



PARIS 2024



PARIS 2024



# **SPECTRUM MANAGEMENT PLAN**

**VERSION 2 - MARCH 2023**

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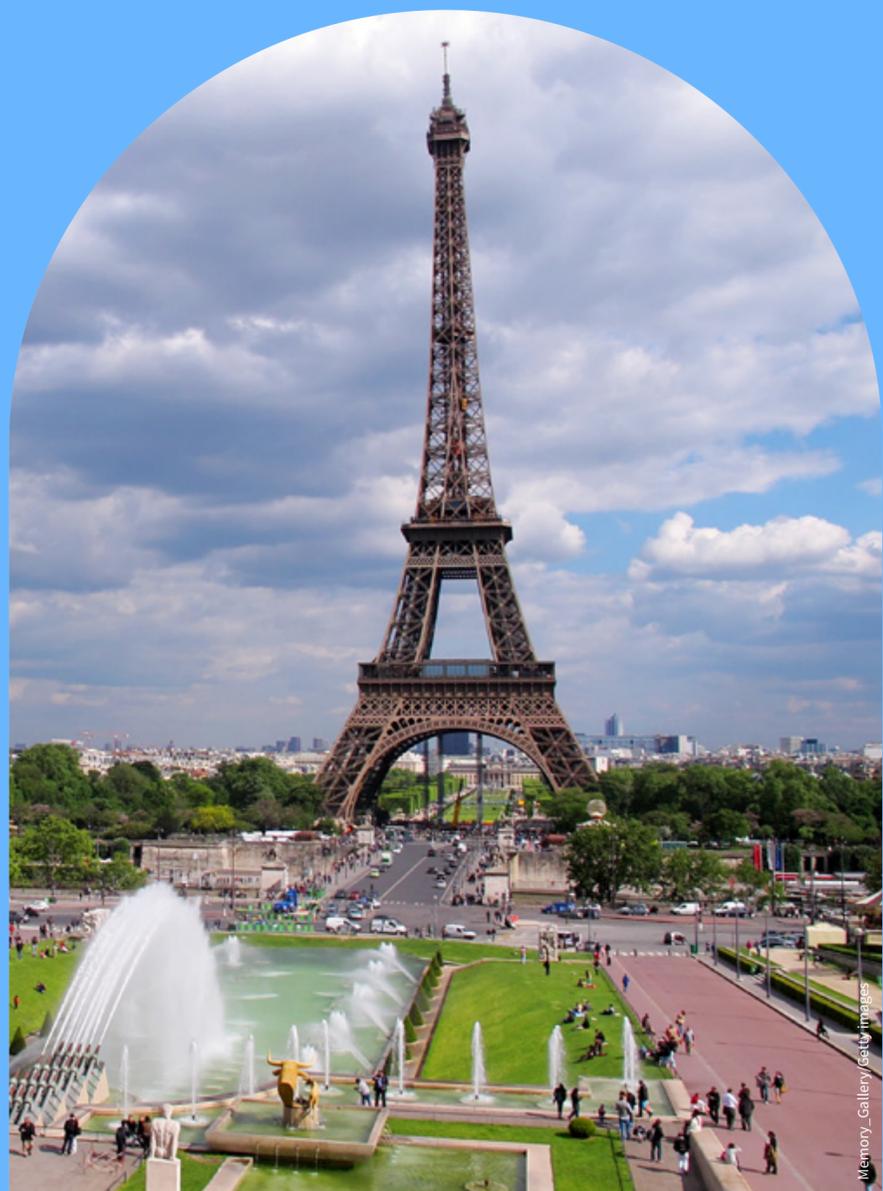
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# GLOSSARY

TERMS	MEANING
ANFR	Agence nationale des fréquences - the French government agency regulating the radio frequencies uses
Arcep	Autorité de régulation des communications électroniques, des postes et de la distribution de la presse : the French government agency in charge of regulating electronic communications in France
Arcom	Autorité de régulation de la communication audiovisuelle et numérique
Authorisation	The authorisation is issued to the owner of specific types of radio frequency equipment, to bring and operate it in the venues
Channel bandwidth	Portion of the radio spectrum occupied by the transmitted signal
DAB	Digital Audio Broadcasting
DECT	Digital Enhanced Cordless Telecommunications
DVB-T	Digital Video Broadcasting -Terrestrial
Duty cycle	Ratio of time where the radio device is transmitting during an observation period of one hour
FSK	Frequency Shift Keying (modulation type)
IBC	International Broadcast Centre
IdF	Ile-de-France - Paris and its suburban area
IEM	In-Ear Monitor
LAN	Local Area Network
Licence	Individual licence gives its owner the right to use a specific radio frequency equipment with an assigned frequency on a specific site and period
MRH	Media Right Holder
OCOG	Organising Committee for the Olympic Games
OPG	Olympic and Paralympic Games
PMR	Private Mobile Radio: a two-way voice communications system
PMSE	Programme Making Special Event
SBP	Spectrum Booking Portal
SRD	Short-Range Device
TDD	Time Division Duplex
T&T	Testing and Tagging
UHF	Ultra High Frequency (300MHz-3GHz)
Venues	Competition venues and other relevant premises under Paris 2024 spectrum management
VHF	Very High Frequency (30MHz-300MHz)

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CHAPTER  
1

# INTRODUCTION

# 1.1 THE OLYMPIC AND PARALYMPIC GAMES PARIS 2024

The Games of the XXXIII Olympiad and the XVII summer Paralympic Games (“the Paris 2024 Games”) will be held from 26 July to 11 August 2024 and from 28 August to 8 September 2024 respectively.

The competitions will be held mainly in Paris (the host city of the Games and the capital of France) and its suburbs, like Saint-Denis, Le Bourget, Nanterre, Colombes, La Courneuve, Vaires-sur-Marne, Versailles, Saint-Quentin-en-Yvelines and Élancourt. However, other major cities are associated with this event such as Marseille, Lyon, Bordeaux, Nantes, Saint-Etienne, Lille, Nice, Châteauroux and finally Teahupo’o in French Polynesia.

The Paris 2024 Organising Committee for the Olympic and Paralympic Games (hereafter Paris 2024) is responsible for planning, organising, financing, and delivering the Paris Olympic and Paralympic Games in 2024. To this end, and with regard to issues related to spectrum use, testing, tagging and monitoring of radio equipment, it closely works with two separate entities:

- The first one is the Agence nationale des fréquences (ANFR) which is responsible for the radio spectrum management in France, and in particular of the frequency planning, and the radio site management and
- the Autorité de régulation des communications électroniques, des postes et de la distribution de la presse (Arcep) which is in charge of regulating electronic communications in France.

According to the French legislation, Arcep is responsible for delivering the spectrum authorisations under the general authorisation regime or the individual authorisation regime. Usually, the ANFR delivers, on behalf of Arcep, temporary frequency use authorisations for PMR and, as appropriate, for audio/video Programme Making and Special Events (PMSE) and Arcom delivers authorisation for audio description systems. For the Olympic Games and Paralympic Games, Paris 2024 will notify spectrum users of authorisation.

To ensure a safe and reliable spectrum environment, the ANFR will test and tag all the radio equipment during the Games at the competition venues and other relevant venues except the ones defined in Section 1.6. The ANFR will ensure the radio spectrum monitoring and if needed the enforcement during the Paris 2024 Olympic and Paralympic Games (OPG).

At the same time, the ANFR will continue its spectrum management activity near the Olympic and Paralympic venues and manage spectrum requests from other spectrum users.



## 1.2 OBJECTIVES

To anticipate the spectrum needed for the Paris 2024 OPG, the ANFR and Paris 2024 studies are based on the data from the past OPG as well as other major international sport events, considering technological evolutions. The bands made available for the Paris 2024 OPG and presented in this Guide take into account the status of currently assigned spectrum in France.

As for the spectrum assignment, the ANFR should ensure to avoid harmful interference not only among the wireless systems operated by the stakeholders involved in the Games, but also between these stakeholders' systems operated in the Games and other wireless systems already in operation nationwide. To avoid such harmful interference, Paris 2024 and the different stakeholders shall also conform to the applicable French spectrum regulations. In case of non-compliance with these regulations, penal sanctions may be applied.

Thus, the objective of this document is to define the spectrum management plan and clarify the spectrum assignment conditions.

## 1.3 SPECTRUM USAGE STATUS

Paris, the host city, and its suburbs gather 16 % of the French population and most of the head offices of the main companies established in France, and there is accordingly already a very high use level of radio spectrum. Also, 5G deployments are reducing the bands historically allocated to the PMSE usages.

The main competition venues are located less than 10 km from the athletes' village and are concentrated in small areas. This situation induces difficulties related to the re-use of the spectrum.

For the above reasons, Paris 2024 strongly requests the stakeholders involved in the Games **to use a wired communication system wherever and whenever possible**, in particular for microphones and cameras. The radio spectrum **shall** be used **only** when the wired communication system cannot operationally be used.

In addition, attention is drawn on the fact that **equipment using spectrum under general authorisation (a.k.a licence-exempt bands) operates without protection from interference and is not allowed to create interference to individually authorised spectrum users.**

## 1.4 WIRELESS EQUIPMENT SUBJECT TO SPECTRUM COORDINATION

Nobody shall operate in venues any wireless equipment or make any use of radio frequencies, without obtaining an individual temporary authorisation, or a temporary general use authorisation as defined hereafter.

### 1.4.1 WIRELESS EQUIPMENT REQUIRING INDIVIDUAL TEMPORARY AUTHORISATION

At the Paris 2024 Games, Paris 2024 will obtain the individual temporary authorisations from the ANFR / Arcep for the benefit of the stakeholders involved in the Games.

In order to avoid harmful interference, spectrum coordination between radio equipment used by stakeholders and existing radio equipment will be ensured.

