A Study of Fuzzy theory Application in ADSL Broadband-Network Failure Early Warning System

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ABSTRACT

The fuzzy controller, the core of the ASDL broadband network failure early warning system, is the subject of this study which de-velops on the basis of the fuzzy theory. The basic framework of the controller includes two inputs, incoming and outgoing traffic values from the DSLAM(Digital Subscriber Line Access Multiplexer) of ADSL network equipment towards the Remote terminal of ADSL Tranceiver Unit(ATU-R), one output set has two respective modes of different traffic type, network communication status and sub-scriber circuit board status. According to statistical analysis, the membership function defines the traffic value of the inputs into three fuzzy subsets of HIGH, MED, LOW, and the operation status of the output into three fuzzy subsets of BUSY, ACT, and DOWN. The system first receives DSLAM-to-ATU-R incoming and outgo-ing traffic values, then feeds the data into the fuzzy controller, and finally uses the relative relationship between the incoming and outgoing traffic values to reason the output result applying fuzzy rules. According to the definition of the membership function, an output result of BUSY indicates system in high traffic, ACT indi-cates system in operation, and DOWN indicates a failure condition. The failure early warning system of this study is mainly de-signed to monitor an abnormal status of the upstream equipment of DSLAM-ATM, and ISP, and the IP layer of network communica-tions. It provides speedy failure information and alerts to network administrators through an early warning mechanism in order to elevate the efficiency of repair and ensure a good communication quality. In addtion, the failure early warning system of this study is to make improvement on failure detection function to ensure a re-duced time for failure discovery and increased client satisfaction, in unusual situations when DSLAM system's fail to alarm of sub-scriber circuit board irregularities.

Keywords : Digital Subscriber Line Access Multiplexer(DSLAM), failure early warning system, fuzzy theory, fuzzy controller, mem-bership function.

Table of Contents

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