Consultation on the assignment process of radio spectrum in the sub-700MHz band for Digital Terrestrial Television Services in Malta

Consultation Paper

MCA/C/20-3838

Publication Date

5th June 2020

www.mca.org.mt

(+356) 2133 6840
info@mca.org.mt

Valletta Waterfront, Pinto Wharf,
Floriana FRN1913, Malta

MALTA COMMUNICATIONS AUTHORITY

Contents

Revision History

Rev No	Description	Date
01	1. Correction of frequency channel number as listed in paragraph 2 of sub-section “Purpose of this consultation” within Section 1 2. Correction of Table 5 in Section 3	24th June 2020

1. Introduction

The Local Dimension

Digital Terrestrial Television (DTTV) is a wireless terrestrial service which enables the broadcasting of audio-visual content in digital format. DTTV can reach a significant number of television viewers even when these are spread across a considerable geographical area. With DTTV technology, the latter can be achieved while investing a moderate amount of capital in the access and distribution networks. This is in contrast with other digital TV distribution platforms that make use of wired distribution technology and which also tend to require significantly large investments.

Back in 2005, Multiplus Ltd (which was later acquired by GO plc in 2007) began to offer DTTV services in Malta on a nationwide commercial basis. The Malta Communications Authority (MCA) granted Multiplus Ltd the rights of use for a number of spectrum channels in the UHF band. The rights of use were assigned for a period of eight (8) eight years, with the possibility of renewing the spectrum license for an additional eight (8) year period. Upon the expiry of the license back in 2013 the Authority renewed the aforementioned spectrum license for an additional eight (8) year period up until May 2021[1]. The spectrum license which was originally granted to Multiplus Ltd consisted of the right of use for eight channels, each having a bandwidth of eight Megahertz (8 MHz). The network adopted DVB-T and MPEG-2 standards for the transmission and encoding of the audio-visual content in digital format.

In 2011, Malta completed the digital switch-over programme by first setting up a digital terrestrial TV platform which would carry the TV stations that meet the General Interest Objectives resulting in the switch-off the analogue TV broadcasting stations.

In 2009, the then Ministry of Infrastructure, Transport and Communications, in collaboration with the Malta Communications Authority and the Broadcasting Authority, published a policy and strategy paper addressing the broadcasting of Digital Terrestrial Television that meets the General Interest Objectives (GIO). The key elements of this paper included: (i) the

[1] Link to current spectrum licence as awarded to GO Plc.
http://www.mca.org.mt/sites/default/files/pageattachments/GO%20plc%20DTTV%20licence_amended%202016-08-19.pdf

establishment of a General Interest (GI) network which would eventually carry the GIO stations on a free-to-air basis; (ii) the establishment of a GI network operator; and (iii) the assignment of the GI network operator to the state broadcaster i.e. the Public Broadcasting Services Ltd (PBS). The Paper also established that from amongst the channels registered for use by Malta under the Geneva 2006 Agreement (GE06), a channel in the VHF band and another channel in the UHF band were to be reserved for GI broadcasting. The remaining channels would be allocated for commercial television distribution networks.

A European Dimension

Radio spectrum is a limited natural resource which requires effective management to maximise the applications and use of spectrum without causing harmful interference. Since radio transmissions propagate unhindered beyond the geographical borders, radio spectrum needs to be managed at an international level. The International Telecommunications Union (ITU) is the internationally recognized body which, through its administrative regulations such as the Radio Regulation Rules inter-alia administers the use of spectrum across the globe. The 2015 World Radio Conference (WRC-15) of the ITU decided that for countries in Region 1[2], which includes Malta, the 470-694 MHz band, also commonly referred to as the 'sub-700MHz band' shall remain exclusively allocated for broadcasting services on a primary basis and to wireless audio PMSE use on a secondary basis. WRC-15 also agreed to review the allocations within the 470-960 MHz band at the 2023 World Radio Conference (WRC-23)[3].

The European Parliament and the Council of the European Union have also adopted a number of decisions[4] with regard to Europe's future digital services. In shaping Europe's Future Digital Policy, the European Commission (CION) following the recommendation by the Radio Spectrum Policy Group on the long-term strategy on the future use of the UHF band (470 – 790 MHz), established that Member States shall ensure availability of the sub-700MHz band for a period lasting at least until 2030 and make the band available for electronic communications networks capable of transmitting broadcasting services, including free television. The respective decision also obliged Member States to publish national roadmaps to facilitate the use of the 700MHz band for terrestrial wireless broadband services, while

[2] https://www.itu.int/en/ITU-R/information/Pages/emergency-bands.aspx

[3] WRC-23 agenda item 1.5 - https://www.itu.int/dms_pub/itu-r/oth/0c/0a/R0C0A00000C0036PDFE.pdf

[4] https://eur-lex.europa.eu/legal-content/en/TXT/?uri=CELEX%3A32017D0899

ensuring the availability of broadcasting services in the sub-700MHz band, at least until 2030.

Purpose of this consultation paper

In view of the current DTTV spectrum license expiry in May 2021, the obligations emanating from the CION decisions, together with the goals identified in the National Roadmap for the UHF band between 470 – 790 MHz (MCA/O/18-3256)[5], the Authority is hereby consulting on the assignment process and respective license conditions for spectrum channels in the 470 – 694 MHz band.

This consultation will concern the spectrum which is used for the commercial DTTV services. Therefore, one channel in the UHF band (Channel 43) and one channel in the VHF band (Channel 5) shall remain reserved for the transmission of the GIO network. In the eventuality that either or any of these channels become available for commercial use, the Authority would consult again on the future of these channels.

[5] https://www.mca.org.mt/sites/default/files/700MHz%20Roadmap%20MCA_O_18_3256_0.pdf

2. DTTV Spectrum in Malta

The evolution of DTTV spectrum

Since the award of the first radio spectrum licences for the provision of DTTV service back in 2005, significant technological and policy developments with regard to spectrum assigned for DTTV broadcasting have occurred throughout the course of time. This section provides a highlight of the relevant events.

Back in 2006, the ITU concluded the Geneva 06 (GE06) conference during which the rules for the sharing of spectrum resources among the neighbouring countries were established. The outcome from the GE06 conference resulted in Malta being allocated a total of eight spectrum channels in the UHF band and one channel in the VHF band.

Table 1 below shows the list of GE06 spectrum channels allocated for the use in Malta as per the respective spectrum bands and sub bands.

Band	Sub bands	Spectrum Range (MHz)	Number of channels allocated
III (VHF Band)		174 MHz – 230 MHz	1[6]
IV (UHF Band)	Sub 700MHz band	470 MHz – 582 MHz	2
V	Sub 700MHz band	582 MHz - 694 MHz	2

[6] Does not take into account allocations for the transmission of digital radio

(UHF Band)			
	700 MHz band	694 MHz -790 MHz	3
	800 MHz band	790 MHz - 860 MHz	1

Table 1 Spectrum Available for use in Malta as agreed during the GE06 Conference.

