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# A NODE CO-OPERATIVE INTENSIVE BASED SCHEMA FOR CHURN ANALYSIS IN PEER TO PEER NETWORKS

**[1]REDDEMMA YAGA and [2]Dr. CH.D.V. SUBBA RAO**

[1]Research Scholar, Computer Science & Engineering, Sri Venkateswara University College of Engineering, Tirupati, Andhra Pradesh, India. Email: yaga.reddy9@gmail.com

[2] Professor of CSE, Computer Science & Engineering, Sri Venkateswara University College of Engineering, Tirupati, Andhra Pradesh, India. Email: chdvsrao@gmail.com

**ABSTRACT**

The Peer-to-Peer (P2P) networks works based distributed computing technology. A node in the architecture of the P2P network has equivalent resources and responsibilities. With these advantages, P2P networks are used in many applications. Such as file sharing, telecommunications, and multimedia streaming. The P2P network is connected with a huge amount of nodes. Frequently, the nodes join the network and as well as leave the network. This type of paradigm is called churn in the P2P network. Many recent research works revealed that churn is the main problem faced by the present P2P network. The churn process significantly reduced content availability, data accuracy and increase overhead. To overcome the limitations of the P2P network for multimedia transmission, this paper proposed an Incentive-Based (IB) schema. The proposed IB schema promotes cooperation between the nodes and encourages fair communication among the nodes. The IB schema maximizes the effectiveness in real-time P2P networks for multimedia transmission. In this paper, IB schema mainly focused on the enhancement of the P2P networks. The proposed schema is implemented using Network Simulator. The proposed IB schema achieved better performance in transmission multimedia in P2P networks.

**Keywords -** Incentive Based Schema, Churn Analysis, Multimedia Transmission

## 1. INTRODUCTION

A P2P network is s self-organizing network with equal entities. Each peer in the network serves as a receiver and transmitter. With the evolution of the internet, the P2P network has huge development for large-scale distributed systems. The P2P network has significant potentiality in data sharing and multimedia transmission. The peers in the network have equal capabilities and responsibilities, unlike a traditional client-server model. The P2P network constitutes a large number of networks, each peer in the network contributes resources for actively participating in network operations. In P2P networks the more peers dynamically join in the networks and leave the networks, this phenomenon is called Churn. This phenomenon causes the breakdown of network structure and it's very difficult to restructure. The design and evaluation of P2P networks consider the dynamical peer's participation [1]. The key challenge is data rebalance among the active peers in the network for each instance of peers joins and leave the networks. This leads to traffic congestion and degrades the P2P network performance [2].

In P2P networks the nodes join the network and leave the network indecently, this phenomenon is called churn. The churn rate is major problem in P2P networks, which leads to network overhead and delay in the network. Also disturb the network topology and communication paths. The every event in churn rate while it’s joining the network or leaving the network degrade the network performance [3]. The churn process high effect on the performance of network character and the nature of decentralized. The peers in the networks join or leave dynamically and have no barrier in the P2P network. When the network user start the P2P

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application start the nodes join the network and the user stop application the nodes leave the network. So the churn can define as the change in node structure in the networks due to node friendly joins and leaves. The churn rate highly impact on performance P2P network for multimedia transmissions.

The remaining paper arranged in different as followed. In Section II discussed about literature review on analysis of churn effect on multimedia transmission in P2P networks. In Section III presented problem statement and the proposed methodology. In Section IV presents network simulation results while section V concludes the paper.

## 2. RELATED WORK

In this section discussed about the churn analysis of P2P networks for multimedia transmissions. **Anas Ahmad Abudaqa et al [4]** introduced Super Generation Network Coding (SGNC) for data distribution in P2P networks. The SNGC improved the data transmission and reduce the computational overhead. The experimental results showed that SNGC achieved better performance in P2P data distribution in terms of availability, overhead, decoding data. However, the proposed framework outperforms but it's applicable for medium size data transmission only. The network overhead increase, if transfer large size data.

The P2P network has natural imbalance in data distributions, its leads usage higher bandwidth and high resource utilization. The churn also highly impact on p2p network such as waste of resources, increase overload and reduce network capability. To overcome limitations **Qi Zhang et al** proposed Kademlia network high churn impact on load transfer reduces half of the load balance and network overhead[5][6].

