Cover sheet for response to an Ofcom consultation

BASIC DETAILS

Consultation title: OpenSignal Response to OfCom's Call For Input

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Address (if not received by email):

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Name   Brendan Gill   Signed (if hard copy)

OpenSignal Response to OfCom's Call for Input

Contents

Introduction.

Let us start by saying that we feel the description of the various potential methods for collecting data on the mobile customer experience in OfCom's call for input (CFI) was a good appraisal of the available methodologies. Our company has been built around one mission: understanding the performance of wireless networks through direct measurement of user experience and in this capacity we would like to add our thoughts to the discussion and also elaborate further on our methodology; describe some benefits of our approach that have not been mentioned thus far; and elaborate on the difference between simulation and measurement in the assessment of the true customer experience.

The true customer experience: Simulation and Measurement.

In our opinion the single most important part of this discussion is to draw the distinction between approaches that directly measure how mobile users experience mobile networks and approaches that seek to simulate or approximate it. Any method that does not directly measuring what the consumer is experiencing introduces significant errors. At a minimum, to truly measure the user experience you need to take into account both (a) the user's behavior and (b) the true experience the device has of the network. Simulated models such as drive-testing and network probes lack at least one of these key elements.

For example, whilst drive testing can gather data on the experience devices have of the network the behavioral element has been completely removed. Simple things like the way consumers hold their devices can significantly impact the experience and this is missed in the drive testing simulation. Furthermore, drive testing generally only gathers data outdoors whereas much of consumer use of mobile devices is indoors where the experience can be completely different. On the other hand, data provided by MNOs from the network side has an improved (but not perfect) understanding of user behavior in its data, however it is not able to measure exactly what the user experiences on the device. Instead MNOs must use ancillary data and a model to extrapolate to what the user is actually experiencing, which introduces errors and inaccuracies. For example, it's not possible to directly measure the latency of the user's device from the network side. For streaming media and voice over ip services it's often not possible to know exactly how much data is reaching the user's device and how that data transfer is performing. The only way to truly measure what the user is experiencing and take into account the effect of their behavior is with an agent that exists on the device the consumer is using.

OpenSignal Methodology.

The OpenSignal app. We have built a mobile application that users can download for free that collects data on the mobile customer experience. The application collects a broad array of metrics including: radio data (e.g. signal strength, signal to noise ratio etc);the connected network type (e.g. HSPA, GPRS etc, the operator and the cell tower id); throughput data (e.g. download speed, upload speeds, network latency etc); and user data (e.g. location, time of measurement, device model etc). Some of this data is collected in a passive manner with no interaction required on the part of the user and some of the data is collected only when the app is in the foreground. The rate at which we passively collect data is a user configurable setting in the app, so it will vary from user to user, but by default we collect data every 15-20 minutes. We go to great lengths to minimize the impact to battery life and data usage and have developed a sophisticated testing routine since launching in 2010. During this time our app rated over 4/5 stars by over 50,000 users, which is a great testament to its utility and robustness.

Incentivising users. It is a great challenge to incentivise users to download any application and we've worked very hard to provide value to our users to encourage participation. By leveraging the same data we are collect across all users of the app we provide a suite of tools to help users understand and improve their network experience. Features include the ability to see the direction that signal is coming from in real-time; diagnose issues with a speed test; view coverage maps for all MNOs worldwide and find nearby free wi-fi from a crowd-sourced database of over 130million wi-fi hotspots. This is all backed up by a highly scalable cloud architecture and complex data processing algorithms rendered in a simple, intuitive

interface for mobile devices. By providing these user-facing features we've reached a balance whereby users are willing to provide us with their (anonymized) experience data in return for the benefits the application brings them. OfCom notes that assembling a large panel of users can be expensive, but through this methodology we've managed to build up a panel of over 20,000 consumers in the UK who are actively using our application.

On-Device Data. Another note the CFI makes about on-device data is that it's not possible to know if the device is "in a bag or in the users' hand", however it's actually possible to deduce a great deal about the current usage situation. It's actually possible to programmatically detect if the user is currently using the device and what they are using it for e.g. if a call is currently active or a particular application is being used and if the device is currently sending or receiving data. With this knowledge its possible to make sure that you are sampling experience data only at relevant times when the user is currently making use of the device. For example, we are careful to only ever record data on the network conditions when the device screen is switched on and in active use. Not only does this negate the issue of incorrect sampling, but this is actually a strength of on-device data. Data recorded by MNOs on the network side typically contains less information about the current condition of the device. Without knowing when the device is in use or not, you are forced to create averages for metrics over all times whereas our data represents averages over only the times when the user is actually using their device.

Furthermore, on-device data has access to more granular location information e.g. GPS accuracy (~2m) and can even infer based on the speed the device is moving at what the current usage mode is e.g. in a car, train, walking or stationary, which gives more dimensions by which the data can be cut. This provides greater flexibility and ultimately can lead to deeper insight.

