SIP REPORT

- Using SIP to build Context-Aware VoIP Support for Multiplayer Networked Games

F92942099 廖振詠
J93922003 宋志偉
R93942098 吳蔡偉
R93942109 李中崴

OUTLINE

- INTRODUCTION
- SIP AND VOIP
- ARCHITECTURE [1]
- SIP WORKFLOWS

[1] Using Session Initiation Protocol to build Context-Aware VoIP Support for Multiplayer Networked Games

Game Guide

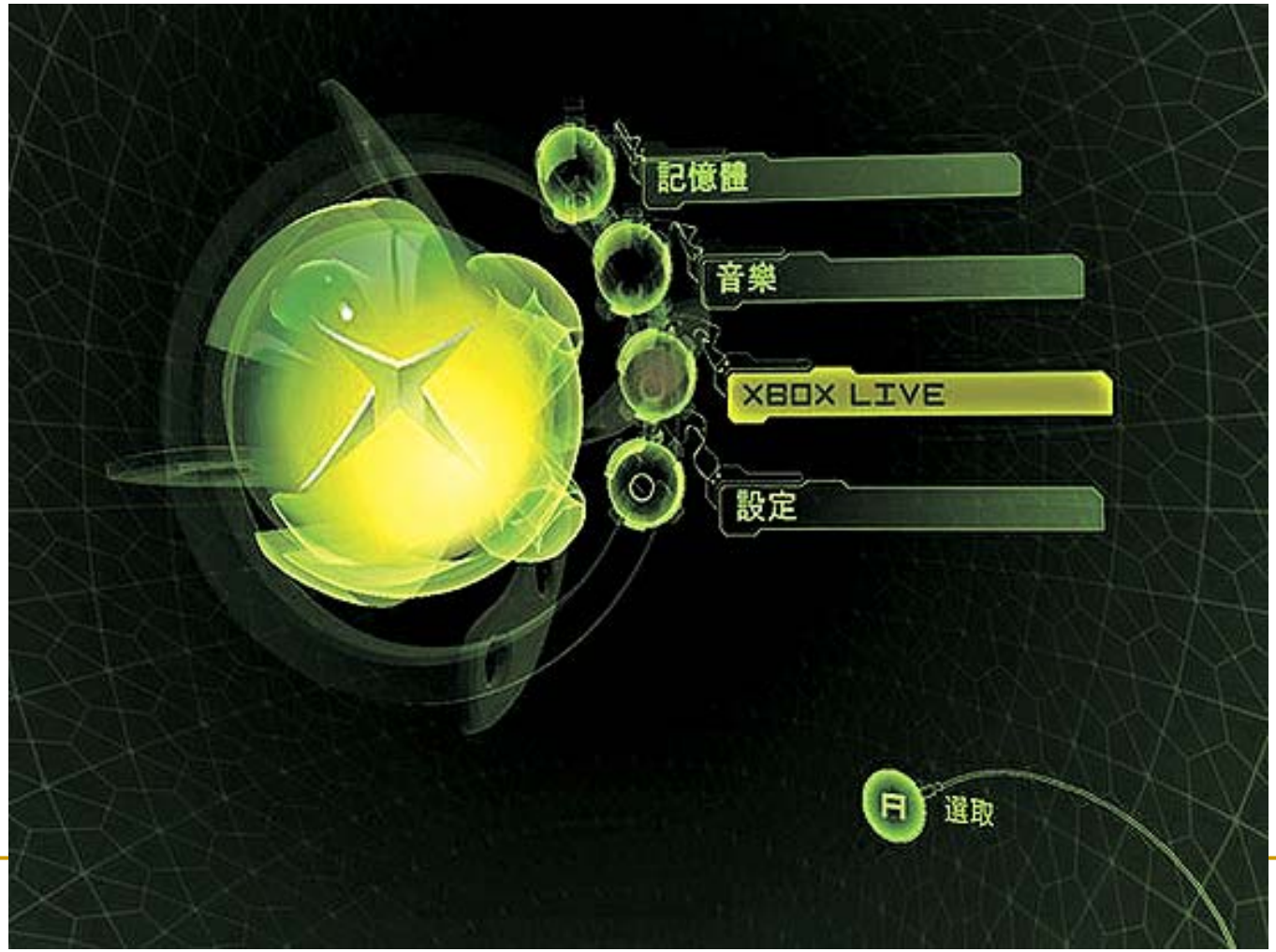
Console Environment

- There are many types of consoles
  - Nintendo- Gamecube
  - Sony- Play station 2
    - Have on-line service, but only provide the players in Korea and Japan
  - Microsoft – XBox
    - Xbox-live service provides more than 1,500,000 persons and over than twenty countries

