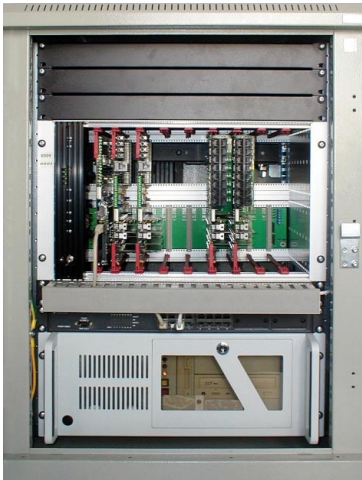


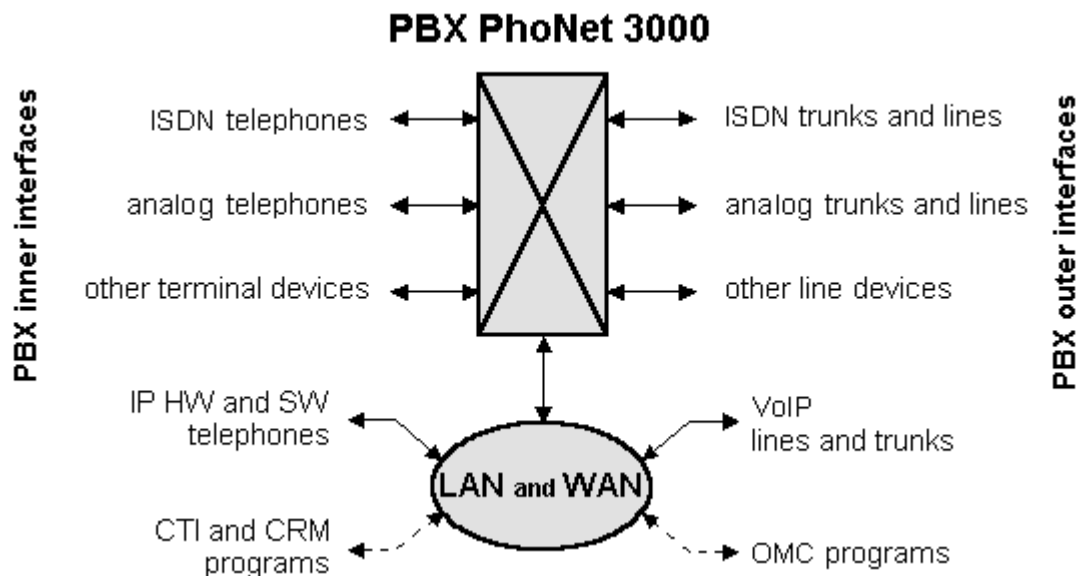
PBX PhoNet 3000 – the private branch telephone exchange



PBX PhoNet 3000 is a 5th generation private branch telephone exchange applying consistently all of the most advanced principles of packet commutation in telephone calls (or, VoIP technology).

The **PhoNet** private branch telephone exchange is applicable where private companies, state-owned and other institutions need to be equipped with advanced telephone systems. The **PBX** can operate in a single site, or in a complex of sites, or even in a whole group of distant sites dispersed over an area. OK

