



MediaPlayer™ vs. RealPlayer™

A Comparison of Network Turbulence

Mingzhe Li, Mark Claypool, Robert Kinicki

CS Department

Worcester Polytechnic Institute

Worcester, MA, USA

<http://perform.wpi.edu/>



WORCESTER POLYTECHNIC INSTITUTE

Introduction

- Streaming video often does not like TCP
 - Wants smooth stream, so rate-based
 - Does not always want retransmissions→ Chooses **UDP**
- UDP flows may be unresponsive to congestion
 - Handle with Active Queue Management (**AQM**)
- Typical AQMs model UDP flows as **CBR** (“firehose”)
- More realistic models of streaming UDP flows will make AQMs more effective
- We investigate size and distribution over time
 - **Turbulence**
- Big 3: **RealPlayer**, **MediaPlayer**, QuickTime [Jup01]



Methodology

- **Build** automated video players
(*MediaTracker* and *RealTracker* [WCZ01])
 - Use commercial cores
 - Software Development Kits (SDKs)
 - Record application stats: frame rate...
- **Select** hosts with both RealNetworks and Microsoft Media video servers
- **Stream** identical content to players on the same host
- **Analyze** results

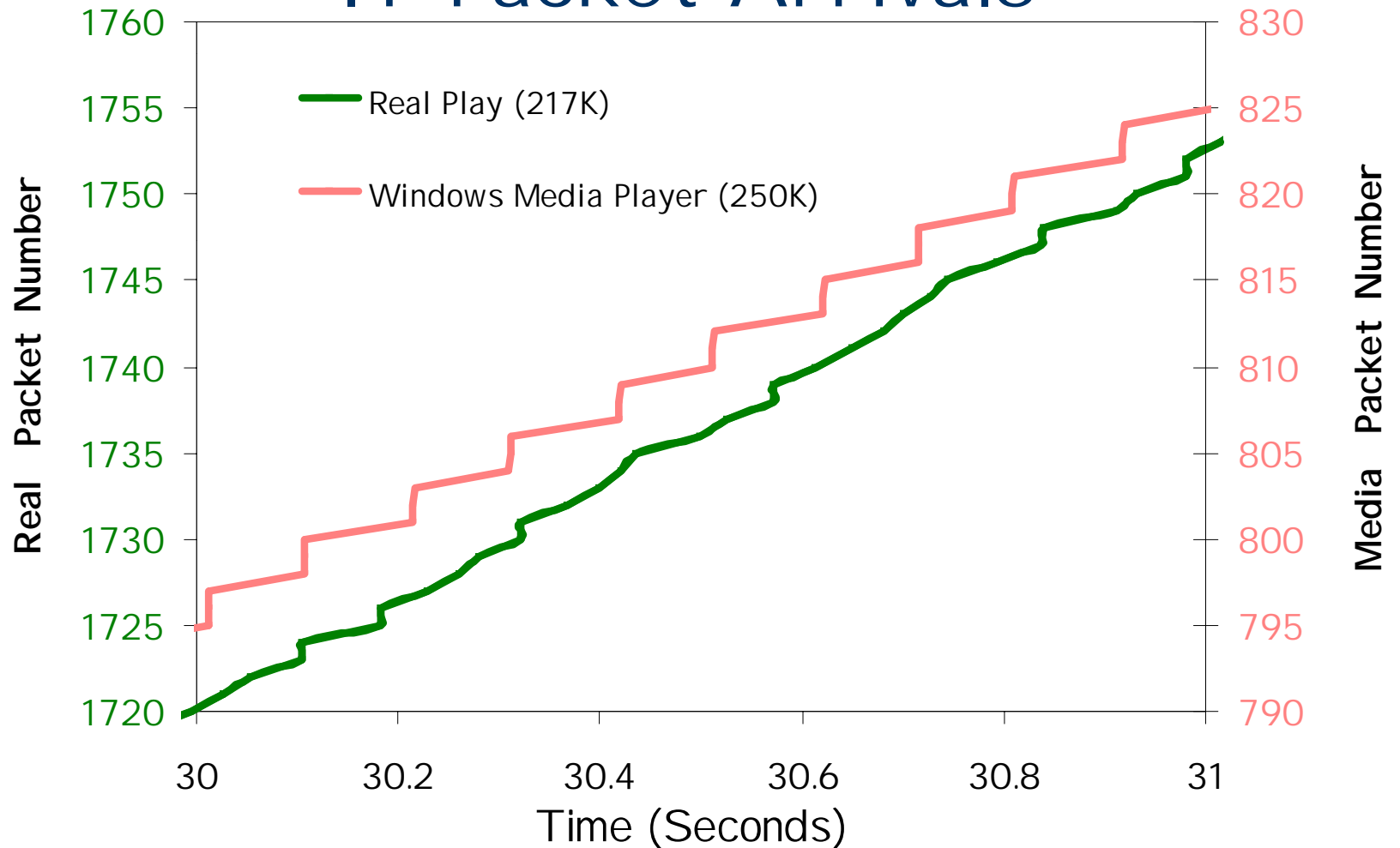
Clip Selection

	<i>Type</i>	<i>Bandwidth</i>	<i>Real</i> <i>(Kbps)</i>	<i>Microsoft</i> <i>(Kbps)</i>
1	Sports	High	284	323
	3:46	Low	36	50
2	Commercial	High	268	307
