Annex 11

Note for Applicants on The Coverage of 600 MHz Band DVB-T2 Television Multiplexes

Indicative coverage and transmission arrangements

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Section 1

Transmitter locations

1.1 This *Coverage Note* provides indicative details of the coverage that might be achieved by a two-multiplex network of DVB-T2 transmitters using the 600 MHz band at 10, 20 or 30 locations, based on a practical short-term deployment of transmitters at a selection of the UK's principal transmitter stations. These stations are those which have established internationally co-ordinated frequency assignments in the 600MHz band. The Note is being published because Ofcom considers that potential applicants for the 600 MHz band TV multiplex licence may find this information useful when commencing their own technical analysis. The Note reflects the best coverage estimates available to Ofcom at the time of publication: however these estimates are indicative only and applicants should fully inform themselves in order to develop their own view of the coverage which the networks could achieve in practice. Applicants will need to form a view on these matters when considering whether to apply for the 600 MHz multiplex licence, and the Technical Plan build-out which they are willing to commit to in their application.

1.2 Existing national and regional terrestrial television services are broadcast from a network of 80 principal transmitter sites (as shown in figure 1) and nearly 1,000 smaller relay transmitter sites. This *Coverage Note* considers networks utilising 10, 20 and 30 of these existing transmitter sites. Figure 1 shows these site locations considered coloured in green.

1.3 The indicative networks outlined in this document are based on the use of established TV transmitter sites: because these sites are co-located with existing DTT services, they should not cause interference to existing DTT services (e.g. 'hole punching' interference). Most terrestrial TV reception is via fixed rooftop aerials that only work well when receiving signals from the direction in which they are pointing, therefore viewers' existing aerials will already be directed towards the established transmitter sites. For these reasons, the use of existing transmitter sites provides a credible basis for identifying where it may be possible to provide 600 MHz DTT services covering a high number of existing DTT viewers at a modest level of technical complexity for a short-term award.

1.4 Arqiva (the transmission provider which owns the existing DTT sites) has provided an indication of the cost and type of practical two-multiplex network that could be deployed in the 600 MHz band for an interim period within the constraints of a short term licence. Arqiva investigated the option of deploying networks which would predominantly make use of the existing installed base of decommissioned 'low power' DTT transmitters that were in use before digital switchover took place. In a number of cases the equipment is still located on the station premises, having been replaced by separate higher power transmitter infrastructure which is now used by the post-switchover DTT networks.

In some cases the antennas and transmitters used by the pre-switchover networks have been removed and equipment may need to be installed. Technical modifications to the previously-used equipment may also be required.

The indicative coverage levels described in this Note are based on notional antenna patterns provided by Arqiva for a putative network of the type described above, and will in practice be subject to any limitations on the feasibility of modifications to the previously used DTT equipment (which has not been fully tested for compatibility with

the modulation mode and frequencies proposed for use in the 600 MHz band). Applicants should come to their own view, in consultation with their preferred transmission supplier, on the risks that factors such as these pose to their own roll-out plans.

