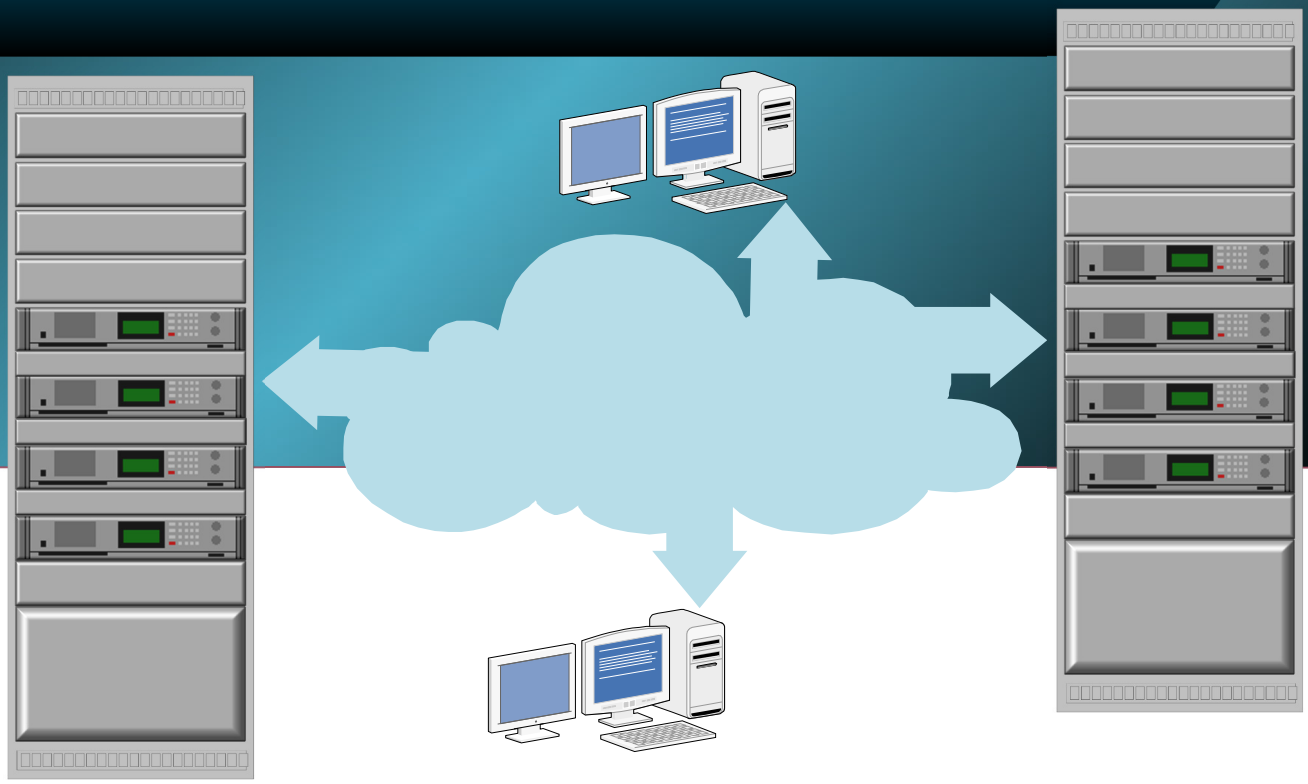
Keynet 4 - MPT1327 Solutions



Multisite, IP connected Solution for Voice and Data Communications

- Tried, Tested, Proven Hardware
- LAN, WAN and DSL connectivity supported
- Upgrade paths from Keynet 2 can be funded by significant reduction in recurring revenue spend
- In House Customisation for Widest Range of Pioneering Solutions
- Cradle to Grave Manufacturers Support

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1 Introduction

The purpose of this document is to give an overview of Radio Systems Keynet 4 MPT1327 radio communications systems.

