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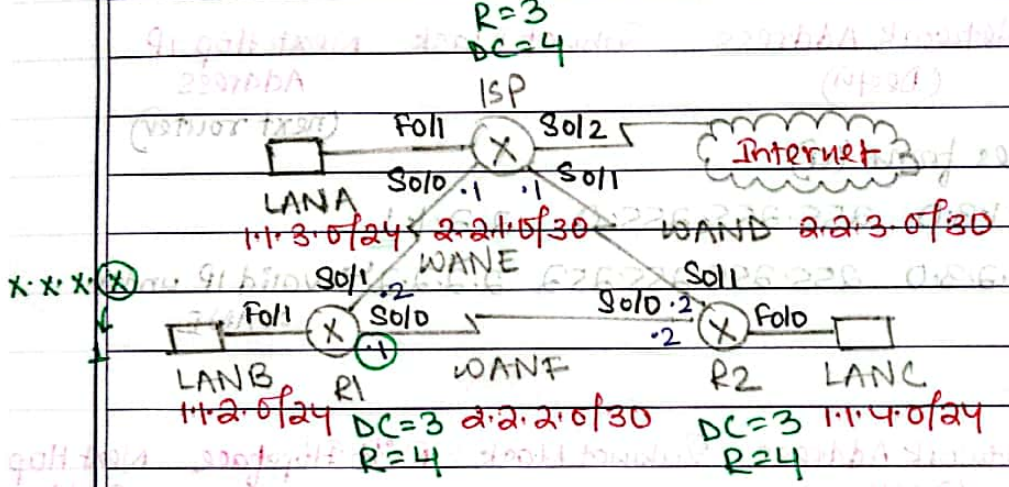
CSE421 – Computer Networks – SEQ

Lecture 13 – Static Routing

Routing – the decision making process of the router where the router decid
which interface/port to use to forward the received packet.

Routing
- Static Routing (manual) → acquaint w/ remote networks
- Dynamic Routing (automatic)



* no. of static routes = no. of remote networks

Step 1 – Identify DC + R.

Step 2 – Commands

ISP → remotely connected – LANB + WANF + LANC

Static Routing – individually configure the routers and acquaint them w/ (manual) the remote networks using some commands.

* important in order to share information.

(1) Standard Static Routing –

(a) Directly Connected / Attached (direct connection w/ router ports)

(b) Next Hop / Recursive

(c) Fully Specified

For R1, direct connections → LANB + WANE + WANF

" ISP, " " → LANA + WAND + WANE + Internet

" R2, " " → LANC + WANF + WAND

For R1, remote connections → LANA + LANC + WAND + Internet

" ISP, " " → LANB + LANC + WANF

" R2, " " → LANA + LANB + WANE + Internet

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(a) Directly Connected / Attached —

ip route Network Address (Destn) Subnet Mask Exit Interface

* Static Route to LANA from R1.

ip route 1.1.3.0 255.255.255.0 s0/1

* " " " WAND from R1.

ip route 2.2.3.0 255.255.255.252 s0/0

⇒ finding exit interface via routing table

(b) Next Hop / Recursive —

ip route Network Address (Destn) Subnet Mask Next Hop IP Address (next router)

Same examples from (a)

ip route 1.1.3.0 255.255.255.0 2.2.1.1

ip route 2.2.3.0 255.255.255.252 2.2.2.2 ↳ valid IP under WAN E

(c) Fully Specified —

ip route Network Address (Destn) Subnet Mask Exit Interface Next Hop IP Address

Same examples from (a)

ip route 1.1.3.0 255.255.255.0 s0/1 2.2.1.1

ip route 2.2.3.0 255.255.255.252 s0/0 2.2.2.2

Where is it used? — MAN (Multi-Access-Network) / Switched Networks

S 172.16.1.0/24 [110] via 172.16.2.2

↓ ↓ ↓ ↓ ↓

Route type N.A S.M. AD/cost next hop

* cost is always 0 for static routing as it is configured manually, router performs no calculation of its own.

* AD — Administrative Distance → Trustworthiness

Trust ↑↑ AD ↓↓ Primary Route AD = 1 [default; empty is command]

↓↓ ↑↑ Backup Route

→ Floating Static Route

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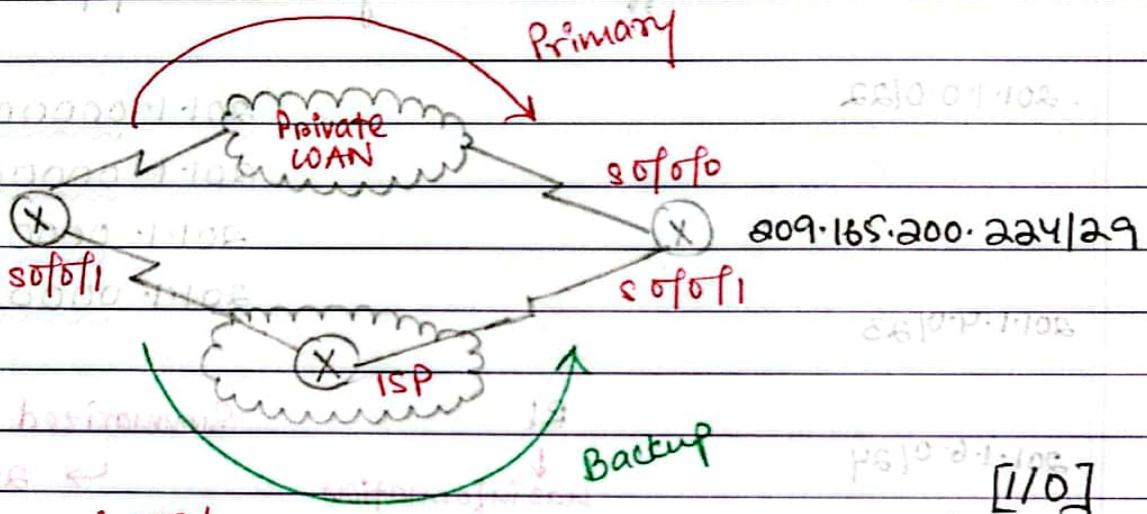
Floating Static Routing –

