



IPv6 and Core Network Services: An Acquisition Guide

IPv6: Integrated to the Core



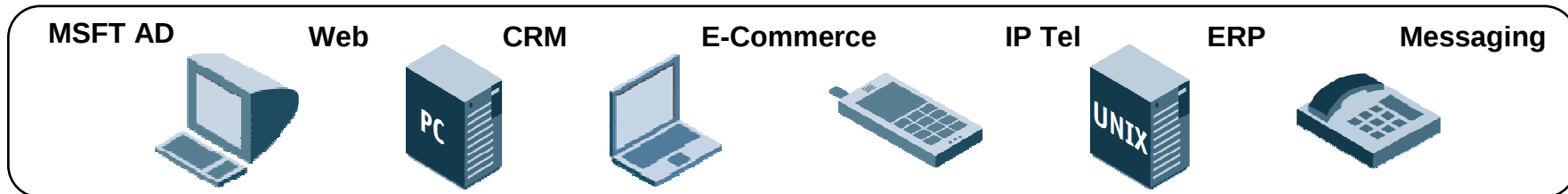
Infoblox core network services appliances provide a utility-grade platform for IPv6 name services.

Core Network Services – The “Glue” Between Networks and Applications

2001:4f9:0:1::a
2002:4f2:0:2::b
2003:4f3:0:3::c
2004:4f4:0:4::d
2005:4f5:0:5::e
2006:4f6:0:6::f



Applications



Core Network Services

NAMING
(DNS)

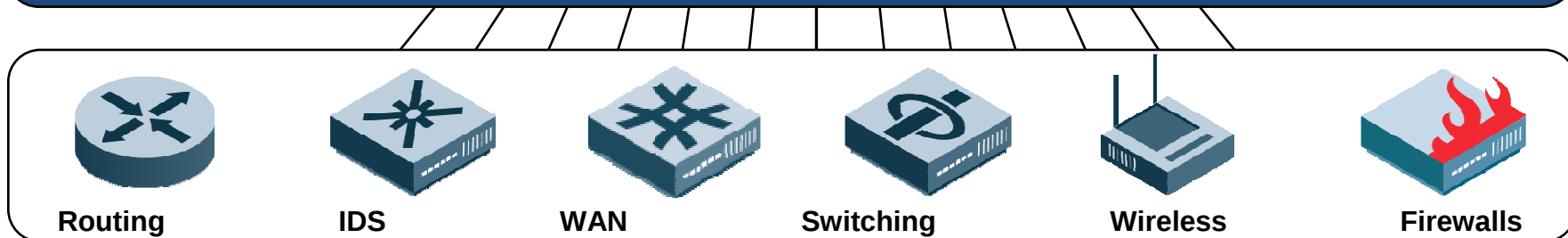
ADDRESSING
(DHCP)

IP ADDRESS MGMNT
(IPAM)

FILE DELIVERY
(TFTP / HTTP)

AUTHENTICATION
(RADIUS)

TIME
(NTP)



Network Infrastructure

DNS DHCP IPAM RADIUS FTP/TFTP/HTTP NTP MORE...



- Integrated core network services on hardened appliances
 - Central management and control
 - Enhance existing infrastructure, or build a new one

SIMPLIFY

FORTIFY

SAVE

Infoblox Grid Technology Provides an Integrated, Resilient Core Network Services Platform



Grid: A collection of *member* appliances running one or more services (DNS, DHCP, RADIUS, File Delivery, etc.)

