Context Transfer in Wireless Mobile Networks

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Wireless networks and Internets are the fastest growing areas in telecommunications. It is expected that convergence of these technologies is inevitable, and adopting full IP (Internet Protocol) architecture in wireless communications has been studied. However, there are still a number of open issues. For example, IP was originally designed for best effort services, while the majority of wireless traffics have a real-time nature. To guarantee satisfactory performance, IP Quality of Service (QoS) schemes have to be deployed. As a result, network routers have to keep a set of state variables for every IP flow in order to provide the demanded service quality. These state variables are part of "context" that is needed for processing IP packets in networks. The concept of "context" was proposed and studied by the IETF (Internet Engineering Task force) Seamoby (Seamless mobility) working group. Understanding context is important for wireless communications since handover in wireless networks makes the communication path change frequently, and efficiently restoring context information after handover is critical for service quality.

Our research focuses on context in mobile wireless networks and how to achieve seamless handover by context transfer. Specifically, our goals are:

1. Understanding the nature of context and how to organize and specify context information.
2. Developing a framework for efficient context transfer during handover.
3. Identifying the new network management issues to achieve seamless handover.

To achieve the above goals, we have first extracted context information from relevant IETF RFC (Request For Comments) documents. The RFCs studied include IntServ (Integrated Services), DiffServ (Differentiated Services), Header Compression, and AAA (Authentication, Authorization, Accounting). Then, we have classified context information into three categories: the first category is related to IP QoS, the second category is related to wireless transmission, and the third category is related to security and accounting. Further, we have studied two ways to represent and encode data in distributed applications. The first way is to use ASN.1 (Abstract Syntax Notation One) and binary encoding rules like BER (Basic Encoding Rules) or DER (Distinguished Encoding Rules). The second way is to use XML (eXtensible Markup Language) and text-based encoding. While the first method is more efficient, the second method is more flexible, supports data evolution, and can provide data validation. We have compared programming support and parser efficiency of XML and ASN.1 BER in the Java platform and decided to use XML to specify context information. We are currently building a context transfer framework using Java and XML.