

SIP Conferencing

IIR - SIP Congress 2001
Stockholm, Sweden

21 - 24 May 2001

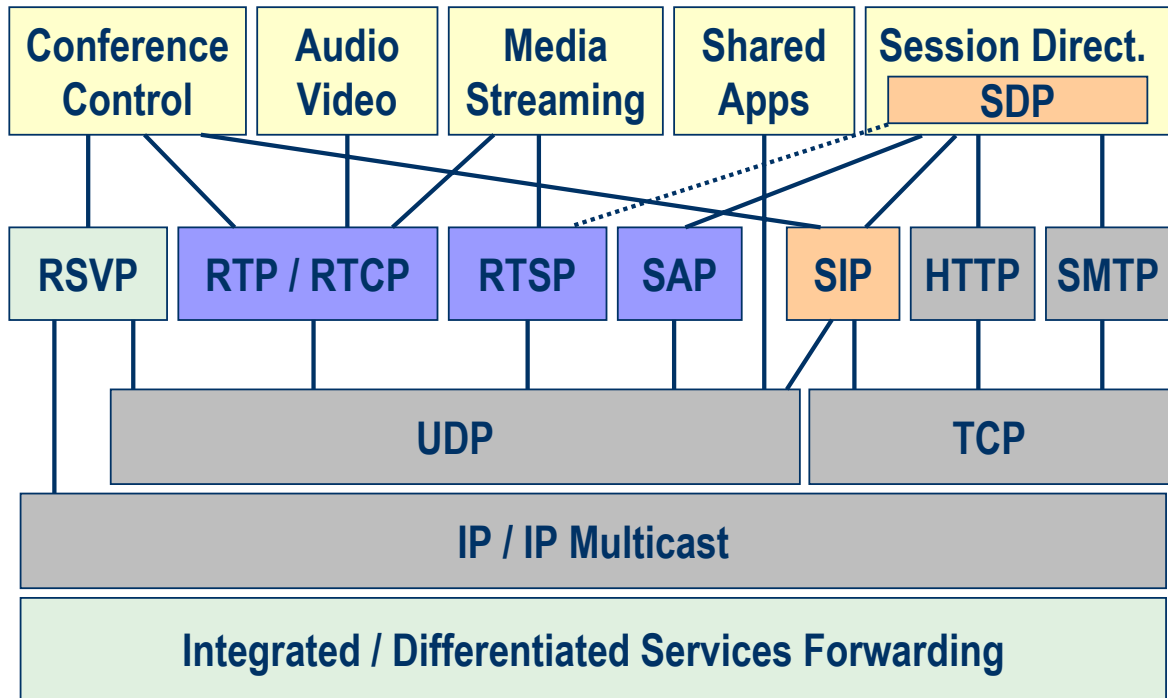
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IETF Conferencing

- Packet multimedia experiments since 1980s
 - Audio/video tools + protocols for A/V over IP
 - Conference announcement and control protocols
- First IETF Audiocast (1992)
- Since then: IETF sessions on the Mbone
 - Audio + video (+ sometimes slides)
- Other uses of Mbone conferencing
 - Lectures, seminars, project meetings, ...
 - Broadcasting NASA missions, concerts, ...

IETF Conferencing Architecture

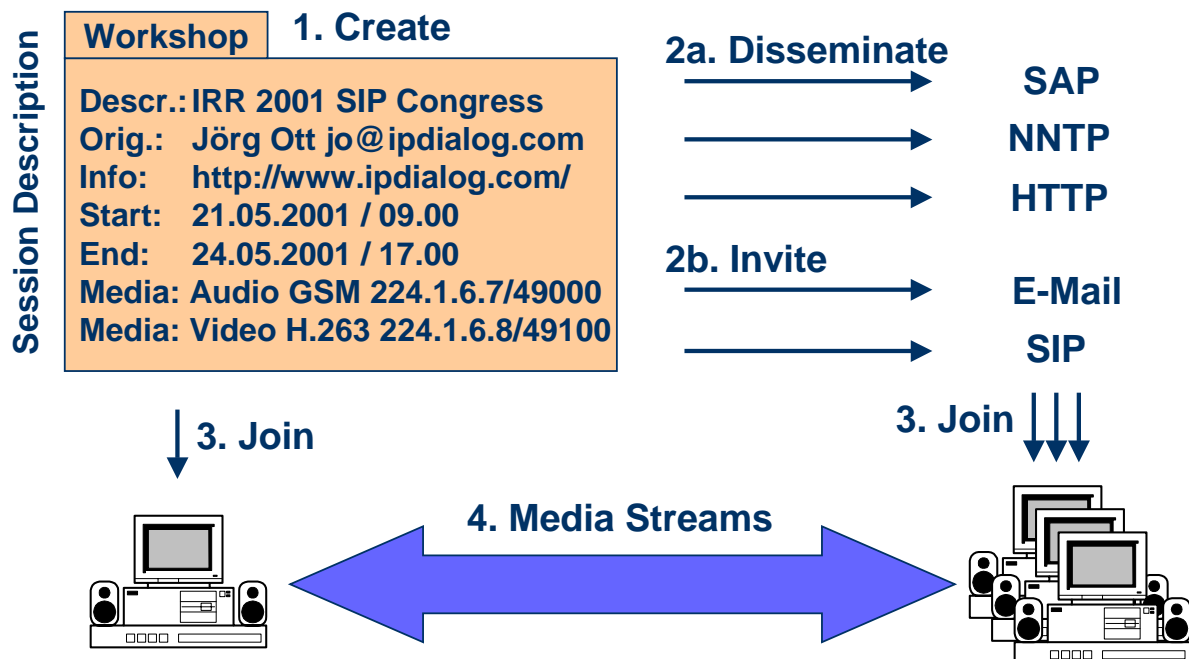


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IETF Conferencing Model



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SIP and Conferencing over Time...

- Origin: MMUSIC
Multiparty Multimedia Session Control
- From Invitation... to initiation, modification, and termination
- From Multiparty... to point-to-point-focused
- From Multimedia... to voice-centric

The latter is not SIP — but it is the way SIP is looked at today in many cases.

