

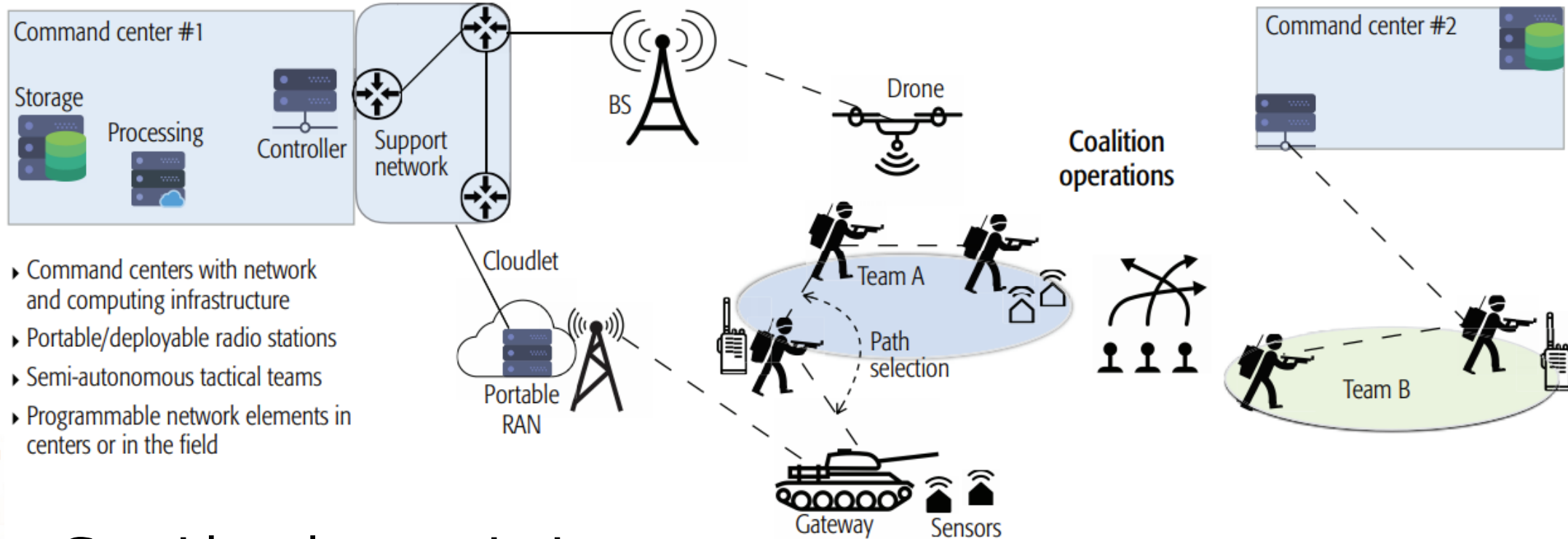
CeTUP: CONTROLLER- EQUIPPED TOPOLOGY UPDATE PROCESS FOR TACTICAL AD-HOC NETWORKS

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MOTIVATION

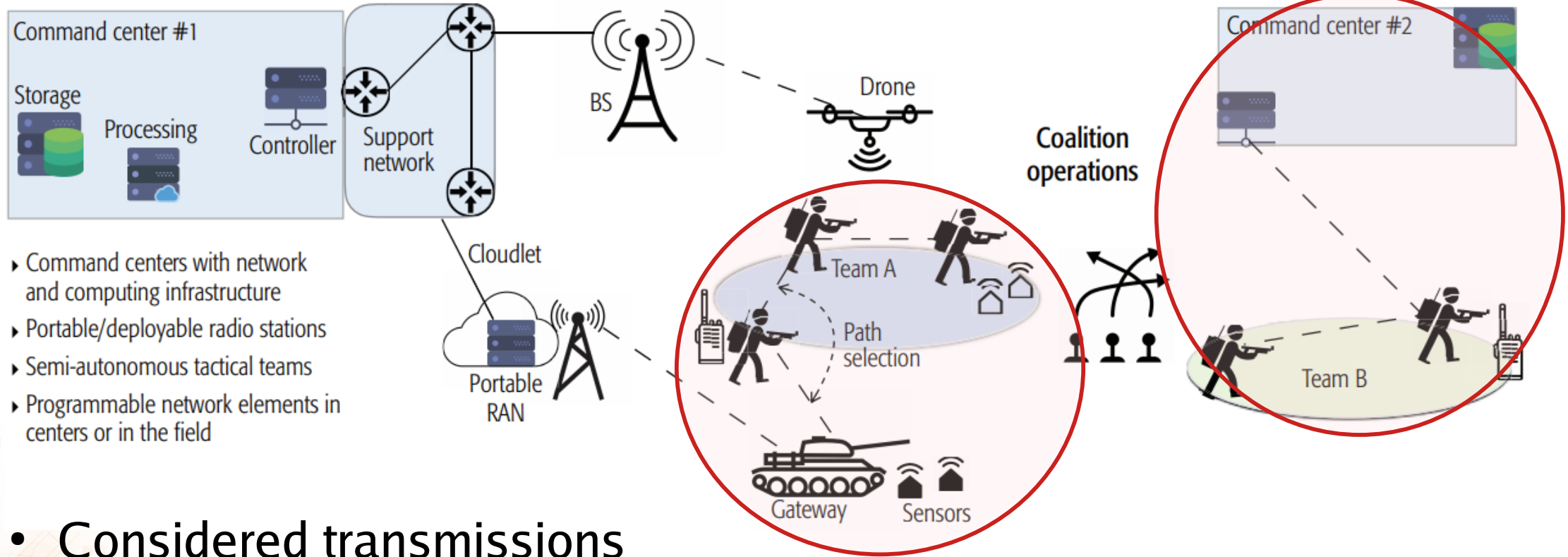


- ▶ Command centers with network and computing infrastructure
- ▶ Portable/deployable radio stations
- ▶ Semi-autonomous tactical teams
- ▶ Programmable network elements in centers or in the field

• Considered transmissions

- Video streams
- VoIP / Video calls
- Observation pictures
- Tactical instructions

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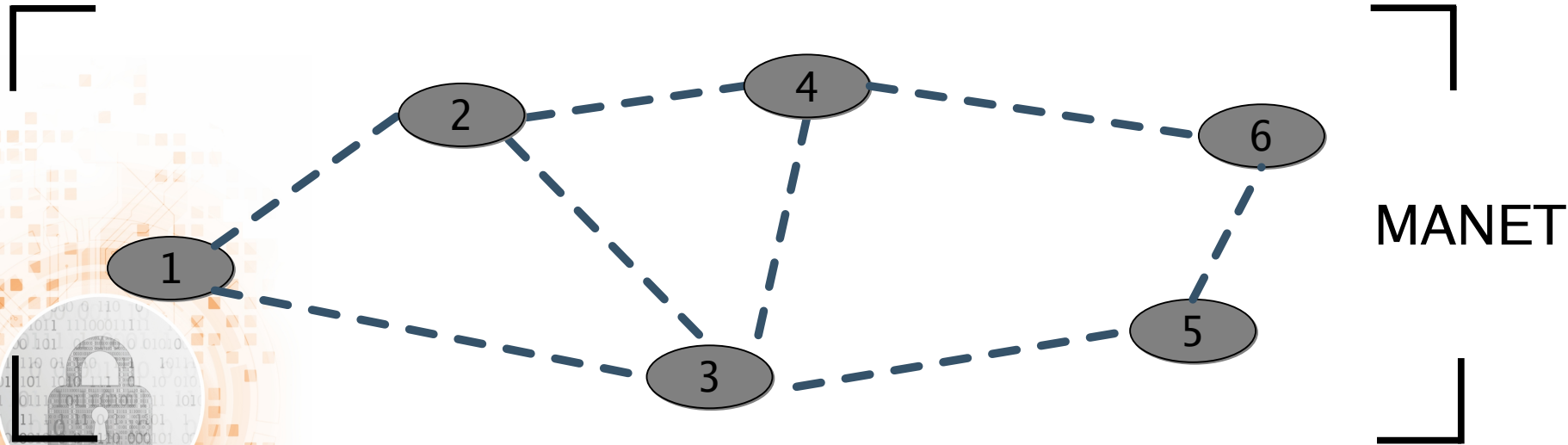
Source:

K. Poularakis, G. Iosifidis and L. Tassiulas.

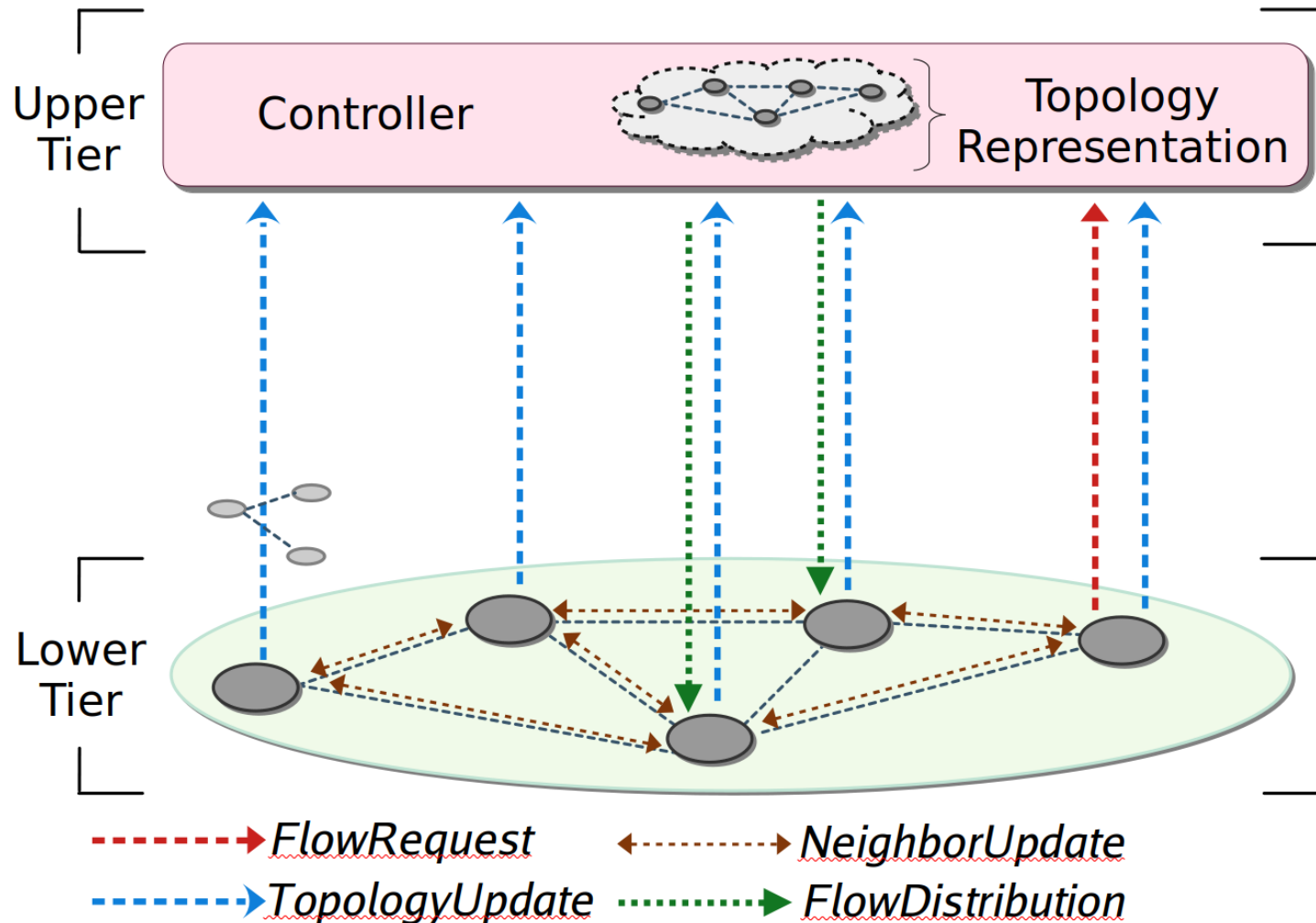
SDN-Enabled Tactical Ad Hoc Networks: Extending Programmable Control to the Edge (IEEE Communications Magazine 2018)

THE NETWORK ARCHITECTURE

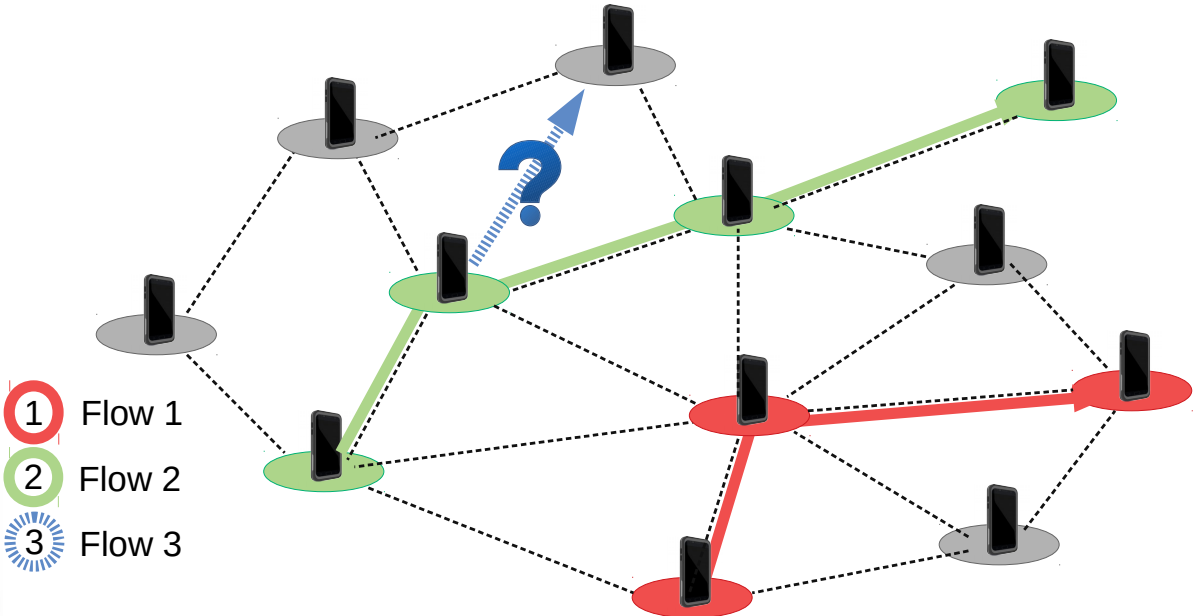
- MANET characteristics:
 - nodes act as client and router, respectively
 - restricted transmission capacity
 - nodes are expected to behave mobile



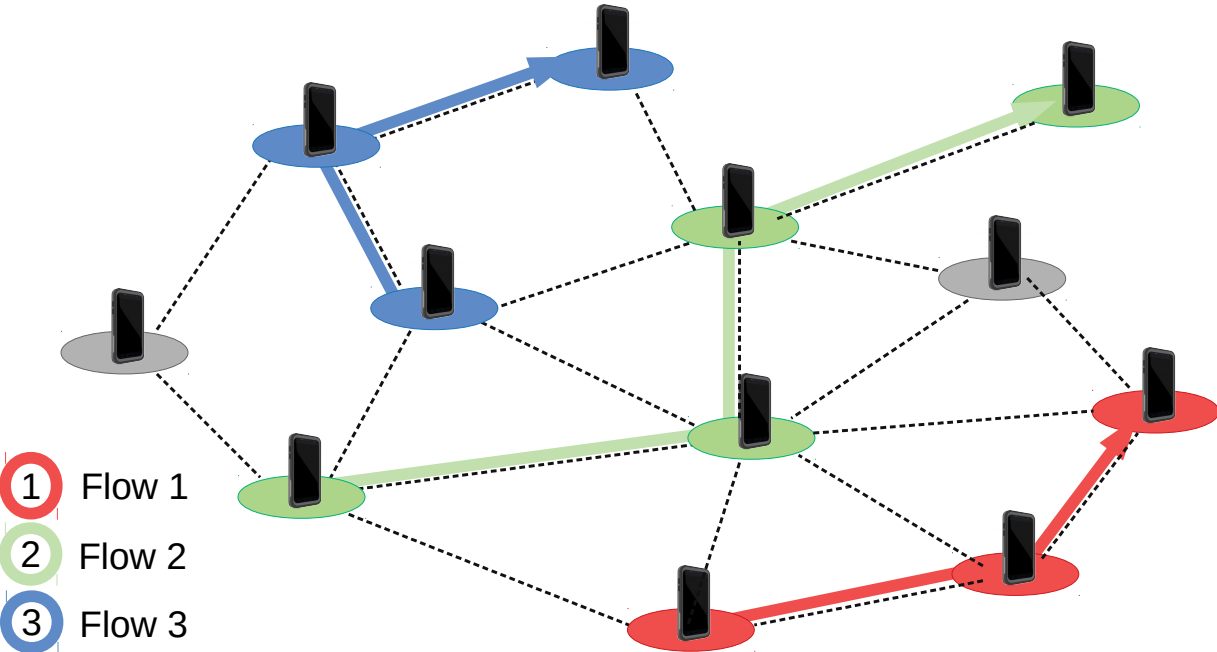
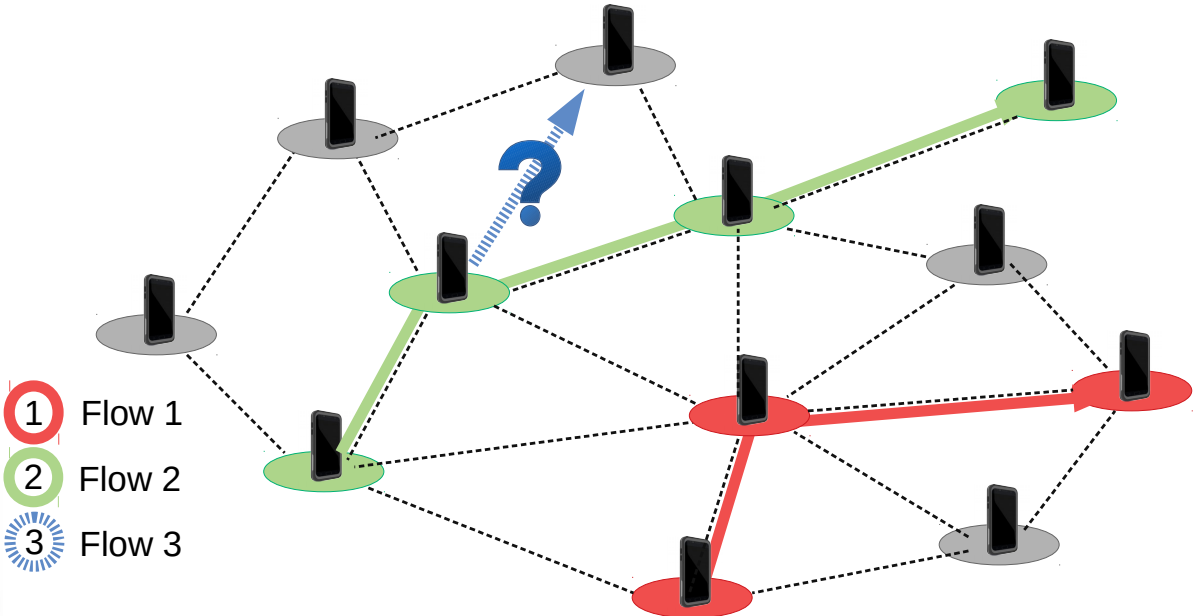
Proactive CeTUP Architecture



