SIP-based Protocol for P2P Large-scale Multiparty VoIP (MVoIP) Conference Support

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Outline

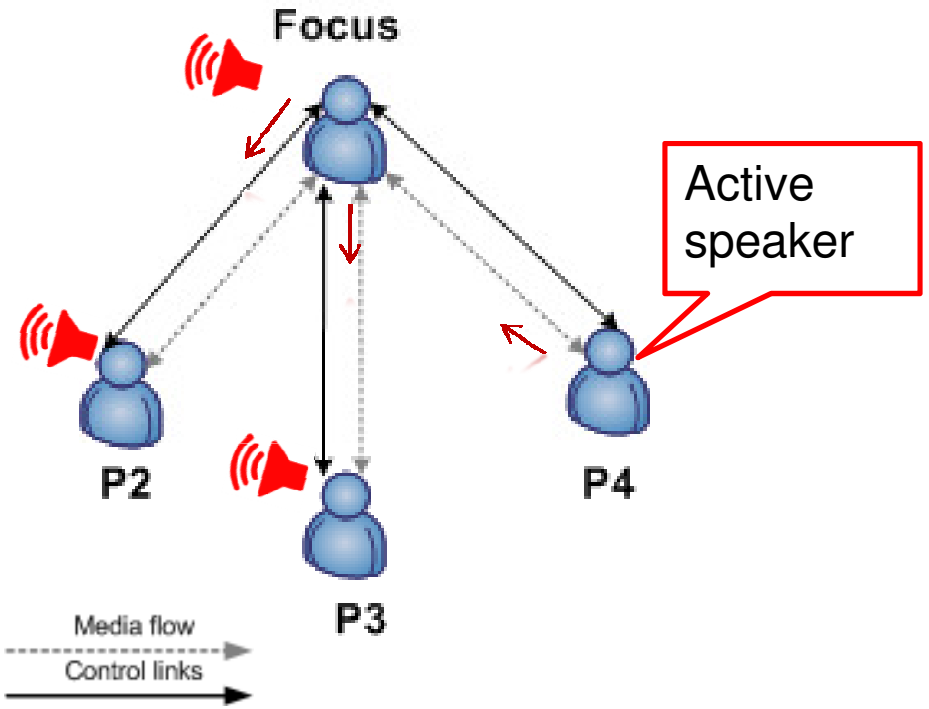
- Motivations
- Existing conference models for multi-party VoIP
- The proposed Model
  - Model Overview
  - Model Components
  - The Application Service Protocol
- Examples of implemented scenarios
- Conclusion

Motivations

- Enable Voice communication between large group of internet-users sharing the some interests/activities :
  - Scientific/professional, cultural/tourism, social/politic, entertainment (online-gaming, networked games)
- More user-devices and network bandwidth are available to support multimedia based services (text, audio, video, etc.)

- **Our aim :** create large scale VoIP conference between participants based exclusively on P2P model to process media (without conference server)

Some existing VoIP conferencing models

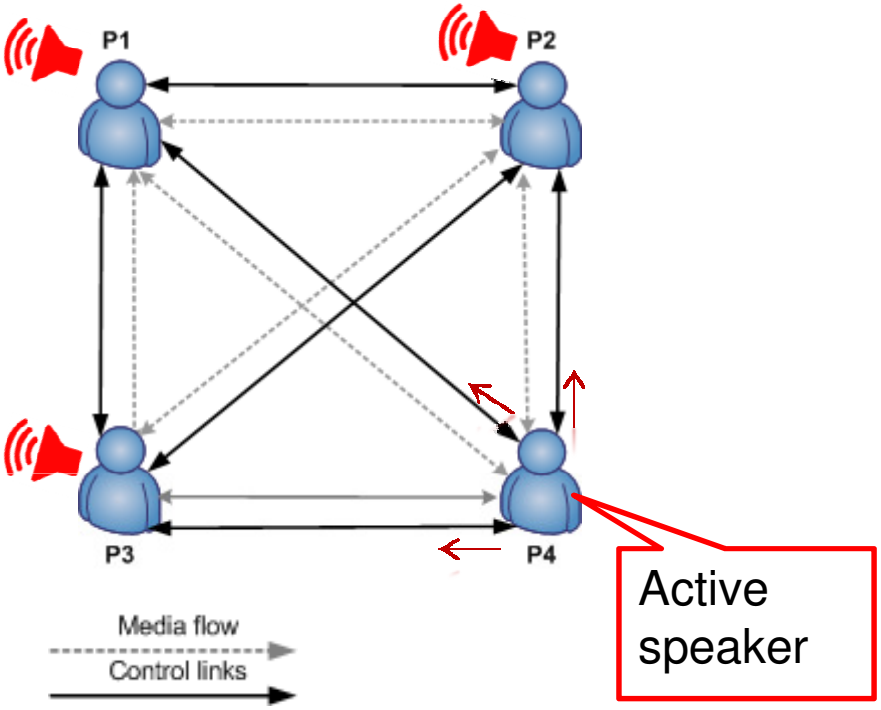


The end-system mixing Model

+ Compatibility with basic VoIP devices
+ Easy to administrate/moderate
+ Easy to implement

- Support only small scale conferences
- When Focus leaves, no mean to continue

Some existing VoIP conferencing models

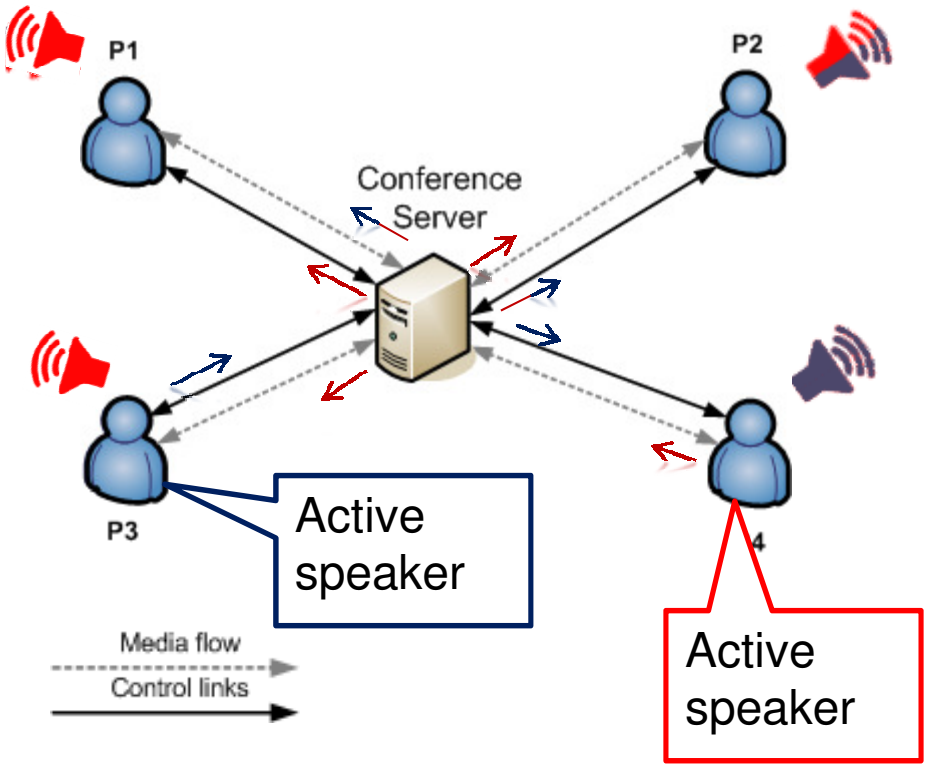


The full-mesh Model

+ Reliable and robust model
+ Flexibility to add users to conference
+ Media-process load fully distributed

