



**The Importance of Business Radio to the UK**  
**A contribution from the FCS Business Radio Group**  
**October 2007**

## Contents

	Page
<b>1. Purpose</b>	<b>3</b>
<b>2. Introduction and background</b>	<b>4</b>
<b>3. Overview of typical Business Radio users</b>	<b>5</b>
<b>4. Key operational advantages of Business Radio and their relevance to users</b>	<b>6</b>
<b>5. Specific case studies, operational benefits and problems averted</b>	<b>9</b>
<b>6. Monetary evaluation of the operational benefits</b>	<b>13</b>
<b>7. Knock-on effects</b>	<b>13</b>
<b>8. Summary of financials and societal benefits</b>	<b>14</b>
<b>9. Conclusions</b>	<b>14</b>
<b>10. References</b>	<b>15</b>
<b>Appendix 1</b>	
<b>Comparison of Business radio and other services</b>	<b>16</b>

## 1. Purpose

Business Radio (BR) spectrum is used by organisations to operate private two-way mobile communications networks for their own private use (i.e. for internal communications purposes rather than for offering communications services to the public).

BR systems are owned by a licensee or user, such as a construction company or hospital, and operated with the professional support of dealers. Licences to access radio spectrum of a specific frequency to operate Business Radio are issued by the UK spectrum regulator Ofcom

It is very evident that the value of the BR sector to the UK economy is not high on the public agenda and may not be fully appreciated, even by the spectrum regulator. The result is that regulatory policy decisions may well be made resulting in an irreversible negative impact on the very great contribution that BR makes to UK plc.

Whilst the value of the actual sales and services in the sector is measured in tens of millions of pounds, the wider benefits to companies and organisations comprising UK plc is in the order of hundreds of millions. Users not only gain efficiency benefits but they also have to have the unique functionality provided by Business Radio to meet increasingly stringent Health and Safety and other legislative requirements.

This contribution provides an analysis of the current value of Business Radio to the UK, based on examples of its widespread use, particularly in support of critical infrastructure, in order to highlight that the sector's continuing requirement for spectrum is an essential input to the whole UK economy.

In summary by means of this contribution we aim to:

1. Raise the public profile of Business Radio
2. Gain recognition of the importance of guaranteed access to radio spectrum for Business Radio and where current spectrum policy is deficient.
3. Alert decision makers to the national detriment if spectrum access is not forthcoming

## 2. Introduction and background

In the UK and across Europe access to radio spectrum is increasingly important in public debate.

Principles underlying the basis of future EU spectrum policy were outlined by the European Parliament in its “Resolution towards a European policy on the radio spectrum (2006/2212 (INI))” adopted on 14 February 2007 (Reference 1). In particular the EP notes:

Clause 8 “The EP rejects a one-sided market model of spectrum management and urges the Commission to reform the system of spectrum management in such a way as to facilitate **the coexistence of different types of licensing models, i.e. traditional administration, use without numerical restrictions and new, market-based approaches**; stresses that the aim must be to boost economic and technical efficiency as well as the usefulness to society of this valuable resource.

Clause 17 “Adequate amounts of spectrum should be allocated to the needs of consumers and of **services of public and general interest**

Clause 18 “Urges Member States to take a decision on the priority to be given to **the protection of the public interest and of frequencies of strategic importance as a key principle in developing spectrum management policies**”

Ofcom’s Consumer Panel in its 2006-7 Annual Report section 22 (Reference 2) says,

“We asked Ofcom to think about holding a spectrum bank as a reserve for socially beneficial services and which part of the spectrum would best be used for such a reserve”

This paper has been prepared by the FCS Business Radio Group based on a survey of FCS members reporting on the use and value of business radio by their customers and their future requirements. We identify where BR is used as an essential input across the economy and where the public interest is served.