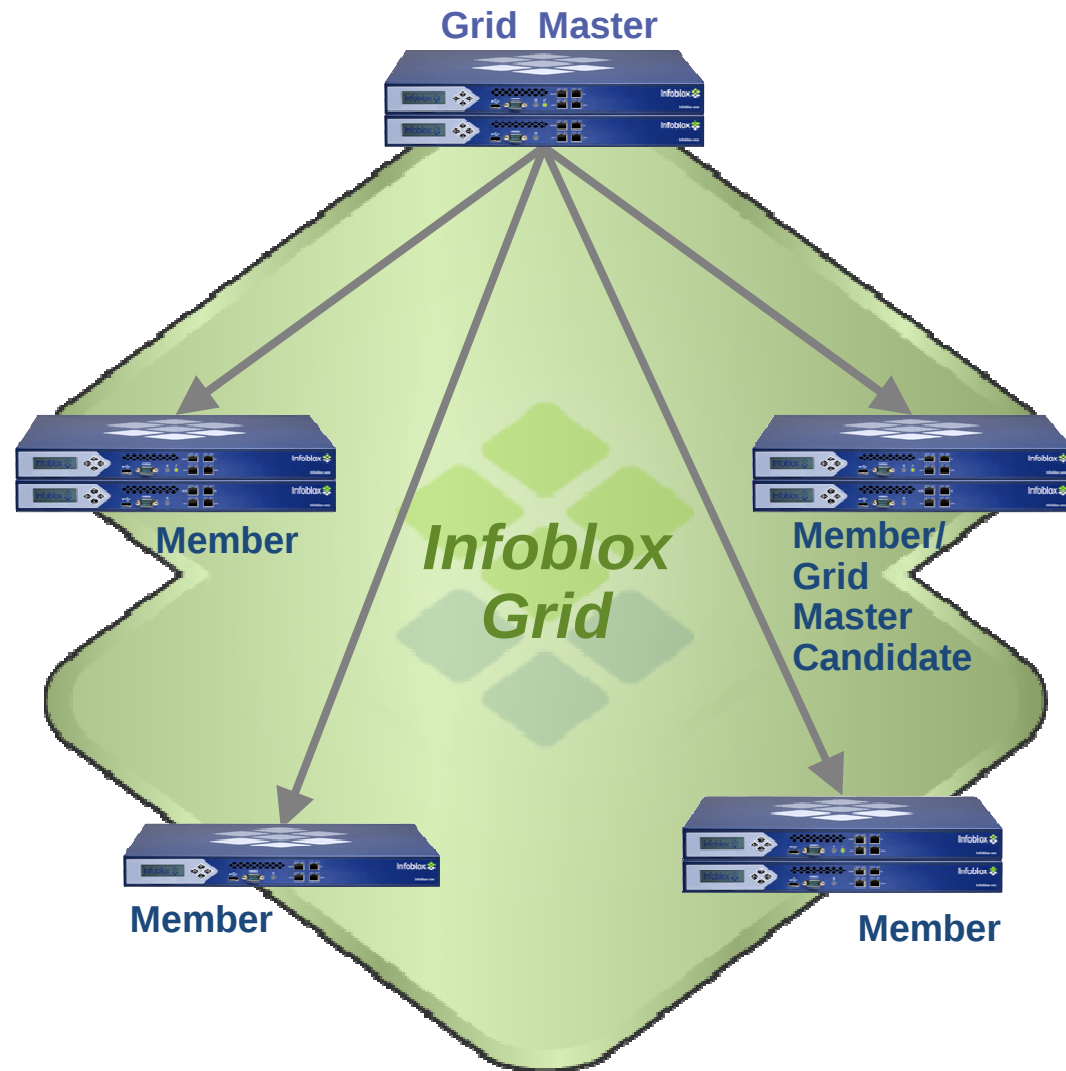
Coordinated by a *grid master*

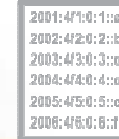
Sharing a distributed database

Communicating via an SSL VPN

Provides:

- **Centralized visibility and control**
- **Backup and restore**
- **Monitoring and reporting**
- **Failover and disaster recovery**





- **The Infoblox approach has been to integrate IPv6 into the very core of the product**
 - Not an “add-on”
 - Included in the core product, no additional licenses
 - All dialogs that accept v4 also accept v6 (with error checking)
- **integration with DNS, DHCP and IPAM**
 - Phase I
 - AAAA records
 - ip6.arpa zone
 - Phase II
 - Dual IPv4 / IPv6 network stack
 - DNS configured to listen on IPv6
 - Phase III
 - IPv6 Host and Bulk Host support
 - Phase IV
 - IPv6 IPAM
 - DHCP v6



