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Performance Analysis of Combined Algorithm for Preemptive Handoff of Real Time and Non-Real Time Services

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Abstract

Handoff is very important concept in mobile computing. When a mobile user travels from one area of coverage or cell to another cell within a call's duration the call should be transferred to the new cell's base station. Otherwise, the call will be dropped because the link with the current base station becomes too weak as the mobile recedes. Indeed, this ability for transference is a design matter in mobile cellular system design and is call handoff. Handoff is very rigorous process. Performance of handoff is very important issue. There are many types of handoff in the mobile computing.

In this paper performance of preemptive handoff is analysed by the combined algorithm for real time services and non-real time services by using MATLAB.We choose the fluid flow model [19] as the mobility model of mobile users. However, our proposed method can be easily used to other mobility models as well.

Introduction

Whenever a mobile moves out of coverage its coverage area to another cell's coverage area, a handoff is needed to continue the communication services. Idea if handoff seems to be very simple but in actual there are lots of complex algorithms involved in a handoff of a properly designed network.Zeng proposed a number reservation handoff scheme with preemptive procedure. In this scheme, calls are divided into three different classes: originating calls, real-time service handoff calls, and non real-time service handoff calls. The real-time and non real-time service handoff requests make their own queues. A given number of channels in each cell are reserved exclusively for handoff request calls. Out of these channels, some are reserved exclusively for the real-time service handoff request calls. The remaining channels are shared by both the originating and handoff request calls. The real-time service handoff requests have priority over non real-time service handoff requests and all the handoff requests have priority over originating calls.

MATLAB

MATLAB is widely used in all areas of applied mathematics, in education and research at universities, and in the industry. MATLAB stands for MATrixLABoratory.This makes the software particularly useful for linear algebra but MATLAB is also a great tool for solving algebraic and differential equations and for numerical integration. MATLAB has powerful graphic tools and can produce nice pictures in both 2D and 3D. It is also a programming language, and is one of the easiest programming languages for writing mathematical programs. MATLAB also has some tool boxes useful for signal processing, image processing, optimization, etc. we use MATLAB 7.11 to obtain our result.

System Modal

we consider a system with many homogenous cells with a fixed channel assignment scheme and a set of S channels is permanently assigned to each cell.we focus our attention on a single cell, which we call as the referenced cell in the paper. When a mobile user generates a call in the referenced cell, we donate it as an originating call.

