Response: The Ofcom Consultation, "The Future of Digital Terrestrial Television." 2008-01-30

This response to 'The Future of Digital Terrestrial Television' Ofcom Consultation is in **full support** of the Ofcom plan, with a few minor comments and an alternative 'Plan B' answer to question 12.

At the end of this paper are my answers to the 23 questions.

In addition I have 3 larger proposals, that all build on the Ofcom plan and all with focus on the best use of DVB-T2 and MPEG-4.

- A proposal to enable one HD channel **pre-DSO** UK-wide from 2009/2010.
- A proposal for an early DVB-T2/MPEG-4 upgrade to PSB-2 and creating a 4th HD block at DSO.
- A proposal that Ofcom should offer the COM MUXes an easy and early path to DVB-T2/MPEG-4

The present DVB-T/MPEG-2 services will only be very slightly affected - both pre- and post-DSO - by these proposals. Viewers presently using DVB-T equipment should be able to continue to watch the current public service broadcasts using there equipment – 'for the foreseeable future'.

My first proposal is very much in line with this consultation relating to HD, DVB-T2 and MPEG-4, but it is related to the **pre-DSO** situation in regions with DSO later than Granada (i.e. DSO in 2010-2013)

The other two proposals focus on multiplying the benefits by a fast, but fair move to DVB-T2 and MPEG-4.

Of particular importance is it, that my second proposal will enable not 3, but **4 HD blocks at DSO**.
This eliminates the wait for a somewhat speculative MPEG-4 coding gain to enable the 4th HD block.

The Opcom plan is using the extra capacity created at DSO by the QAM16/64 change, by better MPEG-2 encoding, by using DVB-T2 and MPEG-4 to get just enough capacity for the 3 HD blocks.

These proposals are likewise using the large increase in ERP and area covered at DSO and the availability for a limited time of some newly freed spectrum, to enable a faster move to DVB-T2 while protecting the current DVB-T viewers and there assets.

While the first proposal do not use any new spectrum resources the second and third do use extra frequencies. These are, however, only used for a limited time and at an ERP level 6 -10 dB below the post-DSO ERP levels. This is **not** a proposal for a 7th or 8th MUX.

Crystal Palace as an example: Proposal 2 and 3 will work with an unchanged ERP of 40 kW, will work nicely with 60 kW and with 80 kW coverage will be well above the current coverage.

Crystal Palace	pre-DSO	Post-DSO
Analog total ERP (not Five)	4000 kW	0 kW
PBS + COM total ERP	120 kW	1200 kW
MUX-2 / MUX-C ERP	20 / 20 kW	45 / 15 kW - 55 / 25 kW
MUX-2 + MUX-C ERP	40 kW	60 – 80 kW
MUX-2+C / (PSB + COM) ERP	33 %	5 – 6.7 %

Raising the total ERP from 1200 kW to 1280 kW is an increase of less than 0.3 dB.
(Note proposal 3 as included here may no longer use MUX-C at DSO CP 2012Q2)

The risks with these proposals are identical to those in the Ofcom plan. Same technology, same equipment and same time schedule. There will be a need for more receivers, but this is rather a mitigating factor as it increases the size of the early market and makes it more interesting to vendors.

I know these proposals will make DSO in the regions 'Border' and 'West Countries' somewhat more difficult. I think, without going into specific details, that these problems can be managed in a way that will be well accepted by the affected viewers in these regions.
It is, however, very important that the viewers in these regions - not least in the **Selkirk** area – are **informed urgently about the new DVB-T2** standard and are recommended purchase of inexpensive STB's on a 'need to have' basis only.

Finally I will urge Ofcom to initiate full investigations - including a full technical evaluation - into the new and much improved possibilities for regional, national and UK-wide single frequency networks (SFN), that the DVB-T2 standard likely will provide.

This - I think - will be very much in line with the Ofcom goal of ensuring spectrum efficiency**.**

Terms used.

Even though DVB-T can be combined with MPEG-4 and DVB-T2 with MPEG-2, I will take

- DVB-T to mean DVB-T and MPEG-2
- DVB-T2 to mean DVB-T2 and MPEG-4.

I will also assume that all DVB-T2 is also HD enabled, while any DVB-T is not.

I shall use the terms MUX-1,2,B and MUX-A,C,D when referring to the pre-DSO MUXes running at pre-DSO ERP unless otherwise noted.

I shall use the term PSB-1,2,3 and COM-4,5,6 when referring to the post-DSO MUXes transmitting with ERP as in http://www.ofcom.org.uk/tv/ifi/tech/dsodetails/81plan.pdf

I shall refer to MUX-1,2,B and PSB-1,2,3 collectively as the PSB MUXes.
I shall refer to MUX-A,C,D and COM-4,5,6 collectively as the COM MUXes.

ERP is “effective radiated power”

SFN is “Singel frequency network”

The term 'DD spectrum' is short for the main digital dividend channels i.e. C31-40 and C63-68.

The term 'interleaved spectrum' is spectrum within C21-30 and C41-62, being reusable, at some ERP level.

The term 'SFN recovered spectrum' is spectrum recovered from changing a MUX on two or more main transmitters from MFN to SFN.
This may or may not include - depending on context – spectrum recovered by operating smaller 'gab-fillers' in SFN mode with there main transmitter.

The protection of existing DVB-T receivers

The only reason not to move directly to DVB-T2/MPEG-4 is the need for new receivers everywhere. And any proposals - like the one in this consultation - must protect the DVB-T receivers already in use.

