Core network protocols and architectures

Multi-Protocol Label Switching

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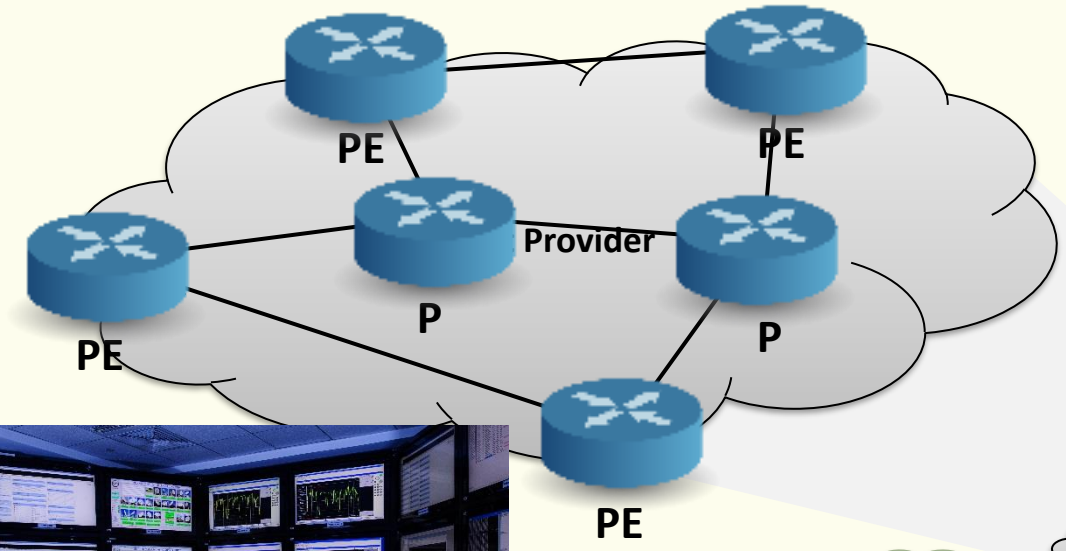
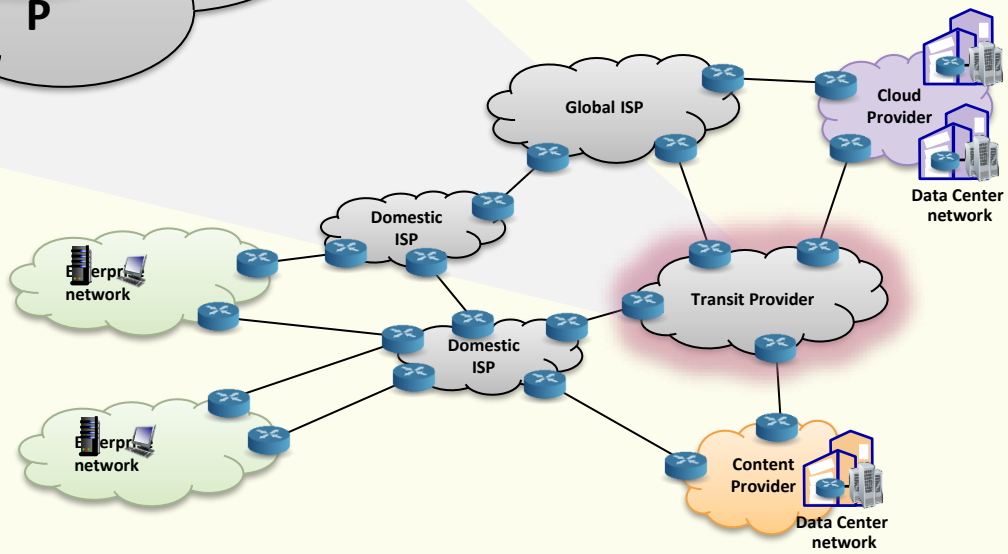
Multi-Protocol Label Switching