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The Role of SIP in Conferencing

- INITIATE a call or conference
- JOIN a conference
- LEAVE a conference
- INVITE participants
- EXPEL participants?
- CONFIGURE media streams
- SHARE state? CONTROL conference?

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SIP and Multiparty Conferencing

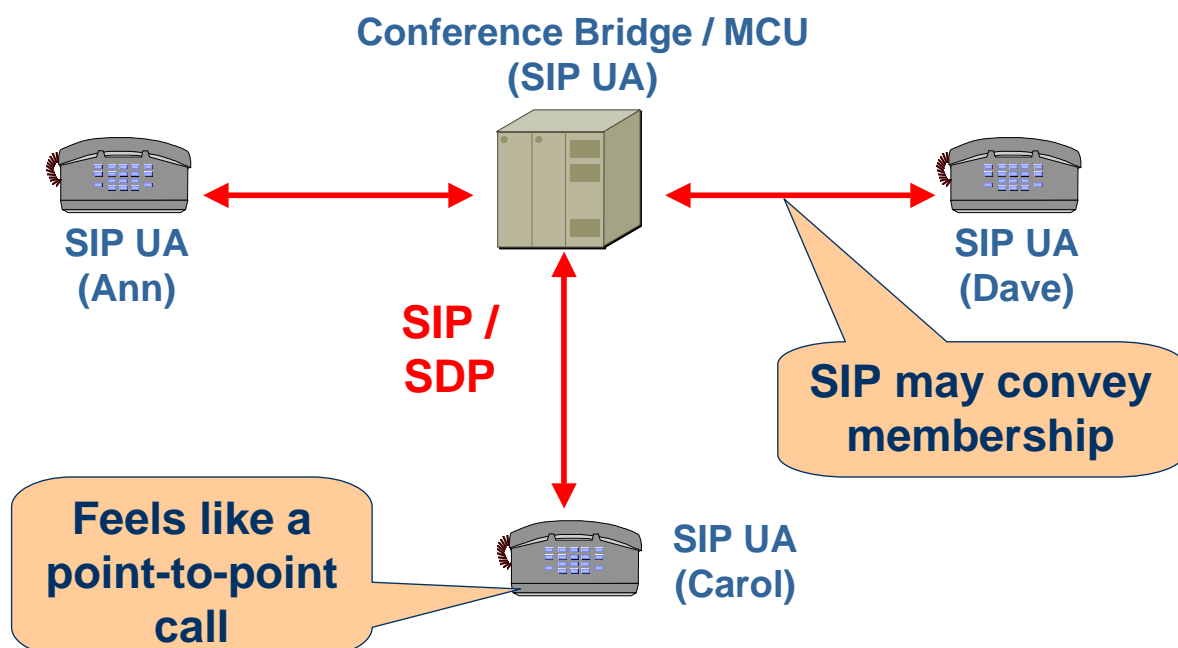
- SIP signaling relationships
 - Central (bridge, endpoint) vs. mesh
- Media distribution
 - Unicast vs. multicast
- Media mixing
 - Centralized (bridge, endpoint) vs. decentralized
- Conference creation
 - ad-hoc vs. scheduled
 - “dial-in” vs. “dial-out” vs. equal peers

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Centralized Signaling: Bridge

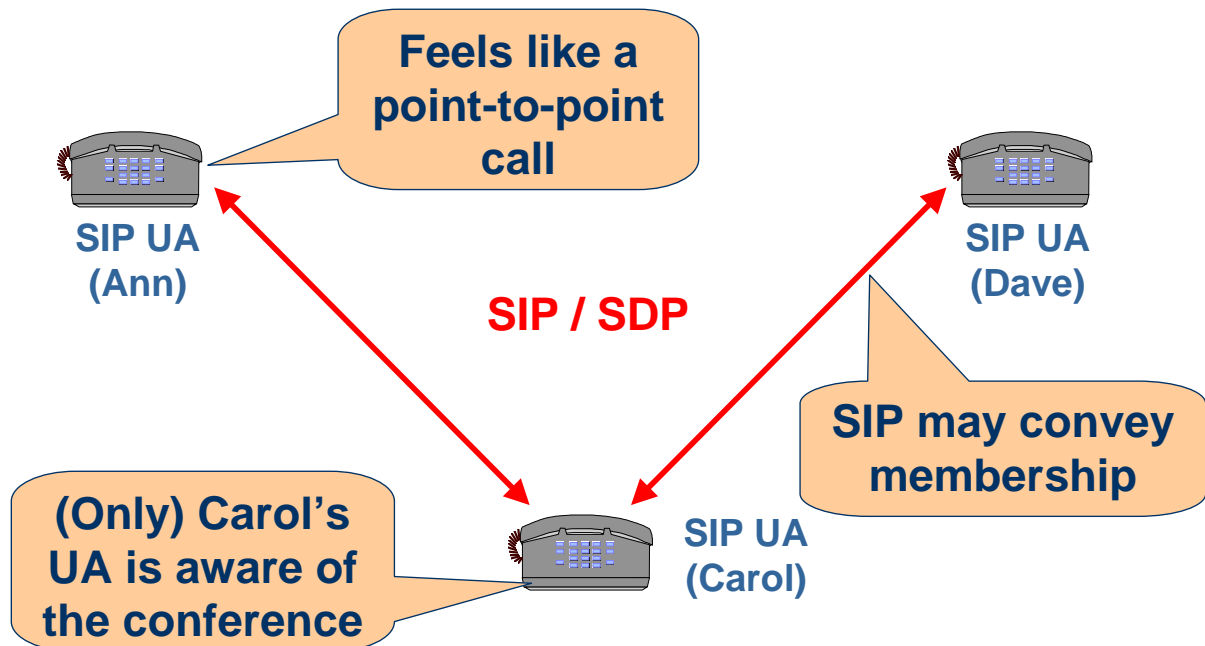


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Centralized Signaling: Endpoint

