



CENTER FOR INNOVATION IN TELECOMMUNICATION & INTEGRATION OF SERVICES

Performance of a multi-hops configuration with 802.11: from simulation to experimentation

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Architectures of Networks of Services



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Context and objective

■ Context

- Ad hoc networks
- 802.11 (DCF mode)
- Weak performances of 802.11 in ad hoc context
 - Simulation results
 - Few experimental results

■ Objective

- What are the performances of 802.11 in real ad hoc networks?



Experimental evaluation in ad hoc networks

- Dedicated to specific routing protocols
 - DSR, ABR
- APE
 - Ad hoc Protocol Evaluation testbed
 - Environment for testing ad hoc protocols
- Forwarding
 - Environment for testing MAC protocols in ad hoc context
 - Isolate the effects of the MAC layer from higher layers



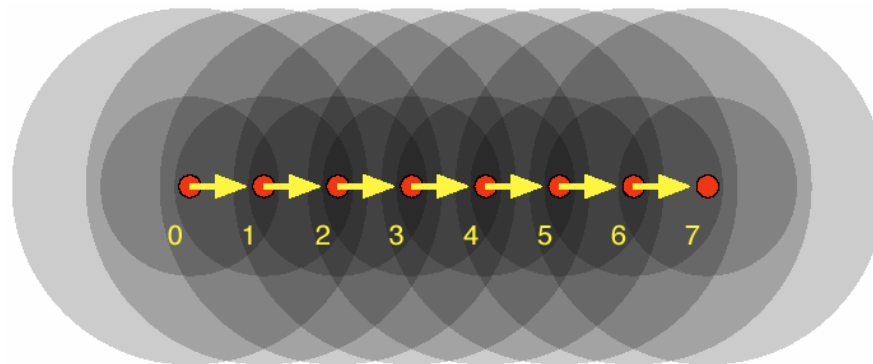
Forwarding

- Toolbox
 - To deploy scenarios
 - To monitor parameters (on-going and post monitoring)
- Static routing protocol
- UDP packets
- Linux code