- Routing scalability



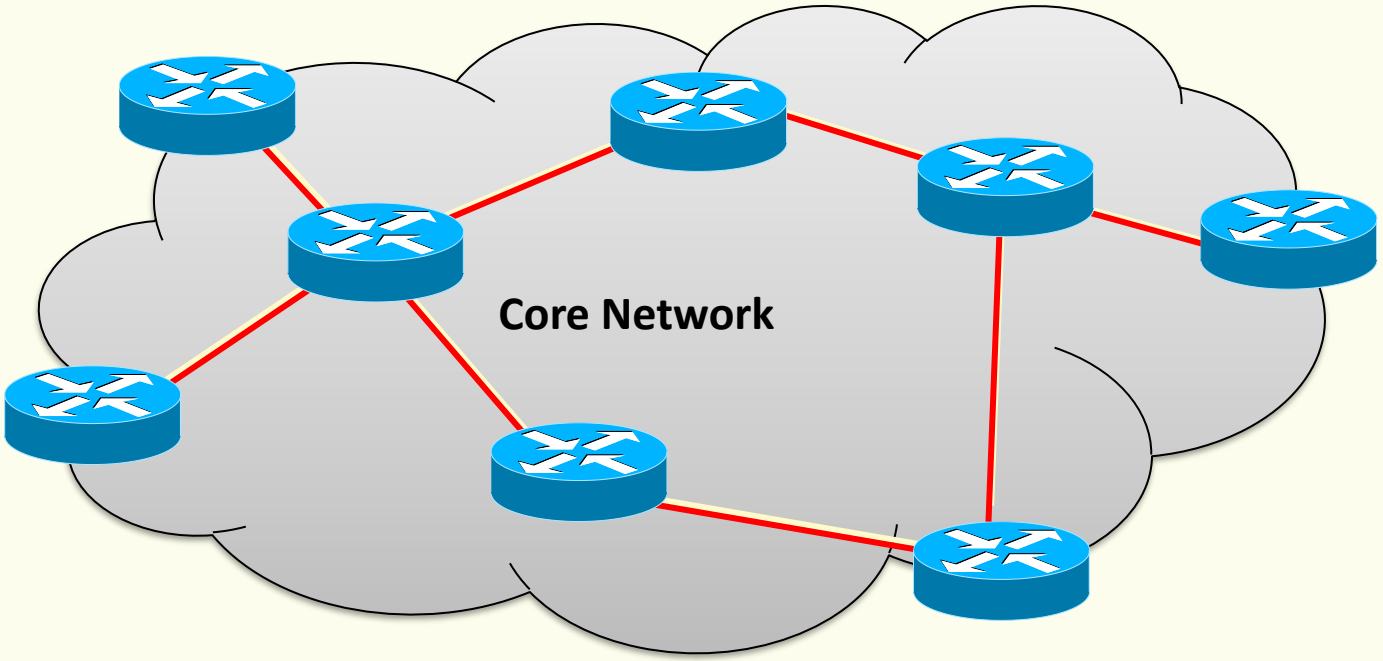


MPLS problem statement

- **Scalability** of network layer routing
- Greater **flexibility** in delivering routing services
- Optimize network **performance**
- Simplify **integration** of routers with cell-switching based technologies

