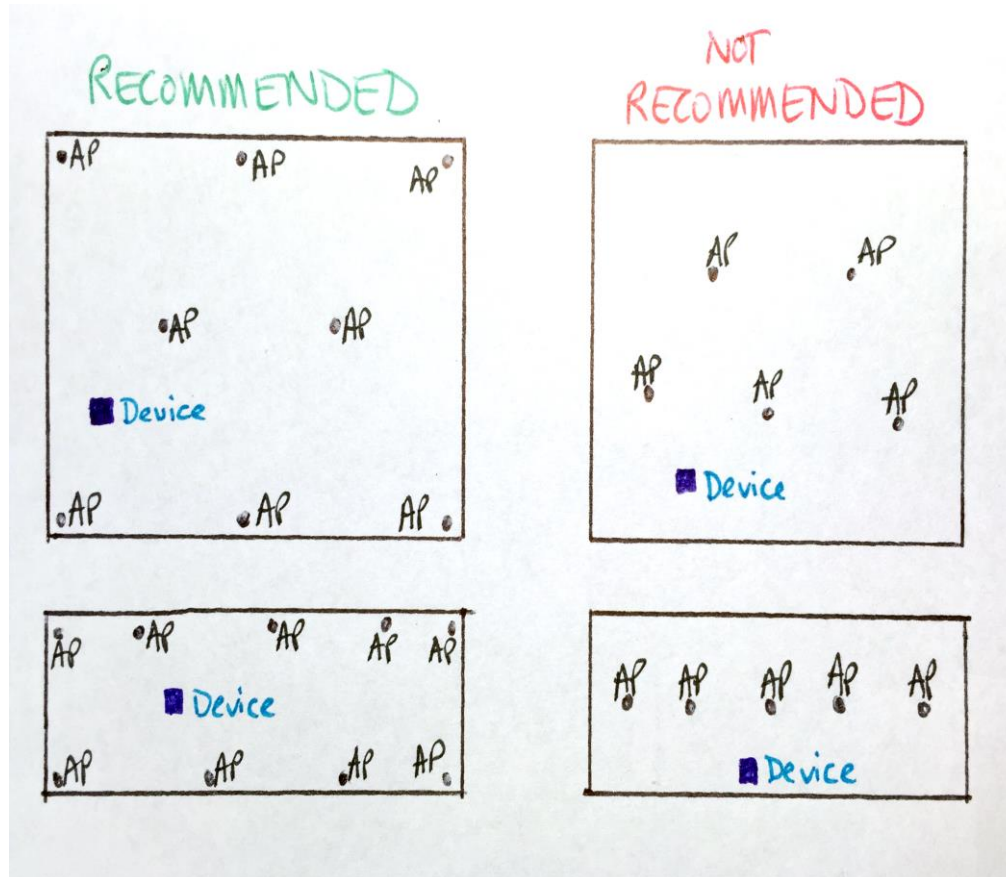


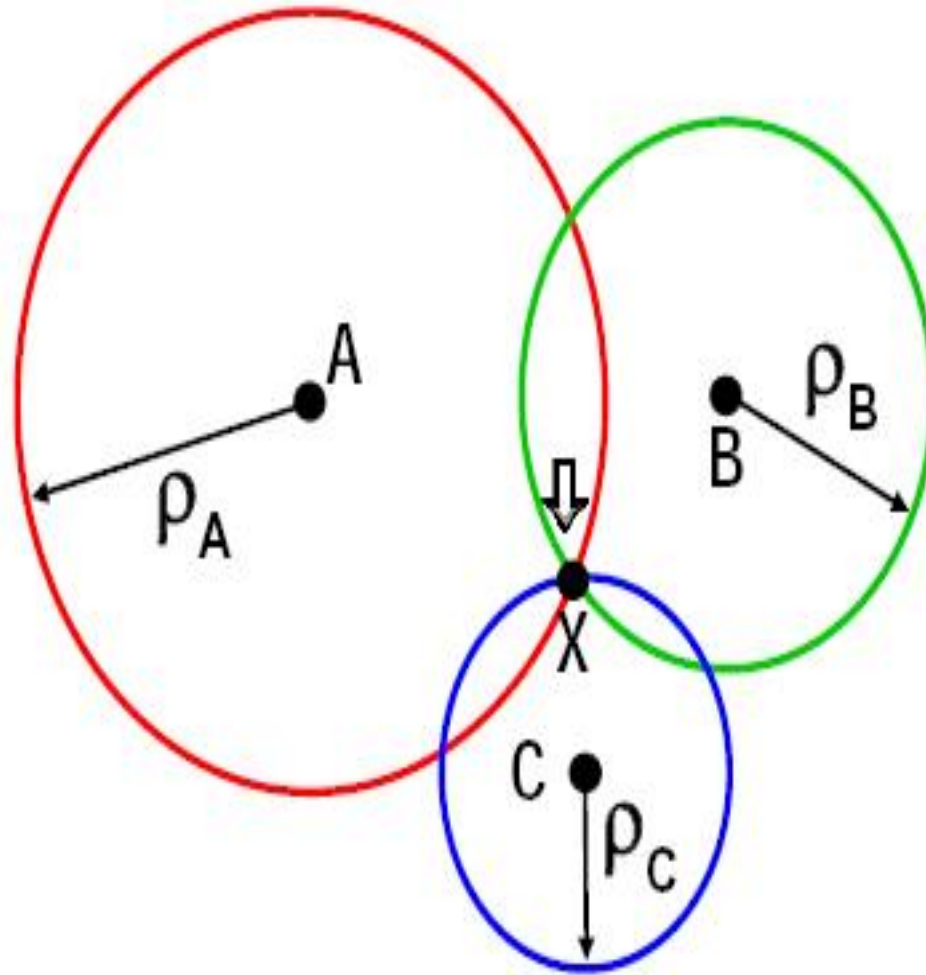
# The History of Location Tracking

Jennifer Huber  
