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An Advanced Approach for Distance Vector Routing Protocol Babel

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Abstract—*This type of protocols maintains fresh lists of destinations and their routes by periodically distributing routing tables throughout the network. The main disadvantages of such algorithms are: Respective amount of data for maintenance. And Slow reaction on restructuring and failures. It is loop-avoidance vector routing protocol. The* ***Babel*** *routing protocol is a distance-vector routing protocol for Internet Protocol packet-switched network that is designed to be robust and efficient on both wireless mesh networks and wired networks.*

Keywords:— *MANET, IPv4, TTL, distance vector routing, routing table, etc.*

1. INTRODUCTION

Babel is based on the ideas in Destination-Sequenced Distance Vector routing (DSDV), Ad hoc On-Demand Distance Vector Routing (AODV), and Cisco's Enhanced Interior Gateway Routing Protocol (EIGRP), but it uses a variant of Expected Transmission Count (ETX) link cost estimation rather than a simple hop-count metric. It employs several techniques to ensure the absence of routing pathologies, such as routing loops.

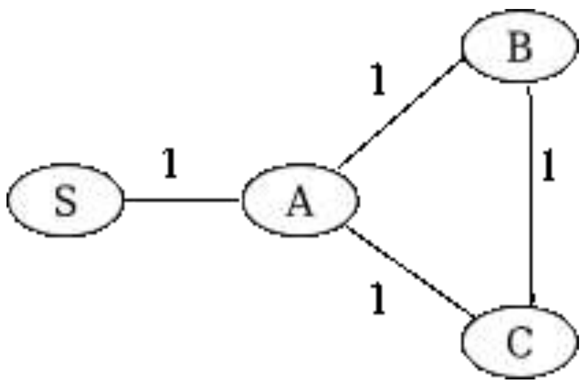

Figure 1: Node configuration in babel network

Babel operates on IPv and IPv networks. It has been reported to be a robust protocol and to have fast convergence properties.[1][2]

Two implementations of Babel are freely available: the standalone sample implementation, and a version that is integrated into the Quagga routing suite.[3][4] The version integrated into Quagga allows for authentication.[5] a table-driven routing scheme for ad hoc mobile network based on the Bellman–Ford algorithm. It was developed by C. Perkins and P. Bhagwat in 1994. The main contribution of the algorithm was to solve the routing loop problem. Each entry in the routing table contains a sequence number, the sequence numbers are generally even if a link is present; else, an odd number is used. The number is generated by the destination, and the emitter needs to send out the next update with this number. Routing information is distributed between nodes by sending *full dumps* infrequently and smaller incremental updates more frequently.

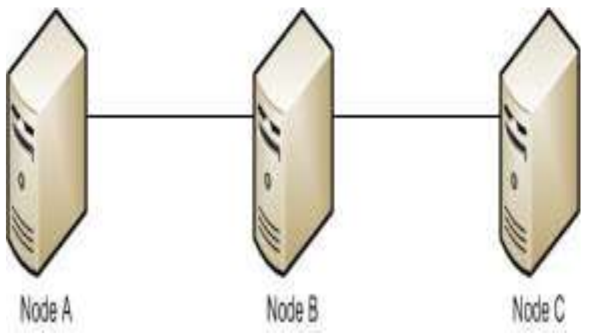

Figure 2: Node combination in adhoc network

Destina-tion	Next Hop	Number of Hops	Se-quence Number	Install Time
A	A	0	A 46	001000
B	B	1	B 36	001200
C	B	2	C 28	001500

Table 1: Routing table in adhoc network

2. RELATED WORK

If a router receives new information, then it uses the latest sequence number. If the sequence number is the same as the one already in the table, the route with the better metric is used. Stale entries are those entries that have not been updated for a while. Such entries as well as the routes using those nodes as next hops are deleted.

DSDV requires a regular update of its routing tables, which uses up battery power and a small amount of bandwidth even when the network is idle.

Whenever the topology of the network changes, a new sequence number is necessary before the network re-converges; thus, DSDV is not suitable for highly dynamic networks. (As in all distance-vector protocols, this does not perturb traffic in regions of the network that are not concerned by the topology change.) itself does not appear to be much used today[citation needed], other protocols have used similar techniques.