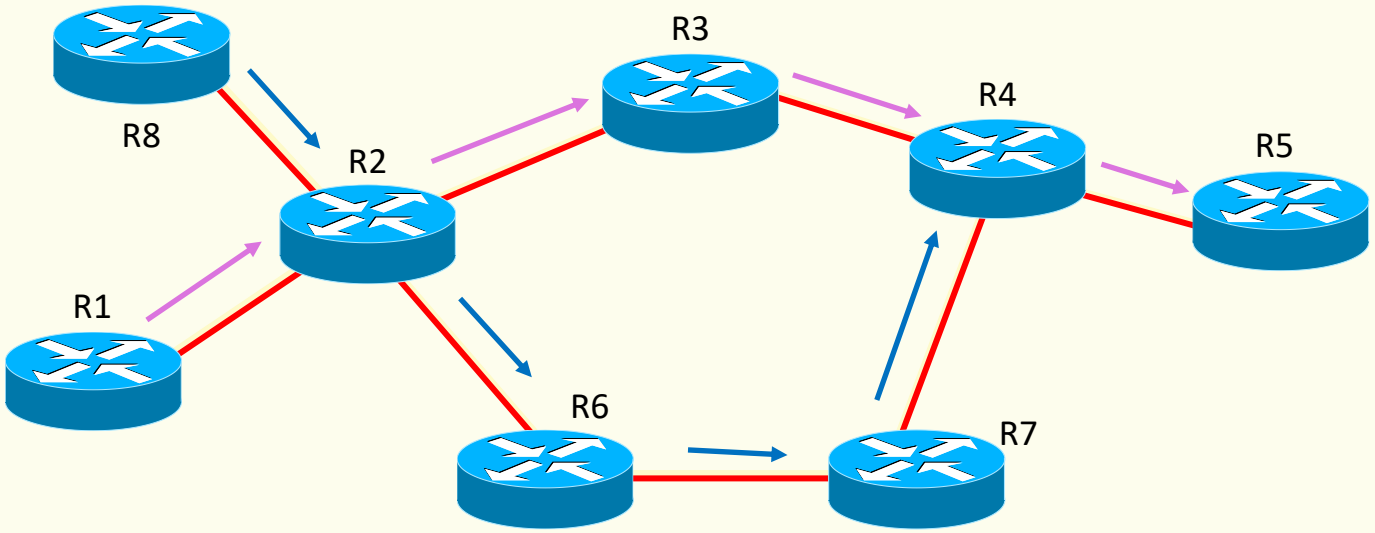
MPLS problem statement

- **Scalability** of network layer routing



MPLS problem statement

- Greater **flexibility** in delivering routing services



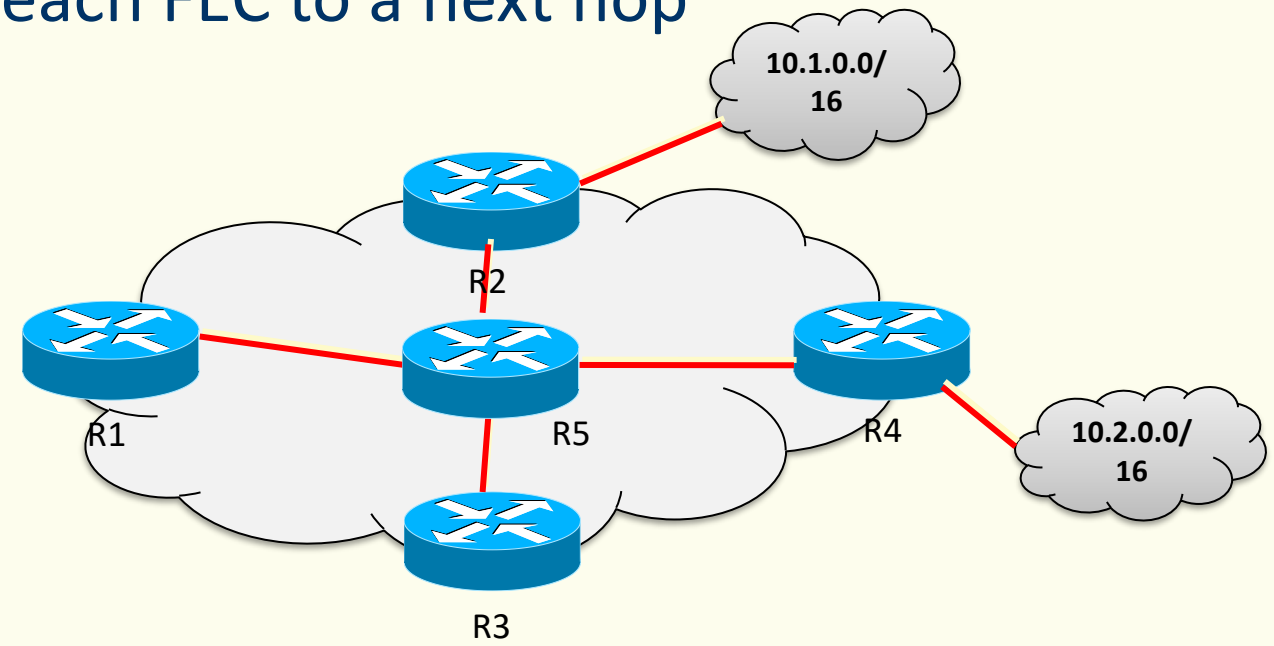
MPLS problem statement

