


Cover sheet for response to an Ofcom consultation

BASIC DETAILS	
Consultation title: Call for Input: Measuring mobile quality of experience	
To (Ofcom contact): Richard Moore	
Name of respondent: Jeremy Kuhn, Director of International Marketing	
Representing (self or organisation/s): RootMetrics Ltd.	
Address (if not received by email):	
CONFIDENTIALITY	
Please tick below what part of your response you consider is confidential, giving your reasons why	
Nothing <input type="checkbox"/>	Name/contact details/job title <input type="checkbox"/>
Whole response <input type="checkbox"/>	Organisation <input type="checkbox"/>
Part of the response <input checked="" type="checkbox"/>	If there is no separate annex, which parts?
If you want part of your response, your name or your organisation not to be published, can Ofcom still publish a reference to the contents of your response (including, for any confidential parts, a general summary that does not disclose the specific information or enable you to be identified)? YES	
DECLARATION	
I confirm that the correspondence supplied with this cover sheet is a formal consultation response that Ofcom can publish. However, in supplying this response, I understand that Ofcom may need to publish all responses, including those which are marked as confidential, in order to meet legal obligations. If I have sent my response by email, Ofcom can disregard any standard e-mail text about not disclosing email contents and attachments.	
Ofcom seeks to publish responses on receipt. If your response is non-confidential (in whole or in part), and you would prefer us to publish your response only once the consultation has ended, please tick here. <input type="checkbox"/>	
Name JEREMY KUHN	Signed (if hard copy) 

RESPONSE TO OFCOM CONSULTATION ON MEASURING MOBILE VOICE AND DATA
QUALITY OF EXPERIENCE

1. INTRODUCTION

RootMetrics, an independent commercial organisation that measures a consumer's experience of mobile call, text, and data performance, welcomes the opportunity to comment on many of the questions raised in Ofcom's call for input on *Measuring Mobile Voice and Data Quality of Experience*.

We believe that an independent, transparent, and unbiased view of mobile performance is deeply valuable for consumers in their decision-making. Moreover, we believe it is important to produce these results by measuring performance in the same ways consumers experience mobile networks, rather than through artificial means, simulations, or through altered equipment such as 'jailbroken' handsets that can produce a skewed view of a consumer's experience. Indeed, providing this view to consumers directly and to the UK public at large via the press is part of our core mission, and is very much akin to Ofcom's stated goal of "enabling consumers to make better informed purchasing decisions."

As champions for consumers to have the necessary information to make smarter decisions about mobile networks and products, we support efforts to widen the availability and reach of this critical information. At the same time, we disagree with Ofcom's stated premise that "the absence of an initiative to date suggests that the necessary coordination is not in place" and thus that Ofcom must take this role on itself: the entire premise of our business is independently measuring comparable network quality of consumer experience across MNOs using a scientifically accurate methodology (including 4G-enabled devices), then syndicating this data for purchase by interested parties, whilst making summary findings freely available to the public and press to help consumer decision-making. In proof of the success of this, we offer that the results of our initial studies in the UK's 16 largest urbanised areas – covering approximately 50% of the population – and additional press work on mobile experience have been reported in over one hundred and thirty publications in the UK since our October, 2012 launch in the country; the titles that have shared our findings include the BBC, the *Daily Telegraph*, the *Sunday Times*, *Metro*, the *Manchester Evening News*, the *Hull Daily Mail*, *City AM*, the *South Wales Echo*, as well as several national and local digital publications (please see the annex for a full list of our press coverage). We will be continuing this work in our return visits to our sixteen studied cities twice per year, publishing formal reports, as well as continuing updates of our maps of call and data performance with real-time crowd submissions.

With these factors in mind – Ofcom's desire to help consumers in their decision making, and the similarity to the current studies we conduct – we offer the following response.

2. RESPONSES TO KEY QUESTIONS RAISED

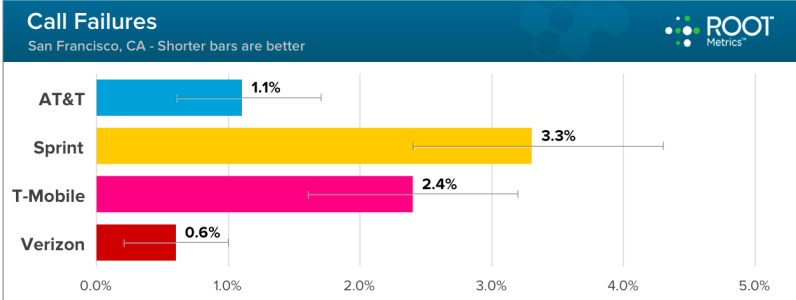
Q1: What kinds of information consumers find useful and what data is required to produce it?

