

WIE 2018

FWA Performance Analysis

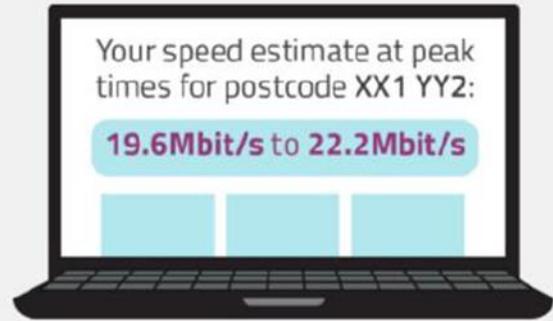
Achilles Petras

BT Applied Research



How it started (Advertising Standards Agency, Ofcom Code of Practice requirements)

- 1** Providing more **realistic speed estimates** at the point of sale, which reflect peak times.



- 2** Always providing a **minimum guaranteed speed** at the point of sale.

Did you know that if your speed falls below X Mbit/s for a sustained period you may have a right to exit your contract.



- 3** **Strengthening customers' right to exit** if speeds fall below the minimum guaranteed level.



Limit the time for provider to improve speed before offering right to exit.

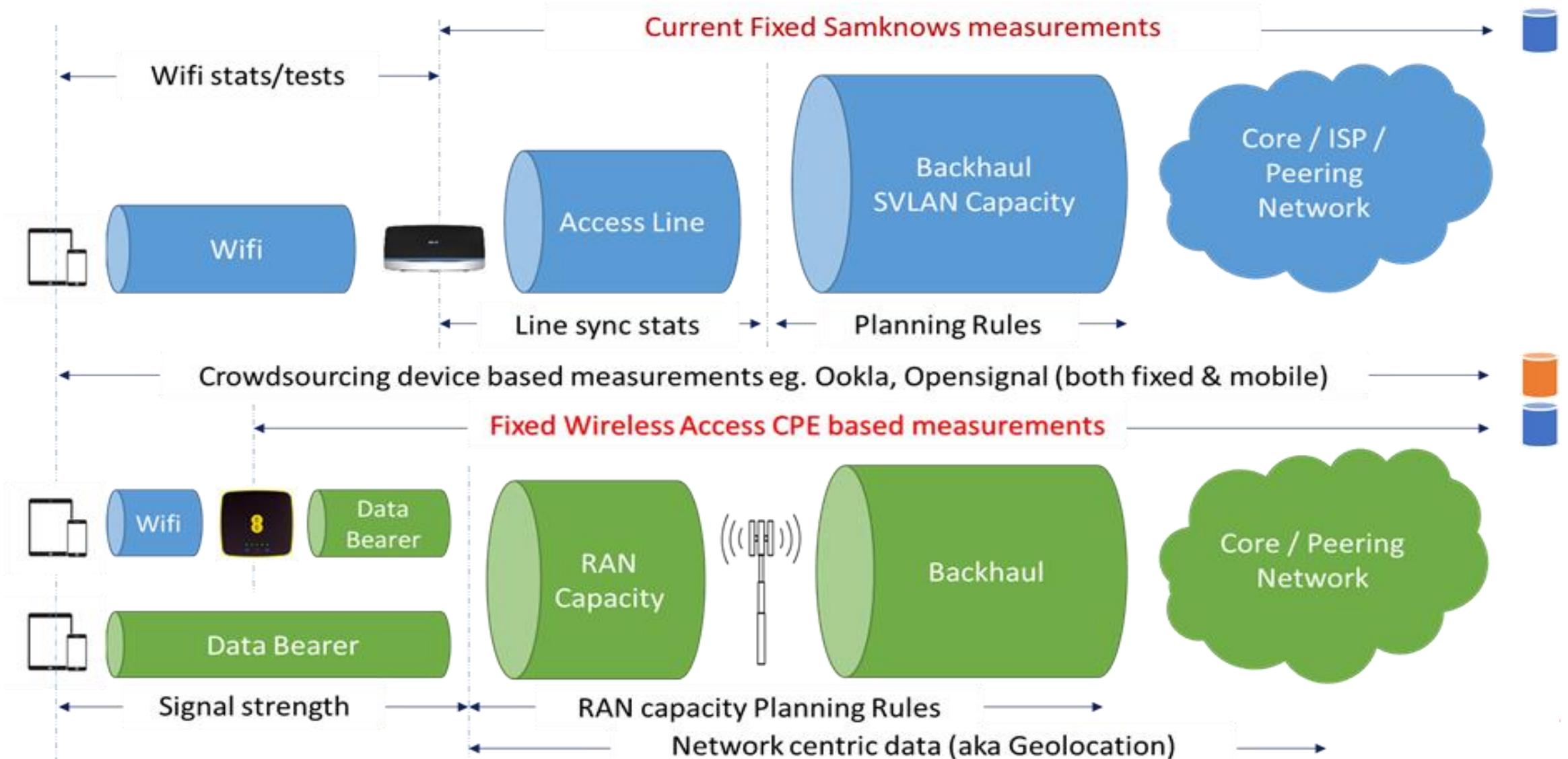


For residential customers the right to exit will apply to phone and TV services bought at the same time as broadband.