XBOX-Live Features

- A platform developed for XBOX on-line game
- Characteristic
  - Speech
  - Friend list and arrangement
  - Download the newest content
  - Roaming
  - Live-aware
  - Voice message

XBOX-Live Registration



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XBOX-Live Manual

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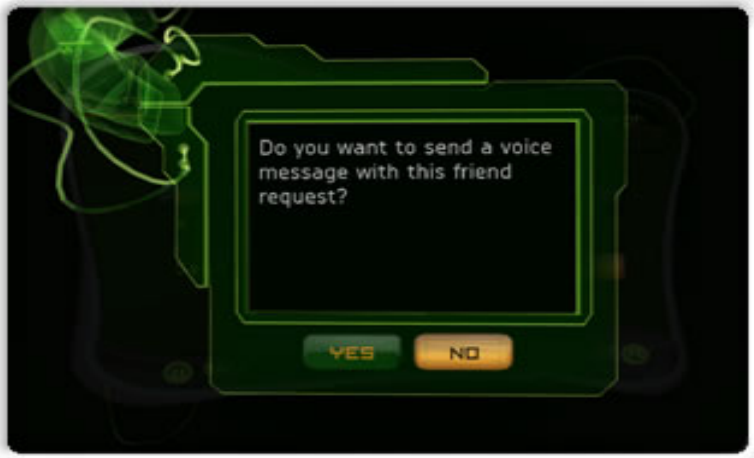
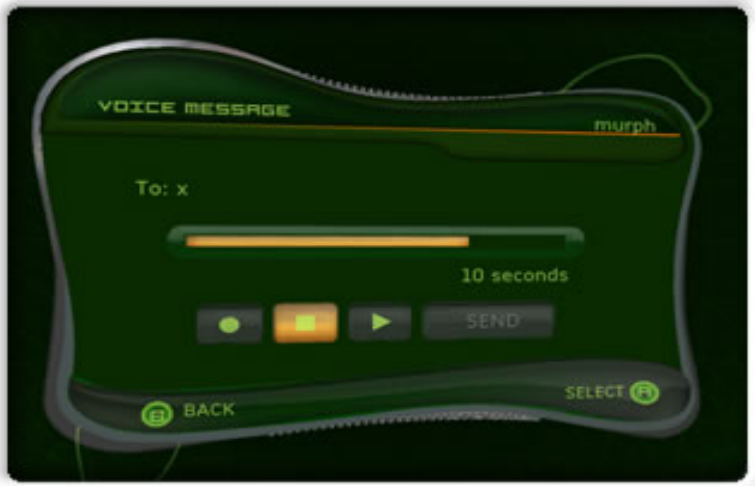
Voice Message





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Counter-strike

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Counter-strike

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Midterm Madness

Doom3

Doom3

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Video Conferencing

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The classes of on-line games

- First-Person Shooters (FPS)
  - Central server
  - Interactive requirement
  - No more than a few ten
- Massively Multiplayer On-Line Role-Playing Games (MMORPG)
  - Central server
  - No interactive requirement
  - Support hundreds of players at a time
- Peer-to-Peer Games
  - Don't need any servers except for a directory service for players to locate opponents

Current solution for inter-player interaction

- Game Context Independent
- Requirements for User Initiation
- Operability

More interaction !

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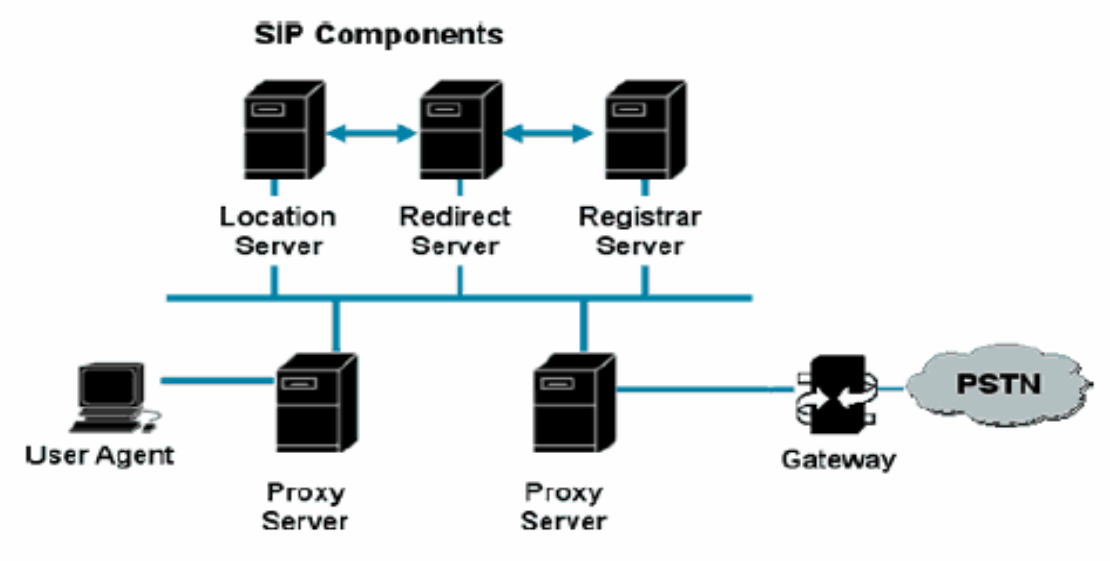
SIP and VOIP

