To Increase the Bound of Vertex in Overlay Relay Routing Nodes using Dynamic Threshold Function

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Abstract – The Overlay routing has been anticipated in recent years as a successful way to accomplish convinced routing properties, exclusive of going into the elongated and monotonous process of regularity and global deployment of a routing protocol. This gives ascend to the optimization, reliability, fault tolerant and high distributed problem which we overcome in this work we are using distributed and non-trival approximation algorithm. In order to arrange the physical infrastructure by an overlay routing, it will have the new superfluous functionality that needs to organize and deal with overlay nodes. In terms of capital and operating costs both can comes with a non-negligible cost. In the Internet BGP-based routing over the shortest-path routing example, the question can mapped to: Which is the least number of relay nodes that are essential in order to arrange the routing among a group of autonomous systems (ASs) utilize the underlying shortest path between them. In the TCP performance illustration, this may transform to: Which is the minimal number of relay nodes required in order to build an each TCP connection. Regardless of the specific suggestion in mind, To study the complication of common optimization problem called Overlay Routing Resource Allocation (ORRA) and complexity .but, we believe one-to-many or many-to-many scenarios, then the only overlay node may engross the path property of various paths, and thus choose the finest locations becomes a large amount of less inconsequential.

Index Terms – Autonomous systems (ASs), TCP, Overlay Routing Resource Allocation (ORRA), Overlay routing.

1. INTRODUCTION

An overlay network is a computer network, which is built on the top of another network. The virtual or logical links nodes are connected in overlay network, each of which is similar to a path, possibly during many physical links, in the underlying network. Overlay Voice-over-IP (VoIP) applications such as Skype, Google Talk, Tango, Viber and others. Such applications are attractive more and more admired contribution IP telephone services used free ,but they require abound end-to-end delay (or latency)among a few pair of users to sustain a practical service quality. We provide an idea about the our design can be very usable in this case, allowing applications to desire a smaller number of hubs, yet refining performance for many users.it can be suitable for various scheduling policies. Then, we have to show that the trouble is MAX SNP-hard, which is an approximation algorithms [1].

The Carrier Sense Multiple Access (Q-CSMA)-type random access algorithms that can be shown by queue length can attain the utmost possible throughput in ad-hoc wireless networks. In this type of network, there is a more than one entity try to access a certain link at that time more than one links are in active, at that time we are getting a collision. We are not successfully transmitted over the medium when the collision occurs. Its define a cross algorithm to use for recover the competence of collision avoided communication to recover throughput and shrink latency. Wireless mesh networks typically provide several paths from a source to a destination, and by using such paths efficiently, we can aggregate the available resources [3] etc. Wireless multi-hop networks [4] are characterize by the use of various and vigorously changing routing paths. In a network of wireless nodes, we make obvious that DiffQ far outperforms many previously planned "practical" solutions for congestion control. The presentation and analysis of a mathematical model that arises in connection with the development and deployment of large-scale broadband networks. In future communication networks there are expected to be applications that are able to modify their data transfer rates according to the available bandwidth within the network. Traffic from such applications is termed elastic a typical current example is TCP traffic over the Internet, and future examples may include the controlled-load service of the Internet Engineering Task Force and the Available Bit Rate transfer capability of ATM (asynchronous transfer mode) networks. The utility-based congestion control [7] that can be on combining differential-backlog scheduling algorithms. But, the work that can usually does not concentrate on a number of problems such as how signaling should be performed and how the innovative algorithms act together with additional wireless protocols. Future wireless networks are expected to support applications with high data rate requirements.

Since the wireless spectrum is scarce, it is essential to fully make use of the potential capacity of the network. One approach to get better the capacity of a wireless network is to use multi-hop as an alternative of the traditional single-hop communication. Another approach is to together to control multiple layers of the network, with adaptive coding, link scheduling, power control, and routing. The capacity of

wireless multi-hop networks with joint control over multiple layers. An issue that has not been treated thoroughly in the literature is how to control the data rates [9] of the applications so that they fall within the capacity region. In future wireless networks, more and more applications will be data-oriented. Such applications are elastic, i.e., they can transmit data over a wide range of data rates. A network without an appropriate rate control mechanism could perform poorly in practice.

Let the graph $G=(V,E)$ with s vertices and m edges and getting maximal (bipartite) cliques in a given (bipartite) . We propose for enumerating all maximal cliques [10] with the help of two algorithms. One runs with O($R(s)$) time delay and in O(s ^{2}) space and the additional runs with O(Δ^4) time interruption and in O($s+r$) space, where Δ denotes the highest degree of G, $M(s)$ denotes the time needed to multiply two s × n matrices, and the last one requires O(sr) time as a preprocessing.