The CION, in shaping Europe's digital future, back in 2007 and 2009 adopted a policy whereby, in view of upcoming mobile technology such as 4G and in anticipation of increased speed and better quality of service for wireless broadband networks, large amounts of radio spectrum which were previously assigned for the transmission and distribution of broadcasting services were reallocated for the use of wireless broadband services. This process, termed as the digital dividend was carried out in two steps.

The "first digital dividend" was achieved through Decision 243/2012/EU of the Parliament and Council mandating the allocation of the UHF spectrum band 790 – 862 MHz (the 800 MHz band) for the setting up of terrestrial services capable of providing wireless broadband.

The "second digital dividend", adjacent to the first digital dividend band, allocated the additional UHF spectrum band 694 -790 MHz (the 700 MHz band) for further mobile use in support of 5G technologies. The second digital dividend was achieved through Decision 899/2017(EU) of the European Parliament and the Council of the European Union whereby the spectrum in the 700MHz band was repurposed for the setting up of terrestrial services capable of providing wireless broadband.

The delivery of the digital dividend in Malta had a direct impact on the amount of spectrum which was previously allocated for broadcasting of TV services. The repurposing of the 800MHz band resulted in the forfeiture of one of the spectrum channel (Channel 66) which was previously assigned to the state broadcaster for GI purposes. As a result of this, Malta successfully coordinated with its neighbouring countries using procedures set out in the GE06, for a replacement channel in the UHF Band. Eventually, the 800MHz band was licensed for commercial wireless broadband networks in 2018.

The reassignment of the 700MHz band for high speed wireless broadband services meant that the total number of DTTV broadcasting channels available in Malta would diminish further. As identified in the Authority's National Roadmap for the UHF band between 470 and 790 MHz (MCA/O/18-3256), only five (5) of the GE06 coordinated channels in the UHF band will remain available for DTTV broadcasting after June 2021.

In view of this, Malta embarked on a negotiation process with its neighbouring countries in order to coordinate the use of additional UHF channels for commercial DTTV broadcasting. Malta managed to conclude a coordination agreement for the use of additional spectrum in the UHF band with Italy and Greece as from 1st July 2022, Malta may use an additional eight (8) UHF channel for its commercial DTTV broadcasts, albeit with strict power conditions and with limited protection against harmful interference predominantly in certain areas facing the African coast.

Future availability of DTTV Spectrum in the sub-700 MHz band

Following the coordination agreements, the sub 700 MHz spectrum available for DTTV broadcasting in Malta amounts to a total of thirteen (13) UHF broadcasting channels. The bandwidth and channel spacing of the aforementioned channels is set at 8 MHz. Of these channels, one (1) is assigned for use, on an indefinite basis and for non-commercial use, to the designated GIO network provide for the transmission and distribution of channels that meet the GIO. Therefore, this channel is excluded from the process outlined in this consultation. For the avoidance of doubt, this channel is also excluded from any spectrum licence conditions that are proposed in this paper.

In view of the differences in the technical and operational parameters with which the available DTTV spectrum may be used, this spectrum will be organised into two (2) categories of spectrum channels as indicated in below.

Group 1– DTTV Spectrum registered for use by Malta under the GE06

Channel Number	Centre Frequency
28	530 MHz
31	554 MHz
38	610 MHz
45	666 MHz

Table 2 List of spectrum channels in Group 1

Group 1 spectrum can be used within the transmission parameters described in the GE06 with respect to these channels, however, on condition that no undue interference is caused to any of Malta's neighbouring countries. Furthermore, users of spectrum in this group can claim protection against harmful interference which could be caused by broadcasting

transmission stations located in neighbouring countries of Malta, provided that the transmission network in Malta operates within the GE06 transmission parameters.

Spectrum in Group 1 will be commercially available as from 12th May 2021 following the expiry of the current spectrum license.

Group 2 – DTTV Spectrum coordinated between Malta and Italy

Channel Number	Centre Frequency
21	474 MHz
22	482 MHz
23	490 MHz
25	506 MHz
26	514 MHz
30	546 MHz
33	570 MHz
39	618 MHz

Table 3 List of spectrum channels in Group 2

Group 2 spectrum shall be used in accordance with the agreement reached between Malta and Italy. This agreement establishes a coordination zone[7] which should be respected to ensure the efficient use of radio spectrum by both countries. Consequently, undertakings enjoying a right of use of any of these channels must ensure that their signal does not reach

[7] Refer to Annex 4

any land based territory beyond the established coordination zone with a field strength greater than the coordination trigger field strength[8] as defined in the GE06 namely 21dBµV/m for channels falling in the Band IV (470-582 MHz) and 23dBµV/m for channels falling in Band V (582-718 MHz). The agreement also aims to provide protection in case of harmful interference that originates from the Italian territories and the islands of Malta and Gozo. Protection against harmful interference cannot be claimed if caused from transmission located in any other area[9].

DTTV spectrum in Group 2 will be commercially available as from 1st July 2022.

[8] The coordination trigger field strength is defined as the signal field-strength which, when exceeded, determines that coordination is required.

[9] The Authority maintains its efforts to coordinate with its neighbouring countries to secure protection against harmful interference from these countries.

3. Spectrum Lots

The term 'lot' is the minimum amount of spectrum that an interested party can apply for and is defined in terms of its size, the technical characteristics and the period of availability. The lot structure and their respective license conditions attached as proposed by the Authority are designed in order to (i) *ensure the efficient and effective use of spectrum; (ii) promote a competitive approach; (iii) Promote further investment and innovation; and (iv) safeguard the public interest.* The proposed lot structure also takes into consideration the goals as identified in the National Roadmap for the UHF band between the 470 – 790 MHz

The lot structure as proposed in this paper primarily takes into account the availability of the sub-700MHz spectrum band and the potential that this spectrum offers to set up a commercially viable DTTV network. This spectrum could be used to set up either a new network or extend the operation of an existing one. In either case, any DTTV network needs to establish its position within a competitive market which comprises wired TV distribution networks, as well as other IP solutions that deliver multimedia content and broadcasting services to the consumer which can also grow in the near future. Cognisant of this complex market, the Authority will be proposing that spectrum lots are designed to ensure the maximum spectral resources possible to a single DTTV operator thus maximising the potential to offer a range of services that could compete in the current market[10].

Each of the respective lots will have license conditions attached with rights of use reflecting relevant technical and operational parameters accordingly.

Based on the above-mentioned underlying principles, the Authority is proposing the lot structure as follows: -

[10] https://www.mca.org.mt/articles/communications-market-review-january-june-2019

Lot 1 – Interim Lot

Lot 1 – Interim Lot shall consist of all the channels in Group 1. The right of use applicable with this lot shall cover the period starting from 12th May 2021 and ending on 30th June 2022.

