

# INTERNATIONAL TELECOMMUNICATION UNION



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**Circular letter**  
**6/LCCE/78**

11 May 2012

**To Administrations of Member States of the ITU, Radiocommunication  
Sector Members, ITU-R Associates participating in the work of  
Radiocommunication Study Group 6 and ITU-R Academia**

**Subject:** Questionnaire on spectrum requirements for terrestrial television broadcasting in connection with WRC-15 Agenda item 1.2

**References:** Administrative Circular CA/201

1 Consistent with the directives set forth by Administrative Circular [CA/201](#) and in accordance with the outcomes of the first session of the Conference Preparatory Meeting 15-1, ITU-R Working Party 6A seeks estimates from Members States and Sector Members of current and future spectrum requirements for terrestrial television broadcasting in Region 1 and Iran.

2 One particular question that will be addressed by the JTG 4-5-6-7 is to confirm the lower edge of the allocation to the mobile service made at WRC-12 from 694-790 MHz. As a result Working Party 6A realizes the JTG 4-5-6-7 needs to be fully informed about the implications to the broadcasting service consequential to that decision.

3 The following questionnaire, which is being sent to all Administrations and Sector Members in Region 1 and Iran, is designed to gather information on spectrum use in the band 694-790 MHz for television broadcasting.

4 Administrations and Sector Members are also invited to make more detailed inputs addressing the matter of current and future spectrum requirements for television broadcasting to the next meeting of WP 6A.

5 Administrations and Sector Members are requested to submit responses to [brsgd@itu.int](mailto:brsgd@itu.int) or [rsg6@itu.int](mailto:rsg6@itu.int) by 31 July 2012.

François Rancy  
Director, Radiocommunication Bureau

At the request of the Chairman of Study Group 6 the attached questionnaire is published for consideration of the Administrations of Member States, Sector Members and Associates, as appropriate. The Radiocommunication Bureau does not make any engagement nor assume any responsibility with respect to the content of the attachment or any follow-up action as may be required.

**Distribution:**

- Administrations of Member States of the ITU and Radiocommunication Sector Members participating in the work of Radiocommunication Study Group 6
- ITU-R Associates participating in the work of Radiocommunication Study Group 6
- ITU-R Academia
- Chairman and Vice-Chairmen of Radiocommunication Study Group 6
- Secretary General of the ITU, Director of the Telecommunication Standardization Bureau, Director of the Telecommunication Development Bureau

## QUESTIONNAIRE ON SPECTRUM REQUIREMENTS FOR TERRESTRIAL TELEVISION BROADCASTING IN CONNECTION WITH WRC-15 AGENDA ITEM 1.2

This questionnaire can be completed online at the following web page:

<https://extranet.itu.int/rsg-meetings/sg6/wp6a/Lists/DTTB%20Questionnaire/overview.aspx>

Login as:   **Username:** (your TIES username)@ties.itu.int  
              **Password:** (your TIES password)

NOTE - Electronic versions of Annexes 1, 2 & 2 can be found under QUESTIONNAIRE in the WP 6A Share Folder on the WP 6A Sharepoint site.

**Name of the Administration/Sector Member: FRANCE**

**For sector members please indicate the geographical area over which you operate:**

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- 1
- a) What standards have you adopted for digital terrestrial television broadcasting?
  - b) Have you started introduction of digital terrestrial television services?
  - c) If yes, please provide further detail on the number of multiplexes in use, their technical specifications, the percentage of geographic area or population they are intended to cover and the total spectrum use to inform WP 6A.

A proposed format for detailed responses is provided in Annex 1.

**Reply:**

**1.a) DVB-T is the current standard for terrestrial broadcasting.**

**As far as video coding is concerned, two standards are currently in use:**

- **MPEG-2 is used for free-to-air SDTV channels in main land France;**
- **MPEG-4 is used for free-to-air SDTV channels in French overseas territories, free-to-air HDTV channels in main land France, and pay-TV (SD and HD).**

**The coexistence of those two different video coding standards in France can be explained by the progressive roll-out of the DTT platform (especially in terms of TV service offer, see below).**

**As far as audio coding is concerned (for main audio stream, original soundtrack and audio-description), SDTV is MPEG-1 layer 2 stéréo and HDTV uses also in addition DD+ 5.1.**