	0:39	Low	84	102
3	Sports	High	284	307
	0:60	Low	37	38
4	Music T.V.	High	181	309
	4:05	Low	26	50
5	News	High	218	250
	1:47	Low	22	39
6	Movie Clip	Very High	637	731
	2:27	High	271	347
		Low	39	102

Experimental Setup

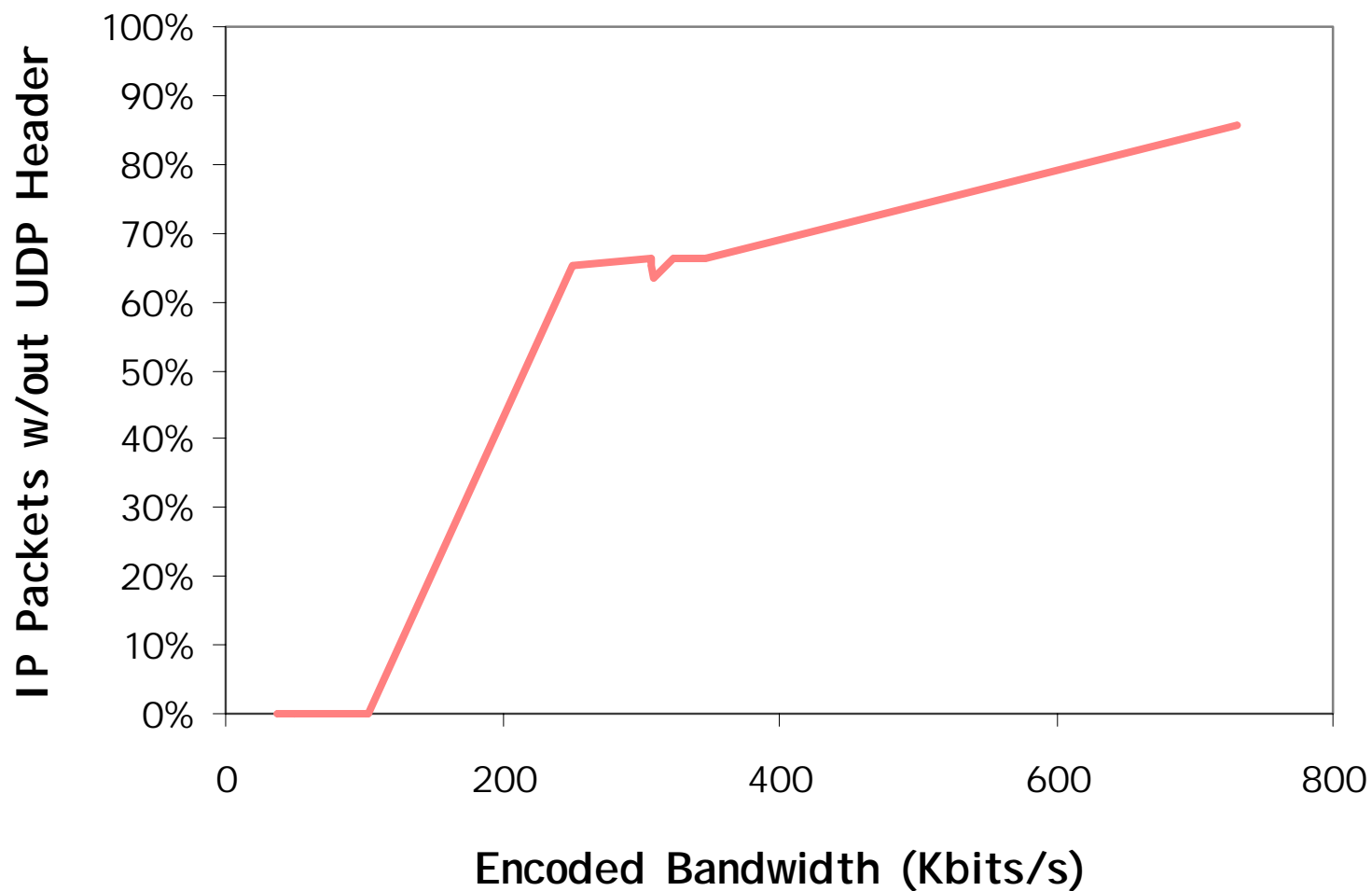
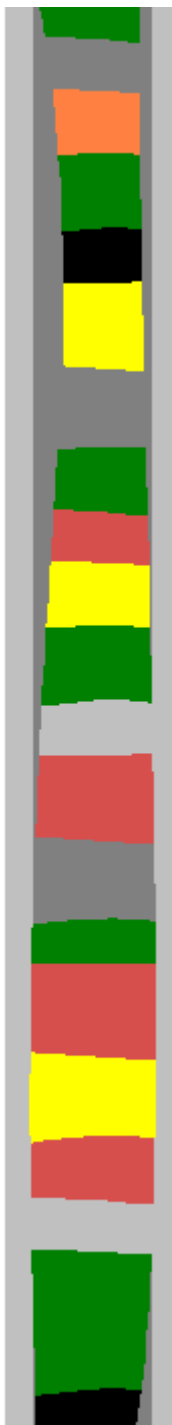
- Player Platform
 - Microsoft Windows 2000 PC
 - P4 1.8 GHz, 512M RAM, AGP 32MB video card
 - `mindspeed.wpi.edu` (Worcester, MA, USA)
- Network
 - LAN: PCI 10M NIC Win2k professional
 - Campus uplink: ~50 Mbps (Yipes in 15 Mbps)
- Software
 - Microsoft Media Player version 7.1
 - RealNetworks RealOne Player build 6.0.10.505
 - **Ethereal** version 0.8.20

