Additional comments:

Our response is obviously focused on the needs of ES (Emergency Services - across the time-frame under consideration in this Consultation paper).

Question 1: Have we captured all the major trends that are likely to impact spectrum use over the next ten years in this section and the separate Appendix on sectoral developments? Are there other market, technology or international developments that could lead to significant changes in spectrum demand and supply over the next 10 years?:

Our response is obviously focused on the needs of ES (Emergency Services - across the time-frame under consideration in this Consultation paper). It does seem to correctly state the influences that will define and determine those requirements to Government.

As we understand it, ESMCP has determined that MCV (Mission critical voice) and MCD (Mission critical data) will both be delivered as a 4G/LTE platform service, and that this will come into service as existing PPDR (TETRA) services' contracts expire in the 2016-2020 time-frame. We support this decision, as:
o- this represents a step-change improvement for both MCD and MCV, and should enable a more data-rich capability in theatre alongside MCV (MCV being the most critical service when saving lives in theatre). There is no feasible TETRA future capability that can approach the BAU capabilities of the advanced communications platform that 4G/LTE provides.
o- costs of a 4G/LTE service as described by ESMCP will bring vast savings over the existing ASL TETRA service.

This position of support for 4G/LTE as the platform of choice for MCV and MCD has been tested, and the ES professional community (as indicated by APCO US, APCO Global Alliance and British APCO) has agreed a statement confirming this position.

The only spectrum available to support 4G services (for ES) is that presently in use by the MNO's; hence, as we understand it, the ESMCP design to carry ES MCV and MCD traffic over commercial 4G/LTE services is one where there is no apparent choice, certainly between inception and realistic availability of spectrum, plus build-out time, of additional capacities in the forthcoming 700 Band.

Aside from Cost, the other "4C's" are Capacity, Capability, Coverage and Criticality. There are issues around some of the functionality necessary to save lives being provided over the ESN (Emergency Services Network, being the network defined by ESMCP).

Criticality and Capability include Direct Mode (point to point voice over no present bearer) and Red Button (total priveleged access - above the "normal" network priority expected to be given to Emergency Services traffic). If these functions require spectrum outside of the Commercial spectrum being used by the 4G MNO's then this must be included in any mandates resulting from this spectrum review.

Coverage of remote areas can be solved either by investment in additional transmitters or by

secondary transmission at (typically 400 Band) more suitable spectrum than that used by 4G MNO's. This investment, if the first option is the approach, is presumably catered for in the price of the service offered for ES by MNO's. It is noted that this review includes possibilities of ES re-use of certain 400 Band spectrum, although this would have to be a parcel big enough to support the MCV and MCD applications in use across the MNO-provided services in areas with coverage. Air-to-ground communications warrant further consideration as this is also potentially outside of the MNO-provided capabilities.

Post-2018 (or realistically after clear-down, availability and build-out), there will be opportunity to consider the ES 4G traffic growth and needs going forward, and to consider the global initiative for harmonisation of ES traffic in the 700 Band. This will result in requirement for guaranteed, prioritised capacity in the 700 Band once it becomes available, specifically also meeting the 4C's requirements. We remain focused upon requirements and upon ensuring that, at all times, our ES professionals have a service that meets these in order to save lives.

Question 2:Do you have any comments on this summary of our approach to spectrum management and on the principles discussed in Annex 5?:

Mention is made of the importance of evaluating social benefit value when considering spectrum and auctions. The value of just one life is incalculable - Emergency Services depends on having MCV and MCD delivered fit for purpose. We would like to underline the importance of the social and ethical considerations when comparing income from spectrum auction with either allocation of dedicated of spectrum for future ES use or with Obligations that guarantee the 4C's model and the ESMCP requirements for Public Safety communications. As an example - and this is not relating to a specific major incident, it is BAU (business as usual) on an ordinary day - an Emergency Services person has the need to 'push the red button' (immediate network priority over any activity) 20 times in a typical day. This capability, any time, anywhere, is what mission critical communications requires to save lives.

Auction types, for the 700 Band, must provide capacity for ES 4G/LTE communications that is mission-critical in quality and availability.