- SIP [RFC 3261] is an HTTP-like protocol
- The session is established using SIP mechanisms which involve :
  - INVITE
  - OK response
  - ACK
  - RE-INVITE
  - REFER
  - SUBSCRIBE
  - /NOTIFY



SIP based VoIP Architecture

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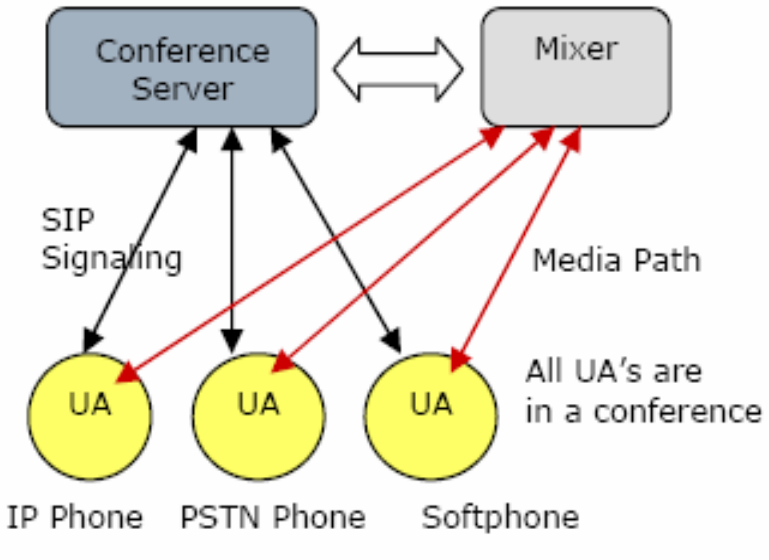
SIP based Conferencing

- The **conference server** (**CS**) is the controlling agent responsible for setting up sessions for every participant including establishing the media paths of the participants with the mixer.



Multiuser Conferencing

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Integration with Gaming Infrastructure
Centralized Gaming

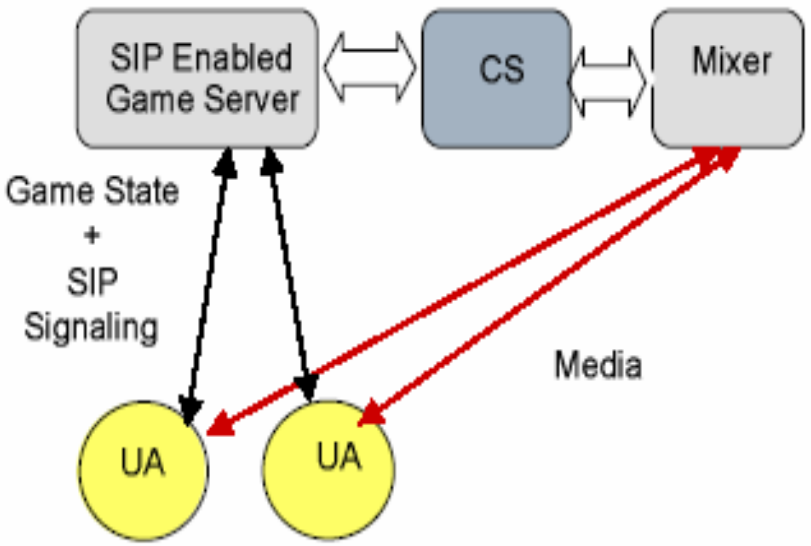
- The game server (GS) is responsible for the entry and exist of players.
- Two critical issues for such an infrastructure
  - Scalability
  - Reliability
- To couple the GS with the CS. The GS need to maintain state about the players' audio sessions.
  - State parameters like location, teammates' position, shared contexts
  - ☞ *Audio session policy*

Integration with Gaming Infrastructure
Centralized Gaming (cont.)

