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.
   
   Your speed estimate at peak times for postcode XX1 YY2:
   
   - 19.6Mbit/s to 22.2Mbit/s

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

Current Fixed Samknows measurements

- Wifi stats/tests
- Access Line
- Backhaul SVLAN Capacity
- Core / ISP / Peering Network
- Line sync stats
- Planning Rules

Crowdsourcing device based measurements eg. Ookla, Opensignal (both fixed & mobile)

Fixed Wireless Access CPE based measurements

- Wifi
- Data Bearer
- RAN Capacity
- Backhaul
- Core / Peering Network
- Signal strength
- RAN capacity Planning Rules
- Network centric data (aka Geolocation)
Monitoring techniques

Active vs Passive

Active probes
Crowdsourcing vs CPE based

Crowdsourcing
- Wifi included
- 3rd Party Apps and Server

CPE based
- No Wifi influence
- On net Server

CPE packet capturing

Passive (packet capture)
CPE vs Network Centric

Network Centric
coming out of tapping points

Data cleansing against device specs
Time and Space Sporadic measurements

Regular measurements
Data plan consumption
CPE development

Not generally available due to CPE resources

Both control and data plane data processing required
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.

When at home... I know what speed to expect!

Converged QoE monitoring capability

When at home... I know what speed to expect!

low-hanging fruit use case for PoC
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
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
Variability of TCP upstream throughput measurements per Hour of Day split by number of threads
4G LTE Download Speeds (Mbps)

- Advertised 75th percentile
- Actual 95th percentile
- Actual 75th percentile
- Actual 50th percentile
- Actual 25th percentile
- Actual 5th percentile

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. Further details of our estimation approach are set out in Annex 1.

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