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**PERSEUS Wired/Wireless Remote Dispatchers
TETRA Dispatching Application & Features**



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SELEX
Communications

A Finmeccanica Company

PERSEUS Wired/Wireless Remote Dispatchers TETRA Dispatching Application & Features



TETRA Dispatching Applications & Features - Overview

The SELEX Communications' Dispatcher can be considered as window opened on PERSEUS and the ElettraSuite system based on the TETRA standard. This application is a PC-based tool easy to be used for:

- Management, supervision and control of radio-communications with users on the field (Dispatching).
- Administrative management of users and groups (Subscriber Management).

The Dispatcher Stations are ready for a variety of additional applications such as AVL/APL applications in order to radiolocate vehicle and personnel on the field or access to remote databases (necessary as a support to the operator activity).

The offered functions are the same independently on the hardware platform; this is possible due to the client/server paradigm used to separate the GUI from the serving functions used to accomplish the dispatching tasks. This characteristic allows for operators to pass more easily from a platform to another.

There are **three main platforms** for TETRA Dispatcher Stations:

- 1) **Wired station** with full functionality (Dispatcher Station).
- 2) **Wireless station** with reduced functionality (Radio Dispatcher Station).
- 3) **Multi-operator system** for Control Centres (Control Room Server plus Dispatcher Stations) with full functionality.

All the hardware platforms are completed by a professional set of audio accessories (Dispatcher Audio Console, microphones, headset, etc.).

In the following, the features of the client and server sides of the Dispatcher Application are presented and the differences between the Dispatcher and Radio-Dispatcher Application are highlighted.



TETRA Dispatcher Application

CLIENT SIDE FOR SINGLE/MULTI-OPERATOR WIRED DISPATCHER STATIONS

WDS- WAN Dispatcher Station

LDS - LAN Dispatcher Station (analogue/VoIP versions)

Suited for PMR operations

This application has been studied to fit the needs of the PMR (Professional Mobile Radio) operational environment and in particular for PSS (Public Safety and Security) organizations.

The Graphic User Interface allows to the Dispatcher Operator to manage all communication services available in a TETRA system, with groups and single users.

Touch-screen option

In case a touch-screen monitor is needed, a GUI aimed to this purpose is available. For this reason the shape of buttons and other visual commands have been thought for a comfortable use also with gloved hands (that can often happen especially using a PC on the field).



Full/reduced GUI option

In order to take into account different customer needs about the display, the GUI is supplied in two formats resolution: 1024x768 or 1280 x 1024 (below an example).

FUNCTIONAL CHARACTERISTICS

The Dispatcher Application supports the following services:

- Speech and data calls.
- Short Data Service.
- Supplementary services.
- Simultaneous sixteen calls management.
- Subscriber management.
- Logging of the dispatcher operations.

Speech and Data Calls

The dispatcher application allows the operator to set-up and clear the following kinds of calls:

- Individual call, which is a speech call between the dispatcher operator and a mobile station or a PABX gateway.
- Group call, which is a speech call between the dispatcher operator and a group of subscribers.
- Circuit data call, which is a file transfer between the dispatcher operator and an individual or group subscriber.

Circuit data calls can be made in:

- Unprotected mode at one of the following selectable speed:
 - 7,2 Kbps (1 slot)
 - 14,4 Kbps (2 slots)
 - 21,6 Kbps (3 slots)
 - 28,8 Kbps (4 slots)
- Protected mode at one of the following selectable speed:
 - 2,4 Kbps (1 slot)
 - 4,8 Kbps (2 slots)
 - 7,2 Kbps (3 slots)
 - 9,6 Kbps (4 slots)

Short Data Service

The dispatcher application supports the following kinds of Short Data Service (SDS):

- Predefined individual short data message. The application supports predefined individual short data messages. The maximum length of a single message is 210 characters.
- Predefined group short data message. The application supports predefined group short data messages. The maximum length of a single message is 210 characters.
- Individual free text short data message. The maximum length of a individual free text data messages is 210 characters.
- Group free text short data message. The maximum length of an individual free text data messages is 210 characters.
- SDS text with delivery notification. A text message can be sent with the request of a "receipt" notifying the delivery of the message itself to the destination.

