

Kick off meeting

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The Scope of WP6

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UPM. Universidad Politécnica de Madrid

- The largest and oldest technical University in Spain.
- Our group belongs to the Telecommunication School in Madrid
- Our contribution in N4C is mostly related to Wireless ad hoc Networks (as Sensor Networks).
- Our expertise comprises:
 - Digital Signal Processing in communications
 - Routing in ad-hoc networks
 - HW developments
- We lead WP6 and contribute to many other WPs



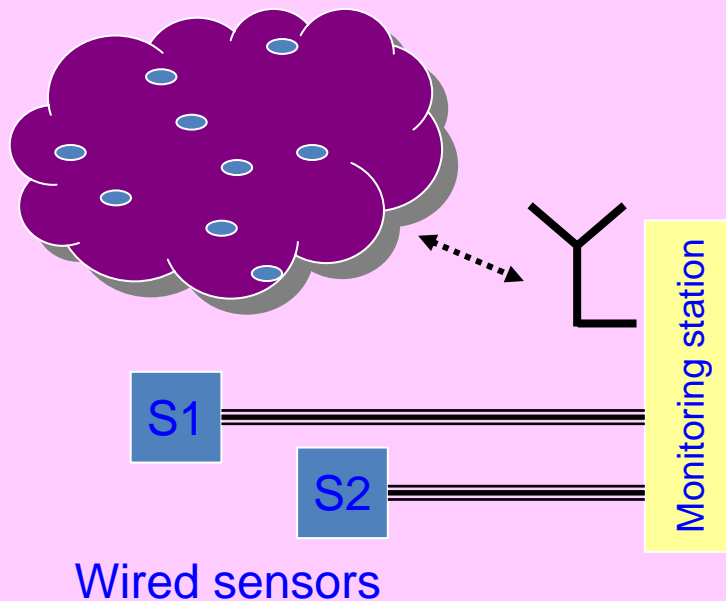
What is in... and what is not...

- **This WP deals with air interfaces, not with integration of technologies.**
- **We will develop partial developments and test beds but integration must be the scope of other WPs**
- **Main input: definition of scenarios and clear specification of what is needed**
- **Main output: several demonstrators showing some specific functionalities**

Basic units (bricks) to create the communication system (1)

- **Sensor network (wired / wireless).**

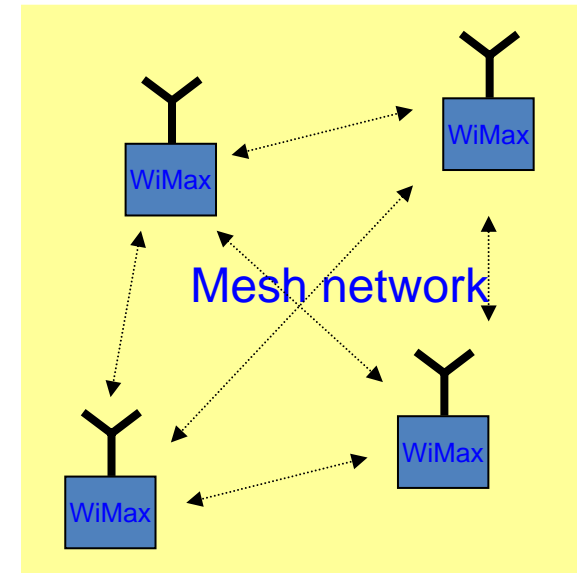
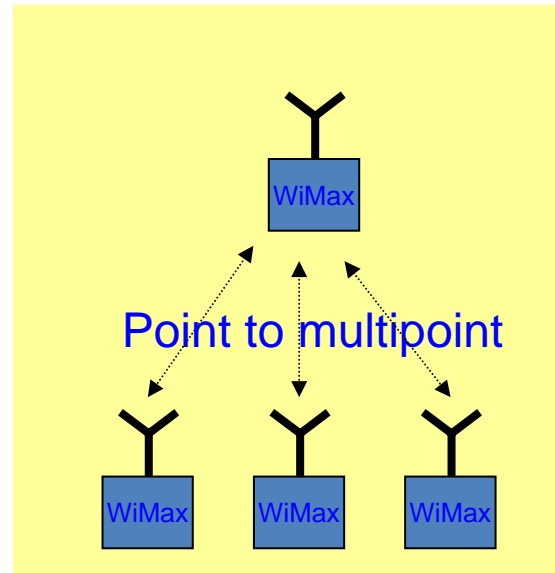
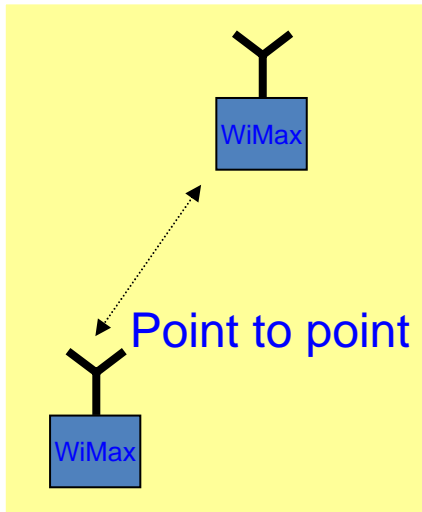
Sensor Network



