Autonomous System Numbers
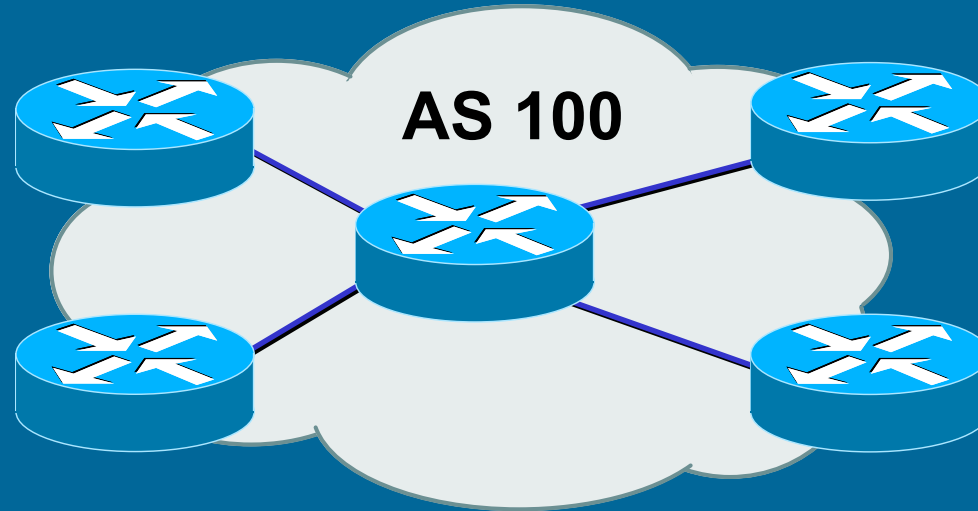
How to describe Routing Policy

Overview

- What is an AS?
- Guidelines and procedures
- Policy expression

What is an Autonomous System?

AS 100

- Collection of networks with same routing policy
- Usually under single ownership, trust and administrative control

ASN Guidelines

- ◆ **When do I need an AS?**
  - ◆ Multi-homed network to <u>different</u> providers and
  - ◆ Routing policy different to external peers
- ◆ **Factors that don't count**
  - ◆ Transition and 'future proofing'
  - ◆ Multi-homing to the same upstream
    - ◆ *RFC2270: A dedicated AS for sites homed to a single provider*
  - ◆ Service differentiation
    - ◆ *RFC1997: BGP Communities attribute*
- ◆ **Recommended reading**
  - ◆ *RFC1930: Guidelines for creation, selection and registration of an Autonomous System*

Requesting an ASN

- **Complete the request form**
  - **RIPE NCC**
    - http://www.ripe.net/ripencc/mem-services/registration
  - **ARIN**
    - http://www.arin.net/regserv/templates/asntemplate.txt

- **RIPE NCC request form**
  - Must include routing policy
  - Is now based on RPSL description

RPSL

- ◆ **Routing Policy Specification Language**
  - ◆ Specified in rfc2622
    - ◆ http://www.isi.edu/ra/rps/training/rfc2622.txt
  - ◆ On-line tutorial
    - ◆ http://www.isi.edu/ra/rps/training

  - ◆ Defines object structure
    - ◆ For AS objects
    - ◆ For route objects
    - ◆ And more…..

The AS Object

◆ **An example**

```
aut-num:        AS4777
as-name:        APNIC-NSPIXP2-AS
descr:          Asia Pacific Network Information Centre
descr:          AS for NSPIXP2, remote facilities site
```

POLICY RPSL

```
as-in:          from AS2500 action pref=100 accept ANY
as-in:          from AS2524 action pref=100 accept ANY
as-in:          from AS2514 action pref=100 accept ANY
as-out:         to AS2500 announce AS4777
as-out:         to AS2524 announce AS4777
as-out:         to AS2514 announce AS4777
default:        AS2500 100
```

```
admin-c:        PW35-AP
tech-c:         NO4-AP
remarks:        Filtering prefixes longer than /24
mnt-by:         MAINT-APNIC-AP
changed:        paulg@apnic.net 19981028
source:         APNIC
```

