

# VLAN Routing

## L3-Routing

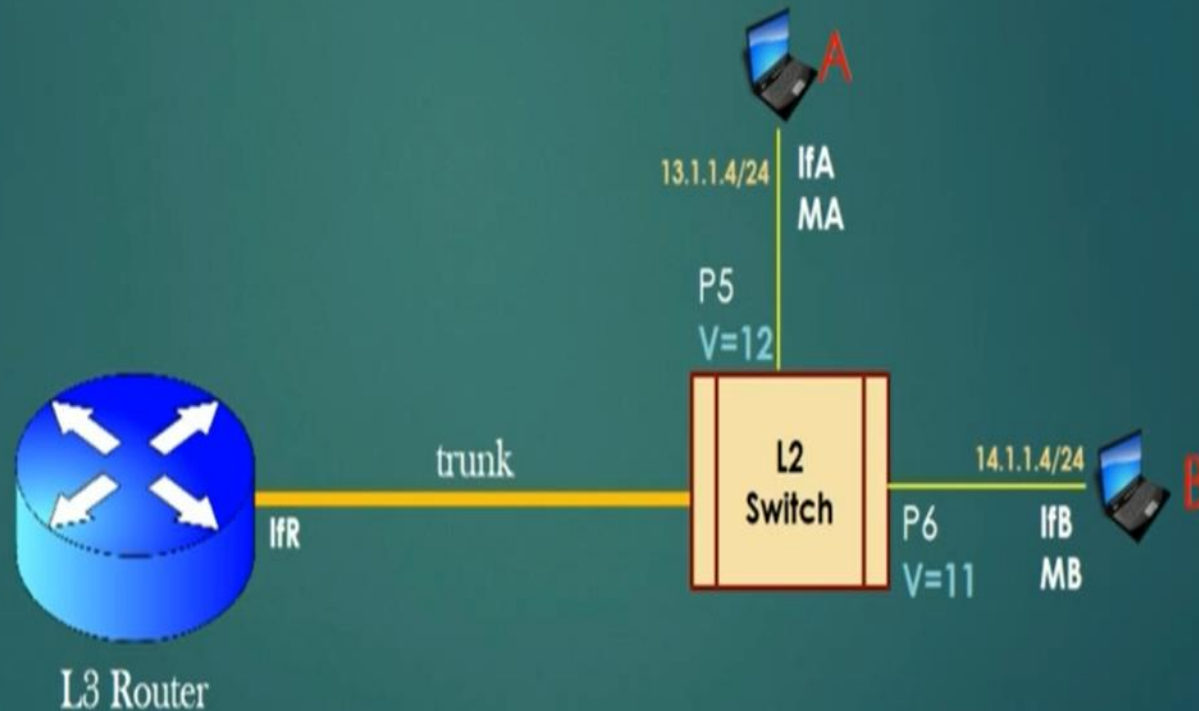
# TOPIC COVERED IN THIS LECTURE

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- Router - VLAN Routing: Introduction
- Problem Statement
- Concept of SVIs
- L3 Router Configuration for VLAN forwarding
- Router to VLAN Forwarding – Example

# Router-VLAN Routing

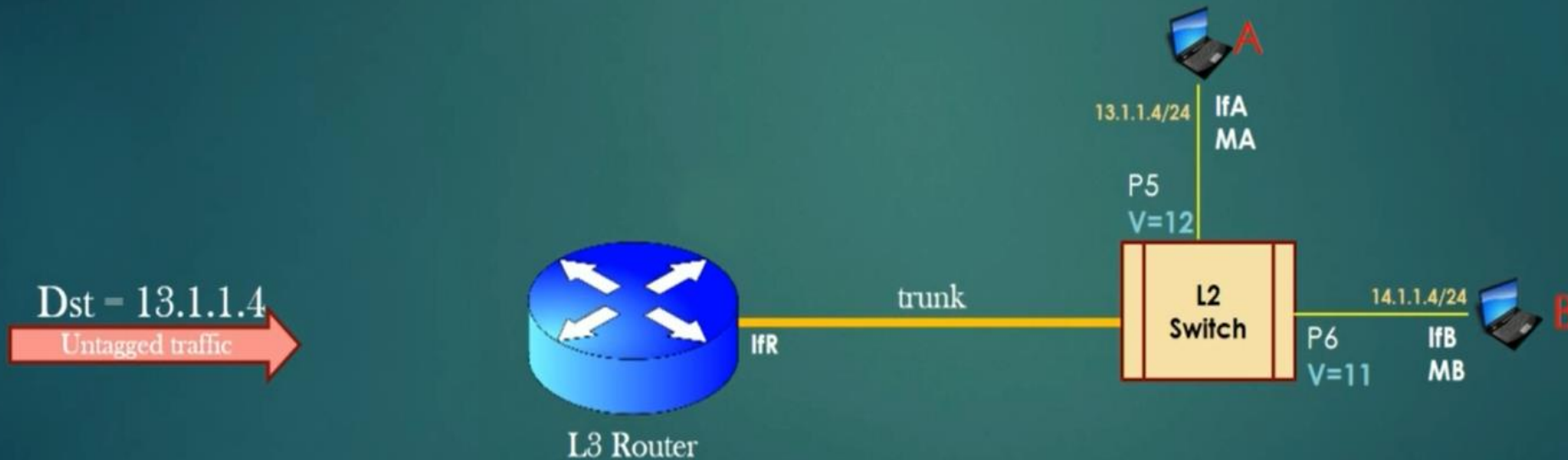
➤ How L3 Router will deliver the traffic to host A?



# Router-VLAN Routing

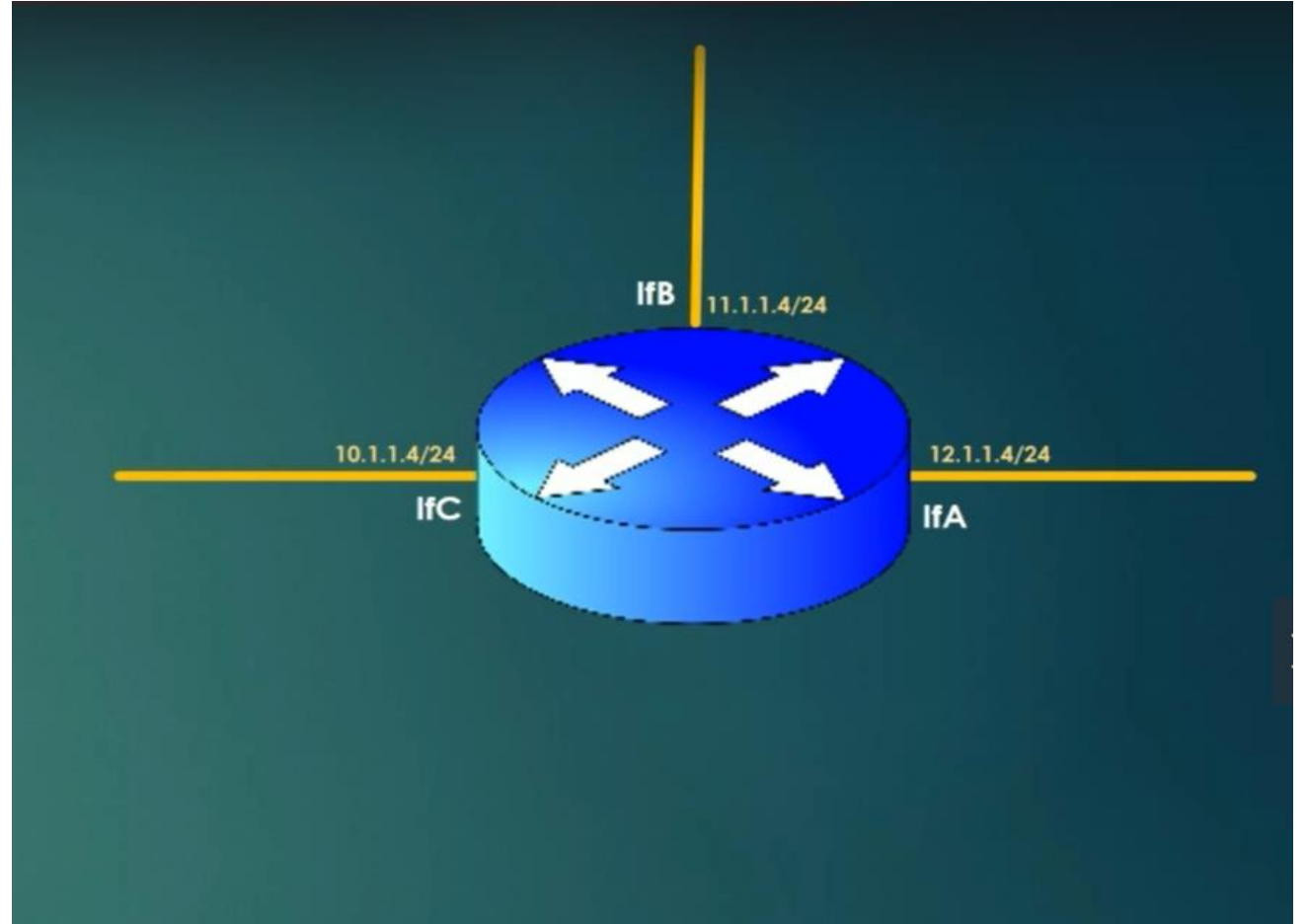
## Problem Statement:

- Since VLANs are also subnets - stick to the basics.
- In this lecture, we will understand how L3 router deliver traffic received from outside (internet) to host machine present in one of the VLAN.



# Router Possession

- Before actually learning that how L3 router will deliver the traffic to one of the host machine present in any VLAN, we need to actually build-up some prerequisite knowledge.
- Let us first study what exactly Router Possession is?



