CCNA 200-301, Volume I

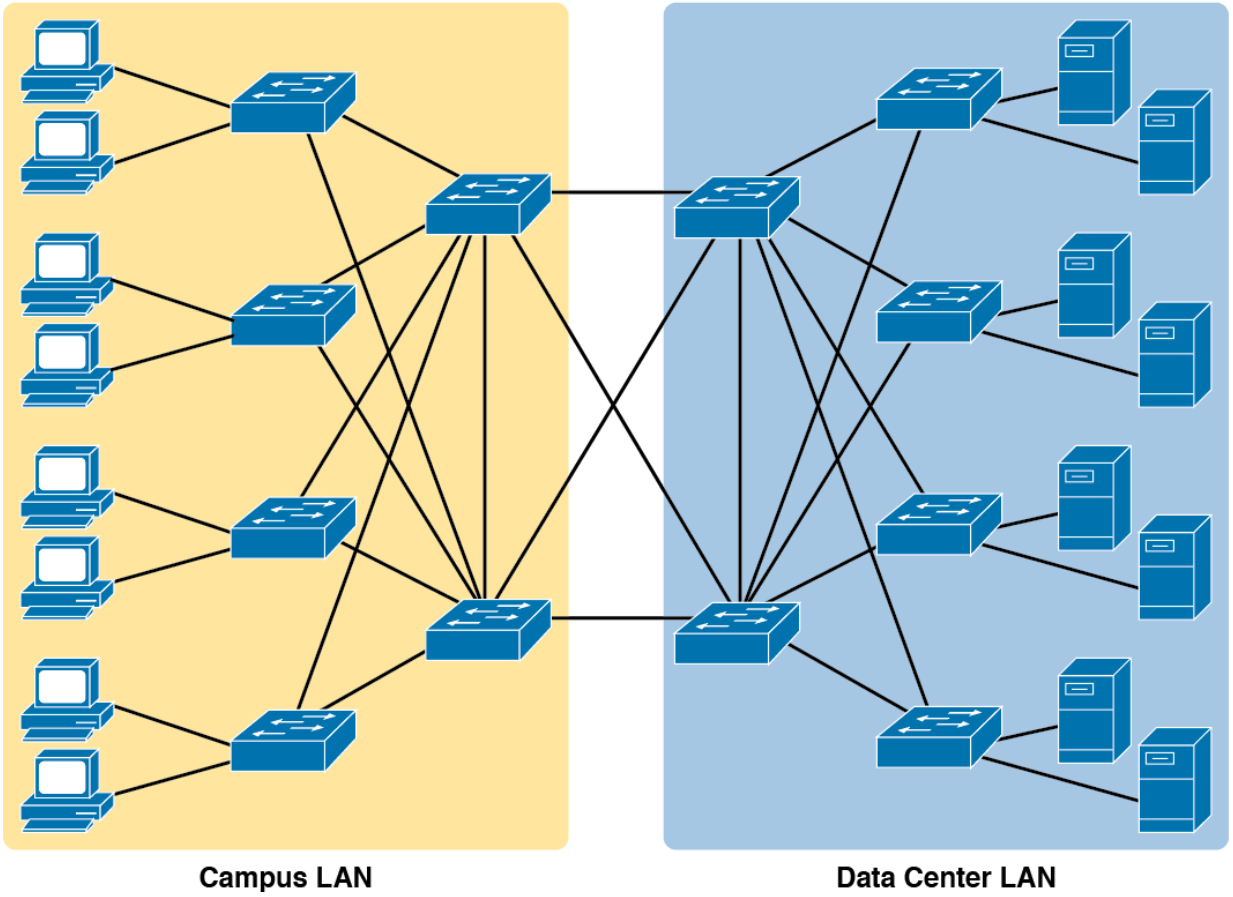
Chapter 5

Analyzing Ethernet LAN Switching

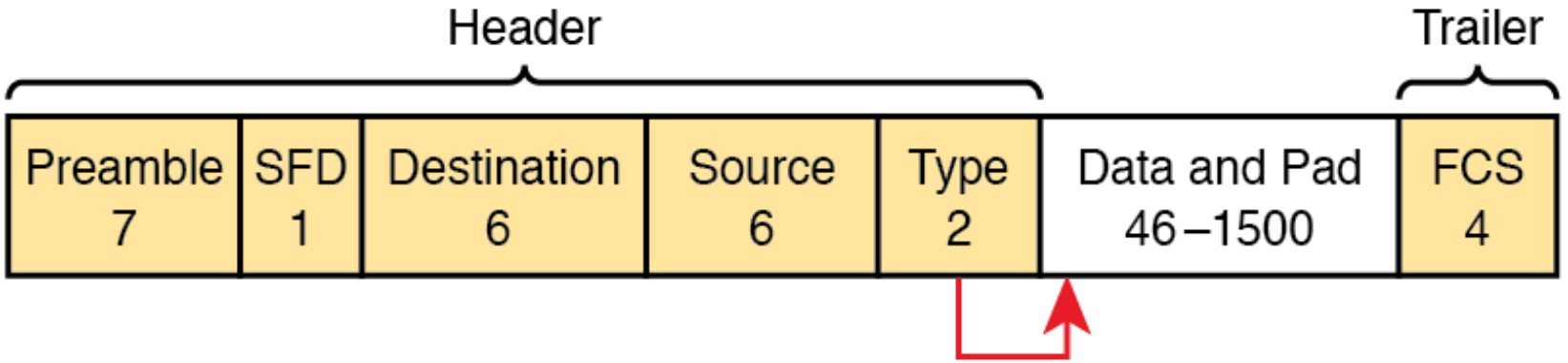
Objectives

