

# Mobile ad-hoc networking

*and its applications*

**Mansur Abbasi, Henning Berg, Sven-Jørgen Karlsen, Jon  
Oldevik, Lars Bye**

[mansuraa at ifi.uio.no](mailto:mansuraa@ifi.uio.no), [hennb at ifi.uio.no](mailto:hennb@ifi.uio.no), [svenjok at ifi.uio.no](mailto:svenjok@ifi.uio.no),  
[jonold at ifi.uio.no](mailto:jonold@ifi.uio.no), [lkbye at ifi.uio.no](mailto:lkbye@ifi.uio.no)



Problem analysis document ("*undringsdokument*") INF 5261 spring  
2006

UNIVERSITETET I OSLO

February 14<sup>th</sup> 2006

# Innhold

<b>INNHold .....</b>	<b>2</b>
<b>1. INTRODUCTION .....</b>	<b>3</b>
1.1 THE PROJECT GROUP.....	3
1.2 THE PROJECT .....	3
<b>2. THE PROBLEM ANALYSIS .....</b>	<b>3</b>
2.1 INTRODUCTION.....	3
2.2 THE PROBLEM.....	4
2.3 PROJECT METHOD.....	4
2.4 EXAMPLE PROTOTYPE .....	5
<b>REFERENCES.....</b>	<b>5</b>

# 1. Introduction

This report is the problem analysis (*Undringsdokument*) report for INF5261 for the project group ‘*Mobile ad-hoc networking and its applications*’. Our main objective is to look at the possibilities and limitations of using mobile terminals for ad-hoc networking and to answer the following: What are the useful applications of mobile terminals for ad-hoc networking today and in the future?

## 1.1 The project group

The group consists of four members:

- Mansur Abbasi – [mansuraa at ifi.uio.no](mailto:mansuraa@ifi.uio.no)
- Henning Berg – [hennb at ifi.uio.no](mailto:hennb@ifi.uio.no)
- Lars Bye – [lkbye at ifi.uio.no](mailto:lkbye@ifi.uio.no)
- Sven Jørgen Karlsen – [svenjok at ifi.uio.no](mailto:svenjok@ifi.uio.no)
- Jon Oldevik – [jonold at ifi.uio.no](mailto:jonold@ifi.uio.no)

## 1.2 The project

We will focus on using mobile technology in ad-hoc networking scenarios. In the project we will study possible application domains and see how mobile ad-hoc networking is and may be used in practice, and look at the technical and theoretical prerequisites and challenges. In addition, the project will implement a prototype that illuminates challenges and possibilities at technical level, business level, and social level.

Part of the project will be to select the example on which to base a prototype.

We will try to establish external collaboration for our project: Currently we are working on this establishment with one of a set of possible partners (FFI, Telenor, UiO DMMS, AHO).

The following elaborates the focus of the project.

# 2. The problem analysis

## 2.1 Introduction

Our initial project vision is to study and provide enablers for mobile ad-hoc network applications. Mobile ad-hoc networks, known as *MANETs*, represent a great potential for communication, interaction, and collaboration in a world with a rapidly increasing number of mobile (computing) devices everywhere.

Information availability is at times crucial for the operation of certain services, be it in commercial, non-commercial, or community-oriented scenarios. For example, in rescue operations, e.g. local/national flooding situations, or international environmental crisis, the need for quick spread of

information to inflicted parties is of essence. (Spreading of rescue information to possible victims, communication between rescue teams, etc).

Information at everybody's fingertips can be essential at times; and necessary in order to cope with important tasks, such as:

- decision-making
- knowledge management
- coordination
- situational awareness
- information pushing

Other, more entertaining-oriented or business-oriented examples can also be found. This group will look at the application of ad-hoc networking – without focusing on a particular domain. Rather, it seeks to find answers to general issues regarding ad-hoc mobile networking.

## 2.2 The problem

We set out to investigate the problem of using ad-hoc mobile networks in different application areas.

It will set out by investigating existing work in this area, and study articles, books, examples, etc. This will establish a foundation for understanding the domain and give a basis for further in-depth studies and selection of an example.

