Input by ViaSat to Support the Universal Service Obligation (USO) Consultation
High Capacity Satellite (HCS) Broadband

EXECUTIVE SUMMARY

The USO is the latest, and welcomed, commitment to improve the delivery of broadband services to the nation, focused on premises and business. Progress in improving UK broadband has been good but even after the full current programme completes by end 2017, around 1M households will not be able to access services of 10 Mbps+. Thus far the UK Government approach to ensuring that everyone has access to broadband has been to support and invest in deployment of Fibre to the Cabinet (FTTC), since at Superfast speeds FTTC is cost effective in a CAPEX sense for a substantial majority of households.

Attention is now shifting to those households and businesses where CAPEX costs for FTTC range from painfully high to prohibitive, and there is recognition that other technologies for these cases must be re-examined as part of defining a USO requirement. The satellite industry has been engaging with UK Government, in part through the UK Space Innovation and Growth Strategy (IGS) [1], on the issues. Headlines include:

- High capacity satellite (HCS) technology has dramatically changed the performance, cost, and number of subscribers that can be served compared to traditional satellites.
- HCS technology in use today is particularly well suited to meet the needs of the underserved last 5-10% of the UK population. In the US, unsubsidised HCS broadband competes with terrestrial alternatives today and serves nearly 2M households.
- HCS technology is in a phase of rapid improvement, and next generation technologies will eclipse expectations based on traditional views of satellite capability.
- Satellite broadband can deliver services at 24 Mbps now and service providers will offer 50-100 Mbps by 2016/17[2] with second-generation HCS satellites. Third generation HCS will be available everywhere in the UK in 2020 delivering 100 Mbps speeds. The manufacturing contract for this satellite has already been signed.
- Fibre is not cost effective for all – but satellite can be and offers wider national utility for critical national infrastructure, and fixed and mobile emergency and security services.
- The space industry, telecommunications companies and media companies together could deliver significant services to the UK Government and population.
- The underserved are not confined to rural areas, there are more underserved in urban areas. USO policy should take this into account.
- Speed is a key factor but capacity (volume) is equally important to users. Networks that can scale are critical to successful delivery.
- The HCS technology and business model is economically viable without subsidy, but where other technologies are subsidised the market becomes skewed. This needs mitigation to ensure consumers have choice and the Governments intent is met.

[1] Paper to Support the UK Innovation and Growth Strategy for 2014-2030 in Satellite Broadband.
[2] Eutel Sat's Tooway service in Europe offers speeds up to 22 Mbps and ViaSat's Exede service in the US recently began selling plans that deliver more than 25 Mbps, both using first generation HCS. Higher speeds are technically achievable but uneconomical until the next generation of HCS.

About ViaSat:

ViaSat, Inc, as a global broadband services and technology company, ensures consumers, businesses, governments and military personnel have affordable broadband access with terrestrial equivalent performance - anywhere - whether on the ground or in-flight. The Company's innovations in designing high-capacity satellites and secure ground infrastructure and terminal technologies coupled with its international network of managed Wi-Fi hotspots enable ViaSat to deliver a best available network that extends the reach and accessibility of broadband internet service. ViaSat is active in the UK conversation on how to serve the broadband needs of the population and UK interests abroad. This includes plans to deliver high-speed internet to consumers, enterprises, and mobility applications as well as engagements in major defence programmes. ViaSat is active in the UK Space trade association as well as other technical and policy-oriented groups. ViaSat has recently entered into a Joint Venture with Eutelsat to expand the reach of HCS broadband throughout the UK and Europe.

MAIN REPORT

OVERALL RESPONSES TO OFCOM QUESTIONS

This paper (from Section 1 onwards) is the input provided to the initial Government call for responses on the USO. Some of the information and views made their way into the Government paper, but much did not and is more relevant to the more detailed work to be carried out by OFCOM. However this section seeks to provide "headline views" of the specific OFCOM questions, for which more detail will be in the remainder of the paper.

Q – How should the minimum technical performance of the USO be specified?

Whilst 10 Mbps is seen as an appropriate level for initial consideration, there is a danger that networks are then designed to that minimum level. Since there is already aspiration to move to ultrafast and areas of the UK enjoy 100 Mbps and beyond now, 10 Mbps may be a low target. It is believed that the current superfast definition would be a realistic target for 2020 (the date the USO is understood to have to be in effect) so the USO should aim for 24/30 Mbps. Satellite providers (potentially one solution to the USO) should be able to deliver 30-100 Mbps service routinely to the UK by 2020.

In addition to speed (the headline figure for Government, consumers and the media), capacity is key; this paper (and the associated presentation) explores this. Capacity is an issue in terrestrial (especially LTE/4G) and satellite networks. ViaSat already delivers significant capacity on its satellite services and by 2020 will be aiming at consumer affordable unlimited packages (already available as a premium service in the US).

