BATS codes

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the multi-hop curse

- it is well known that in a wireless multi-hop network, the throughput drops drastically after 3 or 4 hops
- that’s why we don’t see wireless networks with more than a few hops
- but wireless networks with many hops are emerging in different applications

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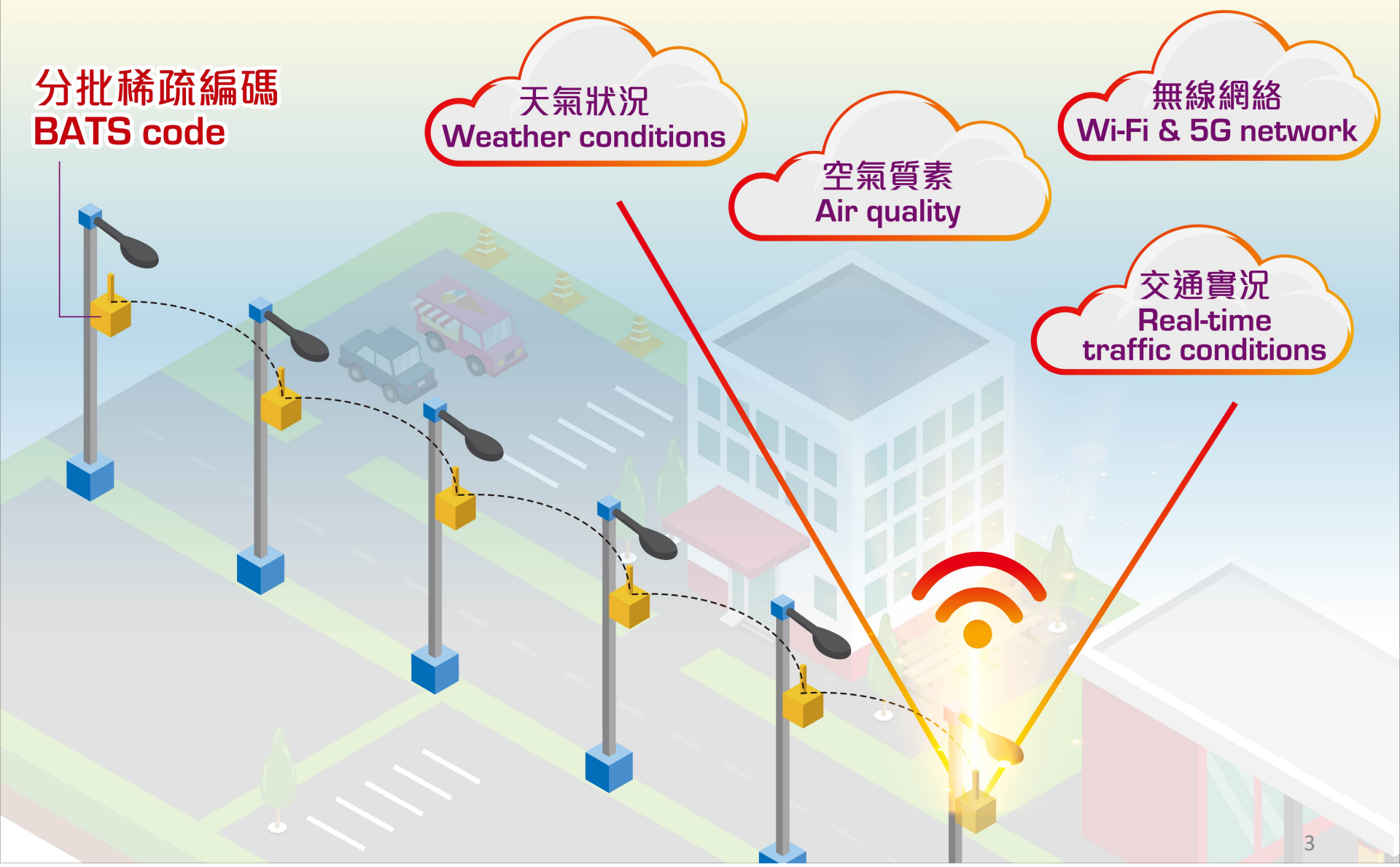
