IS4WCN 2012

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Objectives of qMp

- Need for free, open source CN Firmware
  - Guifi mostly uses Mikrotik (closed system)
- Generic: (made to be used in any CN)
  - Avoid dependencies, use open source and content
  - Support for lightweight and cheap hardware
- Quick & easy MESH/MANET deployment, Full autoconfiguration
  - dynamic mesh routing protocols
  - L1/2 access: Ad-Hoc, managed, ethernet, fiber, …
- Native Ipv6 support
- Support for experimental (next generation) routing protocols

History

- Need to cover a big demostration in 2010
  - We quick modify our old system (GSF)
- We decided to start a new one with new features and with a bigger scope
- Found funding from a foundation (.cat TLD) to start project

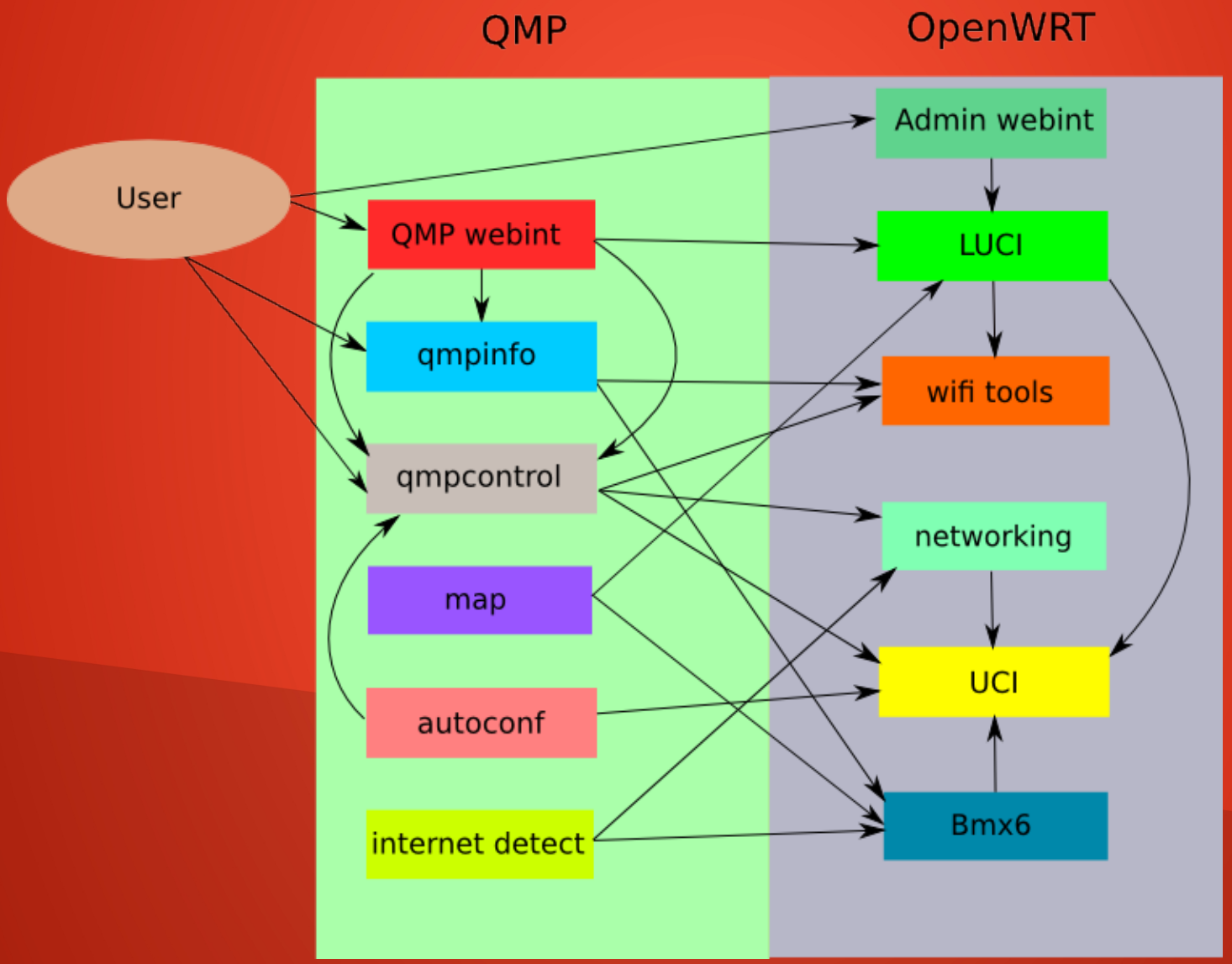
Some Features

- Autoconfiguration (first boot)
  - Default out-of-the-box configuration
  - WiFi smart mode/channel selection
  - Autogenerated IP based on MAC (IPv4 may clash)
- Customizable for specific community demands
- Network interfaces types
  - Lan (bridged, dhcps)
  - Mesh (vlan-tagged)
  - WAN (dhcpc)