Representation of Routing Policy

- ## Routing and packet flows

announces   accepts

packet flow →

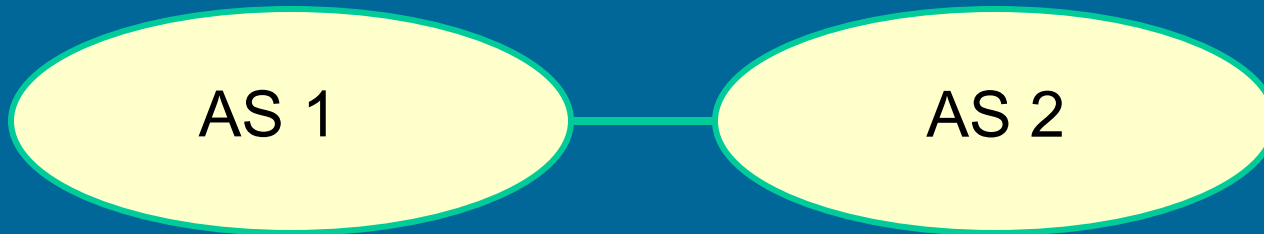| AS 1 | **routing flow** → | AS 2 |

packet flow ←
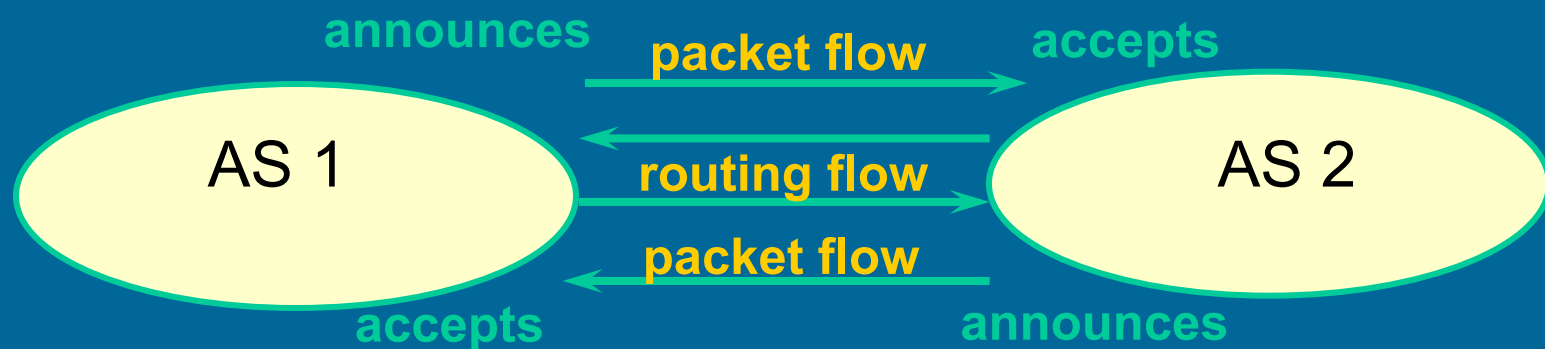
accepts   announces

- ## For AS1 and AS2 networks to communicate
  - AS1 must announce to AS2
  - AS2 must accept from AS1
