



INTERIM MEETING OF VHF & up Committee of IARU REGION 1
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Subject	144 / 435 MHz APRS Harmonisation		
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Introduction

There is an increasing need to harmonise the frequencies of some activities across the three IARU Regions. This paper considers the options for APRS in both the 144 and 435 MHz bands, whilst noting the need to protect/harmonise narrowband usage as well. It also includes a proposed reply to Region-3 regarding a request re 144.390 MHz.

Background

Pan-Region Harmonisation in the VHF/UHF bands has usually focussed on long distance modes including narrowband, EME and satellites - and indeed further effort on these is desirable. However there are considerable benefits if APRS can also be harmonised – and recent interference cases and requests show the risks if it is not.

Traditional APRS is essentially a wideband FM-based data mode and thus only compatible with sufficiently wide FM/All-modes segments. It is important to recognise this bandwidth/usage and note that it is wholly incompatible with weak signal narrowband/DX segments. When the use of APRS is maritime-mobile or air/spaceborne (by balloons, satellites, ISS etc) its reach can also be considerable (assisted by digipeating).

For the amateur service, a review shows that:

Region-1

144MHz: There is widespread harmonisation based on 144.800 MHz NBFM as illustrated by the attached map - compared to other Regions.

435 MHz: The current APRS recommendation is 432.500 in the all-modes segment. This frequency is less popular than 144.800 and previous history for it includes:

- Vienna-2004/Davos-2005: Introduced at 433.800 (only when 144.800 can not be used)
- Cavtat-2008 added 432.500 as an alternative to 433.800 due to ISM issues
- v5.40 of the VHF Handbook in Jul-2009 saw removal of the old 433.800 and usage note

In addition there is widespread usage of low power APRS in the 433 MHz ISM band - notably by balloons (not all amateur) which has significant range due to their height

Region-2 (Americas) is not fully harmonised. However US influence has advocated 144.390 into the relatively new Region-2 VHF Band plan, along with consideration for 145.010.

Region-3 (Asia-Pacific) has no agreed APRS frequencies (and a fairly sparse band plan at this time). However the recent Region-3 Conference asked their Directors to enquire regarding 144.390 and to do further work on its band plans (see additional information).

For the amateur satellite service:

APRS is coordinated for amateur satellite use within the global 145.8-146.0 and 435-438 MHz sub-bands. However recent international interference cases affecting Region-1 from 144.390 APRS downlinks by US Satellites and other uncoordinated frequencies by some new Chinese satellites, illustrate why it is so important that all amateur satellite systems must be coordinated. This has recently been emphasised by the IARU-AC.

Proposals

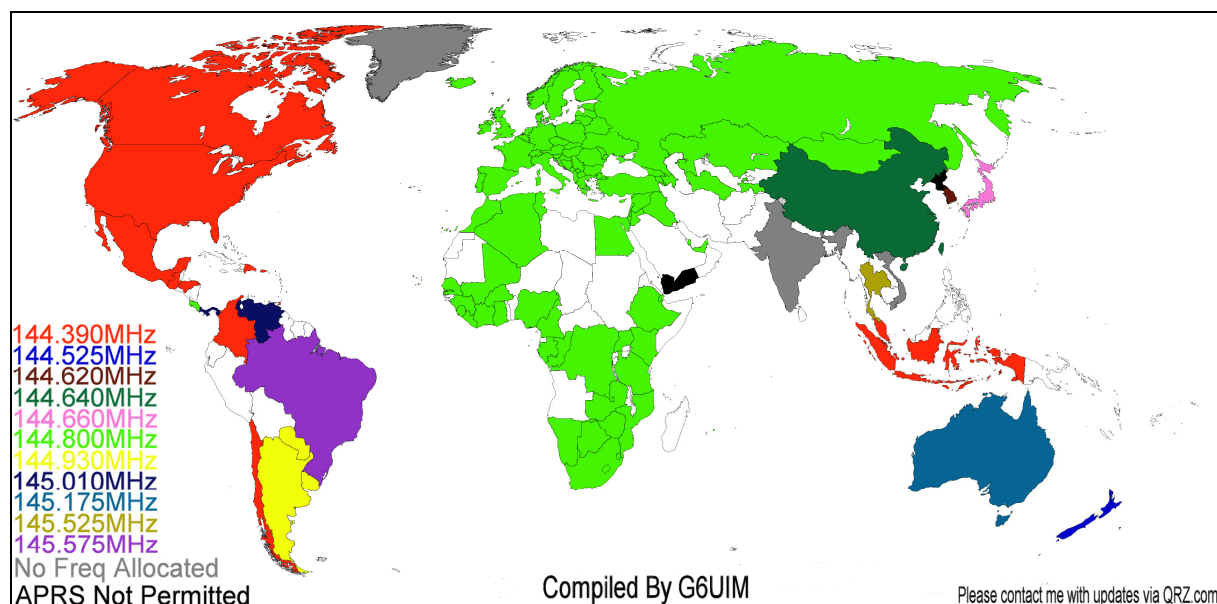
- Firmly establish the principle that traditional APRS is essentially a wideband mode, and thus only compatible with sufficiently wide FM/All-modes segments.
- Note that Region-1 is fully harmonised with 144.800 MHz NBFM, but that there are wide variations in other Regions and likely to be growing demand.
- Note that Region-1 and Region-3 share a substantial land border and that prevailing winds for balloons and orbits for satellites are generally in the R1-to-R3 direction
- Note the request from the recent IARU Region-3 Conference, and reply regarding 144.390 MHz as being unsuitable, but that we are interested...
- Liaise with both Region-2 and Region-3 to improve harmonisation of narrowband, EME and APRS in the 144-146 and 430-440 MHz bands
- Whilst the priority is 144 MHz, additionally to consider the options for also harmonising APRS in the 430-440 MHz band as well
- Emphasise that Satellite APRS use must only be in the globally coordinated satellite sub-bands
- Emphasise that all APRS equipment design and use must be on a failsafe basis to prevent unauthorised/uncoordinated transmissions

