MOBILEMAN

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Mobile Metropolitan Ad hoc Networks

MOBILEMAN

MobileMAN Functionalities – A Minimal Set

Deliverable D6

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Abstract: The aim of this deliverable is to provide the software that implements, on the Linux operating system, the basic functions required to set up a MANET. The work mainly concentrated on implementation and analysis of routing and forwarding protocols. We have designed an Ad Hoc framework in a modular way for including both legacy IETF protocols and new routing and forwarding protocols that will be developed in the next steps of the project. In this deliverable we concentrated on implementation and analysis of routing protocols emerging in the MANET framework. Specifically, the Ad Hoc framework has been instantiated with modules that implement one proactive (OSLR), and one reactive routing protocol (AODV).

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SUMMARY

The aim of this deliverable is to provide the software that implements, on the Linux operating system, the basic functions required to set up a MANET. The work concentrated on the implementation and analysis of routing and forwarding protocols emerging in the MANET framework. The intent was to analyze their limitations and provide an extensible platform for developing new routing and networking solutions. So far the developed framework includes the AODV, OSLR routing protocols. The framework contains a "common module" and individual "routing modules". The "routing modules" are independent modules that implement the selected routing protocols (AODV, OSLR, etc). These modules can be activated and deactivated in the runtime in order to accommodate the routing mechanism to the node resources or network conditions. The "common module" constitutes the core of the Ad Hoc framework and it is kept permanently in the Ad Hoc node. The "common module" stores all the routing information collected in the same node from multiple routing protocols that may be running simultaneously, and interacts with the lower layers (Kernel routing table). This “Common Module” consists of: a "Protocol Registry", a "Common Cache", and “Common Cache & Registry Server” (CCRS). The Common Module communicates with the independent routing modules. The "Protocol Registry" keeps all the relevant information about the active protocols running in the node (i.e. AODV, OSLR, etc) and some network modeling information collected from previous executions. The “common module” also contains the "Common Cache" that is filled with the routing data conveyed from the different routing protocols (i.e. AODV and OSLR routing data is aggregated into the "Common Cache"). Initially, the “Common Cache” entries contained the nodes IP address and path metrics. Moreover, the “Common Cache” is being extended with new fields for storing the node’s geographical location, its Fully Qualified Domain Name (FQDN) and services that the nodes provide (DNS, DHCP). This information is uploaded into the “Common Cache” by any of the individual “routing module” running in the node (either legacy routing protocols with new

enhancements or new routing protocols designed and implemented for this purpose). The CCRS copies the new routing information of Common Cache into the kernel Routing table in order to benefit the overall routing process from the coexistence of multiple routing algorithms simultaneously in the node. The kernel routing table maintains the necessary routing information (IP address and next hop address) while the “Common Cache” is a placeholder for additional information about the nodes participating in the AD Hoc network. This framework is implemented on top of Linux Operating System and integrated into physical devices (iPAQ) in order to have field fault testing on real devices including all inconveniences that are guessed with simulations. We have designed the Ad Hoc framework in a modular way for including new routing protocols and obtaining a prototype in a very short time. This framework would be the development platform for investigating new algorithms for providing suitable Service Discovery in Ad Hoc networks.