IJCRT.ORG ISSN : 2320-2882

INTERNATIONAL JOURNAL OF CREATIVE RESEARCH THOUGHTS (IJCRT)

An International Open Access, Peer-reviewed, Refereed Journal

Greedy Hub Routing Service With LEQ

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Abstract:

There is a vast increase in broadband access due to which this new generation netizens are spawned. In today's situation consumers mainly use the network as a interactive medium for multimedia entertainment and communication purpose. It includes interactive network applications such as teleconferencing, network gaming and online trading which are gaining popularity. We propose a latency equalization service (LEQ), which equalizes the perceived latency for all clients participating in an interactive network application. LEQ is used in variety of applications like gaming, video streaming and real-time communication systems. To effectively implement the proposed LEQ service, network support is essential. LEQ is a process used in data communication networks to ensure that all devices on the network experiences the same delay when transmitting and receiving the data. The LEQ architecture uses a few routers in the network as hubs to redirect packets of interactive applications along paths with similar end-to-end delay. We first formulate the hub selection problem, prove its NP-hardness, and provide a greedy algorithm to solve it.

Keywords: Latency Equalization Service (LEQ),NP-Hardness,End-to-End Delay,Greedy Algorithm.

1. INTRODUCTION

Multiparty interactive network applications such as teleconferencing, network gaming, and online trading are gaining popularity these days. In addition to end-to-end latency bounds, these applications require minimized delay difference among multiple clients of the service for a good interactive experience. This project propose a noel method of Latency Equalization (LEQ) service, which equalizes the perceived latency for all clients participating in an interactive network application. To effectively implement the proposed LEQ service, network support is essential for connecting the routers and selecting the hubs. The LEQ architecture uses a few routers in the network as hubs to redirect packets of interactive applications along paths with similar end-to-end delay. We first formulate the hub selection problem, and provide a greedy algorithm to solve it. Through extensive simulations, we show that our LEQ architecture significantly reduces delay difference under different optimization criteria that allow or do not allow compromising the per-user end-to- end delay.

Our LEQ service is incrementally deployable in today. The main Objective of this project is to equalize the perceived latency for all clients participating in an interactive network application. The LEQ architecture uses a few routers in the network as hubs to redirect packets of interactive applications along paths with similar end-to-end delay.

2. LITERATURE SURVEY

1. Introduction to Interactive Applications:

- In the current landscape, consumers predominantly use networks as interactive mediums for multimedia entertainment and communication purposes. The surge in network applications spans business and entertainment sectors, with a particular focus on interactive sessions involving multiple users, such as online gaming, online music, e-commerce bidding, and telepresence.

2. Challenges in Interactive Applications:

- The success of interactive applications depends on minimizing both end-to-end delay and delay differences among participants. The need for real-time interactivity is crucial, and traffic engineering and Quality of Service (QoS) techniques are employed to address end-to-end delay requirements. However, these approaches fall short in meeting the demands of multiparty interactive network applications that necessitate bounded delay differences for enhanced interactivity.

3. Impact on Online Gaming:

- The delay difference experienced by gamers significantly influences the quality of online gaming. Game servers often implement mechanisms where players can vote to exclude those with higher lag times. This highlights the importance of minimizing latency differences to ensure fair and high-quality gaming experiences.

4. Challenges in Distributed Live Music Concerts:

- In scenarios like distributed live music concerts, where individual musicians collaborate from different locations, internet services may degrade the quality of the live music due to latency differences. Achieving synchronized performances poses a challenge that necessitates innovative solutions for latency equalization.

5. Latency Differences in E-commerce Applications:

- Latency differences between shopping agents and pricing agents in e-commerce applications can lead to price oscillations, potentially providing an unfair advantage to pairs of agents with lower latency. Addressing this issue requires effective latency equalization mechanisms to ensure fair competition.

6. Previous Approaches - Application-Based Solutions:

- Previous works have primarily focused on application-based solutions, either at the client or server side. Client-side solutions face challenges in exchanging latency information securely among clients, potentially leading to cheating. Server-side techniques rely on server-based latency estimation, which may not be sufficiently accurate for various scenarios and introduces computational and memory overhead on servers.

7. Need for Network Support:

- Experiments have demonstrated that the source of delay in interactive applications often originates from the network side. Recognizing this, there is a growing consensus on the need for network support to address end-to-end delay and delay differences, paving the way for more effective latency equalization.