**Ding Ding, et al [7] [8]**. Proposed a novel social-based bootstrapping method for churn analysis in P2P networks. The P2P network becomes supple in the existence of the churn and failure of uncorrelated. The proposed method achieved better performance in maintenance of network routing. But to deploy in real time scenarios the proposed method should be enhanced in P2P networks.

**Fei Huang et al [9].** Proposed Novel Agent Based P2P Network Schema for reduce churn stimulate delays in the P2P networks. The Churn delays are two types, such as channel switch delays and tributary recovery. The agent based schema reduce churn delays with addition of queuing model in the network. However, the Novel Agent Based P2P network reduce delays, But the schema does not focus differentiate priority based agents and normal agents.

The communication networks facing significant challenges by churn of connections in the network. To overcome the prediction of churn in communication networks **B.N.Krishna Sai et al** proposed a modeling techniques and predictive analysis. The proposed method given better results by increasing threshold values and selection of right features. But this model is not applicable all P2P networks [10].

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## 3. PROPOSED METHODOLOGY

### 3.1 Problem Definition

The nature of dynamic mobility P2P networks have many hidden problems. The quality of service of multimedia transmission is degraded due to delay and unreliability in the network. Moreover the transmission of multimedia is essential in P2P networks and the transmission paths should be no delay. The delay free paths give primary priority to maintain QoS in the network. The transmission of multimedia over P2P networks optimization is necessary for better QoS. But the performance of multimedia transmission is degraded in P2P network by the churns. The defend of churns is main problem of P2P networks. This is the motivation behind in the design of proposed work called Intensive Based Schema, which focuses on fair communication in P2P networks.

### 3.2 Intensive Based Schema

The proposed IB schema implemented in P2P networks to improve the performance of multimedia transmission in the presence of churns. The churns in P2P networks leads to delay and availability of multimedia content. To overcome the limitations of p2p systems introduced an intensive based schema for fair communication. In p2p network many peers are join and as well as leave the network. But for fair communication need satisfied trusted paths. To constitute trusted paths first implement intensive trust calculation based on satisfied and un-satisfied reputation of a peer.

