Gestion de la Mobilité pour l'internet du Futur Centré autour de l'Information

Résumé du projet de recherche (Langue 1)

The contemporary Internet ecosystem today has gone through series of evolutionary changes in the last forty or fifty years. Initially designed as a network for fixed nodes, it has scaled well enough with the development of new technologies both in fixed and wireless networks. This architecture based on the communication model of the telephone network (1st generation network) is a client-server model where communication systems exchange data over dedicated. Termed as the 2nd generation network, this architecture over the years has been challenged by many problems and issues such as network congestion, path failure, DOS attacks, mobility issues for wireless nodes (not directly supported by the architecture), etc. End users ask the network some piece of information irrespective of the location where it is stored. This approach is the basic notion for a network where information is considered as the premier entity superseding the node. Such networks, in general, are termed as Information Centric Network (ICN), in which various problems faced by the current Internet, mentioned above, can be handled with a unifying approach by putting the information at the center of network architecture. On a global scale, this network architecture design is termed as the Future Information Centric Internet. Similarly, Mobile Internet usage has been increased overwhelmingly in the last decade. There has been an estimated 1.2 billion mobile broad-band subscriptions for 2.4 billion Internet users in 2011. Because of increased spectrum efficiency and ubiquitous availability of cellular connectivity, the seamless mobility and connectivity is now considered as daily life commodity. However, in case of the Internet, the IP based mobility solutions cannot catch up in performance with the fast evolving cellular networks. Therefore, one of the primary goals of the Future Internet is to design mobility management schemes that overcome the issues in wireless networks such as handover and location management, multihoming, security, etc. In this thesis, we have proposed mobility management solution in wireless networks in the context of ICN in general and in the context of Network of Information (NetInf) in particular. The NetInf is an ICN based Future Internet architecture. We propose a NetInf Mobile Node (NetInf MN) architecture which is backward compatible with the current Internet architecture as well. This cross architecture support for mobility support works closely with Central Control Unit (CCU) (network entity) for improved performance for handover management in particular. The Virtual Node Layer (VNL) algorithm defines how different modules of NetInf MN and CCU units work together. The game theoretical and Reinforcement Learning (CODIPAS-RL) scheme based mathematical model shows how handover management and data relaying in the wireless networks can increase the network coverage through cooperative diversity. The simulation results show that the proposed model achieves both Nash and Stackelberg equilibria where as the selected CODIPAS-RL scheme reaches global optimum. Finally, as a use case example of NetInf architecture, we propose the NetInf Email service that does not require dedicated servers or dedicated port unlike the current email service. The use of asymmetric keys as user's ID is the unique feature proposed for this service. The NetInf email service architecture details follow the working principle of this service explaining how different architectural components work. We discuss different challenges and requirements related to this service. The prototype developed for this service will be used for the implementation of this service.