OBJECTIVE

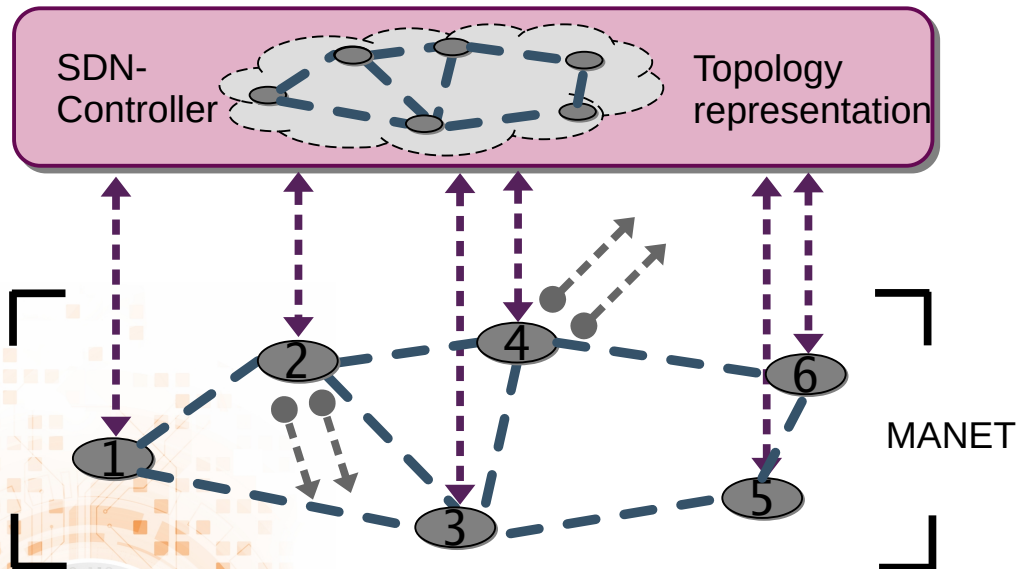


OBJECTIVE

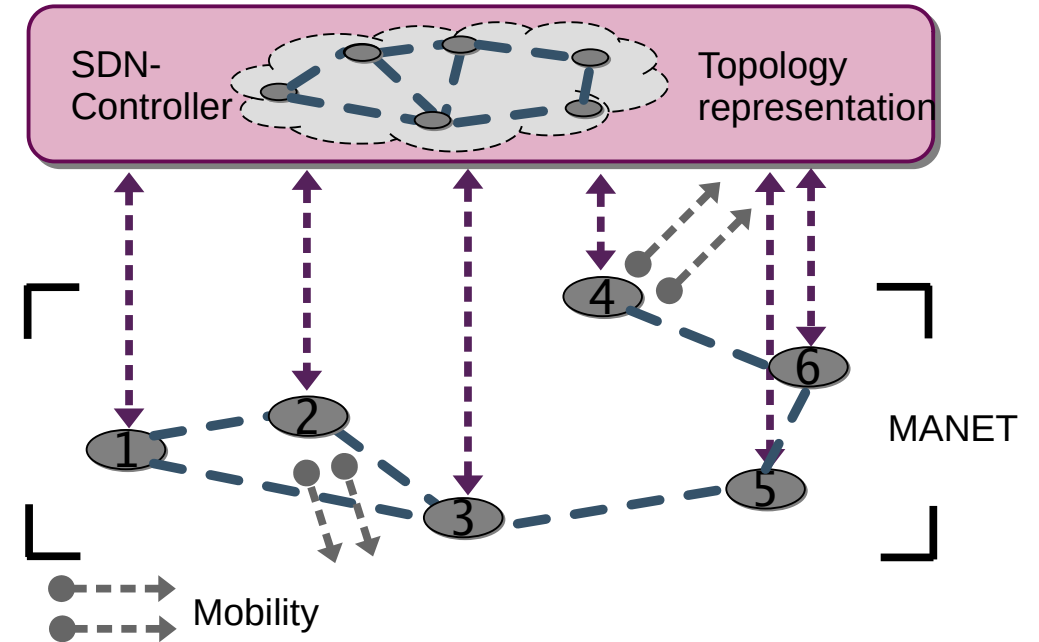


SHORTCOMINGS OF proactive CeTUP

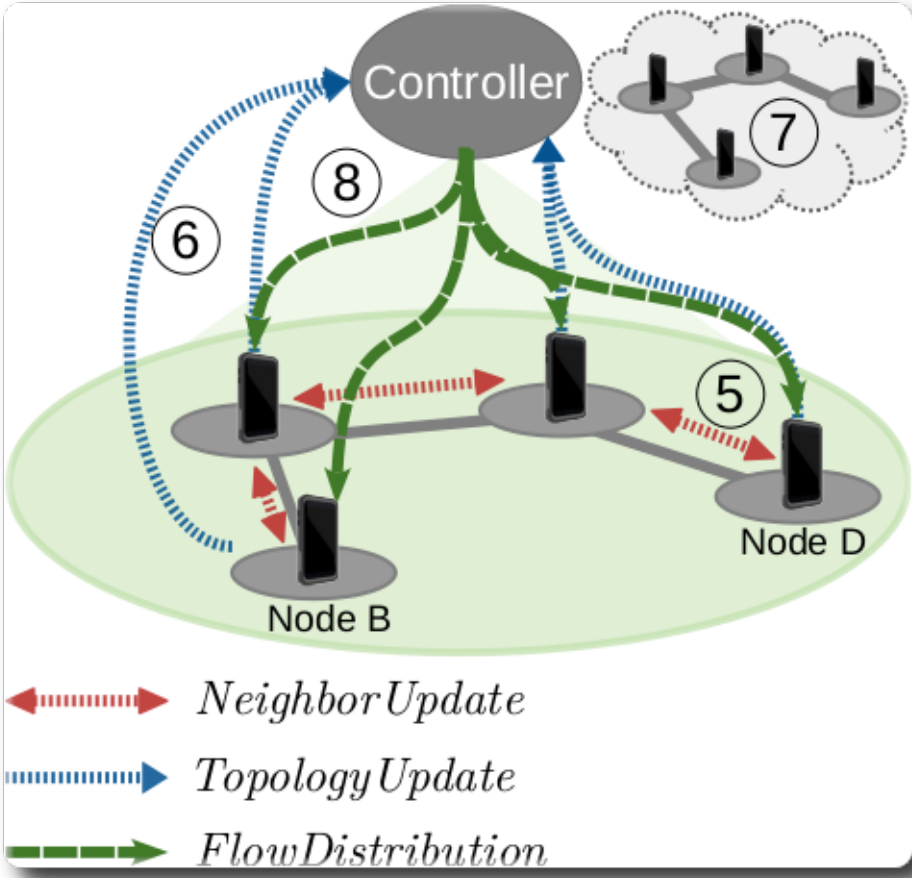
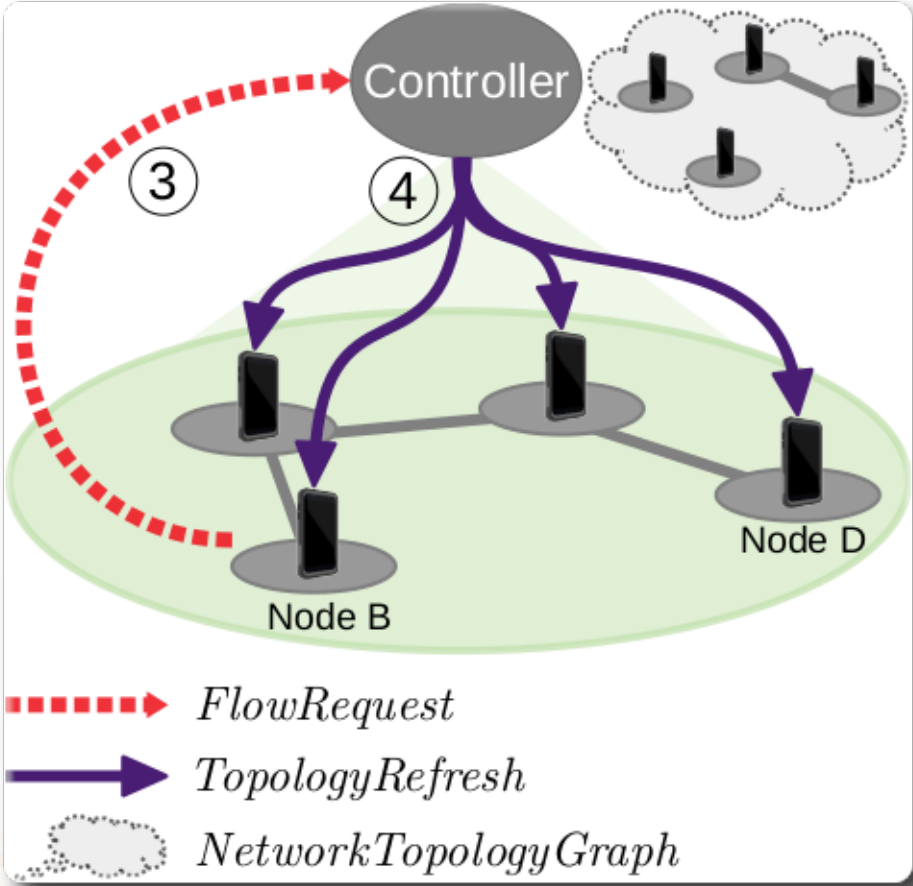
- topology at time t_n



