

for Staples

- NW devices = อุปกรณ์ที่เชื่อมต่อ NW ได้ (NW component)
- NW Diagram ① Physical ② Logical
- NW Add ① Physical ② Logical
- NW Component
 - HW
 - SW
 - End device
 - Intermediate
 - Media
 - Copper
 - Fiber
 - Wireless

- NW
 - LAN
 - WAN

IPv4

Ver.	IP header length	Type of service	Total length
			Fragment offset
			Header Checksum
		Source Addr	
		Dest Addr	
		Options	Padding

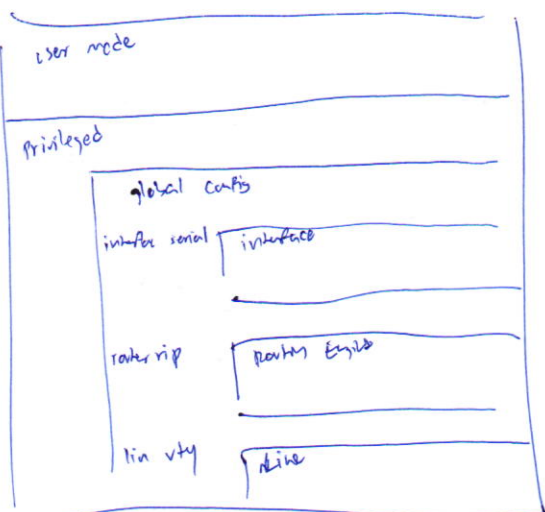
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Message Delivery

- Unicast : 1 → 1
- Multicast : 1 → many
 - IP 224.0.0.0 - 239.255.255.255
 - MAC begins with 01-00-5E
- Broadcast : 1 → All
 - MAC : all Fs

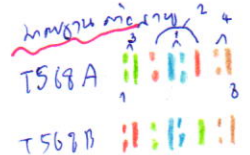
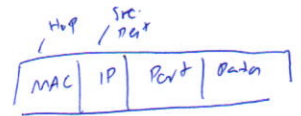
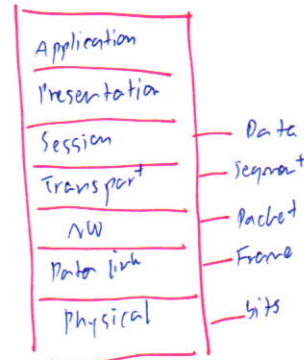
Access Cisco Device

- Telnet
- SSH
- Console port
- Aux port



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- Reliable - Fault Tolerance, Security, Scalability, Quality of Service



A-A } straight
B-B } straight
A-B - cross

Port Addr.

- 0-65,535
- 0-1023 reserved
- 1024-4095 register
- 4096-65535 private/dynamic

	First octet range	default subnet
A	0-127	255.0.0.0
B	128-191	255.255.0.0
C	192-223	255.255.255.0
D	224-239	

- IP
 - class A B C
 - D (multicast reserved LAN domain)
 - E (reserved)

- MAC = 48 bit (6 byte)
 - 12 hex
 - 3 byte is 24 bit (some (001))
 - 3 byte is 24 bit (some (001))

Private Addressing

- 192.168.0.0/16
- 10.0.0.0/8
- 172.16.0.0/12

Basic Config

- Hostnames
- Limit access : Password
- Verify connectivity
- Saving config

R> enable
R# configure terminal
R(config)# hostname CE1
CE1#
R(config)# banner motd #
pass : # enable password & com
exit
secret : enable secret
console pass : 987654321 console
VTY n : 987654321 telnet

R(config)# interface (type) (port)
ip address (ip) (subnet)
no shutdown

R# show ...
R# copy running-config startup-config



CHAPTER 3

- Characteristic of NW
- | | |
|-----------------|-------------|
| 1. Topology | 5. Speed |
| 2. Reliability | 6. Cost |
| 3. Scalability | 7. Security |
| 4. Availability | |

- Router : route packets
- = computer
 - cpu
 - os
 - mem

- Powder
 - Root up Process
 - Test router with POST run bootstrap loader
 - Locate & load IOS SW
 - " " " " config file
 - or enter setup mode

- Router Function
 - Find best path
 - Forward package
 - use static & dynamic protocols to learn remote nw & build routing table

- Purchase
Forwarding method
 ① Process switching
 ② Fast switching
 ③ Cisco express Forwarding (CEF)

- IP Addr
 - Subnet mask
 - Default gateway
- ↓
 assigning IP via
 DHCP

- Document configuration
 - Device name
 - interface
 - IP Addr & subnet
 - Default gateway

- Static - Set IP Address, subnet & gateway manually

- Dynamic : DHCP protocol

- Basic settings

- banner : banner word # (text) #
- config interface : serial cable CPE - clock rate 56000
- verify connect : show ?

