for Staples

ripv1 VS ripv2

Ripv1
- classful vector routing prot   V2
                                      - classless
- not support discontiguos subnet   - update hop กัดไปด้วย
- not ___ VLSM
                                      ~ multicast
- ไม่ใส่ subnet ในการ update
                                      - มีการ authentication
- broadcast

ดูทั้งหมดได้ เมื่อมีปัญหา   Can authentication
show ip interfaces brief   - RIP V2
show ip protocols   - EJGRP
debug ip rip   - OSPF
show ip route   - IS-IS
                                - BGP

VLSM & CIDR
- Verifying Rip v2 update
- verify information ของ Ripv2 โดย debug ip rip
- Network using VLSM
  - use classless เมื่อ กระจาย network to subnet mask

CIDR use supernetting
  └ bunch nos contiguous classful
    กิ single nw
  └ check verify - show ip route
                - debug ip rip

standard VS Entented IPV4 ACLS

• standard   • Exten
- check source address   - source & des
- permit or denied ก่อนหลัง   - permit or denied บางตัว
- NO. 1-99, 1300-1999   - 100-199, 2000-2699
- Name มีเลขได้   • แนะนำตัวเริ่มใหม่ • ไม่มี ช่องว่าง

Example wildcard Mask in ACLS
Ex1 R1(config)# access-list 1 permit 0.0.0.0
    R1(config)# access-list 1 permit 255.255.255.255
Ex2 R1(config)# access-list 1 permit any
    R1(config)# access-list 1 permit 192.148... 0.0.0.0
                                        host 192.148.10.10

ควรใช้ ACLs ตอนไหน (ที่ไหน)
• Extened ACLs : ใกล้กับ sorce
• stan___ : ใกล้กับ dest

Syntax ของ standard ACL s
Router(config)# access-list access-list-number
  deny | permit | remark
  sorce [source-wildcard] [log]
• คำสั่งลบ คำสั่ง
  no access-list ตามด้วย เหมือน ด้านบน

ต่อไปเป็นการ set access-group
Ex R1# access-list 1 deny host 1 ___
       ___ permit any
       interface g0/0
(config-it)# ip access-group in

Telnet หรือ SSH
Router(config-line)# access-class
access list-number
{ in [vrf-also] | out}
verify ดูได้
PC17 ssh   ip-addr

Syntax ของ Exten Acls
access-list 114 permit tcp ip ถ้า 0.0.0.255 any eq 23 คือ telnet
                                              อีก keyword
access-list 104 permit tcp any ip__ 0.0.0.255 establish
                                              ftp, tftp สุดท้าย

แจ้งว่าเป็นแบบ stand จะการ in/out
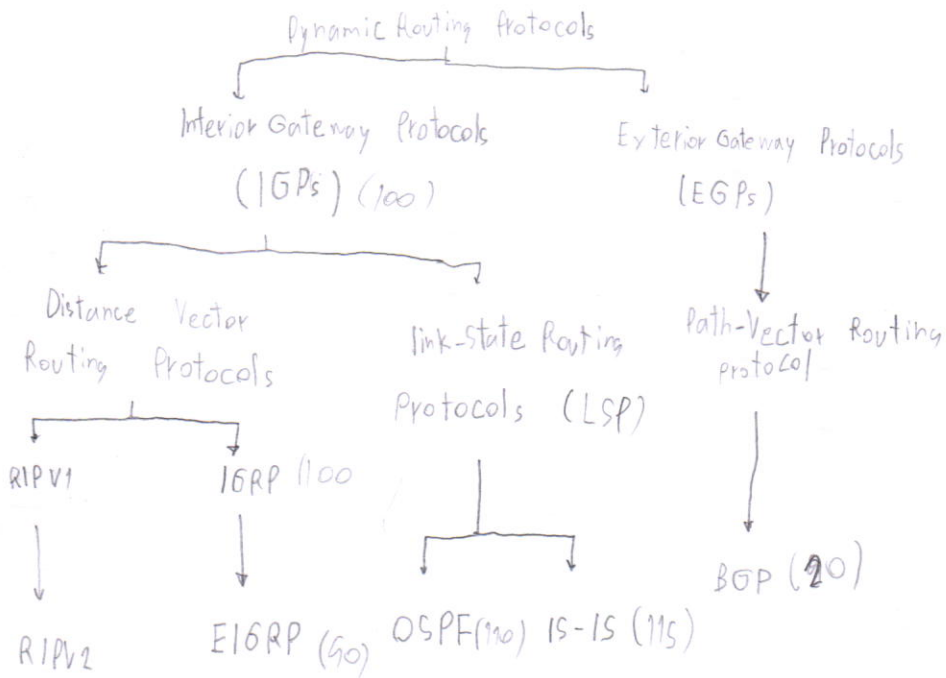
create name Extended ACL.