  - AS2 must announce to AS1
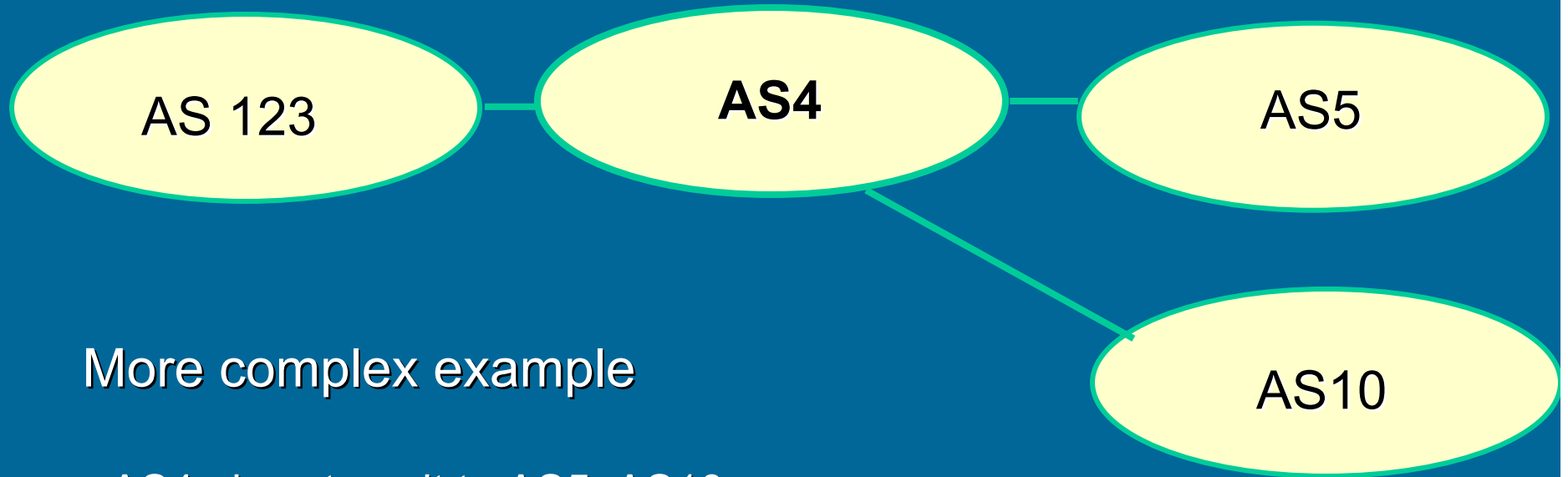 - AS1 must accept from AS2

Representation of Routing Policy

Basic concept

AS 1 ——— AS 2

*COST per AS shows preference
lower cost means 'preferred'*

aut-num: AS1
<administrivia go here>
import: from AS2 action pref=100 accept AS2
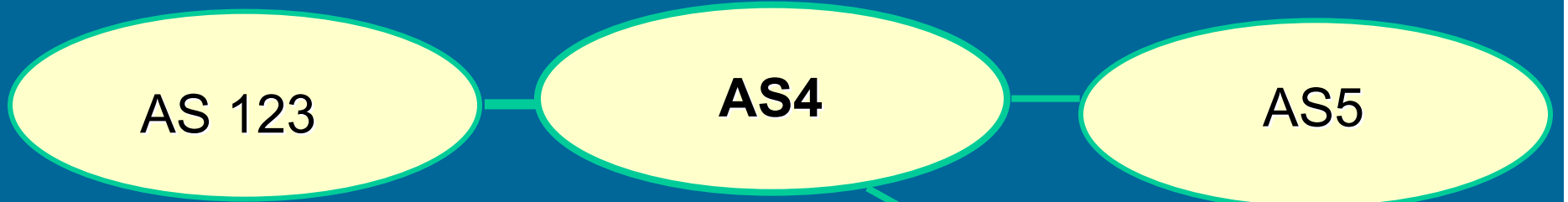export: to AS2 announce AS1

