

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

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



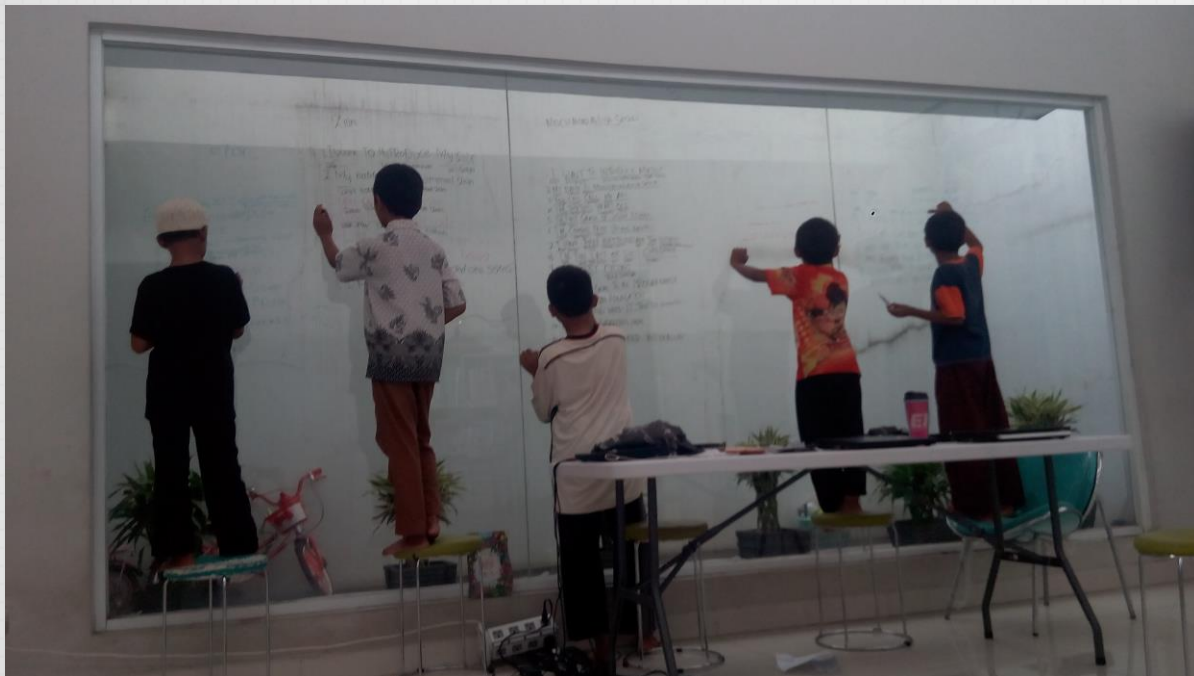
EAT
PRAY
CODING

SUPER HUMAN PROJECT



EAT
PRAY
CODING

SUPER HUMAN PROJECT



EAT
PRAY
CODING

LEARN
ENGLISH

SUPER HUMAN PROJECT



PLAYING



=

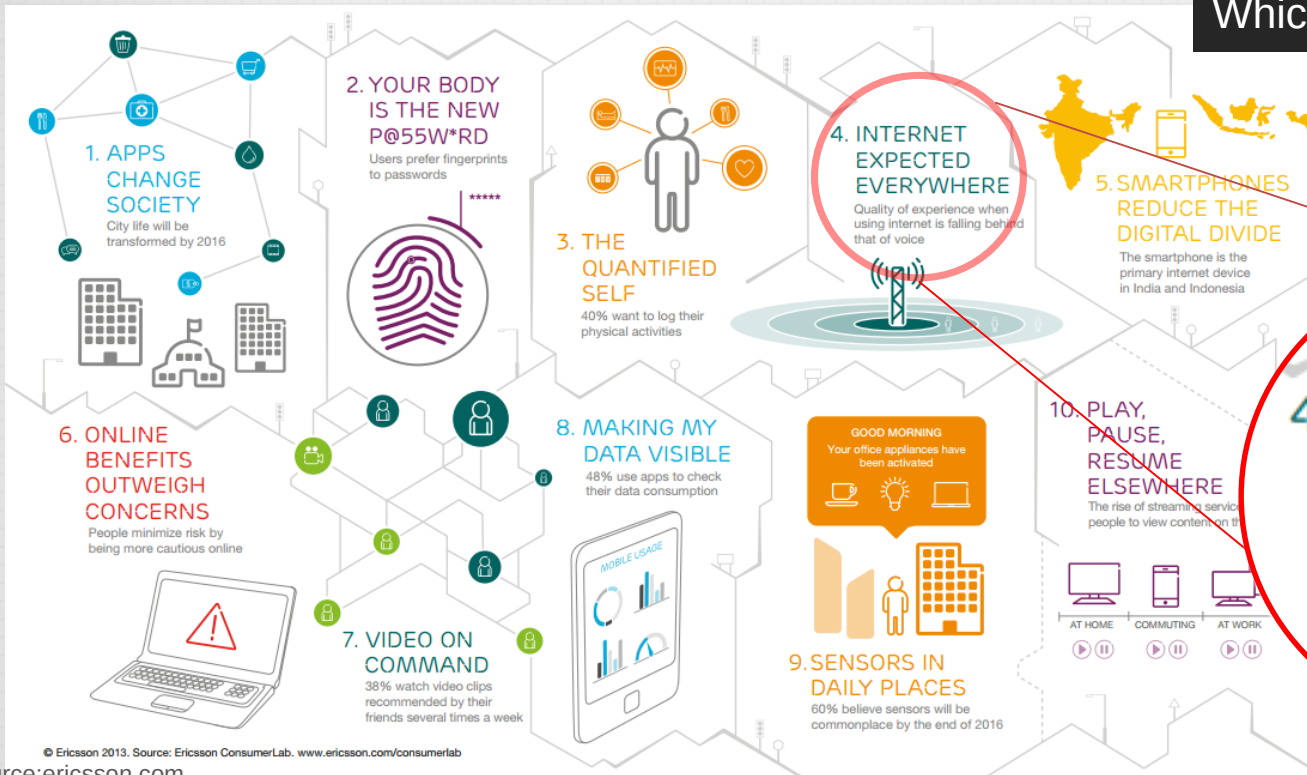
TOPIC BACKGROUND

TECHNOLOGY TREND

Which one you want to be?

JUST WATCHER

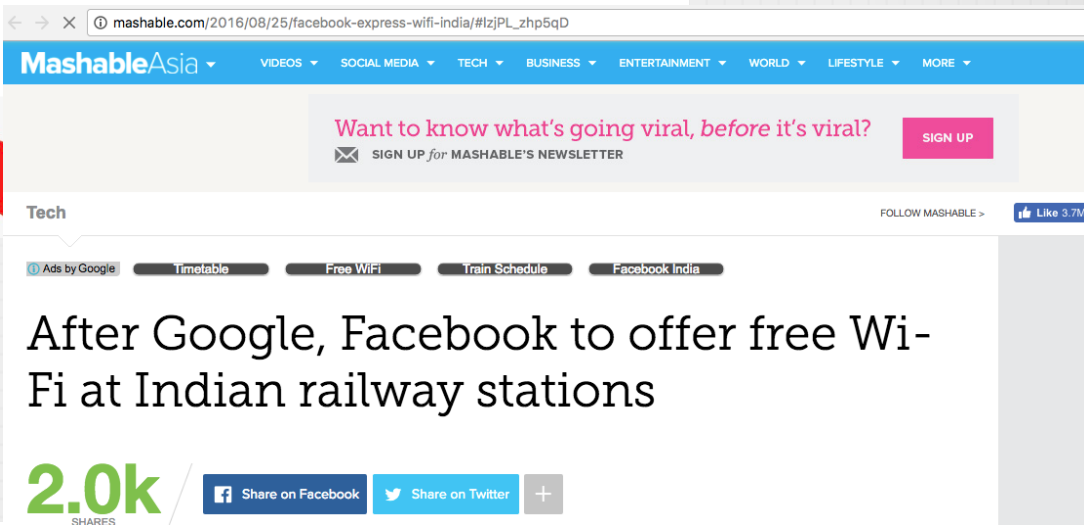
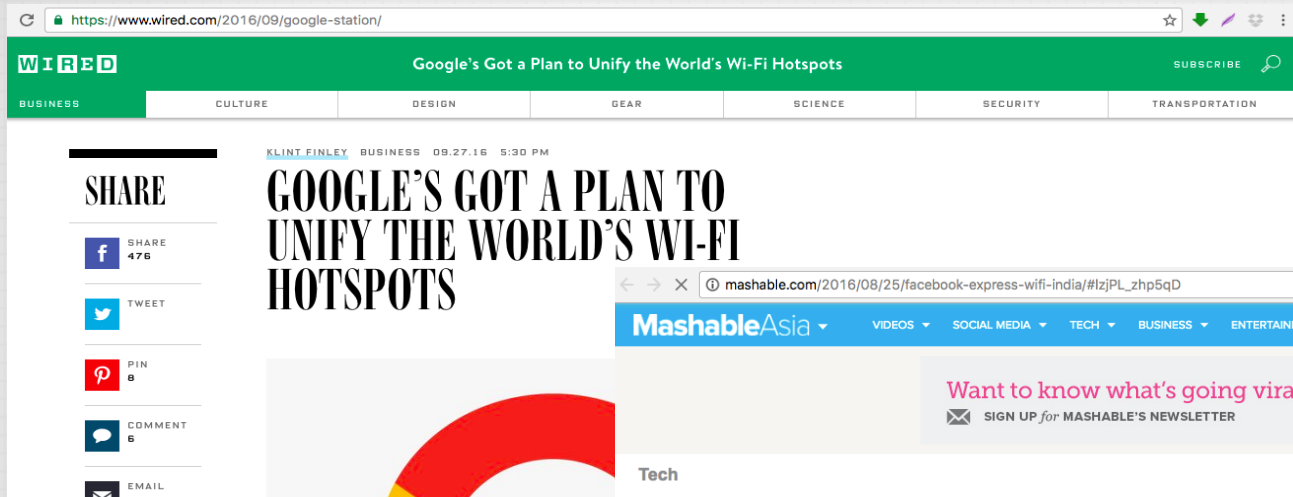
or PLAYER



