OVERVIEW

Trunked radio networks based on the MPT 1327 signalling protocol have significant acceptance worldwide.

MPT is suited to industrial, transportation, service and security sectors as well as public access subscription networks.

Model 827 Multi-Site gives the capability to build wide area regional MPT trunking networks, with a population of up to 5,000 subscriber mobile radio units.

Zetron’s Model 827 Multi-Site Networks are based on Zetron’s Model 827 Trunking Controller enabling systems operators to inter-link existing or new sites to provide a smooth upgrade path from single-site to multi-site service. In multi-site applications an audio data link connection is required.

The integral switching within each site means that a separate network switch is not required. This supports a variety of network topologies and also provides a high level of system resilience.

All standard speech and data call types are supported including multi-site group calls.

FEATURES AND BENEFITS

• Compliant with MPT 1327 and MPT 1343 international trunking standards giving a wide choice and availability of subscriber equipment.

• Provides a seamless and expandable modular infrastructure for wide area radio networks.

• Switchless architecture means the use of a large central switch is avoided and network resilience is increased.

• Uses existing Zetron Model 827 Controller with integrated telephone interface for intersite connection. Increased capacity for intersite traffic is provided by one or more Model 844 4-Port Intersite Link Modules.

• Individual sites in the network can have different numbers of channels to reflect different traffic requirements and the number of links between sites can be chosen to meet expected demand.

• Intersite routing of traffic through up to 4 sites means a wide range of network architectures can be supported.

• Separate audio and data links result in faster call setup times.

• Continuous intersite audio link monitoring gives high network availability by removing faulty links from service.

• Distributed processing enables standalone site operation in the event of network failure and minimizes intersite traffic.

Switchless Architecture—no regional switch for intersite connection

• No single point of failure

• Controlled degradation - functionality passes to another unit in case of failure.

• Cost-effective

Uses existing Model 827 platform—on board telephone interfaces can be configured for intersite connection

• Modular expansion from single site systems

• Low initial investment for multi-site operation

Intersite traffic can be routed through up to 4 sites—Model 844 provides increased intersite capacity

• Wide range of network architectures can be supported

Distributed database

• Efficient call setup

• Increased system control for each mobile on a per site basis

Double site registration

• Optimum call setup time

• Minimizes registration traffic in coverage overlap areas

Continuous intersite link monitoring removes faulty links from service

• Higher network availability
NETWORK ARCHITECTURE

Transmitter sites are connected together using two links; one audio and one data. The method may be leased circuit, microwave, or IP links.

The integral switch architecture of 827 Multi-Site means that traffic on any channel can be routed through any intersite telephone interface at the site. Additionally, these intersite links handle all registration and call set up transactions. On busy systems, one intersite link is normally assigned to provide a high-speed data link between sites for registration and call set up data, with the remaining links for voice traffic.

Speech and data traffic does not have to terminate on an adjacent site, but can pass through up to 4 transit sites on the way to a destination site. This feature allows the network topology to be designed to suit varying traffic densities or situations where link access to a site may be limited.

Distributed switching enables intersite links to be located according to traffic density, without the need for a large centralized switch.

A MODULAR, EXPANDABLE SYSTEM

Zetron’s 827 Multi-Site provides a modular upgrade path from single-channel through multichannel, standalone sites, to multichannel, multi-site systems, all based on the same platform—the Model 827 MPT Trunking Controller.

This means that a network can be expanded gradually, with traffic demand, without requiring a large initial investment.

An existing Model 827–based standalone trunking site can be field-upgraded to multi-site operation by the addition of the Multi-Site Software Option to each Controller and the reconfiguration of at least one telephone interface for intersite operation.

Additional telephone interfaces may be purchased for this purpose in the form of telephone interface option cards (for existing controllers), additional Model 827 Controllers with telephone interfaces or the Model 844 Four Port Intersite Link. The powerful capabilities of the Model 827 are covered in the separate Model 827 brochure. The unique architecture of the Model 827-based site means that local telephone access can still be provided at each site, without the need to utilize intersite resources.

Remote or local system management is provided with the Multi-Site Database Management software.

The Database Management Software enables the multi-site service to be “phased-in” as a value-added feature with particular fleets or individual, while retaining single-site service for other radio units.

