

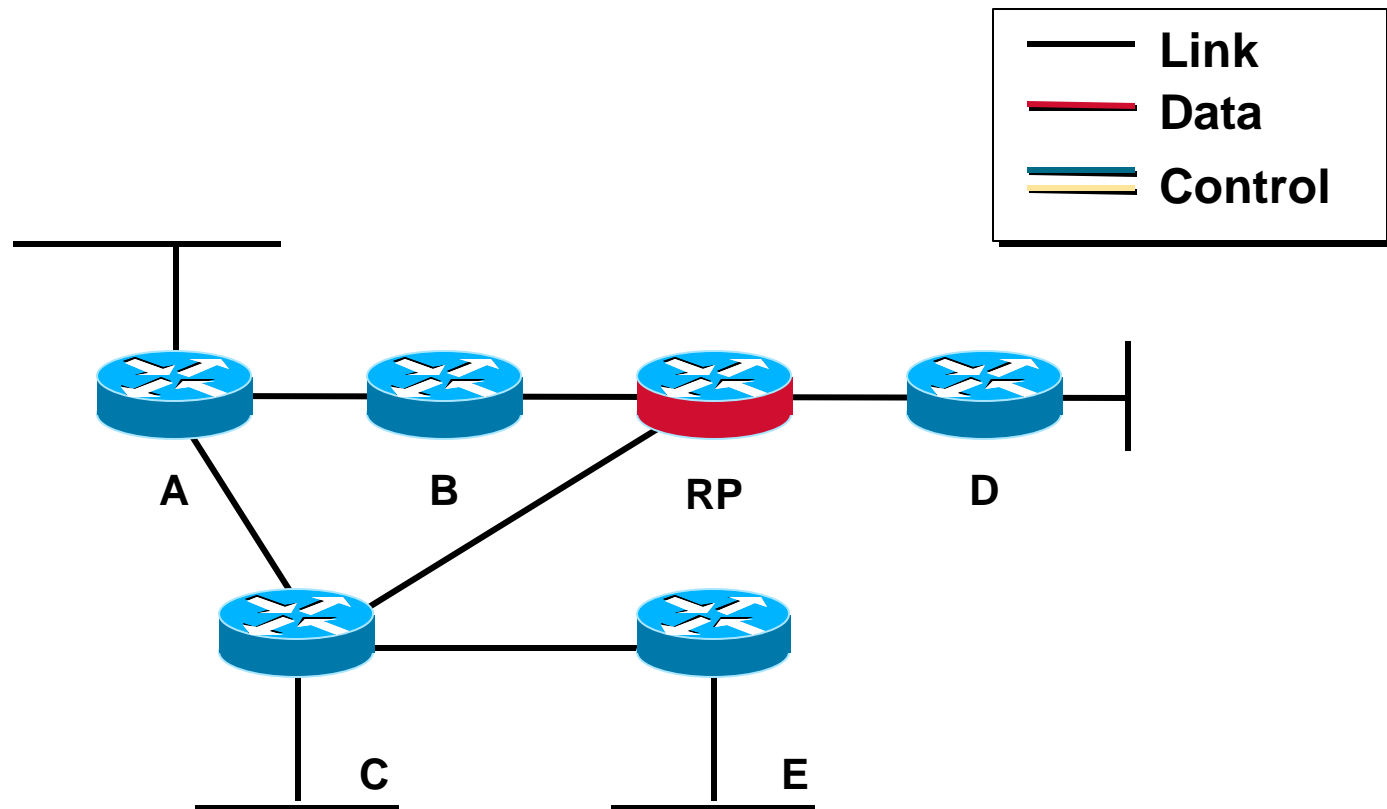
Source Specific Multicast (SSM) Solutions

Aug./2000

Agenda

- **Current Status of PIM-SM, MSDP, IGMP**
- **New stuff: Source Specific Solutions**
 - IGMPv3/PIM-SSM
 - Interim features
- **Roadmap**

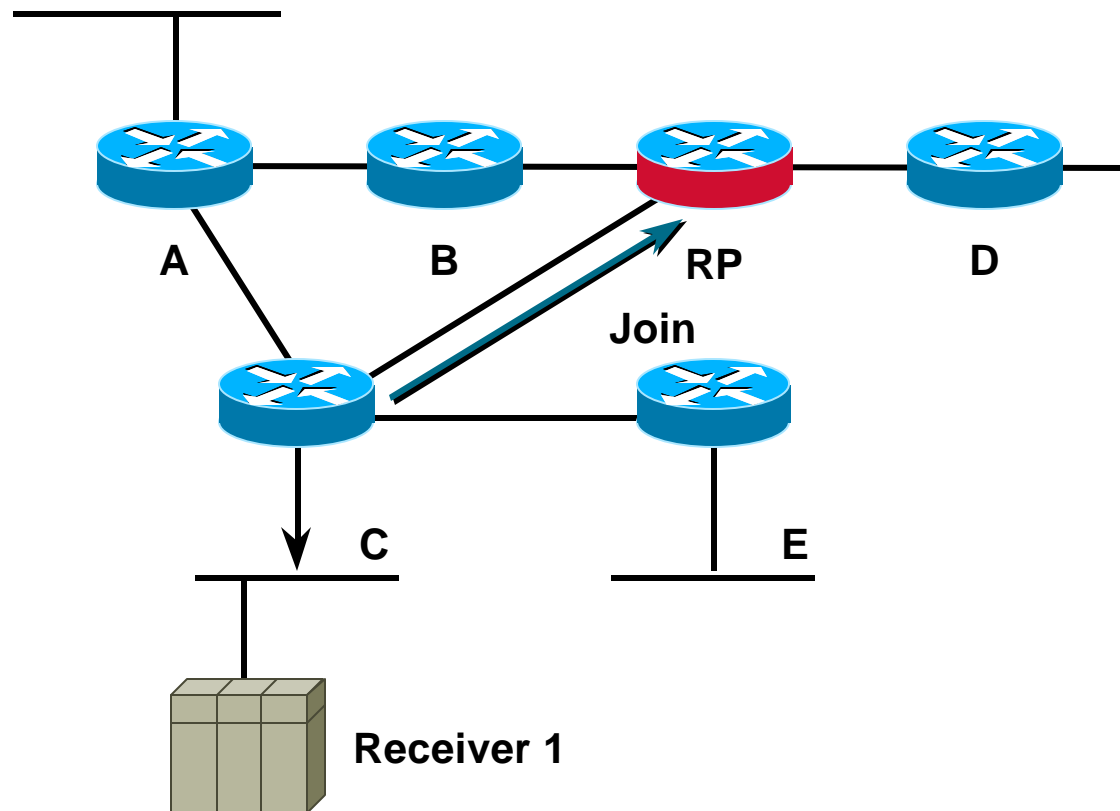
PIM Sparse Mode Review



The Rendezvous Point (RP) is the shared root, and is administratively assigned.

