



PBX System

The PBX system offers an electronic solution for post offices, national postal services to manage and monitor their PO Box system.

Function and structure

The proposed PBX modular post box system is built up from intelligent units. Every single PO Box has its own, built-in, dedicated, lock driver unit with microcontroller; the PO Boxes connect to a common IP network. Via the network the boxes can be separately monitored and managed. The PO Boxes are placed in changeable Rack modules.

The modular system consists of rack towers with the same built and height, which can be placed next to each other, connected and built into box walls or islands, furnished with fascia signs and corner elements.

In a tower unit 6 Rack modules can be accommodated; one Rack module holds 9 small or 6 medium or 3 large boxes.

Thus, in a tower there can be 52 standard small boxes; from the medium PO Boxes 36 pcs, from the large ones 18 pcs can be accommodated. The Rack modules containing the three box types are in the same size and can be switched, and can be put into the racks in arbitrary proportion.

The customers access their PO Box with RFID proximity card and/or PIN. For such authentication, the PBX-F-PC-5L client console rack has 8,2" colour touchscreen and RFID card reader. On the screen the customers receive information on the status of their PO Box (or PO Boxes), and messages from the operation. Similar to the modular mechanical built of the system, the electrical system is simple and modular as well. In the Rack units, all



PBX-F-9S Rack



PBX-F-6M



PBX-F-PC-5L Rack

boxes have their own lock driver panels with microcontroller, which are in the same Po RS485 bus connection string. All Rack units have one Cat6 terminal with RJ45 plug. The six Rack units built in the same tower connect to a common PoE-RS485 gateway, which is connected to a PoE port of the PoE switch, belonging to the infrastructure of the building.

Physical features

All Rack modules are in the same size and can be easily exchanged. Rack modules are protected against unauthorized access and dismounting (PBX-FRM). The PBX tower – base unit of the system – is a massive, stable construction. Its variations are: open frame, can be used in a string (FRM), standalone cabinet (CAB), cabinet with a large, common door (CAB-G), cabinet for outdoor use (CAB-O). All towers have six Rack modules in a steady, rigid steel frame. Elements of the system are made of materials which can stand the extreme weather conditions: the walls and doors of the PO Boxes are corrosion resistant alloy steel, the coating of the doors is enhanced composite ABS cast. The structure has unified, clear forms, the



Designed box doors

doors will have designed, decorative coating, with numbering, handles and status signs integrated harmonically. Colouring strictly follows the customers' standards. The PO boxes are in RAL7035 colour by default, but colouring can be matched to the client's design and branding policy.



PBX-FRM

Dimensions

The new PO Boxes are well-trying, unified boxes with 180 mm width. Their suggested depth is 425 mm so even A3 sized printed materials can fit in (lengthwise, rolled up)

Suggested PO Box heights are as follow:

Small:	100 * 180 * 425 mm	(H*W*D)
Medium:	150 * 180 * 425 mm	(H*W*D)
Large:	300 * 180 * 425 mm	(H*W*D)

Box doors

The doors are on the front side of the boxes by default, but boxes with front and back doors can be requested.

- 1) Front opening door exists: PBX-F
- 2) Front + rear door opening exists: PBX-FR
- 3) Right hand hinged door: basic version
Left hand hinged door: LHD option
- 4) Common, second door exists for the whole unit (Double door): PBX-FD
- 5) Delivery agent can unlock all doors he is authorized to at the same time

Design and structure

The PBX system can be assembled, dismantled, moved in blocks and re-assembled anywhere, like building blocks, even in temporary settlements.

