Troubleshoot Common Problems with OSPF

Contents

Introduction

This document describes how to troubleshoot common problems with Open Shortest Path First (OSPF).

Prerequisites

Requirements

There are no specific requirements for this document.

Components Used

This document is not restricted to specific software and hardware versions.

The information in this document was created from the devices in a specific lab environment. All of the devices used in this document started with a cleared (default) configuration. If your network is live, ensure that you understand the potential impact of any command.

Conventions

Refer to [Cisco Technical Tips Conventions](#) for more information on document conventions.

Main Flowchart

If you have the output of a **show ip ospf neighbor**, **show ip ospf neighbor**, or **show tech-support** command from your Cisco device, you can use the [Cisco CLI Analyzer](#) to display potential issues and fixes. To use [Cisco CLI Analyzer](#), you must have JavaScript enabled.

> **Note**: Only registered Cisco users have access to internal Cisco tools and information.

```
            ( Main )
               │
               ▼
     ┌───────────────────┐                                              ( Main 1 )
     │   Which symptom   │                                                  │
     │  best describes   │                                                  │
     │   your problem?   │                                                  │
     └───────────────────┘                                                  ▼
               │                                         ┌─────────────────────────────────────────┐
               │                                         │ This indicates that the OSPF packet is being corrupted by │
     ┌───────────────────┐                               │ layer 2 or software. If the sender is sending Type 6 │
     │ Receiving "ospf-4-badlsa type error" │──────────▶ │ MOSPF packets then you need to ignore it by configuring │
     │        message     │                              │ ignore lsa mospf. Open a TAC case if this does note │
     └───────────────────┘                               │ resolve the problem. │
               │                                         └─────────────────────────────────────────┘
               │                                         ┌─────────────────────────────────────────┐
     ┌───────────────────┐                               │ For OSPF process to begin, the router must have an │
     │ Receiving "can't allocate router-id" │            │ interface with a valid IP address in the state up/ line │
     │ message when configuring OSPF │──────────────────▶│ protocol. If you are running more than one OSPF process, │
     └───────────────────┘                               │ make sure you have at least one interface that meets these │
               │                                         │ criteria for each OSPF process. │
               │                                         └─────────────────────────────────────────┘
     ┌───────────────────┐                               ┌─────────────────────────────────────────┐
     │ Receiving "ospf-4-errrcv" message │──────────────▶│ Please refer to What Do %OSPF-4- │
     └───────────────────┘                               │ ERRRCV Error Messages Mean? │
               │                                         └─────────────────────────────────────────┘
               │                              ◇                            ┌─────────────────────────────┐
     ┌───────────────────┐              Is the route in      No            │ A common mistake is to leave the │
     │ Routes (static or dynamic) are not │──────── question a default ───────────▶│ keyword "subnets" out of the │
     │ being redistributed into OSPF │         route?                       │ redistribute command. Verify your │
     └───────────────────┘                    ◇                            │ config, then open a TAC case if this │
               │                               │                           │ did not help. │
               │                              Yes                          └─────────────────────────────┘
               │                               │                           ┌─────────────────────────────┐
               │                               └──────────────────────────▶│ Please see How Does OSPF │
               │                                                           │ Generate Default Routes? │
               │                                                           └─────────────────────────────┘
               │                              ◇
     ┌───────────────────┐              Is OSPF being        Yes           ┌─────────────────────────────┐
     │ Receiving "ospf unknown protocol" │──── configured on a ───────────────────▶│ Please see OSPF Tips for the Cisco │
     │ message when configuring OSPF │     Cisco 1600 or                    │ 1600 and 800 │
     └───────────────────┘              Cisco 800?                         └─────────────────────────────┘
               │                               │
               │                              No                           ┌─────────────────────────────┐
               │                               └──────────────────────────▶│ Open TAC Case │
               │                                                           └─────────────────────────────┘
     ┌───────────────────┐
     │ OSPF routers not establishing FULL │                               (  OSPF Neighbor States  )
     │ neighbors (NOTE: neighbors will not │─────────────────────────────▶
     │ be formed over secondary networks) │
     └───────────────────┘
               │
     ┌───────────────────┐
     │ OSPF routes missing from routing │                                (  OSPF Route Check  )
     │        table       │──────────────────────────────────────────────▶
     └───────────────────┘
```
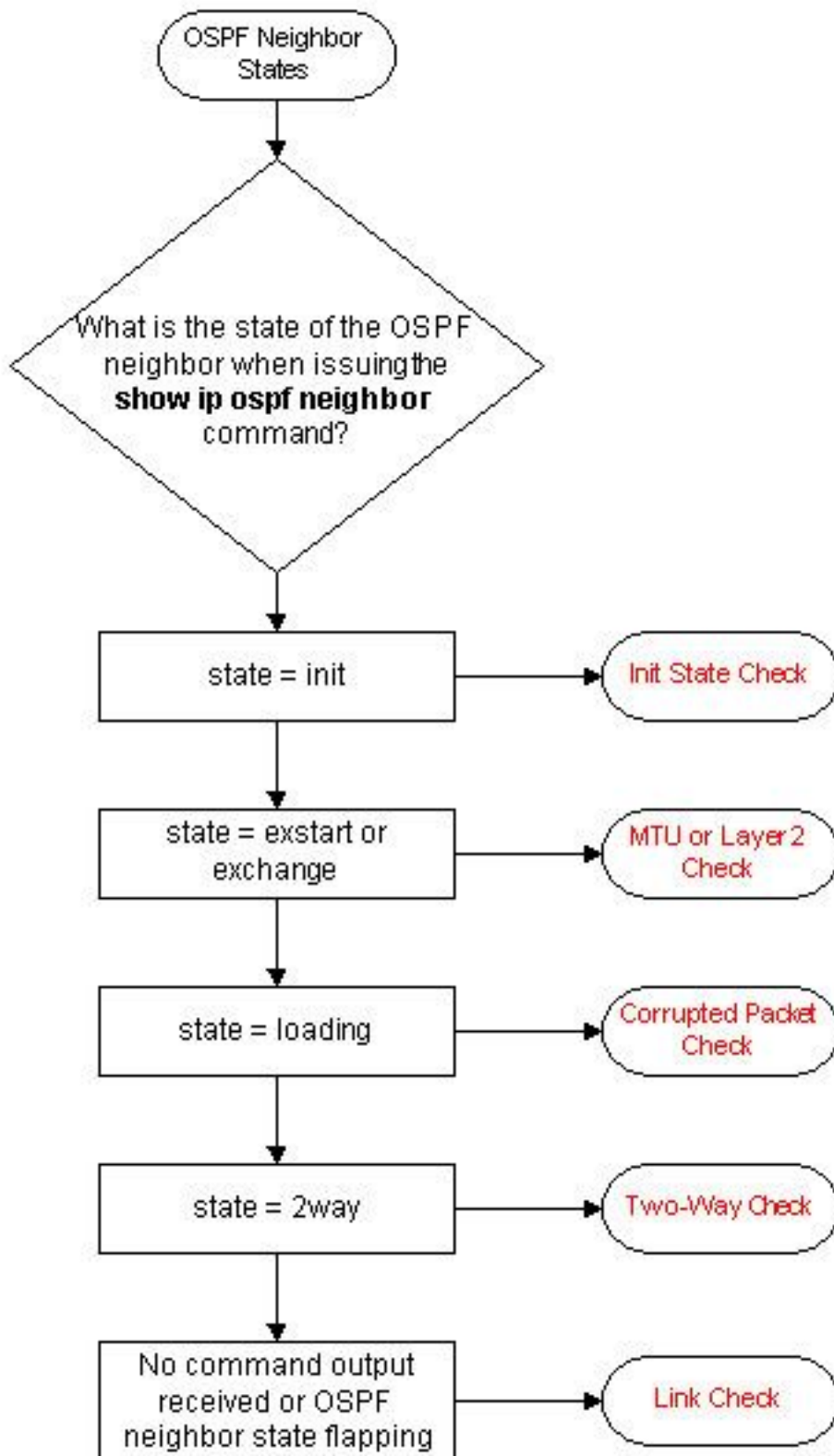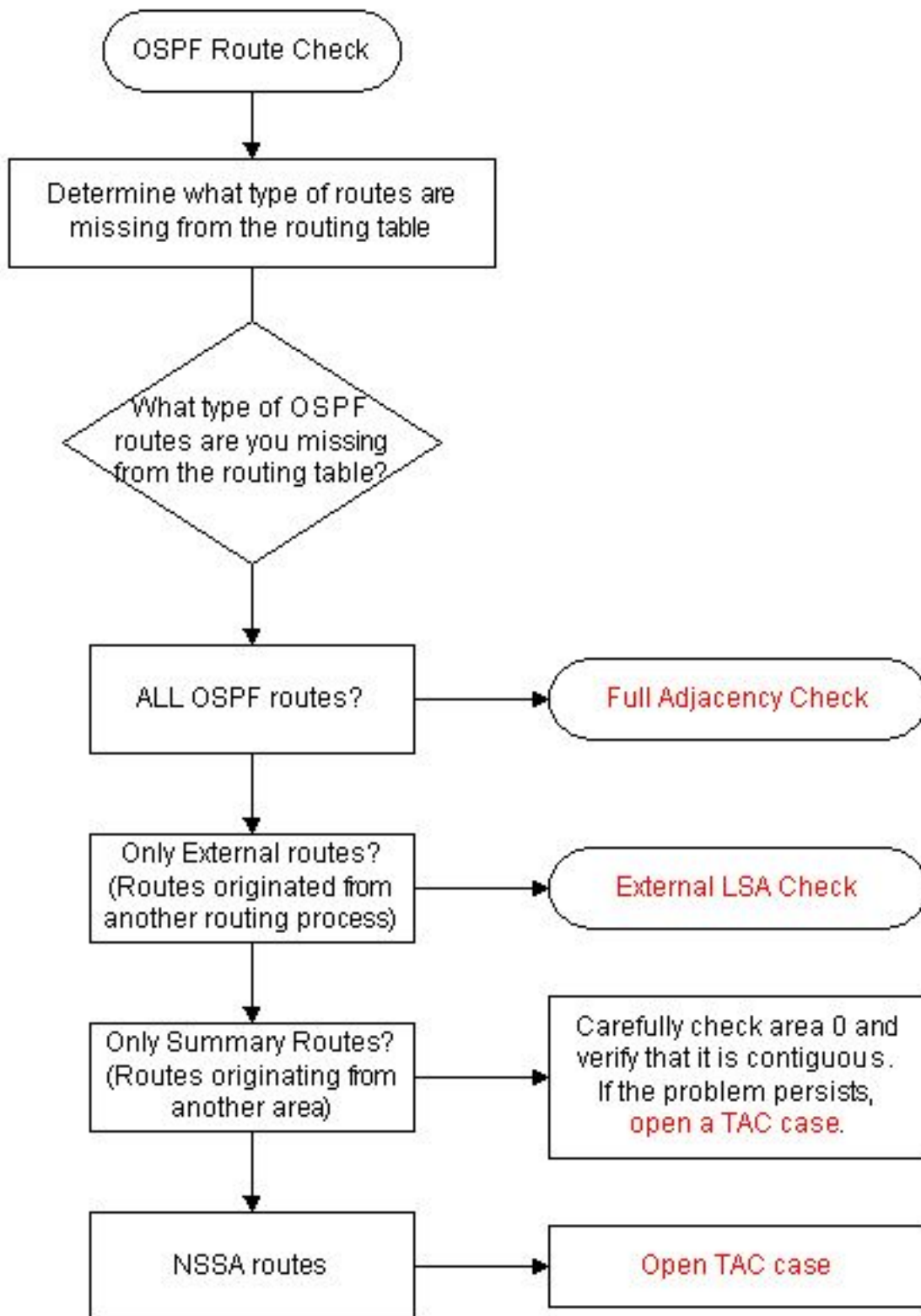
Troubleshoot OSPF Neighbor States