Question 3:Do you think we have adopted the right approach to analysing future trends and developments that could raise the need for future regulatory action?:

The scoring technique used does correctly indicate the serious reliance (in terms of urgency) on ES having MCV (mission-critical voice) services. Presently, deployment of ES to incidents already relies on MCD (data) also at the same service level. Our view is that the separacy shown in the diagram (figure 11) is flawed in this respect.

No government, nor department, nor commercial organisation contracted to by them, will survive the adverse publicity of lives lost as a result of insufficient ability to communicate at incident or theatre.

Availability of advanced technology to the criminal and terrorist forces increases the need for secure, mission critical, robust, resilient MCV and MCD. Growth rates (presently predicted at

'80 times' within 10 years as a general maxim), added to global ES harmonisation needs, together justify 700 Band ES provisions in an incontrovertible manner, in whichever guise.

Question 4:What are your views on the results of our analysis of future developments summarised in this section and discussed in greater detail in the Appendix to this consultation? Please provide evidence in support of your views wherever possible possible:

From as ES standpoint, recognition of the societally critical outcome of ESMCP's ESN (the new 4G/LTE network platform and services) to provide MCV and MCD by replacing the existing contracts (2016-2020 end dates) is reassuring. The inevitable concerns of delivery of a 4C's quality MCV (and MCD) will garner press and public attention. MNO-delivered provision of this service will be scrutinised heavily, and ES (as a community) are unlikely to accept any degradation in capability to save lives - in other words, will not rely on the new platform until it is proven. At this point, growth will occur, as badly needed integrated support systems and increased life saving techniques leverage the new service. By the time that 700 Band spectrum is genuinely deployable (probably well after 2020 in real terms), it is very likely that additional capacity needs and harmonisation with European and other 700 Band ES systems will drive the need for our recommendations to have been accepted ('way back in 2015') so that ES can continue to function.

It is this very time-difference that is the key. The 700 Band potential capacity benefits (and Auctions) are a few years after service inception across MNO-provided capacity. But by then the need for ES provisions within 700 will be as critical as they are at this time - the key is that the decision to support this needs to be taken now! Once 'early' decisions on how the 700 Band will be parcelled are taken, it will be too late to affect this.

So the priorities of ES in the report (around figures 11 and 12), and the 'early' specification of how 700 Band parcels will be comprised, are both critical to saving lives, maintaining government reputation, and must be planned into 700 Band plans now.

Question 5:Do you agree that a consideration of mobile and wireless data demands should feature as a priority area in our work programme for the next ten years? Have we captured all the major issues that we should consider within this area? :

Limiting our response to an ES perspective, yes.

In addition to the ESMCP related requirements, and future 700 Band requirements earlier, we would highlight that:
o- use of WiFi at incident and theatre for local headcams, data-intensive local support applications, with backhaul to Bronze / Silver / Gold command
o- Air-to-ground needs
o- M2M control (breathing apparatus, robot devices, UAVs, etc.)
are directly linked into interoperability needs for ESN.

Question 6:Do you agree that the future of PMSE spectrum access should feature as a priority area in our work programme for the next ten years?

Have we captured all the major issues that we should consider within this area? :

No comment. We would encourage cognisance of the output from ICT KTN group (Cambridge Wireless) with respect to PMSE and ES.

Question 7:Do you agree that the implementation of our 700 MHz strategy and the longer term future of DTT should feature as a priority area in our work programme for the next ten years? Have we captured all the major issues that we should consider within this area? :

Specifically 6.37 - 6.47 (we will avoid responding outside of ES-related matters). We generally support the statements as offered, although the ES community worldwide does appear to have consensus that future TETRA developments are most unlikely to resolve the MCD needs of Public Safety.

The 700 Band MCV and MCD requirements referred to are presently being commented upon at a more detailed level (in respect of the consultation with the ES community by ESMCP). These may still be summarised as the 4C's at this level of response.

It is also important to consider the benefits of interoperability with parallel Public Safety entities (non-blue-light and voluntary, utilities, transport, etc.) by including their needs in the ESN approach. This further supports the need to consider capacity beyond the geographical boundaries of MNO provisions (eg. 400 Band) and the areas mentioned in our response to Q5, and of course massive forecast MCV and MCD growth.

