

INTERNATIONAL TELECOMMUNICATION UNION – RADIOCOMMUNICATION SECTOR
ITU-R FAQ on the DIGITAL DIVIDEND and the DIGITAL SWITCHOVER

A: DIGITAL DIVIDEND

Question: What is the Digital Dividend?

The digital dividend is the amount of spectrum made available by the transition of terrestrial television broadcasting from analogue to digital.

Question: What makes the Digital Dividend possible?

The Digital Dividend is made possible by the transition from analogue to digital TV broadcasting as a result of the improved spectrum efficiency provided by the new digital technologies:

- a) Digital video compression reduces the transmission size (bits) of the video signal. As a result, instead of one analogue TV programme several (typical four to twelve) digital programmes of equivalent quality can be broadcast in the same 6-, 7- or 8-MHz wide channel.
 - b) Digital modulation (COFDM) minimizes the multipath interference effect (phenomena when the signal is received directly from the transmitter and as reflection from various objects). Consequently, the signal level required for good TV reception is significantly lower for digital, hence transmitter power is lower. Since the need to cope with multipath reception is reduced, this may also lead to a decrease in the number of broadcasting stations.
 - c) The re-use distance is smaller, i.e. the same frequency or TV channel (for other programmes) can be used at locations that are closer to each other than in the analogue case. This reduction in the re-use distance is due to the fact that digital TV can operate at significantly lower protection ratios than analogue TV.
 - d) The same frequency can be used by adjacent transmitters as long as the same broadcast content is transmitted, i.e. so-called single-frequency networks (SFN) can be designed so that the signals of specific transmitters in the SFN can constructively augment each other (arrive in the time domain within the guard interval of the COFDM scheme used).
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Question: What are the main advantages of Digital TV Broadcasting? Why is it important to migrate to digital broadcasting?

The introduction of digital television will bring the following benefits for customers and network operators as well as for the manufacturing and the audiovisual media industry:

1. Customers and network operators: The customer benefits derive primarily from the possibility of digital processing and compression, making a more efficient use of the network's capacity.



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The key benefits include (as compared to analogue television broadcasts):

- a. wider choice in TV and radio channels;
 - b. improved picture, e.g. HD, UHD and sound quality, e.g. Advanced Sound System (depending on the system settings). UHD may include enhanced features such as 4K/8K image quality, High Dynamic Range (HDR), Wide Colour Gamut (WCG);
 - c. greater flexibility with the potential for portable and mobile reception;
 - d. enhanced information services including the Electronic Programming Guide or enhanced 'teletext' services (with enhanced graphics);
 - e. potential for interactivity, e.g. accessibility to broadcasting services for persons with disabilities and cooperative networks, such as Integrated Broadcast Broadband (IBB);
 - f. increased market competition and innovation thanks to the potential arrival of new entrants at different levels in the value-chain, for instance new service providers, broadcasters, multiplex operators or network operators. In addition, switchover implies specific benefits for some categories of market players: easier storage/processing of content and reduction of transmission costs.
2. Industry benefits: With the introduction of digital terrestrial television networks, a new industry has arisen, producing:
- a. lower prices (per channel) for broadcasters.
 - b. pay-tv services: digital terrestrial television networks can easily facilitate a full bouquet of services and incorporate a paying/billing system (i.e. conditional access system (CAS)); the market comprises several global players delivering integrated systems (head-end encryption and smart-card decryption).
 - c. new transmitter networks: including new transmitters consuming less electrical power, antennas and transport networks.
 - d. new receiver devices: several devices are being produced in the current market, including set-top-boxes, PC-card integrated receivers, USB-based receivers and Integrated Digital Television sets (IDTVs).
 - e. new interactive services.

For more information, please see the [video](#) by François Rancy, BR Director on 'ITU on The Digital Switchover'.

You may also wish to read the [blog](#) by the former Chairman of ITU-R WP 6C, David Wood on 'The Future of Digital Television' or the [interview](#) with Christoph Dosch, former Chairman of ITU-R Study Group 6 on 'The Digital Dividend: A Revolution in Technology'.



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Question: What is the relation between the digital transition and the digital dividend?