- Require large bandwidth from each user
- Not adapted for devices with limited computational power/autonomy
- More complex to implement
- Require from basic VoIP devices to support extended signaling protocol (SIP, H323)

Some existing VoIP conferencing models

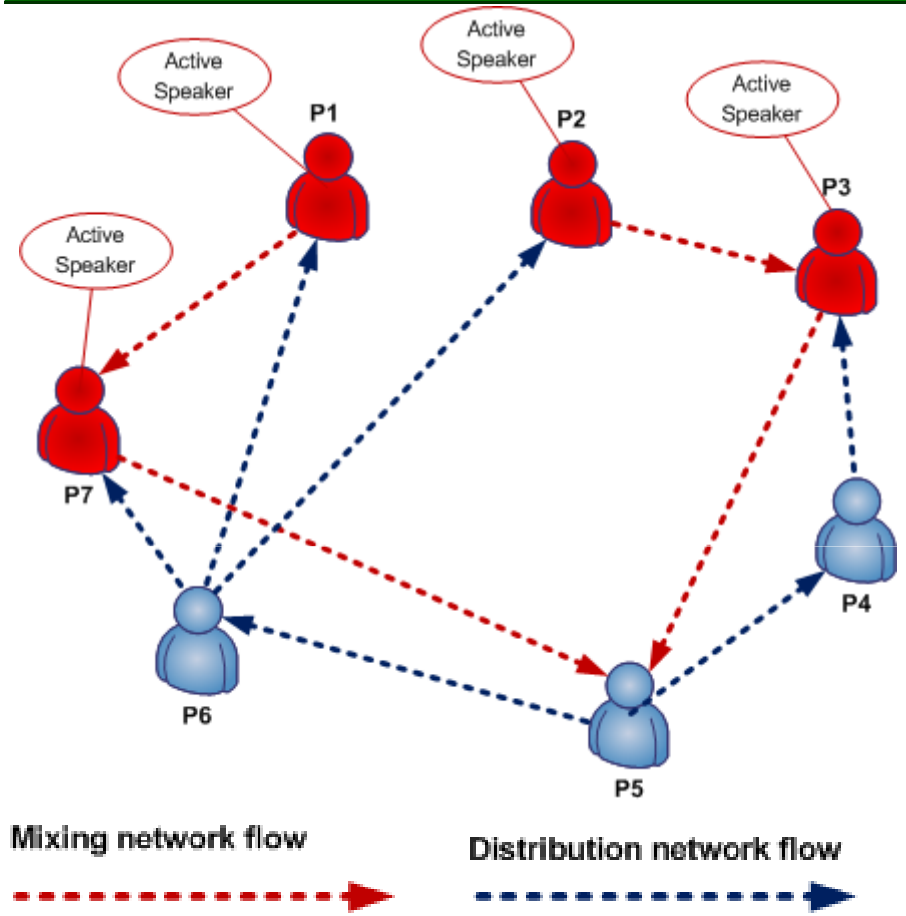


+ Support large scale conference
+ Compatible with basic VoIP devices
+ Support devices with limited resources

- Require large bandwidth and maintenance from Conference-server side
- Unique point of failure

Conference server based Model

Some existing VoIP conferencing models



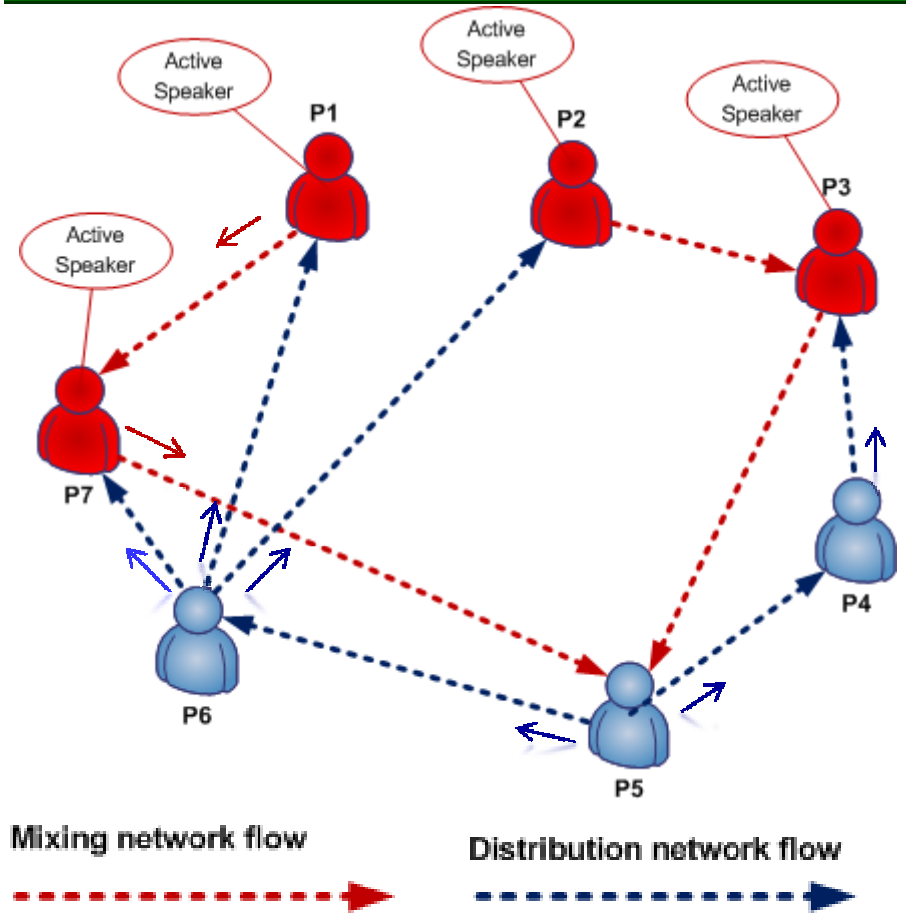
PeerTalk Model

[Xiaohui Gu and Coll., 2008]

+ Support large scale conference
+ Enable network resources optimization
+ Dynamically scalable according to participant activity
+ Adapted to support devices with limited resources

- Conference control is not obvious
- Possibility of Echo effect for active speaker

