Notice of the Final Oral Examination
for the Degree of Master of Science

of

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BSc (University of Prince Edward Island, 2012)
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"New Results on Broadcast Domination and Multipacking"

Department of Mathematics and Statistics

Friday, June 26, 2015
10:30 A.M.
David Turpin Building
Room A144

Supervisory Committee:
Dr. Gary MacGillivray, Department of Mathematics and Statistics, University of Victoria
(Co-Supervisor)
Dr. Richard Brewster, Department of Mathematics and Statistics, UVic (Co-Supervisor)

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Chair of Oral Examination:
Dr. Falk Herwig, Department of Physics and Astronomy, UVic

Abstract

Let $G = (V;E)$ be a graph and f be a function such that $f : V \rightarrow \{0,1,2, \ldots, diam(G)\}$. Let $V_f^+ = \{v : f(v) > 0\}$. If for every vertex $v \notin V_f^+$ there exists a vertex $w \notin V_f^+$ such that $d(v,w) \leq f(w)$ then f is called a *dominating broadcast* of G. The quantity $\sum_{v \in V} f(v)$ is called the *cost* of the broadcast. The minimum cost of a dominating broadcast is called the *broadcast domination number* of G, and is denoted by $\gamma_b(G)$. A subset $S \subseteq V$ is a *multipacking* if for every $v \in V$ and for every $1 \leq k \leq rad(G)$, $|N_k[v] \cap S| \leq k$. The *multipacking number* of G is the maximum cardinality of a multipacking of G, and is denoted by $mp(G)$.

In the first part of the thesis, we describe how linear programming can be used to give a $O(n3)$ algorithm to find the broadcast domination number and multipacking number of strongly chordal graphs. Next, we restrict attention to trees, and describe linear time algorithms to compute these numbers. Finally, we introduce k-broadcast domination and k-multipacking, develop the basic theory and give a bound for the 2-broadcast domination number of a tree in terms of its order.