HOME OFFICE
Queen Anne's Gate London SW1H 9AT
Direct Line: 071-273- 2531
Switchboard: 071-273-3000

Our reference:

Your reference:

To : All Chief Officers

11 January 1993

Dear Chief Officer

DEAR CHIEF OFFICER LETTER 2/1993

Items

1. Cloning of Handheld Radios.
2. Major Review of Radio Communications for the Emergency Services - Home Office Communications Advisory Panel (HOCAP).
3. Road Traffic Act 1991 : Road Humps and Variable Speed Limits.
4. Technical Bulletin 2/1992 - Acetylene.
5. Aerial Appliances - Public Displays.
6. RAF Search and Rescue Helicopter Equipment Upgrade - Night Vision Goggles.
7. British Rail - Emergency Planning and Contact Arrangements with Emergency Services.
8. British Rail - Emergency Cutting - Aluminium Rolling Stock.
9. Hazards Posed to Firefighters by Asbestos.
10. Fire Service Inspectorate - Fire Safety Inspections of Brigades.
11. The Cone Calorimeter : A Small Test Method for Fire Growth - Fire Research Project.
12. Comparison of British Standards BS 5445 : Part 7 and BS 5446 : Part 1 - Fire Research Project.

Yours faithfully

SIR REGINALD DOYLE
Her Majesty's Chief
Inspector of Fire Services

FIRE SERVICE COLLEGE
00034534J
TH 9537. DCO

CLONING OF HANDHELD RADIOS

Item 1 of DCOL 7/1990 dealt with radio communications at incidents and referred to the availability of extra channels for operational use. Item 9 of DCOL 5/1991 reported progress in relation to UHF and VHF radio interoperability.

2. Some of the current generation of handheld radios facilitate full or partial channel programming by a technique known as "cloning". In this technique, channel programming information can be passed from a "master" or primary handheld radio to any number of "slave" or secondary radios by means of a special interconnecting cable. Since the issue of new fireground frequencies, there has been a tendency by some brigades to adopt cloning as a means of adding these new frequencies to fireground radios.

3. It should be noted that information specific to any one channel may not be transferred or, in the case of partial cloning, could disrupt some of the settings specific to any one channel already programmed into the "slave" radio. An example of a setting specific to any one channel is deviation which is the extent to which the frequency of the carrier wave is increased and decreased in sympathy with the amplitude and polarity of the modulating signal. The change in the frequency of the carrier wave is known as the frequency deviation or simply as the deviation.'

4. Before transfer takes place, users should be satisfied that all settings specific to any one channel of the "master" radio will be correctly transferred to the "slave" radio without disrupting the settings specific to any one channel of the "slave" radio. If that cannot be guaranteed then full or partial cloning should only be regarded as a short-term emergency means of programming a radio. Settings should be checked, at the earliest opportunity, by a technician using a field programmer. <u>All</u> cloned radios must be properly tuned and this should be done as soon as possible.

5. Chief Officers should confirm with the manufacturer any technical limitations inherent in the use of this technique which could affect their equipment before using cloning as a routine means of programming their Brigade's radios.

6. This item is for information and no significant financial or manpower implications are envisaged.

File reference number : FEP/91 59/1507/15

Telephone number of contact : 071 273 3842/4006 (technical)
071 273 3583 (general)

Item 2
DCOL 2/1993

MAJOR REVIEW OF RADIO COMMUNICATIONS FOR THE EMERGENCY SERVICES - HOME OFFICE COMMUNICATIONS ADVISORY PANEL (HOCAP)

Dear Chief Officer Letter 3/1991 informed brigades of progress with the Major Review of Radio Communications for the emergency services. Brigades were asked to complete a comprehensive questionnaire leading to the establishment of a User Requirement for radio communications within the police and fire services.

2. This item informs brigades of further progress and advises Chief Officers about a Home Office Communications Advisory Panel (HOCAP), established to provide guidance for the provision of new or enhanced radio communications systems for fire brigades and police forces while the Major Review is being conducted.

PROGRESS REPORT

3. The draft Fire Service User Requirement for England and Wales was discussed with brigades at regional seminars held during Autumn 1991. The revised User Requirement issuing from these seminars was approved by the Joint Committee on Fire Brigade Communications at its meeting on 11 March. It has now been taken forward into the next stage of the major review which involved comparison with a parallel User Requirement developed for the police service. The review has also identified and examined the technical, management and financial issues involved in meeting the requirements. A detailed submission to Ministers will be made shortly.

HOME OFFICE COMMUNICATIONS ADVISORY PANEL (HOCAP)

4. A Home Office Communications Advisory Panel has been established, primarily to assist police forces to avoid wasteful investment, to maintain standards and preserve national operational considerations. HOCAP is also tasked with assisting fire brigades in an advisory capacity on those occasions when requests are referred to them from the Home Office Radio Frequency and Communications Planning Unit (RFCPU). The fire service HOCAP is chaired by the head of RFCPU and membership includes representatives from RFCPU and the Fire Service Inspectorate.

5. It is envisaged that applications for change or increase in frequency assignments would normally be referred by brigades to the RFCPU, who will consider any such applications and decide whether the proposed change has any implications for the work of the Major Review.

6. Brigades proposing developments to radio communications systems may choose to meet with HOCAP in order to discuss their proposals. Brigades wishing to discuss proposals with HOCAP should contact Her Majesty's Inspector of Fire Services (Telecommunications), Room 956, Home Office, 50 Queen Anne's Gate, London SW1H 9AT (tel 071-273-3842).

7. Discussions within HOCAP are regarded as confidential.

8. Detailed advice in the form of guidance notes is being prepared and will be issued to brigades by the Home Office Radio Frequency and Communications Planning Unit (RFCPU).

9. This item is for information and there are no significant financial or manpower implications.

File reference number : FEP/92 59/1507/10

Telephone number of contact : 071-273-3583 (general)
071-273-3842 (technical)

Item 3
DCOL 2/1993

ROAD TRAFFIC ACT 1991 : ROAD HUMPS AND VARIABLE SPEED LIMITS

Chief Executives were notified by Department of Transport Circular 2/1992 on 17 August 1992 that an Order was made to commence, with effect from 1 July 1992, the provision of Section 45 and Schedule 4, paragraph 12 (amongst others) of the Road Traffic Act 1991. Chief Fire Officers may wish to note the contents of that circular.

2. Section 45 of the Road Traffic Act 1991 amends Section 84 of the Road Traffic Regulations Act 1984 (Speed limits on roads other than restricted roads) to remove the requirement that a single speed limit must apply to each section of road. The amendment empowers the Secretary of State to grant consent to a Speed Limit Order made by a Local Highway Authority to introduce a variable speed limit on a section of road specified in that Order. The different speed limits may apply according to conditions specified in the Order and must be indicated at the roadside by means of traffic signs showing which speed limit is in force at any particular time. Local Highway Authorities are required to consult local Emergency Services before submitting proposals for trial sites.

3. Schedule 4, paragraph 12 of the Road Traffic Act 1991 amends Section 90a(1) (Construction of road humps by Highway Authority) and 90b(1) (Additional powers of the Secretary of State to authorise the use of non-standard road humps). Local Highway Authorities are required to consult the Emergency Services before submitting applications for authorisation.

4. A copy of Department of Transport Circular 2/92 is attached at Annex A.

5. This item is for the information of Chief Fire Officers. There are no cost or manpower implications.

File reference : FEP/86 95/228/1

Telephone contact number : 071 273 3942

(Department of Transport)

Circular 46/92
(Welsh Office)

ANNEX A
ITEM 3
DCOL 2/1993

THE DEPARTMENT OF TRANSPORT

2 MARSHAM STREET LONDON SW1P 3EB

Welsh Office
Highways Directorate
Phase 1
Government Buildings
Tŷ Glas Road
Llanishen
Cardiff CF4 5PL
All correspondence to be addressed to the Director of Highways

The Chief Executive
County Councils) in England
District Councils) and Wales
London Borough Councils
Common Council of the City of London

17 August 1992

Dear Sir/ Madam

ROAD TRAFFIC ACT 1991: ROAD HUMPS AND VARIABLE SPEED LIMITS

1. On 3rd June 1992 an Order was made to commence, with effect from 1st July 1992, the provisions of Section 45 and Schedule 4, paragraph 12 (amongst others) of the Road Traffic Act 1991. This circular provides guidance to local highway authorities on those provisions.

VARIABLE SPEED LIMITS

2. Section 45 of the Road Traffic Act 1991 amends Section 84 of the Road Traffic Regulations Act 1984 (Speed limits on roads other than restricted roads) to remove the requirement that a single speed limit must apply to each section of road.

3. The amendment empowers the Secretary of State to grant consent to a Speed Limit Order made by a Local Highway Authority to introduce a variable speed limit on a section of road specified in that Order. The different speed limits may apply according to conditions specified in the Order and must be indicated at the roadside by means of traffic signs showing which speed limit is in force at any particular time.

4. Section 45 also empowers the Secretary of State to make Regulations governing the conditions under which speed limits may be varied, after which variable speed limits made in accordance with the Regulations will not require the consent of the Secretary of State. In order to obtain guidance on the most appropriate form for these Regulations, the Departments will be carrying out a number of trials of variable speed limits on trunk roads and with a view to widening the experience from these trials, the Departments are also seeking trial sites on local roads. Local Highway Authorities are therefore invited to submit proposals for trial sites containing the following information:-

(1) a map showing the proposed site;

(2) accident statistics for the previous three years;

(3) proposed speed limits and their times of operation;

(4) the views of local residents and emergency services

(5) any environmental factors which should be taken into account in establishing a trial;

(6) any other relevant information.

This information should be sent to Road Safety Division, Room C17/08, Department of Transport, 2 Marsham Street, London SW1P 3EB and for Wales to the Director of Highways for the Welsh Office, Transport and Highways Group, Govt. Buildings, Ty Glas Road, Llanishen, Cardiff CF4 5PL by 31st December 1992.

5. The most likely use for variable speed limits will be outside schools, where a lower speed limit would apply at times when children are going to school or returning home. However, Local Highway Authorities are also invited to propose trial sites at any other suitable locations in their areas. The length of road affected by these trials will vary according to local conditions but should normally be between 100 metres and 600 metres.

6. It is the Departments' intention to authorise approximately 100 trial sites. Those authorities whose sites are selected for trial will be informed and invited to make a Traffic Regulation Order in accordance with the outlined proposals and subject to the procedures laid down in the Local Authorities' Traffic Orders (Procedure)(England and Wales) Regulations 1989 for submission for the consent of the Secretary of State. A draft model order for this purpose is attached at Annex *B*.

7. All trials will be monitored by the Transport Research Laboratory under contract to the Department of Transport. The monitoring will be carried out in collaboration with each Local Highway Authority, which will be expected to pay for the supply and installation of signs and speed monitoring equipment.

ROAD HUMPS

8. Schedule 4, paragraph 12 of the Road Traffic Act 1991 amends Sections 90A(1) (Construction of road humps by highway authority) and 90B(1) (Additional powers of the Secretary of State) of the Highways Act 1980 to empower the Secretary of State to authorise the use of non-standard road humps.

9. Under current legislation, Local Highway Authorities do not require the consent of the Secretary of State for the use on local roads of road humps which are constructed in accordance with the Highway (Road Humps) Regulations 1990. The new provisions empower the Secretaries of State to authorise the use on any local road of road humps which do not comply with the 1990 Regulations.

10. It is not intended to use these powers to provide widespread

derogation from the 1990 Regulations, which are generally satisfactory and consent is unlikely to be granted to any scheme where it is possible to comply without difficulty with those regulations. These powers will be used mainly where proposed schemes have been devised in the spirit of the regulations but where, for one reason or another, they cannot all be met. For example, this may be the case on a bus route, or where an unusual road configuration precludes a layout of humps as required by the Regulations.

11. Applications for authorisation should be made to the Department of Transport's Regional Offices in England and for Wales to the Director of Highways ; they should contain the following information:-

(1) an explanation of why the Regulations cannot be met together with a brief description of the purpose of the scheme and the estimated casualty savings;
(2) three copies of plans showing the scheme and the location of each road hump;
(3) diagrams of any special signs for which authorisation is requested, showing the sizes and colours to be used;
(4) where the proposed hump does not have profiles conforming with those in the Regulations, drawings showing the proposed profiles; and
(5) the comments of the emergency services on the proposed scheme.

12. It will be important to assess the effectiveness of any new designs, so monitoring of speeds and flows should be undertaken wherever possible.

MANPOWER AND RESOURCE IMPLICATIONS

13. The measures contained in this Circular are additional options for highway authorities to use and consequently need have no manpower or financial implications.

DISTRIBUTION

14. Any enquiries on distribution of this circular should be addressed to NGAM Division, Room 3/11, 2 Monck Street for the Department of Transport and to the Director of Highways for the Welsh Office, Transport and Highways Group, Government Buildings, Ty-Glas Road, Llanishen, Cardiff CF4 5PL - telephone 0222 761456 ext. 5251. Any other questions should be addressed to Room C17/08, 2 Marsham Street, London SW1P 3EB: telephone 071-276-6322.

P H MARTIN
DEPARTMENT OF TRANSPORT

J G EVANS
NETWORK MANAGEMENT
WELSH OFFICE

pm-27.d

LOCAL AUTHORITY ORDER

[TITLE]

1. The Council of the County of ... in exercise of their powers under Section 84(1), and 1A of the Road Traffic Act 1984(a) and of all other powers enabling them in that behalf and with the consent of the Secretary of State under paragraph 13 of Schedule 9 to that Act and having given public notice in accordance with section 84(2) of that Act and having consulted the chief officer of police in accordance with paragraph 20 of that Schedule, hereby makes the following order:-

(1) This order may be cited as the [ ] Order 19[ ] and shall come into force on [ ].

2. (1) No person shall drive a motor vehicle on any of the lengths of roads specified in the Schedule to this Order at a speed exceeding -

(a) 20 miles per hour at a time when such a speed limit is indicated by a traffic sign in accordance with paragraph (2) below; or

(b) [ ] miles per hour at any other time.

(2) Such an indication may be given between the hours of [9.00 a.m. and 5.00 p.m.] [9.00 and 10.00 a.m. and 4.00 and 5.00 p.m.] on [Mondays to Fridays (inclusive)]* and at no other time.

3. (1) The [ ] Order 19[ ] shall be amended as follows;

(2) [ ].

(a) 1984 c.27; section 84 was amended by paragraph 61 of Schedule 8 to the New Roads and Streetworks Act 1991 (c.22) and by section 45 of the Road Traffic Act 1991 (c.40).

* Complete as appropriate.

Item 4
DCOL 2/1993

TECHNICAL BULLETIN 2/1992 - ACETYLENE

A Technical Bulletin has been prepared about acetylene. This contains information on production, storage and types of cylinder. It also recommends actions at incidents involving acetylene.

2. A copy of the Technical Bulletin is enclosed for the information of Chief Fire Officers. Further copies can be purchased from HMSO, price £4.95 (ISBN 011 341047 6).

File reference : FEP/92 64/1500/5

Telephone contact number : 071 273 3942

AERIAL APPLIANCES - PUBLIC DISPLAYS

Brigades were advised by FINDS message on 16 July 1990 not to allow hydraulic platforms to be used for public rides or demonstrations until further notice. This item confirms that the use of hydraulic platforms and other aerial appliances for giving rides to the public at displays such as open days should not be reintroduced into brigades.

2. This advice is not intended to preclude the use of aerial appliances on occasions when members of fire authorities or others with a recognised role but who are not members of the fire service, may wish to appraise themselves of the capabilities of the machine, or, at the discretion of the brigade, have a legitimate reason for using the aerial appliance. Provided that adequate safeguards are taken, such people may be allowed in the cage.

3. Chief Fire Officers are reminded of the advice contained in DCOL 3/1989 Item F, which said that all practicable steps should be taken to ensure the safety of cage occupants, including the use of netting or suitable safety belts or harnesses if appropriate.

4. Nothing in this advice is intended to constrain the operational use of aerial appliances at fires and other incidents.

5. No financial or manpower implications arise from the issue of this guidance.

File reference number : FEP/90 344/800/1

Telephone contact number : 071 273 3942

RAF SEARCH AND RESCUE HELICOPTER EQUIPMENT UPGRADE - NIGHT VISION GOGGLES

Night Vision Goggles (NVG) have recently been introduced to RAF Search and Rescue (SAR) Sea King helicopters. The NVGs are a light intensification aid fitted in binocular form to the crews' helmets and allow the crews to "see in the dark", although the picture is displayed in monochromatic green.

2. The Ministry of Defence (MOD) has issued the attached guidance note to all Team Leaders detailing the modifications to operational procedures required as a result of the introduction of NVGs. MOD has asked that the guidance note be brought to the attention of fire brigade personnel.

3. In addition to the points made in the guidance note, personnel being deployed in NVG operating helicopters must also be aware not to shine any white light inside the cabin without the prior permission of the crew.

4. This item is for information only. There are no manpower or financial implications.

File reference : FEP/92 140/1500/1

Telephone contact number : 071 273 3942

RAF BOULMER GUIDANCE FOR THE USE OF NIGHT VISION GOGGLES AS ISSUED TO THE MOUNTAIN RESCUE COMMITTEE (E & W) CONFERENCE AT AMBLESIDE 19/20 SEPTEMBER 1992

NIGHT VISION GOGGLES(NVG)

The SeaKing flights are currently undergoing conversion to the use of NVG, Brawdy and Lossiemouth are already qualified and Boulmer will be cleared for NVG operations by the 25 September 1992. Whilst NVG considerably enhance the crews ability to operate the aircraft safely at night there are major limitations to their effectiveness under certain conditions. It is essential that MRT's are aware of these problems and, in order that our mutual needs for safty can be met, the following guidelines are given:

1. Arrival at landing sites and winching situations MRT's should aim to reduce the amount of white light used to the minimum commensurate with their continued safety. NO light should be shone directly at the aircraft and whenever possible torches should point towards the ground. The pilot will progressively convert to using the aircraft lights for illumination and once these are on the situation is as normal.

2. Departing landing sites and winching situations Once the aircraft is ready to depart from a landing site or winching situation the pilot will reduce the number of aircraft lights used and go back on to NVG for the departure. MRT's should once again reduce the amount of white light used, if possible, until the helicopter is well clear of the area.

3. Indicating your position If the helicopter crew are using NVG you will not need any other light source than a head-torch , on a dark mountain side it will be visible from up to 2 miles away! Under no circumstances should you use paraflares to indicate your position unless you are requested to do so by the crew.

4. Searches If during a night search involving a helicopter you require the use of a paraflare for ground illumination please ensure that you contact the aircraft before you fire it. This will enable the pilot to place the helicopter in a safe flying configuration, and please wait until the pilot confirms that he is happy for you to fire. The consequences of not following this procedure could be disastrous!

NVG are NOT a panacea for night mountain flying, however, they do enhance the safety of the operation if used judiciously. By following the above guidelines MRT'S will greatly assist the safe operation of helicopters at night, and your adoption of the above procedures is requested. In due course it is intended that these guidelines will be formalised, after consultation with the MRT's, and be issued as 'Standard Operating Procedures'.

BRITISH RAIL - EMERGENCY PLANNING AND CONTACT ARRANGEMENTS WITH EMERGENCY SERVICES

The British Railways Board has prepared instructions for their managers for:

(a) Emergency Planning for stations and other facilities (MP 708); and

(b) Contact arrangements between British Rail and the Emergency Services (MP 702).

2. Chief Fire Officers will wish to be aware of the existence of these British Rail internal documents, the main aims of which are:

(A) Emergency Planning: To identify principles and requirements for effective contingency plans for emergencies;

The procedures include:

(i) systems for calling fire brigades, access routes, provision of station plans.

(ii) communication and control facilities.

(iii) dealing with the media.

(iv) training and exercises.

(B) Contact arrangements: To identify the standard required for contact arrangements between British Rail and the Emergency Services. The arrangements must be easily understood and applied by British Rail personnel and the Emergency Services, thus enabling a prompt response to incidents or emergencies;

The procedures include:

(i) the Area British Rail Operations Manager will take the lead in agreeing arrangements with the Emergency Services.

(ii) Emergency Services must be able to identify immediately the British Rail control location responsible for a line of route or location irrespective of Rail Business ownership.

(iii) arrangements for giving immediate identification of an incident location.

(iv) provide an interface between Emergency Services and Electrical Controls.

(v) identify access points.

(vi) provision of communication equipment and testing arrangements.

3. Chief Fire Officers should expect to be contacted in the next few months by British rail area managers in order to agree these emergency arrangements. If any brigade experiences difficulties in these discussions, it would be helpful if they would advise HMI Kilford on 071-273-3501.

4. No manpower or financial implications arise from the issue of this guidance.

File reference : FEP/90 9/309/1

Telephone contact number : 071 273 3501 or 3942

BRITISH RAIL - EMERGENCY CUTTING - ALUMINIUM ROLLING STOCK

1. BACKGROUND

1.1 The Director of Track and Rolling Stock, Regional Railways has recently advised on the most effective and compatible methods of operation by the emergency services in the cutting of aluminium structured vehicles when carrying out rescues following a train accident.

2. EXISTING GUIDANCE

2.1 Existing guidance on features of trains and emergency procedures for railway incidents can be found in the Manual of Firemanship Book 4, Chapters 18 and 21. This guidance refers to rolling stock constructed mainly of steel.

3. THE EXTENT OF THE NEW GUIDANCE

3.1 The new guidance from British Rail refers to Class 158 vehicles currently in operation and the new Class 323 due to enter into service at the end of this year in the Birmingham area. A map of Class 158 routes where they are currently operating is attached at Annex A, but long-term they could run anywhere on the BR network. The Class 323 trains could operate anywhere on the electrified routes in the London Midland Region which extends north as far as Preston and south as far as Bletchley. Some of the main routes intended to date are:

Manchester to Manchester Airport

Manchester to Crewe via Stockport

Manchester to Stoke on Trent via Macclesfield

Manchester to Birmingham New Street

Litchfield to Redditch

Subject to performance, the 323 will also be used on a wider scale as new stock arrives.

4. CUTTING EQUIPMENT AND ITS EFFECTS

4.1 Generally any cutting equipment which would produce high temperatures is undesirable due to risk of fire, creation of toxic fumes and injuries to trapped casualties and operators. The use of oxy/acetylene torches or other thermal cutting equipment is not recommended for the following reasons:

a) the process will melt rather than cut aluminium producing running molten metal;

b) aluminium body shell designs tend to utilise the benefits of extruded sandwich and hollow sections which could cause the torch flame to blow back, making the cutting process difficult and again hazardous to operating staff; and

c) generally these processes require more specialised training than mechanical cutting methods.

5. RECOMMENDED EQUIPMENT

5.1 The following cutting equipment is recommended for use, but other equipment already held by brigades may be suitable:

a) circular saws/carborundum discs suitable for aluminium;

b) power secateurs;

c) routers;

d) nibblers - but they will require an entry hole to start; or

e) pneumatic chisels.

5.2 All equipment used should be capable of cutting through extruded sandwich bodyside sections of approximately 70mm thickness and heavy box numbers of approximately 200mm deep cross section with a wall thickness of 20mm.