“8.29. First, it is very important that PSB services continue to be available universally to DTT viewers who have existing equipment.”

I think, however, the above statement do not distinguish clearly enough, between the need for PSB services to be available universally to all DTT viewers and the need to protect existing (DVB-T) equipment already in use by DTT viewers.

The need to protect the current DVB-T/MPEG-2 receivers is based on sound economic thinking. But, even beyond pure economics, there is a political need to back the promises given or implied - rather stupidly, I may add - to the general public about the life expectancy of the DVB-T standard and equipment.

I noticed, that the COM MUXes are not within scope of this consultation and are not expected to protect the DVB-T receiver for any extended period. They may, indeed, ask for Ofcom's permission to change to DVB-T2 or other changes.

But it still leaves some important questions:

- What is to be protected?
- Where is it to be protected?
- How long is it to be protected?

What is to be protected?

“The DVB-T receivers, purchased and used actively before new DVB-T2 STB's was general available, should be protected at the pre-DSO signal levels.”

DVB-T equipment purchased for future use or as 'nice to have' products need **not** be protected.

DVB-T equipment purchased new or second-hand after the general availability of DVB-T2 STB's need **not** be protected.

I addition, I think, only DVB-T equipment used by viewers paying ‘colour TV License’ continuously from pre-DSO forward need to be protected.

Where is it to be protected?

Until DSO, only 73 % of UK households are covered by DTT transmissions and it is estimated that 55-65 % are using DTT in some form.
Estimated 8-15 % of UK households living in DTT covered areas are still using analog TV sets only.
This is symbolized by the **red area** in FIG 1 (areas not to scale, areas are not real circles)

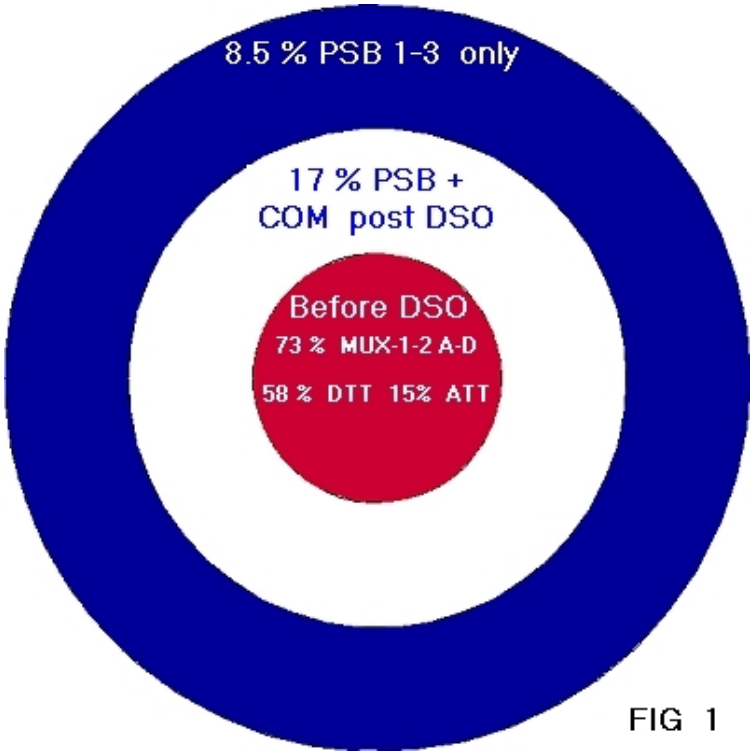


FIG 1

The red area for MUX 1,B is slightly larger than for MUX 2, due to the QAM16 vs. QAM64 transmission modes. The difference is equivalent to 4 dB in ERP, but the change to the 8K mode will compensate somewhat and increase the immunity to impulse noise.
The **red area** to be used shall be **larger** than the **red area** defined by the current MUX-2.

At DSO an additional 17 % of households will be able to receive both the PSB and COM MUXes from the 80/81 transmitters. This is the **white area** in FIG 1.

At DSO 8.5 % of UK households will be able to receive only PSB 1-3 from relay transmitters – the **blue area** in FIG 1 - and 1.5 % will not be able to receive any DTT.

Pre-DSO, all actively used DVB-T receivers must be located in the **red area** (definition of red area) and must be using aerials that are powerful enough to receive the signals at the low pre-DSO ERP levels. Otherwise they will not receive any digital TV. Please note that when digital signals are received without errors an increase in signal strength will not improve the picture quality in any way.

"The DVB-T receivers should be protected in the red area only and at pre-DSO signal levels only"

One implication of this is that every household in the **white and blue** areas should be actively discouraged from purchasing DTT receiver equipment before DSO, but wait for the availability of DVB-T2 products.

In addition all '**red**' households should be recommended only to purchase DVB-T equipment on a **'need to have'** basis. Though it will continue to work, better equipment will be available in the second half of 2009.

There will be some people moving out of the red area, but they will be relatively few, as only 27 % of homes are outside the red area. Most people do not move far anyway.

How long is it to be protected?

In the consultation paper Ofcom states that DVB-T will be used **'in the foreseeable future'**. I fully understand that this is neither the place nor the time - for Ofcom - to announce the shutdown of DVB-T and MPEG-2.

The cost - say per year, in terms of lost spectrum efficiency - by not using the better standards should, however, be compared with the saving of postponing - for the same 1 year period - the purchase of new equipment, new STB's and new transmitters.