- Optimize network **performance**

Label switching concept

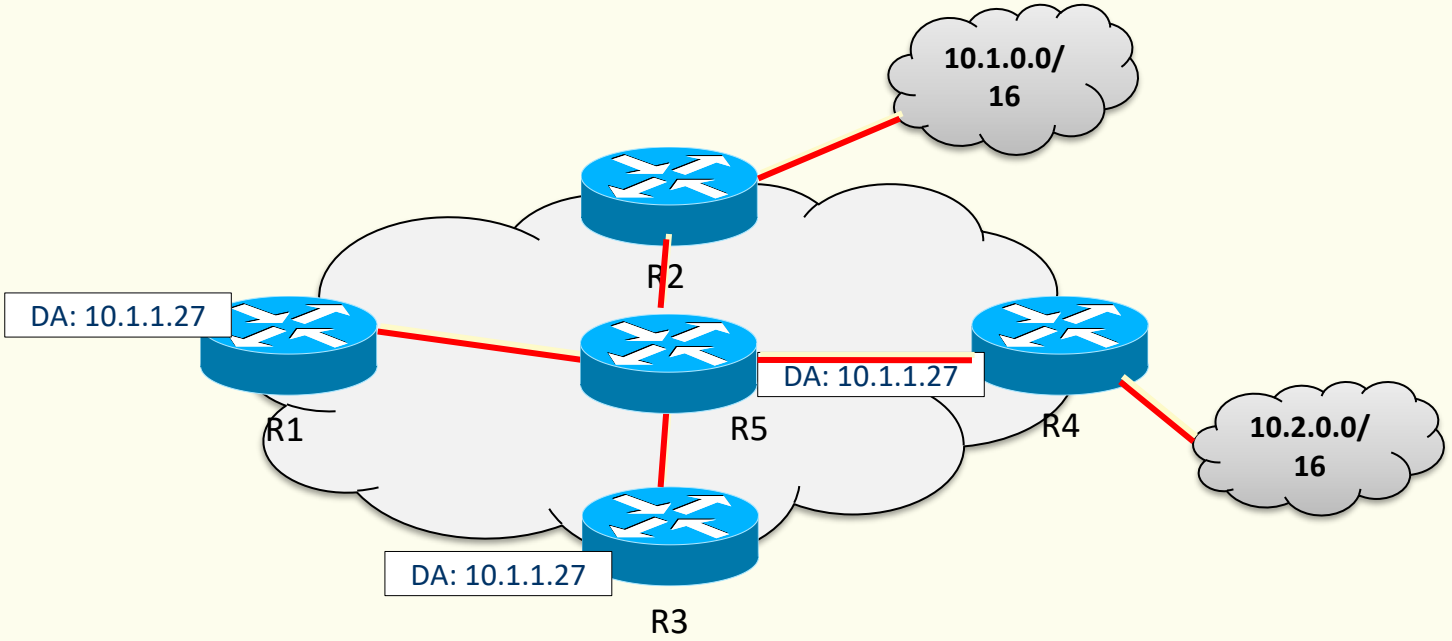
- Conventional IP forwarding (reformulated)
  1. **Partition** packets into a set of Forwarding Equivalent Classes (FECs)
  2. **Map** each FEC to a next hop

