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BOOKS

- Bowersox, Donald J., Closs, David J., (1996), "Logistical Management." Tata McGraw, Hill, New Delhi.
- Hunker, H.L. and A.J. Wright (1963), "Factors of Industrial Location in Ohio," Ohio State University.

CONTRIBUTIONS TO BOOKS

- Sharma T., Kwatra, G. (2008) Effectiveness of Social Advertising: A Study of Selected Campaigns, Corporate Social Responsibility, Edited by David Crowther & Nicholas Capaldi, Ashgate Research Companion to Corporate Social Responsibility, Chapter 15, pp 287-303.

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- Schemenner, R.W., Huber, J.C. and Cook, R.L. (1987), "Geographic Differences and the Location of New Manufacturing Facilities," Journal of Urban Economics, Vol. 21, No. 1, pp. 83-104.

CONFERENCE PAPERS

- Garg Sambhav (2011): "Business Ethics" Paper presented at the Annual International Conference for the All India Management Association, New Delhi, India, 19–22 June.

UNPUBLISHED DISSERTATIONS AND THESES

- Kumar S. (2011): "Customer Value: A Comparative Study of Rural and Urban Customers," Thesis, Kurukshetra University, Kurukshetra.

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- Garg, Bhavet (2011): Towards a New Natural Gas Policy, Economic and Political Weekly, Viewed on July 05, 2011 http://epw.in/user/viewabstract.jsp

RE-ATTEMPT CONNECTIVETY TO INTERNET ANALYSIS OF USER BY MARKOV CHAIN MODEL

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ABSTRACT

The need of internet is widely spread throughout the world. A large number of people are joining the user group everyday. Places where broadband facilities are not available, people are using dial-up based connectivity, specially in rural areas. This suffers from troubles of frequent non-connectivity and call-disconnectivity. A user leaves the computer terminal after multiple failure attempts of non-connectivity. Some hard-core and dedicated users of dial-up based connection re-joins the attempt process after being away for time being. If re-joining has some probability then this needs to study intensively. Naldi [2002] assumed that there are only two operators and developed a probability model. unfortunately, the consequence of failing to achieve the properties are harsh, mostly lost data, angry users, misuse data and safe, secure data. This paper is an attempt to analyse the rejoining probability by using a Markov chain model over consumer behavior and internet traffic sharing.

KEYWORDS

Markov Chain Model, Blocking Probability, Internet Service providers, Transition probability matrix.

INTRODUCTION

In India many users in rural areas are using internet through dial-up setup where the telephone lines are used as to provide connecting and data expressions. Definitely the broadband service is faster in speed but require higher cost. In contrary, dial-up services are cheaper, although slower in connectivity.

Suppose that there are two operators in the market to provide internet service to users. The market is competitive and both service providers are looking for to grave more to more customers in order to improve upon their customer base.

We establish the following hypotheses to model the behaviour of the user and the sharing of his traffic between the two competitors.

- The user initially chooses one of the two operators (indicated as O_1 and O_2) with probability p and 1-p (initial shares respectively).
- The probability p can take into account all the factors that may lead the user to choose one of the two operators as his first choice, including the range of service it offers and past experience.
- After each failed attempt the user has two choice: he can either abandon (with probability P_A) or switch to the other operators for a new attempt.
- Switching between the two operators is performed on a call-by- call basic and depends just on the latest attempts.
- During the repeated call attempt process the blocking probability L_1 and L_2 (i.e. the probability that the call attempt through the operator O_1 and O_2 fails) and the probability of abandonment P_A stay constant.
- When user abandons the attempts process (with probability P_A) he can again join the connecting process either from O_1 or from O_2.