A fuller analysis of the scope of BR (also referred to as PMR) its markets, use and was published by consultants Analysys, Dot econ and Mason in December 2004 in their study of future uses of Band III spectrum for Ofcom (Reference 3)

### 3. Overview of typical Business Radio users

Business radio users are found in every economic sector of the UK economy. FCS members contributing to a survey carried out in February 2007 support customers in the following broad economic sectors:

Aerospace and airports  
Automotive  
Banking  
Biotechnology  
Broadcasting  
Chemicals  
Construction  
Defence  
Education  
Electronics  
Emergency services  
Entertainment and events  
Environmental  
Finance  
Healthcare  
IT sector  
Local government  
Manufacturer  
Marine  
National government  
Petroleum  
Pharmaceuticals  
Ports  
Public safety  
Retail stores  
Retail centres  
Security  
Sport  
Telecoms  
Transport  
Utilities

#### **4. Key operational advantages of Business Radio and their relevance to users**

While all UK companies and organisations can and do use public telephony services to conduct their business there are crucial areas where only business radio services can provide essential support.

These key areas are:

- Health, safety, security, emergencies
- Disaster recovery and business continuity
- Operational efficiency
- Dedicated bespoke services

The important operational advantages cited by BR users are:

Service features:

- Immediate communications to one or all workers
- Resilience
- Fast call set up. (one button)
- Users can define their service levels and are not reliant on third party networks
- Call priority and pre-emption

Control:

- Coverage can be tailored for use in any environment including basements, internal communications, tunnels
- "Group Calls" i.e. messages to, from and between targeted audiences
- The ability to use data, speech (and a mix of both) on a single channel

Security:

- all communications traffic remains on the organisation's private network

Cost:

- Investment and running costs are known and not subject to public network fluctuations
- low, easily budgeted costs and operational costs

Equipment:

- Robust equipment is available for business, harsh environments and hazardous site use
- Equipment is easily repaired.
- Radios are easy to use

##### *Health and safety*

A major benefit of business radio is in support of employers' Health & Safety obligations, particularly relating to lone workers.

Lone working is an example where specific legislation applies. The Health and Safety at Work etc Act 1974 (HSW Act) and the Management of Health and Safety at Work (MHSW) Regulations 1999 state that employers have responsibilities for the health, safety and welfare at work of their employees and the health and safety of those affected by work. Lone working comes under this Act.

Although there is no general legal prohibition on working alone, the broad duties of the HSW Act and MHSW Regulations still apply. These require the employer to identify hazards of the work, assessing the risks involved, and putting measures in place to avoid or control the risks. Using BR significantly reduces the hazards of lone working by providing a path whereby other BR users will be informed if a lone worker has not responded to a request or has become incapacitated in any way. This is actioned



by the radio subscriber equipment. Timers on the equipment alert the user to respond after a set time period or via man down options. Man down use is where an emergency call is automatically transmitted when the radio unit is off of the vertical plane for a pre-set time and angle i.e. when the lone worker falls over the alarm goes off.

BR users have prescribed radio coverage in areas of buildings for example where the mobile phone networks cannot penetrate and therefore mobile phones would not be a viable alternative to BR.

Other vital applications include people tracking with radio, emergency call, linking fire alarms to radio, operating alarms and closed contacts over radio, fire brigade access to building communications system on arrival to evacuate building so they have radio coverage on site.

Hospitals use BR and paging for calling emergency teams when patients suffer heart attacks and other emergencies. They also use BR for general administration and maintenance.

#### *Disaster recovery*

When a disaster occurs immediate communication is essential to locate workers, co-ordinate disaster handling and getting business back on its feet. The bombs of 7/7 2005 led to widespread panic, localised overload of the public telephony networks and network outage resulting in delay in recovering the situation. Businesses in London were brought to a halt. However the many banks in the City of London were able to continue trading by using their own private radio networks and gaining economic advantage.