Mobility Solutions Architect

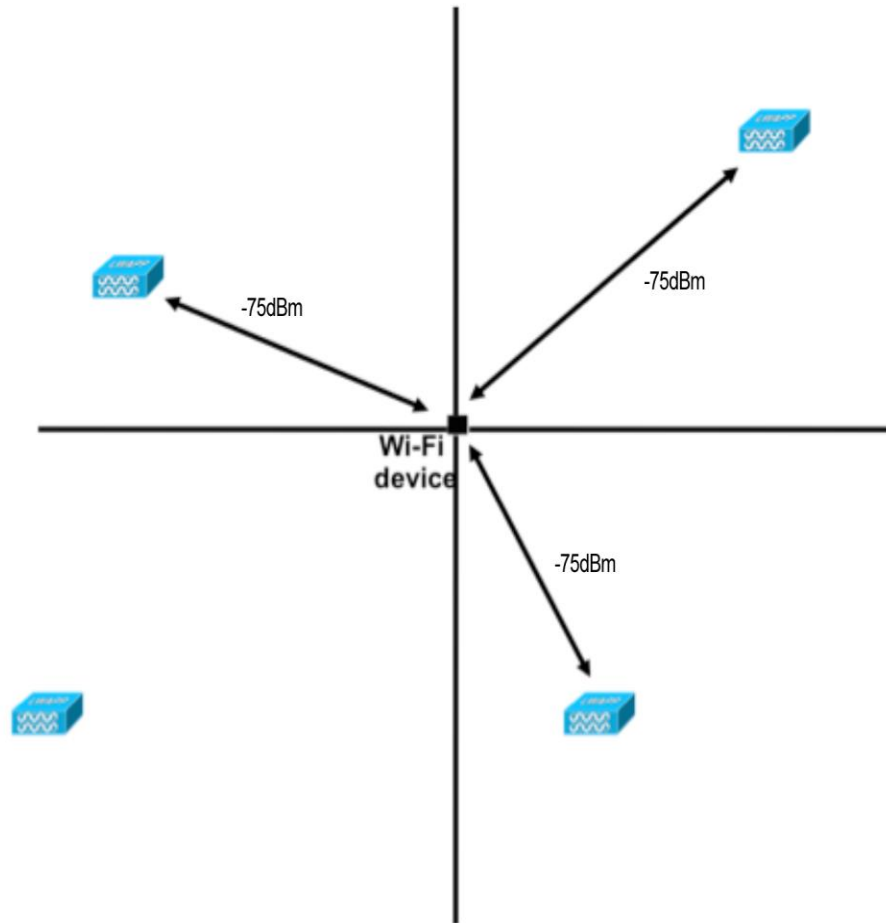
# RSSI Location Tracking: Best Practices



