

# MikroLine

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- MikroLine Indonesia

# DEPLOYMENT POSSIBILITIES WITH CAPsMAN INFRASTRUCTURE & CASE STUDIES

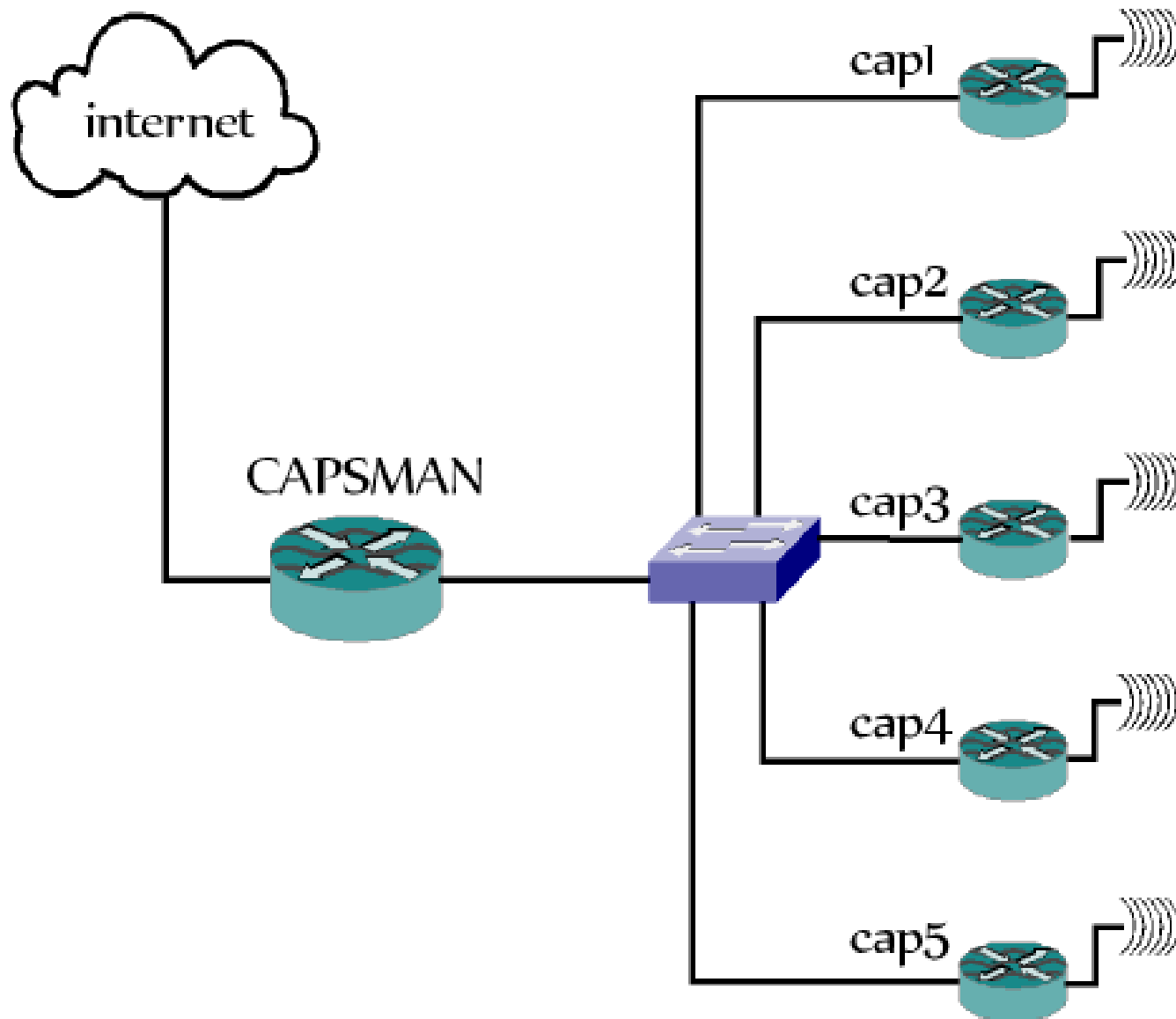
# CAPsMAN

- ROS feature start from v 6.11
- CAPsMAN Infrastructure consist of one CAPsMAN and a number of 'Controlled Access Points' (CAP)
- CAP will be configured by CAPsMAN, including client authentication (WPA/WAP2, Access List & Radius)
- Router with CAP just allow itself to establish connection with CAPsMAN Router

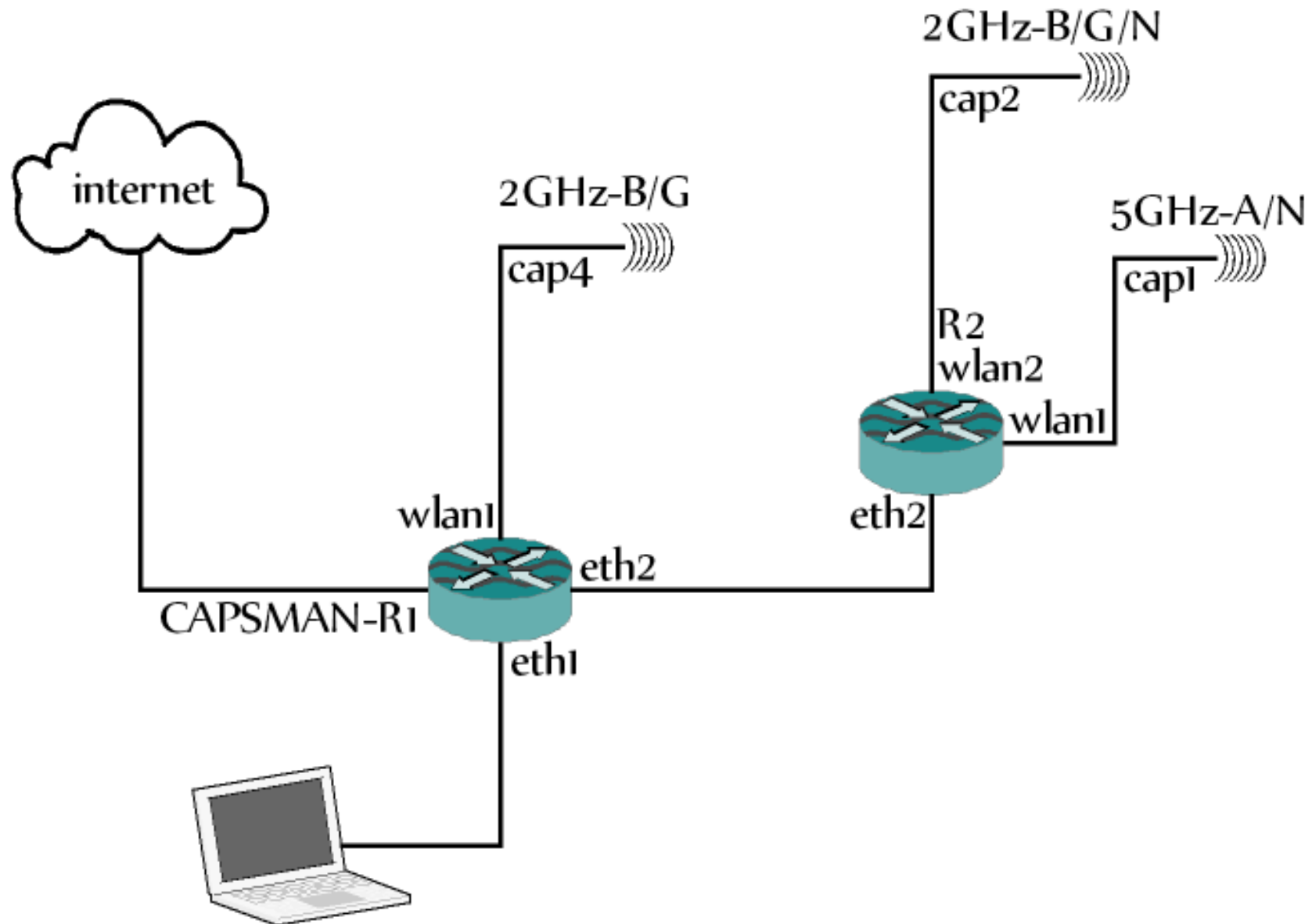
# CAPsMAN

- CAP to CAPsMAN connection can be established using L2 or L3
  - L2 Connection:
    - no IP configuration necessary
    - CAP and CAPsMAN must be on the same segment (physical or virtual)
  - L3 Connection:
    - IP configuration necessary
    - CAP must be able to reach CAPsMAN using IP protocol (ping it)

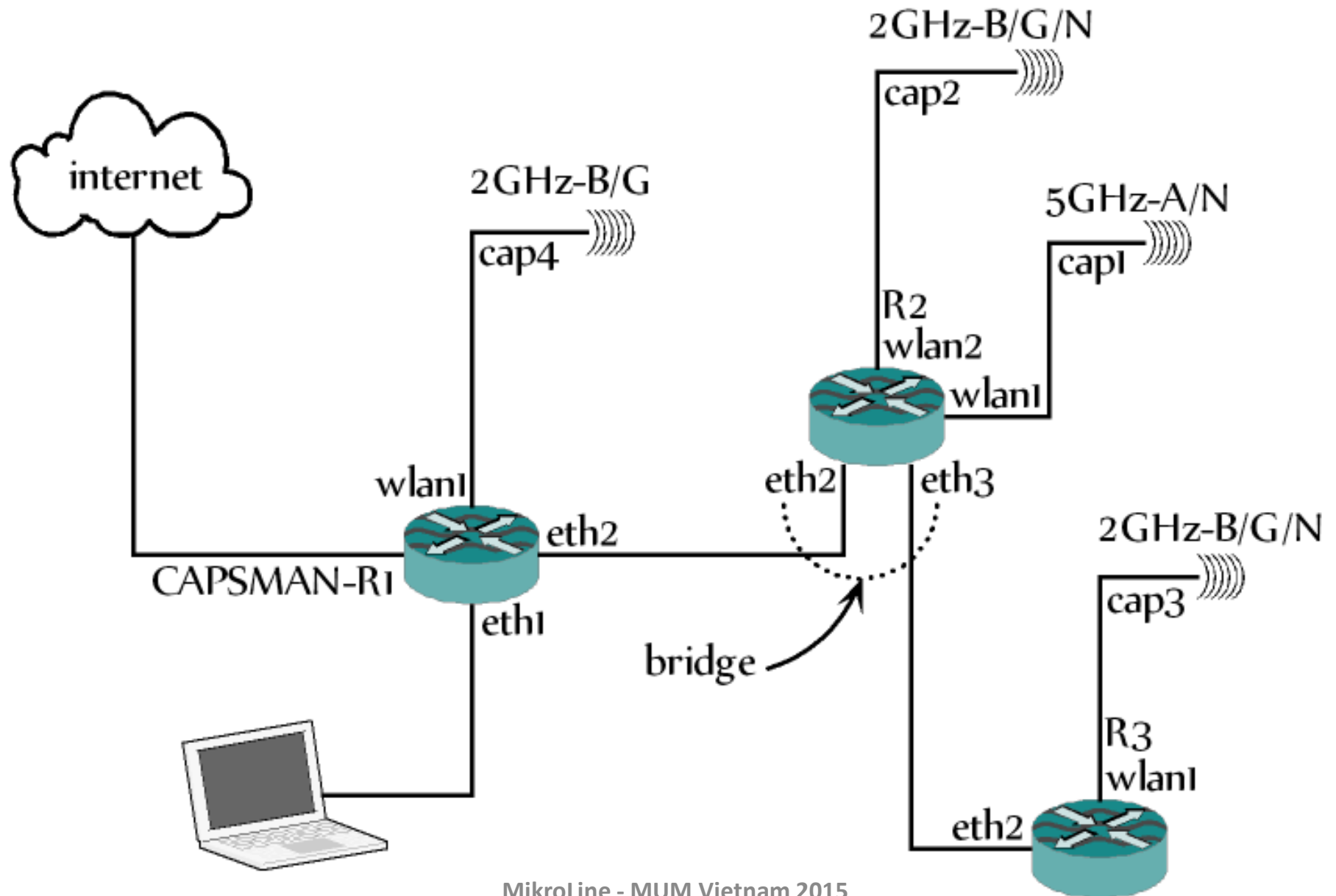
# CAPsMAN [1]