- **The volume of IPv6 addresses along with the length of the address *demands* better tools for DNS**
 - Forward zone has AAAA record instead of IPv4 A record
 - PTR records are in the ip6.arpa zone instead of in-addr.arpa

```
$ dig @10.34.1.30 test-v6.lo0.net aaaa

;; QUESTION SECTION:
;test-v6.lo0.net.      IN      AAAA

;; ANSWER SECTION:
test-v6.lo0.net.      28800 IN      AAAA fe80::20d:93ff:fe0:694e
```

```
$ dig -x fe80::020d:93ff:fe0:694e @10.34.1.30

;; QUESTION SECTION:
;e.4.9.6.0.f.e.f.f.f.3.9.d.0.2.0.0.0.0.0.0.0.0.0.0.0.0.0.8.e.f.ip6.arpa. IN PTR

;; ANSWER SECTION:
e.4.9.6.0.f.e.f.f.f.3.9.d.0.2.0.0.0.0.0.0.0.0.0.0.0.0.0.8.e.f.ip6.arpa. 28800 IN PTR test-v6.lo0.net.
```

2001:4f9:0:1::a
2002:4f2:0:2::b
2003:4f3:0:3::c
2004:4f4:0:4::d
2005:4f5:0:5::e
2006:4f6:0:6::f

- **Maintaining a forward and reverse mapping for IPv6 using vi(1) on db files won't scale**

- What are the chances you will mistake a digit in a PTR record when you type hundreds of these:

`e.4.9.6.0.f.e.f.f.f.3.9.d.0.2.0.0.0.0.0.0.0.0.0.0.0.0.8.e.f.ip6.arpa`

- **Need easier ways to maintain forward and reverse mappings**

IPv6 AAAA

2001:4f1:0:1::a
2002:4f2:0:2::b
2003:4f3:0:3::c
2004:4f4:0:4::d
2005:4f5:0:5::e
2006:4f6:0:6::f



Grid Manager: admin@10.34.41.254

File Edit Tools View Window Help

Infoblox Views DNS DHCP and IPAM AAA File Distribution Administrators Global Search

Infoblox Views DNS Members

Name Type Comment

Infoblox Views

default

Forward-Mapping Zones

test.com

IPv4 Reverse

IPv6 Reverse

Add Forward-Mapping Zone

Add Resource Records

Remove test.com

View Properties

Edit Properties

Copy Zone Records...

Report Invalid Records...

Host...

Bulk Host...

NS(A) Records...

A Record...

AAAA Record...

CNAME Record...

DNAME Record...

MX Record...

SRV Record...

TXT Record...

Filter All Records Go to

Name Type Value Comment

foo-ipv6 NS Record ib-10-34-41-254.infoblox.com Auto-created by Add Zone

foo-ipv6 AAAA Record fe80::2008

foo-ipv6 A Record 192.168.1.10

Add AAAA records to a zone the same way as all other record types

IPv6 ip6.arpa

2001:4f1:0:1::a
2002:4f2:0:2::b
2003:4f3:0:3::c
2004:4f4:0:4::d
2005:4f5:0:5::e
2006:4f6:0:6::f

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IPv6 ip6.arpa

2001:4f1:0:1::a
2002:4f2:0:2::b
2003:4f3:0:3::c
2004:4f4:0:4::d
2005:4f5:0:5::e
2006:4f6:0:6::f

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[illegible]

IPv6 Dual-Stack Network Addresses

2001:4f9:0:1::a
2002:4f2:0:2::b
2003:4f3:0:3::c
2004:4f4:0:4::d
2005:4f5:0:5::e
2006:4f6:0:6::f



- IPv6 addresses maintained across HA failover

error checking to prevent incorrect or duplicate IPv6 addresses

*Edit ib-10-34-41-254.infoblox.com (ID Grid Member)

Information

ID Node Properties

Host Name: ib-10-34-41-254.infoblox.com

(V)IP Address: 10.34.41.254

Subnet Mask: /24 255.255.255.0

Gateway: 10.34.41.1

☒ Enable IPv6

(V)IP Address: fe80::2010

CIDR Prefix: /64

Gateway: fe80:2001

Comment:

☒ HA Pair

Virtual Router ID: 29

Warning: Virtual router ID must be unique for the local network.

