

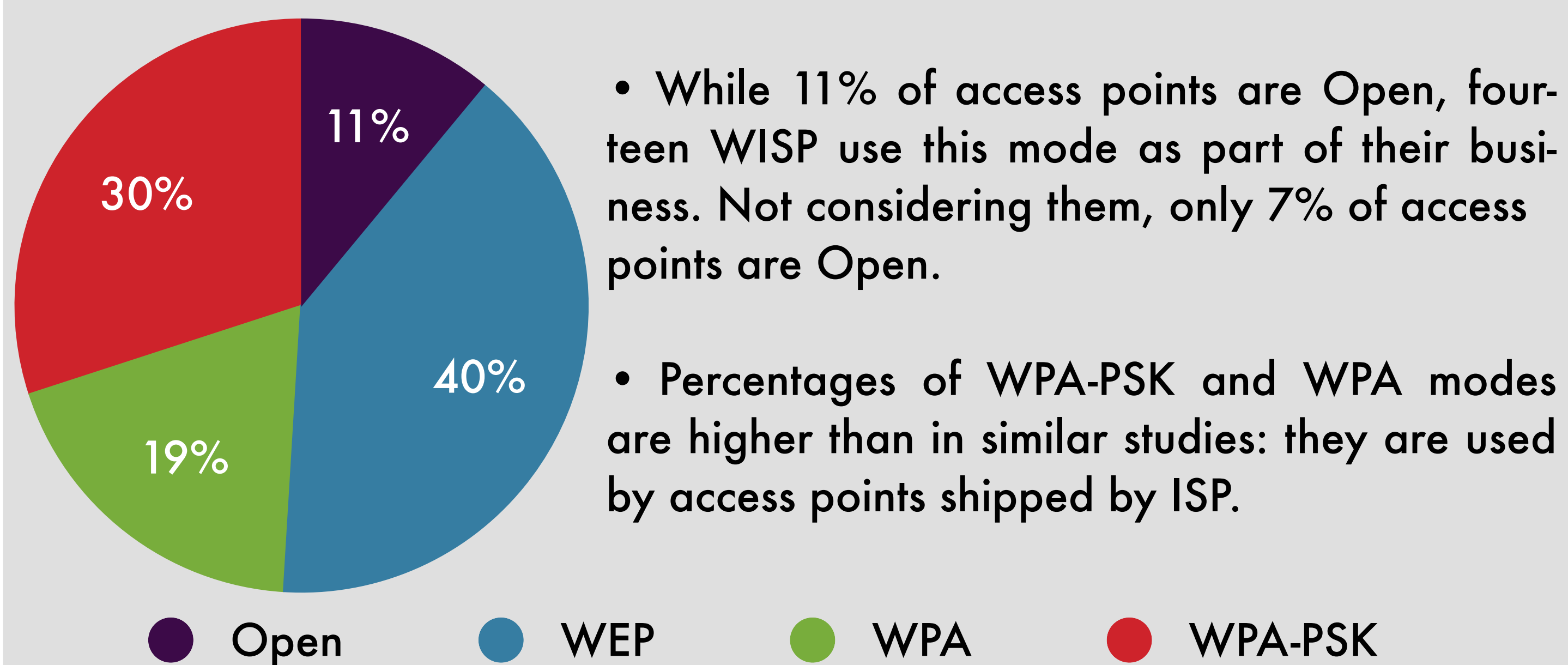
Characterization of 30.000 802.11 access points

Open source wardriving software for Nokia smartphones
Public data set containing various access points parameters