In our work with consumers and press, we believe consumers need clear and easy distillations of the highly complex mobile space. As a product with high utility but low salience, consumers tend to rely on only the most obvious mobile network failings as signs of the underlying network strength or weakness – experiences such as dropped or blocked calls, mobile internet speeds, etc. Often, we hear anecdotally that consumers may simply look to bars of signal strength as a determinant of experience quality.

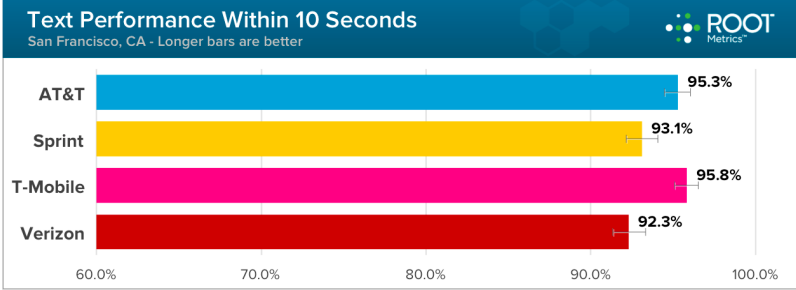
Given this, we believe it is incumbent upon organisations such as ours to distill the many variables of choice into clear and easy measurements. To this end, we collect hundreds of key performance indicators of experience that help give a comprehensive picture of mobile performance. We then filter these extensive and complex measurements into a very particular set of reported data that speaks to the main drivers of consumer experience and helps guide decision-making:

Examples of our presentation of important consumer data, from a recent report in San Francisco, California. These same reporting categories will be available shortly in forthcoming UK reports based on testing currently underway as of March 2013.