6. PROTECTIVE CLOTHING

6.1 All such operations should be carried out wearing protective clothing appropriate to the equipment being used.

7. No financial or manpower implications arise from the issue of this guidance.

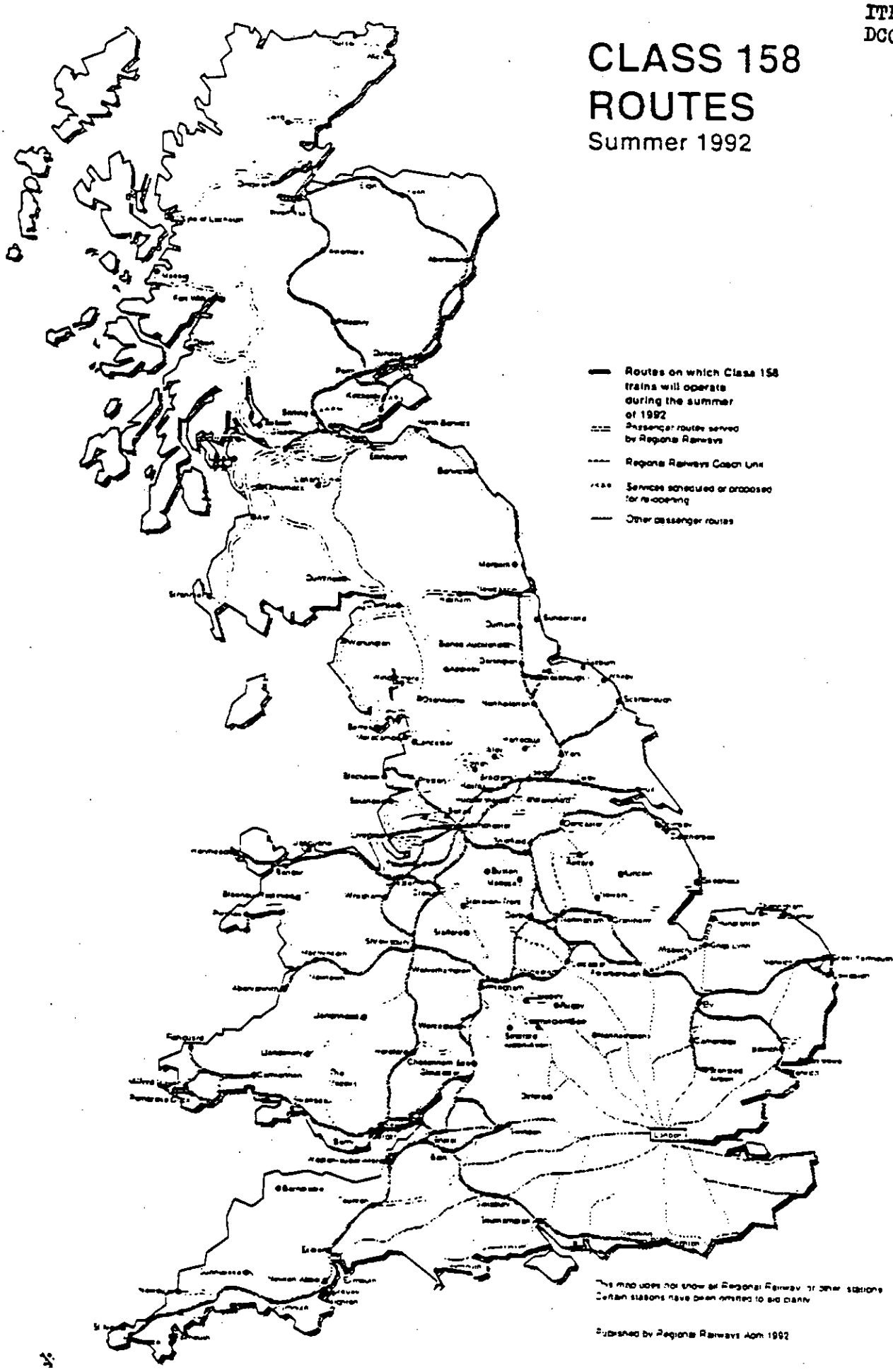
File reference : FEP/90 9/309/1

Telephone contact number : 071 273 3942

ANNEX A
ITEM 8
DCOL 2/1993

CLASS 158 ROUTES

Summer 1992



HAZARDS POSED TO FIREFIGHTERS BY ASBESTOS

AMENDMENT TO DCOL 11/1992 ITEM 4

The following amendment should be made to DCOL 11/1992 Item 4:

Page 1, paragraph 2, 4th line should read :-

"Crocidolite - blue asbestos UN 2212 EAC 2X"

ie blue not brown asbestos

Telephone number of contact : 071 273 3342

Item 10
DCOL 2/1993

FIRE SERVICE INSPECTORATE - FIRE SAFETY INSPECTIONS OF BRIGADES

Following the introduction of published brigade inspection reports, the current practice of carrying out fire safety inspections has been reviewed. It is now considered that the short interim inspection is no longer adequate and provides insufficient information upon which to base a published report.

2. The introduction of more comprehensive annual returns, together with proposed output measures and performance indicators, will facilitate closer monitoring in the longer term and will ultimately allow consideration to be given to the need for a full inspection of an individual brigade during any particular year.

3. It is proposed that, with effect from 1 January 1993, the following arrangements will apply:

i) an annual fire safety inspection of the seven Metropolitan brigades;

ii) a full fire safety inspection of Shire brigades once every two years, subject to paragraph (2) above;

iii) the weight of the inspection resource and duration of inspection will vary in relation to the size of brigade;

iv) informal visits to brigades where specific issues are identified from annual returns or previous reports, or where the Territorial Inspector or Chief Fire Officer requests such a visit. These visits will not normally be the subject of published reports.

4. I hope you will find the new arrangements acceptable and note that they will allow more flexible and effective use of Inspectorate resources.

Item 11
DCOL 2/1993

THE CONE CALORIMETER : A SMALL SCALE TEST METHOD FOR FIRE GROWTH - FIRE RESEARCH PROJECT

This item which carries no additional cost or manpower implications, informs brigades of the completion of a research project on the value of the cone calorimeter as a small-scale test method for measuring the post-ignition fire behaviour of the materials and composites used in furniture, and its wider application for testing and regulating other materials used in buildings. The results of the research are summarised in the enclosed report.

2. THE REPORT'S CONCLUSIONS

2.1 The results go a long way towards confirming the suitability of the cone calorimeter as a small-scale test method for assessing the burning behaviour of furnishing items. As reported, this has been done by comparing simple parameters, principally peak and mean heat release rates, derived from both the small and large-scale test methods. Further development work necessary for better assessment of post-ignition fire behaviour of materials has also been identified.

3. FURTHER ACTION

3.1 As Chief Officers may be aware, the European Commission recently announced details of the 1991-94 Measurement and Testing Programme in support of both the Construction Products Directive and the proposed Upholstered Furniture Directive. This comprehensive programme of pre-normative research is intended to provide the required test methods on which the Essential Requirements of both Directives will be based. It will include looking at the further development of the cone calorimeter as a standard method of test.

3.2 Small scale tests based on calorimetry have been identified as providing a possible means of enforcing the proposed Directive. In order to assist the Commission in their efforts, the results of this Home Office research have been passed to Directorate General III for their consideration.

File Ref : FEP/90 17/20/2

Telephone number of contact : 071-273-2867 (policy)
071-273-3525 (technical)

Item 12
DCOL 2/1993

COMPARISON OF BRITISH STANDARDS BS 5445: PART 7 AND BS 5446: PART 1 - FIRE RESEARCH PROJECT

This item informs brigades of the completion of a research project initiated by the Home Office to determine whether the British Standard BS 5446 : Part 1 could be replaced, either wholly or in part, by the European-based British Standard BS5445 : Part 7 when considering smoke alarms for life safety purposes. The results of the research project are summarised in the enclosed summary report (Research Report No 47).

2. THE REPORT'S CONCLUSIONS

2.1 Whilst BS 5445 : Pt 7 provides a standard against which the efficacy of residential ionisation-type detectors can be measured and is more representative of real fire conditions, it does not at present provide a suitable alternative to BS 5446 : Pt 1 in respect of residential optical-type detectors.

3. FURTHER ACTION

3.1 FSM/12 Committee of the British Standards Institution is considering the need for a new standard on smoke alarms in single residential dwellings and copies of the full research report will be made available to BSI and the relevant trade associations.

File Ref : FEP/87 17/20/12

Telephone number of contact : 071-273-2867 (policy)
071-273-4020 (technical)

DRAFT ITEM FOR INCLUSION IN A DCOL Annex A

MAJOR REVIEW OF RADIO COMMUNICATIONS FOR THE EMERGENCY SERVICES - HOME OFFICE COMMUNICATIONS ADVISORY PANEL (HOCAP)

Dear Chief Officer Letter 3/1991 informed brigades of progress with the Major Review of Radio Communications for the emergency services. Brigades were asked to complete a comprehensive questionnaire leading to the establishment of a User Requirement for radio communications within the police and fire services.

2. This item informs brigades of further progress and advises Chief Officers about a Home Office Communications Advisory Panel (HOCAP), established to provide guidance for the provision of new or enhanced radio communications systems for fire brigades and police forces while the Major Review is being conducted.

PROGRESS REPORT

3. The draft Fire Service User Requirement for England and Wales was discussed with brigades at regional seminars held during Autumn 1991. The revised User Requirement issuing from these seminars was approved by the Joint Committee on Fire Brigade Communications at its meeting on 11 March. It will now be taken forward into the next stage of the Major Review. This will involve comparison with a parallel User Requirement for the police service in order to identify and examine those requirements and the technical and financial issues involved in meeting them from a common system. It is anticipated that a detailed submission to Ministers will be made by the Home Office towards the end of the year.

HOME OFFICE COMMUNICATIONS ADVISORY PANEL (HOCAP)

4. A Home Office Communications Advisory Panel has been established, primarily to assist police forces to avoid wasteful investment, to maintain standards and preserve national operational considerations. HOCAP is also tasked with assisting

fire brigades in an advisory capacity on those occasions when requests are referred to them from the Home Office Radio Frequency and Communications Planning Unit (RFCPU). The fire service HOCAP is chaired by the head of RFCPU and membership includes representatives from RFCPU and the Fire Service Inspectorate.

5. It is envisaged that applications for change or increase in frequency assignments would normally be referred by brigades to the RFCPU, who will consider any such applications and decide whether the proposed change has any implications for the work of the Major Review.

6. Brigades proposing developments to radio communications systems may choose to meet with HOCAP in order to discuss their proposals. Brigades wishing to discuss proposals with HOCAP should contact Her Majesty's Inspector of Fire Services (Telecommunications), Room 956, Home Office, 50 Queen Anne's Gate, London SW1H 9AT (tel 071-273-3842).

7. Discussions within HOCAP are regarded as confidential.

8. Detailed advice in the form of guidance notes is being prepared and will be issued to brigades by the Home Office Radio Frequency and Communications Planning Unit (RFCPU).

9. This item is for information and there are no significant financial or manpower implications.

Telephone number of contact : 071-273-3583 (general)
071-273-3842 (technical)

File reference number : FEP/92 59/1507/10

DCOL
1993 no. 2
F92000194

FIRE SERVICE COLLEGE

Annex B

Fire Service
User Requirement for
Radio Communications

GD-91/1174/3.0 Copy 57

12 February 1992

Cover + 106 pages

Smith

Summary

This report presents a user requirement for radio communications for the Fire Service of England and Wales. It is anticipated that the report will form an input to further stages of the Major Review of radio communications for the Fire and Police Services.

Requirements statements have been principally derived by analysis of the responses to a questionnaire completed by all fifty-five fire brigades in England and Wales. A description of the analysis procedure is presented in Section 2. Section 3 provides an overview of the current organisation and operations of the Fire Service.

In addition to its primary aim of addressing user requirements, the questionnaire has permitted information on current and planned radio communications systems to be gathered. This information is summarised in Section 4, together with a description of some of the main difficulties currently experienced with such systems, including:

- main scheme congestion during major incidents or wide spread disasters such as floods;

- the lack of main scheme interoperability between brigades operating AM and FM systems;

- the difficulty in communicating with mobilising control from UHF handportables;

- the lack of sufficient or suitable radio equipment to provide communications between officers in command at major incidents and senior personnel from other emergency services or organisations.

Section 5 provides an overview of the detailed requirements statements that are presented in Section 6. As might be expected, most requirements are met by current brigade radio systems. However, key requirements, which may not currently be met in full, concern:

- the additional capacity needed to meet infrequent demands resulting from major incidents and/or widespread disasters (eg floods, storms etc);

- the potential for the increased use of data and signalling systems to relieve voice traffic congestion for the passage of standard or easily formatted messages;

- an increased capability for hand-held radio equipment employed at incidents, eg to permit straightforward communications with mobilising control;

- an improved capability for communications in coastal waters and with aircraft which are supporting Fire Service operations;

- increased interoperability with personnel of other organisations to provide, in particular, greater liaison between commanders of all emergency or other services at major incidents.

As part of the determination of requirements, the questionnaire asked brigades to indicate those aspects of their current systems which should be given priority for improvement. The most important areas were considered to be (in descending order of overall priority):

- the provision of mobile data facilities to permit mobilising messages to be passed to appliances in text form;

- ensuring greater reliability of radio communications;

- providing greater flexibility within communications systems to respond to operational or organisational changes.

Section 7 presents the results of an initial consideration of system ownership issues addressed in Part 3 of the questionnaire. The most significant concerns of brigade officers regarding changes in radio system management include:

- the method by which brigades have sufficient control of their command, control and communication resources that impact on brigade effectiveness for which Chief Officers are accountable;

- the need to ensure that no compromise of brigade requirements or reduction in capability results from any facilities, equipment or resources being used jointly with other organisations;

- the need to ensure adequate competition amongst suppliers of brigade communications equipment to provide price competitiveness;

- lack of confidence in the ability of local and to a lesser extent central public bodies to provide the quality of system or management to meet brigade requirements;

- lack of confidence that commercial organisations would place brigade interests before commercial pressures should any conflict arise (the difficulty in establishing and enforcing suitable contractually binding levels of service provision are particularly highlighted);

- the potential risk to brigade operations arising from vulnerability to industrial action.

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Glossary of Terms

All-informed	*An all-informed communications community of radio users is one in which a message passed by a member of the community is capable of being received by all members of the community.*
Appliance	*A fire engine (eg water-tender or turntable ladder) or fireboat.*
BA	*Breathing apparatus.*
BA team	*A team of firefighters employing breathing apparatus at an incident.*
Border	*The boundary between two neighbouring Brigade areas.*
Broadcast	*Transmission of a message from one particular user (eg mobilising control) to a number of other users.*
CFBAC	*Central Fire Brigades Advisory Council.*
CSMG	*Communications Study Management Group responsible for directing and monitoring the Major Review.*
CTCSS	*Continuous tone controlled signalling system (a signalling system employed with radio communications).*
Day-manned	*A station staffed during the normal working day only. Cover is provided by retained or other staff outside this period.*
Duopoly Review	*A review of telecommunications policy in the UK culminating in a White Paper issued on 5 March 1991. The main conclusion is that the Government has decided to end the duopoly of BT and Mercury.*
Fireground	*The area in the immediate vicinity of the incident.*
HMFSI	*HM Fire Service Inspectorate.*
HMIC	*HM Inspectorate of Constabulary.*

Glossary of Terms

Incident	*Fire, or other emergency, that a brigade is called to attend.*
Intrinsically safe	*Equipment compliant with BS5501 or equivalent standard and so certified.*
Mobile	*On the move, or away from a station or typical place of work. Also a radio installed in an appliance or other vehicle.*
Mobilising alerters	*Individual radio receivers, similar to pagers, which alert crews, particularly retained firefighters, to an incident.*
Mobilising control	*The control room of a fire brigade at which emergency calls are received and from which mobilising instructions to brigades resources are issued.*
Non-rider officers	*Non-rider officers are fire brigade officers who may attend incidents, but do not 'ride' appliances.*
Officer	*Brigade personnel of the rank of Station Officer and above.*
Over-the-border	*In an adjoining brigade area.*
Point-to-point	*Point-to-point communications are typically between two users only. An important aspect is that users are individually addressed or identified. This contrasts with all-informed or broadcast messages which can be received by anyone within the same community.*
Project Team	*The User Requirement Project Team comprises representatives of the Home Office and of three fire brigades.*
PRSU	*Police Requirements Support Unit (Home Office).*
PSTN	*Public Switched Telephone Network.*
Resource	*An appliance crew or officer that may be mobilised to attend incidents.*

Glossary of Terms

Retained	*Part time personnel who in general only attend a station when called to an incident or when required for training purposes.*
RFCPU	*Radio Frequency and Communications Planning Unit (Home Office).*
Secure	*Secure communications are those for which the message content is protected from unauthorised personnel either within, or external to, the Fire Service. Various degrees of security can be provided, ranging from measures to protect against casual eavesdroppers through to those employing sophisticated analysis techniques.*
Stand-by	*Appliances that are assigned to stations other than their own to provide temporary cover.*
Station	*A fire station.*
Station ground	*The geographically defined area which is the responsibility of a station.*
UHF	*Ultra high frequency.*
VHF	*Very high frequency.*
Volunteer firefighters	*Volunteer firefighters typically provide cover in isolated rural areas. The user requirements of volunteer firefighters are assessed to be similar to those of retained firefighters.*
VOX	*Voice operated switch.*
Whole-time station	*A station that is permanently staffed (full-time).*

1 Introduction

1.1 General

1.1.1 This report presents a user requirement for radio communications for the Fire Service of England and Wales. It is anticipated that the report will form an input to further stages of the Major Review of radio communications for the Fire and Police Services.

1.1.2 The report presents the results of a study to determine the radio communications requirements of the Fire Services of England and Wales. The study has primarily comprised:

- development of a user requirement questionnaire;
- completion of the questionnaire by all fire brigades of England and Wales;
- collation of questionnaire responses and production of summary information;
- analysis of the questionnaire results and other information sources to derive a structured set of user requirements;
- drafting of the user requirements statement;
- Fire Service review of the user requirement at four regional seminars.

A parallel process has been undertaken to develop a user requirement for radio communications for the Police Service of England and Wales.

1.1.3 Development of the the user requirement forms part of the Major Review of Radio Communications in the Fire and Police Services. A summary of the Review is presented in the following sub-sections, followed by a description of current issues and initiatives which may have a significant impact on the user requirement.

1.2 The Major Review of Radio Communications

1.2.1 It is essential that the radio communications systems used by all the emergency services enable them to provide a prompt and efficient response to incidents. There is also a need to ensure that those parts of the radio spectrum allocated to the emergency services are used efficiently and that the best value for money is achieved by investing in the most effective technology.

1.2.2 Each service determines its own radio communications requirements and there is inevitably some risk of duplication of resources and incompatibility in the systems they adopt. In particular, the reports on the Clapham Junction, Kings Cross, Hillsborough and Hungerford disasters have drawn attention to the need for

greater flexibility and interoperability.

1.2.3 A Review has therefore been initiated, aimed at developing a coherent strategy for the Fire and Police Services which takes advantage of the latest developments in radio communications to provide maximum flexibility of response and interoperability within and between the Services.

1.2.4 In order to conduct this Review, a Communications Study Management Group (CSMG) has been established and is chaired by a representative of F7 Division of the Home Office. This Group is responsible for directing and monitoring the Review. It includes representatives of G1 Division of the Home Office, the Radio Frequency and Communications Planning Unit (RFCPU), HM Fire Service Inspectorate (HMFSI), Police Requirements Support Unit (PRSU) and HM Inspectorate of Constabulary (HMIC). Administrative support is provided by F7 Division and the Review is supervised by the Home Office Radio Communication Policy Advisory Board, on which local authority and senior Fire and Police Service representatives sit.

1.2.5 The Department of Health is undertaking a review of National Health Service communications, including those of the Ambulance Service, and is represented on the CSMG.

1.3 Terms of reference

1.3.1 The terms of reference for the Major Review are:

(1) to establish the future radio communications requirements and interface with other technologies for the Fire and Police Services;

(2) to identify the equipment, systems and technologies capable of meeting the requirements and likely developments;

(3) to examine the issues which would need to be considered for the provision of common communications facilities for all the emergency services;

(4) to propose common standards for maximum interoperability;

(5) to make recommendations on the means of meeting the longer term requirements which make the most efficient use of the spectrum and provide best value for money;

(6) to formulate a strategy implementing such recommendations;

(7) to provide guidance for the provision of new or enhanced communications systems for brigades and forces in the interim;

(8) to report to the Home Office Radio Communications Policy Advisory Board.

1.3.2 This document addresses elements of item one of the terms of reference, by identifying the future radio communications requirements of the Fire Service.

1.4 Timescales

1.4.1 The Review is concerned with the development of a long term strategy for radio communications within the emergency services. The number and diversity of users involved and the scale of the systems required to support them are such that any major changes will take some time to define, plan and implement. In particular, any associated changes in the radio spectrum assigned to the emergency services are likely to take some time to agree within national and international spectrum administration constraints.

1.4.2 The Major Review is due for completion in 1992.

1.5 Scope

1.5.1 The Review is principally concerned with the use of radio communications by personnel operating in vehicles or on foot away from fixed locations and associated personnel operating in mobilising controls. Within this, it includes:

- both day-to-day communications, pre-planned events and major incidents;
- communications requirements of both operational and non-operational groups;
- communications requirements of specialist groups;
- both voice and data communications.

1.5.2 The Review is not primarily intended to address the following:

- communications between fixed locations served by telephone systems;
- data communications between fixed locations;
- information systems.

1.5.3 However, the areas identified in paragraph 1.5.2 cannot be entirely divorced from a consideration of radio communications. For instance, they may share fixed networks with radio traffic and access to information systems and telephone systems and may increasingly be extended over radio systems. These areas are

therefore being addressed to the extent that they impact directly on radio communications, or vice versa.

1.6 Related issues

1.6.1 Currently, three principal issues or initiatives can be identified which are of relevance to Fire Service radio communications, namely:

- the Local Government Review;
- the OFTEL review of emergency call arrangements;
- mobilising control issues.

Local Government Review

1.6.2 The Secretary of State for the Environment has announced a review of the structure of Local Government in England and Wales and has established separate Local Government Commissions for England and Wales to make recommendations on the way local government should be organised.

1.6.3 Outside Metropolitan areas, county authorities are currently the fire authorities and any change in this tier of local government may well have implications for the future organisation of the Fire Service.

OFTEL Review of emergency call arrangements

1.6.4 In June 1989 OFTEL initiated a review of the way in which emergency call arrangements on public telecommunications networks are organised.

1.6.5 A Review Group drawn from the wider representation of the Emergency Authorities and the Public Telecommunications Operators has examined the feasibility of providing a 999 service which reflects the technical and economic developments since the emergency call service started and which does not reduce the current high quality service to the public. The recommendation, contained in a draft report, is for the establishment of a single call handling agency for all emergency call traffic from all systems operated by public telecommunications operators in the UK. The draft report also indicates that all such emergency call traffic could be handled by 3 operator centres.

1.6.6 The draft report has been put to public consultation and the responses to this are now being considered; however, the implementation of emergency call handling arrangements based upon as few as three operator centres may have implications

for the way in which the Fire Service deals with emergency calls for its services.

Mobilising control issues

1.6.7 A substantial proportion of the first generation mobilising and communications systems in Fire Service control rooms will need replacement or substantial enhancement during the early to mid 1990s.

1.6.8 The Home Office, in conjunction with the local authority organisations representing Metropolitan and County Authorities, has set up a study examining the extent to which replacement of existing systems is required and establishing the most cost-effective and efficient means of replacement.

2 Conduct of the Study

2.1 Introduction

2.1.1 Within the study, the principal method for identifying requirements was by means of a questionnaire. This section describes questionnaire development, completion and analysis activities, together with the Fire Service review of a draft version of the requirement, under the following headings:

- questionnaire development (Section 2.2);
- distribution and completion of the questionnaire (Section 2.3);
- collation of questionnaire responses and production of summary (Section 2.4);
- determination of requirements from questionnaire (Section 2.5);
- traceability of requirements (Section 2.6);
- consistency checking (Section 2.7);
- Fire Service review (Section 2.8).

2.2 Questionnaire development

2.2.1 The user requirement questionnaire was developed by a working group comprising representatives from the Fire Service Inspectorate and individual brigades together with consultants from Smith Associates Limited and the Harris Research Centre.

2.2.2 Development of the questionnaire involved the determination of requirements issues regarding the use of radio communications by the Fire Service and the drafting of questions to address these issues. Questions were drafted in a form such that the responses would be suitable for later collation and analysis.

2.2.3 Prior to distribution, a pilot exercise was undertaken in which representatives from a limited number of brigades considered the responses which they would make to the questions posed. Review comments from this pilot exercise were incorporated into the questionnaire, which was then distributed to all brigades in England and Wales.

2.3 Distribution and completion of the questionnaire

2.3.1 The questionnaire was distributed to the Chief Officers of all brigades in England and Wales. To aid completion of the questionnaire, presentations and visits to a number of brigades were made by members of the Fire Service Inspectorate.