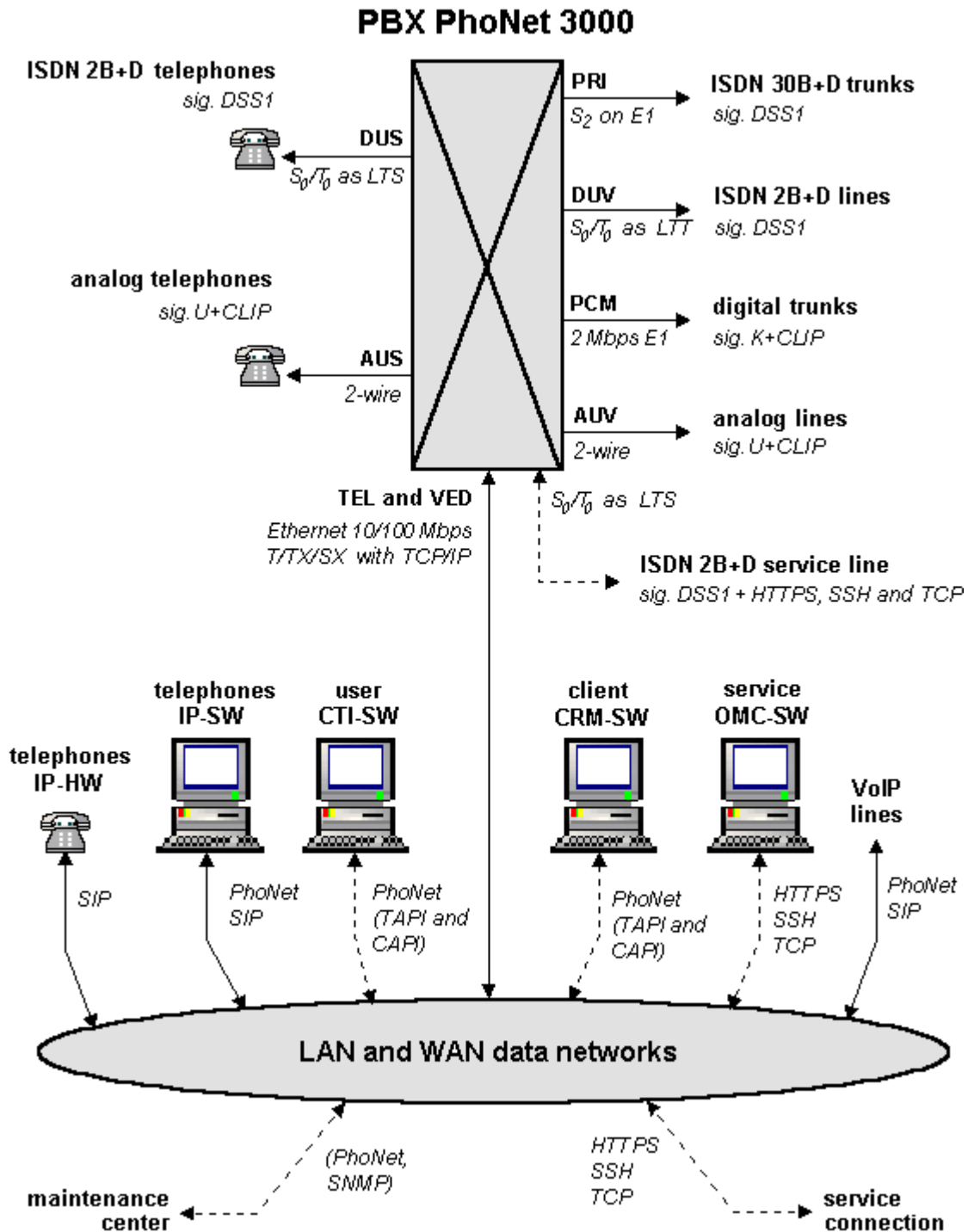
Total capacity of all inner and outer interfaces of a **PBX PhoNet 3000** may be 30 to 120 ports (so-called „small-sized PBX“) or 80 to 3000 ports (so-called „middle-sized PBX“). A PBX PhoNet can handle as many as 300 simultaneous telephone connections. Peripheral boards are dimensioned to operate 100 % of their capacities. Modules of peripheral boards are dimensioned to manage 60 simultaneous calls, which corresponds to min. 99,99 % control of all required calls. Statistical tests of **PhoNet** system have proved the error rate below 5×10^{-4} .



A typical **PBX** does not have a public telephone number of its own, but has a range of subscriber numbers assigned by the operator whose telephone network it is connected to. In most **PBXs**, classical analog or ISDN ports prevail, only partly being supplemented by advanced VoIP interfaces. The **PhoNet** system, on the contrary, enables to install exchanges with prevalence of IP telephones or VoIP connections, or with an arbitrary rate of various kinds of classical and modern ports. Telephone calls inside a **PBX** are usually not charged and a **PBX** is not considered as a part of a public telephone network, but it is used in the place of a so-called terminal equipment.

*PBX PhoNet 3000 – the private branch telephone exchange
(business documentation - offer sheet)*

PBX PhoNet 3000 has three kinds of interfaces: inner, outer and system ones. To the inner interfaces, telephones and other kinds of terminal equipment can be connected (such as faxes, modems, VoIP lines or doorbell systems). To the outer interfaces, telephone lines and other kinds of line type devices can be connected (such as GSM gates, VoIP gates or transmission systems). Various kinds of computer programs (such as CTI, CRM or OMC applications) can be connected to the system interfaces. Required PBX configuration is created by assembling it from both standard and special parts (boards DUS, AUS, PRI, DUV, PCM, AUV etc.) and features of each interface are specified in data sheets of particular items.



*PBX PhoNet 3000 – the private branch telephone exchange
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The **inner interfaces of PBXs** can be connected with ISDN-type, analog or IP terminal equipment (fixed or portable telephones, VoIP gateways, faxes, modems, bell door systems etc.). The ISDN-type 2B+D interface is composed of an LTS bus connectible with 1 to 8 ISDN telephones (with DSS1 signalling). The analog 2-wire interface type is connectible with 1, or rarely 2, analog telephones (with U signalling complemented by CLIP-DTMF or CLIP-FSK). The IP interface is composed of a LAN network Ethernet TP 10/100 Mbps, connectible to HW- or SW-type of telephones or VoIP gateways (with SIP signalling).