- LAN Switching Concepts
- Verifying and Analyzing Ethernet Switching

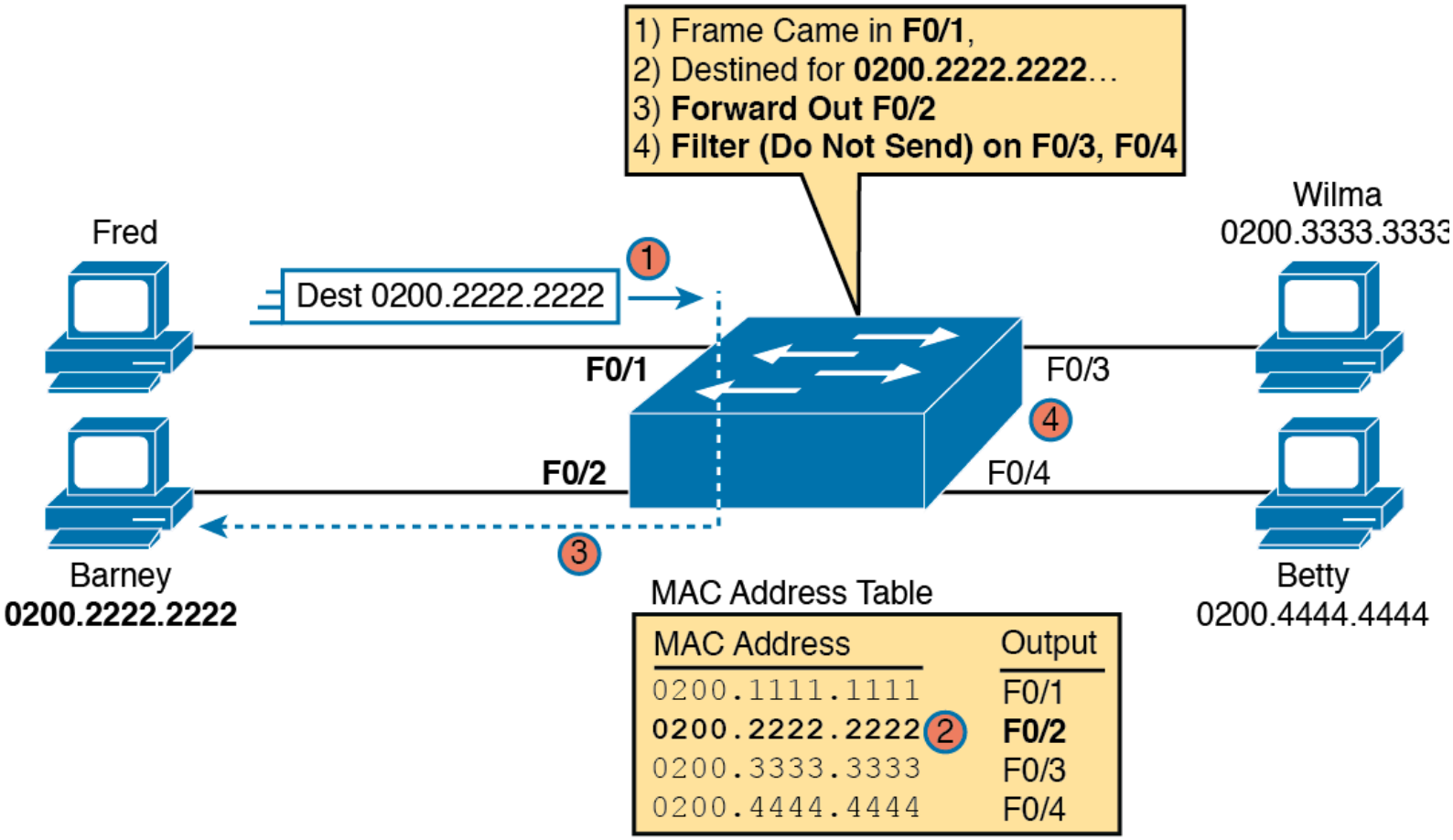
Campus LAN and Data Center LAN, Conceptual Drawing



