

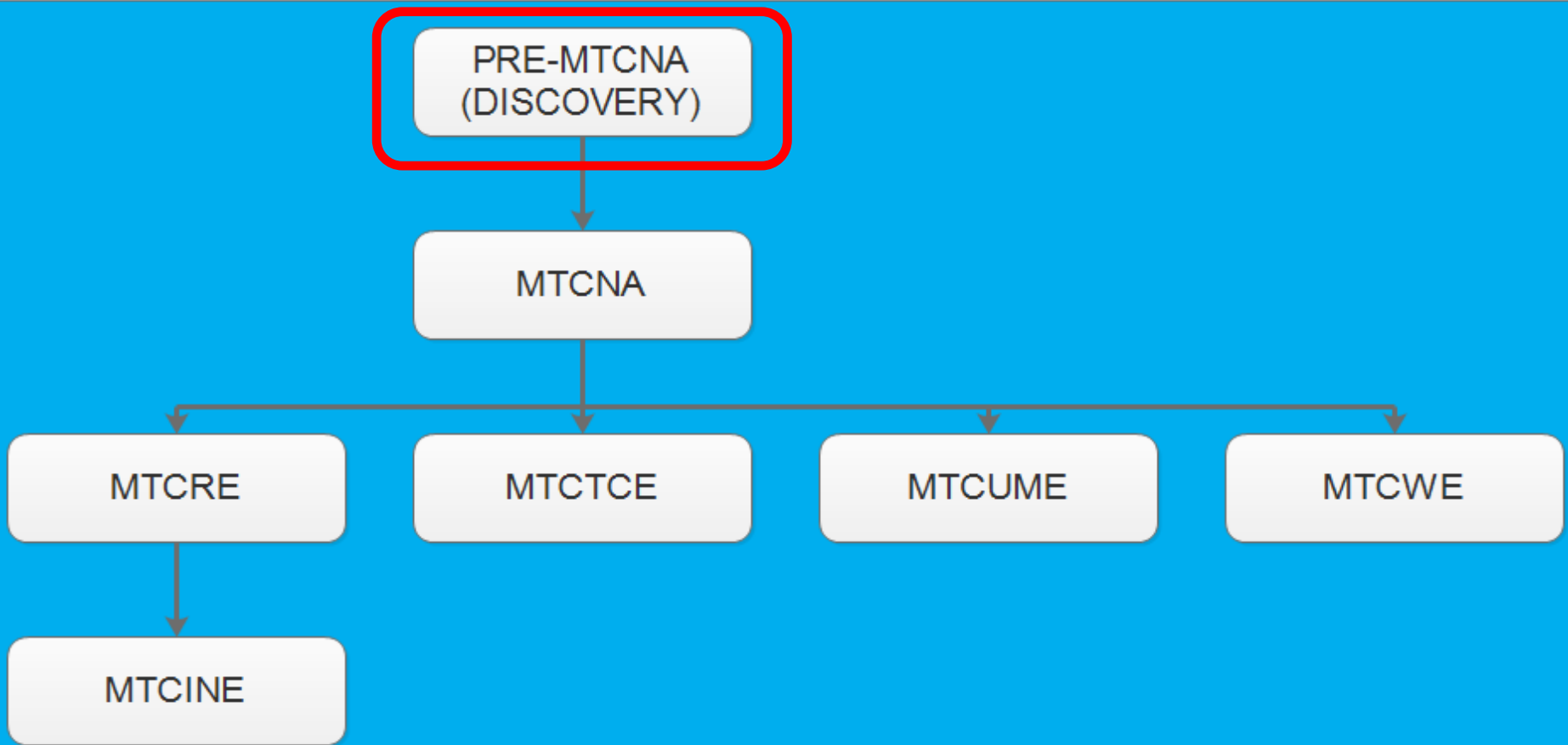
MIKROTIK DISCOVERY (PRE-MTCNA)

<http://www.belajarmikrotik.com>

MTCNA DISCOVERY

- Introduction to Networking
 - TCP/IP BASIC (7 Layer OSI)
 - IP Address & Subnetting
 - DHCP Server & Client
 - Introduction to MikroTik
- Introduction to MikroTik
 - Hardware
 - Reset and Installation
 - Software
 - Connection to Router
 - General Implementation

JENJANG SERTIFIKASI MIKROTIK



INTRO TO NETWORKING

NETWORKING

- ❑ Jaringan digambarkan dalam sebuah model berlapis, yang terdiri dari modul-modul yang terpisah
- ❑ Tujuannya untuk mengurangi tingkat kerumitan dalam mempelajari keseluruhan jaringan. Serta memfasilitasi keberanekaragaman aplikasi, protokol, dan hardware.
- ❑ Terdapat 2 model yang digunakan hingga saat ini, yaitu:
 - ❑ Open System Interconnection (OSI)
 - ❑ Transport Control Protocol / Internet Protocol (TCP/IP)

NETWORKING

□ Dalam model OSI, jaringan digambarkan pada 7 layer yang berbeda:

1. Application
2. Presentation
3. Session
4. Transport
5. Network
6. Data Link
7. Physical

NETWORKING

- Serupa tapi tak sama dengan OSI, TCP/IP hanya memiliki 4 layer dalam modelnya
 1. Application
 2. Transport
 3. Internet
 4. Network Access

NETWORKING

- Meskipun berbeda dalam jumlah layer dan penamaan, namun fungsi dari layer-layer kedua modul tersebut tidak berbeda. Beberapa layer pada OSI, digabungkan menjadi 1 layer TCP/IP

OSI	TCP/IP	Fungsi
Application	Application	Layer interaksi dengan user
Presentation		Format, struktur data & Enkripsi
Session		Mengatur sesi setiap aplikasi
Transport	Transport	Mengatur koneksi antar Host
Network	Internet	Pengalamatan & penentuan jalur tujuan
Data Link	Network Access	Penjembatanan antara hardware dan software
Physical		Transmisi data

APPLICATION LAYER

- Layer yang berinteraksi langsung dengan user
- Merupakan layer yang dapat dipahami oleh orang awam
- Contoh:
 - HTTP
 - FTP
 - POP₃
 - SMTP
 - DNS

TRANSPORT LAYER

- Mengatur pipa koneksi antar host (end-to-end connection)
- Terdapat dua protokol yang sering digunakan
 - TCP
 - UDP

TRANSPORT LAYER (TCP)

- Transport Control Protocol
- Didasari atas kebutuhan transfer data yang reliable (data yang diterima valid sesuai yang dikirimkan)
- Connection Oriented, diimplementasikan dengan three way handshake
- Mampu mengatur segmen yang datang secara acak, dan meminta kembali jika ada segmen yang rusak
- Header lebih panjang, sehingga proses lebih lama
- Digunakan dalam aplikasi email, web, dan file transfer

TRANSPORT LAYER (UDP)

- ❑ User Datagram Protocol
- ❑ Didasari atas kebutuhan transfer data yang cepat sampai ke tujuan
- ❑ Connectionless, tidak membutuhkan koneksi end to end
- ❑ Paket yang acak atau rusa, akan ditampilkan apa adanya
- ❑ Header lebih pendek, sehingga proses jauh lebih cepat dibandingkan TCP
- ❑ Digunakan dalam implementasi VoIP, Video Streaming, dan Game Online

TRANSPORT LAYER

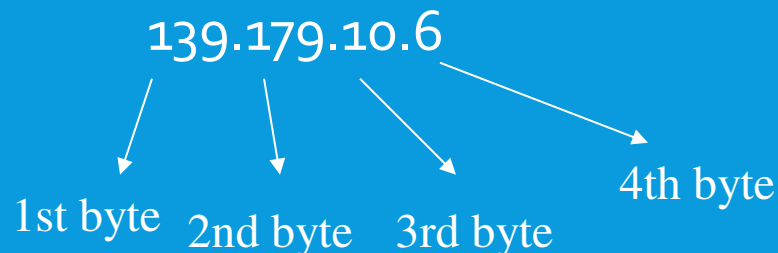
- Setiap aplikasi dalam application layer, memiliki korelasi dengan protokol pada transport layer.
- Setiap aplikasi dibedakan dengan menggunakan port number.
- Contoh:
 - HTTP TCP port 80
 - FTP TCP port 21
 - DNS TCP/UDP port 53
 - SSL TCP port 443
- Port number yang dimaksud, disediakan oleh host penyedia servis yang bersangkutan (pada server yang dituju)
- Pada Transport Layer bekerja fitur Firewall

NETWORK LAYER

- Logical Addressing (Alamat IP). Disebut logis karena bisa diubah berdasarkan kondisi.
- Sebagai Best Path Determination, penentuan jalur terbaik untuk mencapai suatu tujuan (Routing)
- Perangkat yang bekerja pada layer 3:
 - Router
 - PC

IP ADDRESS

- IP Address merupakan alamat host yang dikenal di Internet, dapat terpasang pada router maupun PC
- Alamat IP terdiri dari 32 bit bilangan biner, di mana setiap 8 bit dapat direpresentasikan dengan bilangan desimal



10001011 . 10110011 . 00001010 . 00000110

In binary form

SUBNET MASK

- Subnet mask merupakan faktor untuk menentukan jaringan dari sebuah alamat IP
- Strukturnya sama dengan alamat ip, hanya saja bit 0 dan 1 berkumpul menjadi satu

255.255.0.0



11111111 . 11111111 . 00000000 . 00000000

BIT MASKING

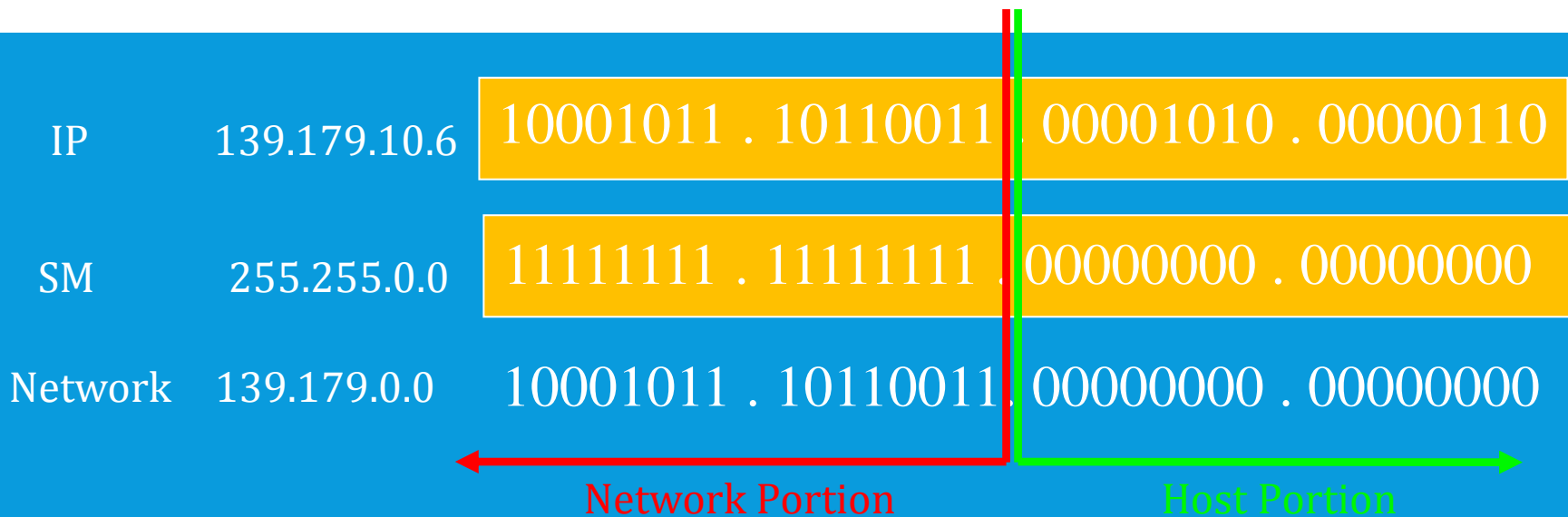
- Jika dioperasikan dengan Alamat IP maka akan didapat properti-properti dalam sebuah jaringan

IP 139.179.10.6 10001011 . 10110011 . 00001010 . 00000110

SM 255.255.0.0 11111111 . 11111111 . 00000000 . 00000000

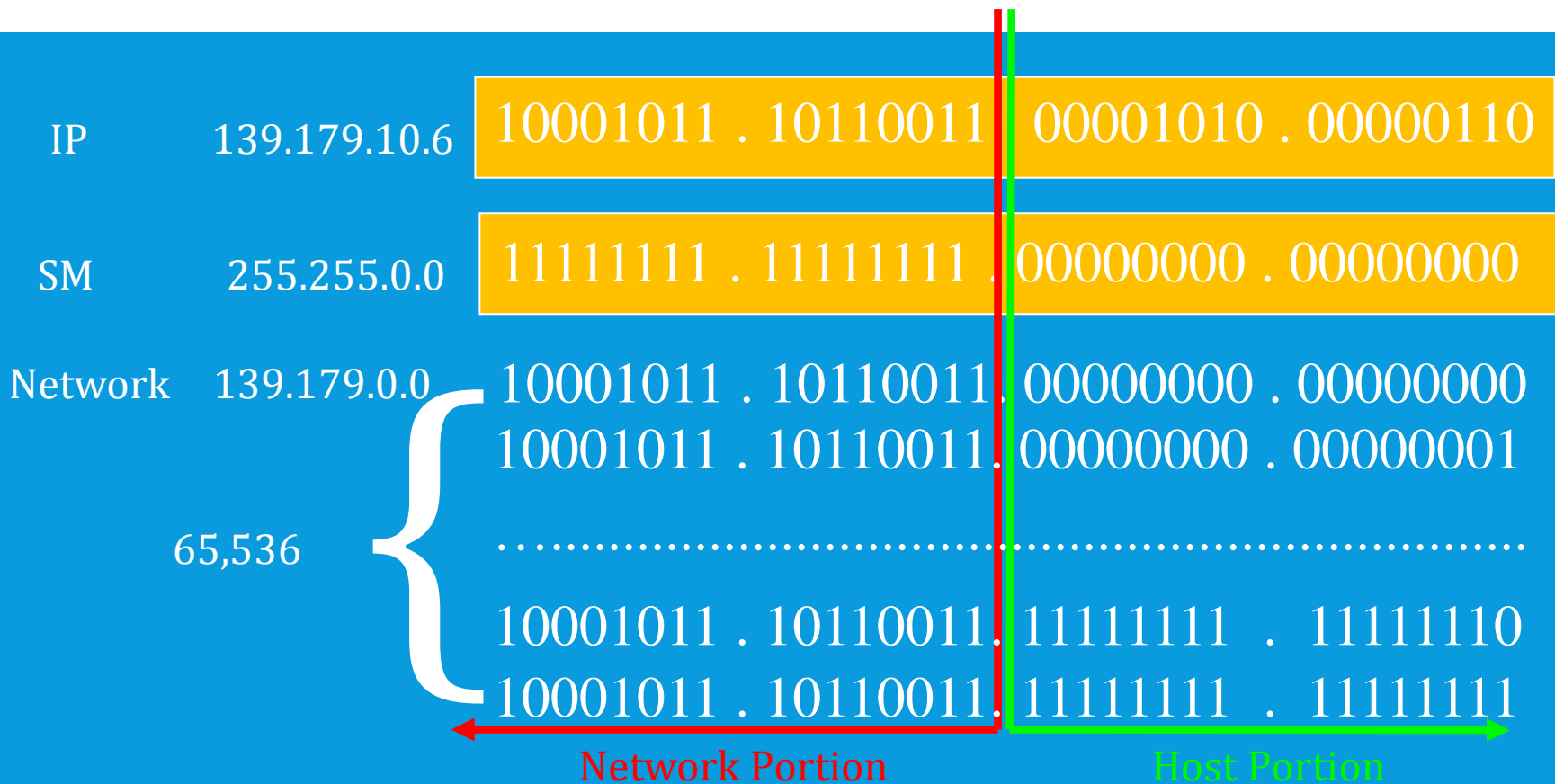
A	B	A AND B
0	0	0
0	1	0
1	0	0
1	1	1

BIT MASKING



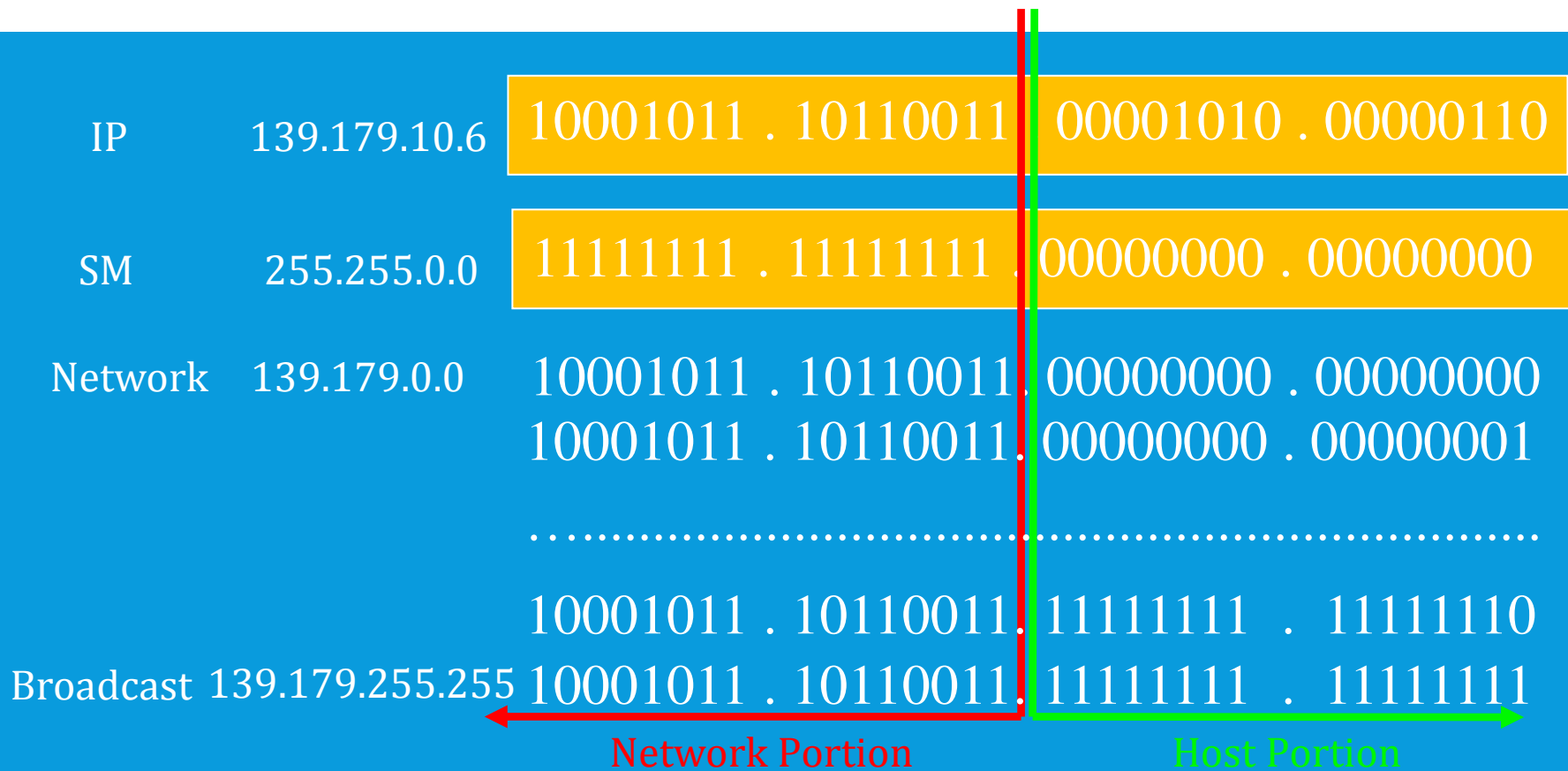
- Dalam sebuah jaringan,
 - network portion akan selalu sama.
 - tidak boleh ada host portion yang sama (unique)

BIT MASKING



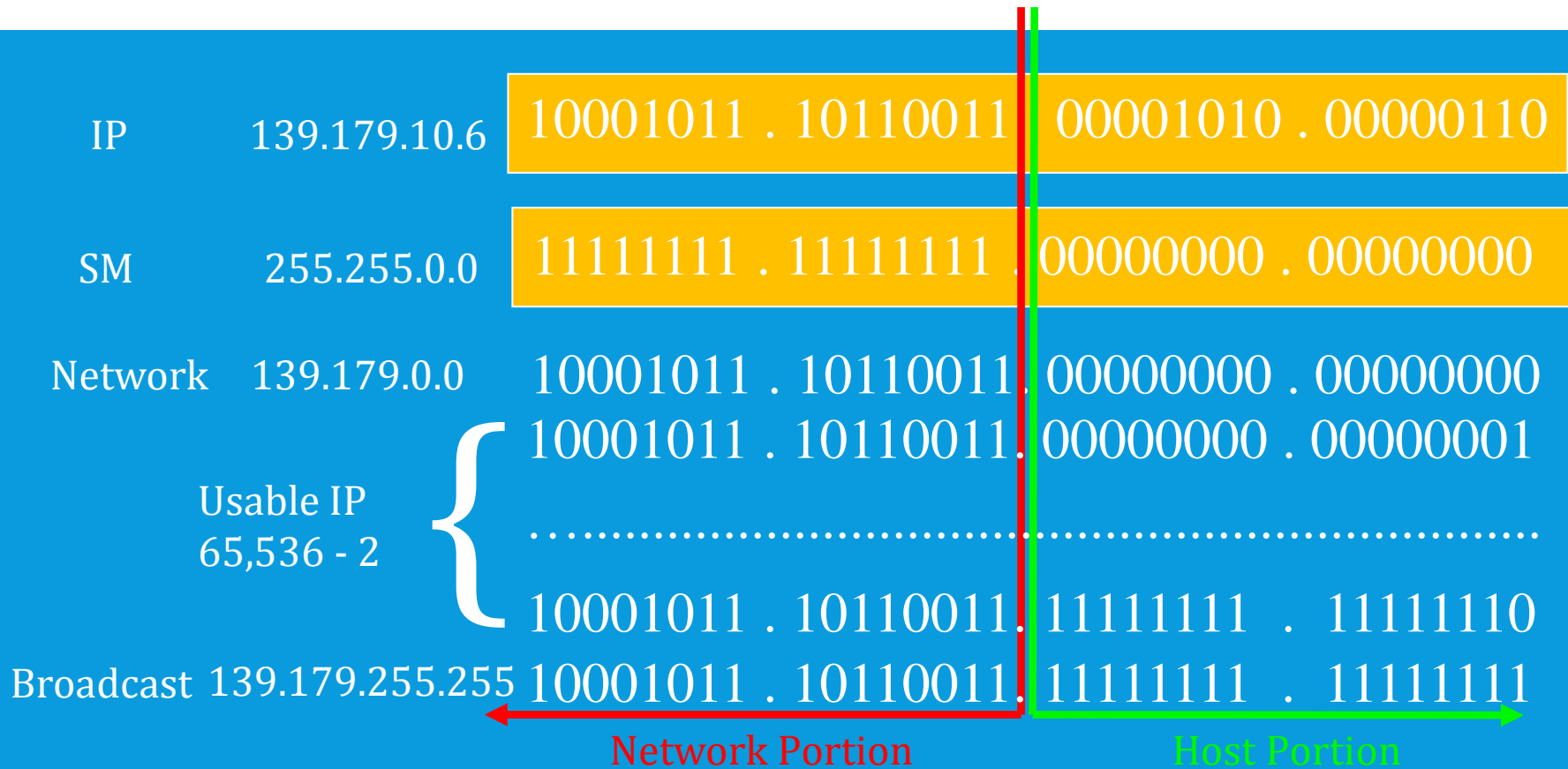
- Dalam sebuah jaringan:
 - Jumlah total alamat IP, sejumlah kombinasi dari host portion

BIT MASKING



Sisanya dapat digunakan sebagai alamat IP

BIT MASKING



- Alamat pertama digunakan sebagai Network ID
- Alamat terakhir digunakan sebagai Broadcas Address

BEST PATH DETERMINATION

- Menentukan jalur terbaik untuk menuju suatu network
- Jalur terbaik ditentukan berdasarkan routing table
- Routing table dibentuk dalam 2 macam cara:
 - Static
 - Dynamic

STATIC ROUTING

- Routing table diisi secara manual oleh admin
- Rute akan selalu tetap, meskipun jalur ada yang putus
- Tidak membutuhkan resource terlalu besar
- Rumit jika ukuran jaringan sangat besar

DYNAMIC ROUTING

- Routing table diisi secara otomatis menggunakan routing protocol
- Rute dapat berubah, menyesuaikan dengan kondisi jalur ada, sehingga dapat membuat failover jika ada jalur yang putus
- Membutuhkan resource yang cukup besar
- Mudah dalam konfigurasi, namun sulit dalam identifikasi

DATA LINK LAYER

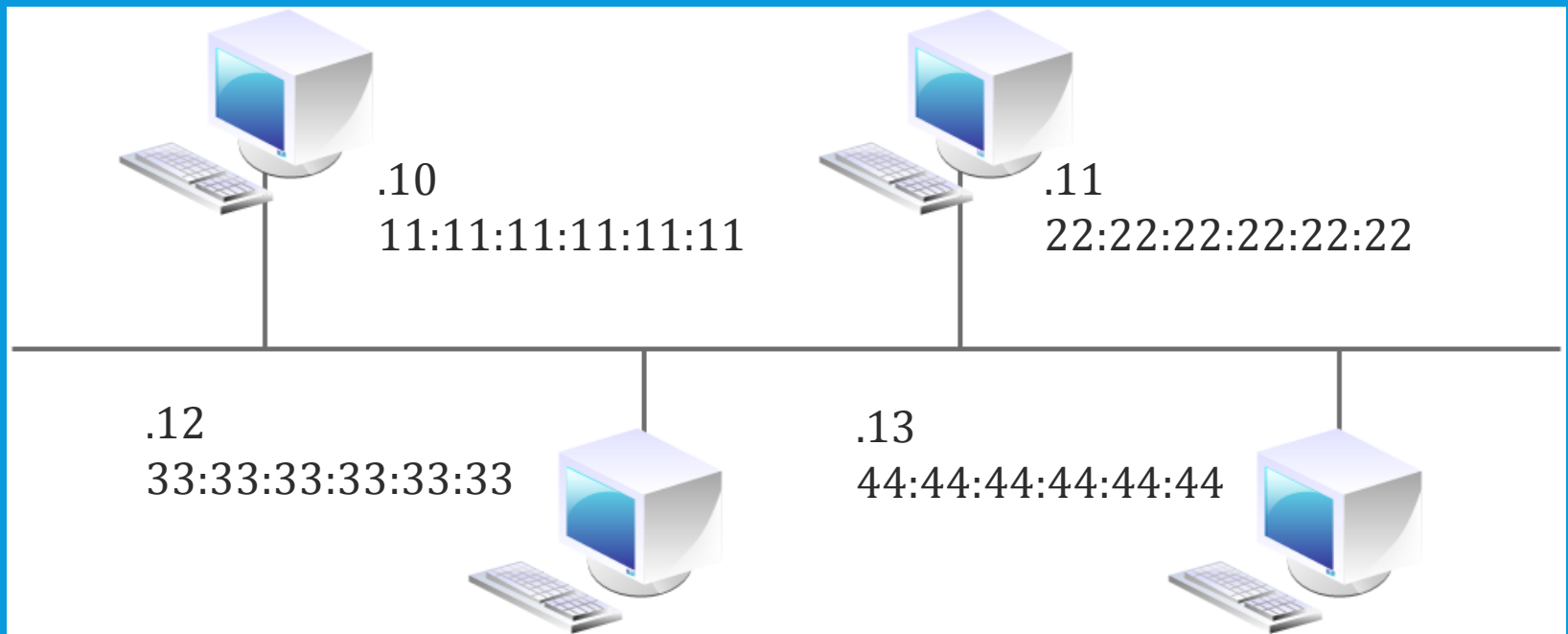
- Physical Address / Hardware Addressing dengan menggunakan MAC Address
- Sebagai metode pengalamatan pada Local Area Connection
- Hanya dikenal dalam satu broadcast domain
- Setiap alamat IP akan dipetakan menjadi MAC Address pada data link layer menggunakan protocol ARP
- Perangkat yang bekerja pada layer ini:
 - Switch
 - Bridge
 - PC,Router

PHYSICAL LAYER

- Sebagai media transmisi data yang sudah berbentuk bit
- Setiap bit akan direpresentasikan sesuai dengan media yang digunakan, misalnya:
 - Tembaga -> Listrik
 - Fiber Optik -> Cahaya
 - Udara -> Gelombang
- Perangkat yang bekerja pada layer ini
 - Kabel
 - Repeater
 - Hub
 - Switch, Bridge, Router, PC

