Telecommunications and Information Exchange Between Systems

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TELECOMMUNICATION AND INFORMATION

EXCHANGE BETWEEN SYSTEMS

Title: Requirements related to Mobility Control in the Future Network

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Summary:

The mobile and wireless networks are becoming the key driver for future network. The trend is the background why we should developed new Internet architecture that is optimized to wireless/mobile environments. This contribution proposes some requirements for the development of mobility control protocol in wireless/mobile optimized future network architecture, based on the understanding that the most representative feature of the mobile/wireless optimized future network is effective built-in mobility support.

1. Background

With an explosive growth of subscribers of 2G/3G cellular systems and wireless data systems such as WiFi and WiMAX, the mobile/wireless networks become the key driver for future network. It is reported that there were over 2 billion cellular phones, compared to 500 million PCs in the year of 2005, and further more than 400 million cellular phones already had Internet capability. It is also noted that the various new types of wireless networks like ad-hoc networks and sensor networks are emerging and expected to be one of major access means to the future Network [1].

However, we note that current Internet was basically designed for fixed network environment, not for mobile/wireless. It means that current Internet needs some additional features to support wireless/mobile environment, as shown in Mobile IP, but it may brings inefficiency due to its patch-on approach. Based on this observation, some activities are already started to design the future network (or Internet) for wireless/mobile environment rather than fixed environment.

A typical example of the activity is eMobility which is a project of EU FP7. They say that the first generation Internet had been developed mainly for research and many new protocols were patched to support commercial purposes in the second generation Internet. Now eMobility envisions the third generation Internet as the wireless/mobile Internet with the name of Post-IP with advanced capabilities such as wireless QoS, enhanced traffic management, mobility, location awareness and so on [2].

GENI, which is the representative testbed project for future Internet, also notes that wireless/mobile will be major access for future Internet so some design documents of GENI already covers the issues including ad-hoc and sensor networks [3]. Also we can easily find many FIND projects are very closely related with wireless/mobile environment [4].

Another notable observation is the relationship with new radio systems such as IMT-advanced or beyond IMT-advanced. Recently Ericsson, which is a leading mobile equipment company, suggests that current Internet should be revolutionary changed to effectively support future All-IP networks with new revolutional radio technologies [5].

The trends that were described above are the background why we should developed new Internet architecture that is optimized to wireless/mobile environments. This contribution proposes some requirements for the development of mobility control protocol in wireless/mobile optimized future network architecture, based on the understanding that the most representative feature of the mobile/wireless optimized future network is effective built-in mobility support.

2. Proposing Requirements related to Mobility Control

We propose following requirements for efficient mobility control in future network. Note that whole necessary requirements are not limited to the followings and need to be carefully reviewed and updated.

A. Mobile-optimized network architecture and protocols

Current Internet basically assumes that a terminal is static regardless of its version. However it is generally accepted that wireless/mobile access will be dominant in the future network. Therefore the architecture and relevant protocols for future Internet should be optimized to wireless/mobile environment.

B. Separation of user identifier from locator

Since current Internet was designed mainly to support static terminals, it has difficulty to provide session continuity for mobile terminals. The difficulty comes from the IP address usage both for identifier and locator. Therefore the user identifier should be separated from locator to effectively support mobile terminals.

C. Separation of control from user data transport

Current Internet does not differentiate control signals from user data. Future networks need more secure and efficient control to support various types of services via various types of access ways (new as well as exisitng). To achieve the enhanced controllability, the control operations need to be separated from user data transport like in telecommunication systems.

D. Location Privacy

Current Internet packets must include the IP address of sender as source address. It means that sender's location is revealed regardless of the sender's intention and it brings location privacy problem. Future Internet should provide sender's location privacy feature by architecture itself.

E. Support of Network-based built-in mobility control

Host-base mobility control needs that every mobile terminal must implement relevant protocol stacks and it may be an obstacle in the deployment of mobile services. Therefore network-based mobility control should be provided as well as host-based one in future network. Also the mobility control should be provided in the form of built-in rather than add-on.

F. Idle mode/ intermittent connection support

Idle mode and intermittent connection are natural characteristics in wireless communications. That is, most mobile terminals have idle mode to save power and some networks, e.g., ad-hoc networks, may not provide persistent connection to user. Future Internet should make services possible in these network environments.

G. Route optimization

Triangle routing for mobile terminals is a well-known problem in current Internet. In future Internet, the routing to moving terminals should be processed through direct path as possible as.

H. Availability of lower layers' information

To enhance performance in service provisioning, the use of lower layer information should be available in future Internet. For the purpose, a general framework may be necessary.

3. References

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