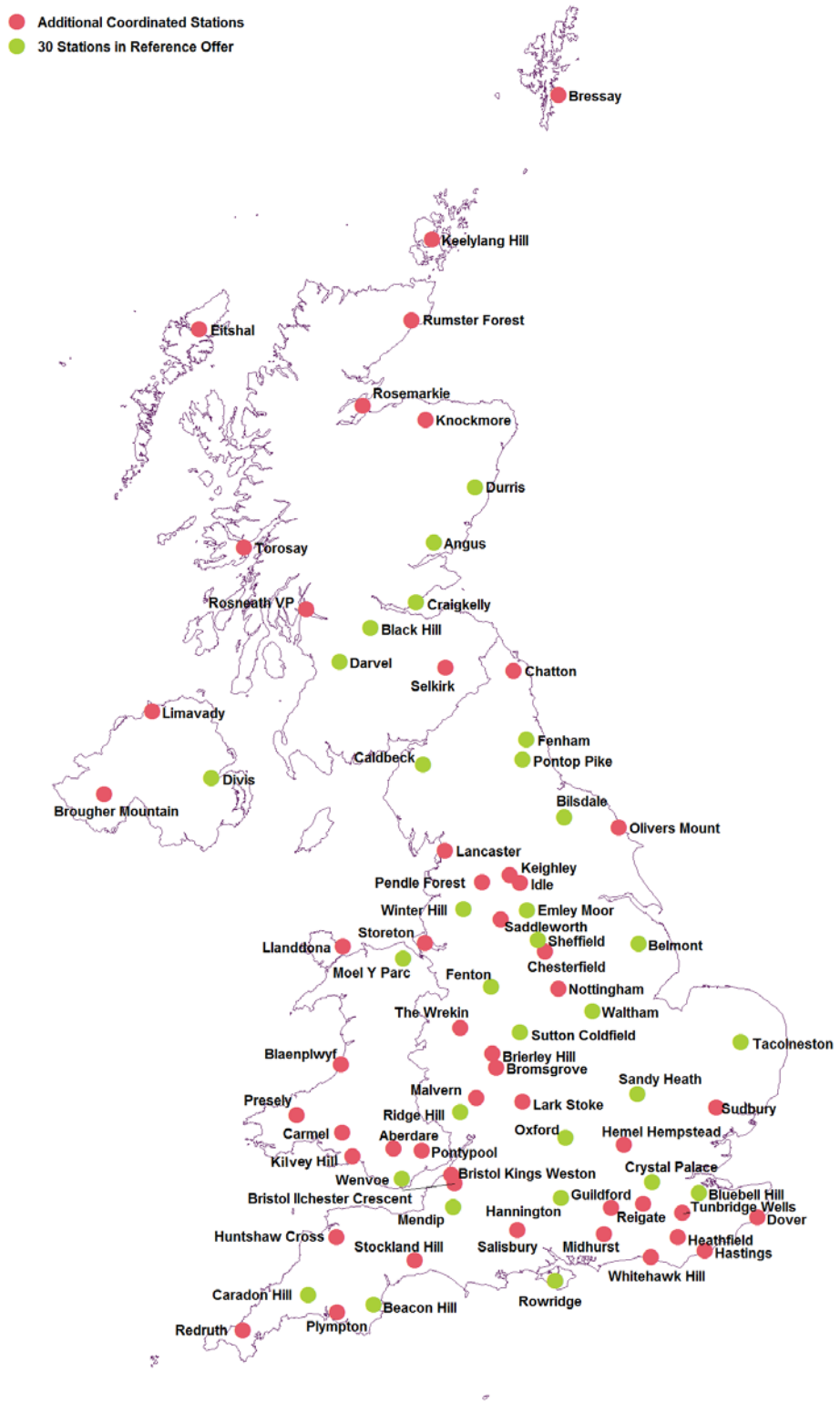

Figure 1: 600 MHz Band TV stations in green that are considered in this document

Section 2

Assumptions and Caveats

2.1 In carrying out our assessment of the feasibility of a two multiplex network in the 600 MHz band, a number of assumptions have been made. The most significant are set out in this section. The actual coverage achieved by the network will depend on how closely the final technical arrangements match our assumptions.

Antennas

2.2 Based upon Arqiva's assessment, we have assumed that existing transmitting antennas can be used at most transmitters.

2.3 If not using an existing DTT antenna, then physical space (aperture) for a new antenna will need to be found on the transmitter mast. Should this antenna be higher or lower in practice than the height assumed by Arqiva, there may be an increase or decrease in the coverage that can be achieved.

Modulation

2.4 The interim short term licence for the network will require the use of DVB-T2 modulation and MPEG-4 advanced video coding. In our coverage analysis we assumed that the network will use the same DVB-T2 modulation mode as that currently used for the existing BBC Multiplex B DTT service (256 QAM, 32K FFT, rate 2/3, 1/128 guard interval). This mode offers capacity of approximately 40 Mbit/s (or approximately 39 Mbit/s if Extended Carrier mode is not used).

