Post 8

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EIGRP AND DUAL P2

DUAL Concepts: EIGRP uses Diffusing Update Algorithm (DUAL) Provide best loop-free path/backup paths

DUAL terms: Concepts at core of loop avoidance w/DUAL

- Successor
- FD: Feasible Distance
- FS: Feasible Successor
- RD/AD: Reported Distance/Advertised Distance
- FC: Feasible Condition/Feasibility Condition

EIGRP uses convergence alg DUAL: Convergence critical to avoid routing loops

- Routing loops bad for performance
- Distance vector protocols prevent routing loops w/hold-down timers/split horizon
- EIGRP uses both, but handles w/DUAL
- Used to obtain loop-freedom at every instance through route computation
- Allows all routers in topology change to sync at same time
- Provides fast convergence over other distance vectors

Decision process done by FSM: Finite State Machine:

- Finite # of stages (states)
- Transitions bet stages
- Operations
- Tracks all routes/uses EIGRP metrics to select loop-free paths/ID's routes w/least cost-path for table
- Recomputation can be proc-intensive
- Avoids recomputation by having list of backup routes DUAL deemed loop-free
- If primary fails: Best backup immediately added to table

Successor/Feasible Distance

Successor	Neighboring router used for packet fwding: Least cost-route to dest network • IP address of successor shown in table entry after word via
Feasible Distance	Lowest calc metric to reach dest network • Metric listed in table 2nd # inside brackets • AKA metric for route

Feasible Successors, Feasibility Condition, and Reported Distance

Feasible Successors	• DUAL converges quickly after change in topology b/c can use backup paths w/out recomputing • Backup paths known as FS: Feasible Successors

Topology Table: show ip eigrp topology

- Contains all routes known to each neighbor: As router learns routes from neighbors: Installed in topology table
- Lists successors/FSs DUAL calc to dest networks: Only successor installed into table

show ip eigrp topology all-links Displays links whether they satisfy FC/not

- All possible paths to network: Including successors

Topology table displays:

P	**Route in passive state** • When DUAL not performing: Diffusing computations to determine path • Route in stable mode: AKA passive state
A	If DUAL recalcs for new path: Route in active state: Displays A • All routes in table should be passive state for stable routing domain

# successors	# of successors for network • If multiple equal cost paths to network: Multiple successors
FD	EIGRP metric to reach dest network: Displayed in IP table

DUAL Finite State Machine (FSM)

- Centerpiece of EIGRP: Route-calc engine/Finite State Machine (FSM)
- Defines set of possible states something can go through

debug eigrp fsm Examine what DUAL does when route removed

No Feasible Successor: No guaranteed loop-free backup path to network

- Path not in topology table as FS: Network in active state
- Actively queries neighbors for new successor

When successor no longer avail/no fs: Puts route into active state: Sends queries asking other routers for path

- Routers return replies: Let sender of query know whether/not have path
- If no replies have path: Sender doesn't have route

show ip eigrp topology all-links Displays links whether they satisfy FC/not

- All possible paths: Successors

EIGRP for IPv6

- IPv6: Separate processes from IPv4 | Separate PDM

EIGRP IPv4/IPv6

Advertised routes	IPv4: Advertises IPv4 networks IPv6: Advertises IPv6 prefixes
Source and dest addr	IPv4: Sends msgs to multicast 224.0.0.10: Use source addr of outbound int IPv6: Sends msgs to multicast FF02::A: Sourced using link-local addr of exit int

IPv6 Link-local: Routers running dynamic protocol, exchange msgs bet neighbors on same subnet/link

- Only need to send/receive msgs w/directly connected neighbors: Always sent from source IP of router doing fwding
- IPv6 link-local addresses ideal for this
- Enables device to comm w/other IPv6-enabled devices on same link
- Packets w/source/dest link-local can't be routed beyond link where packet originated.

EIGRP for IPv6 msgs sent using:

Source IPv6 addr	Link-local addr of exit int
Dest IPv6 addr	When packet needs to be sent to multicast addr: Sent to FF02::A: If sent unicast: sent to link-local of neighbor

- Link-local addresses auto created when global unicast address assigned to int
- Not required on int; however, link-local are

R1(config-if)# ipv6 address link-local-address link-local
R1(config)# ipv6 unicast-routing [*global config*] Enables IPv6 routing
R1(config)# ipv6 router eigrp autonomous-system [*global config*] Enter router config mode
eigrp router-id Precedence over any loopback/phy int IPv4
Router(config-if)# ipv6 eigrp autonomous-system [*int config*] Enable EIGRP for IPv6 on an int
ipv6 eigrp int Enables int to form adjacencies/send/receive updates
show ipv6 eigrp neighbors View neighbor table/verify adjacency
Output from show ipv6 eigrp neighbors:

H column	Neighbors in order learned
Address	IPv6 link-local of neighbor
Int	Local int Hello packet received
Uptime	Amount of time since neighbor added to table

show ipv6 protocols Displays params/other info about state of any active routing protocol processes config'd
show ipv6 route