



Resolving Reliability and Optimization Downside in Overlie Relay Nodes Mistreatment Pastry

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ABSTRACT: **PASTRY** and **Overlie routing** is a very attractive scheme that allows **improving certain properties of the routing** (such as delay or TCP throughput) **without the need to change the standards of the current underlying routing**. **PASTRY** is an implementation of a Distributed Hash Table(DHT) algorithm for P2P routing overlay using the **PASTRY** implementation the silent features to achieve the reliability,fully centralized and high fault tolerant . However, deploying overlie routing requires the placement and maintenance of overlie infrastructure. This gives rise to the optimization,reliability,high fault tolerant and highly distributed problem which we overcome in this project using . **PASTRY** distributed algorithm and non-trivial approximation algorithm. The current BGP routing in the Internet , where from a single source to all autonomous systems (ASs), that a small number of less than 100 relay servers is sufficient to enable routing over shortest paths reducing the average path length.

KEYWORDS: *PASTRY ,Non-trivial approximation algorithm; shortest path; minimum cost; end-to-end delay.*

I. INTRODUCTION

An overlie network is a computer network, which is built on the top of another network. Nodes in the overlie can be thought of as being connected by virtual or logical links, each of which corresponds to a path, perhaps through many physical links, in the underlying network. For example, distributed systems such as peer-to-peer networks and client-server applications are overlie networks because their nodes run on top of the Internet.

Overlie routing and **PASTRY** computer connected to the Internet and running **PASTRY** node software can be a **PASTRY** node Application specific security policies may be applied Each node is identified by a unique 128 bit node identifier (NodeId) The node identifier is assumed to be generated randomly Each Node Id in is assumed to have the same probability of being chosen Node with similar Node Id may be geographically far Given a key , **PASTRY** can deliver a message to the node with the closest Node Id to key within $d \log_2 b N_e$ steps, where b is a configuration parameter (usually $b=4$) and N is the number of nodes has been projected in modern years as an effective way to attain certain routing properties, without going into the long and tiresome process of consistency and global employment of a new routing protocol. The main and foremost main is to reduce the end to end delay which can be achieved by minimizing the number of nodes in between the sender and receiver.

Overlie Voice-over-IP (VoIP) applications such as Skype ,Google Talk , Tango, Viber and others. Such applications are becoming more and more popular offering IP telephone services for free ,but they need abounded end-to-end delay (or latency)between any pair of users to maintain a reasonable service quality. We show that our scheme can be very useful also in this case, allowing applications to choose a smaller number of hubs, yet civilizing performance for many users.

II. BACKGROUND/RELATED WORK

Questions like these arose like : How “good” is Internet routing from a user’s perspective considering round-trip time, packet loss rate, and bandwidth? They showed that in 30%–80% of the cases, there is an alternate routing path with

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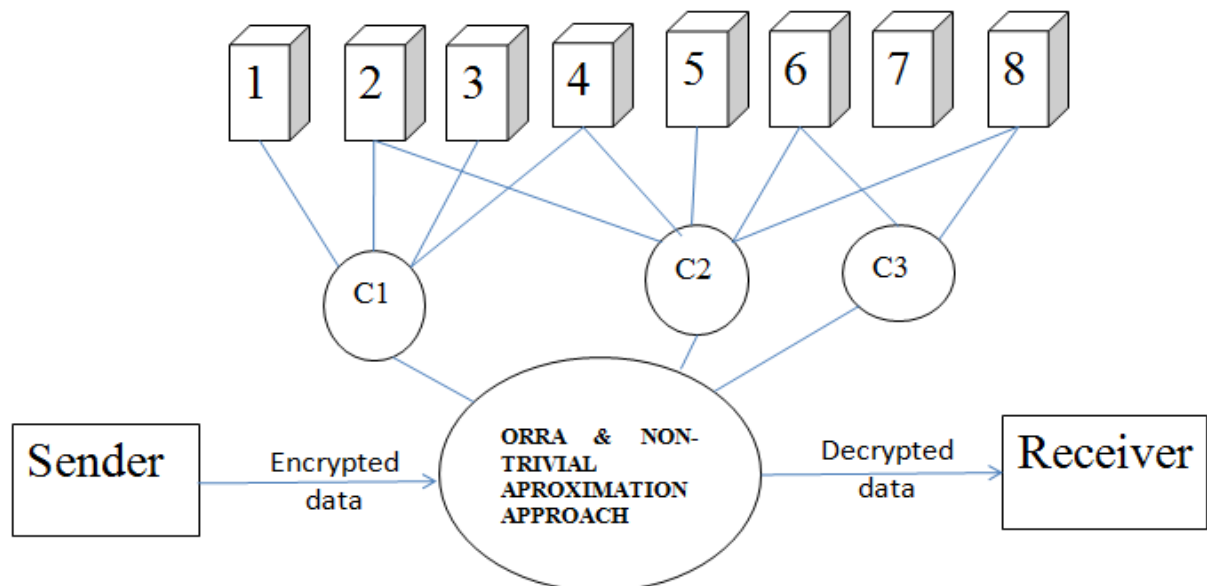
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better quality compared to the default routing path.