2.5 Indicative population coverage figures, based the DVB-T2 modulation mode above, are provided in Section 3 of this document.

2.6 If a different modulation mode is ultimately adopted (for example, a longer guard interval to facilitate single frequency network configuration) the indicative population coverage (and available data capacity) of the 600 MHz band multiplexes is likely to be different. Further information on the applicable transmission standards is provided in the Technical Licence Conditions section of the 600 MHz consultation document.

Impact on other DTT multiplexes in the UK

2.7 The methodology adopted during the assessment and design of notional transmission arrangements for the 600 MHz multiplexes has been developed to result in minimal impact on the coverage of the existing DTT UK-wide multiplexes.

2.8 Coverage predictions are carried out using a sophisticated computer modelling system that breaks the UK into 100m x 100m 'pixels' and calculates the likelihood of reception in each pixel. The model does not have detailed information on the reception conditions in each square and has to make generalised allowances for things like the presence of buildings and trees. We also have to rely upon estimations of the viewing patterns of households in some areas where the coverage of adjacent transmitters overlaps and there is a choice of transmitter from which they can receive their programmes.

2.9 The method and principles we have adopted are very similar to those used to plan coverage for digital switchover (including the impact of interference from one

transmitter to another) which means that we can have confidence that the predictions are correct in the majority of situations.

Influence of domestic aerial direction

2.10 The coverage predictions summarised in Section 3 have been derived using the same coverage criteria as are used for planning digital switchover. The calculations provide an indication of the maximum coverage from each transmitter where households are predicted to be able to receive the 600 MHz multiplexes. This is called 'gross' coverage.

2.11 It is very unlikely that all households in the gross coverage area have aerials pointing towards the transmitter. Consequently the number of households that could actually receive the 600MHz multiplexes, and the area actually covered in practice, would be somewhat smaller. No comprehensive database exists of where aerials are pointing in any particular area and the only way to obtain reliable information is to carry out a rooftop survey. Further information on population coverage is provided in Section 3.

Influence of domestic aerial group

2.12 Traditionally domestic aerials have been designed to work over only a part of the total range of UHF channels; these are called 'grouped aerials'. The grouped aerial approach was sensible as the frequencies used by the historic four analogue television services were usually close together, and the task of designing aerials was made easier by tailoring their response to these relatively narrow channel groups.

2.13 At digital switchover, some of the digital programme services from some transmitters make use of transmission channels that lie outside the existing analogue aerial group for a particular area. Households in those areas needed to replace their aerials with a wideband design to be able to receive all of the digital programme services reliably. Wideband aerials can receive services on any of the UHF channels and many aerials that have been installed in the last 10 to 15 years are of this type. A considerable number of grouped aerials do however remain in use.

2.14 The likelihood that households will be able to receive the 600MHz multiplexes will be influenced by their existing aerial group. The cases are described below;

2.14.1 *In group:* The 600 MHz multiplex channel falls within the analogue aerial group. Households that are predicted to lie within coverage and have an aerial meeting the standard assumptions that points towards the appropriate transmitter.

2.14.2 *Just outside*: The 600 MHz multiplex channel is within a few channels of the analogue aerial group. Although not designed to work on these channels, a grouped aerial can still be expected to perform reasonably well, although some households that are predicted to be in coverage may not be able to receive the 600MHz multiplex as a result of their aerial's performance tailing off.

2.14.3 *Outside with others*: The 600 MHz multiplex is outside the aerial group, but so are some of the other digital programme services. Households therefore have a strong motivation to replace their aerials with a wideband type if they would like to receive all of the programme services. It is unrealistic to expect that all have done so though and some households that are

predicted to be in coverage may therefore not be able to receive the 600 MHz multiplex.

