OSPF Troubleshooting

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Foreword

This section introduces common observations and means of troubleshooting OSPF. Through the process of troubleshooting OSPF, a more thorough understanding of the intricacies of the OSPF protocol can be developed.

Objectives

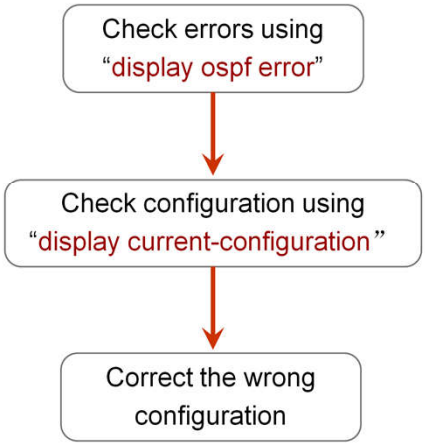
Upon completion of this section, you will be able to:

- Master the use of common OSPF troubleshooting tools
- Perform general OSPF troubleshooting

Contents

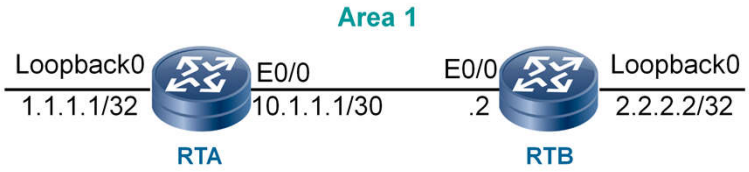
OSPF neighbor relationship troubleshooting

Steps for Neighbor Relationship Troubleshooting



Failures within area are mainly caused by neighbors relationship. It is not difficult to deal with that problem. Firstly, “display OSPF error” command is used to show errors information; Secondly, “display current-configuration” is used to show configuration of OSPF; Lastly modify wrong configurations.

Problem Description—No Intra-Area Routes




```
[RTB]display ip routing-table
 Routing Table: public net
Destination/Mask    Protocol  Pre  Cost      Nexthop         Interface
2.2.2.2/32          DIRECT    0    0         127.0.0.1       InLoopBack0
10.1.1.0/24         DIRECT    0    0         10.1.1.2        Ethernet0/0
10.1.1.2/32         DIRECT    0    0         127.0.0.1       InLoopBack0
127.0.0.0/8         DIRECT    0    0         127.0.0.1       InLoopBack0
127.0.0.1/32        DIRECT    0    0         127.0.0.1       InLoopBack0
```


Two routers are directly connected , all the networks are configured within one area .

After completion of configuration , check the routing table of RTB , there is no routing information of RTA's loopback address .

This failure is usually caused by the relationship of neighbors , the main way is to check the error information of OSPF , check configurations according to the error information , and correct the wrong configurations .

Checking OSPF Error Statistics—Router ID Confusion

```
[RTB]display ospf error
                OSPF Process 1 with Router ID 1.1.1.1
 OSPF packet error statistics:
   0: IP: received my own packet           0: OSPF: wrong packet type
   0: OSPF: wrong version                  0: OSPF: wrong checksum
   0: OSPF: wrong area id                  0: OSPF: area mismatch
   0: OSPF: wrong virtual link             0: OSPF: wrong authentication type
   0: OSPF: wrong authentication key       0: OSPF: too small packet
   0: OSPF: packet size > ip length        0: OSPF: transmit error
   0: OSPF: interface down                 0: OSPF: unknown neighbor
   0: HELLO: netmask mismatch              0: HELLO: hello timer mismatch
   0: HELLO: dead timer mismatch           0: HELLO: extern option mismatch
  24: HELLO: router id confusion           0: HELLO: virtual neighbor unknown
   0: HELLO: NBMA neighbor unknown         0: DD: neighbor state low
   0: DD: router id confusion              0: DD: extern option mismatch
   0: DD: unknown LSA type                 0: LS ACK: neighbor state low
   0: LS ACK: wrong ack                    0: LS ACK: duplicate ack
   0: LS ACK: unknown LSA type             0: LS REQ: neighbor state low
   0: LS REQ: empty request                0: LS REQ: wrong request
   0: LS UPD: neighbor state low           0: LS UPD: newer self-generate LSA
   0: LS UPD: LSA checksum wrong           0: LS UPD: received less recent LSA
   0: LS UPD: unknown LSA type             0: OSPF routing: next hop not exist
   0: DD: MTU option mismatch              0: ROUTETYPE: wrong type value
   0: OPQ-9  : out of flooding scope       0: OPQ-10 : out of flooding scope
   0: OPQ-11 : out of flooding scope
```