- The GS and the CS act as SIP back-to-back UAs.

  (B2B UA) This might slow down the control mechanism for heavily loaded game and CSs.

  - ☞ Merge CS and Mixer
  - ☞ Merge GS and CS



Centralized Gaming Architecture

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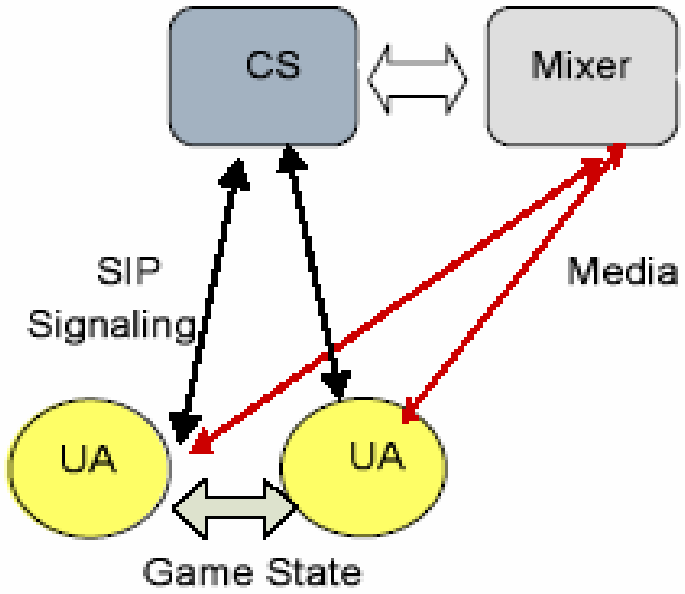
Integration with Gaming Infrastructure

Decentralized Gaming

- Why decentralized gaming
  - ☞ Centralized gaming has *scalability* and *reliability* issues
- The basic idea is to allow each clients to communicate with every other appropriate client and the updates are exchanged using such direct interaction.



Decentralized Gaming Architecture

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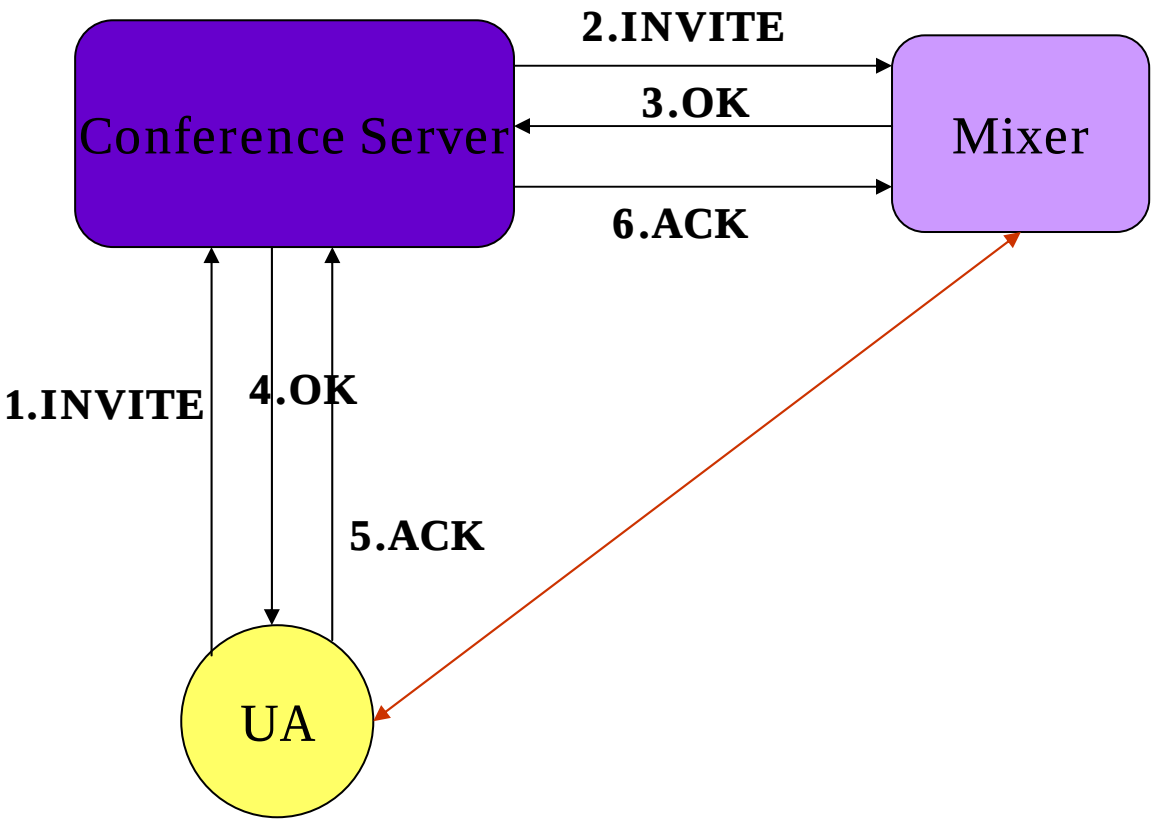
Multi-user Conferencing Workflows