2.14.4 *Out of group*: The 600 MHz multiplex is out of analogue aerial group and some, perhaps many, households may have difficulty receiving the 600 MHz multiplex unless they have replaced their aerials with a wideband design. In most of these areas, DTT services did operate out of group for many years prior to digital switchover although they have moved back into group at switchover. This would have provided an incentive to households to install wideband aerials, but not all would have done so.

2.14.5 Table 1 below shows the list of transmitter locations for the 30 sites and the relationship between the frequencies identified to be used by the 600MHz multiplexes and grouped aerials as described above.

Table 1

Transmitter Site	**10, 20 or 30 sites**	**Channels**	**Assumed existing Aerial** (if not a wideband aerial)
Crystal Palace	10	33, 35	*In group*
Winter Hill	10	31, 37	*Out of group*
Sutton Coldfield	10	33, 35	*One just outside, One in group*
Craigkelly	10	33, 34	*In group*
Black Hill	10	32, 35	*One just outside, One in group*
Divis	10	33, 34	*In group*
Pontop Pike	10	33, 34	*Out of group*
Rowridge HP	10	31, 37	*In group*
Wenvoe	10	31, 37	*One just outside, One in group*
Bilsdale	10	31, 37	*In group*
Waltham	20	31, 37	*Outside with others*
Hannington	20	32, 34	*Just outside*
Belmont	20	33, 35	*In group*
Oxford	20	31, 37	*Out of group*
Tacolneston	20	31, 37	*Out of group*
Ridge Hill	20	32, 34	*In group*
Emley Moor	20	32, 34	*Just outside*
Mendip	20	33, 35	*Out of group*
Sandy Heath	20	32, 34	*In group*
Durris	20	32, 35	*In group*
Angus	30	31, 37	*Out of group*
Bluebell Hill	30	32, 34	*Just outside*
Sheffield	30	31, 37	*In group*
Moel-y-Parc	30	32, 34	*Just outside*
Caldbeck	30	32, 35	*In group*
Caradon Hill	30	31, 37	*In group*
Beacon Hill	30	33, 34	*Outside with others*
Darvel	30	31, 37	*In group*
Fenton	30	32, 34	*In group*
Fenham	30	31, 37	*In group*

Adjacent channel interference

2.15 In some areas the proposed 600 MHz frequency could be adjacent to, and therefore susceptible to, adjacent channel interference from the UK-wide multiplexes. Hence the coverage achieved in practice could be less extensive than predicted. Three mechanisms will contribute to the susceptibility of 600 MHz TV multiplexes:

2.15.1 Operating at a lower power level relative to the UK-wide multiplexes;

2.15.2 Restricted antenna pattern relative to other multiplexes;

2.15.3 A significant difference in the height of the 600 MHz multiplex transmitting antennas in relation to other multiplexes at the same transmitting site.

Other than modulation mode, careful selection of antenna pattern and the position of the antenna on the mast may help mitigate any coverage reduction. Where possible, the antenna pattern should match that of the UK-wide multiplexes, at least over the primary service area of the 600 MHz network. Also, the antenna height should be as close as possible to that used by the UK-wide multiplex, though this may be restricted by lack of space on the structure. In such a case, these two criteria could be met by sharing the same antenna as the UK-wide multiplex where this is technically feasible.

European Assumptions

2.16 In determining the indicative coverage it is necessary to make assumptions about the incoming continental interference environment which can affect the coverage level achieved. This is determined by the bilateral agreements with our neighbouring countries as explained in section 6 of the consultation document and detailed in an annex on co-ordination conditions.

2.17 In the assessment of coverage we have assumed that our neighbouring countries will operate on all their co-ordinated assignments in the 600MHz band using the parameters that have been agreed with the UK. However in a number of cases they may be operating below their co-ordinated rights or may not even have brought their allocated assignments into use and therefore the incoming interference could be less and resulting coverage different to that determined in the prediction.