At the end of the transition from analogue to digital television in a country, analogue transmissions will be switched off throughout the territory of that country. This will release valuable spectrum, known as the digital dividend, which will then become available either for broadcasting (e.g. to provide more TV channels or higher quality TV channels such as HDTV), or for broadband mobile, in order to reduce the digital divide by providing broadband internet access to geographical areas which are still not covered.

Because interference does not stop at borders, there is a need for close coordination of the use of spectrum between neighboring countries during all the transition period and during the implementation of the digital dividend in order to avoid interference which may affect a large part of the populations on both sides of the borders. Joint coordinated efforts are therefore necessary at bilateral and regional level to ensure the success of this coordination. These efforts involve the governments, the regulators, the operators and more generally the actors of the telecommunications and broadcasting sectors.

Question: What steps are being taken by administrations regarding the Digital Dividend?

As part of the decisions taken by the [ITU World Radiocommunication Conferences](#) in 2007 and 2012, the upper parts of the UHF band (the so-called 800-MHz and 700-MHz bands) were allocated to the mobile service and identified for International Mobile Telecommunications (IMT) on a shared co-primary basis with the broadcasting service.

Since 2008, these decisions prompted coordinated efforts in Europe, Africa, the Middle East and Central America and Caribbean to harmonize the use of the 800 MHz and/or 700 MHz bands in their respective regions for IMT while consolidating the use of the lower part of the UHF band by digital television broadcasting.

After completion of the transition to digital broadcasting, these countries have been/will be in a position to allocate the 700 MHz and/or 800 MHz bands as part of the so-called 'digital dividend' – to the mobile service for broadband mobile deployment.

Today, many countries have already allocated the 700 MHz and 800 MHz bands to the mobile service and others are considering doing it soon.

See ITU [Press Release](#) of 26 February 2015 – 'Countries gear up for transition to digital broadcasting'



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B: DIGITAL SWITCHOVER

Question: What is the ‘Digital Switchover’?

The *Digital Switchover* (DSO) is the process of moving from analogue to digital terrestrial television. The process generally comprises three stages:

- a) Establishing the new digital services on temporary frequencies, if required, and operating both analogue and digital services for a period (simulcasting) during which viewers have the opportunity to make changes to their receiving installations to receive the new digital signals.
- b) Switching off the analogue services (ASO – Analogue Switch-off)
- c) Change the frequencies of the digital services to their final frequencies if required (the so-called re-stacking).

The status of the [DSO](#) process throughout the world is monitored by the ITU.

Please see the [video](#) to learn more on the Switchover: ‘**Digital to Analogue TV Switchover**’.

C: GE06 AGREEMENT and RRC-06 CONFERENCE

Question: What is the GE06 Regional Agreement?

The GE06 Regional Agreement is an international treaty, adopted by 119 ITU Member States at the Regional Radiocommunication Conference held in 2006 in Geneva Switzerland, for the planning of digital radio and television services in Europe, Africa, Middle East, Central Asia and the Islamic Republic of Iran in the frequency bands 174-230 MHz and 470-862 MHz.

This agreement was adopted to facilitate the transition to digital TV broadcasting in these regions by ensuring the availability of coordinated spectrum at the end of the transition from analogue to digital TV.

The GE06 Agreement includes:

an analogue frequency Plan, which at the time of adoption of the Agreement contained 94,536 analogue frequency assignments that were authorized for use without restrictions in the above countries until 17 June 2015 (except in the VHF band in 35 countries for which the due date is in 2020)



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a digital frequency Plan, , which at the time of adoption of the Agreement, contained 45,456 digital frequency assignments and 25,035 frequency allotments that were authorized for use without restrictions after 17 June 2015 and with the restriction of protecting analogue assignments in the plan before that date (in the VHF band in 35 countries, the due date is in 2020). a list of frequency assignments to stations of other primary services in the frequency bands covered by the Agreement compatible with the GE06 analogue and digital plan. At the time of adoption of the Agreement, the list contained 23,558 assignments.

regulatory procedures to be applied to make changes to the above Plans or list, for example adding new assignments or allotments, modifying existing assignments (or allotments) or suppressing existing assignments (or allotments). These procedures have been applied extensively by ITU Member States since 2006 to accommodate the digital dividend and new spectrum requirements for broadcasting. For this reason, the above numbers have changed since 2006, with most of the analogue assignments suppressed and many additions made to the digital plan and to the list.

