Multipath Optimized Link State Routing (MP-OLSR)

IRCCyN, UMR CNRS 6597
Image Video Communication Team
Polytech'Nantes, France

Jiazi YI, Benoît PARREIN
firstname.lastname@univ-nantes.fr

Outline

- SEREADMO Project
- MP-OLSR Specification
- Simulation Results
- Testbed

SEREADMO Project

- Supported by RNRT (French Research Program for Networks and Telecommunications)
- Goal: find a secure and reliable routing protocol for wireless ad hoc networks
- Participants

# MP-OLSR Specification

- Topology Sensing
- Routing Computation
  - Multipath Dijkstra Algorithm

An Example...

An Example...

f_e

f_e

f_p

f_p

f_p

$f_p(e) = 3e$
$f_e(e) = 2e$

2 punishment functions
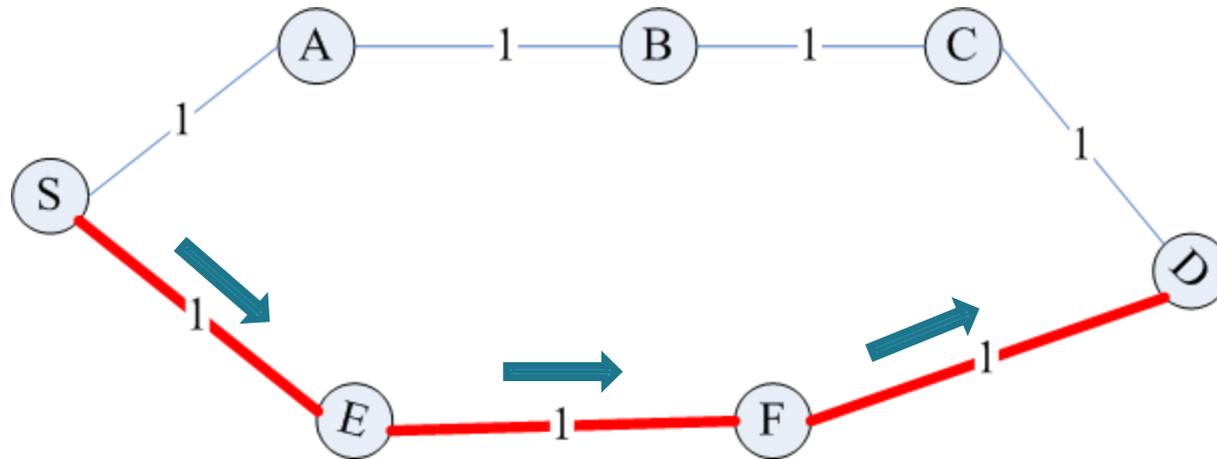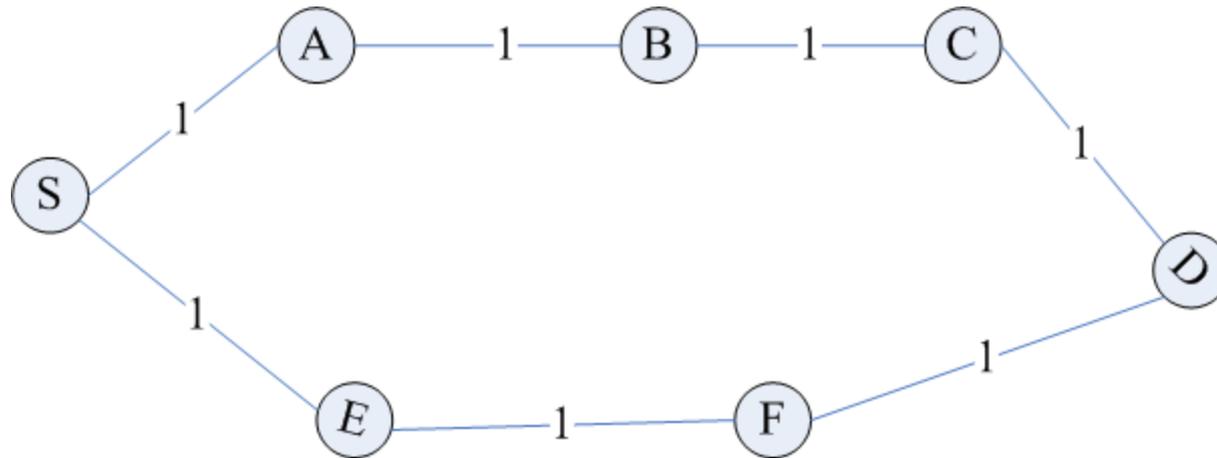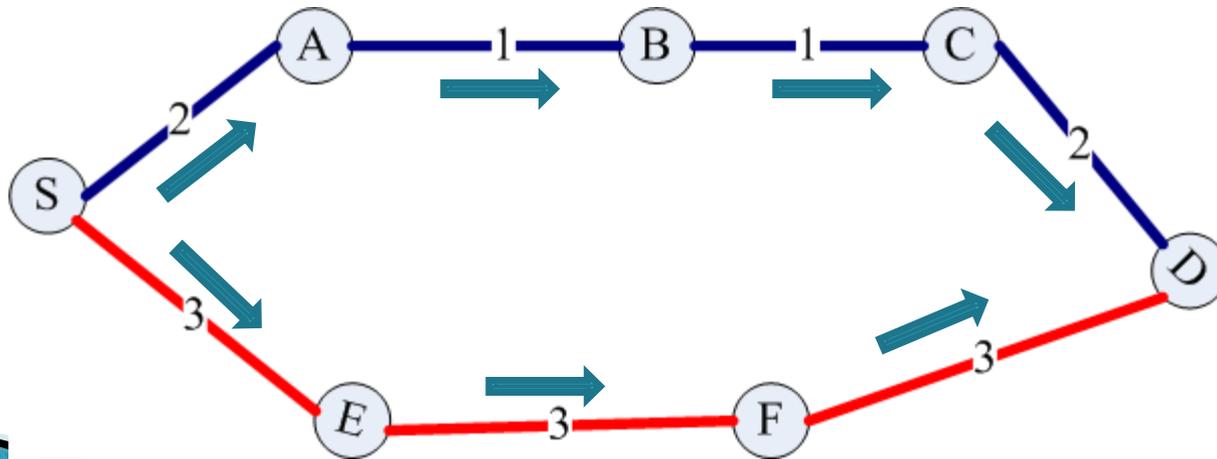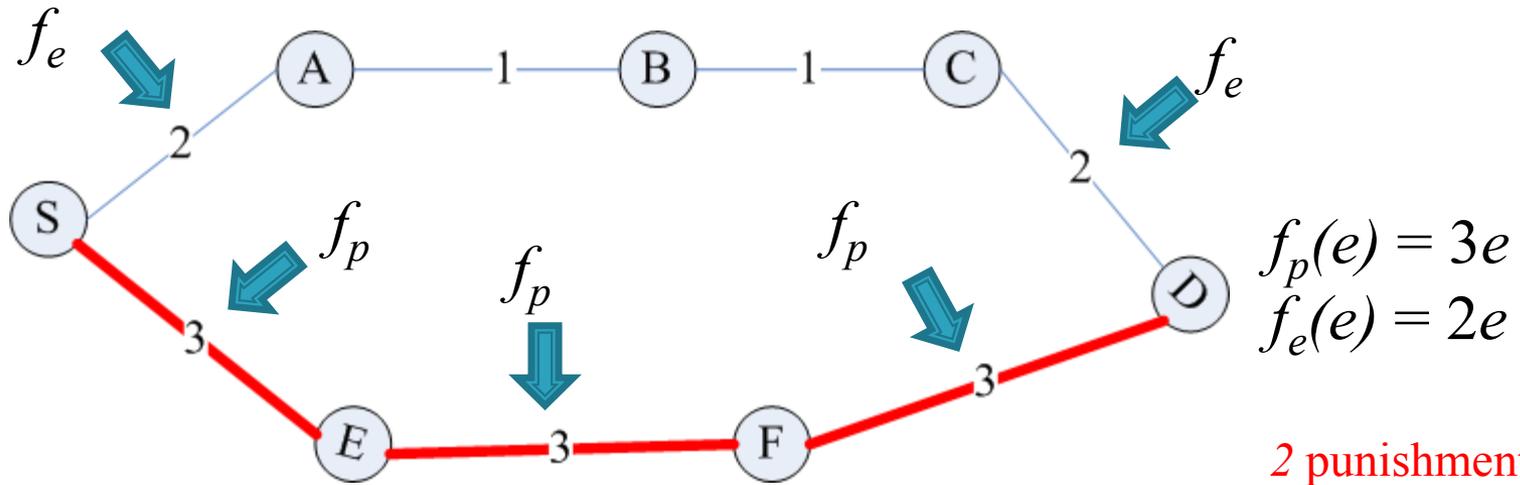
MP-OLSR Specification

