

## **Chapter 9**

# **Indoor Positioning**

## **9.1 WLAN Positioning**

### **9.1.1 Principles of WLAN Positioning**

- **Proximity sensing**
- **Lateration**
- **Fingerprinting**

## 9.1.2 WLAN Fingerprinting

Table 9.1 Example of a radio map

Position	Direction	RSS/[dBm] from 00:02:2D:51:BD:1F	RSS/[dBm] from 00:02:2D:51:BC:78	RSS/[dBm] from 00:02:2D:65:96:92
$p_1$	0°	-59	-75	-71
	90°	-54	-73	-67
	180°	-49	-72	-69
	270°	-55	-73	-65
$p_2$	0°	-35	-64	-50
	90°	-27	-64	-43
	180°	-40	-65	-52
	270°	-30	-60	-46
$p_3$	0°	-69	-66	-73
	90°	-65	-60	-68
	180°	-63	-66	-70
	270°	-68	-62	-76

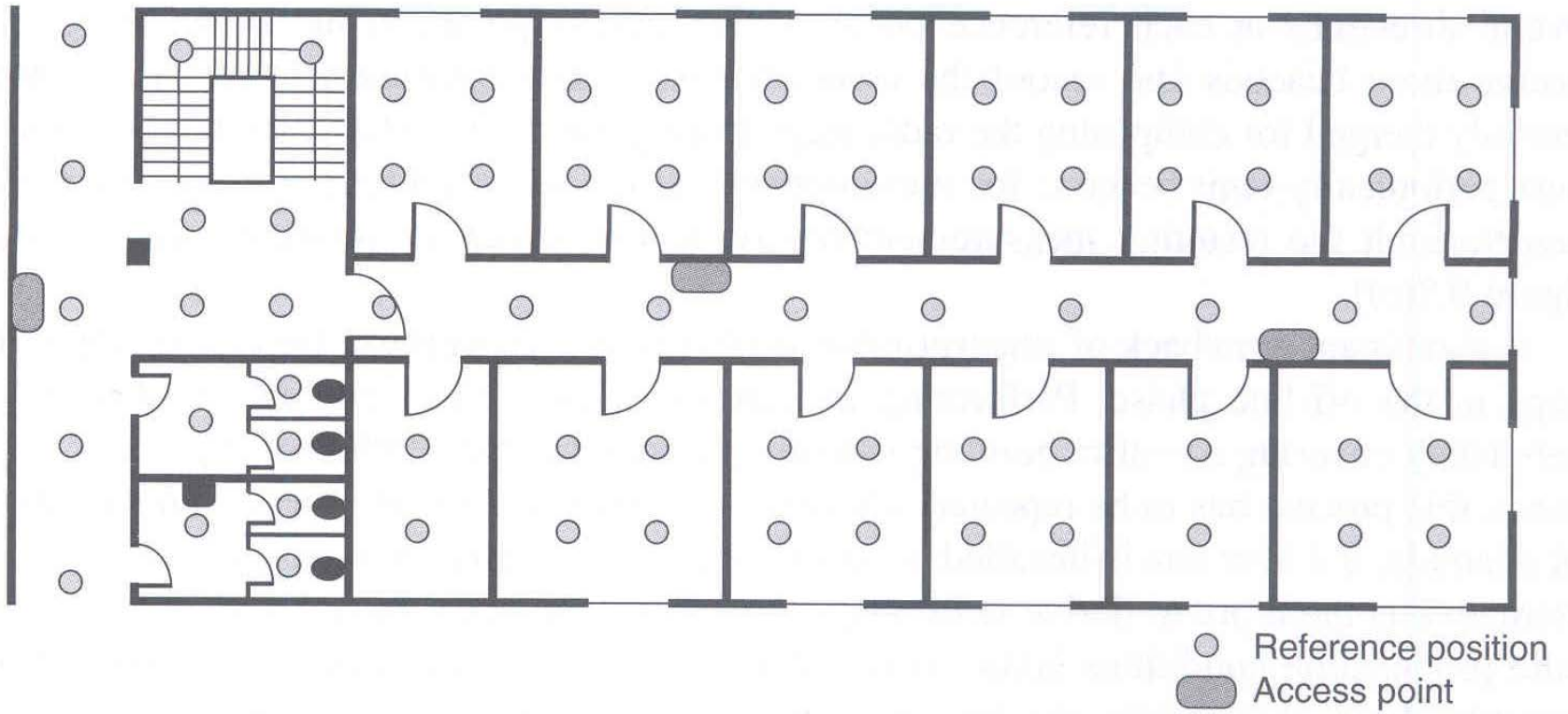


Figure 9.1 WLAN fingerprinting environment.