Section 3

Indicative Household Coverage

3.1 The figures in this section provide an indication of coverage that might be achieved by the 600 MHz multiplexes and have been produced based on notional transmitter arrangements using the 10, 20 and 30 sites listed in Table 2.

3.2 Population coverage assessments are based on a predicted TV signal strength level in each 100m x 100m area of the UK (known as a 'pixel'). All households in pixels within which at least 70% of the locations are predicted to be served are counted. No adjustment has been made for the number of households that may be receiving their TV services from other platforms such as satellite or cable.

3.3 The total number of households in the UK is assumed to be 28.3 million: this figure is derived from the Royal Mail Postcode Address File (PAF), which includes business as well as residential addresses. All coverage figures assume that households have good quality aerials that are correctly aligned and of the appropriate group or are wideband where required.

3.4 The coverage figures include estimates of the number of households that might be able to receive the 600 MHz multiplexes if they were transmitted using the assumed characteristics. It is not possible to provide an exact figure for the number of households that receive their television services from any particular transmitter and it is therefore difficult to be precise about how many households could receive the 600MHz multiplexes. As guidance, we have provided two measures:

3.4.1 **Gross population** represents the total number of households that could receive the 600 MHz multiplex if their aerials are pointing towards the appropriate transmitter. In practice, the gross coverage of adjacent transmitters overlap to some extent which means that households have a choice of which direction to point their aerials. Gross coverage is therefore almost always an overestimate of the number of households using a particular transmitter as some households within the gross coverage area can be expected to be watching a different transmitter. Gross coverage is nevertheless useful as it provides an upper limit for the maximum possible number of households served.

3.4.2 **DPSA** (Digital Preferred Service Area) is an attempt to provide a more realistic estimate of the number of households that might be able to receive the 600MHz multiplex than gross population. The DPSA is a prediction of the areas where a particular transmitter is likely to provide better signals than other transmitters. In those areas, it is reasonable to expect that households have aerials pointing at the transmitter in question and could therefore receive the new multiplex broadcast from that transmitter. The DPSA method is a numerical prediction and cannot, however, take account of viewer preferences where households sometimes choose to receive services from a different transmitter. No allowance has been made in the figures for the proportion of households that make use of alternative platforms such as cable or satellite.

3.5 Our initial assessment shows that networks of the first 10 sites, first 20 sites and all of the 30 sites from Table 1, carrying two 600 MHz multiplexes could achieve coverage of approximately:

3.5.1 In the case of a 10 site network;

National	10 site		Within DPSA	
Mulitplex 1 (LAY_7)	15,508,821	54.71%	12,929,018	45.6%
Multiplex 2 (LAY_8)	15,189,549	53.58%	12,697,277	44.8%
LAY7 & 8 (Core)	14,702,102	51.86%	12,509,906	44.1%

3.5.2 In the case of a 20 site network;

National	20 site		Within DPSA	
Mulitplex 1 (LAY_7)	20,298,460	71.6%	18,190,971	64.2%
Multiplex 2 (LAY_8)	19,564,042	69.0%	17,823,028	62.9%
LAY7 & 8 (Core)	19,184,506	67.7%	17,513,097	61.8%

3.5.3 In the case of a 30 site network;

National	30 site		Within DPSA	
Mulitplex 1 (LAY_7)	21,387,096	75.4%	19,397,159	68.4%
Multiplex 2 (LAY_8)	20,507,758	72.3%	18,945,590	66.8%
LAY7 & 8 (Core)	20,113,797	71.0%	18,615,346	65.7%

3.6 Table 2 below shows the indicative coverage for each multiplex and transmitter forming a national layer for Gross Coverage and the Coverage within the DPSA. The 'six core DPSA' is defined as the areas where a transmitter station provides reception of the three Public Service Multiplexes and also is the best source of reception of the three commercial services.