- Packet Forwarding
  - IP Source routing, compatible with OLSR

- Route Recovery
  - To reduce route failures

- Loop Detection
 - To reduce the transient loops

Simulation Results

- Qualnet Simulator
- Multipath based on OLSRv2

| 81 nodes |
| 1500*1500m |
| 3 paths |
| 802.11b PHY/MAC |
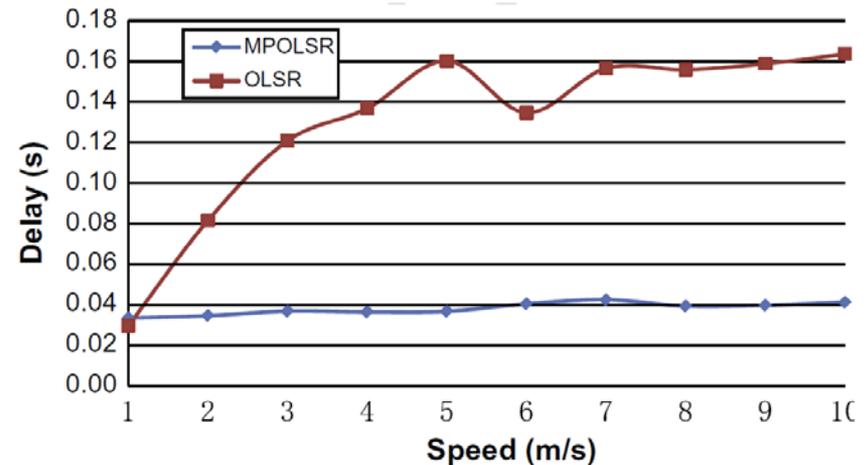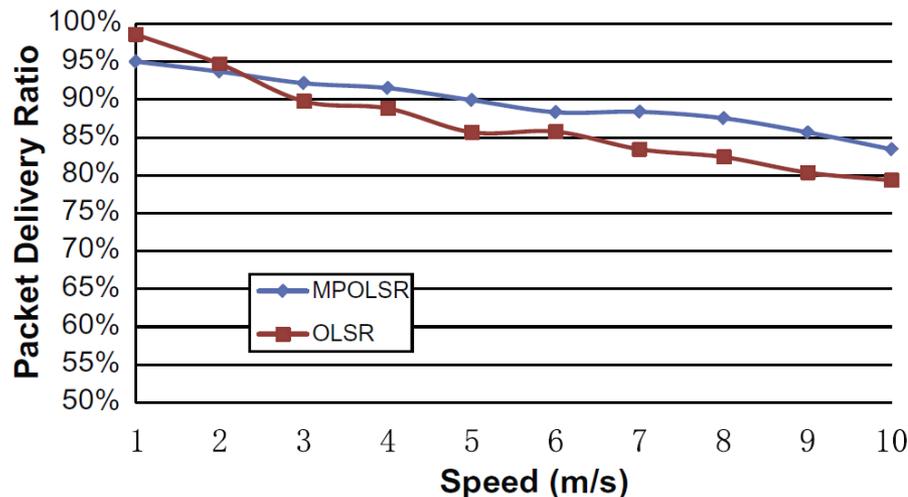
* More results on *Multipath Optimized Link State Routing,* Elsevier ad hoc network Journal , 2010