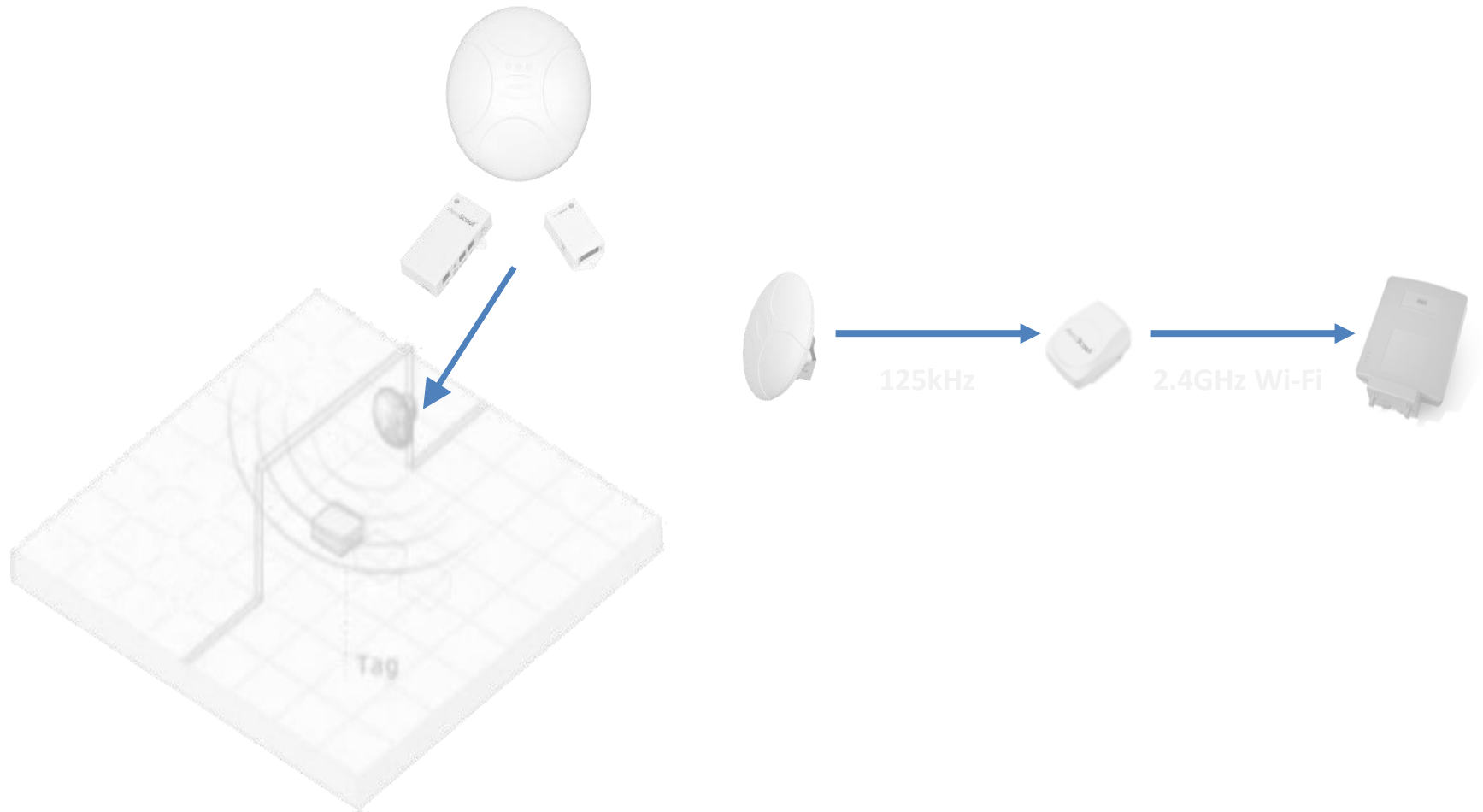
# Location Tracking: RSSI Triangulation



How do we define an RSSI location ready deployment?