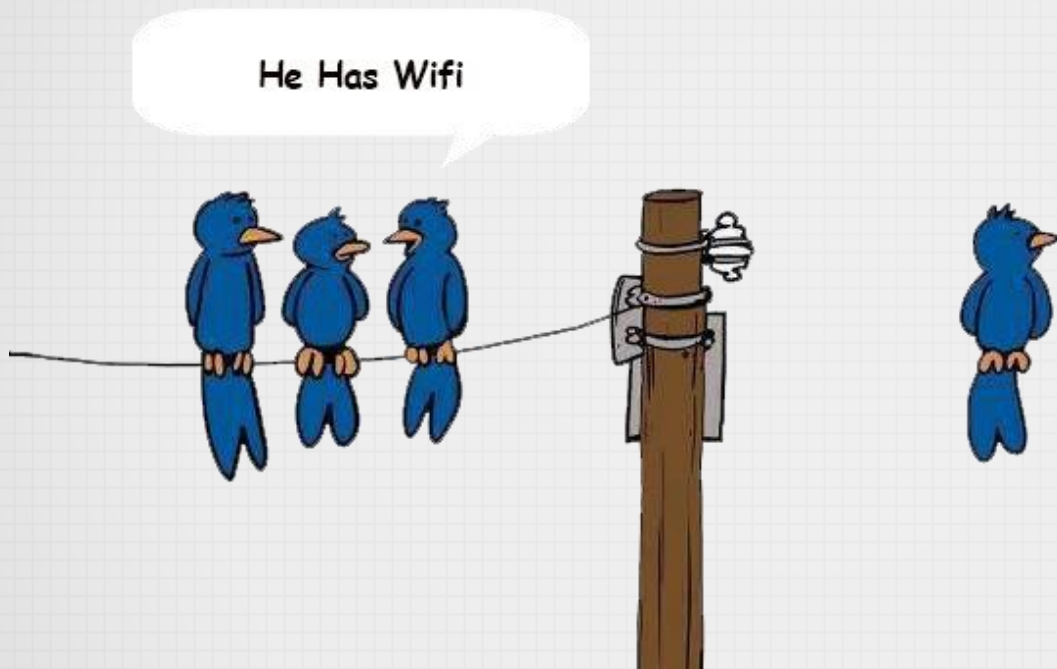
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Source:ericsson.com