# Router Possession

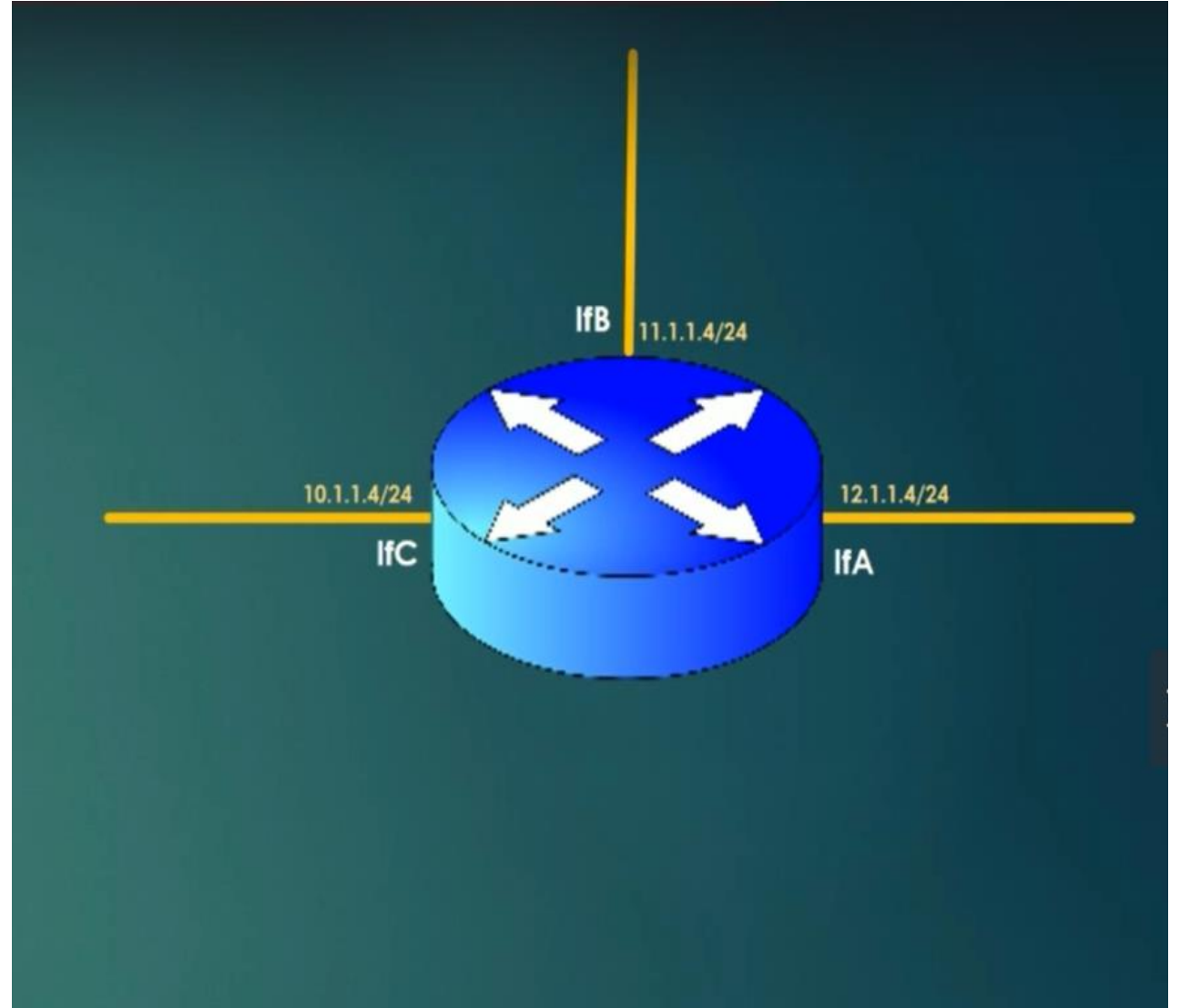
➤ The L3 router hosts three different subnets.

➤ 11.1.1.0/24

➤ 10.1.1.0/24

➤ 12.1.1.0/24

Router possession refers to the state in which a router is responsible for managing and routing traffic to and from specific IP subnets.



# Router Possession

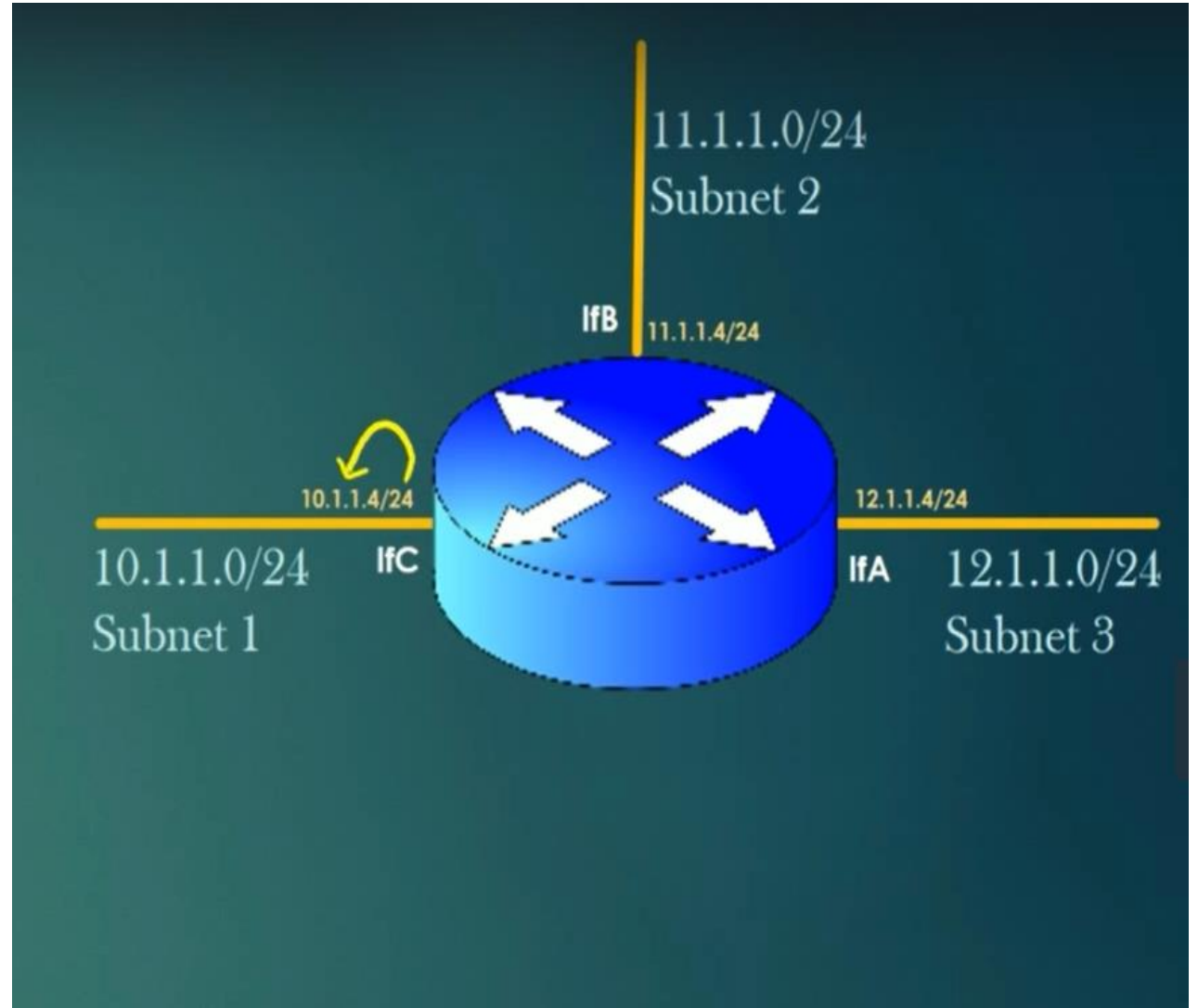
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To create more subnets on router we can use physical interface, but that will be costlier so we can use SVI's

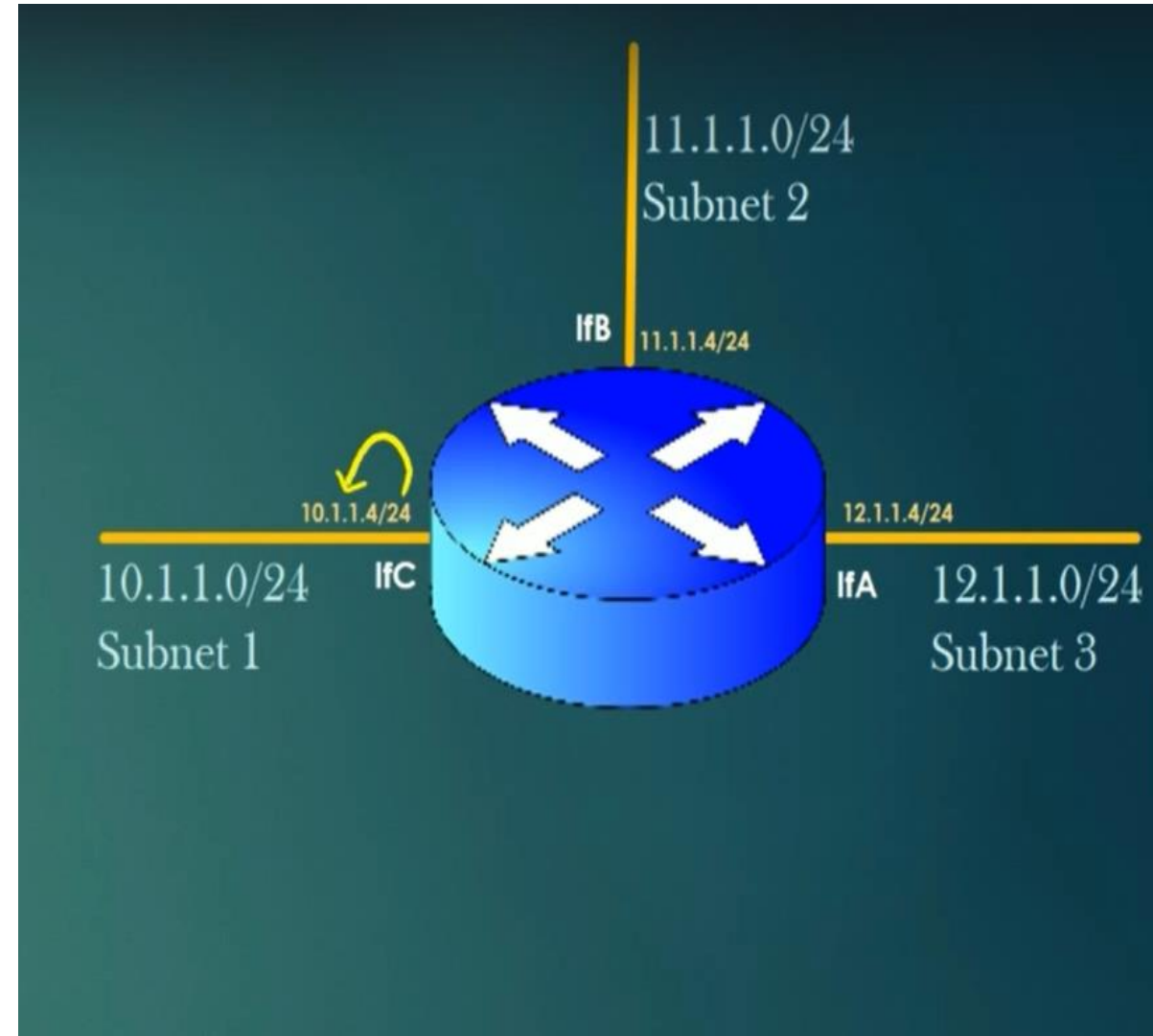


# Router Possession

- The L3 router hosts three different subnets.
  - 11.1.1.0/24
  - 10.1.1.0/24
  - 12.1.1.0/24
- In other words, we say the L3 router is in possession of these three subnets.
- It means, this router should receive the traffic for destination ip addresses=member of any subnets possessed by the router.
- Now let us assume that this router has only three physical hardware interfaces, remember ip-address/mask are configured on interface only.
- Given the above limitation, what will you do to make this router posses more number of subnets?

