i.search

System Description

Version 3.2.0

www.swissphone.com

SWISSPHONE

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I-SEARCH System Description Version 3.2.0 english.doc

Versions Verification

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Contents

1.   Introduction

I.SEARCH is the professional paging system for all applications. Being modular in structure, it can be adapted to meet any needs. I.SEARCH can be individually expanded to provide the best solution for any paging environment.

One of main I.SEARCH advantages is that it combines both local (on-site) and national (off-site) paging and GSM SMS. It also supports interfaces with other paging media such as DECT cell phones.

Alongside classic PBX paging, I.SEARCH also supports connectivity with building control systems, alarm contacts and messaging from the software GUI. As such, it provides a full-scale system for any application.
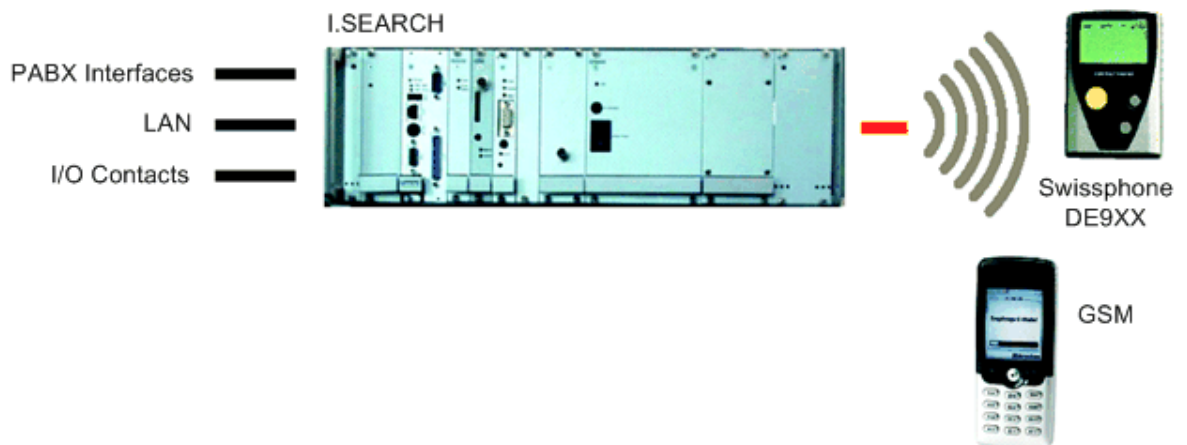
Benefits at a glance
- Connects to various PBXs
- Interfaces with messaging platform
- Combines on-site and off-site paging
- Various paging media (GSM, paging, Mail)
- Supports interfacing with building systems (technical alarms)
- Supports multisite networks (with multiple transmitters)
- Individually expandable
- Maintenance and data management via ISDN/PSTN access

Software features
- Direct messaging
- E-mail messaging
- Supports PBX paging processes
- Automatic messaging (alarm and information server)
- Subscriber data management
- Various user levels
- Imports and exports user data (CSV file)
- Exports log files (CSV file)
- Local configuration from any office PC (browser GUI)
- Escalation module
- Absence management
- Work and time schedules
- etc.

Alarm module
I.SEARCH offers various input modules for alarm points:
- 32 floating contacts
- Cascadable modules
- Local contacts (accessible via LANs)

Web interface
I.SEARCH can be fully operated and configured from an internet browser (e.g., Microsoft Internet Explorer, Netscape) installed on any PC in the intranet. The web interface offers easy, intuitive handling and does not require special hardware or software. That means that no additional system monitors are required.
- Browser GUI
- 8 different user levels (user, support, admin, etc.)
- Local management and system input
- Imports and exports user data (CSV file)
- Exports log files (CSV file)
- System monitoring
- Direct messaging

PBX interfaces (personal branch exchange)
There are 3 interfaces providing connectivity to PBXs
- ESPA 4.4.3 (supports up to 6 interfaces with external hardware)
- ESPA 4.4.4
- CSTA (upon request; depends on PBX)
- Special protocols available upon request

On-site messaging (local)
- 4W or 25W transmitters
- Paging frequencies (UHF 430-450MHz or 450 – 470MHz in 12.5, 20, 25kHz channel spacing)
- Supports multiple transmitters (via LAN or RS-422/ RS-232)
- POCSAG standard code

Off-site messaging (national)
- Coverage area is dimensioned to suit needs (regional, national, international)
- Messaging platform provides provider access via ISDN or internet (TCP/IP)
- Optional GSM support via messaging platform or internal hardware

Uninterruptible power supply (UPS)
- Continues running during power outages for at least 2 hours

Pagers
Swissphone provides a wide range of digital POCSAG pagers for various needs.

2. I.SEARCH Models

2.1. The I.SEARCH 200 Class (only on request)

I.SEARCH 200 is a preconfigured system in a desktop case. It contains predefined hardware and software modules. I.SEARCH 200 can go into operation without configuraton.
Exisising systems extended with additional hardware and software modules. I.SEARCH 200 uses the same software as I.SEARCH 500.

2.2. The I.SEARCH 500 Class

I.SEARCH 500 allows individual solutions. It is modular and flexible enough to be tailored to individual customer needs. Some engineering is usually required to adapt the system to local conditions.
I.SEARCH 500 consists of various hardware and software modules. Using local module units or 19" rack, these modules are combined to create the overall system. I.SEARCH 500 uses the same software as I.SEARCH 200.

2.3. The I.SEARCH 400 Class (only on request)

I.SEARCH 400 is based on standard PC technology and Microsoft Windows.
This document does not describe I.SEARCH 400 . For more information about I.SEARCH 400, please consult the I.SEARCH 400 documentation (Genius 2000).

3. Hardware

3.1. Base System

The base module consists of a computer and power supply unit. All the electronic components are contained in a rugged desktop case (I.SEARCH 200) or a 19" rack (I.SEARCH 500). I.SEARCH has a power connection (230V/50Hz), a network port (10/100BaseT, Ethernet) and several other interfaces for the system, including an antenna connector (BNC) for attaching a local transmitter.

3.2. Computer

I.SEARCH uses an embedded single board computer. The I.SEARCH configuration requires 64 MB RAM and a flash disk with minimum256 MB. I.SEARCH. The computer board features an AT-96 bus interface through which the computer communicates with external hardware components. The board features additional built-in interfaces such as serial, parallel port, VGA adapter, USB and Ethernet adapter. The front panel of the computer module has a reset button so you can cold-reset I.SEARCH if it hangs.
The computer module has monitor and keyboard ports, but they are not used because all system communications are conducted using the network port and a standard browser.

3.3. Network port

The network port is a 16-bit Ethernet port that supports IEEE 802.3-compliant 10Mbps transmission. The connector is a standard port with an RJ-45 connector.

3.4. Power Supply

The operating voltage is provided by a primary clocked power supply. The output voltages of the power supply are +5V and ±15V. the input voltage is 230V/50 Hz.

3.5. Network Input Module

The power switch is located on the rear of the network input module on the rear side of the case. It regulates the phase and the neutral conductor. It also contains 2 fuses.
The switch has been positioned so that outside parties cannot accidentally turn off the system.

3.6. Power Cable

I.SEARCH has a C13 socket for standard power cables. That means the system can be shipped with a country specific power cable.

3.7. Protection System (ESD)

The system case is connected to mains ground. All system outputs refer to this potential. All external contacts are separated galvanically.

3.8. GSM Modem Option

The GSM modem option is added to the system using a plug-in unit. The unit consists of a Siemens GSM RS/TX module and a conversion circuit to the AT-96 bus system. If the system already contains the SMS/GSM option, there is an FME antenna connection for the GSM antenna.

3.9. 16x I/O Module Option

A plug-in card and an external cross-connect system allow the operation of 16 inputs and outputs. The cross-connect system can be installed separately (max. 2m).

3.10. Transmitter Option

3.10.1. Transmitter

The transmitters used in I.SEARCH meet the national on-site paging standards (ETSI 300224). The transmitters are designed to transmit data digitally (POCSAG) and continuous operation. Modulation type is DFSK by default.

Properties:
- Frequency bands: VHF (66-88MHzor 136-174MHz), UHF (400–470 MHz), programmable
- Output power: 0.1-25W (up to 100W on request), programmable
- Channel spacing: 12.5, 20, 25kHz
- Transfer rate: 512, 1200, 2400bps (normally 1200bps)

3.10.2. Antenna system

The impedance of the antenna must be 50Ω. The antenna must also be specified for the working frequency. The cable length has an influence on the output power. The shorter the better.

3.10.3. Indoor Antenna

Any omnidirectional antenna can be used in indoor applications. Swissphone recommends antennas from Kathrein. The antenna should ideally be located in the centre of the company premises.

3.10.4. Outdoor Antenna

Any omnidirectional antenna can be used in outdoor applications. Swissphone recommends antennas from Kathrein. You will have to follow the standard installation instructions when installing an outdoor antenna. The antenna should ideally be located in the centre of the company premises.

3.11. WD2000 Watchdog Module Option

The watchdog module monitors the system. If the software/kernel blocks, it will fail to increment a counter. After 5 minutes of inactivity, the counter will restart the system. A floating contact will also be opened/closed. The module also monitors the system's various operating voltages. If one of these voltages fails, a message is sent to the controller, or rather a floating contact is opened or closed.

3.12. Case Options

I.SEARCH is in three different hardware versions available.

3.12.1. Desktop Case (only on request)

The "Propac" desktop case offers room for 3 additional 4TE optional units besides PC- and power supply unit.

3.12.2. 19" Rack

The 19" rack offers room for 6 additional 4TE optional units besides PC- and power supply unit.

This rack can also be installed in a wall-mounted cabinet (generally 9HE or according to customers requirements).

3.12.3. ITC2000 Case (until 2008)

In this case I.SEARCH is built into an ITC2000 transmitter rack (25W POCSAG transmitter) and offers room for 3 additional 4TE optional units besides PC- and power supply unit.

3.13. Hardware Configuration

3.13.1. I.SEARCH 200 Desktop Case

Rear view:
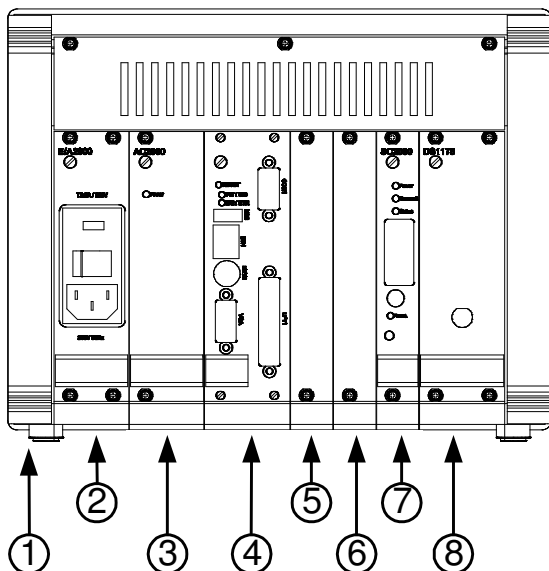
Figure 1:   I.SEARCH 200 in desktop case

1) Desktop case W x H x D = 256 x 204 x 316 mm, rear view.
2) Power socket (fixed location)
3) AC2000 power supply (fixed location)
4) Base BSC2000 computer unit (fixed location)
5) to 7): spares 1 to 3: Spare bays for the following optional 4TE units:
- COM2 interface (preferred location 5) for 4.4.4 input interface (4TE module).
- ISDN or analogue unit for off-site messaging connectivity and/or remote access (4TE module).
- I/O unit for connecting floating contacts (4TE module).
- SC2000 synchronisation module (preferred location 7) to provide POCSAG formatting for a local paging network (on-site)4TE module)
- WD2000 watchdog unit (monitoring I.SEARCH functionality and activating the failure alarm via 2 floating contacts).
- OC2000 interface RS232/RS422 for attaching I.SITE transmitters (4TE module must be installed in the bay immediately to the right of the SC2000 synchronisation module; only supported in I.SEARCH 500 modules).

8) Spare bay: for installing the integrated 0.1-4W DS1178 POCSAG transmitter (8TE module does not need a backplane slot. The module must be installed to the right of the SC2000 synchronisation module. If possible, it should be installed right next to the SC2000 card).

3.13.2. I.SEARCH 500 19" Rack

Front view:
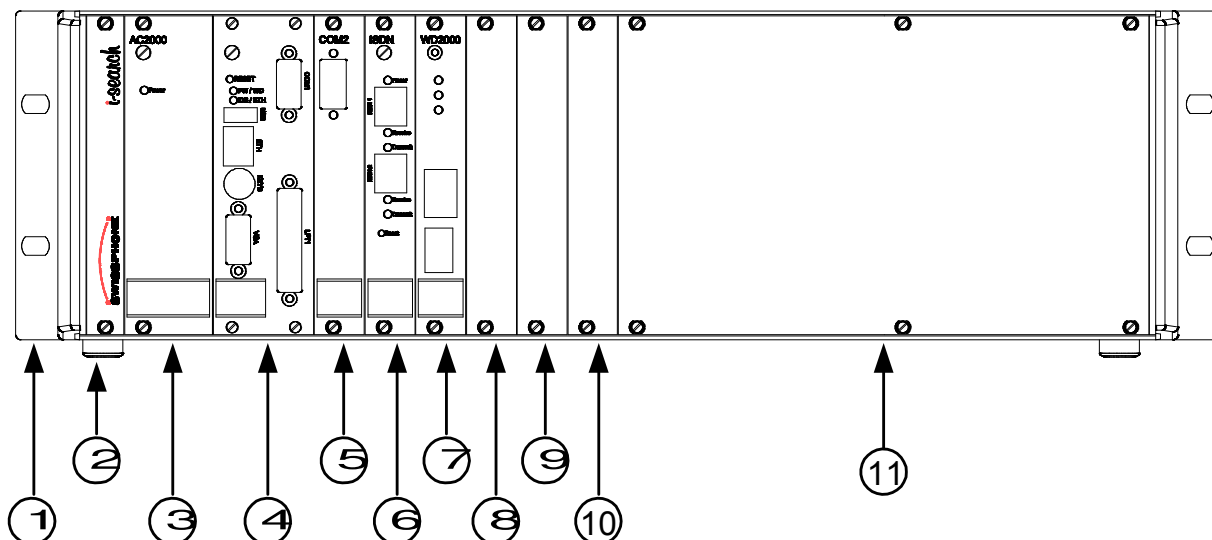
1) 19" rack
2) Dummy plate with name decal
3) AC2000 power supply (fixed location)
4) Base BSC2000 computer unit (fixed location)
5) to 10): spares 1 to 6: Spare bays for the following optional 4TE units:
- COM2 interface (preferred location) for ESPA 4.4.3, ESPA 4.4.4 input interface (4TE module).
- ISDN or analogue unit for off-site messaging connectivity and/or remote access (4TE module).
- I/O unit for connecting floating contacts (4TE module).
- WD2000 watchdog unit (monitoring I.SEARCH functionality and activating the failure alarm via 2 floating contacts) (4TE module).
- SC2000 synchronisation card to provide POCSAG formatting for a local paging network (on-site). (4TE module)
- OC2000 interface converter RS232/RS422 for attaching I.SITE transmitters (4TE module must be installed in the bay immediately to the right of the SC2000 synchronisation card).
11) Spare bay: for installing the integrated 0.1-4W DS1178 POCSAG transmitter (8TE module does not need a backplane slot. The module must be installed to the right of the SC2000 synchronisation card. If possible, it should be installed right next to the SC2000 card).

