UPBX
MiniCom DX-500

Digital telecommunications platform

Telecommunication system MiniCom DX-500 —
platform for modernizing communication networks of large enterprises and departments. Its distinctive feature is its ability to optimally fit into almost any corporate communication system, harmoniously combining the ability to work with both old analog systems and the most modern digital equipment.

Features and Applications

The MiniCom DX-500 telecommunication system was created as a unified digital platform for modernizing communication networks of large enterprises and departments.

Understanding well that the digitalization of communication networks will occur in stages, the developers of the MiniCom DX-500 system paid special attention to:

- **ensuring continuity of equipment, compatibility with existing analog channels and equipment, the possibility of smooth, phased modernization of communication networks;**
- **preservation of existing network algorithms and conveniences of dispatch control when transferring systems to work via digital channels and communication lines;**
- **unification of the hardware of switching and terminal equipment of networks, significantly increasing the redundancy and maintainability of equipment, allowing the functions of these systems to be combined in a single product;**
- **providing subscribers (and primarily dispatchers) with expanded capabilities of digital networks with service integration, including the transmission of video information, while unconditionally maintaining existing management principles;**
- **increasing the stability and quality of communication.**

ИНФОРМ ТЕХНИКА

Main technical characteristics of PBX MiniCom DX-500

Types of internal subscriber ports		
	Analog 2-wire	local (analog TA) / speaker (loudspeaker) / MB (MB device)
	Digital 2-wire	digital remote control (Upoe)
	Digital 4-wire	ISDN device (2B+D), So
Types of ports for external trunks		
	Analog trunks	city 2-wire trunk line / 4-wire trunk line (TC) / 3-wire trunk / 6-, 8-wire trunk
	Digital trunks	ISDN PRI, CAS PCM lines for connecting a DECT controller VoIP Ethernet 10/100
Dedicated digital channels for data collection and transmission		
		V-24 (RS-232)
Alarm types		
	4-wire (TC)	outgoing trunk line / LDSL with ten-day dialing / incoming trunk line with ten-day dialing / outgoing SL/LDL with MBSK-shuttle dialing / incoming SL with MCHK-shuttle dial / incoming SLM with ten-day dialing / incoming SLM with set of MBS-shuttle / 2600 2-sided / 2100 2-sided / 600 2-sided / 600+750 2-sided / ADASE / TDNV / TDNI
	3-wire	outgoing trunk/bandwidth with ten-day dialing / incoming trunk line with ten-day dialing
	6-, 8-wire (E&M)	with immediate confirmation / without Wink with response signal / with Wink with response signal / without Wink and response signal
	6-wire DSL	1ÿÿÿ (inductive code) / 1ÿÿÿ (Mink code)
		2VSK with a ten-day set / 2VSK with a set of MChK-shuttle / 2VSK SLM with a ten-day set / 2VSK SLM with a set of MChK-shuttle / USL 2VSK with a ten-day set / USL 1 VSK with a ten-day set / E-DSS1, E1 interface / E-DSS1, So / Q-SIG / E&M / R2 interface
IP telephony		
	Protocol	SIP

ИНФОРМ ТЕХНИКА

UPBX MiniCom DX-500

System architecture

PBX MiniCom DX-500 *is* a completely digital switching system. Its architecture makes it possible to build communication networks in a configuration with multiple access to one or more digital paths, which significantly increases the efficiency of using communication channels and increases the network capacity. The modular principle of system construction ensures simplicity and cost-effectiveness of capacity expansion in the range from 32 to 4096 ports and 48 DSLs.

Distinctive features of the system architecture:

- **Distributed control method. Every 128 ports or 4 PCM paths are serviced by independent processors with their own software.**
- **Distributed switching. Every The control module has its own non-blocking digital switching field. Switching of conversation paths within the cluster is carried out without the use of centralized station resources.**
- **Availability of a duplicated common non-blocking switching field of 1024 for 1024 ports.**
- **Possibility of spatial separation of station modules over significant distances along digital paths or fiber-optic lines.**
- **Possibility of using MiniCom DX-500 as a terminal, transit or transit-terminal station.**
- **To reduce the cost of equipment in stations with a capacity of up to 256 ports, it is possible to operate without a duplicate digital switching fields.**

Interstation connections

For interstation interaction of MiniCom DX-500 systems, an in-house protocol is used DX-NET, which provides full exchange of service information between parts of stations.

