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LINEAR AND THRESHOLD PERFORMANCE FOR NETWORK DESIGN TO PACKET SWITCHING USING POISSON DISTRIBUTION

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Abstract : Routing algorithm is a major division in network layer for design the path to transmission the information. The network layer making route packets from source to destination for selecting a route through the network and in general more than one route is possible root. Based on performance criteria, route selection will be done and the finding the shortest route and select path that passes through the least number of nodes which results in the least number of hops per packet to perform this task to reach the goal. The Poisson distribution can be applied to systems with a large number of possible events, each of which is rare. How many such events will occur during a fixed time interval? Under the right circumstances, this is a random number with a Poisson distribution. The conventional definition of the Poisson distribution contains two terms that can easily overflow on computers: λ^k and $k!$. The fraction of λ^k to $k!$ can also produce a rounding error which is very large compared to $e^{-\lambda}$, and therefore give an erroneous result.

Keywords: Computer Network, Type of attacks, Routing, Packet Switching, Poisson Distribution

I. INTRODUCTION

A router is fast technique equipment transformation the information through routing table with an access for every one of all destination to way through the IP packets. The routing table may be accepted the data or information via two method of algorithm ,one of the method is an static and another is dynamic information, it can be formed in table to administrator enters the route table and periodically updated by using of protocols approximating RIP, OSPE or BGP, dynamic routing table. Routing algorithm is a major division in network layer for design the path to transmission the information. The network layer making a route packets from source to destination for selecting a route through the network and in general more than one route is possible root. Based on performance criteria, route selection will be done and the finding the shortest route and select path that passes through the least number of nodes which results in the least number of hops per packet to perform this task to reach the goal[1][5].

Once the decision making is made, this information or message should be stored in the routing table which let the router knows how to forward a packet. In virtual circuit packet, routing table contains both the incoming and outgoing packet number and determines the output port for the packet to be forwarded. In datagram networks, based on the destination address, routing table contains the next hop to forward the packet[6][7].

Depending upon the responsiveness, routing algorithm can be classified into two types as: Static (non-adaptive) Routing Algorithm and Dynamic (adaptive) Routing Algorithm

Static (non-adaptive) Routing Algorithms: In static routing, an initial path will be determined by the network topology and then pre-calculated paths are loaded and fixed for a long time in the routing table. This type of routing suits all small networks and becomes inconvenient for a bigger network. The only disadvantage of this routing is its incompetence to respond quickly to network failure.

- Static routing manually sets up the optimal paths between the source and the destination computers.[2]
- The static routing is suitable only for very small networks and cannot be used in large networks.
- In a case of static routing, the network administrator finds out the optimal path and makes the changes in the routing table.[2]

Dynamic (adaptive) Routing Algorithms : If there is a change in the topology traffic, dynamic routing algorithm will take the routing decision and through neighbor communication, network status will be continuously monitored. Hence, a change in network topology is eventually propagated to all the routers. Each and every router computes the path that suits the destination based on the information gathered. Router complexity is the only disadvantage of this dynamic routing algorithm.

- Using the dynamic protocols, dynamic routing updates the routing table and finds the optimal path between the source and the destination computers
- The dynamic router eliminates the faulty router thereby finding out another possible optimal path from the source part to the destination part.
- In the dynamic routing algorithms, the algorithm and the protocol are responsible for routing the packets and making the changes in the routing table[2].

II.PROPOSAL METHODOLOGY: SHORTEST ROUTE IDENTIFICATION FOR PACKET SWITCH USING POISSON DISTRIBUTION

2.1. Time calculation for Packet switched network

The ISO standard for worldwide communication requires the standard protocol to sending the information from one destination to another source destination. Message switching is mediator for sending the information with number of features, advantage and services to other executable devices for communication. They are two type communication to accompany for sending and receiving the message and storage in buffer should be available to accommodate the long message, as well as receiving the short messages, the buffer's have a small amount of storage is required for storage space. Accordingly, if the message duration is (Tm) and it must be relayed (R) times. While ignore the waiting time, the delay will be (RTm). The main drawback of time process is becomes an problematic for long messages maintenances with relays. To avoid this problem message switching system is practiced and it would be useful for interrupt the long message to allow transmitting feature for communication[8][10].

