Elasticity Detection:

A Building Block for Internet Congestion Control[4]

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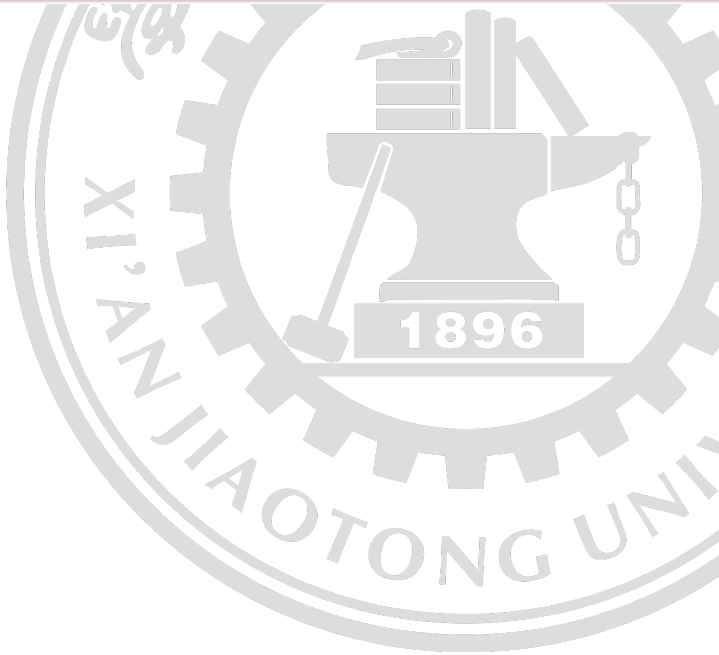
January 24, 2024



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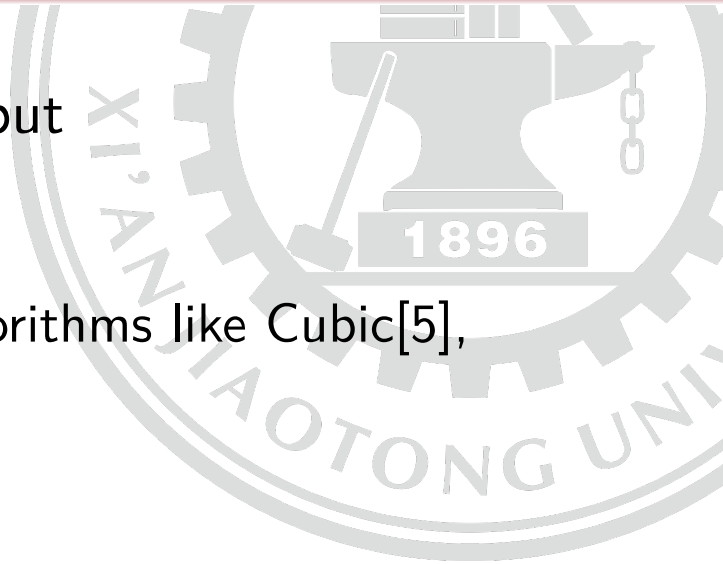

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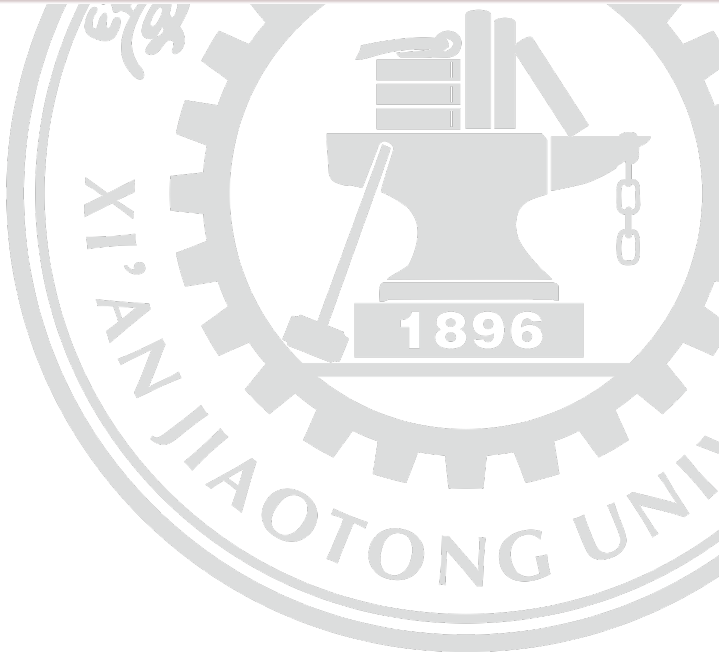
  - Use delay-based CC algorithms otherwise.



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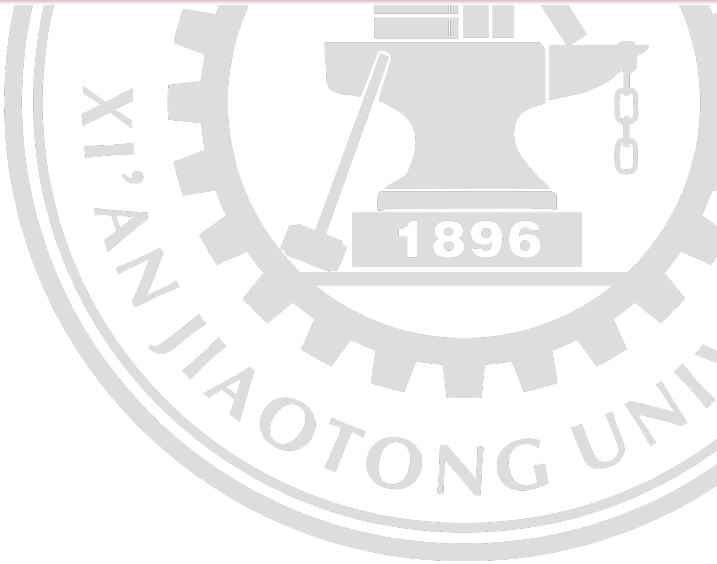