**Interactive data is progressively being introduced by some TV channels using HbbTV.**

**Other data (subtitles, signalling, event information) use DVB.**

**Audio and other associated data rate represents today around 15% of the video data rate**

**1.b) Yes**

- **March 2005: launch of DTT in main land France (free-to-air SDTV);**
- **November 2005: launch of pay-SDTV over the DTT platform in main land France;**
- **October 2008: launch of HDTV over the DTT platform in main land France;**
- **November 2010: launch of SDTV in French overseas territories.**

**1.c) The DTT platform covers 97% of the French metropolitan population, with the main target to provide audiovisual services for fixed rooftop reception (see annex 1):**

- **6 multiplexes (R1, R2, R3, R4, R5, R6) are currently deployed, covering 97% each (except one which is currently covering 94,4% and should cover 97% by 2015);**
- **2 additional multiplexes are planned for a coverage of 97% of the population each, to be launched in December 2012.**

**These multiplexes will contain 33 full-time TV channels by December 2012 (see details in annex 1):**

- **18 full-time free-to-air TV channels, of which 14 are broadcast in SD MPEG-2 format and 4 are broadcast in both SD MPEG-2 and HD\* MPEG-4 formats (simulcast);**
- **1 local/regional full-time free-to-air SD MPEG-2 television service delivered over multiplex R1. It represents 34 local TV services covering 60% of the French metropolitan population (and quite soon, 36 local TV services covering almost 63% of the French metropolitan population), plus second local variations of the TV channel called “France 3” covering ~32% of the French metropolitan population;**
- **6 new full-time free-to-air MPEG-4 HDTV\* channels will be progressively deployed from December 2012;**
- **8 Pay-TV MPEG-4 services, including one in HD\* format.**

**and 1 national on-demand audiovisual media service offering push-VOD (commercial launch expected this year).**

**In addition, 13 DVB-T channels are locally used to broadcast regional/local free-to-air TV channels.**

**\* The HDTV delivered to the viewers today is 1080i – 50 Hz, which means that HDTV available on the DTT platform today is not in full HD format (1080p : 1080 progressive 50 Hz) yet.**

- 2**
- a) Have you commenced analogue television switch-off?
  - b) If you have any such plans, when do you expect to have completed the analogue switch-off process?

**Reply:**

**Switch-off started in October 2009 and finished in November 2011.**

- 3 a) viewer uptake of terrestrial television in your country, including those whose service provider uses terrestrial broadcast re-transmission (e.g. in cable networks)?
- b) If possible, please also provide details of the number or proportion of users who receive television primarily by terrestrial means.

**Reply:**

- 3.a) At the end of 2011, according to the “French observatory of household equipment for digital TV reception<sup>[1]</sup>”:**
- **62.3% (16.7 million) of equipped TV households were using terrestrial TV (digital or analogue, since DSO was not fully completed in H2-2011);**
  - **61% of the French households were using the DTT platform.**

**Other key results for H2 2011:**

- **26.8 million households were equipped with at least 1 TV set;**
- **99.3% of households had a digital TV reception means;**
- **25.3% of households had at least 2 reception means.**

**3.b) According to the “French observatory of household equipment for digital TV reception”, 57.7% of equipped TV households (15.435 million) use terrestrial TV reception means on their primary TV set (H2 2011). Terrestrial TV reception means is the most widespread means for primary TV sets in France (it is also true for secondary TV sets).**

**Therefore, considering only primary TV sets gives a partial view of TV reception landscape in France since 51.5% of French TV-equipped households have at least 2 TV sets.**

- 4 a) Indicate how many analogue television transmitters use channels in the frequency sub-band 694-790 MHz (as indicated in Resolution **232 (WRC-12)**).
- b) How many are in the remaining part of the UHF band.

**Reply:**

**There are no more analogue transmitters in operation since November 2011.**

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<sup>[1]</sup> « Observatoire de l'équipement des foyers pour la réception de la télévision numérique » is led by CSA in cooperation with French Government and France Télé Numérique, the body in charge of DSO communication. Observatoire studies rely on around 40,000 phone interviews for first half of a year and around 36000 phone interviews for second half. These studies are therefore the most precise statistical tool about French TV reception means. The percentage base of these studies are the number of metropolitan households which are equipped with at least one TV set. They only refer to the principal lodgement.

