Establishing a Single Switched Network

Foreword

The introduction of a switching device as part of the enterprise network demonstrates how networks are able to expand beyond point-to-point connections, and shared networks in which collisions may occur. The behavior of the enterprise switch when introduced to the local area network is detailed along with an understanding of the handling of unicast and broadcast type frames, to demonstrate how switches enable networks to overcome the performance obstacles of shared networks.

Objectives

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

- Explain the decision making process of a link layer switch.
- Configure parameters for negotiation on a link layer switch.

Storia!

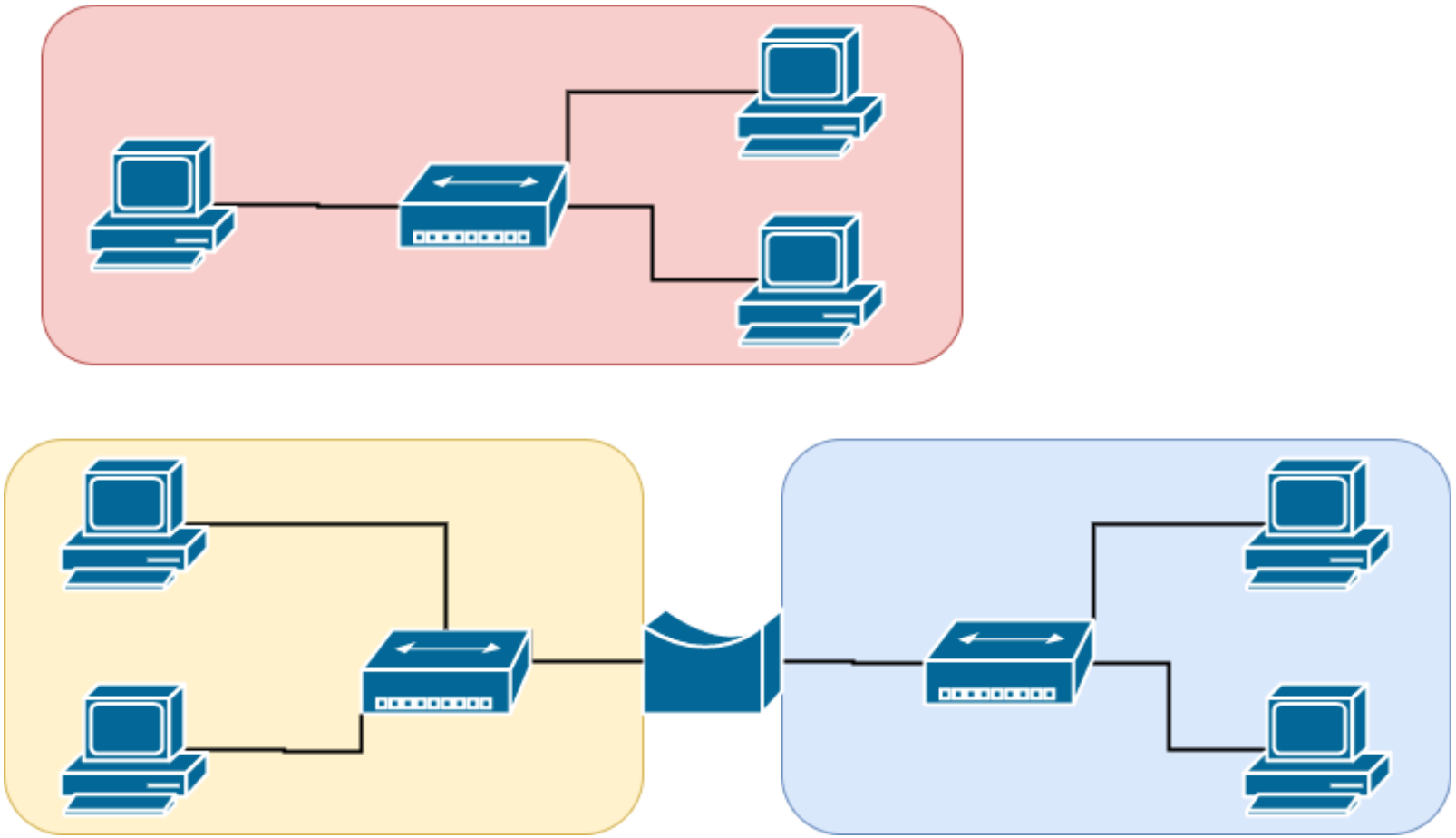
HUB

- Dispositivo di L1. Può essere realizzato con pochi compomenti.
- Estende il dominio di collisione

