

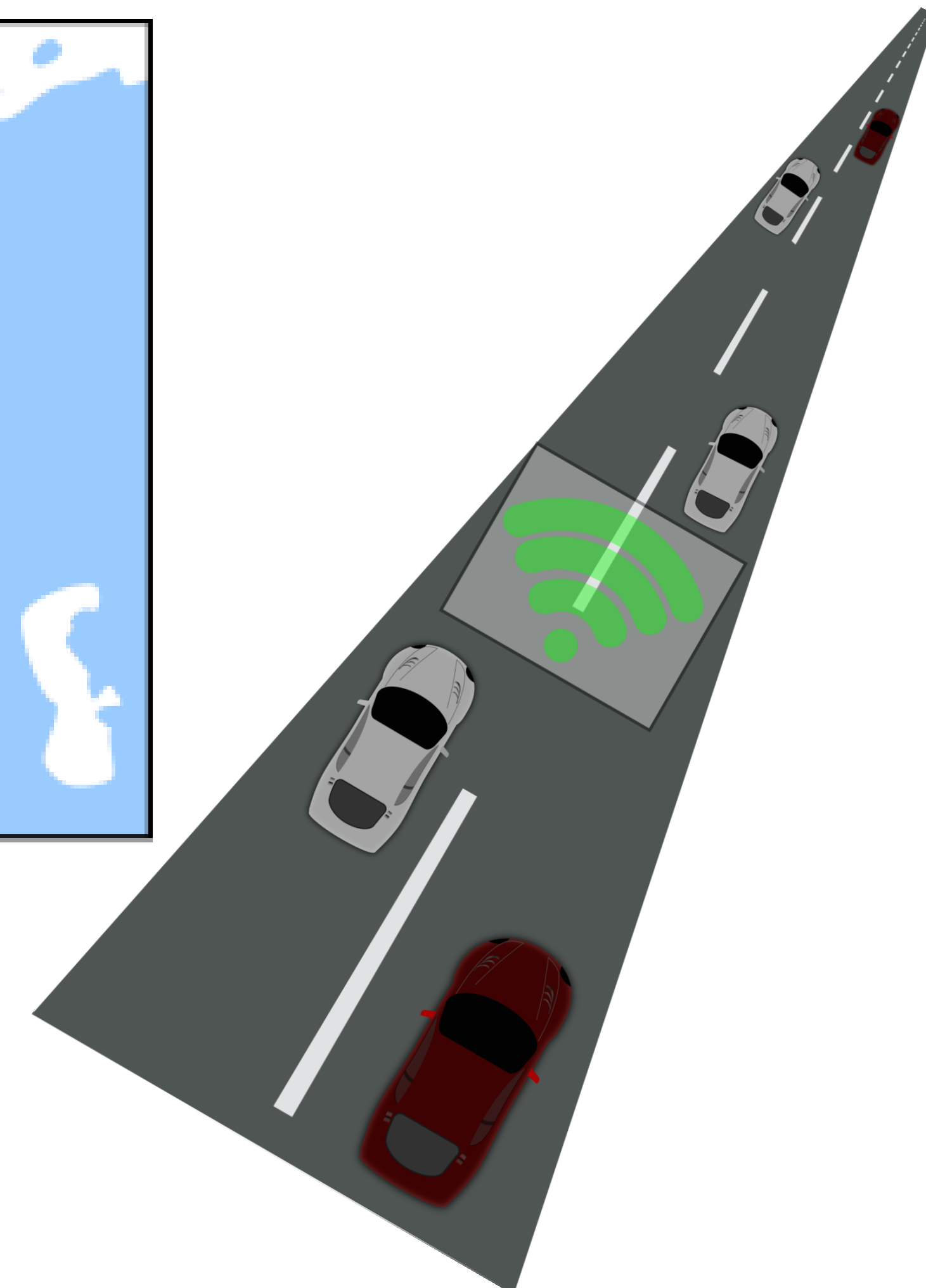
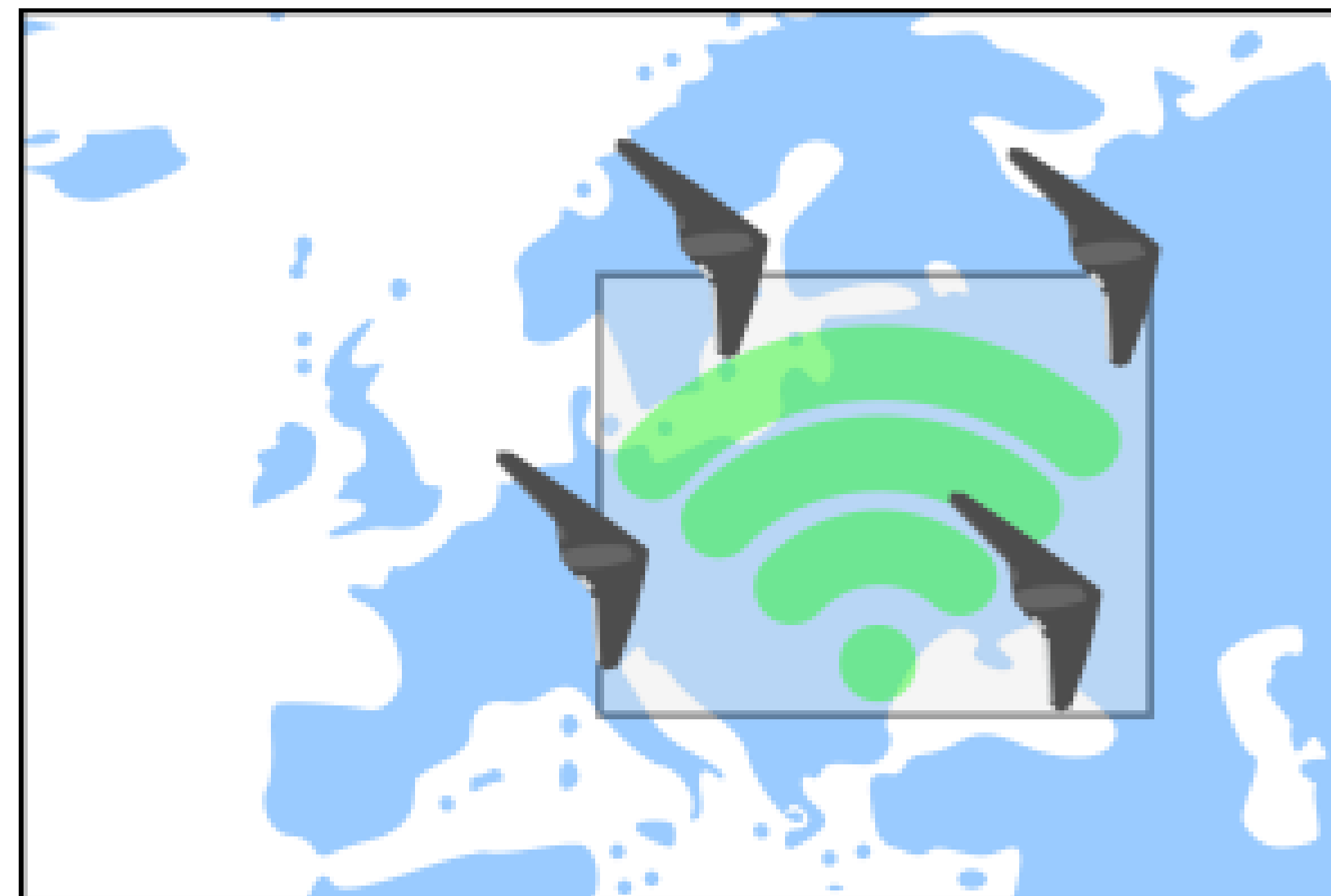
The Wi-STARK Architecture for Resilient Real-Time Wireless Communications

