

# MikroTik Hotspot 2.0 / IEEE 802.11u



# ABOUT ROFIQ FAUZI

- MTCNA, MTC(all)E
- More than 10 year in Telco and Internet Industries
- Consultant & MikroTik Certified Trainer at **ID-Networkers**
- Deliver consultant service and training in Asia Pacific (Malaysia, Philippine, India, Thailand, Nepal and Cambodia)
- Co founder [IDNFoundation.org](http://IDNFoundation.org)

CONSULTANT

<http://www.mikrotik.com/consultants/asia/indonesia>

CERTIFIED TRAINER

<http://www.mikrotik.com/training/partners/asia/indonesia>



# ABOUT id-networkers



Rofiq Fauzi, Oky Tria Saputra, Ikhwanul Kurnia Rahman / ID-Networkers

Rating: ★★★★★ 4.8/5 (1075 votes)

Average student result: 70%

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# ABOUT idNfoundation.org

- NGO as Yayasan IDN – Kemenkumham No. AHU – 0025185. AH .01.04 tahun 2016
- Program
  - Sekolah IT gratis SD s/d SMP (Super Human Project) – first time
  - Pesantren Networking (program pelatihan gratis lulusan SMK 1 tahun) angkatan ke-4
  - Pelatihan gratis untuk guru-guru SMK TKJ – since 2014
  - SMK Madinatul Quran – since 2014



