

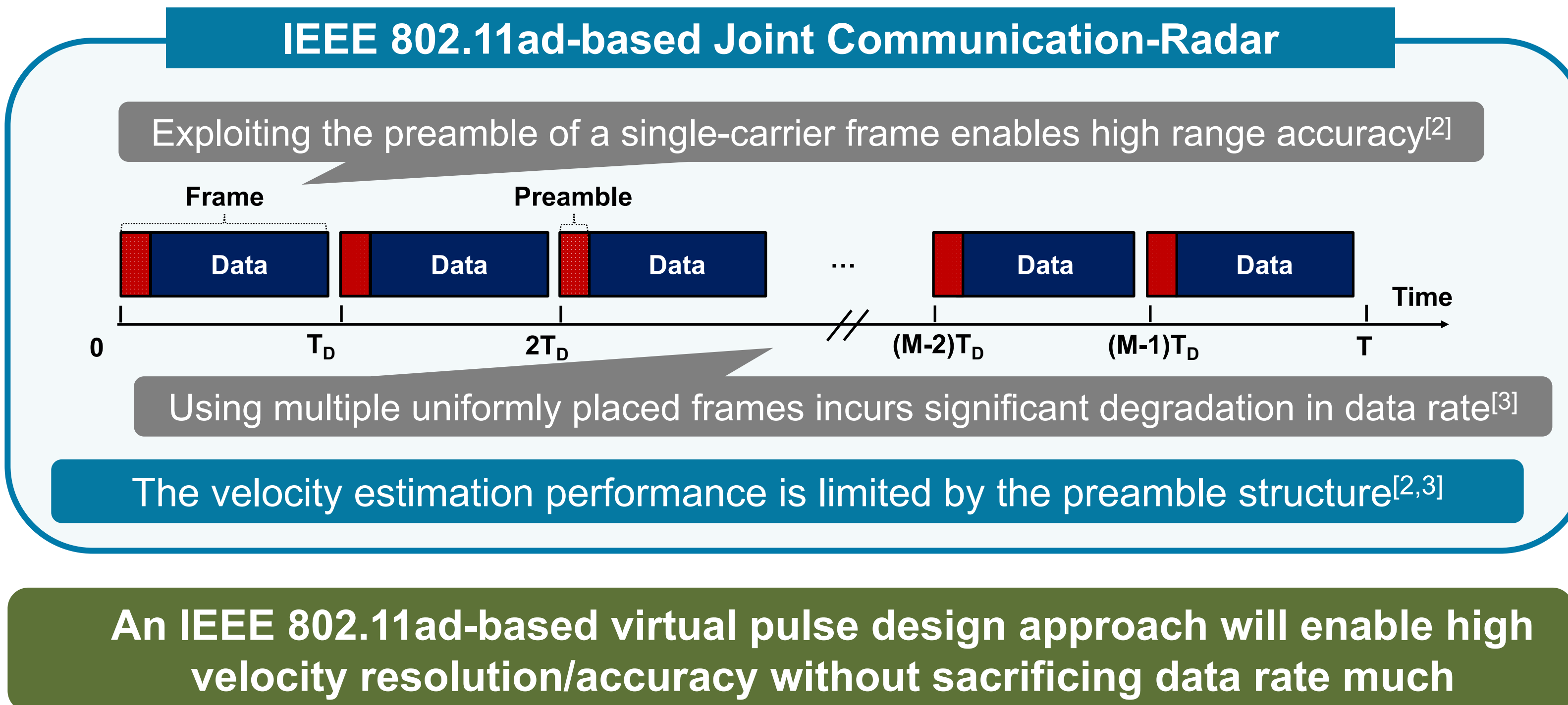
