

Transition Within SIP Based Multi-Party Communication: From Tightly-Coupled To Fully-Coupled Conference

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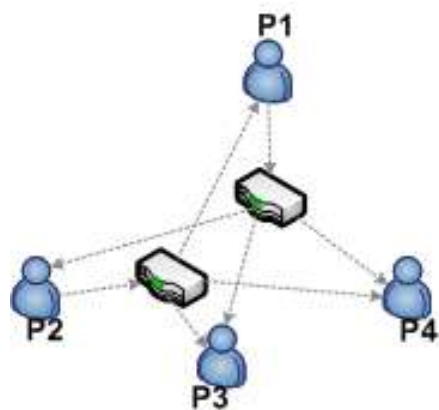
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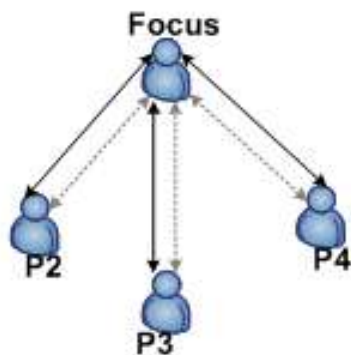
Outline

- ▶ Overview of conference models
- ▶ Motivations (Tightly-coupled model limitations)
- ▶ Solution (Fully-coupled transition)
 - ▶ Transitions overview
 - ▶ Transition steps
 - ▶ Transition Message protocol
- ▶ Evaluation of Transition Message Costs
- ▶ Conclusion

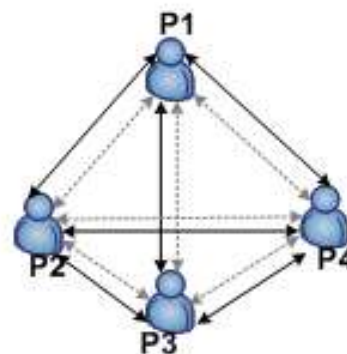
Overview of multiparty communication topology approaches



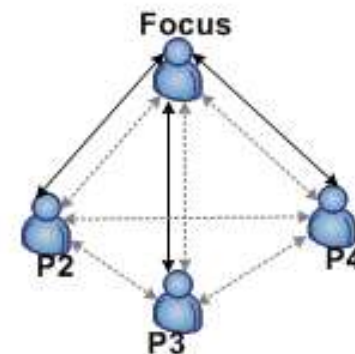
Loosely-coupled
(Multicast routing)



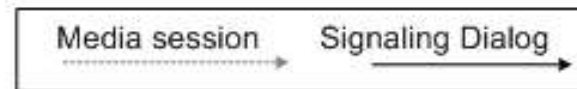
Tightly-coupled
signaling and media



Fully-coupled signaling and
media

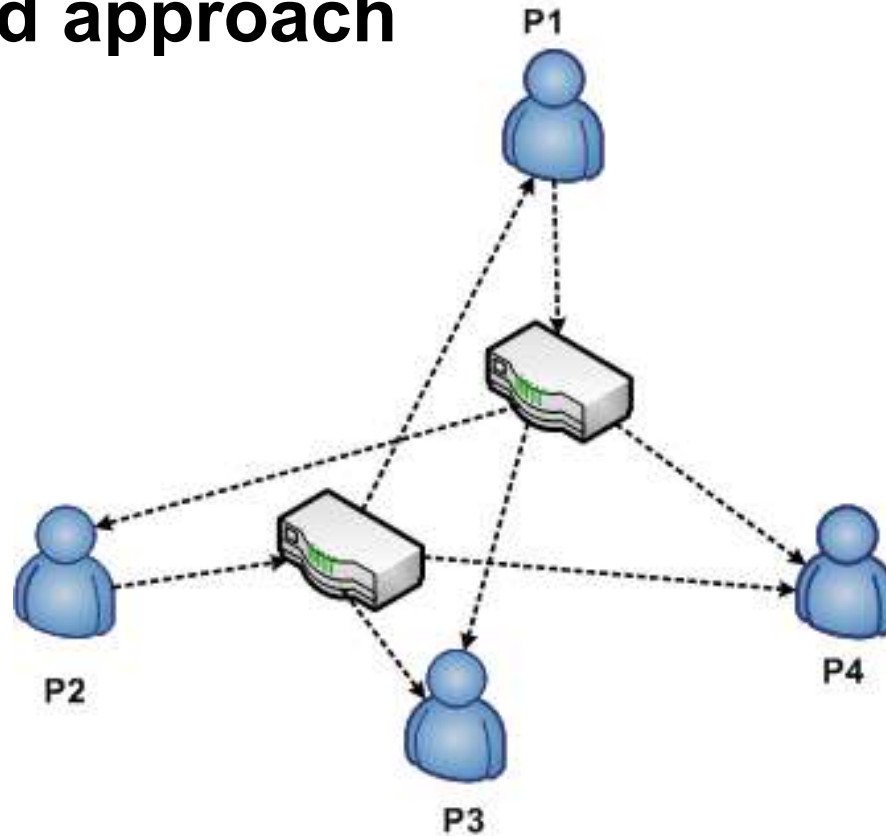


Tightly coupled signaling,
Fully-coupled media



Multiparty communication topology approaches

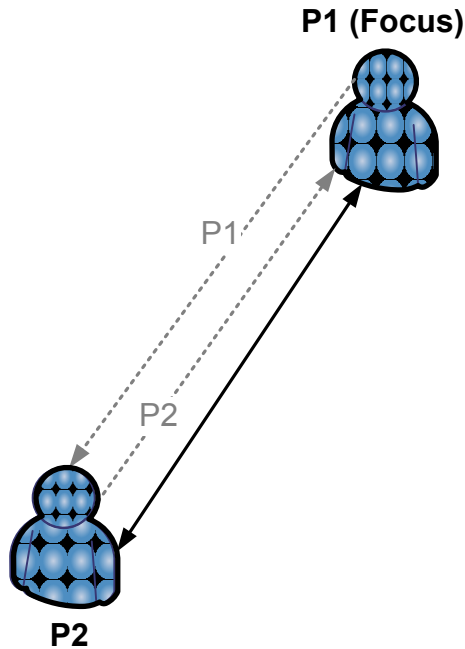
Loosely-coupled approach



Multicast routing

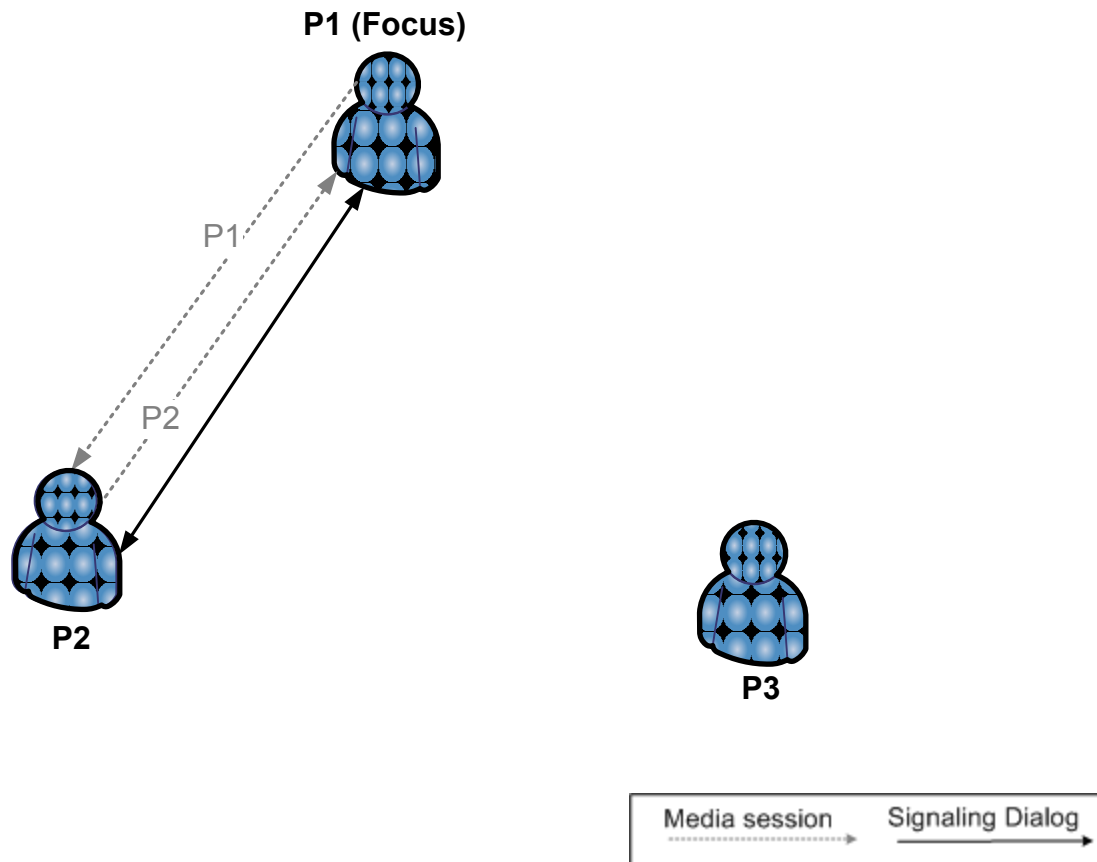
Multiparty communication topology approaches