# SUPER HUMAN PROJECT



**EAT**  
PRAY  
CODING

# SUPER HUMAN PROJECT



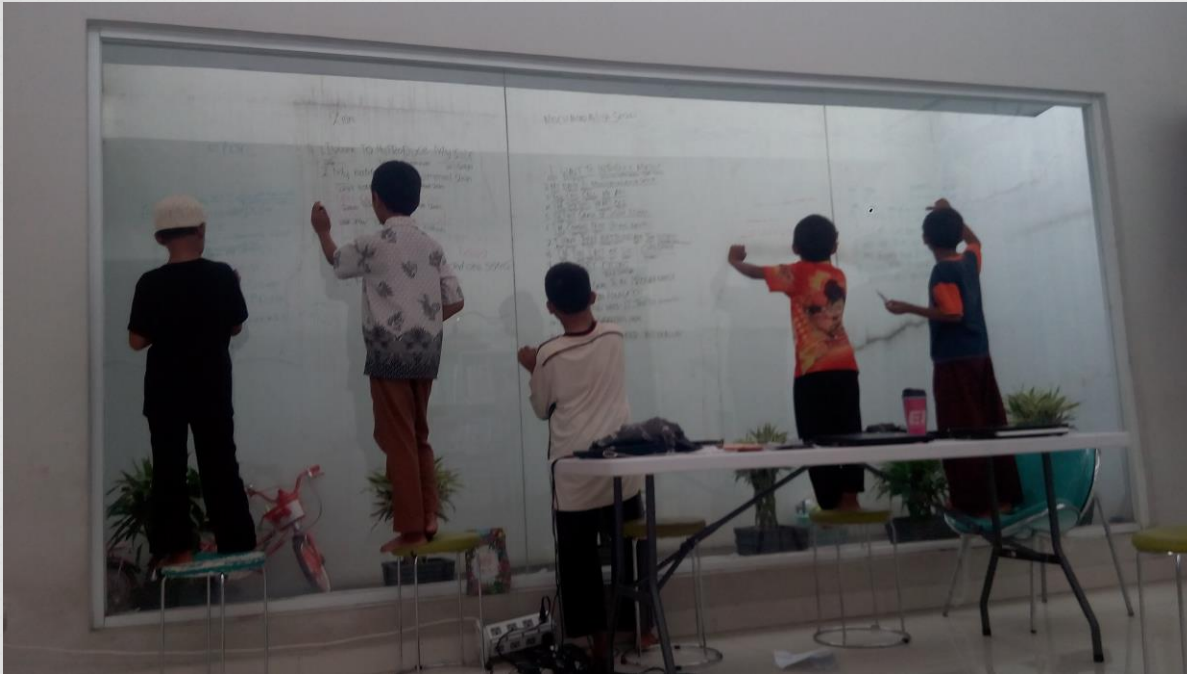
EAT  
**PRAY**  
CODING

# SUPER HUMAN PROJECT



EAT  
PRAY  
**CODING**

# SUPER HUMAN PROJECT



EAT  
PRAY  
CODING

**LEARN  
ENGLISH**



# SUPER HUMAN PROJECT



# PLAYING



# TOPIC BACKGROUND



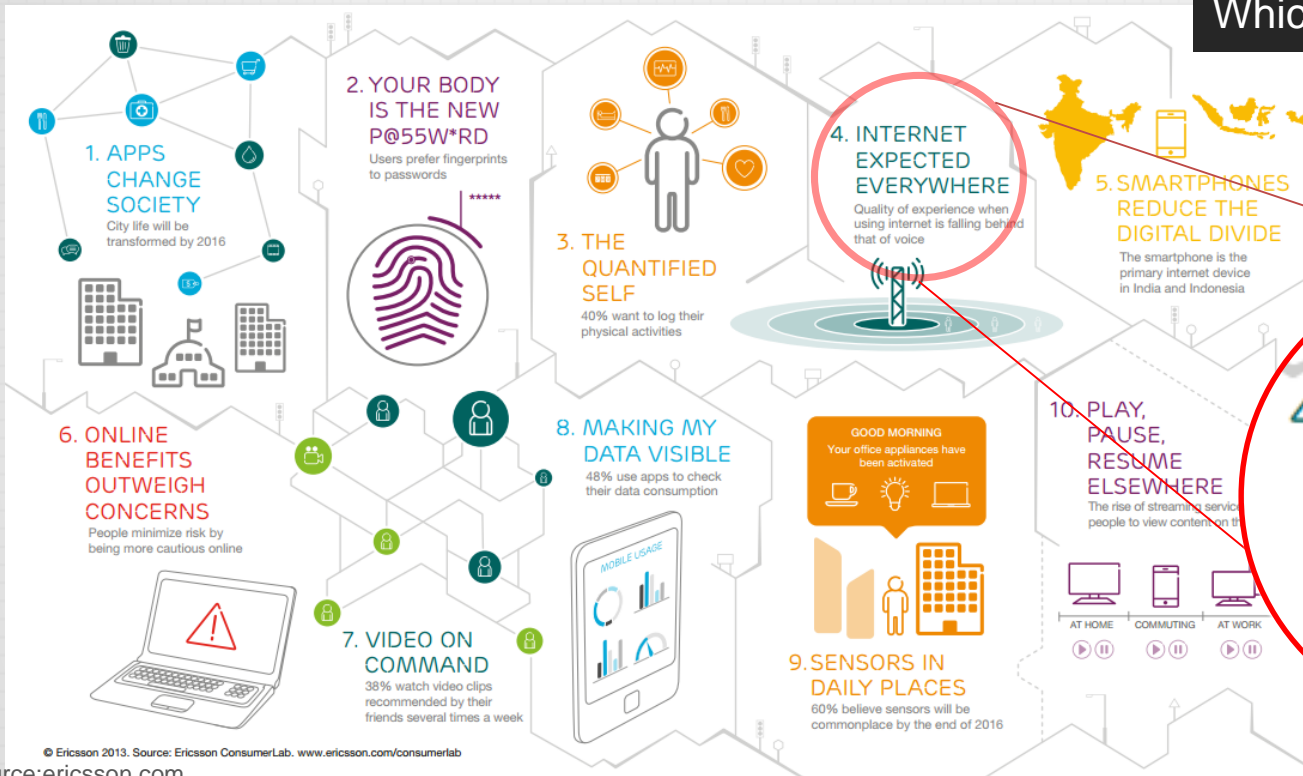
# TECHNOLOGY TREND

Which one you want to be?

JUST WATCHER

or

PLAYER



Source:ericsson.com



# Internet Expected Everywhere

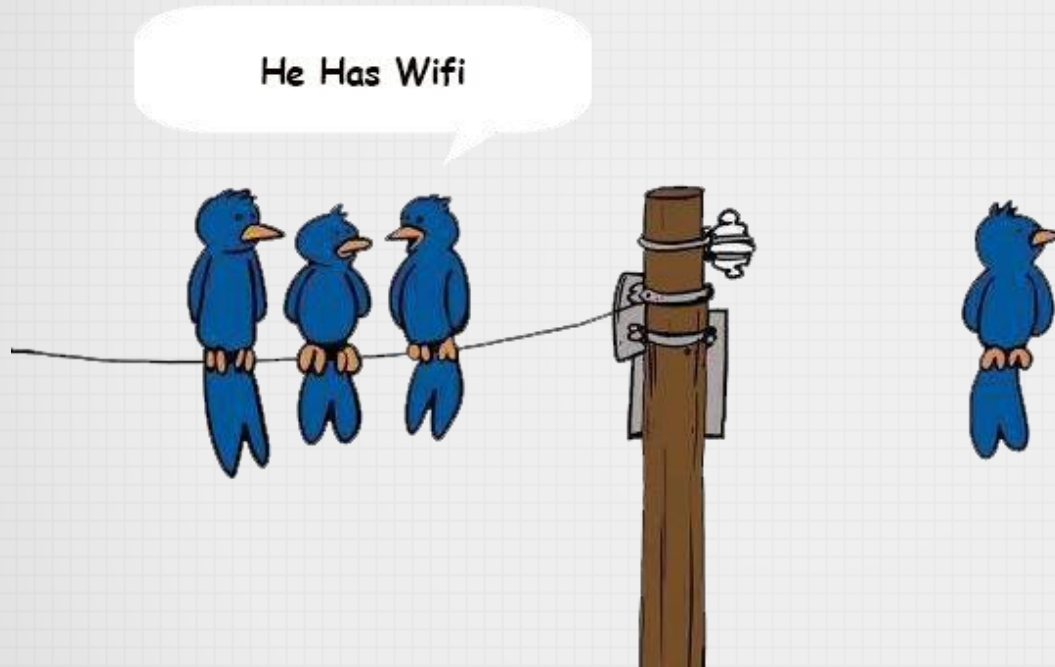
The image shows a composite of two web pages. The background is a Wired.com article from 2016 titled "GOOGLE'S GOT A PLAN TO UNIFY THE WORLD'S WI-FI HOTSPOTS" by Klint Finley. The article is in the Business section and has 476 shares on Facebook, 6 tweets, 6 pins, and 6 comments. A red arc is visible at the bottom of the article's main image.

Overlaid on the bottom right is a snippet of a MashableAsia article from 2016 titled "After Google, Facebook to offer free Wi-Fi at Indian railway stations". The article is in the Tech section and has 3.7M likes. It features a newsletter sign-up banner that says "Want to know what's going viral, before it's viral? SIGN UP for MASHABLE'S NEWSLETTER". Below the title, there are tags for "Ads by Google", "Timetable", "Free WiFi", "Train Schedule", and "Facebook India". At the bottom of the snippet, there are social sharing buttons for Facebook (2.0k shares), Twitter, and a plus sign for more options.