Supplementary Services

The dispatcher application allows the operator the issuing of the following supplementary services:

- **Pre-emptive priority calls.** This kind of calls is allowed to disrupt ongoing calls at lower priority level, if no resource is available.
- **Call Authorized by the Dispatcher.** With this feature the dispatcher is required to verify and approve a call request before the call is allowed to proceed.
- **Group patching.** It allows the dispatcher operator to set up communications between two or more group subscribers.
- **Subscriber monitoring.** This service allows the dispatcher operator to monitor one or more users' activity (i.e. calling/called number, type of call, duration, etc.).
- **Discrete listening.** This service allows the dispatcher operator to listen a call between two other users or user group, without entering into the call as an active party.
- **Forced call termination.** This service allows the dispatcher operator to clear down a monitored call.
- **College call.** This service allows the mobile user to send an SDS to a specific group of dispatchers in order to be contacted

by one of them; the dispatcher that will take responsibility of the request automatically notifies it to the others and the pending call is removed from them.

- **Group management.** This service (exploiting the DGNA (Dynamic Group Number Assignment) TETRA supplementary service), allows the operator (having the proper privileges) to dynamically set a new group of users, modify the memberships of an existing one or delete a group.
- **Subscriber Profile management.** This service allows the operator (having the proper privileges) to modify subscriber profiles, create a new subscribers or delete them.

Simultaneous Sixteen TETRA Calls Management

The dispatcher application allows the monitoring of up to sixteen simultaneous TETRA calls (no matter if individual or group calls).

Calls to be monitored are easily selected from the ongoing calls window Call monitoring includes the capability from the dispatcher position to control the volume of any calls among the monitored ones.

History window

For a better management of past calls, history folders are provided inside a dedicated window:

- the Individual Call history folder that has a record of the last individual calls made or received.
- the SDS history folder that has a record of the last SDSs sent or received. Moreover there is an area where it is possible to display the text or the code (for status messages) of the selected SDS message.
- the Alarm history folder that contains a record of the last alarms received.

Encryption

The application provides a dedicated window for the selection of the key to be employed in an end-to-end encrypted call. The Dispatcher operator can choose a different key for the individual and group voice calls. Also Circuit Data calls can be encrypted.

CLIENT SIDE FOR SINGLE WIRELESS DISPATCHER STATIONS

RDS - Radio Dispatcher Station

The solution for Small Offices or In-field operation

The Radio Dispatcher is comprised of a PC and one fixed-radio module FC3000.

In this case the Dispatcher Application run with a subset of the features present in the full version due to the constraints imposed by the radio vector. Nonetheless, it's a dispatching solution useful for small offices or nomadic use on field.

The Radio Dispatcher tanks to the DGNA service made through the Packet Data, can be considered the small network element with dispatching services.

A resilient solution

Even in the case the RDS Application goes in crash (or the PC itself) it is always possible to keep in touch with the managed users by using directly the FC3000 radio through the Front Panel which the fixed-radio is equipped with.

Whenever the Radio Dispatcher Application is resumed is always possible to switch again to the PC-assisted dispatching operation.

Functions

The Radio Dispatcher Application allows an operator to use the functions of a radio equipment by means of a PC connected to a fixed radio module. The PC can support Microsoft Windows NT/2000/XP operating system, adding the same call management tools making possible dispatching operation even with.

Radio Dispatching services are checked in the table here below (the table reports on the first column all the services available in a Dispatcher Station):

Service	Radio Dispatcher Appl.
Speech & Data calls	
Individual speech call	•
Group speech call	•
Circuit Data unprotected modes	•
Circuit Data protected modes	•
Pre-defined SDS	
Individual message	•
Group message	•
User-defined text SDS	
Individual text message	•
Group text message	•
Individual text SDS with delivery notification	•
Supplementary Services	
Pre-emptive priority calls	•
Call Authorized by the Dispatcher	
Group patching	
Subscriber monitoring	
Discrete listening	
Forced call termination	
College call	
Group management	•
Subscriber Profile management	

16 calls management

Packet Data Context

Being this kind of dispatcher based on a radio module, it is necessary to obtain an IP address in order to perform Packet Data operation (for example, to run Group Management services).