The basic selection of the blocks is:

- PBX-F-9S Rack unit containing 9 Small boxes with front doors
 - PBX-F-6M Rack unit containing 6 Medium boxes with front doors
 - PBX-F-3L Rack unit containing 3 Large boxes with front doors
 - PBX-F-PC-5L Rack unit containing industrial PC and RFID card reader and 5 small boxes
 - PBX-CAB Standalone cabinet for mounting 6 pcs Rack units, indoor design
 - PBX-CAB-G Standalone cabinet for mounting 6 pcs Rack units, indoor design, with a second, common glass door for the whole cabinet
 - PBX-CAB-O Standalone cabinet for mounting 6 pcs Rack units, outdoor design
 - PBX-FRM Frame for mounting 6 pcs Rack units, without casing
- Frames and cabinets can be placed next to each other and connected with quick joints. Cables can be connected with RJ45 connectors.

Design elements belong to the blocks to ensure professional appearance and meet the aesthetical requirements:

- PBX-ECE External corner element for PBX cabinet
- PBX-ICE Internal corner element for PBX cabinet
- PBX-UFS Upper fascia sign for PBX cabinet with illumination
- PBX-RCF External corner element for fascia sign with illumination
- PBX-ICF Internal corner elements for fascia sign

Compatibility with existing hardware and software systems

The proposed PBX type modular PO Box system is an intelligent, thought-out, multilayer system of uniform strength, following the latest research results, therefore integrating it with existing physical systems means no economic advantage.

As the PBX system uses Windows-based IT infrastructure, the existing infrastructural elements, servers, PC workstations, Ethernet networks can be used.

Prototype design

The prototype design of the model PO Box will be presented for the Customer and the final version for production will be set after consultation and agreement with the experts of the The Customer.

Mass production starts only according to production documentation qualified and approved by the Customer.

Former experiences

Procontrol has designed and produced intelligent box and keysafe systems for the Dubai Police Force, the Swedish Armed Forces, an automobile factory in Kenya, Hungarian government offices and industrial firms. The system described in this document has unique and innovative features and services.

Visualization and brand signs

The overall aesthetic design of the PO Boxes follows the design and branding elements of the Client.

1) Procontrol can provide samples for multi-branding requirements through its design presentations if requested.

2) If there are indoor and outdoor units they may vary due to the weather conditions. Therefore distinct samples will be produced for them.

3) The PBX units will support The Customer's branding policy; logos, text and colour combinations on materials to have the policy approved look.

Power outage

A basic requirement of the PBX system that customers must be attended in case of power failure or outage. In this mode a built in uninterrupted power supply (UPS) operates the system. In case the power supply does not recover during the bridging time of the UPS, and the batteries run down, the boxes remain closed.

Alternative locking mechanism

At PBX system the customers identify themselves with their PIN and/or RFID proximity card, and after checking the access rights, the command from the server opens the PO Box. In case the customer is out of subscriptions or has payment defaults, the The Customer may block the customer on a workstation, so the server does not send out the opening command.

Numbering and identification

1) Numbering the PBX boxes the manufacturer produces 10 types of number plates with numbers 0, 1, 2, 3, 4, 5, 6, 7, 8, 9. Number plates are from strong ABS plastic; all plates are engraved, with large digits. These plates can be fixed next to each other. On the forefront of all boxes there is a seat where five engraved plates can be placed to show the 5-digit serial number of the box. Serial numbers go from 00001 to 99999. Serial numbers are defined by The Customer and fixed on the boxes by the manufacturer.

2) Permanent-high quality, weatherproof stickers will be used inside the boxes for delivery agent/administrator usage



Box numbering

Alternative notification options (mini OLED display)

For request, the serial number of the boxes can be shown on a small-sized LED display. This option has the advantage that The Customer can send personal messages for any of the customers from a central PC workstation, or can temporarily close, modify or delete a serial number.



