**3GPP TSG RAN Meeting #27** **RP-050029**
**Tokyo, Japan, 9 - 11 March 2005**

---

ETSI MSG #9 M-05-015
Sophia Antipolis, 17 — 18 January 2005

**Title:** LS on Use of GSM BS on board aircraft

**Source:** ETSI MSG
**To:** 3GPP GERAN WG1, 3GPP RAN WG4
**Cc:** 3GPP GERAN, 3GPP RAN

**Contact Person:** Hans van der Veen (NEC Europe Ltd.)

**Tel. Number:** +49 6221 905 11 55
**E-mail Address:** Hans.vanderVeen@netlab.nec.de

**Attachments:** M-05-009 ETSI ERM LS to MSG on Use of GSM BS on board aircraft
ECC WG RA document (05)019 RA6 Report
ECC WG RA document (05)019 Annex 1
ECC WG RA document (05)023
ECC WG SE document 005SE(05)

---

**1. Overall Description:**

ETSI MSG recently received an LS (M-05-009) from ETSI ERM continuing a discussion on the use of GSM on board aircraft. In that LS, ETSI ERM points out a number of documents from ECC (the CEPT Electronic Communications Committee) that are relevant to the discussion.

ETSI MSG believes that GERAN1 and RAN4 may have comments on the LS and the attached documents, and wants to draw particular attention to the time scale mentioned in the 005SE(05) document, which indicates that conclusion on the study should be reached latest by the beginning of June 2005 (because ECC WG SE will have to finish its work on this matter by early June 2005).

**2. Actions:**

**To 3GPP TSGs RAN WG4 and GERAN WG1.**

**ACTION:** MSG kindly asks RAN WG4 and GERAN WG1 to review the attached documents and comment back to MSG as necessary.

CEPT ECC
Electronic Communications Committee

CEPT/ECC/RA
Project Team RA6
Copenhagen, 15-16 June 2004

**Source: SITA**

**Subject: GSM use aboard planes**

ELECTRONIC COMMUNICATIONS COMMITTEE

DRAFT

ECC Decision

of DD MMM 2004

on the use of GSM Base Transceiver Stations on board aircraft

in the frequency bands

1710 – 1785 and 1805 – 1880 MHz

(ECC/DEC/(04)**)

EXPLANATORY MEMORANDUM

## 1 INTRODUCTION

There is increasing demand to use mobile communications from wherever you are located, including the use of GSM mobile phones on board aircraft. However, to ensure successful operation of systems which will facilitate this there is a need to establish a basis for the free circulation of such equipment within Europe and to provide access to the required spectrum.

## 2 BACKGROUND

It is a general aim of the Electronic Communications Committee (ECC) to facilitate the free circulation and use of radio equipment. An objective of this Decision is to extend this general goal to include the air transportation domain.

The system under consideration in this decision, (i.e. the GSM Base Transceiver Station and its associated equipment), together with the GSM spectrum used on board an aircraft, are intended to provide an interface between the passengers' GSM handsets and the terrestrial networks providing the full range of services normally provided on a GSM network. To ensure that the mobile phones on board the aircraft do not attempt to register with terrestrial Base Transceiver Stations, the equipment installed on board will include a control unit requiring the mobile phones to register with the on board system. The link between the GSM system on board the aircraft and the terrestrial network does not form part of this Decision. The link will operate in a different frequency range using satellite links. These satellite links will be in accordance with ECC Decisions. The system will only be operated during certain phases of the flight and will not be operated while the aircraft is on the ground or during take-off and landing.

There is a need for a harmonised approach to the GSM Base Transceiver Station together with free circulation and use of the system to ensure the provision of an uninterrupted service whilst aircraft cross the borders of various countries and to reduce the regulatory requirements placed on administrations, GSM network operators and aircraft operators.

The GSM Base Transceiver Stations shall conform to the ETSI specifications detailed in EN 301 502 except where different parameters are required to meet airworthiness certification demands.

## 3 SPECTRUM ISSUES

It will frequently be the case that on any one flight an aircraft will travel through the airspace of more than one country with the time spent in the airspace of any individual country being of short duration. Thus a procedure is required to ensure that the spectrum of the GSM Base Transceiver Station can be used in any national airspace that the aircraft is crossing.