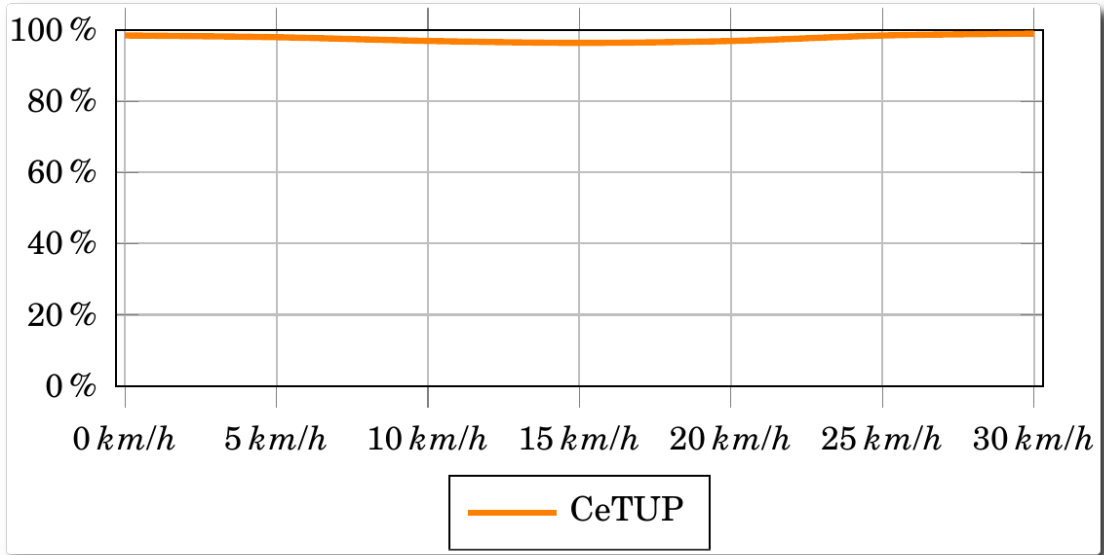
- topology at time t_{n+1}



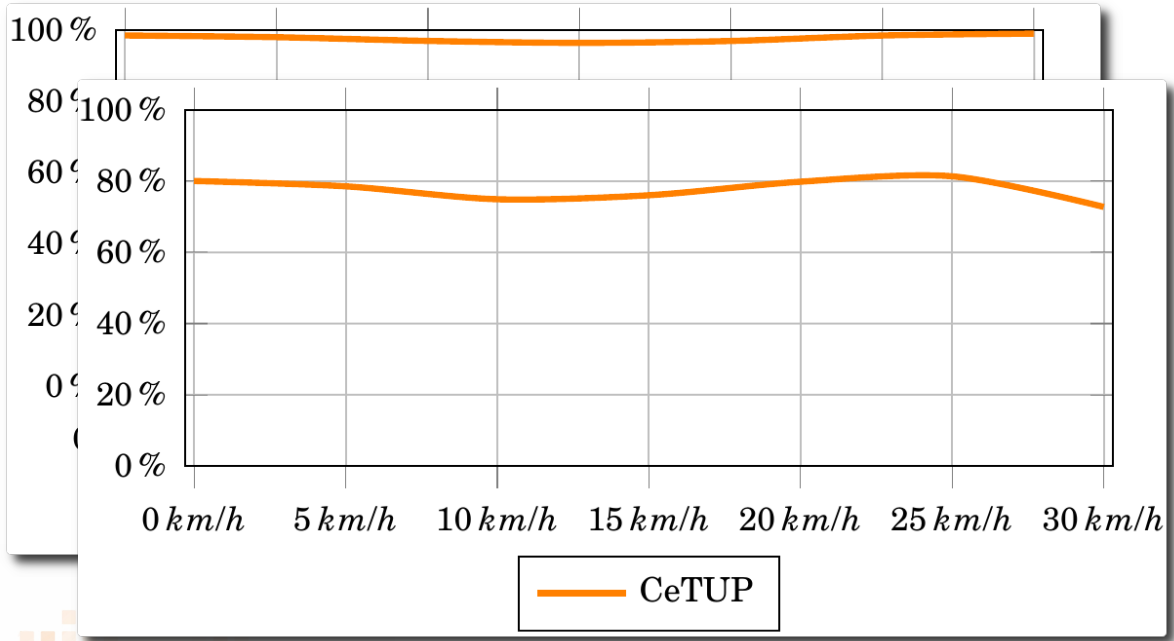
CeTUP EQUIPPED WITH CSMA/CA



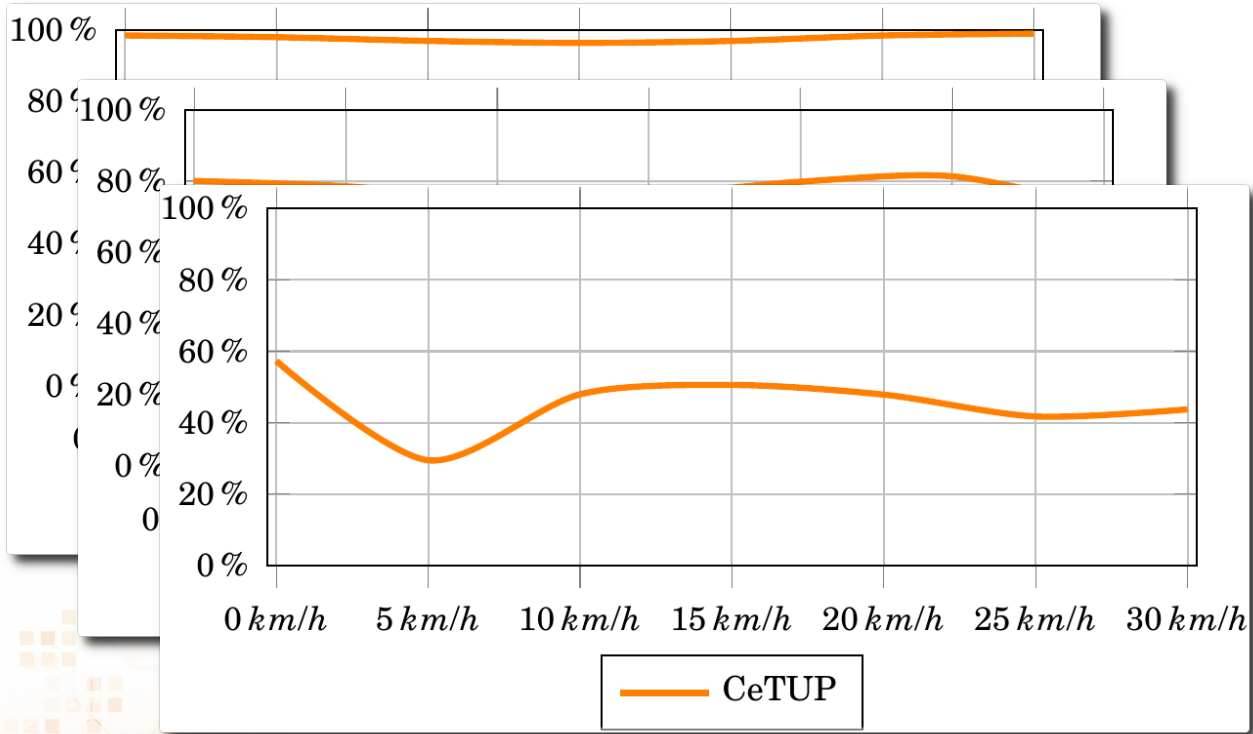
FOUND AND DEPLOYED ROUTES WITH CeTUP



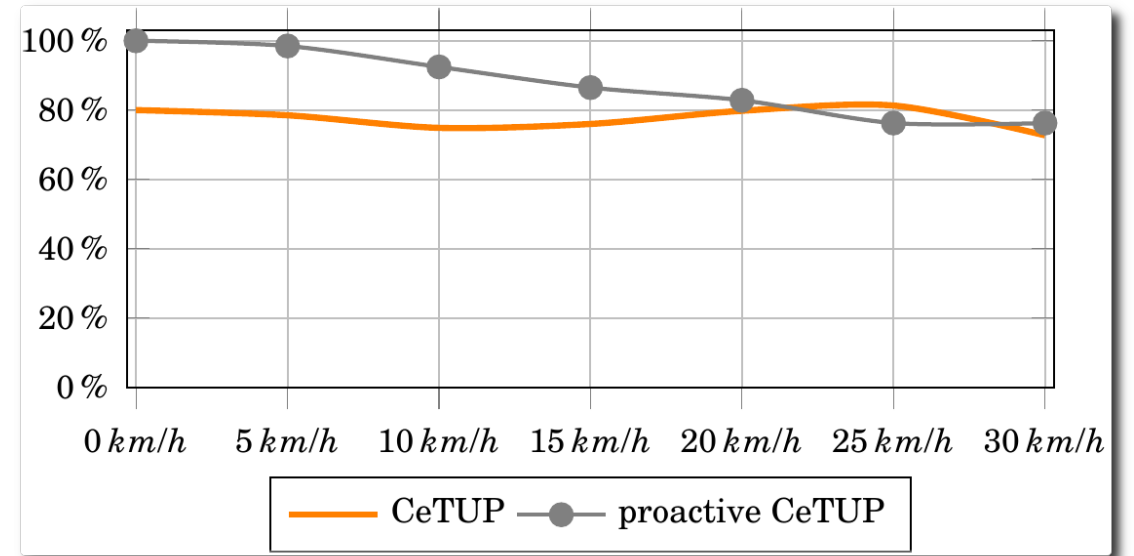
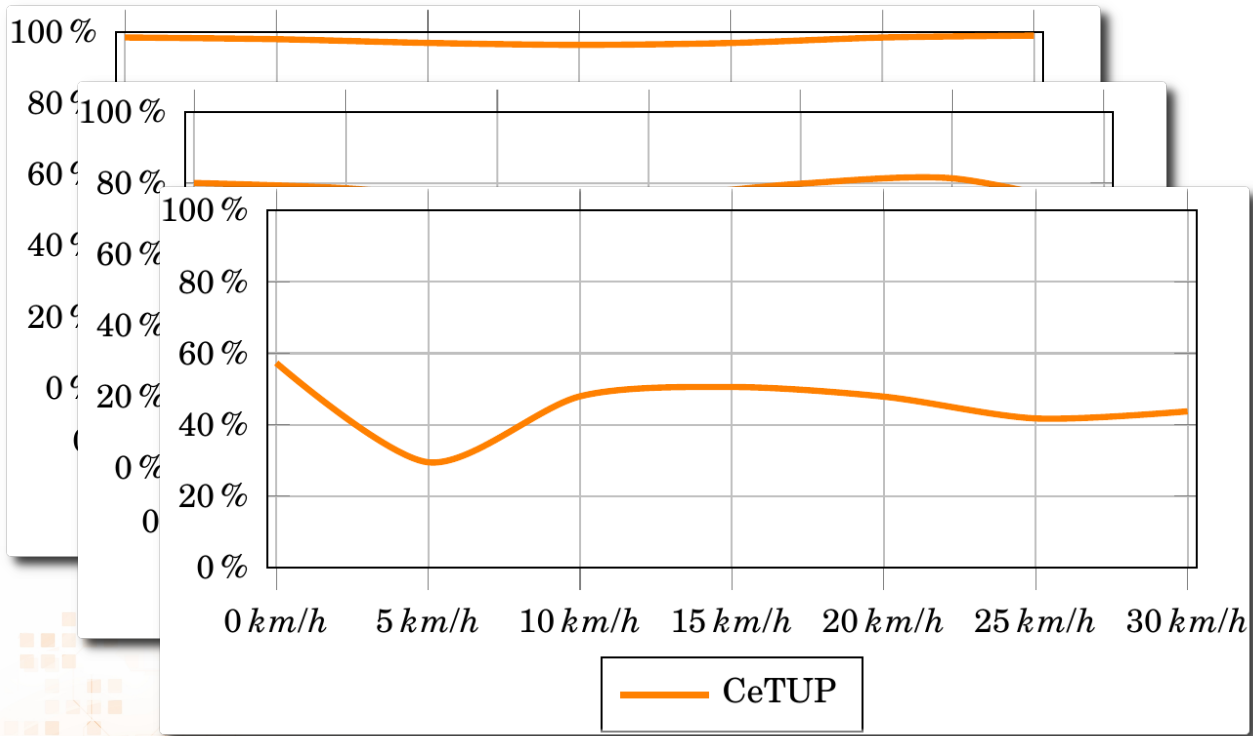
