

Improving Time and Energy Efficiency in Data Center Networks

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ABSTRACT:The Data Centre Networks connect several number of servers in the cloud computing. The job controller is like the resource scheduler in current cloud data centres, such as the VM ware capacity planner. The job controller is responsible for an energy-efficient assignment done by using virtual machines. Currently, the Traffic aware Energy Efficient Routing (EER) algorithm has been implemented in Data Centre Networks which is based on Virtual Machine assignment and does not achieve the energy efficiency. If the number of servers increases the algorithm will not produce good results because of the energy consumption during packet transmission. So in this paper, the Multipath Ad-hoc on demand distance vector routing protocol (MAODV) is proposed to provide optimal path for packet transmission. This protocol finds the best path among multiple paths between the source and the destination. The best path can be selected by that protocol by reducing the number of active switches and the traffic flows can be balanced. The simulation results show that the energy and time consumption were good for MAODV algorithm compared with the EER algorithm.

KEYWORDS: Data Centre Network (DCN), Multipath routing, Virtual Machine, Multipath Ad-hoc on demand distance vector Routing (MAODV), Energy Efficient Routing (EER).

I. INTRODUCTION

Data centre is a pool of resources which are interconnected using a communication network. Data Center Network (DCN) connects all of the data center resources together. DCNs need to be scalable and efficient to connect tens or even hundreds of thousands of servers to handle the growing demands of Cloud computing. The data centers are constrained by the interconnection network. The energy consumption of data centers has become an essential problem. The electricity used in global data centres in 2010 likely accounted for between 1.1% and 1.5% of the total electricity use and is still increasing. The energy consumption of the enormous number of network devices that are used to interconnect the servers has emerged as a substantial issue. Therefore, improving the time and energy efficiency of the network also becomes a primary concern.

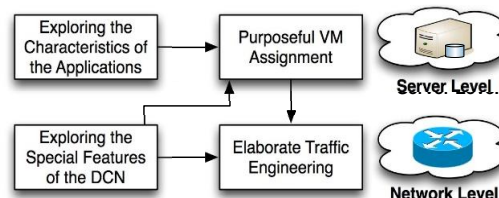


Fig. 1.A general framework for improving the energy efficiency in DCNs.

A virtual machine (VM) is an emulation of a particular computer system. The virtual machines implement the functionality of targeted real machines. In this the virtual machine assignment can act as a bridge between the traffic engineering and application characteristics. The virtual machine assignment is comprised of a set of specification and configuration files and is backed by the physical resources of a host. The uses of virtual machines are to support separate guest operating system. A virtual machine is less efficient than an actual machine when it accesses the host hard drive indirectly. The utilization of network resources and load on network can also be balanced by the virtual machine assignment. Traffic engineering is a method of optimizing the performance of a telecommunications network

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by predicting and regulating the behaviour of data transmitted over that network. The techniques of traffic engineering can be applied to all kinds of networks, including the PSTN (public switched telephone network), LANs (local area networks), WANs (wide area networks), cellular telephone networks, proprietary business and the Internet. An important objective of Internet traffic engineering is to facilitate reliable network operations. Reliable network operations can be facilitated by providing mechanisms that enhance network integrity and by embracing policies emphasizing network survivability. This results in a minimization of vulnerability of the network. A traffic engineering methodology establishes appropriate rules to resolve traffic performance issues occurring in a specific context. A major objective of traffic engineering is to minimize or eliminate the data loss situations and to minimize the cost of operating and maintaining the network by balancing the QoS (Quality of Service) parameters.