Whereas for Keynet 3, design terms of reference were to focus costs solely upon components and functionality that would fulfill the majority of on site requirements with minimal redundant peripherals, Keynet 2 and 4 are both fully featured wide area system with multisite capability and enhanced functionality.

Keynet 2 and 4 solutions retain the same modular approach and can therefore be easily scaled for initial preferred Grade of Service or loading and yet can have additional modules or sites added, as loading demands increase.

For multisite deployments, Radio Systems has a complete portfolio of connectivity options.

When deployed as a multisite system, Keynet 2 can employ a variety of media to connect individual sites or provide downlinks. These can be 4 wire landlines, either discreet or multiplexed, direct E1 or microwave links.

The bridge between Keynet 2 and Keynet 4 has been the advent of WAN and LAN connectivity between remote sites and the availability of reliable, business grade broadband connections using DSL.

For some time both voice and data connectivity into Keynet 2 have been available via IP connectivity but now a fully IP connected solution is available as Keynet 4

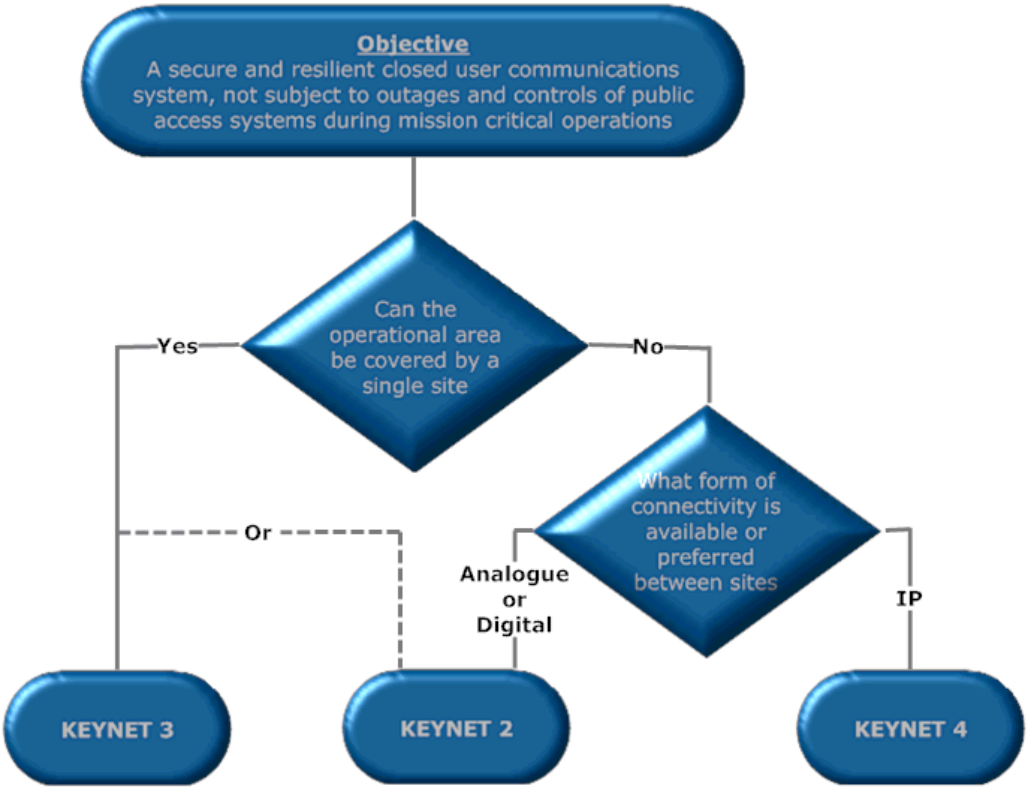
The Radio Systems portfolio of Keynet 2, 3 & 4 enables cost effective scaling and optimization of connectivity in every scenario.

All Keynet versions are fully MPT1327 compliant and since all software is compiled by Radio Systems own in house development team, the areas of the MPT Standard that are prescribed for customisation permit bespoke software packaging.

