EUROPEAN RADIOCOMMUNICATIONS COMMITTEE

ERC Decision of 10 March 1999 on the harmonised introduction of satellite personal communication systems operating in the bands below 1 GHz (S-PCS<1GHz)

(ERC/DEC/(99)06)

latest updated 6 March 2026

EUROPEAN CONFERENCE OF POSTAL AND TELECOMMUNICATIONS ADMINISTRATIONS

EXPLANATORY MEMORANDUM

1 INTRODUCTION

A limited number of new satellite systems within the mobile satellite service (MSS) have been introduced in the bands below 1 GHz, starting by the year 1998.
Other similar satellite systems are planned.
They offer services such as low bit rate data communications, messaging, position determination and other non voice applications for individual users, providing global coverage.
These satellite systems are identified as "S-PCS below 1GHz" (S-PCS<1GHz systems).

2 BACKGROUND

According to the Radio Regulations, the bands 137-137.025 MHz, 137.175-137.825 MHz and 400.15-401 MHz (space-to-Earth), and 148-149.9 MHz, 149.9-150.05 MHz, 399.9-400.05 MHz and 406-406.1 MHz (Earth-to-space), are allocated to the mobile satellite service on a primary basis and the bands 137.025-137.175 MHz, 137.825-138 MHz and 387-390 MHz (space-to-Earth) and 312-315 MHz (Earth-to-space) are allocated to the mobile satellite service on a secondary basis. The bands 235-322 MHz (space-to-Earth, Earth-to-space) and 335.4-399.9 MHz (space-to-Earth, Earth-to-space) are also allocated by Footnote S5.254 to the mobile satellite service under Article S9.21.

At present, some S-PCS<1GHz systems are already in operation and plan to start full commercial service in the very near future, other S-PCS<1GHz systems, some of which may be operated in the same bands, are at various stages of design and implementation.

3 REQUIREMENTS FOR AN ERC DECISION

The ERC recognises that a procedure for a harmonised introduction of S-PCS<1GHz systems will be of benefit to the operators as well as the users of these mobile earth stations (MESs). A commitment by CEPT members to implement the ERC Decision as described in this document will provide a clear indication that S-PCS<1GHz systems will be introduced in CEPT countries in a harmonised manner.

4 SCOPE OF THE ERC DECISION

The conditions for introduction of S-PCS<1GHz systems need to be harmonised in Europe to ensure maximum spectrum efficiency, maximum protection for terrestrial services as provided by the Radio Regulations and maximum competition.

This ERC Decision provides a procedure for the harmonised introduction of S-PCS<1GHz systems within CEPT countries, including principles and criteria for the identification of spectrum to be used by the MESs, as well as technical and operational constraints for each S-PCS<1GHz system to be introduced.
The aim of this Decision is to provide a common approach for CEPT Administrations and a procedure, based on a case-by-case analysis:

- to identify the bands below 1 GHz for the Mobile Earth Stations (MESs) of individual S-PCS<1GHz systems;
- to establish technical and operational constraints, related to the specific type of S-PCS<1GHz system, for the use of frequencies by the MESs, in order to ensure the compatibility with terrestrial services and among S-PCS<1GHz systems;
- to enhance the possibility of competition among different systems and technologies, indicating criteria for competitive entry for future S-PCS<1GHz systems to be brought into operation in the same bands of S-PCS<1GHz systems already in operation or in different bands, giving due consideration to the technical sharing issues and spectrum availability and to the principle of "first come – first served";
- to adopt a due diligence procedure through a "milestone evaluation process" in order to remove "paper satellites".

This Decision includes three Annexes:

Annex 1: List of candidate systems; i.e. systems notified to the ITU and of interest of at least one CEPT Country;
Annex 2: List of systems which satisfy all the conditions of the Decision with regard to compatibility, have made the successful launch and in orbit deployment of the first satellite, and are therefore to be considered by CEPT Administrations for introduction. Systems may be added to this list in accordance with the Decision.
Annex 3: Milestones for due diligence criteria.