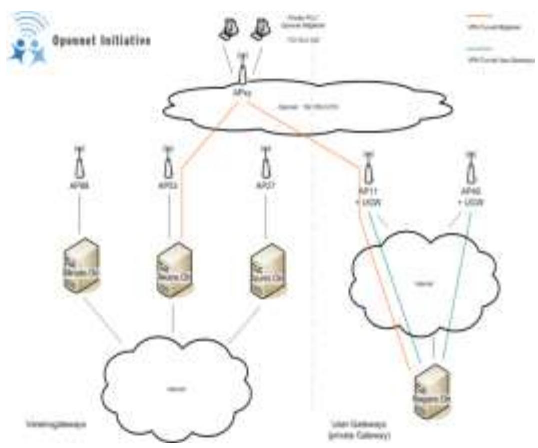

Figure 3: Combination of networking devices and node in adhoc network

The best-known sequenced distance vector protocol is AOD, which, by virtue of being a reactive protocol, can use simpler sequencing heuristics. Babe is an attempt at making DSDV more robust, more efficient and more widely applicable while staying within the framework of proactive protocols.

A RouteRequest carries the *source identifier* (SrcID), the *destination identifier* (DestID), the *source sequence number* (SrcSeqNum), the *destination sequence number* (DestSeqNum), the *broadcast identifier* (BcastID), and the *time to live* (TTL) field. DestSeqNum indicates the freshness of the route that is accepted by the source. When an intermediate node receives a RouteRequest, it either forwards it or prepares a RouteReply if it has a valid route to the destination. The validity of a route at the intermediate node is determined by comparing the sequence number at the intermediate node with the destination sequence number in the RouteRequest packet. If a RouteRequest is received multiple times, which is indicated by the BcastID-SrcID pair, the duplicate copies are discarded. All intermediate nodes having valid routes to the destination, or the destination node itself, are allowed to send RouteReply packets to the source. Every intermediate node, while forwarding a RouteRequest, enters the previous node address and its BcastID. A timer is used to delete this entry in case a RouteReply is not received before the timer expires. This helps in storing an active path at the intermediate node as AODV does not employ source routing of data packets. When a node receives a RouteReply packet, information about the previous node from which the packet was received is also stored in order to forward the data packet to this next node as the next hop toward the destination.

3. WORKING

The network is silent until a connection is needed. At that point the network node that needs a connection broadcast a request for connection. Other AODV nodes forward this message, and record the node that they heard it from, creating an explosion of temporary routes back to the needy node. When a node receives such a message and already has a route to the desired node, it sends a message backwards through a temporary route to the requesting node.

Layer	Attacks
Application layer	Repudiation, data corruption
Transport layer	Session hijacking, SYN flooding
Network layer	Wormhole, blackhole, flooding, location discloser attacks
Data link layer	Traffic analysis, monitoring, disruption, MAC(802.11), WEP, weakness
Physical layer	Jamming interceptions

Table 2: Various attacks in layered architecture

The needy node then begins using the route that has the least number of hops through other nodes. Unused entries in the routing table are recycled after a time.

When a link fails, a routing error is passed back to a transmitting node, and the process repeats.

Much of the complexity of the protocol is to lower the number of messages to conserve the capacity of the network. For example, each request for a route has a sequence number. Nodes use this sequence number so that they do not repeat route requests that they have already passed on. Another such feature is that the route requests have a "time to live" number that limits how many times they can be retransmitted. Another such feature is that if a route request fails, another route request may not be sent until twice as much time has passed as the timeout of the previous route request.

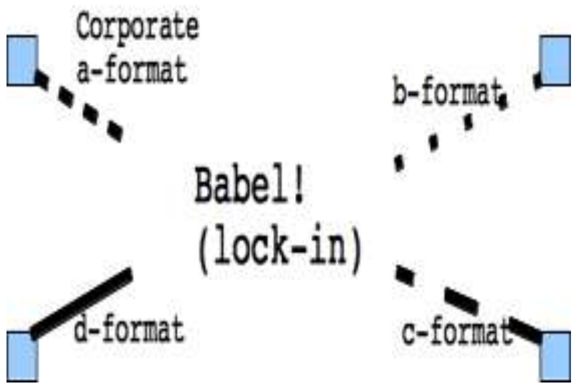

Figure 4: Babel architecture

The advantage of AODV is that it creates no extra traffic for communication along existing links. Also, distance vector routing is simple, and doesn't require much memory or calculation. However AODV requires more time to establish a connection, and the initial communication to establish a route is heavier than some other approaches.