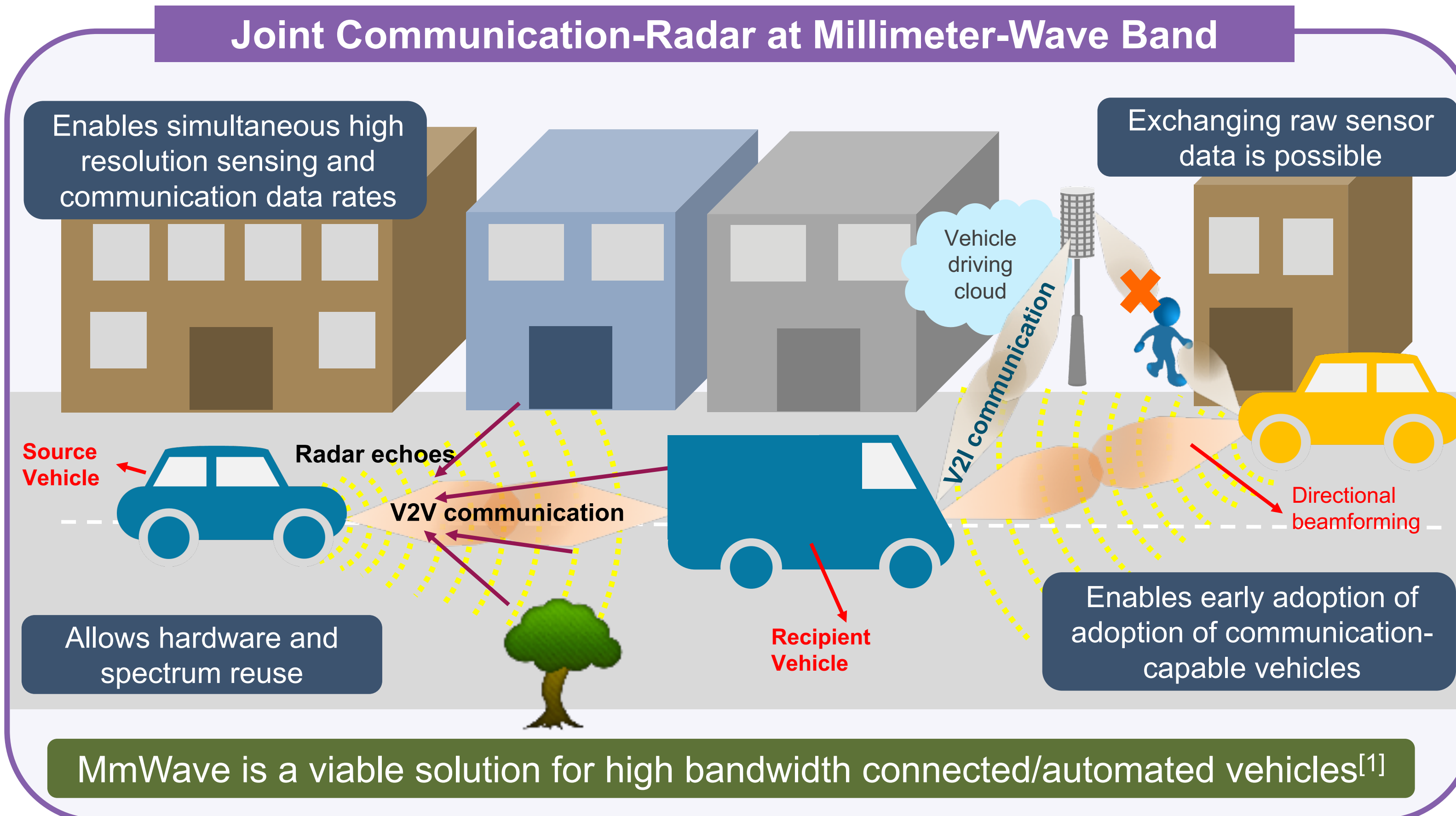