Reprogramming of mobiles will also be unnecessary provided they have been configured with appropriate channel and system identity information.

MODEL 844 FOUR PORT INTERSITE LINK

Transmitter sites requiring little or no telephone interconnect can use the on-board Model 827 Controller telephone ports for intersite links according to system traffic. Where the Model 827 telephone ports are required for telephone interconnect, the Model 844 Four Port Intersite Link provides 4 audio or linking ports and 4 serial ports for multi-site linking. Several Model 844 modules can be incorporated into the system, particularly where a large amount of transit traffic is present, such as a central hub in a “star” type network.

MODEL 427 PERIPHERAL INTERFACE

The Model 427 provides an enhanced, wired “direct connect” interface to a Zetron MPT 1327 Trunking System based upon the Model 827 controller. It is now possible to have a line-connected dispatcher with existing MAP 27 Solutions, as well as with Zetron’s own M4217 NT console. Dispatchers can now have complete command and control over their Zetron MPT 1327 System and perform many functions such as; making and receiving voice and data calls, disabling users, reassigning channels, dynamic regrouping, deleting users, monitoring conversations in-progress in the system, include calls, and management of status messages and SST and MST data calls. The Model 427 offers up to four 4-wire audio connections that are controlled by up to four corresponding RS-232 ports.

The MPT 1327 radio trunking protocol includes the open standard MAP 27 serial communications data interface protocol. The Model 427 supports the Physical and Data Link Layer Interface described under sections 3 and 4 of the MAP 27 version 1.5 for MPT 1327 Equipment, excluding Non Prescribed Data Calls. The Model 427 provides a powerful wired command and control interface into Zetron MPT 1327 infrastructure.
CALL PROCESSING

Call processing in 827 Multi-Site is centered around the Network Information Table held in the database of each site. This gives information concerning which links to use for the onward routing of data, for call set up, registration and for establishing speech paths between sites.

When a mobile call is placed, the calling site uses this table to establish connection with the called subscriber’s home site to identify the two sites (from the primary and secondary registration records) to check for the called subscriber.

Assuming the called subscriber is available, the calling site then refers to the table again to establish a speech path to the called site. The final step of the process is to switch both calling and called mobiles to traffic. This messaging is synchronized to ensure both mobiles are alerted simultaneously.

Emergency calls are set up in a similar way except that radio channels or intersite links may be seized from a lower priority call in order to complete the call.

Group calls may be pre-configured to include up to 6 sites. When the call is placed, the Network Information Table defines how the calling site is linked to other sites involved with the group call. Group calls will proceed even if sites or mobiles programmed to be in the call are not available.

MOBILE ROAMING AND REGISTRATION

Subscriber mobiles roaming around an 827 multi-site network, continually monitor the quality of service from their local site to determine when to log-on to a new site.

This automatic process of logging on to a new site is commonly called “registration”. The registration log-on is also used to determine whether the mobile is allowed service on that site.

Many other networks provide limited multi-site access control, typically fixing site access control in the mobile during installation. This method is both inflexible (mobiles must be reprogrammed every time their service area is increased or sites added to the network) and insecure (mobile users can reprogram their own radios to illegally gain more service).

With 827 multi-site, the concept of single-site access control is extended to multiple sites allowing the system operator using the Database Management Software to determine which mobiles gain access on a site-by-site basis. This provides instant control of mobile access by the operator and improves flexibility of the tariff structure.

For wide area networks, 827 multi-site stores each mobile subscriber’s records at their “home site”. The mobile moves around the network and registers at new sites. This information is sent back to its home site, so the mobile can make a call on its local site and also be located when it receives a call.

Additionally, 827 multi-site uses a double registration technique whereby each mobile can register at two sites simultaneously. This minimizes registration traffic, particularly where site overlap is high, whilst still achieving fast call setup times.

DOUBLE REGISTRATION

With single registration, mobile passing between sites keeps re-registering in response to local signal strength, generating high intersite communications. Double registration on both Site A and Site B eliminates this.

NETWORK MANAGEMENT

Network programming and configuration is through the Multi-Site Database Management Software. Each Model 827 can be programmed to network in a region of up to 32 sites. Programming is done locally or remotely over dial up telephone.