Work with PBX from other manufacturers occurs using standard protocols OKS No. 7, EDSS-1, Q.SIG or 2ÿÿÿ (R1.5).

The developers of the MiniCom DX-500 system paid special attention to its operation on departmental communication networks. The station supports all types of internal alarms used in the territory of the former Soviet Union. UPBX has certificates from the Ministry of Digital Development, Communications and Mass Communications of the Russian Federation, and certificates from departmental commissions that give the official right to work on departmental communication networks.

Network solutions

Maximum cabinet capacity:

- **up to 256 ports and 4 DSLs;**
- **up to 512 ports and 12 DSLs;**
- **up to 1024 ports and 20 DSLs.**

The in-house DX-NET protocol, which ensures inter-station interaction of Mini-NiKom DX-500 systems, allows you to combine up to 4 stations with a single switching field and services and increase the system capacity to 2048 ports and 24 DSLs.

Using an additional module (Switching center), it is possible to combine up to 8 DX-500 modules, forming a station with a total capacity of 4096 ports and 48 DSLs.

The serial-ring architecture of the MiniCom DX-500 PBX provides the ability to build long-distance communication networks. Such a network can include up to 256 stations. They are combined via the E1 digital stream using the standard E-DSS1 protocol.

Removal of GATS subscriber capacity

Thanks to the support of common digital trunk protocols (DTL), widely used in the interconnected communication network (ICN) of the Russian Federation, the MiniCom DX-500 system can be used as a UPBX included in the National Automated Telephone Communication System (OGSTFS) as a substation.

The connection to the GATS, which allocates part of its capacity at the level of trunk lines, is carried out at a primary speed of 2048 Kbit/s, providing 30 B-channels of 64 Kbit/s for information transmission and 1 D-channel of 64 Kbit/s for signaling.

Interaction with the VSS is organized using standard signaling 2ÿÿÿ (R 1.5), OKS No. 7.

MiniCom DX-500 can interact with rural PBXs via two-way trunk lines with two or one VSK.

The response to a caller ID equipment request, implemented in a standard way, makes it possible to include the MiniCom DX-500 UPBX in the automatic long-distance communication network as an end station.

Station services

Parallel call services

One of the key capabilities of the subscriber, on which many of the station's services are based, *is* the subscriber's ability to organize any number of independent conversations simultaneously from one device, with the ability to switch between them, combine and control.

Organizing a new conversation without leaving the current one

While in a conversation with one subscriber (current conversation), simply dialing the number of another subscriber, a new conversation is organized. In this case, the second subscriber (from the current conversation) is automatically put on hold. The subscriber can switch between conversations or combine them into multi-party conversations (conference calling). Repeating this operation allows you to organize almost any number of conversations.

Merging and switching services:

- switch to the previous one;
- combine with the previous one;
- switch to incoming;
- merge with incoming;
- realize the subscriber's ability to switch and merge conversations.

Unconditional forwarding

Unconditional forwarding allows you to forward all calls to a subscriber to the number of any other subscriber. It is possible to organize redirection not only to the station subscriber, but also to an external line with pre-programmed additional dialing of an external network number.

Busy forwarding

"Busy forwarding" allows, if the called subscriber is busy, to forward incoming calls to another number, determined when ordering the service at the station.

Forwarding on non-response

"Forwarding on no answer" allows you to forward incoming calls to another number after the time defined as the "no answer" time has elapsed when ordering a service at the station.

Scheduled forwarding

This service relates to the management of incoming calls and allows you to define a group of subscribers to whom the call will be sequentially redirected in the event of "non-answer" of each of them. The "no answer" time is determined for each port individually.

Group Call Pickup

Intercepts an incoming call by any subscriber in the group.

