

Spanning Tree Protocol

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ABSTRAK

Pada materi ini membahas tentang Spanning Tree Protocol (STP) yang mencegah terjadinya loop di dalam suatu jaringan. Serta akan membahas mengenai Redundancy dalam suatu jaringan, broadcast storms, stp algoritma, serta cara membuat root bridge dan mengkonfigurasinya pada vlan dan membahas mengenai root bridge, BPDU, dan membuat topologi vlan, vtp, intervlan routing, DHCP, stp.

Kata Kunci : spanning tree protocol, stp algoritma, traffic loops, redundant, BPDU.

PENDAHULUAN

Mekanisme untuk mencegah loop adalah STP (Spanning Tree Protocol). Melakukan redundancy dengan spanning tree algoritma mencegah semuanya agar aktif. Jika terjadinya kegagalan STP menggunakan spanning tree algoritma yaitu menentukan port mana yang harus di blocking. Root bridge berfungsi untuk menjadi titik referensi. Setiap switch akan melakukan pertukaran BPDU yang akan membandingkan BPDU mencari bridge ID terkecil yang inilah akan menjadi root bridge. BPDU adalah message frame yang dilakukan antar switch. BPDU ini berisi bridge ID yang ditentukan oleh priority value, mac address, dan extended system ID.

PEMBAHASAN

STP (Spanning Tree Protocol)

Spanning Tree Protocol (STP) adalah Layer 2 link manajemen protokol yang menyediakan redundansi jalan sementara untuk mencegah masalah loop dalam jaringan dan bagaimana STP telah berkembang menjadi sebuah protokol yang cepat menghitung port mana harus diblokir sehingga jaringan VLAN berbasis disimpan bebas dari loop lalu lintas [1].

Spanning Tree Algoritma

STP menggunakan Algoritma Spanning Tree (STA) untuk menentukan port switch pada jaringan harus dikonfigurasi untuk memblokir untuk mencegah loop yang terjadi. STA menunjukkan suatu saklar tunggal sebagai jembatan root dan menggunakannya sebagai titik referensi untuk semua perhitungan jalur [1].

Ada empat peran yang berbeda yang terkonfigurasi secara otomatis pada saat proses spanning tree :

- Root port, merupakan port switch yang paling dekat terhadap root bridge. Root ports meneruskan traffic menuju ke root bridge. MAC address sumber dari frame yang

diterima pada root port dapat digunakan untuk membuat table MAC. Hanya satu root port yang diperbolehkan per bridge.

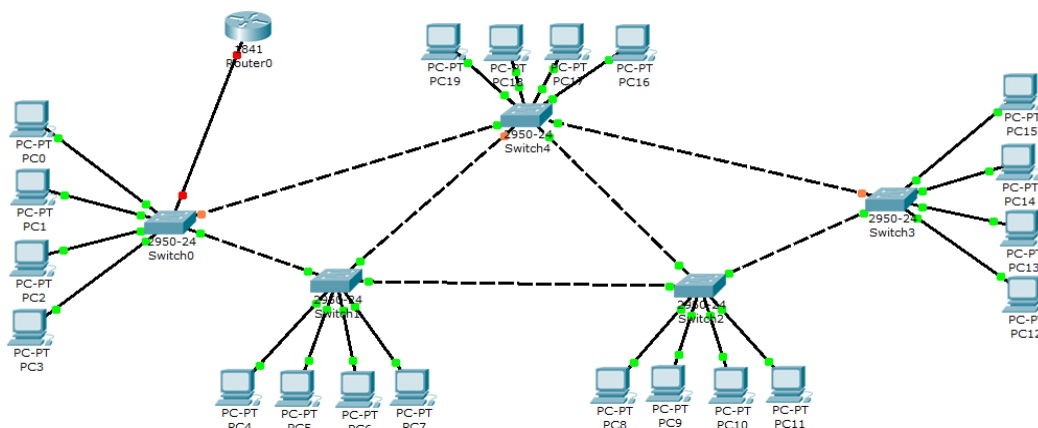
- Designated port, merupakan semua non-root ports yang masih diperbolehkan untuk meneruskan traffic pada network. Hanya satu designated port yang diperbolehkan pada tiap segment.
- Non-designated port, merupakan semua port yang dikonfigurasi sebagai pemblokir untuk mencegah terjadinya traffic loop.
- Disabled Port, merupakan port yang dinon-aktifkan secara administratif, port yang dinon-aktifkan tidak berfungsi dalam proses spanning tree [1].