The London Assembly report on 7/7 (Reference 4), published the following year, focussed particularly on the essential need for radio communications saying:

**“We recommend that, as part of the review of the PPP to be concluded in 2010, London Underground, Metronet and Tubelines seek to speed up the rollout of the new radio system to enable train drivers to communicate with their line controllers. In the meantime, we recommend that Transport for London conduct a study of possible interim solutions to increase the reliability and resilience of radio communications between train drivers and line controllers. We request that Transport for London provide us with an update on progress in time for our November 2006 follow-up review”.**

The London Assembly report also heavily criticised the emergency services reliance on mobile phones that were unusable during 7/7. This greatly reduced the efficiency of the emergency services (and even caused unwitting ambulance crews to ferry casualties to distant hospitals that were already overloaded when nearby hospitals had emergency teams ready and waiting).

The occurrence of congested networks during disasters is well known. It happened in New York on 9/11 2001, as well as in Istanbul, Madrid and during the US hurricanes in 2005. The GSM Association itself counsels against the use of GSM during widespread emergencies. The use of Access Control by the cellular networks during 7/7 was not a great success because of the unclear authorities required to initiate it and the inefficient administration of the mobile numbers.

#### *Operational efficiency*

Many BR users use radio everyday to contact staff on the move, for logistics management or where public telephony will not work, such as basements, tunnels or in rural areas.

#### *Dedicated bespoke services*

Dedicated bespoke service, such as machine-to-machine communications, is a growth area.



Remote control of infrastructure is just one example. Operation of sluice gates and pumps in the water industry has traditionally been upon manual instruction from an operator, but increasingly automatic monitoring systems are being installed to make the decisions and operate the controls. Some of these systems operate over fixed lines, some over microwave radio, but as automation increases, some of these links may operate over business radio systems. London Electricity has some 7000 terminals on their remote control system classified as BR terminals. Buses talking to traffic lights and bus shelters, aircraft relaying data for servicing to the ground as they approach the airport, etc. are further illustrations.

## **5. Specific case studies, operational benefits and problems averted**

The following case studies illustrate the widespread and essential use of business radio.

### **5.1 Dartford Crossing**

The Dartford Tunnel and QEII Bridge forms a strategic part of the M25 orbital motorway and the UK Transport System. Its operator, with an annual turnover of £60 million pa, relies on BR to maintain operation.

BR is crucial for Health and Safety as there is a very high volume of traffic using the tunnels and bridge, hence a real accident potential. The radio system provides coverage throughout the site in the tunnels and on the bridge and for a couple of miles either side. All service vehicles and personnel in the toll booths have radio contact with the main control room which is responsible for all traffic movements on the crossing.

Without BR the H&S issues would compromise the traffic flow and the delays to traffic would have a significant impact on UK road services and social life. The operator requires a highly resilient system that is not dependent on third party network operators. Their system currently provides a number of fall back options allowing continued operation in the event that the primary system goes down. There are no alternatives that meet their requirements.

A loss of BR would lead to a slow down in through put or maybe even closure of the whole crossing.

### **5.2 Channel Tunnel Rail Link construction**

Construction of the new Channel Tunnel Rail Link from Folkestone to St Pancras is heavily dependent on BR for its completion. This project alone is valued at £5 billion.

Business radio is used for the control of all construction and commissioning of the track, high voltage catenary, signalling and the high speed train tests up to 330kms per hour.

During peak activity there can be 30+ construction trains operating under strict rule book conditions with men working on the track. In the event of loss of communications all track work must stop. There are no alternative services as the operator must use a system with instant communications providing an all informed voice channel (this means all users can hear the radio traffic) over a distance of up to 80 kms. Other communications services were investigated and rejected as they do not meet the strict criteria of instant, reliable communications under the customer's own control and tailored to their specific needs. Large parts of the track (17 kms) at the London end are in underground tunnels, where radio works and public systems do not.

An incident occurred with a fire in a tunnel in which two people died and the emergency services had to use the customers' BR system as their own radios would not work underground.

