Ad-hoc Social Networking for the Google Android Platform Project Proposal

CSC 714 Real Time Systems
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Objective

The objective is to explore possibilities for ad-hoc networking between G1 Android phones for the application of social networking. While the G1 phone's wireless networking capabilities are typically used with a 802.11 access point, it is possible to configure the hardware in ad-hoc mode. This mode allows phones to communicate peer-to-peer without an access point. This project will address discovery of phones in communication range, ad-hoc data communications between phones, and exchange of location information to facilitate social networking applications. This may include displaying relative locations and exchanging text messages or other multimedia content.

Introduction

Social networking has become a popular application among wireless phone users. Typical applications, such as Google Latitude, allow mobile users to broadcast their GPS location to a central database. This information can then be shared with other users (based on a whitelist) and viewed on their wireless phones via a map display. The application facilitates communication, such as messaging, between users. Integration with mapping software allows users to find routes to connect users together. Changes in location area updated on map displays in real-time as users travel.

Existing implementations rely on the phone's 3G data networking service, but the G1 phone is also equipped with a 802.11b/g Wi-Fi wireless radio. The Wi-Fi mode allows mobile users to receive service from an Access Point, possibly achieving faster data rates than available with the 3G service plan. An alternative use of the Wi-Fi mode is to establish an ad-hoc connection directly with other Wi-Fi devices without using any Access Point. This mode of communication would be useful if devices are in an area with no 3G data coverage and no Wi-Fi Access Points around.

Using ad-hoc Wi-Fi changes the model for the social networking application. Instead of connecting to a central database, phones are only able to discover other phones within radio range of them. It may or may not be possible to start a map application (e.g. Google Maps) without access to the Internet. Even if Internet access is available, it is not possible to configure the Wi-Fi radio in both ad-hoc and managed modes simultaneously. It may be feasible to use the 3G radio for Internet connectivity and the Wi-Fi radio in ad-hoc mode. This possibility is beyond the scope of this project.

This project will examine the implementation of the open source Wi-Fi tethering project for the Android platform. This open-source project provides some software for operating an Android G1 phone in ad-hoc mode with the intention of bridging the 3G data network connection to wireless clients in an ad-hoc Wi-Fi network. The functionality of bridging network connections is not required for this project, but the configuration of the Wi-Fi radio in ad-hoc mode will be highly valuable and reusable.

Since Google Latitude itself is not open source and has no open API's, there will be no attempt to integrate with this existing application. Instead, this project will develop simple social networking software using resources available in the standard Android SDK. A simple instant messaging application can easily be implemented. GPS coordinates can be obtained and communicated between devices. Even if mapping software is not functional in an offline mode, it would still be possible to display a simple compass showing distance and direction to another user. Other functions of the phone (such as the camera) could be integrated into the application.

Challenges / Design Issues
- Configuration of Ad-hoc mode for a G1 dev phone
- Discovery of other G1 phones operating in ad-hoc mode. What range is possible? How to detect phones going in and out of range?
- Methods for establishing communications between 2 or more devices. What protocols should be used?
- Development of simple social networking applications

Approach
- Use Wi-Fi tethering software to configure G1 phone in ad-hoc wireless mode
- Establish an ad-hoc network with a laptop
- Develop software that can perform simple TCP connections between the phone and laptop using ad-hoc network connection.
- Develop software for discovering other ad-hoc devices.
- Develop software for integrating with GPS and text input functions of the G1 phone using Android SDK.
- Develop communication protocols for transmitting this information over ad-hoc network.
- Develop software for displaying GPS location and text messages received from other ad-hoc peers on G1 phone.

References
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- Android SDK http://code.google.com/android/
- Android Wi-Fi Tethering project http://code.google.com/p/android-wifi-tether/
- Google Latitude http://www.google.com/latitude/