Representation of Routing Policy

AS 123 — AS4 — AS5

AS4 — AS10

More complex example

- AS4 gives transit to AS5, AS10
- AS4 gives local routes to AS123

Representation of Routing Policy

AS 123 — AS4 — AS5

AS4 — AS10

aut-num: AS4

import: from AS123 action pref=100 accept AS123

import: from AS5 action pref=100 accept AS5

import: from AS10 action pref=100 accept AS10

export: to AS123 announce AS4

export: to AS5 announce AS4 AS10

export: to AS10 announce AS4 AS5   ← *Not a path*

Representation of Routing Policy

transit traffic
over link2

AS123   **AS4**

link3
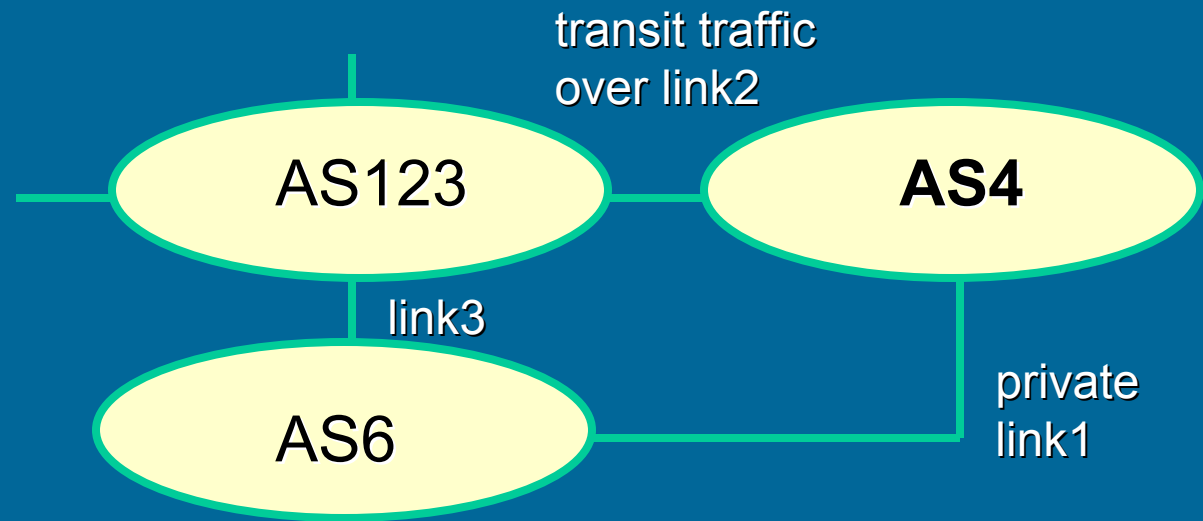
AS6   private
link1

More complex example

- AS4 and AS6 private link1
- AS4 and AS123 main transit link2
- backup all traffic over link1 and link3 in event of link2 failure