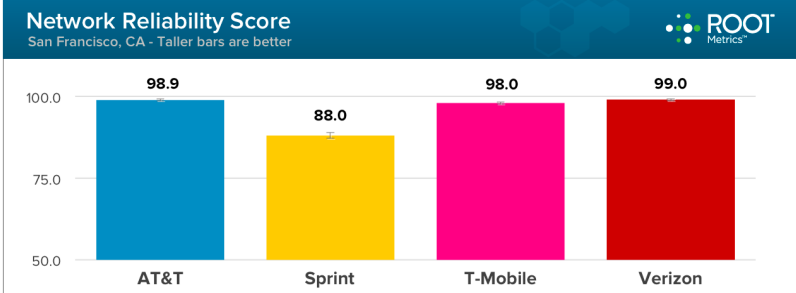
Call Failures



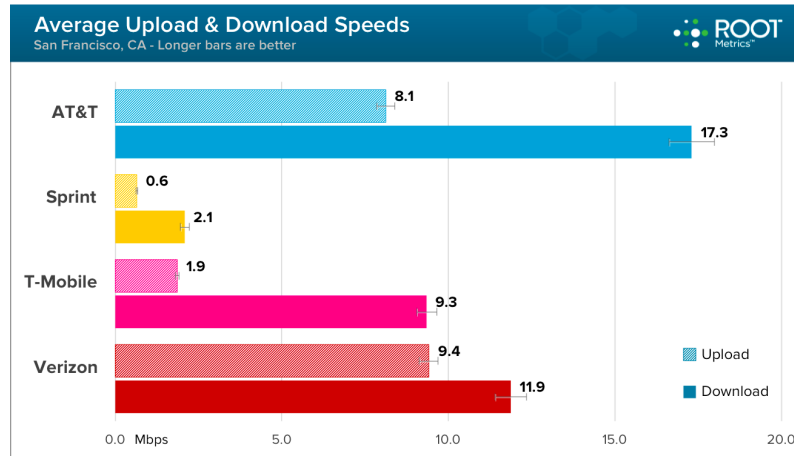
Text – Delivery within 10 Seconds



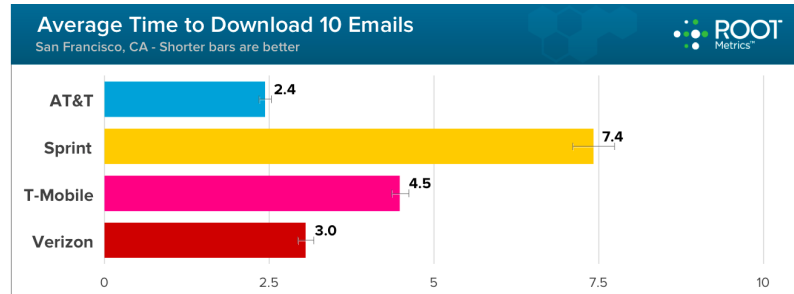
Data – Network Reliability (How often we can connect quickly, and ability to keep the connection)



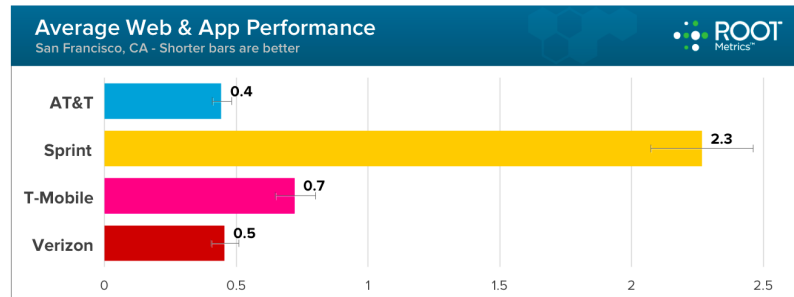
Data – Average Upload and Download Speeds



Data – Average Time to Download 10 Emails



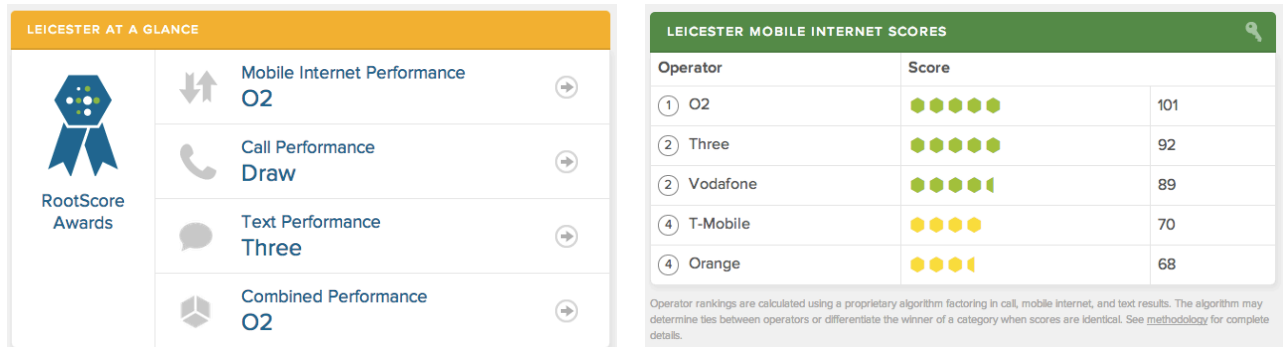
Data – Average Web & App Performance (Average time to load a typical page or app)



Based on consumer feedback, we have found that even the information presented above can be too detailed for the average consumer’s enquiry. To provide further clarity for consumers, we have constructed a proprietary algorithm that takes stock of our KPIs across each major element of performance – call, data, and text - and then yields results into easily understood ranked scores in each performance category. These rankings are statistically significant at a 90% confidence interval. Where statistical methods do not create a clear separation between two scores, we rank individual operators in a tie.

For consumers who prefer a summation of the findings rather than a ranking in individual performance categories, we publish an additional ranking for overall (“Combined”) performance. As in the above, results are statistically significant and when these methods do not create a clear distinction between operators, we declare either a tie or a draw (if more than two MNOs statistically tie). An example of these rankings from our recent Leicester 3G report is given below.