ADDRESS RESOLUTION PROTOCOL

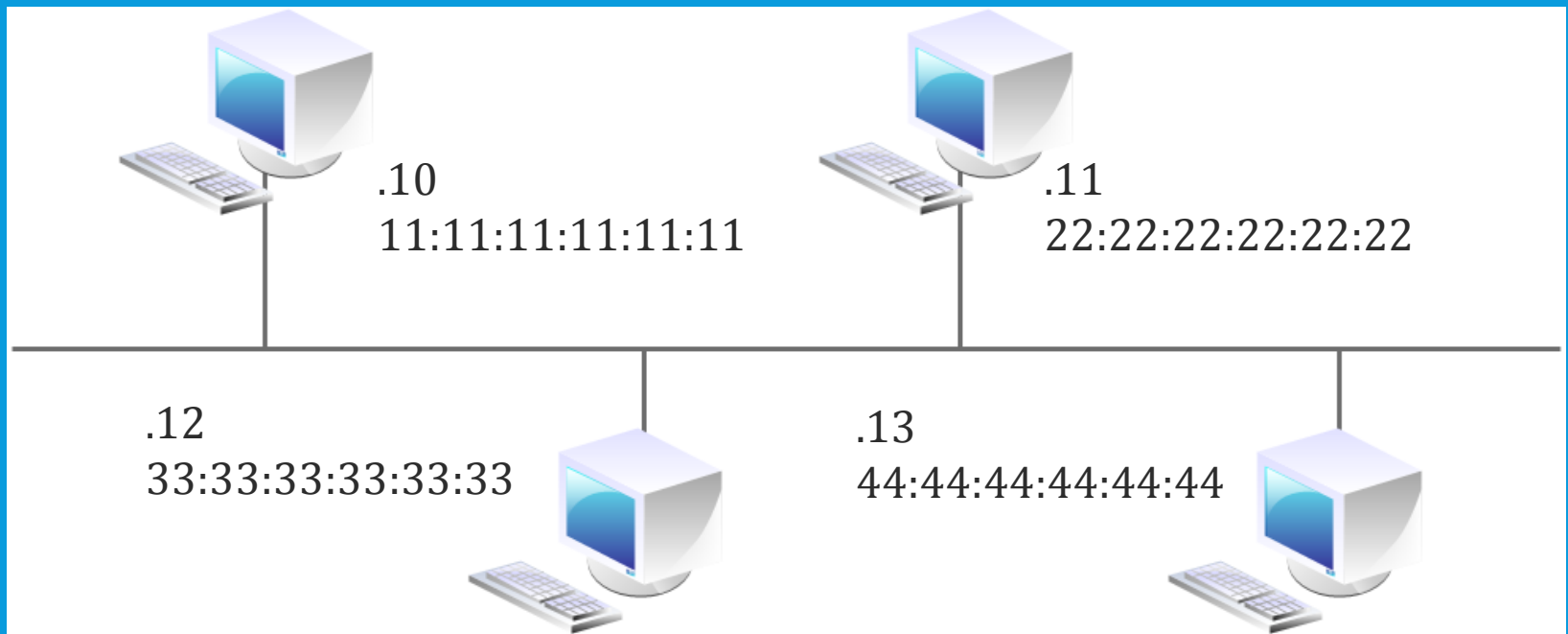
192.168.100.0/24



ADDRESS RESOLUTION PROTOCOL

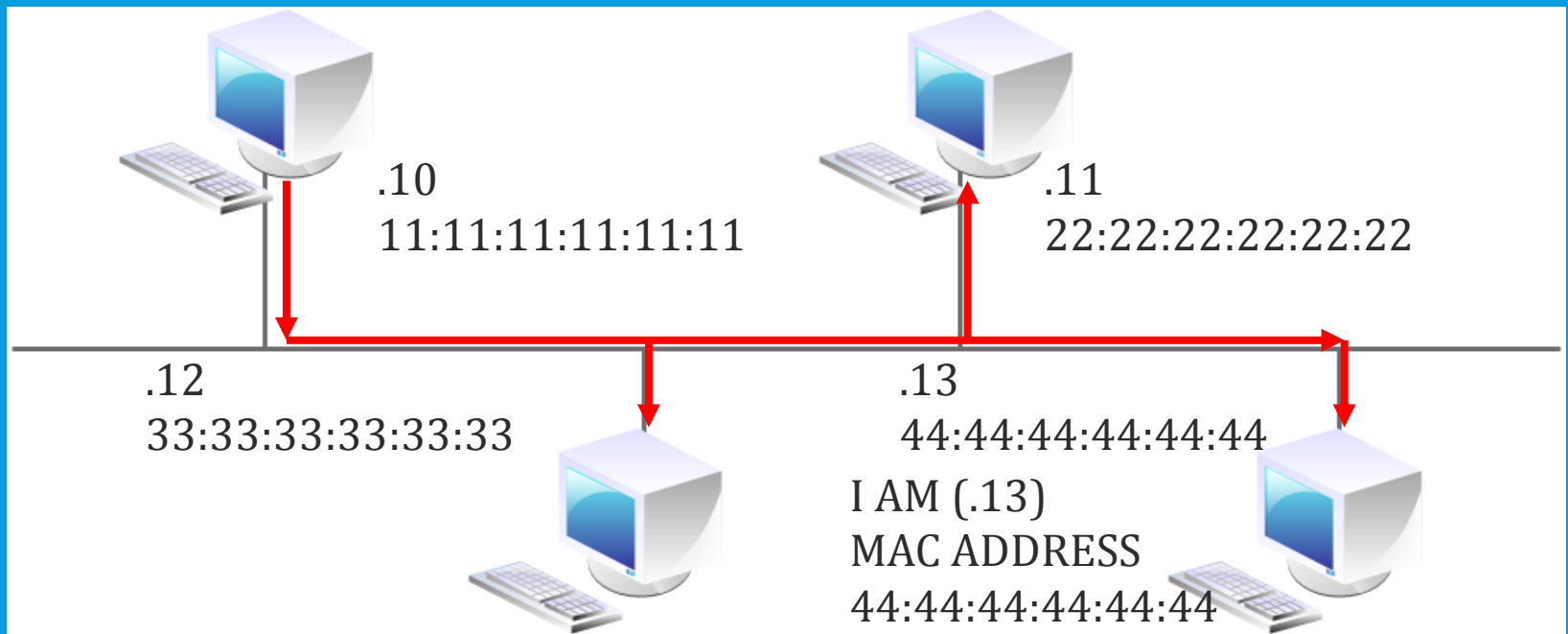
WHO IS (.13)?

(.10) sending to (.13)



ADDRESS RESOLUTION PROTOCOL

(.10) sending to (.13)



TENTANG MIKROTIK

MIKROTIK

- Vendor Hardware Dan Software
- Motto : Routing The World
- Bertempat di Riga, Latvia (Eropa Utara)



PRODUK MIKROTIK

- RouterBoard
 - Hardware untuk MikroTik Router OS
- RouterOS
 - MikroTik Router Operating System
 - Bisa di Install di PC (x86)
 - Terinstall di Semua type RouterBoard

ROUTEROS

- Operating System (OS) berbasis Unix
- Lebih dari sekedar fungsi “Router”
- Support Berbagai Driver Perangkat
 - Jika tidak dikenali, tidak bisa ditambahkan sendiri
 - **Harus mengirimkan file suppout.rif ke MikroTik, ketika device dipasang dan tidak dikenali.**

ROUTERBOARD

- Hardware yang didesain dan diproduksi oleh MikroTik, yang menggunakan MikroTik RouterOS sebagai Operating Systemnya
- Berbagai macam type, model, jenis interface, dan jumlah interfacenya.
- Terdapat Beberapa type Arsitektur RouterBoard
 - MIPSbe, MIPSle, PPC, Tiler

ARSITEKTUR ROUTERBOARD

- Beda arsitektur, beda pula karakter cara pemrosesan dan addressingnya

RouterOS

Please choose your instruction set:

<i>mipsbe</i>	RB400 series, RB700 series, RB900 series, RB2011 series, SXT, OmniTik, Groove, METAL
<i>ppc</i>	RB300 series, RB600 series, RB800 series, RB1000 series
<i>x86</i>	PC / X86, RB230 series
<i>mipsle</i>	RB100 series, RB500 series, RB Crossroads
<i>tile</i>	CCR series
<i>ALL</i>	All system downloads in one torrent file

PENAMAAN ROUTERBOARD

- Terdapat 4 jenis penamaan RouterBOARD
 - Kode "3-DIGIT"
 - Contoh : RB433, RB411, RB951, dst
 - KATA (menggambarkan jenis RouterBOARD secara langsung dengan karakteristiknya)
 - Contoh : OmniTIK, Groove, SXT, SEXTANT
 - Kode "NON-STANDARD", biasanya terdapat pada RB dengan port sampai 9 atau jenis tertentu
 - Contoh : RB800, RB1100, RB2100, dst
 - CCR (Seri Cloud Core Router)

FITUR ROUTERBOARD

KODE	Deskripsi
U	Terdapat port USB
P	Memiliki Injektor PoE
I	Salah satu port (biasanya yang terakhir) dapat mengeluarkan POE
A	Memori (atau lisensi) lebih tinggi
H	Processor lebih tinggi
L	Edisi "LIGHT", biasanya beberapa hardware dikurangi
S	Memiliki port SFP (Fiber Optic)
E	PCI yang tersedia adalah bertipe PCIe
X<N>	Jumlah CORE
G	Memiliki GIGABIT port

FITUR WIRELESS ROUTERBOARD

- Fitur Wireless memiliki kode penamaan :

[BAND][POWER][TEKNOLOGI][ANTENNA]

[BAND]

- 2 : 2.4GHz
- 5 : 5GHz
- 52 : Dual-BAND

[TEKNOLOGI]

- <kosong> : hanya 802.11a/b/g
- n – untuk teknologi 802.11n
- ac – untuk teknologi 802.11ac

[POWER]

- <kosong> : normal (23dbm, 24dbm)
- H – High (23/24dbm, 24/27dbm)
- HP – High Power (25/26dbm, 28-29dbm)
- SHP – Super High Power (27+dbm, 30+dbm)

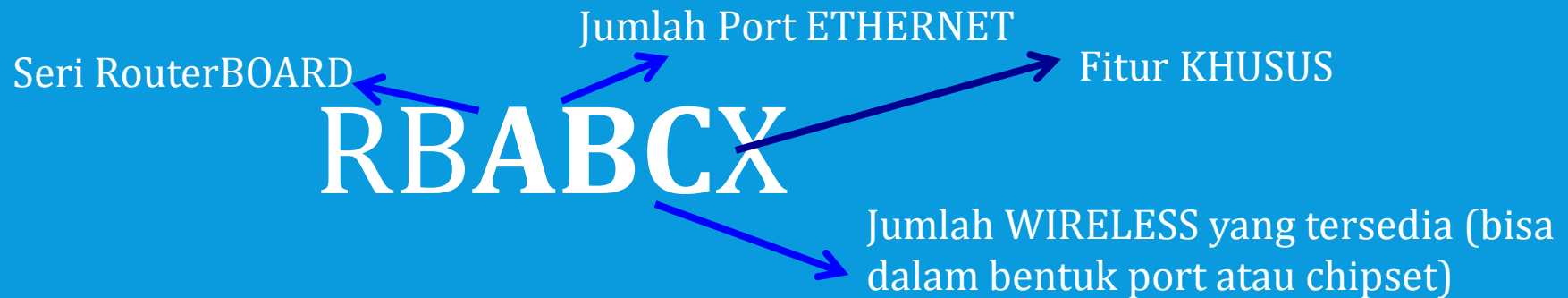
[ANTENNA]

- <kosong> : hanya 1 antenna
- D – DUAL (2 antenna)
- T – TRIPPLE (3 antenna)

JENIS CASING ROUTERBOARD

- Beberapa RouterBOARD memiliki jenis-jenis casing yang khusus, beberapa diantaranya tidak
 - BU – Board Unit, hanya PCB saja
 - RM – Rack Mount (1U mount-rack)
 - IN – Indoor (biasanya diletakkan di meja)
 - OUT – Casing OUTDOOR
 - SA – Casing yang dilengkapi Antenna Sektoral
 - HG – Casing yang dilengkapi Antenna High-GAIN
 - EM – Extended Memory (ada memory tambahan)

PENAMAAN ROUTERBOARD #1



CONTOH : RB951Ui-2HnD

Fitur	433UL	433	433AH	433UAH	433GL
CPU (Mhz)	400	300	680	680	680
RAM (MB)	64	64	128	128	128
Serial Port	-	YA	YA	YA	-
USB	YA	-	-	YA (2)	YA
Gigabit	-	-	-	-	YA
Lisensi	L4	L4	L4	L4	L4

PENAMAAN ROUTERBOARD #2

Seri RouterBOARD

Fitur Tambahan

NAME-X



SXT-5HnD

Groove-52HnD

OmniTIK

QRT 5 (RB911G-5HPnD-QRT

PENAMAAN ROUTERBOARD #3

Seri RouterBOARD

RBAACCX-X

Fitur Tambahan

Informasi Interface

RouterBOARD Seri 2011 (berdasarkan tahun)

RB2011UAS-2HnD

11 Interfaces (salah satunya SFP)

PENAMAAN ROUTERBOARD #4

[KODE]-[PORT]-[CASING]

[KODE]

- DIGIT 1 : SERI
- DIGIT 2 : <belum dipakai>
- DIGIT 3-4 : Jumlah CPU/CORE

[CASING]

* Sama seperti jenis casing RB

[PORT]

- <n>G : sejumlah "n" port GIGABIT
- <n>S – sejumlah "n" port SFP
- <n>S+ - sejumlah "n" port SFP+

CCR1036-8G-2S+

LISENSI ROUTEROS

LISENSI

- Lisensi Mengikat pada Media Penyimpanan
 - NAND, USB Flash, Compact Flash (CF), Harddisk
 - Kerusakan Pada Hardware / Pheriperal Selain HardDrive tidak membutuhkan Lisensi Baru
 - Bersifat Lifetime (Selamanya)
 - Lisensi Trial (Unlisence) hanya 24 jam
 - Lisensi dibedakan berdasar jumlah user, active user dan session (PPP, Radius, User Manager)
 - Basic Fitur Router tiap Lisensi Sama.

LISENSI

Level number	0 (FREE)	1 (DEMO)	3 (WISP CPE)	4 (WISP)	5 (WISP)	6 (Controller)
Price	no key	registration required	volume only	\$45	\$95	\$250
Upgradable To	-	no upgrades	ROS v6.x	ROS v6.x	ROS v7.x	ROS v7.x
Initial Config Support	-	-	-	15 days	30 days	30 days
Wireless AP	24h limit	-	-	yes	yes	yes
Wireless Client and Bridge	24h limit	-	yes	yes	yes	yes
RIP, OSPF, BGP protocols	24h limit	-	yes(*)	yes	yes	yes
EoIP tunnels	24h limit	1	unlimited	unlimited	unlimited	unlimited
PPPoE tunnels	24h limit	1	200	200	500	unlimited
PPTP tunnels	24h limit	1	200	200	500	unlimited
L2TP tunnels	24h limit	1	200	200	500	unlimited
OVPN tunnels	24h limit	1	200	200	unlimited	unlimited
VLAN interfaces	24h limit	1	unlimited	unlimited	unlimited	unlimited
HotSpot active users	24h limit	1	1	200	500	unlimited
RADIUS client	24h limit	-	yes	yes	yes	yes
Queues	24h limit	1	unlimited	unlimited	unlimited	unlimited
Web proxy	24h limit	-	yes	yes	yes	yes
Synchronous interfaces	24h limit	-	-	yes	yes	yes
User manager active sessions	24h limit	1	10	20	50	Unlimited

LISENSI

- Lisensi & Software ID
 - Setiap Instalasi, RouterOS akan membuat Software ID yang spesifik dengan Storagenya
 - Software ID digunakan untuk meng-generate key lisensi
 - Lisensi dapat di beli di web **MikroTik**
 - Dapat juga di beli di Distributor MikroTik
 - Setiap Peserta Training mendapatkan 1 Free Lisensi Level 4

LISENSI

- Mendapatkan Lisensi
 - Untuk membeli / mendapatkan lisensi dari web MikroTik, harus sudah punya login user dan password
 - Login ke www.mikrotik.com

LISENSI

The image shows a screenshot of the Mikrotik software key management interface. The top left features the Mikrotik logo with the tagline "ROUTING THE WORLD" and the website "www.mikrotik.com". The main header includes "Routers & Software" and navigation tabs for "home", "software", and "help". Below the header, there are links for "Overview" and "Support".

The main content area is divided into two sections:

- Account Notices:**
 - Current account balance is **\$0**
 - Prepaid keys available: **22**
- Generate a NEW software KEY:**
 - purchase a key
 - take prepaid key (*available 22*)
 - make a demo key
- For already created software keys:**
 - all keys **or** try search
 - replacement key (*0*)
 - request key from another account

On the right side, there is a "Key Order Page" section, indicated by a large number "1" in a circle. It contains three dropdown menus for configuration:

- Prepaid keys: **WISP AP (Level 4) 5x**
- Device type: **x86 system**
- Software ID: **5KQG-32WK**

A "Next" button is located at the bottom right of the "Key Order Page" section.

KONEKSI PERTAMA KALI

AKSES KE ROUTEROS

- Direct
 - Monitor / Keyboard
 - Serial Console
- Remote
 - GUI
 - Winbox
 - Webfig
 - CLI
 - SSH / Telnet

AKSES ROUTER

Access Via	Condition	Text Based	GUI	Need IP	Custom	Additional Device
Keyboard/Monitor	IF installed in a PC	<input type="radio"/>				
Serial Console	With serial console cable	<input type="radio"/>				<input type="radio"/>
Telnet and SSH		<input type="radio"/>		<input type="radio"/>		
<u>WinBox</u>	Used program called <u>winbox.exe</u>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>		
FTP				<input type="radio"/>		
API	Socket programming			<input type="radio"/>	<input type="radio"/>	
Web (HTTP)			<input type="radio"/>	<input type="radio"/>		
MAC-WinBox	Layer 2 connection	<input type="radio"/>	<input type="radio"/>			
MAC-Telnet	Layer 2 connection	<input type="radio"/>				

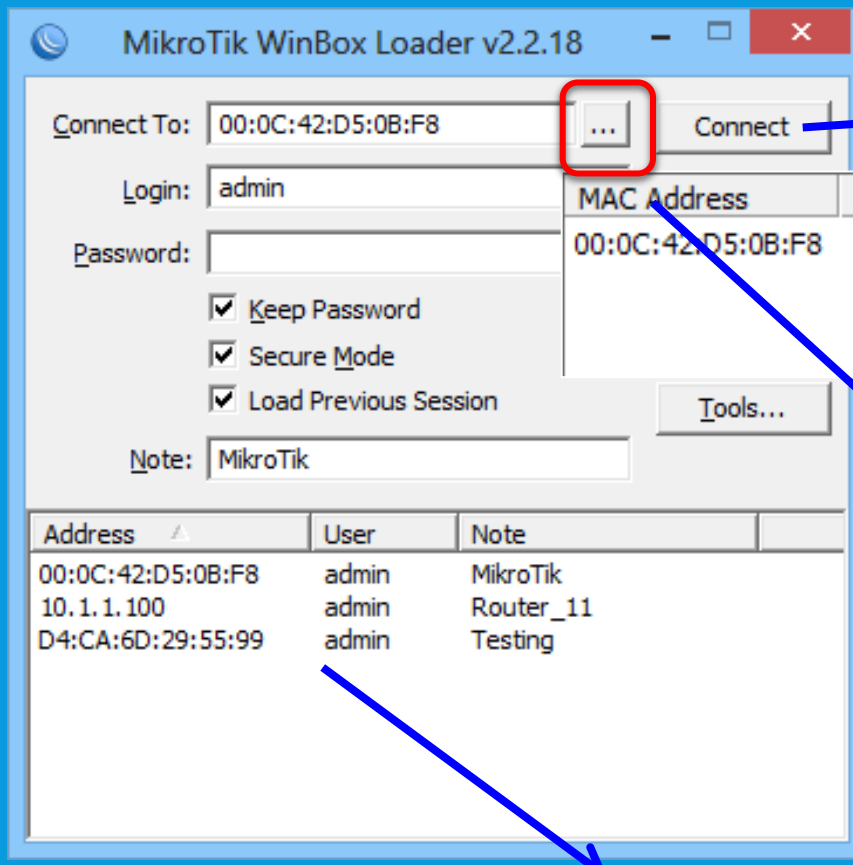
WINBOX

- Winbox
 - Program / Aplikasi yang berjalan di Windows
 - Bisa berjalan di OS Linux, Mac, dll (dengan emulator)
 - Berbasis TCP/IP, User dan Password
- Winbox - MAC
 - Menggunakan Mac-Address
 - Bekerja di Layer2
 - Dial Mac-Address, User dan Password

WINBOX

- Cara yang paling umum dan paling mudah digunakan untuk mengakses RouterOS
- Dapat di Download di website MikroTik
- Dapat di Download di Local Web Router
 - <http://iprouter>
 - Pilih winbox

WINBOX



Connect ke Router

Network Discovery,
Menunjukkan Router
terdekat dalam satu
network discovery
yang sama (Layer2)

Saved router
information

WINBOX



The image shows the MikroTik WinBox v6.1 interface. The main window title bar reads "admin@00:0C:42:D5:0B:F8 (MikroTik) - WinBox v6.1 on RB751U-2HnD (...)". A green box highlights the MAC address "00:0C:42:D5:0B:F8" in the title bar, with a blue arrow pointing to the WinBox Loader dialog box. The dialog box, titled "MikroTik WinBox Loader v2.2.18", has a "Connect To:" field containing "00:0C:42:D5:0B:F8" (highlighted with an orange box) and a "Connect" button (highlighted with a red box). Other fields include "Login:" with "admin" and "Password:" which is empty. There are also checkboxes for "Keep Password", "Secure Mode", and "Load Previous Session", all of which are checked. Buttons for "Save", "Remove", and "Tools..." are visible at the bottom right of the dialog.

admin@00:0C:42:D5:0B:F8 (MikroTik) - WinBox v6.1 on RB751U-2HnD (...)

Safe Mode Uptime: 00:04:07 Memory: 10.2 MiB CPU: 1% Hide Passwords

Quick Set
Interfaces
Wireless
Bridge
PPP

MikroTik WinBox Loader v2.2.18

Connect To: 00:0C:42:D5:0B:F8 ... Connect

Login: admin

Password: |

Keep Password
 Secure Mode
 Load Previous Session

Save
Remove
Tools...

AKSES KE ROUTER

- Gunakan Program "winbox.exe"
- Akses Router Anda via MAC-ADDRESS
- Default User
 - User : admin
 - Pass : <blank> - (kosong tidak ada password)

RESET KONFIGURASI

- Untuk alasan tertentu, kita perlu mereset Konfigurasi RouterOS
 - Sama Sekali Lupa User dan Password
 - Ketika Konfigurasi Terlalu Kompleks untuk di Rekonfigurasi lanjut, Lebih Mudah Direset di Konfigurasi dari Awal

RESET KONFIGURASI

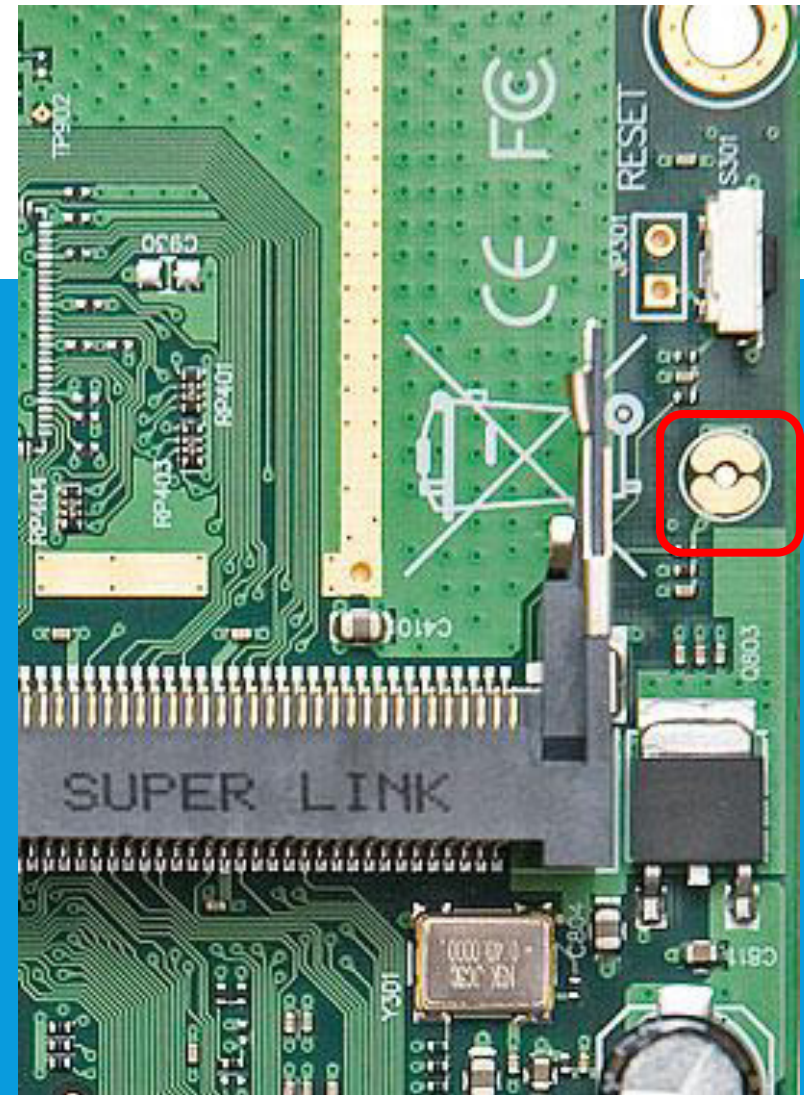
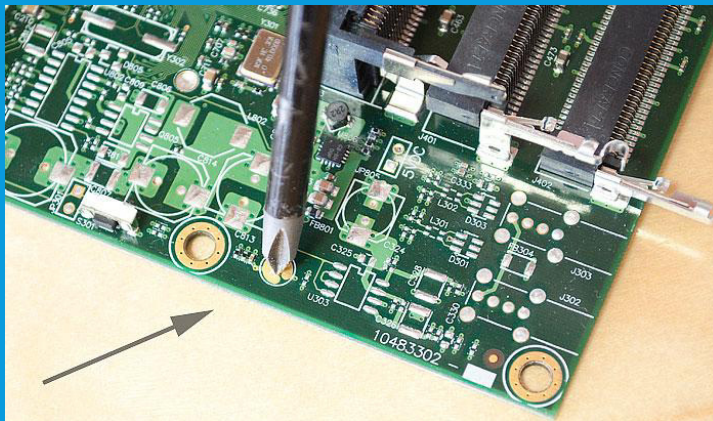
- Hard Reset
 - Mereset Konfigurasi Secara Hardware (via Board)
- Soft Reset
 - Reset Melalui Winbox, CLI (terminal), atau Webfig

HARD RESET

- Reset Jumper
 - Hanya untuk RouterBoard
 - Setiap RouterBoard memiliki Reset Jumper
 - Hubungkan Jumper untuk Mereset
- Reset Button
 - Terdapat Tombol Reset (Reset Button)
 - Tekan sekitar 25 detik sambil menyalakan Router
 - Reset Jumper juga sebagai Boot Squence, untuk memilih Router Booting dari disk atau ethernet

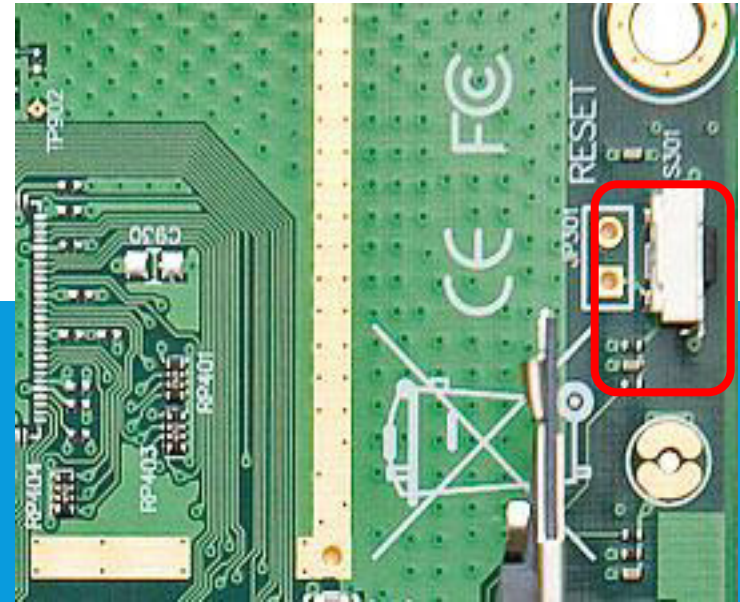
RESET JUMPER

- Reset Jumper
 - Hubungkan Jumper
 - Nyalakan RouterBOARD
 - Tunggu +- 10 detik



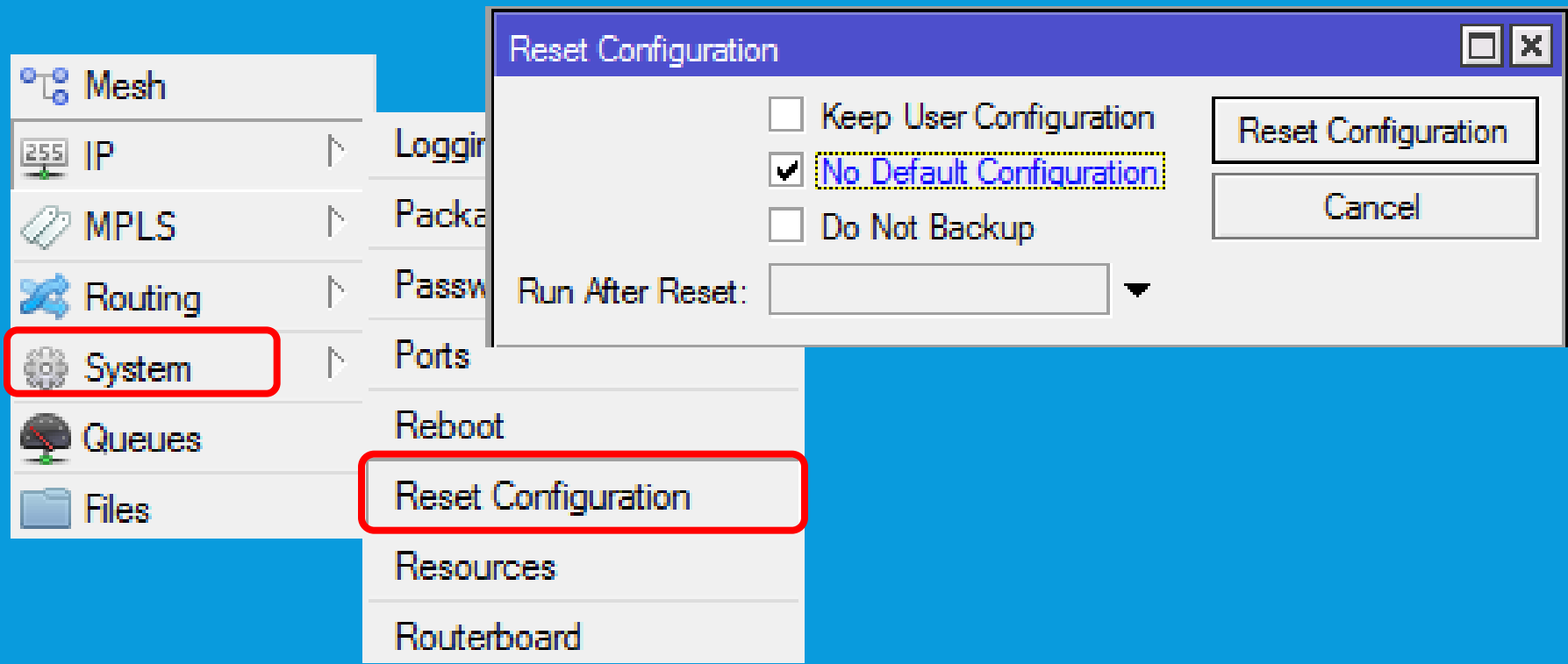
RESET BUTTON

- Tombol Reset
 - Matikan RouterBOARD
 - Tekan tombol RESET
 - Nyalakan RouterBOARD
 - Tunggu sampai lampu berkedip lepas tombol RESET



