

RTIG PMR Roaming Note

Note by: Gareth Tilley, Centaur Consulting Limited, 28 May 2003

1 Introduction

- 1.1 This note represents the finding of the RTIG communications meeting held on 27 May 2003. It has been prepared using a note produced by Bill Tyson with input from bus operators, the Communications Study carried out for RTIG and further work by the RTIG Technical Group. In addition, responses from a questionnaire completed by suppliers, along with information from the 19 SCA funded Authorities and TfL, have also been utilised (see Annex).
- 1.2 It details a proposed solution for roaming buses for those implementing RTI systems. It is not intended to be a technical analysis of the issues. Its purpose is to present a series of proposals for authorities and operators implementing schemes to adopt. In the view of RTIG, these need to be followed to ensure that communications networks meet the requirements of both sets of stakeholders.

2 Context

- 2.1 Many local and regional bus services cross operational and authority boundaries. This poses problems in delivering RTI as roaming buses may not be able to communicate with the different RTI systems they encounter on their day-to-day routes. This patchwork of different RTI systems has led to roaming buses being required to have multiple sets of equipment in order to communicate with local RTI systems.
- 2.2 The issue is most prevalent with PMR systems because there are multiple suppliers each offering differing proprietary systems.

3 Choice of communications system

- 3.1 There are two options for communications to support Automatic Vehicle Location (AVL) and Real Time Information (RTI) systems:
 - Private Mobile Radio (PMR);
 - digital systems - currently GPRS but in the future other digital systems such as TETRA, 3G etc.
- 3.2 Each has advantages and limitations; the relative importance of which is likely to change over time as the market for airtime contracts for GPRS systems develops. These are set out in the RTIG Communications Study and Communications Position Paper.
- 3.3 For PMR, the number and location of base stations determine PMR coverage and the main driver of costs is the number of stations. Network capacity may also be constrained by the availability of radio spectrum and the topography of the area to be covered. It has a low running cost.
- 3.4 For GPRS, a user buys airtime on a commercial network. It has minimal initial costs but requires ongoing annual costs that will depend on the volume of data that have to be transmitted. Early experience is that GPRS charges are very competitive but, in contrast to PMR depend on size.

Proposal

- 3.5 Proposal:

(Pr-1) RTIG recommends that the authority and operators participating in each system carry out a full appraisal of the communications options jointly. This will help produce communications solutions fit for both stakeholders.

4 Communication Study findings

4.1 It is almost inevitable that buses fitted with RTI equipment from one system will need to operate outside the local authority area of that system. The Communications Study examined options for achieving this. Its key recommendations have been accepted by RTIG and are:

- buses should always communicate their location to their home system, even when they are in another local authority area;
- the home server will pass the information to the server in the second area;
- this in turn will communicate the information about the bus to the distribution networks (signs, internet, SMS etc.) serving that area;
- communications between the bus and traffic signals (to request priority) and stop displays (to clear down when the bus has left the stop) should be done on a local basis between the bus and the other equipment.

5 Roaming into neighbouring RTI Schemes

5.1 In order to meet the first of these recommendations (buses should always communicate their location to their home system, even when they are in another local authority area), it is proposed that roaming buses should either switch to GPRS communications when leaving their local PMR area or through the development of regional PMR networks.

GPRS switching

5.2 In most cases it is anticipated that when a bus leaves its local area A and goes beyond the range of its local PMR network into area B (either by entering an area where there is no PMR coverage or an area where the PMR network is not compatible) it will remain in contact with its local centre by switching to GPRS communications.