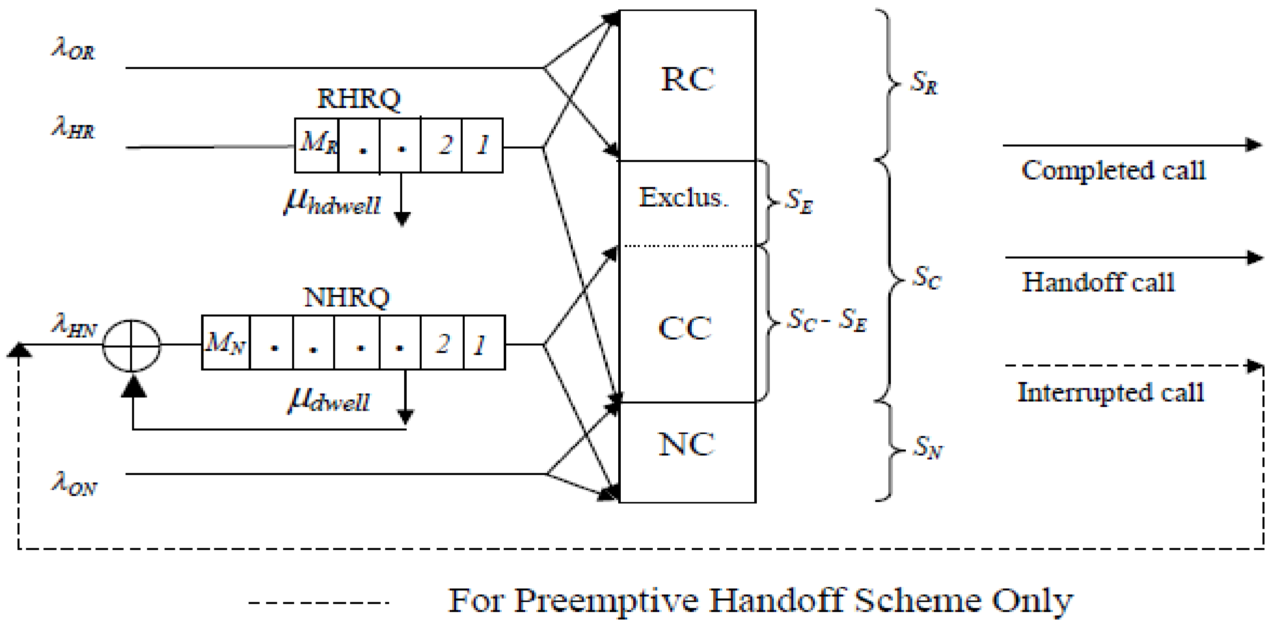

Fig.The system model for the Preemptive handoff

λOR: The arrival rate of originating real-time service calls;

λHR: The arrival rate of handoff request calls of real-time service;

λON: The arrival rate of originating non real-time service calls;

HN: The arrival rate of handoff request calls of non real-time service;

µhdwell: The dropping rate of the queueing real-time service handoff requests;

µdwell: The transferring rate of the queueing non real-time service handoff

Algorithm for of proposed hybrid handoff for real time and non real time handoff calls

1. First of all network will determine whether there is requirement of handoff of not. For this analysis various network parameters and threshold conditions required for a quality voice for the current network will be compared with other available network parameters of other networks. I have done this objective through vertical handoff algorithm
2. After that analysis a vertical handoff will be assigned to mobile in current network if current network parameters are below

threshold values and the other network parameters are higher. If this is not the case, then no handoff could be completed.

3. After handoff is done to a particular network from the list of available networks, it will check for whether there service required by handoff is real time or non real time handoff
4. In case of real time handoff, it will check again for whether real time handoff is of :

a) Voice calls
b) Video calls

5. There are different algorithms for different services : voice services and video services

   - Algorithm for the real time voice services: When an originating real-time service request arrives, it can be served only if there are channels available in RC.

Similarly, an originating non real-time service request can be served only if there are idle channels in NC. An originating real-time service call (or an originating non real-time service call) will be blocked if it finds no channels in the RC (or NC).

Parameter setup

In our numerical examples, we assume that the shape of the cell is circular with radius r, and two kind of mobile users as pedestrian users. Parameters are set as follows: *r*=0.1 Km, *E[D]*=0.1r, *E[V]*=0.5meter/second, *E[TCv]*=120seconds, *E[TCd]*=60seconds, *S*=*SR*+*SC*+*SN*=10, *SR*=4, *SC* =4, *SN* =2, *MR*=5, *SE*=2, *MN*=50, and 47
□=10-8.

The ratio of originating real-time service calls and non real-time service calls □*OR* /□*ON* is set to 1. The simulation stop criteria set to □=10-8. Both arrival events are generated by exponential function with pseudo random number generator.