3.13.3. 19"Rack ITC2000 with I.SEARCH 500

Front view:
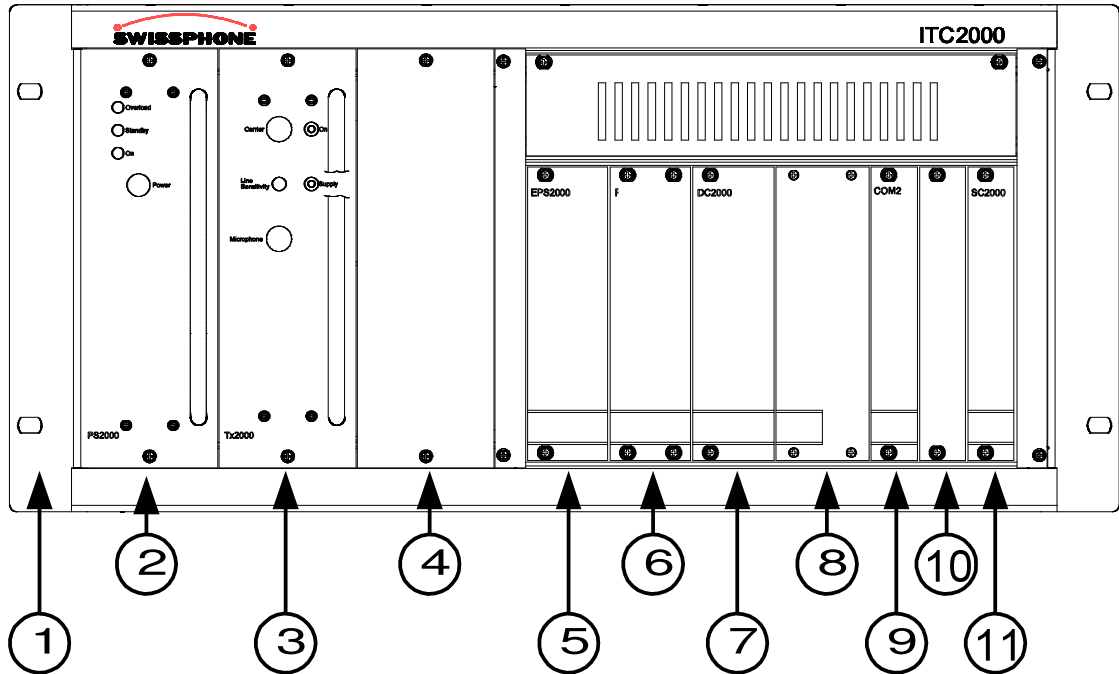
1) 19" ITC2000 rack (front view)
2) PS2000 power supply (fixed location)
3) Tx2000 transmitter (fixed location)
4) Dummy plate
5) On/off switch for EPS2000 battery (fixed location)
6) Dummy plate
7) DC-DC converter DC2000 power supply (fixed location)
8) Base BSC2000 computer unit (fixed location)
9) to 10): spares 1 to 2: Spare bays for the following optional 4TE units:
  • COM2 interface (preferred location 9)) for ESPA 4.4.3, ESPA 4.4.4 input interface (4TE module).
  • ISDN or analogue unit for off-site messaging connectivity and/or remote access (4TE module).
  • I/O unit for connecting floating contacts (4TE module).
  • WD2000 watchdog unit (monitoring I.SEARCH functionality and activating the failure alarm via 2 floating contacts) (4TE module).
  • OC2000 interface converter RS232/RS422 for attaching I.SITE transmitters (4TE module must be installed in the bay immediately to the right of the SC2000 synchronisation card).
11) SC2000 synchronisation card (fixed location) to provide POCSAG formatting for the local paging network (on-site).

4. Functional Description: General Information

The functionality of I.SEARCH breaks down into the functional blocks shown in the following block diagram.

I.SEARCH offers the following features:

- International radio and security standards (CE standards).
- Multilingual operation in English, French and German. Additional languages can be easily added if needed (order guarantee).
- Large call volume must be processable as quickly as possible in accordance with customer requirements.
- No hard disk for enhanced security.
- Optional independent power supply (UPS) for all system components (including transmitter) for at least 1 hour.
- To distribute the OFF-site messages to any destination receiver - Euromessage or TELEPAGE pager, GSM cell phone, etc. - the message data units (at least for the Swiss market) should be routed to a Swissphone platform. From there, they will then be routed to the various service centres. The access networks (ISDN, PSDN, INTERNET) between the customer's system and the Swissphone platform should be selectable based on the customer's system. An alternative path supported by the customer's system should also be defined. This alternative path will be used if the primary access network fails (e.g., primary network = INTERNET, back-up = ISDN).
  Special modules like the GSM module can be used when needed for the international market so the messages can be transported directly to the destination network.
- Connects to the intranet in accordance with the customer's IT operating policy framework.
  Uses the following TCP/IP ports:
    - Port 21 (FTP)
    - Port 23 (Telnet)
    - Port 25 (SMTP)
    - Port 80 (HTTP)
    - Port 6611 (I.SEARCH port for a master-slave configuration; see chapter 7.2.4 Master-slave transmission in this document)
- System monitoring and local alarm (triggering visual and/or audible alarm features).
- Remote access via ISDN or PSTN (using call-back methods) for system maintenance.
- Supports expansions for future, as yet undefined input and output systems.
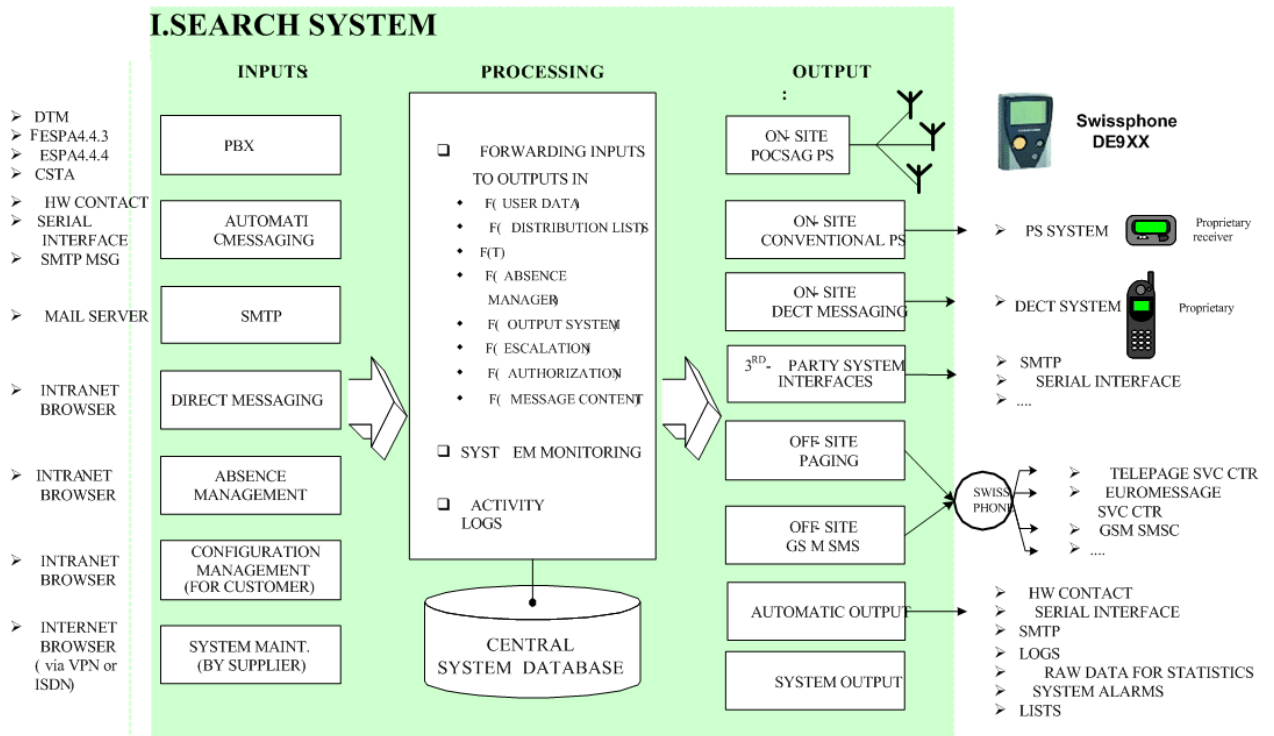
5. Input Modules

A customer system generally consists of several input modules that are combined to create an overall system. Messages may be sent to end user devices from different input modules within a single customer system.

The input modules are built so that the paging jobs forwarded to the processing module always have the same format. That way, the same processing method can be used no matter what their origin might be. The input type of each input model is assigned one of 4 priority levels.

Example: Every one of the mode number values of 0 to 9 under ESPA 4.4.3 or 4.4.4 is assigned one of 4 possible priority levels (Prio0 = lowest priority level, Prio1, Prio2 or Prio3 = most urgent priority level). The assigned priority level is passed to the processing module with every paging job. The priority levels help the processing module decide which message to output first if several messages arrive simultaneously. Plus, the on-site receivers indicate the different priority levels with different melodies.

5.1. Browser Access

5.1.1. General Information

The I.SEARCH system is a fully fledged web server. As such, its interface looks like a web homepage. The advantage of this approach is that you don't need to install extra software. Network users only have to launch their standard browsers to instantly access the I.SEARCH system.
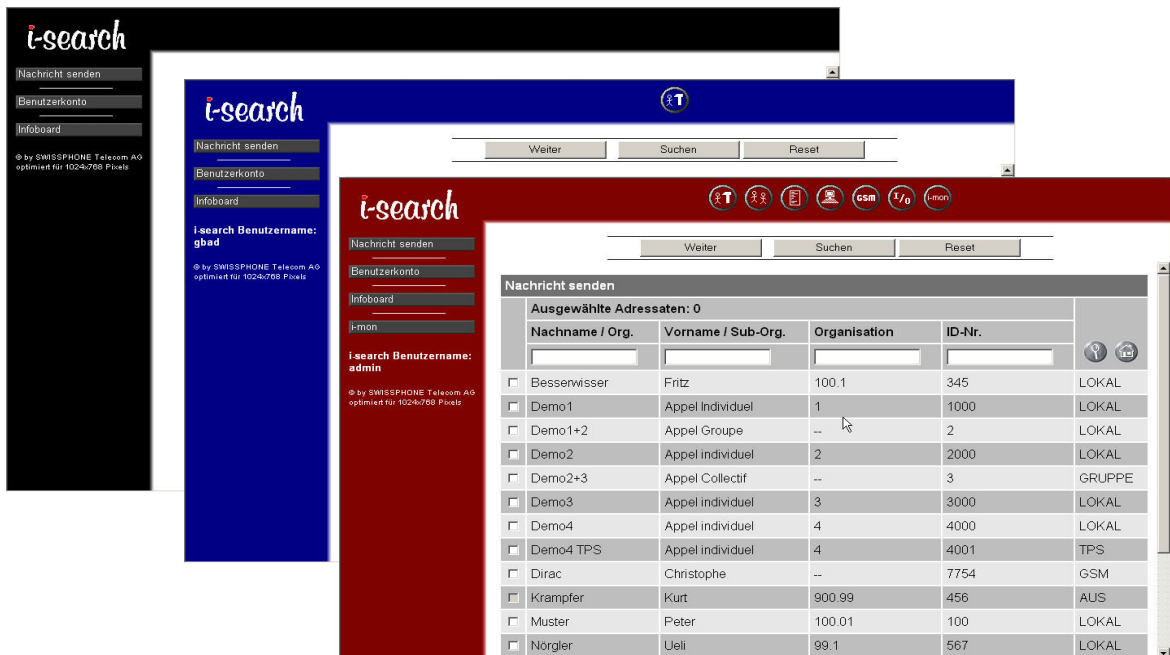
Main work area
The interface is optimized for 1024 x 768 pixel resolution.
All information is displayed in the white main work area, which is bordered to the top and left by a colored navigation bar.

Navigation area
After you access the I.SEARCH interface, you should only navigate using the I.SEARCH interface. Using the browser navigation elements may have some unwanted results, depending on which browser you use. This is especially true if you use the "BACK" button to return to a password protected area. This function has been locked to protect the system against abuse.
The navigation area can appear in various colours. Here is a brief explanation of the colours:

Black: Accessible to all users (user class 0)
Any network user can execute all of the actions displayed (and released) here.

Blue: "User level" (user class 1, 2 and 3)
The content is not displayed until the user logs in with his personal password.

Blue: "Switchboard operator" (user class 4)
The content is not displayed until the user logs in as a switchboard operator with his personal password.

Orange: "Support level" (user class 5)
The content is not displayed until the user logs in as a supporter with his personal password.

Red: "Administrator level" (user class 6)
The content is not displayed until the user logs in as an administrator with his personal password.

Buttons

The vertical and (possibly) horizontal parts of the navigation area contain buttons. In this document, we refer to the vertical area as the navigation column, and the horizontal area as the navigation bar. You can always see the buttons in the navigation column. The buttons in the navigation bar only appear after you log on.

The I.SEARCH logo (top left) is also a button. Clicking the logo from any page will take you directly to the I.SEARCH homepage. It also logs you off the I.SEARCH system.

The following buttons are always displayed in the navigation column. The buttons' functionalities are explained in separate chapters.

Send message

See the "Direct messaging" chapter

User account

Input screen for logging onto the system with your user name and password. When you log onto the system, it checks what user class you have been assigned. Then, based on your authorization level, it provides you with your authorized level of functionality.

Infoboard

The Infoboard can be used for community communications. Any network user (from any user class) can access Infoboard information from the I.SEARCH homepage. The information can be posted and maintained by various departments. The Infoboard could contain an internal telephone directory, the weekly cafeteria menu, or any other in-house messages.

Infoboard access privileges are assigned by the administrator using the "Samba" software tool.

Here are some example boards:
•   I.SEARCH briefing
•   I.SEARCH user manual
•   I.SEARCH development team
•   Company information

Various pages have an integrated help facility, indicated with a question mark icon.

5.1.2.   User Permissions

This feature is part of the I.SEARCH base module.

Active users are people authorized to log into the I.SEARCH system from an office PC within the customer premises (intranet) using a browser. They are given a user name as well as a password that they can manage (change) themselves. Their usage permissions are defined and limited in one of 8 possible authorization classes.

The most important of these 8 user classes are:

•   System configuration and set-up user. This user is generally a Swissphone employee. This user is authorized to configure all the system parameters to suit the customer's requirements. This is the highest authorization class. This user can use all the system's functions.
•   The system administrator for configuring user information, time scheduling and absences. This user is generally one of the customer's employees. This is the 2nd highest authorization class.
•   The normal user. These are people in the customer's premises who are authorized to use some of the system's features. Ideally, this user class should be broken down into several subclasses. For example, the "normal" user can only set himself as present or absent. A switchboard operator, however, can change the absence attribute for all users. The system administrator ought to be able to configure every new user account profile to suit the exact local requirements. Normal users can be assigned to any of 4 different authorization classes. The customer can also reserve the lowest authorization class (system parameter), which only entitles the user to access direct messaging. Users with this authorization level do not need a user name or a password to log in.

- The direct messaging user. These are people in the customer's premises who are only entitled to use the system's direct messaging function. If requested by the customer (= modifiable system parameter), these users do not have to log in with user names and passwords. Instead, they access the direct messaging URL from their (intranet) browser. As such, they do not have to be registered with the system. That also means that the message originator cannot be identified.

