Practical speak subscription handling in multicast conferences

Alessandro Falaschi

Dipartimento Info-Com
Universita' di Roma La Sapienza
ITALY

Statement of the problem

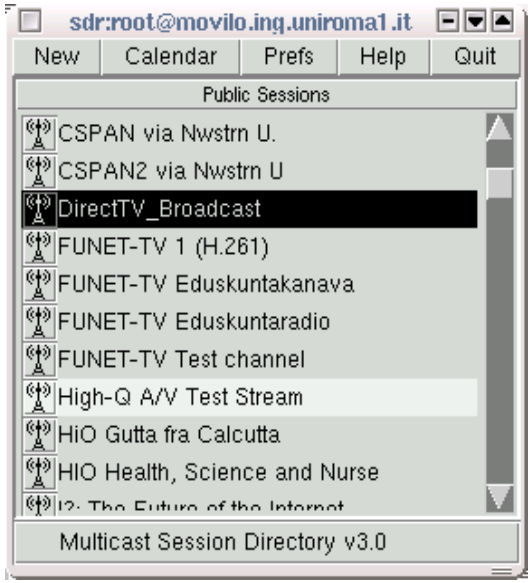
- **Multicast conferences lack of a tool for managing speaker's turn**
  - The social behaviour is to raise an hand, being noted by the chair, and later be invited to speak
- **Integrated solutions have been proposed, and discontinued**
  - MinT, MMCC, Teleport, OpenMash
- **More complex architectures do exists, but they need coordination**
  - Access Grid, VRVS
- ***Asp to Speak* fills the need for a *brick* like other *Mtools***
  - It does only one job and integrates with the others

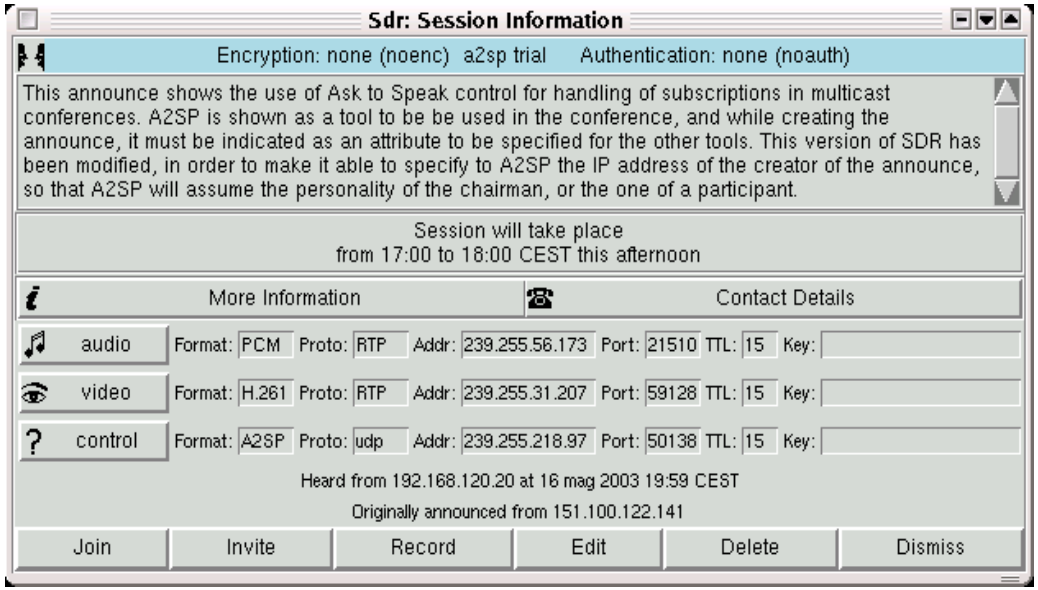
Mtools

- Are autonomous applications for the handling of audio and video in multicast conferences
  - *VIC* for video
  - *VAT, RAT* for audio
  - *ConfCntlr* for remote media control
- Are invoked by joining to announcements delivered by *SDR*
  - *SDR* checks against multicast addresses clashing
- *Ask To Speak* handles speak subscriptions and uses *ConfCntlr* for remote media management