Involved technologies
Zigbee: connection of standard sensors
Specific ultra-low consumption system

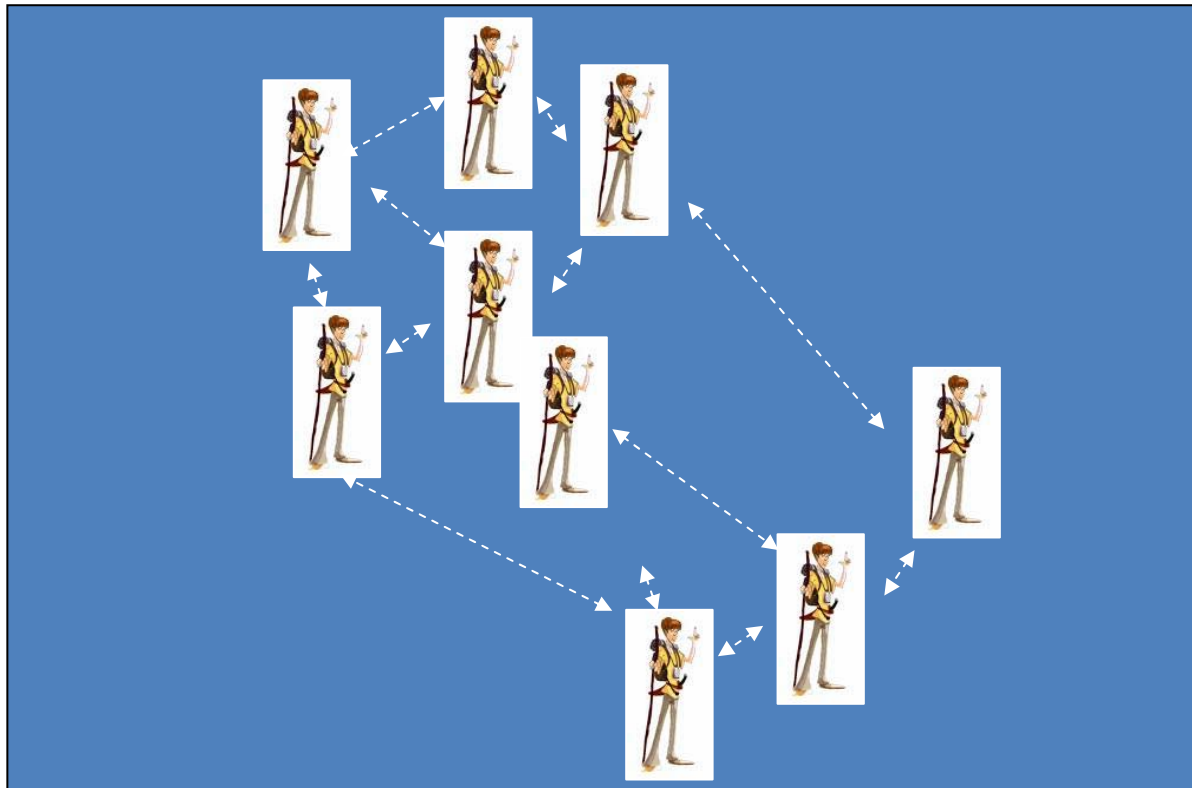
Basic units (bricks) to create the communication system (2)