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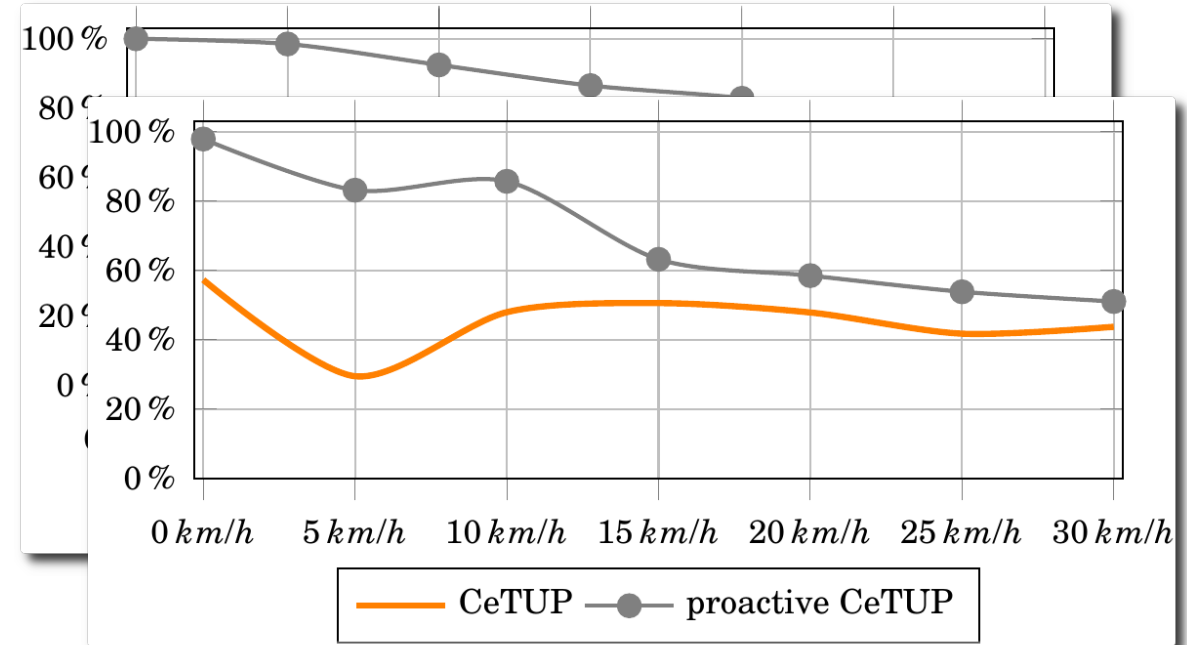
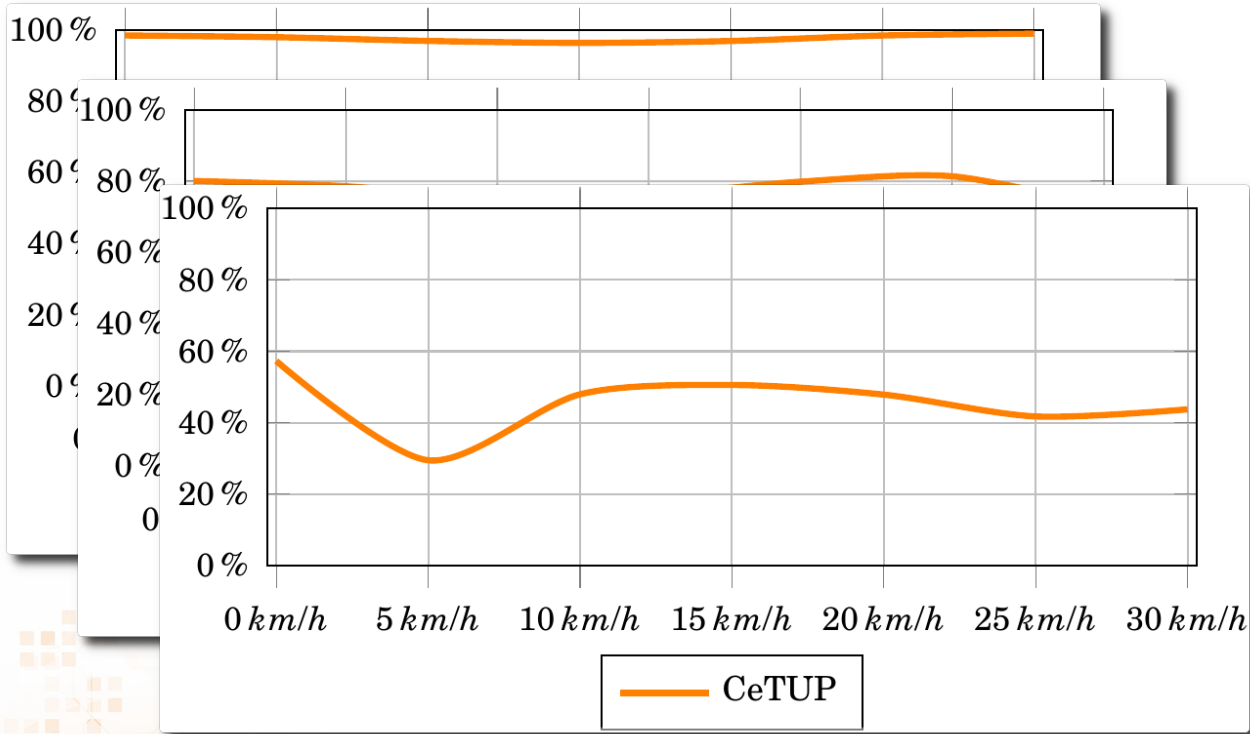
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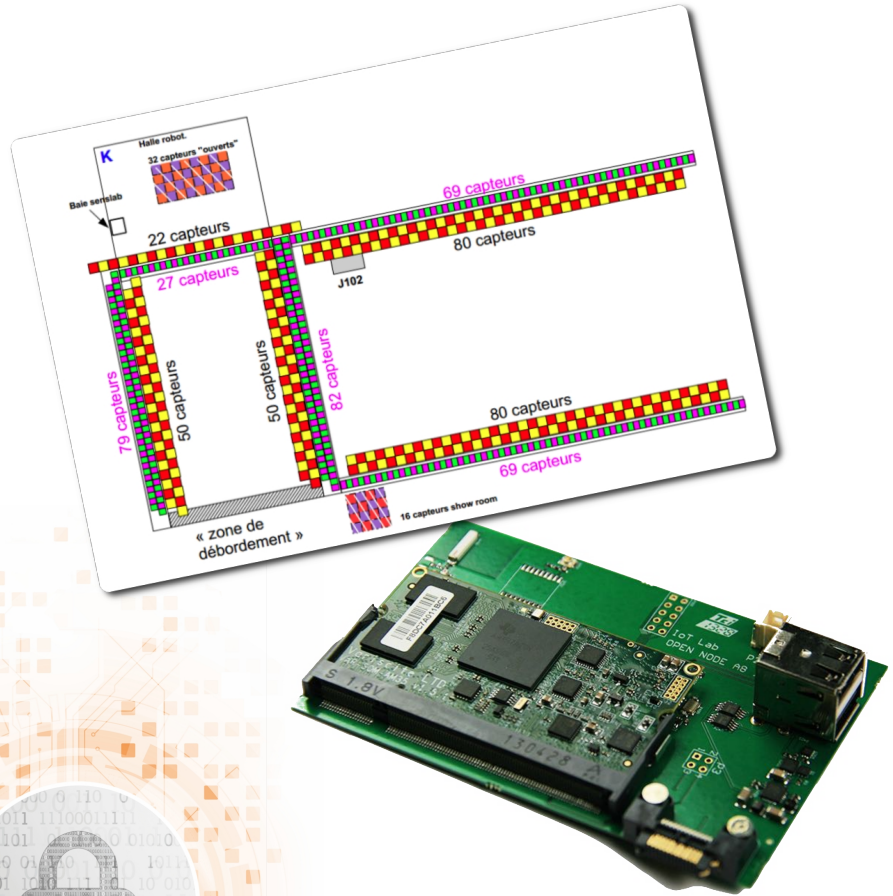
FOUND AND DEPLOYED ROUTES WITH CeTUP



