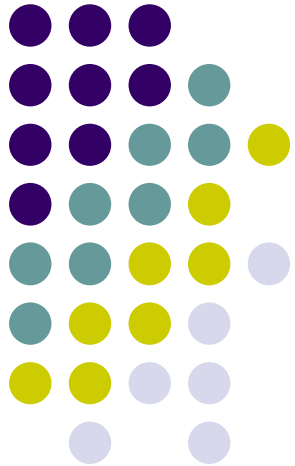
# Bridging and Routing your wireless Network, WDS and OSPF as Case Study



By
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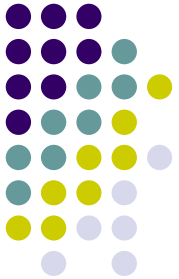
mjohnson@vangage.net, mykjohnson@gmail.com
234-80 33133324, 234 84 785999

# About Vangage Ltd



- Wireless ISP (WISP)
- Network Solution

- Clients Include
- Oil and Gas Sector (SPDC, Shclumberger,Total Elf)
- Banks
- Private Sector

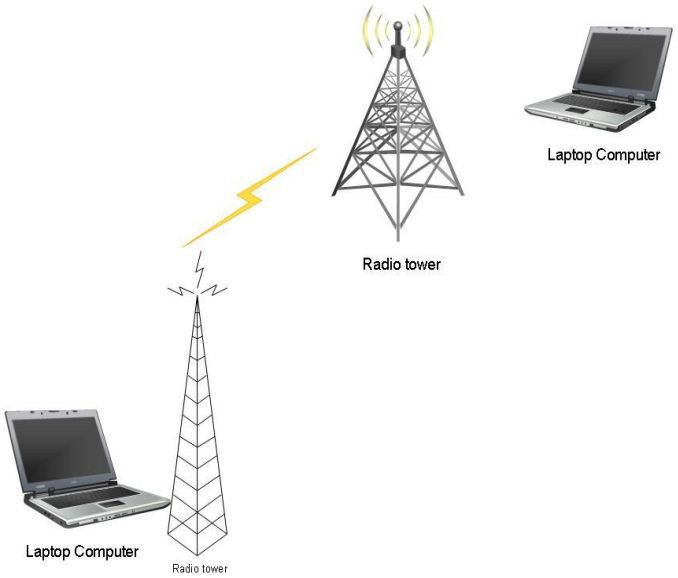
# Overview

- A wireless network
- A bridged network
- A routed Network

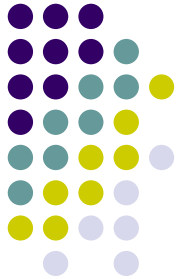
# Wireless network

- Connection of 2 or more network devices wirelessly i.e. without cables

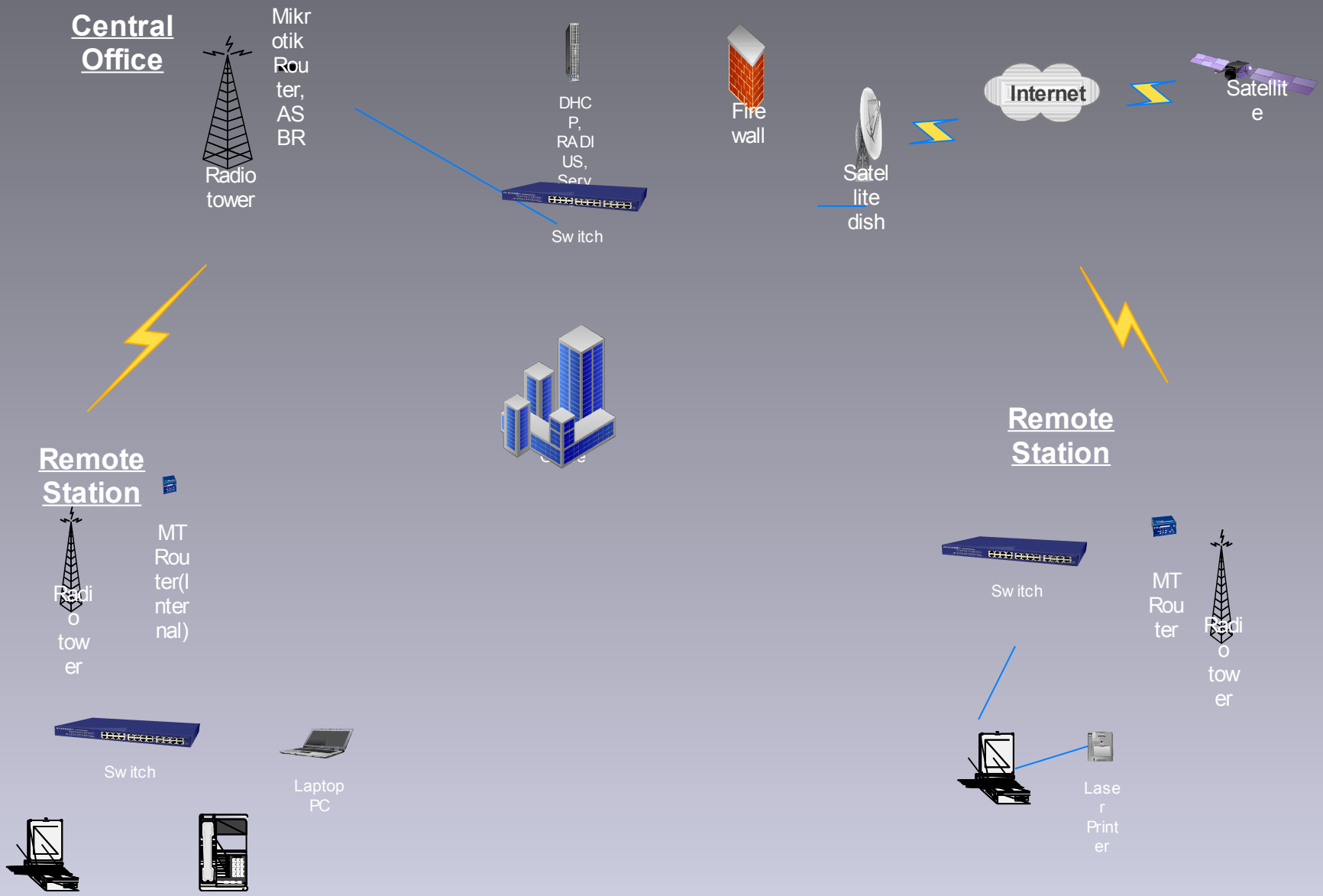
- End points could be connected by  a routing or bridging device



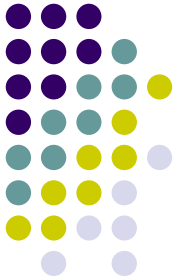
# Outlines on Bridging



- Bridging enlarges the broadcast domain of a network