Refer to [OSPF Neighbor States](#) for neighbor state descriptions.

```
        ┌─────────────────┐
        │ OSPF Neighbor   │
        │    States       │
        └────────┬────────┘
                 │
                 ▼
          ╱─────────────╲
         ╱ What is the    ╲
        ╱ state of the OSPF ╲
        ╲ neighbor when      ╱
         ╲ issuing the       ╱
          ╲ show ip ospf    ╱
           ╲ neighbor      ╱
            ╲ command?   ╱
                 │
                 ▼
   ┌─────────────────┐      ┌──────────────────┐
   │  state = init   │─────▶│ Init State Check │
   └────────┬────────┘      └──────────────────┘
            │
            ▼
   ┌─────────────────┐      ┌──────────────────┐
   │ state = exstart │─────▶│ MTU or Layer 2   │
   │   or exchange   │      │     Check        │
   └────────┬────────┘      └──────────────────┘
            │
            ▼
   ┌─────────────────┐      ┌──────────────────┐
   │ state = loading │─────▶│ Corrupted Packet │
   │                 │      │      Check       │
   └────────┬────────┘      └──────────────────┘
            │
            ▼
   ┌─────────────────┐      ┌──────────────────┐
   │  state = 2way   │─────▶│  Two-Way Check   │
   └────────┬────────┘      └──────────────────┘
            │
            ▼
   ┌─────────────────┐      ┌──────────────────┐
   │ No command      │─────▶│   Link Check     │
   │ output received │      └──────────────────┘
   │ or OSPF neighbor│
   │ state flapping  │
   └─────────────────┘
```
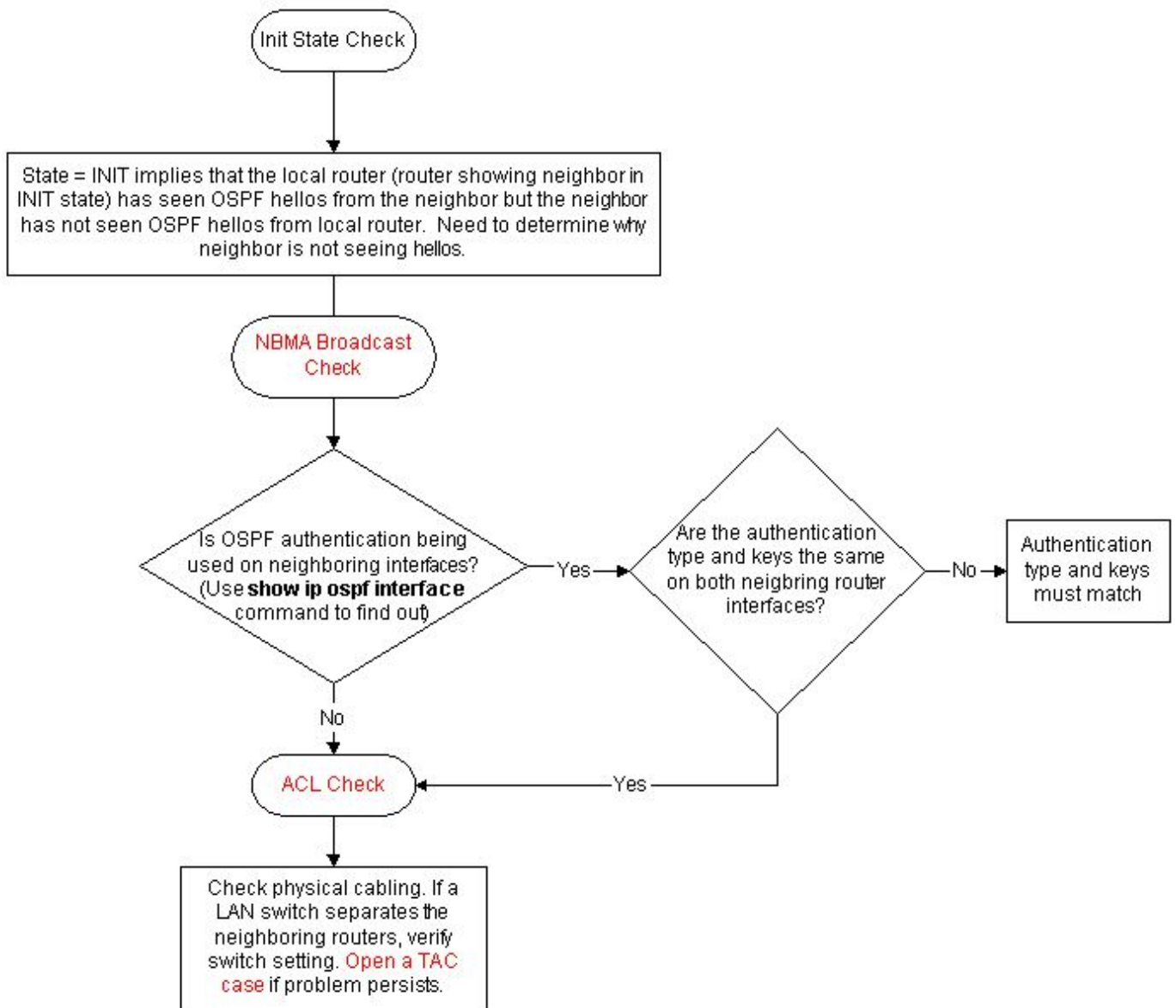
Troubleshoot the OSPF Routing Table

