

Performance of Transport Protocols over Wireless Links

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EECS 822 Project Presentation

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Transport Protocols over Wireless Links

Abstract

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Transport Protocols over Wireless Links

Outline

- Introduction
- Motivation
- Nearly- Reliable Mode
- Quasi- Reliable Mode
- Summary
- Simulation Results
- Conclusion

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Nearly- Reliable Mode

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Nearly- Reliable Mode

Introduction

- Highly reliable but does not guarantee delivery
- Split ARQs used to give high level of reliability
- Gateway immediately returns ACK to the source
- The gateway buffers segments after ACKing them
- More bandwidth efficient than traditional TCP

Nearly- Reliable Mode

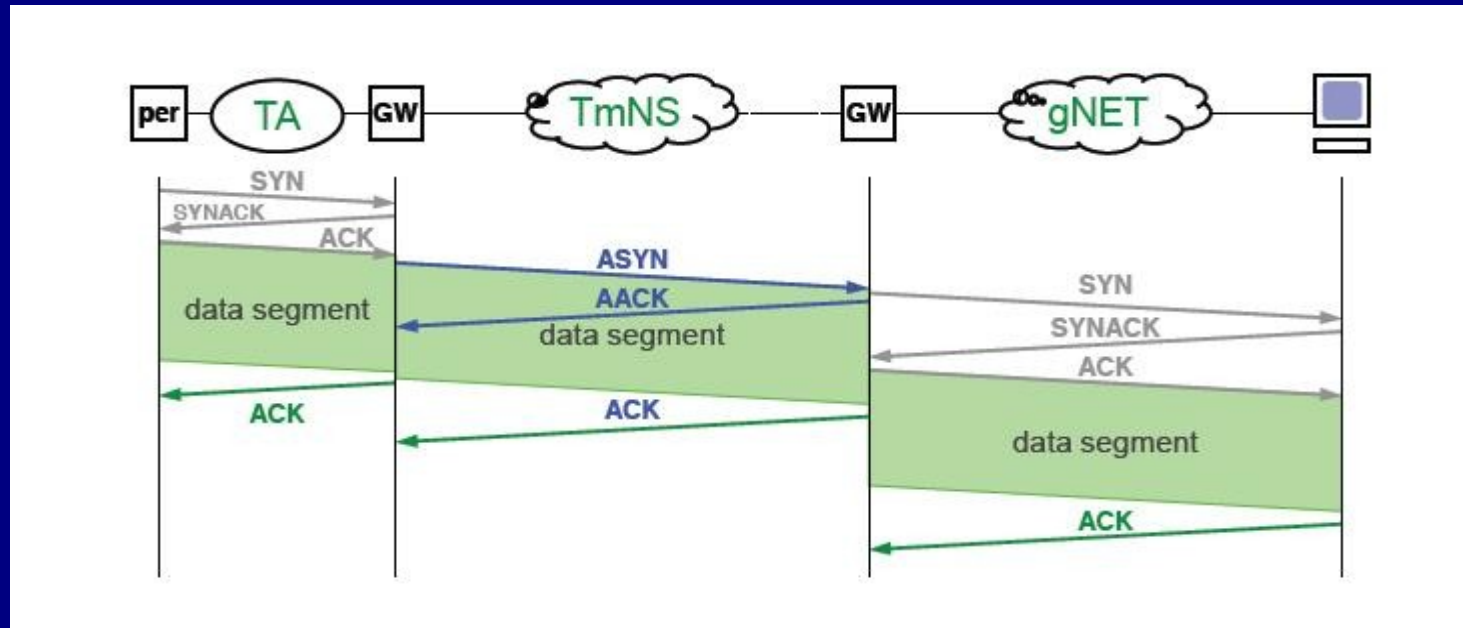


Figure 3 [RS2009]

Nearly- Reliable Mode Performance measurement

- Simulations compare E2E and HBH ARQ
- Nearly- Reliable mode uses HBH ARQ
- Trade off reliability against bandwidth efficiency

Nearly- Reliable Mode Software Architecture

- P2P channel script modified to make channel noisy
- This scenario used to simulate wireless channel
- Various nodes connected with P2P links
- This used to simulate multi-hop scenario
- ARQ mechanism enabled on each node
- E2E ARQ achieved by not using split ARQs