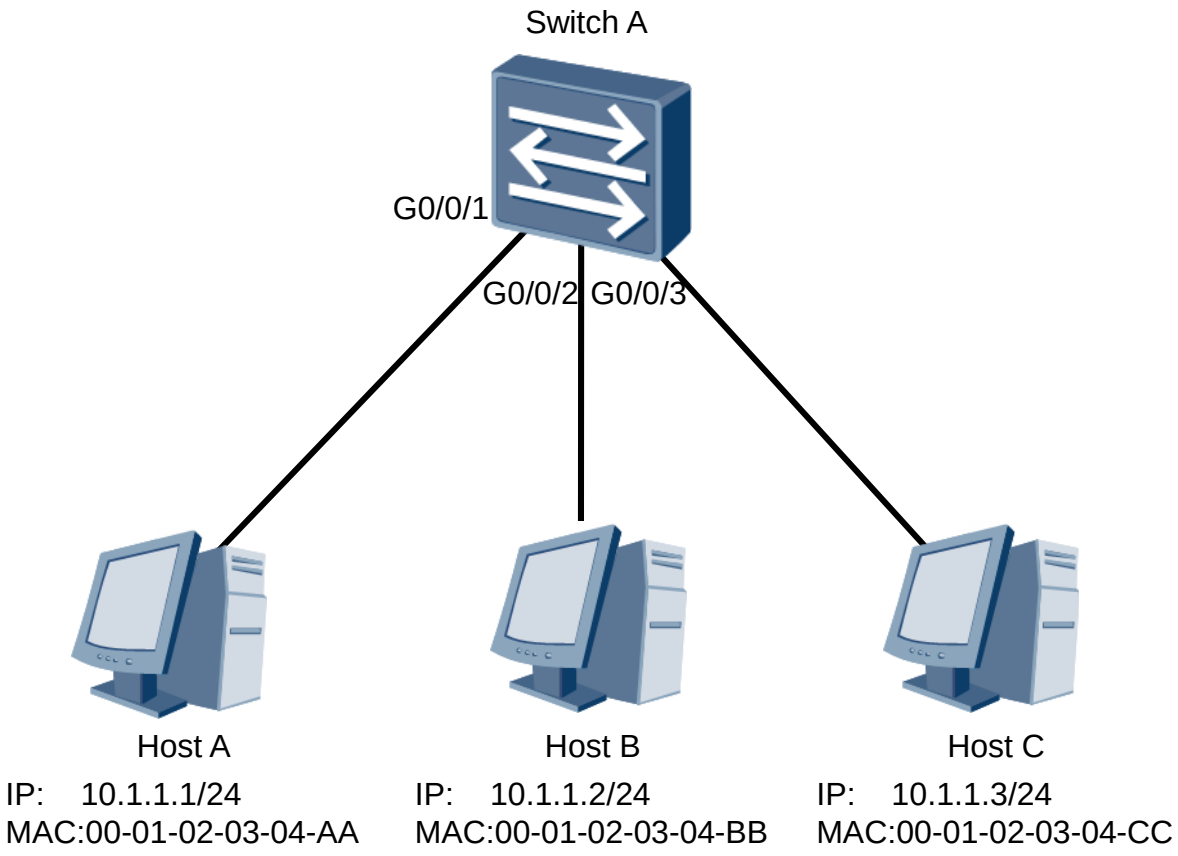
BRIDGE

- Separa i dispositivi in domini di collisione differenti;
- Riduce il numero delle collisioni.
- Aumenta le prestazioni della rete.

Storia!

