

DPR technology

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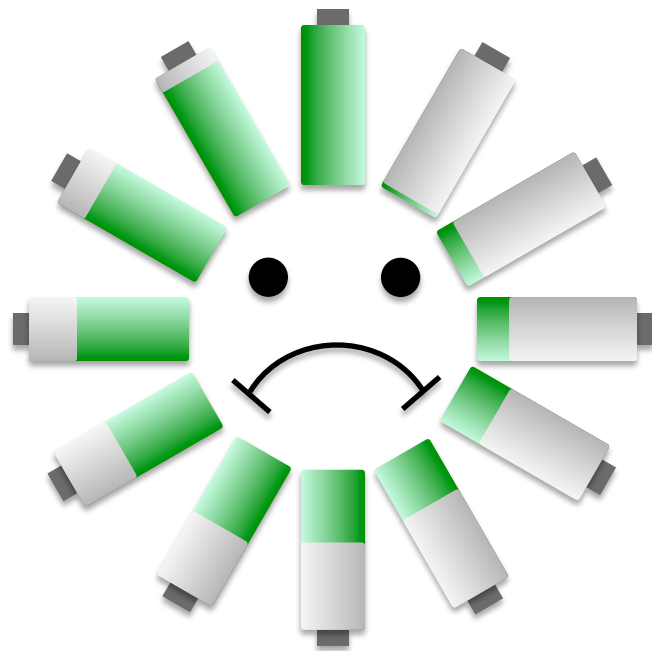


Company background



- Founded in 2012, Headquartered in Waltham, MA
 - Team has deep expertise in Wireless, Networking, Mobile Devices
 - Funded by Sigma Prime Ventures and Venrock
 - Solution in trial with multiple large customers (VoD, Mobile Operators, MSOs)
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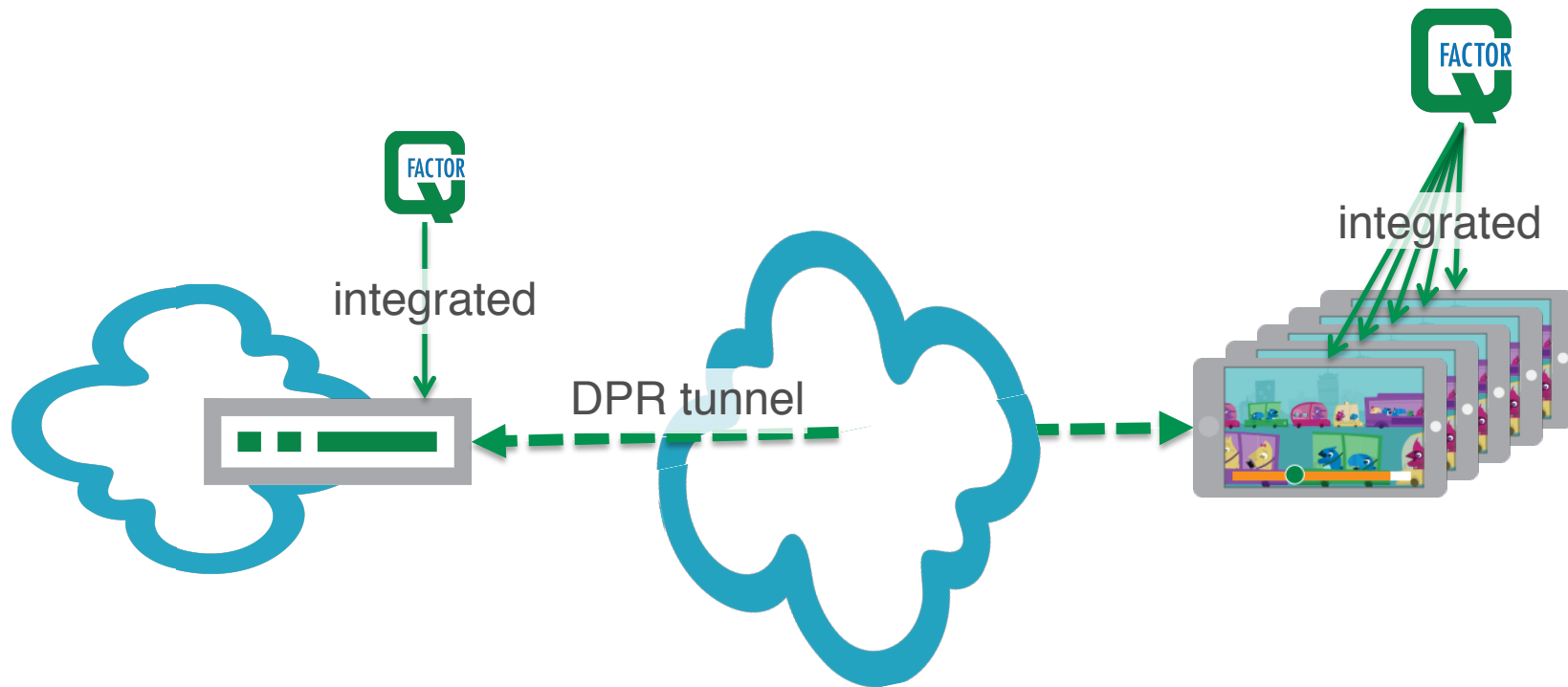
Problem statement



