

ENSC 427

Comparison of TCP with “uTP” for BitTorrent Transfers

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<http://www.sfu.ca/~aciappon/ENSC427/index.html>

Team 5

Agenda

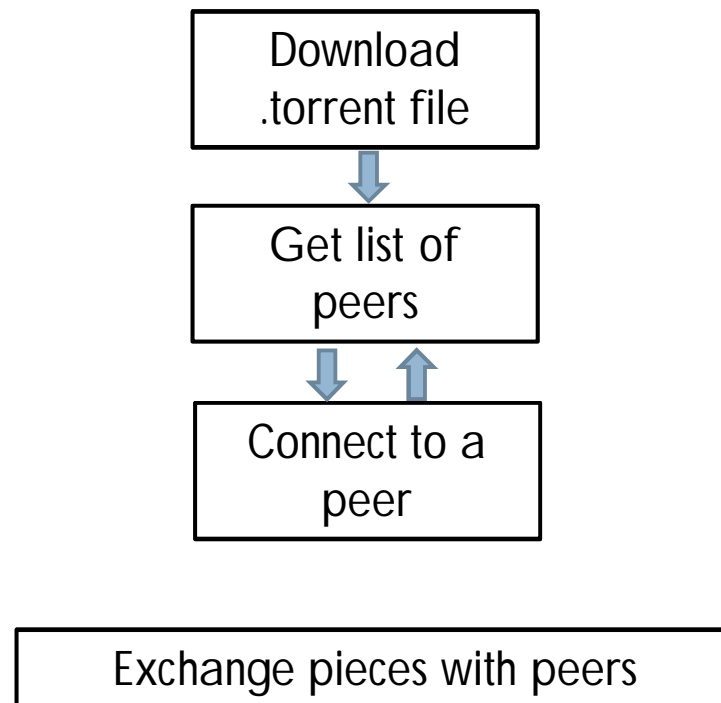
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- 1) Introduction to BitTorrent and uTP
- 2) Related Work
- 3) OPNET Model
- 4) Simulation Results
- 5) Conclusions
- 6) References

BitTorrent

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- A substantial portion of internet traffic is BitTorrent traffic
- The BitTorrent model for transferring files



BitTorrent modelling

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- Torrent network is composed of two types of peers:
 - ▣ Seeders: Uploading to peer(s)
 - ▣ Leechers: Uploading and downloading to peer(s)

- Arrangement of peers changes slowly over time
 - ▣ We chose to model a fixed arrangement of peers

- BitTorrent traffic primarily consists of large data transfers over TCP
 - ▣ Model using FTP

uTP: “micro Transport Protocol”

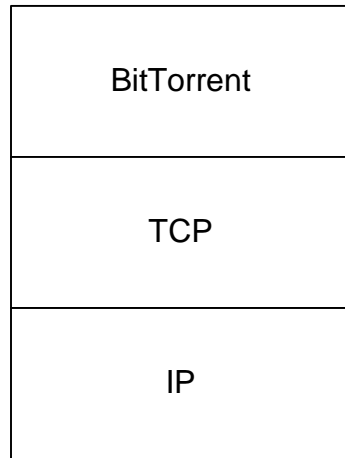
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- Aims to decrease latency while maximizing bandwidth when latency is not excessive
- Uses UDP instead of TCP to carry data
 - ▣ Responsibility for connection-oriented reliable-stream service is now at the application layer
- All TCP parameters (i.e. congestion window) now available to the application

uTP

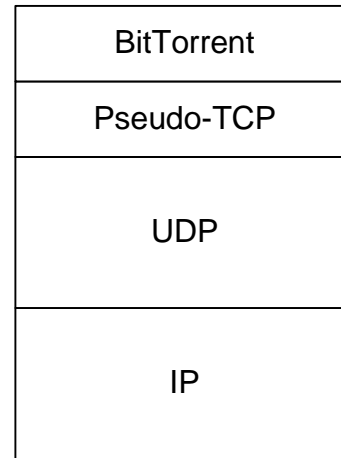
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Standard BitTorrent
over TCP



