

# Implementation of Vertical Handover Solution for Coexisting Ad-hoc Multihop and Infrastructure Access Networks based on IEEE 802.11

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# Outline:

- Introduction
- Network Architecture
- Inter-System Handover Solution
- Case Study
- Conclusions



# Introduction

- Beyond 3G Systems heterogeneous networks.
- Importance of Ad-hoc Networks.
- Coexistence of different types of access technologies.
- Versatility of IEEE 802.11, dynamic configuration.

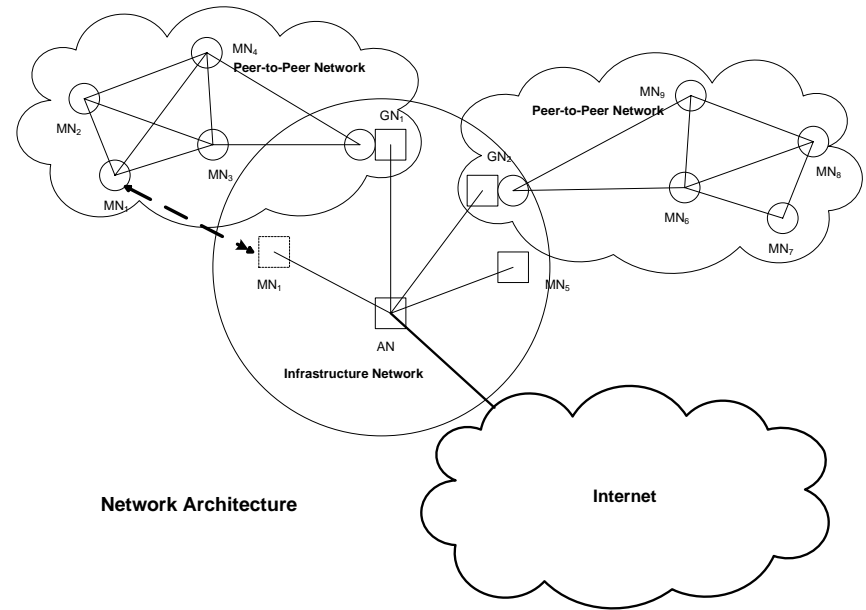
# Network Architecture

## ■ Network Architecture.

- Extend Coverage using peer-to-peer networks.

## ■ Functional Entities:

- Access Node (AN).
- Gateway Node (GN).
- Mobile Node (MN).

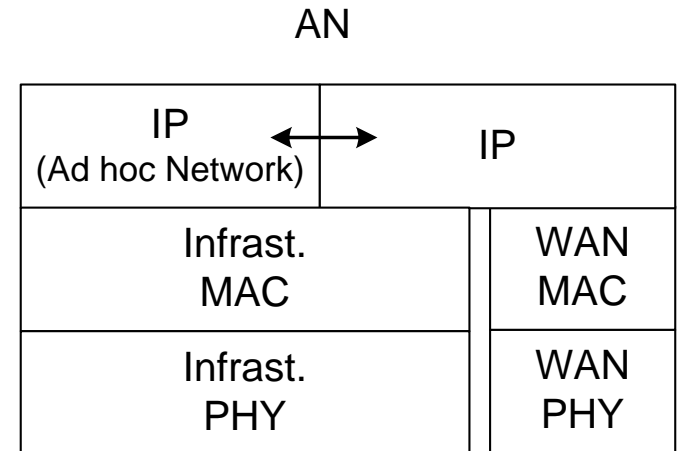


# Network Architecture (II)

## Functional Entities

### ■ Access Node

- Provide access to the Internet.
- Network level.
- NAT, tunneling, firewalling...



