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Mobility Performance Achieving with Mobile IP & SIP Integration

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ABSTRACT

Mobile IP is a standard that allows users to move from one network to another without loosing connectivity. SIP (Session Initiation Protocol) is a signaling protocol used to create, manage and terminate sessions in an IP based network. It is a standard (RFC 3261) put forward by Internet Engineering Task Force (IETF).The problems with network layer and application layer is triangular, handoff, QoS. To overcome the problems of these layers we crate the extension of service to the MIP and SIP with integration of the two services. We proves that the performance of the system gradually increase if we use the MISIP service.

KEYWORDS : DHCP, TCP, SIP, Handoff

1. INTRODUCTION

Recent years have seen an explosive growth both in the number of laptop and notebook computers sold, and in the number of nodes connected to the Internet and the World Wide Web. The notebook computers are themselves ever more powerful, equal in processing capability to many systems sold as desktop workstations. In fact, the future growth of the Internet is likely to be fueled in large part by these very notebook computers, since they account for the part of the computer market that is growing fastest.

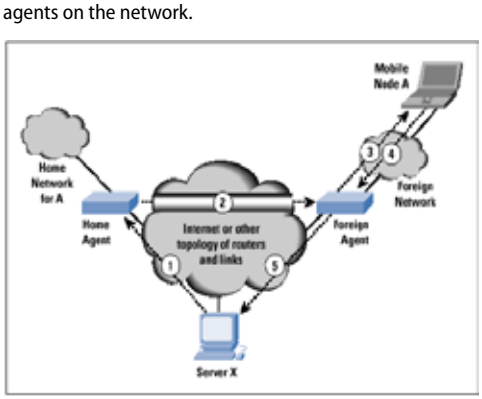
Our main theme here is to compare the network layer solution (i.e. Mobile IP) with the application layer solution (i.e. SIP) to support terminal mobility in VoIP services and then propose a integrated model, to reduce the inter-domain handoff(also known as macro-mobility) delay in VoIP services in a mobile environments. This is a continuation of our on-going work in wireless/mobile networks.

Unlike Mobile IP[1], however, the proposed approach limits tunneling to TCP connections that are active during a movement. Also, for SIP traffic, it limits tunneling to traffic that are sent to mobile node until the re-INVITE is completed in the rest of this paper, we provide problems in mobile IP and SIP in Section 2. Section 3 is devoted to our solutions to mobility support in SIP. Section 4 shows simulation results run on ns2to present that proposed approach can efficiently support real time communications. Finally we give some conclusion remarks in Section 5.

2. Problems in MOBILE IP

Obtaining an IP address using foreign agent

The other method does not include the use of a DHCP server. When a mobile host arrives at a foreign network he needs to discover a foreign agent instead of discovering a DHCP server. The foreign agent is an active entity; a router as the home agent and it sends router advertisement messages telling hosts on the network that it exists. A mobile host can either wait or listen to the network to capture such a message or he can send a router solicitation, a broadcast, to prompt possible agents on the network.



1. A server X sends a message to mobile node A's primary address which is intercepted by the home agent. 2. The home agent tunnels the message to the foreign agent, 3. Which Forwards it to A. 4.A's reply goes to the foreign agent, 5. Who forwards it directly to X.

When a foreign agent has been discovered the mobile host obtains a valid IP address. The address in question does not have to be unique; the router acting as a foreign agent can assign it one of its own addresses. Although assigning a unique address makes communication slightly easier, using an existing address means that the visiting mobiles do not consume IP addresses. Before a mobile host can receive messages at the foreign network, he must register like in the previous method. This time the registration at the home agent goes through the foreign agent, meaning that the mobile host must first register at the foreign agent which will register the secondary address at the home agent. If a mobile host has not received a unique secondary address, a foreign agent must use the primary address as an IP destination address. This means that the foreign agent is not allowed to use ARP [2] on the network to find out the physical address of the mobile host since it is not valid on the foreign network.

Registration/IP Renewal and Deregistration

In both methods the obtained address assigned by the DHCP [3] or by the foreign agent may expire as well as the registration with the foreign agent. That means that a mobile host is not allowed to keep an address forever or an arbitrary long time and that the foreign agent is only willing to forward messages for a given period of time. When a host registers at the foreign agent, the agent provides the mobile host with a time for which the registration is valid, or for which the foreign agent is willing to forward the messages

The Two-Crossing Problem

The methods described seem flawless in theory, but there exist one major problem. A visiting mobile host will tend to communicate with computers on the same network that he is currently visiting.

Consider a mobile host who has received an IP address at a foreign network and has registered both at the home agent and at the foreign agent. When the host wants to send a message, the source address will like mentioned above be the primary address which is located on the home network. Consider now what happens if the receiver, a nearby computer, wants to reply to the message. **Constraints on mobile IP**

There are some constraints regarding mobile IP using any of the two methods described. One constraint regards ingress filtering which is when a border router on some networks discards packets that contain a source IP that is not located at the network the packet was coming from. This sort of filtering is used to stop spoofing, impersonating someone over the internet by changing the source IP.