2. RELATED WORK

Backpressure Architectures: Tassiulas and Ephremides are introduced the backpressure architecture, and in view of the fact that, a considerable exertion has been committed to distributed approximations that assurance a portion of the capacity region. These algorithms continue the slotted TDMA MAC protocol hypothesis of the original algorithm, it is not converted to real implementations. The modern work applies backpressure concepts to build practical systems. In a different approach, several systems have been built on top of offered adjust the 802.11 conflict window to non-sequential links with a privileged discrepancy backlog. Radunovic et al. Multipath TCP transfers can be simplified for to improve the performance backpressure method on top of 802.11. Almost the works assume a divide routing protocol. The approaches that are having the important steps to show realistic improvements of backpressure-inspired protocols in excess of regular CSMA/CA. Centralized 802.11 Architectures: Vendors, like Cisco, Aruba, and Meru Networks, suggest centralized architectures for speculation 802.11 wireless LANs. In these architectures, a downlink transmissions from the APs to the clients coordinated by the vital controller. With a related goal, Liu et al. and Srivastava et al. suggest centralized architectures to plan AP transmissions. It having fundamental differences. For illustration, The AP to the clients and utilize heuristics for scheduling that can be architect only schedule single-hop transmissions. On the other hand, XPRESS controls the entire multi-hop wireless vertebrae and equipment a throughput-optimal scheduler. Interference Estimation: Interference estimation classified into passive or active by an existing techniques. Passive approaches involve monitors deployed throughout the wireless network to gather traffic traces, which are presently analyzed offline. The available infrastructure to introduce test packets into the network and determine intrusion by the active approaches .Padhye et al.comparing the throughput of two links with the measure intrusion, when

transmitting in seclusion and in parallel. Although exact, this technique requires widespread downtime to test all link pairs. Ahmed et al. offer an online approach where APs sporadically calm their clients and run a swift interference tests. This method, however, the downlink is restricted for single-hop wireless LANs. The multi-hop networks, Vutukuru et al. suggest a passive technique to be trained on transmission conflicts. This method exploits some exposed terminals vacant by 802.11, but it does not attend to hidden interferers. Finally, several works determine RSS to predict PDRs. In addition to RSS measurements, the XPRESS hindrance assessment of each TDMA frame to become aware of design measures PDR concealed or preservative interferers and process the network conflict graph.

3. PORPOSED MODELLING

In this paper, we are concentration on the point and study the least quantity of infrastructure nodes that should be auxiliary in order to conserve a specific property in the overlay routing. The Internet BGP-based routing example for the shortest path routing, this question is mapped to: What is the least number of relay nodes with the intention of are desired in organize to make the routing along with a groups of autonomous systems (ASs) use the underlying shortest path connecting them. In the TCP performance case, this may decode to: What is the nominal number of relay nodes desired in organize to make sure to facilitate for each TCP connection, For every predefined round-trip time(RTT) that can facilitate the path between the connection of end points, there is an overlay node competent of TCP Piping. In any case of the specific insinuation in mind, we define a general optimization problem called the Overlay Routing Resource Allocation (ORRA) problem and revision its complication. It turns out that the problem is NP-hard, and we here a nontrivial approximation algorithm so, we can propose two approximation algorithms, both of can be at polynomial runtime. First algorithm is based on a simple greedy method.

Pseudo code for Greedy Method

```
set Greedy (Set Candidate){
solution= new Set( );
while (Candidate.isNotEmpty()) {
solution= new Set( );
while (Candidate.isNotEmpty()) {
next = Candidate.select(); //use selection criteria,
 //remove from Candidate and return value
if (solution.isFeasible( next)) //constraints satisfied
solution.union( next);
if (solution.solves()) return solution}
  //No more candidates and no solution
return null
}
 //remove from Candidate and return value
```

The second one is based on the Local Ratio (L-R) Method that can evaluate the strength of the 2-approximation L-R algorithm, we are obtain a exact FDPS problem, which incorporates the channel quality information and queue length.