# Network Architecture (II)

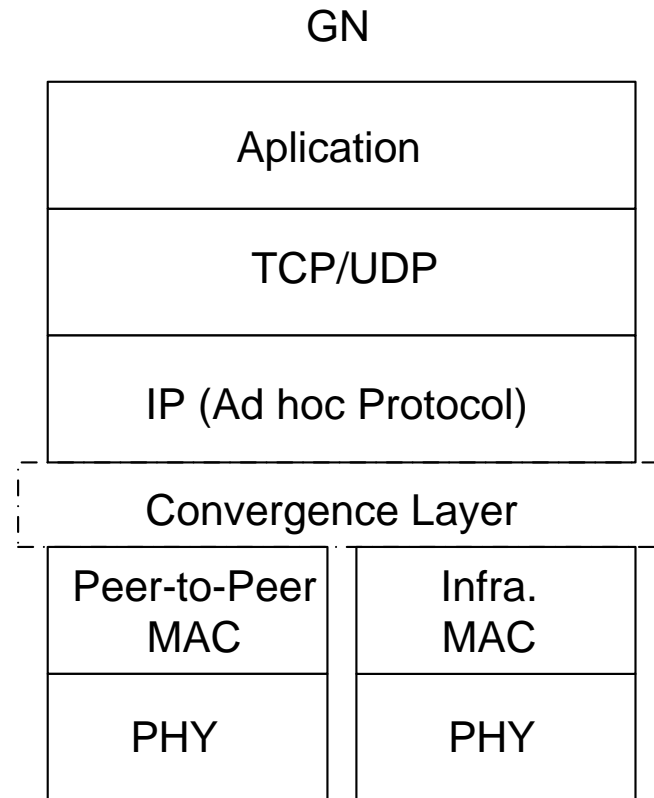
## Functional Entities

### ■ Access Node

- Provide access to the Internet.
- Network level.
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### ■ Gateway Node

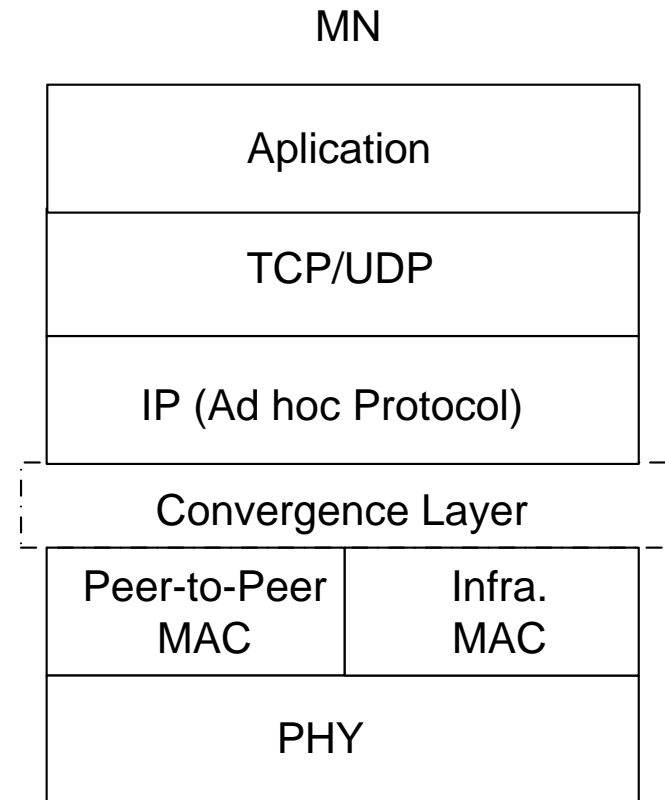
- Two interfaces.
- Enable MNs to reach the AN in multihop way.
- Convergence Layer.



