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Local Real-time Synchronous Audio Multicast over Wifi

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Abstract

The purpose of this project is to build a household real-time synchronous wireless multimedia system(RT-SWMS) and potentially explore the limitation of such a system. The timeline for this project is roughly separated into two parts. Real-time wireless network protocol using multicast and synchronization under UDP multicasting environment. So far a multicast protocol is implemented by using an adapted version of the Scalable Reliable Multicast. Furthermore, changes should be made in order to develop a synchronous system.

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1 Introduction

The purpose of this project is to build a household real-time synchronous wireless multimedia system(RT-SWMS) and potentially explore the limitation of such a system. The system consists of many nodes in a network all connected to a home router using WiFi. Each of this node is modeled by a Raspberry Pi Zero connected to a portable speaker and listen to a multicast server in the same private network. However, unlike Peercasting [?], which is multicasting via peer-to-peer technology, our system uses IP Multicast in a private network and therefore will follow the classic client-server model. Each node will return an acknowledgment back to the server upon receiving each datagram, such response time will be measured and the server will attempt to synchronize all nodes base on the delay in acknowledgement.

2 Motivation

3 Specification

The basic requirements for this project are already descibed by the project title, nevertheless I should formally define the specification for a successful project.

1. The system must be scalable
2. Client-side must not do any heavy lifting
3. The third etc

4 Background

4.1 Forward Error Correction

4.2 Interaural time difference (ITD)

5 Multicast

5.1 Forward Error Correction

Critical Analysis on FEC

6 Synchronization

Design Choice

- UDP Based - Light weight (for raspberry Pi)

7 Conclusion

Significant progress has been made in implementing RM as well as the basics on client recovery. Further client recovery mechanism will soon be added as well as the client synchronization functionality. A rigorous testing will be put in place to ensure the system perform as expected under undesirable network conditions.

8 Timeline

Note: Completed task indicated in purple, incomplete task indicated in grey

