An architecture for the implementation of Mesh Networks in OMNeT++

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UNIVERSIDAD DE MÁLAGA, SPAIN
Rome (Italy), March 6th 2009

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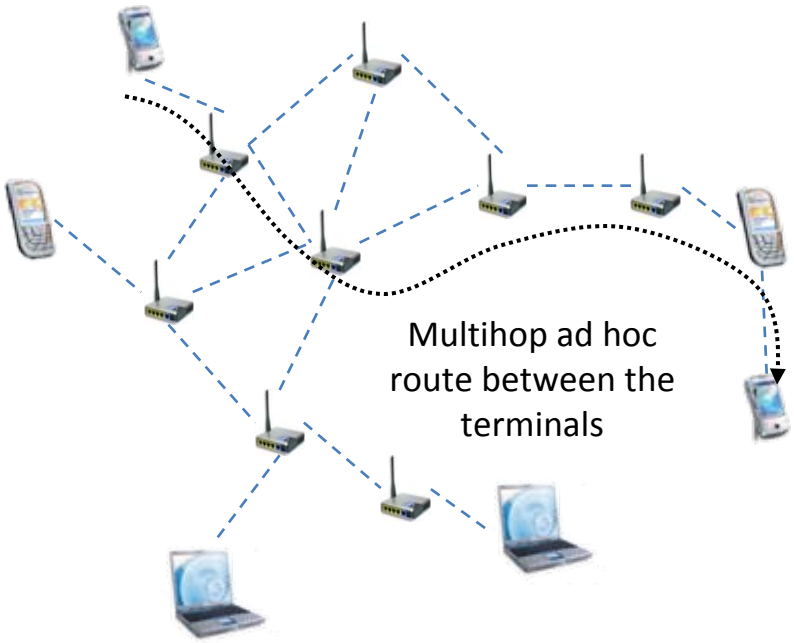
Introduction



- ✓ Mesh architectures: association of peer nodes in an adaptive, infrastructureless and self-organizing way
- ✓ Goal: Create a portable, flexible, MAC-independent and cross layer forwarding protocol for the simulation of layer-2 mesh networks in OMNeT++
- ✓ 2.5 layer protocol: A forwarding header between layers 2 &3.
- ✓ Possibility of several operational modes:

- Path creation: **Source routing** or **hop by hop routing** (depending on the utilized routing protocol)

- **Label based** (MPLS-like) **paths** or **packet by packet** process.

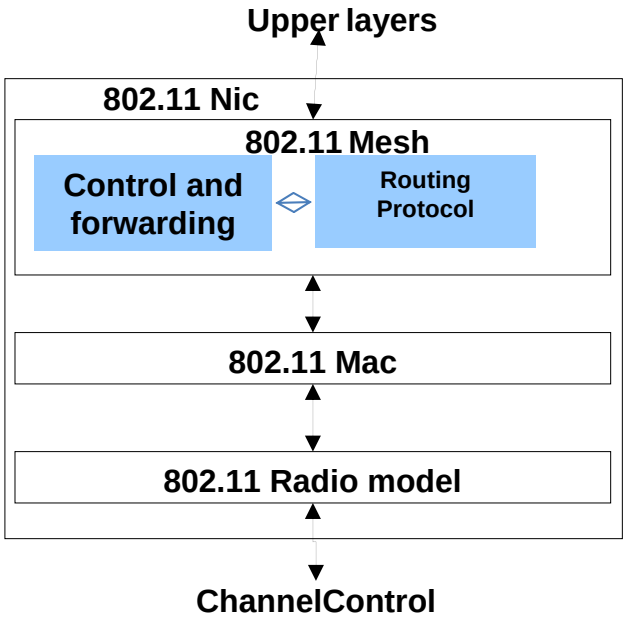
Implementation

- ✓Creation of a specific Inet Module (802.11 mesh).
- ✓Definition of a set of messages that permit:

-Label path ('light MPLS') creation

-Emulation of Typical 802.11s hop-by-hop Routing

The Mesh module executes the routing protocol. The routing protocol uses the MAC address to identify the nodes.



Message Format

```
packet LWMPLSPacket
{
    fields:
        int label;
        int labelReturn;
        int type;
        bool nextHeader;
        unsigned int counter;
        int byteLength;
        MACAddress source;
        MACAddress dest;
        MACAddress vectorAddress[];
};
```

Conclusions & ongoing work

- Modular implementation of an architecture for the generic simulation of mesh networks
- Similar behavior to 802.11s but not necessarily linked to 802.11
- It allows to implement a Virtual Ethernet (for IP all nodes are 1 hop away).
- Label paths (as in MPLS) can be also created
- It could be used with any MAC technology
- Several MAC layers could work an cooperate in the same mesh network simultaneously
- Use of any ad hoc or mesh routing protocol (now only OLSR and -partially- DYMO are implemented)
- Validation of the architecture through a comparison with IP-layer routing for different network configurations
- Developed Inet code with several Ah-hoc routing protocols available at: http://webpersonal.uma.es/~AARIZAQ/