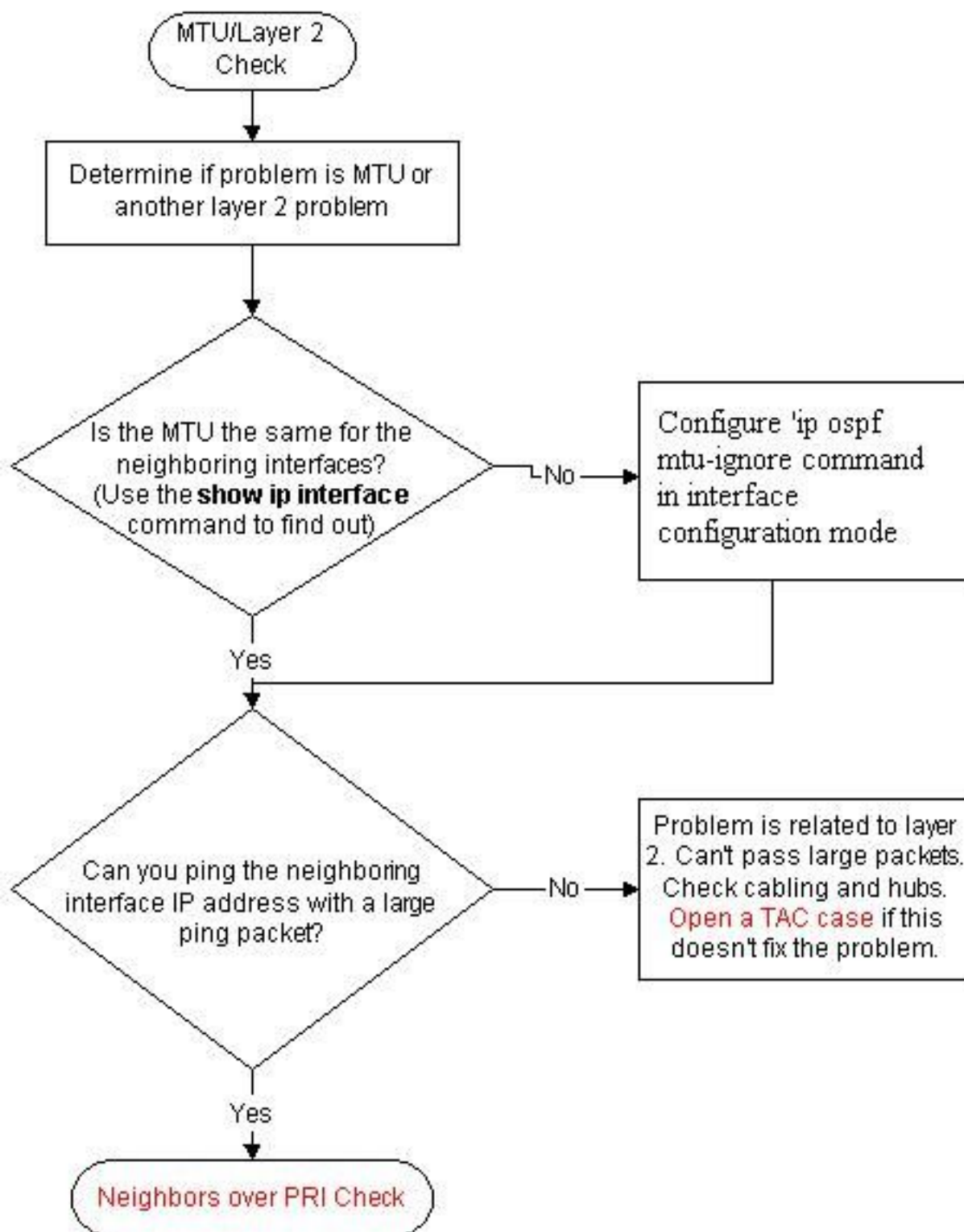# Troubleshoot OSPF Init State

Refer to [Troubleshoot OSPF Neighbor Problems](#) for more information on the OSPF Init State.
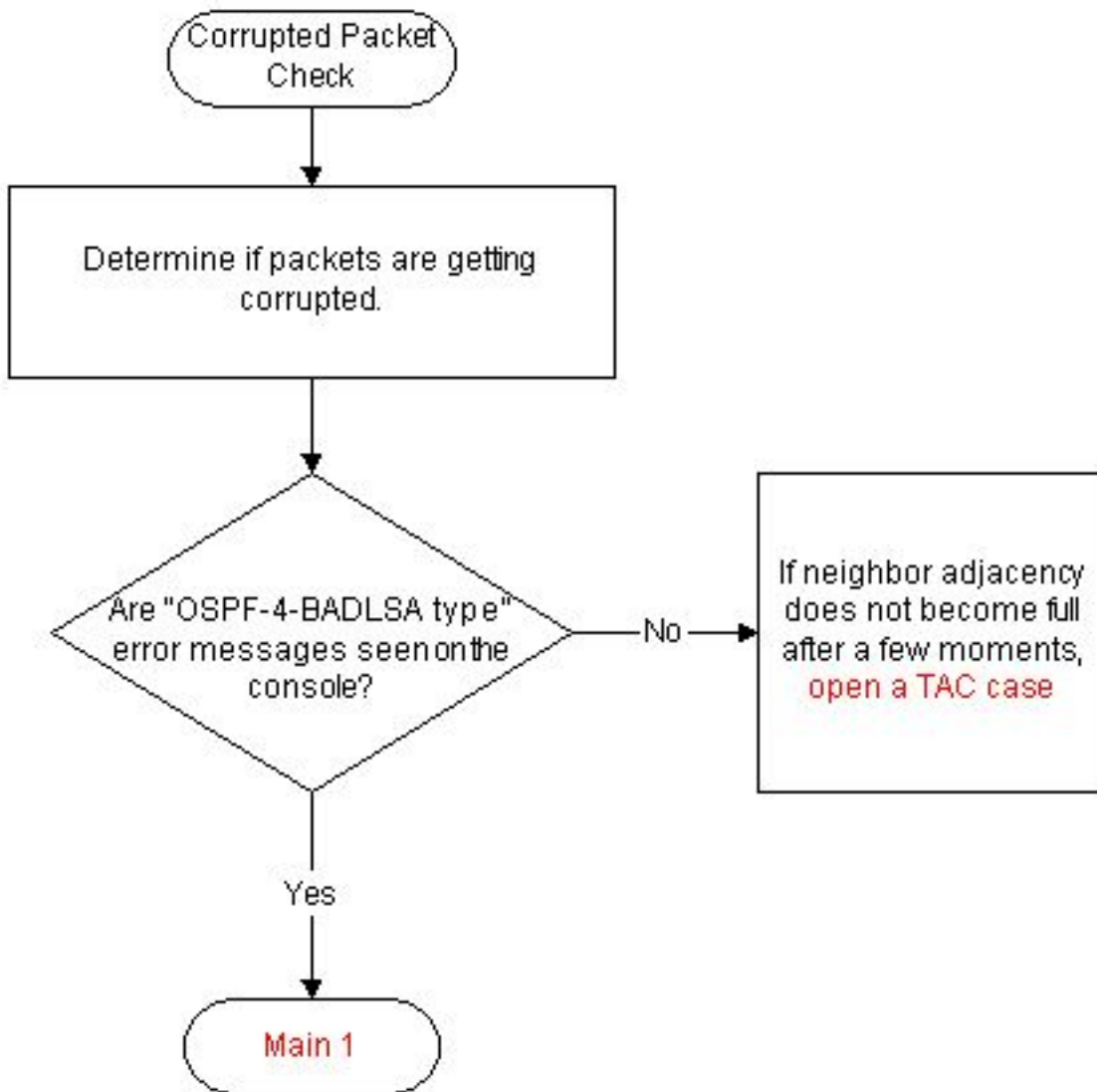
Init State Check

State = INIT implies that the local router (router showing neighbor in INIT state) has seen OSPF hellos from the neighbor but the neighbor has not seen OSPF hellos from local router. Need to determine why neighbor is not seeing hellos.

NBMA Broadcast Check

Is OSPF authentication being used on neighboring interfaces? (Use **show ip ospf interface** command to find out)

Yes →

Are the authentication type and keys the same on both neigbring router interfaces?

No → Authentication type and keys must match

No ↓

ACL Check

← Yes

Check physical cabling. If a LAN switch separates the neighboring routers, verify switch setting. Open a TAC case if problem persists.
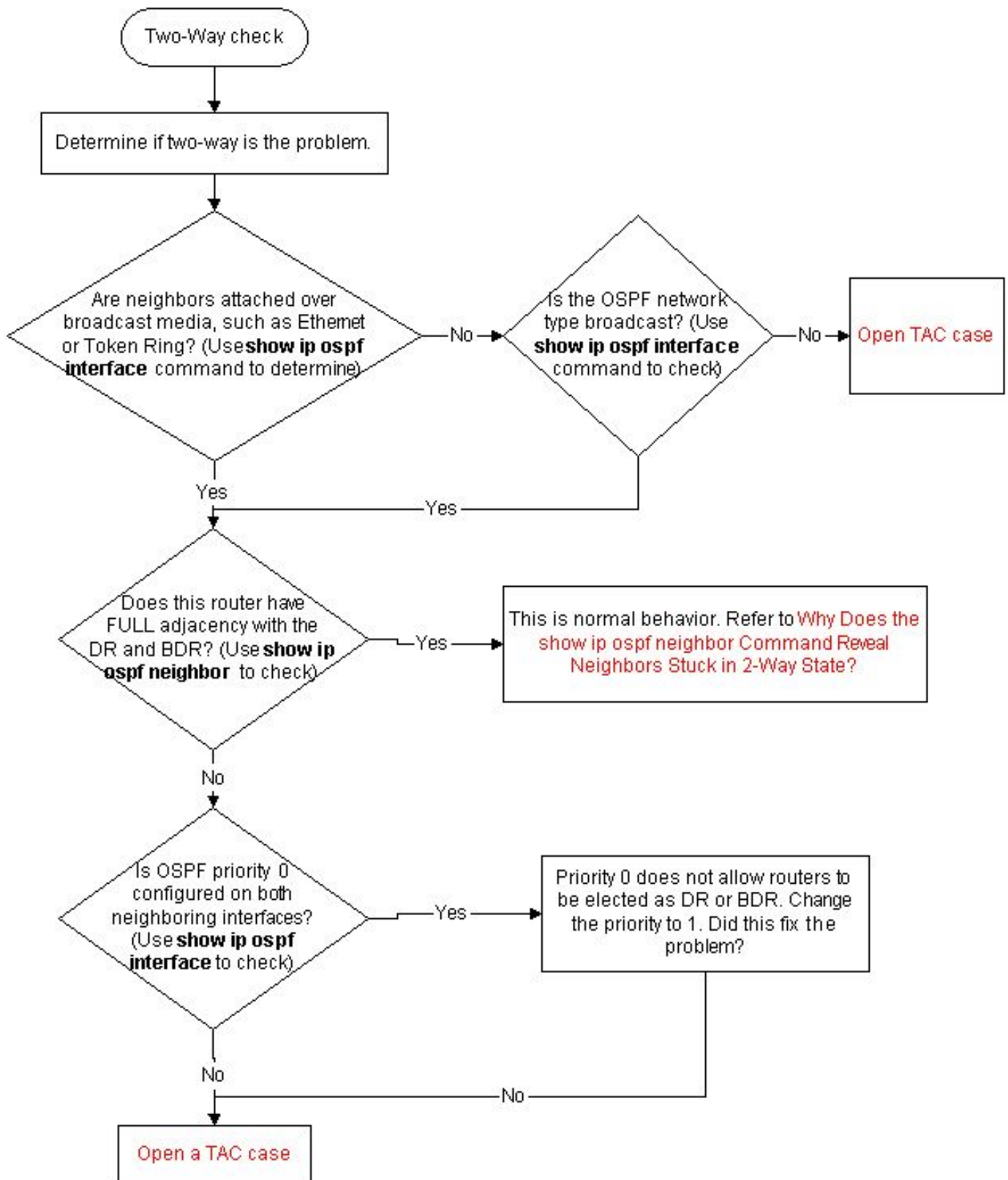
Troubleshoot OSPF MTU