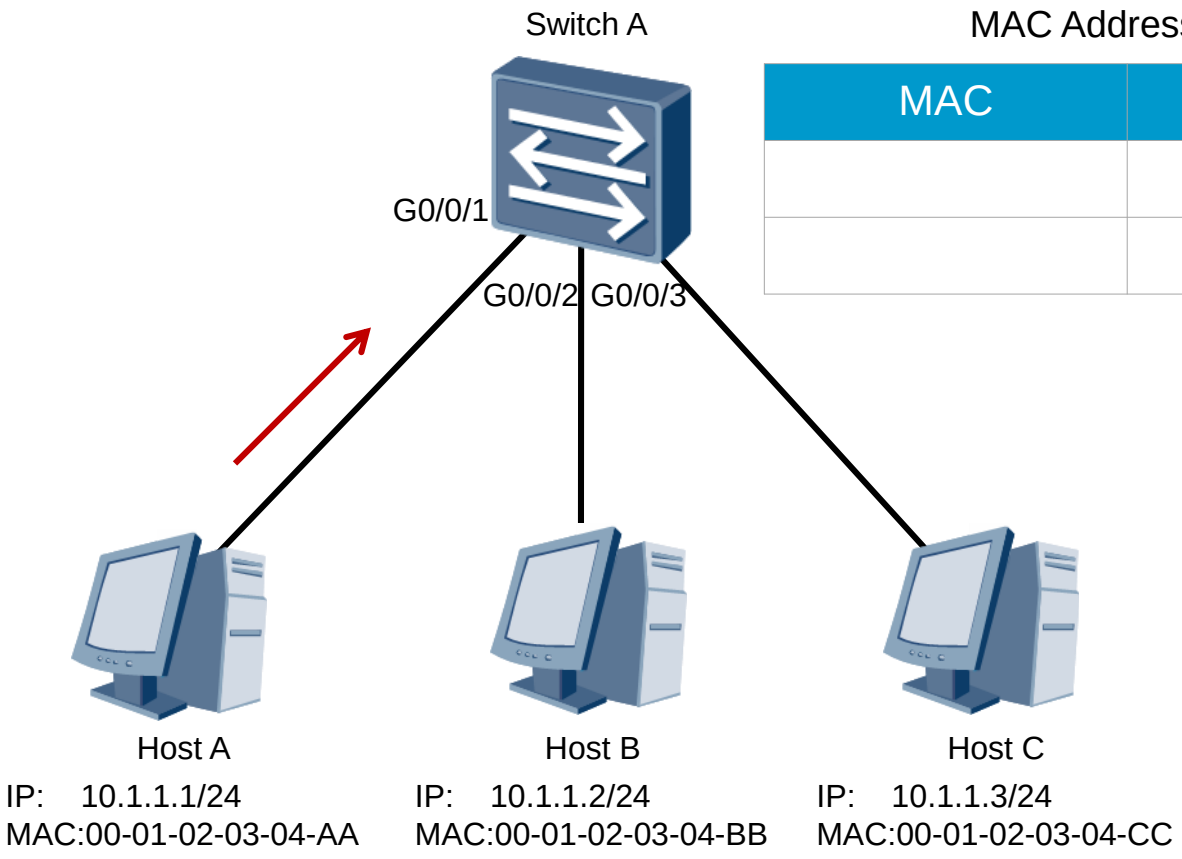


Building a Single Switched Network



- Switches operate within the scope of the data link layer.

