

RECOMMENDATION ITU-R RS.1346*

SHARING BETWEEN THE METEOROLOGICAL AIDS SERVICE AND MEDICAL IMPLANT COMMUNICATION SYSTEMS (MICS) OPERATING IN THE MOBILE SERVICE IN THE FREQUENCY BAND 401-406 MHz

(Question ITU-R 144/7)

(1998)

The ITU Radiocommunication Assembly,

considering

- a) that the band 401-406 MHz is allocated to the Meteorological Aids Service on a primary basis;
- b) that Recommendation ITU-R RS.1165 specifies the technical characteristics of radiosonde systems in the Meteorological Aids Service, and that Recommendation ITU-R RS.1262 specifies the sharing and coordination criteria for Meteorological Aids operated in the band 401-406 MHz;
- c) that the Medical Implant Communication Systems are comprised of an implantable device which is installed within the human body, and a programmer, which is designed for radiocommunication operation at 2 metres away from the body for the programming and occasional communications with the implant device;
- d) that Medical Implant Communication Systems require a single band available worldwide, and may operate in the mobile service currently allocated on a secondary basis in the band 401-406 MHz;
- e) that with a limit of -16 dBm on the e.i.r.p. of Medical Implant Communication Systems (MICS), no harmful interference would occur to the operation of Meteorological Aids from the MICS;
- f) that interference mitigation techniques used by the Medical Implant Communication System equipment, as described in Annex 1, provides a high level of protection to their operation from possible interference by Meteorological Aids systems,

recommends

- 1 that sharing is feasible in the band 401-406 MHz between the Meteorological Aids Systems, and Medical Implant Communication Systems which are in compliance with *recommends* 2 and 3 and with the technical and operational characteristics described in Annex 1;
- 2 that the e.i.r.p. of Medical Implant Communication System transmitters be limited to -16 dBm ($25 \mu\text{W}$) in a reference bandwidth of 300 kHz in order to provide adequate protection of Meteorological Aids Systems;
- 3 that interference mitigation techniques, as discussed in Annex 1, should be used by Medical Implant Communication Systems to protect their operation.

ANNEX 1

Feasibility of co-channel sharing between Meteorological Aids and ultra-low power implantable medical devices in the 401-406 MHz band**1 Background**

Millions of people worldwide depend upon active implanted medical devices to support and improve the quality of their lives. Active implants perform an expanding variety of therapeutic functions: regulating heart rates (via pacing and/or defibrillation), controlling pain, administering pharmaceuticals, controlling incontinence, and treating neurological

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tremors to name just a few. As the technology continues to evolve and the population ages, service to humanity from these devices will rapidly increase from an already large base.

Communication links to implanted medical devices serve a variety of purposes, with new opportunities to improve patients' quality of life constantly arising. Today, communication links are used for: device parameter adjustment (e.g. pacing rate), transmission of stored information (e.g. stored electrocardiograms), and the real time transmission of vital monitoring information for short periods (e.g. cardiac performance during the implant procedure). A communications system for medical implant devices includes a programmer and an implanted device. The programmer transmits data to the implanted device and receives data from the implanted device. The programmer operates outside the human body and contains an ultra low power transceiver and an antenna. The implanted device also contains an ultra low power transceiver and an antenna, but operates inside the human body. The implanted device receives data from the programmer and transmits data to the programmer. Current technology that relies on RF induction cannot support the requirements for higher data rates (e.g. 100 kbit/s).

Implanted medical device communications systems are inherently portable. Patients travel around the world and can be far from their primary physician when an emergency arises and the need for device communication occurs. Likewise, programmers are often moved between medical facilities and countries. This mobility requirement and the constraints on the system design require the availability of at least a single channel between 250 and 450 MHz for use worldwide. For medical implant communication systems (MICS) to be successful, the identification of a single, worldwide band 3 MHz wide for use by all manufacturers is vital. Operation in a portion of the band (401-406 MHz) appears to be the only viable option.

For effective MICS operations, the effective radiated power needs to be in the range of -20 dBm ($10\text{ }\mu\text{W}$) to -16 dBm ($25\text{ }\mu\text{W}$). This low ERP in combination with the link being used almost exclusively indoors and in urban areas virtually eliminates the potential for MICS operations to interfere with Metajds. Note also that because the device's primary purpose is therapeutic, the communication link is used only 0.005% of the device's lifetime further limiting its interference potential.

2 MICS characteristics

2.1 Frequency of operation

The focus on 401-406 MHz as the frequency band for MICS operation is the result of many factors. The frequency band selected must be capable of reliably supporting high data rate transmissions, lend itself to small antenna designs, fall within a relatively low noise portion of the spectrum, propagate acceptably through human tissue, and be feasible with circuits that require a minimal amount of electrical power.

2.2 Total required bandwidth

MICS operations require 3 MHz of available spectrum for the creation of at least 10 channels. These channels are used to avoid interferers and support the simultaneous operation of multiple devices in the same area (such as clinics with multiple rooms). International spectrum studies have shown that even with 3 MHz available only one or two channels will be usable in many environments.