THE IMPLEMENTATION OF PROGRAMMABLE WIRELESS ROUTER USING JAVA

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ABSTRACT

Nowadays available wireless routers do have extra levels of embedded security. Existing Wireless routers can be configured for invisible mode. So that wireless network cannot be scanned by outside wireless clients. If there is no configuration for wireless router, bandwidth of the Wi-Fi signal will be shared among all the nodes in wireless network equally. If configuration done for the wireless router, according to assigned bandwidth all nodes will access data. The problem with existing routers is, if the particular node is accessing heavy data, bandwidth of the Wi-Fi signal reserved for that particular node, the other nodes cannot access data with high speed. The recent technological advancements have paved the way for programmable wireless router to increase the speed of data accessing and increase the data transfer rate. The main objective of this paper is to increase the data transfer rate and data access through the programmable wireless router. The proposed prototype is to design a programmable wireless router and implemented via JAVA.

Key words: Wireless Router, Packet forwarding, Packet processing, protocol management.

I. INTRODUCTION

The proposed prototype is to design a programmable and more efficient wireless router which is going to provide better management of packets ,better packet forwarding, it also provides better security protocols which helps in preventing unauthorized access. It also helps in providing a good way of preventing system crash from corrupt configuration and log files.

Making a wireless router programmable not only increase performance, but also improves data has access and data transferred rate. In the time of busy schedules data access and data transfer rate is the major issue related to the routers. Programmable wireless router also helps in preventing unauthorized access and reset procedure in case of corrupt files.

Authentication block is also one of the applications in wireless router. Security therefore can be tightened up when people who access the router are being monitored and logged. Also with dynamic bandwidth allocation we will get the chance of providing different bandwidth for different users, giving registered people extra access rate and data transfer rate by providing more bandwidth to user with heavy data.

II. PROBLEM DESCRIPTION

There are many features that can be included in a Programmable Wireless Router. Separate authentication block, static bandwidth allocation block, scheduling algorithms, routing algorithms are commonly seen in a wireless routers. The Wireless Router can be programmed to manage inbuilt authentication block that prevent unauthorized access normally it is not inbuilt and provided with separate administrator, dynamic bandwidth allocation which provides bandwidth according to the data you are accessing. Most Wireless Routers does not have reset button in the case of corrupt log which can crash our system we can also implement that in programmable wireless router. The field of Routers, Wireless Routers encompasses an enormous variety of technologies, across commercial, industrial, institutional and domestic purposes. The function of Wireless Routers is to provide as a good interface between two computer networks; its purpose is to transfer packets with high access and transfer rate, to provide good scheduling algorithms, to provide good authentication block, to provide good priority queues for storing packets temporarily and to provide secure way of managing database in router. The essence of Wireless Routers and programmable routers is in the control technologies, which allow integration, automation, and optimization of all the services and equipment that provide services and manages router functioning.

III. LITERATURE SURVEY

For the past decade, Routers has been increasingly perceived by developers as a unique and important measure to reflect the specific performance and properties of packet transfers in different networks. The models of routers evolve from early router performance evaluation studies and refine them. The very first device that had fundamentally the same functionality as a router does today, i.e a packet switch was the Interface Message Processor (IMP); IMP's were the devices that made up the ARPANET, the first packet switching network. The idea for a router (although they were called "gateways" at the time) initially came about through an international group of computer networking researchers called the International Network Working Group (INWG). Set up in 1972 as an informal group to consider the technical issues involved in connecting different networks, later that year it became a subcommittee of the International Federation for Information Processing. These devices were different from most previous packet switches in two ways. First, they connected dissimilar kinds of networks, such as serial lines and local area networks. Second, they were connectionless devices, which had no role in assuring that traffic was delivered reliably, leaving that entirely to the hosts (although this particular idea had been previously pioneered in the CYCLADES network).

The idea was explored in more detail, with the intention to produce a real prototype system, as part of two contemporaneous programs. One was the initial DARPA-initiated program, which created the TCP/IP architecture of today. The other was a program at Xerox PARC to explore new networking technologies, which produced the PARC Universal Packet system, although due to corporate intellectual property concerns it received little attention outside Xerox until years later.