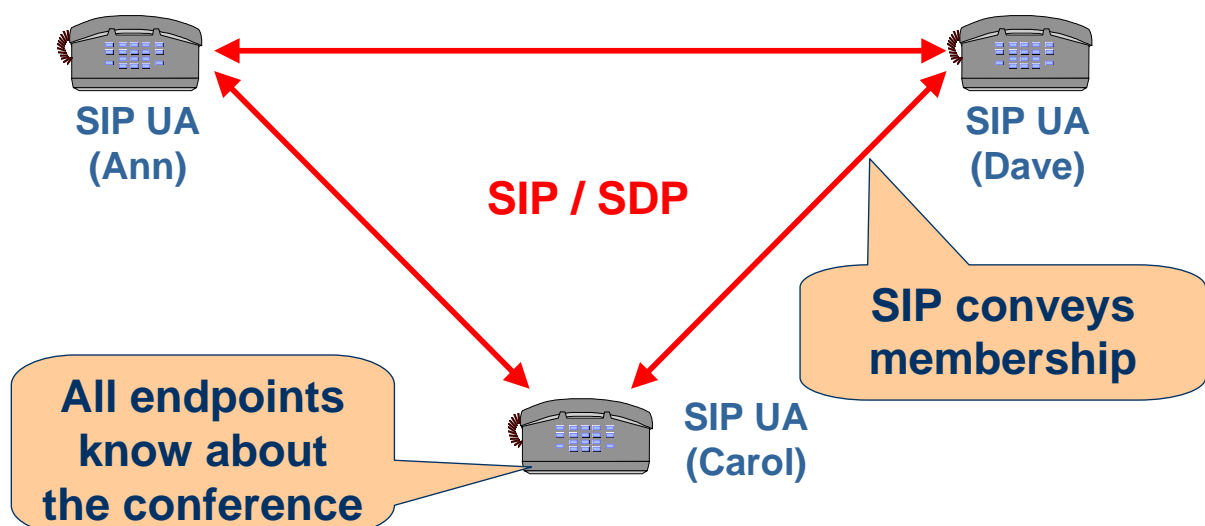


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Decentralized Signaling: Mesh