Tightly-coupled approach



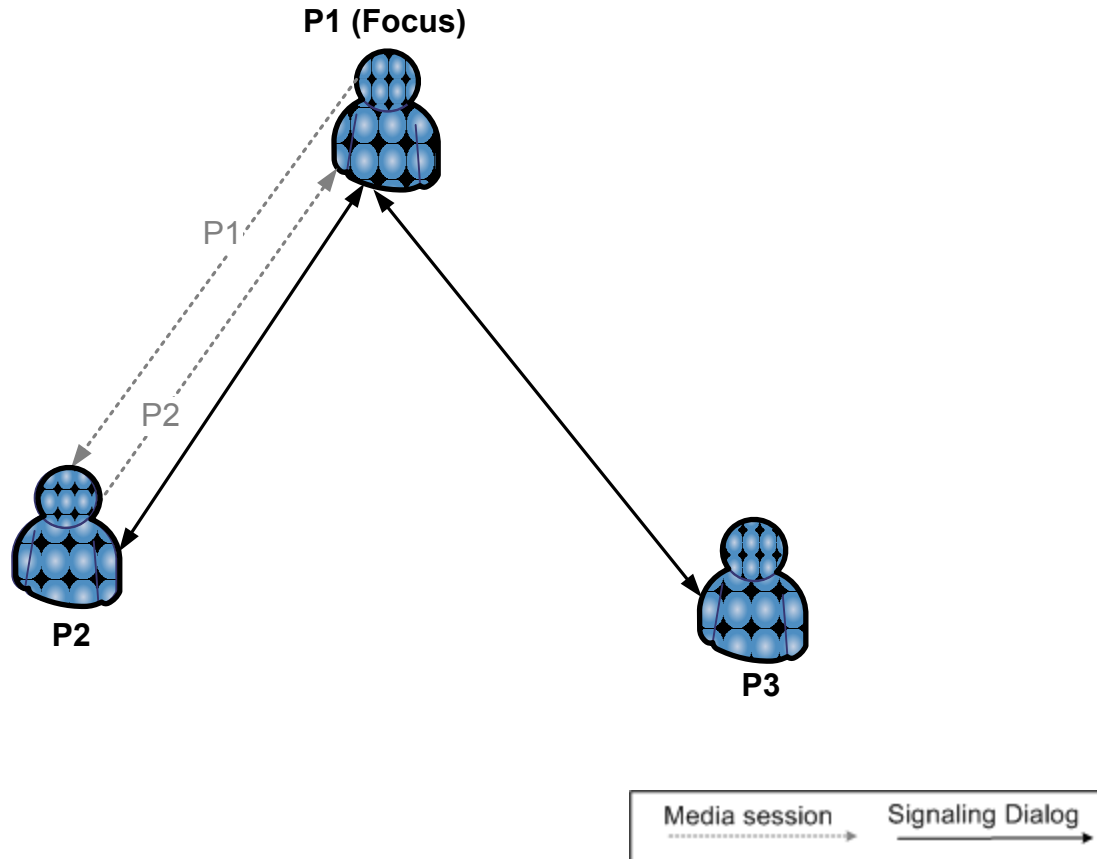
Multiparty communication topology approaches

Tightly-coupled approach



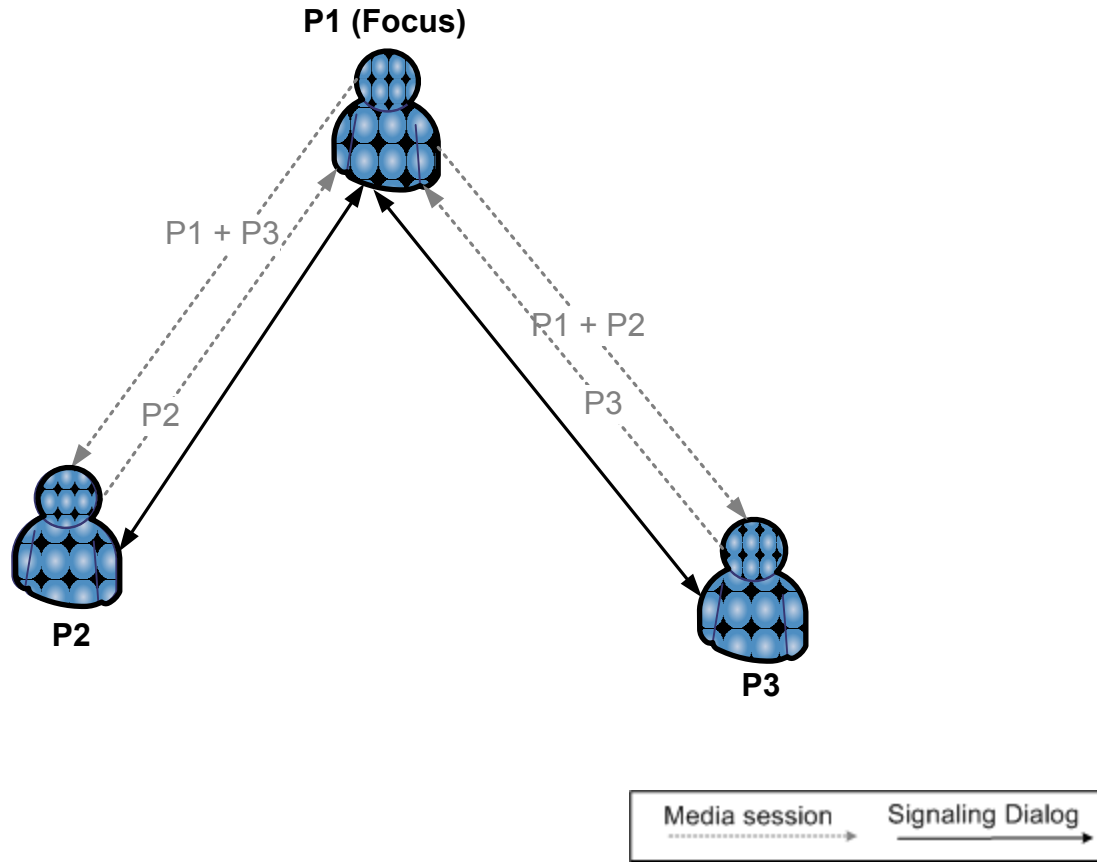
Multiparty communication topology approaches

