

"Network Connectivity and Configuration" Theme

The M-Zones programme has identified wireless networking as the main focus for network connectivity within the research programme, because Smart Space services offered to users are accessed at the access network level and it is widely anticipated that this will be predominantly wireless in the future. From the perspective of wireless access, the view of the late 1980s and early 1990s was that the telecommunications research community would be able to develop a Universal Mobile Telecommunication System that would be able to provide a unified radio access systems catering for all service needs. This has not become a reality but instead, driven by market forces, a wide range of mobile and wireless communications technologies have emerged. This includes the Global Systems for Mobile Communications (GSM) and its evolution in form of the General Packet Radio Service (GRPS), and EGDE (Enhanced Data Rates for GSM Evolution). It includes Wide-Band CDMA and the 3G mobile network technology and in the local area, wireless LAN systems based on IEEE802.11 standards, ETSI HiperLAN, Bluetooth, HomeRF, Digital Enhanced Cordless Telecommunications (DECT) and other systems. All of these wireless network technologies use different methods to form networks ranging from the planned, cellular network approach to ad-hoc networking to a hybrid form provided by some WLANs standards such as IEEE802.11, HiperLAN, and DECT.

This fragmented wireless access networking landscape poses significant problems for the delivery of communication services to users in Smart Spaces, as the range of data rates provided by the individual systems ranges from a few tens of kilobytes to tens of megabytes in the case of IEEE802.11a/g and the mobility support ranges from wide area mobility in the case of GSM and UMTS to virtually no mobility in the case of Bluetooth.

In order to deliver services in a smart space environment, it is critical to manage network configuration and connectivity from the network and the terminal side in such a way that the optimum access technology in terms of delivering a particular service is chosen. This means from the network perspective the optimum configuration that achieves the agreed QoS, that achieves maximum capacity, or that achieves maximum revenue for the operator. From a user perspective this means context-awareness of access in terms of location, time of day, business/leisure situation to minimise cost, maximise bandwidth, always guarantee a particular QoS, etc. The first paper in this state of the art review addresses the issue on admission control and mobility management in such a heterogeneous access network environment. It reviews the current state of the art in handover control, network selection and access control, and mobility management protocols based on Mobile IP and cellular IP. It suggests routes for future research utilising management concepts such as policy-based management. The second paper reviews aspects of ad-hoc networking, in particular with respect to addressing in wireless ad-hoc networks but provides also a limited review of routing in ad-hoc networks. Addressing is a critical issue in any wireless networks in particular when users access resources through different radio access technologies as this may require the use of multiple addresses. Implications are in the area of security, routing, charging, and QoS delivery. The paper suggests future research directions for addressing in ad-hoc networks.