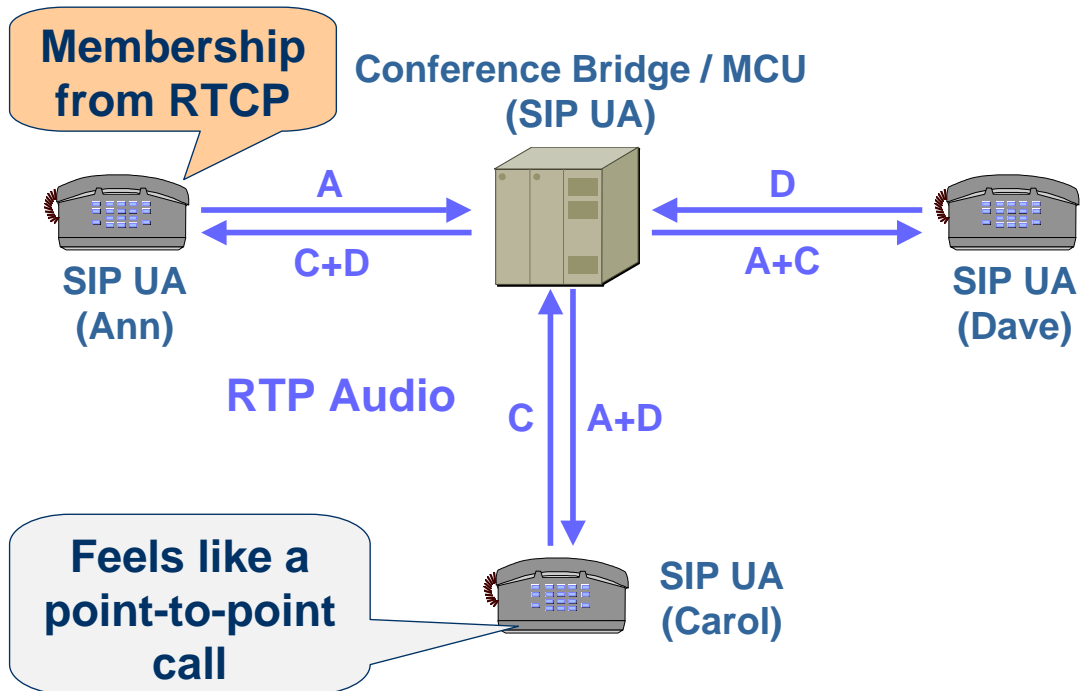


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Centralized Media: Bridge

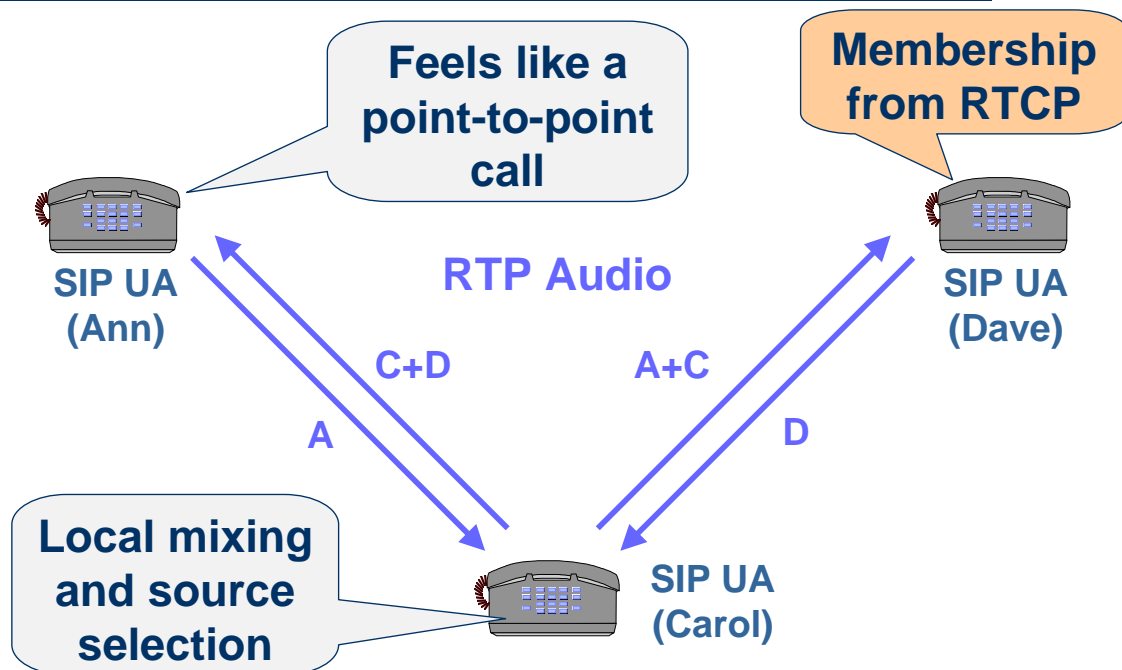


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Centralized Media: Endpoint

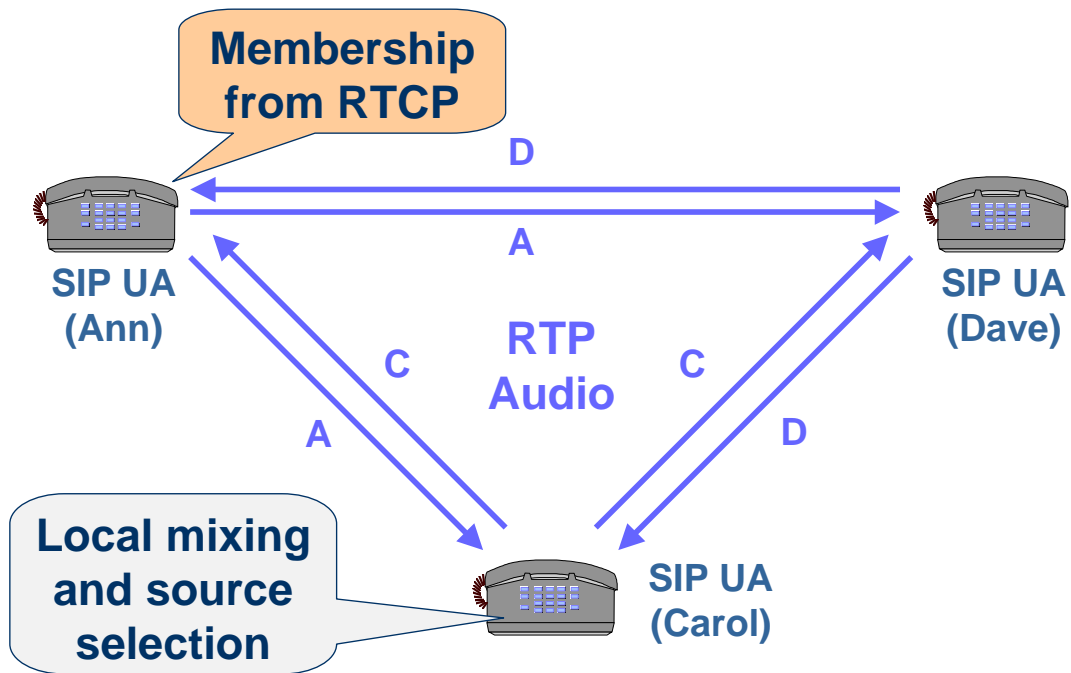


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Decentralized Media: Multi-Unicast

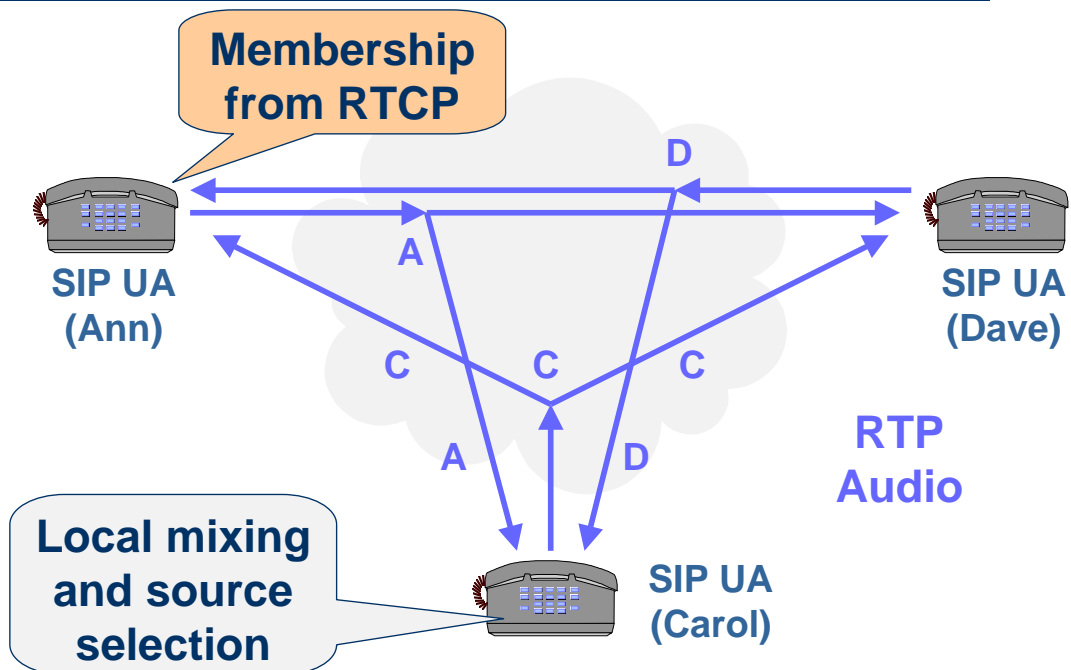


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Decentralized Media: Multicast



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Conference Creation

- Ad-hoc expansion of a SIP call
 - INVITE further participants
 - Re-configure media streams
 - Introduce a mixer if necessary (e.g. by SIP server)
- Advance reservation of a bridge / MCU
 - (Reservation itself out of scope)
 - Call in to conference URL
 - Call out from bridge to list of participants
 - Repeatedly (re-)configure media streams as needed
- (Scheduling and Announcement with SAP)