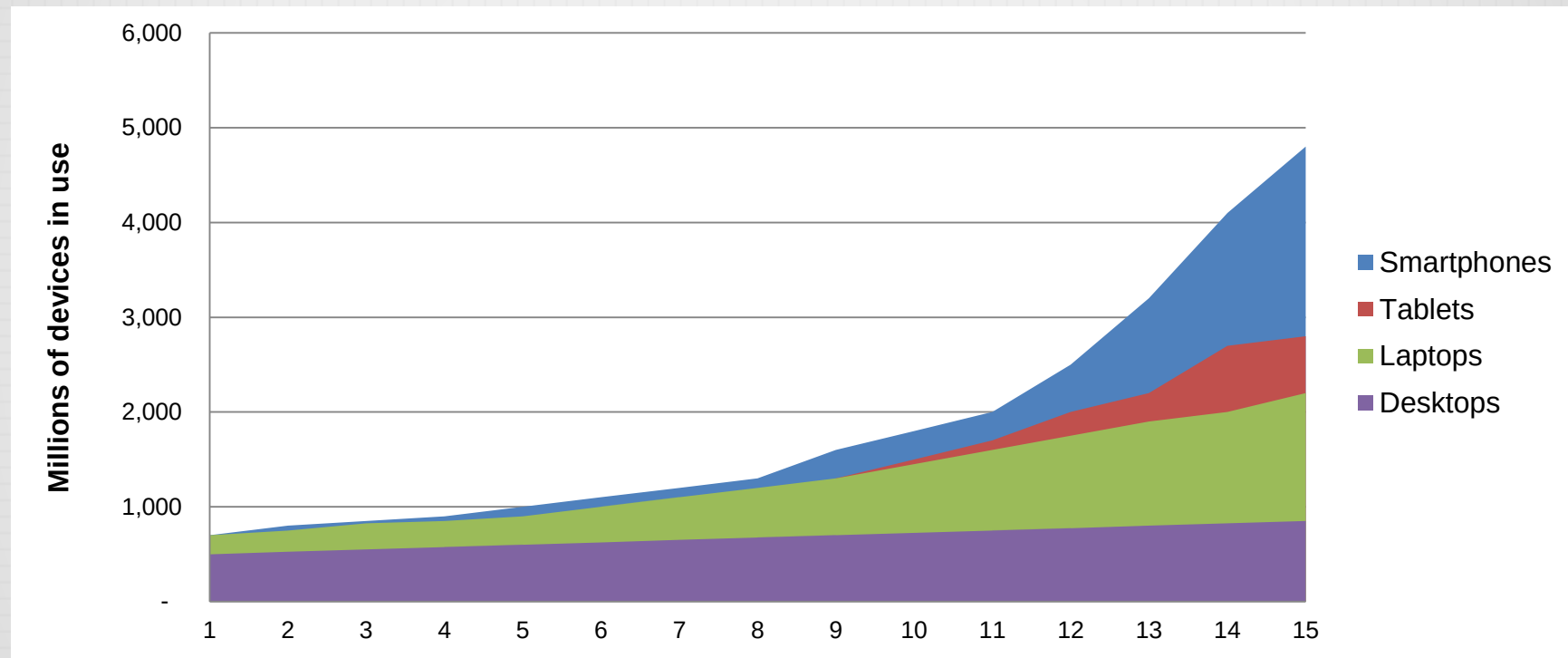
Internet Expected Everywhere



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?

