HK Wi-Fi Security Survey 2008
2008 無線網絡應用保安普查

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Organizers

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(PISA)

專業資訊保安協會

Hong Kong Wireless Technology Industry Association

(WTIA)

香港無線科技商會

Sponsor

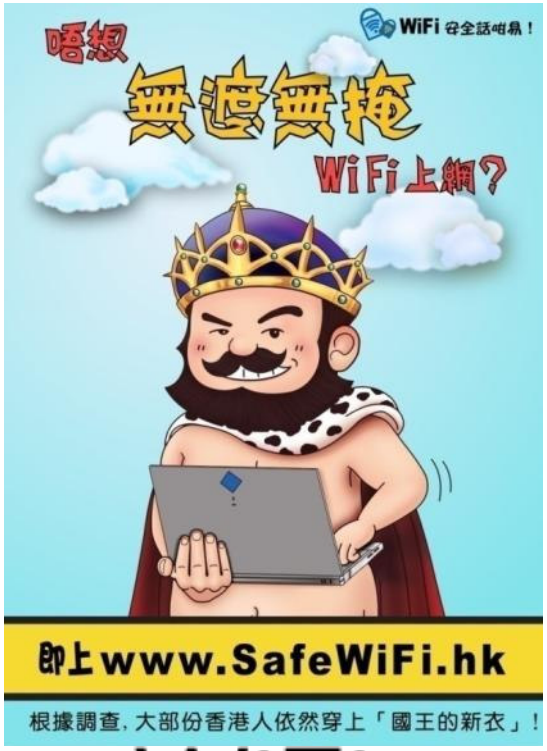
OFTA

電訊管理局

WiFi 安全話咁易

About SafeWiFi.HK

- Public Awareness Campaign on WiFi Safety
- portal website www.SafeWiFi.hk to provide affluent knowledge about Wi-Fi Security.
- WTIA & PISA conduct survey about Wi-Fi Security and promote the importance of Wi-Fi Security. For more information, please visit www.safewifi.hk.



Introduction to WTIA

Hong Kong Wireless Technology Industry Association

www.hkwtia.org

Objectives of WTIA

Not-for-Profit Corporation registered in HK since 2001 with objectives:

- To promote the development, usage and awareness of wireless technology applications in Hong Kong
- To represent and safeguard the interests and opinions of the wireless technology to the Government and other international parties
- To enhance communication and partnership between different types of companies in the wireless technology industry

Activities of WTIA

- has over 150 local and overseas company members, including mobile network operators, mobile device manufacturers, wireless technology providers, system integrators, wireless application services developers, consultancy firms, etc.
- has organized different types of activities, including conference, seminar, workshop, competition, exhibition, etc. to accelerate the industry development.
- operate the Wireless Development Centre (WDC) at Cyberport

Introduction to PISA

Professional Information Security Association

(PISA)

專業資訊保安協會

www.pisa.org.hk

About PISA

- A not-for-profit organization for local information security professionals found in 2001
- Focus on developing the local information security market with a global presence in the industry

Mission of PISA

- to facilitate knowledge and information sharing among the PISA members
- to promote the highest quality of technical and ethical standards to the information security profession,
- to promote best-practices in information security control,
- to promote security awareness to the IT industry and general public in Hong Kong

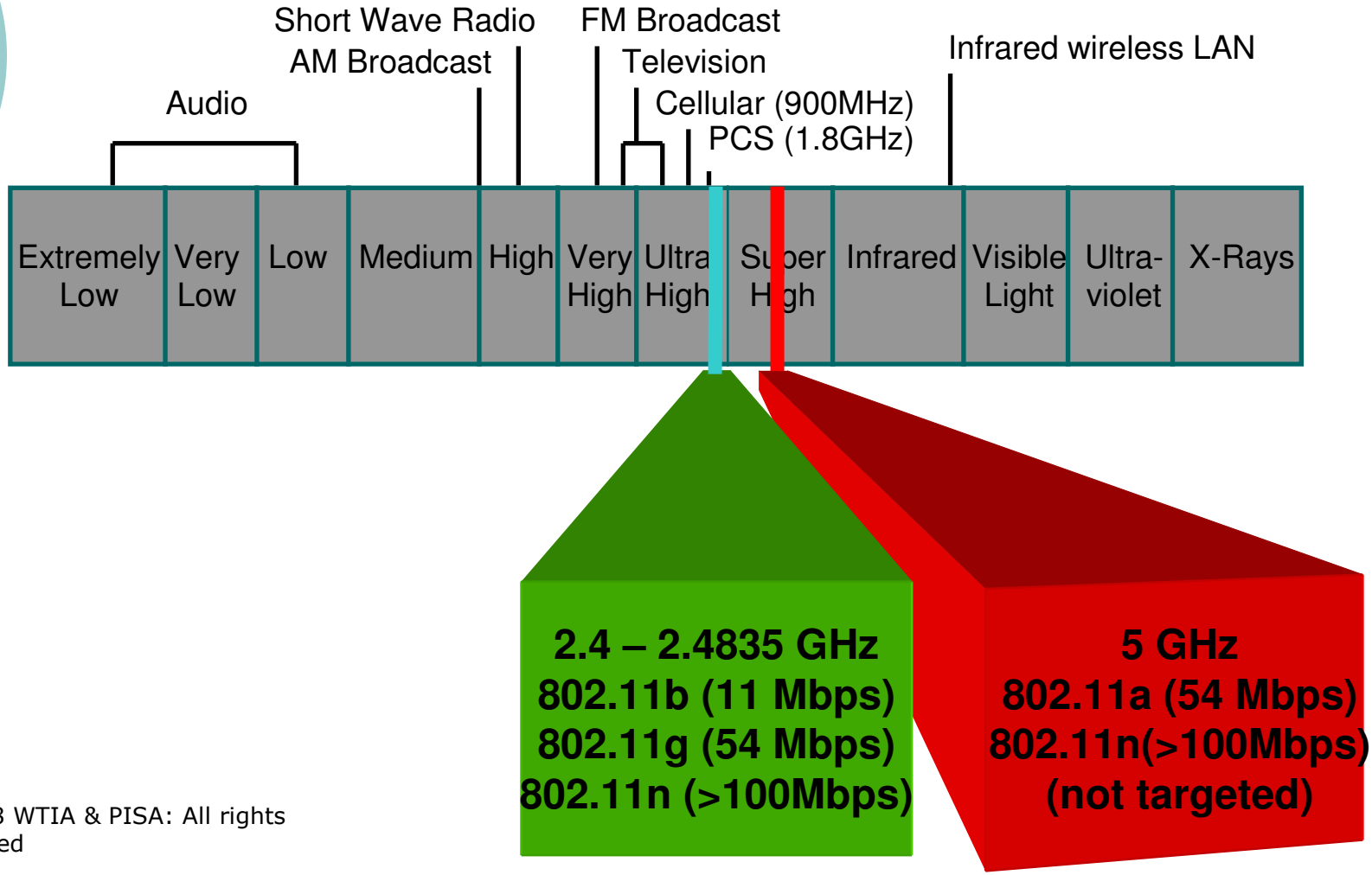
Hong Kong
Wi-Fi Security Survey

- Nickname - HK War Driving
- WTIA and PISA Board and Neutral Definition: non-intrusive collection of "**Wireless LAN**" **or** "**Wi-Fi**" information including network name, signal, location by using a device capable of WLAN signal receiver and moving from one place to another

Is this legal?

- there are always two sides
- Simply driving around a city searching for the existence of wireless networks in a non-intrusive way, with no ulterior motive cannot be illegal.
- However, if you are searching for a place to steal internet access, or commit computer crimes then the wardriving you performed was done in a malicious manner and could be treated as criminal offense.