## **Solution:**

- Create logical interfaces and assign ip/mask to them.
- These logical interfaces are given the special name as **Switch Virtual Interfaces (SVI)**.
- SVIs are not physical hardware, but just software based interfaces like loopback interfaces only.
- So we can create as many SVIs as we want.

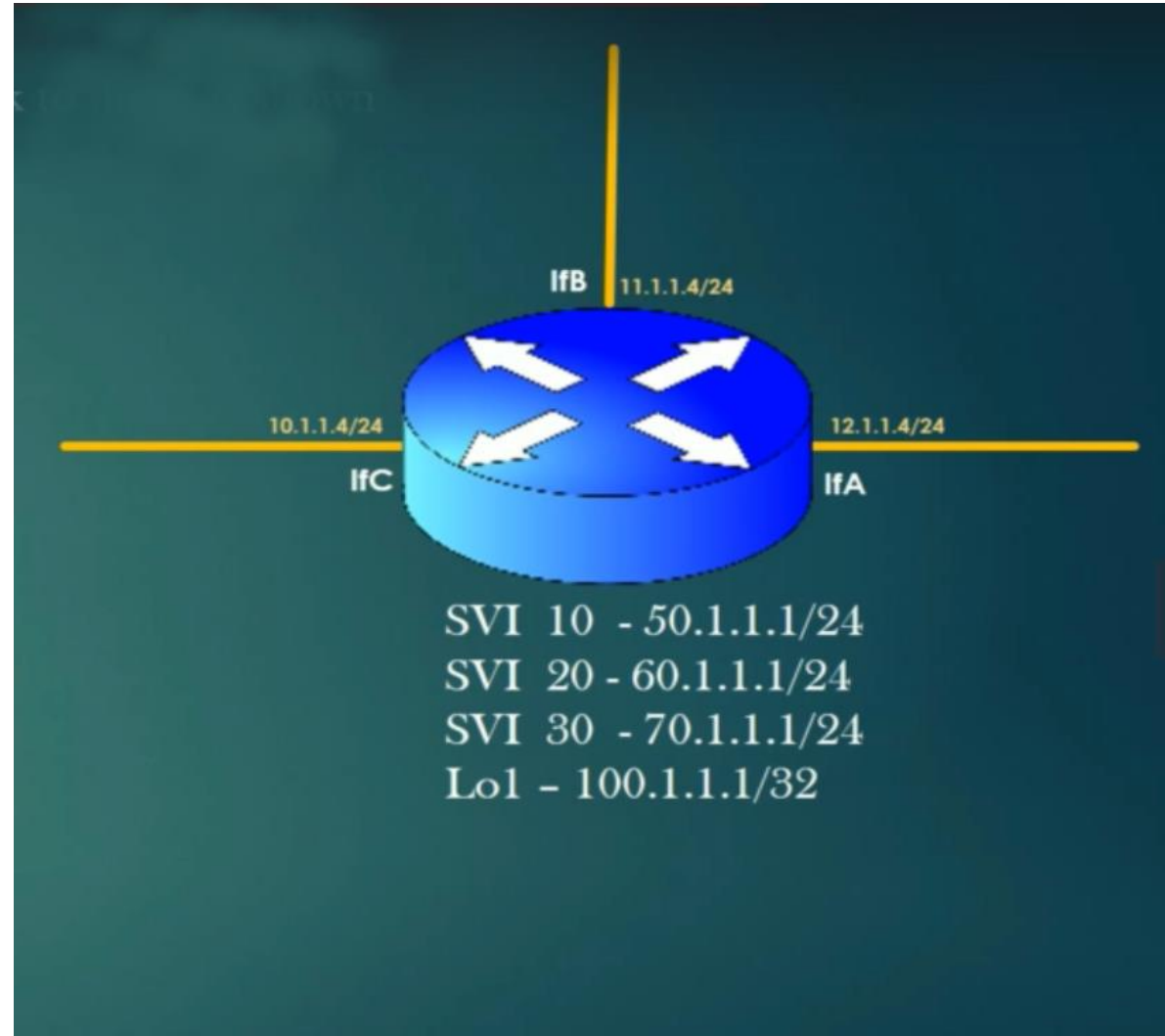


The loopback interface allows a computer to send network traffic to itself. This is useful for testing network-related functionality on the local machine without involving external networks



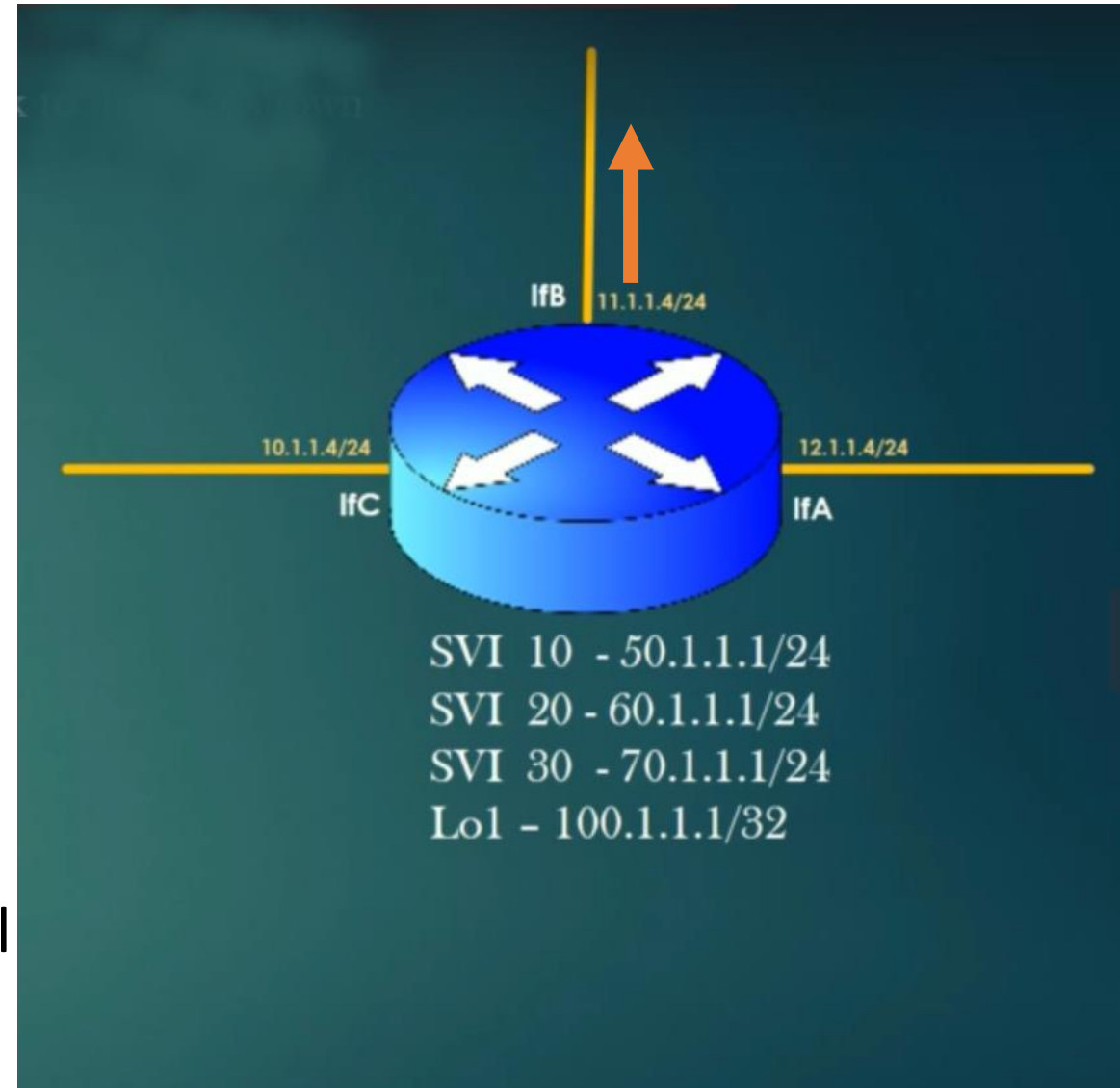
# Switch Virtual Interfaces (SVI)

- Let us create SVI10, SVI20, SVI30 on Router and assign ip/mask to them as shown
- We have also created one loopback interface LO1 with ip- 100.1.1.1/32
- Now router is said to be in possession of following subnets:
  1. 11.1.1.0/24
  2. 10.1.1.0/24
  3. 12.1.1.0/24
  4. 50.1.1.0/24
  5. 60.1.1.0/24
  6. 70.1.1.0/24
  7. 100.1.1.1/32
- So using the concept of SVIs you can make a L3 router is possession of as many subnets as you want without attaching real physical interface/hardware.
- Now this router must receive the traffic with destination ip address =member of any subnet possessed by L3 router.
- So, in addition to real physical subnets this router would receive traffic destined for ip address 50.1.1.x, 60.1.1.x, 70.1.1.x or 100.1.1.1 (self).

