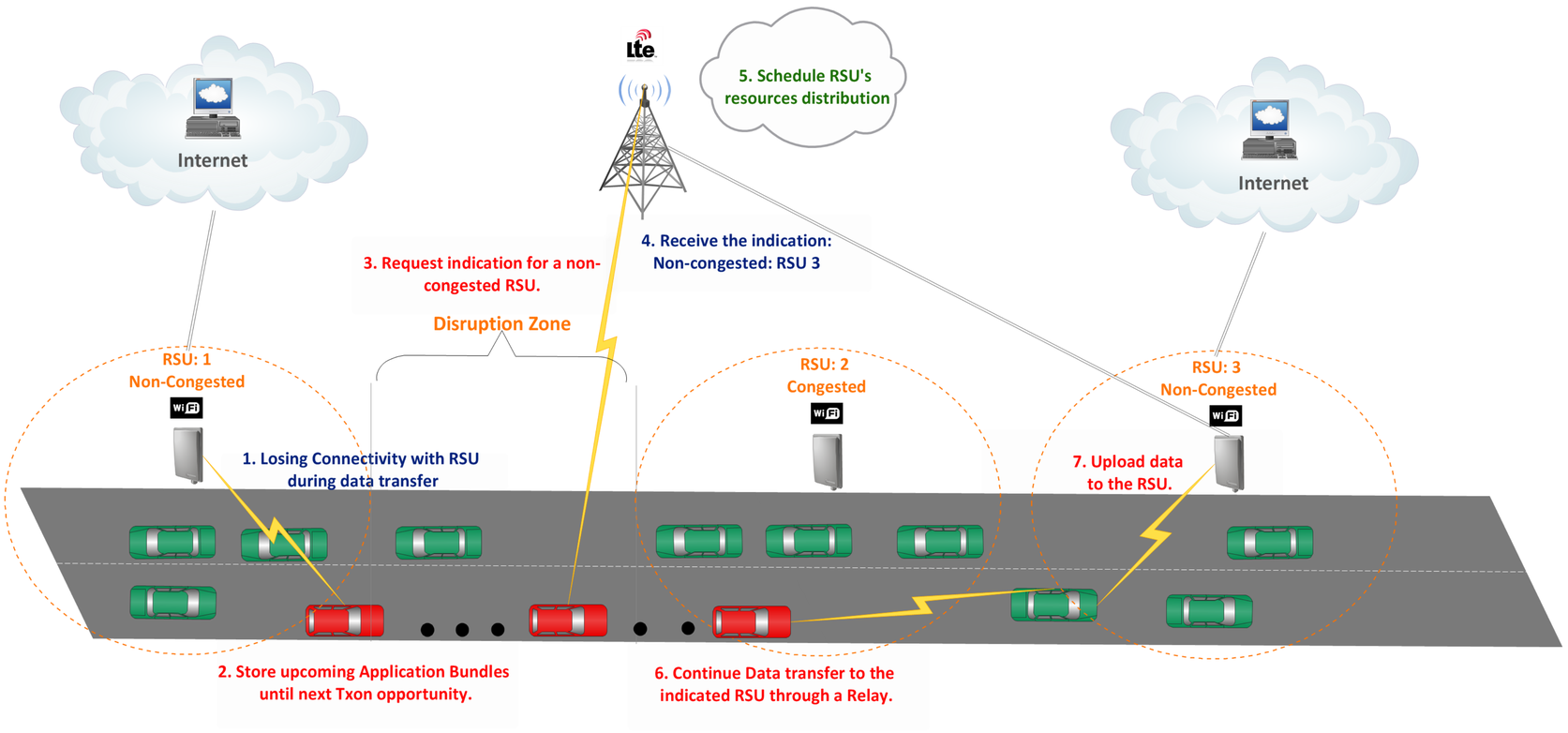
Transport Layer Mechanisms for Vehicular Disruption Tolerant Networks