# Precise RSSI Location Awareness Through RFID Exciters



# RSSI Location Tracking with Active RFID Tags



## T3 Tag

Flat Form Factor and  
Advanced Features for Wi-Fi  
Tags

Kisses Mother Tag  
Automatic Matching of  
Mothers and Infants

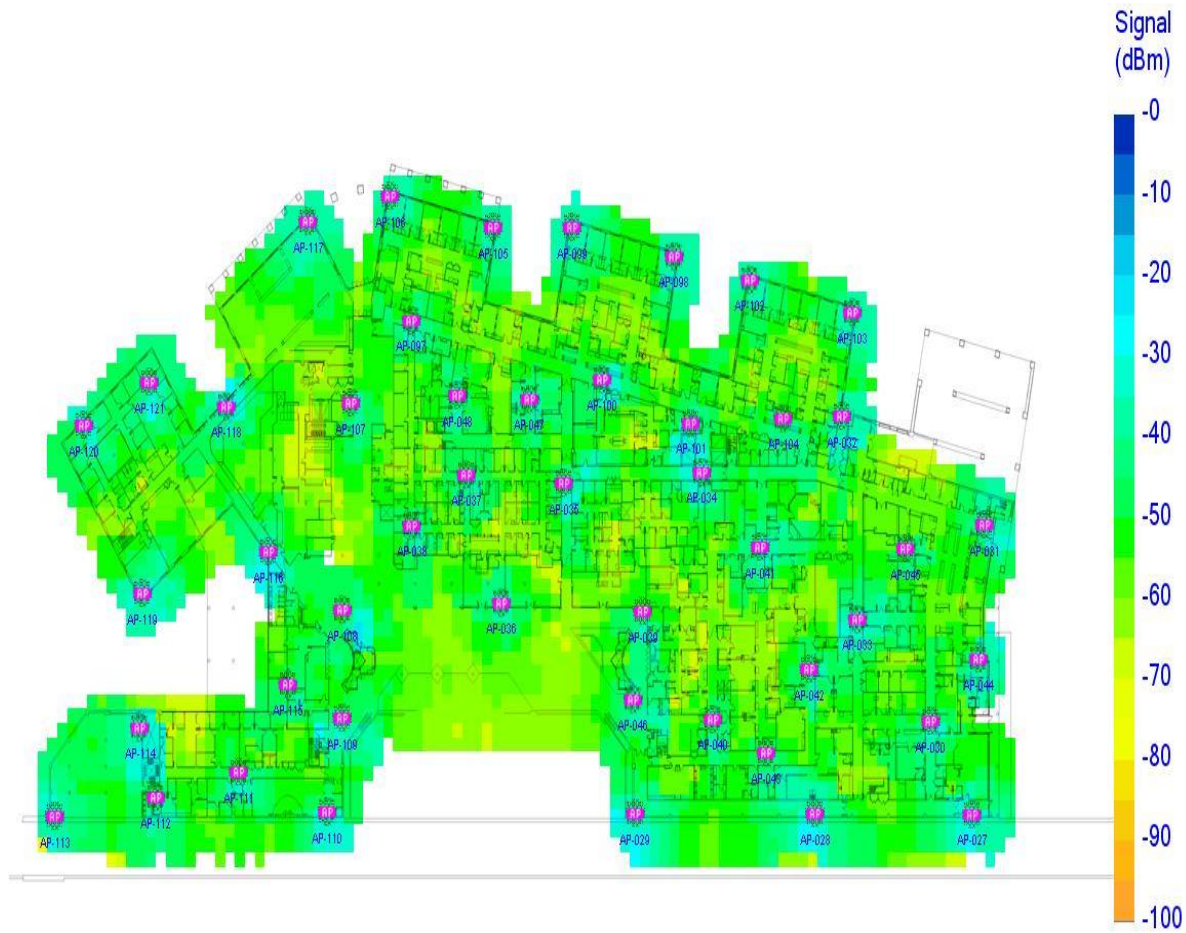


## T7a Autoclave Tag

First Wi-Fi RFID Tag that  
Withstands Rigorous  
Sterilization Processes

Hugs Infant Tag  
The Only Infant Wi-Fi Tag in  
Use Today

# RSSI Location Tracking: Before & After



# Bluetooth Low Energy (BLE)

Technical Specification	Classic Bluetooth technology	Bluetooth low energy technology
Distance/Range (theoretical max.)	100 m (330 ft)	50 m (160 ft)
Over the air data rate	1–3 Mbit/s	1 Mbit/s
Application throughput	0.7–2.1 Mbit/s	0.27 Mbit/s
Active slaves	7	Not defined; implementation dependent 128-bit AES with Counter Mode CBC-
Security	56/128-bit and application layer user defined	MAC and application layer user defined Adaptive frequency hopping, Lazy