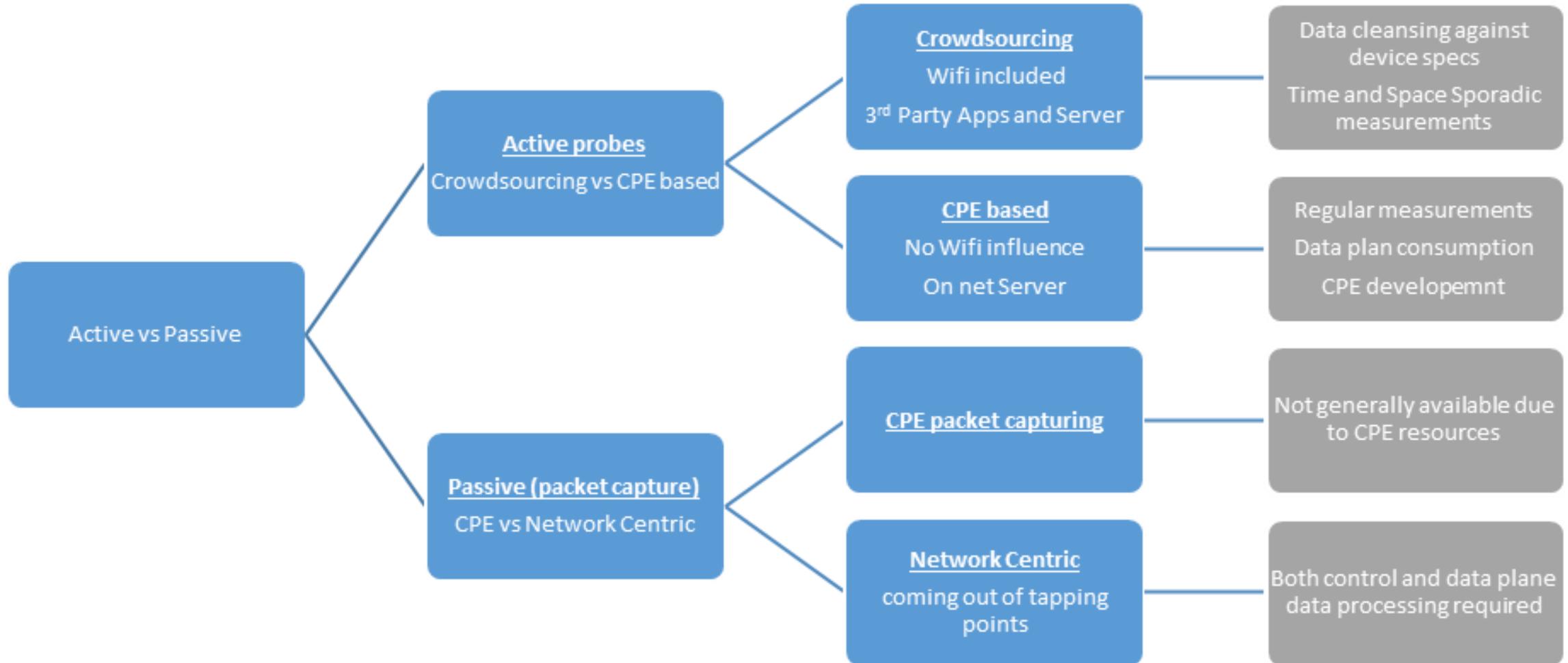
- 4** **Ensuring all customers benefit from the codes**, regardless of their broadband technology.

