

Iskrateł Dispatching Suite for Industries

# Iskrateł DS4I



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# 1 Introduction

The document contains information about Iskratel DS4I. Denomination »SI3000 DS4I« stands as »***Iskratel Dispatching Suite for Industries***«.

Iskratel DS4I system provides gathering users' multimedia information from different communication channels into one central point so that they can quickly and efficiently react in critical situations.

## 2 SI3000 DS4I systems

### 2.1 Background

Despite the existing or on-going automation of the mission critical operations in many industrial and transportation fields, the manual control by highly educated dispatchers is needed to perform accurate and safe work process fulfilling.

Existing dispatching systems gather lot of information from different sources, no integration of system is provided and therefor great effort is needed for information decoding and providing the adequate response. Iskratel is providing components for integration of dispatching systems for a wide area of need – from environments, such as gas industry, railway networks, mines, military needs, etc.

### 2.2 Briefly about dispatching systems

Dispatching systems for mission critical systems should provide:

- Integration into communications networks in different industries,
- Gathering of visual, data, video and voice information and extraction of the relevant information,
- Optimization of working processes,
- Centralization of fault diagnostics and reporting,
- Redundant operations considering networking, communications and power supplies;

Implementation of integrated services and usage of ergonomic GUIs, customized for the user's specific processes should result in quick and efficient dispatcher's work.

Iskratel dispatching systems are designed to prevent breakdown situations. Our mission is to prevent situations where dispatcher is needed to save lives.



**Figure 1: Integrated dispatching system**

Our offer meets market needs:

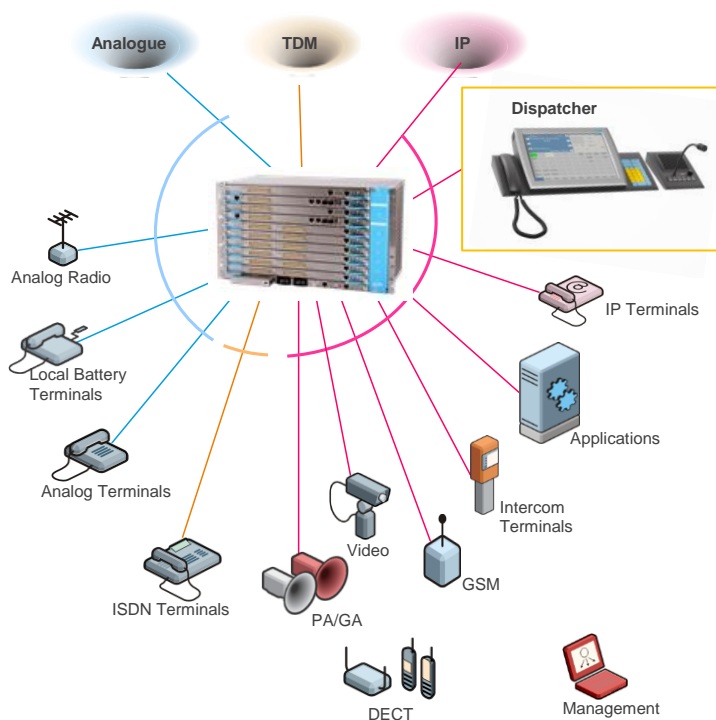
- **Unified** dispatching platform, which integrates several separate systems,
- **Flexible** dispatching equipment ensuring adaptation to every customer working environment,
- High **reliability**,
- **Secure** and **fast** distribution of multi-media information,
- **Scalable** dispatching infrastructure with new features.

### 3 Architecture of the SI3000 DS4I

Control room where a number of dispatchers take place and control the overall situation of a large industrial or traffic complex is just an external presentation of the entire dispatching system. In fact the dispatching systems architecture comprises of four basic areas:

- **Communication platform,**
- **Dispatching infrastructure,**
- **Dispatching terminal platform,**
- **Input/output devices;**

Iskratel SI3000 DS4I offers to different industries scalability, modularity and rich features. It is adaptable platform for implementing different requests in the field of dispatching.



**Figure 2: DS4I architecture**

The system is highly reliable; it enables Public Addressing & General Alarming. By using Iskratel communication platform it provides connectivity to legacy networks and interfaces, from CB/LB, CAS signalling, E1 (SS7, PRA, QSIG), to VoIP signalling like SIP. As the Iskratel's Multipurpose Dispatching Terminal (SI3000 MPD) is complete SIP oriented realization offers integration of basic voice links with new multimedia services.

### 3.1 Communication platform

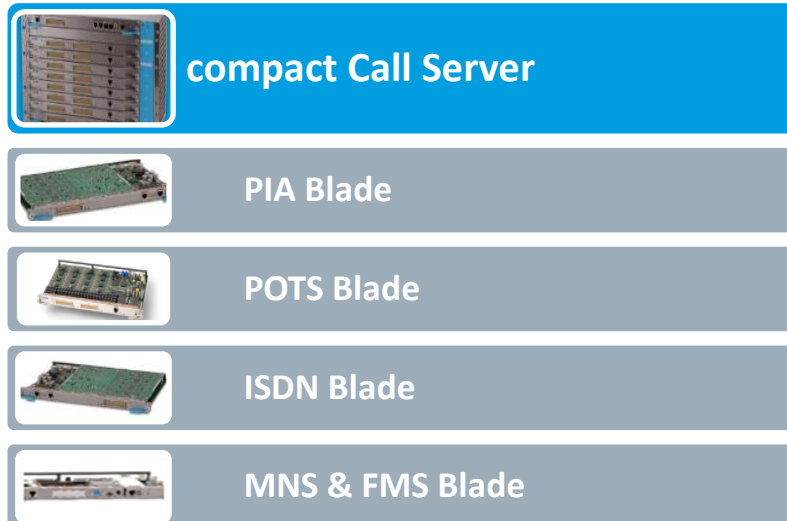
The solution is based on Iskratel standard and dedicated modules:

- SI3000 cCS – compact Call Server,
- SI3000 DRS – Digital Recorder Server,
- SI3000 NS – Notification Server,
- SI3000 MN – Management Node,
- SI3000 FMS – Fault Management System,
- SI3000 MPS – Modular Power Supply;

### 3.1.1 Switching platforms & Network interface modules

#### 3.1.1.1 SI3000 cCS – compact Call Server

SI3000 cCS provides several application options and can be used in the network as:



**Figure 3: Iskratel communication platform**

- Switch-access node or telephone exchange which enables connectivity to subscribers and access and service nodes.
- IP gateway that includes signaling and media gateway for the conversion of TDM signaling and media traffic to IP and vice versa.
- A service node with the option of connecting additional application servers for voice-enabled, call and other services.
- Point of interaction with the environment through I/O ports.
- A converged notification server through peripheral interface (PIA blade) towards equipment for audio content distribution.
- A multifunctional node that enables the combination of the above-listed functionalities.

