

# Pengantar WiFi (Jaringan Komputer)

Imam Suharjo

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# Pengertian

- Wi-Fi adalah sebuah teknologi yang memanfaatkan peralatan elektronik untuk bertukar data secara nirkabel (menggunakan gelombang radio) melalui sebuah jaringan komputer, termasuk koneksi Internet berkecepatan tinggi.
- Wi-Fi Alliance mendefinisikan Wi-Fi sebagai "produk jaringan area lokal nirkabel (WLAN) apapun yang didasarkan pada standar Institute of Electrical and Electronics Engineers (IEEE) 802.11".
- Meski begitu, karena kebanyakan WLAN zaman sekarang didasarkan pada standar tersebut, istilah "Wi-Fi" dipakai dalam bahasa Inggris umum sebagai sinonim "WLAN".

# Wi-Fi Alliance

- Wi-Fi Alliance adalah organisasi nirlaba yang mempromosikan teknologi Wi-Fi dan mensertifikasi produk Wi-Fi untuk kesesuaian dengan standar interoperabilitas tertentu.
- Tidak setiap perangkat yang mematuhi IEEE 802.11 diajukan untuk sertifikasi ke Wi-Fi Alliance, kadang-kadang karena biaya yang terkait dengan proses sertifikasi. Kurangnya logo Wi-Fi tidak selalu berarti perangkat tidak kompatibel dengan perangkat Wi-Fi.
- Wi-Fi Alliance memiliki merek dagang Wi-Fi. Produsen dapat menggunakan merek dagang untuk merek produk bersertifikat yang telah diuji interoperabilitasnya.  
(<https://wi-fi.org/>)



# Wi-Fi Alliance

- (<https://wi-fi.org/>)

The screenshot shows the Wi-Fi Alliance website homepage. At the top left is the Wi-Fi Alliance logo with the tagline "The worldwide network of companies that brings you Wi-Fi®". To the right is a search bar containing the text "Certified products, news, etc." and a "SEARCH" button. Below the search bar is a link: "View Wi-Fi CERTIFIED™ products by category".

On the left side, there is a vertical navigation menu with the following items: "Who We Are", "Membership", "Certification", "Discover Wi-Fi", "News & Events", and "Product Finder".

The main content area features a large teal banner with a globe icon on the left. To the right of the globe, the text reads: "There will be nearly 628 million global public Wi-Fi® hotspots in 2023, up from 169 million in 2018." Below this text is a dark grey box with the following content:

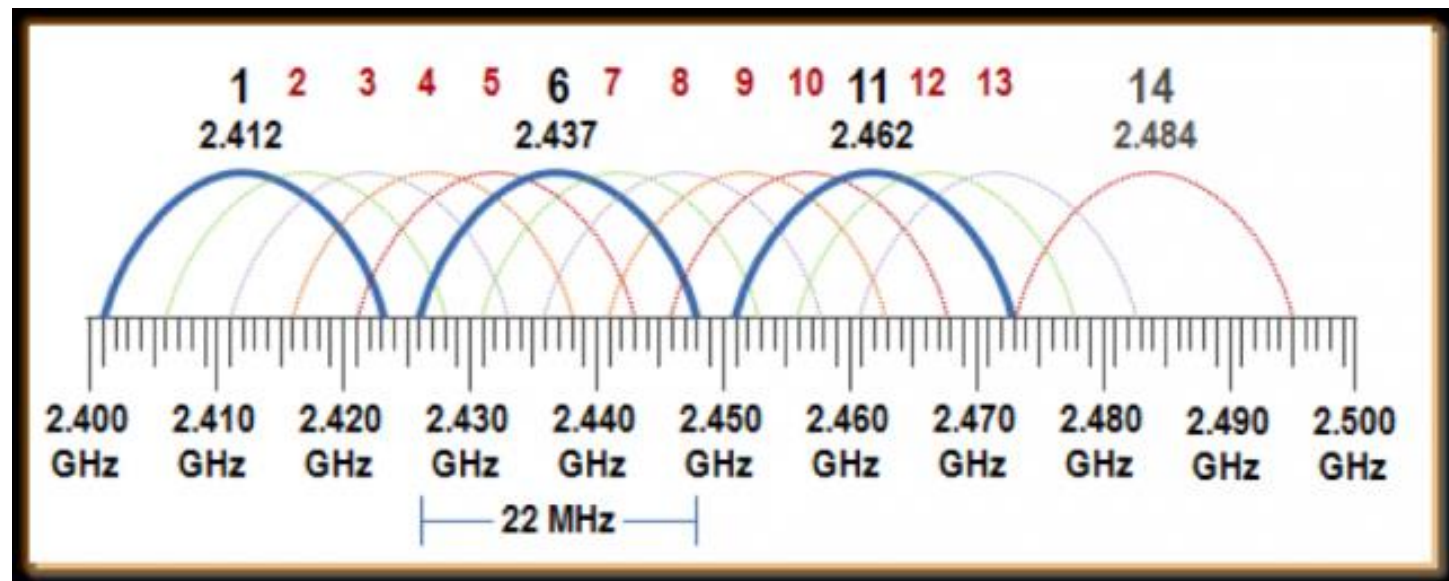
**Cisco report highlights Wi-Fi growth**  
Cisco released its Annual Internet Report in March. The research forecasts exciting Wi-Fi trends to expect soon.