Some more Features

- Internet autodetection and smart gateway
- Easy web interface based on LuCi
  - Visualization tools (map, graph topology, nodes list)
  - Splash screen (captive portal without auth)
  - Splah screen HTML web editor
  - Networking tools (bwtest, ping, traceroute, …)
  - One-click configuration wizard
- Easy and automatic system upgrade tool

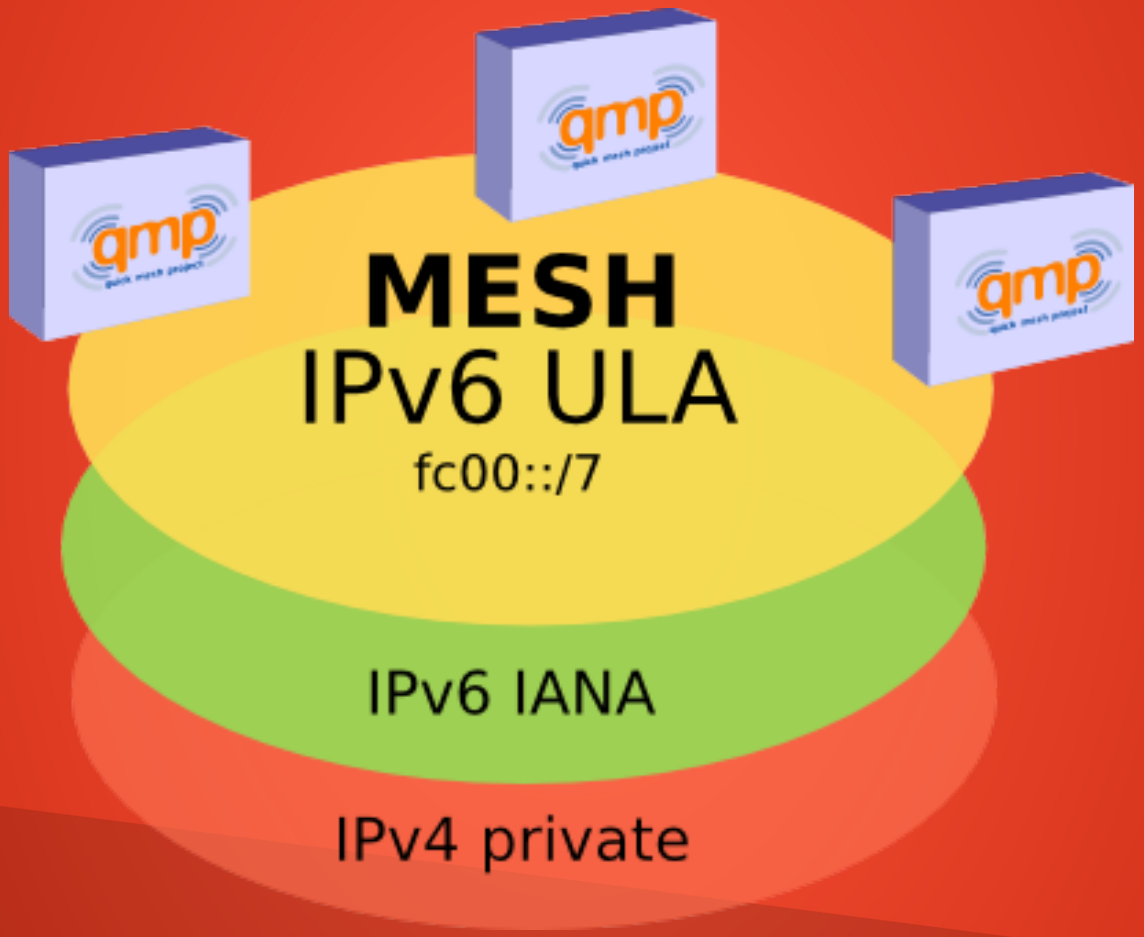
QMP/OpenWRT relations