5.1.3. Direct Messaging

This feature is part of the I.SEARCH base module.

The direct messaging module includes:

- Address book with all the names of possible destinations (passive users) that the user is authorized to send messages to (see table below for more). There is an efficient search procedure (applying filters to a given address book) to speed up the process of finding a certain name.
- Standard texts in a text library are also available for use (in preparation). The standard texts are written and defined by active users whose authorization class is 4 or higher.
- Input field for entering messages. Users should see how many characters they have entered so far. The maximum message length should be limited (parameterizable). Generally, it is set as the maximum message data unit (MDU) size for all existing output systems. Messages that exceed the maximum MDU length for the various output systems will be split up into several messages (separated only at delimiters / blanks, and not within individual words).
- The system immediately displays the positive or negative (with the reason for the obstruction) acknowledgement of the message.
- The following information is logged in a log book that the administrator can read: entered message with information on the time, trigger, receiver and the system's positive or negative acknowledgement. When supplemented with variable parameters (cost centre, organizational name, personnel number, etc.), the log book can be exported to an external system automatically according to a preset schedule, or manually based on an administrator command (for internal accounting or statistical evaluations, etc.).

Transmission authorization based on user and utilization classes:

User class Active user	Utilization class Passive Individual & Group Users						
	0	1	2	3	4	5	6
0 = No system logon	☑	✖	✖	✖	✖	✖	✖
1 = Standard 1 active user	☑	☑	✖	✖	✖	✖	✖
2 = Standard 2 active user	☑	☑	☑	✖	✖	✖	✖
3 = Standard 3 active user	☑	☑	☑	☑	✖	✖	✖
4 = Switchboard operator active user	☑	☑	☑	☑	☑	✖	✖
5 = Support active user	☑	☑	☑	☑	☑	☑	✖

6 = Admin active user	☑	☑	☑	☑	☑	☑	☑

Key:

☑ = Active user can send messages to passive individual and group users.
Passive users with this utilization class are shown in the list of possible destinations.

✖ = Active user cannot send messages to passive individual and group users. Passive users with this utilization class are not shown in the list of possible destinations.

5.1.4. Administrator Configuration Management

This feature is part of the I.SEARCH base module.
Generally, the I.SEARCH system administrator is one of the customer's employees.
The system administrator logs onto to system by pointing his (intranet) browser to the I.SEARCH homepage URL and entering his user name and password. The "System configuration" and "System utilities" chapters of this document describe in detail what configuration settings the administrator can make.

5.2. Private Branch Exchange (PBX) Interfaces

5.2.1. DTMF

This function is an optional expansion to the I.SEARCH 500 base module (not available with I.SEARCH 200).
I.SEARCH only supports DTMF recognition with the optional PSTN card (ISDN S0 or analogue telephony unit). The card is connected to the PSTN with an RJ11 connector.
This interface allows a phone line connected to I.SEARCH to place calls from any telephone set and to send a message (numerals or the number of a predefined standard text) to the end user device of a person or a group using a telephone keypad (DTMF dialling). This method is used mainly when I.SEARCH is not connected to a PBX, or when the attached PBX has not implemented the paging function and thus does not have an ESPA 4.4.3, ESPA 4.4.4 or CSTA interface.
The following format is used to enter messages on a phone keypad:

A identification no. * B telephone no. [* Standard text no.] #
Where:

A identification no.
The destination identification number of the paged party (passive user number)

"*"
Mandatory (DTMF) delimiter

B telephone no.
The phone number for the paging party's phone that the paged party is being asked to dial.

[* Standard text no.]
Standard text parameter identification number after a delimiter [*]. These characters are optional. Optional characters are indicated with square brackets [and]. The standard text parameter identification number refers to a standard text that has been set in I.SEARCH and that replaces the identification no. in the transmitted message.

"#"
Pound key (DTMF) is the stop character; it signalizes the end of the DTMF MDU.
I.SEARCH acknowledges the message receipt with a 600ms long 1200Hz tone. Then, I.SEARCH tears down the call. The paging party can hang up the receiver again (i.e., go on-hook). The paged party now receives the message "101 (Smith, John) is paging you" on his end user device (pager, GSM, etc.).

If the message text was entered incorrectly, I.SEARCH acknowledges the message with two short 600Hz tones, each lasting 300ms.

5.2.2. ESPA 4.4.3

This function is an optional expansion to the I.SEARCH 500 base module (not available with I.SEARCH 200).

The ESPA 4.4.3 interface was specified in Publication 4.4.3 (February 1984) of the European Selective Paging Association (ESPA). It contains the hardware specification (number of connectors, signal levels, definition of frequencies used, etc.), the necessary data flows (for basic operations between PBXs and paging systems) as well as the recommended number of ESPA 4.4.3 interfaces relative to the number of PBX subscribers.

In terms of hardware, the ESPA 4.4.3 interface uses a 2-, 4- or 6-wire E&M line. I.SEARCH supports all these options. The hardware definition must be parameterized when the system is started up.

All the mode digit values (0 to 9) in the Mode_Digit_1 or Mode_Digit_2 fields can be accepted and forwarded to the main I.SEARCH module. I.SEARCH can interpret all mode digit values in a given system and assign each one of them a special meaning for that particular PBX as well as one of 4 possible priority levels. Depending on the application and the customer's preferences, an optional additional text that varies from mode digit value to mode digit value can replace the message field content or be added to it (before or after the effective ESPA 4.4.3 message content).

How many ESPA 4.4.3 interfaces you need to connect depends on the requirements of the individual customer system. It is also possible to connect several remote PBXs to a single I.SEARCH system using different ESPA 4.4.3. interfaces, and to operate these PBXs from the single system (request if needed).

To use ESPA 4.4.3 interfaces, you need a device called an RP201, which is only available with an I.SEARCH 500 (and not I.SEARCH 200). The RP201 allows you to connect up to 6 different ESPA 4.4.3 circuits to a PBX. The RP201 is responsible for all the handshaking at each ESPA 4.4.3 interface.
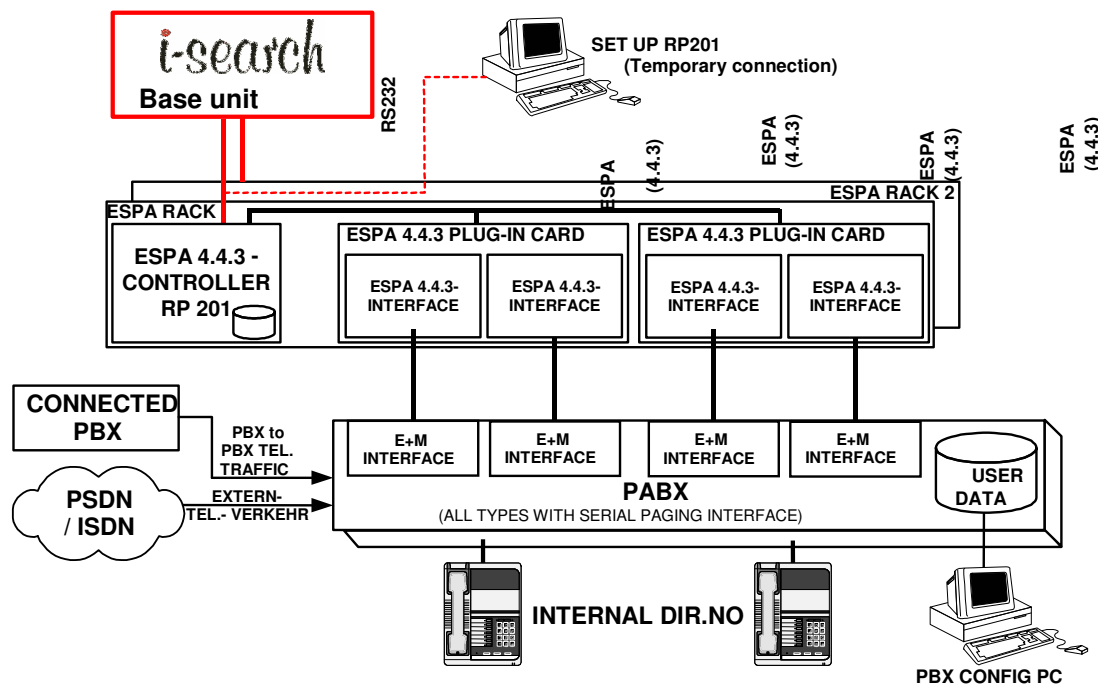

Figure 2:   I.SEARCH ESPA 4.4.3 interface

5.2.3. ESPA 4.4.4

This feature is an optional expansion module for the I.SEARCH base module.
The ESPA 4.4.4 interface was specified in Publication 4.4.4 of the European Selective Paging
Manufacturers Association (ESPA).
The publication specifies the hardware and data flows (basic operations of MDUs exchanged between the
PBX and the paging system).
The ESPA 4.4.4 interface is based on a serial interface (bit synchronous; character asynchronous
according to ISO 11777; 1 start bit; 7 data bits; even parity; 2 stop bits; 1200bps).
The I.SEARCH computer unit has a COM interface, but it cannot be used as the ESPA 4.4.4 interface.
That is why an additional COM2 interface unit has to be included in I.SEARCH for this function.
If several devices with COM interfaces are attached to I.SEARCH, we recommend using COM servers as
shown below.

```
                                                                  COM 2
  ┌──────────┐   ┌──────────┐   ┌──────────┐   ┌──────────┐  ┌──────────┐
  │ SERVER N │   │ SERVER 3 │   │ SERVER 2 │   │ SERVER 1 │  │          │
  └──────────┘   └──────────┘   └──────────┘   └──────────┘  │ I.SEARCH │
        │ COM          │ COM          │ COM          │ COM   │          │
  ┌──────────┐   ┌──────────┐   ┌──────────┐   ┌ ─ ─ ─ ─ ─┐  └──────────┘
  │COM SERVER│   │COM SERVER│   │COM SERVER│    COM SERVER
  └──────────┘   └──────────┘   └──────────┘   └ ─ ─ ─ ─ ─┘
                                                         IT LAN
  ━━━━━●━━━━━━━━━━━━●━━━━━━━━━━━━●━━━━━━━━━━━━●━━━━━━━━━━━━●━━━
```
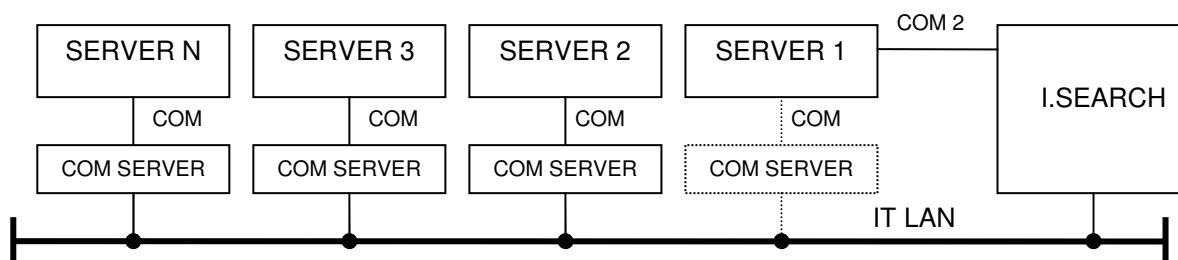
As was the case with the ESPA 4.4.3 interfaces, I.SEARCH should be able to interpret and route MDUs
sent from any PBX make and model.

5.2.4. CSTA

This feature is an optional expansion module for the I.SEARCH base module.
The CSTA interface developed in the I.SEARCH project will be used. If necessary, CSTA interfaces for
other PBX vendors can be subsequently developed.

5.3. Automatic Messaging

5.3.1. Potential-free Contacts

This feature is an optional expansion module for the I.SEARCH base module.
The system address for every potential-free contact is assigned to a passive escalation user address, a
text (message sent out when an event occurs) and a state field (definition of notifiable state changes -
rising edge, trailing edge, etc.).
With these elements, whenever a state change occurs, a page MDU (using the native I.SEARCH MDU
format) is generated and routed to the processing module for treatment.
An acknowledgement parameter can be defined for every alarm criterion in order to interrupt the
escalation process (if necessary). See the "Escalation management" chapter in this document for more
information.
The input module connected to the potential-free contacts can be connected centrally or remotely (locally)
to the main I.SEARCH module. Depending on the actual application, the connection should be made
using an IT LAN or a universal cabling system.

5.3.2. Serial Interface

This feature is an optional expansion module for the I.SEARCH base module.
The system can interpret serial protocols used by building control systems, alarm systems, etc. As with floating contacts, it can view and process the alarm messages as passive escalation users.
The I.SEARCH computer unit has a COM interface, but it cannot be used as the serial interface. That is why an additional COM2 interface unit has to be included in I.SEARCH for this function.
If several devices with COM interfaces are attached to I.SEARCH, we recommend using COM servers as shown below.
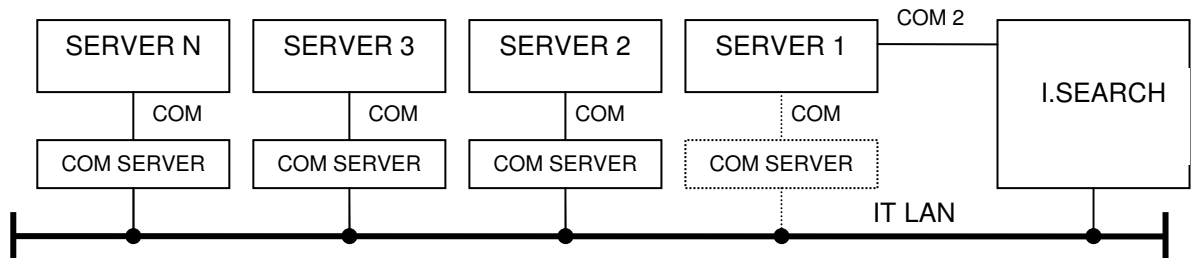
5.3.2.1. Simplified Serial Interface ("NADRO") Protocol

This feature is part of the I.SEARCH base module. To use it, you need a spare COM interface or COM servers.
COM port settings:
- Port: COM1 (ttyS0)
- Transfer rate: 9600
- Data bits: 8
- Parity: None
- Stop bits: 1
- Flow control: None

The following protocol is supported:
→ < aaaa / [pppp /] [AL no.] [/function no.] >
    where aaaa = own identification no.
        /   = Nadro delimiter
      [pppp/] = optional 4-digit password and delimiter
      [AL no.] = option number of the element being acknowledged.
      [Function no.] = Acknowledged, unacknowledged = immediate escalation, etc.
← <aaaa/OK>   = Acknowledgement accepted or
    <aaaa/NOK> = Acknowledgement failed
Where the characters have the following significance:
Characters explained in the following chapters:
→   MDU from outside to I.SEARCH
←   MDU from I.SEARCH to outside.
[….]   Optional content

5.3.2.2. Other Serial Protocols

Other protocols can be developed following a consultation in order to meet customer requirements.