Bridge Protocol Data Unit (BPDU) adalah pesan yang dipertukarkan antara switch di dalam sebuah Area Network saling berhubungan berlebihan Lokal (LAN) [2].

Broadcast Storms

Broadcast Storms terjadi ketika ada siaran frame begitu banyak terjebak dalam loop 2 layer bahwa semua bandwidth yang tersedia dikonsumsi. broadcast storm tidak dapat dihindari pada jaringan dilingkarkan. Sebagai perangkat mengirimkan lebih siaran keluar pada jaringan, lalu lintas semakin banyak tertangkap dalam loop, akhirnya menciptakan broadcast storm yang menyebabkan jaringan untuk gagal. STP Topologi Redundansi meningkatkan ketersediaan topologi jaringan dengan melindungi jaringan dari satu titik kegagalan, seperti kabel jaringan gagal atau switch. Ketika redundansi diperkenalkan ke dalam desain 2 Layer, loop dan frame duplikat dapat terjadi. Loops dan frame duplikat dapat memiliki konsekuensi parah pada jaringan. Protokol Spanning Tree (STP) dikembangkan untuk mengatasi masalah ini. STP memastikan bahwa hanya ada satu jalur logis antara semua tujuan pada jaringan dengan sengaja memblokir jalan berlebihan yang dapat menyebabkan lingkaran. Sebuah port dianggap diblokir saat lalu lintas jaringan dicegah dari memasuki atau meninggalkan port tersebut [1].

Contoh STP pada network :



Gambar Topologi STP

KONFIGURASI PADA ROUTER

```
Router>enable
Router#conf ter
Router(config)#interface fastEthernet 0/0
Router(config-if)#no shutdown
Router(config-if)#exit
```

Cara mensetting password :

```
Router(config)#enable password 1234
Router(config-line)#line vty 0 4
Router(config-line)#password 2345
Router(config-line)#login
Router(config-line)#exit
Router(config)#interface fastEthernet 0/0.2
Router(config-subif)#encapsulation dot1Q 2
Router(config-subif)#ip address 192.168.1.1 255.255.255.0
Router(config-subif)#ex
Router(config)#interface fastEthernet 0/0.3
Router(config-subif)#encapsulation dot1Q 3
Router(config-subif)#ip address 192.168.2.1 255.255.255.0
Router(config-subif)#ex
Router(config)#interface fastEthernet 0/0.4
Router(config-subif)#encapsulation dot1Q 4
Router(config-subif)#ip address 192.168.3.1 255.255.255.0
Router(config-subif)#ex
Router(config)#interface fastEthernet 0/0.5
Router(config-subif)#encapsulation dot1Q 5
Router(config-subif)#ip address 192.168.4.1 255.255.255.0
Router(config-subif)#ex
Router(config)#interface fastEthernet 0/0.6
Router(config-subif)#encapsulation dot1Q 6
Router(config-subif)#ip address 192.168.5.1 255.255.255.0
Router(config-subif)#ex
Router(config)#interface fastEthernet 0/0.7
Router(config-subif)#encapsulation dot1Q 7
Router(config-subif)#ip address 192.168.6.1 255.255.255.0
Router(config-subif)#ex
Router(config)#interface fastEthernet 0/0.8
Router(config-subif)#encapsulation dot1Q 8
Router(config-subif)#ip address 192.168.7.1 255.255.255.0
Router(config-subif)#ex
Router(config)#interface fastEthernet 0/0.9
Router(config-subif)#encapsulation dot1Q 9
Router(config-subif)#ip address 192.168.8.1 255.255.255.0
Router(config-subif)#ex
Router(config)#interface fastEthernet 0/0.10
Router(config-subif)#encapsulation dot1Q 10
```

```
Router(config-subif)#ip address 192.168.9.1 255.255.255.0
Router(config-subif)#ex
Router(config)#interface fastEthernet 0/0.11
Router(config-subif)#encapsulation dot1Q 11
Router(config-subif)#ip address 192.168.10.1 255.255.255.0
Router(config-subif)#ex
Router(config)#interface fastEthernet 0/0.12
Router(config-subif)#encapsulation dot1Q 12
Router(config-subif)#ip address 192.168.11.1 255.255.255.0
Router(config-subif)#ex
Router(config)#interface fastEthernet 0/0.13
Router(config-subif)#encapsulation dot1Q 13
Router(config-subif)#ip address 192.168.12.1 255.255.255.0
Router(config-subif)#ex
Router(config)#interface fastEthernet 0/0.14
Router(config-subif)#encapsulation dot1Q 14
Router(config-subif)#ip address 192.168.13.1 255.255.255.0
Router(config-subif)#ex
Router(config)#interface fastEthernet 0/0.15
Router(config-subif)#encapsulation dot1Q 15
Router(config-subif)#ip address 192.168.14.1 255.255.255.0
Router(config-subif)#ex
Router(config)#interface fastEthernet 0/0.16
Router(config-subif)#encapsulation dot1Q 16
Router(config-subif)#ip address 192.168.15.1 255.255.255.0
Router(config-subif)#ex
Router(config)#interface fastEthernet 0/0.17
Router(config-subif)#encapsulation dot1Q 17
Router(config-subif)#ip address 192.168.16.1 255.255.255.0
Router(config-subif)#ex
```

```
Router(config)#interface fastEthernet 0/0.18
Router(config-subif)#encapsulation dot1Q 18
Router(config-subif)#ip address 192.168.17.1 255.255.255.0
Router(config-subif)#ex
Router(config)#interface fastEthernet 0/0.19
Router(config-subif)#encapsulation dot1Q 19
Router(config-subif)#ip address 192.168.18.1 255.255.255.0
Router(config-subif)#ex
Router(config)#interface fastEthernet 0/0.20
Router(config-subif)#encapsulation dot1Q 20
Router(config-subif)#ip address 192.168.19.1 255.255.255.0
Router(config-subif)#ex
Router(config)#interface fastEthernet 0/0.21
Router(config-subif)#encapsulation dot1Q 21
Router(config-subif)#ip address 192.168.20.1 255.255.255.0
Router(config-subif)#ex
```