Note: If the problem is related to Layer 2, check if a proxy ARP is enabled. If it is enabled, disable it, and use the **clear ip arp** command in order to clear the ARP cache.
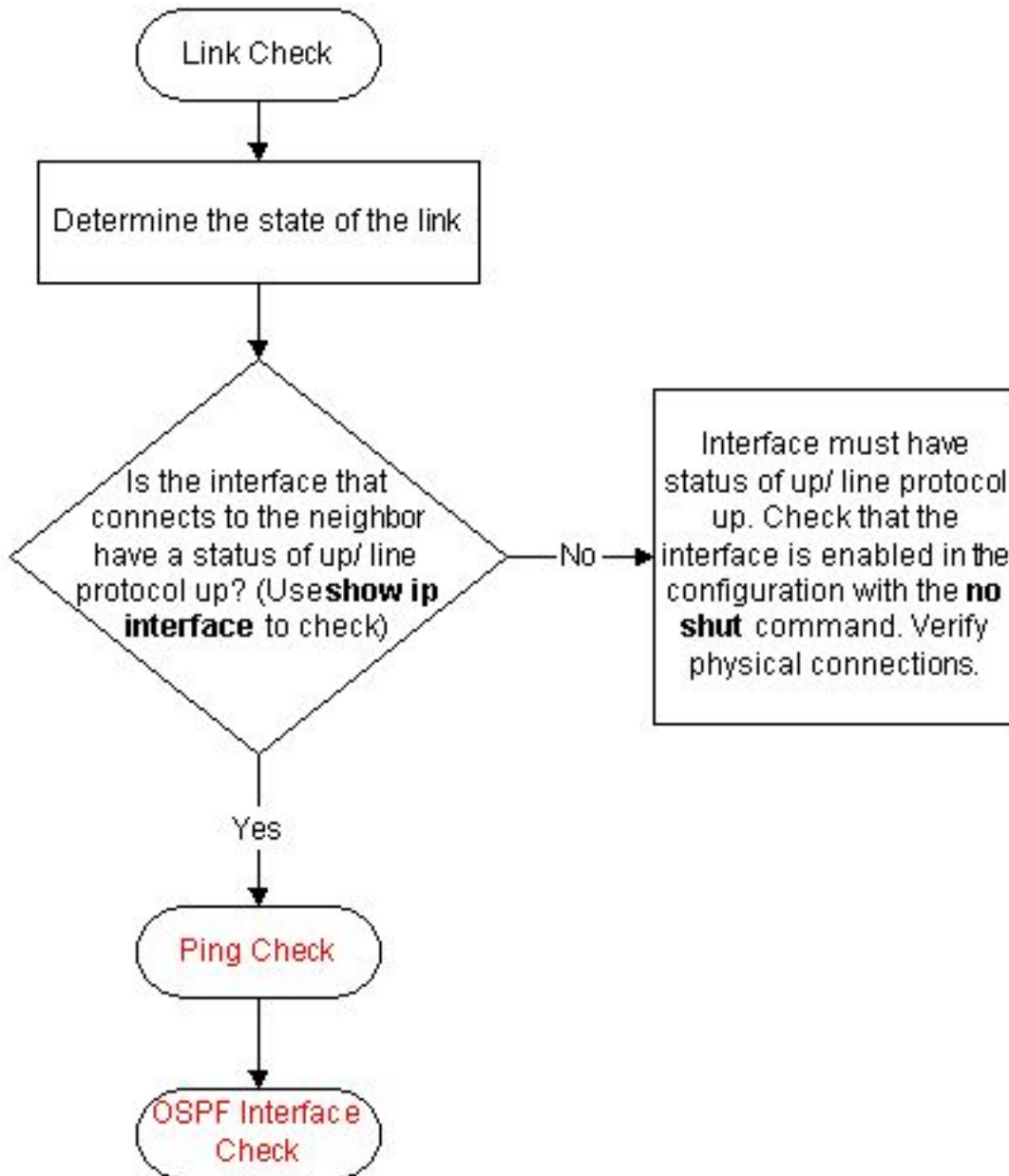
Troubleshoot OSPF Corrupt Packets

Troubleshoot OSPF Two-Way State

```
Two-Way check
    │
    ▼
Determine if two-way is the problem.
    │
    ▼
Are neighbors attached over          Is the OSPF network
broadcast media, such as Ethernet    type broadcast? (Use        Open TAC case
or Token Ring? (Use show ip ospf ───No──►  show ip ospf interface ───No──►
interface command to determine)      command to check)
    │                                    │
   Yes ◄──────────────────Yes───────────┘
    │
    ▼
Does this router have                This is normal behavior. Refer to Why Does the
FULL adjacency with the              show ip ospf neighbor Command Reveal
DR and BDR? (Use show ip ───Yes──►   Neighbors Stuck in 2-Way State?
ospf neighbor to check)
    │
   No
    │
    ▼
Is OSPF priority 0                   Priority 0 does not allow routers to
configured on both                   be elected as DR or BDR. Change
neighboring interfaces? ───Yes──►    the priority to 1. Did this fix the
(Use show ip ospf                    problem?
interface to check)
    │                                    │
   No ◄─────────────────No───────────────┘
    │
    ▼
Open a TAC case
```
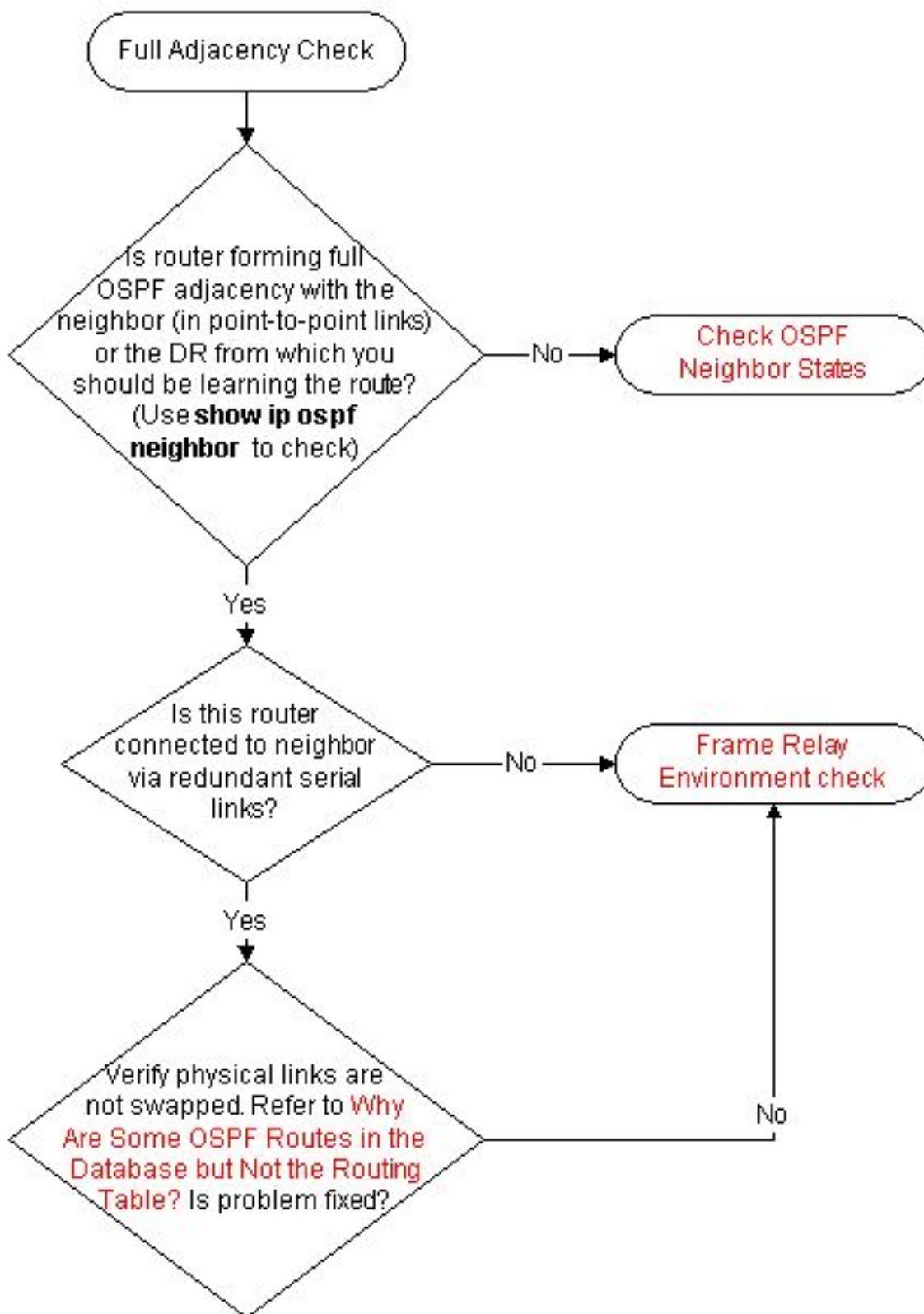
Troubleshoot OSPF Links