R1(config) # ip access-list extended SURFING
R1(config-ext-nacl) # Permit tcp 192 (IP_____ 0.0.0.255 any eg 80
                # exit

Routing Protocols Classification รวม Administrative Connected 0

                                                            Static 1

Dynamic Routing Protocols

Interior Gateway Protocols   Exterior Gateway Protocols   EIGRP sum s
   (IGPs) (100)   (EGPs)   External EIGRP 170

Distance Vector   link-State Routing   Path-Vector Routing
Routing Protocols   Protocols (LSP)   protocol

RIPV1   IGRP 1100   BGP (20)

RIPV2   EIGRP (50)   OSPF(110) IS-IS (115)

ข้อดีของ LSP;
- แต่ละ Router สร้าง topology map ของตัวเอง ขึ้นมาเพื่อหาเส้นทาง shortest path
- การ flood lsps achieve ทำให้ได้ convergence (บรรจบกัน ใช่ไหม)
- LSPs จะส่งเฉพาะ change in topology และ contain only information ของ change นั้น
- Hierarchical design ที่ implement multiple area

ข้อเสีย LSPs

• ต้องการ memory เยอะ
• ต้องการ CPU processing เยอะ
• Bandwidth อาจ ไม่เพียงพอ เวลา lsf flooding

OSPF Feature
• classless   • Efficient
• Fast Convergence • scalable
• Secure

OSPF Operation

Down State ——→ init stat ——→ Two-way c ——→ Exstart st —→ Echage s

Establish   Synchronize   loading s
  Neighbor   OSPF
    Adjacencies   Database

Config Single OSPFv2   OSPF Cost

a)router ospf Process-id

$$Cost = ref\ bw / interfac\ bw$$
$$\llcorner 10^8$$

ถึง 65,535

AUTO COST

- fast bw 100

(con-rou) network network-al wild   area areaid
(wan 0.0.0.256)
- Giga bw 1000
- 10 Giga bw 10000

DHCP 3allocation methods

- manual Allo _ = Admin assigns

- Auto

- Dynamic

ยกตย. code DHCP

R1 (conf) # ip dhcp excluded -add- 192~

pool LAN-pool-1

R1 (dhcp-con) # network ___

default -router ___

dns-server ___

domain-name example.com

LAN Design

· Borderless sw nw design
ทั่วไม่ได้จบ
- Hierarchical
- Modularity
- Resiliency
- Flexibility

วิธี disable

no service dhcp

The Switched Environment

- Tranparent Bridge Process Jeff Doyle

receive Frame
↓
Learn source address or refresh ay ing timer
↓
Is the destination a broadcast, or unknow Unicast?
No ↓   ↓yes Flood Packet
Are the source and destination on the same interface?
No ↓   ↓yes Filter Packet
Forward unicast to correct port

sw forward method
store -and fw switching
cut-Through sw

Frame forwarding
store and fw switching
ตรวจสอบ sw จะ
- check errors (via FCS cned)
- Perform Automatic Buffer is

เป็นการ Fw ทั้งนั้น

cut-Through switching
ทุกเวลาจะ Fw ใน 10 micro sec

ไม่มี FCScheck

ไม่มี Automatic Buffering

Fragment. free ~69 ไบ

Basics Switch Concept & configuration

- Basics Sw Conf
  - Switch Boot sequent ────────
  - Preparing for Basic Switch Mangement ──────
  - configure swich Ports ────────