SOFT RESET

- Reset Via Software RouterOS
 - Via Winbox, Mac-Winbox, Webfig



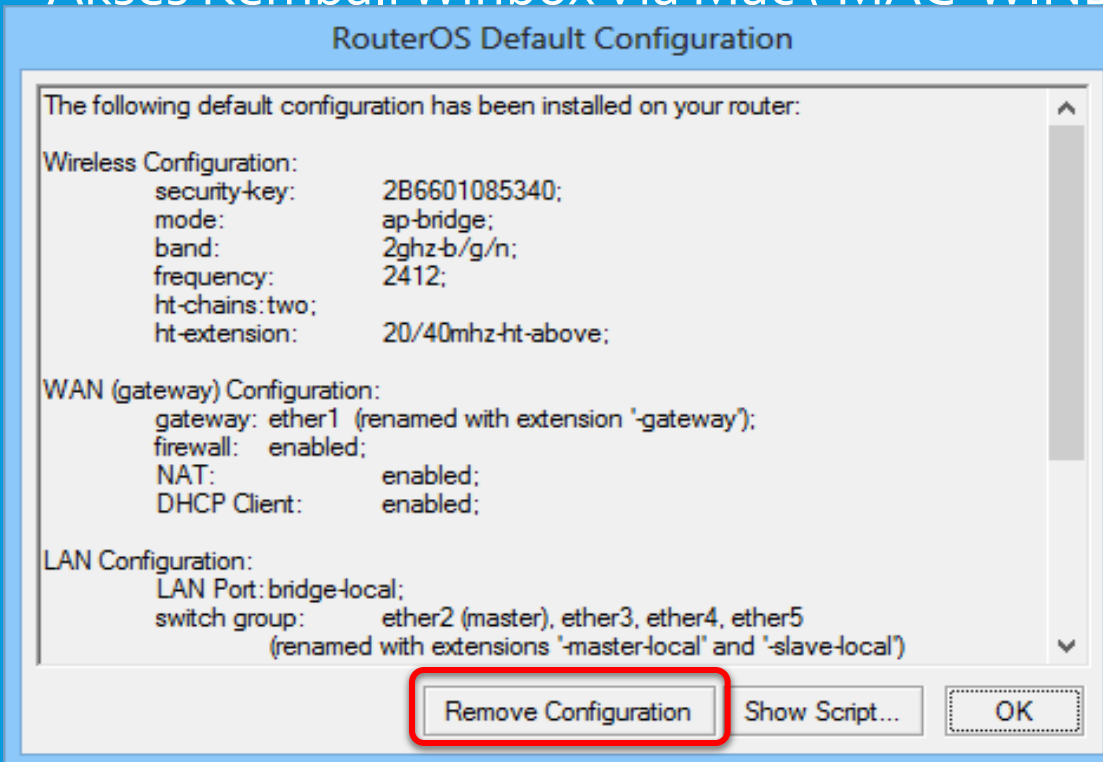
SOFT RESET

- Reset Via Software RouterOS
 - Via Terminal, SSH, Telnet

```
[admin@MikroTik] > system reset-configuration  
Dangerous! Reset anyway? [y/N]:  
█
```

RESET KONFIGURASI

- Remove Default Configuration
 - Menghapus Konfigurasi Default Bawaan Router
- Akses Kembali Winbox Via Mac (MAC-WINBOX)



WINBOX

The image shows a screenshot of the WinBox v6.1 web interface for a MikroTik RB751U-2HnD router. The interface is annotated with blue arrows pointing to various elements, each with a descriptive label:

- Undo / Redo:** Points to the circular arrows icon in the top left toolbar.
- Delaying change:** Points to the 'Safe Mode' button in the top toolbar.
- Status BAR, display IP, version, RouterBOARD type information:** Points to the top status bar showing 'Uptime: 00:02:03', 'Memory: 10.2 MiB', and 'CPU: 1%'.
- Resource information, right click to show/hide:** Points to the 'Hide Passwords' checkbox in the top toolbar.
- Hide/show password:** Points to the eye icon in the top toolbar.
- Winbox traffic:** Points to the green traffic light icon in the top toolbar.
- Secure connection active:** Points to the padlock icon in the top toolbar.
- Menu:** Points to the 'System' menu item in the left sidebar.
- Working area:** Points to the main content area of the interface.

The left sidebar contains the following menu items: Quick Set, Interfaces, Wireless, Bridge, PPP, Switch, Mesh, IP, MPLS, Routing, System, Queues, Files, and Log.

COMMAND LINE

- Non GUI Configuration
 - Ketika konfigurasi melalui GUI tidak bisa dilakukan
 - (cth: keterbatasan bandwidth)
 - Ketika Membutuhkan konfigurasi Scripting
 - Terminal Based Configuration (Text)

COMMAND LINE

- Prinsip Dasar Command Line
 - Menu dan Sub Menu
 - Berupa Direktori dan Sub Direktori
 - Root Direktori diawali dengan "/" (tanda slash)
 - Tab dan Double Tab
 - Untuk menampilkan daftar direktori atau command yg ada
 - Untuk Completed Short Typing
 - "sys" <tab> → "system"
 - "inter" <tab> → "interface"
 - "sys re" <tab><tab> → "resource, reboot, reset-configuration"

COMMAND LINE

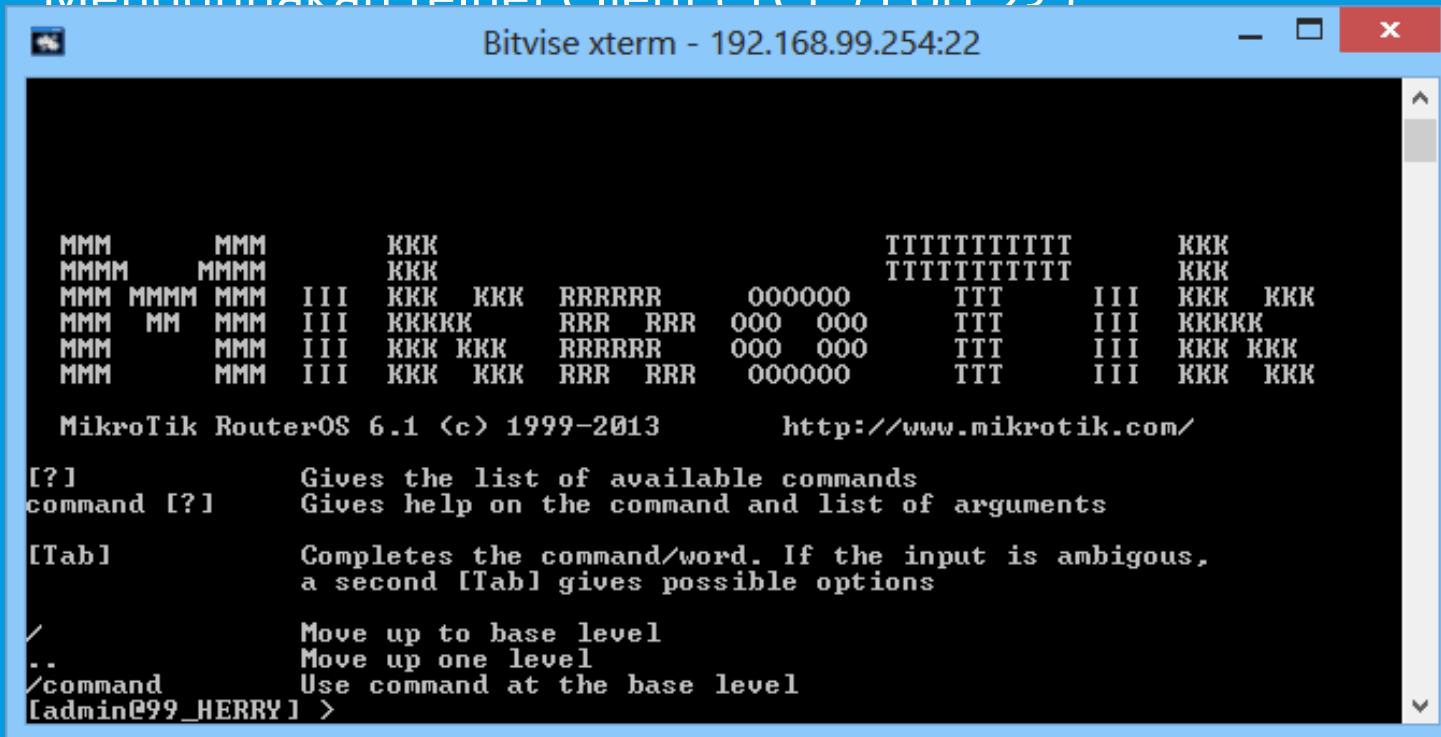
- Command dan Navigasi
 - Menggunakan “ ? ”
 - Menunjukkan seluruh command, direktori, atau sub direktori, dari root direktori atau sub direktori tertentu
 - Navigasi
 - Panah Atas - Bawah, untuk melihat “command history” yang dilakukan sebelumnya
 - Panah Kiri - Kanan, untuk kursor teks

COMMAND LINE

- Beberapa Metode untuk mengakses via CLI
 - New Terminal (local router terminal)
 - Telnet (unsecure port 23)
 - SSH (secure TCP port 22)
 - Serial Console (hyper terminal)

SSH / TELNET

- Menggunakan SSH Client (TCP / Port 22)
- Menggunakan Telnet Client (TCP / Port 23)



```
Bitvise xterm - 192.168.99.254:22

MMM      MMM      KKK      TTTTTTTTTT      KKK
MMMM     MMMM     KKK      TTTTTTTTTT      KKK
MMM MMMM  MMM  III  KKK  KKK  RRRRRR      000000      TTT      III  KKK  KKK
MMM  MM   MMM  III  KKKKK  RRR  RRR  000  000      TTT      III  KKKKK
MMM      MMM  III  KKK  KKK  RRRRRR      000  000      TTT      III  KKK  KKK
MMM      MMM  III  KKK  KKK  RRR  RRR  000000      TTT      III  KKK  KKK

MikroTik RouterOS 6.1 <c> 1999-2013      http://www.mikrotik.com/

[?]          Gives the list of available commands
command [?]  Gives help on the command and list of arguments

[Tab]       Completes the command/word. If the input is ambiguous,
            a second [Tab] gives possible options

/           Move up to base level
..         Move up one level
/command    Use command at the base level
[admin@99_HERRY] >
```

SSH CLIENT



SERIAL CONSOLE

- Saat kita tidak bisa mengakses semua interface (mis, terdisable semua), kita bisa menggunakan koneksi dengan kabel serial
- Serial kabel hanya ada di beberapa type RB
- Serial Console merupakan sebuah koneksi antara RouterOS dengan PC melalui sebuah kabel serial (Interface Serial)
 - PC dan Router harus sama sama memiliki Serial Port
 - Menggunakan Terminal Program (Hyperterminal)
 - Membutuhkan kabel Null-Modem (Serial)

SERIAL CONSOLE

- Kabel NULL-MODEM

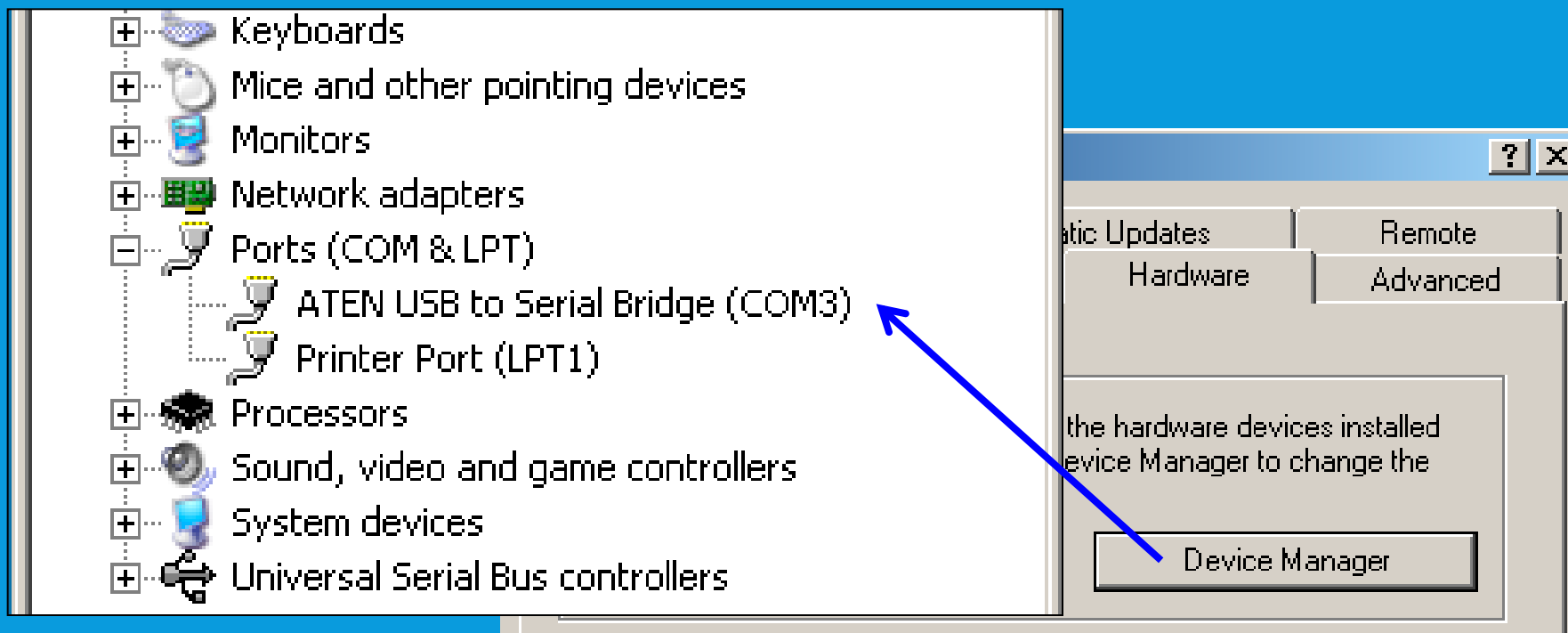


DSUB9 to DSUB9 Cable

Name	Pin	Pin	Name
Receive Data	2	3	Transmit Data
Transmit Data	3	2	Receive Data
Data Terminal Ready	4	6	Data Set Ready
Signal Ground	5	5	Signal Ground
Data Set Ready	6	4	Data Terminal Ready
Request To Send	7	8	Clear To Send
Clear To Send	8	7	Request To Send

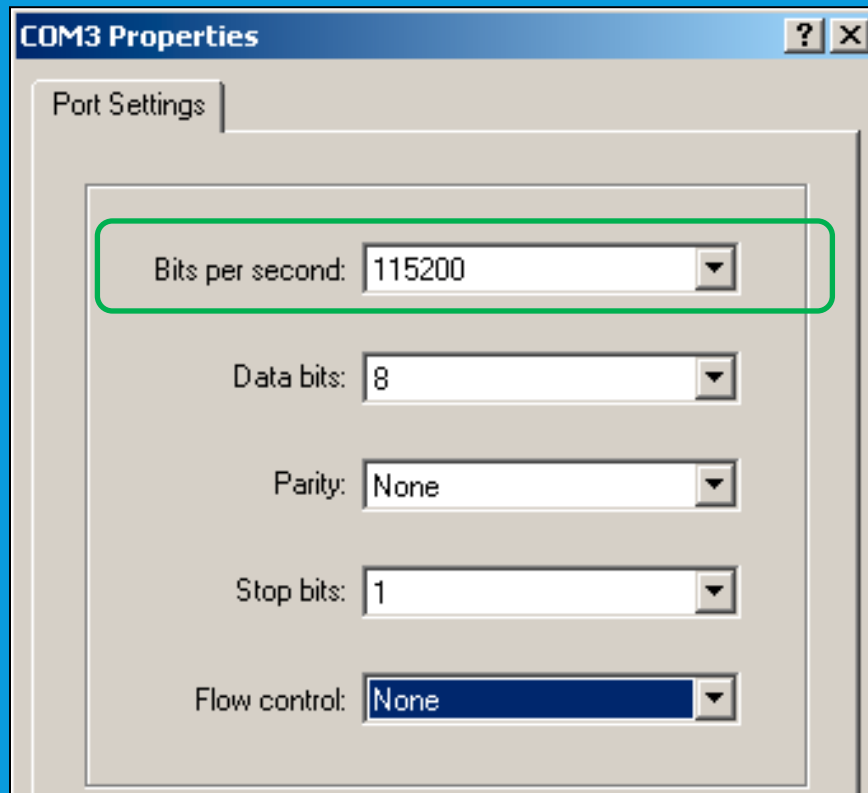
SERIAL CONSOLE

- Jika Menggunakan USB to Serial Converter
 - Pastikan Driver telah Terinstal



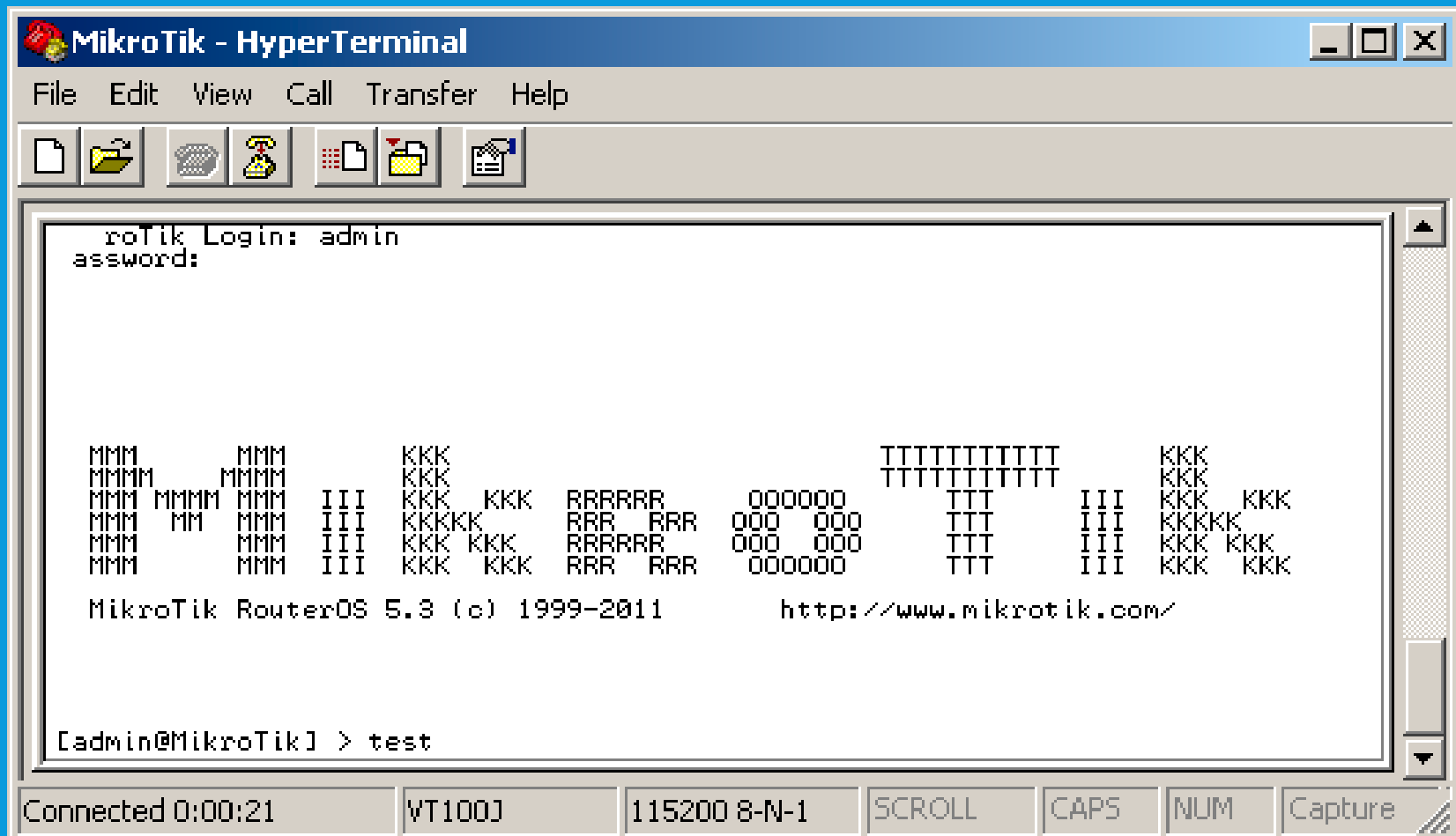
SERIAL CONSOLE

- Menggunakan nilai BAUD-RATE "115200" bps



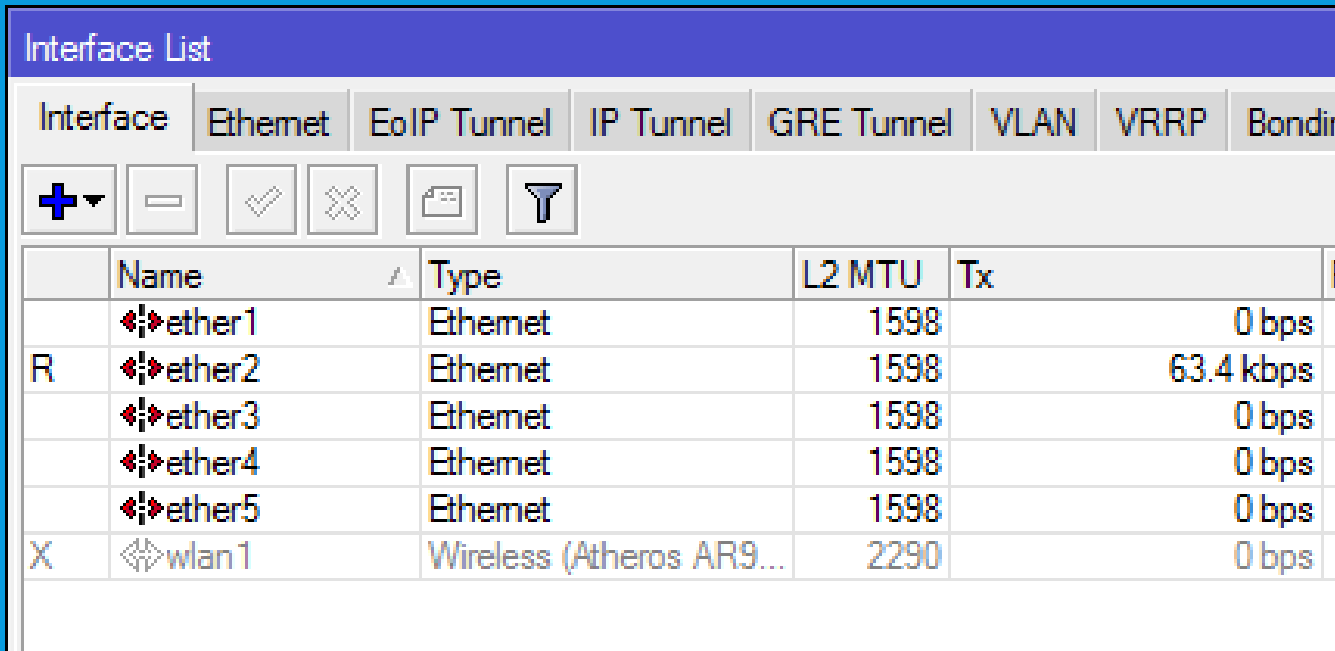
BAUD RATE
115200

SERIAL CONSOLE



COMMAND LINE + WINBOX

- Cobalah menghasilkan tampilan-tampilan ini melalui Command Line (NEW TERMINAL)

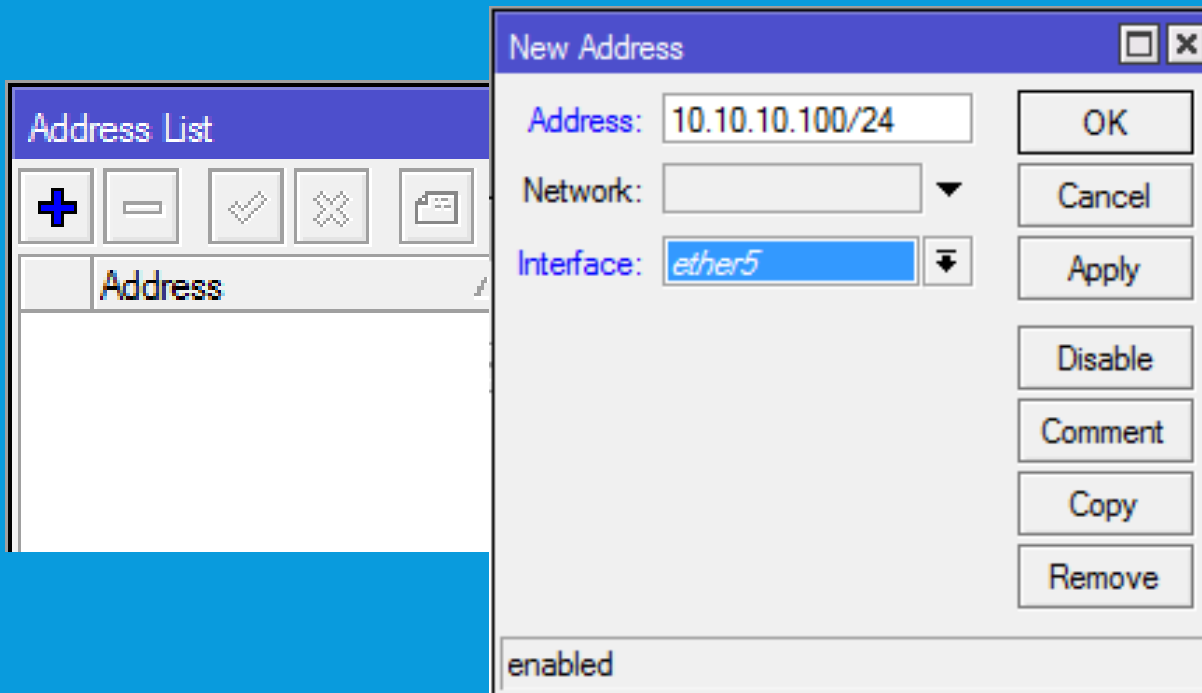


The screenshot shows the 'Interface List' window in WinBox. It features a tabbed interface with 'Ethernet' selected. Below the tabs are several icons for interface management: a plus sign with a dropdown arrow, a minus sign, a checkmark, a cross, a document, and a funnel. The main area contains a table with the following data:

	Name	Type	L2 MTU	Tx	P
	ether1	Ethernet	1598	0 bps	
R	ether2	Ethernet	1598	63.4 kbps	
	ether3	Ethernet	1598	0 bps	
	ether4	Ethernet	1598	0 bps	
	ether5	Ethernet	1598	0 bps	
X	wlan1	Wireless (Atheros AR9...	2290	0 bps	

COMMAND LINE + WINBOX

- Cobalah menambahkan IP
 - NOTE : bila menambahkan IP, jangan lupa menggunakan SUBNET (/24 atau lainnya)
- Cobalah menghapus IP yang baru saja Anda buat