Cara Setting DHCP :

```
Router(config)#ip dhcp pool vlan2
Router(dhcp-config)#default-router 192.168.1.1
Router(dhcp-config)#network 192.168.1.0 255.255.255.0
Router(dhcp-config)#ex
Router(config)#ip dhcp pool vlan3
Router(dhcp-config)#default-router 192.168.2.1
Router(dhcp-config)#network 192.168.2.0 255.255.255.0
Router(dhcp-config)#ex
Router(config)#ip dhcp pool vlan4
Router(dhcp-config)#default-router 192.168.3.1
Router(dhcp-config)#network 192.168.3.0 255.255.255.0
Router(config)#ip dhcp pool vlan5
Router(dhcp-config)#default-router 192.168.4.1
Router(dhcp-config)#network 192.168.4.0 255.255.255.0
Router(dhcp-config)#ex
Router(config)#ip dhcp pool vlan6
Router(dhcp-config)#default-router 192.168.5.1
Router(dhcp-config)#network 192.168.5.0 255.255.255.0
Router(dhcp-config)#ex
Router(config)#ip dhcp pool vlan7
Router(dhcp-config)#default-router 192.168.6.1
Router(dhcp-config)#network 192.168.6.0 255.255.255.0
Router(dhcp-config)#ex
Router(config)#ip dhcp pool vlan8
Router(dhcp-config)#default-router 192.168.7.1
Router(dhcp-config)#network 192.168.7.0 255.255.255.0
Router(dhcp-config)#ex
Router(config)#ip dhcp pool vlan9
Router(dhcp-config)#default-router 192.168.8.1
Router(dhcp-config)#network 192.168.8.0 255.255.255.0
Router(dhcp-config)#ex
Router(config)#ip dhcp pool vlan10
Router(dhcp-config)#default-router 192.168.9.1
Router(dhcp-config)#network 192.168.9.0 255.255.255.0
Router(dhcp-config)#ex
Router(config)#ip dhcp pool vlan11
Router(dhcp-config)#default-router 192.168.10.1
Router(dhcp-config)#network 192.168.10.0 255.255.255.0
Router(dhcp-config)#ex
Router(config)#ip dhcp pool vlan12
Router(dhcp-config)#default-router 192.168.11.1
Router(dhcp-config)#network 192.168.11.0 255.255.255.0
Router(dhcp-config)#ex
Router(config)#ip dhcp pool vlan13
Router(dhcp-config)#default-router 192.168.12.1
Router(dhcp-config)#network 192.168.12.0 255.255.255.0
Router(dhcp-config)#ex
Router(config)#ip dhcp pool vlan14
Router(dhcp-config)#default-router 192.168.13.1
```

```
Router(dhcp-config)#network 192.168.13.0 255.255.255.0
Router(dhcp-config)#ex
Router(config)#ip dhcp pool vlan15
Router(dhcp-config)#default-router 192.168.14.1
Router(dhcp-config)#network 192.168.14.0 255.255.255.0
Router(dhcp-config)#ex
Router(config)#ip dhcp pool vlan16
Router(dhcp-config)#default-router 192.168.15.1
Router(dhcp-config)#network 192.168.15.0 255.255.255.0
Router(dhcp-config)#ex
Router(config)#ip dhcp pool vlan17
Router(dhcp-config)#default-router 192.168.16.1
Router(dhcp-config)#network 192.168.16.0 255.255.255.0
Router(dhcp-config)#ex
Router(config)#ip dhcp pool vlan18
Router(dhcp-config)#default-router 192.168.17.1
Router(dhcp-config)#network 192.168.17.0 255.255.255.0
Router(dhcp-config)#ex
Router(config)#ip dhcp pool vlan19
Router(dhcp-config)#default-router 192.168.18.1
Router(dhcp-config)#network 192.168.18.0 255.255.255.0
Router(dhcp-config)#ex
Router(config)#ip dhcp pool vlan20
Router(dhcp-config)#default-router 192.168.19.1
Router(dhcp-config)#network 192.168.19.0 255.255.255.0
Router(dhcp-config)#ex
Router(config)#ip dhcp pool vlan21
Router(dhcp-config)#default-router 192.168.20.1
Router(dhcp-config)#network 192.168.20.0 255.255.255.0
Router(dhcp-config)#ex
Router(config)#^Z
Router#copy running-config startup-config
Destination filename [startup-config]?
Building configuration...
[OK]
```