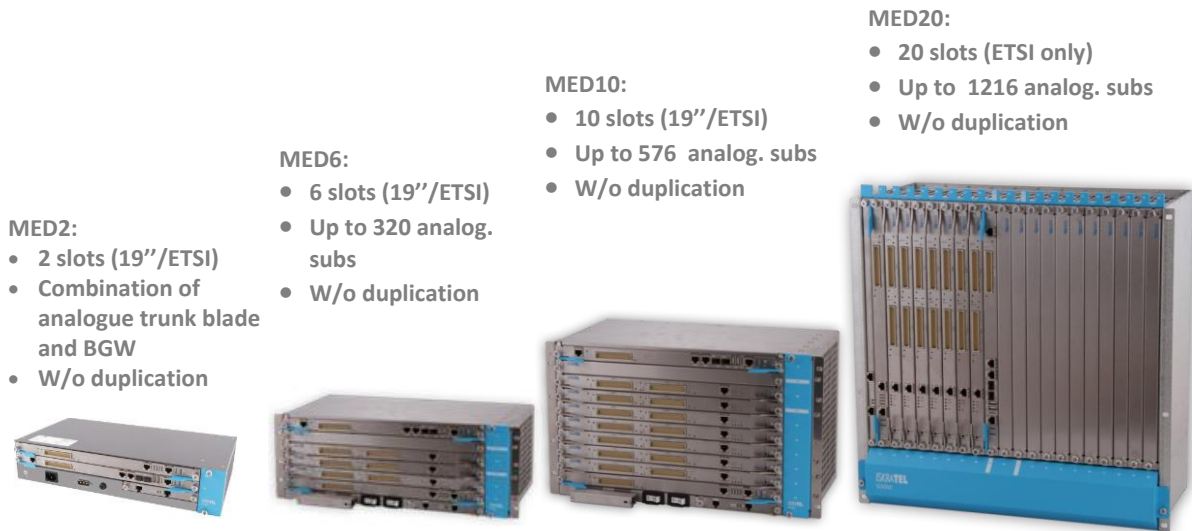


Figure 4: Iskratel MED housing

### 3.2 Dispatching infrastructure

Among of the greatest advantages of Iskratel DS4I is its infrastructure.

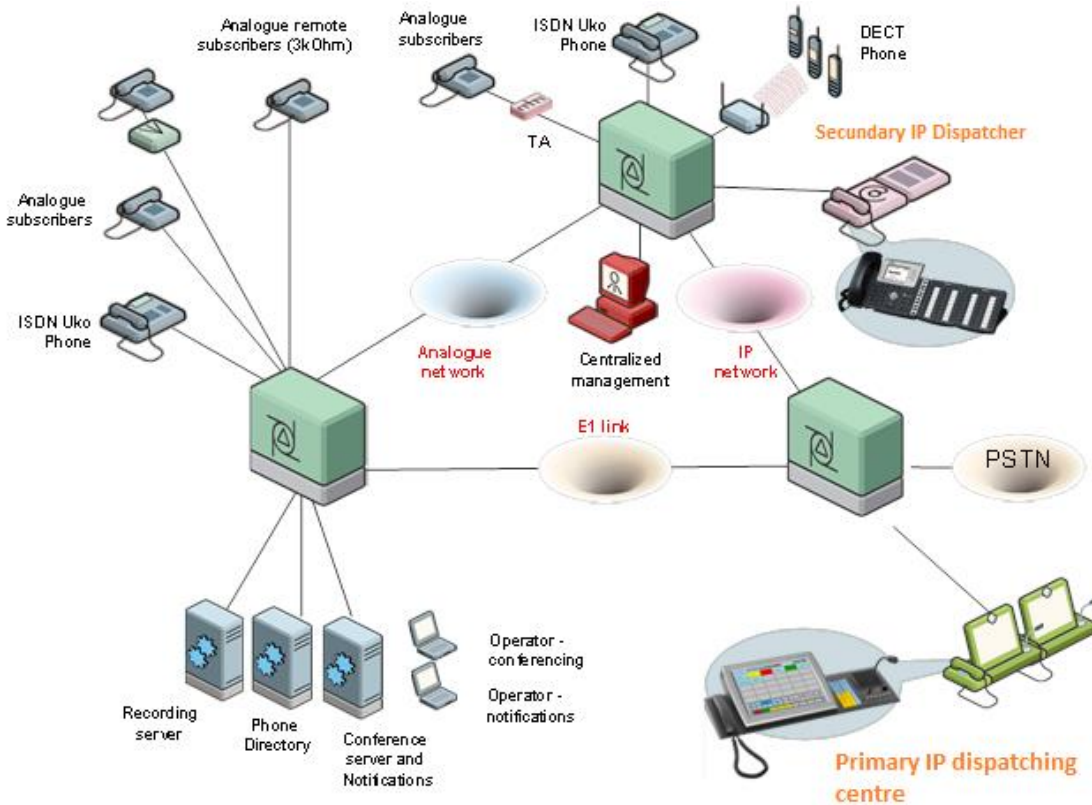


Figure 5: Iskratel dispatching infrastructure

Core of the system with its SI3000 cCS enables support:

- Any type of **network**,
- Any type of **terminals**:
  - *Analog CB/LB*,
  - *ISDN*,
  - *IP Phone*,
  - *DECT*;
- **PC-based** or **phone-based** dispatcher,
- Centralized management,
- Centralized services,
- Alarming;

**Note:**

For special applications in industries, **Iskratel DS4I** is the only product supporting modern (both **fixed** and **mobile** access technologies) and **legacy interfaces** (LB, CB, analogue 2-wire and 4-wire trunks with selective calls) within a **single dispatcher terminal**.

### 3.2.1 Management and Fault Management system



**Figure 6: Iskratel management and diagnostic system**

SI3000 MN equipment supports functionalities of Accounting Management, Configuration Management, System & Security Management functions, and also integration with OSS/BSS systems.

SI3000 FMS provides report gathering and presentation for the entire system and its modules. The system enables presentation of the reporting results in geographical or schematic view. Viewing of additional



information, establishment of parameters of measurements and also statistical processing of results of measurements and their display is additionally enabled.

Management applications are realized as central point of configuration and fault management system. Management of different modules and knots of the entire system are presented on separate GUI tabs. The user gets information in different graphical views, as presented in the figures below.