- 5
- What frequencies/channels are currently used or intended to be used by digital terrestrial television broadcasting in your country? Please distinguish between those in use and those intended to be used.
  - If allotments/SFNs are in use, a sketch map of frequency allocations could be included, with an accompanying table of allocations, as shown in Annex 2. Otherwise, it might be possible to show main transmitters and channels, grouped in layers, in a table.
  - Please indicate how many digital television assignments/allotments use channels in the frequency sub-band 694-790 MHz (as indicated in Resolution **232 (WRC-12)**, and
  - How many are in the remaining part of the UHF band.

**Reply:**

**5.a) The DTT platform currently uses all frequencies between 470 and 790 MHz, i.e. 40 channels (channel 21 to channel 60).**

**5.b) See table, in annex 2. MFN and SFN are combined to the best extent possible in order to improve spectrum efficiency**

**5.c) and 5.d): In main land France, 1'934 DTT sites are used to broadcast multiplexes R1, R2, R4, R5 and R6 covering 97% of the French metropolitan population, which consist of:**

- **98 main transmitters representing almost 85% of the French metropolitan population;**
- **1529 relay transmitters;**
- **307 local transmitters.**

Multiplex	R1	R2	R3	R4	R5	R6	R7	R8
Number of main assignments over 49 (out of 98 main transmitters)	24	30	36	27	33	17	30	29
Number of main assignments below 48 (out of 98 main transmitters)	74	68	62	71	65	81	68	69
Nb of assignments (main, relay and local) with a channel $\geq$ 49 (question c)	465	419	482	598	621	281	513	516
Nb of assignments (main, relay and local) with a channel $\leq$ 48 (question d)	1469	1515	751	1336	1313	1653	1114	1111
Total	1934	1934	1233	1934	1934	1934	1627	1627

- 6      a) Are those frequency bands also shared with other primary services?  
b) If yes, please give details of those systems and their spectrum use.

**Reply:**

**There is currently no other primary services in the band 470-790 MHz.**

- 7      a) Are those frequency bands also shared with secondary services such as PMSE (Programme Making and Special Events), radio astronomy or wind-profile radar?  
b) If yes, please give details of those systems and their spectrum use.

**Reply:**

**7.a) Yes**

**7.b)**

**PMSE: the whole band 470-790 MHz can be used for secondary ancillary audio-links (PMSE, talk-backs...).**

**Radioastronomy: will soon be using the band 608-614 MHz in a place called Nançay. The use of channel 38 (606-614 MHz) for broadcasting is therefore restricted to 3 main transmitters in main land France (Marseille R8, Saint-Etienne R1, Toulouse R2) and their relay stations, far enough from Nançay so that the use of this band for radioastronomy is protected.**

- 8      a) Do you foresee the adoption or expansion of television services broadcast using second-generation systems such as DVB-T2?  
b) If yes, please give indicative details of the planned transition, including any simulcast period.

**Reply:**

**8.a) Yes**

**The spectrum dedicated to the broadcasting service is limited and highly constrained by international cross-border coordination. Therefore, the only way DTT platform can meet the viewer expectations in the future, in particular in terms of higher picture resolution, additional TV programmes and mobility, is to migrate towards next generation transmission and video coding technologies, such as DVB-T2 and MPEG-4/HEVC.**

8.b) There is no detailed plan available for the time-being in France concerning the transition period towards DVB-T2 and MPEG-4/HEVC.

Moreover, the timing of HEVC DTT receiver availability is not clear for the moment. HEVC is a new video compression standard currently developed jointly by ISO/IEC MPEG and ITU-T VCEG. The HEVC standard may be finalized in January 2013.

These new transition(s) will be very challenging and probably very different from the DSO (transition from analogue to digital television), because:

- HDTV is already available on the French DTT platform since 2008, using DVB-T/MPEG-4. Therefore, new incentives will be required for viewers to accept the transition(s), because they will have to pay for new user equipment. If new consumer propositions are not sufficiently attractive to drive the adoption of new technologies, an important Government intervention will be required;
- There will be very limited spectrum available for a simulcast with old and new technologies. In particular, a simulcast of the existing DVB-T offer and its DVB-T2 counterpart will be impossible (see below).

