



FEATURES

Trunking Controller

- Fully MPT 1327/1343 compliant
 - Modular "plug and play" structure enables an economical building block approach to site development with expansion capability of up to 24 channels per site, and 32 sites per system
 - Individual Subscriber Validation plus Electronic Serial Number (ESN) checking
 - System configuration software is included and provides easy configuration setup and maintenance from a single local or remote connection
 - Intersite database programming allows multisite networks to be programmed and updated remotely from a PC, using only one physical connection to any site
 - External sense and internal alarm input monitoring
 - Four levels of user defined call priority in addition to the three MPT 1327 standard levels
 - Support for an extensive range of MPT 1327 call types
 - Emergency calls can be set to demand resources by preemptive clearing of existing calls
 - Three separate call queues for voice, phone, and busy mobile
 - Cyclic control channel operation for balanced repeater transmitter duty-cycle loading
 - Flash upgradable firmware/software
 - Supports "AHOY-P" — checks radio availability on traffic channels for members included in multi-site group calls. Sites with members not automatically responding to interrogation are withdrawn to make system resources available for other calls
- Automatic call diversion in case user radio is switched off or out of range.

Telephone Interconnect Option

- Configurable for telephone interconnect interface, or audio link port for multisite networking with data link
- Internal voice prompts provide user-friendly dialing guidance for incoming calls
- Least cost routing for outgoing telephone calls reduce toll charges
- Line level balance settings accomplished via software
- Built-in modem for dial-up database management
- Built-in DSP (Digital Signal Processing) audio processing and echo canceling

INTRODUCTION

The MPT 1327 trunked mobile radio standard is internationally recognized for public and private radio systems. Zetron's Model 827 Trunking Controller implements this standard in a single controller package along with integrated advanced telephone interconnect capability. Its modular design approach ensures a cost-effective system with expansion capability. Many features are incorporated into the controller.

BENEFITS

The MPT 1327 open standard provides a highly capable and flexible trunked system. Users can choose from a wide range of equipment choices for both subscriber units and site repeaters, specific to their performance and investment requirements. At the heart of each MPT 1327 system is a dedicated digital control channel, where call requests and channel assignments are rapidly processed to provide fast user access. Group and individual conversations are possible, as well as group announcements. If a called party is busy, a user can request a call back. Many other call types are also supported.

System operators gain extensive control and management of all aspects of their system. Due to the variety of highly configurable system and user parameters, one can optimize their trunking system for ideal performance, efficiency and security. For example, users can be required to log in using their mobile electronic serial number (ESN). Different fleets can be supported on the system. Within a fleet, individuals and groups can be identified and users given priority access. Emergency calls are fully supported and can even preemptively demand resources to ensure call execution. System statistics and billing summary data are also readily available in an exportable data format.

CALL TYPES

The MPT 1327 specification has structured call types with room for user definition. The following call types are supported:

- Individual
 - Simple, Emergency, Priority, PSTN, PABX
- Group
 - Normal, Emergency, Inbound, Broadcast or Conference, PSTN, PABX
- Status
- Inter-prefix Individual, Group, and Status
- Registration
- Non-Prescribed (traffic channel) Data
- Include Call (individual or group)
- Emergency call with preemptively clearing

SYSTEM ARCHITECTURE

The Zetron Model 827 integrates MPT 1327 into one capable unit using powerful 32-bit processing. Other manufacturers typically require several layers of hardware to provide the features and functionality inherent in the Zetron-based distributed architecture. The telephone interconnect card option makes the Model 827 particularly attractive where extensive phone traffic is expected.

Each Model 827 in the trunked radio system interfaces with a repeater, for up to a total of 24 controllers/channels per site. All controllers are then linked together through a 64 Kbps PCM audio "highway" and three data buses. System control data is passed between the trunking controllers through the buses. One Model 827 becomes the communication bus "master," and manages the other trunking controllers. Most importantly, no central switch is required in a single or multisite application. For multi-site systems, an audio and data link are required between each site.

Each site has database capacity for up to 5,000 users with up to 2,000 group identities and 500 fleets. Although the system database is uploaded through one Model 827, it is transferred to all other units at the site over the shared data buses. This provides system resilience, ensuring that loss of one repeater or controller still allows the rest of the system to stay in operation. The database upload can also be effected system-wide in multisite networks over the data links between sites, ensuring efficient and easy updates.

Flexible Repeater Interface

The Model 827 is a compact, one-unit high 19" product for rack mount installation. Repeater interfacing is simplified through the use of a modular rear-panel connector for easy interface cable construction to mate with repeaters from a wide range of manufacturers. DIP switch settings are easily accessible from front panel access plates, and an array of LEDs provide visual confirmation of unit operation.