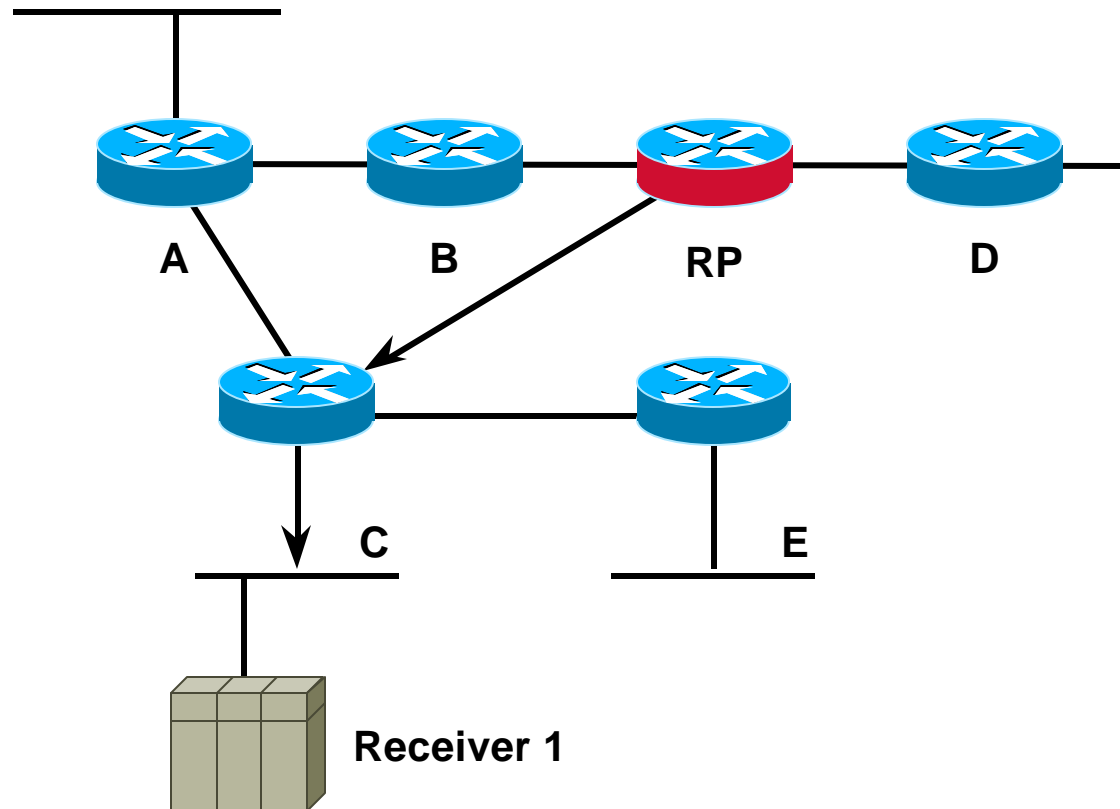
PIM Sparse Mode Review

Receiver 1 Joins Group G
C Creates (*, G) State, Sends
(*, G) Join to the RP

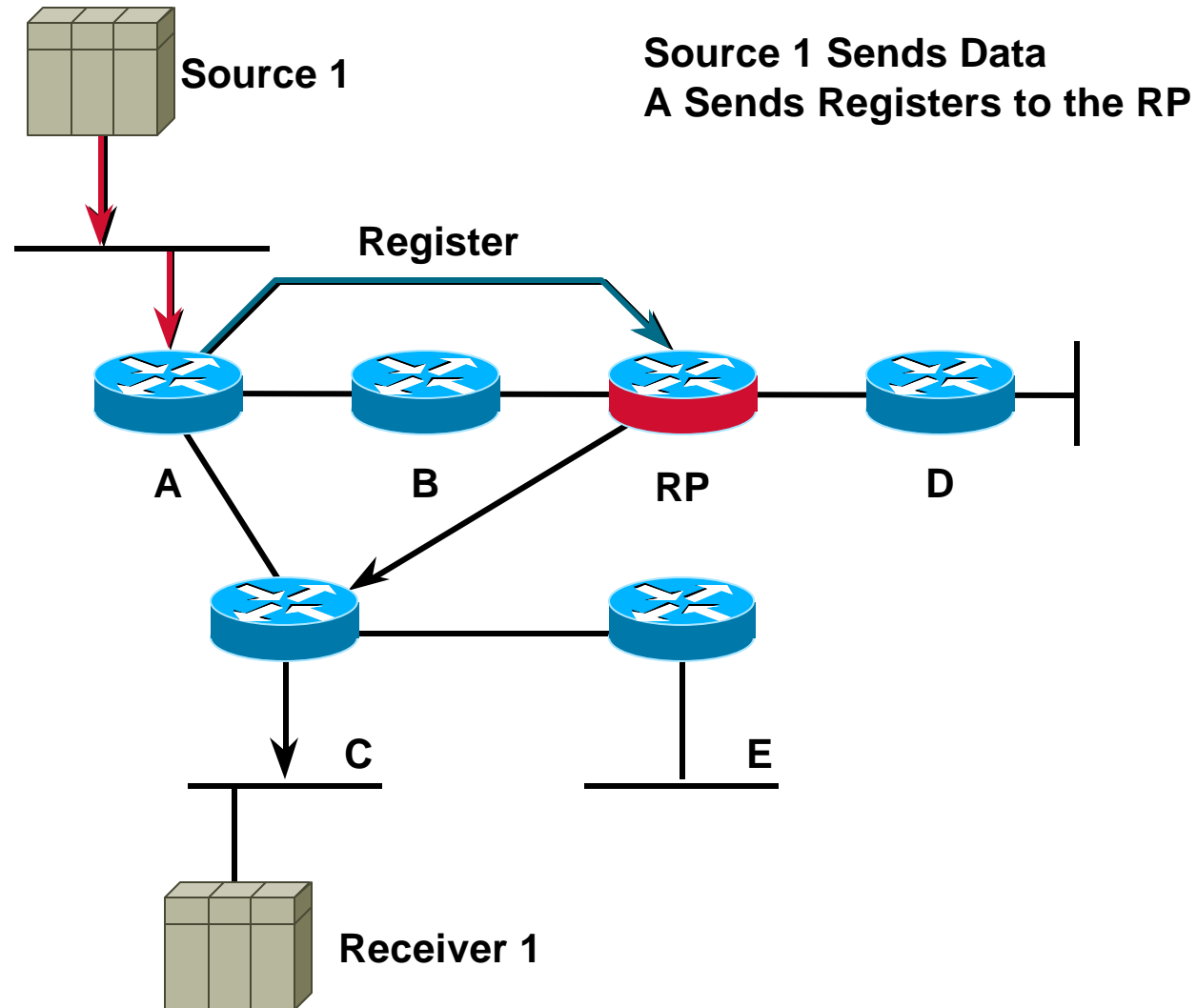


PIM Sparse Mode Review

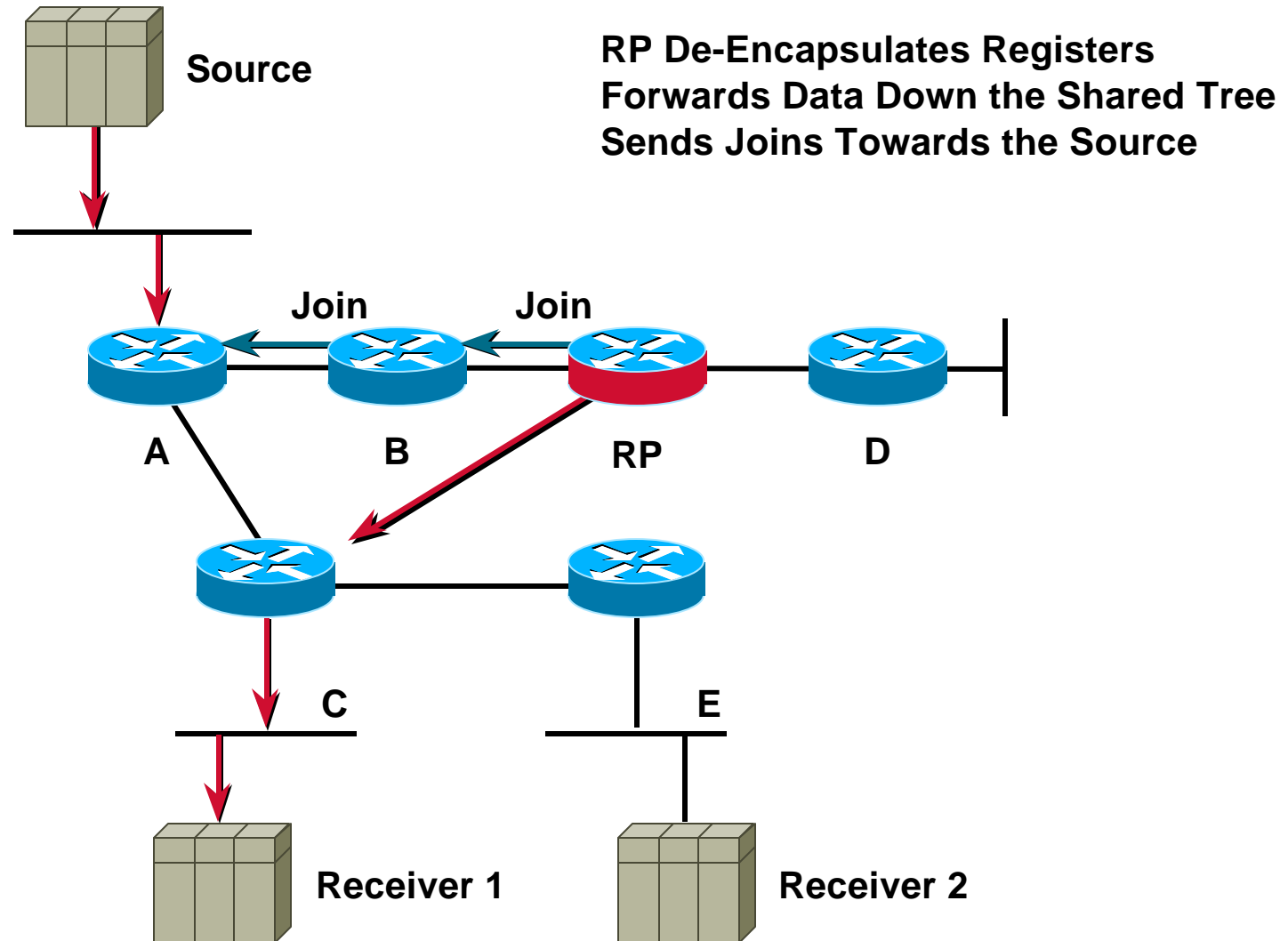
