Asia Pacific Network Information Centre

APNIC

APRICOT 2004
KUALA LUMPUR

Secured Dynamic Updates

Caution

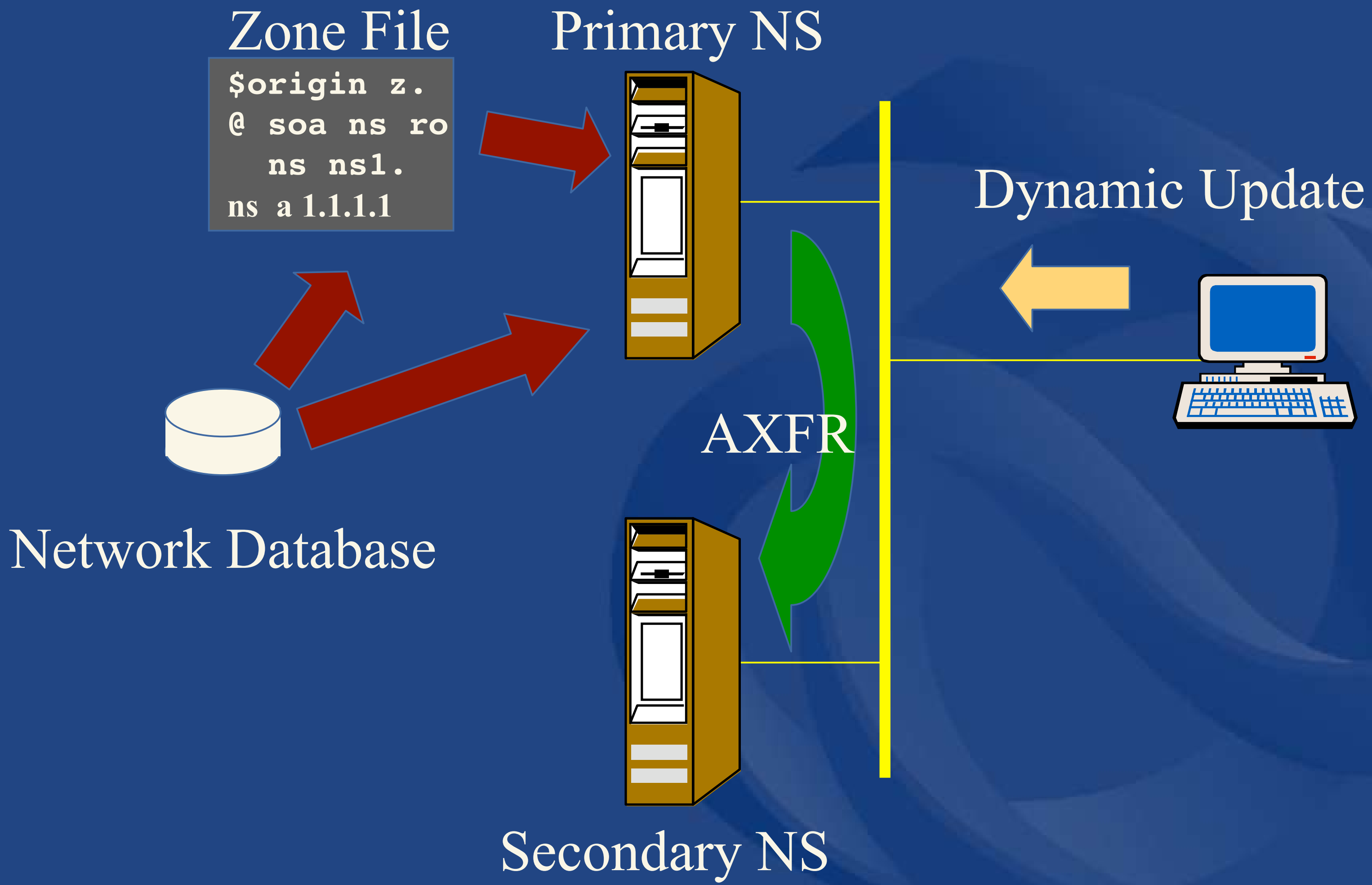
- Portions of this slide set present features that do not appear in BIND until BIND 9.3
  - Snapshot code is available for this

- BIND 9.2 can perform most of the dynamic update features

Outline

- Dynamic Update Basics
- Setting Up A Dynamic Zone
- Tools
- Securing It
- Authorization Configuration
- Playing with Update Commands
- Interactions with DHCP

Getting Data Into DNS



Advantages of Dynamic Updates

- Change DNS data quickly
- Make changes from anywhere
- No need to reload whole zone
- Data becomes more current