- Depends on broadcasting to locate a network device
- Deployed on Mikrotik routers using WDS

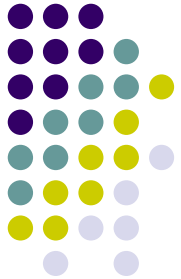

Central Office
Mikrotik Router, ASBR
Radio tower
DHCP, RADIUS, Serv
Switch
Firewall
Satellite dish
Internet
Satellite
Remote Station
MT Router(Internal)
Radio tower
Switch
Laptop PC
Remote Station
Switch
MT Router
Radio tower
Laser Printer

# What you need to know about WDS



- Acronym for Wireless Distribution System (WDS)
- Connects networks wirelessly
- Transparently Bridge networks

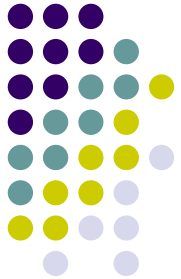
# What you need to know about WDS (Cont'd)



- Locate devices on the network by use of MAC addresses

- Each frame has 2 MAC addresses, i.e. sender's MAC and recipient MAC address

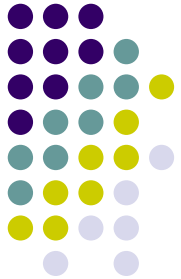
# Hardware for WDS



- Two Mikrotik Routers running wireless (One in AP and other in station mode). Use intergrated mikrotik radio for simplicity

