Hytera™ | TETRA

Hytetra WHITE PAPER

ETSI TETRA Standard

About TETRA

The TETRA Association

The TETRA MoU (Memorandum of Understanding), now known as the TETRA Association, was established in December 1994 to create a forum which could act on behalf of all interested parties, representing users, manufacturers, application providers, integrators, operators, test houses and telecom agencies. Today the TETRA Association represents more than 150 organisations from all continents of the world.

The goal for the TETRA Association is to provide a forum for all those interested in TETRA to encourage adoption of the standard and support initiatives to obtain appropriate levels of spectrum such that growth in operational TETRA systems is not restricted by regulation.

TETRA networks around the world

Today, TETRA is being developed in 114 Countries around the world

TETRA Standard

Terrestrial Trunked Radio (TETRA) is a digital trunked mobile radio standard developed by the European Telecommunications Standards Institute (ETSI). The purpose of the TETRA standard was to meet the needs of traditional Professional Mobile Radio (PMR) user organizations such as those listed below.

²Public Safety

²Transportation

²Utilities

²Government

²Military

²PAMR

²Commercial & Industry

²Oil & Gas

The air interfaces, network interfaces as well as the services and facilities are specified in sufficient detail to enable independent manufacturers develop infrastructure and radio terminal products that would fully interoperate with each other. For example, radio terminals from different manufacturers can operate on infrastructures from other manufacturers.

The ability for full interoperability between different manufacturer's products is a distinct advantage of open standards developed by ETSI. As the TETRA standard is supported by several independent manufacturers this increases competition, provides second source security and allows a greater choice of terminal products for specific user applications.

Because the TETRA standard has been specifically developed to meet the needs of a wide variety of traditional PMR user organisations it has a scaleable architecture allowing economic network deployments ranging from single site local area coverage to multiple site wide area national coverage.   Besides meeting the needs of traditional PMR user organisations, the TETRA standard has also been developed to meet the needs of Public Access Mobile Radio (PAMR) operators.

Africa	Asia Pacific	Middle East	Latin America	East Europe	Scandinavia	South Europe	West Europe
Algeria	Afganistan	Bahrain	Argentina	Belarus	Denmark	Andora	Austria
Angola	Australia	Egypt	Aruba	Bosnia	Finland	Gibraltar	Belgium
Botswana	Azerbaijan	Iran	Bermuda	Bulgaria	Iceland	Greece	France
Congo	Bagladesh	Iraq	Brazil	Croatia	Norway	Italy	Germany
Djibouti	Brunei	Isreal	Chile	Czech Republic	Sweden	Malta	Ireland
Kenya	China	Jordan	Columbia	Estonia		Monaco	Luxemburg
Libya	East Timor	Kingdom of Bahrain	Costa Rica	Hungary		Portugal	Netherlands
Morocco	Georgia	Kuwait	Curacao	Kosovo		Spain	Switzerland
Namibia	India	Lebanon	Dominican Rpblc	Latvia			UK
Nigeria	Indonesia	Oman	Ecuador	Lithuania			Vatican City
Senegal	Kazakhstan	Palestine	Haiti	Macedonia			
South Africa	Malaysia	Qatar	Mexico	Poland			
Sudan	Maldives	Saudi Arabia	Panama	Romania			
Tanzania	Mongolia	Syria	Peru	Russia			
Tunisia	New Zealand	Turkey	St Martin	Slovakia			
uganda	Pakistan	UAE	Trinidad & Tobago	Slovenia			
	Philippines		Venezuela	Ukraine			
	Singapore						
	South Korea						
	Taiwan						
	Thailand						
	Tukmenistan						
	Uzbekistan						
	Vietnam						

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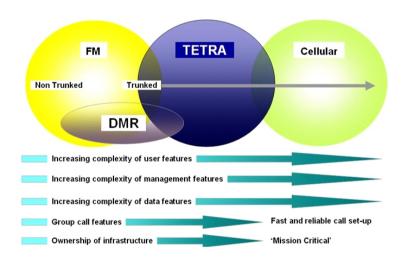
Advantage
of TETRA

TETRA adopts the latest digital modem technology. It brings the following advantages:
■ Versatile functionalities for varieties of user demands;
■ Overall dispatch management;
■ Reliable and diversified data application;
■ Fast call response.

