

## Thesis Abstract

No. \_\_\_\_\_

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Title of Thesis: Signaling-based Dependable Services on the Internet				
Summary of Thesis: <p>Signaling protocol begins to be used to perform billing and authentication to devices, and to exchange the parameters for QoS setting, before the devices start the communication in the services on the global Internet. This dissertation proposed an advanced architecture to improve the availability of the services using the signaling protocol. By utilizing the proposed architecture, the communication restriction on the earthquake disaster can be reduced. In addition, the proposed architecture makes it possible to utilize the signaling protocol in the services using the large number of devices, e.g., Internet of Things (IoT) services, which is expected to be breakthrough in the future.</p> <p>The issues regarding the architecture and operational methods for providing the services by using the signaling protocol have become apparent and never been solved in the even single network domain. There are architectural issues where the signaling protocol cannot prevent the communication of users from being disrupted, when the volume of the traffic increases beyond the bandwidth of the routes and the capacity of the servers. Because the current architecture uses the only shortest path and the servers registered beforehand, the routes having the available bandwidth and the servers having the available capacity are not used for the communication.</p> <p>On the other hand, there is an operational issue where it becomes difficult for the operators to locate where the signaling messages are lost, because the signaling messages are exchanged among the multiple servers at the multiple times. The network operators need to prepare the redundancy to backup the active servers so as to maintain the quality. Then, there is another operational issue where the load of the network operation becomes high, when the servers for the redundancy increase in number.</p> <p>This dissertation proposed the advanced architecture to utilize the route having available bandwidth so as to improve the availability of the services, and to make the devices connected into the servers having the available capacity so as to improve the availability of the signaling protocol. This makes it possible to provide the dependable services which can response to the unexpected communication request by flexibly utilizing the resources of the routes and servers in the whole network.</p> <p>This dissertation also proposed the operational methods that locate the lossy links of signaling</p>				

messages from the limited information and reduce the number of the servers used for the redundancy without degrading the service quality.

The proposed methods reduce the time for the trouble shooting of signaling protocol and streamline the operational method for the redundancy by reducing the number of servers required for the redundancy.

The proposals described above were evaluated based on the performance requirement of the single network domain. The further study regarding the function to adjust the policy among the multiple network domains is required to use the signaling protocol on the global Internet.

However, the proposed architecture and operational methods evaluated in this dissertation can be easily extended on the global Internet, because the global Internet consists of the multiple network domains and each network domain manages by itself. As the result, this dissertation contributes to a large foundation of the improvement of the availability of the services using the signaling protocol on the global Internet.

**Keyword:** Network operation, Network architecture, Signaling, Internet