- ~~the~~ Router on Best Path
on lowest metric

- Routing Table (show ip route) directly connected Route
Reroute " "
Next hop Association

- Dynamic routing protocol - 15-15

- Routing Information Protocol (RIP)
v. 14. Hop based

- Open shortest Path First (OSPF)

- ## Enhanced Interior Gateway

- ### Routing Protocol (EIGRP)

9. BW delay load reliability

- Static Routing — Exterior Routing Protocols (BGP)

- ~~static~~ Static routing router will follow path way
(load balancing)

- Config static route
 $R(config) \# ip \text{ route}$

- Setzig default Rate

- Setting default route
R(config)# ip route 0.0.0.0 0.0.0.0 210.1.1.1

- ## Static Routing

1. Standard Static Rate $\text{S} - \text{S} -$

1. Standard static
2. Default static

3. Summer Static Rate

- u, Floating 

- classful

- classless Inter-Domain Routing : CIDR

- Variable Length Subnet Masking : vlsm : subnet for subnet

Route	Source	AD
Connected		0
Static		1
Internal EIGRP		90
OSPF		110
RIP		120

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DYNAMIC ROUTING PROTOCOL

- Functions :
 - in best path
 - dynamically share info between router
 - update routing table อัตโนมัติเมื่อมีข้อมูล

- Purpose :
 - รู้ถึง remote nw
 - maintain up to date routing info
 - in best path, in best path จะใช้เส้นทางเดิมไว้ก่อน

- ms config routing กับ nw configuration, admin monitor, scale ได้ง่ายเหมือน config เดิม, Predictability msrating or topology

- classifying Routing Protocol

- ▷ Autonomous System : a group of routers under 1 authority

- ▷ Types (Routing protocol)
 - Interior Gateway Protocols (IGP)
 - Exterior Gateway Protocols (EGP)

- Distance vector : ใช้เวลาคำนวณ + slow

- Periodic update RIP IGRP

- Link state : ใช้เวลา นาน หรือ topology update isn't periodic

- ▷ Classful Routing Protocol : ใช้กับ subnet mask เดิม

- ▷ Classless " " : ใช้ " "

- Convergence : ใช้เวลา นาน

- Routing Protocol Metrics

- ▷ Metric : ค่าที่ใช้วัดว่าเส้นทางไหนดีที่สุด best path เป็น delay, hop count.

- ▷ Load Balancing : ถ้ามี cost เท่ากัน จะใช้เส้นทางไหนก็ได้

- Administrative Distance of a Route : ใช้วัด priority ของเส้นทางไหนดีที่สุด

- 0 Connected, 1 Static, 100 IGRP, 110 OSPF, 115 IS-IS, 120 RIP

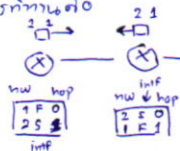
DISTANCE VECTOR ROUTING PROTOCOLS

distance + vector, RIP IGRP EIGRP

- Characteristic
 - periodic update (Broadcast)
 - neighbors
 - entire table update = routing table

- Network Discovery : ใช้ state machine

- 1 Cold Start
- 2 Initial Exchange
- 3 Exchange Routing Info



basic config
send update packet
(hop+1)

- Routing Loops

PROB : Count to infinity, Route Poisoning, TTL

Solution : set max hop, Hold down Timers

split horizon : ไม่ส่ง update บน interface ที่ Learn มา
poison reverse

RIP v1

- Characteristic : classful, distance vector
 - metric = hop count (>15 = unreachable)
 - update are broadcast every 30secs

- Configuration :
 - R1 (config) # router rip
 - (config-router) # network [nw ip]