FEC: a group of IP packets which are forwarded in the same manner



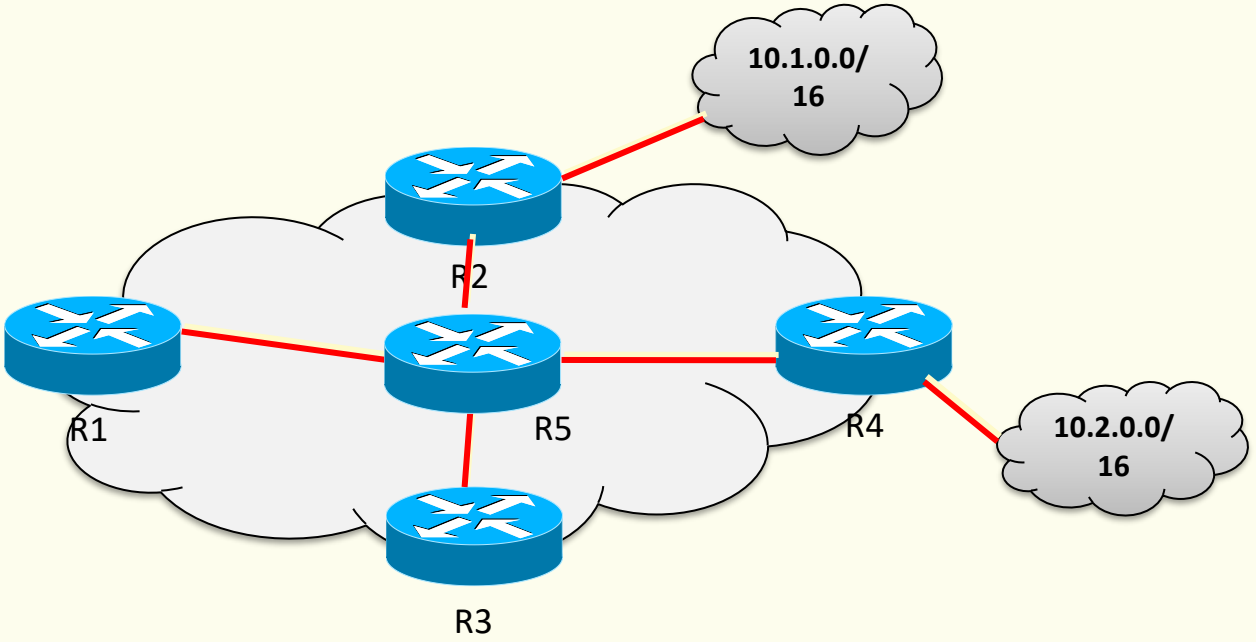
Label switching concept

- Conventional IP forwarding (reformulated)
  - Partitioning and mapping is done **at each hop**



