draft-mase-manet-loopdetec-00

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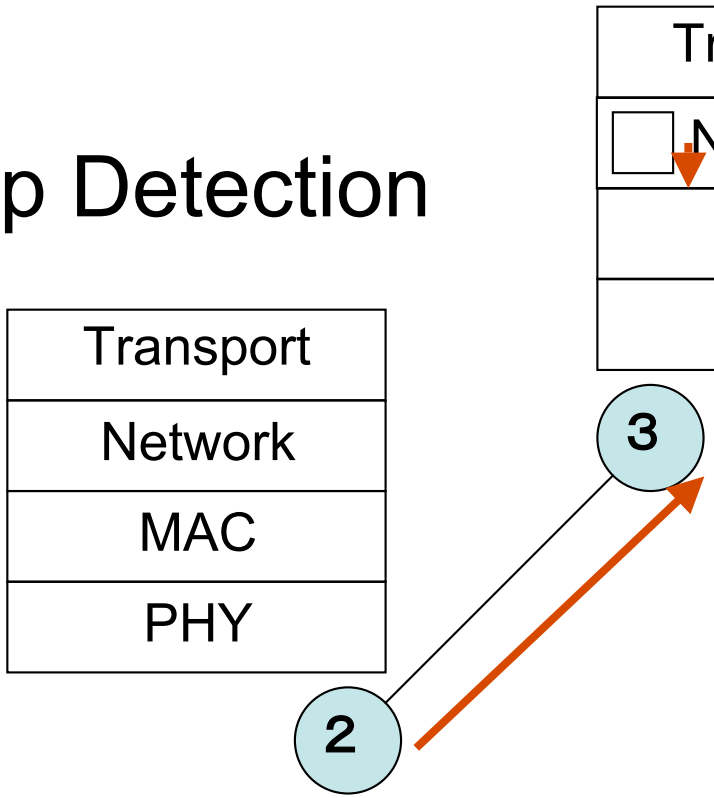
Motivation

- Every routing protocol is not Loop-Free.
- Radio resources are wasted by unnecessary looped packets.
- Looped packets should not be forwarded!
- Routing protocol might be able to solve these loops (if possible).