In the spectrum currently allocated to DTT in France (470-790 MHz), there is no possibility to coordinate any new 9<sup>th</sup> nationwide multiplex with neighbouring countries. Therefore, the migration towards DVB-T2 will first require an MPEG-2 to MPEG-4 switchover, because it will free the capacity of one nationwide multiplex without reducing the DTT service offer.

It is estimated that this MPEG-2 switch-off may be possible in 2015/2016 with limited Government intervention. This is due to the fact that following the market success of free-to-air MPEG-4 HDTV available on DTT since 2008, the French Parliament decided in 2009 to adopt legal measures mandating progressive integration of HD capability (i.e. DVB-T/MPEG-4) in products sold on the French market (TV sets with integrated DTT tuners and from December 2012, DTT set-top boxes). Therefore, in a way, the transition towards MPEG-4 has already begun.

Once this step is completed, the capacity of only one nationwide DVB-T2 multiplex will be available:

- Will DVB-T2/HEVC receivers be available at reasonable cost for end users at that time (i.e. 2016, after MPEG-2 switch-off) or may this DVB-T2 multiplex be launched at first in DVB-T2/MPEG-4, followed several years later by another switch to DVB-T2/HEVC, therefore requiring two migrations which might be ineffective and unrealistic if these two transitions are too close?
- What will be the consumer incentives born by this only one DVB-T2 multiplex? Will it be enough capacity to make viewers buy new equipment?
- And finally, how the remaining 7 national DVB-T multiplexes will switch to DVB-T2?

- 9        a) Do you foresee a requirement for new and enhanced services, including HD and 3D television, on the terrestrial television platform?
- b) If yes, please give indicative details of the number and nature of services planned, and if known, the expected timeframe for their introduction.

**Reply:**

**9.a) Yes**

**There is a strong demand for HDTV, which – among several factors – can be explained by the dramatic adoption of large flat screen television by consumers. The success of DVD, of Blu-Ray discs, of video-game consoles or home theatre equipments has also reinforced the growing expectation of video and audio quality of households, and is making Standard Definition (SD) content appear comparatively inferior in terms of quality.**

**Therefore, the whole existing DTT offer is expected to migrate towards HD video format in the medium term in France.**

**The HDTV video format is also expected to evolve from 1080i (which is the HD format broadcast in France today) to full HD format (1080p). Indeed, production technology is now migrating towards progressive 50 Hz HD (1080p), which means that all programmes in the future could be 1080p HD quality, as for Blu-ray discs, depending on the perceived quality. Besides, consumers are more and more equipped with full HD TV sets.**

**In the longer term, the consumer demand for higher picture resolution could probably continue to grow. All relevant TV distribution platforms, including DTT, would, in this case, benefit from supporting ultra HDTV (4K) to meet this demand.**

**DTT will also continue to deliver higher audio quality, multichannel sound, better accessibility of TV programmes through higher availability of subtitles and audio-description, linear and interactive services such as HbbTV (several services were launched this year in France).**

**Also, the DTT platform could evolve towards mobility, with the objective to provide mobile reception of DTT programmes towards secondary screens, including but not limited to smart-phones and tablets (i.e. mobile terminals including broadcasting tuners).**

**Such DTT platform evolving towards delivery to mobile terminals may also be used by mobile operators to cope with the data traffic generated by linear video content and certain non-linear content that could be pushed (and stored).**

**9.b) The full French DTT service offer (see question 1) should need to evolve towards full HD (1080p) in the medium term (2020):**

- **25 full-time free-to-air TV channels (available today on the DTT platform), plus any new free-to-air TV channels that may be authorized in the future on the DTT platform (from 0 to 5 additional TV channels?);**
- **8 Pay-TV channels (available today on the DTT platform), plus any new pay-TV channels that may be authorized in the future on the DTT platform;**
- **1 on-demand audiovisual media service (offering push-VOD), plus any new on-demand audiovisual media services that may be authorized in the future on the DTT platform;**
- **13 DTT channels are locally used to broadcast regional/local free-to-air TV channels, plus any new regional/local TV channels that may be authorized in the future on the DTT platform.**

**It is also envisaged that some of these TV channels evolve towards ultra HD in the longer term (2025).**

- 10**      a) Are there plans in your country to launch more multiplexes in the future?
- b) If yes, how many more and when? Please also indicate the expected timeframe for their introduction.