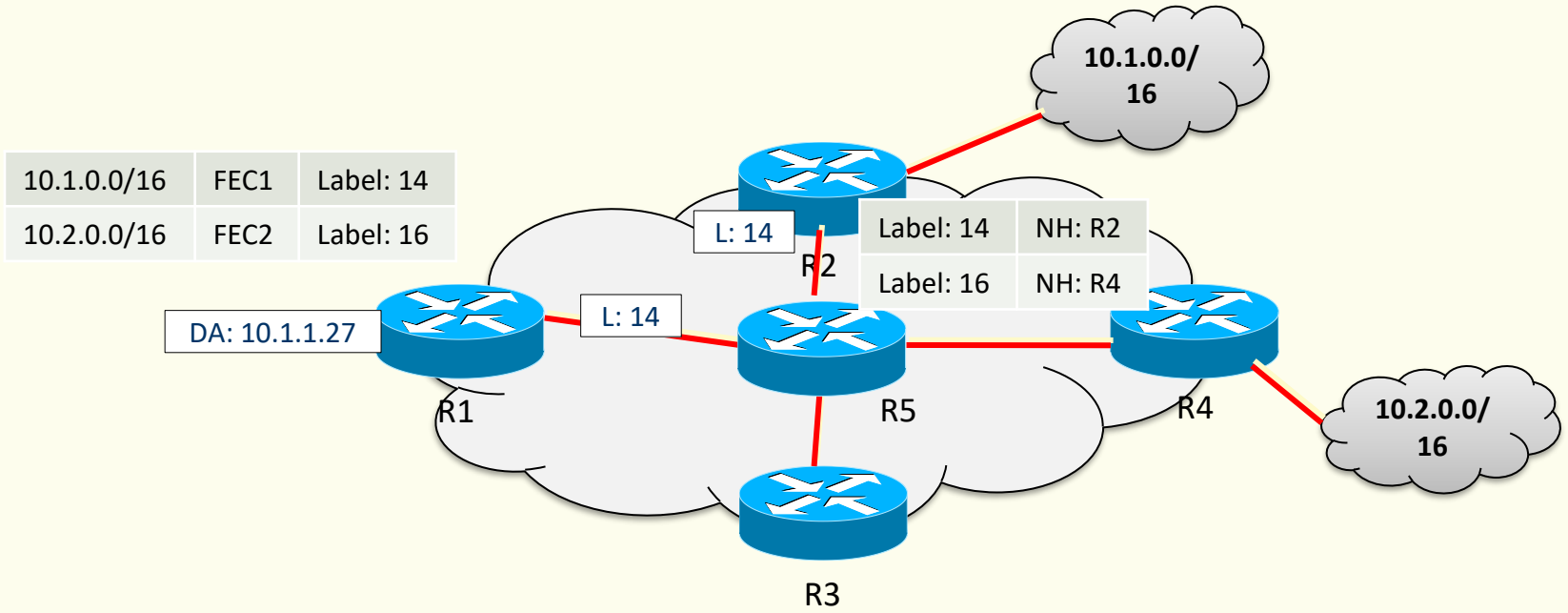
Label switching concept

- Can we decouple partitioning from mapping?
  - Partitioning into FECs at **edge routers**
  - Only mapping at each hop (**edge + core routers**)



