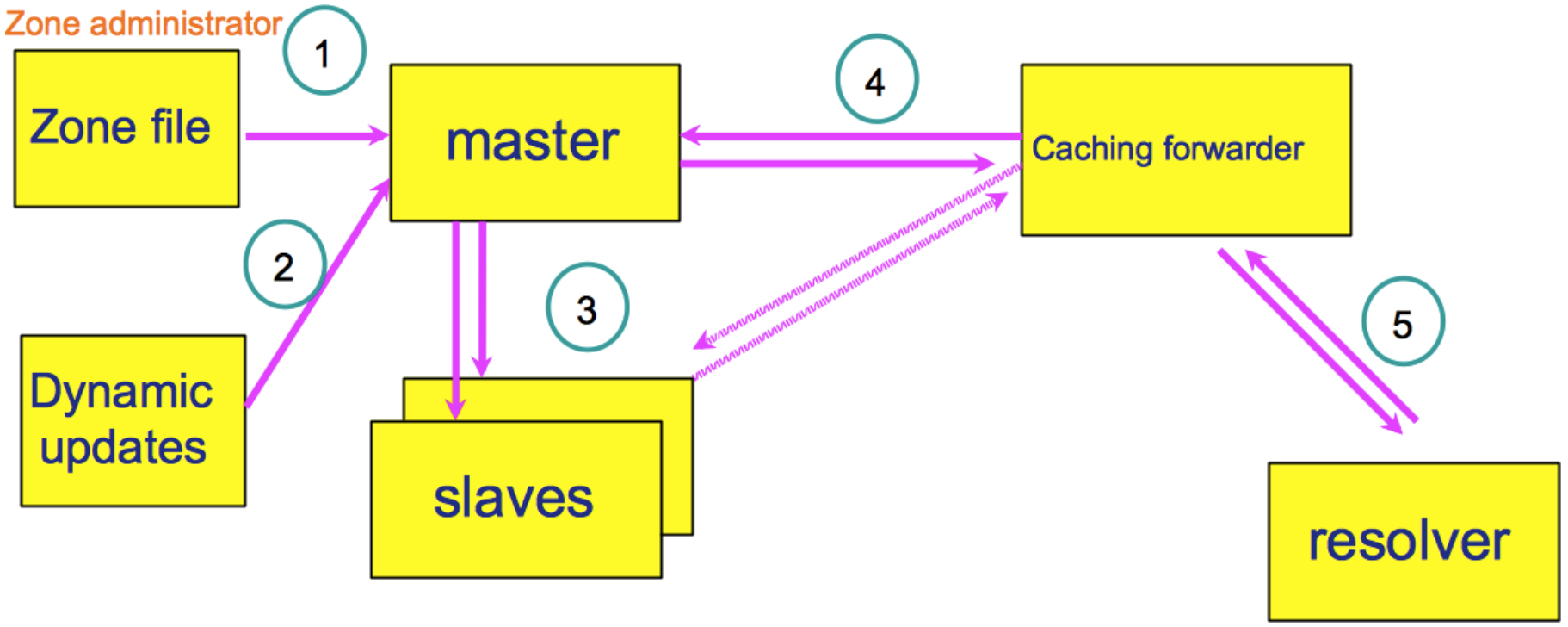
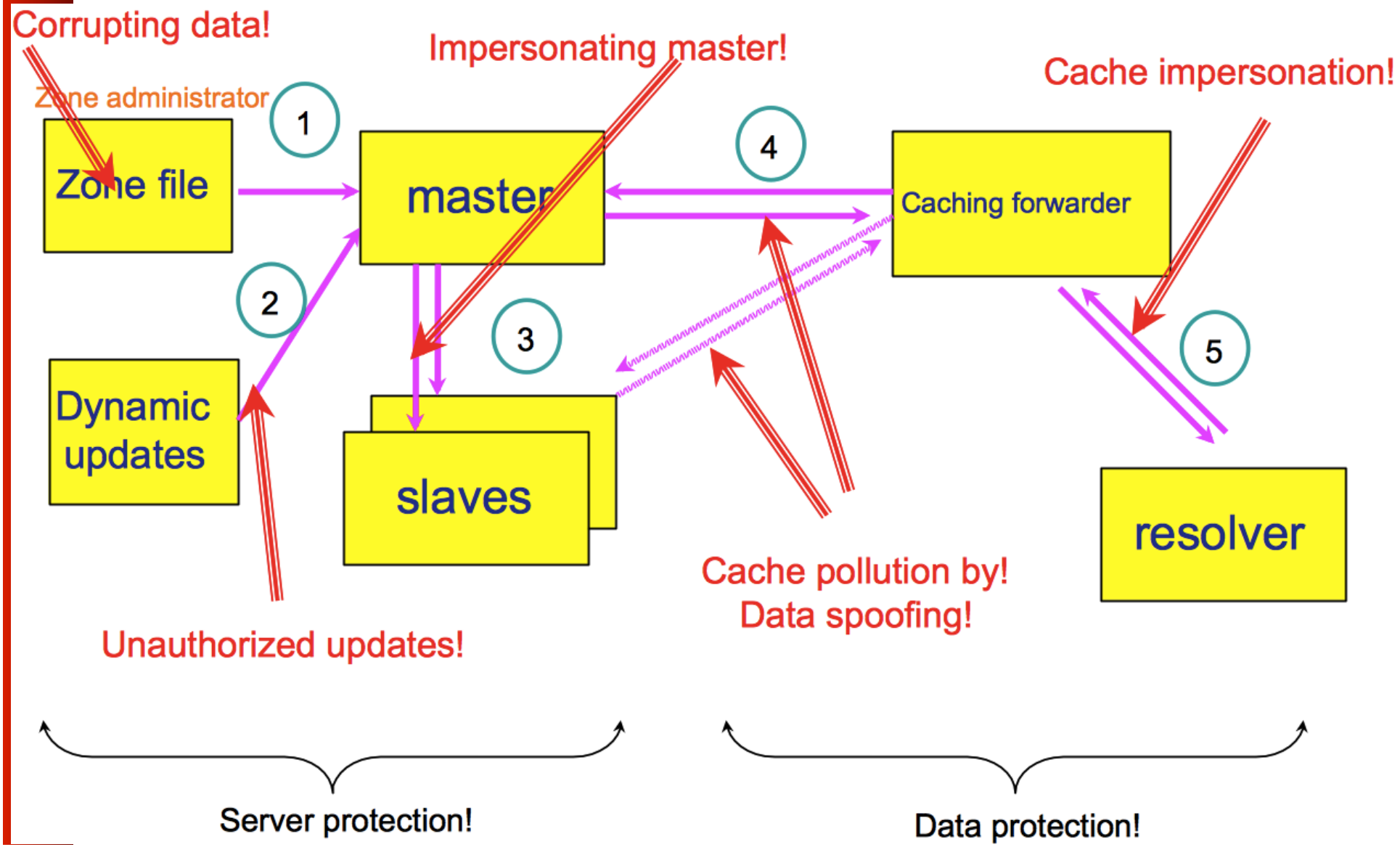
Advanced DNS Operations & Security

