Protocol Independent Multicast (PIM) Examples

Acknowledgments:
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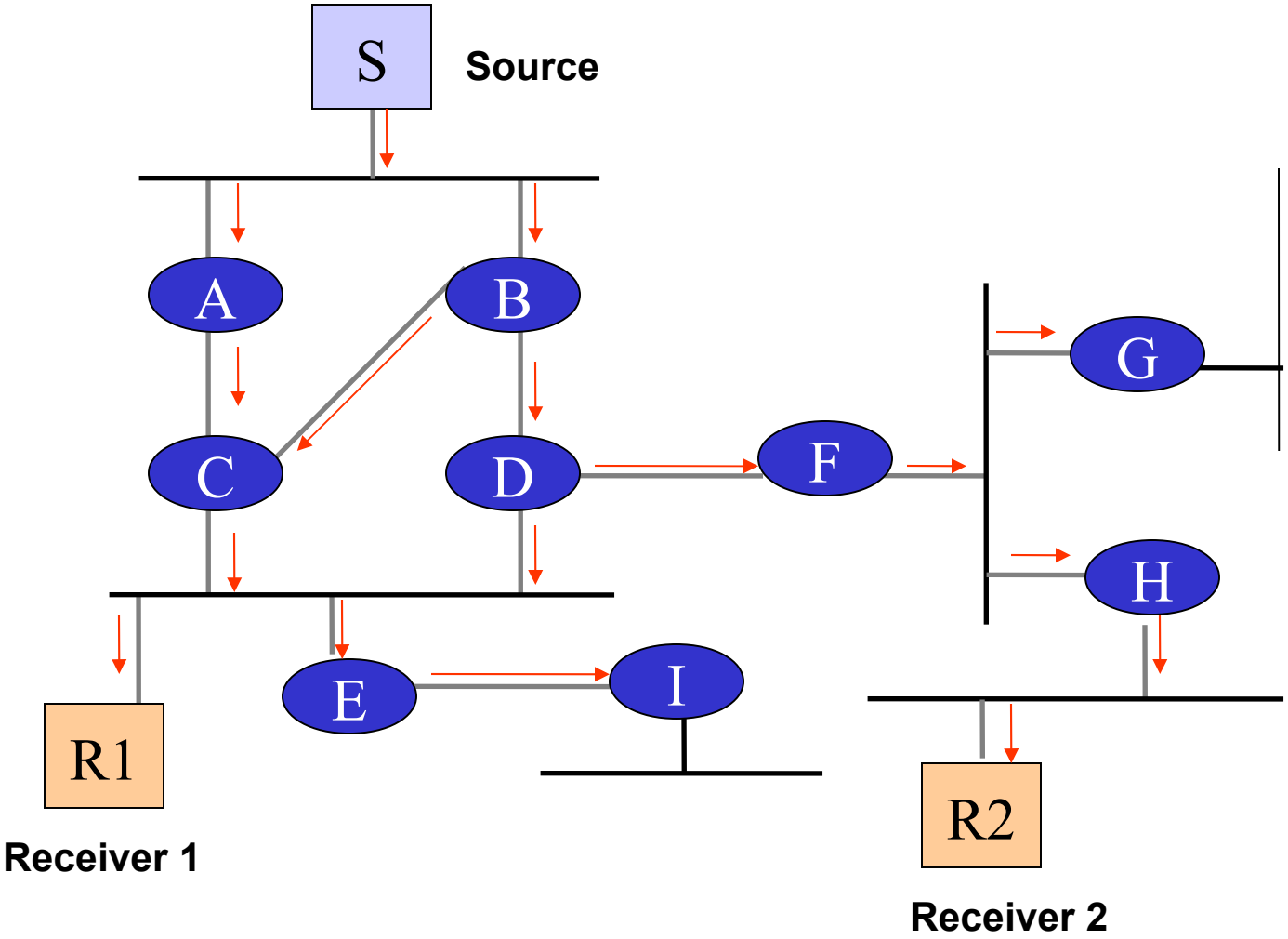
PIM Dense Mode (DM) Actions

- *Prune* used to remove links not on the reverse shortest path (i.e., shortest path back to source)
- *Asserts* used to determine the forwarder for network with two routers
- *Grafts* used to join existing source tree

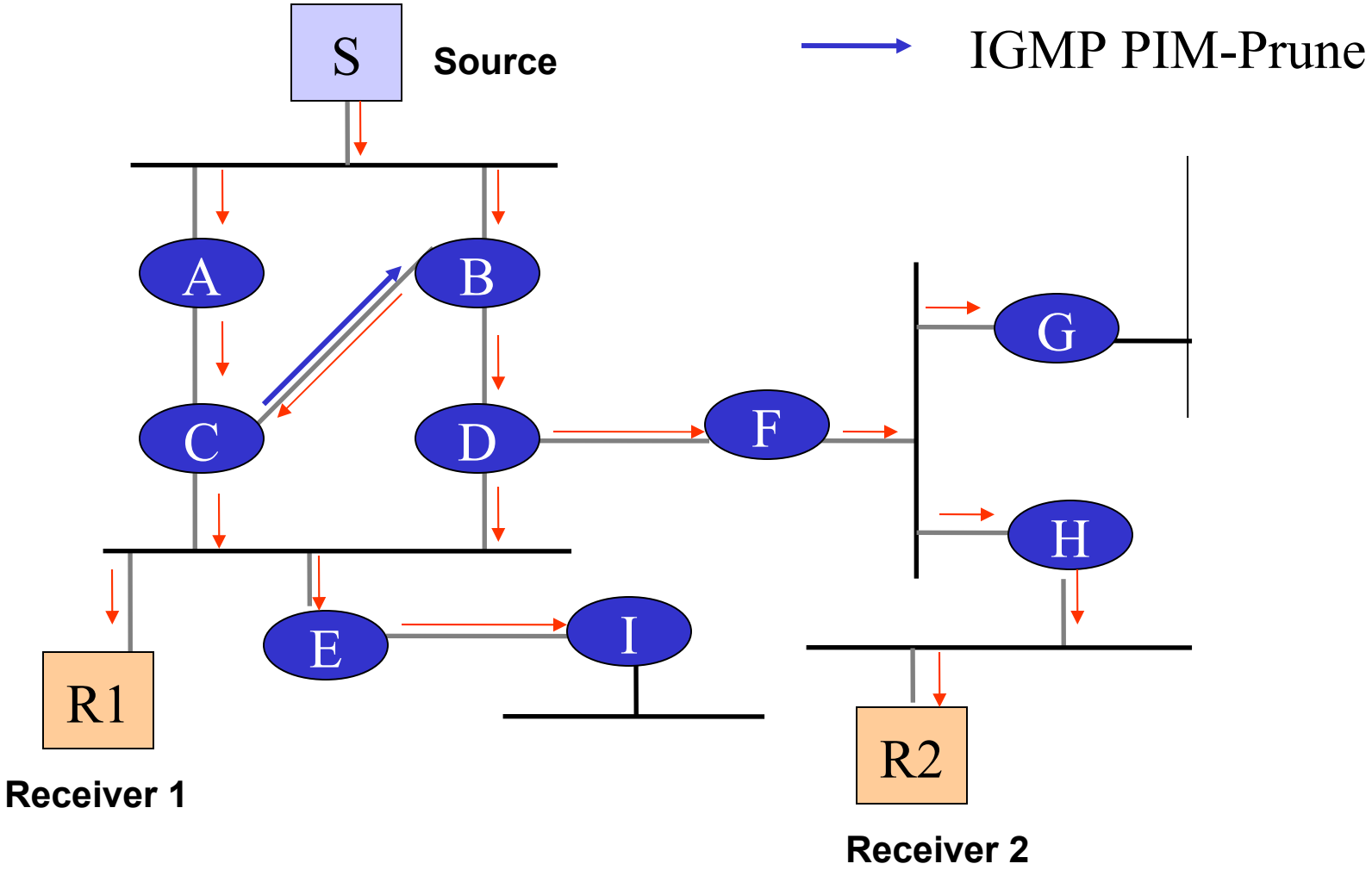
PIM-DM(1)

