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Extended Mobile P2P Networks for a Various Streaming Services

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Abstract. Recently, in the mobile smart service environment such as augmented reality, virtual reality, IoT, there occur the cases in which the stream blocks of different types need to be synchronized to match the user's service requirements. However, the existing P2P services may not satisfy diverse environments and requirements of the client node. This paper proposes a way to receive service selectively according to the environment of the network and the client regarding the complete form of composite media and component media. In addition, in order to analyze the proposed method, it compared them to the normal P2P protocol having a conventional mesh structure, which they showed a better result by more than 30% in the nodes available to service and service request rejection rate.

Keywords: P2P, Mobile, Smart Service, IOT, Streaming

1 Introduction

P2P networks, based on decentralized networks, can be classified into Structured ones and Unstructured ones [1]. The Unstructured P2P, with no specific server, maintains the network and provides service only with peers. Therefore, while it is flexible to the changes of network, the exploration phase can be extended, and the message delivery can result in excessive traffic. On the other hand, Structured P2P is often applied to a method to create and manage Tree for providing P2P-based Multicast service using Distributed Hash Table (DHT). The best examples of DHT-typed P2P networks are Chord [2] and others.

This paper proposes a way to receive service selectively according to the environment of the network and the client regarding the complete form of composite media and component media.

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2 Related Work

2.1 Single Tree Structure

A single tree structure [3] that allows a parent node and a child node is a simple structure in which a node only maintains control information of a parent, sibling, and child node. However, if a parent node has a defect, every child node cannot receive services, and many child nodes need to find a new parent node for contact.

2.2 Multiple-Tree Structure

The multiple-tree structure [4] proposed to address the problems caused by the disconnection with a parent node builds the nodes that are joined to the system in a multi-distribution tree. As the child nodes can receive a stream from parent nodes, it reduces the chance of losing the entire stream, which can be caused by parents nodes' leaving.

2.3 The Hierarchical Structure

Hierarchical cluster structure [5] serves to disperse the load of the server or distribution node by keeping the server cluster or distribution node cluster. However, the hierarchical cluster is not highly applicable to the Internet environment that utilizes flexible networks.

2.4 The Mesh Structure

Mesh Structure [6] has been proposed as Multiple Source Multicast Overlay Infrastructure, which consists mesh structure for the relationship between each node and builds a tree for the data transmission. Since the mesh structure is highly adaptable to a heterogeneous network in particular, it can be described as having advantages in the current mobile environment.

3 Extended P2P for mobile streaming service

Let us define synchronization-complete multimedia sources as V. In media V, there exists related component media such as { V_1, V_2, V_3, V_4, ... V_n }. For example, in V, all or part of the video sources, subtitles, and sound, the media information, images, smart information can be synchronized.

Required V_1 is composite multi-media composed of media V_{1a}, V_{1b}, V_{1c}, V_{1d}. In some of the nodes in P2P network, there exists not only synchronized media V_1 but also V_{1a}, V_{1b}, V_{1c}, V_{1d}, not synchronized but managed as a single file. In another node, V_{1a}, V_{1b}, V_{1c}, V_{1d}, a component of V_1 is stored in an independent form.

That is, the extended stream service method proposed in this paper can expand service opportunities by dealing not only with synchronized composite media with a single stream but also with component media streams before synchronization. In order to provide services for the extended media stream, you should be able to effectively refer to the source node ID that stores Type-specific component block.

Figure 1 shows the Component Reference Bucket List. The List is composed of Multimedia Component Structure and Source Bucket List.

