Evolution of operating environments for new communication service control

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Traditionally, software in the communication field, especially switching software, has followed a specific path different from that in the information processing field. Individual processings in switching software are simple, but in multiplicity, "real-timeness," and reliability, it has unparalleled features. Communication software itself, which manages a huge amount of communication resources spread over a global scale and assigns them on a real-time basis according to enormous amounts of service orders, constructs a large operating system.

However, telecommunication systems are now going to change significantly. With the advance of the information society, there is a large demand for new communication services using various communication media such as text, image, and video as well as voice. To respond to these demands, much effort has been devoted to evolving communication networks to digital and broad-band networks, and new communication networks such as Integrated Service Digital Network (ISDN) have just begun to be introduced. In the 1990s, multimedia information "pipelines" will be economically available for the general public as well as business users. On the other hand, even if these broad and efficient information pipelines are provided, they are only a treasure left unused if there are no mechanisms for efficiently controlling information streams in the pipeline. In parallel with the advance of physical capabilities of the network, the advance of operating environments for network and service control is necessary. The expectations for the advance of operating environments in communication systems are:

1. Enhancement of user programmability of communication services—the drastic allowance of users participation in service customization. Conventionally, communication services have been one-sidedly and uniformly provided by service providers such as common carriers and system vendors. However, considering diversification and personalization of future communication services, it is impossible to avoid feeling some limitation in the conventional mechanism of service provision. This is the time for us to introduce the idea of user programmability into the communication world by which users themselves can customize services to meet their own requirements.

2. Provision of communication services with much freedom, independence of time, place, and media—the basic subject of communication service control. Much effort has been devoted to achieving the subject so that everybody can freely communicate whenever, wherever, and using every media they want. However, a systematic approach is necessary now when new communication networks such as ISDN have just begun to be constructed. The concept of virtual network control which is realized in AT&T advanced 800 service, for example, points the way we should follow. Service control on virtual networks, which are independent of physical networks consisting of terminals, transmission lines, and so forth, makes it possible to realize communication services with much freedom without physical constraints.

To provide these new services, the operating environments of communication systems must be evolved. The basic point is to depart from the closed world of telecommunications to be in harmony with the information processing world. Communication software should not only be system software but provide higher level operating environments for supporting advanced communication services. To realize user programmable services, it is necessary to provide various utilities by which end users as well as some few specialists, who have been developing communication software as an operating system, can easily define their own services. Furthermore, in virtual network control, operating environments for complex processing using large amount of data are necessary. These basic features are similar to those of information processing, and commonality of various resources including man-power for the development of application packages will become more and more important. Thus, commonality with the operating environments of information processing resources is the basic direction of the evolution of the operating environments of communication software, but it should be done strictly considering specific features of communication software: ultra multiplicity, "real-timeness," and high reliability. RTR (Real Time Reliable) operating system of AT&T and HSOS (Hybrid Structured Operating System) of FUJITSU, which integrate UNIX and real-time operating systems, are examples of new operating environments meeting the above requirements. The operating system offering multi-environments for the control from real-time/ultra-multiprocessing to complex data processing will be the main stream of operating environments for future communication service control.