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Motivation

Real-Time + Wireless Communications

- Lack of effective real-time support in the current wireless standards and literature;
- Capable to reduce system's Size, Weight, and Power consumption (SWaP);
- Enabling **communication** and **cooperation** between mobile entities with safety-critical constrains (e.g., UAVs, and cars);



Concept

broadcast: correct nodes, receiving an uncorrupted frame transmission, receive the same frame;

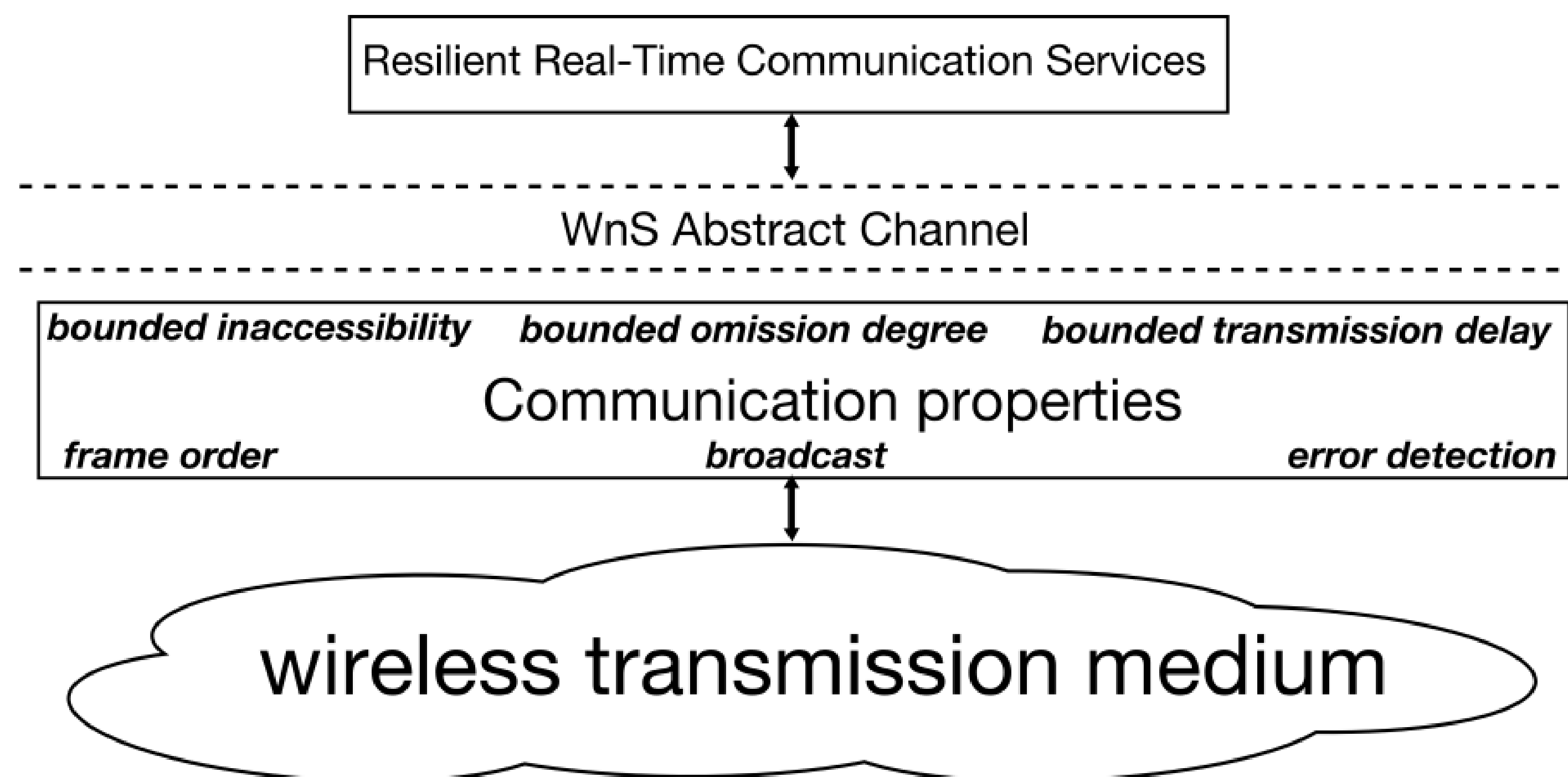
frame order: any two frames received at any two correct nodes are received in the same order at both nodes;

error detection: correct nodes *detect* and *signal* any corruption done during frame transmissions in a locally received frame;

bounded omission degree: In a known time interval \mathcal{T}_{rd} , omission failures may occur in at most k transmissions;

bounded inaccessibility: In a known time interval \mathcal{T}_{rd} , a wireless network segment may be inaccessible at most i times, with total duration of \mathcal{T}_{ina} ;

bounded transmission delay: Any transmission request is transmitted on the wireless network segment, within a bounded delay $\mathcal{T}_{td} + \mathcal{T}_{ina}$.



