

## Response to Ofcom's L-Band consultation

### About Arqiva

1. Arqiva has a 50-year history in transmission and has helped pioneer the technologies of the digital age. Formerly the broadcast division of ntl Group, Arqiva was purchased in 2005 by an international consortium led by Macquarie Communications Infrastructure Group.
2. Arqiva is responsible for the entire analogue transmission networks for ITV1, Channel 4 and five and played a leading role in the introduction of digital terrestrial television, for which we have built national networks carrying the Digital 3 & 4 and SDN multiplexes. The network for Digital 3 & 4, with its regional structure, is one of the most complex digital terrestrial TV networks in the world.
3. Arqiva owns and operates some 350 FM and 70 MF transmitters, with customers ranging from the large radio groups such as GWR, EMAP, Chrysalis, Capital and Scottish Radio Holdings, to small community-based stations, and has played a leading role in the development and introduction of digital radio in the UK, supporting the commercial radio industry in making the transition from analogue. Arqiva built the transmission network for Digital One, the national commercial DAB multiplex, and has multiplexing and transmission contracts for 42 of the 46 local and regional DAB multiplexes.
4. In respect of mobile TV, one of the most promising potential uses of L-Band, Arqiva undertook the feasibility studies, field trials and network design for the Singapore mobile DVB-T network and also operates the infrastructure for the Oxford DVB-H trial and for the Mobile TV Now! DMB/DAB-IP trial currently on air in London.
5. All of the above activities are underpinned by Arqiva's Spectrum Planning Group which has extensive experience of planning analogue and digital TV and radio networks and which also offers a coverage prediction service for Arqiva's radiocommunications customers.

### Answers to specific questions

*Q1. Do stakeholders agree with these proposals for the award of this band or have any other comments on the contents of this document?*

6. Arqiva generally supports the approach Ofcom has taken including the careful consideration given to the issues presented by the characteristics of this spectrum. Ensuring that these are addressed as speedily and practically as possible is essential given the particular

importance of this spectrum, a product both of the potential uses of it with current technology and its early availability.

7. L-Band, with its line-of-sight propagation characteristics, is ideally suitable to services targeted at relatively small geographical areas. These will tend to be low power (ERP) as self and international interference would be a problem for any high-power use.
8. Given this, Arqiva does not believe that there is a “wide range and variety of potential services” for which this spectrum would be suitable in respect of current technologies. Rather there appears to be a limited range of suitable technologies:
  - DMB or DAB-IP;
  - DVB-H;
  - Wireless broadband;
  - Satellite radio (S-DAB) - although the consumer demand is unclear and its launch might risk undermining T-DAB just prior to its achieving mass adoption;
  - Community radio on DAB, where the prospects for wide-area DAB are far better in Band III.
9. The extent to which the L-Band auction might elicit bids to operate any of the above technologies will depend upon:
  - the timing of the auction (see Q3 below) with respect to the interplay between L-Band and UHF for some services;
  - the channelisation adopted (Q4 and 5 below); and
  - assessments of the interference analysis, especially implied constraints on geographic coverage.
10. Demand for L-Band spectrum to operate T-DAB multiplexes seems unlikely given the far more suitable characteristics of Band III, both in terms of propagation characteristics (which enable large areas to be covered by single medium-power assignments) and compatibility with current receivers. In addition, provided that the outcome from the current Regional Radiocommunication Conference is sufficient to ensure that Ofcom will be able to license a second national commercial multiplex, then Arqiva would agree that there is probably sufficient spectrum available to T-DAB in Band III to meet short-medium term demand.
11. Demand for wireless broadband seems far from certain given that WiMAX equipment is currently not being developed for this band, being instead developed for higher frequencies:
  - 2.3 - 2.6 GHz
  - 3.3 - 3.6 GHz
  - 5 GHz.

12. There is also potential demand in the lower 27.5MHz for Programme Making and Special Events (PMSE) use but there are considerable constraints on terrestrial use and insufficient spectrum to be attractive for operation of wireless digital cameras as an alternative to the 2.6 GHz band - especially in light of likely broadcaster and consumer demand for HD Outside Broadcasts. However PMSE services may be a good use for the top 12.5 MHz because of the need there for low power uses to protect European satellite services.
13. Arqiva believes that, although the range of potential suitable uses is limited, it is sufficiently wide and, in the lower 27.5MHz, the substitution and aggregation risks sufficiently high, that Ofcom's proposal of a simultaneous multiple round auction, on a technology- and application-neutral basis, seems the auction design most likely to maximise the potential for optimal use of this spectrum.
14. Arqiva further supports the auctioning of specific lots with limited package bidding provided that multiple bids are permitted (i.e. a bidder may simultaneously bid for a package in addition to bidding for one or more of the underlying lots).
15. One further issue which it is worth raising is the potential for interference from users of L-Band into domestic satellite reception which have been poorly installed or maintained. The normal working bands of commonly used broadcast satellites (i.e. C, Ku and Ka) are widely down-converted to the L-Band frequency range (950 MHz - 1750 MHz) by satellite dish Low Noise Blocks (LNBs) for the distribution of signals along coaxial cables to Set Top Boxes (STBs). Consequently there is potential for these distribution paths to be affected by ingress of transmissions to these signal paths from external L-Band frequency users. This degradation of service to a number of specific TV channels has already been recognised in domestic SkyDigital installations throughout the UK.

