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An Overly Architecture for throughput Optimal Routing using Cluster Based network

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Abstract—**Cluster-based network control structures endorse more capable utilize of resources in controlling large dynamic networks. Therefore they are very good candidates for ad hoc networks. There are many types of cluster-based architectures proposed in the literature for definite purposes. Of them link-cluster architecture is specifically designed for transmission management in ad hoc networks. Bequest networks are frequently planned to operate with plain single-path routing, like the shortest path, which is known to be throughput suboptimal. On the other hand, earlier proposed throughput optimal policies (i.e., backpressure) need each machine in the network to make active routing decisions. We study overlay architecture for dynamic routing; only a subset of devices (overlay nodes) require to make the dynamic routing decisions. We conclude the necessary compilation of nodes that must bifurcate traffic for achieving the utmost multi-commodity network throughput.**

Keywords— Cluster based, overlay networks, bequest network, network control, backpressure routing

I. INTRODUCTION

This paper presents quite a few cluster based control structures and associated control algorithms for large dynamic networks. Applicability of these structures and algorithms to ad hoc networks are also investigated predominantly on routing functions. Cluster-based control networks improve efficiency of resource use by creating contexts for:

- Managing wireless transmission between multiple nodes to reduce channel contention.
- Forming routing backbones to reduce network diameter.
- Abstracting network state information to reduce its quantity and variability.

We study best possible routing in networks where some bequest nodes are replaced with overlay nodes. While the bequest nodes execute only forwarding on pre-specified paths, the overlay nodes are capable to animatedly route packets. *Dynamic backpressure* is known to be an optimal routing policy, but it usually requires a uniform network, where all nodes contribute in organize decisions. As an alternative, we guess that only a division of the nodes are convenient; these nodes form a network overlay inside the bequest network. The option of the overlay nodes is shown to conclude the throughput area of the network. We relate our best possible node assignment algorithm to a number of graphs and the consequences demonstrate that a small fraction of overlay nodes is sufficient for achieving highest throughput. Finally, we propose a threshold-based policy (BP-T) and a heuristic policy (OBP), which animatedly control traffic bifurcations at overlay nodes. Policy BP-T is proved to make the most of throughput for the case when underlay paths do not partly cover.

We estimate our algorithm on numerous classes of usual and random graphs. In the case of random networks with a power-law degree distribution, which is a general model for the Internet. We find that smaller number than 80 out of 1000 nodes are necessary to be convenient to allow the complete throughput area.

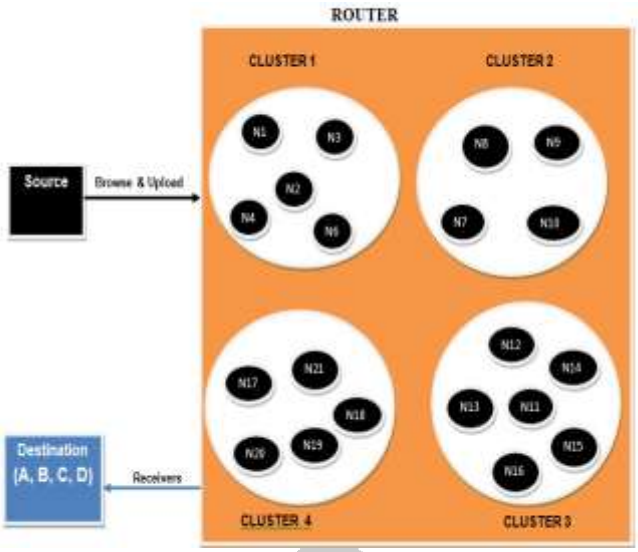

Fig. 1. Cluster Based network. This control structures promote more efficient use of resources in controlling large dynamic networks. With cluster based control, the physical network is distorted into a virtual network of interconnected node clusters.

Our first finding is that ring networks need accurately three convenient (overlay) nodes to allow the similar throughput area as when all nodes are convenient, free of the whole number of nodes in the network, Provoked by this, we build up an algorithm for choosing the smallest amount number of convenient nodes necessary to allow the complete throughput region..