This Decision places the evaluation of milestones compliance under the competence of ERC, on the basis of declarations by Administrations. Nevertheless, should the CEPT adopt provisions to include S-PCS<1GHz in the mandate of the Milestones Review Committee for S-PCS above 1 GHz or decide to put the evaluation of milestones compliance for S-PCS<1GHz systems under the responsibility of a specific competent body, this Decision takes into account those possibilities and no revisions are needed.

In order to establish a level playing field for open competition, no priority order is recognised among systems meeting all the conditions to entry Annex 2 and all the milestones at different points in time but before 1 January 2002.

By that date, this Decision shall be reviewed by the ERC, in the light of the progress made by systems toward implementation and the requests for spectrum appearing in Annex 1, with a view to making adjustments, as necessary.

The Annexes to this Decision may be reviewed by the ERC upon requests from Administrations willing either to introduce new S-PCS<1GHz systems or to amend the existing entries for S-PCS<1GHz systems.

This ERC Decision does not relate to the adoption of MES technical standards or to the free circulation and use of MESs.

5 THE ADOPTION OF THE DECISION

Administrations which have committed to implement this Decision are expected to consider introduction of S-PCS<1GHz systems and the authorisation of the use of the frequencies in their territory for the MESs of such systems following the procedure and under the conditions identified by this Decision.
Administrations which have committed to implement this Decision must communicate the national measures used to implement the Decision to the ERC Chairman and the ERO when it is nationally implemented.

ERC Decision
of 10 March 1999
on the harmonised introduction of satellite personal communication systems operating in the bands below 1 GHz (S-PCS<1GHz), amended on 20 November 2020, amended on 5 March 2021, amended on 2 July 2021, amended 1 March 2022, amended 1 July 2022, updated 10 March 2023, updated 8 March 2024, updated 7 March 2025 and latest updated 6 March 2026

(ERC/DEC/(99)06)

"The European Conference of Postal and Telecommunication Administrations,

considering:

a) that the frequency bands 137-137.025 MHz, 137.175-137.825 MHz and 400.15-401 MHz (space-to-Earth), and 148-149.9 MHz, 149.9-150.05 MHz, 399.9-400.05 MHz and 406-406.1 MHz (Earth-to-space) are allocated to the mobile satellite service on a primary basis and that the bands 137.025-137.175 MHz, 137.825-138 MHz and 387-390 MHz (space-to-Earth) and 312-315 MHz (Earth-to-space) are allocated to the mobile satellite service on a secondary basis;

b) that the use of the frequency bands mentioned in c*onsidering a)* above (except the band 406-406.1 MHz) is subject to coordination under Resolution 46 (Rev. WRC-97)/S9.11A;

c) that the frequency bands 235-322 MHz and 335.4-399.9 MHz are also allocated by the Radio Regulations No.S5.254 to the mobile satellite service;

d) that the use of the frequency bands mentioned in c*onsidering c)* above is subject to coordination under Art.S9.21;

e) that ERC Report 25 identifies the band 225-399.9 MHz as harmonised military band;

f) that the use of the frequency 243 MHz is subject to the RR No. S.5.256;

g) that the use of the frequency band 406-406.1 MHz by the mobile satellite service is limited to low power satellite emergency position-indicating radiobeacons;

h) that the use of the frequency band 137-138 MHz is subject to the provisions of the RR No. S5.206 (different category of service);

i) that the use of the frequency band 148 - 149.9 MHz is subject to the provisions of the RR No. S5.219;

j) that the RR No. S5.221 requires that stations of the mobile satellite service in the band 148 - 149.9 MHz shall not cause harmful interference to or claim protection from stations of the fixed or mobile services in the countries listed therein;

k) that the RR No. S5.208A requires that in making assignments to space stations in the mobile satellite service in the bands 137 - 138 MHz, 387 - 390 MHz and 400.15 - 401 MHz, Administrations shall take all practicable steps to protect the radio astronomy service in the bands 150.05 - 153 MHz, 322 - 328.6 MHz, 406.1 - 410 MHz and 608 - 614 MHz from harmful interference from unwanted emissions;