# Hardware and Configuration

- ASUS eeePC 901
- Based on OLSRd* 0.5.6r2
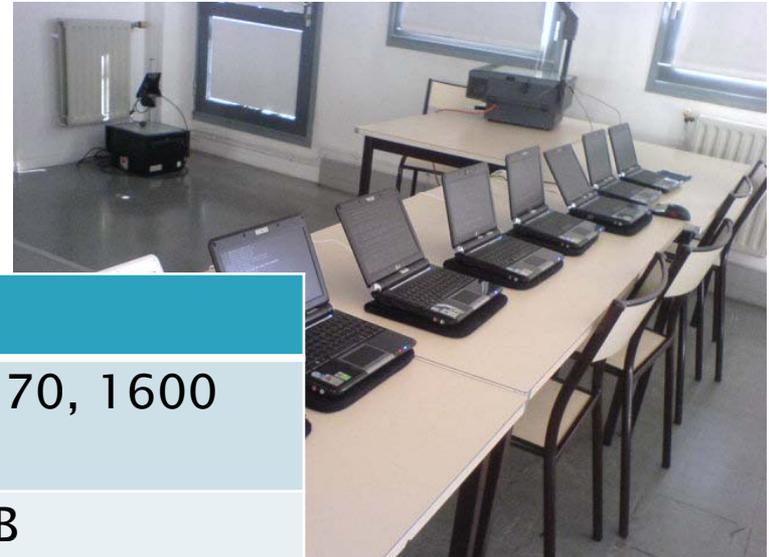
Parameter	Value
CPU	Intel Atom N270, 1600 MHz
Memory	DDR2 1024MB
Radio	802.11g 2.487GHz
Rate	54Mb/s auto
Operating System	Linux 2.6.21.5(bt3)
Applications	UFTP
Network protocol analyzer	Wireshark v0.91.6 (with MP-OLSR plugin)
Network synchronization	NTP