# Network Architecture (III)

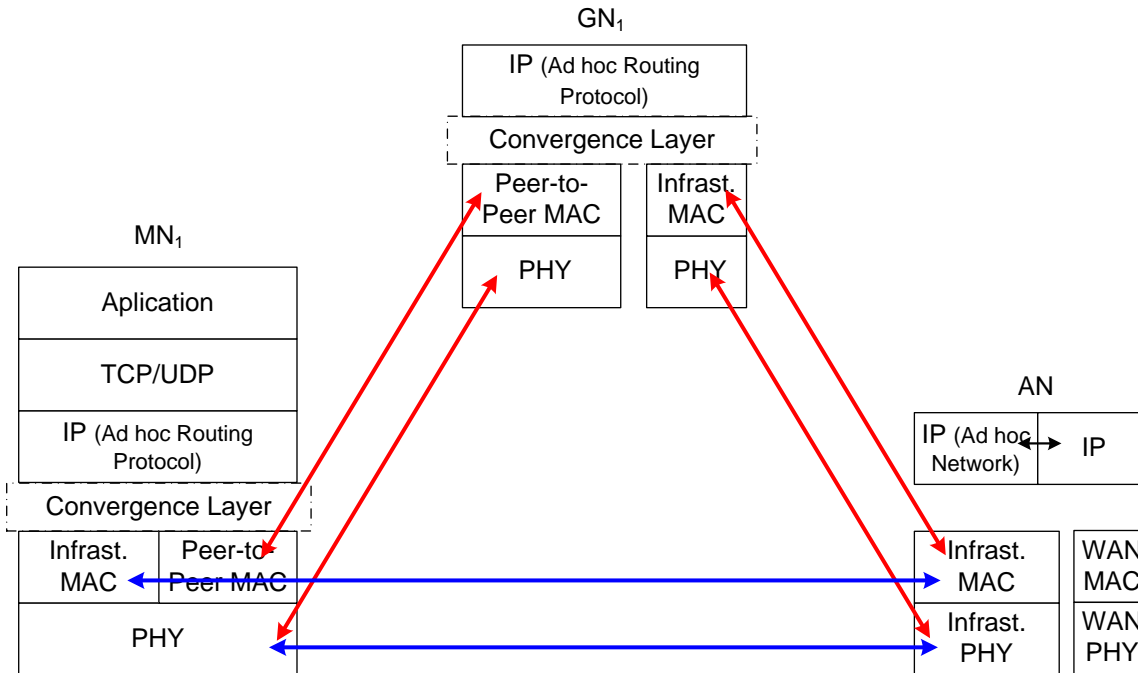
## Functional Entities

- Mobile Node
  - Work on single access mode.
  - Convergence layer. Manager wireless interfaces.
- Each node select the most appropriate access network