Notification and end call services

Call notification

To use this service, the subscriber calling a busy subscriber dials the service code, after which a special signal informs the subscriber conducting the conversation about the receipt of an additional call. The subscriber can accept or ignore the incoming additional call.

Voice (emergency) notification

In emergency situations, if the called subscriber does not answer after sending a notification signal, the calling subscriber can redial the service code. In this case, the caller's transmission path is connected to the callee's receive path (with 6 dB attenuation) and voice notification becomes possible. In this case, the caller cannot hear any of the participants in the conversation, and the second participant in the conversation also does not hear the notification addressed to the partner.

Ending a call to a busy person

The Call Back service allows the caller to order a repeat call to a busy subscriber after the end of the call.

End a call on no answer

This service is similar to the previous one, but a repeat call will occur after the first conversation from the absent subscriber’s phone.

Dialing service

The subscriber is given the opportunity to repeat the last dial, if it did not exceed 28 characters, including pauses. When calling the “Repeat dialing” service, the station repeats the entire sequence of the previous dial as it was made (i.e., automatically reproduces pauses between digits as the subscriber did them).

Conference call

This service allows any subscriber to combine conversations into a conference by sequentially calling and connecting additional subscribers.

Any of the conference participants can also add additional lines to it using the same service.

In total, up to 60 participants can participate in one conference.

Circular conferences

To facilitate calling frequently collected conferences, there is a circular conference collection service: the required number of groups of subscribers is determined, the circular call of which is carried out by dialing the service code and the number of a pre-prepared group. All called subscribers are in a multi-party conversation when they pick up the handset.

Communication restriction services

For flexible distribution of all station capabilities, 256 levels of categories and priorities are provided. Incoming and outgoing categories are assigned to subscribers, external lines and communication channels. Categories are also assigned to service capabilities. Depending on their distribution, specific interactions of subscribers, channels and services are allowed or prohibited.

Tariff services

This service is designed to provide, if necessary, payment for calls on certain categories of lines, providing information about the calling and external line used for communication, the dialed number, type of call, date, time and duration of the conversation.

Measurement and adjustment services

The station provides semi-automatic adjustment of subscriber sets to the parameters of a specific line and subscriber device, as well as automated determination of the state of line-cable devices, carried out by measuring inter-pair transitions.

The first of these services is available even to subscribers and can be called by dialing the service number, the second is intended for the convenience of service personnel.

Call recording services

The MiniCom DX-500 system may contain an additional software and hardware complex for recording conversations based on a personal computer, which allows you to organize the recording of conversations on 4, 8 or more channels, for example, to record all technological conversations of the dispatcher.

Voice mail

The voicemail owner can listen to, save, delete, or forward received voice messages with his comments.

Notification system

The system allows you to notify subscribers using a predetermined list of numbers and transmit to them autoinformer phrases, for example, notifying subscribers about a debt.

Special (non-telephone) services

There are a number of equipment configurations to solve specific problems of departmental telecommunications, when the MiniCom DX-500 system is able to offer services that are desirable and appropriate in complex communication networks, but not typical for telephone exchanges. Among them *is* constant switching of channels with their output in digital or analog form for various needs. This service is necessary, for example, when a linear communication structure is built along long objects with low traffic, and there is a limited number of PCM paths for combining objects

MiniCom DX-500 takes on the role of a multiplexer in such a structure, allocating channels for the needs of data transmission, telemetry, and building departmental trunking systems both in digital and analog form (2- or 4-wire terminations, standard joints).