Q – How should we ensure the USO is affordable?

By encouraging other providers to enter the market and no longer subsidising some areas of the market, which leads to a skewed playing field. Already several fibre providers are proving they do not need Government subsidy to close business models and deliver affordable services. This is also true of satellite providers in the US. In the UK, broadband services are very affordable, but this has often been offset by the fee for a landline and

Government subsidy. Some voucher scheme or support (for example access to real estate for gateways, support and protection of spectrum) for other providers would help close the affordability gap for consumers who currently (or in the future) will not benefit from superfast fibre.

Q – Should there be a social tariff for broadband services?

There is a policy debate to come here; should the Government subsidise a basic USO to enable, for example, the Governments digital agenda and digital by default services? There is merit in financial support to deliver services to those with social needs. The key is to what level should the Government be seen to subsidise access to, for example, entertainment? ViaSat has no specific view on this issue.

Q – What might the potential demand for the USO be?

Significant, and this will not be confined to rural areas. In the UK the last 5% (some 1.4 million households) are a significant number. Even within suburban areas fibre does not deliver 100% services. ViaSat's experience in the US is that take up of satellite broadband in suburban areas has been significant.

Q – How should the universal service provider be designated?

It is only possible for a single provider to provide the USO if that provider has all the available technology and business solutions inside their offering. This will likely only happen with Government intervention, for example to ensure a suitable satellite option is included. Even regions will face this issue. Satellite is by nature regional and ubiquitous. Satellite would need to be a service offered across the nation, perhaps by several providers and through a number of companies as one technical solution for consumers where the cost and demand makes it suitable.

Q – How could any potential market distortions of competition be minimised?

The UK has invested significantly in a FTTC based solution, which has been largely successful and seen the roll out of additional fibre to large areas of the country. However, this focus has meant that other technologies have not been put in place to provide 100% coverage with sufficient capacity to service demand. It is believed that a line should be drawn under the FTTC roll out funding and a new model put in place that encourages other providers (including satellite) to put in place the required infrastructure to service current, and future demand for consumers, mobile users and the national interest.

Q – When and on what basis should the USO be reviewed?

Reviews would be needed to track major technology improvements that might provide better technical or business solutions for the nation. An annual review may be needed.

Section 1 – MARKET AND BUSINESS CONTEXT

1.1 The first generation of High Capacity Ka band satellites launched in the United States (ViaSat-1) and Europe (KaSat) demonstrate that commercially viable broadband service yielding performance substantially better than ADSL is possible without government subsidy, and that these satellites can reach everyone under the satellite footprint at a CAPEX per household superior to terrestrial alternatives in a percentage of households, that might be as much as 25% to 50%. These first generation satellites provide as much as 140 Gbps of total capacity and can serve a million households.

1.2 HCS satellites already under manufacturing contract will provide over a Tbps of capacity that can be deployed with far higher geographic flexibility and concentration of capacity than first generation satellites, including a ViaSat-3 satellite that will serve Europe and the UK. Scheduled to be in service in late 2020, this European ViaSat-3 satellite will provide speeds of 100 Mbps to residential terminals costing around £150-300[3] while providing volumes of 50-100 GByte/month, with enterprise services of 1 Gbps.

1.3 This capability creates the possibility to address a large percentage of the UK's underserved in a cost effective manner. To cater for market uncertainty and developments, these satellites have the ability to deploy capacity where it is needed and provides the best return on investment, which could be anywhere across Europe or Africa. One issue for satellite service providers in the UK has been the uneven playing field, where satellite can only be used with subsidy in some areas. The dominance of terrestrial providers (marketing power, local influence and significant direct government funding) has meant that the underserved and local government are not necessarily aware of, or understand, other options to deliver broadband (the BDUK pilots are seeking to address some of this). Whilst satellite is ubiquitous and once launched can rapidly deliver broadband services – the time it takes for an installer to turn up and fix an antenna to a premise or to be self installed in a couple of hours – the decision to build, launch and operate a satellite can be significant (in the region of £3-600M CAPEX) and hence unless markets are apparent and stable there is risk. Innovation is mitigating this through the flexible coverage and capacity but Government also has a role in mitigating this risk by encouraging and supporting investment for the benefit of consumers and the national interest. The USO initiative provides a potential mechanism to address this and, due to the nature of satellite, these decisions are of a national rather than local level.