"Router id confusion"is found through "display ospf error " command .

OSPF requires all the routers must have their own unique router id, which can’t be overlapped .

Checking OSPF Configuration

```
[RTA]display current-configuration
#
 sysname RTA
#
 FTP server enable
#
 l2tp domain suffix-separator @
#
 router id 1.1.1.1
#
radius scheme system
```

```
[RTB]display current-configuration
#
 sysname RTB
#
 FTP server enable
#
 l2tp domain suffix-separator @
#
 router id 1.1.1.1
#
radius scheme system
```


Check the configuration of RTA and RTB , both the router id are configured as 1.1.1.1 .

Change RTB's router id into 2.2.2.2 (loopback address) , the failure is

corrected .

Checking OSPF Error Statistics —Area Mismatch

```
[RTB]display ospf error
                OSPF Process 1 with Router ID 2.2.2.2
 OSPF packet error statistics:
   0: IP: received my own packet          0: OSPF: wrong packet type
   0: OSPF: wrong version                 0: OSPF: wrong checksum
   0: OSPF: wrong area id                13: OSPF: area mismatch
   0: OSPF: wrong virtual link           0: OSPF: wrong authentication type
   0: OSPF: wrong authentication key     0: OSPF: too small packet
   0: OSPF: packet size > ip length      0: OSPF: transmit error
   0: OSPF: interface down               0: OSPF: unknown neighbor
   0: HELLO: netmask mismatch            0: HELLO: hello timer mismatch
   0: HELLO: dead timer mismatch         0: HELLO: extern option mismatch
   0: HELLO: router id confusion         0: HELLO: virtual neighbor unknown
   0: HELLO: NBMA neighbor unknown       0: DD: neighbor state low
   0: DD: router id confusion            0: DD: extern option mismatch
   0: DD: unknown LSA type               0: LS ACK: neighbor state low
   0: LS ACK: wrong ack                  0: LS ACK: duplicate ack
   0: LS ACK: unknown LSA type           0: LS REQ: neighbor state low
   0: LS REQ: empty request              0: LS REQ: wrong request
   0: LS UPD: neighbor state low         0: LS UPD: newer self-generate LSA
   0: LS UPD: LSA checksum wrong         0: LS UPD: received less recent LSA
   0: LS UPD: unknown LSA type           0: OSPF routing: next hop not exist
   0: DD: MTU option mismatch            0: ROUTETYPE: wrong type value
   0: OPQ-9  : out of flooding scope     0: OPQ-10 : out of flooding scope
   0: OPQ-11 : out of flooding scope
```


"Area mismatch" is found through "display ospf error" command .

OSPF prescribes that the area is a group of network , all the interface must be configured into one area , otherwise the neighbourship can’t be built up .

Checking OSPF Configuration

```
[RTA]display current-configuration configuration ospf
#
ospf 1
 area 0.0.0.1
  network 1.1.1.1 0.0.0.0
  network 10.1.1.0 0.0.0.3
#
return
```

```
[RTB]display current-configuration configuration ospf
#
ospf 1
 area 0.0.0.2
  network 2.2.2.2 0.0.0.0
  network 10.1.1.0 0.0.0.3
#
return
```


After check the configuration of OSPF , two interfaces are configured into different areas ,after change the configuration of RTB , all the networks are configured into area 1 , the failure is corrected .