Board	Terminal equipment	Kind of interface	Nr. of ports	Signalling
DUS_16	ISDN 2B+D	8 x S ₀ /T ₀ as LTS	16	DSS1
DUS_8	ISDN 2B+D	4 x S ₀ /T ₀ as LTS	8	DSS1
DUS_4	ISDN 2B+D	2 x S ₀ /T ₀ as LTS	4	DSS1
AUS_16	analog	16 x 2-wire	16	U+CLIP
AUS_8	analog	8 x 2-wire	8	U+CLIP
AUS_4	analog	4 x 2-wire	4	U+CLIP
TEL_SIP	VoIP	Ethernet 10/100 Mbps T/TX/SX	1	SIP

The **outer interfaces of PBXs** can be connected to ISDN trunks, ISDN lines, digital trunks, analog lines and VoIP connections. ISDN 30B+D trunk has usually an E1 modem connected to the respective E1 port of the exchange (with DSS1 signalling). ISDN 2B+D line is usually closed with an NT converter linked to a two-point LTT port of the exchange (with DSS1 signalling). The digital trunk is usually closed with an E1 modem linked to a respective E1 port of the exchange (with K-DEC or K-R2 signalling supplemented by CLIP-R2). The analog line is usually protected with surge suppressors linked to a 2-wire port of the exchange (with U signalling, complemented with CLIP-DTMF or CLIP-FSK). A virtual VoIP link is made of a WAN network linked to the exchange through a LAN network Ethernet TP 10/100 Mbps (with SIP signalling).

Board	Telephone lines	Kind of interface	Nr. of ports	Signalling
PRI_30	ISDN 30B+D	1 x S ₂ na E1	30	DSS1
DUV_16	ISDN 2B+D	8 x S ₀ /T ₀ as LTT	16	DSS1
DUV_8	ISDN 2B+D	4 x S ₀ /T ₀ as LTT	8	DSS1
DUV_4	ISDN 2B+D	2 x S ₀ /T ₀ as LTT	4	DSS1
PCM_30	PCM 32/30	1 x 2 Mbps E1	30	K+CLIP
AUV_8	analog	8 x 2-wire	8	U+CLIP
AUV_4	analog	4 x 2-wire	4	U+CLIP
AUV_2	analog	2 x 2-wire	2	U+CLIP
VED_SIP	VoIP	Ethernet 10/100 Mbps T/TX/SX	1	SIP

Boards of **PBX telephone interfaces** (except for PRI_30 and PCM_30) are delivered with front outlet (for patch cords of structured cables) as well as with rear outlets (for "SYKFY cables" of classical distribution systems). TEL_SIP and VED_SIP stand for „virtual boards" only (SW drivers).

The **system interfaces of the PBX** are connectible to the following SW:

- **User software of CTI type** (Computer Telephone Integration) is made up of a number of applications that support activities of users, secretaries and operators, making the use of telephone functions and services easier. **The Thick Client PhoNet** is an optional part of the exchange. It is a set of programs for PCs with MS Windows 98/NT/2000/XP using PhoNet proprietary interfaces. This SW enables to control functions of the exchange (such as connection through or forwarding a call), control of voice mail (such as play and erase a record), display information about calls (such as list of missed calls), store telephone numbers (for instance in contact directory or in speed dial directories) and complement the exchange with some other user services (such as the client's SMS or attendance register). Moreover, the support of the standard TAPI and CAPI interfaces enabling co-operation with CTI applications from other suppliers, is under preparation.
- **Customer software of CRM type** (Customer Relationship Management) is made up of a variety of applications that support activities of marketing, sale, service, information or clerk relations towards customers (or, to calling or called persons). Therefore, description of programmers' proprietary **PhoNet data interface** makes a part of the documentation of the exchange. The exchange can be connected to information systems able to react to the number of the dialling customer (i.e. display automatically information about the dialling person) or to take over and use directly the number of the called customer (i.e. directly start dialling to a particular person). Therefore, training of authors of the connected CRM application may become a part of an exchange delivery. Also, support of TAPI and CAPI standard interfaces is being developed, making possible co-operation with non-adjusted applications.
- **Service software of OMC type** (Operations and Maintenance Centre) is made of applications that support administrators of telephone exchanges and serve to supervise its operation or to administer its configuration. The so-called **PhoNet Thin Client** is always a built-in part of the exchange. It is a web application, and it is sufficient to have an ordinary browser connected to the exchange to be able to use it. This interface is accessible via local LAN network (for local administrator's use), via private WAN network (for company operation centre's needs), via public WAN network (for needs of outsourced services), or via public telephone network (as a back-up method of remote access). The range of parameters of an exchange administrable by a service interface is given by access rights. This web interface may also be partly used by PBX users, as they can get an access to data related to their subscriber's numbers (so-called **My telephone** page).
- **Maintenance centre** is being developed to centralize the maintenance of operational and failure conditions of a group of operating exchanges (that is, to collect record about calls, failure alarms or load measurement) and for administration of parameters of subordinated exchanges (for instance to distribute new versions of control SW or changes in price programs of call charges). So-called **RePIC system** (Regional operational information system), linked to exchanges via PhoNet proprietary interface, is an optional part of the exchange. Also, support of SNMP standard interface is being developed, in order to enable co-operation with supervisor applications from other suppliers (such as OpenView).