The CFI reasons 'actual' performance data will "provide no data in not spots (by definition)", but in fact our methodology which measures 'actual' performance can indeed provide data on the location of not spots. We store our measurements locally on a user's device and upload that data to our servers intermittently so if a user is temporarily in an area with no signal that poses no problem.   We can detect the lack of signal and the user's location at the time and send it to our servers when the user eventually does get a usable signal. However, this is something that MNO provided data will fail to detect and again, underlying the importance of knowing more specifically the situation of the user device, an MNO would not be able to tell the difference between a device which is simply switched off and one that is in a not spot and trying to communicate with the network.

User Centric Metrics. Overall we agree that the CFI highlights some of the key metrics for assessing consumer experience, however we feel that for signal availability a more user centric approach could be a useful addition. Geographical coverage information is indeed important but it lacks any behavioral element and therefore is less likely to map to the true user experience. We propose that a metric

such as the proportion of time that an average user spends with no/poor signal, or the proportion of time an average user has a 3G connection available are more relevant representations of what users experience. Purely geographical coverage information does little to address the different usage conditions e.g. indoor, outdoor, in-vehicle etc and the proportion of time spent in each of these conditions. Nor is it suitable for taking into account signal fluctuations due to weather, time of day, upstream problems, overall usage behavior or any number of other reasons. With the customer centric metrics we propose all of these behavioral conditions and temporal fluctuations are built into the metrics.

Wi-Fi. Any accurate representation of the modern mobile user experience needs to take wi-fi connections into consideration. Most modern devices come with wi-fi as standard, the availability of wi-fi networks is growing and more data is being sent over wi-fi networks than ever before. Without taking this into account an assessment of the mobile experience would be very inaccurate. For example, perhaps a given user is in a location with poor 3G signal quality and this is recorded on the MNO side as a poor user experience, when in fact the user has a fast wi-fi connection and is in actual fact very satisfied. Any model that neglects the effects of wi-fi will not accurately approximate the mobile customer experience. Note: the OpenSignal mobile application is able to detect when a user is connected to wi-fi networks and we always take this into account when assessing the true customer experience.

International benchmarking. It is also worth mentioning that OpenSignal has built up a global community of engaged users reporting customer experience data on over 1000 networks in over 200 countries and territories. Worldwide, we have a panel of over 500,000 users, which puts us in a unique position to provide an international backdrop to our customer experience metrics and is more than any other community-based approach. With other methodologies it's possible to benchmark UK MNOs against one another however in order to push forward the UK mobile industry as a whole it is necessary to benchmark MNOs internationally and this is a place where OpenSignal analysis can be uniquely important.

About OpenSignal.

Opensignal was founded by a group of four Univerity of Oxford Physics graduates in 2010. Prior to starting OpenSignal the founders built a company specialising in hardware solutions for cellular signal problems based in California. OpenSignal is backed by Qualcomm Ventures (the world's leading manufacturer of wireless chipsets), O'Reilly AlphaTech Ventures (a Silicon Valley based VC firm with an excellent understanding of consumer apps) and Passion Capital (a UK based VC firm with strong contacts within European industries). The company is headquartered in London, UK but believes improving the mobile customer experience is a global issue

as indicated by the 5 million people who have either downloaded the Android application or visited the OpenSignal.com website.

OpenSignal also recently won UKTI's 'SmartUK' competition to be named the 'UK's most innovative company'.

Conclusion.

OpenSignal applaud OfCom's initiative to examine the mobile customer experience. Mobile networks are an increasingly important part of our lives and we started OpenSignal because not enough accurate, objective data existed for consumers to be able to make informed choices on their mobile network. We would like to see the distinction drawn between direct measurement methodologies, such as on-device data and those that attempt to simulate the customer experience, such as drive testing or network probes. Not knowing more granular information about the user situation such as whether the user is currently interacting with the phone or whether they are connected to wi-fi means that there are large inaccuracies in any methodology that does not involve directly measured on-device data. For this reason we strongly encourage OfCom not to adopt an approach that uses no source other than MNOs, not least because it would be hard to justify a fair regulation of a market when the only source of information are those agents that are being regulated, but because for the reasons we have explored MNO supplied data alone cannot accurately assess the mobile customer experience. It is also a fragmented source of data and fair calibration between data supplied by different operators would be very difficult.

We've also pointed out some additional benefits to on-device data that weren't present in the CFI including: the ability to measure the true user experience; the ability to gather more granular location data; the ability to understand in detail the current user situation; the ability to take wi-fi usage into account; and have also addressed the criticisms. We would also like to see more user centric metrics included in the analysis that map closer to user behavior as well.

OpenSignal has a great deal of experience in collecting and analysing data on the mobile customer experience based on on-device data and has a sizeable panel in place already. We would be happy to take part in the discussion going forward.