Copper		✓ Applies
Part or full fibre		✓ Applies
Mobile		✓ Applies

Monitoring landscape

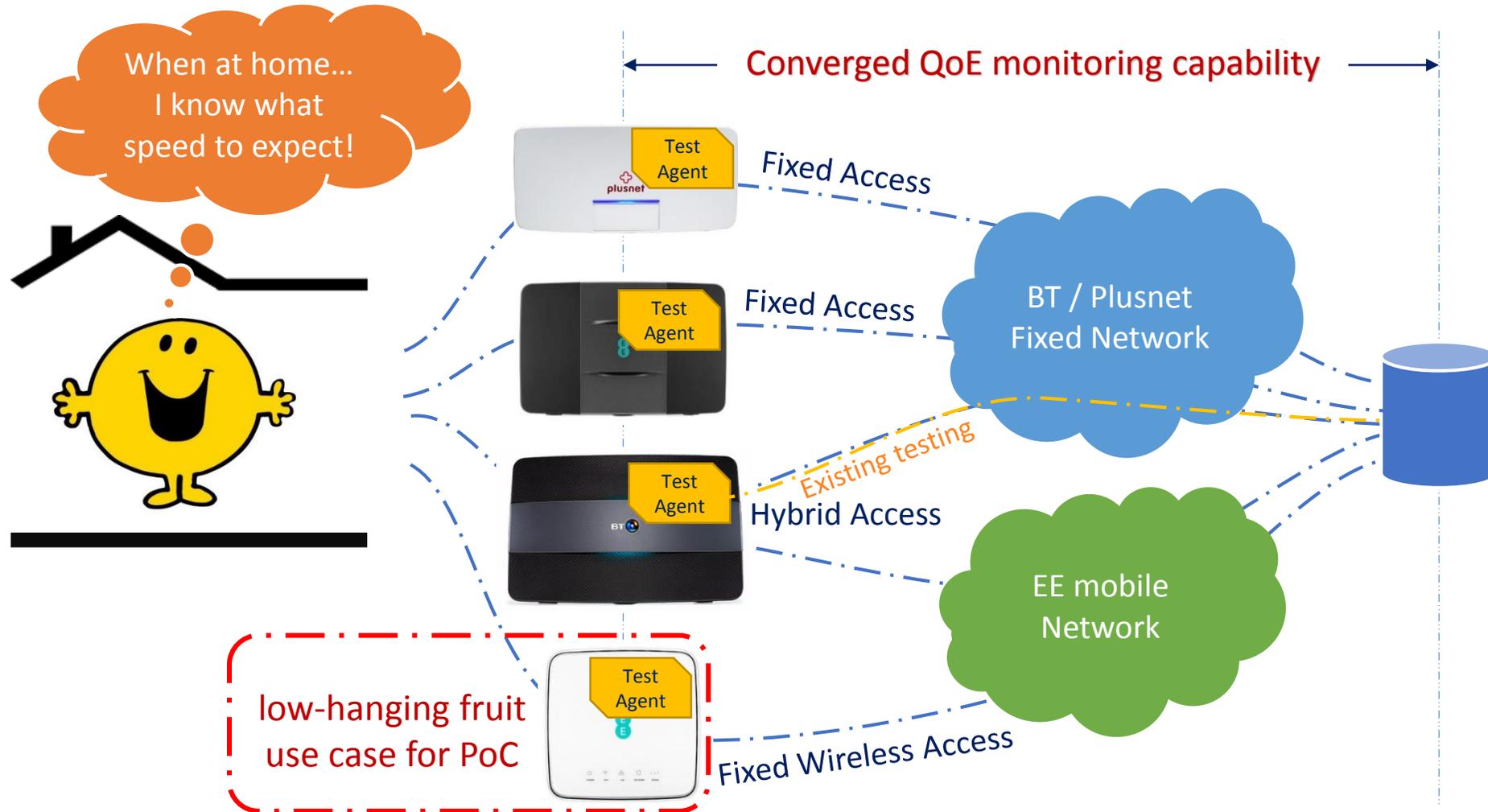


Monitoring techniques



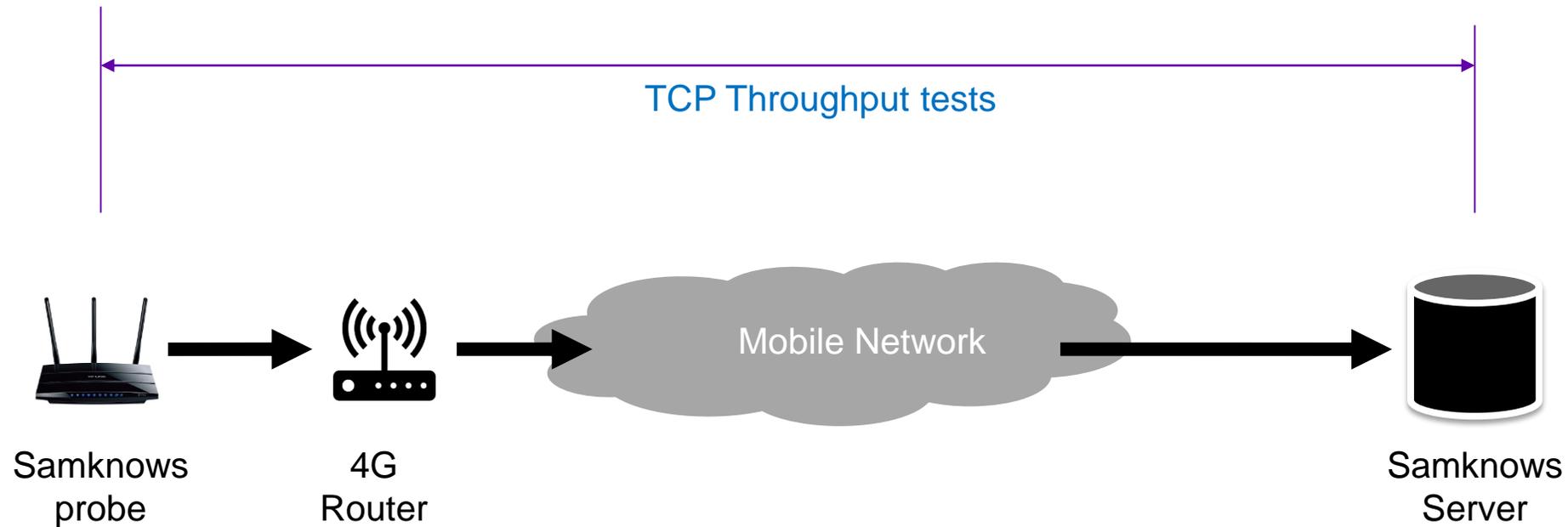


A unified CPE based monitoring solution that could offer comparable performance stats to address Ofcom's CoP and ASA's requirements for achievable speeds for EE, Plusnet & BT