# VIRTUAL PULSE DESIGN FOR IEEE 802.11AD-BASED JOINT COMMUNICATION-RADAR

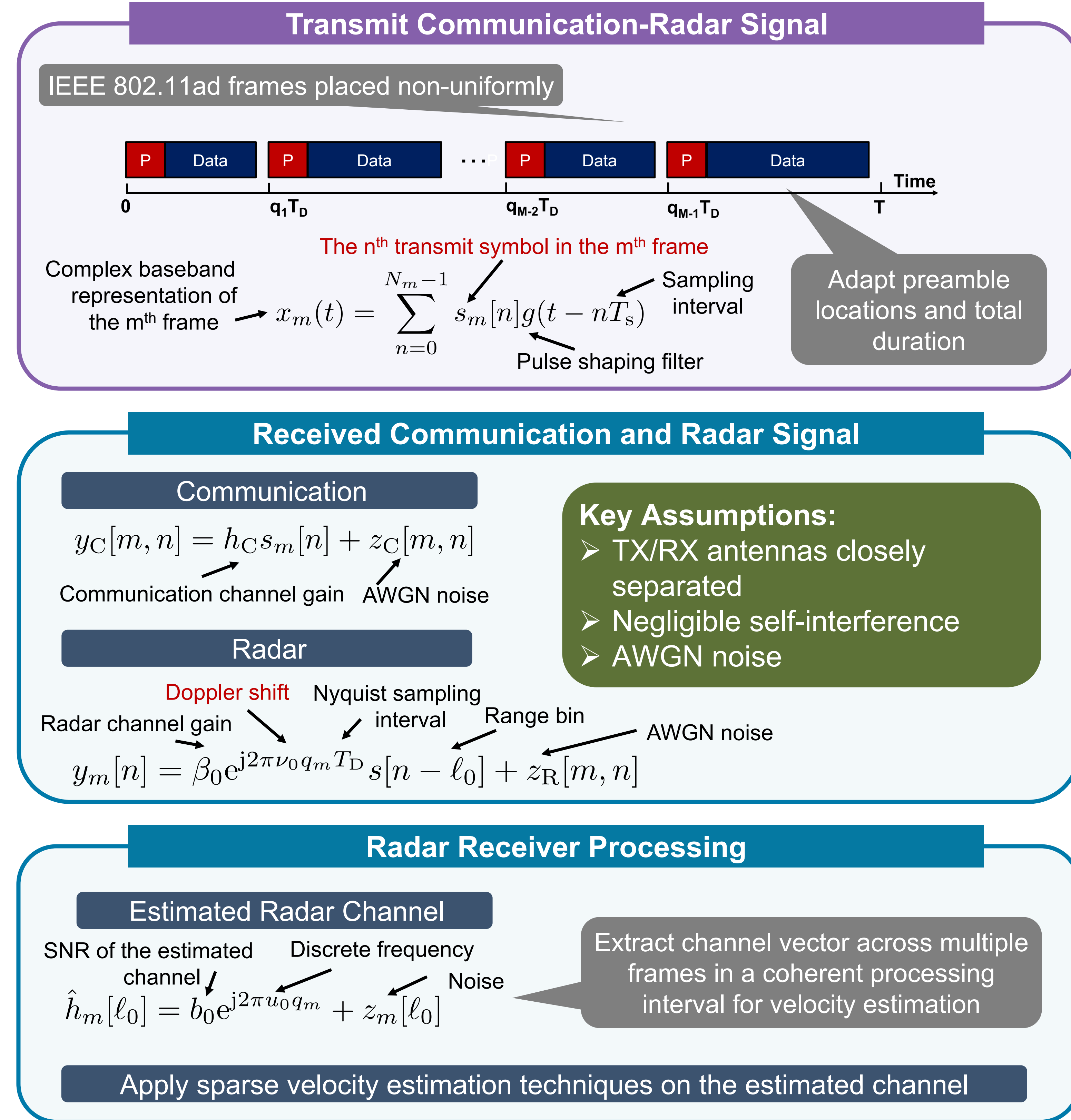