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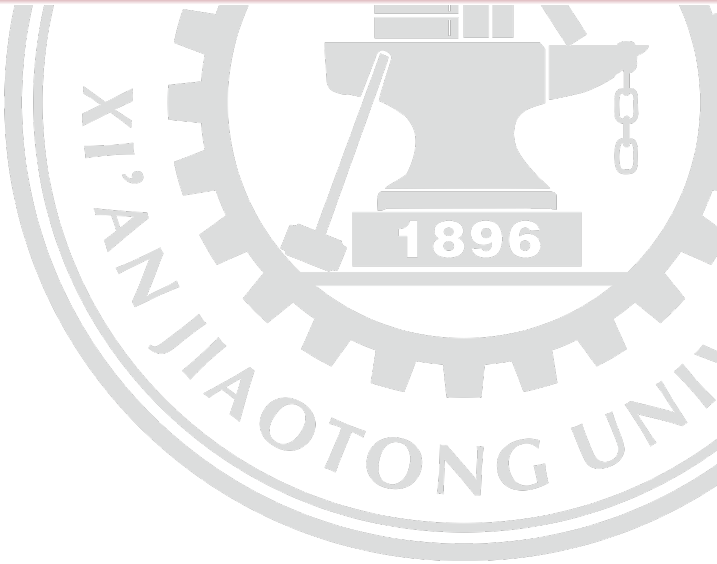

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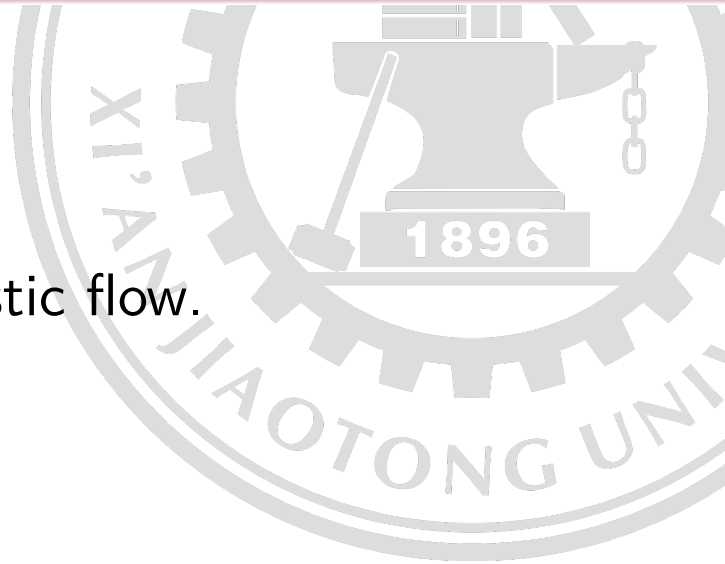

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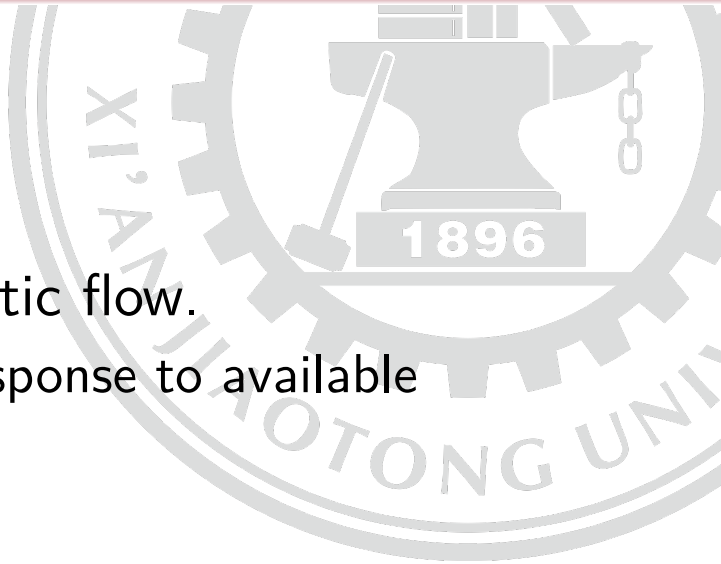

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  - Same throughtput as the deployed TCP-competitive CC algorithms

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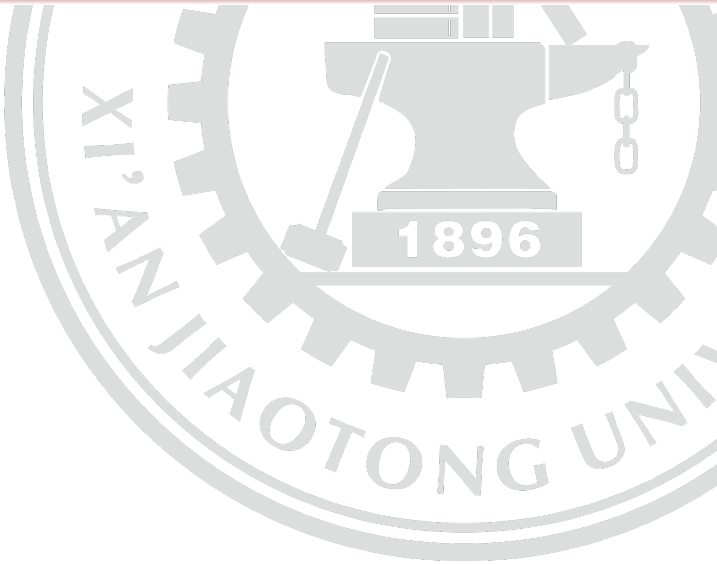

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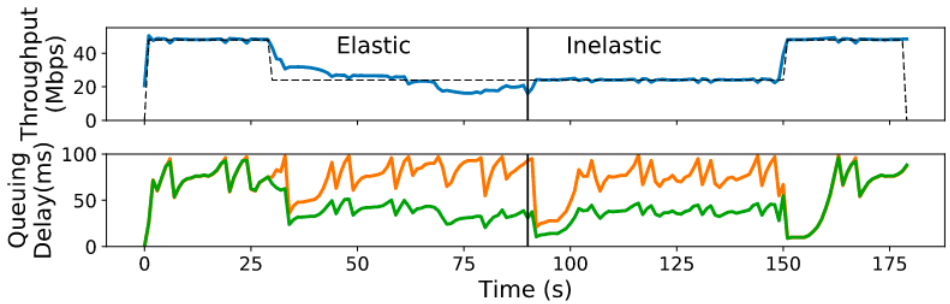

Figure 1: Instantaneous delay measurements do not reveal elasticity.[1]