Tightly-coupled approach



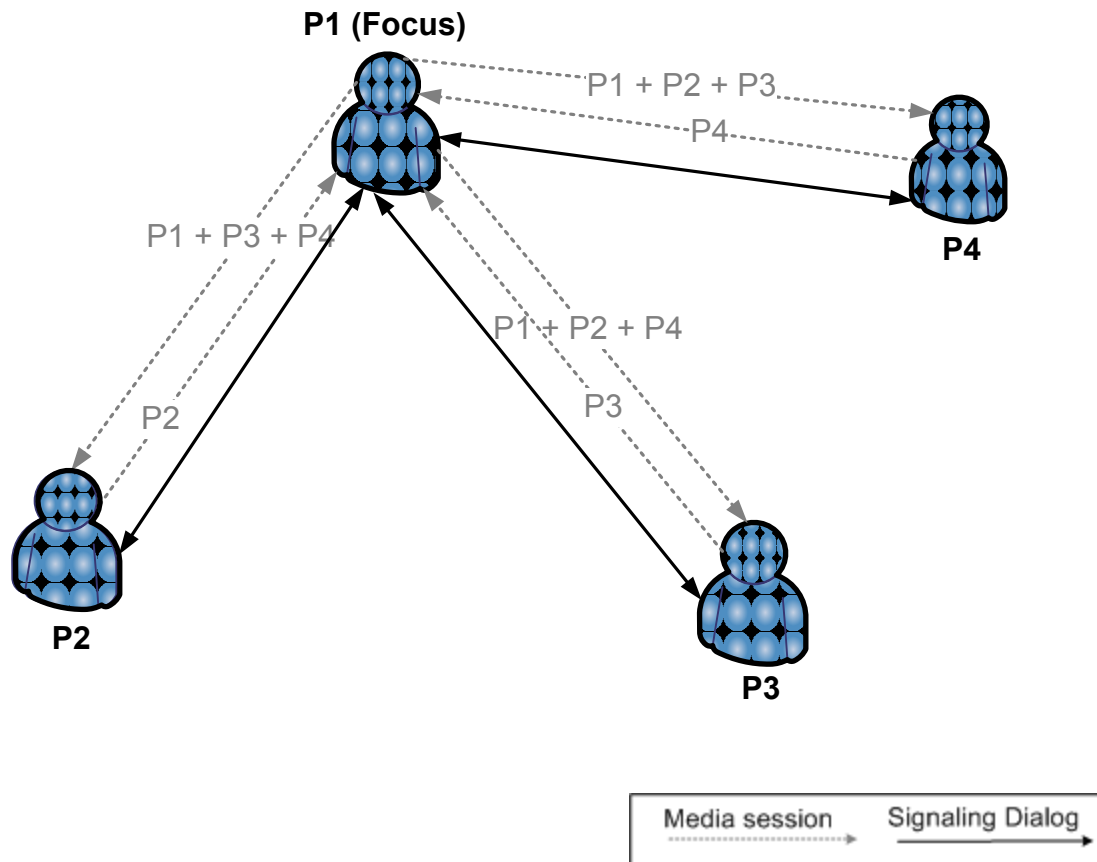
Multiparty communication topology approaches

Tightly-coupled approach



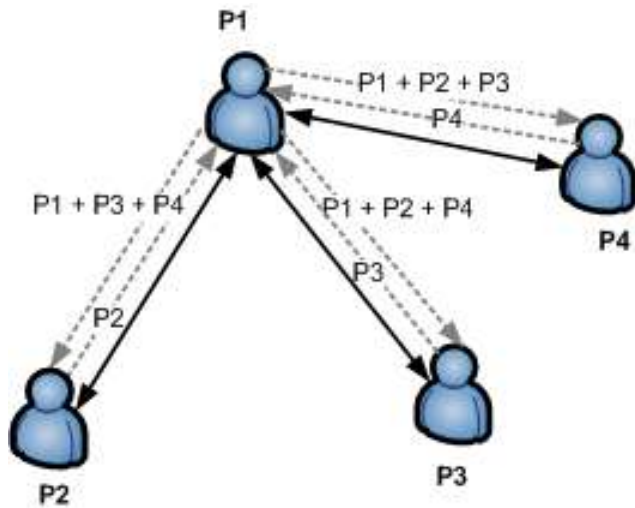
Multiparty communication topology approaches

