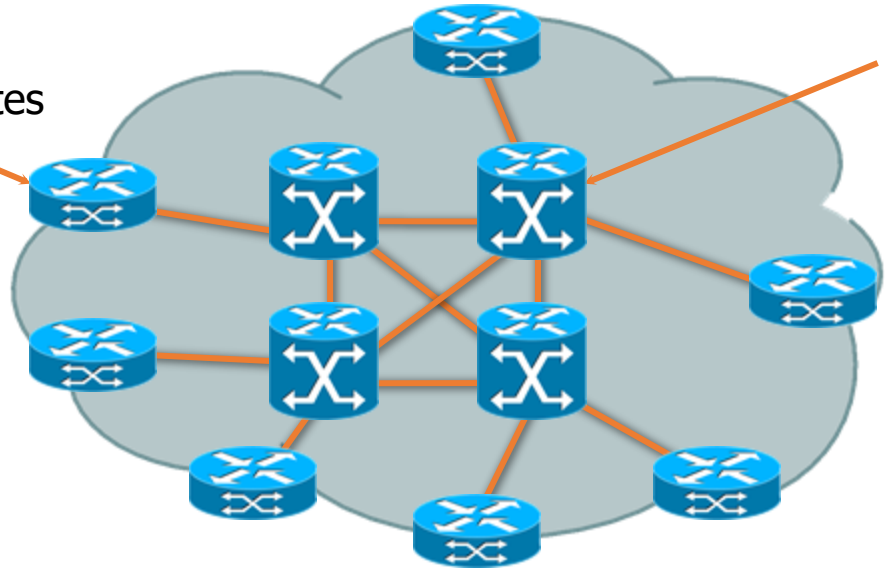
Multiprotocol Label Switching

MPLS

MPLS Conceitos

- **Na fronteira:**
  - Classificar os pacotes
  - Inserir a label nos pacotes
  - **Edge Router**



- **No Core:**
  - Reencaminhamento dos pacotes com base nas labels (não se usa o endereço IP)
  - A label indica o caminho destino

Label Distribution Protocol (LDP)
Usado para efetuar a troca de labels

MPLS conceitos

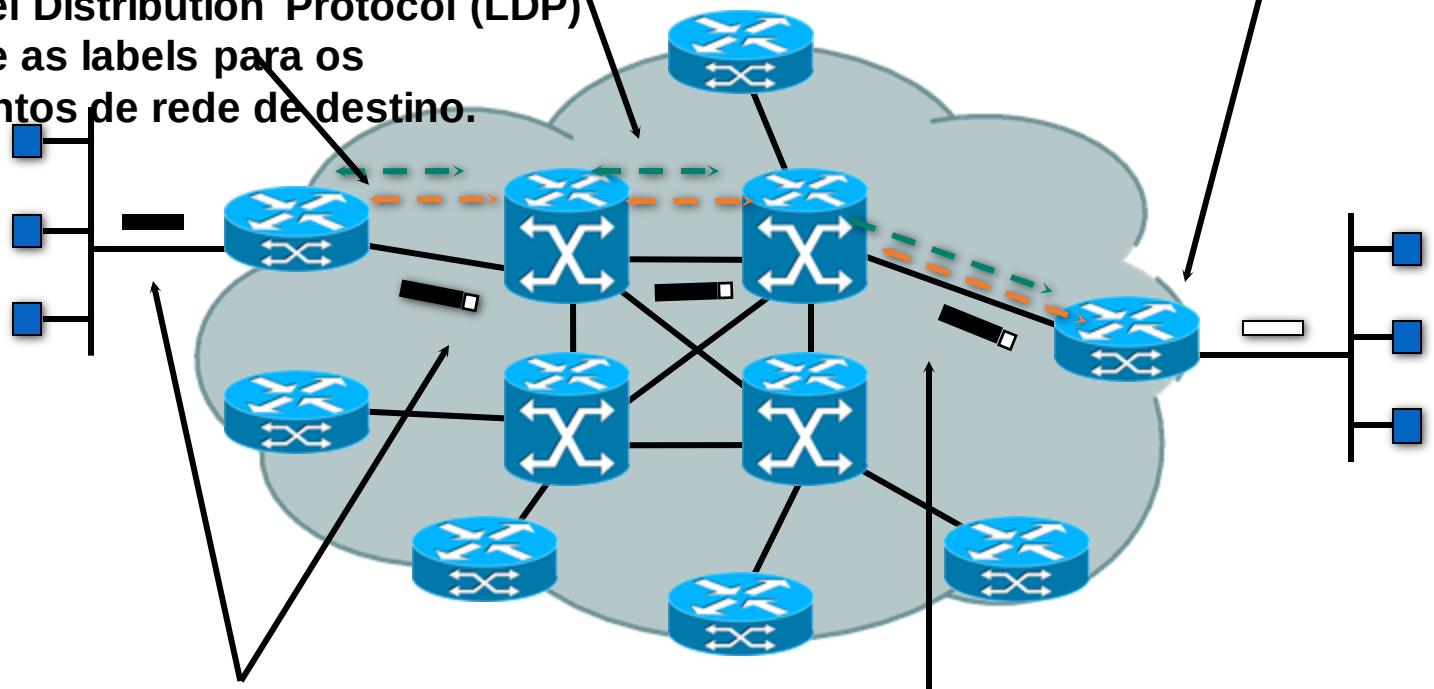
- MPLS: Multi Protocol Label Switching
- O encaminhamento de pacotes é feito com base em labels.
- As labels são atribuídas quando o pacote entra na rede.
- Os nós MPLS encaminham pacotes com base no valor da label (não nas informações do IP).

