A novel cognitive engine towards geo-location based vertical Handoff decision

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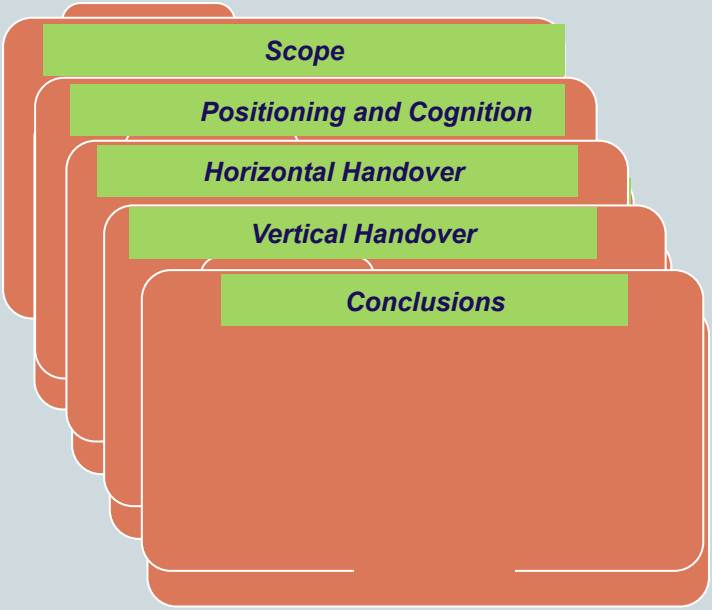
Outline


Scope
Positioning and Cognition
Horizontal Handover
Vertical Handover
Conclusions

Scope of work

The **scope** of this work is:

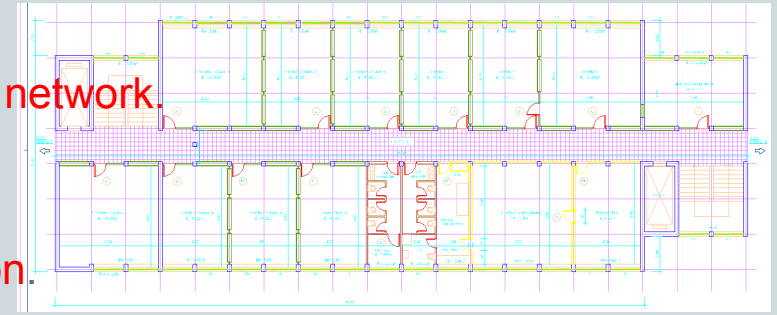
To present a use case scenario in indoor environments, regarding position based **Horizontal Handoff** decision and execution.

To present **Vertical Handover scenario** that results by considering a cognitive engine where Positioning data and sensed environmental metrics are used for the Cognitive Decision to be initiated

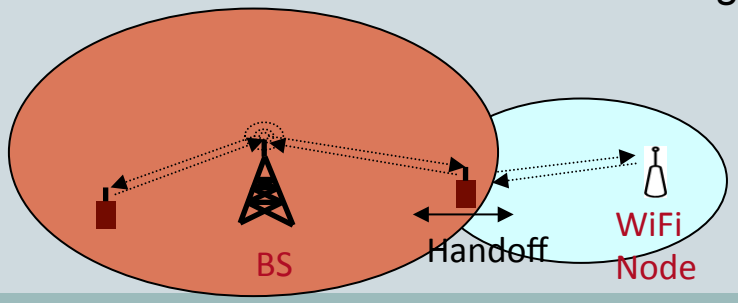
Positioning

Geo-location steps leading to handover

- **Learning Phase**
  - Creation of a database with position, radio and performance map.
- **Cognitive Decision Engine Integration**
  - Monitoring in a periodic way the holistic view of the network.
  - Identification of imminent handoff event.
  - Decision of the appropriate Access Point association.
- **Geo-Location based handover**
  - Execution of the handoff decision.



