A P2P Virtualization for Distributed Adaptive Conference Management

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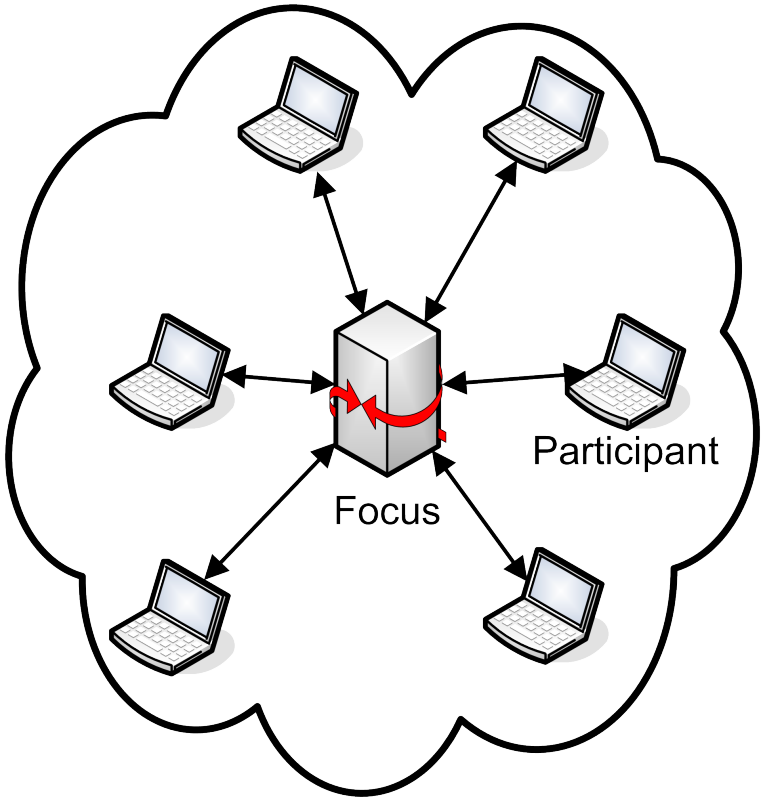
Content

- Traditional Conferencing
- Distributing the Conference Focus
- P2P Overlay Virtualization
- Summary/Outlook

Traditional Conferencing

- Conferencing with SIP
- Central point of control called *focus*:
  - Conference represented by URI
  - Negotiates media parameters
  - Provides dialogs to each participant
  - Media stream connectivity
  - Conference policy access
  - Notification services