Konfigurasi Switch S1:

```
Switch>ena
Switch#conf t
Cara membuat membuat nama switch :
Switch(config)#hostname Server
Cara membuat password switch :
Server (config)#enable password 1234
Server (config)#line vty 0 4
Server (config-line)#password 2345
Server (config-line)#login
Server (config-line)#exit
```

MENSETTING VLAN PADA SWITCH

```
Server (config)#vlan 2
Server (config-vlan)#name vlan2
Server (config-vlan)#ex
Server (config)#vlan 3
Server (config-vlan)#name vlan3
Server (config-vlan)#ex
Server (config)#vlan 4
Server (config-vlan)#name vlan4
Server (config-vlan)#ex
Server (config)#vlan 5
Server (config-vlan)#name vlan5
Server (config-vlan)#ex
Server (config)#vlan 6
Server (config-vlan)#name vlan6
Server (config-vlan)#ex
Server (config)#vlan 7
Server (config-vlan)#name vlan7
Server (config-vlan)#ex
Server (config)#vlan 8
Server (config-vlan)#name vlan8
Server (config-vlan)#ex
Server (config)#vlan 9
Server (config-vlan)#name vlan9
Server (config-vlan)#ex
Server (config)#vlan 10
Server (config-vlan)#name vlan10
Server (config-vlan)#ex
Server (config)#vlan 11
Server (config-vlan)#name vlan11
Server (config-vlan)#ex
Server (config)#vlan 12
Server (config-vlan)#name vlan12
Server (config-vlan)#ex
```

```
Server (config)#vlan 13
Server (config-vlan)#name vlan13
Server (config-vlan)#ex
Server (config)#vlan 14
Server (config-vlan)#name vlan14
Server (config-vlan)#ex
Server (config)#vlan 15
Server (config-vlan)#name vlan15
Server (config-vlan)#ex
Server (config)#vlan 16
Server (config-vlan)#name vlan16
Server (config-vlan)#ex
```