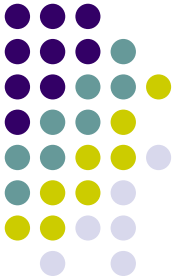
- Laptop connected to both MT routers

# Simple WDS Config (AP side)



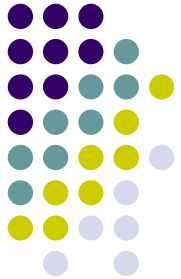
- Create a bridge /int br add name=wds-bridge
- Add relevant interfaces i.e. /int br port interface=ether1 bridge=mum
- /int br port interface=wlan1 bridge=mum
- /interface wireless set wlan1 ssid=MikroTik frequency=5805 mode=bridge disabled=no
- /interface wireless set wlan1 wds-mode=dynamic wds-default-bridge=wds-bridge

# Simple WDS Config (Remote Site)



- Create a bridge /int br add name=wds-bridge
- Add relevant interfaces i.e. /int br port interface=ether1 bridge=mum
- /int br port interface=ether1 bridge=mum
- Configure wireless: interface wireless set wlan1 ssid=MikroTik frequency=5805 mode=station-wds disabled=no
- interface wireless> set wlan1 wds-mode=dynamic wds-default-bridge=wds-bridge

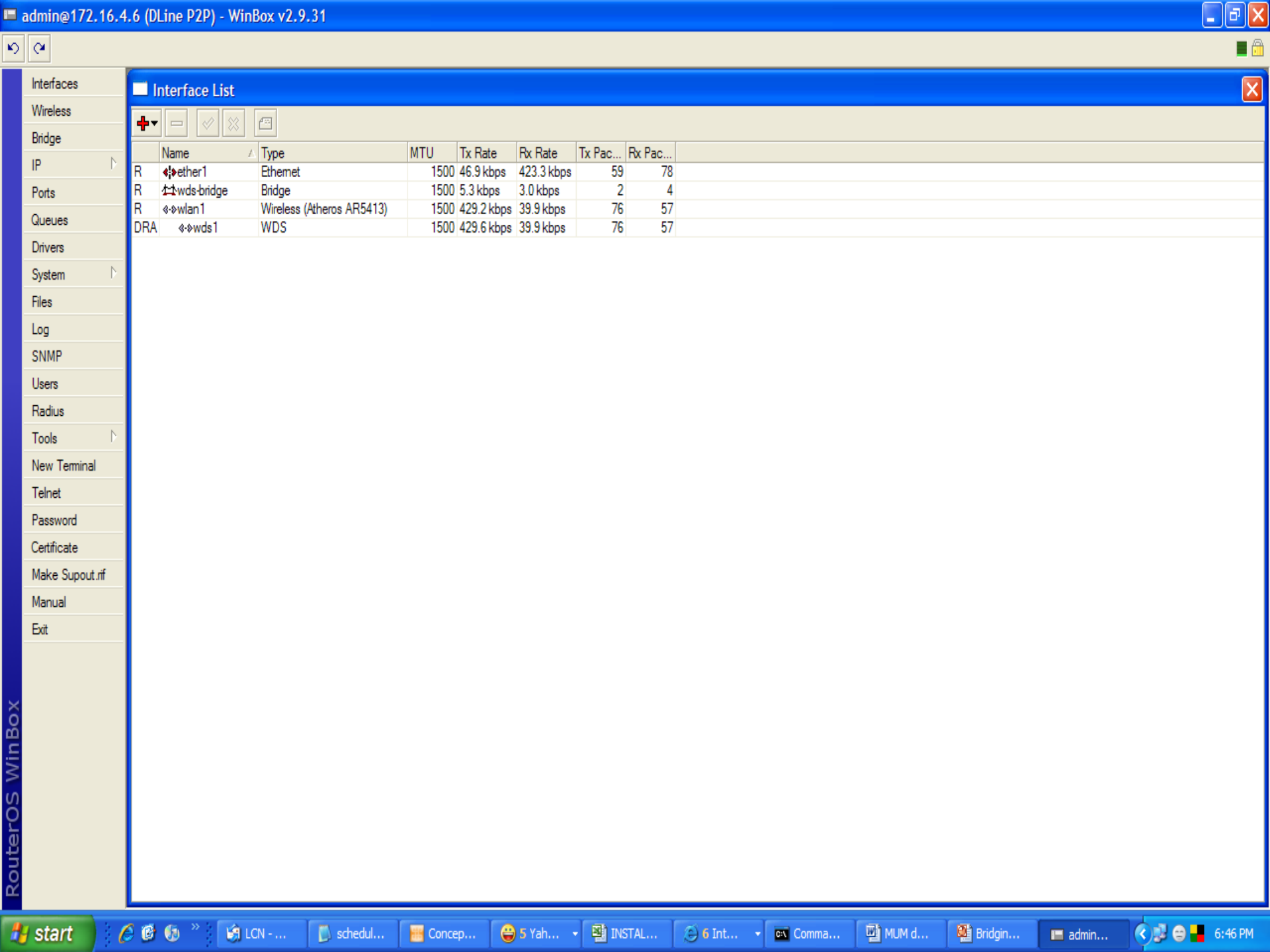
# Simple WDS Config (Cont'd)