### **5.3 London Underground**

LU moves 3 million people per day around the capital. Business Radio is essential for the functioning of the railway service to ensure communication with staff operating trains and stations and between engineering and maintenance staff. LU also supplies radio services to the British Transport Police and London Fire Brigade, providing radio coverage at over 130 deep tube underground stations.

LU operates under a legal Safety Case that requires specific radio services to be available to operate trains under one person operation in tunnels. There is no other radio service that meets these strict requirements. If the LU radio system has a fault and there is no coverage in an area, no passengers

will be transported through that area. This can lead to major disruption and even shutdown of a complete Line.

A major investment in Business Radio is the 20 year Connect PFI at an estimated £2 billion. This is a new TETRA system for the whole of the LU network. It is currently being enhanced to support Airwave services in all deep tube stations and tunnels.

LU is also planning a £2M investment to replace obsolete Business Radio equipment in order to continue to support London Fire Brigade's UHF Fire Ground Communication capability in deep tube stations and extending coverage into all tunnels.

#### **5.4 Container terminal**

The radio systems in this £89 million per year company are used for operations, security and health and safety. Terminal operations use the BR for controlling cranes, straddle carriers and men during the unloading and loading of 1.5 million containers per annum. Security use the radio system to protect the perimeter for personnel safety and containers stored on site. Security is also in place to protect against terrorist threats. The radio system is used for general Health and Safety as this system is used to broadcast an 'All Stop' in the event of emergency. If two radio systems fail, the terminal has to stop operations.

#### **5.5 Oil refinery**

As in other major sites the radio systems in oil refineries are used for operations, security and health and safety. Operations use the radio system for controlling personnel relating to oil refining, maintenance of equipment. The Security function uses the radio system to protect the perimeter, for personnel safety and against terrorist threats. Health & Safety is paramount on the site. Personnel use the radio for lone working. Medical teams use the radio system to speed their response and all general site communications, other than desk phone or email, is carried out over the radio system.

#### **5.6 Multinational pharmaceutical company**

BR is used throughout the manufacturing site for control of people, processes, machines, lone worker safety and emergency services. This is a top rated Intrinsically Safe site and a high tier COMAH site (Control of Major Accident Hazards ([www.hse.gov.uk/comah/index.htm](http://www.hse.gov.uk/comah/index.htm))) therefore has a high potential of explosion/fire. They run their own fire and emergency services on site. There are also employee security issues. Without BR communications safety of work would be compromised and hence production output. The site would have difficulty operating and meeting the stringent H&S regulations or obtaining insurance without its radio systems.

There are no alternative services to BR since the company needs full mobility and security from a system that they control without dependency on third party networks. They have many groups of workers linked via radios and need the ability to call groups and individuals as well as "all call" in emergencies.

#### **5.7 Plant hire to the construction industry**

Two-way radio is used for the management of construction sites. Crane and safety operations cannot have any audio delays. If the groundsmen calls to the crane man "don't drop" and there is an audio delay the crane operator may only hear "drop", with potentially harmful results.

Use of radio is fundamental to give adequate safety cover on all construction sites

#### **5.8 Britain's biggest waste cleaning company**

The company uses BR in its cleansing vehicles and dust carts. This chain has contracts with Councils throughout the UK. For refuse collection they use BR to direct their vehicles as to which runs to service next. Without radio, inefficiencies resulting from duplications and missed runs would occur and “all-call” alerts could not be made. Holding a mobile phone is illegal and unsuited to this environment.

### **5.9 Traffic enforcement**

A large traffic enforcement company with a turnover of £154 Million has contracts with 35 Councils to provide traffic wardens, clampers and tow trucks.

The company uses radio for safety and security of their personnel and for the passing of instructions and relevant information between control and their operatives. If BR were not available they would be forced to use mobile phones as an alternative. These, they already use in some outlying areas but they find them to slow and inefficient for use in large busy areas. The slowness of use when summoning assistance is especially problematic.