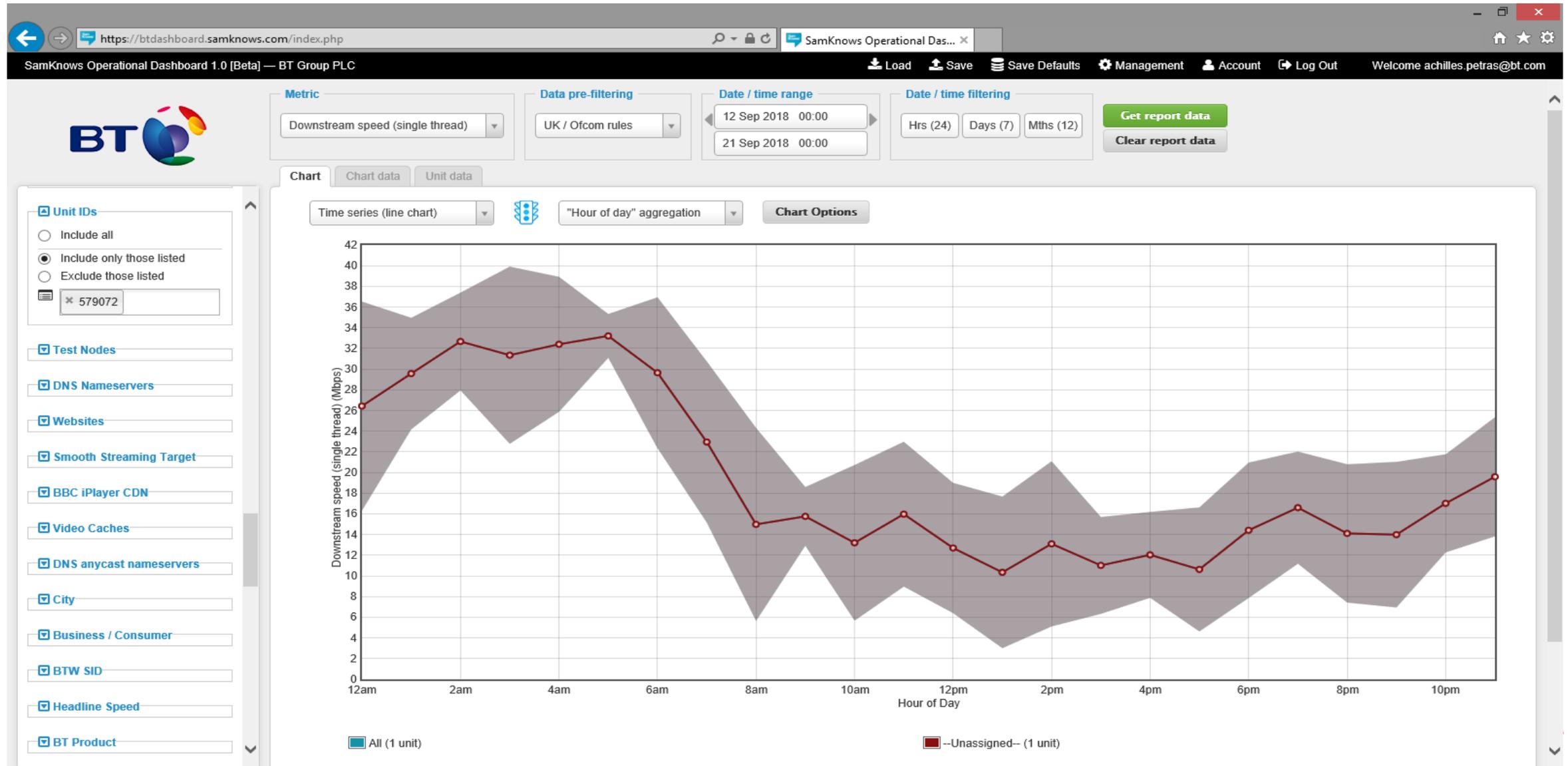


Fixed Wireless Access – Proof of Concept

* currently based on one probe at Adastral Park



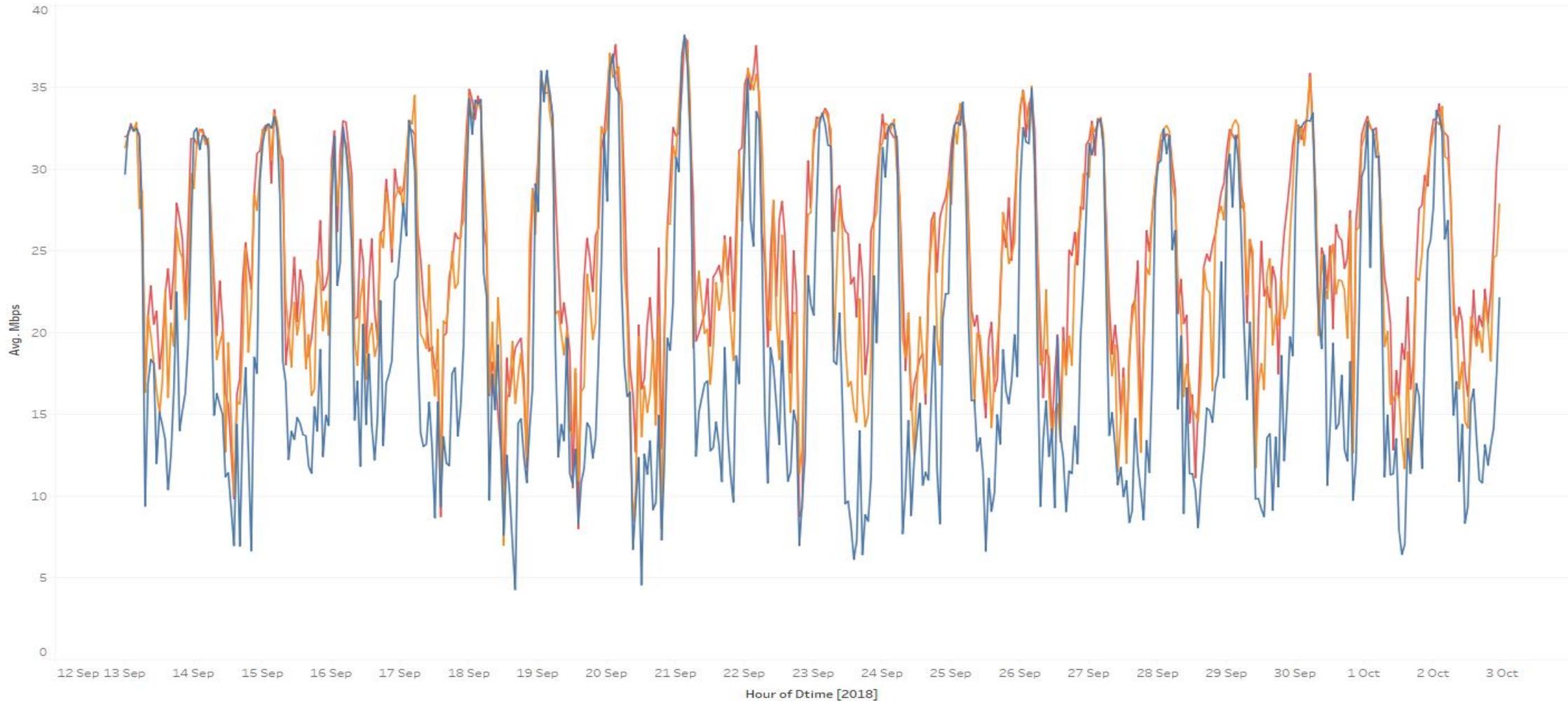
How does it look and feel?