Some existing VoIP conferencing models



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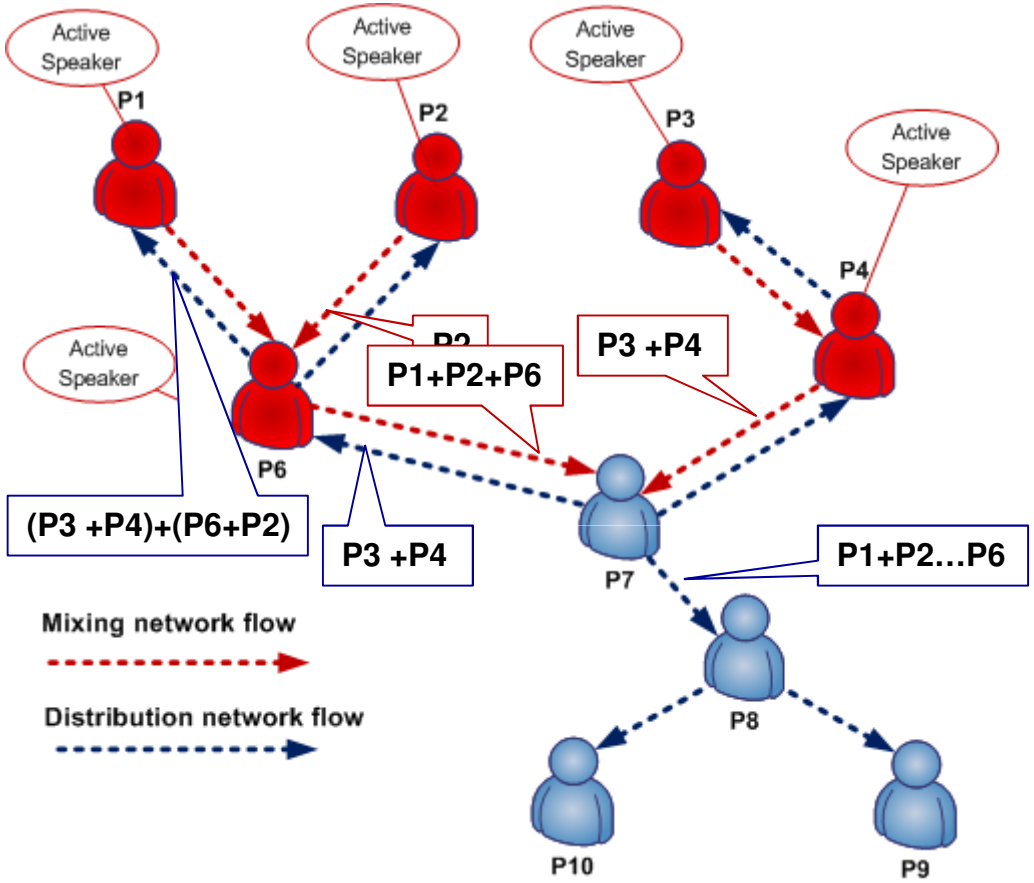
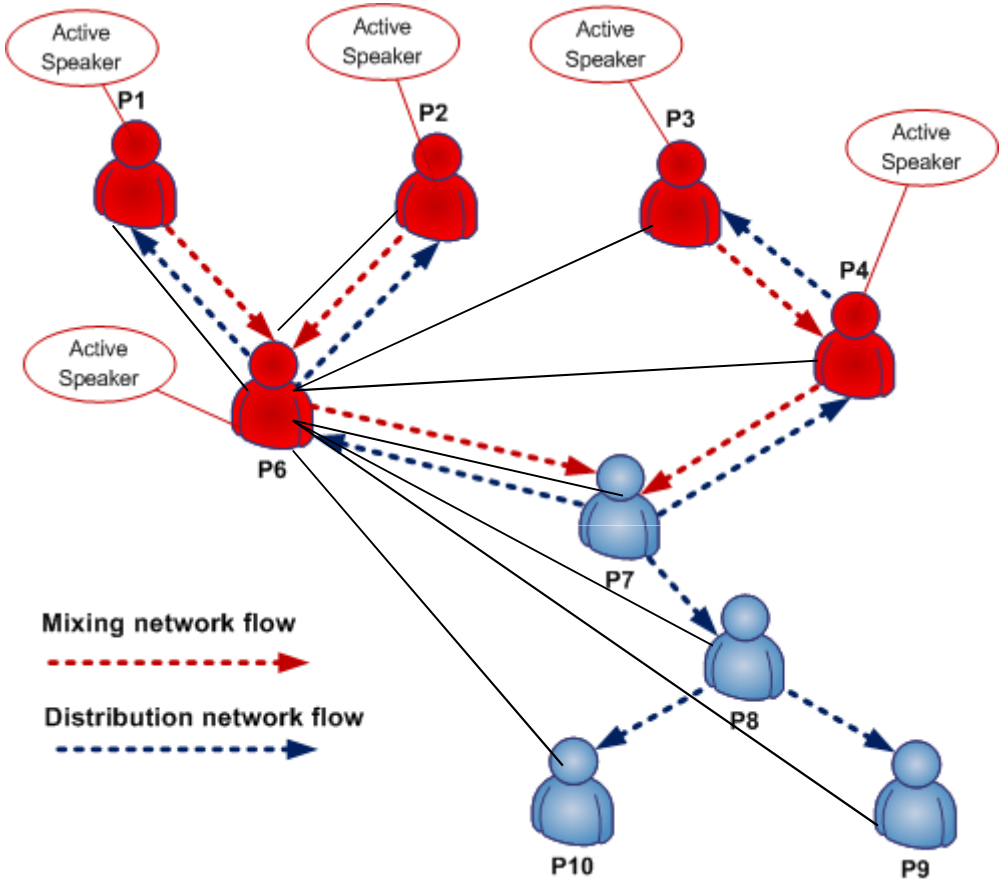
Our Model : Overview



+ Support large scale conference
+ Enable network resources optimization
+ Dynamically scalable according to participant activity
+ Adapted to support devices with limited resources
+ Avoid echo effect for active speaker participant
- Conference control ?

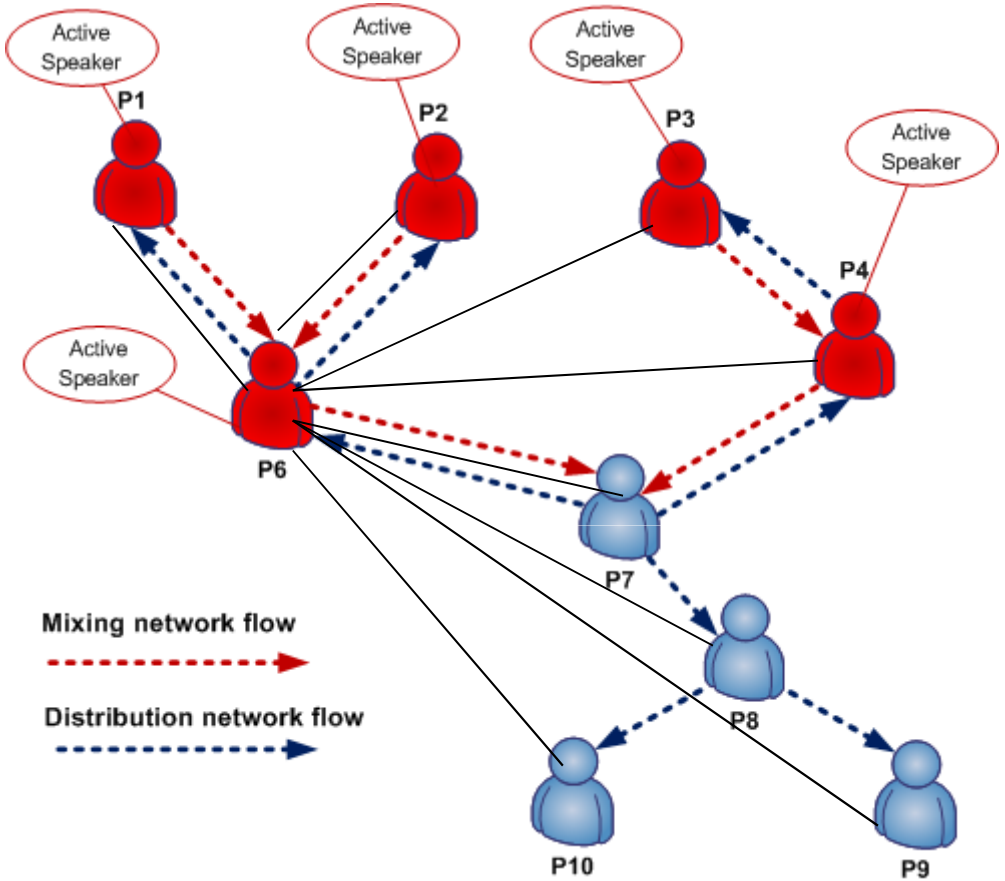
Our Model : Overview



Signaling and Control links

- Support large scale conference
- Enable network resources optimization
- Dynamically scalable according to participant activity
- Adapted to support devices with limited resources
- Avoid echo effect for active speaker participant
- Conference control centrally managed