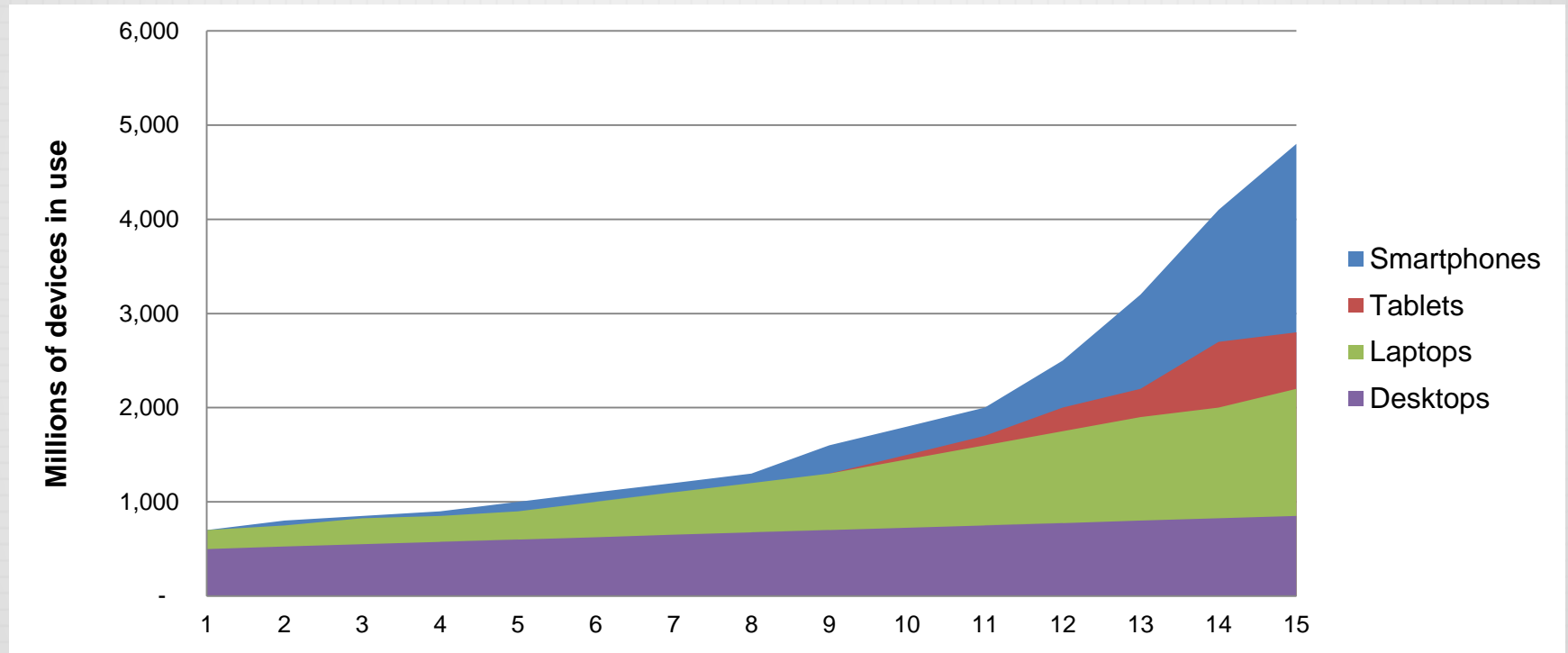




# Internet Expected Everywhere



# MARKET OF WIFI DEVICES



Source : ruckuswireless.com



Why can't connecting to a Wi-Fi network be as **easy as connecting to a cellular network?**



# 802.11u summary

- Also called hotspot 2.0 (HS2.0)
- 802.11u is an amendment to the IEEE 802.11 standard to add features that improve interworking with external networks
- 802.11u enables cellular-like roaming among wireless networks



# NEXT GENERATION of wifi



## TODAY

- Connecting to a Wi-Fi hotspot is completely manual
- Login process tedious, error prone
- No consistent roaming between networks
- Many steps to gain Internet access
- Carriers lose opportunity for their roaming policies to affect network selection

## TOMORROW

- Device and network negotiate capabilities
- Device auto selects Wi-Fi network
- Users do nothing
- Policies pushed to phone
- New revenue source for carriers
- Carriers gain opportunity for their roaming policies to affect network selection

Source: John Lombardi, ruckuswireless.com



# Who doing **what?**

Organization	Initiative	Details
IEEE	802.11u	802.11u amendment to 802.11 standard published in February 2011
Wi-Fi Alliance	Hotspot 2.0	Technical program and specification that defines technical requirements for Passpoint™ interoperability certification
Wireless Broadband Alliance	Next Generation Hotspot	End-to-end roaming trials establish common commercial framework for interoperability across networks and devices

# HOW IT WORK



Can you tell me  
your network info?  
Before I associate?



Yes! Here it is:  
Realm: provider.com  
EAP Method = EAP-SIM

## Legacy Device

### Manual Setup

1. Power-on or unlock the phone
2. Select Wi-Fi network
3. Go to Web-auth
4. Browse webpage and enter right credential, usually ID/PWD
5. Choose roaming plan
6. Start Internet

