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IPv6 Implementation experience from a Hosting Provider

IPSERVER ONE

About IP ServerOne

- Founded in year 2003
- **The only hosting provider that has in-house DDOS mitigation capability**
- 40 Employees
- Managing 3500 physical servers
- Total 120 Racks in 3 data centers in Malaysia, and 2 Data centers in Singapore.
- Contributing 10% of Malaysia's domestic traffic.
- Total traffic sent to Internet: Approximately 4.8 Gbit/s at peak



Why didn't we implement IPv6 Earlier?

- We still can recycle some IPv4 address space
- No Customer demand
- Our ISP in Malaysia yet IPv6 Ready. But they are more ready now.
- Need to do Change Request at the Upstream provider. That involved additional cost

The logo for IPv6, with 'IP' in grey, 'v' in green, and '6' in green.

What push us to do now?

- We really don't have much IPv4 address left.
- Customer is asking for it now.
- TM Unifi is now IPv6 supported.
- We have replaced all the network gear to Cisco ASR1000 routers



Why our customer ask for IPv6 now?

- Some ISPs in Malaysia their IPv4 Address Pool is very small. To grow the business there need to have IPv6 ready
- Malaysia has a lot of good app developer. All apps that need to be running on iOS 9, it need to be IPv6 ready before the app got approved, and published at the Apple AppStore

The Effective date is on 1st June 2016

Why our customer ask for IPv6 now?

Here is a discussion over Internet, on the App got rejected due to IPv6 compatibility issue



https://www.reddit.com/r/iOSProgramming/comments/4ufrew/app_rejected_because_app_wasnt_tested_on_ipv6/

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iOSProgramming

COMMENTS

Question: App Rejected Because App Wasn't Tested on IPv6 network. self.iOSProgramming
Submitted 1 month ago * by SexySama

Novice programmer here. Trying to approve my first app, but met with a rejection:

From Apple 2. - 1 PERFORMANCE: APP COMPLETENESS Performance - 2.1

We discovered one or more bugs in your app when reviewed on iPad > running iOS 9.3.3 on Wi-Fi connected to an IPv6 network.

Specifically the "purchase" button does not activate the In-App->Purchase process.

Next Steps

Please run your app on a device while connected to an IPv6 network (all >apps must support IPv6) to identify the issue(s), then revise and >resubmit your app for review.

If we misunderstood the intended behavior of your app, please reply to >this message in Resolution Center to provide information on how these >features were intended to work.

For new apps, uninstall all previous versions of your app from a device, >then install and follow the steps to reproduce the issue(s). For updates, >install the new version as an update to the previous version, then follow >the steps to reproduce the issue(s).

Resources

For information about supporting IPv6 Networks, please refer to >Supporting IPv6 DNS64/NAT64 Networks and About Networking

My in-app purchase works. I tested over and over again. I don't really know the difference between IPv6 vs IPv4. But the thing is that I am NOT connecting to any networks except apple's in-app purchase. That's it. Did the reviewer made a mistake? Or, am I overlooking something?

I submitted my response to the app appeal board.

Edit: tried to format quote.

8 comments share

Malaysia biggest - is now IPv6 Ready

```
Aims-MYIX-10G#show bgp ipv6 unicast summary
```

Neighbor	V	AS	MsgRcvd	MsgSent	TblVer	InQ	OutQ	Up/Down	State/PfxRcd
2001:DE8:10:::2	4	9930	160334	176418	3623389	0	0	15w6d	11
2001:DE8:10:::4	4	24218	336148	349481	3623389	0	0	15w6d	0
2001:DE8:10:::5	4	45668	177873	176416	3623389	0	0	15w6d	4
2001:DE8:10:::B	4	24028	176435	176423	3623389	0	0	15w6d	16
2001:DE8:10:::1A	4	15169	126183	132449	3623389	0	0	6w0d	104
2001:DE8:10:::2B	4	38322	29001	28998	3623389	0	0	2w4d	1
2001:DE8:10:::32	4	17451	176840	176418	3623389	0	0	15w6d	82
2001:DE8:10:::36	4	56092	160809	156752	3623389	0	0	14w0d	1
2001:DE8:10:::37	4	56092	160744	156786	3623389	0	0	14w0d	1
2001:DE8:10:::44	4	132111	71779	66488	3623389	0	0	5w6d	5
2001:DE8:10:::45	4	18206	176256	429722	3623389	0	0	15w6d	2
2001:DE8:10:::46	4	32934	327470	349515	3623389	0	0	15w6d	16
2001:DE8:10:::62	4	18206	176249	429652	3623389	0	0	15w6d	2
2001:DE8:10:::83	4	4788	458964	349464	3623389	0	0	15w6d	1535
2001:DE8:10:::86	4	13335	144073	151808	3623389	0	0	6w6d	3
2001:DE8:10:::97	4	9930	160309	176374	3623389	0	0	15w6d	11
2001:DE8:10:::9F	4	32934	327808	349406	3623389	0	0	15w6d	16
2001:DE8:10:::A0	4	134809	21346	23497	3623389	0	0	2w0d	1
2401:3400:2401:::104A	4	45352	32565	115499	3623390	0	0	2w5d	22