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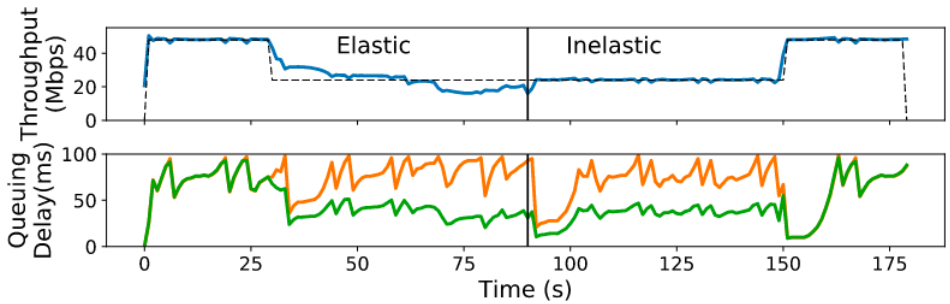

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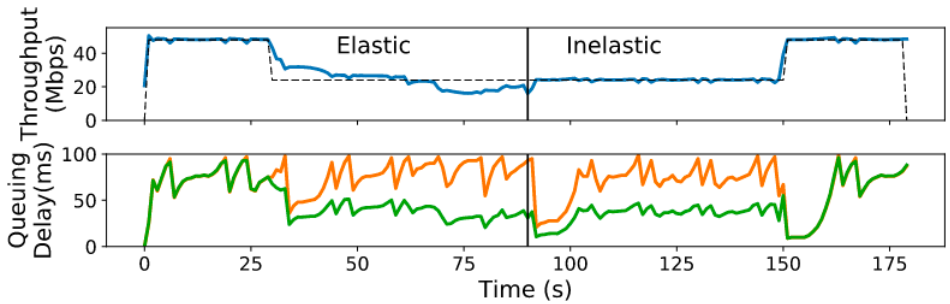

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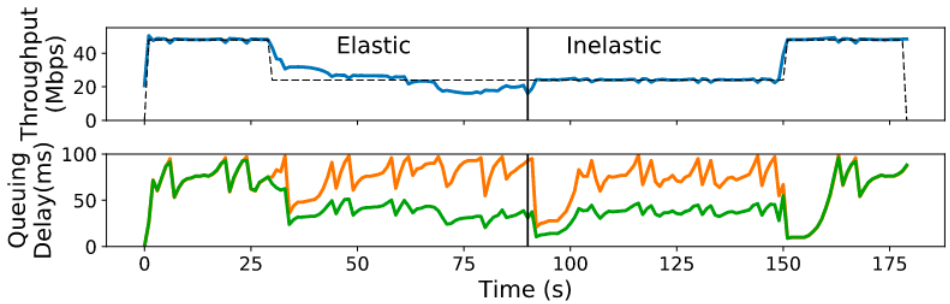

Figure 1: Instantaneous delay measurements do not reveal elasticity.[1]

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  - Modulate sending rate to create variations in available bandwidth.
  - Monitor how the cross traffic responds to these variations.

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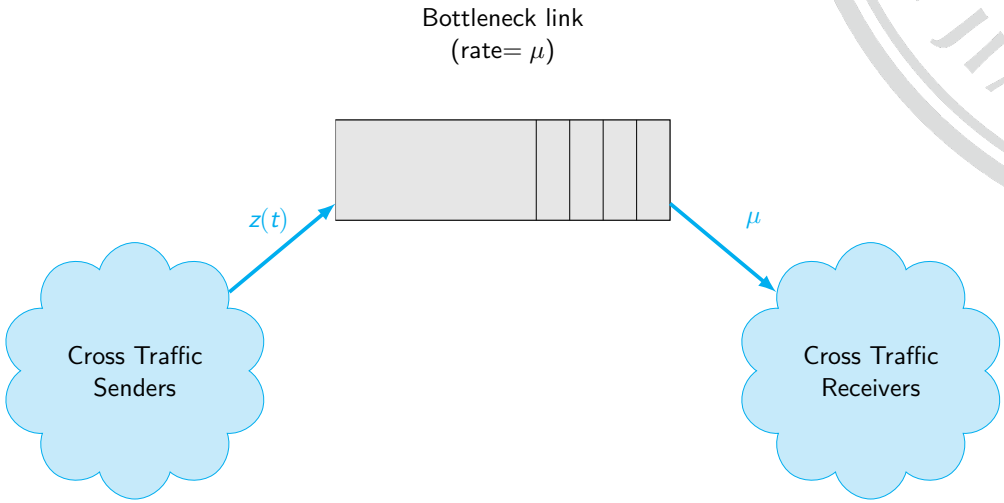

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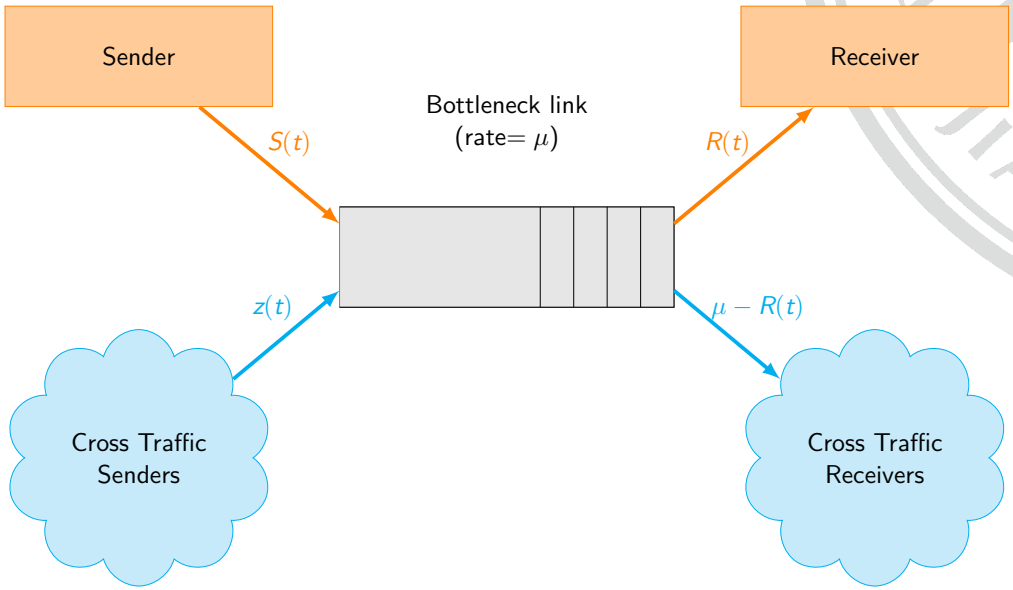