Descriptions of **PhoNet** thick and thin clients, as well as proprietary and standard interfaces, are to be found in separate documents.

*PBX PhoNet 3000 – the private branch telephone exchange
(business documentation - offer sheet)*

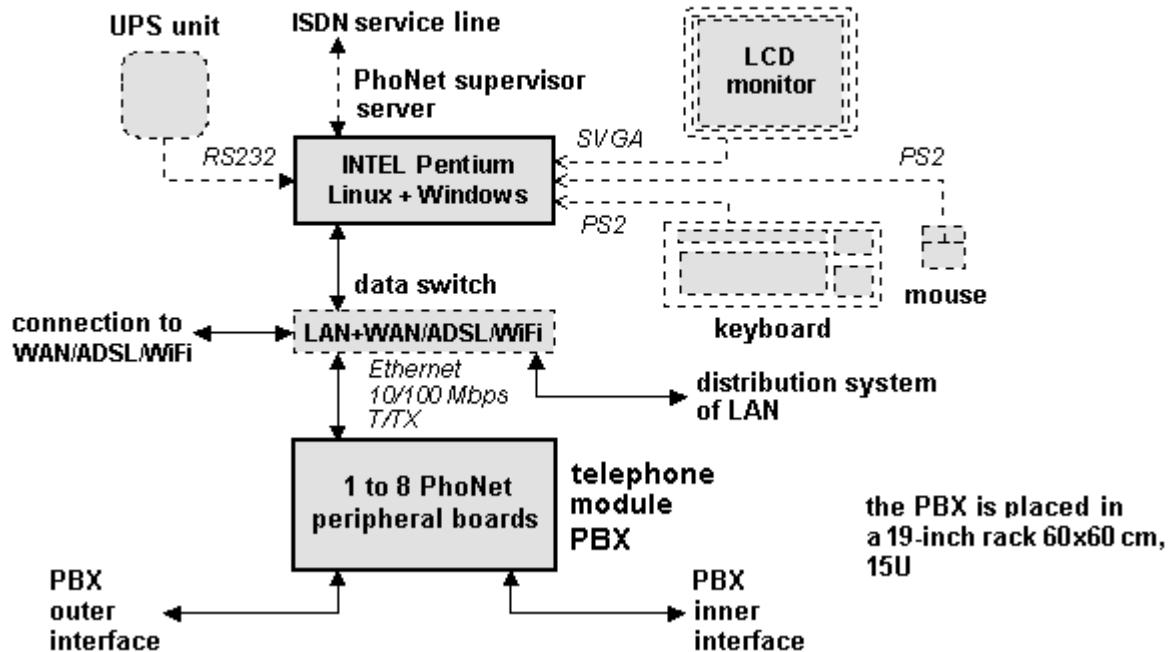
Main technical features of **PBX PhoNet 3000** are as follows:

Basic features of private branch telephone exchange PhoNet:	Small-sized PBX has 30 to 120 ports, middle-sized PBX has 80 to 3,000 ports Mail box is available for any terminal equipment Registration and recording of all telephone calls Loss of calls is less than 0.01 % Reliability of PBX is minim. 5×10^{-4} and typical 1×10^{-4}
Ports for ISDN terminal equipment:	DUS boards with 8, 4 or 2 interfaces 2B+D of S_0/T_0 type as LTS Front RJ45 for patch cord or rear connector for SYKFY DSS1 sig. according to ITU-T Q.721 and Q.731
Ports for analog terminal equipment:	AUS boards with 16, 8 or 4 interfaces of 2-wire type Front RJ45 for patch cord or rear connector for SYKFY U sig., DTMF/DEC dialling, transmission CLIP type DTMF/FSK
Ports for VoIP terminal equipment:	No special HW (only special PhoNet system SW) Connecting via LAN type Ethernet 10/100 Mbps T/TX/SX SIP sig. according to RFC 2543, RFC 3261 and RFC 2833
Ports for ISDN telephone trunks:	PRI boards with interface 30B+D type on S_2 as 2 Mbps E1 Front RJ45 for patch cord or for individual 4-wire DSS1 sig. according to ITU-T Q.721 and Q.731
Ports for ISDN telephone lines:	DUV boards with 8, 4 or 2 interfaces 2B+D of S_0/T_0 type as LTT Front RJ45 for patch cord or rear connector for SYKFY DSS1 sig. according to ITU-T Q.721 and Q.731
Ports for PCM telephone trunks:	PCM boards with 1 interface 32/30 type 2 Mbps E1 Front RJ45 for patch cord or for individual 4-wire K sig. DEC/MFC-R2 type, CLIP reception and transmis. MFC-R2 type
Ports for analog telephone lines:	AUV boards with 8, 4 or 2 interfaces of 2-wire type Front RJ45 for patch cord or rear connector for SYKFY U sig., DTMF/DEC dialling, reception CLIP type DTMF/FSK
Ports for VoIP telephone lines:	No special HW (only special PhoNet system SW) Connecting via LAN type Ethernet 10/100 Mbps T/TX/SX SIP sig. according to RFC 2543, RFC 3261 and RFC 2833
Interface for user CTI-SW applications:	PhoNet Thick Client (application for MS Windows) Protocols: proprietary PhoNet and standard IP (support of TAPI and CAPI standards is developed)
Interface for customer CRM-SW applications:	PhoNet data interface (programmer interface) Protocols: proprietary PhoNet, standard IP and SOAP (support of TAPI and CAPI standards is developed)
Interface for service OMC-SW applications:	PhoNet Thin Client (web application) Protocols: standard HTTPS, SSM and TCP (support of SNMP standard is developed)
Basic parameters of PBX power supply:	Feed 230 VAC / 50 Hz, internal distributing frame 24/35/48 VDC Analog terminal equipment with current 18 mA at 24/35/48 VDC ISDN terminal equipment 40 VDC at max. $8 \times 0.05/20$ mA
Basic mechanical configuration of PBX:	Special boards are placed in 19-inch frames of 6U height Special 19-inch frames and other components of PBX assembly are located in 19-inch racks of 60 x 45/60/80 cm (w x d)

*PBX PhoNet 3000 – the private branch telephone exchange
(business documentation - offer sheet)*

A **PhoNet** private branch exchange can be delivered in two versions. The small-sized **PBX** can be used for capacities of 30 to 120 ports and the middle-sized PBX for capacities of 80 to 3,000 ports. The large-sized versions with capacity of up to 10,000 (even up to 120.000) ports can hardly find an application in the field of private branch exchanges, but can be used in internet or public exchanges.

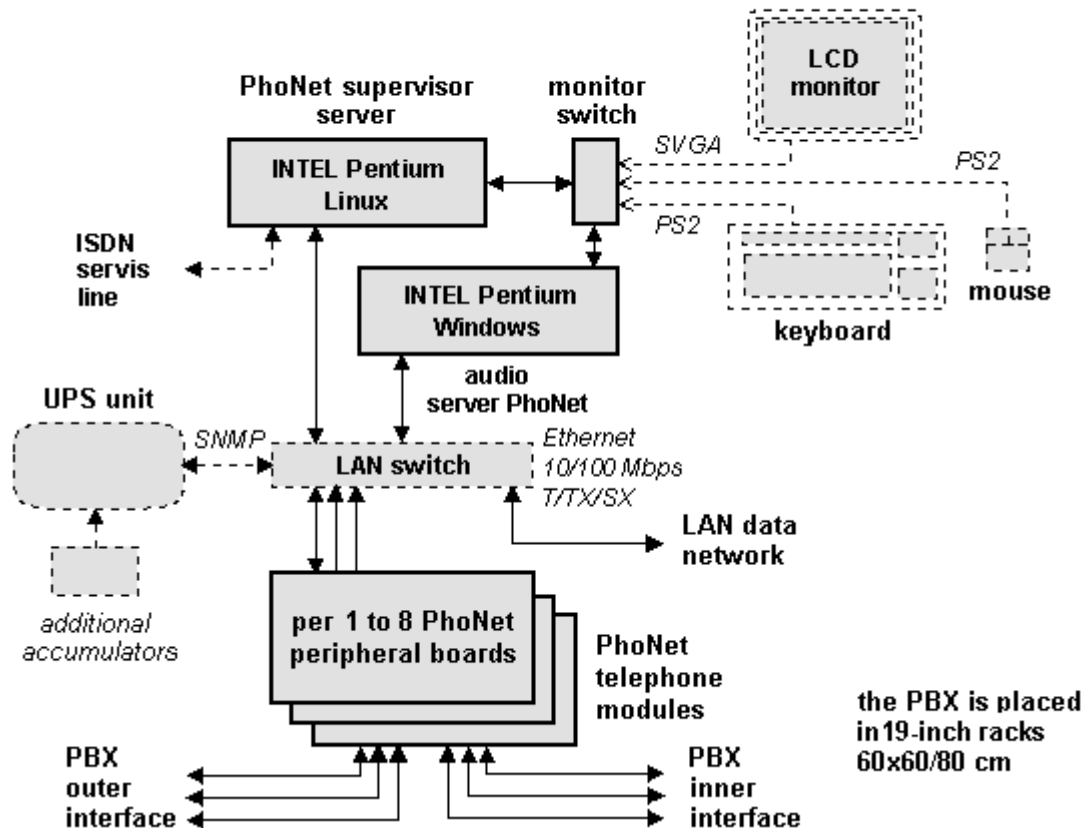
**the small-sized PBX 3000
for 30 to 120 telephone ports**