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uTP



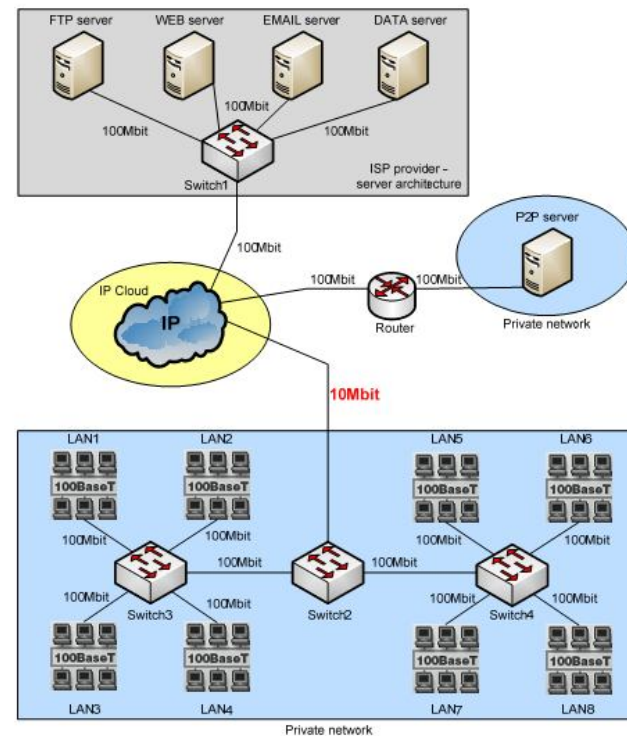
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Related Work

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- Impact of P2P traffic to the IP communication network performances in OPNET (M. Fras, S. Klampfer, Ž. Čučej)
 - “Use of P2P applications rapidly decreases network performance and reflect negative influences onto other useful applications.”

- uTP is very new: no specific studies published
- New protocol used in the BitTorrent client application “ μ Torrent” v1.9. Currently only v1.8.2 is available (Mar.31 2009)



OPNET Model

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- With uTP, data is carried over UDP
 - ▣ Application-level reliable stream service makes traffic pattern TCP-like

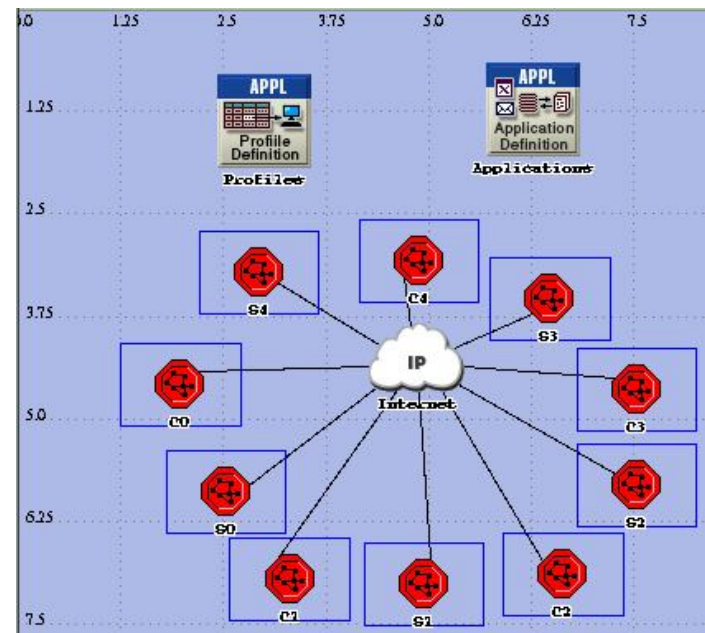
- Simulate uTP using TCP with modified parameters
 - ▣ segment size
 - ▣ disabled TCP-Reno (fast recovery)
 - ▣ Smaller initial congestion window

OPNET Model cont'd

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- FTP profile in conjunction with VoIP profile
 - ▣ Used to compare performance of VoIP with regular BitTorrent and with the uTP BitTorrent