Our Focused in 2.4G License Free Spectrum



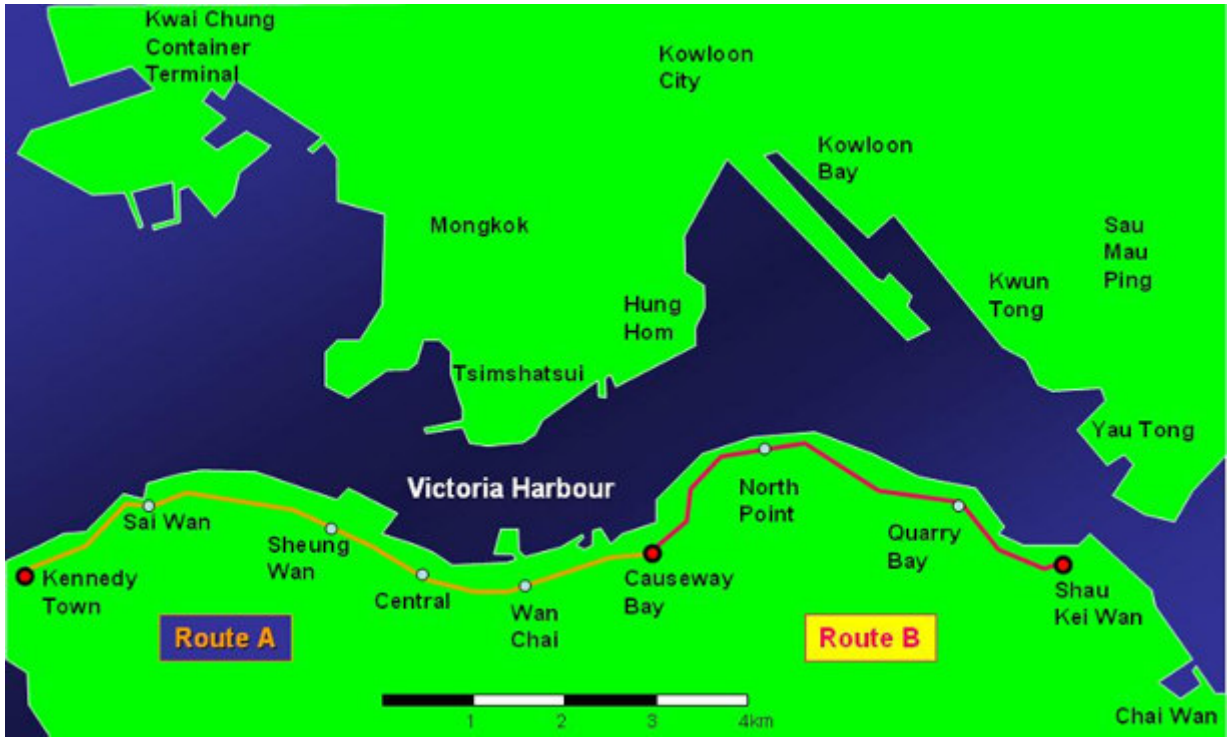
Our Code of Ethics in WD

- Our Objective of the Survey is to study the WLAN Security status and to arouse the public awareness in the WLAN Security
- We do not publicize the exact location and owner of the individual insecure APs. We Publicize only the consolidated figures
- We do not connect to any insecure AP to further explore their vulnerability
- We do not interfere/jam any wireless traffic

History of PISA/WTIA War Driving

Year	Tramway	Others
2002	Route A	N/A
2003	Route A + B	Victoria Peak War Driving – Long Distance
2004	Route A + B	Victoria Harbour War Sailing - Ferry
2005	Route A + B	Kowloon – Car and Bus
2006	Route A + B	Hong Kong Island round trip – Mini Bus
2007	Route A + B	Macau War Driving
2008	Route A + B	War driving in Victoria Harbour, Kowloon, New Territories and Macau

War Tramming Route A & B

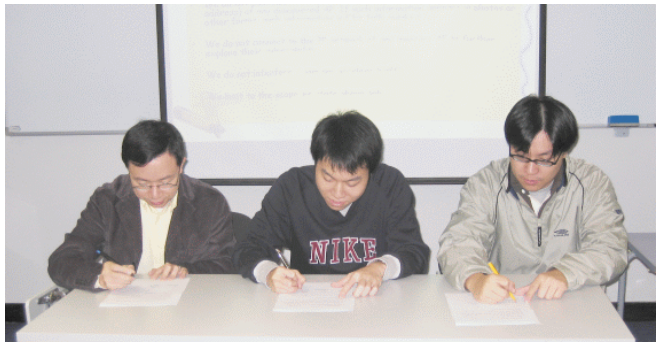


War Driving 2003

Two Checkpoints on the Victoria Peak

Point <1> Peak-West Point <2> Peak-East (near Peak Tram Station)

War Driving 2004



War Driving 2005

War Driving 2006

War Driving 2007

A Tales of Two Cities :
WD in HK and Macau

Hong Kong
WiFi Security Survey
(War Driving) 2008

The most comprehensive war-driving survey in Hong Kong: covering HK Island (Tramway), Kowloon, New Territories and Victoria Harbour




Objectives of WD2008 - HK

- To study the current WLAN security status of HK
- To benchmark the results with previous figures from 2002 to 2007 in HK
- To conduct a non-intrusive WLAN security field study with responsible disclosure of information
- To arouse public awareness in WLAN security in both HK
- To benchmark the results with neighboring area. e.g. Macau

Equipment Used:

- *Hardware:*
  - Notebook computers,
  - WLAN cards, antennae and GPS

- *Software:*
  - Vistumbler (http://vistumbler.sourceforge.net)
  - WiFi Hopper (http://www.wifihopper.com)
  - Netstumbler - fade out (http://www.netstumbler.com)

