MPT 1327

TRUNKED RADIO NETWORKS

Introduction
This document explains the concept of trunking and introduces the non-proprietary MPT standards.

Trunking

The concept of trunking
Radio communications have played a major role in the public and private sectors in every nation of the world. The convenience, ease of use, and relatively low cost of modern radio systems has led to the annual addition of more new radio users than ever before. As a result of this rapid growth, the available frequency resources must be used as efficiently as possible.

One of the most efficient means of conserving the available frequency spectrum is the use of trunking techniques. Trunking allows the sharing of a relatively small number of communications channels between a group of users. Communications using trunking technology have been with us for about 75 years in the telephone industry.

The idea of sharing telephone lines amongst groups of users on a real-time basis was first proposed in a paper by the Danish mathematician A. K. Erlang, in 1918. Prior to this, telephone calls were only possible over dedicated lines (Telegraph).

Initially, several trunk lines were installed between major towns and manual exchanges provided a means of resource sharing.

Advances in technology eventually allowed the automatic allocation of communication lines on a real-time basis and the concept of trunking was born.

Problems with conventional mobile radio
The diminishing availability of radio spectrum began to cause concern in the early 1980s and it became obvious that more efficient management of the frequency spectrum was necessary.
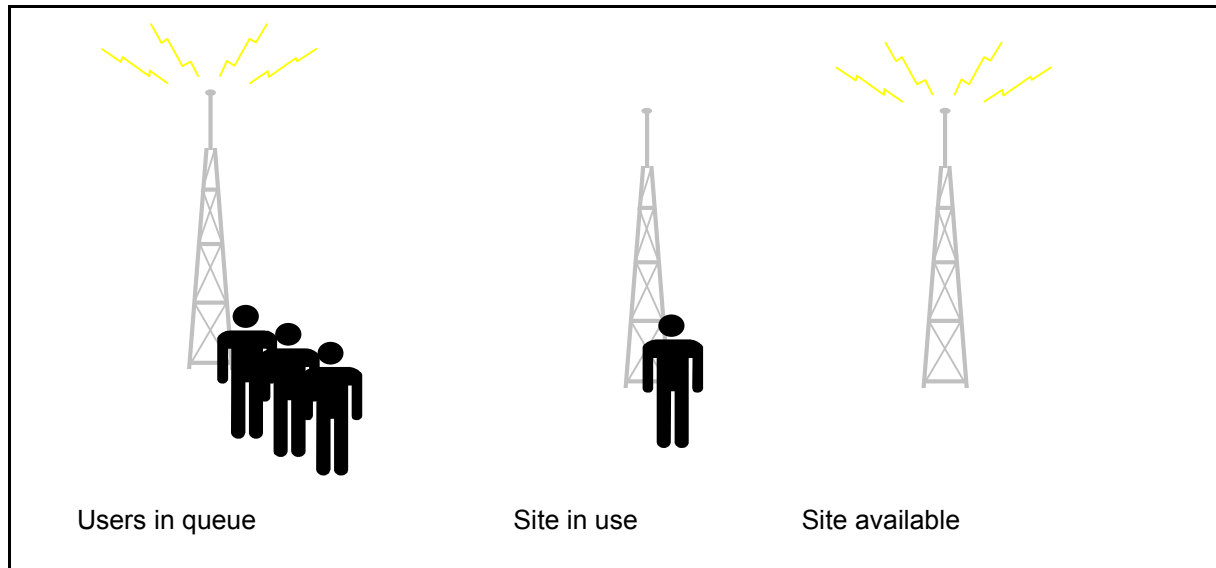
Figure 1: Users of a trunked radio system

Historically, organisations with a significant number of mobile staff had to rely on multi-channel communications networks or smaller systems restricted to a single frequency. The result was that some channels were overcrowded while other channels were unused. The effects of heavy utilisation during peak load times combined to cause user frustration and a reduced quality of service. In addition, failure of a site meant that all users of that site were without communications.