Positioning



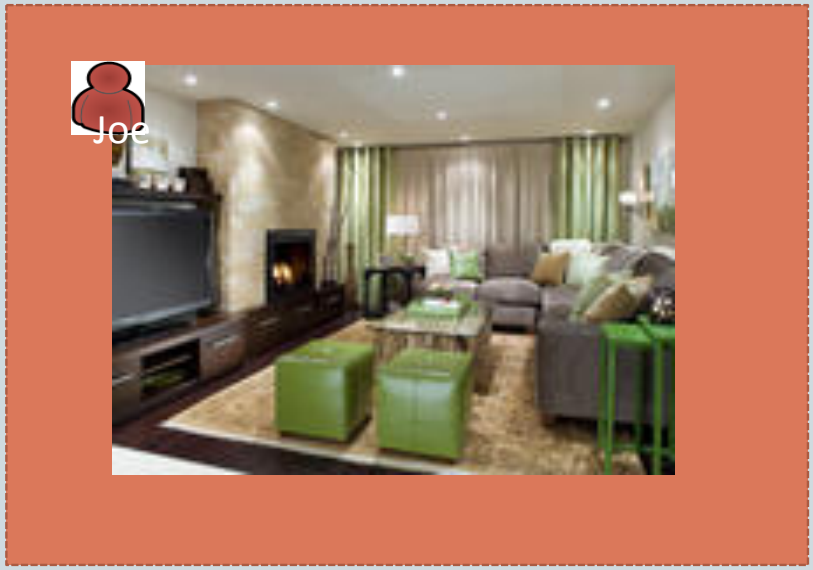
Cognitive cycle

Geo-location of a user's terminal

Positioning:

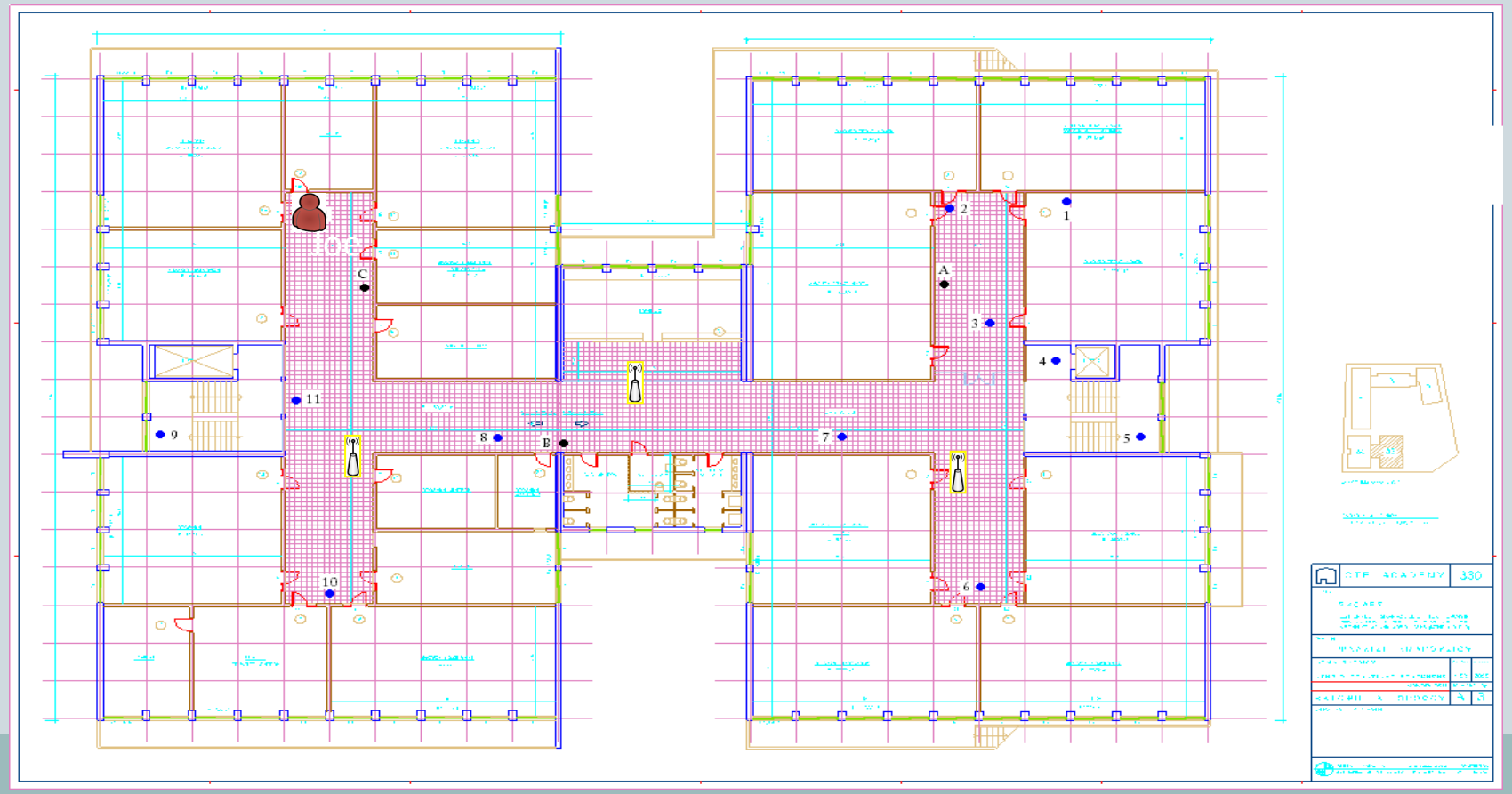
Enable **indoor** user location

- To offer him proper services
- To improve network efficiency
- To help user find his way