Tightly-coupled approach

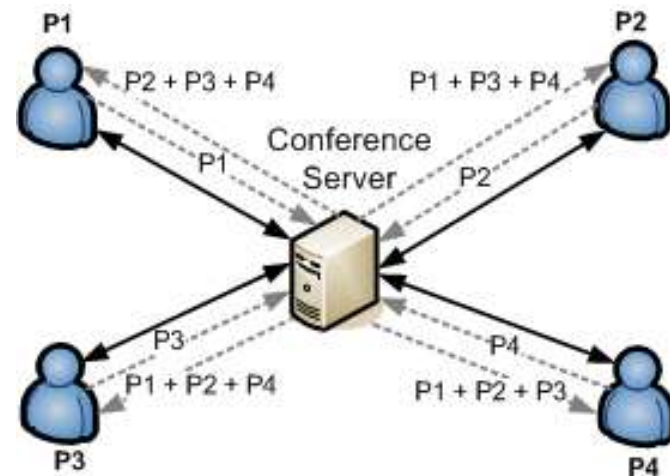


Multiparty communication topology approaches

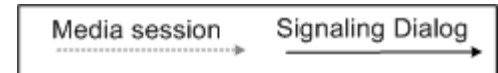
Tightly-coupled approach



End-System Mixing

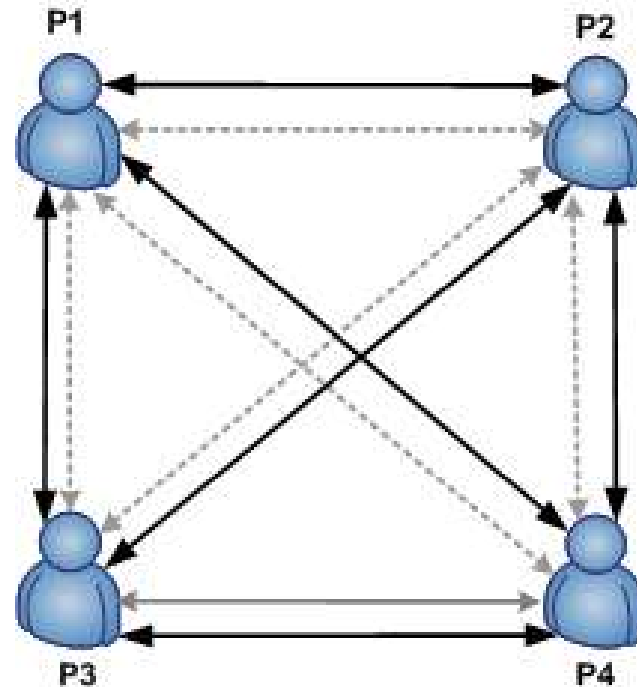


Server Mixing



Multiparty communication topology approaches

Fully-coupled approach

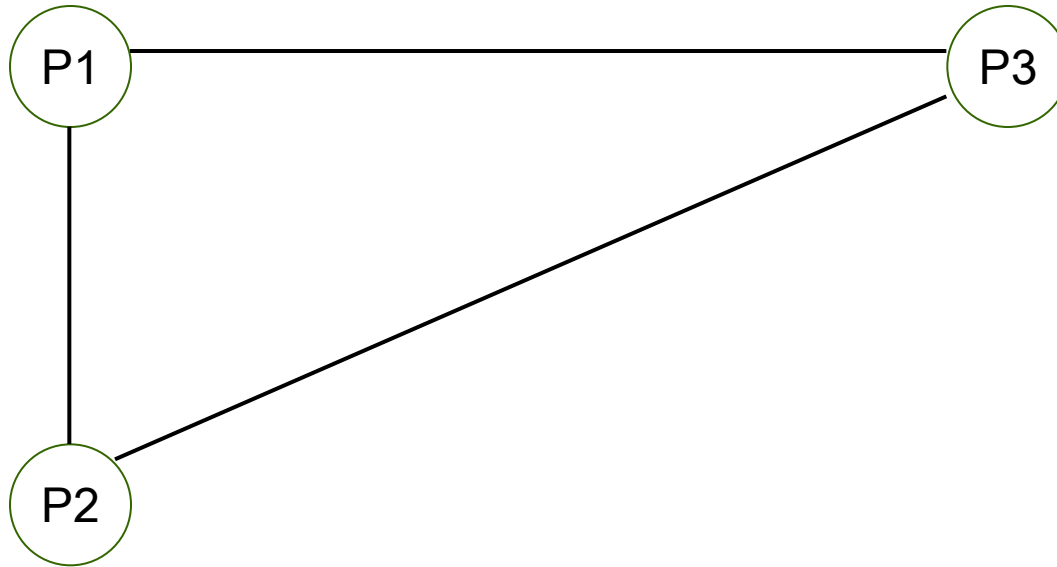


Fully-coupled



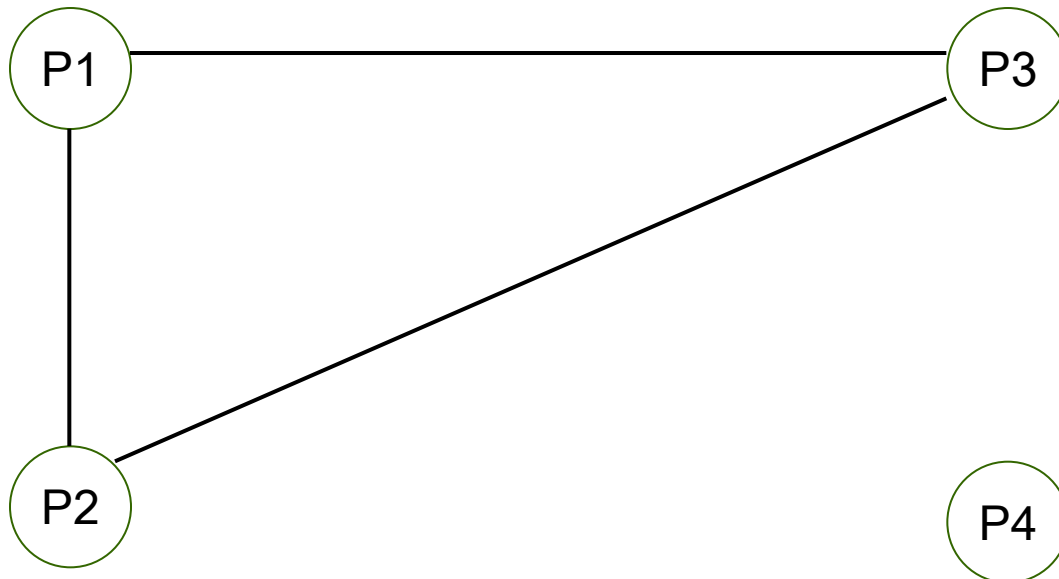
Multiparty communication topology approaches

Fully-coupled model establishment



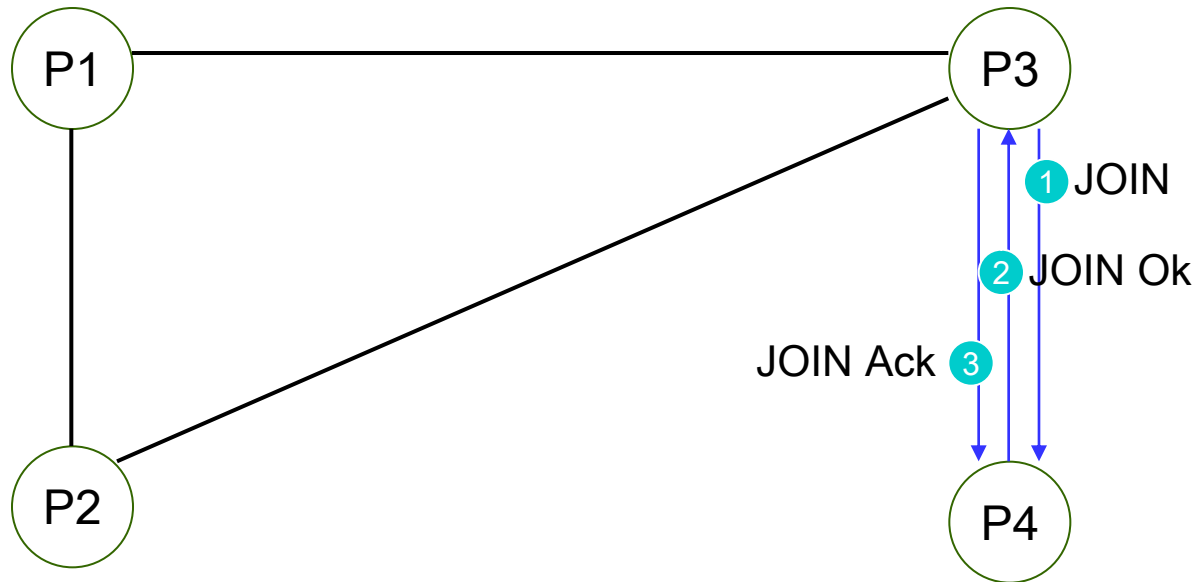
Multiparty communication topology approaches

Fully-coupled model establishment



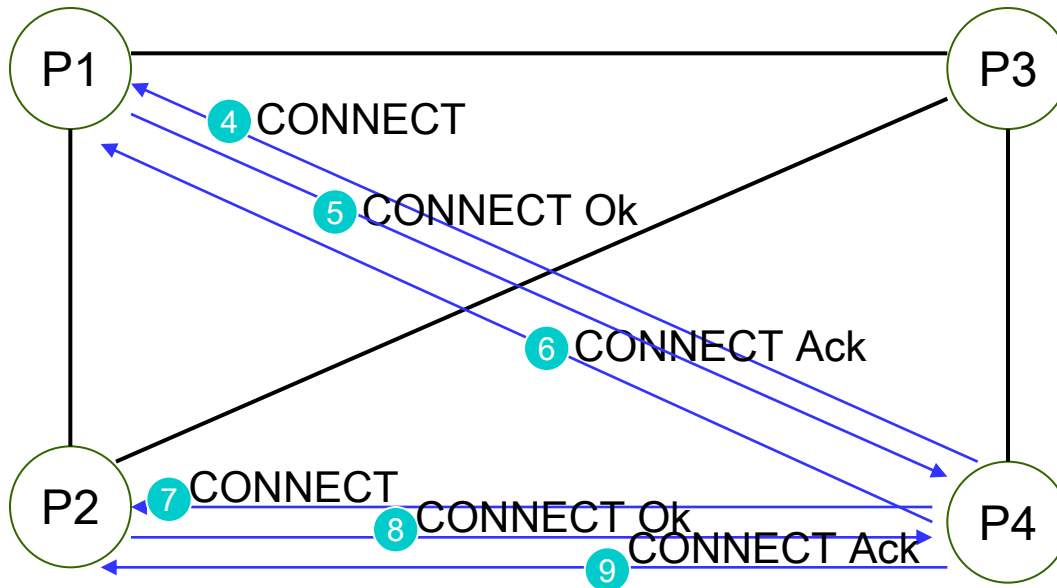
Multiparty communication topology approaches