These problems were compounded for customers requiring communications coverage over extended areas.

Advances in technology again provided a break-through in the form of low-cost single-chip microprocessors. This allowed the concept of trunking to be applied to mobile radio systems.

How trunked systems operate

Trunked radio systems share a pool of radio channels between many groups of users with each user having the exclusive use of a channel for the duration of the call. Allocation of channels is performed by a control channel. Figure 1 is a schematic illustration.

In effect, when a user places a call, the radio asks for a traffic channel via the control channel. The control channel assigns a traffic channel for the duration of the call. When this is done, the control channel switches all of the radio units involved in the call to the proper frequency. When the call ends, the traffic channel is returned to the pool of available channels, for re-use.

If a traffic channel fails, radios do not lose service; the other channels in the pool are used instead.

Connecting sites in a trunked system

The connection of trunking sites is accomplished using audio switches, similar to telephone exchanges. The audio switch is also capable of providing interconnections to the telephone system.

MPT1327 open standard for trunked networks

The need for more efficient and effective use of the radio spectrum in the UK was first noted in a Green Paper from the MPT (Ministry of Posts and Telegraphs) to the UK parliament in 1981.

Development of MPT 1327

A committee made up of several prominent international radio manufacturers in conjunction with the British Department of Trade and Industry was set the task of producing suitable specifications for trunking of radio channels. The brief was to produce a specification that would provide for open radio systems that would appear transparent to the user. The result was the MPT 1327 open standard. The minimum performance and compatibility of mobile equipment is further defined by the related specifications MPT 1343 and MPT 1352.

The original consortium of manufacturers consisted of:

- Fylde Microsystems / Tait Electronics Limited
- Philips
- Motorola
- GEC Marconi

with input from several other major manufacturers.

Adoption of MPT 1327

The first true MPT 1327 system went operational in Telecom Tower London in October 1986. The system was a five-channel single-site system operating on VHF, using TEL / Fylde software, trunking control hardware and TEL RF modules. It is significant that this system was operational nearly one year before the MPT 1327 standard was officially published.

MPT 1327 protocol has been adopted as the *de facto* standard by a large number of manufacturers and regulatory authorities world-wide. It is being promoted as a European Standard by the UK DTI, Philips, Motorola, and GEC Marconi. Although these three original consortium members still hold patent rights, there are currently no patent restrictions imposed on the use of the MPT 1327 standard, encouraging new suppliers to freely offer products conforming to the standard. Network operators see the advantages of being open and compatible and being able to offer users a choice of mobile radio equipment. To date the MPT1327 standard is gaining momentum and further support.

Advantages of MPT 1327

MPT 1327 has enjoyed very rapid market acceptance in what was a very traditional market for the following reasons:

- Regulation of the UK market by the introduction of the MPT 1327 standard ensured that the members of the original consortium had a guaranteed market in which to sell both mobile radios and network equipment.

- MPT 1327 had support from recognised world leading radio manufacturers from day one. This gave MPT 1327 both user and network operator credibility from the start.

- Having few patent restrictions and being recognised as an open non-proprietary standard gave MPT 1327 an attractiveness to manufacturers and users alike.

- MPT 1327 makes use of existing and familiar technology, this is important to not only manufacturers but also users and service providers.

- The MPT 1327 protocol is frequency-independent in that it is not confined to a particular set of frequencies but can take advantage of the most suitable propagation characteristics required for the application and regional spectrum availability. (TEL has installed TaitNet systems operating in all the land mobile radio bands including VHF, UHF, 800 MHz, and 900 MHz.)

- MPT 1327 was designed from the outset to provide cost effective trunked communications over networks of varying size and coverage requirements including linked wide area systems.

- Specific user group requirements can be individually configured to allow for mixed user group requirements on the same system thus allowing emergency and other varying type services to co-exist on the network.

In the decade since its inception, MPT 1327 has become the most widely accepted open trunked radio standard in the world. Its popularity continues to grow as providers introduce more advanced mobile services and radio features.