Comment on the Proposal to allocate IPv6 address by nation states

Internet Governance Task Force of Japan (IGTF-J)
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This paper is a work in progress and we welcome your comments for further revision.

Summary
This Memo provides IGTF-J's comment on the new proposed scheme to allocate IPv6 address by nation states and managed by their governments as a dual system operating concurrently with the current IP address system operated by the Regional Internet Registries, suggested in the paper written by Mr. Zhao of ITU Telecommunications Standard Bureau.

1 Technical requirements to allocate IPv6 Address

Internet Protocol (IP) has two distinct characteristics in terms of addressing:
1) Fixed address length, and
2) Every packet has an embedded address, which is required for connectionless communication.
This means, as is seen in the case of transition from IPv4 to IPv6, that in order to change the address system the protocols must also be changed fundamentally. Therefore, in order to use a protocol as long as possible, maximum care should be taken to guarantee availability of IP addresses indefinitely for all users who want to communicate.

Since IPv6 has a vast address space of 128 bits, many people tend to forget the importance of conservation of address resources. However, IPv6 is not different from IPv4 in terms of fixed address length. It should be noted that IPv6 address resources are vast but *not infinite*, and also that their practical availability is far lower than the theoretical maximum. For instance, address segments are simply divided such that the lower 64 bits of the 128 bits of IPv6 is used for addressing within a single LAN segment, while the address length for individual sites is only 48 bits. These factors immediately lower the address availability dramatically.

In addition to the care for the quantity of address allocation, care should also be taken for preservation of an operational routing system. Even if quantitative conservation is fully taken care of, routing aggregation is essential in order to ensure global routability for all IP addresses. Excessive fragmentation of Ipv6 address space will cause a failure of the routing system resulting in discontinuation of services to many part of the Internet. This would affect many network providers, and especially small operators who will suffer unsustainable cost increase due to increasingly expensive routers required to operate in this environment.

2. Management scheme requirements to satisfy technical requirements

Currently, IP address management and allocation is carried out by four Regional Internet Registries (RIRs) under the central management by IANA (Internet Assigned Numbers

Authority). The RIR framework has operated for over 10 years and is the only IP Address space allocation mechanism with a successful proven record. Should a new and different management scheme be introduced in the future, that new scheme must satisfy the technical requirements mentioned in 1. above as much as the current RIR framework, and any method that has the potential to undermine these requirements *must* be avoided.

The most important policy in allocation of IP address space is *fairness*. Allocation standards must be kept globally uniform, regardless of the region or property of user organizations. In case there are plural bodies that provide address allocation services, the difference in allocation standards must not become elements of competition. To guarantee this it is essential to maintain uniform allocation policies achieved through coordination activities between parallel allocation bodies and education mechanisms from upstream allocation bodies to downstream bodies (which is currently maintained by assignment window with autonomous size judgment) such as currently exercised by RIR-NIR-LIR[1] scheme.

It is also very desirable to develop address allocation policies by open meeting process that is open to all interested parties including users which is also currently exercised by RIRs and their constituencies.

3. Perceived characters of Nation-state based addressing

Let's assume that IP addresses are allocated by nation states. This will enable easy recognition of some users' nationality/locale by reading the first several bits of addresses, and enable attractive services such as automatic traffic segmentations, prioritized processing and statistical processing, but it will also enable questionable applications such as easy censorship, tracking or restriction of communication content.

In any case, existing addresses already allocated (both IPv4 and IPv6) have not been allocated on a national basis, and if only some addresses are allocated in this manner, then not all IP addresses will have the same characteristics or support the above services

4. Concerns toward managing IP address by nation-states

We believe that fulfilling both 1. Technical requirements and 2. Management scheme requirements are essential for IP address allocation and management even in case of the existing arrangements by RIRs. Therefore, we should not accept any risk of not meeting these conditions.

Mr. Zhao's paper discusses about installing the IP address management by nation-states with the current RIR scheme continuing to operate in parallel. We are, however, much worried that we may not be able to keep consistent allocation standards in those parallel systems, including a worse case that these two systems will compete as IP address allocation service providers and result in compromise to existing essential standards of address management.

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[1] RIR (Regional Internet Registry), NIR (National Internet Registry) and LIR (Local Internet Registry)

We do understand that national governments have much interest in Internet governance issues including IP address allocations and that they want to protect these resources under national sovereignty perspectives, as Internet is becoming a kind of social infrastructure these days. However, we strongly believe that the conditions required for address management as mentioned above should not be constrained or limited by the interests of national sovereignties, but they should be kept in order to preserve the functions of Internet to be used among all the people of the world for their distribution of information and communication.

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Internet Governance Task Force of Japan is a joint group established in August 2004 by individuals and organizations from the Japanese Internet Community and Internet Industry to engage in the activities of the Working Group on Internet Governance (WGIG) to achieve safe and trusted global framework of Internet operation and application through maintaining and further developing private sector-led management.

This memo was drafted by IGTF Working Group on Internet Resources, including Takashi Arano *(Member of the Board, IPv6 Forum) and* Akinori Maemura *(Chair, Executive Council of APNIC); they worked in their individual capacity and not representing the organization they are affiliated with.*

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