D/S TCP Throughput time series (hourly buckets) split by number of threads

Hourly Downstream Throughput time series split by number of threads

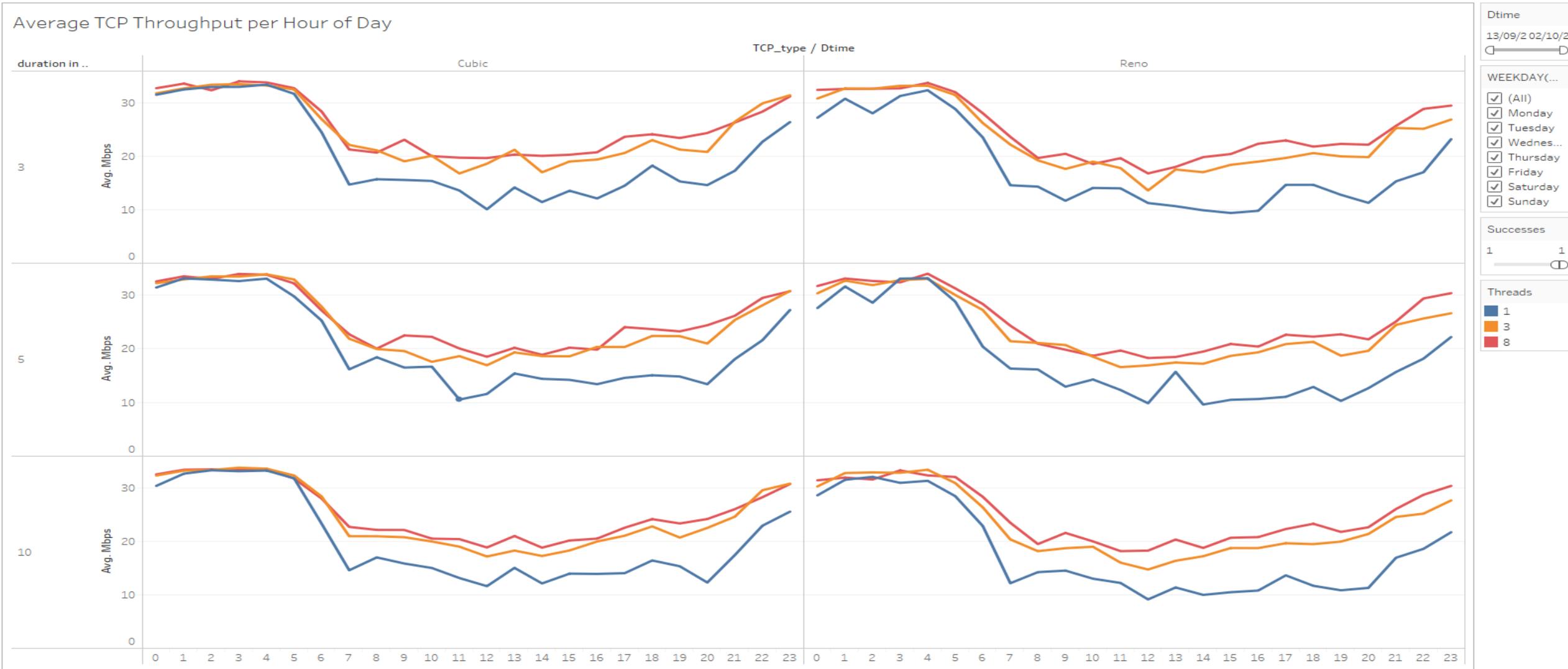


Summary	
Count:	1428
AVG(Mbps)	
Sum:	32,554.52
Average:	22.80
Minimum:	4.29
Maximum:	38.19
Median:	22.48

Threads	
1	
3	
8	



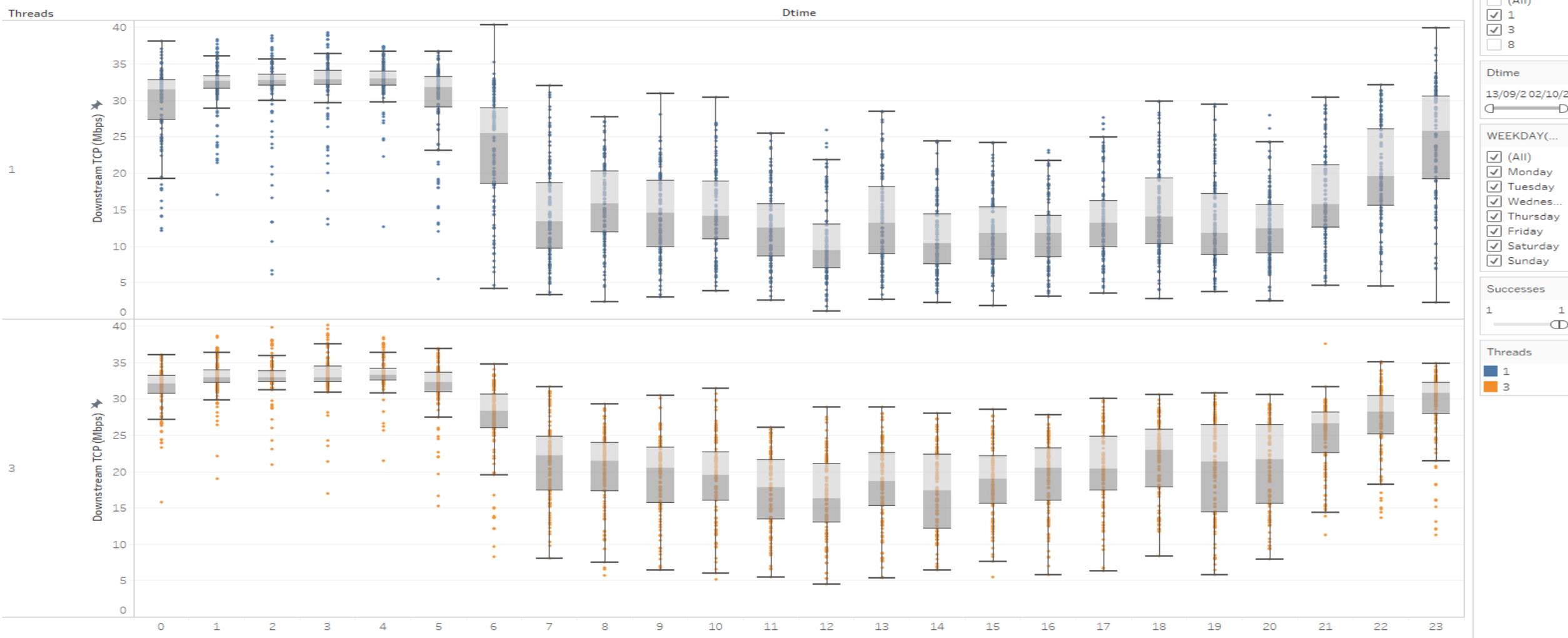
D/S TCP Throughput daily profile vs number of threads, test duration and TCP type