Problem Statement

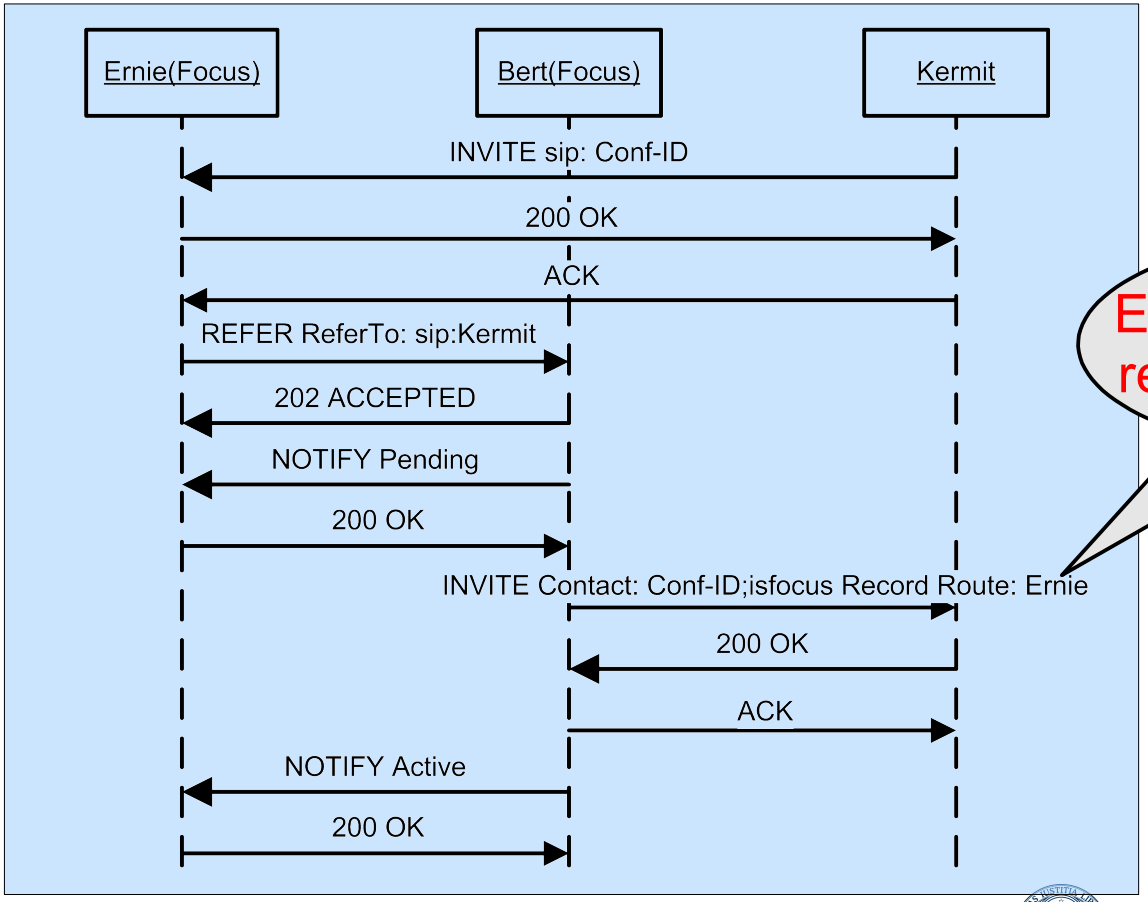
- Problem: Conference URI
  - *Identifies* multi-party session
  - *Locates* globally conference focus
    - Single point of failure
- Goal: Distribute conference focus transparently
  - *Identifier/locator split* for the conference URI
  - Identify conference at multiple focus peers
  - Route adaptive to proximity and peer capacities

Scalable Distributed Conferencing (SDCON)

- Creating topology of focus peers:
  - *Primary Focus* → Conference initiator
  - *Secondary Focus* → Controller on demand
- Extending conference event package
  - Consistent view to overall conference
- Focus Discovery
  - Detect secondary focus peers among participants
- Call delegation to other focus peers