### **5.10 Britain’s largest bank with a turnover in excess of £200 Billion**

BR is used in all of the bank’s city buildings and many others throughout the country. The bank uses BR for security i.e. anticrime measures and also anti terror measures (they have had bomb attacks in other parts of the world) and also day to day routines such as maintenance, cleaners, reception. Most of their large buildings have several basements and vaults where mobile phones will not work. The bank also requires the simplicity and speed of operation that BR gives. Under current health and safety regulations many of their operations would not be possible without BR.

### **5.11 Film industry**

This company has a world wide value of £21.8 billion and is worth between £500m-£800m to UK PLC.

BR is essential for providing communications during film shoots. Upwards of 500 radio units over 20 channels link various factions together when required. Users range from the Director, through assistant directors, make-up, special effects, electricians, carpenters etc. A film would not be able to be completed on budget without the use of BR.

There are NO alternatives to BR.

Mobile phone coverage is poor inside buildings, basements, underground stations, film locations and television studios etc so mobile phones could not be used. Also BR communication is instant and can be a ‘1-to-all’ call. Imagine a scenario where a film director had to tell a special effects team to proceed with an explosion at a certain point in the film. Can you imagine if these types of call were made via mobile phones which has a time delay in the system processing the call. With poor cell performance and peer-to-peer calling only, mobile phones are not fit for purpose in these and thousands of other working scenarios.

### **5.12 BBC outside broadcasts and live shows**

The UK’s public service broadcaster has an annual turnover of £784 million. As well as use of radio spectrum to broadcast TV and radio shows and for programme making, business radio is used. BR communications is used for film shoots, outside broadcasts and shows (live and taped) as well as for security, facilities, engineering at various BBC sites in the UK.

### **5.13 Formula One Management**

BR facilitates communication between 200 users over 20 groups. A MPT 1327 trunked conduit allows Formula One Management to bring a Formula 1 event live to millions. Ofcom actually provide the frequencies for the UK event at Silverstone....Over 530 radio channels are required for the teams, FOM, FIA, events, concessions etc!!!!!!!

Imagine if race director had to make a call to red flag a race due to an accident via public telephony systems with its inbuilt delays.

#### **5.14 A large premier league football club with a turnover of £177 Million.**

Football clubs use BR for many things, the chief of which is crowd control on match days. Club managers also communicate via BR directly with the on ground police, fire and ambulance services. The biggest benefit to them is the all informed ability whereby with one press of the button control can speak to everyone and everyone knows what is going on. If a decent radio system had been available at Hillsborough the resulting tragedy would probably not have happened. Without their two way radio system our client would lose their safety certificate and be unable to stage matches.

#### **5.15 A hotel chain with hotels throughout the country and a turnover of £187 Million.**

Hotels use BR for onsite communications between management, chambermaids, kitchen staff etc. During the day in a hotel 101 different things can happen that need individual attention. In the old days they had to try to use a house phone system which was inefficient. Since staff are mobile the calling party had to try many extensions in the hope of locating the required person, in any kind of urgent or emergency situation such a system was obviously hopeless.

#### **5.16 Routine use**

Diverse organisations rely on BR for day to day activity and operational management. Three examples are:

**Stocks & Shares Trading** - Within this £298 billion annual turnover authority the radio system is used for site security, maintenance and general facilities management.

**Shopping Mall Operator** - BR is used to ensure total and immediate communication between shops, security and Mall management. Without radios shoplifting would grow explosively and worker security put at risk Shop Watch schemes proliferate across all UK shopping malls.

**Supermarkets**- BR is used for shop security, stock replenishment and customer safety. BR provides fixed cost, instant communications.

## 6 Monetary evaluation of the operational benefits

The case studies illustrated above show that business radio is used to support major infrastructure, industries and construction in a cost effective manner.

Public sector users have long term investment and pay back periods compared to the commercial sector.