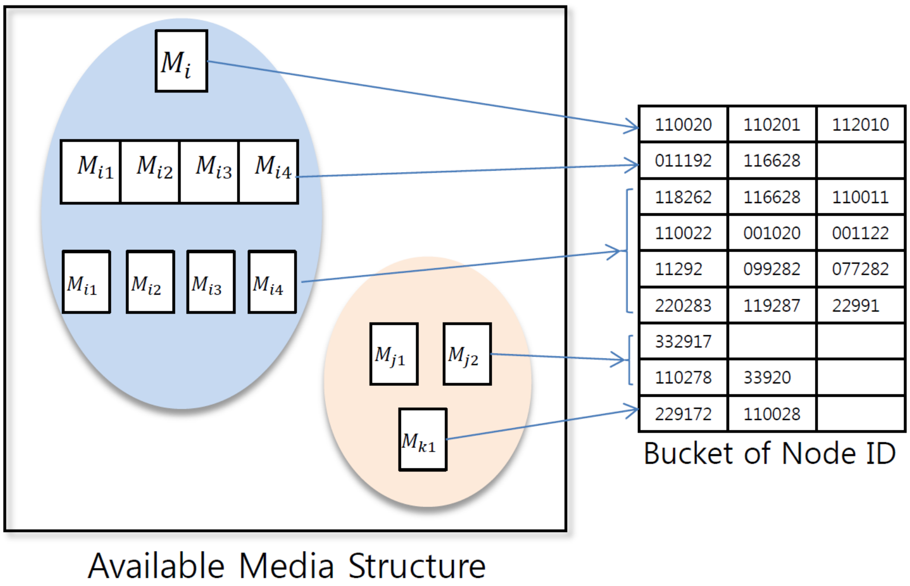

Fig. 1. Component Structure and Bucket List

In the extended component service, it is composed of six Bucket List and three kinds of streams to provide services to multimedia block V_i. Therefore, it is possible to increase the redundancy of the service stream in the P2P network, giving the client node an increased opportunity to receive a media stream service.

4 Performance Evaluation of the Proposed Model

This paper the main interest of the extended P2P policies proposed in this paper is to have an effective way for the service and the resource utilization for the mobile device when the media stream needs to be treated on different types of wireless P2P network.

Therefore, we proposed expanding the types of media streams and a real-time synchronization mechanism, considering the service start time. Figure 1 shows the number of nodes that store the relevant block if there is a service request for the stream block.

Extend is a way to expand the media services proposed in this paper, and Original is a common method that applies common P2P protocol with a mesh structure. It shows that as the service requirements of the node increase may also have to be increased with increasing storage blocks for a particular stream, by the very nature of the P2P network.

The average number of serviceable nodes are 111.54 for Extend and 78.46 for Original, and maximum number of nodes that can provide service is 1450 and 1020 respectively, which shows that the proposed method is more excellent by 30%.

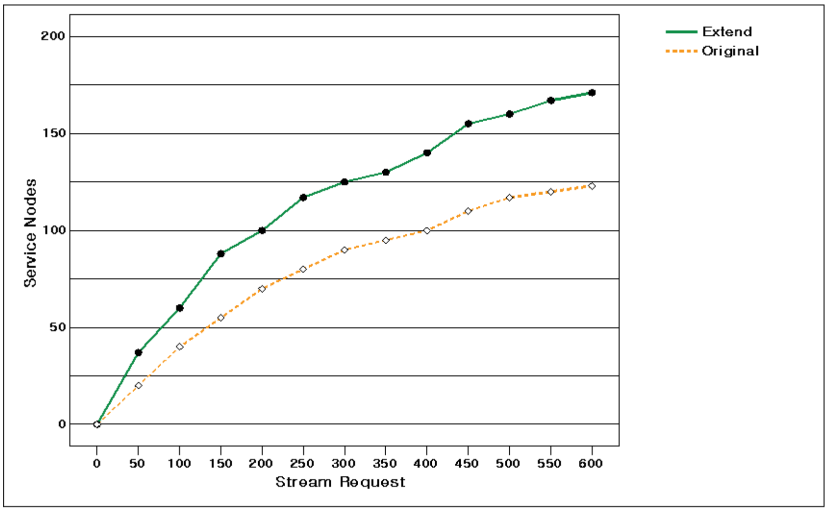

Fig. 2. Analysis of participating nodes

5 Conclusion

Recently, however, not only smart services such as augmented reality, virtual reality but also IoT environment and diverse business services are required, and new technologies are being developed and expanded for this purpose. Therefore, the P2P service in the future requires real-time synchronization of heterogeneous networks and various contents in accordance with individual needs as well as cooperation the nodes for the service.

To solve this problem, this paper proposes a way to diversify the type of stream blocks for services and a real-time synchronization scheme of the composite stream blocks according to a user's needs. It also proposes a stream placement policy for storing them efficiently. In addition, in order to analyze the proposed method, it compared them to the normal P2P protocol having a conventional mesh structure, which they showed a better result by more than 30% in the nodes available to service.

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