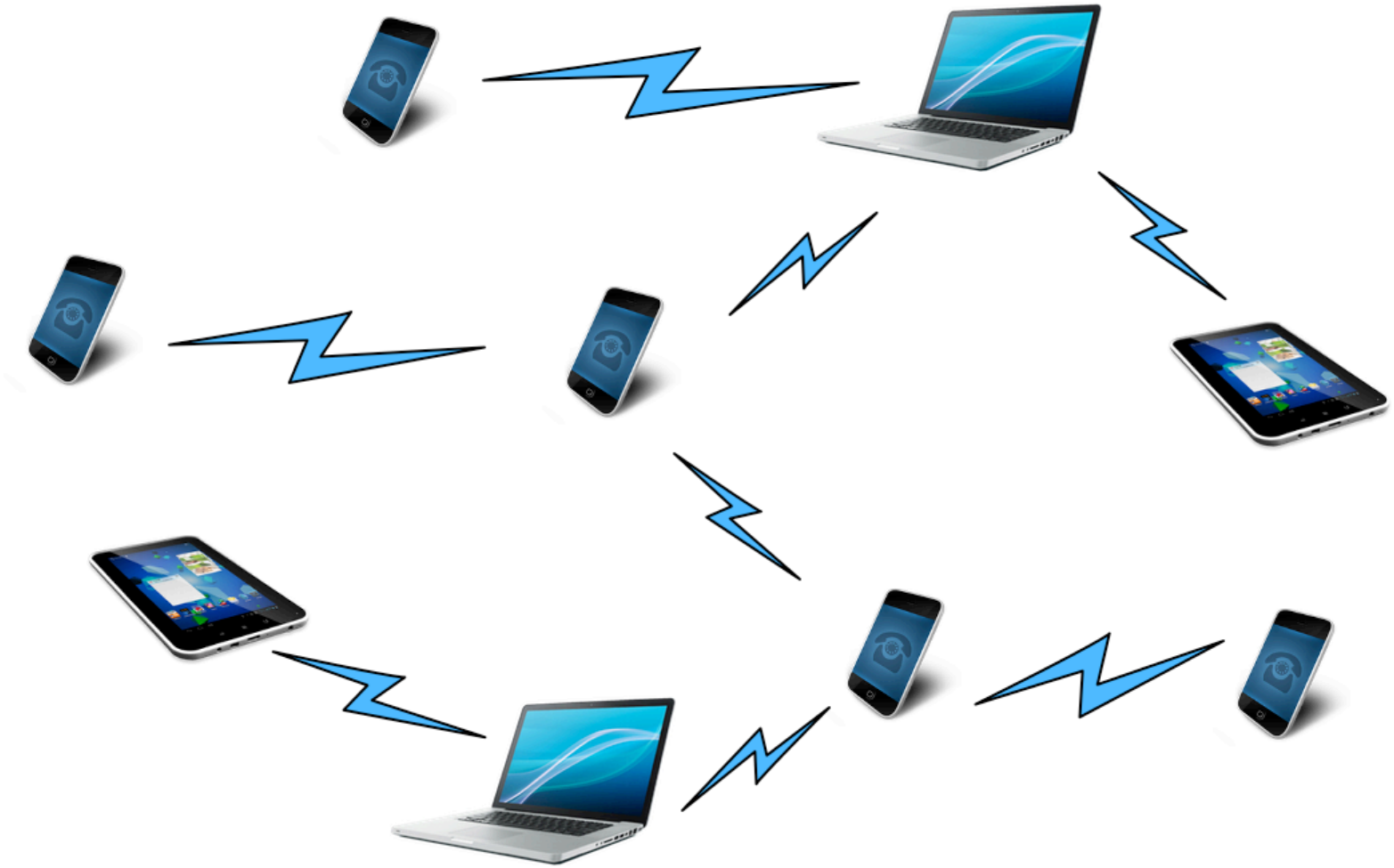
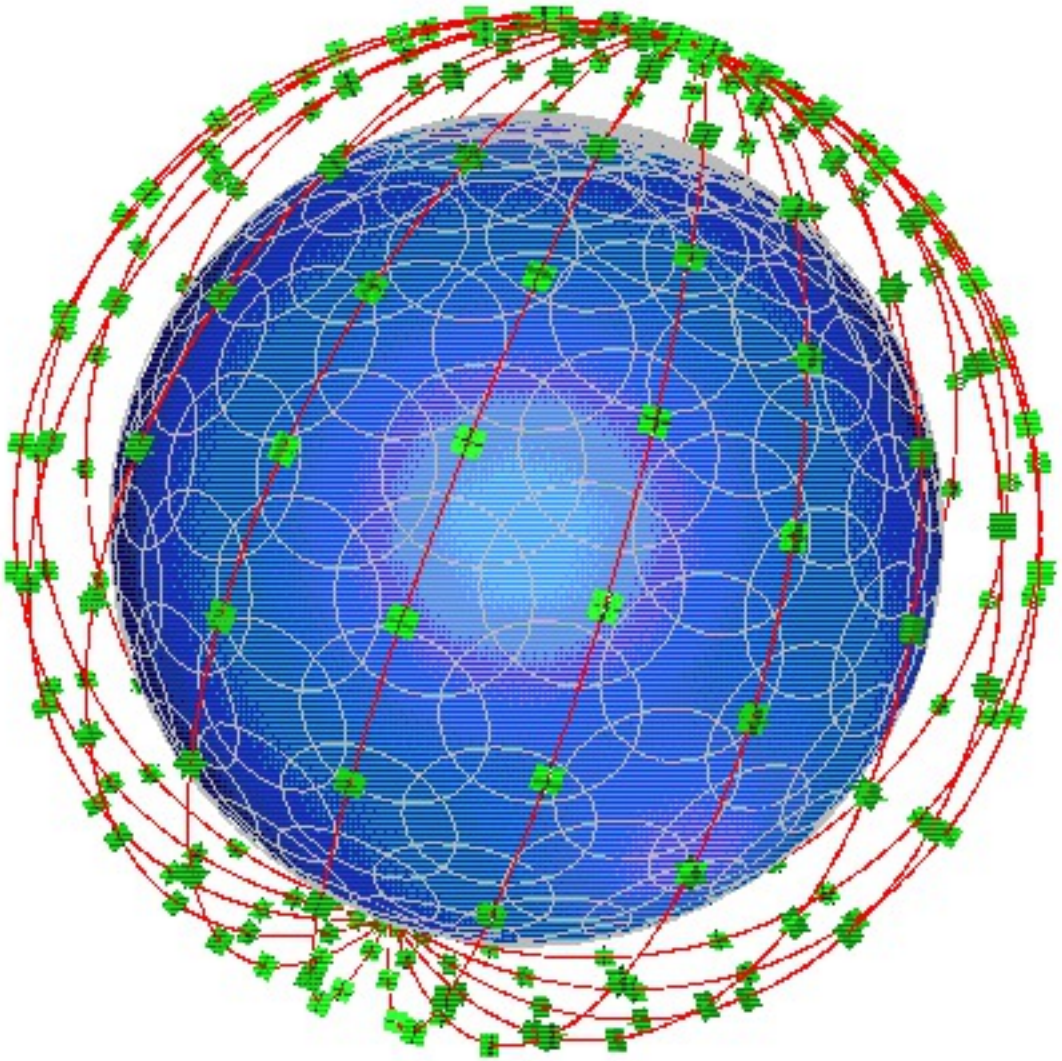
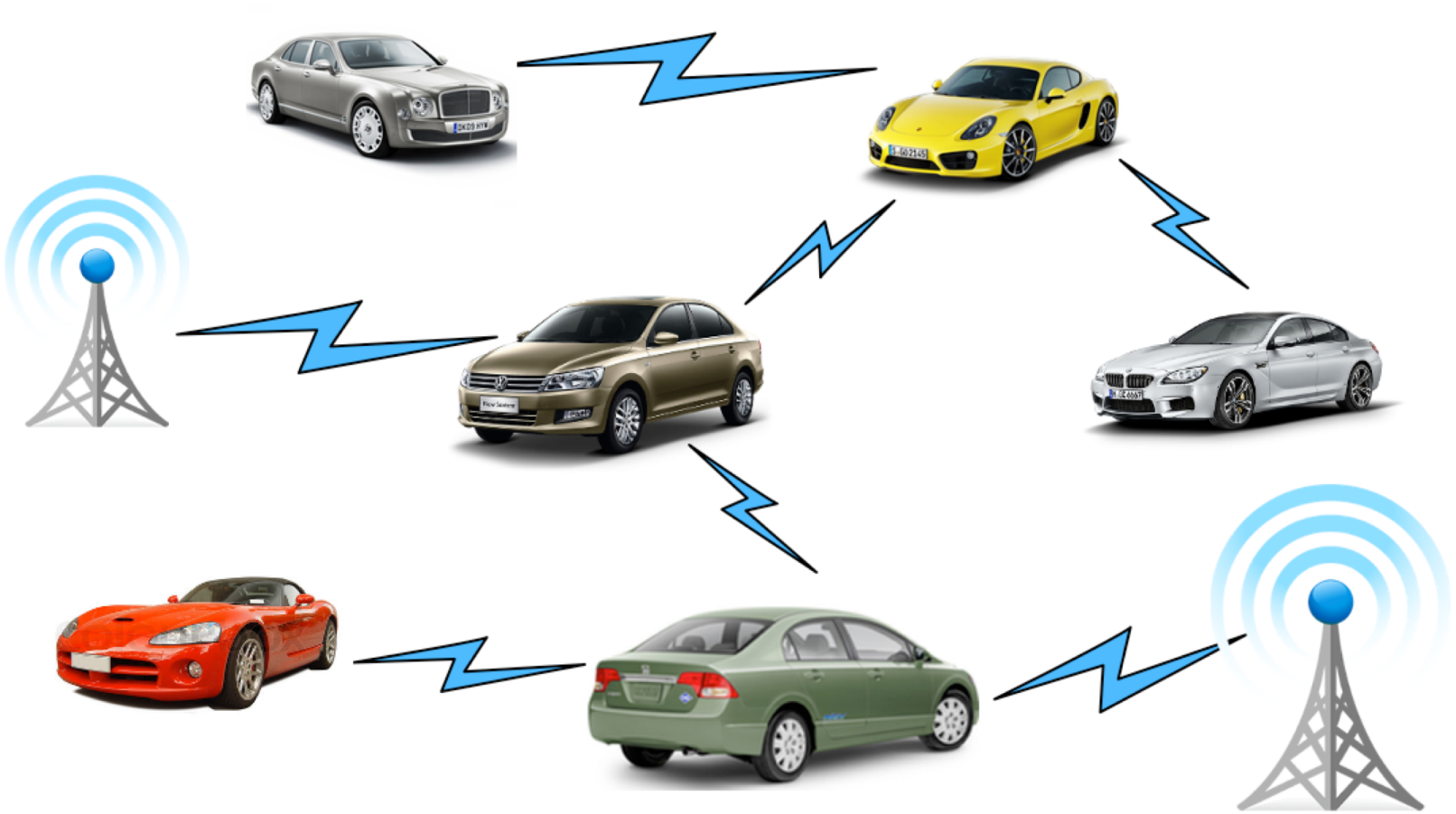
BATS code









