

# Leveraging ICN In-network Control for Loss Detection and Recovery in Wireless Mobile networks

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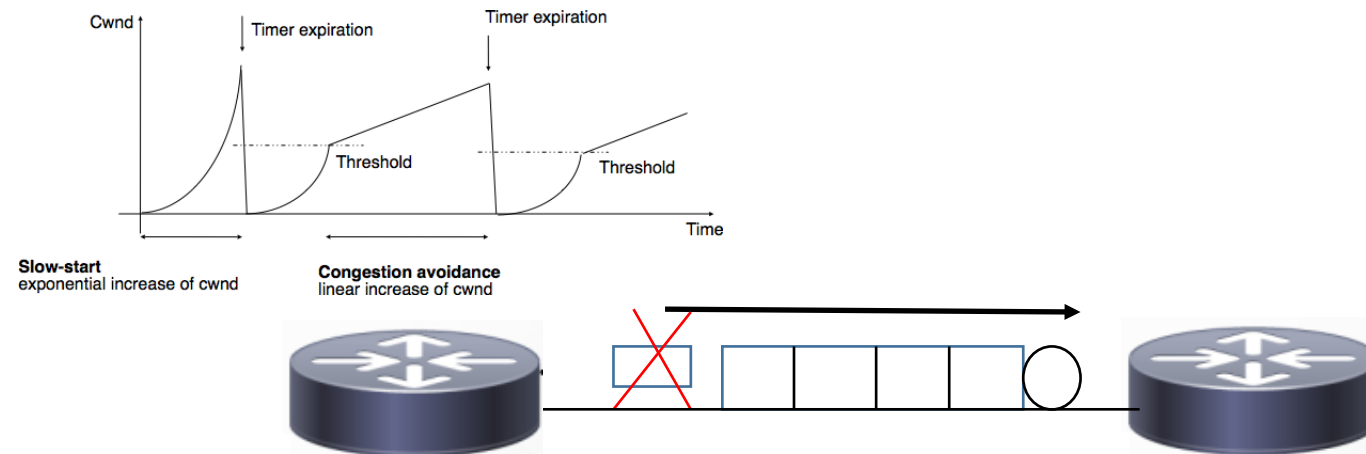
# 5G Network

- Tremendous increase in No. of conneted Mobiles



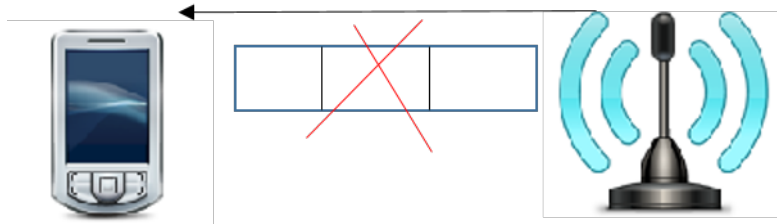
# 5G Network: 3 types of packet losses (1/2)

## 1. Congestion losses:

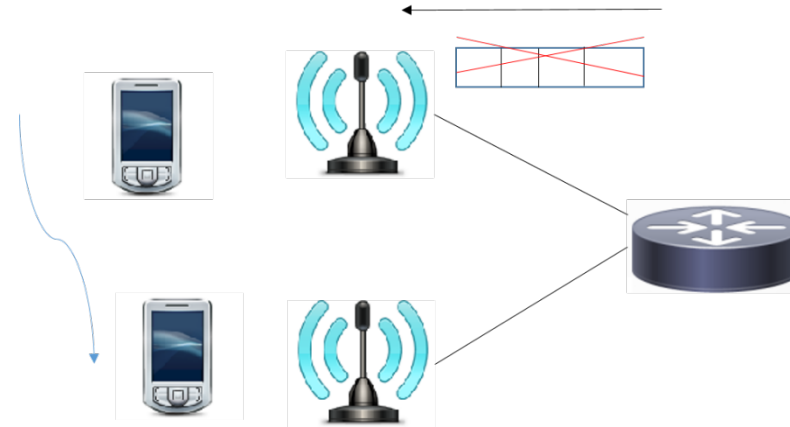


# 5G network: 3 types of packet losses (2/2)

## 2. Wireless losses



## 3. Mobility losses



- Q: how to avoid impact of type 2,3 loss on congestion control mechanism?
- TCP westwood: not consider mobility loss.