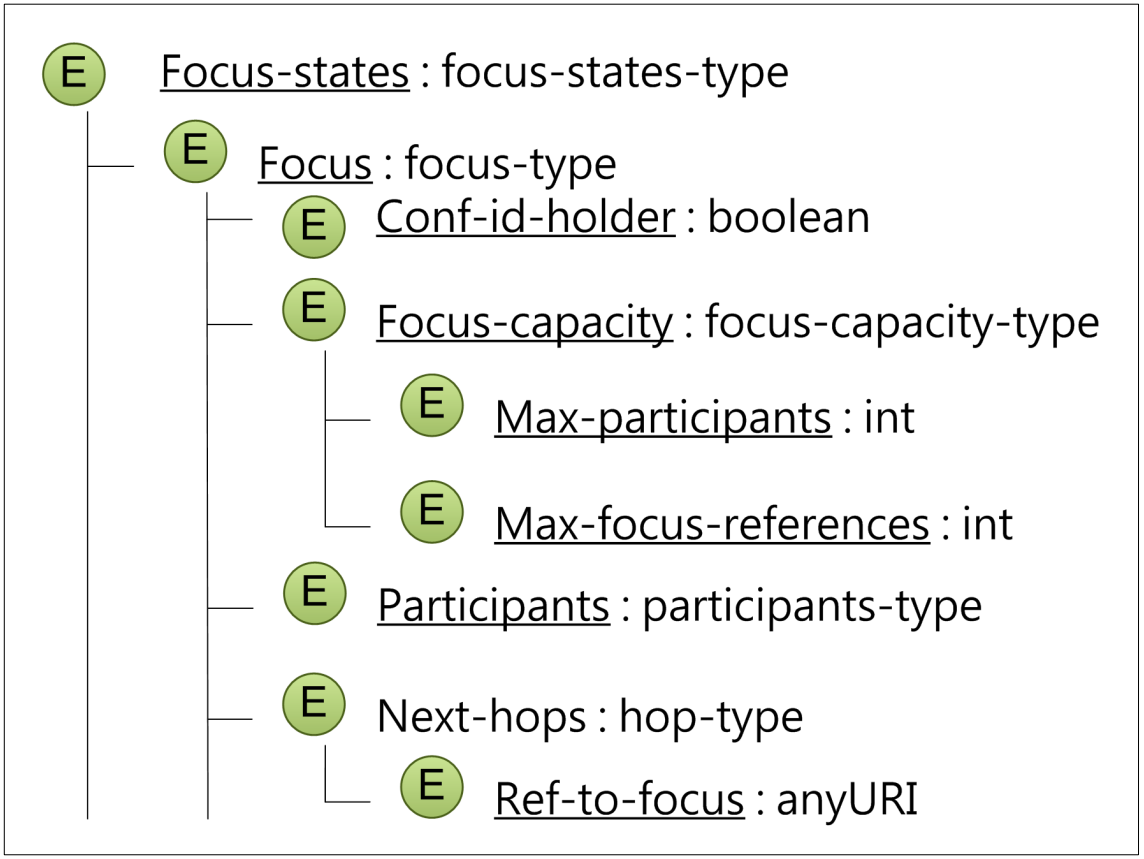
ID/Locator Split

- Delegating calls to remote focus peers
- INVITE appears as if it originated from conference initiator



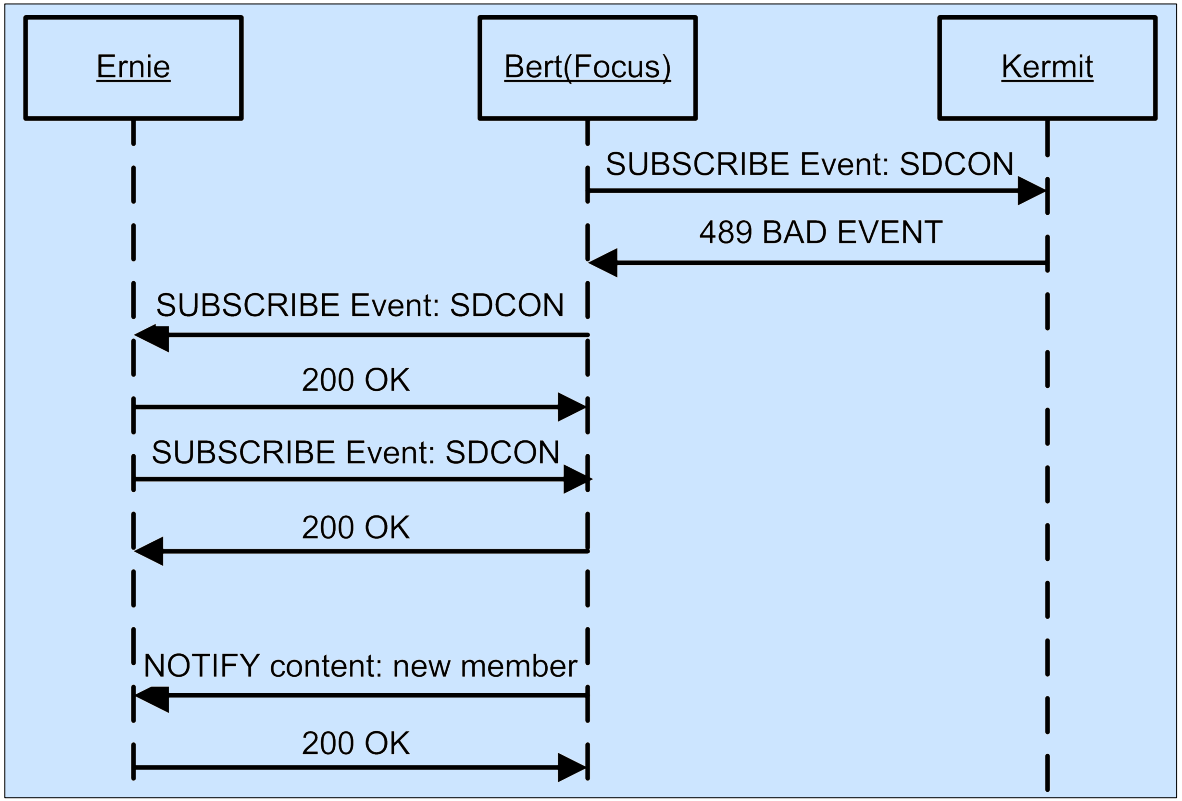
Multi-Focus Extension

- *SDCON* extends the Event Package for Conference State
- Extension meets multi-focus demands:



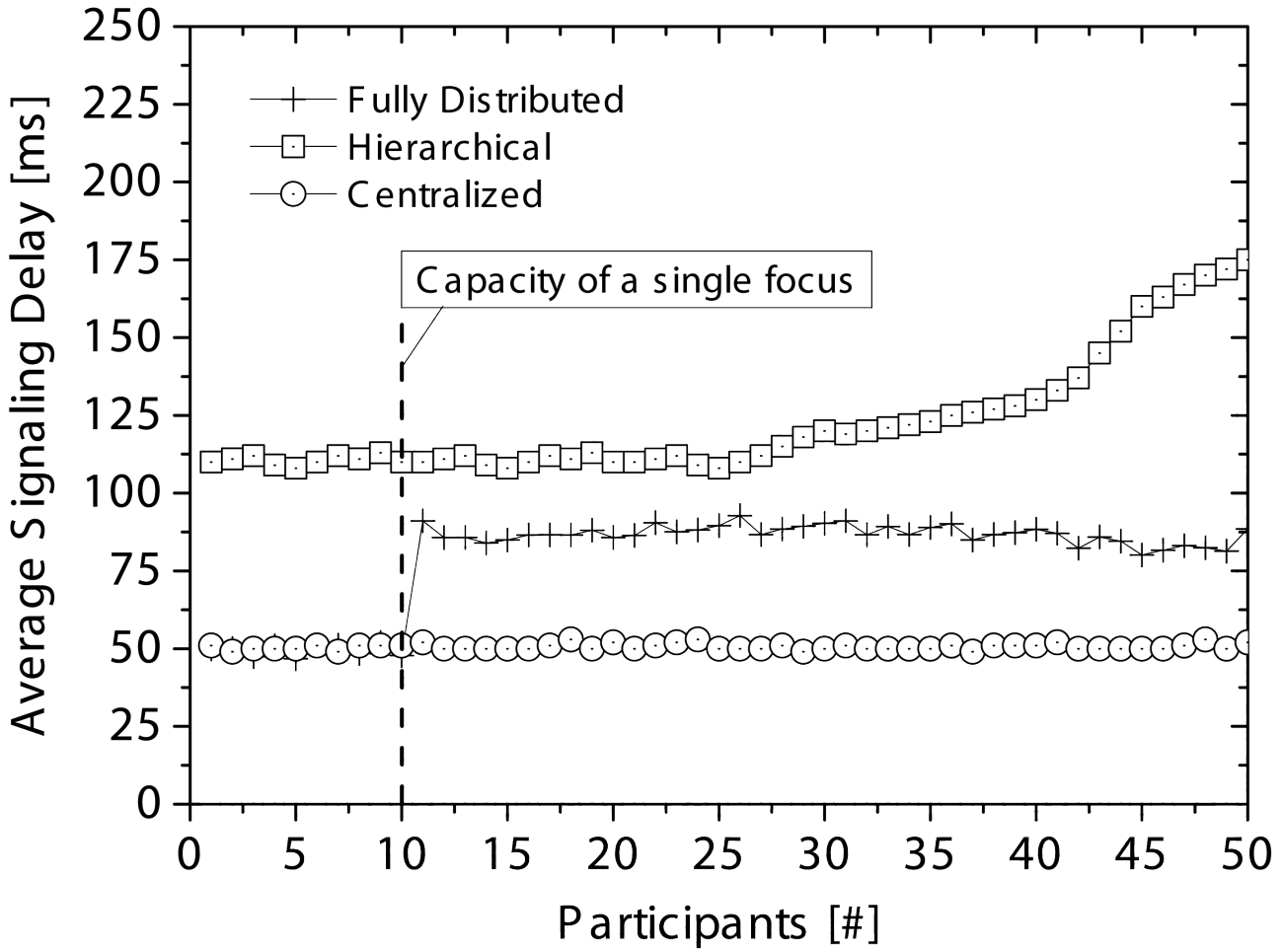
Focus Discovery

- Focus discovery and synchronization by subscribe/notify
- Discovery by iteratively subscribing participants for *SDCON*
- On change of conference state, focus notifies remote controller