The GE06 Agreement provides not only new possibilities for the structured development of digital terrestrial broadcasting but also sufficient flexibility to adapt to the changing radiocommunication environment. The GE06 Agreement triggered the analogue to digital broadcasting switchover in the countries-parties to this Agreement and assisted the process of digital switchover worldwide.

For further information, please see ITU [Press Release](#) of 16 June 2006.

Question: Where can I find the text of the GE06 Agreement ?

The text of the GE06 Agreement is contained in the “Final Acts” of RRC-06 Conference. There were actually three separate conferences with three separate Final Acts adopted in 2006:

- The Final Acts of the RRC06 Regional Radiocommunication Conference (RRC) relating to the planning of digital broadcasting in Europe, Africa, Middle East and the Islamic Republic of Iran:
- The Final Acts of the Regional Radiocommunication Conference for the revision of the Stockholm 1961 Agreement (RRC-06-Rev.ST61)
- The Final Acts of the Regional Radiocommunication Conference for the revision of the Geneva 1989 Agreement (RRC-06-Rev.GE89)

The last two conferences were held in conjunction with RRC-06 and abrogated the relevant parts of the previously existing agreements in Europe and Africa for analogue broadcasting.

All three **Final Acts** are available for free download from the [ITU website](#).

Against payment, the Final Acts of RRC-06, RRC-06-Rev.ST61 and RRC-06-Rev.GE89 are also available on [CD-ROM](#).



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Question: How was the date of 17 June 2015 set for the switching of analog to digital TV television for the Region 1 countries and Iran? Why is there a transition period?

Following rounds of intensive negotiations during the Regional Radiocommunication Conference in Geneva in 2006 (RRC-06), the 119 countries of [ITU Region-1](#) (Europe, Africa, the Middle East and Central Asia) and the Islamic Republic of Iran agreed on two dates as the deadline for the end of the transition period from analog to digital TV television. The [RRC-06](#) agreed that the transition period from analogue to digital broadcasting, which began at 00h01 UTC on 17 June 2006, should end on **17 June 2015** for the UHF Band, with a five-year extension for the VHF band (174-230 MHz), i.e. on **17 June 2020**, in some countries.

In developing the frequency plan included in the GE06 Agreement for digital television broadcasting transmissions (the “GE06 Plan”), two options were considered:

- Design the digital plan to ensure mutual compatibility between analogue and digital transmissions, i.e. coexistence without harmful interference. This would have allowed full flexibility as to the date at which the digital switchover would occur in each country, but would have led to a very inefficient plan once analogue transmissions have ceased since a large part of the spectrum would then have remained unused.
- Design the digital plan independently of the analogue plan, which had existed in Europe since 1961 and in Africa since 1989. This implied to define a transition period until the end of which analogue transmissions would have priority (digital transmissions were required to protect analogue transmissions and not claim protection from them) and after which the opposite would happen, i.e. digital transmission would have priority (analogue transmissions are required to protect digital transmissions which are in conformity with the plan and cannot claim protection from them). This second option was the one retained in the GE06 Agreement.

On 17 June 2015 for UHF and 17 June 2020 for VHF for some countries, the end of the transition period was reached, therefore digital transmissions which are in conformity with the GE06 Plan now have priority over analogue transmissions, among the 119 countries of the GE06 Agreement.

After the transition periods, the full potential of digital TV and digital radio broadcasting in these countries has therefore become available.



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Question: Are analogue TV transmissions prohibited after the end of the transition periods in countries signatories to the GE06 Agreement? What will happen to those countries who have not met the deadlines of 17 June 2015 and 17 June 2020 for Digital Switchover agreed at GE-06?

No.

The end of the transition period does not mean the end of analogue TV transmissions. It means that their regulatory status is reduced but they may continue to be operated, provided that they protect digital transmissions operating in conformity with the GE06 plan. In addition, they cannot claim protection from these digital transmissions.

Question: What happened after the 17 June 2015?