5.3.3. SMTP Interface

This feature is an optional expansion module for the I.SEARCH base module.
The system can interpret serial protocols generated by building control systems, alarm systems, etc. As with floating contacts, it can view and process these protocols as passive escalation users.
1.   Communication example
Note: S = Server, C = Client
Client must set up a TCP/IP link to I.SEARCH on port 25 (SMTP). After connecting, the server responds as follows:

```
S: 220 I.SEARCH PageMail SMTP Service version 0.0.5 is ready
C: hello I.SEARCH
S: 250 Hello... nice to meet you
C: mail from: USER1
S: 250 OK
C: rcpt to: USER2
S: 250 OK
C: data
S: 354 Enter Mail, end by a line with only '.'
C: Test message from USER1 to USER2
C: .
S: 250 Message received OK
C: quit
S: 221 Goodbye! Have a nice day!
```

The server's responses always end with <CR><LF> (Carriage return, line feed). In the other direction, the server will only interpret the client's commends if they end with at least one <LF>.

5.3.3.1. Sample Communication: SMTP over RS232

Note: S = Server, C = Client
Client must be connected to the server's serial port with a null-modem cable.
COM port settings:
- Port: COM1 (ttyS0)
- Transfer rate: 9600
- Data bits: 8
- Parity: None
- Stop bits: 1
- Flow control: None

The difference between this arrangement and SMTP over Ethernet is that the client has to make the first step; the server does not respond automatically. So a message sent over RS232 might look something like this:

```
C: hello I.SEARCH
S: 250 Hello... nice to meet you
C: mail from: USER1
S: 250 OK
C: rcpt to: USER2
S: 250 OK
C: data
S: 354 Enter Mail, end by a line with only '.'
C: Test message from USER1 to USER2
C: .
S: 250 Message received OK
C: quit
S: 221 Goodbye! Have a nice day!
```

The server's responses always end with <CR><LF> (Carriage return, line feed). In the other direction, the server will only interpret the client's commends if they end with at least one <LF> or one <CR>.

5.3.4. Server Monitoring

This feature is part of the I.SEARCH base module.
I.SEARCH has a simple server monitoring feature much like the DOS ping command. After a preset number of pings have failed, a predefined message text is sent to a passive individual or group user.

5.3.5. MIP11 Plus

This function is a optional extention of the I.SEARCH base module and available from Version 2.1.7.14 or higher.
MIP11 Plus implements the MIP11 Plus protocol. Serial and LAN interface via TCP Port 6618 is supported.

The MIP11 protocol defines the character "[" as message terminator for alphanumeric messages and therefore can not be used within a message, otherwise the message is invalid.
The "MIP11 Plus Extended" protocol uses the character "»" as message terminator. the character "»" is not part of POCSAG character set.
To encrypt and transmit a MIP11 Plus message, a user with IDEA configuration with the according RIC/sub address must be defined in I.SEARCH.

5.4. SNMP-Traps

This function is a optional extension of the I.SEARCH base module and available from Version 2.1.9 or higher.
With this module I.SEARCH is capable or trapping "SNMP-Traps".
Each trapped " SNMP-Trap" leaves a record in logbook of the module and is being forwarded to the "Input Handler" module.
The module has no configuration dialog, but can be controlled "Input Handler" module. Undesirable "Traps" can be filtered by the "Input Handler" module.

5.5. E-Mail Messaging

This feature is part of the I.SEARCH base module.
Every passive user can have a mailbox address defined through a page mail name in the I.SEARCH mail server.
The system can receive, process and interpret SMTP messages addressed to the page mail name. As with floating contacts, it can view and process these messages as escalation passive users.
The e-mails may be part of regular office communications, or they may be alarm notifications generated by building control systems, alarms, etc.
If necessary, a copy of the received e-mails can be forwarded to another preset mailbox address on an outside mail server.

6. Processing Modules

6.1. User Groups

This function is part of the I.SEARCH base module.
There are two different types of users.

6.1.1. Active Users

As described in the "User permissions" chapter in this document, active users are people authorized to log into the I.SEARCH system from an office PC within the customer premises (intranet) using a browser. They are given a user name and password that they can manage (change) directly. The functions they are entitled to use depend on which of the 8 possible authorization classes they are assigned to.

6.1.2. Passive User

Passive users are the addresses to which messages can be initiated and sent by an input function. Passive users can (but do not have to) also be active users. Passive users are identified by an input number (identification number) (which could be that person's internal telephone number).
Passive users are also assigned to one of 8 possible usage levels. The usage level interacts with the authorization class of the active users and prevents messages from being initiated by unauthorized users.

Interdependence between authorization class and usage level:
Authorization class < usage level $\Rightarrow$ Active user may not send a message.
Authorization class $\geq$ usage level $\Rightarrow$ Active user may send messages.
Passive users, which can be assigned to people or objects (e.g., alarm object), break down into 2 subtypes:

- Passive individual users: An passive individual user has 1 to 4 output systems to which messages can be delivered depending on the user's time, absence and work schedule.
- Passive group users: Every passive group user is assigned to a distribution list. This distribution list shows the address of the passive individual user to which the message must be distributed. The message can be forwarded to several passive individual users simultaneously and/or successively after a predefined escalation period (if the escalation module has been activated). Group telephone numbers (e.g., 118, which in Switzerland is used by plant fire departments) are declared as passive escalation users.
  When the message is processed, the input system's priority level is transferred to the passive individual users.
- Every passive user can have different output destinations. Depending on the situation, time and current parameter settings, the messages assigned to the passive user will be forwarded to one of these output destinations. The possible output destinations of an passive individual user are currently:

  - Message rejected (no active output)
  - RIC and sub-RIC of an on-site pager
  - Directory number of an off-site pager (Telepage or Euromessage)
  - Directory number of an off-site GSM device for transmitting SMS messages
  - E-mail address (in preparation)
  - Identification number of another passive user (fill-in representative, only in connection with time and absence management).

6.2. Processing Input Messages

No matter which input system originates a given message, it is always processed and forwarded to the output systems according to the same method:

6.2.1. Messages to Passive Individual Users

This feature is part of the I.SEARCH base module.
All I.SEARCH messages are sent as text messages. That means that all the RIC sub-addresses of on-site pagers must be programmed with the **alphanumeric calling class**.
Sent messages to passive users with pagers can be of the following calling types:

Individual call:
A message is sent to only one receiver in the entire pager population. This on-site pager is the only one who may receive, save and signal the message.
The RIC address of an individual call is assigned to individual users in I.SEARCH.

Broadcast call:
Several recipients **with the same address code** (RIC) are **simultaneously** called with one group directory number. This type of call is preferable whenever messages need to be received quickly by a large number of users (e.g., fire department alarm).
In this case, the broadcast call group must be defined as an individual user in I.SEARCH.

6.2.2. Messages to Passive Group Users

This feature is part of the I.SEARCH base module.
All I.SEARCH messages are sent as text messages. That means that all the RIC sub-addresses of on-site pagers must be programmed with the **alphanumeric calling class**.
The messages to passive group users are "duplicated" und individually sent to each passive individual user listed in the group list. In terms of paging terminology, these messages belong to the "hunt group" call type.

Hunt group:
Several (up to 32) receivers **with different individual call address codes** (RIC) are activated in I.SEARCH when a message is sent to a user group. The input message is broadcast sequentially to the number of individual users defined in the user group configuration (User administration, User group, **User selection**). The RIC's used for the individual call are used for the individual users.

6.3. Time and Absence Management

These functions are optional expansions to the I.SEARCH 500 base module (not available with I.SEARCH 200).
The time and location of the paged parties determine the requirements concerning the end user devices to which the messages have to be sent. The instance initiating the message should not decide which pager to send the message to; rather, I.SEARCH should be able to send the messages to the correct pager.
Time and absence management are two independent software modules that can be activated and used for each customer system.
Whereas time management follows a fixed, defined schedule (rules in different lists are laid down by an administrator during system configuration), absence management allows individual users to temporarily and quickly modify the distribution rules of their accounts.
Inputs should be distributed and forwarded to the corresponding outputs according to predefined time schedules and/or the absence management function: The distribution rules can be defined globally for the entire system (same for all input addresses = standard lists) or individually per input address (= individual lists).
The message distribution rule in time management is defined by an administrator.
The message distribution rule that applies while passive individual users are absent is maintained individually (per passive individual user).

Every active user with an authorization class > 0 who is also an passive individual user is authorized to change the distribution criteria settings of his account with the absence wizard (in the browser). Active users with an authorization class > 4 are authorized to change the distribution criteria of other passive individual users with the absence wizard.

Absence messages can be entered (activated or deactivated) via the following interfaces:

- (In preparation) Absence management URL from PC (intranet browser)
- (In preparation) Pager deposit holder: Determines whether pager is deposited or not.
- (In preparation) Telephone service feature: By selecting a PBX process, etc.
- (In preparation) Time recording system: Interpreting data from a time recording system.
- (In preparation) Switchboard: Interpreting the state of a switchboard's push buttons.
- (In preparation) Outlook absence feature: Importing the data from the absence wizard of common calendar programs like Microsoft Outlook, PDA's etc.

The second processing step only processes telegrams sent to passive individual users. As shown below, processing uses various processing lists.
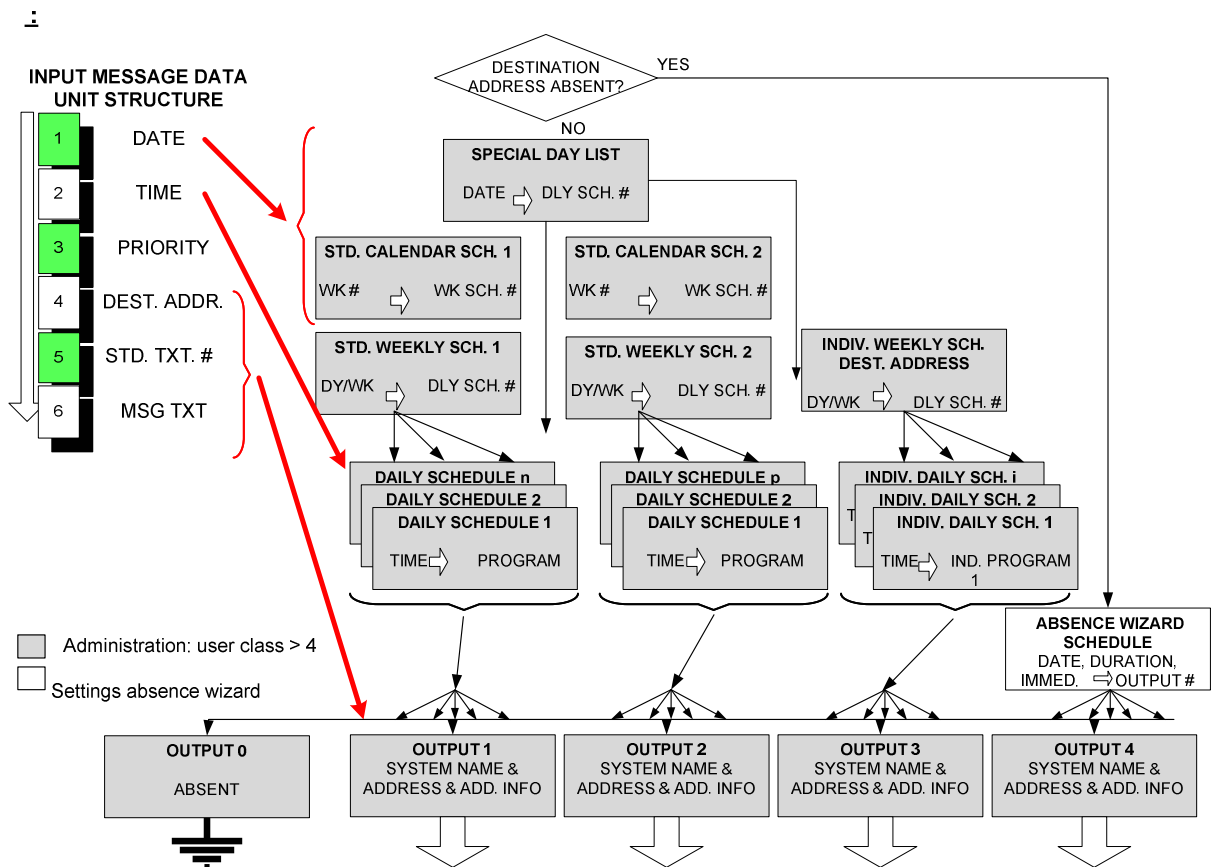
Input telegram structure:

The telegrams being processed must always have the same format regardless of their origin (e.g., ESPA 4.4.3, direct messaging, or alarm contact).

Telegrams consist of:

Date, time, priority of message (determined by input system), number of the passive user, fix text number and original message text.
The original message text field is optional, all others are mandatory.

Assigning time scheduling lists to passive users:

Every passive user is assigned to one of the following possible time schedules:
• Calendar schedule 1
• Calendar schedule 2
• Standard weekly schedule 1
• Standard weekly schedule 2
• Individual weekly schedule

Calendar schedule:

If necessary, 1 of two different calendar schedules (schedule 1 or schedule 2) can be assigned to a passive user.
The calendar schedules define which of the 2 possible standard weekly schedules should be used for each calendar week.

Calendar schedule:	**Week no.:**						
**Schedule 1**	01	02	03	...	...	50	51
Standard weekly schedule 1	●	○	●			○	●
Standard weekly schedule 2	○	●	○			●	○
**Schedule 2**	01	02	03	...	...	50	51
Standard weekly schedule 1	○	●	○			●	○
Standard weekly schedule 2	●	○	●			○	●

Weekly schedule:

The standard weekly schedules 1 and 2 can be assigned directly to passive users. In this case, messages will be distributed according to the same pattern throughout the year. They can also be used in combination with calendar schedule 1 or 2. In this case, calendar schedule 1 or 2 is assigned to passive users. It is principally possible to mix the two types (individual users are assigned to one standard weekly schedule, while other users are assigned to a calendar schedule).
Each of the 7 days of the week is assigned a day type. As a rule, Monday through Friday are treated the same. They can all be assigned to day type 1. You can define 2 different standard weekly schedules that can be assigned to a larger number of passive users. Whenever a passive individual user needs to be treated differently than in the standard weekly schedules, you can define an individual weekly schedule that applies only to that user.

Weekly schedule:	Daily schedule:						
Standard 1	Mo	Tu	We	Th	Fr	Sa	Su
Daily schedule #	*1*	*1*	*1*	*1*	*1*	*2*	*3*

Special daily schedule:

Days such as holidays that do not conform to the above weekly schedule can be handled separately. Each of the days mentioned in the list is assigned a day type. The system supports one special daily schedule.

Special daily schedule	Daily schedule #
01/01/2003	*3*
01/02/2003	*3*
04/18/2003	*3*
04/21/2003	*2*
: :	*: :*

Daily schedule:

Each daily schedule mentioned in the weekly schedule or in the special daily schedule must have a definition. In other words, the number of daily schedules equals the sum of the daily schedule numbers mentioned in the standard weekly schedules 1 and 2, the special daily schedule, and the individual weekly schedules.

The daily schedule uses the time of day to determine which of the 1 to 4 output systems the input messages should be sent to (no matter which input system they are from). A program can have a message output to one or more output systems simultaneously. You can also set up a policy so the messages will be rejected. In this case, the passive user address is reported as absent to the PBX. In direct messaging, the user is informed that the message was rejected (no message buffering until it can be sent out). The default time period is defined in a 24-hour format from 00:00 to 24:00. Smaller time units (minimum time unit = 1/4 hour) can be defined if required. However, the system ensures that the definition covers the entire day (00:00 to 24:00).