Panagiotis Matzakos, EURECOM – Mobile Communications Department



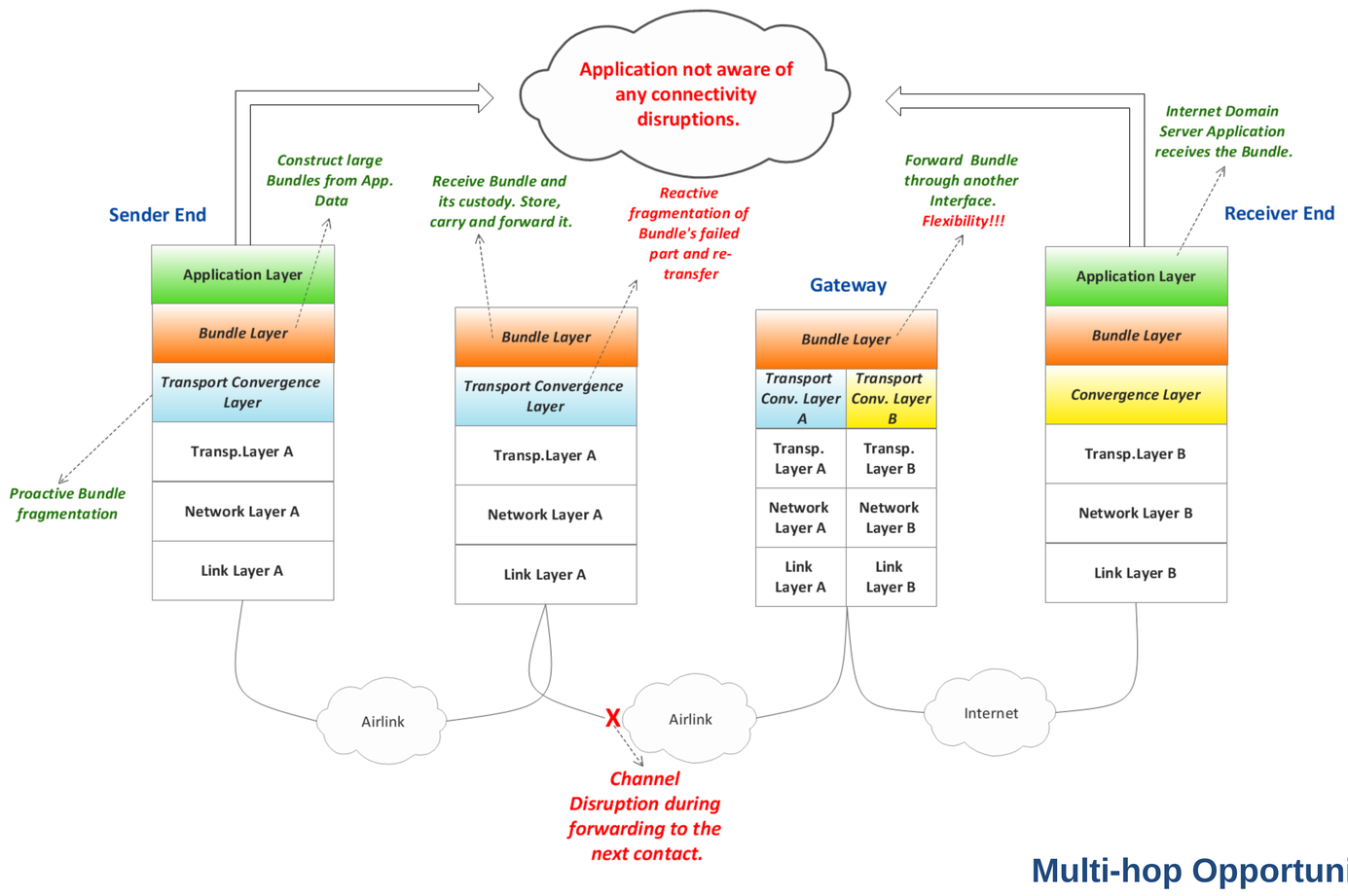
Bulk Data Transfer

- Low priority Big Data traffic.
- Upload Vehicle's sensor measurements.
- Upload Massive CCTV frames of public transportation.

Design Framework

- **Sessions "surviving" limited connectivity, frequent disruptions.**
- **Avoid overloading cellular Network and congested RSUs.**
- **Applications remain transparent to disruptions!**

Transport in DTN



- Breaks end-to-end connectivity into multiple reliable hops.
- **Sessions surviving disruptions in highly dynamic topologies.**
- **Application transparent to intermittent connectivity.**
- Avoid congestion control, connection establishment signaling .
- Transfer pure data when contact appears.
- Avoid redundant retransmissions (custody transfer, reactive fragmentation, adjustments to Retransmission Timers).
- Flexible Architecture for interconnecting Heterogeneous Networks.

Applicablility :

- Lack of End-to-End connectivity.
- Large propagation delays and/or frequent , long disruptions.
- Error – prone channels.
- Asymmetric data rates (uplink vs downlink).

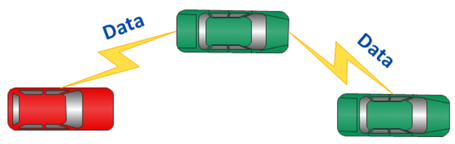
Mobility Support

- **Opportunistic Contacts:** No knowledge of contacts duration; Use **Reactive fragmentation** in cases of partial Bundle transfer.

- **Predicted contacts:** Extract contact duration from localization information exchange (position, velocity, direction,…); **Proactively fragment** Bundles to "fit" in this duration.

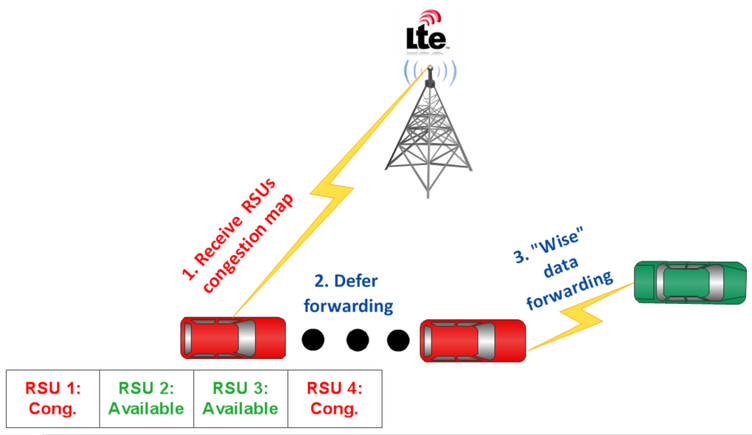
- **LTE assistance:** Broadcasts regional RSUs' congestion maps to assist Bundle forwarding.

Multi-hop Opportunistic Contacts



Predicted Contacts

LTE assisted forwarding decisions



Heterogeneous Connectivity

- "Wiser" forwarding decisions thanks to LTE.
- **Positive impact on redundant transmissions and overload avoidance.**
- Achieve better bandwidth exploitation .

Design Issues

- Keep Congestion maps updated.
- Overhead?
- Resource allocation : Distributed or central?
- Criteria for choosing among: storing, forwarding (V2V), or even LTE upload when local RSU is congested.

EURECOM – CAMPUS SOPHIATECH
450 route des Chappes F-06410 BIOT Sophia Antipolis
www.eurecom.fr