Uses of Dynamic Update

- Adding a new delegation to a large zone
  - Cut down on reload times
- Conference attendees
  - Laptops can use same name, new IP

Risks of Dynamic Update

- Authoritative servers listen to the network for data
- Authorization checks needed before accepting a request
- Server risks being tied up with updates
- Dynamic zones are hard to edit via "the old ways"

Other Considerations

- Once a zone goes dynamic, it is hard to edit
- Mixing dynamic data and critical static data is a bad idea, even neglecting security concerns
- This isn't meant to scare you from dynamic update, but to alert you

"Secure" Dynamic Update

- Secure refers to the safety of the update requests
  - Only the right clients will be able to get data into the zone
- Limitations on the term "secure"
  - Won't stop anyone issuing bad requests
  - Doesn't address DNSSEC, adding digital signatures to the zone

Tools

- In order to do any of this, we need tools (software)

- All are part of a BIND 9 distribution
  - named - the server, concentrating on conf file
  - dig - a query/response tool
  - nsupdate - issues dynamic update messages
  - rndc - remote name server daemon control
  - dnssec-keygen - makes the keys needed

A static zone

```
zone "myzone.example." {
          type master;
          file "myzone.example.";
          allow-transfer { any; };
};
```

Adding a dynamic zone

```
zone "myzone.example." {
        type master;
        file "myzone.example.";
        allow-transfer { any; };
};
zone "dynamic.myzone.example." {
        type master;
        file "dynamic.myzone.example.";
      allow-transfer { any; };
        allow-update { any; };
};
//note: on-line slide is different
```

dynamic.myzone.example

```
> cat db.dynamic.myzone.example

$ORIGIN dynamic.myzone.example.
$TTL 1d      ; 1 day
@      IN     SOA      ns1 root   (
                                  1           ;
  serial
                                  30m    ; refresh
  (30 minutes)
                                  15m    ;retry (15
  minutes)
                                  19h    ;expire
  (19h12m)
                                  18min ;minimum
  (18min)
                                         )
        NS          ns1.myzone.example
```

Journal Files

- Once a dynamic zone begins running
  - A journal file (<zonefile>.jnl) is created when the first dynamic update has been made
  - This binary, non-text file maintains all updates in recent times
  - Updates aren't immediately reflected in the original <zonefile>, but they are eventually
  - Journal entries are written to the zone file at server shutdown (and on demand)

dig

- Basic debugging aid
- dig @server domain.name type
- Used to verify that change has been made
- Used to verify that SOA number increments

dig examples

```
> dig @127.0.0.1 version.bind chaos txt
> dig @127.0.0.1 myzone.example. soa
  +multiline
> dig @127.0.0.1 dynamic.myzone.example.
  soa
```

nsupdate

- Generates updates based upon user input
- Used to make requested updates

nsupdate example

```
% nsupdate
> server 127.0.0.1
> zone dynamic.myzone.example.
> update add alu.dynamic.myzone.example. 600
  A192.168.160.1
> update add dynamic.myzone.example. 600 MX 10 alu
> send
> quit
```

- Just to check our work...

```
% dig @127.0.0.1 alu.dynamic.myzone.example. A
% dig @127.0.0.1 dynamic.myzone.example. MX
```

rndc

- "Remote" management of server, usually across 127.0.0.1
- Used to stop, reload server
- Used to freeze and unfreeze dynamic zone { available in BIND 9.3 }

rndc examples

```
% rndc -c rndc.conf status
% rndc -c rndc.conf reload
% rndc -c rndc.conf freeze dynamic.myzone.example
% rndc -c rndc.conf unfreeze
  dynamic.myzone.example
% rndc -c rndc.conf stop
```

NOTE: "freeze" and "unfreeze" are introduced in BIND 9.3

dnssec-keygen

- Simple tool to generate keys
- Used for DNSSEC too
- Used here to generate TSIG keys
- Used also to generate SIG(0) keys - in version 9.3

dnssec-keygen tsig example

```
% dnssec-keygen -a HMAC-MD5 -b 128 -n host
sample.tsig.key
Ksample.tsig.key.+157+02308

% ls Ksample*
Ksample.tsig.key.+157+02308.key
Ksample.tsig.key.+157+02308.private
```

dnssec-keygen sig(0) example

```
% dnssec-keygen -a RSA -b 512 -n host
sample.tsig.key
Ksample.tsig.key.+001+18681

% ls Ksam*
Ksample.tsig.key.+001+18681.key
Ksample.tsig.key.+157+02308.key
Ksample.tsig.key.+001+18681.private
Ksample.tsig.key.+157+02308.private
```