IPv6 Address Allocation

- Different Guru may have different opinions on how the IPv6 should be allocated.
- Here is what IP ServerOne feel that, it's work well with our existing environment.
- We give /112 of IPv6 to customer that running on Dedicated VLAN.
- This would will give customer 65K IPv6 addresss
- For single server, we will allocate /120 for each customer

/112 IPv6 address example

- Example:
- 2401:3400::0000 to 2401:3400::FFFF
- Total IPv6 available: 65,535

/120 IPv6 address example

- Example:
- 2401:3400::0000 to 2401:3400::00FF
- Total IPv6 available: **256**

Why allocate so little? Where IPv6 pool is so big?

- **Don't confuse the support engineers**
- Then are still very fresh to IPv6 environment. Give them a big of time to get familiar

- **Don't confuse the customer also**
- There isn't an application that really need so many IP address for now.

So, What's need to be done?

- Networking
 - Make sure all the switches firmware support IPv6
 - Make the routers to be IPv6 ready
- Logical infrastructure
 - Get the DNS server to support IPv6
 - Get the Reverse DNS support on IPv6
- Web Server + Mail server

Router configuration

```
Aims-MYIX-10G#show bgp ipv6 unicast summary
```

Neighbor	V	AS	MsgRcvd	MsgSent	TblVer	InQ	OutQ	Up/Down	State/PfxRcd
2001:DE8:10:::2	4	9930	160334	176418	3623389	0	0	15w6d	11
2001:DE8:10:::4	4	24218	336148	349481	3623389	0	0	15w6d	0
2001:DE8:10:::5	4	45668	177873	176416	3623389	0	0	15w6d	4
2001:DE8:10:::B	4	24028	176435	176423	3623389	0	0	15w6d	16
2001:DE8:10:::1A	4	15169	126183	132449	3623389	0	0	6w0d	104
2001:DE8:10:::2B	4	38322	29001	28998	3623389	0	0	2w4d	1
2001:DE8:10:::32	4	17451	176840	176418	3623389	0	0	15w6d	82
2001:DE8:10:::36	4	56092	160809	156752	3623389	0	0	14w0d	1
2001:DE8:10:::37	4	56092	160744	156786	3623389	0	0	14w0d	1
2001:DE8:10:::44	4	132111	71779	66488	3623389	0	0	5w6d	5
2001:DE8:10:::45	4	18206	176256	429722	3623389	0	0	15w6d	2
2001:DE8:10:::46	4	32934	327470	349515	3623389	0	0	15w6d	16
2001:DE8:10:::62	4	18206	176249	429652	3623389	0	0	15w6d	2
2001:DE8:10:::83	4	4788	458964	349464	3623389	0	0	15w6d	1535
2001:DE8:10:::86	4	13335	144073	151808	3623389	0	0	6w6d	3
2001:DE8:10:::97	4	9930	160309	176374	3623389	0	0	15w6d	11
2001:DE8:10:::9F	4	32934	327808	349406	3623389	0	0	15w6d	16
2001:DE8:10:::A0	4	134809	21346	23497	3623389	0	0	2w0d	1
2401:3400:2401:::104A	4	45352	32565	115499	3623390	0	0	2w5d	22

Router configuration

```
# enable IPv6 Routing feature in Cisco
ipv6 unicast-routing
no ipv6 dhcp server join all-dhcp-servers

# Sample interface configuration
interface TenGigabitEthernet0/0/1.509
 encapsulation dot1Q 509
 ip address 10.5.10.1 255.255.255.192
 no ip redirects
 no ip proxy-arp
 ipv6 address 2401:3400:1000:6::1/64
 ipv6 address 2401:3400:1000:6::1/64
 ipv6 address 2401:3400:1000:7::1/64
 ipv6 address 2401:3400:3400::1/64
 ipv6 enable
 ipv6 nd prefix default no-advertise
```

Switches configuration

```
# enable IPv6 Routing feature in Cisco
ipv6 unicast-routing
no ipv6 dhcp server join all-dhcp-servers

# Sample interface configuration
interface TenGigabitEthernet0/0/1.509
 encapsulation dot1Q 509
 ip address 10.5.10.1 255.255.255.192
 no ip redirects
 no ip proxy-arp
 ipv6 address 2401:3400:1000:6::1/64
 ipv6 address 2401:3400:1000:6::1/64
 ipv6 address 2401:3400:1000:7::1/64
 ipv6 address 2401:3400:3400::1/64
 ipv6 enable
 ipv6 nd prefix default no-advertise
```