It is - to me - unlikely, that this economic 'break-even' will happen later than 5 years after 'first customer shipment' of DVB-T2 STB's - maybe sometime in late 2014.

Relatively few viewers, that mainly watch the 5 main channels, may prefer to use there DVB-T receiver somewhat longer.

For the COM MUXes it seems, that the main target viewer-groups will have changed to new receivers much sooner. Those that have not changed to new DVB-T2 receivers after a few years are hardly commercially attractive viewers.

With DVB-T2 STB's available from the second half of 2009, I will assume - pessimistically, I think - that

- The COM MUXes may stop DVB-T/MPEG-2 transmissions no later than end of 2012.
- The PSB services, except the main channels, must transmit DVB-T/MPEG-2 for at least some years longer.
- The main channels BBC1, BBC2, ITV1, C4 and Five may need to transmit using DVB-T/MPEG-2 even longer.

This will give - for the **newest** DVB-T equipment - a lifetime of 5+ years with all pre-DSO PSB SD services and a longer lifetime with only the 5 main PSB channels available.

For the average DVB-T receiver the useful lifetime may be well over 10 years.

These dates are not part of my proposals, but are only my own current thinking.

First proposal: One DTT HD channel (BBC-HD) - UK-wide from 2009/2010.

DVB-T2 will enable a 30 % increase in bit rate at the same power level and with same coverage.

This is valid for all current DVB-T modes, including the current QAM16 mode used by MUX-B. It will allow MUX-B to transmit 24 Mbps instead of 18 Mbps with same or better quality.

For all pre-DSO regions with DSO **later** than Granada (2009 Q4) it is proposed:

- That BBC-Parliament and maybe one or two other services are relocated from MUX-B to one of the other MUXes. As pre-DSO coverage is close to identical for all MUXes, any MUX - with capacity - can hold the displaced services. If the BBC optimizes stat-muxing on MUX-1 pre-DSO as they plan to do post-DSO, BBC-Parliament may be carried on MUX-1.

- That DVB-T2 capability is added to MUX-B in addition the existing DVB-T capability. This is expected to include only new digital and low power analog (RF) equipment.

- That MUX-B broadcasts with unchanged ERP, DVB-T at 18 Mbps and DVB-T2 at 24 Mbps, with **identical area covered**. MUX-B is identical UK-wide and only one extra MPEG-4/stat-mux is needed.
  The existing SD services on the 18 Mbps MUX-B will be using 12-13 Mbps with MPEG-4 encoding, freeing 5-6 Mbps. DVB-T2 will add another 6 Mbps extra capacity.
  This gives a total extra capacity of 11-12 Mbps - **enough for one HD channel from 2009/10**.

- That MUX-B **broadcasts one HD channel** and the non relocated SD services (currently BBC-4, 30X) using DVB-T2 **from very early 2010, starting with a 5 hour daily schedule** and with an extended schedule, during large events.

- That MUX-B broadcasts the normal schedule including BBC-CBeebies using DVB-T for the remaining 19 hours.

- That MUX-B may extend the DVB-T2 schedule into the early hours, in order to 'podcast' extra HD programs.

Benefits:

- The DVB-T2 modulators and other transmission equipment can likely be reused when MUX-B becomes PSB-3 at DSO.

- Existing DVB-T viewers can continue to view BBC-4 and other services for 19 hours per day. And view BBC-Parliament for 24 hours per day.

- Even though capacity is only enough for this one BBC-HD channel, it will demonstrate new services - UK-wide - on the DTT platform up to **3 years earlier than otherwise possible**.

- Purchase of DVB-T2/MPEG4 receivers will be the obvious choice from 2009 for everybody, UK-wide.

- The size of the market for DVB-T2 will be significantly larger already from 2009/2010.

- There will be many DVB-T2 receivers in use at later (than Granada) DSO's.

- Existing DVB-T receivers can be used at second, third TV set.

- The last DVB-T box purchased on a '**need to have**' basis - UK-wide - will be late 2009.
  This will be the start time for the count-down to the closing of DVB-T services (maybe some 4-7 or more years later).

- The 3 large sports events - the Winter Olympics in Vancouver, the FIFA World Cup both in 2010 and the London Olympics in 2012 - will be great promoters of the new standard.

- Olympic figure skating and ice dance will likely be great to view on HD and is known to attract viewers not normally viewing sports. Need I say “Torvill and Dean, and 24 mill viewers”?

Drawbacks

- BBC-4 viewers will need a new STB to view the evening broadcast on BBC-4, but BBC may schedule important programs on one of BBC's other channels. BBC-4 has many reruns anyway.

- Some info services may not be available on DVB-T during the evening 5 hour DVB-T2 period. But BBC may use new Internet services to compensate.

These two points are the only reduction in PSB services for current DVB-T viewers that I propose in all tree proposals.

- The BBC-HD service will only be available in the red areas - 73 % of the households – pre-DSO.

Second proposal: Upgrade PSB-2 to DVB-T2/MPEG-4 at DSO.

This proposal focuses on upgrading PSB-2 to DVB-T2 at DSO, while protecting the DVB-T receivers in the **red** area described above by retaining MUX-2 at low ERP levels for DVB-T transmissions.

It is part of this proposal that MUX-2 should operate close to the current MUX-1 coverage.
This should be possible with a combination of 1) selecting the best available frequency post-DSO 2) using the 8K mode and 3) at least a small increase in ERP post-DSO.