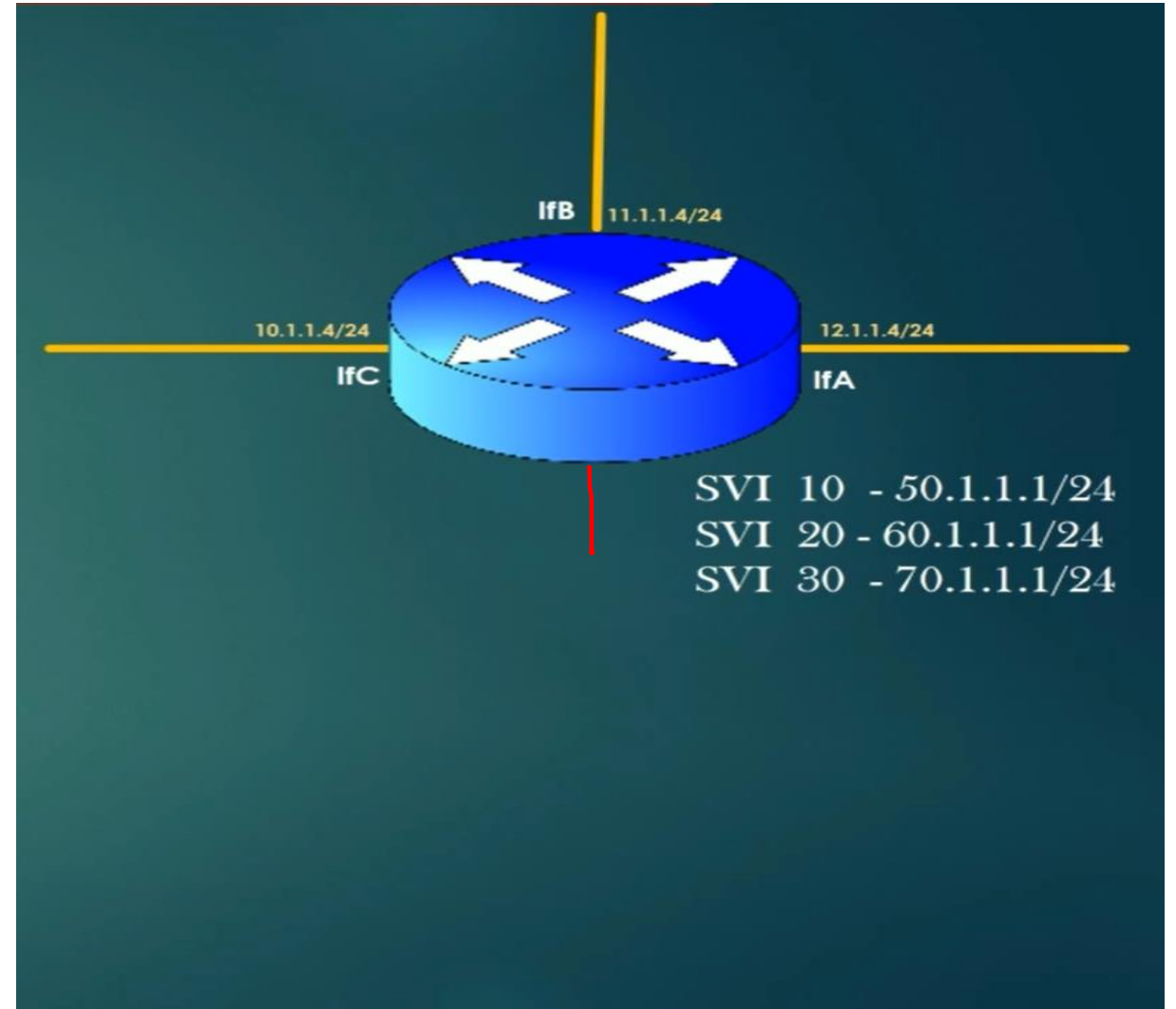


# Switch Virtual Interfaces (SVI)

- When this router receives the traffic for destination =11.1.1.3, router shall forward the traffic out of interface ifB via L2 routing.
- When this router receives traffic for Dst=100.1.1.1 or 11.1.1.4 or 12.1.1.4 or 10.1.1.4 router itself will consume the traffic.(Exact match)
- But what will router do if it receives the traffic for destination 50.1.1.x, 60.1.1.x, 70.1.1.x where x!=1.
- Router has to forward the traffic to machine present in directly connected local subnets
- But where are those subnets?

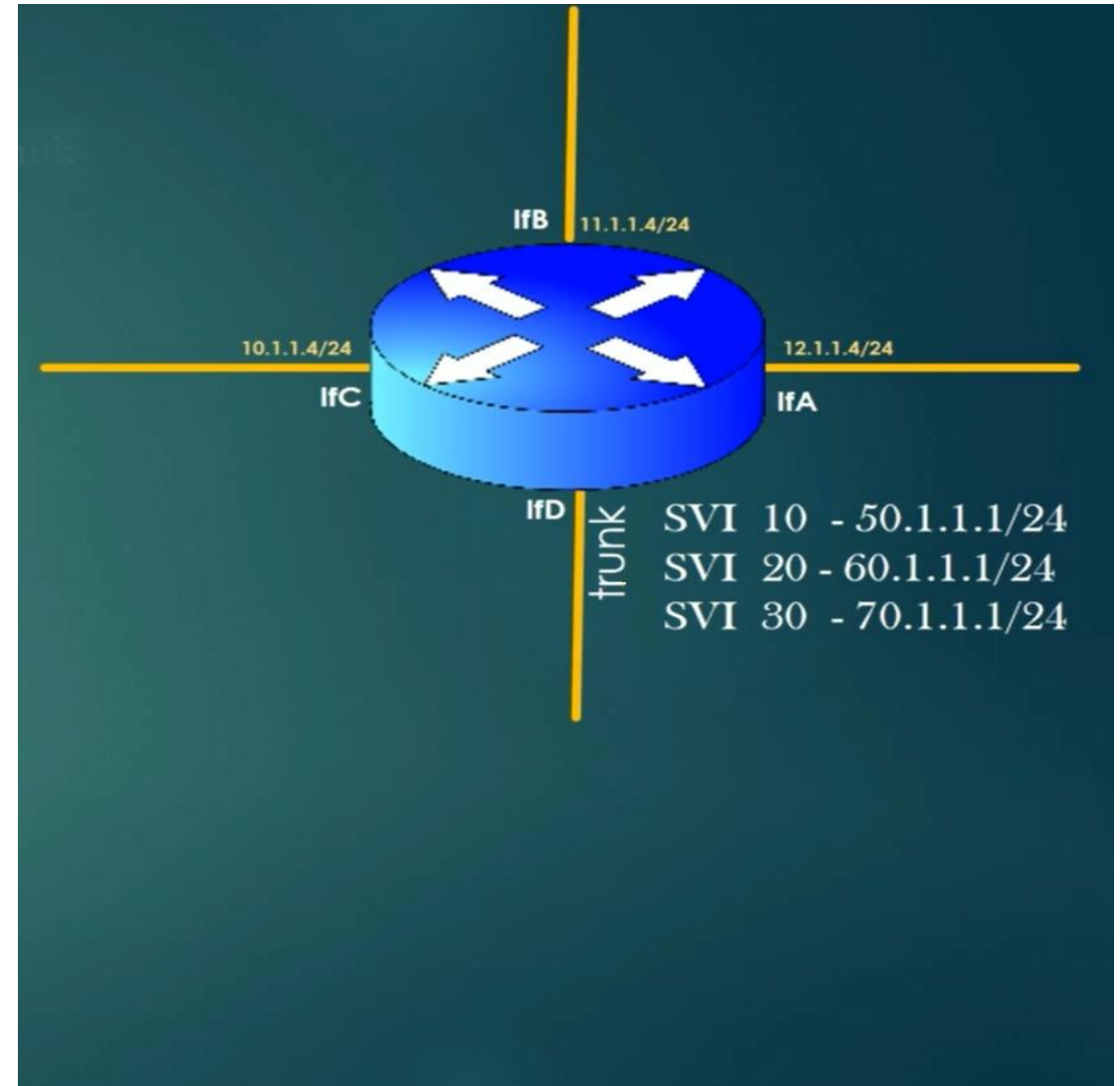


# L3 Router Configuration for VLAN forwarding



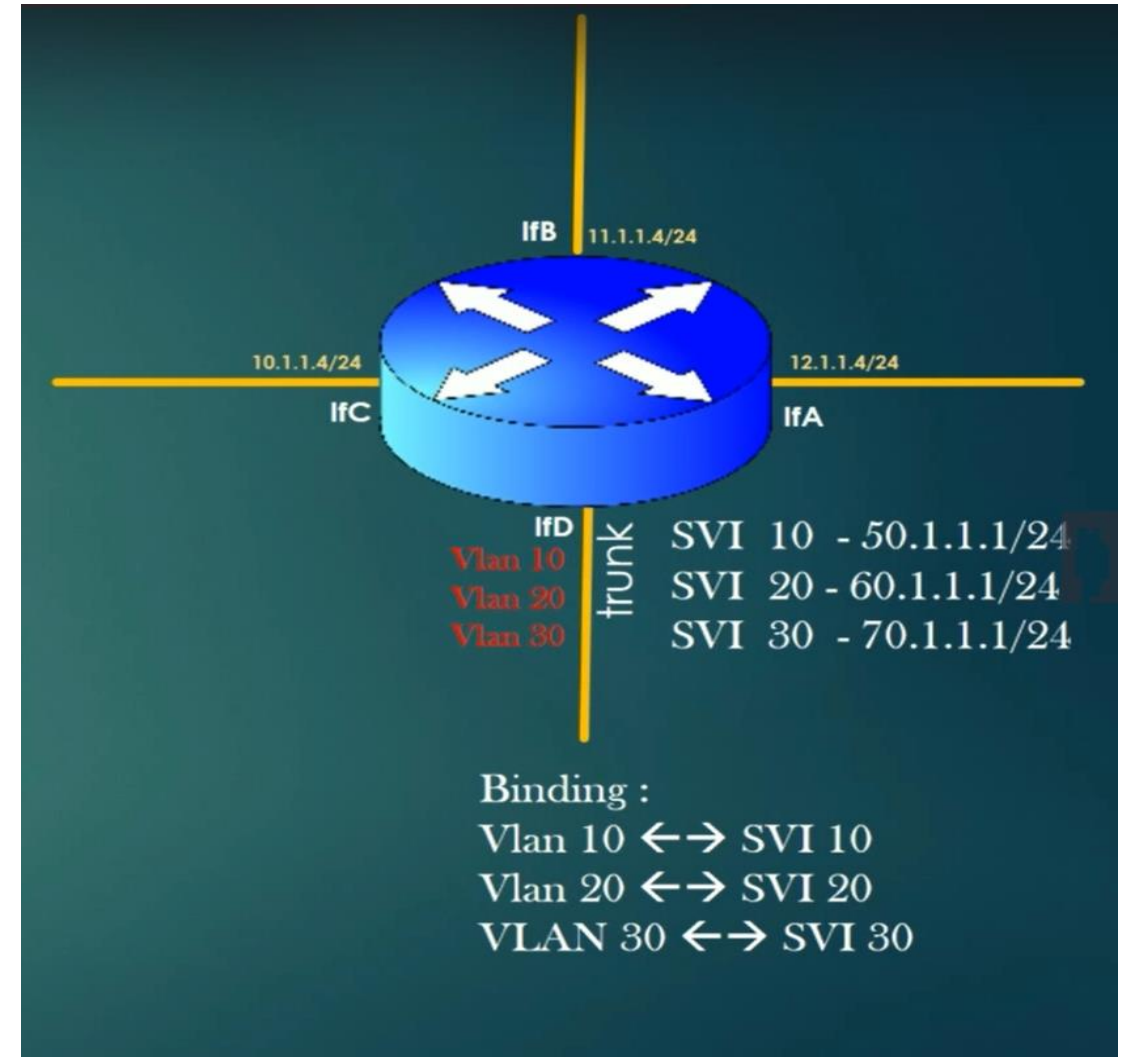
# L3 Router Configuration for VLAN forwarding

- Take one physical interface of a router, say ifD and configure it as a Trunk.