- Subnets contain either 1 seeder or 3 leechers
- 5 seeders
- 15 leechers



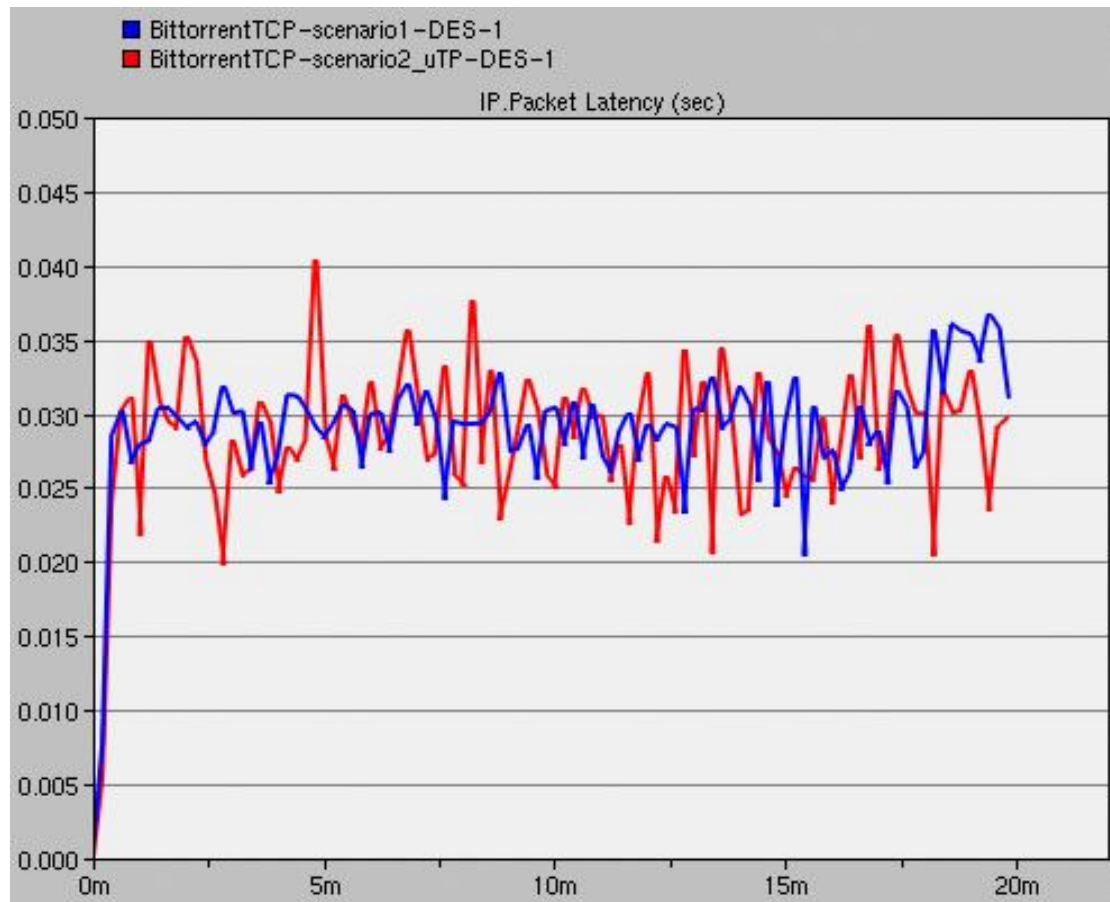
Simulation Results: Latency

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- TCP parameters were modified to better reflect uTP

- Packet Latency (normal TCP)

- Packet Latency (uTP)