MPLS Funcionamento

1a. Os protocolos de encaminhamento existentes (por exemplo, OSPF, IS-IS) estabelecem a acessibilidade às redes de destino.

1b. O Label Distribution Protocol (LDP) estabelece as labels para os mapeamentos de rede de destino.

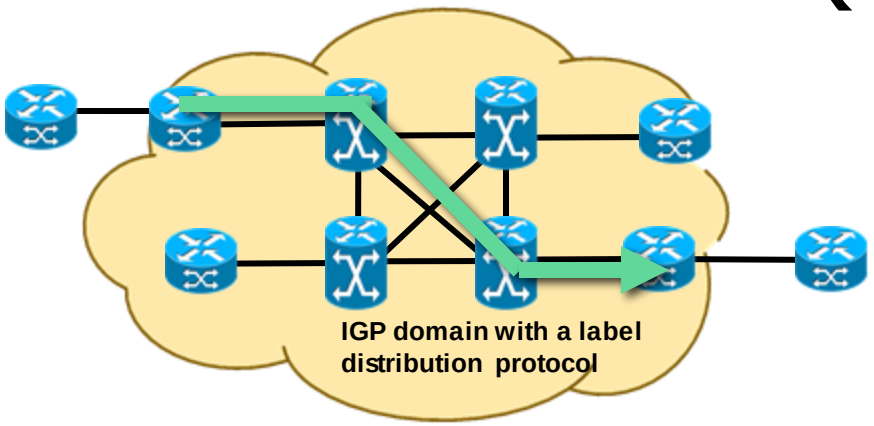
4. O Edge LSR remove o label e entrega o pacote no destino.



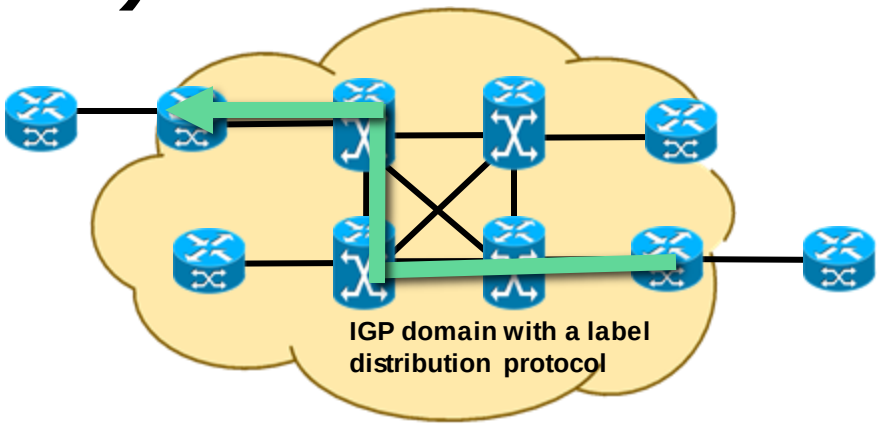
2. O Ingress Edge LSR recebe os pacotes e insere o label (PUSH) no pacote.