The Initial State of The Switch

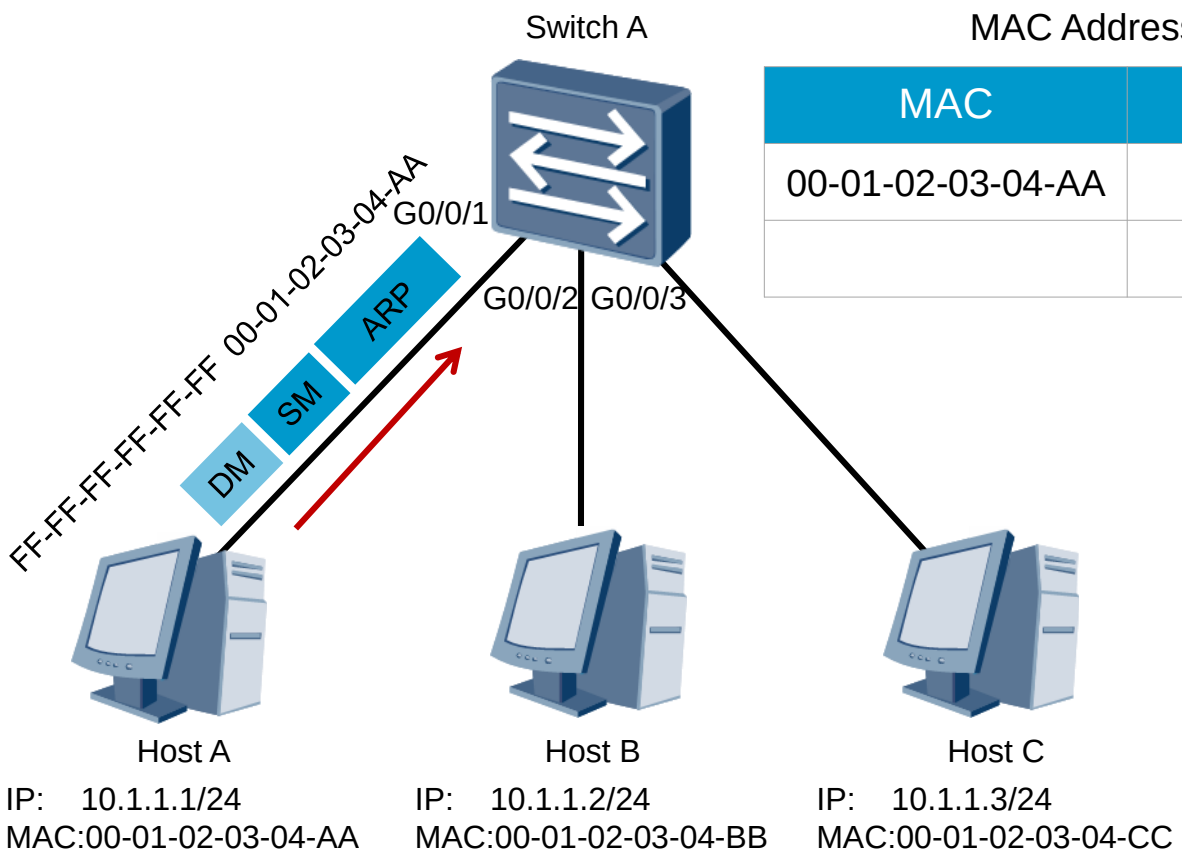


MAC Address Table

MAC	Interface

- Each switch uses a MAC table for making forwarding decisions.