IP Packet Arrivals

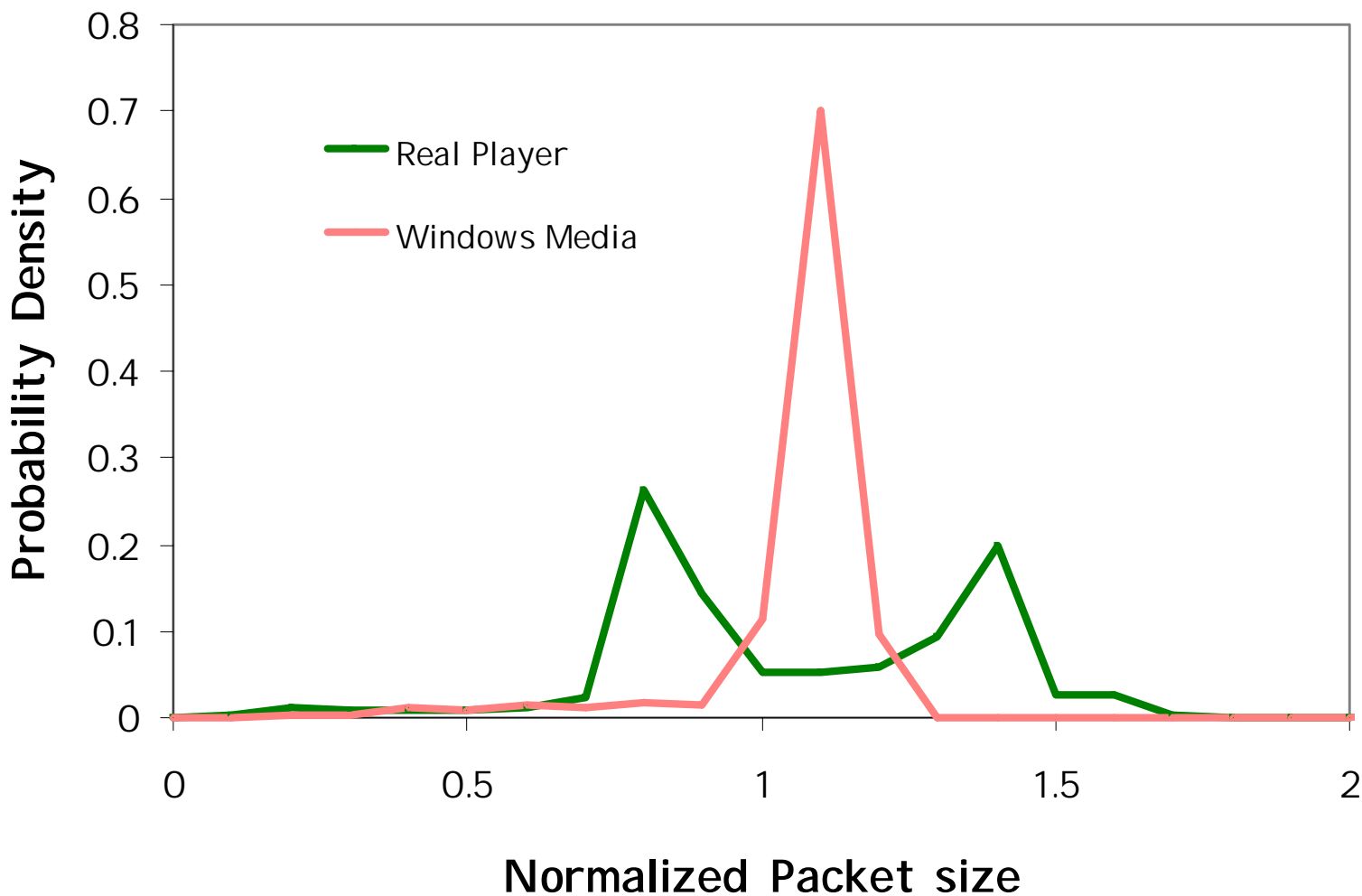


- RealPlayer - single packets
- Media Player - groups of packets (3 in this example)
 - 2 at about 1500 bytes (typical MTU)
 - 1 "left-over" less than MTU

