SCOPE- Service Classified Overlay for P2P Environment,

A service platform for P2P services over Ad-hoc Networks

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Abstract

In this Demo we exhibit some features of our platform called SCOPE. SCOPE provides an Open DHT with unified application interface (API) for mobile users and allows them to provide and benefit from communication services such as Instant Messaging, File sharing and Voice chat. The main goal in this Demo is to demonstrate and evaluate this server-less P2P communication services on ad-hoc mode in a real scenario and get the feedback of the users about the performance.

1. Introduction

While there have been intensive research in both of academy and industry on Ad-hoc Networks, there are not yet a service platform that helps to deploy and manage the applications on these infrastructure-less network technologies. Many interesting use cases can be created by providing a unified service framework in these networks including mobile ad-hoc networks, wireless mesh networks and vehicular networks. For example, in an exhibition or a big event, it is worth providing ad-hoc networks and deploying P2P services such as File sharing, Experience Sharing, P2P Voice/text Chat, streaming, advertisement service, information services, e-commerce etc.

To achieve this aim, an auto-organized service framework with minimum infrastructure is required. In this regard we have developed a P2P service platform called SCOPE- Service Classified Overlay for P2P Environment. SCOPE is developed in the frame of ExpeShare [11] European project and its main idea is to provide a distributed infrastructure with unified API that enables development of miscellaneous P2P services on ad-hoc networks.

In this demo we reveal some features of SCOPE which focus on P2P communication services and virtual communities. We carry out a demonstration on Ad-hoc Network with heterogeneous devices. These could be PDAs, mobile phones or laptops. To construct and organize an overlay, certain devices are selected to serve as the Super Nodes (SN). SNs are the devices with enough computing/storage capacity that process the requests of the clients and route their requests to the proper peer/item. Due to the computing requirements, in our platform, only laptops can serve as super nodes. Moreover, instead of having a flat overlay for all the services, we organize service classified sub-overlays for each service class (Figure 1). For instance, the SNs which support SIP (Session...
Initiation Protocol) will create a sub-overlay for communication services. Hence, the requests for a certain service type will be forwarded to the corresponding sub-overlay and will not be propagated in the entire network.

In this demo we show how the clients of our system can take advantage of P2P communication services. We provide each of them an identification and allow them to share their personal data and communicate to each other in a P2P manner on their mobile devices. Beside of the demo that we provide in our dedicated space, we are also able to assign a free identifier to the MASS 2008 attendees (the volunteers) and allow them to communicate to each other. In addition we are able to allow the MASS organizer to share the daily news of the conference with the attendees by using our P2P systems.

Moreover we can provide a service for the attendees to establish some communities according to their research interest, share their v-cards (virtual business cards) and indicates their availability for discussion on the subject of their interest with other people of the community. Another important goal is to get the feedback of the users and adapt our work for mass market.

2. Basic Idea and General Features

The main idea behind the SCOPE is to provide an efficient overlay for P2P services over Ad-hoc Networks. The strategy for construction of P2P overlay in ad hoc networks is very important and has direct effect on the performance of the system [7, 8]. We assume that there are several services running on the networks. In practice, a real network has to handle a variety of services. From the user point of view, the multimedia services, entertainment, advanced communication service are preferred. As a sample of services that SCOPE can provide, in this Demo, we provide a P2P overlay for SIP based communication services such as Telephony, messenger, Push to Voice/Video. In our demo, we deploy some super nodes on which SCOPE service package will be installed.

We also intend to provide a monitoring station which can be considered as the administrator control point. This monitoring station will shows the on-line users, the active connections and the records of the clients in each SN. Our service framework is based on Bamboo open-sources [2] which provides PASTRY [8] DHT services. Bamboo with its public name OpenDHT [1] has been deployed on Planetlab [3]. Bamboo has been developed to handle high churn [6] which means the continuous process of node arrival and departure. It also uses proximity neighbor selection [4, 5].

We have modified Bamboo according to some of our requirements and we have developed Client agent to allow the users to Put/Get their information in the overlay. An open source SIP stack also is integrated to enable SIP-based Services over Ad-hoc Networks. Moreover, in layer 3, OLSR [9] is used for Ad-hoc routing.

3. Demonstration Details and Scenarios

Some bootstrap super nodes start constructing the overlay. Then, other devices can join our overlay and access into services.

- All the attendees will be invited to pick up an identifier in our overlay; for example their name will be their identifiers in the identification space.
- They will receive a client-agent software to install on their Mobile or PDA.
- With the laptop, a user can become a super node after installing our service platform package.
- We provide a P2P SIP distributed proxy/registrar that enables SIP based communications. For example, anyone can use his Softphone in order to register to our P2P SIP overlay and makes call to other clients of the SCOPE.

When the devices are connected to wireless ad hoc networks, SCOPE clients will use our client agent to connect to the overlay and discover and retrieve a list of services and communities as Figure 2 shows.

Figure 2: The join procedure to the SCOPE
Many interesting use cases can be provided in an event such as a conference by deployment of SCOPE framework. A SCOPE client has access to a list of various services available anywhere in the meeting. Moreover, the clients are able to create their own communities with the keywords of their interest (ie. Distributed systems, sensor networks…).

After receiving the list of services or communities, an attendee can communicate to others. Moreover, by sharing his availability times in the SCOPE overlay, an attendee gets the chance to meet people in his field of interest in the place.

For example, consider that David has just arrived at the Conference. He can register to the SCOPE overlay and define his domain of interest (e.g. sensor network) and more details about himself (Figure 3). Then he would like to know the people who work on the same topic. So he can run a search with “sensor network” as the keyword and get the name of the people (Figure 4).

Now consider that David is also interested to benefit from SIP services to contact to other people in the meeting. He can request a list of addresses of SIP Super Nodes in the overlay by triggering a lookup for “SIP Overlay” as Figure 5 shows. Then he can subscribe his ID with one of these SNs and get the capability to contact other peers.

4. Some Requirements for Demo

- Power plug and wire.
- Internet access (Wired and wireless)
- Big screen (or a PC projector)
- Volunteers to test our system in the conference
- A desk in conference registration to communicate with volunteers
- Two laptops (optional)
- Space: Minimum 8 m²

5. Summary

In this DEMO we show some features of our P2P overlay which is called SCOPE. SCOPE provides creation of the service classified sub-overlays and community networks for mobile users in ad-hoc networks.

6. References