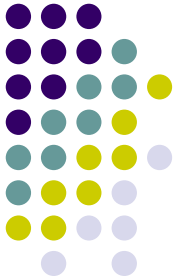
- For AP
- /ip address add address=10.0.1.1/24 interface=wds-bridge

- For Remote site
- /ip address add address=10.0.1.2/24 interface=wds-bridge

- Test your configuration by pinging 10.0.1.2 from pc at AP

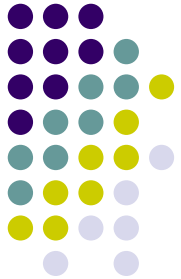

admin@172.16.4.6 (DLine P2P) - WinBox v2.9.31
Interfaces
Wireless
Bridge
IP
Ports
Queues
Drivers
System
Files
Log
SNMP
Users
Radius
Tools
New Terminal
Telnet
Password
Certificate
Make Supout.rif
Manual
Exit
RouterOS WinBox
Interface List
Name
Type
MTU
Tx Rate
Rx Rate
Tx Pac...
Rx Pac...
R ether1 Ethernet 1500 46.9 kbps 423.3 kbps 59 78
R wds-bridge Bridge 1500 5.3 kbps 3.0 kbps 2 4
R wlan1 Wireless (Atheros AR5413) 1500 429.2 kbps 39.9 kbps 76 57
DRA wds1 WDS 1500 429.6 kbps 39.9 kbps 76 57
start
LCN - ...
schedul...
Concep...
5 Yah...
INSTAL...
6 Int...
Comma...
MUM d...
Bridgin...
admin...
6:46 PM

# When To Bridge



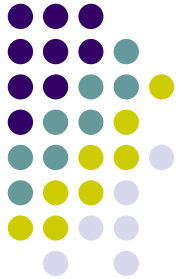
- Extend your office to remove ‘logical boundary’
- Provides avenue for sharing network devices/resources e.g. printers
- Network is centrally managed and trusted
- Limited system processor usage

# Outlines on Routing



- Routing breaks broadcast domains
- Devices are located on the network, by IP addresses. Segments your network
- Types include static and dynamic e.g. OSPF, BGP, RIP

# What you need to know about OSPF

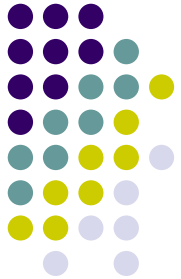


- Acronym for Open Shortest Path First (OSPF)
- Fast routing protocol for large networks

- OSPF network can be broken into smaller units with the backbone Area  0 at the core

- Areas provide logical grouping for routers in same broadcast domain

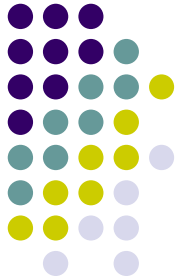
# What you need to know about OSPF (cont'd)



- OSPF is a link-state routing protocol that runs Dijkstra's algorithm to calculate the shortest path to other networks