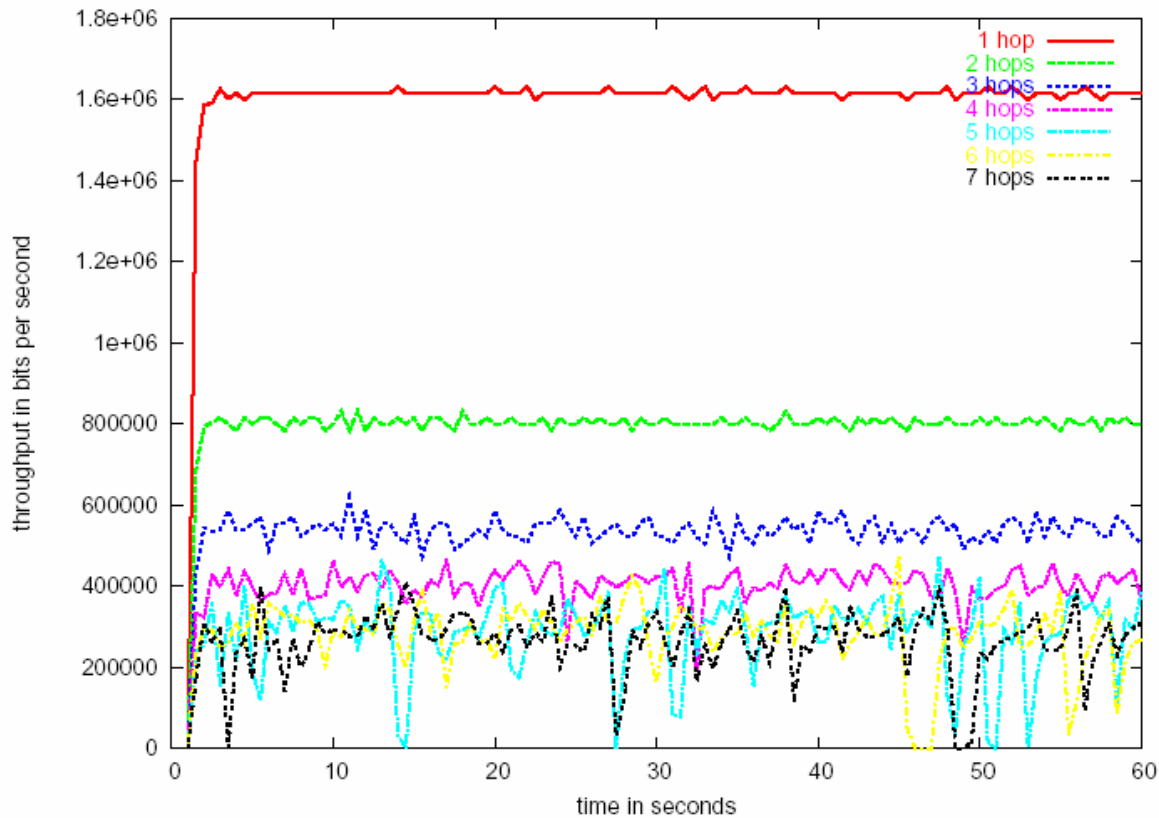
Chain configuration

- Previous evaluations with Forwarding on basic configurations
- Chain configuration
 - classical multi-hops configuration