SIP Workflow for a Conference Join

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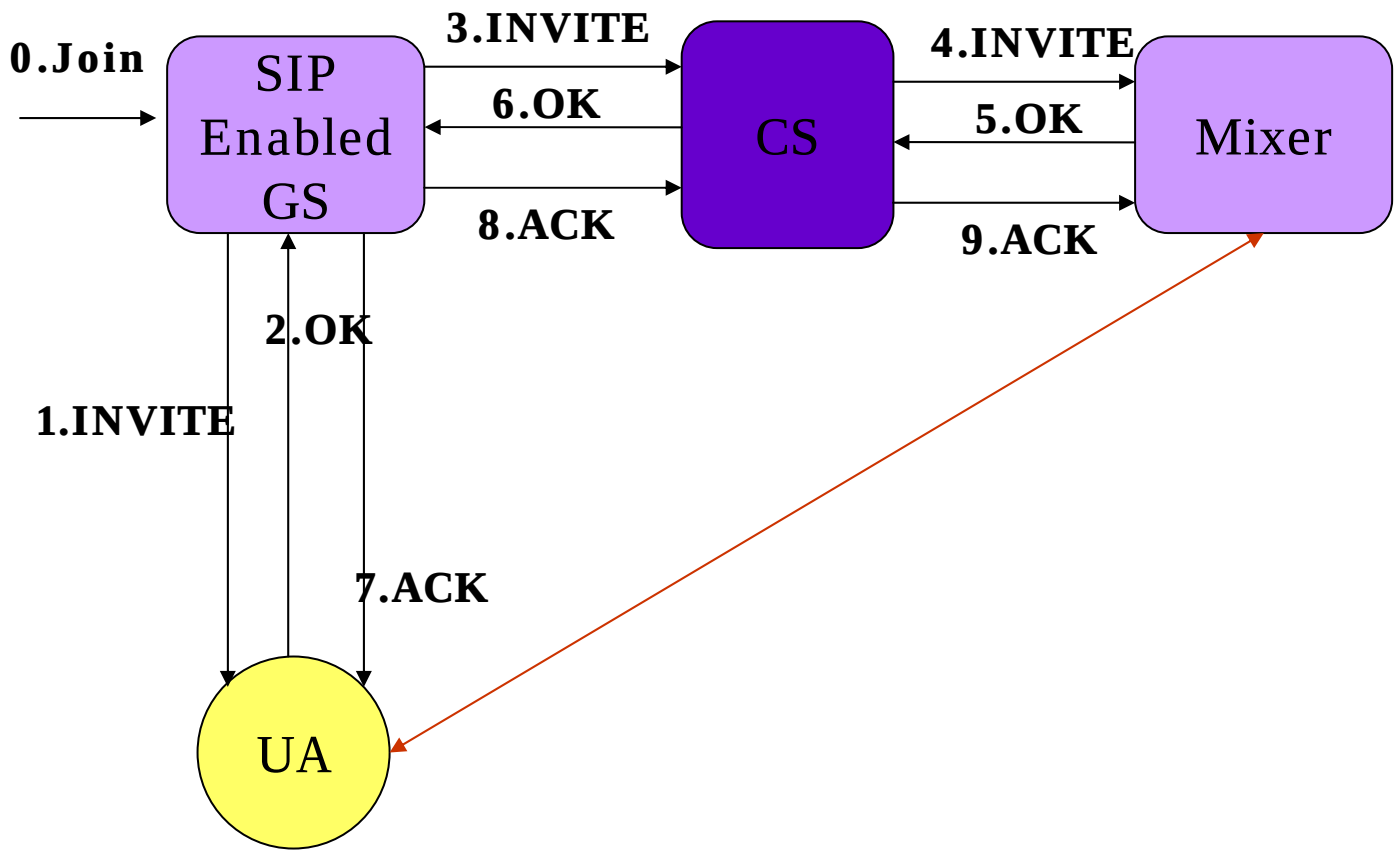
Gaming Workflows