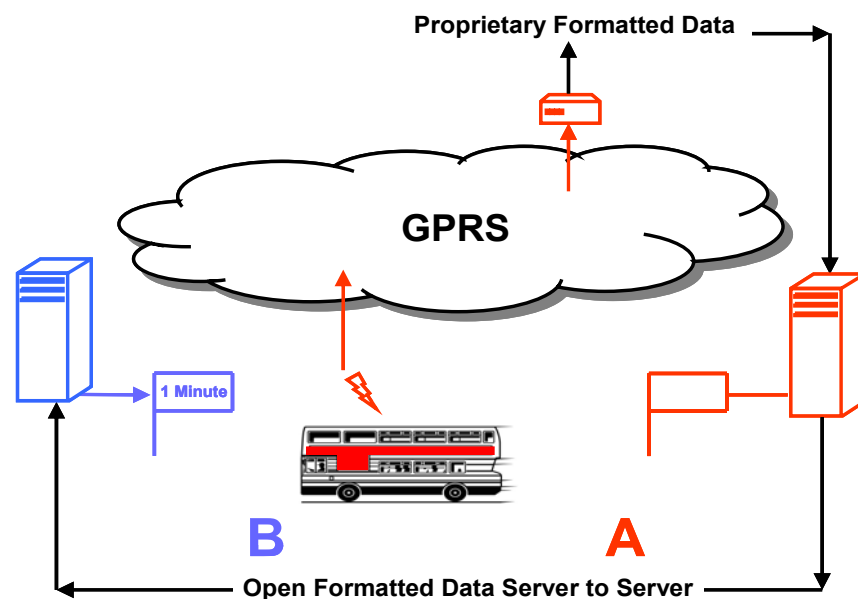


Figure 1: Switching to GPRS communications when roaming

- 5.3 This will mean roaming buses will have to be kitted out with both PMR and GPRS systems. In order for this to be cost effective RTIG needs to develop the possibility of having a "pay as you go" tariff structure for buses. This should be examined when the GPRS framework contract is drawn up later this year.
- 5.4 Alternatively it may be more cost effective for such buses to be equipped only with GPRS communications. Such an evaluation will need to be carried out on a case by case basis, taking both capital and revenues costs into account.

Regional cooperation

- 5.5 In most cases it is anticipated that when a bus leaves its local area it will have to switch to GPRS communications, however there may be circumstances where a bus roams into an area with a compatible PMR network. In this case, the additional costs of using GPRS for roaming buses could be avoided by the setting up of local agreements to allow a bus roaming from home area A to neighbouring area B to communicate with the neighbouring PMR network.
- 5.6 For example, neighbouring RTI Partnerships could put in place agreements to designate control channels that bus services roaming between RTI Schemes will utilise, thus allowing roaming buses to communicate.

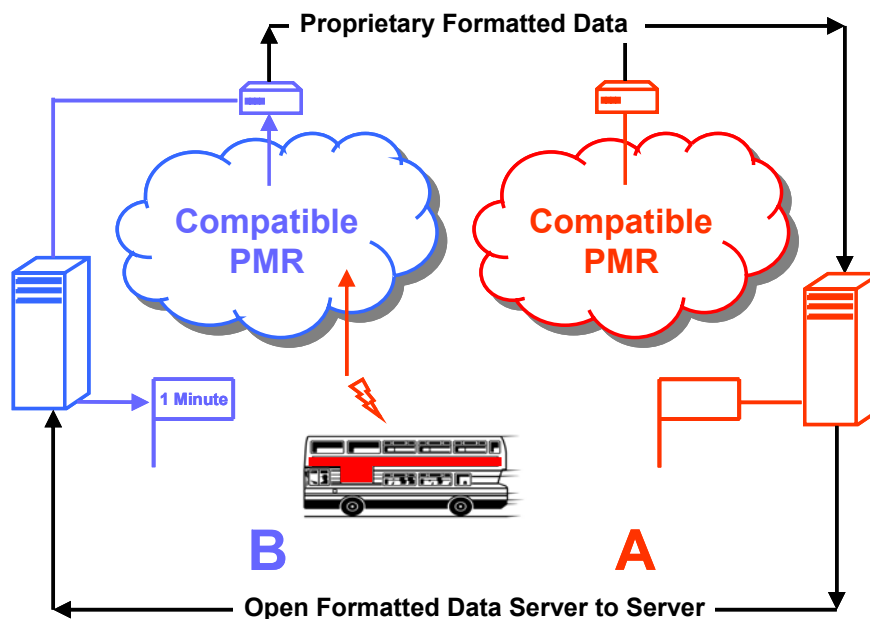


Figure 2: Roaming into a compatible PMR network

- 5.7 In order to facilitate this, RTIG should continue to foster cooperation between different RTI Partnerships. As part of this process RTIG has produced a map that may aid the formation of regional cooperation by identifying which neighbouring RTI systems have similar communications systems. This is presented in the Annex.

Proposals for roaming

- 5.8 Proposals:

(Pr-2) Buses should always communicate their location to their home system, even when they are in another local authority area. This will be done by buses switching to GPRS communications when roaming or the development of regional PMR networks.

(Pr-3) The home server will pass the information to the server in the second area.