Simulation Result

Both fig shows the result of analytical model and preemptive handoff scheme

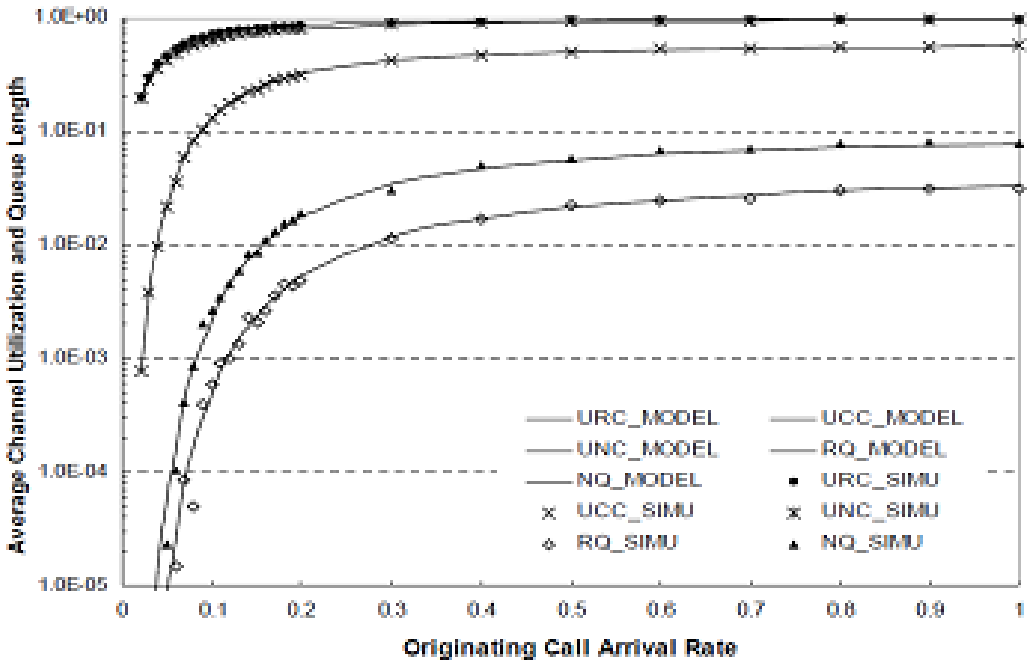

Fig.1.Comparison of average channel utilization and queue length of analytical model and simulation for preemptive handoff scheme

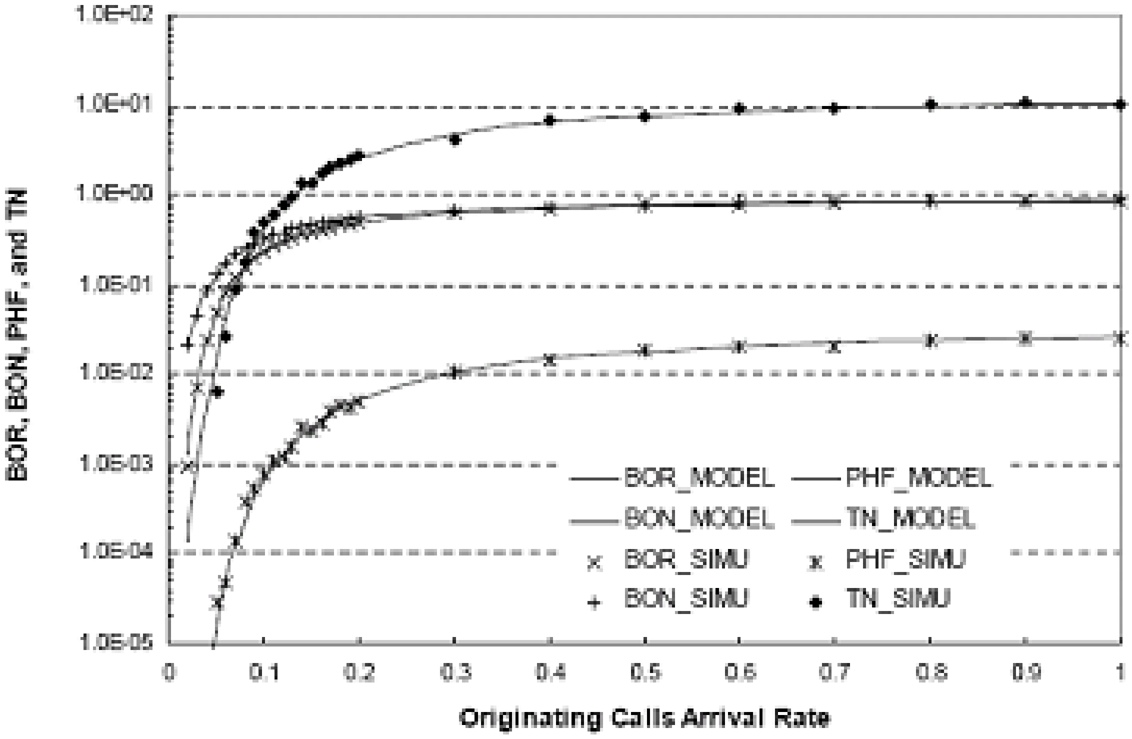

Fig.2. Comparison of BOR, BON, Phf and TN between analytical model and simulation for preemptive handoff