- Congestion
- Deep buffering
- Packet loss

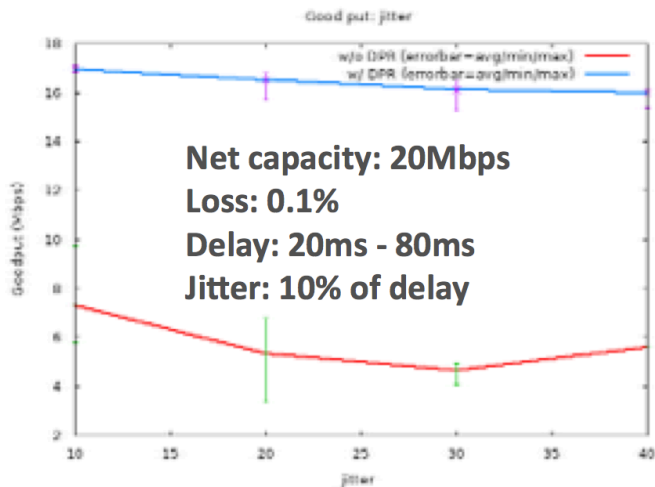
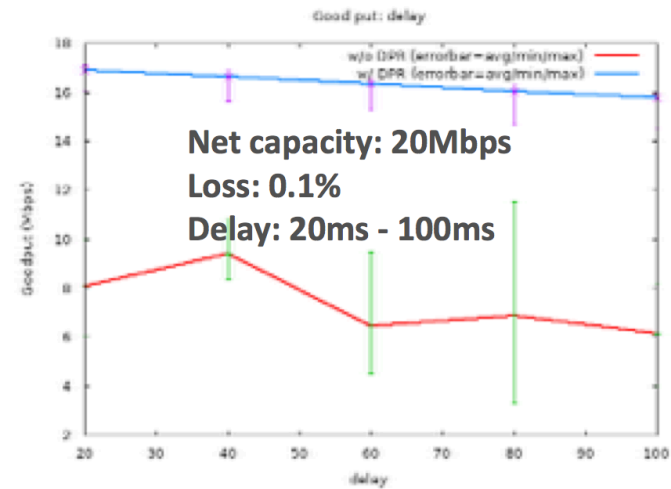
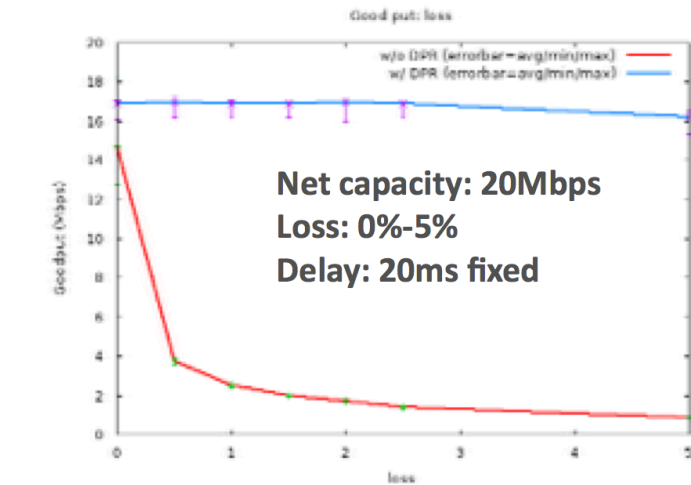
All Last Mile Networks **Suffer**, Some Suffer **MORE**

