# MPT1327 in the field

**With much attention currently given to the spread of new digital radio systems – such as TETRA, TETRAPOL and APCO25 – it is often easy for existing, field-proven technologies to be overlooked. The MPT 1327 trunked radio protocol, originally developed in the UK in 1986, is still the most prevalent trunking protocol throughout the EMEA region. Organisations that establish their own dedicated radio network typically select a trunked radio scheme because of advanced capabilities including wide-area dispatch, economical infrastructure, private calls and efficient use of radio spectrum.**

*By Nick Carter, Product Manager at Zetron Inc.\**

Trunked radio system operators cover a variety of organisations – from private companies and operations serving a local region, through to multi-nationals offering a robust alternative to cellular services. Typical customers include local government, transportation and utility companies, although public service providers, who install the infrastructure and then sell network airtime, can also operate trunked systems.

MPT 1327 is proven technology, with systems installed in many thousands of locations and applications worldwide. It is scaleable-down to very small networks and employs an open protocol with standard interfaces – presenting users with a wide choice of radio terminals and, through the related MAP27 protocol, offering a variety of data applications to be overlaid onto the system.

In a trunked radio network, a large number of *[PMR]* mobiles can share a number of channels via the efficient allocation of those available when a user presses 'transmit'. When a mobile takes part in a call, one of the unused channels is dynamically assigned to it for the duration of that call, after which the channel returns to the pool for use by any mobile.

The strengths of MPT 1327 lie in its efficient radio spectrum use, large user capacity, fast call set-up times with low speech latency and wide area roaming capability. Powerful security functions include mobile registration and Electronic Serial Number checking facilities, while third-party application interfaces allow a range of customer-specific applications or peripherals to be integrated to the system. Desktop dispatch positions may be added, to provide command and control of voice and data calls together with system management. In addition, support for status and multiple data message types, allows, for example, AVL (Automatic Vehicle Location) or GPS data to be transported across the trunked radio system.

Each call is assigned one of four possible access levels (in order of increasing priority): Barred, Normal, Priority, and Emergency. System resources are allocated on a first-come-first-served basis, unless a higher-priority call is competing for the same resource.

Meanwhile, one repeater channel is dedicated to managing system operation by providing a data up-link and down-link for processing radio call requests, validating users upon registration and roaming, plus data messaging. It also provides a carrier signal used by roaming mobiles to acquire the strongest control channel and hence the best site or system.

Furthermore, MPT 1327 can integrate with telephony at PSTN or PABX level, to provide a powerful, voice prompt-based, interface to the trunking network *(see page 32)*.

In most cases in the target markets, an MPT 1327 based solution has a lower investment price, whilst providing the appropriate technical solution and often a higher return on investment, than that achieved with 'newer' technologies.

## System architecture

The flexibility of MPT 1327 delivers both single- and multi-site networks. Single-site applications are common, and at their simplest, may consist of just one controller, repeater and an antenna/combiner.

Multi-site networks however, are used to cover large geographical areas, or where coverage is particularly poor – such as mountainous regions. As radio users move around within the system footprint, they are registered on the base stations according to signal strength, which provides automatic roaming from one site to the next.

Whilst a centralised control arrangement *(see figure 1)* has potential database administration and networking benefits, the modular architecture of the distributed system *(see figure 2)* is a powerful solution. It is attractive both to small system users and any network where future expansion is required. With a switch-less distributed system, the costs of future expansion are linear, predictable and economical.

However, possibly the most significant benefit is the 'graceful degradation' of distributed systems. Here, the failure of a trunking controller has less significance than a similar failure in a centralised system because the control intelligence is distributed across all trunking controllers. Each controller is assigned an identity on the PCM (Pulse Code Modulation)-based network. One controller is assigned as the 'master' controlling the others in the system. The failure of one controller simply results in another taking over; the only impact may be a reduction in the 'grade of service' provided rather than the loss of the site. This feature is invaluable for mission-critical applications or where the radio site is located at a remote location with difficult or costly access, allowing for any visits to the site to be managed efficiently.
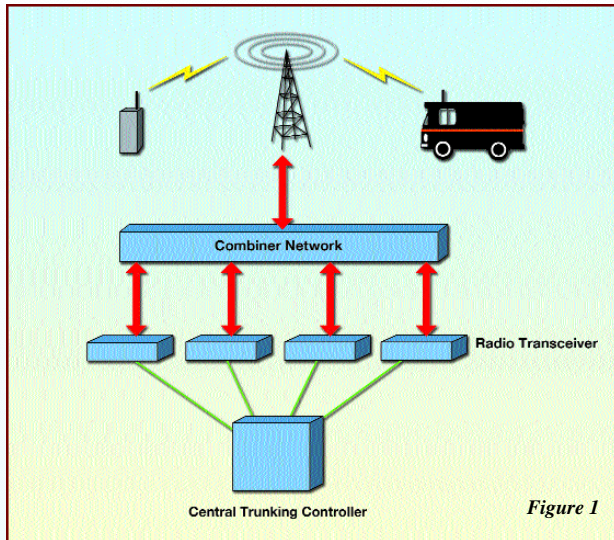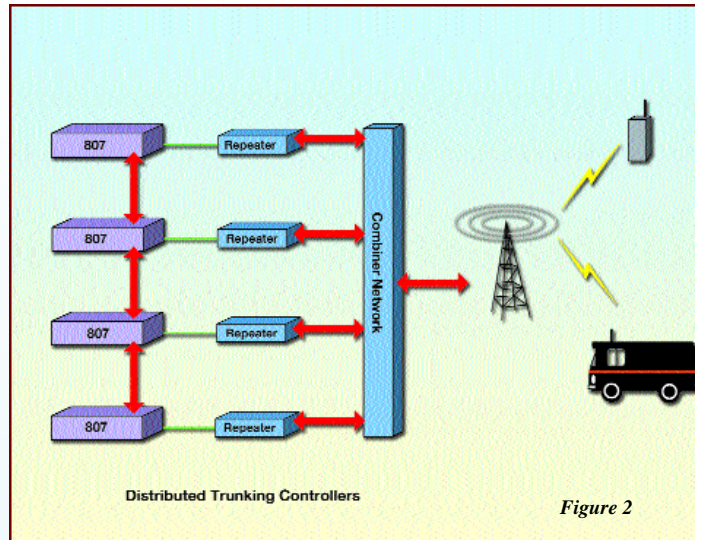
Figure 1