*Q.2. Do you agree with Ofcom's proposed approach to address the international issues resulting from the Maastricht Plan applicable to the 1452 - 1479.5 MHz frequency band in this spectrum?*

16. Arqiva generally supports Ofcom's approach to address the international issues, in proposing to seek more flexibility within the Maastricht plan through negotiation. Withdrawing from the plan would not help, and staying strictly within it is too restrictive. Arqiva notes, and supports, the recent RSPG opinion.
17. We note in section 5.33 of the Consultation that Ofcom sees a significant risk in seeking more flexibility within Maastricht. Arqiva believes that the major concern is the timescale for agreeing this flexibility.

18. It is essential for Ofcom to do all it can to secure that flexibility before the auction takes place. Without this, there would be considerable risk in acquiring L-Band spectrum in which to launch DVB-H as licensees would not have the necessary certainty that this technology could be deployed in 5 MHz channels since this would include transmitting in the 'gaps' between the 1.7 MHz DAB blocks.
19. The alternative, as proposed in section 1.9, of requiring any mobile broadcast TV service launching in L-Band to employ DAB or DMB would be to favour one technology over another and would likely be viewed by most potential operators as a poor second best as this would considerably increase the capital investment required, and consequently the risk attached to such an innovative service, for offering a similar number of TV channels.
20. To ensure that investment in innovative services is not discouraged, Arqiva believes that Ofcom needs to give more urgency and commitment to a successful outcome to this than is shown in (for example) section 1.8.
21. However, if it seems to Ofcom that doing so could take years, than Arqiva would recommend that the auction not be delayed any further and that Ofcom continue to work towards agreeing this flexibility throughout the auction and award process in the expectation that agreement could be secured before any services requiring this flexibility completed their initial network build and were launched in this spectrum. This outcome, however, would very much be second best and the additional uncertainty would be reflected in the willingness to bid.

*Q3. Do you agree with Ofcom's proposed approach to award all of the spectrum between 1452 and 1492MHz at the same time and as soon as practically possible (i.e. a simultaneous award of the top 12.5MHz and the lower 27.5MHz of this spectrum)?*

22. In principle Arqiva agrees that all of the spectrum between 1452 and 1492 MHz should be awarded as soon as practically possible and there seems no obvious reason why both parts of this band should not be awarded simultaneously.
23. What is of greater concern is the relative timing of the auction for the lower 27.5 MHz vis-à-vis other auctions. For each of the services for which this spectrum appears most suitable there is alternative, more suitable spectrum which Ofcom will also auction.
24. If L-Band is auctioned before these alternatives, this will be reflected in the range and seriousness of L-Band bids and the prices ultimately

achieved for spectrum licensed. Of arguably greater importance to UK plc, this could result in new, innovative services failing to acquire spectrum.

25. This is especially relevant to DVB-H for which UHF spectrum within Band IV and V (i.e. the Digital Dividend spectrum and Channel 36) would be more beneficial for consumers as:
  - European industry backing for DVB-H is focussed on UHF and adoption of the same here would lead to a wider range of cheaper handsets being available;
  - because of the lower frequencies, the capital expenditure required for network build would be considerably lower.
26. Mobile TV is an innovative service with proven consumer demand from the Oxford DVB-H and overseas trials, plus it has considerable potential to play a key role in showcasing UK media at the 2012 London Olympics - truly the trackside seat in your pocket. In addition Arqiva is mindful of the considerable support for mobile TV in Germany, Italy, Spain and the recently announced French mobile TV initiative.
27. Any delay in making available suitable spectrum for launching mobile TV would be highly disadvantageous for UK plc. As the optimal spectrum in which to operate mobile TV is UHF, an efficient outcome for L-Band spectrum would most likely be secured if potential DVB-H operators could bid for L-Band spectrum informed by the outcome of an earlier (or simultaneous) auction for alternative UHF spectrum.
28. With the likely timing of the DDR auction currently being the end of financial year 2007/08, and assuming that UHF Channel 36 is satisfactorily addressed by Ofcom following the conclusion of the Regional Radiocommunication Conference, the optimum solution would therefore seem to be to auction UHF Channel 36 first, followed by L-Band.
29. However if this could not be achieved without delaying L-Band, Arqiva would recommend that the L-Band auction proceed without reference to Channel 36 as any delay beyond the current anticipated timing (2007Q2) would be significantly disadvantageous to investors, consumers and UK plc.

*Q4. What are your views on the preferred packaging option for the lower 27.5 MHz of this spectrum?*

30. The auction design must ensure that the channelisation adopted does not unduly inhibit any service for which this spectrum would otherwise be suitable from acquiring viable spectrum.

