P2P Packet Voice Conferencing System

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Project Overview

A lot of emerging interactive multimedia applications depend on the real-time group communication technologies - such as group chats, video and voice conferencing, internet-based classroom, online multiplayer games, social networking applications and casual games, etc. Maintaining the smooth operation of these applications, however, can only work on the stable network environment and reliable end devices, and always face the challenge of the highly dynamic nature of user churn due to peer joining, departing and failing. The group-based real-time P2P voice conferencing system aims to solve the problem so that the system is able to work without centralized servers in unreliable end devices and in uncertain environments.

Our project is to improve the performance of this protocol by implementing network coding in it.

Methodology

Matlab Implementation

C++ Implementation

Coding procedures

Example of Matlab coding

- Network decoding
  \[ C_{\text{dec}} = \begin{pmatrix} 1 & 5 & 8 & 7 & 5 & 3 \\ 4 & 9 & 3 & 6 & 8 & 1 \end{pmatrix} \]
  \[ E_{\text{dec}} = \begin{pmatrix} 28 & 5 & 13 \end{pmatrix} \]
  \[ C_{\text{dec}} = \text{bit}(C) \]
  \[ A = EN_{\text{dec}} = \begin{pmatrix} 1 & 2 \\ 3 & 4 \end{pmatrix} \]

C++ Simple Example:

- Given simple matrix
- To get familiar with the coding environment

```cpp
#include <matrix>

vector<int> A = [1, 2, 3, 4];
vector<int> C = [5, 0, 7, 9];
```

Conclusion

- Problem solving approach:
  - Problem identification
  - Implementation - Simple Example
  - Implementation - General Case

- Successfully implemented network coding in Linux C++ environment