Initial flood of data



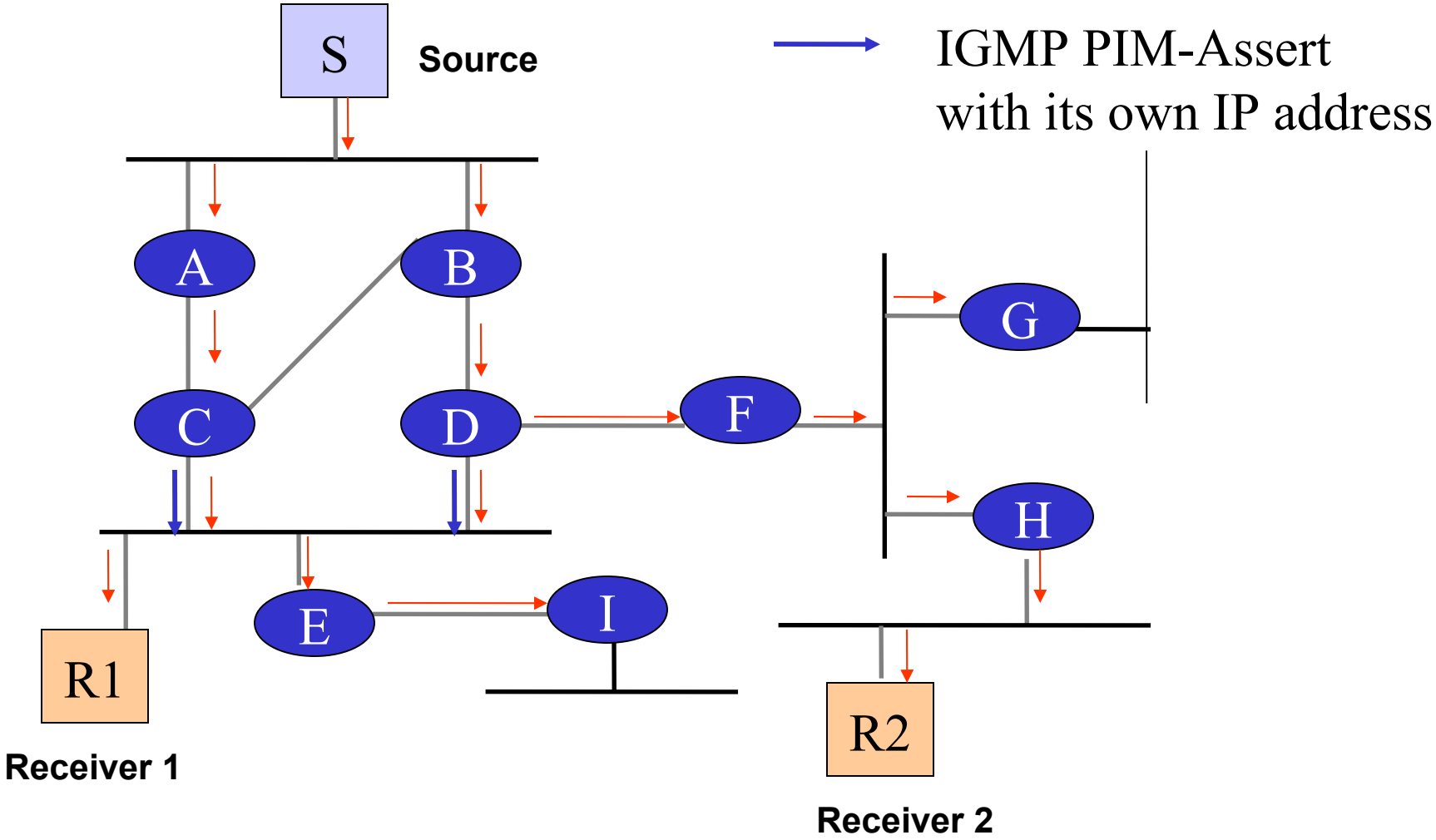
PIM-DM(2)

prune non-RPF p2p link



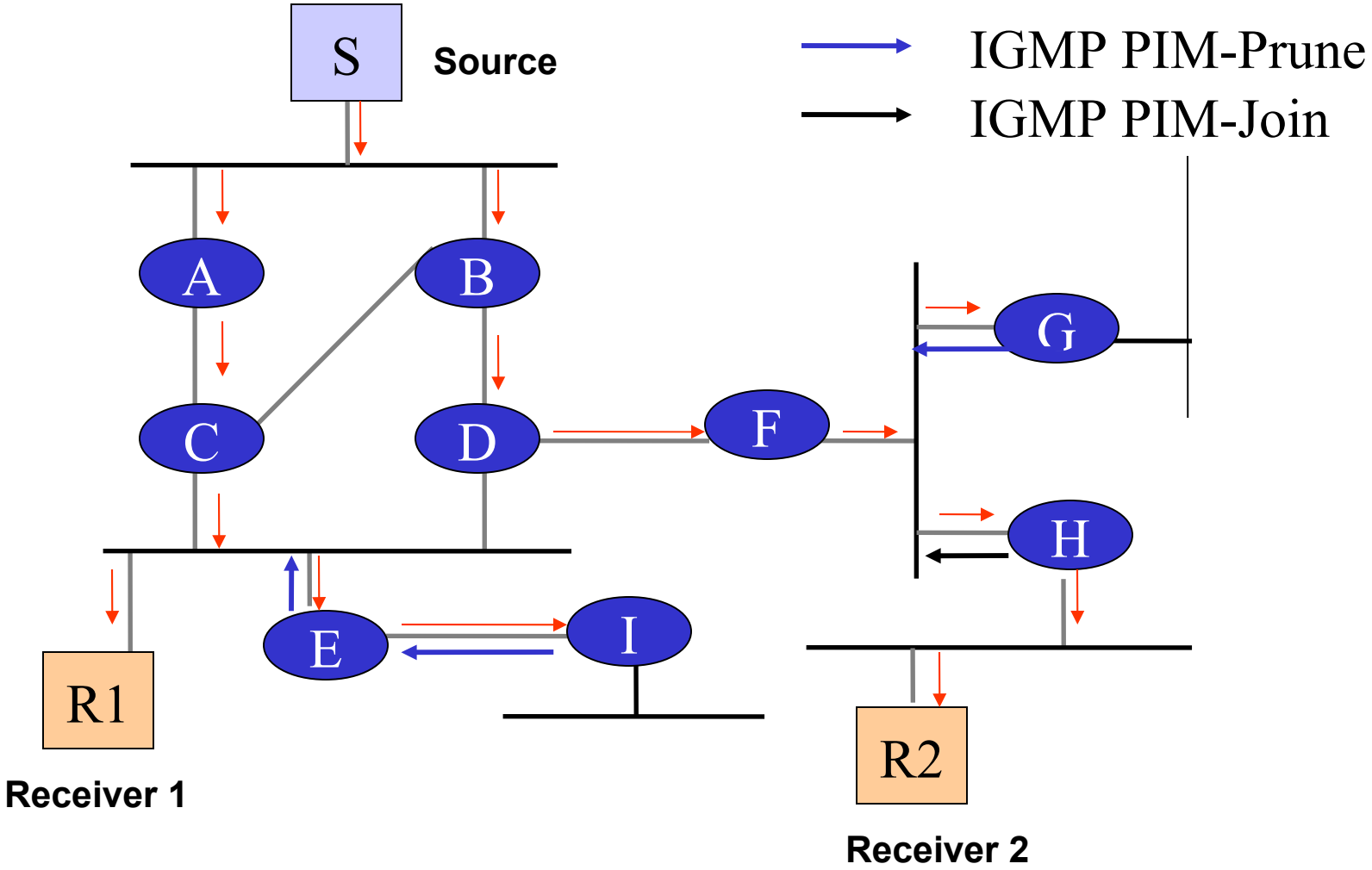
PIM-DM(3)

C and D Assert to Determine Forwarder for the LAN, C Wins



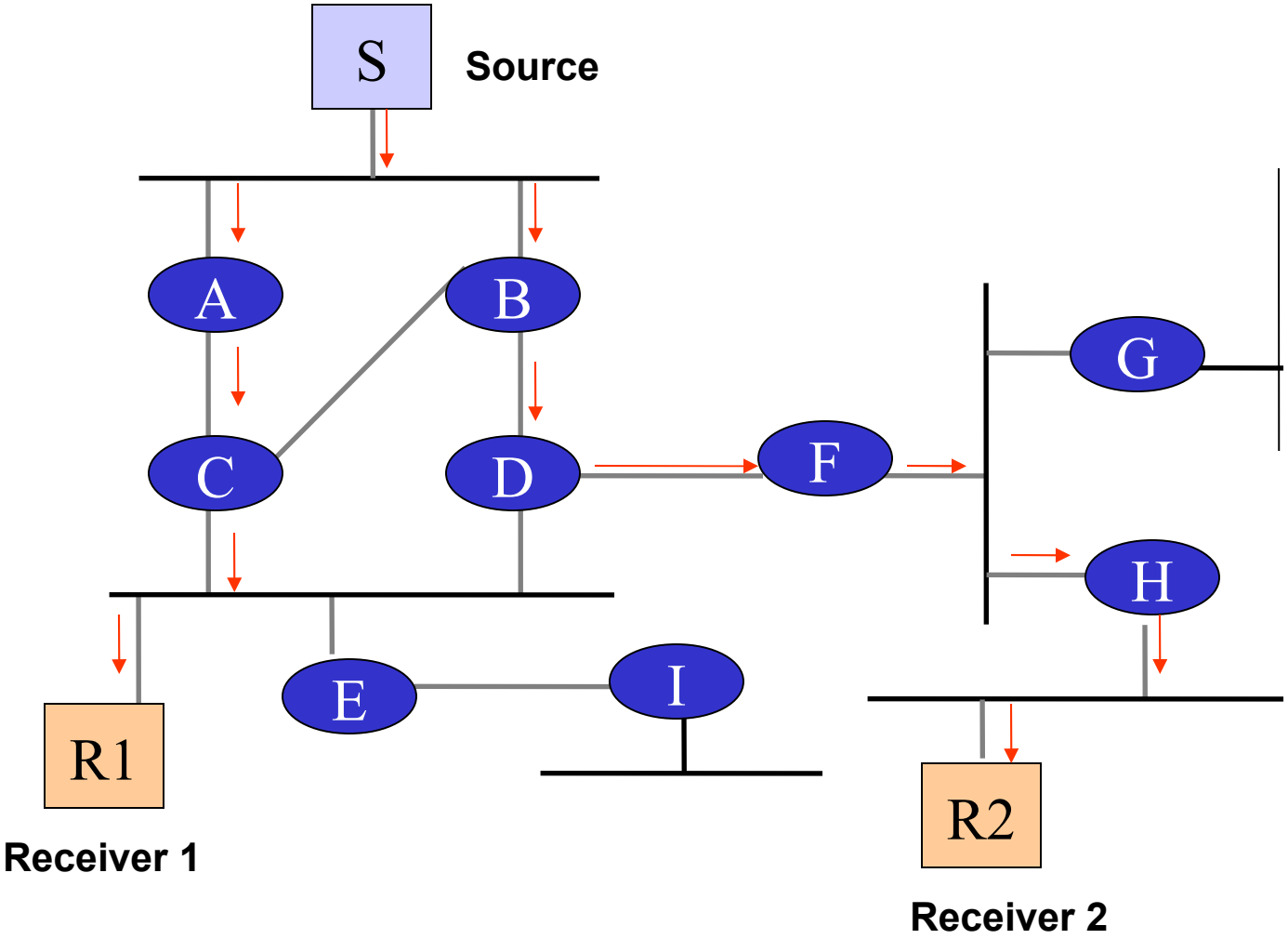
PIM-DM(4)