2.3.2 The questionnaire was divided into 3 parts:

- Part 1: Background, Current Systems and Existing Plans;
- Part 2: Future Requirements;
- Part 3: Policy Issues.

2.4 Collation of questionnaire responses and production of summary

2.4.1 On receipt of all completed questionnaires, a database of responses was created. The entry of data into the database was subject to a number of checks to ensure the accuracy of the stored information. Summary tables providing an overview of brigade responses were produced for each question. In these tables, responses to questions were grouped depending upon the nature of the question. For example, for a question requiring answers to be expressed as a percentage, the responses might be grouped 0%-10%, 10%-20%, etc.

2.4.2 In addition to the grouping of responses from all brigades, responses were examined in a number of categories to identify any trends or significant differences. For example, the responses in the 0%-10% group of a question would be divided between metropolitan, urban and rural brigade categories. This method permits investigation of whether requirements differ depending on the nature of the brigade. In addition to the metropolitan/urban/rural category other categories used include:

- geographic area of the brigade, derived from Part 1 Question 3.1.1:
  - large (greater than or equal to 500,000 hectares);
  - medium (between 160,000 hectares and 500,000 hectares);
  - small (less than or equal to 160,000 hectares);
- brigade size (number of personnel), derived from Part 1 Questions 3.3.1 to 3.3.5:
  - large (greater than or equal to 1,000 personnel);
  - medium (between 600 and 1,000 personnel);
  - small (less than 600 personnel).

2.5 Determination of requirements from questionnaire

2.5.1 Responses to the questionnaire were analysed both to determine the requirements

which exist and also to determine the relative priority of requirements. The priorities used and the definitions attached to these priorities are as follows:

Essential	A system or its components must be capable of meeting these requirements in order to be acceptable to all users. Note that some users may choose to procure systems meeting a subset of the essential requirements. Careful consideration must be given to the classification of requirements as essential since such requirements may have a critical impact on possible solutions.
Highly desirable	Highly desirable requirements are those for which the failure to provide an inherent capability to meet any individual requirement does not necessarily result in the system or a component of the system being unacceptable, but for which the failure to meet a significant number of highly desirable requirements may result in the system being deemed unacceptable by users.
Desirable	It would be of benefit to the user if desirable requirements were met by the system or a component of the system. However, the omission of these requirements may be acceptable to users.
Unwanted	Unwanted requirements are those which would render a system unacceptable to users if they were to be provided. (Note that no unwanted requirements have been identified in the analysis.)

2.5.2 In many cases the combined responses to questions indicate clearly the nature of requirements. However, in other cases there is sufficient spread in the responses to warrant further consideration. In this instance, a method has been adopted which is explained in paragraphs 2.5.3-2.5.6.

2.5.3 Where the responses to questions are not conclusive, the responses are examined in the categories discussed above to determine whether there is a different requirement for different types of brigades. For example, metropolitan brigades may have an essential requirement where such a requirement is less important for other brigades.

2.5.4 If it is not possible to determine the requirement within one of the categories then the total response is re-examined. Where there is an even spread of responses (eg 20% of all responses indicated essential, 50% highly desirable and 30% desirable), the requirement clearly exists, however the importance or the extent of the requirement remains to be determined. A priority is assigned to the requirement by consideration of the following:

- the average of the responses;

- the nature of the distribution of the responses;

- the assessed feasibility of meeting the requirement (since it is important not to overspecify requirements potentially subject to high cost or technical risk).

2.5.5 Where there is not an even spread of responses (eg 30% consider requirement essential, 20% desirable and 50% not wanted), then the extent of the requirement is assessed not to be a service-wide requirement. Where it is apparent that a requirement exists for certain brigades (eg the 30% in the example) requirements statements indicate that any solutions should be capable of meeting the requirement (recognising the fact that some brigades will choose not to adopt this option).

2.5.6 Some requirements are derived from text responses from individual brigades. Where no priority information was provided, a priority, based on the understanding of the Project Team has been used in the requirements statement.

2.6 Traceability of requirements

2.6.1 Each of the requirements in Section 6 is traced to one or a number of sources. The principal source for requirements is the summary of questionnaire responses, however other sources are also used. A complete list is as follows:

- summary of questionnaire responses;

- individual questionnaire responses;

- documents;

- Project Team;

- Fire Service review.

Each requirement is numbered to aid future traceability.

2.7 Consistency checking

2.7.1 The primary sources of information for determination of requirements were questionnaire responses from all fifty five brigades. Within these responses a high degree of consistency was apparent. However, responses to some questions did give rise to inconsistent results. Typically, these arose where respondents were asked for estimates of values, the difficulty being to estimate consistently over a number of questions. Where necessary, the approach adopted has been to present requirements based on the judgement of the Project Team.

2.7.2 Within the formal requirements statements themselves, consistency has been achieved by separating the requirement into independent categories (eg coverage, performance etc). Requirements within each category have then been drafted and reviewed to provide internal consistency.

2.8 Fire Service review

2.8.1 Following the analysis of the questionnaire responses, a draft version of the user requirement was produced and distributed to all Fire Brigades in England and Wales. Four regional seminars were held at which brigade representatives provided comments on the draft requirement. Further written comments from brigades were also invited and received.

2.8.2 All the comments made have been considered and have been incorporated within this document as appropriate.

3 Fire Service Organisation and Operations

3.1 Introduction

3.1.1 In order to place the user requirement in context and to provide background information to those unfamiliar with the service, this Section describes the current structure of the Fire Service. In addition, details are provided regarding service funding, staffing, equipment and operations.

3.2 Local authority responsibilities

3.2.1 Under the Fire Service Acts 1947 and 1959, responsibility for fire services rests with local authorities. Each administrative county is designated as the fire authority for its area; since 1985 the six former metropolitan fire authorities and the Greater London Council fire authority have been replaced by fire and civil defence authorities. There are currently fifty five fire authorities in England and Wales.

3.2.2 Each fire authority is required to make provision for firefighting purposes, and to secure and maintain the services of a fire brigade and equipment to undertake this work. Fire authorities also have discretion to employ fire brigades and equipment for purposes other than firefighting, such as road accidents, chemical spillages and rescues.

3.3 Central Government responsibilities

3.3.1 While fire authorities have statutory responsibility for the provision of fire cover and exercise day-to-day control over the activities of their fire brigades, the Home Secretary has a general responsibility for the efficiency of the fire service and is answerable to Parliament on fire policy. Assistance is given to fire authorities by the Home Office in establishing standards and by the provision of technical guidance.

3.3.2 The Home Office Fire and Emergency Planning Department advises the Home Secretary on fire matters including the operational efficiency of the fire service and the enforcement of fire safety legislation. Fire brigades are inspected annually by HM Inspectorate of Fire Services. The Inspectorate also provides the technical resources for compilation of codes of practice and guides to legislation for the benefit of fire brigades. HM Chief Inspector provides an annual report to the Home Secretary (published by HMSO).

3.4 The Central Fire Brigades Advisory Council

3.4.1 Except on discipline and conditions of service matters, the Home Secretary is advised in the discharge of his tasks by the Central Fire Brigades Advisory Council. This Council was set up under the 1947 Act and is normally chaired by a Home Office Minister and includes representatives of the local authorities, the fire service

and other interested organisations. A similar Council advises the Secretary of State for Scotland.

3.4.2 The CFBAC is in turn advised by a number of standing committees, and ad hoc committees are also established from time to time to consider or review particular policies. By agreement between the Home Secretary and the Secretary of State for Scotland, these joint committees advise both the Council for England and Wales and the Council for Scotland. There are joint committees to deal with the specific subjects of fire brigade operations and communications.

3.5 Fire Service funding

3.5.1 The fire authorities form part of their respective local authorities. Some funding is provided from central government as part of a composite grant made to local authorities, the remaining cost is collected through the mechanism of the community charge. The Fire Service, unlike the Police Service, receives no specific grant from central government. The money for the Fire Service is not ring-fenced within the total amount available and the Fire Service has to compete with other local authority services for its resources.

3.6 Staffing and equipment

3.6.1 Equipment and procedures in the service are standardised to permit brigades to work together at incidents. Training is also standardised and promotion to the lower ranks is by means of national written and practical examinations. Recruits are trained at a number of Brigade recruit training establishments to a standard syllabus. The Fire Service College, at Moreton-in-Marsh, Gloucestershire is responsible for training in specialist skills as well as progressional and management training for all ranks of the service. At any time up to 500 students are under training.

3.6.2 The Fire Service in England and Wales is staffed by wholetime professional firefighters, together with retained personnel and trained volunteers who have other full-time occupations and who are called out whenever they are required. The authorised establishment for wholetime firefighters in England and Wales is 35,902[1] and 16,539[1] retained firefighters. These are supplemented by an authorised establishment of 1,508 control room staff and nearly 6,000 non-uniformed support staff.

3.6.3 Retained firefighters are paid an annual 'bounty' and paid for attending each call in which they are involved. Such a system obviously relies to some considerable extent on the co-operation of retained firefighters' normal employers. There are also volunteer firefighters in some areas who provide a response in isolated rural areas. Such a combination has served this country well and enables the provision of an effective firefighting force both in major towns and throughout the

countryside where costs would preclude a totally wholetime fire service.

3.6.4 Brigades are normally organised administratively into stations, each of which is responsible for a geographically defined area and is managed by a Station Commander, and Divisions (or Areas) which will have responsibility for a number of stations and which are managed by a Divisional Commander. Principal officers and specialist departments are likely to be administratively centred as part of a Brigade Headquarters.

3.7 Standards of fire cover

3.7.1 Of considerable importance to Fire Service organisation and efficiency are what are known as the 'recommended standards of fire cover'. In simple terms, the whole of England Wales and Scotland is categorised into one of five categories of fire risk. 'A' risk areas are typically the centres of very large towns. 'B' risk areas are the centres of smaller towns, 'C' risk areas are likely to be normal residential areas and 'D' risk areas are the normal countryside surrounding towns. There is a further category known as 'Rural' which describes the type of environment where there is a minimal fire risk. Additionally, 'Special Risk' premises are single sites within a risk area that are considered to be a significantly higher risk than that of the surrounding risk category.

3.7.2 Minimum response times are recommended for each risk category. For an 'A' risk these involve an attendance at a fire of two pumping appliances within five minutes of receiving a call and a third appliance within eight minutes. For 'B' risk these are reduced to one appliance in five minutes and one in eight minutes. For 'C' risk this is one in eight to ten minutes and for 'D' risk one in twenty minutes.

3.7.3 Meeting these times determines the locations of fire stations and how they should be staffed. Staffing options include whole-time firefighters who are obviously instantly available to respond, and retained firefighters who need to be called out and have first to respond to the fire station.

3.8 Mobilising and communications

3.8.1 Every brigade in this country has a single central control room which is responsible for receiving all 999 calls and for mobilising appliances and calling-out retained firefighters. Mobilising, which in most cases is computer assisted, is in accordance with pre-determined attendances which relate to the fire risk categorisation of the incident address and the type of incident.

3.8.2 Fire appliances are mobilised by a network of private circuits or radio bearers to fire stations where mobilising messages from the central control are printed on a remote printer. Retained firefighters are called-out by mobilising alerters which are very similar to paging receivers but use local transmitters actuated remotely by the

mobilising control.

3.8.3 Messages from incidents, including those requesting further assistance, are sent back to the mobilising control by radio. The Fire Service in England and Wales currently use low band assignments in the VHF band.

3.8.4 Such an arrangement lends itself to the use of data, status messages and simple coded messaging. One brigade has, for example, recently developed a system by which mobilising messages can be transmitted to, displayed and printed directly in fire appliances. Brigades often maintain central databases of risk and hazardous substance information which is usually sent verbally to incidents when required, however, the trend is towards the use of mobile data to facilitate access to central databases from incidents.

3.8.5 There is a substantial degree of interoperability between brigades using amplitude modulation at VHF which is inhibited only by a small number of Brigades which use schemes with frequency modulation. There are two national single-frequency assignments at VHF for interoperability between brigades in this band. Radio station sites are often shared with police.

3.8.6 Communications at the scene of incidents are normally through UHF hand-held radios (sometimes with interfaces direct to breathing apparatus facemasks). The Fire Service throughout the UK uses common UHF assignments thus facilitating support at incidents involving personnel from more than one brigade. Two of the UHF assignments are two-frequency; portable or mobile base stations are deployed, when necessary, to facilitate their use. There are also a number of sites, such as Gatwick airport, on the London Underground system and in some road tunnels (for example the Holmesdale tunnel on the M25) where fixed base stations are provided. Common single and two-frequency UHF assignments permit interoperability with police and other emergency service commanders at incidents.

3.9 Command at incidents

3.9.1 At operational incidents the officer in charge will be the most senior fire brigade officer in attendance. This officer will be responsible for the command of all aspects of fire service operations at the scene and will be responsible for assessing the incident, the resources that will be necessary to deal with it and for requesting reinforcements. At larger incidents subordinate officers may be responsible for command of geographical sectors of the incident or for particular functions such as the investigation of the cause of fire. Many brigades deploy a mobile control unit to assist in incident command at large or serious incidents.

3.10 Breathing apparatus

3.10.1 Wherever irrespirable atmospheres are encountered or suspected, firefighters will

be deployed in teams equipped with breathing apparatus. Specialist interfaces are required to permit the use of radio communications in conjunction with breathing apparatus. Additionally, where the hazard includes flammable or explosive dusts or gases, equipment may need to be protected to prevent it being a potential source of ignition.

3.11 The changing role of the Fire Service

3.11.1 During 1990 fire brigades in England and Wales received a total of 949,500 calls for emergency assistance. Of these 407,000[1] were to fires of which 164,500[1] were to fires involving property or casualties. False alarms accounted for 351,000[1] calls and the remainder were for other types of incidents (ie not fires).

3.11.2 Although brigades are primarily charged with dealing with fires, they have increasingly become involved in all aspects of rescue and are regarded by many as the premier emergency rescue service in the country. Some brigades incorporate the words 'Fire and Rescue Service' in their title. This trend has led towards the procurement of equipment suitable for dealing with road traffic and other transport accidents, building collapses and incidents involving hazardous chemicals. Specialised training also reflects the importance of the rescue role of the Fire Service. During 1990, 191,000[1] calls for assistance fell into this category of which 32,901[1] concerned road traffic accidents.

3.11.3 Although Fire Service operations are primarily carried out within their brigade area, there may be operational incidents which ordinarily occur outside this area. This could include for coastal brigades, incidents that occur at sea and on oil rigs, or dealing with catastrophes that have occurred elsewhere in the world. Teams of UK firefighters have, in recent years, operated in Mexico, Armenia and Turkey.

3.12 Fire safety issues

3.12.1 Fire safety represents an important area of Fire Service operations. This task involves enforcement of existing fire safety legislation on the one hand and on the other the provision of general and specific advice to public authorities, businesses and the general public on matters relating to fire safety. Brigades are heavily committed to local and national initiatives directed towards fire safety publicity and education.

3.12.2 During 1990, this involved the issue of 7,509[1] new or replacement fire certificates to premises certified under the Fire Precautions Act 1971 and the supervision of the 179,306 fire certificates then in force. As can be imagined, this task is likely to require inspections of buildings both during construction and after completion and often involves the preparation and maintenance of detailed plans.

4 Current and Planned Fire Service Radio Communications

4.1 Introduction

4.1.1 This Section summarises the current use of radio communications within the Fire Service of England and Wales highlighting problems and limitations. The information presented in this Section is drawn mainly from Part 1 of the User Requirement Questionnaire.

4.1.2 The Section is divided into the following parts:

- main radio schemes (Section 4.2);
- fireground radio (Section 4.3);
- mobilising alerting systems (Section 4.4);
- pagers (Section 4.5);
- mobilising systems and bearers (Section 4.6);
- other radio communications equipment (Section 4.7).

4.2 Main radio schemes

4.2.1 All Fire Brigades in England and Wales, except the Isles of Scilly, have a wide area VHF radio scheme for co-ordinating the activities of brigade resources. These schemes operate with frequency assignments in VHF low band. Approximately three quarters of all brigades use a single main scheme channel to provide communications over the whole brigade area. However, fourteen brigades employ more than one main scheme channel (the maximum being five channels).

4.2.2 By far the majority of main schemes (eighty five percent) use amplitude modulation, although eight brigades have channels which are frequency modulated. Where multiple sites are used to provide wide area coverage for a main scheme channel, quasi-synchronous techniques are used almost exclusively (some five schemes employ site select methods). Averaged over all brigades, about four hill-top sites per brigade provide main scheme radio.

4.2.3 Whilst all main scheme radio systems support voice communications about half of all brigades employ some form of data system. Such systems vary from equipment capable of transmitting a small range of status or location indications to mobile data terminals in appliances capable of receiving mobilisation messages in text form. In general such systems are implemented using shared voice and data channels, although four brigades have main scheme channels dedicated to data use. Approximately a quarter of all brigades employ CTCSS signalling on their main schemes.

4.2.4 Most brigades (eighty five percent) have six or fewer base stations. In general, base stations are equipped with main and stand-by bays. On average, base station equipment is about seven years old although a significant number of brigades (about forty percent) have equipment which is in excess of ten years old. Only two brigades have any firm plans to replace some or all of their main scheme infrastructure, however eleven brigades plan to increase the number of VHF channels in use.

4.2.5 Currently, the methods of providing links to VHF base station are:

- VHF radio links (used by thirty seven brigades);
- UHF radio links (used by seven brigades);
- analogue leased circuits (land lines or microwave) (used by ten brigades);
- private analogue microwave (used by five brigades);
- analogue microwave shared with the Police Service (used by fifteen brigades);

Note that some brigades employ a number of link methods.

4.2.6 Twenty brigades currently have plans to change the method used for such links, although no Service-wide preference for any particular linking method is apparent.

4.2.7 Most VHF radios (eighty percent) are mobiles used for voice only (on average about one hundred and thirty five per brigade). Nine brigades have VHF mobiles which are used for data transmissions only. Most brigades (eighty five percent) also have VHF transportable radios and fixed mobiles (typically less than ten per brigade in each case). A third of all brigades have VHF/UHF repeater sets (on average about six per brigade which have them). These repeaters permit personnel with UHF handportables (see Section 4.3) to communicate on a VHF main scheme.

4.2.8 Ten brigades are equipped with VHF handportables of which there are generally less than ten per brigade. However, two metropolitan brigades have in excess of fifty and a hundred respectively. Only three brigades have VHF handportables which are classified as Intrinsically Safe. VHF radios are on average about three to four years old. About half of all brigades expect a change in the number of VHF mobiles in the next five years with increases in the region of about ten mobiles being the most common.

4.2.9 Difficulties experienced with main radio schemes are:

- **Congestion**: Main schemes generally provide sufficient capacity for day-to-day brigade operations. However, some brigades experience congestion on a regular basis eg during shift changes. The principal difficulty is the lack of

capacity to handle infrequent major or widespread incidents, for which many resources need to be mobilised and co-ordinated.

- **Fire service interoperability:** Most brigades employ amplitude modulation on their main schemes, however there are a small number which use frequency modulation. Thus although there is a substantial degree of interoperability between brigades using AM, such interoperability does not extend service-wide.

- **Coverage:** Some brigades have difficulty providing necessary communications to resources operating in coastal waters.

4.3 Fireground radio

4.3.1 UHF radio equipment is employed by brigades to provide local area communications at a fireground. Recently there has been an increase from three to six UHF frequency assignments for fireground radio. About ninety percent of fireground radio comprises handportable equipment, with an average of about one hundred and fifty sets per brigade (including spares). Two thirds of brigades have Intrinsically Safe UHF handportables, but for two thirds of these brigades less than a quarter of the total holding of UHF handportables are certified Intrinsically Safe.

4.3.2 Sixteen brigades have vehicle adaptors by which radios can be used within vehicles and removed for handportable use. To aid communications for BA teams thirty one brigades have equipment to interface radios to BA apparatus. Very few brigades (eleven) have UHF mobile sets and for those that do there are no more than ten per brigade. In order to provide extended coverage at incidents, three quarters of brigades have mobile or transportable base station equipment.

4.3.3 The UHF equipment of more than three quarters of brigades is less than six years old and about a quarter of all brigades expect to replace their UHF equipment within the next five years. Some brigades currently have equipment which is unable to use all six of the fireground radio channels and plan to replace or supplement this equipment with radios which can.

4.3.4 In order to provide fireground communications in key areas (such as airports) or in difficult communications environments (eg tunnels), eleven brigades are able to make use of a few UHF base stations permanently installed at such sites. Eighteen of these base stations are owned by brigades.

4.3.5 Current limitations of UHF fireground radios are:

- **Interference:** Although there has been a recent increase in UHF channel allocations, there remains the possibility that firefighters at nearby incidents will be using the same channels resulting in communications interference.

- **Main scheme communications:** Some brigades have UHF/VHF repeater equipment to permit UHF handportables to communicate on main scheme radio channels. However, such equipment often has a limited capability; in particular some equipment (vehicle control units) results in the loss of all-informed operation for UHF users.

- **Coverage:** Fireground radios are required to operate in difficult communications environments, for example in buildings or in tunnels. Problems are experienced in providing adequate coverage, particular since low power handportables operating in simplex mode are typically in use.

- **Interoperability:** Many organisations in addition to fire brigades may be present at incidents. There is generally a need to co-ordinate the activities of each organisation and current Fire Service radio equipment (together with that of other organisations) is not capable of providing this interoperability when required.

- **High-noise environment:** When operating in conditions of high ambient noise, firefighters currently experience difficulties in hearing radio messages. Further problems are sometimes encountered due to the quantity of radio traffic on the channel resulting in relevant messages being missed.

- **Hands-free operation:** The use of VOX with fireground radio results in all speech being transmitted, resulting in channel congestion.

4.3.6 Official reports regarding the Clapham Junction railway accident[2] (12 December 1988), King's Cross underground fire[3] (18 November 1987) and the aircraft accident at Manchester Airport[4] (22 August 1985) have highlighted communications interoperability and coverage issues:

Clapham Junction Railway Accident[2]

4.3.7 'Recommendation 67: Emergency services shall provide local radio communications at the accident site to facilitate liaison between the control units and experts on site.'

King's Cross Underground Fire[3]

4.3.8 'Recommendation 110 (Most Important): The radio equipment in underground stations for the British Transport Police must be made compatible with that used by the London Fire Brigade.'

4.3.9 'Recommendation 119 (Necessary): The London Fire Brigade must improve the means of radio communications between firefighters below ground.'

Manchester Airport Aircraft Accident[4]

4.3.10 **'Recommendation 4.14: A requirement should be introduced for an effective communication system for Rescue and Fire Fighting personnel as part of the licensing requirements for all major airports. That requirement should include provision for communication on the same system by the officer in charge of the units deployed by any local authority fire service having standing arrangements to attend such airports.'**

4.4 Mobilising alerting systems

4.4.1 Mobilising alerting systems are used by almost all brigades principally for the mobilisation of retained firefighters or of day-manning firefighters who are providing cover outside normal hours. Systems typically comprise a number of mobilising alerter transmitters located at, or close to, stations which are linked to mobilising control. The transmitters broadcast signals to firefighters mobilising alerters which are devices similar to commercial pagers.

4.4.2 There is an average of about twenty mobilising alerter transmitters per brigade and about half of all alerter equipment is duplicated for resilience. A quarter of all systems are between sixteen to twenty years of age. Six brigades have systems where all the transmitter equipment is over twenty years old.

4.4.3 There is a wide variation in the number of firefighters mobilising alerters in each brigade, corresponding to the variation in the number of such firefighters. The average number across all fifty five brigades is close to four hundred mobilising alerters per brigade. Eighty percent of brigades have mobilising alerters which are all ten years old or less.

4.5 Pagers

4.5.1 A variety of paging methods are used by brigades, namely:

- overlay paging on VHF main scheme channels (thirty seven brigades);
- private wide area paging systems (three brigades);
- commercial paging (forty six brigades);
- local area paging, eg employing alerter transmitters (nine brigades).

Note that some brigades employ a number of paging methods.