This is using extra frequencies, but **it is NOT a 7th multiplex** in the sense, it is only simulcasting the PSB-2 SD services available pre-DSO.

For Granada and all regions with DSO thereafter (from 2009 Q4) it is proposed:

- To reorganise PSB-2 at DSO with a total of 9 SD services.

- That PSB-2 is upgraded to DVB-T2/MPEG-4 using post-DSO ERP and parameters suitable for a regional (DVB-T2 type) SFN - bit-rate 31-33 Mbps.
  The 9 services will require about 18-19 Mbps on PSB-2.

- To retain MUX-2 at pre-DSO ERP using - if possible - existing low power transmitters.

- That MUX-2 is moved to
  - a frequency used at the site before DSO, but freed at DSO (DD or non-DD spectrum)
  - 'Interleaved spectrum'
  - a DD frequency i.e. C31-40, C63-68 (temporarily).
  - 'SFN recovered spectrum' for late DSO regions.

- To change MUX-2 mode to 8K. This should give some extra signal and impulse robustness.

- That MUX-2 ERP is increased by 1-4 dB where possible without interference problems or high costs.
  MUX-2 should now have **very good coverage** in the **red** area.

- That the 9 PSB-2 SD service are simulcast on MUX-2 at 24 Mbps. If MUX-2 can only hold 8 SD services then simulcast one SD service on COM-6 (Ref my answer to Q12)

- That, during 2010-2012, some 'SFN recovered spectrum' is obtained by converting PSB-2 and maybe PSB-3 into regional - spectrum efficient DVB-T2 type - SFN's.
  This I believed to be particularly helpful in the South and South East of England.

- To use modern SFN gab-fillers for PSB-2 and PSB-3 to free additional frequencies at low-ERP MUX-2 locations (30+ locations).

- To move MUX-2 at all 80 sites to non-DD frequencies and do this - for post-DSO sites - before 2012 if possible.
  Caldbeck and Ridge Hill both transmitting two PSB-2 services may present a special problem?

Benefits.

- The promised protection of DVB-T/MPEG-2 equipment is maintained for **all viewers** in the **red** area.

- The universal 98.5 % coverage is maintained.

- The extra capacity on PSB-2, estimated to 12-15 Mbps, can be used to broadcast one HD channel, plus one or maybe two new SD channels. This will allow **all 4 main HD channels to be broadcast from DSO**. This is a very important benefit as the 4th HD channel will no longer dependent on improvements in real-time MPEG-4 encoding. Such improvements have often been overestimated in the past.

- If and when MPEG-4 improves, new SD services may be allocated to PSB-3 or even to PSB-2. When PSB-3 eventually will have the capacity for all 4 HD channels, the 4th HD channel can move to PSB-3. (Stat-muxing is assumed to work best with all HD or all SD programs in a MUX).

- For PVR's the more efficient MPEG-4 encoding done by the TV-station will maintain the original broadcast quality and increase the capacity of the PVR harddisk 1.5 to 2 times.

- SFN can be build with a much improved standard and using only new DVB-T2 receivers. Potential problems with older DVB-T receivers in relation to echo performance etc. can be ignored.

- As PSB-2 and PSB-3 are converted to DVB-T2 and SFN enabled, new low cost 'on channel repeaters' can be used. This may even create savings later in the DSO process.

- Most or all of the transmitters for MUX-2 exist and is not expected to be upgradeable by the typically 10dB planned at DSO. This 'existing and pre-installed' equipment base does also make it - economically - very attractive to retain MUX-2 and upgrade PSB-2 to DVB-T2 at DSO.

Drawbacks

- The main drawback is the use - for a limited time - of more spectrum. Some DD frequencies may be needed in 2009-2011/12. The fact that only 22 of the 80/81 sites transmit with 5 kW or more should, however, make frequency allocation easier.

- One or a few DD frequencies may be needed for the lifetime of MUX-2 in the South of England, where four of the seven 20 kW MUX-2 transmitters are located and where International coordination is much needed and often very difficult.
  Aerial group 'A' sites may present a problem as 38% of the group A channels (C21-C37) are DD channels.

- I minor problem may be that the 2K-only receivers will not work until 2012 as now planned. Everyone else will however get a better and more robust reception. It has been argued that these 2K receivers were expensive, but any book in economics will tell that the maximum value of any product is its replacement cost.
  With DVB-T2, a clearly superior product on the market, the fast move to flat screen TV and the energy savings that is likely with new boxes, I think the 8K mode should be delayed until DSO Granada, but not longer.

- Investment in new MPEG-4 encoders and DVB-T2 modulation units (mostly digital) may strain budgets in the early DSO years, but should not add much to the total cost.

- Operational cost for MUX-2. But MUX-2 currently transmit with only 335 kW UK-wide. This is only 9.3 % of the planned PSB-2 ERP.

One possible 'MUX-2 exit strategy'.

Having introduced the '**red**' MUX-2 and suggesting Ofcom should allocate the needed frequencies, I have also briefly written my version of a 'MUX-2 exit strategy'.

This is not a proposal, but just one possible scenario for eventually closing MUX-2.

- Continue MUX-2 simulcast of the 9 SD services from PSB-2 until after the end of final DSO, maybe sometime in 2014/2015.

- Upgrade PSB-1 to DVB-T2/MPEG-4 and SFN. The only BBC services to be broadcast in DVB-T/MPEG-2 are BBC1 BBC2 and one BBC-Info service.