The **small-sized PhoNet 3000 PBX** only contains a simple supervisor server and a single telephone module. The supervisor server consists of half-industrial HW (a PC suitable for a 19-inch rack) and of system SW (VMware, OS Linux, OS Windows and DB Postgres). In the supervisor server, all central parts of application SW are included (so called supervisor processor and audio processor). The telephone module has a frame and a module power supply, a main processor and one to eight peripheral boards. The peripheral boards can be connected with classical terminal equipment (telephones, faxes, modems, doorbells etc.) and with classical line devices (lines, trunks, GSM gateways etc.) Advanced VoIP terminal and line devices (HW- and SW-type IP telephones, VoIP gateways etc.) can be connected to **PBX** via LAN. External calls can come in and go out through classical telephone connections as well as through advanced VoIP communication (via WAN, ADSL or WiFi connection). Besides, LCR function takes part in routing outgoing calls.

To run a small-sized **PBX**, a small LAN switch is needed (Ethernet 10/100 Mbps T/TX, may be complemented by HW and SW for WAN, ADSL, or WiFi) and a UPS unit is necessary (400 to 800 VA). The customer may buy these items as PBX optional parts, or get them on his own. A small-sized **PBX** can be placed in a 19-inch rack, also an optional complement of an order (or, a free space in a customer's own 19-inch rack is sufficient). Other options are terminals (an LCD, a keyboard and a mouse).

the middle-sized PBX 3000 for 80 to 3000 telephone ports



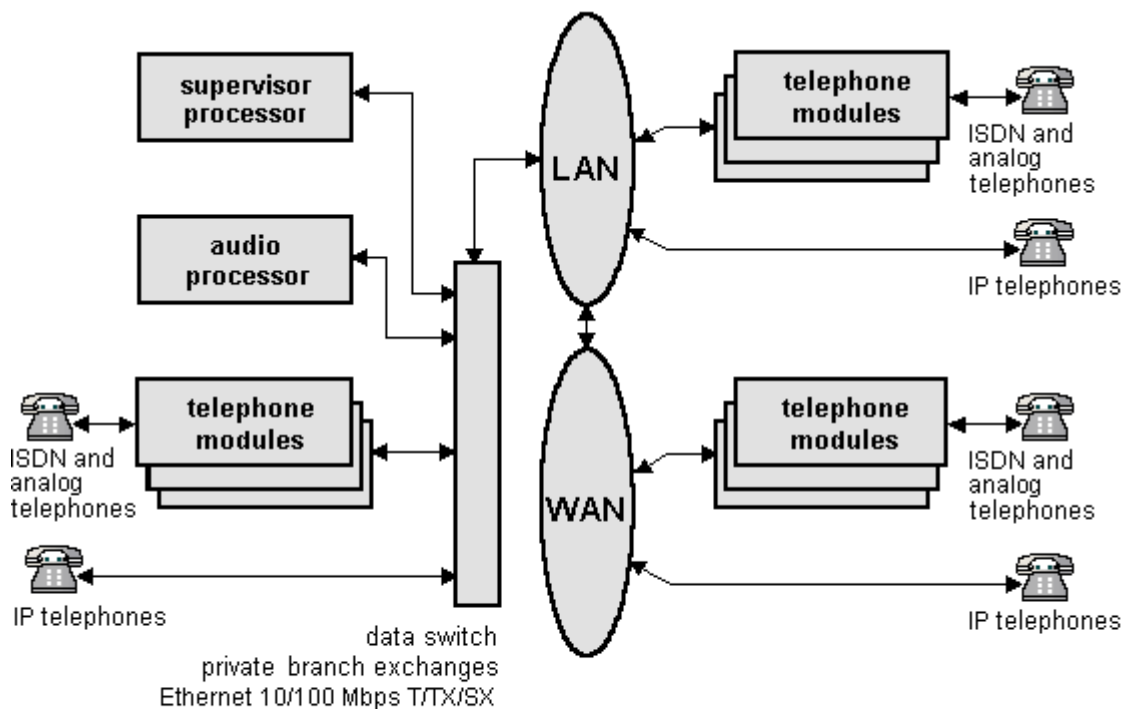
The middle-sized **PhoNet 3000 PBX** contains a double supervisor server and more than one telephone modules. The supervisor and audio servers consist of half-industrial HW (a PC suitable for a 19-inch rack) and system SW (one server with OS Linux and DB Postgres, another server with OS Windows). Optionally, a reliable brand name PC suitable for a 19-inch rack can be ordered for delivery. In supervisor server, a central part of application SW is run (so called supervisor processor under OS Linux), and the other part is run in audio server (so called audio processor under OS Windows). Every telephone module has a frame and a module power supply, 1 to 3 main processors and 1 to 8 peripheral boards. The peripheral boards can be connected to classical terminal equipment (telephones, faxes, modems, doorbells etc.) and classical line devices (lines, trunks, GSM gateways etc.). Advanced VoIP terminal and line devices (HW- and SW-type IP telephones, VoIP gateways etc.) can be connected via LAN. External calls then may come in and go out through classical telephone lines as well as through advanced VoIP communication (that is, via WAN connection accessible through LAN). Besides, LCR function takes part in routing of outgoing calls.