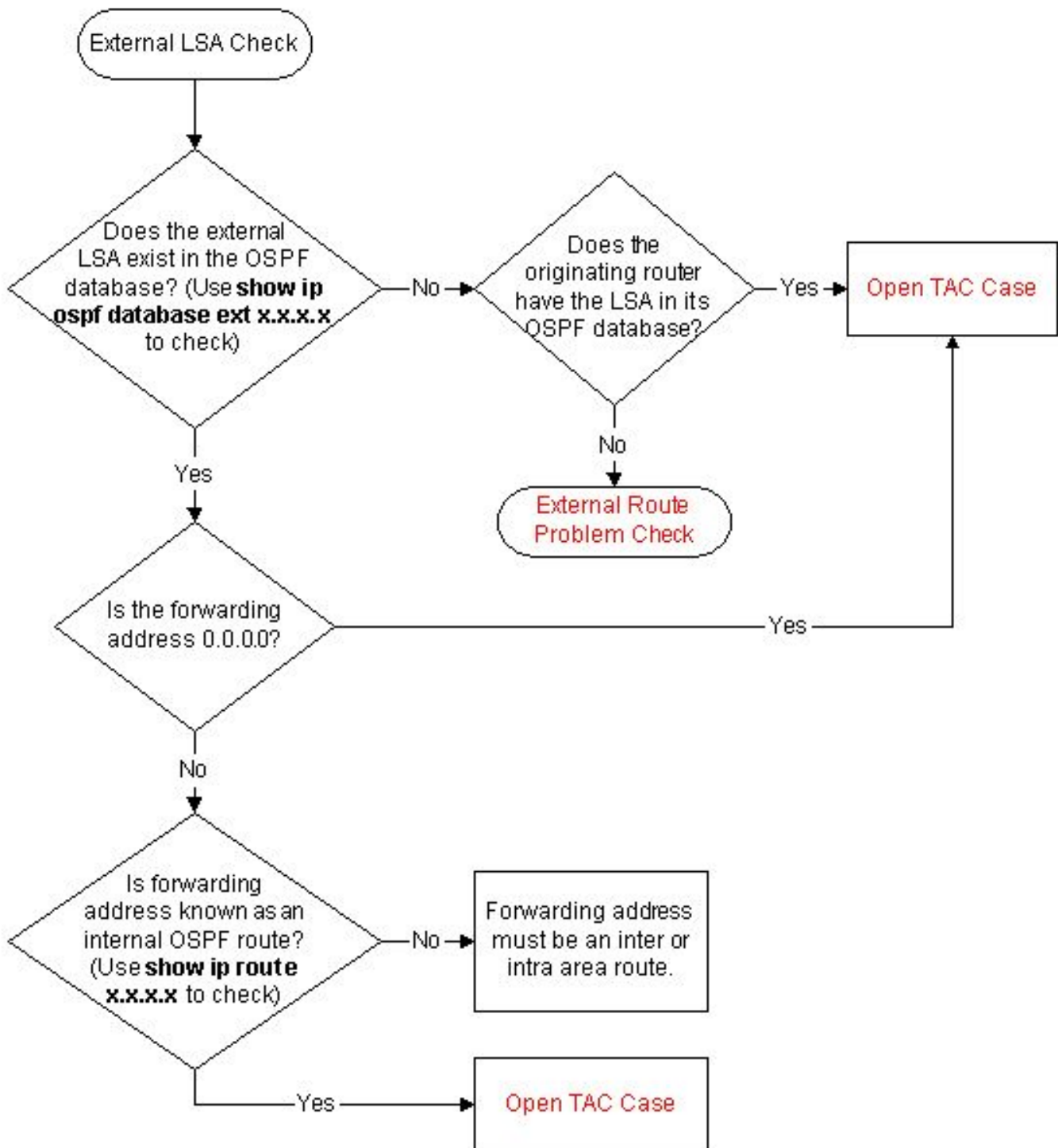You can use an Embedded Event Manager (EEM) script to troubleshoot the links flapping.

For more information, refer to this Cisco Support Community document that describes how to use an EEM script in order to collect information from a router when there is an OSPF flap: Troubleshoot OSPF Flaps with EEM Script.
.

Troubleshoot Full Adjacency

```
                    ┌─────────────────────┐
                    │ Full Adjacency Check│
                    └─────────────────────┘
                               │
                               ▼
                          ╱────────────╲
                         ╱ Is router     ╲
                        ╱ forming full     ╲
                       ╱ OSPF adjacency     ╲
                      ╱ with the neighbor    ╲        ┌─────────────────┐
                      ╲ (in point-to-point   ╱──No──▶ │  Check OSPF     │
                       ╲ links) or the DR    ╱        │ Neighbor States │
                        ╲ from which you    ╱         └─────────────────┘
                         ╲ should be       ╱
                          ╲ learning the  ╱
                           ╲ route?      ╱
                            ╲(Use show  ╱
                             ╲ip ospf  ╱
                              ╲neighbor╱
                               ╲to    ╱
                                ╲chk)╱
                                  │
                                 Yes
                                  │
                                  ▼
                             ╱─────────╲
                            ╱ Is this    ╲
                           ╱ router        ╲          ┌──────────────────┐
                          ╱ connected to     ╲─No──▶  │  Frame Relay     │
                          ╲ neighbor via     ╱        │ Environment check│
                           ╲ redundant      ╱         └──────────────────┘
                            ╲ serial links?╱                   ▲
                             ╲───────────╱                     │
                                  │                            │
                                 Yes                           │
                                  │                            │
                                  ▼                            │
                             ╱─────────╲                       │
                            ╱ Verify     ╲                     │
                           ╱ physical      ╲                   │
                          ╱ links are not    ╲                 │
                         ╱ swapped. Refer to  ╲                │
                         ╲ Why Are Some OSPF  ╱──No────────────┘
                          ╲ Routes in the    ╱
                           ╲ Database but    ╱
                            ╲ Not the       ╱
                             ╲ Routing     ╱
                              ╲ Table? Is ╱
                               ╲ problem ╱
                                ╲fixed? ╱
                                 ╲────╱
```
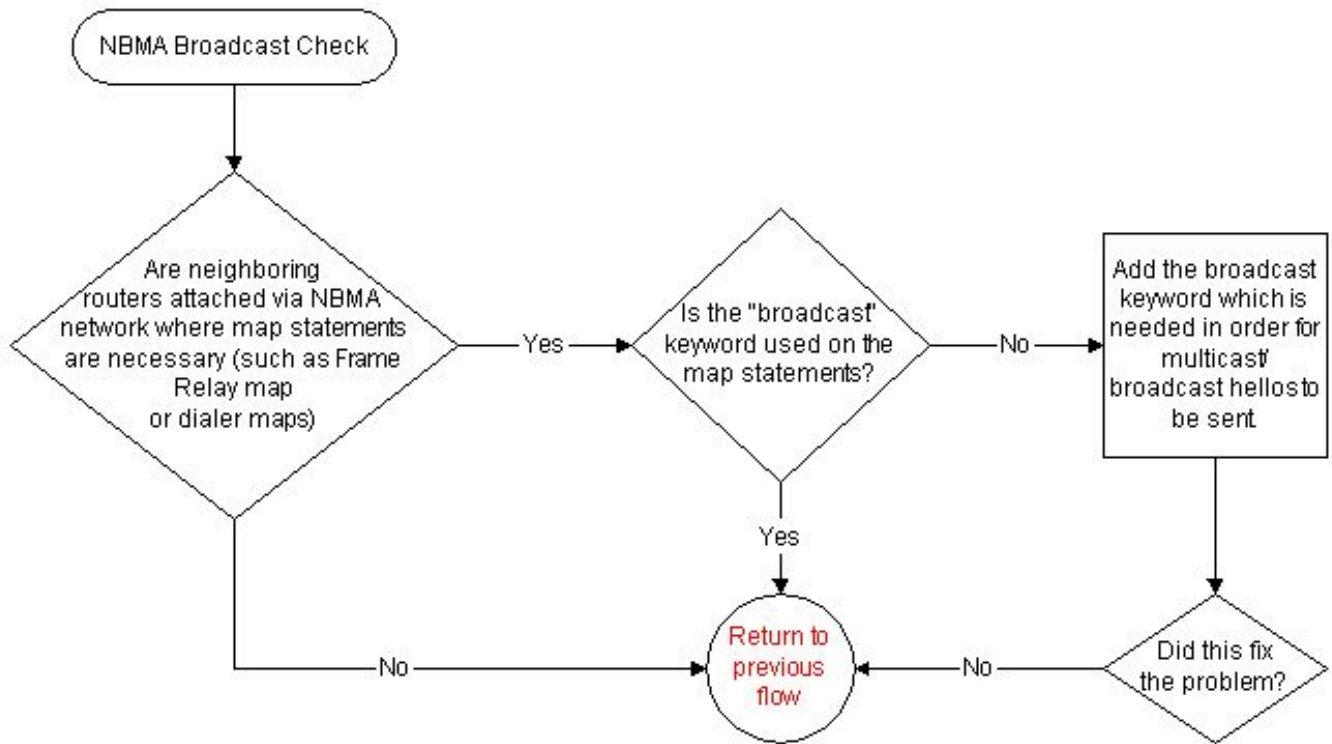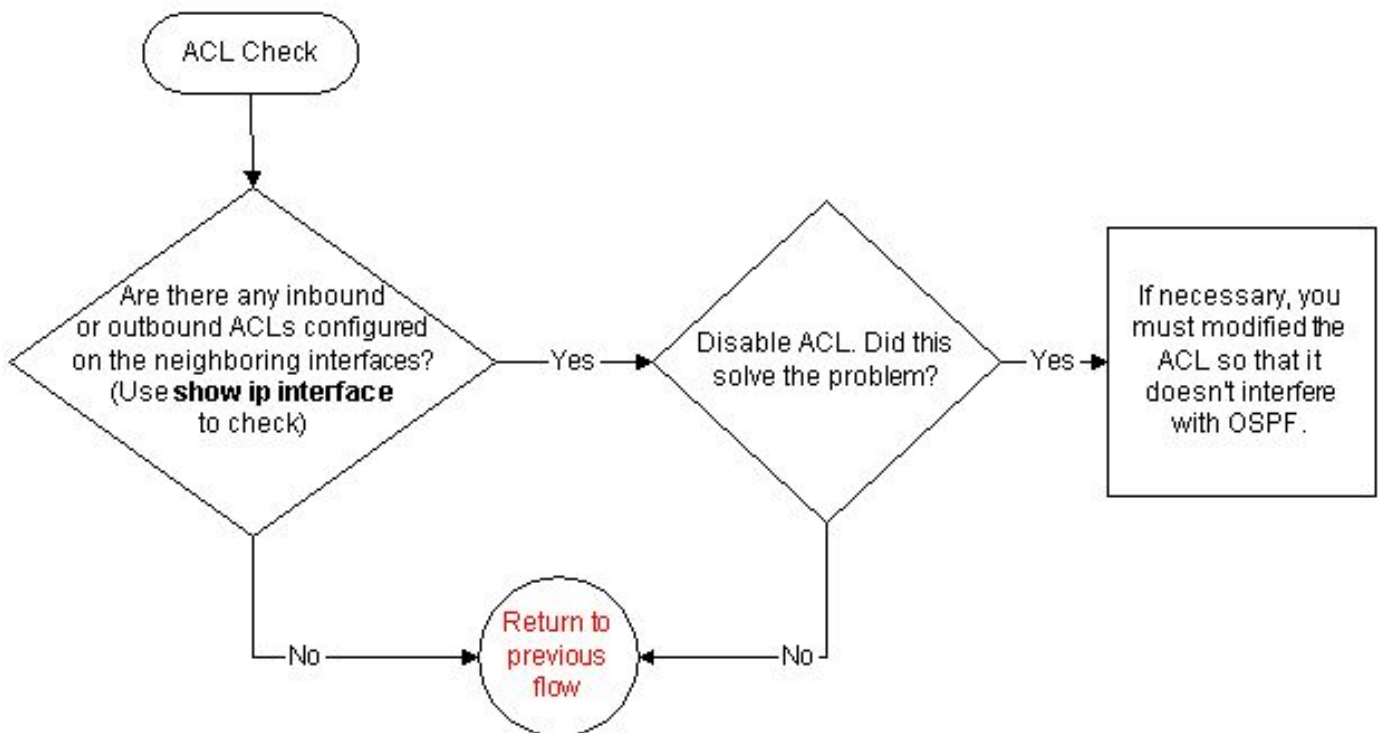
Troubleshoot External Link-State Advertisements