The earliest Xerox routers came into operation sometime after early 1974. The first true IP router was developed by Virginia Strazisar at BBN, as part of that DARPA-initiated effort, during 1975-1976. By the end of 1976, three PDP-11-based routers were in service in the experimental prototype Internet.

The first multiprotocol routers were independently created by staff researchers at MIT and Stanford in 1981; the Stanford router was done by William Yeager, and the MIT one by Noel Chiappa; both were also based on PDP-11s.

As virtually all networking now uses IP at the network layer, multiprotocol routers are largely obsolete, although they were important in the early stages of the growth of computer networking, when several protocols other than TCP/IP were in widespread use. Routers that handle both IPv4 and IPv6 arguably are multiprotocol, but in a far less variable sense than a router that processed AppleTalk, DECnet, IP, and Xerox protocols.

In the original era of routing (from the mid-1970s through the 1980s), general-purpose mini-computers served as routers. Although general-purpose computers can perform routing, modern high-speed routers are highly specialized computers, generally with extra hardware added to accelerate both common routing functions, such as packet forwarding and specialised functions such as IPsec encryption. Still, there is substantial use of Linux and Unix machines, running open source routing code, for routing research and other applications.

Given the above literature review, it can be seen that the majority of the past research in routers has been either limited to wired routers or if wireless then also there is less security and bandwidth related problems. Little has been done on the assessment of the programmable wireless routers. As a plethora of intelligent components and products have been introduced and made available in the markets over the last 20 years, the adjective ‘programmable’ has been extensively applied to portray the smart properties of wireless router products. Manufacturers of programmable technologies often claim their systems are more intelligent than others of their kind, but these assertions tend to be vague and unjustified. Considering the existing problems in the research as well as in implementation, a new index that represents the degree of system intelligence and indicates the desirable goal in designing programmable wireless routers must be developed. Therefore, the important issues are to investigate and determine how to measure and improve system performance, and to determine the performance indicators for assessing degrees of efficiency of routers.

IV. DESIGN METHODOLOGY

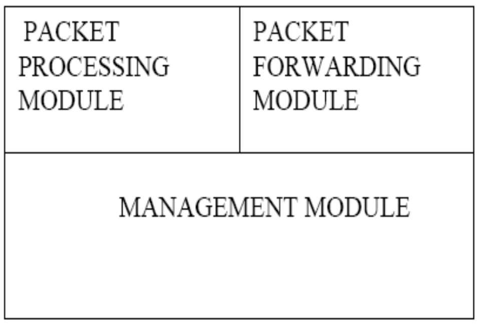
The proposed prototype includes the development of programmable wireless router. Since use of wired router is very costly and messy also that’s why we are using wireless router. Due to this we should have extra level of security in our system which should prevent unauthorized access of users. In our system we have added this layer by implementing user authentication block which first checks the authentication of every user who wants to access the router, user list is stored in administrator so whenever user wants to communicate with other users first of all its macid and userid is checked whether it is in the user list or not. After this only they will get access. There is one more problem in existing systems i.e. related to bandwidth allocation. If configuration done for the wireless router, according to assigned bandwidth all nodes will access data. In existing system there is no provision of dynamic bandwidth allocation for ex. If two clients are sending files like one is sending text file and another is sending some video file then there is no way in existing system so that we can allocate more bandwidth to video file . Both the files will get same bandwidth according to the existing system which will cause decrease in speed of overall system and this may cause system crash also. To prevent this we are applying strategies which are going to allocate the bandwidth dynamically. In our methodology we are using 3 computers one is going to work as a router and other two has some clients on it which are going to communicate with each other via programmable router. So by using our proposed system we provide fast access speed and high speed transfer rate which will make the existing system more powerful, efficient and also increase the performance.

V. COMPARSION

CHARACTERSTICS	EXISTING SYSTEM	PROPOSED SYSTEM
Bandwidth allocation	Statically allocated	Dynamically allocated
Authentication	Separate block	Included in router itself
Resetting	Normally not included	Clear the log process
Scheduling	FCFS,SJF etc.	FCFS
Administrator	Separate block	Included in system itself
Data access rate	Medium	High
Data transfer rate	Medium	High

VI. SYSTEM ARCHITECTURE

A collection of components that work together to realize some objective forms a system. Basically there are three major components in every system, namely input, processing and output. Input will take the input and then it will be processed and send to the output port:



A) **Packet processing module:**

Every packet has some information in it with the address of the destination .First step of processing is to accept packet arriving on an incoming link then it will Lookup packet destination address in the forwarding table, to identify outgoing port(s). Then it manipulate packet header: e.g., decrement TTL, update header checksum.