# ICN opportunities

- Connection-less transport model
- We propose:
  - ✓ WLDR (wireless loss detection and recovery)
  - ✓ MLDR (mobility loss detection and recovery)
- WLDR + MLDR -> address impact of loss on congestion control

# Outline

- **WLDR+ evaluation**
- MLDR+ evaluation
- Combining WLDR+MLDR
- conclusion

## WLDR: related work

- Transport layer solution:  
I-TCP: buffering at proxy high
- Link-layer based solution:  
Snoop TCP: mac layer specific
- Explicit notification solution:  
zigzag: effective for particular conditions

## WLDR: basic idea

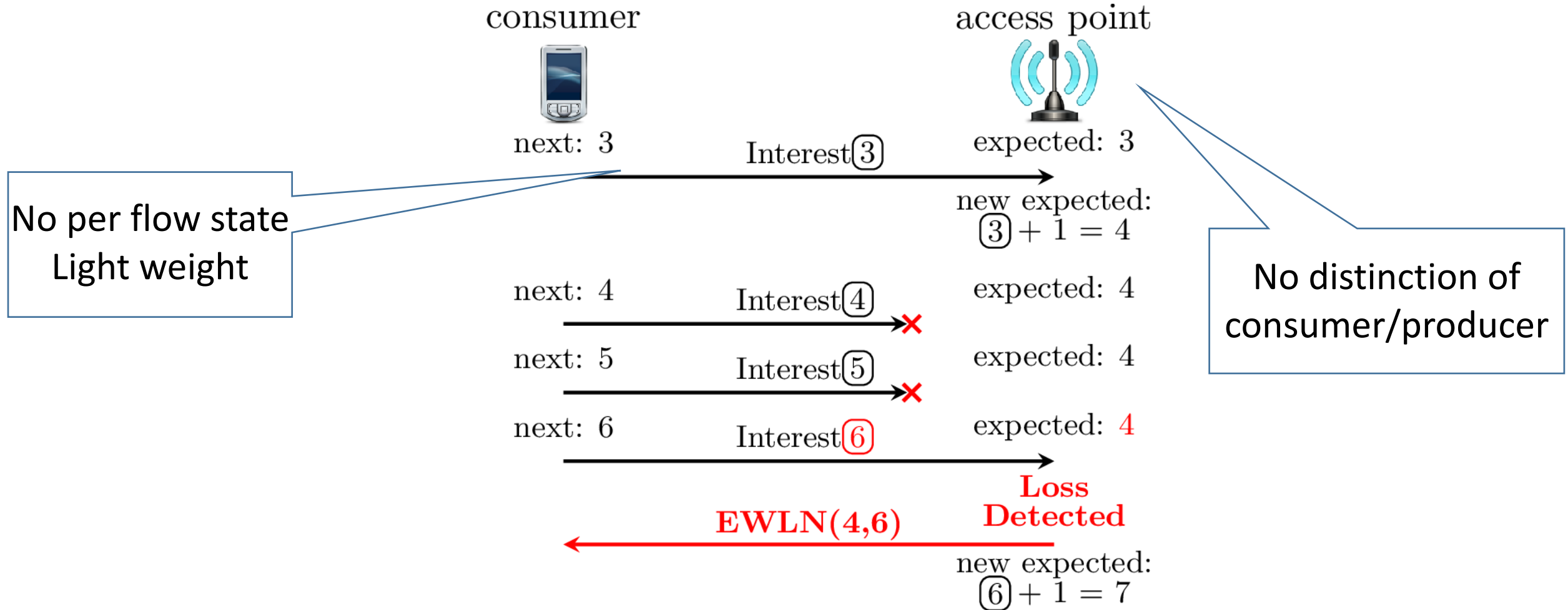
- Hop by hop mechanism
- Loss detection: channel sequentiality



- Loss notification: explicit notification
- Loss recovery: retransmit by the sender