Representation of Routing Policy

transit traffic
over link2

AS123

AS4

link3

private link1

AS6
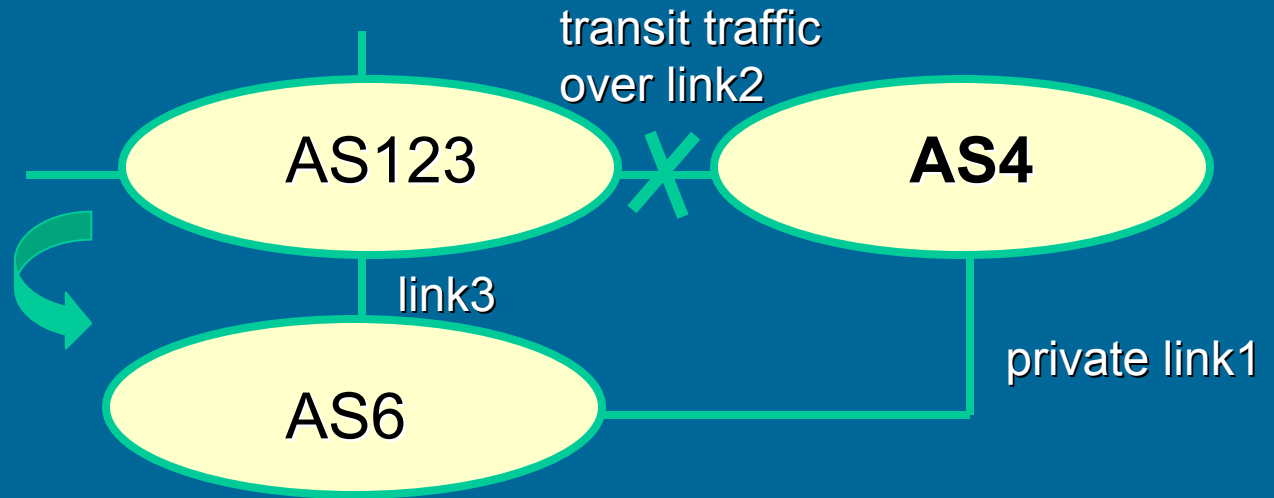
AS representation

aut-num: AS4

import: from AS123   action pref=100   accept ANY ← *full routing received*

import: from AS6   action pref=50   accept AS6
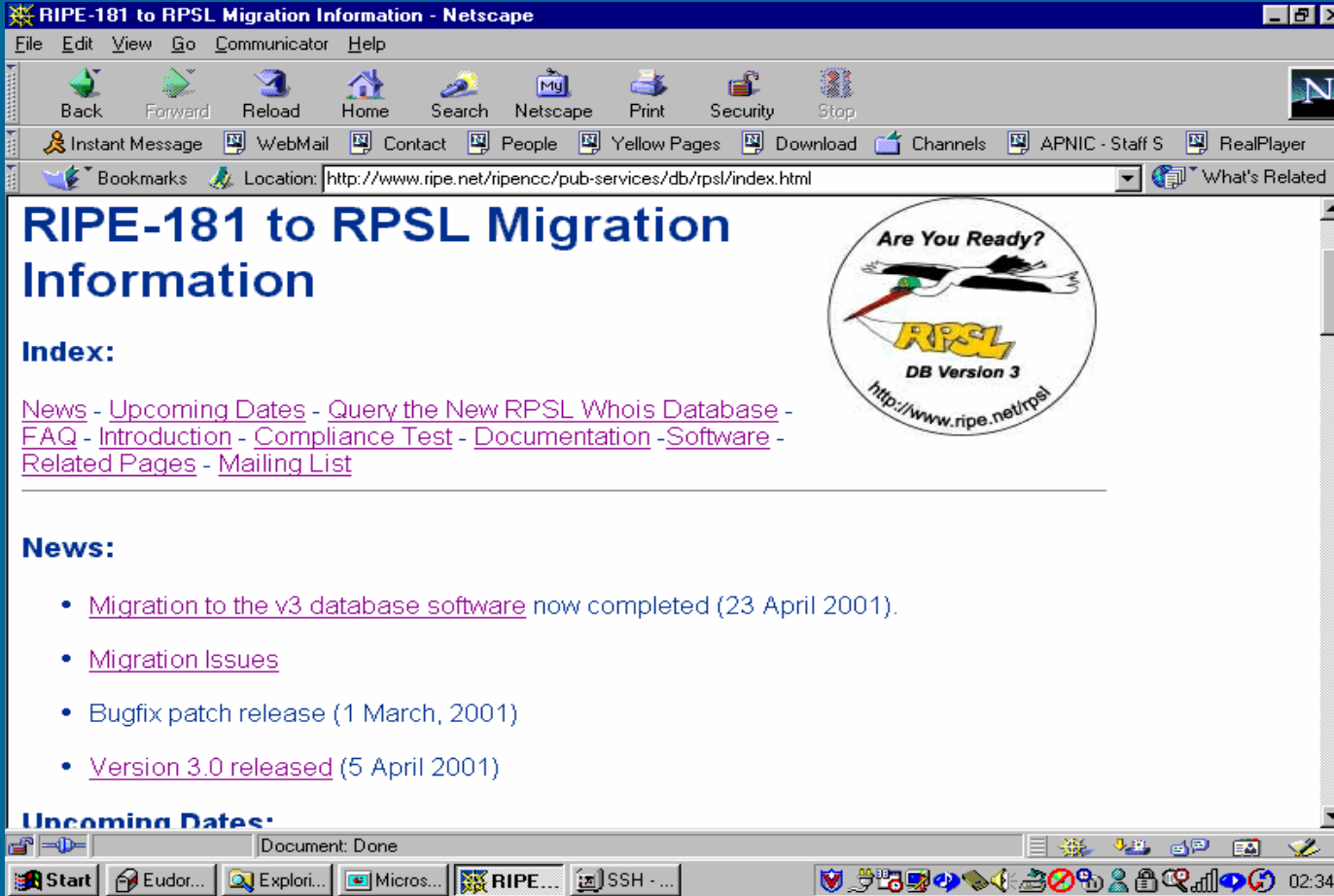
import: from AS6   action pref= 200   accept ANY

higher cost for backup route

export: to   AS6   announce   AS4

exportt: to AS123   announce   AS4

More Information

◆ http://www.ripe.net/ripencc/pubservices/db/rpsl/

Questions?