KONFIGURASI LAB

MTCNA LAB TOPOLOGY

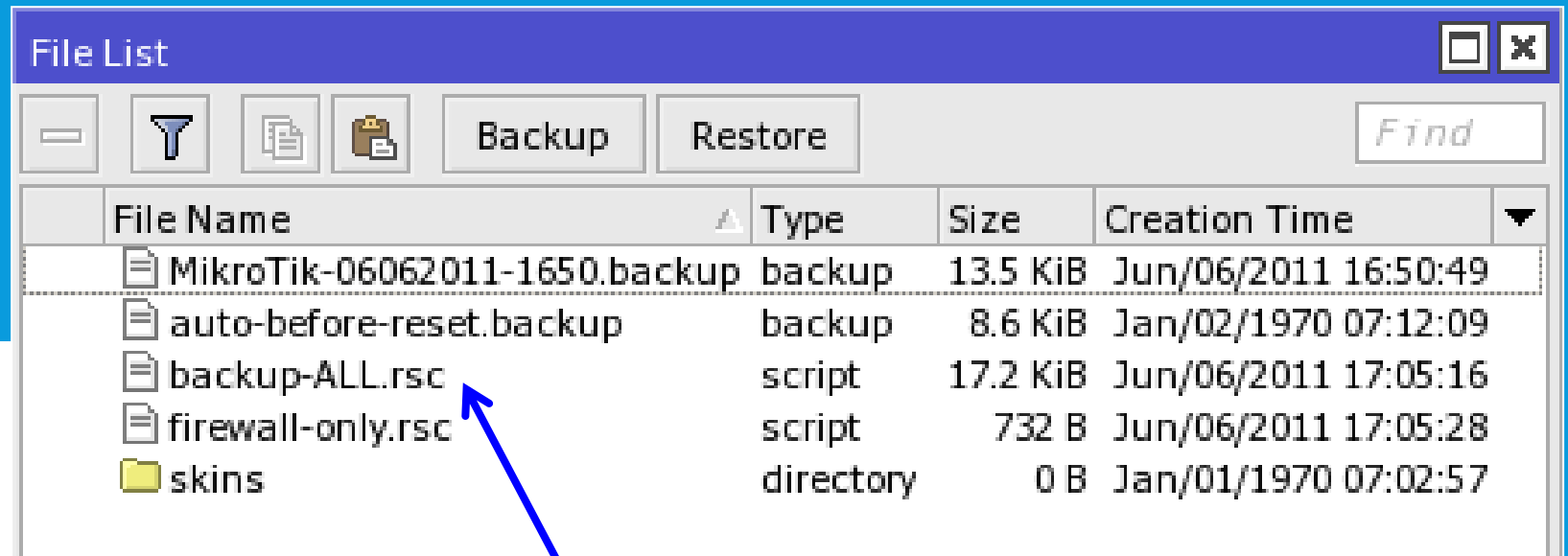
SCRIPTING

- MikroTik dapat di konfigurasi berbasis Script
 - Script dapat memudahkan kita untuk membuat konfigurasi - konfigurasi secara Otomatis
- Dapat digunakan untuk membackup per menu , submenu atau bagian tertentu
- Hanya dapat berjalan di CLI (commandline)
- Proses Import dan Export tidak perlu reboot

EXPORT SCRIPTING

- Export
 - Untuk melihat konfigurasi yang ada saat ini secara script
 - `/export`
 - Untuk menyimpan konfigurasi saat ini, dalam bentuk file script
 - Harus menyertakan nama file hasil export
 - `/export file=file.rsc`

EXPORT SCRIPTING



File Name	Type	Size	Creation Time
MikroTik-06062011-1650.backup	backup	13.5 KiB	Jun/06/2011 16:50:49
auto-before-reset.backup	backup	8.6 KiB	Jan/02/1970 07:12:09
backup-ALL.rsc	script	17.2 KiB	Jun/06/2011 17:05:16
firewall-only.rsc	script	732 B	Jun/06/2011 17:05:28
skins	directory	0 B	Jan/01/1970 07:02:57

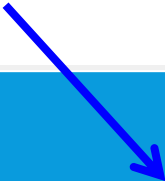
```
Use command at the base level
[admin@99_HERRY] > export file=backup-ALL
[admin@99_HERRY] > /ip firewall export file=firewall-only
[admin@99_HERRY] >
```

IMPORT SCRIPTING

- Import
 - Untuk Memasang Konfigurasi dari Script
 - `/import namafile.rsc`
 - Tidak Memerlukan Reboot
 - Jika terjadi Error, Script tidak akan dilanjutkan

IMPORT SCRIPTING

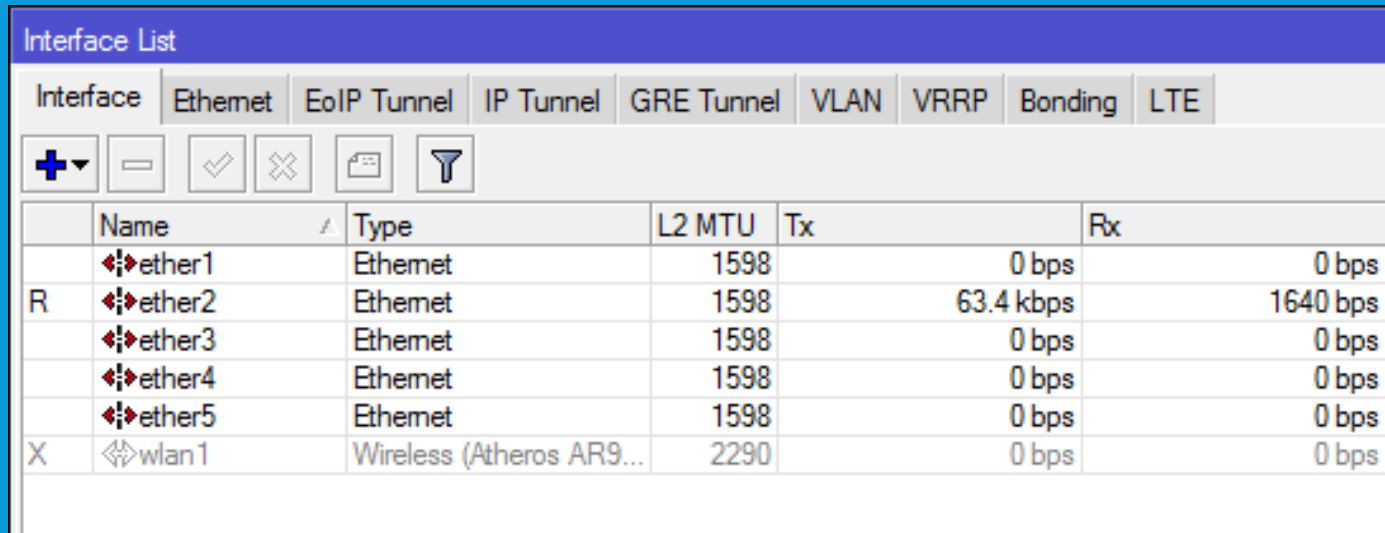
```
set [ find default=yes ] authentication-types=wpa-psk,wpa2-psk group-ciphers=\
    tkip,aes-ccm mode=dynamic-keys supplicant-identity=MikroTik \
    unicast-ciphers=tkip,aes-ccm wpa-pre-shared-key=belajarmikrotik \
    wpa2-pre-shared-key=belajarmikrotik
#line 11
/ip hotspot user profile
#line 12..13
set [ find default=yes ] idle-timeout=none keepalive-timeout=2m \
    mac-cookie-timeout=3d
#line 14
/ip address
#line 15
add address=192.168.99.254/24 interface=ether1 network=192.168.99.0
failure: already have such address
[admin@99_HERRY] > █
```



Command (perintah) ganda, tidak dapat di proses, akan di informasikan sebagai ERROR / Failure

INITIAL SCRIPT

- Pastikan posisi INTERFACE Router Anda seperti gambar di bawah



	Name	Type	L2 MTU	Tx	Rx
	ether1	Ethernet	1598	0 bps	0 bps
R	ether2	Ethernet	1598	63.4 kbps	1640 bps
	ether3	Ethernet	1598	0 bps	0 bps
	ether4	Ethernet	1598	0 bps	0 bps
	ether5	Ethernet	1598	0 bps	0 bps
X	wlan1	Wireless (Atheros AR9...	2290	0 bps	0 bps

- Serta tidak ada IP Address di ROUTER

BUAT SCRIPT

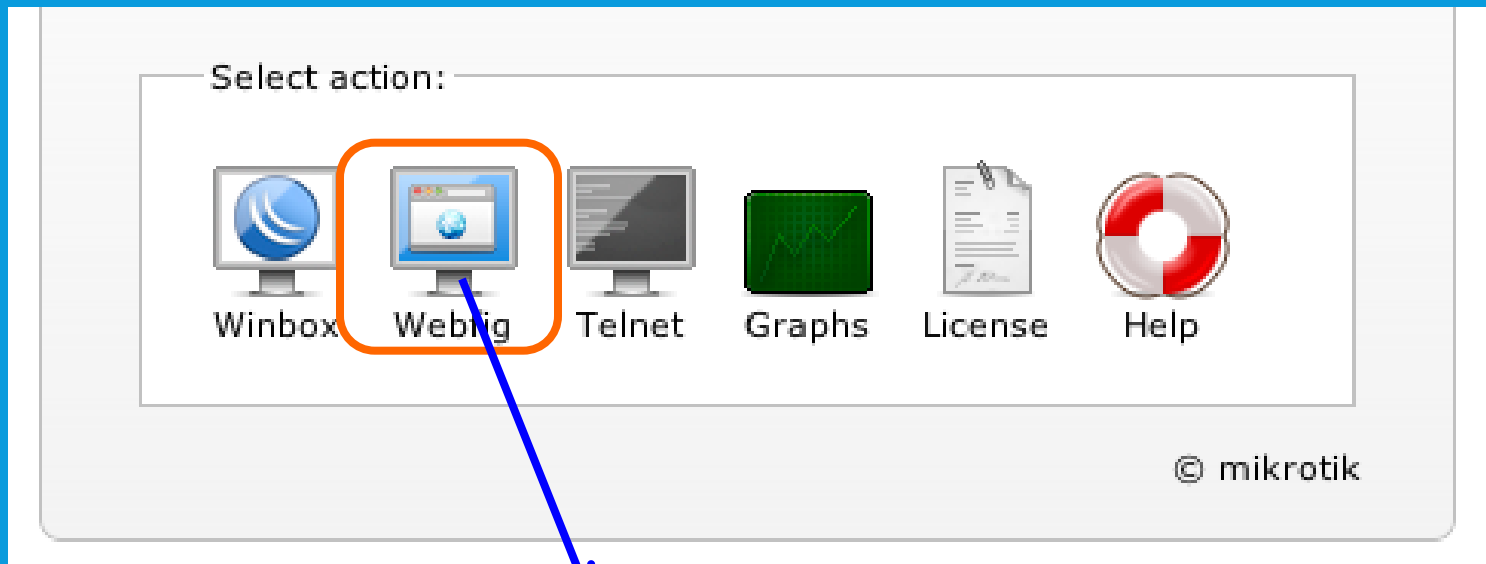
- Dengarkan INSTRUKSI Trainer

TESTING

- Test Koneksi
 - Ping ke IP Local Router anda
 - Ping ke IP WLAN Router anda
 - Ping ke Class AP
 - Ping ke DNS Luar (ms google, 8.8.8.8)
 - Ping ke www.yahoo.com (atau lainnya)
- Jika salah satu test gagal, Periksa kembali

WEBFIG

- Webfig dapat digunakan disemua platform OS, berbasis web, bisa menggunakan browser desktop maupun mobile. (global compatibility)



Klik di Menu
Webfig

WEBFIG

MikroTik - Interface List at admin... x +

192.168.99.1/webfig/#Interfaces

Google

WebFig v6.18

Interface List

Interface Ethernet EoIP Tunnel IP Tunnel GRE Tunnel VLAN VRRP Bonding LTE

Add New ▾

6 items

		▲ Name	Type	L2 MTU	Tx	Rx	Tx Packet (p/s)	Rx Packet (p/s)
D	R	ether1	Ethernet	1598	85.8 kbps	7.1 kbps	8	5
D		ether2	Ethernet	1598	0 bps	0 bps	0	0
D		ether3	Ethernet	1598	0 bps	0 bps	0	0
D		ether4	Ethernet	1598	0 bps	0 bps	0	0
D		ether5	Ethernet	1598	0 bps	0 bps	0	0
E	X	wlan1	Wireless (Atheros AR9229)	2290	0 bps	0 bps	0	0

Quick Set

Wireless

Interfaces

Bridge

Switch

PPP

Mesh

IP

MPLS

Routing

System

Queues

Files

Log

Radius

Tools

New Terminal

MetaROUTER

Partition

Make Supout.rif

WEBFIG

The screenshot shows the Mikrotik WebFig v6.18 interface configuration page for the 'ether1' interface. The browser address bar shows '192.168.99.1/webfig/#Interfaces.Interface.1'. The left sidebar contains a navigation menu with items: Quick Set, Wireless, Interfaces (selected), Bridge, Switch, PPP, Mesh, IP, MPLS, Routing, System, Queues, Files, Log, Radius, Tools, New Terminal, MetaROUTER, Partition, and Make Supout.rif. The main content area displays the configuration for 'Interface <ether1>'. At the top right, it says 'WebFig v6.18 Interface <ether1>'. Below this are several buttons: OK, Cancel, Apply, Cable Test, Blink, Reset MAC Address, Reset Counters, and Torch. A status bar shows 'link ok', 'running', and 'not slave'. The configuration is organized into sections, with 'General' being the active section. The 'Enabled' checkbox is checked. The 'Name' field is 'ether1', 'Type' is 'Ethernet', 'MTU' is '1500', 'L2 MTU' is '1598', 'Max L2 MTU' is '2028', and 'MAC Address' is 'D4:CA:6D:B2:9F:4E'.

MikroTik - Interface <ether1> at ...

192.168.99.1/webfig/#Interfaces.Interface.1

WebFig v6.18
Interface <ether1>

OK Cancel Apply Cable Test Blink Reset MAC Address Reset Counters Torch

link ok running not slave

Enabled

General

Name	ether1
Type	Ethernet
MTU	1500
L2 MTU	1598
Max L2 MTU	2028
MAC Address	D4:CA:6D:B2:9F:4E

WEBFIG

- Winbox dalam Browser (web / http)
 - Hampir sepenuhnya sama dengan Winbox
 - Bisa Add, Remove, Disable, dan Enable
 - Compatible dengan semua OS
 - Akses Mudah, <http://iprouter>
 - Pilih webfig, masukkan username dan password

ROUTEROS VERSION

- MikroTik secara rutin melakukan pembaharuan Versi
 - Memperbaiki Bugs
 - Menambah Kompatibilitas Driver
 - Menambah / Merubah Fitur
 - Memperbaiki Performa / Processing
 - Versi lebih baru memiliki lebih banyak fitur
 - Contoh V3.* dengan V6.*
 - WebFig, Safe Mode, MPLS dll

ROUTEROS VERSION

- Versi dan Fitur
 - Dapat di lihat di status-bar winbox
 - Dapat di lihat di Menu " system > package "
 - Package merupakan fitur
 - Berupa Individual Package
 - Package dapat ditambah, dihapus, enable dan disable
 - Perubahan akan diterapkan Setelah Reboot (Restart)
 - Package dihapus jika tidak diperlukan
 - Versi dapat di Upgrade dan Downgrade
 - Menggunakan File RouterOS ".npk"
 - Compacted Package (Combined)
 - Berisi Seluruh Package

ROUTEROS VERSION

The screenshot shows the Mikrotik WinBox interface. The title bar indicates the user is 'admin@192.168.99.254 (99_HERRY)' connected to 'WinBox v6.1 on RB751U-2HnD (mipsbe)'. The 'v6.1' is highlighted with an orange box. A blue arrow points from this box to the text 'MikroTik Version' in the main interface area. Another blue arrow points from the 'v6.1' box to the 'Version' column in the 'Package List' window. The 'System' menu item in the left sidebar is highlighted with a red box, and a red box also highlights the 'Packages' sub-menu item. A green box highlights the 'Version' column in the 'Package List' table.

admin@192.168.99.254 (99_HERRY) - WinBox v6.1 on RB751U-2HnD (mipsbe)

Safe Mode

Hide Passwords

Quick Set
Interfaces
Wireless
Bridge
PPP
Switch
Mesh
IP
MPLS
Routing
System
Queues
Files
Log
Radius

LEDs
License
Logging
Packages
Password
Ports













Package List

Check For Updates Enable Disable Uninstall Unschedule

Name	Version	Build Time	Scheduled
routeros-mipsbe	6.1	Jun/12/2013 11:50:54	
advanced-t...	6.1	Jun/12/2013 11:50:54	
dhcp	6.1	Jun/12/2013 11:50:54	
hotspot	6.1	Jun/12/2013 11:50:54	
ipv6	6.1	Jun/12/2013 11:50:54	
mpls	6.1	Jun/12/2013 11:50:54	
ppp	6.1	Jun/12/2013 11:50:54	
routing	6.1	Jun/12/2013 11:50:54	
security	6.1	Jun/12/2013 11:50:54	
system	6.1	Jun/12/2013 11:50:54	
wireless	6.1	Jun/12/2013 11:50:54	

MikroTik Version













PACKAGE

Package List					
	<input type="button" value="Check For Updates"/>	<input type="button" value="Enable"/>	<input type="button" value="Disable"/>	<input type="button" value="Uninstall"/>	<input type="button" value="Unschedule"/>
Name	Version	Build Time	Scheduled		
 routers-mipsbe	6.1	Jun/12/2013 11:50:54			
 advanced-t...	6.1	Jun/12/2013 11:50:54			
 dhcp	6.1	Jun/12/2013 11:50:54			
 hotspot	6.1	Jun/12/2013 11:50:54			
 ipv6	6.1	Jun/12/2013 11:50:54			
 mpls	6.1	Jun/12/2013 11:50:54			
 ppp	6.1	Jun/12/2013 11:50:54			
 routing	6.1	Jun/12/2013 11:50:54			
 security	6.1	Jun/12/2013 11:50:54			
 system	6.1	Jun/12/2013 11:50:54			
 wireless	6.1	Jun/12/2013 11:50:54			













PACKAGE

Package	Features
advanced-tools (<i>mipsle, mipsbe, ppc, x86</i>)	advanced ping tools. netwatch, ip-scan, sms tool, wake-on-LAN
calea (<i>mipsle, mipsbe, ppc, x86</i>)	data gathering tool for specific use due to "Communications Assistance for Law Enforcement Act" in USA
dhcp (<i>mipsle, mipsbe, ppc, x86</i>)	Dynamic Host Control Protocol client and server
gps (<i>mipsle, mipsbe, ppc, x86</i>)	Global Positioning System devices support
hotspot (<i>mipsle, mipsbe, ppc, x86</i>)	HotSpot user management
ipv6 (<i>mipsle, mipsbe, ppc, x86</i>)	IPv6 addressing support
mpls (<i>mipsle, mipsbe, ppc, x86</i>)	Multi Protocol Labels Switching support
multicast (<i>mipsle, mipsbe, ppc, x86</i>)	Protocol Independent Multicast - Sparse Mode ; Internet Group Managing Protocol - Proxy
ntp (<i>mipsle, mipsbe, ppc, x86</i>)	Network protocol client and service
ppp (<i>mipsle, mipsbe, ppc, x86</i>)	MIPPP client, PPP, PPTP, L2TP, PPPoE, ISDN PPP clients and servers
routerboard (<i>mipsle, mipsbe, ppc, x86</i>)	accessing and managing RouterBOOT. RouterBOARD specific information.
routing (<i>mipsle, mipsbe, ppc, x86</i>)	dynamic routing protocols like RIP , BGP , OSPF and routing utilities like BFD , filters for routes .
security (<i>mipsle, mipsbe, ppc, x86</i>)	IPSEC, SSH, Secure WinBox
system (<i>mipsle, mipsbe, ppc, x86</i>)	basic router features like <i>static routing, ip addresses, sNTP, telnet, API, queues, firewall, web proxy, DNS cache, TFTP, IP pool, SNMP, packet sniffer, e-mail send tool, graphing, bandwidth-test, torch, EoIP, IPIP, bridging, VLAN, VRRP</i> etc.). Also, for RouterBOARD platform - MetaROUTER Virtualization

ENABLE DISABLE PACKAGE

Package List						
	Check For Updates	Enable	Disable	Uninstall	Unschedule	Downgrade
Name	Version	Build Time	Scheduled			
 routeros-mipsbe	6.1	Jun/12/2013 11:50:54				
 advanced-t...	6.1	Jun/12/2013 11:50:54				
 dhcp	6.1	Jun/12/2013 11:50:54				
 hotspot	6.1	Jun/12/2013 11:50:54	scheduled for disable			
 ipv6	6.1	Jun/12/2013 11:50:54	scheduled for enable			
 mpls	6.1	Jun/12/2013 11:50:54				
 ppp	6.1	Jun/12/2013 11:50:54				
 routing	6.1	Jun/12/2013 11:50:54				
 security	6.1	Jun/12/2013 11:50:54				
 system	6.1	Jun/12/2013 11:50:54				
 wireless	6.1	Jun/12/2013 11:50:54				

UNINSTALL PACKAGE

Package List						
	Check For Updates	Enable	Disable	Uninstall	Unschedule	Downgrade
Name	Version	Build Time	Scheduled			
 routers-mipsbe	6.1	Jun/12/2013 11:50:54				
 advanced-t...	6.1	Jun/12/2013 11:50:54				
 dhcp	6.1	Jun/12/2013 11:50:54				
 hotspot	6.1	Jun/12/2013 11:50:54				
 ipv6	6.1	Jun/12/2013 11:50:54	scheduled for uninstall			
 mpls	6.1	Jun/12/2013 11:50:54				
 ppp	6.1	Jun/12/2013 11:50:54				
 routing	6.1	Jun/12/2013 11:50:54				
 security	6.1	Jun/12/2013 11:50:54				
 system	6.1	Jun/12/2013 11:50:54				
 wireless	6.1	Jun/12/2013 11:50:54	scheduled for uninstall			

UPGRADE

- UPGRADE
 - Memperbaiki dari Bug Versi Sebelumnya
 - Menambahkan Fitur terbaru
 - Perlu diperhatikan batasan maksimum Versi yang bisa di Upgrade
 - System → Lisence – “Upgradable To”

UPGRADE

- Download File Upgrade Dari Web MikroTik
 - Pilih Sesuai Arsitektur RouterBoardnya
 - MIPSbe, MIPSle, PPC, Tile

Download MikroTik software products

RouterOS

Please choose your instruction set:

mipsbe RB400 series, RB700 series, RB900 series, RB2011 series, SXT, OmniTik, Groove, METAL

ppc RB300 series, RB600 series, RB800 series, RB1000 series

x86 PC / X86, RB230 series

mipsle RB100 series, RB500 series, RB Crossroads

tile CCR series

ALL All system downloads in one torrent file

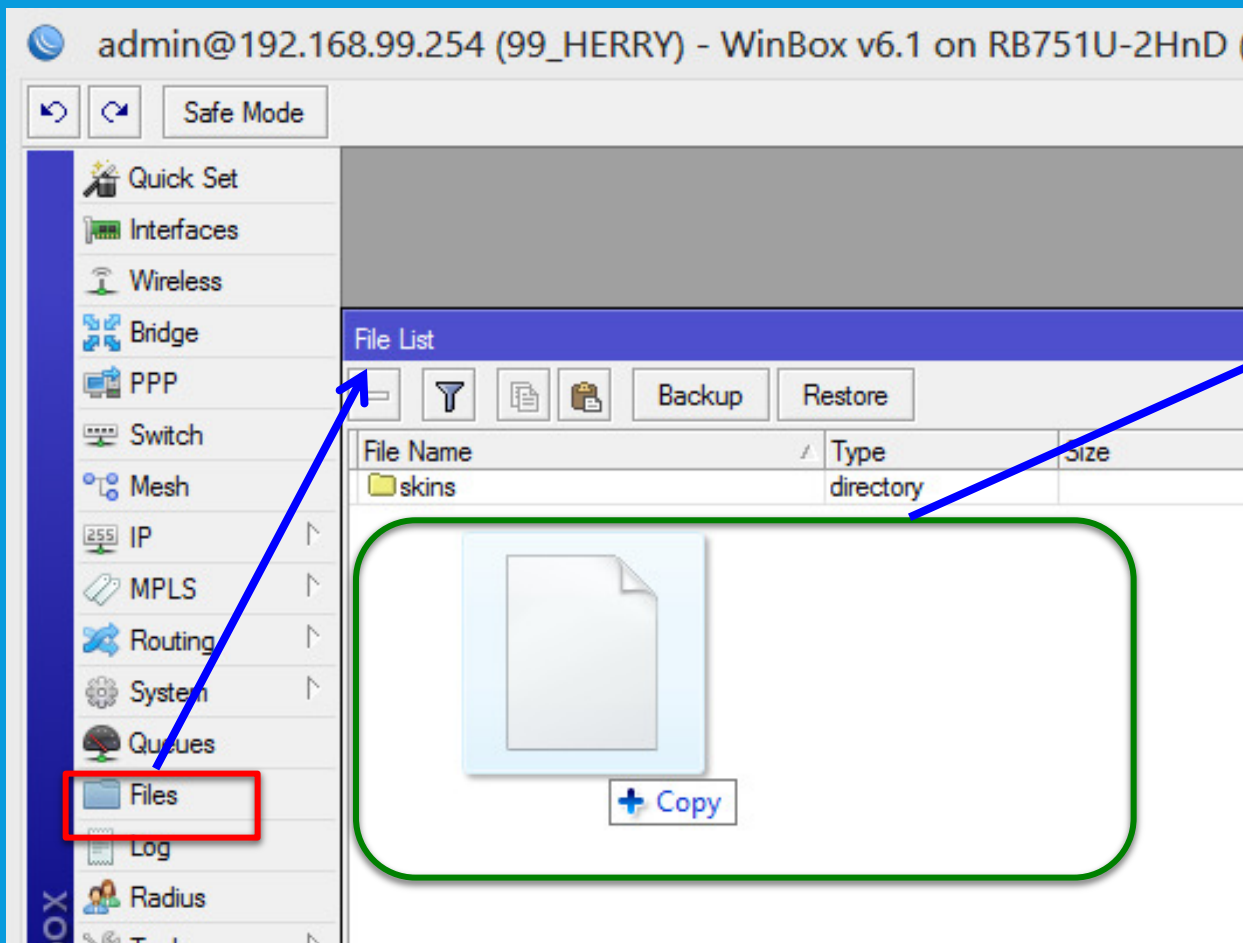
DOWNGRADE

- DOWNGRADE
 - Saat terdapat Bugs di Versi Terbaru, Downgrade ke Versi sebelumnya
 - Saat Membutuhkan Fitur yang sudah tidak ada di Versi Terbaru

UPLOAD PACKAGE

- Upgrade dan Downgrade
 - Package File (.npk)
 - Diupload ke RouterOS
 - Melalui Drag and Drop Winbox
 - Melalui FTP (TCP / 21)
 - HARUS di ROOT Folder

UPLOAD PACKAGE



Drag-and-drop ke dalam Winbox, pastikan berada di ROOT Folder

UPLOAD PACKAGE

admin@192.168.99.254 (99_HERRY) - WinBox v6.1 on RB751U-2HnD (mipsbe)

Safe Mode Hide Passwords

File List

File Name	Type	Size	Creation Time
routeros-mipsbe-5.25.npk	package	636.0 KB	Jan/02/1970 01:05:20
skins	directory		Jan/01/1970 00:00:49

Uploading Files

Uploading routeros-mipsbe-... (722.5 KB of 11.9 MiB at 188.48 kb)

Cancel

2 items | 14.6 MiB of 64.0 MiB used | 77% free

PROSES UPGRADE

- RouterOS Upgrade
 - Upload File Upgrade
 - Reboot

```
[admin@MikroTik] > file print detail
0 name="skins" type="directory" creation-time=jan/01/1970 00:02:57

1 name="auto-before-reset.backup" type="backup" size=8 823
  creation-time=jan/02/1970 00:12:09

2 name="routeros-mipsbe-5.4.npk" type="package" size=12 049 874
  creation-time=jan/02/1970 00:01:59 package-name="routeros-mipsbe"
  package-version="5.4" package-build-time=may/27/2011 10:22:06
  package-architecture="mips"
[admin@MikroTik] > sys reboot
Reboot, yes? [y/N]:
```

PROSES DOWNGRADE

- RouterOS Downgrade
 - Upload File Package (Versi Lebih lama)
 - Buka System → Package
 - Klik Downgrade → Reboot

PROSES DOWNGRADE

The screenshot shows the WinBox v6.1 interface for a Mikrotik RB751U-2HnD router. The main window displays the 'Package List' with a table of installed packages. A 'Downgrade' button is highlighted with a red box. A 'Confirm Reboot' dialog box is overlaid on the table, asking 'To downgrade, router needs to be rebooted, reboot?' with 'Yes' and 'No' buttons. The 'Yes' button is also highlighted with a red box. A blue arrow points from the 'Downgrade' button to the 'Yes' button.

admin@192.168.99.254 (99_HERRY) - WinBox v6.1 on RB751U-2HnD (mipsbe)

Safe Mode

Hide Passwords

Package List

Check For Updates Enable Disable Uninstall Unschedule Downgrade Find

Name	Version	Build Time	Scheduled
routeros-mipsbe	6.1	Jun/12/2013 11:50:54	
advanced-t...	6.1	Jun/12/2013 11:50:54	
dhcp	6.1		
hotspot	6.1		
ipv6	6.1		
mpls	6.1		
ppp	6.1		
routing	6.1		
security	6.1		
system	6.1	Jun/12/2013 11:50:54	
wireless	6.1	Jun/12/2013 11:50:54	

Confirm Reboot

To downgrade, router needs to be rebooted, reboot?

