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

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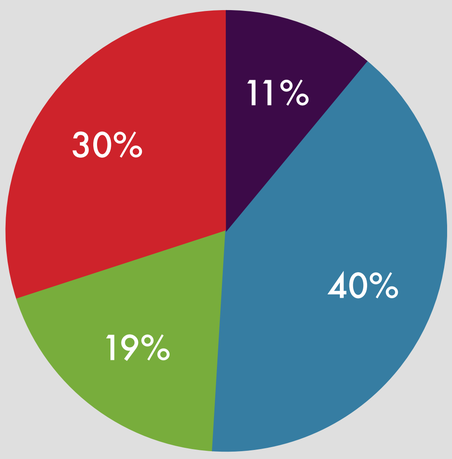
Characterization of 30.000 802.11 access points
Open source wardriving software for Nokia smartphones
Public data set containing various access points parameters

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.

• 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.

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.

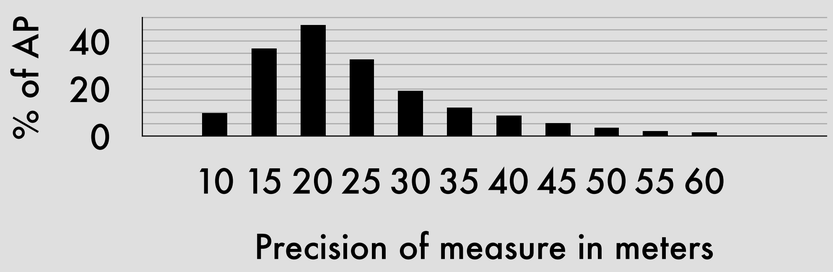
• Manufacturers of access points shipped by ISP are ranked before well known network vendors.

• 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.

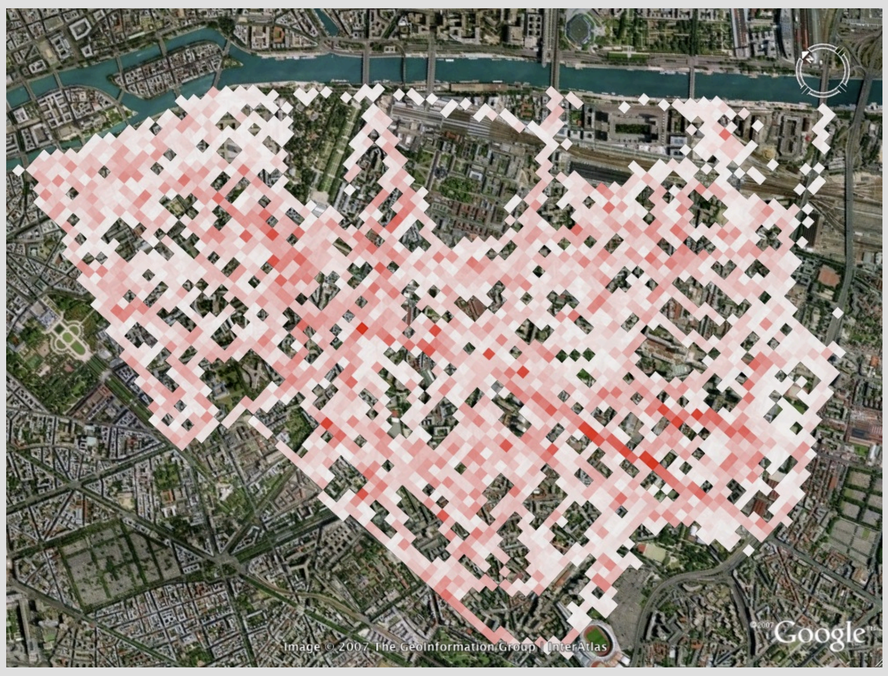
Geographical coordinates - Paris 5th and 13th

• Accuracy of geolocalization techniques depends on the measures' precision.
• In our data set precision is high: 50% of measurements under 20m, 90% under 40m.



Access points density - Paris 5th and 13th

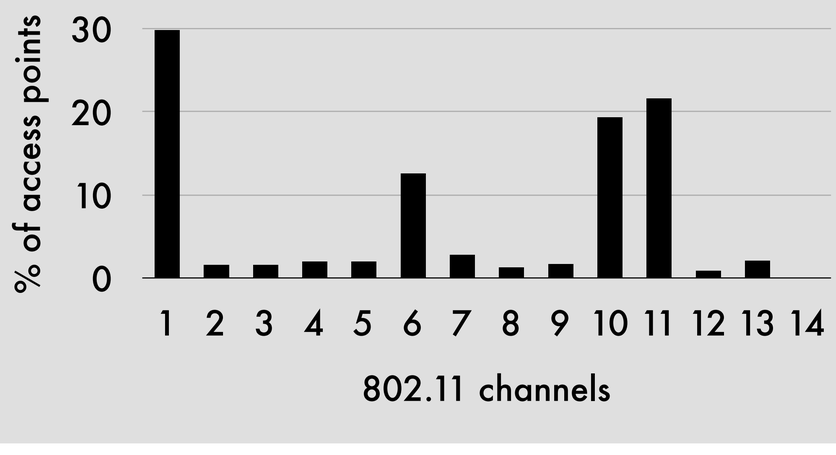
• Paris 5th and 13th: 4300 AP per km^2
• Tokyo: 3000 AP per km^2
• Manhattan: 1900 AP per km^2



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



Other parameters - Paris 5th and 13th

• 802.11b only: 57% of access points
• 64% of 802.11b/g access points are shipped by ISP

• Ad-hoc mode: 1% of access points

Perspectives and future work

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