RP Creates (*, G) State



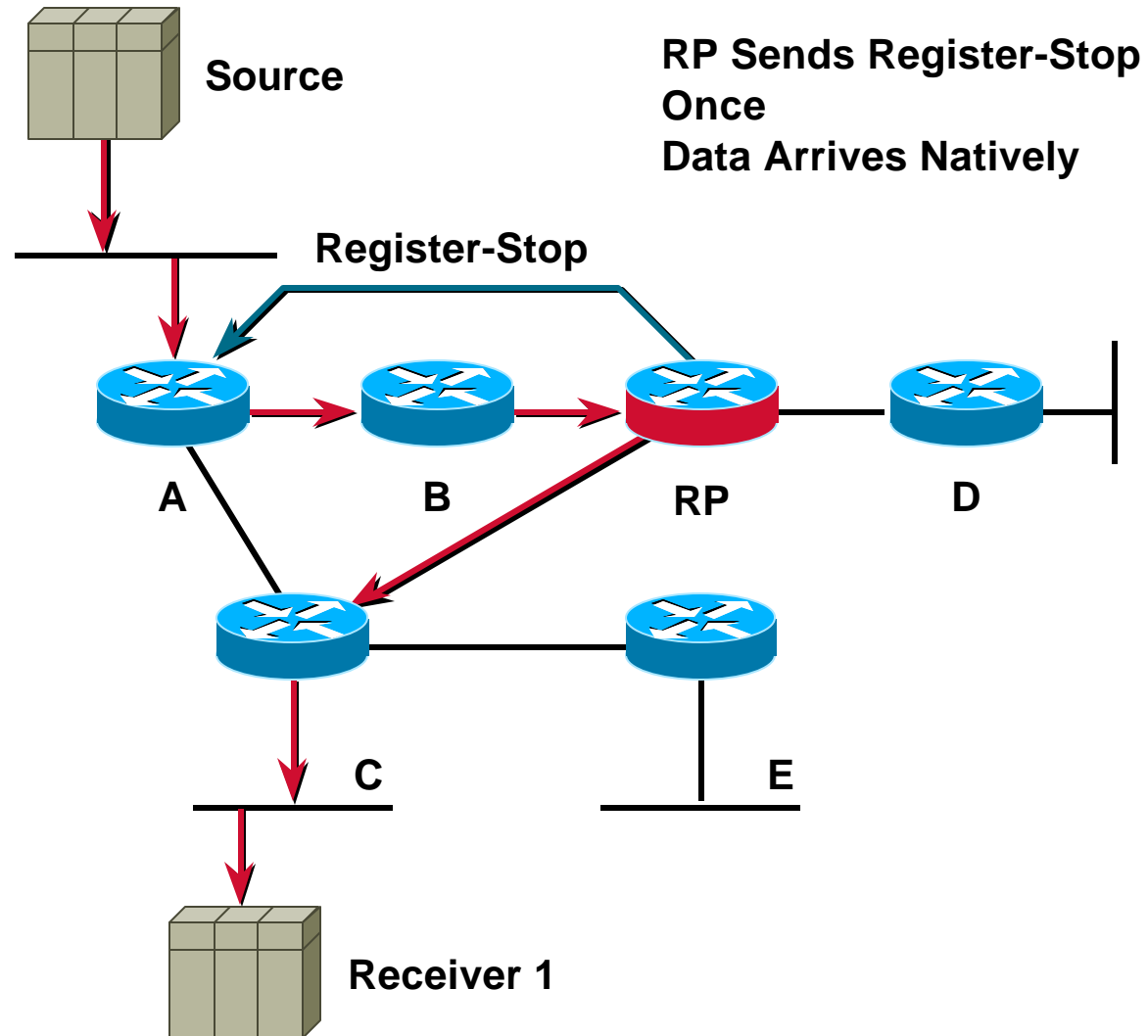
PIM Sparse Mode Review



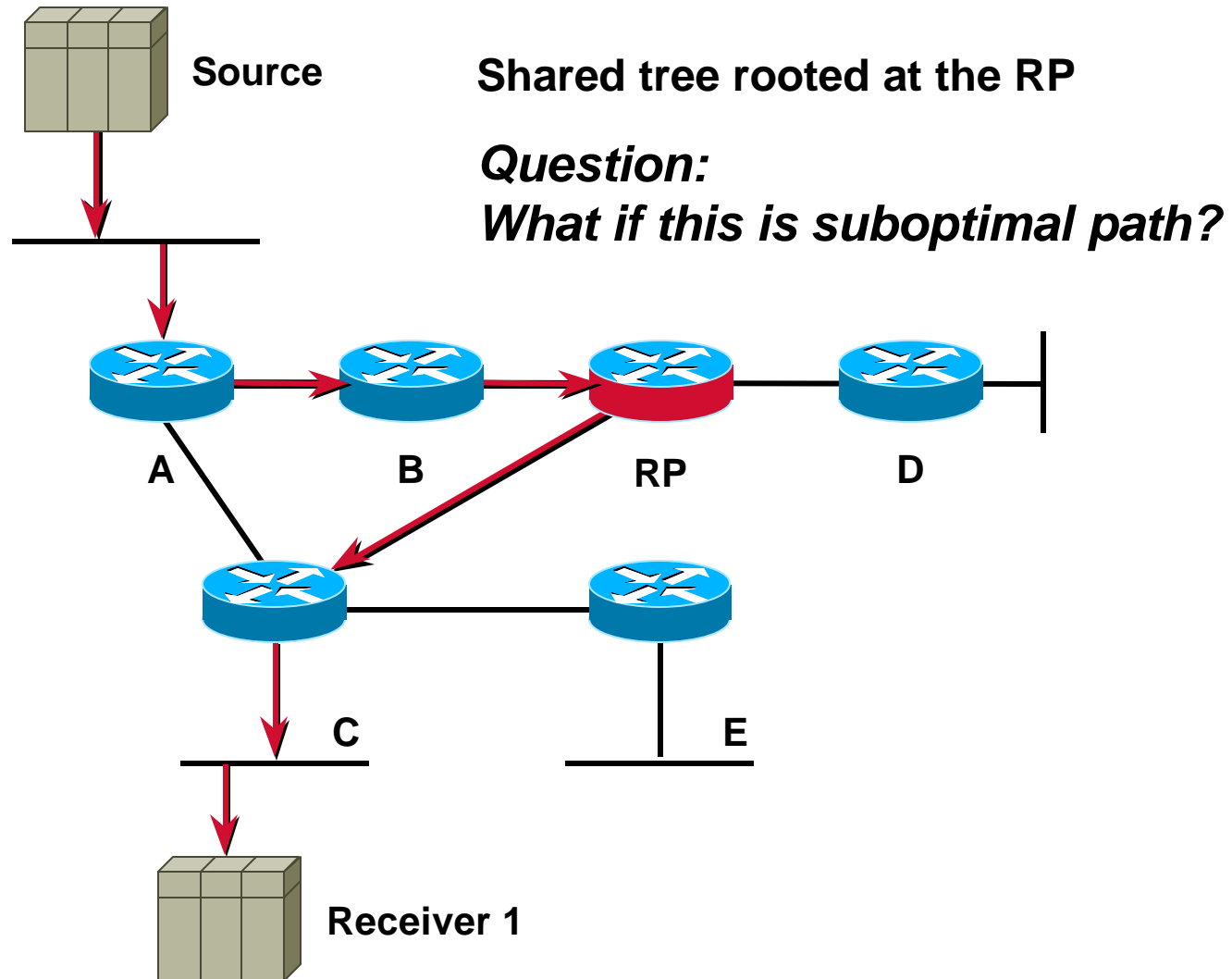
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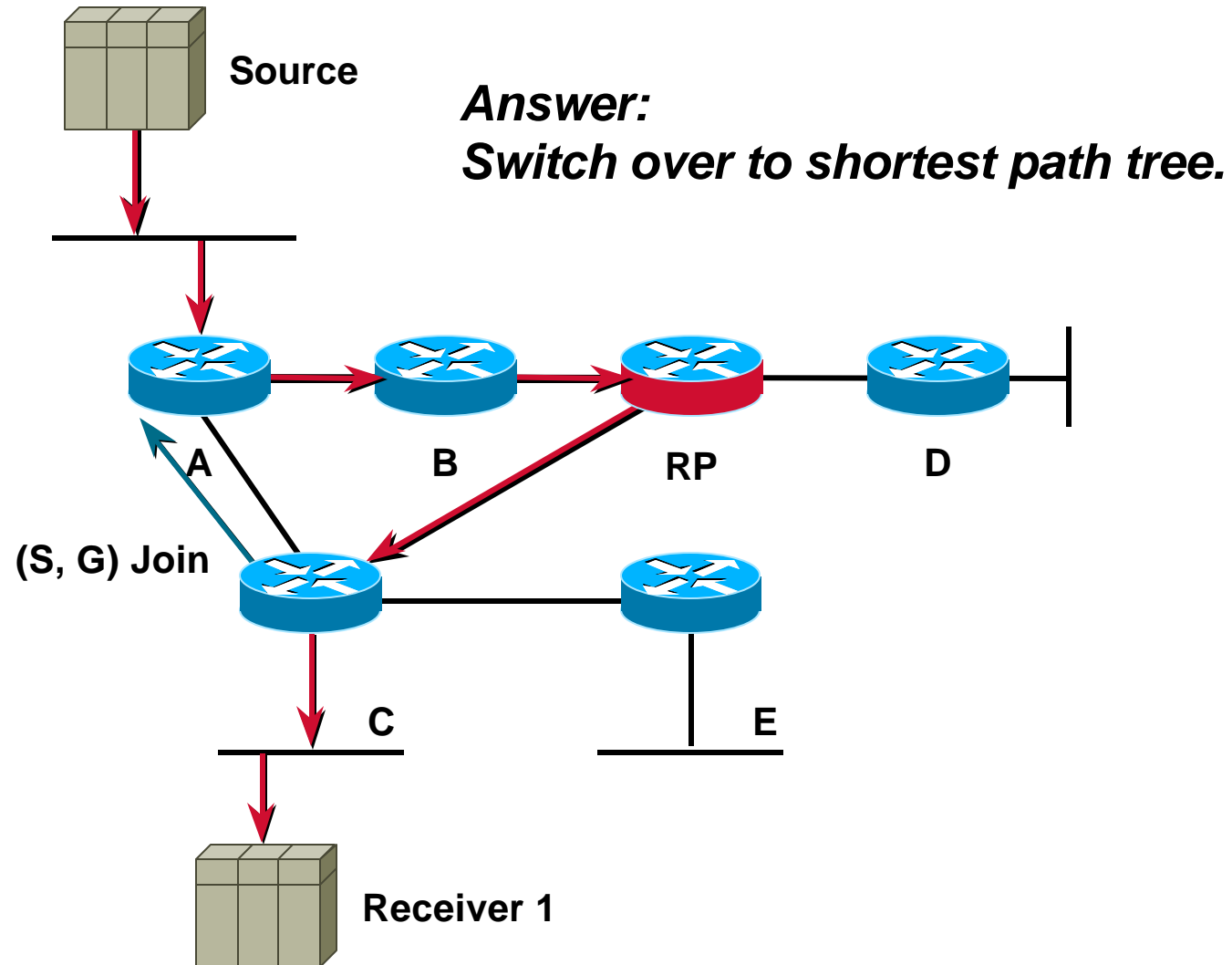
PIM Sparse Mode Review