Troubleshoot OSPF NBMA Networks

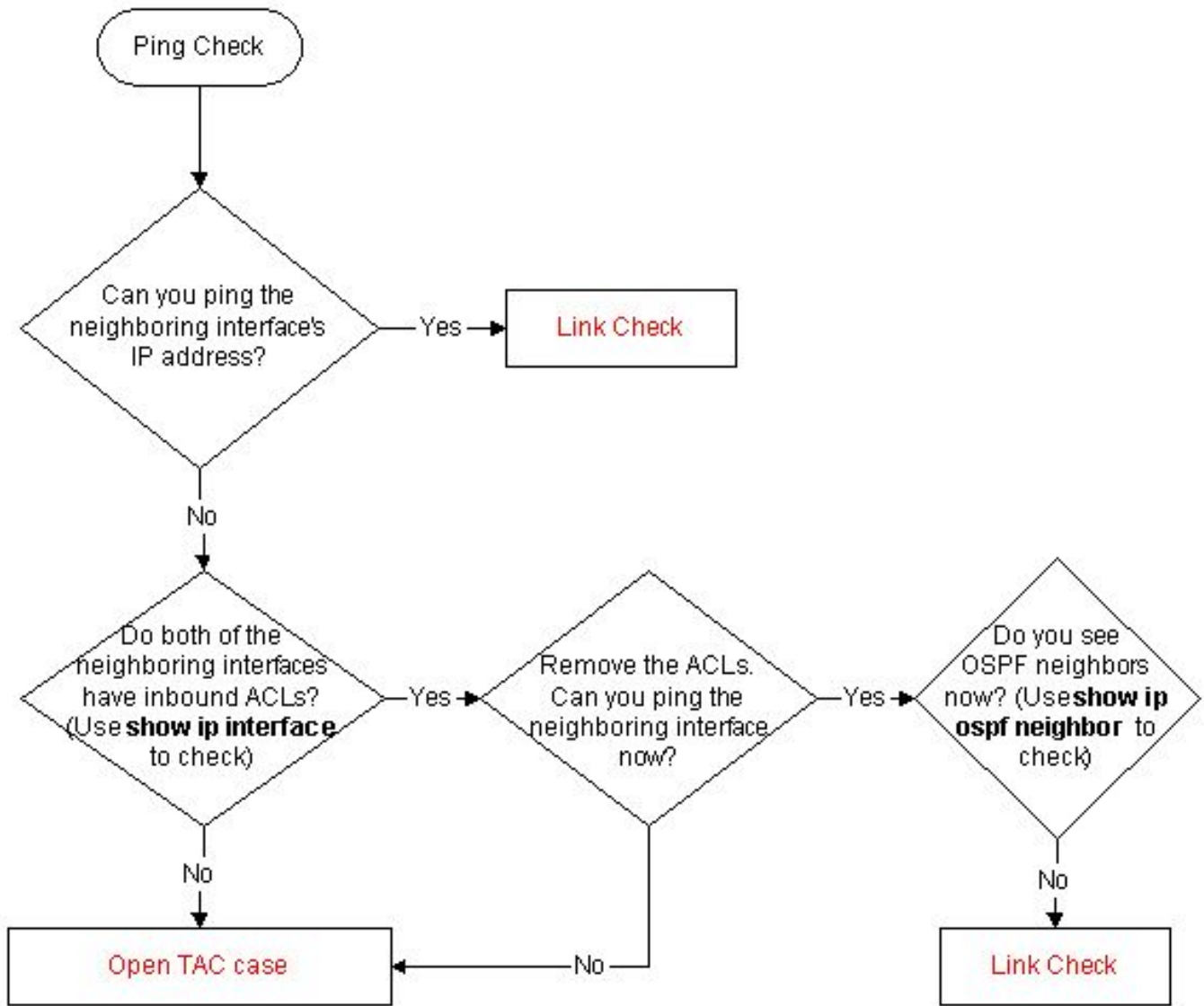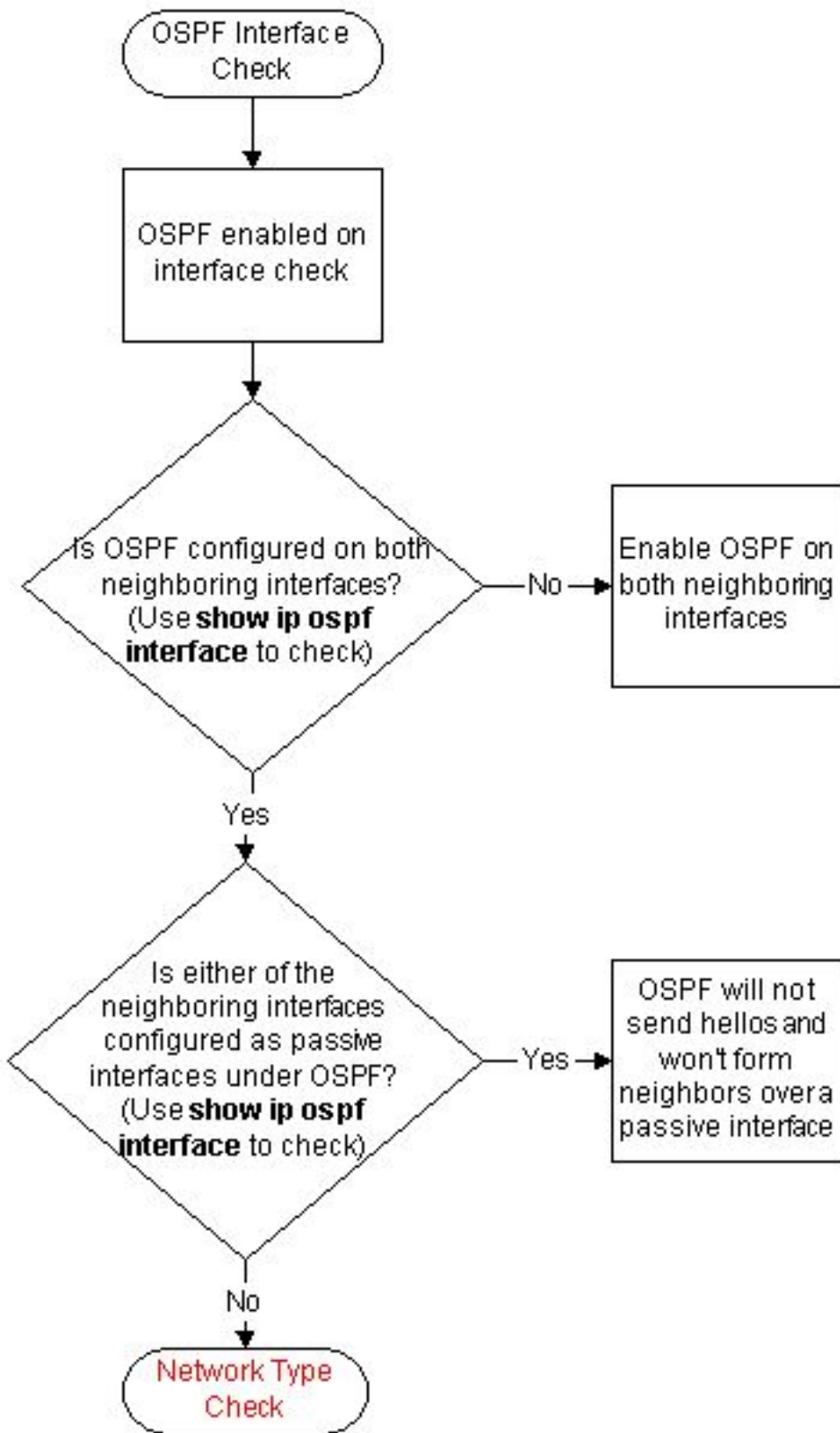Refer to Troubleshoot Open Shortest Path First Route Database Issues for more information on this topic.

NBMA Broadcast Check

NBMA Broadcast Check

Are neighboring routers attached via NBMA network where map statements are necessary (such as Frame Relay map or dialer maps)
— Yes → Is the "broadcast" keyword used on the map statements?
— No → Add the broadcast keyword which is needed in order for multicast/ broadcast hellos to be sent.