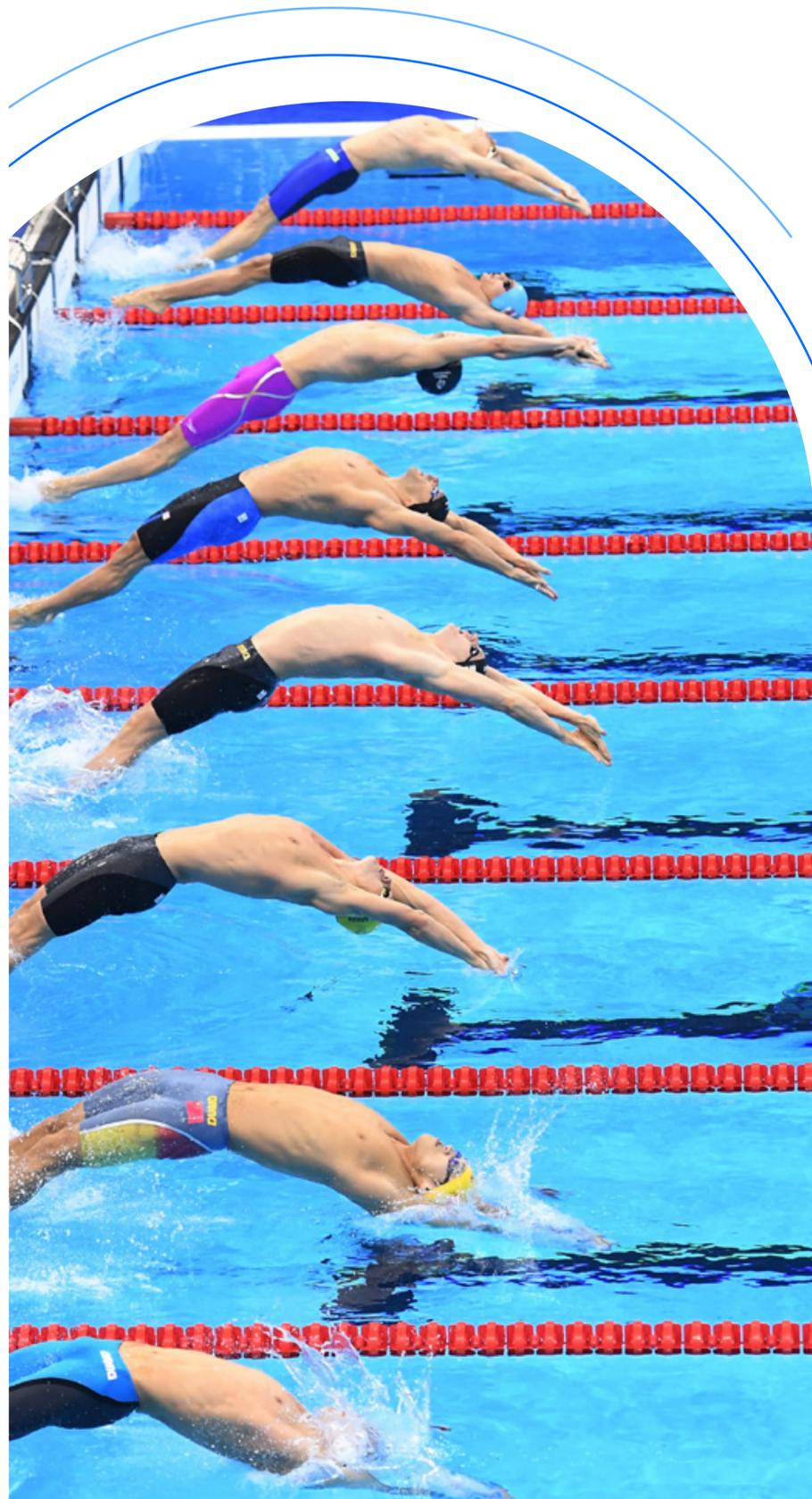
### 1.4.2 WIRELESS EQUIPMENT SUBJECT TO A TEMPORARY GENERAL USE AUTHORISATION

Radio equipment using the specified spectrum under the general authorisation regime, including Wireless LAN, will also have to be declared and duly authorised by Paris 2024 in order to avoid the risk of potential interference.

It should be noted that devices operating under the general authorisation regime could experience interference from other stations unrelated to the Games operation. All equipment, with the exception of those mentioned in section 1.6, will be tested and tagged prior any use in venues.

According to the frequency tables hereafter, all radio equipment shall comply with the applicable European harmonised standard<sup>1</sup>. The usage is allowed on a non-interference and non-protection basis.

<sup>1</sup> Exceptions may be allowed on a case-by-case basis for Licence Exempt wireless release trigger service.



Quinn Rooney/Getty images

## 1.5 WIRELESS SERVICES

The following wireless services that will be deployed during the Paris 2024 Games are subject to temporary authorisation:

- Private Mobile Radio (Land Mobile Radio, Handheld Radio (Walkie-Talkie))
- telemetry/telecommand
- Talk-back System (Intercom)
- Wireless Microphones and In-Ear Monitors
- Wireless cameras and mobile airborne video links
- Microwave fixed point to point link
- Microwave transportable point to point link
- Permanent and Transportable Satellite Earth Station
- Wireless LAN (Access Point)
- Wireless Release Trigger<sup>2</sup>
- Other Services

All equipment shall operate according to the conditions given in the temporary authorisation delivered.

<sup>2</sup> Wireless release trigger does not require temporary authorisation, see section 2.10

## 1.6 WIRELESS EQUIPMENT THAT DOES NOT REQUIRE AUTHORISATION

Regardless of licences already obtained in France, all radio equipment used within the venues requires a temporary authorisation notified by Paris 2024 with the following exceptions:

- Mobile phones, tablets and connected watches, smart bracelets, Bluetooth headsets and other wearable smart devices
- Wireless file transmitter
- Wireless release trigger, see section 2.10 for the authorised bands

**In any case: the use of those devices as Hot-Spots or for tethering will be strictly forbidden.**

## 1.7 PROHIBITED WIRELESS EQUIPMENT

Some equipment is strictly forbidden in and around the Competition and non-Competition venues:

- Jammer. You are notified that article L33-3-1 of the French Postal and Electronic Communications Code, prohibits the installation, possession and use of any device intended to render electronic communications devices of all types, both for transmission and reception, inoperative.
- Wireless release trigger using **315 – 317.5 MHz band**.
- Licence-exempt walkie-talkies using 351.16 – 351.38 MHz band.

In addition, wired connection to printers shall be used (no Wi-Fi communication).



Jamie Squire/Getty Images

## CHAPTER 2

# TYPES OF WIRELESS DEVICES

The spectrum plan per application is presented in detail in this section.

## 2.1 PRIVATE MOBILE RADIO (PMR)

This publication presents the conditions for the use of radio equipment, considering existing frequency assignments in metropolitan France and French Polynesia. The coordination constraints result from the deep cohabitation studies performed by ANFR and French governmental assigning authorities.

Spectrum users should carefully plan their spectrum requirements, and Paris 2024 strongly recommends the use of cables as much as possible, in order to optimise the radio resource allocation.

In any case, spectrum users must adopt systems that conform to European standards for the smooth coordination and assignment of temporary authorisation.

Private Mobile Radio (PMR) is used by many entities, for communication activities. This includes private security services, sport team services, National Olympic Committees and National Paralympic Committees, transport, venue management, ceremonies, catering, spectator services and ticketing. Other PMR users will include partners, MRH, and Paris 2024's suppliers. Except for the talk-back systems, the mainly voice-based PMR is expected to use a push-to-talk simplex system.

The VHF and UHF bands suitable for PMR already have a considerably high number of users in and around the Paris area. These bands are expected to be assigned to the talk-back system and telemetry and telecommand at the Paris 2024 Games.

The use of digital PMR systems rather than analog ones is recommended due to the spectrum efficiency they provide. However, the digital system generates an audio delay of about 100 ms to 500 ms. Analogue radios will still be used by key user groups if such delay is unacceptable for the user's operations.

Paris 2024 and ANFR encourage spectrum users to request assignments in the VHF band.

A private push-to-talk system based on the 3GPP on the LTE network is deployed on venues for Paris 2024's operational needs in order to free spectrum.

Below, we define two sub-services in PMR:

### 2.1.1 LAND MOBILE RADIO (LMR)

Land Mobile Radio refers to mobile communication equipment and its relay equipment (repeater/base station) with multiple users for terrestrial data or voice communication (Direct Mode Operation / Duplex) but does not include handheld walkie-talkies without repeater/base station.

### 2.1.2 HANDHELD RADIO (WALKIE-TALKIE)

Handheld Radios refer to the walkie-talkie that is not used in repeater/base station mode, or other point-to-point voice (Direct Mode Operation / Simplex) communication equipment with the same working mode as the handheld walkie-talkie.

Table 1 shows the detailed information regarding the available frequency bands assigned to PMR for Games time needs.

The transmission power may vary by usage, but **high power shall be avoided** from the viewpoint of effective spectrum usage. Transmission power should be preferably no more than 1W or maximum 5W in exceptional cases.

If the preferred frequency is not available, an alternate frequency will be assigned from the frequency range of the radio which is tuneable.