Daily schedule :		***Standard 1***				
Time		OFF	*1*	*2*	*3*	*4*
From:	**To:**					
00:00	08:00	*X*				
08:00	12:00		*X*			
12:00	13:30		*X*	*X*		
13:30	17:30		*X*			
17:30	24:00	*X*				

Absence wizard schedule:

Both the user and active users with an authorization class > 3 can override the time schedules described above with the absence wizard of a passive user address.
With the absence wizard, you can

• Program or pre-program routings to another passive individual user. Once routed, the messages follow the distribution rules of the new passive individual user. Chain routes (routes of routes) must be prevented (automatic check when the route is programmed or pre-programmed).
• Temporarily distribute the messages in a way that differs from programs 1 to 4 of the output schedule
• Manage distribution variations due to holiday, all-day, temporary or regular absences
• Leave messages for direct messaging users

6.4. Escalation Management (on request)

6.4.1. Escalation

(In preparation) This function is an optional expansion to the I.SEARCH 500 base module (not available with I.SEARCH 200).
If the user is an **passive escalation user**, the system accesses the escalation list first. Every passive escalation user is assigned one of 2 possible default escalation lists (default 1 to default 2) or an escalation list individually designed for this user.

Escalation list:
Typically, an escalation list is a matrix that is structured as follows:

ESCALATION LIST X	Times:			
Duration [last event time + number of seconds]	T0 = [Range: 0...60s] *0*	T1 = [Range: 1...60s] *30*	T2 = [Range: 1...60s]	T3 = [Range: 1...60s]
Passive individual user 1	*3810*	*3816*		
Passive individual user 2	*3815*			
Passive individual user 3				
:				
:				
Passive individual user 9				
Passive individual user 10				

Time T0:

The time from when the event starts until it is forwarded to the passive individual users in the 2nd column (in this example, the passive individual users 3810 and 3815). As a rule and in this example, the wait period = 0 seconds, i.e., the message is processed immediately. However, it might not be forwarded until a few seconds later, provided that the message's cancellation criterion (subsequent state change) has not occurred.

Time T1:

The time from T0 until the event is forwarded to the passive individual users in the 3rd column, provided that the message's cancellation criterion (subsequent state change) has not occurred. In the example, this wait time is set to 30 seconds.

Time T2:

The time from T1 until the event is forwarded to the passive individual users in the 4th column, provided that the message's cancellation criterion (subsequent state change) has not occurred. There is no further escalation after T1 in the example.

Time T3:

The time from T2 until the event is forwarded to the passive individual users in the 5th column, provided that the message's cancellation criterion (subsequent state change) has not occurred. There is no further escalation after T1 in the example.

Passive individual users 1, 2, 3 ... 32:

Each column states which passive users the message should be simultaneously forwarded to. Messages sent to passive individual users are processed according to the current time and absence settings of their passive users.
In the example, the original message is immediately forwarded to the passive individual users 3810 and 3815 at the start of the event. If the state of the passive escalation users does not change within the next 30 seconds, the original message will additionally be sent to the passive individual user 3816.
Caution: Distribution lists with a large number of passive individual users may temporarily overload the output system. This leads to major delays and lost messages. If you want a message to be sent to more than 23 passive users, you should do this by some other means if at all possible.
Recommended solutions:

• Using a group RIC or a group directory number if the output is to be sent to output systems with pagers. In this case, the identification number of the applicable object corresponds to a passive individual user instead of a passive escalation user.

• Using the DynGo® principle, if the message is to be forwarded to an output systems with POCSAG pagers. In this case, the identification number of the applicable object corresponds to a passive individual user instead of a passive escalation user. The DynGo® alarm part "(100)" is added to the message standard text.

• If messages are desired to be forwarded to several SMS receivers, the use of a SMS Large Account is recommended.

An escalation list consists of at least one passive individual user at the time of T0.
If (at T_x) the message(s) cannot be sent to an escalation level for technical or absence reasons and another escalation level T_{x+1} is specified in the escalation list, the system escalates to the next level immediately without waiting for the defined timer value to pass.
In its simplest initial manifestation, an escalation list consists of only one column with the time T0 (T0 value = 0). This escalation list is termed the group list.
In the case of a **passive individual user**, the received MDU is immediately forwarded to the second processing stage.

6.4.2. Acknowledgement process

Characters explained in the following chapters:
→   MDU from outside to I.SEARCH
←   MDU from I.SEARCH to outside.
[....]   Optional content

Purpose
The purpose of the acknowledgement process is to stop the escalation.
The following acknowledgement processes (cumulative and optional) can be used:

Independent:
Return the element to its original state (only possible for I/O messages)

Floating (I/O) contact:
(From I/O module) Change the state of another I/O contact assigned to this alarm element.

DTMF: 2-way input:
→ Dial main (PBX) phone number
← DTMF 5 + frequency "OK" = Suffix dialling ready
→ DTMF dialling: aaaa ∗ [pppp ∗] [AL no] [*function no] #
       where aaaa = Own identification no.
           ∗   = DTMF separator
      [pppp∗] = Optional 4-digit password and separator
      [AL no.] = Optional number of the element being acknowledged.
      [Function no.] = Acknowledged, unacknowledged = immediate escalation, etc.
← DTMF 1 + frequency "OK" = Acknowledgement accepted or
   DTMF 2 + frequency "NOK" = Acknowledgement failed

SMTP interface:
→ Destination aaaa@ I.SEARCH
   Originator   bbbb@sample.com
    Subject   < aaaa / [pppp /] [AL no] [/function no] >
and/or
    Text   < aaaa / [pppp /] [AL no] [/function no]>
    where aaaa = own identification no.
          /   = Nadro separator
      [pppp/] = Optional 4-digit password and separator
      [AL no.] = Optional number of the element being acknowledged.
      [Function no.] = Acknowledged, unacknowledged = immediate escalation, etc.
← Destination bbbb@I.SEARCH
   Originator   aaaa@sample.com
   Subject   <aaaa/OK>   = Acknowledgement accepted or
   Text   <aaaa/OK>   = Acknowledgement accepted or
   Subject   <aaaa/NOK>   = Acknowledgement failed or
   Text   <aaaa/NOK>   = Acknowledgement failed

Simplified serial interface ("NADRO") protocol:
→ < aaaa / [pppp /] [AL no.] [/function no.] >
       where aaaa = Own identification no.
           /   = Nadro separator
      [pppp/] = Optional 4-digit password and separator
      [AL no.] = Optional number of the element being acknowledged.
      [Function no.] = Acknowledged, unacknowledged = immediate escalation, etc.
← <aaaa/OK>   = Acknowledgement accepted or
<aaaa/NOK> = Acknowledgement failed

Browser acknowledgement:
Users can manage a log book-like list, e.g.:
Unacknowledged elements (last in uppermost line):
☐ AL no x   Name   State   Event$_{date+time}$
■ AL no y   Name   State   Event$_{date+time}$
☐ AL no z   Name   State   Event$_{date+time}$

Acknowledged elements (last in uppermost line):
☑ AL no a   Name   State   Event$_{date+time}$ Q$_{date+time+ident.\#}$
☑ AL no b   Name   State   Event$_{date+time}$ Q$_{date+time+ident.\#}$
☑ AL no b   Name   State   Event$_{date+time}$ Q$_{date+time+ident.\#}$

where ☐ = Unacknowledged element. Acknowledgement
             permitted for user.

■ = Unacknowledged element. Acknowledgement
      not permitted for user.

☑ = Acknowledged element (limited to a specific
      number, e.g., logs)

6.5.   System Utilities

6.5.1.   System Configuration

This feature is part of the I.SEARCH base module.
Generally, the I.SEARCH system administrator is one of the customer's employees.
The system administrator logs onto to system by pointing his (intranet) browser to the I.SEARCH
homepage URL and entering his user name and password. This gives him access to the following
function URL:

System administration:
• General system configuration (including specifying the user language or the browser start pages
  when users log on)
• Configuration of the I/O contact texts and destinations
• Definition of list output formats (field name and position)
• Configuration of optional additional, search and CSV export file fields
• Backup and restore operations (see chapter Backup and Restore Operations)
• Log book access incl. export as ASCII files (see chapter Log File Export Operations)
• Access to system utilities

6.5.2.   User Administration

This feature is part of the I.SEARCH base module.
Generally, the I.SEARCH system administrator is one of the customer's employees.
The system administrator logs onto to system by pointing his (intranet) browser to the I.SEARCH
homepage URL and entering his user name and password. This gives him access to the following
function URL:

User administration:
• Add new user
• Change user data
• Delete user accounts
• Reset passwords

Passive user administration:
• Add new passive user
• Start adding new passive users with CSV file (see next chapter)
• Change passive users
• Delete passive user accounts

- Administer (add, change, delete) text libraries
- Administer (add, change, delete) daily schedules, time schedules
- Administer (add, change, delete) distribution lists
- Administer (add, change, delete) passive user output addresses

6.5.3. User Administration with CSV Files

This feature is part of the I.SEARCH base module.
The administrator can use the CSV file import function to set up a large number of users. It allows him to add all the user accounts in a file to the I.SEARCH system with only one read operation.
A CSV file is a file with the name **xxxxx.CSV**.
It consists of a header defined by Swissphone followed by an unspecified number of rows. Each row contains the account data of an I.SEARCH user account.
The different parameter values of a user account are separated in the row with prescribed delimiters (semicolons [= ";"]). The order and meaning of the individual parameters in the rows are specified by Swissphone AG.
This process can be used to sort and complete the data as required to use I.SEARCH. This data may also come from another system, such as a PBX.
Possible operations when importing data in a CSV file.

I.SEARCH Database content before import	CSV file Row Database content	I.SEARCH Database content after import
Account does not exist	New account data	Account added
Account already exists	Existing account data	Account data overwritten (except password)

If required (as per input in "IMPORT CSV FILE" input screen):

Account already exists	Account not included	Account data will be deleted

CSV files can best be edited and created with the common Microsoft EXCEL program. Swissphone AG provides its customers with an EXCEL template called "CSV template I.SEARCH Vx.x" to help administrators generate the user data in an EXCEL file.
The operations that have changed the I.SEARCH database during the CSV file import are logged in a journal and displayed in an acknowledgement window.
The administrator can export all the user data set up in the system. The export is done in the form of a CSV file that in turn can be input into an EXCEL file, for example.
The following options are available for both user data and group data:

- *Header + column name + data:* The exported CSV file resembles the EXCEL import file template in terms of structure.
- *Column name + data:* The exported CSV file does not include a header section. The first three rows in the EXCEL file template are omitted. The only output is the column header and the actual user data.
- *Data only:* The exported CSV file includes neither a header section nor a column name. The first four rows of the EXCEL file template are omitted. The only output is the user data.
-

Two different CSV files (user data and group data) are created. The system tells the administrator that the two files have been successfully created.
The files can be stored anywhere on a server or PC.

6.5.4. Using Additional Fields

This feature is part of the I.SEARCH base module.
User accounts have defined parameters that specify a user (database set). In addition to the fields predefined by the I.SEARCH system, there are ten more fields that can be freely defined. These fields can serve two different purposes:

- They can be displayed and used in the user selection lists for "SEND MESSAGE" (direct messaging). This should help the active user to locate certain users in a large list faster (e.g., using internal organizational labels for the passive user).
- They can be displayed and used in the user selection lists for "ADMINISTER USER" and "ADMINISTER GROUP". This should help the administrator to locate certain users in a large list faster (e.g., with office numbers).
- These fields can be appended to any LOG entry in the CSV export files. With this information, these log files can, for example, be used for internal accounting for initiated calls, or for statistical analyses. (See chapter Log File Export Operations)

6.5.5. Operational Analysis and Error Management

This feature is part of the I.SEARCH base module.
The I.SEARCH system administrator has various tools for on-site error analysis:
- Logs of completed transactions
  - Per input system
  - Per output system
  - Per data manipulation
- Start diagnosis processes
- Visual and audible system alarm output with acknowledgement option

6.5.6. Backup and Restore Operations

This feature is part of the I.SEARCH base module.
The backup function enables you to save all software programs, system configurations, system settings and user configuration data in a file. So, in case of a system failure or data loss, this data can be restored to the system, making it fit for operation based on the restored data and programs.
The backup function can be initiated by the administrator manually at any time.
In addition, the backup function can also be initiated automatically at a predefined time (once a day, weekly, monthly).

In addition to the local I.SEARCH server, the backup can also be saved to an external server or PC, which adds to the security of the system. In case of a more serious system failure (e.g., in case of fire or flooding), a new system can quickly be put into operation with the most recent state of the destroyed system provided that the backup file was saved on a server not affected by the damage.
The following information must be predefined for exporting the backup file to a third-party server in I.SEARCH:
- Name of the server to which the backup file must be loaded
- Name of the directory in which the backup file should be saved
- Windows account information allowing the I.SEARCH system to log onto the server or PC to save the data, including work group information: account, login name and login password.

The restore function can be initiated by the administrator manually at any time.

6.5.7. Log File Export Operations

This feature is part of the I.SEARCH base module.
The requested log files (one file per input system, per output system and per data manipulation) can be exported regularly to an external server or PC in a similar fashion as the backup. These exports are initiated automatically at the same time as the backup (identical time information). The information required for the export has the same significance as the backup definitions described above.

Exporting the log files may become necessary for various reasons:

- **As a backup**: To prove when a message was sent out at a later time.
- **As a basis for internal accounting**: The log files can serve as raw data for the internal accounting of the sent calls. Each log file entry can be supplemented with specific, additional optional fields defined by the administrator. One example is the users' cost centre number. The log CSV export file can be imported into Microsoft EXCEL and simply converted into a list for internal accounting.

- **As a basis for internal statistics**: The log files can serve as raw data for statistically evaluating sent calls, system usage etc. As in internal accounting, each log file entry can be supplemented with specific, additional optional fields defined by the administrator. The log CSV export file can be imported into Microsoft EXCEL and simply converted into a list for internal accounting.

6.5.8. Remote Access

This function is an optional expansion to the I.SEARCH 500 base module (e.g., in combination with a service level agreement; not available with I.SEARCH 200).

Access from ISDN base terminal or PSTN analogue modem. The connection is established in a call-back procedure, i.e., the service and support agent establishes a modem connection between his workstation PC and the I.SEARCH system. I.SEARCH identifies the calling workstation and by the user name and terminates the modem connection. The I.SEARCH system subsequently establishes a modem connection to a call-back number using the same ISDN or analogue telephony network. A remote data transmission connection is established when the service and support agent accepts this call back at his workstation PC. Via this remote data transmission connection, the service and support agent can then log onto the remote I.SEARCH in his browser. He can fully use the same browser functionalities of the system as if he were using the system on the intranet.

A wide range of operational analysis and error management tools are available. The operational data and logs can be used to determine the causes of problems or irregularities.

6.6. High Availability Cluster

With the "High Availability Cluster" module two I.SEARCH can be connected by LAN and will act like one System. This function is available from Version 2.1.9.

If one I.SEARCH is not available or not functioning, the second I.SEARCH will overtake the job, so that there is always a working functioning System available

Each I.SEARCH has its own IP adress which allows access to the single I.SEARCH system and a third virtual IP address which is shared by both I.SEARCH systems.

The external systems which communicate with the I.SEARCH system, always use the virtual IP-Address. The I.SEARCH owning the virtual IP-Address is the active system, the other is the "standby" system. As soon as the active system fails the "standby" system takes over.

