

# ROUTING PROTOCOLS

R1

· ROUTERS SEND ONE ANOTHER UPDATED MESSAGES ADVISING OF CHANGES IN INTERNETWORK TOPOLOGY & CONDITIONS.

· EACH ROUTER CALCULATES ITS OWN ROUTING TABLE BASED ON THE UPDATED INFORMATION.

· A ROUTING TABLE IS A LIST OF ROUTES AVAILABLE TO FORWARD TRAFFIC TO VARIOUS DESTINATIONS

· EACH ROUTER MAINTAINS A SINGLE ROUTING TABLE.

· MAJORITY OF ROUTERS RUN ONE PROTOCOL; SPECIALIZED BORDER ROUTERS RUN TWO IN ORDER TO PASS ROUTES BETWEEN AREAS USING DIFFERENT PROTOCOLS.

· A ROUTED PROTOCOL CONTAINING NETWORK LAYER 3 INFORMATION ENABLES THE PROTOCOL TO BE DIRECTED FROM ONE NETWORK TO ANOTHER

Ex: TCP/IP, IPX/SPX, APPLETALK, etc

- ROUTING PROTOCOL PROVIDES SUPPORT TO ROUTED PROTOCOL BY SHARING INFORMATION.

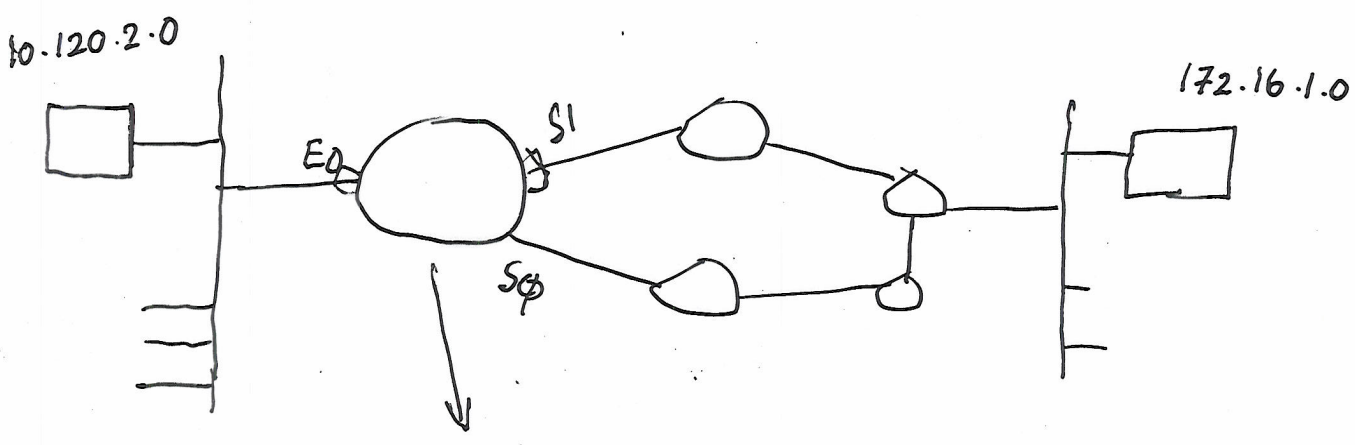
ROUTING PROTOCOL INFORMATION IS DISTRIBUTED AMONG ROUTERS.

Ex. RIP, OSPF, etc

" A ROUTING PROTOCOL ROUTES A ROUTED PROTOCOL "

### ROUTING FUNCTIONS:

1. WHAT IS THE DESTINATION ADDRESS OF THE ITEM TO BE ROUTED?
2. IDENTIFY SOURCE INFORMATION
3. DISCOVER ROUTES : WHAT ARE THE INITIAL POSSIBLE ROUTES OR PATHS TO GIVEN DESTINATIONS?
4. SELECT ROUTES (BEST PATH)
5. MAINTAIN ROUTING INFORMATION.



| Network   | Destination | Interface |
|-----------|-------------|-----------|
| Connected | 10.120.2.0  | E0        |
| Learned   | 172.16.1.0  | S0        |