The overhead bit must identify the destination of the unit so that each switching center will know the further route to the source of the unit where the user can be charged for services. Further, as a part of the overhead, the synchronization bits must be included to identify the beginning and end of the unit. As already mentioned, different packets switching are reassembled in packet switching in proper sequence. In a message switched system, the information overhead must be annexed to each message accompanied by overhead bits[3]. Accordingly, with respect to message switching packet switching has two disadvantages.

(1) To transmit a given amount of information per unit time, packet switching requires bits to be transmitted at a rapid rate more than is required for message switching.

(2) The switching hardware needed to packetize, add overhead, de-packetize and reassemble is more complicated and it must operate rapidly than the corresponding hardware needed in message switching [9][11]. To overcome the problem, the transmission time can be calculate to finding the maximum period of time for sending the information with packet or without packet through the path of travelling the information, such a technique can introduce through state 1 and state 2 calculation with support of Poisson distribution.

State 1: <u>Calculate the transmission time for message information without packet</u>

(i) A message can send through source C_0 to destination C_K over K transmission facilities (links) of message B bits.

(ii) Whereas 'B' is a message length of bits, 'b' is a overheads of bits in transmission of message.(B+b) is a total number of transmission bit message i.e total transmission time.

(iii) f_b is a bit rate per seconds (bps)

TM (Transmission Time) = K [(B+b) / fb] +T_P ………… (1) since b<<B, then K [B / fb] +T_P ………….(2).

State I1: <u>Calculate the transmission time for message information with packet</u>

(i) Let us, the message can be divides many number of packet 'p' , then can be mention as bits per packets (bits/packets i.e B/p) and overheads bits is 'b', then say as single transmission of packet is K [(B/p+b / fb] +T_P ….(3)

(ii) If any delay after first series of next, then (B/p + b)/f $_b$, total time require for transmission K [(B/p+ b / f $_b$] + (P-1)((B/p + b)/f $_b$)]+T_P ………(4)

The packets switching have to be put in sequence order and store in the destination part. Message segmentation consequences in many smaller packets, the header size is usually the same for all packets regardless of their size, and the total amount of header bytes is more than destination part. And this case, a finite propagation time delay which association with the propagation over a link in transmission , then (Tp) and (Tm) will be increased by the amount (K) values. Another major domain problem occurs in storing and forwarding ability is introduces delay thus making message switching unsuitable for real time applications like voice and video. The problem solving in smooth process through the

discrete frequency distribution which gives the probability of a number of independent events occurring in a fixed time for transmission by Poisson distribution approach model .

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2.2.When to use the Poisson distribution for appropriate model?

The Poisson distribution is an appropriately mapping with the time interval, the following assumptions are true.

Case 1: 'K' is the number of times (t) ,when the event occurs in an time interval and 'K' can be denoted the take values 0, 1, 2,3,4 …etc. Even any one of the event does not affect the probability then second event start automatically and it will be occur events independently. Case 2: Two events cannot take place at exactly the same time or parallel. Case 3:Events can constant, rate can be either higher or lower rate for a amount of limit of interval(Measure). Case 4: the probability of even have statement as, Event time interval is proportional to the length of the time interval.