A REVIEW

Naldi [1998 a, b, c & d] examined the impact of traffic measurement and traffic analysis in telecommunication sector with special reference to telephone network. Shukla and Gadewar [2007] examined stochastic model for cell movement in a knockout switch in computer network. In similar contribution, Shukla *et al.* [2007] discussed a stochastic model for space division switches in computer network and its extension is in Shukla *et al.* [2007 b]. Szabo *et al.* [2007] discussed accurate traffic classification in world of wireless mobile and multimedia network. Dainotti *et al.* [2008] presented a detailed discussion on classification network traffic via packet level hidden Markov model. Shukla and Jain [2007 a & b] developed Markov chain model analysis methodology and indexing technique for multilevel queue scheduling in operating system. Shukla and Thakur [2007] presented crime based user analysis in internet traffic sharing under cyber crime. Shukla and Thakur [2008 a, b & c] discussed Markov chain modeling application for Banyan switch network and traffic sharing problem. John *et al.* [2008] presented an analysis for trends and differences in connection behavior within classes of internet backbone traffic. Shukla, Tiwari and Tiwari [2008] focused on the rest state analysis in internet traffic distribution in multioperator environment. Shukla, Jain and Ojha [2010 a, b & c] discussed markov chain model based analysis of deadlock index and multilevel queue scheduling .Shukla and Thakur [2010 a & b] applied the imputation methods over knowledge discovery and web mining in data warehouse search problems. Shukla, Thakur and Tiwari [2010] discussed stochastic modeling of internet traffic management and in one more similar analysis Tiwari, Thakur and Shukla [2010] presented a view point on cyber crime analysis for multi dimensional effect in computer network. Marnerides *et al.* [2008] discussed the problem related to detection and mitigation of abnormal traffic behavior in autonomic networked environments. Shukla and Singhai [2010] discussed traffic analysis of message flow in three cross bar architecture in space division switches. Shukla, Jain and Choudhary presented a technique for estimation of ready queue processing time under usual group lottery scheduling (GLS) in multiprocessor environment. Some other useful similar contributions are due to Thakur and Shukla [2010]. Shukla, Gangele, Verma and Singh presented [2011] elasticity of internet traffic distribution computer network in two market environment. Shukla, Gangele, Verma and Singh [2011] developed a detailed discussion on elasticities and index analysis of usual internet traffic share problem.

MARKOV CHAIN MODEL

Let O_1 and O_2 are two operators in a competitive market and a user enters into a cyber cafe where computer terminals for operators are available to access the Internet.

Let $\{X^{(n)}, n\geq 0\}$ be a Markov chain having transitions over the state space $\{O_1, O_2, Z, A\}$ where

State O_1: User attempting call through first operator O_1

State O_2: User attempting call through second operator O_2

State Z: Corresponds to a success call (in connectivity)

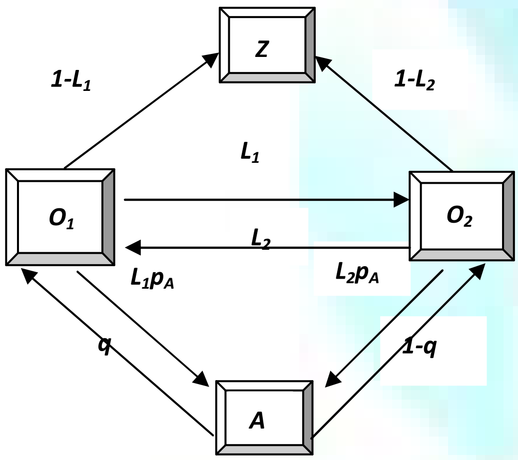
State A: User leaving (abandon) the attempt process

The $X^{(n)}$ stands for state of random variable X at n^{th} attempt ($n\geq 0$) made by the user. Some underlying assumptions for model are:

- The user initially chooses one of the two operators, operator O_1 with probability p and operator O_2 with probability $(1-p)$. This we say is the initial preference to an operator.
- When first attempt of connectivity is failed, the users attempts one more to the same operator, and thereafter, switches over to the next one where two more consecutive attempts are likely. This we say "two-call" basis attempts for the effort of connectivity.
- User has two choices after each failed attempt
  1. He can either abandon with probability p_A or
  2. Switches to the other operator for a new attempt.
- The blocking probability that the call attempt through the operator O_1 fails is L_1 and through the operator O_2 is L_2.
- The connectivity attempts of user between operators are on call-by-call basis, which means if the call for O_1 is blocked in k^{th} attempt ($k>0$) then in $(k+1)^{th}$ user shift over to O_2. If this also fails, user switches to O_1.
- Whenever call connects through either of O_1 or O_2 we say system reaches to the state of success in n attempts.
- The user can terminate the attempt process marked as the system to the abandon state A at n^{th} attempts with probability p_A (either O_1 or from O_2).
- When a connected call is suddenly disconnected either from O_1 or O_2 and connected again with operator O_1 with probability S_1 and with O_2 with probability S_2 we say disconnectivity occurs.
- On the occurrence of disconnectivity, the return back from success state to operator O_i(i = 1, 2) is based on initial transition from O_i. Due to this disconnectivity the system returns back to same operator from where it reached to the success state (Z).
- From state Z user can not move to the abandon state A.
- State Z and A are absorbing states.

MODEL OF USER BAHAVIOUR

THE FIGURE 1.0 SHOWS THE TRANSITION DIAGRAM



Let L_1 and L_2 be the blocking probability of network of O_1 and O_2 respectively. The q is probability of transition from abandon state to operator O_1. the user behavior can be modeled by four state discrete time markov chain in which state O_1 corresponds to the user attempting to place a call through the operator O_1 state O_2 corresponds to the user attempting to place a call through the operator O_1 state Z corresponds to a successful call and state A to the user leaving the process.