Table 4 below indicates the spectrum channels in Lot 1.

Channel Number	Centre Frequency	Band Number
28	530 MHz	IV
31	554 MHz	IV
38	610 MHz	V
45	666 MHz	V

Table 4 List of Spectrum Lot -1

Lot 2 – Future Lot

Lot 2 – Future Lot consists of a combination of spectrum from Group 1 and Group 2 which are available between 1st July 2022 and 31st December 2030.

Table 5 below indicates the spectrum channels in Lot 2

Group	Channel Number	Centre Frequency	Band Number
1	28	530 MHz	IV
1	31	554 MHz	IV
1	38	610 MHz	V
1	45	666 MHz	V
2	21	474 MHz	IV
2	22	482 MHz	IV
2	23	490 MHz	IV
2	25	506 MHz	IV
2	26	514 MHz	IV
2	30	546 MHz	IV
2	33	570 MHz	IV
2	39	618 MHz	V

Group 1 - GE06 coordinated Channels

Group 2 - MT + IT coordinated UHF Channels

Table 5 List of spectrum channels in Lot 2

An applicant may express his interest for any of the individual lots or both lots concurrently. In identifying the demand for spectrum, precedence will be given to those valid applicants who have expressed interest for both lots concurrently.

4. Assignment Process and applicable criteria

The Authority proposes to adopt the assignment process highlighted in Figure 1 below.

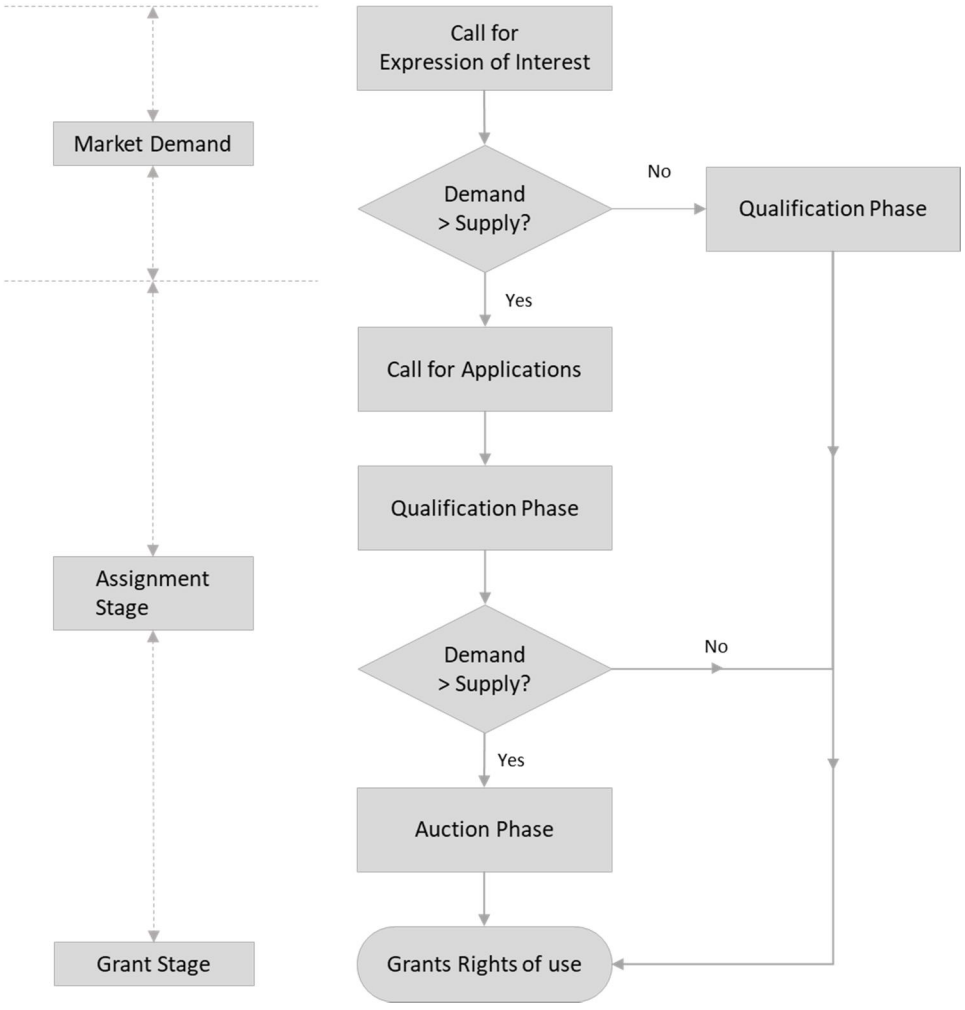

Figure 1 Overview of the spectrum assignment process

The assignment process is divided into:

a) The Market Demand stage during which the Authority awaits a formal request for the spectrum to be registered with the Authority. This stage will be initiated with the

publication of its Decision establishing the spectrum assignment framework for the grant of rights of use of radio spectrum for DTTV and shall remain open until at least a single request for spectrum is received by the Authority.

Upon registering demand for the spectrum, the Assignment stage will be initiated with a call for applications and followed by a qualification phase during which phase the applicants are screened against a number of criteria. Considering only the demand for spectrum arising from those applicants that pass the qualification phase, the appropriate route for the spectrum assignment will be decided which will mainly decide whether the spectrum auction would be held or not.

Market Demand

The Authority intends to initiate the spectrum assignment process as proposed in this consultation if it receives a formal request for all the spectrum in the sub-700Mhz band or part thereof. All such requests shall be processed in accordance to the final Decision establishing the spectrum assignment framework as published by the Authority.

The Authority shall publish a notice announcing the receipt of such request together with an Expression of Interest inviting interested parties to express their interest in acquiring spectrum in the sub-700MHz band as listed in this consultation paper. This process will run for a period of three (3) weeks.

If on the expiry of this time period it results that the demand for spectrum exceeds the spectrum being made available, then the Authority shall issue a formal Call for Applications. Otherwise, the Authority will proceed with publishing a binding Request for Information requesting a detailed proposal thus allowing the Authority to complete the validation process. Following the successful completion of the validation of the proposal the Authority will proceed with a direct assignment

Assignment Stage

Call for Applications

It is proposed that a formal call for applications is published by the Authority following a call for an expression interest which results in a spectrum demand that exceeds supply.