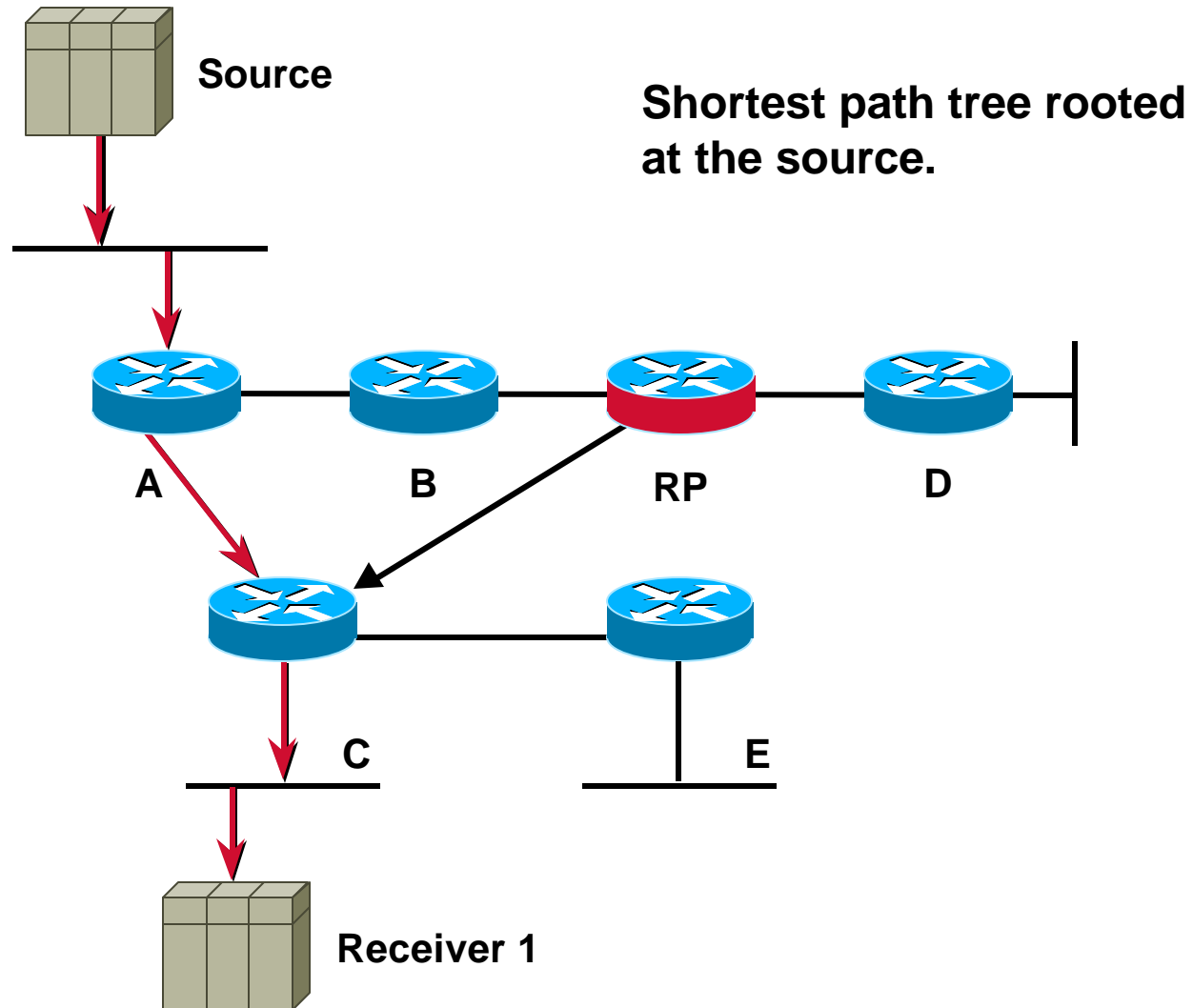
PIM Sparse Mode Review



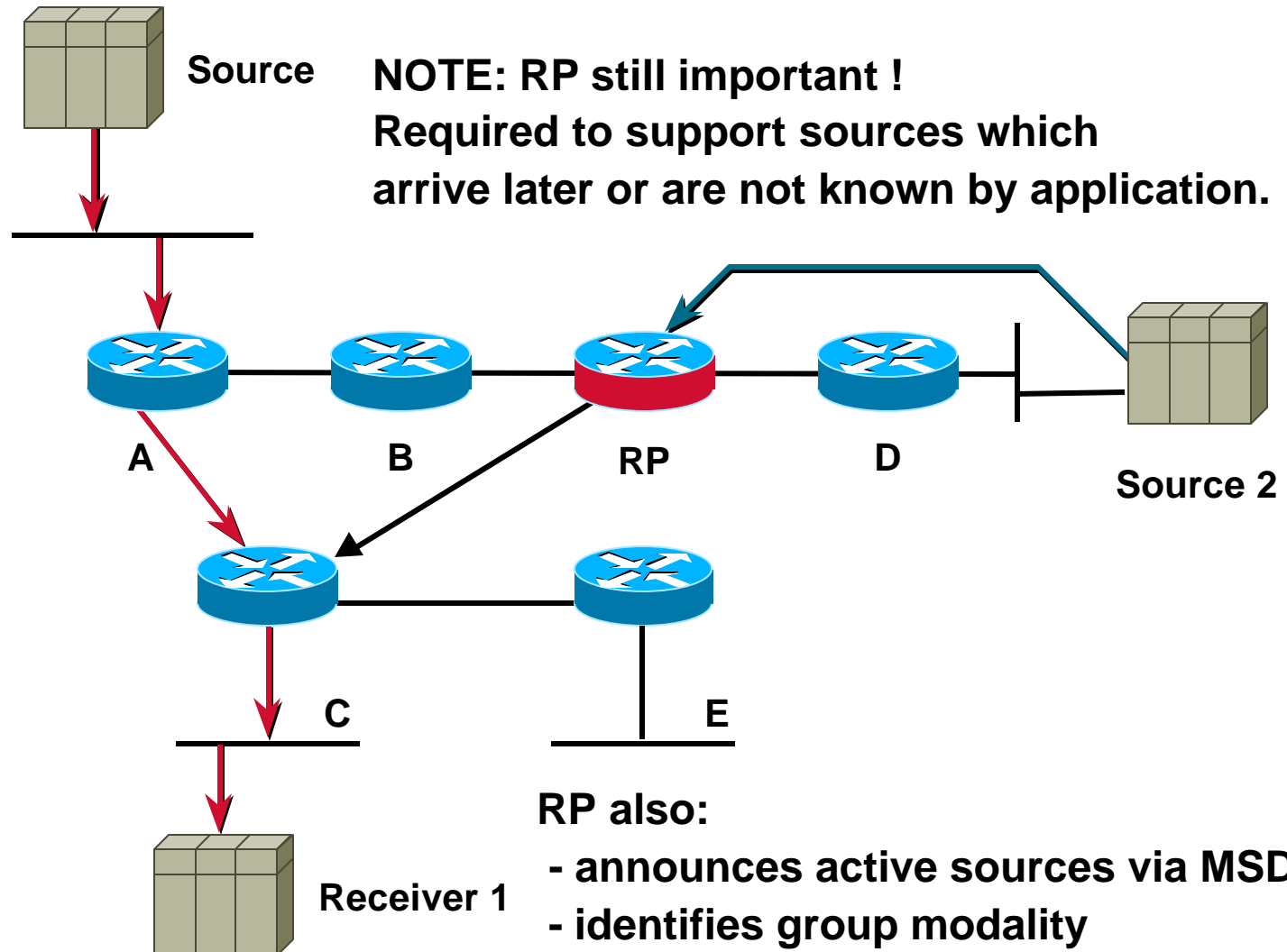
PIM Sparse Mode Review



PIM Sparse Mode Review



PIM Sparse Mode Review

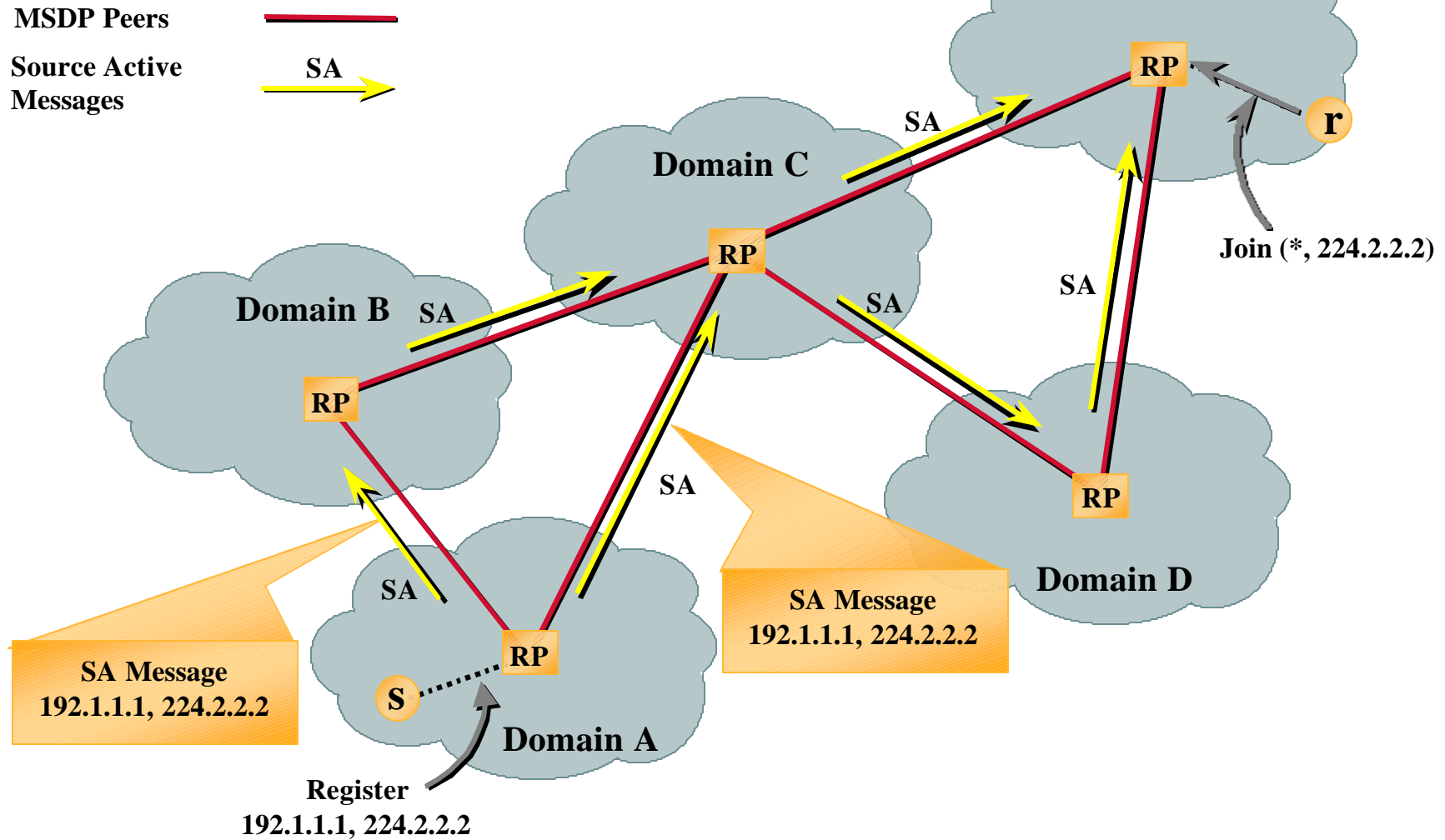


RP also:

- announces active sources via MSDP
- identifies group modality
- serves as root for bidir