Our Model : conference member classification



- **Media Network :**
  - **MDN** : Mixer/Distributer Node
  - **LN** : Leaf Node
- **Signaling/Control Network**
  - **AN** : Administrator Node
  - **RAN** : Replica Administration Node

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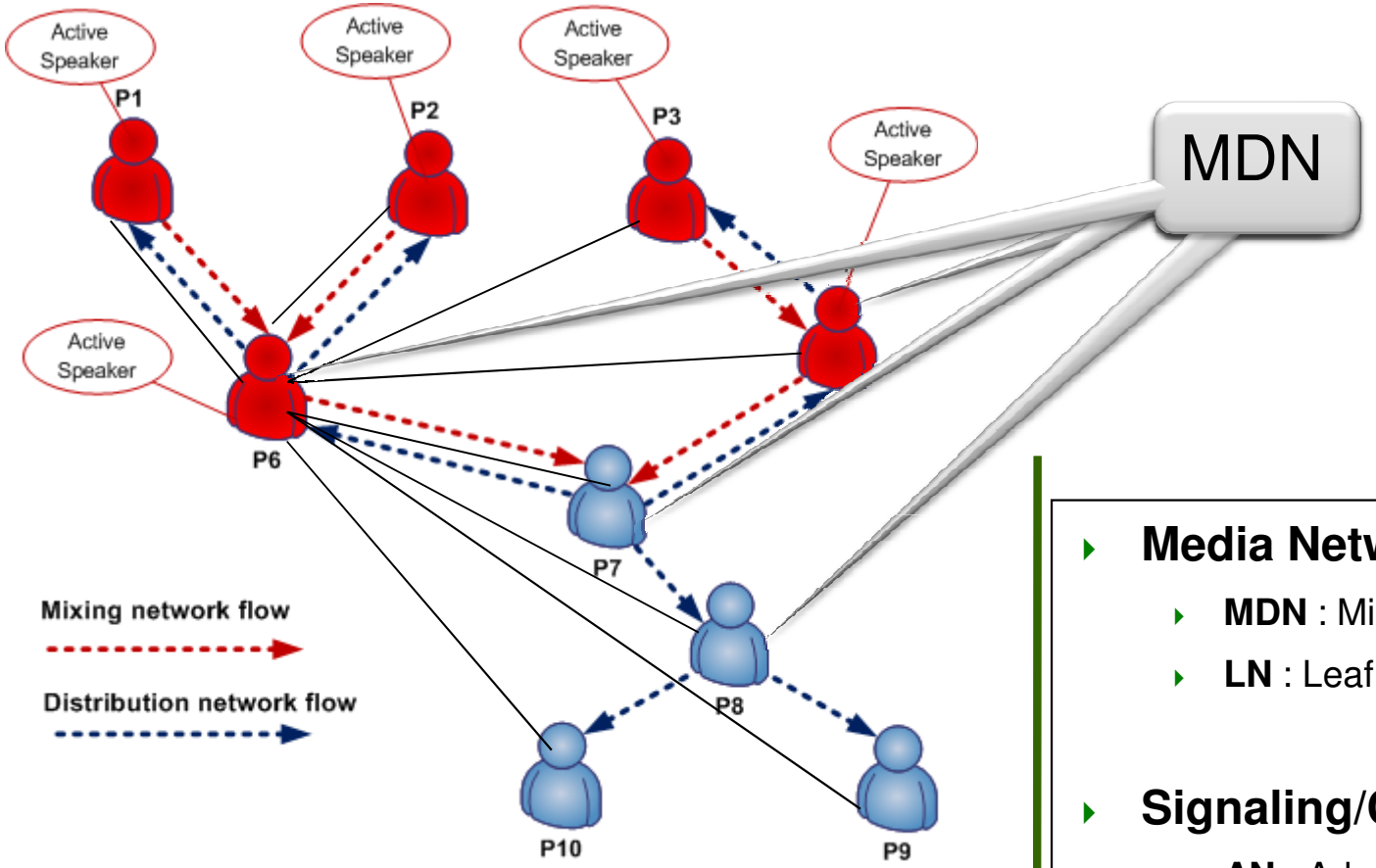

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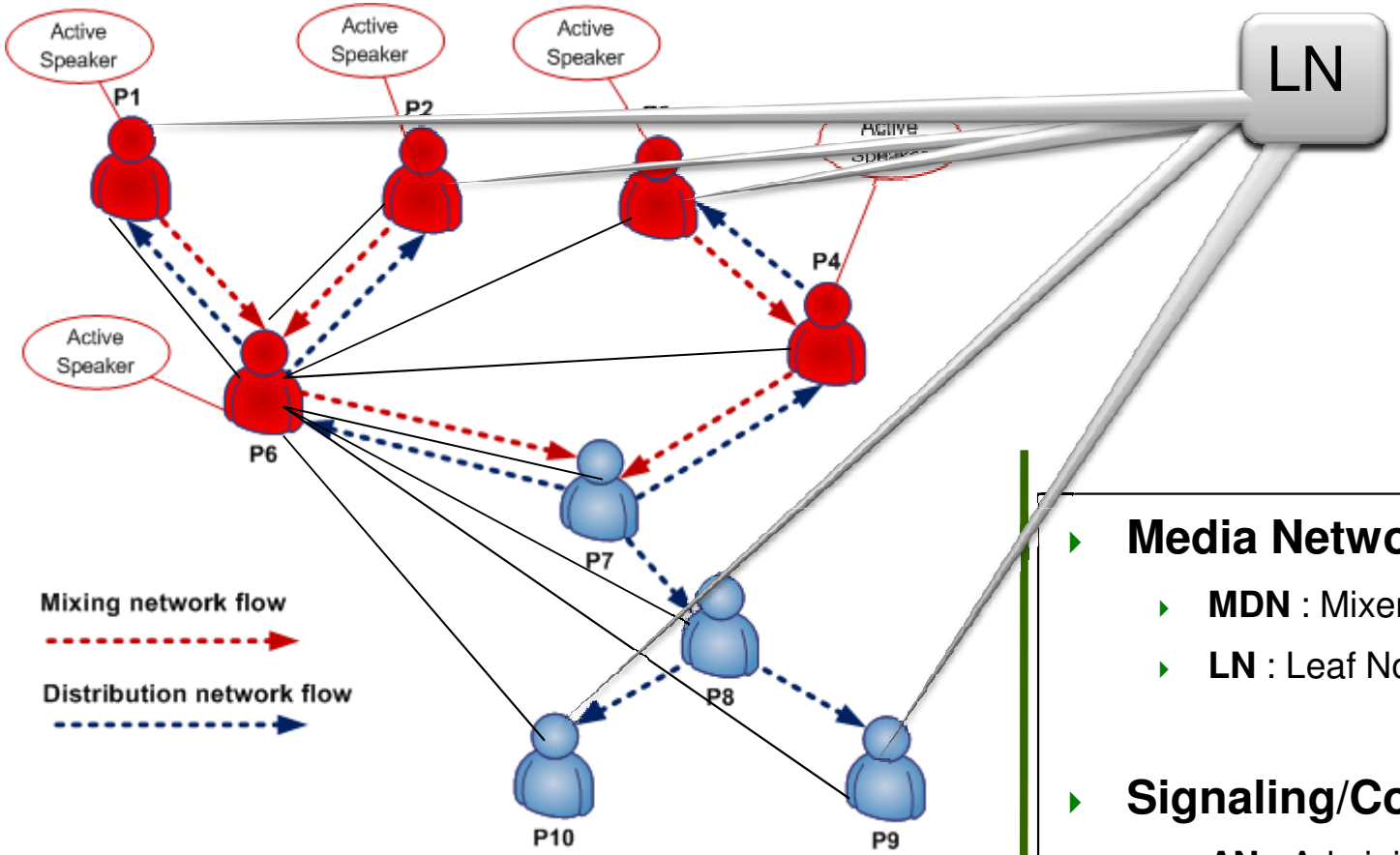