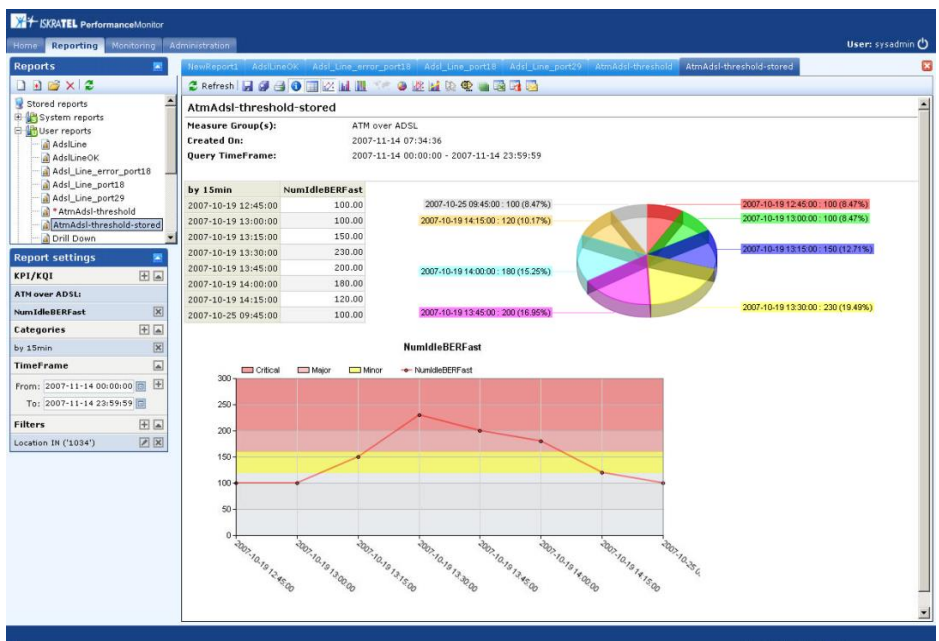
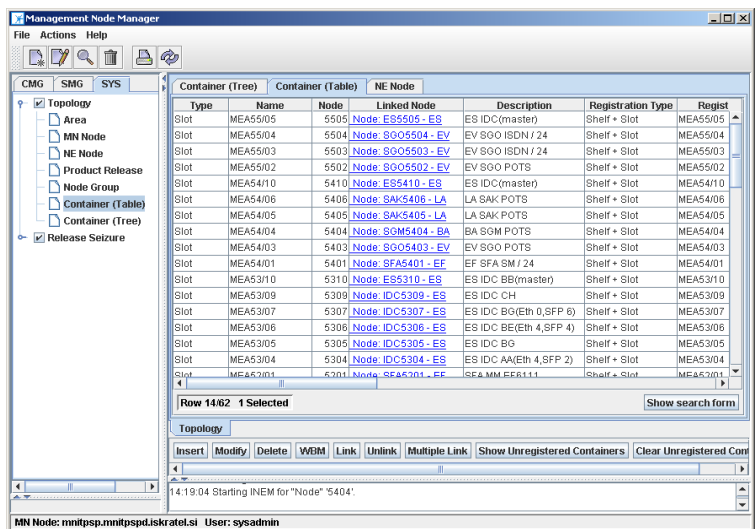


Figure 7: Graphical view of management applications

Flexibility and openness of the management node architecture allows future changes in the management scheme (for example, the organization of multilevel centralization of management) or expanding of functionalities with other systems (OSS/BSS, etc.).

## 3.2.2 Optional systems

### 3.2.2.1 SI3000 DRS – Digital Recorder Server

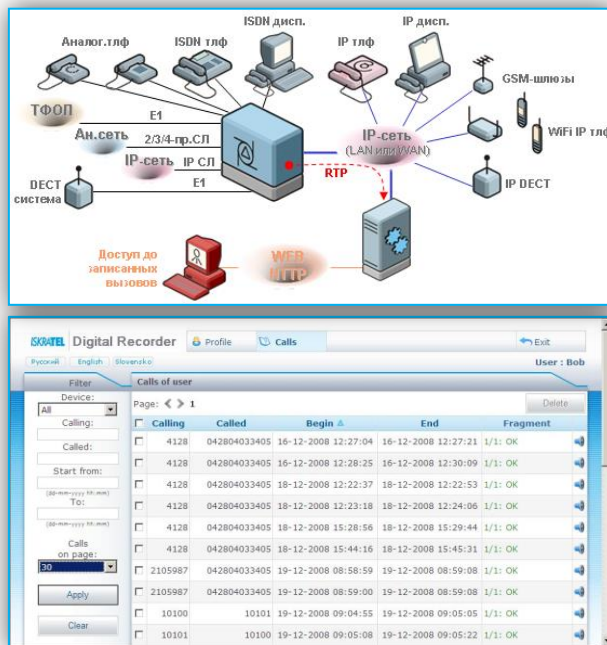


Figure 8: Iskratel Digital Recording Server

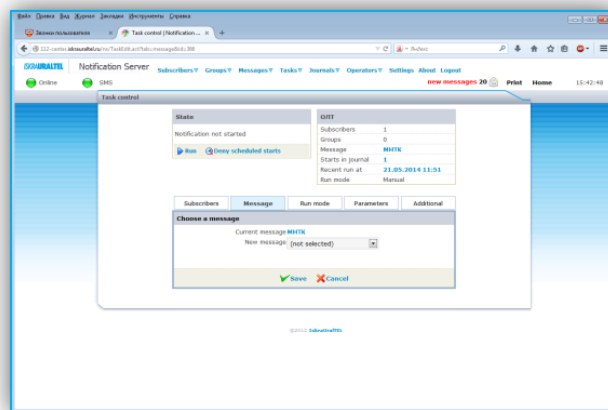
SI3000 DRS enables recording of user calls within the DS4I. The system enables:

- Centralized or remote recording,
- Setting of recorded device criteria by different criteria:
  - Dialed prefix,
  - User number,
  - Trunk number,
  - Dispatcher circuits;
- Recording of all types of accesses (analogue, ISDN, VoIP user accesses, dispatching terminals, CAS, E1, SIP ... trunks),
- Web access application for the DRS users;

Triggering of start/end of conversation is realized through monitoring of the recorded device signalling or in special cases by VAD (Voice Activity Detection) criteria, no additional equipment is needed for plugging the DRS device.

### 3.2.2.2 SI3000 NS – Notification Server

SI3000 NS provides possibility of alerting mass of users within a single task. The system enables:



**Figure 9: Iskratel Notification Server**

- Configuration of alerting tasks,
- Alerting by voice calls,
- Alerting with SMS messages,
- On-the-fly or scheduled alerting,
- Repeating of alerting,
- Optional confirmation of alerting message reception,
- Reporting on alerting,
- Web access application for the NS users;

Alerting can be prepared in advance or before the invocation. Invocation of alerting services can be set from the NS Web administrator application or from external applications.

### 3.3 Dispatching terminal platform



**Figure 10: Iskratel dispatching terminal hardware platform**

The system comprises of large set of user terminals:

- SI3000 MPD– Multi Purpose Dispatcher
- IP phone terminals – for basic dispatcher functionalities standard terminals can be used;

System enables wide use of standard equipment and can be also customized for other specific types of equipment, based on customer requirements.