System management and diagnostics are supported through the integrated logging capability every time a speech or data call is placed on the network.

Comprehensive call details are recorded. These details include calling and called party identity, dialled number (for PSTN/PABX calls), duration, channel/line assigned and reason for call termination.

All information for call detail records is sent to the calling subscriber’s homesite for storage and subsequent retrieval. Additionally, all sites involved in a transaction retain limited transaction records for diagnostics purposes.

CALL PROCESSING EXAMPLE

Initial Conditions
- Mobiles 480 and 481 have SITE A as their home site.
- Mobile 480 is registered on SITE A and Mobile 481 on SITE C

Call Processing
- Mobile 480 travels from SITE A to SITE B and registers.
- SITE B notifies SITE A of this registration.
- Mobile 480 calls Mobile 481.
- Mobile 480 is queued while SITE B verifies location of Mobile 481 by checking with SITE A.
- SITE A returns SITE C as currently registered site for Mobile 481.
- SITE B establishes a link with SITE C and mobiles.
- 480 and 481 are connected.
Network Resilience and Fallback
Many designs of infrastructure suffer from the disadvantage that overall network availability is dependant on the reliability of individual intersite links which are not always under control of the network operator.

During idle periods, the 827 Multi-Site regularly monitors the availability of intersite links and withdraws them from service if there is a failure to communicate in either direction. This ensures that the highest quality of service is available to subscribers at all times.

When a site becomes totally isolated from the rest of the network, it is still capable of operating as a fully fledged trunking system. Normal teleconnect service continues to be available provided one or more telephone lines are terminated at the site.

**COMPLIMENTARY PRODUCTS**

DCS-5020 Digital Console System

The DCS-5020 is designed to meet the needs of the small to medium-sized operations control room. Combining telephone and both digital and analogue radio control, the DCS-5020 supports combinations up to 28 ports and 15 screen-based operator consoles.

Series 4000 Trunked Console

Zetron’s Series 4000 range includes a Trunked Radio Wireless Console System. The Series 4000 Trunked Console is a new concept in Communications Control Systems. For the first time, both trunked and conventional radio channels, as well as telephone lines, can be completely integrated, providing control room operators with a seamless presentation.

**SPECIFICATIONS**

**Model 827 Multi-Site**

Networking
Capacity: 32 sites per region using intersite linking specified below

Site Capacity: 24 radio channels and 32 telephone lines/links per site

Subscriber Capacity: 5,000 radio units
2,000 groups
500 fleets

Hardware Platform: Model 827 MPT Trunking Controller equipped with telephone interface option as required for intersite links

Model 844 4-Port Intersite Link
Model 427 Peripheral Interface

Intersite Linking
Speech and Data: 4 wire (leased circuit), IP or 4 wire E&M (microwave link) through telephone interface—minimum of 2 (separate audio & data required)

Registration: Double registration record (Primary and Secondary)—held at home site

System Database Management: M827BASE database management software

Model 844 Four Port Intersite Link

Capacity: 4 analog speech/data interfaces
4 serial data interfaces
64kbps PCM audio bus (compatible with M827)

Analogue Interface: 4 wire (leased circuit) or 4 wire E&M (microwave link)

Serial Data Interface: 1200 to 19200 bps (adjustable) RS232 suitable for connection to V28 leased line modem or similar

Programming: Remote or local programming with Multi-Site Database Management Software

Model 427 Peripheral Interface

Audio Ports
Line Type: 4-wire or 4-wire E&M

Signaling: E&M leads

MAP 27 Serial Ports
Serial Data Protocol: Supports the Physical and Data Link Layer Interface described under sections 3 and 4 of the MAP 27 for MPT 1327 Equipment Version 1.5 Specification

Data Port Speed: Common data rates from 1200-19.2 kbps

Data Port Capacity: System supports maximum of 16 ports per site

System/Site Capacity
Dispatcher: 48 per system
Audio Port Interfaces: 16 per site
Radio Channels: 24 radio channels per site
Sites: 32 sites per system

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See Zetron price list for option pricing.
Specifications subject to change without notice.

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