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On Bandwidth-efficient Handoff Scheme for PMIPv6 Networks

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Abstract

In this paper, we propose a novel bandwidth-efficient handoff scheme for proxy mobile IPv6 networks. Mobile nodes (MNs) are classified as either slow or fast; first, though, to implement a bandwidth-efficient handoff scheme, an MN should be registered in a microcell. The microcell is overlapped to handle an overflow session request, which is nested; in a macrocell, an overflow session request makes a request to return from the boundary of the new microcell. If idle session traffic is in a cell, it is requested by the target microcell. If the total systemic traffic load is not very large, the proposed scheme provides the best bandwidth efficiency and a more favorable quality of service (QoS) for an MN without the incurrence of a large systemic processing cost.

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1. Introduction

The basis for the proposal of this paper is the research regarding an efficient handoff method for the bandwidth of the proxy mobile IPv6 (PMIPv6) network that is presented[1]. In particular, the method[2] was leveraged for the four approaches regarding the resource sharing between the two layers; however, the maximum network bandwidth divides the other parts of the macrocell-layer and microcell-layer resources. The overflow from one layer to another layer is not considered in this paper, and the request overflowed in the macrocell monitors the channel resources in the microcell; moreover, a cancellation request moves to the microcell of the entered target beyond the microcell boundary. If all of the traffic channels are available, the session will then move to the target microcell.

The PMIPv6 network should be overflowed to the macrocell layer for an idle traffic channel, or it can be moved successfully to the microcell layer; also, it should be able to monitor the control channel in both the macrocell and microcell layers. A modular access gateway (MAG) should be able to convert a layer during it communication with the base station of the macrocell layer. It is possible to provide a better service quality to the mobile node (MN) at a small processing cost in a system with an optimally efficient bandwidth by comparing the combinations of three schemes

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(nine candidate schemes) with the MAG, the latter of which is either slow or fast; this is just like a performance evaluation if all of the traffic loads in a system are blocked.

The remainder of the paper is organized as follows. In Section 2, the relevant research are presented. Section 3 provides definitions for all three of the schemes that are used for the efficient handoff scheme. Section 4 presents evaluation results. Finally, Section 5 concludes this paper.

2. Related Work

The current Internet mobility management/control technology comprises the centralized manner feature that is based on a hierarchical network architecture. The current mobility management performs a mobility management/control function that is based on a centralized mobility-management anchor in the core network; however, this is now a centralized mobility-management system, as a very easy handling capability is expected in the event that the mobile Internet-traffic demand increases exponentially. Mobility management has therefore been analyzed and studied in a variety of ways.

Consider a macrocell and a high-speed micro-cell cellular system resources performance overlap microcell[3,4], a hierarchical cell structure and the multiple-access options for the support of a personal communication system was proposed[5]; however, the flow request of a microcell layer is allowed over the macrocell layer, whereas in the opposite direction, the flow request is not accepted[6]. The overflow to the macrocell layer in a microcell handoff is therefore restricted[7]. Speed-sensitive handoff techniques are used in the flexible, hierarchical cellular networks[5], whereby microcells are used to provide the lower mobility traffic and macrocells are used to provide the higher mobility traffic. In the microcell to macrocell, overflow requests to the microcell are allowed; furthermore, the overflow is allowed to cancel the request of the process. In a comparison with the other schemes[5], the total bandwidth resource remains constant, showing that both fast and slow can provide a better quality of service for the MN. A proxy-based, seamless handoff scheme[4] is proposed for a mobile IP in a heterogeneous network. With respect to PMIPv6, a cost-effective mobility-management scheme with a delegation ability that is supported by the network has been described[7]; in addition, by using a network-based mobility management rather than a host-based mobility-management service provider, a maintenance and management that is at a lower cost than the network is offered[8]. The employment of secure smart mobility (SSM) for the design of a mechanism has allowed for the development of an analytical model to analyze the coverage of PMIPv6 and F-PMIPv6, and for the selection of a better alternative between PMIPv6 and F-PMIPv6 for users of mobility-service characteristics that change based on the model[9]. SSM is the best choice for the mobility anchor point that fits the size of the area for the optimization of the systemic performance. The MN offers additional special functions, and a network-directed handover is possible with a new PMIPv6-SIP architecture while the session without middleware is maintained[10]. A handover is required to use the PMIPv6 mobility management of the terminal, and the SIP session is used for a centralized mobility management. For a wireless mobile network, an Auto Test system[11] is proposed for the mobility performance testing of the mobile client, whereby an IP-based QoS that is based on user-traffic patterns in the next-generation mobile network offers a guarantee mechanism[12]. A study regarding mobility management and the continuing implementation problem of the PMIPv6 system must be considered in the future.

3. Bandwidth-efficient Handoff Scheme

It is assumed that a network-forming domain consists of continuous microcells, as shown in Fig. 1; moreover, these microcells form a lower layer out of those two layers, whereby all of the N microcells are overlapped with the macrocells that form an upper layer. Each macrocell can utilize the C_M traffic channel and the C_u channel is assigned to each microcell. All of the channels are to be shared between the transmission session request and the handoff request; that is, no priority is granted to the handoff request.

This assumption is to be conducted without any addition of the handoff priority in the remainder of this paper; anyhow, the analysis scheme proposed in this paper can be easily expanded to include a handoff-request priority. In the proposed system, the MN that is classified as either slow or fast crosses the areas of many cells on a random basis; moreover, the speed of the MN is not modified during communications. This paper proposes and analyzes a system