4.5.2 Overlay and private wide area paging systems typically provide coverage over the whole brigade area, whereas local area systems, as the name implies, provide

coverage around a single transmitter only. Most commercial pagers are for regional use only, however about ten percent operate with national coverage. Averaged over all brigades there are about a hundred pagers per brigade, although there is considerable variation between brigades both in the numbers and types of pagers.

4.5.3 Most pagers (over ninety percent) are tone or numeric pagers only, although a majority of brigades (thirty one) have a small number of message pagers. In general, an estimated eighty five percent of pagers are used not only for routine purposes but also to mobilise personnel, as necessary. Of those brigades which use commercial pagers, three quarters conduct their paging via a bureau service, the remainder directly.

4.6 Mobilising systems and bearers

4.6.1 All brigades operate a single mobilising control room, the exception being the Isles of Scilly Brigade which is co-ordinated though the Cornwall mobilising control. Most brigades (eighty five percent) have between three and seven operator positions at mobilising control and nearly all brigades make use of computer assisted mobilising systems. Most brigades (forty four) have plans to replace or undertake major enhancements to their mobilising systems within the next five years. (Note the comments in paragraphs 1.6.7 and 1.6.8 relating to mobilising controls.)

4.6.2 Few brigades (eleven) employ radio as a primary or secondary bearer of mobilising messages to stations. However, approximately half of all brigades expect to make use of radio to provide links to mobilising systems in future, the principal reason being on cost grounds (compared with use of land-lines or PSTN).

4.7 Other radio communications equipment

4.7.1 Many brigades (thirty seven) make use of cellular telephone equipment to meet some of their communications needs. Mobile, portable and transportable telephones are used of which there are usually less than ten in each category per brigade. However two brigades have more than twenty portable telephones and one has more than twenty mobile telephones. Less common are cellular fax machines (just over fifty amongst all fifty five brigades). Two thirds of all brigades expect to see a modest increase (less than ten) in their holdings of cellular telephones in the next few years.

4.7.2 In order to support waterborne operations, a minority of brigades employ marine band radios. Some of these are mobiles (nineteen in total between ten brigades), the majority being handportable or transportable (thirty eight between fourteen brigades). Only one brigade has air band radios (three in total) to co-ordinate air-related activities.

5 Description of Radio Communications Requirements

5.1 Introduction

5.1.1 This section provides a description in narrative form of the Fire Service user requirement for radio communications. A formal statement of requirements is presented in Section 6. The aim of this section is to provide an overview of the requirement. A summary of those requirements which may not be fully met by current brigade radio systems is provided at the end of the section. The summary also indicates the aspects of existing equipment which should be given priority for improvement.

5.1.2 The section is divided into the following sub-sections:

- mobilisation communications (Section 5.2);
- communications from an incident (Section 5.3);
- communications at an incident (Section 5.4);
- routine communications (Section 5.5);
- summary and priorities (Section 5.6).

5.1.3 Within each sub-section requirements are discussed under the headings of:

- users;
- traffic types;
- other users and interoperability;
- area of coverage;
- quality of coverage;
- performance;
- availability.

Section 5.4, communications at an incident, contains additional headings addressing particular requirements for:

- radio equipment used at incidents;
- specialist requirements which may result in the provision of radio bearers.

Section 5.5 also discusses the requirement for routine paging systems.

5.1.4 It is anticipated that the definition of the user requirement will facilitate the adoption of a procurement policy which results in supplier independence. Furthermore, it is envisaged that a modular approach will be possible, through which individual procurement authorities will be able to purchase requirements solutions which are the most cost effective for their needs. Therefore, although the requirement states that system solutions must be designed with an inherent capability to meet, for example, essential requirements, the facility will not necessarily have to be 'purchased' by procurement authorities.

5.1.5 It is important to note that the requirement stated is for generic Fire Service communications and therefore requirements specific to a particular brigade are not presented. It is not envisaged that the absence of such requirements from this document will preclude the procurement of equipment to meet those requirements.

5.2 Mobilisation communications

5.2.1 Users

5.2.1.1 Radio communications for mobilisation are required, principally, to alert mobile resources to attend incidents and to provide any necessary information regarding such incidents to the mobile resources. Radio communications may also be required to link fixed locations (eg primary or secondary bearers between mobilising controls and fire stations) where they are the most effective solution (considering, for example, requirements, cost, radio spectrum availability and reliability).

5.2.1.2 Mobile resources requiring communications for mobilising purposes may be any of the following:

- mobile appliance crews (ie away from fire stations or any other locations to which mobilising instructions are issued via a fixed infrastructure);
- retained firefighters, or other personnel who may be mobilised to an incident and for whom no permanent mobilising system via fixed infrastructure is employed (this category includes day-manning personnel providing cover outside normal hours or volunteer firefighters);
- other mobile resources (ie other personnel who may be mobilised to incidents and for whom no permanent mobilising system via fixed infrastructure is readily available).

5.2.2 Traffic types

5.2.2.1 It is essential to be able to pass mobilisation messages by voice (the requirement for retained firefighters is discussed in paragraph 5.2.2.2). However, it is perceived that

substantial reductions in the quantity of voice radio traffic can be realised through the use of data communications to pass formatted messages. As a result, there is an essential requirement to pass text messages to mobile personnel. In addition, it is highly desirable that graphics (such as maps or plans) can be transmitted.

5.2.2.2 The principal requirement regarding the mobilisation of retained firefighters is the need to alert them to attend the station. Consideration should also be given to providing the capability to mobilise firefighters either individually, in groups or collectively.

5.2.2.3 In all cases where mobilisation instructions are issued, it is essential that mobilising control can obtain an acknowledgement when messages have been received. Wherever possible, it is essential that messages can be acknowledged immediately on receipt. In the case of retained firefighters, it is highly desirable that messages can be acknowledged as soon as they are received.

5.2.3 **Other users and interoperability**

5.2.3.1 Although the primary communications exchange is between mobilising control and the resources being mobilised, the capability for communications to be monitored by other brigade personnel such as staff at divisional headquarters is required. In particular, there is a need for station commanders, who may be responsible for a number of stations, to be aware of the deployment of their appliances. In many cases, mobilising messages will need to be broadcast to more than one station and frequently also to appliances which are already mobile.

5.2.3.2 In order to co-ordinate the response to incidents, there are requirements for radio communications with other brigades and with other organisations. The principal requirement is for communications to be possible between mobile personnel and mobilising controls from neighbouring brigades. (Note that on average a very small number of incidents (less than 5 percent) require the mobilisation of appliances from neighbouring brigades.) It is also desirable for brigade mobilising controls to communicate directly with the mobile resources of:

- police forces;
- ambulance services;
- local authority emergency planning departments;
- airport fire services;
- water authorities/companies;
- local authority highway departments;

- coastguard;
- Forestry Commission.

5.2.3.3 Whilst many brigades see the benefits to be realised from solutions to this requirement, it is generally recognised that there are considerable procedural issues to be resolved before it is acceptable for mobilising controls to communicate directly with mobile personnel of other organisations, without reference to the command and control structure of the other organisation.

5.2.3.4 Particular mobilising communications requirements arise where personnel and equipment are deployed to major events such as carnivals, air shows, etc. There is sometimes a need to mobilise individual crew members, usually from a central location or control point at the event. Where an event control centre is established, communications facilities should be established with appliances at the event and the relevant brigade mobilising control. The need also arises at such events for handportable communications between mobile personnel and mobilising control.

5.2.4 Area of coverage

5.2.4.1 The coverage or reach of communications required for mobilisation of mobile resources is determined by the possible locations of the resources themselves. Mobile appliances are generally located within their brigade area. On occasions, they may be just 'over-the-border' in neighbouring brigade areas. It is rare that they are any significant distance (eg more than 10km) into other brigade areas. Where relevant, coverage is also required at sea (up to 5km from the shore) and in estuaries.

5.2.4.2 Most mobile appliances are typically located within the station ground only. To a lesser degree, appliances may be outside the station ground but within a division or equivalent or occasionally elsewhere in the brigade area. In general, the appliances of metropolitan brigades are more likely to be outside the station ground than those of other brigades.

5.2.4.3 The coverage required for communications to alert retained firefighters (and other personnel falling in this category, defined in paragraph 5.2.1.2) is quite closely defined, since the distance of retained personnel from their station is determined by that distance at which they are able to reach the station within the required response time. For three-quarters of brigades, the maximum distance is about 5km or less, although two brigades have indicated a requirement for a range of 15km or more.

5.2.4.4 Mobile personnel requiring mobilisation communications have the most general coverage requirements of all mobile resources. Typically, they may be located anywhere within brigade areas (or just 'over-the-border') and it may not be possible to readily determine their location more precisely.

5.2.5 Quality of coverage

5.2.5.1 Where radio is used, the primary requirement is to mobilise appliances and/or their retained crews to attend incidents. It is essential that the quality of coverage is sufficient to permit messages to be passed to appliances in the open, whether in urban or rural environments, and to appliances located within buildings (eg car parks). It is highly desirable that coverage should extend to appliances located underground (eg in tunnels). Retained firefighters may be located in buildings or vehicles, and it is essential that the quality of coverage is sufficient to alert them in such locations.

5.2.6 Performance

5.2.6.1 Rapid mobilisation of resources to incidents is a vital operational requirement. To support this requirement, it is essential that mobilisation communications have a high grade of service (eg an average access time of less than 5 seconds with the maximum delay not to exceed 10 seconds). It is estimated that, on average, about 30 seconds is required for the transmission of a mobilisation message by voice. For data communications, a message of approximately 300 characters in length is envisaged.

5.2.6.2 In the case of widespread disasters such as floods and storms, all resources of a brigade are generally stretched. Of particular relevance here is the need to mobilise resources to a large number of incidents. Currently in such circumstances, severe radio channel congestion is often experienced. There is therefore a requirement for extra communications capacity during these periods. (Solutions to this might include, for example, stand-by private incident channels or pre-emption capabilities on public communication networks (eg cellular telephone networks).)

5.2.7 Availability

5.2.7.1 Since mobilising communications are so vital to brigade activities, it is essential that there is a high degree of availability for communications involving the mobilisation of personnel to incidents (eg greater than 99.99% availability). This very high degree of availability is currently achieved through the use of duplicated equipment and/or other fall back techniques. The design objective is for 100% availability.

5.3 Communications from an incident

5.3.1 Users

5.3.1.1 The following require communications from an incident:

- officers in command;

- firefighters;
- appliances;
- officers' cars;
- control units and other vehicles;
- vessels acting in support;
- aircraft acting in support.

5.3.2 Traffic types

5.3.2.1 It is essential that voice communications between mobilising control and mobile personnel are provided, together with the capability for mobile personnel to pass short status messages to mobilising control and for mobilising control to pass text messages to mobile personnel. It is highly desirable for mobilising control to be able to pass graphics messages (eg maps, plans etc) to mobile personnel and also for mobile personnel to pass text messages to control. As part of the data capability, it is essential that brigade databases can be accessed directly from the incident without the need to involve mobilising control.

5.3.3 Other users and interoperability

5.3.3.1 In addition to mobilising control, there are requirements to communicate with other brigade personnel not at the incident. Such personnel include appliance crews en route to an incident and officers at brigade and divisional (or equivalent) headquarters.

5.3.3.2 It must be possible for communications to be established with the mobilising controls of neighbouring brigades on those occasions when resources are attending incidents in neighbouring brigade areas.

5.3.3.3 Senior commanders at incidents may require communications from the fireground to other non-brigade personnel. The organisations to which these personnel belong are very much dependent upon the situation. The main organisations with whom communications are required are:

- neighbouring fire brigades;
- ambulance services;
- local police forces.

Other examples are:

- local authority emergency planning departments;
- airport fire services;
- water authorities/companies;
- local authority highway departments;
- coastguard;
- Forestry Commission;
- volunteer rescue organisations.

5.3.3.4 Control units deployed at incidents require access to the PSTN in order to communicate with other organisations from the fireground.

5.3.3.5 It is highly desirable that communications from an incident to brigade personnel can be all-informed, such that those who need to participate or monitor communications can do so for each message transmitted. A point-to-point mode of communication is also required between a user at an incident and mobilising control. In certain circumstances a secure mode of operation is required to pass messages of a sensitive nature. Communications with other organisations do not in general require any form of all-informed operation, and in some instances, a discreet point-to-point communications facility is preferable.

5.3.4 **Area of coverage**

5.3.4.1 In general, resources may be mobilised to attend incidents anywhere within the brigade area, although most frequently, they will be called to incidents in their own station ground. In addition, appliances may be required to provide cover (ie 'stand-by') at other stations. On occasions, appliances will attend incidents 'over-the-border' in neighbouring brigade areas. In such cases, incidents will be co-ordinated through the neighbouring brigade mobilising control.

5.3.4.2 Note that on occasions, brigade resources may attend incidents far from their brigade areas (eg Armenia in recent times). It is desirable that routine communications links to the UK PSTN can be provided to support the communications needs of personnel assigned to disaster areas or other areas abroad. Note that in such areas, local telephone systems providing international calls may not exist or may be unavailable due to damage, power cuts etc.

5.3.5 **Quality of coverage**

5.3.5.1 The communications link between mobilising control and the incident is essential. Whilst it is essential that firefighters with appliances (including waterborne resources) have access to such communications, it is also highly desirable that

equipment is available to permit firefighters on foot to communicate directly with mobilising control. Firefighters must be able to communicate from incidents when on foot, in the open or in buildings. It is highly desirable that they can communicate from within tunnels.

5.3.6 Performance

5.3.6.1 Since most messages from an incident are of lower priority than mobilisation communications, a lower grade of service than that indicated in paragraph 5.2.6.1 is acceptable (eg average access time 5 seconds with maximum not to exceed 30 seconds).

5.3.7 Availability

5.3.7.1 Availability requirements for communications from an incident are similar to those for mobilisation (eg greater than 99.99%).

5.4 Communications at an incident

5.4.1 Users

5.4.1.1 Radio communications are required to co-ordinate brigade activities at incidents, for example for command and control of BA teams. The users are as detailed in Section 5.3.1.

5.4.2 Traffic types

5.4.2.1 It must be possible to establish a number of distinct all-informed 'communities' of users, such that firefighters receive messages only from members of their own community (eg a command 'community' or a BA team 'community'). Currently, there is the capability to establish up to eight distinct 'communities'.

5.4.3 Other users and interoperability

5.4.3.1 Many brigades have highlighted the increasing need for air-ground communications. The requirement for radio equipment to operate in the high ambient noise environment of aircraft is indicated, together with a requirement for airborne communications which are straightforward to install (eg do not require special power supplies).

5.4.3.2 Another area highlighted by many brigades concerns waterborne and particularly coastal water incidents. Access is required to distress channels to permit communications for example with search and rescue, harbour masters, lifeboats and ships' masters. In addition, the capability to provide brigade incident communications on vessels acting in support of operations is required.

5.4.3.3 Commanders require the capability to communicate by radio with personnel of other organisations at an incident in order to co-ordinate activities. The principal organisations are:

- neighbouring brigades;
- airport fire services;
- coastguards;
- local police;
- ambulance services;
- local authority emergency planning departments.

Others of importance include personnel from:

- Forestry Commission;
- local authority highway departments;
- water authorities/companies;
- pollution control authorities;
- private fire services;
- air/sea rescue;
- volunteer rescue organisations.

These communications are required mainly to permit command level liaison with other resources at an incident. A channel is currently assigned for this purpose.

5.4.3.4 Where firefighters and personnel from other organisations are co-ordinating specific activities (eg casualty evacuation), it is highly desirable that they are to be able to establish temporary all-informed communications amongst themselves. The main other organisations are neighbouring brigades and local police and ambulance services, together with airport fire services, coastguards and local authority emergency planning departments.

5.4.4 Area of coverage

5.4.4.1 Radio communications are required not only to extend from the incident, but are needed to provide local communications at the incident itself. It is estimated that about three-quarters of all incidents attended require local radio communications.

In general a range of about 1-2km is required for such local communications. However, for widespread incidents such as forest fires, a greater range capability (eg up to 10km) is required. Equipment to provide this extended range capability is required for incidents of this type.

5.4.4.2 It is essential that communications can be established at a minimum of two separate incidents which are in radio range of each other without suffering any mutual interference effects.

5.4.5 Quality of coverage

5.4.5.1 It is essential that for all mobile resources requiring communications at an incident, the quality of coverage is such that they are able to communicate whatever their location (eg in appliances, in tunnels, in the air etc).

5.4.6 Performance

5.4.6.1 The grade of service requirements are similar to those for communications from an incident. However, it is essential to have the capability to make an emergency call providing more rapid access. (Note that currently, different fireground channels are typically employed to separate traffic related to different activities and not to alleviate congestion.)

5.4.7 Availability

5.4.7.1 Availability requirements for communications at an incident are similar to those for mobilisation (eg greater than 99.99%).

5.4.8 Equipment requirements

5.4.8.1 Equipment is required to support communications from appliances (including waterborne vessels), on foot, from aircraft and vessels providing support and must be capable of being used with BA and other specialist items of clothing or equipment.

5.4.8.2 Particular requirements apply to BA team communications. Whilst it highly desirable that each member of the team has access to voice communications, it is essential that each team member is able to transmit a distress message. In addition, it is highly desirable that health monitoring information can be relayed to a control point at the incident.

5.4.8.3 Particular attention needs to be given to radio ancillaries employed by BA teams. The primary requirements are for radios to interface to BA equipment and to be intrinsically safe.

5.4.9 Additional requirements

5.4.9.1 The capability to transmit telemetry (eg from temperature sensors) at an incident to to other locations at the fireground, such as control units, is highly desirable. Also, use is made of video and thermal imaging equipment by brigades and it is desirable that the information from this equipment can be relayed to incident control points. (Radio bearers for slow scan video might be considered in solutions to this requirement.)

5.4.9.2 For operational safety reasons, it is important that firefighters can be evacuated from an incident or areas (typically pre-defined 'sectors') of an incident. Currently, it is Fire Service policy to make use of whistles to provide evacuation signals. It is possible that radio communications might be used to transmit evacuation signals. However, it is the Fire Service's view that it is essential to have the capability to evacuate non-Fire Service personnel who may not have access to Fire Service radios.

5.4.9.3 There is a requirement to provide communications links between incident control points of different organisations. Radio communications might form a solution to this requirement.

5.5 Routine communications

5.5.1 Users

5.5.1.1 Many duties carried out by brigade personnel can be encompassed within the broad category of routine activities. In the conduct of routine activities, many personnel may be mobile in that they are not at their normal place of work. Examples are personnel conducting fire prevention inspections or attending meetings, or appliance crews carrying out special services such as filling water tanks/swimming pools. It is estimated that about 50% of all voice traffic on brigade main radio schemes concerns routine activities. This sub-section presents the radio communications requirements for mobile appliance crews and other personnel who are conducting routine duties. Requirements for paging facilities are considered in Section 5.5.8.

5.5.2 Traffic types

5.5.2.1 Whilst voice communications facilities are essential, a considerable amount of routine traffic involves the passage of short status messages to mobilising control for which standardised signalling or data messages are required. It is also essential that there is the capability to transmit text messages to mobile crews and other personnel (primarily from mobilising control). An essential requirement is the capability for personnel to access brigade databases directly without passing enquiries via mobilising control, subject to the relevant personnel being

authorised for such access by the brigade.

5.5.2.2 Most routine calls require point-to-point communications only (eg a typical telephone conversation). However, there is a requirement (particularly for mobilising controls) to be able to broadcast routine messages (eg traffic information) to all relevant mobile crews and other mobile personnel.

5.5.3 Other users and interoperability

5.5.3.1 Requirements for communications with other organisations are not as extensive as for mobilising or incident communications, the main requirement being for access to the PSTN.

5.5.4 Area of coverage

5.5.4.1 Most mobile appliance communications coverage is required within the station ground only. To a lesser degree, coverage for a particular appliance is required within a division or equivalent and also over the whole brigade area. In general, the appliances of metropolitan brigades have a greater requirement for coverage outside the station ground than other brigades. Of the occasions (about 15% on average) when crews are outside their division (or equivalent), it is very rare for them to be outside their brigade area (less than 2% of the time on average). Most activities outside the brigade area are within neighbouring brigade areas and, in the main, are close to the 'border' with a neighbouring brigade (eg within 10km).

5.5.4.2 In contrast to mobile appliance crews, the movements of other mobile personnel are not generally based around particular station grounds. An estimated 40% of mobile personnel operate within a division (or equivalent), with a further 40% operating throughout the brigade. Also, a significant proportion (ie 20%) require communications outside the brigade area. For most of these occasion, communications are required with neighbouring brigades only. However, there is a requirement to provide regional or national coverage for some personnel.

5.5.4.3 Most routine mobile communications require messages to be passed to or from mobilising control, although there are significant requirements for communications with brigade personnel at other locations, including brigade and divisional headquarters, brigade workshops and individual stations. Also, over 10% of routine communications require the transmission of messages to other personnel who are mobile (either appliance crews or other personnel).

5.5.5 Quality of coverage

5.5.5.1 Coverage must be of sufficient quality to permit communications from vehicles and personnel on foot whether in the open (in urban, rural or waterborne locations) or in buildings or car parks.

5.5.6 Performance

5.5.6.1 By the very nature of routine communications, a high grade of service is not as critical as for mobilisation or incident communications. However, it is considered that access times in excess of 30 seconds lead to unacceptable inconvenience to users.

5.5.7 Availability

5.5.7.1 The availability requirements of communications employed for routine activities are less stringent than for mobilisation or incident communications and a typical public network availability figure is acceptable (eg greater than 99.9% availability). Loss of communications for periods significantly longer than those for incident or mobilisation communications are acceptable (eg one hour).

5.5.8 Routine paging

5.5.8.1 For many personnel conducting routine duties, only the capability to be paged is required. The currently available paging facilities are generally considered to meet the routine paging requirement (particularly regarding the number of staff issued with pagers). It is estimated that most pagers (in excess of eighty five percent) may be required not only for routine paging but also for mobilisation purposes.

5.5.8.2 Approximately half of all brigades have requirements to page a small number of personnel on a national basis and a slightly greater number (typically less than ten per brigade) on a regional basis. However, the main requirement is to provide coverage over brigade areas.

5.5.8.3 It is essential that all relevant personnel (eg those currently equipped with pagers) can be paged from mobilising control. It is highly desirable that such personnel can also be paged directly from brigade telephone extensions.

5.5.8.4 It is essential that paging equipment used for routine purposes is able to indicate the priority of the message by having more than one form of paging signal or message (eg different tones). It is also highly desirable for equipment to indicate the number or identity of the caller, as is the requirement for equipment to receive and display short alphanumeric messages.

5.6 Summary and priorities

5.6.1 This section has provided an overview of the Fire Service User Requirement for radio communications. As might be expected, most requirements are met by current brigade radio communications systems. Key requirements, which may not currently be met in full, concern:

- the additional capacity needed to meet infrequent demands resulting from major incidents and/or widespread disasters (eg floods, storms etc);

- the potential for the increased use of data and signalling systems to relieve voice traffic congestion for the passage of standard or easily formatted messages;

- an increased capability for hand-held radio equipment employed at incidents, eg to permit straightforward communications with mobilising control;

- an improved capability for communications in coastal waters and with aircraft which are supporting Fire Service operations;

- increased interoperability with personnel of other organisations to provide, in particular, greater liaison between commanders of all emergency or other services at major incidents.

5.6.2 In addition, it is the view of the Project Team that the radio communications equipment used by mobile personnel within a brigade should be capable of inter-operation with similar equipment used by all other brigades.

5.6.3 As part of the determination of requirements, the questionnaire asked brigades to indicate those aspects of their current systems which should be given priority for improvement. The most important areas were considered to be (in descending order of overall priority):

- the provision of mobile data facilities to permit mobilising messages to be passed to appliances in text form;

- ensuring greater reliability of radio communications;

- providing greater flexibility within communications systems to respond to operational or organisational changes.

6 Statement of User Requirement for Radio Communications

6.1 Introduction

6.1.1 This section presents formal statements of user requirements for Fire Service radio communications. The statements are grouped as follows:

R1 Communications Elements and Users;

R2 Voice Communications;

R3 Data Communications;

R4 Mobilising Alerting and Routine Paging Communications;

R5 Other Users and Interoperability;

R6 Area of Coverage;

R7 Quality of Coverage;

R8 Performance;

R9 Availability;

R10 Equipment Characteristics;

R11 Additional Requirements.