- Distributes routing information between routers in same AS

# Requirements for OSPF Setup



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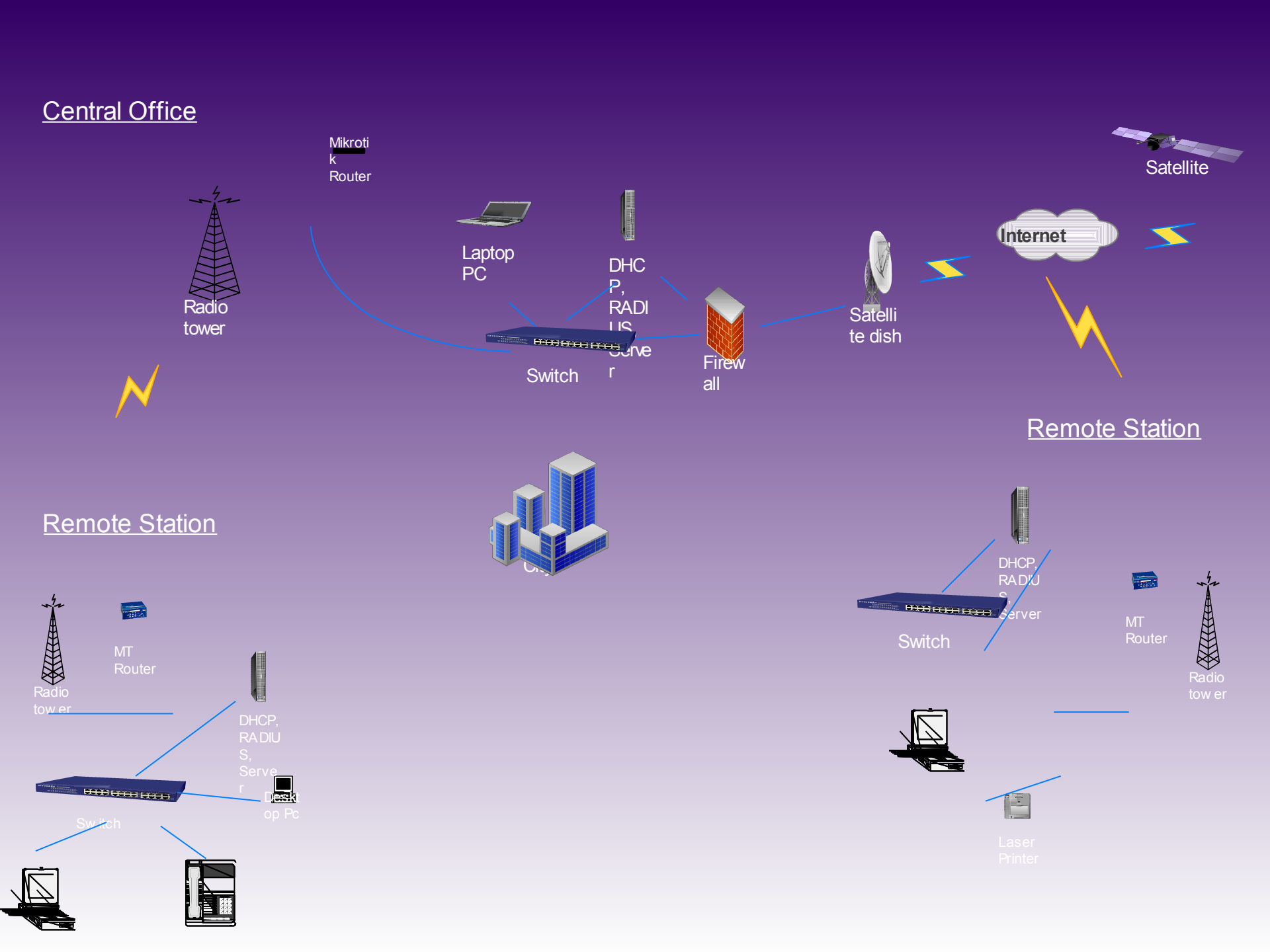
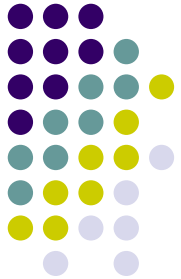

Central Office
Mikrotik Router
Satellite
Radio tower
Laptop PC
DHCP, RADIUS, Server
Switch
Firewall
Satellite dish
Internet
Remote Station
Remote Station
MT Router
Radio tower
DHCP, RADIUS, Server
Switch
Desktop Pc
MT Router
Radio tower
Laser Printer

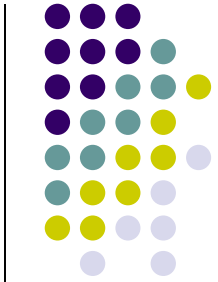
# Simple OSPF Configuration (AP site)



- /ip address add address=10.0.1.1/24 interface=wlan1 disabled=no
- /rou ospf set router-id=10.0.1.1 distribute-default=if-installed-as-type-1
- /rou osp network add network=10.0.1.0/24 area=backbone
- You can add as many networks as you want to advertise