Radio Systems commercial and technical philosophies work in parallel and each enquiry is judged on its merits and feasibility. This unique approach has made Keynet the system of choice where maximum functional potential and end user investment returns readily result.

2. Keynet Version Technical and Operational Selection

In addition to this brochure, ones describing Keynet 2 & 3 are also available. The fundamental technical choice of which Keynet version forms the best fit to purpose can be made initially from the following illustration.



Regardless of which version is indicated, connectivity from any Keynet system can be analogue, digital or IP for despatchers etc.

3. Commercial Considerations

In assessing the overall costs of any system, capital spend and recurring costs are both considerations.

Radio Systems believes that capital pricing for Key products is cost competitive, when comparing like for like.

Coupled with that, a Keynet 4 solution, as an initial investment or an upgrade path offers a considerable cost saving on revenue spend. In fact an upgrade from Keynet 2 to Keynet 4 could conceivable recover all upgrade costs in year one with substantial savings for all remaining years of the systems life.

If the UK is taken as an example, landline annual rental pricing has steadily increased to the point where multisite systems can attract a charge from landline network operators of tens of thousands of pounds.

If connectivity can be replaced by a Clients corporate LAN or WAN, then by sharing network connectivity with other in house services, landlines that are dedicated to and charged to the radio system are not required.

Where no corporate LAN or WAN exists between Keynet sites, DSL connectivity can be used. At the time of writing a business grade DSL connection can be obtained at under fifty pounds per month. Dependent upon data volumes and available DSL bandwidth specification, one line per site can be sufficient.

Calculating the required DSL capacity takes in a number of variables but with Radio Systems experience, we are always happy to advise prior to any commitment by propsective or existing Clients.

4 Keynet 4 Component Parts

4.1 KF510 Base Station

The core of the Radio Systems in house infrastructure is the Key branded KF510 Base Station.

From a standard multifunctional hardware platform, the Radio Systems software suite has versions for PMR, MPT1327, voice, data, fast polling and telemetry applications.

Where Radio Systems supplies KF510 Base Stations configured for MPT1327 operation, the infrastructure is referred to as Keynet.

In excess of 1,000 KF510's are deployed in active systems in the UK and overseas with a reputation for MTBF often exceeding 5 years.

Importantly, given its history and pedigree, the KF510 is the core component of all Keynet versions. For some time, by design, a single Keynet 3 site could be upgraded to Keynet 2 without component redundancy and with managed additional hardware costs.

The same principle applies to an upgrade from Keynet 2 to Keynet 4 but with the cost imperatives outlined in section 3, above.

4.2 Power Supplies

The KF510 Base Station operates directly from a 12 volt DC supply. Radio Systems offer a range of power conversions, such that customer supplies in any industry standard dc or ac range can be accommodated.

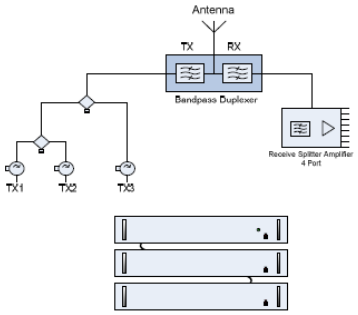
Where maintained supplies to radio infrastructure are desirable and not available on site, Radio Systems offers a range of UPS options.

4.3 LIFU (LAN Interface Unit)

Keynet 4 sites are IP connected and LIFU's (LAN Interface Units) provide the hardware interface, numbers being dependent upon the number of co located KF510 Base Stations. In simple terms, the LIFU converts between analogue speech plus serial data used in Keynet 2 to IP traffic operating over LAN, WAN or the Internet (DSL).

It is worth mentioning in passing that the LIFU also provides the IP interface from Keynet 2 to the outside world. With units having been deployed in this role for a number of years, the picture emerges that with KF510 and LIFU's having a proven operational history, the hardware risks in deploying or upgrading to Keynet 4 have largely been mitigated.