l) that the use of the frequency bands 149.9-150.05 MHz and 399.9-400.05 MHz is subject to the provisions of R.R. Nos. S5.220, S5.224A and S5.224B;

m) that the use of the frequency bands 137-138 MHz, 148-150.05 MHz, 399.9-400.05 MHz and 400.15-401 MHz by the mobile satellite service is limited to non-geostationary satellite systems;

recognising:

a) that some mobile satellite systems providing low bit rate data communication with global coverage, identified as S-PCS<1GHz systems, are currently capable of providing commercial service within the CEPT countries;

b) that the bands below 1 GHz are extensively used by many services, although the extent to which they are used varies throughout CEPT countries;

c) that future S-PCS<1GHz systems should not inhibit the introduction in CEPT countries of S-PCS<1GHz systems which are able to commence commercial service at an earlier date;

d) that the use of frequencies by the mobile earth stations (MESs) should be subject to compliance with certain technical constraints, related to the specific S-PCS<1GHz system, in order to ensure the compatibility with terrestrial services and other S-PCS<1GHz systems;

e) that there is a need to make provisions for competitive entry for future S-PCS<1GHz systems that may be brought into operation in the same bands as S-PCS<1GHz systems already in operation or in different bands, giving due consideration to spectrum availability and technical sharing issues;

f) the establishment of milestone criteria will allow the monitoring and evaluation of the progress of a satellite system towards the offering of service, so that only authenticated spectrum requirements will be considered;

g) that some Administrations have already established due diligence procedures to reduce the possibility of paper satellites;

noting:

(a) that the free circulation and licensing of MESs is subject to ERC Decision ERC/DEC(99)05;

DECIDES

1. that for the purpose of this Decision "S-PCS<1GHz system" shall mean non-voice non-geostationary MSS system operating in the bands below 1 GHz, subject to the conditions specified in the Radio Regulations;

2. that S-PCS<1GHz systems to be operated within CEPT countries shall meet the milestone criteria given in Annex 3;

3. that S-PCS<1GHz systems listed in Annex 1 to this Decision shall be considered as the Candidate Systems for the introduction in CEPT countries;

4. that further S-PCS<1GHz systems may be added to the list in Annex 1 upon the request of at least one CEPT Administration, on the condition that this Administration declares compliance of that system with milestone 1 of Annex 3;

5. that an S-PCS <1GHz system listed in Annex 1 shall be added to the list in Annex 2 (List of systems to be considered for introduction in CEPT countries) upon request of at least one CEPT Administration on condition that :

   a) this S-PCS <1GHz system has met milestones 1 to 6 in Annex 3, and

   b) all necessary inter-service and intra-service compatibility studies for this S-PCS<1GHz system have been successfully completed and agreed by the ERC, and

   c) the required operational constraints in CEPT countries based on the results of studies referred to in *decides 5b)* have been approved by the ERC;

6. that CEPT Administrations shall consider allowing the frequency usage, on a provisional basis until 1 January 2002 , for the operation of MESs of those S-PCS<1GHz systems listed in Annex 2 subject at least to all the relevant operational constraints listed therein;

7. that, unless a specific competent body is established within CEPT, the ERC shall examine, on the basis of declarations by Administrations, whether the milestone criteria are met for the satellite systems applying for spectrum in the bands covered by this Decision;

8. that S-PCS<1GHz systems introduced into the list in Annex 2 shall be required to make every reasonable effort, giving due consideration to service provision capability, to allow other S-PCS<1GHz systems to use the same bands;

9. that an S-PCS<1GHz system meeting all the milestone criteria in accordance with Annex 3 and has successfully completed all necessary compatibility studies before 1 January 2002 shall not have priority with regard to the access to the available spectrum over another S-PCS<1GHz system meeting the same criteria later but also before 1 January 2002 ;

10. that CEPT Administrations in conducting frequency coordination shall take into account the *decides* above;

11. that this Decision shall be reviewed by 1 January 2002 by the ERC, in the light of the progress in the introduction of S-PCS<1GHz systems and with regard to the compatibility studies and milestone criteria contained in Annex 3;

12. that this Decision shall enter into force on 15 March 1999;

13. that CEPT Member Administrations shall communicate the national measures implementing this Decision to the ECC Chair and the European Communications Office when the Decision is nationally implemented."