It is proposed that the Call for Application to include the following elements:

a) A non-refundable application fee will be established with the issue of the Call for Applications.
b) A bid bond/performance guarantee. The bid bond would initially serve to ensure the applicant's commitment towards the assignment process. This bid bond shall be kept for the entire duration of the assignment process and will only be released, subject to the terms of the whole assignment process, once the successful applicants have been announced. For successful applicants, the bid bond will be converted into a performance guarantee which will serve as evidence of good will, to guarantee that the licensee will honour the winning bid and abide the spectrum license conditions. The bid-bond will be released when the licence coverage obligations are met, provided that the necessary coverage is reached within the timeframe established in the licence.
c) First year radio spectrum licence fees which shall be refunded to all unsuccessful applicants at the end of the assignment process

Validation Phase

The assignment process should not only establish the price for the spectrum but should also aim at identifying the applicant which is best positioned to maximise the use of the spectrum by building infrastructure which is available on a nationwide basis, and strengthens competition in the electronic communication sector – or more specifically in the digital television broadcasting networks and services. This validation phase will not rank any of the applicants but will rather produce a pass/fail result based on a set of criteria. Applicants for spectrum will be required to present a detailed proposal to be assessed technically and financially. While the final list of documentation that will be necessary to support the phase will be published in the call for application, this consultation paper will focus on the main elements that make the validation phase.

Applicants for the spectrum licence will be required to successfully pass through:

a) **Due diligence** process will be carried out in which the credentials of the applicants for spectrum are established and verified.

b) A **technical assessment** of the proposal during which the Authority will validate the proposal against the technical requirements listed in Section 5 of this consultation paper. This process will also attest the technical competence of the applicants.
c) A **commercial assessment** of the long-term business plan that will enable the execution of the technical solution presented in (b) above while ensuring healthy returns for the applicant throughout the whole operating period of the spectrum licence.
d) **Access to finance** necessary to execute the business plan to completion.

Following the validation phase the Authority will reassess the demand for spectrum and the process will proceed as follows:

a) Should there be no single applicant that passes the validation stage, then the process is suspended for a period of one (1) month allowing the applicants to revise their application. Following this period, and after any necessary reassessments, should the process conclude with no valid applicants, the process will be closed off only to be reinitiated when new demand from the spectrum is received.
b) Should the demand be less than or equal to the supply, then the Authority will proceed with a direct assignment.
c) Should the demand exceed supply, the Authority will proceed to an auction.

Auction

The Authority proposes that in case that demand for spectrum exceeds supply, an auction is carried out as a fair mechanism to establish the market value of the spectrum. The Authority proposes that the Auction Rules shall be published only if the demand for spectrum exceeds supply. At this stage, applicants shall be given the opportunity to withdraw their application and their bank guarantee will be released. Beyond this stage, and hence once applicants have been invited to participate in an auction, applicants shall be required to take part in at least the first round of the auction stage. Failure to do so would result in a forfeiture of the bank guarantee.

Future of unassigned spectrum

In the eventuality that the spectrum lots remain unassigned, the Authority proposes that the unassigned spectrum will remain available to any interested party subject to the same conditions as listed in the MCA Decision establishing the assignment spectrum conditions. Should future interest be expressed for the Lots in question, the process outlined above will be initiated.

5. Conditions of Rights of Use of Radio Spectrum

In this section, the Authority is proposing the technical and operating conditions which will eventually be attached to the spectrum license. The conditions of the rights of use of radio spectrum are additional to any other obligations applicable to all authorised undertakings including but not limited to the provision of access and interconnection (including infrastructure sharing) and must carry obligations as applicable to DTTV networks and service providers.

In proposing the following conditions, the Authority seeks to strike a balance between the inherent need to ensure the efficient use of spectrum while minimizing the deployment costs against the need to deliver a high-quality product and service to the end-user.

The design of a broadcasting network for TV and multimedia services may be characterized by the technology used for the broadcast of the TV signal (the radio frequency (RF) network) and the technology which encodes the data carried by the RF network. The technology used to implement the RF network primarily determines how much bitrate will be extracted per unit of spectrum, and the level of resilience towards interference it will able to resist without collapsing. The encoding technology determines the amount of bitrate necessary to encode the picture and the audio.

The technical conditions which will be associated with the spectrum are more relevant to the RF network. The planning characteristics of a TV RF network (RF network) may be summarized by the following:

1. Obligation to reach coverage targets set out in the licence conditions.
2. Obligation not to cause interference to other countries
3. EMF Obligations
4. Desire to protect the network from any incoming interference
5. Overall network costs.

The solutions that address one objective, normally runs in conflict with achieving the next objective. For instance, the drive to reach coverage obligations may direct the network designer to increase the transmission power, hence increasing the signal reach. However, the obligation not to cause interference to third countries, or not to cause harmful EMF emissions may necessitate reducing the effective transmitted signal power. This may eventually result in the necessity to increase the number of signal transmitters in order to make up for the reduced transmitting power while ensuring adequate signal coverage, thus increasing network costs. Therefore, a delicate balance between the targets helps in achieving a functional and financially feasible network design.

During the validation stage of the assignment process, the Authority will test the ability of the applicants in balancing the obligations. Given that at this stage there will be no active networks that could be physically measured, the Authority will request the applicants to provide their proposed network plans as part of the call for applications for spectrum. The Authority will then assess these network plans using network coverage simulation tools. Proposals which do not meet the license requirement outlined below will be rejected.

The obligations to be attached with the license of this spectrum shall only deal with the first three elements in the list above.

Use of Radio Frequency

The National Frequency Plan designates the primary use for the 470 – 690 MHz band for terrestrial broadcasting services. On the basis of the latter, the radio frequency spectrum shall be used by the Licensee only to establish and operate a terrestrial network using a Single Frequency Network[11] configuration capable of providing electronic communication services suitable for digital terrestrial television services together with other services related to the

[11] Single-Frequency Network (SFN) as per Recommendation ITU-R-BT.1306 - A single-frequency network is a broadcast network where several transmitters simultaneously send the same signal over the same frequency channel.

broadcasting of television signal including but not limited to electronic programming guides, and other services suitable for disabled end-users when these are available.

In addition, in view of the obligations imposed by the CION with regard to the equivalent of access to electronic communications services by disabled end user, the broadcasted signal shall be capable of delivering an audio, video and data stream concurrently without any significant degradation on the quality of the broadcasted stream. Such technical conditions shall allow the broadcasting of information which is required by a number of open standard features (such as subtitling and audio description) which will facilitate the experience of disabled end users.

DVB-T is a technical standard, developed by the DVB Project and published by ETSI as EN-300.744. The standard specifies the framing structure, channel coding and modulation for Digital Terrestrial Television broadcasting. DVB standard- being deployed across all EU member states as well as in the large majority of the countries across the world, turns out to be the de-facto standard of choice for the deployment of DTTV transmission networks. Also, given the wide availability of reasonably priced DVB-T set-top boxes and integrated receivers, renders a large number of households ready to receive DVB-T transmissions effortlessly. This results in a reduction of deployment costs for this technology.

