

A roadmap for the UHF band between 470 - 790 MHz

Public consultation

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Consultation

MCA/C/18-3191

Publication Date

23 APRIL 2018

DOCUMENT REVISION HISTORY

DATE	Revision	Comments	Authors & Contributors
23/04/2018	1.0	Consultation	MCA

DISTRIBUTION

DATE	Revision	Comments
23/04/2018	1.0	General Public, Electronic Communications Network and Service Providers

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Executive summary

Spectrum in the 700 MHz band is an attractive resource with high value primarily to mobile network operators and society at large. The 700 MHz band (694 MHz – 790 MHz) is harmonized throughout the European Union ('EU' or 'Union'). The duplex frequency bands 703-733 MHz and 758-788 MHz shall be used for mobile services in the future. The use for the rest of the band, which consists of a centre gap and guard bands will be decided by each member state within the Union, from the following services:

- PMSE (Program Making and Special Events), e.g. wireless microphones, in the frequency range 694-703 MHz and 733-758 MHz.
- PPDR (Public Protection and Disaster Relief) in the frequency range 698-703 MHz, 733-736 MHz, 753-758 MHz and 788-791 MHz.
- M2M/IoT (machine-to-machine radio communications/Internet of Things), e.g. equipment for Internet of Things, in the frequency range 733-736 MHz and 788-791 MHz.
- SDL (Supplemental downlink), extra capacity for download of data in the frequency range 738-758 MHz.

Identifying the optimal use of the 700 MHz band for the local needs

The MCA has embarked on the process for the allocation of the 700 MHz band. The overall objective for the allocation is to facilitate the efficient use of the spectrum and maximize the economic benefit to the society.

The MCA is carrying out this public consultation with all of the interested stakeholders on the optimal use for the 700 MHz band. This analysis is being carried out to help identify and better address the spectrum needs of the local Maltese scenario. The MCA will review all the responses received in order to determine the optimal usage of the spectrum that will facilitate the most efficient use of the resource and also to be socioeconomically most beneficial

Through this public consultation, the MCA is proposing that 2 x 30 MHz is allocated for commercial, and public mobile networks augmented by an additional 15 or 20 MHz bandwidth dedicated for supplemental downlink. The consultation also presents the two options of either having parts of the 700 MHz band set aside for a high speed broadband service for public safety network (PPDR) or having such needs (broadband services for PPDR-users) met by commercial operators in public mobile networks if deemed necessary. Furthermore, the MCA foresees an opportunity for the mass market low cost cellular IoT devices to utilise 3 MHz of the harmonised 700 MHz band, thereby creating a large enough addressable market to support manufacturing economies of scale.

The PMSE industry, following the outcome of the MCA consultation MCA/C/17-2933 will no longer be permitted to make use of the 700 MHz frequency bands. The MCA recommends PMSE users to adopt related equipment that supports other frequency bands than 700 MHz.

Paving the way for the future of DTT in Malta

The future of the digital terrestrial television (DTT) platforms for the Maltese market is also within the perspective of the document. Malta has already embarked on a process of negotiating equitable access for spectrum in the 470 – 694 MHz band (sub 700 MHz band). Such spectrum is necessary for the access provision of both General Interest and commercial DTT service in Malta. In addition, in view of the adopted technology lifecycles coupled with the expiry of the current DTT licences on the horizon, it may be appropriate to review the economic and technical models that suit the local market in the near future.

Through this consultation, the MCA is considering the potential of the DTT platform within the Maltese audio-visual entertainment market and is inviting stakeholders for their opinions about an appropriate way forward that would suit the evolving market needs and technological developments.

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Background



To ensure access and connectivity across the Union, whilst
facilitating the deployment of innovative digital services
over wireless broadband networks

The European Parliament and the Council Decision (EU) 2017/899

Demand for pervasive wireless connectivity is continuously growing driven mainly by smart devices. Such a demand is expected to increase further with the introduction and spread of IoT technologies, and future 5G devices. This connectivity, emanating from multiple user devices, depends primarily on the use of radio spectrum – the key and finite resource for wireless communications. Availability of radio spectrum is key to allow for the development and proliferation of innovative services, such as connected cars, remote health care, smart cities or video streaming on the move. In view of this rising demand for wireless connectivity, the EU has re-purposed part of the spectrum in the UHF (ultra-high frequency band) for mobile broadband. The (UHF) band comprises the range 470-790 MHz and is currently used for digital terrestrial television and for wireless audio programme making and special events (PMSE) equipment.

The European Commission, Parliament and Council have reached an agreement¹ on an EU wide approach for the use of the UHF band (470-790 MHz), focusing primarily on the use of the **700 MHz** (694-790 MHz) and the **sub-700 MHz** (470-694 MHz) bands. The primary objective of European Parliament and the Council Decision (EU) 2017/899 is to ensure access and connectivity across the Union, whilst facilitating the deployment of innovative digital services over wireless broadband networks. In this regard the Decision puts a number of obligations on the Member States which need to be implemented within strict timeframes. These are listed below:

- Make available the 700 MHz band (694-790 MHz) band for terrestrial systems capable of providing wireless broadband electronic communications services by **30 June 2020**. On the basis of certain justified reasons (as per the Annex to the Decision), this deadline may be extended by two years.
- Conclude all frequency coordination agreements with other EU member states by **31 December 2017**.
- Undertake frequency coordination activities with third countries with respect to the use of the 470-790 MHz band, both for terrestrial broadcasting as well as for wireless broadband electronic communications services.
- Ensure, at least until 2030, the availability of the sub 700 MHz band (470-694 MHz) for terrestrial broadcasting services and wireless audio programme making and special events (PMSE) equipment.

¹ European Commission Implementing Decision 2016/687 & Decision (EU) 2017/899 of the European Parliament and of the Council of 17 May 2017 on the use of the 470-790 MHz frequency band in the Union

- By not later than **30 June 2018**, adopt and publish a national plan and schedule ('national roadmap') showing how the various obligations of the Decision are going to be met, following consultation with the relevant stakeholders.

The repurposing of the UHF band will have a direct influence on various stakeholders, namely:-

- citizens, who will benefit from new and innovative mobile broadband applications and services (in particular innovative on-demand and live streaming audio visual services);
- mobile service providers, will have access to additional valuable sub-1GHz spectrum to respond to increasing demand for mobile data traffic, in particular for indoor coverage;
- providers of DTT services and to users of wireless audio PMSE equipment, which will have to make use of alternative frequency bands following the allocation of the 700 MHz band to wireless broadband; and
- Government and civil society in general will benefit from economic opportunities that this new spectrum band will create.

In view of the multitude of stakeholders involved, the MCA, prior to adopting and publishing of the 'national roadmap', will be hereby consulting on the underlying principles that will shape the future use of both the 700 MHz and sub 700 MHz band. The involved stakeholders are invited to submit their feedback on the proposed roadmap. The feedback shall assist the MCA in delivering spectrum management activities for the repurposed UHF band consistent with the Authority's spectrum management goals.

The European Commission implementing decision 2016/687

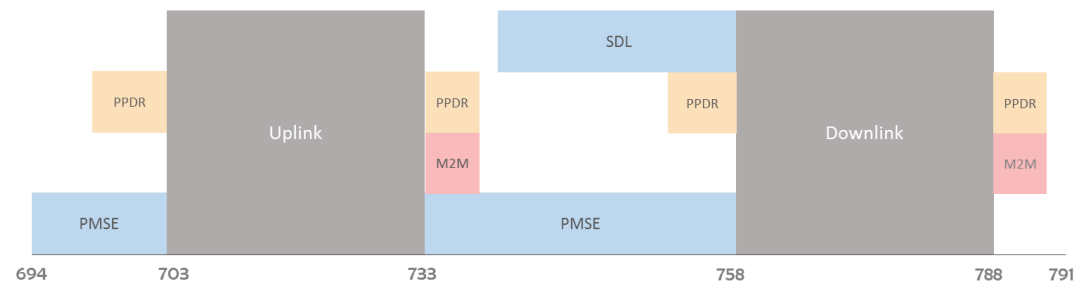
The provision of additional spectrum (i.e. the 700 MHz frequency band) for wireless broadband use would cater for part of the anticipated increase in wireless broadband data traffic. UHF spectrum has unique benefits that cannot be provided by higher frequency bands. The inherent technical characteristics of the 700 MHz frequency band as well as the coordinated use of the airwaves shall allow for a cost effective service coverage (including in building) as well as promote the enhancement of new and innovative wireless broadband services. The availability of the 700 MHz spectrum will also facilitate the roll out of 5G (as expected from around 2020), allowing for the large-scale introduction of innovative digital services.

The European Commission [adopted](#) on 28 April 28 2016, implementing decision [2016/687](#) on the harmonisation of the 694–790 MHz band (700 MHz band). The decision allocates 2x30 MHz (703-733 and 758-788 MHz) for wireless broadband electronic communications services on a co-primary basis. Such an allocation for wireless broadband electronic communication is without prejudice to the rights of Member States to organise and use spectrum for public

order and public security purposes. With regard to the other parts of the band, the Decision foresees four options from which EU member states can choose, namely:

- (i) Up to 20 MHz in the duplex gap (one to four blocks of 5 MHz) can be awarded as supplemental downlink (SDL) for wireless broadband;
- (ii) PPDR services can use either 2x5 MHz just below the commercial services, or 2x3 MHz just above, or both;
- (iii) Machine-to-machine radio communications (M2M) can use 2x3 MHz just above the commercial services; and
- (iv) PMSE equipment (like wireless microphones), which in most countries already use the band, can be allowed to continue using 694-703 and 733-758 MHz or parts of it.

