

# Chapter 25

## Fednets: P2P Cooperation of Personal Networks Access Control and Management Framework

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### ABSTRACT

*A personal network (PN) is a network of a user's personal devices and services, cooperating with each other independently of their geographical location to provide ubiquitous services to the user. PNs can be the producers and consumers of the services, content and resources. They can also export the subsets of their personal resources and services to other PNs. In such cases, PNs may form a group-oriented secure network called a Federation of Personal Networks (Fednet). A Fednet is a temporal, ad-hoc opportunity or purpose driven network of PNs, in which PNs collaborate with each other to share resources and services in a peer-to-peer manner. A Fednet is a pervasive and ubiquitous computing technology that enables the users to enjoy cooperation and promises exciting opportunities for different applications in various fields, such as education, healthcare, entertainment, business and emergency. In this chapter, the authors discuss PN technology expanding on the concept of Fednet. They provide example scenarios for Fednets, showing their potential impact to the quality of life of their users. Furthermore, they present the architecture and lifecycle of a Fednet. They explain the interactions of the main architectural components during its lifecycle and present a framework for the secure access control and management for a Fednet. The framework provides a controlled collaboration of PNs, where each PN controls the access to its resources and services. Finally, the authors provide a brief overview of some of the existing resource sharing group-oriented networks related to Fednets.*

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## 1. INTRODUCTION

Recent developments in device technologies resulted in various personal digital devices equipped with networking capabilities that enable them to communicate with each other, forming a person-centric network. A personal network (PN) (Niemegeers & Heemstra de Groot, 2003) is an example of a person-centric network. It is a network of a user's personal digital devices that cooperate with each other regardless of their geographical location. Some of the devices in the PN can be located at home, others in a user's office or car, and some of the devices the user can carry with her/him. Based on their location, personal devices can be grouped into clusters. A simple PN consists of a local cluster around the user. The local cluster can be extended with remote clusters, such as an office cluster, home cluster and car cluster by means of interconnecting infrastructures. Together they form a distributed personal environment of a user. This is illustrated in Figure 1.

The concept of a personal network and its design challenges have inspired many projects that investigated different aspects of PNs, such as the Dutch projects Freeband PNP2008 (2004-

2008) and QoS for PNs at home (2004-2008), and the European IST projects Magnet and Magnet Beyond (2006-2008). The European project Pac-Woman (2003) has research outcomes useful for the research on personal networking.

Personal devices of the user in the PN, communicating with each other independently of their geographic location, can provide ubiquitous services to the user, such as remote babysitting, remote control and monitoring of one's house, content sharing and conferencing services. In some situations it is beneficial and even crucial to share these personal resources and services with others to achieve a common goal that otherwise, by means of a single PN, would not be possible. Examples are: sharing digital media for business or entertainment, sharing sensor information from different sources for rescue of people in a disaster relief operation or getting real-time information from devices that belong to other people in healthcare applications. To achieve a common goal, different persons' PNs can federate into a group-oriented network. Then a personal network that is tailored to the needs of one person will grow into a network of a group of persons who share a subset of their resources and services with each other.

Figure 1. Example of a personal network



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