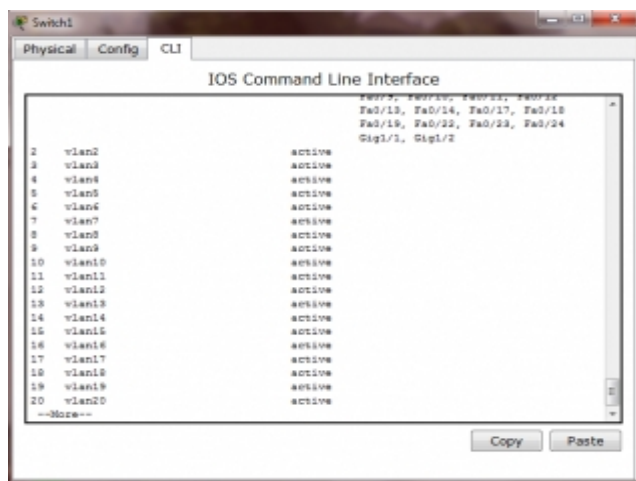
```

Server (config)#vlan 17
Server (config-vlan)#name vlan17
Server (config-vlan)#ex
Server (config)#vlan 18
Server (config-vlan)#name vlan18
Server (config-vlan)#ex
Server (config)#vlan 19
Server (config-vlan)#name vlan19
Server (config-vlan)#ex
Server (config)#vlan 20
Server (config-vlan)#name vlan20
Server (config-vlan)#ex
Server (config)#vlan 21
Server (config-vlan)#name vlan21
Server (config-vlan)#ex
Server (config)#^Z

```

Server# show vlan brief

gambar vlan aktif



Mensetting member tiap VLAN :

```

Server (config)#interface fastEthernet 0/1
Server (config-if-range)#switchport mode access
Server (config-if-range)#switchport access vlan 18
Server (config-if-range)#ex
Server (config)#interface fastEthernet 0/2
Server (config-if-range)#switchport mode access
Server (config-if-range)#switchport access vlan 19
Server (config-if-range)#ex
Server (config)#interface fastEthernet 0/3
Server (config-if-range)#switchport mode access
Server (config-if-range)#switchport access vlan 20
Server (config-if-range)#ex

```

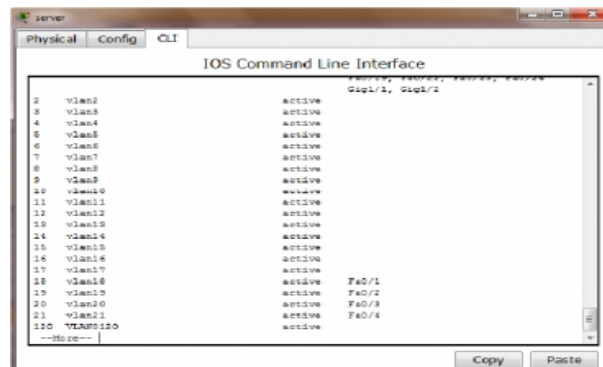


```

Server (config)#interface fastEthernet 0/4
Server (config-if)#switchport mode access
Server (config-if)#switchport access vlan 21
Server (config-if)#ex
Server (config)#^Z
Server (config)#show vlan brief

```

Gambar Member Port Vlan yg telah aktip



MENSETTING PORT TRUNK

```

Server (config)#interface range fastEthernet 0/15-16
Server (config-if)#switchport mode trunk
Server (config-if)#switchport trunk native vlan 1
Server (config-if)#ex
Server (config)#interface range fastEthernet 0/20-21
Server (config-if)#switchport mode trunk
Server (config-if)#switchport trunk native vlan 1
Server (config-if)#ex

```

CARA SETTING VTP

```

Server (config)#vtp mode server
Server (config)#vtp domain unsri
Server (config)#vtp password 1234
Server (config)#end
server#copy running-config startup-config
Destination filename [startup-config]?
Building configuration...
[OK]

```

Konfigurasi Switch S2:

Cara membuat membuat nama switch :
switch(config)#hostname S2

Cara membuat password switch :
Server (config)#enable password 1234
S2 (config)#line vty 0 4
S2 (config-line)#password 2345
S2 (config-line)#login
S2 (config-line)#exit
Cara Mensetting VTP client :
S2 (config)#vtp mode client
S2 (config)#vtp domain unsri
S2 (config)#vtp password 1234