- WiMAX:
 - Suitable scenario: high data rate and long distance link. We must guarantee over horizon communications
 - Currently there are no portable devices
 - Resources: several bands and flexible bandwidth
 - Links:
 - Point to point
 - Point to multipoint
 - Mesh network

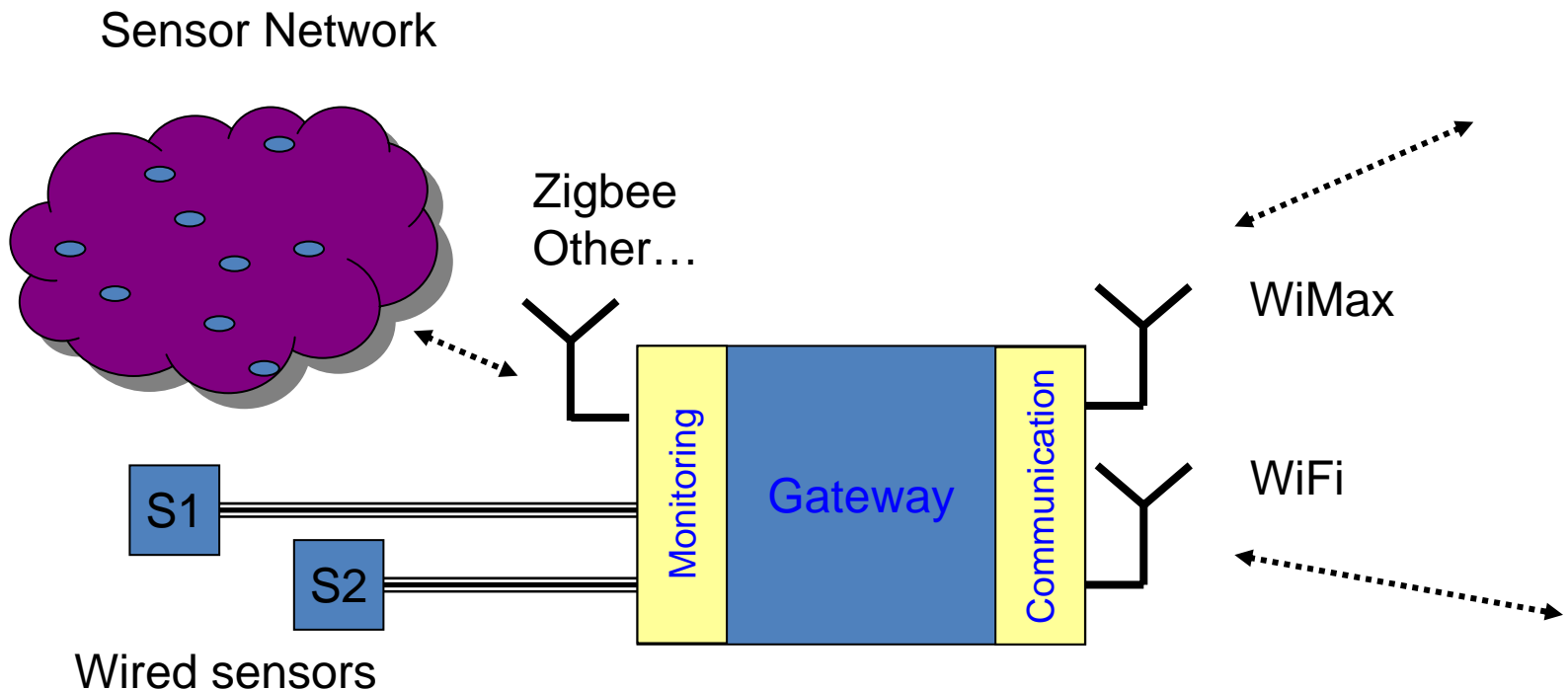


Basic units (bricks) to create the communication system (3)

- WiFi:
 - Suitable scenario: high/medium data rate and short distance link.
 - There are commercial mobile devices
 - Resources: standard architecture in the 2.4 GHz band
 - Links: Mesh network