EU band plan for the 700 MHz band – (EU) 2016/687



The timeline for awarding the band, as highlighted above is set at an EU level by the decision (EU) 2017/889 of the European Parliament and the Council. Member states shall allow the use of the band for wireless broadband by June 30, 2020. However, member states may delay this deadline for up to two years, on the basis of a number of specified reasons listed in the Decision.



The availability of the 700 MHz spectrum will also facilitate the roll out of 5G, allowing for the large-scale introduction of innovative digital services.

Spectrum for
terrestrial
systems capable
of providing
wireless
broadband
electronic
communications
services

Spectrum allocation

Without prejudice to the need of the individual Member States for public order and public security purposes, the European Commission implementing decision [2016/687](#) on the harmonisation of the 700 MHz band allocates 2x30 MHz (703–733 and 758–788 MHz) for wireless broadband electronic communications services on a primary basis. Taking into consideration the inherent technical characteristics of the 700 MHz frequency band as well as the coordinated use of the airwaves, the UHF spectrum has unique benefits that cannot be provided by other higher frequency bands. Deployment of commercial wireless broadband electronic communications services in the 700 MHz band will allow for a cost effective service coverage (including in building) as well as promote new and innovative wireless broadband services. In particular the 700 MHz band has been identified as a pioneer band for the 5th generation (5G) of wireless broadband technologies. Public Protection and Disaster Recovery solutions, while they operate in various parts of the VHF and UHF bands, are currently being adopted within the protocols employed by commercial mobile networks. Concurrently, the implementing decision, in order to address any broadband spectrum needs by such services, sets aside up to 8 MHz of spectrum for the provision of Broadband PPDR services (BB-PPDR).

“In view of the facts highlighted above, the MCA notes that the National Frequency Plan shall permit the use of the 700 MHz band (703–733 and 758–788 MHz) for mobile services capable of providing wireless broadband electronic communications applications on a primary basis.”

Availability of Spectrum

The UHF TV broadcasting band ranges between the 470 and 790 MHz. This band is currently used across Europe, mainly for digital terrestrial television and wireless audio PMSE equipment. In Malta, the 700 MHz band is currently licensed on a primary basis to GO plc for the provision of its **TV service over a DTT platform until May 2021**. The DTT white spaces are currently used on a secondary basis for wireless audio PMSE under a general authorisation licensing regime (S.L.399.40²).

The decision (EU) 2017/889 of the European Parliament and the Council established that Member States shall allow the use of the band for wireless broadband by June 30, 2020. The aforementioned date, may however be extended by up to two years, on the basis of any of the following reasons as specified in the Decision:-

- (1) Unresolved cross-border coordination issues resulting in harmful interferences;
- (2) The need to ensure, and the complexity of ensuring, the technical migration of a large amount of the population to advanced broadcasting standards;

² <http://www.justiceservices.gov.mt/DownloadDocument.aspx?app=lom&itemid=11475&l=1>.

- (3) The financial costs of transition exceeding the expected revenue generated by award procedures; and
- (4) Force majeure.

In Malta, the existing DTT platform employs the MPEG2 encoding standard. In the meantime DTT technologies have continued to evolve with the development of MPEG4 and HEVC new encodings standards being more efficient. In particular the MCA notes that migration from DTT to IP based TV services continues to grow steadily³. This may signal that in Malta, a natural migration away from DTT services will take place. While migrating to new advanced broadcasting technologies will provide significant improvements to the DTT platform, the necessity for the significant investments to effectively roll-out a new nationwide DTT network coupled with the costs of replacing end user set-top boxes may not be a viable option particularly when one considers that the existing DTT licence expires in May 2021 and hence does not provide a sufficiently long payback period. The MCA therefore notes that any such changes to the DTT technologies employed shall be considered post licence renewal in 2021.

The MCA, on the basis of reasons numbers two (2) and three (3) identified above, considers that the Decision allows for Malta to make the 700 MHz band available for ***WBB by not later than 30 June 2022.***

It should be noted that the 2015 World Radiocommunication Conference (WRC-15) of the International Telecommunication Union (ITU) has allocated the 700 MHz band to the mobile service on a co-primary basis with the broadcasting service in order to allow countries that wish to make use of this band for wireless broadband technologies. The allocation of the 700 MHz band effectively provides a global mobile band for roaming with economies of scale. Some European countries have in fact already assigned the 700 MHz band to the mobile service providers. However, due to the early state of development of such a band, the mass roll-out of 5G networks across Europe utilising the 700 MHz band is not expected to happen in the short term (i.e. not before 2019).

The MCA also notes that the local mobile communications electronic industry during 2018 would have acquired a considerable amount of spectrum in order to implement new technologies and augment their existing service offerings. In view of these investments, the local electronic communications industry may not be in a (financial) position to adopt right away the 700 MHz band as part of their bouquet of spectrum in order to augment further their service coverage and offerings.

The MCA, based on: (i) the need to ensure minimal DTT service disruption, (ii) the DTT frequency co-ordination agreements achieved with the neighbouring countries and (iii) that the local mobile industry will still be at the forefront of mobile broadband wireless access products with their existing spectrum holdings, considers making available the 700 MHz band ***for commercial WBB as from June 2021 as a prudent approach to diminish the impact on the involved stakeholders.***

³ <https://mca.org.mt/articles/key-market-indicators-electronic-communications-and-post-q1-2013-q4-2017-0>

#1 The MCA is hereby inviting the stakeholder to submit their feedback on the proposed date by when the MCA shall make available the 700 MHz band for commercial WBB.

Pricing and licence conditions

Spectrum, like any other resource, has an economic value associated with it. This value is primarily led by demand and by the willingness of service providers to pay for exclusive rights to use radio frequencies.

Currently, the prices for the use of spectrum are established under S.L.399.28. The prices for the specified frequencies reflect mostly the potential revenue which the frequencies might generate. Such figures are established once a number of operational factors for the band in question are taken into consideration. The bandwidth available, the frequency band position within the radio spectrum, and any attached technical conditions are prime factors that affect the price paid for spectrum.

UHF spectrum has unique benefits that cannot be provided by higher frequency bands. The inherent technical characteristics of the 700 MHz frequency band shall allow for a cost effective service coverage (including in building) as well as promote new and innovative wireless broadband technologies. The availability of the 700 MHz spectrum, as highlighted in the RSPG Opinion⁴, will also facilitate the roll out of 5G (which is expected from around 2020), allowing for the large-scale introduction of innovative digital services.

The 700 MHz band effectively broadens the sub 1 GHz spectrum already available to the mobile ECS providers. Thus, the price for spectrum in the 700 MHz band should somewhat reflect the established prices of the neighbouring spectrum bands. However, although the primary usage of the 700 MHz band is approximately the same as for the adjacent spectrum bands (800 MHz up to 1800 MHz), given the possible social use for the spectrum in question, the price per MHz of spectrum in the 700 MHz band will have to reflect the commercial or social value of its objective use.

New social phenomena of 'always on' requirements, paired with the fact that broadband speeds are constantly increasing (as are the number of objects connected to the Internet) pose hefty spectrum requests on service providers. Technologies are operating within different frequency bands in order to meet with the ever challenging targets being set. Also new standards are evolving that bind nascent frequency bands with ones that are already being used. Pricing concepts, therefore, need to be revised in order to reflect these developments.

⁴ http://rspg-spectrum.eu/wp-content/uploads/2013/05/RPSG16-032-Opinion_5G.pdf

In addition to the price for the spectrum, apart from the updating of the National Frequency Plan to designate the frequency band for its intended use, the assignment and management principles governing the spectrum band in question will also need to be outlined.

In order to certify the effective and efficient use of spectrum, the MCA attaches numerous conditions with the right of use for particular frequency bands. These conditions address the technical and the operational factors that will govern the use of the individual frequency band.

As per Directive 2002/21/EC as amended, spectrum assignment is technology and service neutral. Individual licences do not dictate which technology is deployed by the service provider. Notwithstanding this, service providers are encouraged to discuss with the MCA their technology roadmaps prior to the deployment of a new technology which makes use of one or more assigned frequency bands.

In order to cater for future developments, while at the same time maximising its potential use, a spectrum assignment and management framework for the 700 MHz band needs to be drafted highlighting the applicable licence conditions such as licence duration, coverage obligations, applicable spectrum caps, QoS parameters and handback conditions.

#2 The MCA is hereby inviting stakeholders to submit their feedback on potential assignment and management principles that may be appropriately adopted for the use of the 700 MHz spectrum band within the Maltese mobile industry.



The allocated use for spectrum in the centre gap and guard bands



The European Commission harmonisation measure for the 700 MHz band foresees four different use options for the centre gap and guard bands in the 700 MHz Band.

The following are the MCA's rationale and proposals to the allocated use for spectrum in the centre gap and guard bands as earmarked in the implementing decision.

PMSE

PMSE services encompass a range of audio and video wireless services, such as wireless cameras and microphones used in theatrical productions, corporate and concert events as well as supporting activities such as news gathering, sports events and outside broadcasts. The use of the PMSE services may happen at unpredictable times and locations (news gathering) or may be planned ahead in advance of a particular event (outside broadcasting, or concerts). As described in ECC Report 204, PMSE applications are divided into three main categories namely:- Audio PMSE applications, Video PMSE applications, and Service links, with a few exceptions such as In Ear Monitors (IEM), wide band talkback and video assist which are normally outside the PMSE spectrum allocations.

Due to divergent national frequency plans and differing PMSE requirements in the various CEPT countries, PMSE equipment is usually capable of operating over a range of frequency bands or tuning ranges. The use in any one country of radio equipment will be limited to the range of frequencies identified nationally (if any) within that country for PMSE, and will be operated in accordance with the related national regulatory conditions and requirements. A list of frequencies that are available for audio and video PMSE use are identified in Annex 2 and Annex 3 of the ERC Recommendation 25-10 as amended on the 18th October 2016. The spectrum swathe 470 MHz – 694 MHz forms part of the spectrum bands identified in the aforementioned annexes. When considering the spectrum identified for use by PMSE on a tuning range basis, it can appear that there is a large amount of spectrum available. However, PMSE has always shared spectrum with a wide range of services and to manage use, individual licences can be issued for a specific use on a specific date and at a specific location. The sharing conditions in a given country depend on the licence given to the new service.