MSDP Overview

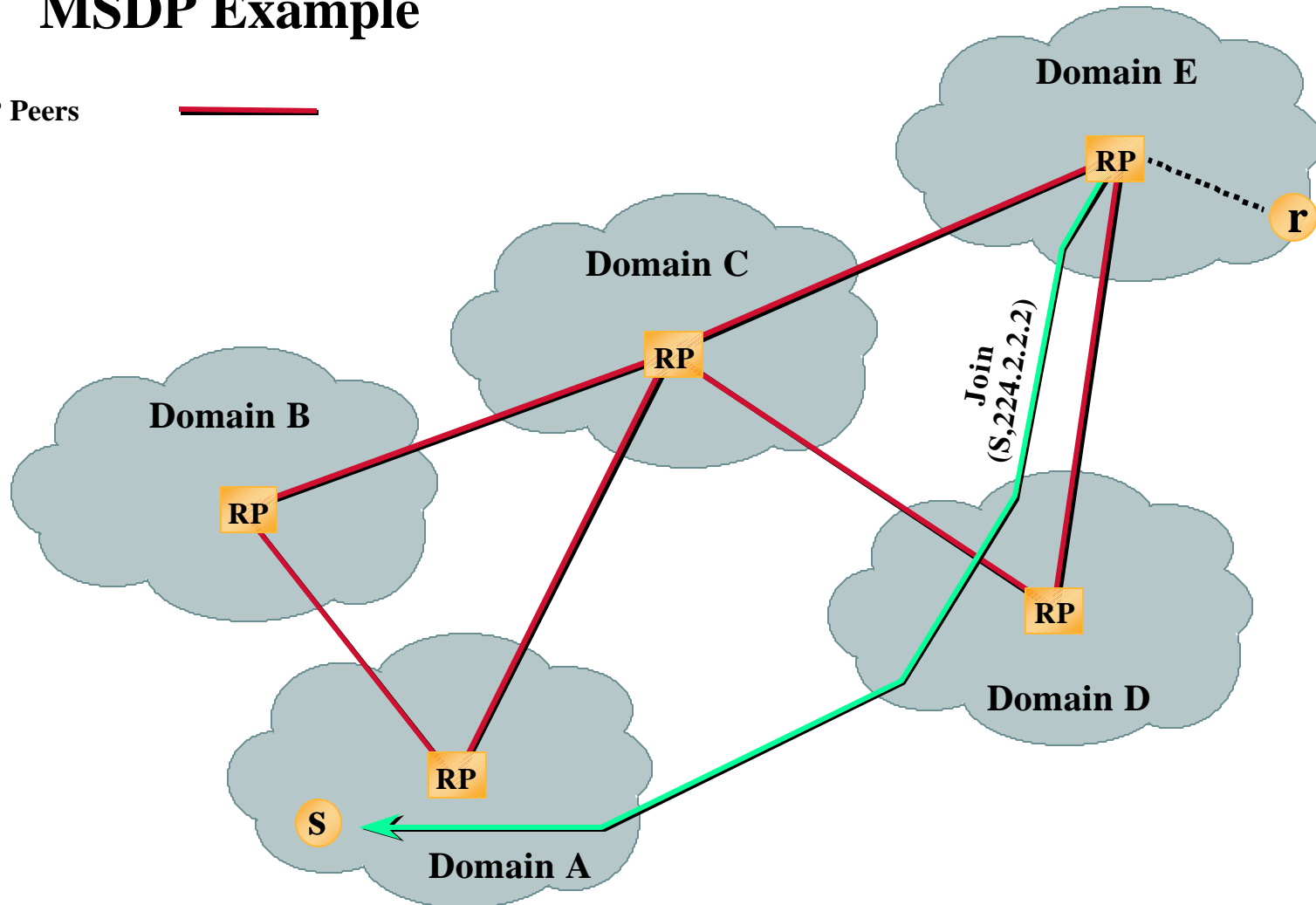
MSDP Example



MSDP Overview

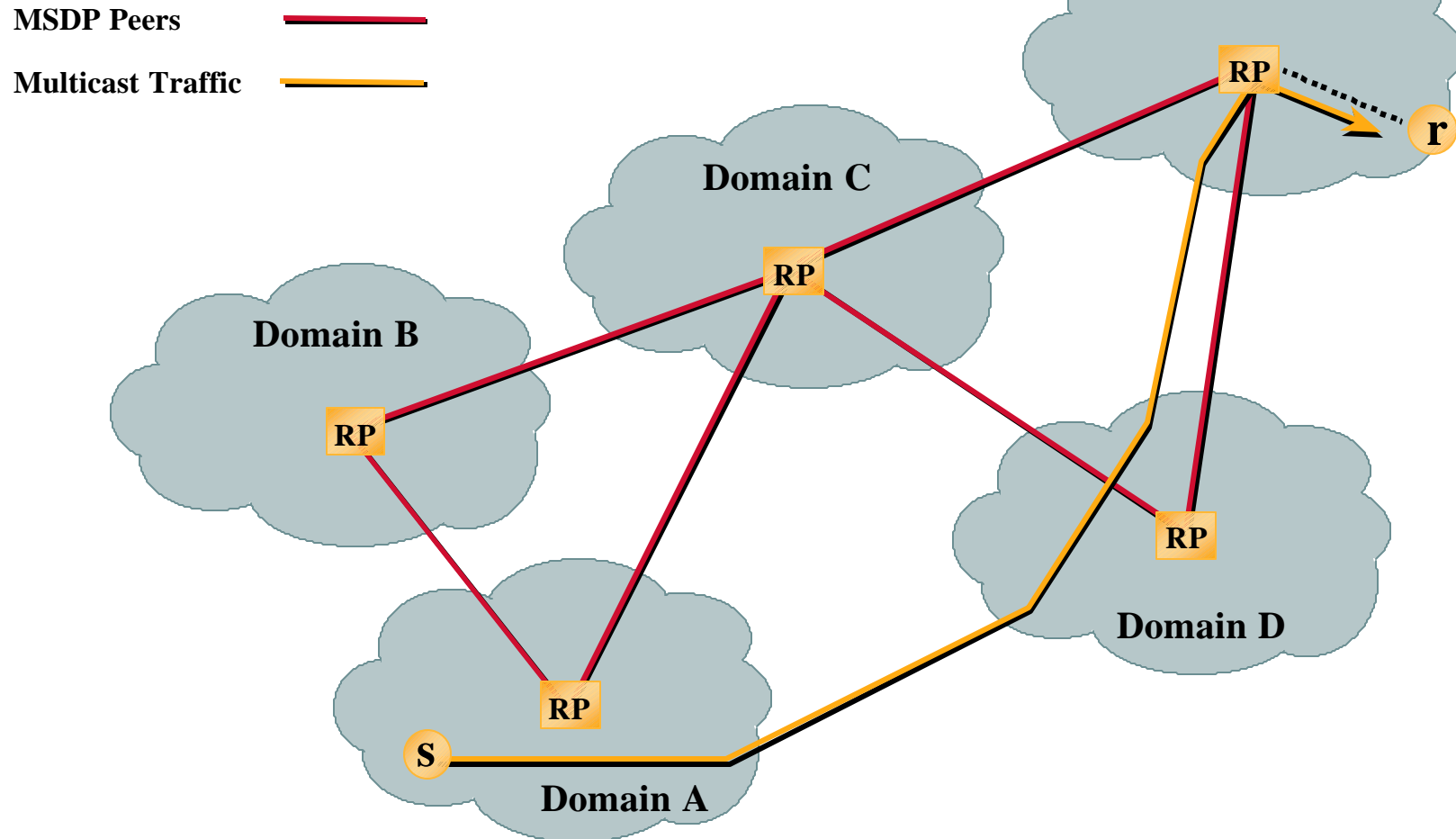
MSDP Example

MSDP Peers



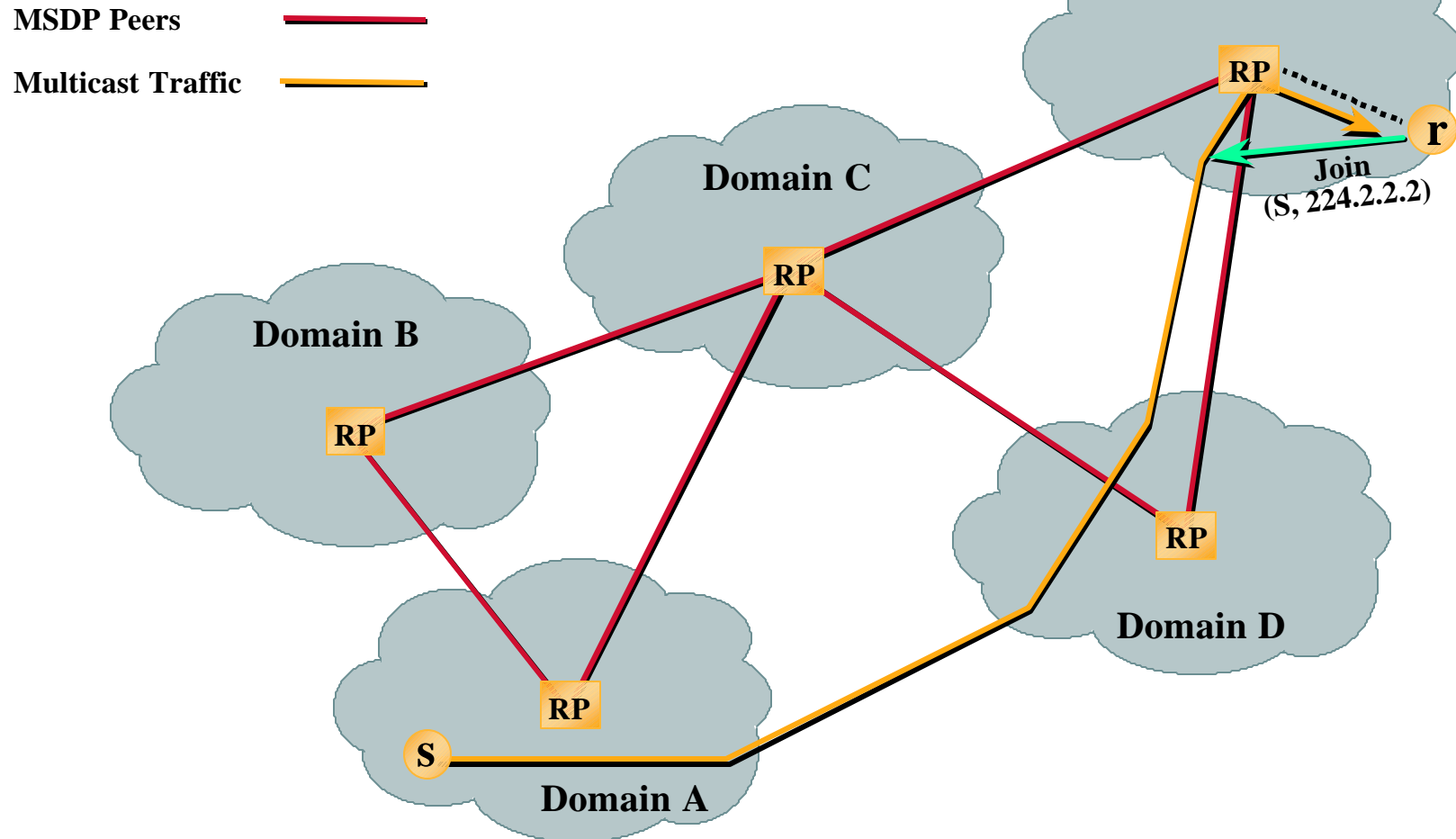
MSDP Overview

MSDP Example



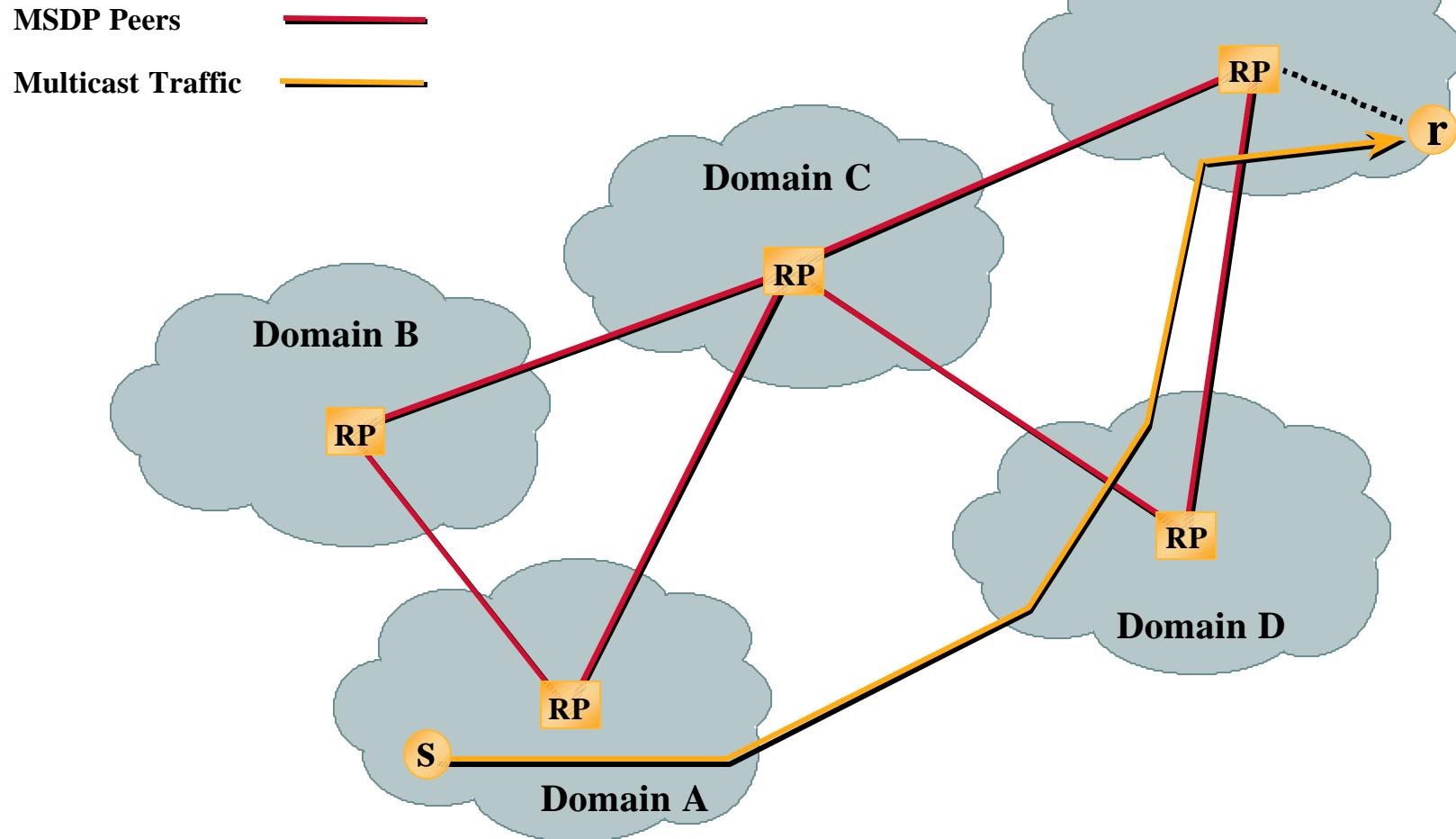
MSDP Overview

MSDP Example



MSDP Overview

MSDP Example



What if source is well-known?

- **Simplify solution for well-known sources, particularly in cases where there is a single source sending to a given group.**
 - Allow immediate use of shortest forwarding path to a specific source, without need to create shared tree.
 - Eliminate dependence on MSDP for finding sources.
 - Simplify address allocation for global, single source groups when combined with elimination of shared trees (232/8).