* http://www.olsr.org

Implementation of MP-OLSR
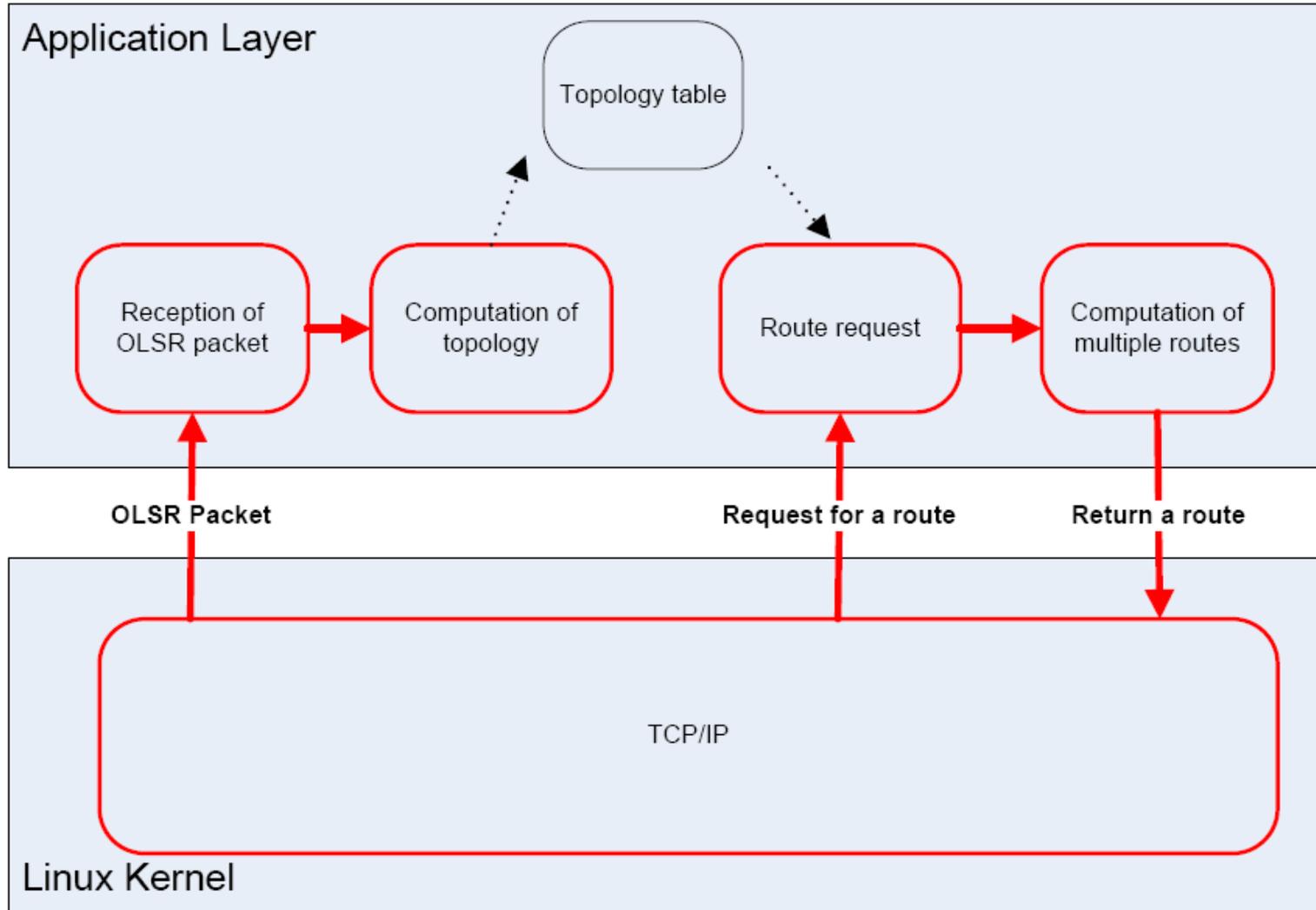
Scenario 1
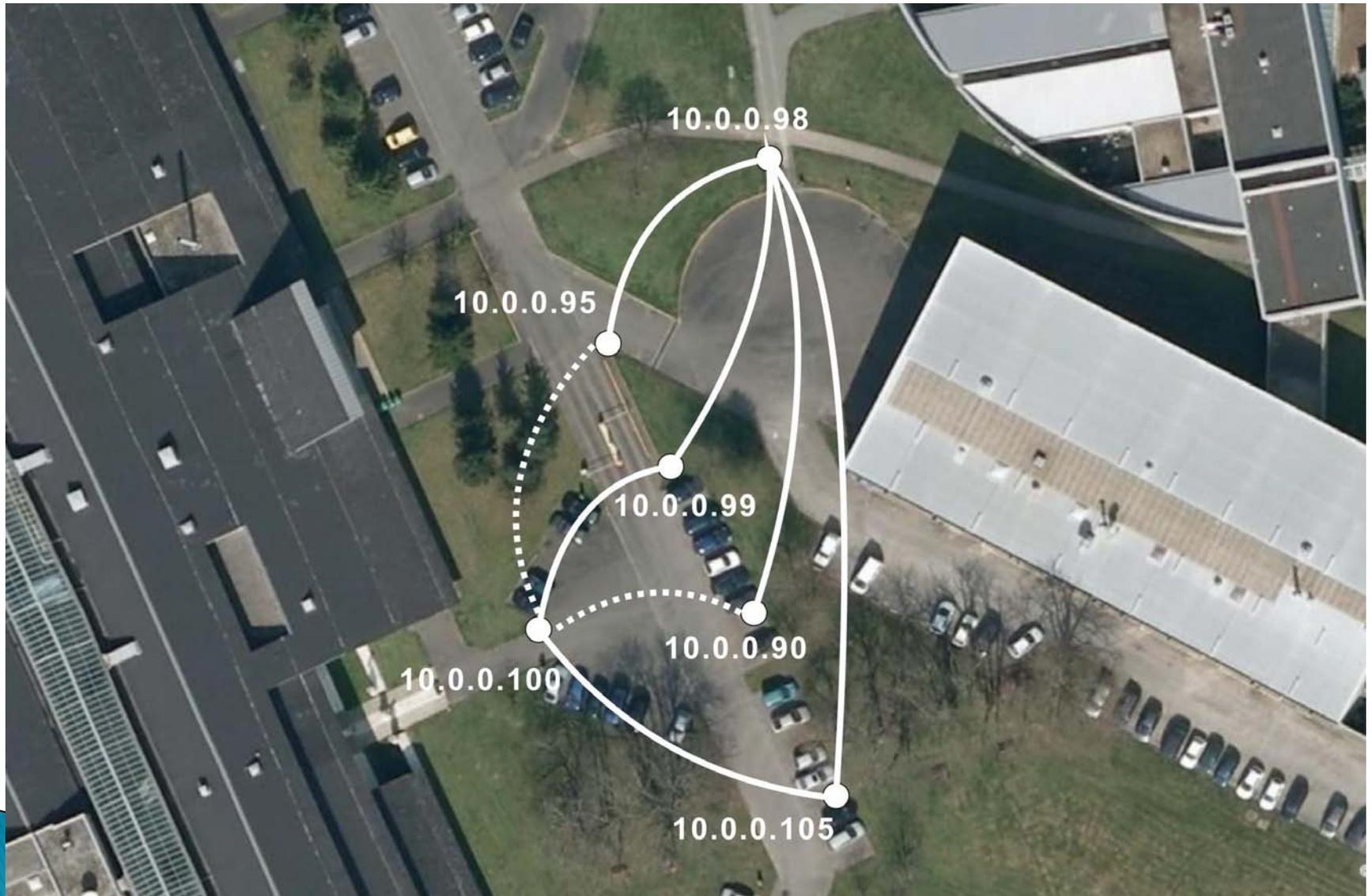
Results of scenario 1