II. RELATED WORK

Several schemes have been proposed to increase the energy in Data center networks. The energy efficiency routing algorithm [1] is used to find the routing path under packet transmission. The MPTCP is to find out the efficient routing path and the transmitted packets would take huge energy consumption because using EER routing path selection was difficult to find optimal path between source and destination. The system used traffic-alive VM placement to network, then analysed how to accomplish better capability provisioning using VM multiplexing by exploring the traffic patterns of VMs. Here two algorithms are used to find the optimal path. The three VM principles are used to solve the energy consumption problem by increase the number of active switches [1] and equity the traffic flows. It is depends on relation of power expenditure and routing. The Energy Efficient Routing algorithm balanced traffic flow among the maximized number of switches. It could not frame scalable and reliable network architecture. They increased the energy consumption and the total cost can be maximized. They reduced the network utilization process. The VM assignment provided the flexibility and the hardware resource utilization. The VM assignment acts as a bridge between the application characteristics and the traffic engineering. The three VM principles are applied to find out the optimum switches from the node behaviour and the best one is chosen. After that the Energy Efficient Routing (EER) algorithm [1] was applied to find the switch control and also the optimal path was identified. In this stage, the minimum path between the target nodes was determined. Then the relation between the power consumption and routing was analysed. Since the evaluation was based on the behaviour of both source and destination. The behaviour of both source and destination was calculated. The algorithm allowed the source to forward the information to the destination. Dcell [11] was a fault tolerant since it did not have single point of failure and it was a distributed fault tolerant routing protocol. By using Dcell there was no severe bottleneck problem occurred. It used more and longer communication link with higher wiring cost. D. Abts, M. R. Marty proposed that [6] a flattened butterfly topology itself is inherently more power efficient than the other commonly proposed topology for high-performance datacentre networks. If additional wrap around links are enabled then the offered demand also increased. Pcube [14] a server centric data center structure that conserves energy by varying bandwidth availability based on traffic demand. But in Pcube for real world applications the energy waste cannot be avoided. N.Vasic, P.Bhurat, [13] proposed that evaluate response with real network data and demonstrate that it achieves the same energy savings as the existing approaches. It achieves high application level throughput and latency. However more energy-proportional faces several challenges that are hard to overcome.

III. PROPOSED METHODOLOGY

The multicast operation of the Ad hoc On-Demand Distance Vector (AODV) routing protocol (MAODV) is intended for use by mobile nodes in a data centre network. The MAODV process allows each mobile node in the network to send multicast traffic network performs in two steps. Initially there is a route from that data source node to network nodes, then the network node receive the multicast packets, it propagate the data through the whole network, reaching every group members. The traffic balancing can be accomplished by multipath routing protocol. The multipath routing protocol MAODV is to route all of the flows using selected switches. It can establish multiple sub flows across different paths between the same pair of endpoints for a protocol connection. In this process to achieve the less energy consumption during packet transmission among source and destination use the formulated loading process. By that process the total cost and the total power consumption can be minimized. They balanced traffic flow among the

minimized number of switches. It improves the network utilization process to execute correct result. It can frame a scalable and reliable architecture. By using this Multipath Adhoc on demand vector routing protocol the energy and time efficiency have been increased. They can be experimentally done and their results are given below.

The comparison between the existing Energy Efficient routing algorithm and the proposed MAODV routing protocol algorithm can be done by the energy and throughput graphs. These graphs clearly show that the proposed methodology provides high energy and time efficiency than the existing one. The flow diagram for the proposed methodology is given below. By applying the MAODV algorithm the source node broadcasts the route request and waits for the reply from the neighbour nodes. Then the optimal path is identified and the packets are transmitted from source to destination through the optimal path. The optimal path has been obtained from various paths. The numbers of active switches are also reduced by using this Multipath Adhoc on demand vector routing protocol. Figure 2 shows the data flow diagram of the proposed methodology.

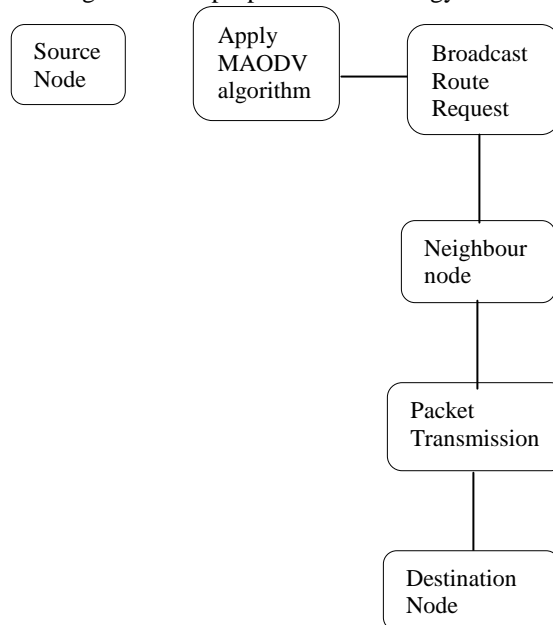


Fig.:2. Flow diagram of the proposed Methodology

A. Path Discovery

The MAODV is also used to find the mobile node flow control. In this process source node broadcast the request to all other node in the network to find different path to reach the destination. To achieve energy conservation and to explore the relation between energy consumption and routing, design demand distance vector routing is used. This routing algorithm is to find the optimal number of path determined and the balance traffic flows to reach less energy consumption. It calculates different paths in order to find the optimal path between the source and the destination.