- Verify use
 - show running-config
 - " ip route
 - " ip rip
 - " ip protocols

- UDP, port 520

- Automatic Summarization

pros : size of routing update is reduced

: 1 route summarization routes ใน หน้า

lookup routing table ย่อสั้น

cons : ไม่รองรับ discontinuous networks

(ถ้า Boundary มี information ไม่ต่อเนื่อง)

- Default Route : ip route 0.0.0.0 0.0.0.0 serial

default-information originate (ถ้า rip ใช้ default route)

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RIPv2

- A classless distance vector
- Next hop addr is included in update
- Routing updates are multicast
- authentication is an option

Limitations RIPv2

- ▷ Loopback interfaces
- ▷ Null interfaces: 128/30 packet
- ▷ Static routes & null interfaces
 - null interface will serve as the exit interface for static route

Configuring RIPv2

- ↳ R1 (config) # router rip
- ↳ config-router # version 2

- ▷ Auto-summary & RIPv2
- ▷ verify info: debug ip rip

Verifying & Troubleshooting RIPv2

- Check status of all links
- Check cabling
- Check IP addr & subnet mask configuration
- Remove any unneeded configuration commands

Classless Characteristic

- No subnet mask in update
- Support Variable Length Subnet Masking (VLSM)
- Support Route Summarization

Route redistribution

- ▷ does not support VLSM
- ▷ No CIDR support

RIPv1 v2 Similarities

- ▷ 90 timers
- ▷ 90 split horizon / split horizon with poison
- ▷ 90 triggered update
- ▷ Max hop count of 15

CIDR uses Supernetting

↓
a branch of contiguous classful net that's addressed as a single net

Routing Protocol that can use authentication

RIPv2 EIGRP OSPF IS-IS BGP

ACCESS CONTROL LIST

control packet flow with / on
information flow with / on access list: implicit deny

Standard ACLs (1-99) (1300-1999)

check source addr only
generally permits/denies entire protocol suite

Wildcard Mask 0 0 0 0 0 0 1 1
0.0.0.0 ~~128.0.0.0~~ 128.0.0.0 128
1.1.1.1 ~~7.1.1.1~~ 7.1.1.1 7
192.168.1.1 } → 192.168.1.0
0.0.0.255 }
~~192.168.1.1~~ 255.255.255.255 - [mask] =

Secure vty

R1 (config-line) # access-class [ACL num] in/out

Extended ACL (100-199) (2000 to 2699)

- ▷ can filter: Source dest
Protocol
Port numbers

ex access-list 114 permit tcp 192.168.20.0 0.0.0.255 any eq telnet
access-list 101 deny tcp 192.168.11.0 0.0.0.255 192.168.10.0
0.0.0.255 eq ftp
ip access-group 114 in
SURFING in
BROWSING out

Three Ps

- 1 ACL / protocol
- 1 ACL / direction
- 1 ACL / interface

PLACE: close to destination
(extended) close to source

Configure

R1 (config) # access-list [ACL num]
deny/permit/remark
source [source wildcard]

ex

access-list 1 permit ip
192.168.10.0 0.0.0.255

(90)

in/out interface #1: 128

ip access group 1 in

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OSPF

- Link State Routing Protocol - ใช้ topology topology (rip มี info ของ router ฝั่งๆ)

► ข้อดี : nw design is hierarchical, ควบคุมได้ large nw
: mirror fast convergence

► ใช้ Dijkstra's Algorithm
Shortest path first (SPF)

► Type [OSPF
15-15

- ขั้นตอน
- ① Router ส่ง hello packet
 - ② Each router ส่ง Link State Packet (LSP) ที่เก็บ topology ของ network
 - ③ flood LSP ไปยัง neighbor
 - ④ Each router เปรียบเทียบ LSP ที่ได้รับ

► Pro : 1. router 2 topology ที่รวม
faster convergence
LSP ถูกส่งไปยัง neighbor
network hierarchical design

cons : require additional mem, CPU
bandwidth growth when flood LSP
↳ solution ใช้ Area (multicast)
multiple area 0 of network