At the bottom of the banner are five small square icons. Below the banner, there are two horizontal sections: "NEWS See All" and "FEATURED CONTENT". Under "NEWS See All", there is a link to "Jarkom - Wifi". Under "FEATURED CONTENT", there is a link to "Imam Suharjo - 2020 - <http://imam.web.id>".

# Gelombang radio dan Frekuensi WiFi

- WiFi merupakan jalur populer saat ini yang dianggap praktis untuk melakukan transfer data menggunakan Gelombang radio (tanpa kabel)
- Frekuensi yang digunakan WiFi pada umumnya 2,4Ghz dan 5,8 Ghz (5Ghz) Sesuai standar IEEE 802.11 dan FCC yang dibagi menjadi kanal-kanal frekuensi.

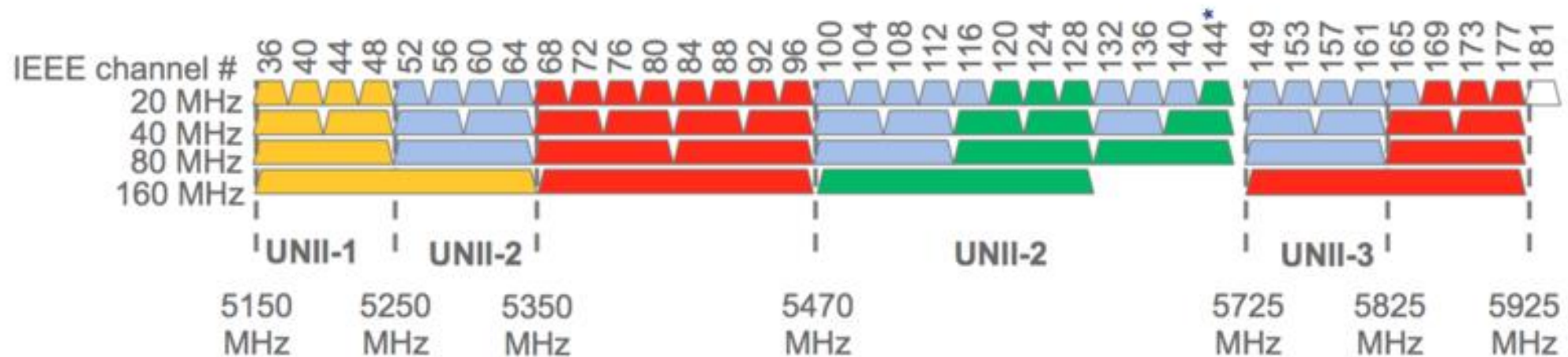
- Kanal 2,4 Ghz →



# Spektrum 5 Ghz

## -B Changes: 5 GHz Spectrum (FCC)

- Already available for indoor AP use; *added for outdoor use as part of -B*
- Currently available 5 GHz channels
- New channels *added as part of -B*
- Potential new channels (future)