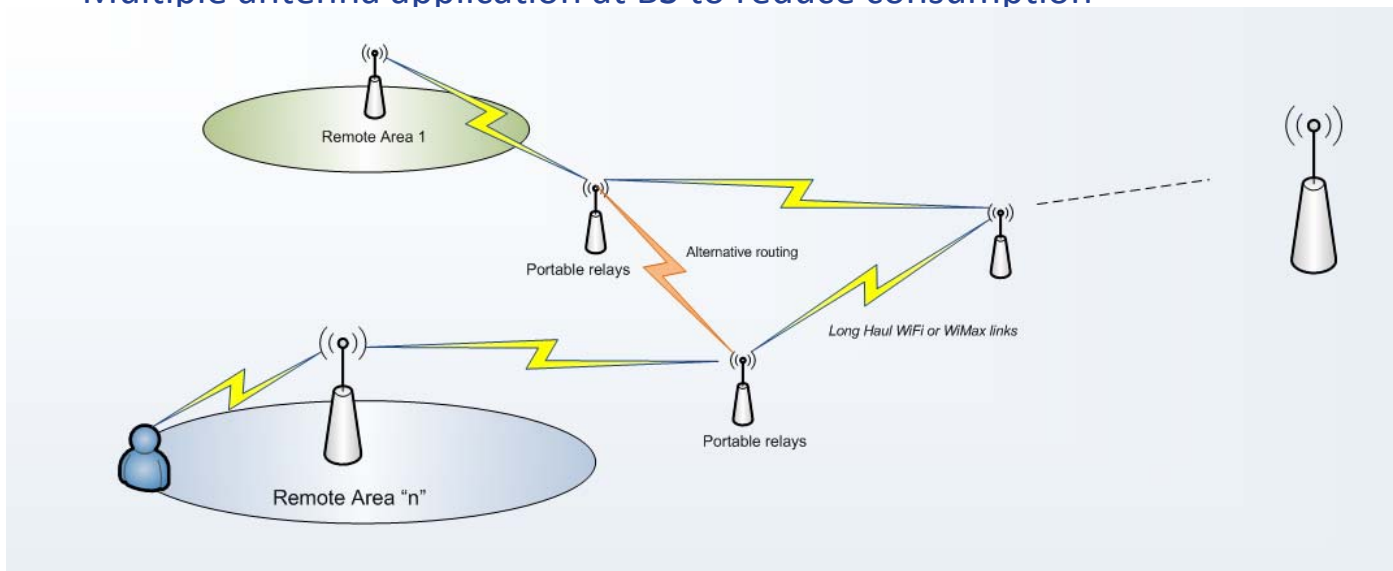


Final goal: air interface technologies integration... not the scope of this WP6



First scenario. Internet access to remote places using WiMAX

- There are two phases:
 - Long distance point to point link.
 - Lower carrier to increase coverage (433 MHz, 866 MHz). Specific HW developments are required. Regulatory issues have to be checked out
 - Narrower bandwidth: 1.75 MHz
 - Short distance point to multipoint
 - Standard carrier (2.4 GHz) and equipments to reduce costs
 - Multiple antenna application at BS to reduce consumption