Recommendations

- Update Section 7.11.3 (Guidelines for APRS) of the Region-1 VHF Managers Handbook to include 'APRS is considered to be a long distance wideband mode and is not compatible with narrowband segments. The implementation of APRS equipment shall also ensure it operates on a failsafe basis to guard against unwanted transmissions/interference' and to remove the obsolete reference to ON6TI
- Reply to Region-3 that In Region-1 144.390 is not suitable for APRS as it is totally incompatible with weak signal narrowband usage in the 144.000-144.500 MHz range and that 144.800 is well established in neighbouring Region-1 countries.
- Noting that further work is in prospect on the Region-3 band plan, to also advise Region-3 that Region-1 is willing to liaise/assist on harmonising narrowband, EME and APRS usage in both 144 and 435 MHz bands. That 144.800 or similar frequencies in the 144.7 or 144.9 areas (potentially compatible with Region-1) be considered – given existing terrestrial/maritime usage, geography and the prevailing wind directions for airborne/balloon APRS usage
- To consider if the current Region-1 432.500 frequency is the best choice for global harmonised APRS use in liaison with Region-2/3
- Consider an Input to the 2016 Region-2 Conference which will be held in Chile in October to also emphasise the need for globally coordinated use and offer liaison regarding VHF/UHF APRS
- To also consider a pan-Region effort to maximise compatibility for narrowband/EME harmonisation in the 144.000-144.500 and 432.0-432.5 MHz ranges in parallel with the APRS considerations (either at Chile or by other means)
- Emphasise that spaceborne APRS must be confined to globally coordinated amateur satellite sub bands. Therefore items that are ambiguous and generate confusion in national band plans such as 'Space communications' and 'New Oscar Sub band' should be removed as soon as possible in all Regions in accordance with IARU-AC and Satellite Coordination guidance

APRS - Additional Information

APRS in the 144 MHz band



Notes:

- a) Original source is acknowledged!
- b) We also understand that India has some 144.8 usage

Region-3 2015 Conference Recommendations

WG2 Recommendation AI 12.7/XVI	That the Region 3 Directors are requested to consult with Member Societies and Regions 1 and 2 as to whether the frequency 144.39 MHz is suitable for a common APRS frequency in Region 3.	WG-2-6
WG2 Recommendation AI 11.5/XVI	That the IARU Region 3 Band Plan is amended as set out in Annex 1 to this report. The Directors are requested to consider how the format of the Region 3 Band Plan can be changed in future to be similar to that of Regions 1 and 2.	WG-2-1

Region-2 Band Plan (Cancun-2013) extracts

Frequencies, MHz	BW(Hz)	Mode	Applications and observations
144,360-144,400	12000	DM	ACDS, APRS Center of Activity 144,390 MHz
144,500-144,600			Local Option
144,600-144,900	12000	FM, DV	Repeater inputs (exclusive) (output +600 kHz)
144,900-145,000	12000	FM, DV	Weak Signal
145,000-145,100	12000	All modes	ACDS, IVG (10 kHz channels) (Note 3)

(Note-3) – In Caribbean region 145,010 MHz must be protected for APRS operation

NB – Region-2 has no recommendation for 70cms APRS