The state Z is absorbing state define a markov chain $\{X^{(n)}, n\geq 1\}$ with state space $\{O_1, O_2, Z, A\}$ where $n=0,1,2,3,4,....$ Denote discrete time.

The starting conditions (state distribution before the first call attempt) are [Naldi [2002]]

$$\begin{bmatrix} p[X^{(0)} = O_1] = p \\ p[X^{(0)} = O_2] = 1 - p \\ p[X^{(0)} = Z] = 0 \\ p[X^{(0)} = A] = 0 \end{bmatrix} \quad ...(1.0)$$

Since the user switch from O_1 and O_2 only if his call fails and if he does not abandon, the transition probability from O_1 to O_2 is $L_1 (1-p_A)$. Consequently, the probability of a call places through O_1 being completed is a single attempt is $1-L_1$.

The one–step transition probabilities matrix as stands by Naldi [2002] is:

$$\begin{array}{c} \\ O_1 \\ O_2 \\ Z \\ A \end{array}\begin{array}{c} \begin{array}{cccc} O_1 & O_2 & Z & A \end{array} \\ \begin{bmatrix} 0 & L_1(1-p_A) & 1-L_1 & L_1 p_A \\ L_2(1-p_A) & 0 & 1-L_2 & L_2 p_A \\ 0 & 0 & 1 & 0 \\ q & 1-q & 0 & 0 \end{bmatrix} \end{array} \quad ...(1.1)$$

Following results are derived by Naldi [2002]:

$$P[X^{(n)}=O_1]=P[X^{(n-1)}=O_2]L_2(1-p_A) \quad ...(1.2)$$

$$P[X^{(n)}=O_2]=P[X^{(n-1)}=O_1]L_1(1-p_A) \quad ...(1.3)$$

After unwrapping the recursions we get the general relationships for O_1

$$\left\{\begin{array}{ll} P[X^{(n)}=O_1]=p\sqrt{(L_1L_2)^n}.(1-p_A)^n, & n \;\; even \\ P[X^{(n)}=O_1]=(1-p)L_2\sqrt{(L_1L_2)^{n-1}}.(1-p_A),^n & n \;\; odd \end{array}\right\} \quad ...(1.4)$$

for O_2

$$\left\{\begin{array}{ll} P[X^{(n)}=O_2]=(1-p)\sqrt{(L_1L_2)^n}.(1-p_A)^n, & n \;\; even \\ P[X^{(n)}=O_2]=pL_1\sqrt{(L_1L_2)^{n-1}}.(1-p_A)^n, & n \;\; odd \end{array}\right\} \quad ...(1.5)$$

The state probabilities after the first attempt can be obtained by simple relationship:
Here n=1, 2, 3, 4, 5, 6, 7….

$n = 1$

$$\left[\begin{array}{l} p[x^{(1)}=O_1]=p[x^{(0)}=O_2]p[x^{(1)}=O_1/x^{(0)}=O_2] \\ p[x^{(1)}=O_2]=p[x^{(0)}=O_1]p[x^{(1)}=O_2/x^{(0)}=O_1]... \\ p[x^{(1)}=A]=p[x^{(0)}=O_1]p[x^{(1)}=A/x^{(0)}=O_1] \end{array}\right] ...(1.6)$$

$n = 2$

$$\left[\begin{array}{l} p[x^{(2)}=O_1]=p[x^{(1)}=O_2].p[x^{(2)}=O_1/x^{(1)}=O_2]+p[x^{(1)}=A].p[x^{(2)}=O_1/x^{(1)}=A] \\ p[x^{(2)}=O_2]=p[x^{(1)}=O_1].p[x^{(2)}=O_2/x^{(1)}=O_1]+p[x^{(1)}=A].p[x^{(2)}=O_2/x^{(1)}=A] \\ p[x^{(2)}=A]=p[x^{(1)}=O_1].p[x^{(2)}=A/x^{(1)}=O_1]+p[x^{(1)}=O_2].p[x^{(2)}=A/x^{(1)}=O_2] \end{array}\right] ...(1.7)$$