If these cases are true, then 'K' is in Poisson random variable, and the distribution of 'K' is a Poisson distribution.The Poisson distribution can be applied to systems with a large number of possible events, each of which is rare. How many such events will occur during a fixed time interval? Under the right circumstances, this is a random number with a Poisson distribution. The conventional definition of the Poisson distribution contains two terms that can easily overflow on computers: λ^k and $k!$. The fraction of λ^k to $k!$ can also produce a rounding error which is very large compared to $e^{-\lambda}$, and therefore give an erroneous result. For numerical stability the Poisson probability mass function should therefore be evaluate as which is mathematically equivalent but numerically

stable

Basic amenities requirement for finding the time interval packet travel using Poisson distribution.

The following analytical are solution for the finding time interval for packet receiving using poisson distribution methods.

Solution : To determine the probability that 'm' packet occurs in a time τ, P (m, τ);

Condition 1: Assume that the transmission of any packet was statistically independent of any other packet.

(i) If only if, the probability of no message occurring in the time interval $\tau1$ is P $(0, \tau1)$ …………………(5).

(ii) The probability of no packet occurring in the time interval $\tau2$ is

P $(0, \tau2)$………………….(6)

Solution: (5)+(6) gives that , Events are independent the probability that no packet will occur in the interval $\tau1+\tau2$ is $P(0, \tau1+\tau2) = P(0, \tau1) \cdot P(0, \tau2)$ ……….(7)

Condition 2: Granted that as 'τ'- increase, the probability of a packet occurring in the interval increases. So that, P $(0, \tau)$ is a function of 'τ' alone, it may be denoted as $f(\tau)$ and it contain in $f(\tau1+\tau2) = f(\tau1).f(\tau2)$.

Condition 3: Let be 'τ' decrease to a small value, and it denoted as $\Delta\tau$, then reduces to $P(0, \Delta\tau) = 1 - \lambda\,\Delta\tau$ …………………………(8), where λ is yet to be determined, which approaches unity as $\Delta\tau$ approaches zero.

The interval $\Delta\tau$ at most 1 packet can be received and the portability of 'm' packets are received in a time interval $\tau+\Delta\tau$, then $P(m, \tau+\Delta\tau) = P(m, \tau).\ P(0, \Delta\tau) + P(m\text{-}1, \tau).\ P(1, \Delta\tau)$……………………(9).

Condition 4: Possibility of two or more packets in the interval $\Delta\tau$.

The probability that all ' m' packet to received in the 'τ' seconds interval and second product term is the probability that m -1 packets are received in the time.

Since $P(0, \Delta\tau) = 1 - \lambda\,\Delta\tau$ ………………(10), and

$P(1, \Delta\tau) = 1 - P(0, \Delta\tau) = \lambda\,\Delta\tau$ ………..(11)

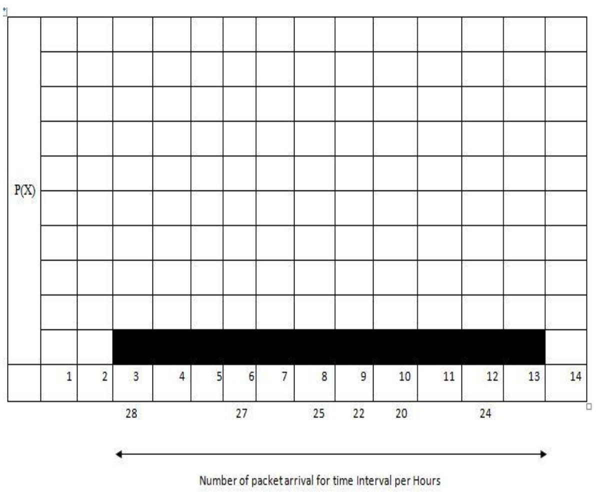
Whereas, the limit as $\Delta\tau \rightarrow d\tau$, becomes an ,

$dp\ (m, \tau)/\ d\tau = \lambda\ [P(m\text{-}1, \tau) - P(m, \tau)]$ …………………(12)

By direction substitution,to verify that the solution of the differential – difference equation of the Poisson distribution (11) and (12),