Having regard to: -

(i) The provisions of Article 18 of the ITU Radio Regulations;

(ii) The provisions of Article 30(a) of the Chicago Convention; and

(iii) The fact that the system under consideration in this decision will be controlled so as to ensure that there is no interference with GSM systems operating outside the aircraft cabin

It is considered that the responsibility for control of the GSM spectrum utilised on board an aircraft as part of the system should be that of the country of registration of the aircraft.

## 4 AIRWORTHINESS CERTIFICATION

Airworthiness verification of the BTS and its associated equipment will be required and is the separate responsibility of the civil aviation authorities of the country of registration of the aircraft.

## 5 REQUIREMENT FOR AN ECC DECISION

There is a need for an ECC Decision to allow for the harmonised operation of GSM Base Transceiver Stations and to permit access to the GSM frequency bands.

ECC Decision
of DD MMM 2004

on the use of GSM Base Transceiver Stations on board aircraft
in the frequency bands
1710 – 1785 and 1805 – 1880 MHz
(ECC/DEC/(04)**)

" The European Conference of Postal and Telecommunications Administrations,

*Considering*

a) That the bands 1710 – 1785 and 1805 – 1880 MHz are allocated to the mobile service on a co-primary basis in the ITU Radio Regulations;

b) That within Europe the bands 1710 – 1785 and 1805 -1880 MHz have been designated for GSM usage;

c) That it is possible by use of a Base Transceiver Station and other associated equipment to permit the use of GSM handsets on board an aircraft during flight;

d) That, provided the spectrum power levels and frequency bands used are suitably controlled, it is possible to ensure that there is no interference with aircraft systems or GSM systems operating outside the aircraft cabin;

e) That, as such a system will confine the effect of the relevant GSM spectrum within the aircraft cabin, it will therefore also permit the sharing of spectrum by multiple operators resulting in more efficient use of spectrum;

f) That it is contemplated that the equipment will not be operated while the aircraft is on the ground. The equipment will be switched on during the ascent phase, will be operational during the cruise phase and switched off during the descent phase;

g) That the technical characteristics of such a system will be in accordance with the relevant ETSI standards and specifications, subject to the control of power levels and frequency band used;

h) That there are various ECC Decisions permitting the free circulation and use of GSM handsets and this Decision is extending the coverage of these existing Decisions;

i) That for the purposes of the Decision the aircraft cabin space is considered to be equivalent to the national territory of the country of aircraft registry and any such system will only be used within the aircraft cabin;

j) That accordingly responsibility for control of the GSM spectrum utilised on board an aircraft as part of such a system is that of the country of registration of the aircraft

k) That in accordance with Article 18 of the ITU Radio Regulations and Article 30 of the Chicago Convention the GSM Base Transceiver Station will be authorised by one administration but will be operated within the airspace of other countries;

l) That the GSM Base Transceiver Station and its associated equipment will be subject to airworthiness approval by the aviation safety authorities;

m) That this Decision shall not impede EEA member countries from fulfilling their obligations according to Community laws.

DECIDES

1. That the spectrum power levels and frequency bands should be controlled to ensure that there is no interference with aircraft systems or GSM systems operating outside the aircraft cabin. The system shall comply with the

parameters specified in EN 301 502 and EN301 511 except where the airworthiness certification specifies that a lower value is required to ensure safe operation of the system;

2. That administrations shall allow free circulation and use of such systems provided that the system operator either holds the required spectrum licence or has been exempted from the need to do so, in each case by the country of registration of the aircraft;

3. That the Base Transceiver Station and its associated equipment must be subject to appropriate airworthiness certification by the relevant national aviation safety authorities;

4. That this Decision shall enter into force on [dd mmm yyyy] [or if possible a date before that];

5. That administrations shall communicate the national measures implementing this Decision to the ECC Chairman and the Office when the Decision is nationally implemented.

*Note:*
*Please check the CEPT web site (www.cept.org) for the up to date position on the implementation of this and other ECC Decisions.*

RA(05)019

CEPT ECC
Electronic Communications Committee

**4th WGRA MEETING**

**Copenhagen 1 – 4 February 2005**

**Date issued: 10 January 2005**

**Source: Chairman RA6**

**Subject: Report of RA6**


**Summary**

RA6 held three joint meetings with RA5 since the last meeting of WGRA.

The joint meetings dealt with AESs and ESVs, the result of these meetings will be presented by the chairman RA5.

