ISSN:0975-9646

Venkata Durga Kira Kasula et al, / (IJCSIT) International Journal of Computer Science and Information Technologies, Vol. 2 (5) , 2011, 1954-1957

Analysis and Performance of ARCP for Multi Region Mobile Emissary Environments

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***Abstract*— This Paper presents Adaptive Reliable Communication Protocol performance and presents different possible phases like registration, locality management and message release .The procedure will uses this categorization for the mechanisms proposed in standards and implemented in mobile emissary systems. Then the protocols also assess the different mechanisms regarding their throughput, fault tolerance, their message complexity and the migration and low delay, communication overhead and they induce its utmost focus is to maintain high availability and dynamic balancing of resources in a Mobile computing. The system also restores broken process communication involved in the job through registration.**

Key Words: **Mobile Emissary, Multi-Region, Adaptive Reliable Communication Protocol, Mechanisms.**

I. INTRODUCTION

A software emissary is an intellectual program that proceeds as a user's special subordinate. Software agent capable with the property of mobility is called mobile emissary. Mobile emissary performs a user's mission by drifting and executing on a number of hosts associated to the network. Mobile emissary tools are used to develop many distributed applications. This technology has been used by applications such as dispersed information recovery, electronic business, disseminated network supervision, and parallel computing. In recent times, it has also been used for resource finding in peer-to-peer computing systems and wireless sensor networks. A mobile emissary system is a proposal that can generate, construe, implement, transmit, and conclude mobile emissary. Several mobile emissary systems have been developed. Examples consist of AGLETS, VOYAGER, CONCORDIA, MOLE, AJANTA, MAP, MESSENGERS, TACOMA, ODDUGI and SPRINGS.

In a mobile emissary computing background, a mobile emissary must be able to be in touch with other mobile emissary or users with the intention of dissecting their states. However, the mobility of emissary makes it more convoluted to trace mobile emissaries and bequeath messages reliably. Therefore, a reliable communication protocol that provides proficient location management and reliable message delivery is rudimentary for the development of mobile emissary systems.

Abundant communication protocols have been anticipated in a mobile emissary computing environment: Home-Proxy (HP), Forwarding-Proxy (FP), Shadow, Broadcast, Search-by-Path-Chase (SPC). Nevertheless, some problems remain vague. First, obtainable protocols despite the SPC protocol do not think of multi region computing environments. Second, they do not reassure the deliverance of messages. In other words, a tracking problem occurs a message follows a mobile emissary without being delivered to the emissary. A message is just sent to the nodes that the mobile emissary starved of delivery.

II. BACKGROUND

A. Classification of Protocols

In mobile emissary environment, a communication protocol consists of two parts: locality administration and Message release. Locality administration is liable for tracing and locating mobile emissary sooner than communication takes place. Message release is in charge of transferring messages to mobile emissaries.

There are a number of locating methods to manage location information of mobile emissary: Location server, Forwarding pointers, and Broadcast. In the Location server approach, a location server maintains the information of location in a federal way to keep path of mobile emissaries. In the Forwarding pointers approach, when a mobile emissary drifts from one node to a different, it leaves behind a reference that point to its latest location. In the Brute-Force (Broadcast) approach, a message containing the identifier of a mobile emissary is broadcast to a set of nodes.

There are numerous delivery methods to transmit messages to mobile emissaries: Direct, Group, Blackboard, Mailbox, and Forwarding. In the Direct approach, a mobile emissary interacts with one more mobile emissary unswervingly and synchronously. In the Group approach, a mobile emissary sends messages to a set of mobile emissaries simultaneously. In Blackboard approach a universal information room is used to exchange messages. When a mobile emissary desires to throw a message, it puts the message in the common information room regardless of where the recipient emissary is or when it reads the message. If the receiver emissary moves to the node where the message is stored, it can read the message. In the Mailbox approach, a mobile emissary sends and receives messages through a mailbox or a message correspondent. In the Forwarding approach, when a mobile emissary drifts to a unusual node, it leaves following a trail that conveys information in relation to the next location. A message is delivered by subsequent the trail passageway.

B. Existing Protocols

Preceding studies on communication protocols for mobile emissary environments contain: HP, FP, Shadow, Broadcast, SPC, ARP and RCP.

The ARP protocol adopts the Location server and Forwarding pointers approaches for locality administration and the Mailbox approach for message release. The ARP protocol delivers messages using a mobile mailbox. An emissary keeps path of the positions of its mobile mailbox. When an emissary drifts, its mobile mailbox moves from one node to a different according to the outlay of message delivery. A message is former send to the mobile mailbox. A mobile emissary retrieves messages from the mailbox when desired. The ARP protocol has an elevated transparency when transferring the mailbox. If the node that has a mailbox fails, the messages are lost. Furthermore, both mobile emissaries and residence nodes must keep path of mobile mailboxes. The ARP protocol was implemented on the MAP mobile agent system.