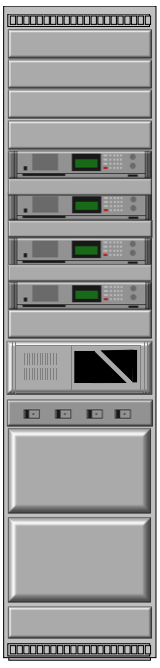
4.4 Antenna Configuration



The KF510 Base Station has separate transmit and receive antenna connections.

In a single unit deployment, two antenna working can be used or for economy, Radio Systems can supply a Duplexer that enables single antenna working.

Where multiple KF510 or other Base Stations are deployed to a single site, inclusive of Keynet configuration, Radio Systems is able to offer a variety of carefully calculated aerial combining options that enable single antenna working to comply with local licensing and site sharing Standards



5 Keynet 4 Architecture

5.1 A Single Keynet Site

Keynet 2 single site operation is an upgrade in terms of functionality from Keynet 3 in that a full range of audio and data peripherals can be connected with Keynet 2 software suites running the site. Typically, this can mean fast polling channels being in use, all channels having PABX connectivity and line connected despatchers being deployed.

In practice the above applies to a single site Keynet 4 solution, where Keynet 4 software would be used.

It is worth noting again that whether an upgrade to Keynet 4 is from Keynet 2 or 3, there is no RF hardware redundancy with KF510 Base Stations having a proven history.

The governing factors on whether single or multiple site infrastructures are deployed are primarily coverage and operational area. Radio Systems can undertake propagation studies as part of the design process to identify optimum numbers and locations of both channels and sites.

5.2 Multisite Keynet 4 Infrastructure

Where propagation studies indicate the requirement for more than one site to give operational coverage, Keynet 4 supports up to 256 sites.

All Transmitter sites that comprise a system have to be interconnected if a common platform for all mobiles is required. Keynet 4 uses LAN.WAN or DSL.

5.3 Keynet 4 Applications

As with Keynet 2, Keynet 4 systems can also provide all mandatory MP1327 functionality, however, given Radio Systems in house software development capabilities, the parameters prescribed for customisation in the Standard can be fully exploited to fulfill a whole range of customer specific solutions.