3.7 As the predicted coverage is a theoretical calculation, the actual coverage that could be achieved in practice might vary from the predicted figures. For example, the use of a transmit antenna at a different height to that assumed will change the coverage. There is also a limit to the accuracy of the computer prediction of the TV signal strength since the method uses statistical clutter models rather than data on the actual buildings, trees or other potential obstacles in a particular area. The method and assumptions are however consistent with those used in planning for digital switchover.

Table 2 Key

LAY_7 = 600MHz Multiplex 1 Indicative Gross population coverage

LAY_8 = 600MHz Multiplex 2 Indicative Gross population coverage

DPSA = Indicative 6 Core Digital Preferred Service Area population coverage

** Rowridge has HP transmissions only but DPSA numbers include homes in the VP and HP DPSA

Table 2 Indicative population coverage for a two multiplex network showing gross predicted coverage and DPSA (6 CORE)

		30 Sites				20 Sites				10 Sites			
		LAY_7	DPSA	LAY_8	DPSA	LAY_7	DPSA	LAY_8	DPSA	LAY_7	DPSA	LAY_8	DPSA
10100	CRYSTAL PALACE	4,788,149	4,281,953	4,470,962	4,144,199	4,807,989	4,283,221	4,478,388	4,144,923	4,977,526	4,306,815	4,601,642	4,175,523
10300	WINTER HILL	2,952,874	2,703,236	2,900,585	2,670,004	2,972,703	2,705,929	2,902,095	2,670,048	3,051,210	2,707,549	2,953,515	2,671,735
10200	SUTTON COLDFIELD	1,801,725	1,604,411	1,928,451	1,697,232	1,806,290	1,604,642	1,930,477	1,697,237	2,579,076	2,011,357	2,724,792	2,049,417
14700	CRAIGKELLY	620,126	418,409	627,091	418,648	620,126	418,409	627,132	418,648	620,197	418,409	627,216	418,648
10500	BLACK HILL	1,148,864	1,013,426	1,165,044	1,012,271	1,150,796	1,013,983	1,165,713	1,012,505	1,241,833	1,030,296	1,243,811	1,024,999
10700	DIVIS	412,127	404,934	389,154	385,296	412,145	404,934	393,178	388,717	412,221	404,934	396,886	391,137
10900	PONTOP PIKE	1,056,024	683,131	823,149	622,394	1,056,025	683,132	823,296	622,396	1,126,905	684,153	971,390	633,712
10800	ROWRIDGE **	619,648	438,321	565,172	399,197	619,707	438,460	565,183	399,198	620,448	438,537	565,722	399,266
10600	WENVOE	622,504	341,403	768,218	364,175	655,873	347,129	783,746	365,225	663,223	347,797	791,806	365,301
11600	BILSDALE	897,375	572,433	895,206	561,755	1,062,465	574,251	1,054,975	563,093	1,309,585	579,171	1,221,798	567,539
11100	WALTHAM	669,399	445,580	686,889	448,844	680,526	448,108	698,185	451,467				
12600	HANNINGTON	1,044,920	420,412	584,898	381,818	1,125,633	420,439	599,973	383,206				
12000	BELMONT	1,507,015	769,349	1,646,638	756,164	1,507,015	769,349	1,647,442	756,326				
11700	OXFORD	370,689	356,186	359,671	348,096	370,990	356,423	359,680	348,096				
11400	TACOLNESTON	333,033	316,829	307,142	294,255	333,038	316,834	307,151	294,264				
14900	RIDGE HILL	433,471	242,834	400,781	247,634	467,369	243,741	418,330	248,213				
10400	EMLEY MOOR	2,047,422	1,466,326	1,767,880	1,405,236	2,241,822	1,468,233	1,802,298	1,406,906				
11000	MENDIP	1,145,931	831,768	1,082,272	809,768	1,156,132	836,125	1,082,272	809,768				
12400	SANDY HEATH	671,974	663,327	670,234	660,410	702,066	691,072	694,590	682,760				
11200	DURRIS	231,794	166,531	202,313	160,032	239,978	166,557	202,340	160,032				
12300	ANGUS	421,789	175,427	394,723	175,047								
15800	BLUEBELL HILL	268,000	169,286	220,421	161,587								
10403	SHEFFIELD	232,220	156,511	232,668	156,366								
14500	MOEL Y PARC	1,151,327	67,575	286,285	49,995								
13700	CALDBECK	142,777	126,023	125,018	120,321								
13100	CARADON HILL	230,015	156,080	163,879	125,790								
13600	BEACON HILL	123,085	106,479	74,324	73,055								
15200	DARVEL	179,531	106,538	181,460	105,768								
10211	FENTON	144,042	102,967	145,695	103,654								
10903	FENHAM	166,387	89,474	149,364	86,579								