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

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



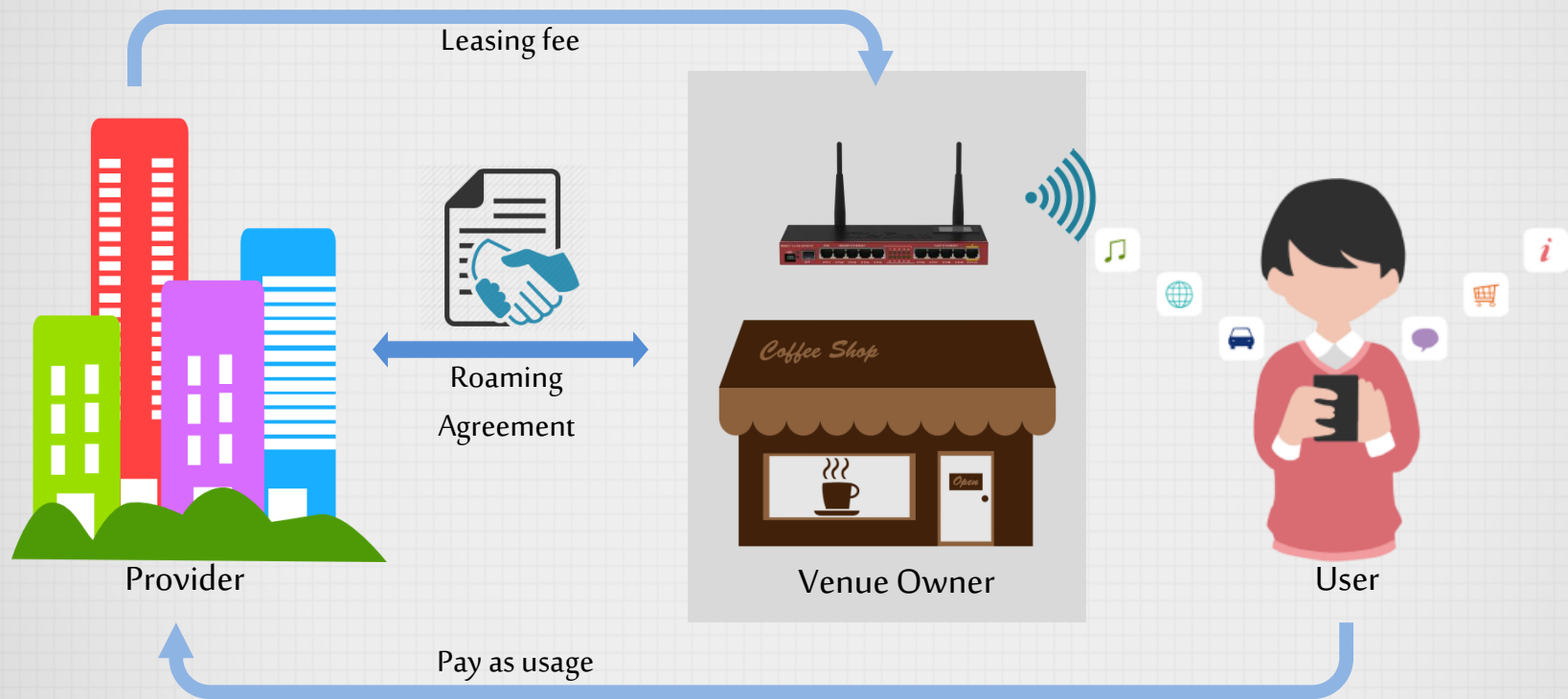
802.11u

Automatic Setup

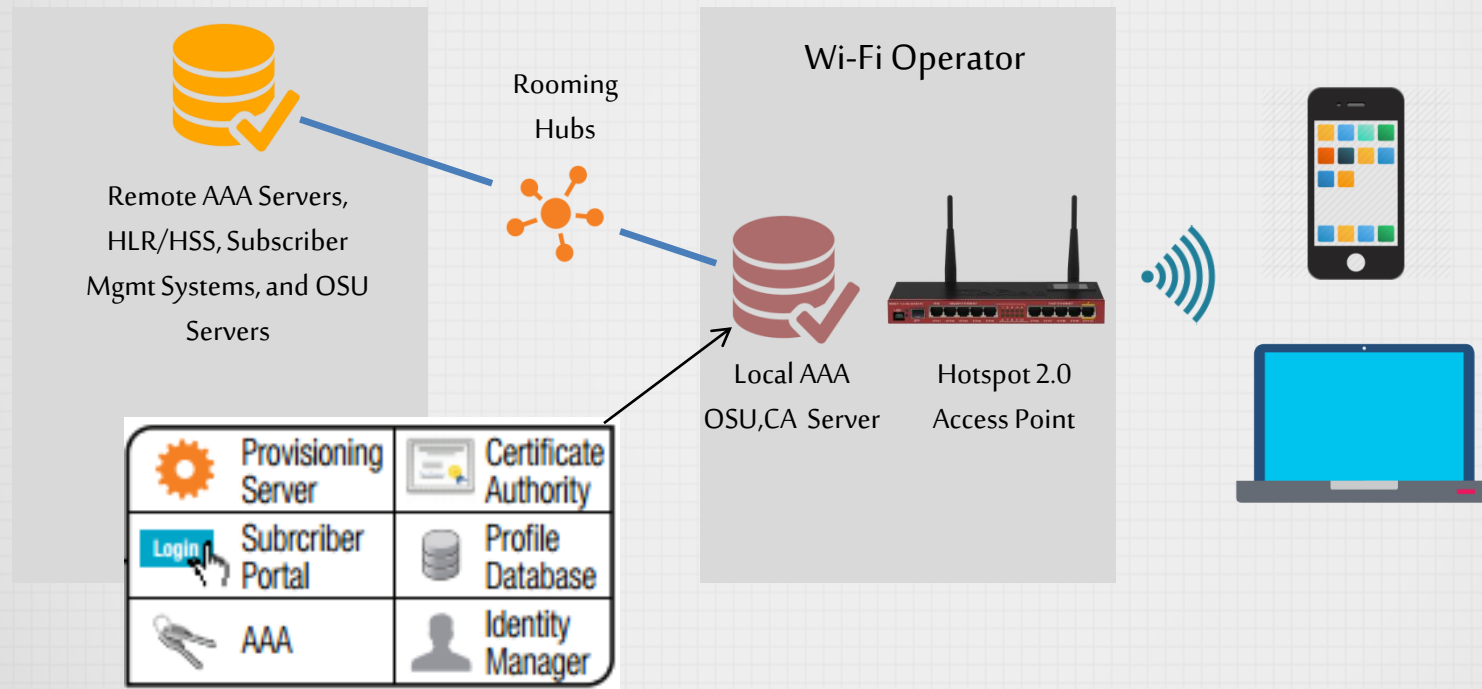
1. Power-on or unlock the phone
2. Handset automatically validates network and initiates connection

Source: John Lombardi, ruckuswireless.com

HOW IT WORK



Hotspot 2.0 Components



Credential and eap method in Hotspot 2.0