Transport Protocols over Wireless Links

Quasi- Reliable Mode

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Quasi- Reliable Mode

Introduction

- Does not use ACKs and ARQs
- Provides open loop error recovery
- Uses mechanisms like FEC
- Provides no guarantee of delivery, only statistical reliability
- Tradeoff
 - bandwidth overhead against overhead of retransmissions

Quasi-Reliable Mode

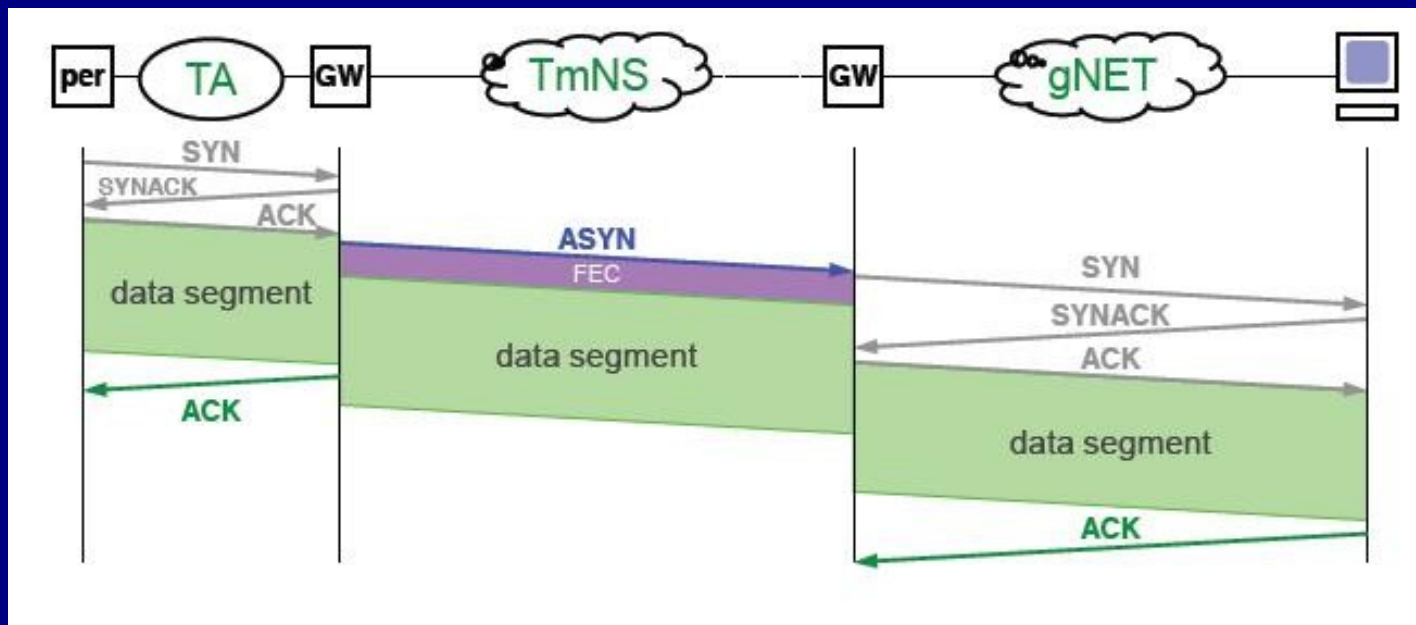


Figure 4 [RS2009]

Quasi- Reliable Mode

Performance measurement

- Simulations compare FEC and non-FEC modes
- Reed-Solomon FEC used
- Trade off
 - bandwidth overhead due to redundant bits
 - against time overhead due to retransmissions
- Efficiency of FEC in correcting errors
 - bit errors
 - burst errors

Quasi- Reliable Mode

Reed-Solomon Codes

- RS- FEC code emulated
- Represented as RS (n, k) with s-bit symbols
 - k code words of s-bit symbols encoded into n code words
- Most popular used is
 - RS (255, 223) with 8 bit symbols
- Theoretical limit on number of errors
 - $t = (n-k)/2$

Quasi- Reliable Mode

Software Architecture

- RS- FEC code emulated
- Errors introduced using RateErrorModel (ns-3)
- RateErrorModel modified to suit emulation
- Packets marked as corrupted and sent to Layer4(L4)
- FEC emulated at L4 decides on reconstruction
- FEC emulated by modifying the UDP header
- Efficiency of FEC calculated based on this

Acknowledgements

- Justin P. Rohrer, ResiliNets Research Group
- Asifuddin Mohammad, ResiliNets Research Group
- Egemen Cetinkaya, ResiliNets Research Group
- Professor James Sterbenz

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