7. Output Modules

7.1. General Information

I.SEARCH supports many different output systems.
They include on-site POCSAG network, traditional paging system, DECT messaging, off-site paging network (TELEPAGE, Euromessage), GSM-SMS. Other output systems can be added at any time as required.
Different output systems are connected to meet different customer needs. Every passive user of an I.SEARCH system is assigned between 1 and 4 output systems. The number and type of output systems vary from passive user to passive user.
From the intranet browser GUI, the administrator (user class > 3) defines the output systems that passive users can use along with their addresses and additional information (directory number and legitimation code for a paging output system).
Received messages are distributed in accordance with the time and absence management settings.
A message received from an input system can be simultaneously output to up to 4 different output system addresses for a passive user at a certain point in time.
The messages may also be distributed to various output system addresses, depending on the day of the week and the time.

Special aspects of on-site POCSAG output systems:
POCSAG receivers for on-site output systems should be able to determine the priority level of a received message and issue a special bleep for each priority level.
You can only configure these different bleeps with a POCSAG protocol and a standard pager if you send each priority level to a different RIC sub address. To simplify the programming of the entire pager population refer to the following table.

Priority level 0 (lowest priority):	RIC sub address A for all RIC's
Priority level 1:	RIC sub address B for all RIC's
Priority level 2:	RIC sub address C for all RIC's
Priority level 3 (highest priority):	RIC sub address D for all RIC's

The frequentness with which messages are sent (repeated) depends on the priority level. The number of times a message is sent and the minimum wait period between these times is parameterized for each priority level and customer system.
Thus, the address for each on-site POCSAG pager is simply defined as the RIC value.
The system is not designed to support bleep differentiation for different priority levels on off-site output systems.

7.2. On-Site Paging

The I.SEARCH system can also control a local POCSAG paging network.
Unlike local paging networks operated by conventional paging systems, I.SEARCH does not use proprietary transmission protocols. Instead, it uses the international paging standard POCSAG (Post Office Code Standardisation Advisory Group, a.k.a. CCIR Radiopaging Code No. 1).
The paging frequency for the premises-based paging network is assigned to the customer by a national frequency regulator (such as BAKOM in Switzerland).
Acting on behalf of the customer, Swissphone files the license application with the regulator for the required frequency. Then, it builds a local paging network to offer coverage throughout the company premises. The network contains 1 to n local paging transmitters.
The messages input in I.SEARCH are transmitted by the local transmitter(s).
A Radio Identification Code (RIC) is transmitted with the message to address the destination pager(s).
If the transmitted RIC address matches one of the addresses programmed in the pager (a pager can have several different RIC's), the pager will beep and display the message.
In this document, the term "on-site pager" refers to a pager that receives the assigned local POCSAG frequency and interprets the POCSAG code words.

On-site pagers should be able to determine the priority level of a received message and issue a special bleep for each priority level.

You can only configure these different beeps with a POCSAG pager if you send each priority level to one of the 4 different RIC/sub addresses.

To make it easier to program the entire pager population for the system, all pagers (whether or not they are supposed to receive all messages in all priority classes) have to be configured with the following definition.

Priority level 0 (lowest priority):	RIC sub address A for all RIC's
Priority level 1:	RIC sub address B for all RIC's
Priority level 2:	RIC sub address C for all RIC's
Priority level 3 (highest priority):	RIC sub address D for all RIC's

The frequentness with which messages are sent (repeated) depends on the priority level. The number of times a message is sent and the minimum wait period between these times is parameterized in each I.SEARCH customer system ("System configuration", "General settings"). These parameters should be considered when programming the on-site pagers.
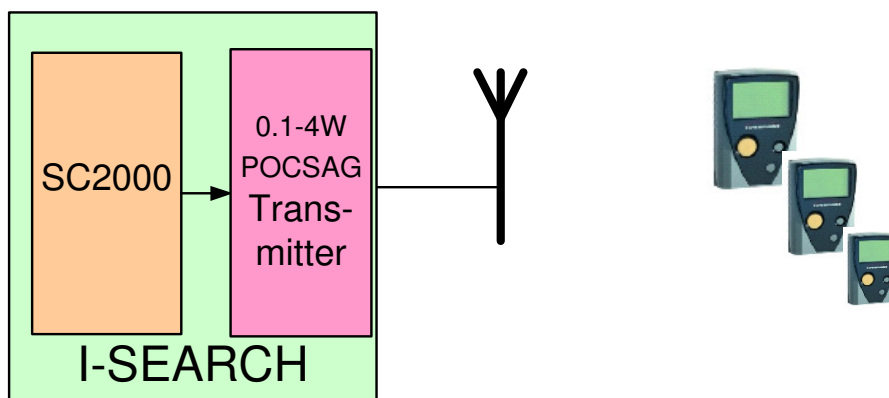
7.2.1. Transmitters

I.SEARCH can only be equiped with one integrated POCSAG transmitter. To extend radio coverage it is possible to operate I.SITE transmitters (refer to 7.2.1.2) or I.SEARCH Slave transmitters (refer to) with I.SEARCH.

In any case I.SEARCH must be equipped with the SC2000 module (synchronisation unit) in order to format the POCSAG data and control the transmitters. The SC2000 module requires a 4TE bay in the 19" rack.

7.2.1.1. Integrated 4W POCSAG Transmitter DS1178

This feature is an optional expansion module for the I.SEARCH base module

Transmitter
The transmitter Swissphone DS1178 is licensed for on-site paging according to ETSI 300224. The transmitter is designed for digital data transmission. Modulation type is DFSK.

Transmitter characteristics
Refer to 3.10.1

Antenna system
Refer to 3.10.2

Indoor antenna
Refer to 3.10.3

Outdoor antenna
Refer to 3.10.4

7.2.1.2. Integrated 25W POCSAG Transmitter

This function is an optional expansion to the I.SEARCH base module. There are two versions possible:

- I.SEARCH combined with ITC2000 (until 2008, refer to **Fehler! Verweisquelle konnte nicht gefunden werden.**)
- Transmitter module 25W out of ITC2100 (from 2008)

I.SEARCH combined with ITC2000:

The I.SEARCH is integrated in a ITC2000 transmitter rack. The 19" rack contains an embedded PC unit, the transmitter equipment (synchronisation card and transmitter), the power supply unit and 1 spare bay for an additional 4TE unit.
If requested, the 19" rack can also be installed in a wall mount 6HE cabinet (height 337mm, width 600mm, depth 500mm).
The DS2000 transmitter is manufactured by TAIT in New Zealand. The transmitter comes furnished with a POCSAG modulator board developed specifically for Swissphone. The various transmitters are specified in the following table.

Name	**T826-xx-xxxx**	**T836-xx-xxxx**	**T856-xx-xxxx**
Frequency bands	VHF (4m) 66-88MHz	VHF (2m) 148-174MHz 136-156MHz	UHF (70 cm) 400-440MHz 440-480MHz
Modulation	POCSAG (DFSK) PM and FM	POCSAG (DFSK) PM and FM	POCSAG (DFSK) PM and FM
POCSAG data rate	512, 1200, 2400 Baud	512, 1200, 2400 Baud	512, 1200, 2400 Baud
Channel spacing	12.5, 20 and 2 kHz	12.5, 20 and 2 kHz	12.5 kHz and 25kHz
Frequency offset	5kHz and 6.25kHz	5kHz and 6.25kHz	6.25kHz
DFSK frequency shift	±4kHz ±4.5kHz	±4kHz ±4.5kHz	±2.3kHz ±4.5kHz
Switching bandwidth	8MHz 128 preset soft-switchable channels	8MHz 128 preset soft-switchable channels	8MHz 128 preset soft-switchable channels
Tx output power (configurable)	5-25W	5-25W	5-25W
Booster (optional)	100W	100W	100W
Compliance	ETSI 300 113 (086)	ETSI 300 113 (086)	ETSI 300 113 (086)
Size WxHxD	60x183 (5 HE)x320mm	60x183 (5 HE)x320mm	60x183 (5 HE)x320mm
Temperature	-30℃ - 60℃	-30℃ - 60℃	-30℃ - 60℃

**Transmitter module 25W out of ITC2100:**

The 25W transmitter module out of ITC2100 can be integrated in the I.SEARCH 19" rack (former I.SEARCH 500 refer to **Fehler! Verweisquelle konnte nicht gefunden werden.**).

7.2.1.3. I.SITE Transmitters

This function is an optional extension to the I.SEARCH base module.

I.SITE is used together with I.SEARCH. It is an FSK transmitter that receives the modulation data over a serial interface. This serial interface can be a standard RS232 or a floating RS422 connection. I.SEARCH also needs to have the SC2000 synchronisation unit and OC2000 RS232/RS422 interface to format the data.
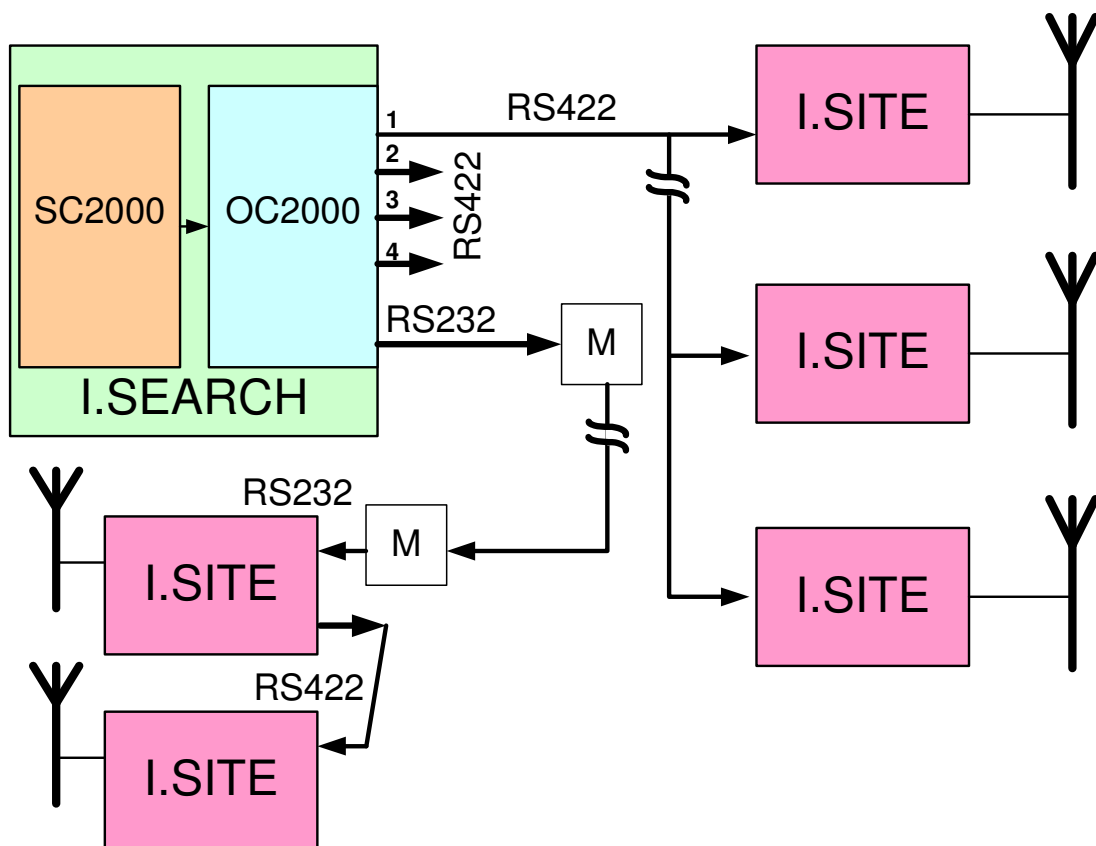
The remote I.SITE transmitters are connected to the main module over a serial RS422 interface. The serial connection must be 2 x 2 wires for I.SITE light and 3 x 2 wires for I.SITE II (one additional wire pair for acknowledge), preferably as twisted pairs in order to reduce interference as much as possible. The maximum connection length is 1200m. In case of I.SITE light 10 transmitters can be attached to one connection.

Transmitter "I.SITE light"
Refer to 7.2.1.1 Transmitter

Transmitter "I.SITE II"
Refer to 7.2.1.2 Transmitter module 25W out of ITC2100

Transmitter properties
Refer to 3.10.1

Transmitter interface
The interface contains the functions, transmitter keying, data input and RX/TX lines. The input signal levels are TTL. The feed voltage is 13.8V. The HF output connection is engineered as a BNC connection.

Note: The output must always be terminated with 50Ω. ESD hazard!

Interface module
The interface card converts the input signals to TTL levels for the transmitter. There is also a 5V voltage regulator for the electronic components. A TTL-RS422 converter is available in case more transmitters are installed later. Individual solder straps are used to fully configure the interface module.

Power supply
The operating voltage is provided by a primary clocked power generator (CPG). The primary CPG generates the +13.8V output voltage. On the input side, it is fed with 230V/50 Hz.

Power cable
A case socket (C13 socket) is built in for standard power cables. That means the system can ship with a country-specific power cable.

Protection systems (ESD)
The system power supply is connected to the power grid ground. The antenna uses a floating output.

Antenna system
Refer to 3.10.2

Indoor antenna
Refer to 3.10.3

Outdoor antenna
Refer to 3.10.4

Case/design/mechanics
The case was specifically chosen for indoor/outdoor installations. It meets IP 66 protection standards.
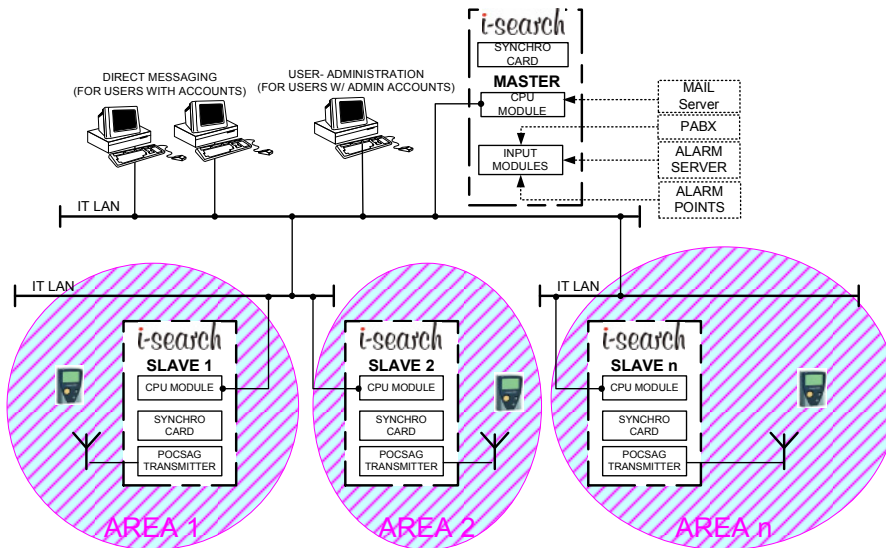
I.SITE light

I.SITE II

7.2.1.4. I.SEARCH Slave

This feature is an optional expansion module for the I.SEARCH base module.

Master-Slave Transmission

A customer system consists of a master I.SEARCH system that contains the standard input modules such as one or more interfaces to a PBX (ESPA4.4.3, ESPA 4.4.4 or CSTA), interfaces to alarm servers or I/O hardware contacts, mail servers or browser-based message entry systems.
This I.SEARCH system can be equipped with local transmitters (not shown above). The transmitters may be I.SITE transmitters or may be integrated directly in the rack. In either case, the system must also be equipped with a transmitter integrated in the rack, a synchronisation card and (if necessary) RS422 interfaces to I.SITE and the transmitters.
It can also be equipped with the standard off-site paging output modules.
This document only discusses how to parameterize the I.SEARCH 200 slaves and how to parameterize the I.SEARCH master so it can communicate with the I.SEARCH slaves.