Part 1: The Hong Kong Side

Day 1: Victoria Harbour War Sailing

25 Oct 2008 (Saturday) 12:45pm-3:30pm

Day 2: HK Island War Tramming

9 Nov 2008 (Sunday) 10:00am-1:00pm

Day 3: New Territories War Driving

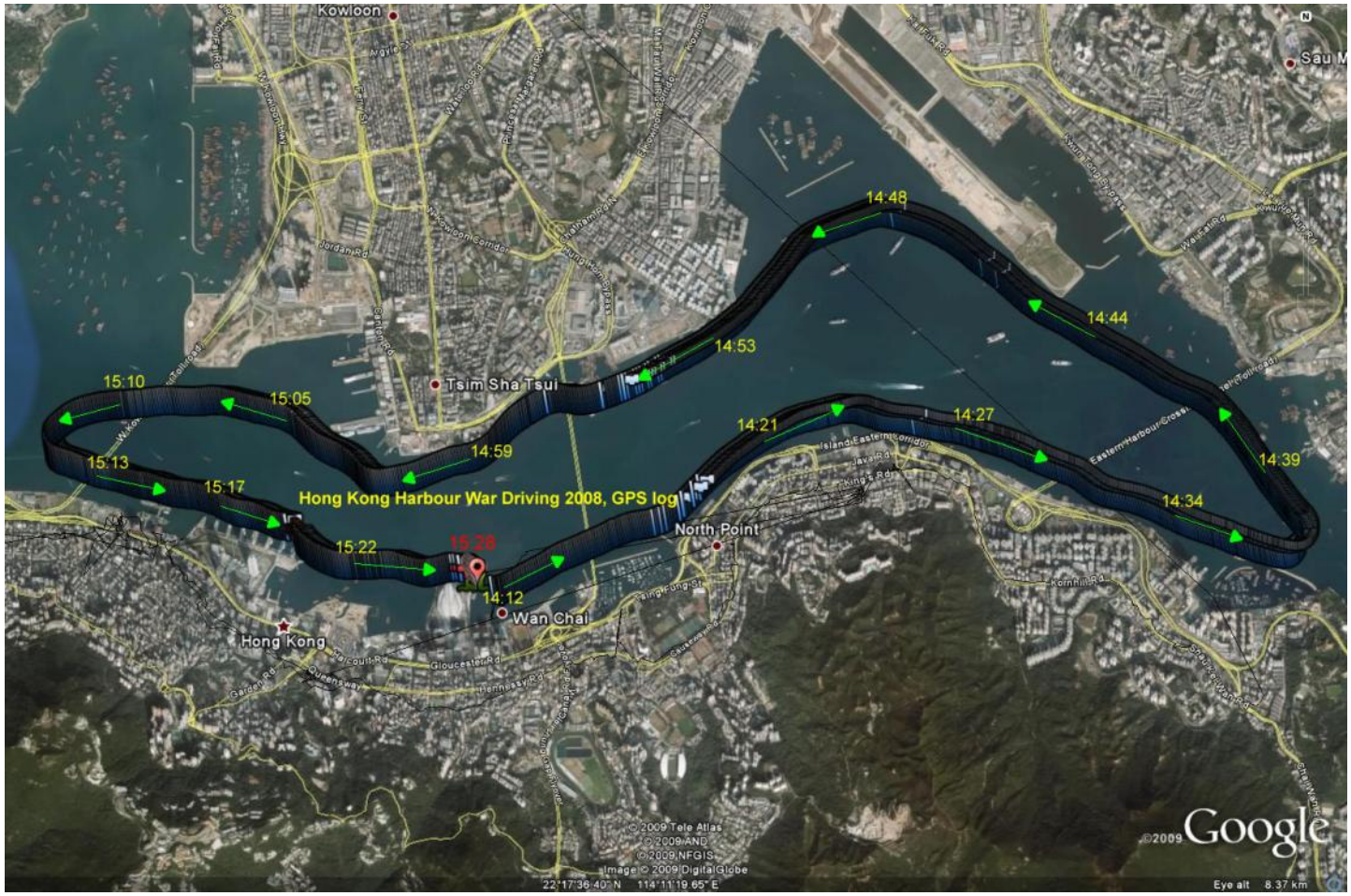
23 Nov 2008 (Sunday) 10:00am-2:00pm

Day 4: Kowloon War Driving

7 Dec 2008 (Sunday) 2:00pm-6:00pm

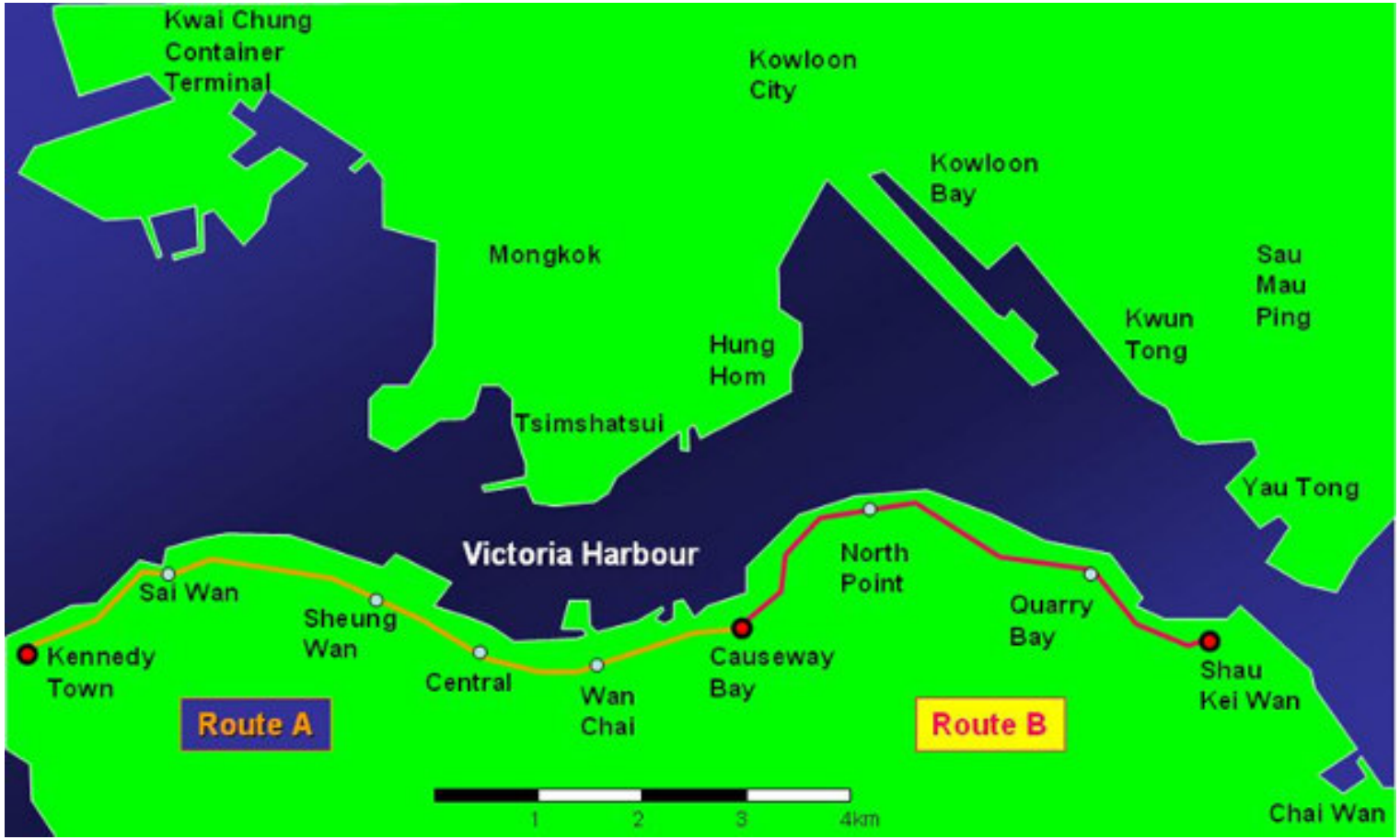
Day 1: Victoria Harbour

Day 1: Victoria Harbour



Day 2: HK Island Tramway

Day 2: HK Island Tramway



Day 2: HK Island Tramway

- War Driving on a tram had been proved to be a very effective way because trams run at a moderate speed (30-50km/h) in the middle of the road, allowing very good coverage of signals from the both sides.
- By War Driving on a tram, we benchmark the results with that of previous war driving studies from year 2002 to 2007 along the tramway
  - Route A - from Kennedy Town to Causeway Bay
  - Route B - from causeway Bay towards Shau Kai Wan
- This A+B route covers the whole tram way and is equivalent to the whole business corridor of the Hong Kong Island

Day 3: New Territories

Day 3: New Territories

Day 4: Kowloon

Day 4: Kowloon

Part 2: Extra ~ Macau War Driving

Macau Bus Route 6 & 15

27 Sep 2008 (Saturday) 10:00am-5:00pm

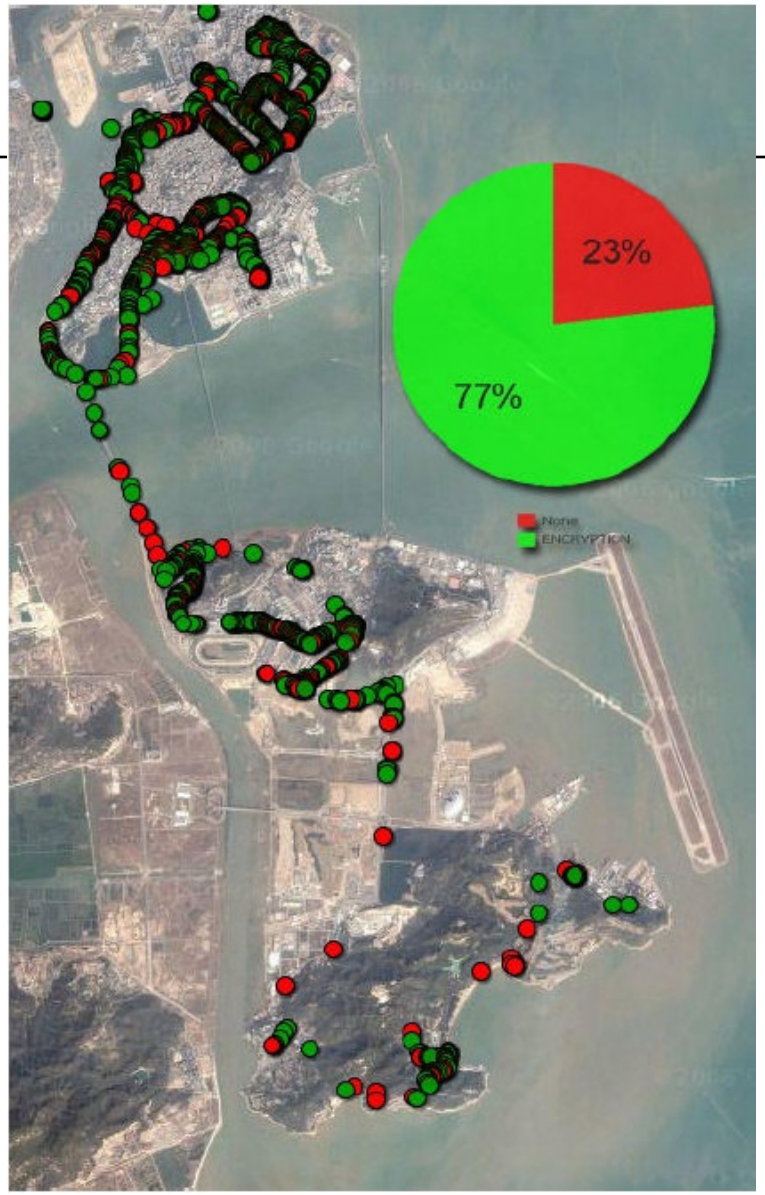
Co-organizing with
- ISACA Macau Chapter
- MANETIC
- Electronic Commerce Association of Macau