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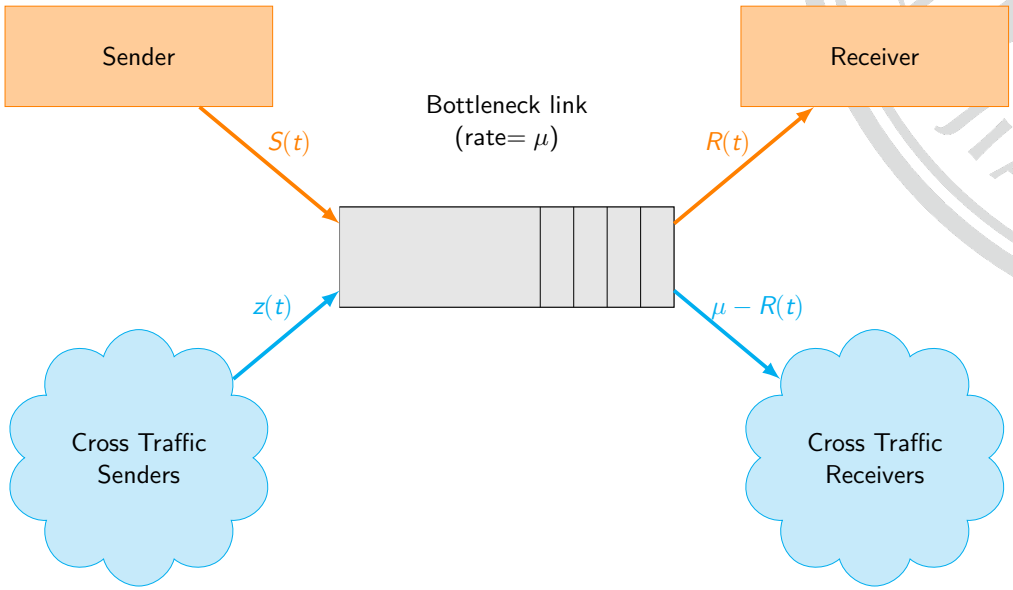

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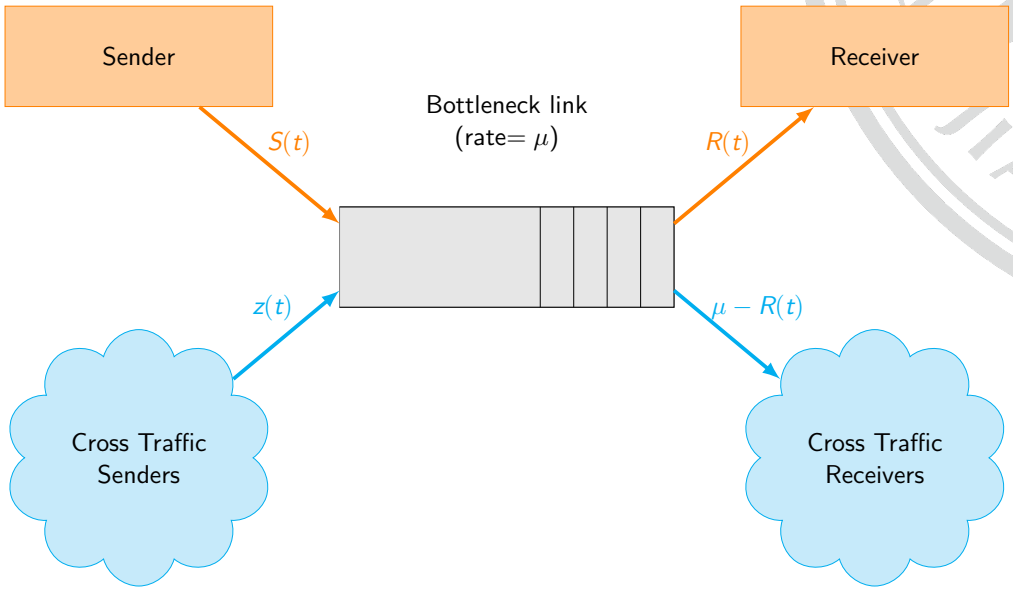

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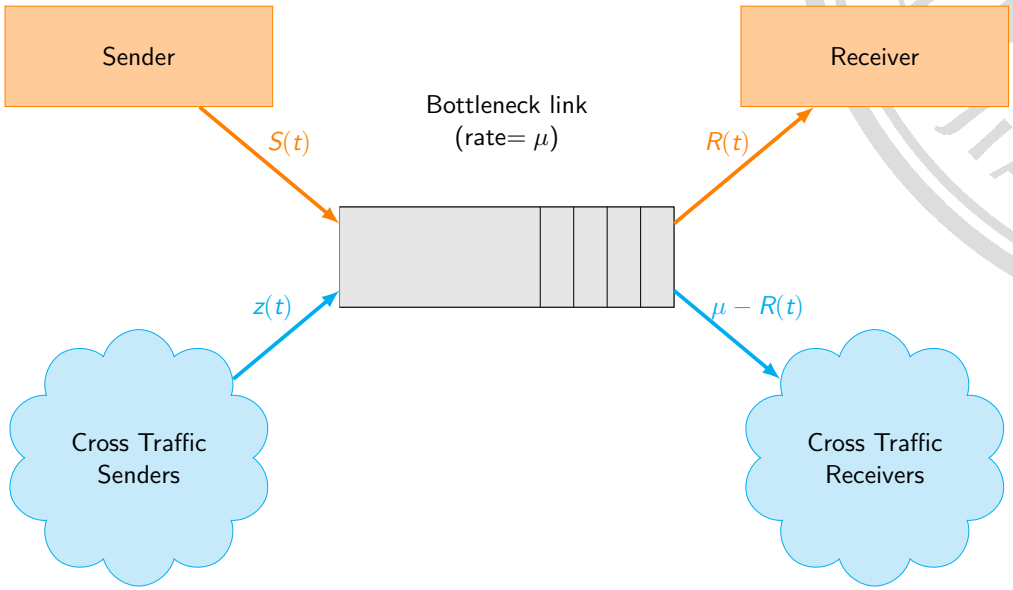