- swich Security : security Remote Access
- switch Port Security

○ Duplex com

○ Auto — MDIX

○ verify

-post
-Run boot loader software
- Boot loader does low-level cpu initialization
- Boot loader initializes the flash file system
- Boot loader locates and loads a default Ios
os software image into mem and hands control
of the switch over to the IOS
- โหลด Ios image ล้มเหลว sw จะทำงานเมื่อ
  └ พารามิเตอร์ = Auto boot โดยดู inter~ in the Boot envi variable
  └ ถ้า variable ไม่ได้ set ค่า ปกติ = seach top to bot ผ่าน flash file
    ซึ่งจะ load อันที่เจอ 1 ก ได้อันแรก
  └ Ios os จะ initialize intfaces โดยใช้ cisco Ios command
  ที่อยู่ cont file, startup conf, which is stored in NVRAM

Note: the command boot system can be used to set The
boot envi var iable

EIGRP

-manage cis o sw
- IP address & subnet ปกติ จะ conf หลัก

	RIPV1	RIPV2	IGRP	EIGRP
speed of convergance	slow	slow	slo	fast
scalability -size rm	small	small	small	small
Vse of VLSM	x	✓	x	✓
Resource usage	low	Low	Low	Medium
Implement & maintain	simple	Simple	Simple	complex

Basic Switch ARP | LAN Design

Core layer : feature → layer 3 Support, Very High forward rate, , redundant component
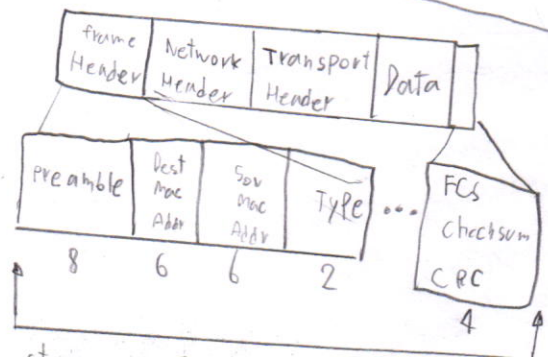Link Aggregation , QOS

Distribution layer : feature → layer 3 support, High forwarding rate, Gigabit Ethernet/10 Gigabit Eth, redundant cpu
Security Policies/Access Control Lists, Link Aggregation, QOS

access layer : feature → Port security , VLANs, Fast Ethernet/Gigabit Ethernet
Power over Ethernet , Link aggregation, Quality of Service
(PoE)   (QoS)

Switch Environment   frame forwarding

- store -and -forward Switching
  - check errors (ใช้ FCS)
  - Perform Automatic Buffering
  - slower forwarding

- cut -Trough Switching
  - 10 microsec
  - No FCS check
  - No _____
    Fast - forward ~12 bytes
    Fragment -free ~64 bytes

frame Header	Network Header	Transport Header	Data

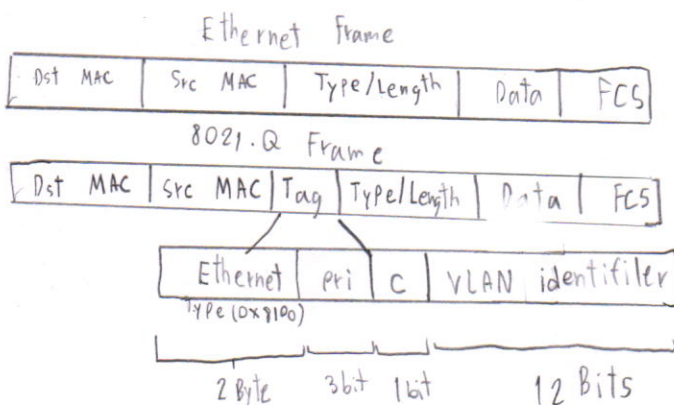| Preamble	Dest Mac Addr	Sov Mac Addr	Type	...	FCS Checksum CRC
8	6	6	2		4

store -and -forward switching receipt of
the entire frame (Vp to 9200 bytes)