Routing Protocol uses an on-demand approach for finding routes, that is, a route is established only when it is required by a source node for transmitting data packets. It employs destination sequence numbers to identify the most recent path. The major difference between AODV and Dynamic Source Routing (DSR) stems out from the fact that DSR uses source routing in which a data packet carries the complete path to be traversed.

However, in AODV, the source node and the intermediate nodes store the next-hop information corresponding to each flow for data packet transmission. In an on-demand routing protocol, the source node floods the *RouteRequest* packet in the network when a route is not available for the desired destination. It may obtain multiple routes to different destinations from a single *RouteRequest*. The major difference between AODV and other on-demand routing protocols is that it uses a *destination sequence number*(DestSeqNum) to determine an up-to-date path to the destination. A node updates its path information only if the *DestSeqNum* of the current packet received is greater or equal than the last*DestSeqNum* stored at the node with smaller hopcount.

The **Enhanced Interior Gateway Routing Protocol (EIGRP)** is an advanced communications protocol that helps automate routing decisions on a computer network. The protocol was designed by Cisco System to accommodate key design change to the underlying communications protocol used on the Internet known as IPv.[1] EIGRP was originally a proprietary protocol, which meant that it was only available on Cisco routers, but became an open protocol in 2013, allowing any route manufacturer to use it.[2]

EIGRP allows a route to share information it knows about the network with neighbouring router within the same logical area known as an autonomous system. Contrary to other well known routing protocols, such as routing information protocol, EIGRP only shares information that a neighbouring router would not have, rather than sending all of its information. EIGRP is optimised to help reduce the workload of the router and the amount of data that needs to be transmitted between routers.

In addition to the routing table, EIGRP also uses the following tables to store information:-

- ***Neighbor Table****:* The neighbor table keeps a record of the IP address of router that have a direct physical connection with this router. Routers that are connected to this router indirectly, through another router are not recorded in this table as they are not considered neighbours.

- ***Topology Table:*** The topology table stores routes that it has learned from neighbour routing tables. Unlike a routing table, the topology table does not store all routes, but only routes that have been determined by EIGRP. The topology table also records the metrics for each of the listed EIGRP routes, the feasible successor and the successors. Routes in the topology table are marked as "passive" or "active". Passive indicates that EIGRP has determined the path for the specific route and has finished processing. Active indicates that EIGRP is still trying to calculate the best path for the specific route. Routes in the topology table are not usable by the router until they are inserted into the routing table. The topology table is never used by the route to forward traffic. Routes in the topology table will not be inserted into the routing table if they are passive, are a feasible successor, or have a higher administrative distance than an equivalent path.[4]

Information in the topology table may be inserted into the router's routing table and can then be used to forward traffic. If the network changes, for example, a physical link fails or is disconnected, the path will become unavailable. EIGRP is designed to detect these changes and will attempt to find a new path to the destination. The old path that is no longer available is removed from the routing table as it is no longer available. Unlike most distance vector routing protocols, EIGRP does not transmit all the data in the router's routing table when a change is made but will only transmit the changes that have been made since the routing table was last updated. EIGRP does not send its routing table periodically, but will only sent routing table data when an actual change has occurred.

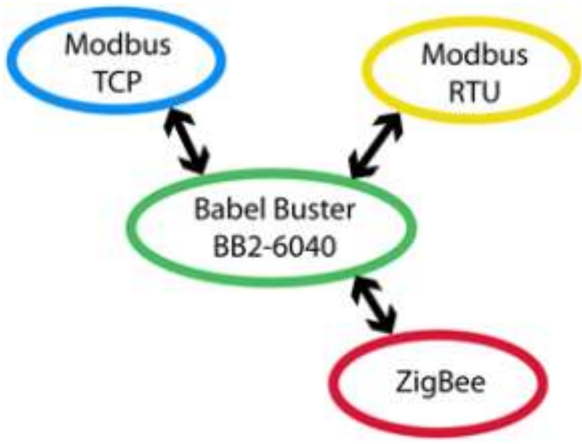

Figure 5: Babel with other wireless technology

When a route running EIGRP is connected to another router also running EIGRP, information is exchanged between the two routers and a relationship is formed known as an adjacency. The entire routing table is exchanged between both routers at this time. After this has occurred, only differential changes are sent.

