BGP(Border gateway protocol)

- AS -- *Autonomous system* – group of routers under same administrative control

- AS numbers are allotted by ICANN

- BGP*(Border gateway protocol)* manages routing tables *contains entries in lakhs*

- BGP glues the whole thing together

- Routing info exchange through TCP over port 179

- eBGP(*external* BGP) – routers between *different AS(i.e. different administrator)like BSNL ,Airtel*

- iBGP(*internal* BGP) – routers within *same AS*

- BGP *allows each subnet* to advertise its existence to rest of Internet

- Previous protocols were restricted to *intranet only*.

BGP

eBGP ——

iBGP ——
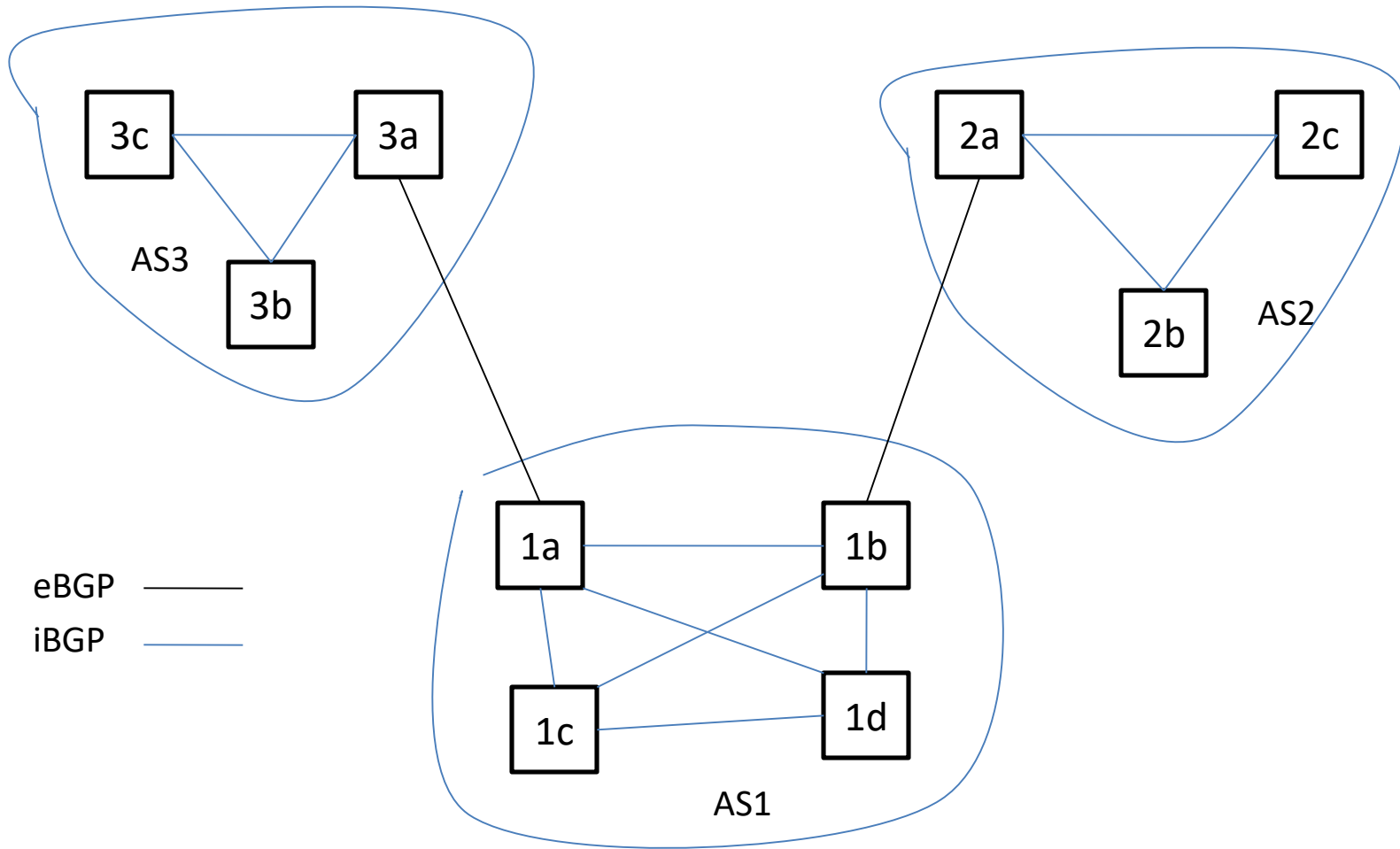
BGP

- BGP uses CIDR(*classless interdomain routing*) prefix, each prefix represent subnet

- BGP Advertisement contains (*subnet prefix,AS-path,next-hop*)

  ----subnet prefix

  ----BGP attributes – main attributes

    AS-PATH, NEXT-HOP

- Let us see how Advt(Advertise) is being done using eBGP & iBGP

- Then how route is determined

BGP

Consider fig of PPT no 2

Subnet prefix in fig PPT no : 2

$$AS2: 202.141.8.0/24$$
$$202.141.9.0/24$$
$$202.141.10.0/24$$
$$AS3: \quad 202.141.11.0/24$$

AS2 can advertise 202.141.8.0/22 to other AS's because longest prefix match is used

Advt of AS3 : 3a -------1a----eBGP

                   1a-------1b-----iBGP

                   1b------2a-----eBGP

Advt of AS2 :   2a------1b-----eBGP

                   1b------1a-----iBGP

                   1a------3a----eBGP

BGP

Here gateway/next hop is being considered same as current hop

Advt of AS3 : 3a ------ 1a   202.141.11.0/24, AS3, 3a(*subnet prefix , AS path , next hop*)

                 1a ----- 1b   202.141.11.0/24, AS3, 1a

                 1b ----- 2a   202.141.11.0/24, AS3 AS1, 1b

Advt of AS2 :   2a ------ 1b   202.141.8.0/22 AS2, 2a

                 1b ---- 1a   202.141.8.0/22 AS2, 1b

                 1a ---- 3a 202.141.8.0/22   AS2 AS1, 1a

