Designing and Evaluating Seamless and Transparent Middleware

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Universal assumption today is that in the near future different ad-hoc networks will become very common and everyone will carry one or more mobile network devices with them all the time. These devices will utilize different networks and know their location. This means that the supply and demand of different value added electronic services will grow exponentially. These services will require seamless and transparent middleware (i.e. software that mediates between an application program and a network).

In my research paper I will present work in progress related to this area. The research discussed is part of the NOMAD project (see http://www.ist-nomad.org) that is funded by the European Commission IST programme in the 5th Framework Programme. The aim of the NOMAD program is to develop and demonstrate middleware capable of seamlessly integrate available and future technologies, i.e. UMTS and WLAN, as well as IP compatible multi-hop ad-hoc networks, into a single integrated NOMAD platform. This employs new algorithms for the parallel use of multiple access interfaces. The product to be designed in this project is seamless and transparent middleware that gives network and value added service providers, for example, the opportunity to carry out different business transactions.

In an earlier study, a methodology for defining user requirements especially for middleware was studied and developed. Middleware presents a challenge to those defining user requirements because there may be many different kinds of users of the technology. In this earlier study, our methodology was found suitable for categorizing the use traits that will be used in the middleware product development process. The testing and validation of defined user requirements will be integrated into the current phase of the NOMAD project.

The NOMAD project is currently in very interesting stage as it is time to start the actual pilots and field trials of the system. The aim is to implement the NOMAD system at the end user site and to further refine the software based on the feedback from the trials. The pilots will be held in two different European countries. Full-featured prototypes of the integrated network and service discovery platforms are currently being installed and configured at the end users sites, implemented according to the specifications and the user requirements. A number of sample services based on the NOMAD network and software platform have been specified and implemented on the test-beds. Based on the results of heuristic evaluation and analysis of the NOMAD software user interface, some design adjustments are probably still to be done.

In the pilots, the adequacy of the components of the NOMAD architecture will be tested. There will be several test persons who will complete the sample services. Both qualitative and quantitative research methods will be used in the study. The three major methods will be observation, interviewing and survey-questionnaire. The test users will be monitored and their actions recorded. The times to complete each service will be measured and possible delays, for example related to network changes, will be calculated and analysed. All the subjects will be interviewed with a semi-structured interview and their opinions and attitudes towards this technology will be investigated with a questionnaire developed especially for this purpose. The main challenge and research question in this phase of the project is how to design the NOMAD system and user interface so that

the users experience it to pleasant to use even thought the underlying technology is transparent and seamless. The final results of these studies are expected to be ready by the end of April 2004.

My research paper discusses various issues related to seamless and transparent middleware design and evaluation. The main contributions are

- Design issues for middleware platform and user interface
- New ways how to evaluate, from the end user's point of view, the desirability of a mobile device user interface in the context of seamless and transparent technology