Mini OLED display

Security

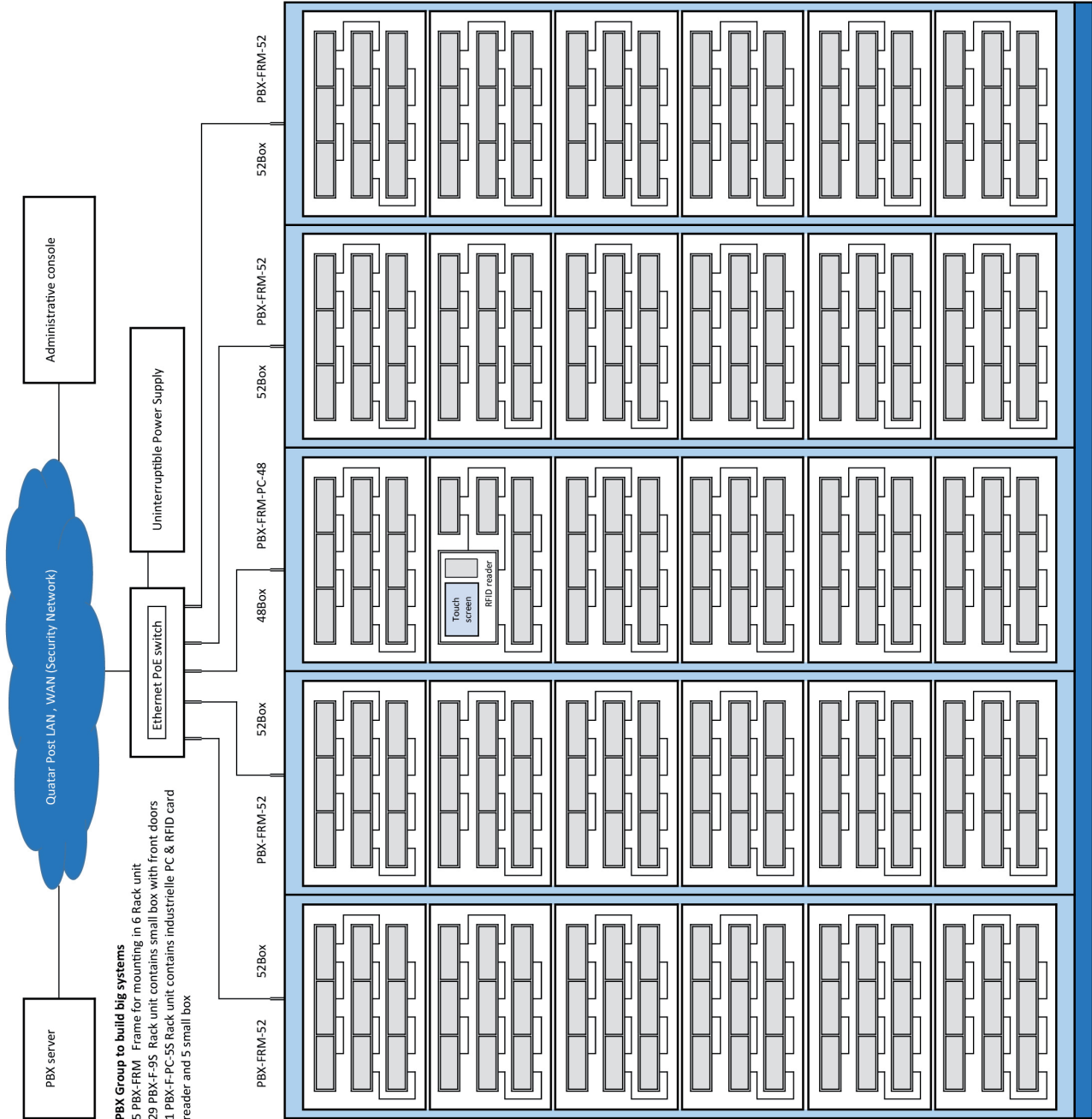
1) Sensors built in the PBX system perceive the vandalizing attempts, like attempt to pry open a closed PO Box, or to remove a unit of boxes or a cabinet, and automatically trigger the alarm. The alarm function can be extended to attacks against the IP network and breakdowns.