S2 (config)#end

CARA MENSETTING PORT TRUNK

S2 (config)#interface range fastEthernet 0/21-22
S2 (config-if)#switchport mode trunk
S2 (config-if)#switchport trunk native vlan 1
S2 (config-if)#ex
S2 (config)#interface fastEthernet 0/24
S2 (config-if)#switchport mode trunk
S2 (config-if)#switchport trunk native vlan 1
S2 (config-if)#ex
Membuat member port:
S2 (config)#interface fastEthernet0/1
S2 (config-if-range)#switchport mode access
S2 (config-if-range)#switchport access vlan 14
S2 (config-if-range)#ex
S2 (config)#interface fastEthernet 0/2
S2 (config-if-range)#switchport mode access
S2 (config-if-range)#switchport access vlan 15
S2 (config-if-range)#ex
S2 (config)#interface fastEthernet 0/3
S2 (config-if-range)#switchport mode access
S2 (config-if-range)#switchport access vlan 16
S2 (config-if-range)#ex
S2 (config)#interface fastEthernet 0/4
S2 (config-if-range)#switchport mode access
S2 (config-if-range)#switchport access vlan 17
S2 (config-if-range)#ex
S2 (config)#^Z
S2#copy running-config startup-config
Destination filename [startup-config]?
Building configuration...
[OK]

Konfigurasi Switch S3:
Cara membuat membuat nama switch :
switch(config)#hostname S3

Cara membuat password switch :

```
Server (config)#enable password 1234
S3 (config)#line vty 0 4
S3 (config-line)#password 2345
S3 (config-line)#login
S3 (config-line)#exit
```

Cara Mensetting VTP client :

```
S3 (config)#vtp mode client
S3 (config)#vtp domain unsri
S3 (config)#vtp password 1234
```

Cara Mensetting Port Trunk :

```
S3 (config)#interface range fastEthernet 0/23-24
S3 (config-if)#switchport trunk native vlan 1
S3 (config-if)#ex
S3 (config)#interface fastEthernet 0/15
S3 (config-if)#switchport trunk native vlan 1
S3 (config-if)#ex
```

Membuat member port:

```
S3 (config)#interface fastEthernet0/1
S3 (config-if-range)#switchport mode access
S3 (config-if-range)#switchport access vlan 6
S3 (config-if-range)#ex
S3 (config)#interface range fastEthernet 0/2
S3 (config-if-range)#switchport mode access
S3 (config-if-range)#switchport access
S3 (config-if-range)#switchport access vlan 7
S3 (config-if-range)#ex
S3 (config)#interface range fastEthernet 0/3
S3 (config-if-range)#switchport mode access
S3 (config-if-range)#switchport access vlan 8
S3 (config-if-range)#ex
S3 (config)#interface range fastEthernet 0/4
S3 (config-if-range)#switchport mode access
S3 (config-if-range)#switchport access vlan 9
S3 (config-if-range)#ex
S3 (config)#^Z
S3#copy running-config startup-config
Destination filename [startup-config]?
Building configuration...
[OK]
```

Konfigurasi Switch S4:

Cara membuat membuat nama switch :

```
switch(config)#hostname S4
```

Cara membuat password switch :

```
Server (config)#enable password 1234
```

```
S4 (config)#line vty 0 4
S4 (config-line)#password 2345
S4 (config-line)#login
S4 (config-line)#exit
Cara Mensetting VTP client :
S4 (config)#vtp mode client
S4 (config)#vtp domain unsri
S4 (config)#vtp password 1234
Cara Mensetting Port Trunk :
S4 (config)#interface range fastEthernet 0/22-23
S4 (config-if)#switchport trunk native vlan 1
S4 (config-if)#ex
```

```
S4 (config)#interface fastEthernet 0/16
S4 (config-if)#switchport trunk native vlan 1
S4 (config-if)#ex
```

Membuat member port:

```
S4 (config)#interface fastEthernet0/1
S4 (config-if-range)#switchport mode access
S4 (config-if-range)#switchport access vlan 10
S4 (config-if-range)#ex
S4 (config)#interface fastEthernet 0/2
S4 (config-if-range)#switchport mode access
S4 (config-if-range)#switchport access vlan 11
S4 (config-if-range)#ex
S4 (config)#interface fastEthernet 0/3
S4 (config-if-range)#switchport mode access
S4 (config-if-range)#switchport access vlan 12
S4 (config-if-range)#ex
S4 (config)#interface fastEthernet 0/4
S4 (config-if-range)#switchport mode access
S4 (config-if-range)#switchport access vlan 13
S4 (config-if-range)#ex
S4 (config)#^Z
S4#copy running-config startup-config
Destination filename [startup-config]?
Building configuration...
[OK]
```