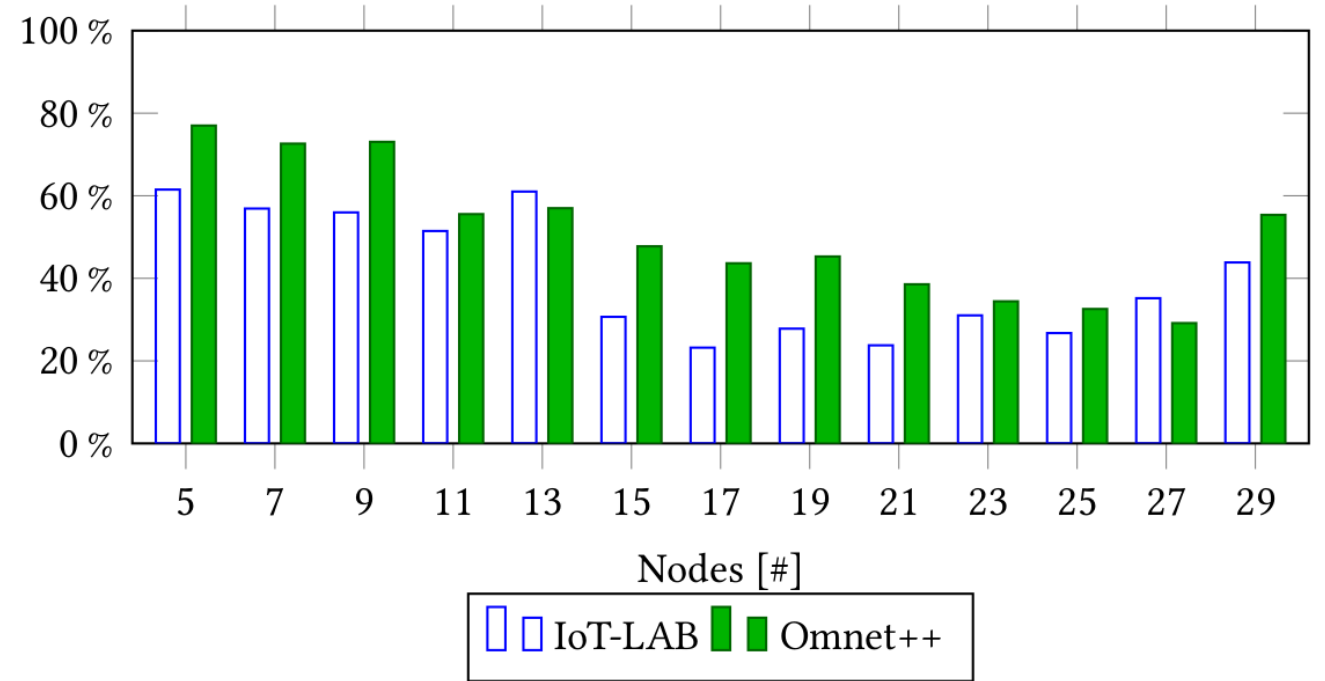
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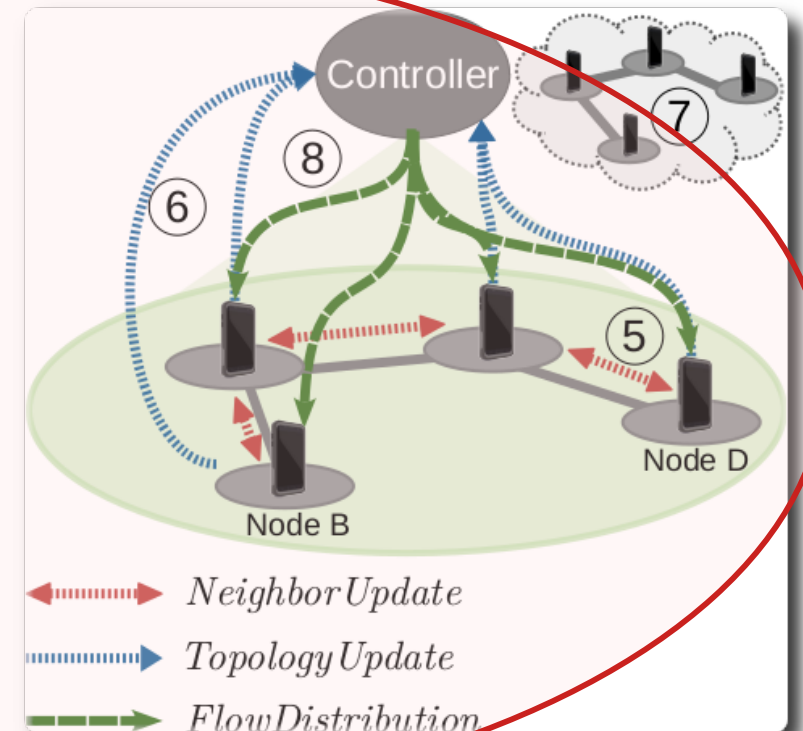
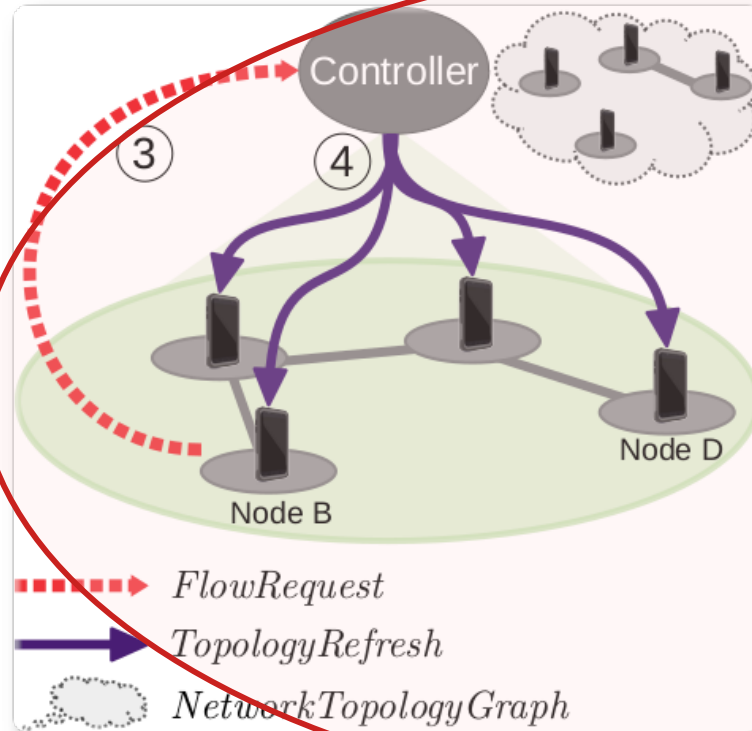
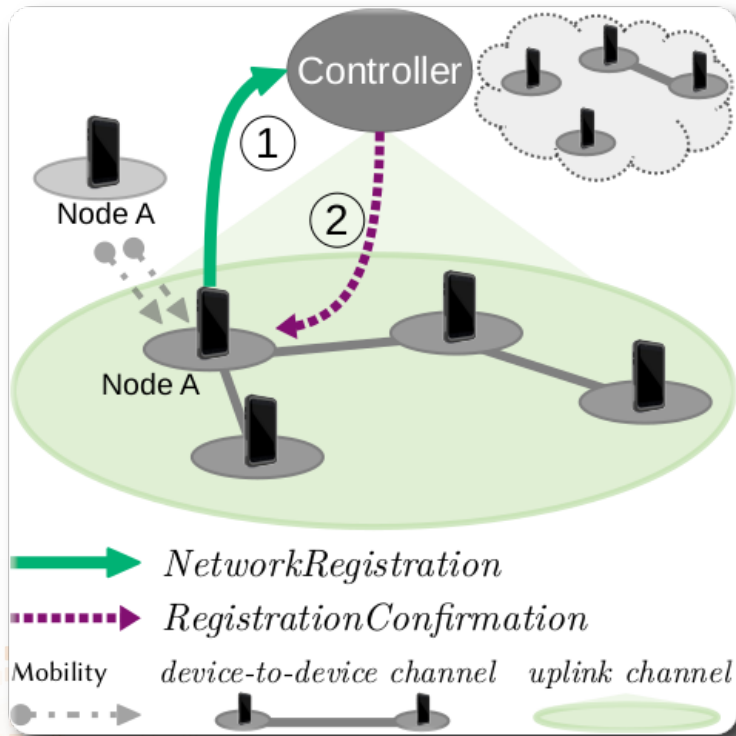
VERIFYING FINDINGS