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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

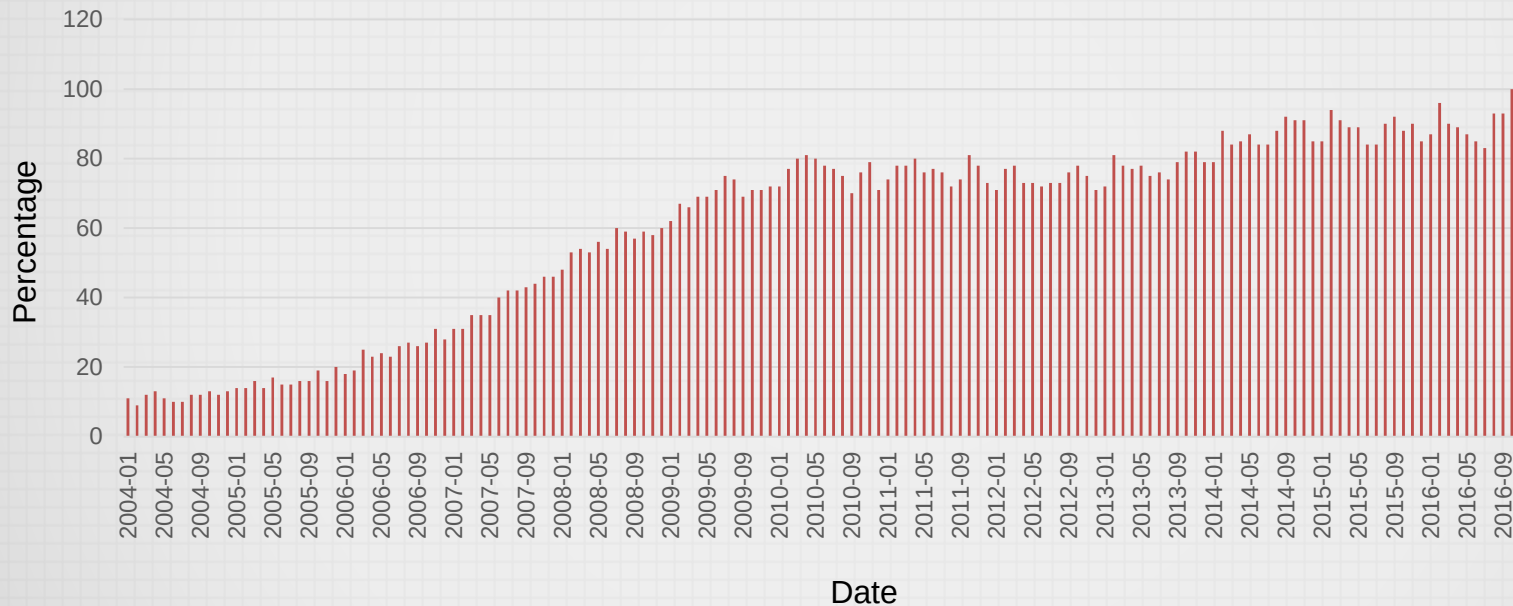
- ✓ Samsung with Android version 4.2.2, 4.3 or 4.4, 5.0+
 - Galaxy S6 & S7 Edge/Edge+
 - Galaxy S4, S5, S6
 - Galaxy Note 3, 4, 5
 - Galaxy Note 10.1, Pro 12.2
 - Galaxy Tab Pro 8.4, 10.1
 - Galaxy Mega 5.8/6.3
- ✓ Apple iOS devices with version 7, 8 or 9
 - iPhone 6, 6S, 6 Plus, 6S Plus
 - iPhone 5, 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?