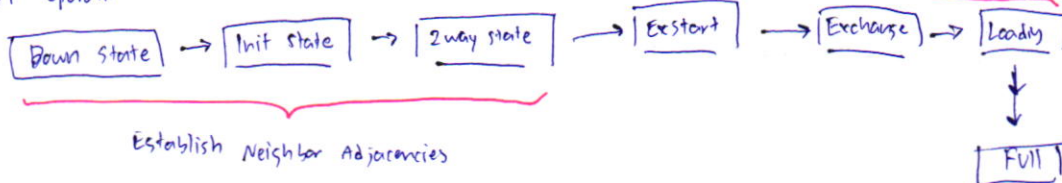
• OSPF

- feature : classless efficient Secure Scalable fast convergence
- MAC Address = multicast 01-00-5E-00-00-05 ใช้ 01-00-5E-00-00-06
IP 224.0.0.5 ใช้ 224.0.0.6 multicast
IPv6 FF02::5

Hello packets are sent every 10 sec / 30 sec
Dead interval = hello * 4

Synchronize OSPF DB

► OSPF Operation



- DR and BDR 1 ใน 2 router ที่เลือก DR
เลือก BDR 1 ใน 2

► Configuration

```

R1(config)# router ospf [process-id]
(config-router)# router-id 1.1.1.1
# end

(config)# interface loopback 0
(config-if)# ip address 1.1.1.1 255.255.255.255
# end

network [nw] [wildcard] area 0
  
```

► Cost = $\frac{100,000,000 \text{ bps}}{\text{interface bandwidth (bps)}}$

► Redistributing an OSPF Default Route

```

(config)# ip route 0.0.0.0 0.0.0.0 loopback N
# router ospf [process-id]
(config-router)# default-information originate
  
```



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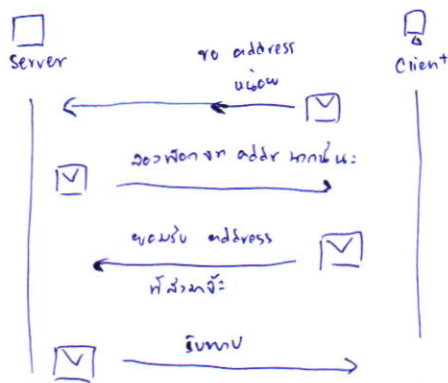
• DHCP (Dynamic Host Configuration Protocol)

- Protocol that provide automatic IP addressing & other info (Subnet mask / Prefix length, Default gateway, DNS server address)
- Supports IPv4 and IPv6

3 address allocation methods

- Manual Allocation: admin assigns IPv4, DHCP communicate only IPv4 address to the device
- Automatic Allocation: DHCPv4 assigns IPv4 GUI No lease
- Dynamic Allocation: DHCPv4 assigns IPv4 GUI No lease

Operation



Configuring DHCP

- Exclude address from the pool (Default gateway)
- Set up DHCP pool name
- config specific Task & define range of address and Subnet mask, use default router and for default gateway

ex R1(config) # ip dhcp excluded-address

192.168.10.1
192.168.10.9

ip dhcp pool LAN-POOL-1

(dhcp-config) # network 192.168.10.0 255.255.255.0

default-router 192.168.10.1

dns-server 192.168.11.5

domain-name example.com

end

disable cmd

= no service dhcp

DHCP Relay

via DHCP via broadcast with 255.255.255.255 as destination
with 192.168.10.1 as helper-address [router]

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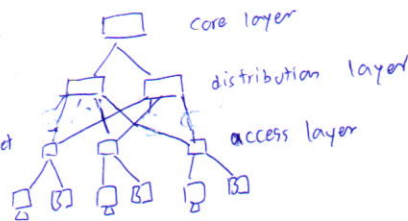
SWITCH NETWORK

LAN DESIGN

Borderless switched nw design

- principle - hierarchical - Resiliency
- Modularity - Flexibility

- Access layer - Port Security - Power over Ethernet
- VLANs - Link aggregation
- Fast Ethernet / Gigabit - QoS

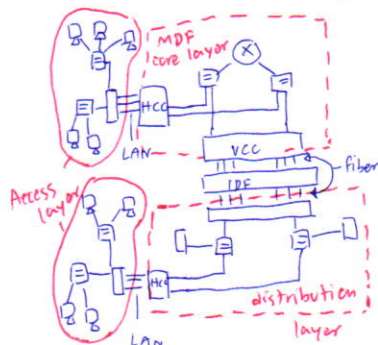


- Distribution layer - Layer 3 support - Redundant Components - QoS
- High forwarding rate - Security Policies / Access Control List
- Gigabit / 10 Giga Ethernet - Link aggregation