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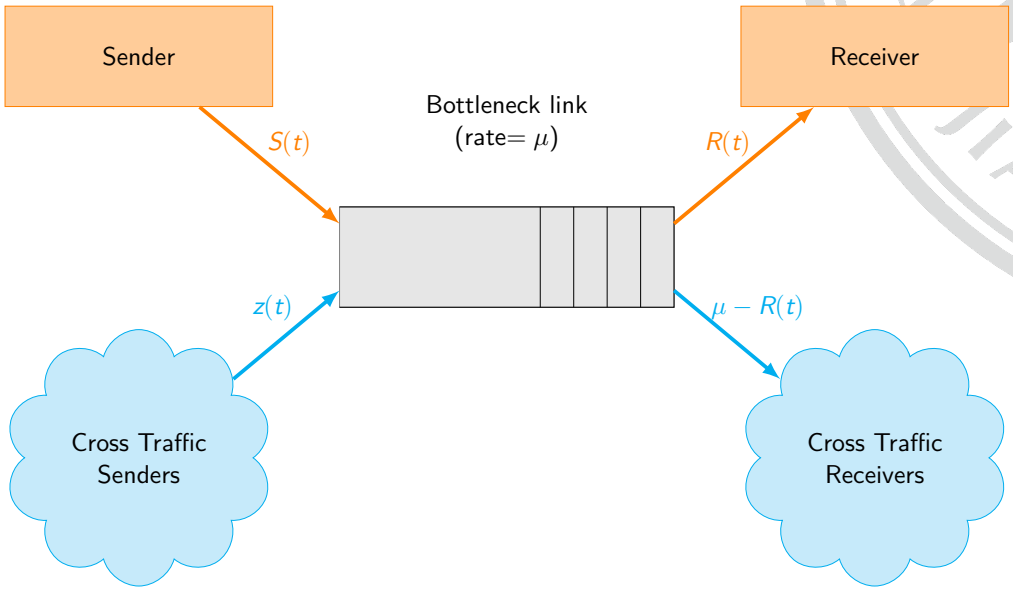

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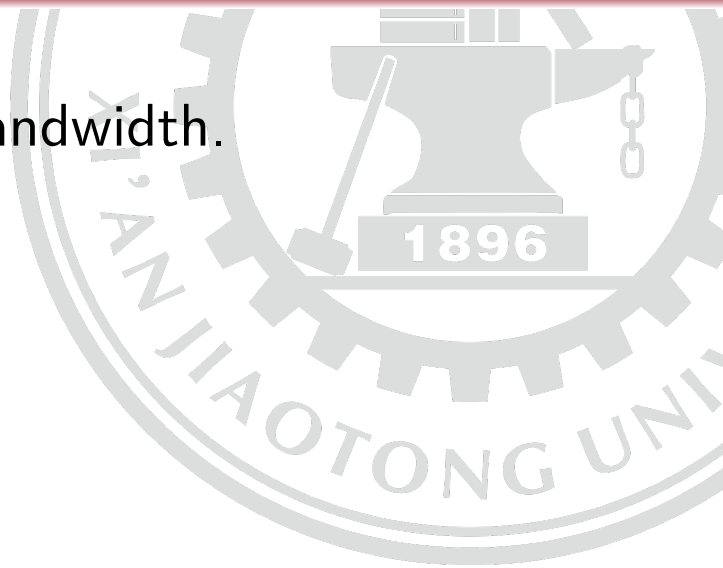

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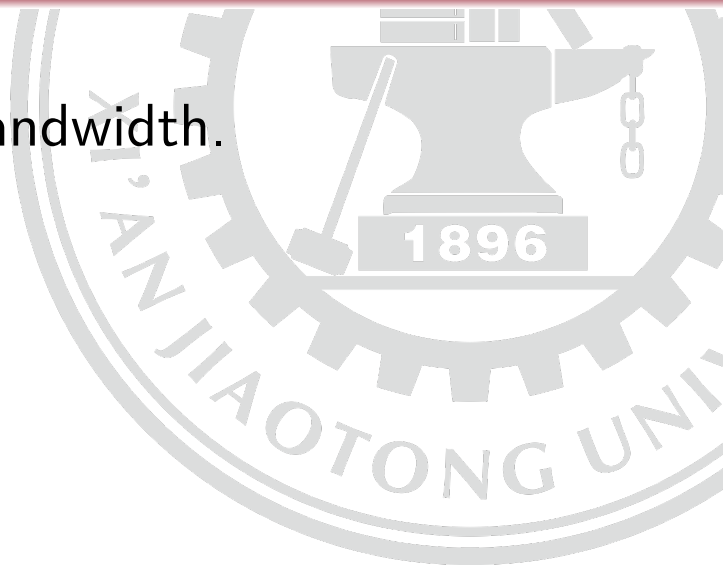

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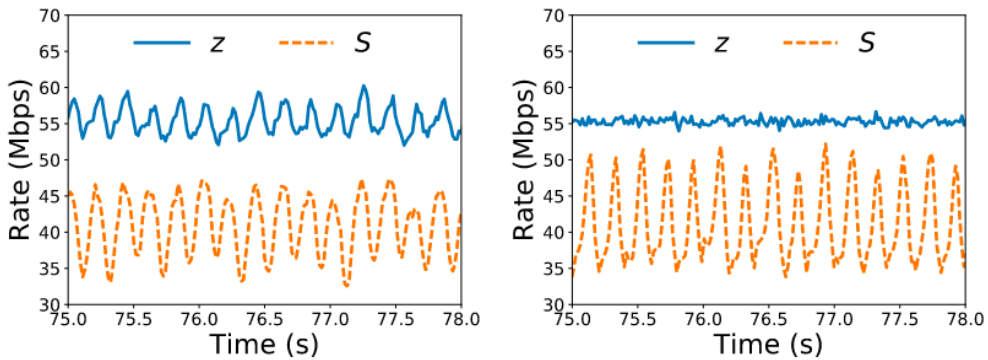

Figure 2: Cross traffic's reaction to pulses.[1]

