

A Novel Approach to Redundancy Allocation Problem in Critical Information Infrastructure Management

PART A. Summaries of Project Request

Summary: Recent catastrophic events such as 9-11 terrorist attacks, Indian Ocean Tsunami, and Hurricane Katrina causing devastation in New Orleans have highlighted the importance of protecting critical infrastructure systems during the man-made or natural disaster. According to congressional report, geographic concentrations of critical infrastructure systems are often associated with combination of social-economic influences such as community preference, resource location, financial interest of public and private sectors. Such concentration alleviates the vulnerability of human society to the man-made and natural disasters. Most critical infrastructure systems interact through different levels of connectivity with complex relationships. The modeling and analysis of the dependencies and interdependencies among different infrastructure systems become highly challenged. Even the interdependencies among the components within the same critical infrastructure system are very complicated. Much effort today in critical infrastructure management has been focusing on developing models to simulate the behavior of critical infrastructure system and to discover the interdependencies and vulnerabilities among the critical infrastructure systems. Different modeling approaches have been proposed including agent based model, game theory based model, effects-based operations model, risk management model and mathematical models. Moreover, the critical infrastructure systems interact with human society through different kinds of organizations including government and private sectors. Thus, in critical infrastructure management, it is extremely important to consider flexibility, sustainability and resiliency

at the strategic levels of all organizations working cooperatively together. This requires consideration at all levels of critical infrastructure management for emergency planning including mitigation, preparedness, response, and recovery. Among the critical infrastructure systems, the information infrastructure is considered as the most interconnected through digital means. Moreover, the increasing reliance on information and computerized control systems among all critical infrastructure systems brings the increasing importance of the critical information infrastructure.