MAC Address Learning

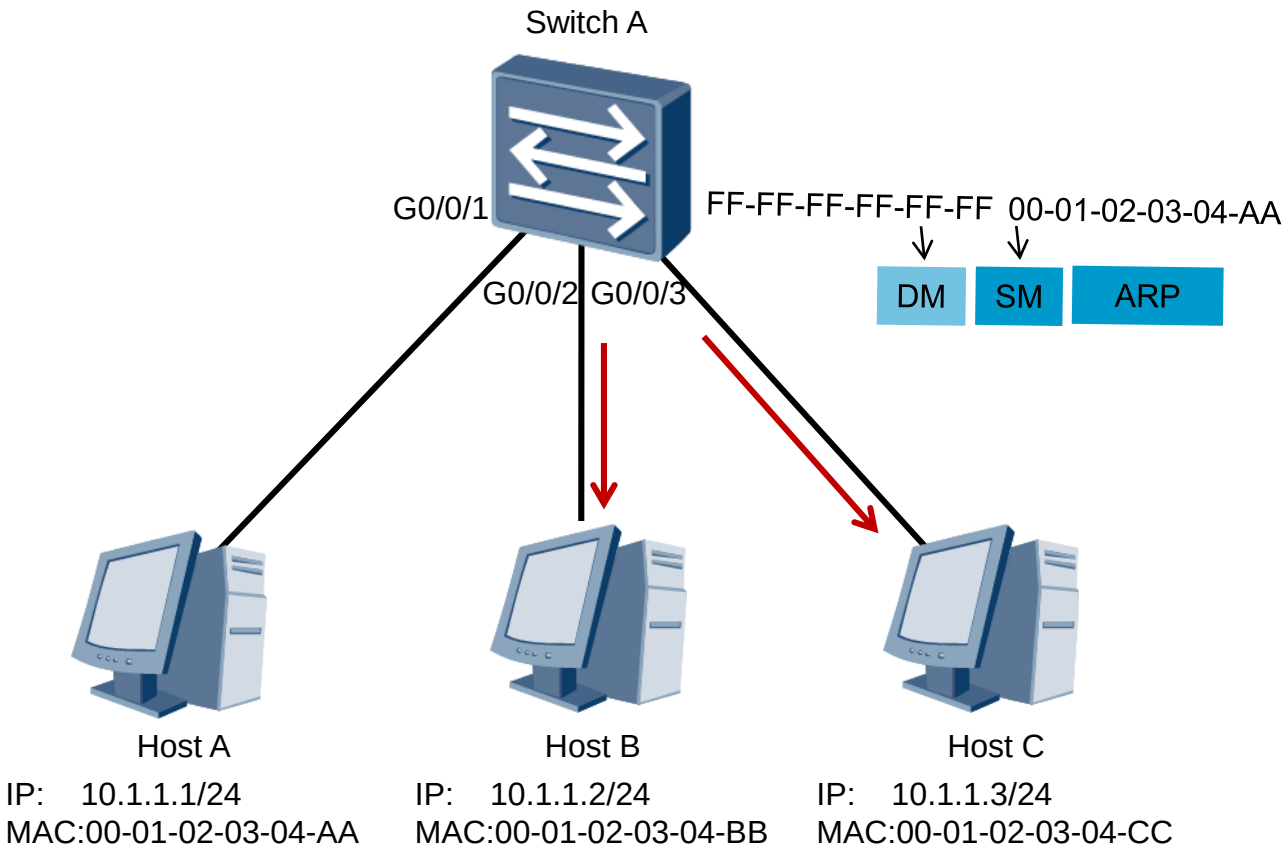


MAC Address Table

MAC	Interface
00-01-02-03-04-AA	G0/0/1

- The source MAC addresses of received frames are recorded.

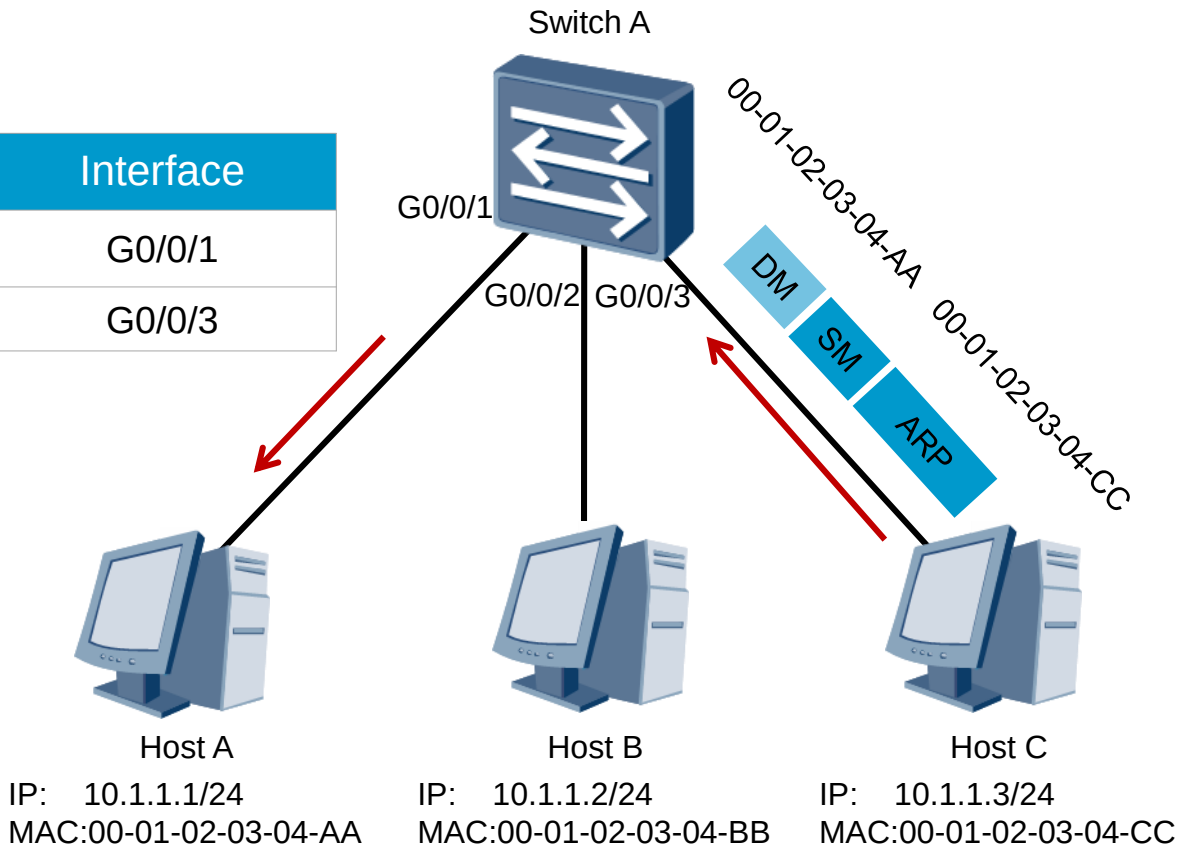
Forwarding The First Data



- Frames destined for unknown link layer destinations are flooded.