$P(m, \tau) = (\lambda\tau)\ m\ e\lambda\tau\ /\ m!$ …………(13) is an final solution for finding the average value of 'm' is to be $\bar{m}$ **= E (m) =** $\lambda\tau$. , thus the '' is defined as the average number of packets per seconds, in simply say as $P(X) = e^{-\lambda}\lambda^{X}\ /\ x\,!$

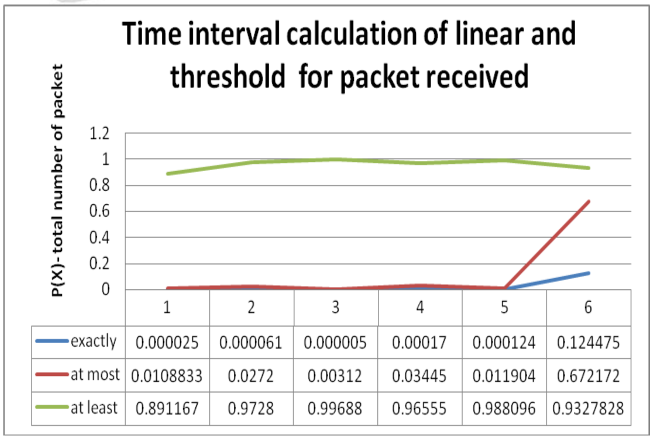
Consider the example of packet arriving at a network, to calculate the number of 'm'packet arriving per hour into the network as mention in terms of 'λ' interval time.



The following picture represented the 'm' of packet sent and received the information in particular interval of time in a network is in figure 1.1, where P(x) total number of packet sets sent and received in network.

The sample data set is shown below for arrival of interval time for packet bases on the Poisson distribution is $P(X) = e\text{-}\ \lambda\ \lambda X\ /\ x\ !$ is a linear transfer function of packet, the output is proportional to the total number packet given as input. The equation $\mathbf{P(X) = \sum_{X=0}^{2} e^{-\lambda} \lambda^{X}\ /\ x\,!}$ and $P(X) = 1- \sum_{X=0}^{2} e^{-\lambda}\lambda^{X}\ /\ x\,!$ is derived from equation (10),(11)and (12) and it say as threshold based on the at most received the packets or at least received the packet, or in another works say as the packet is greater than or less than received at the destination sources of the network, and based the table 1.1 ,it show the calculation for finding the travels of packet in a given interval of time to receiving the data set from source to designation with or without data loss of packet.

Number of arrival per hours of packet	Number of interval time (per hours)x	Exactly arrival of packet of given interval (2) $P(X) = e^{-\lambda}\lambda^{X}\ /\ x\,!$	At most, packet arrival of given interval (3) $P(X) = \sum_{X=0}^{2} e^{-\lambda}\lambda^{X}\ /\ x\,!$	At least, packet arrival of given inte rval (4) $P(X) = 1-\sum_{X=0}^{2} e^{-\lambda}\lambda^{X}\ /\ x\,!$
20	10	0.000025	0.0108833	0.891167
22	9	0.000061	0.0272	0.9728
24	12	0.000005	0.00312	0.99688
25	8	0.00017	0.03445	0.96555
27	6	0.000124	0.011904	0.988096
28	3	0.124475	0.672172	0.9327828



III.CONCLUSION

Security has transformed into a key issues in WSN's because they are naturally of the vulnerable to a superior number of attacks than wired networks, so network required the successful security mechanism to minimize the security attacks, security related issues and challenges in wireless sensor system with OSI network layer. Moreover, this research the articulate about the brief dialog on the packet switching with identifying the route of the path of network system to send the data set through layer technology with security manner as well the direction or angle of the path of the routing with the static and computer involved in the overall transmission from the source computer C0 to the destination computer CK over K transmission facilities links on Poisson Distribution to increase trusted system detection and remediation of vulnerability is crucial. Computer network to solve the problem of security and vulnerability to improve the security evaluation procedure.

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