Konfigurasi Switch S5:

Cara membuat membuat nama switch :

```
switch(config)#hostname S5
```

Cara membuat password switch :

```
Server (config)#enable password 1234
```

```
S4 (config)#line vty 0 4
```

```
S4 (config-line)#password 2345
```

```
S4 (config-line)#login
```

```
S4 (config-line)#exit
```

Cara Mensetting VTP client :

```
S5 (config)#vtp mode client
```

```
S5 (config)#vtp domain unsri
S5 (config)#vtp password 1234
```

Cara Mensetting Port Trunk :

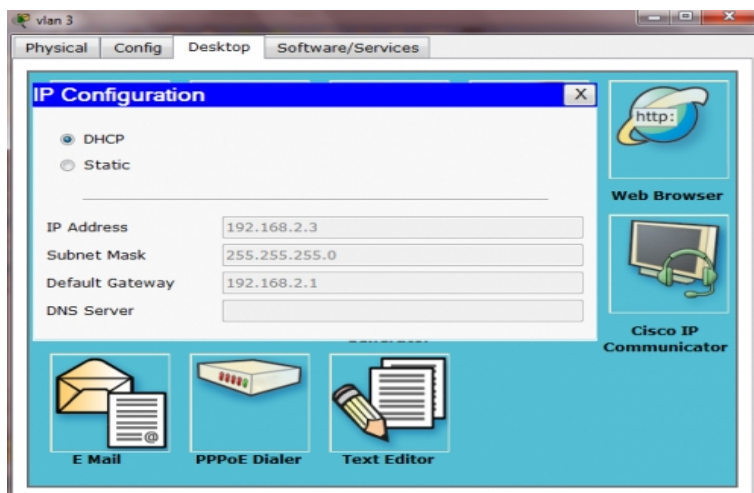
```
S5 (config)#interface range fastEthernet 0/20-24
S5 (config-if)#switchport trunk native vlan 1
S5 (config-if)#ex
```

Membuat member port:

```
S5 (config)#interface fastEthernet0/1
S5 (config-if-range)#switchport mode access
S5 (config-if-range)#switchport access vlan 2
S5 (config-if-range)#ex
S5 (config-if)#interface fastEthernet 0/2
S5 (config-if)#switchport mode access
S5 (config-if)#switchport access vlan 3
S5 (config-if)#ex
S5 (config)#interface fastEthernet 0/3
S5 (config-if)#switchport mode access
S5 (config-if)#switchport access vlan 4
S5 (config-if)#ex
S5 (config)#interface fastEthernet 0/4
S5 (config-if)#switchport mode access
S5 (config-if)#switchport access vlan 5
S5 (config-if)#ex
```

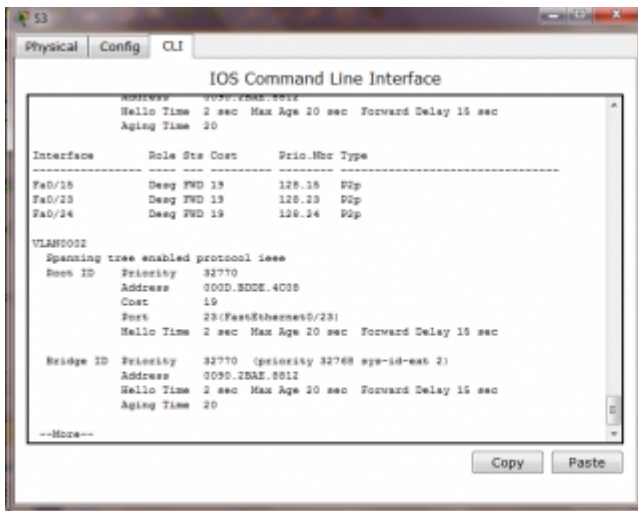
```
S5 (config)#^Z
S5#copy running-config startup-config
Destination filename [startup-config]?
Building configuration...
[OK]
```

gambar DHCP yg berhasil:



cara melihat apakah di network ada root bridge

```
show spanning tree
```



cara mensetting dan mengubah suatu nilai priority di root ID

Cara menyetting stp(spanning tree protokol)