# CAPsMAN [2]

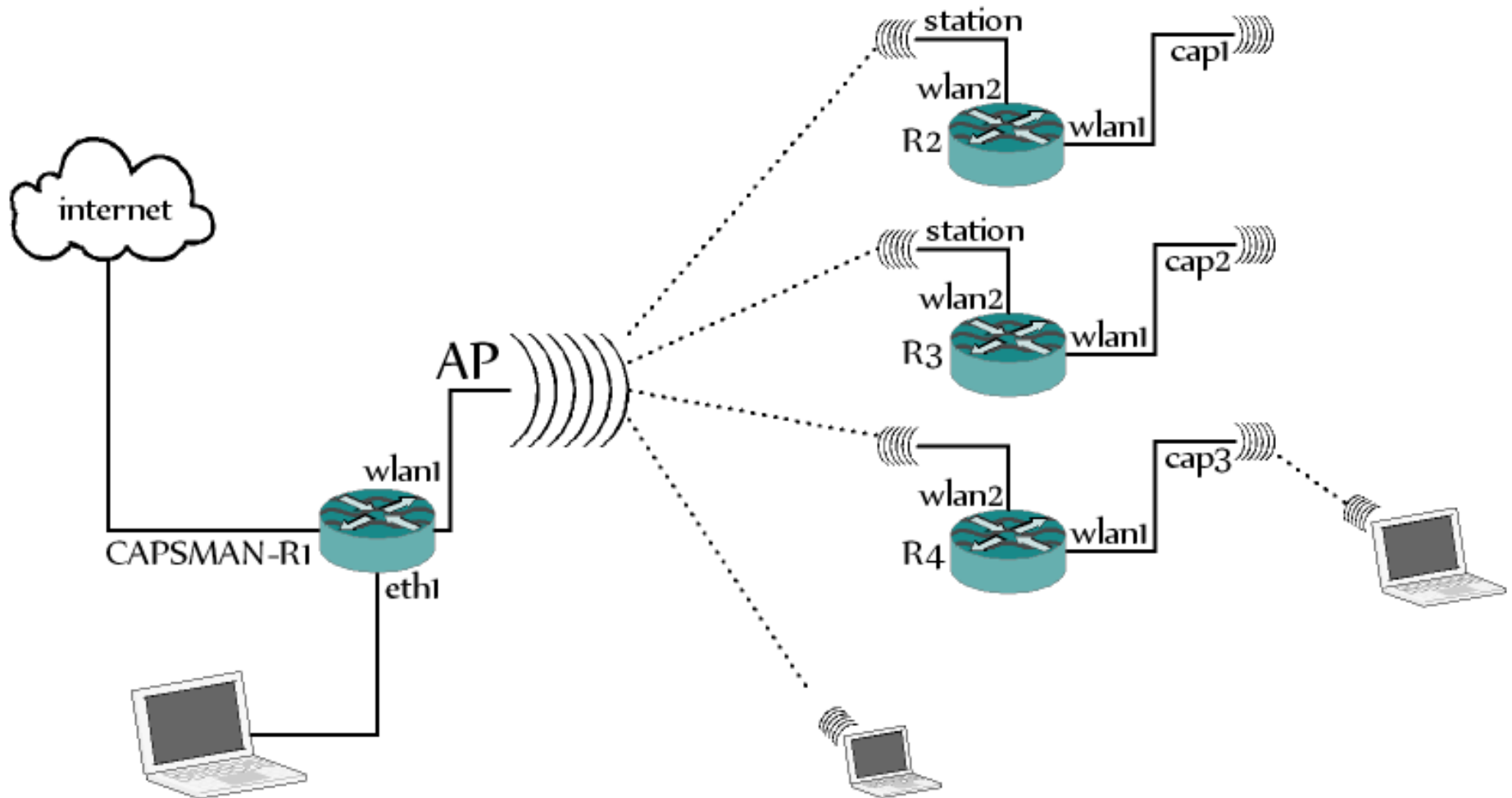


# CAPsMAN [3]

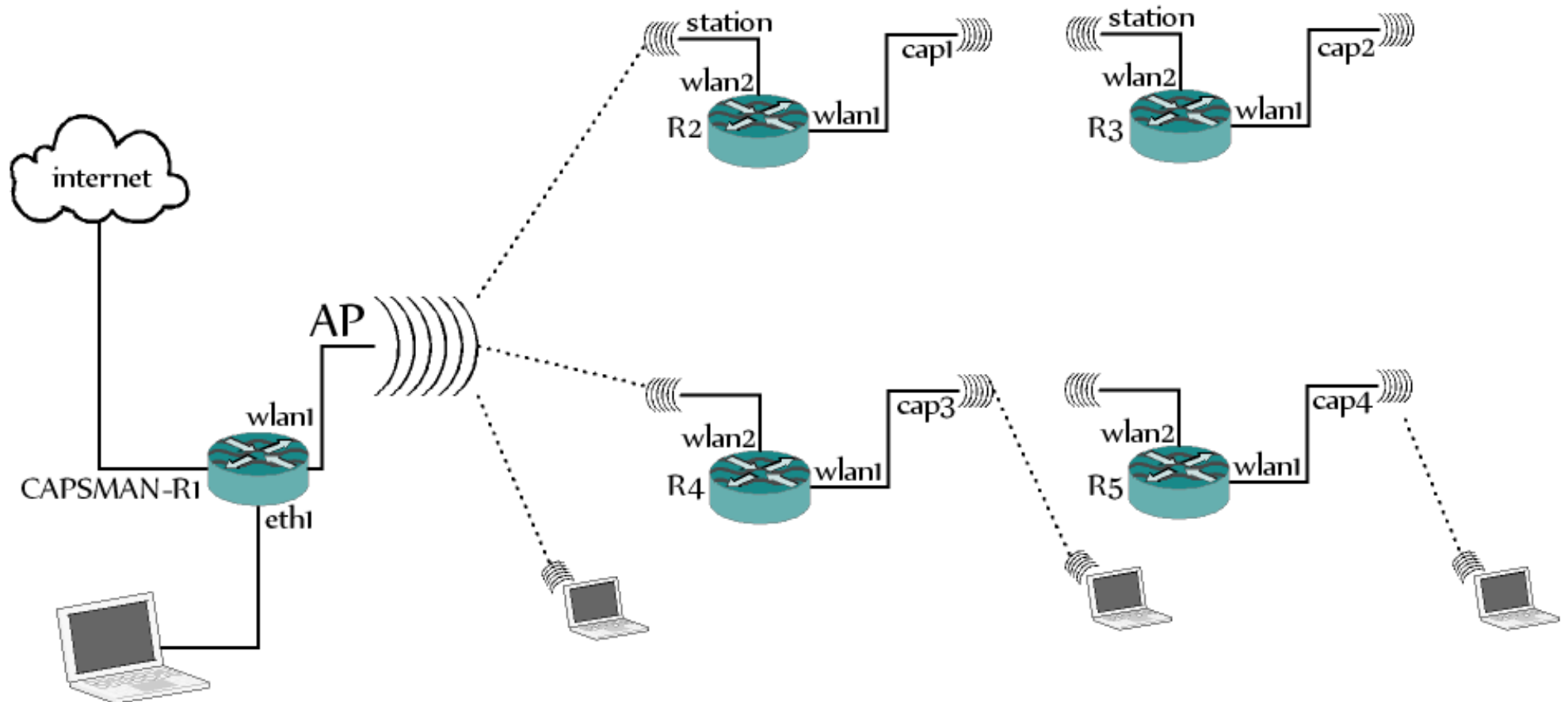




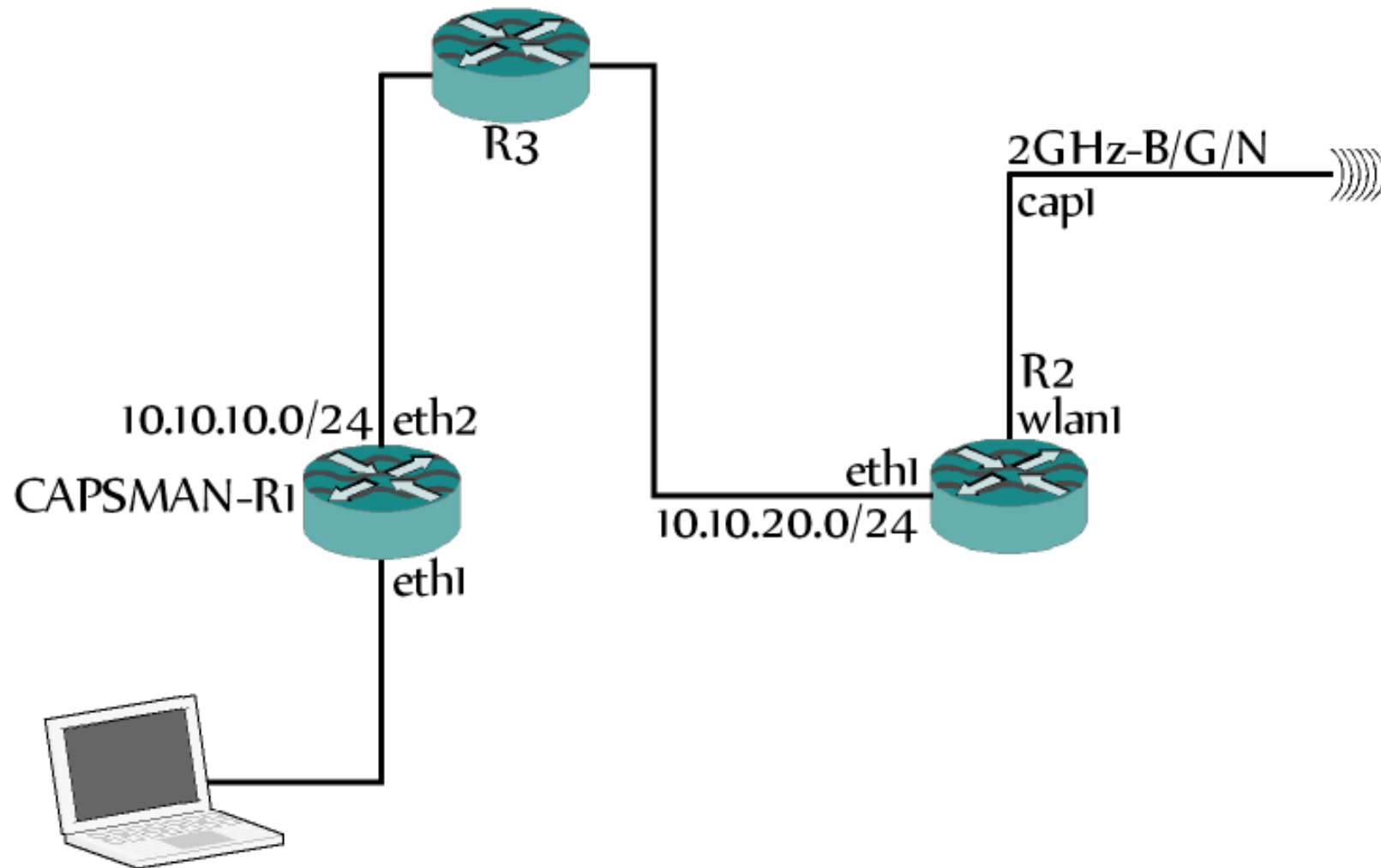
# CAPsMAN [4]



