PARISUNIVERSITAS

Daily Walks In Paris: A Practical Analysis of Wi-Fi Access Points

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Characterization of 30.000 802.11 access points Open source wardriving software for Nokia smartphones Public data set containing various access points parameters

Methodology

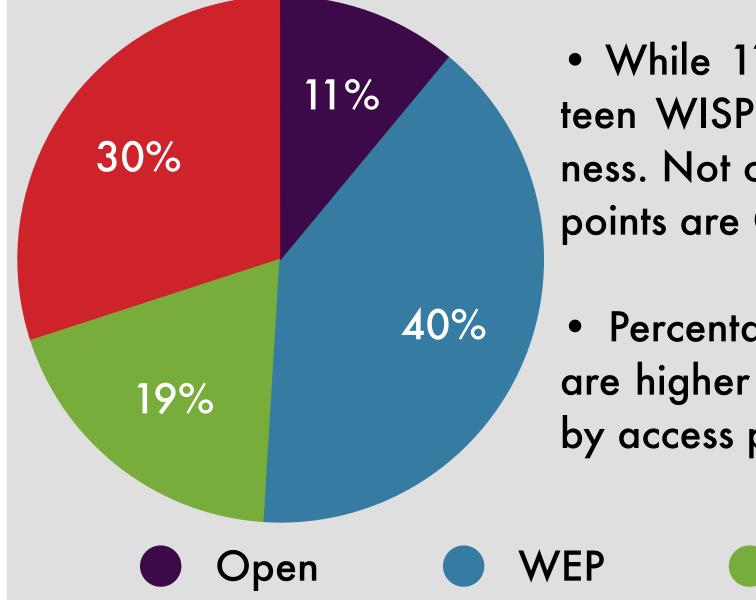
• In this work, we analyze various parameters of 30.000 802.11b/g access points obtained in two Paris districts in fall 2007. The data was produced while walking in the streets with Nokia smartphones and GPS receivers.

Access points density - Paris 5th and 13th

- Paris 5th and 13th: 4300 AP per km²
- Tokyo: 3000 AP per km²
- Manhattan: 1900 AP per km²

• For each access point, we retrieved its geographical coordinates and essential frame level information such as: SSID, BSSID, connection mode, security scheme, supported data rates, channel and information elements.

Security modes - Paris 5th and 13th



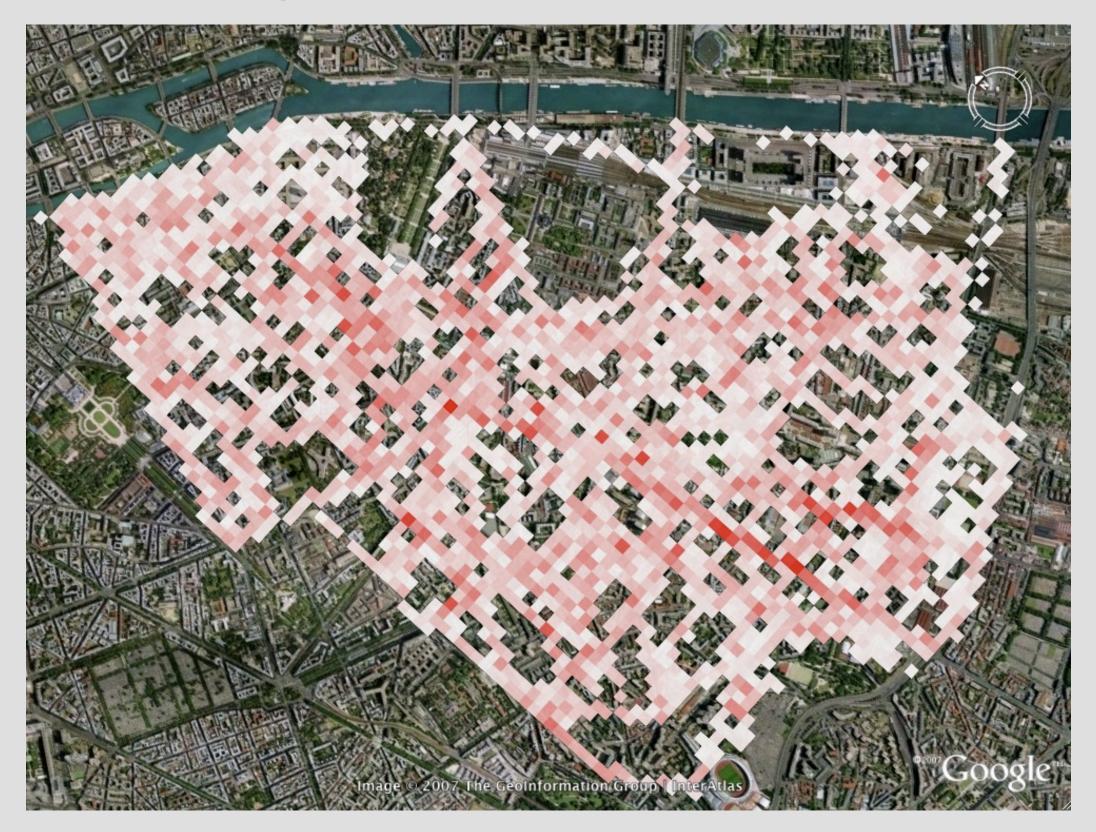
• While 11% of access points are Open, fourteen WISP use this mode as part of their business. Not considering them, only 7% of access points are Open.