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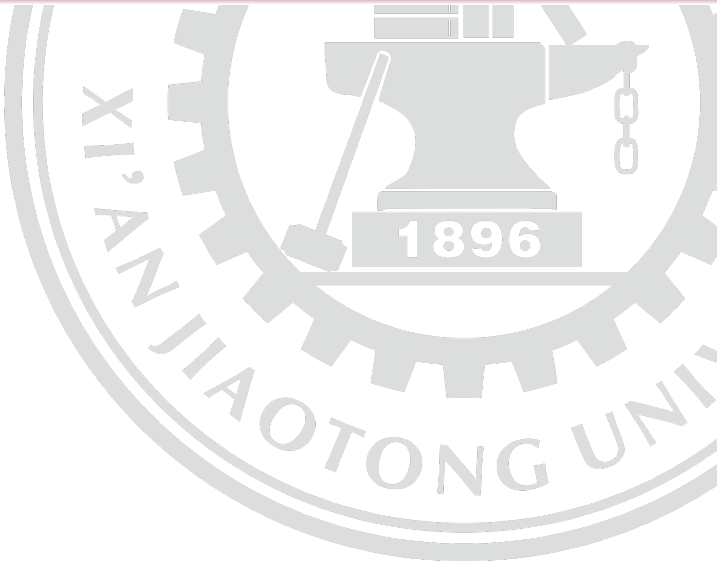

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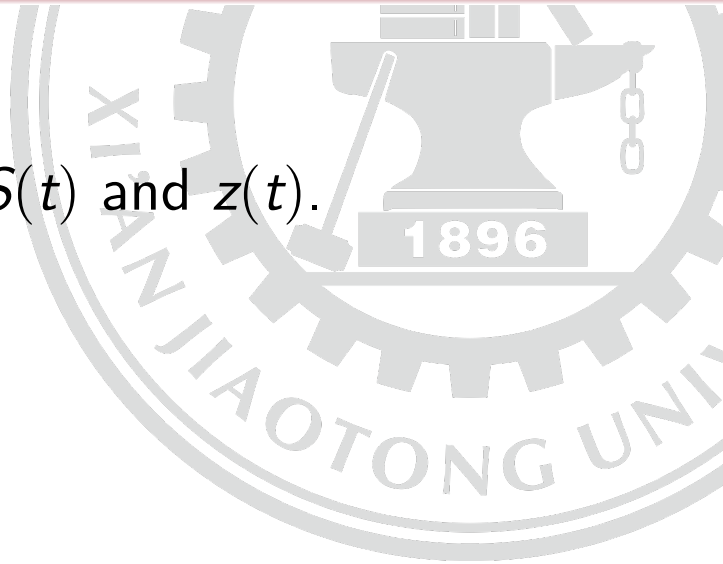

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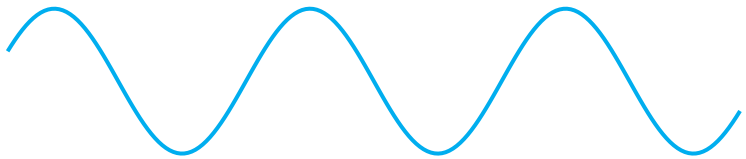

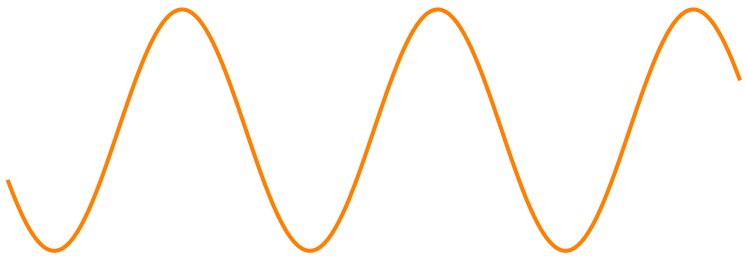

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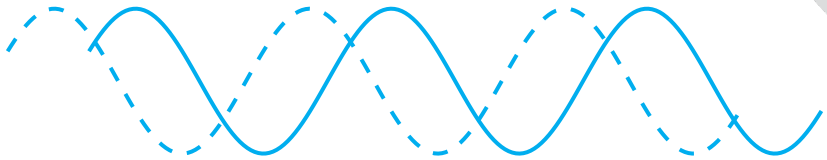

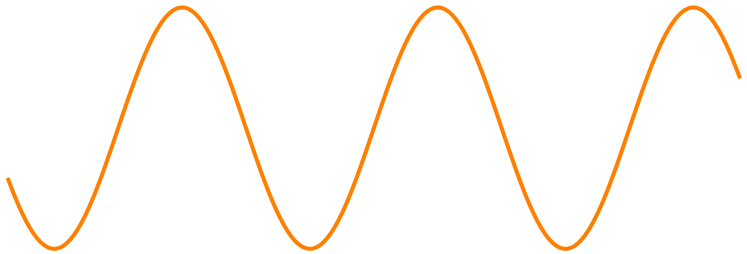

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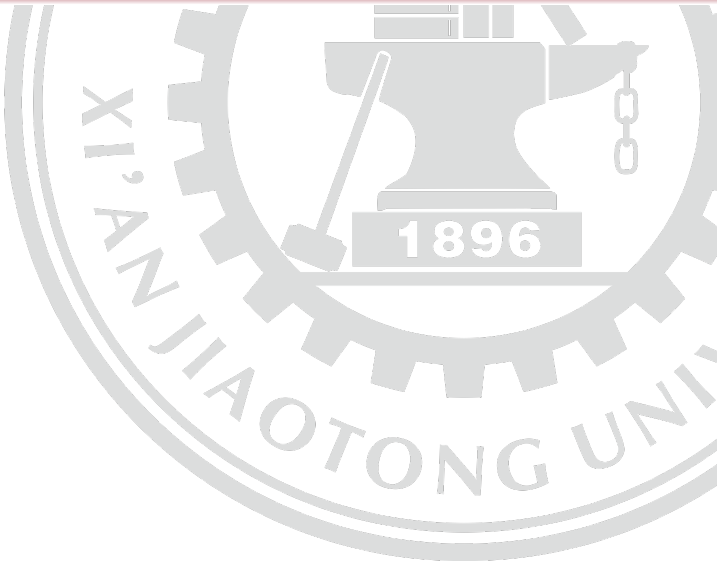