# CAPsMAN [5]

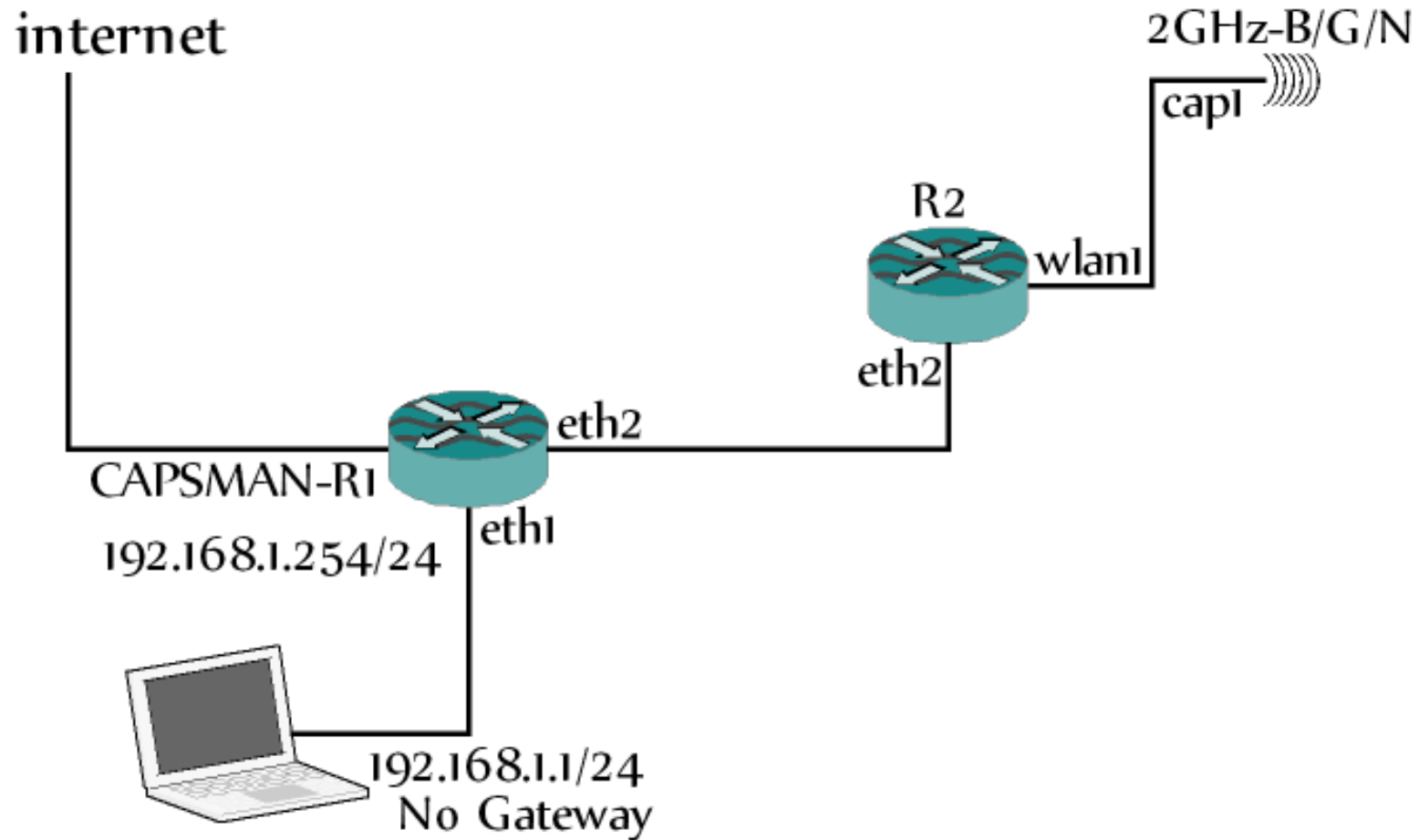


# L3 CAPsMAN [6]



# CAPsMAN CASE STUDIES

# LAB [1]



# LAB [1] - R2/CAP1

Quick Set  
CAPsMAN  
Interfaces  
**Wireless**  
Bridge  
PPP  
Switch  
Mesh

Wireless Tables

Interfaces | Nstreme Dual | Access List | Registration | Connect List

+ - [X] [Y] [Z] [W] [V] CAP Scanner Fre

	Name	Type	L2 MTU	Tx
--- managed by CAPsMAN				
X	wlan1	Wireless (Atheros AR9...	1600	
X	wlan2	Wireless (Atheros AR9...	1600	

CAP

☒ Enabled

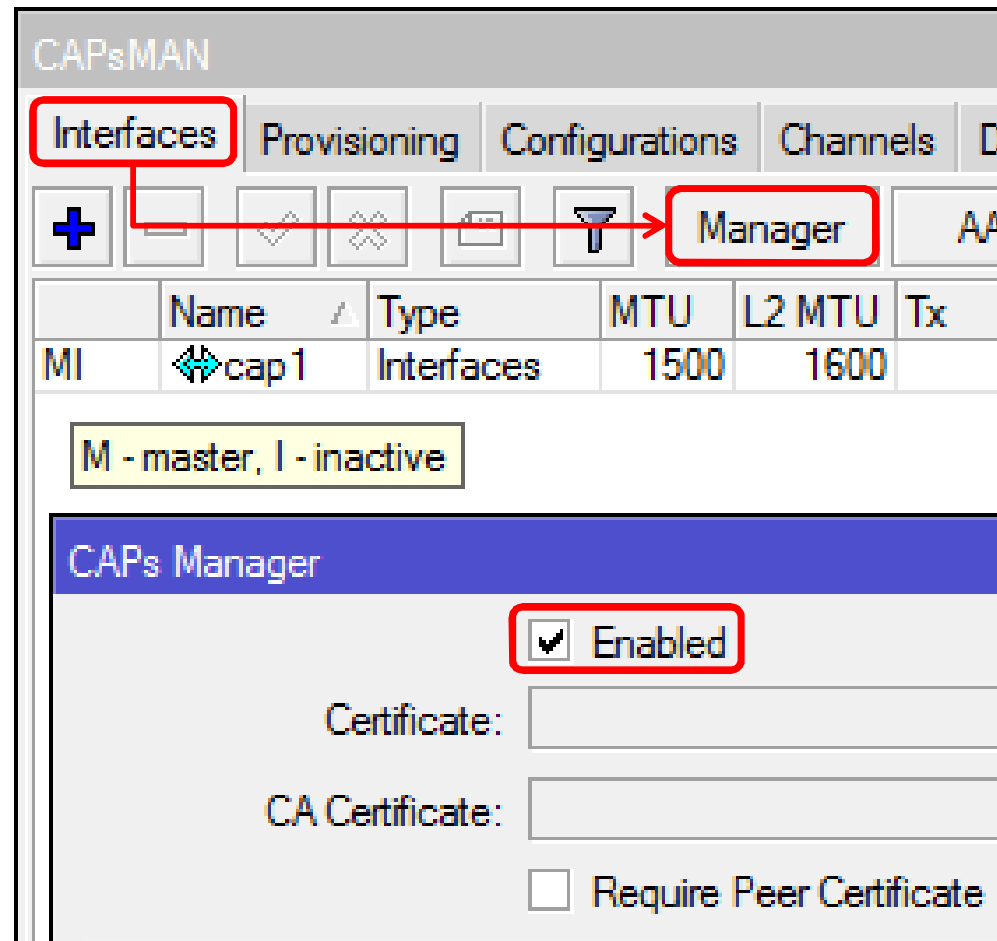
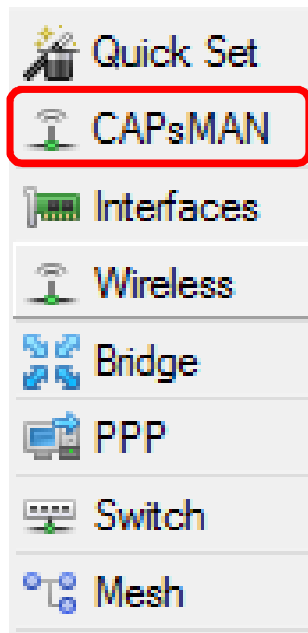
Interfaces: wlan1 [v] [^]

Certificate: none [v]

Discovery Interfaces: ether2 [v] [^]

☐ Lock To CAPsMAN




# LAB [1] - R1/CAPsMAN



# LAB [1] - R1/CAPsMAN

CAPsMAN

Interfaces Provisioning **Configurations** Channels

**+**   

Name	SSID	Hide SSID
cap1_2GHz	cap1_name_2GHz	

**CAPs Configuration <cap1\_2GHz>**

**Wireless** Channel Datapath Security

Name: cap1\_2GHz




Mode: ap

**SSID: cap1\_name\_2GHz**

Hide SSID: ☐

CAPsMAN

Interfaces Provisioning Configurations **Channels**

**+**   

Name	Frequency	Width	Band	Extension Channel
chn_2Ghz	2412MHz	20MHz	2ghz-b/g/n	disabled

**CAPs Channel <chn\_2Ghz>**

Name: chn\_2Ghz

Frequency: 2412

Width: 20

Band: 2ghz-b/g/n

Extension Channel: disabled

**name:** write your name for easy identification



# LAB [1] - R1/CAPsMAN

CAPsMAN

Interfaces Provisioning Configurations Cha

+ - ✓ ✗ [icon] [icon] Manager

	Name	Type	MTU	L2 MT
MB	cap1	Interfaces	1500	16

Interface <cap1>

General Wireless Channel Datapath S

Configuration: cap1\_2GHz

Mode: ap

SSID: cap1\_name\_2GHz

Hide SSID:

CAPsMAN

Interfaces Provisioning Configurations Cha

+ - ✓ ✗ [icon] [icon] Manager

	Name	Type	MTU	L2 MT
MB	cap1	Interfaces	1500	16

Interface <cap1>

General Wireless Channel Datapath S

Channel: chn\_2Ghz

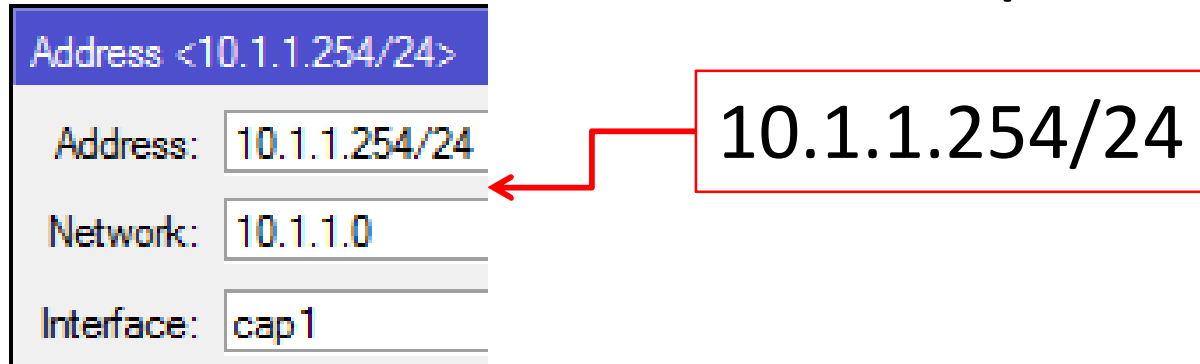
Frequency: 2412

Width: 20

Band: 2ghz-b/g/n

# LAB [1] - R1/CAPsMAN

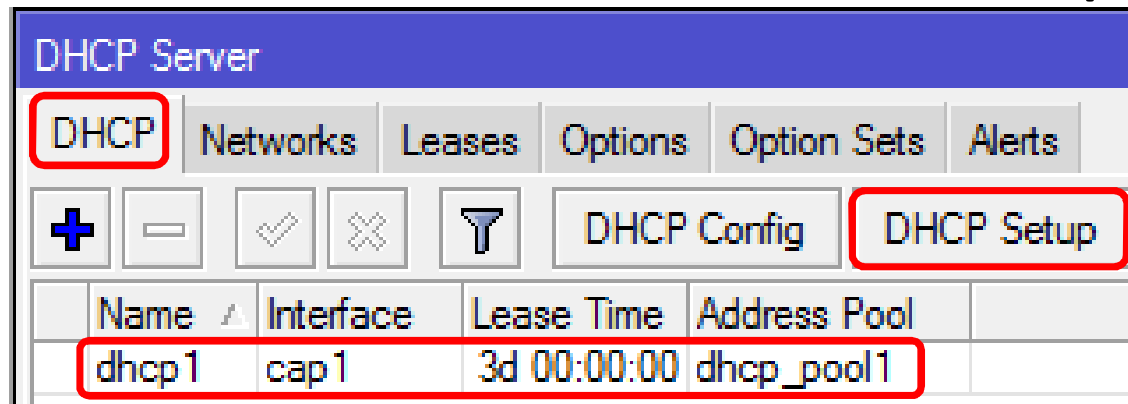
- IP Address for interface cap1



Address <10.1.1.254/24>

Address:	10.1.1.254/24
Network:	10.1.1.0
Interface:	cap1

- DHCP Server for interface cap1



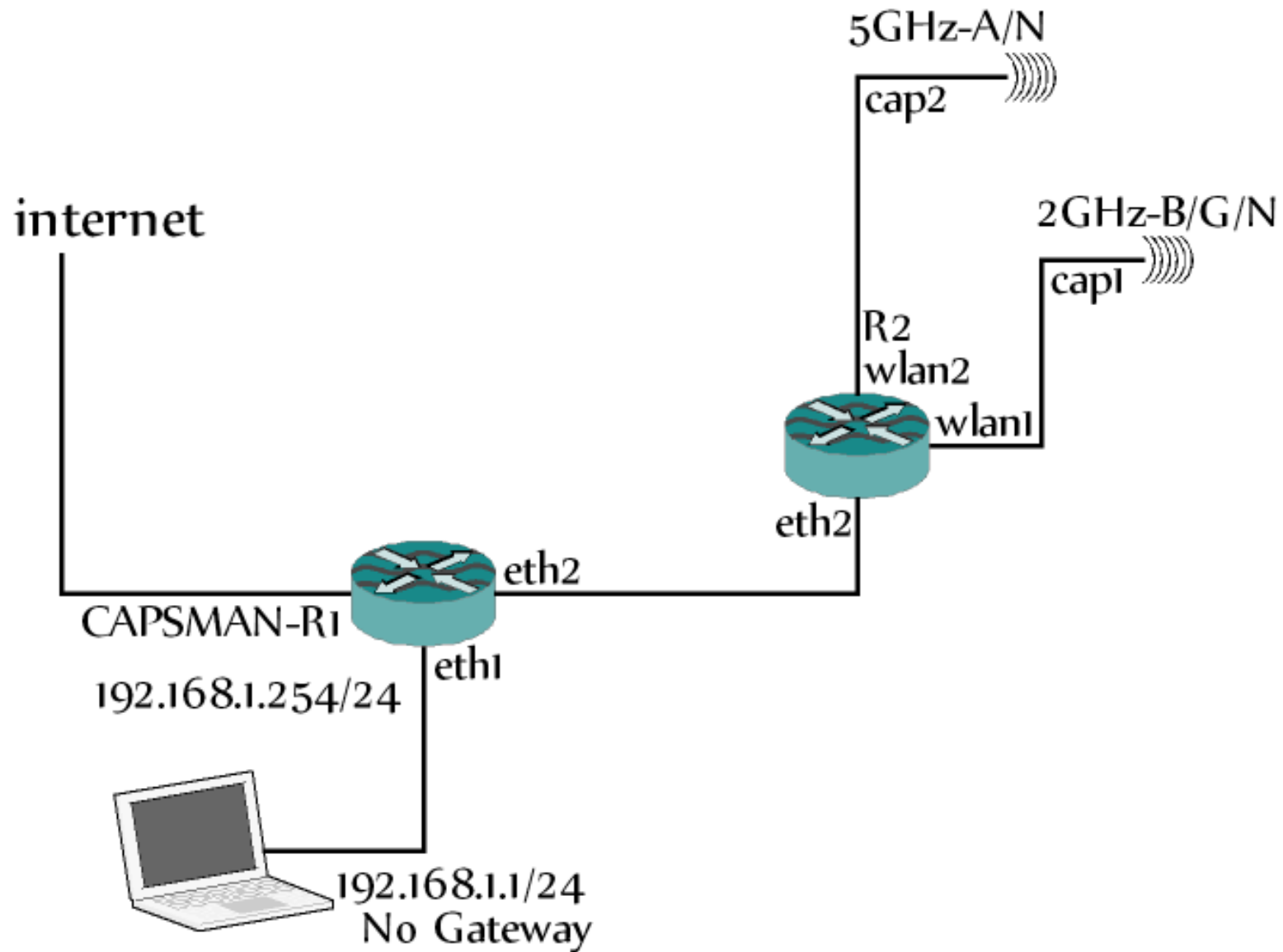
DHCP Server

**DHCP** Networks Leases Options Option Sets Alerts

+ - ✓ ✗ ⌵ DHCP Config **DHCP Setup**

Name	Interface	Lease Time	Address Pool
dhcp1	cap1	3d 00:00:00	dhcp_pool1

# LAB [2]



# LAB [2] - R2/CAP2



Wireless Tables

**Interfaces** Nstreme Dual Access List Registration Connect List Sec

+ - [Icons] **CAP** Scanner Freq. Us

	Name	Type	L2 MTU	Tx
	--- managed by CAPsMAN			
	--- channel: 2412/20/gn(30dBm), SSID: MikroLine, CAPsMAN forwarding			
X	wlan1	Wireless (Atheros AR920x)	1600	
	--- managed by CAPsMAN			
	--- channel: 5180/20-Ce/an(17dBm), SSID: , CAPsMAN forwarding			
X	wlan2	Wireless (Atheros AR920x)	1600	150

**CAP**

☒ Enabled

Interfaces: wlan1  
wlan2




Certificate: none

Discovery Interfaces: ether2

# LAB [2] - R1/CAPsMAN

CAPsMAN

Interfaces Provisioning **Configurations** Channels

**+**   

Name	SSID	Hide S
cap1_2GHz	cap1_name_2GHz	
cap2_5GHz	cap2_name_5GHz	

CAPs Configuration <cap2\_5GHz>

**Wireless** Channel Datapath Security

Name: cap2\_5GHz




Mode: ap

SSID: cap2\_name\_5GHz

Hide SSID:

CAPsMAN

Interfaces Provisioning Configurations **Channels**

**+**   

Name	Frequency	Width	Band	Exten
chn_2Ghz	2412MHz	20MHz	2ghz-b/g/n	disabl
chn_5GHz	5180MHz	20MHz	5ghz-a/n	Ce