### 3.3.1 SIP phone terminal

Basic Iskratel dispatching terminal is designed on the SIP phone terminal enabling all necessary features for seamless work.

The phone for dispatcher workplace offers:

- HD voice, handset, speaker
- Full-duplex hands-free speakerphone with external gooseneck microphone:
  - Cardioid directional characteristic
  - Optimal speaking distance approximately 30cm up to 1m
  - Including the relevant microphone windscreen
- Additional keyboards with direct keys and LCD display or LED for status indication of each contact
- Optional PTT pedal



**Figure 11: Basic dispatching terminal**

### 3.3.2 Multipurpose dispatcher (SI3000 MPD)

Multipurpose dispatcher (MPD) terminal is designed to manage calls and conference calls to provide all types of relationships between phones in dispatching networks and operational technological communication networks.



**Figure 12: Multipurpose dispatcher terminal**

Hardware and software solution is part of dispatching communications and is organized workplace based on robust fan-less industrial PC. The MPD terminal is operating in modern dispatching communication systems and networks.

MPD terminal is based on Intel Atom platform and is equipped with highly reliable 15" touch screen. Components of dispatching terminal may differ depending on requirements. In order to achieve suitable configurations of MPD terminal, it can be combined with add-on modules such as handset, speaker box, keyboards. Module speaker box has integrated stereo speakers and a goose-neck microphone with three-

color bar-graph display serving as VU meter, volume indicator and six programmable keys with LED indicators for mode control and volume adjustment.

MPD terminal supports usage of telephone directory. The content of directory is defined by technical (administrative) personnel who are in charge for telephone exchange. Each telephone directory contains a set of data that is displayed on dispatcher terminal when incoming call is present.

MPD terminal supports control and management of conferences and their participants as well as video calls and video conference calls among themselves. In video conference call one dispatcher terminal sees all participants and invited participants can see active speaker (user that is currently speaking).

The connection between call control server and dispatcher terminal is made over Ethernet/IP interface which solves long distance connectivity issues. Ethernet redundancy is supported.

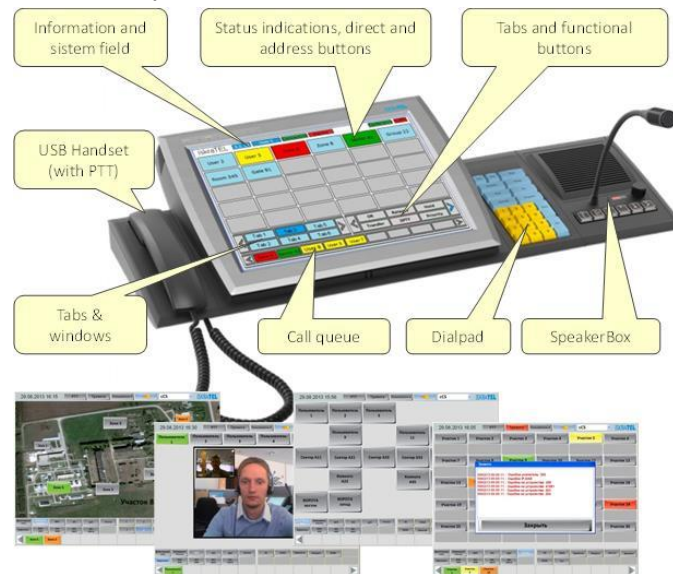
SI3000 MPD enables:

- Modern dispatching terminals with future high-end functionality to bring together **multi-media** information:
  - Voice,
  - Visual,
  - Video,
  - Data.
- Combination of **communications, controlling, monitoring** and **announcements** functionalities → dispatcher can process and extract **relevant** information.
- Upgrades with additional features:
  - Video surveillance,
  - Information and notification systems.

The main value propositions of the SI3000 MPD are:

- **Single** platform,
- **Interoperability** with other systems,
- **Video** calls, conferences and surveillance,
- **Radio** communications,
  - **Safe** and **secure** communication,
  - Communication over different technologies (Analogue, ISDN, IP, LTE, GSM, GSM-R, TETRA,...),
- Replaces **numerous** different dispatching equipment with **single** terminal;

Intuitive terminal's **Graphical User Interface** is designed as self-guiding tool, which main goal is to simplify the operator's processes as much as possible. Its main characteristics are:



**Figure 13: Graphical User Interface of MPD terminal**

- Overall communications **control**,
- Voice, video and visual **services**,
- **Flexible** and customizable GUI,
- **Multiple** systems **integrated** into one:
  - dispatching,
  - info & notifications,
  - conferencing,
  - surveillance,
  - diagnostics,
  - ...

### 3.3.2.1 Customization and localization

SI3000 MPD is highly adaptable device, which can be tailored by the requests of the user (industry).

- Communication access to and from MPD can be established via any type of network signalling. Iskratel cCS enables perfect Network/SIP gateway,
- User's graphic interface can be customized to fit exactly into the operator's workflow on specific working environments such as Railways, Oil and Gas Industry, Power Utilities...
- Audio and Video connections and conferencing can be applied,
- Any language or writing can be implemented in GUI,
- Optional equipment can be used to easy the operator's work;

### 3.3.2.2 MPD terminal ergonomics

MPD terminal is tailored to meet demanding requirements (functional, ergonomic, performance, quality, environmental ...).

Terminal construction and shape enable the user to adjust monitor's angle. All commands can be executed by a simple touch on the touch screen monitor.

Presence of Iskratel in the field of private communications networking and industry for decades gives the customer guaranty of highly intuitive operator's GUI, customizable and adaptable to different working process scenarios.

### 3.3.2.3 Optional equipment



Add-on module **Speaker Box** serves as hands-free bidirectional voice communication and is independent equipment that can be connected to MPD terminal. The Hands-Free audio device comprises of built-in Voice Speaker (i.e. left-hand side loudspeakers) and goose-neck microphone, along with an incremental encoder for volume control, bar-graph multicolour LED indicator and two function keys (MIC key and HF key). Two more keys are provided for immediate loudspeaker volume control of the external headset and handset.



**Additional dial pad** contains dial buttons and additional functional buttons by which user can uses basic telephony functions. Using these functions user can carry out its work more efficiently and quickly.

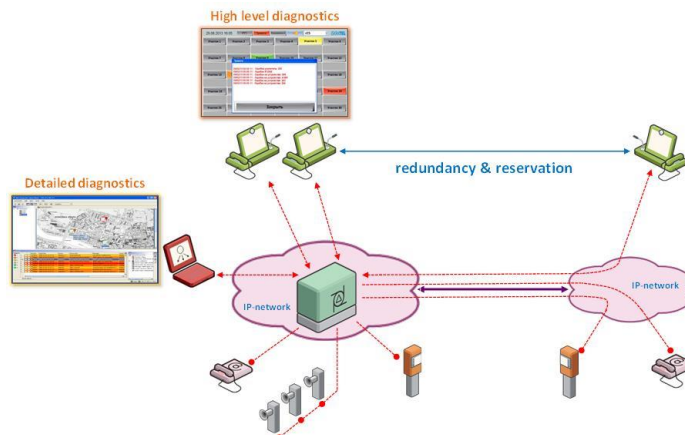


**Video camera** enables video communication with other users who possess the video communication abilities.



Additional **PTT pedal** which enables the MPD operator to switch to existing conversations.

