Duplex Mismatch Problem

OSI Layer Layer 1-Layer 2

Problem Desctription:

Duplex mismatch is a communication problem that occurs when two interconnected devices in a network (for example, a computer and a switch port) operate in different transmission modes. It usually occurs when one device is configured in full-duplex mode (capable of sending and receiving data simultaneously) and the other in half-duplex mode (capable of communicating in only one direction at a time).

This incompatibility can result in collisions, frame errors (FCS/CRC errors), packet losses and serious degradation in network performance. It manifests itself with symptoms such as slowdown in TCP-based applications, audio and video interruptions in real-time applications such as VoIP/video.

As specified in clause 28 of the IEEE 802.3 standard, if one port is using autonegotiation and the other port is manually fixed, the port that is auto-negotiating sets itself to half-duplex. If the other port is fixed as full-duplex, this leads to a duplex mismatch. Symptoms of this mismatch include late collisions on the half-duplex side and CRC errors and clipped frames on the full-duplex side. In addition, bandwidth performance is severely degraded during continuous data transfer; in many cases, the connection speed can be reduced by up to 1%.

Diagnosis - How is Duplex Mismatch Detected?

1. High Latency and Variable Ping Times:

Ping tests have inconsistent response times in milliseconds (for example: 1ms → 35ms → 2ms). "Request Timed Out" error may be received in some pings.

2. CRC (Cyclic Redundancy Check) and Input Error Faults:

When the switch interfaces are checked with the show interface command, input errors, CRC errors, late collisions values increase.

Collision counter is observed especially on half-duplex ports.

3. Disconnections and File Transfer Problems:

The connection is interrupted or the transfer is interrupted during FTP or file copy operations. Stuttering in video/image streaming, audio loss.

4. One-way Flow in Network Traffic (Asymmetric Traffic):

Packets may be travelling smoothly in one direction only, while heavy losses may occur in the other direction.

Especially in TCP continuous retransmission is observed.

5. Manual Configuration and Auto-Negotiation Conflict:

With the show running-config or show interfaces status commands, it is seen that the duplex setting of one of the devices is set manually and the other is set automatically.

6. Abnormal Behaviour of Switch LEDs:

Physically, the LEDs on the relevant port on the switch blink continuously or remain yellow instead of being on steady.

Admin Guide - Solution and Precautions for Duplex Mismatch Problem

1. Manually match the duplex settings at both ends.

Auto-negotiation may give incorrect results. Therefore, duplex and speed settings must be set manually in the same way on both devices.

Sample Switch Setting:

Switch(config)# interface fa0/1

Switch(config-if)# duplex full

Switch(config-if)# speed 100

2. check port statistics with the show interfaces command

Anomalies such as CRC, late collision, input error should be detected with the following commands:

Switch# show interfaces fa0/1

If input errors or collisions are high, there is probably a duplex mismatch.

3. Keep auto-negotiation features on or off at both ends

If one is manual and one is automatic, a mismatch may occur. Either make both manual or leave both as auto-negotiation.

4. Restart the problem ports (shut-no shut)

After making the settings, reboot the port up and down:

Switch(config-if)# shutdown

Switch(config-if)# no shutdown

5. Check for device updates

In some older switch or NIC firmware, auto-negotiation may work incorrectly. An update may be required.

6. Analyse packet delays with network monitoring tools

Symptoms of duplex mismatch (retransmission, latency spikes) should be monitored using network monitoring tools such as Wireshark, PRTG or NetFlow.

7. Cable tests and physical layer inspection should be performed

Poor cabling, terminals or corroded ports can also increase such problems. Physical checks should be done.

Simulation

In this simulation, a scenario is modelled in which communication is established between a port fixed in full-duplex mode at one end (Switch0) and a port operating in half-duplex mode at the other end (PC0). This situation is called duplex mismatch, as clearly defined in the IEEE 802.3 standard, and seriously affects network performance at layer 1 and layer 2 (physical and data link) levels.