Where $M = L_1 \; L_2 \; (1-p_A), \quad N = p\,q$

$$\left[p\;[x^{(0)}=O_1]=p,\; p\;[x^{(0)}=O_2]=1-p,\; p\;[x^{(0)}=Z]=0,\; p\;[x^{(0)}=A]=0\right] ...(1.8)$$

$$\left[p\;[x^{(1)}=O_1]=(1-p)L_2(1-p_A),\; p\;[x^{(1)}=O_2]=pL_1(1-p_A),\; p\;[x^{(1)}=A]=pL_1p_A\right] ...(1.9)$$

$$\left[\begin{array}{l} p\;[x^{(2)}=O^1]=p\;.p_A(M+qL1),\; p\;[x^{(2)}=O_2]=M\;(1-p)(1-p_A)+p(1-q)L_1p_A, \\ p\;[x^{(2)}=A]=M\;\; p_A \end{array}\right] ...(1.10)$$

$$\left[\begin{array}{l} p\;[x^{(3)}=O_1]=M\;[(1-p)L_2(1-p_A)^2+p_A(p-pq+q)] \\ p\;[x^{(3)}=O_2]=p_A[pL_1(1-p_A)(M+qL_1)+M\;(1-q)] \\ p\;[x^{(3)}=A]=p\;_A[pL_1p_A(M+qL_1)+L_2\{M\;(1-p)(1-p_A)+p(1-q)L_1p_A\}] \end{array}\right] ...(1.11)$$

$$\left[\begin{array}{l} p[x^{(4)}=O_1]=p_A[M(1-p_A)\{p(M+qL_1)+L_2(1-q)\}+NL_1p_A\{M+qL_1+qL_2(1-q)\}+qL_2M \\ (1-p)(1-p_A)] \\ p[x^{(4)}=O_2]=M[(1-p)M(1-p_A)^2+L_1(1-p_A)p_A(p-pq+q)]+p_A(1-q)[pL_1p_A(M+qL_1) \\ +L_2\{M(1-p)(1-p_A)+p(1-q)L_1p_A\}] \\ p[x^{(4)}=A]=Mp_A[\{(1-p)M(1-p_A)+p-pq+q\}+p_A\{p(M+qL_1)+L_2(1-q)\}] \end{array}\right] ...(1.12)$$

SIMULATION STUDY

This section contains re-attempting connectivity of analysis model characteristics with respect blocking probability of operation O_1 and operator O_2.

$$\left[\begin{array}{l} p[x^{(5)}=O_1]=p_A[ML_2(1-p_A)^2\{p(M+qL_1)+L_2(1-q)\}+MNq(p_A)\{ML_1+L_2(1-q)\} \\ +qL_2{}^2M\;(1-p)(1-p_A)^2]+Mqp_A[\{(1-p)M\;(1-p_A)+p-pq+q\}+p_A\{p(M+qL_1)+L_2(1-q)\}] \end{array}\right] ...(2.0)$$

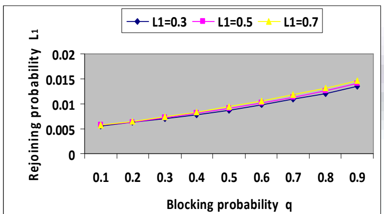


fig. (2.0) (L2=0.7, p=0.5, pA=0.05, M=0.1995, N=0.15)

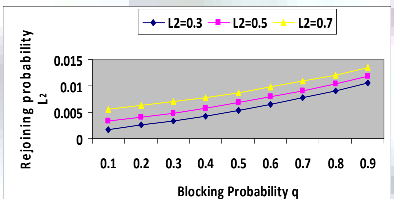


fig. (2.1) (L1=0.3, p=0.5, pA=0.05, M=0.1995, N=0.15)

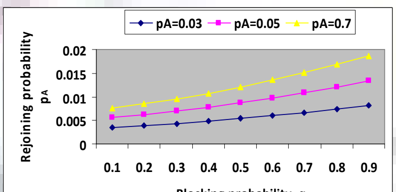


fig. (2.2) (L1=0.3, L2=0.7, p=0.5, M=0.1995, N=0.15)

In reference of fig. (2.0, 2.1, and 2.2) L_1, L_2, and p_A values is separately high. While rejoining probability variation with respect to re-attempting probability q it is found that they are in increasing trends. For lower value of L_1, L_2 and p_A the rejoining connectivity level upper than when L_1, L_2 and p_A is high.

$$\left[\begin{array}{l} p[x^{(5)}=O_2]=p_A[M\;(1-p_A)\{pL_1(1-p_A)(M+qL_1)+M\;(1-q)\}+NL_1{}^2(1-p_A)p_A\{M+qL_1 \\ +qL_2(1-q)\}+qM_2(1-p)(1-p_A)]+M\;(1-q)p_A[\{(1-p)M\;(1-p_A)+p-pq+q\}+p_A\{p(M+qL_1) \\ +L_2(1-q)\}] \end{array}\right] ...(2.1)$$

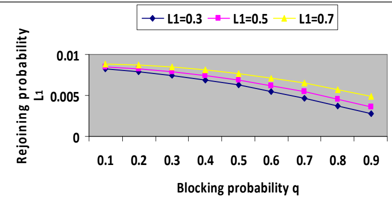


fig. (2.3)(L2=0.7, p=0.5, pA=0.05, M=0.1995, N=0.15)