The RCP protocol adopts the Location server approach for locality administration and the Blackboard approach for message release. The Location server approach, conversely, has tribulations such as scalability and a particular point of failure. In the Blackboard approach, every node has storage space where messages are deposited.

The RCP for mobile emissaries is described taking into consideration of multi region mobile emissary computing environment. RCP uses a region lookup server that maintains locality information of mobile emissaries within a region. RCP consists of a Location Management Phase (LMP) and a Message Delivery Phase (MDP). LMP is a method in which a mobile emissary registers the location to its Location Server, its Home Node, or Region Servers when it is created or when it drifts. MDP is a method where in a dispatcher delivers a message to a receiver emissary at the same time as locating it.

III. SYSTEM MODEL

A mobile emissary computing environment consists of subsequent devices: mobile emissary, nodes, Region and a Region Lookup Server (RLS).

- Mobile emissary: A mobile emissary is a mobile entity consisting of procedure, information, status, and mobility metadata. When a mobile emissary drifts, it chooses the subsequent object, based on its itinerary or vigorously according to execution flow. The lane from a antecedent to the target is known as migration path.
- Node: A node provides the execution environment for mobile emissary. A mobile emissary system, a stage that can generate, construe, implement, transmit, and terminate mobile emissary, is installed at a node. A node offers an unambiguous service. The node that originally creates a mobile emissary is called its Home Node (HN).
- Region: A Region is a collection of nodes with the aim of similar ability.
- Region Lookup Server: An RLS is conscientious for the ability of its region. Lookup Server maintains the location information (that is, HNs and RLS) for mobile emissaries produced in all regions. Thus, it can be used to offer a preliminary point for locating an emissary at some point in communication. It additionally maintains a record of, the services delivered at each node.

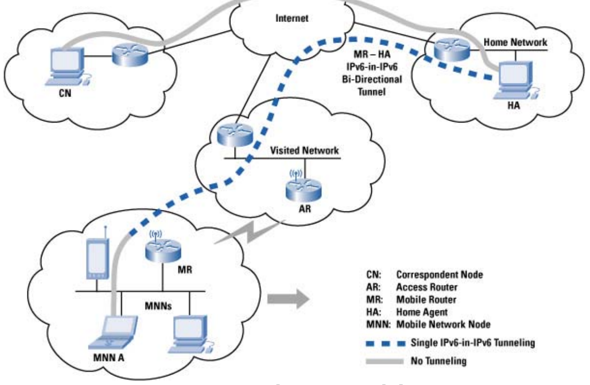

Fig 1: Communications between Mobile Emissaries.

A. *Disadvantages of Existing Protocols:*

Offered communication protocols have a few shortcomings. First, existing protocols apart from the SPC protocol do not think about a multi region computing environment. If these protocols are used in a multi region environment, they will not be appropriate for communication among mobile emissaries in terms of message release cost and bottleneck because they do not use a region theory throughout message release. For example, the message delivery cost increases in the FP, Broadcast, Shadow, and ARP protocols. The HP and Shadow protocols still have the bottlenecks.

RCP is having poorer Communication Overhead than SPC and ARP Protocols. RCP has a lower Message Delivery overhead than FP, Shadow and ARP Protocols. However, the HP and SPC protocols do not supply reliability such as the tracking problem and delivery in transfer.

The availability of RCP is lower than that of the HP and Broadcast protocols for the reason that the locality administration and message release of the HP protocol is allied to a home proxy and the Broadcast protocol does not use HN and RLS for the period of communication.

The storage usage of RCP is worse than that of the FP, Shadow, and SPC protocols because these protocols accumulate locality information on path proxies.

