

Maritime and Coastguard Agency (MCA) responses to
‘Independent Audit of SPECTRUM HOLDINGS
Emerging Issues - A consultation document – July 2005’

Responses to the Questions:

QUESTION 15

Do you agree with the principle that Administered Incentive pricing (AIP) be introduced for maritime navigation radar.

We do not agree with the principle that AIP be introduced for maritime mobile navigation radar.

Before giving the detailed reasons, it needs to be made clear that the term "maritime navigation radar" needs to be defined.

There are 3 basic classes of maritime radar –

1 those that are incorporated into International regulations – e.g. those of the International Maritime Organisation (IMO) – a United Nations Agency – through the IMO Safety of Life at Sea Convention (SOLAS). These are mobile radars.

2 those that are non – SOLAS, operate exclusively at sea, on small commercial and pleasure craft and are not mandatory carriage

and

3 those that are used for surveillance of coastal waters for a variety of purposes both civil and military.

CLASS 1

The IMO mandates through the SOLAS Convention that various classes of ships (classified by tonnage and use) should carry radar systems. This means that some of these classes will carry 2 radars and others only a single system. The systems are specified in the S and X bands and are part of the ITU Radio Regulations. The radars are in use across the world in Internationally mobile ships not registered or originating in the UK. The introduction of AIP in the UK if deemed feasible would be likely to result in a mass migration of UK registered ships to jurisdictions outside the UK.

IMO has recently (2004) revised the performance standards for radar, which increase the specification in terms of size of detectable target and detection probability. This requirement for high detection probability leads to the need for high peak transmitted power, very sensitive receivers and receiver processing that allows them to share with other radars.

The discussions in IMO have also confirmed that no alternative to radar is seen over the next few decades.

The essential use of such radar systems is for COLLISION AVOIDANCE not navigation.

The above requirements are likely to increase the necessary spectrum bandwidth required, but still within the current ITU allocations.

The need for an alternative spectrum allocation in both S and X bands remains. The different propagation properties of the two bands with regard to rain, snow etc, are well known, and will continue to be necessary.

The frequency bands in 2 900 to 3 100 MHz and 9 300 to 9 500 MHz are internationally harmonised in IMO and ITU and these bands are shared by all maritime countries. The characteristics of the mobile maritime radars have been developed over the years to avoid mutual interference. These radars also are capable and need to share with other radars e.g. military radiolocation and aeronautical.

The radar centre frequencies extend all over the above bands and market surveys have indicated that although there are some usage peaks within the bands, there are no parts of the bands that are not used. In addition, the military usage involves frequency hopping over the entire bands.

There is therefore virtually no scope to move these radars to other bands without formidable International negotiation. Such moves would also not be able to meet the current and ongoing operational requirements of the IMO.

Opportunities for improving the spectral efficiency of such mobile radars are extremely limited. Over the last few years as the requirements of the ITU have become more severe in terms of unwanted emissions, the radar industry has spent considerable finance at researching alternative solutions. Whereas military and aeronautical radars may have a basic cost of some millions sterling, the basic cost of a maritime mobile radar remains under £10 000, due particularly to ruthless International competition. There are also significant environmental restraints on board ships, in terms of location, weight, physical size, that constrain the technical solutions.

The fundamental method of transmission is the magnetron, first developed in World War II. Many improvements have been made in its transmission characteristics, particularly with regard to unwanted emissions. It remains the only means of transmission that is compatible with the global cost of such radars.

For maritime mobile radars, the key issues are meeting the IMO and ITU requirements (i.e. the International treaty obligations), meeting the International technical standards (IEC and ISO), researching new technology and market considerations.

Class 2

For non-SOLAS vessels there is no requirement for mandatory carriage of radar. IMO designates in SOLAS the classes of ships that are required to carry radar systems.

Below a certain tonnage limit and use category, there are no IMO requirements.

The single largest class of mobile radar users are pleasure/leisure craft. They number some millions, and operate exclusively in the X band, due to physical constraints. They are voluntarily fitted and are used essentially for collision avoidance. (the cost now of a GPS or equivalent receiver satisfies the navigation requirement).

There is intense International market competition. Despite this the industry has adopted similar standards to IMO, and to ITU for unwanted emissions. Such standards have been developed within the IEC and the UK has taken a major part in their development.

The carriage of such equipment is International, although voluntary. The introduction of AIP in the UK would be likely to not only reduce safety at sea, but also have a severe effect on UK manufacturers of such equipment.

A significant number of the craft in UK waters are of foreign origin and are not licensed for radio transmissions in the UK.

Class 3

Shore based maritime radars are used for surveillance of coastal waters. There are those that survey important shipping areas e.g. the Dover Straits, ports that have major commercial obligations to their customers, ports that are concerned with the environmental effects of groundings/collisions and military firing ranges that are concerned with local safety.

Most have radars that use the X band, but some of the more sophisticated also use S band.

In S and X band they use the same frequencies as mobile radars. In X band there are some systems in the band 9 200 to 9 300 MHz. In certain parts of the world there is International cooperation between systems to survey specific areas of the sea.

IMO has issued voluntary guidelines for such vessel traffic systems (VTS). There is also integration with the GMDSS Automatic Identification System (AIS). The AIS provides the shore component of the system.