Section 4

The DTT Platform

Description of the DTT platform

4.1 The existing UK-wide DTT services are broadcast from a network of 1,156 transmitters. Each transmitter site transmits either three or six UK-wide multiplexes: all sites carry the three Public Service Broadcaster (PSB) multiplexes (provided by the BBC and Digital 3&4 Ltd), and the UK's 80 principal transmitters carry a further three 'commercial' multiplexes (provided by Arqiva Ltd and SDN Ltd). An additional multiplex carrying local TV services is expected to launch during 2013.

Multiplex	Operator	Notes
PSB1 – BBC A	BBC	
PSB2 - D3&4	Digital 3 & 4	Consortium of Channel 3 licensees and Channel 4
PSB3 - BBC B	BBC Free To View Ltd	DVB-T2 multiplex carrying High Definition channels
COM4 - SDN	SDN	Subsidiary of ITV plc
COM5 - Arqiva A	Arqiva	
COM6 - Arqiva B	Arqiva	
Local multiplex	Comux UK Ltd	

4.2 An estimated 98.5% of the UK population is served by at least three UK-wide multiplexes. Approximately 90% of the population is served by the network of 80 principal transmitters carrying six UK-wide multiplexes. In areas outside the coverage of the 80 principal sites, a much larger number of 3-multiplex sites provide the three 'public service' UK-wide multiplexes in areas where signals from principal transmitters are poor or unavailable.

Licensing of existing multiplex operators

4.3 All UK-wide multiplex operators hold Wireless Telegraphy Act licences from Ofcom which authorise their use of the spectrum. All multiplexes (except BBC A) also hold multiplex service licences awarded under the Broadcasting Act 1996. The BBC A multiplex is 'gifted' directly to the BBC under its Charter and associated Framework Agreement, and therefore does not require a Broadcasting Act licence.

4.4 The multiplex licences place a number of conditions upon the licensees relating to digital switchover, cooperation and interoperability. For the latter category, licensees are required to comply with the *Television Technical Performance Code*[1] and the

[1] Television Technical Performance Code: http://stakeholders.ofcom.org.uk/binaries/broadcast/guidance/tech-guidance/tv_tech_platform_code.pdf

Reference Parameters[2] which describe some minimum conditions which seek to ensure interoperability between the licensee's broadcasts and domestic receivers.

Digital Television Group (DTG) and the D-Book

4.5 Although UK DTT services use the internationally standardised DVB-T and DVB-T2 systems, in several areas these standards deliberately include significant scope for flexibility in detailed implementation options. However, the DTT platform in the UK operates on a horizontal model, with several independent multiplex operators (rather than a single platform operator), and with many manufacturers supplying a diverse range of domestic receiver equipment. It is therefore necessary to achieve effective interoperability between both the multiplexes as broadcast, as well as between the signals and receivers, in order to ensure platform stability and to facilitate the technical evolution of the platform.

4.6 Requirements in the licences of the multiplex operators (which the BBC also adheres to in the case of the BBC A multiplex) do reduce the number of options, for example in permissible basic transmission modes. These restrictions were introduced with a view to improving prospects for platform interoperability, and are contained in Ofcom's *Reference Parameters*. Nevertheless many detailed aspects of implementation lie outside the scope of the broadcasters' licences, leaving numerous choices to be made by broadcasters, multiplex operators and receiver manufacturers.