Frames can begin to be forwarded
as soon as the Destination Mac is Recive

Controlling Broadcast Domain with VLANs

- VLAN can be use to limit the reach of broadcast frames
- VLAN is a broadcast domain of its own • a broadcast frame sent by a device in a
  specific VLAN is forwarded within that VLAN only
- Unicast and multicast frames are forwarded within the originating VLAN as well

Tagging Ethernet Frames for VLAN Identification

Ethernet Frame

Dst MAC	Src MAC	Type/Length	Data	FCS

8021.Q Frame

Dst MAC	Src MAC	Tag	Type/Length	Data	FCS

Ethernet Type (0x8100)	Pri	C	VLAN identifiler
2 Byte	3 bit	1 bit	12 Bits

Config VLAN

S1 (config)# interface fa 0/1
" if) switch port mode acces
" if) switch port access vlan 20
" if) end

Trunk Links
int fa0/1
sw m trunk
sw trunk native vlan 99
sw trunk allowed vlan 10,20,30
end

VTP & NAT

VTP
- Server
- Client
- Transparent

Feature	Server	Client	Transparent
Source VTP messages	yes	yes	No
Listen to VTP mess	yes	yes	No
Create VLANs	yes	No	yes *
Remember VLANS	yes	No	yes *

---

adding a switch to an existing VTP domain
- clear the configuration
- clear the VTP file
- Power cycle the switch
- Configure VTP mode and domain
- Password protect the domain

VTP Pruning
Switch (vlan) # vtp pruning

───(Config)# int fa 0/3

─── if) # sw trunk pruning) vlan remove
                                    vlan -id

NAT ── Type of NAT (static, dynamic)

Benefits of NAT
- Conserves the legally registered addressing scheme
- Increases the flexibility of connections to the public network
- Provide consistency for internal network addressing schemes
- Provides network security

Disadvantages of NAT
- Performance is degraded
- End-to-end functionality is degraded
- End-to-end IP traceability is lost
- tunneling is more complicated
- Initiating TCP connection can be disrupted

EIGRP

คือ classless version ของ IGRP

RTP is the EIGRP Transport layer used for delivery and reception of Eigrp Packets

EIGRP Packet Types

Hello	Discover other EIGRP routers in the network.
Update	Convey routing information to know dest
Ack	Ack the receipt of any EIGRP Packet
Query	Request specific information from neighbor router
Reply	Respond to a query

EIGRP operation (metrics)

 แบบ EIGRP metric ปกติ

$$[K_1 * bw + K_3 * delay] * 256 = metric$$ เพราะ K_1 และ $K_3 = 1$

$\partial =) \delta''$ $(bw + Delay) * 256 = metric$

EIGRP operation
Topology Table
หน้าถัดไป

EIGRP Feature	Description
Diffusing Update Algorithm (DUAL)	• EIGRP use DUAL as routing algorithm • DUAL guarantees loop-free and back-up path throughout the routing domain
Establishing Neighbor Adjacencies	Adjacencies are used to track the status of these neighbors
Reliable Transport Protocol	• EIGRP RTP provides delivery of Eigrp Packets to neighbors • RTP and neigbor adjacencies are used by DUAL
Partial and bouded update	• Instead of Periodic updates, EIGRP send Partial triggered updates when a path or metric changes • Only those routers that require the information are minimizing bandwith use
Equal and Unequal Cost Load Balancing	• EIGRP supports equal cost load balancing and unequal cost load balancing which allows administrators to better distribute traffic flow in their networks

DUAL

Term	Description

Successor
- Is a neigboring router that is used for packet forwarding is the least-cost-route to destination network
- The IP address of a successor is shown in routing table entry right after the word "via"

Feasible Successor (FS)
- These are the "Backup Paths" that are a loop-free
- Must comply to a feasibility condition

Reported Distance (RD)
- Also called "advertised distance" this is report metric from the neigbor advertising the route
- If the RD metric is less than the FD, then the next hop, then the next hop router is down stream and there is no loop

Feasible Distance (FD
- this is the actual metric of a route from current router
- Is the lowest calculated metric to reach the destination network
- FD is the metric lised in the routing table entry as the second number inside the brackets