3. Os LSR substituem as labels e enviam o pacote para o router seguinte.

Label Switch Path (LSP)



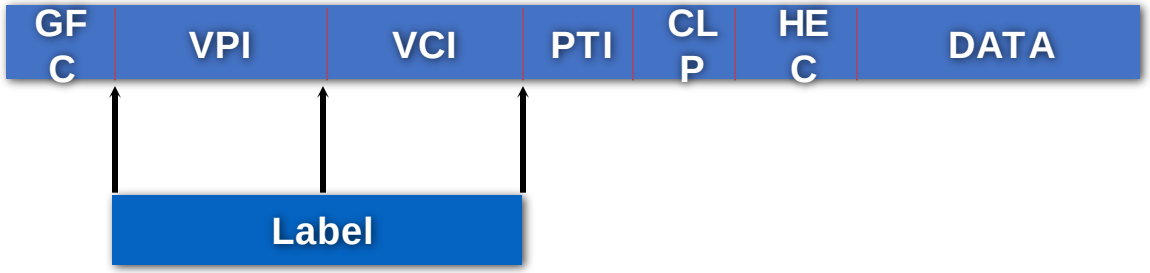
LSP follows IGP shortest path



LSPs are unidirectional, Return traffic takes another LSP

Encapsulamento

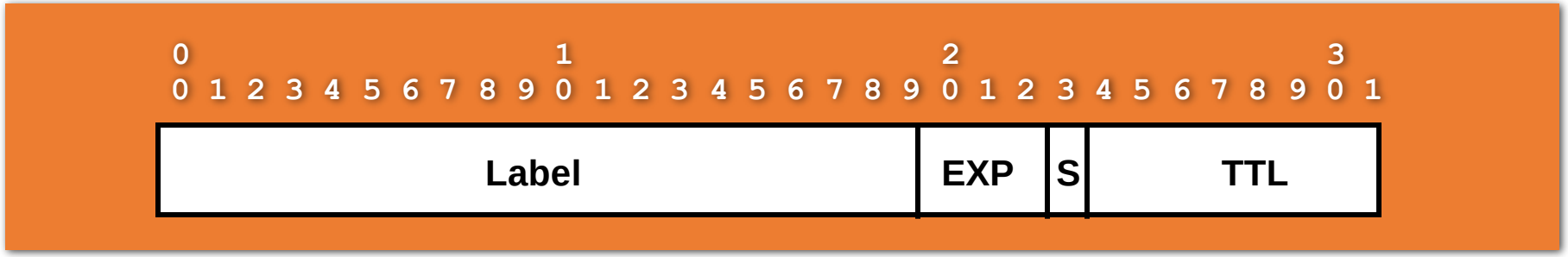
ATM Cell Header



PPP Header
(Packet over SONET/SDH)

LAN MAC Label Header

Label Header



Label = 20 bits
EXP = Class of Service, 3 bits
S = Bottom of Stack, 1 bit
TTL = Time to Live, 8 bits

- Header= 4 bytes, Label = 20 bits.
- Pode ser usado em redes Ethernet, 802.3, ou links PPP

