
What can IXPs do for IPv4/IPv6 route exchange ??

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Agenda

- 1. JPIX - Service Deployment**
- 2. Range of Each Service**
- 3. How come we are doing this?**
- 4. Action Taken: Port Filtering**
- 5. JPIX IPv6 IX - Prohibited Frames**
- 6. JPIX IPv6 IX - How it looks**
- 7. What is good about filtering?**
- 8. Watch Out...**
- 9. Request For Comments**

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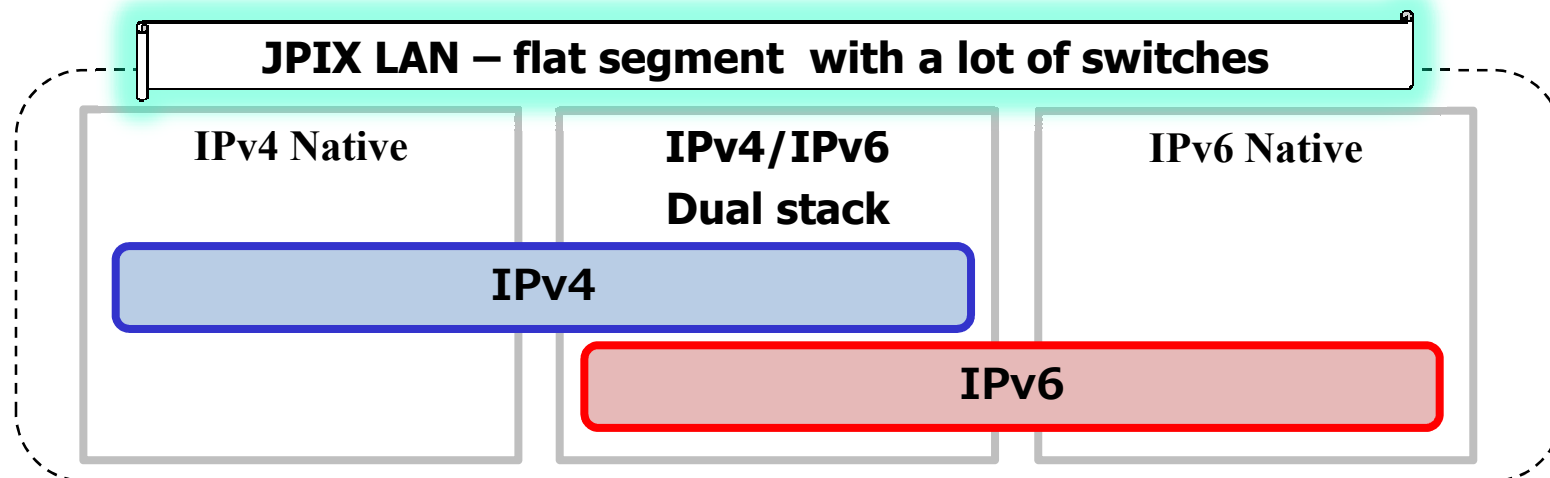
JPIX - Service Deployment

- **JPIX established on year of 1997**
 - Commercial *IPv4 Native Service*
- **Development of JPIX IPv6 IX service**
 - Jan, 2002 Trial Service
 - Pilot service only in Otemachi Site
 - Stand-alone : *IPv6 Native Service*
 - Sep, 2008 Commercial
 - *IPv4/IPv6 Dual Stack , Native IPv6 , and Native IPv4 Service*
 - Users can select a port among { IPv4/IPv6 dual stack port | IPv4 native port | IPv6 native port } via same environment.

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Range of Each Service

- **Design of our Dual Stack Architecture**
 - “IPv4 Native Users” **can** exchange their traffic with in IPv4 Native Environment: NO IPv6 Traffic Allowed
 - “IPv6 Native Users” **can** exchange their traffic with in IPv6 Native Environment: NO IPv4 Traffic Allowed
 - Dual Stack Users **can** exchange their traffic with both IPv4 Native Users and IPv6 Native Users.
 - “IPv4 Native Users” and “IPv6 Native Users” **can not** exchange their traffic each other



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How come we are doing this?

- **Premises**

- **JPIX product service: It was only IPv4 packets = IPv4 Native**
- **JPIX experimental Service: It was only IPv6 packets = IPv6 Native**
- **For “IPv4 Native Users,” IPv6 packets are trash that eat up useful bandwidth(Backhaul or IPLCs are still expensive) and cpu power, and vice versa.**
- **Port speed varies, from 10M to 10G-LAG**

- **Traffic should not be affected by other protocols**

- **Because we call it Native**



NATIVE

1. Originating, growing, or produced in a certain place or region; indigenous.
2. Occurring in nature pure or uncombined with other substances.

