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Design Issues of Sustainable Self Organized Network Management System

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Abstract : **This paper is the survey on self-organized network management system and its development process. We review the basics of network management system, its historical perspectives and progress. The issues like network traffic, transmission technology, intelligence for decision making, sustainability, disaster recovery and architectural design of total network management system is also discussed in this contest. The need of new network management system components is concluded in this work. The outlook on development process can also be seen in this paper.**

***Keywords* — Network Management System, Self organized Network, Optical Networks.**

I. INTRODUCTION

At present the importance and necessity of computer network is increased to such an extent that, to survive without it is sometimes impossible. There is no till other option available than internet or networks for most of the task. As these computer networks are inversing day by day , the problems associated to it are also increasing rapidly. Change in the technology also causes the change in the network design and its type. In last few decades' drastic change in the software appearance, hardware, topology, transportation logics are observed. One of the main reasons for these entire is , rapid increased of necessity of smart devises, computers and its usages. This also changes the appearance of software applications. Communication ports and devices are also changed due to changes in communication applications. Due to these Enovation's communication speed and protocols also changed in most of the network transactions. Number of devises in the Network are become more or it may reached to unlimited at present compare with last few years. Hence the data generated from them is also limitless. The type of data in the network is also varying from device to devise and application to applications, Due to dependency on the network the problem generated at one point or place is observed at second point within fraction of minute. This creates serious damage in the network environment. According to the need of applications the communication in the communicating party has been increased. In lesser effort more accurate and correct services should be available within stipulated time. To face any critical situation arrived in the network, existence of a strong backbone mechanism which will tackle the problem accurately and will start the necessary process immediately is most awaiting. Most of the time the executions of the processes are not under control and they may need optional resources hence some complex decision need to make in stipulated time. The network should be design in such a way that it can take its own decision or it should be made capable for it. For making complex decision, a network monitoring mechanism must be developed such that the monitoring of traffic in complete network is become easy for finding the working status of network. While making the complex decision in the network some of the following factors must be take in to consideration.

A. The time duration of the alternate option

It is very important to think about, the duration of time to be continued with this path and time of cutoff, also there should not be any compromise in the Quality of Service on execution with alternate sources.

B. The obstacle in the suggested path

List of obstacle and type of it must be Prepared in advance and dealing with these obstacles must be defined clearly. Change in the background processes and alternates made should not hamper the user fronts.

II. BASICS OF NETWORK MANAGEMENT SYSTEM

At present the demand of network service and its customization is a big challenge for network management. Advances in the technology services and advances in the topological changes made heavy pressure on network management due to service obligations. Followings are the important components of Network Management system.

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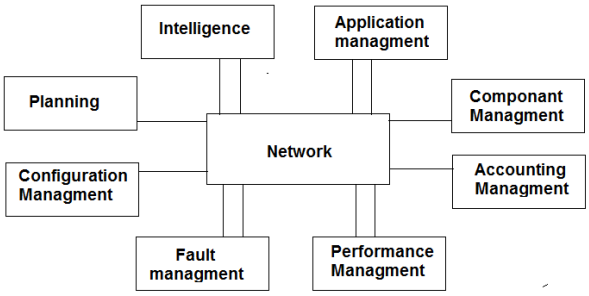

Figure 1: Components of NMS

A. *Configuration management*

This component in the network management system is used for configuration of network services as well as resources to satisfy expected service demand, it is also responsible for collection of data, exercises control over for initialization, starting and termination of resources and services.

B. *Fault and Performance management*

This component is responsible for identification of trouble and alternatives for the service restoration of the network, it may be equipped with complete mechanism for maintaining the performance and mechanism for the fault tolerance, at network and service level as per design.

C. *Security management*

The whole security related issues are addressed in this section of the network, the problems like vulnerabilities and suspected behavior is identified and dealt with.

D. *Accounting management*

The accounting of complete network management system for Configuration, Planning, Component, Applications, Fault management and Performance management is accommodated in this section. Additionally the intelligence management is also merged in the system. All the components have defined Relationship among each other for service obligations. Whole network management system is the associations of service, technology and management algorithms.