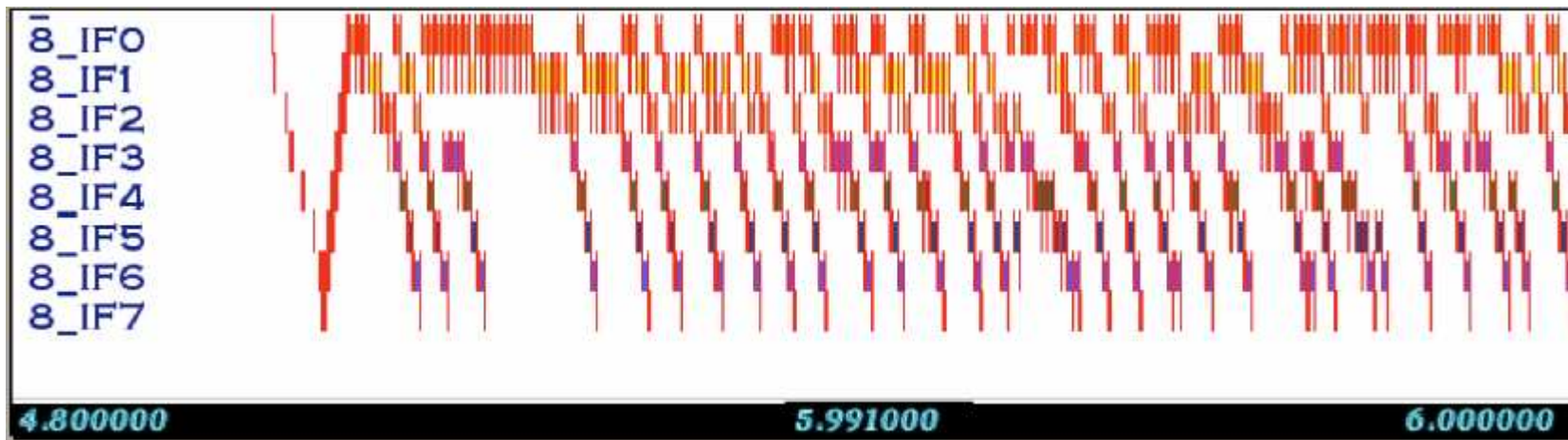
Simulation results



NS2
2 Mb/s
1000 bytes
Unicast packets
AODV



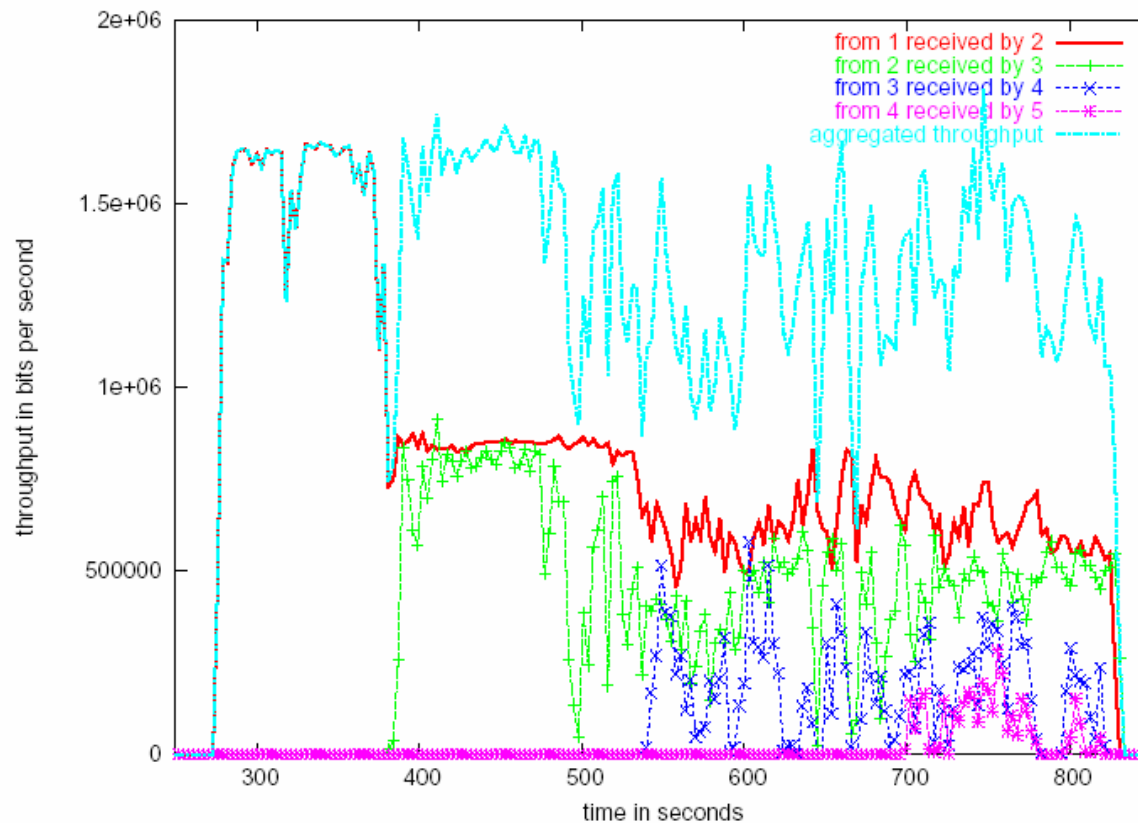
Simulation results



Route requests exchange at the beginning
Packets are essentially lost in the first hops