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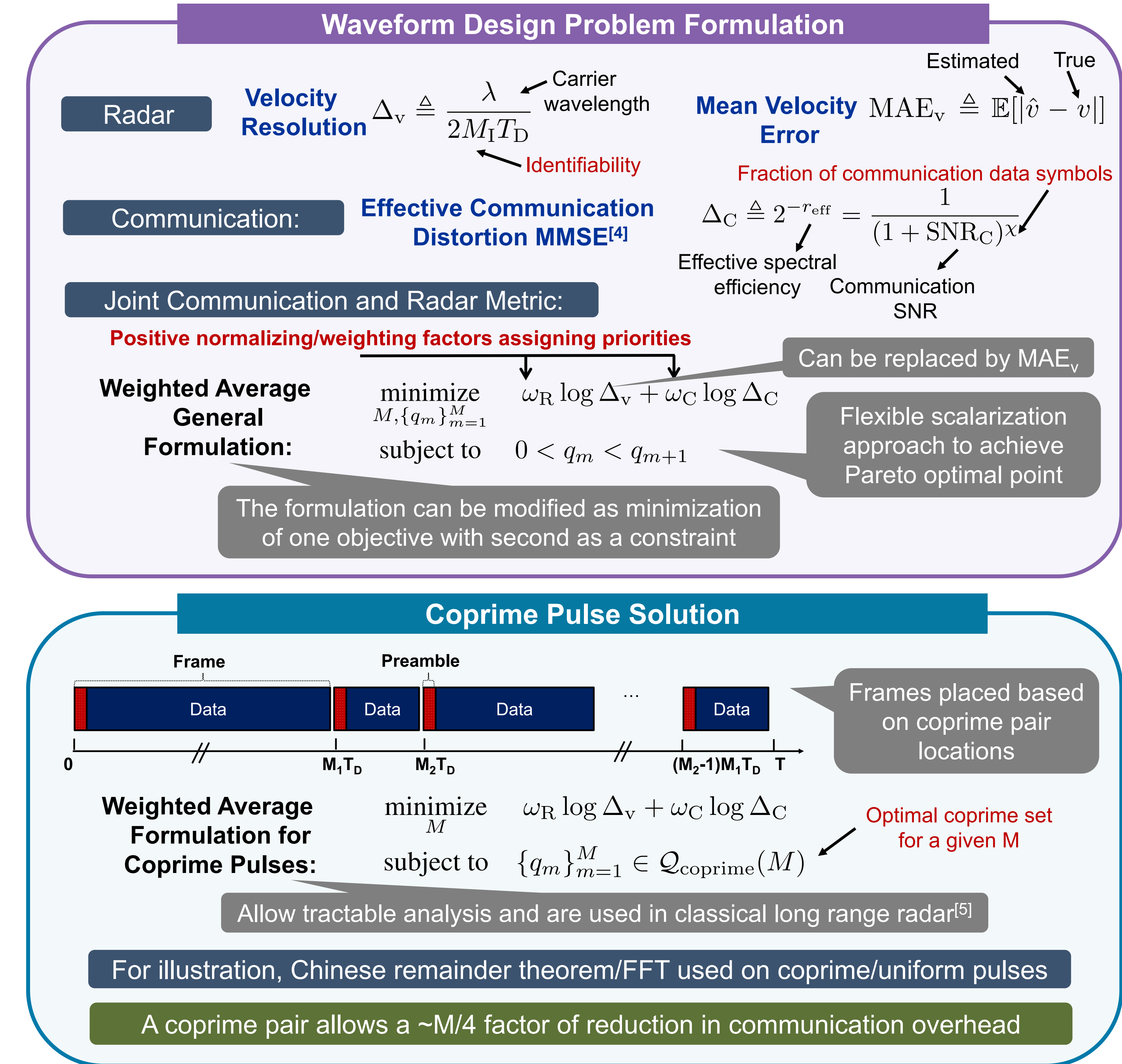
## I. INTRODUCTION