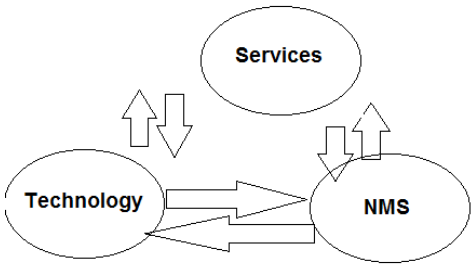

Figure 1: NMS relationship

III. HISTORICAL PERSPECTIVE OF NETWORK MANAGEMENT

The network management issues are frequently raises in the network users, research and development community the problem is encountered by many authors, some of the papers has contributed in this domain like The Survivable Network Design Problem is taken in to consideration by author in [5] he proposed a model along with Protected Working Capacity Envelope called capacity SNDP (ca-SNDP) in which consist a weighted and undirected graph used to model the network topology, each edge is with the weight which is maximum capacity bandwidth of this edge. This topology will construct two network such that a working and a backup network. The objective of ca-SNDP is Design survivable network with maximum total bandwidth in working network. Genetic algorithm is used for solving ca-SNDP. Seventeen problem instances where experimented by author. They run each data set 10 times. The efficiency and bandwidths in working network is high. For the solutions made by the model which uses p-Cycle, by applying the genetic algorithm, inheritance of the results from the earlier generations is possible. The Authors dealt with the problem of localizing node failures in this work he consider two different sets of failed nodes, condition is that between two such a sets there must be a path traversing one and only one of them. They characterized such node first, they characterized the maximum identifiability of node failures, measured by the maximum number of simultaneous failures that can always be uniquely localized.

In [1], the discussion is done on management of optical network, authors work on the problem of spectrum-aware survivable strategies with failure probability constraints under static traffic in flexible bandwidth optical networks. In ordered to minimize the total number of frequency slots consume, Author has developed the integer linear program (ILP) models for dedicated-path protection and shared-path protection. Authors proposed two algorithms one for a spectrum-aware dedicated protection (SADP) algorithm and second for a spectrum-aware shared protection (SASP) algorithm. Results shows that the ILP model solutions consume minimum number of frequency slots, but lead to higher average joint failure probability compared to the SADP and SASP algorithms. Moreover, both the SADP and SASP algorithms achieve a better performance in terms of total number of frequency slots consumed as compared to a conventional dedicated-path protection algorithm and a conventional shared-path protection algorithm, respectively, but lead to higher average joint failure probability. Simulation results showed that the both algorithms achieved better performance in terms of total number of frequency slots consumed and average number of hops than CDPP and CSPP algorithms, However, SADP and SASP result in larger average joint failure probability than the conventional dedicated-path and shared-path protection approaches.

Disaster recovery and management in the network is also an equally need to be address like any other emerging topics. In [2], the importance is given to communication in disaster management and recovery operations after natural disasters.

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To virtually recreate a series of disaster conditions authors used a disaster emulation framework built on top of the large scale network TESTBED, the analysys is done using observations made from how communication performance depends on the mobility pattern of the vehicles. The density of vehicles is used to make various practical decisions. Along with other network, fiber optic is being widely used, especially in the metro core networks. Lots of solutions have been proposed for management of optical network and its topology. However most of them neither focus on all-optical networks nor fault tolerance issues

In [3] the efforts are made on solution for designing physical topology, Traffic requirements, fiber cost and survivability of optical metro core networks. From the experimental results, it is concluded that Survival algorithm can design effectively for all optical networks with low cost, Survival algorithm allows to design physical topology that ensuring the network survivability. The algorithm has polynomial complexity and can be used for design large scale network is shown by the complexity evaluation of survival. Many researchers have focused how the Survivable routing is needed to be design and implement. In [4] Problem of survivable routing in multi-domain optical network is investigated and resolved. this method can achieve good performance in terms of average total cost and blocking probability this work has achieved increased in systematic inter domain connectivity. The link Failure is common problem in network In [5] study of the problem of survivable optical network is undertaken the work on the link failure situation and reconnection of services in respective domains. Mapping of flexible grid in optical network is implemented the total cost of the network is controlled by formulating the problem as an integer linear program.

Dynamic survival traffic grooming problem is addressed In [6] this work provides guaranteed survivability in single link failure. By analysis of time complexity analysis they solve problem in worst case to address the problem of dynamic survivability traffic grooming. For load balancing two methods used for experimentation TGML and TGMHL over TGMH, this reduced network cost by saving network recourses.

IV. Conclusion

Network Management System has not only made a large progress in recent decades but it also decides our way of we live. All optical networks need high level of sustainability, reliability and survivability mechanism. to integrate service reliability and energy efficiency is also the problem need to be address. The necessity of network traffic monitoring is also a major issue in the network which is to be solving yet. To estimate network performance as a design parameter there is a need of an analytical model. In our opinion it is necessary to develop intelligent network and its management system to use network more efficiently and properly.

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