Pseudo code for L-R(local ratio) Method

1.// labeling stage
2.for S∈R do
3.S ← nil
4. repeat
5. choose s∈R maximizing Δ =|SN(s)|
6. choose ˆw with support in SN(s)
7. w ← w−min w(s)ˆw(s) ˆ w(s)>0ˆw
8. forv∈SN(s)w(r)=0 do
9. r←Δ
10. until every vertex is labeled
11. // scheduling stage
12. sort (s,r) ∈ E in lexicographic order of min {s,r1},max {s,r}
13. S ← empty schedule
14. for e∈ E in sorted order do
15. add e to S as early as possible
16.return S

Once the labels are computed, the edges (s,r)∈E are sorted in escalating value of min{s,r} , infringement ties with max {s,r}. The edges are scheduled greedily insorted order: Start with the empty schedule and add the edges, one by one in sorted order, to the current schedule as early as possible without creating a conflict.

FINDING OVERLAY VERTEX CUT

To provide qualified services, various applications require overlays to assurance reliability and evade network faults. In case of the extrovert streaming may be disrupted when network faults occur. In contrast with general nodes, the fault of "critical" nodes such as central servers is more possible to lead to network failures. The service requirement can be caused to the remove of   prospective "critical" nodes as services and resource are provided by all the node in the system. In the network topology, the remove of "critical" nodes induced that cannot be possible. Overlay nodes are extremely self-organized. The randomly selected nodes or via locally defined algorithms that should be useful to make the connections. In these cases, for manage the network topology here there is no centralized. The high-degree nodes that contain the small amount of failure can professionally "shatter" the overlay network, which makes the network highly vulnerable in the face of well-constructed, targeted attacks. Another type of "critical" nodes, cut vertices, in overlay networks that should be influence.

Let we consider a network as an undirected graph in the fig.1. With the help of cut vertices and such nodes that erasure will create new components in the innovative graph. For a connected graph (component), avoiding cut vertices partitions the graph. In this paper, "graph", "component", and "vertex" are concepts defined in graph theory: a "graph" is used to represent a network; a "component" is a connected graph; and a "vertex" is other name for a node. The node and the vertex will be used interchangeably in the remainder of this paper.
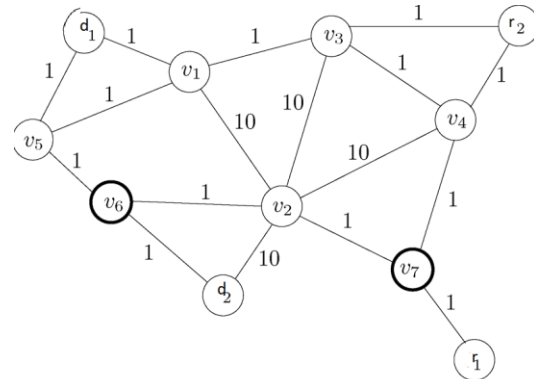

Fig. 1. Overlay routing example: Deploying relay server on v6 and v7 enables overlay routing

Definition 1: Given a graph G=(V,E) is a pair of vertices , a set of underlay paths pu, a po^{s,t} be set of overlay paths , and a set of vertices (D,R) .We say that U covers if such that is a concatenation of one or more underlying paths, and the endpoints of each one of these underlay paths are in

$$ U \cup \{d\} \cap \{r\} . $$

Intuitively speaking, the set of vertices U , also called relay nodes, is used to perform overlay routing, from sources to destinations such that packets can be routed from one relay node to another using underlay paths. The Overlay Routing Resource Allocation (*ORRA*) problem is defined as follows:

Definition 2: Given a graph , a set of G=(V,E) source–destination pairs that the path F={(d1,s1),(d2,s2)…..(dn,sn).(where), a set of underlay paths pu, and a set of overlay paths po , find a subset of vertices $U \subseteq V$ such that , covers (d,s) .

Using the assumption that single-hop paths are always in , the set is a trivial feasible solution to the *ORRA* problem.

Algorithm ORRA (G=(V,E), M,Pu, Po,C)

Åv € v/C, if m(v)=0 then C ← {v}
2. If C is a feasible Solution returns C
3. Find a pair(d,r) ε Q not covered by C
4. Find a (minimal) Overlay Vertex Cut I' (I'∩C=∅)
   With respect to (d,r).
5. Set =minᵢₑᵢ' m(i)

6. Set m1(i)= ϵ, iϵI'

7. I set m2(i)= m(i)-m1(i)

8.ORRA(G,M2,P$_U$,P$_O$,C)

9. I C If C \{i} is a feasible solution then set C=C\{i}

10. Returnc C

At each iteration, the algorithm picks vertices with weight that is equal to zero until a feasible set is obtained (steps 1 and 2 of the algorithm). Thus, since at each iteration at least one vertex gets a weight that is equal to zero with respect to (steps 5–7), then in the worst case the algorithm stops after iterations and returns a feasible set. In Step 9, unnecessary vertices are removed from the solution, in order to reduce its cost. While this step may improve the actual performance of the algorithm, it is not required in the approximation analysis below and may be omitted in the implementation.