Methodology

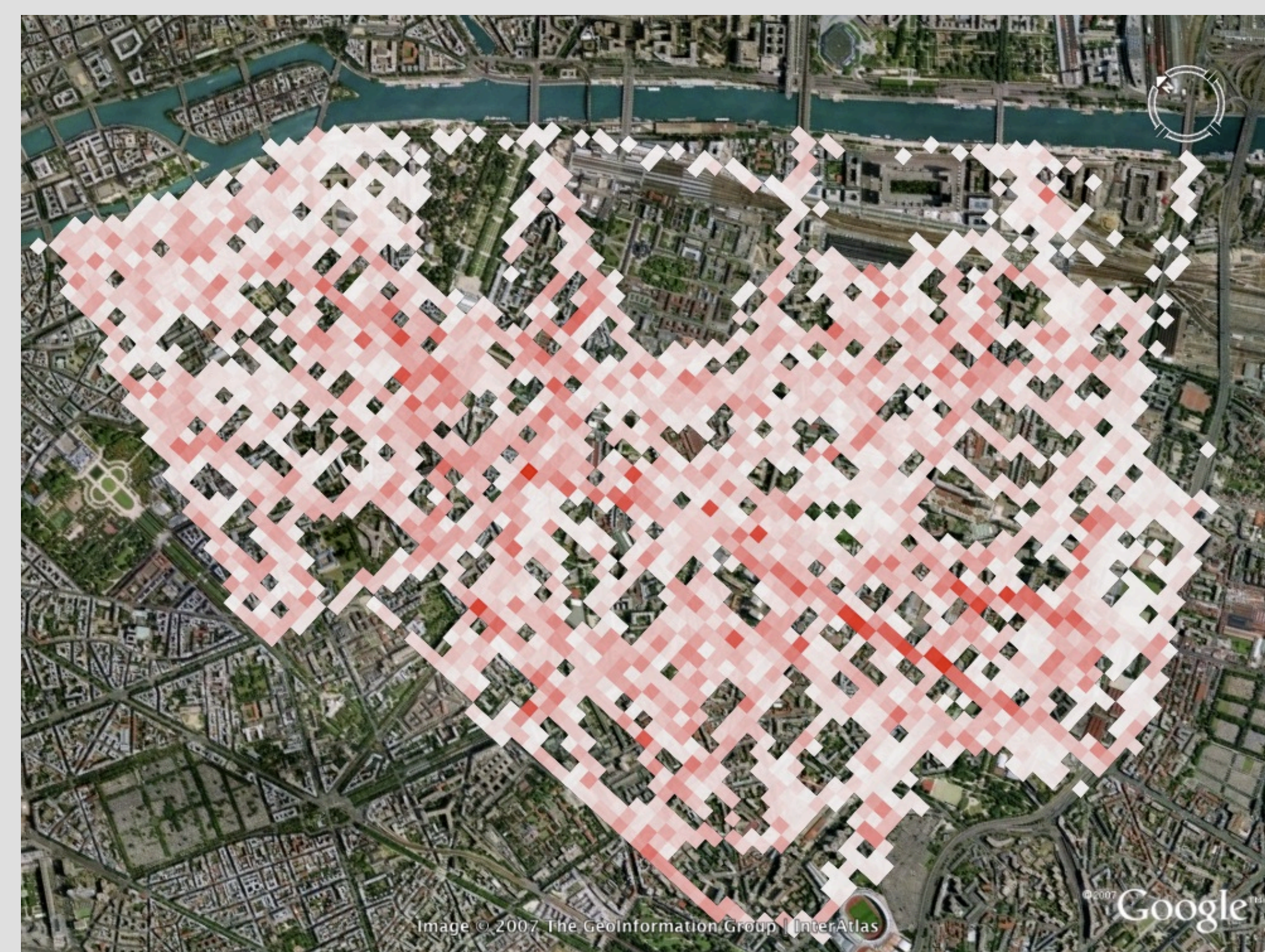
- In this work, we analyze various parameters of 30.000 802.11b/g access points obtained in two Paris districts in fall 2007. The data was produced while walking in the streets with Nokia smartphones and GPS receivers.
- For each access point, we retrieved its geographical coordinates and essential frame level information such as: SSID, BSSID, connection mode, security scheme, supported data rates, channel and information elements.

Security modes - Paris 5th and 13th



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



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.