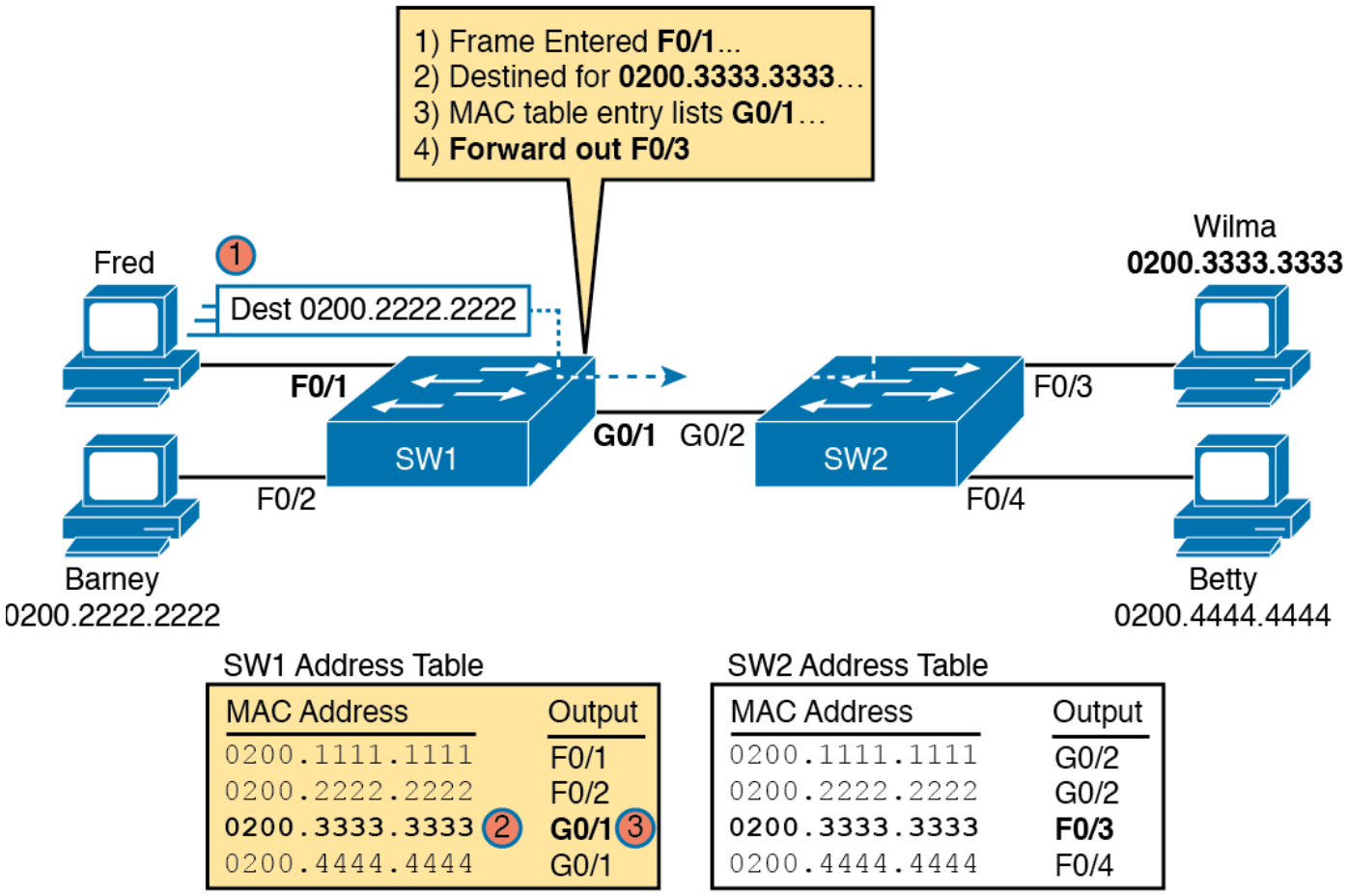
IEEE 802.3 Ethernet Frame (One Variation)