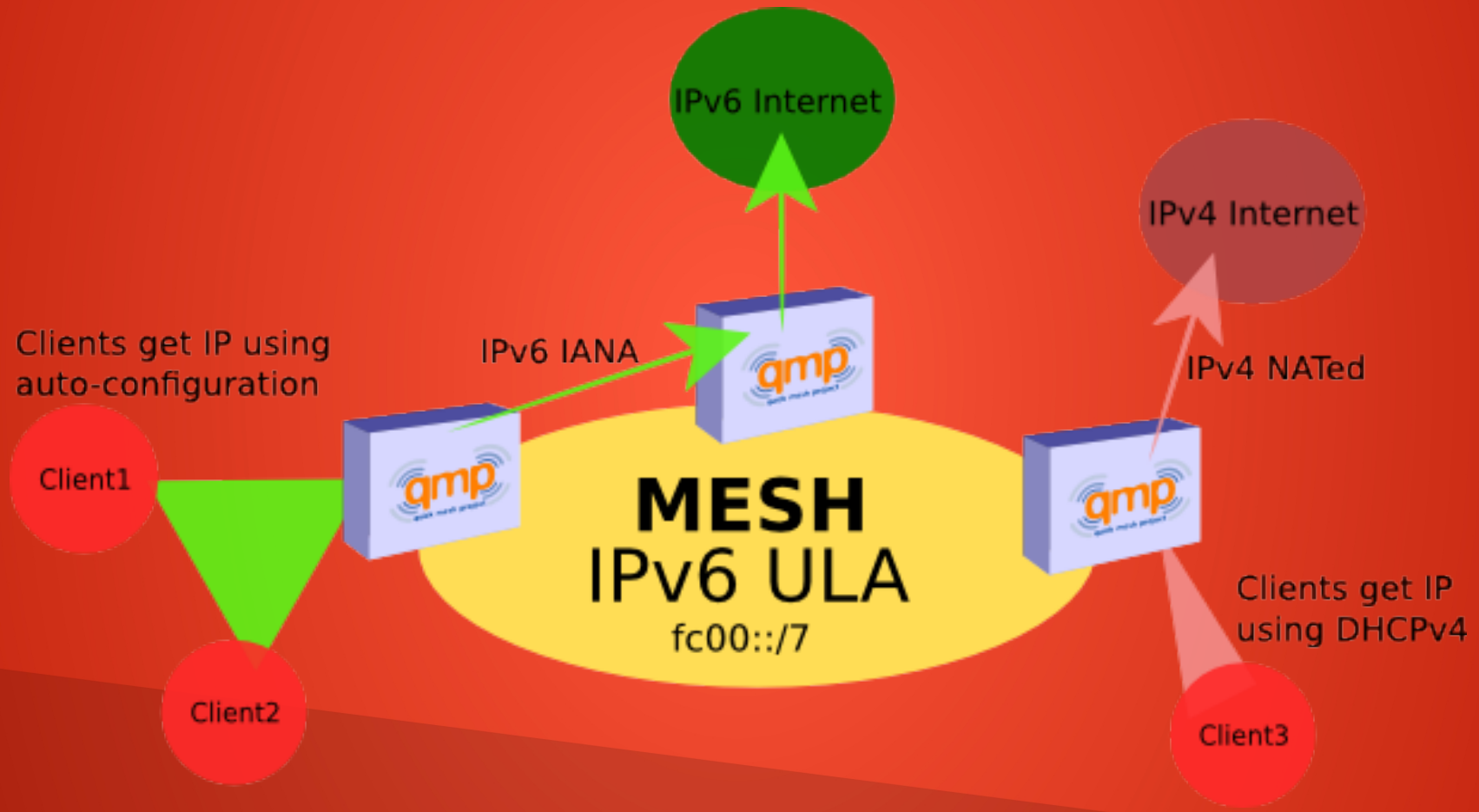
IP Scheme

- Two-tier Architecture
- Ipv6 ULA as mesh backbone
  - unique local address (rfc 4193 draft)
- User traffic in Ipv4 or Ipv6 overlay network
  - Ip4in6 or ip6in6 tunnels
  - Address collisions affect only colliding nodes
  - Ipv6 global ranges assigned using AHCP (not finalized yet)
    - Gateway gets at least /60, it gives /64 to cliend nodes
    - Nodes use Ipv6 autoconfiguration to give /128 to end users