I, E, G send Prune
H send Join to override G's Prune



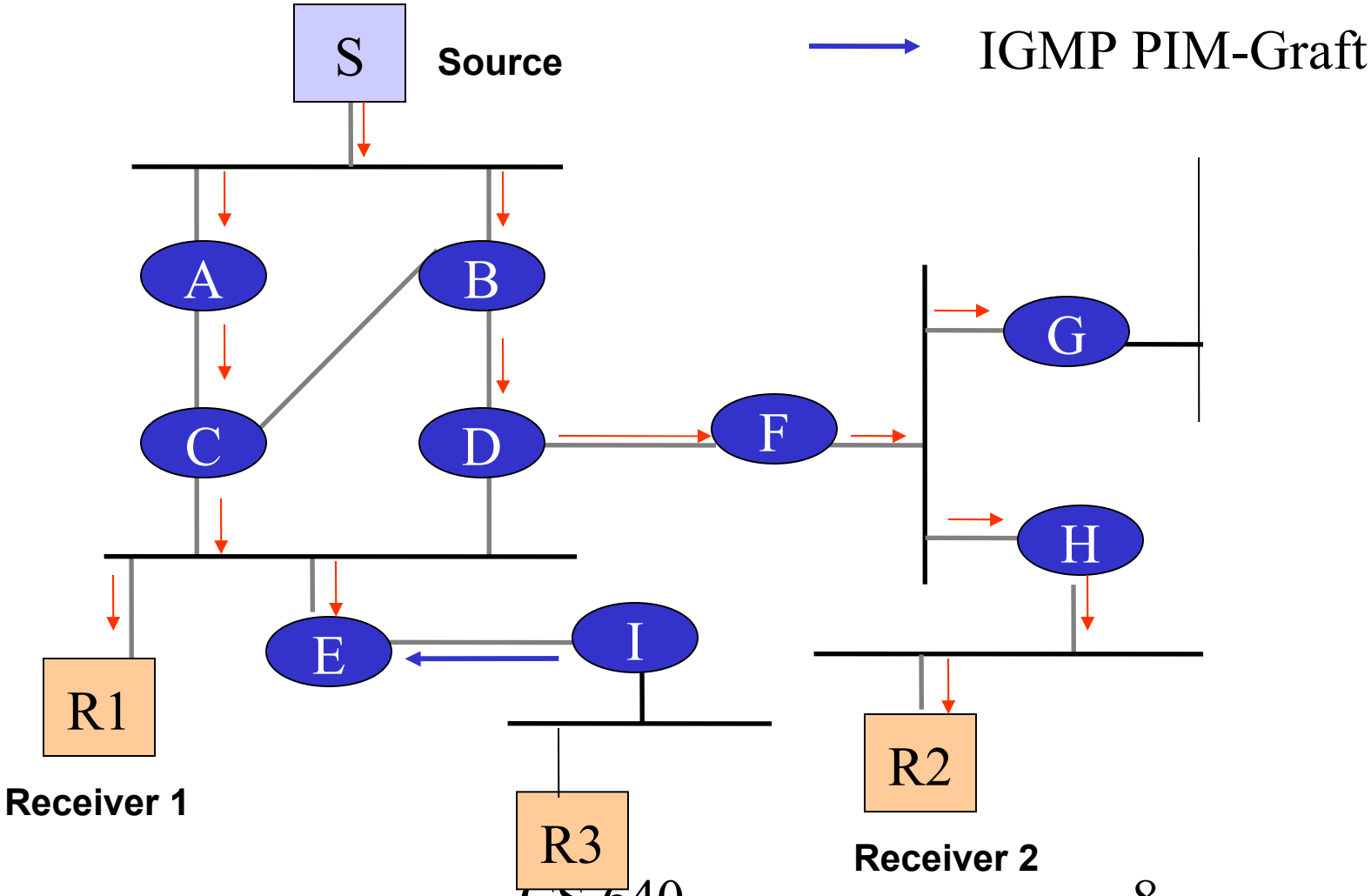
PIM-DM(5)

I Gets Pruned
E's Prune is Ignored (since R1 is a receiver)
G's Prune is Overridden (due to new receiver R2)



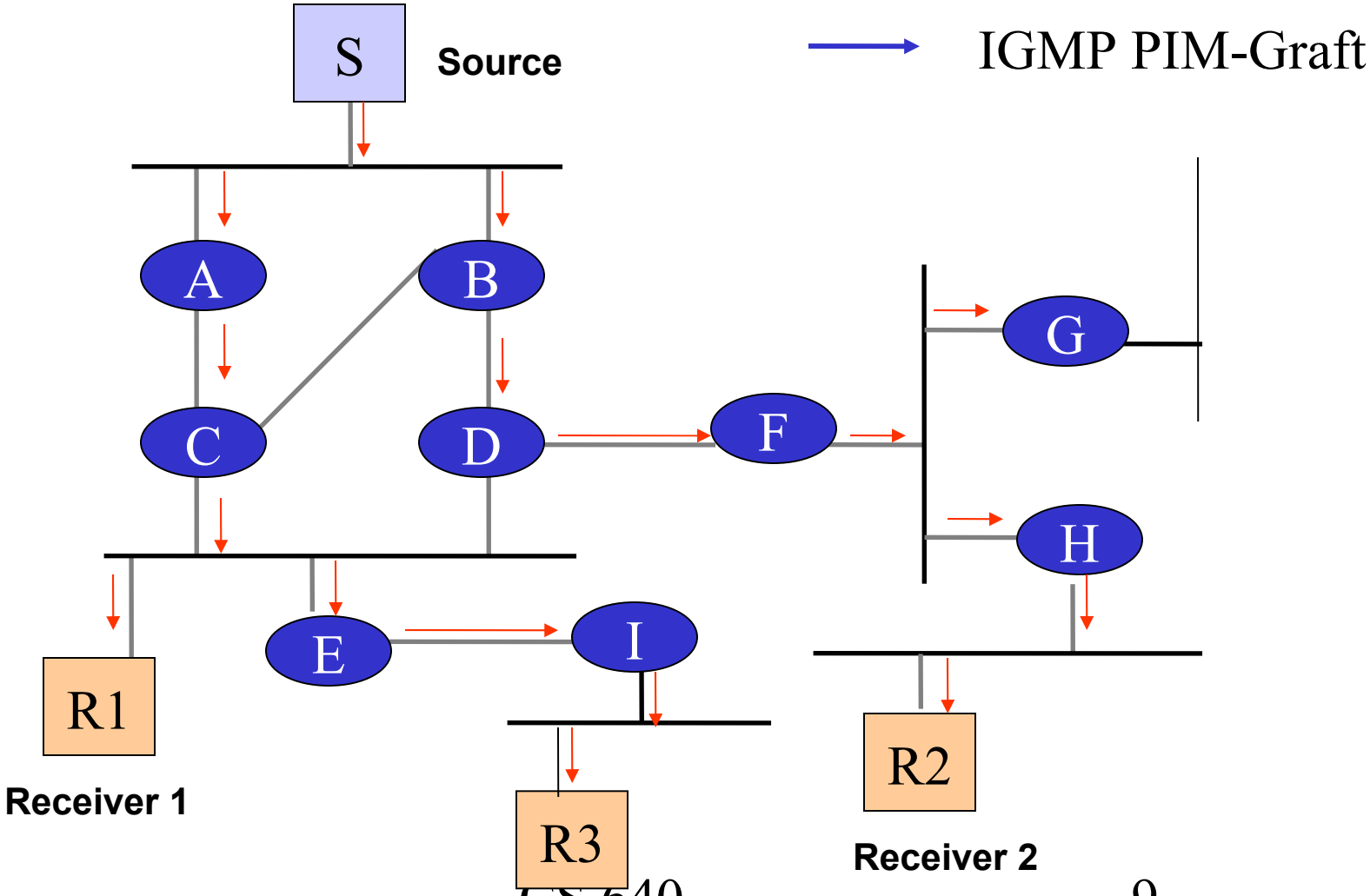
PIM-DM(6)