As already mentioned, the Implementing Decision foresees four different use options with regard to the spectrum situated in the guard bands and duplex gap. Amongst the different use cases, wireless audio PMSE equipment (like wireless microphones), which in most countries already use the band, can be allowed to continue using the 694–703 MHz swathe and 733–758 MHz swathe or parts of it. The available spectrum within the tuning ranges in any particular country is determined on a national basis; each tuning range may be wholly, partially or not available on a given day, in a given location in a given country.

The European Commission, following an Impact Assessment on the available spectrum for PMSE use adopted an Implementing Decision 2014/641/EU on harmonised technical conditions of spectrum use by PMSE equipment. This Implementing Decision designates and makes available on a harmonised basis the frequency bands 823 to 832 MHz and 1785 to 1805 MHz for wireless audio PMSE use as well as an additional amount of at least 30 MHz to be made

available in spectrum ranges to be identified by the Member States. In addition, the European Commission had later on adopted an additional Implementing decision on the harmonisation of the 2010-2025 MHz frequency band for portable or mobile wireless video links and cordless cameras used for programme making and special events (video PMSE).

In view of the Decision 2017/899/EU, of the European Parliament and of the Council, the MCA, on the 29th of September 2017 has consulted⁵ with the PMSE industry on their future needs for spectrum in the 700 MHz band. The MCA, in the afore mentioned consultation has, in accordance with the timeframes stipulated in Decision (EU) 2017/899⁶, proposed the introduction of a new limitation⁷ to prohibit the use of wireless audio PMSE apparatus from using the 694-790 MHz band as from 1 January 2021. This was mainly due to avoid harmful interference problems with the other possible use cases. The MCA, in the responses submitted to the Consultation, did not receive any objections to the above proposal.

“The MCA is hereby advising the stakeholders that the National Frequency Plan shall not permit the use of audio PMSE equipment in the 700 MHz band as from 1 January 2021. “

⁵ MCA/C/17-2933

⁶ Decision (EU) 2017/899 of the European Parliament and of the Council of 17 May 2017 on the use of the 470-790 MHz frequency band in the Union.

⁷The thirty-first (31st) Schedule of the S.L.399.40 regulates radiocommunications apparatus used for wireless audio programme making and special events (PMSE).

PPDR

PPDR services are provided by a service or agency, recognised as such by the national administrations, that provides immediate and rapid assistance in situations where there is a direct risk to life or limb, individual or public health or safety, to private or public property, or to the environment, but not necessarily limited to these situations (Source: Commission Recommendation C(2003)2657).

PPDR activities are omnipresent and continuous in nature. PPDR supports a wide range of public services such as the maintenance of law and order, protection of life and property, disaster relief and emergency responses. It ranges from day to day routine security and policing activities to event specific disaster relief such as large scale emergencies, public events and natural or man-made disasters. Thus, the nature and scope of PPDR communications vary with the event at hand ranging from basic voice communications to complex video and data communications. Voice service is primary for PPDR communication. However, while voice services will remain an important component of PPDR operations, data and video services are expected to play a key role increasingly.

PPDR communication networks design for mission critical traffic are different from normal commercial networks in many ways. In principle, as defined in the ITU-R report Radiocommunication objectives and requirements for Public Protection and Disaster Relief⁸, a PPDR communication network must: (i) be available for most of the time with minimal network downtime, especially in emergencies; (ii) have sufficient capacity and redundancy to handle traffic during the peak operational conditions; (iii) provide coverage in the whole geographic area including indoors especially in basements or large and crowded infrastructures; (iv) be easily and rapidly deployable; (v) be interoperable between PPDR communication networks for the effective and efficient operation and cooperation amongst PPDR agencies; (v) be deployed in highly dynamic environment, which translates to a wide variety of mobility requirements; (vi) be real-time and have low latency; (vii) meet very high QoS standards so that missions are not affected due to poor quality; (viii) be reliable as it would be required to operate in hostile environments; (ix) be capable of only being heard by the intended recipient for safety and confidentiality purposes; and (x) be easily reconfigurable and scalable to accommodate the scale and nature of each PPDR mission.

Currently, all the Public Safety organizations in Malta operate their own dedicated voice centric networks to provide narrowband mobile communications on a variety of technologies operating in the VHF and UHF bands. In addition, some of the critical PPDR agencies in Malta rely on the data services offered by the commercial mobile network operators in order to use narrowband data applications such as pre-defined status messages, data transmissions of electronic forms and messages, access to databases and wideband data applications such as short messages, email, and compressed images and video.

⁸ ITU-R Report M.2377 - https://www.itu.int/dms_pub/itu-r/opb/rep/R-REP-M.2377-1-2017-PDF-E.pdf

The MCA, in view of national security issues and the services rendered by the PPDR agencies towards the local community, has engaged in preliminary discussions with the PPDR agencies considered critical in Malta. The MCA discussed the spectrum needs for their PPDR networks with the Civil Protection Department, the Malta Police Force, the Armed Forces of Malta and Mater Dei Hospital. Cognisant about the benefits that compliment a Broadband PPDR network, the aforementioned agencies have acknowledged the supplementary benefits that a BB-PPDR network has over a narrow band PPDR network. The possibility of investing and deploying a BB-PPDR network in Malta is currently being explored by one of the critical PPDR agencies in Malta.

With the proliferation of digital technologies, there is a growing need in PPDR communication for significant enhancements in operational data capabilities. High speed mobile data capabilities that can be relied upon in adverse situations have a huge potential in the public safety community for increasing the situational awareness of those who respond first as well as appropriate resource allocation by operational centres. By their nature, PPDR operations can derive significant benefits from the ability to access a wide variety of information in real-time, including informational databases, access to instant messaging, high-quality images and video, mapping and location services, and other applications.

PPDR applications, such as transmission of high resolution images and real time video, require much higher bit-rates than the current narrowband PPDR technology can deliver. In order for broadband networks to support improved data and multimedia capabilities, they require higher data rates and higher capacity with widely differing requirements in terms of capacity, timeliness and robustness of the data service. Hence, an adequate amount of spectrum may need to be made available to meet the growing needs of BB-PPDR.

The spectrum needs for Public Protection and Disaster Relief have been raised during the last few years by the various institutions in such a field. The ECC is investigating various solutions to meet such requirements. Recently, a number of deliverables on the subject matter were published by the ECC. In June 2016, the ECC published a harmonisation deliverable - ECC Decision (16)02 complemented by the ECC Report 218. Such deliverables identify the frequency options available for broadband PPDR. They also foresee that interoperability amongst the various BB-PPDR can only be realised through the availability of multi-band broadband PPDR user equipment (400 MHz and 700 MHz) and the adoption of common technical standard (i.e. LTE and its evolutions). In addition to the above mentioned deliverables, the ECC has also published CEPT Report 53 and 60 in which the alternative options (M2M, SDL, PMSE, BB-PPDR) for the 700 MHz duplex gap are being considered. The various use cases have also been listed in the ECC Decision 15(01). In addition, the Third Generation Partnership Program (3GPP) and the European Telecommunications Standards Institute (ETSI) are kept abreast on the findings in ECC Report 218 due to the related work streams in 3GPP RAN4.

The BB-PPDR frequency bands below 1 GHz identified by the ECC

The 400 MHz Range

ECC Decision (16) 02⁹ concludes that the 400 MHz range does not provide enough available spectrum to provide a stand-alone BBPD solution. Such a band can only offer national flexibility for BB-PPDR when it comes to additional spectrum besides the 700 MHz range. The spectrum compatibility with, among other things, the radio astronomy service, radio location service and the terrestrial broadcasting service, has been assessed in ECC Report 240, indicating the technical measures needed to ensure their coexistence. A spectral bandwidth of up to 2 by 5 MHz could be realized in the 410-430 MHz and 450-470 MHz bands respectively.

Due to spectrum compatibility issues as well as lack of current harmonization activities for LTE for the band, the 410-430 MHz band is currently under discussion on whether such a band will be considered further within the scope of the ECC harmonization deliverable for BB-PPDR.

The 700 MHz Range

In order to be able to fulfil the national PPDR requirements, BB-PPDR networks can be accommodated within the 700 MHz range by either: (i) designating spectrum for dedicated BB-PPDR networks, or (ii) the use of a commercial mobile fixed communications network (MFCN) or (iii) a combination of both requirements. Harmonized technical requirements for the use of MFCN in the 700 MHz band (703-733 and 758-788 MHz) are specified in ECC Decision (15)01.

In addition, the ECC Report 239 assessed the BB-PPDR spectrum compatibility with the MFCN and the terrestrial broadcasting service below 694 MHz, indicating the technical measures needed to ensure their coexistence. The ECC has also conducted numerous investigations¹⁰ about additional aspects for future BB-PPDR spectrum use.

Finally, the assumption is that mission-critical voice and narrowband data will continue to be carried in most CEPT countries by the existing dedicated TETRA, Tetrapol and DMR networks until 2025 to 2030. The spectrum for these networks has been designated in ECC Decision (08)05. However in some CEPT countries, PPDR agencies could migrate all of their mission-critical voice and data services onto networks using broadband technology such as LTE.

⁹ ECC Report 218 provides the technical background for the ECC legal decision ECC Decision (16) 02

¹⁰ <https://cept.org/ecc/topics/public-protection-and-disaster-relief-ppdr>.

Which 700 MHz spectrum shall be assigned for PPDR and why?

