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A Modified Proportional Fair Radio Resource Management Scheme in Virtual RAN

This paper proposes a model for radio resource management in virtualised radio access networks, based on the criterion of proportional fairness, which is also adapted to deal with the situations when there is not enough capacity to serve all the subscribers with an acceptable level of service, so-called the extreme case. A single virtual network operator providing four different class of services negotiates for required capacity to serve its subscribers, from a centralised entity called Virtual Radio Resource Manager (VRRM). The main goals of VRRM defined in this work, are to maximise the utilisation of resources, while maintaining a level of fairness in the allocation of data rate among different services. However, under extreme situations the algorithm is modified to react differently according to the intensity of offered traffic load. In general, it keeps serving a number of users having the stringiest Quality of Service (QoS), with the minimum guaranteed data rate, while starts to delay the rest of users performing lowest QoS priority services. The performance of the proposed algorithm is evaluated through a practical heterogeneous network scenario and different evaluation metrics. Results show that when there is enough capacity, the algorithm is capable of satisfying the predefined service level agreements while keeping fairness, whereas under extreme situations it delays just enough number of users to free capacity for high priority services. In both cases, the algorithm is capable of maximising the utilisation of resources.

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