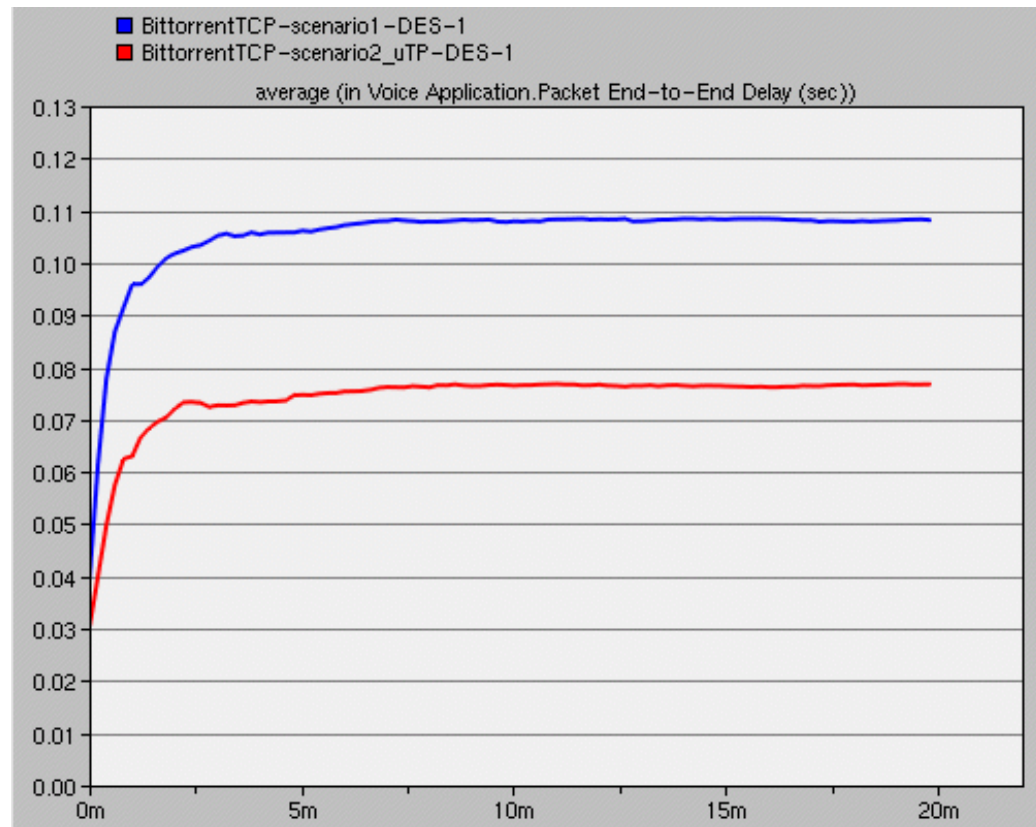
Simulation Results: uTP throughput

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- Same goodput but less data is transferred overall because there's less overhead

- Traffic received (normal TCP)

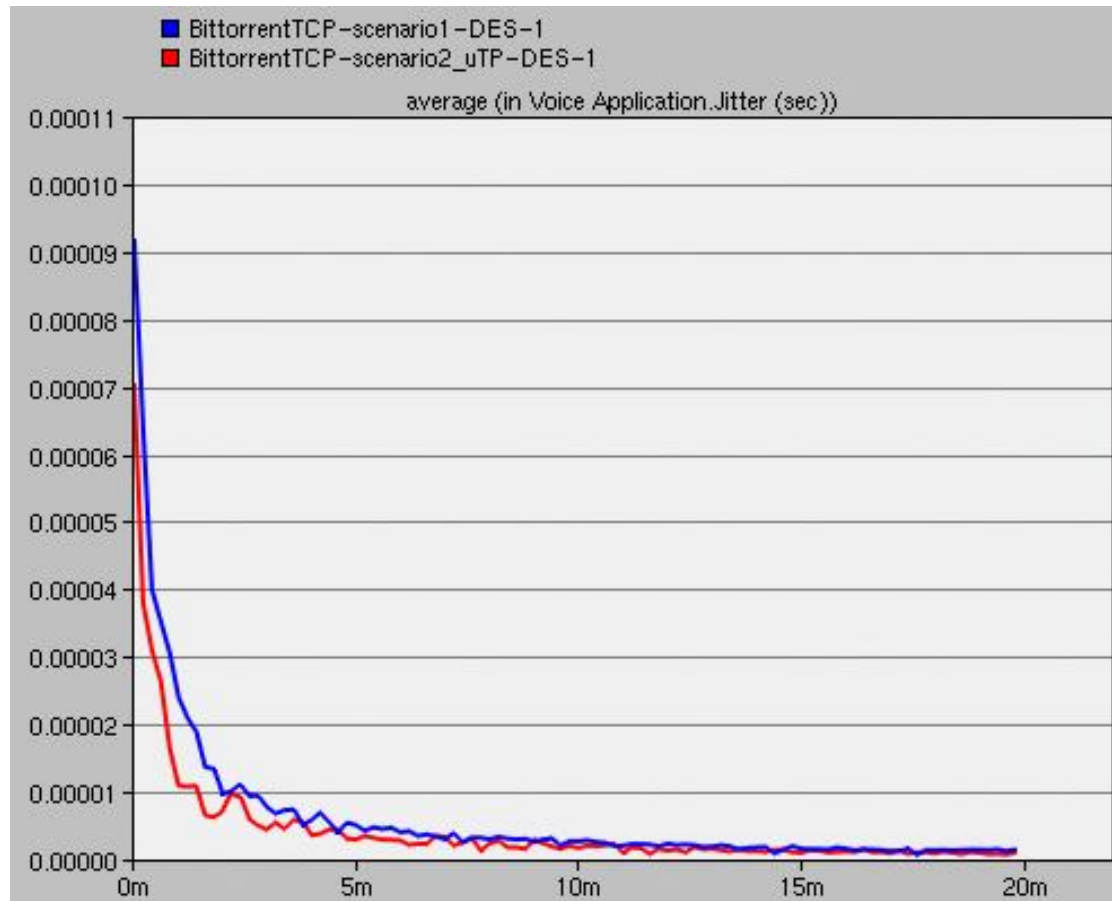
- Traffic received (uTP)



Simulation Results: VoIP Jitter (client)