breaking
the multi-hop curse

introducing BATS

what is BATS?

BATS code is an advanced network coding technology developed at

Institute of Network Coding, CUHK

BATS codes are ideal for multi-hop networks with packet loss

what is BATS?

BATS code transmits coded packets in batches

a small number of batches are stored and recoded at each relay

BATS code dramatically increases throughput in a wireless multi-hop network

an illustration

- comparison between BATS code and fountain code
- packet loss rate = 20% (no retransmission)
- file size = 16
- play animation.mp4 in full screen

prototyping

video streaming between 2 PC’s through 10 RaspberryPi 3

11 wireless hops with significant packet loss due to interference

play configuration.mp4 in full screen

performance comparison

BATS code vs fountain code

play demo.mp4 in full screen

benefits of BATS

high throughput ☑

low latency ☑

low coding complexity ☑

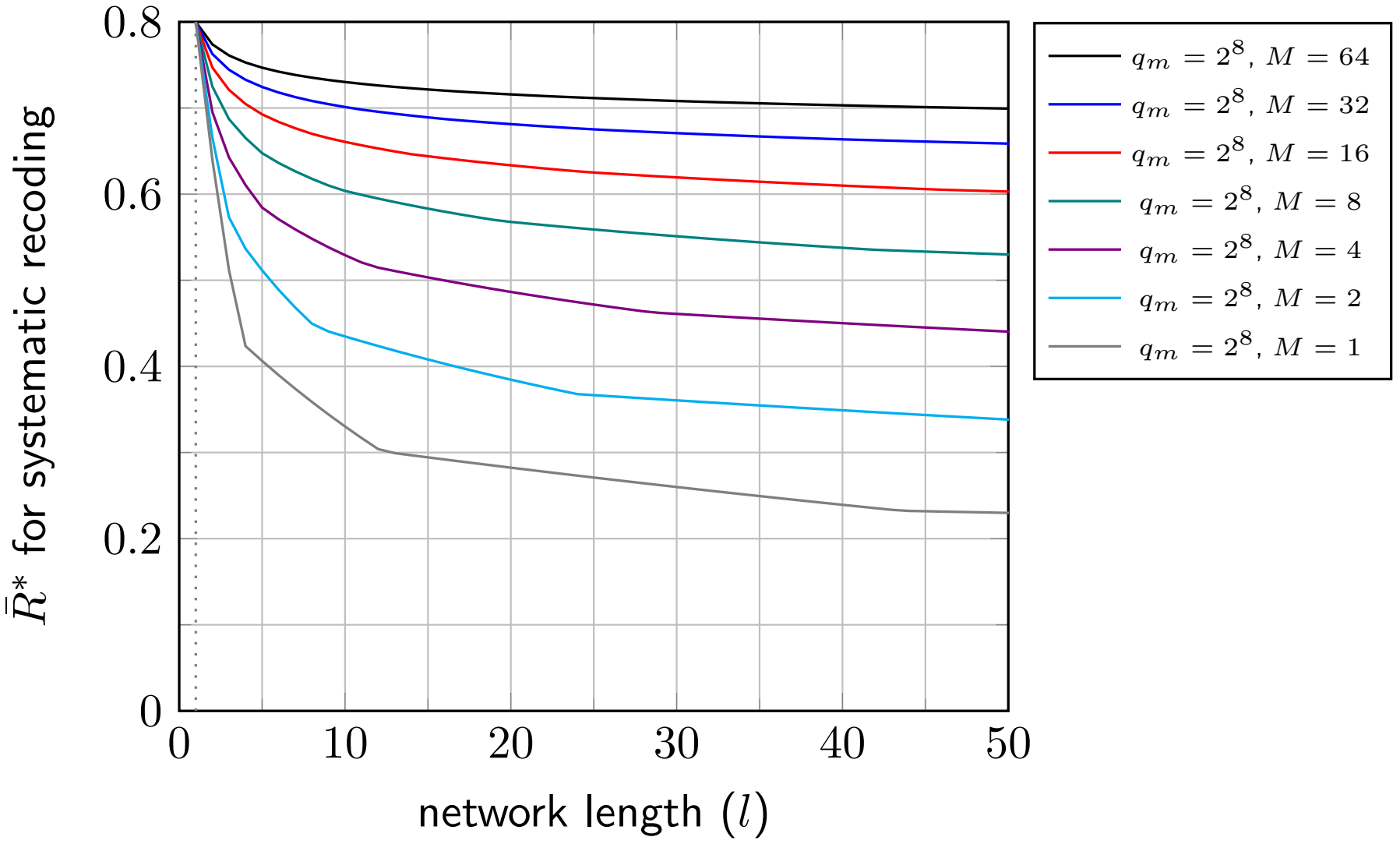
low storage requirement ☑

what is BATS?