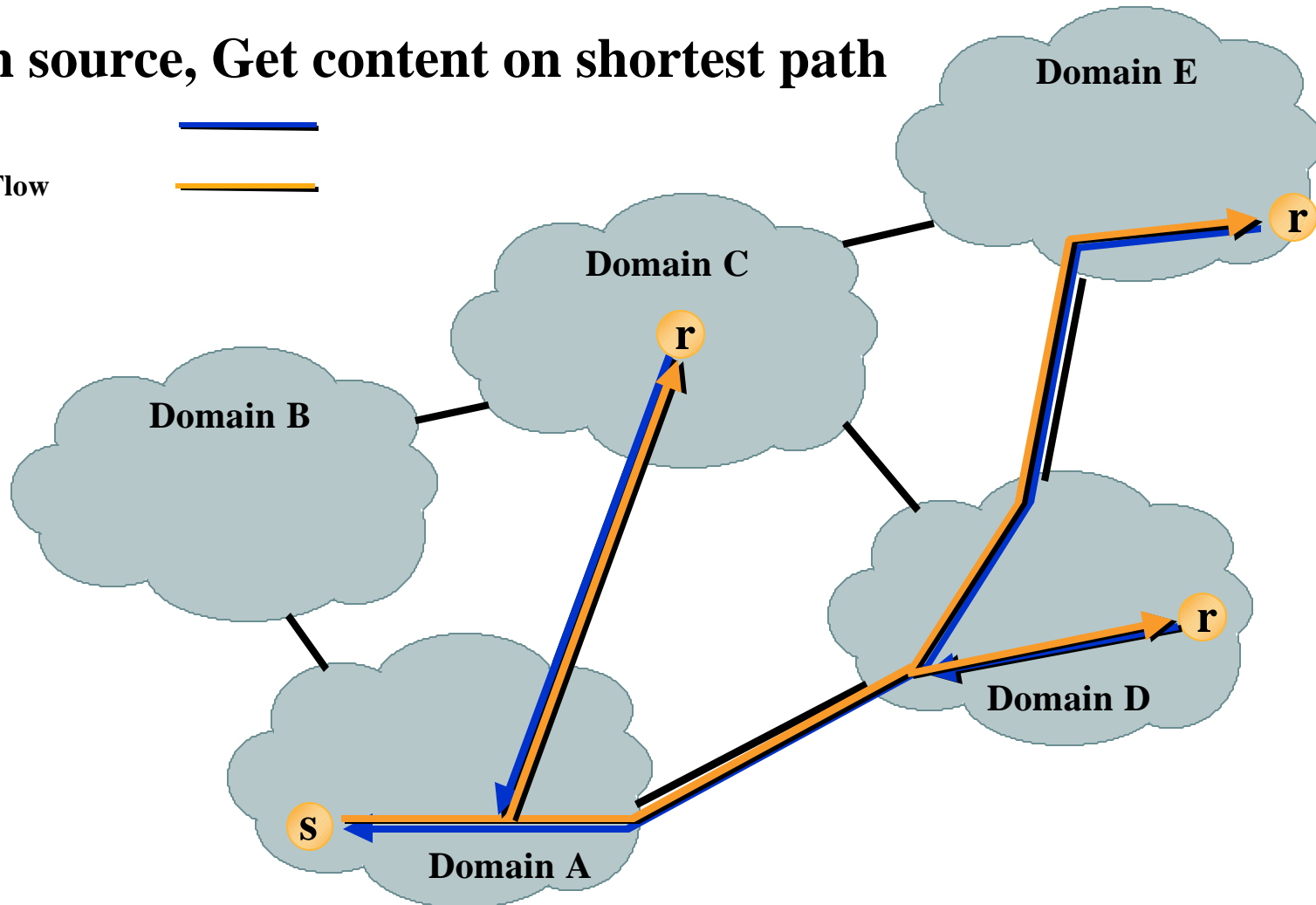
SSM Objective

Join source, Get content on shortest path

Join



Data Flow



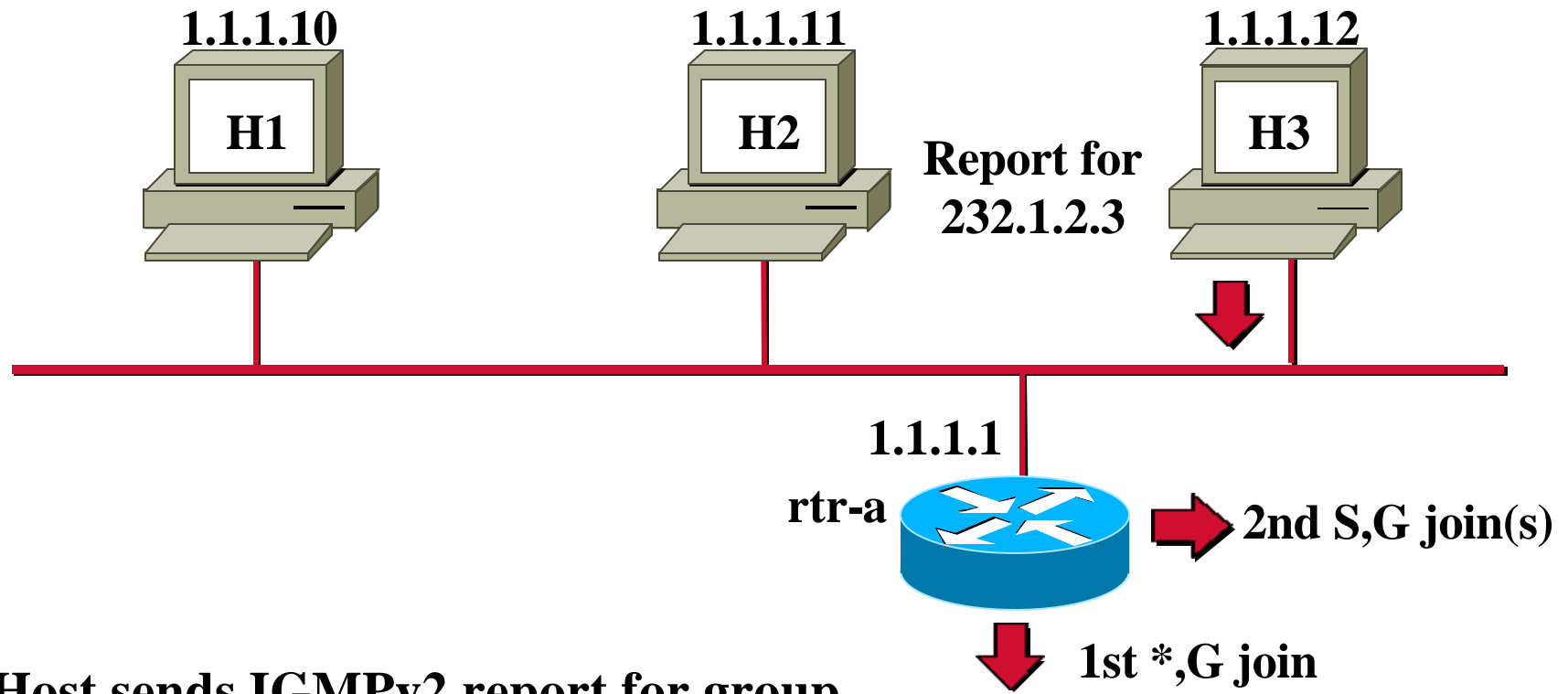
Source Specific Multicast

- **Allows first-hop router to respond to receiver initiated join requests for specific sources within a group.**
- **Allows first-hop router to send s,g join directly to source without creation of shared tree.**
- **Support elimination of shared tree state in 232/8, simplifying address allocation.**

Source Specific Multicast

- **Long term solution:**
 - **IGMPv3 in routers and hosts**
 - Allows for inclusions lists and exclusion lists
 - **PIM-SSM**
 - Sends immediate PIM S,G joins based on include lists
 - Prevents *,G joins from being sent
- **Interim solutions:**
 - Achieve SSM functionality when IGMPv3 not yet deployed.

IGMPv2



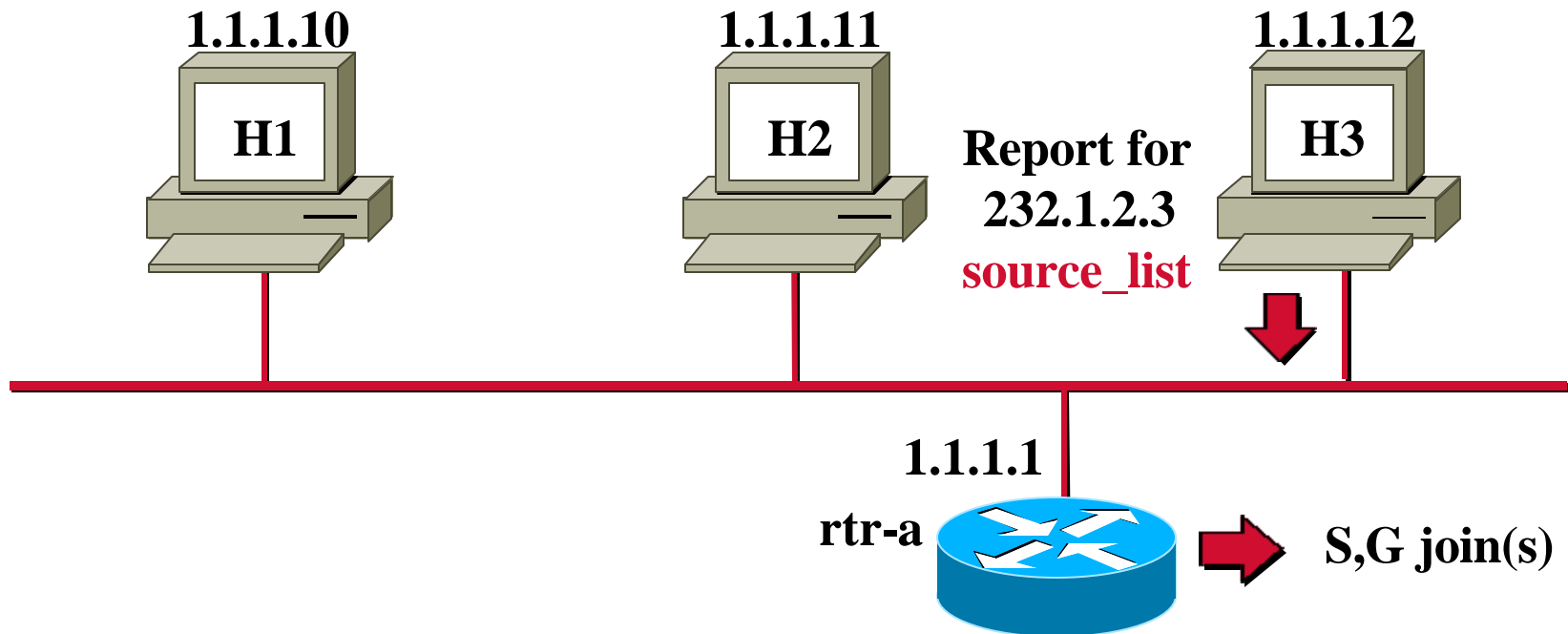
Host sends IGMPv2 report for group

DR adds membership

DR sends *,G join to RP (it has to, it doesn't know the sources)

DR sends S,G join to source (data provides the sources)

IGMPv3



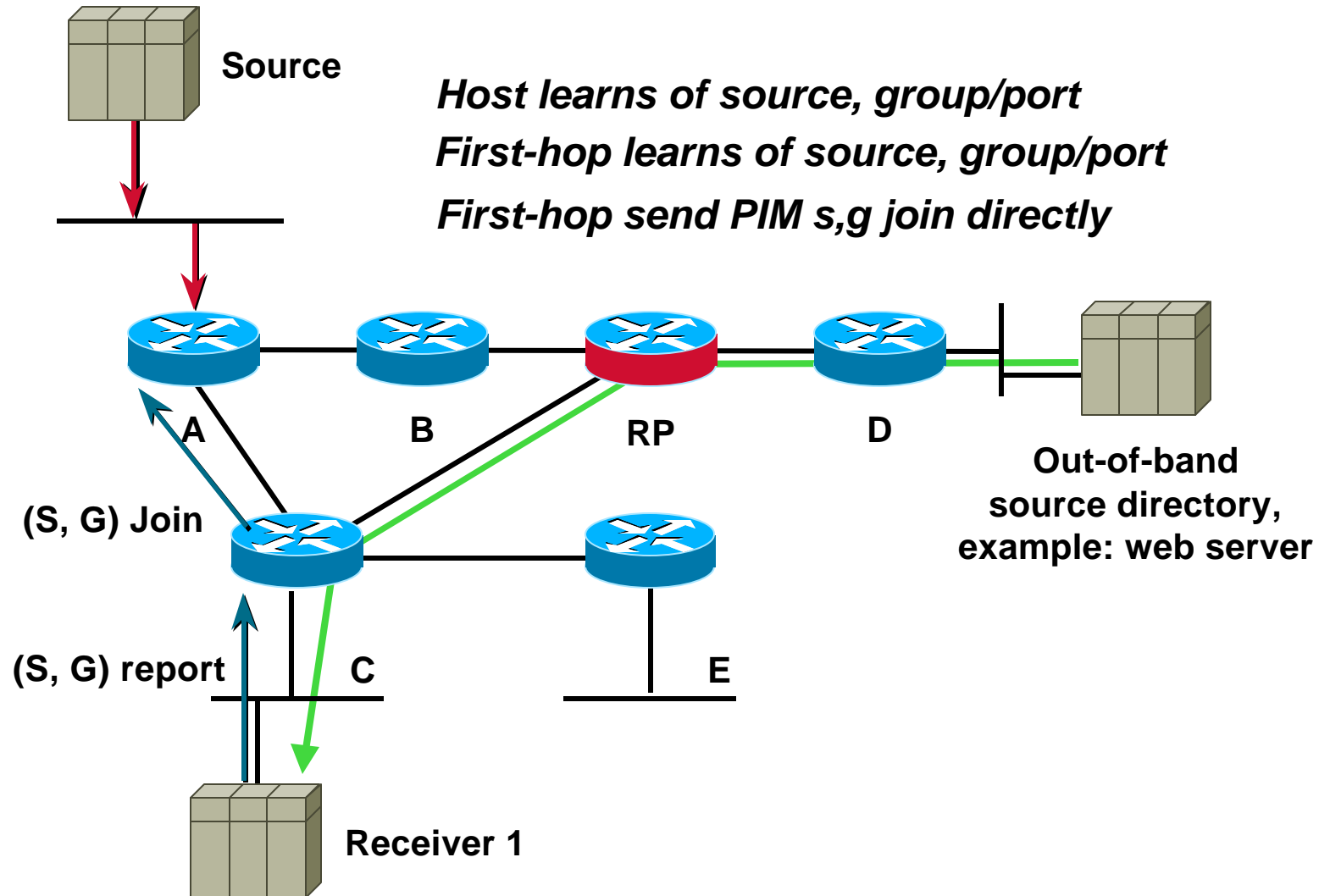
Host sends IGMPv3 report for group which can specify a list of sources to explicitly include.

```
IPMulticastListen (Socket, IF, G, INCLUDE, source-list)
```