Checking OSPF Error Statistics —Network Mismatch

```
[RTB]display ospf error
                OSPF Process 1 with Router ID 2.2.2.2
 OSPF packet error statistics:
   0: IP: received my own packet           0: OSPF: wrong packet type
   0: OSPF: wrong version                  0: OSPF: wrong checksum
   0: OSPF: wrong area id                  0: OSPF: area mismatch
   0: OSPF: wrong virtual link             0: OSPF: wrong authentication type
   0: OSPF: wrong authentication key       0: OSPF: too small packet
   0: OSPF: packet size > ip length        0: OSPF: transmit error
   0: OSPF: interface down                 0: OSPF: unknown neighbor
   9: HELLO: netmask mismatch              0: HELLO: hello timer mismatch
   0: HELLO: dead timer mismatch           0: HELLO: extern option mismatch
   0: HELLO: router id confusion           0: HELLO: virtual neighbor unknown
   0: HELLO: NBMA neighbor unknown         0: DD: neighbor state low
   0: DD: router id confusion              0: DD: extern option mismatch
   0: DD: unknown LSA type                 0: LS ACK: neighbor state low
   0: LS ACK: wrong ack                    0: LS ACK: duplicate ack
   0: LS ACK: unknown LSA type             0: LS REQ: neighbor state low
   0: LS REQ: empty request                0: LS REQ: wrong request
   0: LS UPD: neighbor state low           0: LS UPD: newer self-generate LSA
   0: LS UPD: LSA checksum wrong           0: LS UPD: received less recent LSA
   0: LS UPD: unknown LSA type             0: OSPF routing: next hop not exist
   0: DD: MTU option mismatch              0: ROUTETYPE: wrong type value
   0: OPQ-9  : out of flooding scope       0: OPQ-10 : out of flooding scope
   0: OPQ-11 : out of flooding scope
```

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"Netmask mismatch" is found through "display ospf error " command .

OSPF prescribes the network mask must be the same in broadcast , NBMA , Pto- MP network , otherwise the neighbourship can’t be built up.

Checking OSPF Configuration

```
[RTA]display current-configuration
#
interface Ethernet0/0
 ip address 10.1.1.1 255.255.255.252
#
ospf 1
 area 0.0.0.1
  network 1.1.1.1 0.0.0.0
  network 10.1.1.0 0.0.0.3
#
return
```

```
[RTB]display current-configuration
#
interface Ethernet0/0
 ip address 10.1.1.2 255.255.255.0
#
ospf 1
 area 0.0.0.1
  network 2.2.2.2 0.0.0.0
  network 10.1.1.0 0.0.0.255
#
return
```

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Checking the configuration of OSPF , the network mask length is 30 on RTA E0/0 , however RTB's network mask length is 24 , if the network mask length mismatches , the neighbouring can’t be built up .

Change the network mask length into 30 bit , change the wild mask into 0.0.0.3 , the failure is corrected .

Checking OSPF Error Statistics —Wrong Authentication Type

```
[RTB]display ospf error
                OSPF Process 1 with Router ID 2.2.2.2
 OSPF packet error statistics:
   0: IP: received my own packet           0: OSPF: wrong packet type
   0: OSPF: wrong version                  0: OSPF: wrong checksum
   0: OSPF: wrong area id                  0: OSPF: area mismatch
   0: OSPF: wrong virtual link             2: OSPF: wrong authentication type
   0: OSPF: wrong authentication key       0: OSPF: too small packet
   0: OSPF: packet size > ip length        0: OSPF: transmit error
   0: OSPF: interface down                 0: OSPF: unknown neighbor
   0: HELLO: netmask mismatch              0: HELLO: hello timer mismatch
   0: HELLO: dead timer mismatch           0: HELLO: extern option mismatch
   0: HELLO: router id confusion           0: HELLO: virtual neighbor unknown
   0: HELLO: NBMA neighbor unknown         0: DD: neighbor state low
   0: DD: router id confusion              0: DD: extern option mismatch
   0: DD: unknown LSA type                 0: LS ACK: neighbor state low
   0: LS ACK: wrong ack                    0: LS ACK: duplicate ack
   0: LS ACK: unknown LSA type             0: LS REQ: neighbor state low
   0: LS REQ: empty request                0: LS REQ: wrong request
   0: LS UPD: neighbor state low           0: LS UPD: newer self-generate LSA
   0: LS UPD: LSA checksum wrong           0: LS UPD: received less recent LSA
   0: LS UPD: unknown LSA type             0: OSPF routing: next hop not exist
   0: DD: MTU option mismatch              0: ROUTETYPE: wrong type value
   0: OPQ-9  : out of flooding scope       0: OPQ-10 : out of flooding scope
   0: OPQ-11 : out of flooding scope
```