These advantages maximize the usability and security of TETRA products.

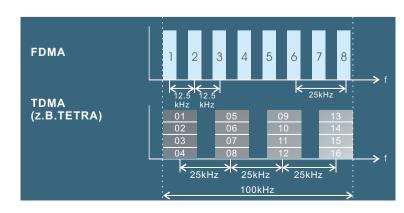### 1)Full Duplex Communications
TETRA supports full duplex communication connections and can interoperate with fixed and mobile phones through the gateway.

2)Voice and Data Capabilities
The TETRA mechanism uses Time Division Multiple Access (TDMA) to simultaneously distribute a time slot channel for voice services and another for sending and receiving data. TETRA terminals can process data applications when receiving or sending voice.

3)High Data Transmission Rate
The maximum data transmission rate is limited by radio frequency (RF) channel bandwidth. Generally, higher channel bandwidth gives a higher data transmission rate. The TDMA modulation in the TETRA protocol uses a 25 KHz bandwidth channel, which doubles the channel bandwidth of typical FDMA and gives a higher data transmission rate on a single RF carrier.

TETRA Interface Applications

The TETRA air interface is a digital wireless route and supports the following functions:

■ Group call, single call and phone call
■ Short data transmission of up to 256 bytes
■ Circuit switching and packet switching data at a data transmission rate range of 2.4 kb/s (high protection) to 28.8 kb/s (no protection)
■ Registration and group management
■ Security and authentification
■ Group call, single call and short data services in DMO
■ A radio station can be used as a gateway (or repeater) to expand coverage when DMO is enabled
■ Standard external interface PEI to simplify interconnections and interoperability with external devices

4)Secure Communication

TETRA's complex modulation and demodulation mechanism supports a 128-bit encryption key, making it extremely difficult to illegally intercept communication data.

5)Superior Audio Performance

Audio performance remains stable and excellent within the network coverage, optimizing user experience.

6)Supplementary Services

Supplementary TETRA services can be categorized as: (1) Emergency services, such as interception (DL) and ambience listening (AL); and (2) General business communication/telephone applications, including blocking inbound/outbound calls, display/hide numbers.

Supplementary services are categorized into two types: professional dispatching and telephone. Professional dispatch services include access priority, pre-emptive priority and priority calls, include call, control transfer, late entry, dispatch console inspection calls, AL, DL, area selection, abbreviated addressing, talking party identification, and dynamic restructuring. Telephone services include: search call listing, call transfer, call restriction, call reporting, call waiting, and call holding, caller/called party identification display restriction, call completion to a busy user/no response, and call retention.

7)Flexible Configuration of Terminal Features Based on User Level

TETRA services can be customized for different users through configuration options. For example, differentiated services can be separately customized on the basis that every TETRA user is provided with general communication functions.

Low level users: group call and status message

General level users: single call, group call, status message and short message

High Level users: single call, group call, status message, short message and phone call

8)Wide Communication Range

During trunked mode operations (TMO), TETRA communications can be theoretically supported within a network. For a 4 time slot TETRA system, the maximum theoretical communication range is 58 km, though terminals and base station RF performance limit the range in practice.

9)Low RF Power Demand

TETRA uses a non-constant envelope modulation scheme that offers greater efficiency than an APCO25, DMR or FM system scheme. For a 1 W or 3 W TETRA portal radio, peak power is 2 W or 6 W. A 10 W TETRA mobile radio uses about 20W transmission power.

Two Way Radio
■ Individual Call (one to one) / Group Call (one to many call) (semi-duplex mode)
■ Quick call setup in Multi-site system
■ TMO & DMO

Mobile Phone
■ Full Duplex Communication
■ free-handle telephone

Wireless Data Modem
■ IP packet data service
■ messaging

Two-way Text messaging（pager）
■ Short message service
■ Pregrogramed message

Data terminal
■ Built-in database inquiring function

Encryption
■ Data & voice Air Interface Encryption