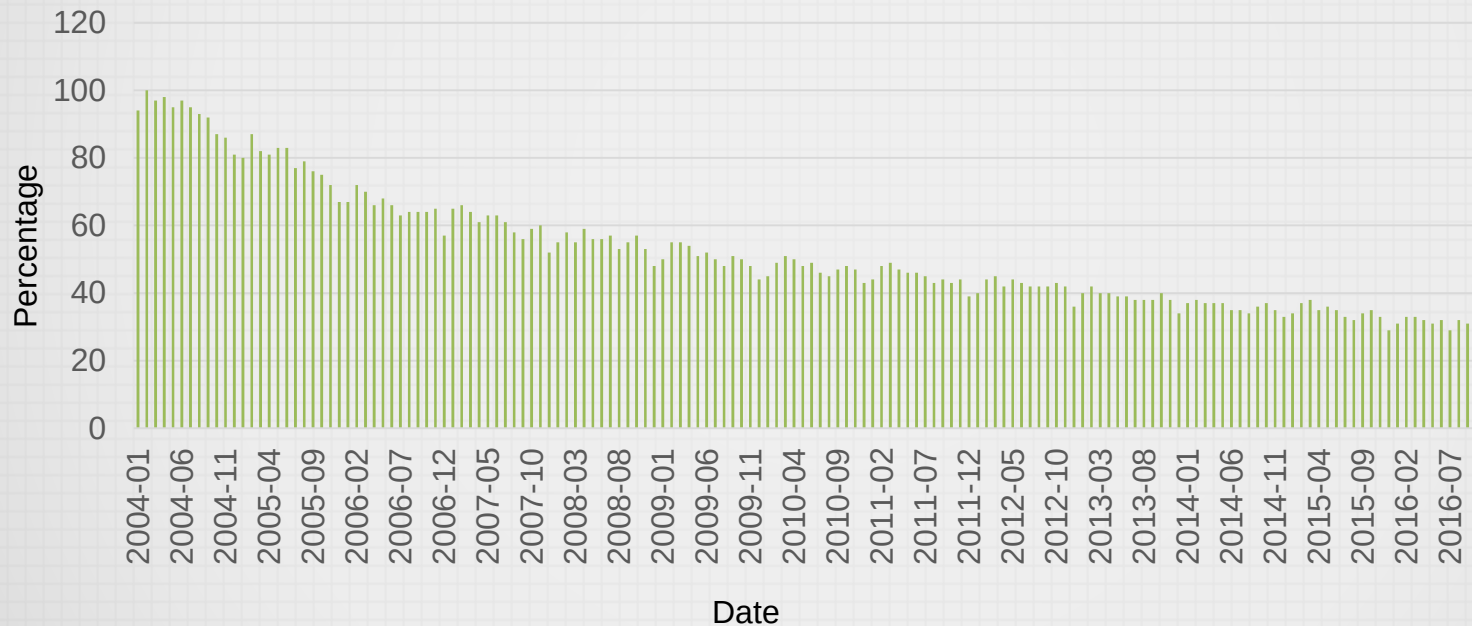
Technology Trend

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



Technology Trend

https://www.google.com/trends/explore#q=*****



LAB DEMO

Lab Topology



802.11
SSID "hotspot-2.0"



802.11u
SSID "World WiFi Day Hotspot 2.0 Profile"



Single AP



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@IDN] > 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      uesa              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

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Paste

Calibri (Body) 10

B I U abc X₂ X²

AaBbCcDdEe Normal AaBbCcDdEe No Spacing AaBbCcDdEe Heading 1 AaBbCcDdEe Heading 2 AaBbCcDdEe Title AaBbCcDdEe Subtitle