New Receiver, I send Graft



PIM-DM(6)

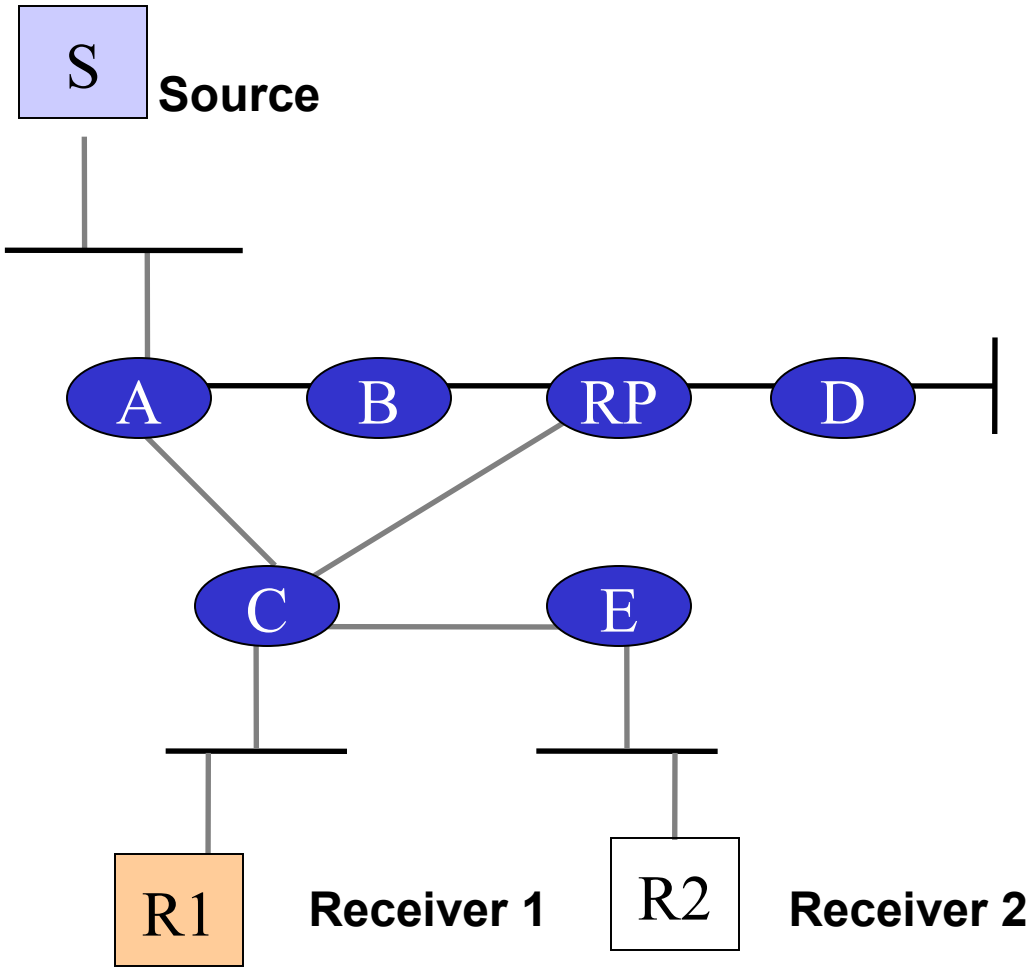
new branch



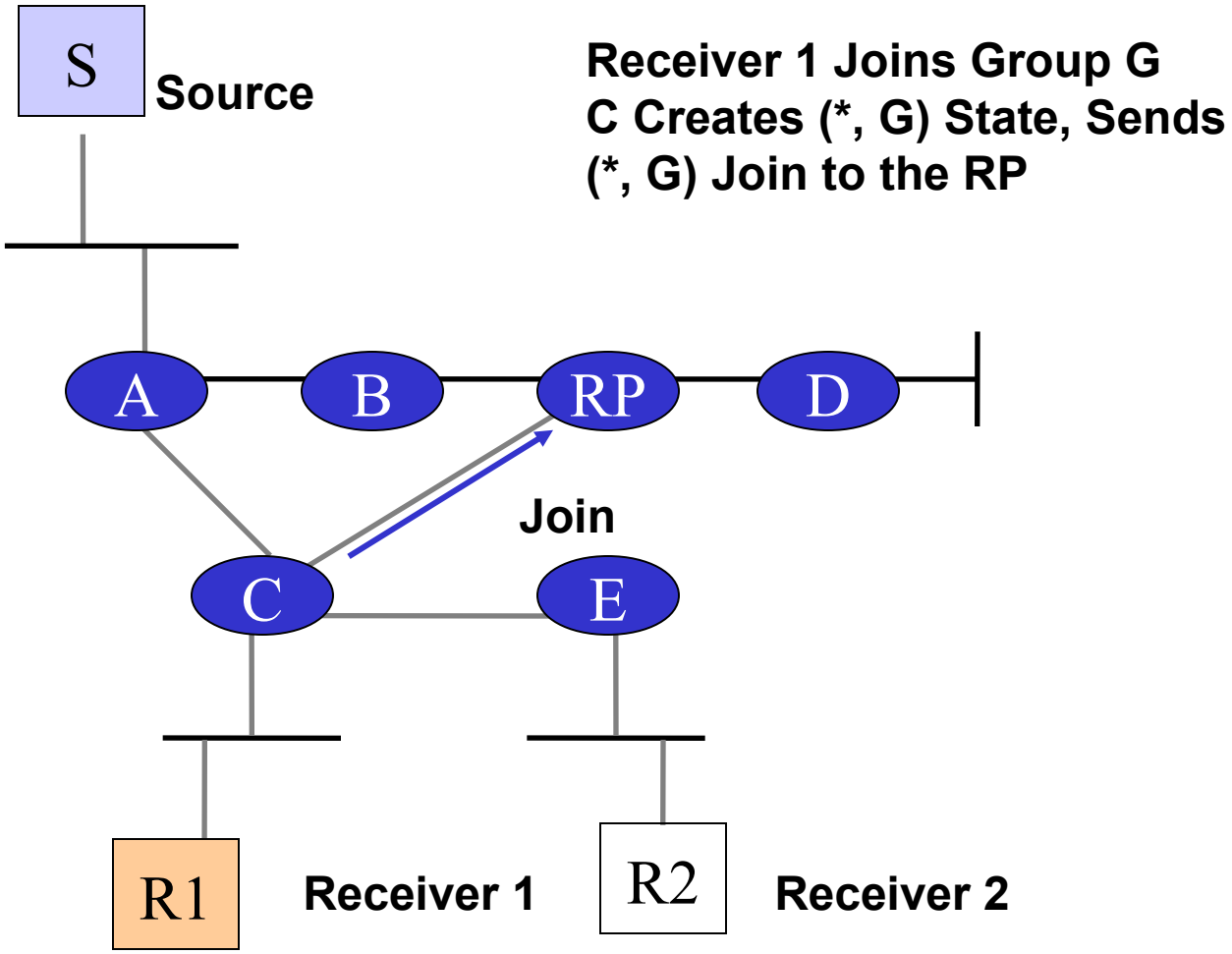
PIM Sparse Mode (SM) Actions

- Create routing tree for a group with *Rendezvous Point* (RP) as a root for the tree
  - Receivers send *Join* towards the RP
  - Sender send *Register* towards the RP
- Transition from going through RP to using shortest path tree (SPT)