# Nama jaringan SSID atau Wi-Fi

- SSID (pengidentifikasi rangkaian layanan), atau nama jaringan, akan mengidentifikasi jaringan Wi-Fi untuk pengguna dan perangkat Wi-Fi lainnya. SSID peka huruf besar dan kecil.
- Pilih nama yang unik untuk jaringan dan tidak dibagikan oleh jaringan di sekitar lainnya atau jaringan yang kemungkinan Anda temukan. Jika router dilengkapi SSID default, penting untuk mengubahnya dengan nama yang unik. Nama SSID default umum yang harus dihindari adalah linksys, netgear, dlink, wireless, 2wire, dan default.
- Jika SSID tidak unik, perangkat Wi-Fi akan sulit mengenali jaringan. Hal ini dapat mengakibatkan kegagalan untuk tersambung secara otomatis ke jaringan, atau menyambungkan ke jaringan lainnya yang berbagi SSID yang sama.

# Beberapa standar WiFi (IEEE 802.11)

Name	Speed	Frequency	Notes
802.11a	54 Mbps is the maximum, but usually 6 to 24 Mbps	5 GHz	Not compatible with b or g networks. This is one of the oldest standards, but still in use by many devices today.
802.11b	11 Mbps	2.4 GHz	Compatible with g networks. Really, g was made to be backwards compatible with b to support more devices.
802.11d	N/A	N/A	D isn't really a network type of its own. It includes additional information like access point information and other information specified by different country's regulations. Usually, this is combined with other networks like 802.11ad.
802.11g	54 Mbps	2.4 GHz	The most popular network type. Its combination of speed and backwards compatibility makes it a good match for today's networks.
802.11n	100 Mbps	2.4 and 2.5 GHz	The fastest type of network. 100 Mbps is common, though speeds of up to 600 Mbps is possible under perfect conditions. It does this by using multiple frequencies at once and joining that speed together.

# Beberapa standar WiFi (IEEE 802.11)

IEEE 802.11 PHY Standards

Release Date	Standard	Frequency Band (GHz)	Bandwidth (MHz)	Modulation	Advanced Antenna Technologies	Maximum Data Rate
1997	802.11	2.4 GHz	20 MHz	DSSS, FHSS	N/A	2 Mbits/s
1999	802.11b	2.4 GHz	20 MHz	DSSS	N/A	11 Mbits/s
1999	802.11a	5 GHz	20 MHz	OFDM	N/A	54 Mbits/s
2003	802.11g	2.4 GHz	20 MHz	DSSS, OFDM	N/A	54 Mbits/s
2009	802.11n	2.4 GHz, 5 GHz	20 MHz, 40 MHz	OFDM	MIMO, up to 4 spatial streams	600 Mbits/s
2013	802.11ac	5 GHz	40 MHz, 80 MHz, 160 MHz	OFDM	MIMO, MU-MIMO, up to 8 spatial streams	6.93 Gbits/s

<https://forum.huawei.com/enterprise/en/huawei-hg8247h-modem-problem/thread/479113-100181>

# Latest WiFi Standards

Over time, different classifications of WiFi networks were given different naming conventions.