When comparing the alternative PPDR deployment strategies within the 700 MHz band, each approach may be seen as offering both advantages and disadvantages. A PPDR network can be classified either as dedicated network infrastructure, commercial network infrastructure or a hybrid network infrastructure.

Dedicated Network(s) Infrastructure: the BB-PPDR Network is planned, build, and operated by the PPDR Agency/s themselves. Such a PPDR network can also be built, owned and operated by government owned agencies. These networks will then provide the mobile broadband services through service offering tenders (commercial offerings). In a shared dedicated network mission critical users can act only as clients or as priority users with others sharing the network. Re-use of the available spectrum is an inherent part of such a dedicated “*commercial*” strategy.

Commercial Network Infrastructure: the network infrastructure is shared between PPDR/Public Safety and Commercial network subscribers. Mobile broadband services to PPDR agencies are differentiated using user access barring, special QoS, on demand resource reservation, dedicated applications, etc.

Hybrid Network(s) Infrastructure: the infrastructure is partly dedicated and partly shared network infrastructure between PPDR /Public Safety and Commercial Networks. Such a model is mainly based on various types of Mobile Virtual Network Operator (MVNO) architectures, varying from OTT to RAN sharing models.

In relation to the above mentioned classifications, commercial or hybrid model can be achieved through an alliance with the existing ECS mobile network operators present across the island. The existing mobile operators have the necessary infrastructure in place reducing the overall deployment, operation and maintenance time and costs by leveraging the existing infrastructure and assets. It is imperative that stringent SLAs for operation and maintenance of such networks will be in place between the PPDR agencies and mobile ECS operators. Moving towards the adoption of commercial based or hybrid solutions results in the better utilization of spectrum resource, the associated benefits of available deployed technologies and also unlock further economic applications of such networks.

In assessing which PPDR spectrum model is to be adopted for the 700 MHz band, the MCA notes that:-

- ***The Government has statutory obligations for the provision of national mission critical communications including PPDR services.***
- ***Building dedicated mission critical networks, will eventually require exclusive dedicated spectrum for the operation of these networks.***

- *Spectrum exclusivity in turn carries additional financial burden, especially when the opportunity costs are factored into.*
- *Dedicated networks that are deployed exclusively by PPDR agencies will require huge capital investment especially in the case of duplicate infrastructure. Furthermore, the ongoing technological advancements will require periodic network infrastructure investments in the future.*
- *The market value of the spectrum and economic circumstances may force a rethink of the affordability of a dedicated network over the next few years*

At this stage, it is appropriate to discuss and adopt an approach which eventually will not become an economic constraint to PPDR agencies whilst at the same time yield commercial value if possible. It is also debatable whether the feasibility of integrating PPDR networks within cellular networks, having the desired functionality, can be better leveraged by looking into more efficient spectrum utilisation. While making such choices, trade-offs such as the loss accruing from non-commercial deployment of valuable spectrum viz-à-viz, socio-economic benefits from effective PPDR operation needs to be deliberated to arrive at the right balance.

In view of the above, the MCA is hereby putting the following issues for the comments and feedback of the stakeholders:

#3 Do you consider the need for the deployment of a BB-PPDR communication network in Malta in order to meet the challenges in the near future? If so, what are the timeframes envisaged by when the PPDR entities will need to make use of a broadband network?

#4 In your opinion, which of the modes described above (dedicated, commercial, or hybrid) will be more suitable for the Maltese BB-PPDR needs? Whilst taking into consideration the deployment plans of LTE in the 700 MHz band, should mobile ECS providers be earmarked for providing a nationwide broadband PPDR communication network? If so, which are the regulatory aspects that the MCA needs to take into consideration in order to enable such an operational model?

#5 What is the adequate amount of spectrum necessary for a BB-PPDR network to be able to address the future challenges that are encountered by PPDR entities?

#6 In your opinion, which potential assignment and management principles may be appropriately adopted for the use of the 700 MHz spectrum band for BB-PPDR.

Downlink Transmission (Supplemental Downlink for wireless broadband)

Spectrum administrators may utilise the 25 MHz duplex gap in the 700 MHz frequency band for non ECN options such as PPDR, PMSE, M2M, or they may opt to implement up to four block(s) of 5 MHz for base station ('downlink-only') transmission (referred to as supplemental downlink (SDL) for wireless broadband in the harmonised technical conditions for the 700 MHz frequency band as issued in the Commission Implementing Decision (EU) 2016/687.

In its most recent market review as at June 2017, the MCA notes that year-on-year growth in mobile telephony service subscriptions are up by 3.5%. This figure is surpassed by demand for mobile broadband services which are up by 21.7% for the same period. The increase in demand for mobile broadband services is also reflected in the different mobile markets within Europe. The aforementioned analysis suggests that in the future there is likely to be a significant demand for additional mobile spectrum. Consequently, the MCA is of the opinion that the future allocation of the 700 MHz band centre gap spectrum for mobile downlink will ensure the optimal use of spectrum in Malta. The amount of 5 MHz spectrum blocks, of which the primary use shall be allocated for SDL, will vary from a minimum of three up to a maximum of four blocks depending on the national PPDR needs. The aim of the MCA is to make available the 700 MHz centre gap spectrum for mobile downlink as from June 2021. The date when such spectrum is earmarked to be available coincides with the date when the rest of the 700 MHz band will be available for WBB.

The Commission Implementing Decision (EU) 2016/687 states that any mobile data service in the centre gap should be downlink-only, without making specific reference to SDL. In order to be consistent with the regulatory framework as set down in the Commission Decision, and in line with the technology neutral approach as per Directive 2002/21/EC as amended, the MCA is considering the allocation of the centre gap for downlink use, without specifying that this necessarily be SDL. Such an opinion adopts a broader consideration on how the centre gap should be allocated in the long-term especially when taking into account the pace at which technologies may evolve between now and the release of the 700 MHz band. In practice the most likely form of downlink-only technology to use the centre gap is SDL. However, in theory it could refer to other technologies, for example TDD downlink only services or Multimedia Broadcast Multicast Services (MBMS).

In view of the above, the MCA is hereby putting the following issues for the comments and feedback of the stakeholders:

#7 In view of the still evolving state of technology operating in the 700 MHz band, will it be opportune for the MCA at this stage to postpone the decision on the primary use of the 700 MHz centre gap frequency to a later date? What are your opinions on allocating in the National Frequency Plan the primary use of the centre gap spectrum (738-758 MHz) primarily for Downlink Transmissions?

#8 Which assignment and management principles (including licence conditions and price attached) are best suited for the earmarked use of the 700 MHz centre gap spectrum?

M2M / IoT

Machine-to-machine communications is one of the most rapidly growing areas of wireless. The connectivity revolution powered by M2M and the emerging Internet-of-Things is one of the most important trends in modern technology and is set to transform countless industries. This leap in connectivity means the Internet of Things is a major new market that could form a cornerstone of the expanding digital economy. Machine-to-machine communications covers a very wide range of applications¹¹, with differing requirements (for example, in terms of bit rate, number of devices and latency). These result in an equally wide range of technical solutions, which also have a wide range of needs for spectrum.

Spectrum is an essential building block for IoT/M2M devices connectivity. Ubiquitous, affordable, high-speed broadband and narrowband connections using potential frequency bands are critical to meet the needs of consumers and public and private sectors throughout the IoT/M2M ecosystem. Effective and efficient management of this increasingly scarce resource is a priority for the MCA in order to build a thriving M2M ecosystem.

Mobile services play an important role in M2M and IoT markets, and are rapidly evolving to meet the ever growing array of requirements. Currently, it is estimated that around 70% of the M2M market uses short-range, unlicensed connections (e.g. WiFi, Zigbee etc.), however the wide area market is heavily reliant on cellular connectivity. Mobile technology is evolving to meet all the demands of wide-area IoT services:- most notably via GSM systems for low bandwidth applications, such as utility meters, vending machines, and through 3G and 4G-LTE for high bandwidth applications such as streaming video and automotive applications. However, unlike cellular solutions which have been optimised to provide coverage where people live and commute, a reliable M2M service should take into consideration the following set of requirements namely:- (i) very low power of operation enabling operation on a primary battery for many years; (ii) an improved link-budget, in the order of 20dB, relative to existing cellular systems; (iii) efficient radio access protocols for devices that transmit infrequently; (iv) a focus on optimisation of physical layer to maximise coverage and reduce power, with the consequence of relaxing peak throughput; (v) a frequency allocation in the sub-1 GHz band for improved propagation characteristics and ability to maintain small, yet efficient integrated antennas at low cost; and (vi) the ability to exist adjacent to cellular network bands, sharing of sites, antennas, and power amplifiers to enable a service to be provided nationwide at lowest cost. Given the requirements of wide-area IoT services vary much more widely than traditional mobile services, cellular

¹¹ A 2014 Ofcom report identified a possible 149 M2M applications for the UK market - Aegis and Machina Research, 'M2M application characteristics and their implications for spectrum', May 2014.

technology standards have evolved to support all use cases. A mobile ecosystem backed by global standards is already delivering solutions supporting the growth of IoT services. NB-IoT and LTE-M systems for narrow band (200 kHz) and wideband (1.4 MHz and 3 MHz) are being developed by 3GPP in order to enable operators and regulators to maximise the use of spectrum assets.

In view of service and technology neutral frameworks, this advancement in technology will eventually allow operators to deploy the latest cellular IoT technologies in their licensed spectrum bands. The latest cellular standard (3GPP Release 13) allows GSM and LTE networks to support Low Power Wireless Access IoT applications in almost all licensed mobile bands. This includes the ability to support personal and IoT connectivity in the same frequency band at the same time. The amount of licensed mobile coverage (i.e. sub-1 GHz) and capacity (i.e. above 1GHz) spectrum to support the rapid growth of IoT is currently being addressed by the drive towards further spectrum band harmonization.