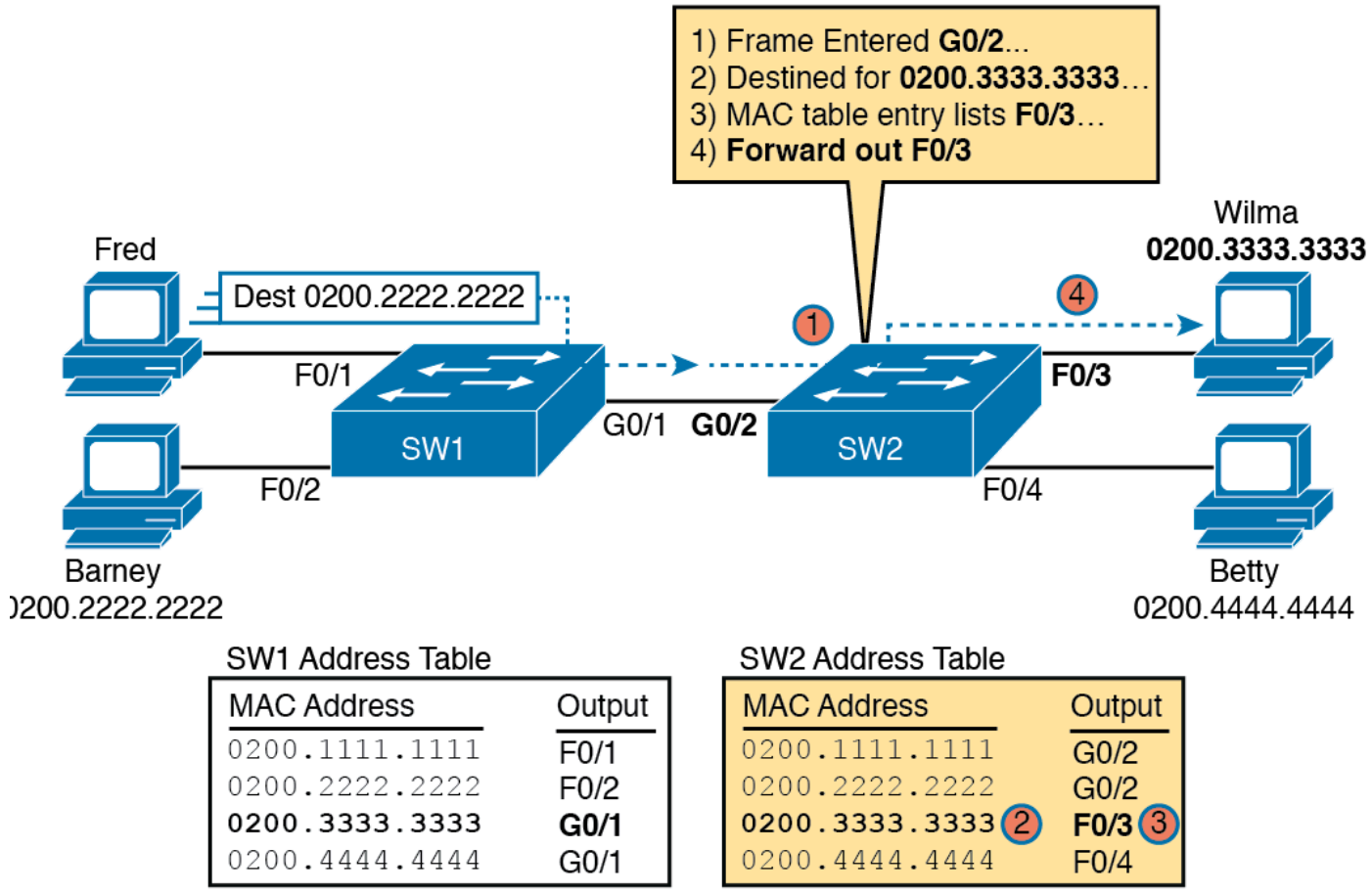
Sample Switch Forwarding and Filtering Decision