Media Player IP Packet Fragmentation



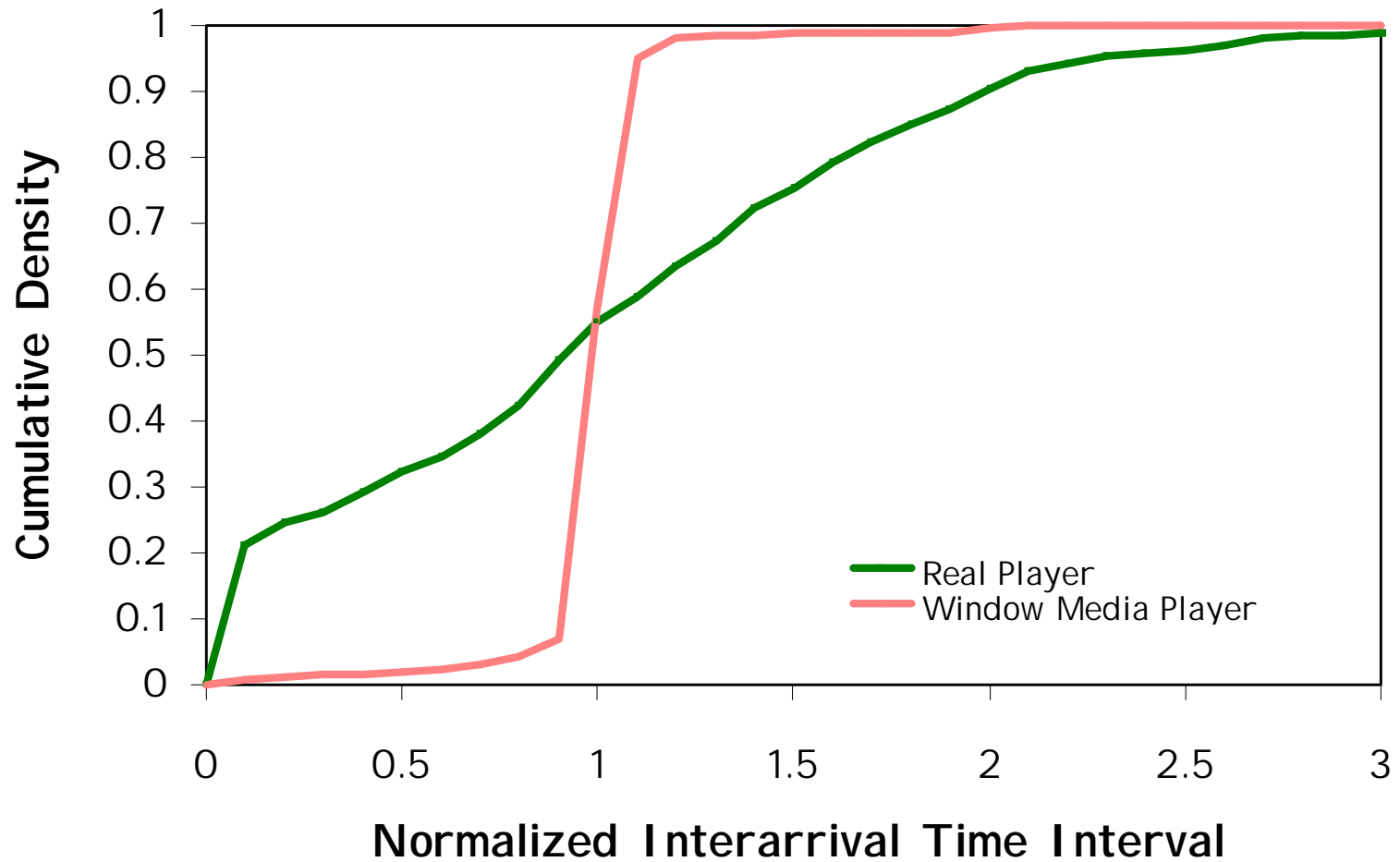
Normalized UDP Packet Sizes



Media Player - More "Constant Packet Size"

RealPlayer - Less "Constant Packet Size"