Since usual backpressure routing cannot be explicitly realistic to the overlay situation, we build longer extensions to back-pressure routing that conclude how to route packets among overlay nodes. We confirm that highest throughput can be attained with our policies in numerous scenarios, when only a portion of legacy nodes are replaced by convenient nodes. Moreover, we monitor summary delay relative to the case where all nodes are convenient and operate under backpressure routing.

II. CLUSTER BASED NETWORK ARCHITECTURE

A. *Clusterheads*

There are at least two algorithms proposed for the choosing of cluster heads in, one is identifier-based clustering and the other is connectivity-based clustering. Implementation for both algorithms. With the centralized version, the node with the largest number of neighbors is chosen for the cluster containing that node. With the distributed version of identifier- based clustering, a node choose itself if it has the lowest or highest numbered identifier in its neighborhood. With the distributed version of connectivity-based clustering, a node becomes a cluster head if it is the most highly connected of all of its neighbors which are not elected as cluster heads.

The variants of clustering algorithms that always form dislodge clusters for the beyond two methods are also described in the literature. In those cases cluster heads are used only as aids in cluster arrangement and not as coordinators of intra-cluster transmission.

B. *Node Mobility*

As nodes shift about the network, cluster connection must be reorganized accordingly to make sure proper scheduling of transmissions. Identifier-based clustering is extra steady than connectivity-based clustering in the cluster recomputation. This is because a node's cluster head status may modify more frequently with connectivity based clustering.

The less cluster modified algorithm reduces the number of changes in cluster head status due to node movement. In this algo, a change in cluster head position occurs only if two cluster heads move within the variety of each other and in this crate one of them relinquishes its cluster head or a normal node moves out of range of any other node and becomes a cluster head for its own cluster. The cluster preservation schemes are also proposed by Lin and Gerla to minimize the number of changes in the set of existing clusters as nodes move.

C. *Routing*

The link clustered structural design provides a natural routing backbone consisting of cluster heads and gateways and the links between them. However, cluster heads as points of traffic attention may become crowded and each cluster head may become a breakdown point for communication across its cluster. Therefore, link- clustered architecture is not used as routing control structural design in routing algorithms. Instead, each node distributes and collects routing information, and generates and selects routes. Though, clusters exists to define regions for transmission organization primarily and to form a routing backbone in link-clustered architecture.

III. EXISTING SYSTEM

- Techniques to supply throughput-optimal multipath routing have been explored in various contexts. The work in existing system considers the problem of setting link weights provided to the Open Shortest Path First (OSPF) routing protocol such that, when coupled with bifurcating traffic equally among shortest paths, the network achieves throughput equal to the optimal multi-commodity flow.
- The authors of existing system use an entropy maximization framework to develop a new throughput-optimal link state routing protocol where each router intelligently bifurcates traffic for each destination among its outgoing links.
- The work in existing system proposes resilient overlay networks (RON) to find paths around network outages on a faster timescale than BGP. Likewise, a other system proposed for choosing placement of overlay nodes to improve path diversity in overlay routes. While both of the previous works show that their strategies select high quality single path routes, furthermore we identify multipath routes that offer maximum throughput.

IV. DISADVANTAGES OF EXISTING SYSTEM

- Existing techniques all require centralized control, universal adoption by all network nodes, or both; thus none of these techniques could provide incremental deployment of throughput optimal routing to wireless networks.
- Moreover, these techniques cannot be used in conjunction with throughput optimal dynamic control schemes, such as backpressure.

V. METHODOLOGY

- We consider two problem areas for control of heterogeneous networks. First, we develop algorithms for choosing the placement of controllable nodes, where our goal here is to allocate the minimum number of controllable nodes such that the full network stability region is available.
- Second, given any subset of nodes that are controllable, we also wish to develop an optimal routing policy that operates solely on these nodes.
- Our solutions for the first and second problem areas are complementary, in the sense that they can be used together to solve the joint problem of providing maximum throughput when only a subset of nodes are controllable. However, our solutions can also be used in isolation; our node placement algorithm can be used with other control policies, and our BP extensions can yield maximal stability with any overlay node placement and legacy single-path routing.