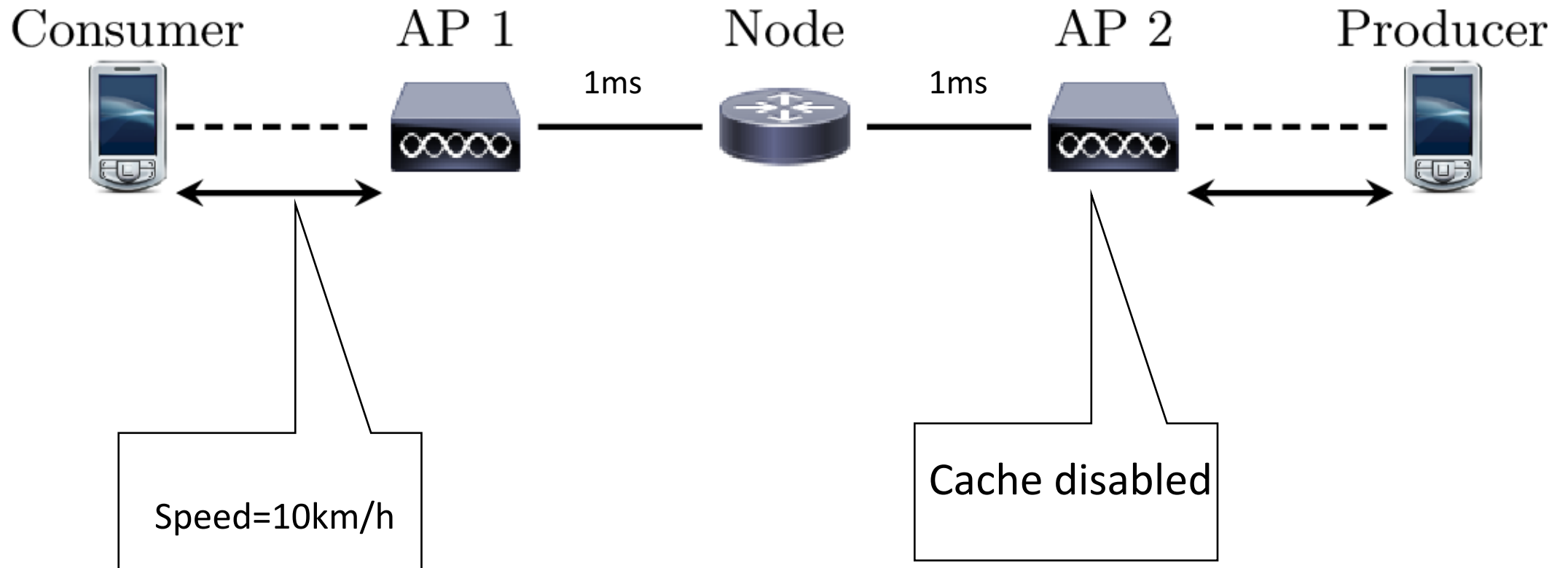


# WLDR: example



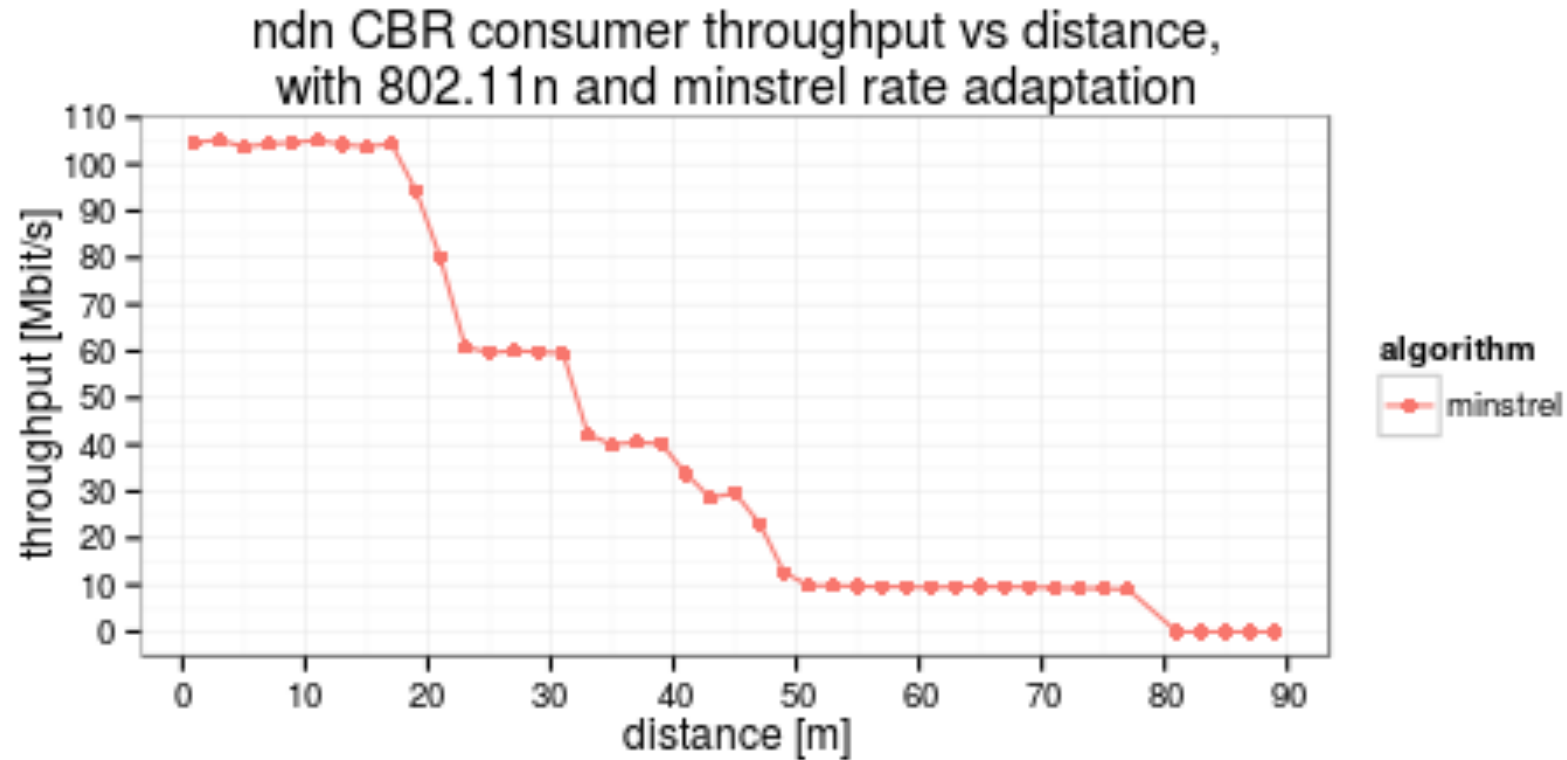
# WLDR evaluation: topology

10 flow of 50k



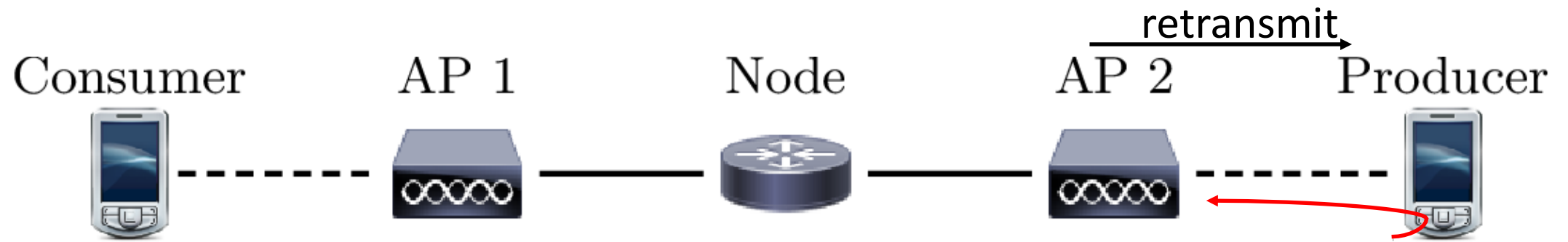