While the concept of using pastry routing and overlie routing to improve routing scheme was presented in this work, it did not deal with the deployment aspects and the optimization aspect of such infrastructure. A resilient overlie network (RON), which is an architecture for application-layer overlie routing to be used on top of the existing Internet routing infrastructure.

Similar to our work, the main goal of this architecture is to replace the existing routing scheme,high fault tolerant and achieves highly distributed .This work mainly focuses on the overlie infrastructure (monitoring and detecting routing problems,highly distributed and maintaining the reliable system), and it does not consider the cost associated with the deployment of such system.

III. ARCHITECTURE DIAGRAM



ARCHITECTURE DIAGRAM EXPLANATION:

- Sender sends data in encrypted format.
- There are eight available nodes or servers.
- Out of the eight available nodes three shortest paths are found out they are C1, C2, C3.
- Non-Trivial Approximation algorithm is used to select the best shortest path.
- The Receiver decrypts the data.
- Encryption and decryption is done by using RSA Algorithm.

IV. PROPOSED ALGORITHM

I) RSA ALGORITHM FOR ENCRYPTING THE DATA

1. Choose two different large random prime numbers P and Q
2. Calculate $n = PQ$
 - n is the modulus for the public key and the private keys
3. Calculate the totient: $\phi(n) = (p - 1)(q - 1)$.

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4. Choose an integer e such that $1 < e < \phi(n)$, and e is coprime to $\phi(n)$ ie: e and $\phi(n)$ share no factors other than 1; $\gcd(e, \phi(n)) = 1$.
 - e is released as the public key exponent
 5. Compute d to satisfy the congruence relation $de \equiv 1 \pmod{\phi(n)}$ ie: $de = 1 + k\phi(n)$ for some integer k .
 - d is kept as the private key exponent
 - Step 1: Numbers can be probabilistically tested for primality.
 - Step 3: changed in PKCS#1 v2.0 to $\lambda(n) = \text{lcm}(p-1, q-1)$ instead of $\phi(n) = (p-1)(q-1)$.
 - Step 4: A popular choice for the public exponents is $e = 2^{16} + 1 = 65537$. Some applications choose smaller values such as $e = 3, 5$, or 35 instead. This is done to make encryption and signature verification faster on small devices like smart cards but small public exponents may lead to greater security risks.
 - Steps 4 and 5 can be performed with the extended Euclidean algorithm; see modular arithmetic.
- The public key is made of the modulus n and the public (or encryption) exponent e . The private key is made of the modulus n and the private (or decryption) exponent d which must be kept secret.
- For efficiency a different form of the private key can be stored:
 - P and Q : the primes from the key generation,
 - $d \pmod{p-1}$ and $d \pmod{q-1}$: often called d_{mp1} and d_{mq1} .
 - $q^{-1} \pmod{p}$

II) PASTRY & NON-TRIVIAL APPROXIMATION ALGORITHM FOR FINDING THE SHORTEST PATH

ALGORITHM 1

State of a node

Each PASTRY node has a state consisting of:

- a routing table used in the First phase of the routing (long distances)
 - a neighborhood set M contains the Node Id and IP addresses of the M nodes which are closest (according to a metric) to the considered node
 - a leaf set L contains the Node Id and IP addresses of the $L/2$ nodes whose NodeId are numerically closest smaller than the present Node id, and the $L/2$ nodes whose NodeId are numerically closest larger than the present Node Id
- The routing table is a $\text{dlog}_{2b}(N) \times (2b-1)$ table
- B is the configuration parameter
 - N is the number of PASTRY nodes in the network
- The 2^{b-1} entries at row n each refers to a node whose NodeId shares the present node NodeId in the first n digits but whose $(n+1)$ th digit has one of the 2^{b-1} possible values other than $(n+1)$ th digit in the present node id.

ALGORITHM 2 :

The routing procedure is shown in pseudocode form below. It is executed whenever a message with destId D arrives at a node with nodeId A . We begin by defining some notation.

R_i^l : the entry in the routing table R for domain i , $0 < i < 2^b$ at level l , $0 < l < \lfloor \log_2 b \rfloor$.

M_i : the entry in the neighbourhood table M , representing the j th M_j i -th closest node, $0 \leq j < M$. L_i : the i -th closest node Id in the namespace table L , $-\lfloor L/2 \rfloor < i < \lfloor L/2 \rfloor$, where negative/positive indices indicate node Ids smaller/larger than the present nodeId, respectively.