Note:
Please check the ECO Documentation Database (https://docdb.cept.org/) under "Documentation / Implementation" for the up to date position on the implementation of this and other ERC Decisions.

ANNEX 1
(updated March 2026)
List of Candidate S-PCS<1GHz Systems

System name	ITU name	Candidate bands(NOTE)	Year of expected commercial service introduction
ORBCOMM	LEOTELCOM-1	Up-link: 148.0-150.05 MHz Down-link: 137-138 MHz	1998
SWARM	USASAT-NGSO-7	Up-link: 148.0-150.05 MHz Down-link: 137-138 MHz	2020
ARGOS KINEIS	EB-SAT-LEO-1 ARGOS-4A A4MSSNG A4NG-C A4NG	Up-link: 399.9-400.05 MHz Down-link: 400.15-401 MHz	2025
MYRIOTA	MNSAT	Up-link: 148.0-150.05 MHz and 399.9-400.05 MHz Down-link: 137-138 MHz and 400.15-401 MHz	2020
	ADS	Up-link: 399.9-400.05 MHz Down-link: 400.15-401 MHz	
CONNECTA IoT	CONNECTA IOT	Down-link: 400.15-401 MHz	2025

NOTE: The candidate bands are to be intended as design frequency limits. The designated operating band within CEPT for each system is indicated in Annex 2

ANNEX 2
(updated March 2024)
List of systems to be considered for introduction in CEPT Countries

SYSTEM NAME : LEOTELCOM-1	
OPERATIONAL CONSTRAINTS	
Up-link designated bands	148-150.05 MHz
Down-link designated bands	137-138 MHz
Multiple access method	FDMA
Modulation method	Narrow band Frequency or Phase modulation
Maximum MESs e.i.r.p. spectral density	10 dBW/(4 kHz)
Technique to avoid causing interference from MESs	Dynamic channel avoidance assignment system (DCAAS as described in Annex 2 of ITU-R Recommendation M.1039) such that mobile earth stations avoid transmitting on the same frequency being actively used by terrestrial fixed or mobile stations
Maximum burst duration for MESs transmission	500 msec
Maximum duty cycle for MESs	Not greater than 1% in any 15 minute period for any single channel
Maximum duty cycle for system control bursts	Not greater than 1% in any 15 second period for any single channel
All MES traffic with the exception of the system control bursts	Consecutive transmissions from a single earth station on the same frequency shall be separated by at least 15 seconds

SYSTEM NAME : ARGOS KINEIS	
OPERATIONAL CONSTRAINTS	
Up-link designated bands	399.9-400.05 MHz
Down-link designated bands	400.15-401 MHz
Multiple access method	Up-link CDMA and FDMA Down-link: FDMA
Modulation method	Up-link: spread spectrum (120 kHz) and narrow-band (PSK, 4 kHz) Down-link: narrow band (PSK, 4 kHz)
Technique to avoid causing interference from the down-link emissions	ARGOS KINEIS down-link transmitters shall be designed to filter spurious emissions to a maximum level of -80 dBm in any 1 kHz bandwidth within the band 406.1-410 MHz to comply with the 2% data loss criteria for RAS observations in accordance with Recommendations ITU-R RA.769-2 and ITU-R RA.1513.
Maximum MESs e.i.r.p. spectral density	Maximum beacon e.i.r.p. level shall not exceed 5 dBW in the 399.9-400.05 MHz band.
Technique to avoid causing interference from MESs	The MES shall transmit only when the satellite is visible.
Maximum burst duration for MESs transmission	1 second
Minimum time between bursts	30s
Maximum duty cycle per MESs	0.3% (over 15 min), typically 0.01%