Due to lack of time, no separate meeting of RA6 was held. Subjects still pending since the last meeting are:

Preliminary draft Decision on free circulation and use of the MPAX system (airborne GSM Base transceiver stations). The draft was presented in Dublin as preliminary draft and call for comments. It was after the meeting sent to WGFM and WGSE also asking for comments. No comments have been received so far.

Preliminary draft Decision on licence exemption, carriage and use of CDMA/PMAR wide band terminals. The ECC asked for arguments for or against such a Decision. Some text was produced at the meeting in Dublin to report back to ECC. Obviously, the arguments were not strong enough to convince ECC and the query for the need of such a Decision remained open.


**Proposal**

WGRA is asked

- to approve the draft Decision on MPAX, keeping in mind that comments from WGFM and WGSE might still arrive later
- to urge administrations to indicate whether they could implement the draft Decision on licence exemption, carriage and use of CDMA/PAMR
- to decide on the further steps with regard to this Decision

Annexes: 1 - preliminary draft Decision on free circulation of MPAX airborne GSM station
2 - preliminary draft Decision on licence exemption, carriage and use of CDMA/PAMR terminals

RA(05)023

CEPT ECC
Electronic Communications Committee

**4th WGRA MEETING**

**Copenhagen 1 – 4 February 2005**

**Date issued: 11 January 2005**

**Source: Finland**

**Subject: GSM base station on board aircraft**

## Summary

Some technical as well as legal concerns are described in this document, which also has been submitted to the concurrent WG SE meeting

## Proposal

WG SE and WG RA should look at the issues raised here for their own area of competence. WG SE should assess the technical feasibility of the proposed method to suppress interference to ground networks and to aeronautical systems on board and WGRA should study the implications of the legal concerns to the draft ECC Decision.

## Background

SITA made a proposal to WG RA on an ECC Decision to facilitate free circulation of GSM base stations on board civil passenger aircraft. The idea is to provide GSM services for passengers through a base station on board aircraft connected to the GSM network through a satellite link. Some technical concerns were raised in the previous WG SE meeting and the matter was also raised in the last ECC meeting where WG SE was requested to study the technical solution.

## Technical concerns

SITA made a proposal to WG RA on an ECC Decision to facilitate free circulation and usage of GSM base stations on board civil passenger aircraft. The idea is to provide GSM services for passengers through a base station on board aircraft connected to the GSM network through a satellite link. The method to control the GSM terminals in order to prevent them using the terrestrial GSM networks is arranged so that the *Network Control Unit (NCU) raises the noise floor for the frequency bands that will be controlled with just a narrow bandwidth available for active communications. This noise floor is controlled so that the airborne system is not visible by terrestrial networks and similarly the terrestrial systems are not visible to the airborne system*.

This means that the NCU is a selective jammer, which passes through only a single carrier or carriers but blocks the rest of the band from communication with the ground base stations. It is likely that the system can be dimensioned so that it does that without causing interference

to the terrestrial networks. However this jammer has to cover all the frequency bands of different terrestrial cellular networks, which otherwise could be accessed using a terminal on board. If the picocell on board is using the GSM1800 frequencies, then also at least GSM900 (primary and extended bands), R-GSM, CDMA450 and 3G bands should be jammed. Even if the terminals set to automatic network selection would most likely lock to the picocell on board, they can always be switched to manual network selection in order to select any available ground network. Therefore all the base station transmit bands of such potentially available networks should be covered. On the other hand there should be no noise generated on the frequency bands used for aeronautical purposes. Also due measures should be implemented in order not to cause interference to GSM usage on board e.g. SAR or medical helicopters flying in the vicinity of this airplane in question when take-off or landing phases of flight. For all these reasons the NCU should be activated only above some minimum flight surface and below that the use of mobile phones would be prohibited. On the ground the passengers should be allowed to use the terrestrial networks according to the present rules of the airlines.

## Legal concerns

Licensing arrangements for individual picocell base stations on board and the system as a whole need further consideration. It is not clear that the administration of the airline operator's home country can issue a licence for operation in the airspace of other countries on frequencies used also by ground based GSM networks in other countries. The airborne network operator also needs an authorization on the basis of the authorisation directive. This requires a selection process if there are more than one applicant. In this particular case there is however no real shortage of frequencies because if the technical solution discussed above works, then all the GSM bands are available for communication to only those few hundred passengers in the cabin. The only possible point of congestion is the satellite link.