# WLDR evaluation: wireless channel

- 802.11n , fast fading, rate adaptation

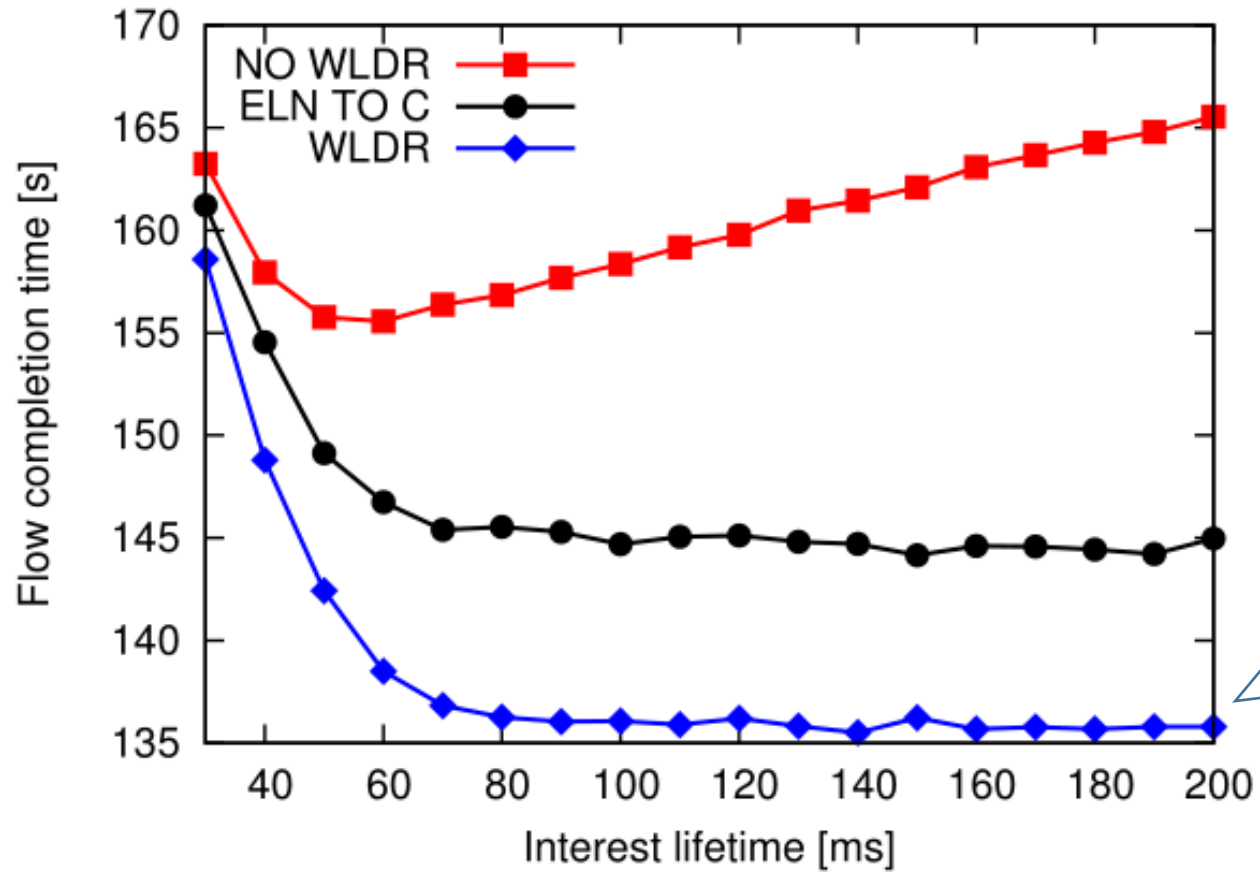


# WLDR evaluation: 3 schemes compared

- 3. WLDR