SYSTEM NAME : SWARM	
OPERATIONAL CONSTRAINTS	
Up-link designated bands	148.0-150.05 MHz
Down-link designated bands	137-138 MHz Not more than 4 Swarm satellites operating simultaneously over CEPT at any given time Only one satellite per each 150 kHz in the 137-138 MHz band operating simultaneously over CEPT
Multiple access method	CSMA/CA (Carrier Sense Multiple Access / Collision Avoidance)
Modulation method	Narrow band Frequency or Phase Modulation
Maximum down-link e.i.r.p.	Limited to -1.55dBW
Maximum down-link duty cycle	Maximum: 10% (over 24 hours) Typical: 5% (over 24 hours)
Bandwidth	Not less than 41.7 kHz (up-link and down-link)
Maximum MESs e.i.r.p. spectral density	0 dBW/4kHz
Technique to avoid causing interference from MESs	Low duty cycle (<1%), low-power, and carrier sense multiple access (CSMA) media access control (MAC) protocol with Collision Avoidance (CSMA/CA) “listen before talk” (LBT); energy detection threshold near noise floor.
Maximum burst duration for MESs transmission	1700 milliseconds (in 149.9000-149.9500 MHz band) 500 milliseconds (otherwise)
Maximum duty cycle for MESs and system control	Not greater than 1% in any 15 minute period for any single channel (typical duty cycle is 0.1%)

SYSTEM NAME : MYRIOTA (399.9-400.05 MHZ AND 400.15-401MHZ)	
OPERATIONAL CONSTRAINTS	
Up-link designated bands	399.9-400.05 MHz
Down-link designated bands	400.15-401 MHz
Multiple access method	Up-link: Narrow band frequency hopping Down-link: Narrow band FDMA
Modulation method	Up-link: FSK Down-link: FSK
Maximum down-link e.i.r.p.	400.15-401 MHz band: ▪ 4 kHz carrier: 10 dBW ▪ 20 kHz carrier: 8.5 dBW
Maximum down-link duty cycle	400.15-401 MHz band: ▪ 4 kHz carrier: 10% in 5 seconds ▪ 20 kHz carrier: 20% in 5 seconds
Technique to avoid causing interference from down-link emissions	400.15-401 MHz band: Myriota down-link transmitters shall be designed to filter out-of-band emissions to at least a level of -110 dBc, corresponding to a maximum peak e.i.r.p. of -100 dBW, in any 4 kHz bandwidth within the band 406.1-410 MHz to comply with the 2% data loss criteria in accordance with Recommendations ITU-R RA.769-2 and ITU-R RA.1513 for the protection of the Radioastronomy Service. To protect the SFTSS service in the frequency band 400.05-400.15 MHz, the lower 10 kHz (400.15-400.16 MHz) of this frequency band shall not be used. SFTSS: Standard frequency and time signal-satellite
Maximum MESs e.i.r.p. spectral density	IoT modules: 5 dBW/4kHz, maximum 4 kHz Micro-gateways: -2.96 dBW/4kHz, maximum 50 kHz
Technique to avoid causing interference from MESs	The MES transmits only when the satellite is visible.
Maximum burst duration for MESs transmission	262 milliseconds
Minimum time between bursts	2 seconds
Maximum duty cycle for MESs and system control	IoT modules: 0.5 % in 24 hours (typically 0.02%) Micro-gateways: 5.0% in 24 hours (typically 0.5%) Note: duty cycle is defined over all frequency hops

