Previously I've spoken to stakeholders in groups and as individuals, as an adviser responding the comprehensive audit of public sector spectrum assets as laid out by Professor Martin Cave's Review (2003.) Not intended as a criticism at this early stage, but I note that the Roadmap is incomplete in respect of 1) Scenario planning (i.e.: favourable/neutral/unfavourable); 2) Utilities Review (in progress); and 3) Short-range devices (consultation.)

Itemised response (assumed as 'no response' where boxes are left blank):

Box 2.6: Clarification would be useful for: *"At the most basic level"*
*Historically IEEE's US Major E. Howard Armstrong (1850-1954) devised FM radio as it was less affected by atmospherics (than AM). Consider whether such a footnote is a useful addition.
*Always useful to differentiate between controllable radio frequency interference 'rfi' and uncontrollable rfi arising that may arise from the natural environment.

Box 2.11: Clarification would be useful for: *"Main commercial use"*
* Useful inserting for transport: "Including Automated Number Plate Recognition 'ANPR' to enforce revenue collection from road traffic compliance (vehicle tax and MOTs); motorway tolls, river crossings, vehicle parking at airports (etc).
*Separately, a case study to illustrate in-vehicle emergency response - 'E-call' system –would be useful. All new cars are fitted with this device since 2018. RAC say more awareness is needed.
https://www.itu.int/en/ITU-T/extcoop/cits/Documents/Workshop-201507-Beijing/Presentations/S1P5-Yan-Li.pdf

Box 2.18: Clarification *of tabulated data (figs.4 etc)* to avoid misleading conclusions by readers
*Can confuse stakeholders where three rows of data for up to 100 GHz make a total 100%
*Otherwise, without further explanation of band sharing, there's insufficient clarity between three contracting categories a fourth expanding category (100-275 GHz.) *If needed, 'Venn' diagrams can be used to illustrate intersection and overlap between each category, hence restoring 100% analysis.

Box 2.19: Noted that 'Short-range devices' consultation may give good cause to update
*So-called 'guard bands' has been omitted as a means by which to separate groups of users. Was this intended? *If not, a Case Study with graphical illustration would be a useful addition here.
*Also, reference: 'Software Defined Radio' SDR where 'listen before talk' searching is mentioned.

Box 2.24: Noted that a second 'Digital Dividend' seems possible within core frequencies of Terrestrial TV (470-700 MHz.) *Should Public Services Broadcasting Policy decide to migrate existing 'free-to-air' TV channels to the internet (as implemented by EU radio broadcasters who cannot afford to maintain or replace transmitters); then the vacated spectrum can be re-farmed. 6G mobile auction use could raise windfall income to the Exchequer worth at least £11 bn. *Existing SMART TV's already meet the needs of people (via the Internet) having cultural differences which aren't regionally defined. *Themed case studies to illustrate, would be useful addition. *That is not to undermine Ofcom's successful project that legalized "Pirate" FM Radio to benefit local communities.

Box 2:30: *Noted that previously, Ofcom has been slow to grant UK Radio 'Ham' Amateurs access to designated pan-European bands and quick to remove (lower) bands to be "re-farmed" for shared or alternative use. *Noted that new emergency powers were added to 'Ham' licenses, but no specialized equipment was gifted to carry out potentially important functions during future decades.
*Categories between numbers of 'Business' Radio' users and 'Hams' need further clarification.
*Once 'Taxis' are set aside, the number of (c. 20,000) Business radio users falls significantly; whereas the number of 'Hams' is not stated at all. *Previously, from Ofcom reports to the WRC, the number of 'Hams' was understated (c. 60,000+) as there are inconsistencies when comparing 'partly' and 'fully' qualified 'Hams' between each country. For this reason UK has an 'intermediate' qualification

category that is often ignored by statisticians. *Historically, Ofcom has sequestrated Amateur bands (e.g.:) 2350MHz and 3410-3475MHz frequency range –widely regarded by RSGB members at that time as 'spectrum theft' (2014.) *Inconsistent Amateur bands that are out-of-step with the ITU/CEPT regulators have adversely affected the price and availability of UK-legal equipment. *A long-term roadmap could usefully bring about stability, allaying the threat of further sequestration of amateur bands. It cannot be ignored that certain Chinese manufacturers (Baofeng etc) equipment is either of limited use or no use in the UK. A reliable Roadmap must help manufacturers to get things right.

Box 2.43 *Previously, Ofcom was reportedly "quick to identify" but "slow to release public sector spectrum." *Important to recognize that this process is 'not new' as mechanisms already exist to realize market value from public sector spectrum release. *More generally, Ofcom's Roadmap expands the UK Frequency Allocation 'UKFAT' to 275 GHz, but the question is whether this goes far enough: given that around 860 GHz has been demonstrated on a low-power network at zero-cost.

Box 2.44 *Space Science in the UK has undergone nothing short of a revolution involving satellite technology and miniaturization over the last 15 years. *As Ofcom manages UK Satellite filings with the ITU, there's a good story to tell. *Ofcom has enabled (*what figure that is £'bn?) of economic value. *UK Space Agency can be asked for quantification and offer suitable case study to illustrate.

Box 2.45 * Europe's largest and most flexible space telescope (EC Funded with UK participation) for Solar; Planetary; Heliospheric & Ionospheric exploration began experimentally nearly 20 years ago. *Recommend that Science and Technology Facilities Council 'STFC' provide their narrative on a 'LOFAR' case study to illustrate space weather in from data analysis obtained from the 10-240MHz shared band. *Relevant project has just opened for public dissemination as a case study – as below. https://cordis.europa.eu/project/id/777442/reporting

Spectrum for Utilities

*With market growth for SMART meters over the next ten years, the Utility companies may expect to achieve near-full residential and business market penetration without further subsidy. *At the same time, continuity of supply (of electricity – whether single or three-phase; and hydrogenated methane gas) is also guaranteed once 2G/3G spectrum is vacated (i.e.: that is stated by Ofcom as: 'late 2033'.)

Noted that Ofcom is *'developing a strategy to support the changing wireless operational communication needs of the (named) Energy sectors.'* *The difficulty here is that having provided 50% subsidy under State Aid rules, government expects all different types are future-proof and will continue to function once 2G/3G spectrum is switched-off. I took the initiative to raise this issue with BSI and BEIS, as a BSI Committee Member. For background, Ofcom is probably aware that govt has already spent £11bn (according to ITN estimates) installing Smart meters over the last 10-15 years reaching 46-50% of business and residential premises. *Utility companies have made corresponding guarantees to government that all versions of SMART meters are 'futureproof' and will continue to function once 2G/3G SIM cards no longer work (i.e.: once 2G/3G spectrum is vacated in 2033).

Box 3.4

*For clarity, Ofcom is must to confirm to Utilities whether or not the definition of 'futureproof' means migrating mobile data to 5G/6G; when that will not vacate any spectrum at all. *5G/6G migration cannot be safely assumed to happen once Ofcom evict the Utility companies from existing 2G/3G mobile services. *Ofcom would do well to discuss networking alternatives to avoid passing-on adverse costs to consumers and business in what will continue to be a fragile energy market.

*Noted that quite recently, Government legislated for newly purchased Electric Vehicle owners to charge their vehicles off-peak. *As the latest Smart Meters are programmed for ‘delay after activation,’ that means Utility companies can manipulate individual charging time to meet demand favorably, for night-time charging and safeguard continuity of supply from the National Grid.