An Implementation of RACF to resource control in NGN for the Network Simulator ns-2

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Abstract—In the NGN architecture, the Resource and admission control functions (RACF) is aimed at providing real-time application-driven and policy-based transport resource management for a wide range of services and transport technologies. The RACF has two entities; PD-FE (Policy Decision Functional Entity) and TRC-FE (Transport Resource Control Functional Entity). The PD-FE makes the final policy decisions based on the service information such as service type, flow description, bandwidth and priority and transport network information such as maximum upstream and downstream. In this paper, We introduce a implementation of the RACF in ns-2 and the implementation more helps to understand the policy based NGN architecture and scenarios.

***Index Terms*—RACF, PD-FE, TRC-FE, Resource Control, ns-2, NGN**

I. Introduction

THE RACF (Resource and Admission Control Functions) was developed by ITU-T for resource control. This RACF has important roles as the brain of NGN. The RACF is aimed at providing real-time application-driven and policy based transport resource management for a wide range of services and transport technologies. The RACF consists of PD-FE (Policy Decision Functional Entity) and TRC-FE (Transport Resource Control Functional Entity). The PD-FE makes the final policy decisions based on the service information such as service type, flow description, bandwidth and priority, transport network information such as resource admission result and network policy rules, and transport subscription information such as maximum upstream and downstream capacity. The PD-FE makes policy decision and install/uninstall to the policy enforcement functional entity for the resource control operation such as gate opening/closing, bandwidth allocation, packet marking, traffic shaping, and address latching. The TRC-FE collects and maintains the network information and resource status information. the PD-FE has important roles for resource control based on user's policy request. To satisfy user's bandwidth request, transport network should enhance resource control mechanism . So We implemented the RACF system in ns-2 and in the NGN environment, it has more robust policy control than native IP network.

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II. Related Work

A. RACF(Resource and Admission Control Functions)

In the NGN, the RACF (Resource and Admission Control Functions) acts as the arbitrator between SCF (Service Control Functions) and TF (Transport Functions) for QoS related transport resource control within access and core networks . The RACF makes the policy decisions based on transport resource status and utilization information. The RACF executes policy-based transport resource control upon the request of the SCF, determines transport resource availability, makes admission decisions, and applies controls to transport functions for enforcing the policy decisions as shown in fig 1,. The RACF interacts with transport functions for the purpose of controlling one or more of the following functions in the transport stratum: bandwidth reservation and allocation, packet filtering; traffic classification, marking, policing, and priority handling; network address and port translation; firewall. The RACF consists of two types of resource and admission control functional entities, the PD-FE (Policy decision functional entity) and the TRC-FE (Transport resource control functional entity). This decomposition of PD-FE and TRC-FE enables the RACF to support a variety of access and core networks (e.g. fixed and mobile access networks) within a general resource control framework.

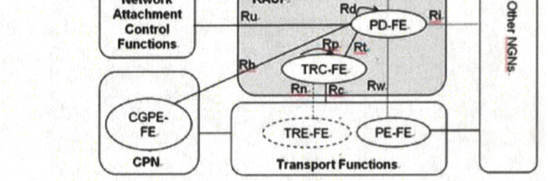


Fig 1. RACF Within the NGN Architecture

III. Implementation and Simulation Result

We implemented the RACF in ns-2. As illustrated in Fig 2, There are three UDP traffic flows from source to destination respectively. Each traffic flow has different values per link. The RED traffic has traffic profile such as packet size 1000, transmission speed 1.5Mb and duplex link. The Green traffic has traffic profile, packet size 1000, transmission speed 1.0Mb and duplex link. The Blue traffic has traffic profile, packet size 1000, transmission speed 0.5Mb and duplex link.

In the procedures of simulation, at first, each node should register to PD-FE server. The PD-FE server obtains the specific node profile such as link speed, transmission speed and route information, and the PD-FE server maintains this information for resource control. Then each end nodes request policy control to the PD-FE server. The PD-FE server requests the TRC-FE to confirm available resource in the transport network. If there exists available resource to allocate, the TRC-FE responses to the PD-FE server. And then, the PD-FE server install the policy decision for the request to the PE-FE.

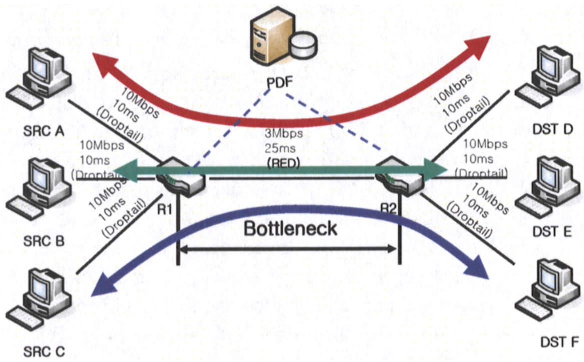
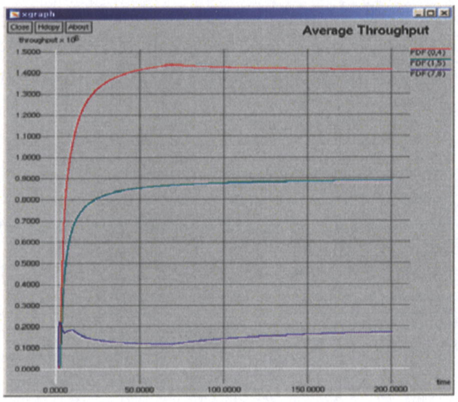


Fig 2. Node Configuration for the Network Simulator

As illustrated in Fig 3, there are results of the simulation. In the RACF scenario, each traffic can send the controlled packets by PD-FE server based on requested bandwidth. The other scenario is just best effort model without the policy control by the PD-FE server.



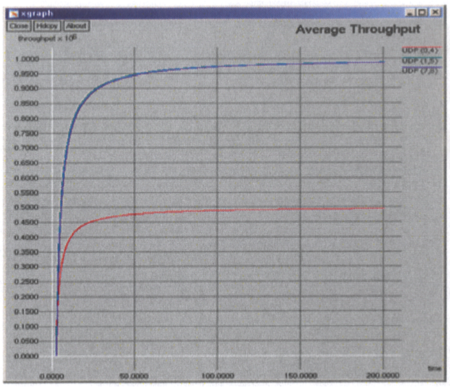


Fig 3 Results of the simulation RACF model and BE model

IV. Conclusion

In the NGN environment, there are many kinds of access network and core network technologies (Fixed and Mobile network). To guarantee End-to-End QoS, the RACF should deploy in the network to support it. In this paper, We present an implementation model and scenario of the RACF of ITU-T.

From the result, to allocate resource to the PE-FE based on end user's request, the RACF scenario has more better performance than non-RACF supported network. This implementation helps to understand the RACF system in NGN and the policy based resource control. In the future, we'll enhance the implemented module to simulate and evaluate the performance of the handover between fixed network and mobile network.

Acknowledgment

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