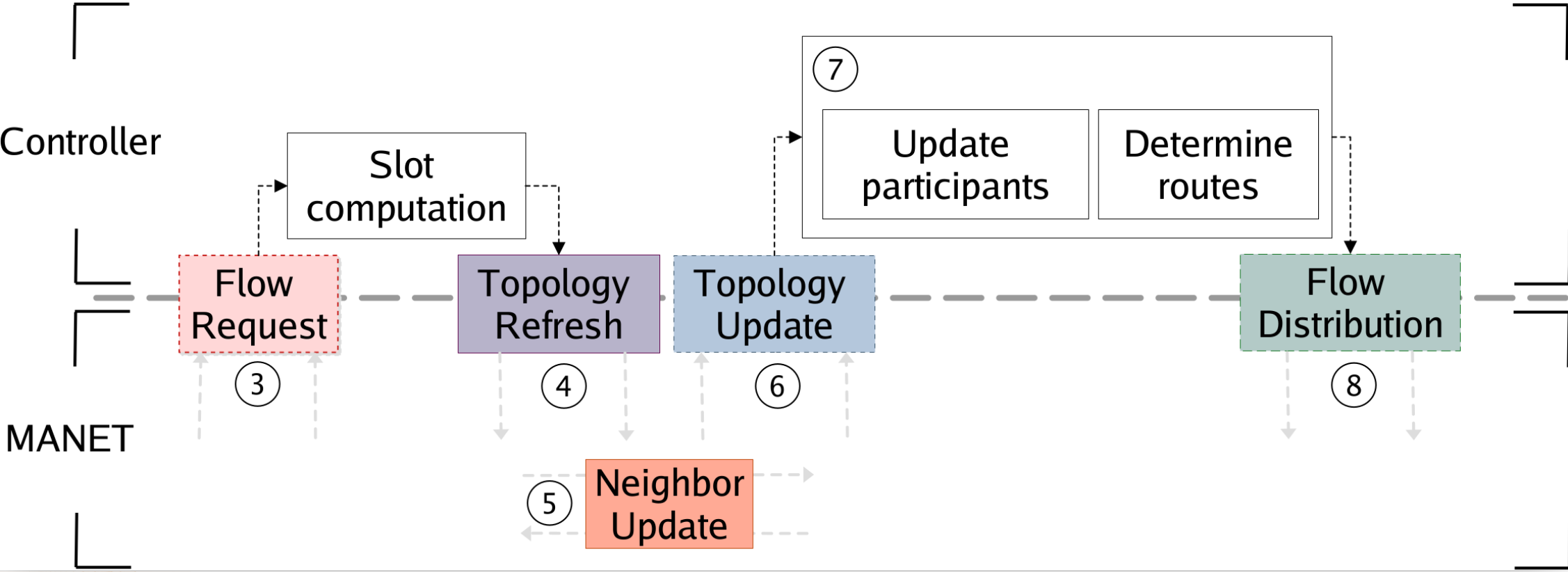
Delivered NeighborUpdate



SLOT MANAGED CeTUP



SLOT COMPUTATION

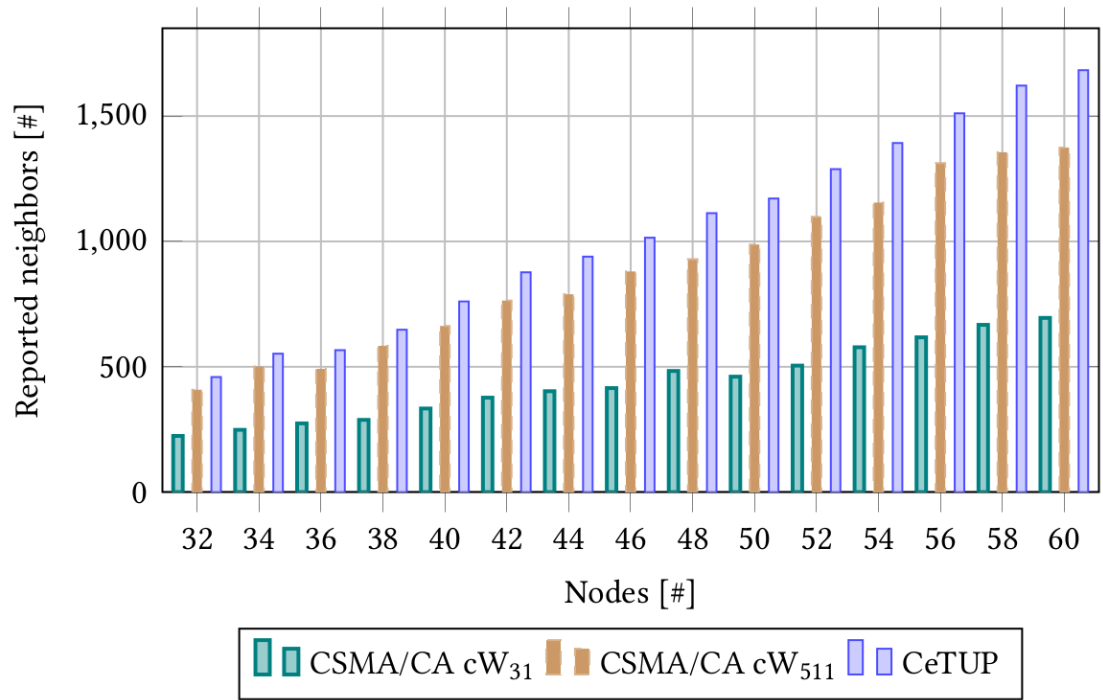
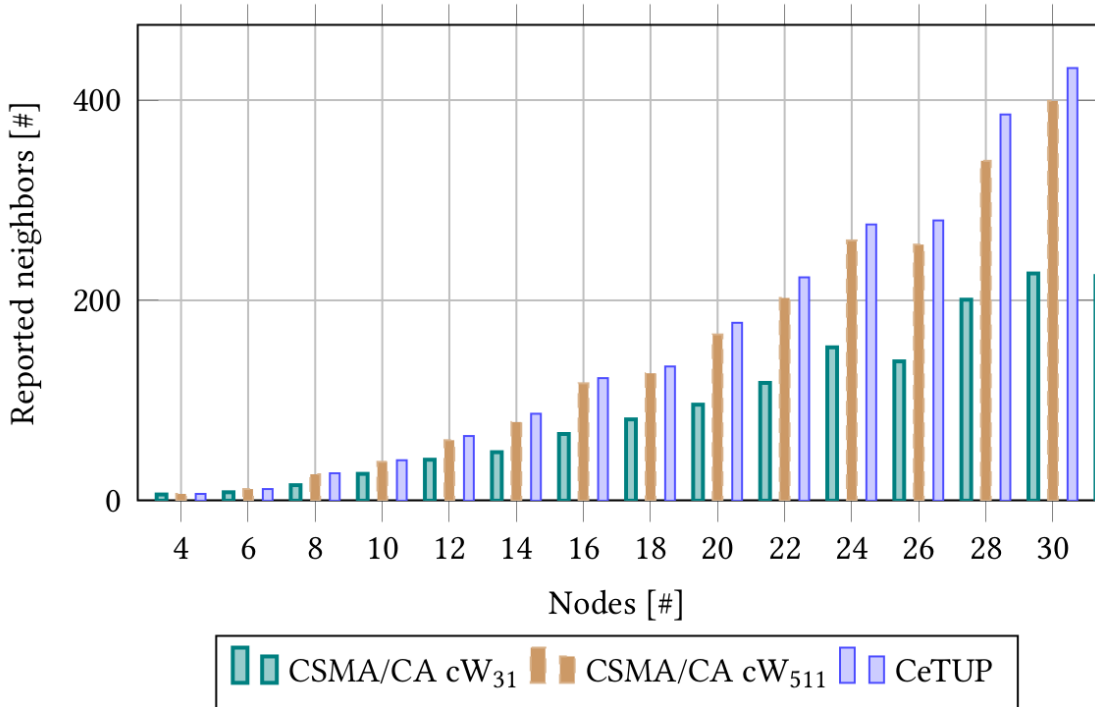


EVALUATION

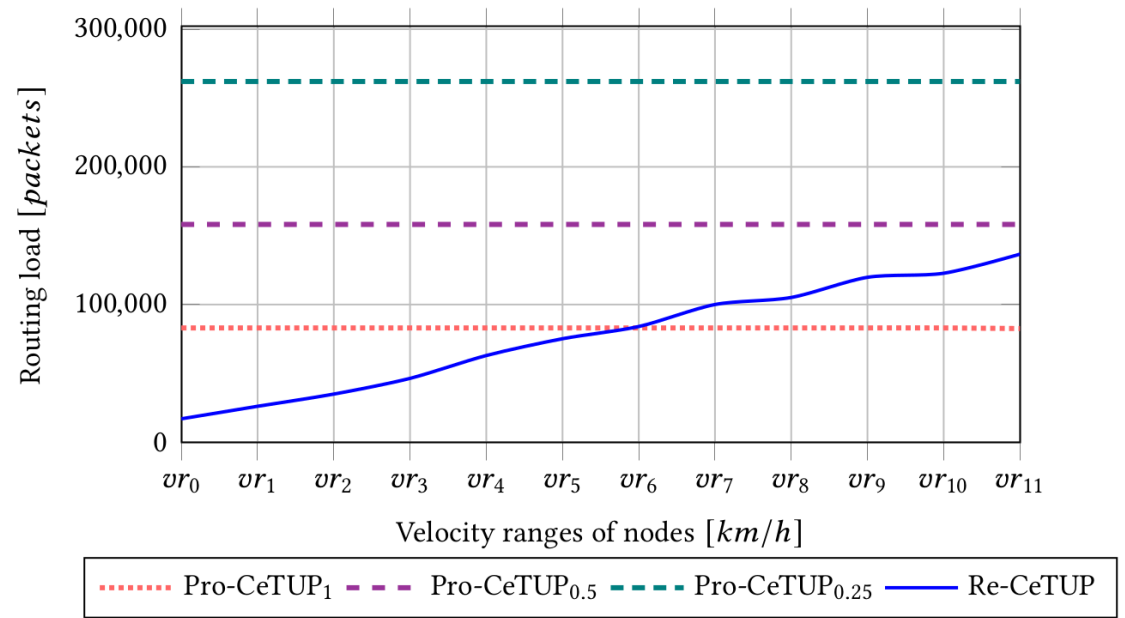
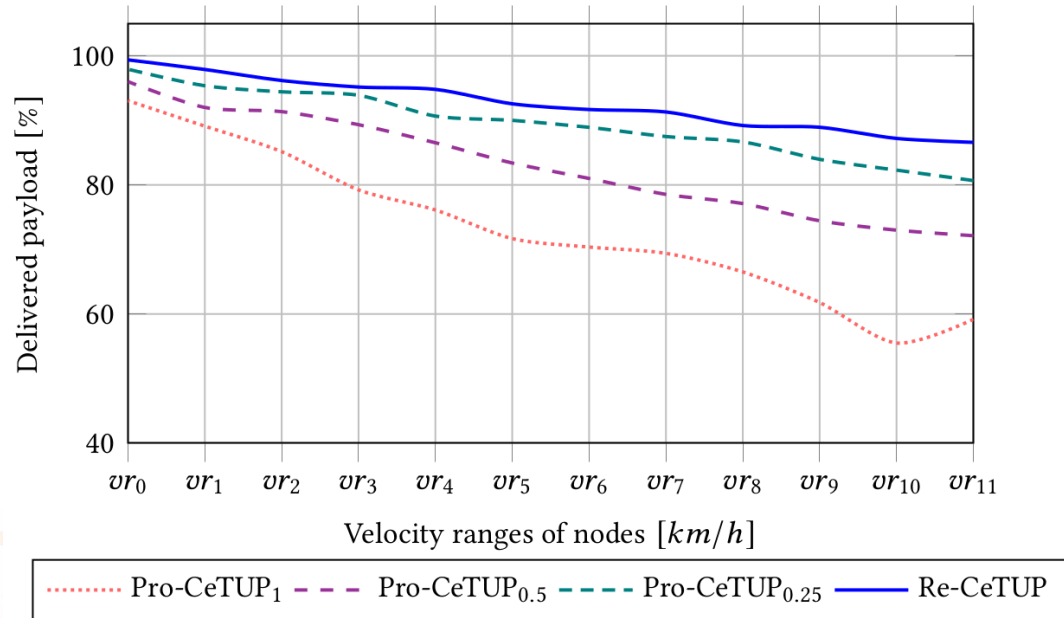
- Comparing CeTUP equipped with CSMA/CA vs. slotted CeTUP
 - 4–60 participating nodes
 - Reception range of nodes: 150m
 - Playground: 300m x 300m

- Comparing CeTUP vs. proactive CeTUP
 - Playground: 550m x 250m
 - Velocity: $VR = \{0 \text{ km/h} - 5 \text{ km/h}, 5 \text{ km/h} - 10 \text{ km/h}, \dots, 55 \text{ km/h} - 60 \text{ km/h}\}$

CSMA/CA-BASED CeTUP VS. SLOT-BASED CeTUP



Proactive CeTUP VS. CeTUP AT RUNTIME



SUMMARY AND FUTURE WORK

- Concept how nodes stay connected to a controller without uplink channel connectivity
- Compare algorithm against OLSR



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