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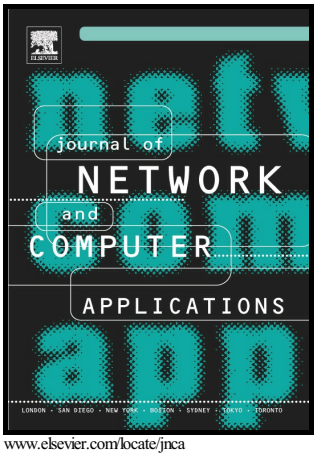

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Restoration Methods for Cloud Multicast Virtual Networks ☆

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Abstract

Providing reliability guarantees for services hosted in cloud data center networks is a well studied problem that received much attention from the literature in recent years. Yet, the existing literature failed to account for the mode of communication that these hosted services may exhibit. Rather, it is assumed that the constituent Virtual Machines (VMs) are always exchanging traffic in a one-to-one communication mode. This paper is concerned with the problem of restoring failed services with a one-to-many communication mode, the mode of communication for a multitude of multicast applications and services hosted today in the cloud. Through motivational examples we show that the problem of restoring multicast Virtual Networks (VNs) greatly differs from that of unicast services, thereby demanding separate attention. To this extent, we formally define the problem of restoring multicast services in event of facility node failure, and we mathematically formulate it using an Integer Linear Programming (ILP) model. Further, we propose REAL: a multicast virtual network restoration algorithm. REAL distinguishes the failure of multicast source node from that of multicast terminal nodes, and adopts a hop-to-hop search to handle receiver or terminal node failures, and a path convergence approach to recover from source node failures. We evaluate our proposed schemes against a Greedy and

☆This work is an extension to the article [1] presented at the proceedings of the 2015 IEEE CLOUD conference.