Phil Walter/Getty images

TABLE 1: FREQUENCY BANDS TO BE ASSIGNED TO PMR

BAND NAME	FREQUENCY BANDS	ESTIMATED AVAILABLE SPECTRUM (MHZ) <sup>3</sup>	TECHNICAL SPECIFICATIONS		CONSTRAINTS IN ADDITION TO COORDINATION WITH EXISTING PERMANENT ASSIGNATIONS
	FROM – TO (MHZ)		MAX TRANSMIT POWER <sup>4</sup>	ADDITIONAL PARAMETERS	
VHF	68.4625 – 69.25	0.2125	1W	Possible duplex with 72.5125 – 73.3 MHz Channel bandwidth: 12.5 or 6.25 kHz	
	70.250 – 70.525	0.2875	1W	Simplex Channel bandwidth: 12.5 or 6.25 kHz	
	70.9875 – 71.95	0.850	1W	Simplex Channel bandwidth: 12.5 or 6.25 kHz	
	75.3 – 77.475	2.125	1W	Possible duplex with 80.3 – 82.475 MHz Channel bandwidth: 12.5 or 6.25 kHz	
	80.3 – 82.475	2.125	1W	Possible duplex with 75.3 – 77.475 MHz Channel bandwidth: 12.5 or 6.25 kHz	
	144 – 146	Up to 2	1W	Simplex Channel bandwidth: 12.5 or 6.25 kHz	
	148.8 – 151.3	2.088	1W	Possible duplex with 153.4-155.9 MHz Channel bandwidth: 12.5 or 6.25 kHz	
	153.4 – 155.9	2.088	1W	Possible duplex with 148.8 – 151.3 MHz Channel bandwidth: 12.5 or 6.25 kHz	
	156.0 – 159.6	2.132	1W	Simplex Channel bandwidth: 12.5 or 6.25 kHz	
	160.6 – 162.9				At the Teahupo'o venue, simplex channels are limited to 160.6 – 162.3 MHz
	158.4 – 168.9	4.5	1W	Possible duplex with 163 – 173.5 MHz Channel bandwidth: 12.5 or 6.25 kHz	At the Teahupo'o venue, duplex channels are from 157.7 to 168.9 MHz
163 – 173.5	4.5	1W	Possible duplex with 158.4-168.9 MHz Channel bandwidth: 12.5 or 6.25 kHz	At the Teahupo'o venue, duplex channels are from 162.3 to 173.5 MHz	
UHF	403.5 – 405.5	2	1W		At the Bordeaux venue, simplex channels are limited to 403.5 – 404 MHz
	406.1 – 408	0.225			
	408 – 410	0.5265			This band is available <b>only</b> for venues in Paris and around (Ile-de-France)

<sup>3</sup> Estimated available spectrum in France metropolitan area.

<sup>4</sup> Transmission power over the air, including the antenna gain.



BAND NAME	FREQUENCY BANDS	ESTIMATED AVAILABLE SPECTRUM (MHZ) <sup>3</sup>	TECHNICAL SPECIFICATIONS		CONSTRAINTS IN ADDITION TO COORDINATION WITH EXISTING PERMANENT ASSIGNATIONS		
	FROM – TO (MHZ)		MAX TRANSMIT POWER <sup>4</sup>	ADDITIONAL PARAMETERS			
UHF	410 – 414.5	1	1W	Possible duplex with 420-424.5 MHz Channel bandwidth: 12.5 or 6.25 kHz			
	414.5 – 420	0.112	1W	Possible duplex with 424.5 – 430 MHz Channel bandwidth: 12.5 or 6.25 kHz			
	420 – 424.5	1.25	1W	Possible duplex with 410-414.5 MHz Channel bandwidth: 12.5 or 6.25 kHz	This band is simplex in Teahupo'o venue.		
	424.5 – 430	0.112	1W	Possible duplex with 414.5 – 420 MHz Channel bandwidth: 12.5 or 6.25 kHz			
	430 – 440	10	1W	Simplex Channel bandwidth: 12.5 or 6.25 kHz	Available for voice communication.		
	440 – 441.5	0.250					
	441.5 – 443.55	0.875			Available spectrum at OPG venues of Marseille, Bordeaux, and Nice is 0.5 MHz		
	443.55 – 444.5	0.475			At Teahupo'o venue: possible duplex with 453.55 – 454.5 MHz		
	444.5 – 446	0.120					
	446.2 – 447						
	447 – 449.775	0.5625					
	450.025 – 453	1					
	453 – 460	1.05			1W	Possible duplex with 463-470 MHz Channel bandwidth: 12.5 or 6.25 kHz	
	460 – 463	1			1W	Simplex Channel bandwidth: 12.5 or 6.25 kHz	
463 – 470	1.05	1W	Possible duplex with 453-460 MHz Channel bandwidth: 12.5 or 6.25 kHz				

<sup>3</sup> Estimated available spectrum in France metropolitan area.

<sup>4</sup> Transmission power over the air, including the antenna gain.

## 2.1.3 LICENCE-EXEMPT FREQUENCY FOR PMR

Radio Equipment that conforms to technical standards in Europe and is operated in the spectrum in Table 2 requires a temporary general use authorisation from Paris 2024 in order to be used in/around the venues, in order to avoid the risk of potential interference.

This equipment operates without protection from interference and is not allowed to create interference to individually authorised spectrum users.

**TABLE 2: FREQUENCY BAND OF LICENCE-EXEMPT PMR SERVICE**

BAND	FREQUENCY BAND (MHZ)		BANDWIDTH (MHZ)	TECHNICAL SPECIFICATIONS	
	FROM	TO		MAX TRANSMIT POWER	ADDITIONAL PARAMETERS
446	446	446.2	0.2	500 mW	Simplex Channel bandwidth: 12.5 kHz

## 2.2 TELEMETRY/TELECOMMAND

Telemetry and telecommand refer to the wireless radio equipment designed or adapted for the remote control of cameras (video **parameters** and mechanical head), camera shutters, audio/sound engineering, and lighting settings, tracking system, **pyrotechnic remotes**, and other programme-making equipment, localised data communications and for timing & scoring devices. They generally transmit data using a narrow bandwidth that does not exceed 25 kHz and often transmits with FSK modulation.

Table 3 shows detailed information regarding possible frequency bands assigned to telemetry/ telecommand and small-capacity data transmission indicated in the spectrum plan. Some frequencies could be also assigned to PMR and other audio transmissions.

**TABLE 3: FREQUENCY BANDS FOR TELEMETRY/TELECOMMAND SERVICE**

BAND NAME	FREQUENCY BANDS	ESTIMATED AVAILABLE SPECTRUM (MHZ)	TECHNICAL SPECIFICATIONS		CONSTRAINTS IN ADDITION TO COORDINATION WITH EXISTING PERMANENT ASSIGNATIONS
	FROM – TO (MHZ)		MAX TRANSMIT POWER	ADDITIONAL PARAMETERS	
VHF	156.0 – 159.6	2.132	1W	Simplex Channel bandwidth: 12.5 or 6.25 kHz	At the Teahupo'o venue, simplex channels are limited to 160.6 – 162.3 MHz
	160.6 – 162.9				
UHF	403.5 – 405.5	2	1W	Simplex Channel bandwidth: 12.5 or 6.25 kHz	At the Bordeaux venue, simplex channels are limited to 403.5 – 404 MHz.
	406.1 – 408	0.225	1W	Simplex Channel bandwidth: 12.5 or 6.25 kHz	
	408 – 410	0.5265	1W	Simplex Channel bandwidth: 12.5 or 6.25 kHz	This band is available <b>only</b> for venues in Paris and around (Ile-de-France).
	440 – 441.5	0.250	1W	Simplex Channel bandwidth: 12.5 or 6.25 kHz	
	441.5 – 443.55	0.875	1W	Simplex Channel bandwidth: 12.5 or 6.25 kHz	Available spectrum at OPG venues of Marseille, Bordeaux, and Nice is 0.5 MHz
	443.55 – 444.5	0.475	1W	Simplex Channel bandwidth: 12.5 or 6.25 kHz	
	444.5 – 446	0.120	1W	Simplex Channel bandwidth: 12.5 or 6.25 kHz	
	446.2 – 447				
	447 – 449.775	0.5625			
	450.025 – 453	1	1W	Simplex Channel bandwidth: 12.5 or 6.25 kHz	
	460 – 463	1	1W	Simplex Channel bandwidth: 12.5 or 6.25 kHz	



## 2.2.1 LICENCE-EXEMPT FREQUENCY FOR TELEMTRY/TELECOMMAND

The following frequency bands for operation on a licence-exempt basis of telemetry and telecommand applications are proposed. This equipment **operates without protection from interference and is not allowed to create interference to individually authorised spectrum users:**



TABLE 4: FREQUENCY BANDS OF LICENCE-EXEMPT TELEMTRY/TELECOMMAND

FREQUENCY BANDS	TECHNICAL SPECIFICATIONS	
	MAX TRANSMIT POWER/ MAXIMUM FIELD STRENGTH	ADDITIONAL PARAMETERS
125 kHz	42 dBµA/m à 10 m	
6.78 MHz	42 dBµA/m à 10 m	
13.553 – 13.567 MHz	10 mW	
26.957 – 27.283 MHz	10 mW	
	100 mW Use limited to the following channels: 26.990-27.000 MHz, 27.040-27.050 MHz, 27.090-27.100 MHz, 27.140-27.150 MHz, 27.190-27.200 MHz	Duty cycle limit: 0.1 %.
40.66 – 40.7 MHz	10 mW.	
169.4 – 169.475 MHz	500 mW.	Channel bandwidth: ≤ 50 kHz. Duty cycle limit: 1.0 %. For metering devices, the duty cycle limit is 10.0%
169.4 – 169.4875 MHz	10 mW.	Duty cycle limit: 0.1%.
169.4875 – 169.5875 MHz	10 mW	Duty cycle limit: 0.001%. Between 00:00h and 06:00h local time a duty cycle limit of 0.1 % may be used.
169.5875 – 169.8125 MHz	10 mW	Duty cycle limit: 0.1 %

FREQUENCY BANDS	TECHNICAL SPECIFICATIONS	
	MAX TRANSMIT POWER/ MAXIMUM FIELD STRENGTH	ADDITIONAL PARAMETERS
433.05 – 434.79 MHz	1 mW and 13 dBm/10 kHz power density for bandwidth modulation larger than 250 kHz	
	10 mW	Duty cycle limit: 10 %
862 – 863 MHz	25 mW.	Duty cycle limit: 0.1%. Bandwidth: ≤ 350 kHz.
863 – 865 MHz	25 mW	Requirements on techniques to access spectrum and mitigate interference apply. Alternatively, a duty cycle limit of 0.1% may also be used.
865 – 868 MHz	25 mW	Requirements on techniques to access spectrum and mitigate interference apply. Alternatively, a duty cycle limit of 1 % may also be used.
868 – 868.6 MHz	25 mW	Requirements on techniques to access spectrum and mitigate interference apply. Alternatively, a duty cycle limit of 1 % may also be used.
868.7 – 869.2 MHz	25 mW	Requirements on techniques to access spectrum and mitigate interference apply. Alternatively a duty cycle limit of 0,1 % may also be used.
869.4 – 869.65 MHz	500 mW	Requirements on techniques to access spectrum and mitigate interference apply. Alternatively, a duty cycle limit of 10% may also be used.
869.7 – 870 MHz	5 mW	
	25 mW	Requirements on techniques to access spectrum and mitigate interference apply. Alternatively, a duty cycle limit of 1 % may also be used.
2 400 – 2 483.5 MHz	10 mW	
5 725 – 5 875 MHz	25 mW	
24.00 – 24.10 GHz	100 mW	
24.10 – 24.15 GHz	0.1 mW	
24.15 – 24.25 GHz	100 mW	
57 – 64 GHz	100 mW	

## 2.3 TALK-BACK SYSTEM (INTERCOM)

Talk-back system is used primarily by broadcasters for communication between the director of activities and the members of the production team such as presenters, interviewers, reporters, camera operators, sound operators, lighting operators, and engineers.