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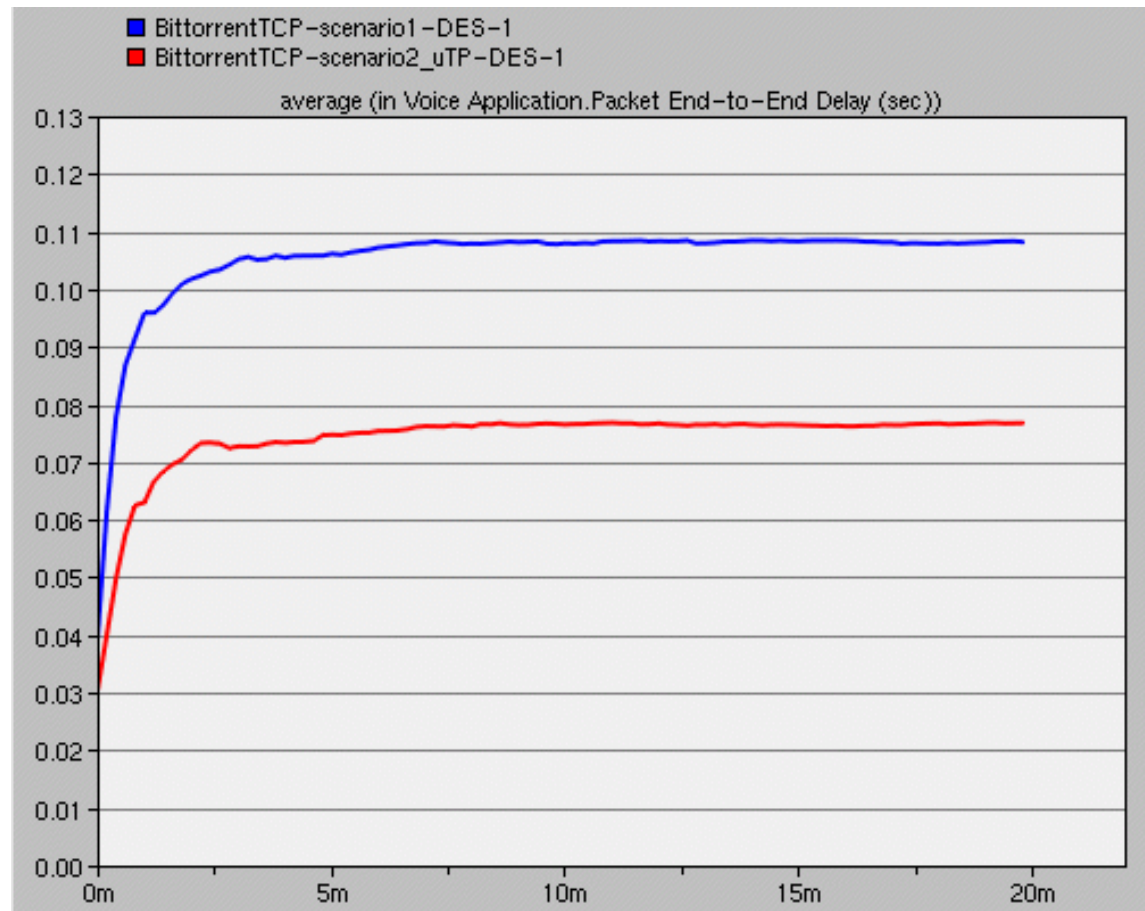
- Improved performance for VoIP application for the client
- VoIP jitter (normal TCP)
- VoIP jitter (uTP)



Simulation Results: VoIP delay

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- Improved VoIP performance end-to-end delay with uTP
- VoIP end-to-end delay (normal TCP)
- VoIP end-to-end delay (uTP)



Conclusion

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- uTP over BitTorrent doesn't compromise other application's relative performance
- uTP gives the Application greater control over the TCP parameters allowing for more robust p2p client software
- All in all: The internet won't collapse when uTP is deployed

References

- [1] B. Cohen, "The BitTorrent Protocol Specification," Jan. 2008. [Online]. Available: http://www.bittorrent.org/beps/bep_0003.html [Accessed: March 7, 2009].
- [2] R. Chirgwin, "Torrents of Disruption on the Way?," Dec. 4, 2008. [Online] Available: <http://searchnetworking.techtarget.com.au/articles/27957-Torrents-of-Disruption-on-the-Way-> [Accessed: Feb. 13, 2009].
- [3] "µTorrent 1.9 alpha 14589," Nov. 25, 2008. [Online] Available: <http://forum.utorrent.com/viewtopic.php?id=49813&p=1> [Accessed: Feb. 13, 2009].
- [4] M. Frasci et al. "Impact of P2P traffic to the IP communication network performances " [Online] Available: www.sparc.uni-mb.si/OPNET/PDF/ImpactOfP2P.pdf [Accessed: Mar.20,2009]

Questions?

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- Questions?
- Another Question?
- One last Question?
- OK enough questions.