 Percentages of WPA-PSK and WPA modes are higher than in similar studies: they are used by access points shipped by ISP.

WPA

Manufacturers - Paris 5th and 13th

%	OUI's name
38.2	Unknown
11.7	Hon Hai Precision Ind
11.5	USI
7.6	TECOM Co. Ltd.
7.6	Neuf cegetel
3.7	Freebox SA
3.3	Cisco Systems
2.4	Netgear Inc.
2.4	D-Link Systems Inc.



Density is represented in 50m x 50m squares. Highest densities (in red) are located around tall buildings or avenues where there is a higher concentration of apartments.

Channels - Paris 5th

• USA: 43% of access points use the default channel (6)

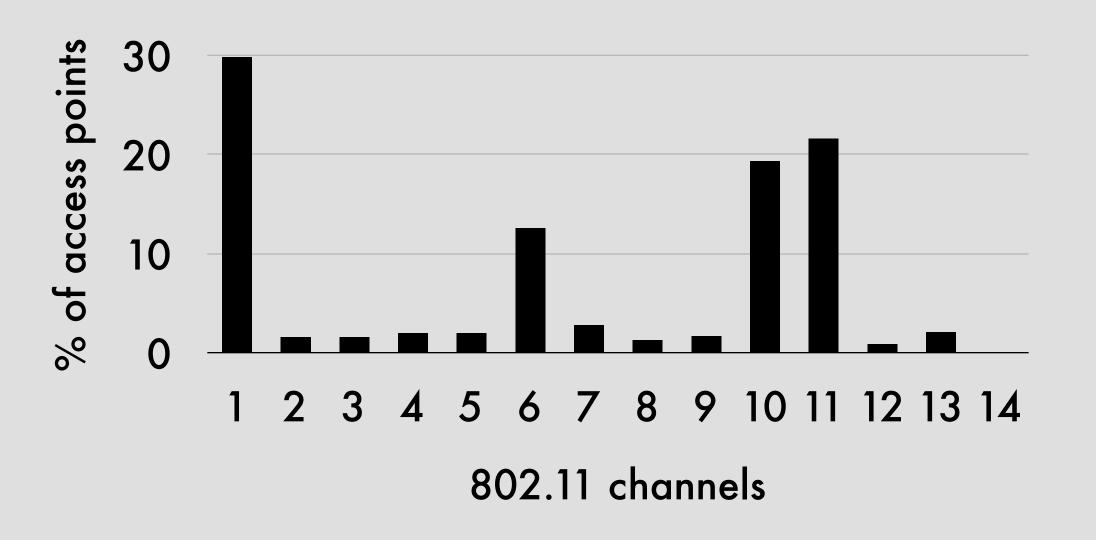
Manufacturers of access points shipped by ISP are ranked before well known network vendors.

WPA-PSK

• 33% of the Unknown manufacturers correspond to access points shipped by ISP using an unregistered OUI.

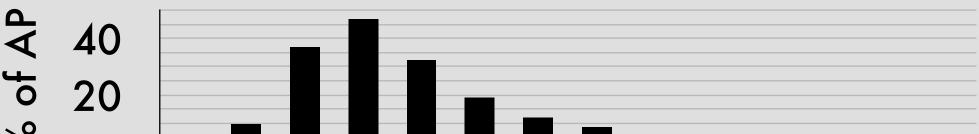
• ISP access points correspond to 55% of access points according to this classification.

• Paris: 64% of access points use the 3 non-overlapping channels (1, 6, 11)



Geographical coordinates - Paris 5th and 13th

• Wi-Fi based geolocation impacted by the precision of measures. • High precision of our data set: 50% under 20m, 90% under 40m.



Other parameters - Paris 5th and 13th

- 802.11b only: 57% of access points
- Ad-hoc mode: 1% of access points
- AP shipped by ISP: 90% of access points

Perspectives and future work



10 15 20 25 30 35 40 45 50 55 60

Precision of measure in meters

1. study mobility patterns using surrounding access points 2. deeper analysis of 802.11 frames 3. study the evolution of the Wi-Fi landscape

Software and data set available on http://content.lip6.fr/warwalking - Partially funded by the french Ministry of Industry