# WLDR: evaluation results



higher gain at big timer

independent from timer

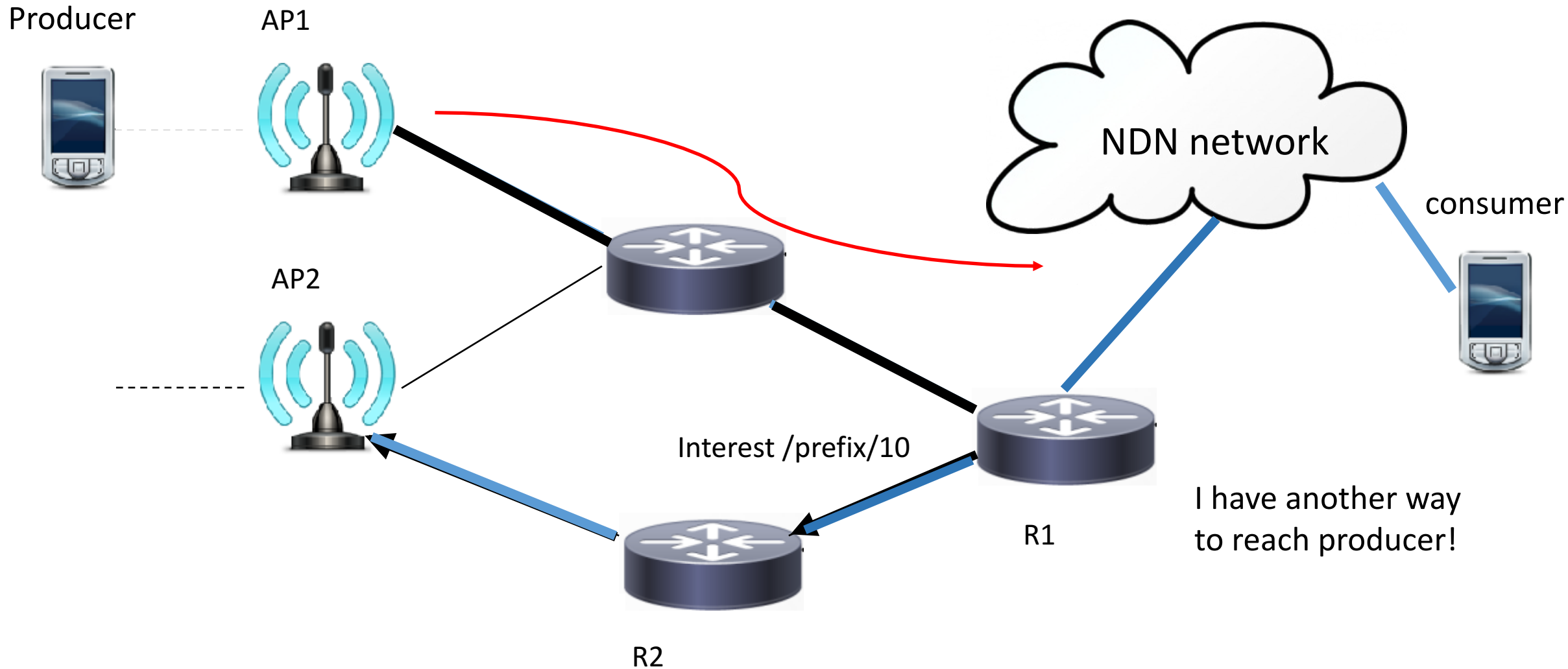
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## MLDR: basic idea