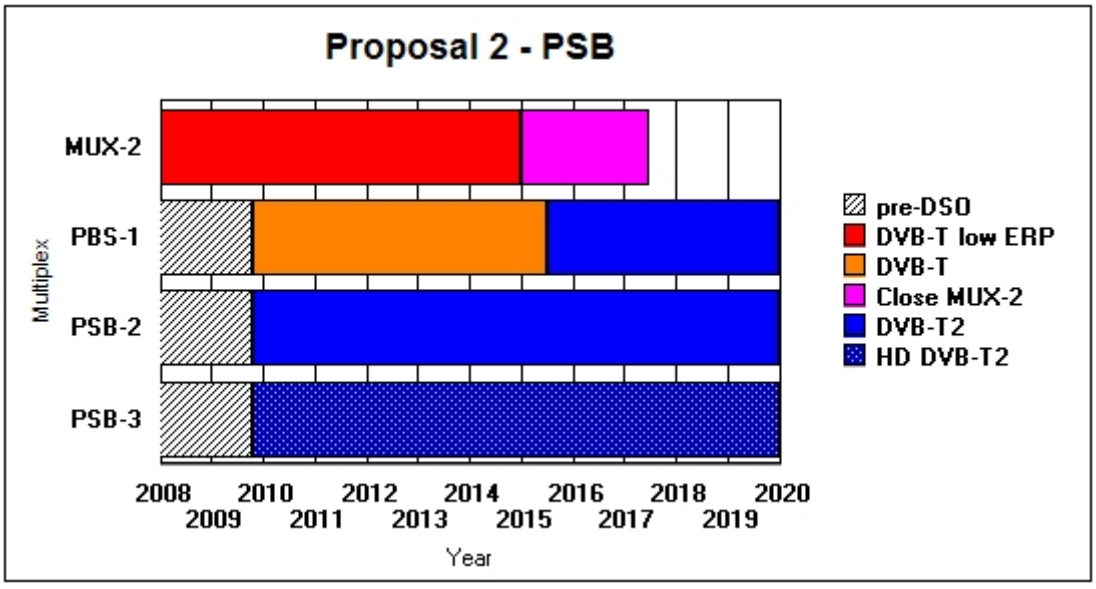
- Simulcast the 5 main channels only, BBC1, BBC2, ITV1, C4, Five and one / two Info services on MUX-2. Secondary PBS-1 and PBS-2 services are then no longer broadcast in DVB-T/MPEG-2.

- If needed MUX-2 ERP may be reduced and modulation may be reduced to QAM16 CR3/4 - bit-rate 18 Mbps with unchanged coverage.

- Close MUX-2 when it is no longer needed. All MUX-2 transmitters need not close on the same date.

- The TV licence database may be used to poll '**red**' viewers, if they still need the DVB-T services and for how long.

Graph for DSO Granada



Third proposal: Upgrade COM-5 to DVB-T2 at DSO and COM-4 at DSO Meridian/Tyne.

This proposal is very much the COM version of my 'Proposal 2' for PSB-2 and is dependent upon that proposal.
As the Ofcom position towards regulating the COM MUXes seems rather different than for the PSB MUXes, I will propose that:

- Ofcom enters into a dialog with the COM broadcasters about a DVB-T2 upgrade.

- Ofcom proposes to allow one of the pre-DSO MUXes A,C or D to be retained - for a **very limited period** and operating at pre-DSO ERP levels (or 1-2 dB higher), in order to ease the upgrade and protect the '**red**' DVB-T viewers.

- Ofcom ensures that a significant part of the COM capacity remains on Freeview. (Ref 8.30)

I know this will be very difficult and likely will necessitate the use of some DD frequencies, but it will make a 'COM' transition to DVB-T2 much less complicated.

I think closing MUX-C early in 2012 (Meridian) will be possible, but 'Olympic considerations' may delay that some 6-9 month (Tyne Tees).

I have written one possible upgrade scenario that may look like this:

For Granada and all regions with DSO thereafter (from 2009 Q4) it is proposed:

- That Five is moved to PSB-2 and 2 SD services are imported from PSB-2 - a total of 21 COM SD services are then on the COM MUXes.

- That all the COM services are sorted in order of importance as agreed between the COM broadcasters, from p1 to p21. (importance = need to stay on DVB-T the longest and needed bit rate)

- That the 7 most important SD-services p1-p7 and most radio services are allocated on COM-6. The next 5 services p8-p12 are allocated on COM-5. The remaining 9 low priority services p13-p21 are allocated on COM-4.

- That COM-4 and COM-6 are upgraded as now planned: DVB-T changing to QAM64, 8K, CR2/3 and bit-rate 24 Mbps.

- That COM-5 is upgraded to DVB-T2/MPEG-4, using parameters suitable for a regional (DVB-T2 type) SFN. COM-5 may use a lower coderate than PSB-2/PSB-3 to partly compensate for the lower ERP of COM MUXes. Estimated bit-rate 30 Mbps.
  The 5 SD services are using 10-12 Mbps and there is **18-20 Mbps free** DVB-T2/MPEG-4 capacity.

- That MUX-C is retained, for all regions with DSO's before Meridian/Tyne at pre-DSO ERP using existing low power transmitter where possible.