"Wrong authentication type" is found through "display ospf error " command .

Same authentication type must be used with in one area ; Configuring authentication type in area view .

Checking OSPF Configuration

```
[RTA]display current-configuration configuration ospf
#
ospf 1
 area 0.0.0.1
  network 1.1.1.1 0.0.0.0
  network 10.1.1.0 0.0.0.3
  authentication-mode md5 1 plain huawei
#
return
```

```
[RTB]display current-configuration configuration ospf
#
ospf 1
 area 0.0.0.1
  network 2.2.2.2 0.0.0.0
  network 10.1.1.0 0.0.0.3
  authentication-mode simple plain huawei
#
return
```


Checking the configuration of OSPF , RTA uses MD5 as its authentication method , RTB uses clear text as its authentication method , authentication method mismatch , the neighbourship can’t be built up .

Change the authentication method of RTA into "simple".

Checking OSPF Error Statistics —Wrong Authentication Key

```
[RTB]display ospf error
                OSPF Process 1 with Router ID 2.2.2.2
 OSPF packet error statistics:
   0: IP: received my own packet           0: OSPF: wrong packet type
   0: OSPF: wrong version                  0: OSPF: wrong checksum
   0: OSPF: wrong area id                  0: OSPF: area mismatch
   0: OSPF: wrong virtual link             0: OSPF: wrong authentication type
   9: OSPF: wrong authentication key       0: OSPF: too small packet
   0: OSPF: packet size > ip length        0: OSPF: transmit error
   0: OSPF: interface down                 0: OSPF: unknown neighbor
   0: HELLO: netmask mismatch              0: HELLO: hello timer mismatch
   0: HELLO: dead timer mismatch           0: HELLO: extern option mismatch
   0: HELLO: router id confusion           0: HELLO: virtual neighbor unknown
   0: HELLO: NBMA neighbor unknown         0: DD: neighbor state low
   0: DD: router id confusion              0: DD: extern option mismatch
   0: DD: unknown LSA type                 0: LS ACK: neighbor state low
   0: LS ACK: wrong ack                    0: LS ACK: duplicate ack
   0: LS ACK: unknown LSA type             0: LS REQ: neighbor state low
   0: LS REQ: empty request                0: LS REQ: wrong request
   0: LS UPD: neighbor state low           0: LS UPD: newer self-generate LSA
   0: LS UPD: LSA checksum wrong           0: LS UPD: received less recent LSA
   0: LS UPD: unknown LSA type             0: OSPF routing: next hop not exist
   0: DD: MTU option mismatch              0: ROUTETYPE: wrong type value
   0: OPQ-9  : out of flooding scope       0: OPQ-10 : out of flooding scope
   0: OPQ-11 : out of flooding scope
```

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Changing the authentication method , routing information also can’t be learnt , check the OSPF error information . "wrong authentication key" is found .

Password must be configured on the interface , OSPF prescribes the password must be same on different sides of the link .

