IETF Multiparty Multimedia Session Control WG (mmusic)

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Overview

Part I:

- **Interpretation of agreement protocol:**
  - Short and long term goals
- **Teleconferencing state:**
  - Operations and attributes
- **Example policy mappings:**
  - Known paradigms: sd and mmcc

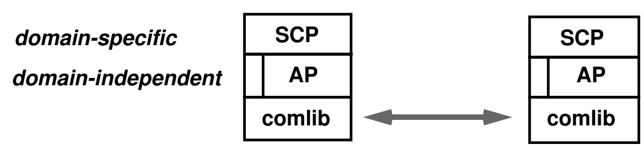
Part II:

- **Discussion:**
  - Influence of addressing on protocol behavior
  - Directory service or active agent?
    - Loose vs tight control, public vs private models
  - Idea for a user directory service
  - Proposed protocol for explicit sessions

Agreement Protocol

- **Framework to describe a diversity of sessions:**
  - Operations that may be performed on sessions
  - Who is qualified to perform those ops
  - Who must approve the proposed ops: *voting rules*
  - The state attributes effected by the op
  - Consistency conditions
- **Aims to support:**
  - Re-usability of messaging components
  - Fluidity from one mode to another
  - Could build negotiation service on top of AP

Session Control Stack



SCP	**= session control protocol**
AP	**= agreement protocol**
comlib	**= communication library,** ***e.g, N-way, M-way, 1-to-1***
other	**= generic ops not needing agreement**

Implementing Session Agreements

- **The Session:**
  - Collective of associated peers for control of shared state
- **Session manager:** **manager_id = <host,port>**
  - Endpoint for receipt and initiation of proposals
  - Listens at known locale, acts on behalf of user
- **Proposer:**
  - member who makes a proposal, responsible for outcome
- **Initiator:** **session_id = <user,manager_id,ts>**
  - Uniquely names session
  - Proposes the initial session configuration

Operations: $O = \{O_i\}$

- **Distributed session management:**
  - Establish, terminate [, merge, schedule]
- **Dynamic membership management:**
  - Add member, delete member, [modify member]
- **Session policy management:**
  - Set, modify, remove
- **Generic:** Status, query
- **Domain-specific:**
  - Specification of media configurations: capabilities, QoS
  - Distribute privacy info: session encryption key
  - Policies: for floor control, sender vs receiver, etc.

Teleconference State: $S = \{S_i\}$

- **Attribute hierarchy: lattice of info**
  - Session-wide characteristics
  - Membership-related attributes
  - Media configuration parameters
  - Policies describing their interaction
- **Specific or general attributes:**
  - session- , membership- , or media-wide
- **Differentiating factors:**
  - Critical for operation or simply informational
  - Maintained *globally* or locally
  - Dynamic or static variables

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Policy Attributes: P

- **Attributes that *define* style of session**
- **A policy is a binding between:**
  - **$\langle O_i$, propose(O_i), V(O_i), STATE$(O_i)\rangle$**
- **Initiator establishes meaningful set**
- **Propose(O_i) and V(O_i):**
  - May be entirely different members
  - Either group may be empty
- **Policy descriptor:**
  - A profile of common policy sets
  - Full matrix of policies not needed
- **Consistency policies:**
  - **$S_i \in E$, $S_i \in C$**

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Session Attributes

Might Include:

- **Session identifier**
- **Membership list: `{member_id}`**
- **Session address(es):**
  - Inclusion of session key
- **Session information:**
  - Session alias
  - Session start/end time: impact resource reservation?
- **Extensibility...**

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Sd Cache Entries

```
n=2148114532 2148114532 740786921
s=** Please don't start a radio session **
i=There is not enough bandwidth to allow more
   than one global radio session at a time.
   See Radio Free Vat session to get a time
   slot.  For further explanation, email
   casner@isi.edu
o=casner@oak.isi.edu
c=224.2.174 191 0 0
m=audio 52858 17126
a=fmt:pcm
```

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Membership Attributes

Might Include:

- **Member address:**
  - **`member_id = <user@manager_id>`**
- **Member information:**
  - Member status (e.g., `On Hold`)
  - Member alias
  - Electronic mail address
  - Geographic location of site
  - Other **RTCP** fields

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Media Attributes

Might Include:

- **Domain-specific payload:**
  - Specific to teleconferencing
- **Carried via session manager exchanges:**
  - Processed by media agents
- **Media list: `{media_id?}`**
- **Media type:** audio, video, groupware
  - Media agent: nevot, ivs, wb
- **Media address**
- **Application specifics:**
  - Encoding, priority, demux schemes, etc.