Signaling Costs

- Comparing three signaling schemes



Conference ID Virtualization

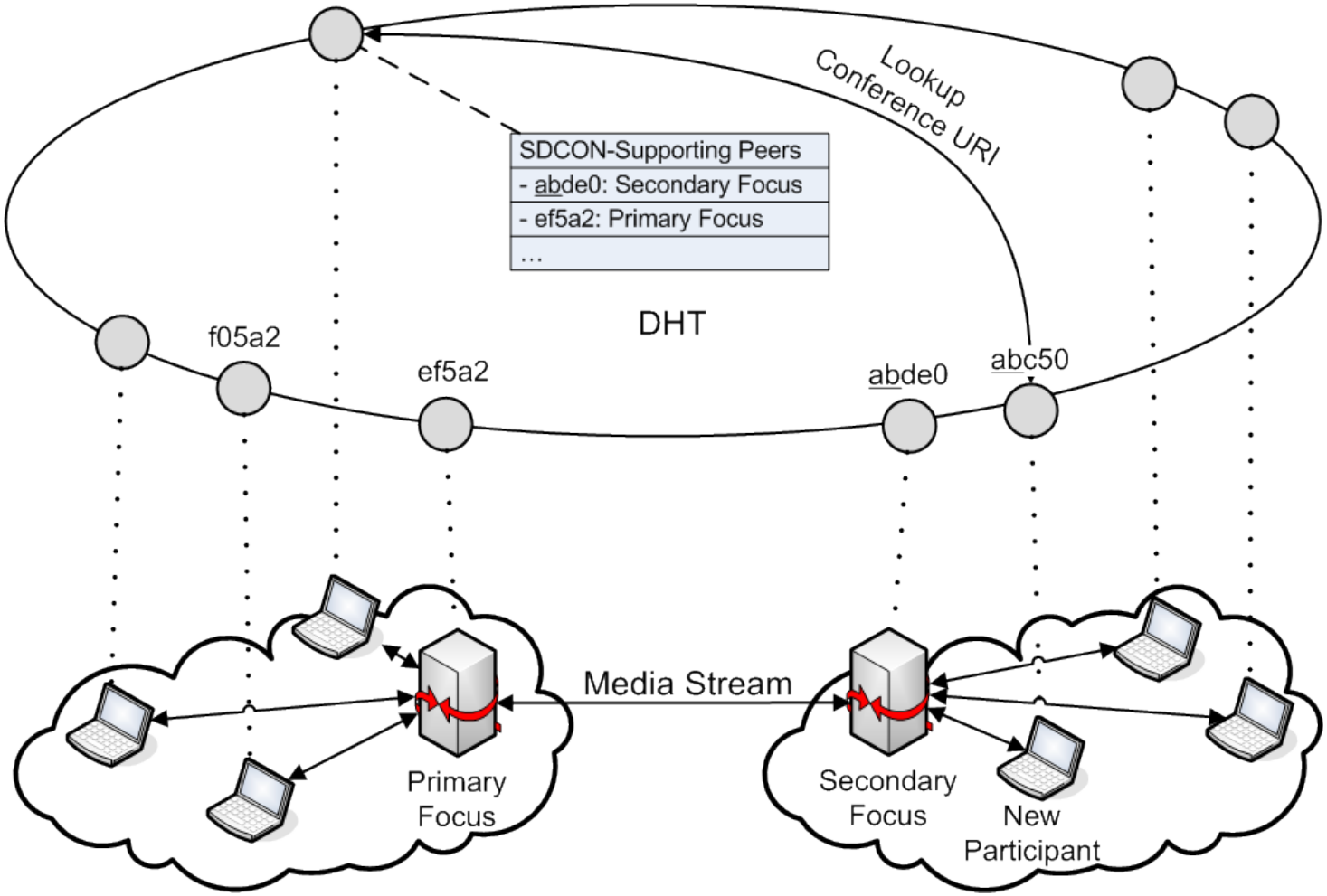
- Objective: Infrastructure-independent conference identifier
  - Not bound to physical focus
    → Creator can leave the session
- Approach: Store conference URI in overlay (DHT):
  - *Multiple entry points* to the conference
  - Secondary focus peers announce their capabilities
    - Indicating status active or potential
  - Participant may choose entry point by proximity and capacity