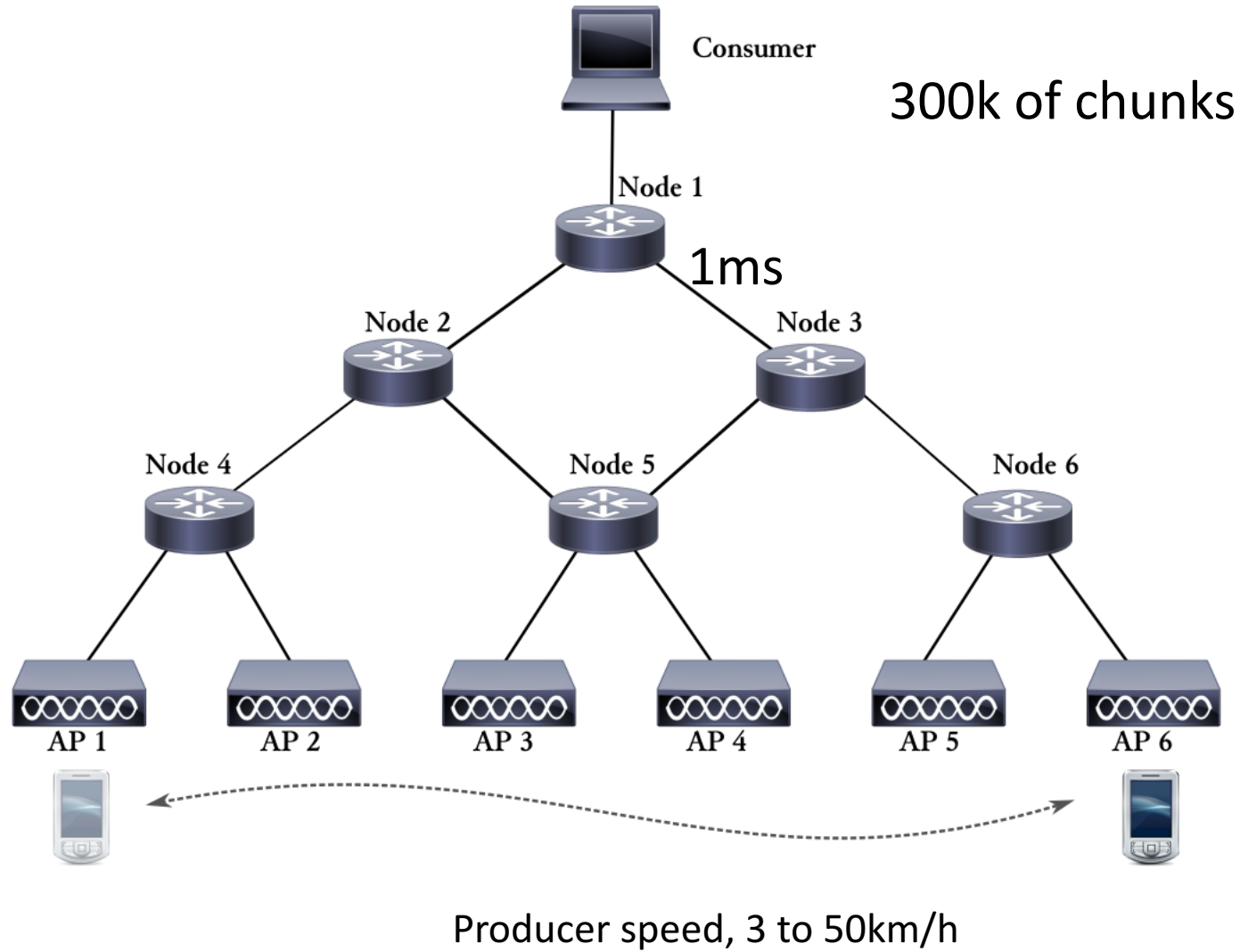
- 2 cases: consumer or producer
- consumer mobility loss:  
retransmit immediately after handover
- producer mobility loss:  
on the fly rerouting  
hoping one hop on the reverse path is updated