Are neighboring routers... — No → Return to previous flow

Is the "broadcast" keyword used on the map statements? — Yes → Return to previous flow

Add the broadcast keyword... → Did this fix the problem? — No → Return to previous flow

Troubleshoot Access Lists

ACL Check

Are there any inbound or outbound ACLs configured on the neighboring interfaces? (Use **show ip interface** to check)
— Yes → Disable ACL. Did this solve the problem?
— No → Return to previous flow

Disable ACL. Did this solve the problem?
— Yes → If necessary, you must modified the ACL so that it doesn't interfere with OSPF.
— No → Return to previous flow

Troubleshoot Neighbors over PRI

```
        ┌─────────────────┐
        │  Neighbors over │
        │   PRI Check     │
        └─────────────────┘
                 │
                 ▼
┌─────────────────────────────────────┐
│ Need to determine if router is      │
│ connected with multiple neighbors   │
│ over the PRI interface.             │
└─────────────────────────────────────┘
                 │
                 ▼
        ╱─────────────────╲
       ╱  Are neighbors    ╲ ──No──▶ ┌──────────────────┐
       ╲  connected via     ╱         │ Open a TAC case  │
        ╲ PRI/BRI link?    ╱          └──────────────────┘
         ╲────────────────╱
                 │
                Yes
                 │
                 ▼
        ╱─────────────────────╲
       ╱ Is OSPF network type  ╲ ──No──▶ ┌───────────────────────┐     ╱──────────╲
       ╱  point to multipoint?  ╲        │ Configure all         │    ╱ Did this  ╲ ──Yes──▶ ┌─────────┐
       ╲ (Use show ip ospf      ╱        │ neighboring links as  │──▶ ╲ fix the    ╱          │ Hooray  │
        ╲ interface command     ╱        │ OSPF point to         │     ╲ problem? ╱           └─────────┘
         ╲ to check)           ╱         │ multipoint. Refer to  │      ╲────────╱
          ╲───────────────────╱          │ Configuring OSPF for  │          │
                 │                        │ more detailed         │          No
                Yes                       │ information.          │          │
                 │                        └───────────────────────┘          │
                 │                                                            │
                 │◀───────────────────No──────────────────────────────────────┘
                 ▼
        ┌─────────────┐
        │  ACL Check  │ ──No──▶ ┌───────────────┐
        └─────────────┘         │ Open TAC case │
                                └───────────────┘
```
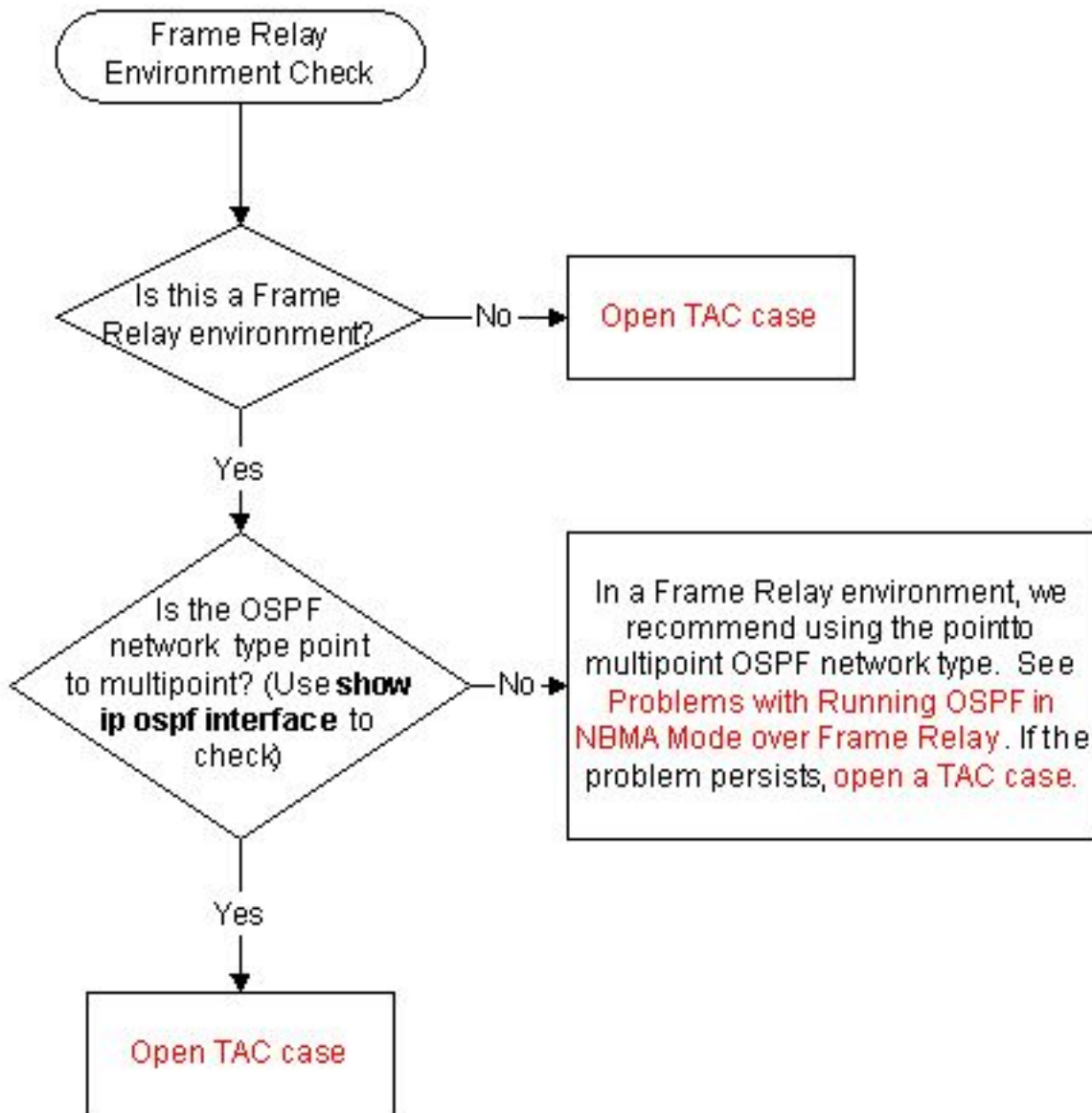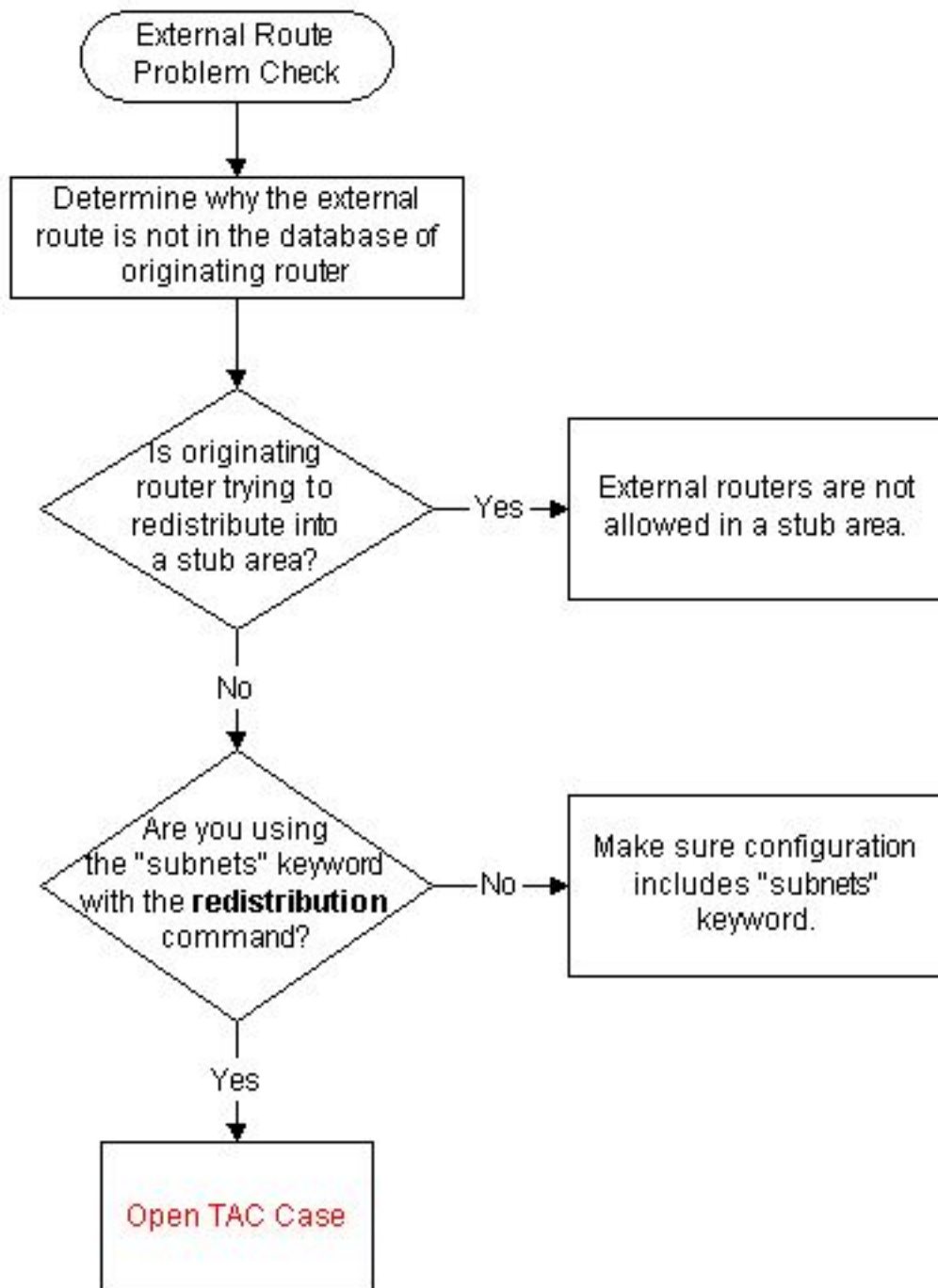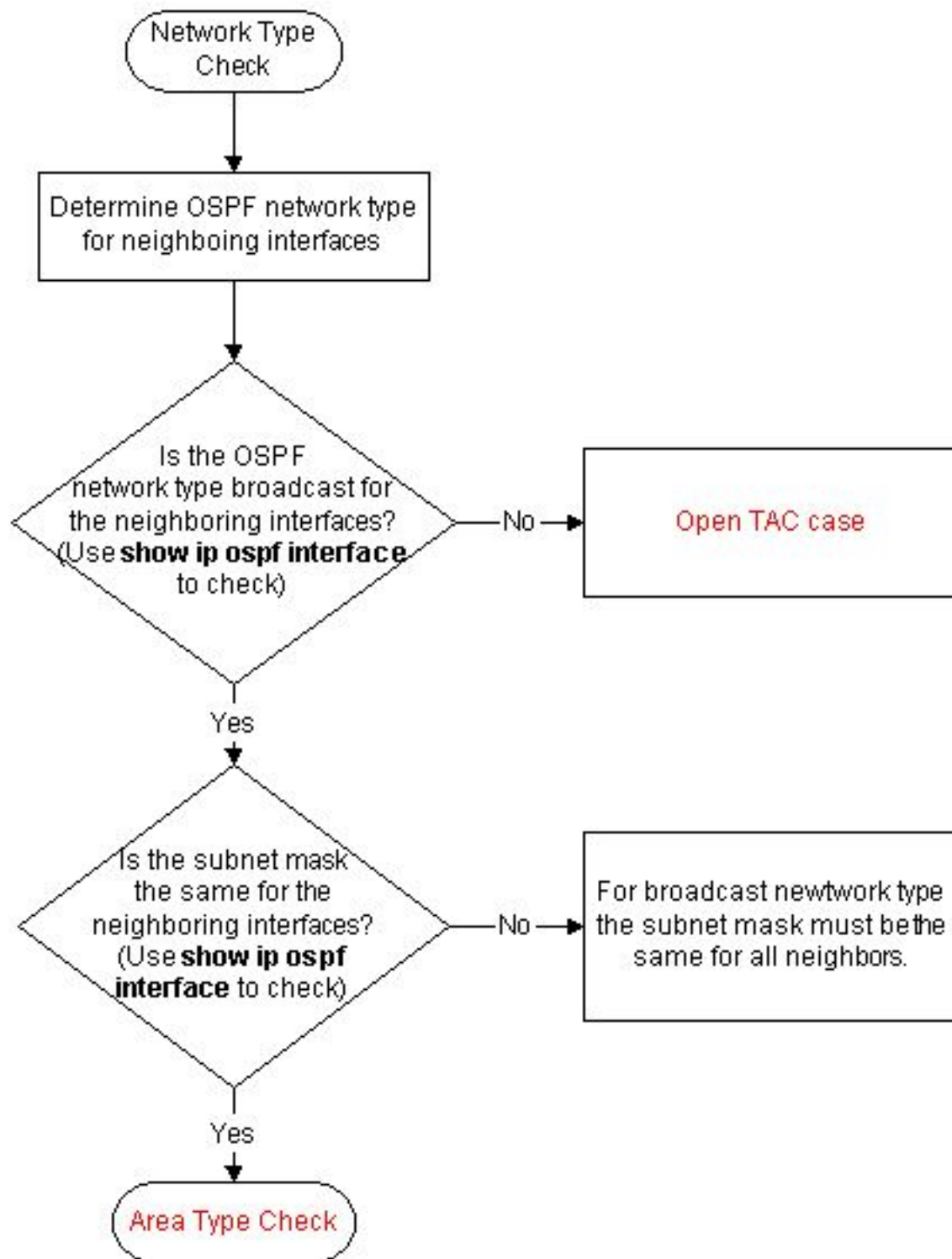
Troubleshoot Ping