Macau

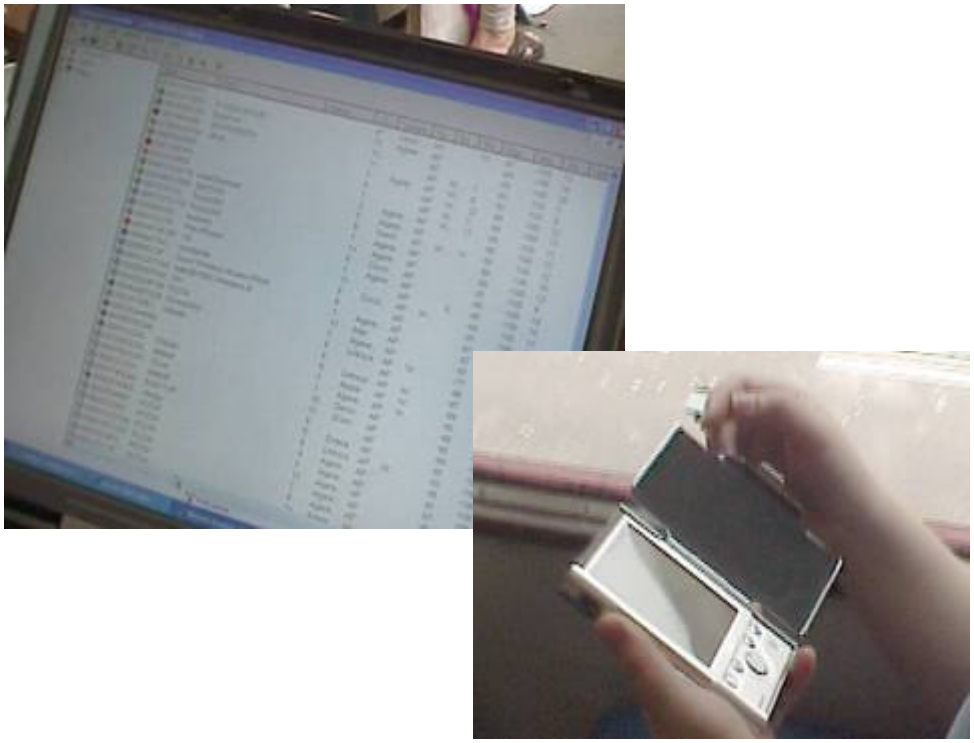
Macau

Bus Route 6 & 15

Covering main districts in Macau as well as Coloane and Taipa Islands

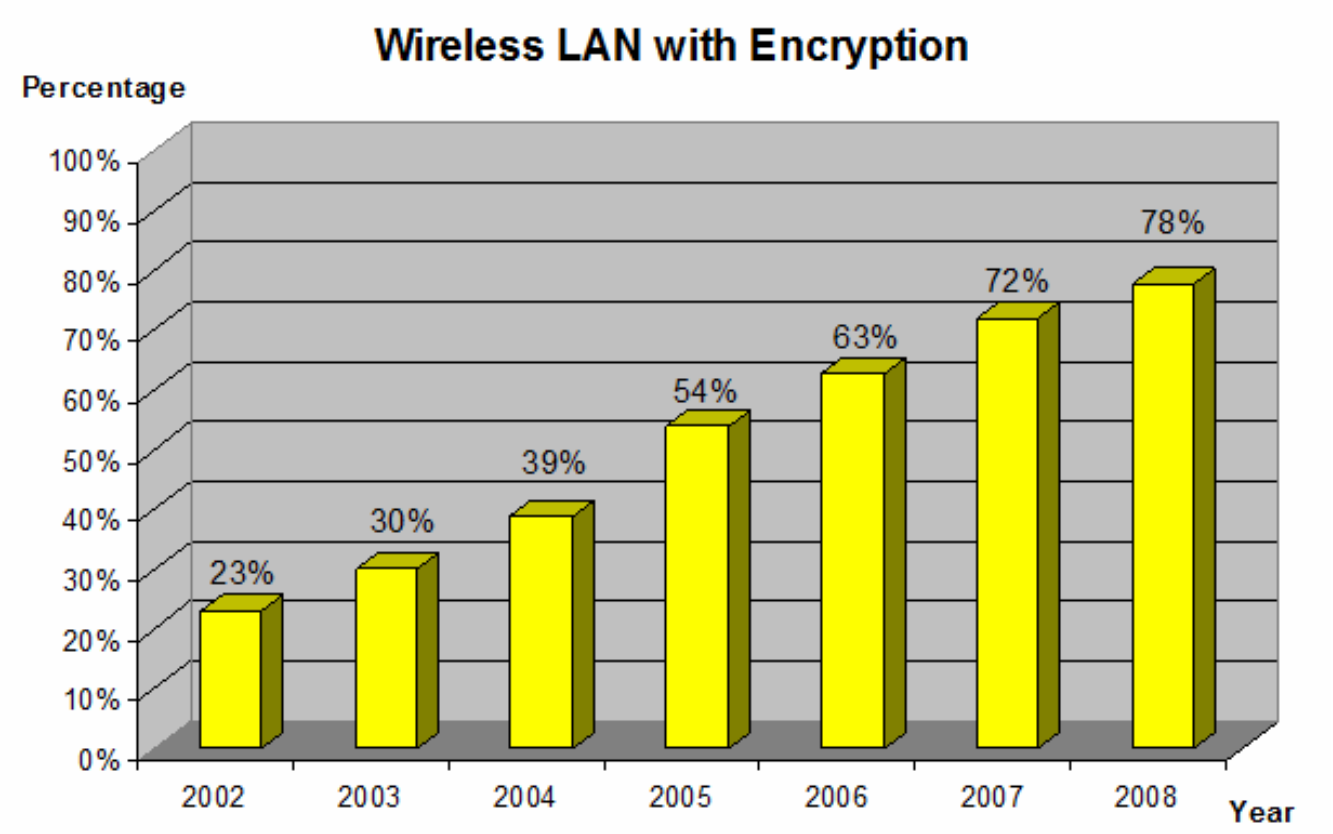


Summary of Findings



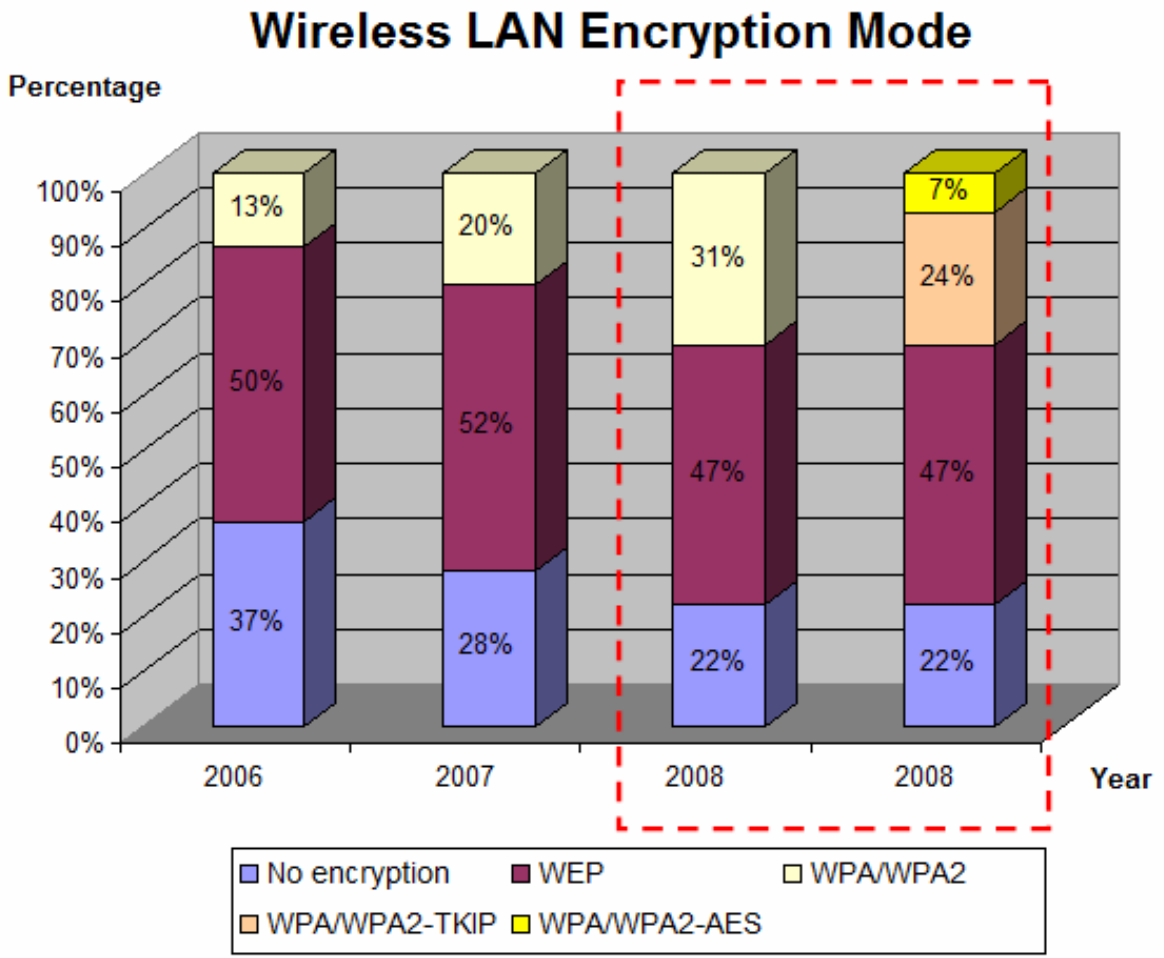
HK: Encryption Mode

- Increasing adoption of encryption settings