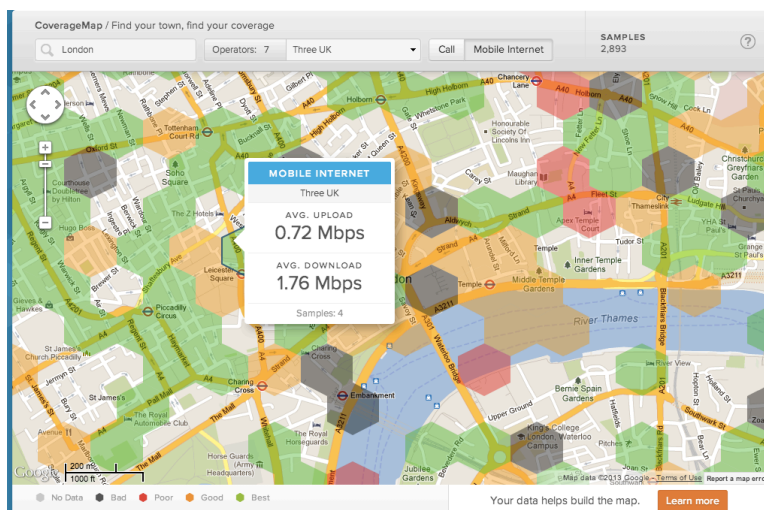
Examples from our March 2013 Leicester Report:



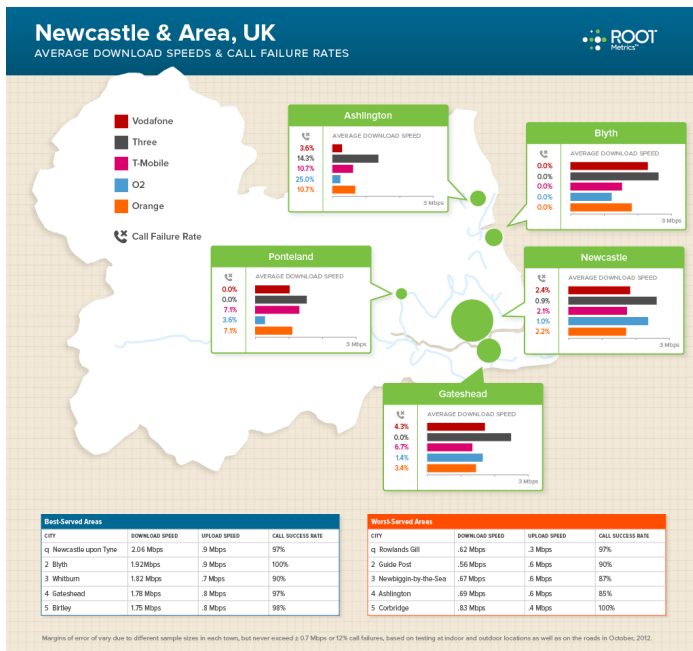
While we believe our particular scores may already meet Ofcom’s goals, we would counsel that irrespective of methodology, any offering of findings must be simplified from the many dimensions of performance into an easily understood metric. While some consumers are ready to delve into every aspect of performance, many simply do not want to – they just want a network that works. No matter the implementation, however, we do not believe it fair for Ofcom to ‘recommend’ a given network in any area – this moves from reporting to endorsing. We apply this caution similarly to ourselves.

As with all things mobile, of course, performance and rankings are highly local. To this end, we believe the information presented above is only useful on a particularly personal level – even broad geographic regions such as “the Southeast” are far too large to give an accurate picture of the highly variable performance someone will encounter between two relatively distant points. By the same token, a county-by-county publishing approach makes a default assumption that the urbanised areas and the rural areas receive the same service, something we know not to be true. To overcome these challenges, while at the same time getting at the highly granular differences in performance in different places, we offer formal

reports for metropolitan areas that include the kinds of data shown above; we also offer very detailed maps that can aid consumers pinpoint their particular service based on their locations, needs, and uses (see searchable map at right). What’s more, we have further distilled our findings to present a view of performance within metropolitan regions by individual cities, towns, and even villages (where results are statistically



significant), and have categorized findings both within urban regions, within rural regions, and along major commuter routes. An example of these kinds of visualisations is presented below from our testing last year in areas around Newcastle, which included parts of Tyne & Wear, as well as Northumberland.



To Ofcom's specific query on use-case data such as inclusion of day of week or time of day information, we believe this could potentially be of use to consumers but it is highly granular and likely of interest to only a few. While any testing programme must plan for addressing these factors in the test design - and while this data could be included as a filter on maps - we do not believe based on experience that these are primary drivers of performance decision-making.