# Inter-System handover solution

Handover of a MN from a Peer to Peer Network to an infrastructure network



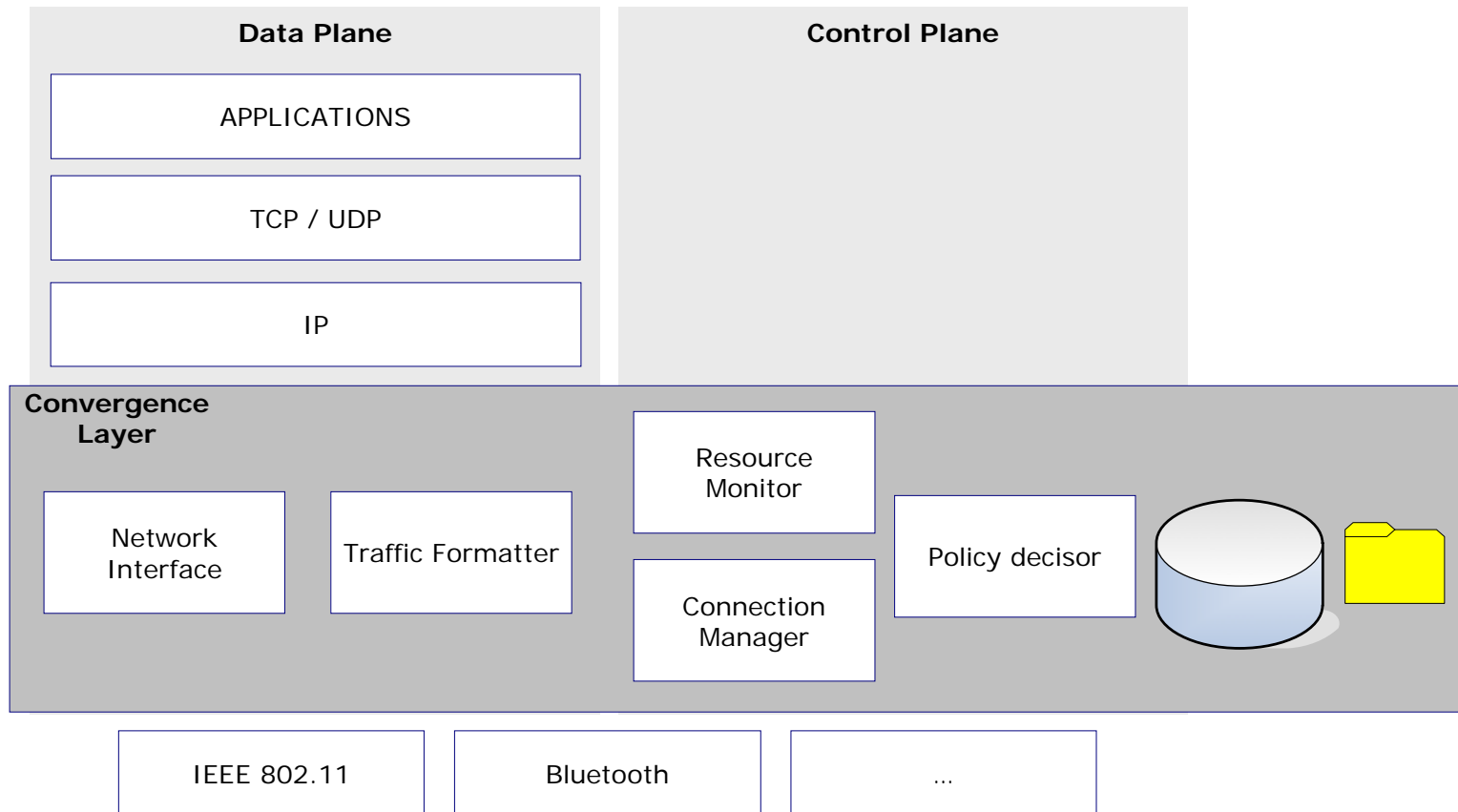
## ■ Challenges:

- Heterogeneity support.
- Cross-layer optimization.
- Reconfigurability of wireless interfaces.