	MP-OLSR	OLSR
Size of the sent file	17.8Mbytes	17.8Mbytes
Duration of the transmission	6m12s	5m17(connection lost)
Requested Rate	62Kbytes/s	62Kbytes/s
Packets sent by 10.0.0.100	15002	9784
Packets sent by 10.0.0.90	4503	5303
Packets sent by 10.0.0.99	3715	0
Packets sent by 10.0.0.95	2084	2909
Packets sent by 10.0.0.98	3726	0
Packets received by 10.0.0.98	13516	6112
Rate of lost packets	9.90%	37.53% (connection lost)

Wireshark trace for OLSR, source node
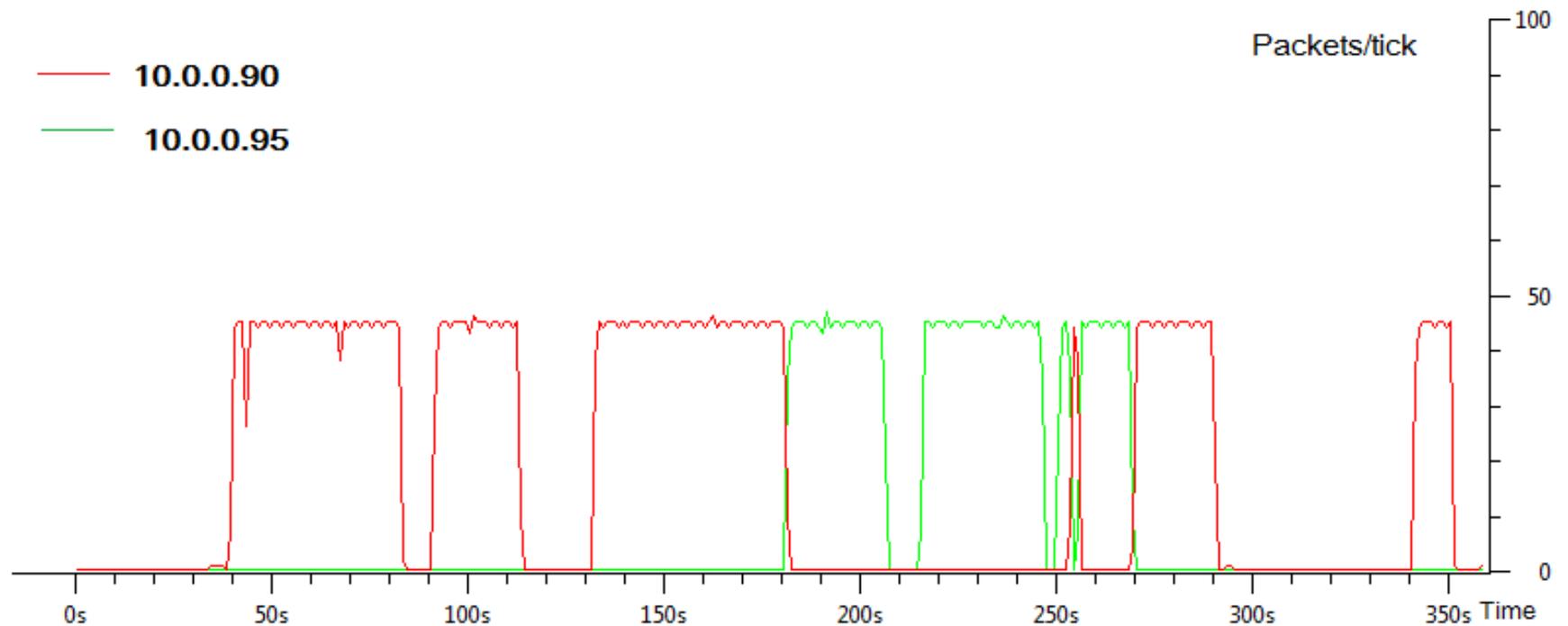
