WIRELESS NETWORKADMISSION CONTROL is one of the most important technologies for the 21stcentury. In distributed network admission controlnetwork-aware techniques areused to reduce network consumption. Various network admission control applicationshave taken network eciency intoconsideration.

This thesisreport focuses on a new approach based on fuzzy logic systems to an-alyze thelifetime of a wireless admission control network. It demonstrates that a type-2fuzzy membership function (MF), i.e., a Gaussian MF with uncertain standarddeviation (STD) is most appropriate to model a single node lifetime in wirelessnetwork admission control. This re-search studies two basic admission control placementschemes: square-grid and hex-grid. Two fuzzy logic systems(FLSs): a singletontype-1 FLS and an interval type-2 FLS are designed to perform lifetimeestimation of the admission control network. Simulation results show that theFLS oersa feasible method to analyze and estimate the network admission control lifetimeand the interval type-2 FLS in which the antecedent membership functions aremodeled as Gaussian with uncertain std outperforms the singleton type-1 FLS.

In the laterchapters, two network ecient techniques inwireless network admission controlare presented: fuzzy optimization fordistributed admission control deployment and spectrum e cientcoding scheme for correlated non-binary sources in wirless network admissioncontrol.

For the admissioncontrol deployment topic, it is shown that given a finite number of sensors,optimizing the admission control deployment will provide sucientadmission control coverage and ameliorate the quality of communications. Weapply fuzzy logic systems to optimize the admission control placement after aninitial random deployment. We use the outage probability due to co-channelinterference to evaluate the communication quality. Fenton-Wilkinson method isapplied to approximate the sum of log-normal random variables. Our algorithm iscompared against the existing distributed self-spreading algorithm. Simulationresults show that our approach achieves faster and stabler deployment andmaximizes the sen-sor coverage with minimum network consumption. Outageprobability, as a measure of communication quality gets eectivelydecreased in our algorithm but it was not taken into consideration in thedistributed self-spreading algorithm.

In the caseof correlated binary sources, distributed source coding has been lit-erallystudied in information theory. However, data sources from real networkadmission controlare normally non-binary. We proposed a spectrum ecientcoding scheme for correlated non-binary sources in network admission control.Our approach constructs the codeword cosets for the interested source, takingadvantage of statistical characters of the distinct observa-

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

DESIGN AND IMPLEMENTATION OF WIRELESS ADMISSION CONTROL NETWORK