- Core layer - Layer 3 support - Redundant Components
- Very high forwarding rate - Link aggregation
- Gigabit / 10 Giga Ethernet - QoS

Common Piz Consideration when selecting switch

- cost - Port density - Power - Reliability - Port speed - Frame buffer - Scalability



HCC = horizontal cross connect

VCC = vertical " " " "

IDF = intermediate distribution facility

MDF = main " " " "

To maximize LAN bw & performance

Function & placement of servers

- Enterprise server - workstation mmp
- Workgroup server workstation

collision detection issues

segmentation issues

broadcast domain issues

Layer 2 device (ex switch) can reduce the size of collision domain

" " " " (ex router) " " " " and

Switch

Switch operation

- Learning : Read frame information learn MAC Addr
- Aging : Remove frame information that > Aging switch timer
- Flooding : Forward frame to all port not in table (Unknown unicast)
- Forwarding : ☒ Broadcast MAC Addr
- Filtering : ☒ Multicast



broadcast domain

content Addressable memory

MAC Addr / CAM

Source table

1 port 1 MAC 1 port

Receive frame

learn src Addr / refresh aging timer

des == broadcast / multicast / unknown unicast?

src & dest on the same interface?

Forward unicast to correct port

Flood packet

Filter packet

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Frame Forwarding

- store and forward - check for error via FCS
- automatic buffering
- slower forwarding

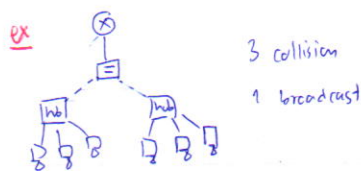
Cut through

- No FCS check
- No automatic buffering
- fast forward ~ 12 bytes (checksum src & dest)
- Fragment free ~ 64 bytes (transmission collision)

Switch

▶ Collision domain

- All ports of hub belongs to the same collision domain
- Every port of a switch is collision domain on its own.



▷ Switch concept & Configuration

- Switch Boot Sequence - initial router

- Basic config - xfm virtual interface, assign ip & subnet on remote minicomputer gateway side



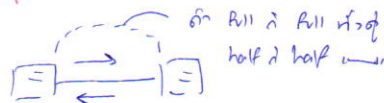
S1 (config) # interface vlan 99

(config-if) # ip address 172.17.99.11 255.255.0.0
no shut down
end

17 (cont) is ip default gateway
172.17.99.1

```
(cont5-if) # end
```

▷ switch port - full duplex, half duplex



cross (conf/as - if) switch network

index auto switch network

► verify v2 show mac-address-table

5 new

tcp port 22
telnet tcp port 23

► Security Remote Access : Secure shell (SSH) is a protocol that provides a secure connection to remote device

```
(config)# ip domain-name cisco.com
```

```
ccorby) # username admin password cca
# like vty 0 15
# transport input ssh
# login local
# end
```

verify
 show ip ssh
 show ssh

Switch port security

- Static secure MAC Addr of switch port ^{part-security} port-security mac-address [mac-address] of port with

switch port
switch per

node access
part - security
part - security

max address 7f000000 ↗ 2gb lach

- Dynamic 

switch port

port-security mac-address sticky

- MAY MAC address

switch part

part-security maximum (MAX)

← Mac 7:15-23

- violation made

u ————— u

violation (protect / restrict / shut down)