At the end of the above-mentioned Transition period, on 17 June 2015, the ITU Radiocommunication Bureau cancelled the entries in the analogue Plan to which the date of 17.06.2015 applied, reviewed the status of the corresponding assignments recorded in the Master International Frequency Register (MIFR) and invited the administrations to cancel the corresponding entries in the MIFR (See details in Article 12 of the GE06 Agreement). The Analogue Plan has ceased to exist for the countries and in the frequency bands to which this date applies.

This does not mean that analogue transmissions are prohibited. It just means that their protection is no longer ensured at the international level, and that they must protect digital transmissions which are in conformity with the GE06 Plan. As for the ITU database, the operational analogue assignments were kept recorded in the MIFR on a non-protection/non-interference basis.

Concretely, it means that in the border areas of a country, new interference constraints may arise for previously authorized analogue transmissions: their power may be required to protect digital transmissions of the neighbouring countries and they may have to accept interference from these digital transmissions.

Question: Has an extension of the deadline been discussed? Why?

The answer is “No”. for the following reason:

The deadline was agreed by a consensual decision of all Member States participating in Regional Radiocommunication Conference. Modifying this decision would require to convene another Regional Radiocommunication Conference, which is certainly not envisaged and not necessary.



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Question: What should administrations do if they cannot switch-off their analogue stations?

For the analogue stations that will continue operations, coordination of these operations with neighbouring countries is essential, especially for the assignments near the border.

Absent of this coordination, harmful interference may occur, or reductions in power may be required, that may leave whole areas without television coverage.

The administrations wishing to continue the operation of analogue frequency assignments need to have them recorded in the ITU Master International Frequency Register (MIFR). They have two options for doing this:

- According to §5.1.3 of the GE06 Agreement, an administration may use a recorded digital assignment to operate an analogue station, under the condition that the analogue assignment does not cause more interference, nor require more protection than the Digital one. The analogue assignment under the envelope of the digital Plan entry will have the rights of protection and recognition.
- Notify directly the analogue assignment to the MIFR (see § 5.1.7 of the GE06 Agreement) with the condition not to cause unacceptable interference to, and not claim protection from, any assignments in conformity with the Agreement and its associated Plans.

Question: What is the status per country of the transition to digital Terrestrial Television Broadcasting?

The ITU portal provides information on the status of the deployment of Digital Terrestrial Television (DTT) worldwide and is available [here](#). Some more detailed information can also be found in [Report ITU-R BT.2140](#).

The digital switchover is not restricted to the countries that are part of the 2006 Geneva Agreement (GE-06) but countries not being signatories of GE-06 are not bound by this deadline of 17 June 2015 for switching-off of analogue broadcasting.



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D: ITU INTERNATIONAL SYMPOSIUM ON THE DIGITAL SWITCHOVER

Question: What was the celebration on 17 June 2015 of the ITU International Symposium on the Digital Switchover?

The [ITU International Symposium on the Digital Switchover](#) was held on 17 June 2015 at ITU Headquarters in Geneva and celebrated a milestone for Digital Terrestrial Television.

The Symposium provided background information on the GE06 Agreement, on the actual situation with respect to the analogue to digital switchover world-wide and on the potential future use of digital TV by the broadcasters in all three ITU Regions, taking into account new television systems such as HDTV and UHD TV on one hand and the allocation of the UHF band to other services known as a “digital dividend” on the other hand. The Symposium was accompanied by numerous technical demonstrations.

This Symposium covered the following topics:

- a) Objectives of the transition to digital TV– technical and regulatory frameworks;
- b) The Analog to Digital Switchover – stocktaking worldwide;
- c) Advanced Technologies for Television;
- d) Building a sustainable ecosystem for Digital TV.

The Symposium concluded with a high-level round table discussion on the future of digital television and honored the contribution of outstanding persons to the Geneva 2006 Agreement.

For more detailed information about this Symposium, please see:

[Video message](#) from the BR Director, Mr. François Rancy.

[Press release](#)

[Website](#)



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E: ITU PUBLICATIONS

Question: What ITU Publications are available on the subject of the Digital Dividend?

[DIGITAL DIVIDEND - Insights for Spectrum Decisions](#)

The above link contains a list of publications related to DSO and Digital Dividend. As spectrum is freed up by the transition of analogue television services to digital, national and international spectrum decision makers are faced with the question of how to allocate the 'digital dividend' resulting from the spectrum efficiencies gained by this process in the frequency bands currently allocated to broadcasting. The report '[DIGITAL DIVIDEND - Insights for Spectrum Decisions](#)' provides a detailed insight into what the digital dividend process entails and to help national and internal spectrum decision makers to allocate and manage the digital dividend process.

