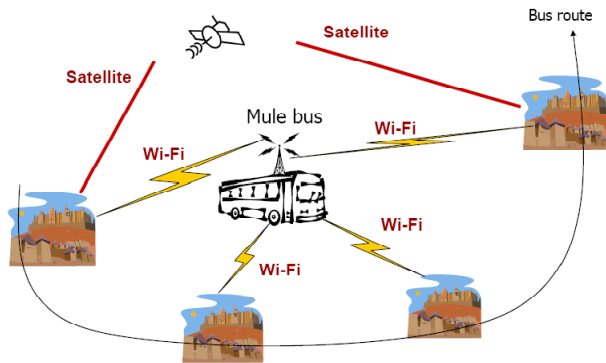


Golnaz Karbaschi (Postdoctoral fellow, started Sept. 2008),  
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## DTN Concept

An attempt to extend the reach of networks

- **Problem:** Periodic/intermittent disconnections
  - ✓ Mobility of the nodes
  - ✓ Weak wireless connection
  - ✓ Heterogeneity and resource limitation



- **Solution :** Store, Wait and Forward the data



### Applications Examples:

- ✓ Interplanetary Internet (IPN: birth of the DTN idea)
- ✓ Providing Internet access to rural areas or moving cars

## Advantages

- Intermediate nodes do not need to be *always-on!*
  - ✓ Reducing power consumption
- Possible sparse deployment of base stations
  - ✓ Reducing implementation costs
- Benefiting from opportunistic contacts
  - ✓ Reaching traffic to non-continuous connected areas

## Challenges in Reliable Communication

- Routing in presence of frequent disruptions
  - ✓ Finding a possible path between the node pairs
- Resource limitations and heterogeneity
  - ✓ Buffer space, contact capacity, energy supplies

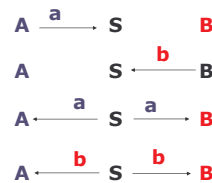
## Existing Routing Strategies

- Prediction based approaches
  - ✓ An oracle predicts past or future node encounters
    - Social forwarding
    - Predicting future location using
    - Controlled/scheduled mobility of the nodes
- Stateless approaches (Zero Knowledge)
  - ✓ Oracle information may be not available!
    - Epidemic Routing
    - Probabilistic Routing
    - Controlled-copy Replication (Spray-and-Wait)
    - **Network Coding**

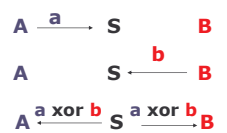
## Network Coding

- Generating a linear combination of the earlier received packets at each node:
  - ✓ Throughput gain, robustness, lower overhead

### Traditional Method



### Network Coding



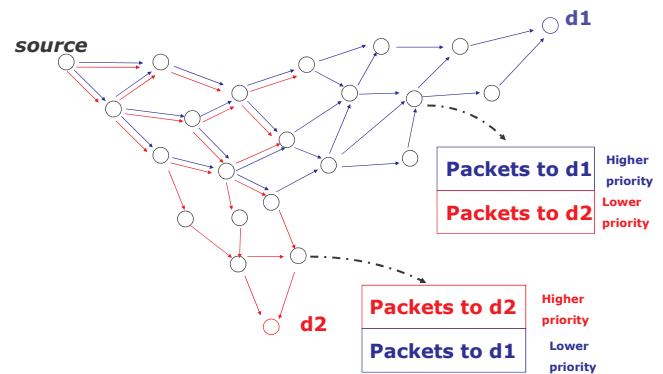
- **Drawback:** decoding the original messages upon reception of enough number of packets.
  - ✓ Rather large delay at each destination for receiving the packets of others

## Our Approach

### Destination-based Network Coding

#### Our solution:

Prioritizing packets that are closer to their destinations



- Using Network Coding
  - ✓ Increasing robustness and throughput
- Contact history to determine priority to destinations
  - ✓ Decreasing delivery delay
- **Problem:** combining independently the packets based on their destinations increases the overhead
- **Our goal:** finding a good tradeoff between the average delay and overhead