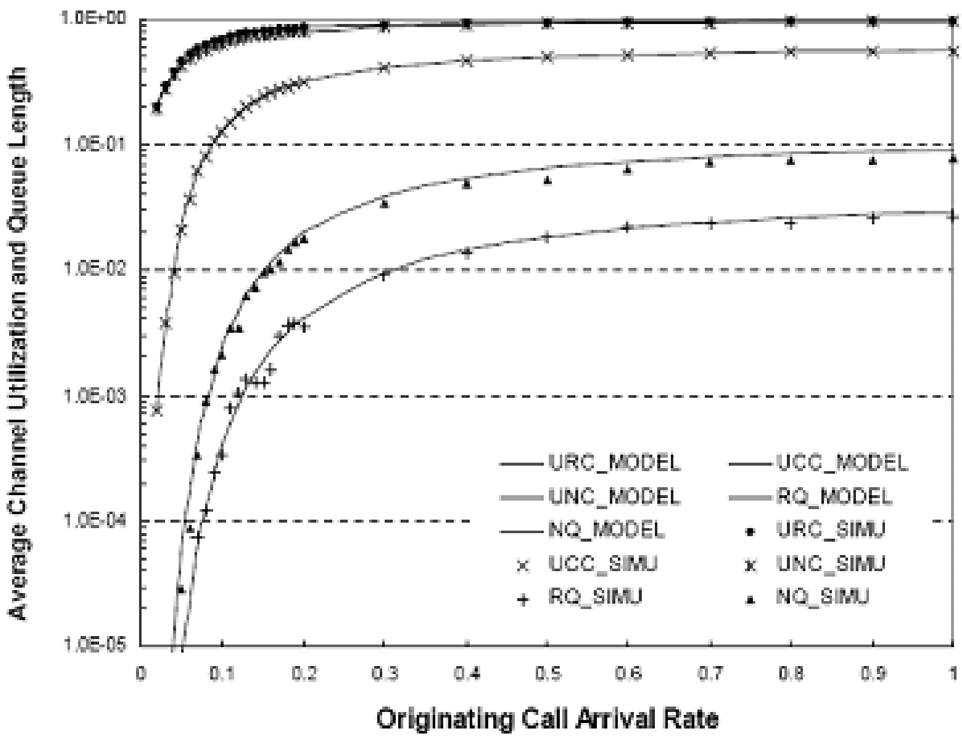

Fig.3 Comparison of average channel utilization and queue length of analytical model and simulation for preemptive handoff scheme

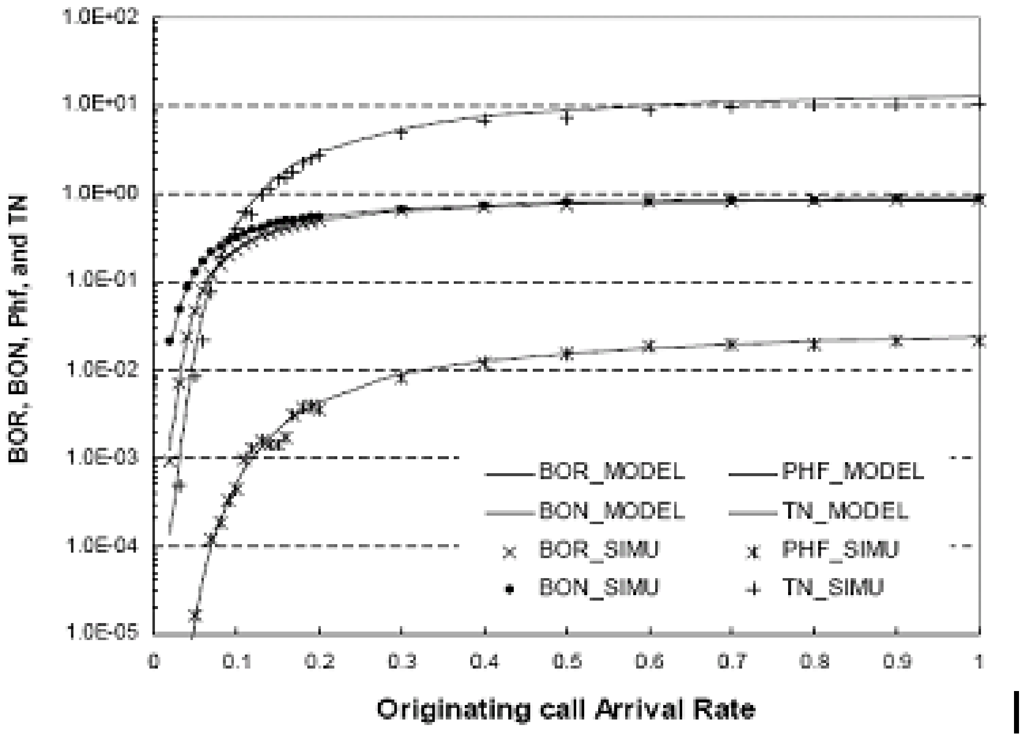

Fig.4. Comparison of BOR, BON, Phf and TN between analytical model and simulation for preemptive handoff scheme.