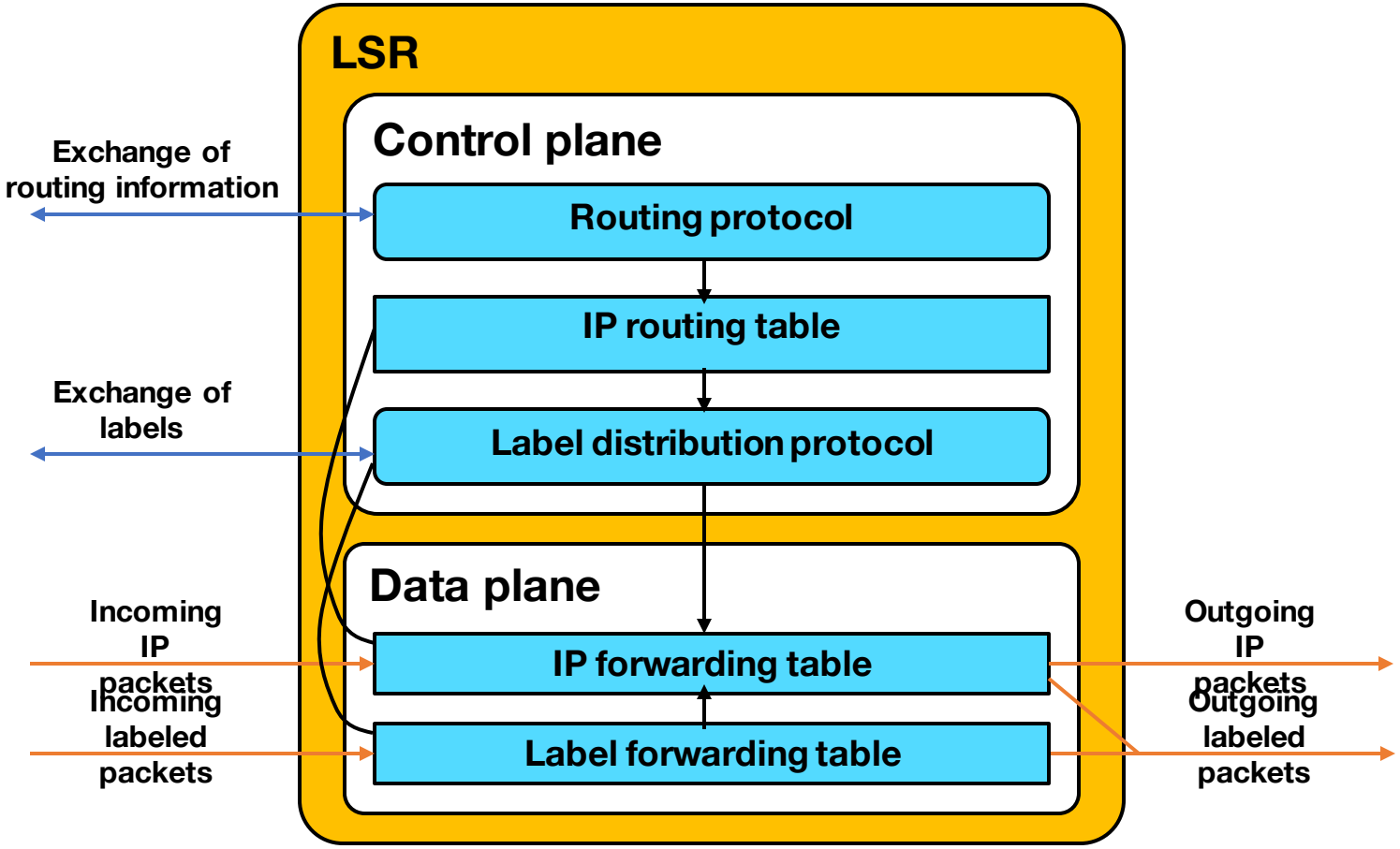
Label Distribution Protocol

LDP

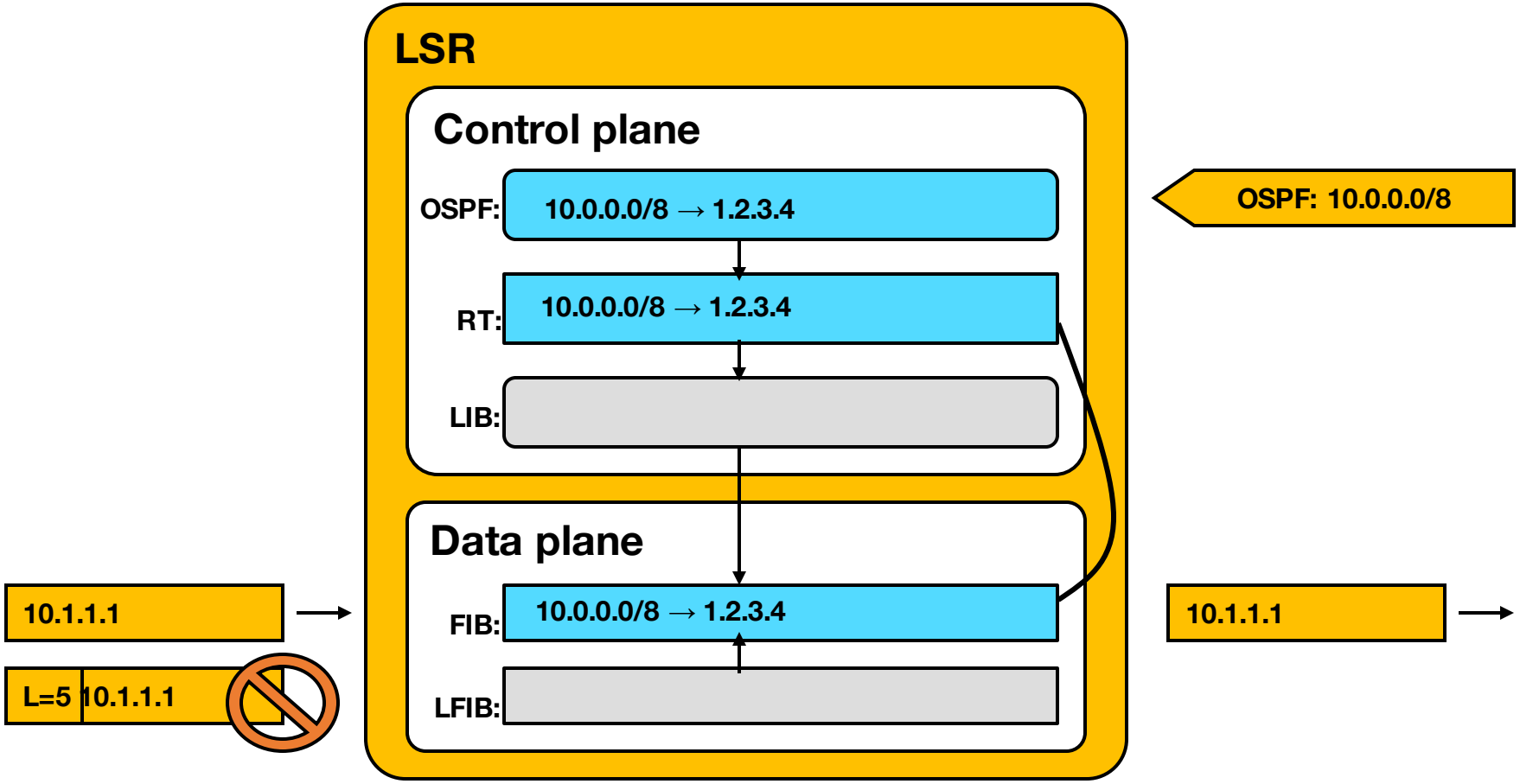
Label Distribution Protocol

- Definido nas RFC 3036 e 3037
- Usado para distribuir labels em redes MPLS
- Como os pacotes são mapeados para LSPs (Label Switched Paths)
- Anuncie etiquetas por FEC
- Alcance o destino a.b.c.d com o rótulo x
- Descoberta vizinha
- Descoberta básica e estendida