B. Packet Transmission

The packets are transmitted between the source and destination by using the optimal path. Each intermediate routing node that a packet crosses the packet is discarded. A new discovery process is started whereby a route request packet is broadcast from mobile node to mobile node until it arrives at the destination that has a route to the destination. The route request is further broadcast until such broadcast reaches the connected network is fully covered. The packets are transmitted through the source to destination in optimal path using MAODV method. It can consume less energy for data communication through optimal path.

IV. RESULTS FOR PROPOSED METHODOLOGY

A. Simulation results for increasing energy

By using the MAODV routing protocol, the energy efficiency in the data center networks can be increased. It is shown in the figure 3

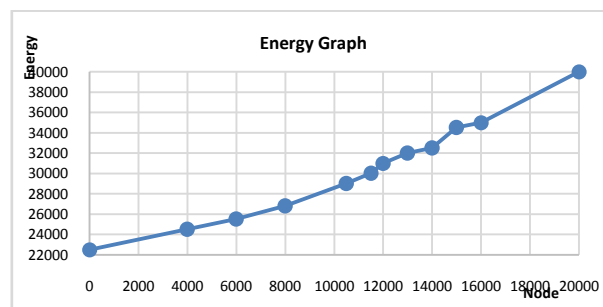


Fig.:3. Energy Graph

B. Simulation results for increasing Throughput

In the proposed methodology by using the MAODV routing protocol the throughput is increased and it is shown in the figure 4.

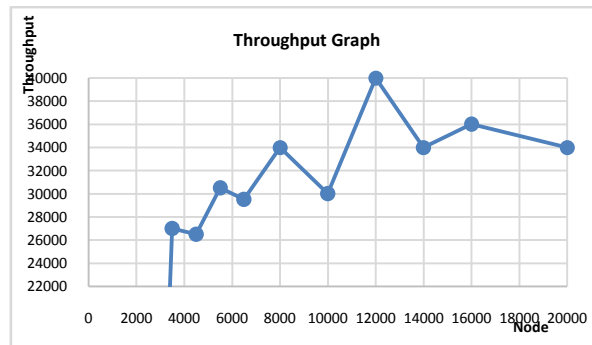


Fig 4 Throughput Graph

The above energy and throughput graphs are the results of proposed methodology. Their performance is analysed with the existing algorithm as shown below.

A. Energy Comparison

The energy that obtained by using the Multipath Adhoc on demand vector routing protocol can be compared with the existing algorithm.

B. Throughput Comparison

The time efficiency also increased when compared to the existing system and they are given as below. By those graphs the proposed algorithm is significantly efficient than the existing algorithm.

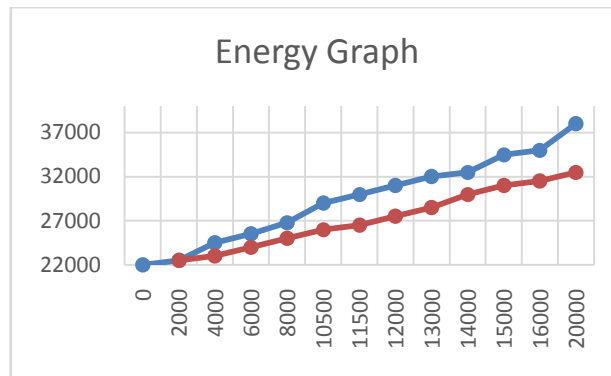


Fig: 5 Energy Comparisons

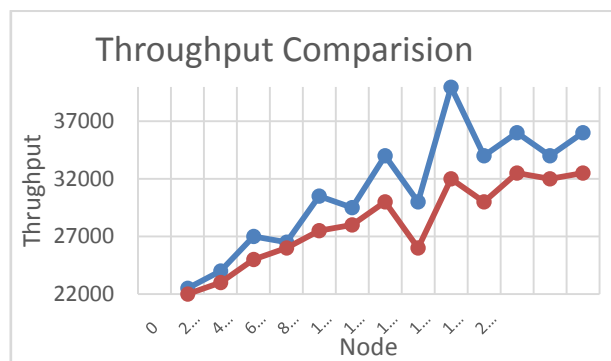


Fig 6. ThroughputComparisons

V.CONCLUSION

In this paper, the proposed algorithm Multipath Ad-hoc on demand distance vector routing (MAODV) protocol is used to overcome difficult problems. The proposed system is to achieve the effective communication between source and destination by choosing optimal path. In this method the optimal path selection is done by multipath routing protocol. Hence the problem of achieving energy efficiency in DCN and analyze relation between routing process and power consumption has been solved. The MAODV method is to minimize the balance traffic flow among transmission of data packets. This result shows that the frame work provides consequential benefits in terms of energy savings.

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BIOGRAPHY

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