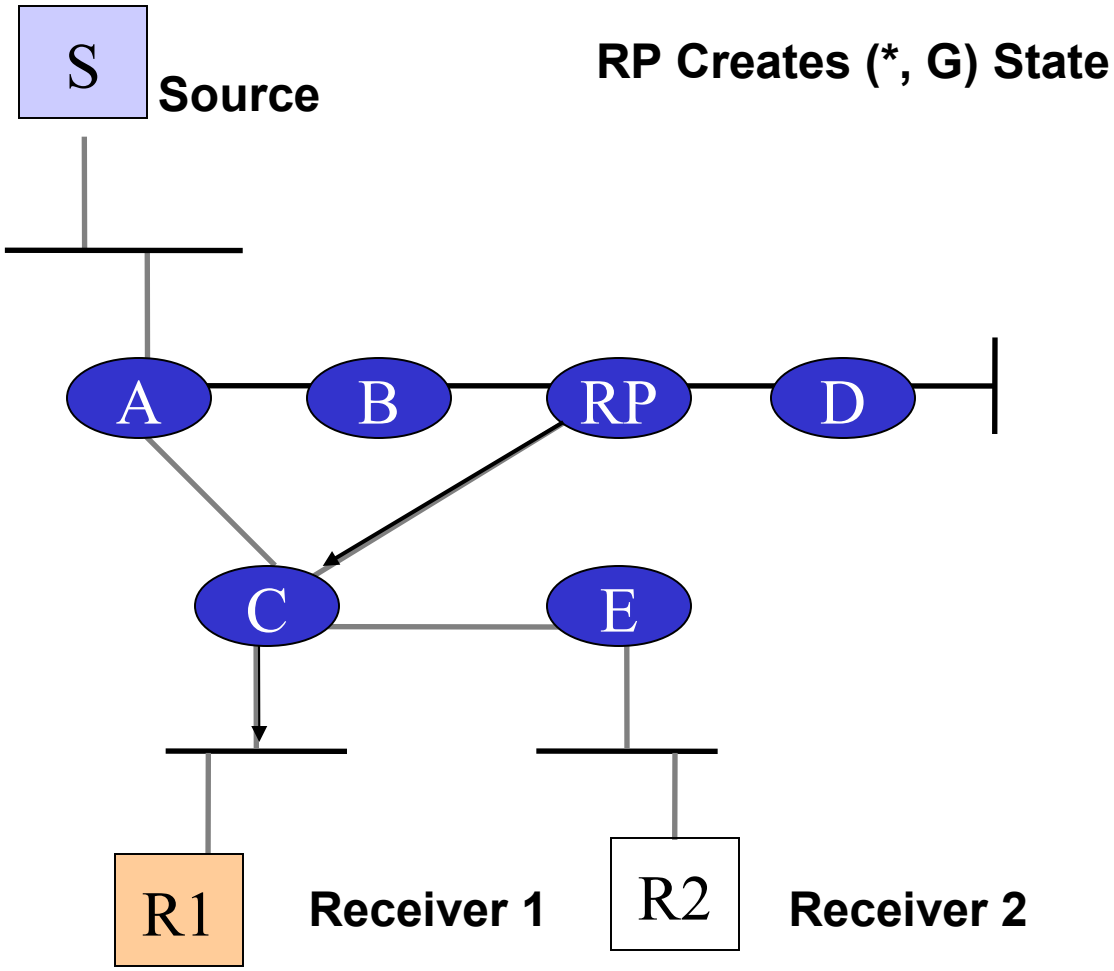
PIM-SM(1)



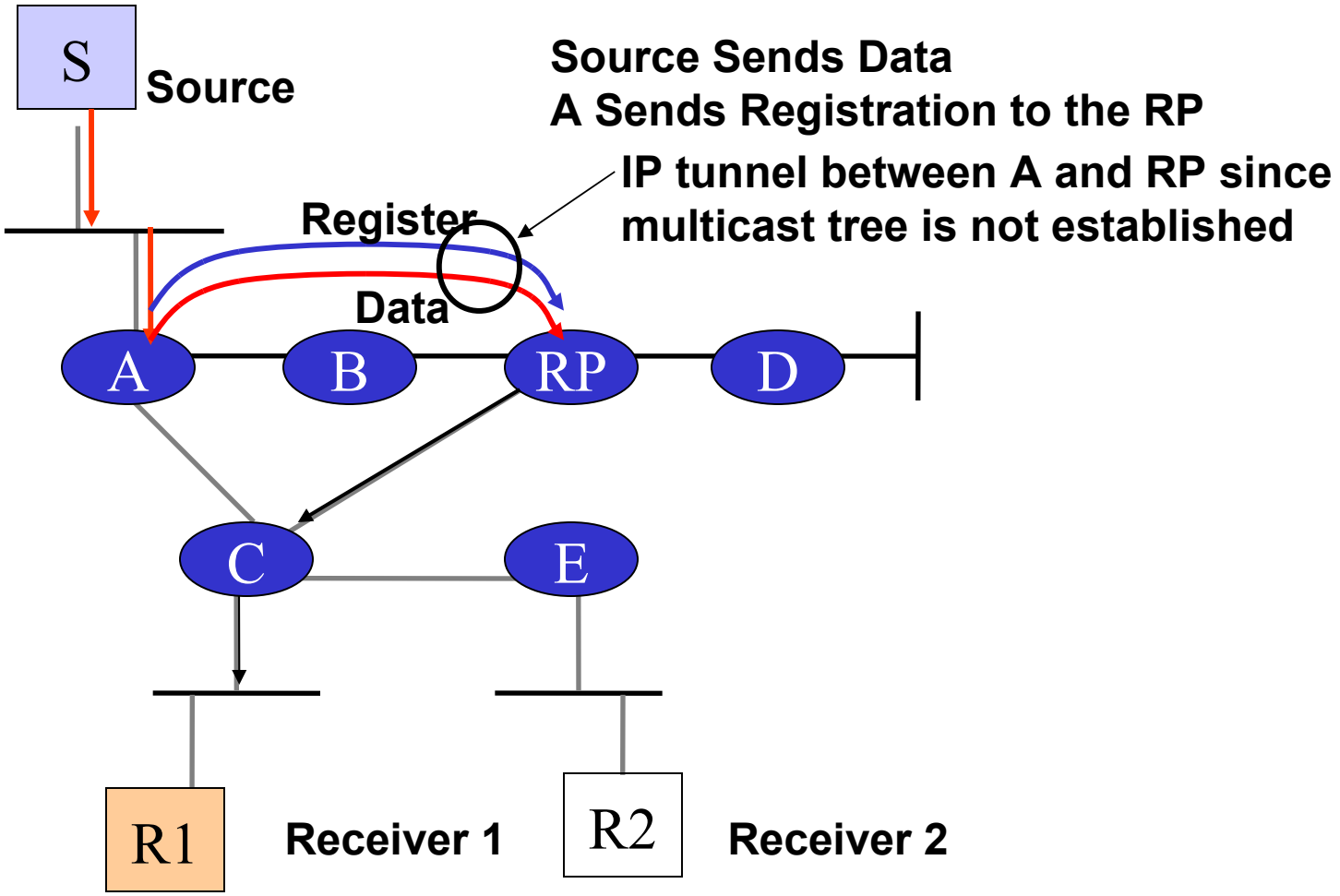
PIM-SM(2)


S
Source
Receiver 1 Joins Group G
C Creates (*, G) State, Sends
(*, G) Join to the RP
A
B
RP
D
Join
C
E
R1
Receiver 1
R2
Receiver 2

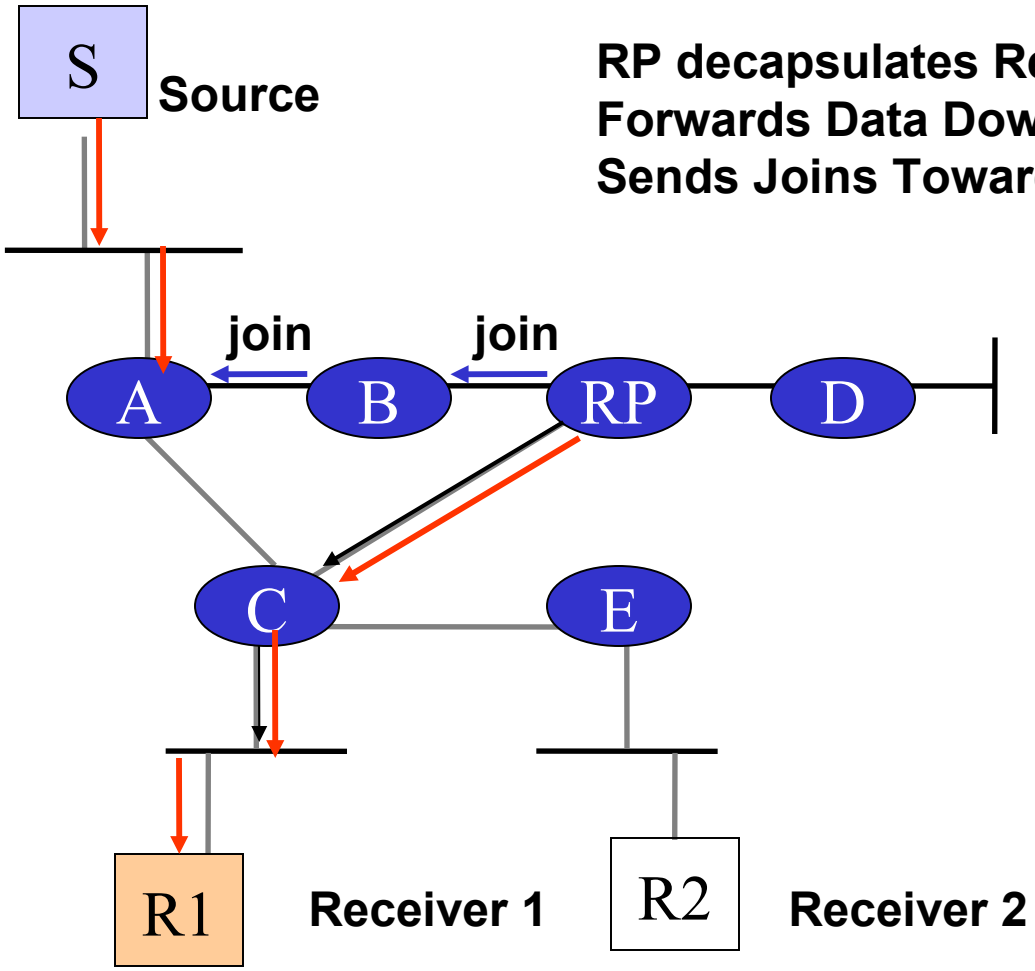
PIM-SM(3)