Results

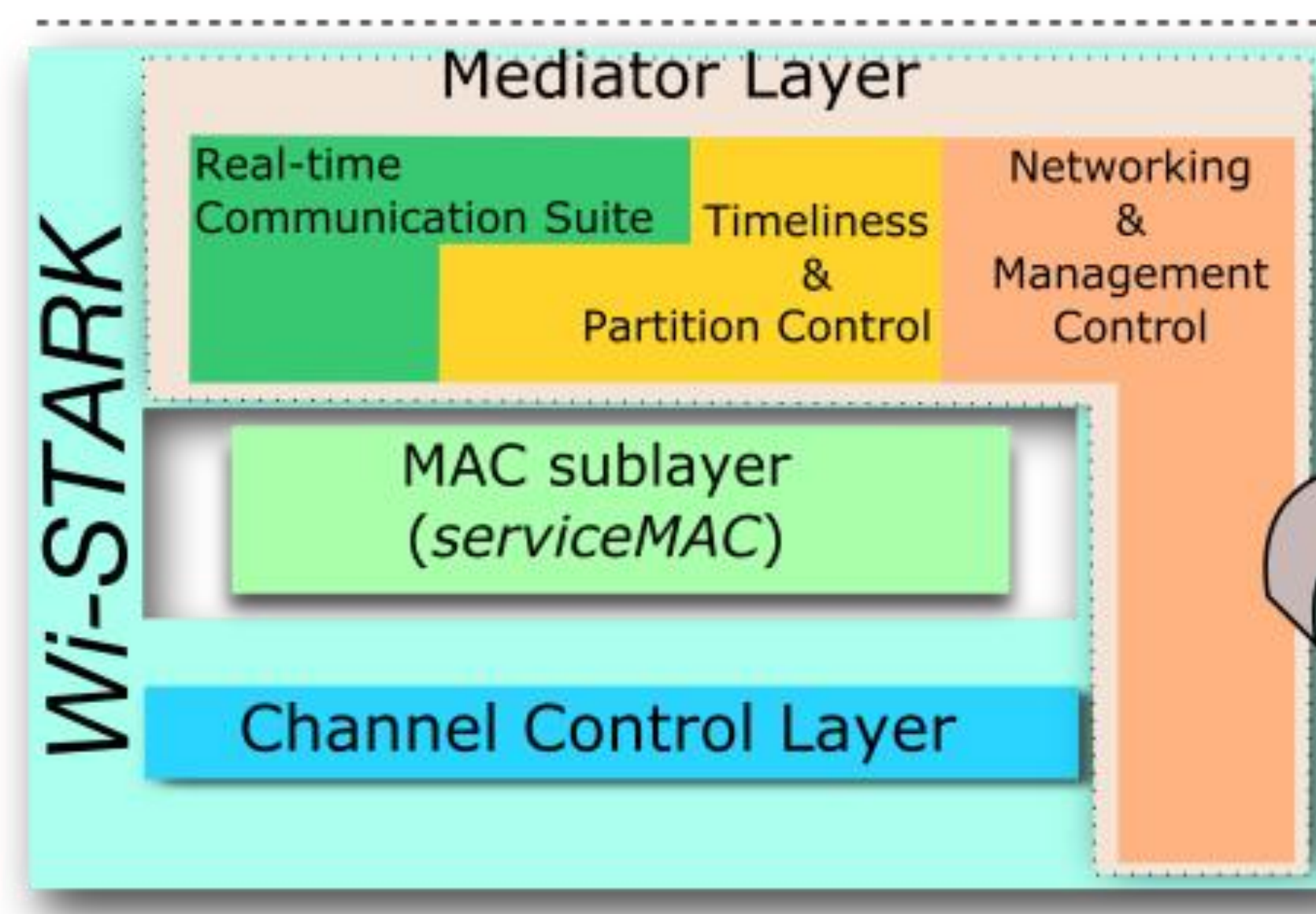
Mediator Layer:

- Reliable frame transmissions;
- Temporal control over communications;
- Static/dynamic configuration for supporting dependable and (hard) real-time network operation;

Channel Layer:

- Enhanced error detection and signaling;
- Advanced and transparent control over communication channels;

The Wi-STARK Architecture



Compliant with wireless communication standards

