Subject	**Repeaters harmonized plan with 9,4 MHz Tx-Rx shift on the 430 - 440 MHz band**		
Society	**REF**	Country:	**France**
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1. Introduction

National considerations, based on specific regulations for the use of the 430 - 440 MHz band, have led to recommend several Tx-Rx frequency shifts of repeaters in different countries:

- 1,6 MHz for F/PA/ON with 12,5 kHz Channel spacing
- - 1,6 MHz with 25 kHz Channel spacing (F_{rx}=Ft_x in UK)
- - 2 MHz with 25 kHz Channel spacing (F_{tx}=F_{rx} in UK)
- 7,6 MHz with 25 kHz Channel spacing and digital communications for HB/DL/OE

These 4 different standards are sometimes confusing and observations of the repeaters activity show that many of them are not consistent with their applicable IARU recommendation. This situation makes the coordination of the channel allocation inefficient or even sometimes impossible for new repeaters deployment particularly in digital modes.

2. Background

The recommended 12 kHz bandwidth has its best efficiency in FM with 12,5 kHz channel spacing as for the current digital communications. Both need a good coordination of the channel allocations for repeaters in order to minimise co-channel and adjacent interferences.

The coexistence of digital and analogue FM in the same frequency segment of the band does not seem to be a technical issue and can be acceptable since their occupied transmission bandwidth is compatible. This is the case on the 2 m meter band on which no difficulties have been reported. Then, many repeaters offer both use analogue and digital on the same channel.

However, a technical problem has been underlined for repeaters having to apply the 1,6 MHz or 2 MHz recommended shift for combining TX and RX signals on a common antenna. Specifications applicable to the RF filter are so tight that its tuning is difficult and often unstable on site. This generally leads to expensive solutions. This problem has found a more cost-effective solution for the professional communications repeaters on the UHF bands through an applicable standardisation at 10 MHz for The Tx-Rx frequency shift.

Presently, digital communications networks are in a wide deployment phase and, by looking for a good quality of service over a specified area, they need more repeaters than for the traditional analogue FM use. In these conditions their installation cost is more critical and the cheapest solution is often preferred through the widest Tx-Rx frequency shift achievable, instead of the smaller one recommended by the IARU national rules, as soon as it is possible by

staying in their allocated frequency band.

A “de facto” standard of 9,4 MHz Tx-Rx frequency shift is now in use in many countries and particularly in France where only 22 % of the existing repeaters (more than 200) fulfil the IARU recommendation, the remaining 78 % being presently out of control.

3. Key point and proposal

The present organisation plan of the 430 - 440 MHz band can easily accept repeaters with a 9,4 MHz Tx-Rx frequency shift by applying minor changes:

- The segment 430,025 to 430,375 MHz has a capacity of 27 channels presently allocated to the output of FM repeaters with 1,6 MHz frequency shift.
- The segment 439,450 to 439,775 MHz has no specific allocation and can be the input segment for FM and digital repeaters with a capacity of 25 channels.

Our proposal takes into account this situation as follows:

- Open the segment 430,050 to 430,375 MHz for output of repeaters in any mode (analogue FM, Digital or mixed on the same channel), with both 1,6 MHz and 9,4 MHz Tx-Rx frequency shifts and less than 12 kHz bandwidth.
- Allocate the segment 439,450 to 439,775 MHz for input of repeaters in any mode with 9,4 MHz Tx-Rx frequency shift and less than 12 kHz bandwidth.
- Recommend changing progressively, if possible, the present Tx-Rx frequency shift of 1,6 MHz, used by the installations already active on this output segment, into 9,4 MHz.