Robustness	Adaptive fast frequency hopping, FEC, fast ACK	Acknowledgement, 24-bit CRC, 32-bit Message Integrity Check
Latency (from a non-connected state)	Typically 100 ms	6 ms
Total time to send data (det.battery life)	100 ms	3 ms , <3 ms
Voice capable Network topology	Yes	No
Network Topology	Scatternet	Scatternet
Power consumption	1 as the reference	0.01 to 0.5 (depending on use case)
Peak current consumption	<30 mA	<15 mA
Service discovery	Yes	Yes
Profile concept	Yes	Yes
Primary Use Case	Mobile phones, gaming, headsets, stereo audio streaming, automotive, PCs, security, proximity, healthcare, sports & fitness, etc.	Mobile phones, gaming, PCs, watches, sports and fitness, healthcare, security & proximity, automotive, home electronics, automation, Industrial, etc.



# iBeacon Range

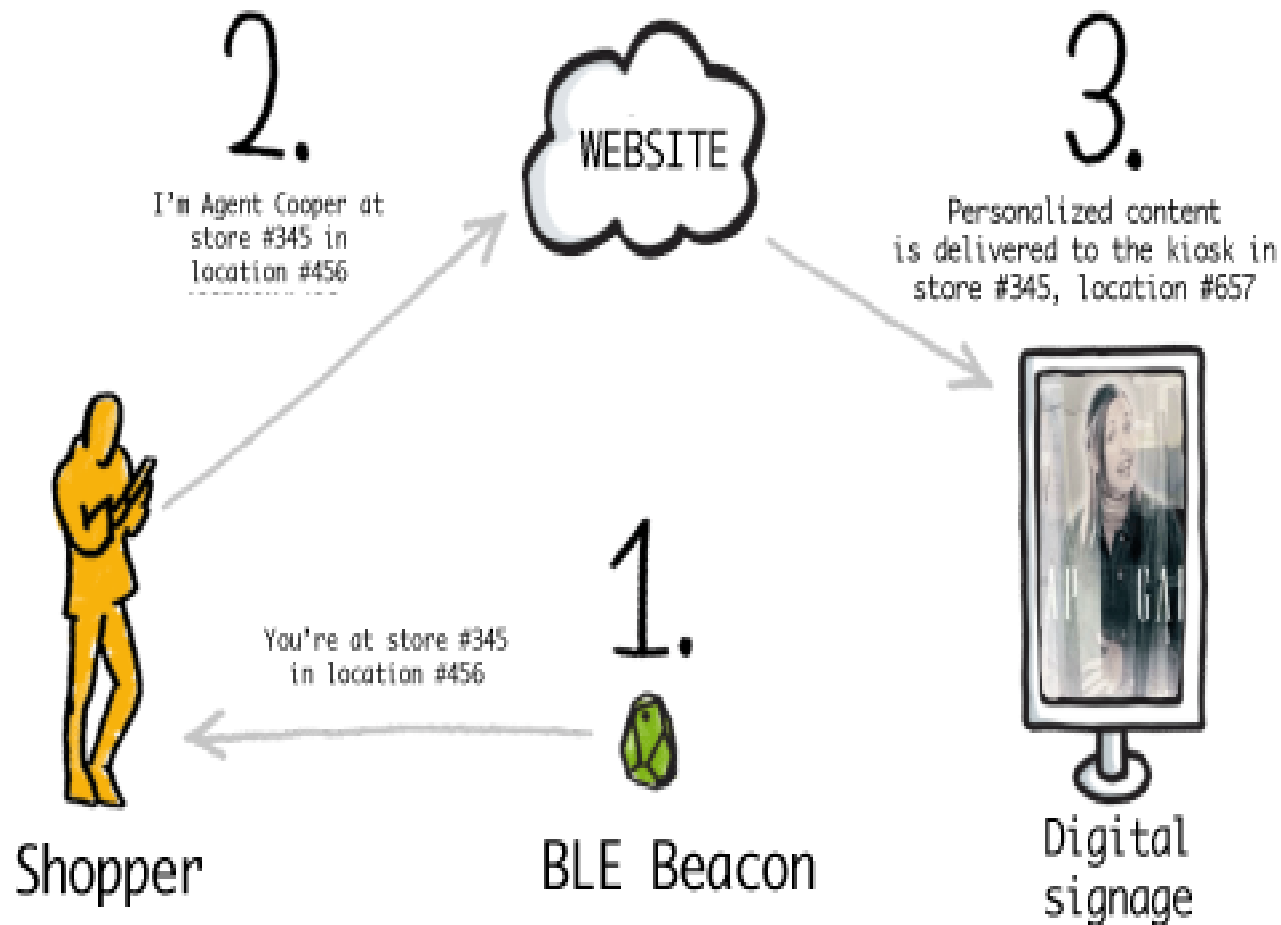
## Signal zones of iBeacon:

- 0 – 0.5m Immediate
- 0.5 – 2m Near
- 2 – 30m Far

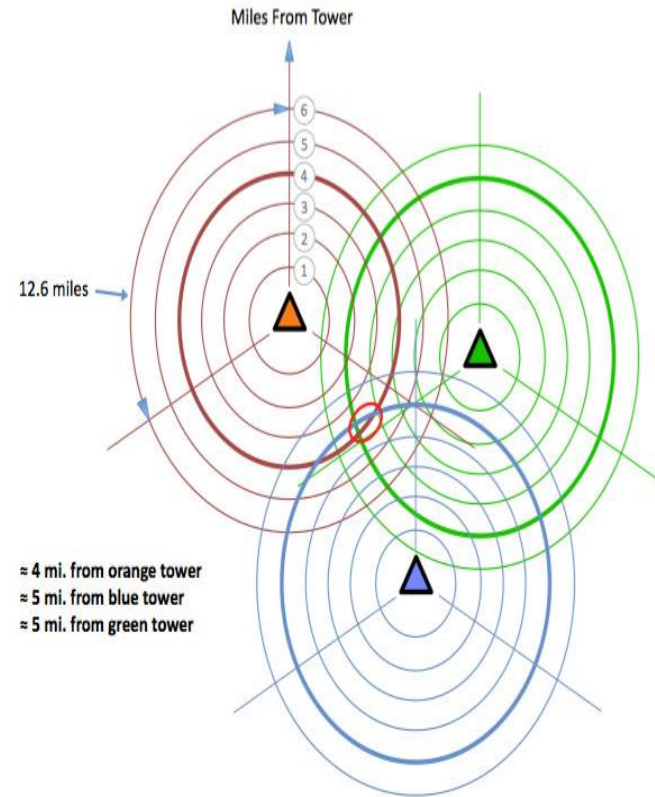
Device can track if it enters or leaves a signal zone



