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# Buffer Allocation and Traffic Shaping Policies Implemented in Routers Based on a New Adaptive Intelligent Multi Agent Approach

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**Abstract :** In this paper, an intelligent multi-agent framework is developed for each router in which agents have two vital functionalities, traffic shaping and buffer allocation and are positioned in the ports of the routers. With traffic shaping functionality agents shape the traffic forward by dynamic and real time allocation of the rate of generation of tokens in a Token Bucket algorithm and with buffer allocation functionality agents share their buffer capacity between each other based on their need and the conditions of the network. This dynamic and intelligent framework gives this opportunity to some ports to work better under burst and more busy conditions. These agents work intelligently based on Reinforcement Learning (RL) algorithm and will consider effective parameters in their decision process. As RL have limitation considering much parameter in its decision process due to the volume of calculations, we utilize our novel method which invokes Principle Component Analysis (PCA) on the RL and gives a high dimensional ability to this algorithm to consider as much as needed parameters in its decision process. This implementation when is compared to our previous work where traffic shaping was done without any sharing and dynamic allocation of buffer size for each port, the lower packet drop in the whole network specifically in the source routers can be seen. These methods are implemented in our previous proposed intelligent simulation environment to be able to compare better the performance metrics. The results obtained from this simulation environment show an efficient and dynamic utilization of resources in terms of bandwidth and buffer capacities pre allocated to each port.

**Keywords :** principal component analysis, reinforcement learning, buffer allocation, multi- agent systems
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