Besides, to run a middle-sized **PBX**, one or more LAN switches are needed (Ethernet 10/100 Mbps T/TX/SX) and a UPS unit (800 to 3,000 VA). The customer may buy these items as PBX optional parts, or get them on his own. A middle-sized **PBX** is to be placed in a 19-inch rack, also an optional complement of an order (or, a free space in a customer's own 19-inch rack is sufficient). Other options are terminals (a monitor switch, an LCD, a keyboard and a mouse).

*PBX PhoNet 3000 – the private branch telephone exchange
(business documentation - offer sheet)*

A project of an arrangement of a **PBX PhoNet 3000** requires a definition of types and quantity of system components that are necessary in the particular case. According to customers' demands, it is necessary to choose boards of inner part of an exchange (that is, DUS and AUS). When the optimal capacity is calculated and the customer's requirements clarified, the composition of boards of the outer part of the exchange (that is, PRI, DUV, PCM and AUV) can be selected. The total number of peripheral boards then define the need for a number of other special parts (that is, how many main processors, 19-inch racks, power sources) and kinds of standard parts (central servers, LAN switches, UPS units, terminal and 19-inch racks). For capacities from 80 to 120 telephone ports (including all VoIP-type interfaces) a standardized small-sized PBX can be used, directly or with modification. For higher capacities, it is advisable to design a configuration of a PhoNet PBX individually, so that this middle-sized PBX meets best the customer's needs.

Interconnection of the **PhoNet** central part (a supervisor server, and possibly an audio server), all **PhoNet** telephone modules (peripheral boards attending classical telephones and lines) and all attended IP telephones (HW- and SW-type), can be carried out with a data switch belonging directly to a PBX, with a private data LAN or a private or public WAN. So, using a LAN and WAN data network and a **PBX PhoNet 3000**, any building, area or a group of distant places can be telephonised.



Note:
*so-called small-sized PBXs only contain HW of supervisor server
running simultaneously SW of supervisor and audio processors.*