	Forward traffic	Sends syslog msg	Display error msg	Increase violation counter	Shuts down ports
Protect	No	No	No	No	No
Restrict	No	Yes	No	Yes	No
Shut down (default)	No	No	No	Yes	Yes

in log when violation occurs

ក្រុម ២១ ២២ ២៣ ២៤ ២៥ ២៦ ២៧ ២៨ ២៩ ៣០ ៣១ ៣២ ៣៣ ៣៤ ៣៥ ៣៦ ៣៧ ៣៨ ៣៩ ៤០ ៤១ ៤២ ៤៣ ៤៤ ៤៥ ៤៦ ៤៧ ៤៨ ៤៩ ៥០ ៥១ ៥២ ៥៣ ៥៤ ៥៥ ៥៦ ៥៧ ៥៨ ៥៩ ៦០ ៦១ ៦២ ៦៣ ៦៤ ៦៥ ៦៦ ៦៧ ៦៨ ៦៩ ៧០ ៧១ ៧២ ៧៣ ៧៤ ៧៥ ៧៦ ៧៧ ៧៨ ៧៩ ៨០ ៨១ ៨២ ៨៣ ៨៤ ៨៥ ៨៦ ៨៧ ៨៨ ៨៩ ៩០ ៩១ ៩២ ៩៣ ៩៤ ៩៥ ៩៦ ៩៧ ៩៨ ៩៩ ១០០

▷ Default : Port security : disable
MAX : 1

violation mode : shutdown

sticky address learning : disabled

▽ Verify show post-security interface FastEthernet 0/1/9

ARP (Address Resolution Protocol)

= map IP to MAC Addr and store in ARP cache send to the host

Diagram 17 ARP request : $cf:7d:33$ MAC Addr : 809 MAC Addr in broadcast

27) ന്ന ന്ന ന്ന ARP request എന്തെങ്കിലും സമയത്ത് ARP request ന്ന ന്ന ARP reply

3) Store in ARP cache

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IPv4

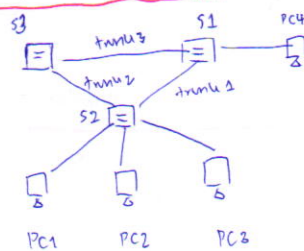
classful ① class A (1-126) ② class B (128-191) ③ class C (192-223)

classless Inter Domain Routing (CIDR)

Fixed Length Subnet Masking : ง่าย ๆ ง่าย ๆ
Variable Length Subnet Masking : ธรรมดา ง่าย ๆ

125 = 128 126 = 192 127 = 224 128 = 240 129 = 248 130 = 252 31/254

Layer 1 Redundancy



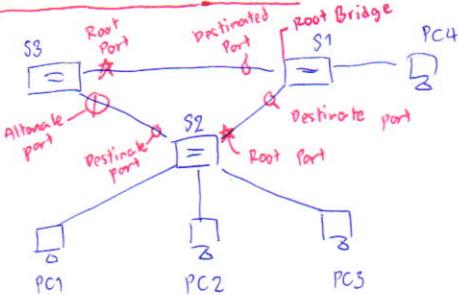
① MAC database instability : เมื่อ MAC table เปลี่ยนแปลง คอมพิวเตอร์
จะรับ: รับ: sw broadcast packet ใน network

② Broadcast Storms : เมื่อ PC1 ส่ง broadcast packet, packet นั้น
ก็จะวน loop ไปเรื่อย ๆ เมื่อ PC ส่ง broadcast packet
แล้ว broadcast จะวน loop ไปเรื่อย ๆ traffic
overload

(Multiple frame transmission)
③ Duplicate Unicast Frames : PC1 ส่ง unicast ไป PC4
S2 จะส่ง packet ไป PC4 แล้ว flood ออกทุก port
S3, S1 จะส่ง packet ไป PC4 จาก flooding ของ S2
ทำให้ PC4 ได้รับ 2 packet จาก S1, S3

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SPANNING TREE PROTOCOL



STP : ensure that there is ONE logical path between all destinations
by intentionally blocking redundant paths that can cause loop

blocked port = user data (data) / loop port ไม่ได้รับ
bridge protocol data unit (BPDU)

ถ้ามี loop มันจะเกิด STP จะเลือก redundancy path active

Root Bridge

BID

- priority ที่น้อยที่สุด
- all port on root bridge
เป็น designated port

Root Port

- Port ที่เชื่อม Root bridge เข้ามา

Designated Port

- ถ้า one end is root port, another end
is designated port

BID ← priority (ค่าที่น้อยที่สุด)
MAC Address

Bridge priority

Extended system ID

BID จาก S3

alternative port

designated port BID ไม่ยอม

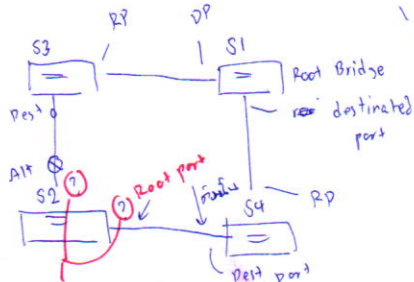
ถ้า BID ของ S3

สูงกว่า BID ของ S2

จะกลายเป็น designated port

Link speed	(Revised IEEE) Cost	(Previous) Cost
10 Gb/s	2	1
1 Gb/s	4	1
100 Mb/s	19	10
1 Mb/s	100	100

