1 MPLS *(2 points)*

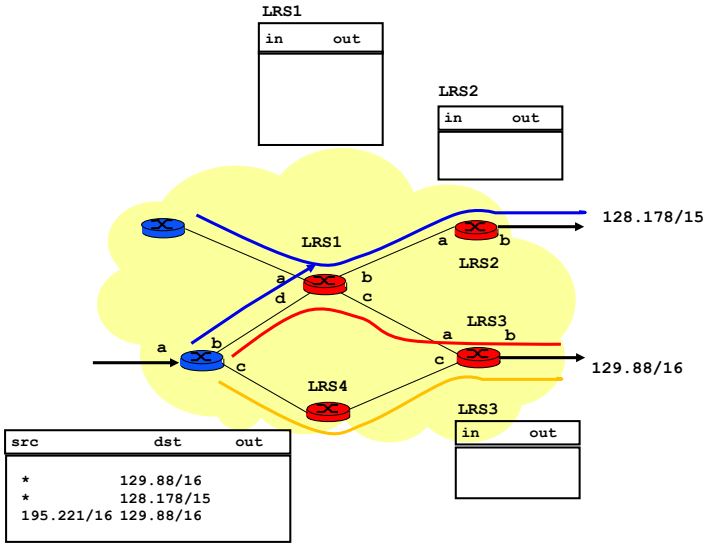


Figure 1: MPLS network

Figure 1 shows an MPLS network composed of two ingress routers and four LSR routers. For the destination `129.88/16`, if the packets come from `195.221/16`, then they must enter LSP going through LRS4, otherwise they must go through LSR1. Fill in the LIB switch tables of these routers that match LSPs shown in the figure.

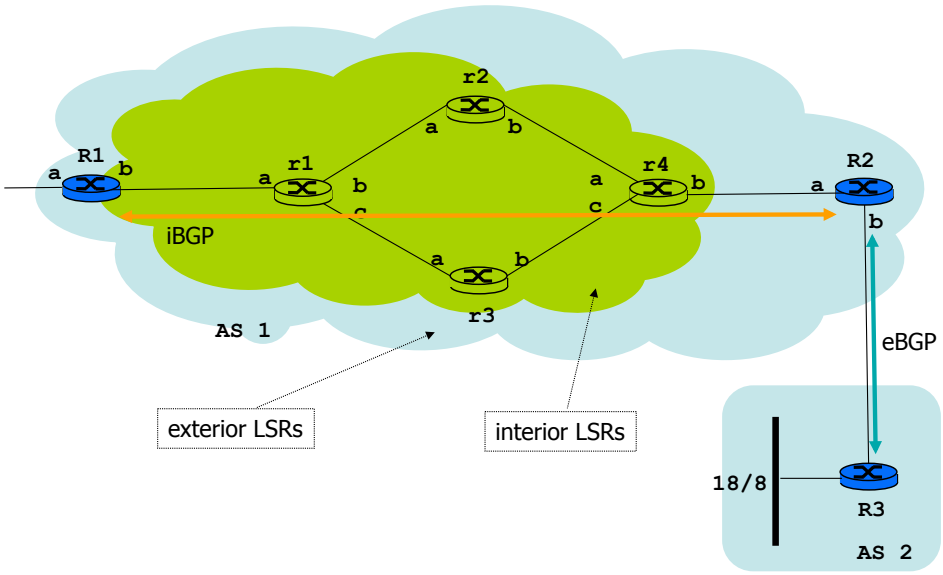
1 MPLS

Consider an Autonomous System `AS 1` that carries transit traffic between other Autonomous Systems using MPLS (cf. Figure 1). Its network consists of two "classes" of LSR: exterior LSRs (e.g. `R1` and `R2`) that interface to other networks, and interior LSRs (e.g. `r1, r2, r3, r4`) that carry traffic between exterior LSRs. Suppose that the exterior LSRs are BGP speakers. We want to deliver the transit traffic from an exterior LSR to another exterior LSR by the interior LSRs. We suppose that BGP speakers use an extension to BGP that allows to distribute a label for an address prefix.

Consider the case in which router `R1` has BGP route information about prefix `18/8` with `NEXT_HOP` attribute set to router `R2`. `R2` binds label L_1 to prefix `18/8` and passes this information to `R1` via iBGP. We assume that an IGP protocol provides required information about routing inside `AS 1`—the route to `R2` goes through `r1, r2, r4`.

- Describe how to set up a LSP inside the `AS 1` MPLS network to forward the traffic to `18/8`.
- Give the switching tables at `R1, r1, r2, r4`, and `R2`.
- Give the MPLS encapsulation along the LSP path of a packet arriving at `R1`.

Figure 1: Example MPLS network



1 VPLS

Consider a telecommunications operator that provides its VPLS service (*Virtual Private LAN Service*): it interconnects VLAN switches of its clients over a MPLS network. Figure 1 shows the internal MPLS network of the operator and the networks to be interconnected: VLAN1 and VLAN2.

Q.1 Describe how ingress routers work. **Q.2** Give the router switching tables that allow this interconnection.

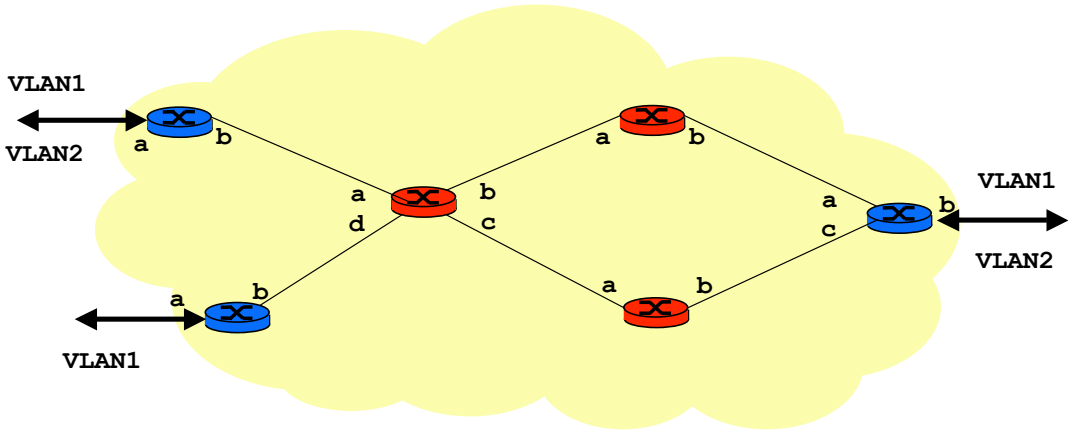


Figure 1: Example VPLS network