The following questions illuminate the problems we aim to study:

- What is ad-hoc mobile networking?
- What are the useful applications of mobile terminals for ad-hoc networking today? What applications can we see for the future?
- How are mobile terminals used for ad-hoc networking today?
- How will it be in the future?
- What are the application areas?
  - In daily life?
  - In professional life?
- What are the requirements for ad-hoc networking? Often quick accessibility of information spreading.
- What are the challenges of mobile ad-hoc networks in terms of technology and commercialisation? What about social aspects?

We will address these issues following a project method outlined below.

## 2.3 Project method

We will approach the problem of *mobile ad-hoc network applications* by addressing these issues described above.

First, the existing knowledge of this topic will be studied. State-of-the-art of technical solutions and theoretical approaches will be analysed. We study relevant articles from conferences such as the International Conference on Ad-hoc Networks and Wireless (adhocNow), the International Conference on Wireless and Mobile Computing, Networking and Communications (WiMOB), the International Conference on Distributed Computing Systems (ICDCS), and the International Conference on Mobile Computing and Networking (MobiCom). Relevant books such as [7][8][9] will give us a good foundation for understanding the domain and its application areas. Articles such as [3][4][5][6] give some background of state-of-the-research in the ad-hoc mobile networking area. Journals, such as the International Journal of Wireless and Mobile Computing (IJWMC) can also provide valuable input. We will investigate how ad-hoc mobile networking relates to the concepts of wearable and ubiquitous computing [1]. We will also study how ad-hoc mobile networking applications can be used in collaborative contexts and whether the concepts of collaborative place are relevant [2].

A case example will be defined, which will be used for further in-depth studies, and as a basis for an example prototype. The project aims to look at one practical situation, e.g. to support some basic information flow between nodes in an ad-hoc network. The selection of a case example will be part of the initial phase of the project. Some ideas are described below:

- Crisis management scenarios contain a broad range of smaller fragment areas in which ad-hoc mobile networking is highly relevant.
- Communication to third party using ad-hoc networking.
- Media streaming case.
- Ad-hoc dating services.
- Ad-hoc chatting.
- Personalized ad-hoc shopping.
- Ad-hoc mobile job application.

The project will define a technical infrastructure on which to realize an example prototype. The details of that infrastructure will be determined in the initial project phase.

## 2.4 Example prototype

Based on the established example, we will design and implement a prototype that illustrates some of the aspects identified with regard to mobile ad-hoc networking.

## References

- [1] Rhodes BJ, Minar N and Weaver J: Wearable Computing Meets Ubiquitous Computing: reaping the best of both worlds, 1999. Symposium on wearable computing.
- [2] Harrison S and Dourish P: Re-Place-ing Space: The Roles of Place and Space in Collaborative Systems, 1996. CSCW/ACM.
- [3] Hubaux, J.-P. Gross, T. Le Boudec, J.-Y. Vetterli, M.: Toward self-organized mobile ad-hoc networks: the terminodes project, Communications Magazine, IEEE, 2001
- [4] Royer, E.M. Chai-Keong Toh: A review of current routing protocols for ad-hoc mobile wireless networks, Personal Communications, IEEE, 1999

- [5] Jun-Zhao Sun, Mobile ad-hoc networking: an essential technology for pervasive computing, Info-tech and Info-net, 2001
- [6] Magnus Frodigh, Per Johansson and Peter Larsson: Magnus Frodigh, Per Johansson and Peter Larsson: Wireless ad-hoc networking – The art of networking without a network
- [7] Giordano, S. 2002. Mobile ad-hoc networks. In Handbook of Wireless Networks and Mobile Computing Wiley Series On Parallel And Distributed Computing. John Wiley & Sons, New York, NY, 325-346.
- [8] C.-K. Toh: Ad-hoc Mobile Wireless Networks: Protocols and Systems, ISBN: 0130078174, Prentice Hall PTR, 2001
- [9] C. E. Perkins: Ad-hoc Networking, ISBN 0-201-30976-9, Addison-Wesley 2001