However, not all IoT operators may have access or are prepared to acquire rights of use for spectrum having the primary use set for mobile communications. International harmonised spectrum reserved specifically for M2M is therefore vital for a global affordable IoT markets. The 700 MHz band provides an opportunity to provide 3 MHz of harmonised spectrum for ECN in Europe that is suitable for low bit rate wide area M2M applications. Such spectrum will enable the mass market low cost cellular IoT devices by creating a large enough addressable market to support manufacturing economies of scale. The emerging LPWA IoT markets will especially benefit from using harmonised spectrum bands in order to reduce the cost of the terminals and therefore accelerate adoption. Without prejudice to the above, member states may, if they deem necessary, opt to allocate the aforementioned band for PPDR applications.

In view of the above, the MCA is hereby putting the following questions for the comments and feedback of the stakeholders:

#9 Do you consider necessary the need to primarily allocate the spectrum band 733-736 MHz and 788-791 MHz for M2M applications? If so, what are the timeframes envisaged by when the M2M industry will need to make use of such spectrum bands?

#10 Which licensing regime (General Authorisation or Individual Licences) do you consider more appropriate for the use of the spectrum band by M2M equipment?

#11 Based on the applicable licensing regime highlighted in question #10 above, in your opinion, which assignment and management principles (including licence conditions and price attached) are best suited for the use of the 700 MHz centre gap spectrum for M2M applications?



Sub 700MHz
Band

Future of DTT

DTT represents the backbone of Europe's 'audio-visual model', delivering the linear TV services to mass audiences and ensuring universal free-to-air access

DTT – an overview of the international dimension

DTT represents the backbone of the ‘audio-visual model’ in the majority of Europe’s urban and rural localities. Whether DTT broadcast is on a regional or national scale, DTT delivers linear TV services to mass audiences whilst providing broadcasters with a transparent and controllable interface with consumers.

In principle, DTT permits: (i) efficient delivery of linear over-the-air audio-visual content to large audiences with a guaranteed quality of service; (ii) near universal territorial coverage; (iii) a wireless platform providing flexibility to deploy and ease of use to the viewer; and (iv) the availability of public service content to all members of society to sustain broader content choice promoting cultural diversity (GIO). In most of the European countries, DTT therefore has a huge potential in remaining a *dominant television viewing platform in the immediate future*. Such a fact is substantiated by the need as identified by the European Union for adequate bandwidth for television broadcasting. In Malta, the latter situation may potentially differ when considering the nationwide rollout of two physical access networks offering commercial linear and non-linear audio visual content.

In Europe, the 700 MHz band, also known as ‘the second digital dividend’, is currently used for digital terrestrial television (DTT) on a primary basis and wireless audio programme making and special events (PMSE) equipment on a secondary basis. In a similar way when terrestrial TV broadcasting migrated from analogue to digital (DVB-T) technologies making the 800 MHz band redundant, *a second digital dividend* will eventually reduce further the total spectrum allocated to terrestrial broadcasting by an average of 30%. In order to minimise further the impact on the operation of terrestrial digital television, as per the European Parliament and Council Decision (EU) 2017/899, ***frequencies in the sub-700 MHz band (470-694 MHz), will remain available, as a priority, for terrestrial broadcasting services until 2030***. Note that PMSE devices, as identified in the ECC recommendation 25 – 10, may also make use of the white spaces within the sub-700 MHz band (secondary basis).

There are both technology and consumer trends in the DTT market that are expected to influence spectrum demand over the coming years. DTT migration to next generation technologies will permit the distribution of higher picture quality content. The migration to new digital picture formats, such as High Definition (HD) and Ultra High Definition (UHD), will meet the ever increasing consumer demands for enhanced image quality. In turn migrating from SD to HD or UHD will eventually result in increased spectrum requirements for terrestrial broadcasting services (in the UHF band). An HD channel requires approximately 150%¹² more capacity than a standard-definition channel. The same logic applies to UHD and, possibly future 3D services, further adding to

¹² Spectrum Policy – Analysis of technology trends, future needs and demand for spectrum in line with Art.9 of the RSPP.

the DTT spectrum demand. In addition, the period of simulcast that is likely to be required when migrating DTT offerings from SD to HD (and later UHD) will also increase the need for spectrum, almost doubling bandwidth use.

DTT technologies have continued to evolve ensuring higher efficiencies and better compression hence reducing DTT spectrum demand. New encoding standards (MPEG4, HEVC) offer greater gains in data capacity while the development of new broadcast transmission standards (DVB-T2) shall allow for an increase in spectral capacity. During any transition period there will be a need to simulcast content using both the new and legacy technologies, temporarily increasing the spectrum required. However, all these technological developments should ultimately lead to more capacity being available on DTT infrastructure.

DVB-T2 is the world's most advanced digital terrestrial television broadcasting transmission system, offering more robustness, flexibility and up to 50% more efficiency than any other DTT systems. Higher spectral efficiency means that with the same amount of spectrum a larger number of programmes can be broadcast or the same number of programmes broadcast with a higher audio/video quality or coverage quality. DVB T2 is an extension of the existing DVB-T standard. It supports SD, HD, UHD, mobile TV, radio, or any combination thereof. DVB-T2 was developed primarily for fixed roof-top reception antennas and has an identical frequency spectrum channel characteristics as DVB-T allowing for backward compatibility with the existing transmission infrastructure. In order to allow for a better use of the spectral resources, cutting edge signal processing technologies were integrated in the standard. DVB-T2 employs modulation techniques used in DVB-T (OFDM) and provides an extended modulation toolkit over DVB-T (up to 32k DFT, 256 QAM modulation constellations, LDPC error protection and BCN coding, Rotated Constellations to name just a few) in order to provide for the additional robustness and flexibility in the service offerings. In addition improved source coding (such as MPEG-4) is employed, the gain in broadcast transmission is remarkable with the possibility of doubling the number of programmes that can be accommodated in one multiplex (while keeping the same audio/video quality). However it is important to note that in the case where sufficient DTT spectrum is made available, the provision of HD services can still be provided using the DVB-T standard in combination with MPEG-4 AVC compression technology.

MPEG-4 is a new multimedia source coding standard that is designed for use in broadcast, interactive and conversational environments. While MPEG-2 is the de facto standard for digital television broadcasting, MPEG-4 offers improved coding efficiency, resulting in better quality of coded video and audio, particularly at low bit rates. Its chief advantage over MPEG-2 is that it is considerably more efficient in its coding

resulting in considerably improved spectral efficiency. Video of comparable quality can be compressed to a considerably lower bit rate, often claimed to be half the bit rate, of MPEG-2.

MPEG-4's strong points are inherited from the successful MPEG-1 and -2 standards. The full MPEG-4 toolbox is very rich and powerful; MPEG-4 adds to MPEG-1 and MPEG-2 while preserving compatibility with major existing standards (MPEG-1, MPEG-2, ITU-T H.263). MPEG-4 covers a wide range of applications, bit rates, resolutions, qualities and services, making it an interesting format for media delivery over different types of transmission or storage technologies

In addition, MPEG-4 allows broadcasters to browse through video archives with ease as well as to distribute their content not only via traditional broadcast means, but also over broadband, IP and mobile networks. The re-purposing of digital video assets is where MPEG-4, with its high coding efficiency for low bit rates, comes into its own. Therefore, MPEG-4¹³ will potentially play a significant role in the interactive, digital television arena.

***HEVC** (High Efficiency Video Coding) is the successor standard to MPEG-4. HEVC has generated huge optimism in the DTT industry when considering the dwindling spectrum shortage. Today MPEG-4 is the most widely accepted and adopted next generation format in online and broadcast domain for content compression and distribution. HEVC, the new video coding standard brings promise of huge bandwidth savings of approximately 40-45% over MPEG-4 encoded content with similar quality. To deliver this level of performance, HEVC requires significantly more computational power and increased processing delays. In addition end-to-end deployment of HEVC will require head-end upgrade, workflow overhaul, re-deployment of set top boxes with embedded HEVC hardware decoders and migration of huge content libraries from MPEG to HEVC. Availability of affordable HEVC technology with high levels of reliability will also be a defining milestone. While HEVC can bring respite to content producers, aggregators, distributors and consumers with more quality content at the same bit rate, HEVC adoption in its current technological phase is still considered far.*

In view of the eroding DTT spectrum following its reallocation for wireless broadband, coupled with the necessary counter reaction to the competitive force exerted by the complementary and alternative TV platforms, the migration towards new higher quality digital encoding and transmission formats **may** be the

¹³ https://tech.ebu.ch/docs/bpn/Exec_Sum_Public_BPN_109.pdf

foreseeable option for DTT. However such developments depend significantly on individual national contexts in particular the maturity and penetration of complementary and alternative platforms.

In order to compete effectively with other complementary and alternative television distribution platforms, as well as for the DTT platform to evolve with the current technological developments, the DTT platform will therefore need to have sufficient capacity¹⁴ to provide new services, whether in relation to more thematic channels or to high definition television. Retaining the competitiveness of the DTT platform in comparison with other television delivery platforms will be essential for broadcast network operators to attract viewers and broadcasters alike. It is only by doing so that the DTT platform will maintain its economic viability.

The ability to generate revenue will also be an important factor in determining whether new services, either free-to-air or pay TV, are launched on the DTT platform. While the DTT platform will do so on condition of having sufficient financial capacity, the process of migrating to a new DTT technology is complex and costly, requiring meticulous planning. Raising awareness together with early device availability accommodating next-generation standards would be essential and a key driver for consumer migration, which nonetheless must benefit from a migration period and/or from migration support measures that respect consumer interests. The migration of the DTT platform will need to safeguard the ongoing delivery of the benefits DTT provides, avoiding undue disruption to viewers and secure value for money.

