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## COURSE TITLE: ETHERNET SWITCH OPERATION

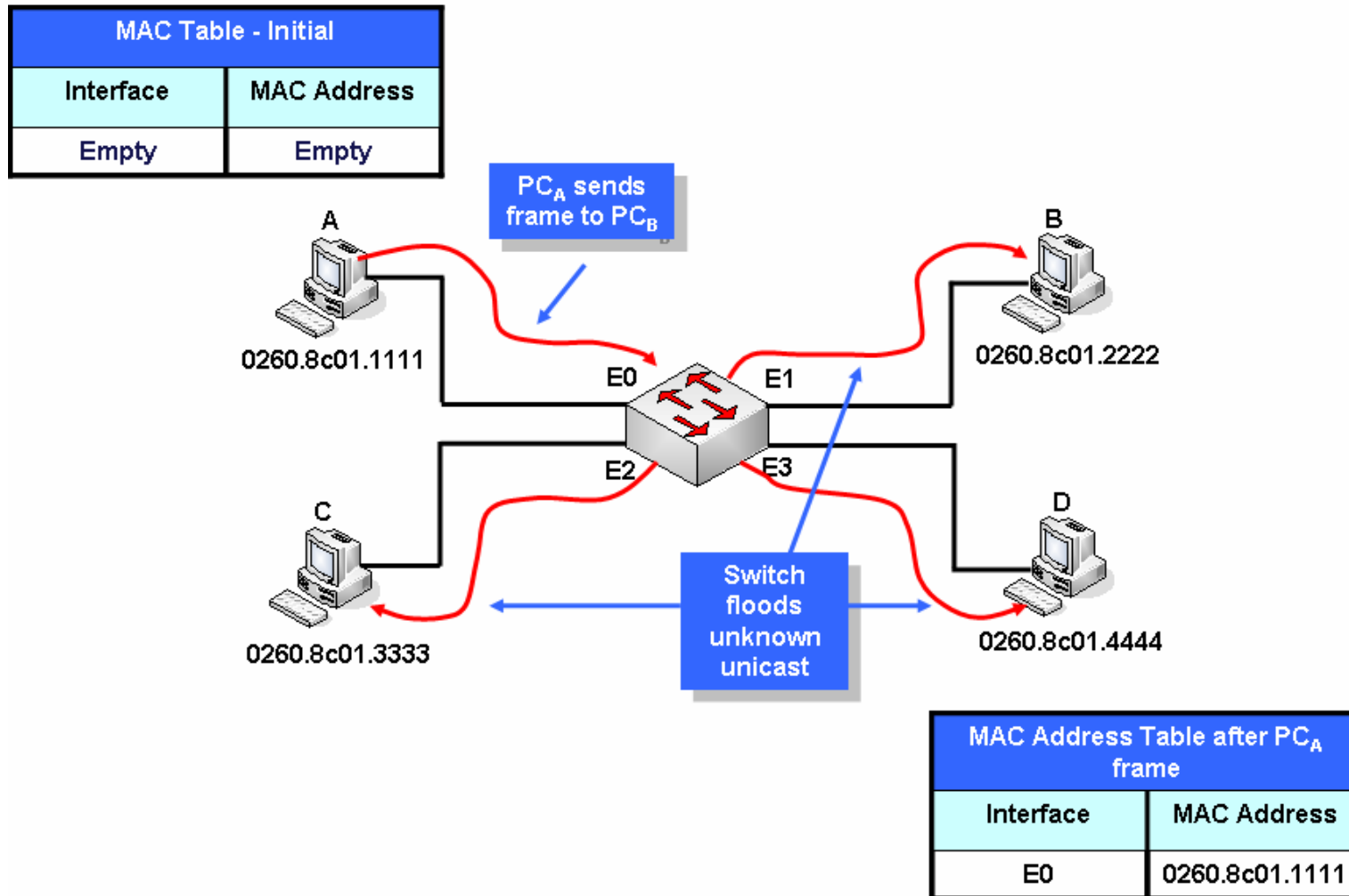
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# Frame Forwarding by a Switch



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## 1.1 Learning Behaviour in Switches