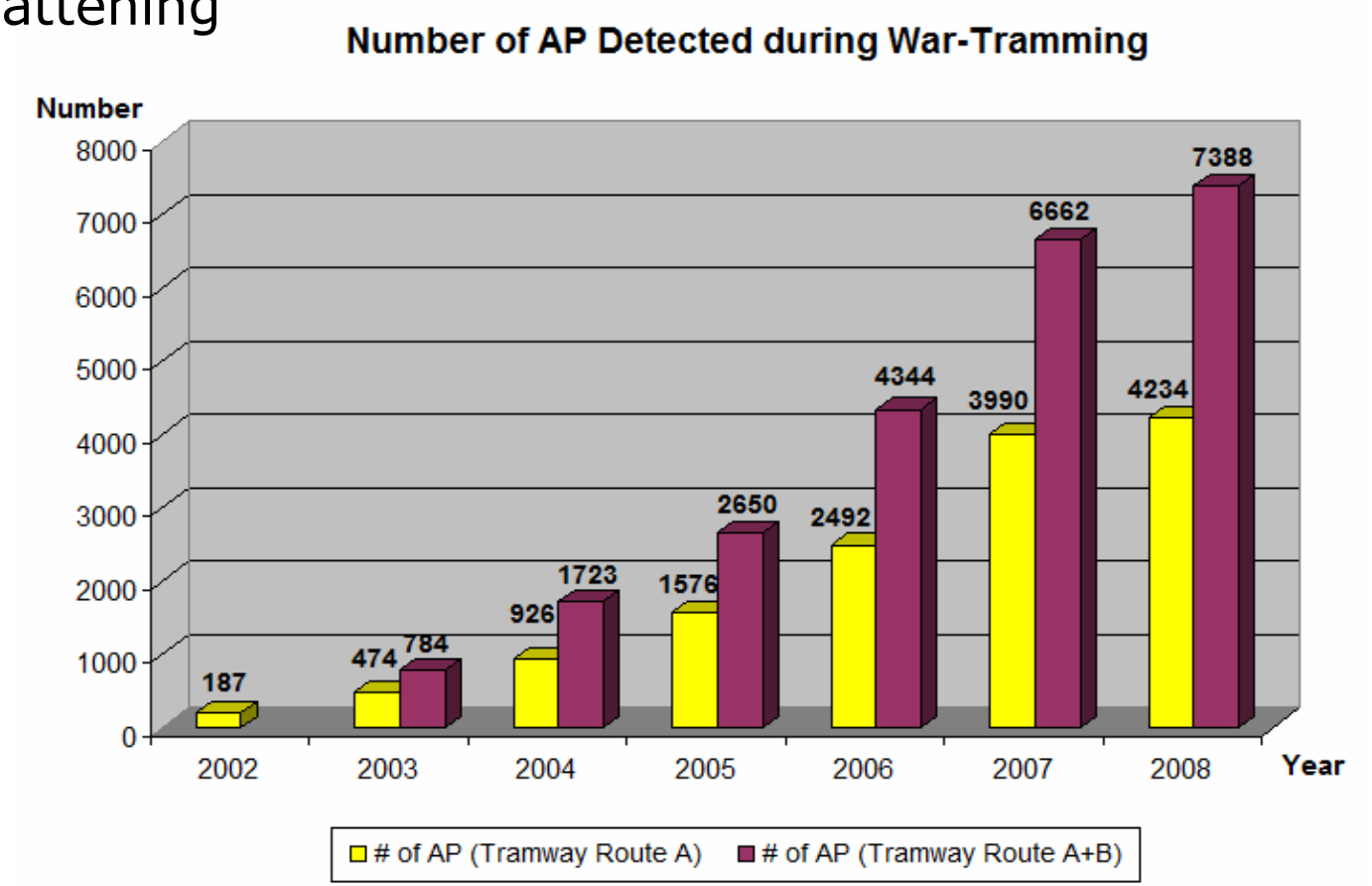
HK: Encryption Mode

- Though encrypted, use of WEP was high
- WEP is nowadays not secure
- WPA/WPA2-TKIP was recently found loopholes and can be hacked
- WPA/WPA2-AES should be used (only 7% WLAN is adopting this highly secured encryption mode)