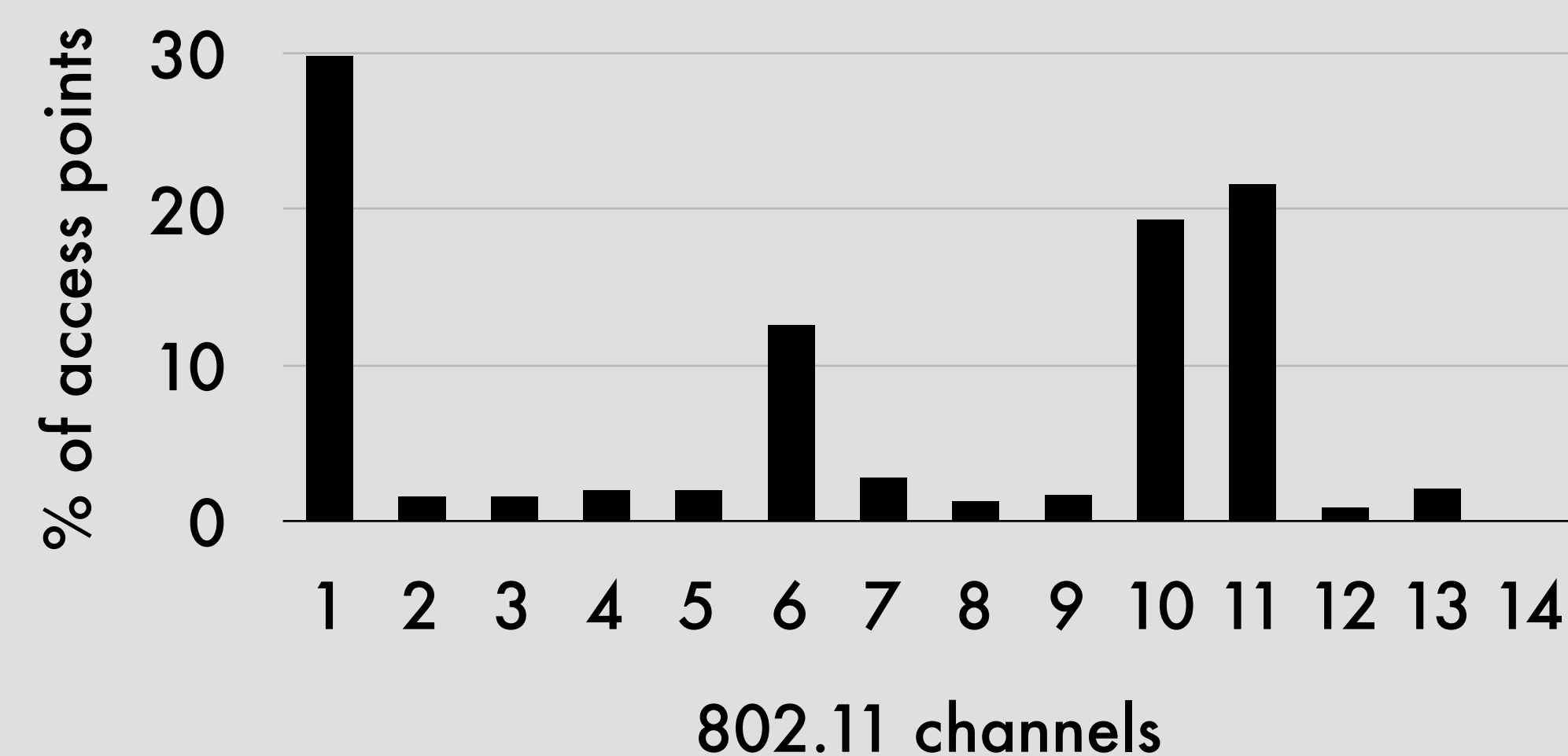
Manufacturers - Paris 5th and 13th

%	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.

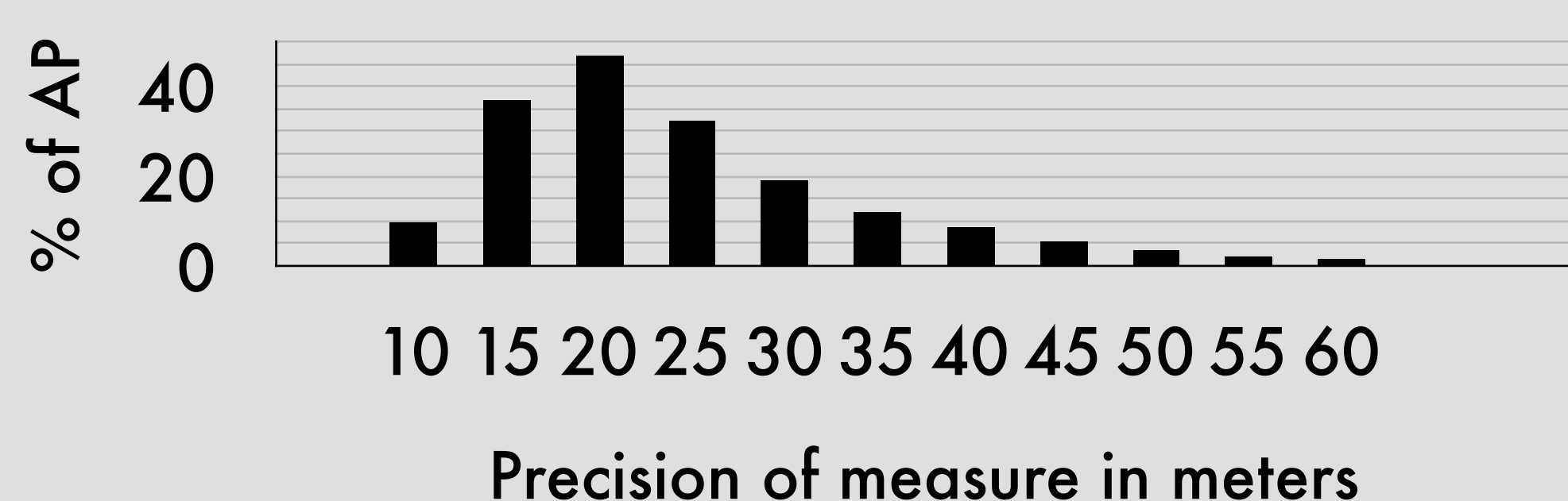
Channels - Paris 5th

- USA: 43% of access points use the default channel (6)
- Paris: 64% of access points use the 3 non-overlapping channels (1, 6, 11)



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

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