B. *Comparisons:*

HP protocol adopts the Location server approach for locality administration and the Direct or Mailbox approach for message release. The locality information of mobile emissary in the HP protocol is stored at a Home Node. When an emissary migrates from one node to a different, the locality information is rationalized. The locality information is used to trace mobile emissaries and deliver messages. This protocol has a few drawbacks. If a mobile emissary moves secluded from its HN or particular server, the expenditure of location information and message release become reasonably prominent. When the quantity of mobile emissaries grows and mobile emissary migrates often, a HN or a detailed server becomes a bottleneck. If the locality information of an HN does not have the most recent information, or if a mobile emissary has left proceeding to a message received at the target, message delivery fails. The FP protocol adopts the Forwarding pointers approach for locality administration and the Forwarding approach for message release. Locality information in the FP protocol is stored at nodes that the mobile emissary has visited. When a mobile emissary migrates to a dissimilar location, a forwarding proxy that maintains information of the subsequent location of the mobile emissary is created at each node. Message delivery is performed by successive chain of proxies, concerned as path proxies. In contrast to the HP protocol, locality administration and message release are scattered in the FP protocol. The FP protocol does not engage a remote update during migration. On the other hand, every node within path proxies must participate in the message release procedure. If path proxies are extended, the cost of message delivery is high. Besides, if path proxies are wrecked, message delivery fails. Assume that path proxies are lengthy and a mobile emissary moves repeatedly. If a mobile emissary leaves before a message arrives, and thus, a message does not grab up with the emissary, the tracking problem will arise. Mobile emissary systems such as Aglets and SPRINGS support the HP protocol. The Voyager mobile emissary system supports the FP protocol.

IV. ADAPTIVE RELIABLE COMMUNICATION PROTOCOL (ARCP)

ARCP is intended to accomplish the following objectives: High throughput, low delay, Communication overhead, message delivery.

- *Throughput:* In computer technology, throughput is the amount of work that a computer can do in a given time period. Historically, throughput has been a measure of the comparative effectiveness of large commercial computers that run many programs concurrently. An early throughput measure was the number of batch jobs completed in a day. More recent measures assume a more complicated mixture of work or focus on some particular aspect of computer operation.
- *Low Delay:* A delay is a network property designed to operate effectively over extreme distances such as those encountered in mobile communications or on an interplanetary scale. In such an environment, long latency sometimes measured in hours or days is inevitable. However, similar problems can also occur over more modest distances when interference is extreme or network resources are severely overburdened. Expedited packets are always transmitted, reassembled and verified before data of any other class from a given source to a given destination. Normal traffic is sent after all expedited packets have been successfully assembled at their intended destination. Bulk traffic is not dealt with until all packets of other classes from the same source and bound for the same destination have been successfully transmitted and reassembled.
- *Communication Overhead:* Here we show that, depending on bandwidth, latency, and how summary information is communicated among the emissaries, delays due to communication overhead vary. If only communication costs are a concern, then at one extreme where message delay dominates cost, sending the plan hierarchy without summary information makes the most sense. At the other extreme where bandwidth costs dominate, it makes sense to send the summary information for each task in a separate message as each is requested. Still, there are cases when sending the summary information for tasks in groups makes the most sense. This will explain how a system designer can prefer how much summary information to send at a time in order to reduce communication overhead exponentially.
- *Message Delivery:* At the time of insistent message deliverance, the reactive approach has a weak point when a mobile emissary has previously registered the contemporary node to its RLS prior to a message arrives at the RLS and stay for an extended time at the node. In this case, message release is deferred until a mobile emissary drifts to an unusual node. In order to work out this quandary, the proactive approach is anticipated. The moment RLS receives a message, it instantaneously sends the message to the resident node (RN), where the receiver emissary resides without to come for a locality revise message.

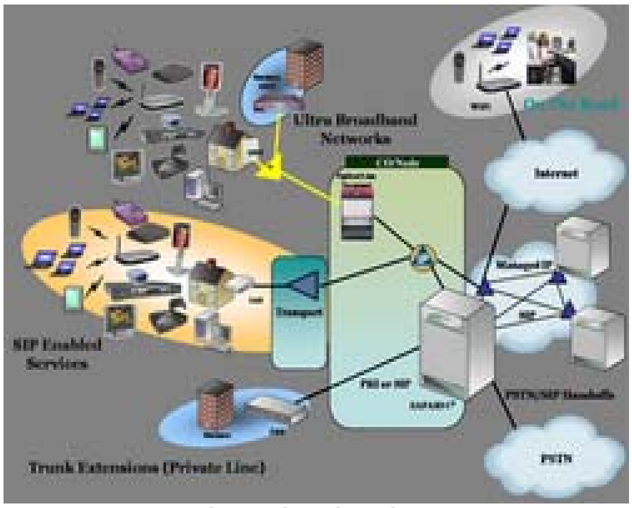

Fig 2: Message Release and Locality Administration in ARCP

A. *Properties of ARCP:*

1) Reliability: Messages are supposed to be delivered to mobile emissary without failure. In a mobile emissary computing environment, the mobility of an emissary causes message delivery to be unsuccessful due to the tracking problem. In addition, a message is delivered to a mobile emissary under migration.
2) Timeliness: A message should be delivered timely. Asynchronous message delivery is not proper for imperative delivery because it does not certify that a message is instantaneously delivered to a receiver emissary. So, a communication protocol should assure that messages should be delivered to emissary in a timely behavior. That is, the message release protocol should convey a message asynchronously and instantly.
3) Scalability: The capability of a system to scale with no performance dilapidation is one of the most significant properties when budding distributed systems. A communication protocol should scale, yet the number of mobile emissaries counts increases. In addition, it is supposed to be geographically scalable even though the nodes or mobile emissaries may be discrete over huge distances.
4) Communication cost: Low communication cost (that is, the cost of location management and message delivery) should be considered when developing a communication protocol.

