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A Network Architecture for mobile computing environment

Hiroki Morikawa

School of Information Science,
Japan Advanced Institute of Science and Technology

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Recently, network connectivity has been wide by developing network technology. Carrying a computer has been possible by developing portable computer(ex. PDA, note book computer), that made possible to use computers in place of movement where not only inside such as a laboratory but outside. PC Card Interfaces (Formerly called PCMCIA interface) are widely used in portable computers so that the configuration of a mobile computer can be dynamically changed by replacing such devices while executing applications. By using these technology such as portable computers and PC Cards, it has been possible to connect to network at any time from everywhere and to use services and resources on network and computing power contain other computers.

In such environment called a mobile computing environment, a case that must dynamically change the network media and select a best network media in many medias will happen. The new network media which had been made for mobile computing environment such as wireless LAN and PIAFS have different characteristic from current network media. Because of this, performance of communication may be decline extremely.

Moving computers and changing network medias cause changing IP address. Communication with other computers can not be possible if IP address changes. In current network system IP address is assigned for network media, so changing network media causes changing IP address. And movement causes changing IP address, too.

For improving these problems, new network protocols such as IETF Mobile IP and SONY CSL VIP are suggested. These methods offer host migration transparency. IETF Mobile IP makes possible to move computers by using servers called home agent and foreign agent on network. IP address of mobile computer is used not identifier of connecting point to network but identifier of that computer. It makes possible to identify the computer not depending to connecting point of network. But current system software

is not separated identifier of connecting point to network and identifier of that computer. Compared with this method, VIP separate connecting point of network and identifier of computer by separating network layer to two layers. Also VIP use propagating cache method that can make routing best. These method can offer host migration transparency and connect network if computer moves, but characteristic of current media that computer is using may cause decline of communication performance.

In this research, we focus four problems of mobile computing environment and suggest JAIST Mobile IP that realize flexible mobile computing environment by solving these problems as following.

- corresponding of various network media
- lack of definite identifier of computers
- timing of changing network media
- change of communication characteristic by changing network media

JAIST Mobile IP have some organizations as follow,

easy change of network media by offering virtual network media

Virtual network media conceal the difference of characteristic between network media such as Ethernet or PPP by abstract interface. By this network media are changed independently from protocol stack and changing network media is masked from higher layer.

offer of definite identifier of computers

Identifier of connecting point to network and identifier of that computer are separated by assign home address of IETF Mobile IP to virtual network interface and assign IP address in visited network media that manage.

smooth change of network media by hand-off controller

Hand-off controller that can select adapt network media by information from environment server is placed. Environment server is database that has resource informations in computer and offers these information to application. Hand-off controller makes possible to change network media smoothly between wire and wireless media.

adapt to characteristic of network media by snooper

Foreign agent in IETF Mobile IP extend. It is called proxy agent. Proxy agent has snooper that makes possible adaptive communication with mobile computer and function of foreign agent. Mobile computer also has snooper. By corresponding both of snoopers in proxy agent and mobile computer, communication that adapt characteristic of current network media used by mobile computer becomes possible.

In this reserch, we discuss the problems of mobile computing environment and suggest JAIST Mobile IP as a frame work for realize flexible mobile computing environment. We discuss the useful of this system by comparing with other systems about functions, and discuss the performance of this system by comparing communication performance with Mobile IP built in CMU.