Distributed Trunking Controllers

Figure 2

## ➤ Low-cost solutions

A single site is the simplest level of MPT 1327 deployment. While the initial rollout costs may appear relatively low, there can be a marked increase in costs with the addition of more channels or features – such as remote programming, multiple fleets or console operation.

Ideal trunking controllers therefore, are designed with this in mind and allow customers to address their needs at the outset, whilst keeping overall costs as low as possible and allowing for future expansion and added applications.

A multi-site solution follows similar architecture, with the addition of a digital inter-site link to connect the network of site controllers. Inter-site capacity can be increased simply, by adding further links to meet expected traffic levels. In the event of an inter-site link failure, the system is able to maintain control by falling back to signaling across the audio link.

For those MPT users migrating from conventional to trunked channels, or from other trunked systems to MPT 1327, cross-busy control channel operation allows the new system to share an existing repeater used for another operation. Here, the controller will only assign appropriate channels for MPT 1327 traffic. This allows the system operator to maintain subscribers



*A Zetron reseller demos the company's MPT 1327 Controllers and handhelds.*

of an existing repeater while phasing in users to the trunking system as needed.

## Database & fleet management

With the distributed architecture, the entire system database can be loaded through any one controller and can then be transferred to all the other units at the site over the shared data buses. Whereas with the multi-site configuration, the database can be updated to all controllers over the network, increasing the system resilience, while giving no single point of failure.

An MPT 1327 network can also be enhanced by the addition of a line-connected dispatch controller. Typically connected using the MAP27 protocol, these provide full command and control of the entire range of voice and data calls across the network, together with management via a menu-based interface. Multiple controllers would be deployed in appropriate control rooms to suit the customer environment

MPT 1327 also offers billing and statistical review. The controller should be able to log the data for details such as repeater call loading on traffic channels, slotted control information and call attempts. There is a benefit in logging system statistics in accordance with the MPT 1318 standard, since this specifies loading and grade of service measurements for MPT 1327 networks. The controller keeps a transaction buffer automatically, which can store up to 4000 calls. If the controller's buffer fills, it will look for another unit on the site with space and use that buffer.

With mission critical systems, it is essential that any problems – if they do arise – are discovered as soon as possible. The controller can monitor three internal and three external alarms. Upon alarm detection, it can then place a status message to a defined radio.

## Telephone interconnect

PABX or PSTN access can be added to any single- or multi-site MPT1327 system. In

the distributed architecture model, a single telephone interface allows any radio port to be connected to the telephone port. Telephone ports are shared resources regardless of which channel the mobiles are using.

As well as providing phone access throughout the site, the telephone interconnect typically provides dial click detector, internal modem, call barring, speed dialing, call limit timers and accurate, automatic hybrid balancing.

Voice prompts, recorded by the system operator, can help telephone users access the MPT 1327 system. Being customisable, these prompts can be recorded in any language.

With controllers becoming more feature rich, the application possibilities for MPT 1327 increases, allowing it to compete cost effectively against the newer digital technologies.

MPT 1327 is capable of providing a cost-effective solution to many mission critical applications. It's a proven, reliable technology that gives the essential 'peace of mind' where reliability is essential. The data capabilities and support for custom applications deliver a variety of integrated solutions particularly in the transportation and utilities sectors.

Moreover, the fact that it is an open standard technology, not tying customers to a single radio manufacturer, delivers a flexible, reliable and advanced solution to many customers needs. Users in these industries should seriously consider MPT 1327 as the appropriate alternative to the digital technologies on offer.

*\*About the author:*

*Nick Carter is Zetron Product Manager responsible for EMEA. Zetron is a provider of mission-critical communications systems and manufactures a wide spectrum of wireless comms equipment including radio dispatch consoles and workstations, emergency call-taking telephone systems, paging infrastructure, trunked radio equipment, wireless SCADA, alarming & telemetry products and more.*

*Visit: www.zetron.com*