B. *Segments of ARCP:*

RCP consists of a Registration Segment (RS), a Location Migration Management Segment (LMMS) and a Message Delivery Segment (MDS).

1) Registration Segment: It is a procedure where the sender and receiver must register for ensuring the authentication and identification. Our secure registration system provides easy and convenient registration. Systems will be processed immediately and automatically, and you will receive confirmation for the sender and receiver. You will be prompted the id and password for the validation so that the users can perform the communication.

2) Locality Migration Management Segment: LMMS is a method whenever the mobile emissary registers its location to its RLS, its HN when it is produced or drifted. LMMS consists of a creation module and a migration module.

In the creation procedure, when a mobile emissary is created at its HN, it sends a creation message to the RLS. At this time, the home RLS guarantees that the emissary has a unique identifier.

The migration system is structured into an intra region migration (Intra- RM) and an inter region migration (Inter-RM). Intra-RM occurs when a mobile emissary drifts inside the similar region, whereas Inter-RM occurs when a mobile emissary drifts from one region to a different region.

In the case of Intra-RM, a mobile emissary sends a location update message only to the current RLS. In the Location server procedure, a mobile emissary sends a location update message to its HN or specific server despite the consequences of its existing region. As a mobile emissary sends a location update message despite of its current location, the cost of location update is greater than before.

In the case of Inter-RM, a mobile emissary sends location revise messages to its HN, the preceding RLS, and the recent RLS when it drifts to another region. Initially, updating the HN assures that the HN knows the current RLS where a mobile emissary is positioned. Then, updating the prior RLS aims to send the messages stored on the preceding RLS. Messages can be sent to the earlier RLS, not the recent RLS if a sender emissary uses the prior location information at the HN previous to the location of the current region is restructured at the HN. In this case, these messages are released when the earlier RLS receive a new message from the receiver emissary. The locality information at the earlier RLS is then expunged. As a final point, a mobile emissary sends a location update message to the present RLS so as to bring up to date the RLS that a mobile emissary has stirred to its region.

3) Message Delivery Segment: MDS is a procedure in which the sender delivers a message to a recipient emissary while locating it. The MDS uses a blackboard to deliver messages to a mobile emissary, make sure that a mobile emissary in transfer can receive messages reliably. Each RLS stores and sustain messages on its blackboard. The MDS follows two approaches: reactive and proactive

The reactive approach delivers a message to a mobile emissary when a mobile emissary updates its location to the contemporary RLS. By means of the reactive approach, a mobile emissary can ensure its messages on a blackboard upon migration. As a consequence, the reactive approach provides periodicity of message delivery and guarantees message delivery to mobile emissary under migration. as a result, it solves the tracking problem. In the case of vital message delivery, the reactive approach has a limitation when a mobile emissary has previously registered the current node to its RLS before a message reaches at the RLS and stays for an extensive time at the node. During these circumstances, message delivery is belated until a mobile emissary drifts to new nodes. In order to resolve this difficulty, the proactive approach is proposed. The moment the RLS receives a message, it instantaneously sends the message to the resident node (RN), where the receiver emissary resides with no waiting for a location update message.

V. CONCLUSION

Main idea of the Adaptive Reliable Communication Protocol is to introduce high throughput, communication overhead, message delivery and low delay on a variety of network conditions and this paper will also include the segments like Registration Segment, locality migration management segment and message delivery segment and how the nodes organize to improve the physical connectivity.

VI. ACKNOWLEDGMENT

We are greatly delighted to place my most profound appreciation to Er.K.Satyanarayana Chancellor of K.L.University, Dr.L.S.S.Reddy Guide, Dr.K.Raja Sekhara Rao Principal, S.Venkateswaralu Head of the department, and Dr.Subramanyam in charge for M.Tech under their guidance and encouragement and kindness in giving us the opportunity to carry out the paper. Their pleasure nature, directions, concerns towards us and their readiness to share ideas enthused us and rejuvenated our efforts towards our goal. We also thank the anonymous references of this paper for their valuable comments.

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