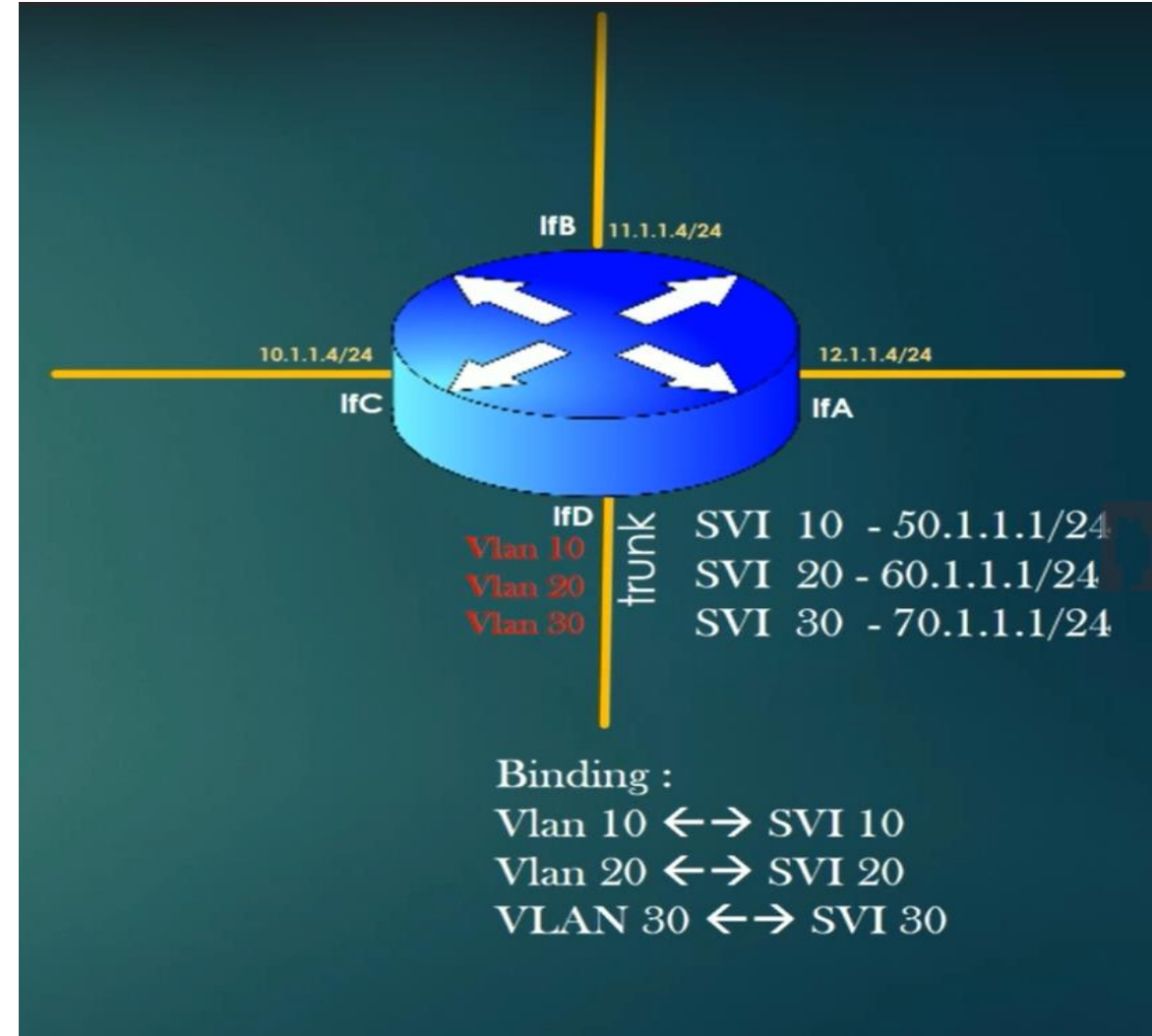
# L3 Router Configuration for VLAN forwarding

- Take one physical interface of a router, say ifD and configure it as a Trunk.
- Configure ifD to operate in VLAN 10,20 and 30.



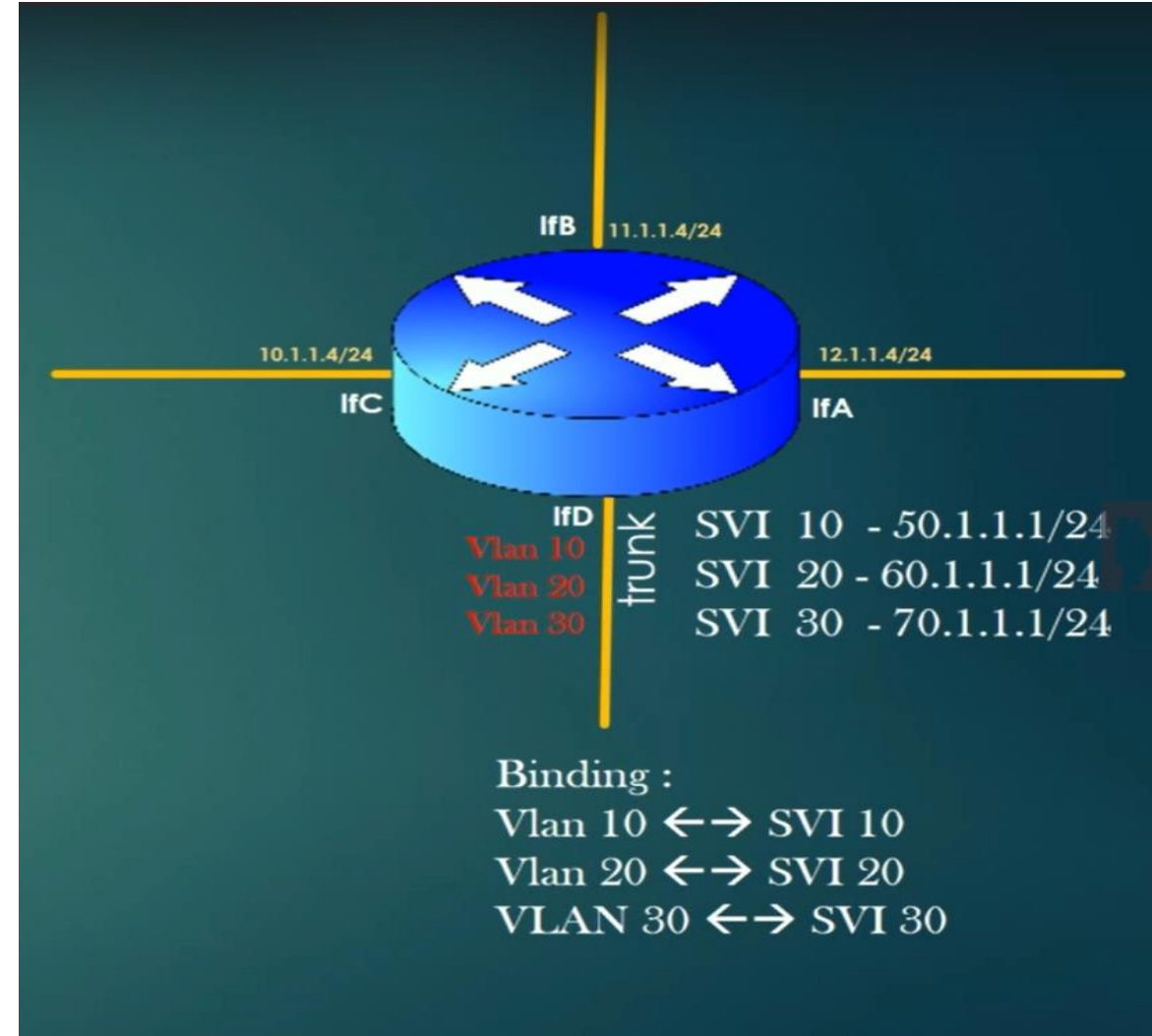
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# L3 Router Configuration for VLAN forwarding