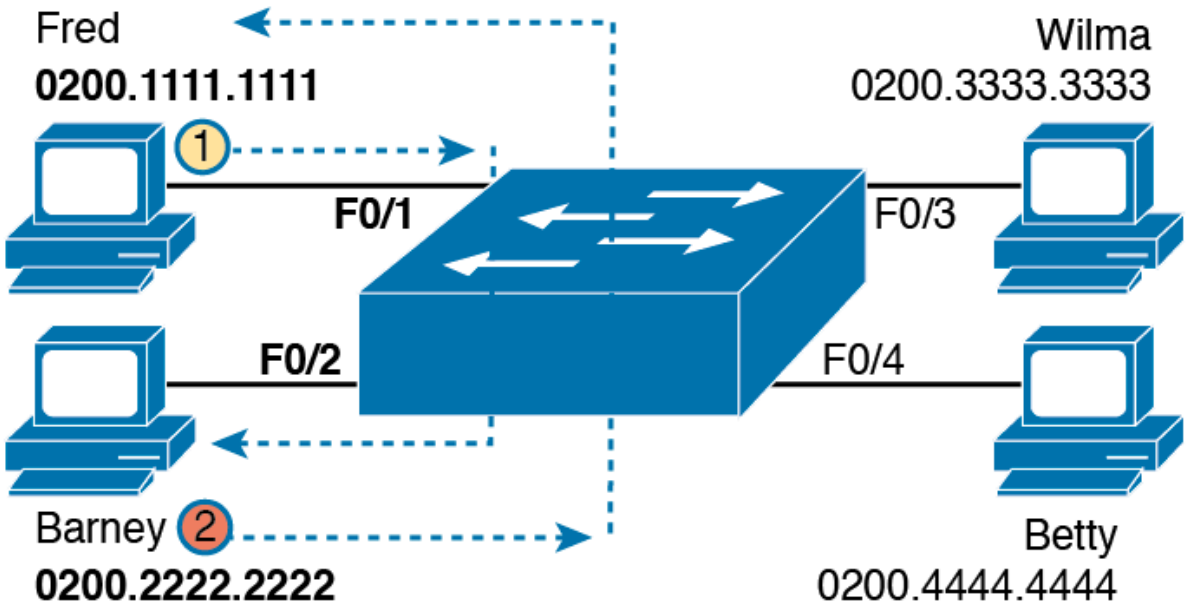
Forwarding Decision with Two Switches: First Switch



Forwarding Decision with Two Switches: Second Switch



Switch Learning: Empty Table and Adding Two Entries



Address Table: Before Either Frame Is Sent

Address:	Output
(Empty)	(Empty)

1

Address Table: After Frame 1 (Fred to Barney)

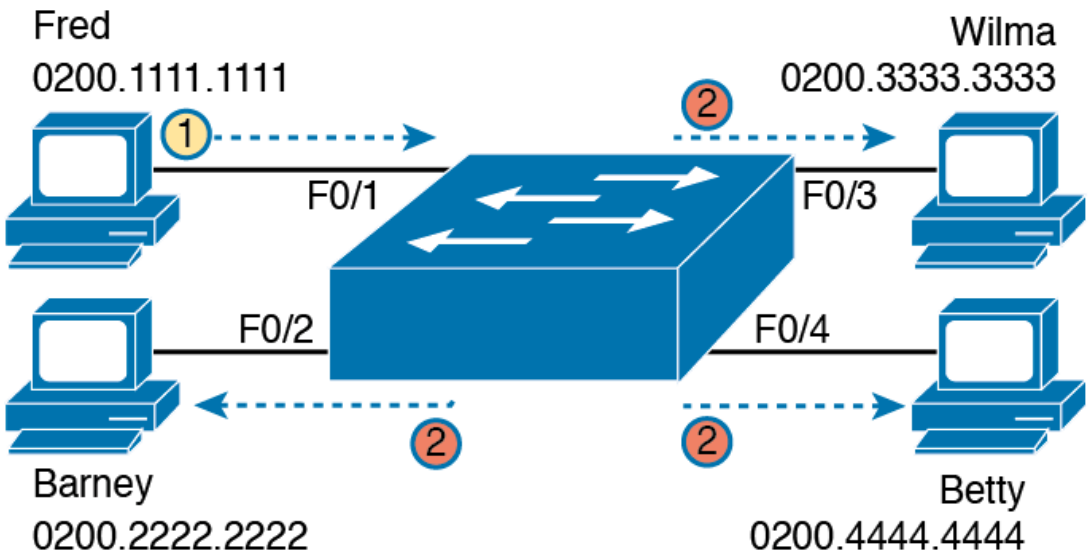
Address:	Output
0200.1111.1111	F0/1

2

Address Table: After Frame 2 (Barney to Fred)