D/S TCP Throughput Variability per Hour of Day vs number of threads

Variability of TCP downstream throughput measurements per Hour of Day split by number of threads



Threads

- (All)
- 1
- 3
- 8

Dtime

13/09/2 02/10/2

WEEKDAY(...)

- (All)
- Monday
- Tuesday
- Wednesday
- Thursday
- Friday
- Saturday
- Sunday

Successes

1 1

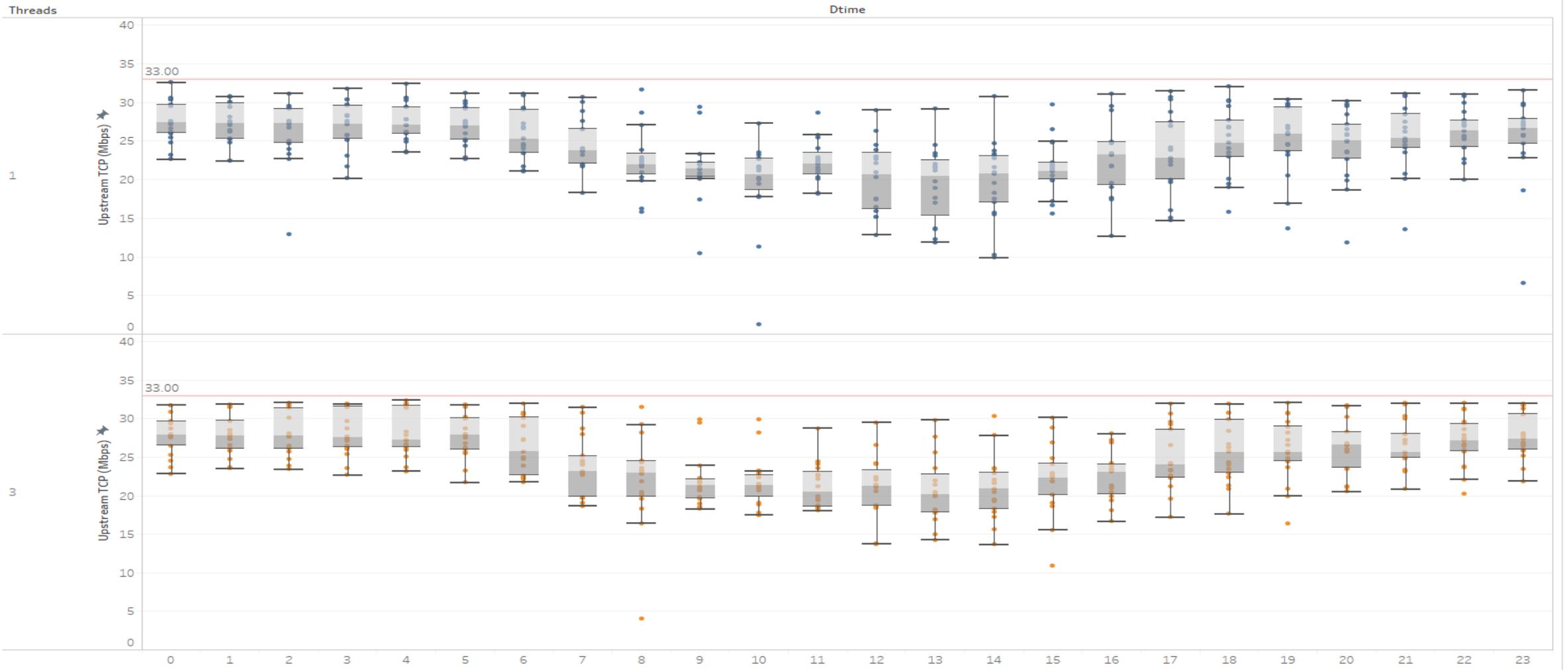
Threads

- 1
- 3



U/S TCP Throughput Variability per Hour of Day vs number of threads

Variability of TCP upstream throughput measurements per Hour of Day split by number of threads



Dtime
13/09/2022 02:10:22

Threads
 (All)
 1
 3

Threads
■ 1
■ 3

Upper Bound
33

4G LTE Download Speeds (Mbps)