S
Source
RP Creates (*, G) State
A
B
RP
D
C
E
R1
Receiver 1
R2
Receiver 2

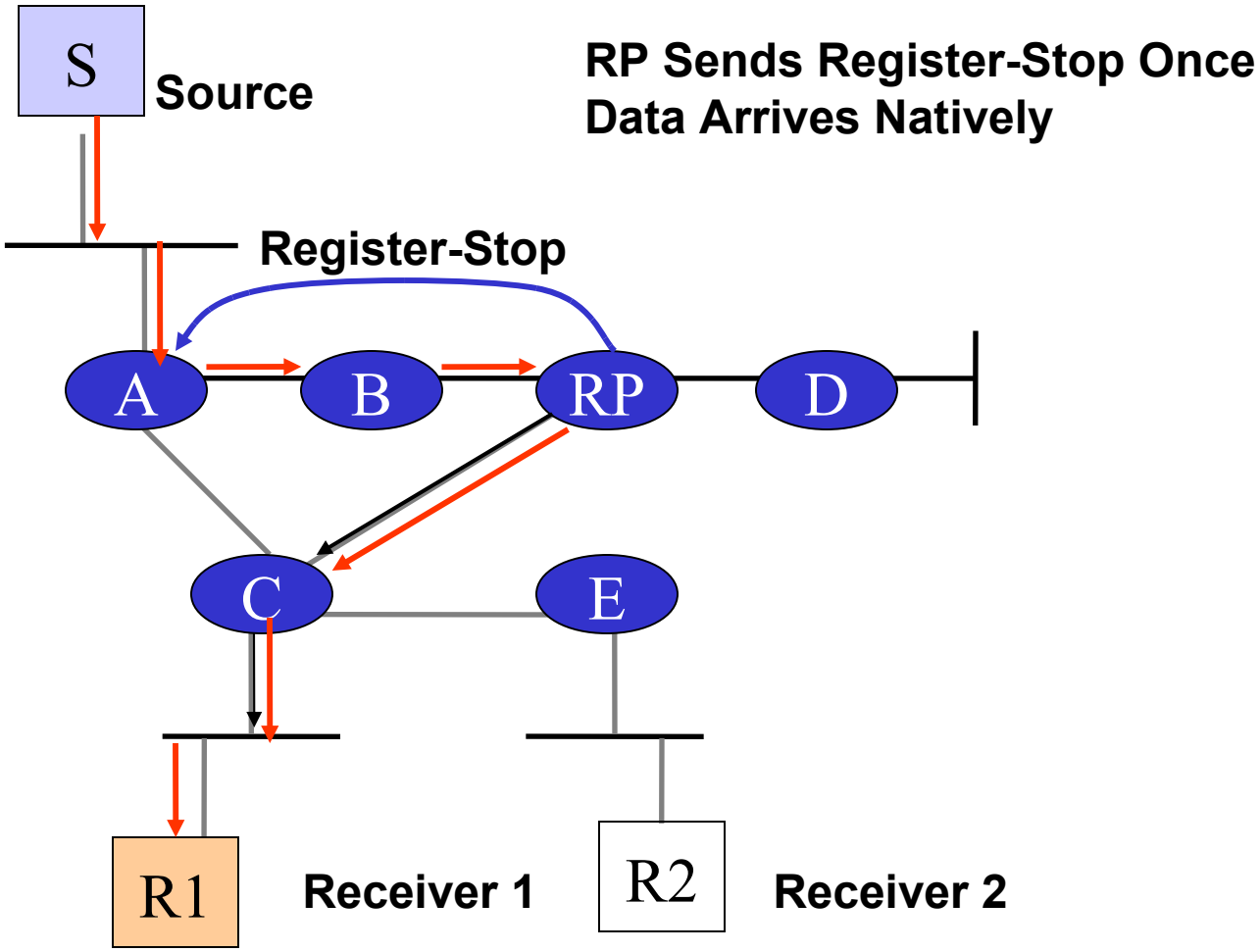
PIM-SM(4)


S
Source
Source Sends Data
A Sends Registration to the RP
IP tunnel between A and RP since multicast tree is not established
Register
Data
A
B
RP
D
C
E
R1
Receiver 1
R2
Receiver 2

PIM-SM(5)

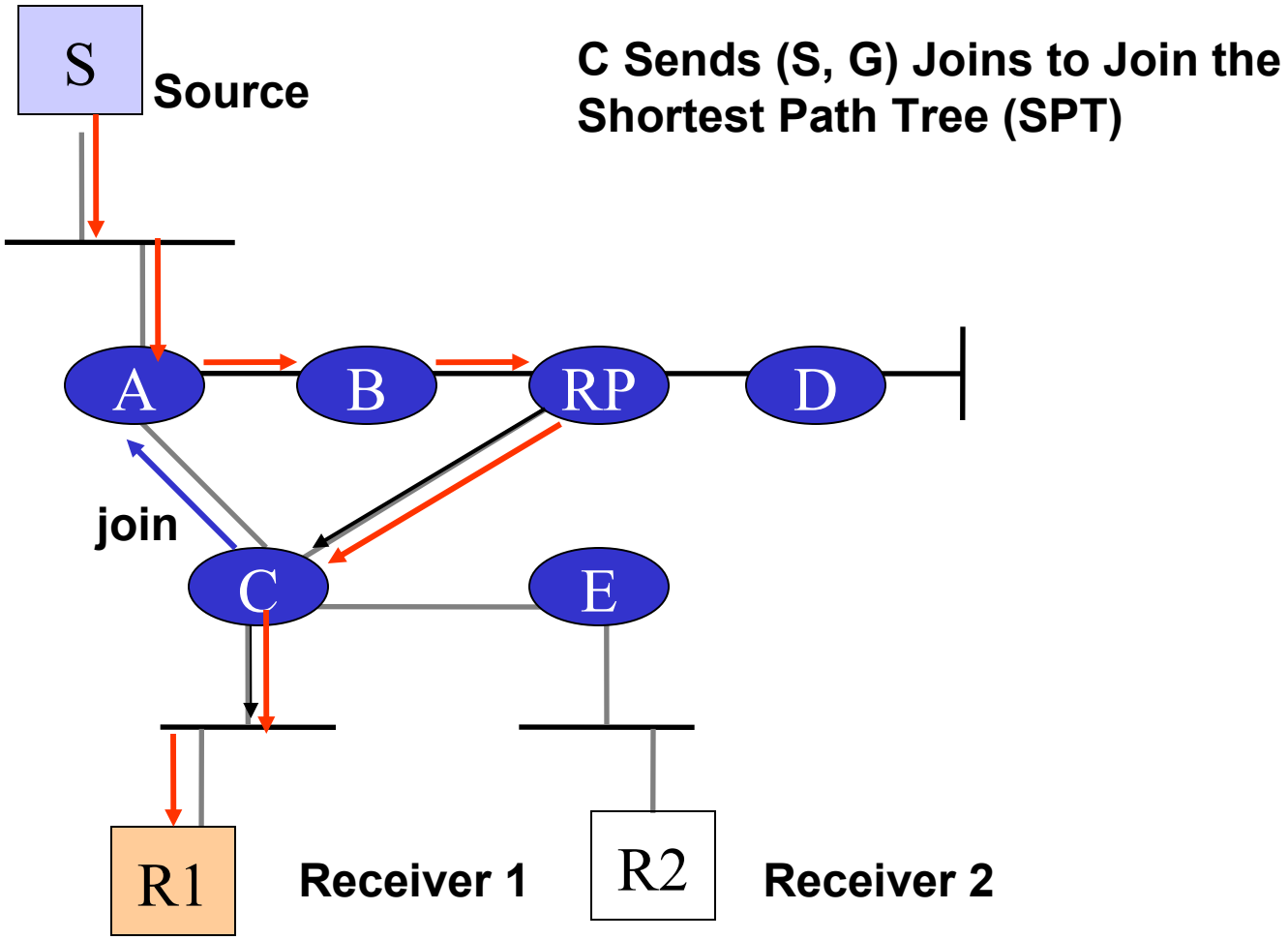

S
Source
RP decapsulates Registration
Forwards Data Down the Shared Tree
Sends Joins Towards the Source
join
join
A
B
RP
D
C
E
R1
Receiver 1
R2
Receiver 2

