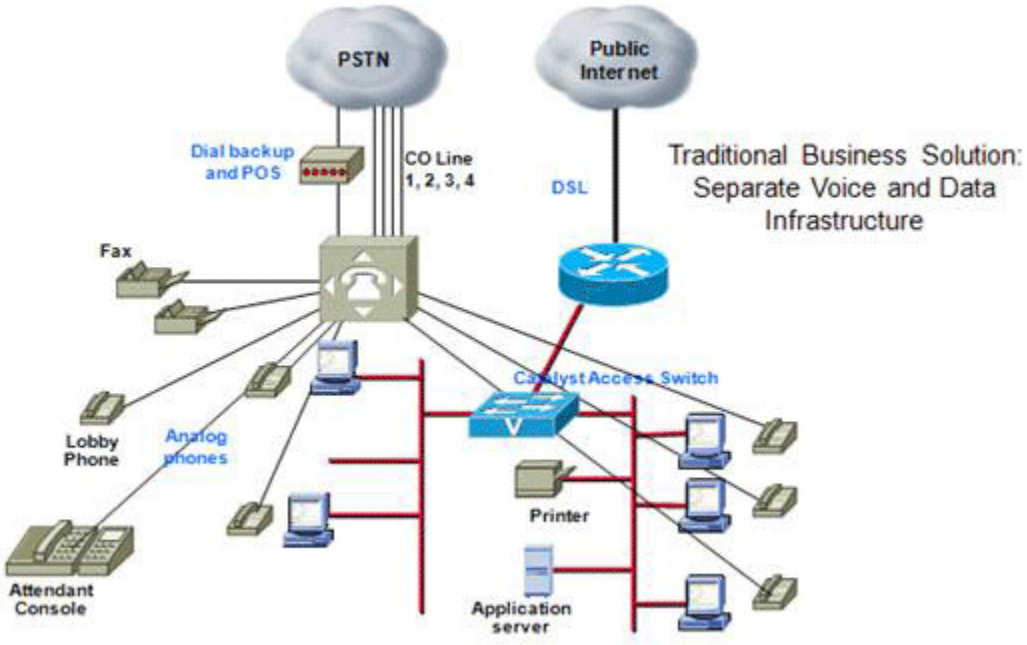
IP telephony – TIM Networks

Content:

Preface

In today's home and business networks, telephone and computer networks are separate, requiring different technical equipment, and therefore the increased cost of maintaining separate technical systems (pictured left - phone system, right - computer network).



Also, if the company has offices in multiple locations (long distance or international), the money goes to unnecessary phone charges between them.

Disadvantages of conventional telephony

- **The cost of phone calls**

- Separate phone and computer networks:
  • It requires two cables (one for phone, one for the computer)
  • Two different sets of technical equipment (telephone and computer)
  • Separate technical support (for PBX and computer network)

- Inability (difficulty) to add new applications to the system (voicemail, call center...).

Benefits of IP telephony

- **One cable for phone and computer** (UTP cable), through which both informations are passed - **data** from your computer and a **voice** from the phone

- **Shared equipment** – same network switch, cables, UPS (uninterruptible power supply)

- **Shared tech support** – IT sector maintains the whole IT system

- Enables the use of a single link (ie the Internet), for data and phone traffic between remote sites - eliminates the need for traditional phone lines between remote locations

- **More than one** call at a time can be made **through one channel** (ie, the Internet), as opposed to traditional phone lines, where one channel is able to perform only a single call.

- **The sound quality is better** compared to traditional telephony.