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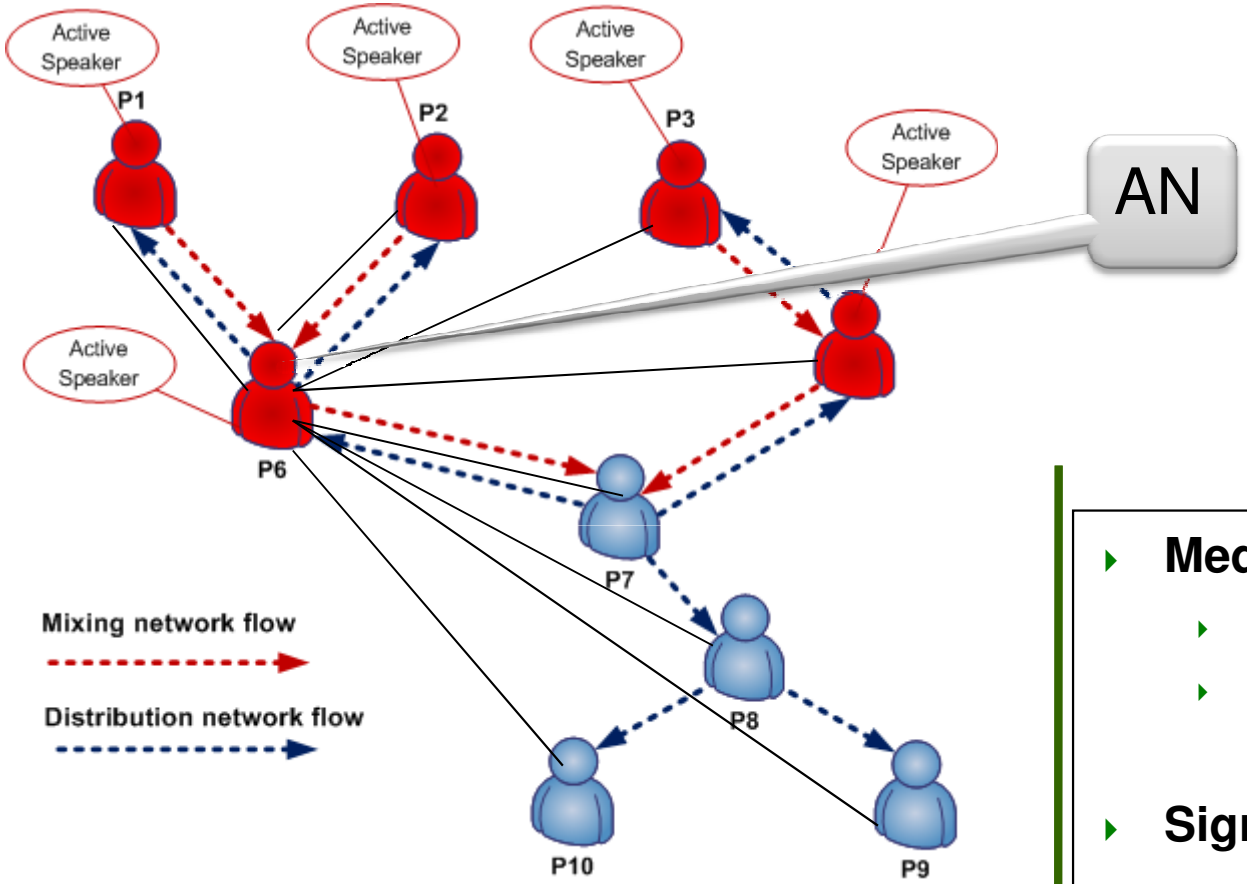

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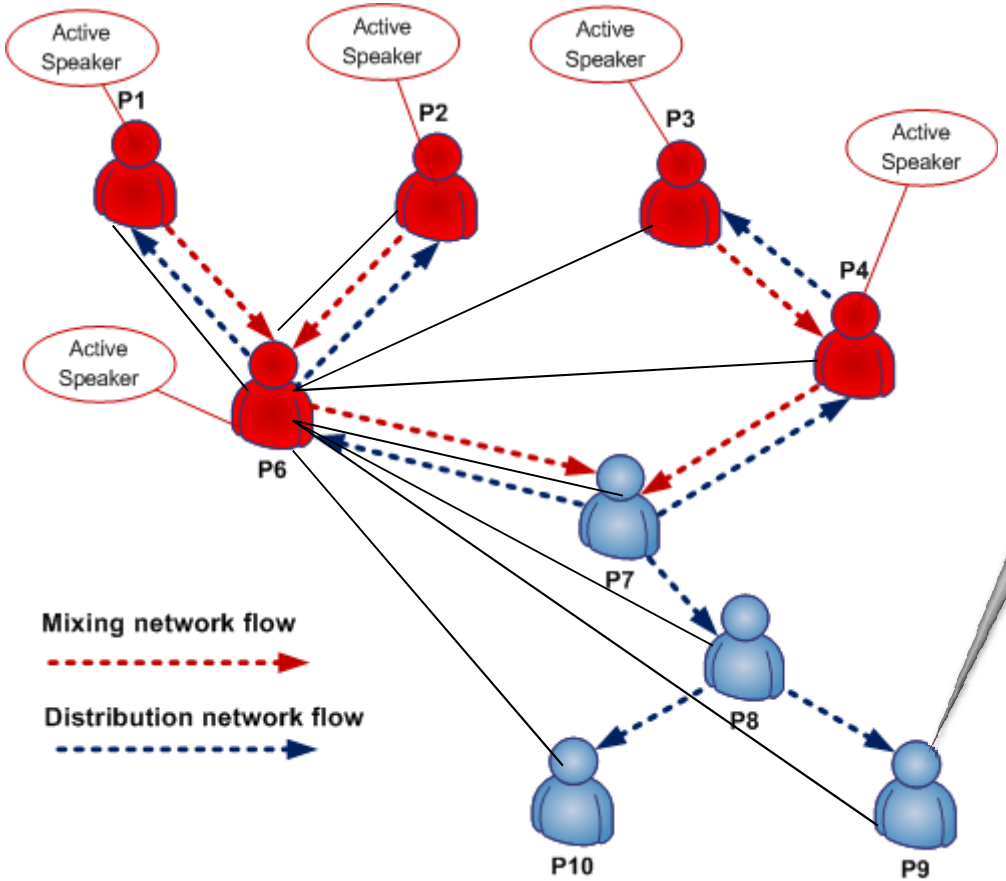