Wireshark trace for MP–OLSR, source node
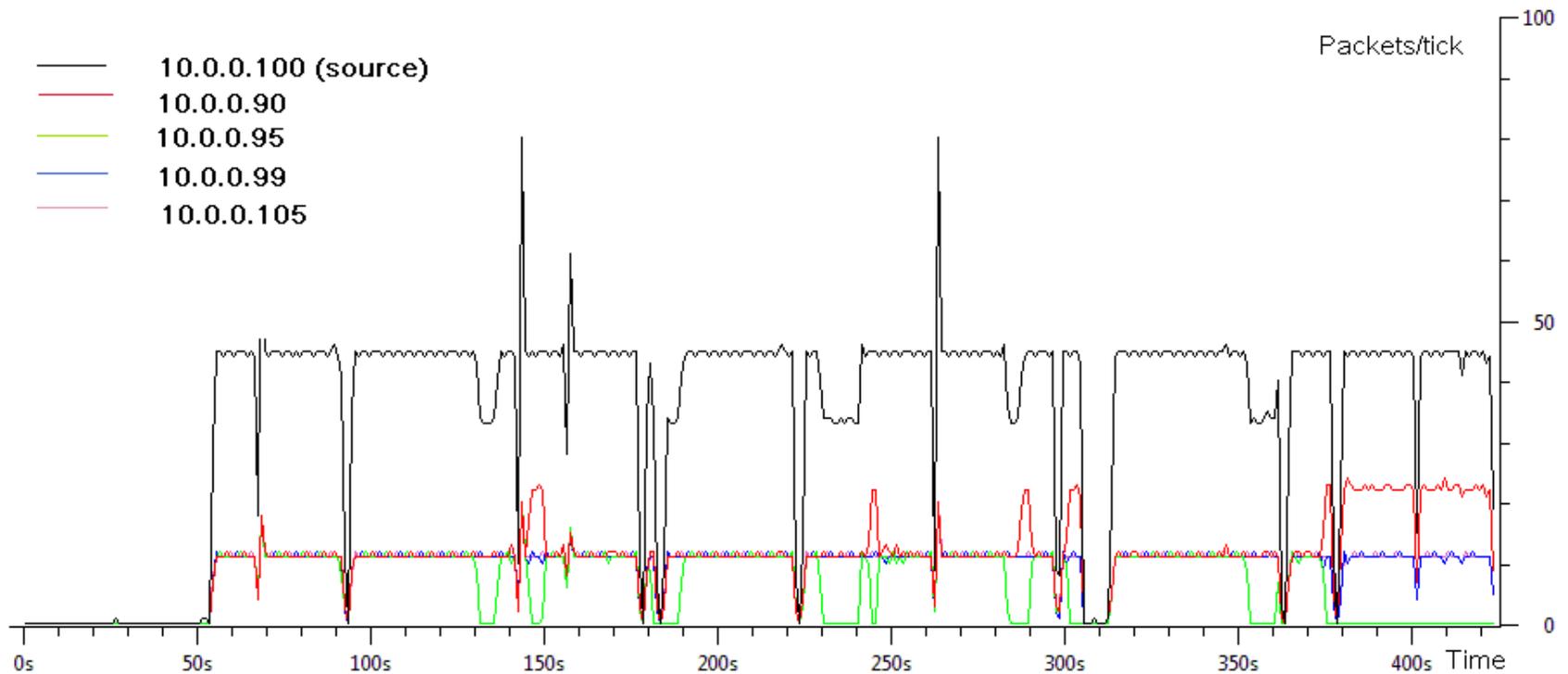
Scenario 2
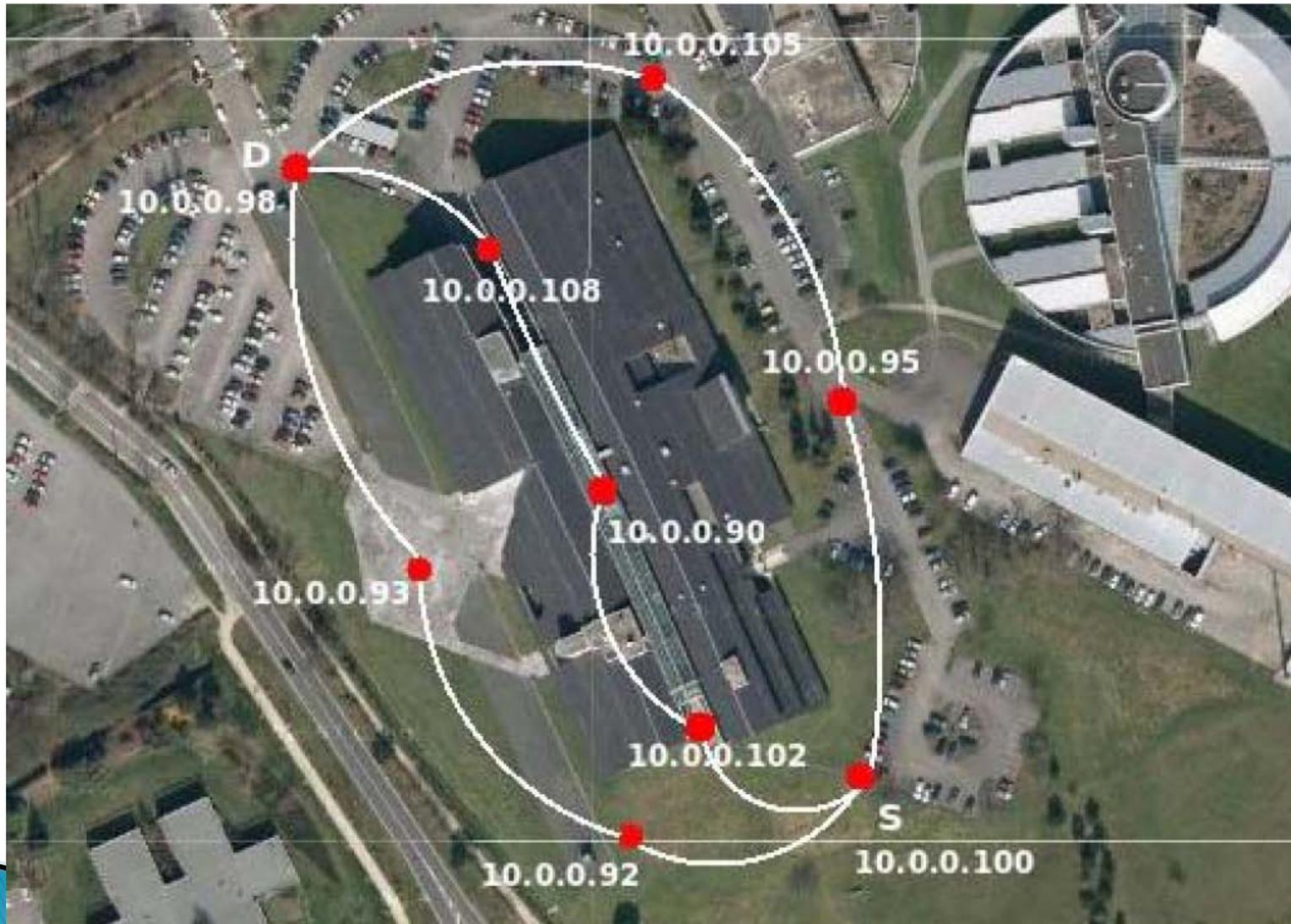
Results of scenario2

Protocol	MP-OLSR	OLSR
Duration of the transmission	9m40s	8m43s (Connection lost)
Packets sent by 10.0.0.100	14528	12548
Packets received by 10.0.0.98	9145	8544
Rate of lost packets	37.5%	31.9% (Connection lost)

* More results on *Multipath Optimized Link State Routing,* Elsevier ad hoc network Journal , 2010

Conclusion

- A multipath extension of OLSR
  - Multipath Dijkstra Algorithm
  - Route Recovery and Loop Detection
  - Compatibility with OLSR (based on IP source routing)
- Simulation based on Qualnet and NS2
- Testbed based on *olsrd*
- Multipath provides better performance in an error-prone environment.
- Research of H.264/SVC video services over MANET in progress

Thanks

- Source code available on line (Qualnet, NS2, testbed)
  - http://www.irccyn.ec-nantes.fr/
    - (IVC team→Platforms→Network simulation and emulation)
  - http://www.jiaziyi.com