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

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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

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