Drivers for the evolution of Digital Terrestrial TV

While the technical characteristics of new higher quality DTT specifications unquestionably brings benefits in comparison with existing terrestrial television standards, the commercial launch of DTT services employing next generation DTT standards will however require a well-conceived business strategy that brings together the needs of the full broadcast industry.

In addition to the development of DTT source coding and transmission standards, the consumption and evolution of linear digital terrestrial TV is also influenced by: (i) the DTT market characteristics, (ii) the key players in the market (pay TV & free-to-air), and (iii) the regulation and policy governing the DTT market. The level of DTT penetration, the degree of competition from other complementary and alternative TV distribution platforms, the penetration and usage of different consumer devices as well as the consumption and usage of linear and non-linear TV, all have a direct influence on the future roadmap for the evolution of DTT. Service providers will ultimately consider the needs of the market, specifically the size of the market and the type of services that the

¹⁴ Increase in spectrum or better spectral efficiency.

different market segments will want to access. It is up to the competent national authorities, either through a market driven or regulator assisted approaches, to ensure that the adoption, consumption and evolution of DTT platforms will be able to address DTT market requirements.

In the foreseeable future, there will also be the potential that mobile infrastructure will play an increasingly important role in the delivery of audio-visual broadcasting services in Europe. Broadcast network requirements have been incorporated into the 3GPP Release 14 of the LTE specifications. The Release 14 specifications aim to overcome shortcomings in previous LTE broadcast specifications (3GPP Multimedia Broadcast Multicast Service (MBMS), or LTE Broadcast). Mobile infrastructure can thus either provide an alternative means of distributing video content (i.e. interworking with DTT, but not replacing it), or, depending on the evolution of the respective regulatory frameworks, could potentially replace current DTT broadcast networks entirely. Mobile infrastructure will, in the latter scenario become the sole wireless infrastructure for broadcast distribution, potentially in conjunction with fibre and cable broadband in the home. However, terrestrial broadcasting and mobile broadband platforms are likely to co-exist for a long time¹⁵ in order to ensure that supply meets demand. DTT will retain its essential role as a competitive platform for the delivery of linear audio-visual services to mass audiences, with little or no prospect for the convergence of the two platforms in the near future.

The future of Digital Terrestrial TV in Malta

Like most other European countries, audio-visual media services form an essential part of the Maltese culture and society. DTT has so far been a major platform in delivering linear audio-visual services to the TV sets located within our homes. The availability of physical access networks in Malta has also ensured mature and established major platforms for the transmission of both linear and non-linear audio-visual media services to our homes over wired infrastructure. The DTT platform currently in use in Malta, uses the DVB-T broadcasting standards together with the MPEG2 source coding standard.

In addition, the availability of high speed internet services has permitted the use of smart TVs, portable and mobile devices – particularly smartphones and tablets – for viewing linear and non-linear TV. During 2017, as per the Audience Surveys¹⁶ carried out by the Broadcasting Authority, approximately 5% of the population follows programmes on the free-to-air platform (addressing General Interest programmes). Of this latter group, approximately 52% have only a free-to-air connection while the remaining 48% also make use of one or more of the alternative available services. In addition, approximately 25%¹⁷ of the population follows programmes on a paid DTT platform.

¹⁵ EBU - 5G and Public Service Media (Psm): Opportunities In Distribution Of Audiovisual Content And Services - https://tech.ebu.ch/docs/bpn/Exec_Sum_Public_BPN_109.pdf.

¹⁶ <http://www.ba-malta.org/1717-oct-2017-audience-assessment>

¹⁷ MCA/R/18-3060

Pay TV

	<u>Q4 16</u>	<u>Q1 17</u>	<u>Q2 17</u>	<u>Q3 17</u>
<i>Subscriptions as at end of period</i>	147,756	149,227	152,371	153,833
<i>Analogue subscriptions</i>	5,399	5,214	3,729	2,064
<i>Digital subscriptions</i>	142,357	144,013	148,642	151,769
<i>cable</i>	71,213	73,580	78,514	82,088
<i>DTT</i>	45,640	42,722	40,444	37,551
<i>IPTV</i>	25,504	27,711	29,684	32,130

Given that approximately 27% of the Maltese population access audio visual services over the available DTT platform (including GIO and commercial services), the MCA considers that adequate resources for terrestrial television transmissions would contribute towards having a competitive environment in the audio-visual market while still maintaining sufficient spectrum for the provision of wireless broadband electronic communications services. Such an opinion is aligned with the European Parliament and the Council Decision (EU) 2017/899 where frequencies in the sub-700 MHz band (470-694 MHz) shall remain available, as a priority, for broadcasting until 2030.

“The MCA is hereby advising the stakeholders that the National Frequency Plan shall permit the use of the sub 700 MHz band (490 – 694 MHz) for DTT service on a co-primary basis, at least, until 2030. “

In accordance with the Geneva 2006 (GE06) agreement of the International Telecommunication Union (ITU), Malta, within the 470-790 MHz band can make use of 8 channels (28, 31, 38, 43, 45, 56, 58, 60) for terrestrial television transmissions¹⁸. At present, the spectrum bands available for DTT in Malta are licensed on a primary basis to GO plc for the provision of commercial TV services until May 2021, and to PBS Ltd. for the delivery of broadcasting content meeting general interest objectives¹⁹. The licence enjoyed by PBS Ltd. has an indefinite term²⁰.

¹⁸ Note that Channels 60, 58 and 56 currently reside in the 700 MHz band

¹⁹ The GIO multiplex is broadcasted on the UHF Channel 43.

²⁰ Footnote MLT-06 in the National Frequency Plan.

During 2017, in accordance with the obligations imposed in the European Parliament and Council Decision 2017/899, the MCA embarked on a frequency co-ordination exercise with Malta's neighbouring countries (namely Italy, Greece, Tunisia and Libya) in order to clear and ensure that the 700 MHz band may be used for wireless broadband services in a timely manner and at the same time make available additional spectrum for DTT in the sub-700 MHz band. Malta has managed to conclude bilateral agreements with Italy and Greece resulting in the potential exclusive use of 11 DTT channels together with an additional two shared DTT channels between Italy and Malta. The co-ordinated channels shall be used for DTT service provision as from June 2022 due to the restrictions arising from differing roadmap milestones adopted by Italy. During the interim period between June 2021 and May 2022, Malta will only be able to make use of 5 DTT Channels (28, 31, 38, 43, 45). The outcome of the bilateral agreement with Italy is subject to any frequency coordination activities that are deemed necessary between Italy on the one hand and with Tunisia and Libya on the other. Due to the current frequency coordination discussions impasse with Tunisia and Libya, Malta, along with Italy have requested the assistance of the European Commission in achieving the successful closure of the frequency coordination agreements with Tunisia and Libya.

Considering that (i) the newly co-ordinated bands with Italy reside in different parts of the UHF Band, and that (ii) the transmission power levels may need to be attenuated in case of interference with Tunisia and Libya, elements of the existing SFN network (power level, transmitter locations, and transmitting patterns) may need to be revisited accordingly.

Although service boundaries are increasingly becoming blurred, currently the broadcasting market and the electronic communications market are separate and distinct. In view of the current commercial DTT licence expiry in 2021, the issuing of new DTT licences in 2021/22, coupled with the latest developments in DTT technologies, at this stage **a review of the DTT broadcasting policy²¹ is opportune²²**. Such a review, is considered necessary in order to provide security and stability, promote innovation and assure long-term investments for the DTT industry stakeholders (GIO and commercial) and viewers. The MCA notes that a phased programme of work is necessary in order to make the 700 MHz band available for wireless broadband use as soon as practicably possible, whilst safeguarding the ongoing delivery of DTT (GIO and commercial offering) and minimising undue disruption to viewers both during the interim period²³(May 2021 – June 2022) and for the future (beyond 2022). In order to achieve these objectives, the MCA, in collaboration with other competent authorities and Government (and possibly with the participation of the potential multiplex operator/s), shall assess the feasibility for the provision of DTT service utilising next generation technologies (DVBT2, MPEG 4) for DTT licensees post May 2021.

²¹ 2005 Policy and Implementation Strategy re Digital Terrestrial Television (DTTV) and Strategy for Digital Broadcasting that meets General Interest Objectives – 2009

²² The MCA, has included a review of the broadcasting policy as part of its 2018 annual plan - <https://mca.org.mt/sites/default/files/MCA%20Annual%20Plan%202018%20-%2025%20January%202018.pdf>

²³ During the sub 700 MHz frequency co-ordination process, it was agreed that as from June 2021, Malta will refrain from the use of channel 60 in order to facilitate the deployment of WBB in the 700 MHz band in Malta.

In assessing the future broadcasting policies that may be adopted for the sub 700 MHz band, the MCA notes that:-

- In order to continue to provide a competitive and attractive proposition for consumers, the next generation DTT platform should plan for the eventuality that HD becomes the primary video formats.*
- UHDTV production is still at an early stage and is unlikely to become mainstream for at least a decade.*
- Although a technology generation remains active for an average of about 20 years, both industry and consumers typically change their devices on a roughly ten year cycle hence introducing the support for new DTT technologies.*
- Migration from DVB-T to DVB-T2 facilitates the possibility of upgrading from SD to HD.*
- Migration to DVB-T2 will trigger the replacement of decoders and TV sets with more advanced models.*
- The majority of new consumer TV equipment is MPEG-4 capable and is backward compatible with MPEG-2.*
- The ability to make a timely transition between the various generations of DTT technologies is likely to be dependent on the extent to which the governance structure supports coordinated action by stakeholders.*


In view of the above, the MCA is hereby putting the following questions for the comments and feedback of the stakeholders:

#12 Currently, 27% of the Maltese population view linear TV provided over the DTT platform (GIO and Commercial). The National Frequency Plan shall permit the use of the sub 700 MHz band (490 – 694 MHz) for DTT service on a primary basis until 2030. How do you foresee the development of the audio-visual market (GIO and commercial DTT offerings) in Malta for the next 10 years?