SYSTEM NAME: MYRIOTA (137–138 MHZ AND 148.0–150.05 MHZ)	
OPERATIONAL CONSTRAINTS	
Up-link designated bands	148.0–150.05 MHz
Down-link designated bands	137–138 MHz
Multiple access method	Up-link and Down-link: narrow band FDMA
Modulation method	Up-link: FSK Down-link: FSK
Maximum down-link e.i.r.p.	137–138 MHz band: ▪ 4 kHz carrier: 1.5 dBW ▪ 20 kHz carrier: 8.5 dBW
Maximum down-link duty cycle	137–138 MHz band: ▪ 4 kHz carrier: 10% in 5s ▪ 20 kHz carrier: 20% in 5s
Maximum MESs e.i.r.p. spectral density	IoT modules: 5 dB(W/4kHz), maximum 4 kHz Micro-gateways: -0.97 dB(W/4kHz), maximum 250 kHz
Technique to avoid causing interference from MESs	The MES transmits only when the satellite is visible.
Maximum burst duration for MESs transmission	262 milliseconds
Minimum time between bursts	2 seconds
Maximum duty cycle for MESs and system control	IoT modules: maximum 0.5 % in 24 hours (typically 0.02%) Micro-gateways: maximum 5.0% in 24 hours (typically 0.5%)

ANNEX 3

Milestones for the introduction of S-PCS below 1GHz

The milestones to be applied are listed below.

A satellite network operator may be represented by different service providers in different countries.

MILESTONES

1. Submission of ITU Advance Publication and Co-ordination Documents

   The satellite network operator should provide clear evidence that the administration responsible for an S-PCS<1GHz system has submitted ITU RR Appendix 4 'Advance Publication Information to Be Furnished for a Satellite Network' and ITU RR Appendix S4 'Notices Relating to Space Radiocommunications and Radio Astronomy Stations'.

2. Satellite manufacturing

   The satellite network operator should provide clear evidence of a binding agreement for the manufacture of its satellites. The document should identify the construction milestones leading to the completion of manufacture of satellites required for the commercial service provision. The document should be signed by the satellite network operator and the satellite manufacturing company and should be available for inspection by the competent CEPT body. If they are the same, a commitment should also be provided by the satellite network operator.

3. Completion of the Critical Design Review

   The Critical Design Review is the stage in the spacecraft implementation process at which the design and development phase ends and the manufacturing phase starts.

   The satellite network operator should provide clear evidence of the completion of the Critical Design Review in accordance with the construction milestones indicated in the satellite manufacturing. The declaration, signed by the satellite manufacturing company and indicating the date of the completion of the Critical Design Review, should be available for inspection by the competent CEPT body.

4. Satellite launch agreement

   The satellite network operator should provide clear evidence of a binding agreement to launch the minimum number of satellites required to provide service within the CEPT. The document should identify the launch dates and launch services and the indemnity contract. The document should be signed by the satellite network operator and the satellite launching companies and should be available for inspection by the competent CEPT body.

5. Gateway earth stations

   The satellite network operator should provide clear evidence of a binding agreement for the construction and installation of gateway Earth stations that will be used to provide commercial service. This document should be available for inspection by the competent CEPT body.

6. Launch of satellites

   a) The satellite network operator should make available for inspection by the competent CEPT body documents confirming the first successful satellite launch and in-orbit deployment.

   b) The satellite network operator should also provide periodic evidence of subsequent launches and successful in-orbit deployment of satellites in the constellation.

Provision of documentation relating to (a) shall constitute compliance with this milestone.

7. Frequency coordination

The satellite network operator should submit to the competent CEPT body documents relating to the successful frequency coordination of the system pursuant to the relevant provisions of the Radio Regulations. However, a system which demonstrates compliance with milestones 1 to 6 inclusive is not obliged to demonstrate at this stage completion of successful frequency coordination with those S-PCS<1GHz systems which fail to comply adequately and reasonably with milestones 1 to 6 inclusive.

8. Provision of satellite service within CEPT

The satellite network operator shall notify the competent CEPT body that it has launched, and has available for the provision of service, the number of satellites it previously identified under milestone 4 as necessary to provide commercial service, and that it shall be providing commercial service within the CEPT on the basis of the operational constraints relevant to that system in Annex 2.