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Robert I. Desourdis, Jr.
David R. Smith, William D. Speights,
Richard J. Dewey, John R. DiSalvo

emerging public safety wireless communication systems

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Interchange of Information and Signaling (DIIS) standard being developed by ETSI. A detailed description of the new European TETRA standard for public safety and other SMR applications is provided.

5.3.1 MPT 1327[17]

This section presents a brief introduction to the MPT 1327 related standards for analog trunking. These standards, first published in 1988 under the auspices of the U.K. Department of Trade and Industry (DTI), have become the de facto standard for radio trunking systems throughout the world outside North America.

The standards are now administered by the Radiocommunications Agency and copies are available from their Web site (http://www.radio.gov.uk/). The standards cover the following areas:

MPT 1327: Basic protocol rules for analog trunked land mobile radio systems.

MPT 1343: Specific implementation of the protocol rules for commercial radio networks.

MPT 1347: Performance requirements to be met by the network fixed equipment.

MPT 1352: Test schedule for approval of radio units on to the trunked network.

Note that the protocol rules and test schedules relate only to the radio air interface, but this technology achieves the same level of interoperability between agencies and manufacturers as that shown in Figure 5.17 (from Project 25). There has been no attempt to standardize any interfaces within the infrastructure or between infrastructures or to establish standard gateways to external services (such as the PSTN or PABX).

17. Access to the MPT 1327, MPT 1343, MPT 1347, and MPT 1352 standards can be obtained from the U.K. Radiocommunications Web site (http://www.radio.gov.uk/). A list of LMR radio systems worldwide, of which MPT 1327 systems constitute a substantial proportion, can be accessed at the following Web address: http://home.att.net/~wwitby/for_trs.htm. Note that there are no guarantees as to the accuracy of this information. Manufacturers include: Fylde Micro Systems, specialized MPT 1327 supplier at http://www.fyldemicro.com/; Motorola, now mainly supplying third-party infrastructure, at http://www.motorola.com/; Nokia, search for MPT 1327 or Actionet, at http://www.nokia.com/; and Tait, http://www.taitworld.com/.

The level of functionality delivered by MPT 1327 is typical for that time (circa 1988) and comprises:

- Analog voice;
- Circuit mode data typically at 1,200 bps;
- Status messages on the control channel;
- Short data messages, also on the control channel.

The payload for the short data messages is 46 bits of free format data, and up to four such messages can be sent to a single address at a time.

5.3.1.1 Network Architecture

Because the infrastructure is not standardized, the system manufacturer is able to select the appropriate network layout for the user application. A typical LMR trunking system is shown in Figure 5.5, and this is appropriate for MPT 1327 implementations. Traditionally, large communication systems have been made up from hierarchical switching network architecture with much of the system intelligence concentrated in a few system nodes. Unfortunately, such systems do not exhibit graceful degradation and often a single failure can lead to complete loss of service.

In a distributed architecture, the system intelligence is distributed throughout the network, leading to improved reliability and inherent fallback capability. These are important considerations to be aware of when analyzing the offerings from different manufacturers.

The MPT 1327 radio system is based on simple FDMA principles and in many ways parallels APCO Project 16 concepts. There can be any number of traffic channels per base station, limited only by the manufacturer's implementation (typical maximum is 32 channels).

A typical public safety implementation may have six traffic channels supported by a single control channel. The protocol supports the option for dedicated or time-shared (between different sites) control channel or even minimum mode operation in which the control channel can revert to carrying traffic in heavily loaded situations.

The MPT 1327 protocol does not support handover between sites, and most system implementations use large cells and have radio coverage limited by receiver noise level considerations rather than by cochannel interference. This convention means that MPT 1327 has followed the typical LMR implementation for widely spaced radio base high-level sites, rather than the