#13 Which elements may exert an influence on the foreseeable development of the audio-visual market in Malta? Will the migration to next generation DTT broadcasting technologies (DVB-T & MPEG-4 or DVB-T2 & MPEG-4) be considered necessary in order to address the local DTT market needs?

#14 Do you concur with the earmarked regulatory proceedings aimed at ensuring the ongoing delivery of commercial DTT minimising undue disruption to viewers for both the interim (May 2021 – June 2022) and future (beyond 2022) time periods? Do you consider it necessary to provide for regulatory intervention or initiatives in order to facilitate the technological evolution of the DTT platform post 2021?

#15 How can the assignment and management principles attached with the right of use for the sub 700 MHz Band facilitate the future deployment of DTT in Malta? Should the MCA consider issuing the sub 700 MHz band for DTT with a licence for a term of 15 years (beyond 2030) subject to any obligations as may be imposed in future EU legislation?



Proposed roadmap

Such a strategy reflects Malta's ability to move forward
with an efficient roadmap towards the adoption of future
technologies

700 MHz – MCA achievements so far

The European Commission adopted on 28 April 2016, implementing decision 2016/687 on the harmonisation of the 694–790 MHz band (700 MHz band). The decision allocates 2x30 MHz (703-733 and 758-788 MHz) for wireless broadband electronic communications services on a co-primary basis. Such an allocation for wireless broadband electronic communication is without prejudice to the rights of Member States to organise and use spectrum for public order and public security purposes.

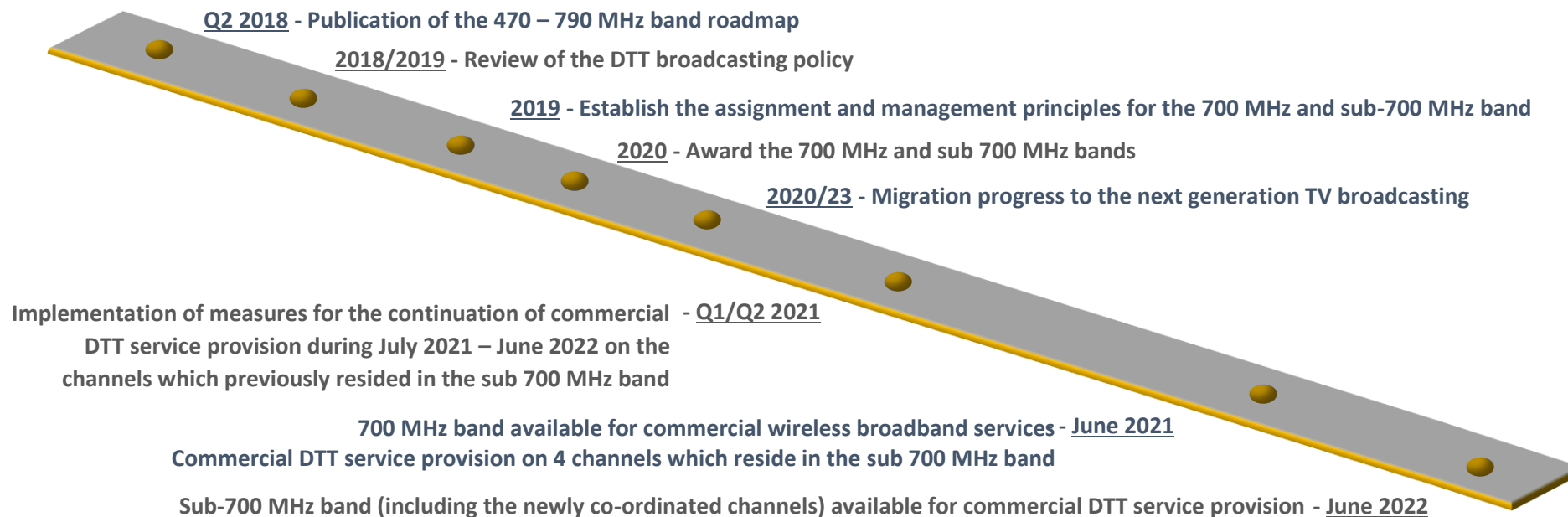
The timeline for awarding the band, was primarily set at an EU level by the Decision ((EU) 2017/889) of the European Parliament and the Council of 17 May 2017.

During 2017, in accordance with the obligations imposed in the European Parliament and Council Decision 2017/899, the MCA embarked on a frequency co-ordination exercise with Malta's neighbouring countries (Italy, Greece, Tunisia and Libya) in order to clear and ensure that the 700 MHz band may be used for wireless broadband services in a timely manner and at the same time make available additional spectrum for DDT in the sub-700 MHz band. By the end of 2017, Malta has manage to conclude bilateral agreements with Italy and Greece. In addition, during the same year, in view of national security issues and the services rendered by the PPDR agencies towards the local community, the MCA has also engaged in preliminary discussions with selected PPDR agencies that are considered critical in Malta.



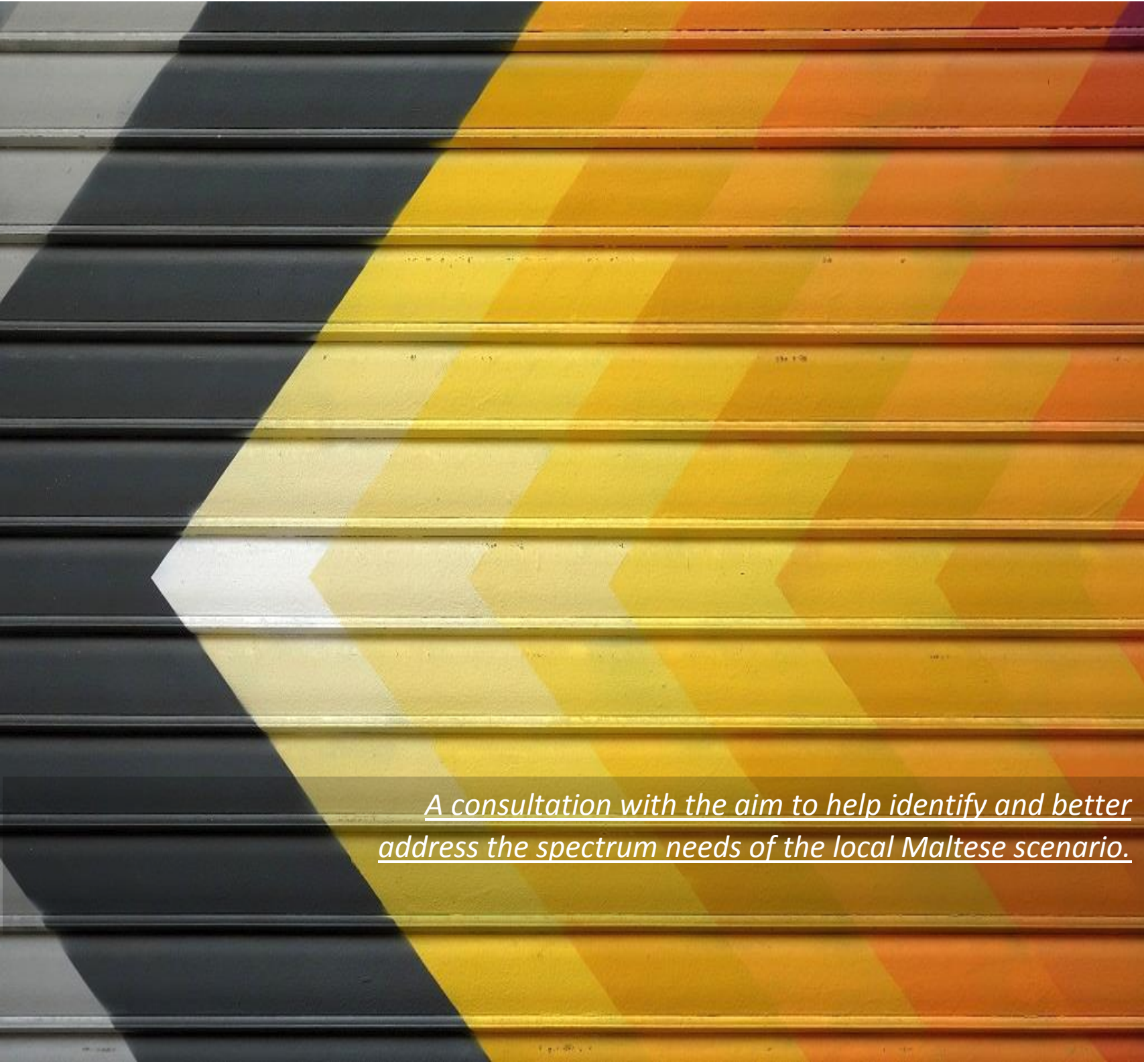
Proposed 700 MHz Band roadmap

The 700 MHz roadmap currently supported by the MCA is depicted in the table below. The roadmap indicates clearly the proposed milestones, whilst ensuring the efficient use of the spectrum and maximizing the economic benefit to the society for both the 700 MHz band and sub-700 MHz bands.



The proposed timeframes seek to allow flexibility in developing and revising the spectrum policy programme for the 700 MHz and the sub-700 MHz bands. Such a strategy, whilst providing for the necessary regulatory commitments, shall at the same time allow for the amendments necessary in order to reflect

market and technological developments at that time. The MCA is of the opinion that such a strategy does not seem to constrain, under any scenario, Malta's ability to move forward with a more efficient roadmap towards the adoption of future technologies



Consultation Questions and Invitation to Comments

A consultation with the aim to help identify and better address the spectrum needs of the local Maltese scenario.