8. Network-Based Latency Equalization:

- The focus of the paper is on designing and implementing network-based latency equalization. This approach aims to overcome the limitations of previous works by directly addressing latency issues at the network level. By doing so, the paper seeks to improve the overall performance of multiparty interactive network applications.The literature survey highlights the challenges posed by latency differences in multiparty interactive network applications and emphasizes the need for network-based solutions. The focus on minimizing end-to-end delay and achieving bounded delay differences is crucial for ensuring fair, high-quality, and real-time interactive experiences in various applications such as online gaming, distributed live music concerts, and e-commerce. The proposed network-based latency equalization approach aims to fill this gap and contribute to the advancement of interactive applications in the networked environment.

3. EXISTING SYSTEM

Latency equalization is a crucial aspect of modern communication systems that ensures the smooth transmission of data between devices. Types of latencies:

1. **Transmission latency:**It refers to the time it takes for data to travel from one device to another device.
2. **Processing latency:** It occurs when a device needs to process incoming data before sending it on.
3. **Queuing latency:** It arises when data packets are held in a buffer before being transmitted.

Methods used in existing system:

- **Time stamping:** In this technique each data packet is given a time stamp that allows the receiving device to calculate the latency.
- **Buffering:** In this technique the data packets are temporarily stored in the buffers to reduce queuing latency.
- **Load balancing:** In this technique the traffic is distributed across multiple paths to reduce transmission latency

Limitations:

