NRCP RESEARCH JOURNAL
www.nrcpjournal.org

ISSN: 0117-3294

Vol. XIII, No. 1, 2013

Determining the Intruder's Location in a Given Network: Locating-Dominating Sets in a Graph

Sergio R. Canoy, Jr.*
Gina A. Malacas
Department of Mathematics
College of Science and Mathematics
MSU-Iligan Institute of Technology
9200 Iligan City
sergio.canoy@g.msuiit.edu.ph
gina_strong@g.math.com

Abstract

The exact location of an intruder (e.g. burglar, fire, etc.) in a given network or graph can be determined using the concept of locating-dominating set in a graph. In this paper the concepts of locating, strictly locating, and locating-dominating sets in a graph will be considered. Corresponding parameters will be discussed and some of their relationships will be given. It is shown that the L-domination number $\gamma_L(G)$ of a connected graph G of order $n \geq 2$ is $n - 1$ if and only if $G = K_n$ or $G = K_{1,n-1}$. If G is a connected graph and $\gamma_L(G) = 2$, then $3 \leq |V(G)| \leq 5$. The locating-dominating sets in the joins of graphs are characterized in terms of the other concepts and the associated L-domination numbers are determined subsequently.

Keywords: locating, strictly locating, locating dominating, join

Introduction

Let $G = (V(G),E(G))$ be a simple connected graph. The ***neighborhood*** of $v \in V(G)$ is the set $N_G(v) = N(v) = \{ x \in V(G): xv \in E(G)\}$. The ***degree*** of $v \in V(G)$, denoted by $deg(v)$, is equal to the cardinality of $N_G(v)$ and the ***maximum degree*** of G is $\Delta(G) = \max\{deg(x): x \in V(G)\}$. A subset S of $V(G)$ is a ***dominating*** set in G if for every $v \in V(G) \setminus S$, there exists $x \in S$ such that $xv \in E(G)$. It is a ***locating set*** in G if $N_G(u) \cap S \neq N_G(v) \cap S$ *for all* $u,v \in V(G) \setminus S$. Set S is said to be a ***strictly locating set*** if it is locating

This research (part of Research Project No. B-105) is supported by the DOST-National Research Council of the Philippines.