# Bluetooth Low Energy (BLE)

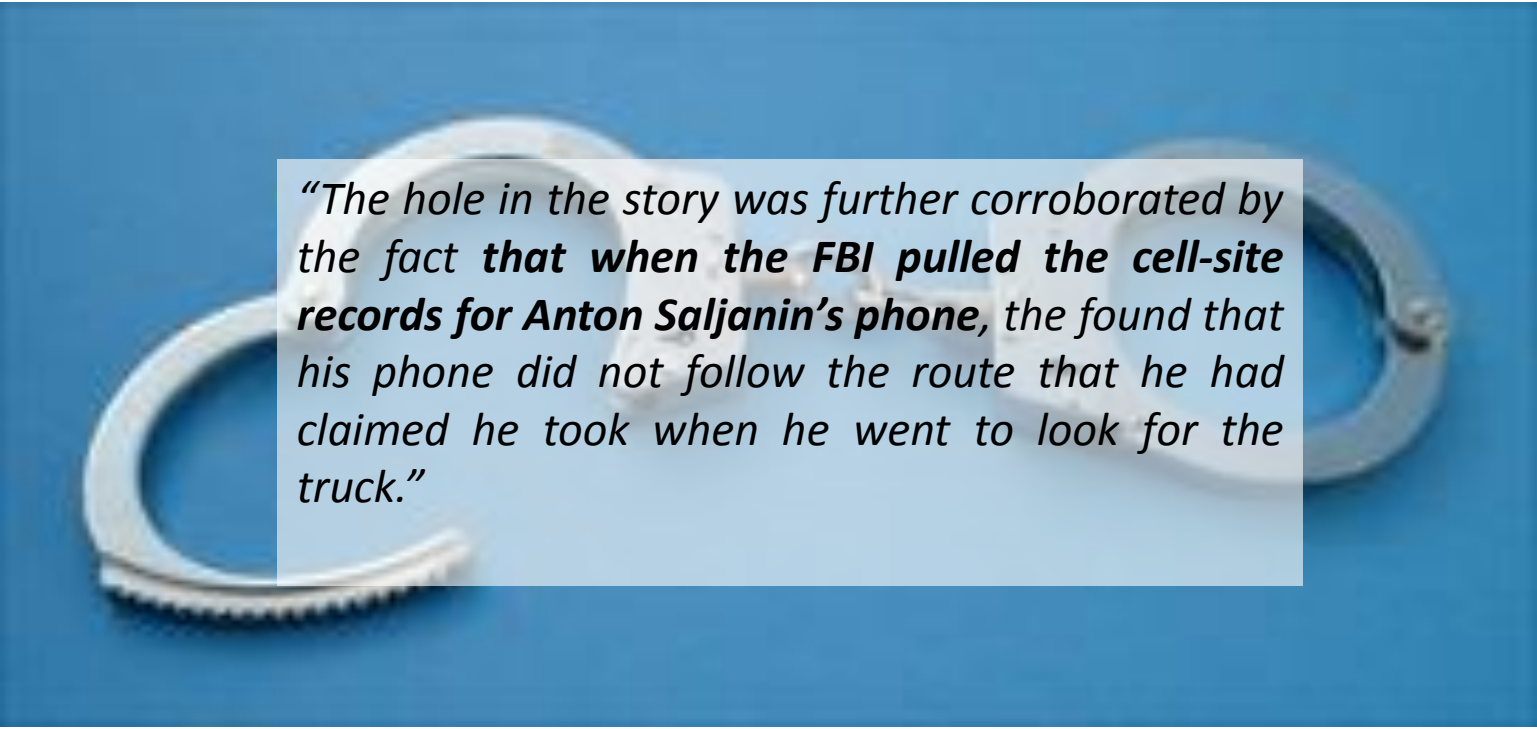


# Location Triangulation Is Not New!



# Apprehending Thieves

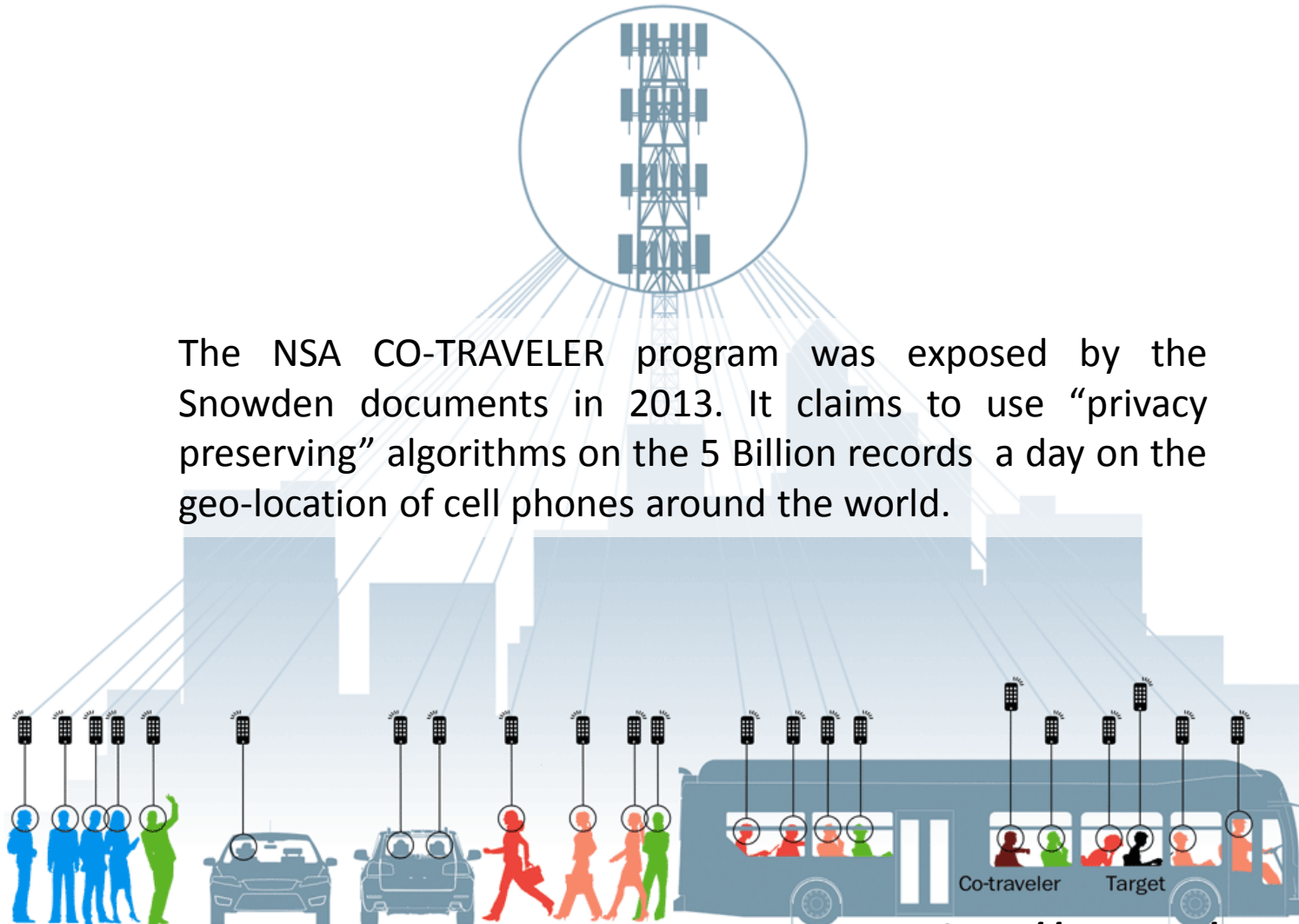
**Four Defendants Charged In White Plains Federal Court In Connection With Heist Of Over \$1 Million Worth Of Computers Bound For Public High School Students**



*“The hole in the story was further corroborated by the fact **that when the FBI pulled the cell-site records for Anton Saljanin’s phone**, the found that his phone did not follow the route that he had claimed he took when he went to look for the truck.”*

# NSA Smartphone Tracking

The NSA CO-TRAVELER program was exposed by the Snowden documents in 2013. It claims to use “privacy preserving” algorithms on the 5 Billion records a day on the geo-location of cell phones around the world.



<http://wapo.st/18iGVhG>

# Gamification of Shopping



Shopkick



Fieldagent



Swagbucks



Stepsaway



Gigwalk



Checkpoints



# Angle of Arrival

Purportedly will increase Wi-Fi location accuracy to within 1 meter.