DNS Security - TSIG

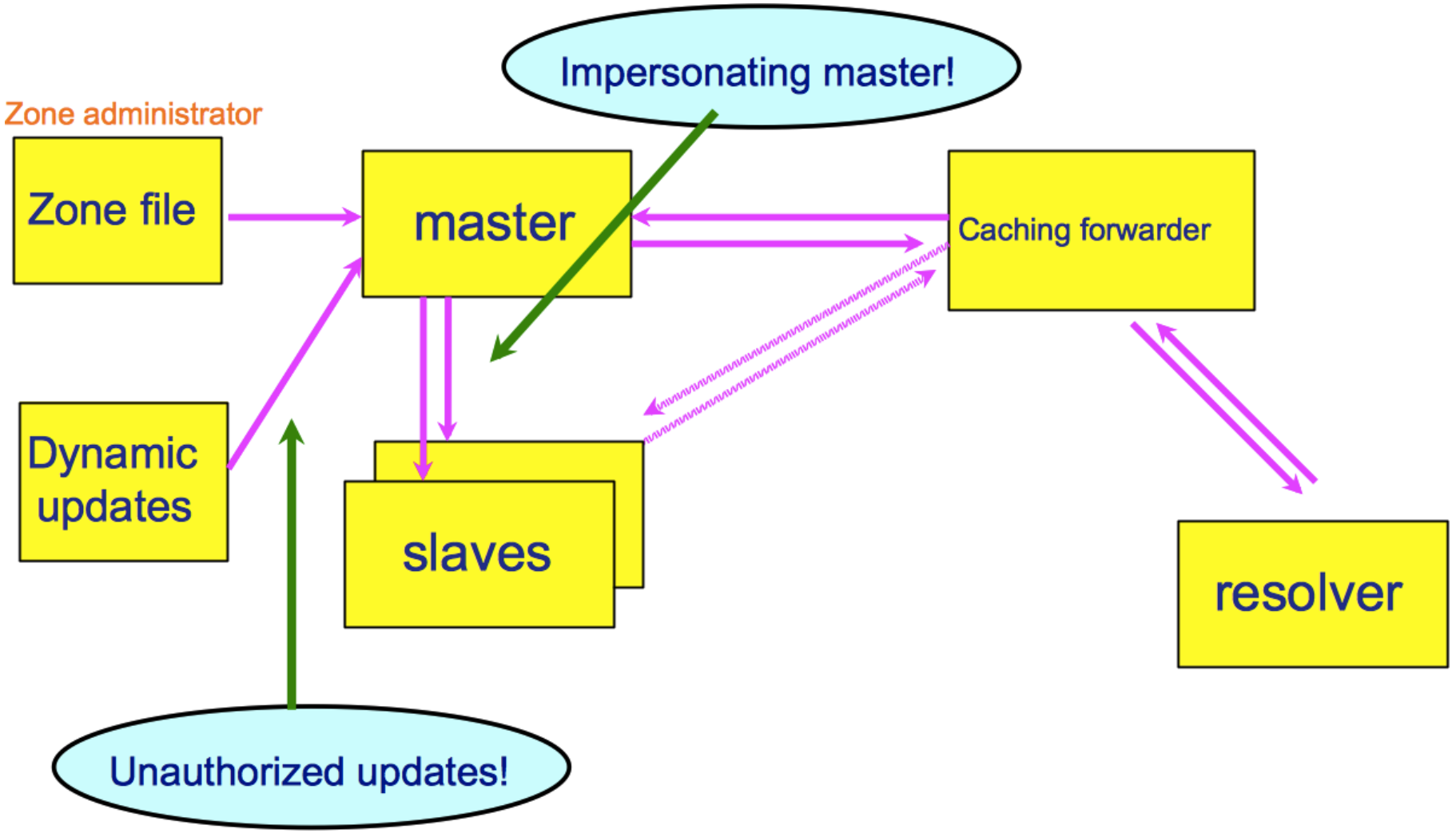
DNS: Data Flow



DNS Vulnerabilities



TSIG protected vulnerabilities



What is TSIG ?

- **Transaction SIGnature**
- A mechanism for protecting communication between name servers and between stub resolvers and nameservers

