

The Development of Video Conferencing system on based on Presenter/Observer Group

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Abstract— This paper propose the architecture of Video Conferencing system based on Presenter/Observer group. The proposed architecture has the advantage of supporting large-scale conference services solving the problem of the existing video conferencing system. In the future, The Video Conferencing supporting UHD(Ultra High-Definition) needing the scalability will be coming in video conferencing market. This architecture of Video Conferencing system based on Presenter/Observer group is proper solution to realize Immersive video conferencing service.

Keywords –Video Conferencing , MCU, Presenter, Observer

I. INTRODUCTION

In existing most MCU-based video conferencing system, MCU decodes, composes and re-encoding incoming video and audio packets[1][2]. The existing video conferencing system several problems. If participants increase, MCU have to mix more video signals and audio signals. the cost for video conferencing increases for expanding participants. The delay is increased because MCU performs simultaneously multiple encoding / decoding (transcoding) multipoint video signals. The increased delay cause user experience (UX: User Experience) to adversely affects to users. We defined presenter and observer group in a conference for solving that problems. MCU has the advantage that the participants in observer group is increased largely without the mixing capability of MCU.

II. THE DESIGN OF PRESENTER-OBSEREVR BASED VIDEO CONFERENCING ARCHITECUTRE

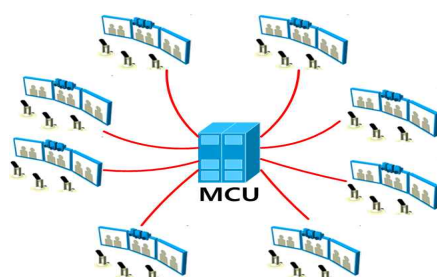


Figure 1. The Existing Video Conferencing Architecture

In existing most MCU-based video conferencing system (Fig. 1), all participants send the video and audio packets to MCU(Multipoint Controller Unit). And then, MCU decodes, mixes and re-encoding incoming video and audio packets. The existing video conferencing system several problems. If participants increase, MCU have to mix more video signals and audio signals. In other words, the cost for video conferencing increases for expanding participants. Also, the delay is increased because MCU performs simultaneously multiple encoding / decoding (transcoding) multipoint video signals. The increased delay cause user experience (UX: User Experience) to adversely affects to users.

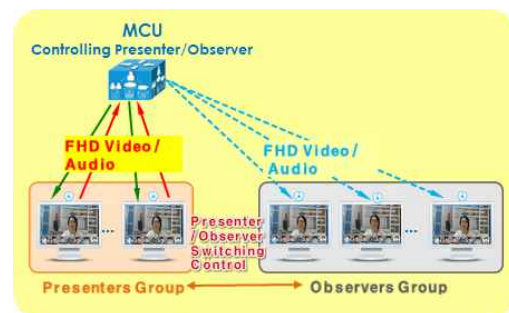


Figure 2. ETRI Presenter/Observer based Conferencing Architecture

We focused on the point that all participants always do not speak in a conference. In other words, We knew that a few participants used to speak in interesting moment during a conference. So, we defined presenter and observer group in a conference. All participants belong to presenter group can say and be main speaker. Participants belong to observer group just can hear and show the presenter group speaking. The MCU mix the video and audio signals of the participants in presenter group. And, the participants in observer group just receive the mixed video and audio signals. So, MCU has the advantage that the participants in observer group is increased largely

without the mixing capability of MCU. In other words, this architecture can provide good UX conference to all participants how to separate participants by grouping. A participant belong to observer group can switch to presenter group. The number of presenter group must be decided. It depends on the capability of MCU. We can think floor control by chairman(selected in all participants) as how to switch from observer to presenter or from presenter to observer.

The MCU has Main speaker detection(MSD) function. The MSD means that it analyzes all audio signals of all participants in presenter group, and determines the speaking participant – main speaker. When MCU make layout, it mix main display as of participant’s video signals determined as a main speaker by MSD

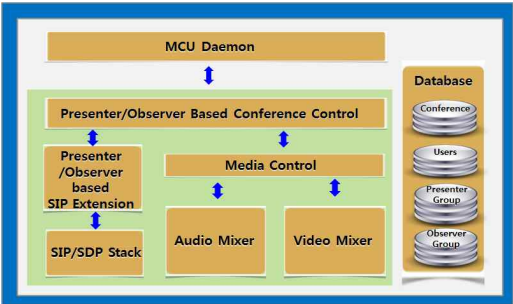


Figure 3. The Structure of Presenter/Observer based MCU

Fig 3. represents the structure of presenter/observer based MCU. Presenter/Observer based conference control performs to control video and audio mixer by the analyzed SIP messages. Audi mixer decodes all audio signals of presenter group and mix audio signals (N-1) except the audio signal where sending the audio signal because of echo. Video Mixer make the layout display mixing all video signals of presenter group. And, there is database that manages conference, user, presenter group, and observer group.