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เลือก root port

เลือก cost ที่น้อยที่สุด

ถ้า BID ของ S4, S3

BID S4 < BID S3

1 topology มี 1 root bridge

Root bridge มี Designated port

sw ที่ไม่ได้ root bridge จะมี 1 root port

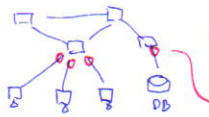
A decorative pink wavy line.

Protocol	Standard	Resource Needed	Convergence	Tree Calculation
STP	802.1D	Low	Slow	All VLANs
PVST+	Cisco	High	Slow	per VLANs
RSTP	802.1w	Medium	Fast	All VLANs
Rapid PVST+	Cisco	Very High	Fast	per VLANs
MSTP	802.1s Cisco	Medium / High	Fast	per Instance

PVST+ : extended switch ID ensures each switch has unique BID for each VLAN

Processes	Bloching	listening	Learning	Forwarding	Disabled
Processes received BPDUs	Yes	Yes	Yes	Yes	No
Forwards data frames received on interface	No	No	No	No	No
" ————— " learned from another interface	No	No	No	Yes	No
Learn MAC address	No	No	Yes	Yes	No

Rapid PVST+ : 72ms blocked port ~~trans~~ state res port ~~trans~~ forwarding learning discarding



Frame width IEEE 802.1P 110th version = 2

Edge port : attach Cisco port Fast

: part information sur, main end point

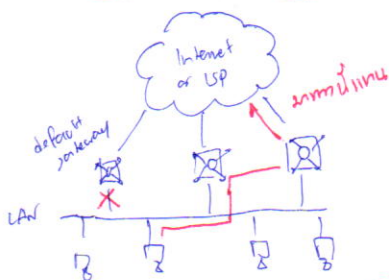
FIRST HOP REDUNDANCY PROTOCOLS

default gateway limitations : in default gate way no dimension configuration

: එමගින් redundancy router දීමක් තිබෙන බැවින් new default gateway

First hop redundancy = the ability to dynamically recover from the failure of device

acting as a default gateway



variety of
hist rep

- ## Hot Standby Router Protocol (HSRP)

HSRP Per 1Pv6

Virtual Router Redundancy Protocol version 2
(VRRPv2)

VRRPv3

show glbp

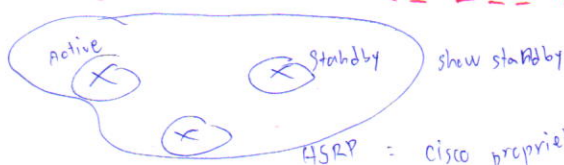
cisco proprietary

gateway load balancing protocol (GLBP)

automatic selection &
simultaneous use of multiple
gateways

VRP = standard protocol

HSRP = Cisco proprietary



for Staples

VLAN

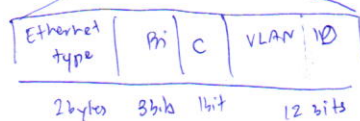
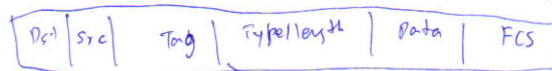
= each VLAN is a broadcast domain

: ที่ถูก management switch 1 domain

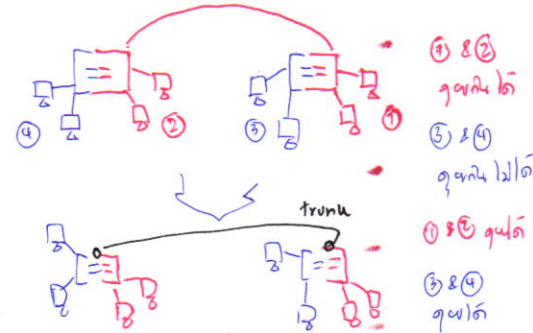
Benefits : improved security, Reduce Cost, Better Performance, Smaller Broadcast, IT & manage effiTypes [Port based
MAC Addr based (isn't used)]VLAN trunk : คือสายที่เชื่อมกัน 1 VLAN