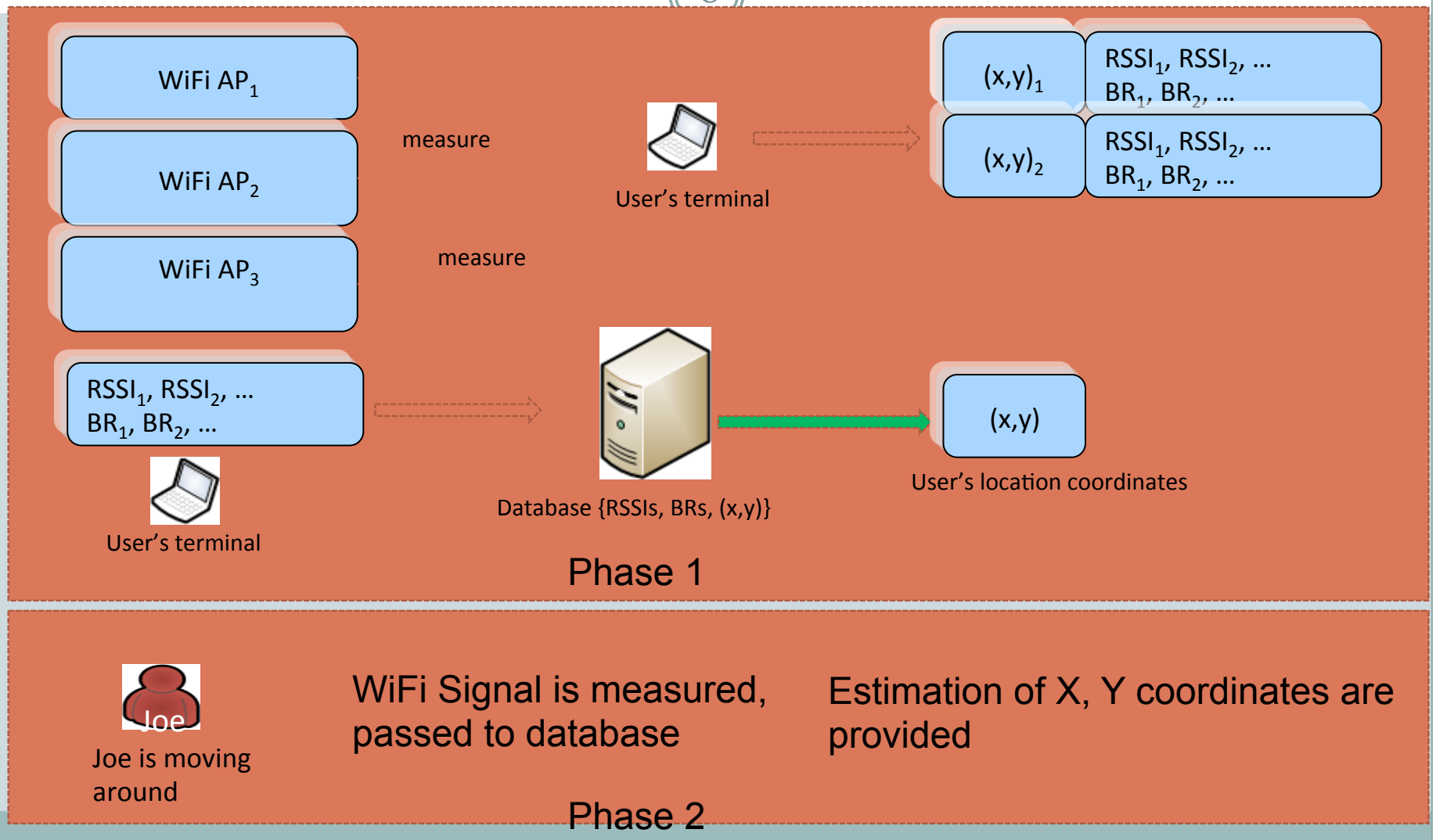


Algorithms for estimating the position

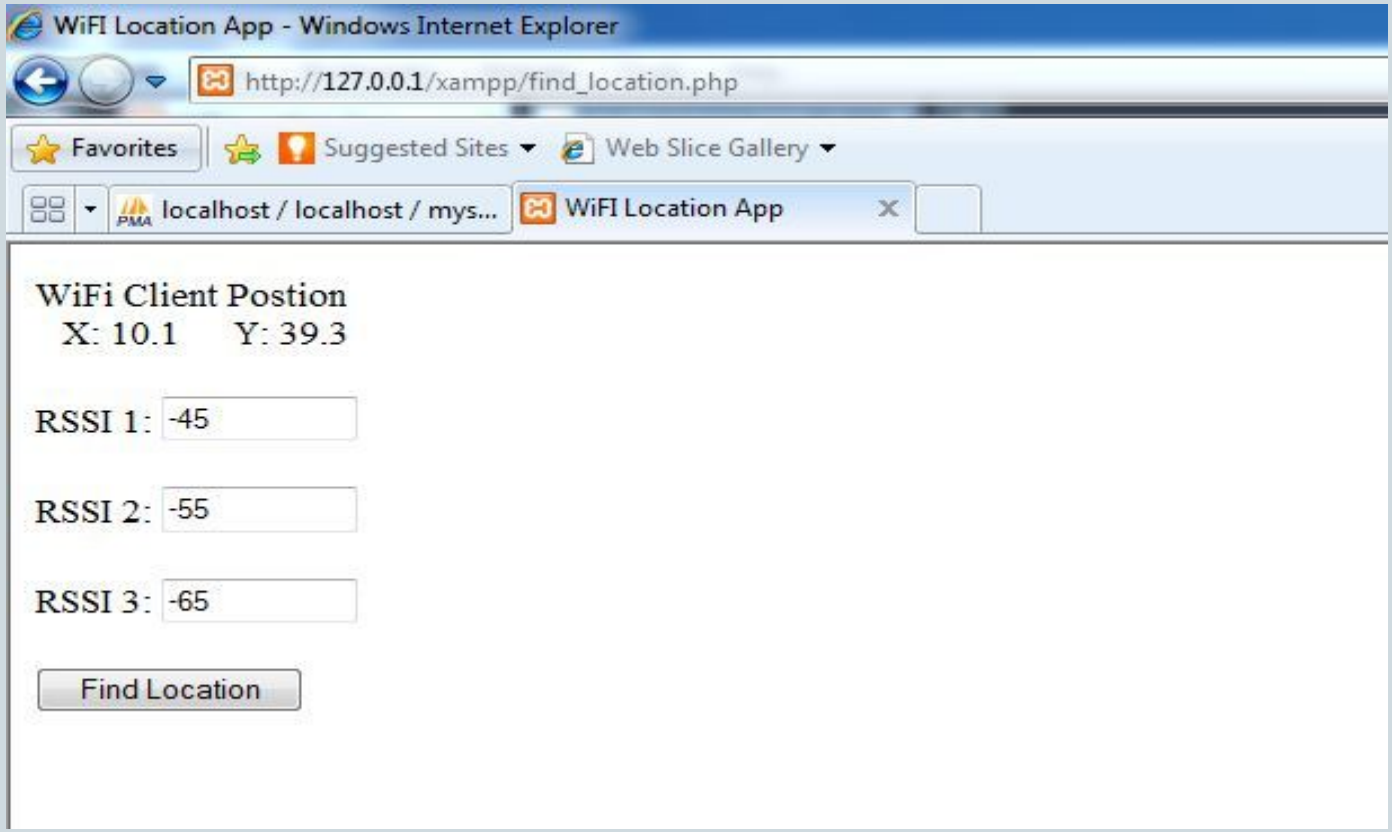
Use **localization** algorithms for predicting the user position. Fingerprinting method was used for various **WiFis 11g,n** by measuring **RSSI, bit rate (BR)** and the distance of the user from three different WiFis for LOS and NLOS cases.