**Reply:**

**10.a) Spectrum resources that may allow the rollout of a 9<sup>th</sup> national multiplex with good coverage are not available nor identified for the moment in France.**

**The geographic situation of France (having 10 neighbouring countries) dramatically reduces the number of TV channels available because of cross-border coordination.**

**However, the question remains open. The planning of a 9<sup>th</sup> national multiplex (or more) in France would be very helpful to cope with the DTT service offer evolutions (see question 9) and to make transition(s) to new advanced technologies (DVB-T2/HEVC) easier (simulcast period, see question 8).**

- 11 a) What is the amount of spectrum you foresee that will be required for terrestrial television broadcasting, if plans in Questions 8, 9 and 10 are to be supported, and services identified in Questions 6 and 7 are to be taken into account? Please indicate the modes of transmission that will be used, and timeframes.  
If appropriate, a suggested form to express these requirements is shown in Annex 3.

Reply:

11.a) The following hypotheses were made:

- Among the different services that can be broadcast to users on the DTT platform, the video component of linear full-time TV channels is driving and will continue to drive the spectrum demand. Therefore, in order to estimate the amount of multiplexes that will be needed for terrestrial television broadcasting, the number of national TV channels and the choice of the video format (HD, full HD or ultra HD) are considered as dimensioning parameters;
- A full DVB-T2/HEVC landscape (i.e. beyond 2022) has been considered: first generations of HEVC encoders may provide, in 2015/2016, a 30% bit-rate saving compared to the best MPEG-4/AVC encoders available today, and a 50% bit-rate saving in 2022;

Format	Video coding	Today			Expected 2015/2016			Expected 2022		
		Video data rate (Mbit/s)	Audio and other associated data (Mbit/s)	Total (Mbit/s)	Video data rate (Mbit/s)	Audio and other associated data (Mbit/s)	Total (Mbit/s)	Video data rate (Mbit/s)	Audio and other associated data (Mbit/s)	Total (Mbit/s)
HD 1080p	MPEG-4/AVC	12 to 13	1 to 2	13 to 15	10,2 to 11	1 to 2	11,2 to 13	10	1 to 2	11 to 12
HD 1080p	HEVC				8,4 to 9,1	1 to 2	9,4 to 11,1	5	1 to 2	6 to 7
Ultra HD 4K	HEVC				20 to 30	1 to 2	21 to 32	11 to 20	1 to 2	12 to 22

**Rough estimate of average DTT bitrates for different formats&coding technologies over next years<sup>1</sup>**

*(Highest expected saving figures were retained for calculation)*

<sup>1</sup> Further studies are needed.

- With the related characteristics as described below, the capacity of a fixed SFN DVB-T2 multiplex is 36,9 Mbit/s, and the capacity of a mobile SFN DVB-T2 multiplex is 19,4 Mbit/s.

Reception mode <sup>2</sup>	System & modulation	FEC	GI	Capacity per multiplex (Mb/s)	Intended percentage population coverage	Content per multiplex
<b>Fixed</b>	DVB-T2, 256-QAM 32 k ext	2/3	1/16	36.9	97%	Up to 3 TV per MUX in 4K/HEVC or Up to 6 TV per MUX s in full-HD/HEVC
<b>Mobility</b>	DVB-T2, 64-QAM 16 k	1/2	1/8	19.4	78% portable outdoor (97 % fixed)	Content addressing mobile terminals (linear TV + datacasting)

- 1) For fixed reception, if UHD is introduced and full HD (1080p) generalized, a scenario after transition to DVB-T2/HEVC (e.g. 2022/2023) could assume two thirds of TV channels being full-HD (1080p) and one third of TV channels being ultra HD (4K)

<sup>2</sup> E.g. fixed, portable outdoor/mobile, portable indoor.

	<b>Number of national full-time TV channels</b> (video + audio + associated data, including interactive data) <b>Dimensioning hypotheses</b> (1/3 Ultra HD channels envisaged around 2022)		<b>Number of fixed national multiplexes needed at the end of the migration towards DVB-T2/HEVC</b> <b>(envisaged around 2022)</b> (95% of the French metropolitan population)
<b>Low</b> (30 TV channels)	20 full-HD	10 4K	7
<b>Medium</b> (35 TV channels)	23 full-HD	12 4K	8
<b>High</b> (40 TV channels)	26 full-HD	14 4K	9

- 2) For mobility, the objective of providing TV programmes towards smart-phones and tablets may require the introduction of mobile SFN DVB-T2 multiplex, although it is difficult to assume a specific number.
- 3) In a nut shell, with the previous hypotheses, 8 national multiplexes would be necessary to support these scenarios (assuming a full DVB-T2/HEVC landscape by 2022).