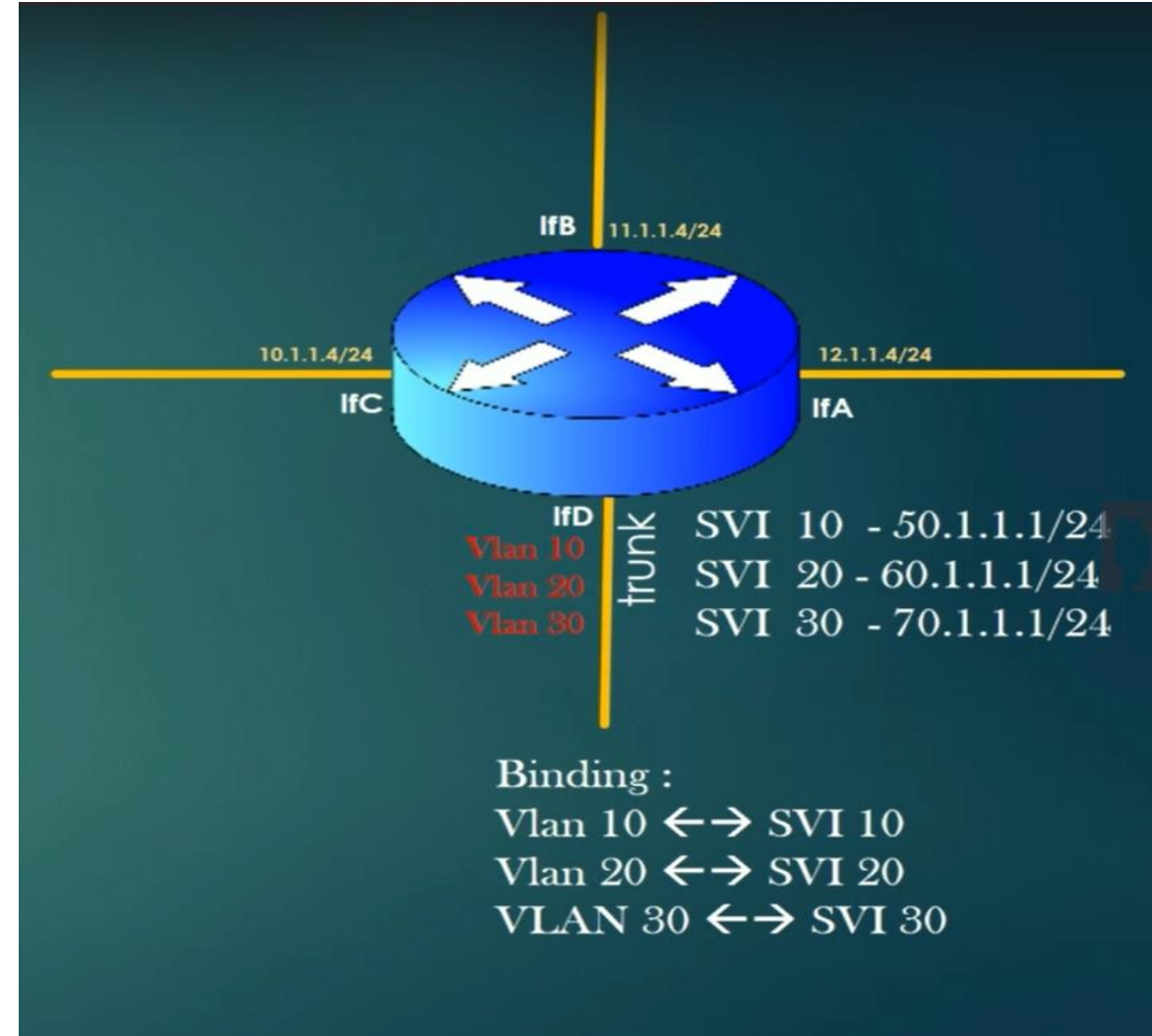
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- By binding the SVIs-VLAN together, VLANS borrow the network id of SVI's.





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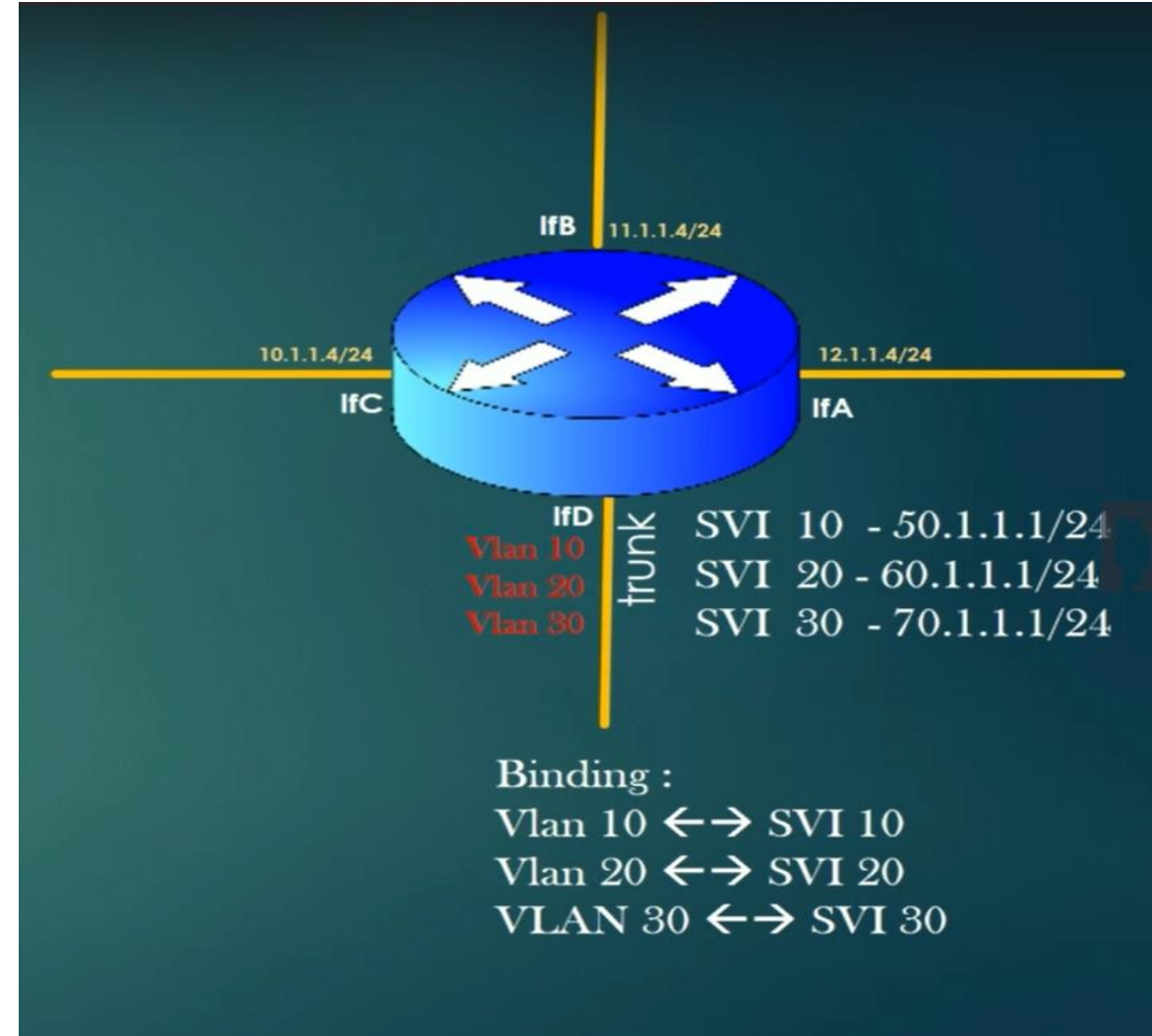
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- By binding the SVIs-VLAN together, VLANS borrow the network id of SVI's.
- For example, VLAN 10 network id will be 50.1.1.0/24. All host machines present in VLAN 10 must be configured with ip address 50.1.1.x/24.





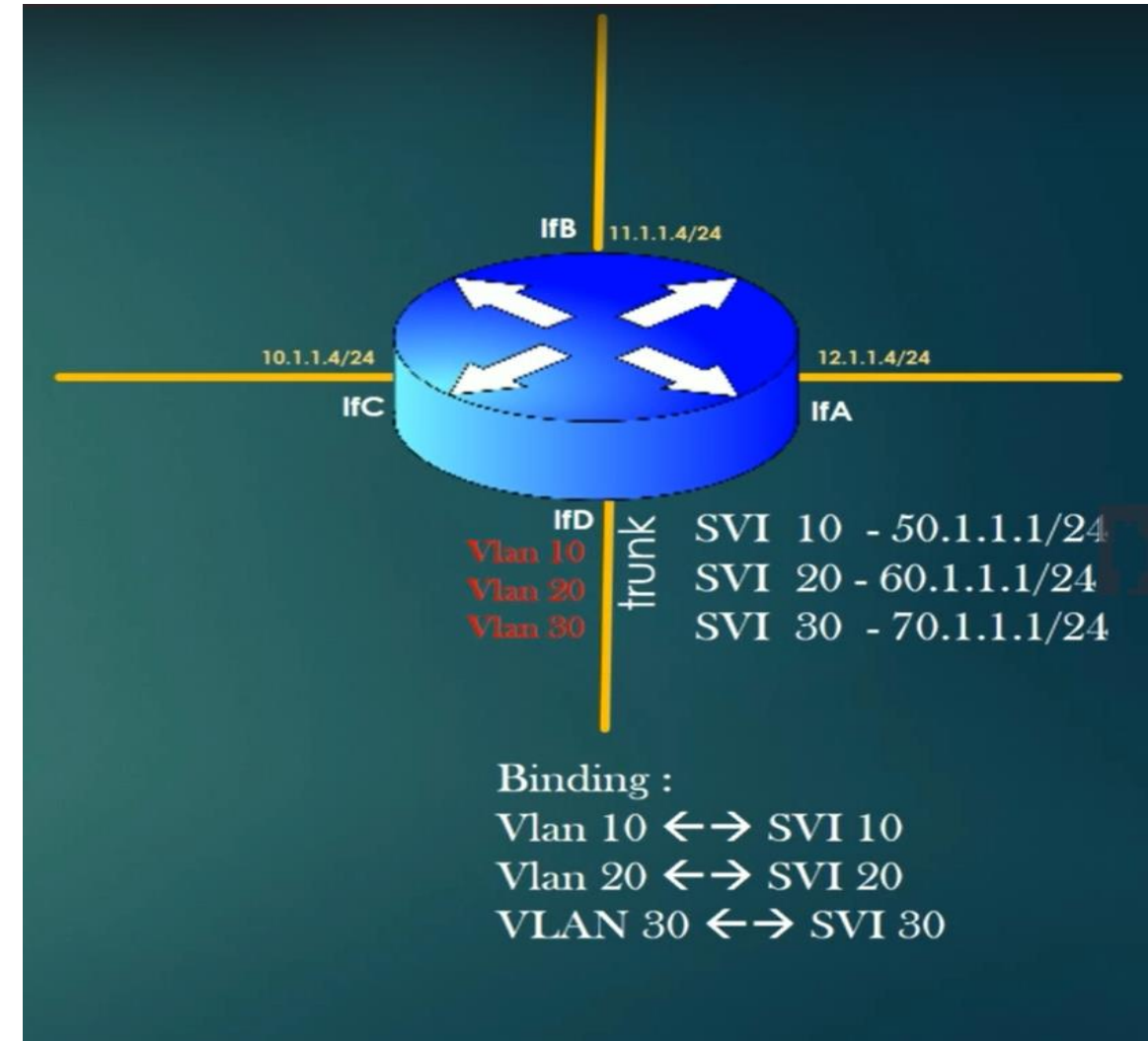
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- For example, VLAN 10 network id will be 50.1.1.0/24. All host machines present in VLAN 10 must be configured with ip address 50.1.1.x/24.
- Remind basics-Every subnet must have network id, VLAN must also have network id since they are subnet after all.