## 802.11u

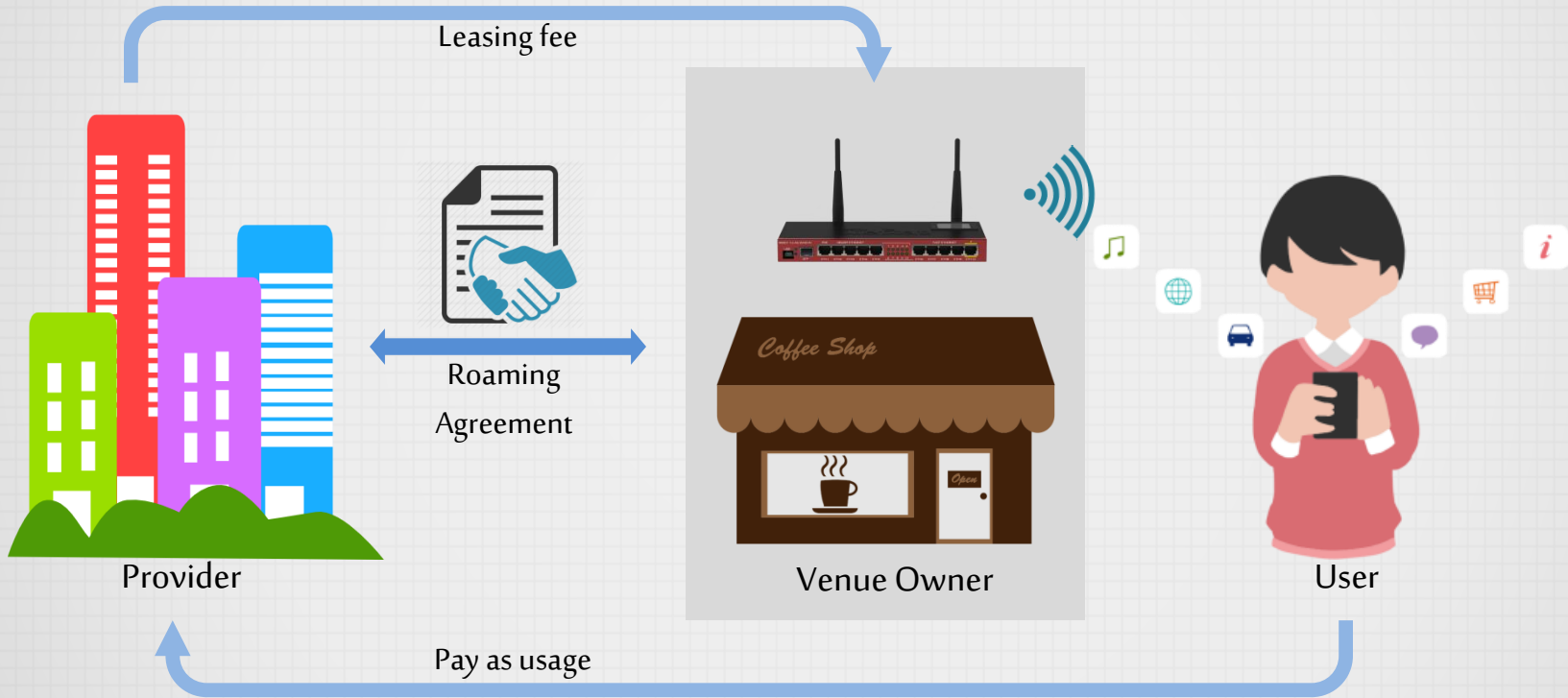
### Automatic Setup

1. Power-on or unlock the phone
2. Handset automatically validates network and initiates connection

Source: John Lombardi, ruckuswireless.com

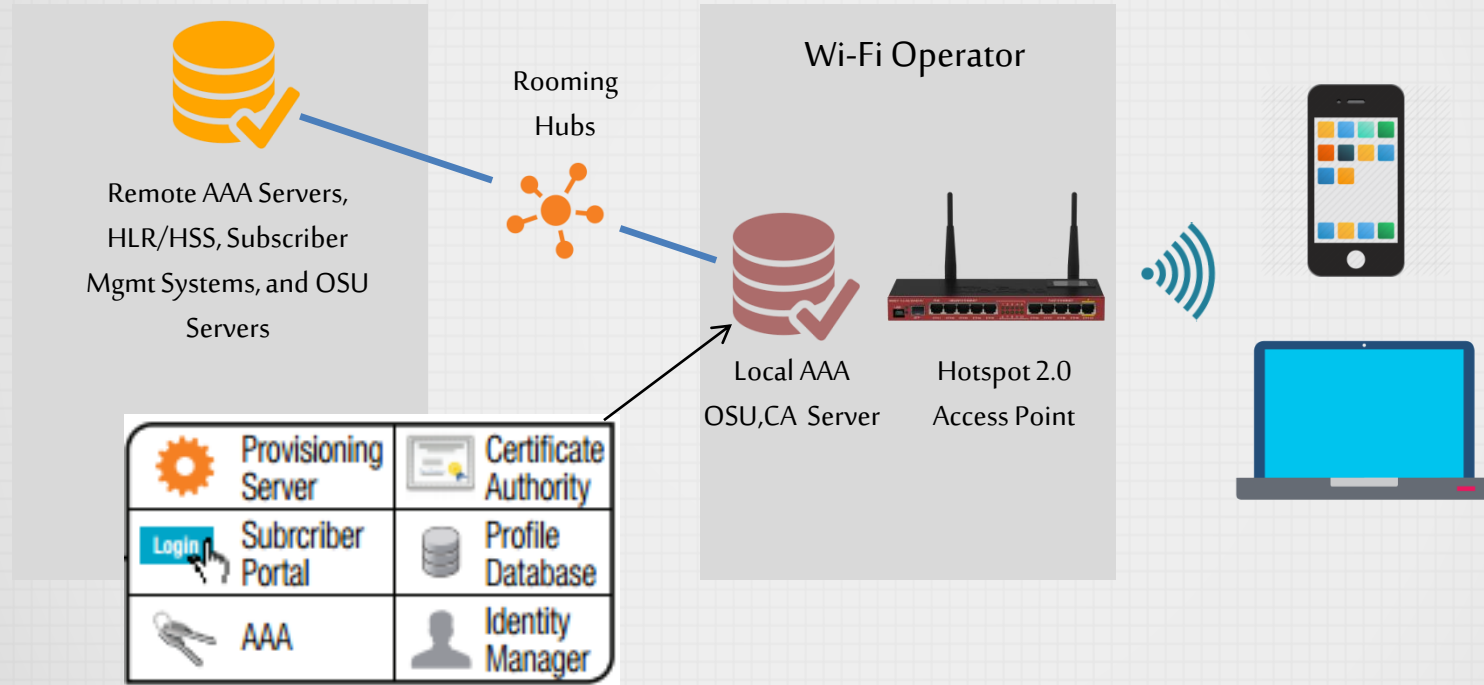


# HOW IT WORK





# Hotspot 2.0 Components



# Credential and eap method in Hotspot 2.0

Credential	EAP Method
Username / Password	EAP-TTLS + MS-CHAPv2
Certificate	EAP-TLS
(u)SIM	EAP-SIM, AKA