(Pr-4) *This in turn will communicate the information about the bus to the distribution networks (signs, internet, SMS etc.) serving that area.*

(Pr-5) *Communications between the bus and traffic signals (to request priority) and stop displays (to clear down when the bus has left the stop) should be done on a local basis between the bus and the other equipment. Therefore RTIG needs to develop standard protocols for communications between:*

- *System servers [completed]*
- *Buses and traffic signals [completion target: summer 2003]*
- *Buses and stop displays [completion target: summer 2003]*

6 Actions

6.1 In order for this solution to be implemented, it requires collaboration between different organisations:

- to develop a GPRS framework that includes a competitive “pay as you go” tariff;
- to encourage regional coordination on PMR communications where appropriate;
- to continue to develop and maintain specifications for communications between system servers, buses and traffic light signals and buses and at stop displays.

A Mapping of communications systems

A.1 Introduction

A.1.1 In order to assess areas where regional PMR networks may be setup a survey of RTI suppliers was undertaken. This is because many communications systems are proprietary to the supplier. In the main the survey enquired about the scale of a supplier's implementations and the communications systems used in each case.

A.1.2 Eight suppliers were sent questionnaires, however only two responses were received (ACIS and Siemens). Therefore also included on the map is information from the 19 SCA funded Authorities funded through Transport Direct and TfL.

A.2 Map of communications systems

A.2.1 The results of the survey are presented in the figure below.

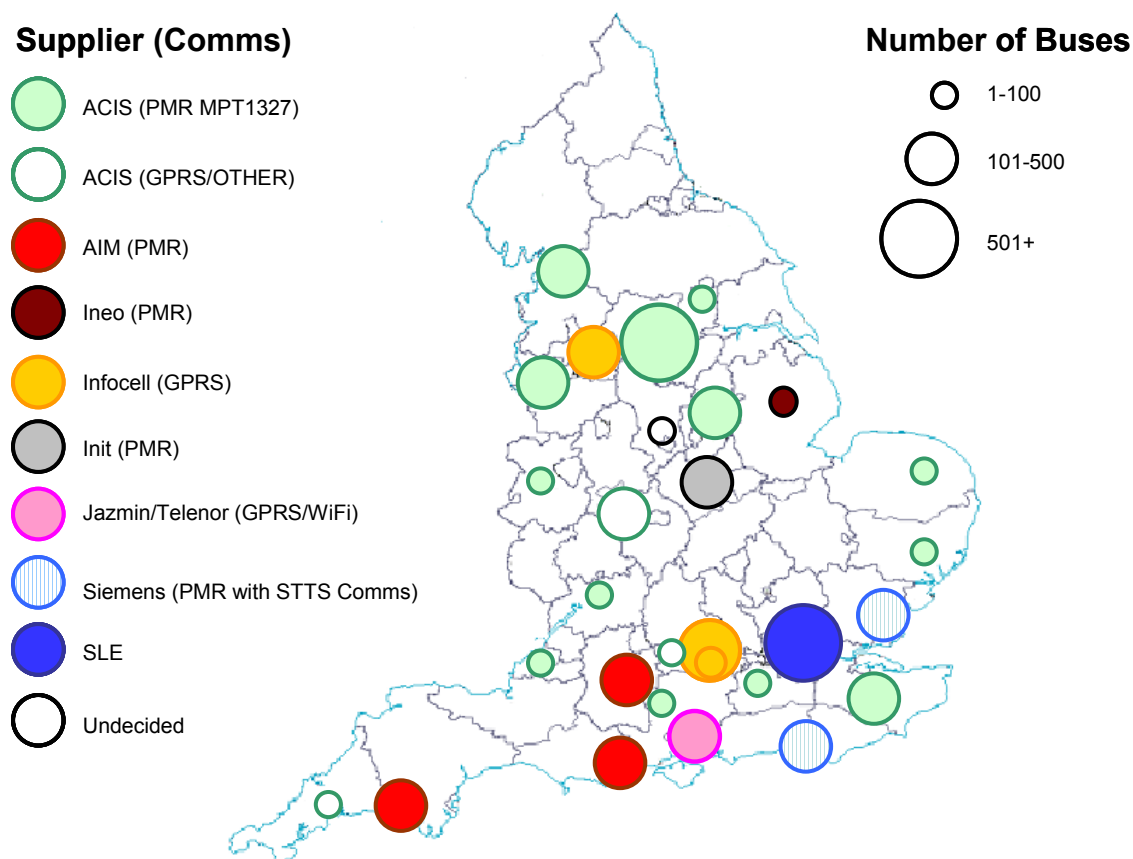


Figure 3: Map of different Communications systems