System of operational-search activities

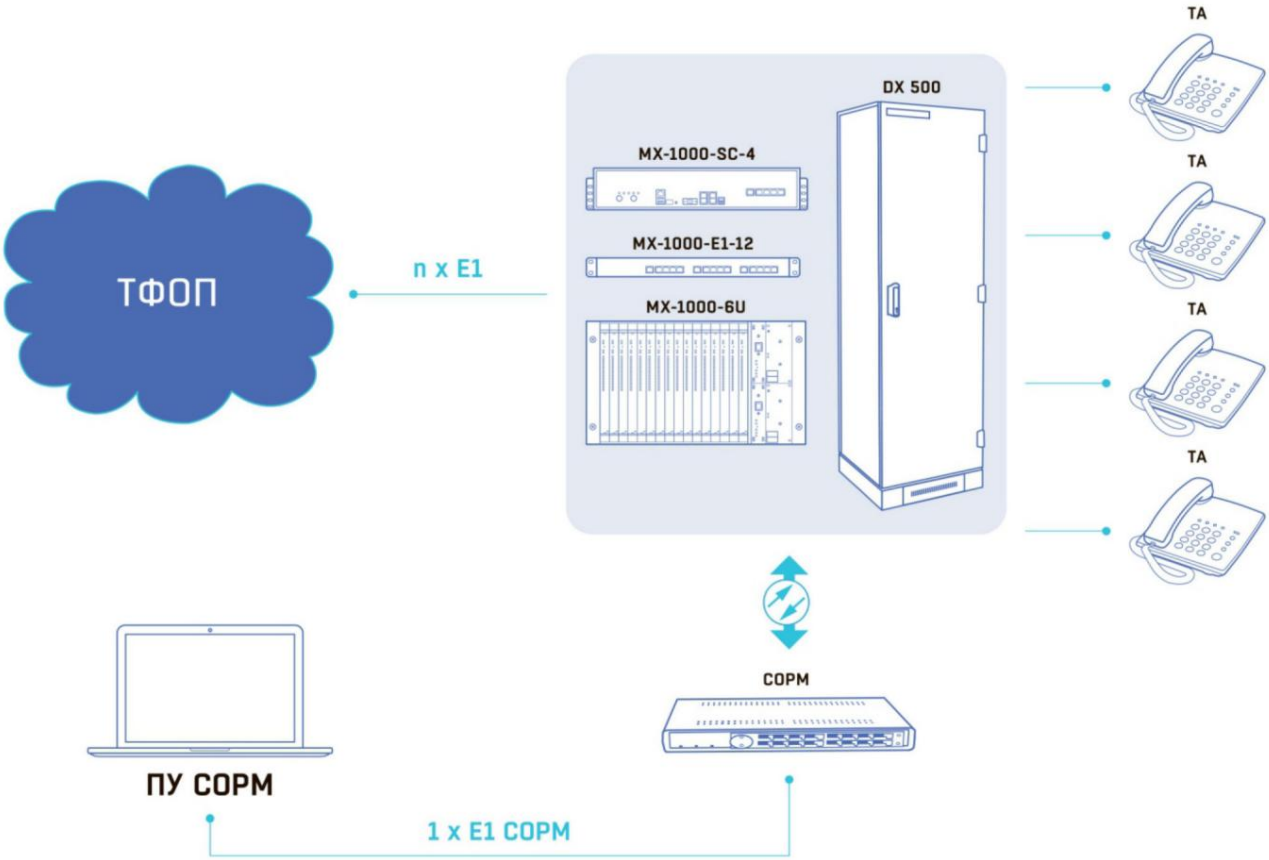
The system of operational-search activities SORM *is* a complex of software and hardware, the main purpose of which is to provide authorized bodies with access to a database of services provided (established connections) and, by a court decision, *the* ability to listen to (record) telephone conversations.

Solutions of the Informtekhnika Group of Companies based on the MiniCom DX-500 UPBX equipment in the field of SORM meet the requirements of the following regulatory documents:

- **Technical requirements for the system of technical means to ensure the functions of operational investigative measures on "electronic telephone exchanges" (Appendix No. 4 to the Order of the State Committee for Communications of Russia dated April 20, 1999**
- **Technical requirements for information exchange channels between the system of technical means to ensure the functions of operational-search activities and the "control point" (Appendix No. 5 to Order of the State Committee for Communications of Russia dated April 20, 1999 No. 70).**
- **"Rules for the use of switching system equipment, including software, ensuring the implementation of established actions during operational investigative activities. Part II. Rules for the use of equipment of transit, terminal-transit and terminal communication nodes of the fixed telephone network, including software that ensures the implementation of established actions during operational investigative activities," approved by Order of the Ministry of Telecom and Mass Communications of Russia dated November 19, 2012 No. 268.**

The unified technical solution is a hardware and software tool that is connected to the control panel via the connecting line of the E1 interface of the authorized body of the ORM (FSB of the Russian Federation) and additional specialized PBX software.