\*EAP : Extensible Authentication Protocol

Source: <http://www.hotspot2experience.com/>



# 802.11u Devices

List of all eligible NGH Hotspot 2.0 devices

- ✓ Samsung with Android version 4.2.2, 4.3 or 4.4, 5.0+
  - Galaxy S6 & S7 Edge/Edge+
  - Galaxy S4, S5, S6
  - Galaxy Note 3, 4, 5
  - Galaxy Note 10.1, Pro 12.2
  - Galaxy Tab Pro 8.4, 10.1
  - Galaxy Mega 5.8/6.3
- ✓ Apple iOS devices with version 7, 8 or 9
  - iPhone 6, 6S, 6 Plus, 6S Plus
  - iPhone 5, 5c and 5s
  - iPad 4th generation
  - iPad Mini, all versions
  - iPad Air and Pro, all versions

Source: <http://www.hotspot2experience.com/>

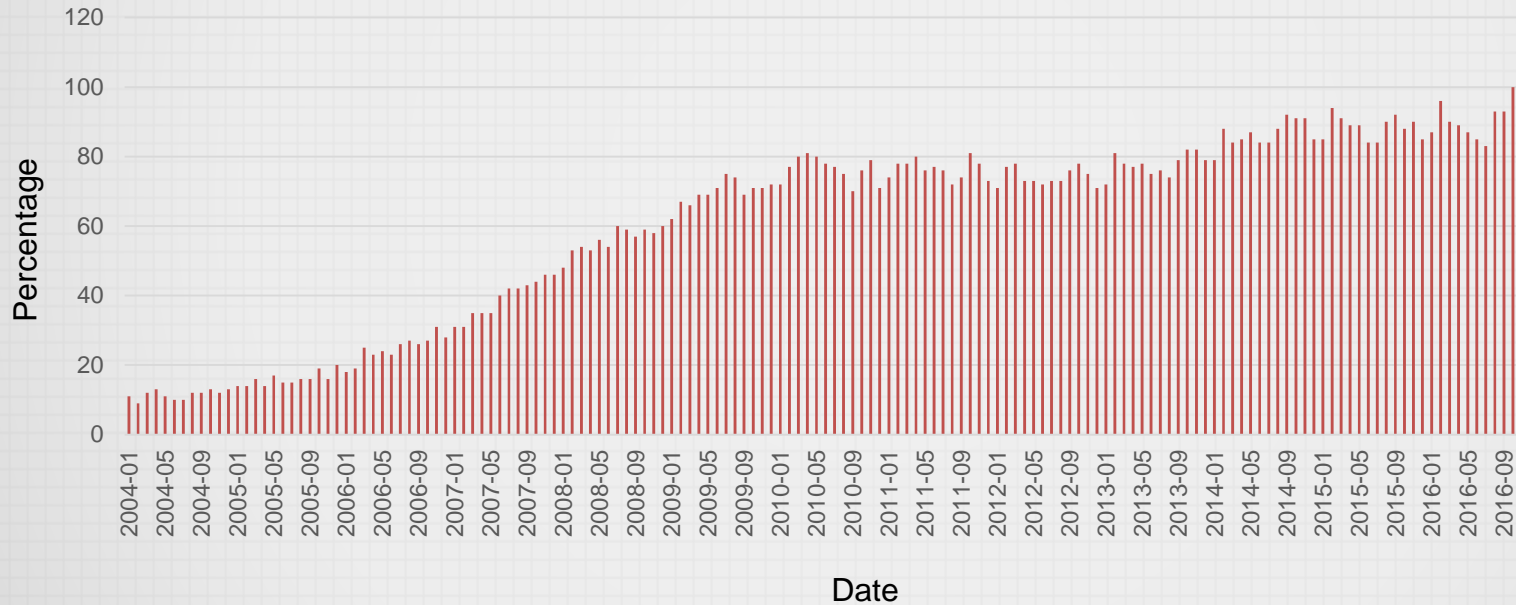


= Does mikrotik support hotspot 2.0 technology?