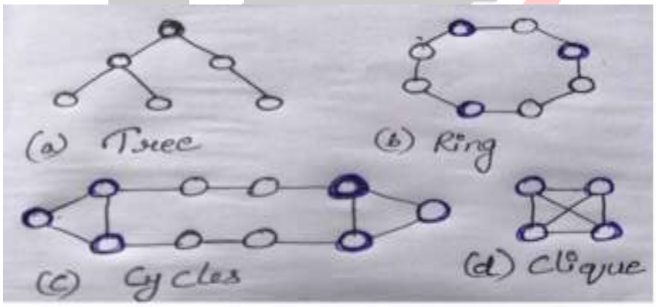

Fig .5 Minimum node placement required to produce max throughput for several normal scenarios, where manageable nodes are bolded in dark shade. (a) No controllable nodes on trees. (b) Exactly 3 controllable nodes on a ring . (c) At least 3 controllable nodes on every cycle. (d) All nodes must be controllable on a clique.

VI. RESULTS

We provide results for various types of network graphs, Including specific graph families and random graphs. By Theorem 1, the full throughput region is provided by the Placement of our algorithm on all these cases.

A. Simple Scenarios

1) Trees and Forests: Consider trees with single-path underlay routes ab for every pair of nodes a and b. A tree is loop free, and thus each path ab is the unique acyclic path from node a to b, as shown in Fig. 5a. Thus, the all-paths condition is automatically satisfied, and $\Lambda G(\emptyset) = \Lambda G(N)$.
It follows that no controllable nodes are required for a forest, which is a disjoint union of trees.

2) Cycles and Rings:
Every cycle requires at least 3 controllable nodes to satisfy the all-paths condition. For a ring, observe that shortest path *ab* connects nodes *a* and *b* in only one direction, even when *a* and *b* are themselves controllable. At least one more controllable node is required to form path *ab* in the counter direction. Generalizing the above observation to consider all pairs of nodes on a cycle. Further, the lower bound is tight for the case of a ring, where the entire graph is a single cycle. These scenarios are illustrated in Figs. 5b and 5c.

3) Cliques: Consider cliques with single-path underlay routes *ab* for every pair of nodes *a* and *b*. We require all edges (*a, b*) be included in the underlay routes, however there is an edge between every pair of nodes in a clique. Thus, all underlay routes are single edges. $ab = (a, b)$ for all pairs $a, b \in N$. A Hamiltonian path, traversing all nodes, will require all intermediate nodes to be controllable. Such paths can start and end at any node, therefore the all-paths condition requires all nodes to be controllable for a clique, as shown in Fig. 5d.

VII. CONCLUTION

We study optimal routing in legacy networks where only a Subset of nodes can make dynamic routing decisions, while the legacy nodes can forward packets only on pre-specified Shortest-paths. This model captures evolving heterogeneous networks where intelligence is introduced at a fraction of nodes. We propose a necessary and sufficient condition for the overlay node placement to enable the full multi commodity throughput region with cluster formation. Based on this condition, we devise an algorithm for optimal controllable node placement. We run the algorithm on large random graphs to show that very often a small number of intelligent nodes suffices for full throughput. Finally, we propose dynamic routing policies to be implemented in a network overlay. We provide a threshold based policy that is optimal for overlays with non-overlapping tunnels, and provide and alternate policy for general networks that demonstrates superior performance in terms of both throughput and delay.

REFERENCES

[1] D. Andersen, H. Balakrishnan, F. Kaashoek, and R.Morris, “Resilient overlay networks,” in Proc. ACM SOSP, Oct. 2001, pp. 131–145. [Online]. Available:http://doi.acm.org/10.1145/502034.50208

[2] L. Bui, R. Srikant, and A. Stolyar, “Novel architectures and algorithms for delay reduction in back-pressure scheduling and routing,” in Proc. IEEE INFOCOM, Apr. 2009, pp. 2936–2940.