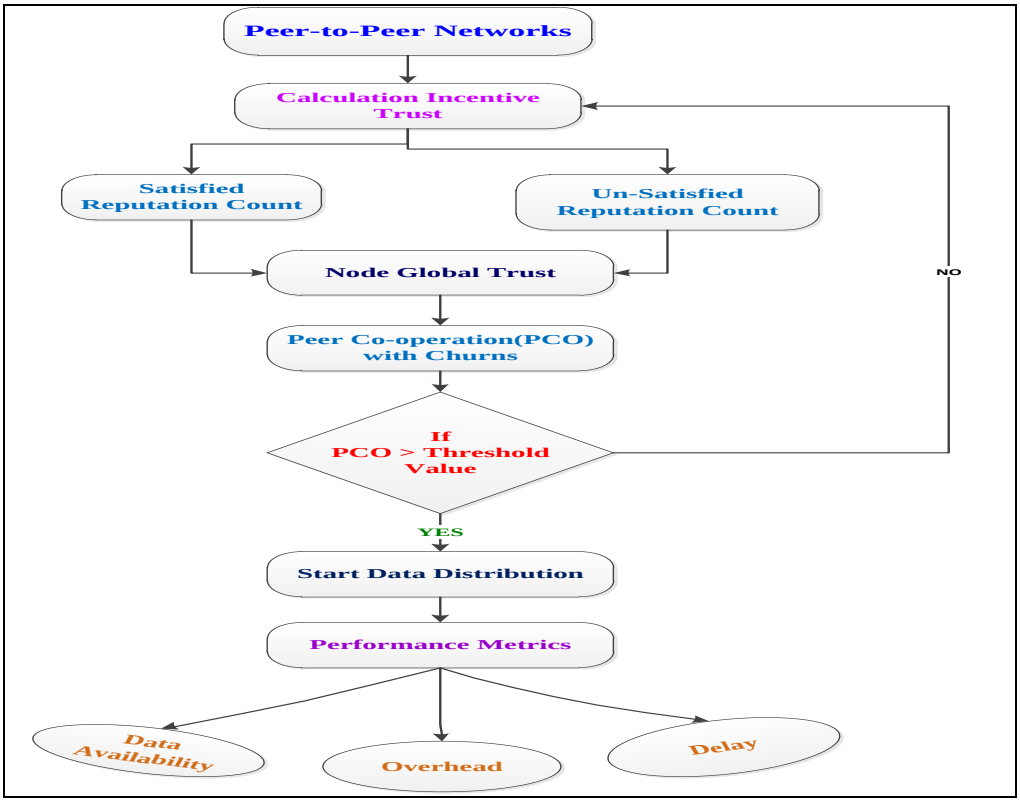


**Fig 1 Architecture of Intensive Based Schema**

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The function of intensive trust calculation gives the node global trust. The node global trust is a difference between the satisfied reputation and un-satisfied reputation. The intensive calculation function with reputation decide the peer co-operation. So based on peer co-operation network constitute the fair paths for multimedia transmissions. The proposed IB Schema is illustrated as shown in Figure 1.

### 3.3 Algorithm

**Algorithm Name Intensive Based Reputation Algorithm**
**Input** Satisfied Reputation Count SRC, Un-Satisfied Reputation Count USRC
**Output** QoS Metrics

1. Start
2. P2P network nodes
3. Calculate Intensive Trust
4. Sum of Satisfied Reputation Count $= \sum_{i=1}^{n} SRCi$
5. Sum of Un-Satisfied Reputation Count $= \sum_{j=1}^{n} USRCi$
6. Peer Global Trust = $\sum_{i=1}^{n} SRCi$ - $\sum_{j=1}^{n} USRCi$
7. Peer Co-operation PCO
8. If (PCO >= Threshold) {
9. Constitute Fair Path
10. Data Transmission
11. }
12. else {
13. Repeat from Line no 3
14. }
15. Evaluate Performance Metrics
16. End

## 4. RESULTS ANALYSIS

The proposed Intensive Based Schema implemented in Network Simulation version 2.35 is used for improved the performance of transmission of multimedia in P2P networks. The network simulation results showed that the proposed IB schema performance P2P network in transmission of multimedia. The simulation results are discussed in sub section. In Table 1 can be observe environment used for network simulation.

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### 4.1 Parameters OF Network Simulation

**Table 1: Network Simulation Environment**

| S No | Parameter Name | Parameter Value |
|---|---|---|
| 1 | Channel Type | WirelessChannel |
| 2 | Radio-Propagation | Propagation/TwoRayGround |
| 3 | Network Interface | WirelessPhy |
| 4 | Type of Interface | DropTail |
| 5 | Model of Antenna | OmniAntenna |
| 6 | Interface Queue Size | 50 |
| 7 | Routing Protocol | AODV |
| 8 | Number.of Nodes | 24 |
| 9 | RXThresh_ | 3000 |
| 10 | CTSThreshold_ | 2000 |
| 11 | RTSThreshold_ | 5000 |
| 12 | Data Rate | 2MB |
| 13 | Basic Rate | 1MB |

In Table 1 presents that the various network parameters and parameter values used for the network simulation. The two ray ground radio propagation used for node deployment. The evaluation of proposed work done by the comparison of different performance metrics. The performance metrics defined in the next sub section.

### 4.2 . Definition of Metrics

In this section defined each performance metric of P2P network that used to show in the network simulation results.

**Table 2: Performance Metrics**

| S No | Name of Metric | Description |
|---|---|---|
| 1 | Availability | The shared data resources guarantee high availability among peers. |
| 2 | Overhead | The percentages resources utilized to transmits fixed size of data across the network. |
| 3 | Delay | The difference between the time of received packets and send packets. |

In Table 2 presents that the definition of performance metrics are used in proposed schema evaluation. They are data availability, overhead and delay.

### 4.3 Results Comparison

The empirical results of data availability, overhead and delay are shown in this sub section.