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Model Transition

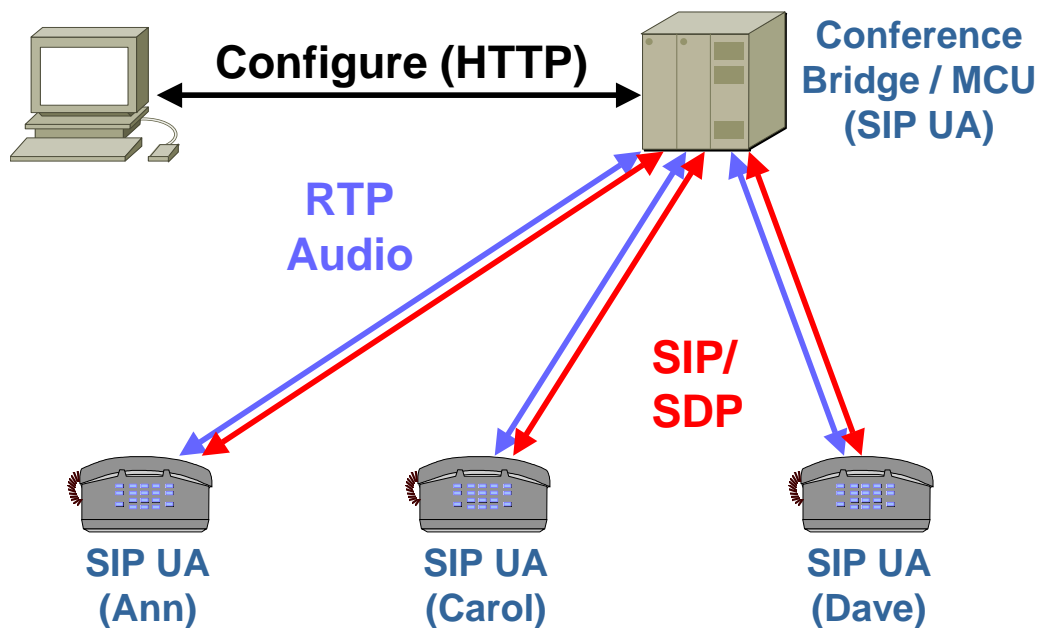
- Conference starts off as a call
 - Endpoints can't do mixing
- Conference grows larger
 - Than the mixing endpoint can deal with
- Conference bridge no longer needed
- “Call Transfer” for all participants
 - INVITE and BYE, REFER
 - Re-direct (and re-configure) media streams

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Example 1: Conference Bridge



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Example 1: Conference Bridge

- Use only basic SIP features
 - SIP URL for identification
 - point-to-point calls for control and media
- Conferencing: application of SIP in the bridge
 - may hide or expose media differences
 - transcoding vs. media re-negotiation
 - may hide or expose participants' identities
- Make a conference "feel" like a phone call
- Works with SIP phones today!

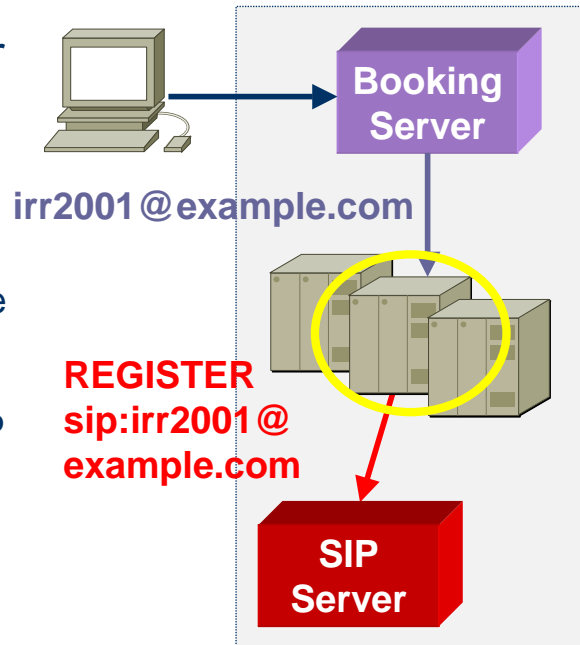
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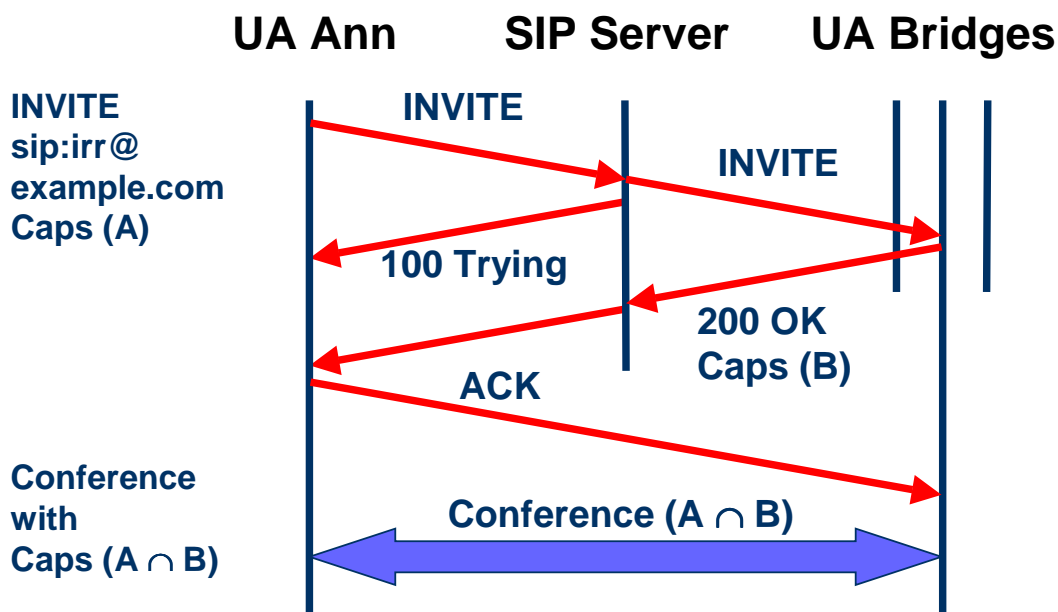
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Conference Setup

