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

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Architectures of Networks of Services
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