Static Team-Based Conferencing



Game Join

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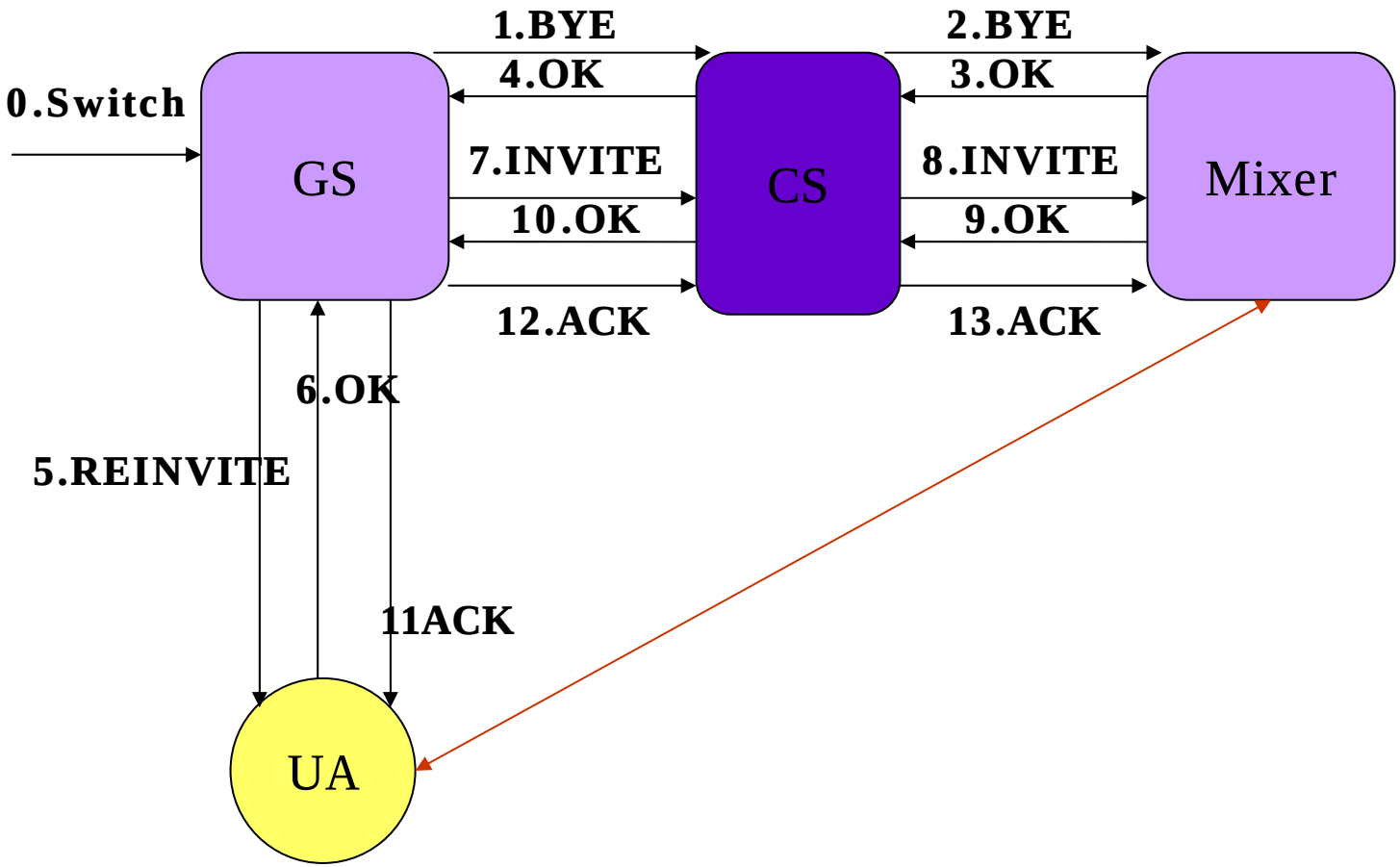
Gaming Workflows

Dynamic Conferencing (1/3)

- Identifying Transition Points
- Seamless Transition

Gaming Workflows

Dynamic Conferencing (2/3)