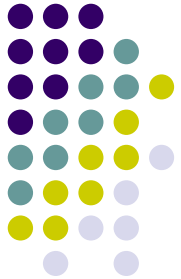
# Simple OSPF Configuration

## (Remote site)



- /ip address add address=10.0.1.2/24 interface=wlan1 disabled=no
- /ip address add address=192.168.1.1/24 interface=ether1 disabled=no
- /rou ospf set router-id=10.0.1.1 redistribute-connected=as-type-1 distribute-default=never
- /rou osp network add network=10.0.1.0/24 area=backbone
- /rou osp network add network=192.168.1.0/24 area=backbone
- /ip firewall nat add src-address 192.168.1.0/24 action=masquerade chain=srcnat

# Simple OSPF Setup (cont'd)



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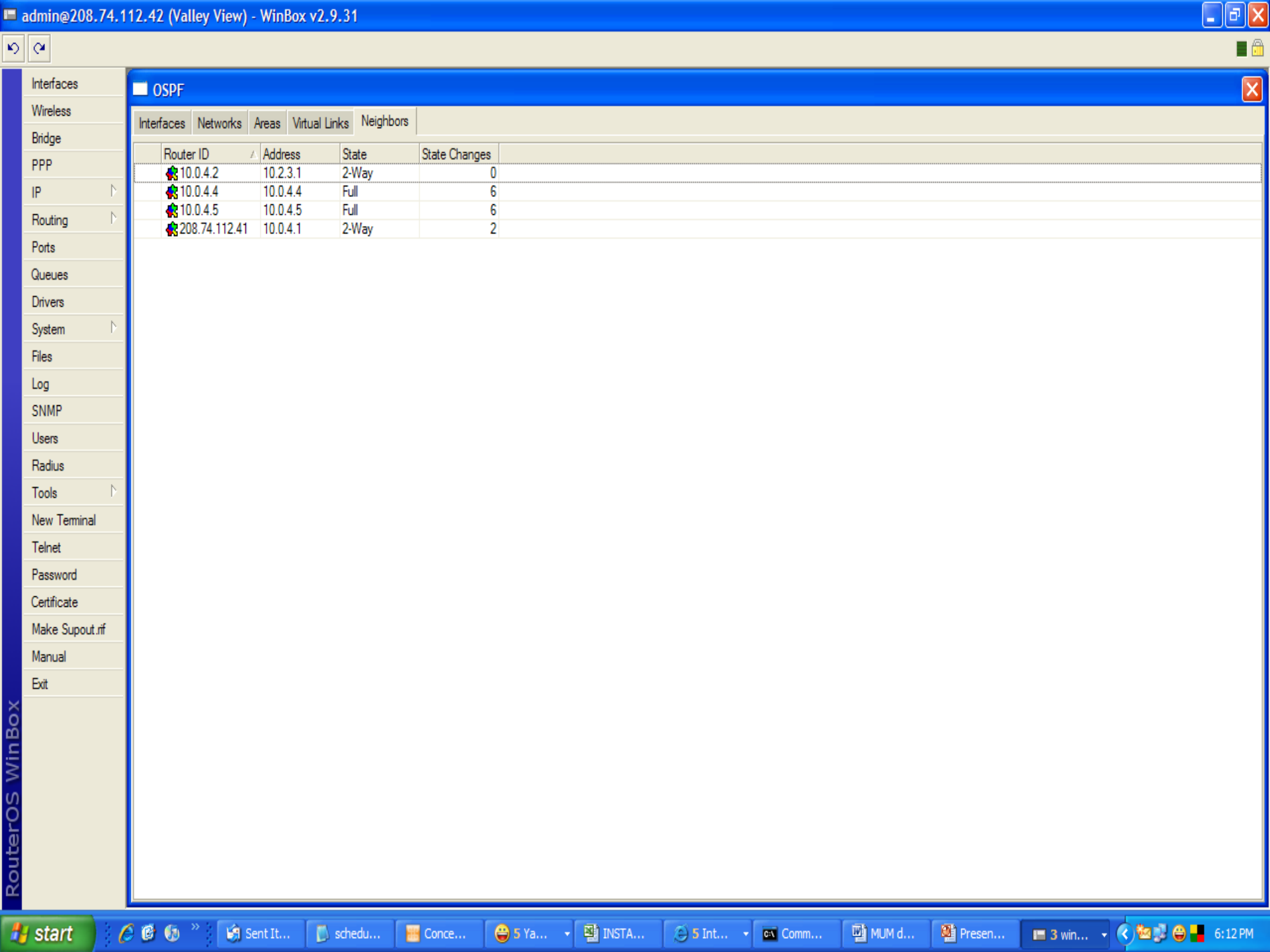
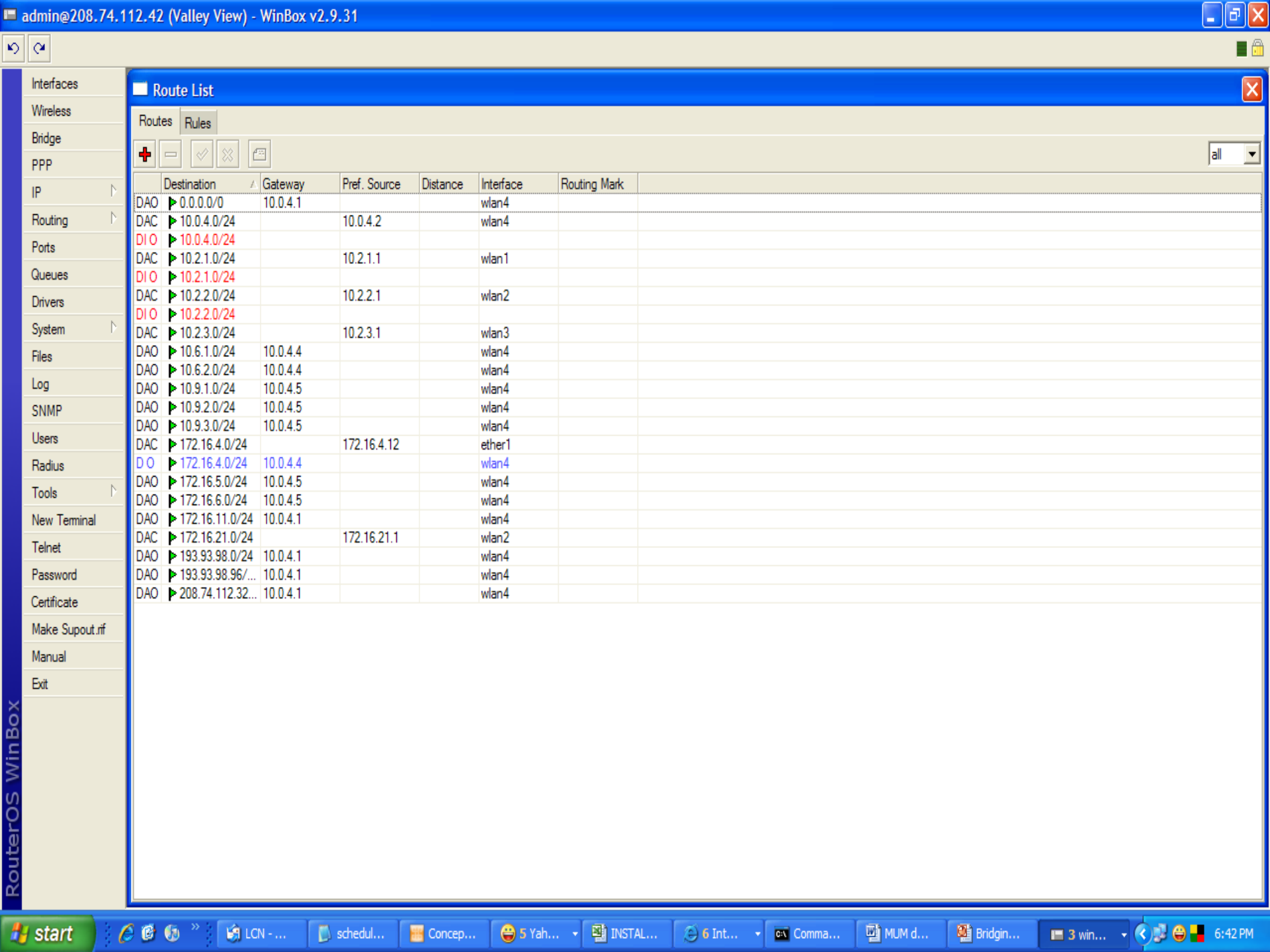

