Licentiate seminar

TITLE: Contributions to IP-based wireless communications

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14.00 - 16.00

PLACE: Sal 4, KTH Forum (4th floor), Kista, Sweden

ABSTRACT:
The introduction of IP-based communications in wireless systems posed several research issues. In this thesis, we present different contributions to address some of the issues in terminals and radio access networks. Firstly, we look at application adaptation to varying levels in quality of service (QoS). We describe a terminal architecture called BRENTA in which mobility is supported at the IP layer and therefore it is not noticeable by applications except for a possible QoS variation. BRENTA transport layer is enhanced with QoS support to deal with these variations. Applications specify their QoS requirements via the Extended Socket Interface. The Extended Socket Layer maps application requests to network QoS schemes. In this way, roaming between networks with different QoS architectures, such as DiffServ and IntServ, is transparent to applications. Nevertheless, applications still need to adapt to varying QoS due to different availability of resources at visited networks. BRENTA specifies four interfaces that offer different levels of application involvement in theQoS adaptation.

Secondly, we look at mobility support in the wired network. We introduce the design of an all-IP Radio Access Network (RAN) for the BRAIN scenario. This RAN specifies a micromobility protocol that installs per-host routes on access network routers. Thus, terminals maintain their IP address during handover and user data is routed in the RAN without additional encapsulation. The main challenge in such RAN is the provision of end-to-end QoS. BRAIN terminals use RSVP as signaling mechanism, therefore the RSVP path must be repaired after handovers. We introduce the loose coupling of reservation and micromobility signaling to repair the RSVP path and show that it can reduce the QoS degradation during handovers. A more general survey of the interactions between QoS and mobility protocols is also presented.

Finally, we present the design of an IP-based RAN for IEEE 802.11 wireless LANs. It is a replacement to the current Ethernet-based one aimed at increasing the coverage area of wireless LANs. Its architecture follows the generic RAN architecture introduced in this thesis and includes most of the suggested optimizations for RANs such as special support for broadcasted frames and movement prediction plus n-casting to reduce handover time. Additionally, we also study the IEEE 802.11 handover procedure and suggest several techniques to reduce its duration.