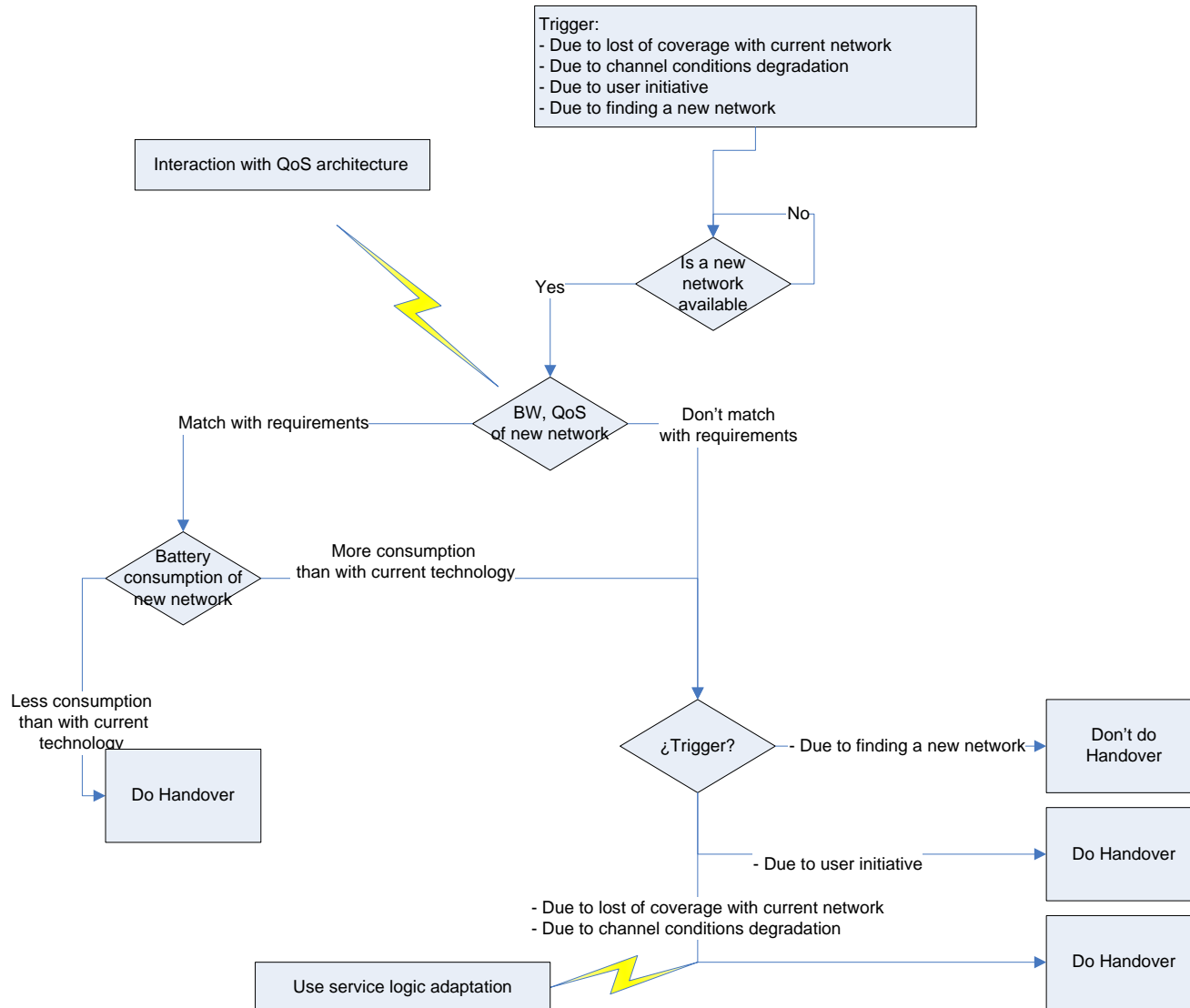
# Inter-System handover solution (II)