PBX
MiniCom DX-500



PBX
MiniCom DX-500-compact

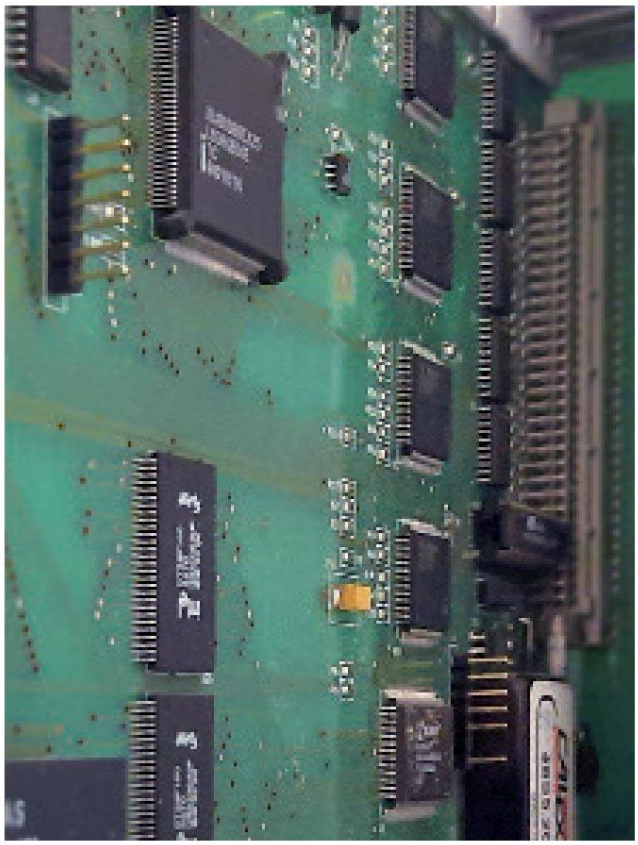
Telecommunication system MiniCom Dÿ-500-compast is an excellent addition to the MiniCom DX-500 information and communication platform and is intended for use in distributed networks of various departments as a low-capacity PBX. Having a modular structure, the station can be expanded to a capacity of 64 or 96 ports. The MiniCom DX-500-compact station is made in a standard 19” frame, does not require a separate rack and can be placed either in racks with other equipment, or in a wall-mounted or desktop version of the case.

The flexible architecture ensures optimal connection of the station to any location and to networks of any configuration, and the distributed control system allows the construction of networks of any complexity. Stations can be combined into a network with an arbitrary topology: “ring”, “star”, combined options.

The set of network interfaces and alarm types of the MiniCom DX-500-compact system allows it to access networks via any communication channels used in Russia. For inter-station interaction, the intra-company DH-NET protocol is used, which ensures full exchange of service information between stations. Connection to systems from other manufacturers is carried out using both analog connectors and

both lines and digital channels.

On departmental communication networks, the MiniCom system Dÿ-500-compact can be used as an autonomous PBX, removal of subscriber capacity from the central station, a digital switch for manual maintenance, IP-PBX, a dispatch switch in communication networks for power engineers, a dispatch switch in general technological and operational-technological networks railway transport communications, digital communication equipment for meetings. The station allows you to organize duplex loudspeaker and command-search communication systems. If necessary, it is possible to connect the MiniCom-DECT microcellular communication system. The station interfaces with analog and digital trunking communication systems and connects to satellite communication systems. The station’s operating parameters can be changed both from the operator’s seat and remotely from a single service center. Using the communication network monitoring and administration system, the operator receives a visual display of the current status and load of communication equipment.



The MiniCom DX-500-compact system provides its subscribers with a full range of office PBX services. These include: a reminder of a planned event, organizing a new conversation without leaving the current one, various forwardings, intercepting calls in groups, conference calls, circular conferences, etc.