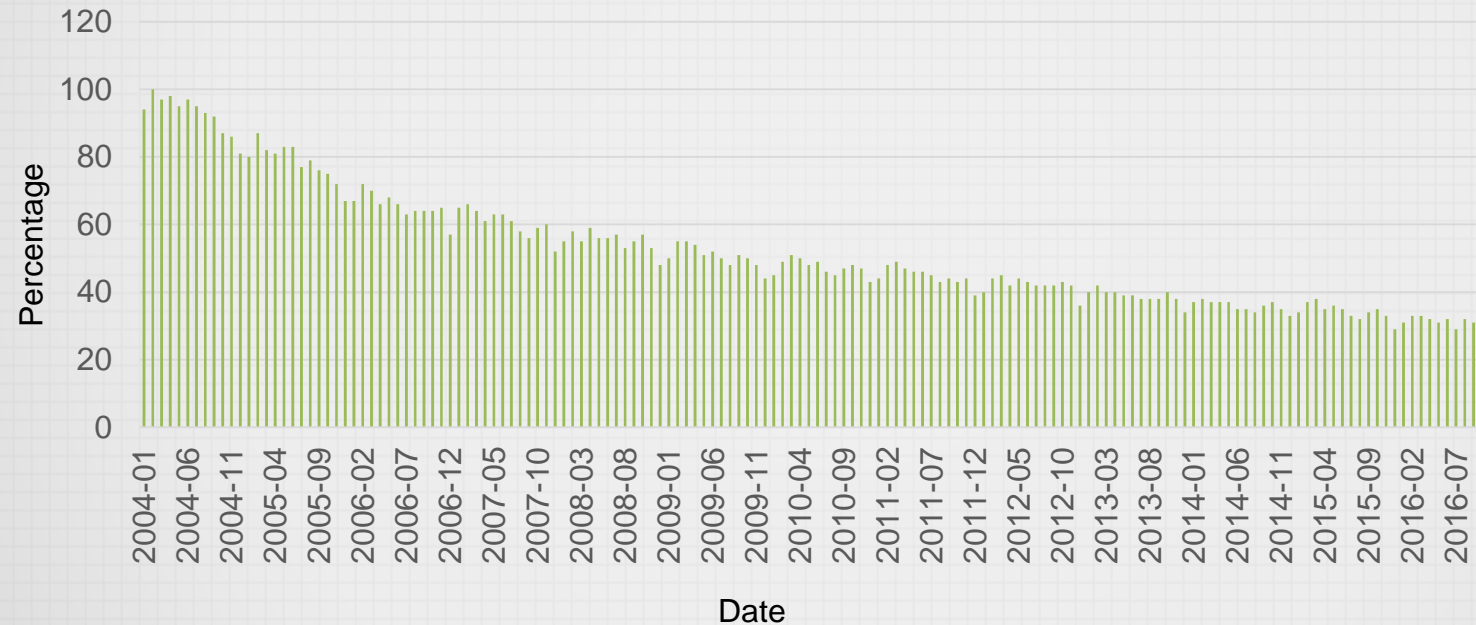
# Technology Trend

<https://www.google.com/trends/explore#q=mikrotik>



# Technology Trend

[https://www.google.com/trends/explore#q=\\*\\*\\*\\*\\*](https://www.google.com/trends/explore#q=*****)







# LAB DEMO



# Lab Topology



802.11  
SSID "hotspot-2.0"



802.11u  
SSID "World WiFi Day Hotspot 2.0 Profile"



Single AP



Internet

# Lab Scenario

- With regard to the limited of time and devices, In this lab we will only test some feature / function of hotspot 2.0 in MikroTik RouterOS
- We will prove that with hotspot 2.0 we can connect with 2 different technology look like 2 different SSID in single wireless interface
- We will only use eap-tls credential type using wireless profile pre-installed in user device.

# MikroTik Configuration

- ✓ The **hidden** menu of wireless **interworking-profile**

```
[admin@IDW] > interface wireless interworking-profiles add
3gpp                copy-from    hotspot20-dgaf    operational-classes  venue                wan-measurement-duration  name
asra                domain-names  internet          operator-names      venue-names          wan-status
authentication-types  esr          ipv4-availability  realms              wan-at-capacity      wan-symmetric
comment            hessid       ipv6-availability  roaming-ois         wan-downlink         wan-uplink
connection-capabilities  hotspot20    network-type      ues                 wan-downlink-load    wan-uplink-load
```

- ✓ Accessible only from **command-line**
- ✓ There is no clue in any mikrotik documentation (wiki, forum, tiktube, mum presentation, etc)
- ✓ Thanks to Uldis for the little bit clue

# MikroTik Configuration

Interface Wireless Internetworking [Compatibility Mode]	
Search in Document	
Home Insert Design Layout References Mailings Review View Table Design Layout	
<b>3gpp</b> ( <i>string</i> ; Default: )	The 3rd Generation Partnership Project (3GPP) is collaboration between groups of telecommunications associations, known as the Organizational Partners
<b>asra</b> ( <i>yes   no</i> ; Default: <b>no</b> )	Additional Steps required for Access (ASRA), field tells the higher layer protocols on the client device what steps to take (e.g. URL redirection, terms and conditions, etc.) after the connection is made
<b>authentication-types</b> ( <i>dns-redirection   https-redirection   online-enrollment   terms-and-conditions</i> ; Default: )	<p>Network Authentication Type Information, what kind of ASRA?</p> <ul style="list-style-type: none"> <li>• <i>Dns-redirection</i> – Note that the Hotspot 2.0 specification forbids network operators from supporting protocols that are not interoperable with DNSSEC. DNS redirection for captive portals violates this requirement.</li> <li>• <i>https-redirections</i> – the URL to which the browser is redirected is indicated.</li> <li>• <i>Online-enrollment</i> – May require the user to create an account of some type</li> <li>• <i>Terms-and-conditions</i> – Acceptance of terms and conditions</li> </ul>
<b>comment</b> ( <i>string</i> ; Default: )	
<b>connection-capabilities</b>	Connection status for commonly used communication ports and protocols. It identifies the availability of common IP protocols (TCP, UDP, IPsec) and ports (21, 80, 443, 5060).