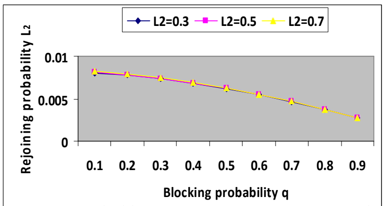


fig. (2.4) (L1=0.3, p=0.5, pA=0.05, M=0.1995, N=0.15)

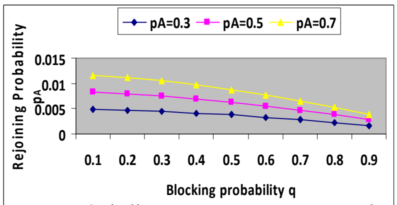


fig. (2.5)(L1=0.3, L2=0.7, p=0.5, M=0.1995, N=0.15)

In view of fig. (2.3, 2.4 and 2.5) the rejoining probability has downward trends and when L_1, L_2 and p_A separately low, the shifting pattern found words lower side. The rejoining probability of the connectivity process of the first operator and both operators' alternates is going down with the increasing level of blocking probability. However, if opponent operator also bears the same in increasing pattern then the rejoining probability curve is further lower down.

$$\left[\begin{aligned}&p[x^{(5)}=A]=L_1(p_A)^2[M(1-p_A)\{p(M+qL_1)+L^2(1-q)\}+N\{M+qL_1+qL_2(1-q)\}+qM_2(1-p)\\&p_A]+M^2p_A[(1-p)L_2(1-p_A)^2+p_A(p-pq+q)]+L_2(p_A)^2(1-q)[pL_1p_A(M+qL_1)+L_2\{M(1-p)\\&(1-p_A)+p(1-q)L_1p_A\}]\end{aligned}\right] \quad ...(2.2)$$

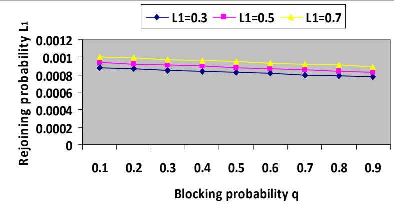


fig. (2.6) (L2=0.7, p=0.5, pA=0.05, M=0.1995, N=0.15)

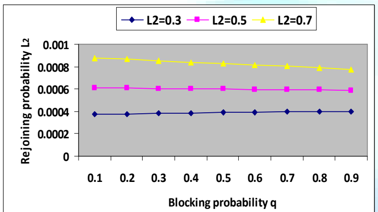


fig. (2.7) (L1=0.3, p=0.5, pA=0.05, M=0.1995, N=-0.15)

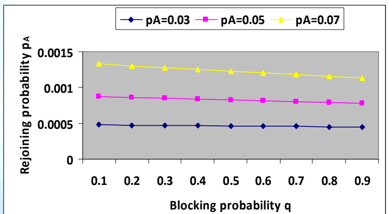


fig. (2.8) (L1=0.3, L2=0.7, p=0.5, M=0.1995, N=0.15)

When to examine rejoining probability with respect to q as obtains in L_1, L_2 and p_A. The output fig.(2.6, 2.7 and 2.8) are showing reverse pattern on the q rejoining probability if high contains a stability factors in re-attempting connectivity variations. These constant pattern of rejoining probability for operator O_1 and operator O_2 or alternates change rate of parameters it shows linear trends of re-attempting operations.

$$\left[\begin{aligned}&p[x^{(6)}=O_1]=p_A[M(1-p_A)\{pM(1-p_A)(M+qL_1)+ML_2(1-p_A)(1-q)\}+NML_1(1-p_A)p_A\\&\{M+qL_1+qL_2(1-q)\}+qM^2L_2(1-p_A)^2(1-p)]+M(1-q)p_AL_2(1-p_A)[\{(1-p)M(1-p_A)\\&+p-pq+q\}+p_A\{Mp(L_2(1-p_A)+q)+L_2^2(1-p_A)(1-q)\}]+L_1(p_A)^2q[\{M(1-p_A)\{p(M+qL_1)\\&+L_2(1-q)\}+N\{M+qL_1+qL_2(1-q)\}+qM^2(1-p)p_A\}]+qM^2p_A[(1-p)L_2(1-p_A)^2\\&+p_A(p-pq+q)]+L_2(p_A)^2(1-q)q[pL_1p_A(M+qL_1)+L_2\{M(1-p)(1-p_A)+q(1-q)L_1p_A\}]\end{aligned}\right] \quad ...(2.3)$$

