

The AS' Property and Policy of MANET Structure Tourism Network

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Abstract—MANET(mobile ad-hoc network) is an independent NET AS SYSTEM, which has much difference with wired network. It does not depend on fixed main network(but can be cooperated with main network). This article puts forward a kind of ASN structure during the design of MANET Tourism Network. So it solves the inadaptability between the net segmentation and combination in the MANET from wired ASN. It proves this MBGP can guarantee net MANET QOS in a simulated way.

Keywords-component; MANET, AS, ASN, BGP, KEY+ASN, NETWORK SEGMENTATION AND COMBINATION

MANET is a kind of communication net with no central structure, which is contrary to the traditional wireless network with base station. It is also called self-organized net. The difference between MANET and wired autonomous network is that MANET gateway BGP agreement is very different from BGP agreement of wired autonomous network.

I. BGP OF WIRED NETWORK

An autonomous system is a set of router assembly which has the united route tactics and it is run under the same technology management section. Each router in the section expresses the same conduct characteristics externally. Seen from exterior the whole AS is an individual entity. World exclusive ASN is distributed by Internet management agency to each AS entity. Internet is an assembly of these autonomous system entities. Autonomous system runs the IGP such as RIP, OSPF and so on within its boundary. Autonomous systems exchange reachable information of route through BGP. Autonomous system route is also called an inter-domain routing. The current BGP-4 is the true standard of Internet inter-domain route. This standard has been defined by IETF in REC1771 and its following set of RFC. BGP-4 has three types of messages

- 1) Open message is used to establish connection.
- 2) Update message is used to notice reachable routing and cancel invalid routing.
- 3) Transmit KeepAlive message periodically to make sure the validity of the connection.
- 4) Transmit message to announce when detecting a mistake.

Among them, transmission between AS is always considered as unailing and set up upon the TCP connection without slow start-up and error recovery

mechanism. It depends on the unailing link of the transport layer (including the following layers). In the wired net, this is a mechanism of the main network. It has three purposes: Limit the Transit Traffic which passes through the AS, Net management tactics of AS, Safe requirement of routing management. It divides the AS net as three types:

1) stub AS: The AS which is only connected with another AS, it has local traffic only.

2) multihomed AS: The AS which has more than one connections with the other AS. Once one of those connections becomes invalid, this multihomed AS still can remain the connection with the internet. However, this kind of AS does not allow any one of the other AS connected with it to asses another AS connected through it. It rejects Transit Traffic.

3) transit AS: It means one AS provides several separated networks with connection service through itself. That is, Net A can connect with Net C through Net B which is a transfer AS. All ISP is this kind of transfer AS, allowing local traffic and transit traffic occur under tactics standard.

Structure of MANET is a normal AS. For example, clustering node net is a type of typical AS. But different from wired BGP, wired BPT can not solve two problems from MANET:

1) BGP thinks routes depend on reliable TCP connection (sending keepalive message), to remain routing table or neighbor, which is a jump between routings; But in the moving MANET net, mobility between nodes leads to unreliability of connection. Node or clustering node (it is always a BGR) depends on different conditions to occur (such as energy first, handing capacity, initiate launch and so on). This way to confirm a main network is completely different from the wired network.

2) BGP router is undertaken by a fixed main engine or a special router. But the bandwidth of the MANGET net clustering node is always not bounteous, and also the role of clustering node is changeable. In MANET, router is multipath and often under maintenance (active router finds it.)

Under this situation, how to remain the autonomous characteristics of MANET is the main problem that MANET faces.