Audio Session Transition

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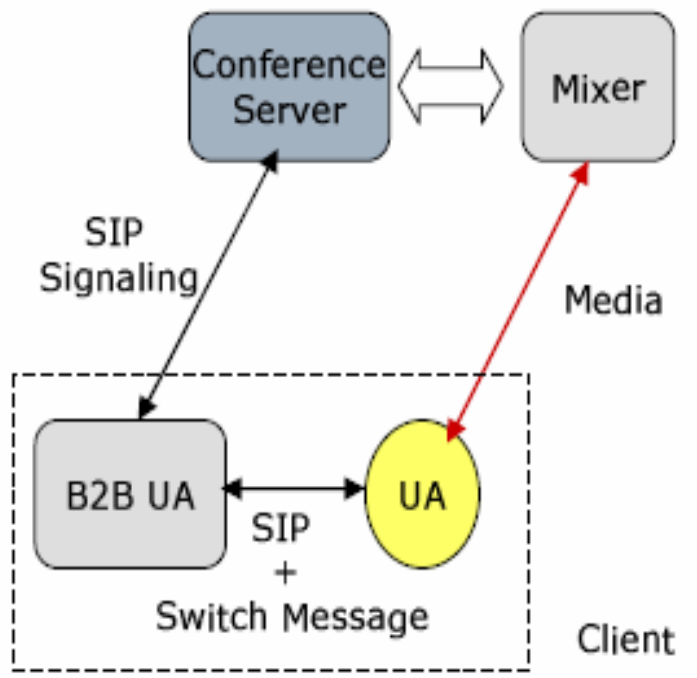
Gaming Workflows
Dynamic Conferencing (3/3)

- Two options to perform the shielding :
  - Modifying CS
  - *Modifying Client*
- A modified client architecture can be used for the centralized architecture when we wish to keep the GS independent of SIP. The client will exchange game state with the GS and perform SIP signaling.



Decentralized Transition

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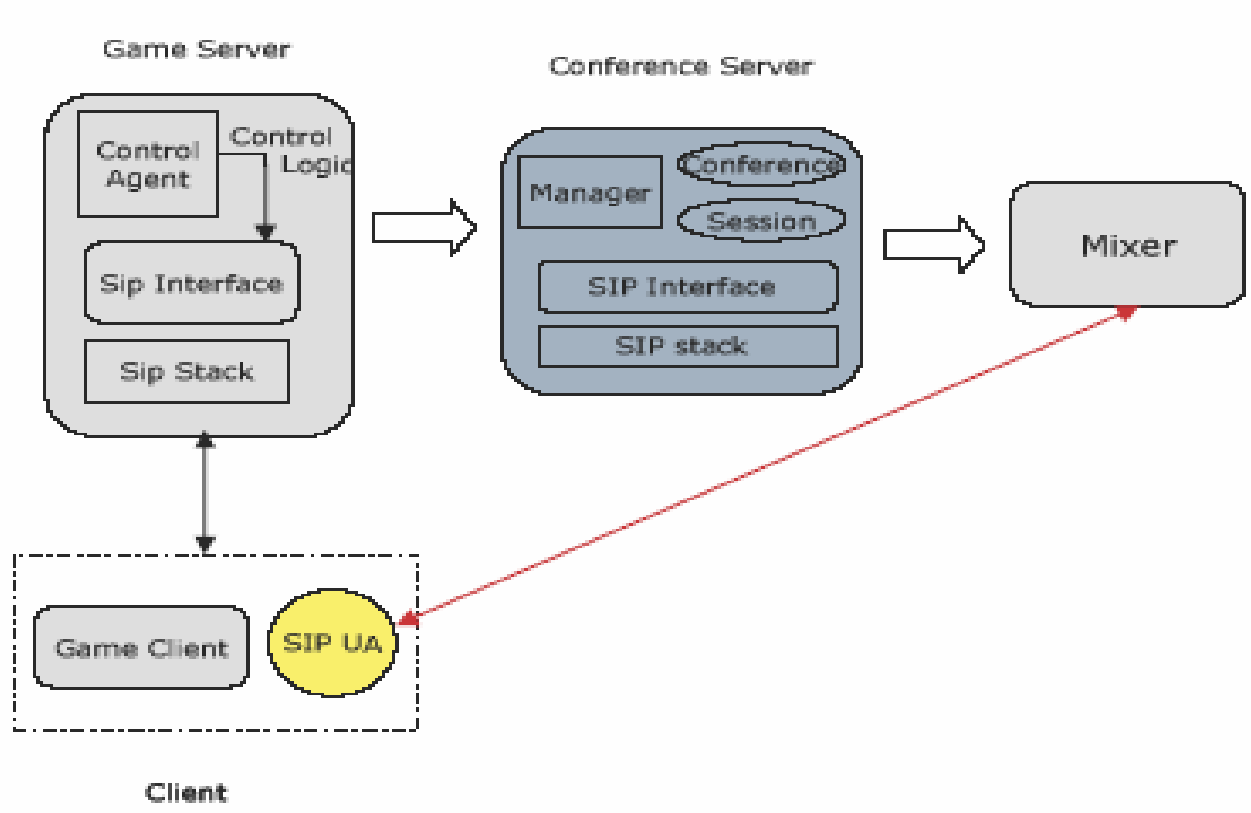
ENHANCED AUDIO MIXING FOR NEAR VIRTUAL EXPERIENCE