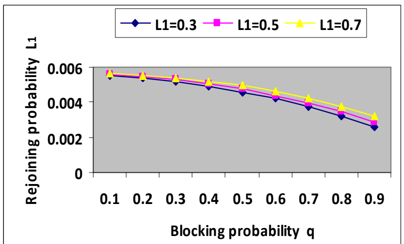


fig.(2.9) (L2=0.7, p=0.5, pA=0.05, M=0.1995,

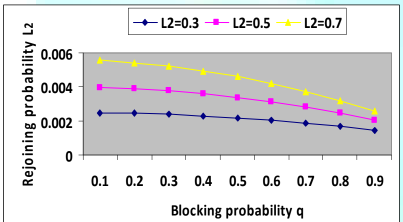


fig. (2.10) (L1=0.3, p=0.5, pA=0.05, M=0.1995, N=0.15)

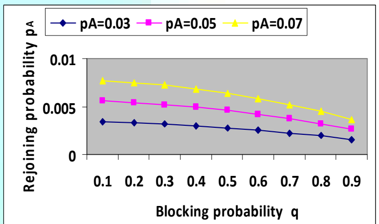


fig. (2.11) (L1=0.3, L2=0.7, p=0.5, M=0.1995, N=0.15)

Fig. (2.3, 2.4 and 2.5) are similar to fig. (2.9, 2.10 and 2.11) and showing downward trend of rejoining probability. The re-attempting process of the connectivity for both operators with respect to alternate's operators where values is little high for both operators the rate of change parameter is downward. This pattern of rejoining probability of connectivity is downward showing a sharp decrement in the re-attempting connectivity.

$$\left[\begin{aligned}&p[x^{(6)}=O_2]=p_A[M^2(1-p_A)^2\{p(M+qL_1)+L_2(1-q)\}+MNp_A\{MqL_1^2(1+p_A)+qM(1-q)\}\\&+qM^2L_2(1-p)(1-p_A)^2]+MqL_1(1-p_A)p_A[\{(1-p)M(1-p_A)+p-pq+q\}+p_A\{pL_1(1-p_A)\\&(M+qL_1)+M(1-q)\}]+L_1(p_A)^2(1-q)[\{M(1-p_A)\{p(M+qL_1)+L_2(1-q)\}+N\{M+qL_1\\&+qL_2(1-q)\}+qM^2(1-p)p_A\}]+M_2(1-q)p_A[(1-p)L_2(1-p_A)^2+p_A(p-pq+q)]\\&+L_2(p_A)^2(1-q)^2[pL_1p_A(M+qL_1)+L_2\{M(1-p)(1-p_A)+p(1-q)L_1p_A\}]\end{aligned}\right] \quad ...(2.4)$$

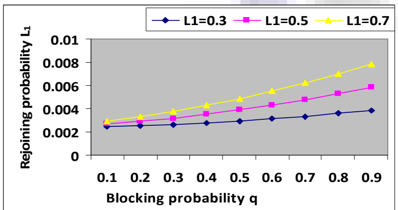


fig. (2.12) (L2=0.7, p=0.5, pA=0.05, M=0.1995, N=0.15)

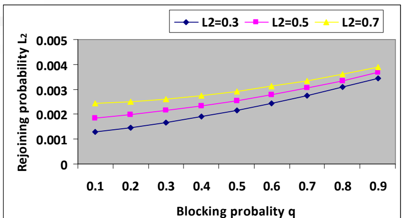


fig. (2.13) (L1=0.3, p=0.5, pA=0.05, M=0.1995, N=0.15)

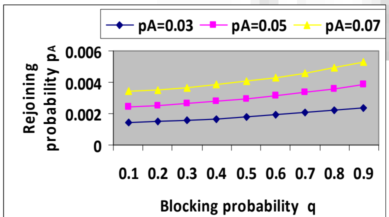


fig. (2.14) (L2=0.7, p=0.5, M=0.1995, N=0.15)

Fig. (2.0, 2.1 and 2.2) are similar to fig. (2.12, 2.13 and 2.14) and showing upward trend of rejoining probability. According to fig. (2.12, 2.13 and 2.14) L_1, L_2, p_A values probability is little shifted high the curves are shifted toward higher values with similar trends. When to consider the opponent blocking probability the trend is linear and by increasing rejoining probability q the rejoins bears positive signals. If L_1, L_2 and p_A is also high with respect to q the rate of positive increment of rejoining probability.