Fully-coupled model establishment



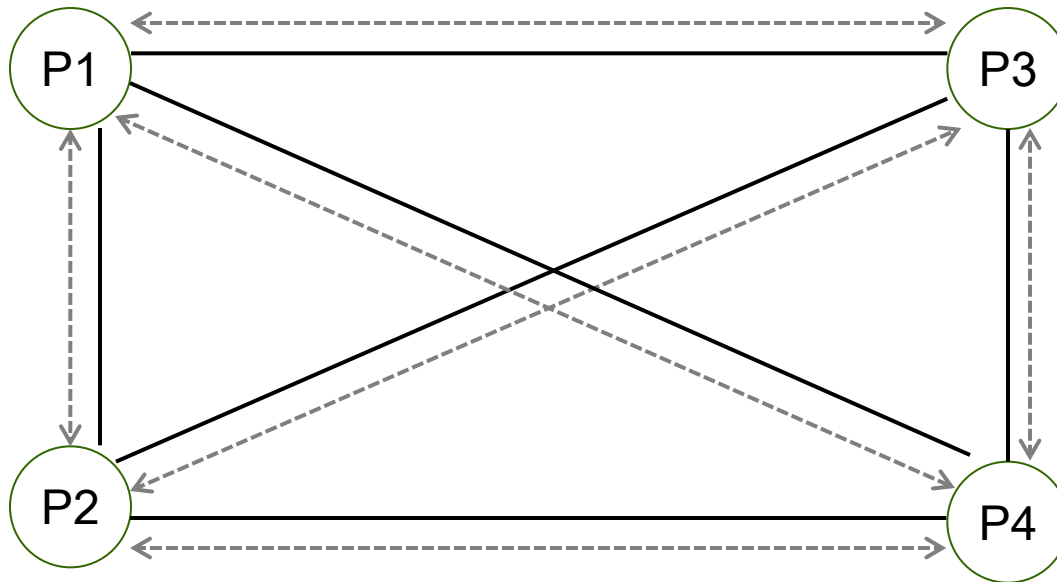
Multiparty communication topology approaches

Fully-coupled model establishment



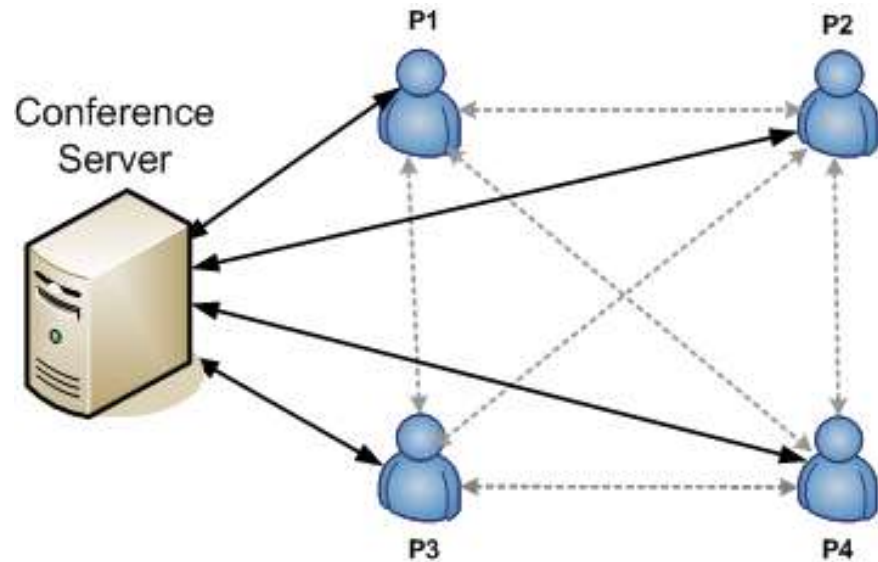
Multiparty communication topology approaches

Fully-coupled model establishment



Multiparty communication topology approaches

Tightly-coupled Signaling, Fully-coupled Media approach



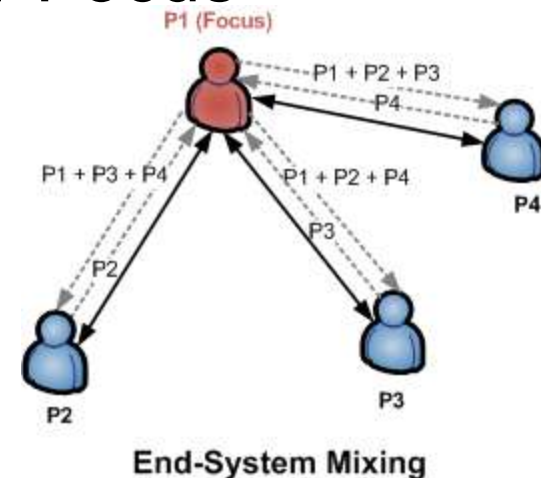
Tightly-coupled signaling,
Fully-coupled Media



Motivations

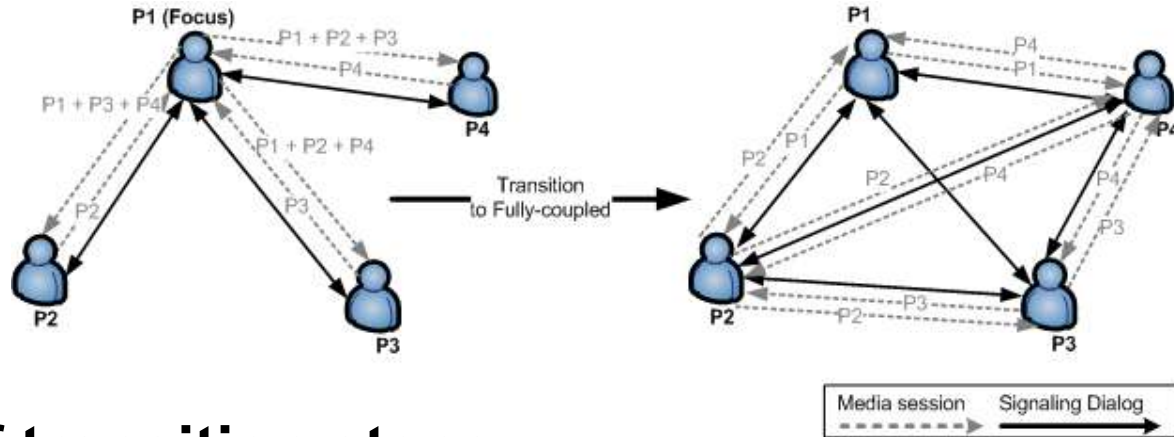
Tightly-coupled approach limitations

- ▶ Central point of failure (Focus)
- ▶ Conference-scale limited by Focus Bandwidth
- ▶ Possible Media process overload for Focus