"Secured" Dynamic Update

- Limited to the security of the requests
- Dynamic Updates to a DNSSEC zone is a work in progress
- Two steps
  - Identify and authenticate the updater
  - Determine if updater is authorized

Steps

- Create a separate zone for dynamic updates
  - (Done)
- Configure keys
- Configure policy

Configuring Keys

- Two styles
  - TSIG - shared secret
  - SIG (0) - public key
- TSIG
  - works in 9.2, secret needed in named.conf (or “include”) and in client
- SIG(0)
  - needs 9.3, public key listed in the zone file (not in named.conf) and private key in client

TSIG keys

- Issue: Naming the key
  – Name is arbitrary, but must be consistent between the named.conf and client
  – There is an advantage to making it the same as a domain in the zone

- To test the keys, turn on key-based authorization of AXFR - just for testing

Making TSIG keys

- `dnssec-keygen -a HMAC-MD5 -b 128 -n host \`
  `slave1.dynamic.myzone.example.`
- `dnssec-keygen -a HMAC-MD5 -b 128 -n host \`
  `slave2.dynamic.myzone.example.`

- `ls:`

```
Kslave1.dynamic.myzone.example.+157+42488.key
Kslave1.dynamic.myzone.example.+157+42488.priva
   te

Kslave2.dynamic.myzone.example.+157+57806.key
Kslave2.dynamic.myzone.example.+157+57806.priva
   te
```

Adding TSIG to named.conf

```
key “slave1.dynamic.myzone.example." {
        algorithm HMAC-MD5;
        secret
  "sd7qi6tiw+N5fK3mGNDNJU9TwIju+1ye7r2shgfkxIg=";
};

key “slave2.dynamic.myzone.example." {
        algorithm HMAC-MD5;
        secret
  "KXMoZHZIIxVsxKp4aUp6YTy3EswUN9CeDEpneJDOgVM=";
};
```

Configuring TSIG AXFR

- Just so we can see that the keys work

```
zone "dynamic.myzone.example." {
        type master;
        file "dynamic.myzone.example.";
        allow-transfer {
                key
  slave1.dynamic.myzone.example.;
                key
  slave2.dynamic.myzone.example.;
        };
        allow-update { 127.0.0.1; };
};
```

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Testing with dig

- Fails:

```
% dig @127.0.0.1 dynamic.myzone.example. axfr
```

- Succeeds:

```
%  dig @127.0.0.1 dynamic.myzone.example. axfr
   -y
   slave1.dynamic.myzone.example.:KXMoZHZIIxVsxK
   p4aUp6YTy3EswUN9CeDEpneJDOgVM=
```

- This shows that the TSIG key is properly configured in named.conf

Key based dynamic updates (TSIG)

```
zone "dynamic.myzone.example." {
        type master;
        file "dynamic.myzone.example.";
        allow-transfer {
                key
  slave1.dynamic.myzone.example.;
                key slave2.dynamic.myzone.example.;
        };
        allow-update {
                key user1.dynamic.myzone.example.;
                key user2.dynamic.myzone.example.;
        };
};
```

"Keying" nsupdate

- The next three slides show different ways to add key information to nsupdate
  - first hides key from "ps -aux" by entering it interactively
  - second hides it by referencing the file it is in
  - last puts the secret on the command line

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Keyed nsupdate #1

```
% nsupdate
> zone dynamic.myzone.example.
> server 127.0.0.1
> key user1.dynamic.myzone.example.
sd7qi6tiw+N5fK3mGNDNJU9TwIju+1ye7r2shgfkxIg=
> update add puri.dynamic.myzone.example. 600 A
192.168.50.1
> send

% dig @127.0.0.1 puri.dynamic.myzone.example A
```

Keyed nsupdate #2

```
% nsupdate -k
Kuser1.dynamic.myzone.example.+157+57806.
> zone dynamic.myzone.example.
> server 127.0.0.1
> update add alu.dynamic.myzone.example. 900 A
192.168.50.2
> Send



% dig @127.0.0.1 alu.dynamic.myzone.example A
```