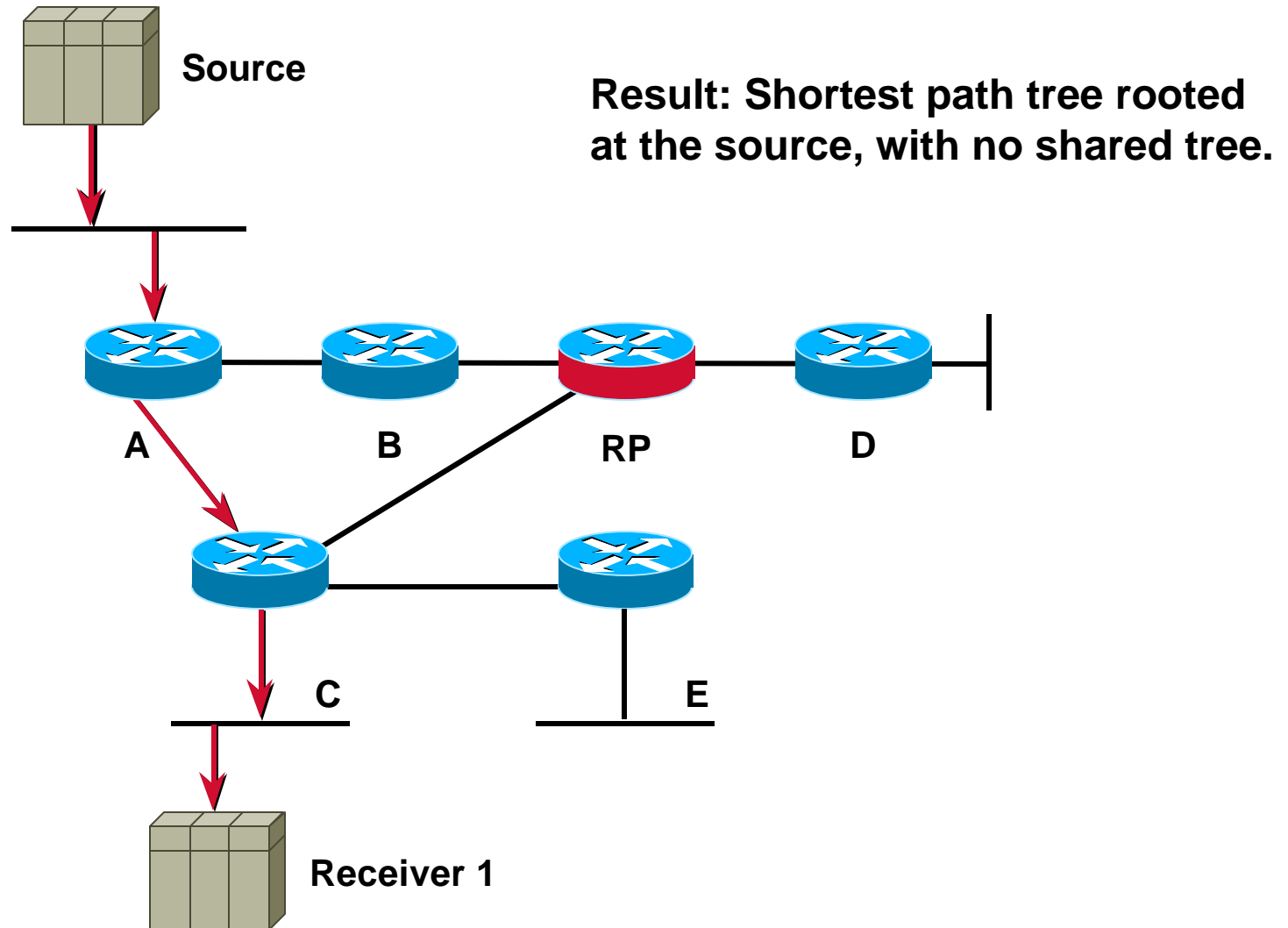
DR adds membership.

DR sends S,G join directly to sources in the source_list, and is not required to send *,G join to RP (and must not in 232/8).