6.1.2 Section 6.2 describes the format of the requirements statements and Section 6.3 discusses the terminology used. An explanation of the communications element diagrams used in the first section of the requirements statement is provided in Section 6.4.

6.1.3 It is emphasised that although requirements for radio communications are presented, radio may be only one (and possibly not the most effective) solution to some of the requirements.

6.1.4 Issues concerning the procurement implications of the user requirement are discussed in paragraphs 5.1.4 and 5.1.5.

6.2 Format of requirements statements

6.2.1 Each requirement is presented in bold type. The priority (see Section 2.5) and origin of the requirement are indicated below in italics. Where requirements have been derived from questionnaire responses, the questionnaire number is used as a reference. Question numbers refer to Part 2 of the questionnaire unless otherwise indicated. For example, Q2.1.23d refers to part d of Question 2.1.23 of Part 2 of the

questionnaire. Responses of individual brigades are indicated in brackets after the questionnaire number. For example, Q2.1.17 (26) refers to the response made by 'brigade 26'. (The completed questionnaires from brigades have been assigned a number from one to fifty five.) Any supporting or background information to a requirement is provided at the end of the requirement statement.

6.3 Terminology

6.3.1 In the requirements section R1, the radio communication requirement is broken down into a number of communication elements. Whilst not pre-empting requirement solutions, it is considered an aid to comprehension of the requirements if examples of solutions to these elements are provided. Thus, the following indicate examples of solutions to five of the communications elements defined in requirements section R1:

(a) mobilisation voice and data communications and communications from an incident: brigade main schemes are current examples of these communications elements;

(b) communications at an incident: UHF fireground radio is the current solution to most of this requirement;

(c) mobilisation alerting communications: the principal examples are retained firefighters' alerters;

(d) routine voice and data communications: examples are portable telephones for use outside brigade areas;

(e) routine paging facilities: pagers are a typical solution.

6.4 Communications element diagrams

6.4.1 Diagrams outlining elements and users are presented in the first section of the requirements statement. The users of a particular communications element are contained within the thick border on the diagram. Where relevant, the primary means of communication (ie voice) is indicated in the centre of the diagram. Other types of communication to be provided together with example users are shown ringed. Communications which extend outside the normal communications area (ie a brigade area or the area of an incident) or which involve non-brigade personnel are shown crossing the communications element boundary.

R1 Communications Elements and Users

R1.1 Communications elements

R1.1.1 The following radio communications elements are to be provided:

(a) Mobilisation voice and data communications (see Section R1.2);

(b) Mobilisation alerting communications (see Section R1.3);

(c) Communications from an incident (see Section R1.4);

(d) Communications at an incident (see Section R1.5);

(e) Routine voice and data communications (see Section R1.6);

(f) Routine paging communications (see Section R1.7);

(g) Radio bearers to provide voice and/or data links between fixed locations where it is effective and desirable to do so;

(h) Specialised radio bearers for particular equipment (eg evacuation signals, video, thermal imagers etc) (see requirements section R11).

Priority: Essential
Origin: Analysis of questionnaire responses

It is important to note that the decomposition of the requirement into the elements (a) to (h) above does not have any implications for final solutions. For example, all elements may be provided by the same 'system'. Alternatively, a single element may be provided by a number of 'systems'. Requirements sections R1.2 - R1.7 detail the typical brigade users of each of the communications elements. Temporary additional users are presented in requirements section R5.

R1.2 Mobilisation voice and data communications

R1.2.1 Mobilisation voice and data communications are to link mobilising control with the following users (see Figure 1):

- **mobile appliance crews;**
- **mobile non-rider officers;**
- **stations (where radio bearers are an effective solution);**
- **fixed locations such as Divisional headquarters which have a requirement to monitor mobilising communications;**
- **aircraft acting in support of brigade operations;**

- **vessels acting in support of brigade operations.**

Priority: Essential
Origin: Project team

Mobile appliance crews may be with appliances or in close proximity to appliances. Non-rider officers may be within brigade vehicles, in close proximity to such vehicles or on foot (including for example within buildings). Additional users with whom communication may occasionally be required are detailed in requirements section R5.

R1.2.2 **Some mobile non-rider officers are to be able to communicate with brigade telephone extensions using mobilisation voice and data communications. (See also requirement R5.1.1.)**

Priority: Highly desirable
Origin: Project team

R1.2.3 **Some mobile personnel (whether on foot, in appliances or in brigade vehicles) are to be able to access brigade databases. (See requirements section R3.)**

Priority: Essential
Origin: Project team
Fire Service review

It is anticipated that the database system will have facilities for a brigade to restrict the access of some users to a 'read' capability only.

R1.3 **Mobilisation alerting communications**

R1.3.1 **Mobilisation alerting communications are to be provided for those users who may be mobilised to attend incidents but who do not require voice or data communications (see Figure 1). Envisaged users are:**

- **retained firefighters;**
- **day-manning firefighters providing cover outside normal hours;**
- **volunteer firefighters;**
- **non-rider officers.**

Priority: Essential
Origin: Project team

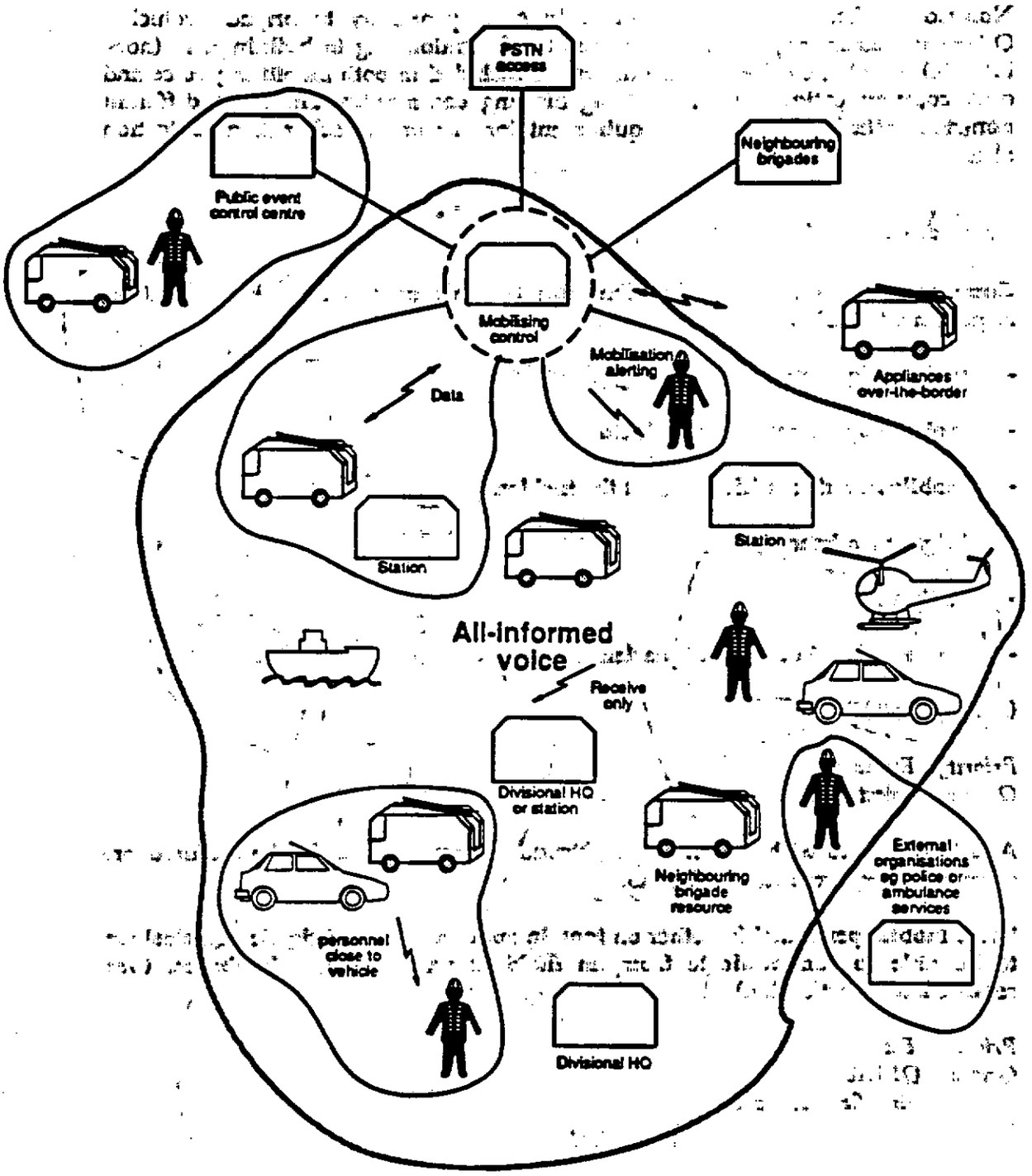

Figure 1
Mobilising voice, data and alerting communications

R1.4.3 **Some mobile non-rider officers are to be able to communicate with brigade telephone extensions using communications from an incident. (See also requirement R5.1.1.)**

Priority: Highly desirable
Origin: Project team

R1.5 **Communications at an incident**

R1.5.1 **Communications are to be provided at incidents for the following (see Figure 3):**

- **firefighters;**
- **officers;**
- **appliances;**
- **officers' vehicles;**
- **incident control units;**
- **aircraft acting in support of brigade operations;**
- **vessels acting in support of brigade operations.**

Priority: Essential
Origin: Project team

Additional users with whom communications may occasionally be required are detailed in requirements section R5.

R1.6 **Routine voice and data communications**

R1.6.1 **Routine voice and data communication facilities are to be available for the following classes of users (see Figure 4):**

- **mobile appliance crews;**
- **mobile non-rider officers;**
- **mobilising control;**
- **stations;**
- **divisional and other headquarters.**

Priority: Essential
Origin: Project team

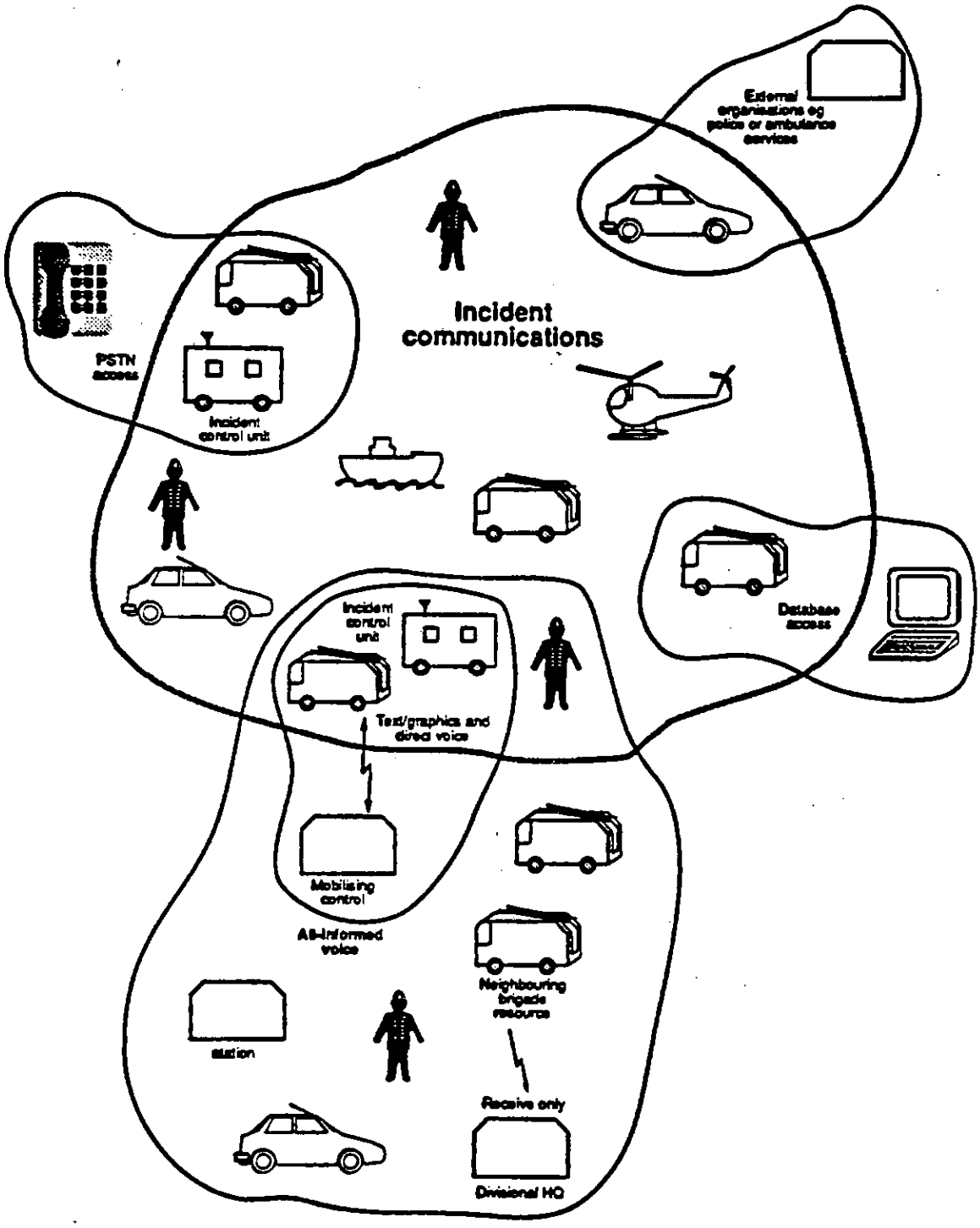

Figure 2
Communications from an incident

R1.4.3 **Some mobile non-rider officers are to be able to communicate with brigade telephone extensions using communications from an incident. (See also requirement R5.1.1.)**

Priority: Highly desirable
Origin: Project team

R1.5 **Communications at an incident**

R1.5.1 **Communications are to be provided at incidents for the following (see Figure 3):**

- **firefighters;**
- **officers;**
- **appliances;**
- **officers' vehicles;**
- **incident control units;**
- **aircraft acting in support of brigade operations;**
- **vessels acting in support of brigade operations.**

Priority: Essential
Origin: Project team

Additional users with whom communications may occasionally be required are detailed in requirements section R5.

R1.6 **Routine voice and data communications**

R1.6.1 **Routine voice and data communication facilities are to be available for the following classes of users (see Figure 4):**

- **mobile appliance crews;**
- **mobile non-rider officers;**
- **mobilising control;**
- **stations;**
- **divisional and other headquarters.**

Priority: Essential
Origin: Project team

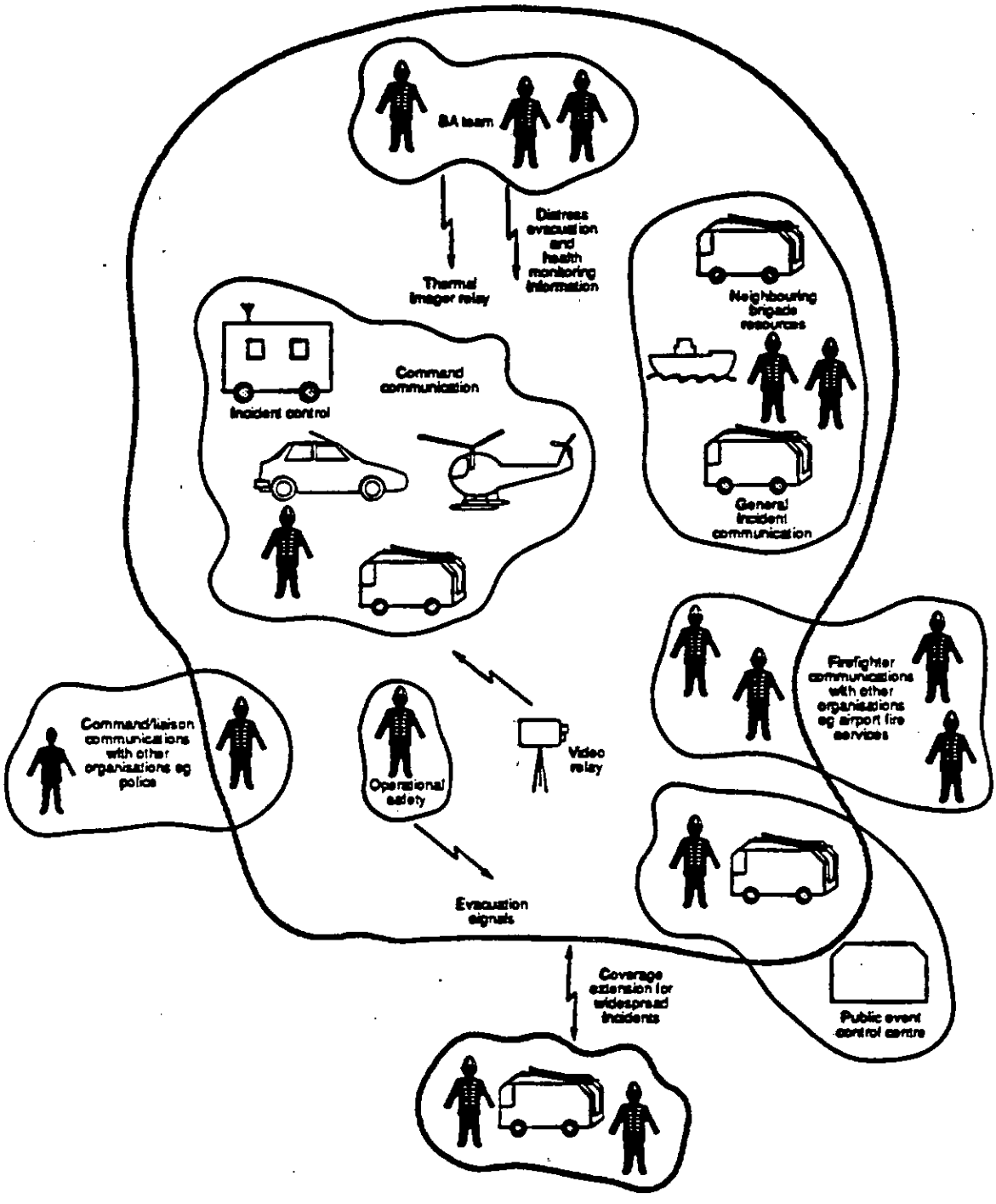

Figure 3
Communications at an incident

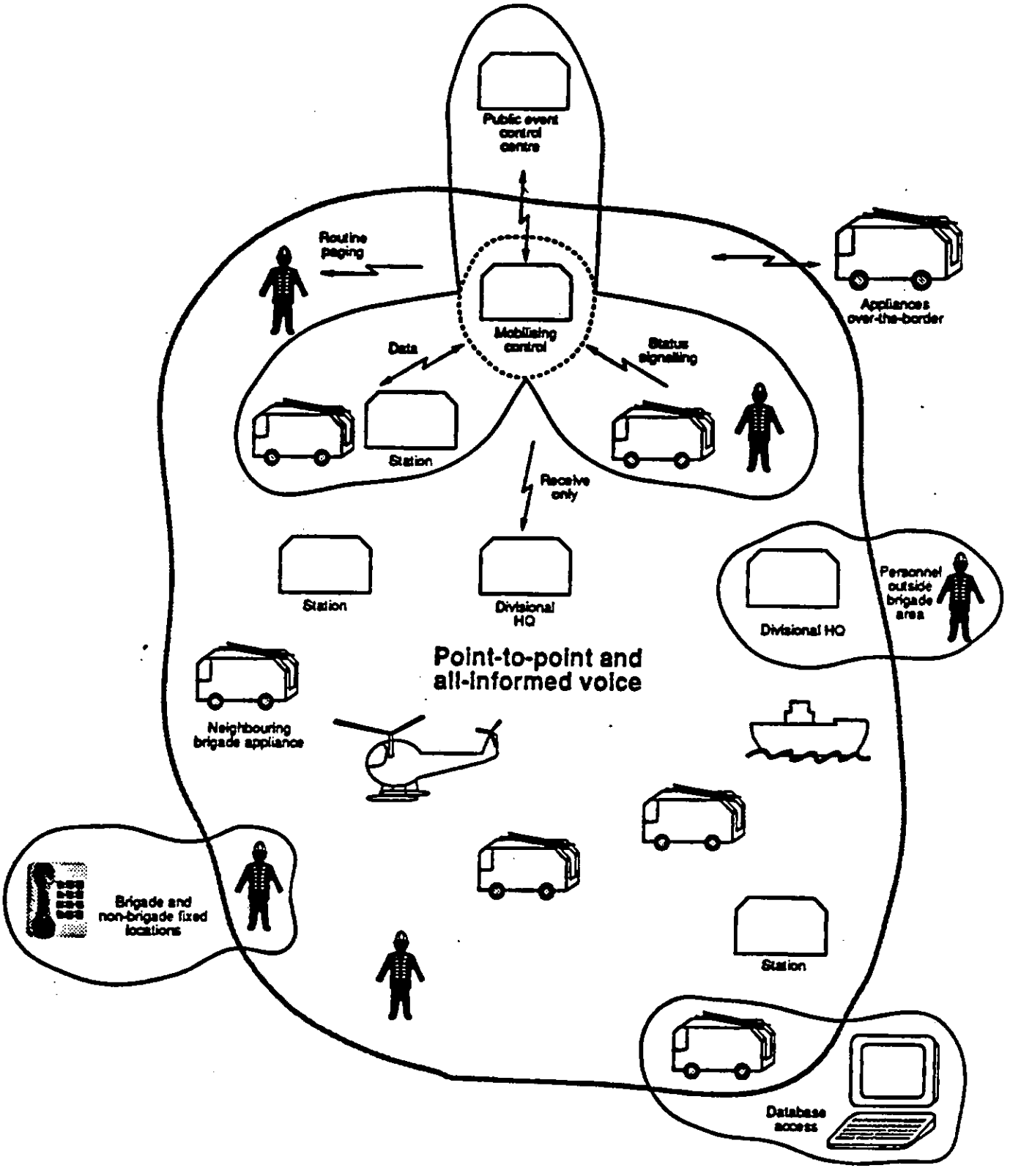

Figure 4
Routine voice, data and paging communications

Mobile non-rider officers may be with vehicles or on foot. Mobile appliance crews will be with appliances. Additional users with whom communications may occasionally be required are detailed in requirements section R5.

R1.6.2 **Using routine voice and data communication appliance crews are to be able to communicate with:**

- **mobile appliance crews;**
- **relevant mobile non-rider officers (see requirement R1.6.3);**
- **mobilising control;**
- **relevant stations (in particular, the appliance's 'home' station or station from which it is temporarily operating ('guesting'));**
- **Divisional and other headquarters requiring to monitor or communicate with mobile appliances.**

Priority: Essential
Origin: Project team

R1.6.3 **Some mobile non-rider officers are to be able to communicate with the classes of users indicated in requirement R1.6.2 using routine voice and data communications.**

Priority: Essential
Origin: Project team

R1.6.4 **Some mobile non-rider officers are to be able to communicate with brigade telephone extensions using routine voice and data communications. (See also requirement R5.1.1.)**

Priority: Highly desirable
Origin: Project team

R1.6.5 **Some mobile personnel (whether on foot, in appliances or in brigade vehicles) are to be able to communicate with brigade databases using routine data communications. (See requirements section R3.)**

Priority: Essential
Origin: Q2.1.8a; Q2.1.13a; Q2.1.23d; Q2.1.25d
Fire Service review

R1.7 Routine paging communications

R1.7.1 Routine paging communications are to be provided for those brigade personnel who require the capability to be contacted by others but who do not require more extensive routine voice and data communications (see Figure 4).

Priority: Essential
Origin: Project team

R2 Voice Communications

R2.1 Basic voice requirement

R2.1.1 Two-way voice communications are to be provided for:

- **mobilisation voice communications (see requirements section R2.2);**
- **communications from an incident (see requirements section R2.3);**
- **communications at an incident (see requirements section R2.4);**
- **routine voice communications (see requirements section R2.5).**

(Additional requirements concerning more than one communications element are presented in requirements section R2.6.)