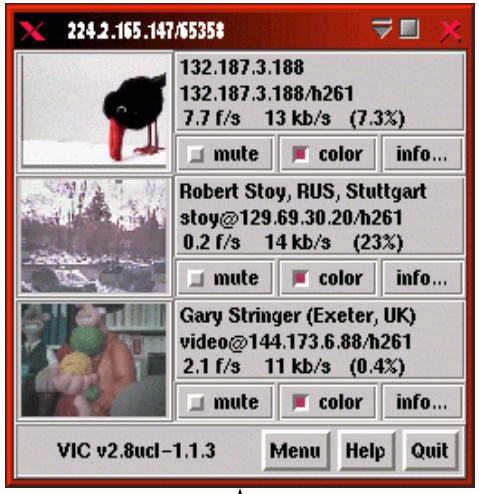
SDR Session Directory

- Receives SAP-encapsulated SDP descriptions
- Allows to announce new sessions, to be held on unused addresses
- Launches applications needed for reception of media that compose the session
- New plugin files for handling of VIC & VAT control by A2SP
- Modified SDR for make it able to pass the IP address of the announcer

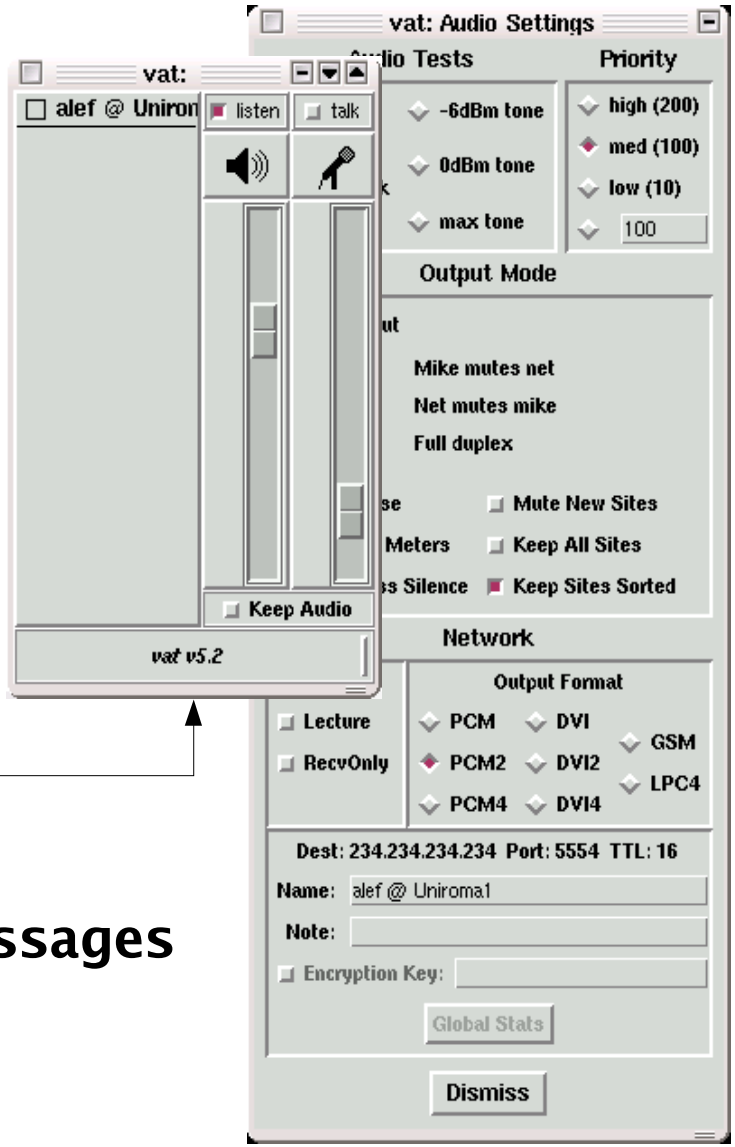




VIC, VAT and Mbus