There is also guidance on the web pages of the EC, which states that a jammer cannot comply with the R&TTE directive (http://europa.eu.int/comm/enterprise/rtte/jammers.htm). It is clear that in this case the jammer is in fact used to prevent interference and to allow communication in a controlled way, but its compliance with the EC statement should be clarified.

**Doc. ECC/SE(05)005**
**Doc.ECC(04)113**

CEPT ECC
Electronic Communications Committee

**40th WG SE Meeting**
**Helsinki, 31 January – 04 February 2005**

**Date issued: 13.12.2004**

**Source: SITA**

**Subject: GSM use aboard aircraft and the WG SE observations**

CEPT/ECC
Brugge, 8 – 12 November 2004

**Doc. ECC(04)113**

**Introduction**
At the request of SITA, WG RA is developing a proposed ECC Decision related to the free circulation and usage of airborne GSM systems. The first draft of this Decision was considered by the recent Dublin WG RA meeting. Before any final decision is made, it was agreed to send liaison statements to WG FM and WG SE seeking their comments on the draft Decision. WG SE has examined the liaison statement and considered that the issue should be raised at the ECC meeting in the interests of overall co-ordination of the activity. Further, WG SE suggested that it was necessary to establish appropriate time scales, and the most efficient mechanism to conduct the work.

This contribution explains the airborne GSM system that SITA is proposing to operate and then goes on to give an indication of the time scale that SITA is suggesting for the work. Finally the contribution comments on the concerns raised by WG SE so that the ECC can make an informed decision on the best mechanism for conducting the work.

**System Concept**
SITA, Airbus and Tenzing have announced their intention to create a joint company, OnAir, to develop and market passenger communications services to the airline industry. One offering by the new company will be a service allowing passengers to use their own GSM phones on board aircraft as they do on the ground today, through a picocell installed on the aircraft. The picocell will consist of a GSM base station, a Network Control Unit (NCU) and the passengers' mobiles. The NCU is used to control the electromagnetic emission environment on board the aircraft to prevent harmful interference with other systems (including both ground systems and avionic systems). The on-board base station will interface to a satellite link to provide connectivity between the aircraft and terrestrial networks. (Please note that the satellite connectivity issues are not part of the current discussion).

The draft Decision provides more explanation of various regulatory aspects related to the airborne GSM system. A key point is that the system will only be operational during the ascent, cruise and descent phases of the flight. While the aircraft is on the ground and during take-off and landing the system will not be operational. OnAir will act as a roaming service provider, with no subscribers of its own.

**Time Scale**
To fit in with other activities (including aviation certification) there is a target for obtaining final ECC approval of the proposed Decision at the 12th ECC meeting, scheduled for November 2005. Consequently, WG RA is looking to finalise the Decision, taking due account of comments from WG FM and WG SE, at its 6th meeting, scheduled for 3rd – 7th October 2005. This date coincides with 52nd

meeting of WG SE so WG SE will have to complete its work by the 51st meeting, 6th – 10th June 2005. WG FM will have to complete its work by the 55th meeting due to be held 26 –30th September 2005. It is recognised that these deadlines are aggressive but SITA is confident that the work can be completed in accordance with these deadlines.

**Addressing the WG SE concerns**
WG SE raised a number of concerns regarding the use of GSM systems on board aircraft (these concerns are given in italics below). In fact, SITA has already considered these points and in general terms the concerns are already being addressed.

WG SE '*potential interference from the on board GSM transmissions to terrestrial networks*'
SITA is proposing to use a NCU within the GSM network on board the aircraft. This NCU will control the radio electromagnetic emission environment on board the aircraft so that the on board transmissions should not be visible either to terrestrial networks or indeed to the aircraft systems. Initial ground tests of the system show that there is no visibility of the on-board network beyond the wingspan of the aircraft.

WG SE '*the use of this system considering the potential interference to aircraft avionics*'
All equipment installed on board an aircraft needs to have an airworthiness certificate, by which it is certified that the system itself, as well as its operation onboard, do not present any risk to the aircraft and its safe operation. Aviation authorities issue this certificate and the certificate is specific to aircraft type and configuration. SITA's partner Airbus is dealing with the certification process for the onboard GSM equipment and this work is progressing well. A critical item review list is expected in December 2004, and Airbus is confident they can address and resolve these issues appropriately and in a timely manner.