2) The structure and setting of the system does not let an unauthorized person to access the content of the boxes. If someone tries to open a door without proper permission, the device recognizes and hinders it, informs the customer and the management at the same time. Such cases can be recorded by small-sized IP cameras automatically as an option.

Electronic components

The PBX system contains high technology solutions, using the most up-to-date scientific results of mechatronics, electronics and informatics. The block drawings of the electrical structure shows that a PBX tower is of many similar smart ProxerBox modules, which connect to an Ethernet like IP network, and get the power supply from here according to the PoE standards. The operators of the system – if they wish to stock spare parts – should only purchase two types of electric spare parts: ProxerBox modules and PoE – RS485 gateways. The PoE switch is already part of the IT network built in the buildings.

PBX Blockscheme



Environmental conditions

The elements of the PBX system are made of materials that withstand extreme environment conditions; the tower unit is a rigid stainless steel frame, into which 6 Rack modules can be mounted.

The wall structure of the boxes and the covering of the towers are from tested, qualified corrosion resistant alloy steel, the coating of the doors is enhanced composite ABS cast.



Air-conditioned bus stop shelter

The electronic parts are so-called military grade electronic components, and they endure high temperature, and have long lifespan in such environment too, due to their construction. Components were selected in the planning phase considering the extreme environmental conditions; the system does not contain parts drying out, electrolyte, and environmentally harmful materials. The electronic parts of the PBX system are protected against the high humidity with a transparent resin coating.

The careful selection of materials and the precise, sophisticated construction make the parts and components of the PBX systems ready for building internal and external systems too.

We offer protective cabins with the PBX system at outdoor usage, which protect the customer, the delivery agent and the parcels and letters from a dust storm or heavy rain.

At outdoor usage, we propose the PBX-CAB-0 outdoor protective cabinet, which protects the device

and the parcels from the weather conditions. In case more cabinets are to be placed next to each other, a closed, protective cabin is suggested, which shields user, agent, devices and parcels from dust storms or heavy rains. Inside the protective cabinet, the more economical PBX-FRM frame system can be used.



Wall with 5 cabinets, PC and 266 Small boxes

Technical requirements

Administrative adaptability

The electronic system of the PO Boxes and the structure of the software are multilevel:

a) Box level: in every single box, an identical ProxerBox panel works with the following functions:

- recognizing the status of the box door: closed, open, pried
- recognizing the status of the lock of the box door: closed, open
- forwarding the status information, online, in real time
- fulfilling commands received online: open, close
- informing customer with light signs: closed, openable, open
- logging
- online communication

The embedded tasks above are performed by the 32 bit ARM microprocessor of the ProxerBox panel with the embedded software. The ProxerBox panels, included in every box, have Po RS485 standard interface, and connect via a PoE-RS484 Gateway unit to the PoE switch.

b) Customer management interface level – user console interface built in PBX towers. Customer management in online and offline standalone mode.

This management interface makes the comfortable, user-friendly usage possible even if there is a network outage or the central administration drops out.

The hardware of the customer interface is a touchscreen-operated industrial PC and an RFID reader, practically one per 150-400 boxes in the middle part of the instalment.

The client software makes possible that the customer chooses between identification with PIN and/or RFID card. After the welcome message and the authorization check-up, the number, location and status of the PO Boxes accessible for the customer are presented on the screen, graphically as well. The customers mark the box they wish to open and the system send an opening command to the PO Box. The light signal turns from red (meaning closed) to blinking green (openable). The customer opens the PO Box, and the light signal turns continuous green. The content and graphical design of the display will be prepared with the experts' agreement at The Customer.

c) All characteristics and operational parameters can be configured and reported via a simple administrative console

d) Background administrative application

Locking mechanism of the boxes

The embedded program handles locking mechanisms' functionality bundled with the application.

User interface

The administration module has a user friendly and easy to use UI and dashboard.

The module is able to generate logs and reports.