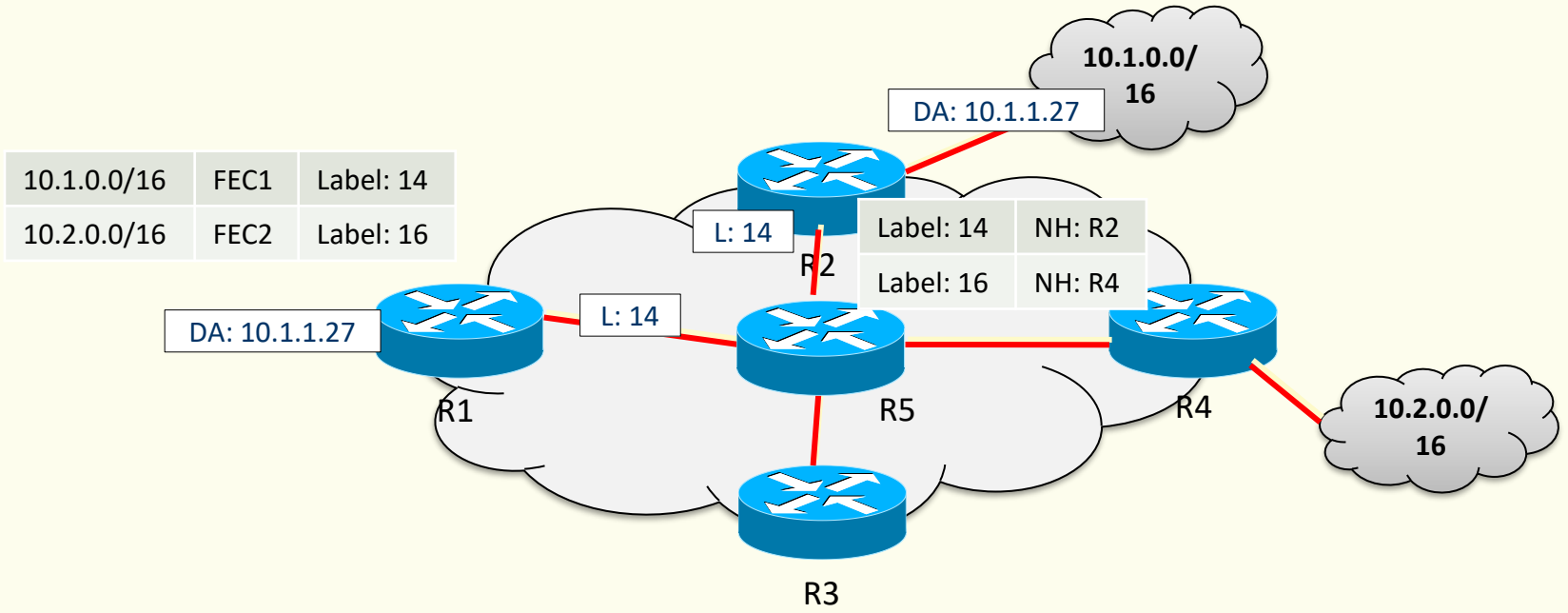
Label switching concept

- Yes, by introducing **labels into packets**
  - Partitioning into FECs at **edge routers**
  - Only mapping at each hop (**edge + core routers**)



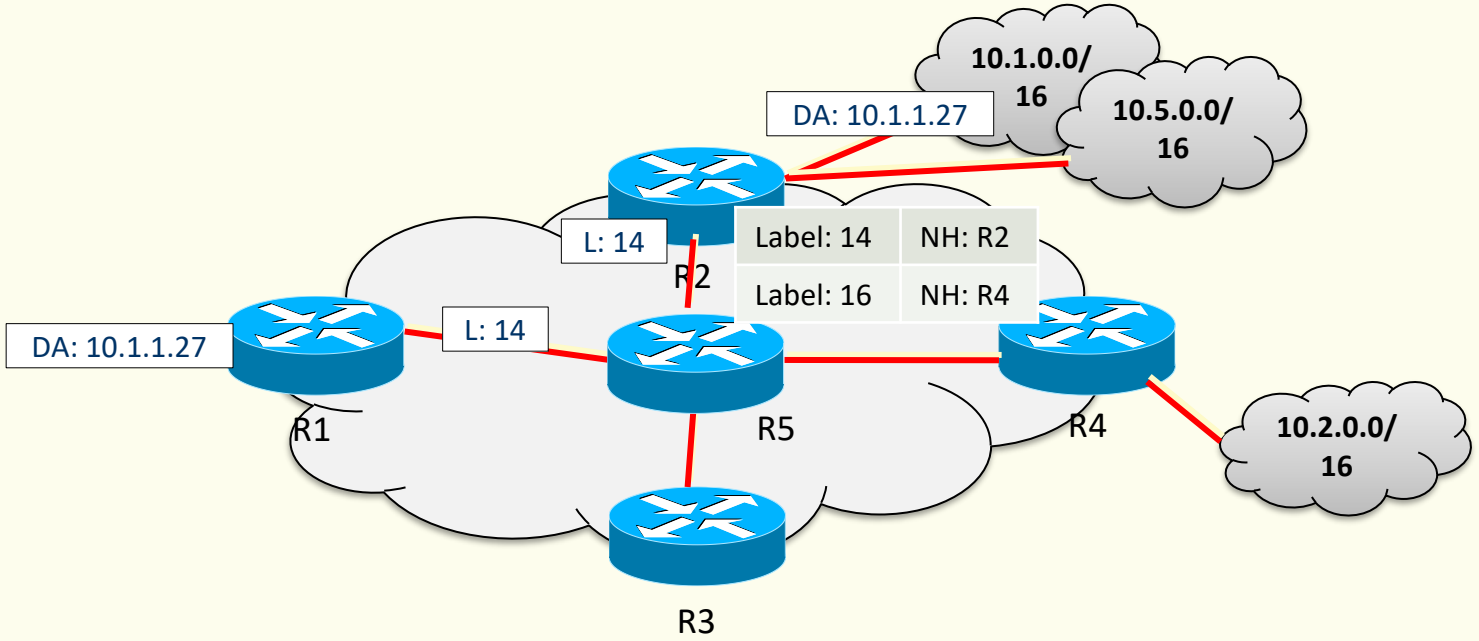
Label switching concept

- Advantages? **Yes!**
  - Easily allows for FEC partitioning other than the destination address based one