Talk-back system in the PMSE-UHF band is allowed under restricted output power. Pre-set frequencies cannot be accepted.

The frequency bands identified for Private Mobile Radio (PMR) (see section 2.1) are to be considered for frequency assignment for the purpose of implementing talk-back systems (see Table 5).



**TABLE 5: FREQUENCY BANDS TO BE ASSIGNED TO THE TALK-BACK SYSTEM (INTERCOM)**

BAND NAME	FREQUENCY BANDS	ESTIMATED AVAILABLE SPECTRUM (MHZ)	TECHNICAL SPECIFICATIONS		CONSTRAINTS IN ADDITION TO COORDINATION WITH EXISTING PERMANENT ASSIGNATIONS
	FROM – TO (MHZ)		MAX TRANSMIT POWER	ADDITIONAL PARAMETERS	
VHF	156.0 – 159.6	2.132	1W	Simplex Channel bandwidth: 12.5 or 6.25 kHz	At the Teahupo'o venue, simplex channels are limited to 160.6 – 162.3 MHz
	160.6 – 162.9				
UHF	403.5 – 405.5	2	1W	Simplex Channel bandwidth: 12.5 or 6.25 kHz	At the Bordeaux venue, simplex channels are limited to 403.5 – 404 MHz
	406.1 – 408	0.225	1W	Simplex Channel bandwidth: 12.5 or 6.25 kHz	
	408 – 410	0.5265	1W	Simplex Channel bandwidth: 12.5 or 6.25 kHz	This band is available <b>only</b> for venues in Paris and around (Ile-de-France).
	440 – 441.5	0.250	1W	Simplex Channel bandwidth: 12.5 or 6.25 kHz	
	441.5 – 443.55	0.875	1W	Simplex Channel bandwidth: 12.5 or 6.25 kHz	Available spectrum at OPG venues of Marseille, Bordeaux, and Nice is 0.5 MHz.
	443.55 – 444.5	0.475	1W	Simplex Channel bandwidth: 12.5 or 6.25 kHz	

BAND NAME	FREQUENCY BANDS	ESTIMATED AVAILABLE SPECTRUM (MHZ)	TECHNICAL SPECIFICATIONS		CONSTRAINTS IN ADDITION TO COORDINATION WITH EXISTING PERMANENT ASSIGNATIONS
	FROM – TO (MHZ)		MAX TRANSMIT POWER	ADDITIONAL PARAMETERS	
UHF	444.5 – 446	0.120	1W	Simplex Channel bandwidth: 12.5 or 6.25 kHz	
	446.2 – 447				
	447 – 449.775	0.5625			
	450.025 – 453	1	1W	Simplex Channel bandwidth: 12.5 or 6.25 kHz	
	460 – 463	1	1W	Simplex Channel bandwidth: 12.5 or 6.25 kHz	

### 2.3.1 LICENCE-EXEMPT RADIO FOR TALK-BACK SYSTEM (INTERCOM)

As a modern solution, Digital Enhanced Cordless Telecommunications (DECT) systems are used more and more in event management to provide wireless global radio access for various intercom services. Given the use of DECT services by Paris 2024 in all competition venues, these services will be authorised if the compatibility with the Paris 2024 usage is ensured.

Radio Equipment conforming to European technical standards and operating in the spectrum in table 6, requires a temporary general use authorisation from Paris 2024, to be used in the venues, in order to avoid the risk of potential interference.

**TABLE 6: FREQUENCY BAND OF LICENCE-EXEMPT EQUIPMENT FOR TALK-BACK SYSTEMS (INTERCOM)**

BAND	FREQUENCY BAND (MHZ)		AVAILABLE SPECTRUM (MHZ)	TECHNICAL SPECIFICATIONS	
	FROM	TO		MAX TRANSMIT POWER	ADDITIONAL PARAMETERS
DECT	1880	1900	20	250 mW.	Digital (TDD: Time Division Duplex) 10 channels of 2 MHz

# 2.4 WIRELESS MICROPHONES AND IN-EAR MONITORS

## 2.4.1 WIRELESS MICROPHONES

Wireless Microphones are mainly used by broadcasters or event organisers to capture interviews, conference talk, music, or ambiance. They can be handheld or body-worn, with integrated or body-worn transmitters.

It is also anticipated that the demand for spectrum for Wireless Microphones at music concerts or theatres in and around the Paris area will increase during the Games.

Considering the above, Paris 2024 and ANFR require the following to avoid the difficulty of assigning frequencies for Wireless Microphones as much as possible:

- Use wired microphones whenever and wherever possible.
- Wireless Microphones shall be used only when wired microphones cannot be used.
- Avoid using Wireless Microphones whenever possible, especially in outdoor areas.
- Use digital Wireless Microphone systems that are usually more tolerant to interference.
- Use strong filtering and dedicated frequency range antenna to reject any high level of the noise floor.

## 2.4.2 IN-EAR MONITOR (IEM)

In-Ear Monitor (IEM) includes equipment used for one-way receiving by staff of live broadcast or command and dispatch, or for entertainers to listen to on-site sounds.

IEMs are mainly used by broadcasters, Paris 2024, or event participants to listen to their own voice, or to mixed feedback of on-site sounds. It usually uses broadcast transmission mode, and the signals are received by the wireless headset worn in the ear.

Considering the above, Paris 2024 requires the following to avoid the difficulty of assigning frequencies for wireless IEMs as much as possible:

- Avoid using Wireless IEMs whenever possible, especially in outdoor areas.
- Use digital Wireless IEM systems that are usually more tolerant to interference.
- When it is possible, do not exceed more than 4 IEM transmitters at the same transmission location to avoid any intermodulation product issues.

Other services, such as audio description and mass cast are considered as Audio PMSE systems and use frequencies identified in the following section.

## 2.4.3 FREQUENCY BANDS FOR WIRELESS MICROPHONES AND IEMS SYSTEMS

Wireless microphones/IEMs require a channel with a bandwidth of 100 – 200 kHz which is wider than other sound transmission, and therefore the spectrum bands to be assigned for those purposes are limited.

The spectrum bands usually assigned for wireless microphones/IEMs in France are White Space (WS) and guard bands of mobile phones. In WS, many of the bands are used by DVB-T and DAB+. Therefore, it would be extremely difficult to assign a frequency that does not overlap with the frequencies used for DVB-T and DAB+ to wireless microphones and IEM systems.

Table 7 shows detailed information regarding possible frequency bands assigned to wireless microphones and IEM systems as a function of the area of use.

In this table, the following legend applies:

- ✓ Available
- ✓<sup>a</sup> : Available in Île-de-France except in the south west of Paris (Château de Versailles, Élancourt Hill, Golf National, Saint-Quentin-en-Yvelines BMX Stadium and Saint-Quentin-en-Yvelines Velodrome)
- ✓<sup>c</sup> : This channel is subject to coordination
- △ Available for some spectrum (subject to the technical specifications/operating conditions)

Since the frequency’s availability depends on the area of use, a geographical division shows the venues in which the same frequency is available. However, approval of frequencies is granted on a venue-basis and not on an area-basis.

**TABLE 7: FREQUENCY BANDS TO BE ASSIGNED TO WIRELESS MICROPHONES/IEMs**

BANDS	SPECTRUM (MHZ)		ESTIMATED AVAILABLE SPECTRUM (MHZ)	TECHNICAL SPECIFICATIONS	GEOGRAPHICAL DIVISION AREAS									
	FROM	TO			CHÂTEAUROUX	PARIS IDF	LILLE	LYON	MARSEILLE	NANTES	BORDEAUX	NICE	SAINT-ÉTIENNE	TEAHUPO'O
<b>30 MHz</b>	32	39	0,45	Puissance max. d'émission : 1 mW	✓									
<b>VHF</b>	55	68	0,9 à 2 MHz	Max transmit power: 5W Channel bandwidth ≤ 100 kHz	✓									
	174	175.75	1.75	Max transmit power: 50 mW Channel bandwidth ≤ 200 kHz	✓ <sup>c</sup>			✓ <sup>c</sup>	✓ <sup>c</sup>	✓ <sup>c</sup>	✓ <sup>c</sup>		✓ <sup>c</sup>	✓ <sup>c</sup>
	175.75	177.5	1.75		✓					✓				✓
	177.5	179.25	1.75		✓					✓	✓		✓	✓
	179.25	181	1.75		✓	✓			✓		✓		✓	✓
	181	182.75	1.75		✓				✓	✓				✓
	182.75	184.5	1.75		✓			✓	✓				✓	✓
	184.5	186.25	1.75						✓	✓				✓
	186.25	188	1.75		✓				✓	✓			✓	✓
	188	189.75	1.75		✓	✓					✓		✓	✓
	189.75	191.5	1.75		✓		✓							✓
	191.5	193.25	1.75		✓					✓		✓	✓	✓
	193.25	195	1.75					✓		✓	✓	✓	✓	✓
	195	196.75	1.75			✓					✓	✓		✓