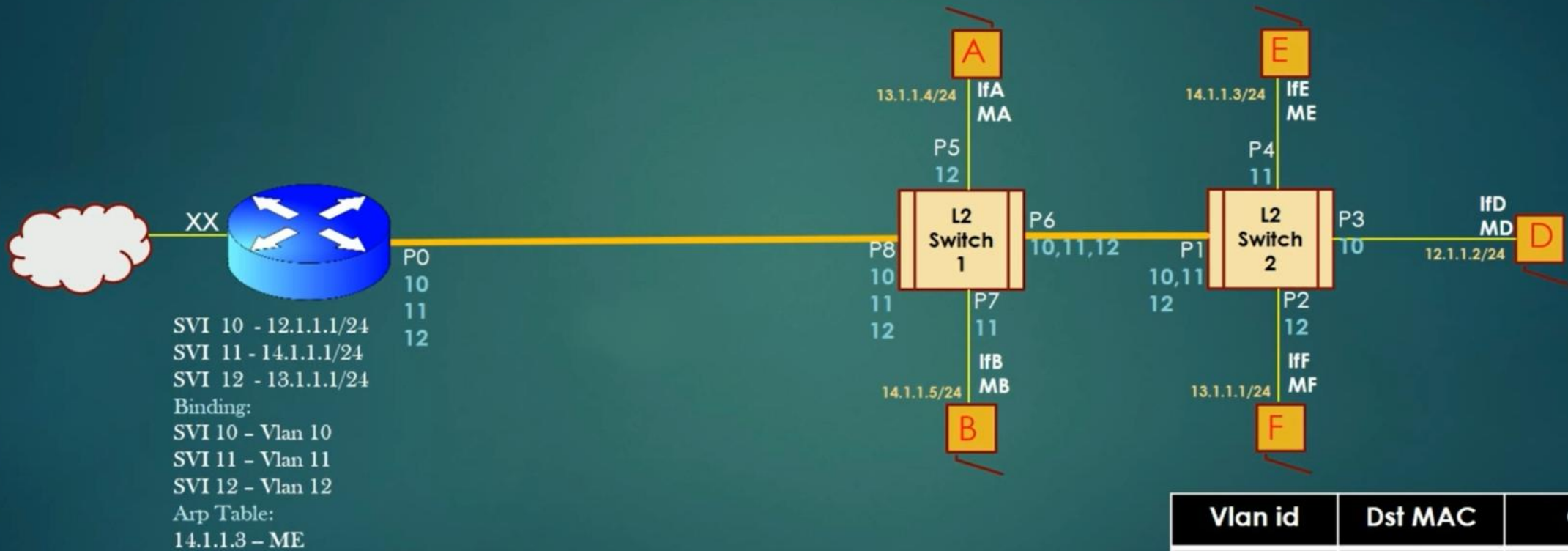
# L3 Router Configuration for VLAN forwarding

- Steps for router-VLAN routing:
  1. If router receives a traffic for destination = 60.1.1.10, it checks in which SVI the Destination ip address is a member of, in this case it is SVI 20 (60.1.1.10 lies in subnet 60.1.1.0/24)
  2. Router then checks the VLAN bind to SVI 20, which is VLAN 20
  3. Router tags the packet with VLAN id 20
  4. Router forwards the packet out of all local physical interfaces which are operating in VLAN 20, in this case interface ifD only.