UPBX
MiniCom DX-500-compact

Main technical characteristics PBX MiniCom DX-500-compact		
Types of internal subscriber ports		
	Analog 2-wire	local (analog TA) / speaker (loudspeaker) / MB (MB device)
	Digital 2-wire	digital remote control (Upoe)
	Digital 4-wire	ISDN device (2B+D)
Types of ports for external trunks		
	Analog trunks	city 2-wire trunk line / 4-wire trunk line (TC) / 3-wire trunk / 6-, 8-wire trunk
	Digital trunks	ISDN PRI PCM lines for connecting a DECT controller VoIP Ethernet 10/100
Dedicated digital channels for data collection and transmission		
		V-24 (RS-232) / V-11 (RS-422/485)
Alarm types		
	4-wire (TC)	outgoing trunk line / LDSL with ten-day dialing / incoming trunk line with ten-day dialing / outgoing SL/ZSL with MBSK-shuttle dialing/ incoming SL with MCHK-shuttle dial / incoming SLM with ten-day dialing / incoming SLM with set of MBS-shuttle / 2600 2-sided / 2100 2-sided / 600 2-sided / 600+750 2-sided / ADASE/TDNV/TDNI
	3-wire	outgoing trunk line / LDSL with ten-day dialing / incoming trunk line with ten-day dialing
	6-, 8-wire (E&M)	with immediate confirmation / without Wink with response signal / with Wink with response signal / without Wink and response signal
	6-wire DSL	1ÿÿÿ (inductive code) / 1ÿÿÿ (Mink code)
		2VSK with a ten-day set / 2VSK with a set of MChK-shuttle / 2VSK SLM with a ten-day set / 2VSK SLM with a set of MChK-shuttle / USL 2VSK with a ten-day set / USL 1 VSK with a ten-day set / E-DSS1, E1 interface / E-DSS1, So /Q-SIG/E&M/R2 interface

Equipment operational-technological communication MiniCom DX-500.ZhT

The railroad communications system is one of the oldest and probably the most complex departmental communications systems.

In recent years, active modernization of railway communication networks has begun. Digital PBXs are being installed, thousands of kilometers of fiber-optic communication lines are being laid, new technologies are being introduced, thanks to which new opportunities are opening up for managing passenger and cargo transportation.

The Informtekhnika group of companies offers equipment developed on the basis of the most modern telecommunication technologies and at the same time taking into account the specific requirements of the railway communication system. Hundreds of MiniCom DX-500.ZhT stations are successfully operated on the following railways: Oktyabrskaya, Kaliningradskaya, Moscow, Gorky, Northern, North Caucasus, Kuibyshevskaya, Sverdlovsk, Far Eastern, Sakhalinskaya, Yakutskaya, Yamalskaya; on the railway networks of Uzbekistan and Kazakhstan.

Special solution for railway communication networks

The MiniCom DX-500.ZhT switching system is a version of the digital UPBX MiniCom DX-500 commercially produced by Informtekhnika. Telecommunication

equipment MiniCom DX-500.ZhT is designed specifically for use in railway communication networks in accordance with the requirements of the "Terms of Reference for the development of a digital automatic telephone exchange for railway transport":

- **Code ATS-C, 1994, "Technical specifications for the development of operational-technological communication equipment for Russian railways."**
- **OTS-C code, edition 2/1998, developed by VNIIASZHT and approved by the Signaling Department,**

communications and computer technology of the Ministry of Railways of the Russian Federation.

Documentation of the operational-technological wire communication system of Russian railways:

- **"Basic technical and operational requirements", edition 2, VNIIAS ZhT, 1997, OST 32.145-2000.**
- **"Operational-technological communication system for Russian railways", OST 32.180-2001.**
- **"Clock network synchronization system for Russian railways" and the concept of modernizing the communication system for meetings of railway transport in the Russian Federation.**

Equipment operational-technological communication MiniCom DX

The developers paid special attention to:

- ensuring continuity of equipment, compatibility with existing analog channels and equipment, the possibility of smooth, phased modernization of communication networks;
- preservation of existing network algorithms and convenience of dispatch control when transferring systems to work via digital channels and communication lines;
- unification of the hardware of switching and terminal equipment of the OTO and OTS networks, significantly increasing its redundancy and maintainability, as well as allowing the functions of these systems to be combined in a single product;
- providing subscribers, and primarily dispatchers, with expanded digital network services with service integration, including the transmission of video information and IP telephony, while maintaining existing management principles;
- increasing the reliability and quality of communication.