Yes No

UPGRADE / DOWNGRADE

- Lakukanlah Upgrade / Downgrade
- Setelah Proses, Perhatikan Apakah ?
 - Menghapus File List yang ada
 - Menghapus Konfigurasi yang ada

KONFIGURASI DASAR

BASIC CONFIGURATION

- Manajemen Pengguna (User Login)
 - Diatur di menu /user (system → user)
 - Dibedakan Beberapa Grup Profil
 - FULL – Hapus, Rubah, Tulis, Tambah
 - WRITE – Tambah, Tulis, Tambah, Tidak bisa hapus
 - READ – Melihat Konfigurasi saja
- User Login
 - Ditampilkan di tab “Active Users”

DEFAULT USER

- Default User
 - User = Admin
 - Password = <blank>, tidak ada
 - User ADMIN Bisa dihapus, apabila ada minimal satu user lain yang aktif dengan profil = FULL

ACTIVE USERS

The screenshot shows the Mikrotik WinBox interface. The 'User List' window is open, displaying a table of active users. The 'Active Users' tab is selected and highlighted with a red box. The table lists five 'admin' users with their login times, source IP addresses, and login methods. The 'System' menu item in the left sidebar is also highlighted with a red box, and the 'Users' sub-menu is open, with 'Users' highlighted.

Name	At	From	Via	Group
admin	Jan/02/1970 00:14:16	0.0.0.0	local	full
admin	Jan/02/1970 01:52:27	192.168.98.1	winbox	full
admin	Jan/02/1970 02:40:06	192.168.98.1	web	full
admin	Jan/02/1970 02:40:19	192.168.98.1	telnet	full
admin	Jan/02/1970 02:40:36	192.168.98.1	ssh	full

USER PROFIL GROUP

batasan yang di ijinan untuk profil tersebut

User List

Users **Groups** SSH Keys Active Users

+ - [icon] [icon]

	Name	▲	Policies
S	🌲 full		local telnet ssh ftp rebo
S	🌲 read		local telnet ssh reboot
S	🌲 write		local telnet ssh reboot

Group <read>

Name:

Policies

<input checked="" type="checkbox"/> local	<input checked="" type="checkbox"/> telnet
<input checked="" type="checkbox"/> ssh	<input type="checkbox"/> ftp
<input checked="" type="checkbox"/> reboot	<input checked="" type="checkbox"/> read
<input type="checkbox"/> write	<input type="checkbox"/> policy
<input checked="" type="checkbox"/> test	<input checked="" type="checkbox"/> winbox
<input checked="" type="checkbox"/> password	<input checked="" type="checkbox"/> web
<input checked="" type="checkbox"/> sniff	<input checked="" type="checkbox"/> sensitive
<input checked="" type="checkbox"/> api	

Skin: [v]

System

OK
Cancel
Apply
Comment
Copy
Remove

WebFig Skin

USERS

User List

Users Groups SSH Keys Active Users

+ - ✓ ✗ 🟡

Name	Group
;; system default user	
🔥 admin	full

New User

Name:

Group: ▾

Allowed Address:

Last Logged In:

Password:

Confirm Password:

OK

Cancel

Apply

Disable

Comment

Copy

Remove

Profil Group

Username hanya bisa digunakan dari IP tertentu

ROUTEROS SERVICE

- RouterOS Service, digunakan untuk mengakses RouterOS
 - Secara Default beberapa service telah aktif
 - Bisa disable / enable servis yang dibutuhkan
 - Bisa di atur untuk dapat diakses dari komputer tertentu (IP / Network)

ROUTEROS SERVICE

- Menu IP → Services

The screenshot displays the Mikrotik WinBox interface. On the left, the 'IP' menu is highlighted with a red box, and its 'Services' sub-menu is also highlighted with a red box. A blue arrow points from the 'Services' sub-menu to the 'IP Service List' window. The 'IP Service List' window has a purple header and contains a table of services. A green rounded rectangle highlights the table content.

Name	Port	Available From
api	8728	
api-ssl	8729	
ftp	21	
ssh	22	
telnet	23	
winbox	8291	
www	80	
www-ssl	443	

ROUTEROS SERVICE

IP Service List

	Name	Port	Available From
X	● api	8728	
	● ftp	21	
	● ssh	22	
	● telnet	23	
	● winbox	8291	
	● www	80	
X	● www-ssl	443	

Untuk alasan keamanan, port default dapat dirubah sesuai keinginan, yang dirasa aman.

IP Service <ssh>

Name: ssh

Port: 22

Available From: 192.168.98.1

enabled

Service dapat diatur untuk diakses dari IP tertentu

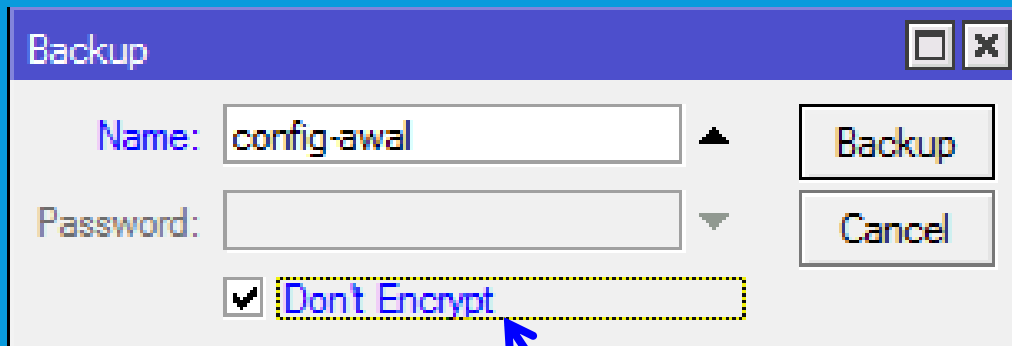
LAB – USER DAN SERVICE

- Buatlah satu username dan konfigurasi SKIN agar username tersebut hanya dapat membuka
 - IP ADDRESS
 - IP ROUTE
 - INTERFACE
- Kunci Service Telnet dan SSH hanya dari laptop Anda

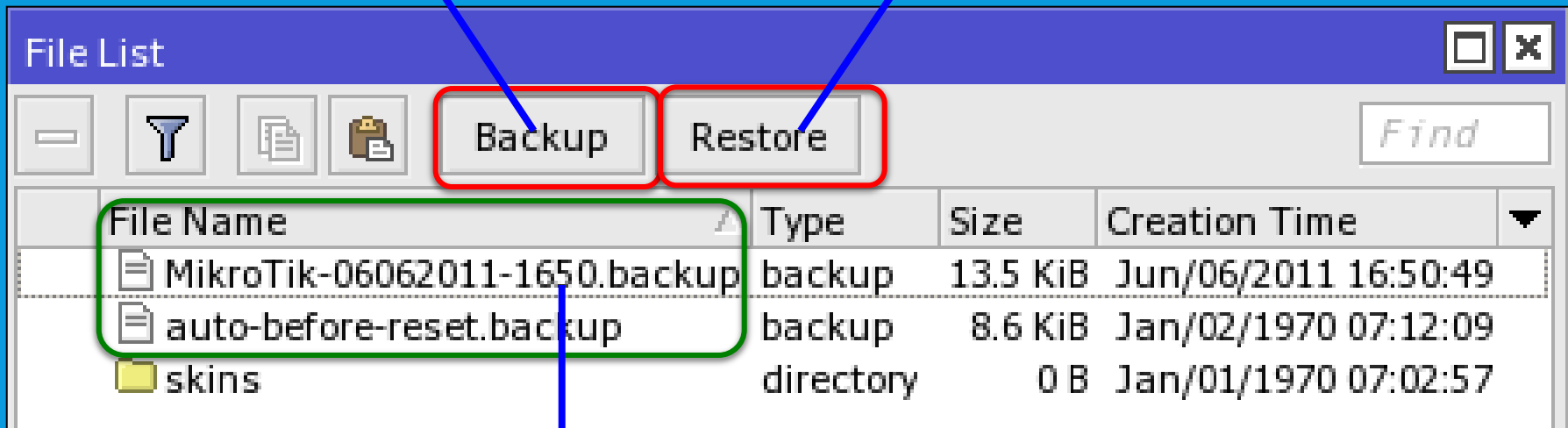
BACKUP & RESTORE

- Konfigurasi RouterOS dapat di backup, untuk keperluan restore konfigurasi dilain waktu.
- Berupa binary file (*.backup)
 - Unreadable, Tidak dapat di baca menggunakan text editor
 - Return Point, Mengembalikan konfigurasi ke kondisi ketika Backup dilakukan

BACKUP & RESTORE



RESTORE BUTTON
Digunakan untuk mengembalikan konfigurasi sesuai Backup

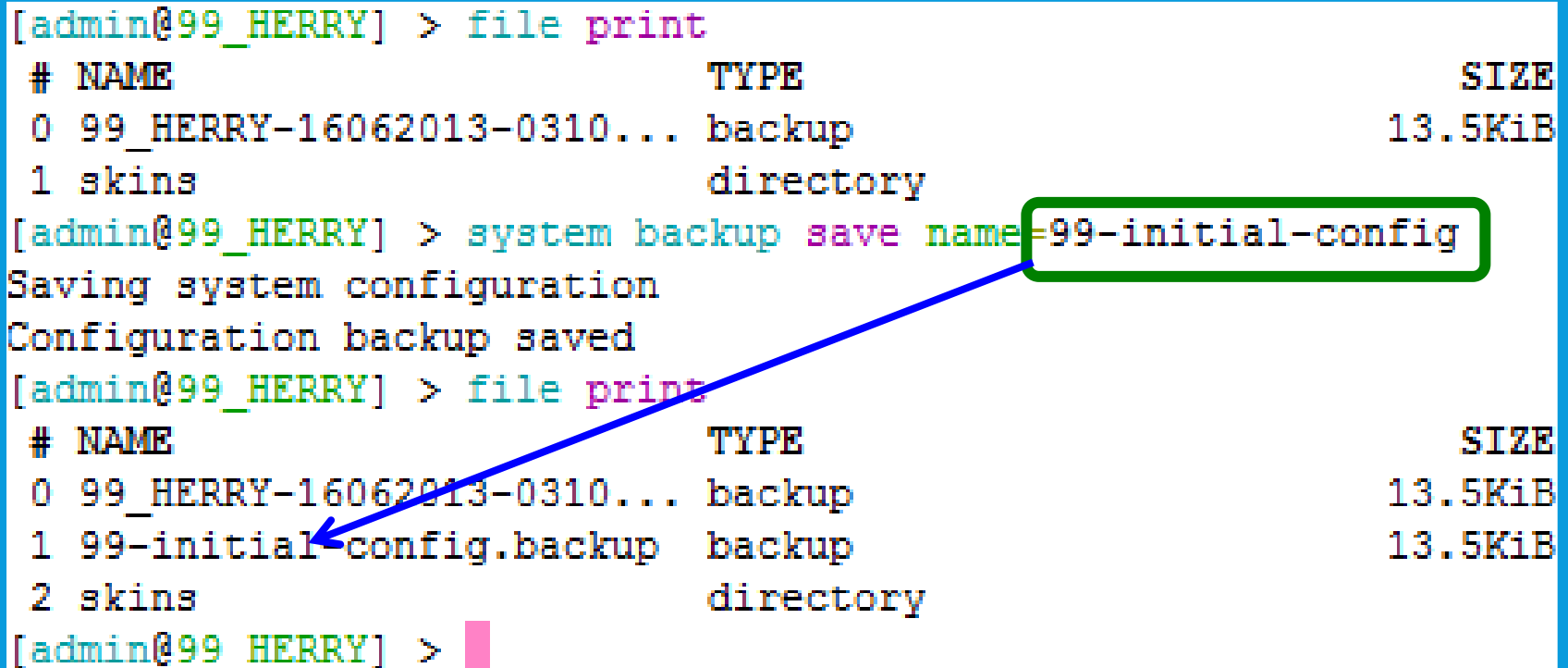


FILE BACKUP
Dapat di drag and drop ke PC

BACKUP & RESTORE

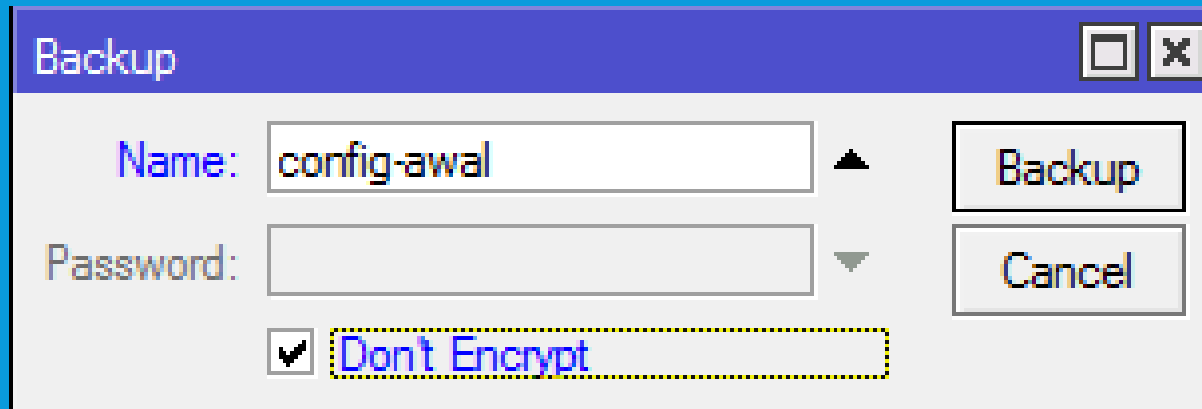
- Backup dapat juga dilakukan dari command
 - Via terminal, telnet dan ssh

```
[admin@99_HERRY] > file print
# NAME                TYPE                SIZE
0 99_HERRY-16062013-0310... backup              13.5KiB
1 skins                directory
[admin@99_HERRY] > system backup save name=99-initial-config
Saving system configuration
Configuration backup saved
[admin@99_HERRY] > file print
# NAME                TYPE                SIZE
0 99_HERRY-16062013-0310... backup              13.5KiB
1 99-initial-config.backup backup              13.5KiB
2 skins                directory
[admin@99_HERRY] >
```



BACKUP & RESTORE

- Backuplah Konfigurasi Anda Saat ini
 - Berikan nama "config-awal.backup"
 - CENTANG "Do Not Encrypt"
 - Simpan Backup Konfigurasi di LAPTOP Anda melalui Drag And Drop



INSTALASI ROUTEROS

REINSTALL ROUTEROS

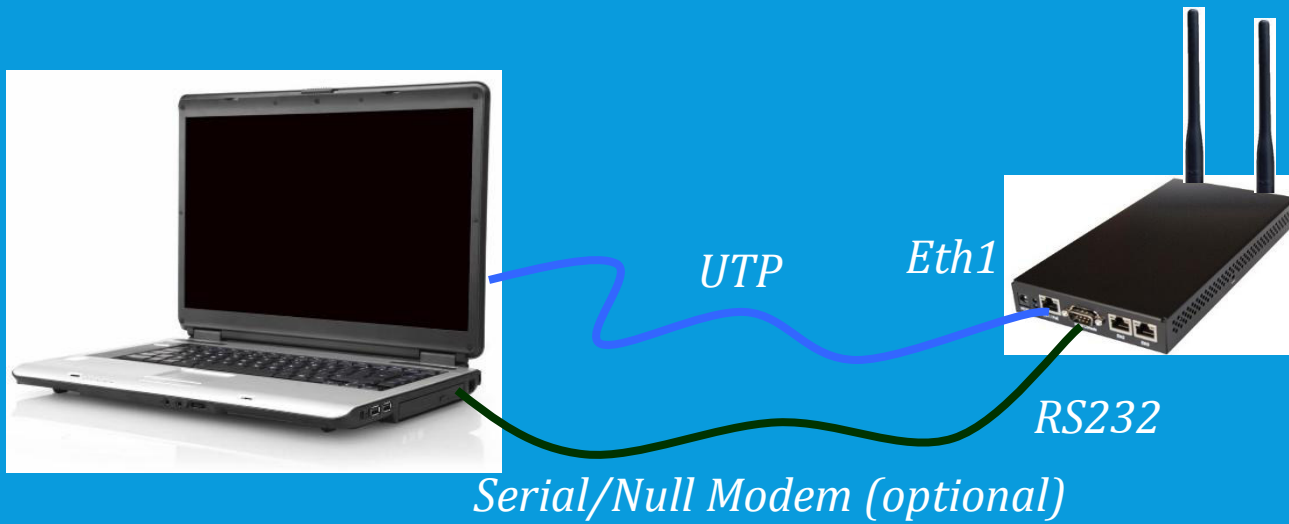
- RouterOS dapat di ReInstall menggunakan
 - CD Instalasi
 - Untuk Router PC, RouterOS yang di install di PC
 - NetInstall
 - Menggunakan EtherBios sebagai Media Instalasi
 - Menggunakan Serial Cable Sebagai Media
 - Setiap RouterBoard hanya bisa di reinstall dengan NetInstall

NETINSTALL

- NetInstall, Metode yang digunakan untuk menginstall RouterOS
 - Menggunakan Program NetInstall.exe
 - Hanya Untuk RouterBoard
 - Bisa Via Serial Cable (NULL-MODEM)
 - Bisa Via LAN (Ether1 RouterBoard)

NETINSTALL

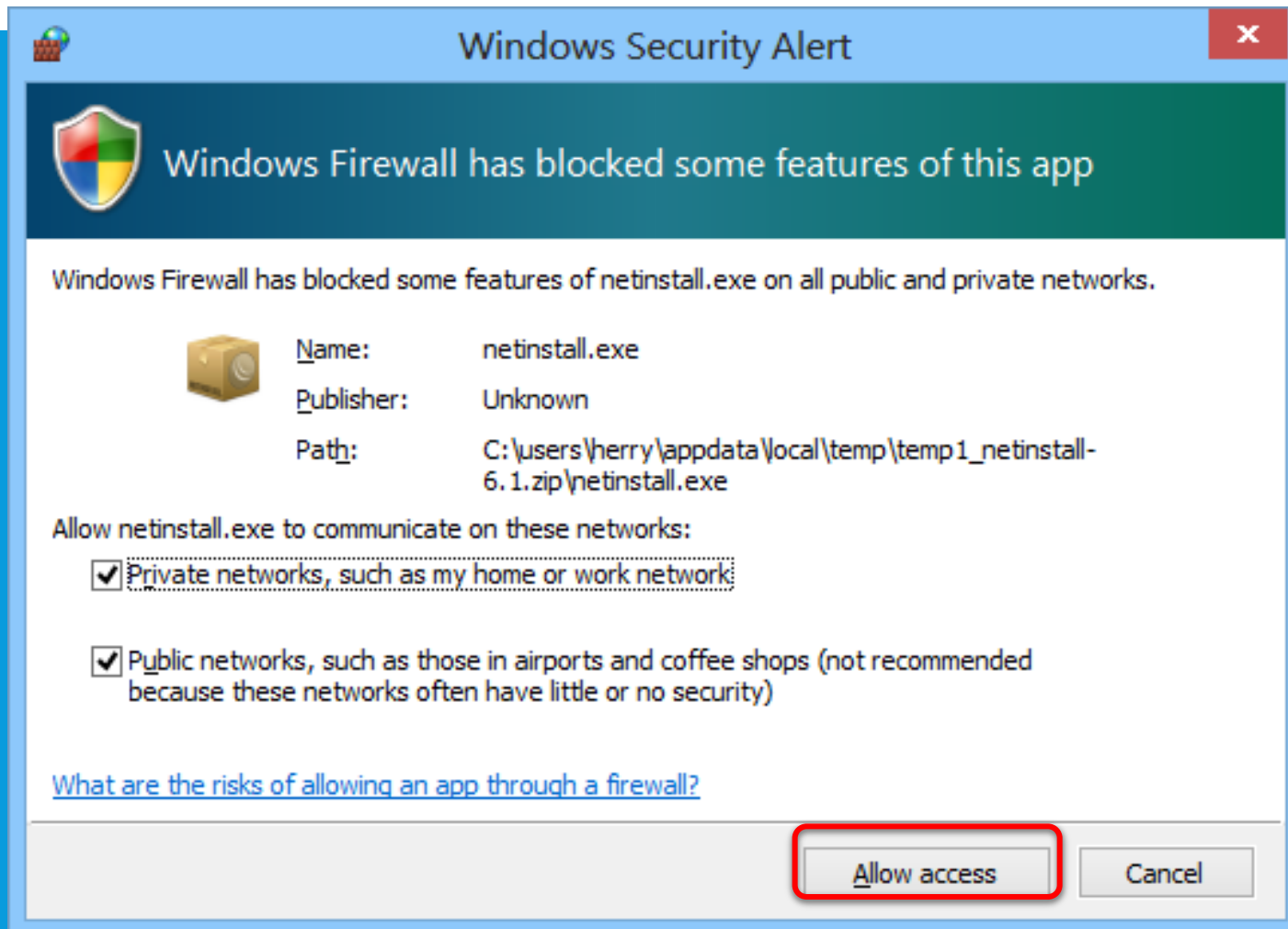
- Topologi NetInstall



NETINSTALL

- Persiapan
 - Pastikan Disable Firewall PC / Laptop
 - Allow Access Netinstall pada Windows Security
 - Aktifkan NetBooting pada Netinstall
 - Tidak Bisa menggunakan LAN Converter
 - USB to LAN
 - Disable Antivirus (optional)
 - Pasang Kabel dari PC ke Ether1 RouterBoard

NETINSTALL



NETINSTALL

The image shows the MikroTik Netinstall software interface. On the left, the 'Routers/Drives' section contains a table:

Label	MAC address / Media	Status
D:\	Hard disk	Ready
E:\	Hard disk	Ready

Below this, the 'Make floppy' section has a 'Net booting' button highlighted with a red box. A blue arrow points from this button to the 'Network Booting Settings' dialog box.

The 'Network Booting Settings' dialog box contains the following text and controls:

- Text: "There you can set parameters for PXE (Pre-boot execution Environment) and Etherboot server that can boot your router over network"
- Checkbox: Boot Server enabled
- Text: Client IP address: 192.168.99.100
- Buttons: OK, Cancel

In the background, the main window shows network configuration options:

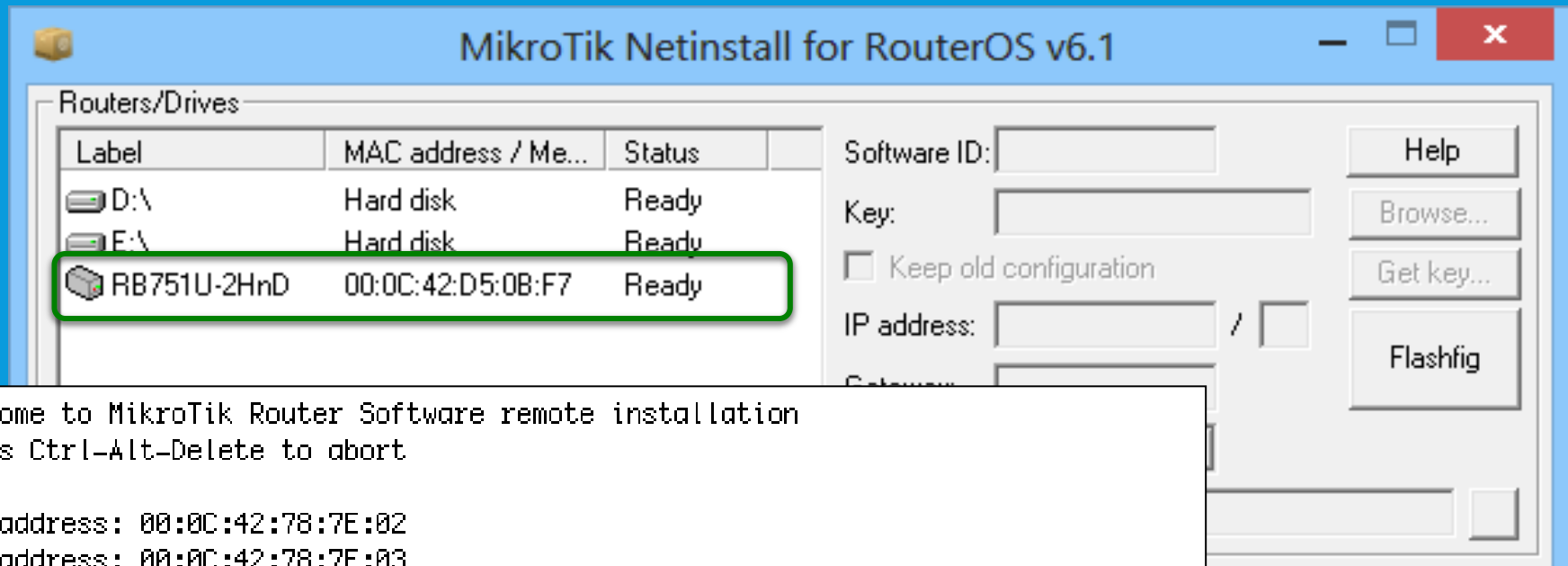
- Radio buttons: Obtain an IP address automatically, Use the following IP address:
- IP address: 192 . 168 . 99 . 2
- Subnet mask: 255 . 255 . 255 . 0
- Default gateway: 192 . 168 . 99 . 1

A green box highlights the IP address, subnet mask, and default gateway fields. A blue arrow points from the top of this box to the 'Net booting' button.

NETINSTALL

- Rubah Boot Router ke Ethernet
 - Bisa melalui command terminal
 - Bisa melalui winbox
 - Bisa menggunakan Reset Button
 - Nyalakan sambil menekan Reset Button
 - Tunggu Hingga MAC-ADDRESS Muncul di NetInstall

NETINSTALL READY



Welcome to MikroTik Router Software remote installation
Press Ctrl-Alt-Delete to abort

mac-address: 00:0C:42:78:7E:02
mac-address: 00:0C:42:78:7E:03
mac-address: 00:0C:42:78:7E:04

software-id: 5KQG-32WK key:
jS9MPCgzim/U4iFHR94mwCF7a7ZpwwX3udAaznfcQI0Rwz8ovn/Bu9uZEKvjWgKAc3MeJj57qPntw4z+W/kKPA==

Waiting for installation server...

NETINSTALL SELECT ROUTER

The image shows two overlapping windows from the MikroTik Netinstall for RouterOS v6.1 software. The background window, titled "MikroTik Netinstall for RouterOS v6.1", features a "Routers/Drives" table with the following data:

Label	MAC address / Me...	Status
D:\	Hard disk	Ready
E:\	Hard disk	Ready
RB751U-2HnD	00:0C:42:D5:0B:F7	Ready

Below the table, the "Selected" field shows "0 package(s)". Buttons for "Make floppy", "Net booting", "Install", and "Cancel" are visible. The "Packages" section includes a "Sets:" dropdown, "Save set", "Delete set", and "From:" fields with a "Browse..." button.