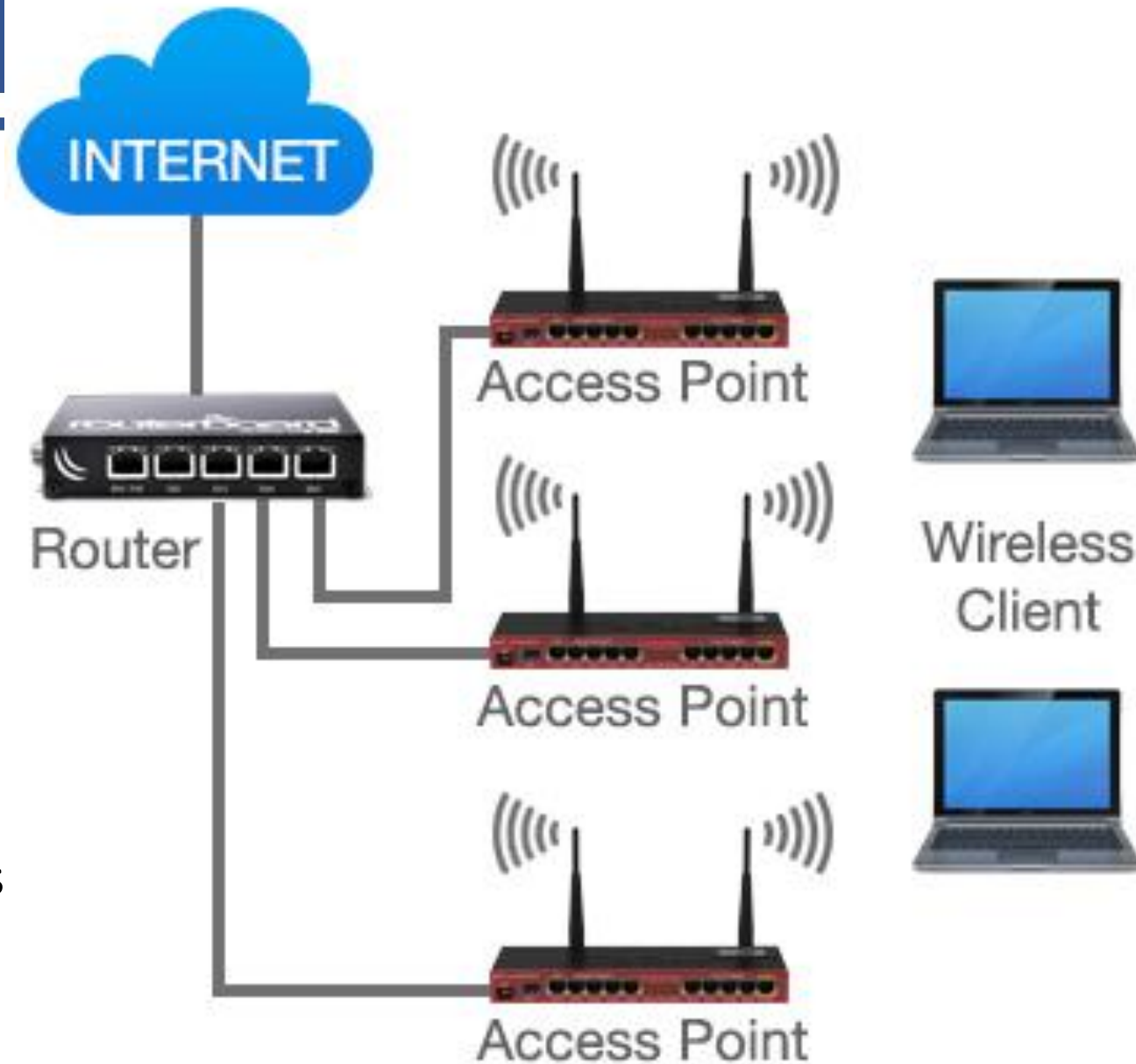
Rather than “802.11b”, it’s just “WiFi 1. ” Much like how mobile phone companies refer to 3G and 5G as different network speeds even though the term is almost always just a marketing tool.

This classification is supposed to help make it easier for consumers to understand — instead of understanding a whole alphabet soup, users can just look for “WiFi 1” or “WiFi 5” as what they need.

