Chair of Network Architectures and Services
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# Implementation and Evaluation of an Available Bandwidth Estimation Tool

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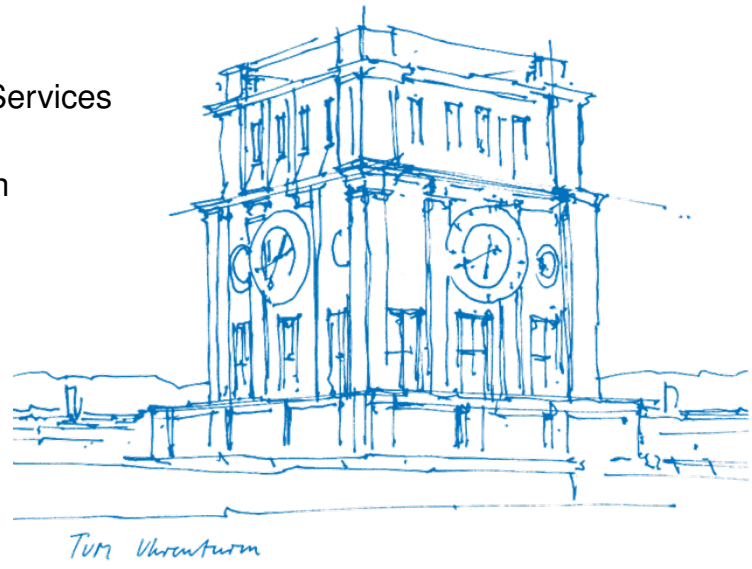


**Motivation**

- Enhance **quality-of-service (QoS)** requirements
- Detect anomalies
- Monitoring the network's state

**Research questions:**

1. How good is the accuracy?
2. Trade-off between accuracy and efficiency?
3. What limitations and restrictions constraint the usage on the internet?
4. What is the difference in accuracy of single-end and both-ended tools?

# Approaches

## Overview

**Probe Gap Model (PGM)**: Spruce or Delphi

- Packet trains/pairs are sent with rate set to the bottleneck's capacity
- Uses relation between input and output rates of probing packets
- Cannot estimate the available bandwidth of multi-hop paths [1]

**Probe Rate Model (PRM)**: Pathload, abget or fabprobe

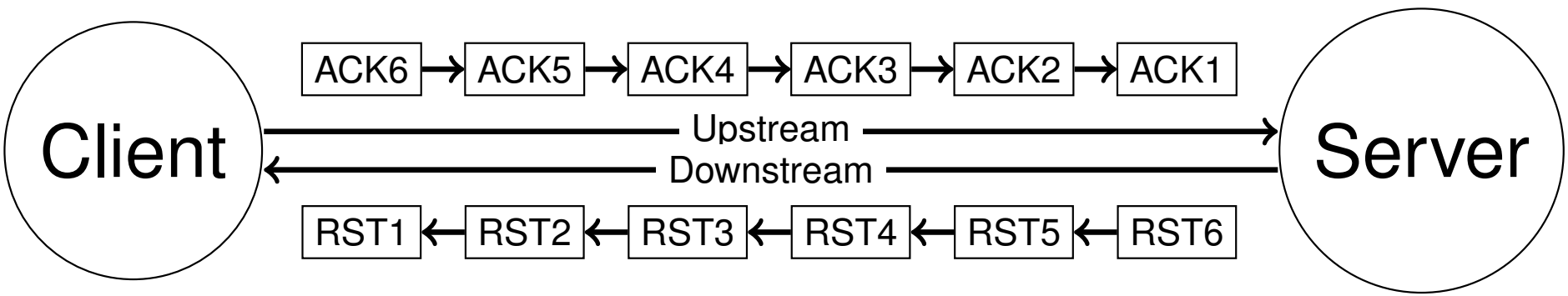
- Iterative probing
- Packet trains are sent at different rates
- Adjusts input rate depending on output rate
- Converges into a range of the available bandwidth