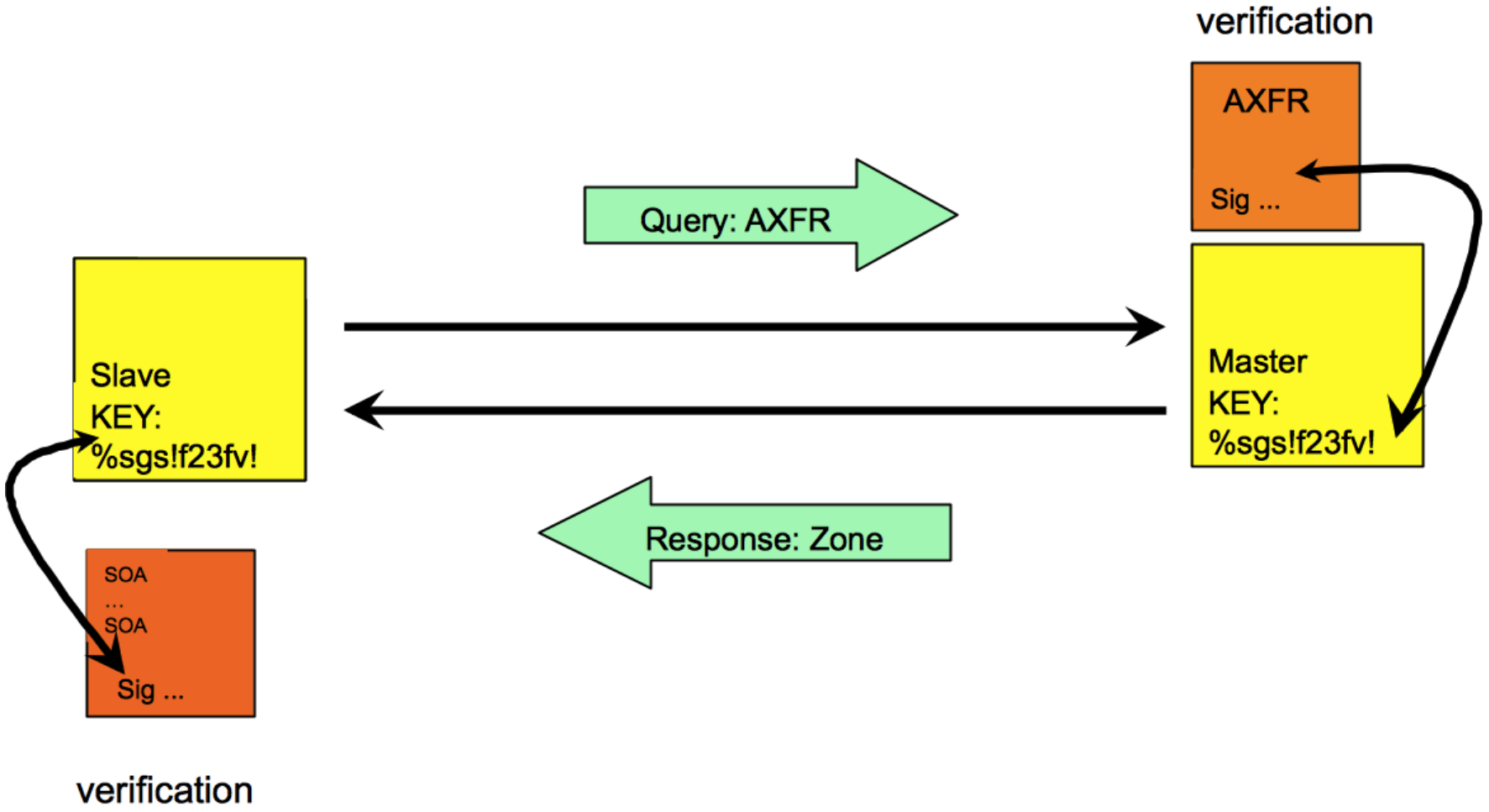
- A keyed-hash is applied (like a digital signature), so the recipient of the message can verify that it hasn't been tampered with:
  - DNS question / answer
  - timestamp