The Destination Reply

MAC	Interface
00-01-02-03-04-AA	G0/0/1
00-01-02-03-04-CC	G0/0/3

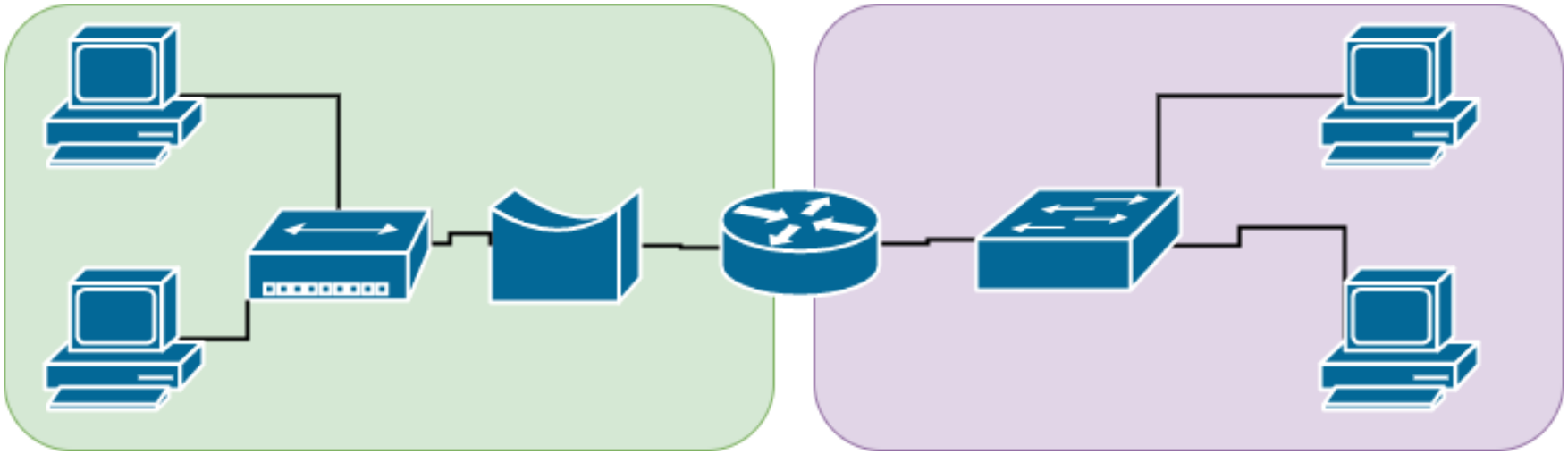


- Frames are forwarded to destinations based on the MAC table.

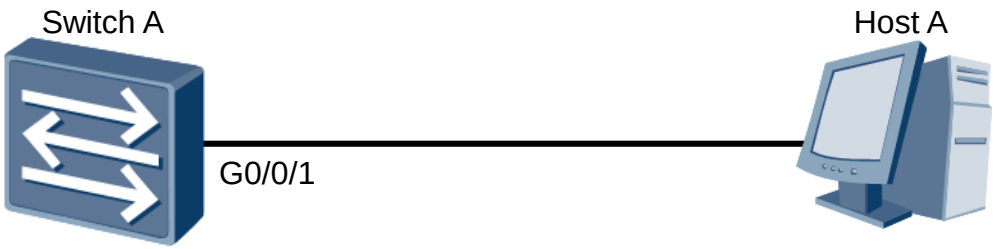
Internal Processing

Modalità	Descrizione
Store-and-forward	Lo switch riceve **completamente tutti i bit del frame** e li immagazzina prima di inoltrarli. Viene verificato il FCS del frame.
Cut-Through	Lo switch inoltra il **frame appena possibile**, in modo da ridurre la latenza. In questo modo non viene controllato il FCS e possono essere inoltrati anche dei frame errati.
Fragment-free	Lo switch inoltra il frame **dopo che ha ricevuto i primi 64byte** del frame stesso, evitando di inviare i frames che sono stati corrotti da una collisione.