If it is not possible to maintain 8 multiplexes (e.g. if the 700 MHz is allocated to mobile service in France), then this would imply a reduction of the DTT platform service offering at that horizon, in terms of UHD/4K TV channels availability and/or the ability to migrate all national TV channels towards full HD and/or the ability of the DTT platform to evolve towards mobility. Moreover, there is a risk that, with limited incentive for the end user, the transition towards DVB-T2/HEVC would be more complex and lengthy.

# ANNEXE 1 - Reply to question 1 c)

Country	No of multiplexes	System & modulation	FEC	GI	Reception mode	Capacity per multiplex (Mb/s)	Current percentage population coverage	Intended percentage population coverage	Content per multiplex	Total capacity (Mb/s)	Total spectrum bandwidth used (MHz)	Any additional comments (e.g. duration of licences)
France (main territory)	1 (R1)	DVB-T, 64-QAM	3/4	1/8	Fixed	24.88	97%	97%	6 SD MPEG2	199,04 Mbit/s	320 MHz	Public service multiplex (No time limit)
	1 (R2)	DVB-T, 64-QAM	3/4	1/8	Fixed	24.88	97%	97%	6 SD MPEG2			Licensed until 2025
	1 (R3)	DVB-T, 64-QAM	3/4	1/8	Fixed	24.88	97%	97%	1 HD MPEG 4 (Canal+) 4 SD MPEG 4 1 SMAD (Selectv) EMM/ECM			Licensed until 2021 Licensed until 2025 Licensed
	1 (R4)	DVB-T, 64-QAM	3/4	1/8	Fixed	24.88	97%	97%	3 SD MPEG 2 1 SD MPEG 4 (Arte HD) 1 HD MPEG 4			Licensed until 2022 (M6) or 2025 (others) Public service (no limit)
	1 (R5)	DVB-T, 64-QAM	3/4	1/8	Fixed	24.88	94%	97%	3 HD MPEG 4			Licensed until 2023
	1 (R6)	DVB-T, 64-QAM	3/4	1/8	Fixed	24.88	97%	97%	4 SD MPEG 2 3 SD MPEG 4 EMM/ECM			Licensed until 2022 (TF1) or 2025 (others)
	1 (R7)	DVB-T, 64-QAM	3/4	1/8	Fixed	24.88	0%	97%	3 HD MPEG 4			To be licensed in July 2012 (until 2022)
	1 (R8)	DVB-T, 64-QAM	3/4	1/8	Fixed	24.88	0%	97%	3 HD MPEG 4			
France (main territory)	1	DVB-T, 16-QAM or QPSK	¾ or 2/3	1/8	Fixed	16,59 or 7.37 MBit/s	25%	25%	1 to 4 SD MPEG2	16,59 or 7.37 MBit/s	224 MHz to 320 MHz	3 main areas Paris (Multi 7) : 2018, Nantes (Ouest TV) : 2020: , Lille (Grand Lille TV): 2019 Other smaller areas
France (overseas territory)	1	DVB-T, 64-QAM	3/4	1/8	Fixed	24.88	95%	95%	8 to 10 SD MPEG4	24.88		Public services Local private services



## ANNEX 2

Reply to question 5 b)