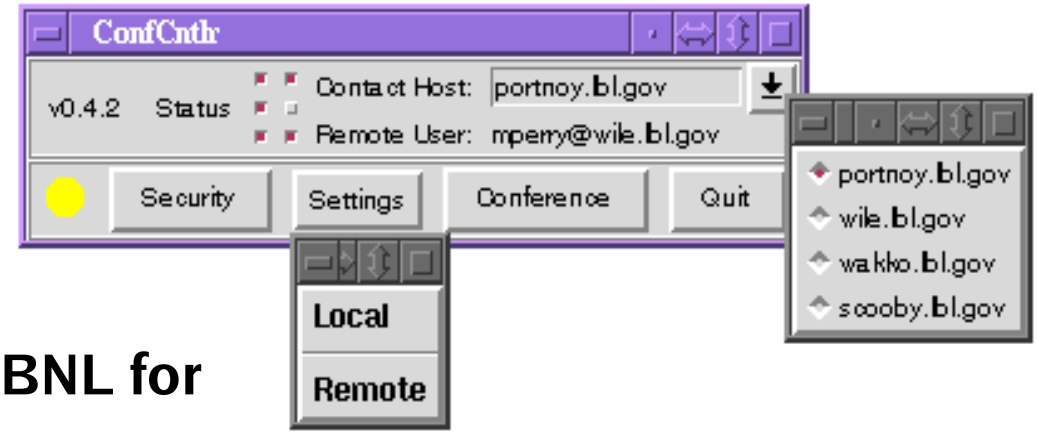
- *VIC* was developed in '93-'96 at LBNL, in '96-'00 at UCL, in '00-'02 at UCB as OpenMash



Mbus messages

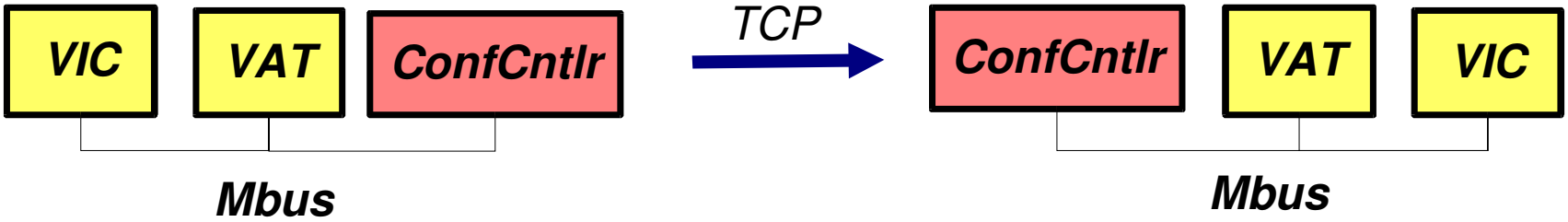
- *VAT* was developed in '92-'96 at LBNL; it interacts with *VIC* by means of *Mbus* messages
- *Mbus* uses Local Multicast (TTL=0) for interprocess communication
  - Active speaker audio switches video focus
  - Is a clear text protocol standardized as *RFC 3259*