BANDS	SPECTRUM (MHZ)		ESTIMATED AVAILABLE SPECTRUM (MHZ)	TECHNICAL SPECIFICATIONS	GEOGRAPHICAL DIVISION AREAS										
	FROM	TO			CHÂTEAUROUX	PARIS IDF	LILLE	LYON	MARSEILLE	NANTES	BORDEAUX	NICE	SAINT-ÉTIENNE	TEAHUPO'O	
VHF	196.75	198.5	1.75	Max transmit power: 50 mW Channel bandwidth ≤ 200 kHz		✓		✓					✓	✓	
	198.5	200.25	1.75									✓	✓		
	200.25	202	1.75		✓	✓		✓				✓		✓	✓
	202	203.75	1.75		✓		✓	✓				✓	✓		✓
	203.75	205.5	1.75				✓	✓			✓	✓		✓	✓
	205.5	207.25	1.75				✓	✓			✓	✓		✓	✓
	207.25	209	1.75		✓		✓	✓			✓	✓		✓	✓
	209	210.75	1.75		✓			✓	✓	✓	✓			✓	✓
	210.75	212.5	1.75			✓		✓			✓	✓		✓	✓
	212.5	214.25	1.75					✓			✓	✓		✓	✓
	214.25	216	1.75						✓	✓	✓				✓
	216	217.75	1.75		✓			✓	✓			✓		✓	✓
	217.75	219.5	1.75							✓	✓	✓			✓
	219.5	221.25	1.75		✓		✓	✓			✓			✓	✓
	221.25	223	1.75		✓	✓		✓	✓	✓	✓	✓	✓	✓	✓
223	224.792	1.792	✓			✓				✓	✓	✓	✓		
226	230	4							✓						

BANDS	SPECTRUM (MHZ)		ESTIMATED AVAILABLE SPECTRUM (MHZ)	TECHNICAL SPECIFICATIONS	GEOGRAPHICAL DIVISION AREAS									
	FROM	TO			CHÂTEAUROUX	PARIS IDF	LILLE	LYON	MARSEILLE	NANTES	BORDEAUX	NICE	SAINT-ÉTIENNE	TEAHUPO'O
UHF	470	478	8	Max transmit power: 20 mW Channel bandwidth ≤ 200 kHz	✓	✓		✓						
	478	486	8		✓		✓							
	486	494	8		✓	✓ <sup>a</sup>								
	494	502	8		✓			✓	✓	✓	✓	✓	✓	✓
	502	510	8		✓		✓		✓	✓	✓			✓
	510	518	8			✓		✓		✓			✓	✓
	518	526	8		✓					✓	✓		✓	✓
	526	534	8					✓	✓	✓	✓		✓	✓
	534	542	8		✓	✓		✓			✓	✓	✓	✓
	542	550	8		✓		✓	✓					✓	✓
	550	558	8			✓		✓	✓	✓	✓	✓	✓	✓
	558	566	8		✓		✓	✓	✓	✓	✓		✓	✓
	566	574	8				✓	✓	✓	✓	✓		✓	✓
	574	582	8			✓	✓		✓		✓			✓
	582	590	8				✓	✓					✓	✓
	590	598	8		✓	✓ <sup>a</sup>			✓	✓	✓			✓
598	606	8		✓	✓	✓	✓	✓	✓		✓	✓		

BANDS	SPECTRUM (MHZ)		ESTIMATED AVAILABLE SPECTRUM (MHZ)	TECHNICAL SPECIFICATIONS	GEOGRAPHICAL DIVISION AREAS									
	FROM	TO			CHÂTEAUROUX	PARIS IDF	LILLE	LYON	MARSEILLE	NANTES	BORDEAUX	NICE	SAINT-ÉTIENNE	TEAHUPO'O
UHF	606	614	8	Max transmit power: 20 mW Channel bandwidth ≤ 200 kHz	✓	✓	✓	✓		✓	✓	✓		✓
	614	622	8			✓ <sup>c</sup>	✓ <sup>c</sup>		✓ <sup>c</sup>	✓ <sup>c</sup>			✓	✓
	622	630	8		✓	✓ <sup>a c</sup>	✓ <sup>c</sup>		✓ <sup>c</sup>	✓ <sup>c</sup>	✓ <sup>c</sup>			✓
	630	638	8			✓			✓	✓	✓ <sup>c</sup>			✓
	638	646	8		✓ <sup>c</sup>			✓ <sup>c</sup>	✓	✓	✓		✓ <sup>c</sup>	✓
	646	654	8		✓ <sup>c</sup>	✓ <sup>a</sup>				✓	✓			✓
	654	662	8			✓	✓		✓	✓	✓	✓		✓
	662	670	8			✓	✓	✓					✓	✓
	670	678	8		✓	✓ <sup>a</sup>			✓	✓	✓			✓
	678	686	8			✓			✓				✓	✓
	686	694	8			✓	✓		✓	✓	✓		✓	✓
	694	698	4							✓				
	736	753	17							✓				
	821	823	2						✓					
823	826	3	Max transmit power: 50 mW Channel bandwidth ≤ 200 kHz					✓						
826	832	6	Max transmit power: 50 mW Channel bandwidth ≤ 200 kHz					✓						

BANDS	SPECTRUM (MHZ)		ESTIMATED AVAILABLE SPECTRUM (MHZ)	TECHNICAL SPECIFICATIONS	GEOGRAPHICAL DIVISION AREAS									
	FROM	TO			CHÂTEAURoux	PARIS IDF	LILLE	LYON	MARSEILLE	NANTES	BORDEAUX	NICE	SAINT-ÉTIENNE	TEAHUPO'O
1,2 GHz	1240	1260	20	Max transmit power: 50 mW Channel bandwidth ≤ 200 kHz	△	✓	✓	△	△	△	△	✓	✓	✓
	1350	1375	9		△	△	△	△	△	△	△	△	△	△
	1375	1400												
1,5 GHz	1518	1525	7	Max transmit power: 50 mW Channel bandwidth ≤ 200 kHz Indoor only	✓									

## 2.5 WIRELESS CAMERA AND MOBILE AIRBORNE VIDEO LINKS

Approximately 200 broadcast organisations will be working at the Paris 2024 Games, and many of them will use Wireless Cameras for the purpose of transmission of video, embedded audio, and embedded control signals. These signals are digital in nature. Paris 2024 foresees that at least 100 channels for Wireless Cameras would be required and 150 channels should be prepared for a stable assignment.

However, the Wireless Camera is more sensitive to interference compared to other devices, and actual Wireless Cameras have a rather large side lobe level that affects adjacent channels, so it is foreseen that the actual frequency allocation will be exceedingly difficult.

Therefore, Paris 2024 requires the following:

- Use wired cameras whenever possible, and strictly limit Wireless Camera use only to cases where it is absolutely not possible to use a wired camera.
- Use strong filtering and dedicated frequency range antenna to avoid any high noise floor.
- To reduce interference as much as possible, operate with the minimum transmission output power.
- To adapt the bandwidth with the video quality required by the operation, Paris 2024 will apply the standard/video signal up to 10 MHz for high definition (HD) and up to 20 MHz for 4K image format.

In terms of frequency management for Paris 2024, the frequency bands identified for wireless cameras are limited to ground-based links and encompass ground-based mobile vehicular video links. Maritime stations have to be considered as ground-based stations.

In case of a ground-to-ground link, the transmission power of the wireless camera will not exceed 250 mW. Paris 2024 recommends an antenna reception height below 20 m. For mobile airborne video link, the transmission power (including the antenna gain) should be less than 10 W. The cable cameras are considered as ground based link with transmission antenna height below 20 m.

Different bands are identified for mobile airborne video links where video transmission systems employing a radio transmitter or receiver, are mounted on helicopters or other flight vehicles. This scenario encompasses equipment that is used by the Host Broadcaster, by the MRH, and by timing systems. It will be used to connect embarked cameras (motorcycle, helicopter, car, or boat) to a relay-plane. From the relay-plane, the signal will be transmitted to a receiving station deployed at the IBC or at the finish line of mobile events such as road cycling, time trial, marathon, triathlon, race walk, or sailing.

The following frequency bands for wireless cameras and mobile airborne video links are proposed: see table 8.

**TABLE 8: FREQUENCY BANDS TO BE ASSIGNED TO WIRELESS CAMERA AND MOBILE AIRBORNE VIDEO LINKS**

FREQUENCY BANDS	TECHNICAL SPECIFICATIONS		ESTIMATED AVAILABLE SPECTRUM (MHZ)	COORDINATION CONSTRAINTS
	DIRECTION	MAX TRANSMIT POWER		
<b>1300 –1350 MHz</b>	Ground to ground Air to ground Ground to air	For G-G link: 250 mW For G-A or A-G: 10 W	From 20 to 50 MHz	Available for ground to ground link with coordination. Ground to air link available in 1300- 1310 MHz
<b>1427 –1518 MHz</b>	Ground to ground Air to ground		90 MHz	Air to ground link is limited to 1447 – 1518 MHz band. Coordination with fixed use at Teahupo'o The Band 1508- 1518 MHz is not available close to airport departure areas (< 1km).
<b>1525 –1559 MHz</b>	Ground to ground Ground to air		34 MHz	Not available at Nantes venue. Coordination with INMARSAT use at airports CDG, Orly, Le Bourget, Bordeaux, Marseille, Nice, Lyon, and Lille.
<b>1613.8 –1660 MHz</b>	Ground to ground Air to ground		46.2 MHz	Not available at Nantes
<b>1675 –1705 MHz</b>	Ground to ground Air to ground Ground to air	For G-G link: 250 mW For G-A or A-G: 10 W	30 MHz	For air to ground link, constraint of emission altitude at 150 m at Nantes and Teahupo'o.
<b>1785 –1805 MHz</b>	Ground to ground Air to ground Ground to air		20 MHz	Not available at Bordeaux, Nantes, Marseille and Nice.
<b>1980 –2010 MHz</b>	Ground to ground Air to ground		From 15 to 30 MHz	15 MHz for air to ground link. 30 MHz for ground to ground link with coordination with mobile satellite.
<b>2010 –2025 MHz</b>	Ground to ground Air to ground Ground to air		15 MHz	
<b>2025 – 2110 MHz</b>	Ground to ground Air to ground		40 MHz	Wireless camera reception antenna should not be installed close to 3G, 4G operator's antennas.
<b>2170 – 2200 MHz</b>	Ground to ground Ground to air		15 MHz	
<b>2200 – 2290 MHz</b>	Ground to ground Air to ground Ground to air	For G-G link: 250 mW or G-A or A-G: 10 W	40 MHz	Not available at Bordeaux, Marseille and Nice Air to ground link under constraint of 150 m altitude limit
<b>2290 – 2310 MHz</b>	Ground to ground Air to ground Ground to air		20 MHz	Not available at Bordeaux