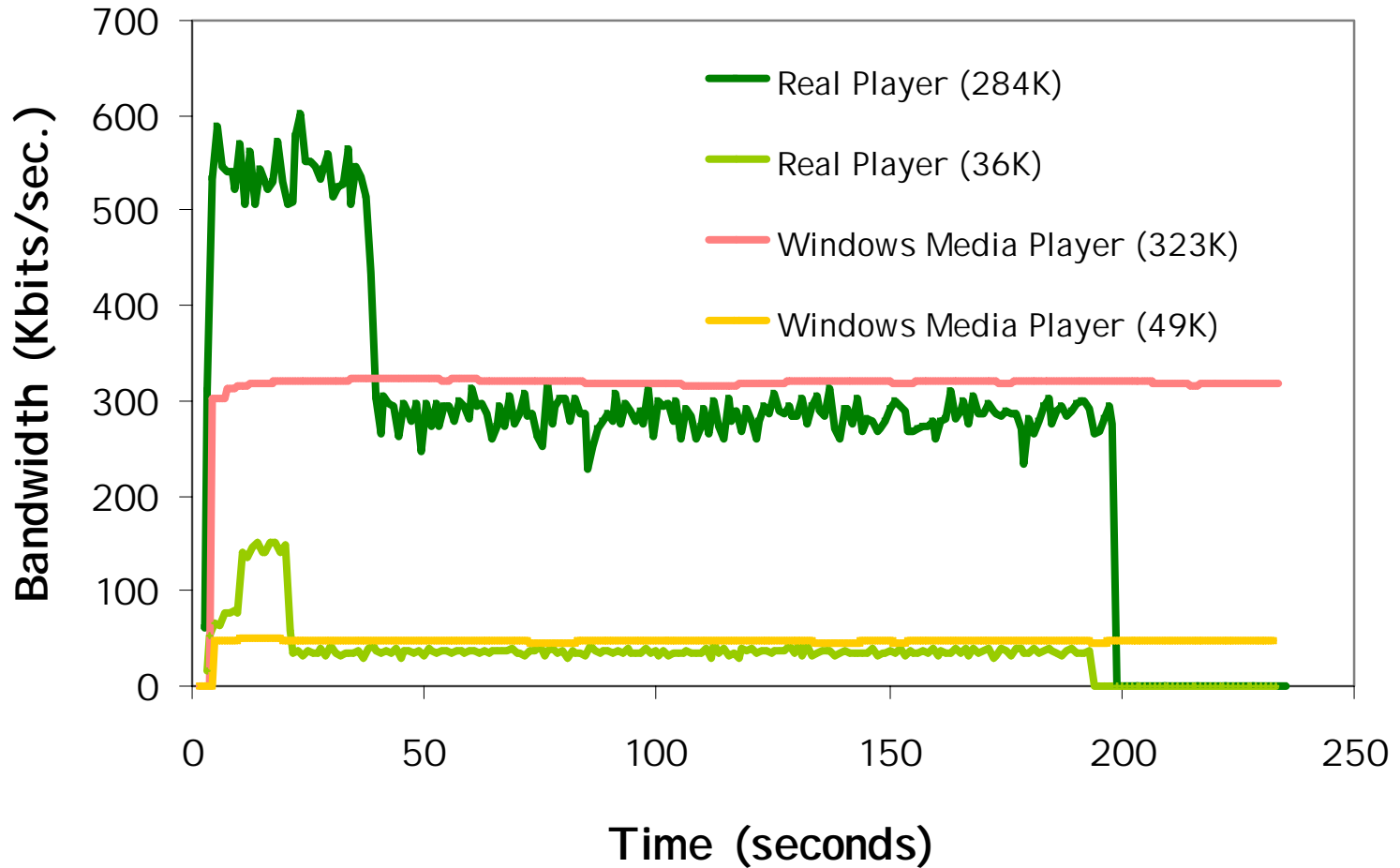
UDP Packet Interarrival Times



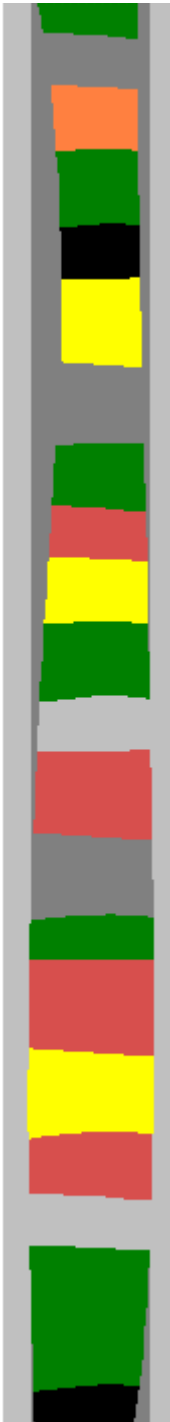
Media Player - More "Constant Packet Rate"

RealPlayer - Less "Constant Packet Rate"