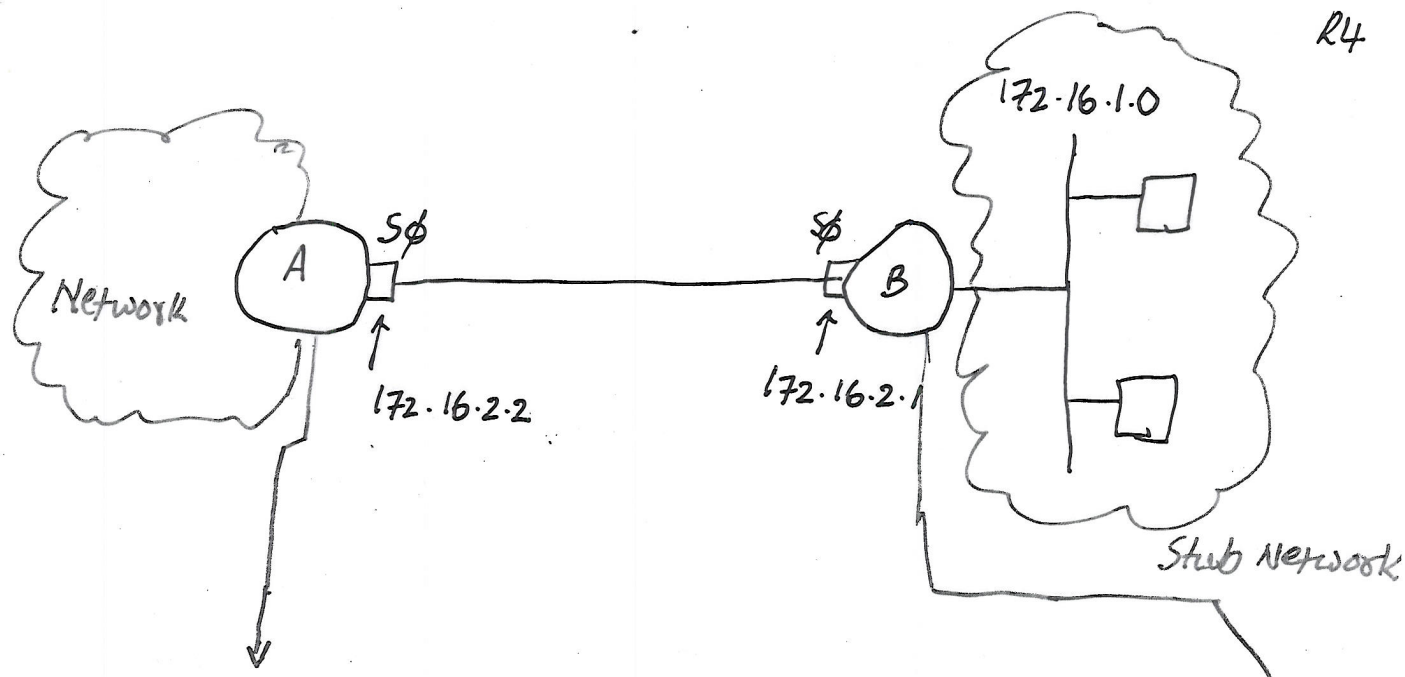
LEARNING:

MANUAL - Static ROUTE

- Network administrator enters this
- MUST UPDATE WHEN TOPOLOGY CHANGES.

DYNAMIC ROUTES:

- ROUTES LEARNED DYNAMICALLY AFTER AN ADMINISTRATOR CONFIGURES A ROUTING PROTOCOL.
- AUTOMATICALLY ADJUSTS TO TOPOLOGY OR TRAFFIC CHANGES.



Static: `ip route 172.16.1.0 255.255.255.0 172.16.2.1`

→

Default:

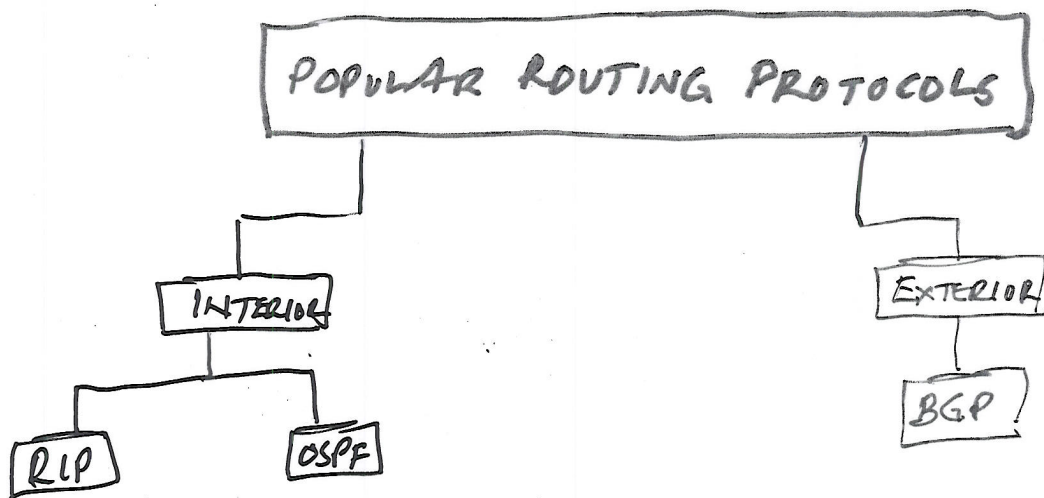
`ip route 0.0.0.0 0.0.0.0 172.16.2.2`

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Reach all known Networks beyond A.

ROUTING PROTOCOLS ARE USED BETWEEN ROUTERS.  
 TO DETERMINE PATHS & MAINTAIN ROUTING TABLES  
 (ex: RIP, IGRP)

ONCE A PATH IS DETERMINED A ROUTER CAN ROUTE  
 A "ROUTED" PROTOCOL.  
 (IP)



RIP IS BASED ON "DISTANCE VECTOR ROUTING"

1. Shares Knowledge ABOUT THE ENTIRE AUTONOMOUS SYSTEM
2. Shares known routes with neighbours
3. Shares at regular intervals. ex: every 30s.

DISTANCE VECTOR ROUTING TABLE:

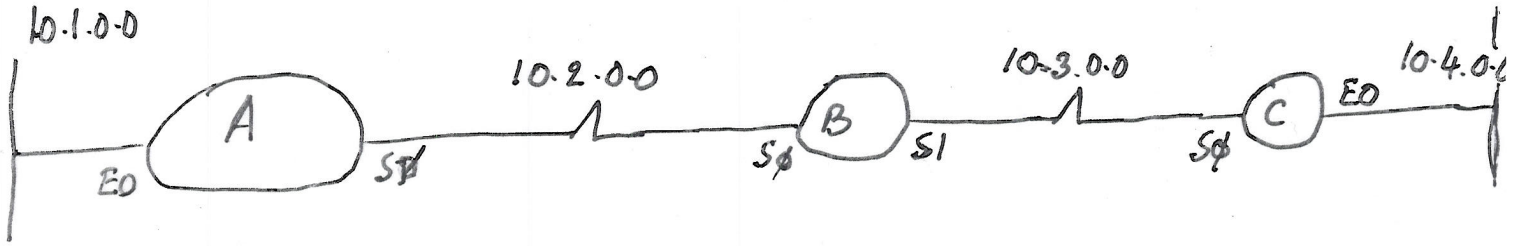
| DESTINATION | HOP COUNT | Next Hop   | Other info. |
|-------------|-----------|------------|-------------|
| 163.5.0.0   | 7         | 172.6.23.4 |             |
| 197.5.13.0  | 5         | 176.3.6.17 |             |

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|          |    |   |
|----------|----|---|
| 10.1.0.0 | Eφ | φ |
| 10.2.0.0 | Sφ | φ |
| 10.3.0.0 | Sφ | 1 |
| 10.4.0.0 | Sφ | 2 |

①

②

|          |    |   |
|----------|----|---|
| 10.2.0.0 | Sφ | φ |
| 10.3.0.0 | S1 | φ |
| 10.1.0.0 | Sφ | 1 |
| 10.4.0.0 | S1 | 1 |

①

②

|          |    |   |
|----------|----|---|
| 10.4.0.0 | Eφ | φ |
| 10.3.0.0 | Sφ | φ |
| 10.2.0.0 | Sφ | 1 |
| 10.1.0.0 | Sφ | 2 |

CONVERGENCE

RIP  
IGRP

OSPF

|       |              |           |           |
|-------|--------------|-----------|-----------|
| Who?  | Neighbour    | Everyone  | Neighbour |
| What? | Whole table  | Change    | Change    |
| When? | Periodically | On change | On change |

DV  
DISTANCE  
VECTOR

LS      Hybrid  
LINK  
STATE