4. CONCLUSION

EIGRP protocol is having routes established on demand and that destination sequence numbers are applied to find the latest route to the destination. The connection setup delay is lower. One disadvantage of this protocol is that intermediate nodes can lead to inconsistent routes if the source sequence number is very old and the intermediate nodes have a higher but not the latest destination sequence number, thereby having stale entries. Also, multiple RouteReply packets in response to a single RouteRequest packet can lead to heavy control overhead. Another disadvantage of AODV is unnecessary bandwidth consumption due to periodic beaconing.

5. FUTURE WORK

A RouteRequest carries the *source identifier* (SrcID), the *destination identifier* (DestID), the *source sequence number* (SrcSeqNum), the *destination sequence number* (DestSeqNum), the *broadcast identifier* (BcastID), and the *time to liv* (TTL) field. DestSeqNum indicates the freshness of the route that is accepted by the source. When an intermediate node receives a RouteRequest, it either forwards it or prepares a RouteReply if it has a valid route to the destination. The validity of a route at the intermediate node is determined by comparing the sequence number at the intermediate node with the destination sequence number in the RouteRequest packet. If a RouteRequest is received multiple times, which is indicated by the BcastID-SrcID pair, the duplicate copies are discarded. All intermediate nodes having valid routes to the destination, or the destination node itself, are allowed to send RouteReply packets to the source. Every intermediate node, while forwarding a RouteRequest, enters the previous node address and its BcastID. A timer is used to delete this entry in case a RouteReply is not received before the timer expires. This helps in storing an active path at the intermediate node as AODV does not employ source routing of data packets. When a node receives a RouteReply packet, information about the previous node from which the packet was received is also stored in order to forward the data packet to this next node as the next hop toward the destination.

REFERENCES:

[1] M. Abolhasan, B. Hagelstein, J. C.-P. Wang (2009). *Real-world performance of current proactive multi-hop mesh protocol*.

[2] David Murray, Michael Dixon and Terry Koziniec (2010). *An Experimental Comparison of Routing Protocols in Multi Hop Ad Hoc Network*.

[3] http://mid.gmane.org/C65F5932-C69A-41EE-8706-70D37C3950EE@wanadoo.f

[4] http://mid.gmane.org/156841327241006@web50.yandex.r D. Ovsienko, « Babel HMAC Cryptographic Authenticatio

[5] Perkins, Charles E. and Bhagwat, Pravin (1994). *Highly Dynamic Destination-Sequenced Distance-Vector Routing (DSDV) for Mobile Computer***.**

[6] Perkins, C.; Belding-Royer, E.; Das, S. (July 2003). *Ad hoc On-Demand Distance Vector (AODV) Routin*. IET. RFC 3561. http://www.*differencebetween*.net/technology/internet/difference-between-igrp-and-eigrp.

[7] Cisco *Systems* (2013), Enhanced Interior Gateway Routing Protocol (EIGRP) Informational RFC Frequently Asked Question, retrieved 14 September 2013.

[8] http://www.differencebetween.net/technology/internet/difference-between-igrp-and-eigr.

[9] Cisco Systems (2013), What is Administrative Distance, retrieved 14 September 2013.

[10] Cisco *Training White Pape*, Global Knowledge Training LLC, 2013, retrieved 17 *September* 2013.

[11] http://www.cisco.com/en/US/tech/tk365/*technologies*_tech_note09186a0080093f07.shtm

[12] "RTP in *EIGRP*. Packet Life. 2009-01-17.

[13] Shamim, Aziz, Liu, Martey 2002, Troubleshooting IP Protocols, Cisco Press USA, accessed 23 November2013.

[14] Ashraf, Muhammad Irfan, et al. "Comparative Analysis of Link State and Hybrid Routing Protocol."

[15] Albrightson, R., Garcia-Luna-Aceves, J. J., & Boyle, J. (1994, May). EIGRP a *fast* routing protocol based on distance vectors. In Proc. Networld/ Interop (Vol. 94, pp. 136-147).