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Virtual Service Resource Replacement Algorithm with Dynamic Resource Allocation Based on Traffic Change in Virtual Networks

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Abstract: Many virtual networks are built by utilizing network virtualization technologies on a substrate network withnetwork resources. Virtual service resources may be used to provide a particular service to users across each virtual network. Additionally, future network services are predicted to include network virtualization for mobile users. In mobile virtual networks, users often switch between nodes and connect to different access points. As a consequence, the virtual network's link and node traffic fluctuates. Because service quality is determined by the quantity of traffic on links and nodes, service quality varies with the user's movement.This study offers a method for replacing virtual service resources in virtual networks for mobile applications with dynamic resource allocation response to changing traffic. The number of resources for every node and every link in our suggested system is modified based on traffic changes. Furthermore, the virtual service resource is moved from a node to an adjacent node, and this substitution is continued until the service's quality meets the specified quality. It is envisaged that the service qualityof the mobile customers would be maintained using our proposed strategy, even if the volume of traffic fluctuates. We measure the efficiency of our suggested technique utilizing simulation. It is shown via numerical examples that our suggested technique works well when there are more users involved and traffic fluctuates.

Keywords:*virtualserviceresource,virtualnetwork,mobileuser,trafficchange*

1.INTRODUCTION

Network virtualization technology is currently being extensively used all over the world [1,2,3]. Network virtualization is one of the newer network technologies that is getting a lot of attention [4,5,6,7]. Utilizing network virtualization technologies and network resources like memory, CPU, and bandwidth, several virtual networks are built on a substrate network [8,9,10]. Numerous use cases have already made use of virtual networks [11,12], and network virtualization technology is projected to be applied in additional circumstances in the future. A network virtualization system is a place it creates virtual networks across a substrate network by providing users for them. In such a framework, a developed anindependentvirtual network of other created virtual networks.As a result, the virtual network is unaffected by another virtual network.

Each virtual network in a network-virtualized system must be built using network virtualization. use a substrate network's resources wisely. Due to virtual networks are created by sharing resources from a finite substrate network.Additionally, different issues like packet loss and network congestion arise as a result of the rise in data traffic in a contemporary communication network [14]. As a result, virtual networks are anticipated to just be built in such a way that they strengthen the virtual networkstoughness. Within this system, a few techniques were suggested. Even if a virtual network is faulty designed, data packets can still be transferred across it. Using these technologies, each virtual network may maintain service for data transfer even if only a single substrate network connection fails. Furthermore, approaches for building virtual networks for resilient networks of substrates were suggested in [15], [16], and [17]. The construction of virtual networks against the substrate network involves the use of sector data transmission services, like the present Internet infrastructure. Particularly high priority courses like traditional services shouldn't have their quality compromised. To prevent interference type of situations, virtual networks are anticipated to be builtagainst substrate networks.

In this study, we describe a virtual service resource replacement approach for mobile applications in virtual networks with dynamic resource allocation depending on traffic change. Our suggested solution consists of two parts: 1) resource allocation that is dynamic and dependent on traffic changes and 2) static resource allocation.2) On the basis of traffic changes, replacement of virtual service resources on a dynamic basis. Dynamic resource distribution modifies the number of resources for every node as well as every link depending on changes in traffic.This resource distribution enables the distribution of more (fewer) nodes and link resources as the number of traffic upsurges (declines). In contrast to that,as part of this dynamic substitution of virtual service resources, the resources switch across nodes.Up until the service reaches the desired level of quality, this replacement is carried out again. It is envisaged that the service quality for mobile customers would be maintained using our proposed strategy, even if the volume of traffic fluctuates.

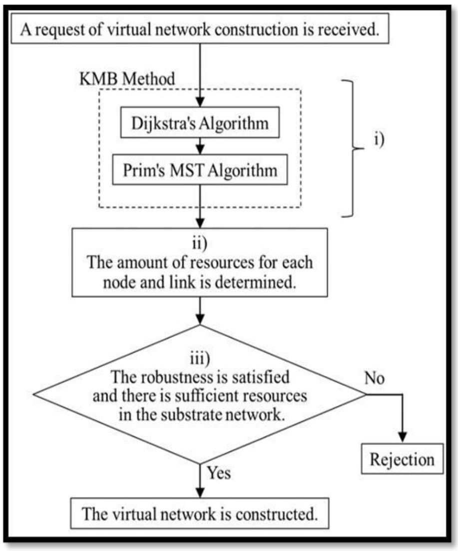

Fig1.Procedureofvirtualnetworkconstruction

2.EXISTING VIRTUAL NETWORK CONSTRUCTION CONSIDERING NETWORK ROBUSTNESS

2.1VirtualNetworkConstructionProcedure

In the following, wepresume that the telecommunications carriers that administers a substrate network serves as the service provider for each virtual network. When a service provider approaches a telecom carrier with a request for the creation of a virtual network.