CAPs Channel <chn\_5GHz>

Name: chn\_5GHz

Frequency: 5180

Width: 20

Band: 5ghz-a/n

Extension Channel: Ce

# LAB [2] - R1/CAPsMAN

CAPsMAN

Interfaces Provisioning Configurations Channels

+ - ✓ ✗ 📄 🔍 Manage

	Name	Type
MB	cap1	Interfaces
MB	cap2	Interfaces

Interface <cap2>

General Wireless Channel Datapath Security

Configuration: cap2\_5GHz

Mode: ap

SSID: cap2\_name\_5GHz

CAPsMAN

Interfaces Provisioning Configuration Channels

+ - ✓ ✗ 📄 🔍

	Name	Type
MB	cap1	Interface
MB	cap2	Interface

Interface <cap2>

General Wireless Channel Datapath

Channel: chn\_5GHz

Frequency: 5180

Width: 20

Band: 5ghz-a/n

Extension Channel: Ce

# LAB [2] - R1/CAPsMAN

- IP Address for interface cap2

Address <10.1.2.254/24>

Address: 10.1.2.254/24

Network: 10.1.2.0

Interface: cap2

10.1.2.254/24

- DHCP Server for interface cap2

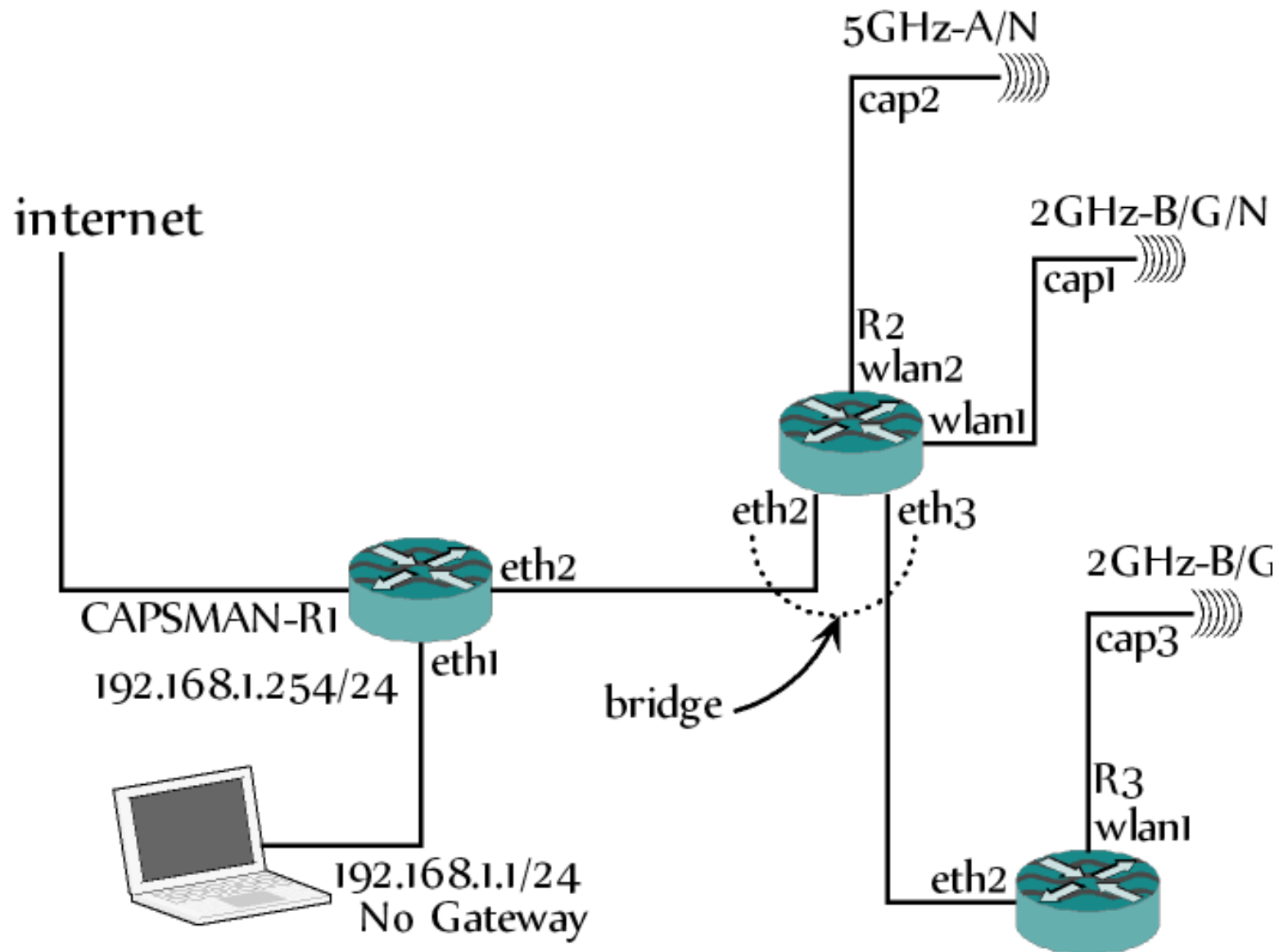
DHCP Server

DHCP Networks Leases Options Option Sets Alerts

+ - ✓ ✗ ⏏ DHCP Config DHCP Setup

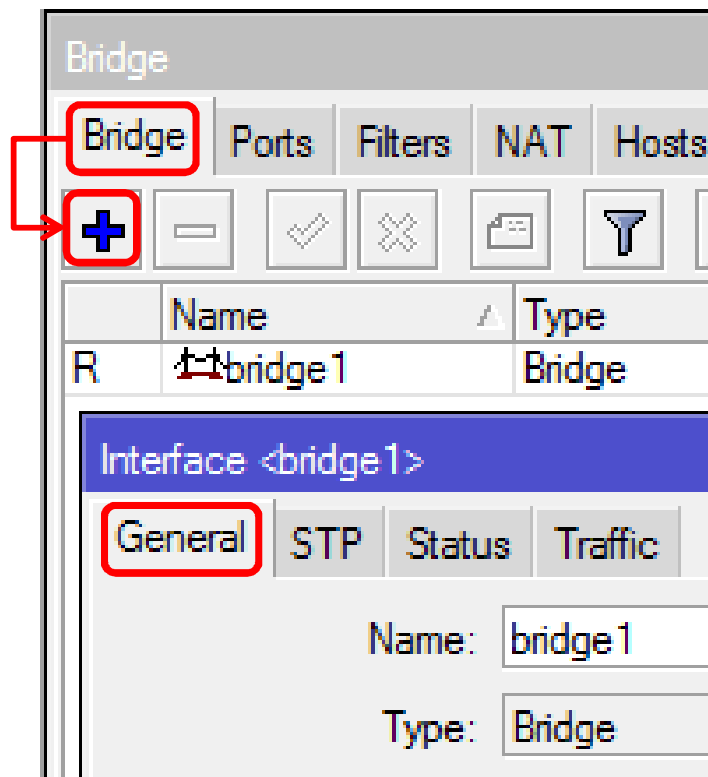
Name	Interface	Lease Time	Address Pool
dhcp1	cap1	3d 00:00:00	dhcp_pool1
dhcp2	cap2	3d 00:00:00	dhcp_pool2

# LAB [3]

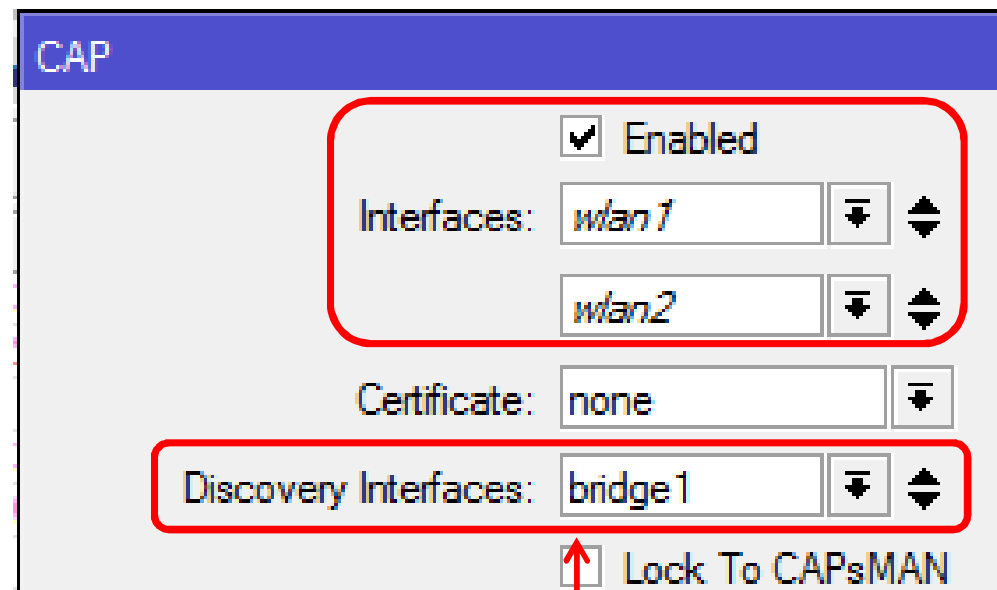
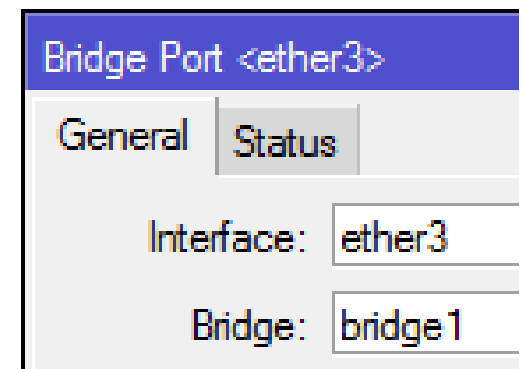
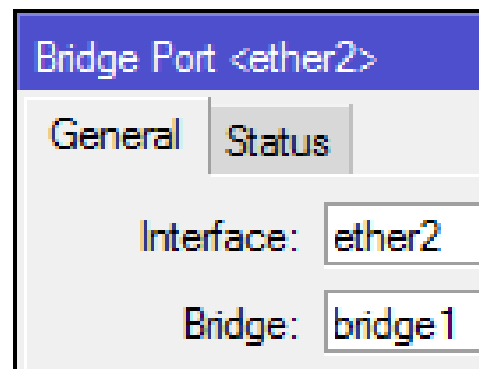




# LAB [3] - R2/CAP1/CAP2



create bridge for ether2 & ether3



change **Discovery Interfaces** from ether2 to bridge1

# LAB [3] - R3/CAP3

CAP

☒ Enabled

Interfaces:




Certificate:

Discovery Interfaces:

# LAB [3] - R1/CAPsMAN

CAPsMAN

Interfaces Provisioning **Configurations** Channels

**+**   

Name	SSID	Hide SSID
cap1_2GHz	cap1_name_2GHz	
cap2_5GHz	cap2_name_5GHz	
cap3_2GHz	cap3_name_2GHz	

CAPs Configuration <cap3\_2GHz>

**Wireless** Channel Datapath Security

Name: cap3\_2GHz




Mode: ap

SSID: cap3\_name\_2GHz

Hide SSID:

CAPsMAN

Interfaces Provisioning Configurations **Channels** Data

**+**   

Name	Frequency	Width	Band	Extension Channel
chn_2GHz_r3	2437MHz	20MHz	2ghz-b/g/n	Ce
chn_2GHz	2412MHz	20MHz	2ghz-b/g/n	disabled
chn_5GHz	5180MHz	20MHz	5ghz-a/n	Ce

CAPs Channel <chn\_2GHz\_r3>

Name: chn\_2GHz\_r3

Frequency: 2437 MHz ▲

Width: 20 MHz ▲

Band: 2ghz-b/g/n ▼ ▲

Extension Channel: Ce ▼ ▲

# LAB [3] - R1/CAPsMAN

CAPsMAN

Interfaces Provisioning Configurations Ch

+ - ✓ ✗ 📄 🔍 Manage

	Name	Type	MTU	L2
RMB	cap1	Interfaces	1500	
RMB	cap2	Interfaces	1500	
RMB	cap3	Interfaces	1500	

Interface <cap3>

General Wireless Channel Datapath S

Configuration: cap3\_2GHz

Mode: ap

SSID: cap3\_name\_2GHz

CAPsMAN

Interfaces Provisioning Configurations Ch

+ - ✓ ✗ 📄 🔍 Manage

	Name	Type	MTU	L2
RMB	cap1	Interfaces	1500	
RMB	cap2	Interfaces	1500	
RMB	cap3	Interfaces	1500	

Interface <cap3>

General Wireless Channel Datapath S

Channel: chn\_2GHz\_r3

Frequency: 2437

Width: 20

Band: 2ghz-b/g/n

Extension Channel: Ce

# LAB [3] - R1/CAPsMAN

- IP Address for interface cap3

Address <10.1.3.254/24>

Address: 10.1.3.254/24

Network: 10.1.3.0

Interface: cap3

10.1.3.254/24

- DHCP Server for interface cap3

DHCP Server

DHCP Networks Leases Options Option Sets Alerts





+ - ✓ ✗ ⚙ DHCP Config DHCP Setup

Name	Interface	Lease Time	Address Pool
dhcp1	cap1	3d 00:00:00	dhcp_pool1
dhcp2	cap2	3d 00:00:00	dhcp_pool2
dhcp3	cap3	3d 00:00:00	dhcp_pool3