Telephone Interface

For those systems desiring access to a PABX or PSTN, the Model 827 excels in both value and performance. Installation of the optional Telco interface card provides an additional port easily configurable for PABX or PSTN interconnect. Alternately the card is configurable as an audio linking port to provide for multisite networking with a required data link to each site. Because PSTN line standards vary around the world, the Telco card was designed to address this with a very flexible interface. PSTN parameters such as line level, DTMF and pulse timings are programmed internally. Multiple line types are supported: E-E (2-wire PSTN), E&M 2- and 4-wire to PABX, and 2- and 4-wire leased line. Accurate hybrid balance is ensured with automatic self-adjustment. As an added value and convenience, the Telco interface card has an on-board modem that when connected to a PSTN line, can be used for database programming uploads and downloads.

Modular Design

The modular "building-block" approach to system development is particularly attractive for small or expanding systems. Channels can be added incrementally, thus operators can "build-as-you-go" without having to buy more infrastructure than needed. Also, the design and cost of future system expansion is both predictable and economical.

For operators migrating conventional channels to trunked, or other trunked systems to MPT 1327, cross-busy control channel operation allows the Model 827 to share an existing repeater being used for other operation. When used with other conventional or trunked repeater controllers that provide a "busy" output, the Model 827 will not assign these channels for MPT 1327 traffic. This allows the system operator to maintain subscribers of an existing community repeater while phasing in users to the trunking system as needed.

SYSTEM CONFIGURATION AND DATABASE MANAGEMENT

System management is performed using a standard PC running Zetron's M827BASE Software. This allows changes to operational parameters or the subscriber database to be made off-line, then uploaded to the site when required.

The management PC does not need to be permanently connected to the system. When uploads are needed, the PC can connect directly to the Model 827 front panel or alternatively, through an external modem. If the telephone

interface option is installed and configured to a PSTN line, the interface's internal modem can be used for remote connection. The power and flexibility of the Model 827 comes from the operator's ability to customize the system using the M827BASE Software, which user-friendly design provides extensive help menus.

ADVANCED TELEPHONE INTERCONNECT

The integrated telephone interconnect offers valuable PSTN and PABX interface options popular in rural and commercial applications. Distributed architecture utilizing a built-in PCM switch allows any radio port to be connected to any telephone port. With the capability to have one telephone port per channel, all radio channels can have telephone access at the same time.

With the telephone interconnect, many convenient features are available, including: dial click detector, internal modem, and accurate, automatic hybrid balancing. Users are guided by 16 built-in voice prompts and are notified if a party is unavailable or a call can not be made. Voice prompts are recordable by the system operator. Telephone tone prompts can also be enabled.

Additional telephone operational features include speed dialing, call limit timers programmable by time of day, least call routing, and full toll restrict for barred numbers.

SIMPLE MULTISITE NETWORKING

Multisite gives the capability to build wide-area regional trunking networks. System operators can network existing or new sites based on Zetron MPT 1327 infrastructure, providing a smooth upgrade path from single-site to multisite service. This means that a network can be expanded gradually with traffic demand without requiring a large initial investment.

Each Model 827 site is linked to the next through two dedicated circuits (one audio & one data link), using the Telco interface option configured for 4-wire leased circuit or 4-wire microwave link operation. Use of E&M signaling is optional.

The integral switching architecture of the Model 827 means that traffic on any channel can be routed to and from the intersite Telco interface at the site. Additionally, the data links are used to pass all registration and call setup transactions. Multisite features include:

- up to 24 radio channels per site
- up to 32 sites per network
- 5,000 subscribers
- Intersite linking via leased circuit, microwave, dedicated full-duplex VHF or UHF links, or IP

MODEL 844 4-PORT INTERSITE LINK CONTROLLER

The Model 844 4-Port Intersite Link Controller complements the Model 827 and is designed to provide an economical and efficient way to bring additional multisite linking capacity. It provides four 4-wire ports and four serial data ports for multisite linking – allowing installed Model 827 Telco interfaces to be dedicated for telephone interconnect. It is also ideal for intermediate or “pass-through” sites, where more links are required than can be provided by the Model 827s alone.

The Model 844 easily interfaces to other M827s and M844s in a system over the shared bus. Each M844 appears on a given Zetron MPT 1327 system as four separately available audio and serial data ports for linking. Multiple Model 844 units can be connected in a site, and can also operate in conjunction with Telco interface options installed in Model 827s.