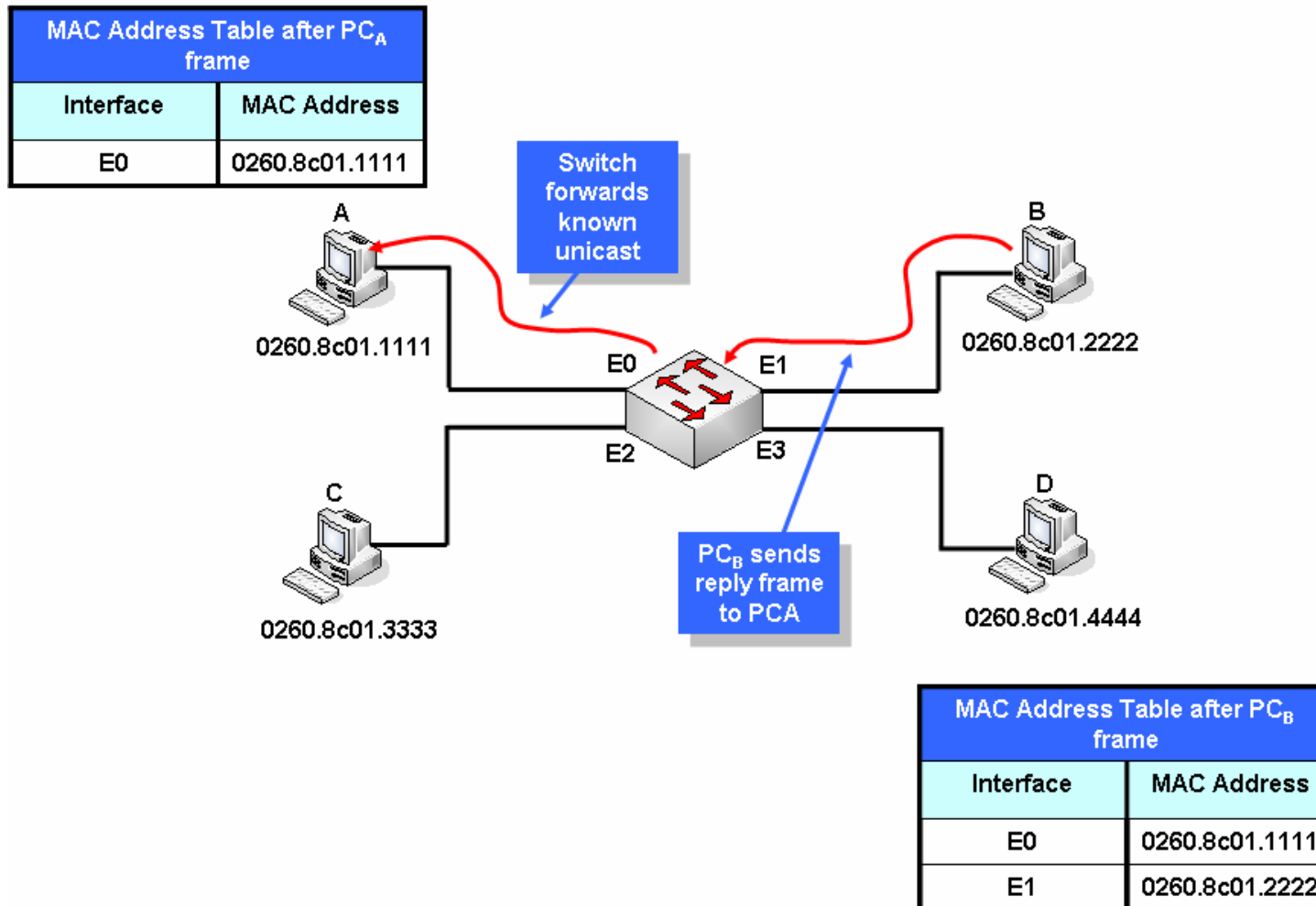
Forwarding in Ethernet switches is controlled by a Forwarding Information Base (FIB) which contains MAC addresses and the port to which they are attached.

### 1.1.1 On Initial Power-Up

When a switch is first powered on, the FIB is empty.