PIM Source Specific Mode



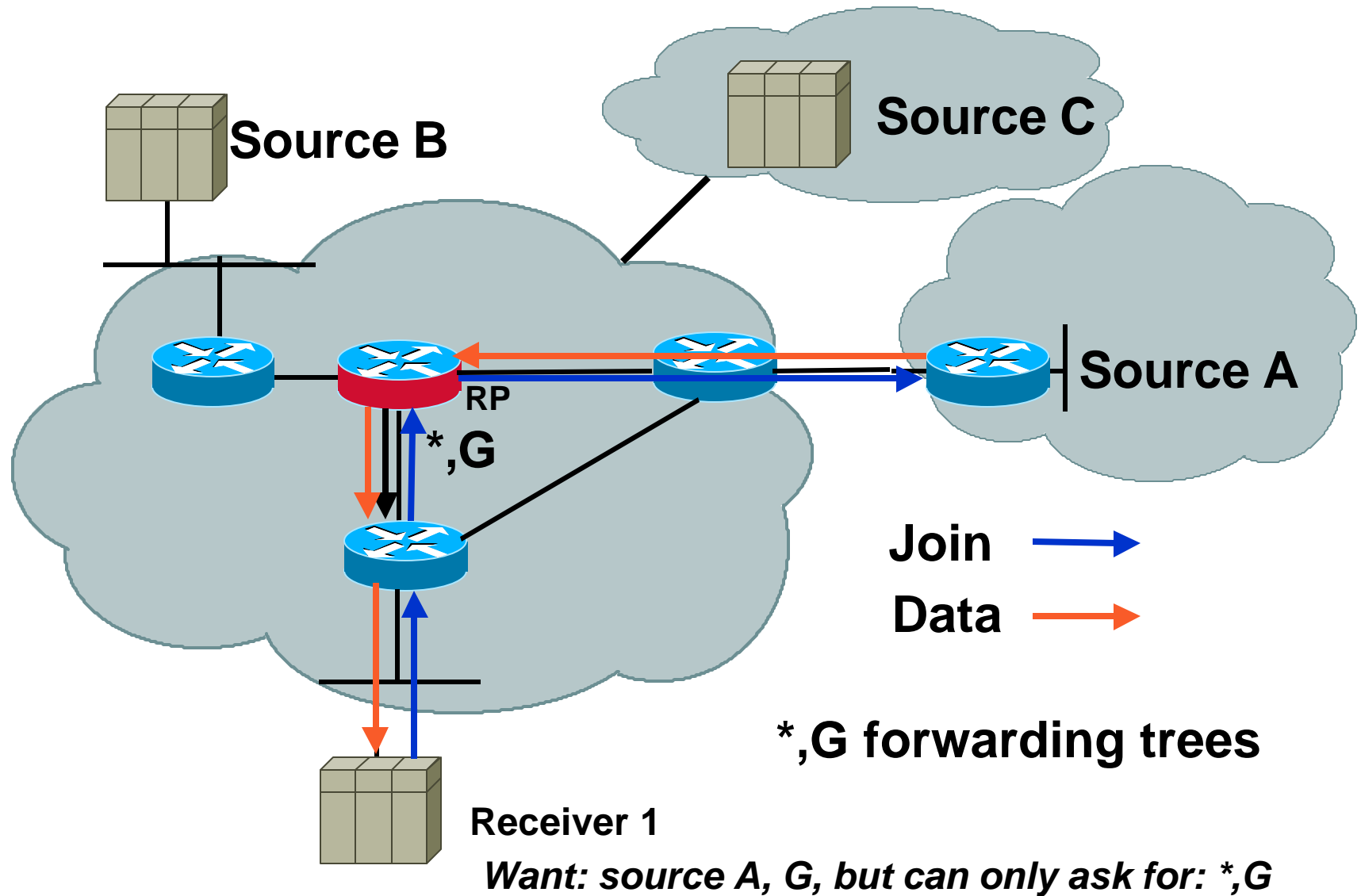
PIM Source Specific Mode



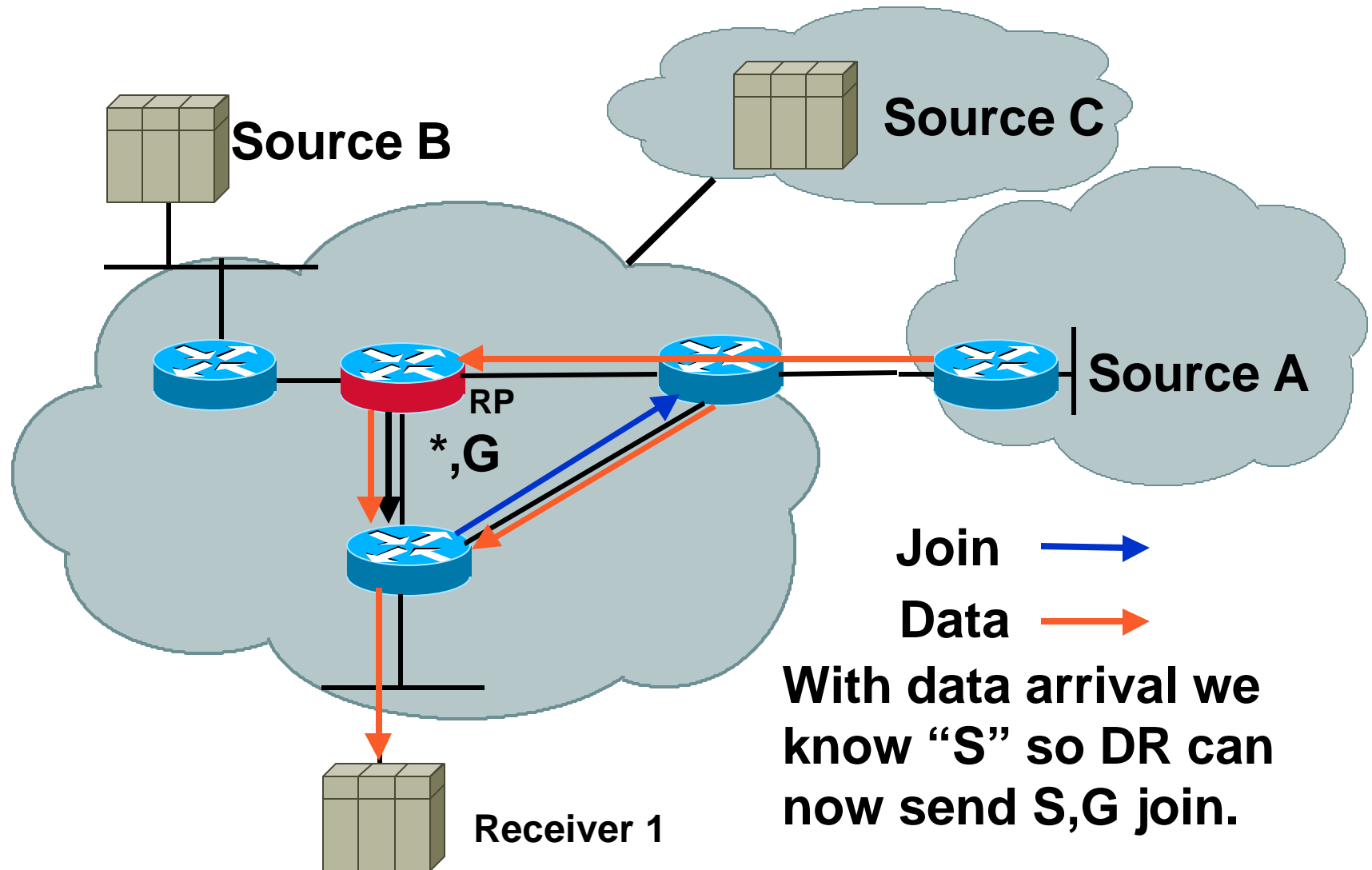
Effect of shared trees

- **Can't control traffic on shared tree**
- **Can't avoid address collisions**

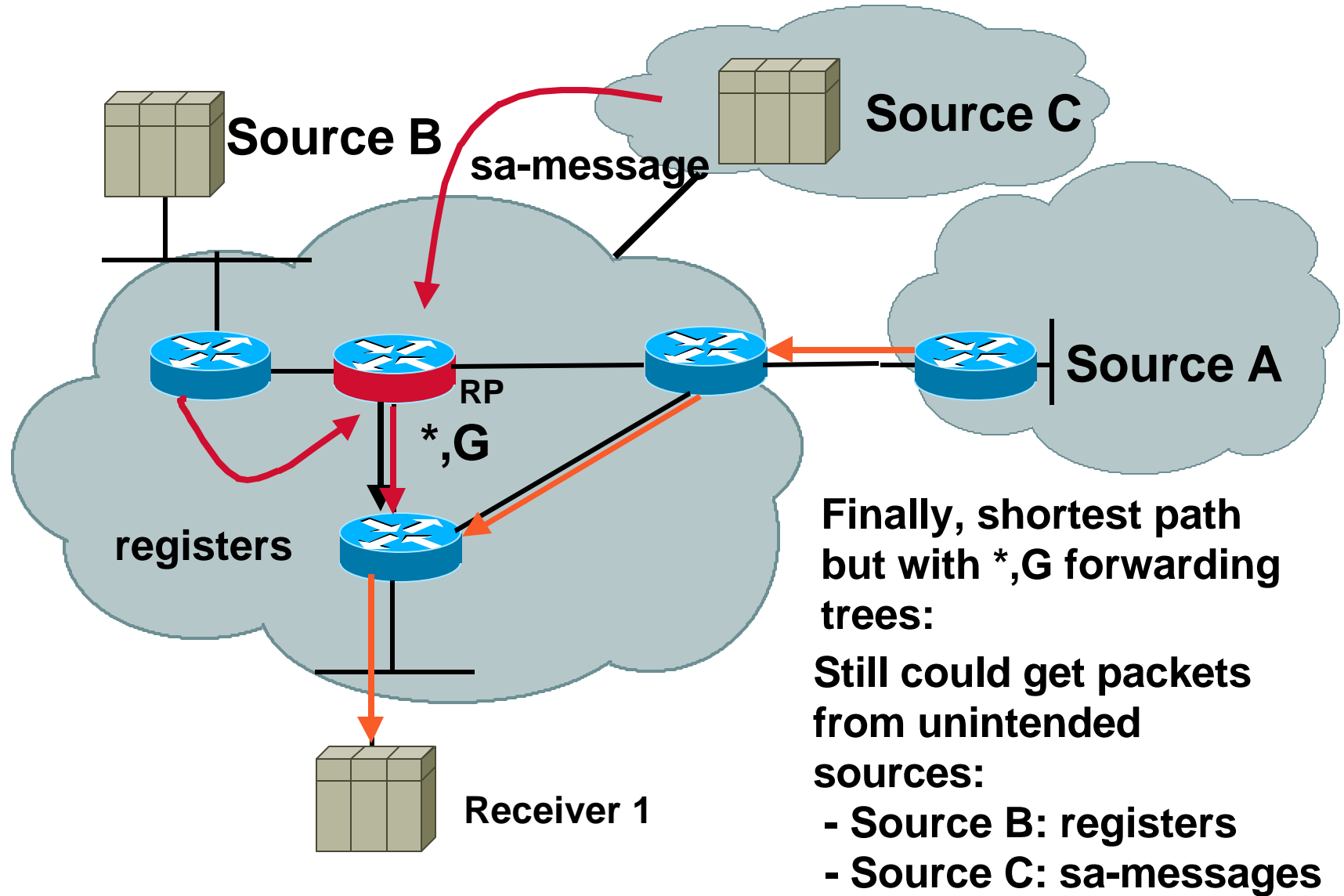
Eliminating Shared Trees



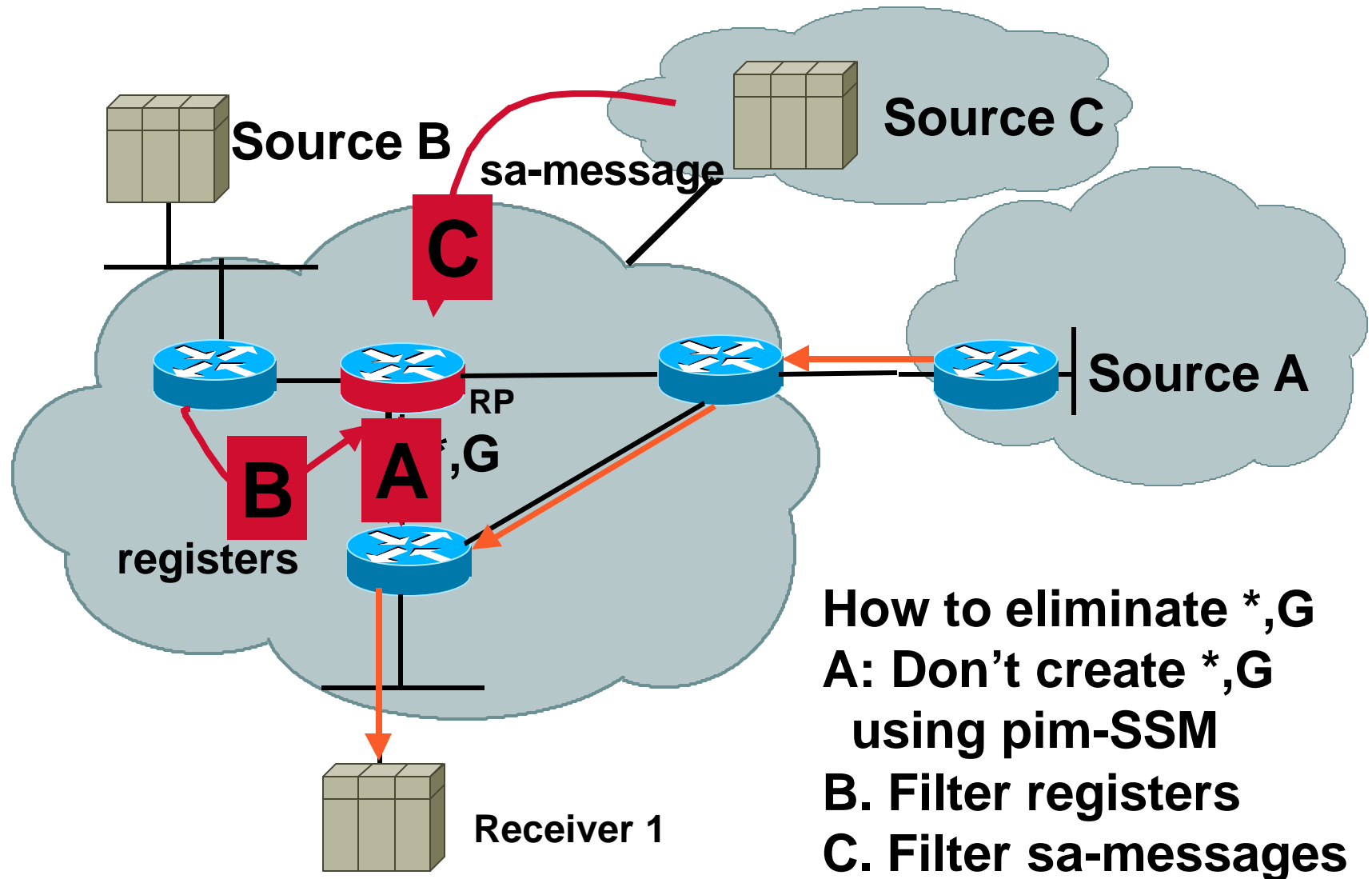
Eliminating Shared Trees



Eliminating Shared Trees



Eliminating Shared Trees



Eliminating Shared Trees

Problem:

Must specify what group SSM applies to globally.

Solution:

232/8 has been allocated by IANA. In this range:

- Config PIM-SSM code, include at least 232/8:**
 - prevents *,G
- Config pre-PIM-SSM code:**
 - filter registers for sources in 232/8
 - filter sa-messages for sources in 232/8

Eliminating shared trees in 232/8

- **Control access of 232/8 source data to legacy shared trees by filtering register messages.**

```
ip pim accept-register list <acl> | route-map <map>
```

- Control is per source and/or per group.

- **Prevent origination or forwarding of sa-messages so 232/8 sources cannot send to external receivers.**

- Accept register AND sa-filters

```
ip msdp sa-filter out|in ...
```


So where is IGMPv3 ?

- **IGMPv3 - currently an IETF draft**
 - draft-ietf-idmr-igmp-v3-04.txt (NOTE: Up for last call now)
- **Most multicast host/router vendors doing initial implementations:**
 - cisco: IGMPv3 implementation committed.
- **Full IGMPv3 host stacks and apps are in initial implementation phase now.**
 - FreeBSD, LINUX
 - MIM, vic/vat : What about windows apps?

Source Specific Multicast

- **Interim solution: IGMPv3-lite**
 - Utilizes simple daemon so application can send v3 messages with source include info directly to router. Daemon available for win95/98/00, MacOS
- **Interim solution: URD URL RenDezvous**
 - Requires no changes to host stack or apps.
 - First-hop router intercepts S,G info from http redirect sent by content provider's web page.

How to Get There

What cisco is doing:

- **IGMPv3/v3-lite/URD and PIM-SSM**
 - 12.1(4)T now, 12.1E and 12.0S soon.
- **Some IGMPv3 host-side work in-house**
 - IP/TV v3/v3-lite capable client
- **Extensive work with stack/apps vendors.**
- **Extending field test program**
 - several ISPs and content providers

RUNNING LIVE TESTS TODAY!

How to Get There

What needs to be done:

- **Deployment of PIM-SM/SSM multicast**
 - Config 232/8 filtering when PIM-SM
- **Deployment of IGMPv3 on DR's**
- **IGMPv3 capable stacks, applications**
- **v3-lite or URD when IGMPv3 not available**
- **Source content**
 - 232/8 (source specific only), and non-232/8
- **Further develop web based elements**

IETF Documents