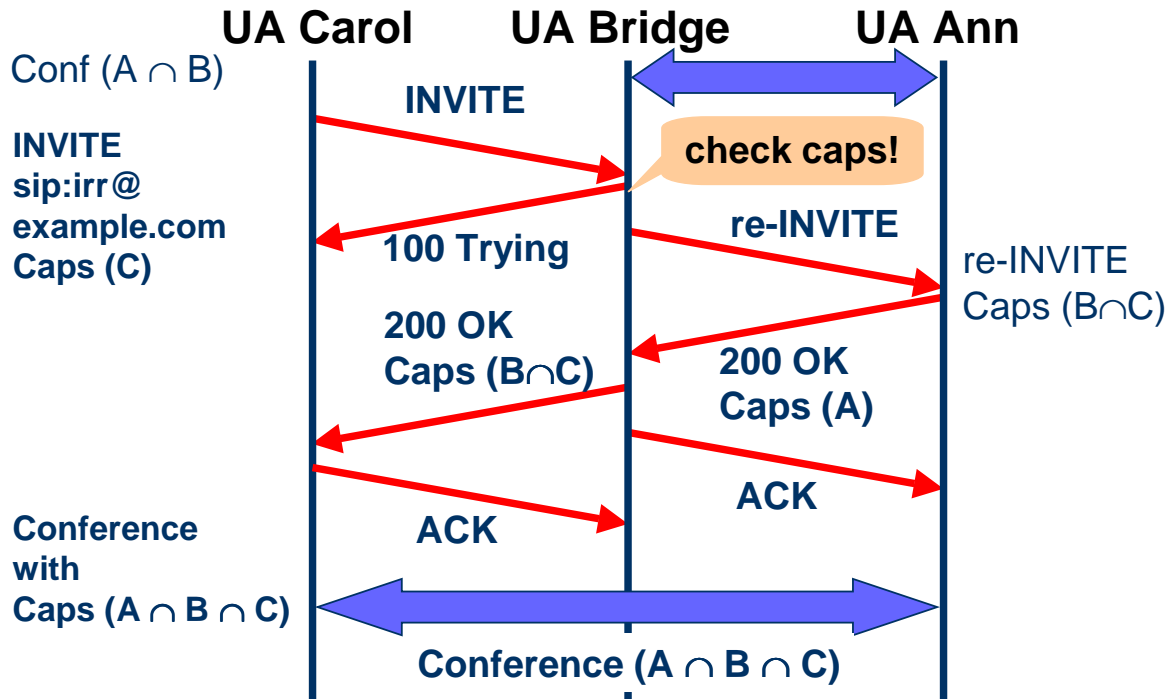
- Ann uses a web browser to set up the conference
- She creates / obtains a URL for the conference
 - to send to Carol and Dave
 - to put on a web page
- Bridge registers with SIP server using the URL
 - when the conference is supposed to start



Ann calls in (1st)



Carol calls in (2nd)

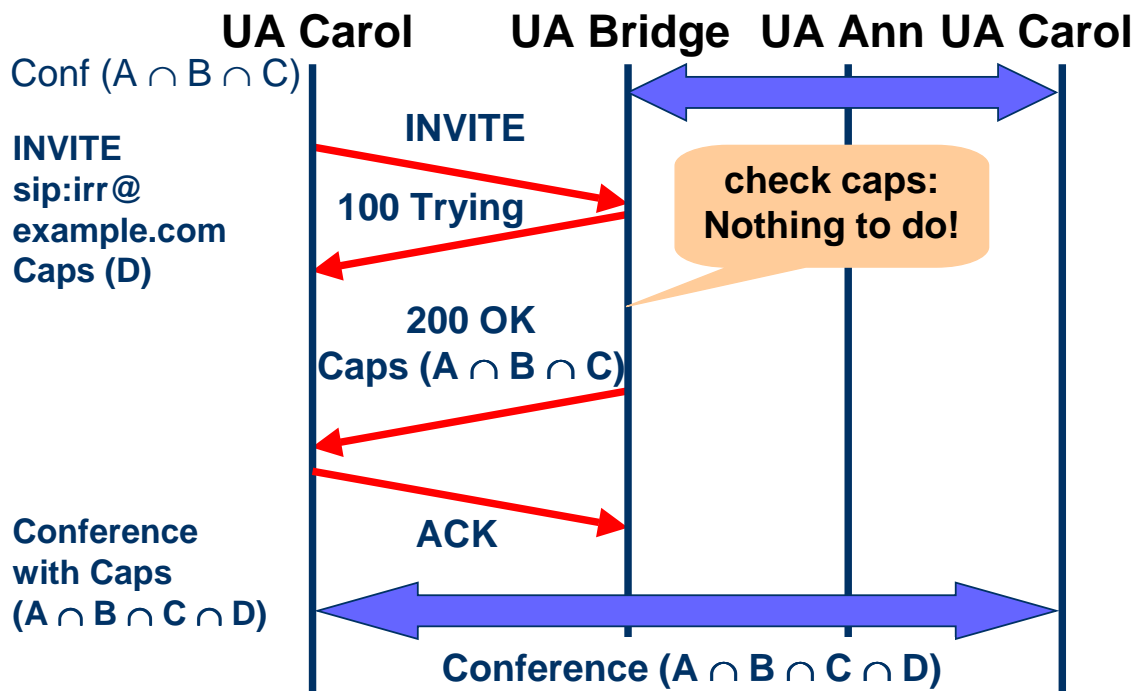


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Dave calls in (3rd)



