CHAPTER 8

CONCLUSION AND DISCUSSION

This chapter presents the conclusion of the work to enhance NAT-PT to support multicast. It summarizes the advantages and the limitations of the developed module. In addition, it presents the discussion of this work and suggests some future work.

8.1 Conclusion

This work surveys an IPv4/IPv6 transition technique and focuses on the translator technique. A translator, NAT-PT, is chosen to evaluate its features because it can provide transparency use applications and communication between IPv4 and IPv6 networks.

8.1.1 Multicast address and packet translation

From testing and evaluation of NAT-PT, it was found that NAT-PT can translate addresses and provide application in unicast style only. The original NAT-PT always drops multicast packets.

This work improved the feature of NAT-PT in order to increase various capabilities to provide service between v4 and v6 world. For enhancement, the multicast address translation function was extended into the original NAT-PT code. The multicast module was installed into the NAT-PT router as the prototype to provide multicast communication. The extension module can translate multicast addresses and packets from IPv4 to IPv6 and vice versa. Then v4 and v6 nodes can join the group and participate in multicast sessions created in either network.

NAT-PT with multicast can provide address translation to the upper layer protocol, RTP/RTCP.

8.1.2 Multicast address mapping

Multicast applications usually dynamically assign group identifiers. In order to use this application style, a user must know the group address that he wants to join. SDP and SAP can be deployed to advertise an available multicast session. They contain session description including the group number for a particular multicast application.

This work proposes a method to discover the available multicast sessions originating from the other IP network. The solution is SAP-ALG. It is used to adjust SAP packet and the description in the payload to be the appropriate values in order to allow the listener in each IP version to know the available multicast applications from the other. The ALG generates a new multicast address and maps to the original group number. Then it advertises the adjusted group and session description to the appropriate listeners.

As a result, the available multicast applications in v4 and v6 site are visible to each other. V4 and v6 recipients can discover the existing group address when SAP-ALG is deployed.

8.2 Discussion

The result of works produces several benefits. However, there are many limitations which require improvements. This part discusses the procedure and result of this work.

Advantages

1. The multicast function is implemented as the prototype on NAT-PT to provide multicast address translation. It is tested and proved that NAT-PT can provide multicast address and packet translation.
2. Apart from unicast communication, multicast can be provided between v4 and v6 worlds by using NAT-PT as the translator.
3. An available group address and multicast applications in v4 can be visible to v6 and vice versa by using SAP-ALG.

Limitations

1. NAT-PT with multicasting still be a single point of failure.
2. NAT-PT does not have the load balancing function when the network has high density session.
3. The extension function is designed and implemented on only one NAT-PT box. There

is no protection to avoid packet looping when there are several multicast enabled NAT-PT boxes on the same network.

4. This work only tested global scope multicast addresses. Nothing, however, actually depends upon the use of global scope, and we expect that limited scope multicast should work just as well. The biggest problem is likely to be choosing a suitable block of limited scope IPv4 multicast addresses which actually work as desired in the v4 network.

8.3 Future work

The NAT-PT enhancement is the prototype implementation to provide multicast communication. It has just been the early state to test the feasibility of multicast through NAT-PT. It is required to extend several functions to provide a practical solution. The extension in the future should be around the following issues:

1. In order to solve a single point of failure, the multiple NAT-PT routers should be located at the boundary on the same network. These translators are possible to load balance address translation when the network has high density traffic. However, the several routers make packet looping problem.
2. To apply multiple NAT-PT boxes on the different networks where there are several v4 and v6 networks. It is possible that a NAT-PT box might be assigned with the duplicated multicast address to the other NAT-PT boxes. They might use the same address to perform address translation to different applications. The problem is that these NAT-PT boxes cannot provide the unique of multicast address mapping to the same session of a particular application.
3. To solve the address duplication problem NAT-PT routers could be configured with distinct multicast address blocks from which to assign group identifiers to translated groups. For IPv6 groups the vast size of the available address space would make this easy to achieve. For IPv4 it may be more difficult. Furthermore it is not clear that this is the appropriate solution. It may be better if two NAT-PT routers mapping the same group identifier produced the same result. The implications of the choice of the mapped address upon possible loop control mechanisms also needs to be considered. This area needs much future research.

4. The NAT-PT user interface for configuration should be upgraded. The current utility is complex and difficult to understand. This is an implementation issue.
5. A well documented and useful application Programming Interface (API) for NAT-PT to connect to user level utilities should be created. This would allow applications like the DNS-ALG (totd) and the SAP-ALG to automatically update the NAT-PT mapping rules. This is also just an implementation problem.