Loop Detection

- Mid-Loop Detection



If

nextHop MAC ==
lastHop MAC

Then

Loop is detected and

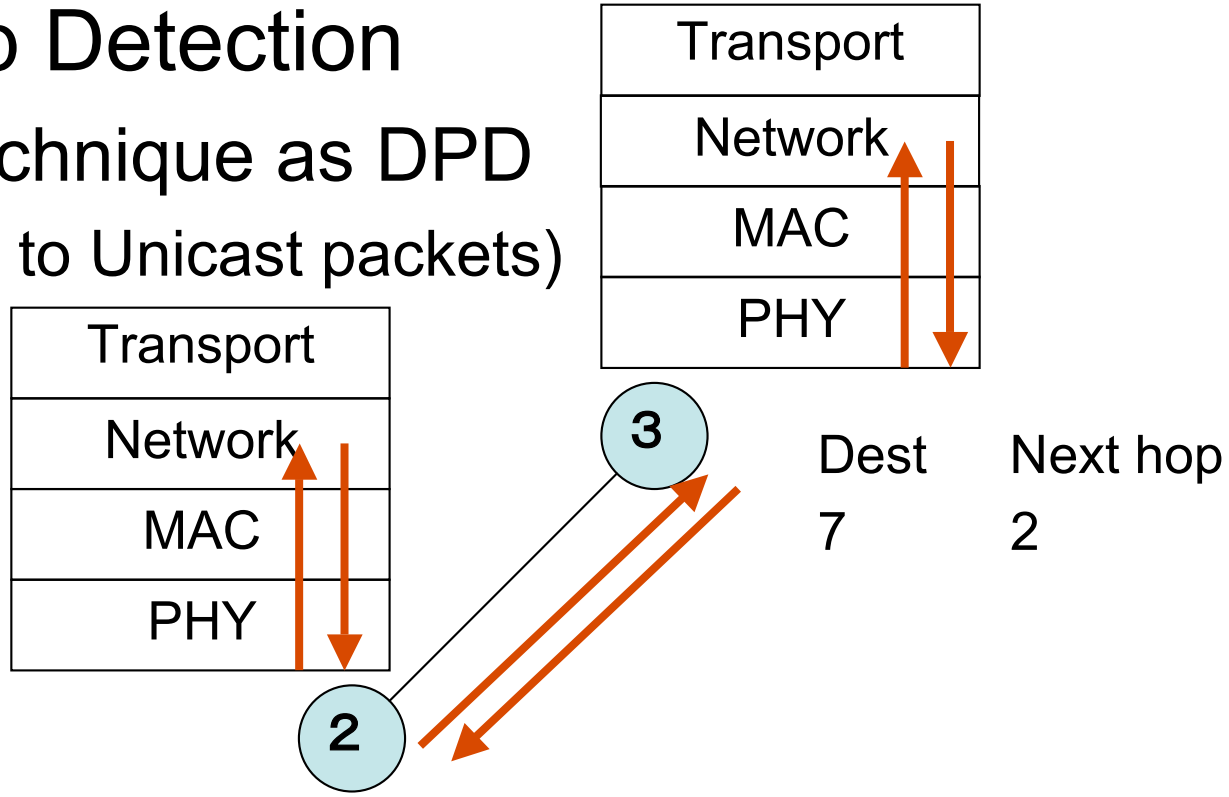
DISCARD PACKET

PD_{MID}

+ Don't need previous packet information.
  (First to calculate)
– Only ping-pong loop can be detected.

Loop Detection

- Post-Loop Detection
  - Same technique as DPD
    (extended to Unicast packets)



(1) Store outgoing packet headers (IP) for each packet (DPD)

(2) Compare incoming packet information against stored ones

DISCARD PACKET PD_{POST}

After Loop Detection

- Just discard the looped packet.
  - Packet Discard in Mid Detection : PD-Mid
  - Packet Discard in Post Detection : PD-Post
- Notify loop existence to routing protocol.

Simulation

Parameter	Values
Simulation Suite	QualNet 4.0
Routing Protocol	nOLSRv2 (OLSRv2 Niigata Univ. Implementation)
Nodes	50
Routing Parameters	Default value
Simulation area	1500m x 1500m
Node placement	Random
Applications	5 CBR (Constant Bit Rate) UDP
Packet size	512 Bytes
Transmission Interval	variable rate
CBR transmission start-end	60s – 660s (<10s random spread)
Transport protocol	UDP
Network protocol	IPv4
MAC protocol	IEEE 802.11
Propagation pathloss	Two-way
PHY-MODEL & DATA-RATE	PHY802.11b 2Mbps
TX-POWER	15.0dBm

Results
(no mobility)