DVB-T2 published as ETSI EN 302 755 is the next generation of DVB standards. DVB-T2 improves the efficiency of DVB-T while increasing the resilience to harmful interference. It is estimated that the nominal efficiency of DVB-T2 over DVB-T is in the range of 50%. The actual efficiency is also a function of the technical configuration of the system which is beyond the scope of this discussion. DVB-T2 is also widely popular across the EU after a number of DVB-T transmitters were upgraded to DVB-T2. Being a relatively newer standard compared to DVB-T, DVB-T2 may be less readily available than its predecessor.

Lot 2 assignment with medium-term licence durations are required to provide evidence of plans to transition towards higher efficiency modulation and encoding standards.

In line with the principle of technology neutrality as specified in article 40 of the Electronic Communications (Regulation) Act, Cap. 399 of the laws of Malta, while ensuring that the spectrum is used in an efficient and effective way, the 470 – 690 MHz spectrum band will be awarded on a technology neutral basis. This implies that the holder of the right of use for such spectrum may deploy its DTV network employing any of the respective DVB standards or any other compatible digital television standards provided that proof of compatibility and conformance to the prevailing interference obligations lie with any prospective applicant or rights holder.

Coverage Obligations

Coverage obligations will be benchmarked against the fixed reception mode[12] which is the widely used method to receive DTTV signal but also offers the most relaxed signal conditions to achieve signal coverage. In adopting the fixed reception mode the Reference Planning Configuration (RPC 1) as established in the GE06 agreement shall be deemed appropriate and the equivalent median field strength for fixed antenna reception shall be used. The correct values and correction factors applicable to calculate the mean field strength of the values indicated for RPC 1 as calculated at a frequency of 650MHz (Band IV/V) is quoted as 56 dB(μV/m) for transmission in the 550MHz band using DVB-T broadcasting technology[13]. An area is considered to be covered with DTTV signal if the measured signal strength at a height of 10m above ground level reaches or exceeds the quoted signal level.

Nationwide coverage shall imply a territorial coverage of 95% of the islands of Malta and Gozo. In this case, given the context of Fixed Reception mode, this requirement will be relaxed to exclude all of the unbuilt-up areas.

Annex 5 proposes a map of Malta and Gozo indicating the areas where the licensees are expected to meet their respective nationwide coverage obligations.

The assessment of coverage obligations is carried in two stages. The first stage would be carried out as part of the validation phase of the application process. At this point, the applicant shall provide the Authority with an estimate of the network coverage attainable with the proposed network. Based on the submissions by the applicant, and based on prediction models using commercially available tools, the Authority shall assess the coverage claims by the applicant. Any proposal which does not meet the coverage criteria will be eliminated from the process.

[12] Fixed Reception mode refers to signal signal reception mode using a directional antenna mounted at roof level, which antenna is optimised to receive high quality signal

[13] In the case of DVB-T2 networks the Equivalent median field strength shall be revised to 54.3 dB(μV/m) in line with Report ITU-R BT.2254-3 - https://www.itu.int/dms_pub/itu-r/opb/rep/R-REP-BT.2254-3-2017-PDF-E.pdf

A second assessment is carried out after the award of the licence as part of the compliance checks of the licence conditions. This assessment will take the form of signal measurements across Malta and Gozo.

Coverage obligations for Lot 1

In view of the short duration allocated for the use of the Lot, the Authority proposes that no spectrum coverage obligations shall apply. The relaxation of coverage obligation on this lot shall facilitate new entrants by granting them sufficient time to design and test out a DTTV network, in preparation for the longer-term spectrum licence.

Coverage obligations for Lot 2

The coverage obligations related to Lot 2 shall be equivalent to nationwide coverage which has to be achieved within twenty-four (24) months from either the date of the award of the spectrum licence of 1st July 2022 whichever date is the latest.

Applicable Criteria for the avoidance of cross-border harmful interference

As stated earlier in this document, radio spectrum designated for the provision of terrestrial broadcasting services is also regulated by regulations adopted within the framework of the ITU to avoid risks of cross-border harmful interference. In this respect it should also be stated that in accordance with Directive 2002/21/EC, Member States shall respect relevant international agreements, including the ITU Radio Regulations.[14]

This section highlights the obligations attached to spectrum in Lot 1 and Group 1 of Lot 2 and Group 2 of Lot 2 separately.

The Authority proposes that DTTV networks are assessed to ensure that they will not cause any undue cross-border harmful interference. This assessment will be carried out both during the Assignment Stage, as well as throughout the duration for the spectrum rights of use.

[14] Directive 2002/21/EC of the European Parliament and of the Council of 7 March 2002 on a common regulatory framework for electronic communications networks and services.

The Authority's objective in carrying out the qualification phase during the spectrum assignment process is to ensure that the applicants have the necessary abilities to design a DTTV network that can meet the coverage obligations as well as avoid cross-border harmful interference. The Authority, however, recognises that the network deployed may somewhat differ from the initial proposed network for the assessment by the Authority due to a number of reasons. Moreover, the network may evolve over time or be modified during its lifetime. The licensees, according to the notification obligations as specified at Law, are to keep the Authority abreast with the latest network developments. The Authority shall then be in a position to maintain its assessments on the conformance with the established licence criteria

The Authority reserves the right to disqualify any application received, if on the basis of the aforementioned assessment, concludes that the proposed network would also cause cross-border harmful interference. Similarly, a licence holder may be held in breach of its spectrum license conditions, if the Authority, through its network assessment, determines that the deployed network may be creating cross-border interference.

The Authority proposes to adopt a common process for the validation of the network at application stage as well as during the licence term. The Authority shall, based on the information submitted by the applicant or the spectrum licence holder, run network coverage simulations using commercial simulations tools which are available on the market, and configured to be compliant with the requirements of the GE06 agreement.

Network coverage simulation tools take as input (a) a network configuration, complete with transmitter location (geographical coordinates and height), transmitting power (ERP), and antenna details and (b) maps of the area to be simulated including topographical details listing the earth's features including land use. One of the output of network simulators is a map of the area of interest showing the signal strength expected to be received from the transmission network.

Recommendation ITU-R *P.1546 – Method for point-to-area predictions for terrestrial services in the frequency range 30Mhz to 4000 MHz*[15], describes a method for point-to-area radio

[15] https://www.itu.int/dms_pubrec/itu-r/rec/p/R-REC-P.1546-6-201908-I!!PDF-E.pdf

propagation for terrestrial services for a range of frequencies including the sub-700MHz band. This model is suitable to simulate networks that use transmitters which are less than 3000 m in height and over long distance paths not exceeding 1000 km in length stretching over land, sea and a mix of both. This model is recommended to assess the impact a network has on third countries however is not suitable to assess radio coverage within the country (local coverage). A number of implementations of the ITU model in P.1546 are available on commercial platforms. Simulation tools, including those implementing P.1546 although configured with the same parameters, could provide slightly different results. This could be attributed to a number of factors, such as the cartographic data especially when assessing signals over mixed paths. In order to minimise any discrepancies in the outcomes arising from the use of different simulation tools, Annex 2 of this consultation proposes the details on how the propagation model within the simulation tool shall be configured during the network coverage simulation exercise.