Range of application

Initially, the MiniCom DX-500.ZhT station was developed to work on communication networks of various departments. It can be applied:

- for building communication networks;
- for connecting the departmental network with the communication networks of other departments;
- for access to public networks;
- for work in digital networks with integration of services (130M);
- in the subsystems of manual service operators;
- in dispatch centers;
- in information centers and passenger service centers;
- as a meeting communication system;
- to create a microcellular communication system of the DECT standard;
- for interfacing with trunk and satellite communication systems;
- for multiplexing and transmission of up to 4 (up to 8) E1 digital streams over 1 (2) optical fibers and semi-permanent switching of individual central communication centers to ensure data transmission.

The architecture of the MiniCom DX-500.ZhT system allows it to be used in digital networks of general technological and operational-technological communications, in the communication system of meetings of railways in Russia, the CIS and the Baltic countries.

Equipment operational-technological communication MiniCom DX-500.ZhT

The station can operate in both digital and analogue environments, which makes its use most effective in the evolutionary development of railway communication networks - from completely analogue to completely digital. The station can perform the functions of an automatic switching node (ASK) with any type of signaling for each trunk.

Thanks to its flexible structure, the MiniCom DX-5OO.ZhT station can be used as a local, departmental, road and main station. At the same time, in OTS and ObTS networks it is capable of functioning as an end, transit or transit-end station. In the hierarchical series, MiniCom DX-500.ZhT is considered as an administrative, executive-administrative, executive station for wired communications and train radio communications, while being at the same time a switchboard for station operational-technological wired communications. Based on the MiniCom DX-500.ZhT, it is possible to organize dispatch communications for a new transportation management vertical using switched, group and direct channels.

Types of communication

In accordance with the requirements of the Department of Communications and Computer Technology of JSC Russian Railways, the MiniCom DX-500.ZhT switching system provides the following types of railway communications:

- road regulatory communications;
- separate wire communication;
- communication of meetings:
  - station wire;
  - station administrative;
- park;
- distillation;
- data transmission of telemechanics systems and television alarms;
- separate wired connection PDS-train control room;
- PRS - train radio communication;
- EMF - energy dispatch;
- LPS - linear-track;
- PS - stationary;
- SDS - service control room for signalization and communications electricians;
- VDS - carriage control room;
- MDS - shunting control room;
- BDS - ticket control room;
- STV - transport paramilitary security of the Department of Internal Affairs;
- OPS - guarded crossing duty officer.

Interfaces and protocols

For the construction of digital operational-technological communication networks, an electrical interface for interstation exchange (G.703) is intended - 2 Mbit/s. PM channels can be used as a backup.

Interaction with other telephone exchanges via analog communication channels is carried out using single-frequency signaling 2600, 2100 and 1600 Hz, and through physical connecting lines - loop signaling.

Connection of digital trunk lines to the MiniCom DX-500.ZhT station in digital networks of general technological communication with integration of services is carried out through the ISDN basic (BRI) and primary (PRI) access interfaces.

For interstation interaction of MiniCom DX-500.ZhT systems, standard protocols and the in-house protocol DX-NET are used. Work with PBX from other manufacturers takes place using the E-DDS1, Q.SIG, 2ÿÿÿ (R1.5), 1ÿÿÿ protocols.

Interaction with PBXs of other departments can be carried out using their internal signaling protocols or PSTN signaling.