Priority: Essential
Origin: Summary of questionnaire responses: Q2.1.8c; Q2.1.13c; Q4.1.10a; Q4.1.11

Note that some users require a receive capability only (eg divisional HQ listening posts). (Q4.1.12.)

R2.1.2 A simultaneous transmission and reception (duplex) capability is to be provided whenever possible for the communications identified in R2.1.1. However, requirements to provide all-informed facilities are to take precedence over the provision of duplex communications.

Priority: Highly desirable
Origin: Fire Service review
Project team

R2.2 Mobilisation voice communications

R2.2.1 An all-informed voice communications capability is to be provided for mobilisation voice communications whereby appliance crews, non-rider officers, stations and headquarters (eg divisional), and vessels or aircraft acting in support are able to monitor and participate in communications to and from mobilising control.

Priority: Essential
Origin: Summary of questionnaire responses: Q3.19a, b, c; Q3.20p, q, r, s

Note requirement R2.6.3.

R2.2.2 **Point-to-point communications between a mobile user and mobilising control are to be provided for mobilisation communications.**

Priority: Essential
Origin: Fire Service review

This requirement provides for discrete communications between mobile users and mobilising control (see also R11.13).

R2.2.3 **A point-to-point voice capability is to be provided for users of mobilisation voice communications to communicate with the controls of other organisations (see requirement R5.2.1).**

Priority: Essential
Origin: Project team

R2.3 **Communications from an incident**

R2.3.1 **An all-informed voice capability is to be provided for communications from an incident to permit users to monitor or participate in communications between personnel at an incident, mobilising control, mobile appliance crews and non-rider officer not at the incident, and stations, headquarters and other locations (eg workshops) and vessels or aircraft acting in support as required by individual brigades.**

Priority: Essential
Origin: Summary of questionnaire responses: Q4.1.11; Q4.1.12; Q4.1.13; Q4.1.14; Q4.1.16

Not all communications from an incident need to be all-informed (eg appliance crews requesting food/drink from their station). In addition, there are circumstances where discreet communications with mobilising control from the officer in command at an incident would be of benefit (*Q4.1.17(26)*). Note also requirement R2.6.3.

R2.3.2 **Point-to-point communications between a mobile user and mobilising control are to be provided for communications from an incident.**

Priority: Essential
Origin: Project team

This requirement provides for discrete communications between mobile users and mobilising control (see also R11.13).

R2.3.3 **A point-to-point voice capability is to be provided for users at an incident to communicate from the incident with the controls of other organisations (see requirement R5.2.1).**

Priority: Essential
Origin: Project team

R2.4 **Communications at an incident**

R2.4.1 **An all-informed and point-to-point voice capability is to be provided for users at an incident to communicate with the users identified in requirements R5.2.2 and R5.2.3.**

Priority: Essential
Origin: Project team

R2.4.2 **For voice communications at incidents, the capability to establish a number of all-informed incident 'communities' is to be provided so that traffic related to different activities at incidents may be separated.**

Priority: Essential
Origin: Summary of questionnaire responses: Q4.2.5; Q4.2.6; Q4.2.7a, b; Q4.2.8

Currently, there are UHF frequency allocations to permit six separate channels to be used, together with an additional two VHF channels and a channel to provide interoperability between emergency service commanders at an incident.

R2.4.3 **In urgent circumstances, there is to be the capability to broadcast voice messages to all users of communications at an incident regardless of any discrete 'channels' (see requirement R2.4.2) which they might be using.**

Priority: Essential
Origin: Questionnaire response: Q4.2.24 (3)
Fire Service review

Whilst all users have the capability to receive such messages, only a small number may have the broadcast (transmit) capability (see requirement R2.4.4).

R.2.4.4 **Users receiving an urgent broadcast (see requirement R.2.4.3) are to be able to signal an acknowledgement of receipt of the message to one or more control points at the incident.**

Priority: Highly Desirable
Origin: Project team
Fire Service review

R2.4.5 **A facility for mobilising control to monitor communications remotely at an incident is to be provided.**

Priority: Desirable
Origin: Project team

R2.5 **Routine voice and data communications**

R2.5.1 **A point-to-point voice communications capability is to be provided for routine voice and data communications provided that this makes more effective use of communications resources than all-informed operation.**

Priority: Highly desirable
Origin: Summary of questionnaire responses: Q2.1.20; Q2.1.21

Most calls from personnel outside a brigade area are point-to-point in nature (eg current use of mobile telephones for routine calls). It is estimated that about 70% of all routine messages do not need to be all-informed (Q.2.1.21).

R2.5.2 **The capability to broadcast voice messages to users is to be provided for routine voice and data communications from mobilising control and mobile personnel operating within the brigade area as required by individual brigades.**

Priority: Essential
Origin: Questionnaire response: Q2.1.31 (47)
Project team

This requirement is to enable routine information (eg regarding traffic conditions) to be broadcast to all relevant personnel.

R2.5.3 **A point-to-point voice capability is to be provided for users of routine voice communications to communicate with other organisations (see requirement R5.2.1).**

Priority: Essential
Origin: Project team

R2.6 **Additional requirements**

R2.6.1 **The capability for mobilising control to establish contact (eg by a type of paging) with personnel who are using any form (all-informed or non-all-informed) of voice communications is to be provided.**

Priority: Essential
Origin: Project team

If, for example, point-to-point call facilities are provided between an appliance and its station, mobilising control must not lose the capability to establish contact with (eg alert) that appliance during the point-to-point exchange. The user in the appliance would then have the option to break off his or her communication and establish voice contact with mobilising control.

R2.6.2 **In extremely urgent circumstances, should the alerting of R2.6.1 fail to lead to the establishment of voice communications, the capability for mobilising control to over-ride the communications of any personnel who are engaged in non-all-informed voice communications is to be provided.**

Priority: Essential
Origin: Questionnaire response: Q9.1 (41)
Fire Service review

Note that such a facility must be used with great care and only when absolutely necessary in order to avoid urgent or important communications being interrupted.

R2.6.3 **All-informed voice communications are to encompass the greatest number of users and areas which the grade of service requirements permit (see requirements section R8).**

Priority: Essential
Origin: Project team

This requirement concerns the fact that a limit is reached when the number of users and the traffic which they generate results in an unacceptable average waiting time (grade-of-service) before a user can communicate. This limit can be determined by users and should not be solution dependent. Where the limit is reached, it is necessary to increase the capacity (eg provide extra 'channels') to improve the grade of service. Note that if users are divided between two or more communities, communications are no longer all-informed, since users in one community cannot generally receive messages broadcast by users in other communities. Requirement R6.1 addresses the split of a brigade-wide community into communities covering smaller areas. The supporting information to that requirement describes the variation in the geographical extent of coverage required for different messages and/or users.

R2.6.4 Priority access for mobilising control is to be provided to those all-informed communications for which the control is a member of the all-informed community.

Priority: Essential
Origin: Fire Service review

This requirement encompasses, for example, the control of main scheme channels by mobilising control.

R3 Data Communications

R3.1 **The capability to pass short status messages (eg regarding activity or message acknowledgements or distress signals) from mobile appliance crews or other mobile personnel to mobilising control is to be provided for:**

- **mobilisation data communications;**
- **communications from an incident;**
- **routine data communications.**

Priority: Essential
Origin: Summary of questionnaire responses: Q2.1.8b; Q2.1.13b; Q2.1.23b; Q2.1.25b; Q4.1.10b

R3.2 **The capability to pass information from mobilising control in text form directly to mobile personnel (and to stations if no fixed infrastructure facilities are available) is to be provided for:**

- **mobilisation data communications;**
- **communications from an incident;**
- **routine data communications.**

Priority: Essential
Origin: Summary of questionnaire responses: Q2.1.23f; Q2.1.25f; Q3.20a, b

Mobilising messages transmitted in text form are estimated to require approximately 300 characters (Q3.15). Metropolitan brigades attach much greater importance than other brigades to the capability to pass mobilising messages to appliances in text form.

R3.3 **The capability for mobile personnel to pass text information to mobilising control is to be provided for:**

- **mobilisation data communications;**
- **communications from an incident;**
- **routine data communications.**

Priority: Essential
Origin: Summary of questionnaire responses: Q4.1.10c
Project team
Fire Service review

R3.4 **The capability for mobilising control to pass graphics (eg maps or plans) to mobile personnel (and to stations if no fixed infrastructure facilities are available) is to be provided for:**

- **mobilisation data communications;**
- **communications from an incident;**
- **routine data communications.**

Priority: Highly desirable
Origin: Summary of questionnaire responses: Q2.1.23g; Q2.1.25g; Q3.20i
Project team

R3.5 **The capability for mobile personnel to pass graphics (eg maps and plans) to mobilising control is to be provided for:**

- **mobilisation communications;**
- **communications from an incident;**
- **routine data communications.**

Priority: Desirable
Origin: Summary of questionnaire responses: Q4.1.10d
Project team

R3.6 **Authorised mobile personnel are to be able to retrieve information directly from brigade databases using:**

- **mobilisation data communications;**
- **communications from an incident;**
- **routine data communications.**

Priority: Essential
Origin: Summary of questionnaire responses: Q2.1.8a; Q2.1.13a; Q2.1.23d; Q2.1.25d; Q4.1.10g
Project team
Fire Service review

The response to Q2.1.23d indicates that the relevance of the requirement is considerably greater in metropolitan brigades than urban or rural brigades.

R3.7 **Authorised personnel are to be able to make direct modifications to brigade databases using:**

- **mobilisation data communications;**

- **communications from an incident;**
- **routine data communications.**

Priority: Highly desirable
Origin: Summary of questionnaire responses: Q2.1.23e; Q2.1.25e
Project team

It is anticipated that any database system will have facilities for a brigade to restrict this capability to authorised users only.

R3.8 **Direct data access to non-brigade databases by authorised personnel is to be possible using:**

- **mobilisation data communications;**
- **communications from an incident;**
- **routine data communications.**

Priority: Desirable
Origin: Summary of questionnaire responses: Q4.1.10h
Project team

R3.9 **The capability to pass mobilising information in text form to retained firefighters, volunteer firefighters or day-manning firefighters providing cover and mobile personnel not with brigade vehicles who may be mobilised to incidents is to be provided.**

Priority: Desirable
Origin: Summary of questionnaire responses: Q3.20e, g

This requirement encompasses the passage of alphanumeric messages to alerting equipment of retained firefighters and non-rider officers.

R3.10 **The capability to pass brigade mobilisation messages to the mobilising controls of neighbouring brigades and to other local emergency controls (police and ambulance) for advisory purposes is to be provided.**

Priority: Desirable
Origin: Summary of questionnaire responses: Q3.19d
Questionnaire responses: Q3.19e, (3), (14), (33), (42)

R4 Mobilising Alerting and Routine Paging Communications

R4.1 **The capability to broadcast alerts from mobilising control to pre-defined groups of individuals (eg appliance crews) is to be provided for mobilisation alerting communications.**

Priority: Essential
Origin: Summary of questionnaire responses: Q3.8a; Q3.20c
Project team

R4.2 **The capability to alert specific individuals (eg those with specialist skills) is to be provided using mobilisation alerting communications.**

Priority: Highly desirable
Origin: Questionnaire responses: Q3.21 (34), (54)

R4.3 **Mobilisation alerting and routine paging communications are to indicate the urgency of the message to the alert recipient.**

Priority: Essential
Origin: Summary of questionnaire responses: Q2.2.2b

R4.4 **Routine paging communications are to permit the transmission to and display by the paging equipment of alphanumeric messages including the identity or number of the caller.**

Priority: Highly desirable
Origin: Summary of questionnaire responses: Q2.2.2a, c

R4.5 **Facilities are to be provided for personnel to signal to mobilising control an acknowledgement of the receipt of mobilisation messages passed using mobilisation alerting communications (see requirements R8.3 and R8.4).**

Priority: Highly desirable
Origin: Summary of questionnaire responses: Q3.20m

Care is required in the implementation of this requirement to ensure that control staff are not overloaded with acknowledgement signals. The underlying operational requirement is to be able to determine as soon as possible whether or not an appliance crew will be made up or a certain officer will be attending, so that additional action can be taken if necessary.

R4.6 **A confirmation (or otherwise) that a mobilisation alerting message has been transmitted is to be passed to mobilising control by the 'system'.**

Priority: Essential
Origin: Summary of questionnaire responses: Q3.20n

R4.7 **Routine paging equipment is to be capable of activation from mobilising control.**

Priority: Essential
Origin: Summary of questionnaire responses: Q2.2.1a

R4.8 **Routine paging equipment is to be capable of activation from brigade telephone extensions.**

Priority: Highly desirable
Origin: Summary of questionnaire responses: Q2.2.1c

R4.9 **Routine paging equipment is to be capable of activation via a commercial bureau system.**

Priority: Desirable
Origin: Summary of questionnaire responses: Q2.2.1b

This requirement principally arises if requirement R4.8 is not met.

R5 Other Users and Interoperability

Requirements in this section are grouped under the following headings:

- **Brigade communications (requirements section R5.1);**
- **Communications with other organisations (requirements section R5.2);**
- **Communications at public events (requirements section R5.3).**

R5.1 Brigade communications

R5.1.1 The capability is to be provided for some personnel to communicate point-to-point with brigade personnel at fixed locations via brigade telephone extensions using:

- **mobilisation voice and data communications;**
- **communications from an incident;**
- **routine voice and data communications.**

Priority: Highly desirable
Origin: Summary of questionnaire responses: Q4.1.10e
Project team

R5.1.2 Communications equipment and facilities are to be provided for mobile users (see requirements section R1) of:

- **mobilisation voice and data communications;**
- **communications from an incident;**
- **communications at an incident;**
- **routine voice and data communications;**

to operate with the corresponding equipment and facilities of neighbouring brigades when located in neighbouring brigade areas.

Priority: Essential
Origin: Summary of questionnaire responses: Q4.1.8; Q4.2.18; Q4.2.19
Project team

R5.1.3 **Communications equipment and facilities provided for:**

- **mobilisation voice and data communications;**
- **communications from an incident;**
- **communications at an incident;**
- **routine voice and data communications;**

is to be inter-operable throughout the Fire Service.

Priority: Essential
Origin: Project team
Fire Service review

R5.1.4 **Some users will have equipment installed in appliances or vehicles for:**

- **mobilisation voice and data communications;**
- **communications from an incident;**
- **communications at an incident;**
- **routine voice and data communications.**

However, such personnel may not have handportable equipment for use when outside (but close to) the appliance or vehicle. In such cases, facilities are to be available for personnel outside the vehicle to be alerted to:

- **a relevant message passed to the appliance or other vehicle radio equipment;**
- **an attempt to contact personnel via the appliance or other vehicle radio equipment;**
- **the need to return to the appliance or other vehicle with the alert initiated by other personnel with the appliance or other vehicle.**

Priority: Highly desirable
Origin: Summary of questionnaire responses: Q3.20h

R5.1.5 **Fall-back arrangements to link a mobilising control with neighbouring brigade mobilising control and with local police and ambulance service controls are to be available (eg following PSTN failure).**

Priority: Essential

Origin: Questionnaire responses: Q8.1 (4), (33), (45), (52)

Note that radio communications may be only one solution to this requirement.

R5.1.6 **In the event of an evacuation of a mobilising control, radio communications are to be available at a secondary control room, which are capable of providing the mobilising control facilities of the following communications elements:**

- **mobilising voice and data communications;**
- **mobilising alerting communications;**
- **communications from an incident.**

Priority: Essential
Origin: Questionnaire responses: Q8.1 (33); 9.1 (2), (11), (14), (30), (35), (54)

R5.2 **Communications with other organisations**

R5.2.1 **Some mobile personnel (as required by individual brigades) are to be able to communicate point-to-point with the control points of non-brigade personnel using:**

- **mobilisation voice and data communications;**
- **communications from an incident;**
- **routine voice and data communications.**

Priority: Essential
Origin: Summary of questionnaire responses: Q2.1.19; Q3.12; Q4.1.8; Q4.1.10i
Questionnaire responses: Q2.1.12 (54); Q4.1.17 (10), (14), (52)
Fire Service review

The non-brigade personnel with whom communications are required are very much dependent upon the situation. The main organisations with whom communications are required are (Q4.1.8):

- neighbouring fire brigades;
- ambulance services;
- local police forces.

Other examples are:

- local authority emergency planning departments;
- airport fire services;
- water authorities/companies;
- local authority highway departments;
- coastguard;
- Forestry Commission;
- volunteer rescue organisations.

The capability for access to the PSTN from incident control units and other particular vehicles is particularly highlighted (Q4.1.17 (23)).

R5.2.2 **Equipment is to be available for officers in command and for control units at incidents to be able to communicate (all-informed or point-to-point) with senior personnel of other organisations attending the incident. The principal organisations are:**

- **the local police and ambulance services;**
- **airport fire services;**
- **coastguards;**
- **local authority emergency planning departments.**

Others are:

- **Forestry Commission;**
- **local authority highway departments;**
- **water authorities/companies;**
- **pollution control authorities;**
- **private fire services;**
- **air/sea rescue;**

- **volunteer rescue organisations.**

Priority: Essential
Origin: Summary of questionnaire responses: Q4.2.16; Q4.2.17
Clapham Junction railway accident report (Reference 2)
King's Cross underground fire report (Reference 3)
Manchester Airport Accident report (Reference 4)

R5.2.3 **Where firefighters and personnel from other organisations are coordinating specific activities (eg casualty evacuation), they are to be able to establish all-informed communications amongst themselves. The principal external organisations are:**

- **airport fire services;**
- **local police and ambulance services;**
- **coastguards;**
- **local authority emergency planning departments.**

Priority: Highly desirable
Origin: Summary of questionnaire responses: Q4.2.18; Q4.2.19

An example of a solution to this requirement might be to provide a common channel which a group of emergency service personnel could select for their radios for the duration of a particular activity.

R5.2.4 **Where aircraft or vessels are supporting brigade operations, equipment is to be available for use on such aircraft and vessels which is capable of providing the following:**

- **mobilisation voice and data communications;**
- **communications from an incident;**
- **routine voice and data communications.**

Priority: Highly desirable
Origin: Project Team

R5.2.5 **For incidents at sea, equipment providing access to marine band communications (particularly international maritime distress channels) is to be available.**

Priority: Essential
Origin: Questionnaire responses: Q2.1.9 (6), (54); Q2.1.12 (6), (10); Q2.1.14 (10); Q4.2.15 (6), (10); Q9.1 (13)

R5.2.6 **The capability is to be provided for communications between mobilising control and mobile personnel of other organisations external to the Fire Service. The principal services are:**

- **police forces;**
- **ambulance services;**
- **local authority emergency planning departments;**
- **airport fire services;**
- **water authorities/companies;**
- **local authority highway departments;**
- **coastguard;**
- **Forestry Commission;**
- **volunteer rescue organisations.**

Priority: Desirable
Origin: Summary of questionnaire responses: Q2.1.19; Q3.12; Q4.1.8
Fire Service review

Whilst many brigades see the benefits that can be realised from solutions to this requirement, it is generally recognised that there are considerable procedural issues to be resolved before it is acceptable for mobilising controls to communicate directly with mobile personnel of other organisations, without reference to the command and control structure of the other organisation.

R5.2.7 **The capability to alert personnel of other organisations from mobilising control is to be provided.**

Priority: Highly desirable
Origin: Questionnaire response: Q2.2.3 (9)

This requirement arises in particular when the two-way communication requirement R5.2.6 is not met. The particular example cited was the capability to page specialist county council personnel.

R5.3 Communications at public events

R5.3.1 At major events (such as carnivals or air displays) to which Fire Service personnel are assigned, temporary central control centres may be established by the organisers or other organisations. There is a requirement for communications facilities to be available to link such temporary control centres and brigade mobilising control.

Priority: Desirable
Origin: Questionnaire response: Q5.3 (33)

R5.3.2 Appliances at events at which temporary event control centres are established (as described in requirement R5.3.1) are to be able to be contacted by the event control centre.

Priority: Highly desirable
Origin: Questionnaire responses: Q5.3 (33), (54)

R5.3.3 Public event control centre communication links are to extend not only to appliances (see requirement R5.3.2) but also to personnel on foot.

Priority: Highly desirable
Origin: Questionnaire response: Q5.3 (54)

R6 Area of Coverage

R6.1 **Radio coverage is to be provided over each brigade area for:**

- **mobilisation voice and data communications;**
- **communications from an incident;**
- **routine voice and data communications;**
- **routine paging communications.**

Dependent upon any solutions developed to meet the grade of service requirements (see requirement R2.6.3 and requirements section R8), all-informed communications 'communities' need not necessarily be provided with coverage over the whole brigade area. Nevertheless, the aggregate coverage of all all-informed communications 'communities' must cover the whole brigade area. Mobilising control is to have access to each all-informed communications 'community'.

Priority: Essential
Origin: Summary of questionnaire responses: Q2.1.9a, b, c; Q2.1.14a, b, c; Q3.9a, b, c, d

Most mobile appliances are typically located within the station ground only. To a lesser degree, appliances may be outside the station ground but within a division or equivalent or occasionally elsewhere in the brigade area. In general, the appliances of metropolitan brigades are more likely to be outside the station ground than those of other brigades. The quantity of metropolitan routine communications splits approximately 55:20:20:5 (station ground : division/area : brigade : other) compared with 75:10:10:5 for other brigades. For other mobile personnel (as opposed to appliance crews), communications are more likely to take place from anywhere within the brigade area. In this case, the split on average is approximately 20:20:40:20.

R6.2 **Coverage is to extend to personnel who are just over-the-border (eg less than 10km) into neighbouring brigade areas for:**

- **mobilisation voice and data communications;**
- **communications from an incident;**
- **routine voice and data communications.**

Priority: Essential
Origin: Summary of questionnaire responses Q2.1.7e; Q2.1.9d; Q2.1.10; Q2.1.12e; Q2.1.14d; Q2.1.15; Q3.9e; Q3.20j

The strength of the requirement increases from rural brigades to urban brigades with metropolitan brigades having the strongest requirement. Note that it is envisaged that the quantity of mobile appliance routine communications requiring coverage just across 'the border' is small and on average less than 2% (Q2.1.7e, Q2.1.9d). For mobile personnel, the requirement is estimated to be significantly greater, at about 9% on average of all mobile personnel communications (Q2.1.14d).

R6.3 **Coverage is to extend to personnel who are some distance over-the-border (eg more than 10km) into neighbouring brigade areas for:**

- **mobilisation voice and data communications;**
- **communications from an incident;**
- **routine voice and data communications.**

Priority: Highly desirable
Origin: Summary of questionnaire responses Q2.1.7f; Q2.1.9e; Q2.1.11; Q2.1.12f; Q2.1.14e; Q2.1.16; Q3.9f; Q3.20k

Note that it is envisaged that the quantity of mobile appliance routine communications requiring coverage across 'the border' is very small and on average less than 1% (Q2.1.7,f, Q2.1.9e). For mobile personnel the requirement is estimated to be significantly greater, at about 9% on average of all mobile personnel communications. Of this 9%, it is estimated that on 2% of occasions communications are required from anywhere within the country (see requirement R6.8).

R6.4 **For coastal brigades, coverage is to extend into coastal waters for:**

- **mobilisation voice and data communications;**
- **communications from an incident;**
- **routine voice and data communications.**

Priority: Essential
Origin: Questionnaire responses: Q2.17i (10); Q2.1.9 (6); Q2.1.12 (10); Q2.1.14 (10), (53); Q2.1.17 (25), (43), (53); Q3.9 (10); Q4.1.6 (42), (43), (44); Q4.2.15 (27)

R5.1.3 **Communications equipment and facilities provided for:**

- **mobilisation voice and data communications;**
- **communications from an incident;**
- **communications at an incident;**
- **routine voice and data communications;**

is to be inter-operable throughout the Fire Service.