Auto generated NS Records

2001:4f9:0:1::a
2002:4f2:0:2::b
2003:4f3:0:3::c
2004:4f4:0:4::d
2005:4f5:0:5::e
2006:4f6:0:6::f



Grid Manager: admin@10.34.41.253

File Edit Tools View Window Help

ID Grid DNS DHCP and IPAM AAA File Distribution Administrators Global Search

Infoblox Views DNS Members

Name Type

Infoblox Views

default

Forward-Mapping Zones

infoblox.com Authoritative

test.com Authoritative

IPv4 Reverse-Mapping Zones

IPv6 Reverse-Mapping Zones

Records

Filter All Records Go to

	Name	Type	Value	Comment
		NS Record	grid1.infoblox.com	Auto-created by Add Zone
		NS Record	ns3.infoblox.com	Auto-created by Add Zone
	grid1	A Record	10.34.41.253	Auto-created by Add Zone
	grid1	AAAA Record	2001::251	Auto-created by Add Zone
	ns3	AAAA Record	2001::1934	Auto-created by Add Zone

grid1 is Internal with both IPv4 and IPv6

ns3 is external with IPv6 only

Auto-Generate NS Records for both Internal and external IPv4 and IPv6 hosts

Last on page:

2001:4f9:0:1::a
2002:4f2:0:2::b
2003:4f3:0:3::c
2004:4f4:0:4::d
2005:4f5:0:5::e
2006:4f6:0:6::f

- Dialog boxes and options for DNS are the same for IPv4 and IPv6

IPv4 and IPv6
addresses in a zone
transfer access list

*Edit lb-10-34-41-254.infoblox.com (Member DNS Properties) X

General

Views

Zone Transfers

☒ Override ID grid zone transfer settings

Allow zone transfers to:

Address Type	Address	Netmask	Permission
IP Address	fe80::2003		Allow
Network	fe80::2100	64	Allow
IP Address	192.168.1.10		Allow
Network	10.0.0.0	255.0.0.0	Allow

Add...
Modify...
Remove
Move up
Move down

Allow TSIG zone transfers for:

Key Name

Add...
Modify...
Remove

External Primary

2001:4f1:0:1::a
2002:4f2:0:2::b
2003:4f3:0:3::c
2004:4f4:0:4::d
2005:4f5:0:5::e
2006:4f6:0:6::f



Grid Manager: admin@10.34.41.254

File Edit Tools View Window Help

ID Grid DNS DHCP and IPAM AAA File Distribution Administrators Global Search

*Add Forward Authoritative Zone (1) X

Name secondary.company.com

Type Authoritative

Comment

☐ Disable this zone

NS Group None

Primary Server Assignment

ID Grid Primary Name Select member... ☐ Stealth

☒ Use external primaries

External Primaries

Name	Address	Use TSIG	Key name	Use DNSone 2.x TSIG	Stealth
ns1-ext.comp...	fe80::2006	false		false	false

Add...
Modify...
Remove
Move up
Move down

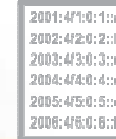
External primary defined with an IPv6 address
Will initiate zone transfers using the IPv6 addresses

- NS Groups allow the admin to simplify and automate management of groups of name servers
- Can include both v4 and v6 servers

External Secondaries

Name	Address	Use TSIG	Key Name	Use DNSone 2x TSIG	Stealth
v6ns1.external.com	2001::fe01	false		false	false
v6ns2.external.com	2001::fe02	false		false	false
v4ns1.external.com	192.168.1.4	false		false	false
v4ns2.external.com	192.168.1.5	false		false	false

Buttons: Add..., Modify..., Remove, Move up, Move down



Infoblox > ping

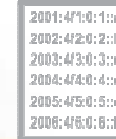
Synopsis:

```
ping [ hostname | ip_address ] [ opt ]
  --[ opt ] is any of
    numerical          (avoid DNS lookups)
    from <src_addr>    (use src_addr as source address)
    v6                 (IPv6 hostname)
```