- That MUX-C is moved to
  - a frequency used at the site before DSO, but freed at DSO (DD or not-DD spectrum)
  - 'interleaved spectrum'
  - a DD frequency i.e. C31-40, C63-68 (temporarily).
  - 'SFN recovered spectrum'

- That the mode is changed to 8K. This should give some extra impulse and signal robustness.

- That the coderate is lowered to 2/3 and the bit-rate from 18 to 16 Mbps to increase robustness and coverage without the need for a larger increase in ERP.

- That MUX-C ERP is increased to at least the pre-DSO MUX-1, B level. If possible increase MUX-C ERP by an additional 1-2 dB.
  MUX-C should now have **very good coverage** in the **red** area.

- That the 5 services P8-12 are simulcast on MUX-C (DVB-T/MPEG-2) until DSO Meridian/Tyne.
  All COM services are available to DVB-T viewers in **red** area.

- That, during 2009-2012, some 'SFN recovered spectrum' is obtained by converting COM-5 into regional - spectrum efficient DVB-T2 type – SFN's.
  This I believed to be particularly helpful in the South and South East of England.

- That COM-4 is upgraded during 2012 to DVB-T2/MPEG-4, using parameters suitable for a regional (DVB-T2 type) SFN. COM-4 may use a lower coderate than PSB-2/PSB-3 to partly compensate for the lower ERP of COM MUXes. Estimated bit-rate 30 Mbps.
  9 SD services are using 16-18 Mbps and there **is 12-14 Mbps free** DVB-T2/MPEG-4 capacity.

- That MUX-C is closed as frequencies are needed during 2012 (not necessarily at the same time for all transmitters). DVB-T viewers loose COM services p8-p12, when the MUX-C transmissions are closed during 2012.
  After DSO Meridian/Tyne, all '**red**' DVB-T viewers will have **all pre-DSO PSB SD services and 7 COM SD services p1-p7 and most COM radio.**
  .
- In early **2013** COM-6 is upgraded to DVB-T2/MPEG-4, operating in a (DVB-T2 type) SFN. COM-6 may use a lower coderate than PSB-2/PSB-3 partly compensating for the lower ERP of COM MUXes. Estimated bit-rate 30 Mbps.
  The 7 SD services are using 12-14 Mbps and there **is 16-18 Mbps free** DVB-T2/MPEG-4 capacity.

COM services are now DVB-T2 only.

Benefits

- The COM MUXes gets 18-20 Mbps extra MPEG-4 capacity at DSO and not just 12 Mbps MPEG-2. MPEG-4 can be used on COM-5. 10 new SD services or 2 HD services can be carried.

- The COM MUXes gets 12-14 Mbps new capacity during 2012.
  The COM MUXes gets 16-18 Mbps new capacity before 2013 Q2.

- A total increase of 46-52 Mbps, equivalent to **5-7 new HD or 25-30 new SD** services by 2013 Q2. **The total capacity** of the COM MUXes is about 90 Mbps (now 60 Mbps) equivalent to **9-12 HD or 45-55 SD services.**

- This proposal will benefit much if my first proposal is realised, as DVB-T2 receivers will be more widely available in 2012 when both COM-4 and COM-5 upgrade directly to DVB-T2 at DSO.

- Existing DVB-T viewers (in **red** area) have access to **all 21 pre-DSO COM services until sometime in 2012.**

Existing DVB-T viewers (in **red** area) have access to **between 7 and 12 COM services in 2012**.
Existing DVB-T viewers (in **red** area) have access to **7 pre-DSO COM services until early 2013.**

- As the COM MUXes are converted to DVB-T2 and SFN enabled, new low cost 'on channel repeaters' can be used. This may make it much more economically for one or more of the COM MUXes to extend coverage maybe from 90 % to 95 % or higher.

  This seems very much in line with "6.40" in this consultation.

- The change to real large scale SFN's will be highly attractive, but will require a frequency re-planning and coordination. This is not expected to be possible before the end of DSO, but for a limited number of sites.