FREQUENCY BANDS	TECHNICAL SPECIFICATIONS		ESTIMATED AVAILABLE SPECTRUM (MHZ)	COORDINATION CONSTRAINTS
	DIRECTION	MAX TRANSMIT POWER		
<b>2310 – 2400 MHz</b>	Ground to ground Air to ground Ground to air	For G-G link: 250 mW or G-A or A-G: 10 W	30 MHz	Not available at Bordeaux, Marseille and Nice.
<b>2400 – 2483.5 MHz</b>	Ground to air		83.5 MHz	
<b>2483.5 – 2500 MHz</b>	Ground to ground	250 mW	16.5 MHz	
<b>2570 – 2620 MHz</b>	Ground to ground	250 mW	up to 50 MHz	Spectrum availability depending on the venues. Coordination with Arcep local authorisations should be ensured. Reception antenna height of 10 m is recommended in venues situated in the north of Paris. Wireless camera reception antenna should not be installed close to 4G operator's antennas.
<b>2700 – 2900 MHz</b>	Ground to ground		From 90 to 190 MHz	Spectrum availability depends on the venue. Maximum transmission antenna high is set to 2 m.
<b>3400 – 3490 MHz</b>	Ground to ground		From 40 to 90MHz	Spectrum availability depends on the venue. Subject to coordination with fixed broadband assignments authorized in certain departments. Not available at Teahupo'o Only indoor use at Lille venue. Wireless camera reception antenna should not be installed close to 5G operator's antennas.
<b>3800 – 3900 MHz &amp; 4000 - 4200 MHz</b>	Ground to ground		From 200 to 300 MHz	Not available for cable cam use. In 3800- 3840 MHz band, wireless camera reception antenna should not be installed close to 5G operator's antennas.
<b>4400 – 4990 MHz</b>	Ground to ground		From 10 to 50 MHz	Some frequencies may be subject to compatibility with other domestic users.
<b>5091 – 5150 MHz</b>	Ground to ground		59 MHz	Some frequencies may be subject to compatibility with other domestic users at Marseille, Nantes and Bordeaux.
<b>5850 – 5875 MHz</b>	Ground to ground		25 MHz	Might experience interference by SRD
<b>6425 – 7115 MHz</b>	Ground to ground		From 440 to 690 MHz	Subject to coordination with fixed links. Availability depends on the venues. Not available at Châteauroux venue.
<b>7115 – 7250 MHz</b>	Ground to ground Air to ground		135 MHz	
<b>7750 – 7900 MHz</b>	Ground to ground Air to ground		For G-G link: 250 mW For G-A or A-G: 10 W	From 70 to 150 MHz For air to ground link, 70 MHz are available in the Paris area and 150 MHz under emission altitude limitation conditions This band is not available for air to ground link in the Nantes venue. Additional restriction at the Marseille venues.

# 2.6 MICROWAVE TRANSPORTABLE POINT-TO-POINT LINK

Frequency bands identified for transportable point-to-point links allow to implement temporary links between two fixed points (e.g. part of a link between an outside broadcasting site and a studio), used for carrying broadcast quality video/audio signals. These bands are not available for wireless cameras and mobile airborne links. Link terminals are mounted on tripods, temporary platforms, purpose-built vehicles or hydraulic hoists. Two-way links are often required. The equipment supporting these links is transportable and the Tx/Rx coordinates are not known beforehand.

A frequency assignment delivered for transportable point-to-point links defines the geographical area where transmitters and receivers may be installed. The frequency authorisation process does not involve coordination between different temporary links.

The following frequency bands for temporary point-to-point video links are proposed:



**TABLE 9: FREQUENCY BANDS TO BE ASSIGNED TO MICROWAVE TRANSPORTABLE POINT TO POINT LINKS**

FREQUENCY BANDS (GHZ)	GEOGRAPHICAL AREA	TECHNICAL SPECIFICATIONS	COORDINATION CONSTRAINTS
21	Metropolitan France	14 x 28 MHz channels (central frequencies: 21 413 MHz, 21 441 MHz, 21 469 MHz, 21 497 MHz, 21 525 MHz, 21 553 MHz, 21 581 MHz, 21 805 MHz, 21 833 MHz, 21 861 MHz, 21 889 MHz, 21 917 MHz, 21 945 MHz & 21 973 MHz)	
22		4 x 28 MHz channels (central frequencies: 22 716.75 MHz, 22 744.75 MHz, 22 968.75 MHz & 22 996.75 MHz) or 8 x 14 MHz channels (central frequencies: 22 709.75 MHz, 22 723.75 MHz, 22 737.75 MHz, 22 751.75 MHz, 22 961.75 MHz, 22 975.75 MHz, 22 989.75 MHz & 23 003.75 MHz)	
38		6 x 28 MHz channels (central frequencies: 38 150 MHz, 38 178 MHz, 38 206 MHz, 39 410 MHz, 39 438 MHz & 39 466 MHz) 12 x 14 MHz channels (central frequencies: 38 143 MHz, 38 157 MHz, 38 171 MHz, 38 185 MHz, 38 199 MHz, 38 213 MHz, 39 403 MHz, 39 417 MHz, 39 431 MHz, 39 445 MHz, 39 459 MHz & 39 473 MHz)	
22	Tahiti		
37			
39			
24	Metropolitan France and Tahiti	Max transmit power: 100 mW	
60		Max transmit power: 55 dBm, Requirements regarding techniques to access spectrum and mitigate interference apply from 57 to 71GHz	

# 2.7 MICROWAVE FIXED POINT-TO-POINT LINK

A frequency assignment delivered for implementing a fixed point-to-point microwave link allows the use of a frequency channel to connect two stations operating at fixed known locations.

Channel bandwidth and transmission power vary depending on the mode of use of each radio. The assigned channel will be determined from the frequency range that meet the requirements of each individual application and usually require link by link frequency coordination.

The following frequency bands for fixed point-to-point links are proposed (see Table 10):

**TABLE 10: FREQUENCY BANDS TO BE ASSIGNED TO MICROWAVE FIXED POINT-TO-POINT LINKS**

FREQUENCY BANDS (GHZ)	LOWER BANDS (GHZ)		UPPER BANDS (GHZ)		TECHNICAL SPECIFICATIONS
	FROM	TO	FROM	TO	
<b>8</b>	8.064	8.246	8.272	8.454	See channel plans 8A / 8B / 8C / 8D for 3,5 / 7 / 14 / 28 MHz channels in Arcep decision n°2017-1332 (Annex 6) Max transmit power: 70 dBm
<b>18</b>	17.7	18.69	18.71	19.7	See channel plans 18A / 18B / 18C for 13,75 / 27,5 / 55 110 MHz channels in Arcep decision n°2017-1332 (Annex 9) Max transmit power: 70 dBm Automatic transmit power control (ATPC)
<b>23</b>	22.00275	22.59074	23.01076	23.59875	See channel plans 23A / 23B / 23C / 23D / 23E for 3,5 / 7 / 14 / 28 / 56 MHz channels in Arcep decision n°2017-1332 (Annex 10) Max transmit power: 70 dBm Automatic transmit power control (ATPC)
<b>32</b>	31.8	32.571	32.627	33.4	See channel plans 32A / 32B for 56 / 112 MHz channels in Arcep decision n°2017-1332 (Annex 12) Max transmit power: 70 dBm Automatic transmit power control (ATPC)
<b>38</b>	37.268	38.25	38.528	39.5	See channel plans 38A / 38B / 38C / 38D / 38E / 38F for 3,5 / 7 / 14 / 28 / 56 / 112 MHz channels in Arcep decision n°2017-1332 (Annex 13) Max transmit power: 70 dBm Automatic transmit power control (ATPC)
<b>70-80</b>	71	76	81	86	See channel plans 70-80 A / B / C / D / E / F / G / H for 62,5 / 125 / 250 / 500 / 750 / 1000 / 1250 / 2000 MHz channels in Arcep decision n°2017-1332 (Annex 14) Max transmit power: 75 dBm



Laurence Griffiths/Getty images

## 2.8 PERMANENT AND TRANSPORTABLE SATELLITE EARTH STATION

This equipment is used to convey audio and video signals during external reporting to studios, or directly to national and international broadcasting networks as Satellite News Gathering (SNG) services.

Permanent satellite services may be Permanent Satellite Earth Stations installed in a known location such as a satellite farm near the IBC or Transportable Satellite Earth Stations installed in the TV compound inside venues – communicating with a satellite located in a geostationary orbit.

Transportable satellite services are an uplink between an earth station, Hub or VSAT and a satellite, used for transmitting broadcast quality video/audio and data signals in KU/KA Bands.

Optical fibers can replace the aforementioned satellite communication. Several venues for Paris 2024 Games are expected to be equipped with optical fiber facilities.

The frequency band 10.7 – 11.7 GHz is used by fixed links in France. Hence, requests in this frequency range will induce a coordination procedure with detailed technical parameters.

Table 11 shows detailed information regarding possible frequency bands to be assigned to fixed or transportable earth stations:

**TABLE 11: FREQUENCY BANDS TO BE ASSIGNED TO FIXED AND TRANSPORTABLE EARTH STATIONS**

BAND NAME	EARTH TO SPACE (GHZ)	SPACE TO EARTH (GHZ)	COORDINATION CONSTRAINTS
<b>Ku band</b>	14 –14.5 12.75 – 13.25	10.7 – 11.7 12.5 – 12.75	Coordination with local fixed link installation is needed in 10.7 – 11.7 band at Élancourt, Lille, Lyon, Saint-Etienne, Bordeaux, and Nice.
<b>Ka band</b>	27.5 –27.9405 28.1925 – 28.9485 29.2005 – 30	17.3 – 17.7 19.7 – 20.2	

## 2.9 WIRELESS LAN (ACCESS POINT)

Wireless LAN is a licence-exempt small-scale, large-capacity wireless system used to access the Internet. In all venues, **only Wireless LAN which has been installed by Paris 2024 is allowed.**

**The deployment of additional private Wireless LAN services will only be allowed by Paris 2024 when it is absolutely necessary for the operation of the Games** and shall not cause interference with the partner’s Wireless LAN devices and extra Wireless LANs.