In order for the Authority to be able to carry out the cross-border interference assessments on the respective DTTV networks, it shall require:-

a) a description of the network in a format as specified in Annex 3,
b) the simulated radio propagation charts covering 1000km from Malta, and
c) the simulated received field strength at the each of the test point listed in Annex 1.

The Authority shall confirm the submitted simulations results against the simulation of the proposed network undertaken by the Authority on a commercially available implementation of the ITU P.1546 prediction model which is suitably configured in accordance to Annex 3. The Authority's final assessment on the technical capabilities of the network being assessed will be based on the output of such a simulation.

The Authority, as a spectrum administrator, liaises with the ITU in the domain of the international management for Radio Frequency spectrum. As specified in the Radio Regulations and various Regional Agreements, the ITU provides spectrum administrators a tool which utilises the P.1546 prediction model in order to determine and validate the coordination zones with the ITU and other neighbouring countries. The output of such a tool is also utilised when spectrum administrators need to claim interference originating from

networks in third countries and request mitigation measures. The use of such a tool is reserved only to national spectrum administrators.

In view of the fact that the ITU prediction tool is not publicly available, the Authority shall separately simulate the networks under assessment using the ITU tools available at the time and provide the simulation results to the applicant or licensee only for reference purposes. The Authority, although it will be conducting its assessments on the simulation results as obtained through the commercially available software solution in its possession at that time, on the basis of the results obtained through the ITU simulation results, may however reserve the right to request adjustments to be applied to the network configuration under assessment in order to avoid interference in neighbouring third country, which are subject to existing or future coordination agreements. The Authority notes that in case were the applicant does not consider such requests as fair and reasonable, the applicant may, subject to a valid justification, quit from the assignment process without incurring any penalties.

Lot 1 and Group 1 of Lot 2

Spectrum listed in Lot 1 is registered for use in the GE06 agreement. Annex 1 lists the basis of the existing agreement. This is based on a total of seven transmitters of 30dBW each, with a distinct antenna radiation pattern and effective antenna height to match the topography of the location of the transmitter and its surroundings. The registered network is a reference network which is solely intended to express the transmission limitation which need to be adhered to when transmitting the respective channels. This does not in any way represent any active DTTV network in Malta, nor does it denote a requirement to implement such a network.

The Authority simulated the reference network using its propagation tools configured to meet the relevant parameters set out in the GE06, including those related to Recommendation ITU-R P1546. A number of test points were established at the border of third countries and the simulated received signal level is recorded and provided as a guideline in the Annex 1 of this consultation. A network is considered to be compliant with the GE06 agreement if the

simulated received signal level does not exceed the values as reflected in the respective test points.

Group 2 of Lot 2

Spectrum listed in Group 2 of Lot 2 is not registered under the GE06 agreement. However, Malta has secured coordination agreements with Italy and Greece, allowing for the use of this spectrum as from 1st July 2022. This agreement establishes a coordination zone which includes the territory of Malta and Gozo and all the administrative borders of the provinces of Sicily, excluding the Provinces of Palermo and Messina as indicated in Annex 4. This agreement provides Malta with the rights to use spectrum subject to the condition that any signal originating from Malta from channels listed under this group does not reach any land based territory beyond the coordination zone with a field strength greater than the coordination trigger field strength[16] as defined in the GE06 agreement and established at 21dBµV/m for channels falling in Band IV and 23 dB µV/m for channels in Band V.

Harmful Interference and EMF Obligations

All wireless networks operators are legally bound to ensure that their networks do not cause harmful interference to other networks providing similar services or services of other nature provided in the same or adjacent band.

In addition, the DTTV network operator enjoying the right of use for such spectrum shall ensure that the cumulative non-ionising radiation emissions from its DTTV network shall comply with any obligations as specified at law and any Decisions or Directives issued by the Authority or any other national competent authority in relation to electromagnetic radiation. Currently the standards for non-ionising radiation emissions refer to those standards adopted by the International Commission on Non-Ionising Radiation Protection (ICNIRP).

[16] The coordination trigger field strength is defined as the Field-strength which, when exceeded, determines that coordination is required.

6. Transfer of Rights

As identified in the National Frequency Plan[17] currently in force, note MLT 09 identifies that rights of use for the respective spectrum cannot be traded, assigned or transferred to third parties. The Authority shall be notified of any impending repossession of spectrum rights in this band. No repossession of spectrum rights may be concluded without the approval of the Authority under the terms of Article 45 of the Electronic Communications (Regulations) Act Cap 399.

[17] Refer to note MLT09 in the National Frequency Plan - https://www.mca.org.mt/sites/default/files/NFP_edition%206-1.pdf

7. License Duration

Lot 1 – Interim Lot

The right of use assigned to this lot shall cover the period 12th May 2021 to 30th June 2022 which may be extended on an annual basis subject to (a) there being no demand registered for spectrum under Lot 2, and a formal written request to be sent to the Authority at least three months before the expiry of the license. The Authority reserves the right not to extend the licence.

Provided further that should the rights of use for spectrum in Lot 2 be assigned, the rights of use of spectrum under Lot 1 are automatically terminated.

Lot 2 – Future Lot

The right of use assigned to this lot shall commence from 1st July 2022 and run until 31st December 2030. The future use of the spectrum beyond December 2030 will be decided later in line with the outcome of a review expected to be carried out by the Commission in the coming years and any harmonisation rules applicable for this spectrum band at the time. The Authority shall subsequently advise Government on the future of spectrum in this band after having carried out an assessment in line with: (i) any recommendations or harmonisation decisions published by the European Commission; (ii) the state-of-the-art of the network deployed; (iii) the service offered; and (iv) the viability of alternative use of spectrum as suggested at the time in the national context, which shall be collectively taken into account.

Given that the future of the sub-700MHz spectrum beyond 2030 is not yet know, it is proposed that should the Government decide to extend the use of the sub-700MHz spectrum for DTT broadcasting, the licence holder of Lot 2 shall be granted the right of first refusal subject to the licence conditions and obligations applicable at that point in time.

8. Spectrum Pricing

On assignment of the spectrum licence, the licensee(s) shall be liable for the full amount of usage fees for all the spectrum channels assigned for the whole term of the licence. The payment of such fees is structured such that these are to be paid on an annual basis at a yearly rate as established in the Eighth Schedule of the Electronic Communications Networks and Services (Regulation) (S.L.399.28) currently set at five thousand, eight hundred and twenty three Euros and forty three cents (€5,823.43).

In the eventuality that the Government decides to alter the price of the respective spectrum while the assignment process is still in progress, **but not yet concluded**, prospective bidders or licence holders will have the right to either exit from the spectrum award process without incurring penalties or accept the new price and proceed with the assignment process.