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### 4.3.1 Content Availability

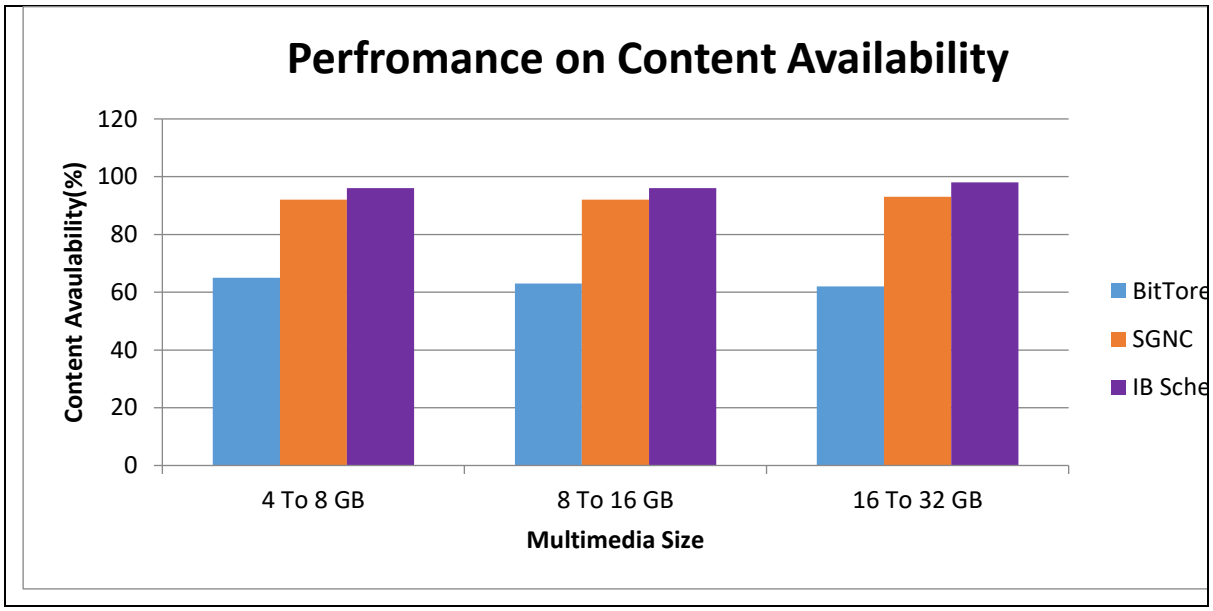


**Fig 2: Performance Comparisons on Content Availability**

Data availability recorded for different schemas is presented in Figure 2. The size of multimedia is considered from 4GB to 32GB increased double for every interval. The availability value is increased for all the approaches when data size is increased. The proposed schema achieved improved performance with comparison of BitTorent[11] and SGNC[4] network.