The ES community has consensus on the requirements for saving lives (4C's), and appears to be consistent on the need for visible independence in Control over shared service provision. Such is the importance of the mission-critical element, that when in BAU 'red-button' moments (20 per day being typical across the UK) and when large-scale disasters occur, ES needs to be reassured that the service requirements agreed to can be managed, monitored and proven independently. Where system design incorporates spectrum-efficient (or spectrum-saving) techniques and technologies to provide such prioritised and highly available capacity, a degree of independence of control, management and readily available evidence must be designed into such provision. This needs to be underpinned by the ability to intervene, permanently if necessary, to remove commercial or other influences that can impede MCV and MCD service to meet requirements as stated.

Question 8:Do you agree that a consideration of competing demands for spectrum at 450 -470 MHz should feature as a priority area in our work programme for the next ten years? Have we captured all the major issues that we should consider within this area? :

We agree that 450-470 MHz consideration is timely. With the shortfall issues around the potential for the new ESN (running on commercial 4G capacity) to be unavailable in many remote areas where Public Safety needs MCV and MCD, some capacity in this range could resolve many such problems.

Question 9:Do you agree that spectrum sharing should feature as a priority area in our work programme for the next ten years? Have we captured all the major issues that we should consider within this area? :

Generally agreed.

Question 10:Do you agree that, in future, we should consider whether and how to play a greater role in supporting improvements to the performance of RF transmitters and receivers? What are your views on the potential future role for regulation in this area?:

Generally agreed.

Question 11:Are there other issues or potential future challenges that you consider should feature as a priority in our work programme for the next ten years? Please provide evidence in support of your views wherever possible:

British APCO believes that there is no more important consideration than provision of MCV and MCD for Public Safety. Presently we have MCV through the TETRA radio network, which largely meets requirements and supports Emergency Services adequately in terms of voice, being the last resort and most critical capability. We support the ESMCP design to move MCV to 4G-LTE, but the requirements for MCV cannot be relaxed without people being killed. Until such time as the service meets requirements (the 4C's, see our Q1 response), the existing capability will continue to be relied upon to save lives. MCD has similar criticality; it is now necessary for successful despatch and support to incidents across the Public Safety sector, and its use, and need, will grow rapidly.

Once hardened, MCV and MCD over commercial spectrum will be running on a Business As Usual basis by the time that additional 700MHz and 450-470MHz spectrum becomes realistically cleared and available. Public Safety will require significant capacity in the 700 Band for growth and harmonisation, and would benefit hugely from capacity at 450-470MHz if service for Public Safety is going to be provided to low-density and remote areas. It is worth noting that sufficient 4G-LTE capacity can bring further benefit by leveraging interoperability with second- and third-tier responders and Public Safety entities (including transport, utilities, etc.).

Generally, we have provided and participated in passionate dialogue around ESMCP and spectrum needs for Public Safety. Activity tends to focus on present requirements; we believe that very few people indeed are considering the future capability needs of Emergency Services. It isn't 'some voice and a bit of data' - technology is moving us increasingly to rich applications and M2M support, simply just to operate and provide life-saving professional services.

Question 12:Do you consider that tracking these metrics could be a useful way to help monitor the effects that our spectrum management strategy has on the nature of spectrum access and how this changes over time? Are there any other indicators that we should be seeking to track for these purposes?:

The importance of Public Safety and its ability to save lives and its dependence on Mission Critical Voice and Data, means that its omission from the metrics considerations in section 7 is, in our view, disappointing.

We might interpret the mix here as being too commercially focused when lives and public safety are at stake.

Question 13:Do you consider that targeted spectrum utilisation measurements could be useful in informing future spectrum management initiatives? What type of specific uses or bands could be the subject of future measurement studies, and why? Please provide evidence in support of your views wherever possible:

Measurements of this kind must surely be useful. The sheer amount of debate (as evidenced by the entire D-Block APCO campaign, and the present activity levels here in the UK with British APCO across the Public Safety community) indicates the importance of the 4C's quality MCV and MCD provision to Emergency Services and other responders.