- Based on a shared secret
  - Both the sender and recipient must be configured with it

What is TSIG ?

- RFC 2845 – TSIG
- Can also be used to authorize:
  - zone transfers
  - dynamic updates
  - authentication of caching forwarders
- Used in server configuration – not in the zone file

TSIG example:



TSIG steps

1. Generate secret
2. Communicate secret
3. Configure servers
4. Test

TSIG – Names & Secrets

- TSIG name

  - A name is given to the key. The name is what is transmitted in the message (so the receiver knows what key the sender has used, out of possibly many)

- TSIG secret value

  - A value determined during key generation
  - Usually seen encoded in BASE64

TSIG – Generating a Secret

- dnssec-keygen

  - Simple tool to generate keys
  - Used here to generate TSIG keys

dnssec-keygen -a <algorithm> -b <bits> -n host <key name>

TSIG – Generating a Secret

- Example

dnssec-keygen -a HMAC-MD5 –b 128 -n host ns1.grp2.net

- This will generate a key similar to this:

Kns1-ns2.grp2.net.+157+15921

- Files

  Kns1-ns2.grp2.net.+157+15921.key

  Kns1-ns2.grp2.net.+157+15921.private

TSIG – Generating a Secret

- TSIG keys are never put in the zone files
- There can be some confusion as keys can look like Resource Records:

ns1-ns2.grp2.net. IN KEY 128 157 nEfRx9…bbPn7lyQtE=

TSIG – Configuring servers

- Configuring the key
  - in named.conf, same syntax as for the rndc statement:

- Using the key:

  - in named.conf, add:

  server x { key ….; };

… where ‘x’ is the IP address of the REMOTE server.

Configuration example – named.conf

Primary server 10.10.0.1

```
key ns1-ns2.grp2.net {
    algorithm hmac-md5;
    secret “APlaceToBe”;
};
server 10.10.0.2 {
      keys { ns1-ns2.grp2.net; };
};
zone “my.test.zone” {
      type master;
      file “db.myzone”;
      allow-transfer {
            key ns1-ns2.grp2.net;
      };
};
```

Secondary server 10.10.0.2

```
key ns1-ns2.grp2.net {
    algorithm hmac-md5;
    secret “APlaceToBe”;
};
server 10.10.0.1 {
      keys { ns1-ns2.grp2.net; };
};
zone “my.test.zone” {
      type slave;
      file “db.myzone.slave”;
            masters { 10.10.0.2; };
      };
};
```

TSIG – Testing with dig

- You can use dig to check TSIG configuration

  dig @<server> <zone> AXFR –k <TSIG keyfile>

or

  dig @<server> <zone> AXFR –y “TSIG secret”

- Wrong key will return “Transfer failed”, and a message will be logged in the security category on the server being queried

TSIG – Time!

- TSIG is time sensitive (to avoid replays)
  - message protection expires in 5 minutes
  - make sure time is synchronized! (NTP)
  - for testing, set the time
  - in operations, use NTP!

Questions

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