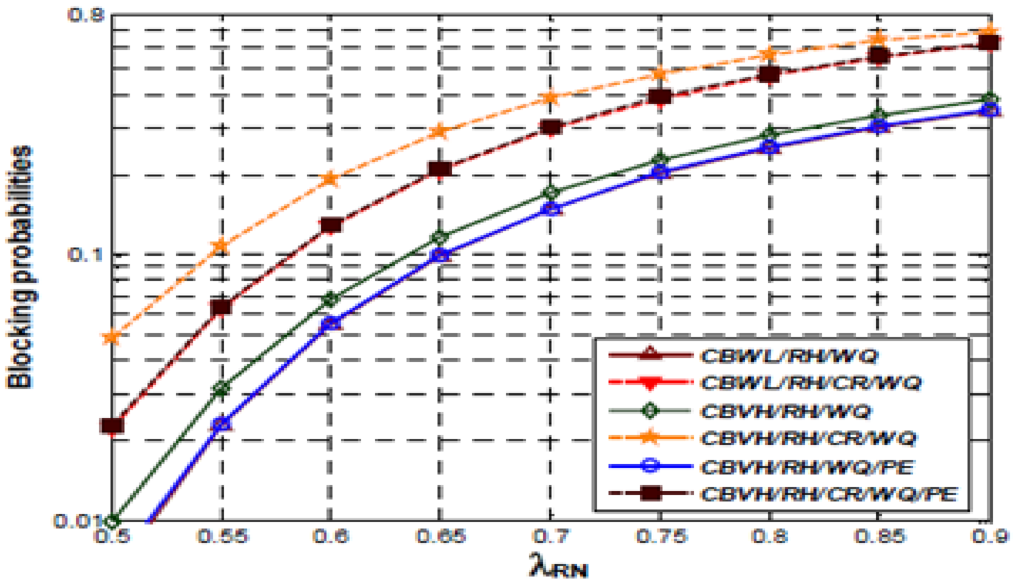

Fig.5 Blocking probability of originating voice services

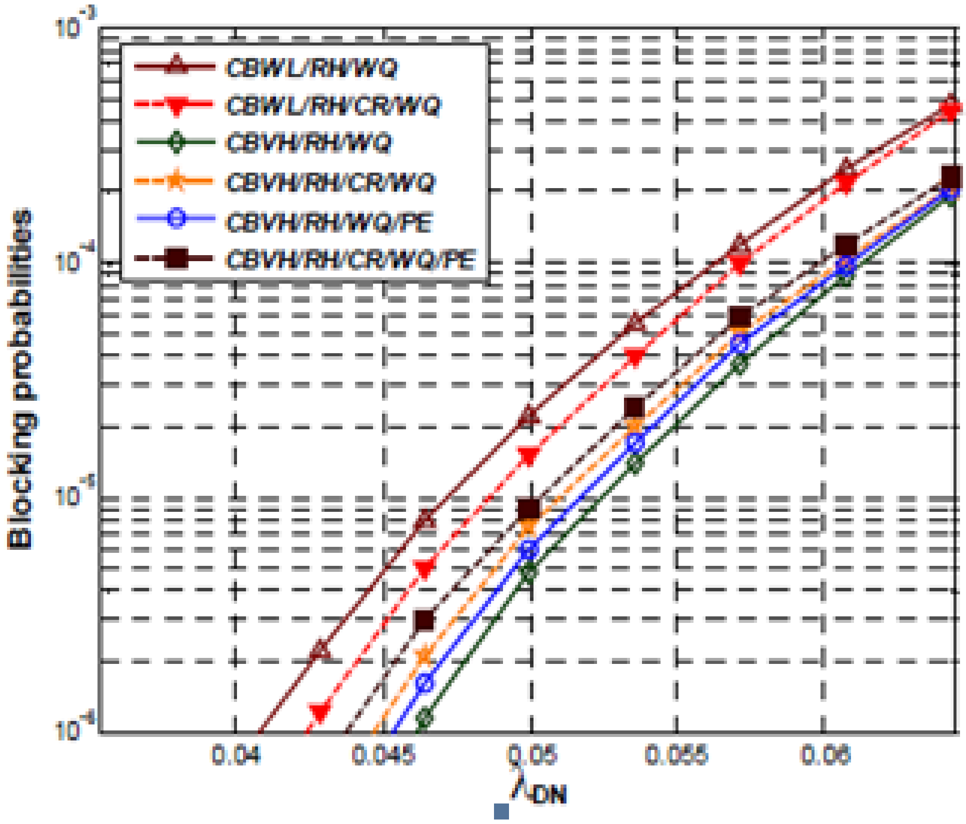

Fig.6. The blocking probability of handoff data services.

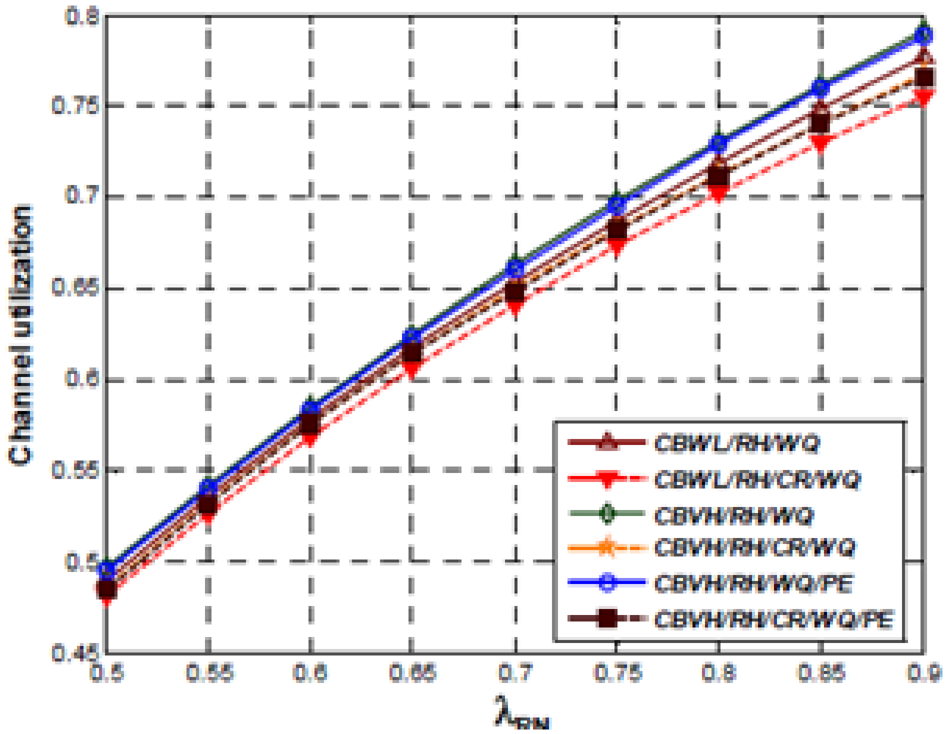

Fig. 7. Channel utilization

Conclusion

The design of handoff scheme is an important consideration for QoS in the integrated wireless mobile network system with real-time and non real-time services. The hybrid reservation handoff schemes (without and with preemptive procedure) have been proposed in this dissertation. An analytical model for the system performance has been presented. Our extensive simulation results are also matches with the analytical evaluations. Blocking probability of originating calls, forced termination probability of real-time service calls, and average transmission delay of non real-time service has been evaluated. It is observed that forced termination probability of real-time service handoff request calls and average transmission delay of non real-time service users could be decreased by our preemptive priority reservation handoff scheme. There is no transmission failure of non real-time service handoff requests except for a negligible small increase in blocking probability as a non real-time service handoff request can be transferred from the queue of one base station to another. Some future developments of the work done so far are as follows.

Mobility pattern of mobile user is a key character to model the system. How about the system performance if we choose a mobility pattern other than the Fluid Flood Model?

Based on our analytical model, the performance of system can be evaluated if the number of channels and other system parameters are given. However, during the system design phase, following question should be answered. Given a set parameters of desired QoS, how to compute the minimum number of channel necessary and how to choose the best reservation number?

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