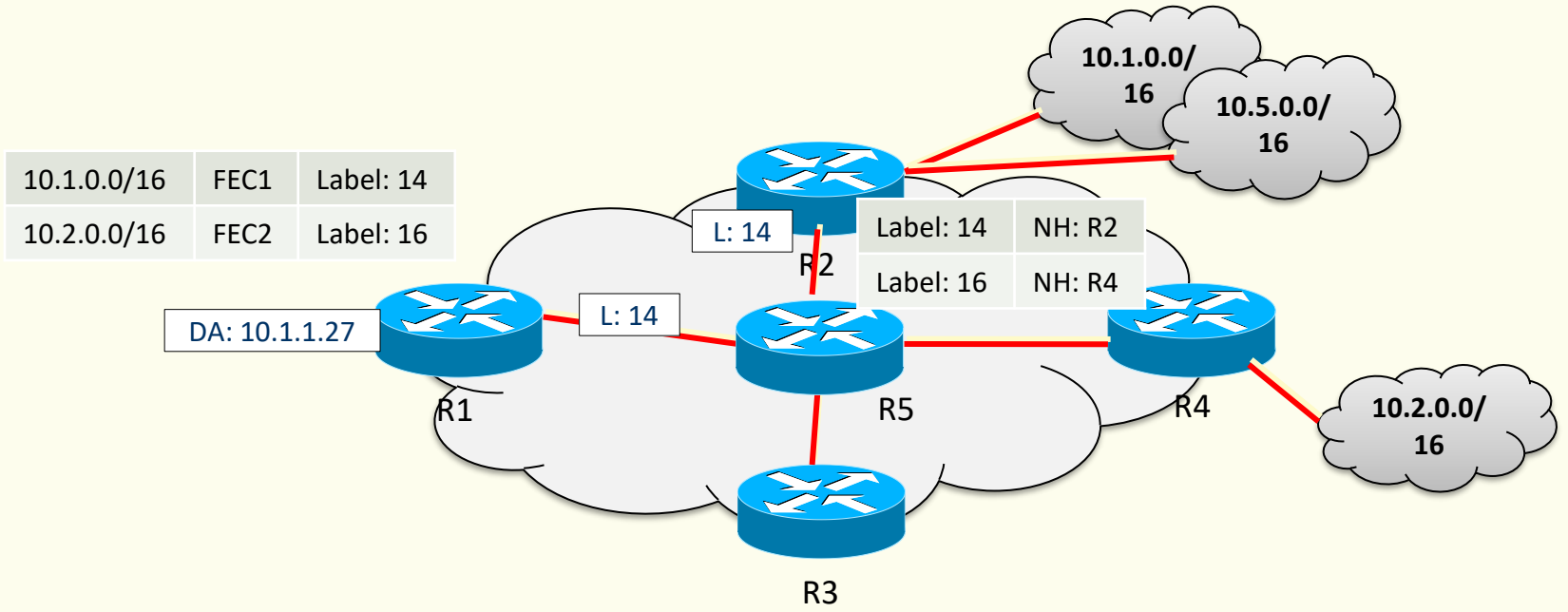
Label switching concept

Address prefix matching 10.1.0.0/16 && DSCP=101110	FEC1	Label: 14
Address prefix matching 10.1.0.0/16 || 10.5.0.0/16	FEC2	Label: 16
Address prefix matching 10.1.0.0/16 && TCP protocol	FEC3	Label: 23
Address prefix matching 10.1.0.0/16 && INport=Se0/0/0	FEC4	Label: 15



Label switching concept

- What about the **label scope**?
  - If domain-wide, it does not scale well



Label switching concept

- **Local-scope** is better, yielding the basis for a distributed solution