Session Initiation Protocol (SIP)

SIP is an application layer protocol used to create or tear down multi-

media sessions. IETF recommends SIP as signaling protocol for VoIP service. It supports multi-cast and unicast. SIP URI is the namespace used in SIP protocol, which is an extension of Domain Name System (DNS) SIP user agent (UA) registers itself with the SIP URI in the SIP Registrar Server by REGISTER message. When a mobile UA moves into a visited network, it will send the REGISTER to its Home Registrar about its new location. SIP can perform mobility support in the Application Layer [8]. UA uses INVITE message to establish a session with other UA. INVITE message contains session description in Session Description Protocol (SDP)[4] format. When a callee UA is roaming into the other network, the SIP Redirect Server will reply with SIP 302 (User Temporarily Moved) with ser's new location Message to the caller UA. The caller UA will send a new INVITE message to new location.

3. PROPOSED ARCHITECTURE

The basic concept of the proposed architecture is that the SIP mobility support approach does not necessarily exclude the Mobile IP approach, rather it may work to complement based on the kind of application. The network architecture of the proposed location management scheme is shown in Fig.2. It uses a SIP network server, and a Mobility Agent with SIP Registrar to facilitate location management. While the SIP network server handles call/session delivery, the Mobility Agent with SIP Registrar is used for handling location registration, location updates, and location queries.

A. Mobility Agent with Registrar

The purpose of the registration process in mobile IP is to inform mobility agent of a mobile node's new IP address and update the binding information between home address of mobile node and the care-of address. This allows TCP corn on-SIP connections to be maintained without a disruption.

For the purposes of our paper, it is useful to consider two types of binding. "user address binding", analogous to binding in an SIP Registrars, is the mapping between user level identifier and a temporary IP address of host name, and "IP address binding", roughly the binding between a permanent IP address identifying a host to a temporary care of address. The Purpose of this table is to map a mobile node's home address with its Current Location (or collocated care-of address) and forward packets accordingly. Also, it is used to support the binding between a mobile user's permanent identifier and his/her computer's *actual IP address*. The former is designed for IP address binding, and the latter is defined for user address binding.

Fig 2: Architecture

In addition it may store other user profiles such as QoS requirements. This information is stored on a home agent using SIP REGISTER message when a host is first registered on the network. Also, if a user changes the device being used, it updates binding information, such as UserURI, ContractURI, Home Address, and Current Location by using SIP Re-REGISTER message.[5]

Handoff

For a successful handoff, a mobile node registers with the affiliated home agent to indicate its location, allowed by a dynamic join and departure of the multi-party conference for handoff. A location update may be performed upon the mobile crossing a service area boundary as described in the previous subsection.

Figure 3 shows the exchange of [8] handoff-related message when a mobile node moves into a new domain while call in progress. The process of using proposed approach to handoff is outlined below. The mobile node not only obtains an initial care-of address, but also acquires globally unique Care-of Address (i.e. co-located care of address).

4. PERFORMANCE EVALUATION

In this section we present our simulation results.

Simulations are conducted to investigate two critical performance issues, i.e. packet loss during handoffs and handoff latency. The simulations are run using NS2 (v2.1b9a) [6] from Lawrence Berkeley National Laboratory (LBNL), which is widely used in the networking community to study IP networks. Because the current version of NS2 does not support SIP for VoIP[9] service, we add a suite of new features (user agent, redirect server, proxy server, registrars) and procedures that are specific to this paper.

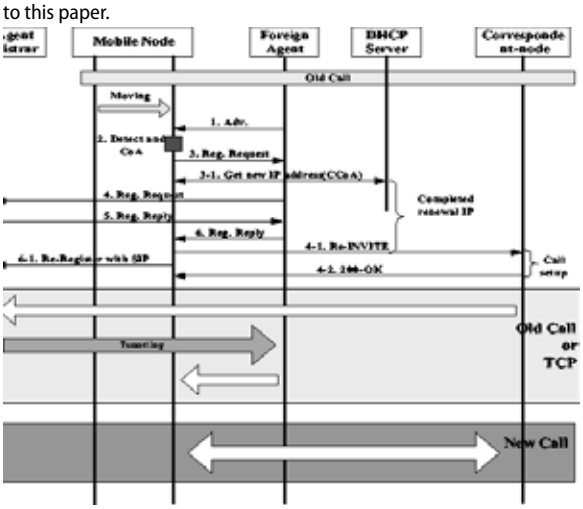


Fig.3 Message flow during a Handoff

5. CONCLUSION

In this paper, we proposed an efficient approach to deal with handoff during ongoing call over VoIP service. Unlike the previous work, the proposed approach uses integrated procedures of mobile IP and SIP mobility for real-time communication over UDP[7]. Compared with other proposals, our proposal has three primary advantages. First, the proposed mechanism can reduce packet loss and handoff latency by compensating mobile IP and SIP-mobility shortcomings mutually. Second, the only modification to the existing infrastructure is the extension in the home agent and the addition of a database to find registrars. Third, the complexity of the proposal occurs only in registration, call setup shares the single-lookup efficiency of SIP and is therefore relatively fast.

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