- Broadcast frames are forwarded on all ports, except the port on which they are received
- Multicast frames are forwarded on all ports, except the port on which they are received
- Unicast frames are forwarded on all ports, except the one on which they are received

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### 1.1.2 During the Learning Phase

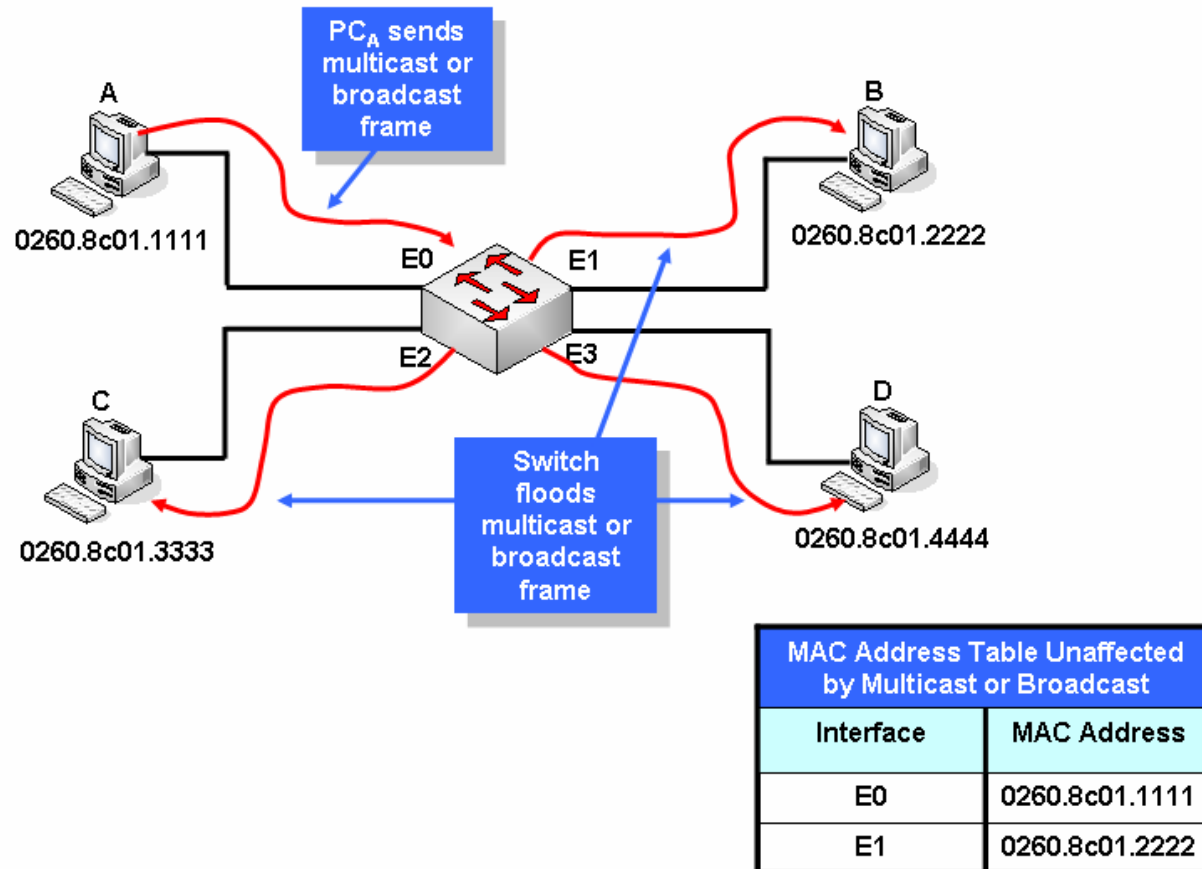
As frames are received (of all types) at the switch, the **source MAC address** is associated with the port on which the frame was received. This address is now a known unicast address<sup>1</sup>. While the learning process is underway, some unicast addresses are known (with an entry in the FIB), and some unicast addresses are unknown (without an entry in the FIB)

- Broadcast and Multicast frames are forwarded on all ports, except the port on which they are received, as before
- Unknown unicast addresses are forwarded on all ports, except the one on which they are received, as before
- Known unicast addresses are forwarded only on the port associated with the destination MAC address in the FIB

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<sup>1</sup> Known unicast addresses are learnt from all types of frame; broadcast, multicast and unicast frames all contain as their source MAC address a unicast address. The reply to broadcast, multicast and unicast frames also provides entries for the FIB, again using the source address of these frames

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### 1.1.3 Steady-State

Once all MAC addresses have been identified, no unknown unicast addresses exist, and all unicast forwarding is to a single port<sup>2</sup>.

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<sup>2</sup> Of course, in practice new hosts may be connected to the switch at any time; they are simply unknown unicast addresses until the first frames from them are processed