admin@208.74.112.42 (Valley View) - WinBox v2.9.31
Interfaces
Wireless
Bridge
PPP
IP
Routing
Ports
Queues
Drivers
System
Files
Log
SNMP
Users
Radius
Tools
New Terminal
Telnet
Password
Certificate
Make Supout.rif
Manual
Exit
RouterOS WinBox
OSPF
Interfaces
Networks
Areas
Virtual Links
Neighbors
Router ID
Address
State
State Changes
10.0.4.2
10.2.3.1
2-Way
0
10.0.4.4
10.0.4.4
Full
6
10.0.4.5
10.0.4.5
Full
6
208.74.112.41
10.0.4.1
2-Way
2
start
Sent It...
schedu...
Conce...
5 Ya...
INSTA...
5 Int...
Comm...
MUM d...
Presen...
3 win...
6:12 PM


admin@208.74.112.42 (Valley View) - WinBox v2.9.31
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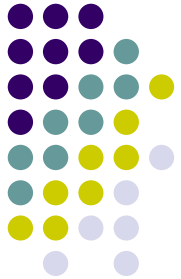
New Terminal
Telnet
Password
Certificate
Make Supout.rif
Manual
Exit
RouterOS WinBox
Route List
Routes
Rules
all
Destination
Gateway
Pref. Source
Distance
Interface
Routing Mark
DAO 0.0.0.0/0 10.0.4.1 wlan4
DAC 10.0.4.0/24 10.0.4.2 wlan4
DI O 10.0.4.0/24
DAC 10.2.1.0/24 10.2.1.1 wlan1
DI O 10.2.1.0/24
DAC 10.2.2.0/24 10.2.2.1 wlan2
DI O 10.2.2.0/24
DAC 10.2.3.0/24 10.2.3.1 wlan3
DAO 10.6.1.0/24 10.0.4.4 wlan4
DAO 10.6.2.0/24 10.0.4.4 wlan4
DAO 10.9.1.0/24 10.0.4.5 wlan4
DAO 10.9.2.0/24 10.0.4.5 wlan4
DAO 10.9.3.0/24 10.0.4.5 wlan4
DAC 172.16.4.0/24 172.16.4.12 ether1
D O 172.16.4.0/24 10.0.4.4 wlan4
DAO 172.16.5.0/24 10.0.4.5 wlan4
DAO 172.16.6.0/24 10.0.4.5 wlan4
DAO 172.16.11.0/24 10.0.4.1 wlan4
DAC 172.16.21.0/24 172.16.21.1 wlan2
DAO 193.93.98.0/24 10.0.4.1 wlan4
DAO 193.93.98.96/... 10.0.4.1 wlan4
DAO 208.74.112.32... 10.0.4.1 wlan4
start
LCN - ...
schedul...
Concep...
5 Yah...
INSTAL...
6 Int...
Comma...
MUM d...
Bridgin...
3 win...
6:42 PM

# When to route

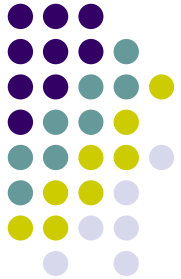
- For segmented network
- For a robust and scalable network
- Good for medium to large networks

# Summary



- When designing your network, you can choose to put multiple segments into one bridged network.
- or to divide it into different networks interconnected by routers.
- If a host is physically moved from one network area to another in a routed network, it has to get a new IP address
- if this system is moved within a bridged network, it doesn't have to reconfigure anything.

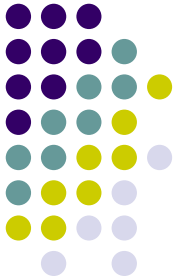
# Summary



- Your choice of config can be dressed with hotspot, PPPOE, VLAN etc.

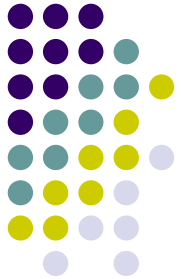
- Whichever design you choose, secure your network.

# Suggested Reading



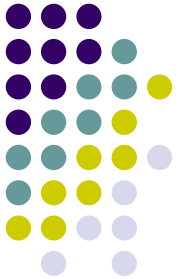
- http://wiki.mikrotik.com:3280/wiki/Transparentl

- http
  ://en.wikipedia.org/wiki/Open_Shortest_Path_F



# Questions???

# Thank You!



For your Comments;

Please write us on mjohnson@gmail.com