Note: in the case of a Dispatcher Station, this enabling operation is not necessary since the workstation is already line-connected to an IP network and it has already its IP address (e.g. the above mentioned Group Management services can be run without any preventive operation).

Application features

- One active Voice/Circuit Data call
 - Group Call (Half Duplex or Broadcast) or Individual call

(Half or Full Duplex).

- Can store into history window the last incoming/outgoing calls, SDS.
- Can show all groups into the Radio activeWPS and extra WPS to manage them priority of scanning and choose some of them to display into the main window of the application.
- Can manage the Radio Phone Books
- Browse the DGNA Subscribers created by the operator and modify or delete them.
- Radio Dispatcher is available in two different video screen resolutions: 1024x768 or 1280x1024 (example below).



Radio Dispatcher (RDS) display page

TETRA Dispatcher Application Architecture

From software point of view, the DS operator uses a set of functionality, implemented by a set of software components. These software components are running in TETRA network elements LDS, WDS and inside the SCN and logically interconnected via TCP/IP.

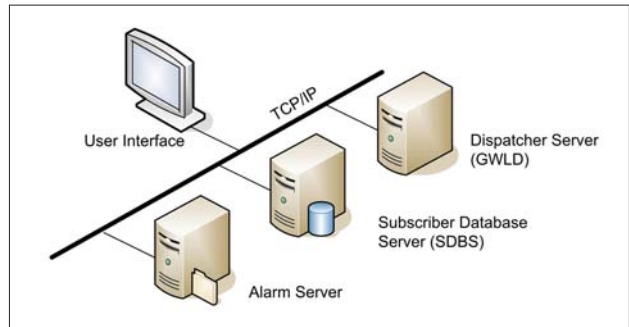
The components are the same for different types of dispatcher station: the difference is the deployment of these components into network elements.

The main components are:

- **User interface:** is the graphical user interface (GUI) offered to the DS operator to use the DS features.
- **Dispatcher server:** the call control application that permits to make/receive calls, sds, etc.
- **Subscriber database server:** the server that offers the access to the database of TETRA users
- **Alarm server:** the server for alarm notification.

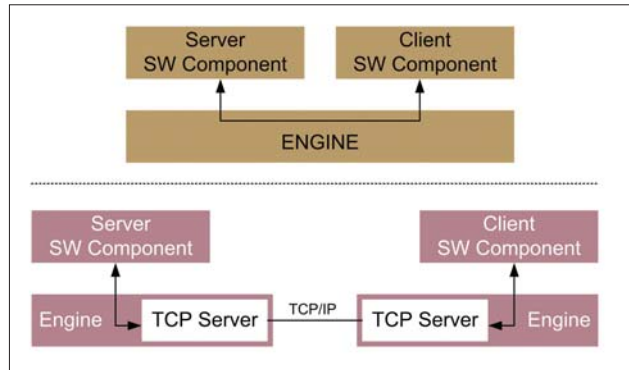
This architecture is valid only for wired Dispatchers that have a connection with the SCN (Switching Control Node) for accessing the required server - the RDS Application differs because it is based on the air interface offered by a Mobile Station.

The architecture foresees an engine hiding to the Dispatcher-server the underlying Operating System, in order to allow its deployment on several target architectures. It provides Software Elements with a message-passing Inter Process Communication



mechanism, supporting both synchronous and asynchronous (queued based) message transfer either local or remote (TCP/IP based), as shown in the figure below. Local communication refers to software elements sharing the same address space (e.g. running in the same task), remote communication refers to software elements not sharing the same address space (e.g. running in different tasks) both on the same or different machines. This allows to manage both different kind of Stations and remotization of the client side (the GUI).