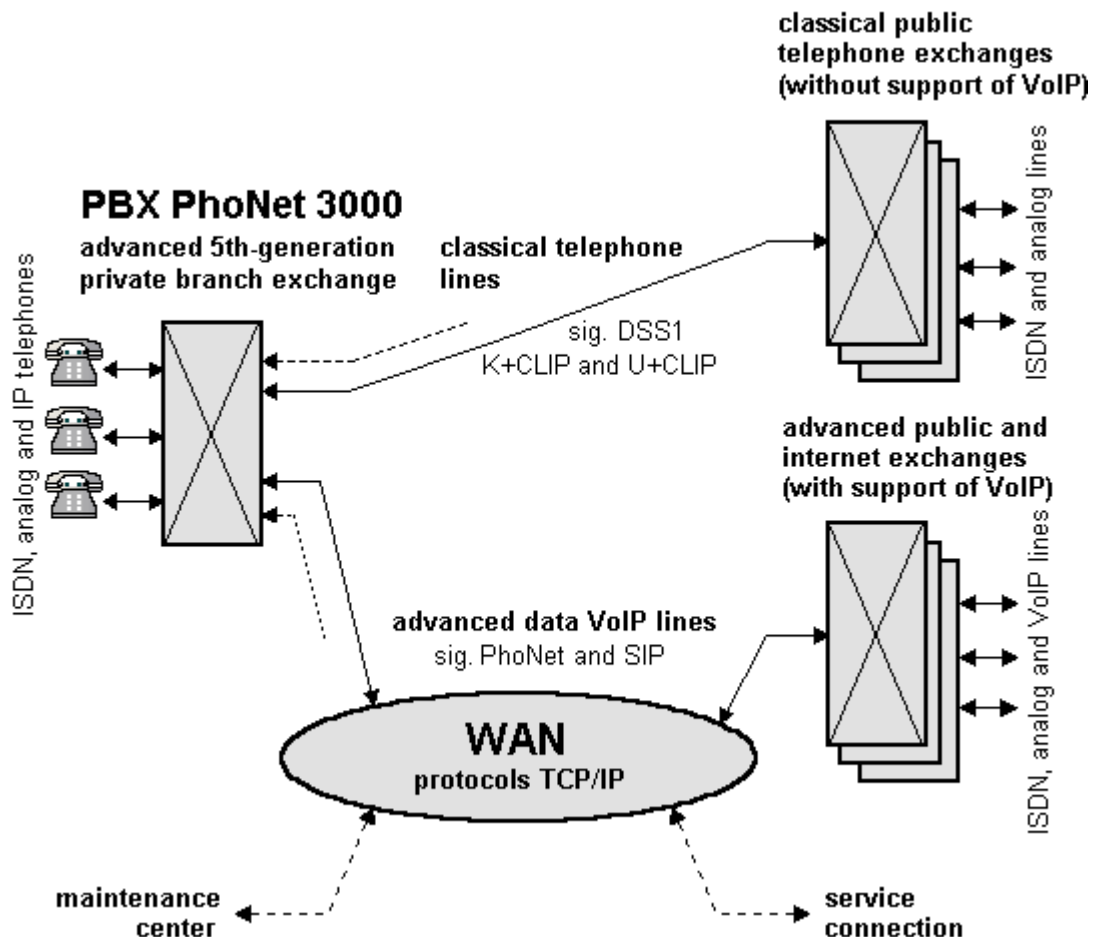
As individual parts of **PBX** may be dispersed almost wherever, such **PBX** components are considered as a single PBX that are subordinated to one SW called supervisor processor (that is, to a common configuration database run in HW of a supervisor server).

*PBX PhoNet 3000 – the private branch telephone exchange
(business documentation - offer sheet)*

Telephone connection of a **PBX PhoNet 3000** to an exchange of a public network can be carried out through classical and advanced telephone trunks and lines. So far, classical telephone lines have been prevailing and data lines make a complement efficiently lowering costs for calling.

To public exchanges of 1st to 4th generation not supporting VoIP lines (or, signalling), a **PhoNet** private branch exchange can be connected with classical telephone lines with DSS1, K+CLIP or U+CLIP signalling. In such a case, an appropriate telephone cable must be attached between the private and public exchanges. So, the sphere of public exchanges, allowing a private branch exchange to be connected, is limited to relatively close neighbourhood, and so is limited the number of telephone operators providing connectivity to public voice networks.

To public exchanges of 5th generation supporting VoIP lines (or, signalling), a **PhoNet** private branch exchange can be linked via advanced WAN computer networks with proprietary PhoNet sig. or with standard SIP sig. In this case, permanent internet connection with an optimal capacity and quality can be used to interlink the private branch and public exchanges. In the same way, interlink to internet exchanges is resolved.



Then, thanks to LCR (low cost routing) function, the outgoing calls from **PBX PhoNet 3000** are routed to such telephone lines (or, public networks) that offer the lowest telephone charges for particular call types.

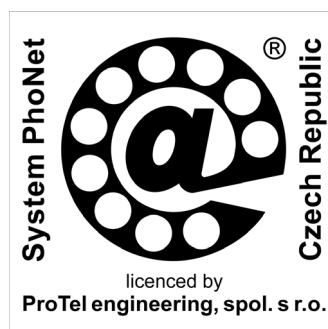
*PBX PhoNet 3000 – the private branch telephone exchange
(business documentation - offer sheet)*

More trade and technical documentation and used abbreviations and concepts, related to **PhoNet** telecommunication system, is outlined in document ***PhoNet_doku_EN.pdf***.

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Private branch exchange is defined to operate
in conformity with technical standards of EC member states



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