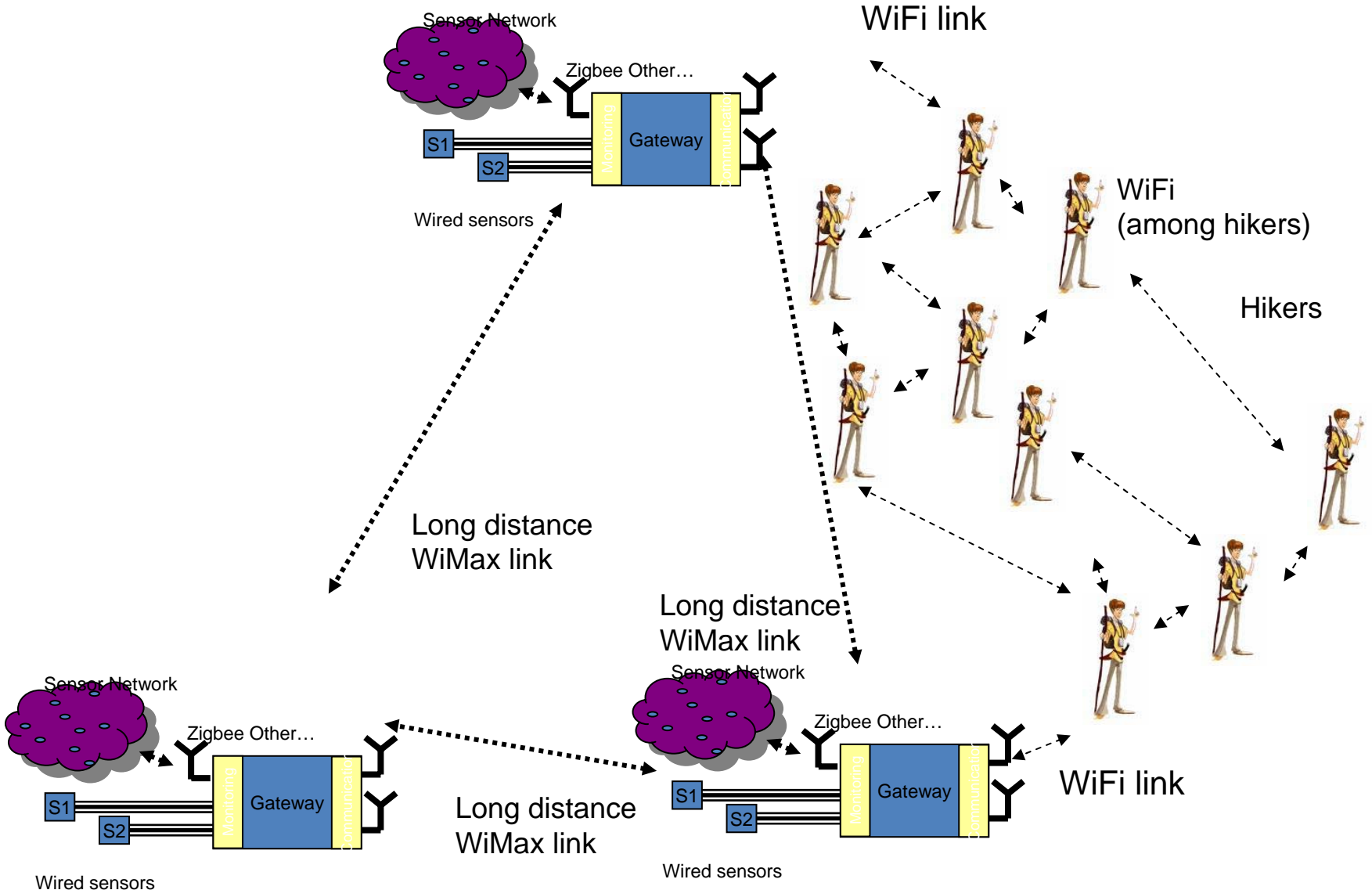
Second scenario.

Environmental monitoring

There are two main functionalities:

- Monitoring using wired and/or wireless sensors.
 - Wireless sensor network will be based on Zigbee architecture
- Communication capabilities
 - Long distance / higher data rate using WiMAX as a mesh
 - Short distance / lower data rate using WiFi and hikers as mobile relays