Since the client and server parts communicate through a TCP/IP link, this can happen independently on the fact the two parts are physically separated or not. The figure above shows the two cases we can have: in the first, client and server are on the same PC (e.g. a remote Dispatcher Station) while in the second one they are located on different machines communicating via an IP network (e.g. a control room where Control Room Server runs the server components while the client side is represented by the Dispatcher Stations).



API & CUSTOMIZATION

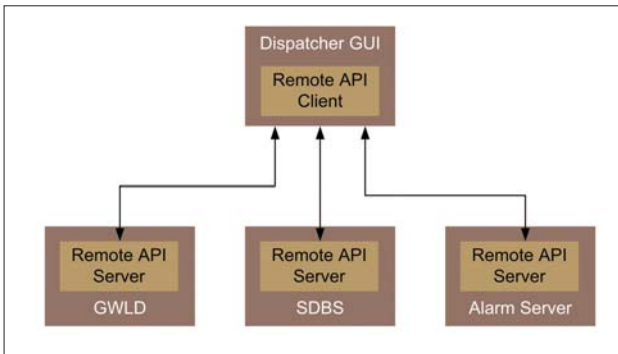
An API interface allows to the client part of the application to exchange information with the server part and perform call to specific functions, so that to manage communications and dispatching services. The API is an open interface that can be used to enhance the application with custom contents and additional features.

Thanks to the API interface and the fact both hardware and software platforms are standard based (such as Intel™ and Windows™), a SELEX Communications' Dispatcher Station can be extended by means of standard software packages and hardware cards typical of the Computer Telephony world.

The API provides an interface hiding the proprietary (SELEX Communications) boards installed into the workstation. This is interesting especially for either third parties or customers

themselves when developing their own enhancements or indeed the complete dispatching application.

The communication between client and server parts occurs by means of a message-passing mechanism supporting synchronous and asynchronous (queued based) message transfer either local or remote (TCP/IP based); this choice allows for transparency and independence on the underlying Operating System.



To develop a new client application that use the RemoteAPI server, a software development kit (SDK) is distributed. This kit contains header files and library to develop a RemoteAPI client and runtime for Windows NT/Windows 2000.

MULTI-OPERATOR IMPLEMENTATION

The Dispatcher Server can instantiate more sessions for serving more clients at a time. In this case we obtain a multi-operator environment: the component managing multiple instances of the client application is the so called **Control Room Server (CRS)**, supplied by the Dispatcher Server). This serving application can be run on two platforms, depending on the logistic arrangement of the Control Centre hosting the Dispatching Stations:

- Inside the Interface Unit of a SCN (Switching Control Node) (in this case the Dispatcher Stations are co-located with respect to the SCN)
- On an independent hardware Control Room Server platform remotely positioned with respect to the SCN (the Dispatcher Stations are remote with respect to the SCN and connected to the CRS platform)

INTERFACING NO-WINDOWS ENVIRONMENTS

In order to provide an interface towards TETRA services even to those customer's applications not based on Microsoft Windows NT operating system, a Unified TETRA Custom Interface is provided with the last CRS platform (CSR 200).

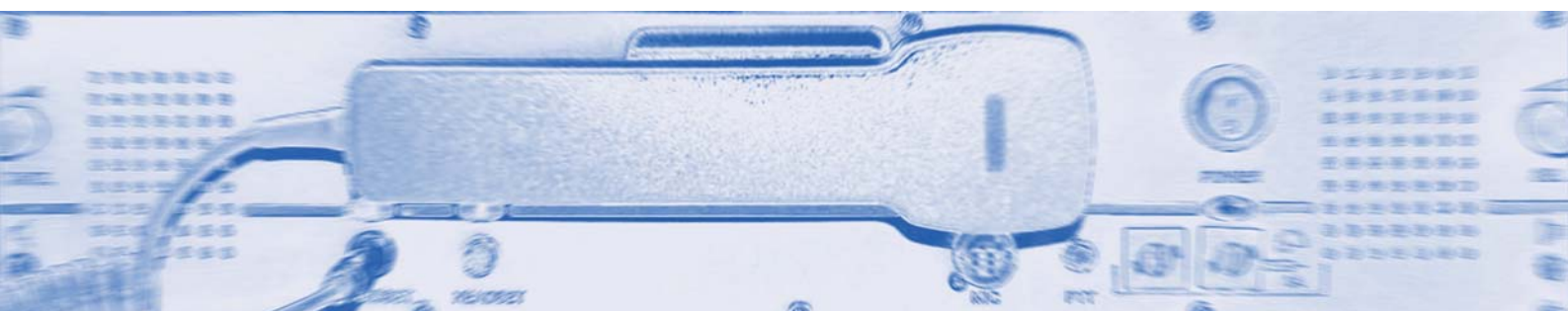
Comparing with the standard API interface (Remote API) has some enhanced features:

- It exports the full set of API exposed by the TETRA network: telephony/RTT, Provisioning and Alarms.
- It provides an interface layer between TETRA network and customized LDS clients that provides an entry point to Selex where customized features could be added without modifying the remote API interface. (i.e. Include Call)
- This interface is based on message exchanges transported by TCP/IP, it doesn't require any Software Kit installation; for this reason it is usable also by those clients not developed on a Windows platform.
- It provides also a secondary TCP/IP connection where all the signaling on the primary connection is echoed; in this way a back-up client application could be up to date regarding the operation executed by the active client application. It is worthwhile noting that such an interface only provides an echo support. Alignment between the active and the hot-standby client machines are responsibility of the client application.

Applicability of DS appl's to DS platforms

Applications	Dispatcher platform				
	LDS 200	WDS 310	XCO-2020	XCO-E	RDS
Standard TETRA Dispatcher Application	X	X	NA	X	N/A
DDS - Dispatcher Application For HS-2020(*) with TETRA features	N/A	N/A	X	X	N/A
RDS application	N/A	N/A	X	X	X

(*): HS-2020 COM-CENTER: multi-technology SELEX Communications Control Room



GLOSSARY OF DISPATCHER APPLICATIONS, TERMS & ACRONYMS

API	Application Programming Interface
CRS	Control Room Server
DGNA	Dynamic Group Number Assignment - Group identity assigned dynamically during operation on the field: this supplementary service allows to build new groups and communicate new identities (GTSI) to the interested users
GTSI	Group TETRA Subscriber Identity
ITSI	Individual TETRA Subscriber Identity
LDS	LAN Dispatcher Station
RDS	Radio Dispatcher Station - Dispatching station based on the fixed radio ElettraSuite FC3000
RTT	Real Time Tracing - service used to trace users' communications activities (see Subscriber monitoring)
WDS	WAN Dispatcher Station
WPS	Working Profile Set - a set of groups pre-loaded (or down-loaded by air) into a Mobile Station (hand-held or vehicular radio) that are to be monitored and to which different call priorities may be associated
Call Authorized by Dispatcher	This function allows a dispatcher operator to authorize an user to do a type of call not foreseen by his/her subscriber profile
College call	This service allows a user to issue a call to a group of dispatchers independently on which of them will take in charge the call itself. After one dispatcher takes the call, the others are notified they are no more involved in the pending call.
Discrete Listening	Supplementary call-intrusion service allowing an authorized dispatcher operator to listen to one or more ongoing calls without any indication to the other parties
Group management	Administrative activities allowed to authorized operators in order to build/delete groups, change group memberships, etc.
Group patching	Function allowing to temporary merge more groups into the same set in order all members of the selected groups can listen to the same dispatcher operator in the same call (and viceversa, the dispatcher can hear any user in the patched group, but members belonging to different groups cannot hear one another)
Pre-emptive priority	Class of priority used for emergency calls; in case the system is congested, resources are made free for this kind of call.
Protected mode	Channel coding used in Circuit Data mode in order to improve data integrity: three modes are implemented: <ul style="list-style-type: none"> • No protection @ 7.2 kbit/s throughput per time-slot; • Low protection @ 4.8 kbit/s throughput per time-slot; • High protection @ 2.4 kbit/s throughput per time-slot.
Subscriber monitoring	Monitoring of the subscribers' communication activities (calling/called parties' identities, call duration/type/..., etc.)