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A Network Architecture for mobile computing environment

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Wireless network have spread area which could be connected to network. Carrying of computers became possible by miniaturization, it made possible to use computer in place of movement where not only inside such as a laboratory but outside. That mobile computers can use PC Card which can be plugged in and out at works. Combination of mobile computer which can be used PC Card and PC card Network media made possible changing network media on the fly. These technologies have made possible to connect to network at any time from everywhere and to use services on network and computing power contain other computers.

In these mobile computing environment there is a case that changes of network media at work or selecting best media in many. 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. Therefore current network system cannot handle new network media completely.

In current network system IP address is assigned for network media. Changing network media causes changing IP address. And movement which is advantage of mobile computer causes a change in IP address, too. TCP/UDP which used by services on network system and applications use IP identify corresponded host by IP address. Therefor current system have not been communicating after changing IP address.

A new network protocol to make allow moving on network such as IETF Mobile IP has been developing. IETF Mobile IP makes possible to move by 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. By this mobile computers are identified wherever connect to network. But current system software is not separated identifier of connecting point to network and identifier of that computer. And there are some problems in that specification.

In this research, we develop a new system with dynamic network selection for solving the problem. This system is placed between protocol stack and network media. The feature of this system is a definite separation identifier of connecting point to network and identifier of that computer. This system provides a single virtual link-level interface for protocol stack by managing all network media that had been handling one by one before. It makes possible to use network media such as wireless LAN and PIAFS these are not able to handle completely before by handle them under the virtual link-level interface. It adopts with IETF Mobile IP and solved problem of IETF Mobile IP specification.

This system has faculties that follow.

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 level.

Separation identifier of connecting point to network and identifier of that computer

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 to network media that manage.

Emulation of foreign agent

Including subset of foreign agent which is server of IETF Mobile IP makes possible to use all network media that can be used by IP.

Our system is constructed by the following components.

Protocol interface

- Provide virtual network interface for protocol stack.

Device interface

- Abstract network media such as Ethernet or PPP.
- Get IP address by DHCP(Dynamic Host Configuration Protocol) or Connect to PPP server.
- Watch connection with network.

Switcher

- Connect protocol interface with device interface to handle IP packet.
- Select better network interface corresponding to the condition.

In our system protocol stack and network media which integrated closely in current system are separated protocol interface and device interface. IP address of identifier for the computer is assigned to protocol interface. IP address of identifier for connecting point to network is assigned to device interface. Switcher select best device interface corresponding to the condition and bind to protocol interface. If best network media has changed by changing the condition, Switcher swaps network media dynamically by selecting new device interface. This action is masked from protocol stack.

This system aims at solving problems follow.

- Building seamless network system for moving computers and changing network media.
- Optimization for communicating environment by selecting best network media for requirement of uses and applications.

In this research, we discuss the problems of network system for mobile computing environment and describe network media selecting system to solving them. We discuss implementation of this system, handling network media on this system and selecting best network media. Network media selecting system solves problems on mobile computers only, but mobile computing environment is total system. So we discuss mobile computing environment too.