Address:	Output
0200.1111.1111	F0/1
0200.2222.2222	F0/2

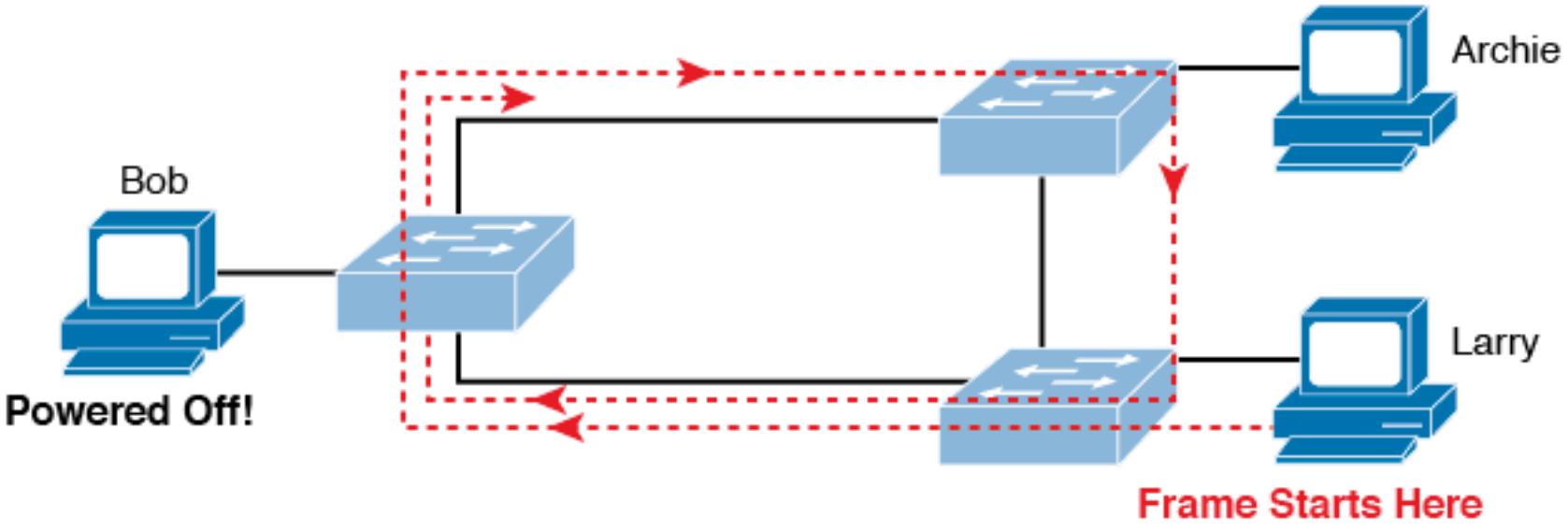
Switch Flooding: Unknown Unicast Arrives, Floods out Other Ports



Address Table: Before Frame Is Sent

Address:	Output
(Empty)	(Empty)