4.7 Since the launch of DTT services, the Digital Television Group[3] (a body whose membership includes both broadcasters and receiver manufacturers) has developed and maintained detailed implementation standards for DTT transmission and reception in the UK, and these are contained in its *UK Digital Terrestrial Television: Requirements for Interoperability* (known as the 'D-Book'). DTG Testing is a subsidiary company whose services include providing conformance testing for DTT receiver equipment. DTG testing also manages the 'Engineering Channel', a service which provides a means for manufacturers to deploy over-air receiver software updates.

4.8 The introduction of any new DTT multiplexes could raise technical coexistence issues relating to the level of interoperability with existing services. It is therefore important that the operator or the interim 600 MHz DTT network ensure that their technical arrangements are compatible with those described within the D-Book.

Digital UK and DTT Platform Management

4.9 To a large extent the existing DTT multiplexes operate as independent entities (each carries unique video, audio and associated data, for example). However, a certain amount of ongoing technical coordination takes place between the multiplexes in order to provide some platform-wide services to viewers, and to ensure full interoperability. Two significant areas where ongoing cooperation between multiplexes takes place are in providing programme schedule information (EPG data), and in the assignment of logical channel numbers (LCNs).

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[2] Reference Parameters for Digital Terrestrial Television Transmissions in the UK: http://stakeholders.ofcom.org.uk/binaries/broadcast/guidance/tech-guidance/dttt_uk.pdf
[3] DTG website: www.dtg.org

4.10 Each multiplex contains programme schedule data which is used by receivers to form and display an EPG, as well as carrying the data that helps home recording devices to function. In order to display an EPG containing schedules for all DTT services (and not just on the multiplex currently tuned to), schedule information is 'cross carried' by all multiplexes: i.e., each multiplex contains information on the programme services and schedules of services carried on all other multiplexes. Ofcom's *Reference Parameters* requires a core amount of schedule data ('now & next') to be cross-carried between multiplexes. In practice the multiplex operators voluntarily cross-carry much more extensive schedule data, which allows receivers to provide a full 7-day EPG.

4.11 To implement cross-carriage, and to incorporate the numerous regional variations carried by the DTT network across the UK, technical infrastructure is in place which provides a central point for the collation and subsequent distribution of 'Central Service Information' (CSI, carrying schedule information amongst other data) to individual groups of transmitter sites. Data is contributed by each multiplex operator to this central point, and it is then collated and made available for distribution to the transmitters.

4.12 The cross-carriage of Service Information data between multiplexes does impose a data capacity overhead on each multiplex, the size of which is largely dependent on the number of services or multiplexes in the cross-carriage 'pool'.

4.13 Existing DTT programme services are also assigned unique Logical Channel Numbers (LCNs). LCNs allow viewers to select their desired programme services at a consistent location in their EPGs or via their remote control (e.g., ITV2 is allocated LCN 6, or button '6' on the remote control). Centralised allocation of LCNs is required in order to prevent LCN conflicts and possible subsequent errors in receiver behaviour.

4.14 LCN allocation, as well as overall management and ownership of the CSI infrastructure, is carried out by Digital UK[4] (who have assumed the former responsibilities of DMOL [DTT Multiplex Operators Ltd] following a merger between the two organisations).

4.15 As noted above, the introduction of any new DTT multiplexes, including interim 600 MHz services, could raise technical coexistence issues relating to the level of interoperability with existing services: for example, the use and labelling of transport stream components including LCNs and network descriptors, as well as arrangements for the provision and distribution of schedule data to facilitate the integration of new services into the Freeview EPG system. The Technical Licence Conditions (Section 6 of the main consultation document) contains details of our proposals for technical standards and interoperability requirements for the interim 600 MHz multiplexes.

[4] http://www.digitaluk.co.uk/industry