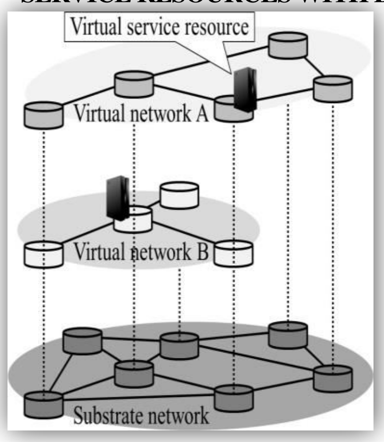

Fig2.Virtualserviceresourcesin virtualnetworks

REPLACEMENTALGORITHM OFVIRTUAL SERVICE RESOURCES WITH DYNAMIC RESOURCE ALLOCATION BASED ONTRAFFICCHANGE

For virtual networks where mobile users access network services, we provide a virtual service resource replacement technique with dynamic resource allocation in this part. It is envisaged that by adopting this strategy, users will be able to make proper use of the virtual service resources.An overview of our suggested methodology is provided in this section. Our suggested approach in this situation may be used for virtual networks that utilize virtual service resources across a substrate network (see Fig 2). A server for the specific service is referred to in this work as a virtual service resource.

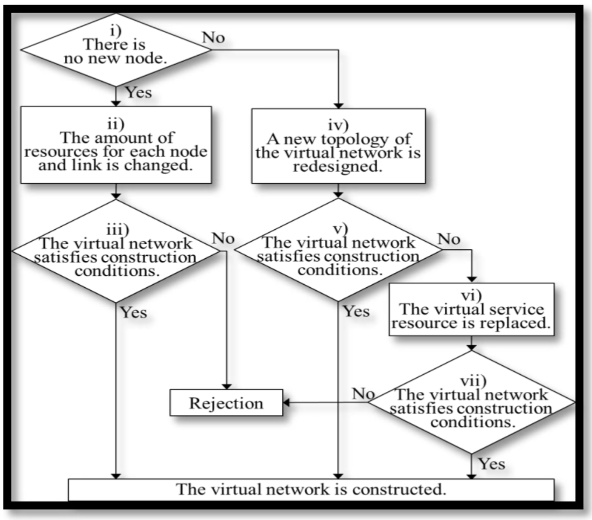

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Fig3.Flowchart of the proposed method

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Now create a scenario where the user's mobility results in a change in user number or the introduction of the new node. The quantity of virtual network traffic increase dramatically as a result of such a user's travel.As a consequence, our suggested approach enables the replacement of virtual network services and the modification of network resource allocation in virtual networks in response to variations in traffic. The steps for our suggested technique are shown below. Our suggested solution's flowchart is shown in Fig 3.

4. SIMULATIONMODEL

In this segment, we explain the simulation model that we utilized to assess the effectiveness of our suggestedapproach. A substrate network is depicted in Fig4.