WiFi Standard	Networks
WiFi 1	802.11b
WiFi 2	802.11a
WiFi 3	802.11g
WiFi 4	802.11n
WiFi 5	802.11ac

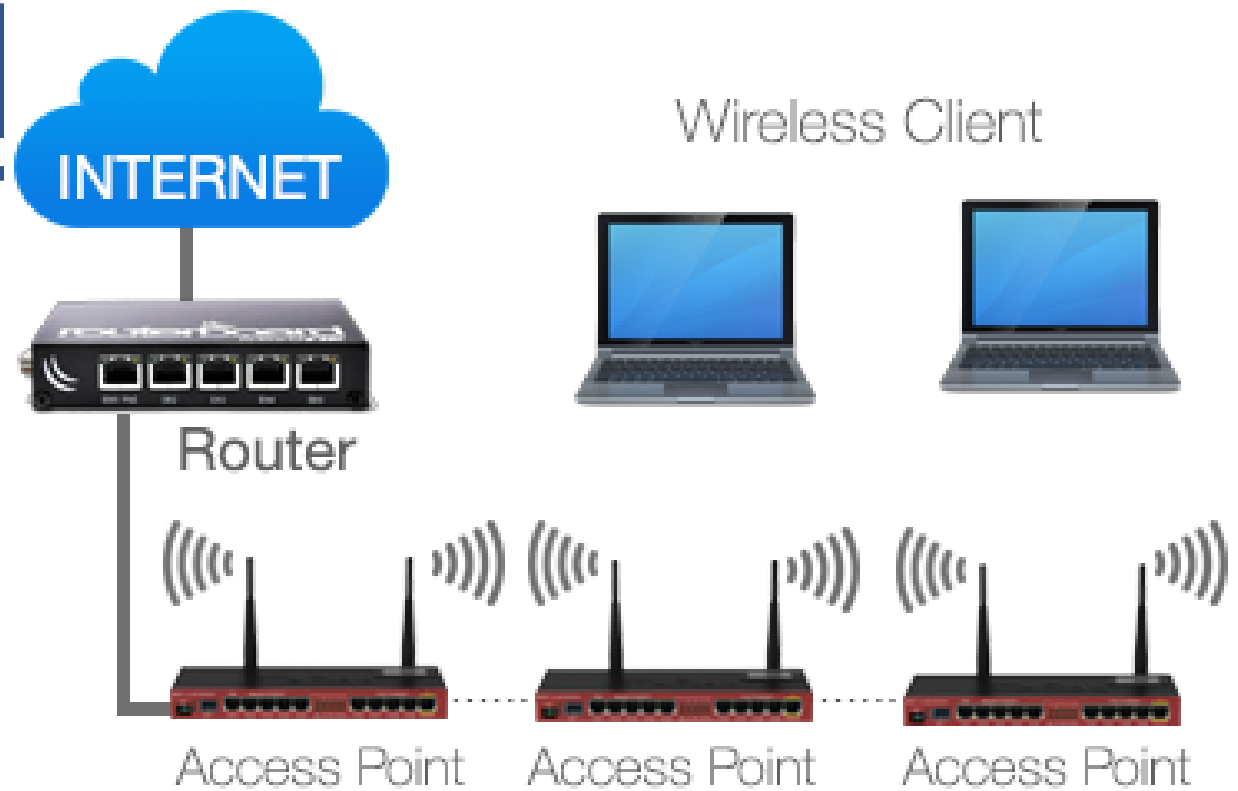
# Contoh Topologi WiFi

- DS (Distribution System)
- Sistem DS dibangun dengan cara mengkoneksikan antara router dengan access point melalui media kabel.
- Metode ini merupakan metode yang cukup rekomended ketika interkoneksi antara router dengan access point memang masih bisa dicover menggunakan kabel.
- Kualitas data dan kecepatan data tidak bergantung pada link wireless antar access point
- [mikrotik.co.id/artikel\\_lihat.php?id=167](http://mikrotik.co.id/artikel_lihat.php?id=167)



# Contoh Topologi WiFi

- WDS (Wireless Distribution System)
- Kebanyakan orang menyebutnya sebagai repeater. Implementasi WDS memang biasanya digunakan untuk ekspansi cover area wireless tanpa membutuhkan kabel seperti pada system DS. Signal dari access point pertama, bisa diteruskan dan dipancarkan ulang oleh access point kedua, dan seterusnya.



