MOBILEMAN

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Mobile Metropolitan Ad hoc Networks

MOBILEMAN

Project Presentation

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Project Co-ordinator: Consiglio Nazionale delle Ricerche (Italy)

Partners: University of Cambridge (UK), Institut Eurecom (France), Helsinki University (Finland), NETikos (Italy), Scuola Universitaria Professionale della Svizzera Italiana (Switzerland)

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ABSTRACT

MOBILEMAN (http://cnd.iit.cnr.it/mobileMAN) is a project funded by the Future and Emerging Technologies arm of the IST Programme of the the European Commission.

This project investigates the potentialities of the Mobile Ad hoc NETworks (MANET's) paradigm. Specifically, the project aims to define and develop a metropolitan area, self-organizing, and totally wireless network that we call *Mobile Metropolitan Ad hoc Network* (MobileMAN). The main technical outputs of this proposal can be summarized as follows. i) Development, validation, implementation and testing of the architecture, and related protocols, for configuring and managing a MobileMAN. ii) Physical implementation of this architecture for lowers layers (i.e., wireless technologies). iii) Integration of applications on top of our self-organized network. iv) Validation of the self-organizing paradigm from the social and economic standpoint.

Project Presentation

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Summary

The future information society is expected to rely heavily on wireless technology. Advances in wireless communication will enable a radical new **communication** paradigm: **self-organized information and communication systems**. In this new networking environment, ***the users' mobile devices are the network***, and they must cooperatively provide the functionality that is usually provided by the network infrastructure (e.g. routers, switches, servers). Such systems are sometimes referred to as Mobile Ad hoc NETworks (MANET's), or as infrastructure-less wireless networks. The MOBILEMAN project will advance the MANET paradigm focusing on communication in a (possibly large) metropolitan area that we call *Mobile Metropolitan Ad Hoc Network* (MobileMAN). A MobileMAN is an **autonomous, self-organized, wireless multimedia network**, built up solely from user devices. In a MobileMAN, **no infrastructure** is required to enable information exchange among users' mobile devices. Users' devices -- which we call terminals -- are an evolution of current mobile phones, and emerging Personal Digital Assistants (PDAs) equipped with wireless interfaces. Terminals are goods that people can purchase at (relatively) low cost, and operate without per-use service fees. The only external resource needed for operation is the bandwidth in the (unlicensed) ISM band.

In a MobileMAN, nearby terminals can communicate directly. Terminals that are not directly connected communicate by forwarding their traffic via a sequence of intermediate terminals. No specialized devices (such as Internet routers or cellular towers) are required. In addition to connectivity, the terminals of a MobileMAN must also cooperatively provide the services -- naming, security, service discovery, data replication -- needed to support applications used in the MobileMAN network.

A MobileMAN is not intended as a replacement for current infrastructure based (wired and wireless) networks. It is intended to complement them, and to enable new application scenarios in which a centralized infrastructure is impossible, undesirable, or unnecessary. In addition, we also envisage intercommunication between a MobileMAN and the Internet. This can be provided by terminals which have simultaneous access to the MobileMAN and to the Internet, perhaps via special access points, or via user terminals with multiple network interfaces (e.g., a PDA equipped with both Bluetooth and GRPS interfaces).

Application supported by a MobileMAN might range from text messaging systems (evolving from the very popular SMS), up to more demanding multimedia (voice and video) services. Eventually, they might even range from simple interactive games to ones that truly merge real, and virtual worlds.

The challenges of building a self-organized MobileMAN are substantial: how can we achieve self-organization in a highly dynamic and completely decentralized network environment?

Objectives

The **objectives** of this project are twofold:

- **technical solutions**: invent and demonstrate solutions that make the self-organisation paradigm effective. This will be reflected into develop the architecture and protocols for a self-organised network, integrated with the lower and upper layers.
- **business and social impact**: to exploit the self-organisation paradigm for supporting innovative applications (in terms of novelty of the services context onto which the applications are integrated, and novelty of the way they are offered to the users), which will improve the life quality of people.

Milestones and the expected results

The main expected **technical outputs** of MobileMAN can be summarised as follows:

- The validation of the **self-organised paradigm** from the technological standpoint, i.e., its technical feasibility.
- Development, validation, implementation, and testing of the **architecture, and related protocols, for configuring and managing self-organised wireless networks**. Innovative results are expected in self-organised networking, security, and location.
- **Physical implementation of this architecture for lowers layers** (i.e., wireless technologies). This will be done by improving the existing IEEE 802.11 wireless technologies for dealing in bursty access environments as self-organised networks.
- Integration and validation of **popular services** (such as SMS and chatting) on top of our self-organised network, as well as, the extensions of these services into new realms, such as multimedia messaging, spontaneous electronic collaboration, and wireless interactive games.

The main **business and social outputs** of this proposal can be summarised as follows:

- Evaluation of the social impact of the self-organizing paradigm by exploiting virtual communities of real users.
- A socio-economic evaluation of the effectiveness of the mobile ad hoc paradigm, and its market access.

Project Data

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Operative commencement date of contract	October 1st, 2002
Duration	36 months
Total effort	317.7 man months
Eligible Costs	2,453,502 Euro
European Commission funding	1,077,000 Euro
Swiss funding to SUPSI	836,792 CHF ≈ 571,770 Euro

TABLE 1 – LIST OF PARTICIPANTS

Participant name	Participant short name	Country	Contact Person
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