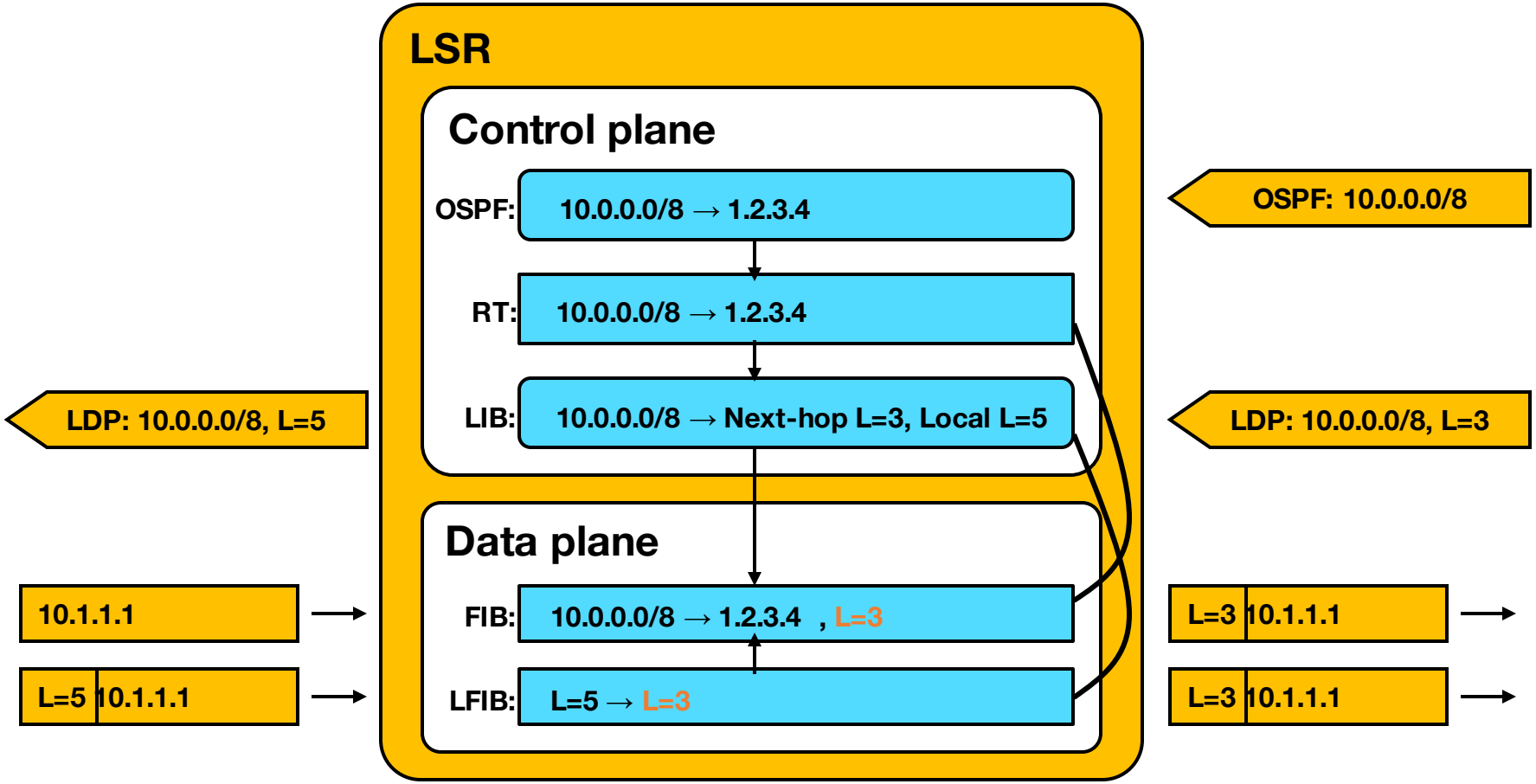
MPLS Unicast IP Routing Architecture



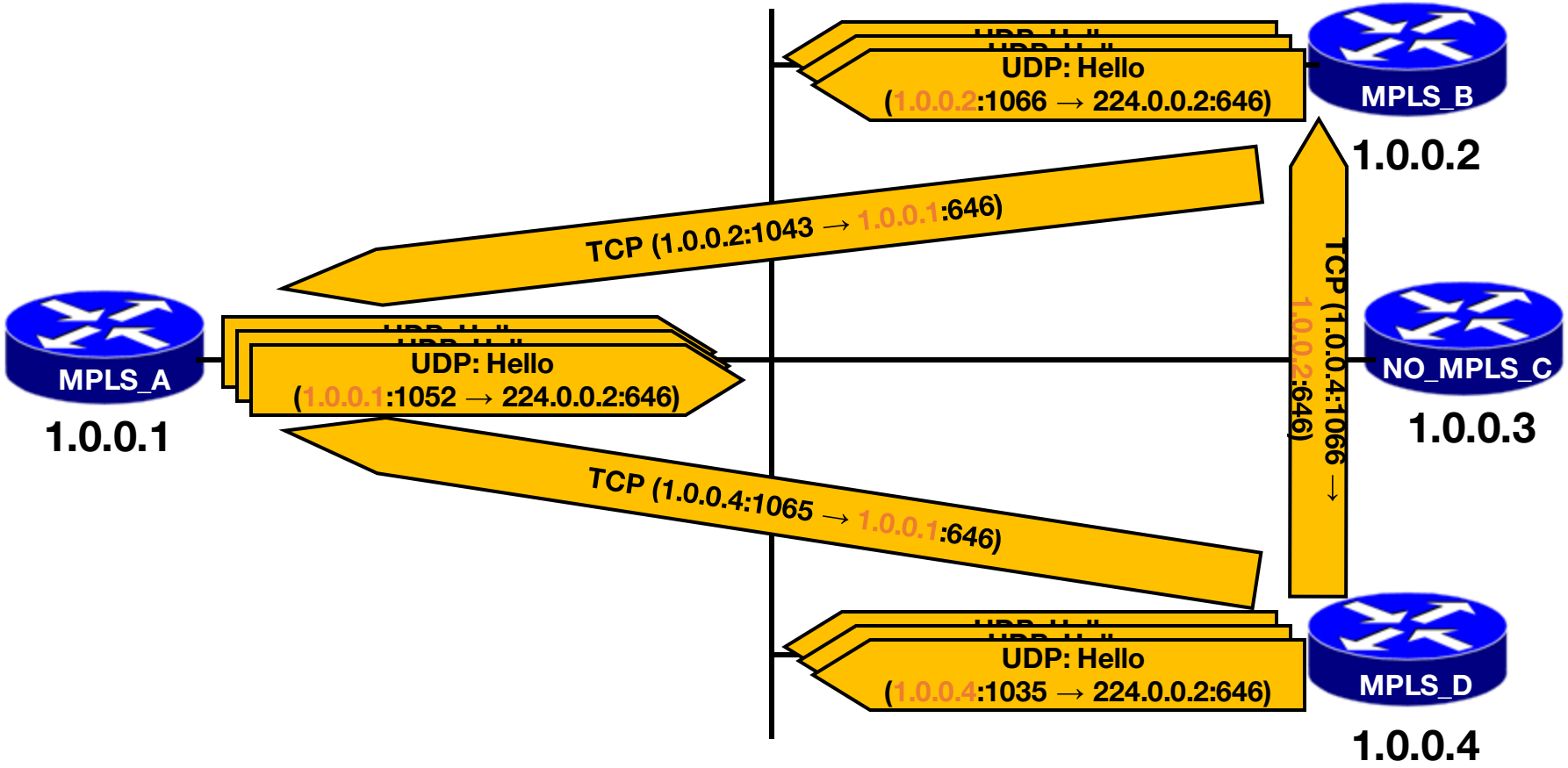
MPLS Unicast IP Routing: Example



MPLS Unicast IP Routing: Example

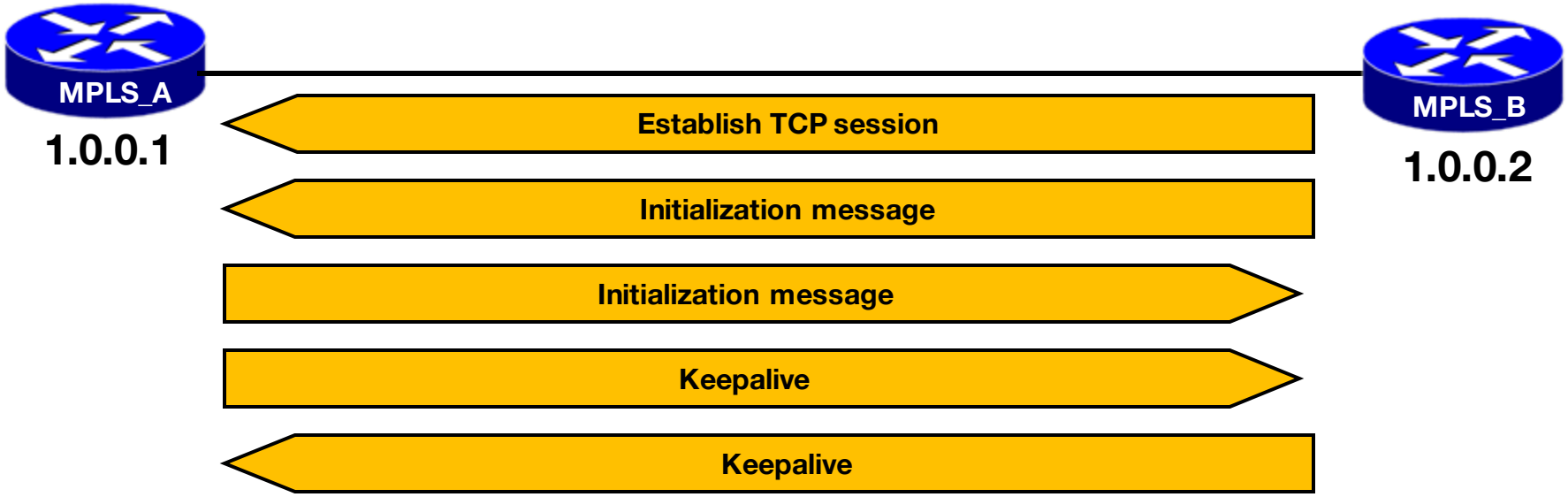


LDP Neighbor Discovery



- LDP Session is established from the router with higher IP address.

LDP Session Negotiation



- Peers first exchange initialization messages.
- The session is ready to exchange label mappings after receiving the first keepalive.