Q2: How to best collect this information?

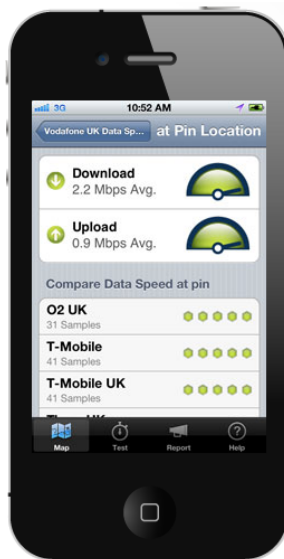
A multi-pronged approach to measurement is an appropriate method for gathering data for the breadth of geography required (we believe it only fair to at least address regions equally, but are mindful that methodology will need to vary for different population densities' given costs). Nonetheless, we strongly believe in two core tenets if the data is to be accurate and useful to consumers:

1. That testing must happen *in the same way* that consumers experience the network if the picture of performance is to be *accurate*.
2. That *actual performance* measurements must be prioritised.

To the first point, we note that traditional drive testing often relies on simulations (such as signal dampening to simulate indoor performance), altered devices, prescribed drive routes, etc. Similarly, traditional drive testing often does not use its phones similarly to the ways real consumers do (such as sending emails, making calls [vs. measuring signal strength], accessing the web whilst walking, using all functions of service on the same phone, etc.). In contrast, we use off-the-shelf and unaltered handsets, test in real world conditions, randomly select our own testing points and routes, test indoors and out, and perform all test dimensions on each phone.

To the second tenet, we strongly advocate for actual performance measurements, primarily through direct measurement methods such as ours, augmented with a robust crowd-sourcing programme to cover rural areas (as noted previously in an introductory conversation, crowd-sourcing is highly useful for gathering results for broad geographies but it can be difficult to apply scientific quality control measures to the data produced as there is no control for many variables (e.g., indoor/outdoor location, device, OS, etc.)).

In our scientific collection programme, we use off-the-shelf, unaltered phones on readily available consumer plans bought from high street stores - just like the average consumer. We then conduct tests whilst driving, at indoor locations and at outdoor locations. This approach not only offers comparability of indoor to drive testing, but also allows for performance metrics to be further parsed between network and device issues. Drive tests are conducted along motorways, major routes, and residential roads near the roads that the population lives and travels. Indoor locations are selected randomly within the confines of Ordnance Survey towns or cities, and are publicly accessible (i.e. pubs, retail locations, cafes, etc.). Indeed, because we achieve statistically significant indoor results, this methodology may obviate a need for fixed point testing. In total, this approach allows us characterise the *true* consumer experience by mirroring consumer usage where, when, and how real consumers use their real phones.



To augment these tests outside areas that are economically feasible for a primary, scientifically controlled study – and to add additional breadth to all results - we recommend inclusion of a crowd-sourcing programme. For this, we currently offer a free Android and iOS app that allows individuals to conduct their own call and data tests. Results are submitted to our online coverage maps – maps that also include the results of our scientific programme - with most consumer tests appearing on the map within 5 minutes of submission. In evidence of how this can help paint a picture of rural coverage, we offer that we currently work with the Countryside Alliance, providing our app and coordinating efforts to help them in their work to prove out rural performance deficits. Similarly, we have met with the offices of MPs advocating for better coverage in their community, offering our app as a tool that a local community can use to achieve results.¹

Finally, we strongly counsel that predicted performance must be approached cautiously if the overall endeavour is to gain consumer trust. The current operator-provided maps of *theoretical* predicted performance (based on signal propagation), for instance, have little trust, a complaint we frequently encounter in our social media conversations. Indeed, their existence seems to leave consumers frustrated at the purported need being met when the maps are known not to be accurate (for the assumed utility). While predictive performance offers a higher ease of implementation, anything that leaves consumers questioning the utility or accuracy of the results will invariably undermine the entire project. To this end, if predictive models are used, we again counsel they must be based first in real-world results rather than the theoretical.

¹ Note that these relationships are not proprietary. We have ready-made tools that we believe have use to local constituencies, and we feel that groups such as these can use our tools to accomplish their goals. However, the relationships are neither exclusive nor commercial, nor by offering our tools do we seek to endorse these or other groups.