Table 12 summarizes the frequency bands identified for operation of Wireless LAN (access points) on a licence-exempt basis:

**TABLE 12: FREQUENCY BANDS FOR LICENCE-EXEMPT WIRELESS LAN**

FREQUENCY BANDS (MHZ)	TECHNICAL SPECIFICATIONS		COORDINATION CONSTRAINTS
	MAX TRANSMIT POWER	MAX TRANSMIT POWER	
2400 – 2483.5	100 mW	Dynamic Frequency Selection (DFS) and Transmitter Power Control (TPC)	Risk of interference by ground to air wireless camera in road events.
5150 – 5350	200 mW Indoor use only	Dynamic Frequency Selection (DFS) and Transmitter Power Control (TPC) are required in band 5250-5350 MHz	Available only in venues where there is no OCOG network deployed; or exceptional usage for Games operation under cohabitation studies.
5470 – 5725	1 W	Dynamic Frequency Selection (DFS) and Transmitter Power Control (TPC) are required in band 5250-5350 MHz	Dynamic Frequency Selection (DFS) and Transmitter Power Control (TPC) are required in band 5250-5350 MHz
5945 – 6425	200 mW Indoor use only	Low Power Indoor (‘LPI’) devices. Requirements regarding techniques to access spectrum and mitigate interference apply.	Low Power Indoor (‘LPI’) devices. Requirements regarding techniques to access spectrum and mitigate interference apply.



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## 2.10 WIRELESS RELEASE TRIGGER

The Wireless Release Trigger is a device with the function of transmitting a control signal to turn on/off the release of a digital still camera. Setting data for the release (exposure control setting, aperture value, etc.) and strobe synchronisation are all included in the control signal to turn on/off the release.

Table 13 summarises the frequency bands identified for operation of wireless release triggers on a licence-exempt basis: this equipment **operates without protection from interference and is not allowed to create interference with individually authorised spectrum users.**

This equipment and the bands proposed are here to highlight where there is available spectrum. The Wireless release triggers must use the bands described in Table 13.

**Authorised wireless release triggers will not require an application through the Spectrum Order Portal. However, it should be noted that channel assignments will be coordinated by Paris 2024 within each venue.**

**TABLE 13: FREQUENCY BAND FOR LICENCE-EXEMPT WIRELESS RELEASE TRIGGERS**

FREQUENCY BANDS (MHZ)	ESTIMATED SPECTRUM AVAILABLE (MHZ)	TECHNICAL SPECIFICATIONS		COORDINATION CONSTRAINTS
		MAX TRANSMIT POWER	ADDITIONAL PARAMETERS	
345.35 – 350.25	2.5	1 mW		
433.05 – 434.79	1.74	1 mW		
		10 mW	Duty cycle limit : 10 %	
2400 – 2483.5	83.5	100 mW.		

## 2.11 OTHER SERVICES

All other wireless equipment that is not included in the above types, such as speed guns operating at 34.7 GHz, must follow the application process as a regular spectrum application and gain approval from Paris 2024 before use. This equipment must be tested and tagged prior to any use in the venues and all other locations.

**Other services will be treated on a case-by-case basis if they constitute a critical necessity for the Games.**

Drone usage will not be considered as such. Corresponding frequency requirements shall be met in frequency tables above related to telemetry/ telecommand and wireless camera and mobile airborne links by adding usage specification (e.g., video link for drone) in the remarks column.



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CHAPTER  
3

# SPECTRUM POLICIES



# 3.1 SPECTRUM BOOKING PORTAL: APPLICATION PROCESS

Additional documents will be provided on the Paris 2024 website:

- **Spectrum Application Guide:** Information on spectrum applications and the licences required for the use of radio equipment during the Games. [publication in January 2023]
- **Spectrum Booking Portal User Manual:** Instructions on how to make a spectrum request on the Spectrum Booking Portal. [publication in January 2023]
- **Spectrum Testing and Tagging Guide:** Description of all procedures for Testing the provisionally approved radio equipment and for receiving tags. [publication in January 2024]

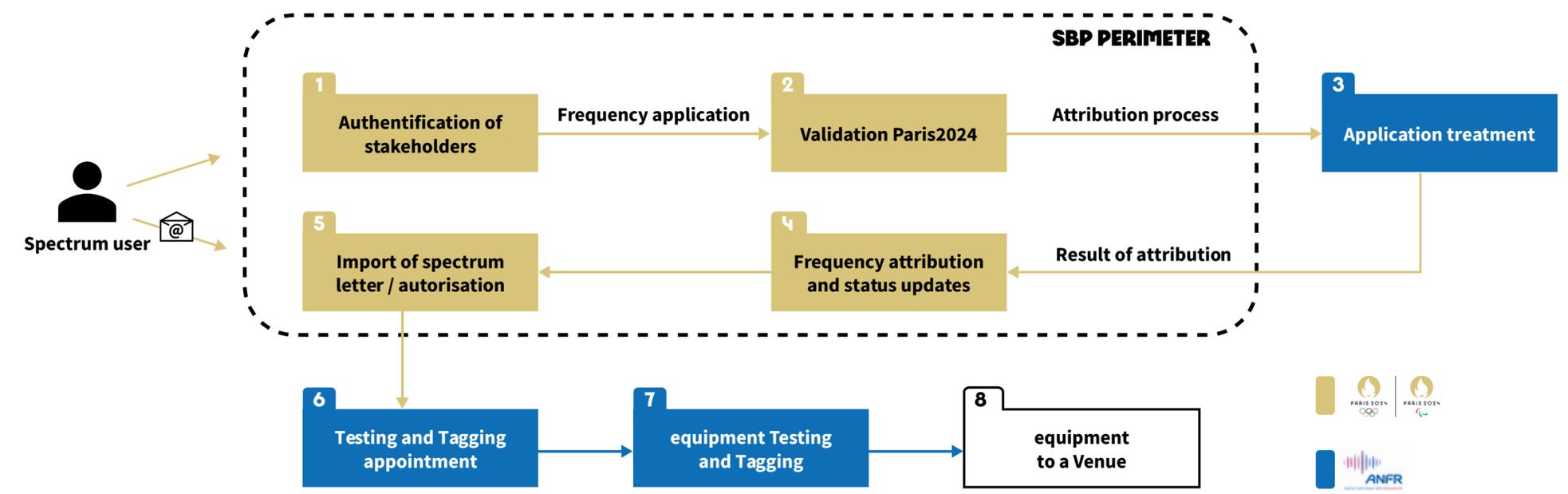
## 3.1.1 SPECTRUM APPLICATION PROCEDURE

All Spectrum applications must be submitted through the Spectrum Spectrum Booking Portal (SBP – frequency application website).

The SBP is expected to be online in February 2023.

The overall flow from the frequency application until the entry of wireless equipment into the venue is shown in Figure 1.

FIGURE 1: SPECTRUM BOOKING PORTAL – GENERAL PROCESS



### 3.1.2 SPECTRUM APPLICATION SCHEDULE

There are three stages in the frequency application schedule for the Games:

- It is strongly recommended that users complete the **frequency application as early as possible** in the **Normal Application Period**.
- Frequency resource is limited for some services, thus **the probability to obtain the desired frequency is lower during Late Application Period**.
- **Extraordinary Application Period is only used for emergency applications** for important frequency demands required for the Games, without perturbing the normal progress of all deployed equipment. Most of the frequencies will already have been allocated at this stage. Therefore, it is not recommended to submit an application during this period.

TABLE 14: SPECTRUM APPLICATION SCHEDULE

PLANNING SOP PARIS 2024	REQUEST SUBMISSION (END USER)	NOTIFICATION (LETTER/NOTIFICATION SENT BY P24)
<b>Normal Application</b>	15 February 2023 → 31 July 2023	From 22 January 2024
<b>Late Application</b>	11 September 2023 → 14 January 2024	From 22 April 2024
<b>Extraordinary Application</b>	1 February 2024 → 6 September 2024	From 1 May 2024

### 3.1.3 SPECTRUM SUBMISSION

Spectrum users can either make a **single application** on the portal or make multiple applications by uploading a spreadsheet via the SBP.

This spreadsheet can be downloaded from the SBP.



Harry How/Getty Images

### 3.1.4 SPECTRUM CHARACTERISTICS

Some important parameters must be specified to fulfil a spectrum application, such as:

- Periods/dates
- Spectrum service
- Location
- Equipment tuning range
- Channel bandwidth
- Tuning step
- Transmission power
- Equipment manufacturer
- Amount of equipment

Further details and information will be given in the Spectrum Application Guide in January 2023.

### 3.1.5 APPLICATION TREATMENT

Once the application has been validated by Paris 2024, all demands will be sent to ANFR for coordination and attribution. All technical analysis will be done at this stage in order to attribute the right frequency depending on the service.

The proposed Spectrum Management Plan takes into account the other domestic frequency users in France (military, civil aviation, radioastronomy, etc.) that already have their part of the French spectrum.

Before the notification period, if necessary, Paris 2024 and ANFR will communicate with the users through the SBP, or the email submitted at registration.

## 3.2 SPECTRUM TESTING AND TAGGING

The Testing and Tagging (T&T) procedure consists of testing users' equipment that must comply with all features detailed in the frequency authorisation granted by ANFR. Upon compliance, each device will receive a tag that allows the use of the device according to its area of operation during the Games.

Further information will be shared in the "Spectrum Testing and Tagging Guide" published in January 2024.

### 3.2.1 TESTING PRINCIPLE

After obtaining the spectrum application approval letter from Paris 2024 and ANFR, the spectrum user is required to have the radio equipment tested before using it in its area of operation.

As all wireless equipment requires a frequency application through the SOP and the T&T process, the number of appointments is expected to be high during the period leading up to the Games. T&T appointments should be arranged **as early as possible** to allow users plenty of time to have all their equipment tested.

Spectrum users are recommended to ensure that their radio equipment has been configured with the attributed frequency, power, bandwidth and other technical parameters before coming to the appointment.

If there is a possibility that the technical parameters of the wireless transmitting equipment need to be changed, spectrum users should prepare and carry the required tools with them.