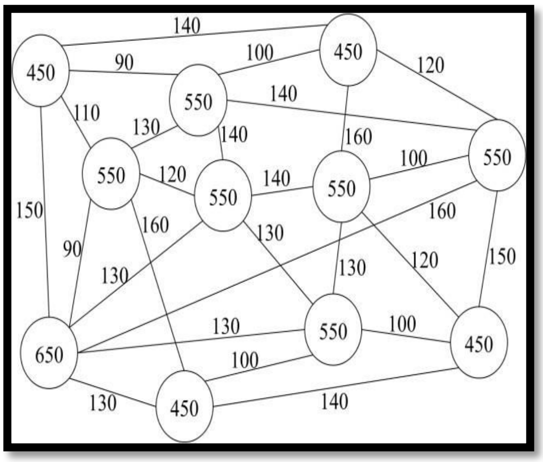

Fig 4.Network Topology

The number of resources available to each node in this substrate network ranges from 450 to 650, and the number of resources available to each connection ranges from 90 to 160. We anticipate that new requests for virtual network creation will come in at a Poisson rate of 1 for this substrate network. This request includes information on H nodes (H 3) as well as the number of resources required for the virtual network to be built. The number ui of users for node ni is chosen randomly from the range [1, 20]. When a new virtual network request is received, the KMB method is used to builda virtual network.[19]. Then, depending on the traffic amount, the number of resources for nodes and connections is allocated, and a virtual service resource is assigned at random.A new virtual network is created,and thisis evaluated to see if it meets the building standards outlined in subsection 2.2. We assume that the virtual network's utilization time follows a 1.0 rate exponential distribution.

After a virtual network is created, its current traffic shifts in accordance with an exponential distribution at the rate of λ2.Given this, the virtual network gains a new node with probability β, while the amount of traffic varies with probability 1-β. Two nodes in the virtual network are randomly chosen when the amount of traffic varies, and 1 to 5 users switch between the two nodes. However, whenever adding a new node to the virtual network, Users for the new node are randomly selected from[1,20].

In the given segment, we utilize the simulation to assess the efficacy of our suggested strategy. We also evaluate the effectiveness of a strategy that uses the random walk algorithm to redesign a new topology rather than the shortest-path betweenness centrality. This technique is called the random walk approach.We also take into account a technique that allows the virtual service resource to move to a neighboring node only once. The Move Once approach is the name for this tactic. The virtual service resource in our suggested approach may be moved to the mentioned newly installed node, it should be noted. We also examine a method that allows for random replacement of the virtual service resource. This approach is known as the random technique.

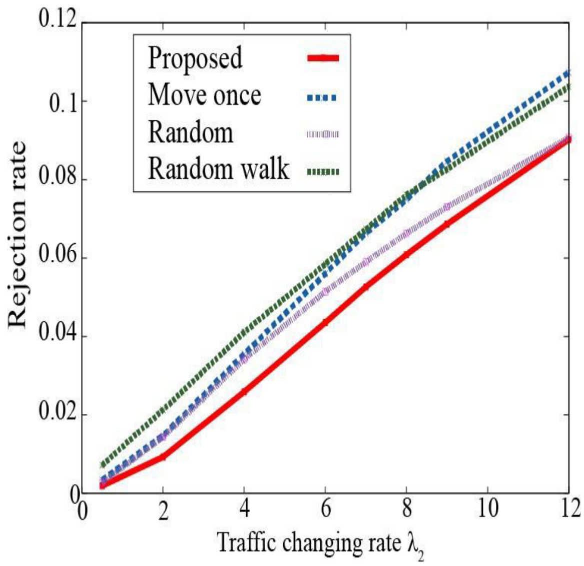

Fig 5. Rejection rateof virtualnetworks vs.trafficchanging rateλ_2

In “this part, we look at how the performance of our suggested strategy is affected by the traffic changing rate λ_2. Following, the probability is equal to 0.5, and the request arrival rate λ_1 is equal to 1.0.

Fig5displays the virtual network rejection rate versus the pace at which traffic is changing. We can see from this fig that as the traffic changing rate λ_2 rises, so does the rejection rate for the four approaches. This is owing to how difficult it is to meet the construction requirements while a user moves. Nevertheless, despite the traffic change rate of λ_2, the rejection rate for our suggested technique is lower than that for other ways. Because of this, our suggested solution can create more virtual networks, and more users can use the virtual network irrespective of the traffic" change. Thus, when the amount of traffic fluctuates, our suggested method still works.

5.CONCLUSION

In order to maintain service quality, we proposed in this study a technique to replace virtual service resources with dynamic distribution of resources depending on traffic fluctuation for applications of mobile in virtual networks. On the basis of the change in traffic, the number of resources for every node and every link in our proposal was modified. The virtual service resource is also shifted from one node to the next, and this substitution cycle is continued until the desired level of service quality is achieved. We analyzed the effectiveness of our suggested strategy using simulation. Comparing the performance results show that our suggested approach works well when a greater user in number will migrate and current traffic changes.

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