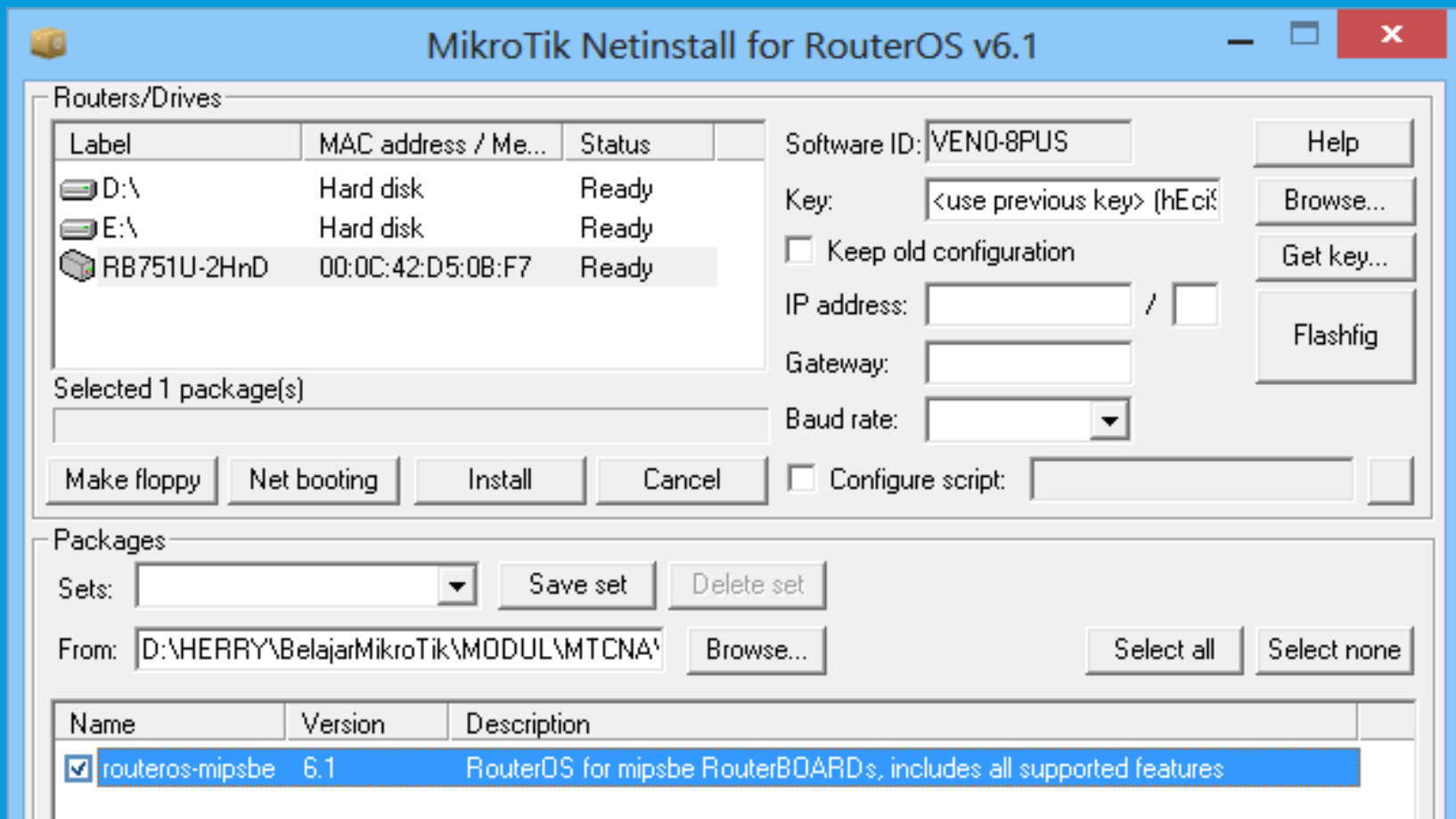
The foreground window, titled "Browse for Folder", is used to select a package directory. It displays a tree view of folders:

- MTCNA
 - MTCNA Resources
 - RouterBOARD
 - RouterOS v5.25 - mij
 - RouterOS v6.0 - mip:
 - routeros-5.25
 - routeros-6.1
 - Tools
 - NEW MTCNA v5 English

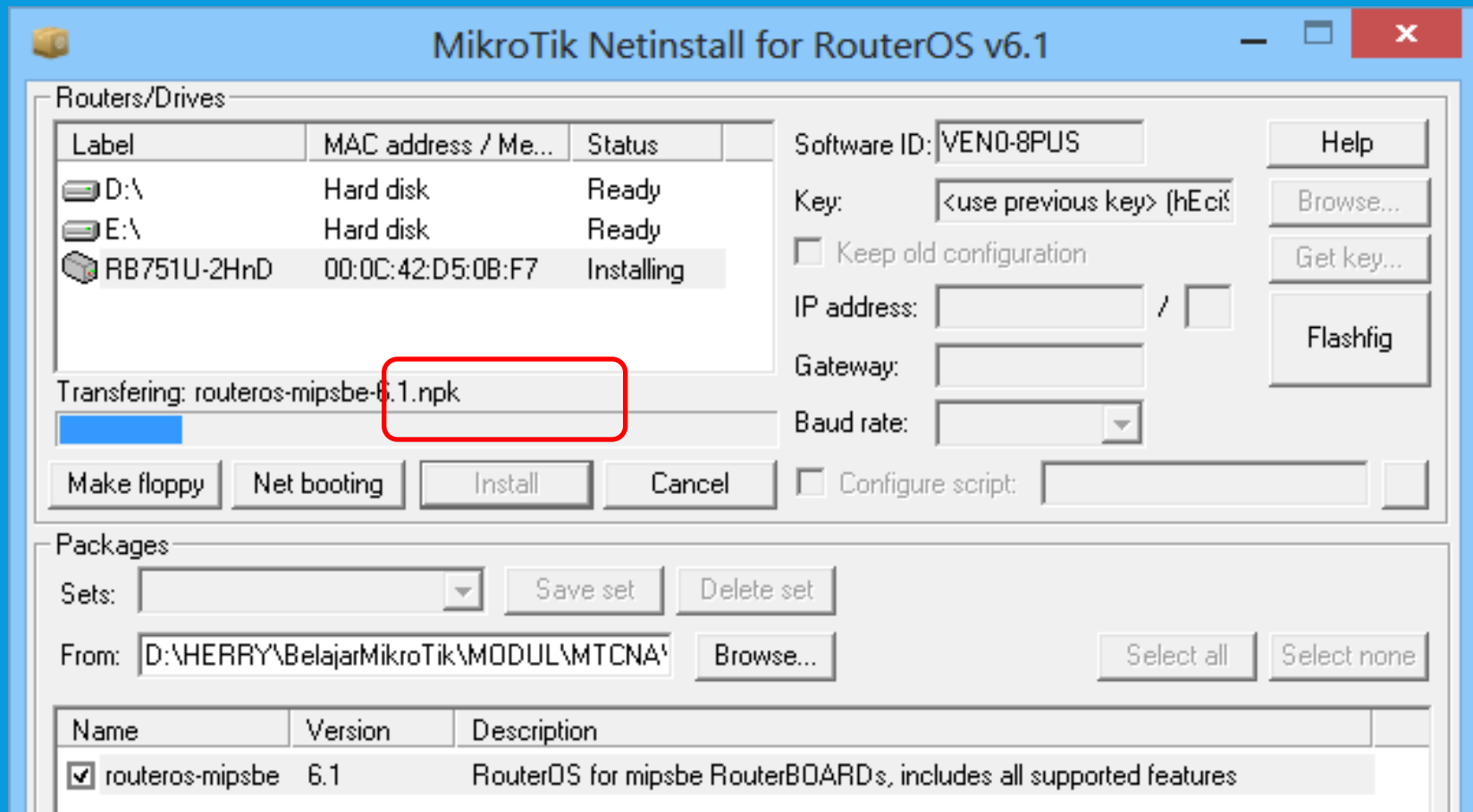
The "routeros-6.1" folder is selected. A blue arrow points from the "RB751U-2HnD" router in the background window to the "routeros-6.1" folder in the foreground window. Another blue arrow points from the "Browse..." button in the background window to the "Browse for Folder" window.

PILIH ROUTER

NETINSTALL SELECT PACKAGE

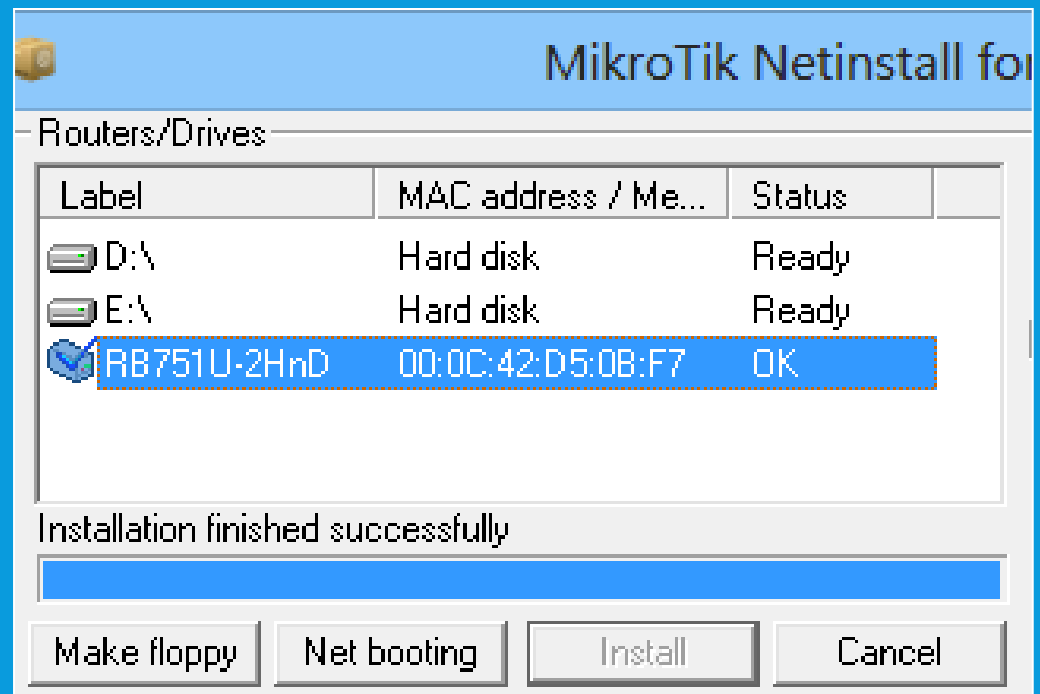


NETINSTALL PROSES



NETINSTALL SELESAI

- Seluruh Konfigurasi Akan Hilang
- Masuk Kembali menggunakan MAC-WINBOX
- Lakukan Restore dari Backup Konfigurasi Anda



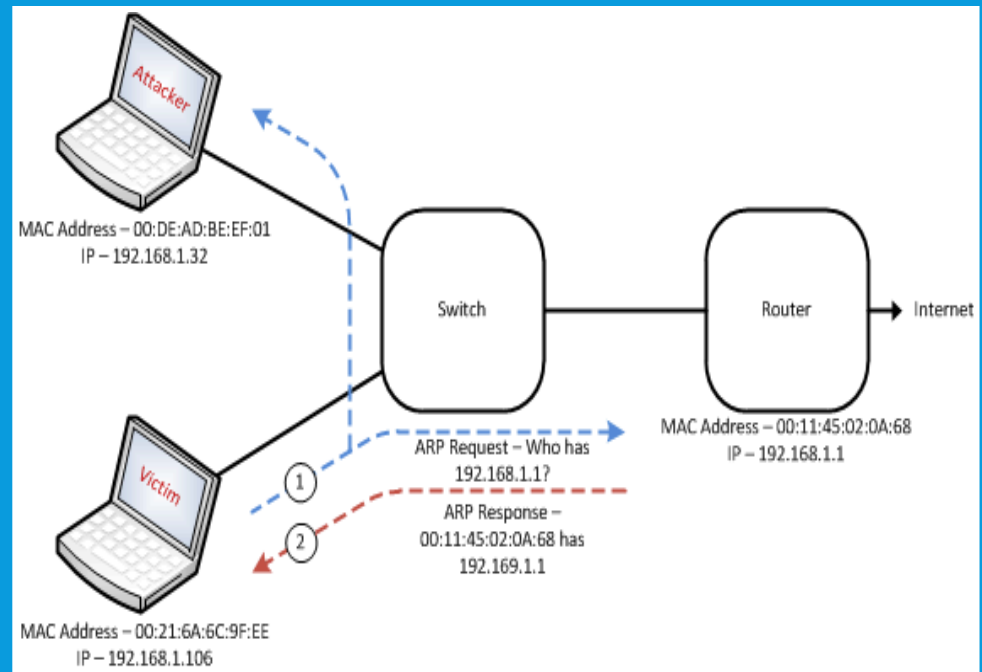
MANAJEMEN JARINGAN LOKAL

LOCAL NETWORK ACCESS

- Membantu merancang jaringan (network) secara efisien
- Mengelola akses local user di dalam atau diluar network
- Fitur RouterOS untuk mengamankan local network
 - Static ARP
 - DHCP Server
 - Proxy – [tidak lagi dibahas dalam MTCNA]
 - PPPoE
 - Hotspot – [tidak lagi dibahas dalam MTCNA]

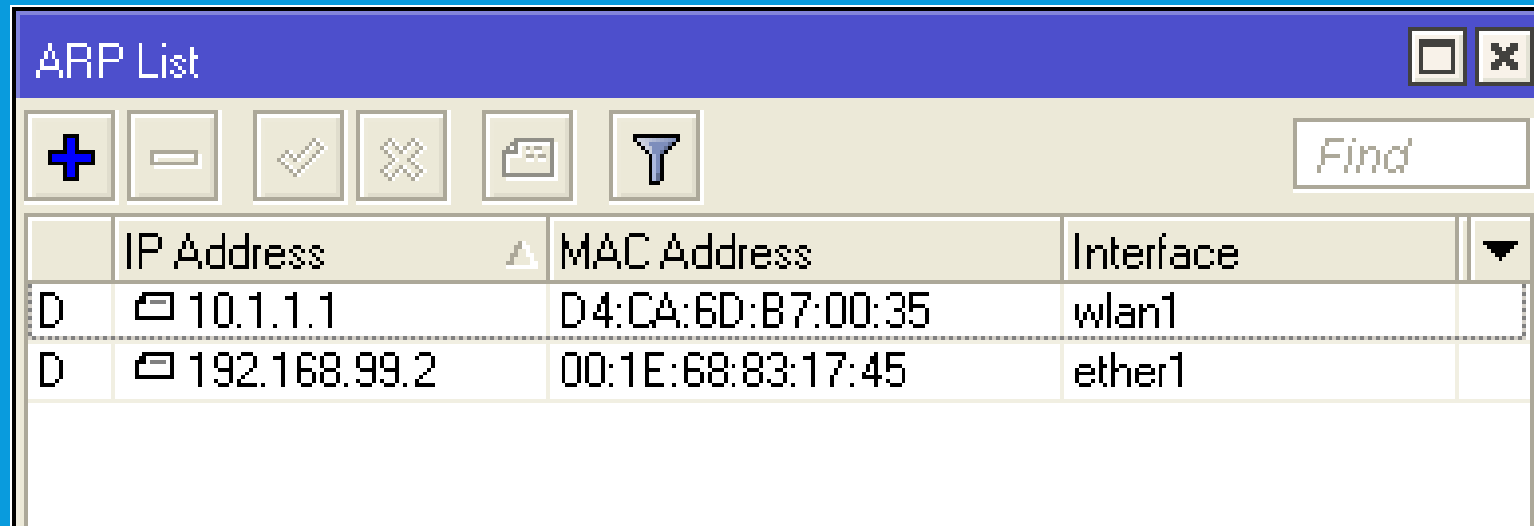
ARP

- ARP = Address Resolution Protocol
- ARP pemetaan logical address (IP address) dengan physical address (mac-address)
- ARP bekerja secara otomatis, tapi dapat dimodifikasi untuk bekerja secara manual



ARP TABLE IN MIKROTIK

- ARP table menyimpan
 - IP address
 - MAC-address
 - Interface of the address



	IP Address	MAC Address	Interface	
D	10.1.1.1	D4:CA:6D:B7:00:35	wlan1	
D	192.168.99.2	00:1E:68:83:17:45	ether1	

ARP TABLE IN MIKROTIK

- Switch
- Mesh
- IP**
- MPLS
- Routing
- System

- ARP**
- Accounting
- Addresses
- DHCP Client
- DHCP Relay
- DHCP Server
- DNS

ARP List

	IP Address
D	10.1.1.1
D	192.168.99.1

ARP <10.1.1.1>

IP Address: 10.1.1.1

MAC Address: D4:CA:6D:B7:00:35

Interface: wlan1

dynamic enabled

OK

Copy

Remove

Make Static

Ping

MAC Ping

Telnet

MAC Telnet

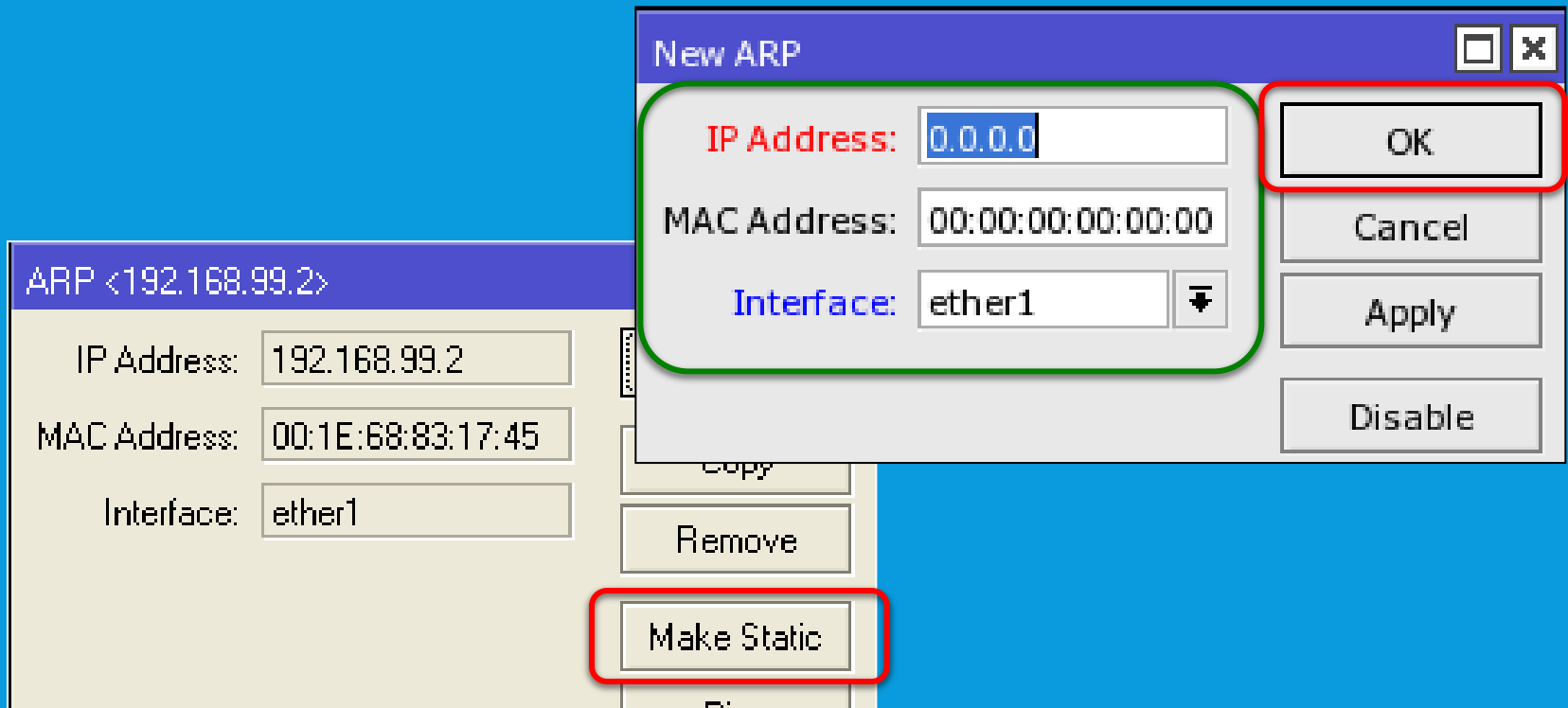
Torch

STATIC ARP

- Untuk meningkatkan keamanan jaringan, ARP dapat dibuat manual / static :
 - User hanya dapat mengakses / memperoleh jawaban dari router jika IP dan mac-address telah teregistrasi ke router
 - Jika salah satu entry berubah (misal, laptop dengan mac-address teregistrasi IP-nya berubah), maka router tidak dapat mengenali laptop tersebut lagi

STATIC ARP - CONFIGURATION

- Menambahkan "new ARP" dalam ARP Table
- Menggunakan fitur "make-static"





INTERFACE CONFIGURATION

Interface <ether1>

General Ethernet Status Overall Stats ...

Name: ether1

Type: Ethernet

MTU: 1500

L2 MTU: 1526

MAC Address: 00:0C:42:78:7E:02

ARP: enabled

Master Port: none

Bandwidth (Rx/Tx): unlimited / unlimited

Switch:

ENABLED

ARP akan secara otomatis dibalas dan disimpan dalam table

DISABLED

Permintaan ARP tidak akan dibalas, dalam hal ini laptop juga harus membuat ARP table-nya sendiri

REPLY-ONLY

Router hanya membalas ARP berdasarkan ARP table yang telah ditentukan

PROXY-ARP

Akan bertindak sebagai proxy pada ARP request

STATIC ARP

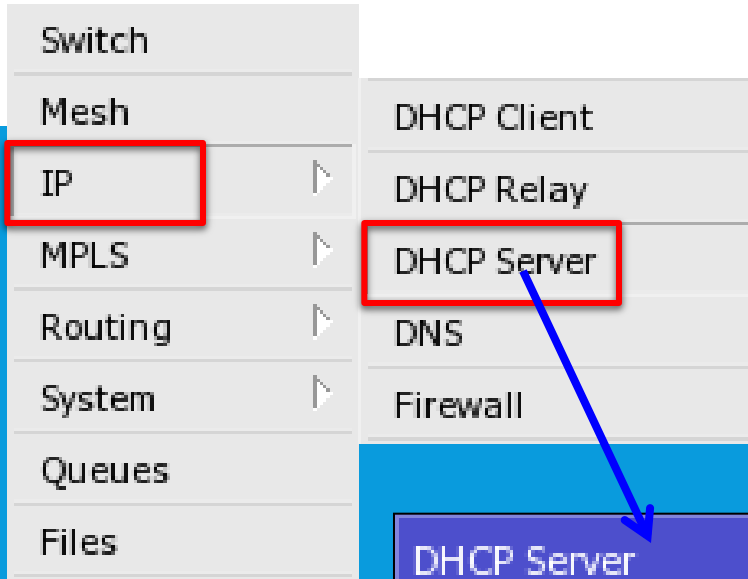
- Tambahkan IP static laptop Anda ke ARP table (atau fitur user "make-static")
- Ubah ARP pada ether1 menjadi reply-only
- Cobalah PING ke gateway
 - Ketika PING ke gateway, ubah ARP table

DHCP SERVER

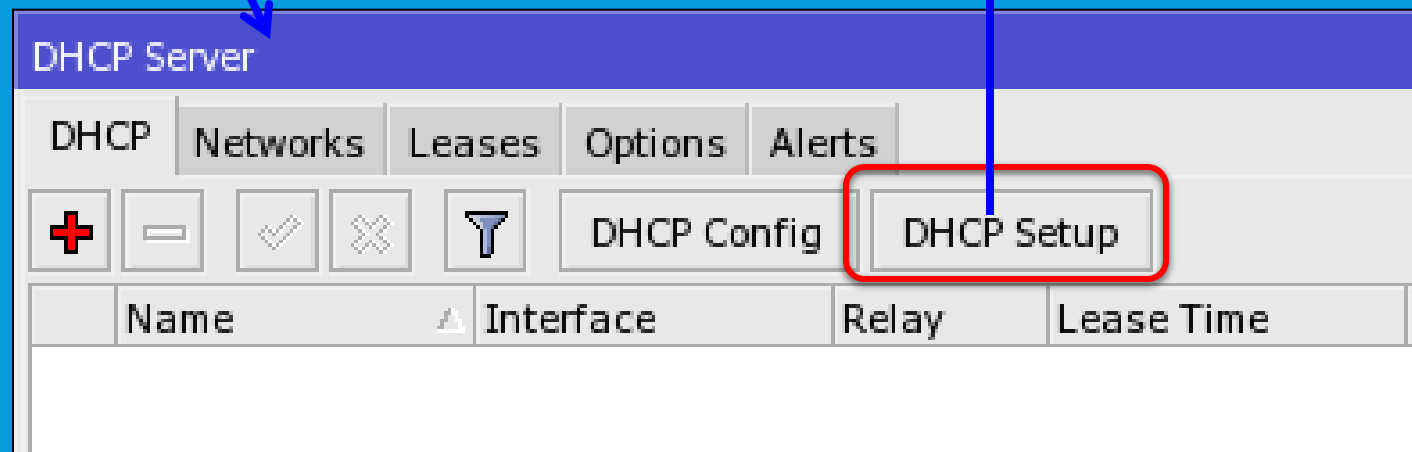
DHCP SERVER

- DHCP Server memungkinkan Anda untuk memberikan IP Address dan beberapa attribute lain untuk client secara otomatis.
- Beberapa attribute diberikan otomatis :
 - Subnet
 - Gateway
 - NTP Server
 - WINS Server
- Sebelum membuat DHCP Server, pertama kita harus menetapkan IP dalam interface dimana DHCP server akan dibuat

DHCP SERVER



Cara paling mudah untuk membuat DHCP server adalah melalui setup Wizard yang disediakan



DHCP SERVER – SETUP

DHCP Setup

Select interface to run DHCP server on

DHCP Server Interface: ether2

Back Next Cancel

DHCP Server Interface interface yang Anda akan dibuat DHCP Server (*pastikan Anda memiliki IP yang valid dalam Interface ini*)

DHCP Address Space
Network IP DHCP

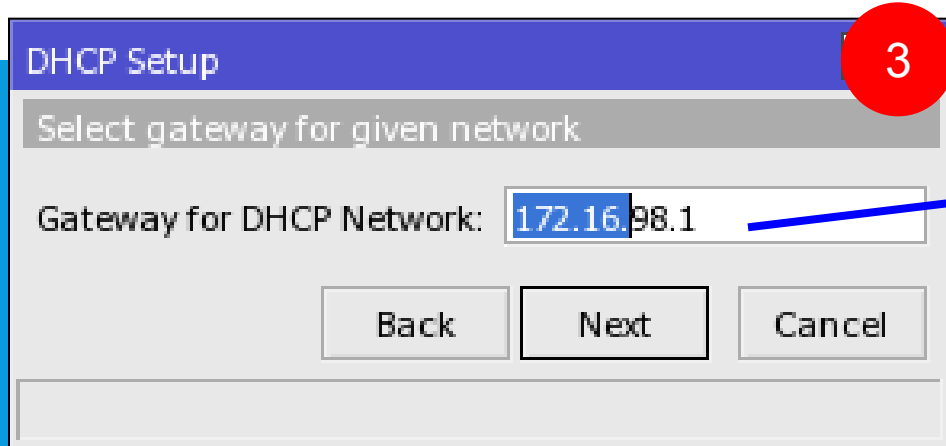
DHCP Setup

Select network for DHCP addresses

DHCP Address Space: 172.16.98.0/24

Back Next Cancel

DHCP SERVER – SETUP



DHCP Setup

Select gateway for given network

Gateway for DHCP Network:

Back Next Cancel

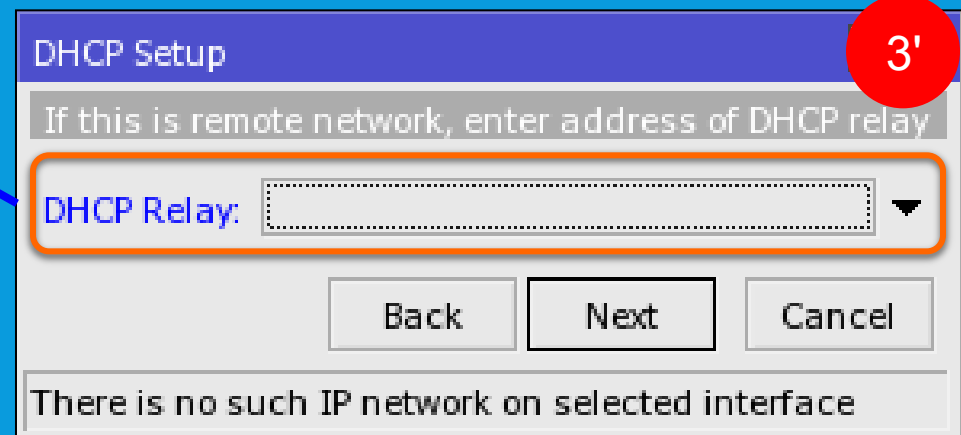
A red circle with the number '3' is positioned in the top right corner of the dialog box. A blue arrow points from the text 'Biasanya IP address yang telah Anda tetapkan pada interface' to the text input field containing '172.16.98.1'.

Gateway for DHCP Network
Biasanya IP address yang telah
Anda tetapkan pada interface

DHCP Relay

Option ini akan terjadi jika
Anda tidak menetapkan IP
di interface, bila ini terjadi,
click cancel dan tempatkan
IP dalam Interface

A blue arrow points from the text 'click cancel dan tempatkan IP dalam Interface' to the 'Cancel' button in the DHCP Setup dialog box shown in the next image.



DHCP Setup

If this is remote network, enter address of DHCP relay

DHCP Relay:

Back Next Cancel

There is no such IP network on selected interface

A red circle with the number '3'' is positioned in the top right corner of the dialog box. An orange box highlights the 'DHCP Relay' text input field. A blue arrow points from the text 'click cancel dan tempatkan IP dalam Interface' to the 'Cancel' button.

DHCP SERVER – SETUP

DHCP Setup

Select pool of ip addresses given out by DHCP server

Addresses to Give Out: 172.16.98.2-172.16.98.254

Back Next Cancel

Address to Give Out
Range Ip yang akan diberikan kepada clients

DHCP Setup

Select DNS servers

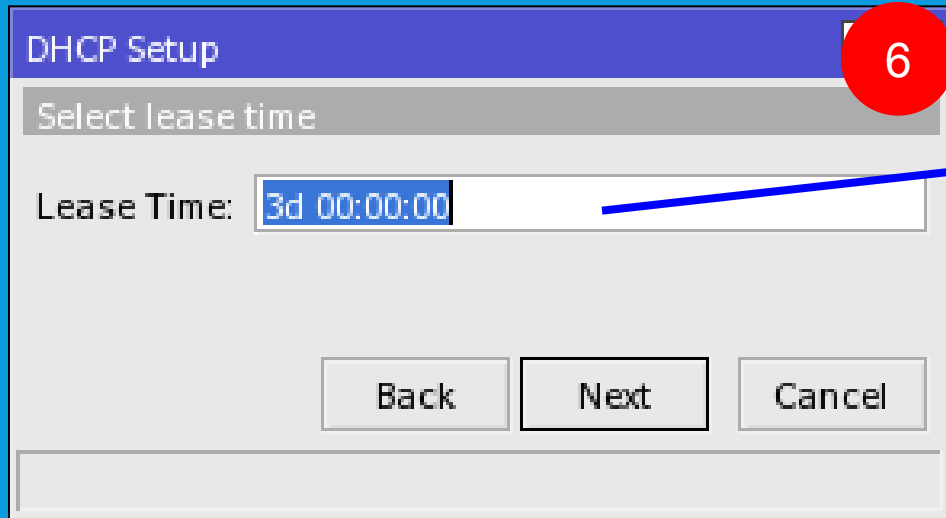
DNS Servers: 10.1.1.254

202.148.11.48

Back Next Cancel

DNS Server
DNS server yang akan digunakan untuk penetapan kepada client

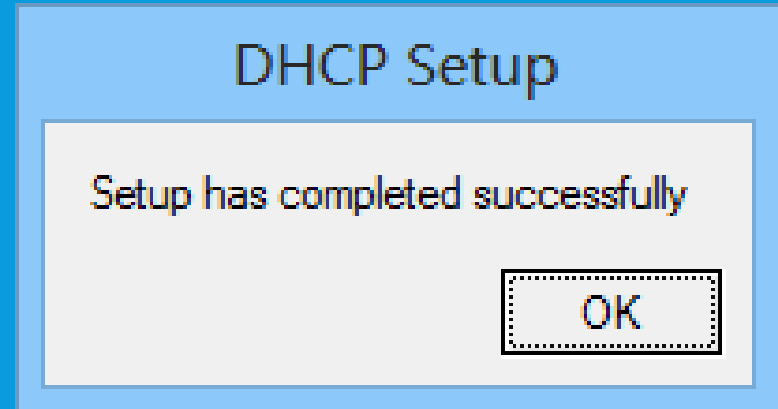
DHCP SERVER – SETUP



The screenshot shows a 'DHCP Setup' dialog box with a purple title bar. Below the title bar is a grey bar with the text 'Select lease time'. Underneath is a text input field labeled 'Lease Time:' containing the value '3d 00:00:00'. A red circle with the number '6' is positioned above the input field, with a blue arrow pointing from it to the text. At the bottom of the dialog are three buttons: 'Back', 'Next', and 'Cancel'.