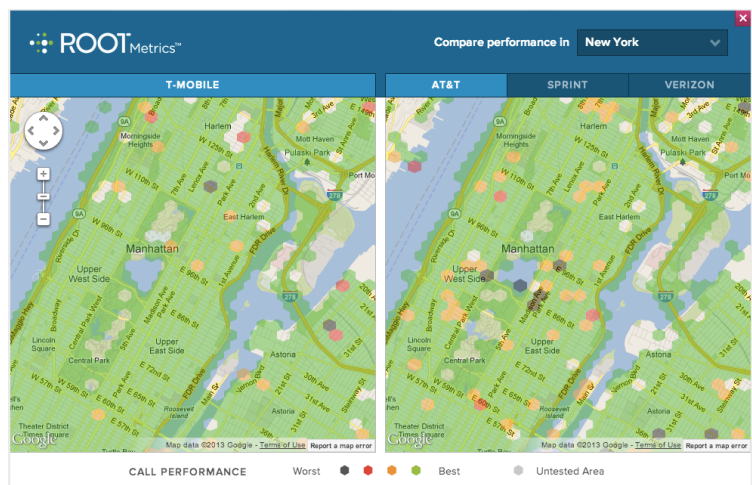
Q3: How often should measurements be conducted?

Given the highly dynamic mobile environment, we believe an annual report will not sufficiently help people in their mobile decision-making. This is particularly true over the next year or two, given the impending rollout of 4G (LTE) networks and the additional spectrum being made available. In lieu of annual reports, we plan to release our own results semi-annually. We also plan to publish summary reports for the national and local regions over time that look at trends of performance across networks and geographies.

Q4: How should the results be presented?

We are strong advocates for engaging and dynamic user experiences – the kind that are likely to quickly answer consumer questions based on their own needs/usage. To this end, we recommend inclusion of highly regional/local reporting that helps consumers in major markets clearly and directly understand the various elements of performance for themselves. Since networks tend to concentrate their investment in these areas, assessing each major city with a detailed report not only helps consumers who live there understand local dynamics, but also enables cities to be compared at an aggregate level that may be meaningful to travellers and the business community. We currently measure the 16 largest conurbations (based on Eurostat’s Large Urban Zones, which are functionally 50% larger than Ofcom’s maps and thus include many major towns and rural areas), and could discuss expanding our programme.

For enabling consumers in *any* location to have a view of performance, we recommend the use of online maps such as ours that show observed performance and that can include results from crowd-sourced tests, as well as professional tests such as ours. With these kinds of maps, consumers can drill down to view performance where they live, work, and play rather than just looking at overall market averages. A variant map we have also created offers the ability to easily compare two networks in the same geography, such as in the example offered at the right (in which the two screens comparing networks move and zoom in parallel).



Within these maps, we believe the issue of recommendation engines must be treated delicately: statistical significance and collection accuracy are inherently difficult when including crowd-sourced results because of the challenges mentioned above. Thus, while it might be helpful to include summary findings in this view – call failures or data speeds, for

instance – outright network ranking at a pinpoint level would likely be too easily biased without the benefit of a clearly controlled programme on the crowd-sourcing side.

Q5: Ofcom's role in reporting this information?

As stated in our Introduction, we believe Ofcom is a valuable source for consumers looking for this kind of information, but we do not agree with Ofcom's assessment that this data is not readily available or that the free market has not properly incentivised its creation. We offer our own entrance into the UK – alongside the existence of competitors in the marketplace before our entrance – as a degree of proof that the necessary coordination is in place to provide this information to the public. Similarly, we cite organisations like Which?, which serve as a sort of national word-of-mouth, even if the findings are not based on in-market testing. Additionally, we cite our work with groups like Countryside Alliance or with Members of Parliament as evidence of our commitment to include rural areas in our mapped results, which are already made available to consumers for free.

In sum, we believe Ofcom can and should be a place where maps and data about mobile performance can be found, but we do not believe it necessary to spend public sector money to fund a wholly new effort that replicates the very undertaking we are already attempting as an independent commercial enterprise. But as we share the same goal – a better-informed and better-served mobile public – we look forward to discussing how we could potentially work together to best use and share the rich data that we have already collected (and will continue to collect) in furtherance of Ofcom's intentions.