# MLDR: example with producer mobility

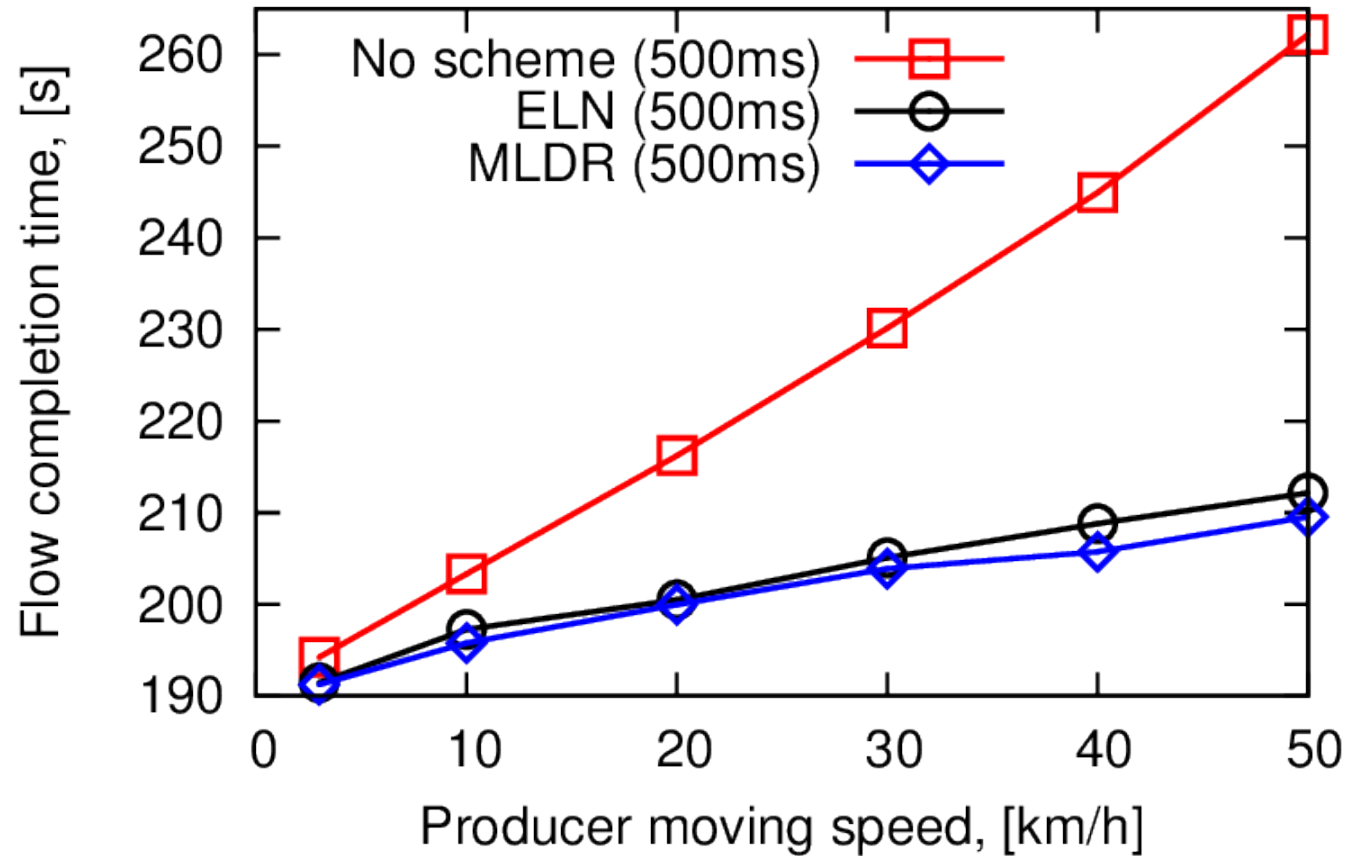




# MLDR: evaluation topology



# MLDR: with producer evaluation results

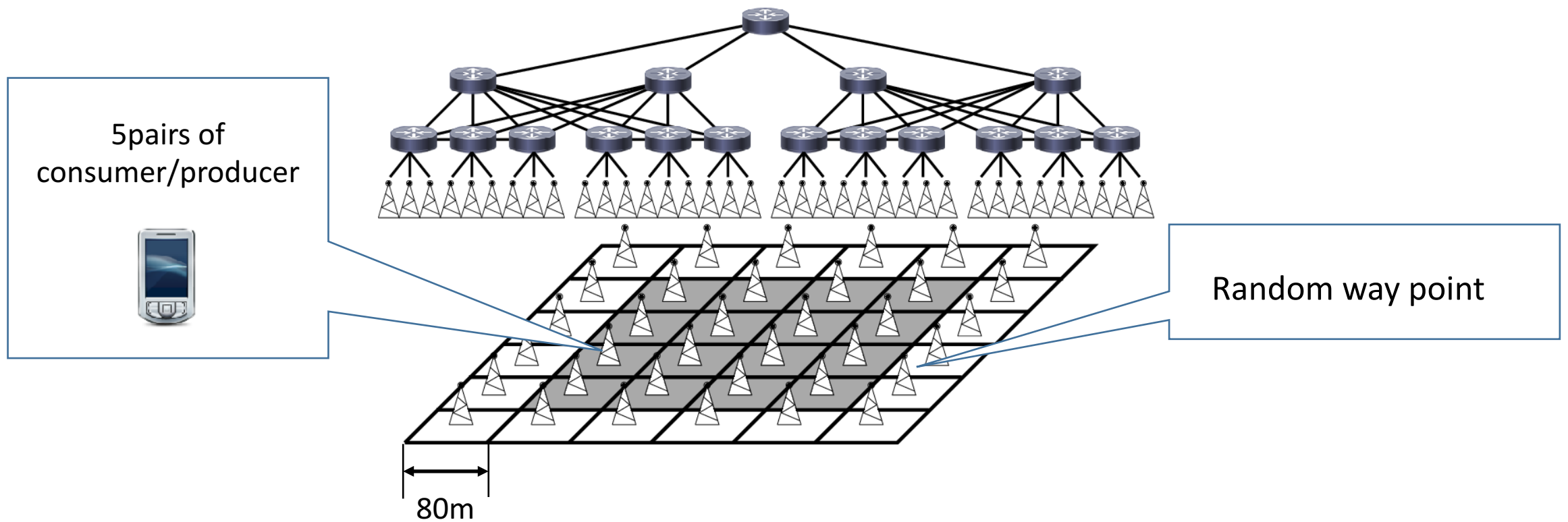


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# WLDR, MLDR: combined evaluation