Lease Time

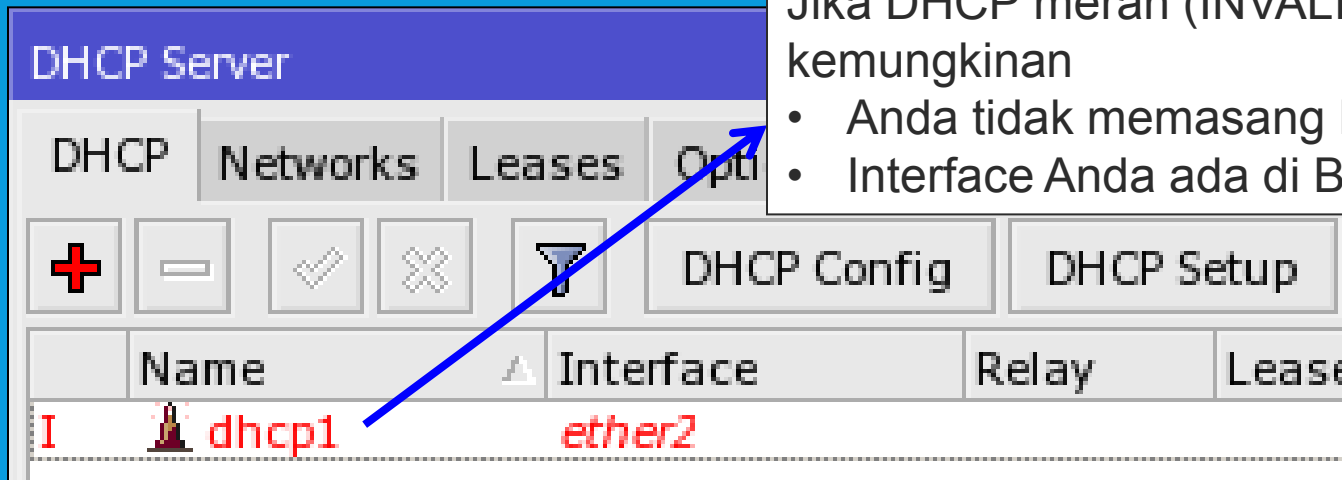
Menyatakan berapa lama record akan disimpan sebelum dibuang. Jika client terhubung selama periode ini, client akan mendapat IP yang sama



The screenshot shows a 'DHCP Setup' dialog box with a light blue title bar. The main area contains the text 'Setup has completed successfully'. At the bottom right is an 'OK' button with a dotted border.

DHCP SERVER – SETUP


- Buat IP address dalam ETH2
 - Gunakan IP lain e.g. 172.16.1.0/24 or 192.168.88.0/24
- Buat DHCP Server dalam ETH2
- Pindahkan LAN Anda untuk connect ke ETH2
 - Set LAN Anda untuk mendapat DHCP



DHCP Server

DHCP Networks Leases Opti

+ - ✓ ✗ ⏏ DHCP Config DHCP Setup

	Name	Interface	Relay	Lease
I	 dhcpl	ether2		

Jika DHCP merah (INVALID) ada dua kemungkinan

- Anda tidak memasang IP pada Interface
- Interface Anda ada di BRIDGE

DHCP SERVER

The image shows two parts of a DHCP server configuration interface. On the left is a summary view titled "DHCP Server" with tabs for "DHCP", "Networks", "Leases", and "Options". The "DHCP" tab is active and contains a table with the following data:

Name	Interface
dhcp1	ether2

On the right is a detailed configuration dialog titled "DHCP Server <dhcp1>". It contains the following fields and values:

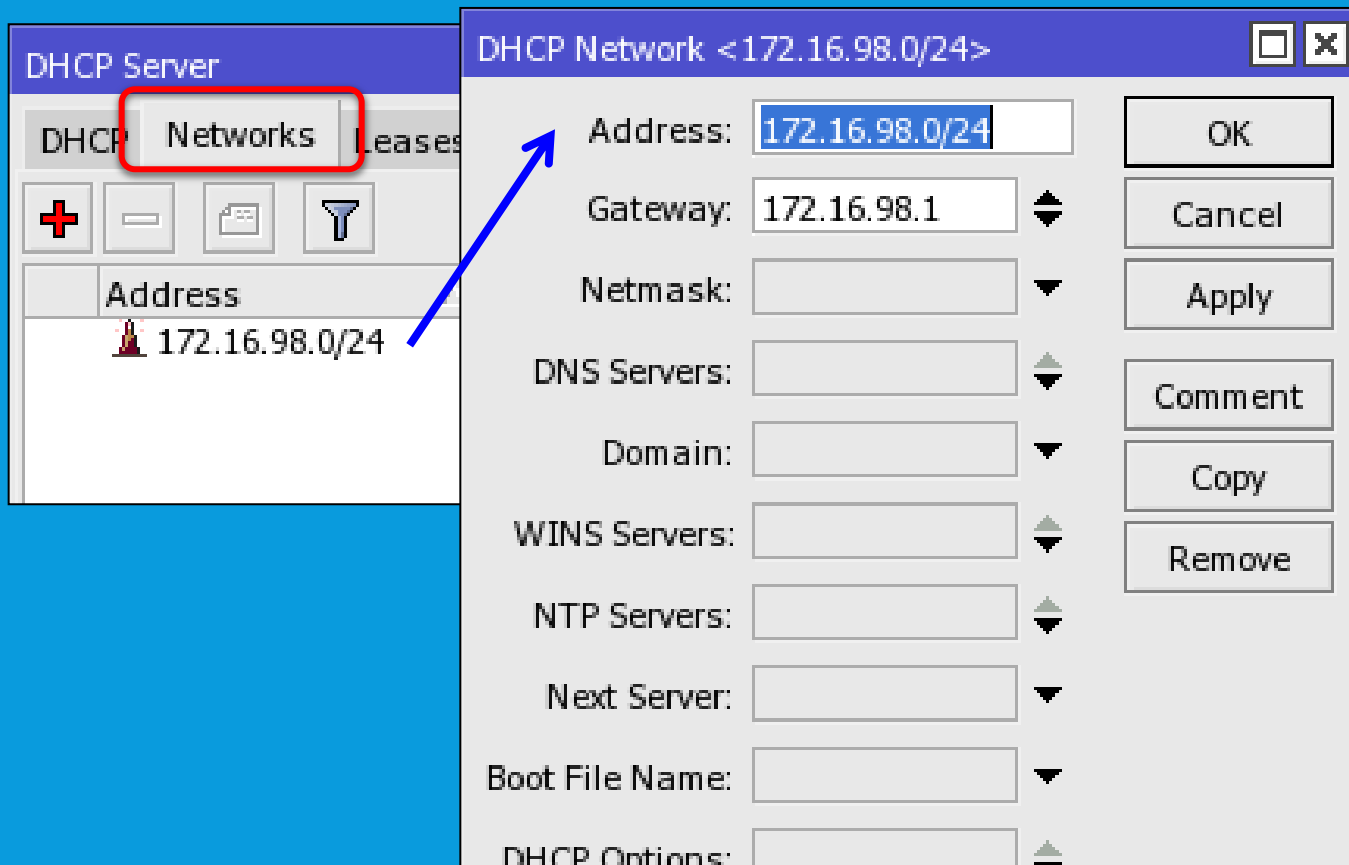
- Name: dhcp1
- Interface: ether2
- Relay: (empty)
- Lease Time: 3d 00:00:00
- Bootp Lease Time: forever
- Address Pool: dhcp_pool1
- Src. Address: (empty)
- Delay Threshold: (empty)

Buttons on the right side of the dialog include OK, Cancel, Apply, Disable, Copy, and Remove. A red box highlights the "Address Pool" field in both views. Blue arrows point from the "DHCP" tab in the summary view to the dialog title, and from the "Address Pool" field in the dialog to the explanatory text below.

Pool (range of) IP yang akan ditawarkan kepada client

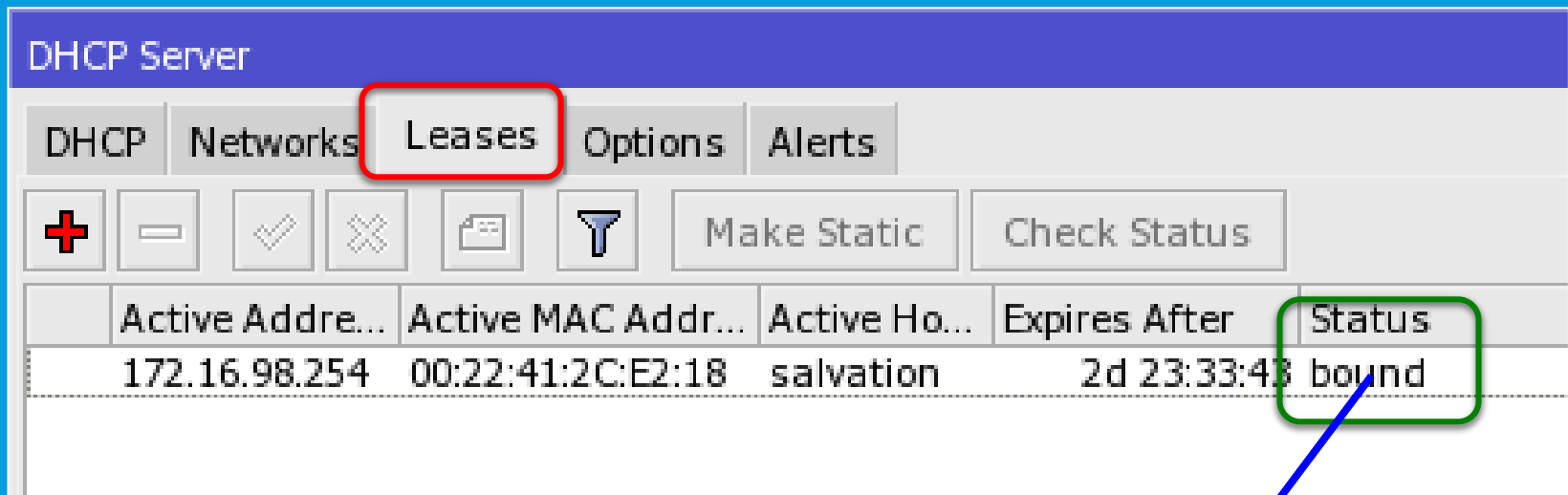
DHCP SERVER - NETWORK

- DHCP Network menyimpan informasi mengenai apa saja pengaturan yang telah ditetapkan



DHCP SERVER – LEASE

- Lease menyimpan informasi mengenai client yang terhubung dengan DHCP Server

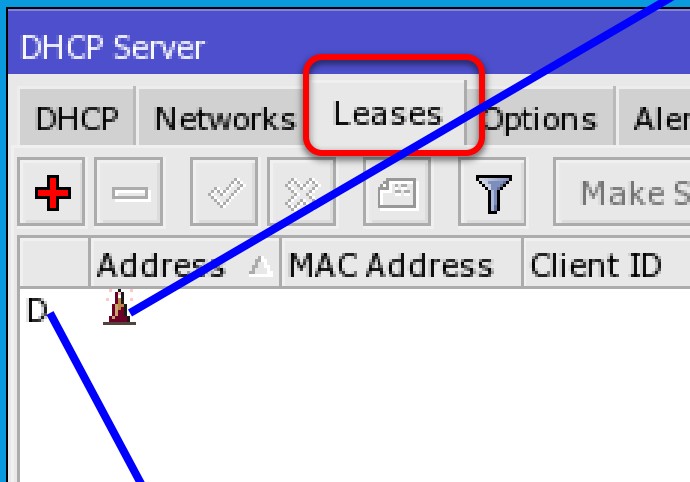


The screenshot shows the DHCP Server interface with the 'Leases' tab selected. The table below displays a single lease entry with the status 'bound' highlighted in a green box. A blue arrow points from this box to the explanatory text below.

Active Addre...	Active MAC Addr...	Active Ho...	Expires After	Status
172.16.98.254	00:22:41:2C:E2:18	salvation	2d 23:33:43	bound

Bound berarti client sudah terkoneksi dan sukses diberikan IP

DHCP SERVER – LEASE



DHCP Lease <172.16.98.254, 172.16.98.254>

Active

Active Address: 172.16.98.254

Active MAC Address: 00:22:41:2C:E2:18

Active Client ID: 1:0:22:41:2c:e2:18

Active Host Name: salvation

Active Server: dhcp1

Expires After: 2d 23:58:37

Last Seen: 00:01:24

Agent Circuit Id:

Agent Remote Id:

dynamic radius blocked bound

OK

Copy

Remove

Make Static

Check Status

Dynamic Address
karena diberikan secara
otomatis

MENGAMANKAN DHCP SERVER

- Untuk mengamankan DHCP Server Anda, ada beberapa tips yang dapat Anda ikuti
 - Selalu menempatkan DHCP dalam jaringan non-wifi (kecuali jika Anda menggunakan otentikasi berbasis seperti 802.11x atau hotspot)
 - Atur DHCP hanya memberi IP untuk mac-address yang teregistrasi (static-lease)
 - Buat authentication berdasarkan mac-address pada RADIUS server yang terpisah

DHCP SERVER – STATIC LEASE

- Static Lease akan mengelola secara spesifik mac-address apa yang dapat memperoleh IP and IP apa yang ditetapkan untuk mac-address
- Oleh karena itu, kita tidak menetapkan pool untuk address, tetapi menggunakan “static-only”

DHCP Server <dhcp1>

Name: dhcp1

Interface: ether2

Relay:

Lease Time: 3d 00:00:00

Bootp Lease Time: forever

Address Pool: static-only

OK

Cancel

Apply

Disable

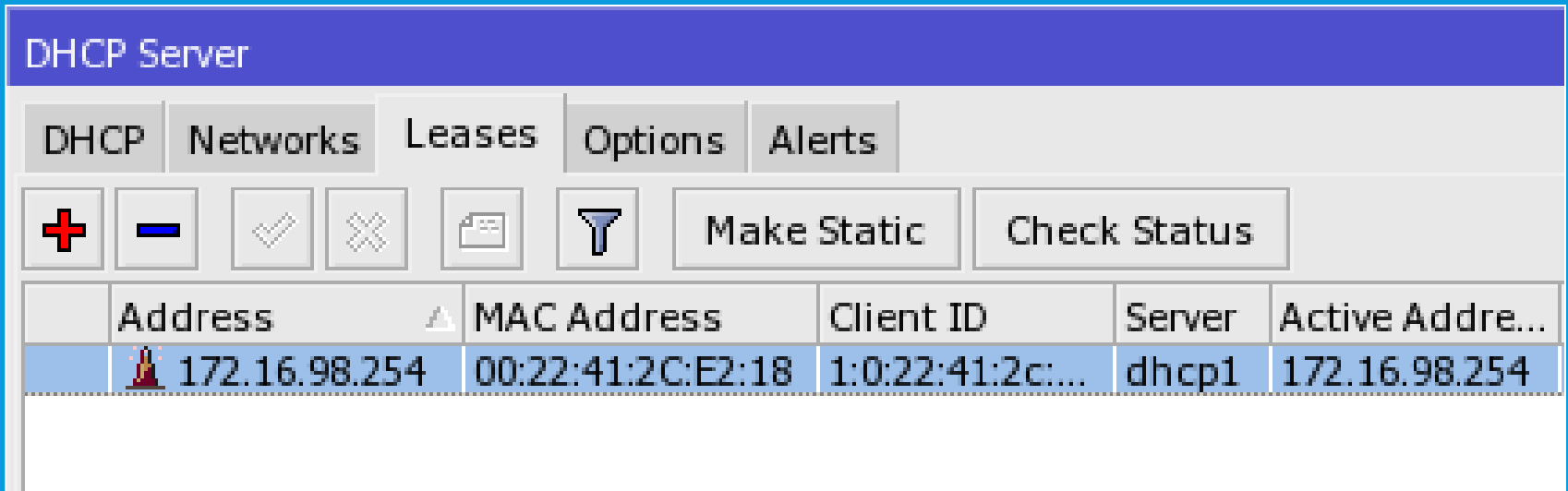
Copy

Remove


Name	Interface
dhcp1	ether2

DHCP SERVER – STATIC LEASE

- Setelah mengubah DHCP pool, sekarang kita harus menambahkan informasi pada lease
- Click tombol “make static” pada tab
 - Huruf “D” = dynamic akan hilang



The screenshot shows the DHCP Server configuration interface. The 'Leases' tab is selected, displaying a table of leases. The table has columns for Address, MAC Address, Client ID, Server, and Active Address. A single lease is listed with the IP address 172.16.98.254, MAC address 00:22:41:2C:E2:18, and Client ID 1:0:22:41:2c:...

Address	MAC Address	Client ID	Server	Active Address...
 172.16.98.254	00:22:41:2C:E2:18	1:0:22:41:2c:...	dhcp1	172.16.98.254

DHCP SERVER – STATIC LEASE

- Sekarang Anda dapat memodifikasi DHCP client Anda dengan mudah

DHCP Lease <172.16.98.254, 0.0.0.0>

General Active

Address: 172.16.98.254

MAC Address: 20:C9:D0:29:9D:EE

Use Src. MAC Address

Client ID: 1:20:c9:d0:29:9d:ee

Server: dhcp1

Lease Time:

Block Access

Always Broadcast

DHCP Options:

DHCP Option Set:

Rate Limit: 128k

Insert Queue Before: burst

Address List: admin-list

DHCP Server

DHCP Networks Leases Options Alerts

+ - ✓ ✗ [icon] [icon] Make St...

Address	MAC Address	Cl
172.16.98.254	00:22:41:2C:E2:18	1:

DHCP SERVER – STATIC LEASE

- Buat static lease untuk laptop Anda
- Cobalah untuk menambahkan rate-limit pada laptop Anda

Simple Queue <dhcp<00:22:41:2C:E2:18/1:0:22:41:2c:e2:18/dhcp1>>

General	Advanced	Statistics	Traffic	Total	Total Statistics
---------	----------	------------	---------	-------	------------------

Name:

Target Address:

<input checked="" type="checkbox"/>	Target Upload	<input checked="" type="checkbox"/>	Target Download
Max Limit:	<input type="text" value="128k"/>		<input type="text" value="128k"/>

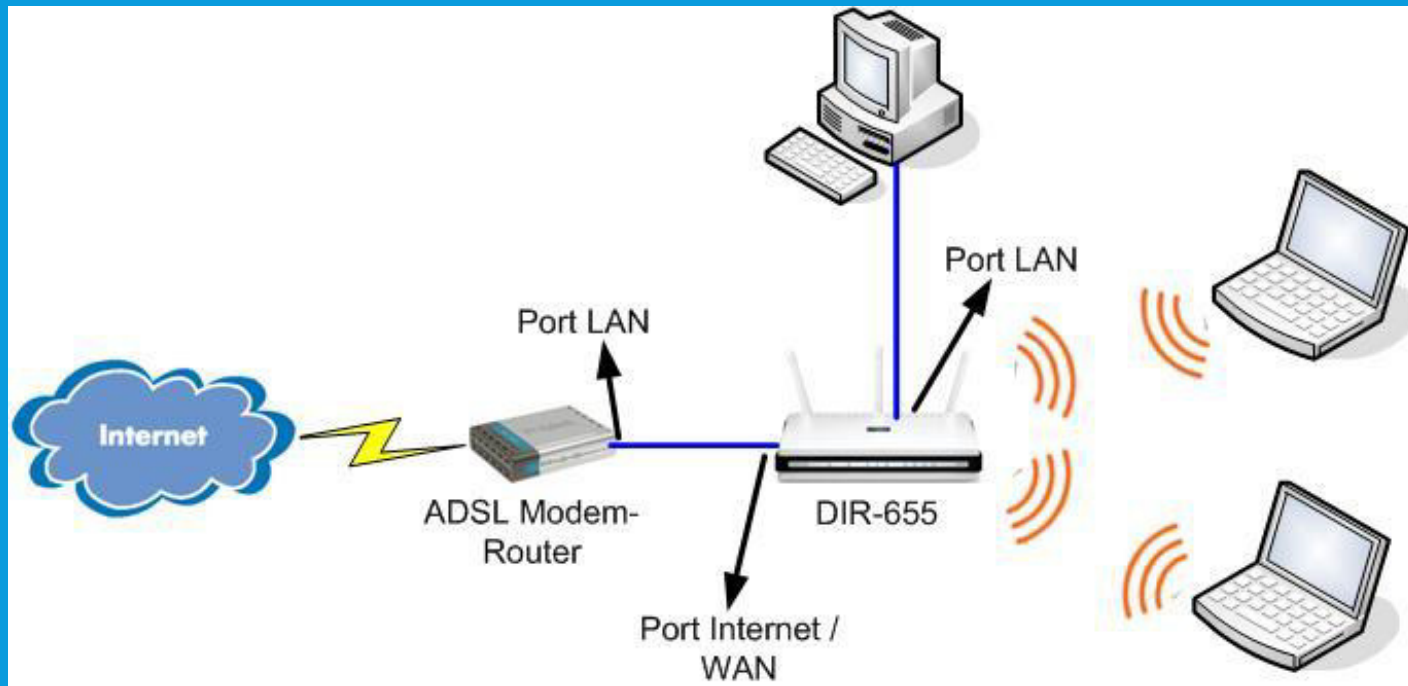
PPPOE

PPPOE

- Point-to-Point Protocol over Ethernet (PPPoE) adalah salah satu mekanisme Tunneling yang menggunakan Layer 2 sebagai dasar koneksinya
 - HARUS tidak ada router diantara PPPoE client dan PPPoE server
- Umumnya digunakan untuk mengontrol koneksi client melalui DSL, Cable-Modem, dan local LAN
- MikroTik RouterOS support PPPoE client and server features

PPPOE

- PPPoE bekerja pada OSI Layer 2 (Data Link Layer)
 - Yang berarti Server dan Client harus dalam physical network yang sama (local network)



PPPOE CLIENT

- PPPoE Client adalah host yang akan memanggil PPPoE Server dan akan memberi informasi jaringan (IP, subnet, gateway, etc) setelah berhasil di autentifikasi
- PPPoE Client digunakan secara luas sebagai DSL client (sebagai contoh Speedy ADSL atau Streamyx ADSL)
- MikroTik mempunyai fitur PPPoE Client
- PPPoE client tersedia untuk semua OS yang dikenal (termasuk Windows, Linux, dan MacOSX)

PPPOE CLIENT IN MIKROTIK

- Wireless
- Bridge
- PPP
- Switch
- Mesh
- IP

PPP

Interface | PPPoE Servers | Secrets | Profiles | Active Connections

+ - [check] [x] [document] [funnel] | PPP Scanner | PPTP Server

Type	L2 MTU	Tx
PPP Server		
PPP Client		
PPTP Server		
PPTP Client		
SSTP Server		
SSTP Client		
L2TP Server		
L2TP Client		
OVPN Server		
OVPN Client		
PPPoE Server		
PPPoE Client		

PPPOE CLIENT IN MIKROTIK

New Interface

General Dial Out Status Traffic

Name: pppoe-out1

Type: PPPoE Client

L2 MTU:

Max MTU: 1480

Max MRU: 1480

MRRU:

Interfaces: wlan1

New Interface

General Dial Out Status Traffic

Service:

AC Name:

User: peserta

Password: *****

Profile: default

Dial On Demand

Add Default Route

Use Peer DNS

Allow

pap chap

mschap1 mschap2

Interface SPESIFIK

PPPOE CLIENT

- Trainer akan men- disabled Informasi Client dalam WAN
 - Disable WLAN₁ IP Anda
 - Lihat bahwa saat ini kita tidak memiliki IP di WAN
- PPPoE Client @ WLAN₁
 - Username : class
 - Password : class

PPPOE CLIENT

PPP

Interface | PPPoE Servers | Secrets | Profiles | Ac

+ - ✓ ✗ [icon] [icon] PPP Scanner

	Name	Type	L2 MTU	Tx
R	pppoe-out1	PPPoE Client		

Interface <pppoe-out1>

General | Dial Out | Status | Traffic

Uptime: 00:00:25

Idle Time: 00:00:00

Encoding:

MTU: 1480

MRU: 1480

Active Links: 1

Active Service Name: service1

Active AC Name: MainAP

AC MAC Address: 00:0C:42:65:D7:A9

PPPOE CLIENT

NAT Rule <>

General Advanced Extra Action

Chain:

Src. Address:

Dst. Address:

Protocol:

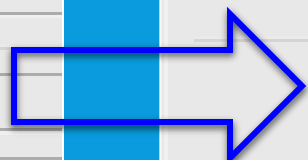
Src. Port:

Dst. Port:

Any. Port:

In. Interface:

Out. Interface:



NAT Rule <>

General Advanced Extra Action

Chain:

Src. Address:

Dst. Address:

Protocol:

Src. Port:

Dst. Port:

Any. Port:

In. Interface:

Out. Interface:

tida

lagi tapi

PPPOE SERVER

- PPPoE server mendengar koneksi client melalui SPECIFIC interface
- Client dapat di autentikasi melalui
 - Local PPP database (PPP Secret)
 - Remote RADIUS server (other location)
 - User Manager (MikroTik RADIUS) locally or remotely
- Klien dapat secara otomatis diberikan rate-limit berdasarkan profil yang digunakan

PPP SECRET AND PROFILE

- Sebelum bergerak lebih lanjut, kita akan mendiskusikan (lagi) mengenai PPP Profile and Secret
- Meskipun PPPoE Server akan melayani banyak local client, kita akan menggunakan IP Pool daripada single IP
- Setiap username/profile pada PPP harus memiliki LOCAL-Address
 - REMOTE-Address

PPP PROFILE – POOL IP

- Buat profile baru, menggunakan IP Pool
 - Pastikan IP Range/Subnet baru

The screenshot illustrates the process of creating a new IP Pool in a network configuration tool. On the left, a navigation menu is shown with 'IP' highlighted in a red box. A blue arrow points from 'IP' to the 'Pool' option in a sub-menu, which is also highlighted in a red box. In the center, the 'IP Pool' configuration window is open, showing a '+', '-', and filter icon. The '+' icon is highlighted in a red box, with a blue arrow pointing to the 'New IP Pool' dialog box. The 'New IP Pool' dialog box is highlighted in a green box and contains the following fields:

- Name: pool-pppoe
- Addresses: 10.20.30.2-10.20.30.100
- Next Pool: none

The background shows a list of existing IP Pools with columns for Name, DHCP, and HS-Pool. The entries are 'dhcp_' and 'hs-poo'.

PPP PROFILE

- Gunakan IP Pool pada profile

The screenshot shows the Mikrotik WinBox interface. In the main window, the 'Profiles' tab is selected. A 'New PPP Profile' dialog is open, showing the 'General' tab. The 'Local Address' is set to 10.20.30.1 and the 'Remote Address' is set to pool-pppoe. A blue arrow points from the '+' icon in the main window to the 'New PPP Profile' dialog. A green box highlights the 'Local Address' and 'Remote Address' fields. A blue arrow points from the text below to the 'Local Address' field.

Setidaknya local-address and remote-address harus ada, jika tidak login akan selalu ditolak

PPP SECRET

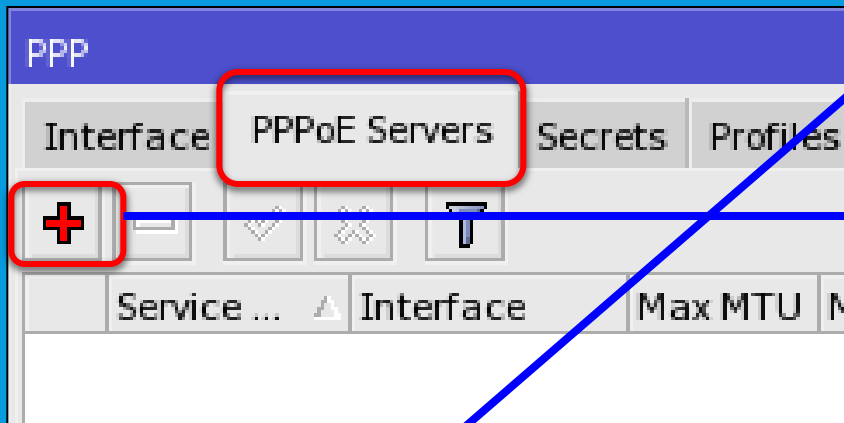
The image shows a software interface for configuring PPP secrets. The main window has a purple header and several tabs: 'Interface', 'PPPoE Servers', 'Secrets', 'Profiles', and 'Active Connections'. The 'Secrets' tab is selected and highlighted with a red box. Below the tabs is a toolbar with icons for adding (+), deleting (-), checking, unchecking, printing, and filtering. A red box highlights the add icon, and a blue arrow points from it to the 'New PPP Secret' dialog box. The dialog box has a purple header and contains the following fields:

- Name: ppp1
- Password: ppp1
- Service: any
- Caller ID: (empty)
- Profile: profile1
- Local Address: (empty)
- Remote Address: (empty)

On the right side of the dialog box, there are several buttons: OK, Cancel, Apply, Disable, Comment, Copy, and Remove.