Source: Scott Jordan, Irvine

advertised 75th percentile

advertised 25th percentile

actual 95th percentile

actual 75th percentile

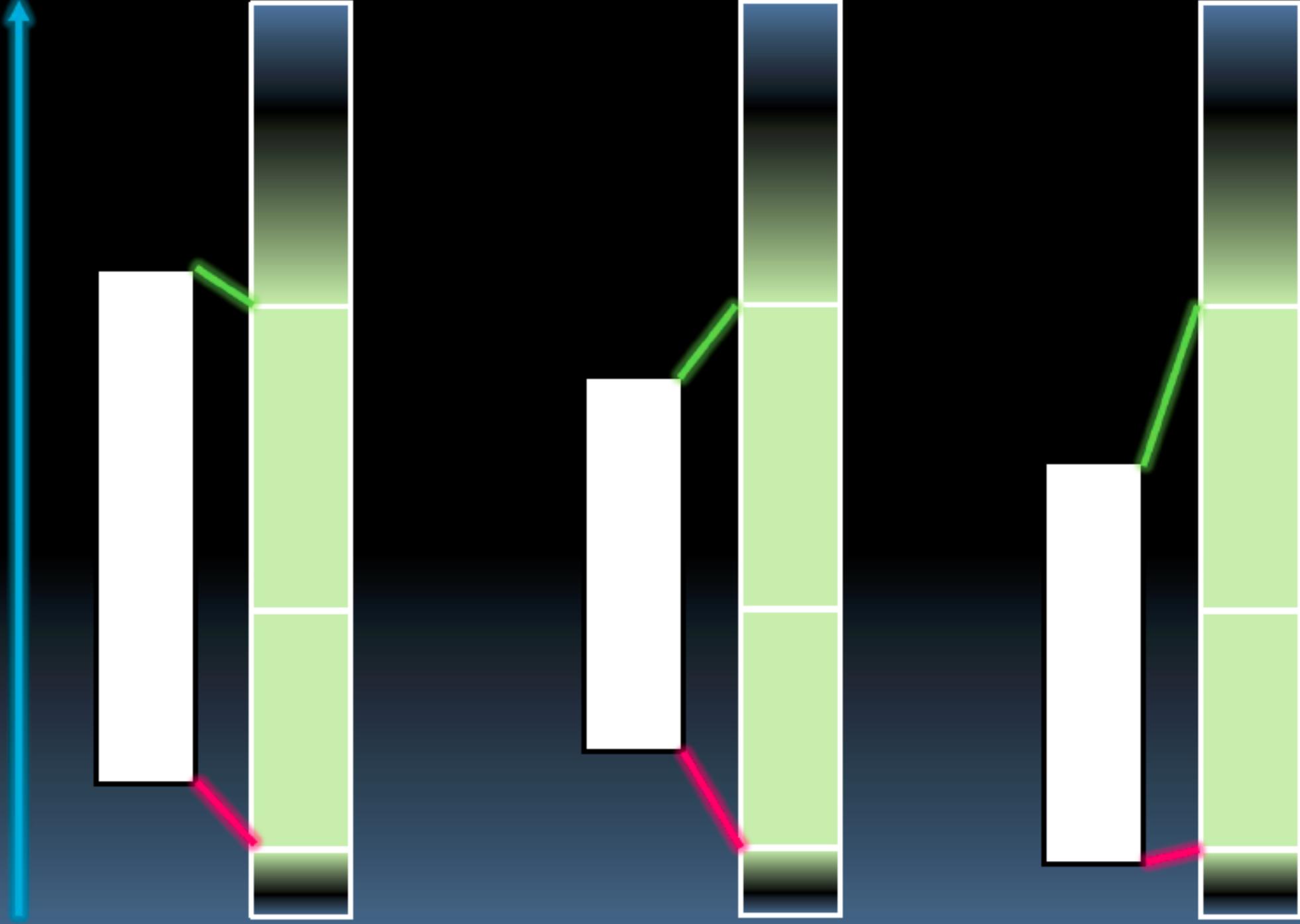
actual 50th percentile

actual 25th percentile

actual 5th percentile



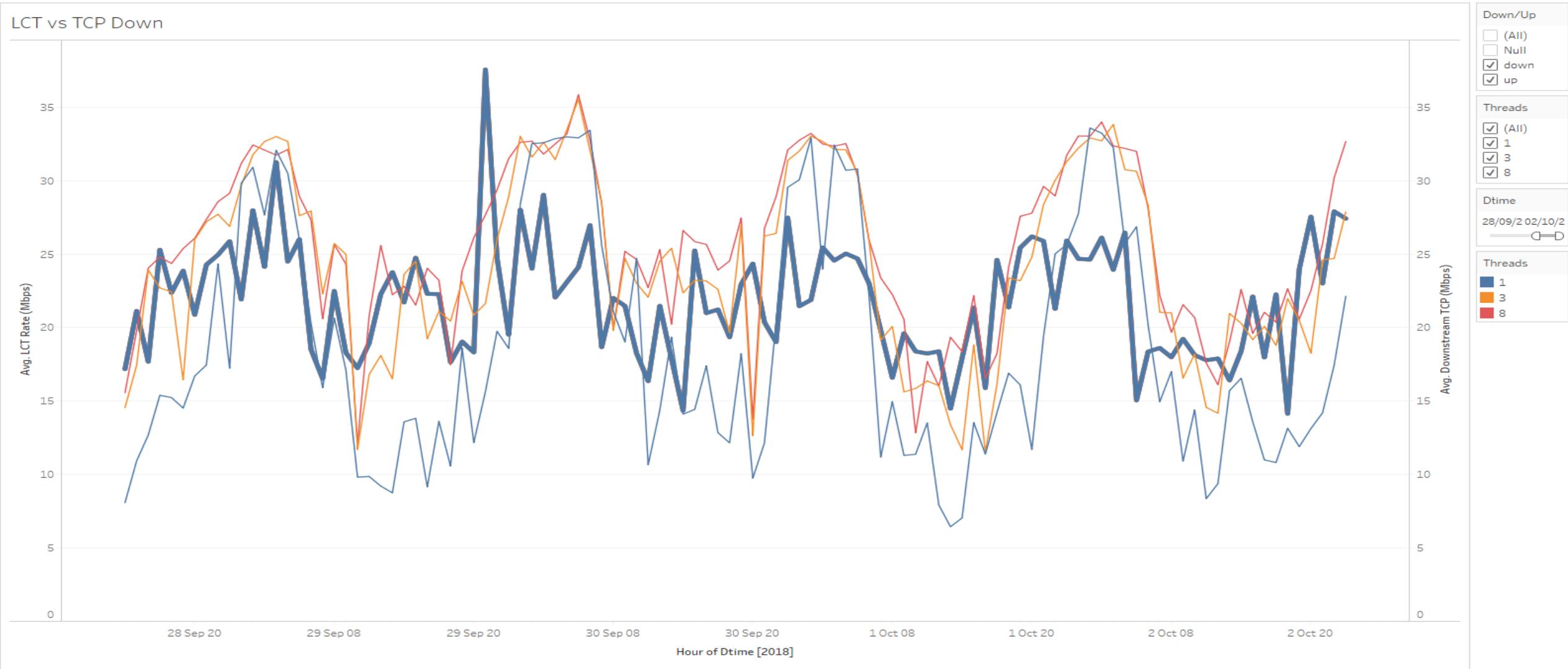
4G LTE Download Speeds (Mbps)