31. This clearly is of particular relevance to mobile TV which could operate in L-Band as either DMB/DAB-IP within 1.7 MHz channels or as DVB-H where the current specification is for channels of 5, 6, 7 or 8 MHz and where DVB has halted its attempt to re-specify DVB-H such that it could be accommodated within a 1.7 MHz channel. Even if it had been so re-specified, and that this implementation then attracted the necessary manufacturer support, this would have been sub-optimal for DVB-H operators and end users as the network build costs would be similar whether DVB-H operated in 1.7 MHz channels (offering only 3 or 4 simultaneous linear television streams per channel) or 5 MHz (offering 10-11 streams).
32. Although DVB-H could most efficiently be launched using 8 MHz channels, the characteristics of the lower 27.5 MHz of L-Band suggest the optimal implementation in this band, as considered by Ofcom, to be 5 MHz DVB-H channels operated within 5.1 MHz packages of three underlying 1.7 MHz channels.
33. It is essential that bidders be easily able to bid for such packages. We recognise that the tradable nature of this spectrum would enable licensees to swap allocations between them post-auction, but this would introduce delays and reduce the certainty that risky, innovative services such as DVB-H would need. Consequently, to ensure that bids for both DMB/DAB-IP and DVB-H could be accommodated within the auction, potential mobile TV operators must be able to bid for packages of three 1.7 MHz channels and for specific 1.7 MHz channels.
34. Ofcom has suggested four packaging options. As pursuing Option D (package the entire lower 27.5 MHz in a single lot) would undermine one of the auction's key objectives by increasing the likelihood of inefficient allocation, there are in effect three packaging options to consider.
35. Option A (1.7 MHz blocks) would allow the market to determine the optimum aggregation, permitting bids for three contiguous lots, but the risk of the 'aggregation' problem described in section 6.23 producing a sub-optimal outcome is considerable. In addition, there would be the added complexity of assessing a bid for a 5 MHz block with the sum of the individual bids for the underlying 1.7 MHz blocks. Ofcom mentions that the disadvantages of Option A may be mitigated by the auction design; this needs to be developed more by Ofcom.
36. Option B, dividing the lower sub-band into five 5.1 MHz channels and a single 1.7 MHz channel, would permit bidders to more easily acquire spectrum in which to operate DVB-H with 5 MHz channels, thus leaving 0.1 MHz of each channel awarded left fallow as a guard band or available to be traded. However this option would be sub-optimal for bidders wishing to launch different services - a crucial

failing. In particular it would seriously disadvantage potential operators of DMB/DAB-IP.

37. Option C suggests that the sub-division into varied sized blocks would be done by Ofcom before the auction. This seems to be implied by section 6.32, where Ofcom are anxious to avoid making judgements by 'pre-compiling lots into larger packages'. If so, this seems too prescriptive and might prevent bidders from acquiring enough 5 MHz blocks in which to operate DVB-H.

38. Overall Arqiva believes that Option A, offering the underlying 1.7 MHz channels, is the most likely to optimise efficient allocation, when combined with a simultaneous multiple round auction with limited package bidding provided that multiple bids are permitted (i.e. a bidder may simultaneously bid for a package in addition to bidding for one or more of the underlying lots).

*Q5. Do you agree the upper 12.5 MHz of available spectrum should be awarded as one lot?*

39. Arqiva does not have a view on this.

*Q6. Do you agree with the proposals for an industry code of practice on engineering coordination to control adjacent-channel interference?*

40. Optimal use of this spectrum, and ensuring that the launch in it of innovative, risky services is not discouraged, would suggest that Ofcom and industry need to agree guidance for how interference should be managed before the auction takes place.

41. For any spectrum band where Ofcom licenses a range of technologies, Arqiva supports the principle of, in the first instance, leaving industry to reach a consensus on dealing with potential interference. However the extent to which this would be the optimal approach for UK plc must be linked to how valuable the relevant spectrum is and Arqiva would urge Ofcom to take into account previous examples where coordinating adjacent channel interference was left entirely to industry.

42. Not knowing the uses which the rest of the band is likely to be used for makes an investment case for bidding for some of this spectrum more difficult. There may be a requirement to cap ERPs and to use approved sites, requirements which may not be part of bidders' business plans and, consequently, may render licensees' proposed services non viable.

43. A mixing of powers and network densities in the same band would create the greatest difficulty in managing the band. This is not just a transmission problem as the transmission parameters are set by the performance of the receivers in their ability to work with local adjacent channel transmissions.
44. Arqiva's considerable experience of industry co-ordination of Band III spectrum to facilitate the roll-out of the Digital One DAB multiplex is that small operators in adjacent channels often have limited capital and incentive to reach agreement; indeed they are incentivised to hold other spectrum users to ransom. Digital One's roll-out suffered considerable delays as a result which cannot, in hindsight, be objectively regarded as having been beneficial to UK plc.
45. The greater the range of new services to be operated in the spectrum, and the more investment at risk backing innovative services, then the greater the benefit to UK plc which would result from Ofcom taking a more hands-on, co-regulatory approach. A failure to ensure this will mean that potential bidders will have to reflect the likelihood of undertaking industry negotiations in their business plans, with that injected uncertainty being reflected in their willingness to bid and the size of any subsequent bids.