STATISTICS AND BILLING

Channel statistics are logged once an hour. The information stored includes repeater call loading on traffic channels, slotted control information, and call attempts per type of call. Statistics are in accordance with the MPT 1318 standard.

The Model 827 automatically keeps a transaction buffer, with storage for about 4000 calls. If the controller's buffer fills, the Model 827 will attempt to find another controller or Model 844 (if installed) in the system with space available and use that buffer. The Model 827 can also trigger an alarm based on a full transaction buffer. Transaction data may be downloaded through the management PC to be used with third party or customer created invoicing packages.

ALARM REPORTING AND MONITORING

The Model 827 can monitor three internal alarms and three external sense alarms. The internal alarms are: subscriber bus faults, repeater bus faults, and transaction buffer overflow. Upon alarm detection, the controller can place a status message to a defined radio.

SPECIFICATIONS

PHYSICAL

Power	10.5 to 16 Volts DC, 12 Watts
Temperature	0 to 60 deg. Celsius
Size	48.3 cm W x 4.5 cm H x 26.3 cm D
Weight	3 Kg

RADIO

Conforms to MPT 1327/1343 trunking standard. Supports radios compliant with MPT 1327/1352. Full-duplex or half-duplex operation.

RADIO INTERFACE

PTT	Form-C relay closure 1 amp @ 30 volts max.
COR	External COR/CAS, polarity select, Internal Squelch
Tx Audio	Adjustable -40 to 3 dBm. 1K ohm impedance @ 1000hz
Rx Audio	Adjustable -40 to 3 dB. Single or differential input 50K ohm impedance @ 1000hz
Connector	12 position detachable screw strip
Modulation	Depends on transmitter

TELEPHONE INTERFACE

Line Type	Configurable End-to-End (PSTN subscriber line/PABX extension) or 2- or 4-wire E&M
From Telco	-24 dBm to +3 dBm
To Telco	-20 dBm to 0 dBm
Signalling	DTMF, Dial Pulse, MFR1, or MFR2
Connector	RJ45-C
Adaptor	RJ45-C to BT 631A plug, 3 meter
Progress Tones	Dial Tone, Ringing, Busy
Modem	Internal 300/1200/2400 baud modem (configurable to Bell 212 or CCITT V.22/V.22bis)
End-to-End	
Ringer Equivalence	3
Incoming Call	Programmable rings to answer
Call Answer	Off-hook, tip-ring current draw
Call Disconnect	Call progress tone detection (tone cadence is programmable), call limit timer, radio unit's inactivity time-out, loss of loop current, DTMF # received from phone.

2- or 4-wire Private Circuit

Signalling	E&M
Incoming Call	Detection of voltage on E-lead
Call Answer	M-lead is a 2 lead circuit with user selectable normally open/normally closed

Call Disconnect

relay contact. Model 827 has M output lead and M return lead.

Call Progress tone detection, call limit timer, radio unit's inactivity timer, removal of voltage from E-lead, DTMF # received from phone.

SITE CAPACITY

Sites	32 sites per network
Channels	24 radio channels per site
Subscribers	5,000 subscribers
Groups	2000 group identities
Fleets	500 fleets

ACCOUNTING

Record Types	Registration, status, mobile-to-mobile, mobile-to-landline, and landline-to-mobile
Capacity	Minimum 3656 to a maximum of 7313 records stored internally. Actual record size depends on call type. PSTN interconnected calls require twice the storage of other call types.
Stored Information	Called/Calling prefix and ID, start date/time, call duration, channel and line assigned.
Filtering	Programmable minimum call time to store for speech and interconnect. Storage of registration and status records can be set to on or off.

ADDITIONAL

Indicators	Telco, Repeater, PTT, COR, Alarm, Bus, Status (VOX detect, FFSK Rx, FFSK Tx, poll, sync, not used, not used, not used, Telco Modem, Telco DTMF)
Prompt Tones	Progress tones and voice prompts, error and warning tones and voice prompts sent to phone.
Data Retention	Retains data for over 8,000 hours when power is removed from unit. There is no drain on the battery when the unit is operating.
Real-Time Clock	Typically 10 year shelf-life.
Programming	Remote programming via PC using M827BASE Database program. Access via internal modem or local RS-232 port
Alarm Monitoring	3 specific system alarms plus 3 nonspecific
Alarm Inputs	0-5volts. Active: ground, Inactive: open circuit
Alarm Outputs	100mA - 10 Volts, Active: grounds control output, Inactive: control output open circuit.

APPROVALS

CE Approved, AUSTEL Approved
When configured correctly, this device meets specifications for connection to public switched telephone networks.

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