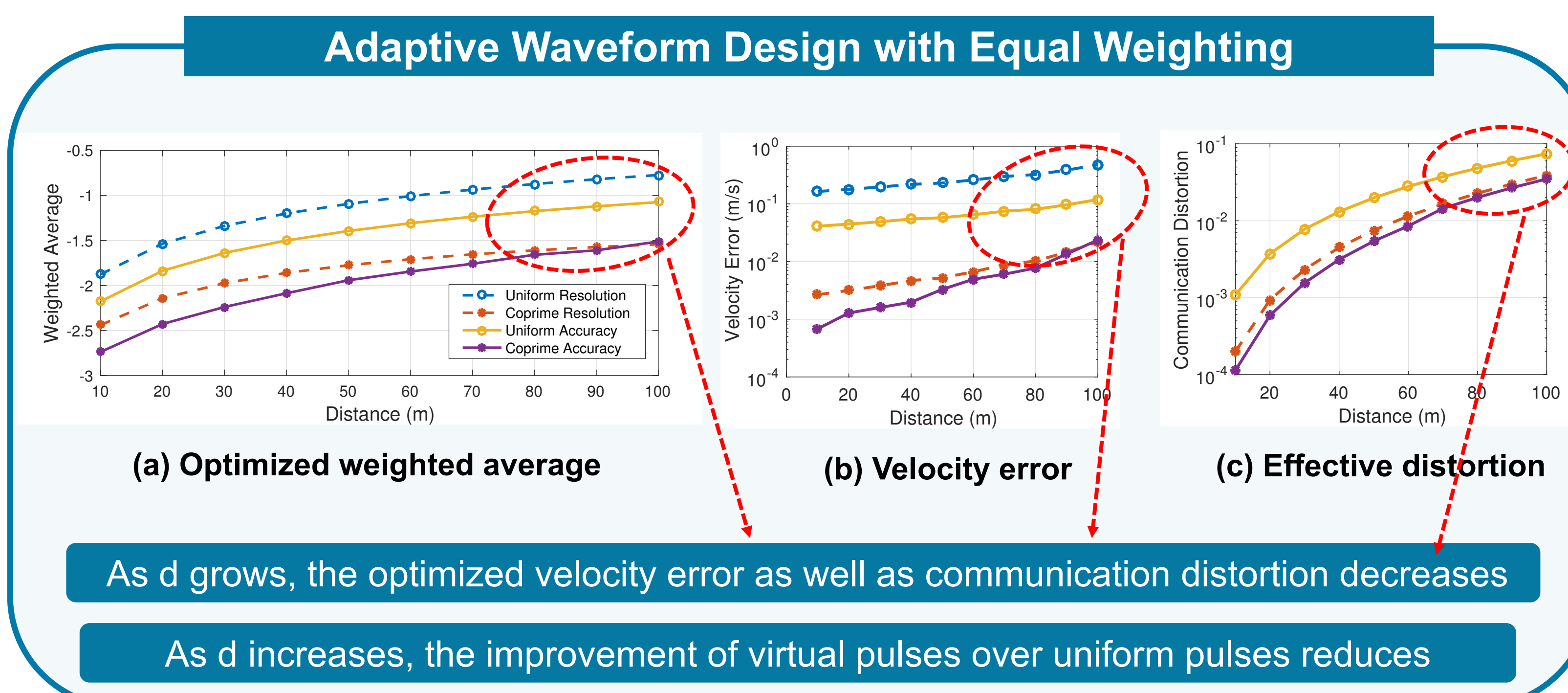
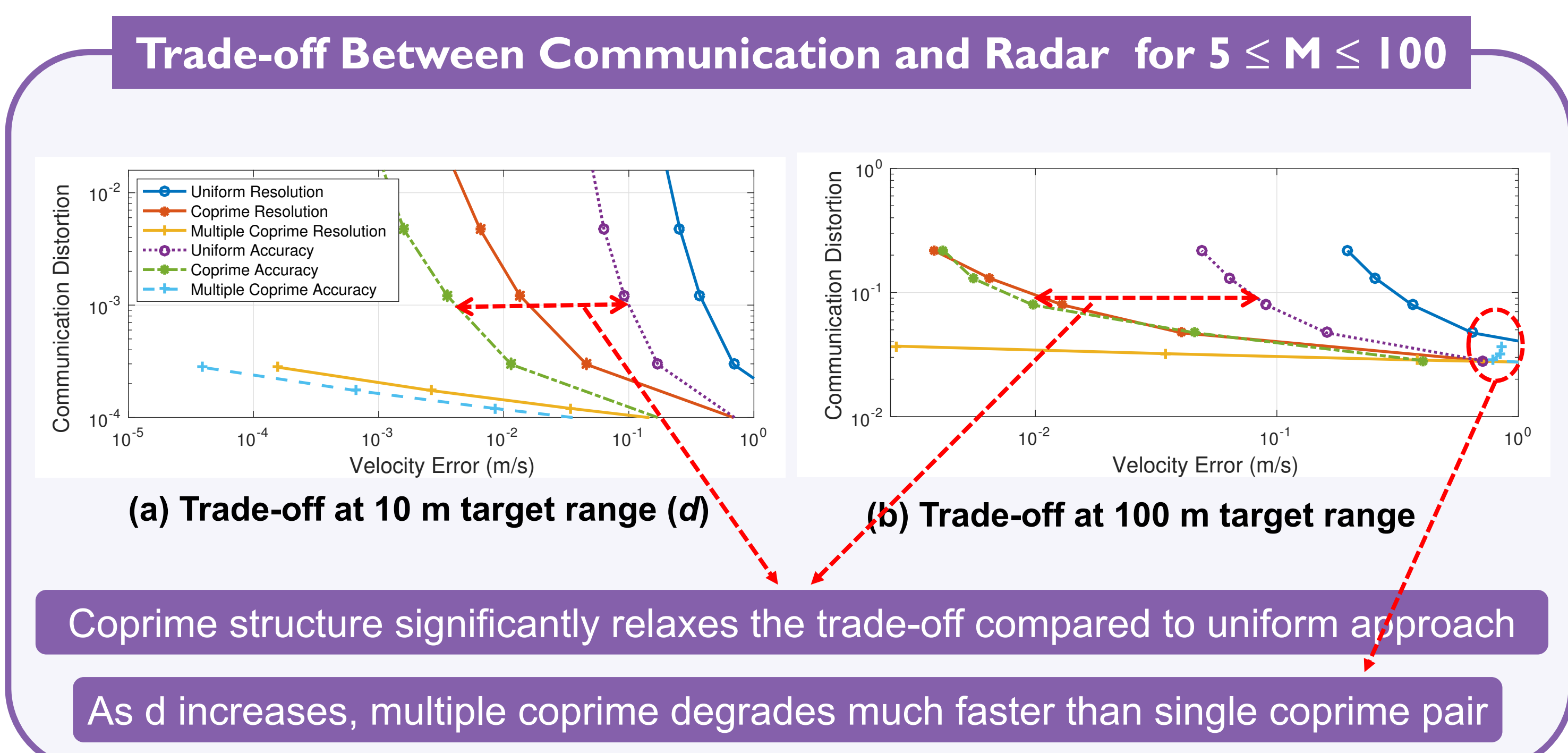
## II. SYSTEM MODEL



## III. VIRTUAL PULSE DESIGN



## IV. NUMERICAL RESULTS



### Notable Observation:

Velocity estimation resolution reduces by a factor of 60x at  $d = 10\text{m}$  and by a factor of 20x at  $d = 100\text{m}$ , while simultaneously achieving 7 Gbps communication data rate using single co-prime pair approach

## V. CONCLUSIONS AND FUTURE WORK

- Developed a virtual pulse approach that permits a trade-off between radar and communication
- The co-prime based pulse design approach improves velocity resolution by a factor of 20x, while simultaneously achieving a communication rate of 7 Gbps at 100 m target distance
- For the CRT method, the factor of improvement enhances with the decreasing range
- Developed analysis are extendable to Cramer Rao Bound metric and other sparse arrays<sup>[6]</sup>
- Extensions include demonstrating the performance of virtual pulses using a mmWave testbed

### REFERENCES

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[6] P. Kumari, S. Vorobyov, R. W. Heath Jr, "Virtual Waveform Design for Millimeter-Wave Joint Communication-Radar System", *Journal in Preparation*