

Self-Stabilizing End-to-End Communication in Bounded Capacity, Omitting, Duplicating and non-FIFO Dynamic Networks

Shlomi Dolev¹, Ariel Hanemann¹, Elad M. Schiller², Shantanu Sharma¹

¹Ben-Gurion University of the Negev, Israel. ²Chalmers University of Technology, Sweden.

Goal: Simulate FIFO behavior over non-FIFO dynamic networks

1 Objective

An algorithm for a bounded capacity non-FIFO dynamic network, which ensures **one time messages delivery** at the receiver **without omission, duplication, reorder**

2 Concept

- Error correcting bits
- Alternating index
- Distinct labels
- Message to packet formation and via-versa

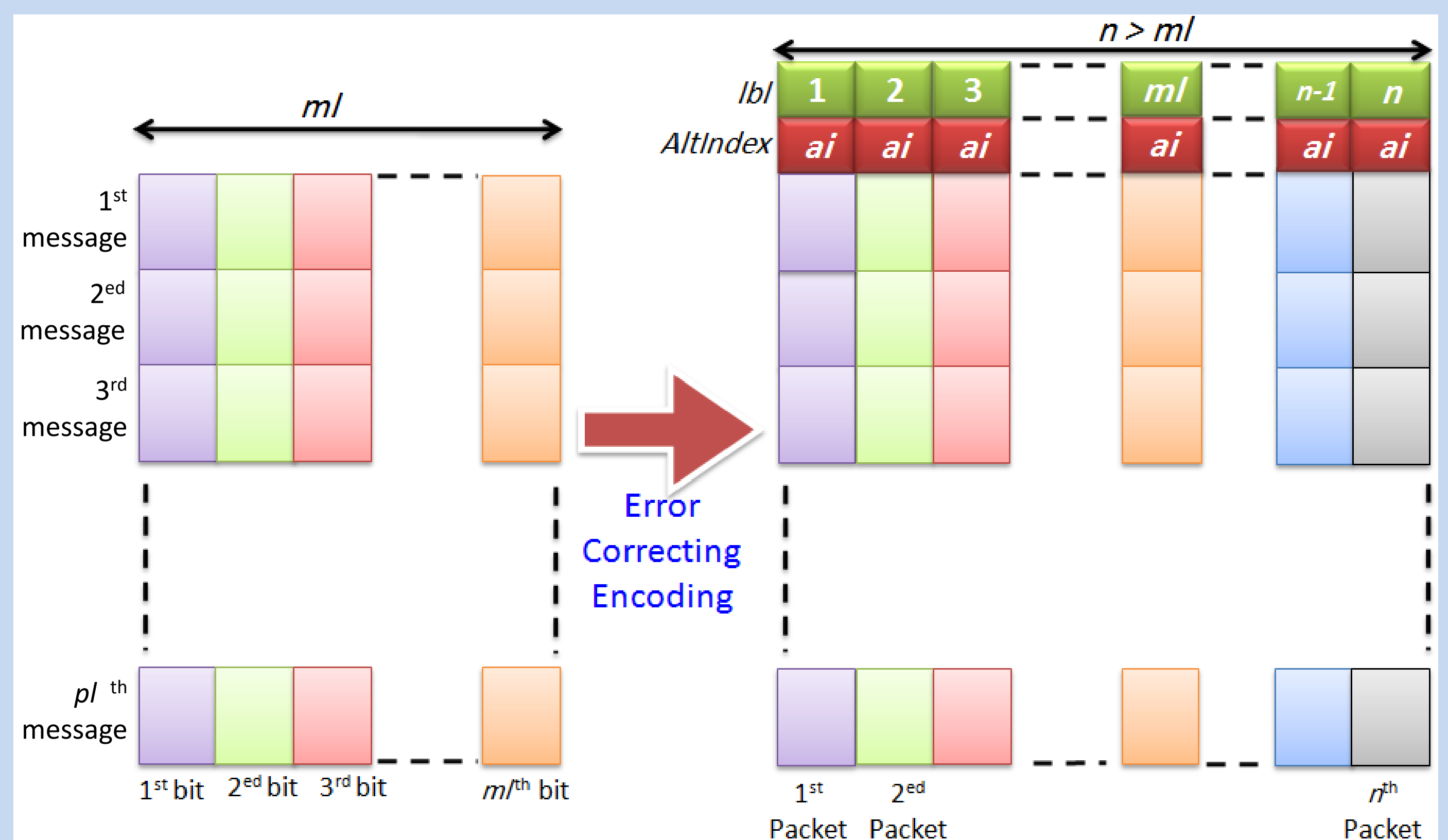
The Sender does:

- Transmission of packets infinitely often
- Wait for '**capacity + 1**' distinct labels acknowledgement before the next fetch

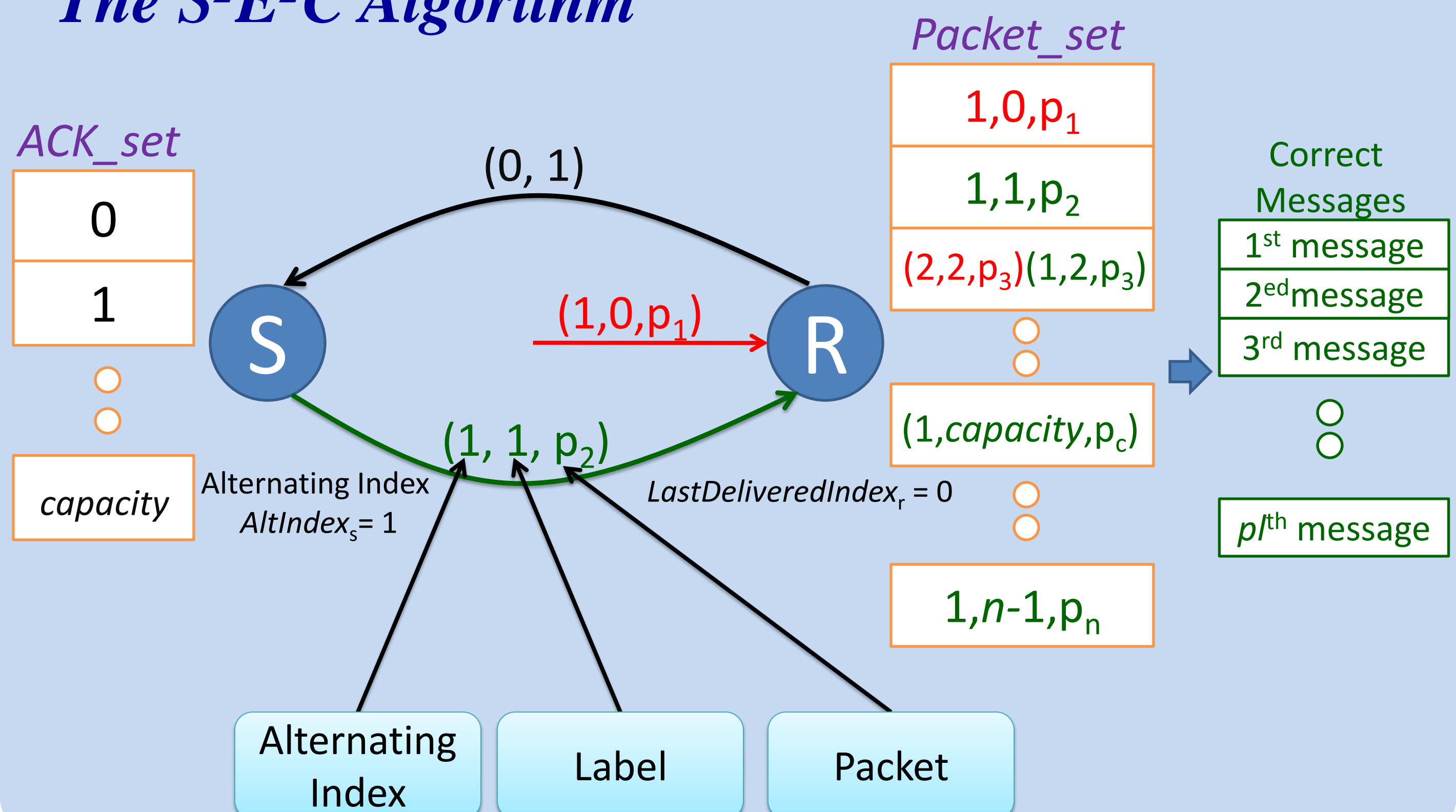
The Receiver:

- Collects packets of '**capacity + 1**' distinct labels with **identical alternating index** before the delivery of messages

3 Packet Formation at the Sender



4 The S²E²C Algorithm



5 Properties of the Algorithm

- Self-stabilizing
- Topological independence → fits dynamic networks
- Implicit sender/receiver synchronization
- One time message delivery without omission/reorder

6 Reference

- E. W. Dijkstra. Self-stabilizing systems in spite of distributed control. Commun. ACM, 17(11):643–644, 1974.
- S. Dolev et al. Stabilizing data-link over non-fifo channels with optimal fault-resilience. Inf. Process. Lett., 111(18):912–920, 2011.