ConfCntlr



- Has been developed at LBNL for remote control of media

- It uses *Mbus* for local control and *TCP* connections to remote peer

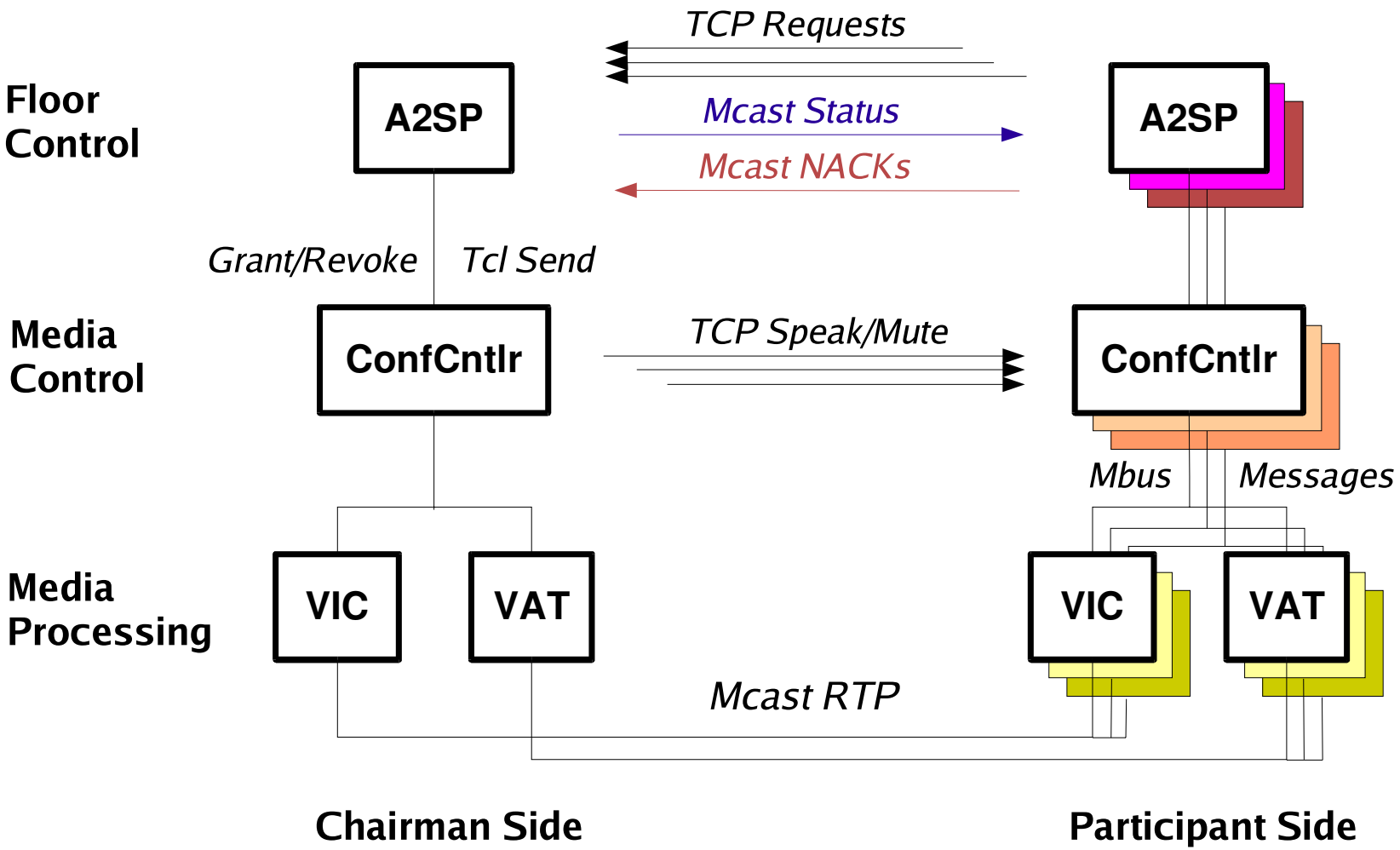


- We choose to rely on existing tools for already developed functionalities, and to use *ConfCntlr* for media control

