T-MATRIX™ F

ARTEVEA digital

ToIP NETWORK SOLUTION

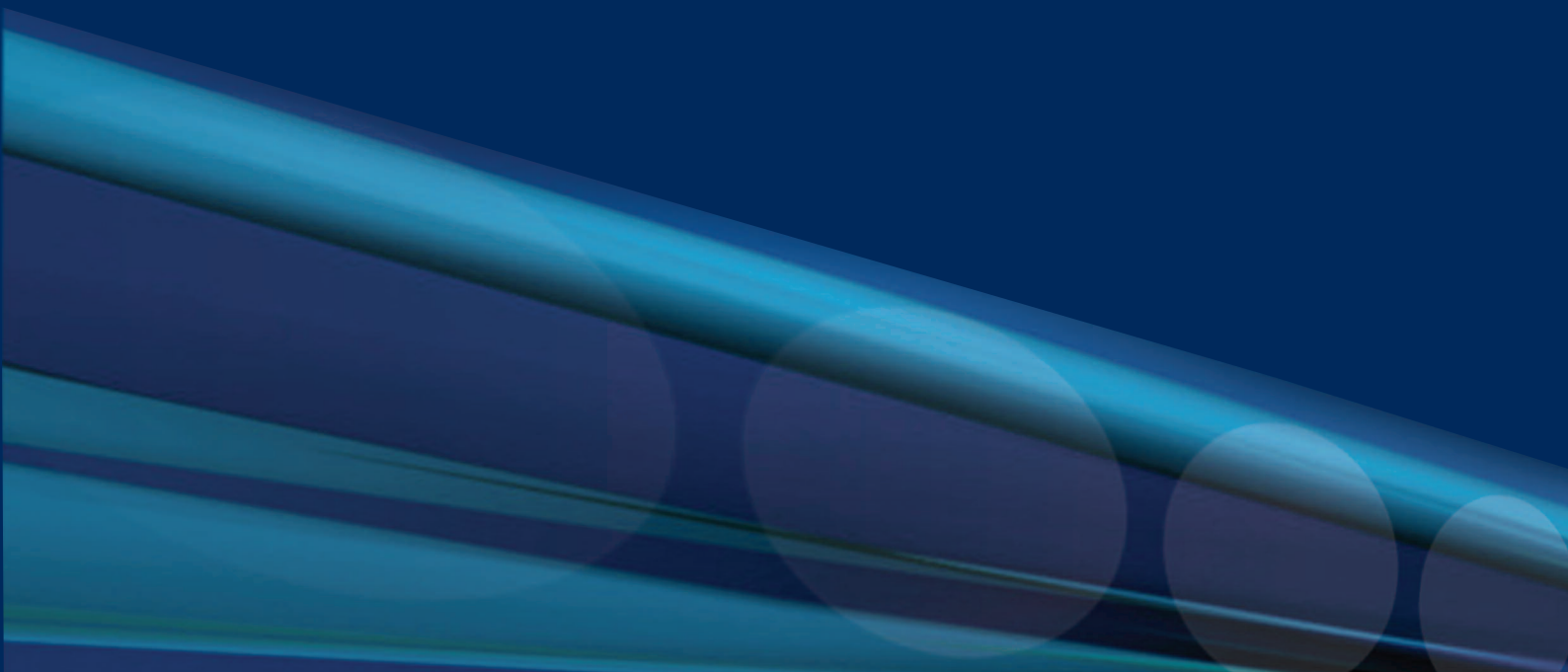
DEPENDABLE TETRA COMMUNICATION

DISTRIBUTED INTELLIGENCE

IP ROUTING

HIGH FLEXIBILITY

INDUSTRY STANDARD CONNECTIVITY



T-MATRIX™ F ToIP NETWORK SOLUTION

T-MATRIX™ F is a cost-effective fixed-site TETRA over IP (ToIP) communications solution designed to meet the needs of professional organisations requiring a permanently installed Private Mobile Radio system.

T-MATRIX™ ToIP solutions are designed and produced exclusively by Artevea Digital Limited (ADL).