PPPOE SERVER

- Buat PPPoE Server



Specific dalam 1 particular interface

Pastikan profile disini memiliki REMOTE-address dan LOCAL-address yang ditetapkan

New PPPoE Service

Service Name:

Interface:

Max MTU:

Max MRU:

MRRU:

Keepalive Timeout:

Default Profile:

One Session Per Host

Max Sessions:

– Authentication –

pap chap

mschap1 mschap2

enabled

PPPOE – CATATAN PENTING

- Perhatikan bahwa PPPoE selalu aktif dalam SPECIFIC interface tunggal
- Jika Anda menggunakan bridge, maka PPPoE harus aktif pada bridge interface, bukan physical interface
- Interface pada PPPoE Server tidak perlu memiliki IP address, karena IP address akan ditetapkan setelah authentication
 - Sebaliknya Instead, ini adalah tips pengamanan untuk tidak menetapkan IP address pada PPPoE Server interface

PPPOE SERVER

- Buat PPPoE Server pada ETHER3
- Buat broadband interface pada LAN Anda
 - Slide selanjutnya akan menampilkan step-by-step pada Anda

PPPOE WINDOWS CLIENT

View your basic network information



SPECTRUM-HERRY
(This computer)

View your active networks



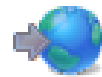
Network
Public network

Change your networking settings



Set up a new connection or network

Set up a wireless, broadband, dial-up, ad hoc, or VPN connection; or set up a



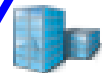
Connect to the Internet

Set up a wireless, broadband, or dial-up connection to the Internet.



Set up a new network

Configure a new router or access point.



Connect to a workplace

Set up a dial-up or VPN connection to your workplace.



Set up a dial-up connection

Connect to the Internet using a dial-up connection.



Browse the Internet now



Set up a new connection anyway

PPPOE WINDOWS CLIENT

How do you want to connect?



Broadband (PPPoE)

Connect using DSL or cable that requires a user name and password.

Type the information from your Internet service provider (ISP)

User name:

[Name you]

Password:

[Password]

Show characters

Remember this password

Connection name:

Broadband

Type the information from your Internet service provider (ISP)

User name:

class

class

Show characters

Remember this password

Connection name:

myPPPoE

PPPOE CONNECTED - STATUS

The connection to the Internet is ready to use



ppp

Interface PPPoE Servers Secrets Profiles **Active Connections**

[-] [Filter]

	Name	Service	Caller ID	Encoding	Address	Uptime
L	ppp1	pppoe	00:22:41:2C:...		10.20.30.100	00:00:25

PPPOE SERVER STATUS

PPP

Interface | PPPoE Servers | Secrets | Profiles | **Active Connections**

[-] [Filter]

	Name	Service	Caller
L	ppp1	pppoe	00:22:41:2C:E2:18

PPP Active User <ppp1>

General

Name: ppp1

Service: pppoe

Caller ID: 00:22:41:2C:E2:18

Encoding:

Address: 10.20.30.100

Uptime: 00:00:34

Session ID: 81600000 hex

Limit Bytes In:


Limit Bytes Out:

local

OK

Remove

Ping



ROUTEROS TOOLS

ROUTEROSTOOLS

- Beberapa Tools RouterOS
 - E-mail
 - Mengirimkan informasi, log, warning, dsb
 - Netwatch
 - Memantau Host UP / Down berbasis ICMP
 - Menambahkan Script ketika Host UP / Down
 - Ping, Traceroute
 - Tool yang umum dan standar dalam networking
 - Profiler (CPU Load)
 - Melihat Detail Penggunaan CPU Load

EMAIL

- Tools yang memungkinkan anda mengirimkan email dari RouterOS
- Dapat di kombinasikan dengan tools lain di RouterOS
 - Mengirimkan Log ke email administrator
 - Mengirimkan Backup ke email Administrator
 - Mengirimkan Informasi UP/DOWN Netwatch
- Menu Tools → Email

EMAIL

Email Settings

Server: 74.125.200.108

Port: 465

Start TLS

From: Hery <hery.damawan@gmail.com>

User: hery.damawan@gmail.com

Password: *****

OK

Cancel

Apply

Send Email

Send Email

Address: 74.125.200.109

Port: 465

User: hery.damawan@gmail.com

Password: *****

TLS

To: hery@belajamikrotik.com

CC:

From: Hery <hery.damawan@gmail.com>

Subject: testing subject

testing body

Body:

File:

NETWATCH

- Memungkinkan anda untuk memonitor status device (host), apakah UP atau Down
- Menggunakan ICMP
- Bisa ditambahkan script ketika UP / Down
- Sangat Berguna untuk Administrator
 - Membuat Failover jika Gateway Down
 - Mengirim Info UP/Down ke email via script

NETWATCH

Netwatch

+ - ✓ ✗ [icon] [icon]

Host	Interval
------	----------

New Netwatch Host

Host Up Down

Host: 10.1.1.1

Interval: 00:01:00

Timeout: 1000 ms

Status:

Since:

enabled

Disable
Comment
Copy
Remove

New Netwatch Host

Host Up Down

On Up:

```
:log info message="link UP"
```

enabled

OK
Cancel
Apply
Disable
Comment
Copy
Remove

PING & TRACEROUTE

- Tools Umum, yang standart disetiap device networking
 - Menu TOOLS → PING / TRACEROUTE
 - Tools Sederhana untuk Troubleshooting
 - Memeriksa Apakah Device Up / Down dan memantau latencynya dengan mengirimkan ICMP Echo (PING)
 - Menampilkan Jalur Routing yang dilalui, dan berapa latencynya (traceroute)
 - Mudah digunakan untuk melacak jalur yang sedang bermasalah (traceroute)

PING

Ping (Running)

General | Advanced

Ping To:

Interface:

ARP Ping

Packet Count:

Timeout:

Ping (Running)

General | Advanced

Src. Address:

Packet Size:

TTL:

DSCP:

Routing Table:

Dont Fragment

Seq #	Host	Time	Reply Size	TTL	Status
0	206.190.36.105	264ms	50	49	
1	206.190.36.105	260ms	50	49	
2	206.190.36.105	255ms	50	49	
3	206.190.36.105	254ms	50	49	

TRACEROUTE

Traceroute (Running) [Window Icon] [Close Icon]

Traceroute To:

Packet Size:

Timeout: ms

Protocol:

Port:

Use DNS

Count: ▼

Max Hops: ▼

Src. Address: ▼

Interface: ▼

DSCP: ▼

Routing Table: ▼

Hop	Host	Loss	Sent	Last	Avg.	Best	Worst	Std. Dev.	History	Status
9	180.240.190.113	0.0%	5	40.4ms	45.6	39.9	55.1	5.8	▲
10	72.14.221.190	0.0%	5	36.5ms	51.6	36.5	73.9	13.9	
11	209.85.243.156	0.0%	5	45.5ms	46.1	36.1	67.1	11.0	
12	209.85.244.25	20.0%	5	39.3ms	63.2	39.3	110.9	28.1	
13		100.0%	5	timeout						
14	8.8.8.8	40.0%	5	54.1ms	46.1	40.9	54.1	5.7		
15	8.8.8.8	0.0%	2	48.7ms	43.2	37.6	48.7	5.6	..	

PROFILER (CPU LOAD)

- Tools yang menampilkan CPU Load
 - Detail Penggunaan CPU tiap Proses
 - IDLE bukan sebuah proses, merupakan prosentase kemampuan CPU yang tersisa.

ROUTER IDENTITY

- Router Identity membantu untuk mengidentifikasi device Router MikroTik
 - Default Identity "MikroTik"
 - Semakin banyak jumlah Router yang di manage di satu jaringan, akan mudah di bedakan jika identitynya berbeda
 - Menu "System → Identity"
 - Identity akan tampil di Neighbor Discovery, Network Discovery dan Status Bar

ROUTER IDENTITY

The image shows a screenshot of the Mikrotik WinBox interface. On the left, the 'System' menu is highlighted with a red box, and the 'Identity' option is also highlighted with a red box. A blue arrow points from the 'Identity' menu item to the 'Identity' dialog box on the right. The dialog box has a purple title bar and contains a text input field with the value 'MikroTik'. Below the input field are three buttons: 'OK', 'Cancel', and 'Apply'.

Menu Item	Sub-Item
IP	
MPLS	
Routing	
System	
Queues	
Files	
Log	
	Drivers
	Health
	History
	Identity
	LEDs
	License
	Logging
	Packages

Identity

Identity: MikroTik

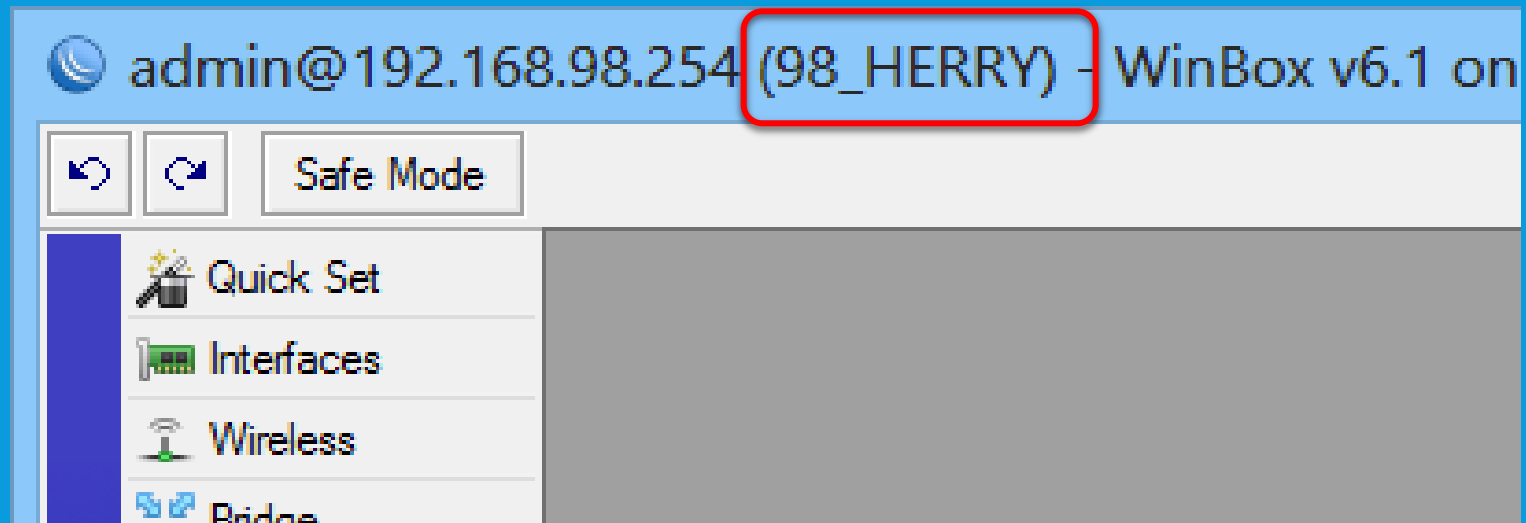
OK

Cancel

Apply

ROUTER IDENTITY

- Identity akan muncul di Status Bar Winbox



ROUTEROS TROUBLESHOOT

CONTACTING SUPPORT

- Supout.rif
 - File yang dikirimkan ke MikroTik Support, untuk mengidentifikasi Error atau Problem yang dilaporkan.
 - /system sup-output
- Autosupout.rif
 - File yang dibuat otomatis oleh Router OS, ketika terjadi error software (kernel panic atau saat RouterOS tidak merespon / hang)
 - Dibuat otomatis oleh watchdog system

LOG & DEBUG

- Logging sangatlah penting, untuk melacak histori dan informasi RouterOS.
 - Log dapat di simpan secara permanen
 - Log dapat di lihat di Menu "Log" RouterOS
 - CLI = /log print

SYSTEM LOGGING

- System Logging Mengatur apa saja yang akan kita catat di Log, dan type Log yang digunakan
 - Rules
 - Topic apa saja yang akan kita log, menggunakan profil action lognya
 - Actions
 - Group Profil yang di bedakan menurut Type Lognya
- Membuat Rules Logging sangatlah mudah, Buat dulu Action Lognya, lalu buat Rules nya dengan memilih Action Log yang telah dibuat sebelumnya

SYSTEM LOGGING

Logging

Rules Actions

+ - ✓ ✗ ⌵ Find

	Topics	Prefix	Action	
*	info		memory	
*	error		memory	
*	warning		memory	
*	critical		echo	

4 items

New Log Rule

Topics: web-proxy ⌵ ⬆

! debug ⌵ ⬆

Prefix: [proxy] ▲

Action: memory ⌵

OK

Cancel

Apply

Disable

Copy

Remove

enabled

SYSTEM LOGGING

- Type Logging
 - Disk : Log disimpan di RouterOS Storage (Disk)
 - Echo : Log ditampilkan di RouterOS Console
 - Email : Log dikirim ke Email
 - Memory : Log di simpan di memory (temp)
 - Remote : Log disimpan di Syslog Server Eksternal

LOGGING TYPE

Logging

Rules Actions

+ - Filter

Name	Type
* disk	disk
* echo	echo
* memory	memory
* remote	remote

New Log Action

Name:

Type: ▾

Lines:

- disk
- echo
- email
- memory
- remote

MONITORING TOOLS

- RouterOS menyediakan beberapa fitur Monitoring untuk memantau Interface Traffic, Real Traffic, Bandwith Limiter dan Resource

TRAFFIC MONITORING

- Monitoring Interface akan menunjukkan aktifitas Traffic di tiap Interface.
 - Menu "Interface"

Interface List						
Interface						
Ethernet						
EoIP Tunnel						
IP Tunnel						
GRE Tunnel						
VLAN						
VRRP						
Bo						
+						
-						
✓						
✗						
📄						
🔍						
	Name	Type	L2 MTU	Tx	Rx	
R	ether1	Ethernet	1526	70.3 kbps	4.7 kbps	
	ether2	Ethernet	1522	0 bps	0 bps	
	ether3	Ethernet	1522	0 bps	0 bps	
R	wlan1	Wireless (Atheros A...	2290	3.1 kbps	90.9 kbps	

TORCH

- Torch akan membantu kita untuk memonitor network traffic secara realtime dan lebih detail
 - Dapat melihat IP Sumber, Tujuan, Protocol dan Port yang digunakan
 - Dapat melihat penggunaan bandwidth tiap aktifitas koneksi

TORCH

Torch (Running)

Basic

Interface: ether1

Entry Timeout: 00:00:03 s

Collect

Src. Address Src. Address6

Dst. Address Dst. Address6

MAC Protocol Port

Protocol VLAN Id

tampilkan

source-ip:source-port

destination-ip:destination-port

Eth. ... ^	Protocol	Src.	Dst.	VL...	Tx Rate	Rx Rate
800 (ip)	6 (tcp)	192.168.98.1:49504	64.130.15.211:80 (http)		24.0 kbps	1109 bps
800 (ip)	6 (tcp)	192.168.98.1:49503	64.130.15.211:80 (http)		36.0 kbps	1109 bps
800 (ip)	6 (tcp)	192.168.98.1:49183	192.168.98.254:8291 (winbox)		2.0 kbps	605 bps

protocol

Total TX dan RX Relatif sama dengan yang tampil di Interface

GRAPHING

- MikroTik mempunyai fitur Graphing (MRTG) Internal, yang akan mencatat traffic dalam bentuk grafik data
 - Grafik akan di kalkulasi setiap 5 menit
 - Traffic yang melalui Simple Queue dapat ditampilkan sebagai Graphing
 - Graphing dapat di simpan di disk atau memory
 - Selain traffic, Graphing juga dapat menggambarkan grafis Resource (CPU, disk, memory, dll)

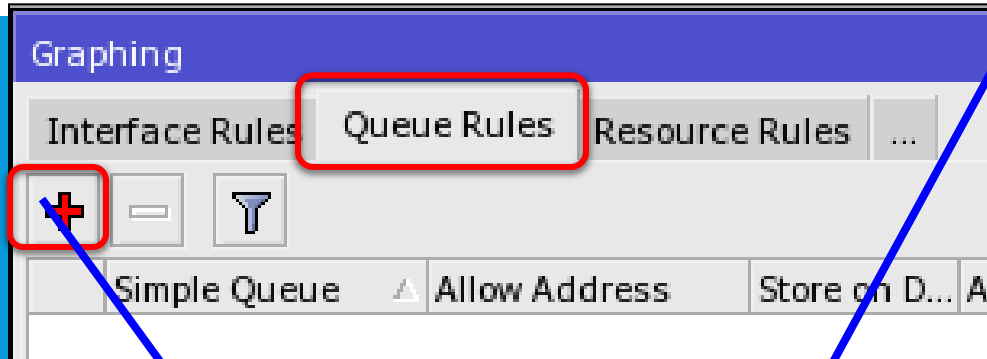
GRAPHING

The screenshot shows the 'Graphing' application window. The title bar is purple and contains the text 'Graphing'. Below the title bar, there are three tabs: 'Interface Rules' (highlighted with a red box), 'Queue Rules', and 'Resource Rules'. Below the tabs, there are three icons: a red plus sign, a minus sign, and a funnel icon. To the right of these icons is a button labeled 'Graphing Settings'. Below this row, there is a table with columns: 'Interface', 'Allow Address', and 'Store on D...'. The 'Interface' column is currently empty.

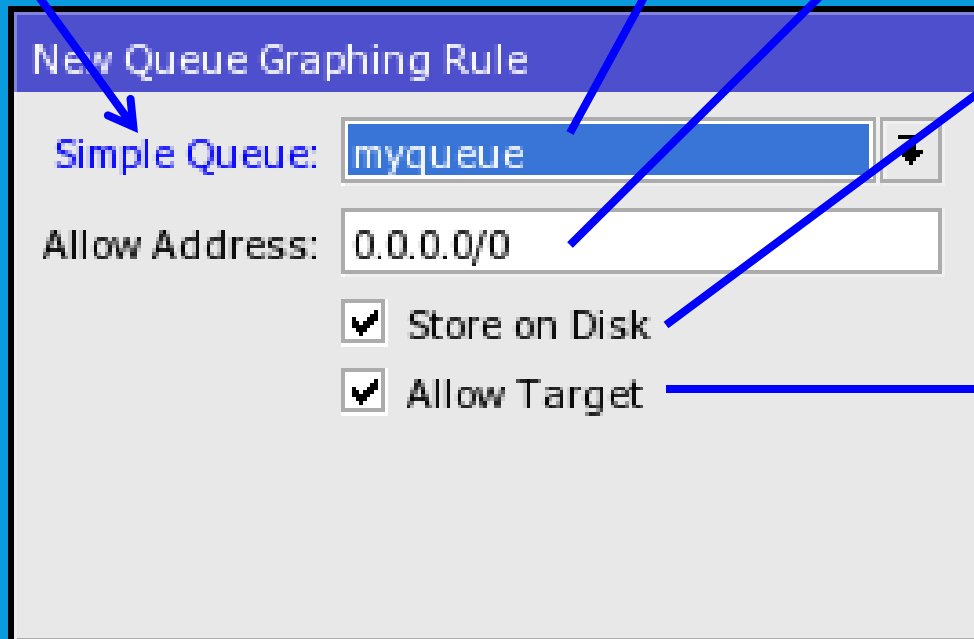
The screenshot shows the application's main menu. The 'Tools' menu item is highlighted with a red box. The 'Graphing' menu item is also highlighted with a red box. Other menu items include 'Files', 'Log', 'Radius', 'New Terminal', 'MetaROUTER', 'Make Supout.rif', 'Manual', 'Exit', 'BTes', 'Ban...', 'Email', 'Flood Ping', 'IP Scan', 'MAC Server', 'Netwatch', and 'Packet Sniffer'.

The screenshot shows the 'Graphing Settings' dialog box. The title bar is purple and contains the text 'Graphing Settings'. Below the title bar, there are three buttons: 'OK', 'Cancel', and 'Apply'. The 'Store Every' setting is set to '5 min' and has a dropdown arrow next to it.

GRAPHING



IP yang dapat mengakses Graph



Simpan di Disk

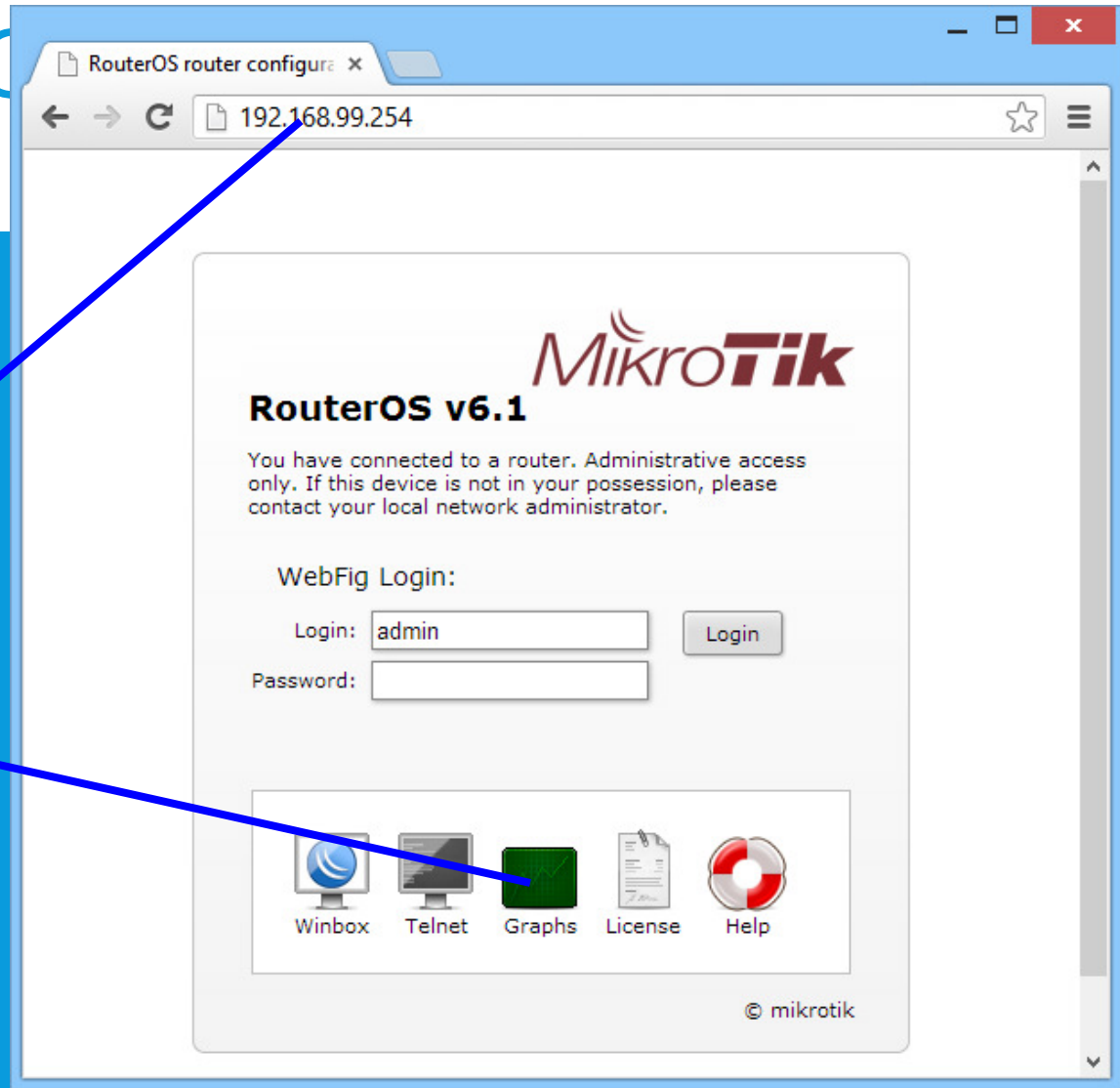
Ijinkan Target yang di tulis di allow address

GRAPHING

- Buka
- Via Browser

Router's IP

Click Here

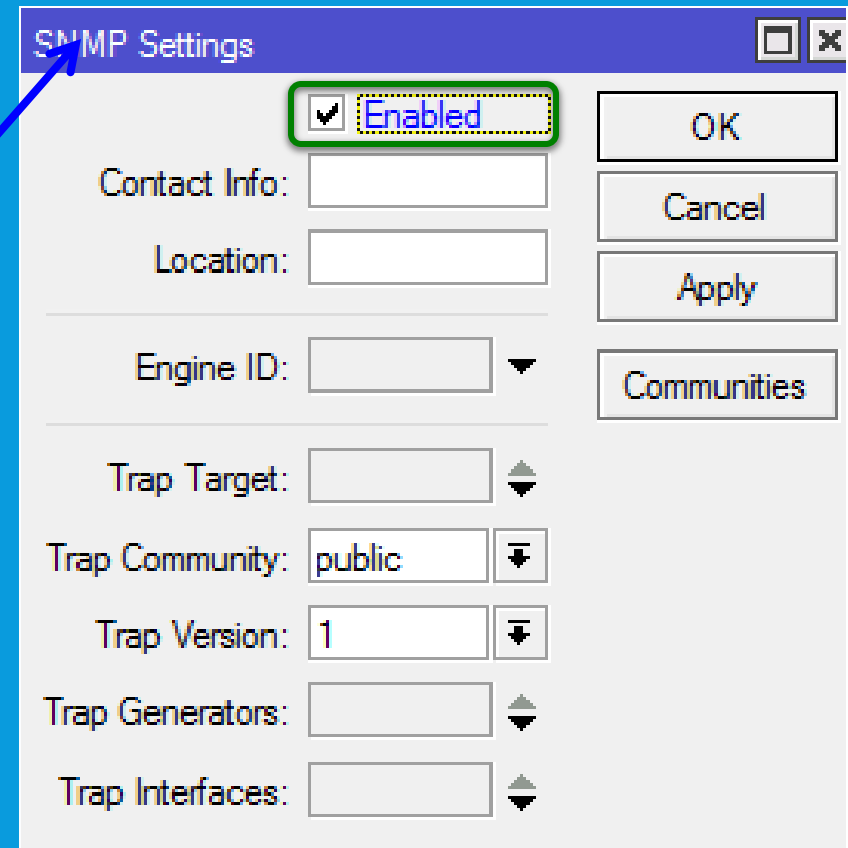
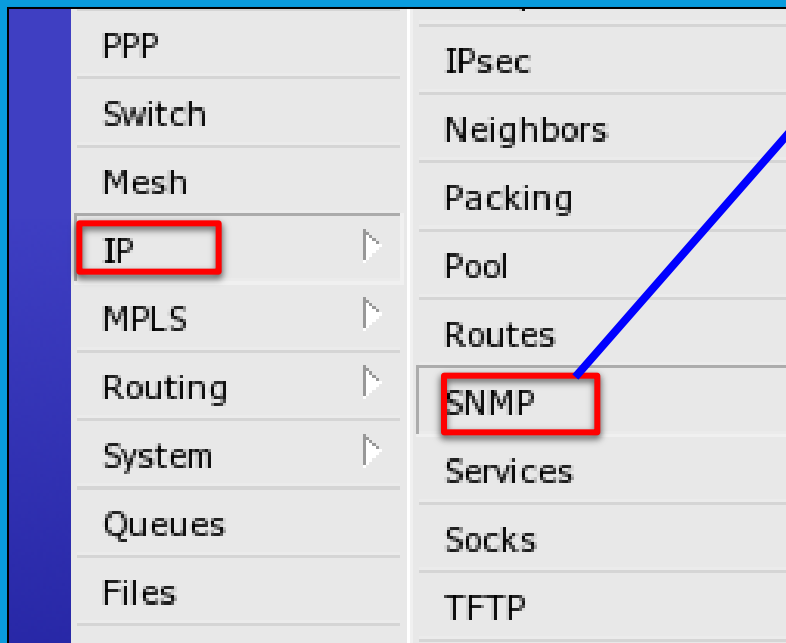


EXTERNAL GRAPHING

- Graphing juga bisa disimpan di Eksternal Graphing (MRTG)
 - Menggunakan SNMP
 - SNMP Merupakan standar protokol pabrikan, yang digunakan untuk memonitor dan manage perangkat dari jaringan internet secara remote. (switch, router, workstation dll)
 - SNMP dapat digunakan untuk melihat
 - Status Device (Up / Down, Uptime, dll)
 - Traffic Penggunaan
 - IP List

SNMP

- Secara Default SNMP tidak aktif



SNMP

The image shows two windows from the Mikrotik WinBox interface. The background window is titled "SNMP Communities" and contains a table with the following data:

Name	Addresses
public	0.0.0.0/0

A blue arrow points from the "+" icon in the top-left corner of the "SNMP Communities" window to the "New SNMP Community" dialog box. The dialog box is titled "New SNMP Community" and contains the following fields and options:

- Name:
- Addresses:
- Security:
- Read Access
- Write Access
- Authentication Protocol:
- Encryption Protocol:
- Authentication Password:
- Encryption Password:

On the right side of the dialog box, there are five buttons: OK, Cancel, Apply, Copy, and Remove.