Comprehensive approach

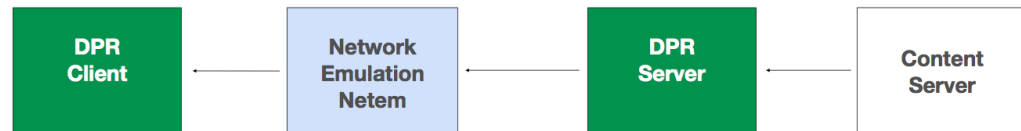


- Do not burst – traffic inside DPR tunnel is paced
- Dynamically recover losses – implemented using NC
- Share bandwidth – back-off if more traffic is sensed

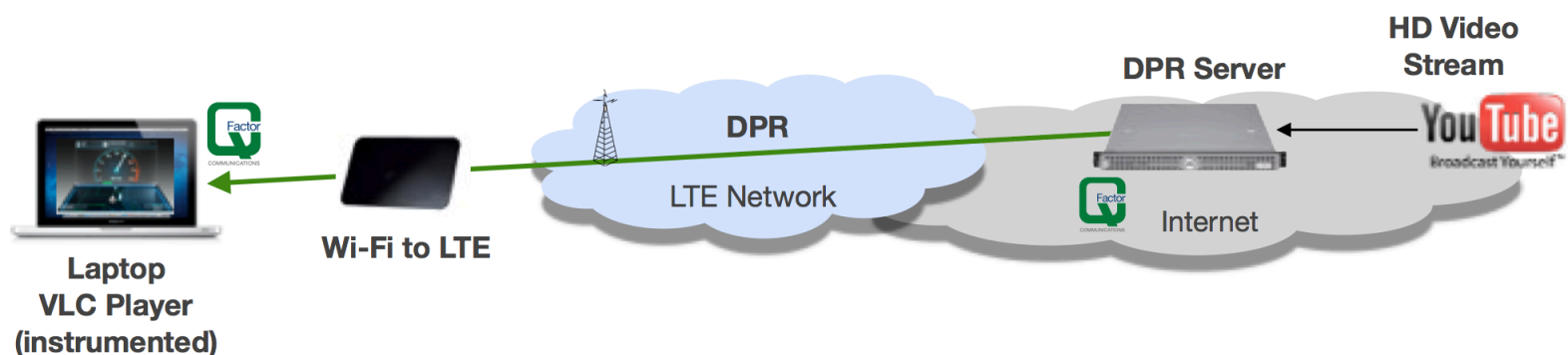
Test bed measurements



- DPR goodput is very high vs. TCP
- Very consistent across increasing network impairments including loss, delay, jitter



Real network measurements



RE-BUFFERING EVENTS		BUFFER RECOVERY (SEC)	
TCP	DPR	TCP	DPR
7	4	22	0.012
5	2	16	0.013
4	3	17	0.02
4	2	18	0.015
AVERAGE			
5	3	18	0.015