AS-PATH avoid loop – when a router receives an advt which contains its AS number in AS-PATH
                       then router rejects that advt because it forms a loop.

BGP

Route selection(i.e how the path would be decided)

    --- select route with highest local preference value (given by local
         administration),preference may be policy,mutual understanding,reliability,cost,etc

    ---- with same local preference
         --- select route with shortest AS-PATH

    ---- with same AS-PATH length
         ---- select route with closest NEXT-HOP (closest means least cost path)

BGP

Importance of local preferences/policies:

Routing policy : if advt contains a AS in AS-PATH, which is against the policy of the organization
            then router ignore advt

```
B---------x
|        /
|      /
C-------y
```
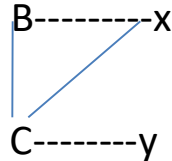
Policy : end AS should carry traffic of backbone provider ?*i.e. x/y needs to carry traffic of B and C*
B,C are back bone providers.   x, y are end AS
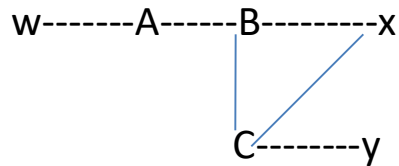
Now x connect through two backbone providers B & C
Can B use x to send its traffic to y ---- is a policy decision of x, x do not allow this
                            ----- if x is mnnit and y is iiita then why mnnit will allow B to
                                use its link to iita
                            ------ to do this, x do not advertise path to y to B
                            ------ this is *selective route advertise policy*

BGP

```
w-------A------B---------x
              |\
              | \
              |  \
              C--------y
```

Policy : Backbone provider carries traffic of another backbone provider ?

A, B, C are back bone providers.   w, x, y are end AS

B has a path to w ---- BAw

- B advt path BAw to x because x is customer of B
- Should B advt path BAw to C, C is backbone provider
- B do not advt path BAw to C if it do not want to carry traffic of C to w, and it may charge to C to allow.