B) **Packet forwarding module:**

This module includes sending (switch) packet to the outgoing port(s) and Classify and buffer packet in the queue. Transmit packet onto outgoing link.

C) **Management module:**

This module includes all the additional features of router that we are going to implement to make this router programmable like dynamic bandwidth allocation for different packets according to their need.

VII. SYSTEM COMPONENTS

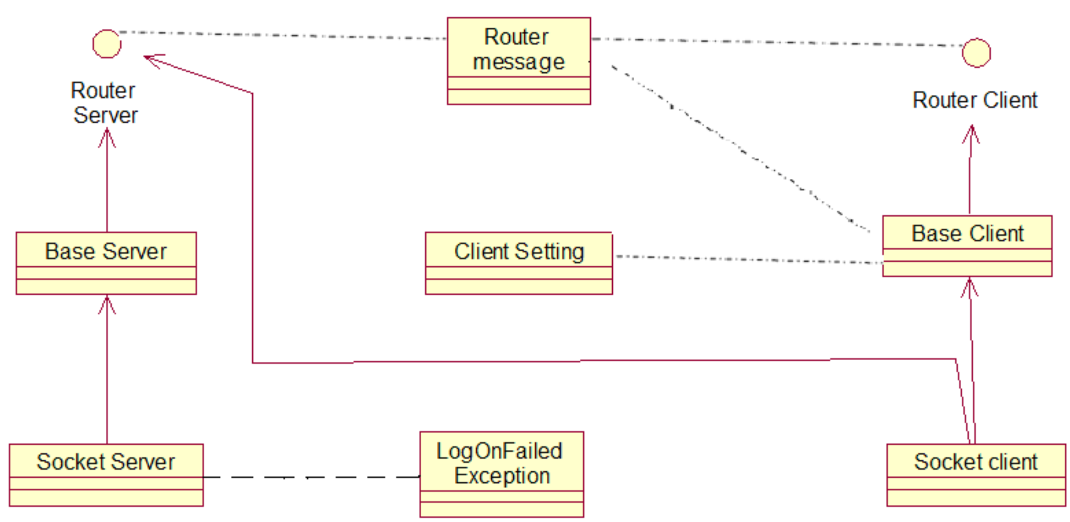
Input ports, output ports, edit engine, a scheduler , priority queue,.

- INPUT PORT-An input port is the point of attachment for a physical link and is the point of entry for incoming packets. Ports are instantiated on line cards, which typically support 4, 8, or 16 ports.
- SWITCHING FABRIC-The switching fabric interconnects input ports with output ports. We classify a router as input-queued or output queued depending on the relative speed of the input ports and the switching fabric.
- SCHEDULER-It will help in deciding which packet will be processed first according to their arrangement in priority queue.
- PRIORITY QUEUES-Packets will be arranged in the priority queue according to the priority that means high priority packets will be delivered first.
- REPLICATOR- It will be replicating the packet if it should be send to more than one destination.
- OUTPUT PORT-An output port stores packets and schedules them for service on an output link.
- ROUTING PROCESSOR- It participates in routing protocols and creates a forwarding table that is used in packet forwarding.

An input port provides several functions. First, it carries out data link layer encapsulation and decapsulation. Second, it may also have the intelligence to look up an incoming packet's destination address in its forwarding table to determine its destination port (this is also called route lookup).Third, in order to provide QoS guarantees, a port may need to classify packets into predefined service classes. Fourth, a port may need to run datalink-level protocols. Once the route lookup is done the packet needs to be sent to the output port using the switching fabric. The switching fabric can be implemented using many different techniques. The most common switch fabric technologies in use today are busses, crossbars, and shared memories. The simplest switch fabric is a bus that links all the input and output ports. Unlike a bus, a crossbar provides multiple simultaneous data pathsthrough the fabric. A crossbar can be thought of as 2N busses linked by N*N crosspoints: if a crosspoint is on, data on an input bus is made available to an output bus, else it is not. In a shared-memory router, incoming packets are stored in a shared memory and only pointers to packets are switched. This increases switching capacity. Output ports store packets before they are transmitted on the output link. They can implement sophisticated scheduling algorithms to support priorities and guarantees. Like input ports, output ports also need to support datalink layer encapsulation and decapsulation, and a variety of higher-level protocols. The routing processor computes the forwarding table, implements routing protocols, and runs the software to configure and manage the router. It also handles any packet whose destination address cannot be found in the forwarding table in the line card.