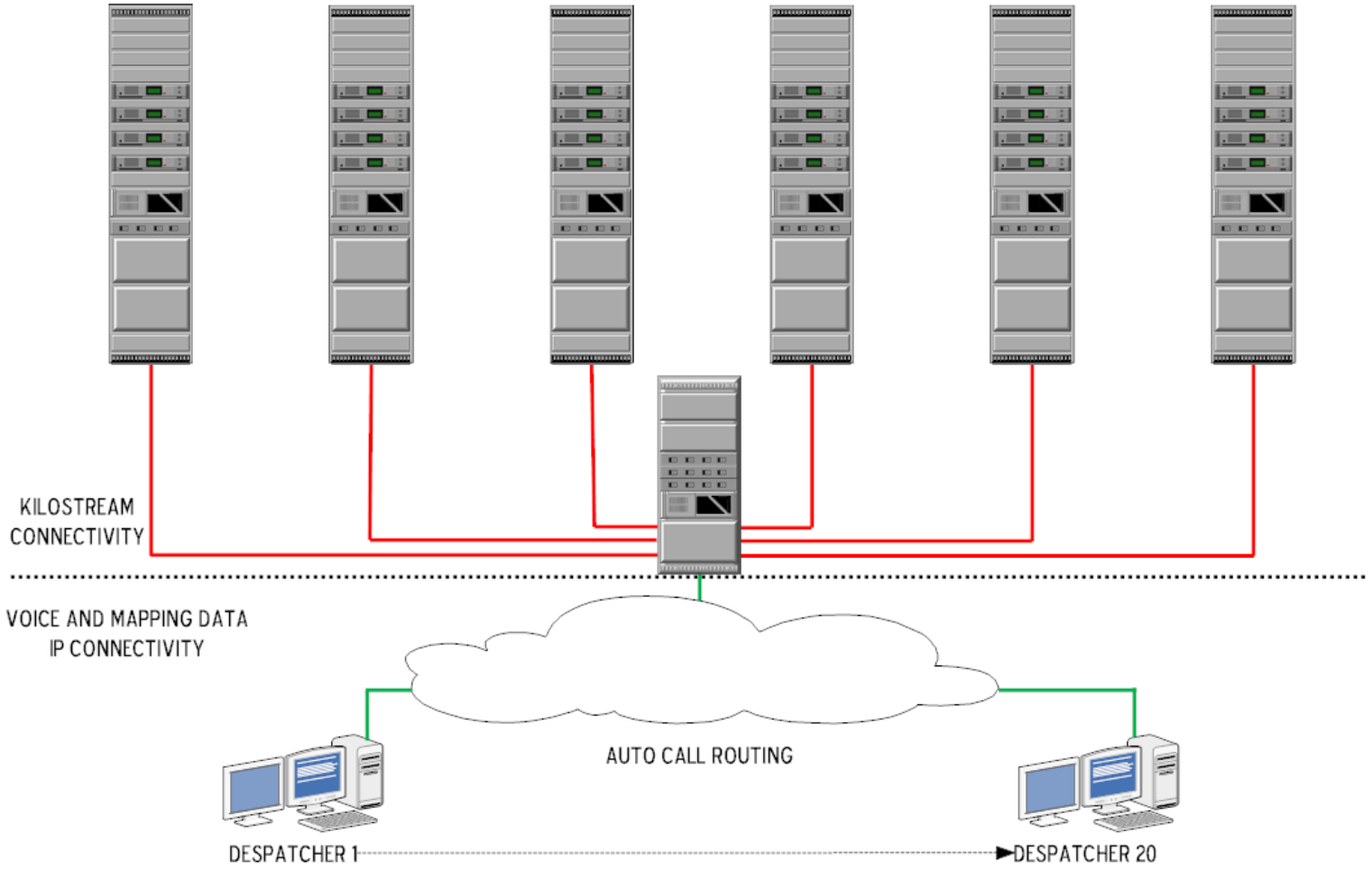
This approach with Keynet 2 has already made Keynet and Radio Systems the first choice for bespoke applications of MPT1327 technology.