Priority: Essential
Origin: Project team
Fire Service review

R5.1.4 **Some users will have equipment installed in appliances or vehicles for:**

- **mobilisation voice and data communications;**
- **communications from an incident;**
- **communications at an incident;**
- **routine voice and data communications.**

However, such personnel may not have handportable equipment for use when outside (but close to) the appliance or vehicle. In such cases, facilities are to be available for personnel outside the vehicle to be alerted to:

- **a relevant message passed to the appliance or other vehicle radio equipment;**
- **an attempt to contact personnel via the appliance or other vehicle radio equipment;**
- **the need to return to the appliance or other vehicle with the alert initiated by other personnel with the appliance or other vehicle.**

Priority: Highly desirable
Origin: Summary of questionnaire responses: Q3.20h

R5.1.5 **Fall-back arrangements to link a mobilising control with neighbouring brigade mobilising control and with local police and ambulance service controls are to be available (eg following PSTN failure).**

Priority: Essential

Origin: Questionnaire responses: Q8.1 (4), (33), (45), (52)

Note that radio communications may be only one solution to this requirement.

R5.1.6 **In the event of an evacuation of a mobilising control, radio communications are to be available at a secondary control room, which are capable of providing the mobilising control facilities of the following communications elements:**

- **mobilising voice and data communications;**
- **mobilising alerting communications;**
- **communications from an incident.**

Priority: Essential
Origin: Questionnaire responses: Q8.1 (33); 9.1 (2), (11), (14), (30), (35), (54)

R5.2 **Communications with other organisations**

R5.2.1 **Some mobile personnel (as required by individual brigades) are to be able to communicate point-to-point with the control points of non-brigade personnel using:**

- **mobilisation voice and data communications;**
- **communications from an incident;**
- **routine voice and data communications.**

Priority: Essential
Origin: Summary of questionnaire responses: Q2.1.19; Q3.12; Q4.1.8; Q4.1.10i
Questionnaire responses: Q2.1.12 (54); Q4.1.17 (10), (14), (52)
Fire Service review

The non-brigade personnel with whom communications are required are very much dependent upon the situation. The main organisations with whom communications are required are (Q4.1.8):

- neighbouring fire brigades;
- ambulance services;
- local police forces.

Other examples are:

- local authority emergency planning departments;
- airport fire services;
- water authorities/companies;
- local authority highway departments;
- coastguard;
- Forestry Commission;
- volunteer rescue organisations.

The capability for access to the PSTN from incident control units and other particular vehicles is particularly highlighted (Q4.1.17 (23)).

R5.2.2 **Equipment is to be available for officers in command and for control units at incidents to be able to communicate (all-informed or point-to-point) with senior personnel of other organisations attending the incident. The principal organisations are:**

- **the local police and ambulance services;**
- **airport fire services;**
- **coastguards;**
- **local authority emergency planning departments.**

Others are:

- **Forestry Commission;**
- **local authority highway departments;**
- **water authorities/companies;**
- **pollution control authorities;**
- **private fire services;**
- **air/sea rescue;**

- **volunteer rescue organisations.**

Priority: Essential
Origin: Summary of questionnaire responses: Q4.2.16; Q4.2.17
Clapham Junction railway accident report (Reference 2)
King's Cross underground fire report (Reference 3)
Manchester Airport Accident report (Reference 4)

R5.2.3 **Where firefighters and personnel from other organisations are coordinating specific activities (eg casualty evacuation), they are to be able to establish all-informed communications amongst themselves. The principal external organisations are:**

- **airport fire services;**
- **local police and ambulance services;**
- **coastguards;**
- **local authority emergency planning departments.**

Priority: Highly desirable
Origin: Summary of questionnaire responses: Q4.2.18; Q4.2.19

An example of a solution to this requirement might be to provide a common channel which a group of emergency service personnel could select for their radios for the duration of a particular activity.

R5.2.4 **Where aircraft or vessels are supporting brigade operations, equipment is to be available for use on such aircraft and vessels which is capable of providing the following:**

- **mobilisation voice and data communications;**
- **communications from an incident;**
- **routine voice and data communications.**

Priority: Highly desirable
Origin: Project Team

R5.2.5 **For incidents at sea, equipment providing access to marine band communications (particularly international maritime distress channels) is to be available.**

Priority: Essential
Origin: Questionnaire responses: Q2.1.9 (6), (54); Q2.1.12 (6), (10); Q2.1.14 (10); Q4.2.15 (6), (10); Q9.1 (13)

R5.2.6 **The capability is to be provided for communications between mobilising control and mobile personnel of other organisations external to the Fire Service. The principal services are:**

- **police forces;**
- **ambulance services;**
- **local authority emergency planning departments;**
- **airport fire services;**
- **water authorities/companies;**
- **local authority highway departments;**
- **coastguard;**
- **Forestry Commission;**
- **volunteer rescue organisations.**

Priority: Desirable
Origin: Summary of questionnaire responses: Q2.1.19; Q3.12; Q4.1.8
Fire Service review

Whilst many brigades see the benefits that can be realised from solutions to this requirement, it is generally recognised that there are considerable procedural issues to be resolved before it is acceptable for mobilising controls to communicate directly with mobile personnel of other organisations, without reference to the command and control structure of the other organisation.

R5.2.7 **The capability to alert personnel of other organisations from mobilising control is to be provided.**

Priority: Highly desirable
Origin: Questionnaire response: Q2.2.3 (9)

This requirement arises in particular when the two-way communication requirement R5.2.6 is not met. The particular example cited was the capability to page specialist county council personnel.

R5.3 Communications at public events

R5.3.1 At major events (such as carnivals or air displays) to which Fire Service personnel are assigned, temporary central control centres may be established by the organisers or other organisations. There is a requirement for communications facilities to be available to link such temporary control centres and brigade mobilising control.

Priority: Desirable
Origin: Questionnaire response: Q5.3 (33)

R5.3.2 Appliances at events at which temporary event control centres are established (as described in requirement R5.3.1) are to be able to be contacted by the event control centre.

Priority: Highly desirable
Origin: Questionnaire responses: Q5.3 (33), (54)

R5.3.3 Public event control centre communication links are to extend not only to appliances (see requirement R5.3.2) but also to personnel on foot.

Priority: Highly desirable
Origin: Questionnaire response: Q5.3 (54)

R6 Area of Coverage

R6.1 **Radio coverage is to be provided over each brigade area for:**

- **mobilisation voice and data communications;**
- **communications from an incident;**
- **routine voice and data communications;**
- **routine paging communications.**

Dependent upon any solutions developed to meet the grade of service requirements (see requirement R2.6.3 and requirements section R8), all-informed communications 'communities' need not necessarily be provided with coverage over the whole brigade area. Nevertheless, the aggregate coverage of all all-informed communications 'communities' must cover the whole brigade area. Mobilising control is to have access to each all-informed communications 'community'.

Priority: Essential
Origin: Summary of questionnaire responses: Q2.1.9a, b, c; Q2.1.14a, b, c; Q3.9a, b, c, d

Most mobile appliances are typically located within the station ground only. To a lesser degree, appliances may be outside the station ground but within a division or equivalent or occasionally elsewhere in the brigade area. In general, the appliances of metropolitan brigades are more likely to be outside the station ground than those of other brigades. The quantity of metropolitan routine communications splits approximately 55:20:20:5 (station ground : division/area : brigade : other) compared with 75:10:10:5 for other brigades. For other mobile personnel (as opposed to appliance crews), communications are more likely to take place from anywhere within the brigade area. In this case, the split on average is approximately 20:20:40:20.

R6.2 **Coverage is to extend to personnel who are just over-the-border (eg less than 10km) into neighbouring brigade areas for:**

- **mobilisation voice and data communications;**
- **communications from an incident;**
- **routine voice and data communications.**

Priority: Essential
Origin: Summary of questionnaire responses Q2.1.7e; Q2.1.9d; Q2.1.10; Q2.1.12e; Q2.1.14d; Q2.1.15; Q3.9e; Q3.20j

The strength of the requirement increases from rural brigades to urban brigades with metropolitan brigades having the strongest requirement. Note that it is envisaged that the quantity of mobile appliance routine communications requiring coverage just across 'the border' is small and on average less than 2% (Q2.1.7e, Q2.1.9d). For mobile personnel, the requirement is estimated to be significantly greater, at about 9% on average of all mobile personnel communications (Q2.1.14d).

R6.3 **Coverage is to extend to personnel who are some distance over-the-border (eg more than 10km) into neighbouring brigade areas for:**

- **mobilisation voice and data communications;**
- **communications from an incident;**
- **routine voice and data communications.**

Priority: Highly desirable
Origin: Summary of questionnaire responses Q2.1.7f; Q2.1.9e; Q2.1.11; Q2.1.12f; Q2.1.14e; Q2.1.16; Q3.9f; Q3.20k

Note that it is envisaged that the quantity of mobile appliance routine communications requiring coverage across 'the border' is very small and on average less than 1% (Q2.1.7,f, Q2.1.9e). For mobile personnel the requirement is estimated to be significantly greater, at about 9% on average of all mobile personnel communications. Of this 9%, it is estimated that on 2% of occasions communications are required from anywhere within the country (see requirement R6.8).

R6.4 **For coastal brigades, coverage is to extend into coastal waters for:**

- **mobilisation voice and data communications;**
- **communications from an incident;**
- **routine voice and data communications.**

Priority: Essential
Origin: Questionnaire responses: Q2.17i (10); Q2.1.9 (6); Q2.1.12 (10); Q2.1.14 (10), (53); Q2.1.17 (25), (43), (53); Q3.9 (10); Q4.1.6 (42), (43), (44); Q4.2.15 (27)

A need for such coverage to extend 5km from the coast has been indicated (Q3.9 (3)).

R6.5 **Standard incident communications equipment is to provide coverage sufficient for most incidents. A range of up to 2 km from radio equipment is envisaged.**

Priority: Essential
Origin: Summary of questionnaire responses: Q4.2.1; Q4.2.2

R6.6 **For those incidents (eg forest fires) or major public events where incident communications are required over an unusually wide area, equipment is to be available to provide this extended range capability.**

Priority: Essential
Origin: Summary of questionnaire responses: Q4.2.3

The maximum range envisaged by most brigades is less than 10km.

R6.7 **Standard incident communications equipment is to provide the extended range capability stated in requirement R6.6.**

Priority: Highly desirable
Origin: Project Team

R6.8 **The coverage for routine voice and data communications and for routine paging communications is to extend beyond brigade boundaries for certain personnel. In some cases, national coverage is needed.**

Priority: Essential
Origin: Summary of questionnaire responses: Q2.1.9f; Q2.1.14f

Typically, for each brigade, less than a third of all mobile personnel have a substantial requirement for regional or national coverage (Q2.1.16). One brigade has indicated a requirement for international coverage for routine paging facilities (Q2.2.3 (33)). Note that solutions to this requirement might comprise private or commercial systems.

R6.9 **Coverage is to be provided around a station for mobilisation alerting communications to mobilise retained, volunteer or day-manning firefighters providing cover to that station. The range over which the coverage is to extend from the station is dependent upon the furthest distance which a firefighter can move from the station whilst ensuring that he or she is able to reach the station in the required response time.**

Priority: Essential
Origin: Summary of questionnaire responses: Q3.7

In over three quarters of brigades, the furthest distance is 5km. In two cases, ranges in excess of 15km are needed, the remainder being under 11km. A significant number (about 50%) of incidents require such alerting to take place. However, this number is much reduced in metropolitan brigades, being on average less than 10% of cases.

R6.10 **The brigade-wide coverage defined in requirements R6.1, R6.2 and R6.3 is to be provided for mobilisation alerting communications for mobilising non-rider officers.**

Priority: Essential
Origin: Summary of questionnaire responses: Q2.1.14a, b, c, d, e; Q3.8b
Project team

Note that this does not exclude a number of sub-systems providing more limited coverage (eg over a division) provided that the aggregate coverage is over a brigade area. Approximately a third of all incidents require the mobilisation of non-rider officers (Q3.8).

R6.11 **For aircraft supporting Fire Service operations which are operating over the areas defined in R6.1 to R6.6 coverage is to be provided for:**

- **mobilisation voice and data communications;**
- **communications from an incident;**
- **communications at an incident.**

Priority: Highly desirable
Origin: Summary of questionnaire responses: Q2.1.17j; Q3.10j; Q4.1.6j
Questionnaire responses: Q4.2.15 (3), (12), (13), (14), (27), (33), (40), (41), (42), (48), (53); Q4.2.16 (13)

R7 Quality of coverage

R7.1 **The quality of coverage is to be such that the following communications facilities can be provided to and from appliances and other vehicles in the open whether in urban or rural environments (including waterborne) and as far as possible without any need for vehicles to move from their location if they are stationary:**

- **mobilisation voice and data communications;**
- **communications from an incident;**
- **routine voice and data communications.**

Priority: Essential
Origin: Summary of questionnaire responses Q2.1.17b, d, i; Q3.10b, d, i; Q4.1.6b, d, i

R7.2 **The quality of coverage is to be such that the following communications facilities can be provided to and from appliances and vehicles located within buildings (eg car parks):**

- **mobilisation voice and data communications;**
- **communications from an incident;**
- **routine voice and data communications.**

Priority: Essential
Origin: Summary of questionnaire responses Q2.1.17g; Q3.10g; Q4.1.6g
Fire Service review

R7.3 **The quality of coverage is to be such that the following communications facilities can be provided to and from personnel on foot whether in the open or within buildings:**

- **mobilisation voice and data communications;**
- **communications from an incident;**
- **routine voice and data communications.**

Priority: Essential
Origin: Summary of questionnaire responses Q2.1.17a, c, e; Q3.10a, c, e; Q4.1.6a, c, e
Fire Service review

The quality of coverage currently provided for personnel on foot, in tunnels and within buildings is considered to give rise to significant communications difficulties (Q2.1.18).

R7.4 **The capability to mobilise personnel to incidents is of vital importance to Fire Service activities. For this reason, the quality of coverage provided for mobilisation**

alerting communications is to be sufficient to alert retained, volunteer or day-manning firefighters and non-rider officers whether located in the open in vehicles or within buildings.

Priority: Essential
Origin: Summary of questionnaire responses: Q3.10a, b, c, d, e, g, i
Fire Service review

R7.5 **The quality of coverage is to be such that the following communications facilities can be provided to personnel on foot or in vehicles, who are located underground (eg in tunnels):**

- **mobilisation voice and data communications;**
- **mobilisation alerting communications;**
- **communications from an incident;**
- **routine voice and data communications.**

Priority: Highly desirable
Origin: Summary of questionnaire responses: Q2.1.17f, h; Q3.10f, h; Q4.1.6f, h
Fire Service review

The quality of coverage currently provided for vehicles in tunnels is considered to give rise to significant communications difficulties (Q2.1.18).

R7.6 **The capability of personnel to communicate at incidents is of vital importance to Fire Service activities and therefore a high quality of coverage for incident communications is to be provided for personnel on foot, with appliances or other vehicles and whether located in the open, in buildings, underground or in the air.**

Priority: Essential
Origin: Summary of questionnaire responses: Q4.2.13a, b, c, d, e, f, g, h, i, j

R7.7 **It is to be possible to establish communications at a minimum of two separate incidents which are in radio range of each other without suffering any mutual interference effects.**

Priority: Essential
Origin: Fire Service review

R7.8 **The quality of coverage provided for routine paging communications must be at least as good as that provided by commercial paging organisations.**

6 *Statement of User Requirement for Radio Communications*

Priority: ***Essential***
Origin: ***Project team***
Fire Service review

Note that the area of coverage requirement for routine paging communications is addressed in requirements section R6.

R8 Performance

R8.1 **Sufficient capacity must be provided to meet the connectivity requirements specified in requirements section R1 together with the grade of service requirements specified in this section. (Additional requirements for extra capacity to meet unusual demands are presented below.)**

Priority: Essential
Origin: Project team

R8.2 **Rapid access times (ie from the time when the requirement to communicate arises to the time when it is possible to communicate) are to be provided for:**

- **mobilisation voice and data communications;**
- **mobilisation alerting communications;**

(eg average access time less than 5 seconds with maximum not to exceed 10 seconds).

Priority: Essential
Origin: Summary of questionnaire responses: Q3.16

R8.3 **Facilities are to be provided for mobilising instructions issued to personnel via mobilising voice and data communications to be capable of immediate acknowledgement (see requirement R4.5).**

Priority: Essential
Origin: Summary of questionnaire responses: Q3.20o, p

Currently, when multiple resources are mobilised, difficulties are sometimes experienced due to simultaneous requirements to acknowledge messages.

R8.4 **Facilities are to be provided for mobilising instructions issued to personnel via mobilising alerting communications to be capable of immediate acknowledgement (see requirement R4.5).**

Priority: Highly desirable
Origin: Summary of questionnaire responses: Q3.20m

R8.5 **Routine voice and data communications have less stringent access time requirements than mobilisation communications. However access times are to be such that users are not significantly inconvenienced (eg average access times less than 30 seconds).**

Priority: Essential
Origin: Summary of questionnaire responses: Q2.1.27

R8.6 **An emergency or priority call facility, which permits more rapid access than might otherwise be achieved, is to be provided for:**

- **mobilisation voice and data communications;**
- **communications from an incident;**
- **communications at an incident;**
- **routine voice and data communications.**

Priority: Essential
Origin: Summary of questionnaire responses Q2.1.23a; Q2.1.25a; Q4.3.3; Q4.3.4; Q4.3.5
Fire Service review

This requirement is driven mainly by metropolitan brigades (57% regard it is a prime requirement). Many other brigades consider it 'nice to have' or of no benefit. See also requirement R10.8.

R8.7 **Where public communications facilities are employed at incidents or during widespread disasters, the Fire Service is to have a priority access capability.**

Priority: Highly desirable
Origin: Questionnaire response: Q9.1 (10)

This requirement arises since such facilities are often in great demand at incidents (eg by the media). An alternative to Fire Service priority access is for an increased network capacity to be provided for the duration of the incident (see requirement R8.10).

R8.8 **Access times for other communications not covered by requirements R8.2 to R8.6 (eg communications at an incident) are to be between these two requirements (eg average access time 5 seconds with maximum not to exceed 30 seconds).**

Priority: Essential
Origin: Summary of questionnaire responses: Q4.1.2; Q4.2.9

R8.9 **Priority access to available capacity is to be given to those who have already established communications. This does not include a situation where an emergency call or other priority call in urgent circumstances is initiated.**

Priority: Essential
Origin: Project team

This requirement addresses the need for users engaged in an exchange not to be unnecessarily interrupted by other users, for example, during pauses in speech.

R8.10 **Extra communications capacity is to be available for:**

- **mobilising voice and data communications;**
- **communications from an incident;**
- **communications at an incident;**

to meet high traffic demands which may occur for example during major incidents and widespread disasters (assuming that the permanent provision of such capacity cannot be justified).

Priority: Essential
Origin: Questionnaire responses: Q2.1.30 (10), (12), (21), (42), (54); Q6.1 (1), (5), (10), (12), (18), (22), (24), (25), (26), (27), (32), (45)
Fire Service review

Note that the requirement for extra capacity may include public communications facilities (eg cellular telephone networks) where these provide solutions to radio communications requirements. This requirement arises since such facilities are often in great demand at incidents (eg by the media). An alternative to increased capacity is Fire Service pre-emption (see requirement R8.7).

R8.11 **Any delays introduced by communications system elements in providing users with access to communications must permit the access time requirements in statements R8.2 to R8.8 to be met.**

Priority: Essential
Origin: Project team

R8.12 **Delays between transmission and reception of voice messages shall not be such that normal conversation is difficult (eg delays should be less than 250ms). The requirement applies particularly to duplex communications.**

Priority: Essential
Origin: Project team

R8.13 **The quality of voice transmissions shall be at least as good as that provided by the best of current radio systems.**

Priority: Essential
Origin: Project team

This requirement concerns the quality of voice transmissions (eg telephone quality or broadcast voice quality) when the radio is operating free of interference, external noise, etc.

R8.14 **The quality of voice transmissions shall be better than that provided by the best of current systems.**

Priority: Highly desirable
Origin: Project team

This requirement concerns the quality of voice transmissions (eg telephone quality or broadcast voice quality) when the radio is operating free of interference, external noise, etc.

R9 Availability

R9.1 **A high degree of availability is to be provided for:**

- **mobilisation voice and data communications;**
- **mobilisation alerting communications;**
- **communications from an incident;**
- **communications at an incident.**

(eg greater then 99.99% availability). The design aim is for 100% availability.

Priority: Essential
Origin: Summary of questionnaire responses: Q10.1f
Project team

Note that the total loss of capability referred to applies to brigade communications in total and not to radio communications only. Thus, in defining availability figures for the radio system, the provision of stand-by or contingency telephone or other fixed network communications has to be taken into account. The very high degree of availability is currently achieved through the use of duplicated equipment and/or other fall back techniques.

R9.2 **A fall-back or contingency means of mobilising resources to incidents is to be provided where the primary means of communication is unavailable. This requirement includes the provision of radio communications to and from stand-by mobilising controls where necessary (see requirements R5.1.5 and R5.1.6).**

Priority: Essential
Origin: Summary of questionnaire responses: Q8.1 (33), (45); Q9.1 (2), (11), (14) (30), (35)

R9.3 **The availability requirements of communications employed for routine activities are less stringent and a typical public network availability figure is to be provided (eg greater than 99.9% availability). Loss of communications for periods significantly longer than those of requirement R9.1 are acceptable (eg one hour).**

Priority: Essential
Origin: Project team

R10 Equipment Characteristics

R10.1 **The following installations/uses of radio equipment are to be available:**

- **appliances (land and waterborne);**
- **control units;**
- **other brigade vehicles;**
- **on foot;**
- **mobilising controls;**
- **other fixed brigade locations;**
- **in aircraft and vessels providing support where relevant;**

for use with the communications elements listed below:

- **mobilisation voice and data communications;**
- **communications from incidents;**
- **communications at incidents.**

Priority: Essential
Origin: Project team

A need for radio equipment for use by divers under water has also been indicated Q4.1.6 (55). Consideration should be given to the integration of radios with standard firefighters' equipment (eg helmets) (Q4.2.24 (10)). Also highlighted is the need to provide equipment which can be installed in aircraft without recourse to special arrangements regarding, for example, alternators and power supplies (Q4.2.15 (3)) and the need for equipment suitable for use on board vessels providing support.

R10.2 **In addition to the equipment detailed in requirement R10.1, incident communications equipment is to be provided for use with BA equipment or other specialist equipment/clothing (eg chemical protection suits).**

Priority: Essential
Origin: Project team

R10.3 **The following installations/uses of radio equipment for routine voice and data communications are to be provided:**

- **appliances (land and waterborne);**
- **control units;**
- **other brigade vehicles;**
- **on foot;**
- **mobilising controls.**

Priority: Essential
Origin: Project team

R10.4 **User equipment for mobilisation alerting communications and routine paging communications is to be lightweight and portable (eg similar to pagers).**

Priority: Essential
Origin: Project team

R10.5 **Radio equipment for use by firefighters must be straightforward and easy to use and must not require extensive user training in its operation.**

Priority: Essential
Origin: Project team

It is important to consider the operational situations in which radios are used and that the need, for example, for multiple key depressions to access the desired channel is unacceptable in urgent/inhospitable conditions.

R10.6 **Equipment for handportable use at incidents is to be available in a form capable of operation whilst wearing gloves and must be capable of transmission with action no greater than the operation of a press-to-talk.**

Priority: Essential
Origin: Project team

See note to requirement R10.5.

R10.7 **Equipment is to be available (eg in the form of ancillaries) to permit radios employed in high noise environments (eg certain locations at incidents or in aircraft) to operate satisfactorily, particularly with regard to audibility of voice communications.**

Priority: Essential

Origin: Questionnaire responses: Q4.2.12 (10), (12), (14); Q4.2.15 (12); Q4.2.24 (10); Q4.3.7 (10)

When operating in conditions of high ambient noise, firefighters currently experience difficulties in hearing radio messages. Further problems are sometimes encountered due to the quantity of radio traffic on the channel resulting in messages being missed (Q4.2.12).

R10.8 **Every member of a BA team is to have the capability to transmit a distress message.**

Priority: Essential
Origin: Summary of questionnaire responses: Q4.3.3; Q4.3.4

On average, it is considered preferable to provide distress signalling facilities independently of radio voice communication equipment. A slight preference for the use of distress signal units was expressed over the provision of alternative dedicated equipment (Q4.3.5).