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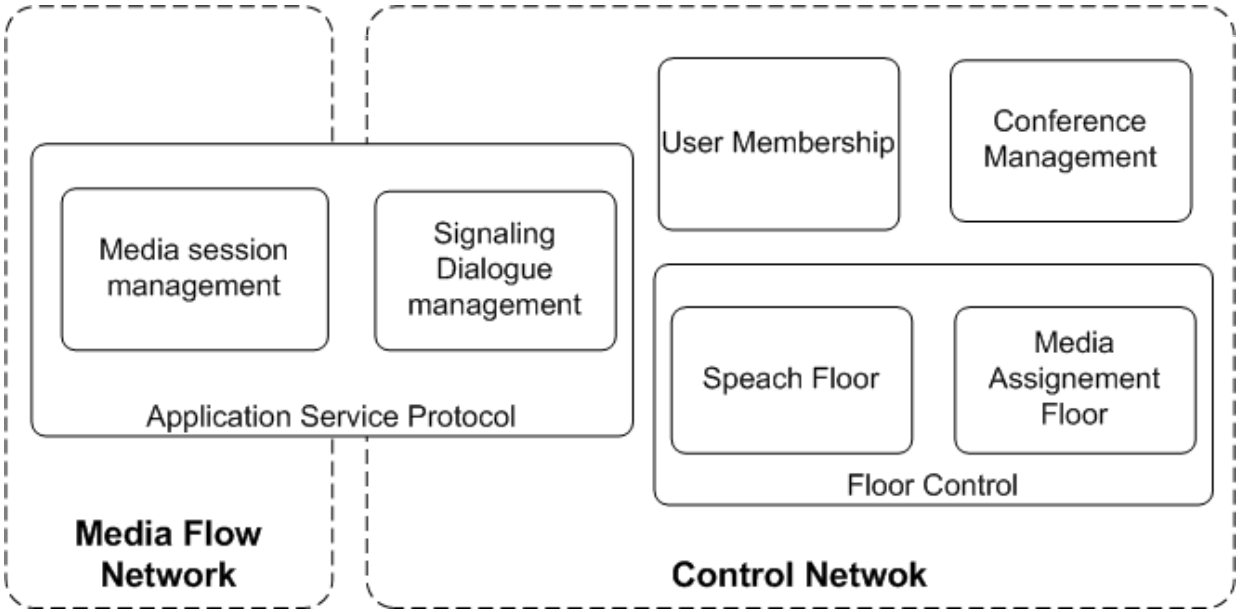
Our Model : System Components



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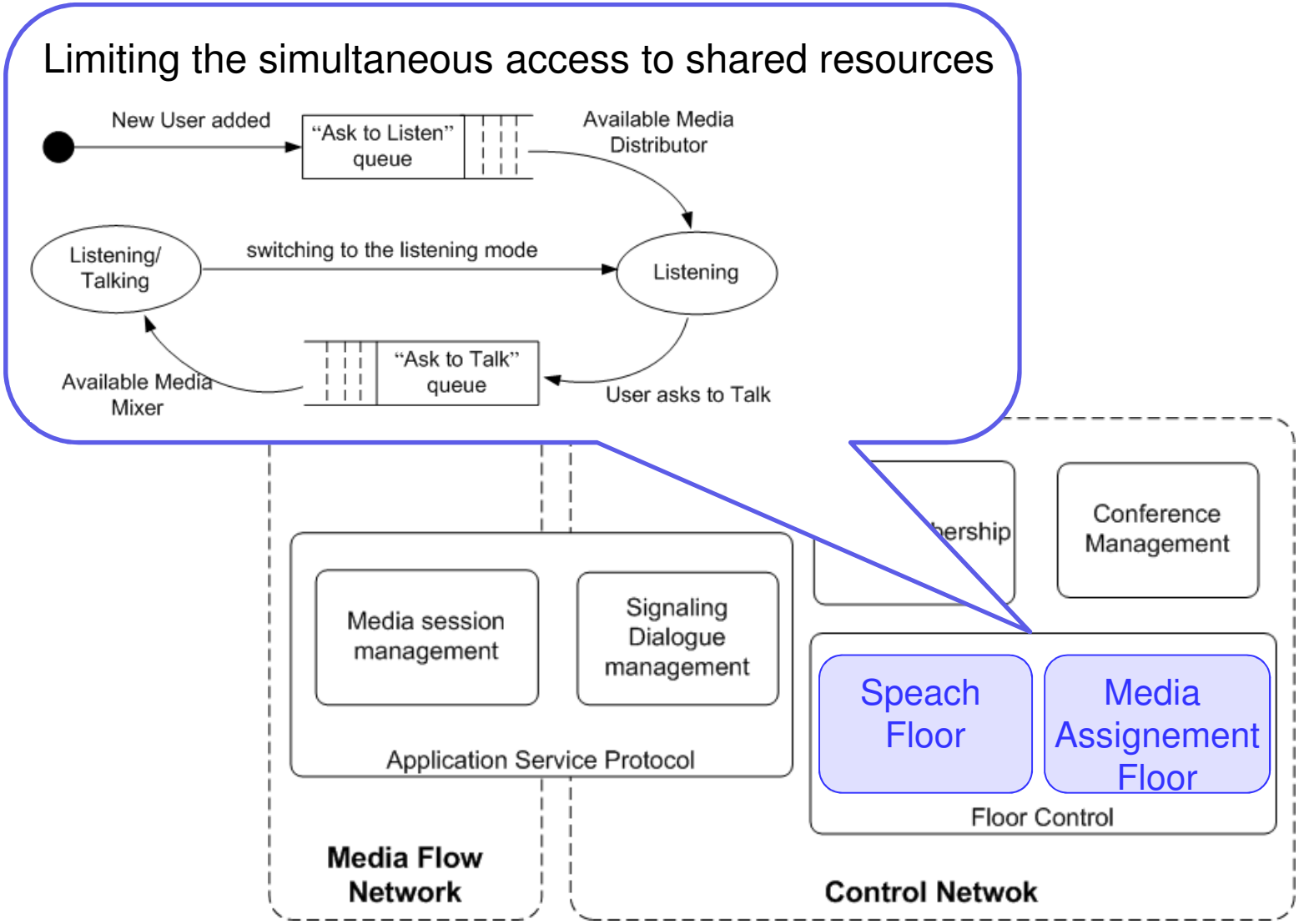
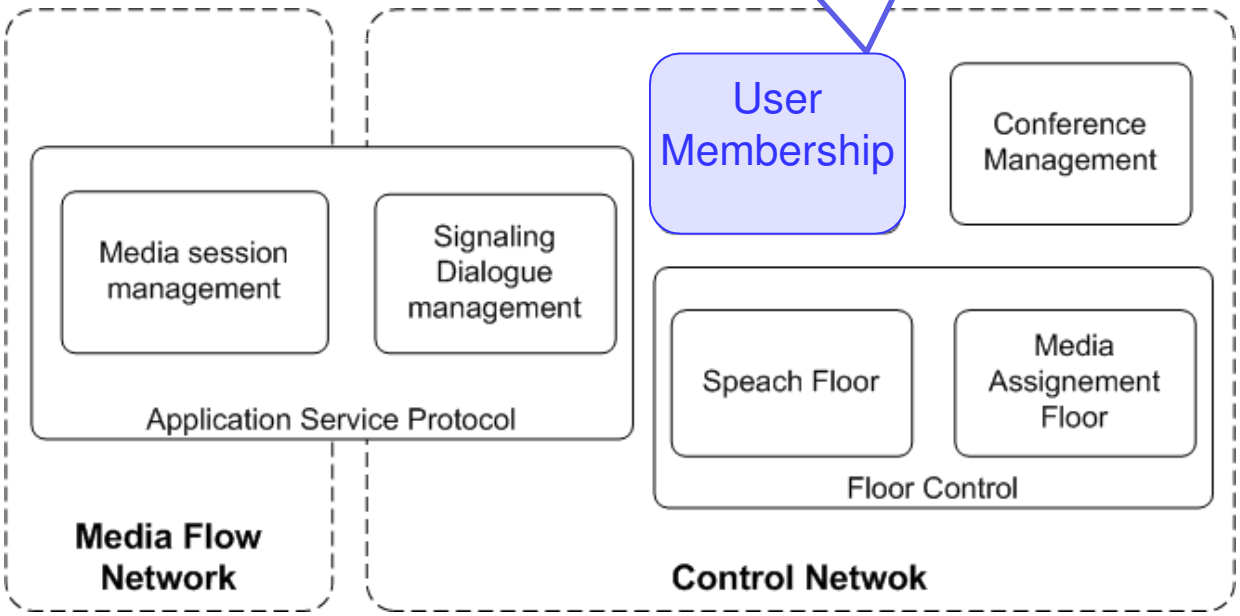