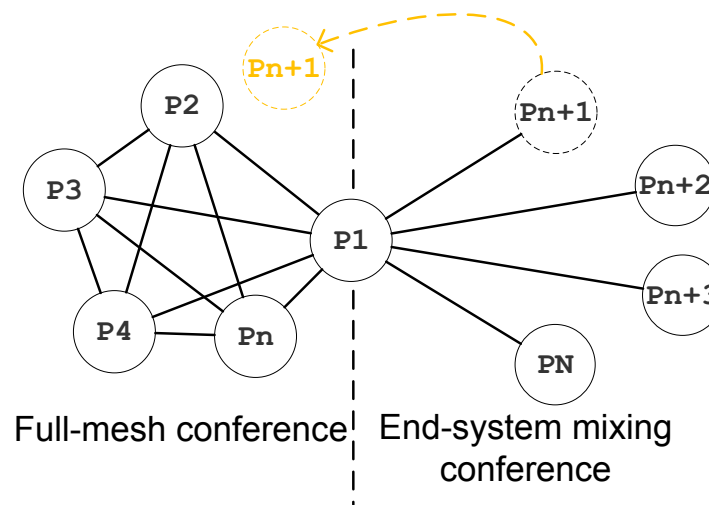


Solution

Transition from Tightly-coupled to Fully-coupled model

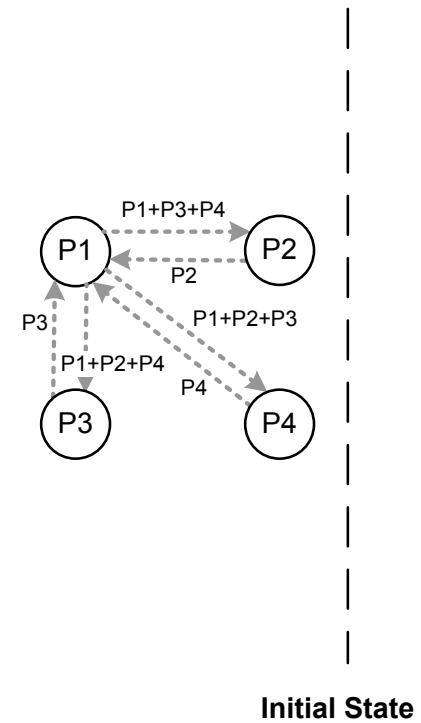


Overview of transition steps



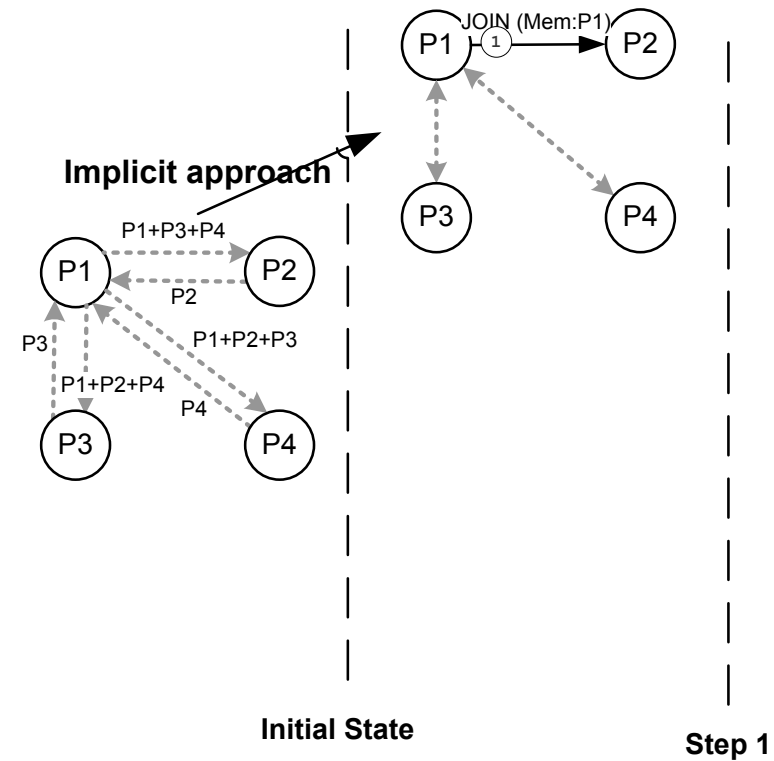
Solution

Transition Message protocol



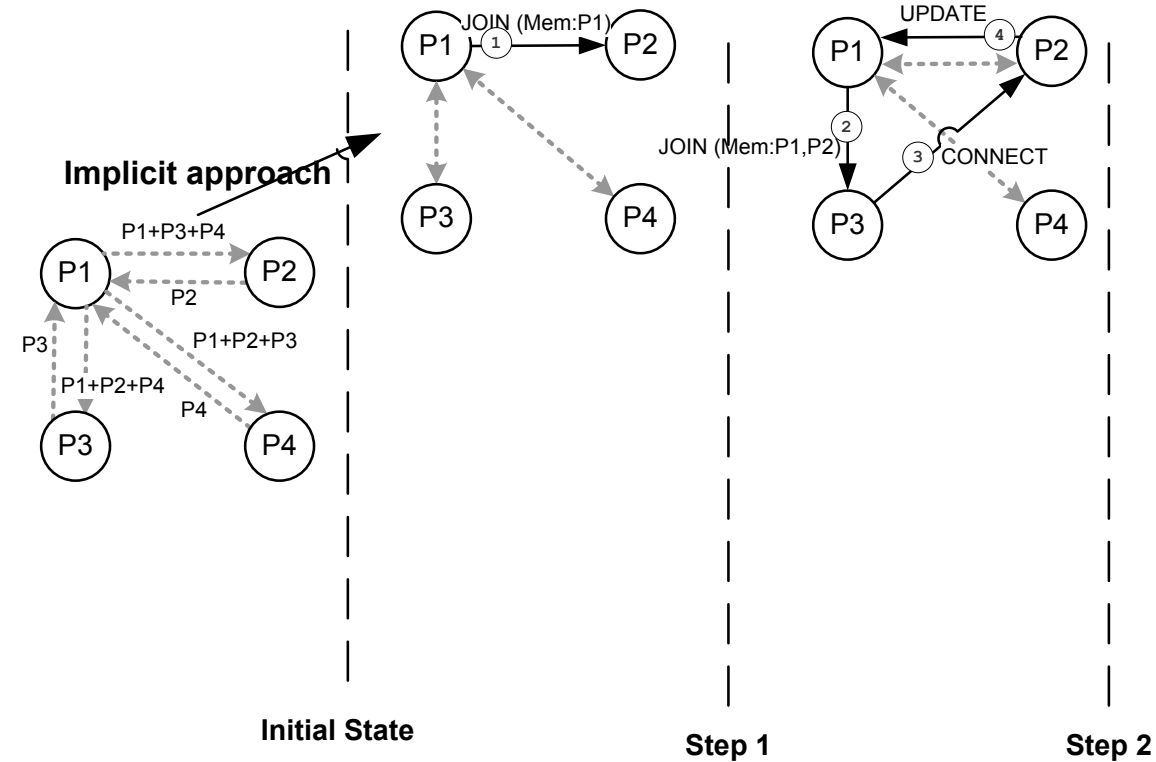
Solution

Transition Message protocol



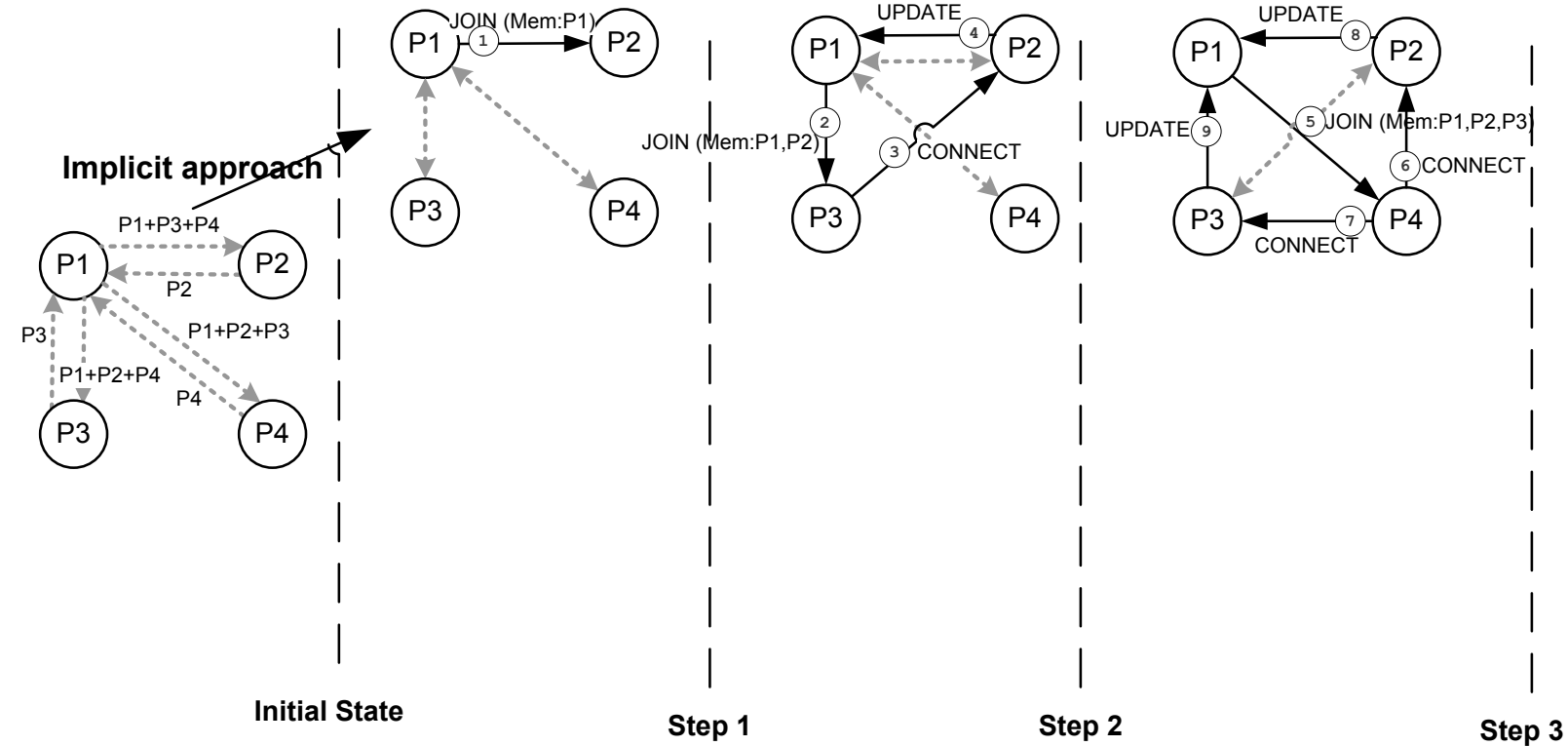
Solution

Transition Message protocol



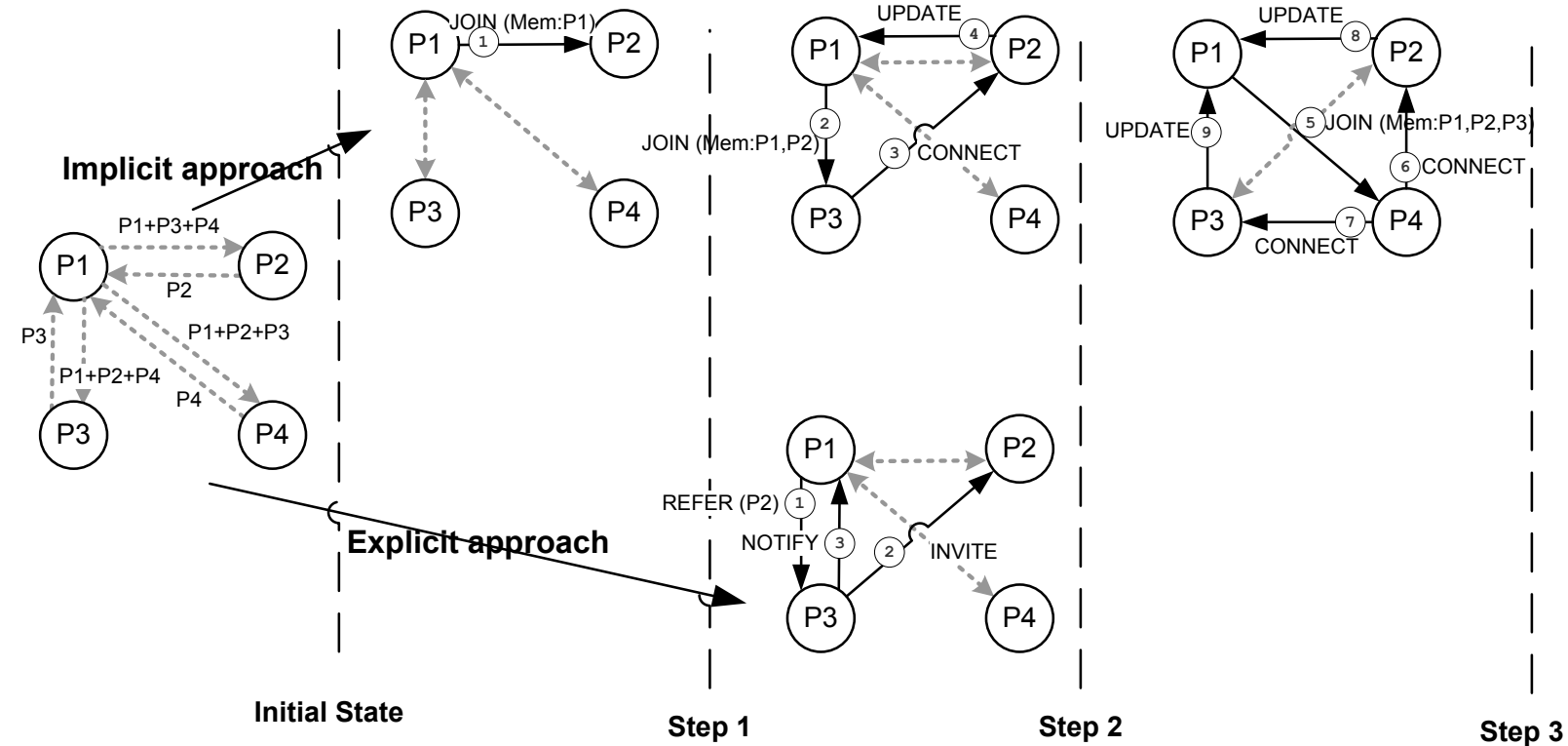
Solution

Transition Message protocol



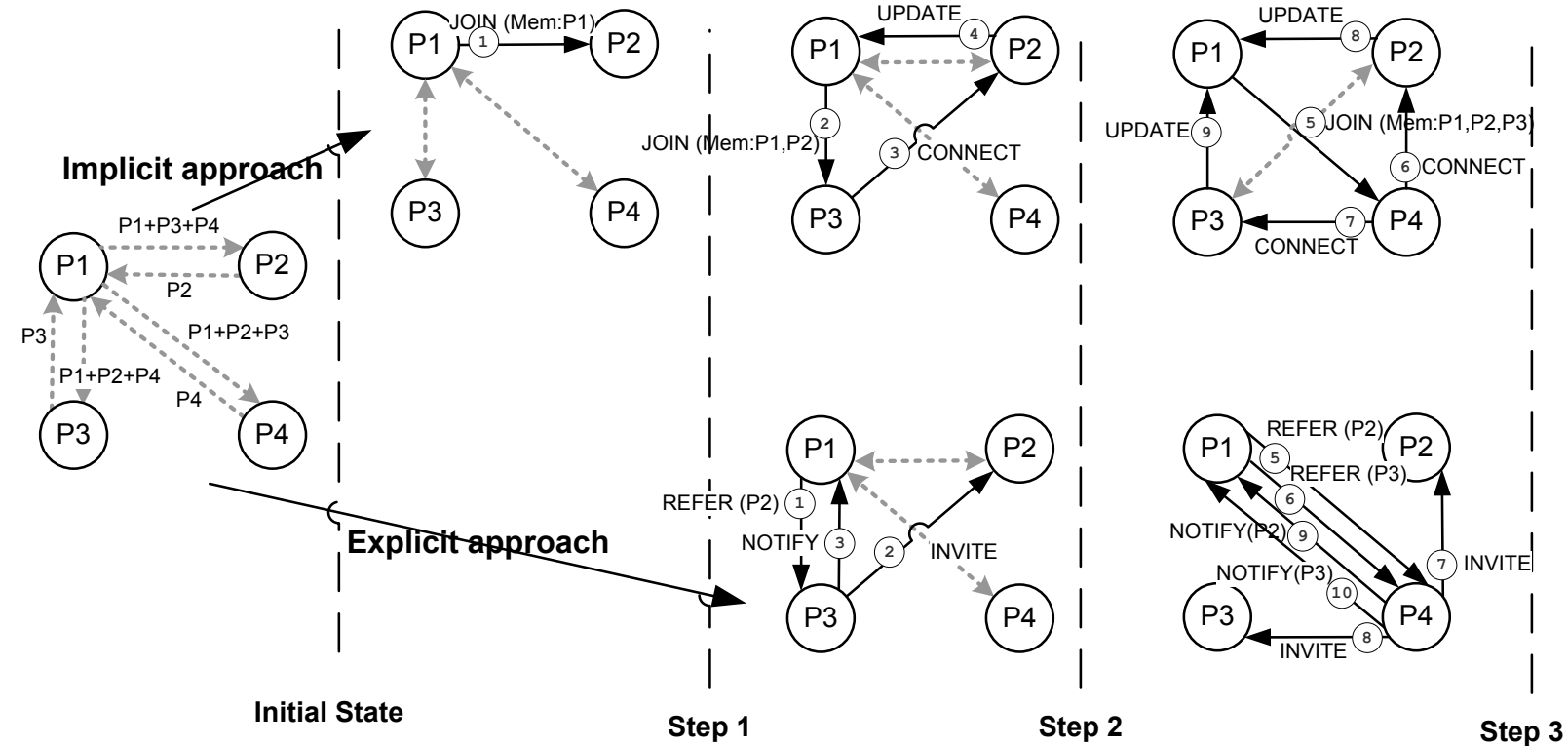