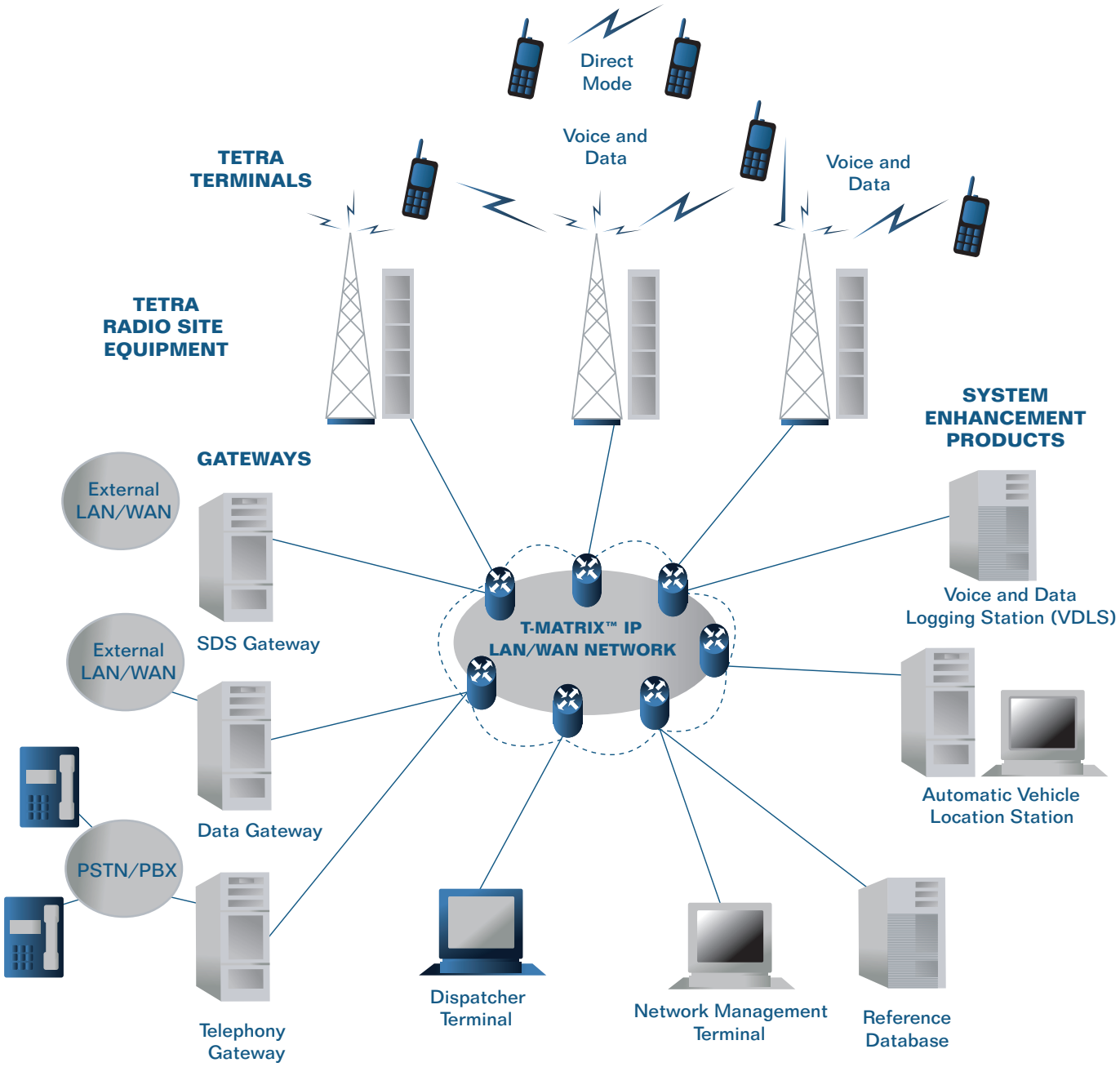
T-MATRIX™ site equipment is scalable according to customer requirements from 1 to 8 transceivers, providing between 4 and 32 logical channels.

An important distinction between a TETRA over IP (ToIP) system and a conventional (switch-based) TETRA system is that a ToIP system has no central switch.

Instead it has distributed intelligence at each Radio Site that can process and handle local calls, set up inter-site calls and keep track of the registration locations of each subscriber, giving an inherently high resilience to backbone network faults. It also means that common resources such as Dispatchers and Gateways can be located at any point in the network.