Network with Redundant Links But Without STP: The Frame Loops Forever

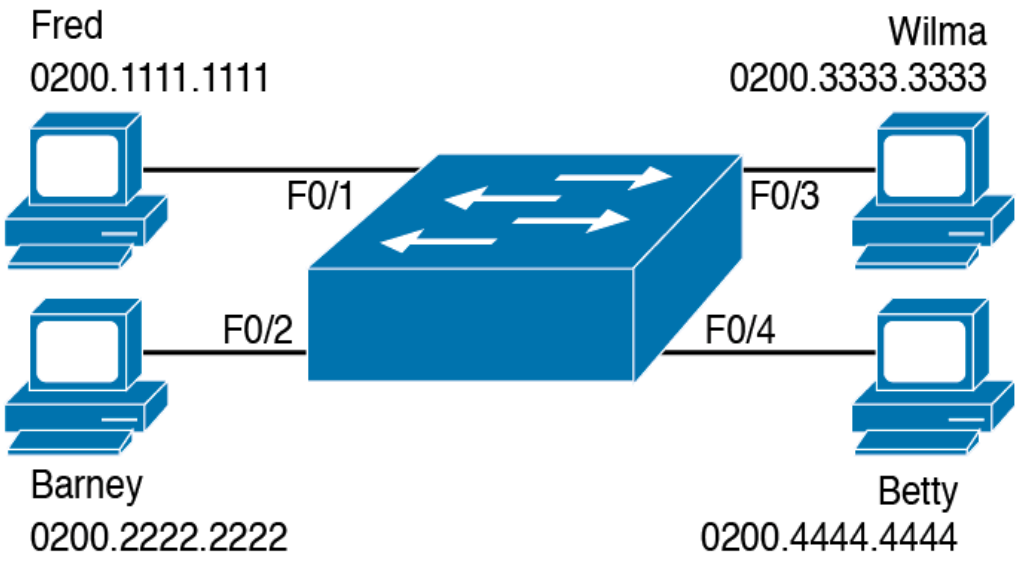


show mac address-table dynamic on switch SW1

```
SW1# show mac address-table dynamic
          Mac Address Table
-------------------------------------------

Vlan    Mac Address       Type        Ports
----    -----------       --------    -----
   1    0200.1111.1111    DYNAMIC     Fa0/1
   1    0200.2222.2222    DYNAMIC     Fa0/2
   1    0200.3333.3333    DYNAMIC     Fa0/3
   1    0200.4444.4444    DYNAMIC     Fa0/4
Total Mac Addresses for this criterion: 4
SW1#
```

Single Switch Topology Used in Verification Section



show interfaces status on Switch SW1

```
SW1# show interfaces status

Port      Name               Status       Vlan       Duplex  Speed Type
Fa0/1                        connected    1          a-full  a-100 10/100BaseTX
Fa0/2                        connected    1          a-full  a-100 10/100BaseTX
Fa0/3                        connected    1          a-full  a-100 10/100BaseTX
Fa0/4                        connected    1          a-full  a-100 10/100BaseTX
Fa0/5                        notconnect   1            auto   auto 10/100BaseTX
Fa0/6                        notconnect   1            auto   auto 10/100BaseTX
Fa0/7                        notconnect   1            auto   auto 10/100BaseTX
Fa0/8                        notconnect   1            auto   auto 10/100BaseTX
Fa0/9                        notconnect   1            auto   auto 10/100BaseTX
Fa0/10                       notconnect   1            auto   auto 10/100BaseTX
Fa0/11                       notconnect   1            auto   auto 10/100BaseTX
Fa0/12                       notconnect   1            auto   auto 10/100BaseTX
Fa0/13                       notconnect   1            auto   auto 10/100BaseTX
Fa0/14                       notconnect   1            auto   auto 10/100BaseTX
Fa0/15                       notconnect   1            auto   auto 10/100BaseTX
Fa0/16                       notconnect   1            auto   auto 10/100BaseTX
Fa0/17                       notconnect   1            auto   auto 10/100BaseTX
Fa0/18                       notconnect   1            auto   auto 10/100BaseTX
Fa0/19                       notconnect   1            auto   auto 10/100BaseTX
Fa0/20                       notconnect   1            auto   auto 10/100BaseTX
Fa0/21                       notconnect   1            auto   auto 10/100BaseTX
Fa0/22                       notconnect   1            auto   auto 10/100BaseTX
Fa0/23                       notconnect   1            auto   auto 10/100BaseTX
Fa0/24                       notconnect   1            auto   auto 10/100BaseTX
Gi0/1                        notconnect   1            auto   auto 10/100/1000BaseTX
Gi0/2                        notconnect   1            auto   auto 10/100/1000BaseTX
SW1#
```

show interfaces f0/1 counters on Switch SW1

```
SW1# show interfaces f0/1 counters

Port            InOctets     InUcastPkts     InMcastPkts     InBcastPkts
Fa0/1            1223303           10264             107              18

Port           OutOctets    OutUcastPkts    OutMcastPkts    OutBcastPkts
Fa0/1            3235055           13886           22940             437
```

show mac address-table dynamic with the **address** Keyword

```
SW1# show mac address-table dynamic address 0200.1111.1111
          Mac Address Table
-------------------------------------------

Vlan    Mac Address       Type        Ports
----    -----------       --------    -----
   1    0200.1111.1111    DYNAMIC     Fa0/1
Total Mac Addresses for this criterion: 1
```

show mac address-table dynamic with the **interface** Keyword

```
SW1# show mac address-table dynamic interface fastEthernet 0/1
          Mac Address Table
-------------------------------------------

Vlan    Mac Address       Type        Ports
----    -----------       --------    -----
   1    0200.1111.1111    DYNAMIC     Fa0/1
Total Mac Addresses for this criterion: 1
```