PIM-SM(6)

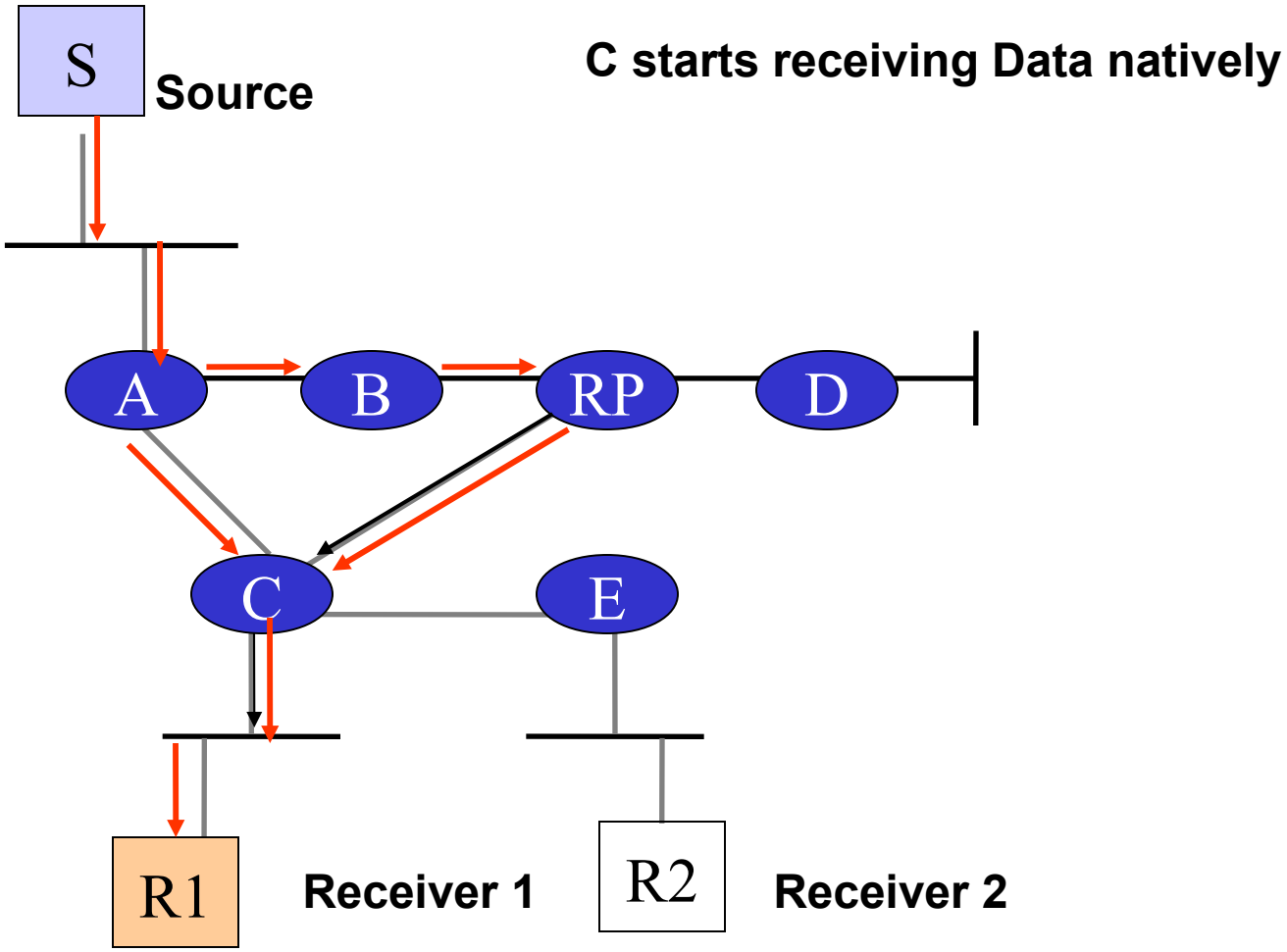

S
Source
RP Sends Register-Stop Once
Data Arrives Natively
Register-Stop
A
B
RP
D
C
E
R1
Receiver 1
R2
Receiver 2

PIM-SM(7)

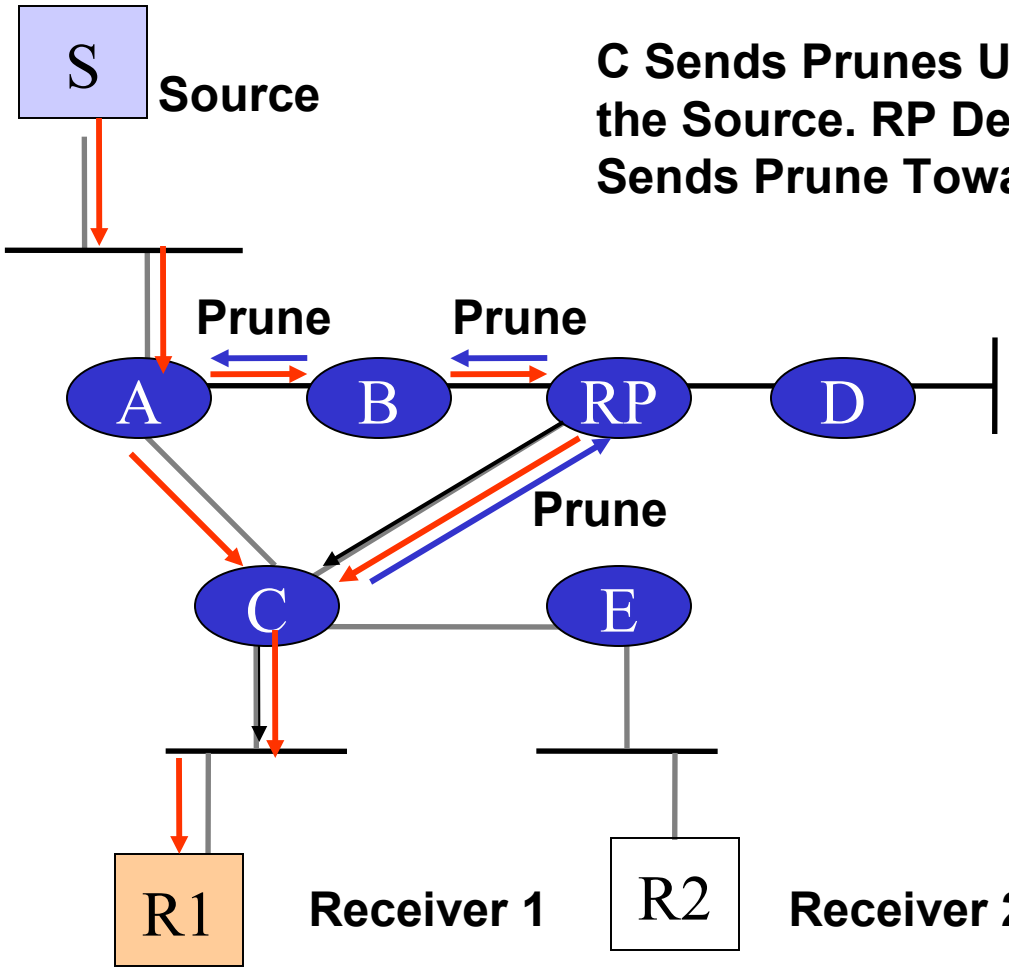
SPT Switchover



PIM-SM(8)