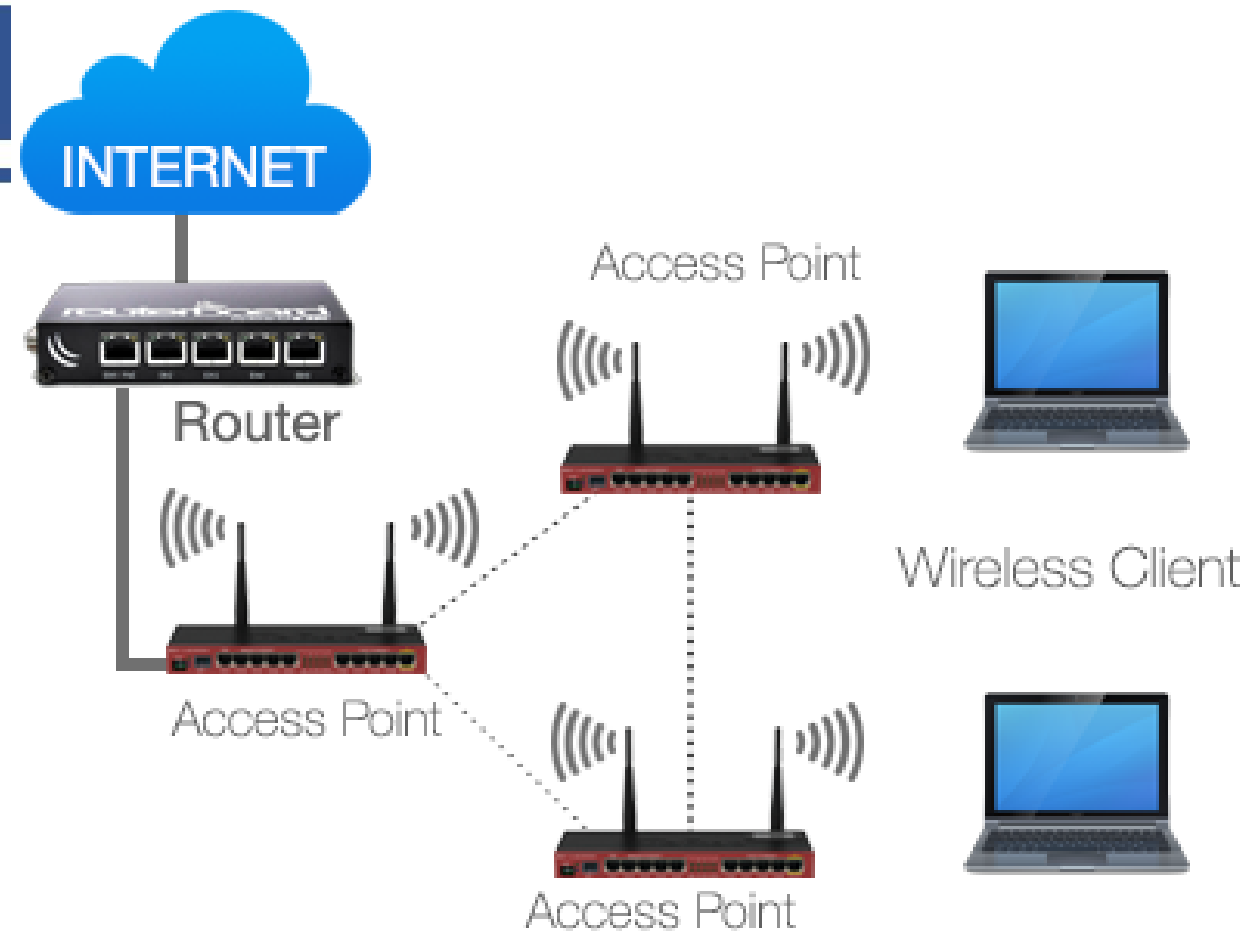
Keterangan :

..... Interkoneksi antar access point via wireless

- [mikrotik.co.id/artikel\\_lihat.php?id=167](http://mikrotik.co.id/artikel_lihat.php?id=167)