Second scenario.Environment monitoring



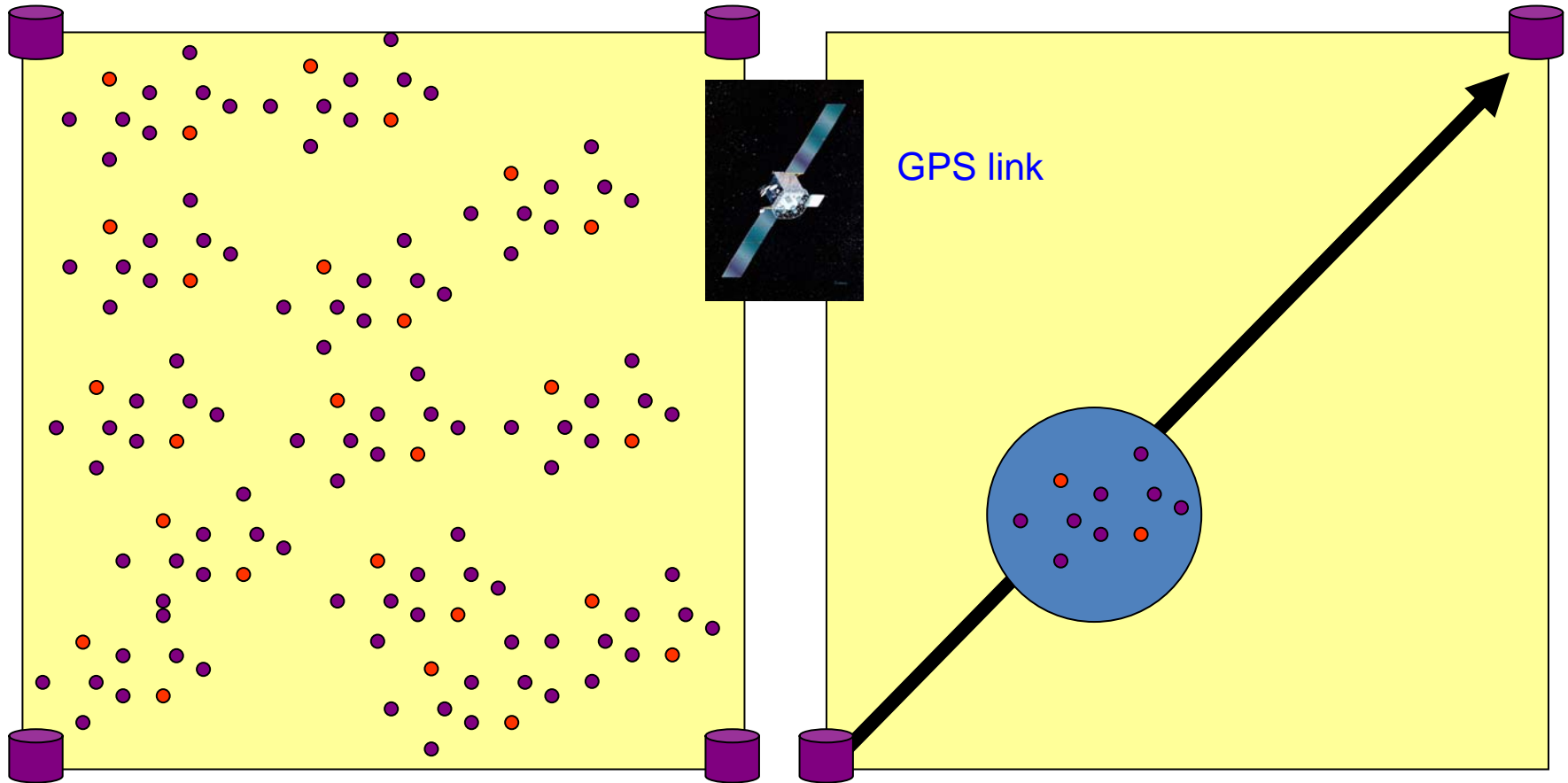
Third scenario. Herd positioning

- There are two main functionalities:
 - Position estimation using GPS and connectivity among the animals
 - We will develop our own ultra-low consumption transceiver.
 - We will propose efficient routing strategies among the animals
 - We have split the animals into two categories.
 - Primary animals: equipped with GPS / Microcontroller, memories and batteries
 - Secondary animals: equipped with a self-power system (using animal movement)
 - Communication
 - From the secondary animals to the primary when power is available (when the reindeer makes a movement) transmitting its identification.
 - From the primary to the herder (static / dynamic base station or person) downloading the position and the identification of the set of animals that have contacted with them along the time
- Proposal of two testing scenarios...

Third scenario. Herd positioning

- Primary node
- Secondary node

Base station (mobile or static)



Testbed 1. Uncoordinated movement

Test bed 2. Coordinated movement

Partial demonstrators

- **Scenario 1: Demonstrator available in Madrid developed by Albentia / UPM at UPM facilities. Remote access capabilities to every other partners to add DTN functionalities.**
 - Point to point prototype due to month 12
 - Point to multipoint prototype due to month 24
- **Scenario 2:**
 - UPM: Wireless sensor networks. Available everywhere. Month 18
 - Albentia: long distance link using WiMAX. Available in Madrid (UPM facilities). Remote access to other partners. Month 18
 - Others (previous project: NORUT, TCD...): short distance using WiFi. Available everywhere. This demonstrator may also show a related scenario where the objective is to provide web access to the hikers...Month 18
 - Global demonstrator including WSN and WiFi links. Month 18
 - Who is going to integrate both technologies and upper layers??
 - The gateway concept appears
 - Include DTN concept on top
- **Scenario 3: Proposal of two test beds. Available everywhere.**
 - Test bed 1. A number of animals covering a certain area that they should not abandon. Random movements in the area are assumed.
 - Test bed 2. A number of animals moving in a coordinated way following a certain track.