II. THE PROPOSE OF AS PROBLEM IN MANET

For a mobile MANET, the autonomous system composed is obviously a constant changeable system. And this circumstance is also changeable. When a network moves from A to B, it will be probably converted from a stub AS to a transit AS or multihomes AS. Typically for example, During process of data feeling, a mobile MANET sense net can become a multihomed AS only when it reaches a certain position or condition. Besides, a tourism network based on MANET structure is a stub AS under the situation without any demands. But when it reaches an activation, this tourism network turn to a multihomes AS or transit AS. At this time, there are three problems in MANET network:

- 1) Integrity of mobile AS. Because net is movable , break-up and combination also happen at any moment. So the problem of AS number (ASN), AS boundary and so on can not be accomplished under the BGP-4 regulation.
- 2) Each node in MANET network is HOST-ROUTER, which has router function. This is an open insert structure. How to limit transit traffic and the transmit function of control node is the problem of stub AS and multihomed AS.
- 3) Node capacity does not accord with agreement of RFC1771 and so on. But from the purpose point, after MANET network becomes AS, its management and application have very good prospect. (General MANET network is single-functioned net , AS nature is a very important point)

There are two types of projects for the creation of AS number: one is according to a set of digit group (key,ASN) (key is an additional system recognition number, which is created randomly or by some corresponding arithmetic. ASN is system number which is confirmed by the management tactics); Another type is to propose a recognition project based on data base through the analysis on the data communication structure between AS .

For MANET network, the main feature of AS is outstanding on the following two aspects:

- 1) The segmentation and combination of network happen often, and probably very frequently. So the problem of segmentation and combination of the same AS number must be solved (If the recognition way is based on wired net ASN or the above key or ASN). After the net segmentation of the same AS and then combine or communicate, how to confirm the recognition of the AS net;
- 2) In Internet, compatibility of wired AS and wireless AS, constant link and move of MANET, which is obviously different from the central movable network. Because it may be accessed to AP in multi-hop way.

The above problems actually start from a very special design. During the process of design and simulation of a tourism network, two actions may happen for the movable MANET: Segmentation of network, but at this time the recognizable of the same AS network should be remained, because the network which has been segmented will combine again; But meanwhile this is another new AS network, which selects its own clustering node and continuously travel. A new ASN is needed now. MANET

node is in low energy, so how to confirm this action and solve it is the main difficult point of the MANET AS.

III. ASN ANALYSIS OF MANNET

Considering an autonomous MANET network join up and transfer connection with a series of AS during its constant moving process, at this time, MANET can be added with a movable recognition through double-layer or multi-layer central net management project, which is the recognition problem of the central moving. At this time AS number can be effectively solved by key or ASN.

Another problem is , a AS network constantly segments and combines. Under the precondition of ASN competition, data base is not applicable. Because the huge data base may cause the ability of node arithmetic and BRG router handling capacity become insufficient. While one of the features of the wireless node is just its handling capacity is low.

There are three may handling projects on the key (key, ASN) structure for the segmentation of MANET:

- 1) Form the new key structure of key son, key. Taking AS-ROOT as the biggest (or the smallest) key son, with every segmentation,reduce (or increase) a new net ASN which is confirmed randomly. When combine, such big (or the smallest) key son replaces the net ASN after combination. Here when two segmented networks and then combine again, double sign problem is serious;

TABLE 1 : comparison of double sign

Times of segmentation and combination	Bluetooth(times of double sign)	Zigbee(times of double sign)	Illustration
2	0	0	Are repeated division, Bluetooth for two network, Zigbee for ten nodes MANET sensor network
4	0	1	
10	2	6	

- 2) The main structure for those nodes which takes key as the main recognition number, such as the MAC or IP address, every time it is segmented a structure table is formed. A network segmentation tree is created. In this way, it can be accurately accomplished when network combination happens. And the situation , which is ,the same key which will probably occurs during the above network combination, can be solved. But, the complexity of the tactics of the combination and the newly formed tree, is too high, which is inconformity with the wireless node with low capacity.

3) ASN composite structure: random key + MAC or IP structure of node, but table structure is not formed. It has the two advantages of the above two . At this time, AS structure has the following forms:

Monotone random key	MAC or IP	ASN
16bit	24bit or 48bit	16bit

Simulation result supports this types of structure. MANET network with 1000 nodes, times of segmentation

and combination as many as 100 , does not have any situation of double sign.

