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Abstract

For efficient design and development of communication networks the stochastic modelling serves the basic frame work. This paper addresses the novel idea of utilizing compound Poisson binomial process for developing and analyzing a two node tandem communication network with two stage arrivals and Dynamic bandwidth allocation (DBA). Here it is assumed that two nodes are connected in tandem and messages arrive to the first and second buffers are connected to a random number of packets and stored in buffers for forward transmission. Arrivals are characterized by compound Poisson binomial processes in both buffers which match close with the realistic situation. The transmission processes in both the transmitters are assumed to follow dynamic bandwidth allocation which is characterized by load dependent on time. Using difference differential equations and joint probability generating function the

transient behaviour of the system is studied. The performance of the network is evaluated by deriving explicit expressions for the performance measures such as mean content of the buffers, mean delays, throughput of the nodes and utilization of transmitters. Numerical illustrations are presented to study the effect of changes in input parameters on system performance measures. With suitable cost considerations, the optimal operating policies of the communication network are derived and analyzed. It is observed that the compound Poisson binomial bulk arrivals distribution parameters have significant influence on system performance measures. Analyzing the two stage direct arrivals improve the network performance and reduce congestion in buffers and mean delays. This model is useful to analyze the communication networks at LAN, WAN and MAN.

Refer

ences

- Gaujal, B. and Hyon, E. (2002), Optimal routing policies in deterministic queues in tandem, Proceedings of Sixth International Workshop on Discrete Event Systems (WODES'02), pp. 251-257.
- Kin K. Leung (2002), Load dependent service queues with application to congestion control in broadband networks, Performance Evaluation, Vol. 50, Issue 1-4, pp. 27-40.
- Kuda Nageswarara Rao, K. Srinivasa Rao and P. Srinivasa Rao-(2011)- Transient Analysis of a Tandem Communication network with dynamic bandwidth allocation having two stage direct bulk arrivals, International Journal of Computer Applications, Vol. 13, No. 7 , pp. 14-22.
- Nageswara Rao, K. , K. Srinivasa Rao, P. Srinivasa Rao - (2010), A tandem Communication network with DBA and modified phase type Transmission having bulk arrivals in International journal of Computer Science issues, Vol7, No3. pp18-26.
- Parthasarathy, P. R. and Selvraju, N. (2001), Transient analysis of a Queue where potential customers are discouraged by Queue length. Mathematical Problems in Discrete distribution and process to model self-similar traffic, 9th IEEE international conference on Telecommunication- CONTEL2007, Zagreb b Croatia, pp. 167-171 Engineering, Vol. 7, pp. 433-454.
- Padmavathi, G. , K. Srinivasa Rao and K. V. V. S. Reddy-(2009), Performance Evaluation of Parallel and Series Communication Network with dynamic bandwidth allocation, CIIT International journal of Networking and Communication Engineering. Vol. 1, No7, pp. 410-421.
- Srinivasa Rao, K. , P. Suresh Varma and Y. Srinivas - (2008), Interdependent Queuing Model with start-up delay, Journal of Statistical Theory and Applications, Vol. 7, No. 2 pp. 219-228.
- Srinivasa Rao K, Vasanta, M. R. , and Vijaya Kumar, C. V. R. S. , (2000), on an interdependent Communication Network, Opsearch Vol. 37, No. 2, pp134-143.
- Sriram, K. (1993), Methodologies for bandwidth allocation, transmission scheduling and congestion avoidance in broadband ATM networks, Computer Network, ISDN System, J. 26, pp 43-59.
- Suhasini, A. V. S. , et al (2013a), Transient analysis of tandem queuing model with non-homogeneous Poisson bulk arrivals having state dependent service rates, International

Journal of Advanced Computer and mathematical Sciences, Vol. 3, No. 3, pp 272-289.

- Suhasini, A. V. S. , et al (2013b), On parallel and series non-homogeneous bulk arrival queuing model, OPSEARCH, Vol. 50, No. 4, pp 521-547.

- Suresh Varma, P. , and K. Srinivasa Rao (2007), A Communication network with load dependent transmission, International Journal of Mathematical Sciences, Vol. 6, No. 2, pp. 199-210.

- Trinatha Rao, P. , et al (2012) – Performance of non-homogeneous communication with Poisson arrivals and dynamic bandwidth allocation, International Journals of Systems, control and communication, Vol. 4 No. 3, pp 164-182.

Computer Science

Index Terms

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Keywords

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Dynamic Bandwidth Allocation (DBA)

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