Collision Domain – Broadcast Domain

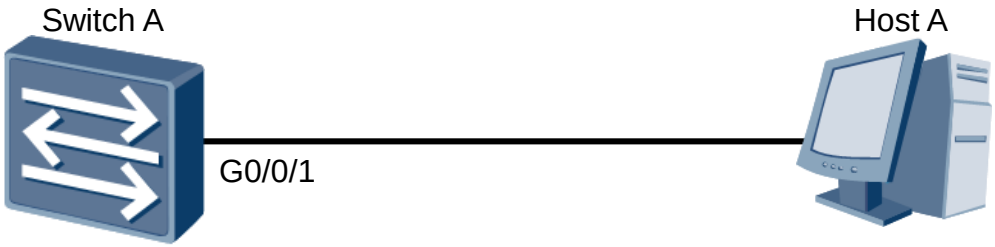


Basic Configuration




```
<SWA>system-view
Enter system view, return user view with Ctrl+Z.
[SWA]interface GigabitEthernet 0/0/1
[SWA-GigabitEthernet0/0/1]undo negotiation auto
[SWA-GigabitEthernet0/0/1]duplex full
[SWA-GigabitEthernet0/0/1]speed 100
```

Basic Configuration Verification




```
[SWA]display interface GigabitEthernet 0/0/1
GigabitEthernet0/0/1 current state : UP
Line protocol current state : UP
……
Speed :  100,  Loopback: NONE
Duplex: FULL,  Negotiation: DISABLE
```

Autonegotiation

802.3u – IEEE autonegotiation

- Consente a due nodi su un link di accordarsi in modo da usare lo stesso «duplex mode» e la stessa «velocità».
- Ogni nodo annuncia le sue potenzialità e viene scelta la combinazione migliore tra quelle possibili;
- Autonegoziazione può essere disabilitata. In questo caso meglio farlo su entrambi i dispositivi che fanno capo al link.

Autonegotiation

Regole in caso di **fallimento** della autonegoziazione.

- Velocità: usare la minima supportata;
- Duplex in base alla velocità:
  - 10Mbps – 100Mbps : Half Duplex
  - Ogni altro caso: Full Duplex.
- Duplex Mismatch

  Si ha quando un nodo lavora in full-duplex ed uno in half-duplex.