A2SP = Ask to Speak

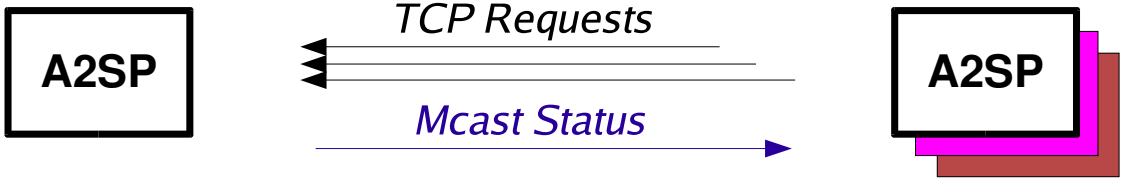
- New *Mtool* for speaker turn handling
- Who creates the session announcement is the *chair*
- Who joins from a different address is a participant
- Chair receives requests to speak by *TCP*, then approves and publishes them by *UDP multicast*
- Chair activates media transmission for remote participants media trough *ConfCntlr*

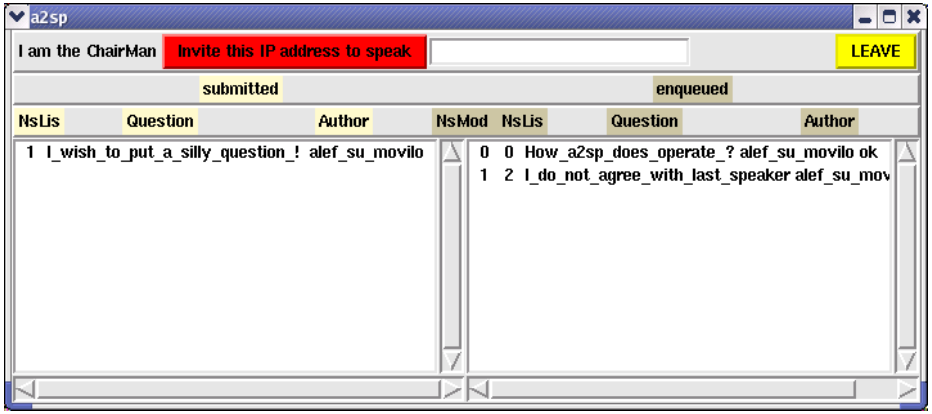
Ask to Speak operations

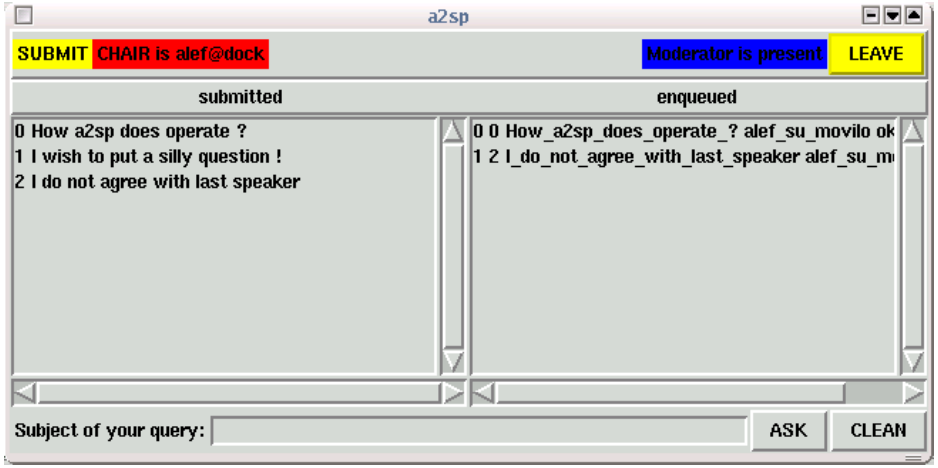


Request submission

- Participants submit a question topic to the chairman
- Chairman approves (*or not*) submissions and publishes approvals via multicast