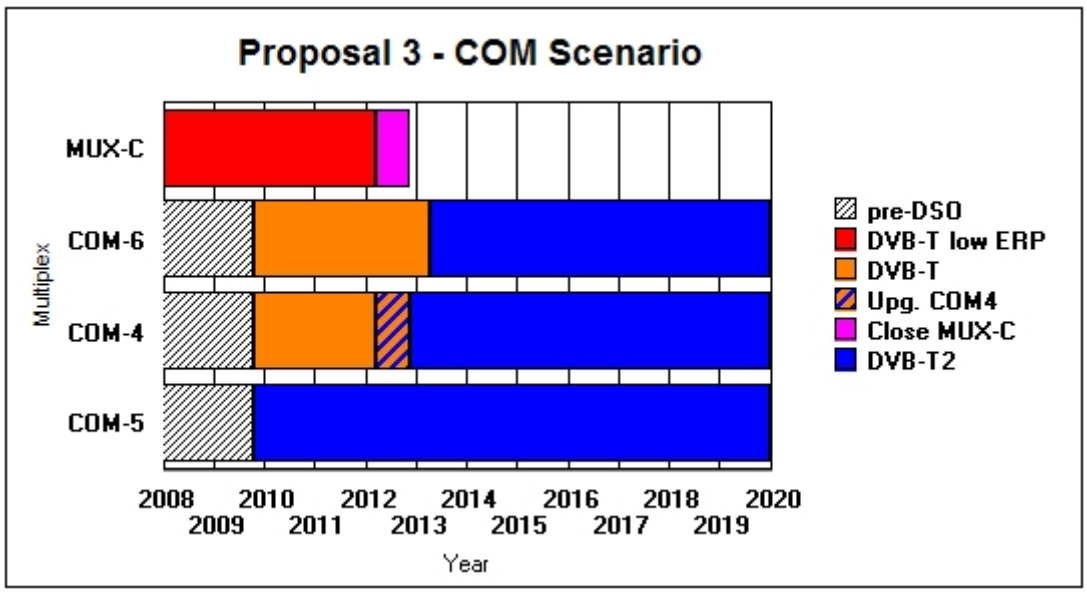
Drawbacks

- The main drawback is the use - on top of MUX-2, but for a very limited time - of more spectrum. The DD frequencies are likely needed, but only until sometime in 2012. Some DD frequencies may well be available at most locations in this timeframe.
  The fact that only 22 of the 80/81 sites transmit with 5 kW or more should make the frequency allocation easier.

- It may not be possible to match the new aerial group and the MUX-C channel, so pre-DSO aerials or wideband aerials may be needed.

- Operational cost for MUX-C. This is only between 6 month and a maximum of 3 years depending on site. It should not be a major problem.

Graph for DSO Granada.



The 23 Answers:

***Question 1**: which services are most likely to drive take up of DTT consumer reception equipment using new technologies? In particular, are HD services the most likely to do so?*

HD services for HD Ready TV sets - because 'they are there' and "should be used to watch HD",
and real need for HD is to watch events, e.g. Winter and Summer Olympics, FIFA and sports, but not just sports -
I think other events as well – e.g. concerts, royal weddings…

HD is a DTT 'must have' in the competition with cable and satellite.

More SD channels will not drive anything. But this proposal may over time provide the capacity should such programs be available to Freeview.

***Question 2**: do you agree with Ofcom's assessment that it would be beneficial for the DTT platform to begin to upgrade to new technologies – DVB-T2 and MPEG-4 - to make more efficient use of spectrum and to allow for the introduction of new services?*

YES – very strongly

***Question 3**: Ofcom is particularly interested in hearing from multiplex operators and programme providers as to whether they are interested in using DVB-T2 and / or MPEG-4, and whether Ofcom should consider permitting their use on DTT?*

I am not in scope.

***Question 4**: do you agree that the earliest possible availability and adoption of the technologies is in the interests of consumers and citizens?*

YES. Provided, that the equipment is well tested and available in needed volume.

***Question 5**: do you agree with Ofcom's view that DVB-T2 MPEG-4 reception equipment could be commercially available in time for DSO in Granada region in late 2009?*

YES,
I think a firm commitment to the standards from both Ofcom and MUX operators is absolutely needed.

The DVB-T2 patent holders must understand that participation in the 'patent-pool' is absolutely required.
All vendors and the delivery chain must understand that assured delivery **before** October 2009 is not a 'maybe'
It is "An Ofcom they cannot refuse" and they should publicly commit to this deadline.

But I will point out that the only part not available today – in some form or other - is the DVB-T2 receiver chip.
This chip may be very advanced inside, but the interface is rather simple: standard MPEG-TS out, an aerial input and a control bus. Integration into products seems relatively easy.

But early contact with chip vendors may be very helpful to speed things up.

Norway, France and others on DTT as well as satellite and cable-TV will provide the volume market for the needed MPEG-4 chips.

I noticed that Ofcom will conduct a special DVB-T2 equipment consultation.

I will however already now point out, that **it is the basic STB and its price and availability** that should have all the focus. PVR's, IDTV's, 'podcast' and other 'nice to have' devices can better be left to the market .

***Question 6**: do you agree that some form of intervention is required in order for the DTT platform to commence an upgrade to new technologies without delay?*

YES very strongly.

***Question 7**: Do you have any proposals for launching MPEG-4 services on a DTT multiplex using DVB-T in advance of the proposed 2009 timetable and if so can you provide details of how such a service would not undermine the proposed MPEG-4/DVB-T2 launch in 2009?*

NO
This should not happen, unless DVB-T2 / MPEG-4 boxes are available earlier than expected by Ofcom.
Public beta-tests, maybe using early USB DVB-T2 'Dongles' and PC's as receivers, may be very useful.
With Internet feedback from a number of beta-testers a very valuable DVB-T2 quality statistic can be collected in a short time.
Such beta-test may also be used as powerful marketing 'News stories'.

***Question 8**: do you agree with Ofcom's proposed approach for adding SD and HD versions of MPEG-4 and DVB-T2 profiles to the list of permitted standards for DTT in the spring, and that Ofcom's consent must be sought prior to adoption of these standards?*

YES
I think, the actual receiver specification – not least the MPEG-4 options - should allow sufficient 'head-room' for future improvements e.g. Support for 10 vs. 8 bit encoding, better colour encoding etc.

Likewise I think the DVB-T2 standard **may** have optional parts that should be mandatory in the UK. A '2K/8K' type problem should never happen again.

I strongly suggest that DVB-T2 should always use 'SFN Ready' parameters (e.g. 32K, GI 1/16)

***Question 9**: do you agree with Ofcom's proposal that Multiplex B should be cleared and upgraded to new technologies?*

YES very strongly.

***Question 10**: do you agree with Ofcom's proposal that all multiplexes should be required to upgrade to 64QAM at DSO in order to make the most efficient use of spectrum (ie that the mode change should not merely be optional)?*

YES
In addition I think the 8K mode is needed for DVB-T from DSO Granada, but not before DVB-T2 is available.