1. Interaction time may not be equal for all the users and servers.
2. Increasing complexity of networks.

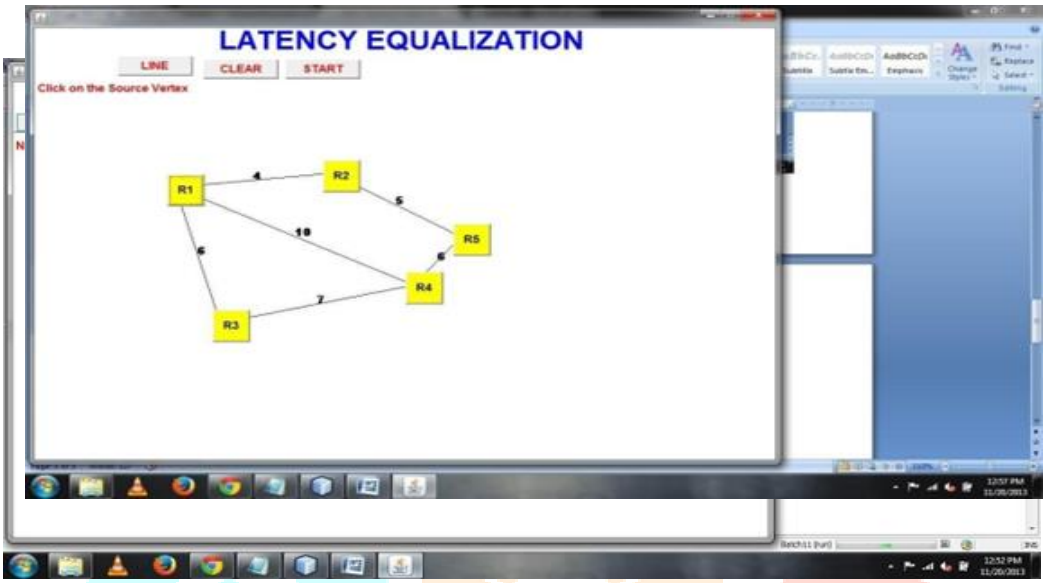
4. PROPOSED SYSTEM

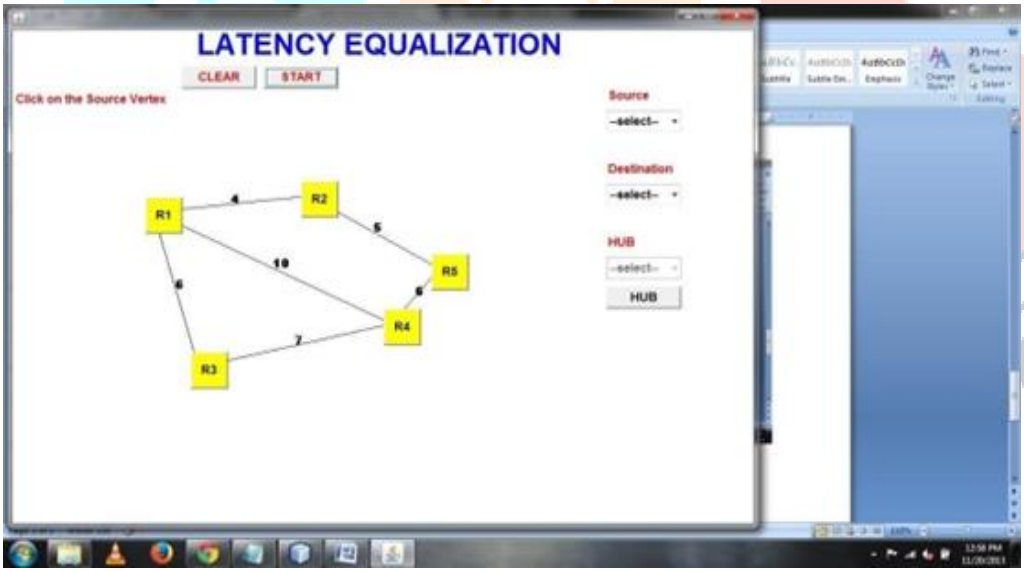
In this world of technology, latency is a common issue that affects the performance of the system. Latency can be caused by various factors such as network congestion, processing delays and hardware limitations. It can significantly affect the performance of the systems, especially in real-time applications like gaming and video-conferencing. LEQ is the technique used to reduce the impact of latency on system performance. This project proposes a new system for latency equalization using greedy algorithm. It aims to improve the performance of the system. Greedy algorithm is used to allocate 7 resources based on their latency. It Prioritizes the resources with lower latency. LEQ works by synchronizing the clocks of all devices on the network, so that the clients can send and receives data at the same time. Flexible routing framework is provided to implement delay difference optimization problems. Reduces the impact of latency on overall system performance.

5. EXPERIMENTAL RESULTS

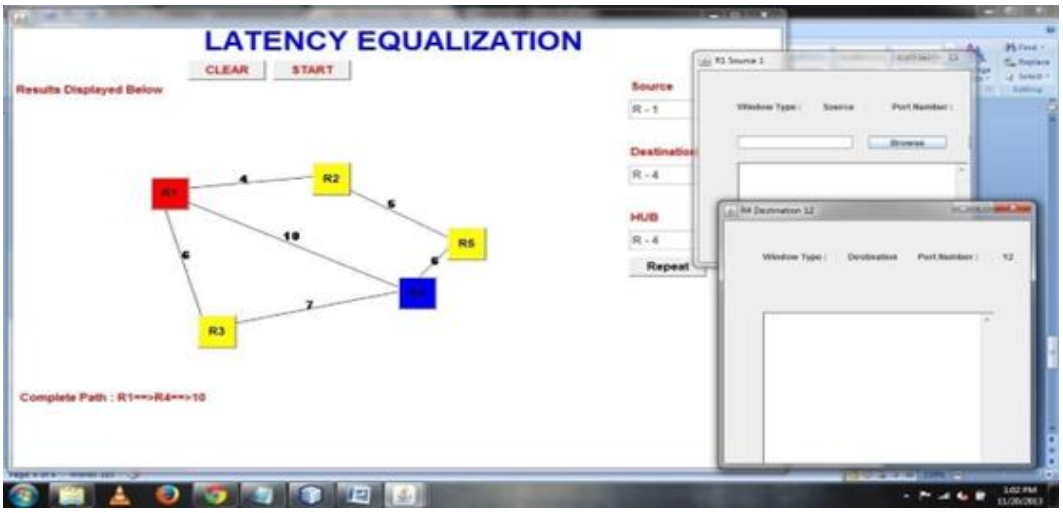
From the below figures it can be seen that proposed model is more accurate in order to prove our proposed system.

Main Window:





In this window we can see latency equalization graph with some set of attributes.



6. CONCLUSION

The LEQ routing architecture and algorithms presented in this project clearly provides a pathway for networks to support scalable and robust multiparty interactive applications. Based on the evaluation of LEQ architecture can be concluded that, with only minor enhancements to the edge routers, the network provider can easily support and enhance the quality of multiparty interactive applications. We show that the LEQ scheme can support different optimization policies that can achieve overall application performance in terms of latency equalization both with and without compromising endto-end application latencies. We can finally say with huge experiments we had shown our LEQ reduces the delay difference among the clients under different optimization criteria that allow or do not allow compromising the per-user end-to-end delay. This Latency Equalization was growing fastly in present environment by implementing few changes in it. Our Latency equalization shown good results in avoiding the end-to-end delay differences.

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