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Policy Matrix: Open Hailing Channel

Oi (Operation)	Propose(Oi) (Who may propose)	V(Oi) (Approval needed)
Session Ops		
Create	ALL	Initiator
Terminate	Initiator	Initiator
Member Ops		
Add	ALL	Proposer
Delete	ALL	Proposer
Modify	M	NULL (U_m)
Policy Ops		
Set	Initiator	Initiator
Modify	NONE	--
Media Ops		
Add	Initiator	Initiator
Modify	NONE	--

Hailing Channel: no E, C, V(O_i)

- **Initiator role simple, yet pivotal: *owner***
  - Session establishment and termination
  - Sets overall session description: static
  - Only one eligible to change it?
- **Dynamic membership:**
  - Unrestricted joins, no notion of invitation
  - Any member may leave at will
  - Member state propagation decentralized and periodic
- **Media is symmetric:** all members snd and recv
- **Two-stage termination:**
  - Termination a directory service op or a session op?
- **All ops ~ performed globally**

Policy Matrix: Explicit Invite Session

Oi (Operation)	Propose(Oi) (Who may propose)	V(Oi) (Approval needed)
Session Ops		
Create	ALL	M=1
Terminate	{ Initiator	Initiator
	ALL	ALL
Member Ops		
Add	ALL	M=1
Delete	ALL	Member effected
Modify	M	NULL (Um)
Policy Ops		
Set	Initiator	Initiator
Modify	ALL	ALL
Media Ops		
Add	Initiator	Initiator
Modify	ALL	{ Member effected
		ALL

Explicit Invite:

- **Initiator only responsible for session init:**
  - Sets overall session description
  - Anyone eligible to change it, tho some S_i fixed
- **Session termination:**
  - Anyone can perform
- **Dynamic membership: MεC**
  - Any member may leave at will
  - Sponsorship to invite/join: 1 member
  - scaling: critical and non-critical members
- **Media is symmetric:** all members snd and recv
  - Mid-session changes: QoS, floor ctrl, suspend
- **Most ops globally performed [all voted on]:**
  - Consistency is a function of session formality: privacy
  - Piggyback state on proposals-->Periodic refreshes

Discussion: End-System Architecture

- **Per domain session manager**
  - To mask addressing and firewall complexities
- **Per workstation session manager**
  - Demux on user id
  - Daemon to listen at given port
- **Per workstation, per user**
  - Individualized; fewer levels of indirection
  - Hard to support one port model

Discussion: Addressing Issues

- **Teleconferences: multidimensional sessions**
  - Repeated issue of demultiplexing
  - Multiple sessions, members, media, policies
- **Session address(es):**
  - Unicast or multicast or both
  - Same or different from `manager_id`
  - Inclusion of session key(s)
- **Media address(es):**
  - mcast vs unicast, different from ctrl, port, ttl, key

Discussion: Directory or Agent?

- **Differences between session directory and session manager?**
  - Should there be?
- **Session existence: 0 or 1 member**
  - Distinction between session creation/membership and session termination/member deletion
- **Treatment of members and non-members**
- **Tradeoff of join/invite:**
  - Each is difficult in other model
  - Public vs private session registry
- **Staying in the loop:**
  - Mid-session configurability
    - Inter-media (e.g., QoS, floor control)

Discussion: User Directory Service

- **Multicast service for user registration**
  - In the style of sd
- **User registers when directory tool launched**
  - Avoids trying to call an unavailable user
  - Tracks multiply-homed users
    - Re-register user based on machine activity
- **Scope implications**
  - Periodic announcements at different ttl's
  - Announcement interval decreases as ttl increases
  - Derives minimum ttl to reach remote users

Session Directory Wishlist

- **Semi-public sessions:**
  - Limited entry info in registry
  - Limited access/distribution
- **Access to multicast allocation**
  - Sharing among all multicast tools
  - Private, semi-public or public
- **Decide convention for addr and port usage**
  - Single vs multiple addresses
  - Fixed or dynamic ports
- **Loose, but private sessions:**
  - Distribution of handle to members only
  - Allows late-comers to join