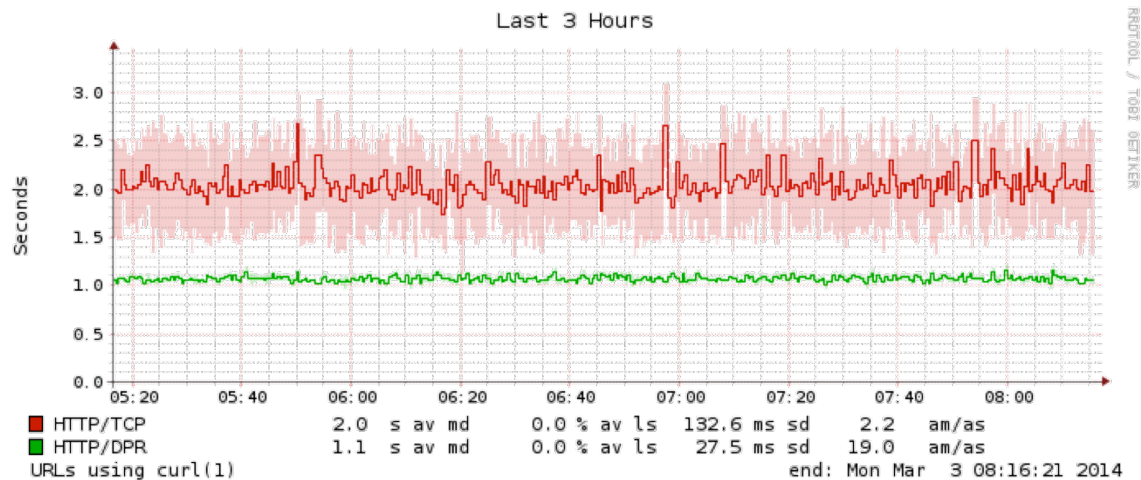
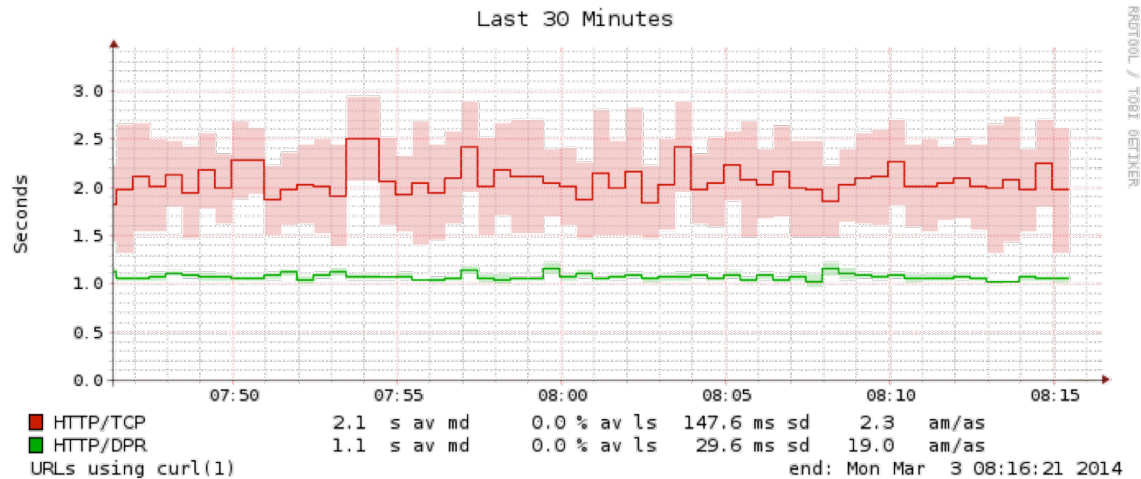
- **Objective:** HD video over LTE/WiFi to capture buffer events and recovery time with DPR on/off
- Laptop with DPR App, DPR server in co-lo book-ending LTE/WiFi link
- Scripts use VLC command line to run video stream for 60 seconds
- VLC outputs Buffer Events and Buffer Recovery Time to log file
- Test is repeated multiple times to gather statistics

Wireless Network Improvements

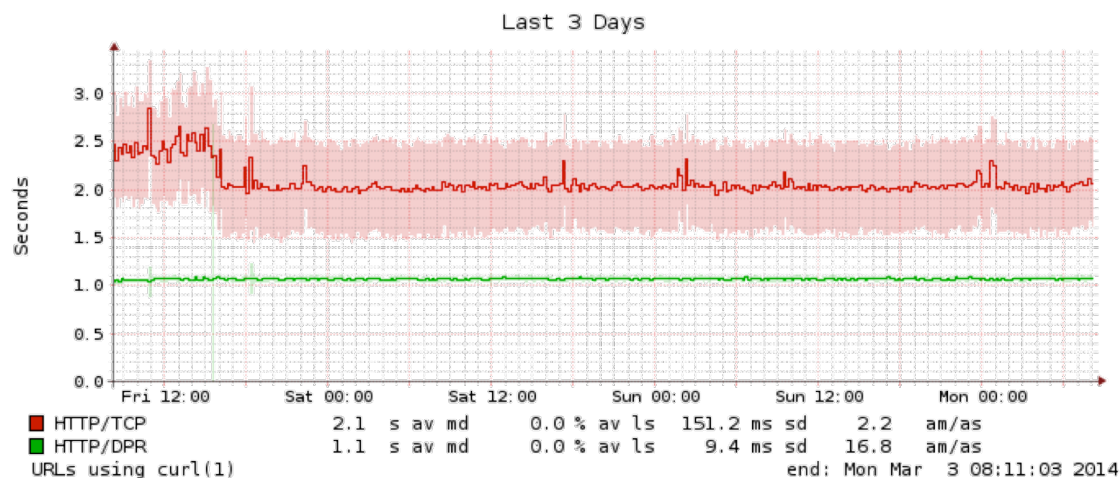
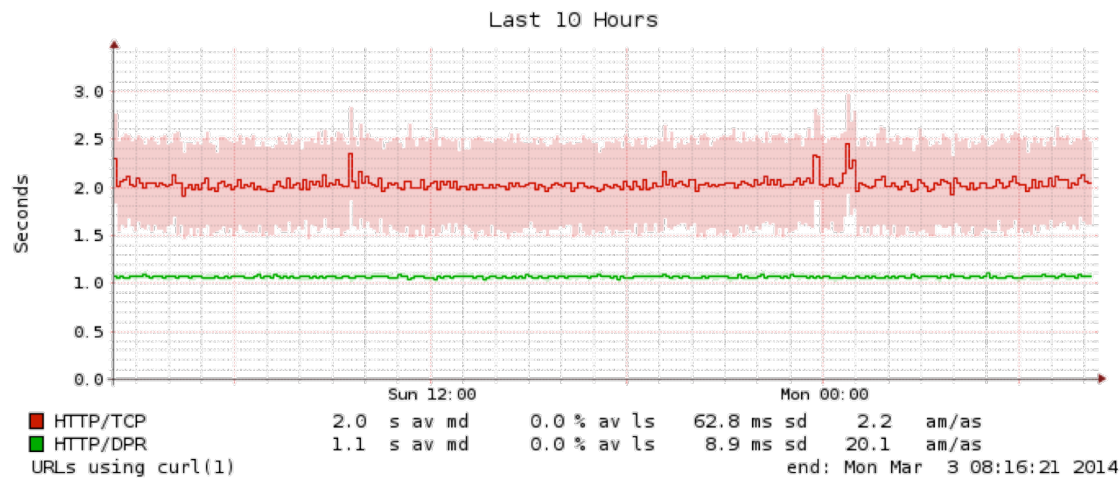