VIII.ARCHITECTURAL FRAMEWORK

This diagram includes basic class diagram and their interrelationship; this will tell the basic working of our system.



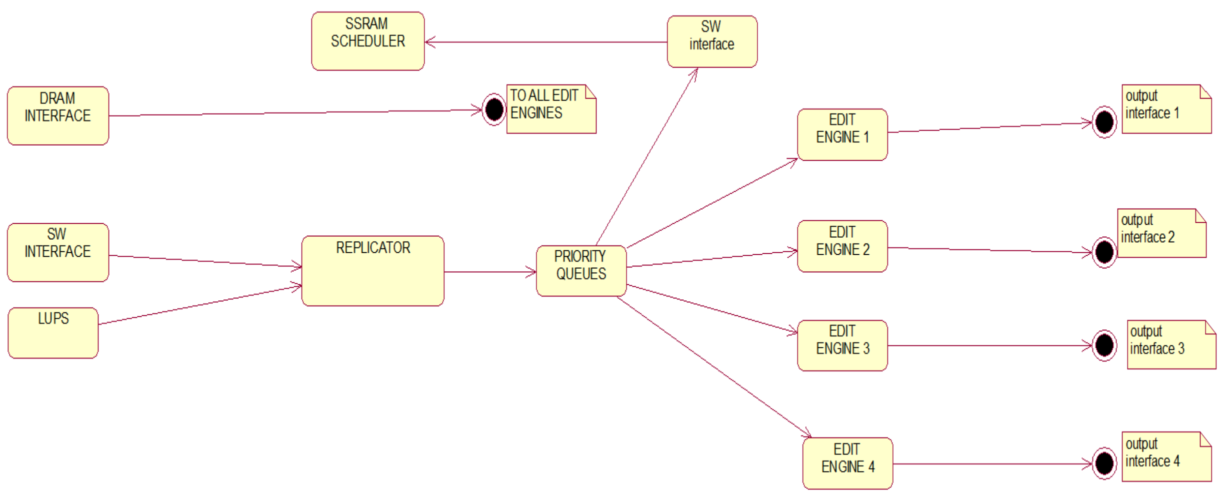
IX. FUTURE IMPROVEMENT

A significant proportion of communication is done via routers. Making routers more efficient is an important step to increase our data access and data transfer rate. Broad participation by consumers, business owners, and governments is required to continuously improve the efficiency for new and existing routers and to achieve more efficient and secure way of communication. This paper provides a software system perspective of improving router efficiency by making it programmable. It proposes an architecture that helps in making of somehow good and more efficient wireless routers. In addition, it addresses the needs and objectives of customers who want more speed and more security everywhere. In case of future enhancement we can make our system more efficient by using learning rules that will help in making our programmable wireless router as a self learning router. We can also use genetic algorithms for better improvement in efficiency as well as performance.

X. CONCLUSION

Routers are in the midst of great change, due to both customer pull and technology push. Customers are demanding higher bandwidth, greater reliability, lower cost, greater flexibility, and ease of configuration. Simultaneously, technology, in the form of ATM switching cores and fast route lookup algorithms, has allowed router vendors to build the next generation of routers. We believe that the advances described in this paper, such as the use of ATM cores, better output queueing, advanced scheduling algorithms, avoiding route lookups, and centralized administration, will be the distinguishing features of this generation. While these advances have solved some difficult problems, important issues still remain unresolved. We believe that understanding the stablility of a network of routers is a critical open issue. Trading off cost, speed, flexibility, and ease of configuration, as always, will be a challenge for router designers in years to come. Traditionally, a new emerging network service needs a set of new network protocols and devices to fulfill all the transport and switch requirements. This makes the development of network infrastructure always lags behind that of network application. In this paper, we present a reconfigurable router architecture, which can provide flexible and evolvable functions and performance. Such router is feasible for the future network and can support the fast deployment of new network application.

A. Internal Structure of the Router:



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