Source: Dictionary.com, "native," in *The American Heritage® Stedman's Medical Dictionary*.
Source location: Houghton Mifflin Company. <http://dictionary.reference.com/browse/native>.
Available: <http://dictionary.reference.com>. Accessed: December 03, 2008.

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Action Taken: Port Filtering(1)

- How can we make it possible?
 - Using **“MAC (L2) ACL by Ether Type on Egress Filter”** on each member port was our answer
 - Ingress Filter is not enough to separate the protocol since you need ARP (IPv4 Broadcast) and ND (IPv6 Multicast) for address resolution.
 - You may rate limit but it still leaks
 - How about have 3 separate segment by service(protocol) type using each different protocol vlan or switch?
 - Member needs to have interface for each service... May not be the best practice.

Action Taken: Port Filtering(2)

- **What we found while we were trying to get it done** (*It is not a vendor specific story... It is a combination of different switches that we have tested*)
 - **L2 Ether type and IPv6 ACL could not be configured at same time**
 - **Can not do the Egress Filtering on arp, ndp, unicast flooding...**
 - **Can not do the Egress Filtering on IPv4 multicast, IPv6 multicast with L2_ACL**
 - **If you enable IPv6 cam profile, throughput went down...**
 - **Even you can rate limit the Unicast Flooding, you may not know who is sending this flood**
 - **etc**

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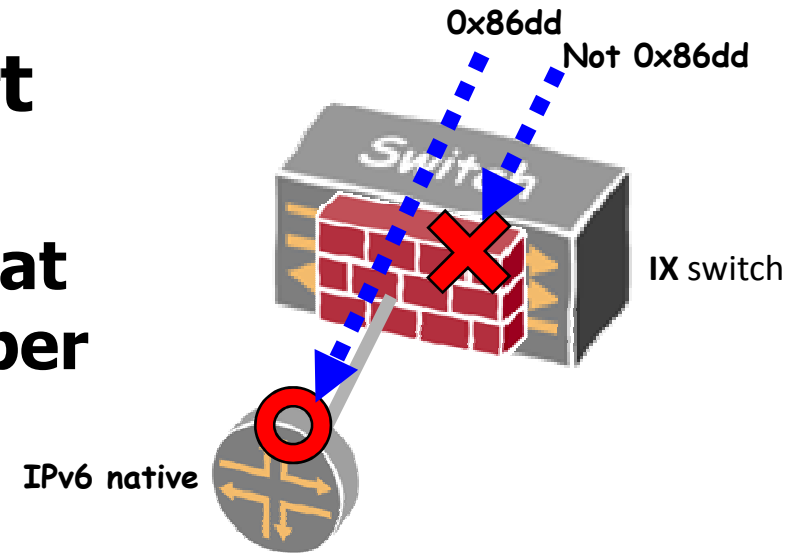
JPIX IPv6 IX - Prohibited Frames

Prohibited Item	Description
Ethernet Frame	Ethernet frames other than Ethertype 0x0800 (IPv4), 0x0806(ARP) and 0x86dd (IPv6) in DIX Ethernet (Ethernet II) 0x86dd is prohibited in "IX Port service IPv4 native", 0x0800 and 0x0806 are prohibited in "IX Port service IPv6 native".
Broadcast	Broadcast other than broadcast ARP is prohibited. All broadcasts are prohibited in "IX Port service IPv6 native".
Multicast	Multicast is prohibited in IPv4. Multicast other than ND (ICMPv6 type 135 and 136) is prohibited.
Link Local	The items below are prohibited. <ul style="list-style-type: none">• Spanning Tree (STP)• Vendor Proprietary Protocol (e.g. Cisco's CDP)• L2 keepalive• UDLD, LLDP, IRDP, LACP• ICMP redirect, Router Advertisement- Proxy ARP• IGP (RIP, OSPF, ISIS, etc.)• Multicast Routing Protocol• BOOTP, DHCP, DHCPv6etc.