Feedback from FCS members has shown that:

- In the public sector the ratio of BR investment to organisation turnover is approximately 1:30
- For a major private manufacturing plant with a turnover of £100 million the radio system cost £100,000; the infrastructure life is 10 years and terminals last up to 7 years
- For a major construction project valued at £5 billion the cost of the radio system over 6 years is £2million

## 7 Comparison of BR to public mobile services

The ubiquity of use of BR outstrips public telephony in many areas.

The table in Appendix 1 has been adapted from the Emergency Communications Requirements for communications from authorities/organisations to individual groups or the general public during emergencies published by ETSI in 2006 (reference 5). It compares the facilities of paging, cell broadcast, SMS, TV with Business Radio.

In comparison to public telephony cell broadcast and SMS, BR like paging, allows simultaneous delivery to targeted large audiences or geographies, and is able to retry delivery when the initial message delivery fails, send data as well as speech to specific groups.

In virtually all other areas of spectrum management the running is made internationally, through spectrum management conferences for broadcasting, international organisations for aeronautical and maritime use etc. Emergency services gain access through CEPT decisions, WiFi, WiMax and satellite services have pressure through IEEE standards. Even Radio Astronomy has international agreements which influence UK decisions on spectrum allocation. Public mobile telephony, both GSM and 3G have harmonised international preference bands. Microwave fixed links use bands not of much benefit to other services. That puts the squeeze on Business Radio where there is little international pressure, no international organisations such as the European Broadcasting Union, but considerable competition for the spectrum.

## 8 Knock-on effects

Respondents to the FCS survey identified future system requirements that will require additional or alternative radio spectrum. These include:

- Demand for increasing bandwidth for data exchange and real time video used for maintenance and in emergencies
- Digital functionality will have many uses but real time analogue is required for certain circumstances
- Clients are already demanding more 'cellular like' features such as telephony, text messaging, and data, secure voice. BR supports these now either as standard or with 3<sup>rd</sup> party boards. With the onset of the newer DMR digital BR products, not only are these features 'as built', but the newer

technology will further enhance these features as well as bringing more advanced features such as IP connectivity to the fore.

- Narrow band technology will also 'grow' the available spectrum allowing more users to share the same space increasing revenue not only for the dealers but also for Ofcom and UK PLC as a whole.
- Smaller, lighter units

## 9 Summary of financial and societal benefits

The value of BR to the economy is up to 2000 times the cost of BR infrastructure systems and terminals. FCS and the Radiocommunications Agency have separately calculated the economic impact of the BR industry to be £1-2 billion pa and with a 5-10 year investment lifecycle in BR projects its leverage effect is worth up to £20 billion annually.

The societal value is not directly computed but if the petroleum refinery or pharmaceutical company cannot function without radio systems the value is equivalent to the insurance payout of a system failure.

Radio is used to protect people as well as goods. Preventing harm or loss of life are growing features of 21<sup>st</sup> century life. If access to radio spectrum is not certain how will these central economic pillars support the economy? Access to spectrum via the spectrum market is not a certainty as the auction of the 2x2MHz UHF spectrum in September 2006 illustrated. One company won the entire spectrum but the organisations that required spectrum in smaller lots for essential use were left out.

Politicians need to be aware of the potential loss of essential services as a result of current spectrum policy if those requiring spectrum for safety of life have lost out to those with deeper pockets providing entertainment.

## 10 Conclusions

Whilst it may be possible, albeit with difficulty, to value most things in financial terms, it is not appropriate for critical areas like the allocation of spectrum to be left to market forces alone. The problem is that business plans are often judged by how fast they return the investment and by how much. Whereas this short term view is perfectly rational when viewed from the Board Room but may in reality be against the National Interest if judged by long-term considerations.

As a finite resource, spectrum is often equated to land. However, no-one would consider it wise in the long term to sell off all of Whitehall to the highest bidder despite the obvious financial reward in the short term and the money that would be introduced into the economy by such a move.