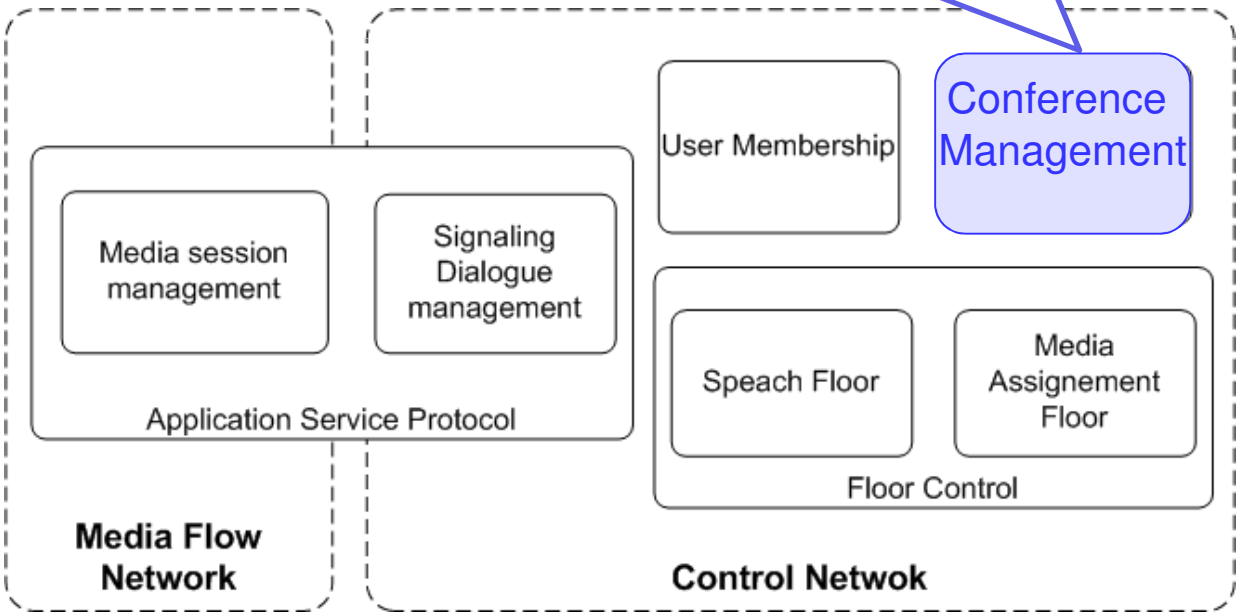
Our Model : System Components

- Invite user to join conference, accept user requests
- remove user, reconnect user
- Manage Conference access policy



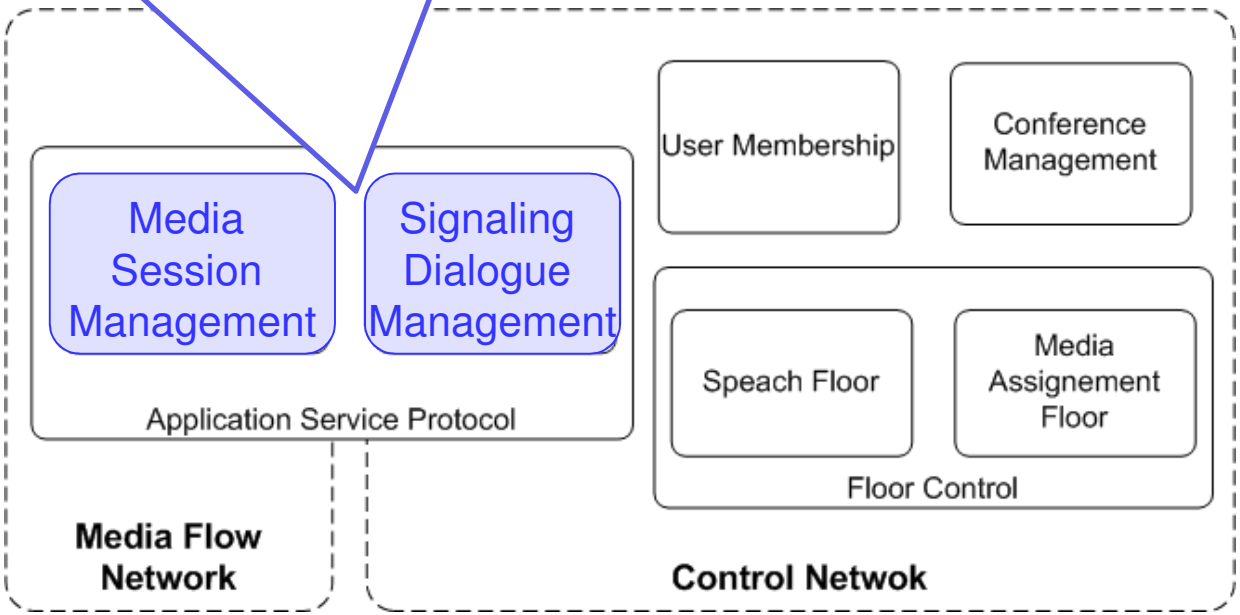
Our Model : System Components

- Conference Creation, Description, Announcement
- Conference Modification and Termination (Destruction)
- Conference URI (SIP) association with AN address.
- Publishing Conference URI (public or private methods)



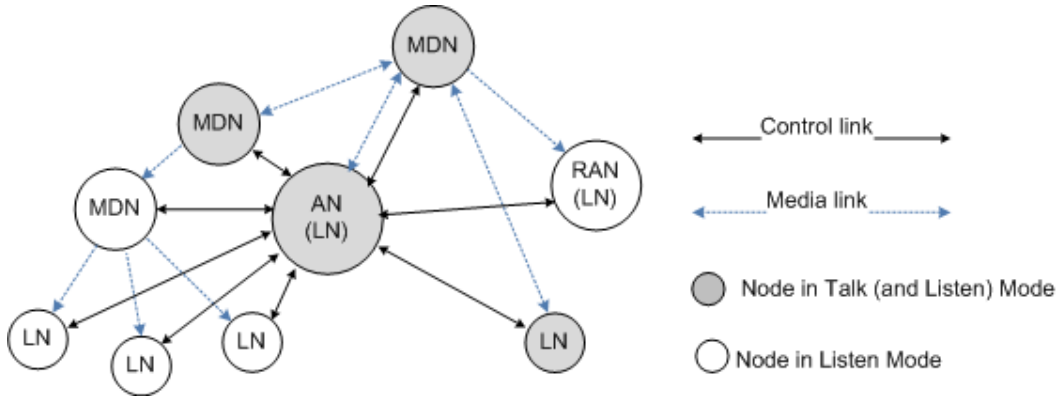
Our Model : System Components

- Connect AN with each participant (Signaling and Control Network)
- Use the 3PCC (Third Party Call Control) tecnique to create the media flow network
- Manage SDP content to agree with media session assignation floor