Radio coverage system

In engineering and putting the systems into service, you have to consider how the radio coverage areas of each transmitter will affect the radio coverage areas of adjacent transmitters. The coverage areas may be separate, or they may overlap.
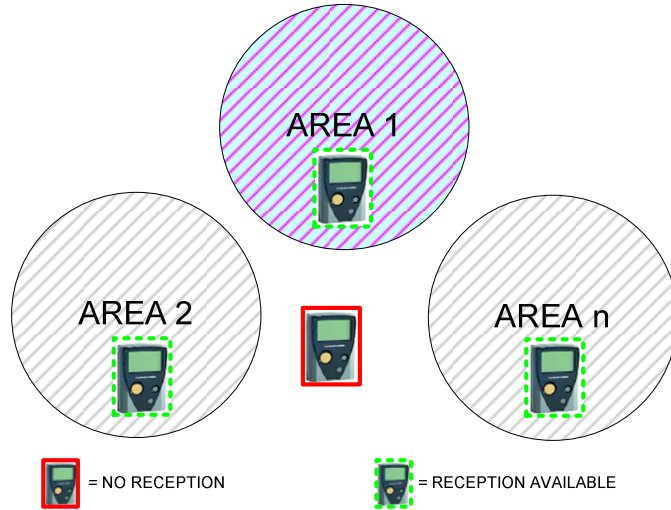
In this case, the messages can be passed to the transmitters for transmission simultaneously.
The receivers do not care whether the transmitters send synchronously or not because they can only receive signals from one transmitter at a time, no matter where they are within the company premises.
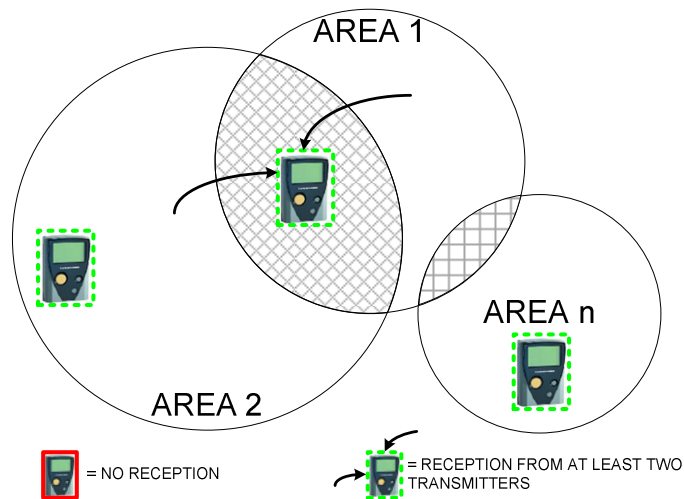
If a pager is in a location where it receives radio signals from 2 or more transmitters, you have to ensure that the signals do not destroy one another and that they can be interpreted properly. There are 2 ways to do this:
The transmitters have to be absolutely synchronous when they transmit (at the bit level, at the POCSAG transmission protocol level, and in terms of the content of the transmitted messages) or
The transmitters cannot transmit signals simultaneously. Instead, each transmitter is given its own time window for transmitting its POCSAG messages. In other words, the message transmission is time-multiplexed.

The transmission method described in this document for I.SEARCH is the time-multiplexing method.

I.SEARCH radio coverage rings
I.SEARCH uses rings in its master/slave operations.
Each ring is assigned a time window in the POCSAG transmission cycle.
All the transmitters in a particular ring receive their transmission command (almost) simultaneously.
Slaves can never transmit perfectly time-synchronously. That is why you have to make sure that their radio coverage area does not overlap with the coverage area of another slave in the same ring.
Slaves whose radio coverage areas overlap should be assigned to different rings.
To minimize the message send time, you should keep the number of defined rings (i.e., time windows) to a minimum.
Note: Any transmitters installed in the I.SEARCH master system will automatically be assigned to Ring 1.
Example: The company premises needs to be serviced by 7 transmitters with the coverage areas shown in Figure 4.
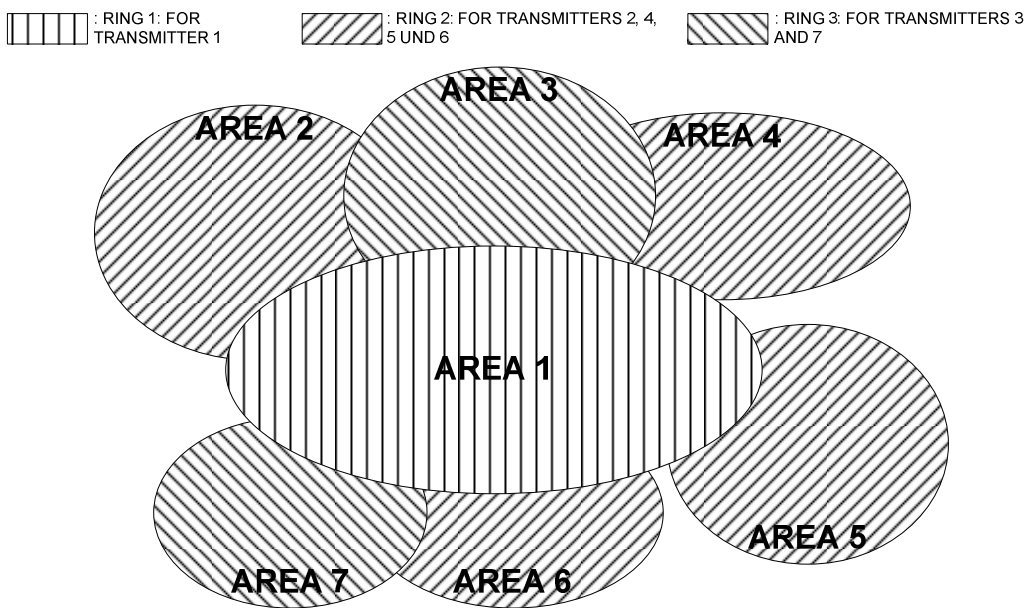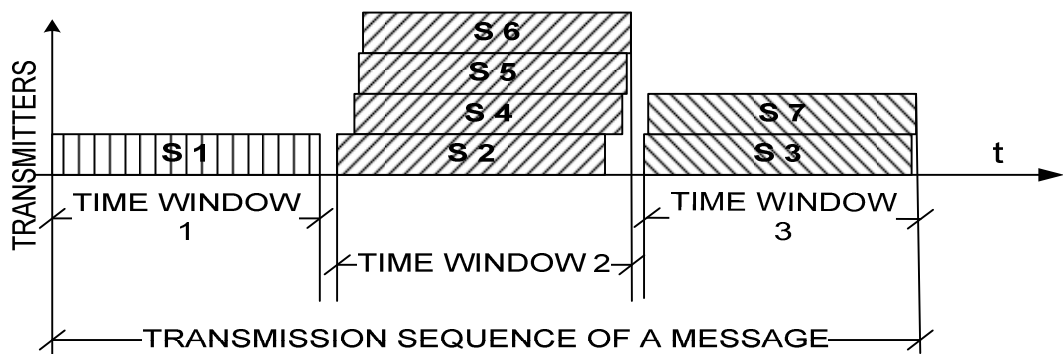

The master's transmitters are assigned to the first ring (time window).
The second ring is assigned to the transmitters for those slaves that do not overlap (Transmitters 2, 4, 5 and 6 - one transmitter per slave).
The third ring is assigned to the transmitters for the remaining slaves, which do not overlap with one another, either (Transmitters 3 and 7 - one transmitter per slave).
Figure 27 depicts a timeline showing the send sequence for each system.

Transmitters assigned to the same ring (here, Transmitters 2, 4, 5 and 6; or 3 and 7) are addressed by the master in a sequence preset during the configuration.

The master controls all the transmissions. Once it finishes its own transmission (Ring 1), it sends the message over the LAN to the next I.SEARCH slave on the ring. If there is no such slave, the message will be sent to the first slave in the next ring (Ring 2). This I.SEARCH slave acknowledges the receipt of the transmission command and its readiness to transmit the message. This method continues until all the slaves in the same ring have been addressed. Once the last designated slave in the ring has been addressed, the slave tells the master when it is done transmitting. That way, the master knows that this ring is finished with its transmissions and it can address the next ring.

The process continues until all I.SEARCH slaves have transmitted the message.

The messages are transmitted in the order specified in the slave server list. This list is stored in the I.SEARCH master (see the "Master/slave configuration" chapter).

7.3. IDEA Encryption

This module is a optional extension module of the I.SEARCH base module and available from Version 2.1.7.14.

With IDEA encryption messages can be encrypted and sent to encryption capable pagers.

7.4. Over Air Programming (OAP)

This module is a optional extension module of the I.SEARCH base module and available from Version 2.1.7.14.

With OAP "Over Air Programming" OAP capable pagers can be programmed over the air.

Momentarily OAP capable pagers can be synchronized with the system time of I.SEARCH.

7.5. On-Site Pagers

Essentially all standard POCSAG alphanumeric receivers are supported. Recommended are Swissphone DE9XX pagers.

All I.SEARCH messages are sent as text messages. As such, all RIC sub addresses of on-site pagers must be programmed with the **alphanumeric calling class**.

An RIC scheme was developed to optimize the programming of the on-site pagers (see the "RIC I.SEARCH POCSAG-d SCHEME" document). The scheme includes policies for optimizing the RIC space provided for local on-site POCSAG paging networks that are powered by I.SEARCH systems. It enables paging networks and receivers to interact in an optimal fashion.

7.6. Off-Site Messaging

Depending on the system's configuration and the customer's preferences, it is possible to operate several types of interfaces in a simultaneous environment (parallel) or an escalation environment (i.e., one interface type is the backup for another interface type). For example, you can primarily use the internet interface, and keep an ISDN interface as a backup in case the first interface fails.

Depending on local requirements, I.SEARCH will route MDUs for off-site systems

- Directly to the appropriate public messaging service centres (Swissphone's TELEPAGE, EUROMESSAGE service centre or the GSM operators' SMSCs), or
- To a Swissphone message input platform that routes all types of off-site messages.

7.6.1. ISDN Output

This feature is an optional expansion module for the I.SEARCH base module.

I.SEARCH must have an ISDN BRI (basic rate interface - S0 line) to send paging or SMS messages to the public paging or GSM operator's facilities. Paging (TELEPAGE or Euromessage) or GSM SMS messages are sent using a suitable protocol (UCP, IXO or MIP protocols). The transmission technology can be V.110 or X.75.

Note: This feature cannot use the same ISDN BRI that is used for remote maintenance. It requires its own ISDN BRI.

7.6.2. PSTN Analogue Telephony Output

This feature is an optional expansion module for the I.SEARCH base module.
If there is no ISDN BRI, I.SEARCH must have an analogue telephone line and a modem to send paging or SMS messages to the public paging or GSM operator's facilities. Paging (TELEPAGE or Euromessage) or GSM SMS messages are sent using a suitable protocol (UCP, IXO or MIP protocols). The transmission technology can be the V.22 to V.42 modem interfaces, with or without error correction and data compression.
Note: This feature cannot use the same telephone line that is used for remote maintenance. It requires its own telephone line.

7.6.3. Internet Output

This feature is an optional expansion module for the I.SEARCH base module.
I.SEARCH must have an internet access facility in order to send paging or SMS messages to the public paging or GSM operator's facilities or in order to forward e-mails.
Within Switzerland, Swissphone provides two ways to output off-site messages over the internet:

7.6.3.1. Paging Internet Large Account

TELEPAGE and Euromessage messages are transferred using the specifications-compliant UCP protocol. To transfer them, you need an internet large account.
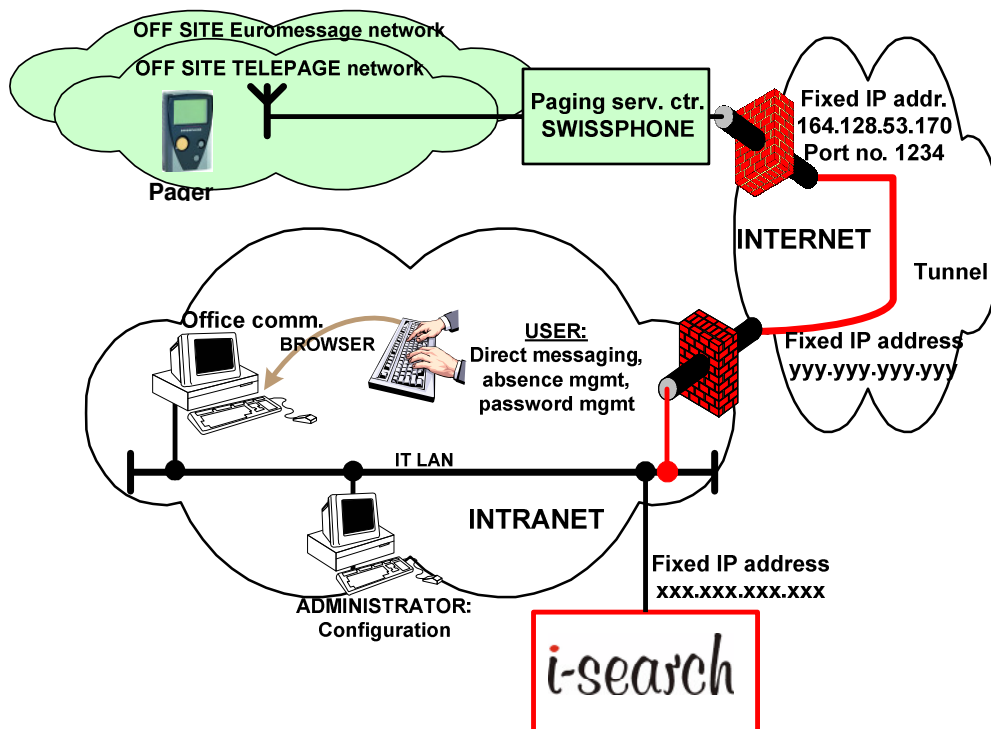
7.6.3.2. IMASYS messaging account (only Switzerland, other countries on request)

Paging (TELEPAGE and Euromessage), SMS and e-mail messages are transferred using a special specifications-compliant encrypted transmission protocol. To transfer them, you need an IMASYS messaging account.
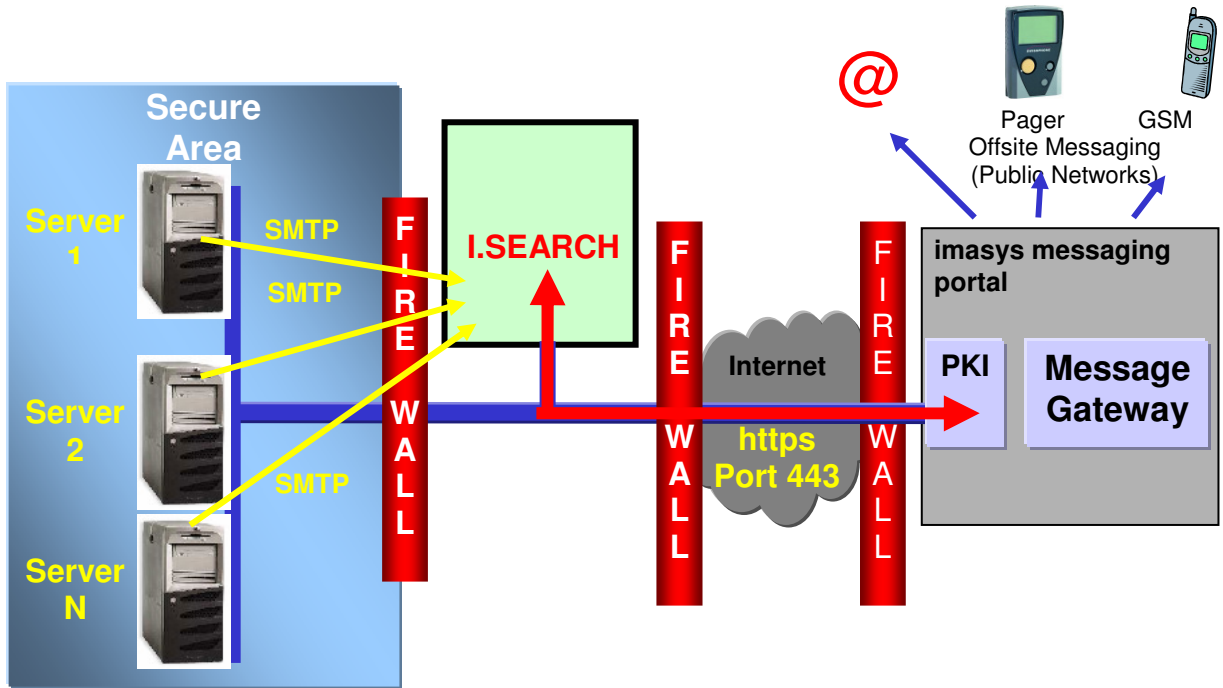

Figure 3: Off-site messaging: an example of how messages could be routed with a Swissphone IMASYS messaging account

7.6.4. Sending SMS Messages with the GSM Module

This feature is an optional expansion module for the I.SEARCH base module.
SMS messages can be sent to a passive user's GSM devices via a GSM module. This can only be done if the system and its GSM module are located in a GSM service area. It may be helpful to install an external antenna extension.
The GSM module is only used in conjunction with a GSM dual-band (900/1800MHz) plug-in unit.
The GSM module also needs a valid SIM card.