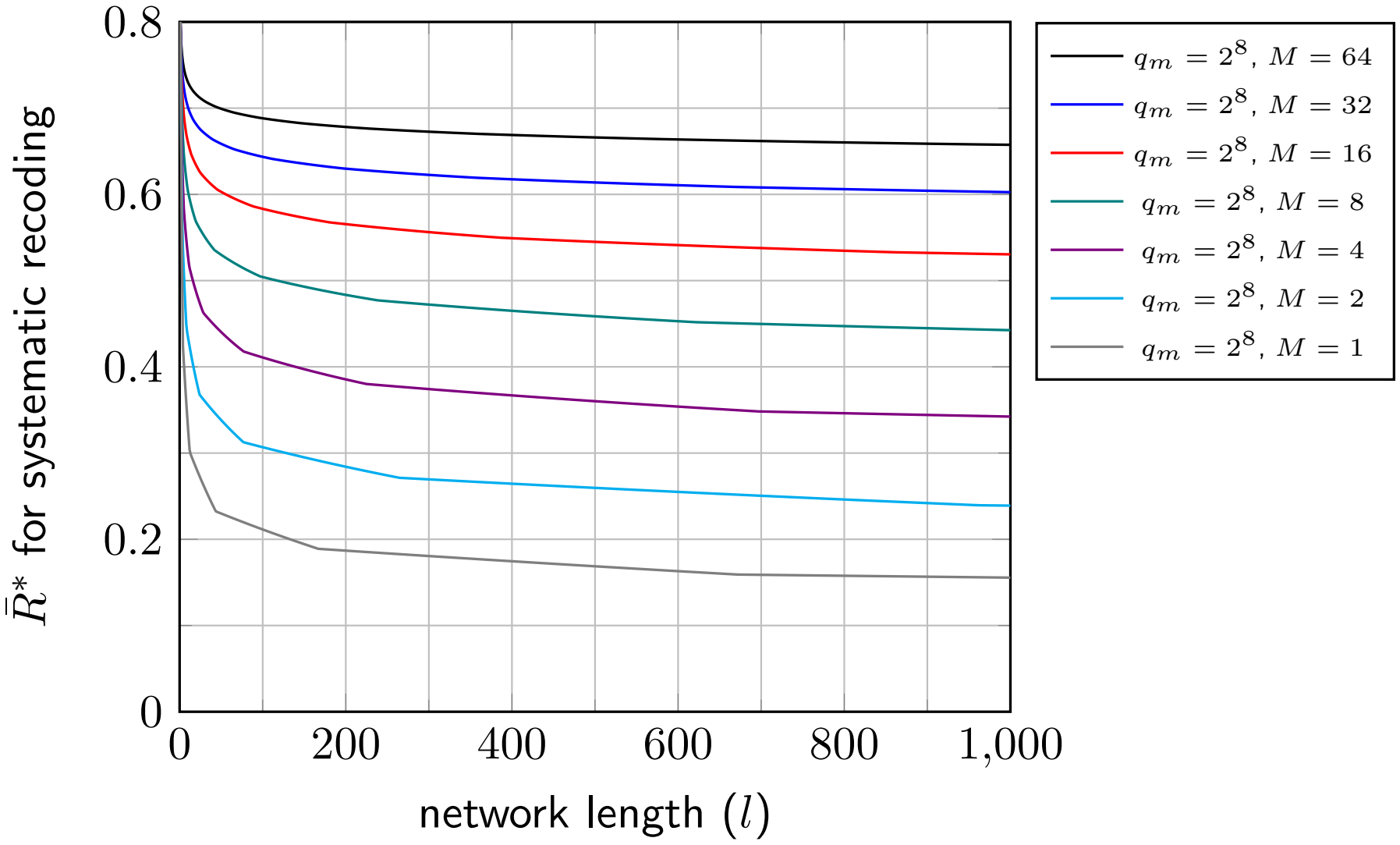
ideal for multi-hop transmission with packet loss

can sustain 10s or even 100s of hops with no significant drop in throughput

Achievable Rates for Line Networks: Up to 50 Hops



Achievable Rates for Line Networks: Up to 1000 Hops



what is BATS?

BATS code essentially converts a multi-hop network into a single-hop network

an enabling communication technology for

- IoT
- 5G
- satellite networks
- underwater communication networks
- power line communication networks

thank you