### 3.2.2 TESTING LOCATION

For Île-de-France (Paris and its suburban area), Testing & Tagging Desks will be set up only at the International Broadcast Centre (IBC), the Main Press Centre (MPC) and the Olympic and Paralympic Village.

At all competition venues outside Île-de-France, a T&T Desk will be located near or within the venue.

Roaming T&T teams will be deployed exclusively in case of needing to tag large quantities of equipment, equipment stored in warehouses, equipment integrated in bikes/cars/trucks/boats/helicopters/planes, as well as for satellite equipment.

More details on the location and opening dates/hours will be given in the Spectrum Testing and Tagging Guide, in January 2024.

### 3.2.3 TAGGING PRINCIPLE

A tag issued by Paris 2024/ANFR will be visibly applied on the radio equipment once it has passed the test. All radio equipment must have the tag to enter its area of operation during the Games.

Non-compliant equipment will get a distinctive tag, to prohibit it from being used.

Security staff will inspect equipment at the entrance of all venues to ensure only authorised/tagged wireless equipment is permitted to enter the venue. Unauthorised equipment will be subject to removal and may be confiscated by security.





Maja Hitij/Getty Images

## 3.3 SPECTRUM MONITORING

ANFR will conduct radio spectrum monitoring with the cooperation of Paris 2024 in order to secure spectrum for wireless equipment used for the Games, as well as to exclude interference and improper use. Paris 2024 requests spectrum users to cooperate in securing an interference-free spectrum environment for the Games.

ANFR will deploy **radio monitoring teams** on all venues to ensure that all radio equipment has the correct tag, and will monitor spectrum on each venue with portable-monitoring-directive spectrum analysers.

All spectrum users should actively cooperate with Paris 2024 and ANFR to ensure that no harmful interference will impact the spectrum services of the Games. ANFR monitoring teams will thus act in order to locate and manage any issues in order to ensure normal operation of the competition.

If any wireless equipment may have a negative impact on the Paris 2024 Games or endanger national security, public safety, life and property safety, the spectrum user should take immediate measures to change frequency or turn off the equipment.

If the spectrum user refuses to switch off the equipment, Paris 2024 will request that the IOC/IPC suspend their accreditation.

The competition venues and main non-competition venues will also be monitored from the remote monitoring control room.

The ANFR will execute spectrum usage monitoring and enforcement actions in the areas where Games-related activities will be held. This will be done in order to identify pre-emptively any possible cases of harmful interference with systems expected to be used during the event, and to take preventative action accordingly.

Paris 2024 and ANFR have in place guidelines for interference management processes by which they manage spectrum interferences for all its spectrum users.

The mission of ANFR in terms of interference handling is defined in L40 and L43 of the French CPCE (Code des Postes et des Communications Électroniques). Criminal sanctions regarding interference are defined in articles L39-1 of CPCE.



Julian Finney/Getty Images

CHAPTER  
4

LOCATION  
OF THE VENUES

# OLYMPIC COMPETITION VENUES MASTER PLAN

## France



## Overseas

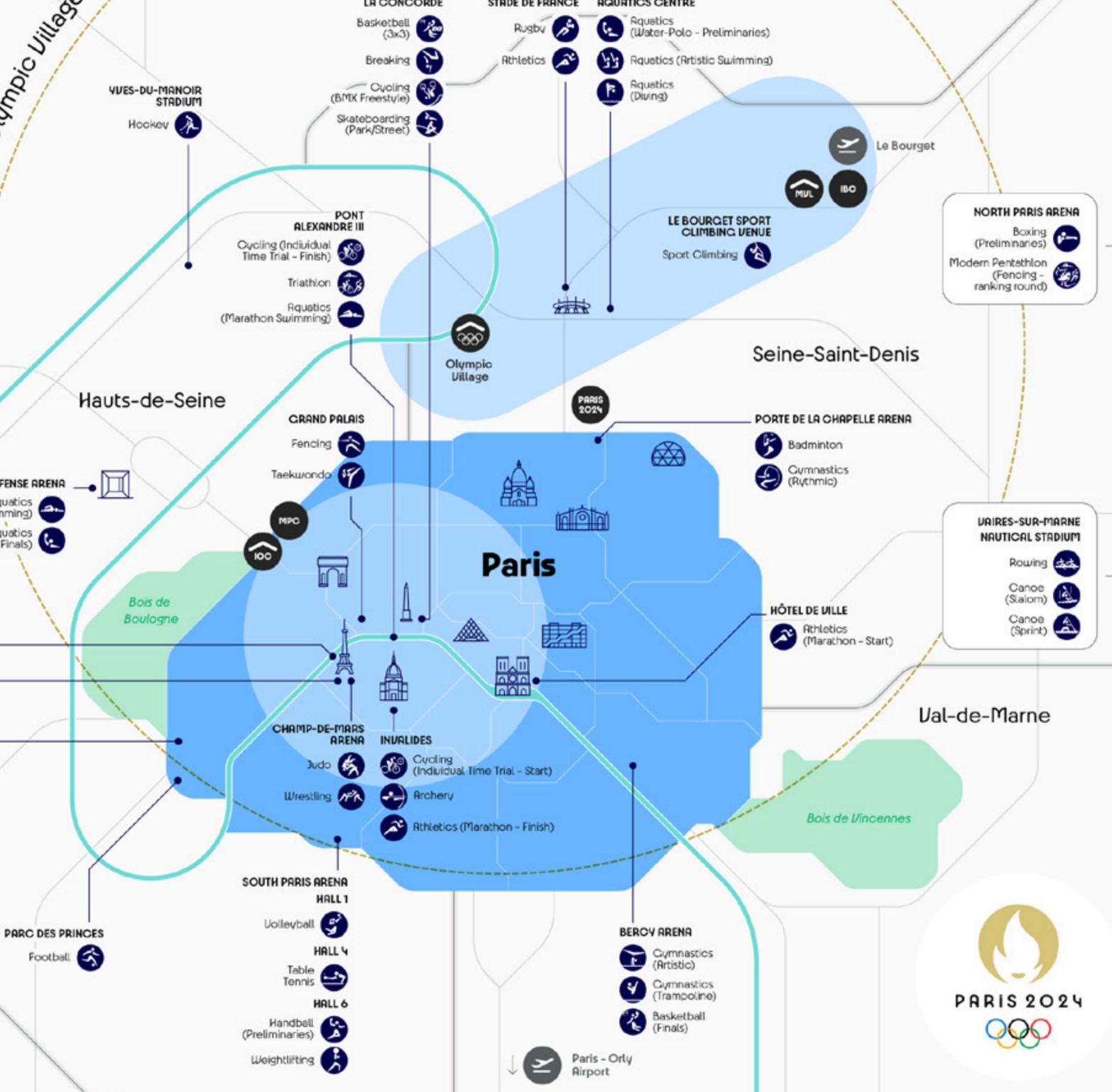


10 km from the Olympic Village

— Department boundaries  
 ■ Arrondissement boundaries  
 — Main roads



<b>ELANCOURT HILL</b> Cycling (Mountain Bike)	<b>SAINT-QUENTIN-EN-YVELINES VELODROME AND BMX STADIUM</b> Cycling (Track) Cycling (BMX Racing)	<b>GOLF NATIONAL</b> Golf	<b>CHÂTEAU DE VERSAILLES</b> Equestrian (Jumping) Equestrian (Dressage) Equestrian (Eventing) Modern Pentathlon
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# PARALYMPIC COMPETITION VENUES MASTER PLAN

## France



CHATEAUROUX SHOOTING CENTRE  
Shooting Para Sport

10 km from the Paralympic Village

Hauts-de-Seine

Seine-Saint-Denis

Val-de-Marne

- Department boundaries
- Arrondissement boundaries
- Main roads

SAINT-QUENTIN-EN-YVELINES VELODROME AND BMX STADIUM  
Para Cycling (Track)

CHATEAU DE VERSAILLES  
Para Equestrian (Dressage)

ROLAND-CARROS STADIUM  
Wheelchair Tennis

GRAND PALAIS  
Wheelchair Fencing  
Para Taekwondo

EIFFEL TOWER STADIUM  
Blind Football

PARIS LA DEFENSE ARENA  
Para Swimming

CHAMP-DE-MARS ARENA  
Para Judo  
Wheelchair Rugby

INVALIDES  
Para Archery  
Para Athletics (Marathon - Finish)

SOUTH PARIS ARENA  
HALL 1  
Boccia  
HALL 4  
Para Table Tennis  
HALL 6  
Goalball

BERCY ARENA  
Wheelchair Basketball

PORTE DE LA CHAPELLE ARENA  
Para Badminton  
Para Powerlifting

STADE DE FRANCE  
Para Athletics

LA COURNEUVE  
Para Athletics (Marathon - Start)  
MUL  
IBO

PONT ALEXANDRE III  
Para Triathlon

NORTH PARIS ARENA  
Sitting Volleyball

CLICHY-SOUS-BOIS  
Para Cycling (Road)

VAIRES-SUR-MARNE NAUTICAL STADIUM  
Para Rowing  
Para Canoe (Sprint)

Paris - Charles De Gaulle Airport

Le Bourget

Paris - Orly Airport



# Contact

Further details and updated information will be published on the official website of Paris 2024.

If there are questions about the Spectrum Management Plan, the frequency application process or the Testing and Tagging process, please contact Paris 2024 via e-mail at the following address:

[spectrum@paris2024.org](mailto:spectrum@paris2024.org)



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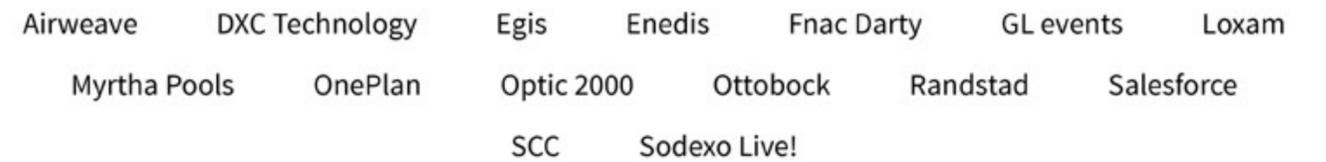
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