A. BGP Routing Scheme

BGP is a policy-based inter domain routing protocol that is used to determine the routing paths between autonomous systems in the Internet. In practice, each AS is an independent business entity, and the BGP routing policy reflects the commercial relationships between connected ASs. A *customer– provider* relationship between ASs means that one AS(the customer) pays another AS (the provider) for Internet connectivity, a *peer–peer* relationship between ASs means that they have mutual agreement to serve their customers,

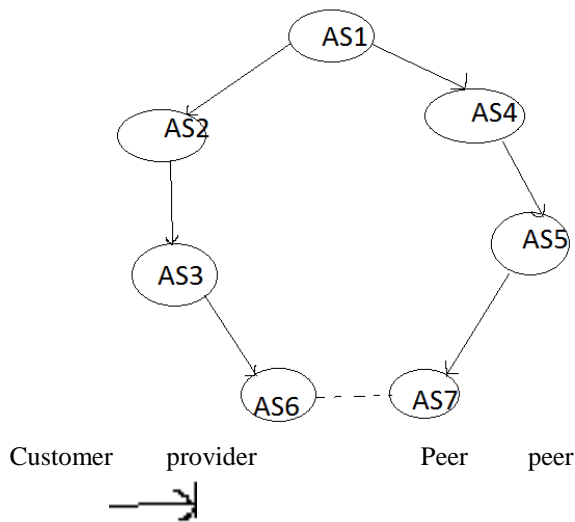Customer   provider   Peer   peer

Fig.2. BGP path inflation

While a *sibling–sibling* relationship means that they have mutual-transit agreement (i.e., serving both their customers and providers). These business relationships between ASs induce a BGP export policy in which an AS usually does not export its providers and peers routes to other providers and peers route export policy indicates that routing paths do not contain so-called *valleys* nor *steps*. In other words, after traversing a

provider–customer or a *peer–peer* link, a path cannot traverse a *customer–provider* or a *peer-peer* link. This routing policy may cause, among other things, that data packets will not be routed along the shortest path. For instance, consider the AS topology graph depicted in Fig.2. In this example, a vertex represents an AS, and an edge represents a peering relationship between ASs. While the length of the physical shortest path between AS2 and AS4 is two (using the path AS2, AS1, AS4), this is not a valid routing path since it traverses a valley. In this case, the length of the shortest *valid*routing path is five (using the path AS2, AS3, AS6, AS7, AS5, AS4). In practice, using real data gathered from 41 BGP routing tables that about 20% of AS routing paths are longer than the shortest AS physical paths. While routing policy is a fundamental and important feature of BGP, some application may require to route data using the shortest physical paths.

In this case, using overlay routing, one can perform routing via shortest paths despite the policy. In this case, relay nodes should be deployed on servers located in certain carefully chosen ASs. Considering such a scenario, the corresponding *ORRA* instance consists of the AS topology graph , the set of valid routing paths derived from the BGP routing algorithm, which is the underlay paths , and the set of shortest physical paths that is the overlay paths.

B. TCP Throughput

Using overlay routing to improve TCP performance has been studied in several works in recent years. In particular, the TCP protocol is sensitive to delay, and there is a strict correlation between TCP throughput and the RTT. Thus, it may be beneficial to break high-latency TCP connections into a few concatenated low-latency sub connections. In this case, the set of relay nodes is used as sub connection endpoints, and the objective is to bind the RTT of each one of these sub connections.
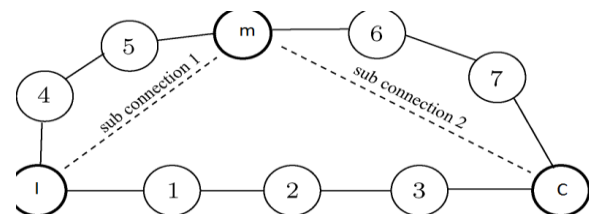

Fig.3. TCP connection into few concatenated low-latency sub connections.

For instance, assuming that each link in the network depicted in Fig.3 has a similar latency, the TCP connection between and can be broken using the relay node located in into two sub connections (between and, and between and) reducing the maximum RTT of the connection (although the total length is increased).With respect to the *ORRA* problem, given a network topology, represented as a graph, a path is an underlying.

C.   Bounded Delay in Peer-to-Peer Overlay Networks

While shortest path is a common routing scheme, it may not optimize the routing delay between network clients. In this case, the service of delay sensitive applications may be harmed. VoIP, for example, is a network technology that uses the Internet to carry voice signals. VoIP applications such as Skype, Google Talk, and others are attractive more and more well-liked offering IP telephone services for free.