### 3.3.2.4 SI3000 MPD Redundancy and Diagnostics



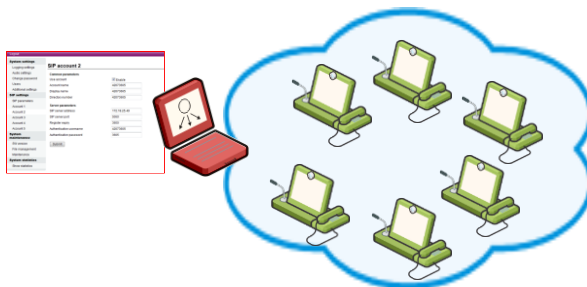
**Figure 14: Redundancy and diagnostic of network via MPD terminal**

MPD diagnostics is partly (high level of information) presented via the MPD GUI itself. Detailed information is presented by the central SI3000 FMS in accordance with the SI3000 product fault management principles.

Redundancy on the level of dispatching is achieved by duplication of MPD terminals. This enables also the reservation of the system.

### 3.3.2.5 Management of MPD terminal

Central management for MPD terminals is supported over web based management. The management enables two types of accounts rights:



**Figure 15: Management of MPD terminals**

- Administration rights for setting and managing system settings such as accounts managing, logging setup, audio setup and maintenance of terminal,
- User rights for setting user settings such as phonebook, function keys, services, call register, audio and video.

### 3.3.2.6 MPD terminal workplace

MPD terminal offers complete working environment for highly demanded operators which need to operate with large scope of tasks at the same time. For this kind of needs MPD terminal can be easily upgraded with video surveillance, information and notification services.





**Figure 16: Example of MPD terminal workplace**

### 3.3.2.7 SI3000 MPD Services and features

Multipurpose dispatcher is a highly customizable SIP device which can be adapted to the requests of any user or industry. MPD operator is able to use large set features:

- Deactivating/activating voice link of conference participant,
- Simplex call to all subscribers,
- External call to specific subscriber on intercom,
- External call to one or more specific speaker groups (zones),
- Supporting of monitoring/diagnostic functionality,
- Supporting auto-answer of incoming calls,
- Supporting establishment of calls via graphical interface,
- Supporting of supervision different signals (alarms, train movements),
- Supporting of PNS (PA/GA) functionality,
- Supporting NIC redundancy,
- Supporting specific SIP protocols for communication Radio over IP,
- Supporting redundancy operation mode (primary/secondary terminal),
- Supporting users and system event logging (different levels),
- Supporting priority calls handling,
- Supporting individual video calls,
- Supporting of audio and video conferencing;

## 3.4 Input/Output devices

A set of input/output devices can be integrated with the communication and dispatcher platform to provide a complete solution to the user. Document presents only a part of them. New or similar type of devices can be integrated in order to fulfil user's technical requests.

### 3.4.1 Phone and intercom devices

Different phone terminals (analogue, ISDN and SIP) can be used as enterprise communication terminals.

For special purposes are used dedicated terminals like external weather/explosion proof intercom terminals.

#### 3.4.1.1 ISDN phone terminal CS400/CS410



**Figure 17: ISDN terminals**

Optimally matched to the SI3000 systems, the Iskratel ISDN phones offer a variety of professional functions, like operative calls, subscriber line status display etc.

Telephone offers 7-line graphic display, 7 soft keys for user prompting and 5 freely programmable function or direct call keys (2 levels) with LEDs on the basic phone; expandable with up to 3x20 keys on additional keyboard modules.

User interface is available in English, Russian, Slovenian and Bosnian language.

The CS410 phone can be adapted for PTT functionality, with PTT on handset and port for PTT pedal, along with external microphone and loudspeaker for louder voice reproduction.



**Figure 18: PTT handset and foot-pedal**

Optional PTT key built-in handset or PTT pedal enables the user to include into existing conversations with his voice only when necessary.

#### 3.4.1.2 Office SIP phones family

Yealink SIP-phones are usually used in Iskratel solutions, due to:

- Proven stability and great interoperability with SI3000
- Advanced functionality (BLF/BLA, intercom, Call recording, XML browser...)
- integration with Iskratel IMS for easy deployment and management of some models



**Touch Screen Video IP Phone VP-530**

- > 7" Touch Screen
- > HD voice
- > 3 Way Video Conferencing
- > 7" 800 x 480 pixels resolution
- > Rotatable CMOS sensor camera with 2M pixels
- > Up to 4 SIP accounts, 18 one-touch soft DSS keys



**Ultra-elegant Gigabit IP Phone SIP-T46G**

- > Yealink Optima HD voice
- > Dual-port Gigabit Ethernet
- > 4.3" 480 x 272-pixel colour display with backlight
- > Built-in a USB port, support Bluetooth headset (Through USB Dongle)
- > Up to 6 SIP accounts, Paper label free design



**Ultra-elegant Gigabit IP Phone SIP-T42G**

- > Yealink Optima HD voice
- > Dual-port Gigabit Ethernet
- > 2.7" 192x64-pixel graphical LCD with backlight
- > Up to 3 SIP accounts
- > Paper label free design, PoE support



**Gigabit Color Phone SIP-T38G**

- > Dual-port Gigabit Ethernet, Power over Ethernet
- > 4,3" TFT-LCD, 16.7M colours, Intuitive user interface
- > HD Voice: HD Codec, HD speaker, HD handset
- > 6 VoIP accounts, BLF/BLA, IPv6, Open VPN
- > Headset, Support Wireless Headset, LCD Expansion module



**IP Phone SIP-T28P**

- > 6 VoIP accounts, 320x160 graphic LCD
- > HD Voice: HD Codec, HD Speaker, HD Handset
- > BLF/BLA, XML phonebook, Auto-provision
- > 2xLAN, PoE, Headset, Expansion module



**IP Phone SIP-T22P**

- > 3 VoIP accounts, 132x64 graphic LCD
- > HD Voice: HD Codec, HD Speaker, HD Handset
- > BLF/BLA, XML phonebook, Auto-Provision
- > 2x RJ45, PoE, Headset, Wall-mounted



**IP Phone SIP-T20P**

- > 2 VoIP accounts, 2x15 characters LCD
- > HD Voice: HD Codec, HD speaker, HD handset
- > 2xRJ45, PoE, Headset, Wall-Mounted

**3.4.1.3 Office analogue phone terminal CP-370**

Analogue phone with CLIP and 10 direct keys and hands-free operation. Phone can be also adapted for PTT functionality.