IP Schema 1



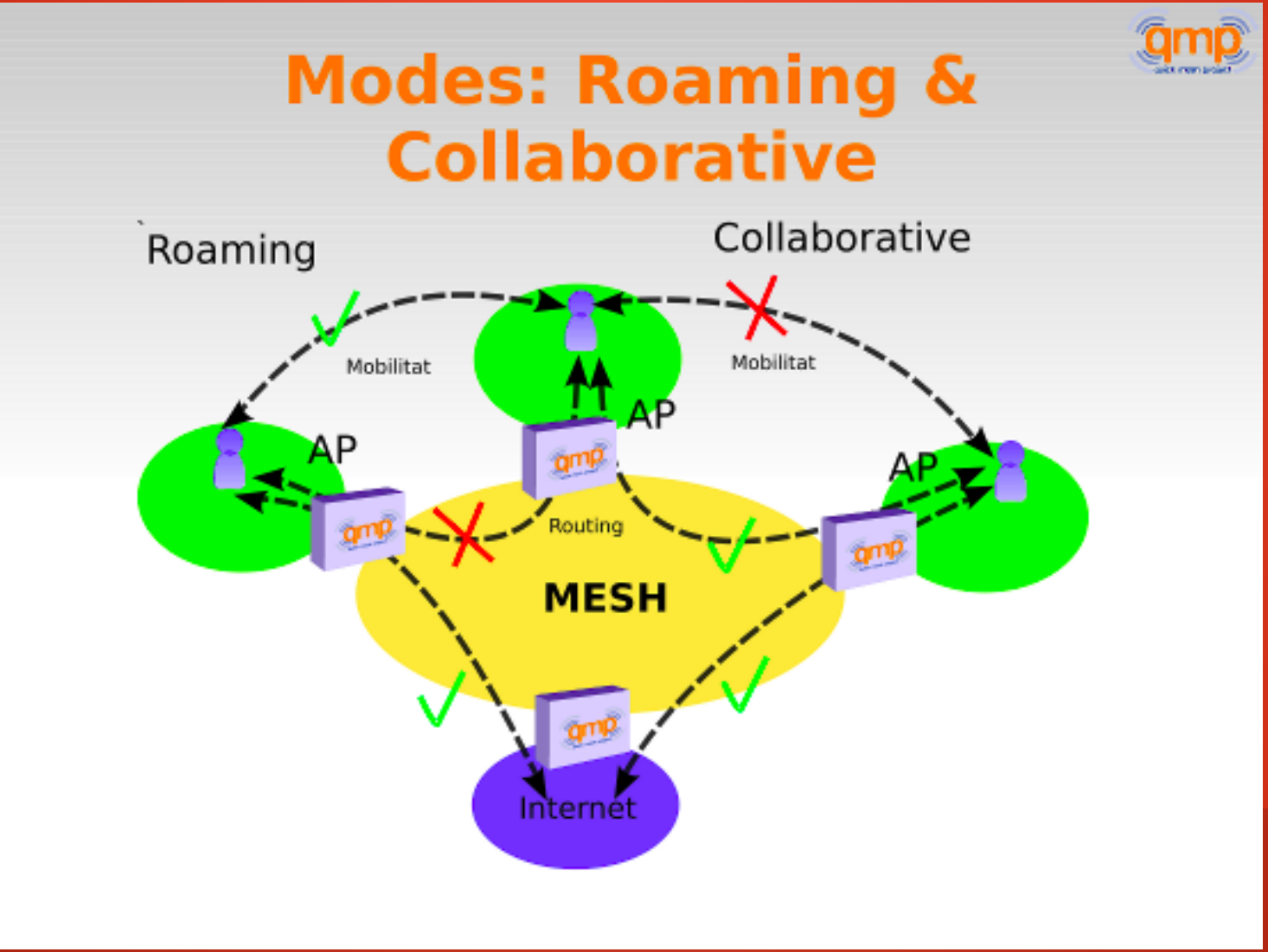
IP Schema 2


IPv6 Internet
IPv4 Internet
Clients get IP using
auto-configuration
IPv6 IANA
IPv4 NATed
Client1
MESH
IPv6 ULA
fc00::/7
Clients get IP
using DHCPv4
Client2
Client3

Two main end-user modes

- Collaborative (for static deployments)
  - Each AP has its own IP address and subnet
    - Can be random or defined by user
  - End-user can reach end-users from other APs
- Roaming (for quick deployments)
  - All AP has the same IP address (172.30.22.1)
  - The AP subnet is a /16
  - Each AP gives a single /24 through DHCP
  - End-user cannot reach end-users of other APs
  - End-user can roam arround the different Aps (same SSID)