It should be noted that in the eventuality of an auction, the reserve price shall be the annual spectrum fee for each 8MHz channel as established at law and indicated above. The successful bidders shall then pay the difference in price between the reserve price and the final bid immediately upon the conclusion of the auction.

9. Submission of Responses

In accordance with its obligations under Article 4A of the Malta Communications Authority Act, Cap. 418 of the Laws of Malta, the Authority welcomes written comments and representations from interested parties and stakeholders during the national consultation period, which shall run from the 5th June 2020 till the 17th July 2020.

The Authority appreciates that respondents may provide confidential information in their feedback to this Consultation document. This 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 openness and transparency, the Authority may 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 as soon as it is received, in accordance with the MCA's confidentiality guidelines and procedures[18]. Respondents are however encouraged to avoid confidential markings wherever possible.

All responses should be submitted electronically to the Authority, in writing and addressed to:

Chief, Spectrum Management and Technology

Malta Communications Authority

Valletta Waterfront, Pinto Wharf,

Floriana, FRN1913 Malta.

Email: spectrum.mca@mca.org.mt

[18] http://www.mca.org.mt/sites/default/files/articles/confidentialityguidelinesFINAL_0.pdf

Extensions to the consultation deadline will only be permitted in exceptional circumstances and where the Authority deems fit. The MCA reserves the right to grant or refuse any such request at its discretion. Requests for extensions are to be made in writing within the first ten (10) working days of the consultation period.

Annex 1 – DTTV stations registered for Malta under the GE06

This Annex provides all the necessary information relating to the reference network for DTTV stations registered for Malta in the GE06 agreement.

In addition, this Annex refers to the following accompanying documents:

a) Accompanying Document 1 – Presents the details of the transmitting stations which are listed in the GE06 agreement. The reference network referred to Section 5 is composed of all transmitters operating simultaneously as an SFN network.
b) Accompanying Document 2 – Presents a simulation of the reference network with the transmitting powers set at the registered power (30 dBW). This is accompanied by a total of 360 test points at one degree intervals representing the border where the trigger field strength is reached. In order to assist applicant to fine tune their network, the Authority proposes to publish two more simulations of the same reference network using transmission power set at +3dB and -3dB during the assignment stage..

Table 6 below lists all the transmitting stations and their location as registered in the GE06. The complete set of details for each transmitter is provided in Accompanying Document 1.

Transmitter Name	**Latitude** **DDMMSS**	**Longitude** **DDMMSS**	**Transmitting Channels**
Cittadella Gozo	360253	0141429	28, 31, 38, 45
Dwejra	355419	0142310	28, 31, 38, 45
Nadur Gozo	360214	0141704	28, 31, 38, 45

Transmitter Name	Latitude DDMMSS	Longitude DDMMSS	Transmitting Channels
Naxxar	355507	0142654	28, 31, 38, 45
Portomaso Tower	355521	0142935	28, 31, 38, 45
San Leonardo	355250	0143330	28, 31, 38, 45
Zebbug Gozo	360418	0141414	28, 31, 38, 45

. Table 6 List of Transmitters, location and transmitting frequency

Table 7 below, provides the list of fields and their description relevant to the data included in Accompanying Document 1.

No	Data item
1	Plan entry code (1 – Assignment, 2 – SFN, 3 – Allotment, 4 – Allotment with linked assignment(s)) and SFN_id,
2	Name of the location of the transmitting station
3	Latitude (±DDMMSS)
4	Longitude (±DDDMMSS)
5	Altitude of site above sea level (m)
6	Digital television system (A, B, C, D, E, F and 1, 2, 3, 5, 7)
7	Reception mode (FX, PO, PI, MO)
8	Polarization (H – Horizontal, V – Vertical, M – Mixed, U – Unspecified)

No	Data item
9	Maximum effective radiated power of the horizontally polarized component in the horizontal plane (dBW)
10	Antenna directivity (D – Directional, ND – Non-directional)
11	Height of transmitting antenna above ground level (m)
12	Maximum effective antenna height (m)
13	Effective antenna height (m), at 36 different azimuths in 10° intervals, measured in the horizontal plane from True North in a clockwise direction
14	Antenna attenuation (dB) – horizontal: value of attenuation of the horizontally polarized component, normalized to 0 dB, at 36 different azimuths in 10° intervals, measured in the horizontal plane from True North in a clockwise direction

Table 7 Description of fields of information as applicable to Accompanying Document 1

Configuration for the network coverage software simulation tool

The following are the key points in ensuring proper configuration of tools and correct estimate of the transmission limits to prevent harmful cross border interference.

1. The propagation model is configured into the network simulation tool using the configuration setting accordance to the GE06 requirements which are also listed in Annex 2 of this consultation document.
2. The reference network model detailed in Accompanying Document 3 is to be loaded in the simulator and simulated using the power setting of 30dB per transmitter having all transmitting stations transmitting simultaneously.
3. Using a simulations radius of at least 1000km, the contour plot is established as that region where the trigger field strength is not exceeded. This plot establishes the geographical boundary where the field strength cannot be exceeded.

Annex 2 – Propagation Model parameters

As discussed earlier different propagation tools may present a slightly different outcome even when using the same propagation model. The list of parameters necessary to be applied to the propagation model are listed in Table 8 of this Annex.

Any simulations which are carried out using parameters different to those listed in this Annex are automatically invalid.

Parameter	**Setting**	**Remarks/Reference**
Receiving/mobile antenna height	Enabled	Recommendation P.1546-6, Annex 1, paragraph 10
Time variability	1%	Recommendation P.1546-6, Annex 1, paragraph 8
Location variability	50%	Recommendation P.1546-6, Annex 1, paragraph 13
Correction based on tropospheric scattering	Enabled	Recommendation P.1546-6, Annex 1, paragraph 14
Path	Sea, warm	-
Transmitting antenna height	Effective antenna height	Recommendation P.1546-6, Annex 1, paragraph 6

Table 8 List of Settings applicable to the P.1546-6 model

Annex 3 – File formatting details for communication of network proposals

As indicated in Section 5 of this consultation an applicant is required to submit the details of its proposed network to the Authority for its assessment. The Authority shall make use of its network coverage simulation tools to verify the submissions received. As part of the submission, the applicant is to provide details of the proposed network in the format shown in Accompanying Document 3.

Accompanying Document 3 is a sample file which describes the reference model denoted in Annex 1 above.