Styles Pane

3gpp (<i>string</i> ; Default:)	The 3rd Generation Partnership Project (3GPP) is collaboration between groups of telecommunications associations, known as the Organizational Partners
asra (<i>yes no</i> ; Default: no)	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
authentication-types (<i>dns-redirection https-redirection online-enrollment terms-and-conditions</i> ; Default:)	Network Authentication Type Information, what kind of ASRA? <u>Dns-redirection</u> – 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. <u>https-redirections</u> – the URL to which the browser is redirected is indicated. <u>Online-enrollment</u> – May require the user to create an account of some type <u>Terms-and-conditions</u> – Acceptance of terms and conditions
comment (<i>string</i> ; Default:)	
connection-capabilities	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**)

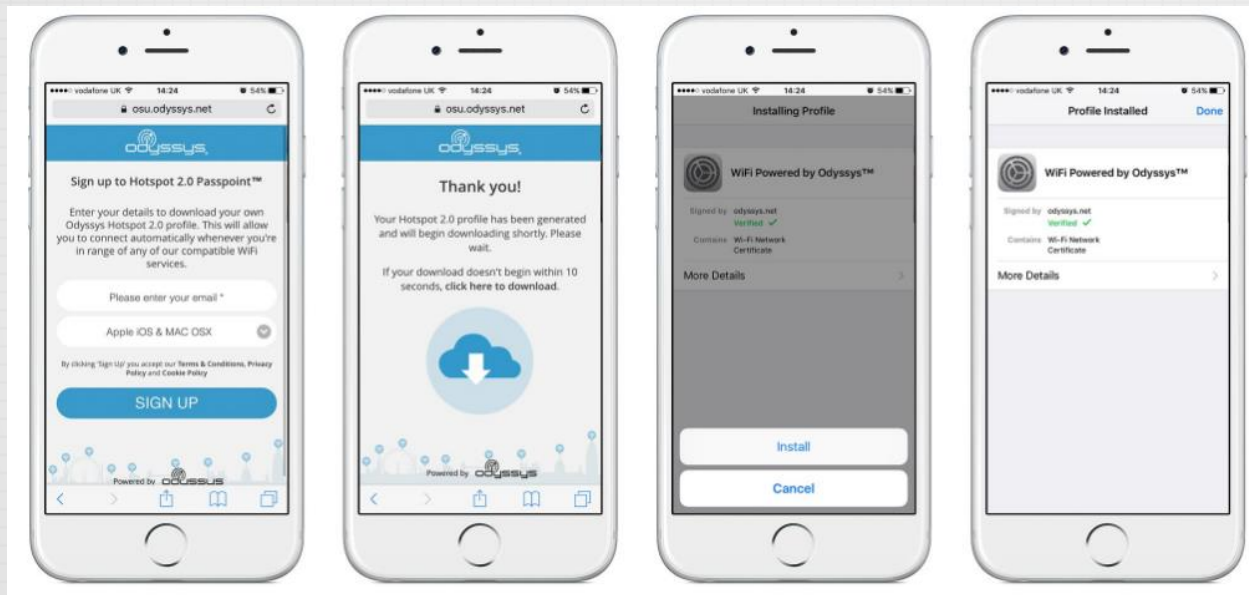
```
/interface wireless interworking-profiles  
add name=prof1 domain-names=odyssys.net operator-  
names="World WiFi Day Hotspot 2.0 Profile"
```

- ✓ Assign interworking profile to wlan

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

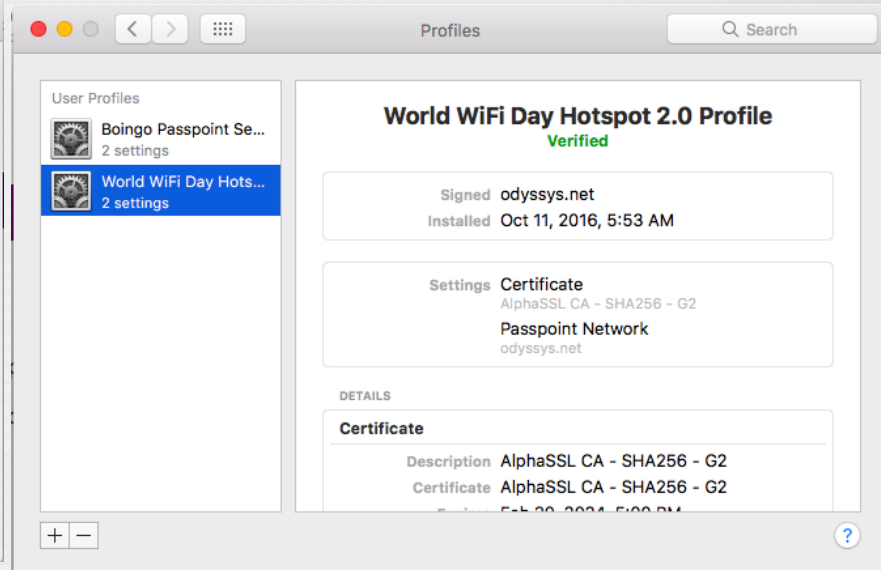
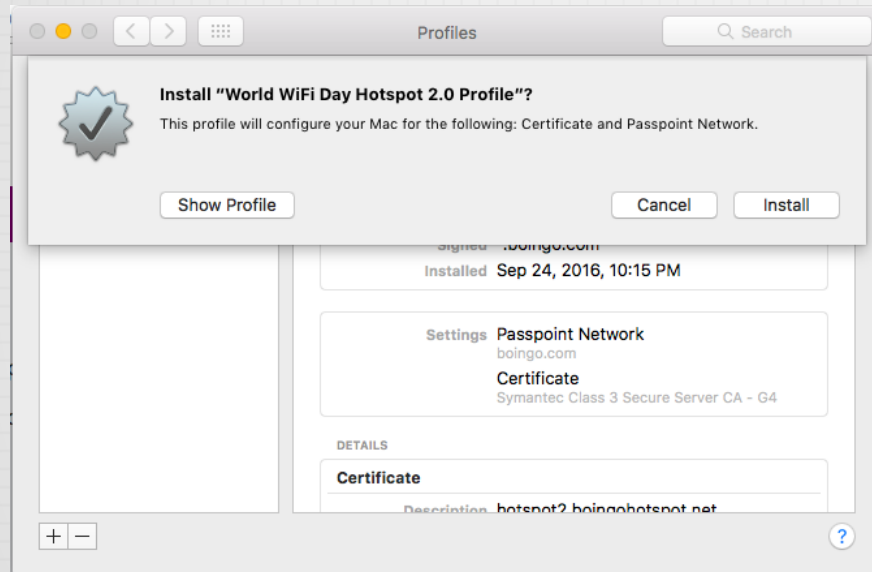
Gadget (iPHONE) Configuration