[Report ITU-R SM.2353](#) - The challenges and opportunities for spectrum management resulting from the transition to digital terrestrial television in the UHF bands

This report, adopted in 2015, provides information agreed within ITU-R on the challenges and opportunities for spectrum management resulting from the transition to digital terrestrial television in the UHF bands, and appearance of the digital dividend, including amongst others expectations, definition of digital dividend, technical, regulatory, economic and societal aspects in the area of spectrum management.

Question: Are there any ITU Guidelines for transition from analogue to digital broadcasting?

[GUIDELINES for transition from analogue to digital broadcasting](#) (edition of 2010)

The guidelines are intended to provide information and recommendations on policy, regulation, technologies, network planning, customer awareness and business planning for the smooth transition to Digital Terrestrial Television Broadcasting (DTTB) and introduction of Mobile Television Broadcasting (MTV). They will help develop a well-defined roadmap for transition covering national goals, strategies and key activities, helping to reach consensus on requirements and solutions, providing a mechanism to help forecast the key miles stones and a framework to help plan and coordinate the steps for the transition. The Guidelines have been prepared for Africa, taking into account the provisions of the GE06 Agreement. However, they could also be applied in countries outside the GE06 planning area, but provisions of other applicable regulations, instead of GE06, should be taken into account in that case.



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Question: Where can I find the list of ITU-R Recommendations on the subject of digital television?

You are invited to consult a non-exhaustive list below:

[SM.2353](#) The challenges and opportunities for spectrum management resulting from the transition to digital terrestrial television in the UHF bands

[BT.2077](#) Real-time serial digital interfaces for UHD TV signals

[BT.2073](#) Use of the high efficiency video coding (HEVC) standard for UHD TV and HDTV broadcasting

[BT.2052](#) Planning criteria for terrestrial multimedia broadcasting for mobile reception using handheld receivers in VHF/UHF bands

[BT.2038](#) Transport of HDTV 3DTV programmes for international programme exchange in broadcasting

[BT.2050](#) Use of UHD TV image systems for capturing, editing, finishing and archiving high-quality HDTV programmes

[BT.2025](#) 1 280 × 720 digital image systems for the production and international exchange of 3DTV programmes for broadcasting

[BT.2020](#) Parameter values for ultra-high definition television systems for production and international programme exchange

[BT.2016](#) Error-correction, data framing, modulation and emission methods for terrestrial multimedia broadcasting for mobile reception using handheld receivers in VHF/UHF bands

[BT.1895](#) Protection criteria for terrestrial broadcasting systems

For a full list of available ITU-R Recommendations on digital television see:
<http://www.itu.int/rec/R-REC-BT/en>.



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Question: Where can I find the list of ITU-R Handbook and Reports on digital switchover and digital dividend?

You are invited to consult a non-exhaustive list below

[BT.2343](#) Collection of field trials of UHDTV over DTT networks

[BT.2339](#) Co-channel sharing and compatibility studies between digital terrestrial television broadcasting and international mobile telecommunication in the frequency band 694-790 MHz in the GEO6 planning area

[BT.2302](#) Spectrum requirements for terrestrial television broadcasting in the UHF frequency band in Region 1 and the Islamic Republic of Iran

[BT.2337](#) Sharing and compatibility studies between digital terrestrial television broadcasting and terrestrial mobile broadband applications, including IMT, in the frequency band 470-694/698 MHz

[BT.2338](#) Services ancillary to broadcasting/services ancillary to programme making spectrum use in Region 1 and the implication of a co-primary allocation for the mobile service in the frequency band 694-790 MHz

[BT.2294](#) Construction technique of DTTB relay station network for ISDB-T

[BT.2295](#) Digital terrestrial broadcasting systems

[BT.2140](#) Transition from analogue to digital terrestrial broadcasting

A full list of available [ITU-R Reports on digital television](#) is available [here](#).

For further information, please contact: BRMAIL@itu.int or ITU-R-communications@itu.int



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