**3.4.1.4 Terminals for special purposes**

**Analogue and SIP terminals in different variants from our partner Fitre:**

- ◆ robust, designed to work in harsh and noisy environment
- ◆ weather proof up to IP66, some models for extended temperature range from -40°C to +70°C
- ◆ explosion proof for group I and II
- ◆ with or w/o handset (intercom design), numerical keyboard or display
- ◆ can be equipped with beacon light or additional external speaker for indicating the incoming call in noisy environment
- ◆ matched for work with SI3000 system

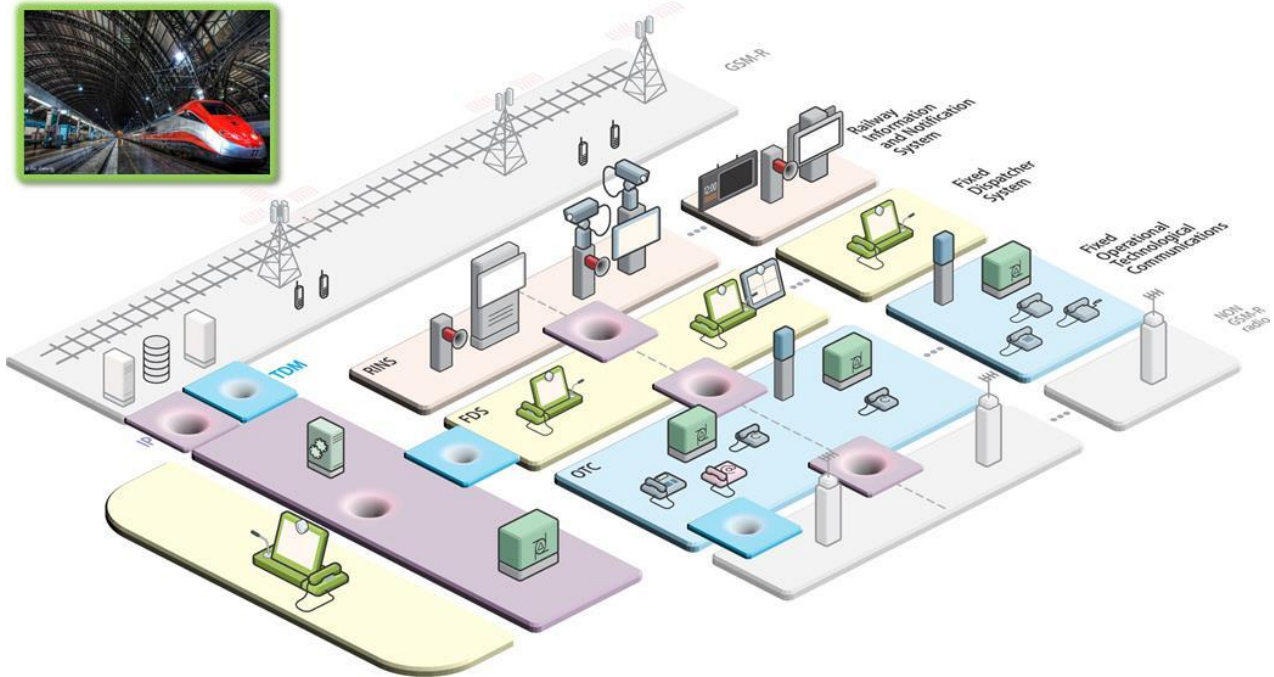


Figure 19: Intercom stations

## 4 Fields of use

### 4.1 Transportation

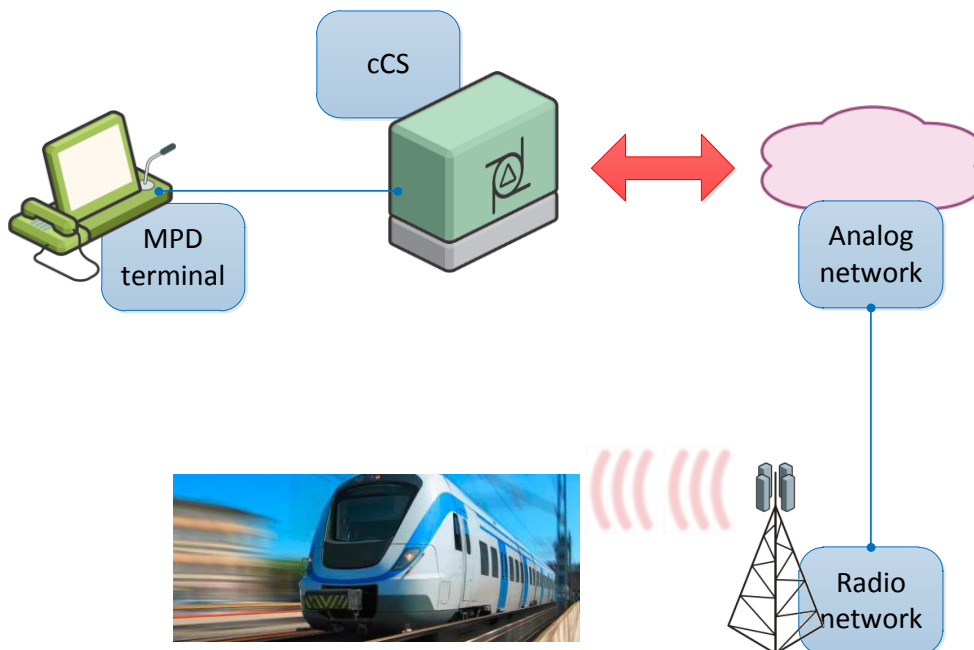
Transportation & traffic requests a complex dispatching system which incorporates public and personnel notifications, textual (video) information for passengers and control over the exceptional situations. SI3000 DS4I fulfils following requests:



**Figure 20: Example of transportation solution**

- Improving of traffic flows through attractive and easy-to-spot information,
- Terminal equipment suitable for any type of environmental conditions,
- Distribution of digital signage and announcement information,
- Easy to operate, maintain and troubleshoot,
- Small station can be fully served from a central location;