MAIN TRANSMITTERS		Frequencies/channels								Population	Number of TV channels > 48
Name of the transmitter	Code Station	R1	R2	R3	R4	R5	R6	R7	R8		
ABBEVILLE	80008	57	25	28	55	58	39	22	35	204 088	3
AJACCIO	20008	21	51	34	44	37	31	24	53	109 247	2
ALBERTVILLE	73006	21	30	33	55	58	52	35	47	77 693	3
ALENCON	61007	24	56	49	31	45	48	52	39	91 521	2
ALES	30026	24	54	43	21	22	37	41	51	409 568	2
AMIENS	60006	41	52	49	47	60	44	50	59	1 117 346	4
ANGERS	49006	25	41	30	28	44	52	32	39	383 842	1
ARGENTON SUR CREUSE	36004	21	47	35	51	53	32	58	55	189 738	4
AURILLAC	46001	54	45	43	51	42	48	39	52	393 731	3
AUTUN	71009	48	51	54	35	42	32	53	39	384 509	3
AUXERRE	89006	52	50	49	31	60	44	23	55	309 819	4
AVIGNON	84006	45	36	33	47	39	42	57	51	795 468	2
BAR LE DUC	55004	48	30	57	22	44	50	51	28	81 688	3
BASTIA	20001	21	51	34	44	37	31	24	53	122 202	2
BAYONNE	64001	56	42	45	49	57	58	43	51	488 823	4
BERGERAC	24016	33	41	56	31	35	58	59	53	457 570	4
BESANCON LOMONT	25002	29	44	54	23	45	47	26	41	312 894	1
BESANCON MONTFAUCON	25018	29	44	54	23	45	47	26	41	312 894	1
BORDEAUX	33002	23	37	60	39	57	30	55	45	1 391 143	3
BOULOGNE	62002	34	23	54	26	29	37	60	32	370 847	2
BOURGES	18002	56	46	43	24	40	36	33	55	396 863	2
BREST	29001	43	58	35	39	30	34	46	37	1 082 260	1
CAEN	14001	25	42	22	29	45	28	30	39	1 009 173	0
CARCASSONNE	11001	60	31	43	57	42	56	41	46	491 812	3
CHAMBERY	73001	43	29	51	54	23	26	57	39	399 671	3
CHAMONIX	74001	45	25	41	22	23	26	28	39	160 479	0
CHAMPAGNOLE	39017	48	21	27	55	58	24	53	39	113 043	3
CHARTRES	28005	47	21	49	50	55	44	52	40	407 578	3
CHAUMONT CHALINDREY	52003	49	43	57	46	52	47	55	39	94 346	3
CHERBOURG	50001	35	34	59	37	60	36	30	50	174 779	3
CLERMONT FERRAND	63001	25	47	22	30	52	28	29	41	957 512	1
CLUSES	74003	37	25	41	22	23	26	28	39	160 479	0

MAIN TRANSMITTERS		Frequencies/channels								Population	Number of TV channels > 48
Name of the transmitter	Code Station	R1	R2	R3	R4	R5	R6	R7	R8		
CORTE	20010	21	51	34	44	37	31	24	53	29 004	2
DIJON	21001	37	50	59	33	28	32	53	39	762 838	3
DUNKERQUE	59009	42	52	27	45	31	21	25	28	344 722	1
EPINAL	88001	60	31	59	37	45	42	32	40	229 896	2
GAP	5003	24	44	34	21	52	31	60	54	117 449	3
GEX	1001	45	21	27	55	58	24	53	39	421 997	3
GRENOBLE	38001	37	50	53	22	25	56	28	27	524 363	3
GUERET	23010	48	31	37	34	60	57	39	26	137 040	2
HIRSON	2005	48	32	27	51	35	54	39	25	119 202	2
HYERES	83001	53	54	28	25	22	48	29	43	116 794	2
LA ROCHELLE	17004	53	52	22	40	27	28	43	36	239 079	2
LAVAL	53006	33	58	43	57	60	51	35	53	316 073	5
LE CREUSOT	71020	48	51	54	35	42	32	53	39	127 729	3
LE HAVRE	76002	43	44	57	32	41	46	47	35	1 099 211	1
LE MANS	72001	26	34	22	59	37	36	35	46	418 781	1
LE PUY	43035	60	31	50	48	32	26	35	56	161 300	3
LESPARRE	33009	31	42	51	59	44	46	48	54	45 030	3
LILLE BOUVIGNY	62001	24	23	27	26	31	21	30	59	3 277 425	1
LIMOGES	87001	49	47	50	34	44	29	46	26	553 632	1
LONGWY	54002	59	47	31	22	39	25	33	58	83 766	2
LYON FOURVIERE	69001	48	44	59	40	49	46	57	41	1 348 797	2
LYON MONT PILAT	42002	43	44	59	40	49	46	57	41	1 944 254	2
MACON	69021	30	44	47	40	49	46	57	41	134 356	1
MARSEILLE	13001	23	59	30	35	27	26	29	38	1 866 008	1
MENDE	48027	34	31	50	53	32	46	35	55	71 318	3
MENTON	6002	39	54	28	25	22	48	45	43	264 814	1
METZ	57001	59	37	31	22	39	36	34	58	843 876	2
MEZIERES SURY	8001	44	32	26	22	34	23	40	36	206 901	0
MILLAU	12062	44	30	59	47	28	29	58	37	85 144	2
MONT SALEVE	74018	45	21	27	55	58	24	53	39	193 787	3
MONTMELIAN	73004	37	30	33	55	58	48	35	47	77 693	2
MONTPELLIER	34014	40	52	50	53	49	56	41	55	1 126 917	5
MORTEAU	25041	29	44	54	23	45	47	26	41	346 259	1
MULHOUSE	68001	24	27	54	37	53	21	50	41	770 645	3
NANCY	54001	53	26	23	22	29	52	51	28	453 747	3
NANTES	44001	47	23	30	54	44	29	32	39	2 098 655	1
NEUFCHATEL EN BRAY	76027	56	48	54	45	29	39	30	40	200 678	2

