

**Huang, Dawei** (Bell Labs Research China, China)

*Imbedded Markov Chain with Application to Network Management*

**Abstract:** We are motivated by the following network management problem: To disseminate the information of how many channels have been used in an optical network, we should broadcast the current available capacity on a link in the network. It is called flooding. However, too much flooding will cause network delay in response or even congestion. So we propose a new flooding technique, called Lazy Flooding; it floods only when links reach a certain status.

To analyze the impact of lazy flooding to the information distortion, we need to know the statistical characteristics of the difference between the real capacity and broadcasted numbers. It leads to a special embedded Markov chain in an M/M/B queuing system. This chain is different from the well-know result by Kendall since we have to consider the embedded epoch at both arriving and departure times. This MC also has a stationary distribution and we can derive an explicit formula for it.

Our analysis shows that the suggested lazy flooding method significantly cuts down the number of floods and thus improves the data communication network response time. On the other hand, it has negligible effect on the network performance due to the selected flooding.