# Tool

## Basic Idea

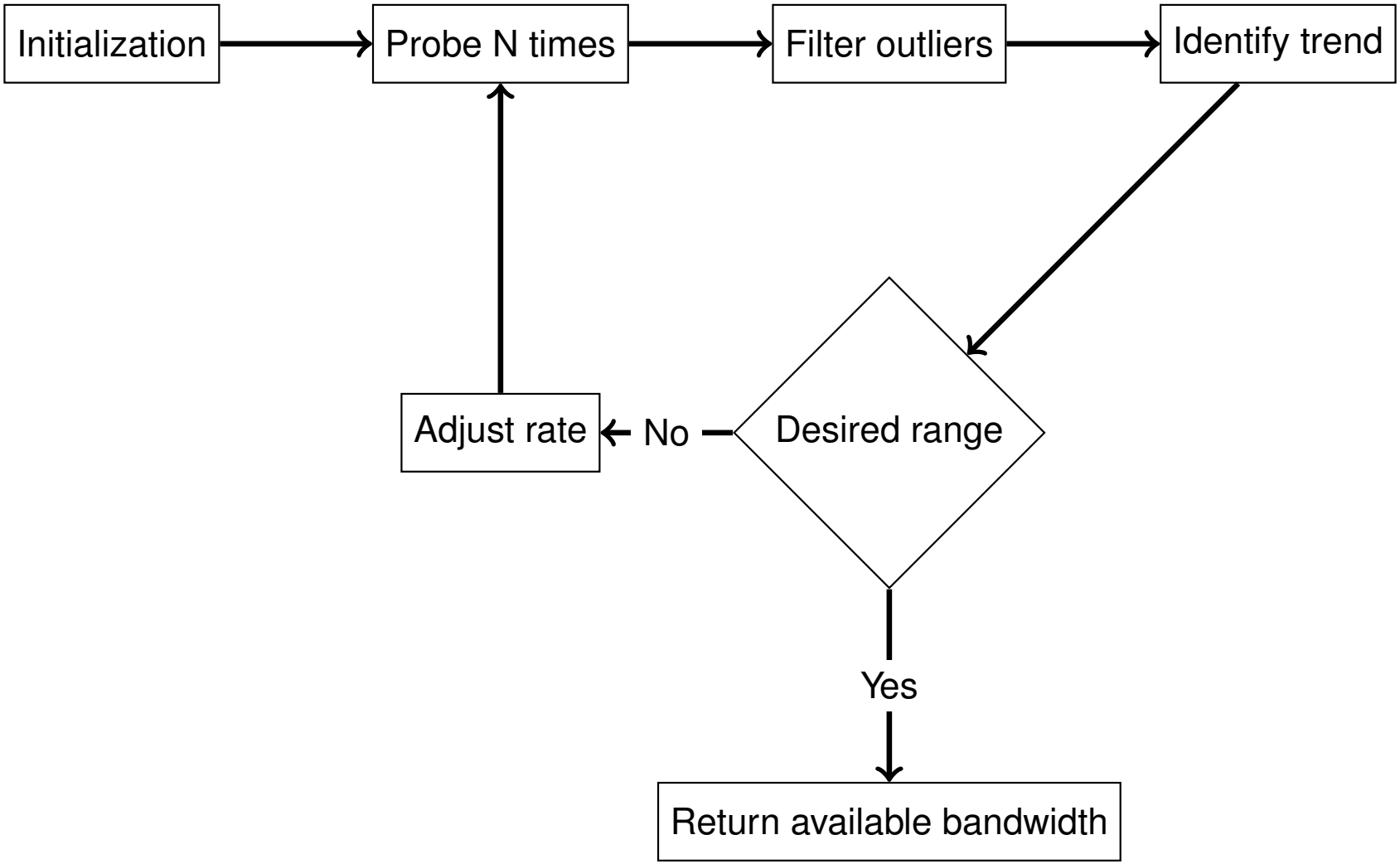
**Requirements:**

- PRM
- Binary-search like probing
- Single-ended tool



# Tool

## Design


Initialization
Probe N times
Filter outliers
Identify trend
Desired range
No
Adjust rate
Yes
Return available bandwidth