Inventory management

The inventory management module is a module of the application package, which queries the PO Boxes installed at certain sites, the client consoles, all online parts of the PBX system; it registers them, lists them per installation site and type, marks their geographical location.

Central configuration

All functionalities and operational parameters are configurable and reported through a single administrative console.

API availability

1) Procontrol may undertake the task of supporting the integration of the Qatar's e-POS (Escher-Riposte) system and the PBX PO Box system, as to front end service.

2) Procontrol commits to providing relevant API for integration and sharing data with all applications inside the organization (as may be required).

Notifications, messages

The system is able to send email or text message on a given sphere of events happening in the PBX system.

Eventlog monitoring and management

The Customer would require the integrated application to be able to maintain an audit trail of events/activities of every PO Box for reporting and security purposes.

The supervisory authority of the The Customer may require real time status report on the status of the PBX system or complete logs on events/ activities in given units in an arbitrary timeframe.

Client information

The client software makes possible that the customers identify themselves with Pin and/or RFID card After the welcome message and the authorization check-up, the number, location and status of the PO Boxes accessible for the customer are presented on the screen, graphically as well.

Backend application

The backend application receives and sends out access/locking commands to and from the E-POS system. Those customers, who are payment defaulters or if there is a need for reallocation of subscribers and their box locations, may get precise information from the E-POS system via the screen at the card reader.

Offline mode

The units of the PBX system switch to offline mode automatically if there is an outage in the IP network or at the Host system. The system attends customers in offline mode too.

In case of power outage the integrated UPS (uninterrupted power supply) units ensure the power supply. In order to extend the UPS bridging time, all modules of the PBX system are made of Low-Power components. The embedded software set the controllers and modules to sleep mode during the breaks.

Data encryption

Data synchronization between individual PO boxes and the backend system use an encrypted VPN channel.

Bandwidth requirements

Bandwidth requirements of the PO Boxes with the relevant backend system: the system requires very low data communication bandwidth, it is operating even over 512 kbit/sec (or faster) speed TCP/IP communication links

Data synchronisation

In case of lost connectivity there will be an automatic data synchronization after the connectivity is re-established.

Location identifier

The geographical location of the PO Boxes is set in the own driver of the PBX tower unit at installation by entering the coordinates and name of the location and the serial numbers of the PO Boxes.