s3#enable

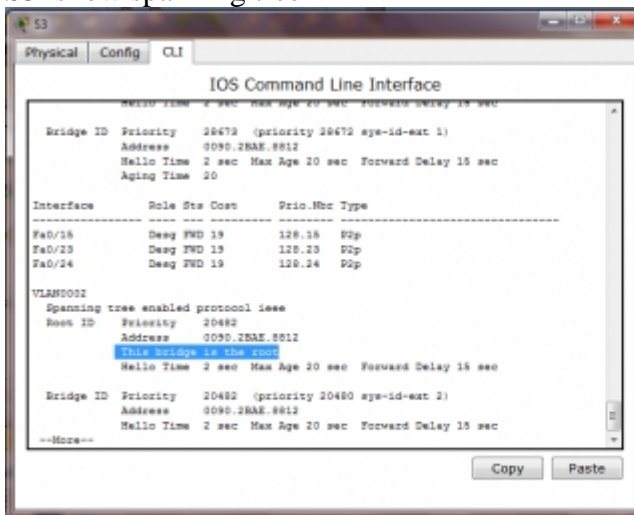
s3#configure terminal

s3(config)#spanning-tree vlan 1 priority (jumlah BID klipatan 4096)

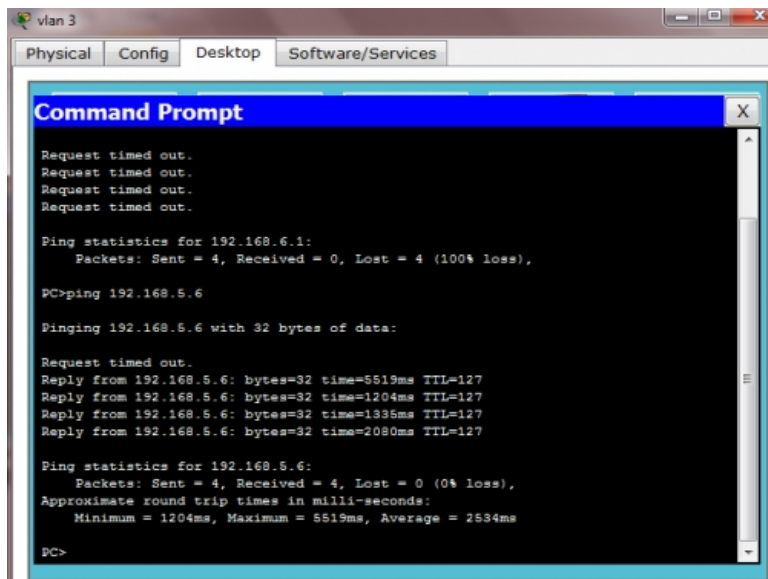
s3(config)#spanning-tree vlan 1 priority 28672

s3#end

S3#show spanning tree



ping menggunakan comand prompt



```
vlan 3
Physical Config Desktop Software/Services

Command Prompt
Request timed out.
Request timed out.
Request timed out.
Request timed out.

Ping statistics for 192.168.6.1:
    Packets: Sent = 4, Received = 0, Lost = 4 (100% loss),

PC>ping 192.168.5.6

Pinging 192.168.5.6 with 32 bytes of data:

Request timed out.
Reply from 192.168.5.6: bytes=32 time=5519ms TTL=127
Reply from 192.168.5.6: bytes=32 time=1204ms TTL=127
Reply from 192.168.5.6: bytes=32 time=1335ms TTL=127
Reply from 192.168.5.6: bytes=32 time=2080ms TTL=127

Ping statistics for 192.168.5.6:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 1204ms, Maximum = 5519ms, Average = 2534ms

PC>
```

KESIMPULAN

STP berfungsi sebagai pencegah agar tidak terjadinya loop. STP akan membuat satu link yang akan diaktifkan sehingga dapat mengirimkan data melalui link tersebut dan link yang lainya akan berfungsi jika link lainnya terjadi sebuah kegagalan.

DAFTAR PUSTAKA

- [1] <http://exp3.cna.ilkom.unsri.ac.id>, diakses pada tanggal 28 April 2012
- [2] Tutang and Kodarsyah, (2001) Belajar Jaringan Sendiri. Medikom, Pustaka Mandiri, Jakarta.