Page 1 of 2 476 Words English (US) Focus 204%

Try  
to  
solve  
the  
puzzle



# MikroTik Configuration

- ✓ Set interface wlan as AP with no security profile.

```
/interface wireless  
set 0 mode=ap-bridge ssid=hotspot-2.0
```

- ✓ Create wlan interworking profile (**the hidden menu**)

```
/interface wireless interworking-profiles  
add name=prof1 domain-names=odyssys.net operator-  
names="World WiFi Day Hotspot 2.0 Profile"
```

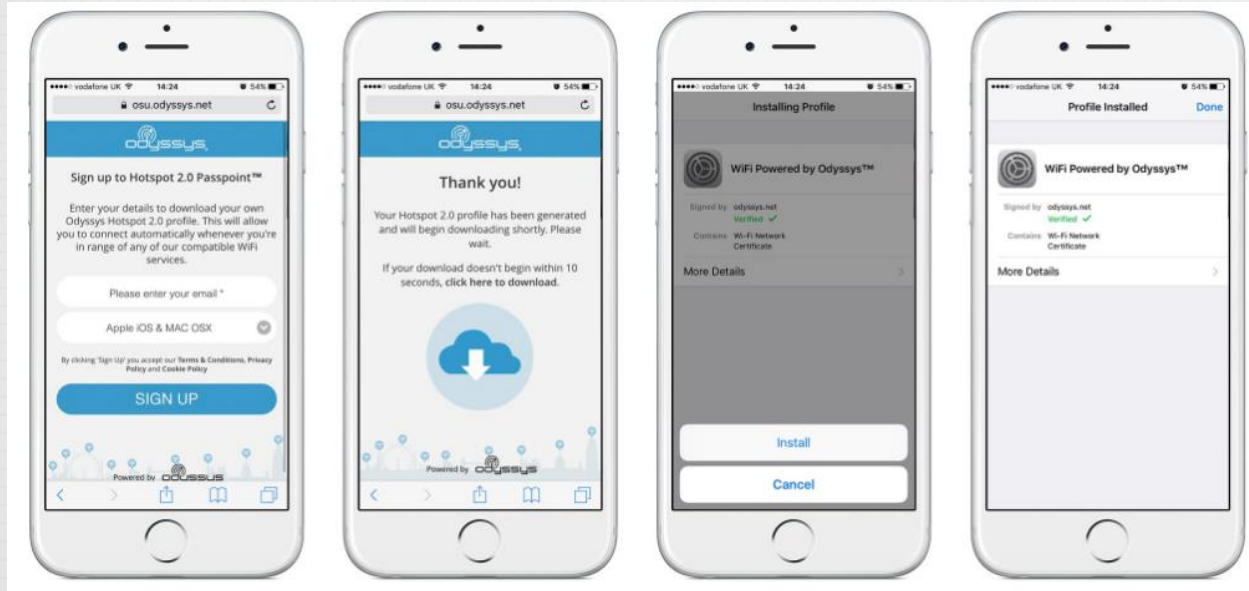
- ✓ Assign interworking profile to wlan

```
/interface wireless  
set 0 interworking-profile=prof1
```



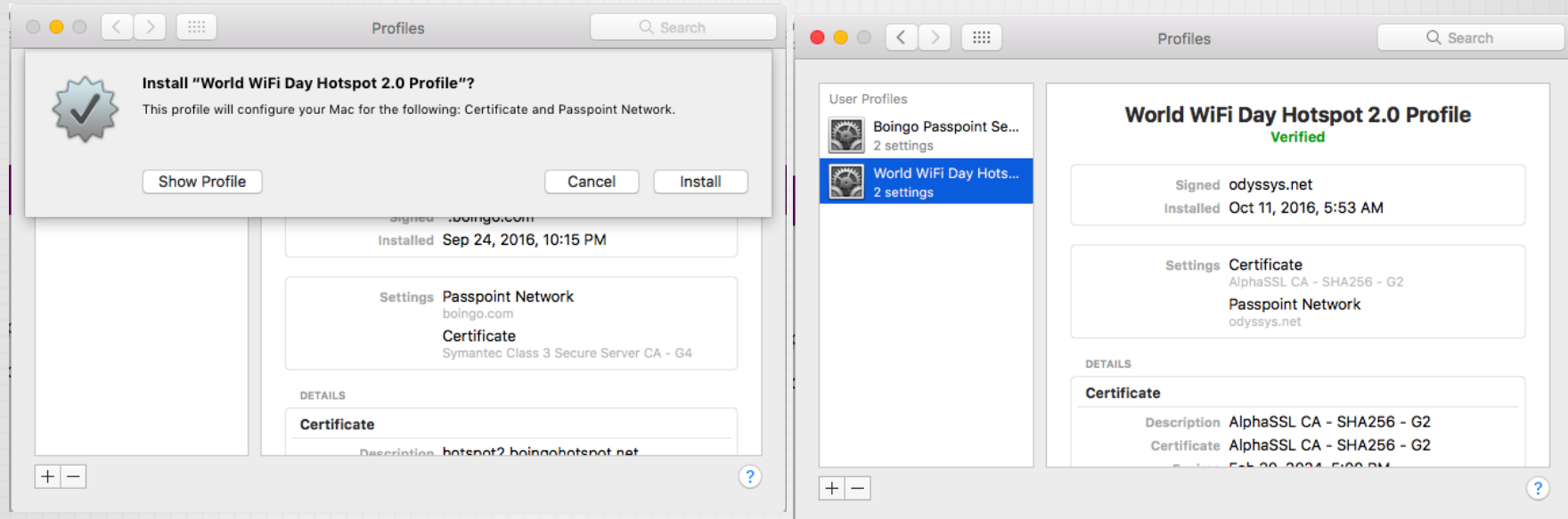
# Gadget (iPHONE) Configuration

- ✓ Go to <https://osu.odysseys.net> and download and install Passpoint Hotspot 2.0 profile



# MAC OSX Configuration

- ✓ Go to <https://osu.odyssey.net> and download and install Passpoint Hotspot 2.0 profile