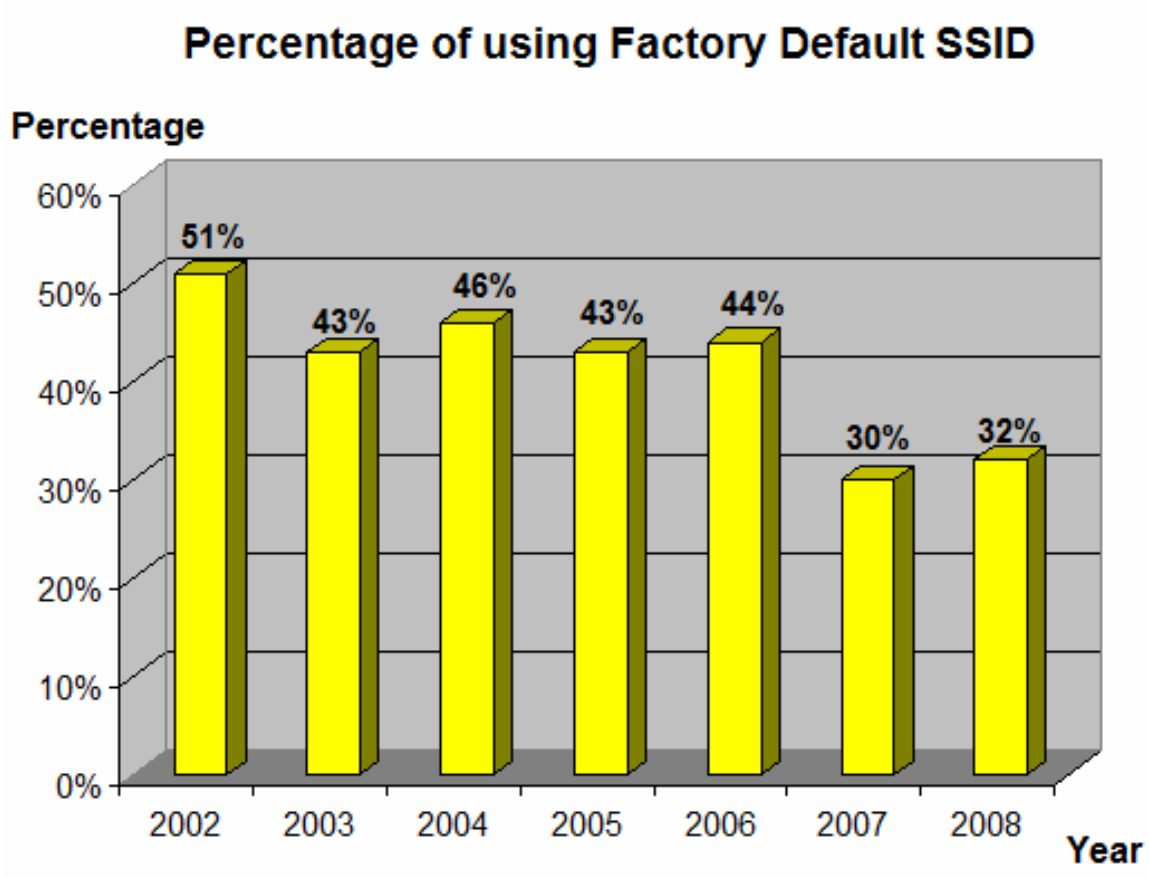
HK: Number of APs

- On average, growth rate is about 40%; the trend is flattening



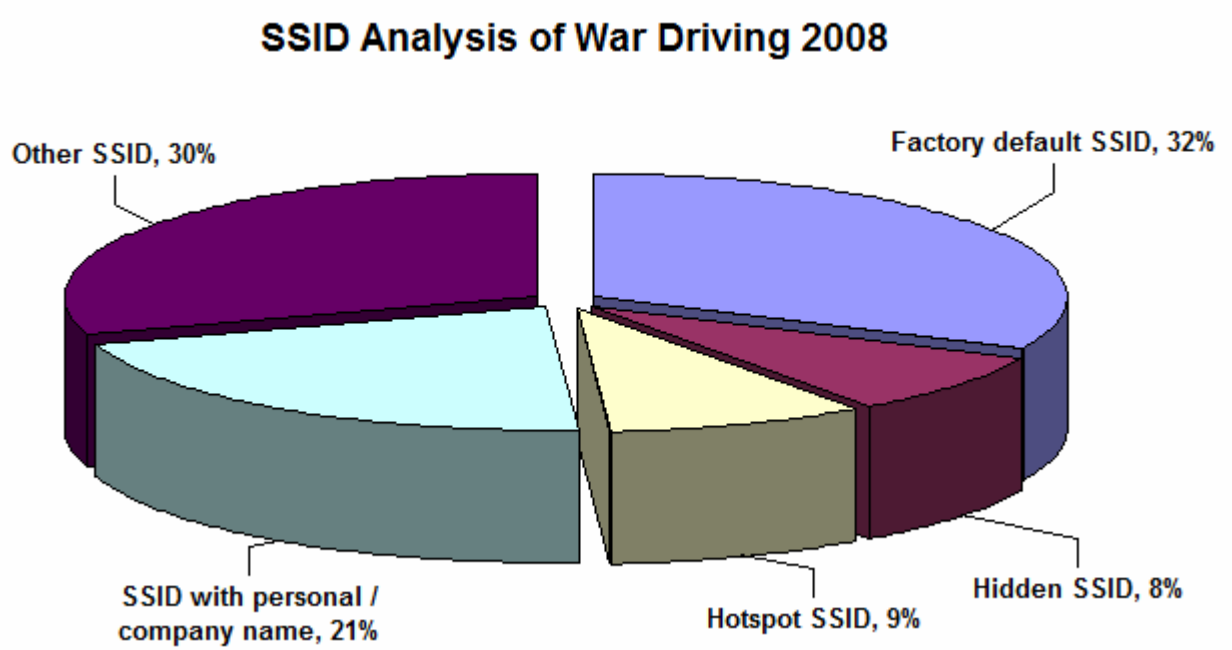
HK: Factory Default SSID

- Refer to default pre-set or generated SSID



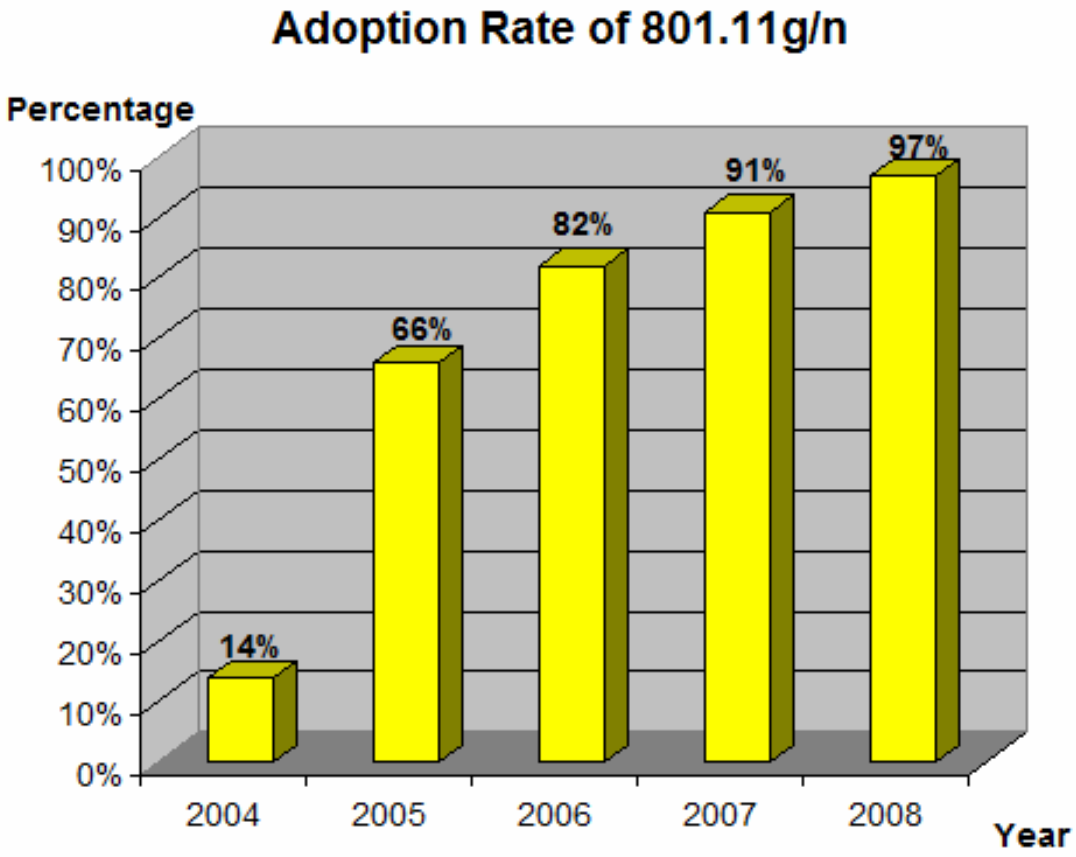
HK: SSID Analysis

- In 2008's SSID analysis, about 30% of users have not changed the default SSID and this may mean other system settings are also not changed (including the administrator password)
- About 20% SSID were associated with personal or organisation name
- enabling the hidden SSID function and change SSID not to associate your identity/name