Solution

Transition Message protocol



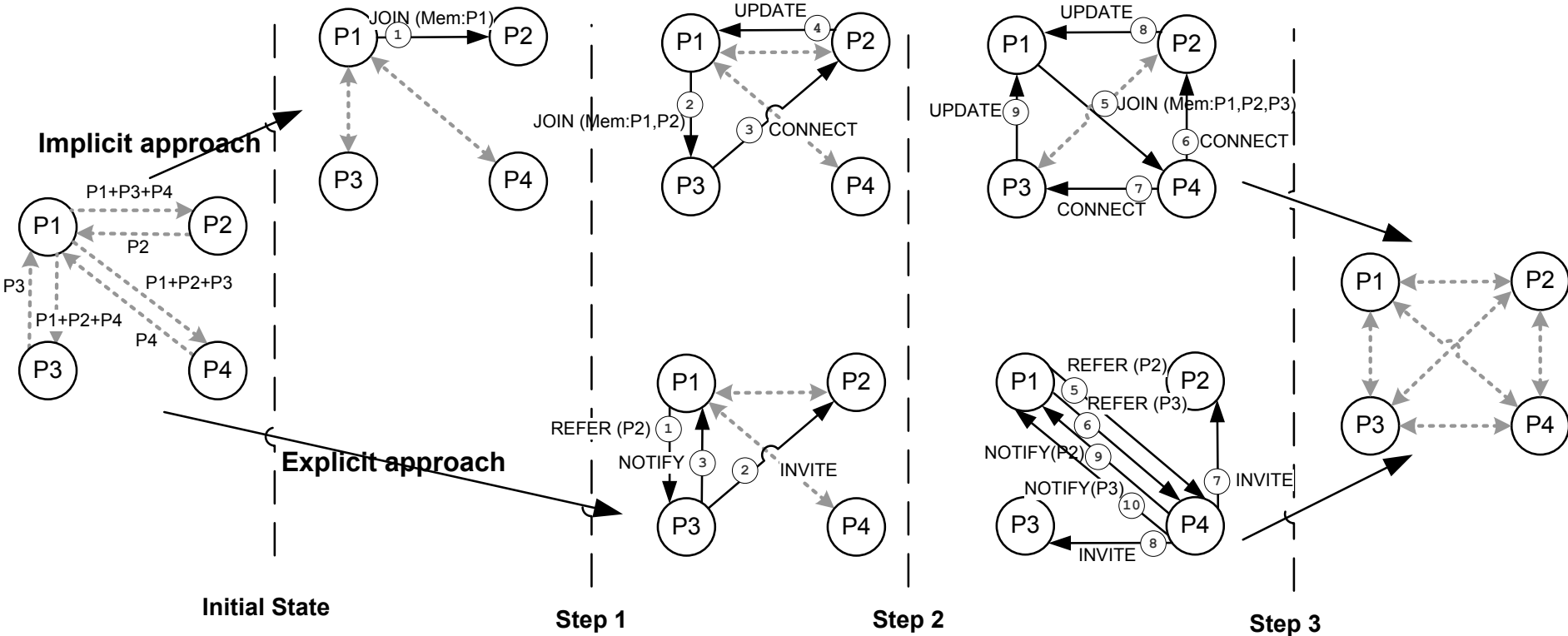
Solution

Transition Message protocol



Solution

Transition Message protocol



Transition Message Costs

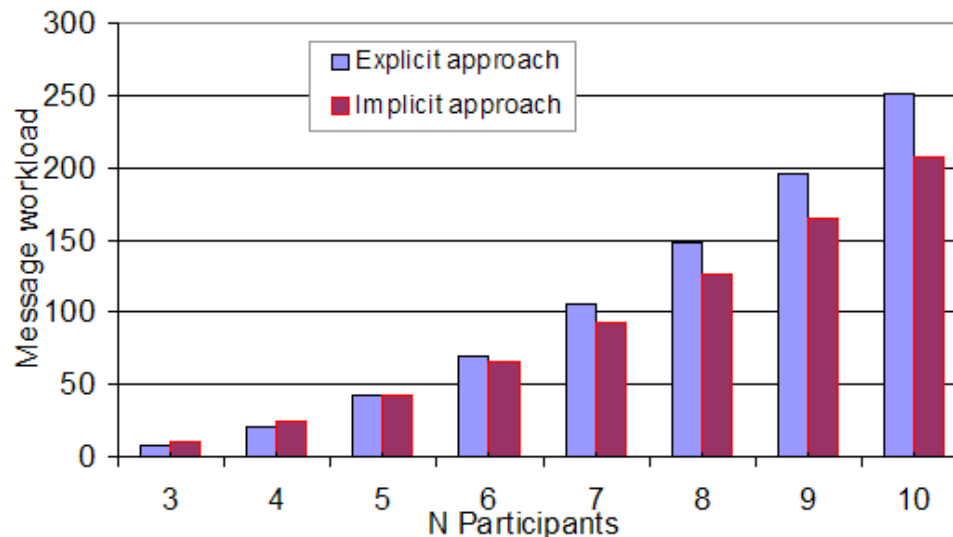
Transition Cost: $T_{\text{cost}} = \sum_{i=1}^{N-1} (\text{Step}_{\text{cost}})i$

For explicit approach:

$$(\text{Step}_{\text{cost}})i = (\text{Refer}T_{\text{cost}} + \text{Invite}T_{\text{cost}} + \text{Notify}T_{\text{cost}}) * (i - 1)$$

For implicit approach:

$$(\text{Step}_{\text{cost}})i = \text{Join}T_{\text{cost}} + (\text{Connect}T_{\text{cost}} + \text{Update}T_{\text{cost}}) * (i - 1)$$



Conclusion

- ▶ We proposed SIP based solution to resolve tightly-coupled conference model limitations
- ▶ Two approaches are explored, and their performances compared (implicit and explicit)
- ▶ Some other solutions can also be considered:
 - ▶ Delegating media mixing load to another participant
 - ▶ Spreading media processing load upon available participants.

Conclusion

Thank you for your attention !! 😊

Questions ?