• Tagging Ethernet Frame for VLAN Identification

- sw จะ tag frame เมื่อมันผ่าน VLAN ใน network แล้ว



L มีค่าใน network ไม่ไป root tag



* ถ้า native VLAN ไม่ใส่ tag , 96 cisco VLAN = native VLAN

for Staples

• 12800 VLAN = VLAN dot address flag

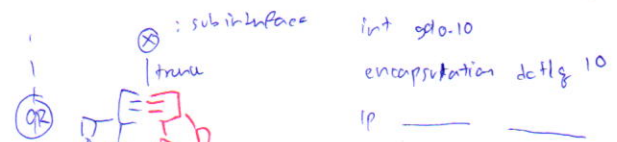
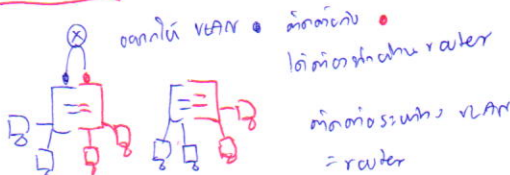
VLANnormal range VLANs : number 1 - 1005

↓ 12800

extended range VLANs : number 1006 - 4096

: config stored in memory - config (NVRAM)

: VTP ได้ learn extended range VLAN

Inter VLANs : มี 2 วิธี คือ VLAN routing**VTP (VLAN Trunking Protocol)** : cisco proprietary , use trunk to manage addition deletion & renaming of VLAN

: config VTP then setup VLANs optional.

Feature	mode		
	Server	Client	Transparent
Source VTP Messages	✓	✓	✗
Listen to "	✓	✓	✗
Create, edit, remove, delete VLAN	✓	✗	✓*
Remember VLANs	✓	✗	✓*

* Locally significant only

for Staples

VTP Pruning : enhances network BW used by reducing unnecessary flooding of traffic switch (vlan) # vtp pruning switch config # in for all , switchport trunk pruning

→ vlan remove [id]

EIGRP

- : ~~cisco proprietary~~ distance vector routing protocol
- : classless version of RRP
- : Ideal for large multiprotocol nw built primary on cisco routers

Feature	
Diffusing Update Algorithm (DUAL)	EIGRP use DUAL as its routing algorithm DUAL guarantee loop-free & back up paths throughout routing domain
Establish Neighbor Adjacencies	EIGRP establish relationship with directly connected EIGRP routers Adjacencies are used to track status of these neighbors
Reliable Transport Protocol (RTP)	provide delivery of EIGRP packets to neighbor RTP & neighbor adjacencies are used by DUAL
Partial and Bounded updates	update incrementally
Equal & unequal cost load balancing	Load balance links w/ equal & unequal cost

PPMs : protocol dependent module ~~integrated~~ protocol interacts w/ IPv4 IPv6

PPMs are responsible for

- maintaining EIGRP neighbor & topology tables
- compute metric using DUAL
- interfacing DUAL & routing table
- implementing filtering & access list
- perform redistribution with other routing protocols

RTP : used for delivery & ~~packet~~ reception of EIGRP packets

Reliable packets

- require explicit ACK acknowledgement
- Update Query Reply

Unreliable packets

- Hello, ACK
- not require explicit acknowledgement

Support Authentication (EIGRP authn doesn't encrypt routing updates)

EIGRP Packet Types

- Hello : discover other EIGRP routers in nw
- Update : convey routing information to known dest

Sent to initially exchange topology info / change
only contain needed info & unicast to router that require it

- ACK
- Query
- Reply

(can use multicast / unicast)

used by DUAL when search for nw

only unicast

EIGRP Message :

- destination multicast Addr 01-00-5E-00-00-CA
- IP Packet header contain dest IP 224.0.0.10 & EIGRP (protocol 88)
- data — (1) packet header : type of msg (2) Type / Length value