$$\left[\begin{aligned}
&p[x^{(6)}=A]=p_A[M^2(1-p_A)p_A\{p(M+qL_1)+L_2(1-q)\}+MNqL_1(p_A)^2\{ML_1+L_2(1-q)\}\\
&+qM^2L_2(1-p_A)p_A(1-p)]+MqL_1(p_A)^2[\{(1-p)M(1-p_A)+p-pq+q\}+p_A\{p(M+qL_1)\\
&+L_2(1-q)\}]+p_A[M^2p_A(1-p_A)\{p(M+qL_1)+L_2(1-q)\}+MNL_1(p_A)^2\{M+qL_1+qL_2(1-q)\}\\
&+qM^2(1-p)L_2(1-p_A)p_A+MNL_1(p_A)^2\{M+qL_1+qL_2(1-q)\}+qM^2(1-p)L_2(1-p_A)p_A]\\
&+ML_2(p_A)^2(1-q)[\{(1-p)M(1-p_A)+p-pq+q\}+p_A\{p(M+qL_1)+L_2(1-q)\}]
\end{aligned}\right] \quad ...(2.5)$$

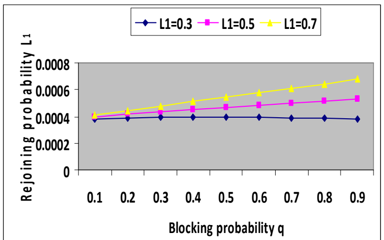


fig. (2.15) (L2=0.7, p=0.5, pA=0.05, M=0.1995, N=0.15)

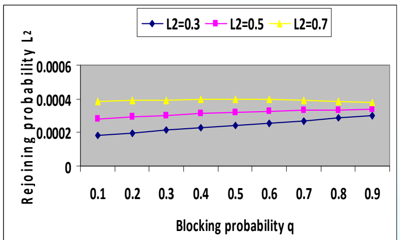


fig. (2.16) (L1=0.3, p=0.5, pA=0.05, M=0.1995, N=0.15)

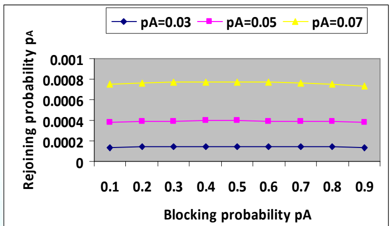


fig. (2.17) (L1=0.3, L2=0.7, p=0.5, M=0.1995, N=0.15)

Fig. (2.6, 2.7 and 2.8) are similar to fig. (2.15, 2.16 and 2.17) and showing linear and constant trend of rejoining probability. L_1 values probability is little shifted high the curves are shifted toward higher values with similar trends. The output are showing reverse pattern on the q rejoining probability if high contains a stability factors in re-attempting connectivity variations. The fig. (2.16 and 2.17) shows that if opponent blocking level is low then rejoining probability level is almost constant. But when opponent blocking is high this parameter has reducing re-attempting patterns.

This paper presents some more extending process equations that represent a better reliable and re-attempting connectivity for simulation study.

$$\left[\begin{aligned}
&p[x^{(7)}=O_1]=p_A[M^2(1-p_A)^2\{pM(L_2(1-p_A)+q)+L_2{}^2(1-p_A)(1-q)\}+qM^2Np_A\{ML_1+(1-q)\\
&L_2(1-p_A)\}+qM^2L_2{}^2(1-p_A)^3(1-p)]+M^2q(1-p_A)p_A[\{(1-p)M(1-p_A)+p-pq+q\}+p_AM(1-p_A)\\
&\{p(M+qL_1)+L_2(1-q)\}]+M(p_A)^2(1-q)[\{M(1-p_A)\{p(M+qL_1)+L_2(1-q)\}+N\{M+qL_1+qL_2\\
&(1-q)\}+qM^2(1-p)p_A\}]+M^2(1-q)L_2(1-p_A)p_A[(1-p)L_2(1-p_A)^2+p_A(p-pq+q)]+ML_2(p_A)^2\\
&(1-q)^2[pp_A(M+qL_1)+L_2\{(1-p)(1-p_A)^2L^2+p(1-q)p_A\}]+qp_A[M^2(1-p_A)p_A\{p(M+qL_1)\\
&+L_2(1-q)\}+MNqL_1(p_A)^2\{ML_1+L_2(1-q)\}+qM^2L_2(1-p_A)p_A(1-p)]+Mq^2L_1(p_A)^2[\{(1-p)\\
&M(1-p_A)+p-pq+q\}+p_A\{p(M+qL_1)+L_2(1-q)\}]+qp_A[M^2p_A(1-p_A)\{p(M+qL_1)+L_2(1-q)\}\\
&+MNL_1(p_A)^2\{M+qL_1+qL_2(1-q)\}+qM^2(1-p)L_2(1-p_A)p_A]+ML_2(p_A)^2q(1-q)[\{(1-p)M(1-p_A)\\
&+p-pq+q\}+p_A\{p(M+qL_1)+L_2(1-q)\}]
\end{aligned}\right] \quad ...(3.1)$$

