DAM-FANS: Dynamic Autonomous Monitoring of Future Access Network Services

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Introduction

The demands of different services by subscribers are becoming more and more complex. Due to these trends in subscriber's demands, the future access networks, along with their heterogeneous nature, are supposed to be more sophisticated and complex than today's networks. The management of such networks, along with the services being provided, is becoming a big challenge. There are a lot of different issues to manage when one looks into an integrated view of such future access networks and service providing. Management issues related to fulfilment of Service Level Agreements (SLA) are on one hand important. On the other hand, the management of faults and higher bandwidth is becoming a significant issue. Management of future access networks requires appropriate measures to control and optimize the network operations autonomously. The autonomous monitoring of networks and services will play a greater role in this context. Therefore, a smart monitoring mechanism should be gathering information in relation to service status as well as the network faults and failures.

Dynamic Monitoring Approach

In order to study the above mentioned problems, our research takes into account the demands of higher traffic and guaranteed service providing in future access networks. In this study, we assumed to use Multi Protocol Label Switching (MPLS) technology to solve the problem of higher traffic demands in future access networks.

Monitoring of future networks will involve a lot of different types of monitors. Monitors to ensure SLA, security, QoS, and mobility are some examples. Thus, different challenges such as the high signalling load, monitor placement and high demand for computing resources for examining the monitoring data (e.g. determining trends and reducing the alarm rates) are observed. Two main approaches can play role to overcome such problems:

- Reducing the information per monitored network element.
- Decreasing the number of monitoring points in the network.

We emphasize the second approach of decreasing the number of monitoring points. We develop an autonomous monitoring system to dynamically place the monitors in the network as per need. This will reduce the number of less efficient monitoring entities from the network. This approach resulted in decreased monitoring cost and reduced monitoring traffic.

Implementation

The aim of this work is to observe a MPLS based network and to detect if any of the network elements (nodes or links) fails. Therefore a large network is realized which is composed of some real and emulated MPLS routers. The emulation of MPLS networks is done with the help of NS2 to provide a large network structure which is closer to real network structures. Emulations and simulations of MPLS networks have been developed and used to study different monitor placement mechanisms. One of the targets of this work is to implement some approaches to reduce the number of monitors. Different approaches of autonomous placement of monitors in future access networks are researched. We were successful in developing an application to place the least number of monitors in future access networks. This software application along with the MPLS networks has been used to research issues related to autonomous placement of monitors in Wireless Internet Lab of TU-Ilmenau.

Conclusion

With this study of autonomous monitor placement, it is possible to dynamically place monitors without manual interactions which resulted in reduced monitoring cost of access networks. This work has benefits such as to provide technology to autonomously detect faults in future access networks with least monitoring entities and cost. In the workshop, we will present the issues of service monitoring in future access networks. We plan to discuss the problems related to dynamic placement of monitoring entities and what kinds of research questions have arisen. Furthermore, we will present a scenario to show our researched software in order to discuss how different approaches could be used to monitor different services in future networks.