[3] B. Fortz and M. Thorup, “Internet traffic engineering by optimizing OSPF weights,” in Proc. IEEE INFOCOM, Mar. 2000,pp. 519–528.

[4] L. Georgiadis, M. J. Neely, and L. Tassiulas, “Resource allocation and cross-layer control in wireless networks,” Found. Trends Netw.,vol. 1, no. 1, pp. 1–144, 2006. [Online]. Available: http://dx.doi.org/10.1561/1300000001

[5] J. Han, D. Watson, and F. Jahanian, “Topology aware overlay networks,”in Proc. IEEE INFOCOM, Mar. 2005, pp. 2554–2565.[Online].Available:http://ieeexplore.ieee.org/stamp/stamp.jsp?arnumber=1498540

[6] N. M. Jones, “Practical algorithms for distributed network control,”Ph.D. dissertation, Dept. Aeronautics Astronautics Massachusetts Inst.Technol., Cambridge, MA, USA, 2013.

[7] N. M. Jones, G. S. Paschos, B. Shrader, and E. Modiano, “An overlay architecture for throughput optimal multipath routing,” in Proc. ACM MobiHoc, Aug. 2014, pp. 73–82.

[8] W. Khan, L. B. Le, and E. Modiano, “Autonomous routing algorithms for networks with wide-spread failures,” in Proc. IEEE MILCOM,Oct. 2009, pp. 1–6. [Online]. Available: http://ieeexplore.ieee.org/stamp/stamp.jsp?arnumber=5379792

[9] M. J. Neely, E. Modiano, and C. E. Rohrs, “Dynamic power allocation and routing for time-varying wireless networks,” IEEE J. Sel. Areas Commun., vol. 23, no. 1, pp. 89–103, Jan. 2005. [Online].Available:http://ieeexplore.ieee.org/search/srchabstract.jsp?tp=&arnumber=1208724%&queryText%3Djsac+neely+modiano+rhors%26opened Refinements%3D*%26searchField%3D%Search+All

[10] M. E. J. Newman, Networks: An Introduction. New York, NY, USA:Oxford Univ. Press, 2010.

[11] G. S. Paschos and E. Modiano, “Throughput optimal routing in overlay networks,” in Proc. IEEE Allerton, Oct. 2014, pp. 401–408.

[12] G. S. Paschos and E. Modiano. (Sep. 2014). “Throughput optimal Routing in overlay networks.”[Online]. Available: http://arxiv.org/abs/1409.1739

[13] L. L. Peterson and B. S. Davie, Computer Networks: A Systems Approach, 4th ed. San Francisco, CA, USA: Morgan Kaufmann, 2007.

[14] A. Rai, C.-P. Li, G. Paschos, and E. Modiano, “Loop-free backpressure routing using link-reversal algorithms,” in Proc. ACM MobiHoc,Jun. 2015, pp. 87–96 .

[15] J. Ryu, L. Ying, and S.Shakkottai, “Back - pressure routing for intermittently connected networks,” in Proc. IEEE INFOCOM, Mar. 2010,pp. 1–5. [Online]. Available: http://ieeexplore.ieee.org/stamp/stamp.jsp?arnumber=5462224

[16] L. Tassiulas and A. Ephremides, “Stability properties of constrained queueing systems and scheduling policies for maximum throughput in multihop radio networks,” IEEE Trans. Autom. Control, vol. 37, no. 12,pp. 1936–1948, Dec. 1992.

[17] D. Xu, M. Chiang, and J. Rexford, “Link-state routing with hop-by-hop forwarding can achieve optimal traffic engineering,” IEEE/ACM Trans.Netw., vol. 19, no. 6, pp. 1717–1730, Dec. 2011.

[18] L. Ying, S. Shakkottai, and A. Reddy, “On combining shortest-path and back-pressure routing over multihop wireless networks,” in Proc.IEEE INFOCOM, Apr. 2009, pp. 1674–1682. [Online]. Available:http://ieeexplore.ieee.org/stamp/stamp.jsp?arnumber=5066