T-MATRIX™ ToIP systems are based on dedicated private IP networks, not the public Internet. This means they can be designed according to the customer's required Quality of Service and can also be made secure.

Additionally, the T-MATRIX™ system achieves a high level of flexibility through the optimal use of industry-standard hardware and software components in its Network, Gateway and System Management equipment.



T-MATRIX™F ADVANTAGES OF TETRA OVER IP

The key benefits of a ToIP network are Resilience, Flexibility, Efficiency and Future proof technology.
The system features that underpin the key benefits are explained below.

BENEFIT	SUPPORTING FEATURES
Resilience	Network elements and links can be duplicated for extra resilience. Radio Sites work in fallback if their network links fail. Muti-site operation still works, even if one part of the network is unreachable. Network continues to operate if central servers fail or shut down.
Flexibility	Any combination of Star or Mesh network topology is allowed in order to balance traffic handling, resilience and cost-effectiveness. Resources such as Dispatchers and Gateways can be placed anywhere in the network. Additional sites, gateways or dispatchers can be added with ease.
Efficiency	Every site is all informed and call processing is very efficient because of IP techniques such as multicast for Group Calls. Group Calls only involve those sites where Group members are currently registered.
Future proof technology	Industry Standard IP Hardware and Software. Multimedia technology, combining voice, data and images. Continuous performance improvements driven by IP market.

T-MATRIX™F OVERVIEW

T-MATRIX™ MANAGEMENT CONTROL CENTRE

The T-MATRIX™ Management Control Centre (MCC) will typically be used to accommodate the following system elements:

- Reference Database
- Network Management Terminal
- Dispatcher Terminals
- Gateways (see below for further details)

T-MATRIX™ GATEWAYS

T-MATRIX™ Gateways provide connection between the TETRA architecture and various types of external networks. The types of gateway that can be configured are:

- Telephony Gateway (Used to interface with PABX, PSTN or other Legacy voice system)
- Data Gateway (To interface with the PSPDN, Public IP, or Private Data Networks)
- SDS to Email Gateway
- Analogue Radio Gateway

T-MATRIX™ RADIO SITE

Each radio site can accommodate between 1 and 8 carriers, giving 4 to 32 logical channels. Note that one logical channel per site is reserved as a control channel, the remainder being available as traffic channels.

For customers that require additional resilience, a number of duplication options are available ranging from duplicated TETRA Site Controller (TSC) to full site duplication.

T-MATRIX™ SYSTEM ENHANCEMENT PRODUCTS

Depending on specific customer requirements other system enhancement equipment may be provided such as:

- Application server(s) providing specific applications such as: automatic vehicle location, traffic analysis, mail box etc.
- Voice and Data Logging System
- Gateway Mobiles
- Repeater Mobiles
- Cell Enhancers

T-MATRIX™ F SYSTEM FUNCTIONALITY

TETRA SERVICES

Basic Services
Individual Call full and half duplex
Unacknowledged Group Call
Broadcast Call

Circuit/ Packet
Data supported

Call Clearance
User Initiated disconnection
Call limit and Tx Inactivity Timer

Short Data Service
(Individual and Group)
Pre-defined Status Message
User Defined Type 4 SDS
Concurrent SDS + Voice

Queuing
Queue call when system resources busy

Facilities
Basic Link services

Trunking
Late AI Traffic Assignment
Early Network User Channel Assignment
Message Trunking

Dialling
ISSI/ITSI Dialling
PSTN Dialling
DTMF Over-Dialling from PABX
DID Dialling from PABX Gateway
MS ITSI Dialling from PABX

SUPPLEMENTARY SERVICES

General
Late Entry
Emergency Call
Priority Call
Pre-emptive Priority Call
Talking Party Identification
Access Priority
Ambience Listening
Dynamic Group Number Assignment

Telephony type
Calling Line Identification Presentation
QSIG Calling Pty ID Presentation

MOBILITY

Registration Procedures
Mobile Initiated registration and de-registration
Undeclared and Unannounced Cell Reselection
Announced Type 3 Cell Reselection (Handover)
Call Restoration

Attach/Detach Group Identities
Attach/Detach of Groups (MS Initiated)
Group Management