## 4.2 Radio connections



**Figure 21: Radio communication**

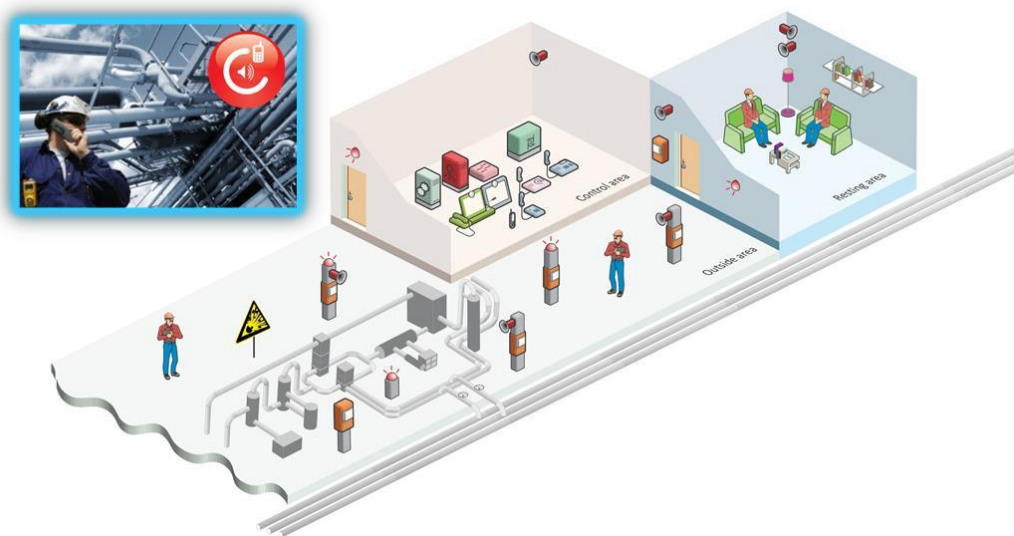
MPD terminal supports the role of connection to the train via the analogue radio stations. Connection between MPD terminal and train is always 1:1, connection to multiple trains at the same time via the same channel is not supported. Connection can only be dropped on the demand of the MPD terminal. MPD terminal can trigger the connection towards analogue radio station which then connects to the nearest train. The train then has the possibility to make a group call on the trains which are nearby.

Connection is always in SIMPLEX mode which is controlled by MPD terminal by pressing the pedal (Push to Talk) – which then reverses the connection. The train also has an option to trigger the call to all nearby analogue radio stations – which then connects the train to the MPD terminal.

## 4.3 GSM-R Fixed Dispatcher System

The SI3000 dispatching system supports with Multi-purpose Dispatcher Terminal and Dispatcher servers the functionality required for work in GSM-R network. It supports integration with existing network on fixed side and connection to mobile part of the network. It is EIRENE certified and supports the MLPP, REC, FN and other railway specific needs as role management, SMS to FN and train location information. The Dispatcher server supports centralized administration of all dispatcher configurations, role transfers in case of night shifts, SMS sending and receiving and history of calls and SMS.

## 4.4 Industry

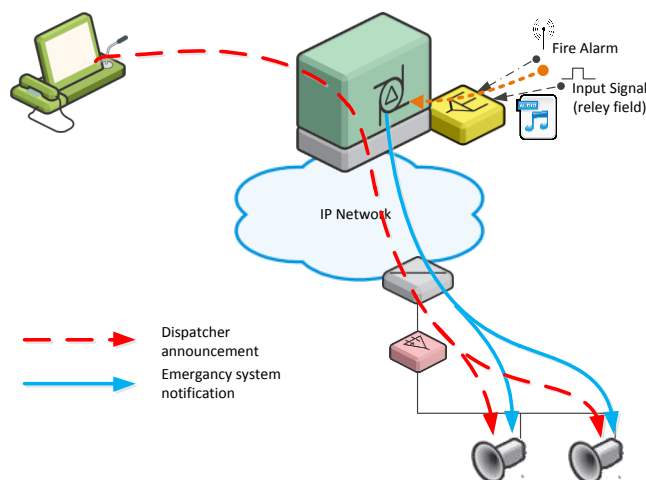


**Figure 22: Example of high-risk industrial solution**

SI3000 DS4I can be widely used in various industries. Large set of input/output devices such as detectors, audio/video terminals enables:

- Distribution of voice/visual information,
- Simplified working process using high-end features,
- Secure and fast distribution urgent, life-saving information,
- Increased safety of personnel,
- Common control centre for communicating, controlling and monitoring;

## 4.5 Notifications in case of emergency situation



**Figure 23: Example of audio notification in critical situations**



In case of emergency situation detected by PIA dry contact monitoring detectors, automatic (or live) notification can be delivered to the enterprise personnel.

In such case the notification messages are reproduced via the PNS speakers.

If the same speaker devices are already used for e.g. dispatcher announcement, this announcement is cut due to the emergency notification call higher priority and the last is delivered to the personnel.

## 4.6 Railways Information and Notification System (RINS)

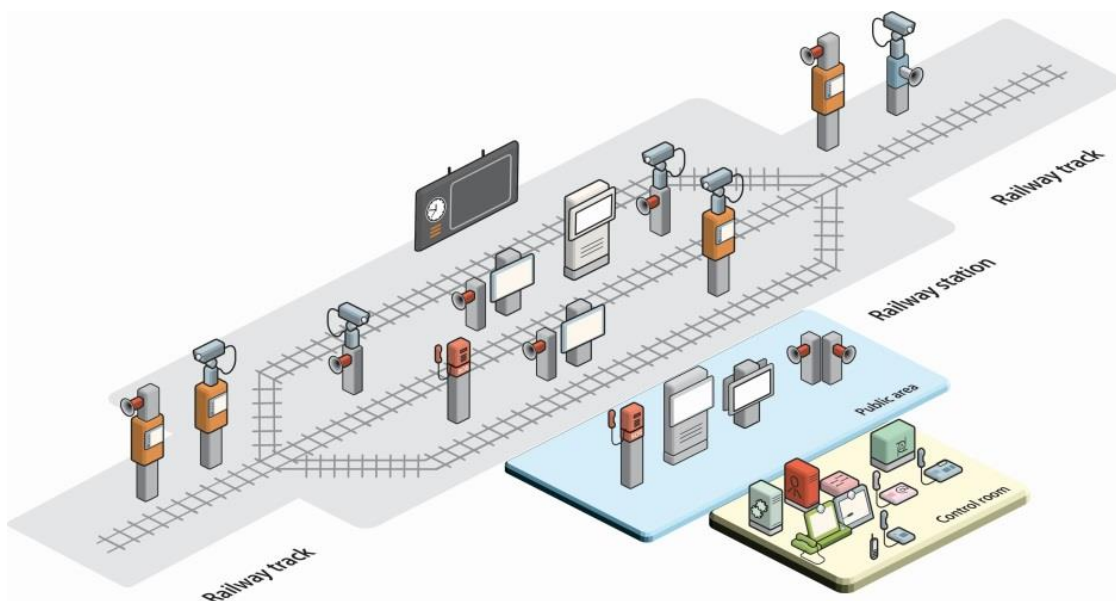


Figure 24: Example of RINS

Iskratel RINS solution offers the user wide possibilities for:

- General travel information (exact time, departures and arrivals, expected delays, gate numbers, etc.),
- safety information in cases of emergency,
- advertisements and
- service messages for the operator's personnel.