By its nature, the quality of VoIP calls is sensitive to network delay, and a considerable amount of effort is put in, in order to reduce the delay between clients in order to achieve better quality. In particular, while a one-way delay of 150 ms is noticeable by most users but in most cases is acceptable, a one-way delay over 400 ms is unacceptable. In peer-to-peer overlay networks, routing is normally done using the underlying IP routing scheme in Fig.3, however one can use our overlay routing scheme to improve end-to-end latency.
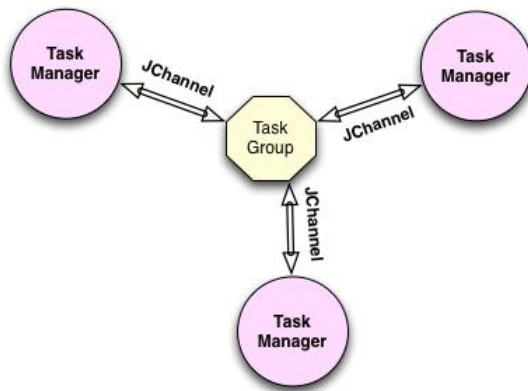

Fig.3: peer-to-peer overlay network

P2P-SIP multimedia forum is operating that users share their reserve of conference to each other in the network. With the purpose of solve the crisis, such as centralized loading, expensive infrastructure and single point error. Peer-to-Peer networks have the crisis that peer has variation among physical location and virtual location in overlay network. In the key of establish P2P-SIP multimedia conference is to construct application multicast competently with physical network information. Then, this paper projected a delay-bounded media relay mechanism on hierarchical overlay networks for P2P conferencing services. Based on the application-layer multicast arrangement and the Hierarchical overlay network architecture, the media relay method can progress the transportation competence of conferencing stream exchange.

4.   RESULTS AND DISCUSSIONS

In the proposed system, the least number of relay nodes are desired in organize to make the routing along with a groups of autonomous systems (ASs) utilize the underlying shortest path

between them. And we defines the general optimization problem called the Overlay Routing Resource Allocation (ORRA) problem and study its complication.
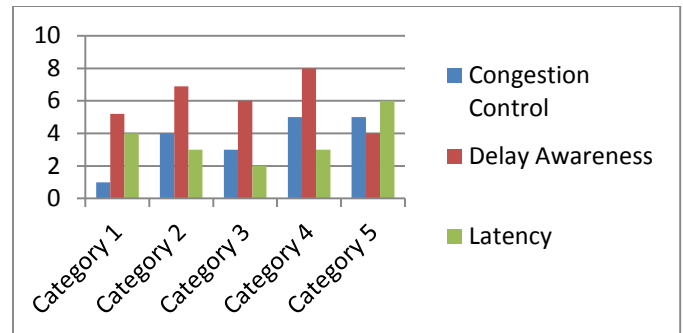

Fig 4: Performance Analysis

In order to evaluate the performance of the proposed model following parameters has been defined:

Congestion control concerns scheming traffic entry into a telecommunications network, so as to avoid congestive collapse by attempting to avoid oversubscription of any of the processing or link

Delay-tolerant network is a network intended to operate successfully over tremendous distances such as those encountered in liberty communications or on an interplanetary scale.

Latency is a time interval between the stimulation and response, or, from a more common point of view, as a time delay involving the basis and the outcome of some physical change in the system being observed.

In the above graph the Y-axis represents the category is the Round Trip Time of the nodes in the network and the X-axis represents the values that are the Congestion Control, Delay Awareness and Latency for that Round Trip Time. In the graph each category having three colors (blue, green, red) which represents the above parameters.

After the last iteration the delay awareness is increased, the congestion decreases and the latency increases when compare to the first iteration. And defines the general optimization problem called the Overlay Routing Resource Allocation (ORRA) problem and study its complication. By comparing the above parameters in existing system and in proposed model, the proposed model outperforms than the existing models.

5.   CONCLUSION

While using overlay routing to improve network performance was intentional in the precedent by various works both practical and theoretical, very a small amount of them consider then the cost allied with the exploitation of overlay infrastructure. In this paper, we addressed the basic problem emergent an approximation algorithm to the predicament. Rather than

allowing for a customized algorithm for a definite application or scenario, we optional a general framework that hysterics a huge set of overlay applications. Considering three diverse practical scenarios, we calculated the performance of the algorithm, showing that in perform the algorithm provides close-to-optimal results.

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