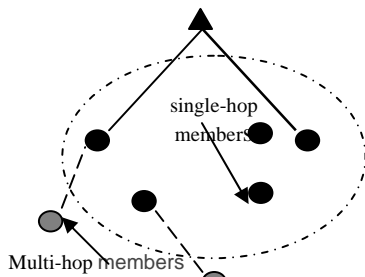
IV. PLUG AND PLAY TACTICS OF MOVABLE MANET NETWORK

During the moving process of MANET network, it constantly communicates with the other networks. The combination and segmentation between MANET networks, which is the difference between BGP and IGP of the AS tactics essentially. For the AS, gateway or clustering node manages two sets of router tactics. One is the communication between the AS , another is router tactics inside the system. For MANET, gateway and clustering node is created dynamically. So every node requires these two functions. For the huge AS net, BRG router tactics and IGP tactics are very important.

Table 2 AS Application routing of MANET

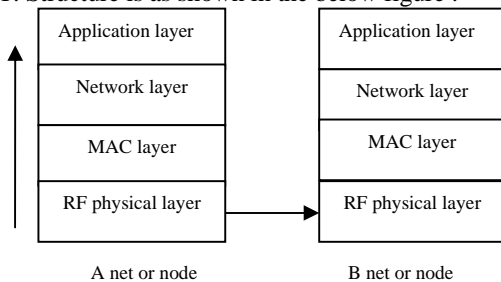
Cable autonomous System AS	MANET AS
Stub AS	Terminal network, independent network and so on
multihomed AS	different medium network, clustering node network and so on
transit AS	All network

When using mixed key of ASN structure, what we can see is : the effective resolve of network segmentation and combination. Considering MANET-AS of a clustering node structure, as shown in figure



• Figure 1 Typical MANET clustering node network (AS)

This figure is a typical clustering node network structure. For the independent network, obviously this is a multihomed AS . But in the wireless network environment, this AS is a mixed system. Because what we can see is an open communication structure at MAC layer, as we achieve a typical AS communication passageway of MANET. Structure is as shown in the below figure :



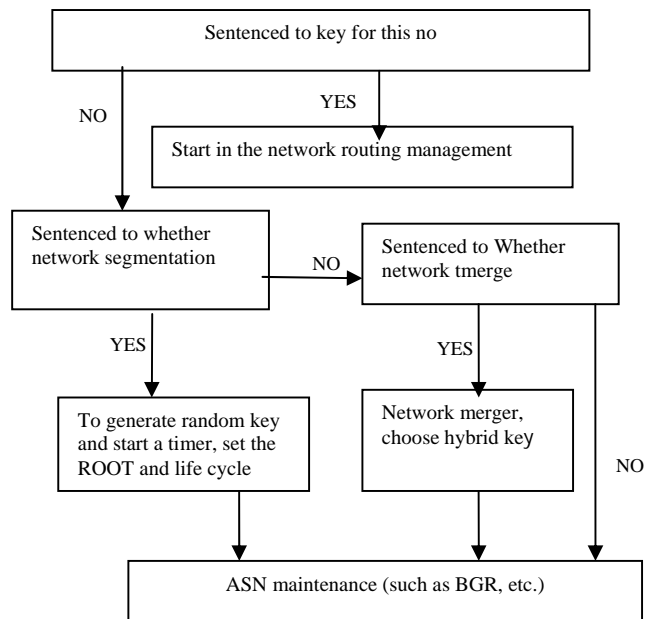
• Figure 2 Diagrammatic sketch of the control of network and node

The structure of the wireless MANET physical layer is different from that of wired net. Physical layer always tries to connect, which is almost controlled through high layer control and test way. We can not see the possible situation during the analysis of network layer: network or node always try to connect with the member outside the network. So when the router layer (above the network layer, including the network layer) uses the wired network BRG agreement, judgement should be done at physical layer even MAC layer to decide if it is the combination of network members or network . Typical MBRG structure is as follows:

1) A network maintenance procedure , through ASN mixed structure of network, discovers the router, segmentation, combination,node or the confirmation of network role , and so on,to maintain the integrality of network;

2) BRG procedure of AS is used to maintain a correct ASN and create an ASN mixed structure, constantly find new network insert or leave, and also make sure the boundary between original network and outward network, in order to maintain MANET feature –every node takes part in the network route or communication during the constant moving process of MANET. Obviously it must be a transit AS;

3) Safe system of AS,which is actually very important in the movable MANET, includes identity confirmation of node, confirmation of role, right (right of receiving and sending data, routing indication and so on), AS network feature and testing way and so on ;



• Figure 3 based on network MBRG hybrid structure

V. SIMULATION AND CONCLUSION

One tourism scenery is mixed with a wired and wireless MANET. A tourism MANET AS (a team) will be able to discover information insert from different scenery during the roaming process. (This is an AS structure which requires tourism scenery explanation) . There are three possibilities with the information insert: accomplish through AS- what will be formed is a ending network; insert through MANET- standard wireless MANET; Sending message through fixed point- a stub AS. If there is no above insert temporarily or installation can not be done, sending through fixed point will be used (Automatically send mainly by the guides). Considering a network which has 100 AS, Moving simulation of a team.

1) Make sure a route table, as the priority selection of the BRG of the movable AS to be inserted into the network and pre-saved in this AS.

2) Make sure a BRG structure based on MJANET of network mixed ASN;

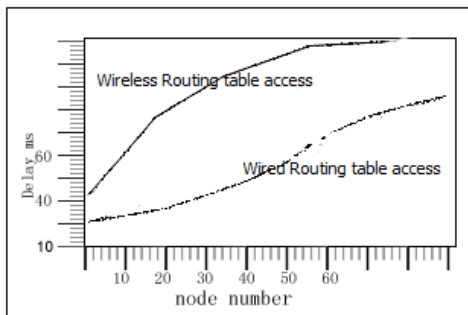
3) Inspect three situations: insert speed and QOS review (time-lag and bandwidth), mutual-communication between AS and the other networks(safety and convenience), self-organization of AS (leave of network members and the convenience and recognition of re-insert)

Simulation result indicates that AS features are reflected effectively.

1) from the creation of a network (formation of a tourism team) to the period ends (leave from tourism network area, scenery), effective distinguish between member and non-member management

2) Insert time and network insert & play are seriously related to routing table .Typical time-lay simulation result is as shown in figure, the main reason is that it is caused by the multi-layer safety testing of network.

3) What Network bandwidth control has been influenced is related to the node density of its location. The bigger the node density is , the better the data sending effect is .



• Figure 4 delay simulation results

[1] TCP/IP detailed (volume 1: agreement) (beauty) W.R ichard Stevens the mechanical industry press P103

[2] A. Elmokashfi, A. Kvalbein, and C. Dovrolis. BGP Churn Evolution: a Perspective from the Core. In INFOCOM, 2010 Proceedings IEEE, pages 1–9, March 2010.

[3]W.Lou,and Y.Fang,“A multipath routing approach for secure data delivery”, MILCOM 2001, 2, 1467, 2001

[4]A.Elmagarmid.M Rusinkiewicz.A Sheth.Management of Heterogeneous and Autonomous Database Systems[M].Morgan Kufmann publishers,1999

[5]Stephen Kent, Charles Lynn, Joanne Mikkelson, and Karen Seo. Secure Border Gateway Protocol (S-BGP) . Real World Performance and Deployment Issues. In Proceedings of the 2000 Symposium on Network and Distributed Systems Security (NDSS '00), pages 103.116, February 2000.

[6] WangRuiJun complex domain such as routing system between autonomus systems in the classification of relationship between computer engineering in November 2005(in chinese)

[7] DongPan mobile Ad - Hoc network distributed security algorithm study of Chinese outstanding bo master's degree thesis full text database(in chinese)