PD:Packet Discard
Mid: mid-loop detection
Post: post-loop detection

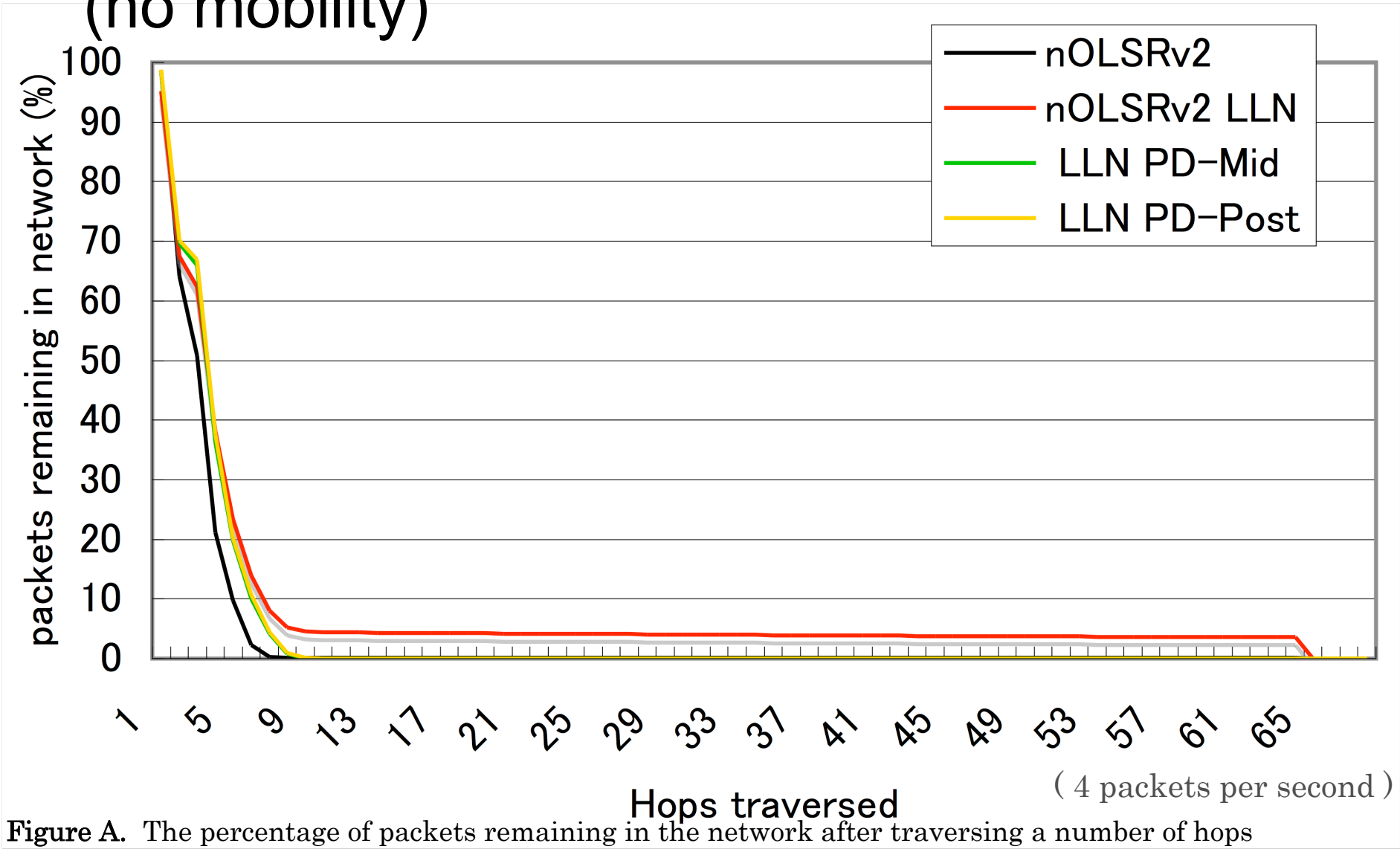
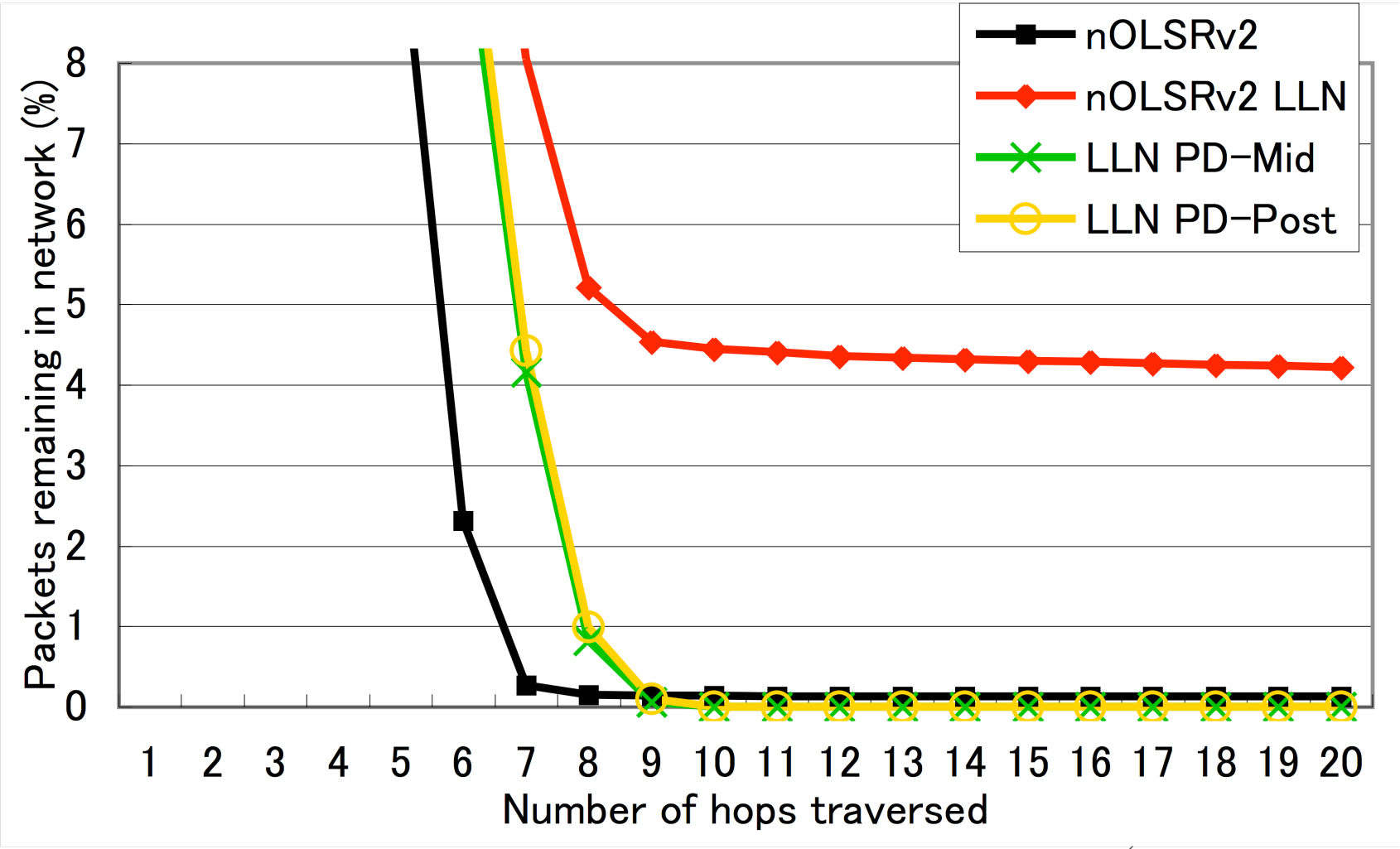