MAIN TRANSMITTERS		Frequencies/channels										
Name of the transmitter	Code Station	R1	R2	R3	R4	R5	R6	R7	R8	Population	Number of TV channels > 48	
NICE	6003	39	54	28	25	22	48	45	43	531 473	1	
NIORT	79001	25	52	22	40	27	28	43	36	1 417 437	1	
ORLEANS	45002	39	57	45	48	41	51	53	27	570 970	3	
PARIS	75003	35	25	22	30	28	32	42	58	10 713 370	1	
PARTHENAY	79007	48	49	33	55	60	50	43	57	156 927	4	
PERPIGNAN	66001	34	21	24	28	54	25	22	48	372 382	1	
POITIERS	86004	30	52	22	56	27	54	43	36	134 712	3	
PORTO VECCHIO	20013	21	51	34	44	37	31	24	53	18 926	2	
PRIVAS	7052	58	44	59	40	49	37	57	55	646 061	4	
REIMS	51001	53	56	43	46	34	45	40	37	838 299	2	
RENNES	35001	21	40	27	49	55	24	46	31	1 258 746	1	
ROUEN	76001	26	34	33	53	23	51	37	40	1 601 822	2	
SAINT ETIENNE	42001	38	44	59	40	49	46	57	41	495 469	2	
SAINT FLOUR	15002	60	21	50	51	32	46	35	56	27 332	4	
SAINT MARTIN DE BELLEVILLE	73059	37	30	33	55	58	48	35	47	10 375	2	
SAINT RAPHAEL	83004	39	54	28	25	22	48	45	43	266 659	1	
SARREBOURG	67007	50	26	23	22	56	25	34	47	336 652	2	
SENS	89004	47	50	49	31	60	44	23	55	125 186	3	
STRASBOURG	67004	48	40	43	22	56	25	51	47	919 442	2	
TARASCON SUR ARIEGE	9038	37	23	33	51	42	39	40	26	97 865	1	
TOULON	83005	58	54	28	25	22	48	29	43	460 328	2	
TOULOUSE	65001	21	38	24	27	25	36	34	32	2 490 269	0	
TOURS	41002	42	23	45	24	37	29	58	31	683 263	1	
TROYES	10001	26	21	27	24	29	36	23	41	397 964	0	
USSEL	19028	23	27	24	55	44	36	40	26	221 726	1	
VANNES	56001	57	25	53	48	22	50	28	33	647 200	3	
VERDUN	55008	59	47	31	22	39	25	33	58	86 595	2	
VITTEL	88030	60	58	59	37	45	42	32	40	127 817	3	
WISSEMBOURG	67018	48	40	43	22	56	25	51	47	14 262	2	

TOTAL

60 267 070

210

Out of

62 131 000

784

97%

27%

Nom du site portant un simplex	Type de simplex	Nombre de chaines	Population (million people)	canal
PARIS	Multi 7	4	10.5	33
LILLE	Grand Lille TV	1	2.7	36
TV8 MB (cluses, Chamonix, Annemasse)	TV8 MB	1	0.7	46
NANTES	Ouest TV	2	1.6	56
TROYES	Canal 32	1	0.3	25

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