# Tool

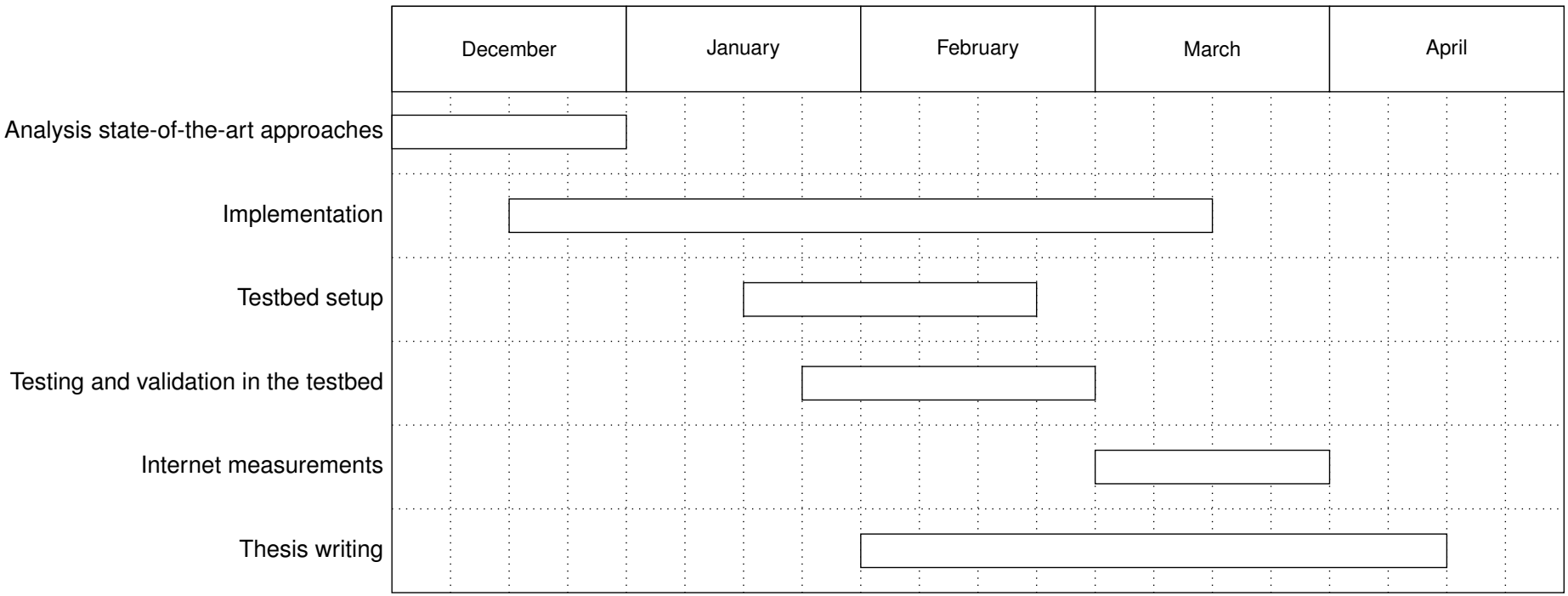
## Design

**Metrics and filters:**

- Pairwise Comparision Test (PCT)
- Pair Difference Test (PDT)
- Decreasing trend filter (DT)
- Iterativly Re-weighted Least Square (IRLS)

# Outlook

## Schedule



# Bibliography

[1] L. Lao, C. Dovrolis, and M. Sanadidi.
The probe gap model can underestimate the available bandwidth of multihop paths.
*Computer Communication Review*, 36:29–34, 10 2006.