Fingerprinting phases



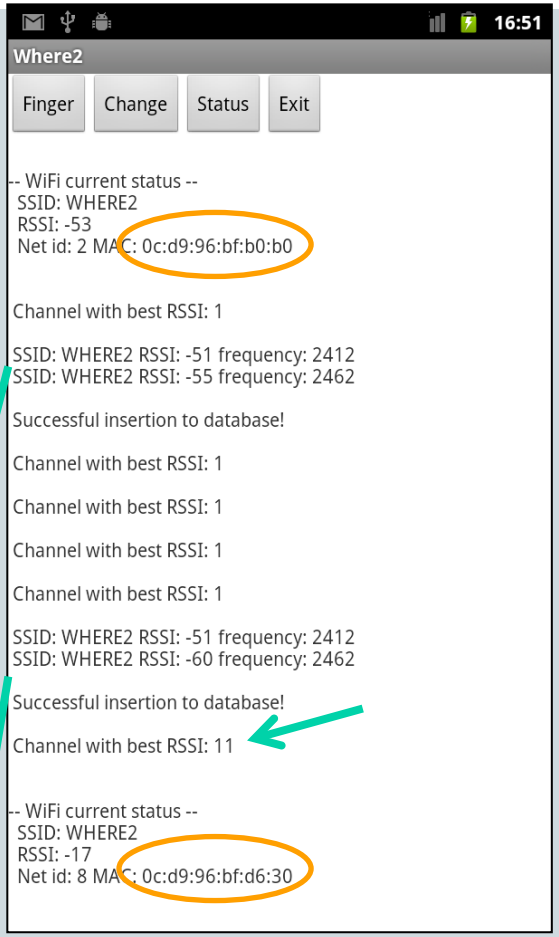
Positioning: Communication of terminal with database for the prediction of terminal's position

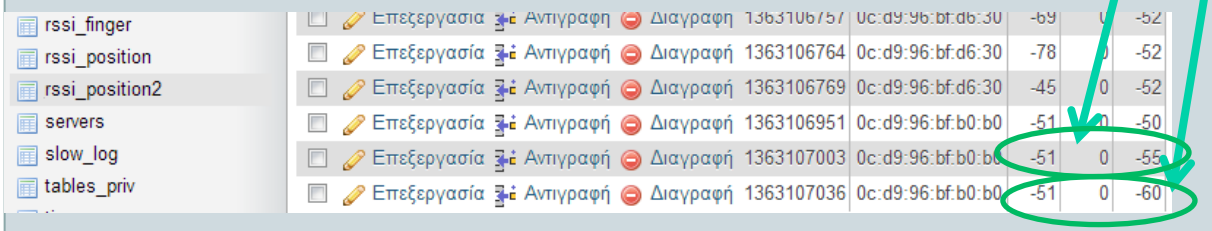


Horizontal Handover of a terminal between WiFi nodes

- Features:
  - Status Wifi networks (RSSI, SSID, channel, frequency, mac, etc.)
  - Change (connect to the AP (i.e., channel) with best RSSI)
  - Finger (RSSIs from specific Aps, insertion of those in MySql DB)