Experimental results

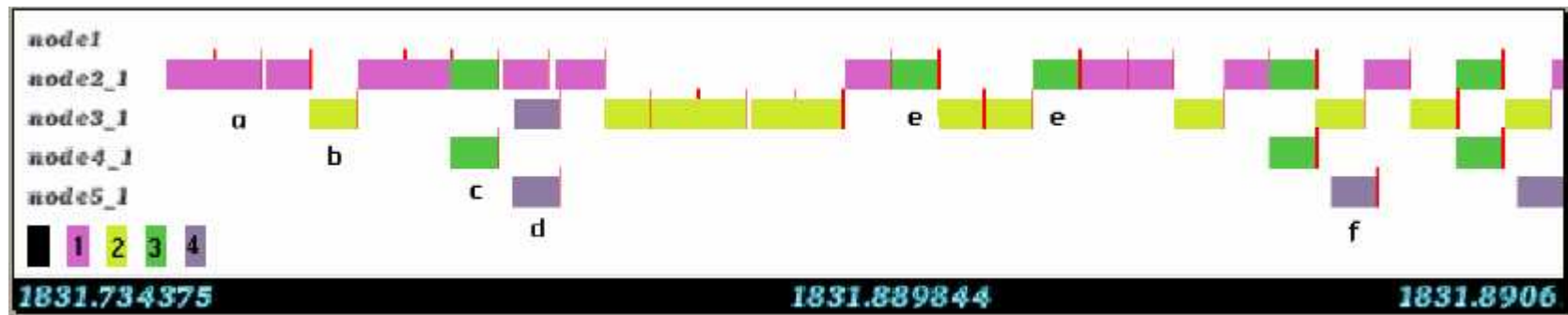


Forwarding
2 Mb/s
1000 bytes
Broadcast packets

High instability
Many packets losses in
the first hops



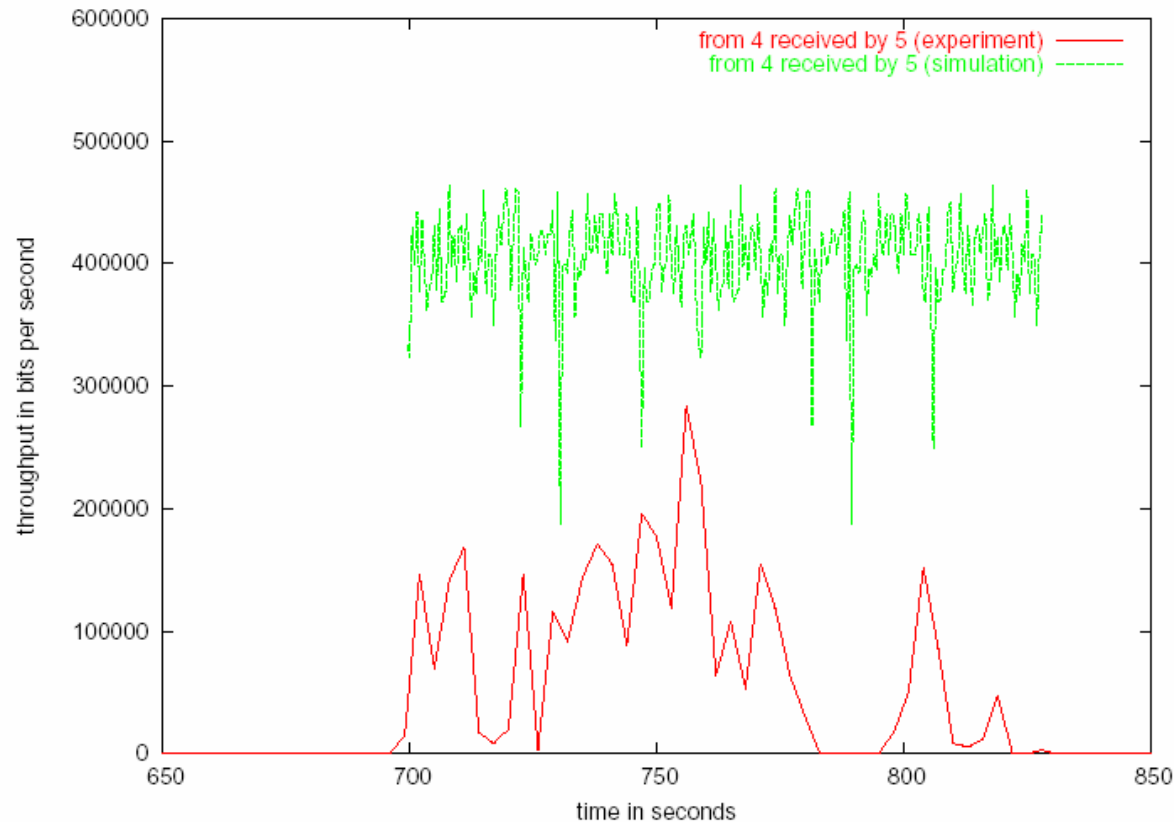
Experimental results



- a: consecutive packets received by 2 from 1
- b: one packet forwarded by 2
- c: and then transmitted by 3
- d: spatial reuse between 1 and 4
- e: packets not received by the neighbors
- f: spatial reuse between 2 and 4



Comparison simulation - experimentation



Worst with unicast packets
in experimentations



Conclusion

- Performances of 802.11 on a real ad hoc configuration
- Rate around 150-200 kb/s on a 4-hops chain
- Higher rates with NS2
- High radio instability
- Many packets lost in practise