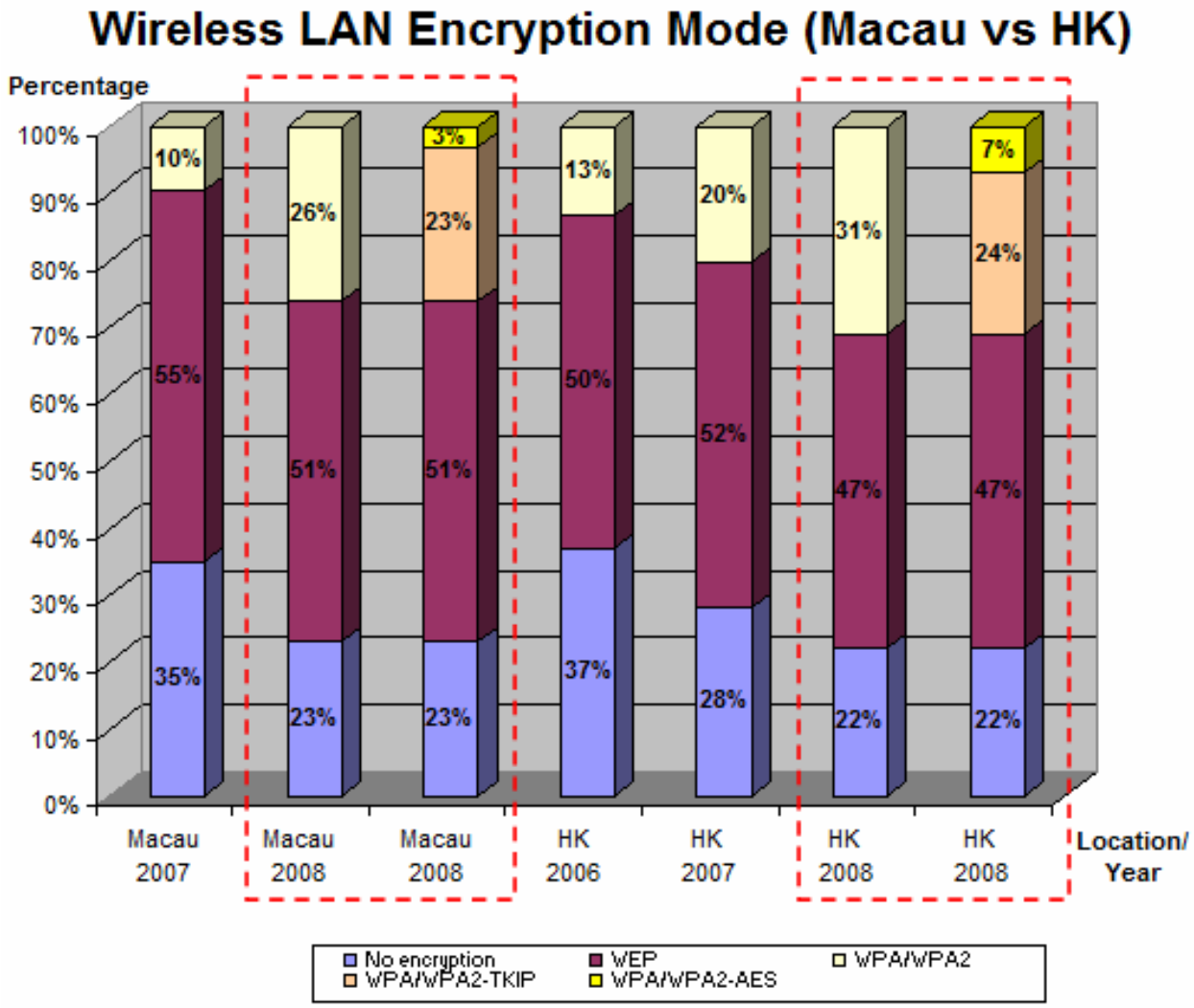
HK: Adoption of 802.11g/n

- Over 90% are 802.11g/n APs



Macau vs HK

- In general, the figures are similar and improving



Overview of Wi-Fi Encryption Modes

- Open
- WEP (Wired Equivalent Privacy)
  - Shared Key: 64 or 128-bit WEP key – 26 hexadecimal character (0-9, A-F)
  - RC4 encryption
  - Security weakness
    - short key size
    - May have IV collisions or altered packets, this is a limitation in WEP design, longer key cannot help
    - May be cracked within a few hours

Overview of Wi-Fi Encryption Modes

- WPA/WPA2 (Wi-Fi Protected Access)
  - WPA/WPA2 – WPA is based on draft 3 of 802.11i standard; WPA2 is based on the final draft of 802.11i
  - Mode:
    - Personal or PSK (Pre-shared key)
      - Pre-shared key can be a string of 8 to 63 char
        - Recommend using longer and complex key (alphabet, number, symbol) and do not use dictionary word
    - WPA-Enterprise
      - 802.1X authentication / RADIUS
      - Individual user has his/her own password. Much safer than Pre-shared key.