## Convergence Layer



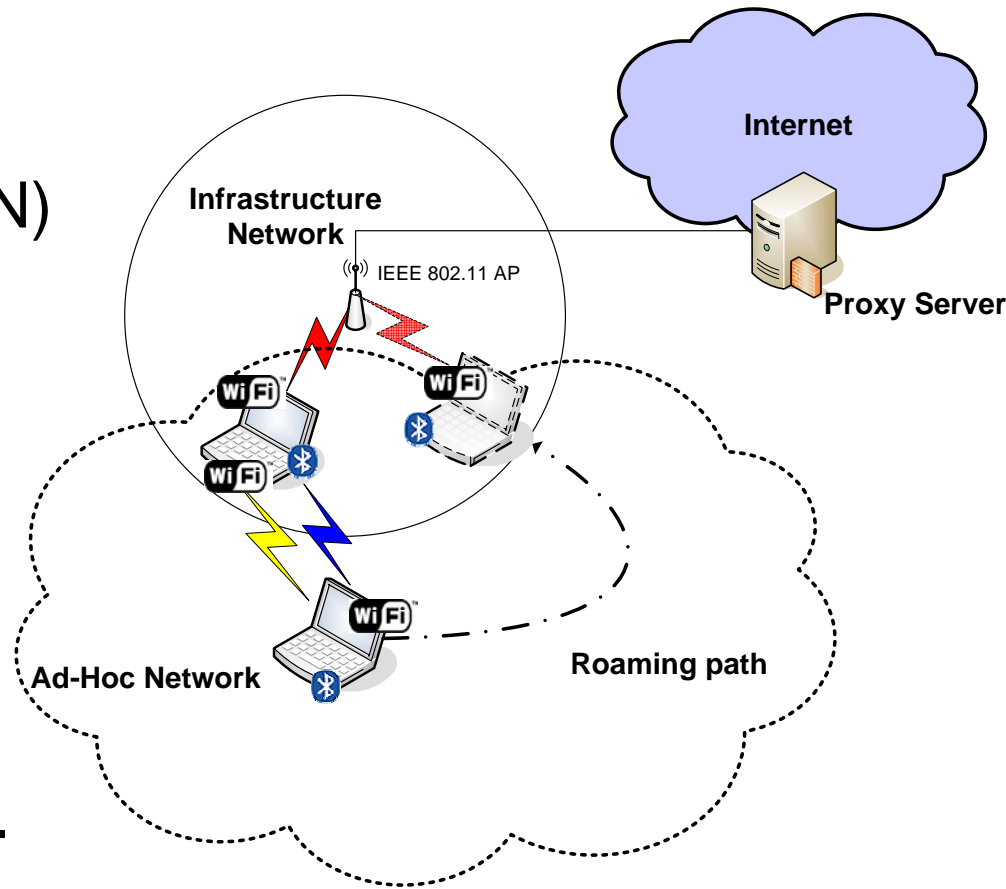
# Inter-System handover solution (III)