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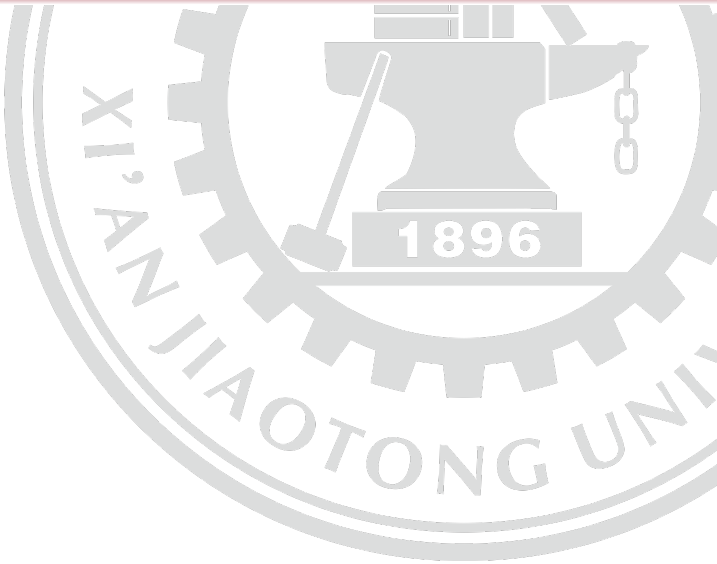

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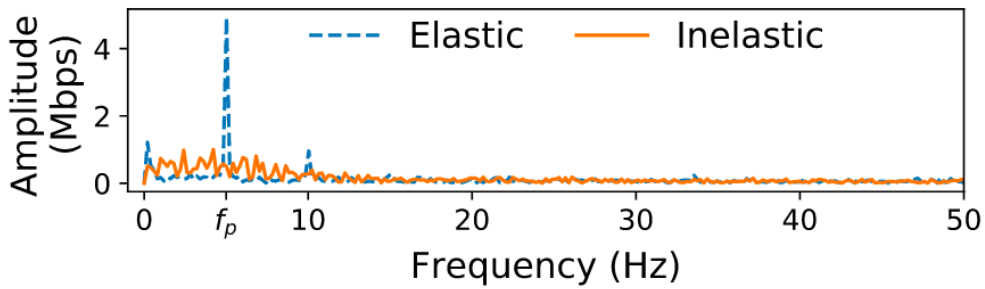

Figure 3: Cross traffic FFT for elastic and inelastic traffic.[1]

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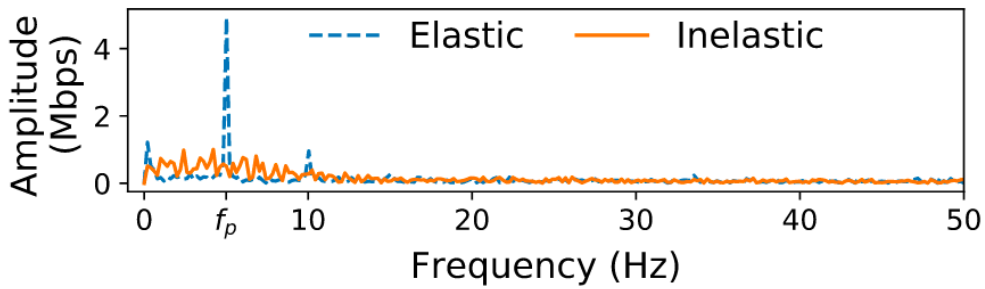

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- Elastic cross traffic exhibits a pronounced peak at f_p compared to the neighboring frequencies.

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- Step 3: Classify cross traffic elasticity.
- From time to frequency domain

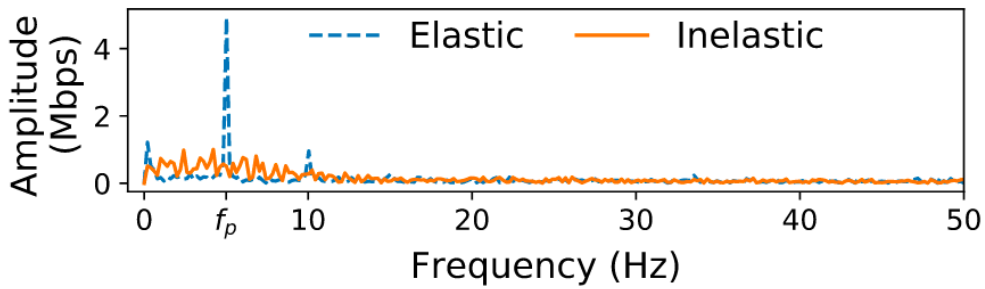
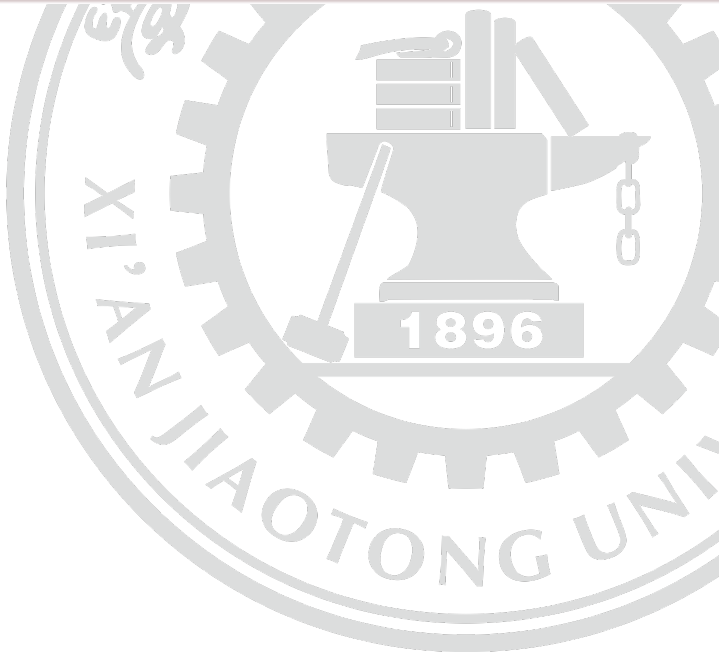


Figure 3: Cross traffic FFT for elastic and inelastic traffic.[1]