Energy economy mode
Energy Group 0

Facilities
Network Broadcast Information
Neighbour Cell information

SECURITY

Encryption
AI Encryption Static Cipher Key
Algorithm TEA1, TEA2

Authentication
Algorithm TAA
Authentication Key Management via NMS

Terminal Security
Permanent Disable
Temporary Disable / Enable

SYSTEM INTERFACES

Gateways
Telephony Gateway (PABX,PSTN, ISDN, Analogue)
Data Gateway
SDS Gateway
Analogue Gateway

Radio Site to Network
E1 / G703
X.21
ATM

NETWORK MANAGEMENT

Fault
Alarm Logging and Management
Equipment Monitoring
External alarms

Configuration
Site configuration
Database management
Radio Site Software download

Account
Call Data Records

Security
NMWS Operator Access Rights Management of Subscriber Access Rights
Encryption Key Management

Subscriber
Addition/Deletion/Modification
Enable/Disable
Provide, modify and withdraw Supplementary Services
Barring of incoming and/or outgoing calls
Call Forwarding

NETWORK CONFIGURATION

Capacity
Scalable in excess of 128 Radio Sites

Accessories
Call Logging
IP Despatchers

Flexibility
Various Redundant Configuration Options
Fault Tolerant Architecture
Control Channel Agility

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T-MATRIX™ F TECHNICAL DATA

GENERAL SPECIFICATIONS

Operation
Full RF Duplex, supporting full duplex and half duplex speech and data calls

Scalable
Between 1 and 8 carriers per site

Channel Spacing
25kHz, 6.25kHz offsets

Available Frequency Bands
370-390MHz (Base Rx), 380-400MHz (Base Tx)

380-400MHz (Tx & Rx)

410-430MHz (Tx & Rx)

450-470MHz (Tx & Rx)

806-825MHz (Base Rx), 851-870MHz (Base Tx)

TRANSMITTER SPECIFICATION

Transmit Power (measured at Transceiver)
Up to +44dBm (25W) maximum

Typical ERP through +6db Antenna and 50m feeder
+48dBm (50W) with no combining
+44dBm (25W) with 2 port hybrid

Power Adjustment
Reduction in power in –2dB steps from maximum

Duty Cycle
100% Duty Cycle (all time slots active)

RECEIVER SPECIFICATION

Receiver Class
Class A, satisfies ETS300-392-2

Static Sensitivity
<3.0% BER for TCH 7.2 at –115dBm

Dynamic Sensitivity
<2.5% BER for TCH 7.2 at –106dBm (typical urban conditions at 50 kph)
<4% BER for TCH 7.2 at –106dBm (hilly terrain conditions at 200 kph)

Diversity Operation
Fully independent receivers – digitally combined for maximum likelihood detection

2-way Receiver Diversity Gain
2dB minimum, 5dB typical. Exact gain depends on antenna configuration and fading conditions

3-way Receiver Diversity Gain
3dB minimum, 7dB typical. Exact gain depends on antenna configuration and fading conditions

RF SUB-SYSTEM SPECIFICATION

LNA and Hybrid Combiner Band
370-470MHz, 806-870MHz

Duplexer Filter Bandwidth
5MHz Pass band for TX and RX Filters and 5MHz stop band (typical, can vary with band)

TX to RX Isolation
>80dBm

Duplexer Spacing
10MHz (typical) at 370-470MHz
45MHz (typical) at 800MHz

Duplex Filter Insertion Loss
<1.1dB

Duplex Filter Out-of-Stop Band Isolation
>60dB to 3GHz

Hybrid Combiner Insertion Loss
<3.5dB (2 port combiner)
<7dB (4 port combiner)

Hybrid Combiner TX-TX Isolation
>45dB

Hybrid Combiner 2-Tone Intermodulation
-65dBc

ENVIRONMENTAL SPECIFICATION

Operating Temperature & Humidity
(Transceiver)
Compliant with ETSI EN 300 019-2-3
Full rated operation from –20°C to +55°C
Up to 90% humidity, non-condensing

EMC
Compliant with ETSI EN 300 827

Safety
Compliant with ETSI EN 60950:2000

Water and Dust Resistance
Compliant with IEC529 rating IP20. Low maintenance design (includes no routine maintenance of fan tray).

POWER SYSTEM SPECIFICATION

Input Voltage
48 Volts DC nominal

110 Volts AC nominal (option)
230 Volts AC nominal (option)

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