The **show mac address-table vlan** command

```
SW1# show mac address-table dynamic vlan 1
          Mac Address Table
-------------------------------------------

Vlan    Mac Address       Type        Ports
----    -----------       --------    -----
   1    0200.1111.1111    DYNAMIC     Fa0/1
   1    0200.2222.2222    DYNAMIC     Fa0/2
   1    0200.3333.3333    DYNAMIC     Fa0/3
   1    0200.4444.4444    DYNAMIC     Fa0/4
Total Mac Addresses for this criterion: 4
SW1#
SW1# show mac address-table dynamic vlan 2
          Mac Address Table
-------------------------------------------

Vlan    Mac Address       Type        Ports
----    -----------       --------    -----
SW1#
```

The MAC Address Default Aging Timer Displayed

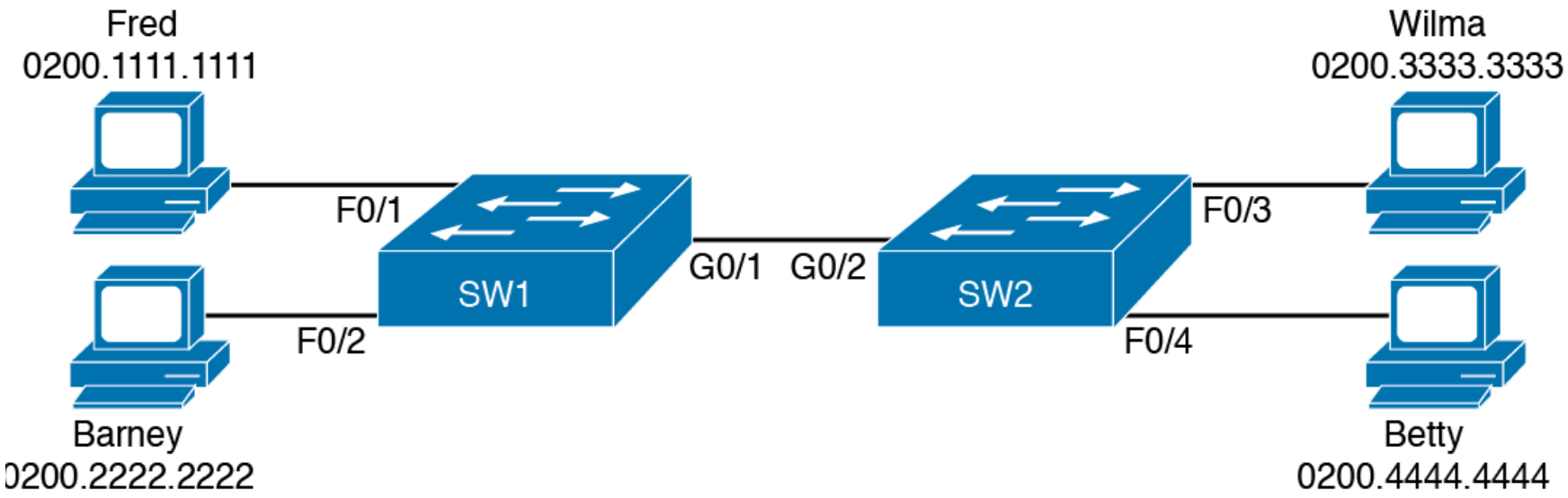
```
SW1# show mac address-table aging-time
Global Aging Time:  300
Vlan    Aging Time
----    ----------
SW1#

SW1# show mac address-table count

Mac Entries for Vlan 1:
---------------------------
Dynamic Address Count   : 4
Static  Address Count   : 0
Total Mac Addresses     : 4

Total Mac Address Space Available: 7299
```

Two-Switch Topology Example



The MAC Address Table on Two Switches

SW1# **show mac address-table dynamic**

Mac Address Table

Vlan	Mac Address	Type	Ports
1	0200.1111.1111	DYNAMIC	Fa0/1
1	0200.2222.2222	DYNAMIC	Fa0/2
1	0200.3333.3333	DYNAMIC	Gi0/1
1	0200.4444.4444	DYNAMIC	Gi0/1

Total Mac Addresses for this criterion: 4

! The next output is from switch SW2

SW2# **show mac address-table dynamic**

1	0200.1111.1111	DYNAMIC	Gi0/2
1	0200.2222.2222	DYNAMIC	Gi0/2
1	0200.3333.3333	DYNAMIC	Fa0/3
1	0200.4444.4444	DYNAMIC	Fa0/4

Total Mac Addresses for this criterion: 4