# Contoh Topologi WiFi

- **MESH** : Satu interface wireless sebagai backhaul terkoneksi ke access point lain, dan interface wireless yang kedua digunakan sebagai access point untuk client. biasanya untuk interkoneksi backhaul menggunakan frekuensi 5GHz, dan untuk access point bagi user menggunakan frekuensi 2,4 Ghz. Cara ini kurang banyak digunakan karena boros interface wireless.
- Opsi yang ketiga dan cukup populer adalah dengan mengkombinasikan WDS dengan MESH menjadi WDS MESH.
- [mikrotik.co.id/artikel\\_lihat.php?id=167](http://mikrotik.co.id/artikel_lihat.php?id=167)



Keterangan :

..... Interkoneksi antar access point via wireless

# Keamanan WiFi

Wireless Network:

Enabled

Disabled

Network Name (SSID): HOME-D12F

Mode: 802.11 b/g/n ▼

Security Mode: WPA2-PSK (AES) ▼

Channel Selection:

Open (risky)

WEP 64 (risky)

WEP 128 (risky)

WPA-PSK (TKIP)

WPA-PSK (AES)

WPA2-PSK (TKIP)

WPA2-PSK (AES)

WPAWPA2-PSK (TKIP/AES) (recommended)

Channel:

Network Password:

Show Network Password:

<https://www.howtogeek.com/204697/wi-fi-security-should-you-use-wpa2-aes-wpa2-tkip-or-both/>

# Keamanan WiFi

- **Open (risky):** Open Wi-Fi networks have no passphrase. You shouldn't set up an open Wi-Fi network—seriously, [you could have your door busted down by police](#).
- **WEP 64 (risky):** The old WEP protocol standard is vulnerable and you really shouldn't use it.
- **WEP 128 (risky):** This is WEP, but with a larger encryption key size. It isn't really any less vulnerable than WEP 64.
- **WPA-PSK (TKIP):** This uses the original version of the WPA protocol (essentially WPA1). It has been superseded by WPA2 and isn't secure.
- **WPA-PSK (AES):** This uses the original WPA protocol, but replaces TKIP with the more modern AES encryption. It's offered as a stopgap, but devices that support AES will almost always support WPA2, while devices that require WPA will almost never support AES encryption. So, this option makes little sense.

<https://www.howtogeek.com/204697/wi-fi-security-should-you-use-wpa2-aes-wpa2-tkip-or-both/>

# Keamanan WiFi

- **WPA2-PSK (TKIP):** This uses the modern WPA2 standard with older TKIP encryption. This isn't secure, and is only a good idea if you have older devices that can't connect to a WPA2-PSK (AES) network.
- **WPA2-PSK (AES):** This is the most secure option. It uses WPA2, the latest Wi-Fi encryption standard, and the latest AES encryption protocol. **You should be using this option.** On some devices, you'll just see the option "WPA2" or "WPA2-PSK." If you do, it will probably just use AES, as that's a common-sense choice.
- **WPAWPA2-PSK (TKIP/AES):** Some devices offer—and even recommend—this mixed-mode option. This option enables both WPA and WPA2, with both TKIP and AES. This provides maximum compatibility with any ancient devices you might have, but also allows an attacker to breach your network by cracking the more vulnerable WPA and TKIP protocols.

<https://www.howtogeek.com/204697/wi-fi-security-should-you-use-wpa2-aes-wpa2-tkip-or-both/>

# Contoh Antarmuka WiFi (TP Link)



TP-Link Wireless N Router WR840N  
Model No. TL-WR840N

Status

Quick Setup

Operation Mode

Network

Wireless

Guest Network

DHCP

Forwarding

Security

Parental Controls

Access Control

Advanced Routing

Bandwidth Control

IP & MAC Binding

Dynamic DNS

IPv6

System Tools

Logout

## Status

Firmware Version: 0.9.1 4.16 v0001.0 Build 180614 Rel.40494n  
Hardware Version: TL-WR840N v6 00000007

## LAN

MAC Address: 00:0A:EB:10:01:4F  
IP Address: 192.168.0.1  
Subnet Mask: 255.255.255.0

## Wireless 2.4GHz

Operation Mode: **Router**  
Wireless Radio: Enabled  
Name(SSID): TP-Link\_014F  
Mode: 11bgn mixed  
Channel: Auto(Channel 2)  
Channel Width: Auto

## Status Help

The **Status** page displays the Router's current status and configuration. All information is read-only.