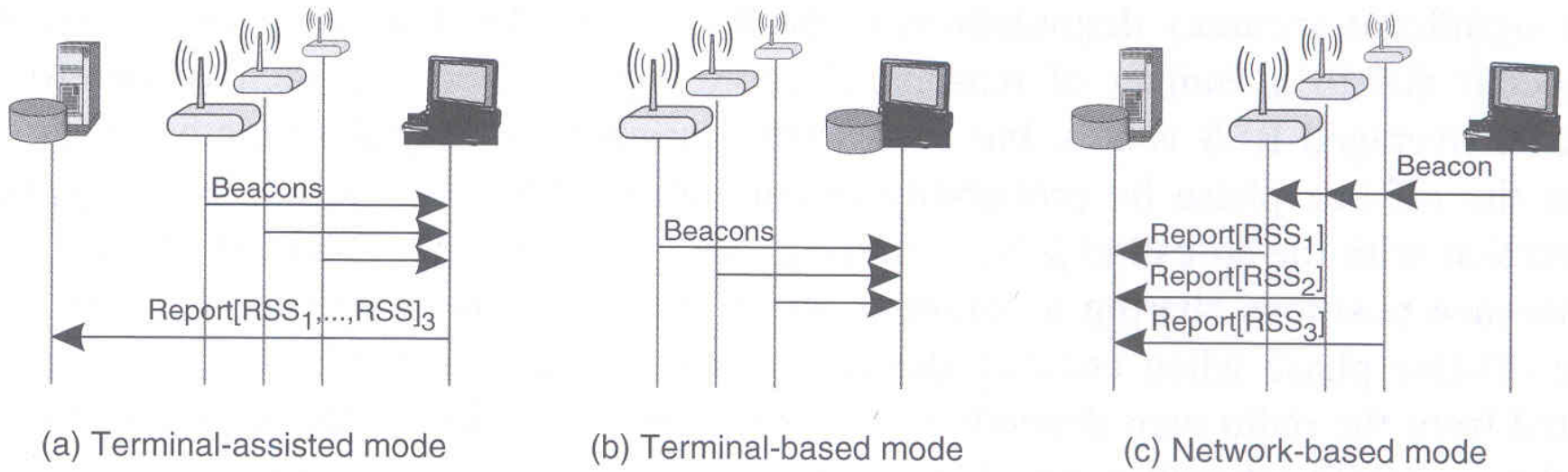


Figure 9.2 Modes for fingerprinting.

Table 9.2 Overview of WLAN fingerprinting systems. Adapted from (Wallbaum and Diepolder 2005)

System	Observable	Accuracy	Mode			Radio Map		Matching	
			ta	tb	nb	emp.	mod.	det.	prob.
RADAR	RSS	2.1 m/50%			×	×		×	
Ekahau	RSS	3.1–4.6 m/90%	×			×			×
Horus	RSS	2.1 m/90%		×		×			×
Nibble	SNR	10 m/80%	×			×			×
WhereMops	RSS	1.5 m/50% 6.0 m/95%		×			×		×

