Review of Multicast Routing in Datagram Internetworks and Extended LANs

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This paper introduces several algorithms for multicast routing based on different methods of unicast routing including single-spanning tree, distance-vector, and link-state routing. The algorithms proposed use the data structures already present in the existing unicast routing protocols and attempt to ensure that the delivery characteristics of multicast packets are the same as those of unicast packets. In Single Spanning Tree multicast, Truncated Reverse Path Broadcasting (TRPB), and Reverse Path Multicasting (RPM) routers and bridges learn which branches lead to members of particular groups through periodic membership reports from those members. Once no membership reports for a specific group are received for a certain amount of time the entries expire. A distance-vector multicast routing protocol was developed in several stages. They started by modifying Reverse Path Flooding (RPF) where a router forwards broadcast packet (on all other links) from a source S if and only if it arrived via the shortest path back to S to fix the problem of packets being able to be transmitted multiple times on the same link. To do this Reverse Path Broadcasting (RPB) only forwards broadcast packets along child links on the shortest path back to S. A new algorithm requiring no new information was created to find the child links. For a given link, the router with the minimum distance to S is considered the parent, and hence the link is a child of the parent. RPB was modified to create Truncated Reverse Path Broadcasting (TRPB) was created to prune the broadcast trees to only send multicast packets where there are desired. Finally, Reverse Path Multicasting (RPM) which uses non-membership reports from routers to prune the shortest path broadcast trees on-demand was proposed. These non-membership reports are generated when a router receives a multicast packet for group G and has only child links not used by other routers to reach S and none of the child links contain members of group G. They then mention how hierarchical multicast routing may be used to help these algorithms scale.

While it was noted that not only did the authors not have any experience with the distribution of multicast traffic or the dynamics of group membership but that this may change as new applications are adopted, this paper would have benefited from some simulation or experimental results to validate their claims. It would be nice to have

The focus of this paper is on modifying existing algorithms to support multicast which constrains the possible developments. One interesting idea is how they combine both notifying routers and bridges of group membership with allowing routers to opt-out of receiving multicast packets destined for particular groups. This allows for better utilization of resources. It is hard to imagine a multicast protocol that did not involve some sort of opt-in or opt-out, and while the specific protocols developed were restricted to existing protocols, the idea of combining both opt-in and opt-out is not limited by those protocols and should be considered in the future when designing clean-slate.