Figure A. The percentage of packets remaining in the network after traversing a number of hops

Results

PD:Packet Discard
Mid: mid-loop detection
Post: post-loop detection



(4 packets per second)

Figure A. The percentage of packets remaining in the network after traversing a number of hops

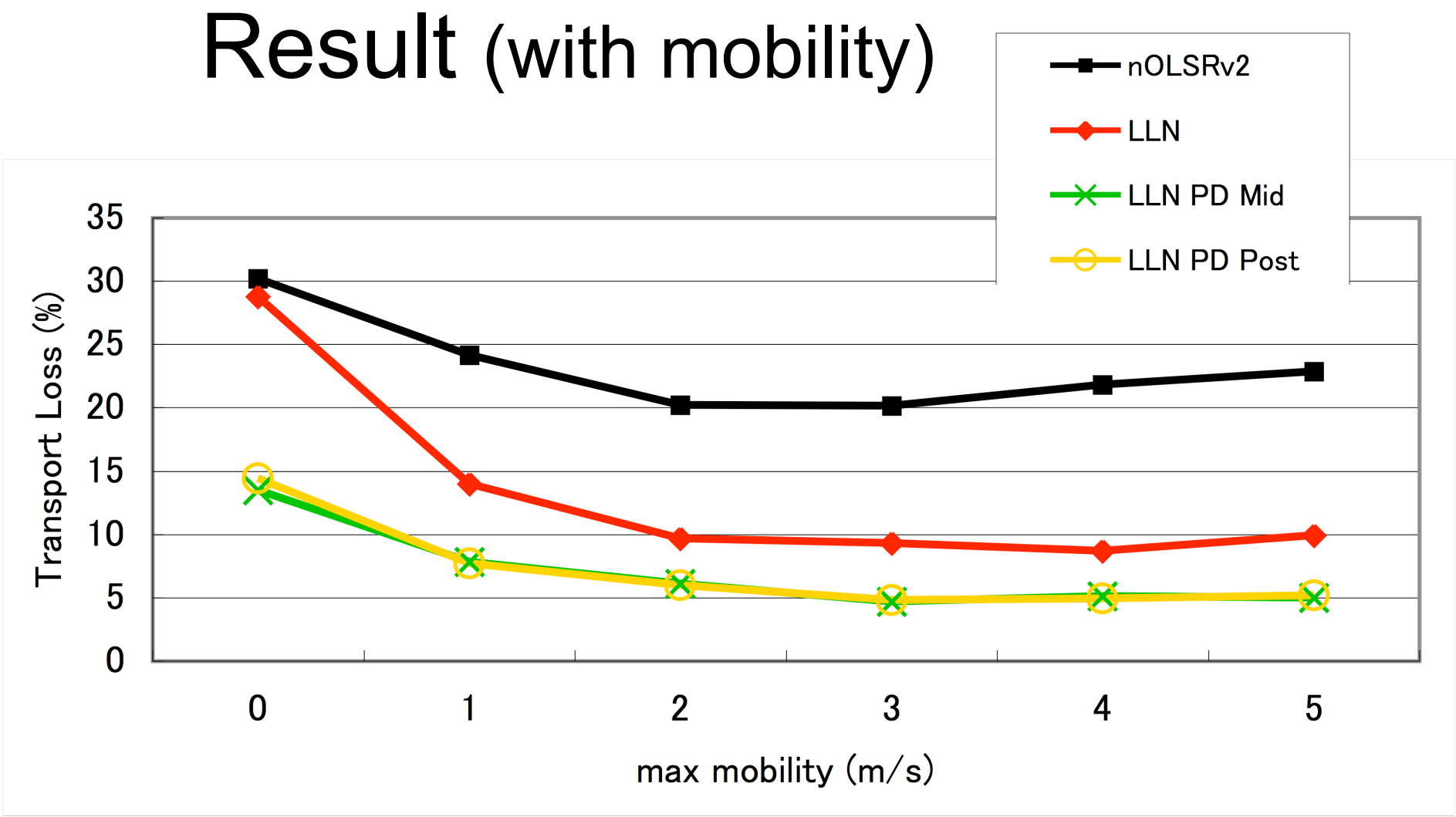


Figure 5. End-to-end Loss (1-PDR) as a percentage against mobility （4 packets per second）

Key points

- Loop detection and looped packet discard improve the total performance.
- This technique is routing independent.
  - MID detection : don't need previous packet information. (first to calculate)
  - POST detection : can detect larger loops.
- Current solution is only discarding looped packet.