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INFN Requirements for an IPng

Status of this Memo

This memo provides information for the Internet community. This memo does not specify an Internet standard of any kind. Distribution of this memo is unlimited.

Overview

This document was submitted to the IETF IPng area in response to RFC 1550. Publication of this document does not imply acceptance by the IPng area of any ideas expressed within. Comments should be submitted to the big-internet@munnari.oz.au mailing list.

Abstract

This white paper is sent by INFN network team, the Italian National Institute for nuclear physics, whose network, named INFNet, is a nationwide network founded to provide the access to existing national and international HEP laboratory and to facilitate communications between the researchers. With this paper we would like to emphasize the key points that we would to consider if charged with IPng plan. We do not really expect to add original items to the selection, but we think that it could be useful to submit the opinions and ideas that come from our network experience.

1. General Requirements

The problems that are to be solved in IP internet are mainly three:

1. address exhaustion

2. flat address space

3. routing efficiency, flexibility and capacity.

The aim of IPng study should be to define a plan that solves all these problems as a whole and not each of them separately.

The general requirements that we underline for this transition are:

- transparency to the final user: user applications should not be influenced.

- flexibility: Simplify the suitability to new communication technology and to topology changes due to new services provided or to different users needs.

2. Application and Transport Level

Starting from the top of the OSI model, we think that the users applications should not be influenced by the migration plan. It means that the TCP (the transport layer) must maintain the same interfaces and services to the upper layers. Anyway, it is also necessary to foresee the use of a different transport services. The possibility to use different transport should be offered to the applications. Therefore a transport selector field is needed.

3. Network layer: service and address

We assume that the network layer must continue to provide the same datagram service as IP does. CLNS could be a solution and a reliable starting point for the IPng. The main advantage is that this solution has been profitable tested and it is already available on many systems. It is not, of course, deployed as widely as IPv4 is, since it is a newer technology, but it is widely configured and and there is already operational experience. The corresponding address, the NSAP, is 20 bytes long. It is long enough to scale the future data network environment. Its hierarchical format can be organized in a really flexible way, satisfying hierarchical routing and policy based routing needs and simplifying the distributed administration and management. A lot of work has been already done in the majority of the countries in order to define NSAP formats satisfying both the requirements of administrative delegation and routing performances.

4. Routing protocols

We don’t consider the decision about the routing protocol to be adopted for the IPng to be fundamental. Even if this choice is very important to obtain good performances, the routing protocols can be changed or improved at any time, because there is no influence into the End Systems configuration. Relationships between NSAP aggregation, hierarchical topology and hierarchical routing algorithm must be taken into account in IPng plan. These issues could improve administration and topological flexibility of the IPng and solve the flat problem of the IPv4. The IPng routing protocols should include policy-based features. The IPv4 network topology is very complex and it will continue to enlarge during the transition. It would be very difficult or impossible to manage it without the "policy" tools. The

multicast capability as well as any other new features that fit in a datagram network should be supported. Regarding the Source Routing feature, since we think that it deeply modifies the aim and the "philosophy" of a connectionless network and it also introduces an heavy complication in the end nodes and routers software, we don't consider it a major issue.

5. Layer 2 or communication infrastructure media support.

This is an open field, rapidly changing, then it must be left open to any evolution. What it should be recommended is to be compatible with the above network layer.

6. Transition and Deployment

We faced the problem of the transition of the DECNET global network to DECNET/OSI over CLNS. This activity is now proceeding to the last step and based on this experience we would underline some points that we found important during the transition deployment. The transitions must be planned and developed in a distributed way. This means that every organization should have the possibility to plan and start their network migration without loosing connectivity with the existing global internet. Of course, the compatibility with the IPv4 world must be maintained, this mean that a new generation system must interwork with both the IPv4 and IPng nodes, using the same applications.

However, it is important to define a deadline for the backward compatibility in order to avoid huge software maintenance in the user systems and a "multi-topology" management. We think that a dual stack approach could simplify very much the transition, whereas a translation mechanism would need a widely and deep coordination in order to maintain the global connectivity during the transition period. The dual stack is simpler and could be easily developed, but it is important to push in order to have pure IPng with global connectivity as soon as possible; this could happen when there are no more "IPv4 only" hosts.

Indeed, the drawback of the dual stack configuration is that you continue to suffer for the IPv4 address space exhaustion and that you must continue to support the IPv4 routing protocols and infrastructure. We don't think that the tunnel solution to interconnect the IPv4 isle could give good performances to the users. Then, it is important to maintain the IPv4 connectivity and the dual stack software support in the End System software in a determined timeframe, or the transition will never end.

Security Considerations

Security issues are not discussed in this memo.

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