5.4 Keynet 4 Infrastructure Examples

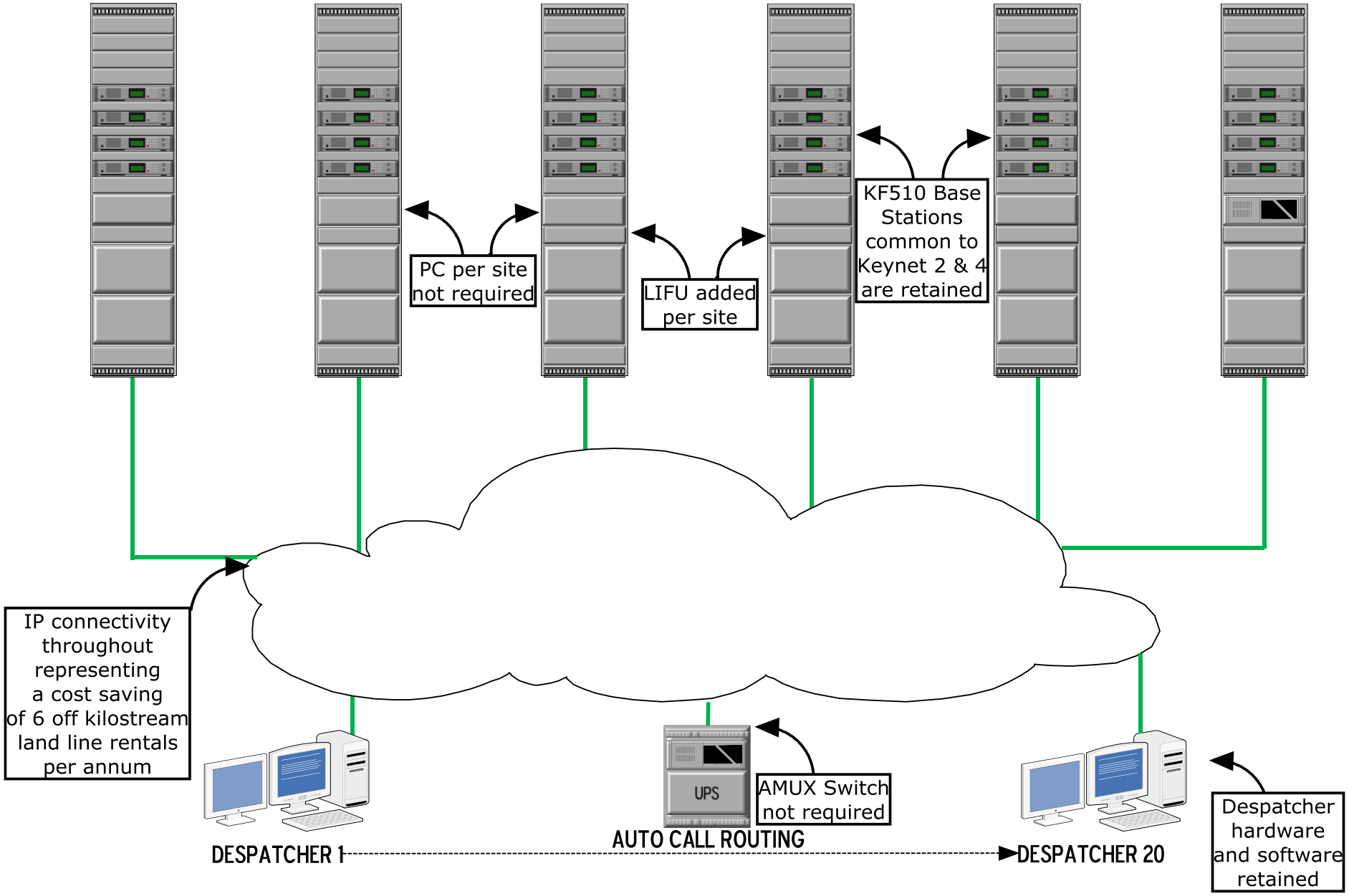
The following drawings illustrate a Keynet 2 reference solution and its upgrade path to Keynet 4.

Six Keynet 2 sites, configured for a bus transport solution

• 2,000 buses fitted with Key mobiles • Operational and emergency voice • Short Data Messaging • Every bus position polled every 30 seconds	• Over 4 million data transactions per day • 20 bus depot Keynet voice and data despatchers • IP connectivity to despatchers • Automatic routing of voice and data to despatchers



The same six site system with upgrade path to Keynet 4



6. Keynet 4 Peripherals

6.1 Mobile Terminals

Radio Systems designs and manufactures the Key range of mobiles in a wide variety of formats with software suites customised to a whole range of end user applications. Generally the Key brand is recommended, however, where it is beneficial to a potential customer to use an alternative, Radio Systems is happy to recommend and supply the most effective solution.

A separate document describes the full features available with the mobile; *The KM4000 Mobile Radio Features.*

In addition to its own Key range, Radio Systems is an authorised distributor for most business radio manufacturers, with access to the widest range of quality equipment to provide optimum solutions.

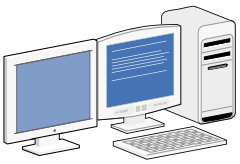
Whatever the challenge, Radio Systems selects the best solution through unbiased in-house evaluation of quality, durability and ease of use to provide dependable, cost effective communications.

In excess of 20,000 Key branded mobiles are currently in active use in a wide variety of voice and data applications. This was the mobile that pioneered voice and data communications within both the bus and electricity supply industries.