Much of the difficulty in assessing spectrum worth lies in the fact that in very large numbers of the most critical applications it is through its use rather than its intrinsic worth that value is gained. After all, a hammer is an essential tool to the building industry but, quite rightly, no-one discusses raising the price of hammers by initially restricting supply then holding auctions.

The dilemma for the Business Radio community and Ofcom is that the former require certain access to radio spectrum in future, whereas Ofcom is delivering spectrum to the market by the single mechanism of an auction. The two positions are incompatible and another mechanism, a negotiated route, is needed for Business Radio.



We encourage Ofcom and Government to find ways of ensuring that Ofcom has a variety of tools to ensure spectrum is allocated to those parts of the economy that need it. Without BR can Government guarantee that the trains will work, the ports function and construction for the Olympics proceeds?

## 11 References

1 "Resolution towards a European policy on the radio spectrum (2006/2212 (INI))" adopted on 14 February 2007- European Parliament

2 Ofcom Consumer Panel Annual Report 2006-07, June 2007

3 Annexes to Final Report for Ofcom: Assessment of options for allocating available spectrum within VHF Band III (174–230MHz) and L-Band (1452–1492MHz) - Analysys, Dot-econ and Mason-December 2004, published by Ofcom

4 Report on July 7 2005- London Assembly Review Committee- ISBN 1 85261 878 7  
<http://www.london.gov.uk/assembly/reports/7july/report.pdf>

5 Emergency Communications (EMTEL); Requirements for communications from authorities/organizations to individuals, groups or the general public during emergencies - ETSI TS 102 182 V1.2.1 (2006-12)

## Appendix 1 Comparison of Business radio and other services

Adaption from (ETSI TS 102 182 v1.2.1 2006-12) published by ETSI in 2006 (Reference 5)

**Table 2: Mobile terminals for use to alert the public in times of crisis**

V = compliant X = non compliant O = not relevant

Emergency notification systems shall:	Paging	Cell Broadcast	SMS	TV	Specifically designed PBR	General PBR
be able to reach citizens in their own dwelling;	V	V	V	V	V	V
be able to reach citizens at their place of work;	V	V	V	V	V	V
be able to reach citizens in public venues;	V	V	V	V	V	V
be able to reach a citizen citizens on foot;	V	V	V	V	V	V
be able to reach a citizen citizens in a vehicle;	V	V	V	X	V	V
provide sufficient instructions regarding actions to be taken;	V	V	V	V	V	V
provide identification of the message/notification originator;	V	V	O	V	V	V
deliver messages within a planned specified time;	V	V	O	V	V	V
allow simultaneous delivery to targeted, large audiences or geographies;	V	V	X	O	V	V
offer sufficient details of the emergency situation;	V	V	V	V	V	V
be able to retry delivery when the initial message delivery fails;	V	O	V	O	V	V
support delivery of notification messages to those with special needs and unique devices, like terminals of hearing and speech impaired persons;	V	O	V	O	V	V
have the ability to deliver messages in multiple languages;	V	V	V	V	V	V
Be capable of addressing congestion management across the various networks used.	V	V	X	V	X	X

**Table 2: Mobile Radio comparison of features**

<b>Feature</b>	<b>Paging</b>	<b>CB</b>	<b>SMS</b>	<b>TV</b>	<b>Specifically designed PBR</b>	<b>General PBR</b>
Immediate Messaging	X	V	X	V	V	V
Good coverage	V	V	V	V	V	V
Portable	V	V	V	V	V	V
2 Way	X	X	V	X	V	V
Long Battery Life	V	X	V	X	V	V
Speech and Data to individuals	X	V	V	V	V	V
Speech to specific groups	X	X	X	X	V	V
Speech to individuals	X	V	V	X	V	V
Data to specific groups	V	X	X	X	V	V
Data to Individuals	V	V	V	X	V	V
Robust Terminals	V	X	X	X	V	V