.255.0 G1/0 10.64.1.1 name SHFE-BJ-MEMBER
Ip route 15.9.11.0 255.255.255.0 G1/0 10.64.1.1 name CFMMC
!BFD configuration
ip route static bfd G1/0 10.64.1.1
Interface G1/0
bfd interval 500 min_rx 500 multiplier 3
No bfd echo
!GTS configuration
policy-map MSTP-10M
class class-default
shape average 10000000
!
Interface G1/0
service-policy output MSTP-10M
```

9.2. Access Configuration Example 2 (NIC Bonding & Single IP Mode)

The offering machine adopts a dual-network adapter single-IP mode for access, as shown in the figure below:

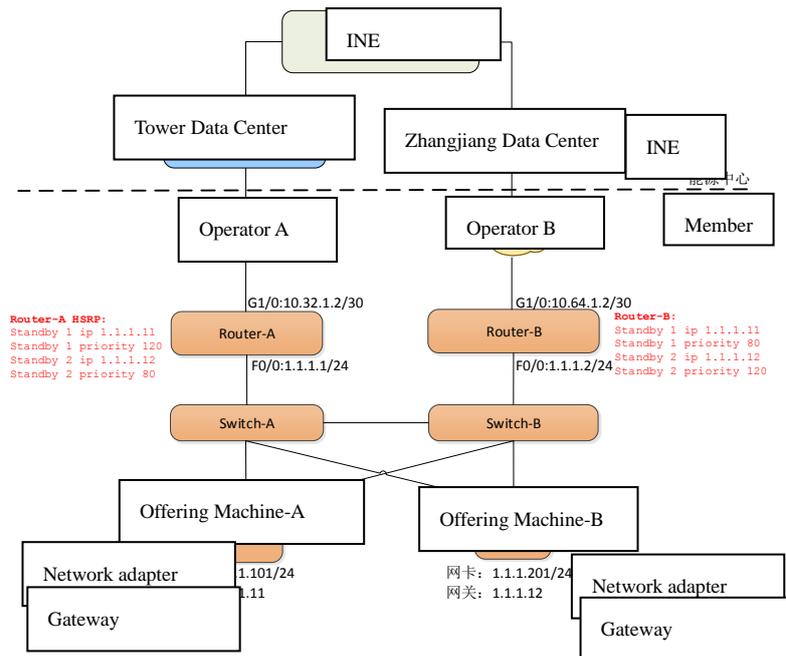


Fig. 5 Network Topology of Offering Machine in Dual Network Adapter Single IP Mode

- Redundancy line: apply for two leased lines of different carriers for accessing INE PD-DC and ZJ-DC, respectively
- Multiple offering machines (two network adapters): each offering machine access adopts two network adapters (dual-network adapter binding to realize redundancy). A same offering machine shall be configured as standby.
- Multiple routers and switches: each router connects with different communication lines; switches are accessed by routers and offering machines, respectively. Two routers adopt NAT+HSRP technology to realize gateway redundancy failover.

It is assumed that the remote Member trading seat accesses PD-DC via Router-A and ZJ-DC via Router-B.

9.2.1. IP Address Assignment

Member router	Member WAN interface address distribution	Member LAN address distribution
ROUTER-A	10.32.1.0/30	10.44.1.0/24

Member router	Member WAN interface address distribution	Member LAN address distribution
ROUTER-B	10.64.1.0/30	10.66.1.0/24

9.2.2. Router Configuration

The configuration of Router-A is as follows:

```

Hostname ROUTER-A
!
Hostname ROUTER-A
!WAN configuration
Interface G1/0
Description To_SHFE_QHDS_运营商-线路编号
Ip address 10.32.1.2 255.255.255.252
!LAN configuration
Interface F0/0
    Description To_SwitchA_xxx
Ip address 1.1.1.1 255.255.255.0
! HSRP configuration
Interface F0/0
Standby 1 ip 1.1.1.11
Standby 1 priority 120
Standby 1 preempt
Standby 2 ip 1.1.1.12
Standby 2 priority 80
Standby 2 preempt
!NAT configuration
Interface G1/0
Ip nat outside
Int f0/0
Ip nat inside
!
Ip nat inside source static 1.1.1.101 10.44.1.101
Ip nat inside source static 1.1.1.201 10.44.1.201
!routing configuration
Ip route 192.168.11.0 255.255.255.0 G1/0 10.32.1.1 name SHFE-DS-FRONT
Ip route 192.168.9.0 255.255.255.0 G1/0 10.32.1.1 name SHFE-DS-MEMBER
Ip route 192.168.12.0 255.255.255.0 G1/0 10.32.1.1 name SHFE-ZJ-FRONT
Ip route 192.168.13.0 255.255.255.0 G1/0 10.32.1.1 name SHFE-ZJ-MEMBER
IP route 192.168.16.0 255.255.255.0 G1/0 10.32.1.1 name SHFE-BJ-FRONT
Ip route 192.168.17.0 255.255.255.0 G1/0 10.32.1.1 name SHFE-BJ-MEMBER
    
```

```
Ip route 15.9.11.0 255.255.255.0 G1/0 10.32.1.1 name CFMMC
!BFD configuration
ip route static bfd G1/0 10.32.1.1
Interface G1/0
    bfd interval 500 min_rx 500 multiplier 3
    No bfd echo
!GTS configuration
policy-map MSTP-10M
    class class-default
        shape average 10000000
!
Interface G1/0
    service-policy output MSTP-10M
!HSRP Track configuration
track 10 ip route 192.168.11.0/24 reachability
    delay up 0 down 0
track timer ip route msec 500
!
Interface F0/0
    Standby 1 track 10 decrement 50
    Standby 2 track 10 decrement 50
```

The configuration of Router-B is as follows:

```
Hostname ROUTER-B
!WAN configuration
Interface G1/0
    Description To_SHFE_Zhangjiang_Carrier-line number
Ip address 10.64.1.2 255.255.255.252
! LAN configuration
Interface F0/0
    Description To_SwitchB_xxx
Ip address 1.1.1.2 255.255.255.0
! HSRP configuration
Interface F0/0
    Standby 1 ip 1.1.1.11
    Standby 1 priority 80
    Standby 1 preempt
    Standby 2 ip 1.1.1.12
    Standby 2 priority 120
    Standby 2 preempt
!NAT configuration
Interface G1/0
```

```
Ip nat outside
Int f0/0
Ip nat inside
!
Ip nat inside source static 1.1.1.101 10.66.1.101
Ip nat inside source static 1.1.1.201 10.66.1.201
! Routing configuration
Ip route 192.168.11.0 255.255.255.0 G1/0 10.64.1.1 name SHFE-DS-FRONT
Ip route 192.168.9.0 255.255.255.0 G1/0 10.64.1.1 name SHFE-DS-MEMBER
Ip route 192.168.12.0 255.255.255.0 G1/0 10.64.1.1 name SHFE-ZJ-FRONT
Ip route 192.168.13.0 255.255.255.0 G1/0 10.64.1.1 name SHFE-ZJ-MEMBER
IP route 192.168.16.0 255.255.255.0 G1/0 10.64.1.1 name SHFE-BJ-FRONT
Ip route 192.168.17.0 255.255.255.0 G1/0 10.64.1.1 name SHFE-BJ-MEMBER
Ip route 15.9.11.0 255.255.255.0 G1/0 10.64.1.1 name CFMMC
!BFD configuration
ip route static bfd G1/0 10.64.1.1
Interface G1/0
    bfd interval 500 min_rx 500 multiplier 3
    No bfd echo
!GTS configuration
policy-map MSTP-10M
    class class-default
        shape average 10000000
!
Interface G1/0
    service-policy output MSTP-10M
! HSRP Track configuration
track 10 ip route 192.168.11.0/24 reachability
    delay up 0 down 0
track timer ip route msec 500
!
Interface F0/0
    Standby 1 track 10 decrement 50
    Standby 2 track 10 decrement 50
```