$$R_i(t) = \sum \vec{X}_j(t).\vec{V}_j(t), \text{ where } 1 \leq j \leq n \text{ and } j \neq i$$

- SIP INFO message can be used to convey the feature vectors.
- More precisely, the GS would compute the new feature vectors for appropriate participants and send an INFO message to the CS/Mixer.

PROTOTYPE IMPLEMENTATION



Prototype System Architecture

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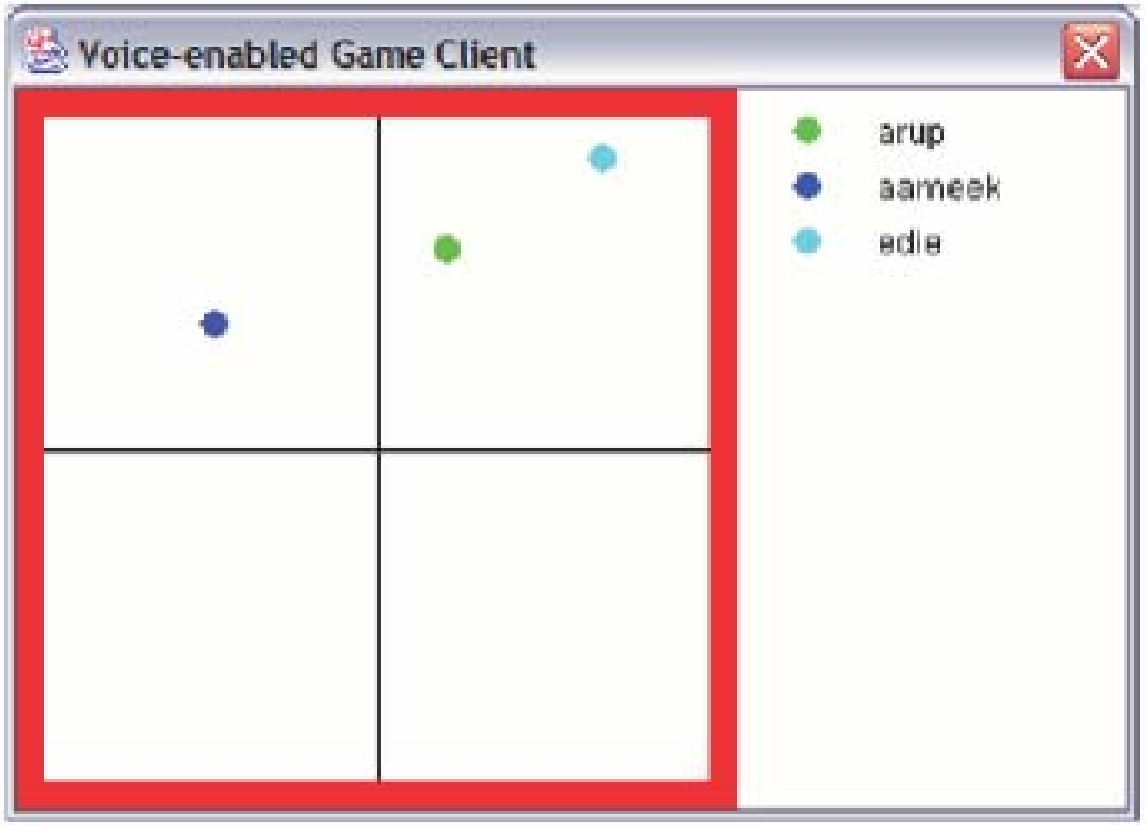
PROTOTYPE IMPLEMENTATION



Client Screen Shot

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Conclusion

- SIP-based collaborative application
- Context-aware VoIP Support
- Interoperability

Ref.

- Aameek Singh, Arup Acharya: Using session initiation protocol to build context-aware VoIP support for multiplayer networked games.

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