FastEthernet0/1 port on the switch is manually switched to full-duplex mode:

On the PC side, the interface settings are manually configured as "half duplex". As seen in the simulation mode, data packets do not reach the destination or the connection is unstable. This is a direct result of duplex mismatch.

PC0

Physical   Config   Desktop   Programming   Attributes

FastEthernet0

GLOBAL

Settings

Algorithm Settings

INTERFACE

FastEthernet0

Bluetooth

Port Status   ☑ On

Bandwidth   ● 100 Mbps ○ 10 Mbps ☐ Auto

Duplex   ● Half Duplex ○ Full Duplex ☐ Auto

MAC Address   0060.4714.16D8

IP Configuration
○ DHCP
● Static
IPv4 Address
Subnet Mask

IPv6 Configuration
○ Automatic
● Static
IPv6 Address   /
Link Local Address: FE80::260:47FF:FE14:16D8

☐ Top

Simulation Panel (top)

Event List

Vis.	Time(sec)	Last Device

Duplex Mismatch

Ful Duplex

2960-24TT
Switch0

PC-PT
PC0

Half Duplex

Reset Simulation — ☑ Constant Delay — Captured to (no captures)

Play Controls

|◀ ‖ ▶|

Event List Filters - Visible Events
ACL Filter, ARP, BGP, Bluetooth, CAPWAP, CDP, DHCP, DHCPv6, DNS, DTP, EAPOL, EIGRP, EIGRPv6, FTP, H.323, HSRP, HSRPv6, HTTP, HTTPS, ICMP, ICMPv6, IPSec, ISAKMP, IoT, IoT TCP, LACP, LLDP, Meraki, NDP, NETFLOW, NTP, OSPF, OSPFv6, PAgP, POP3, PPP, PPPoED, PTP, RADIUS, REP, RIP, RIPng, RTP, SCCP, SMTP, SNMP, SSH, STP, SYSLOG, TACACS, TCP, TFTP, Telnet, UDP, USB, VTP

Edit Filters — Show All/None

Time: 00:18:11.139 — PLAY CONTROLS: |◀ ‖ ▶| — Event List — Realtime — Simulation

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Logical — Physical — x: 602, y: 134 — Root — 17:54:00

Simulation Panel (bottom)

Event List

Vis.	Time(sec)	Last Device
	2.925	--
👁	8.929	--

Duplex Mismatch

Ful Duplex

2960-24TT
Switch0

PC-PT
PC0

Half Duplex

Reset Simulation — ☑ Constant Delay — Captured to: 300.582 s

Play Controls

|◀ ‖ ▶|

Event List Filters - Visible Events
ACL Filter, ARP, BGP, Bluetooth, CAPWAP, CDP, DHCP, DHCPv6, DNS, DTP, EAPOL, EIGRP, EIGRPv6, FTP, H.323, HSRP, HSRPv6, HTTP, HTTPS, ICMP, ICMPv6, IPSec, ISAKMP, IoT, IoT TCP, LACP, LLDP, Meraki, NDP, NETFLOW, NTP, OSPF, OSPFv6, PAgP, POP3, PPP, PPPoED, PTP, RADIUS, REP, RIP, RIPng, RTP, SCCP, SMTP, SNMP, SSH, STP, SYSLOG, TACACS, TCP, TFTP, Telnet, UDP, USB, VTP

Edit Filters — Show All/None

Time: 00:25:48.032 — PLAY CONTROLS: |◀ ‖ ▶| — Event List — Realtime — Simulation

This is the direct result of the duplex dispute.

This scenario illustrates that mismatches due to automatic or manual configuration choices of network equipment can disrupt logical communication. Network administrators should ensure that duplex settings are configured to be consistent at both ends to avoid such errors

Simulation File Name: P7_210316084_BinnurSöztutar_Duplex_Mismatch.pkt