



BANDWIDTH AND ROUND-TRIP TIME DETECTION BASED CONGESTION CONTROL FOR MULTIPATH TCP OVER HIGHLY LOSSY SATELLITE NETWORKS

Hefei Hu, Heng Li, Yuanan Liu

Beijing University of Posts and Telecommunications, Beijing, China

Email: huhefei@bupt.edu.cn

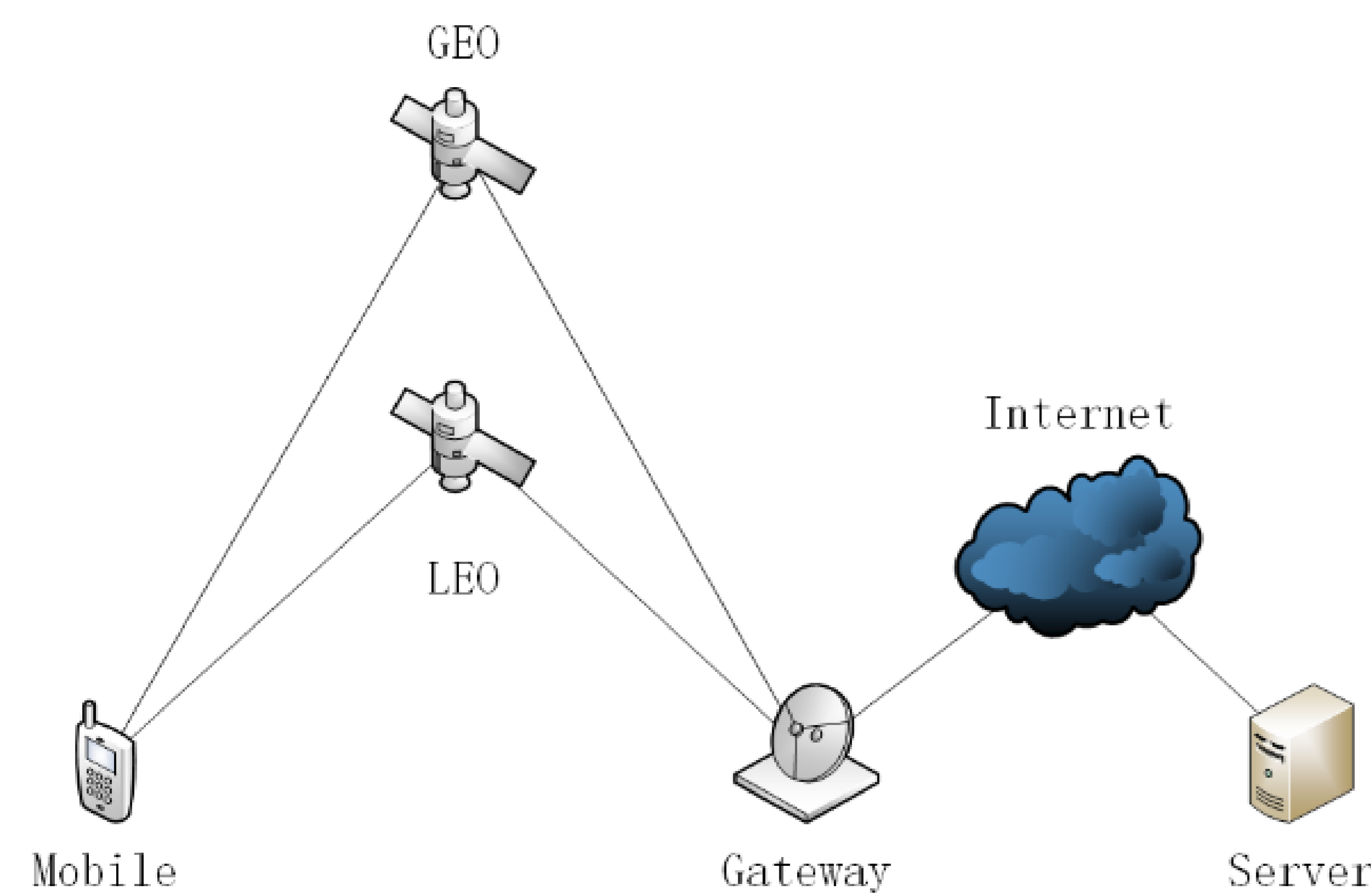
Introduction

Characters of Highly Lossy Satellite Network

- High propagation delay
 - long round-trip time (RTT)
- Frequent handover
 - periodical high packet loss rate
- High bandwidth-delay product

Disadvantage of Current MPTCP Congestion Control Algorithms

- All based on the AIMD (additive increase / multiplicative decrease)
- Interpret packet loss as "congestion"
- Very low bandwidth utilization



Congestion Control Algorithms

Bandwidth and Round-trip Time Detection Based Congestion Control (BWRD)

- Probe the round trip time every Δt_{RTT} seconds and record the minimum round trip time.
- RTT detection value at time T is:

$$RTT_{min} = \min(RTT_t) \quad \forall t \in [T - \Delta t_{RTT}, T] \quad (1)$$

- Calculate the delivery rate every Δt_{BtlBw} seconds

$$\text{deliveryRate} = \frac{ACK_{seq} - \text{lastACK}_{seq}}{\Delta t_{BtlBw}} \quad (2)$$

$$BtlBw = \max(\text{deliveryRate}_t) \quad \forall t \in [T - \Delta t_{BtlBw}, T] \quad (3)$$

Satellite Links Parameters

	LEO Link	GEO Link
Data Rate(Mbps)	1.5	10
Delay(ms)	50	250
Loss Rate(%)	1	1

parameters	values
Handover interval(s)	20
Handover latency(s)	1
Loss rate(%)	20
Total simulation time(s)	50

Simulation

Simulation Results