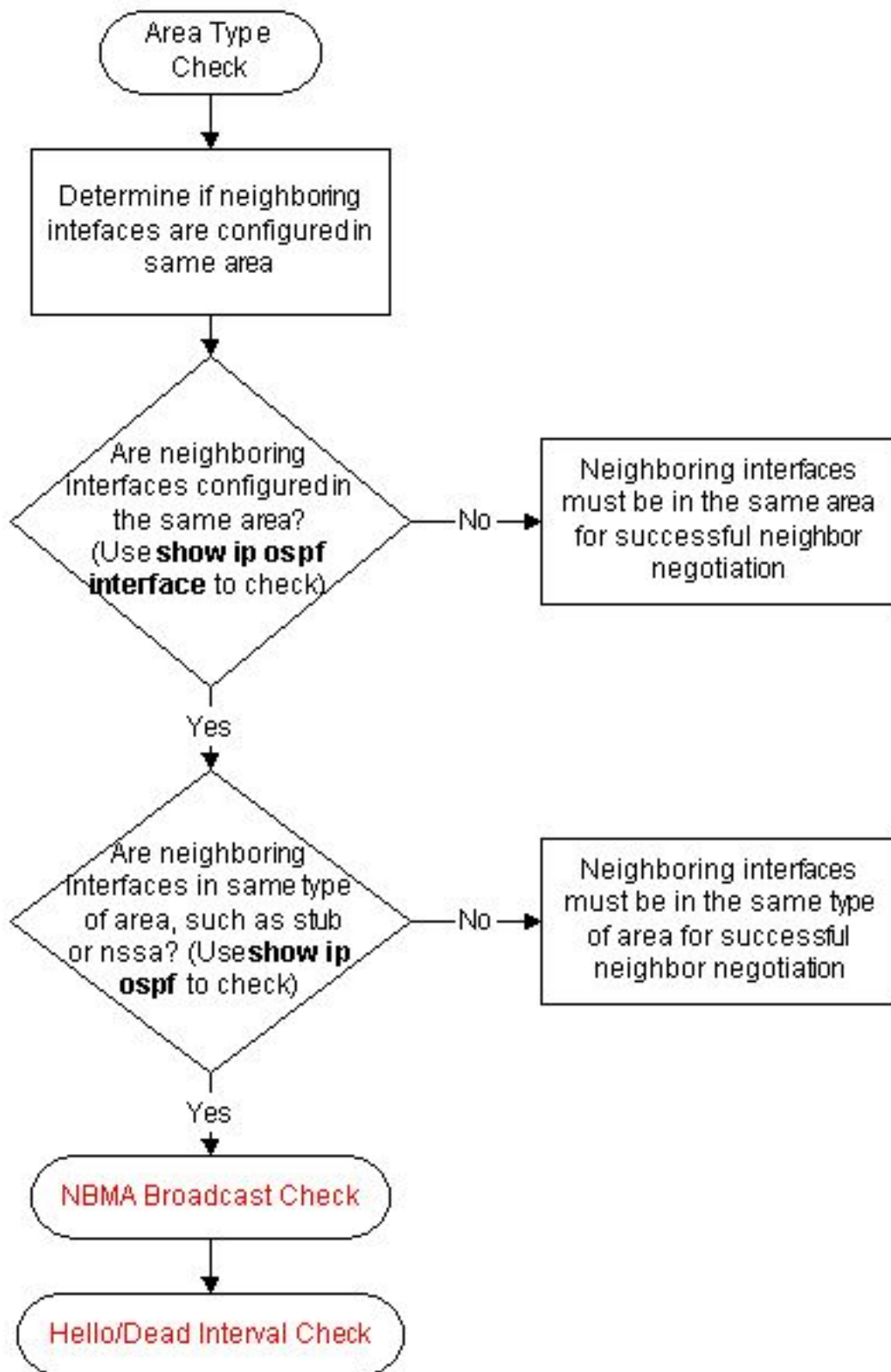# Troubleshoot the OSPF Interface

Troubleshoot Frame Relay Environment

Troubleshoot External Route Problems

Troubleshoot Network Type

Troubleshoot OSPF Area Type

```
                    ┌─────────────┐
                    │  Area Type  │
                    │    Check    │
                    └──────┬──────┘
                           │
                           ▼
              ┌────────────────────────┐
              │ Determine if neighboring│
              │ intefaces are configured in│
              │       same area        │
              └────────────┬───────────┘
                           │
                           ▼
                      ╱─────────╲
                    ╱  Are neighboring ╲
                  ╱  interfaces configured in╲        ┌──────────────────────┐
                 ⟨    the same area?    ⟩── No ──────▶│ Neighboring interfaces│
                  ╲  (Use show ip ospf ╱              │ must be in the same area│
                    ╲ interface to check)╱            │ for successful neighbor│
                      ╲─────────╱                     │     negotiation       │
                           │                          └──────────────────────┘
                          Yes
                           │
                           ▼
                      ╱─────────╲
                    ╱  Are neighboring ╲
                  ╱  Interfaces in same type ╲        ┌──────────────────────┐
                 ⟨  of area, such as stub    ⟩── No ─▶│ Neighboring interfaces│
                  ╲  or nssa? (Use show ip   ╱        │ must be in the same type│
                    ╲  ospf to check)      ╱          │ of area for successful │
                      ╲─────────╱                     │  neighbor negotiation  │
                           │                          └──────────────────────┘
                          Yes
                           │
                           ▼
                 ┌──────────────────────┐
                 │  NBMA Broadcast Check │
                 └──────────┬───────────┘
                            │
                            ▼
                 ┌──────────────────────┐
                 │ Hello/Dead Interval Check│
                 └──────────────────────┘
```

Troubleshoot the Hello/Dead Interval Mismatch

The debug output from the **debug ip ospf hello** command shows the mismatch in hello parameters. Here is an example of the debug output:

```
*Oct 12 14:03:32.595: OSPF: Send hello to 10.224.0.5 area 0 on FastEthernet1/0
 from 192.168.12.2 *Oct 12 14:03:33.227: OSPF: Rcv hello from 10.1.1.1 area 0 from
FastEthernet1/0
 192.168.12.1 *Oct 12 14:03:33.227: OSPF: Mismatched hello parameters from 192.168.12.1

!--- Indicates that there is mismtached hello parameters from 192.168.12.1 *Oct 12 14:03:33.231:
OSPF: Dead R 2 C 3, Hello R 1 C 1 Mask R
 255.255.255.0 C 255.255.255.0 *Oct 12 14:03:33.531: OSPF: Send hello to 10.224.0.5 area 0 on
 FastEthernet1/0 from 192.168.12.2
```

Related Information

- **OSPF Support**
- **Technical Support & Documentation - Cisco Systems**