Infoblox > traceroute

Synopsis:

```
traceroute [ hostname | ip_address ] [ opt ]
  --[ opt ] is any of
    numerical          (avoid DNS lookups)
    from <src_addr>    (use src_addr as source address)
    ICMP               (use ICMP ECHO instead of UDP)
    v6                 (IPv6 hostname)
```



```
Infoblox > dig @localhost infoblox.com ns
```

```
;; ANSWER SECTION:
```

infoblox.com.	28800	IN	NS	grid1.infoblox.com.
infoblox.com.	28800	IN	NS	ns3.infoblox.com.

```
;; ADDITIONAL SECTION:
```

ns3.infoblox.com.	28800	IN	AAAA	2001::1934
grid1.infoblox.com.	28800	IN	A	10.34.41.253
grid1.infoblox.com.	28800	IN	AAAA	2001::251

```
Infoblox > dig @localhost ns3.infoblox.com aaaa
```

```
;; QUESTION SECTION:
```

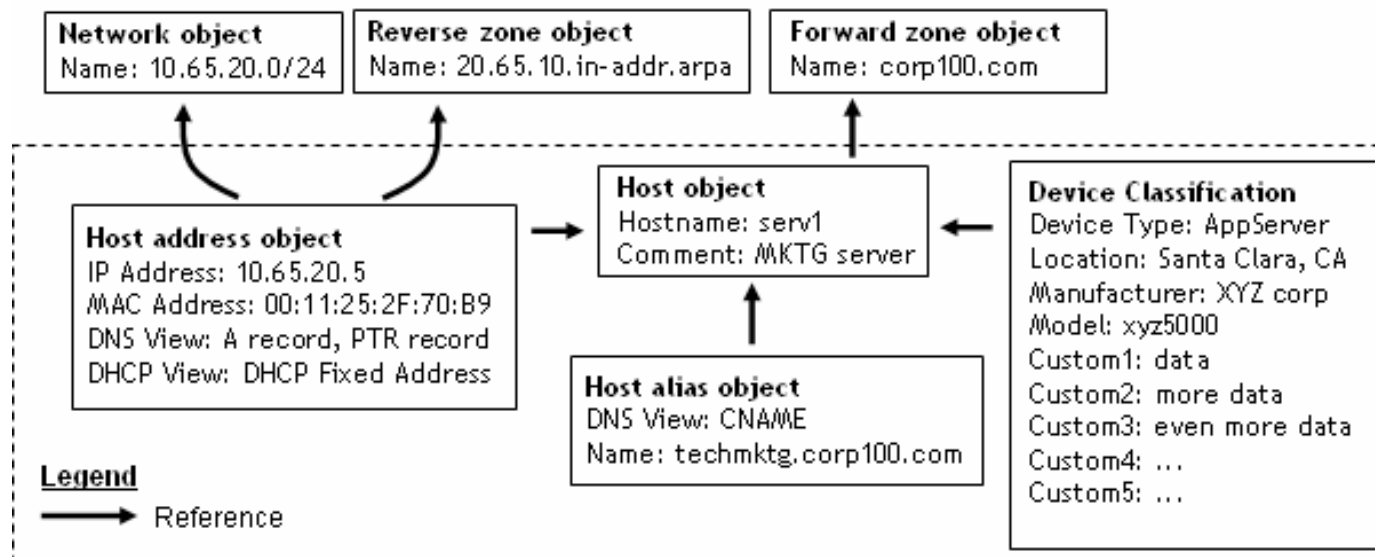
ns3.infoblox.com.		IN	AAAA
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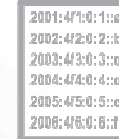
```
;; ANSWER SECTION:
```

ns3.infoblox.com.	28800	IN	AAAA	2001::1934
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- Host objects are a “container” that has both forward records (A), reverse records (PTR) and aliases (CNAME)
- Host Objects link the records so that changes in the forward zone are automatically propagated to the reverse
 - Don’t have errors typing A and PTR
 - Don’t have errors forgetting to maintain both

Infoblox Host Record (Data Model)





■ Vendor Criteria

- Committed to IPv6: solid current implementation and roadmap
- Provide a complete integration
- No additional costs or limitations

■ Technical Criteria

- IPv6 should be completely integrated
- Anything with a v4 address should also be configurable with a v6 address
- Need a way to “bind” the forward and reverse records DNS records to avoid mistakes and errors



Q & A

IPv6: Integrated to the Core



Infoblox core network services appliances provide a utility-grade platform for IPv6 name services.