Keyed nsupdate #3

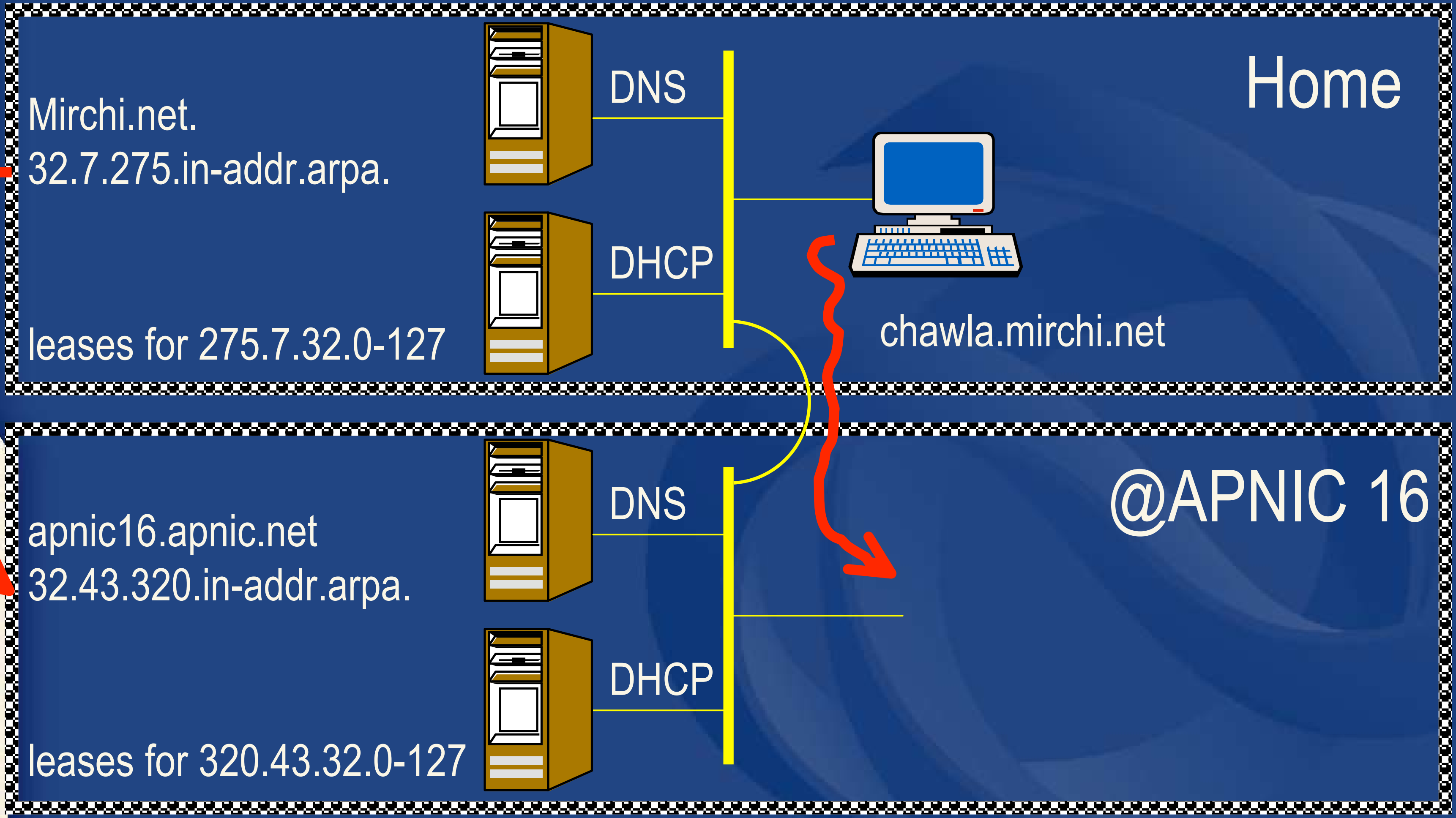
```
% nsupdate -y
  Kuser1.dynamic.myzone.example.:sd7qi6tiw+N5fK3mGND
  NJU9TwIju+1ye7r2shgfkxIg=
> zone dynamic.myzone.example.
> server 127.0.0.1
> update add palak.dynamic.myzone.example. A 90
  192.168.50.2
> send

% dig @127.0.0.1 palak.dynamic.myzone.example. A
```

Interaction with DHCP

- See the following URL for in-depth information
  - http://ops.ietf.org/dns/dynupd/secure-ddns-howto.html

How DHCP and DynUp Look



How This Happens, part 1

- Host has a TSIG/SIG(0) to update the entry
  chawla.mirchi.net. `A 275.7.32.17`
- Home DHCP can change 32.7.275.in-addr.arpa. (via TSIG/SIG(0))
  `17.32.7.275.in-addr.arpa PTR`
  chawla.mirchi.net.
- APNIC16 DHCP can change 32.43.320.in-addr.arpa.
  `17.32.43.320.in-addr.arpa PTR`
  chawla.mirchi.net.

At Lease Change Time

- When releasing home address
  - Home DHCP removes the PTR record
  - Host alters/removes its A RR
  - Done via scripts (depends on DHCP software)
- When gaining APNIC 16 lease
  - APNIC 16 DHCP adds a PTR record
  - Host registers an A RR with the home server

Questions?