<i>Network Type</i>	<i>Transfer Time Reduction</i>	<i>Gain in Goodput Consistency</i>
3G	25%	60%
4G	50%	55%
4G LTE	40%	77%
WiFi	50%	50%

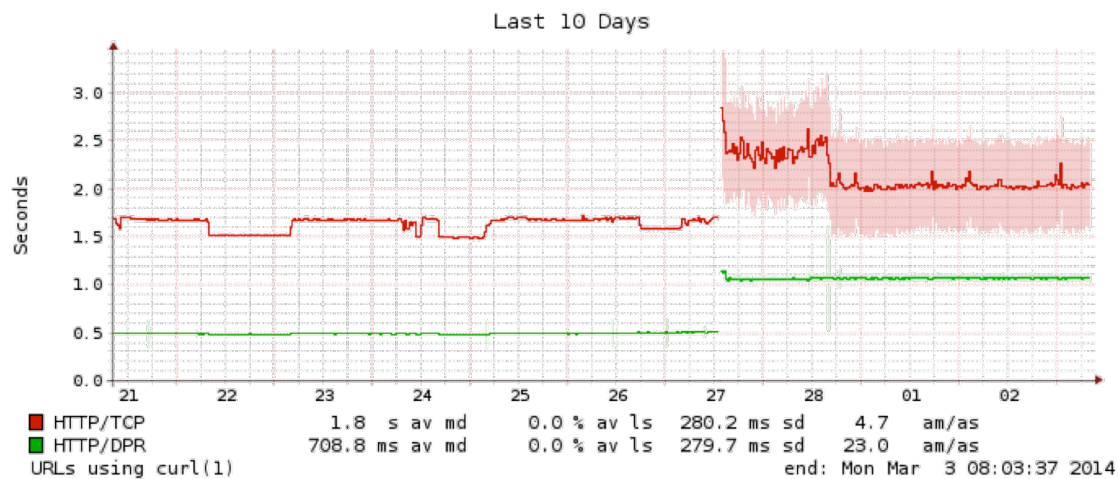
HTTP/TCP vs HTTP/DPR 1MB Upload Time Waltham >> Miami – Last 30 min | 3 hours



HTTP/TCP vs HTTP/DPR 1MB Upload Time Waltham >> Miami – Last 10 hours | 3 days



HTTP/TCP vs HTTP/DPR 1MB Upload Time Waltham >> Miami – Last 10 days



Summary



- DPR offers a comprehensive solution that has shown stable behavior over a wide range of real-world networks
 - DPR shows that network coding technologies combined with accepted best of practice traffic engineering can significantly improve the quality of user experience over wireless networks
 - More testing is scheduled for the near future. If there is an interest we can report them on the next meeting.
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THANK YOU