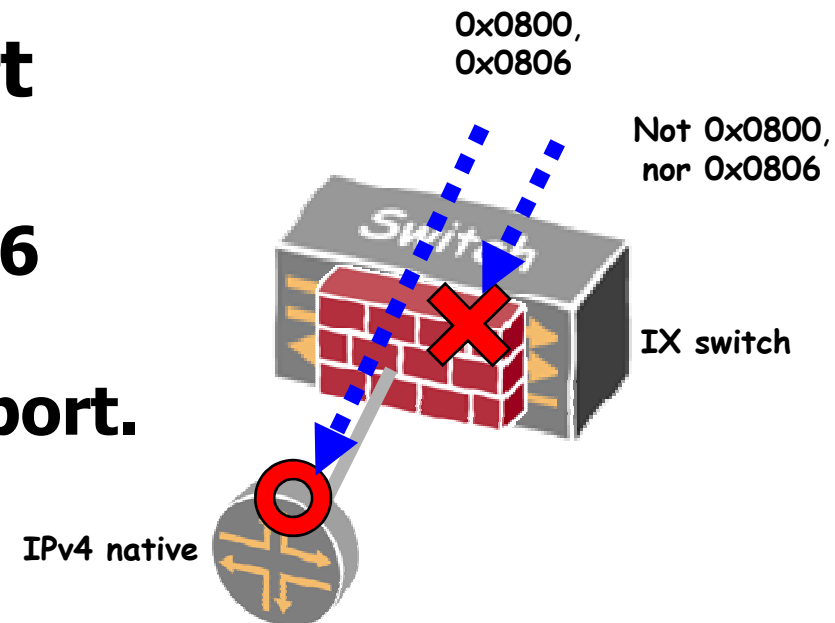
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JPIX IPv6 IX - How it looks

- **IPv6 native IX port**
 - Only ethertype: **0x86dd** is allowed at the egress subscriber port.



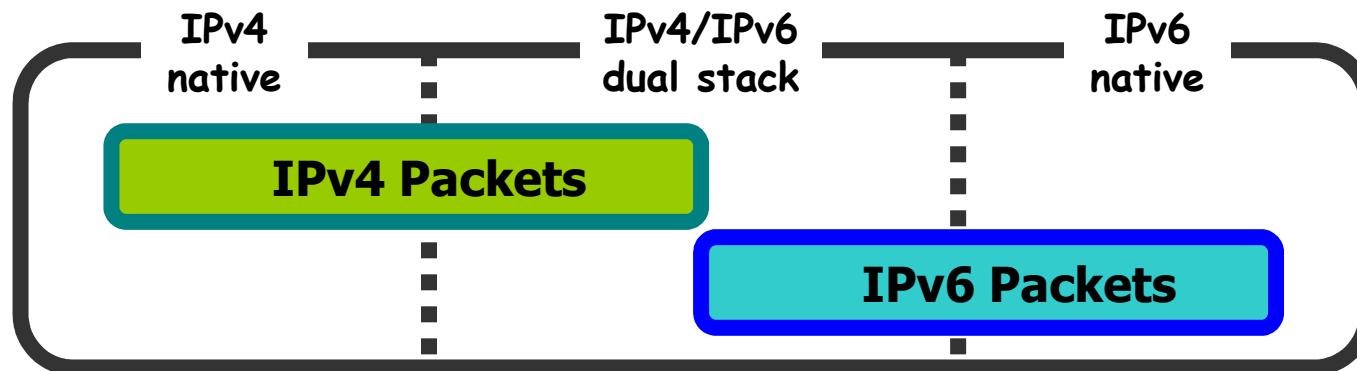
- **IPv4 native IX port**
 - Only ethertype: **0x0800** and **0x0806** are allowed at the egress subscriber port.



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What is good about filtering?

- **Advantageous effect by filtering at the IX switch**
 - **IPv6 packets are not transmitted in IPv4 native port, and vice versa.**
(e.g.) Multicast packet like IPv6 ND are not to be transmitted in IPv4 native port.
 - **Traffic are restricted at IX switch port, in advance of dropping at users' routers, so bad affect for the routers by unexpected packet would be lessened.**



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Watch Out...

- **Announcing Prefixes**
 - **If you are using IPv4 Native Port and announce IPv6 prefix to your peer using IPv4 peering, your IPv6 traffic from your neighbor will get blackholed due to egress filter on our IX switch. Protocol needs to be united with service, peering address, and announce prefix and traffic.**
- **Use of Link Local Address**
 - **Link local address is usually addressed using EUI-64 which uses interface ID. In this case, MAC Address will be changed if NIC changes. It is not recommended to use Link Local Address when you do the peering.**

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Request for Comments

- **What do you think about packet filtering on IX port?**
- **Do you have any requests or suggestions that might help stabilize ISP/IXP operation?**
- **Do protocols need to be separated?**

Thank you