Exploiting Topology-Awareness

- Location-based Identifier, e.g., from landmarking
  - Estimating a peer's proximity by ID
- Participant attaches to closest available focus
  - Source routes in proximity order
    - Client-initiated: Source-routed INVITE to focus peers, first available focus responds
    - Focus-initiated: Source-routed REFER to focus peers delegating calls, first available re-invites

Proximity-aware Focus Selection

- Virtual Conference Example:



Summary and Outlook

- Transparent focus Identifier/Locator split
- Extended Event Package for Conference State to meet multi-focus demands
- Independent of proxies/registrars
- Virtual conference among multiple focus peers
- Optimized conferencing topology by proximity awareness

- Outlook
  - Further optimization of focus meshes
  - Trust relations by shared keys or certificates
  - Define conferencing usage for RELOAD

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Thanks for your attention!

Questions?

References (selective)

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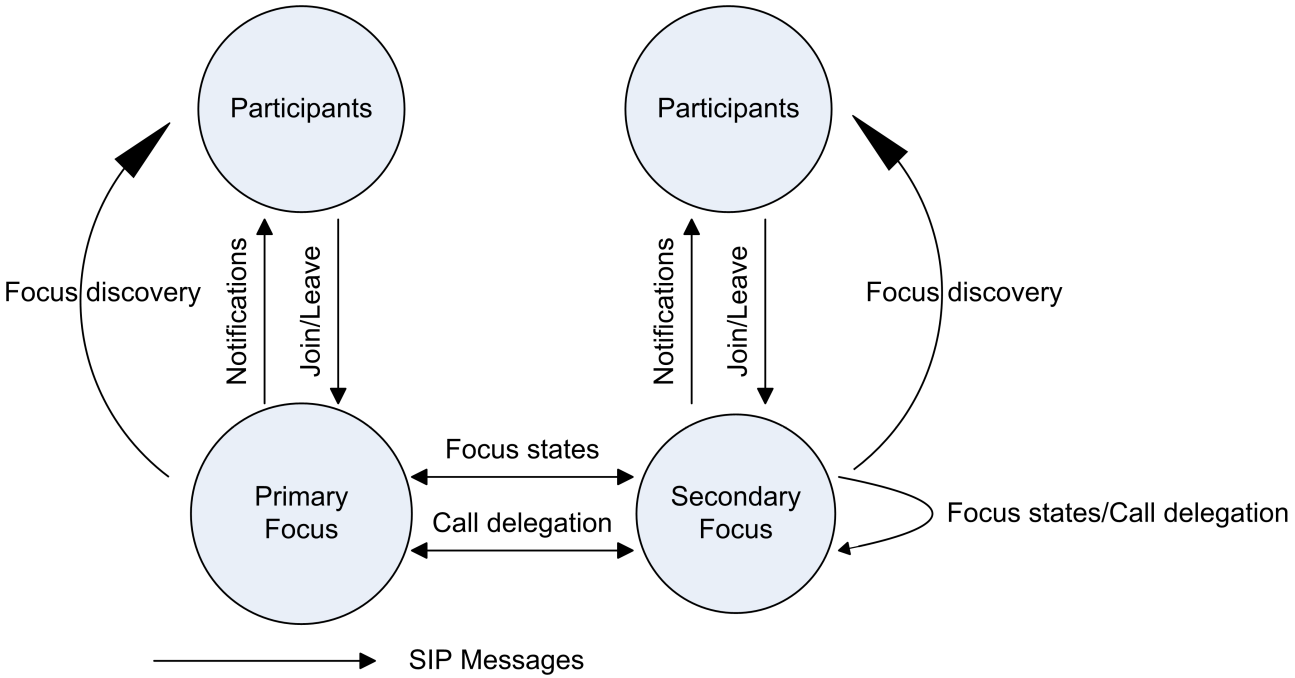
Appendix (1)

- SDCON functionalities:
  - Focus discovery on demand
  - Call delegation to remote focus peers
  - Global state synchronization by subscribe/notify mechanism



Appendix (2)

- Security Implications:
  - Secondary focuses have control over part of the conference

    → only trustworthy nodes supposed to be focus

    (can be all participants)

  - Access-control for writing focus discovery records
    - Certificate based or shared secret
    - Prevent modification using signature/MAC