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



MAC OSX Configuration

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



IPHONE SELECT SSID

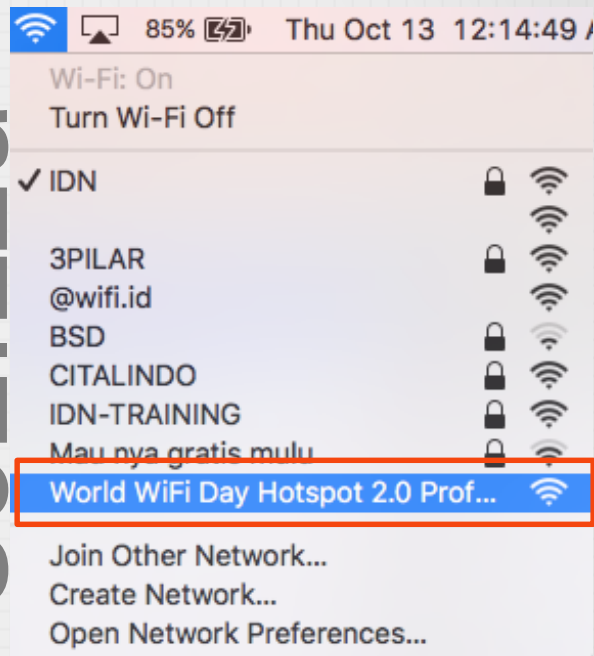


MAC OSX SELECT SSID

802.11u

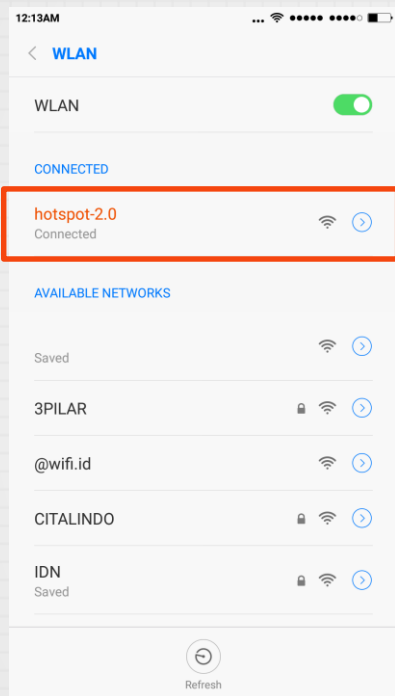


802.11u

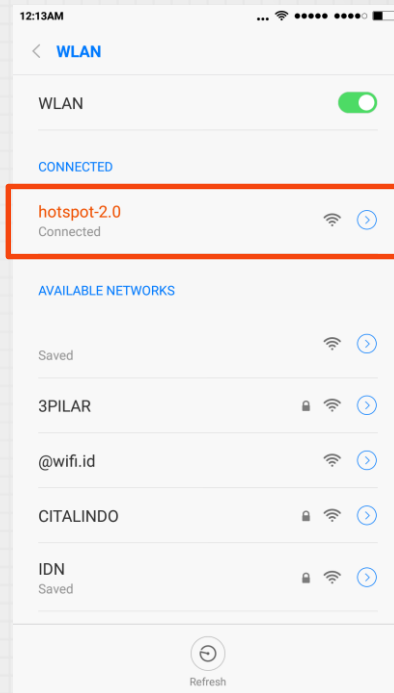


Unsupported device **SELECT SSID**

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

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[rofiq.fauzi](#)

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