R10.9 **Handportable radio equipment is to have characteristics which are no worse than those of equipment currently in use.**

Priority: Essential
Origin: Project team

From Q7.1, those aspects of handportable equipment which are considered to have the highest priority for improvement are:

- water-proofing;
- battery duration;
- robustness.

R10.10 **Firefighters' alerting equipment is to have characteristics which are no worse than those of equipment currently in use.**

Priority: Essential
Origin: Project team

From Q7.2, those aspects of firefighter alerting equipment which are considered to have the highest priority for improvement are:

- water-proofing;
- battery duration;
- robustness.

R10.11 **Vehicle mounted radio equipment is to have characteristics which are no worse than those of equipment currently in use.**

Priority: Essential
Origin: Project team

Those aspects of vehicle mounted radio equipment which are considered to have the highest priority for improvement are (Q7.3):

- size reduction;
- interference (or electro-magnetic compatibility) characteristics;
- robustness.

A degree of hands-free operation for radios mounted in officers' vehicles would also be of benefit.

R10.12 **Any handportable radio communications equipment intended for use in known or suspected flammable atmospheres is to be Intrinsically Safe.**

Priority: Essential
Origin: Summary of questionnaire responses: Q7.4e

R10.13 **Any radio communications equipment used by wearers of breathing apparatus is to be Intrinsically Safe.**

Priority: Essential
Origin: Summary of questionnaire responses: Q7.4d , DCOL 6/92

R10.14 **Any handportable radio communications equipment used at or taken to incidents is to be Intrinsically Safe.**

Priority: Desirable
Origin: Summary of questionnaire responses: Q7.4b, c

R11 Additional Requirements

R11.1 **Selected radios (mainly appliance radios) are to have an automatic location reporting capability to mobilising control.**

Priority: Highly desirable
Origin: Summary of questionnaire responses: Q2.1.23c; Q2.1.25c
Fire Service review

The requirement primarily concerns vehicle location, although automatic location of key personnel would also be of benefit.

R11.2 **The capability is to be available to broadcast evacuation signals over the whole area of an incident, and also over limited areas (eg sectors).**

Priority: Essential
Origin: Summary of questionnaire responses: Q4.2.20; Q4.2.21

Note that signalling by radio is only one solution to this requirement and furthermore, it may not be the most effective (cf current use of whistles). The capability to use both dedicated signalling equipment and conventional radio transmit evacuation signals is of benefit.

R11.3 **The capability is to be provided to signal an acknowledgement of receipt of the evacuation signal in R11.2 to one or more control points at the incident.**

Priority: Highly desirable
Origin: Fire Service review

R11.4 **The capability to transmit evacuation signals to other (non-brigade) personnel operating at an incident is to be available.**

Priority: Essential
Origin: Summary of questionnaire responses Q4.2.22

It is important to note that if Fire Service radios are to be used for the broadcast of evacuation signals, not all non-Fire Service personnel might not have access to such radios.

R11.5 **The capability to transmit telemetry (eg from temperature sensors) at an incident to other locations at the fireground, such as control units, is to be provided.**

Priority: Highly desirable
Origin: Questionnaire responses: Q4.2.23 (3), (6), (9), (10), (12), (14), (18), (19), (20), (23), (32), (33), (34), (35), (38), (40), (45)
Fire Service review

R11.6 **The capability to transmit imagery taken at an incident (eg by video or thermal imaging equipment) to other locations at the fireground, such as control units, is to be provided.**

Priority: Desirable
Origin: Questionnaire responses: Q4.2.23 (3), (9), (10), (12), (14), (18), (33), (35)
Fire Service review

R11.7 **The capability for BA teams to relay health monitoring information to other personnel (eg entry control officer or control unit) at the fireground is to be provided.**

Priority: Highly desirable
Origin: Summary of questionnaire responses: Q4.3.1f

R11.8 **Facilities to record the message content of all incident and mobilising communications (including those with other organisations) are to be provided. Date and time stamping of any recordings is required.**

Priority: Highly desirable
Origin: Questionnaire responses: 4.2.24 (3), (41)

R11.9 **Training in the use of radio equipment is to be possible without any effect on operational communications.**

Priority: Essential
Origin: Questionnaire responses: Q9.1 (3), (6), (12)

This may require the allocation of training frequencies or of low power equipment which does not interfere with operational communications.

R11.10 **Communications management and control facilities must be provided enabling:**

- **remote system control;**
- **remote system interrogation and provision of diagnostics information;**
- **immediate reporting of system failures;**
- **management summary information regarding system usage and performance.**

Priority: Essential
Origin: Project team

R11.11 **Any migration to new radio communications systems must result in no loss of operational capability and must minimise inconvenience to brigade personnel.**

Priority: Essential
Origin: Project team

R11.12 **Equipment to provide routine voice and data communications links to the UK PSTN is to be available to support the communications needs of personnel assigned to disaster areas or other areas abroad.**

Priority: Desirable
Origin: Questionnaire response: Q9.1 (33)

Note that in such areas, local telephone systems providing international calls may not exist or may be unavailable due to damage, power cuts etc.

R11.13 **A secure communications mode is to be available to permit the passage of sensitive information using:**

- **mobilisation voice and data communications;**
- **communications from an incident;**
- **communications at an incident.**

Priority: Highly desirable
Origin: Project team

In particular, a need has been identified for secure point-to-point communications between mobilising control and mobile personnel for the passage of sensitive information to or from an incident or during mobilisation.

7 Summary of Management and Policy Aspects

7.1 Options for system solutions meeting the radio communications user requirements stated in Section 6 cannot be assessed independently of consideration of the means of system control and management. Some options for system solutions (eg national systems) by their very nature require different approaches to system management compared with the management of current systems by individual brigades. If system management changes are required for cost effective technical solutions to be viable, it is important that the impact of these changes is fully addressed.

7.2 As an initial stage in the consideration of system management issues, Part 3 of the user requirement questionnaire invited brigades to provide their perceptions of possible future management options, different to those currently employed. Brigades were also asked to highlight the issues of greatest concern and to identify those areas in which benefits would need to be realised. This Section summarises the responses regarding system management issues. Further details regarding these responses and responses to questions concerning joint mobilising controls and strategic trends and opportunities are presented in Appendix A.

7.3 It is recognised that there are many complex issues surrounding system management and control and that it is difficult to form views without reference to any specific proposals. However, the opinions and information provided by brigades will form a useful input into any further consideration of the impact of change relevant to the management and control of fire service radio communications. It is emphasised that the views provided are those of brigade officers and not fire authorities.

7.4 The questionnaire presented seven system ownership scenarios for consideration:

(a) large scale private Fire Service system;

(b) private systems shared with the Police Service;

(c) private systems shared with the Police and Ambulance Services;

(d) providing services on a privately owned brigade system;

(e) subscribing to a central public body system;

(f) subscribing to a local public body system;

(g) public systems owned and operated by commercial organisations.

7.5 Overall the most attractive options were considered to be:

- Option (a), large scale private Fire Service system. The main reason cited for this preference was that the system potentially offered capital and revenue benefits through economies of scale, in comparison to current individual

brigade systems.

- Option (d), providing services on a privately owned system. The main reason cited for this preference was that the option permitted the retention of radio schemes owned and managed by individual brigades, a method which is currently perceived to operate effectively.

(The options were considered attractive or very attractive by over 58% of brigades.)

7.6 Overall the least attractive options were considered to be:

- Option (f), subscribing to a local public body system. The main reason cited was the lack of confidence that local departments or agencies could provide the quality of management and of system to meet the stringent requirements of the fire service.

- Option (g), public systems owned and operated by commercial organisations. The main reason cited was the belief that commercial organisations would place commercial considerations (eg profit) ahead of Fire Service requirements.

(The options were considered unattractive or unacceptable by over 78% of brigades.)

7.7 Excepting options (a) and (d), brigades would generally prefer to remain with their current systems than to adopt any of the proposed options, even in those cases where such options are the only means of significantly improving radio communications.

7.8 The attractiveness of a facilities managed system for options (a) to (d) was also addressed and a mixed reaction was obtained. Many brigades considered that cost savings would be possible and that management burden on brigades would be reduced. In addition, commercial organisations would provide technically skilled personnel and would also bring continuity to system management and policies.

7.9 Conversely, an approximately equal number of brigades considered that the disadvantages of facilities management outweighed the advantages. The main concerns were with the difficulty in obtaining and enforcing contractual guarantees of service provision. Many brigades were concerned with the loss of direct control over costs, the potential for commercial exploitation and the inability of the commercial organisation to respond in a timely manner to the operational requirements and priorities of brigades.

7.10 More detailed comments for each of the options are provided in Appendix A.

8 References

1 DOYLE, SIR R, *'Annual Report of HM Chief Inspector of Fire Services 1990 '*, HMSO.

2 HIDDEN QC, A, *'Investigation into the Clapham Junction Railway Accident'*, HMSO, November 1989.

3 FENNELL OBE QC, D, *'Investigation into the King's Cross Underground Fire'*, HMSO, November 1988.

4 *'Report on the the accident to Boeing 737-236 series 1, G-BGJL at Manchester International Airport on 22 August 1985'*, Aircraft Accident Report 8/88, Air Accidents Investigation Branch, The Department of Transport, HMSO, 1989.

A Management and Policy Aspects

A.1 Introduction

A.1.1 This Section details the main responses made to Part 3 of the questionnaire, which addressed the following issues:

- system ownership;
- joint (mobilising) control rooms;
- strategic trends and opportunities.

A.1.2 A summary of the system ownership responses is presented in Section 7. The following sub-sections present the potential benefits and issues to be addressed regarding system ownership and the other aspects considered.

A.2 System ownership

A.2.1 Seven system ownership scenarios were presented for consideration:

(a) large scale private Fire Service system;

(b) private systems shared with the Police Service;

(c) private systems shared with the Police and Ambulance Services;

(d) providing services on a privately owned brigade system;

(e) subscribing to a central public body system;

(f) subscribing to a local public body system;

(g) public systems owned and operated by commercial organisations.

A.2.2 Detailed comments for each of the options are presented below. It is important to note that no specific proposals regarding future options were presented to brigades and that therefore a considered judgement was not possible.

Option (a), large scale private Fire Service System

A.2.3 Benefits which brigades would most expect to realise from a large scale Fire Service system, in comparison with current systems are:

- cost benefits (both capital and revenue) achieved through economies of scale;
- greater communications interoperability between brigades achieved through

standardisation of radio equipment;

- management and control advantages primarily in comparison with other options, but also as a result of a reduction in 'parochial' brigade interests;

- performance advantages in that the system would potentially provide increased capacity to meet peak demands during major incidents and would inherently have greater flexibility to respond to Fire Service structural and organisational changes;

- technological benefits realised through economies of scale, permitting 'state of the art' technology to be adopted together with the provision of increased facilities.

A.2.4 The perceived disadvantages of this system are principally considered to be that in comparison to current systems, individual brigades would suffer from:

- less influence in system management and control and consequent difficulties in ensuring the quality of management required by individual brigades;

- the need to compromise the requirements of individual brigades to permit the development of a large scale system;

- performance disadvantages through major congestion during, for example, floods or gales.

Option (b), private systems shared with the Police Service

A.2.5 Benefits to be realised for private systems shared with the Police Service generally follow those of the large scale Fire Service system option (a), together with the potential for interoperability of communications with the police where required.

A.2.6 The principal drawbacks are considered to be:

- the considerable reduction in influence in system management and policy decisions regarding the system, resulting from the involvement of the (much larger) police service;

- the mismatch in radio requirements between the Fire and Police Service resulting from different roles and operational procedures;

- the possibility that the system would not meet Fire Service grade of service requirements due to congestion during major incidents;

- the restriction on procurement options resulting from the necessity to buy equipment compatible with the system.

Option (c), private systems shared with the Police and Ambulance Services

A.2.7 The advantages and disadvantages of systems shared with the Police and Ambulance Services are considered to be comparable to those of a system shared with the police service alone, the difference being of degree or scale only (eg even greater economies of scale might be realised through a system shared between all three services).

A.2.8 Specific comments which are important to note were:

- fire, police and ambulance all operate over different areas, with consequent difficulties for providing radio coverage;
- the development of a joint system with fire and ambulance is preferable to options involving the police since the ambulance service has similar roles and operating procedures to the Fire Service and also is of similar size (when compared with the Police Service).

Option (d), providing services on a privately owned brigade system

A.2.9 Providing services on a privately owned brigade system is generally regarded as an attractive option, offering the following potential benefits:

- management and control advantages in that brigades retain individual control of their own systems (in contrast to all other options presented);
- cost benefits realised through income received from fees paid by other organisations for the use of the system;
- the ability to procure due to income received from fee payers, in an 'advanced' system offering greater facilities;
- the ability to procure, due to income received from fee payers, in a system with increased capacity, which might be used by the brigade during periods of peak brigade loading.

A.2.10 The main concerns are:

- the management overheads incurred in administering system rental/lease to other organisations;
- the possibility that few if any cost benefits would arise once administrative overheads were taken into account;
- the difficulty in providing a system to meet the requirements (eg regarding grade of service) of different users and the possibility that brigade requirements

would need to be compromised as a result.

Option (e), subscribing to a central public body system

A.2.11 Option (e), subscribing to a central public body system is considered attractive for broadly similar reasons to those of option (a). There is the potential for a comprehensive system to be developed, the management burden for which would be largely removed from individual brigades.

A.2.12 The main concerns are:

- the likelihood of a remote management structure with little local control which would be unable to provide a timely response to local requirements;
- lack of confidence in the capabilities of a central government department to provide effective and reliable management;
- the need for Fire Service requirements to be compromised, particularly regarding grade of service and availability, in order that the needs of all users can be met;
- procurement disadvantages regarding the restricted choice and lack of manufacturer competition arising from the need to purchase system compatible equipment.

Option (f), subscribing to a local public body system

A.2.13 Option (f), subscribing to a local public body system, was received very unfavourably. Of those that considered the option attractive, the following benefits would be sought:

- the capital cost advantages arising from economies of scale and the potential to facilitate budget forecasting by subscriptions being funded from revenue;
- the capability for the system and its management to reflect local requirements and priorities;
- the procurement of an 'advanced' system resulting from the economies of scale.

A.2.14 The main disadvantages perceived are:

- the lack of confidence that local departments or agencies could provide the quality of management and system to meet the stringent requirements of the Fire Service;
- the possibility of industrial action involving system managers, with

consequent impact on Fire Service;

- the system would not be tailored to brigade requirements and it would be difficult to secure sufficient brigade influence to ensure that brigade priorities were met;

- the possibility that the resulting system would be inferior to that currently operated;

- the possibility of being 'locked into' a single supplier with a consequent loss of commercial competition.

Option (g), public systems owned and operated by commercial organisations

A.2.15 Option (g) public systems owned and operated by commercial organisations, generally drew an unfavourable response. From those responses which were favourable the following potential advantages have been identified:

- provided there is competition from a number of suppliers, commercial pressures would ensure a high quality of service and 'state of the art' technology;

- funding of subscriptions from revenue rather than incurring capital costs.

A.2.16 Of the many concerns expressed regarding this option the main envisaged difficulties are:

- lack of confidence in commercial management arising the fact that such organisations would place commercial considerations (eg profit) ahead of Fire Service requirements;

- potential service disruptions due to industrial action;

- the difficulty in obtaining and subsequently enforcing guarantees of service provision;

- the lack of direct Fire Service influence in system management and control;

- the difficulty in tailoring the system to meet brigade requirements and priorities;

- the possibility that a monopoly supplier might result with consequent loss of Fire Service control over costs.

A.3 Joint (mobilising) control rooms

A.3.1 For the reasons highlighted in Section 1.6, any current examination of radio communications requirements should address the possibility of joint control rooms and the impact that these would have on system solutions. The opportunity was therefore taken, as part of the requirements questionnaire, to canvass brigade opinions concerning joint control room options.

A.3.2 Brigades were asked to consider nine options for joint control rooms and grade them according to whether they are perceived as unacceptable, unattractive attractive or very attractive. Brigades were then asked to comment on the responses made.

A.3.3 The nine options presented were:

(a) joint mobilising controls serving more than one brigade;

(b) joint Fire and Police control rooms on brigade premises;

(c) joint Fire and Ambulance control rooms on brigade premises;

(d) joint Fire, Police and Ambulance control rooms on brigade premises;

(e) joint Fire and Police control rooms on Police premises;

(f) joint Fire and Ambulance control rooms on Ambulance Service premises;

(g) joint Fire, Police and Ambulance control rooms on Police or Ambulance Service premises;

(h) joint control rooms shared with Police and/or Ambulance Services on neutral premises;

(i) control rooms operated on behalf of brigades and other emergency services by a commercial organisation.

A.3.4 The most attractive options were options (a) and (c) which were considered to be attractive or very attractive by more than 36% of brigades. The most unattractive were options (g) and (i) which were considered unattractive or unacceptable by more than 83% of brigades.

A.3.5 More detailed comments for each of the options are provided below.

Joint mobilising controls serving more than one Brigade

A.3.6 Overall cost reductions are considered to be the principal benefits which might be realised by those who regarded control rooms serving more than one brigade as

attractive or very attractive. Other advantages are considered to be:

- maintenance of fire service expertise (compared with other options);
- improved cross border co-operation;
- standardisation of operating methods and procedures;
- improved staffing levels and better training and career opportunities for control room staff.

A.3.7 Areas of concern are:

- difficulty of implementing effective command and control between different brigades;
- difficulty in standardising operating methods and procedures between brigades;
- loss of local command and control facility and local knowledge;
- personnel difficulties regarding staff relocation and industrial relations.

Joint Fire and Police control rooms on brigade premises

A.3.8 Positive comments regarding this scenario were the potential for increased interoperability between fire and police services and the management influence and maintenance of expertise which would result from control rooms being sited on brigade premises. Cost benefits might also be realised.

A.3.9 Most of the comments concerned the disadvantages of the option, namely:

- police service roles, operations, priorities and procedures are significantly different to those of the fire service, resulting in difficulties in joint operation;
- differences in relative size of organisations would result in loss of brigade influence in ensuring that its requirements are met;
- security requirements of the police service would make joint operation difficult;
- difficulty would be experienced in rationalising the different operating areas of fire brigades and police forces;
- cost benefits may not be realised.

Joint Fire and Ambulance control rooms on Brigade premises

A.3.10 A number of responses suggested that joint control rooms with the ambulance service were preferable to those with the Police Service, since the Fire and Ambulance services are more closely matched in terms of size, roles and operating procedures. In addition, it was considered advantageous by some brigades if only the emergency service elements of the ambulance service were to be incorporated into any joint control room. Other than these comments the responses were broadly similar to those made regarding joint Fire and Police control rooms.

Joint Fire, Police and Ambulance control rooms on Brigade premises

A.3.11 Comments made regarding this scenario followed those made for joint Fire and Police or joint Fire and Ambulance except that benefits or disadvantages were greater in extent (eg greater interoperability between all three services and greater command difficulties).

Joint Fire and Police control rooms on Police premises

A.3.12 In addition to the comments made regarding joint Fire and Police control room on Fire Service premises, the movement of the control room to Police Service premises was generally considered unacceptable for the following principal reasons:

- loss of control of facilities, since control room management would be dominated by the Police Service, for reasons both of location and comparative size of the organisations;
- access difficulties restricting brigade supervision;
- lack of control over performance by Chief Fire Officer;
- potential for being more closely associated with Police Service resulting in loss of 'credibility'.

Joint Fire and Ambulance control rooms on Ambulance service premises

A.3.13 In general, comments were broadly similar to those made for previous scenarios. An additional issue raised was the perception that Ambulance Service equipment is of a lower specification than that of the Fire Service and that considerable capital investment is likely to be required.

Joint Fire, Police and Ambulance control rooms on Police or Ambulance Service premises

A.3.14 Comments made regarding this scenario are broadly similar to those of comparable

scenarios addressed above, the response being altered in degree only.

Joint control rooms shared with Police and/or Ambulance Services on neutral premises

A.3.15 Some advantages were perceived regarding this scenario in that primacy would be less of an issue (but still significant) and that 'parochial' interest would be alleviated. However the majority view found this scenario unattractive or unacceptable for similar reason to those identified for previous scenarios,

Control rooms operated on behalf of your Brigade and other emergency services by a commercial organisation

A.3.16 Almost all comments made with regard to this scenario expressed concern of both the joint handling of the emergency services and the fact that the control room was operated by a commercial organisation. Issues regarding the joint co-ordination of the three emergency services have been addressed within the scenarios discussed above. A control room operated by a commercial organisation may result in the following principal difficulties:

- lack of professional expertise and the likelihood that only the minimum acceptable level of service would be provided;
- threat to service through industrial action;
- loss of brigade control and accountability;
- difficulty in obtaining and enforcing contractual guarantees regarding service provision.

A.4 Fixed links

A.4.1 Prior to the Duopoly Review, regulations have restricted the use of private radio (eg microwave linking systems from carrying voice and data traffic which is also carried on fixed networks. However, as a consequence of the Duopoly Review, there is the potential to carry all or most of such traffic on a private radio linking system. In order to assess the impact that this issue may have on radio communication requirements, brigades were asked:

- whether they considered the provision of a private radio linking system to support voice and data communications to be attractive or not;
- if such a linking scheme were attractive, whether it would remain attractive if the only means of providing the system were to be the sale or lease of spare capacity;

- whether brigades found attractive or unattractive the replacement of private radio linking systems (including links to hill-top sites) by leased services.

A.4.2 A majority of brigades (79%) considered a private radio linking system to support most voice and data communications to be attractive. Of these, most (79%) were not dissuaded from this view by the need to sell or lease spare capacity. (It is important to note that these views are initial opinions only and are not the result of detailed consideration of specific proposals.)

A.4.3 Cost benefits were considered to be the most significant advantages which might be realised by a radio linking system, in particular savings both in call charges and line rental. Other potential advantages are:

- improved system integrity particularly as a result of direct brigade access to the system;

- improved integration with other fire service communications, which would also lead to more effective system management.

A.4.4 One source of concern was the possible loss in communications resilience resulting from the use of a single integrated bearer system. The use of different bearers (eg land line and radio) provides a measure of resilience against the failure of a single bearer system.

A.4.5 In contrast to the radio linking system option, the abandonment of private radio linking systems in favour of leased services was considered unattractive by about half of all brigades. Approximately a quarter found the option attractive (the remainder held no particular views. The main advantage was considered to be the replacement of capital costs by revenue. In addition, the reduction in brigade maintenance requirements and the likelihood that the lessor would provide modern equipment were also highlighted as potential benefits.

A.4.6 The principal concerns with this option (see paragraph A.4.5) were:

- a brigade would lose direct control over its communications bearers and would risk loss of service (eg through industrial action);

- the difficulty and expense in providing alternative routing of lines for the necessary resilience, together with the inherent reduction in resilience resulting from use of one rather than two (eg radio and landline) bearer systems.

A.5 Summary

A.5.1 The responses to Part 3 of the questionnaire, addressing system management and policy aspects, indicates that brigades have serious concerns regarding any changes

to system control, management or ownership and the introduction of joint control rooms.

A.5.2 Whilst cost reductions are likely to be the key driver for any change, the impact that such changes have on operational performance and effectiveness must be addressed.

A.5.3 The principal issues highlighted by brigades are:

- the method by which brigades have sufficient control of their command, control and communication resources that impact on brigade effectiveness for which Chief Officers are accountable;
- the need to ensure that no compromise of brigade requirements or reduction in capability results from any facilities, equipment or resources being used jointly with other organisations;
- the need to ensure adequate competition amongst suppliers of brigade communications equipment to provide price competitiveness;
- lack of confidence in the ability of local and to a lesser extent central public bodies to provide the quality of system or management to meet brigade requirements;
- lack of confidence that commercial organisations would place brigade interests before commercial pressures should any conflict arise (the difficulty in establishing and enforcing suitable contractually binding levels of service provision were particularly highlighted);
- the potential risk to brigade operations arising from vulnerability to industrial action in certain scenarios.

A.5.4 Despite these concerns some brigades identified potential advantages which may be realised from some of the scenarios presented, namely:

- the ability to move costs from capital to revenue;
- opportunities for greater interoperability and standardisation between brigades or other emergency services;
- the possibility that more advanced systems might be within reach of brigades through economies of scale.