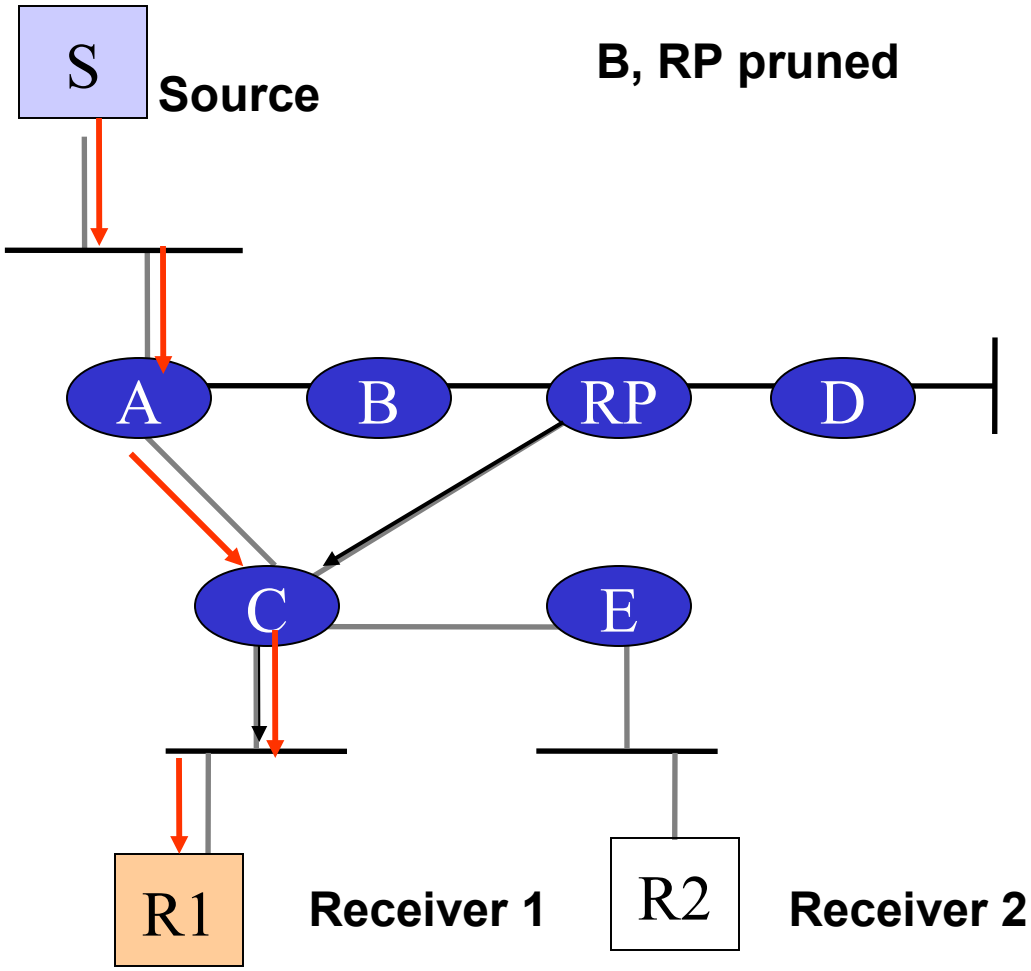

S
Source
C starts receiving Data natively
A
B
RP
D
C
E
R1
Receiver 1
R2
Receiver 2

PIM-SM(9)

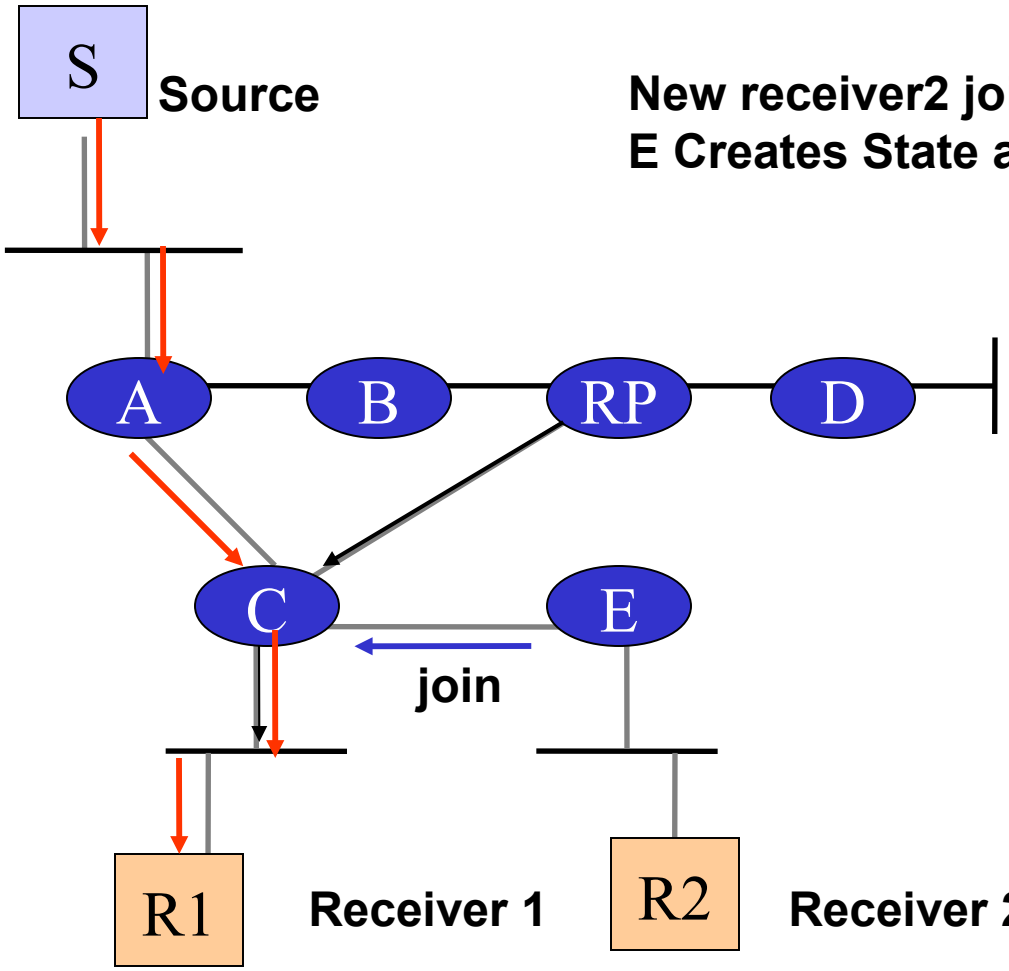


C Sends Prunes Up the RP tree for the Source. RP Deletes (S, G) OIF and Sends Prune Towards the Source

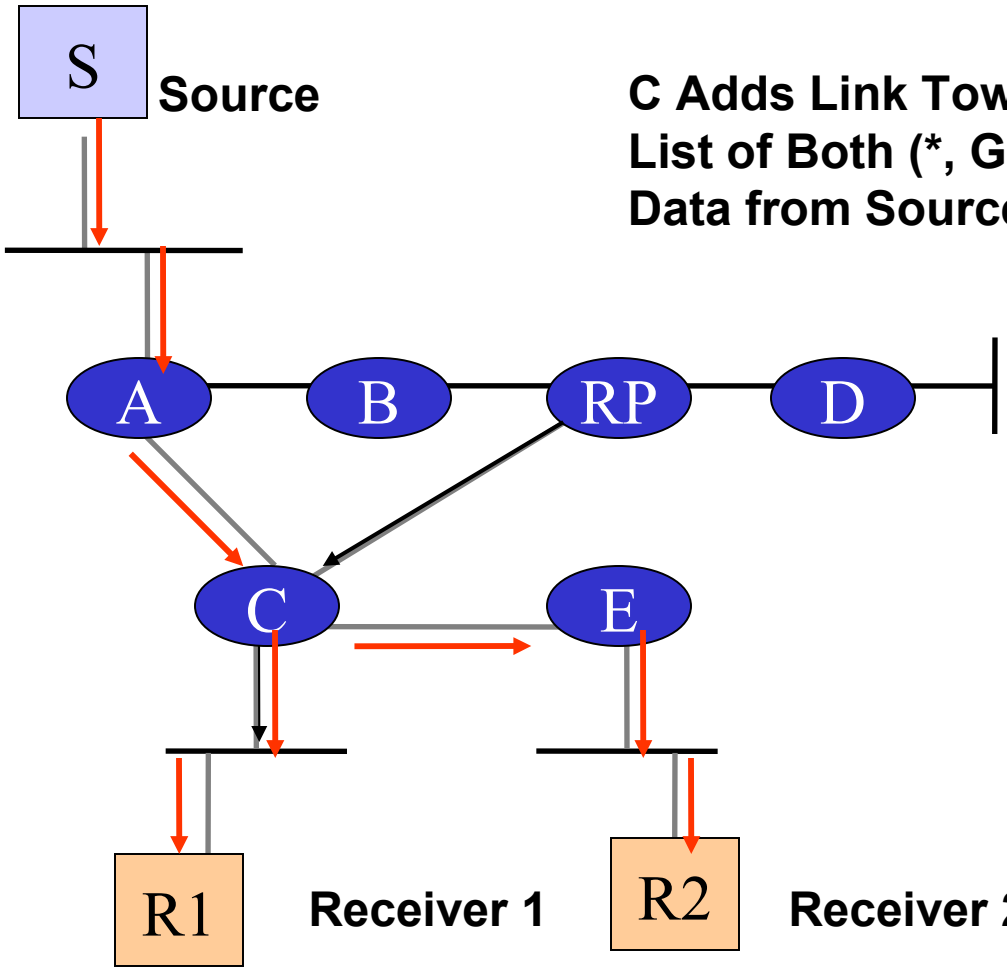
PIM-SM(10)



PIM-SM(11)


S
Source
New receiver2 joins
E Creates State and Sends (*, G) Join
A
B
RP
D
C
E
join
R1
Receiver 1
R2
Receiver 2

PIM-SM(12)


S
Source
C Adds Link Towards E to the OIF
List of Both (*, G) and (S, G)
Data from Source Arrives at E
A
B
RP
D
C
E
R1
Receiver 1
R2
Receiver 2