Equipment operational-technological communication MiniCom DX

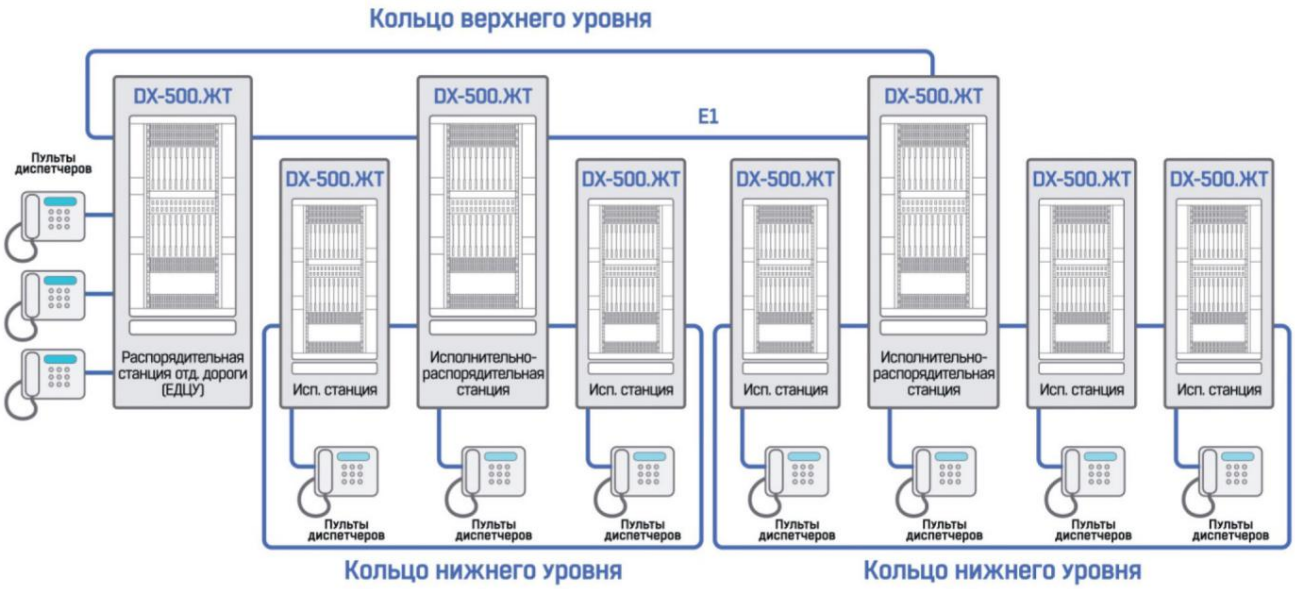
Hardware architecture

MiniCom DX-500.ZhT is a universal digital telecommunication platform. GC "Informtekhnika" has implemented the most modern developments that provide expansion of the scope of application, additional convenience in using communications and new opportunities for management, maintenance and increased reliability.

The MiniCom DX-5OO.ZhT station is a modular system that allows you to simply and economically increase capacity up to 4096 ports and 48 DSLs.

Features of the MiniCom DX-500.ZhT architecture:

- **Distributed control method. Every 128 ports or 4 PCM paths are serviced by independent processors with their own software.**
- **Distributed switching. Each control module has its own non-blocking digital commutation field.**
- **Switching of spoken paths within the cluster is carried out without the use of a centralized station resources.**
- **Availability of a duplicated common non-blocking switching field of 1024 for 1024 ports.**
- **Possibility of spatial separation of station modules over significant distances using digital paths or fiber optic lines.**



The OTS network based on MiniCom DX-500.ZhT stations is built on the principle of rings, which makes it possible to achieve high reliability of the communication system in the event of a break in the linear path. The equipment of executive station sections (up to 30 stations) is connected by a lower-level ring.

The sections are connected to the road branch control station (ROADTSU) by an upper-level ring through bridge stations. Thus, the upper-level ring acts as a pull-up channel from road sections to the control center. It is possible to automatically reserve dispatch communications via PM channels in the event of a break in both directions of the ring.

Using the MiniCom DX-5OO.ZhT systems, it is possible to build long-distance communication networks (up to 256 stations in the network), integrated via the E1 digital stream using the standard E-DSS1 protocol.