## Handover decision process



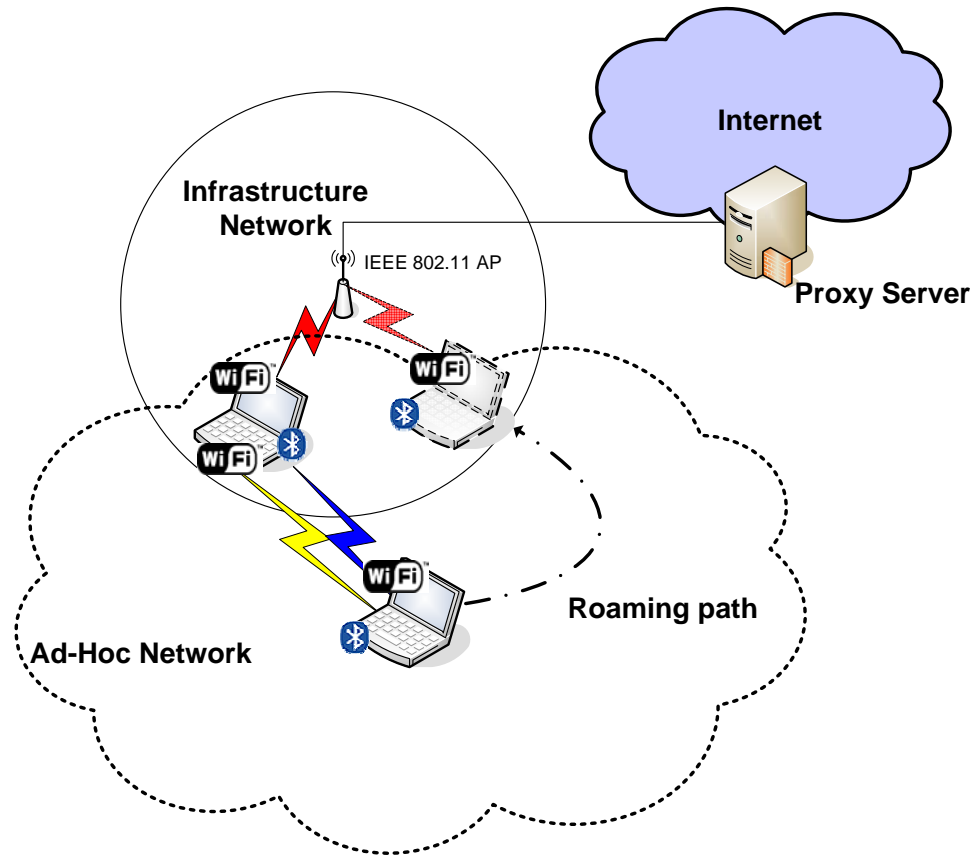
# Case study

- Elements:
  - 2 Laptops (1MN and 1GN)
  - 1 AN
- TBRPF
- Handover policy based on SNR and availability.



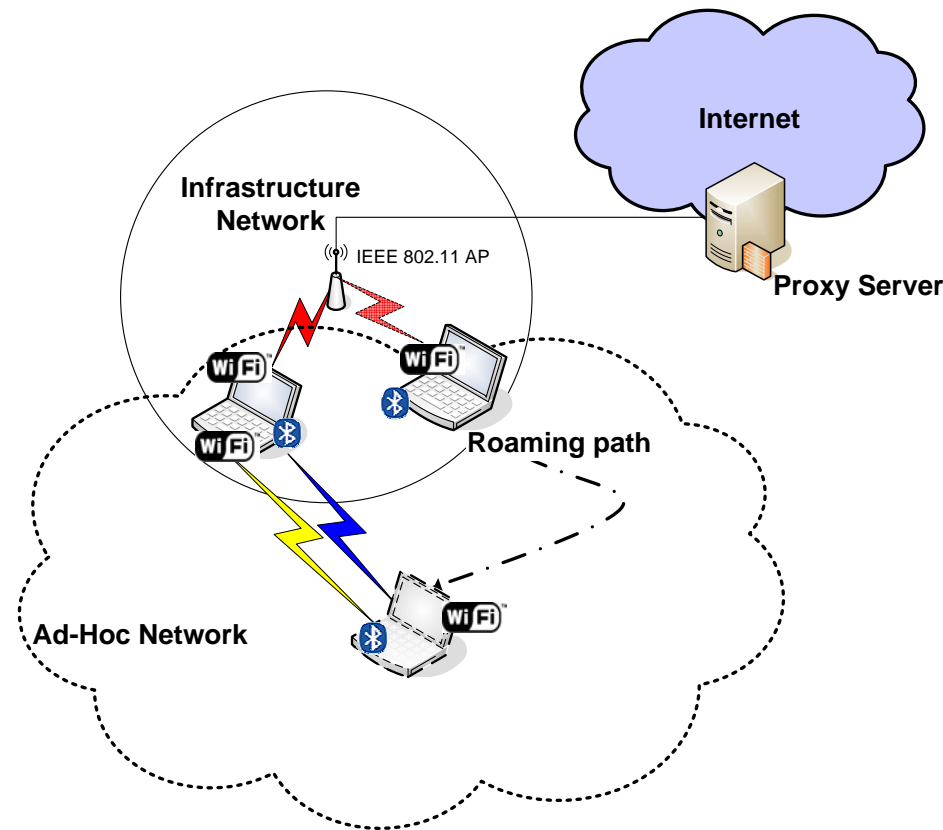
# Functional Tests and Implementation Tunning

- MN roams from ad-hoc to infrastructure network.
- MN roams from infrastructure to ad-hoc network.
  - Access mode shifted.



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# Conclusions

- Ad-hoc networks will play a key role in future wireless environment as a complement of infrastructure based networks.
- The solution presented is based on convergence layer that hides the heterogeneity of underlying technologies.
- IEEE 802.11 offers two access mode with one single WiFi card, and it allows to provide a seamlessly roam between areas covered by AP or ad-hoc network.
- Future work, evaluating more complex scenarios and parameters as delays, lost packets ...