Two main modes



BMX6 the protocol

- Successor of **B**.A.T.**M**.A.N – e**X**perimental
- Distance-vector Protocol
- Cope with huge Ipv6 address space
- Node-individual configurations and conflict handlig (DAD)
- Inspired by human social networks
  - Separation into in static vs dynamic, locag vs global information
  - Learn more about neighbors and abstracting about others
  - Combine short identifiers for static units with dynamic information
    - Static: Ipv6 addresses, hostname, metric function, ...
    - Dynamic Routing update: static id + path metric = 4 bytes
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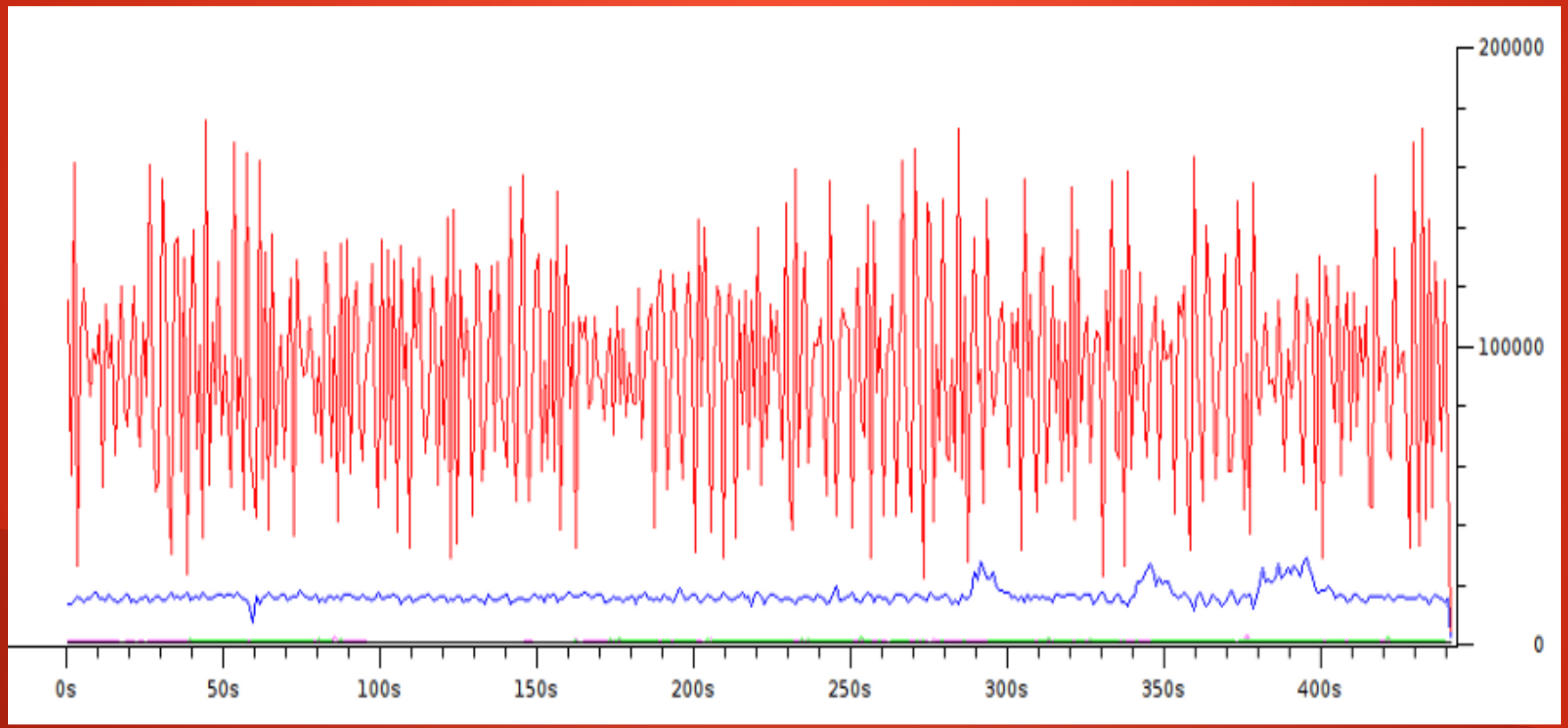
BMX6 overhead VS OLSR



To get involved is easy

- qmpfw: a tool to easy compile qMp
  - Eg Nanostation5 using git and GNU/Make:
    - Git clone git://gitosis@qmp.cat/qmpfw.cat
    - make T=nsm5 build
- working in a API
  - Made in Lua, fits perfectly with OpenWRT
  - For easy development of new applications