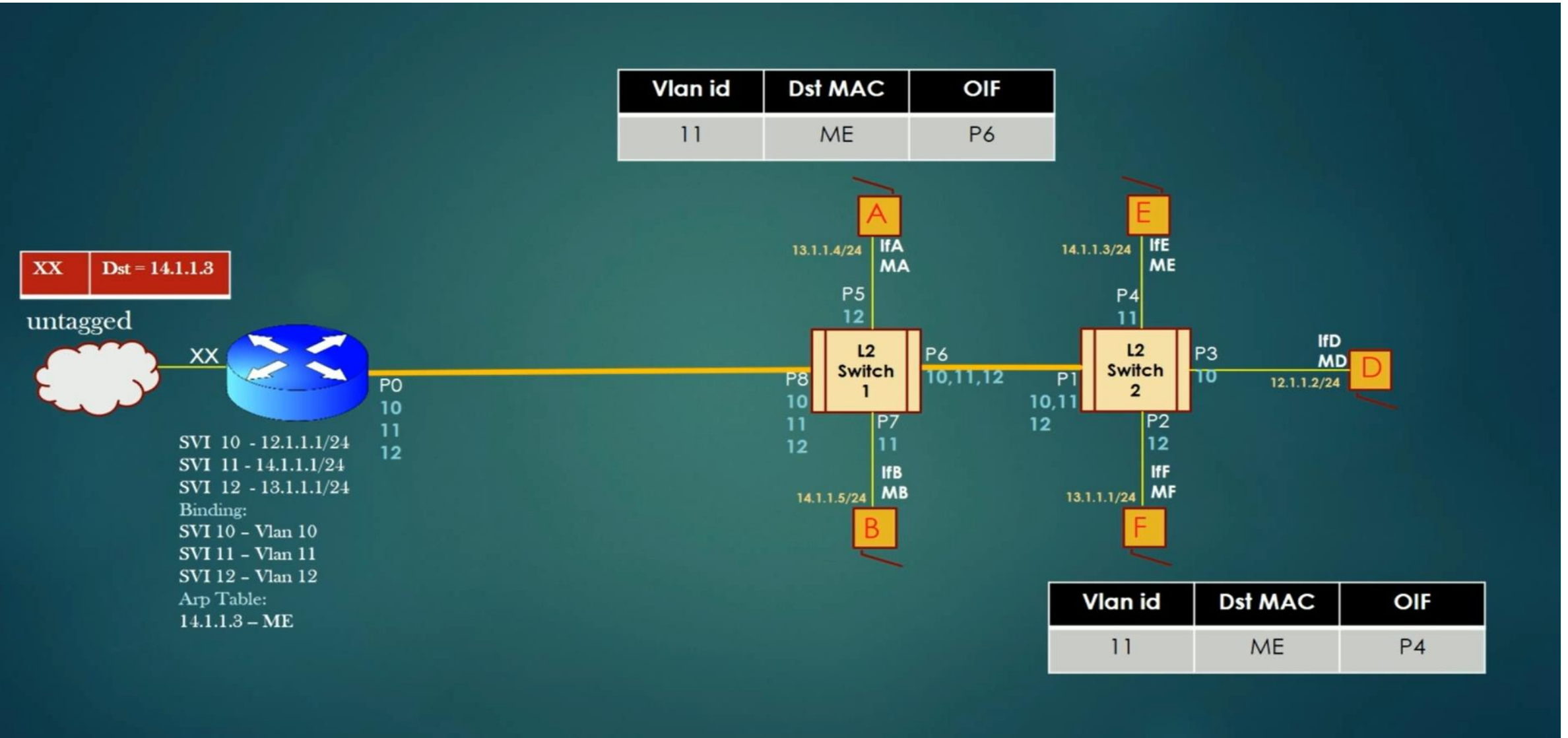
# Router to VLAN Forwarding Example

Vlan id	Dst MAC	OIF
11	ME	P6

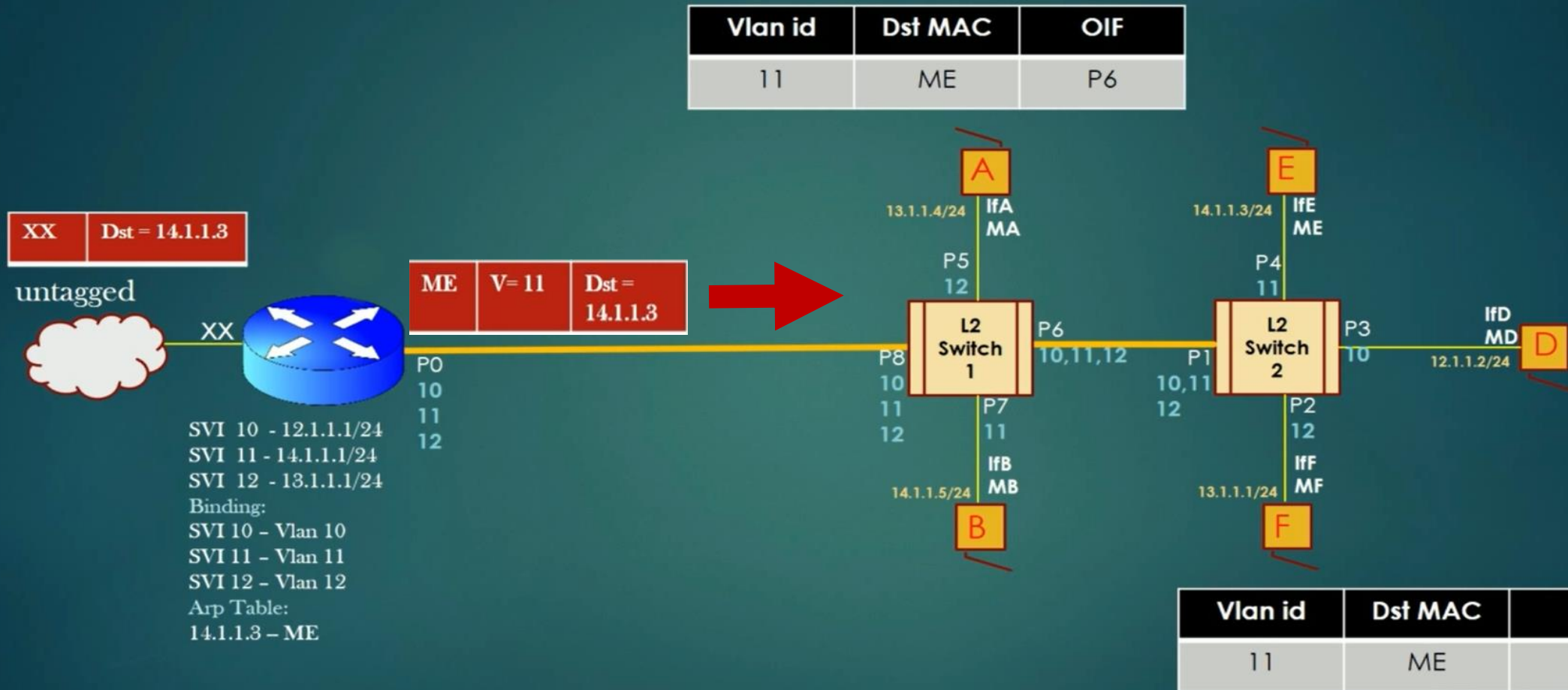


Vlan id	Dst MAC	OIF
11	ME	P4

# Router to VLAN Forwarding Example



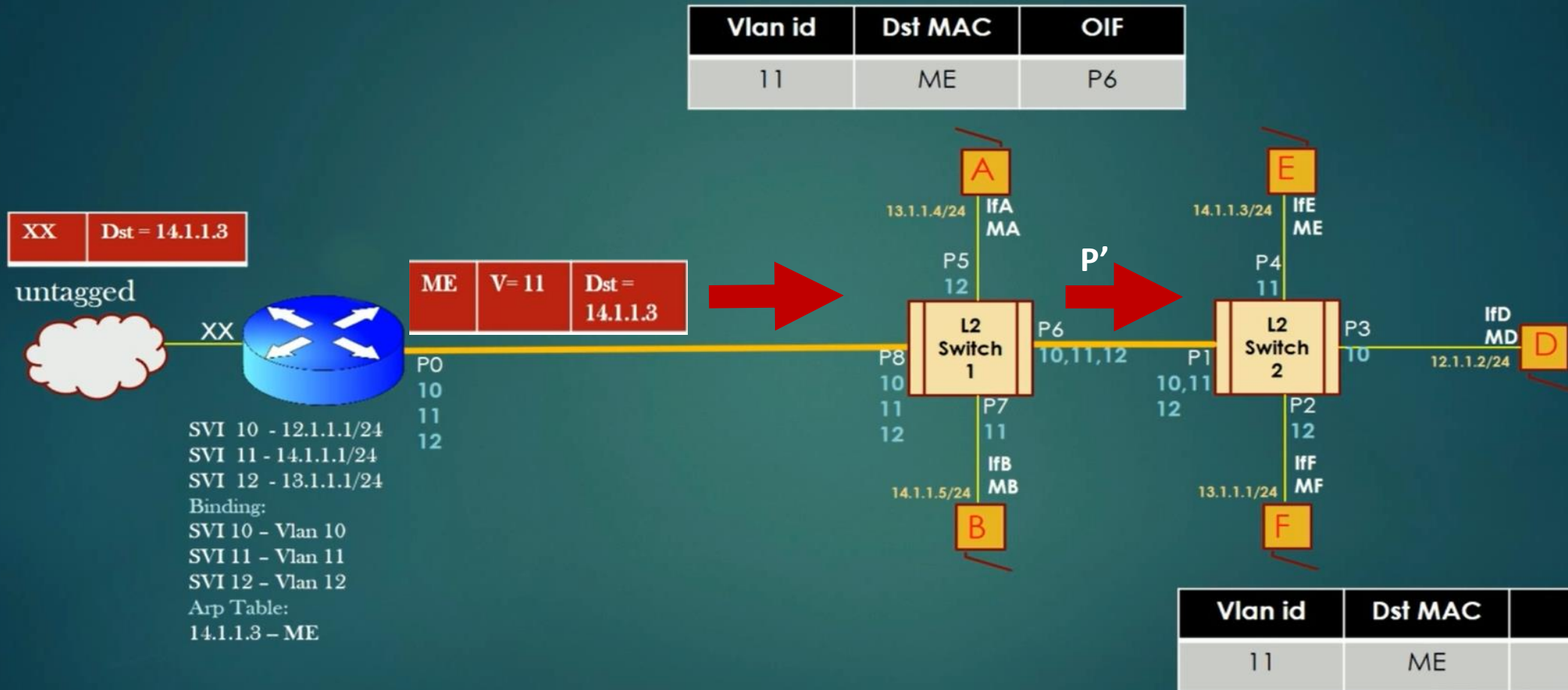
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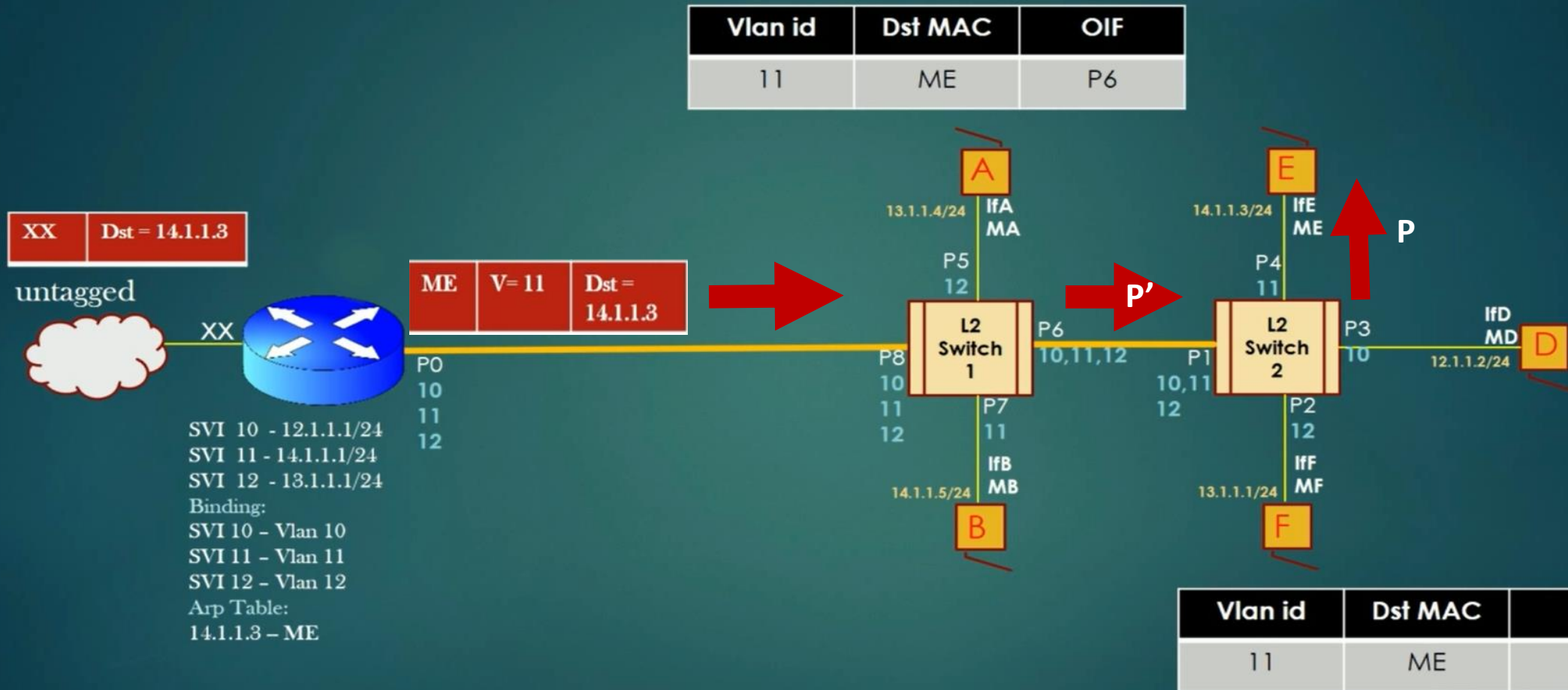
OIF- Outgoing interface



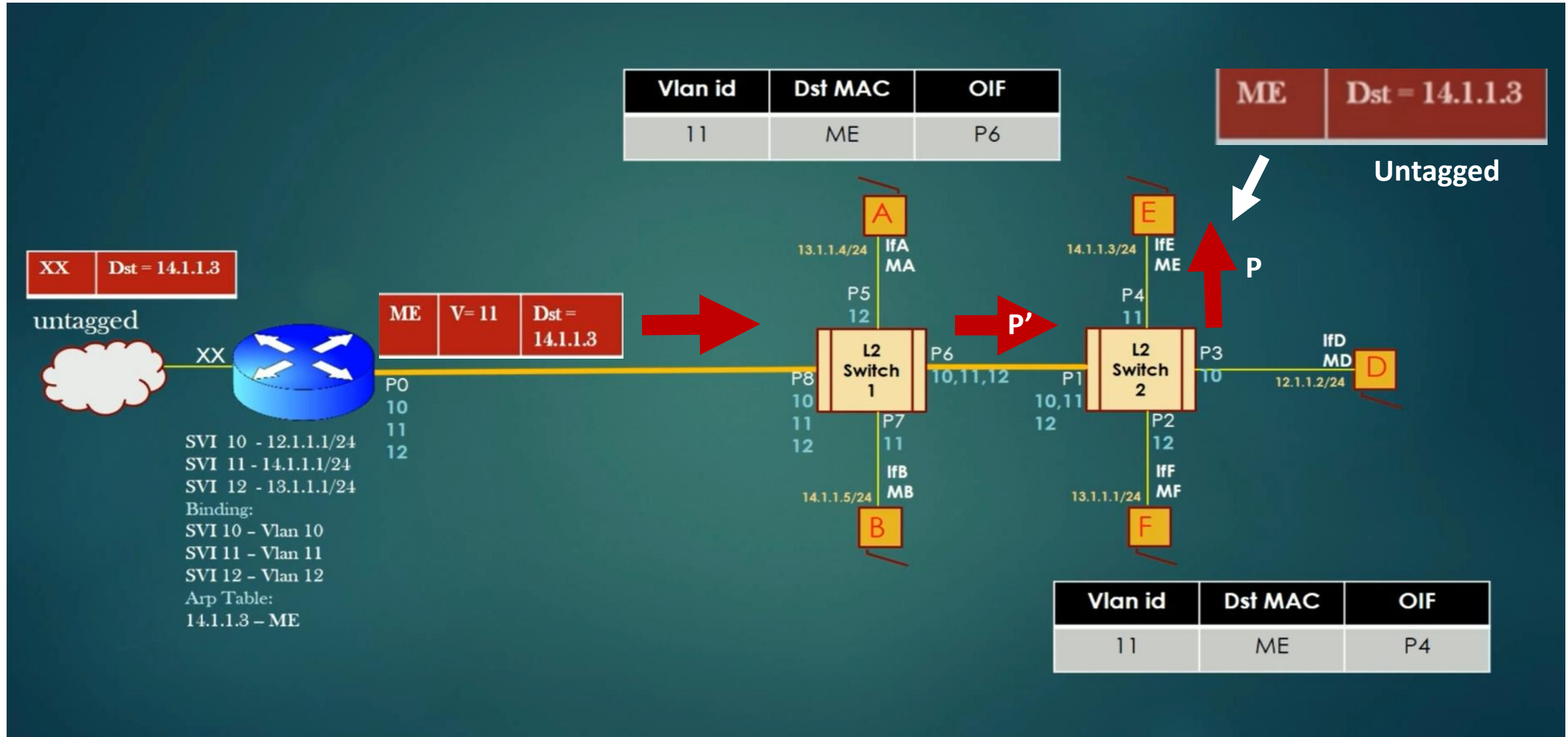
# Router to VLAN Forwarding Example



# Router to VLAN Forwarding Example



# Router to VLAN Forwarding Example





Thank You