Source: Scott Jordan, Irvine

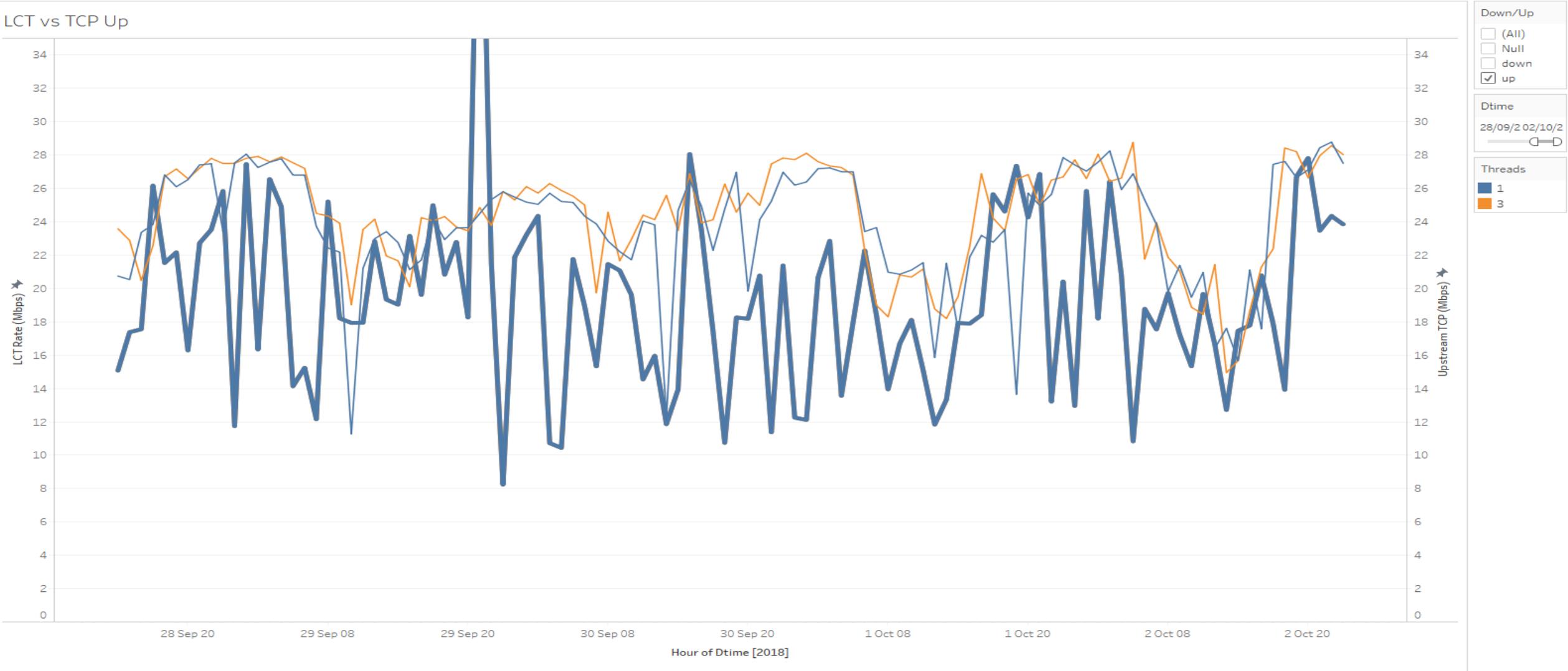


Downstream LCT rate (thick line) vs TCP throughput





Upstream LCT rate (thick line) vs TCP throughput



Supporting FWA case as a substitution service for USO

Implementing the broadband Universal Service Obligation

BT's Response to Ofcom's request for expressions of interest in serving as Universal Service Provider for broadband

4 September 2018

2.3. In practice, we have found that a large proportion of the premises without a decent fixed line connection can already be served with a FWA connection using 4G networks that meet the USO specification. Indeed, we think we can address 450k of the 600k households using our own 4G FWA solution.⁶ Further details of our estimation approach are set out in Annex 1.⁷

2.19. In addition, we have previously looked at FWA customer premise equipment (CPE) that will allow us to actively monitor speeds in the same way that we can with fixed line CPE. If required, this is something we could revisit.



Take away messages

- Adapt tests to mobile network
- Make them light weight (typical TCP test consume a lot of GBs!)
 - Innovate on other tests (packet trains)
- Embrace variability (location, time, network conditions)
 - Use more probes from FWA customers on different locations
- Where to measure from (landscape)
 - Use of network centric data as an alternative
- Decide policies for bandwidth allocation in the RAN
 - FWA vs mobile devices

Thank you