D_i : the domain of dest Id D at level l .

$\text{shl}(A, B)$: the length of the prefix shared among A and B , in levels.



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- (2) // Dis within range of our namespace set
- (3) forward to L_i , s.th. $D - L_j$ is minimal;
- (4) else f
- (5) // use the routing table
- (6) Let $l = \text{shl}(D, A)$

SUBROUTINES

I)Find_Another_Relay($S(r_j), r_j, C_{\min}$):

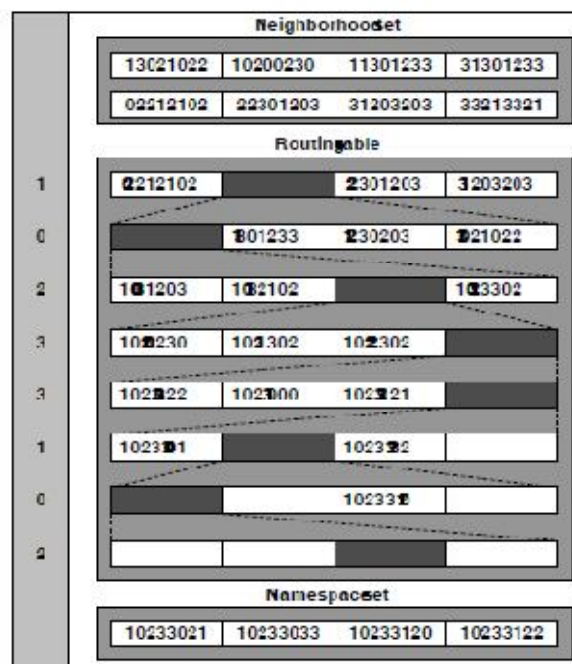
7. For every "unmarked" relay r_k with $C_R(S(r_j), r_k) > C_{\min}$, do the following in the non-increasing order of $C_R(S(r_j), r_k)$.*
8. RunCheck_Relay_Availablity(r_k, C_{\min}).
9. If r_k is available, then do the following:
10. Remove relay node r_j 's assignment to $S(r_j)$;
11. Assign relay node r_k to $S(r_j)$.
12. Otherwise, continue on to next r_k and go to line 8.
13. If all relays are unavailable, then $S(r_j)$ cannot find another relay.

II)Check_Relay_Availablity(r_j, C_{\min}):

14. If r_j is not assigned to any source node, then r_j is available.
15. If $r_j = R(s_b)$ or $r_j = 0$, then r_j is available.
16. Otherwise,
17. Set r_j as "marked".
18. RunFind_Another_Relay($S(r_j), r_j, C_{\min}$).
19. If $S(r_j)$ can find another relay, then r_j is available.
20. Otherwise, r_j is unavailable.

V. EXPERIMENTAL RESULTS

Assuming 16 bit NodeId, $b = 2$, number are expressed in base $2b = 4$.



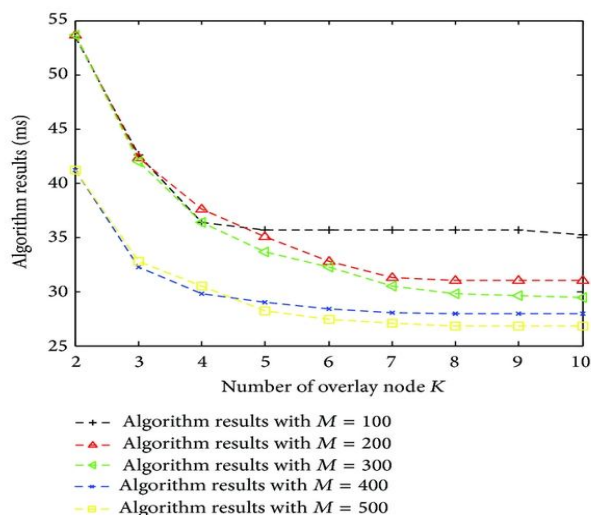
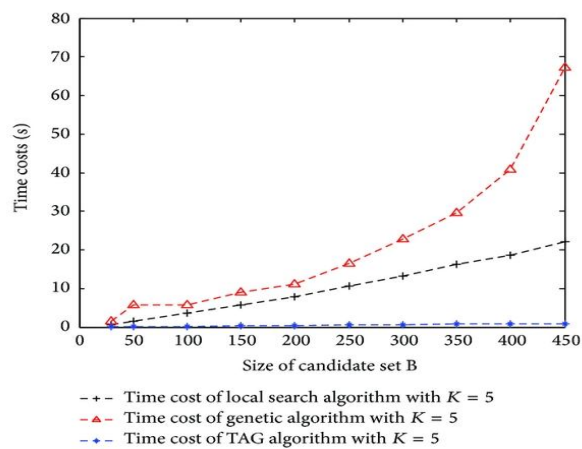
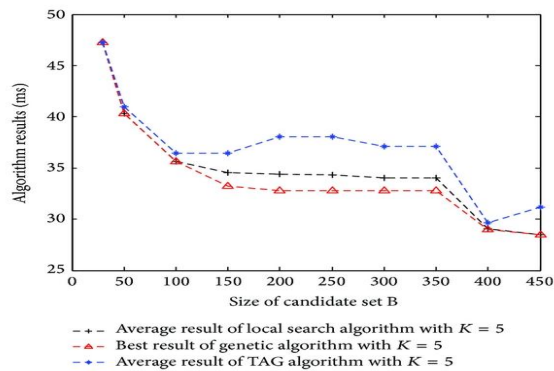
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DESCRIPTION ABOUT THE RESULTS:

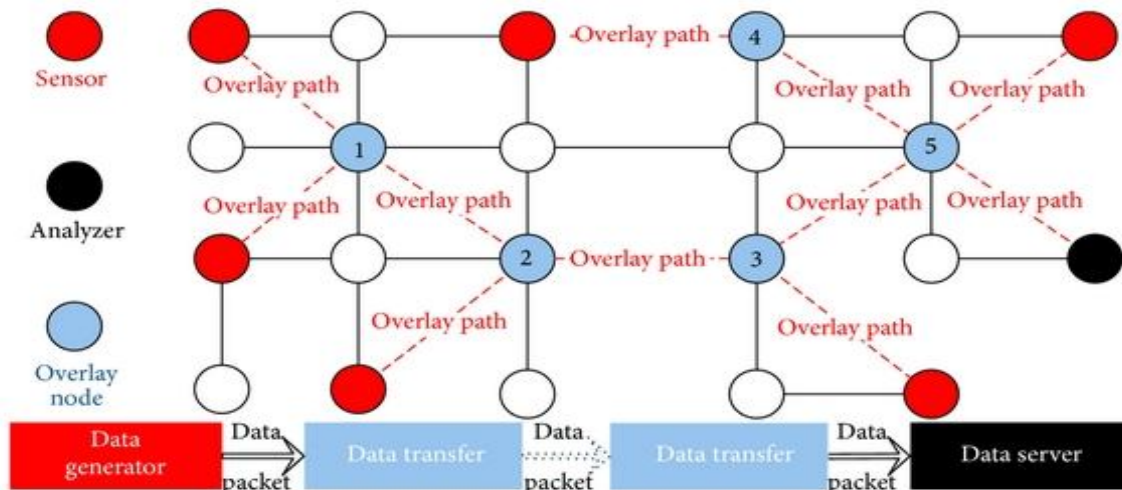
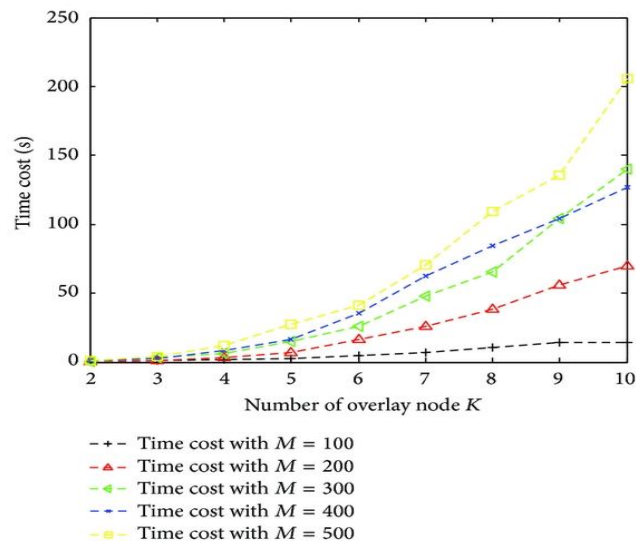
The Neighbourhood set, Routing table and Namespace set are clearly shown. In first diagram, x axis indicates Size of candidate set B, and y axis indicates Algorithm results in milli seconds. Results of various algorithms are shown. In second diagram, x axis indicates Size of candidate set B and y axis indicates Time costs(s). In third diagram, x axis indicates Number of overlay node K and y axis indicates Algorithm Results in milli seconds. In fourth diagram x axis indicates Number of overlay node K and y axis indicates Time costs(s).



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VI. CONCLUSION

The main aim is to reduce the end-to-end delay and to achieve high reliability with fault tolerant between the sender and receiver and to make it cost effective. While using the PASTRY distributed routing algorithm and overlie routing to improve network performance was studied in the past by many works both practical and theoretical, very few of them consider the cost associated with the deployment of overlie infrastructure. The connection between the cost in terms of establishing overlie nodes and the benefit in terms of performance gain achieved due to the improved routing is not trivial, and it is interesting to investigate.

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BIOGRAPHY



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