Checking OSPF Configuration

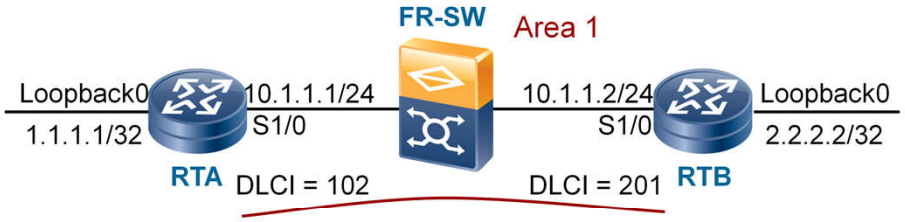
```
[RTA]display current-configuration interface Ethernet 0/0
#
interface Ethernet0/0
 ip address 10.1.1.1 255.255.255.252
 ospf authentication-mode simple plain huawei
#
return
```

```
[RTB]display current-configuration interface Ethernet 0/0
#
interface Ethernet0/0
 ip address 10.1.1.2 255.255.255.252
 ospf authentication-mode simple plain hello
#
return
```


After check the configuration , password mismatch is found .

Change the password into “huawei” on both sides , the failure is corrected .

Problem Description—No Routes Learned on NBMA Network




```
[RTA]display ip routing-table
 Routing Table: public net
Destination/Mask    Protocol  Pre  Cost        Nexthop         Interface
1.1.1.1/32          DIRECT    0    0           127.0.0.1       InLoopBack0
10.1.1.0/24         DIRECT    0    0           10.1.1.1        Serial1/0
10.1.1.1/32         DIRECT    0    0           127.0.0.1       InLoopBack0
10.1.1.2/32         DIRECT    0    0           10.1.1.2        Serial1/0
127.0.0.0/8         DIRECT    0    0           127.0.0.1       InLoopBack0
127.0.0.1/32        DIRECT    0    0           127.0.0.1       InLoopBack0
```

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RTA and RTB are connected through frame relay switch , the network type is NBMA .

After checking the routing table , RTA can’t learn routes through OSPF .

Analysis of the routing table shows the local interface's information and remote interface’s information exist , which means frame relay and IP address are correctly configured, they can make a communication.

Neighbors on NBMA network can’t be auto discovered, only through static manually configuring. In this case, it is necessary to designate neighbor manually.

Checking NBMA Static Neighbor Configuration

```
[RTA]display current-configuration configuration ospf
#
ospf 1
 peer 10.1.1.3
 area 0.0.0.1
  network 1.1.1.1 0.0.0.0
  network 10.1.1.0 0.0.0.255
#
return
```

```
[RTB]display current-configuration configuration ospf
#
ospf 1
 peer 10.1.1.3
 area 0.0.0.1
  network 2.2.2.2 0.0.0.0
  network 10.1.1.0 0.0.0.255
#
return
```

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Check the configuration of NBMA static neighbor , IP address error is found .

Use 10.1.1.2 as RTA's remote neighbor identifier ; Use 10.1.1.1 as RTB‘s remote neighbor identifier .

Configure a static neighbor, the failure is corrected.

Summary for Neighbor Relationship Troubleshooting

Parameter	Requirement
router id	Each router's router id must be unique
area id	All the interfaces on the same network must belong to the same area
network mask	All the interfaces on the same network must have the same network mask, except P2P network.
authentication type	Authentication mode must match in the same area
authentication data	Authentication key must match on the same network
extern option	When configuring stub or NSSA, the command must be configured on all routers in the area
peer	Neighbors on NBMA network must be manually configured

This slide makes a summary of the neighbor failures , P-to-P network don't need to consider the network mask , manually configured peer only exists on NBMA network , other configurations are suitable for all network types .

Summary

- What are common reasons for failure when establishing an OSPF neighbor relationship?
- Must an ABR be connected to the Backbone Area?
- When configuring route aggregation, is it necessary to configure aggregation on all ABRs?

What are common reasons for failure of establishing OSPF neighbor relationship?

Router id confusion , area id mismatch , network mask mismatch, authentication type and authentication password mismatch, external routing capability mismatch , wrong static neighbor configuration on NBMA network .

Must ABR be connected to the Backbone Area?

ABR must be connected to the Backbone Area (area 0) , both physical link and virtual link can be used .

When configuring route aggregation, is it necessary to configure aggregation on all ABRs?

When configuring route aggregation , you must configure aggregation on all ABRs.

Thank You

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