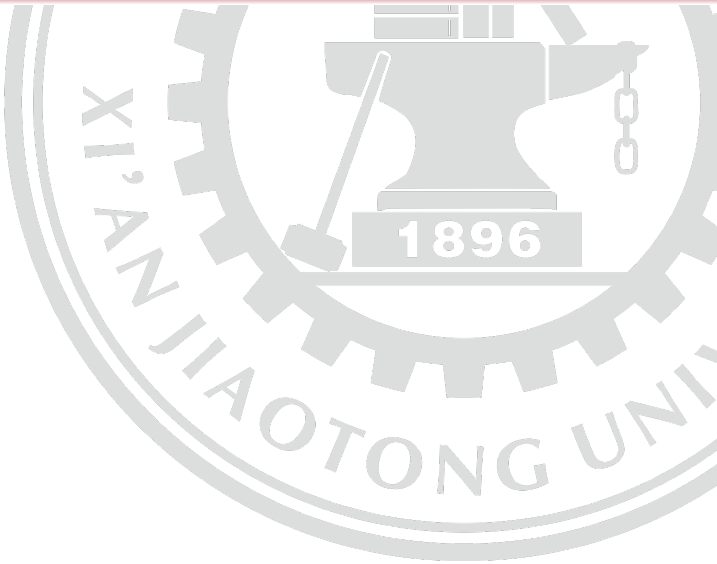
- Elastic cross traffic exhibits a pronounced peak at f_p compared to the neighboring frequencies.
- No need to know RTT of cross traffic.

[1] From Figure 4 in [4].



Experiment

- Setup
  - Bottleneck rate: 96 Mbit/s,
  - Minimum RTT: 50 ms
  - Buffer: 2 BDP



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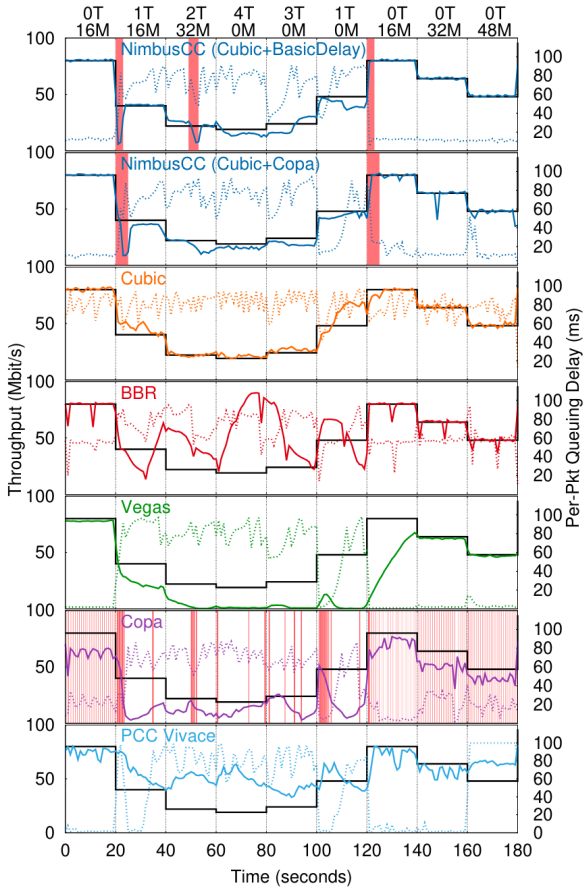
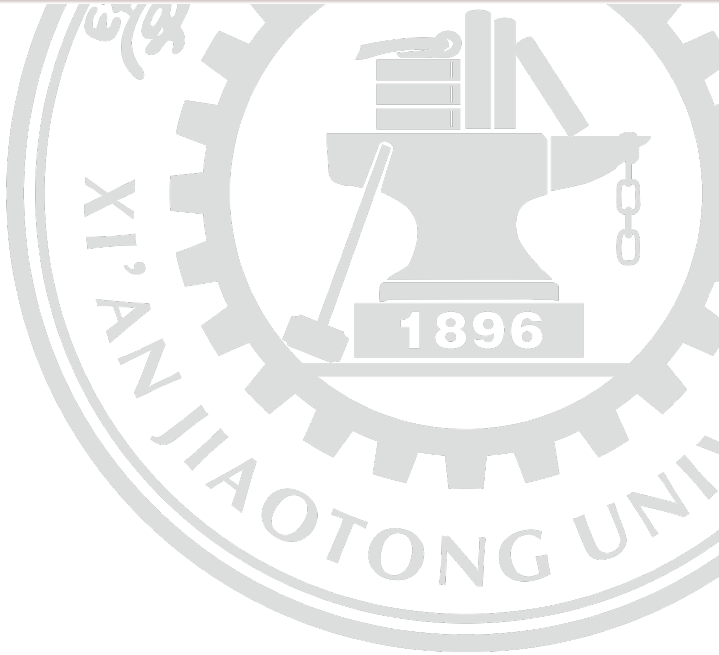


Figure 4: Performance of NimbusCC.[1]

[1] From Figure 7 in [4].



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  - Similar to CSMA

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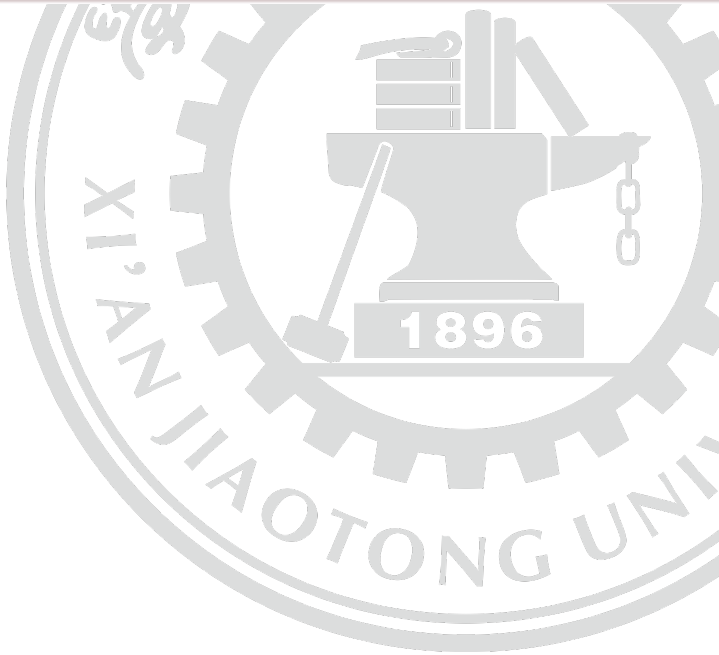

Thanks!