**LAN** - The following parameters apply to the LAN port of the Router. You can configure them on the **Network -> LAN** page.

- **MAC Address** - The physical address of the Router, as seen from the LAN.
- **IP Address** - The LAN IP address of the Router.
- **Subnet Mask** - The subnet mask associated with LAN IP address.

**Wireless** - These are the current settings or information for Wireless. You can configure them in the **Wireless -> Basic Settings** page.

- **Operation Mode** - Indicates the mode which the device is working on.
- **Wireless Radio** - Indicates whether the wireless radio feature of the Router is enabled or disabled.
- **Name(SSID)** - The SSID of the Router.
- **Mode** - The current wireless mode which the Router works on.

[https://emulator.tp-link.com/Emulator\\_TL-WR840N\(EU\)\\_6.20/index.htm](https://emulator.tp-link.com/Emulator_TL-WR840N(EU)_6.20/index.htm)

Jarkom - Wifi

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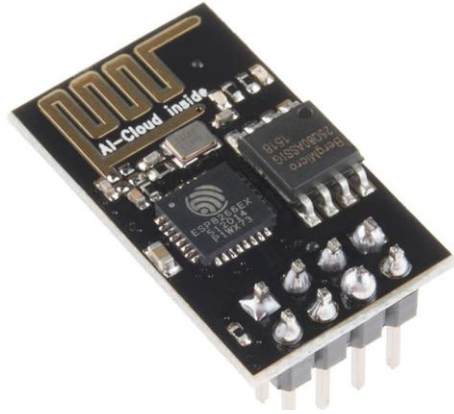
# Contoh Antarmuka WiFi (Mikrotik)

The screenshot displays the Mikrotik WinBox interface. On the left is a vertical menu with various system and network configuration options. The main area shows the configuration for a wlan interface. A dialog box titled 'Interface <wlan>' is open, showing the 'General' tab. The configuration includes:

- Mode: ap bridge
- Band: 2GHz-B/G/N
- Channel Width: 20MHz
- Frequency: 2462 MHz
- SSID: Nunu Andro
- Frequency Mode: manual-txpower
- Country: no\_country\_set
- Installation: any
- Antenna Gain: 0 dBi
- Default AP Tx Limit: [empty] bps
- Default Client Tx Limit: [empty] bps
- Default Authenticate:
- Default Forward:

At the bottom of the dialog, there are status indicators: enabled, running, slave, and running ap. On the right side of the dialog, there are several buttons: OK, Cancel, Apply, Disable, Comment, Advanced Mode, Torch, WPS Accept, WPS Client, Setup Repeater, Scan..., Freq. Usage..., Align..., Sniff..., Snooper..., and Reset Configuration.

# Contoh Bentuk Fisik WiFi



Wifi

# Tugas

- Pilih salah satu model Wifi TP Link disini
- <https://www.tp-link.com/id/support/emulator/>
- Tulis model yang dipilih
- Carilah bentuk fisik WiFi tersebut
- Tunjukkan Konfigurasi yang dilakukan jika akan memberikan
  - Alamat IP = 192.168.100.1 /255.255.255.0
  - SSID = Latihan 1
  - Kanal WiFi = 6
  - Security dengan WPA2 = RAHAsiAKU

# Bahan Bacaan

- [What is Wi-Fi? - A Word Definition From the Webopedia Computer Dictionary](#)
- <https://www.extremenetworks.com/extreme-networks-blog/2-4-ghz-channel-planning/>
- <https://www.netspotapp.com/explaining-wifi-standards.html>
- [mikrotik.co.id/artikel\\_lihat.php?id=167](http://mikrotik.co.id/artikel_lihat.php?id=167)
- <https://www.netspotapp.com/wifi-encryption-and-security.html>