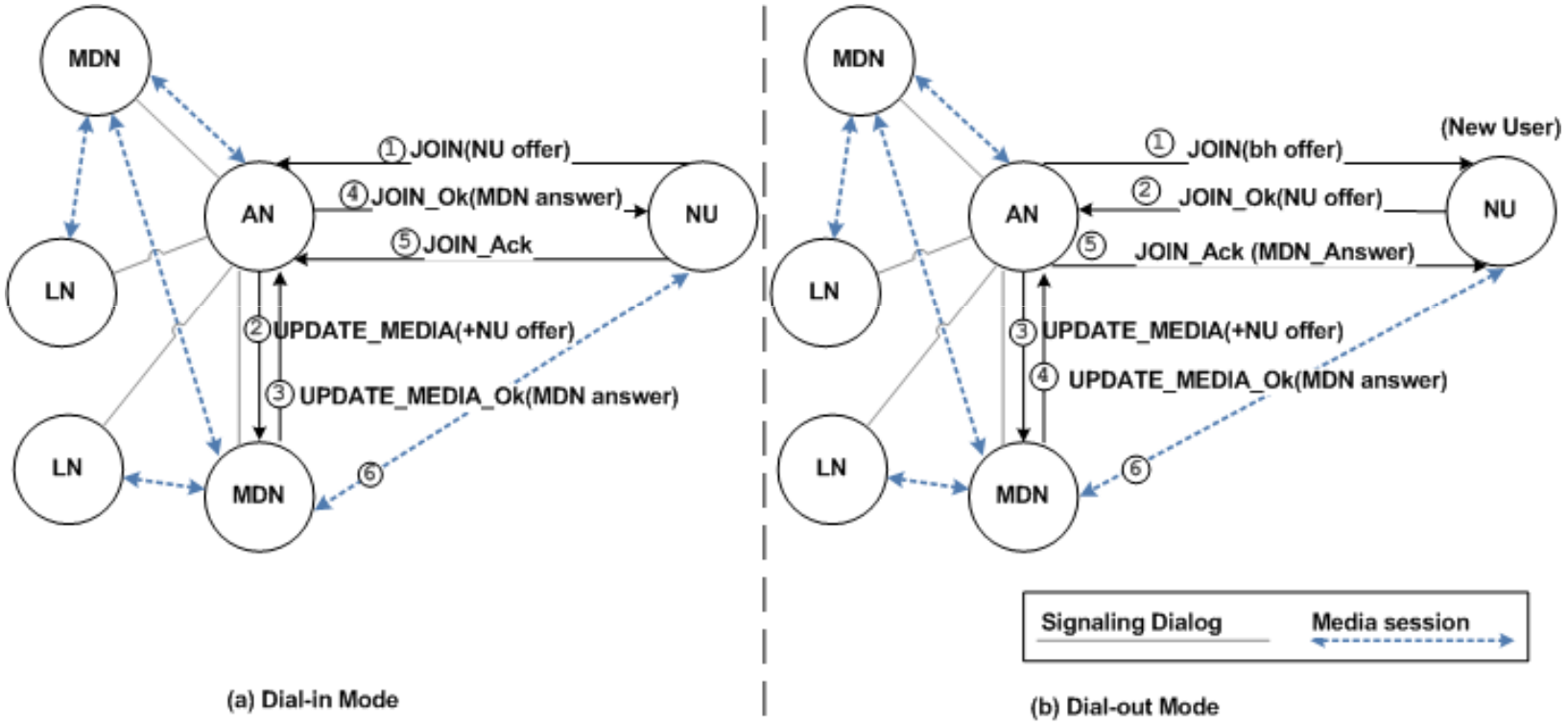
Our Model : The Application Service Protocol

- The Implemented Operations
  - Membership management
    - Adding users to conference *(support "Dial-in" and "Dial-out" modes)*
    - LN, MDN or AN departure or failure
  - Media network management and media load balancing
    - MDN splitting, merging, migration



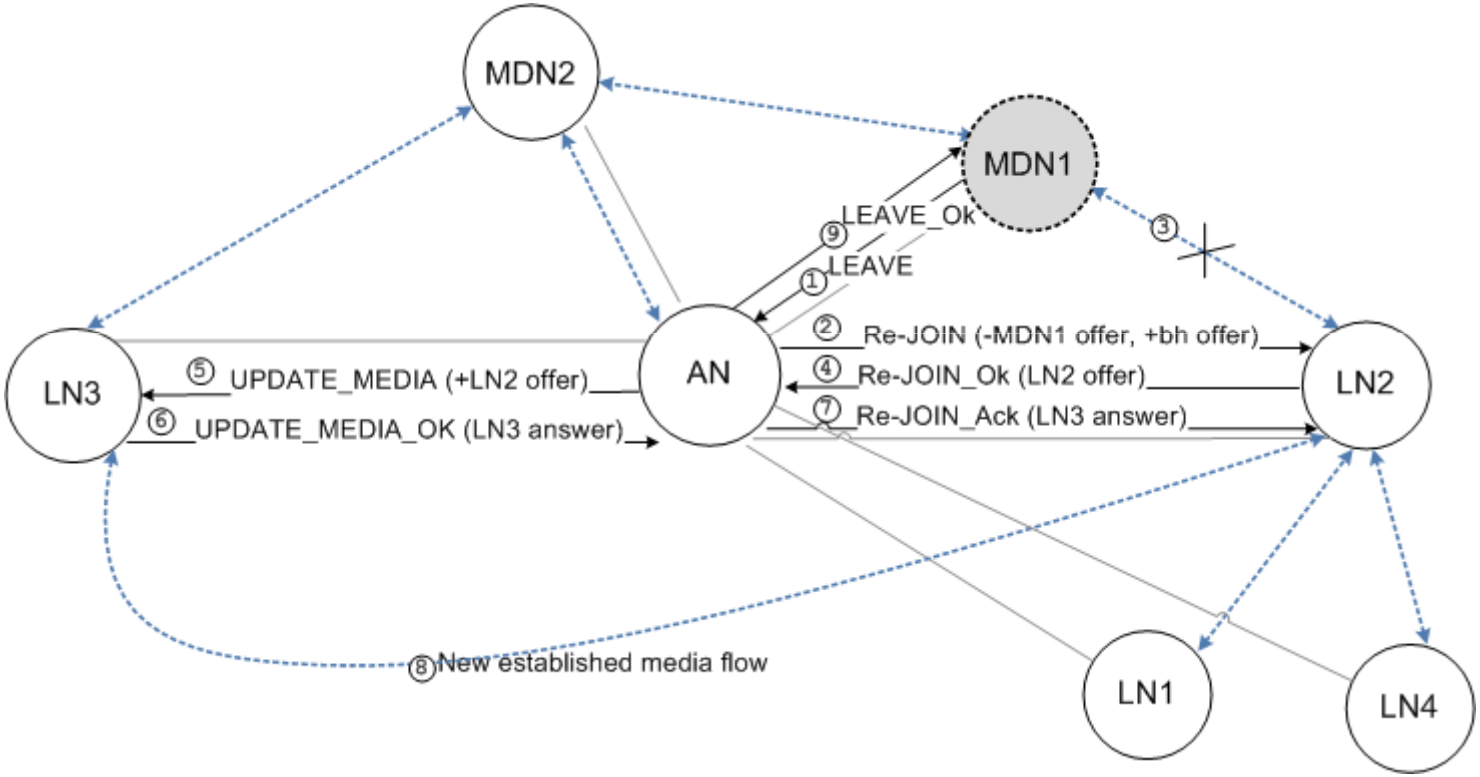
Examples of some implemented scenarios

- Adding users (Dial-in and Dial-out)



Examples of some implemented scenarios

- MDN leaves conference



Conclusion

- We presented new conference model that support large scale conferences where media is fully processed by an overlay P2P network.

- We introduced an Application Service Protocol based on the existing SIP/SDP protocols to facilitate its integration

- Actual and further work :
  - Simulate different scenarios (SIP environment under NS-2)
  - Cost evaluation associated to each conference operation (Membership management and media network management)

Conclusion

Thank you for your attention !! ☺

Questions ?