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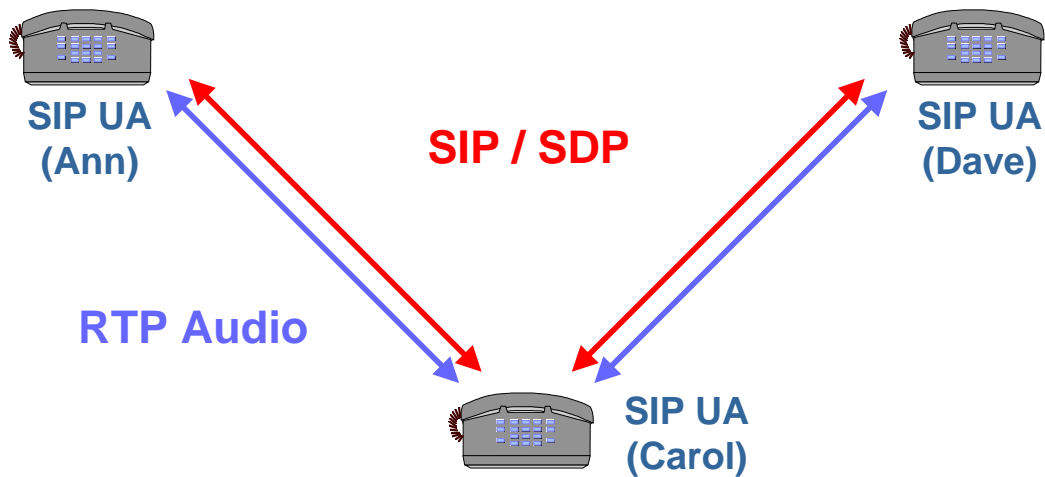
Leaving and Terminating

- Leave a conference: BYE
- Expel a participant: Bridge sends BYE
 - Invocation triggered by other participant?
 - Extensions needed + policies + ...
- Terminate a conference:
 - Bridge BYEs all
 - (Bridge de-registers from SIP server)

Example 1: Conference Bridge

- PRO
 - Endpoints need not be aware of conference
 - (if media distribution is handled centrally as well)
 - Can be done with SIP today
 - Endpoints can leave at will
 - Simple!
- CON
 - Central entity required (find it, book it, access it, ...)
 - Single point of failure

Example 2: Endpoint as “Mixer”



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Example 2: Endpoint as Mixer

- Logically similar to centralized bridge
- Endpoint creates two calls and bridges locally
- Perfect solution for small ad-hoc conferences
- With decentralized media: processing power less an issue
- Implemented in SIP Phones today!

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Example 2: Endpoint as “Mixer”

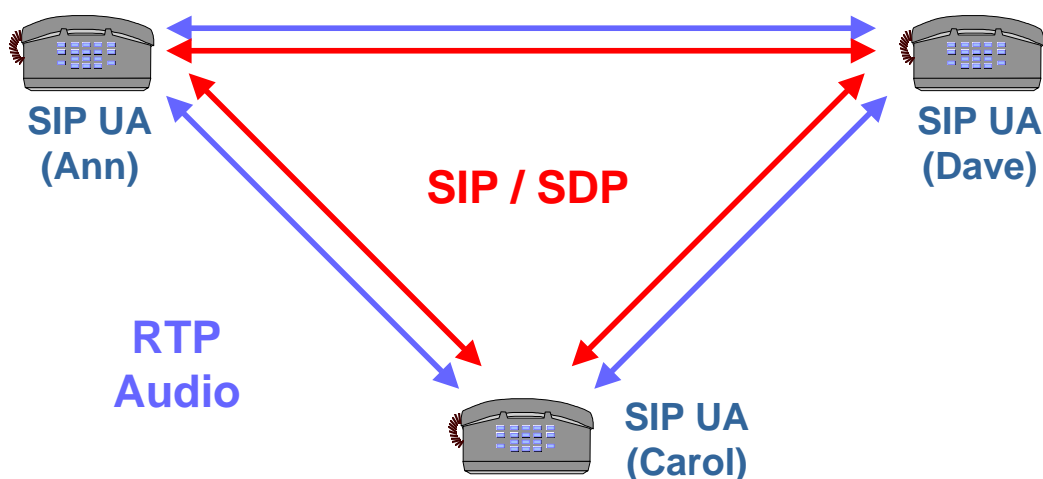
- PRO
 - Endpoints need not be aware of conference
 - (if media distribution is handled by mixing endpoint)
 - Can be done with SIP today
 - Simple!
- CON
 - Mixing endpoint cannot leave
 - or will terminate the signaling relationships
 - Mixing endpoint has to handle many streams (b/w)
 - Single point of failure

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Example 3: Meshed Conference