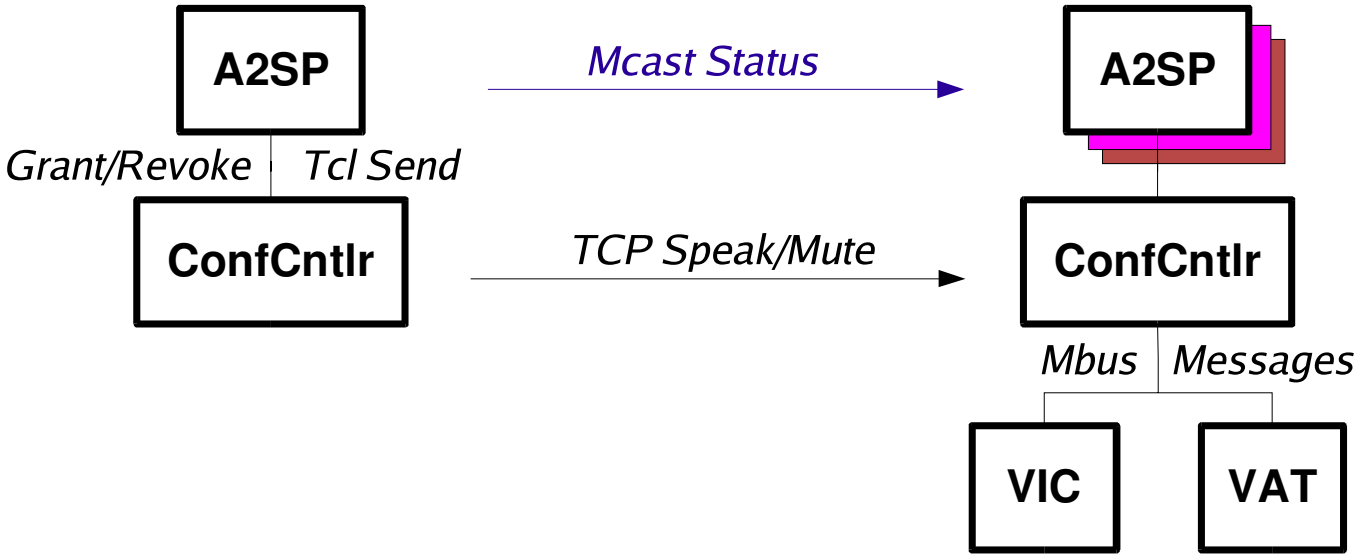






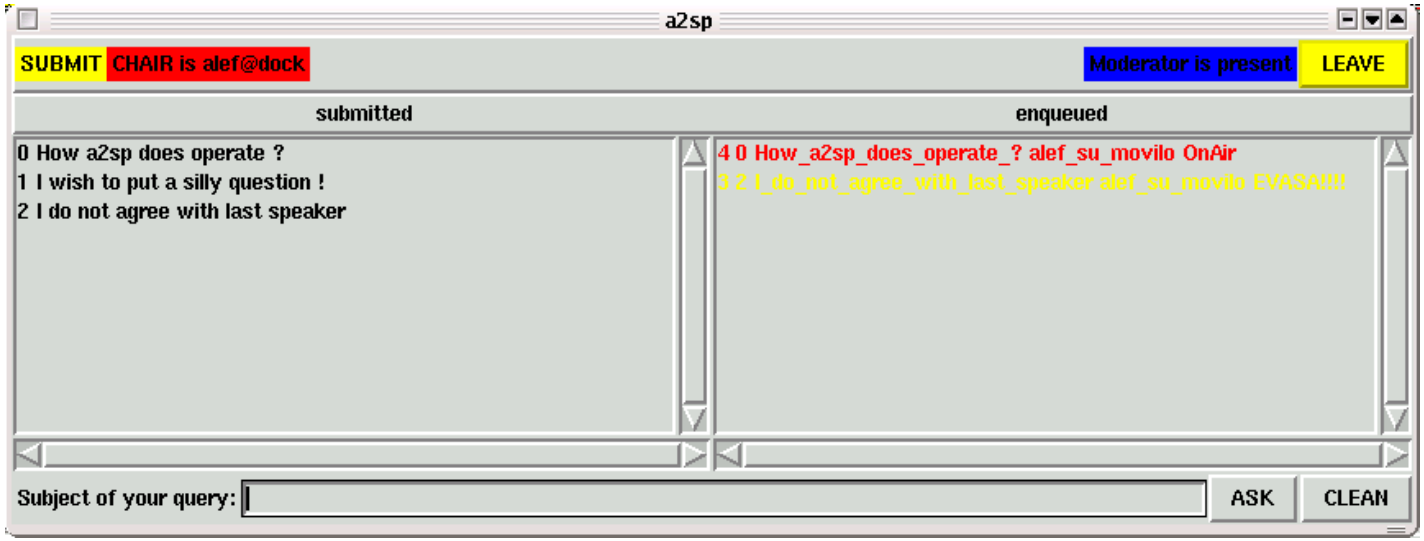
Invitation to speak

- When the Chair selects a participant's accepted question
  - multicasts an *OnAir* message *and*
  - directs ConfCntlr to activate transmission for that participant
- Participants can't intervene by themselves because the *transmit button* has been disabled



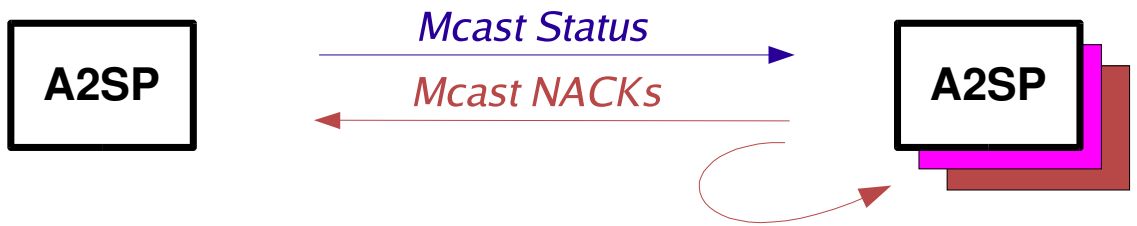
Speaker turnover

- After an invited speaker has finished, its media are deactivated by the same mechanism
- Submissions at the participant side change colour according to the question state: pending, OnAir, gone



Reliable multicast

- Messages from the chair are *progressively numbered*, and the last one is repeated at increasing intervals, as directed by and heartbeat timer
- Missing messages are detected by participants, triggering transmission of *NACK*s, after a random timer expires
- If a *NACK* for the same missing information is heard, the timer is cleared and the retransmission request *suppressed*
  - This avoids feedback *implosion*



Messages

Participant

- by TCP Unicast
  - Submit — the topic of a question
    - *It takes a progressive number*
  - Erase — a question is retracted
    - *Chair will mark it as gone*
  - Bye — participant leaves
    - *Chair marks all his questions as gone*
- by UDP Multicast
  - NACK — Some Chair's sequence numbers are missing

Chair

- by UDP Multicast
  - Update — changes a submission to its approved/OnAir/gone status
  - Blink — contains no data but the last sequence number allows error recovery and late joins

Test, results and open issues

- **No real trial yet *:-(***
- **Multicast seems not to be fully reliable *:-(***
  - **However it can be profitably used in local or controlled environments**
- **A2SP is still in alpha status**
  - **http://genni.ing.uniroma1.it/a2sp**
  - **It compiles only for Linux**
  - **TCL Send command is not portable and is insecure**
  - **Leaving and re-joining of participants or chair is not handled (a session identifier is needed)**

Future

- Additional usability features
  - Anonymous voting for expressing the degree of understanding
  - Autopilot for assign fixed time to all the registered speakers
- Thorough testing against different releases and derivations of the *Mtools*
- Removal of *ConfCntlr* dependency by direct generation of *Mbus* messages