The details of each field as listed in Accompanying Document 3 can be found in Section 1 of Chapter III of the Preface to the BR International Frequency Information Circular (Terrestrial Services) as published by the ITU[19]

[19] https://www.itu.int/en/ITU-R/terrestrial/brific/Pages/default.aspx

Annex 4 – Co-ordination zone between Malta and Italy

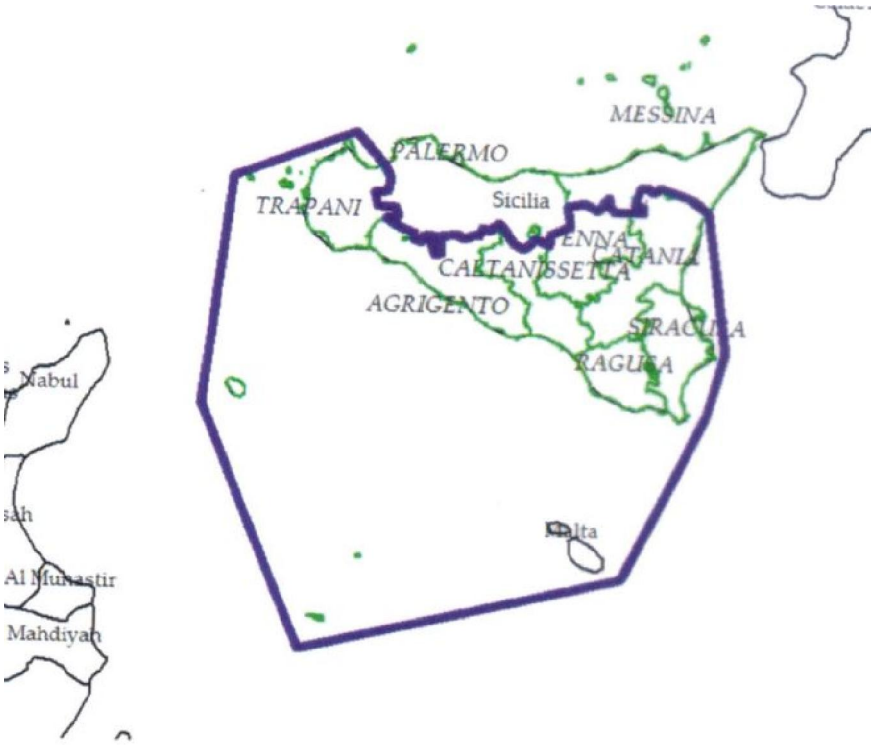

Figure 2 Co-ordination zone between Malta and Italy

The figure above depicts the zone which concerns the coordination agreement reached between the Maltese and Italian authorities. This figure applies only to spectrum forming part of LOT 2 and Group 2. The coordination zone includes the territory of Malta and Gozo, and all the administrative borders of the provinces of Sicily, excluding the Provinces of Palermo and Messina.

Annex 5 – Geographic map of Malta and Gozo indicating coverage obligations

Figure 3 below is a graphical representation of the Land use in Malta. The legend includes the land mass areas over which the coverage obligation shall be due in line with Section 5.

Both the map and the legend are produced and published by Copernicus – Land Monitoring Service[20]. In addition, the map server provided by the Planning Authority allows the same map to be overplayed with more comprehensive map layers.

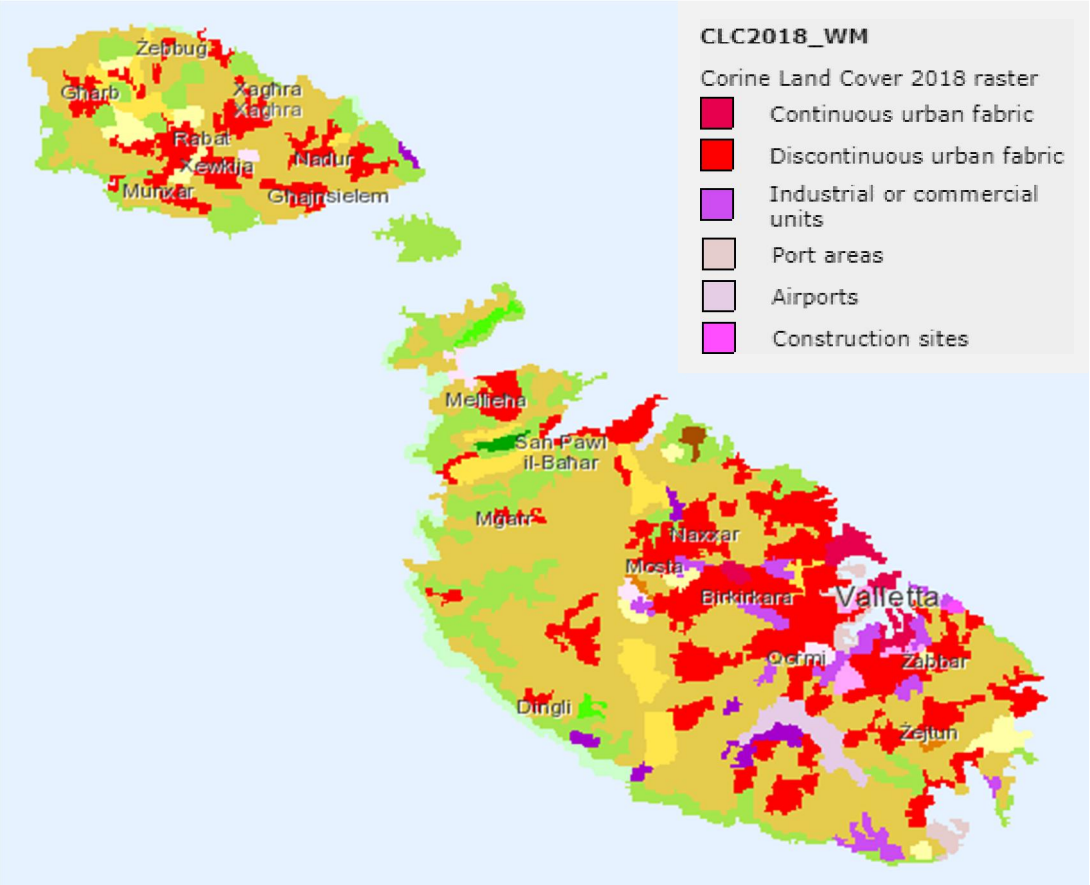

Figure 3 Land use map of Malta and Gozo

[20] https://land.copernicus.eu/pan-european/corine-land-cover/clc2018

The coverage of the DTTV network across the built-up areas of Malta and Gozo are denoted by the map areas indicated as follows:

a) Continuous urban fabric
b) Discontinuous urban fabric
c) Industrial and commercial units
d) Port areas
e) Airports
f) Construction sites

Annex 6 - Glossary

ECNS – Electronic Communications Networks and Services

ECS – Electronic Communications Services

DTV – Digital Television

DTTV – Digital Terrestrial Television

GE06 – Geneva Agreement 2006 (ITU)

(http://search.itu.int/history/HistoryDigitalCollectionDocLibrary/4.129.43.en.100.pdf

ITU – International Telecommunication Union

MCA – Malta Communications Authority