***Question 11**: do you agree with our proposals for accommodating Five, S4C, TG4 and GDS on Multiplex 2?*

YES

***Question 12**: do you agree with our assessment that nine SD services can operate on Multiplex 2? If not, do you have an alternative proposal?*

NO. Or rather '**maybe**'.

I think this question cannot be answered before 9 services have been tested on the new MPEG-2/stat-mux equipment.

I also think the need to use SFN's in the South of England – even in 8K mode - may reduce the bit-rate significantly.
A GI of 1/8 (112 usec, 36 km) will reduce the bit-rate by 2 Mbps per MUX or 4 Mbps in total for PSB-1 and PSB-2 (unless the code rate is increased from 2/3 to 3/4.)

I have however a '**Plan B**' that will work from DSO Granada:

As all existing actively used DVB-T receivers are located within the 90 % COM MUX covered area (they are in fact within the 73 % pre-DSO covered area). Universal coverage can be obtained by **simulcasting one SD service on any COM mux in DVB-T and on PSB-3 in DVB-T2/MPEG-4 for the 8-8,5 %** households that cannot receive the COM MUXes.

Those living in the 8-8.5 % PSB only area have no need for a DVB receiver before the DVB-T2 STB's are available and they **should be told so**. Information via the analog TV channels (only) will reach these viewers very precisely.

They should purchase a DVB-T2 STB at or just prior to the DSO in there region.

***Question 13**: do you agree with our proposals for the reorganisation process for the existing multiplex services set out in the central case scenario?*

YES. Ref. Q12

***Question 14**: do you agree with the principles / conditions that Ofcom proposes to use to evaluate counterproposals for the reorganisation process?*

YES

***Question 15**: Do you have an alternative proposal for the reorganisation process? If yes, please provide details.*

I am not in scope.

***Question 16**: do you agree with Ofcom's assessment of the options for allocating the upgraded capacity?*

YES
It is important that all broadcasters, granted DVB-T2 capacity, are very **committed** to promote the availability of DVB-T2 STB at the earliest possible date. (DSO Granada is more the latest acceptable date)

***Question 17**: do you agree with the proposal that HD broadcasting on the DTT platform should use the more efficient progressive format, rather than the interlaced format?*

YES Very strongly.
In addition to being more compressible **'p'** is also better for fast movements e.g. sports.

As it seems a common misconception that 1080i is better than 720p due mostly, I think, to little other than 1080 being a larger number than 720.
I propose that Ofcom and all involved broadcasters publish some information on this subject.

***Question 18**: do you agree with the proposal that Ofcom should not mandate the use of the capacity for any particular service type (SD or HD) but allow the broadcasters to make proposals?*

YES.
I think this consultation should have looked a little more into the non-HD hours for PSB-3.

HD is expensive and not yet produced by all sources. The broadcasters should be allowed much freedom.
I do, however, think it should be a top 'beauty' requirement that all broadcasters have a significant daily HD schedule from day one. Up-scaled programs should not count towards the HD schedule.

***Question 19**: do you agree with the proposal that the capacity should be allocated in three UK-wide blocks initially, rising to four blocks at DSO?*

YES
With the following modifications:

I think that a 0.4-0.6 Mbps base-allocation should be reserved for a Text/Info-service that can use some of the large amount of idle capacity left over from 'stat-muxing' only tree 10 Mbps HD services.

In addition, I think, the capacity for one SD service should not be granted until PSB-2 is shown to hold 9 SD services, otherwise PSB-3 should simulcast the 9th SD service relocated to a COM mux. Ref Q 12

If PSB-3 capacity is say 32.5 Mbps, I propose 3 x 10 Mbps HD blocks, 2.1 Mbps SD allocation and 400 Kbps Text/Info-service allocation.

***Question 20**: do you agree with the proposed criteria for the comparative selection process?*

YES
"7.92" in the consultation seems to **be the critical point**. (To encourage manufacturers to build DVB-T2…).

Ofcom should 'lobby' for support from regulators and broadcasters in other countries, maybe even in 'Open letters'.

This may also include writing articles about the combined DVB-T2/MPEG-4 Freeview solution in local popular magazines or newspapers. ("A new box, just once" theme.)
Please note that 'BBC' is a more well-known brand than 'Ofcom' is in other parts of Europe.

***Question 21**: do you have any comments on Ofcom's proposals for the upgraded multiplex?*

NO

***Question 22**: Do you agree with Ofcom's impact assessment?*

YES

***Question 23**: Do you agree with Ofcom's assessment of the potential benefits, risks and mitigations strategies relating to the impact of these proposals on the DSO programme?*

I think the benefit of a fast transition to new technology is somewhat underestimated and the value of existing DVB-T equipment maybe somewhat overestimated.

Other comments!

I think that Ofcom should consider an extended testing procedure for the early versions of the new DVB-T2 receivers.
This is not very expensive to do and it will likely eliminate some substandard early products.
The risk of getting a few bad products on the market will - in my view - significantly be reduced.
After a few years such extended testing may no longer be necessary.

I think a 'FreeviewHD' brand should be created very soon and used to brand HD DTT equipment.

The 'digital tick' loge should not be allowed for DVB-T DTT equipment after Christmas 2008 or be changed to indicate that DVB-T equipment will be phased-out rather soon.