$$\left[\begin{aligned}
&p[x^{(7)}=O_2]=p_A[M^2(1-p_A)^2\{pL_1(1-p_A)(M+qL_1+M(1-q))\}+MNL_1{}^2(1-p_A)^2p_A\{M+qL_1\\
&+qL_2(1-q)\}+qM^3(1-p)(1-p_A)^2]+M^2(1-q)(1-p_A)p_A[\{(1-p)M(1-p_A)+p-pq+q\}+p_A\\
&\{M(1-p_A)p(M+qL_1)+ML_2(1-p_A)(1-q)\}]+qL_1{}^2(1-p_A)(p_A)^2[\{M(1-p_A)\{M+qL_1+L_2(1-q)\}\\
&+N\{M+qL_1+qL_2(1-q)\}+qM^2(1-p)p_A\}]+qM^2(1-p_A)p_A[M(1-p)(1-p_A)+L_1p_A(p-pq+q)]\\
&+M(p_A)^2q(1-q)[pL_1p_A(M+qL_1)+L_2\{M(1-p)(1-p_A)+p(1-q)L_1p_A\}]+(1-q)p_A[M^2(1-p_A)p_A\\
&\{p(M+qL_1)+L_2(1-q)\}+MNqL_1(p_A)^2\{ML_1+L_2(1-q)\}+qM^2L_2(1-p_A)p_A(1-p)]+Mq(1-q)L_1\\
&(p_A)^2[\{(1-p)M(1-p_A)+p-pq+q\}+p_A\{p(M+qL_1)+L_2(1-q)\}]+(1-q)p_A[M^2p_A(1-p_A)\\
&\{p(M+qL_1)+L_2(1-q)\}+MNL_1(p_A)^2\{M+qL_1+qL_2(1-q)\}+qM^2(1-p)L_2(1-p_A)p_A]\\
&+ML_2(p_A)^2(1-q)^2[\{(1-p)M(1-p_A)+p-pq+q\}+p_A\{p(M+qL_1)+L_2(1-q)\}]
\end{aligned}\right] \quad ...(3.2)$$

$$\left[\begin{aligned}
&p[x^{(7)}=A]=p_A[M^2(1-p_A)p_A\{pL_1{}^2(1-p_A)(M+qL_1)+M(1-q)\}+MNL_1{}^2(1-p_A)(p_A)^2\{M+qL_1\\
&+qL_2(1-q)\}+M^3(1-p)(1-p_A)p_A]+M^2(1-q)(p_A)^2[\{(1-p)M(1-p_A)+p-pq+q\}+Mp_A\{p(M\\
&+L_1p_Aq)+(1-q)p_A\}]+L_1{}^2(p_A)^3q[\{M(1-p_A)\{p(M+qL_1)+L_2(1-q)\}+N\{M+qL_1+qL_2(1-q)\}\\
&+qM^2(1-p)p_A\}]+qM^2(p_A)^2[M(1-p)(1-p_A)p_A+L_1p_A(p-pq+q)]+L_1L_2(p_A)^2q(1-q)[pL_1p_A\\
&(M+qL_1)+L_2\{M(1-p)(1-p_A)+p(1-q)L_1p_A\}]+p_A[M^2(1-p_A)^2L_2p_A\{p(M+qL_1+L_2(1-q))\}\\
&+M^2Np_Aq\{L_1p_A+L_2p_A(1-q)\}+qM^2L_2{}^2(1-p)(1-p_A)^2p_A]+M^2q(p_A)^2[\{(1-p)M(1-p_A)\\
&+p-pq+q\}+pA\{pL_1(1-p_A)(M+qL_1)+M(1-q)\}]+L_1L_2(p_A)^3(1-q)[\{M(1-p_A)\{p(M+qL_1)\\
&+L_2(1-q)\}+N\{M+qL_1+qL_2(1-q)\}+qM^2(1-p)p_A\}]+M^2(1-q)L_2(p_A)^2[(1-p)L_2(1-p_A)^2\\
&+p_A(p-pq+q)]+L_2{}^2(p_A)^3(1-q)^2[pL_1p_A(M+qL_1)+L_2\{M(1-p)(1-p_A)+p(1-q)L_1p_A\}]
\end{aligned}\right] \quad ...(3.3)$$

CONCLUSION

The attempt process by the user is affected by the re-attempt connectivity probability. If re-attempt probability is high then success of connectivity is also high. This paper presents a new persistent internet connectivity services designed to simplify cluster based internet service management. This rejoining probability called a re-attempting internet structure. Internet services are successfully bringing re-attempting connectivity to masses. Millions of people depend on internet services for applications like searching, messaging, education, news, current events, maps and some other important purpose. All are the very useful for the people but some causes there had problems. In this paper presents if internet service providers and connections are failed then we can connect rejoin probability that reconnect the internet and service connectivity with the re-attempting data structure.

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