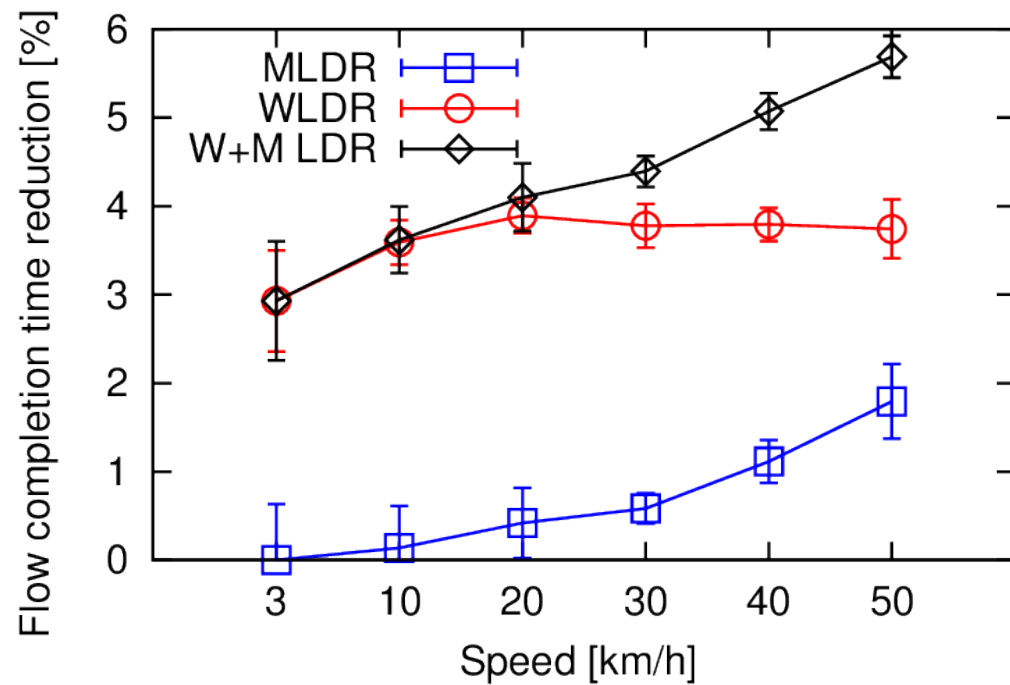
- Simulation setup



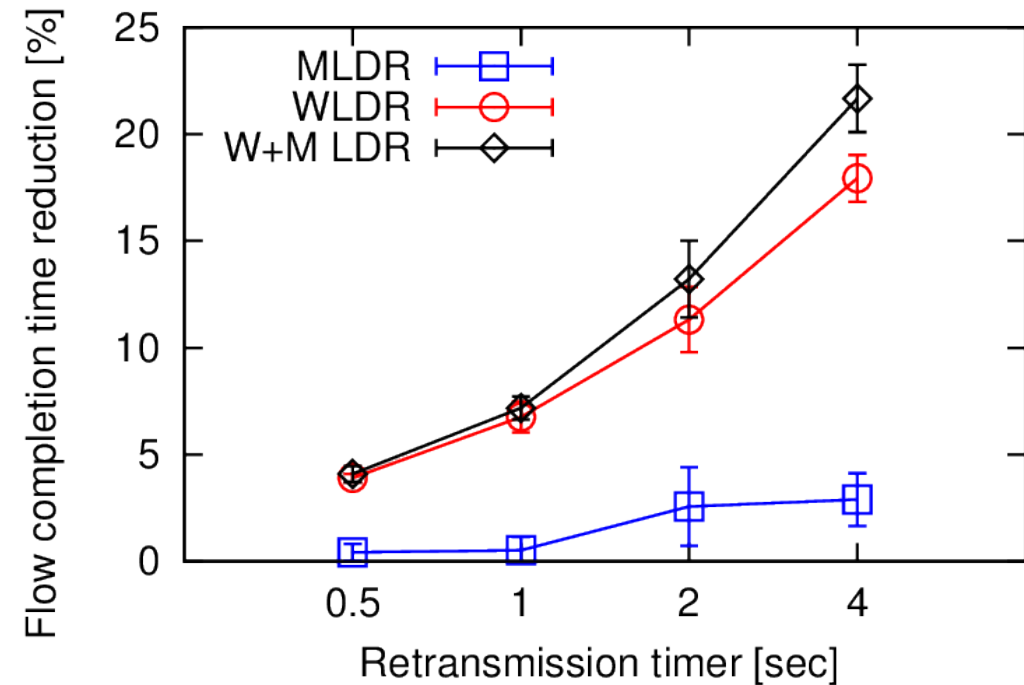
# WLDR+MLDR evaluation: results

More than 20% gain!

## 1. Fixed Retransmission timer=500ms



## 2. Fixed Speed=20km/h



# Conclusion

## WLDR + MLDR:

- Remove dependency from application timers
- Flow completion time reduction
- interest satisfaction time reduction

Thank you!

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Q: Wireless & mobility losses mistreated as congestion signal?

- Most TCP does not incorporate this problem well
- Some does: TCP westwood, not consider mobility loss at all