7.6.5. Sending E-Mail

(In preparation) This feature is an optional expansion module for the I.SEARCH base module.
E-mails can be sent to e-mail addresses in the customer premises intranet, or in the public internet.
The e-mails can be sent directly from the I.SEARCH mail server to another mail server, or they can be forwarded over the IMASYS interface (requires an IMASYS messaging account).

7.7. Off-Site Devices

Essentially all standard POCSAG alphanumeric receivers are supported. Recommended are Swissphone DE9XX pagers.

7.8. System output

7.8.1. System Monitoring and Alarm

Hardware and software functionality is monitored. If an error occurs, an alarm can be activated. The system alarms can consist of local bleeps or visual displays. Wherever possible, log functions should record function failures.

7.8.2. Log Books

This feature is part of the I.SEARCH base module.
Various logs should be generated. The log data needs to be exportable.
Users with user classes > 3 have access to certain logs. For every user class > 3, you can define which logs the class can access and who can export the logs.
Logs are kept on the following:
• Per input system
• Per output system
• Per LAN operation (who logs in, who performs what function, etc.)
• System events
In addition to the mandatory meaningful fields, additional fields from the database should also be defined. These fields should allow customers to further process the data (outside the I.SEARCH system).

7.8.3. Raw Statistical Data

This feature is part of the I.SEARCH base module.
Users with a user class > 3 can export log files for further processing (internal accounting for generated costs, usage, etc.). This way, you can track all the messages processed over a particular period of time (per user, per output system, per input system, etc.).
Raw data can be generated either immediately, by selecting a menu button, or in a scheduled batch (the 1st of every month at 00:00, for example).

7.8.4. Lists

This feature is part of the I.SEARCH base module.
Users with a user class > 3 can retrieve and export database contents for further processing (address book, user lists, processed alarm list, etc.).
The list results can be generated either immediately, by selecting a menu button, or in a scheduled batch (the 1st of every month at 00:00, for example) using the backup function.

8. Accessories

8.1. LAN Converter I.COM

I.COM are Swissphone RS232/LAN respectively. RS422/LAN or RS485/LAN converters. Therewith I.SEARCH can provide as many RS232 respectively RS422 or RS485 interfaces as required. Further information can be taken from the corresponding I.COM documentation..

Remark! With I.COM RS485 it is possible to realise 5 contact inputs by means of the corresponding configuration.

8.1.1. 19" Installation

For a 19" installation there is a special front panel (Swissphone article number 0704099) for up to 10 I.COM converters available.
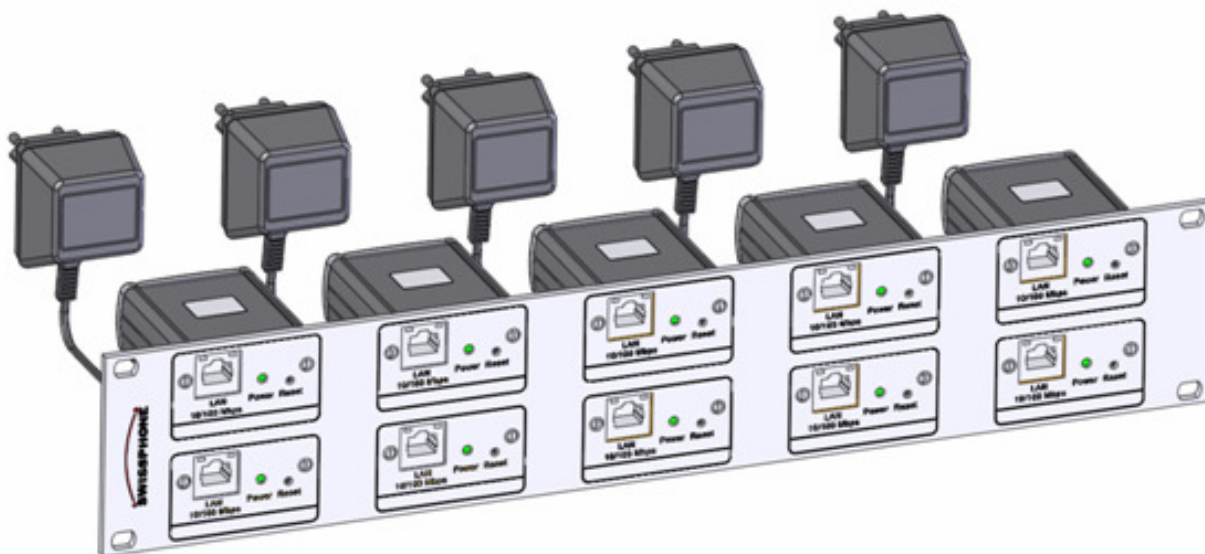
8.2. Monitorstation MS2100

The monitorstation MS2100 serves the supervision of the POCSAG radio coverage. The monitorstation is basically a POCSAG radio receiver with a LAN interface. Sending periodical POCSAG messages addressed to the RIC of the monitorstation using the cyclic radio message function of I.SEARCH, the site of the monitorstation is supervised. The monitorstation sends the received message back to the I.SEARCH over the LAN interface. I.SEARCH must receive the message within a defined time. Is the message not received or the message is not equal to the sent out message, I.SEARCH can tigger an alarm.

8.2.1. Konfiguration

Detailed information to the configuration of MS2100 can be taken from the corresponding MS2100 documentation respectively from the I.SEARCH Manual section "System functions / Transmitter monitoring".

8.3. Multi Charger Rack MCR

The multicharging device in combination with I.SEARCH serves the absence management of pager users. If a pager user places his pager into the MCR, he is stated as absent respectively not reachable by pager. I.SEARCH will then, if required, forward a message as SMS or Email. A MCR is connected with I.SEARCH by LAN.

8.3.1. Konfiguration

Detailed information to the configuration of MCR can be taken from the corresponding MCR documentation respectively from the I.SEARCH Manual section "I.SEARCH Options/Multi Charger Racks".

8.4. LAN-Eingänge "Sealevel"

With the LAN inputs "Sealevel" I.SEARCH can provide remote contacts over the LAN. One module provides 32 contacts. There is a module with LAN interface (Sealevel 430E) and a module with no LAN interface (Sealevel 430N) for cascading available. The states of the inputs are polled by I.SEARCH. Detailed information can be looked up in the corresponding documents on the internet under "www.sealevel.com".
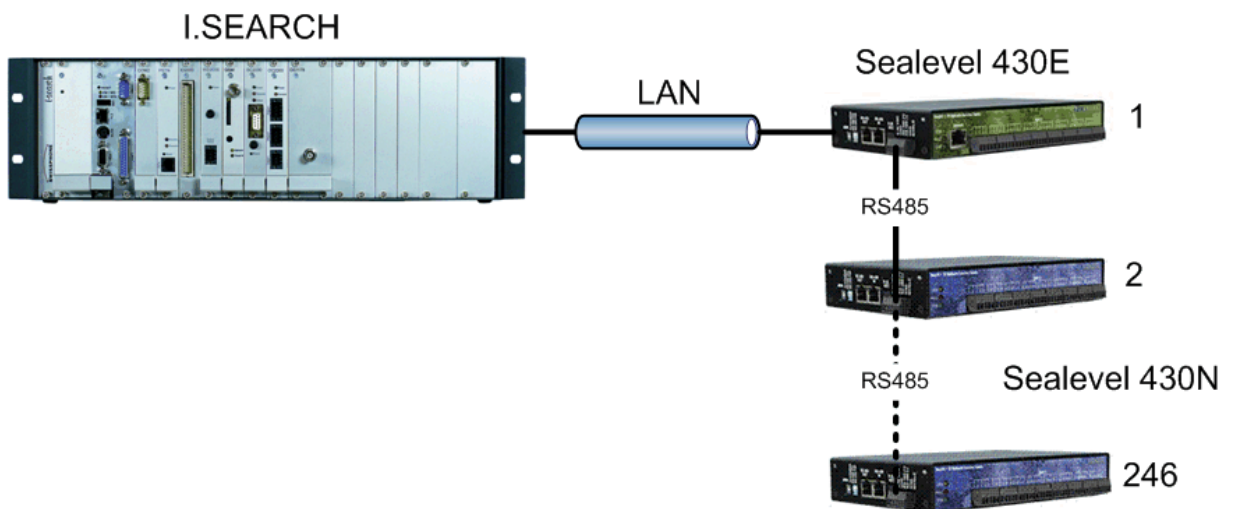
8.4.1. Contact Input

There are always 4 contacts grouped with one "common".
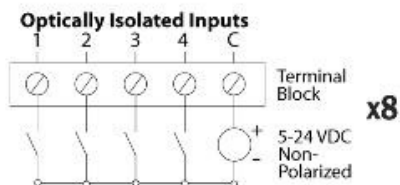
8.4.2. 19" Installation

For 19" installation there are special trays available.

9. Glossary

Ethernet
Ethernet is based on the network protocol CSMA/CD (collision detection). Ethernet version 2.0 is the most recent version.

Gateway
A gateway is a point of interconnection or transfer between two fundamentally different networks that work with different protocols, addressing schemes etc. Typically, a gateway is a computer that functions as a "translator" between the different network worlds.

GSM
GSM (**G**lobal **S**ystem for **M**obile communication) is a digital telephone standard used primarily in Europe.

Hub
A hub is a device used to interconnect end nodes in a star topology network; i.e., all the clients are attached to this central node.

IP address
The IP address is a unique four-octet number assigned to every internet host.
For detailed information lookup under: http://en.wikipedia.org/wiki/IP_address

LAN
A LAN (**L**ocal **A**rea **N**etwork) is a local network, usually restricted to one building.

POCSAG
Abbreviation for "**P**ost **O**ffice **C**ode **S**tandardization **A**dvisory **G**roup". The group developed the POCSAG standard for transmitting messages in paging systems.

Polling
Polling means constantly checking whether a certain event has occurred in a particular program.

RIC
Radio Identification Code. Address for your pager.

Server
Servers are special computers in a network that can perform various functions:

- File servers provide data, programs and storage space-
- Mail servers process received or sent e-mails and distribute them to the appropriate accounts.
- Print servers send print jobs from various computers to a particular printer.

Subnet Mask
The subnet mask has the same format as an IP address (000.000.000.000) and states what network the host belongs to.
For detailed information lookup under: http://en.wikipedia.org/wiki/IP_address

TCP/IP
TCP/IP ("**T**ransmission **C**ontrol **P**rotocol/**I**nternet **P**rotocol") generally refers to an entire protocol suite developed by the U.S. Department of Defense (DoD) to interconnect computers in different networks. Today, TCP/IP is used in many LANs and is the base for the global internet.

10. Technical Specifications

Transmitter	
Frequency band	430 – 470 MHz (factory channel setting)
Channel spacing	12.5 kHz, 20kHz and 25 kHz (factory setting)
Transmission power	0.1 W – 4W (factory setting) 0.2 - 25W transmitters available (off-site system)
Coverage area	0.1-2km^2 depending on the topography and antenna position
Modulation	DFSK
Protocol	POCSAG with data rates of 512 bit/s, 1200 bit/s and 2400 bit/s
Compliance	ETSI 300224 (On-Site paging) ETSI 300113 25W Version
Antenna system	
Connector	BNC
Cable	RG213 /U, length: 2.5m, 5m and 10m pre-manufactured, diameter: 10.3mm, attenuation: 0.16dB/m, min. installation radius: 5cm
Antenna type	Omnidirectional antenna for indoor / outdoor (other antennas on request)
Controller	
Memory	64 MB RAM, 256MB flash
Operating system	Linux
IT	
LAN access	Ethernet 10/100 (RJ45)
Transmission protocol	TCP/IP v4
IP address	Static, selectable
Database	mySQL, local only, access profiles - user and administrator
Browser	JavaScript-enabled (Internet Explorer > V3.0, Netscape > V5.0)
User interface	html/PHP4, in English, German and French
Character set	US ASCII and ISO 8859-1 Latin => POCSAG (D,CH,A,F,UK,US)
Max. message length	Pager: 80-220 characters, GSM/SMS:160 chars
Miscellaneous	
Case, weight	Desktop case with 3HE bays (rear slots), approx. 4 kg
Size	Desktop case: W x H x D = 256 x 204 x 316 mm 19" rack in wall-mounted cabinet: 600 x 470 x 500mm ITC2000 rack: 485 x 200 x 320 mm in wall-mounted cabinet: 600 x 470 x 500mm
Number of optional upgradeable 4TE units	Desktop case: 3 units 19" rack: 6 units ITC2000 rack: 2 units
Number of user accounts	1000
Number of users per group	60 passive individual users
Number of escalation levels per escalation list:	4 each with a maximum of 60 passive individual users per escalation level
Number ESPA 4.4.3. interfaces via RP201	1-6
Number of ESPA 4.4.4 interfaces	1 serial interface, up to 5 via LAN interface
Number of CSTA interfaces	1, more possible if needed
Number of I/O units (4TE)	1-6, each with 16 floating contacts (depends on the number of vacant slots)
Number of ISDN units (4TE)	1, each with 1 or 2 ISDN BRIs (S0 interface)
Number of analogue telephony units (4TE)	1, each with 1 or 1+1 ISDN BRIs (S0 interface)
Operating temperature	0^{0}C to +50^{0}C

Power supply	230 VAC
Conformity	CE