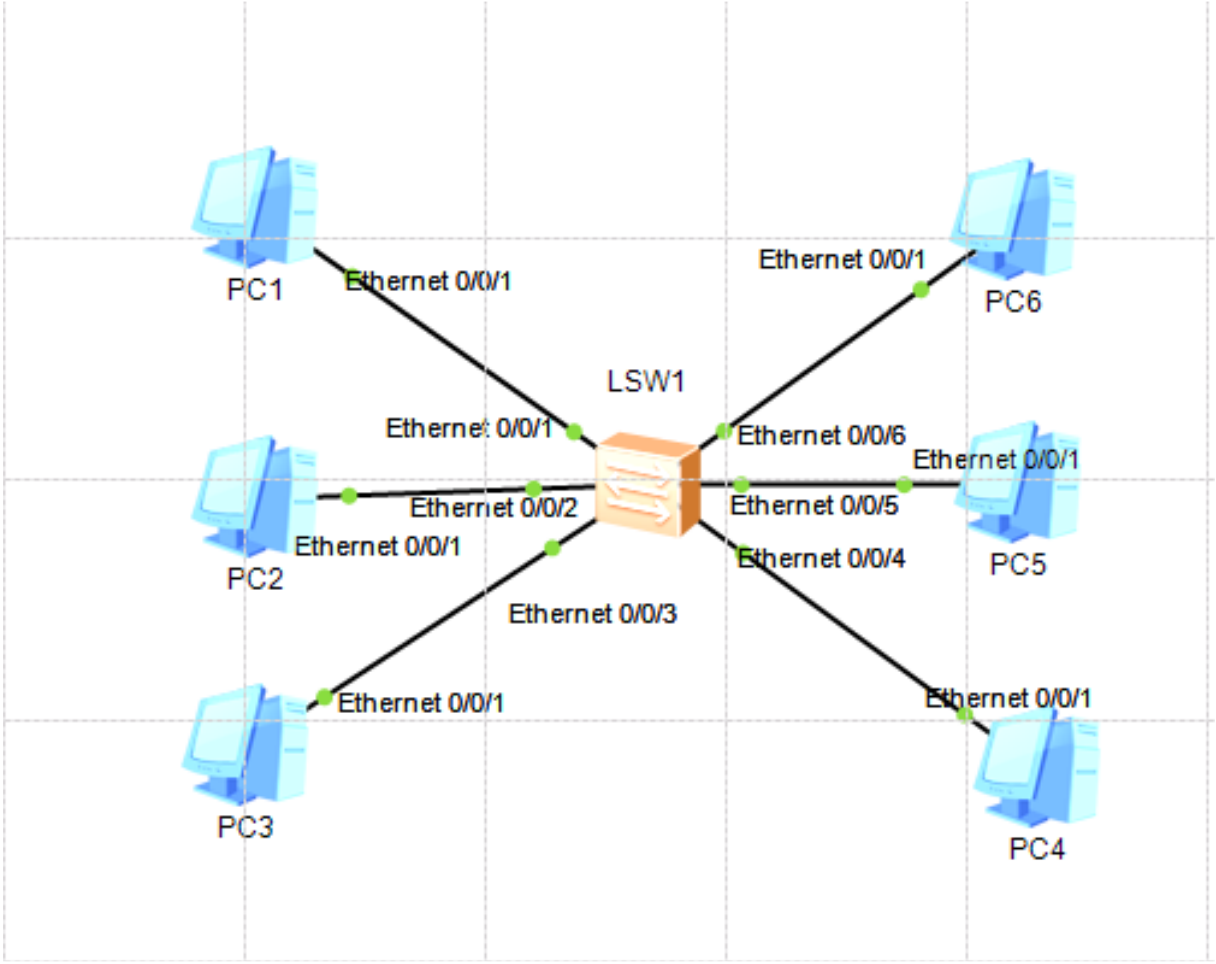
  Il nodo in full-duplex non usa CSMA/CD e spedisce ad ogni momento.

  Il nodo half-duplex usa CSMA/CD e ha l'impressione che ci siano collisioni: applica il backoff.

  Il link è UP ma ha prestazioni scadenti!

Esempi

Mini-Lab_basic:06-switch_base_01



HUAWEI

Esempi

```
[SW1]
[SW1]
[SW1]
[SW1]
[SW1]
[SW1]
[SW1]
[SW1]
[SW1]
[SW1]
[SW1]
[SW1]
[SW1]
[SW1]display mac-address dynamic
MAC address table of slot 0:
-------------------------------------------------------------------------------
MAC Address    VLAN/       PEVLAN CEVLAN Port            Type      LSP/LSR-ID
               VSI/SI                                              MAC-Tunnel
-------------------------------------------------------------------------------
5489-98bd-7eae 1           -      -      Eth0/0/2        dynamic   0/-
5489-9839-2fd4 1           -      -      Eth0/0/6        dynamic   0/-
5489-98ca-27e4 1           -      -      Eth0/0/5        dynamic   0/-
5489-982c-1f79 1           -      -      Eth0/0/4        dynamic   0/-
5489-98d5-23fe 1           -      -      Eth0/0/3        dynamic   0/-
5489-9843-6329 1           -      -      Eth0/0/1        dynamic   0/-
-------------------------------------------------------------------------------
Total matching items on slot 0 displayed = 6

[SW1]
```

Esempi

```
[SW1]
[SW1]display mac-address Ethernet 0/0/1
MAC address table of slot 0:
-------------------------------------------------------------------------------
MAC Address    VLAN/       PEVLAN CEVLAN Port            Type      LSP/LSR-ID
               VSI/SI                                              MAC-Tunnel
-------------------------------------------------------------------------------
5489-9843-6329 1           -      -      Eth0/0/1        dynamic   0/-
-------------------------------------------------------------------------------
Total matching items on slot 0 displayed = 1

[SW1]
```

La tabella di ARP viene cancellata ogni 300 secondi se non viene rilevato ulteriore traffico.

E’ possibile modificare questo valore con il comando mac-address aging-time <time>

Summary

- If a switch records the source MAC address of a host device on a port interface, and the physical connection of the host is then changed to another port interface on the switch, what action would the switch take?

Thank you

www.huawei.com