DNS configuration

```
$ttl 3600
ipserverone.com.      IN      SOA     ns1.ipserverone.com. cllee.ipfusions.com. (
                        2016052513
                        7200
                        1800
                        1209600
                        900 )

ipserverone.com.      IN      NS      ns1.ipserverone.com.
ipserverone.com.      IN      NS      ns2.ipserverone.com.
ipserverone.com.      IN      A       103.3.174.10
www.ipserverone.com.  IN      A       103.3.174.10

ns1                    IN      AAAA    2401:3400:9000:5:103:21:180:150
ns2                    IN      AAAA    2401:3400:1000:5:203:223:144:14

ipserverone.com.      IN      AAAA    2401:3400:1000:4:103:3:174:10
www.ipserverone.com.  IN      AAAA    2401:3400:1000:4:103:3:174:10
```

Reverse DNS configuration for IPv6

```
$ttl 1800
0.0.4.3.1.0.4.2.ip6.arpa.      IN      SOA      ns1.ipserverone.com. support.ipserverone.com. (
                               1111991166
                               900
                               900
                               900
                               900 )
0.0.4.3.1.0.4.2.ip6.arpa.      IN      NS       ns1.ipserverone.com.
0.0.4.3.1.0.4.2.ip6.arpa.      IN      NS       ns2.ipserverone.com.

8.7.0.0.7.4.0.0.5.0.0.0.0.1.2.0.7.0.0.0.0.0.0.1.0.0.4.3.1.0.4.2.ip6.arpa.      IN      PTR      ns8.ipserverone.com.
9.7.0.0.7.4.0.0.5.0.0.0.0.1.2.0.7.0.0.0.0.0.0.1.0.0.4.3.1.0.4.2.ip6.arpa.      IN      PTR      ns9.ipserverone.com.
0.8.0.0.7.4.0.0.5.0.0.0.0.1.2.0.7.0.0.0.0.0.0.1.0.0.4.3.1.0.4.2.ip6.arpa.      IN      PTR      ns10.ipserverone.com.
1.8.0.0.7.4.0.0.5.0.0.0.0.1.2.0.7.0.0.0.0.0.0.1.0.0.4.3.1.0.4.2.ip6.arpa.      IN      PTR      ns11.ipserverone.com.
6.0.1.0.2.0.1.0.0.0.0.0.6.1.1.0.5.0.0.0.0.0.0.1.0.0.4.3.1.0.4.2.ip6.arpa.      IN      PTR      ns30.ipserverone.com.
7.0.1.0.2.0.1.0.0.0.0.0.6.1.1.0.5.0.0.0.0.0.0.1.0.0.4.3.1.0.4.2.ip6.arpa.      IN      PTR      ns31.ipserverone.com.
9.3.1.0.7.4.0.0.5.0.0.0.0.1.2.0.5.0.0.0.0.0.0.1.0.0.4.3.1.0.4.2.ip6.arpa.      IN      PTR      ns46.small-dns.com.
```


Apache web server configuration sample

```
<VirtualHost 2401:3400:1000:4:103:3:174:10:80 >
    ServerName www.ipserverone.com
    ServerAlias ipserverone.com
    ServerAdmin webmaster@ipserverone.com
    DocumentRoot /home/ips1webmy/domains/ipserverone.com/public_html
    UseCanonicalName OFF
    CustomLog /var/log/httpd/domains/ipserverone.com.bytes bytes
    CustomLog /var/log/httpd/domains/ipserverone.com.log combined
    ErrorLog /var/log/httpd/domains/ipserverone.com.error.log
</VirtualHost>

<VirtualHost 2401:3400:1000:4:103:3:174:10:443 >
    SSLEngine on
    SSLProtocol -All +TLSv1.2
    SSLHonorCipherOrder On
    SSLCipherSuite ALL:!ADH:RC4+RSA:+HIGH:!MEDIUM:!LOW:!SSLv2:!EXPORT:!3DES:!GCM
    SSLCertificateFile /usr/local/directadmin/data/users/ips1webmy/domains/ipserverone.com.cert
    SSLCertificateKeyFile /usr/local/directadmin/data/users/ips1webmy/domains/ipserverone.com.key
    SSLCACertificateFile /usr/local/directadmin/data/users/ips1webmy/domains/ipserverone.com.cacert
    ServerName www.ipserverone.com
    ServerAlias ipserverone.com
    ServerAdmin webmaster@ipserverone.com
    DocumentRoot /home/ips1webmy/domains/ipserverone.com/private_html
    UseCanonicalName OFF
    CustomLog /var/log/httpd/domains/ipserverone.com.bytes bytes
    CustomLog /var/log/httpd/domains/ipserverone.com.log combined
    ErrorLog /var/log/httpd/domains/ipserverone.com.error.log
</VirtualHost>
```



Thank you,

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