## **9.2 RFID Positioning**

## **9.3 Indoor Positioning with GPS**

## 9.4 Non Radiolocation Systems

### 9.4.1 Infrared-based Systems

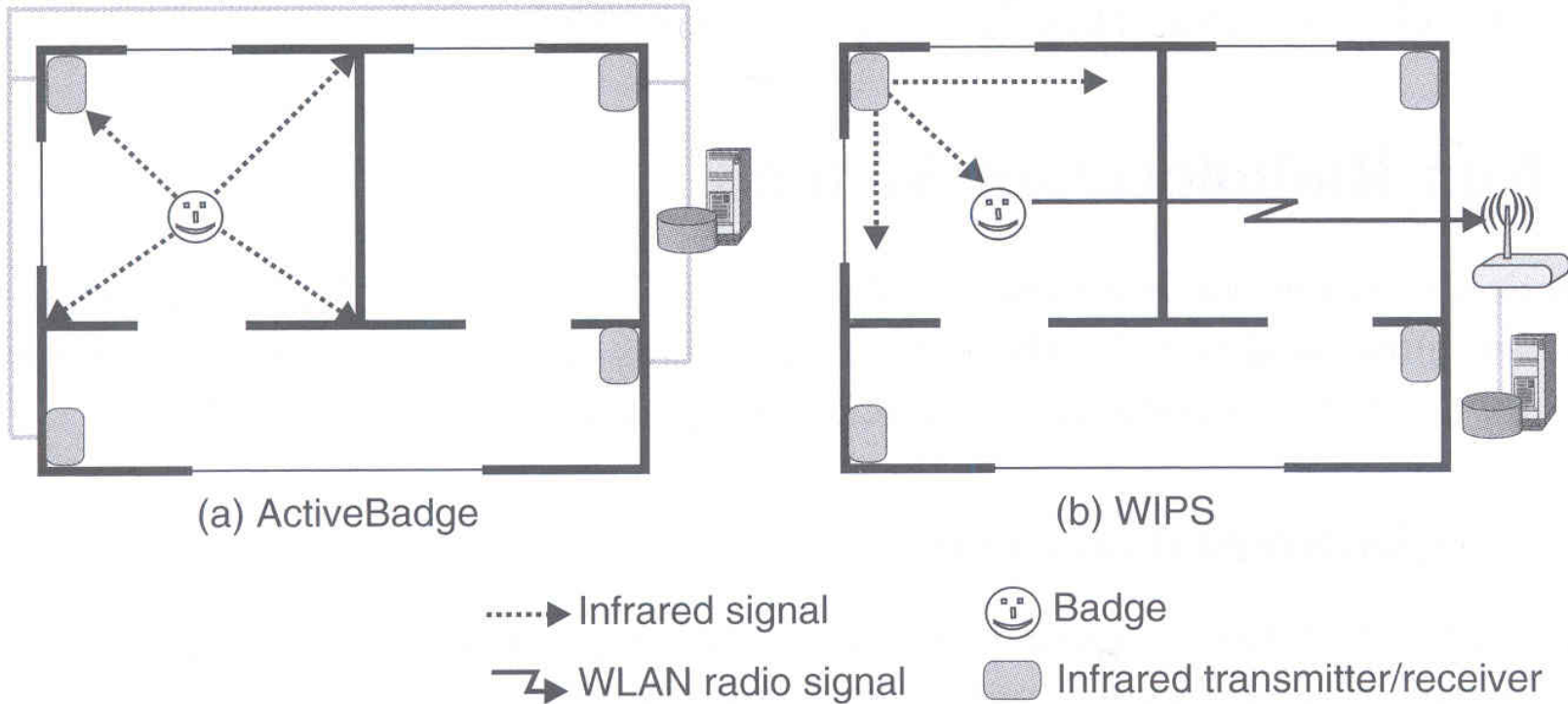


Figure 9.3 ActiveBadge and WIPS. Adapted from (Roth 2004).



## 9.4.2 Ultrasound-based Systems

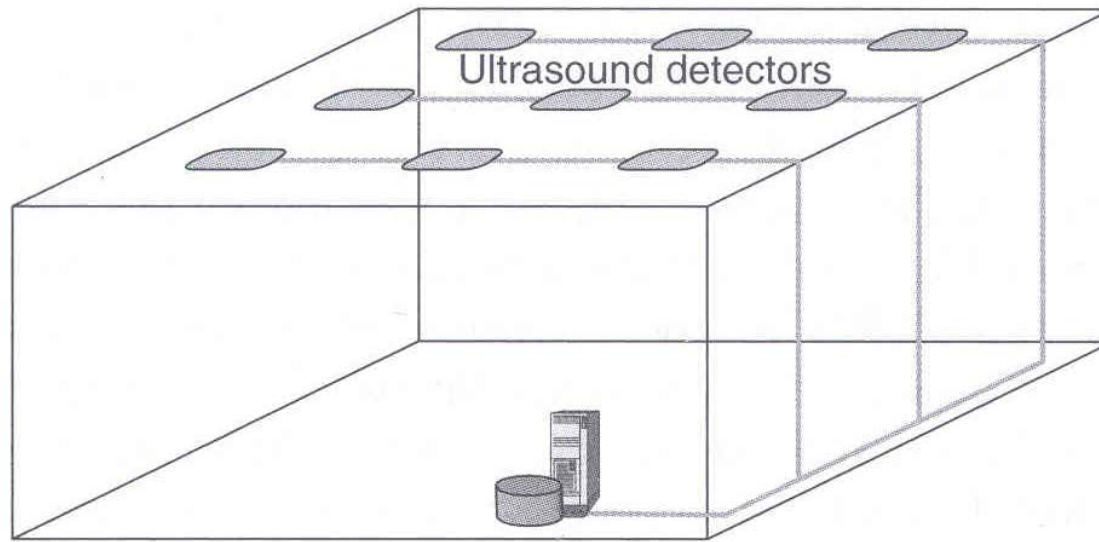


Figure 9.4 Ultrasound infrastructure.

## 9.5 Conclusion