# LAB [3] - CAPsMAN - WPA

CAPsMAN

Interfaces Provisioning Configurations Channels Datapaths **Security Cfg.** Ac

Name	Authentication Type	Encryption	Group Encryption	Passphrase
AP_Security	WPA PSK WPA2 PSK	aes ccm	aes ccm	pasw1234

CAPs Security Configuration <AP\_Security>

Name:

Authentication Type: ☒ WPA PSK ☒ WPA2 PSK ☐ WPA EAP ☐ WPA2 E

Encryption: ☒ aes ccm ☐ tkip

Group Encryption:

Passphrase:

# LAB [3] - CAPsMAN - WPA

CAPsMAN

Interfaces Provisioning Configurations Channels

+ - ✓ ✗ [Icon] [Icon] Manager

	Name	Type
RMB	cap1	Interfaces
RMB	cap2	Interfaces
RMB	cap3	Interfaces

Interface <cap2>

General Wireless Channel Datapath Security

Security: AP\_Security

Authentication Type: WPA PSK WPA2 PSK

Encryption: aes ccm

Group Encryption: aes ccm

Passphrase: pasw1234

using **WPA** security for cap2

# LAB [3] - CAPsMAN - Acces-List

CAPsMAN

Configurations Channels Datapaths Security Cfg. Access List Remote CAP Radio **Registration Table** ...

[-] [Filter]

Interf...	MAC Address	Tx Rate	Rx Rate	Tx Signal	Rx Signal	Uptime	Tx/Rx
cap1	00:25:86:C6:56:CA	54Mbps	54Mbps	0	-63	00:02:22....	149/1
cap1	D4:22:3F:2C:3E:63			0	-69	00:00:33....	82/98
cap2	A0:F3:C1:0B:3D:6D			0	-78	00:27:45....	4 097

- Show Categories
- Detail Mode
- Inline Comments
- Show Columns ▶
- Find Ctrl+F
- Find Next Ctrl+G
- Copy to Access List**



# LAB [3] - CAPsMAN - Acces-List

CAPsMAN

Channels Datapaths Security Cfg. **Access List**

+ - ✓ ✗ 📄 📶

#	MAC Address	Interface	Action
0	00:25:86:C6:56:CA	cap1	accept
1	D4:22:3F:2C:3E:63	cap1	reject

CAPs Access Rule <D4:22:3F:2C:3E:63>

MAC Address: D4:22:3F:2C:3E:63

MAC Mask:

Interface: cap1

Signal Range:

Time

Action: reject

CAPsMAN

Channels Datapaths Security Cfg. **Access List**

+ - ✓ ✗ 📄 📶

#	MAC Address	Interface	Action
0	A0:F3:C1:0B:3D:6D	cap1	accept
1	00:16:CE:72:B2:69	cap1	accept
2		cap1	reject

CAPs Access Rule <>

MAC Address:

MAC Mask:

Interface: cap1

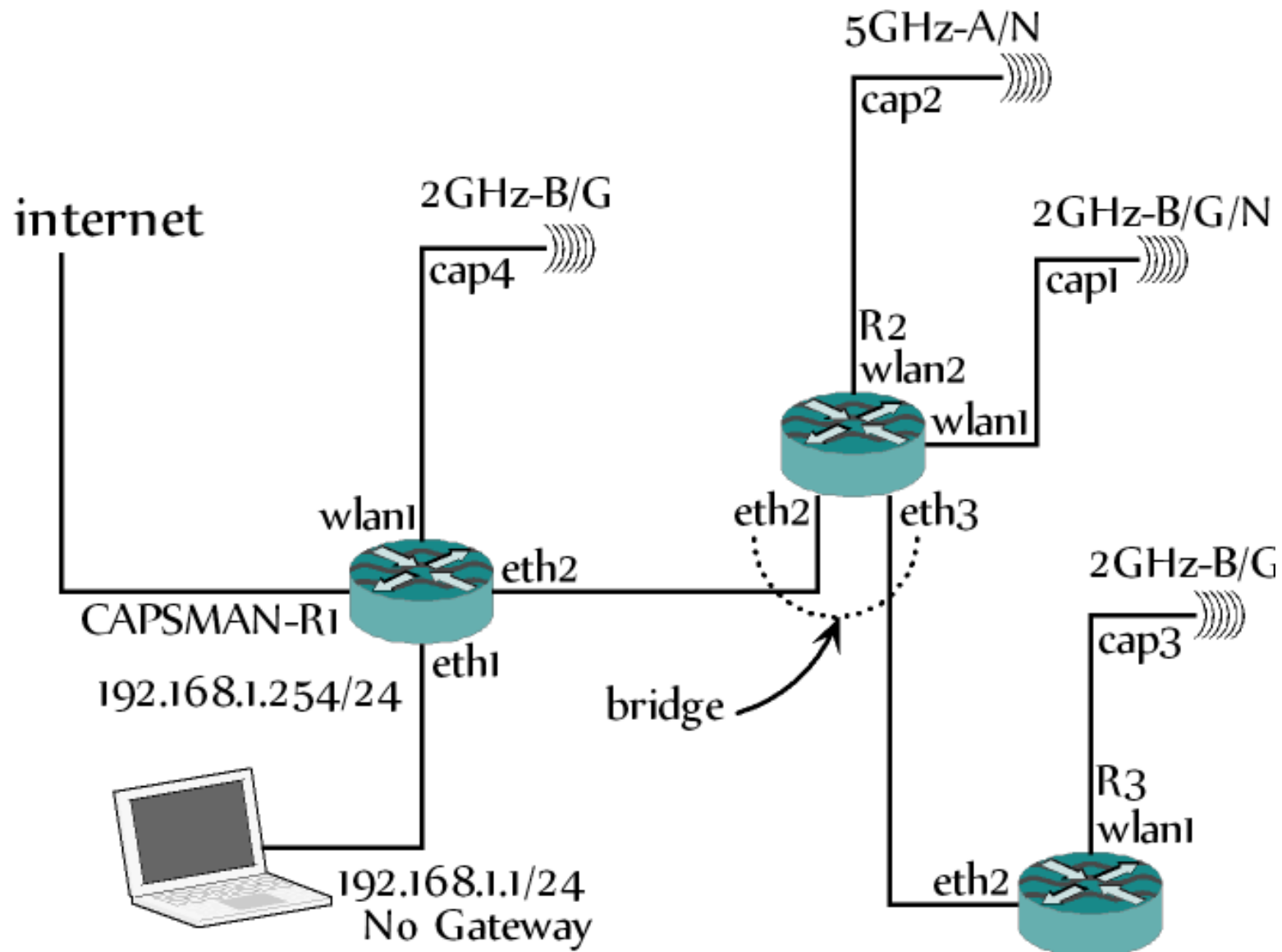
Signal Range:

Time

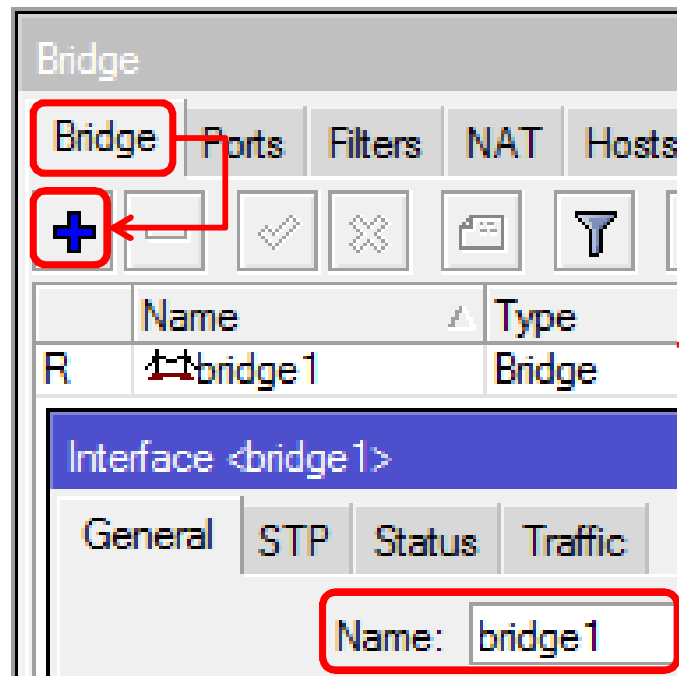
Action: reject

using Acces List to secure cap1

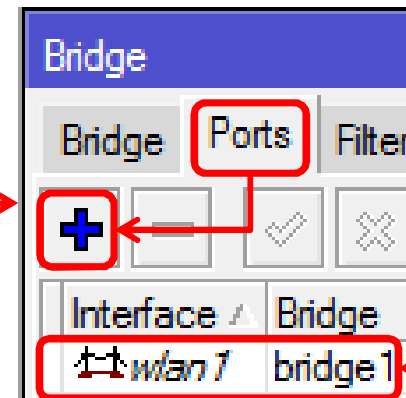
# LAB [4]



# LAB [4] - R1/CAPsMAN



bridge1 for cap4



insert wlan1 as port bridge1

# LAB [4] - R1/CAPsMAN

Wireless Tables

Interfaces | Nstreme Dual | Access List | Registration | Connect List

+ - ✓ ✗ [icon] [icon] CAP Scanner Freq

	Name	Type	L2 MTU	Tx
--- managed by CAPsMAN				
XS	wlan1	Wireless (Atheros AR9300)	1600	

CAP

☒ Enabled

Interfaces: wlan1

Certificate: none

Discovery Interfaces: bridge1

# LAB [4] - R1/CAPsMAN

CAPsMAN

**Interfaces** | Provisioning | Configurations | Channels

+ - ✓ ✗ 📄 📶 Manager

	Name	Type
MB	cap1	Interfaces
MB	cap2	Interfaces
MB	cap3	Interfaces
MB	cap4	Interfaces

Interface <cap4>

General | **Wireless** | Channel | Datapath | Security

Configuration:

Mode:

SSID:

Hide SSID:

CAPsMAN

Interfaces | Provisioning | Configurations | Channels

+ - ✓ ✗ 📄 📶 Manager

	Name	Type
MB	cap1	Interfaces
MB	cap2	Interfaces
MB	cap3	Interfaces
MB	cap4	Interfaces

Interface <cap4>

General | Wireless | **Channel** | Datapath

Channel:

Frequency:

Width:

Band:

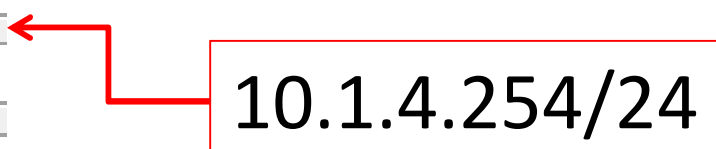
Extension Channel:

# LAB [4] - R1/CAPsMAN

- IP Address for interface cap4

Address <10.1.4.254/24>

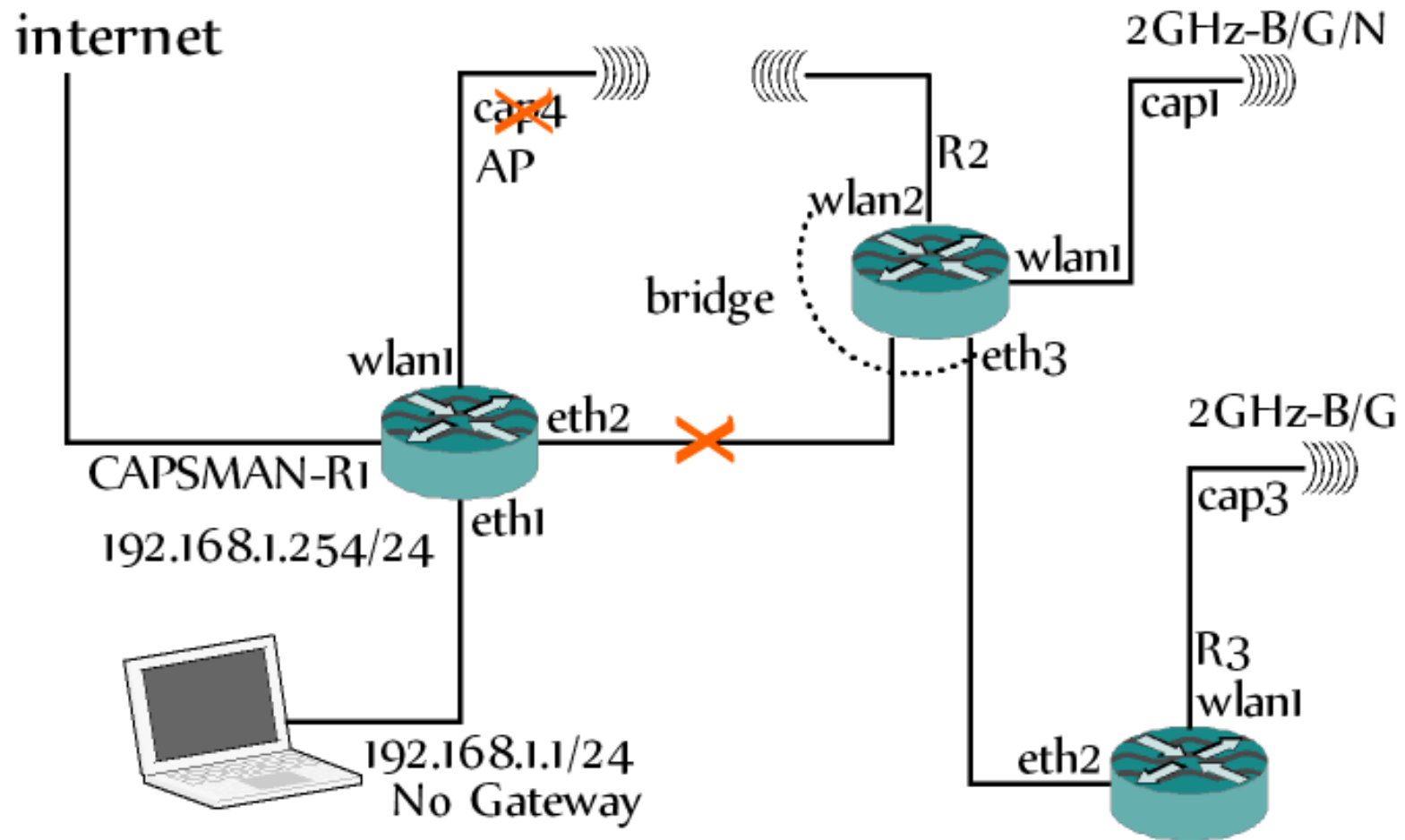
Address:	10.1.4.254/24
Network:	10.1.4.0
Interface:	cap4



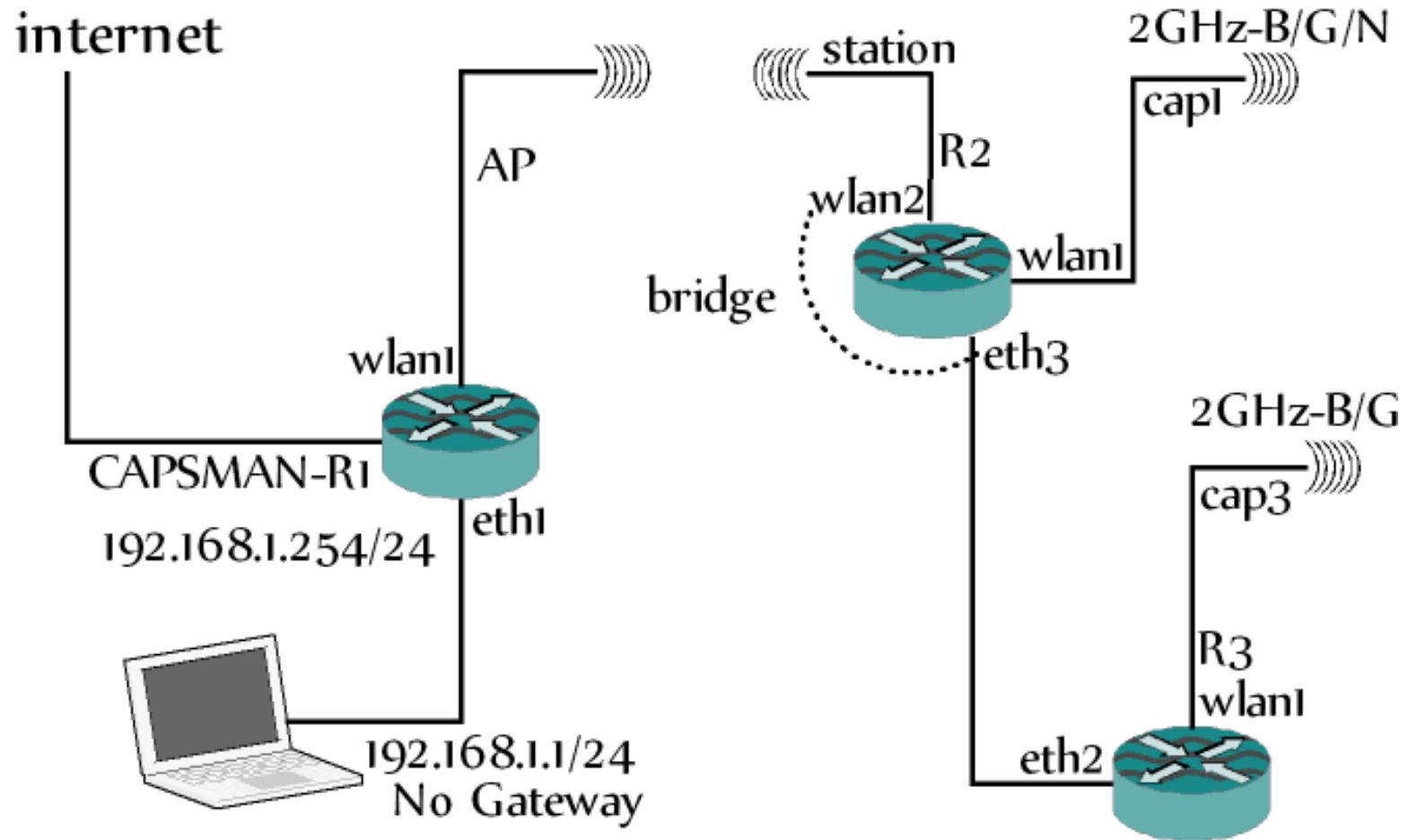
- DHCP Server for interface cap4

DHCP Server					
DHCP Networks Leases Options Option Sets Alerts					
+ - ✓ ✗ ⏏ DHCP Config DHCP Setup					
	Name ▲	Interface	Lease Time	Address Pool	
	dhcp1	cap1	3d 00:00:00	dhcp_pool1	
	dhcp2	cap2	3d 00:00:00	dhcp_pool2	
	dhcp3	cap3	3d 00:00:00	dhcp_pool3	
	dhcp4	cap4	3d 00:00:00	dhcp_pool4	

# LAB [5]



# LAB [5]





# LAB [5] - R1/CAPsMAN

**Bridge**

Bridge Ports

+ - ✓

Name

X bridge1

**CAP**

☐ Enabled

Interfaces: wlan1

disable bridge1 & cap4

change cap4 become AP

**Interface <wlan1>**

General Wireless HT HT MCS WDS Nstre

Mode: ap bridge

Band: 2GHz-B/G/N

Channel Width: 20MHz

Frequency: 2462

SSID: MikroLine\_AP\_CAPsMAN

IP Address & DHCP Server for wlan1

**Address <10.1.100.254/24>**

Address: 10.1.100.254/24

Network: 10.1.100.0

Interface: wlan1

**DHCP Server**

DHCP Networks Le

+ - ✓ ✗

Na...	Interface
dhcp1	cap1
dhcp2	cap2
dhcp3	cap3
dhcp4	cap4
dhcp5	wlan1

**CAPsMAN**

Interfaces Provision

+ - ✓ ✗

	Name
RMB	cap1
XMBI	cap2
RMB	cap3
XMI	cap4

# LAB [5] - R2/CAP2

CAP

☒ Enabled

Interfaces:

Certificate:

Discovery Interfaces:

exclude wlan2 as cap2

Interface <wlan2>

General Wireless HT HT MCS WDS Nstre

Mode:

Band:

Channel Width:

Frequency:

SSID:

change cap2 (wlan2) become station

Bridge

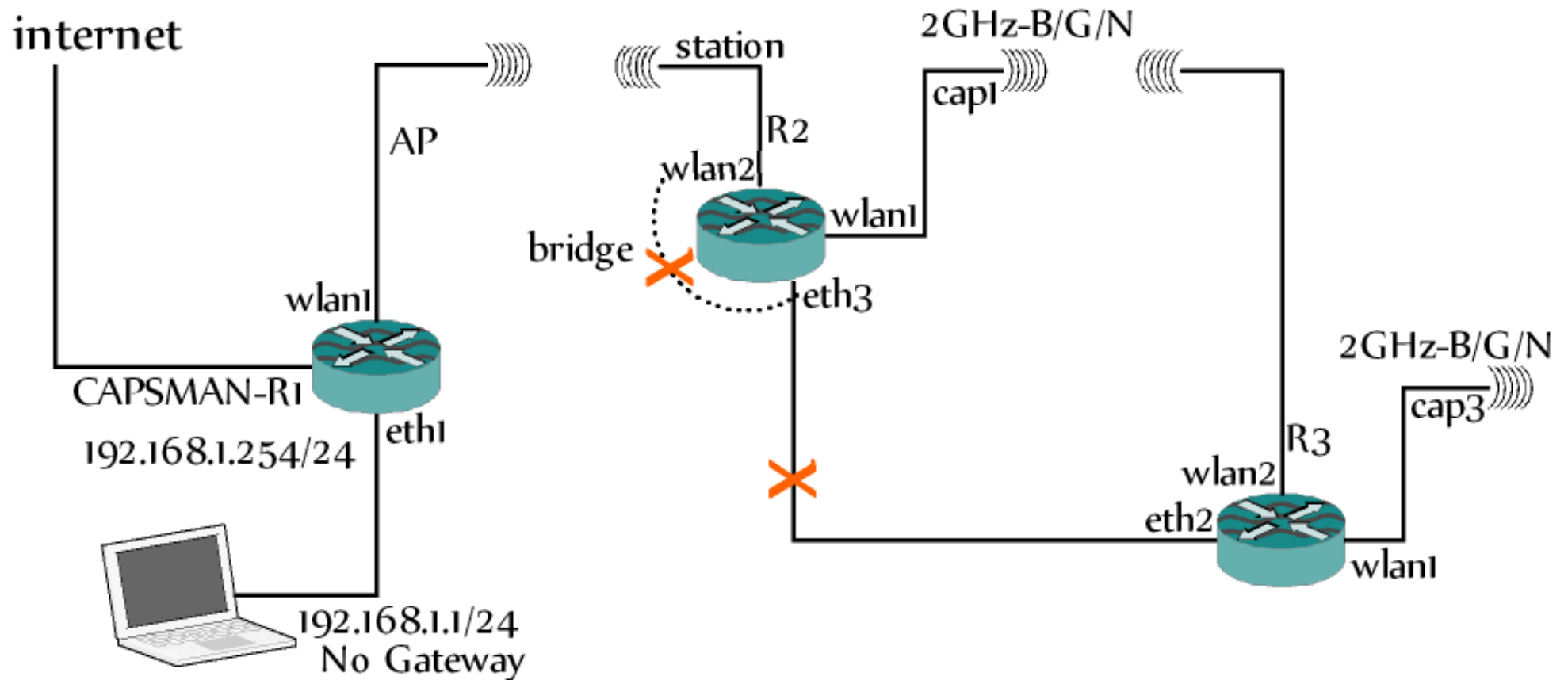
Bridge Ports Filters NAT Hosts

+ - ✓ ✗ [icon] [icon]

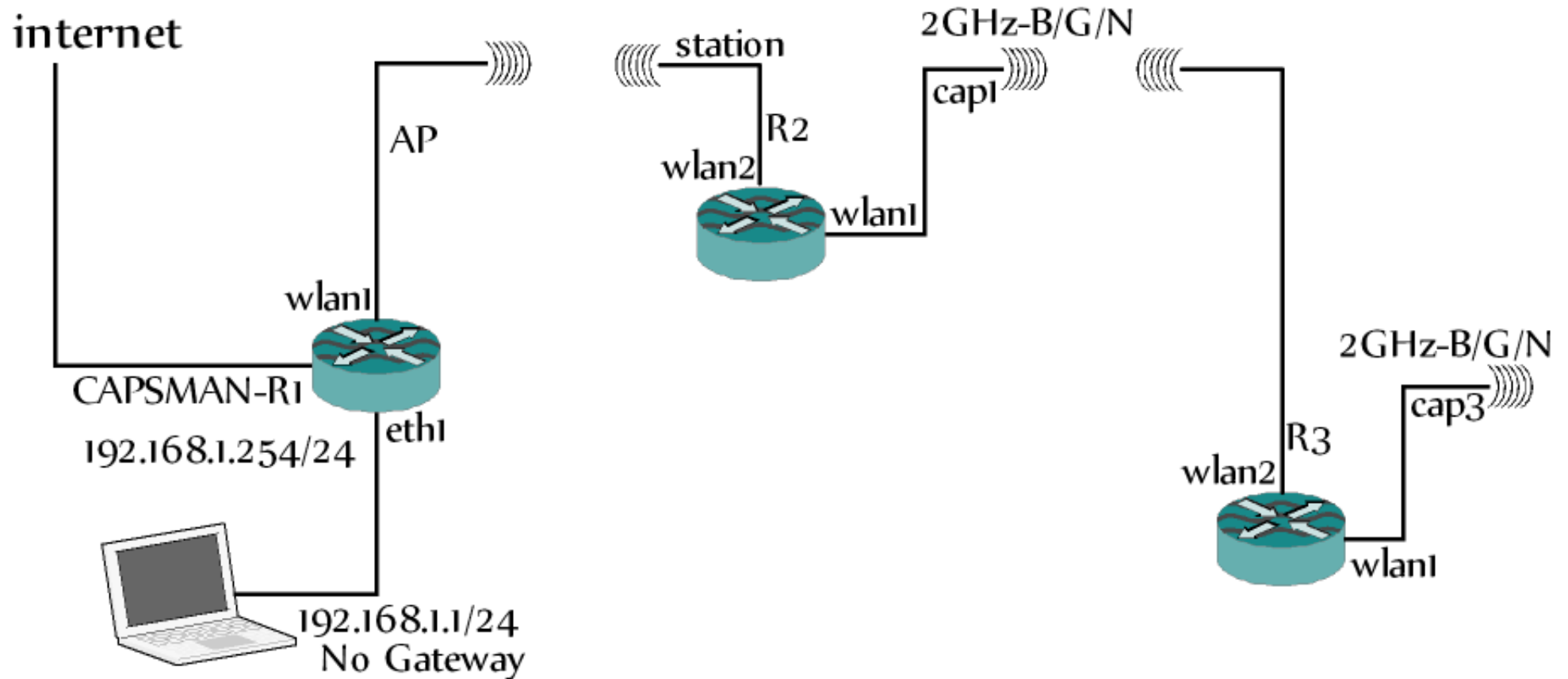
	Interface	Bridge
XI	<del>ether2</del>	bridge1
	<del>ether3</del>	bridge1
	<del>wlan2</del>	bridge1

disable ether2 as port bridge1  
insert wlan2 as port bridge1

# LAB [6]



# LAB [6]



# LAB [6] - R2/CAP1

Bridge

Bridge Ports

+ - ✓

	Name
X	bridge1

disable bridge1

CAP

☒ Enabled

Interfaces: wlan1

Certificate: none

Discovery Interfaces: wlan2

change **Discovery Interfaces** from bridge1 to wlan2

# LAB [6] - R3/CAP3

Interface <wlan2>

General Wireless HT HT MCS WDS Ns

Mode: station

Band: 2GHz-B/G/N

Channel Width: 20MHz

Frequency: 2412

SSID: cap1\_MikroLine\_2GHz

Scan List: default

CAP

☒ Enabled

Interfaces: wlan1

Certificate: none

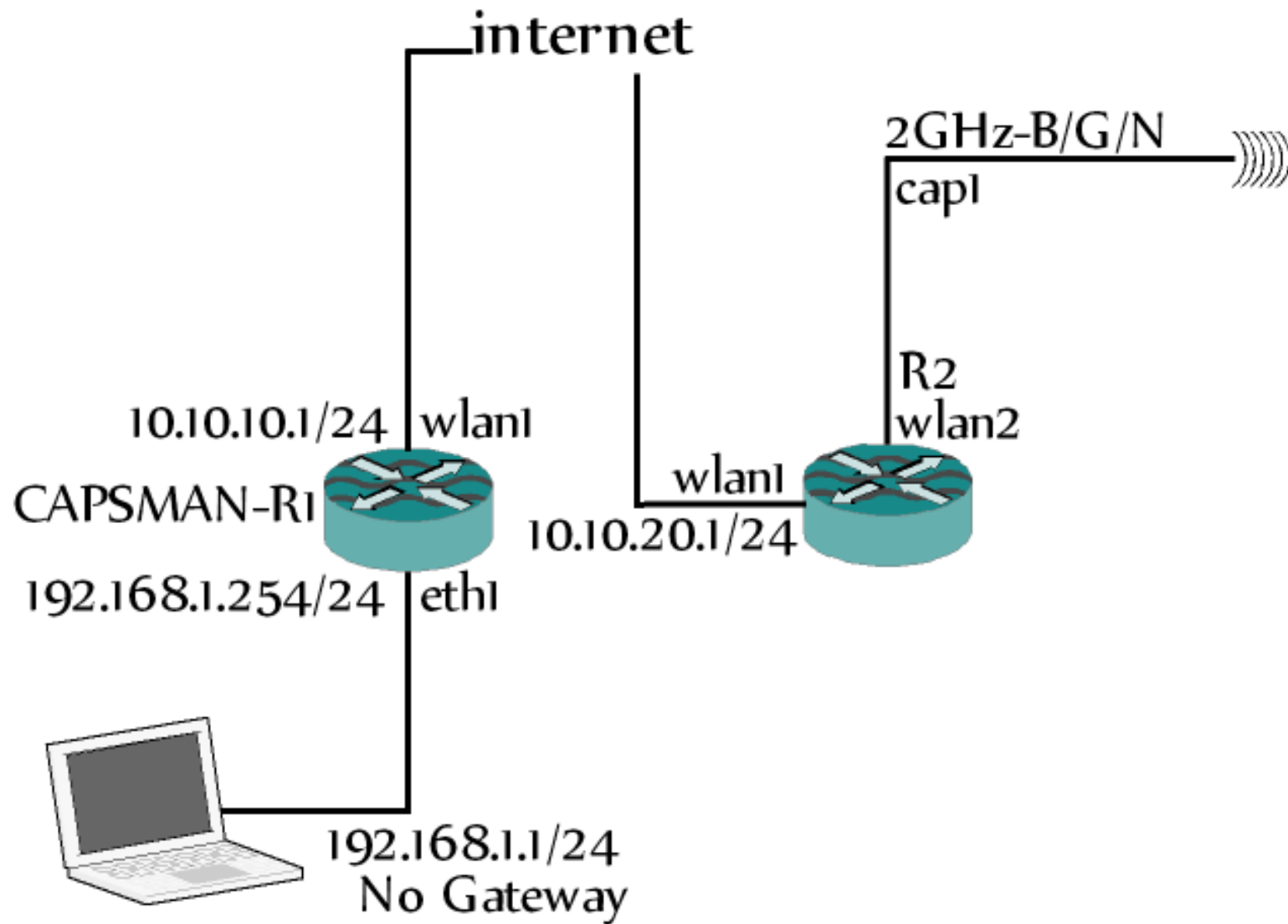
Discovery Interfaces: wlan2

connect wlan2 to cap1-R2

change **Discovery Interfaces** from ether2 to wlan2

# L3 CAPsMAN

# LAB [7]





# LAB [6] - R2/CAP1

Wireless Tables

Interfaces Nstreme Dual Access List Registration Connect L

+ - ✓ ✗ [icon] CAP Scanner

	Name	Type	L2 MTU	Tx
-- managed by CAPsMAN				
X	wlan1	Wireless (Atheros AR9...	1600	
RS	wlan2	Wireless (Atheros AR9...	1600	

CAP

☒ Enabled

Interfaces: wlan1

Certificate: none

Discovery Interfaces:

☐ Lock To CAPsMAN

CAPsMAN Addresses: 10.10.10.1

Thank you very much for your attention

[www.mikroline.com/mum](http://www.mikroline.com/mum)

# MikroLine