Iskratel RINS solution can be implemented in many different configurations as a standalone solution or as a part of the overall Railways InfoCommunication solution.

SI3000 MPD is a vital component of the system and enables control over the entire railway system communication.

## 4.7 Video communication

MPD terminal supports video call and conferencing functionality for better and transparent operator experience in operational communications. With video and conference functionality on SI3000 MPD terminal we bring real-time live communication in different industries.

The video conferencing on MDP terminal enables live communication with up to 16 participants which are monitored by the main operator on extended display. At the same time the stream of the active speaker is presented to all the active participants of the conference. The main operator has ability of voice deactivation, activation and complete isolation of voice link for individual participant in active conference.

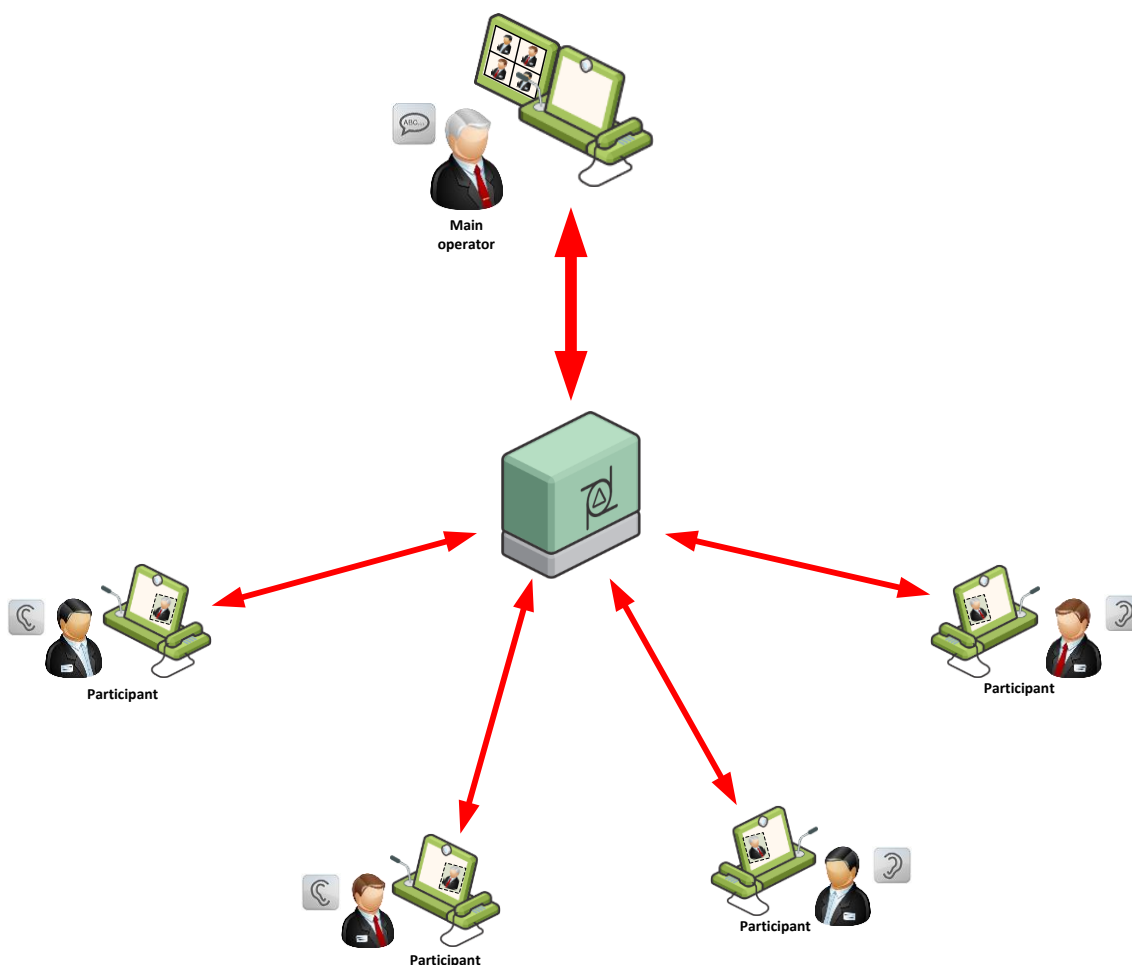


Figure 25: Video conference communication

## 4.8 Video surveillance

Optionally the Multipurpose dispatcher is offering possibility of integration with Video Surveillance system. By using of touch screen interface the operator can easily switch between various cameras. The goal of integration SI3000 MPD and video surveillance is to display critical information from both systems on a single user interface. The system is providing the ability to automatically launch live video stream from camera associated with caller or with audio notification zone.

Sensors such as door switches, smoke detectors, IR detectors or glass break detectors can be used for triggering launch of live camera stream and provide faster incident response and improved security.

To optimize audio notifications, system provides auto-notifications with pre-defined audio messages that are triggered by Intelligent Video Analytics.

Intelligent Video Analytics system of Video surveillance enables automatic triggering of audio notifications based on detection of sensor events.

## 5 Abbreviations

Abbreviation	Meaning
CAS	Channel Associated Signalling
CB/LB	Central Battery/Local Battery
cCS	SI3000 Compact Call Server
DECT	Digital Enhanced Cordless Telecommunications
DRS	Digital Recording Server
DS4I	Dispatching Systems for Industry
DUPLEX/SIMPLEX	Two way/Single way voice communication
E1	European PCM (2 Mbit/s) PCM30
ES	SI3000 Ethernet Switches
FMS	SI3000 Fault Management System
GSM	Global System for Mobile Communications
GSM-R	GSM – Railway
GUI	Graphical User Interface
HD	High Definition
I/O	Input/output device
IP	Internet Protocol
IR	Infra-Red
ISDN	Integrated Services for Digital Network
LED	Light-emitting diode
LTE	Long Term Evolution (4G LTE)
MLPP	Multilevel Precedence and Pre-emption
MN	SI3000 Management Node
MPD	SI3000 Multi-Purpose Dispatcher
MPS	SI3000 Modular Power Supply
NS	SI3000 Notification Server
OSS/BSS	Open Source Software/Business Support System
PA/GA	Personal Address System
PC	Personal Computer
PCM	Pulse Code Modulation
PIA	Peripheral Interface Adapter
PNS	Personnel Notification System
PRA	Primary Rate Access
PTT	Push To Talk
QSIG	Q reference point signalling system
RINS	Railways Information and Notification System
RINS	Railways Information and Notification System
SIP	Session Initiation Protocol
SMS	Short Message Service
SOAP	Simple Object Access Protocol
SS7	Signalling system No.7
TDM	Time Division Multiplexing
TETRA	Terrestrial Trunked Radio
VAD	Voice Activity Detection
VoIP	Voice over Internet Protocol
VU meter	Volume Unit Meter

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