### 4.3.2 Overhead

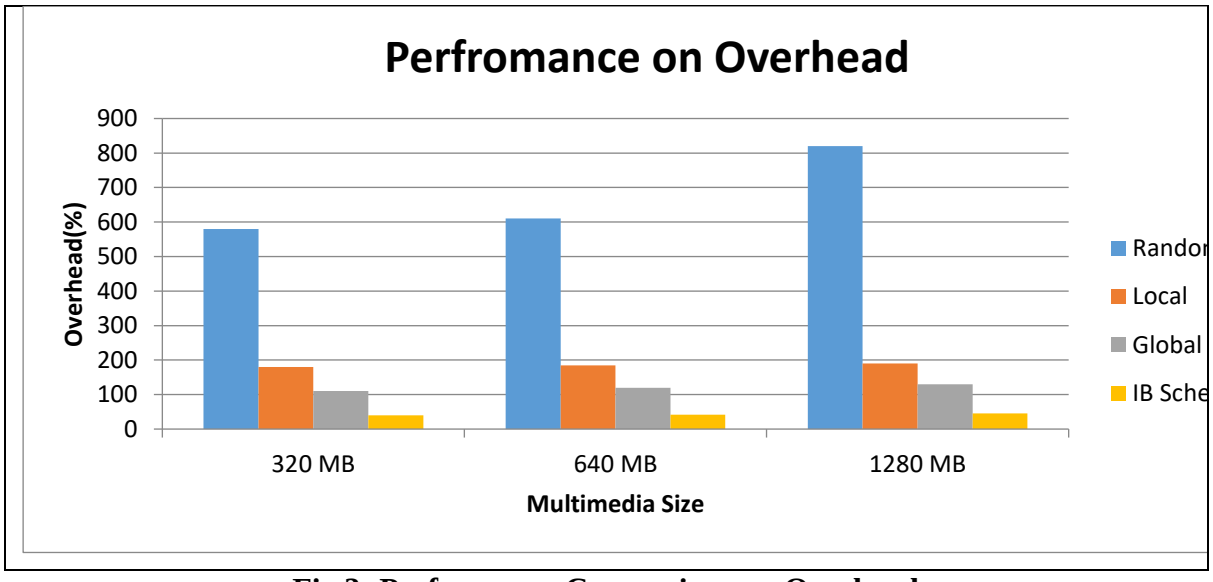


**Fig 3: Performance Comparison on Overhead**

As shown in Figure 3, the percentage overhead of different schema is presented. The results reveal that the proposed scheme named IB schema shows better performance than Random, Local and Global schemas whereas outer performance than Local and Global schemas[4][12].

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### 4.3.3 Delay

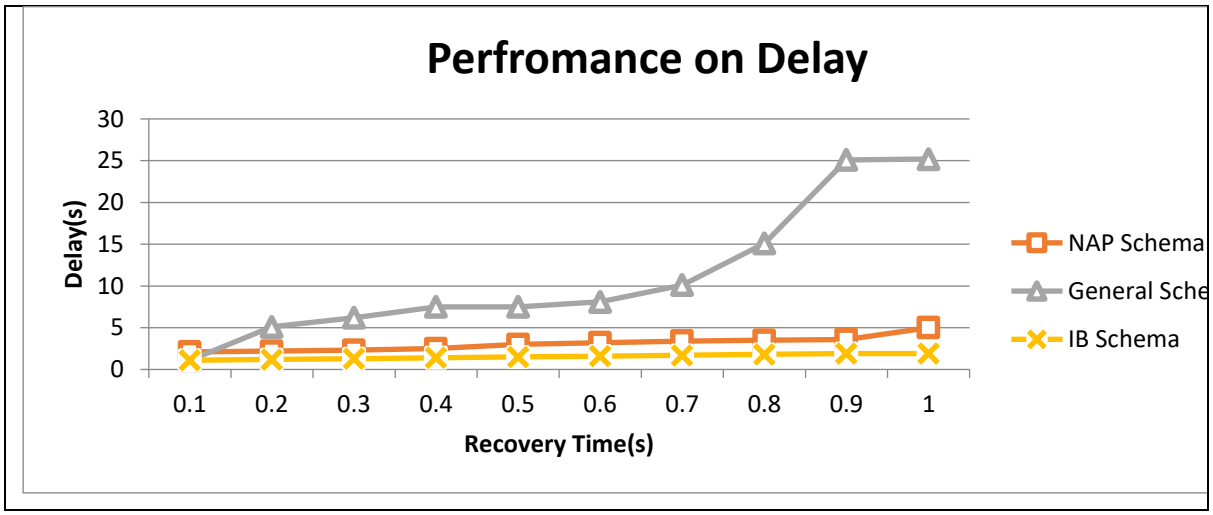


**Fig 4: Performance Comparison on Delay**

As presented in Figure 4, it is evident that horizontal axis represents recovery time while vertical axis shows delay performance. The results showed two important observations. The first observation is that intensive based schema showed better performance when compared with General schema and NAP schema [4][11]. The second observation is that the delay performance is increased for both previous approaches as the recovery time increases.

## 5. CONCLUSION

In this research work, mainly focused on the reduce churn rate in P2P networks for enhance the transmission of multimedia with quality of service. Different factors effects on the quality of multimedia transmissions. They include data availability, delay, and reduce overhead. Such parameters are associated churn paradigm in P2P networks. In this paper proposed a node co-operative intensive based schema. The proposed schema utilize the reputation method and improves the co-operation between the nodes of p2p networks. The proposed schema implementation is made with network simulator. The empirical results shown that the proposed schema has better performance improvement with the present state of the system.

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