An Introduction to Private Mobile Radio

(Known in the UK as Business Radio)

A Contribution to the Spectrum Cluster

The Spectrum Cluster listed Private Mobile as a "Sector". It was felt important to provide an early contribution to the cluster on policy considerations relating business radio.

What is BR Used For?

BR is used in a surprisingly wide variety of situations. The following sectors have extensive applications involving BR:

Aerospace	Environmental	Pharmaceuticals
Airports	Events	Prisons
Banking	Facilities	Ports
Biotechnology	Film Production (e.g. SE)	Public Safety
Broadcasting Operations	Finance	Retail Stores
Broadcasting Production	Healthcare	Retail Centres
Chemicals	IT sector	Safety Related Operations
Construction	Lifeboats	Security (all types)
Defence Security	Local Government	Sport
Distribution Logistics	Manufacturing	Telecoms
Electronics	Marine	Transport Logistics
Emergency services	Oil Industries	Transport Operations
Entertainment	Petroleum Terminals	Utilities

Of course, there are many more that could be included.

Anywhere that has a need for team working and/or immediately accessible, very resilient radio communications with an extremely high success probability is likely to be a BR user. There are a lot of them.

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With such characteristics it will obviously be well suited for most safety-related, mission-critical or business-critical environments. From the UK's perspective, BR has already become deeply installed in many essential/critical operations and is being taken on by many more all the time[1].

BR provides its users with several advantages at very low cost. It is clearly an efficiency aid. But, increasingly, because of its impact on the safety environment, it is called up as a mandatory service that has to be available to teams working in certain environments.

Some examples from the transport sector (but any sector could have been chosen):

- If there is no BR in the cab, London Underground won't run and millions of people will have to walk to work with all the attendant safety issues that would cause.
- If there is no BR at airports, the under-wing services stop and the airport closes.
- If there is no BR, ports can no longer move containers and will close.

Points on Economic Value Calculations

With such examples it is not meaningful to calculate the economic value of the BR radio system. It must be obvious that such outcomes cannot be permitted to happen. However, it is useful to consider the various factors that might affect the validity of any such calculation as that provides a window into the usefulness of market mechanisms such as auctions to assign spectrum.

BR radio systems are usually very low cost yet they provide essential services without which the user organisation would fail to achieve its prime goal. So, for the sake of a few hundred thousand pounds, billions of pounds are lost if the port stops working. Thus BR is in many cases an extremely highly "leveredged" purchase. It is treated in financial terms not as a purchase from which revenue is directly derived but as an essential cost to the main business; just like a container lift crane might be. Similarly, the payment of the radio spectrum licence fee is a cost. Due to this concept of true essentiality, the belief that adjustment of the spectrum licence fee will cause the user to change their behaviour is not well founded. The port needs the BR service, that service needs a certain amount of spectrum to support its operation and that's the end of it.

It is possible to calculate the financial impact of BR in certain cases. For example, the use of BR services by traffic police to get to a road incident very much more quickly than they would otherwise be able to do and so save further accidents, can yield surprising monetary gains. For example, using freely available data on the cost of deaths and serious injuries and assuming very modest efficiency improvement outcomes such as only a few percent of improvement in casualties from knock-on accidents at incidents, it is possible to show that over the life of the BR system, billions of pounds can be saved. However, the really important fact that emerges from such analysis is that it isn't the police that make that saving. It is the insurance companies. Thus the entity making the investment in BR does not see the financial advantage and the entities who do receive the benefit in terms of lower payouts find it extremely difficult to financially recognise them on their books. But, overall, everyone can agree that UK society is far better off as a result of the BR system.

A BR radio system purchase is treated as an essential cost; not a revenue generator, the essentiality may be so total as to make calculation of benefit pointless, the entity buying is may be different from the person gaining the benefit and the entity receiving the benefit may not be able to financially recognise it. But, on the other hand, the BR function may be so highly "leveredged" that the financials resulting from the calculations on a national scale can be truly huge. Worse still, in most cases the use of BR is invisible to the general public. Most of the time, the use of the BR systems prevents

[1] Market research indicates that BR digital technologies have been growing by ~20%pa (compound) for 4 years and show no signs of slowing.

anything unpleasant happening. When things do go wrong, the BR systems (being very resilient) will be available to the work crews to help a speedy recovery.

The conclusion must be that, in the case of BR, consideration of simple economics is a poor mechanism to judge worth and so policy decisions are adversely affected if based on economics alone.

Radio Spectrum Considerations

Many applications are heavily focussed on voice communications[2]. This is because of basic human nature. When a situation gets "intense", most people immediately switch to voice to make sure they get the response and support they need.

The main future demand for radio spectrum in the voice arena is simply to allow for more air traffic generated both by greater numbers of users and by existing users using the systems more. The recent growth of BR is already causing very severe congestion in major urban areas. It is already very difficult or impossible on occasion to obtain spectrum licences in London in the UHF bands. Other urban areas are also expected to reach saturation soon. The BR industry is therefore very keen to assist Ofcom in its work to alleviate these problems.

BR spectrum bands are generally harmonised. This provides scope for scale economies up to a limited level. These very high performance systems are today, very sophisticated. The development investments needed to bring equipment to the market are correspondingly high. Thus this highly specialised equipment is not easily available for all bands. This means that in policy terms, the UK does not have the flexibility to re-locate these essential services to other bands neither does it have the option to reduce the bands the service already occupies.

As the sector develops and expands to satisfy new user requirements there will definitely be a need for much more spectrum. The advent of deeper integration into users operational systems and the increasing complexity of the users' operations has given rise to an increasing (and in terms of the lack of spectrum to support such communications, very worrying) tendency to consider genuinely mission-critical rich-content services. The radio spectrum to support such use might be difficult to identify in the UK. It is important to note that these rich-content services will necessitate different equipment. Thus these services may not be tied to the same bands as are currently used for BR. Other bands may be identified but that would require a global effort to achieve an acceptable level of scale economy. Such bands may already exist at higher frequencies. However, the issue of the site network remains unaddressed. It is acknowledged that this is a very complex issue.

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[2] The users obviously have occasional need for some of the more complicated applications seen on public mobile systems. These almost always at a lower priority and so users are content to have access to both BR and public systems to meet their needs. They off-load the low priority calls to the public mobile systems, leaving the BR to handle the mission-critical communications.