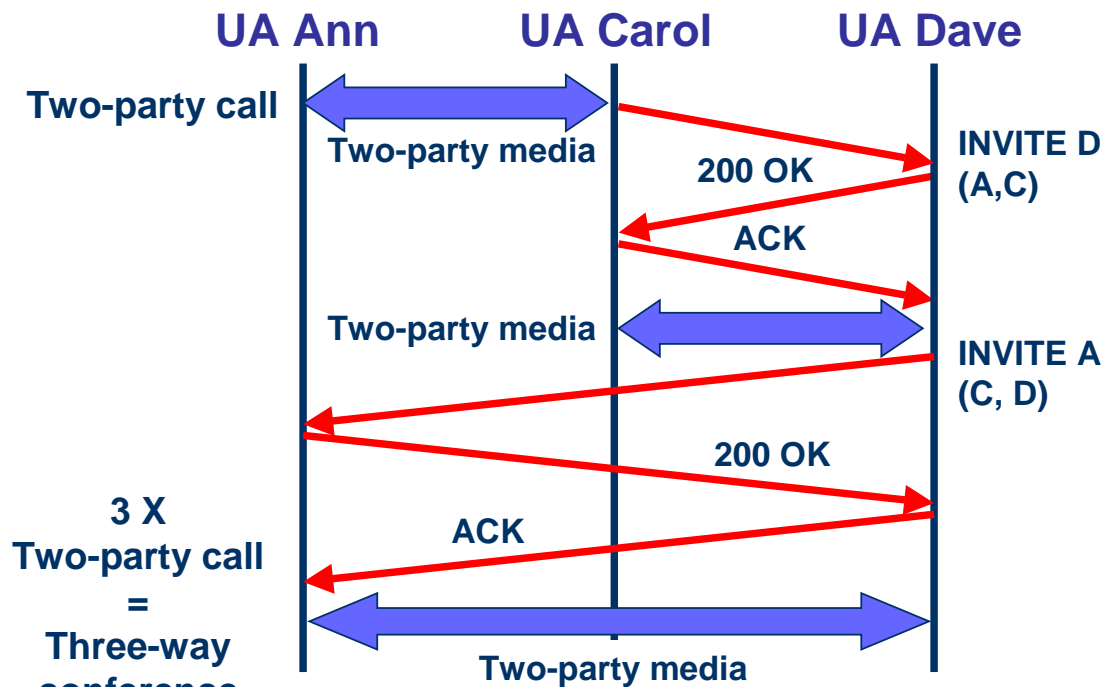


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Example 3: Meshed Conference



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Example 3: Meshed Conference

- PRO
 - No centralized server required
 - No single point of failure
 - Participants may leave at will
- CON
 - More sophisticated endpoints required
 - Each endpoint has to handle multiple streams (b/w)
 - Complex protocol
- Not yet completely defined!

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SIP and Conference Control

For conferences of limited size:

- Share conference state information
 - Membership, media, encryption keys
 - Other?
- Manage the course of the conference
 - Floor control, conference policies, ...
- Use SIP for state, but not for management
- **Should there be another control protocol?**

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SIP for State Synchronization?

- Media configuration handled by SIP anyway
- Membership is straightforward
 - Done for full-mesh conferences
- Use SUBSCRIBE/NOTIFY for other
 - Membership and other conference state
 - Not perfectly efficient
 - But there is currently not so much state
 - Need not scale to arbitrarily large conferences
 - Seek another solution only when really needed

YES

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SIP for Conference Management?

- Current perception: don't do that!
- Instead: devise a conference control protocol when needed
 - Could be carried in SIP
 - Or as one of the media
- Idea of conference control around for years
- BUT: no real (commercial) interest yet

NO

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SIP and Multimedia

First of all:

SIP supports ANY media!

But:

Need the other protocols & applications

And:

Need a way to “signal” them

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Media Protocols

DONE

- Audio
- Video
- Tones (DTMF etc.)
- Text chat
- Fax
- Pointers
- ...

MISSING

- Shared Whiteboard
 - LBL WB, ...
- Shared Text
 - UCL NTE, emacs, ...
- Application Sharing
 - ITU-T T.128
 - Sun VNC
- ...

Session Description Protocol (SDP)

- Has enabled SIP and streaming application
 - works fine for many cases
 - makes many implicit assumptions
- BUT: Designed for Session Announcements
 - rather than for interactive “negotiations”
- Many recent extensions
 - to better support SIP, MEGACO in the short-term
 - General solution being worked out

SDP Next Generation (SDPng)

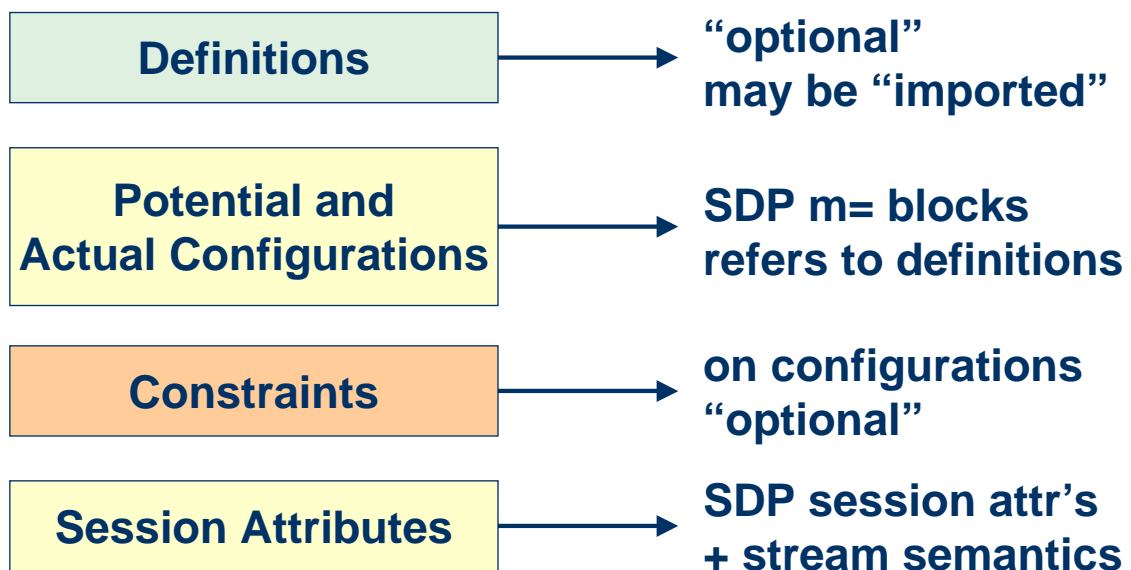
- Being designed to address SDP's flaws...
 - Limited expressiveness
 - For individual media and their combination
 - Often only very basic media descriptions available
 - No real negotiation functionality
 - Limited extensibility (clumsy, hard to coordinate)
 - No semantics for media sessions (only implicit)
- Also: Avoid second system syndrome!
 - Simple, easy to parse, extensible, limited scope

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SDPng Structure



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SDPng Status

- Requirements agreed upon in MMUSIC
 - Also input from SIP, MEGACO
- Basic structure agreed upon
- XML-based syntax chosen
- Strawman proposal available
- Draft spec expected for 51st IETF
- Next steps: definitions (media, transport, ...)

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Conclusion

- For TODAY, we are ok!
 - Audio(visual) conference bridges
 - Small group ad-hoc conferencing
 - End points may but need not support conferences.
- For TOMORROW, there is a long way to go...
 - SIP conferencing support and SDPng
 - Conference control?
 - Media protocols
- And we NEED APPLICATIONS that use it...!

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