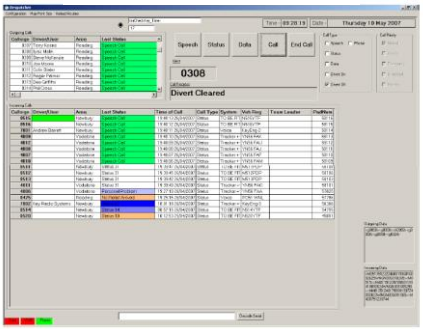
Over 10,000 are fitted to buses and signs in the UK, to provide Real Time Passenger Information to the public, in line with UK Government policies.

Key mobiles were the first in the world to utilise MPT1327 technology for telecontrol. Their inherent interface capabilities enabled the monitoring and control of over 4,500 electricity sub stations and switchgear sites for London Electricity. Updated and evolved versions are now deployed in both Yorkshire and the North West of England.

6.2 Computer Aided Despatchers



Whilst mobiles can be supplied with power supplies for use in offices and depots, there are occasions where enhanced fleet management facilities are required.



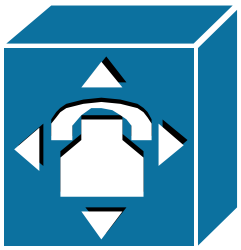
Radio Systems own in house despatcher software packages can be configured to operate equally with any of Keynet 2, 3 or 4 and in terms of upgrading from Keynet 2 to 4, again there is no hardware redundancy

The PC software is offered in two formats voice plus MPT data or voice, plus MPT data, plus asset tracking. Asset tracking is accomplished with a second screen and street level mapping.

Separate Operator manuals give full details but in either case packages are fully featured and permit user customisation.

6.3 Telephone Connect

Keynet 4 can interface directly into a SIP equipped PABX, enabling two way telephone to radio call dialing and conversations.



As with Keynet 2, all Traffic Channels become telephone connect enabled.

6.4 Management Terminal

Although not essential, it is recommended that a Keynet 4 system should be equipped with management hardware and software, e.g. for validation, remote monitoring, alarms etc. A Keynet Management Terminal is available for this.

6.5 Coverage Enhancements

Even with the best planning for optimum siting, it is not always possible to achieve the desired blanket coverage even using multiple Keynet 4 sites, examples being within metal clad buildings or basements.

Rather than using additional local infill sites, Radio Systems can supply Enhancers that in effect boost signals both to and from difficult areas without the need for additional complete sites.

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7. Radio Systems Services

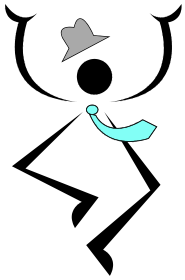
The success and effectiveness of any project is reliant upon a whole range of skills and no matter how good the building blocks of a system might be, without those essential skills, projects can still fail to deliver.

The Radio Systems team is qualified, experienced and moreover understands all the critical steps necessary for a first class delivery.

- Requirements capture and documentation
- Site surveys and propagation studies
- Feasibility studies
- Project Management and Budget Control
- Risk analysis and mitigation
- Preferred component procurement

- In house software and hardware development
- Component manufacturing facilities in ISO9000 environments
- Quality Management and Control
- Factory assembly of systems

- Originating and implementing Factory Acceptance Test Documentation
- Production of Method Statements and Risk Assessments
- Site preparation
- Site installation
- Site commissioning



- Originating and implementing Site Acceptance Test Documentation
- As Built document pack production
- Escrow Agreements
- Warranty
- Maintenance and Support contracts

8. Radio Systems Certification

Radio Systems adheres to all current UK and EU legislation, has been certified by NQA and is regularly audited for continued compliance.

ISO9001 Quality Certification

OHSAS18001 Health and Safety Certification

ISO14001 Environment Certification

Compliant with Waste Electrical and Electronic Equipment Regulations 2006

9. Contacts

The Radio Systems team is always ready to adopt a no obligation consultative sale approach.

For initial discussions, contact details are as below.

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