* backup route in case primary route fails
* uses AD; backup AD > 1 (primary AD)
* less trustworthy than primary route
* this static route "floats" when not in use/primary route is being used
* there can be a backup of the backup



primary

```
ip route 209.165.200.224 255.255.255.240 S0/0/0          [1/0]
ip route 209.165.200.224 255.255.255.240 S0/0/1   5      [5/0]
```

→ backup

AD > 1

Default Static Routing –

* after subnet masking on the packet, it will match of the network entries in the router table
* if no match is found, the router will discard/drop the packets
* to avoid this, default static routing is used
* command for the default path –

```
ip route 0.0.0.0 0.0.0.0 exit int/next hop
```

0.0.0.0 → no networking matching
0.0.0.0/0

* usually configured at points connected to the internet for the ISP router.; packet sent to internet instead of dropping

* → special routing

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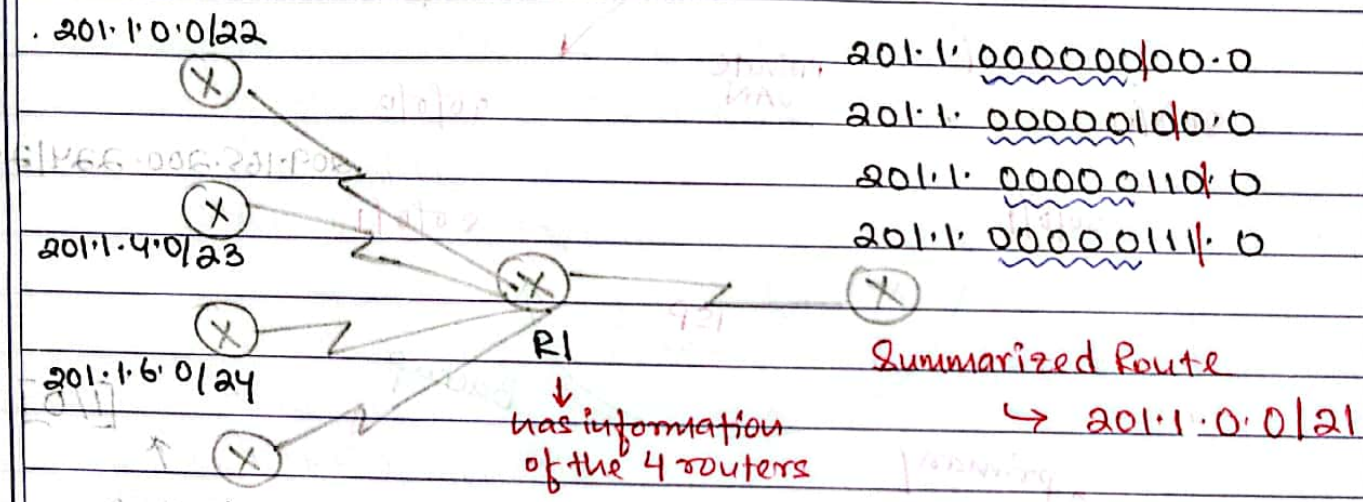
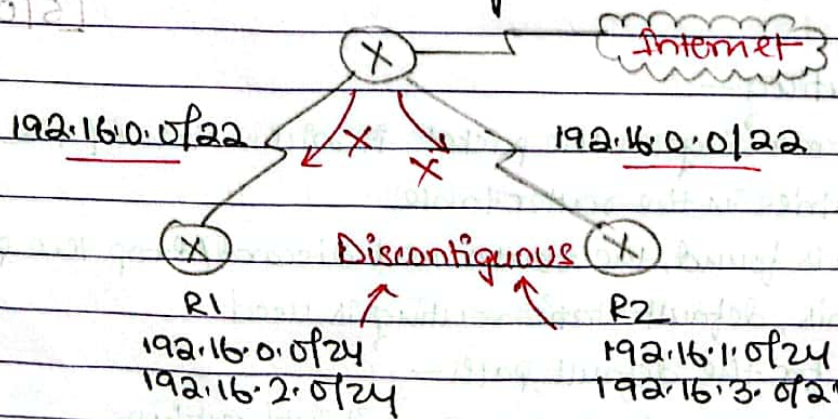
Summary Static Routing –

* a single route can be used to represent multiple routes
  - same exit interface/next hop IP
  - set of contiguous/adjacent networks
  - reduce the number of routes advertised
  - creates smaller routing tables
  - more efficient routing table lookup process



Problems of Summary Static Routing –



Multiple sides have the same summary address. Router cannot decide which port to use to forward the packet. In this case, summarized routing cannot be used.