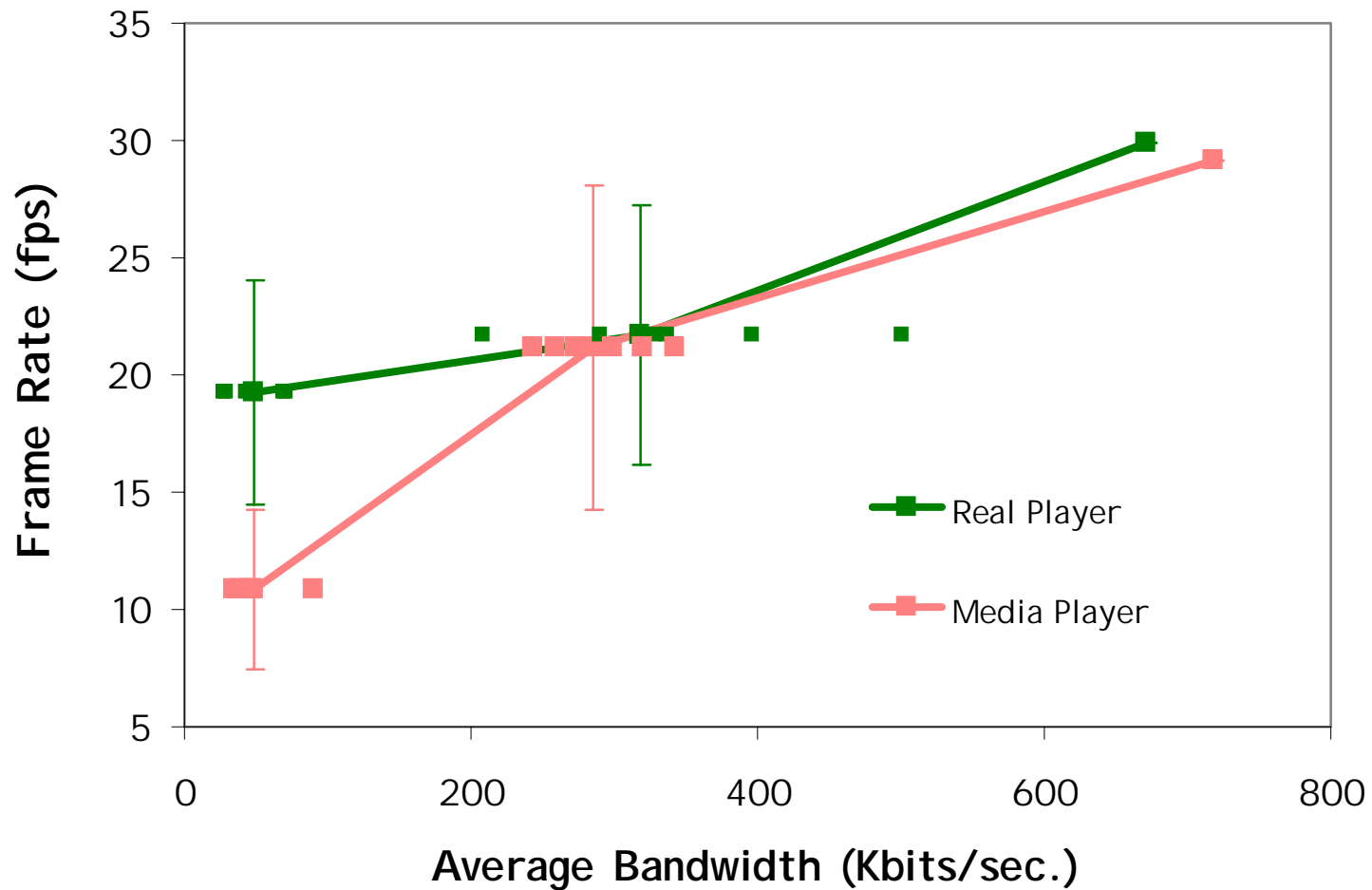
Playout Rate



RealPlayer buffers at a higher rate



Frame Rate



RealPlayer significantly higher at low bandwidth

Summary

- Microsoft **Media Player** typical CBR
 - Constant packet sizes and interarrivals
- RealNetworks **RealPlayer** less CBR
 - Range of packet sizes and interarrivals
 - Buffers at up to 3 times playout rate
- **Media Player** has significant IP frag.
 - 3-5 IP frags / UDP for broadband+ bwidth
- Results can be used for more realistic streaming simulations and emulations
- **MediaTracker** and **RealTracker** online:

<http://perform.wpi.edu/real-tracer/>

Future Work

- Build simulated streaming application
 - In NS
- Server side control
 - Clip encoding, Content type
 - (We have server set-up, preliminary results)
- Bandwidth under congestion
 - TCP-Friendly?
 - (We have results for RealPlayer)
- More players and protocols
 - QuickTime (*QuickTracker*)



MediaPlayer™ vs. RealPlayer™

A Comparison of Network Turbulence

Mingzhe Li, Mark Claypool, Robert Kinicki

CS Department

Worcester Polytechnic Institute

Worcester, MA, USA

<http://perform.wpi.edu/>



WORCESTER POLYTECHNIC INSTITUTE