# IPHONE SELECT SSID

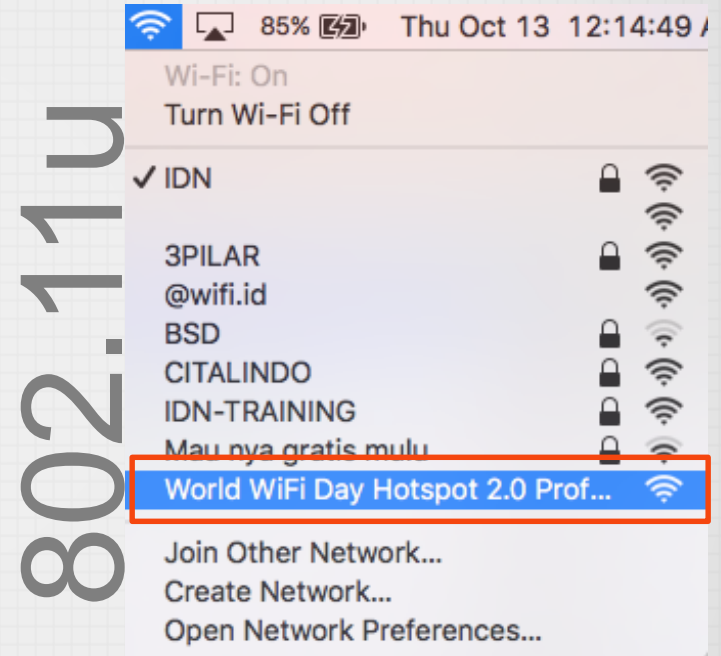
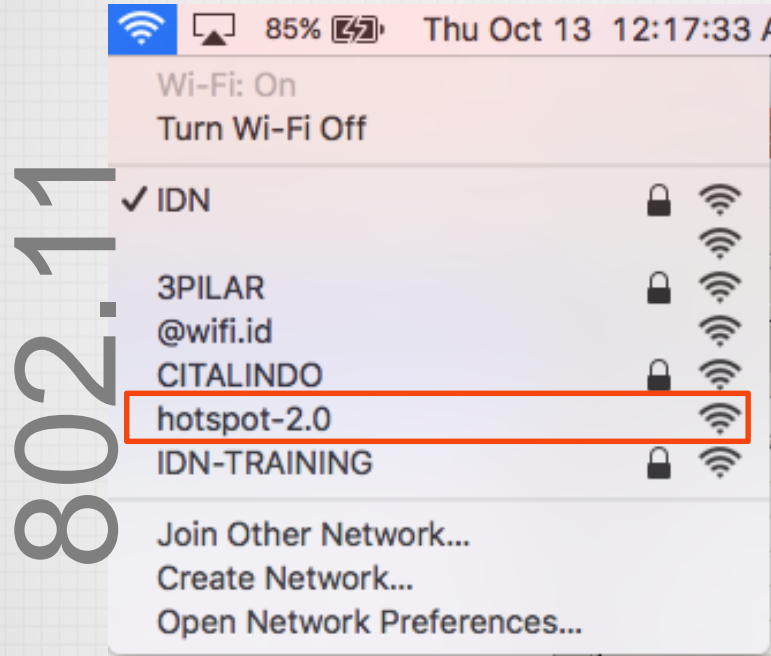
802.11



802.11u

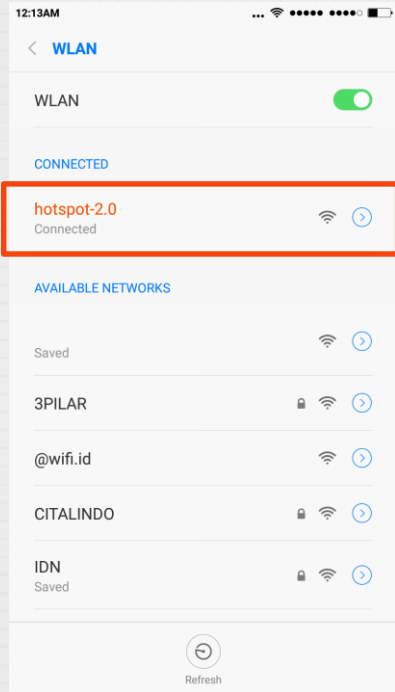


# MAC OSX SELECT SSID

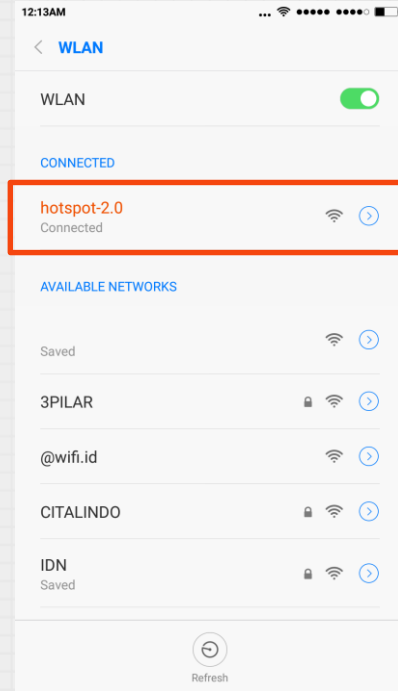


# Unsupported device **SELECT SSID**

802.11



802.11u



# CONCLUSION





# CONCLUSIONS

- ✓ Hotspot 2.0 improve user experience when connecting to Wi-Fi networks.
- ✓ Hotspot 2.0 promise to make connecting to Wi-Fi services as easy, seamless and secure as today's 3G cellular experience
- ✓ We hope that MikroTik will develop and support hotspot 2.0 technology.



If you have any other questions or would like me to clarify anything else, please, let me know. I am always glad to help in any way I can

## CONTACT

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[rofiq.fauzi](https://www.snapchat.com/add/rofiq.fauzi)

“If you cannot survive in the tired of learning, then you will be suffering by the pain of stupidity”  
(Imam Syafi'i)