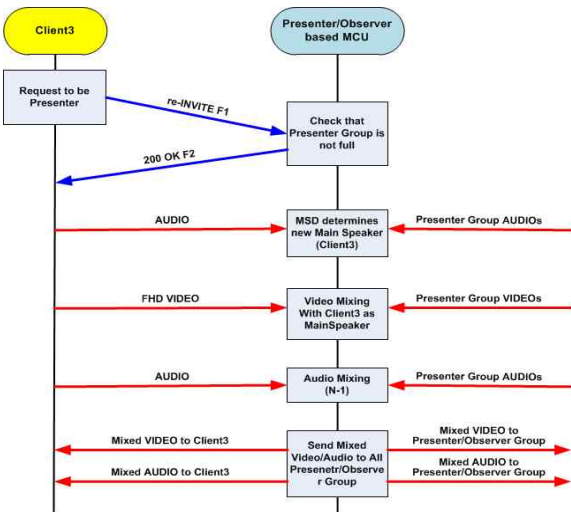


Figure 4. The Timing Diagram for joining Presenter group

Fig 4. represents the timing diagram for joining Presenter group. Preserver/Observer based Conference call control protocol designed by SIP[3] protocol. If client3 request to be presenter, it sends re-invite SIP message including Presenter Join Tag to MCU. The MCU checks whether the number of Presenter group is not full. If it is not full, It accepts the request for joining the presenter group of the client3 and sends 200OK SIP message to client3. The new presenter, client3 sends Video and Audio to MCU. MCU receives audio and MSD(Main Speaker Detection)in MCU analyzes audio of client3(new presenter with audios of the existing other presenters. And then, it determines new presenter in presenters group. If new main speaker(client3) is determined, the MCU makes the layout display in which main display is client3’s Video.

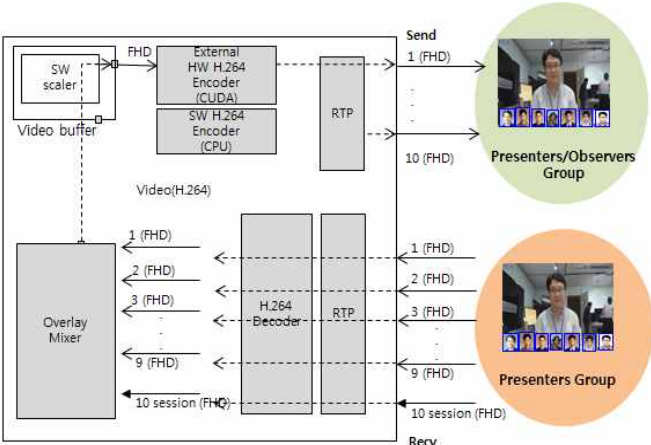


Figure 5. The Structure of Video Mixer in MCU

Fig 5. represents the structure of video mixer in MCU. The audio mixer receives all audio packet the participants of presenter group sending. MSD analyzes all audio signals and determines main speaker. The video mixer decodes all FHD video signals. It scales and compose all video signals. Next, it encodes video signal as H.264 codec by CUDA encoder. And it sends all participants of presenter/observer group



Figure 6. The prototype of Implemented Presenter/Observer based Video Conferencing system(Right figure)

Fig 6. represents the prototype of Implemented Presenter/Observer based Video Conferencing system(Right figure). Left figure represents the video conferencing client system using Presenter/Observer based MCU. the video conferencing client has UI(User Interface) button for switching Presenter/Observer. The Participant can switch between Presenter and Observer by clicking the UI button. The MCU and client was implemented in MS Window OS.

III. CONCLUSION

This paper proposes the architecture of Video Conferencing system based on Presenter/Observer group. The proposed architecture has the advantage of supporting large-scale conference services solving the problem of the existing video conferencing system. In the future, the Video Conferencing supporting UHD(Ultra High-Definition) needing the scalability will be coming in video conferencing market. This architecture of Video Conferencing system based on Presenter/Observer group is a proper solution to realize Immersive video conferencing service.

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