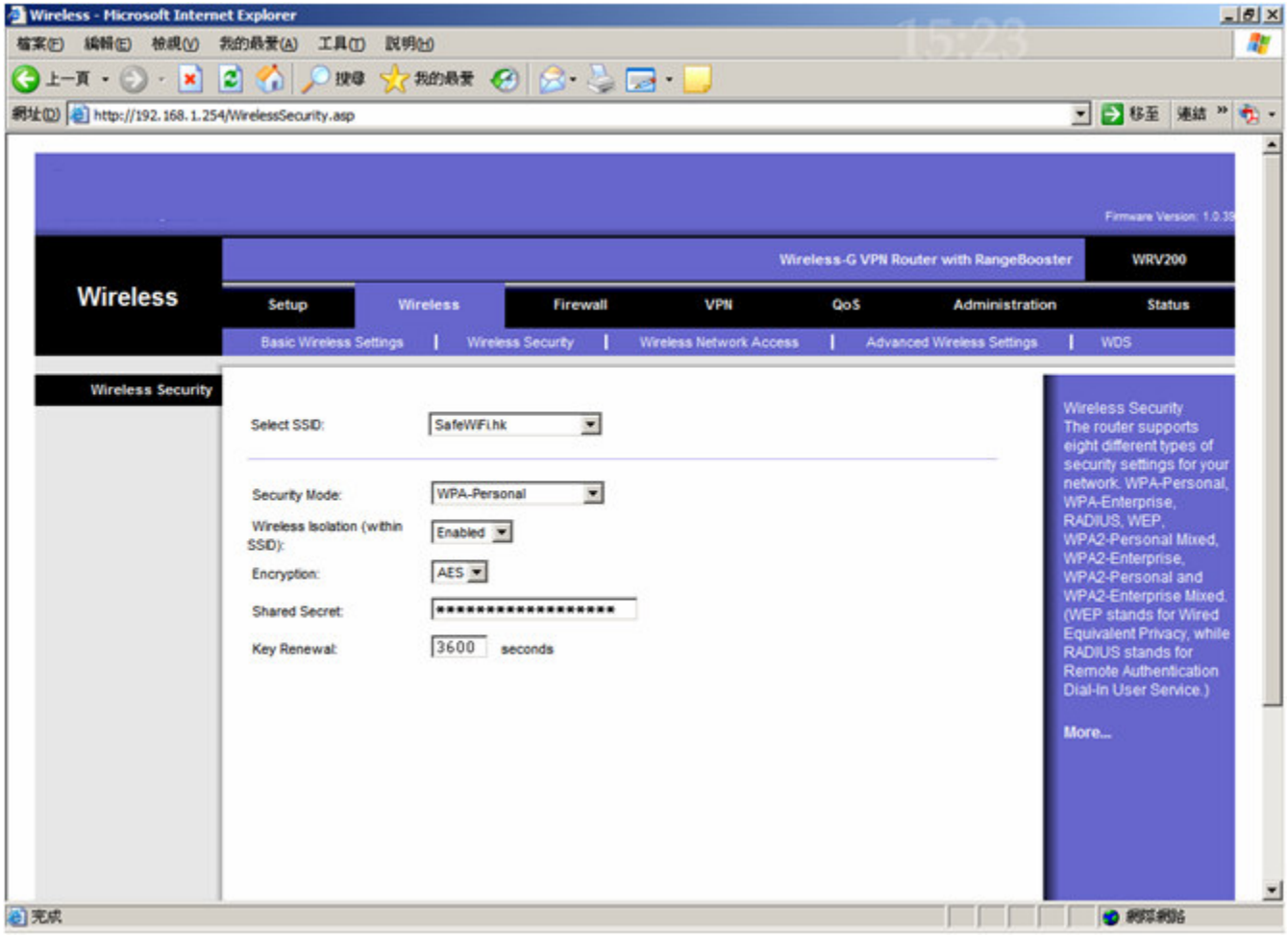
Overview of Wi-Fi Encryption Modes

- WPA/WPA2 (Wi-Fi Protected Access) – cont'd
  - TKIP (Temporal Key Integrity Protocol) / AES (Advanced Encryption Standard) encryption
    - TKIP was implemented to solve WEP problem. AES is a newer implementation and design.
  - WPA/WPA2 is much more secure than WEP
  - However, recently, loopholes were found for WPA/WPA2-TKIP and can be hacked. Hence, we recommend using WPA/WPA2-AES.

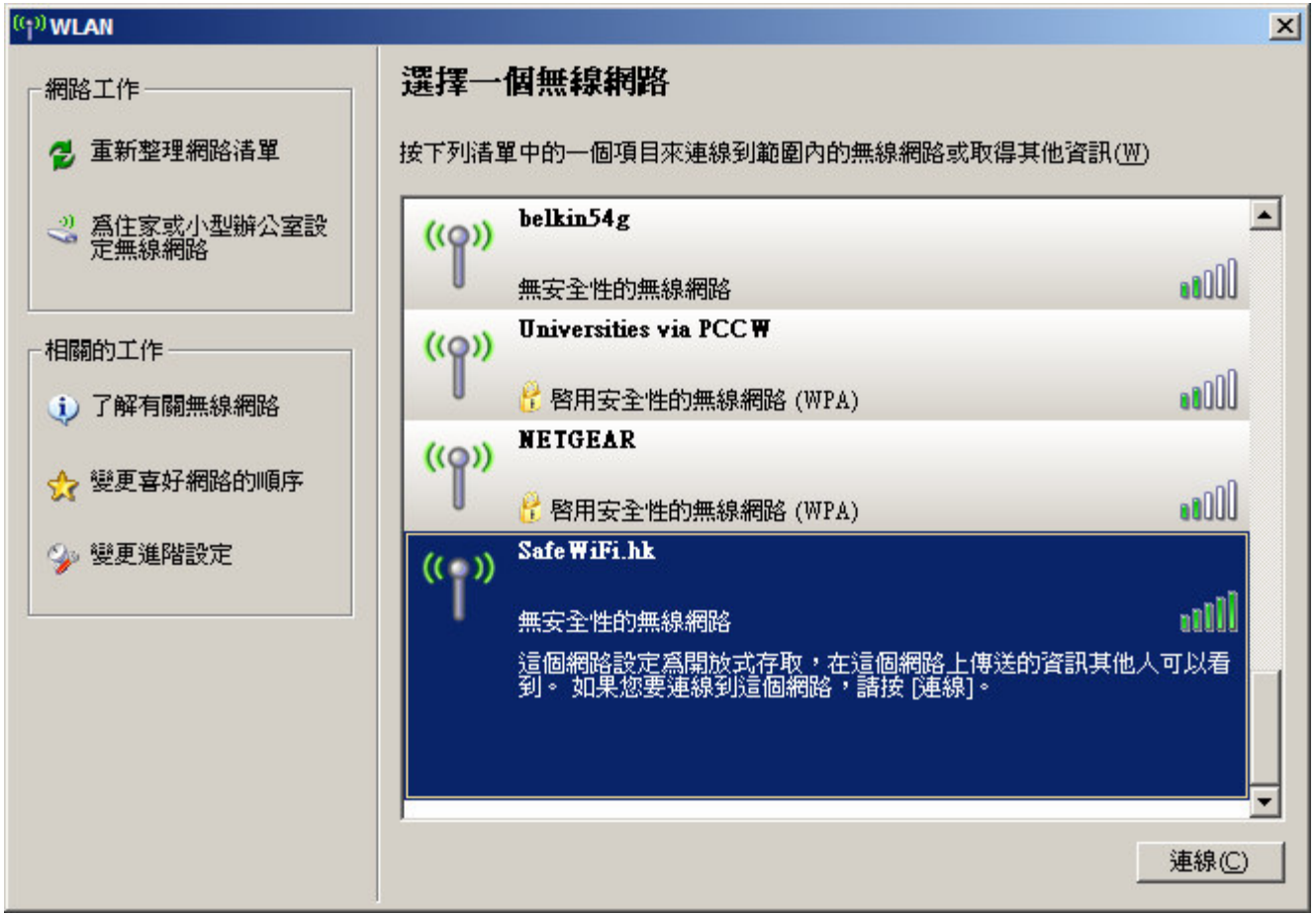
Tips and Recommendation

- Enable encryption mode and use WPA/WPA2-AES
- Though MAC address can be spoofed, recommend to enable MAC Address Filtering
- Though hidden SSID can be seen with a suitable tool, recommend to hide SSID
- Change SSID to not easily identifiable
- Do not just use the “off-the-shelf” settings, need to review
- Better not to put the AP near to the Windows to reduce chance of connection outside your home/office
- Consider to use VPN over public hotspots

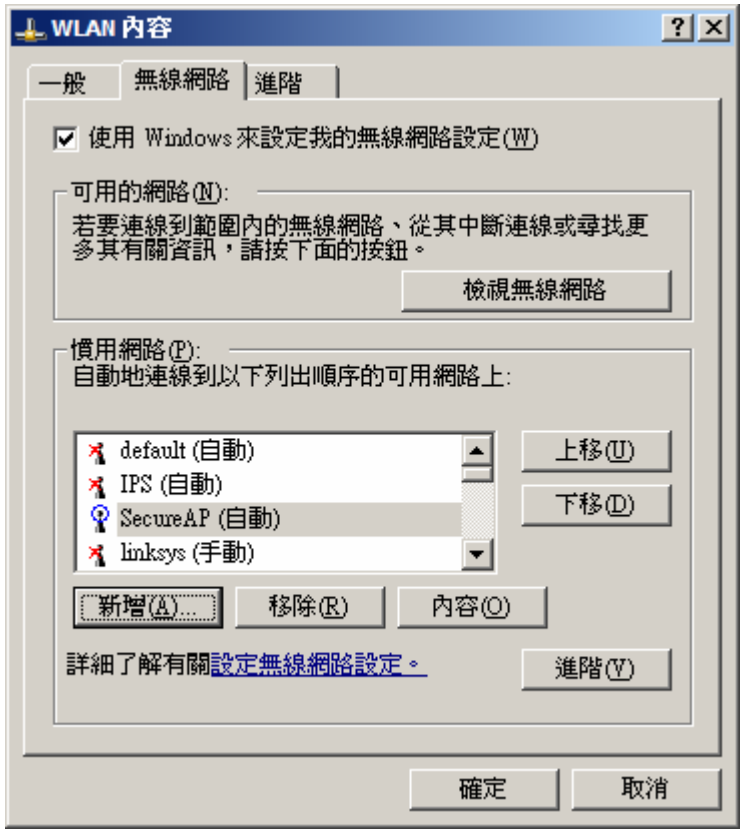
AP- WPA AES Setting



PC – WPA AES Setting



PC – WPA AES Setting



For More Information

- visit Safewifi.hk **WiFi** 安全話咁易
- Seminar on Protecting Your WiFi Network and Utilization" on 28 Feb 2009 (Sat) 「**WiFi** 保安大搜查 – **WiFi**網絡及應用保衛戰」

Acknowledgement

- **All WD2008 Team Members including**

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WTIA

Ken Fong (Convener) , Eric Leung, Jacky Cheng, Joseph Leung,, Kenny Chiu, Michael Kan, Voker Lam

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