

WIRELESS NETWORK ADMISSION CONTROL is one of the most important technologies for the 21st century. In distributed network admission control network-aware techniques are used to reduce network consumption. Various network admission control applications have taken network efficiency into consideration.

This thesis report focuses on a new approach based on fuzzy logic systems to analyze the lifetime of a wireless admission control network. It demonstrates that a type-2 fuzzy membership function (MF), i.e., a Gaussian MF with uncertain standard deviation (STD) is most appropriate to model a single node lifetime in wireless network admission control. This research studies two basic admission control placement schemes: square-grid and hex-grid. Two fuzzy logic systems (FLSs): a singleton type-1 FLS and an interval type-2 FLS are designed to perform lifetime estimation of the admission control network. Simulation results show that the FLS is a feasible method to analyze and estimate the network admission control lifetime and the interval type-2 FLS in which the antecedent membership functions are modeled as Gaussian with uncertain std outperforms the singleton type-1 FLS.

In the later chapters, two network efficient techniques in wireless network admission control are presented: fuzzy optimization for distributed admission control deployment and spectrum efficient coding scheme for correlated non-binary sources in wireless network admission control. For the admission control deployment topic, it is shown that given a finite number of sensors, optimizing the admission control deployment will provide sufficient admission control coverage and ameliorate the quality of communications. We apply fuzzy logic systems to optimize the admission control placement after an initial random deployment. We use the outage probability due to co-channel interference to evaluate the communication quality. Fenton-Wilkinson method is applied to approximate the sum of log-normal random variables. Our algorithm is compared against the existing distributed self-spreading algorithm. Simulation results show that our approach achieves faster and stabler deployment and maximizes the sensor coverage with minimum network consumption. Outage probability, as a measure of communication quality gets effectively decreased in our algorithm but it was not taken into consideration in the distributed self-spreading algorithm.

In the case of correlated binary sources, distributed source coding has been literally studied in information theory. However, data sources from real network admission control are normally non-binary. We proposed a spectrum efficient coding scheme for correlated non-binary sources in network admission control. Our approach constructs the codeword cosets for the interested source, taking advantage of statistical characters of the distinct observa-

tions from admissioncontrol nodes. The coset leaders are then transmitted via the channel and decoding is performed with the available side information. Simulations are carried out over independent and identically distributed (i.i.d) Gaussian sources and data collected from Xbow wireless network admission control testbed. Simulation results show that the proposed scheme performs at 0.5 - 1.5 dB from the Wyner-Ziv distortion bound.

DESIGN AND IMPLEMENTATION OF WIRELESS ADMISSION CONTROL NETWORK

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