1.4 The presumption that the underserved are primarily a rural phenomenon is felt to be inaccurate, and the use of subsidies to confine satellite to rural service distorts the market. Geographic location is not the determining factor in whether a household is underserved. Rather, being underserved is a function of the capital cost of reaching a particular household. The percentage of rural inhabitants who are underserved is indeed higher than for urban inhabitants, but experience suggests that the number of underserved is actually much greater in urban/suburban areas. To avoid ineffective use of funds, a USO plan employing subsidies should consider whether terrestrial CAPEX per household is less than that of satellite and not be based purely on geography.

[3] Designs and cost models are under review.

1.5 Experience in the US shows that population density is the best high-level measure of where there will be large numbers of underserved. For example, 8 years ago the WildBlue-1 spotbeam satellite serving the US with capacity distributed uniformly in geography sold out its beams serving areas of highest population density first, despite a very modest level of service. ViaSat-1 was designed with this result in mind and used smaller beams to serve only the most populous parts of the US. After launch in 2011, it too filled its beams in the most populous areas first. Meanwhile, 9 years after launch, the beams on WildBlue-1 serving the most rural areas are still not sold out. Because of the recognition that the underserved are mostly near or in urban areas, the ViaSat-2 satellite launching next year over North America has been designed to concentrate capacity on populous areas to a substantially greater extent than ViaSat-1.

1.6 This learning experience can now be brought to the UK, where there is no reason to expect a completely different dynamic. All the same terrestrial technology solutions are being brought to bear in both countries with similar CAPEX cost constraints, and while housing patterns are not identical between the US and UK, they are not so different that one should expect a complete reversal of the underserved distribution. It is logical to assume that the percentage of underserved households is higher in rural areas, and data verifies this. But the *number* of underserved households is this percentage times the number of households, and since there are far more households in and around cities, the *number* of underserved is in fact much higher in the most populous regions.

1.7 HCS technology coming to the UK in 2020 will make it possible to meet a USO that's as good as service enjoyed by most urban dwellers and is available everywhere in the UK. Whilst HCS do not require subsidy to be viable, the availability of subsidies or non-financial support (such as spectrum and real estate) can encourage the prioritisation of capacity, working on wider government initiatives and the speedier build and launch of additional satellites to serve more consumers, mobility services, enterprise and government services.

Section 2 - TECHNOLOGY AND DEVELOPMENTS OVERVIEW

2.1 HCS are able to provide unparalleled levels of capacity through spectrum re-use across many narrowly focused spot beams. Ka band HCS are primarily designed to provide residential broadband services but also deliver far wider utility. These systems require deployment of mass market satellite terminals to millions of users and the provision of through-life subscriber management and help desk services in the same way that terrestrial ISPs operate. From the subscriber perspective, satellite broadband service is indistinguishable from terrestrial service.

2.2. ViaSat's satellite broadband service in the US (branded Exede™, and serving over 700,000 users), and EutelSat's Tooway™ service in Europe (over 180,000 users), offer peak speeds greater than 20 Mbps. Since the launch of those satellites, ViaSat technology has also been chosen for the satellite portion of Australia's National Broadband Network and will deliver a standard broadband service at 60 Mbps. ViaSat-1 at 140 Gbps launched in late 2011 to serve the most populous parts of the US is today the highest capacity satellite in the world, equivalent to over 100 traditional satellites at the time of launch.

2.3 ViaSat-2 launches in 2017 to serve North America and the North Atlantic and will have over twice the capacity and seven times the geographic coverage of ViaSat-1. ViaSat has just announced a constellation of three ViaSat- 3 satellites providing near global coverage, with each satellite providing over 1000 Gbps of capacity (1 Tbps). These satellites have the ability to concentrate capacity geographically and the ViaSat-3 satellite serving the European hemisphere will be able to deliver far more capacity to the UK than all satellites currently serving the UK combined, with residential broadband speeds of 100 Mbps or more, and with service plans having no volume limits.

2.4 Satellite today can meet "superfast" definitions and although it does take some time to build and launch a satellite, when it is placed in service a satellite offers immediate access for all customers and users in the footprint – which terrestrial technologies clearly do not since they require a separate build-out effort for each household (for FTTH) or small grouping of households (for FTTC and Hybrid Fibre Coax).

2.5 Some opponents of satellite broadband choose to target the 250msec latency resulting from the earth-to-satellite signal path as a significant cause for concern, pointing at the poor "ping time" performance. But ping time isn't a direct measurement of the latency performance experienced by the user, and in fact, HCS page load times compare very favourably with fibre. It is also noteworthy that in both 2013 and 2014, the US Federal Communications Commission (the FCC) found ViaSat to be the "no 1 internet service provider for delivery on promise". The FCC study measured actual service performance for thousands of subscribers for four delivery technologies – DSL, cable, fibre and satellite – and evaluated services from 14 of the US's largest broadband providers.

2.6 In conclusion, HCS satellites can be used to meet a very high USO bar, and the UK should consider this is determining USO requirements.