WG SE '*one of the technical and regulatory considerations would be how to ensure that an appropriate GSM network is always selected*'
The use of the NCU will ensure that only the on board GSM system is visible to the passengers' mobiles. To support this on board GSM system SITA is applying for global MCC and MNC to ensure appropriate recognition of the network.

WG SE '*the attenuation of an aircraft fuselage may not be sufficient to provide screening from the coverage of terrestrial GSM networks, even at significant altitude, thus passengers may have a choice of connections to either a terrestrial, or the on board network. Connection to terrestrial networks under these conditions may have an impact on safety of the aircraft*'
The use of the NCU should ensure that terrestrial networks are not visible to passengers' mobiles on board aircraft. Additionally the airworthiness certification process requires that if terrestrial networks should become visible on board aircraft, for whatever reason, it will not have any implications on the safety of the aircraft.

WG SE '*one possibility to ensure avoidance of connection to an inappropriate network involves the use of 'GSM interceptors', however this may raise regulatory issues*'
The NCU operates using a different concept to that used by interceptors. The NCU raises the noise floor for the frequency bands that will be controlled with just a narrow bandwidth available for active communications. This noise floor is controlled so that the airborne system is not visible by terrestrial networks and similarly the terrestrial systems are not visible to the airborne system.

**Conclusions**
In short, the OnAir project is proceeding well. WGRA has a draft Decision before it for consideration, WGSE has raised issues, all of which SITA has addressed. WGFM is yet to consider the draft Decision, but SITA is confident that it will be able to address these issues in a timely manner. On that basis, there are reasonable grounds for expecting that the issues, whilst significant, can be addressed in way that allows the timings set out above to be met.

SITA looks forward to working with the ECC and appropriate working groups to ensure that the work is completed within the suggested timescale.

**European Telecommunications Standards Institute** **RM29(05)PAR47**

**Technical Committee**
**Electromagnetic compatibility and Radio spectrum Matters**
**Working Group Radio spectrum Matters**

**Paris, France, 11-14 January 2005**

**LIAISON STATEMENT**

| | |
|---|---|
| **To :** | Mr. Francois COURAU, ETSI MSG Chairman, francois.courau@alcatel.fr |
| **cc:** | Jan-Eric Persson, ETSI ERM-TG25 Chairman, jan-eric.persson@swedianet.com |
| | Igor Minaev, ETSI Technical officer, igor.minaev@etsi.org |
| | Enrico Tosato, ETSI Liaison officer with WG RA, enrico.tosato@ties.itu.ch |
| | Thomas Weber, ETSI Liaison officer with WG SE, Thomas_J.Weber@RegTP.de |
| | ETSI ERM Support, ERMsupport@etsi.org |
| **Source**: | ETSI Working Group ERM RM |
| **Title:** | Liaison statement to MSG on use of GSM BS on board aircraft |
| **Our ref. #:** | RM29(05)PAR47 |
| **Date**: | 14 January 2005 |

Dear François,

ERM-RM, in its 29th meeting in Paris, has become aware that there has been discussion in ECC-WG RA and WG SE concerning the use of cellular equipment on board aircraft based on dedicated flying pico-cells.

We would like to draw the attention of MSG to the following documents:

- RA6 Report: WG RA document (05)019;
- GSM use aboard planes (source SITA): WG RA document (05)019 Annex 1;
- GSM base station on board aircraft (source Finland): WG RA document (05)023;
- GSM use aboard aircraft and the WG SE observations (source SITA): WG SE document 005SE(05).

We would like to remind you that the ETSI liaison officers are:

- Enrico Tosato, ETSI liaison officer with WG RA, enrico.tosato@ties.itu.ch
- Thomas Weber, ETSI liaison officer with WG SE, Thomas_J.Weber@RegTP.de

We could like to draw the attention to the fact that the same subject is being discussed in the USA, in particularly in RTCA (Radio Technical Committee for Aeronautics) sub committee SC 202 (http://www.rtca.org/comm/Committee.cfm?id=1).

Best regards,

Georges de Brito
ERM-RM Chairman
georges.debrito@francetelecom.com

Enclosures:
WG RA document (05)019 RA6 Report
WG RA document (05)019 Annex 1
WG RA document (05)023
WG SE document 005SE(05)