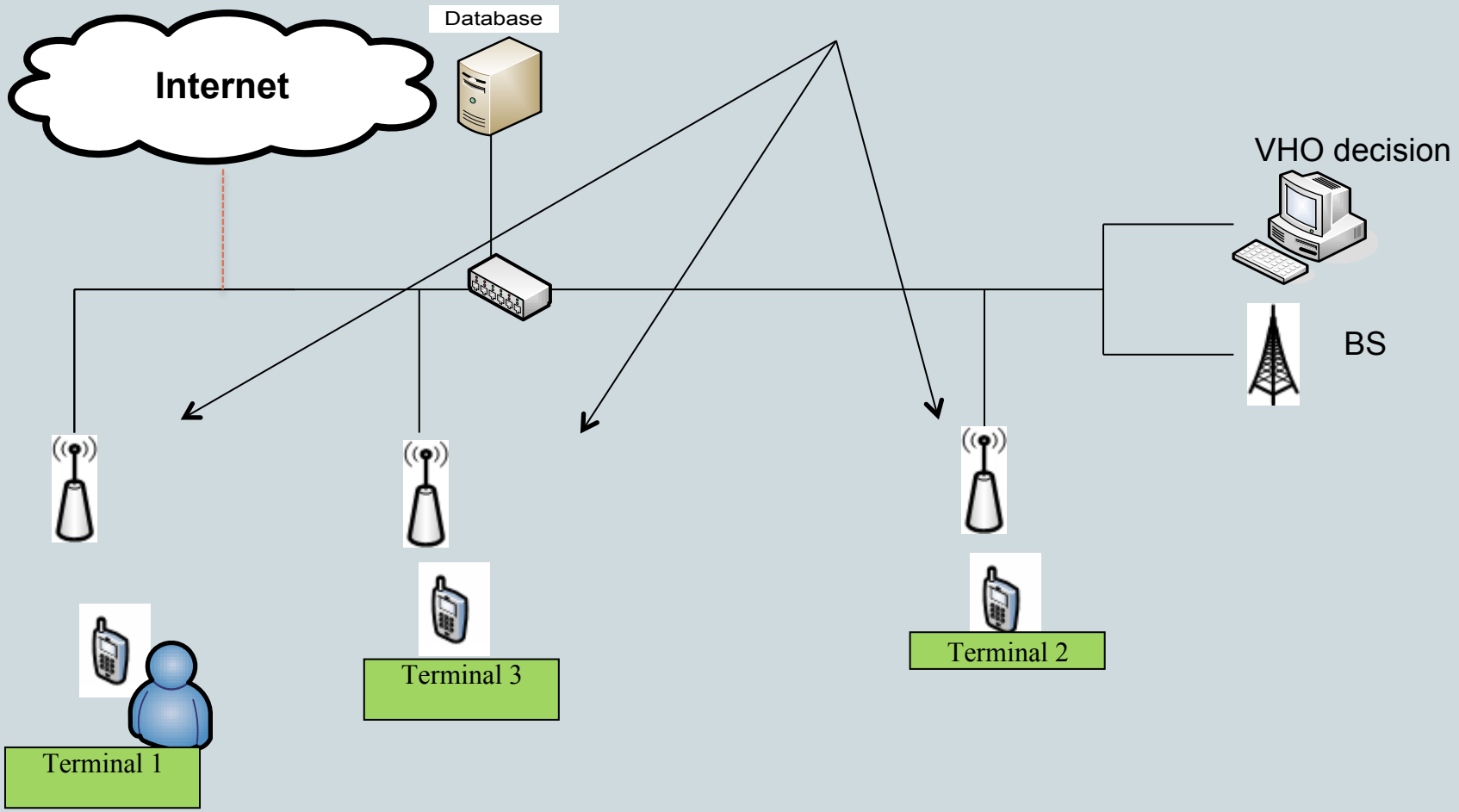
HHO between different WiFis





Vertical handover

Vertical Handover



Vertical Handover

- Coverage and Capacity Optimization of Wireless Access Network:
  - We performed:
    - The assignment of operating frequencies and/or channels to wireless network elements i.e. Access Points
    - Horizontal and Vertical assisted Handover of Multi-RAT (WiFi & mobile terminals)

- Testbed consisted of
  - WiFi access points and one Mobile base station for demonstrating the cognitive process

Danke

Thank you

Merci

Hvala vam

Obrigado

Ευχαριστω

Gracias

Grazie