The Authority would be pleased to receive comments and proposals on any other aspects that may be deemed relevant for the purposes of this consultation. For the sake of clarity and ease of understanding, the Authority encourages stakeholders to structure their comments in the same order as adopted throughout this document.

Consultation Questions

700 MHz band

#1 The MCA invites the stakeholder to submit their feedback on the proposed date by when the MCA shall make available the 700 MHz band for commercial WBB.

#2 The MCA invites stakeholders to submit their feedback on potential assignment and management principles that may be appropriately adopted for the use of the 700 MHz spectrum band within the Maltese mobile industry.

BB-PPDR

#3 Do you consider the need for the deployment of a BB-PPDR communication network in Malta in order to meet the challenges in the near future? If so, what are the timeframes envisaged by when the PPDR entities will need to make use of a broadband network?

#4 In your opinion, which of the modes described above (dedicated, commercial, or hybrid) will be more suitable for the Maltese BB-PPDR needs? Whilst taking into consideration the deployment plans of LTE in the 700 MHz band, should mobile ECS providers be earmarked for providing a nationwide broadband PPDR communication network? If so, which are the regulatory aspects that the MCA needs to take into consideration in order to enable such an operational model?

#5 What is the adequate amount of spectrum necessary for a BB-PPDR network to be able to address the future challenges that are encountered by PPDR entities?

#6 In your opinion, which potential assignment and management principles may be appropriately adopted for the use of the 700 MHz spectrum band for BB-PPDR.

SDL

#7 In view of the still evolving state of technology operating in the 700 MHz band, will it be opportune for the MCA at this stage to postpone the decision on the primary use of the 700 MHz centre gap frequency to a later date? What are your opinions on allocating in the National Frequency Plan the primary use of the centre gap spectrum (738-758 MHz) primarily for Downlink Transmissions?

#8 Which assignment and management principles (including licence conditions and price attached) are best suited for the earmarked use of the 700 MHz centre gap spectrum?

M2M

#9 Do you consider necessary the need to primarily allocate the spectrum band 733-736 MHz and 788-791 MHz for M2M applications? If so, what are the timeframes envisaged by when the M2M industry will need to make use of such spectrum network?

#10 Which licensing regime (General Authorisation or Individual Licences) do you consider more appropriate for the use of the spectrum band by M2M equipment?

#11 Based on the applicable licensing regime highlighted in question #10 above, in your opinion, which assignment and management principles (including licence conditions and price attached) are best suited for the use of the 700 MHz centre gap spectrum for M2M applications?

Sub 700 MHz band

#12 Currently, 27% of the Maltese population view linear TV provided over the DTT platform (GIO and Commercial). The National Frequency Plan shall permit the use of the sub 700 MHz band (490 – 694 MHz) for DTT service on a primary basis until 2030. How do you foresee the development of the audio-visual market (GIO and commercial DTT offerings) in Malta for the next 10 years?

#13 Which elements may exert an influence on the foreseeable development of the audio-visual market in Malta? Will the migration to next generation DTT broadcasting technologies (DVB-T & MPEG-4 or DVB-T2 & MPEG-4) be considered necessary in order to address the local DTT market needs?

#14 Do you concur with the earmarked regulatory proceedings aimed at ensuring the ongoing delivery of commercial DTT minimising undue disruption to viewers for both the interim (May 2021 – June 2022) and future (beyond 2022) time periods? Do you consider it necessary to provide for regulatory intervention or initiatives in order to facilitate the technological evolution of the DTT platform post 2021?

#15 How can the assignment and management principles attached with the right of use for the sub 700 MHz Band facilitate the future deployment of DTT in Malta? Should the MCA consider issuing the sub 700 MHz band for DTT with a licence for a term of 15 years (beyond 2030) subject to any obligations as may be imposed in future EU legislation?

Invitation to Comments

In accordance with its obligations under Article 4A of the Malta Communications Authority Act [Cap.418 of the Laws of Malta], the Authority invites written submissions from interested stakeholders during the consultation period, which shall run from the 23/04/2018 to 12:00 pm of the 22/05/2018.

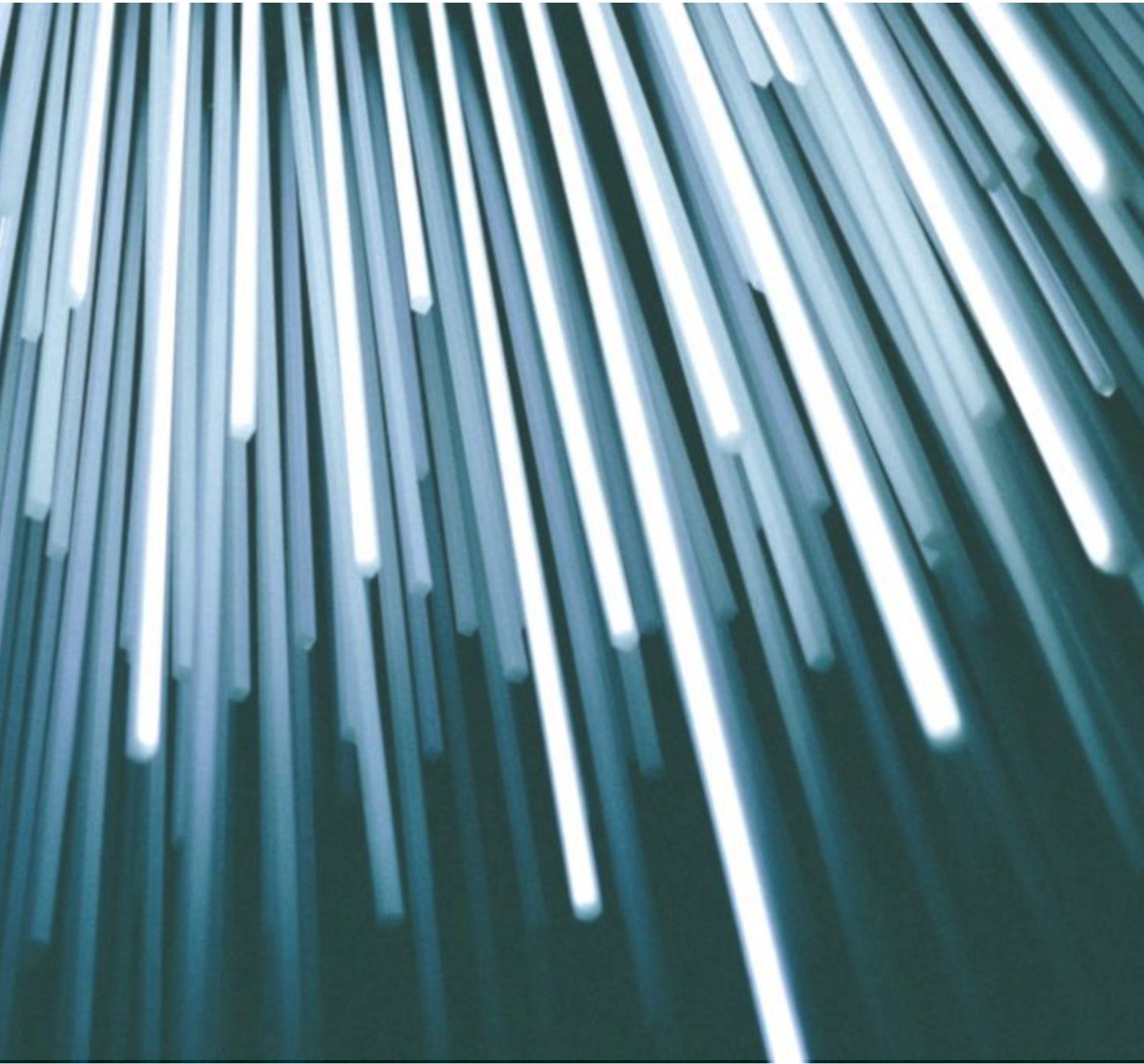
The Authority appreciates that respondents may provide confidential information in their feedback to this consultation document. Any such information is to be included in a separate annex and should be clearly marked as **confidential**. Respondents are also requested to state the reasons why the information should be treated as confidential.

For the sake of transparency, the Authority will publish a list of all respondents to this consultation on its website, within three days following the deadline for responses. The Authority will take the necessary steps to protect the confidentiality of all such material submitted in accordance with the Authority's confidentiality guidelines and procedures. Respondents are however encouraged to avoid confidential markings wherever possible.

All responses should be submitted to the Authority, in writing by no later than 12:00 hrs on 22/05/2018 and addressed to:

Ing. Antoine Sciberras
Chief of Spectrum Management and Technology
Malta Communications Authority
Valletta Waterfront, Pinto Wharf,
Floriana, FRN1913
Malta.
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Extensions to the consultation deadline will only be permitted in exceptional circumstances and only where the Authority deems fit. The Authority reserves the right to grant or refuse any such request at its sole discretion. Requests for extensions are to be made in writing within the first ten (10) working days of the consultation period. Any other requests shall NOT be considered.




Disclaimer

Whilst every care is taken to ensure the accuracy of the information contained in this consultation, the facts, estimates and opinions stated are based on information and sources which, while we believe them to be reliable, are not guaranteed.

No liability can be accepted by the MCA, its directors or employees for any loss occasioned to any person or entity acting or failing to act as a result of anything contained in or omitted from the content of this consultation or our proposals as stated. The proposals made within this consultation document are subject to change without notice. The material in this consultation should not be regarded as legal advice or relied on for assistance in any particular circumstance or situation.

This report has been prepared for consultation purposes only and does not indicate the MCA's commitment to a particular course of action. Additionally, any third party views or recommendations included in this report do not reflect the views of the MCA, or indicate its commitment to a particular course of action.



A roadmap for the UHF band
between 470 - 790 MHz

Public consultation