Some of the more sophisticated systems use radars that are of singular design to fit the specific system requirements. For example, larger antennae, shorter pulse widths to provide improved target angular discrimination and range resolution in high density shipping areas.

The majority of port systems, particularly those with small traffic flows use modified maritime mobile radars.

The application of AIP to such systems would have a financial impact on the small ports, who might well consider closing down their systems and thus increasing the probability of collisions.

QUESTION 16

Do you think that there is scope through means other than pricing (e.g. technical regulations, better co-ordination) to enhance the utilisation and economic efficiency of radar bands?

The ITU has already developed Recommendations on spurious emissions (SM 329) and Out-of-band emissions (SM.1541). The limits in SM.329 are incorporated into the Radio Regulations (Appendix 3) and those in SM.1541 incorporated by reference as guidance.

There is current work in the ITU (JRG 1A-1C-8B) addressing the question of whether the OOB limits for radars could be made more stringent. The International maritime radar industry is fully cooperating in this work and some progress is being made in reducing the unwanted emissions from magnetrons.

The current ITU unwanted emission recommendations are already included in IEC radar standards and these apply to both classes 1 and 2 (see response to Question 13).

In Europe CEPT has reproduced the ITU Regulations for unwanted emissions for maritime mobile radars in CEPT Recommendations. It has also introduced a specific recommendation to cover fixed land based radars and created a future design objective much more stringent than that currently being studied in ITU.

QUESTION 13

What are your views on the technological, operational and economic feasibility of sharing between radar and other technologies?

With regard to the *technological feasibility*, the ITU has developed a series of Recommendations on protection criteria for radar systems. These include a generic recommendation; the remainder are band specific. These include the maritime mobile radar bands.

Extensive trials have been carried out in the UK and USA to determine the necessary interference to noise ratios that are required to protect such radars from various potential interfering sources e.g. IMT-2000, UWB etc. The results are being incorporated into the relevant ITU Recommendations and other radio services that are considering the feasibility of sharing in such bands are advised to take these results into consideration during any sharing studies particularly with regard to separation distances.

There are many other considerations before a case could be made for sharing (See the CEPT studies in SE 24 EEC Report 06 on possible sharing in the band 2 700 to 2 900 MHz between other radio services and Air Traffic Control radar).

There is a strong debate in ITU with regard to the necessary interference to noise ratios required by radar, and it may take many years to resolve.

With regard to **operational feasibility** this will require obtaining the agreement of IMO and ITU for maritime mobile radars (class 1 in response to Question 13) and then this requires the satisfactory answers to the Audit's Question 11. As maritime mobile radars (class 2 of Question 11) operate in the same physical locations as those in class 1 the same difficulties will apply.

Class 3 of Question 11 can be envisaged as being a possible candidate for sharing in particular locations, dependent upon local circumstances. In coastal regions most of the difficulties envisaged with sharing with mobile radars would still apply as the separation distances are small.

QUESTION 11

Views on how existing users can be assured that sharing will not compromise ongoing safety critical or essential use, including through equipment standards, testing, management of liberalisation and operational and technical parameters.

Equipment standards

All technical standards would need to be updated to reflect agreed sharing scenarios. Current maritime mobile radars have to pass a rigorous type approval regime that is reflected in IEC and ISO standards. This regime would need to be updated to incorporate the sharing criteria. In order to ensure a level playing field these standards and approval regime would need to be agreed on an International basis.

Testing

Regulatory Authorities (e.g.OFCOM) would need to carry out exhaustive testing programmes that covered all the likely scenarios, and the range of equipment characteristics, radar and sharing systems, so that the degree of uncertainty in the declared test results was to the satisfaction of the responsible authorities not only in the UK but also to the satisfaction of

International Administrations whose vessels were likely to visit the UK (CLASSES 1 and 2 of Question 15).

Operational and technical parameters

See testing above. The International authorities responsible for Class 1 of Question 15 would need to be satisfied that sharing had been proven to be safe over the full range of operational and technical parameters.

Management of liberalisation

This aspect for Class 1 of Question 15 is covered by the answers above.

NO SPECIFIC QUESTION

Secondary radar

The Cave report (Recommendation 12.2) states “develop a pricing regime for the spectrum used by UK based radionavigation equipment.”

Does this include e.g. maritime radar beacons and differential GPS (the responsibility of the General Lighthouse Authorities). Although there are IMO, ITU and IEC standards, such shore based facilities are mandated by IMO. They are part of the overall global provision of maritime safety equipment, and use specific frequencies recognised in the Radio Regulations. The application of AIP would seem inappropriate and considerations of sharing would need all the similar safeguards already discussed.

ADDITIONAL REMARKS

The Consultation document frequently refers to “maritime communications”. All the arguments against AIP and sharing, for mobile maritime radar (class1 of response to Question 15) also apply to the Global Maritime Distress and Safety System (GMDSS).

Although not mandatory, the communication equipment on small boats (non-SOLAS) (class 2 of response to Question 15) now has International standards through IEC and ETSI. They operate world-wide and in much of the same seas as Class 1, and the arguments against AIP and sharing apply.

Class 3 of the response to Question 15, in particular Coastguard stations, (some of which are integrated with VTS shore based radar stations) use International distress frequencies and other aspects of the GMDSS, and therefore the arguments against AIP and sharing would apply.