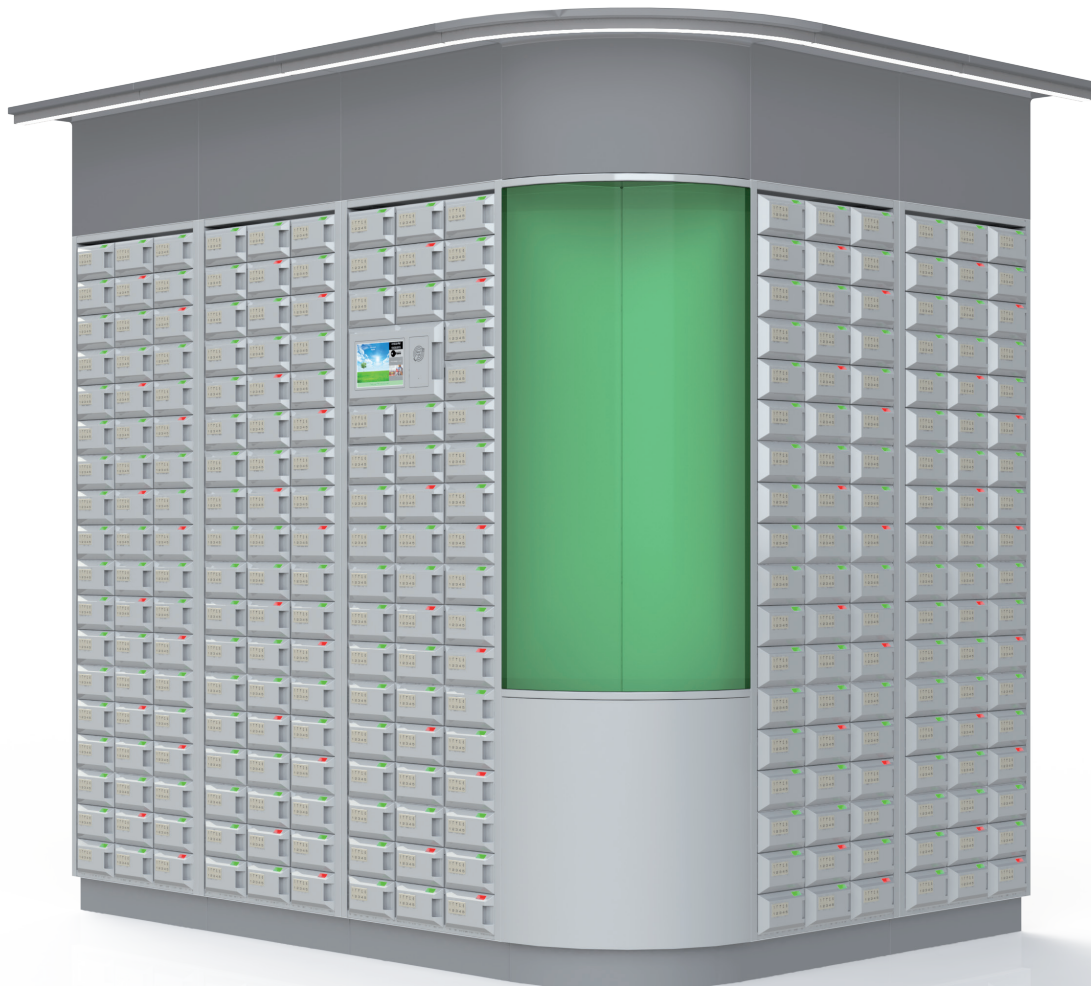
The PO Boxes inventory module can display the tower units and/or the PO Boxes in them in a map format.

Box management
















The PBX towers are independent compact units: their assembly, dismantling, allocation and reallocation is simple: Ethernet and electricity network connection is necessary for it. The current geographical location and the serial numbers of the boxes can be entered from the local console or the PBX administrative console (after proving the proper authorization).

Language options

Language options of the application interface are Arabic and English.



BASIC SELECTION OF PBX BLOCKS v2

		PBX-CAB Cabinet, indoor design, standalone for mounting 6 Rack units	PBX-FRM Frame for mounting 6 Rack units, empty, without casing	PBX-CAB-G Standalone cabinet for mounting 6 Rack units, indoor design with glass door
		PBX-CAB	PBX-FRM	PBX-CAB-G
<p>PBX-F-9S Rack unit containing 9 pcs of S (small) boxes with front doors, W180 X H100 X D430mm</p>				
<p>PBX-F-PC-5L Rack unit containing industrial PC, RFID card reader and 5 pcs of S (small) boxes W180 X H100 X D430mm</p>				<p>PBX-ECE External corner element for PBX cabinet, glass and stainless steel</p> 
<p>PBX-F-6M Rack unit containing 6 pcs of M (medium) boxes with front doors W180 X H100 X D430mm</p>		<p>PBX-CAB-O Standalone cabinet for mounting 6 pcs of Rack units, outdoor design, heat-insulated, sealed, fortified cabinet, with security glass door, and ventilation with dust filter</p> 		<p>PBX-RCF External corner element for fascia sign with illumination Brushed stainless steel with LED lighting</p> 
<p>PBX-F-3L Rack unit containing 3 pcs of L (large) boxes with front doors W180 X H100 X D430mm</p>			<p>PBX-UFS Upper fascia sign for PBX cabinet with illumination. Brushed stainless steel</p> 	<p>PBX-IFS Inner fascia sign for PBX cabinet with illumination. Brushed stainless steel</p> 



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