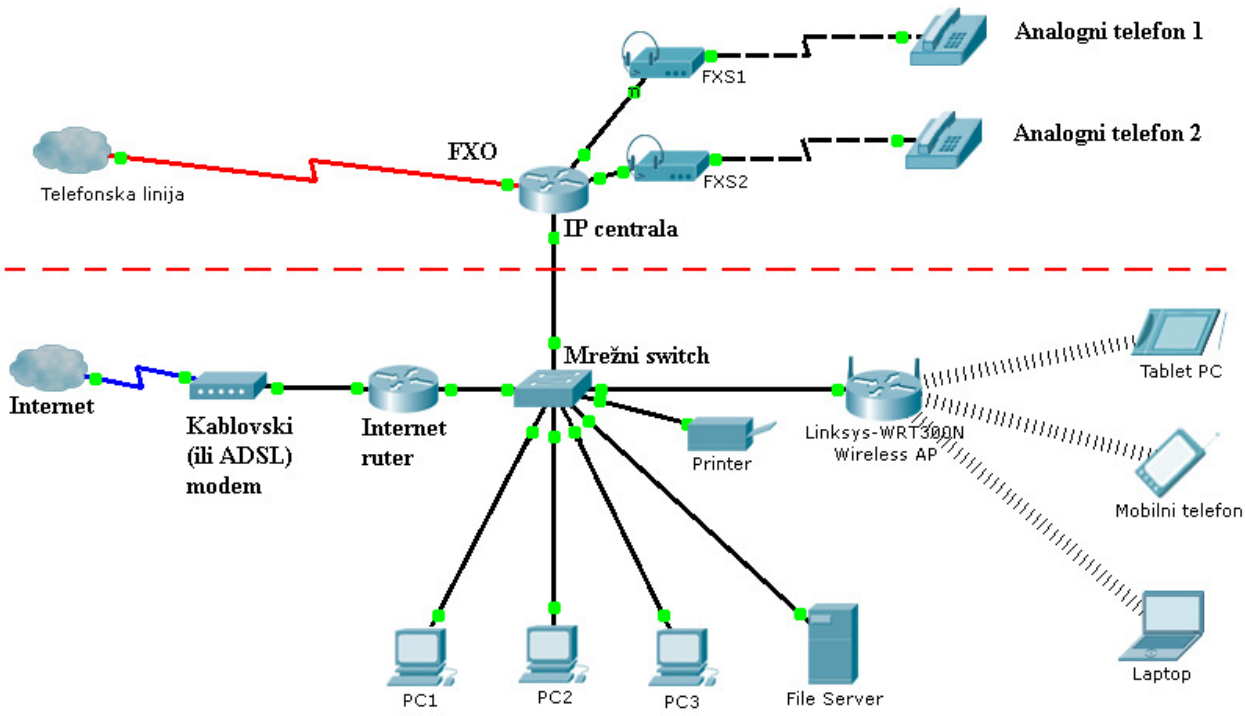
Transition to IP telephony

… using analog phones …

To install **IP telephony** to existing computer network, for starters it is enough to add the **IP PBX**. As simple as that!

IP PBX has ports for analog telephone line (FXO card), and for the analog telephones (FXS card). In this way, **analog phones** can be used to **reduce the cost of the initial transition to IP telephony**. Therefore there is no need to buy expensive IP telephones.

IP PBX is integrated into the existing computer network, as shown in the following picture:



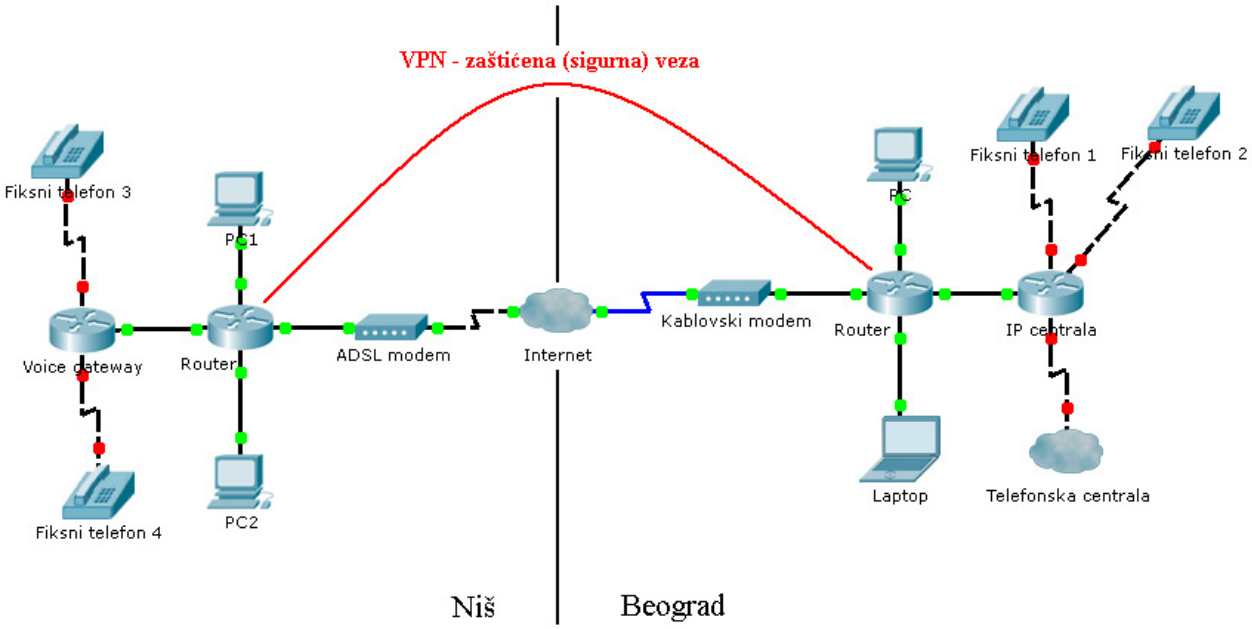
Calling extensions localy (on both locations) is **free**. Numbering plan of local extensions is arbitrarily (ie 101, 102, 1001, 1002, 2001…).

Connecting remote locations

To reduce **long distance** and **international** telephone charges, two locations are connected through the Internet in one network.

Such a system requires minimal investment in technical equipment with great cost savings.

The following picture is an example of a system that connects two sites into one network:



In this way, the **two geographically separate locations** are connected to a local computer network. The connection between these sites is achieved through the Internet.

Protected (**VPN**) connection achieves security in exchange of phone calls between the two sites. This way it is ensured that only the location of Niš can use IP PBX in Belgrade.

IP PBX is connected with PSTN, to establish a traditional phone services. Phone calls from the local computer network (on both locations) can be diverted to traditional telephone line, through the IP PBX.

Calling extensions localy (on both locations) is free.

Numbering plan of local extensions is arbitrarily (ie 101, 102, 1001, 1002, 2001…).

Equipment:

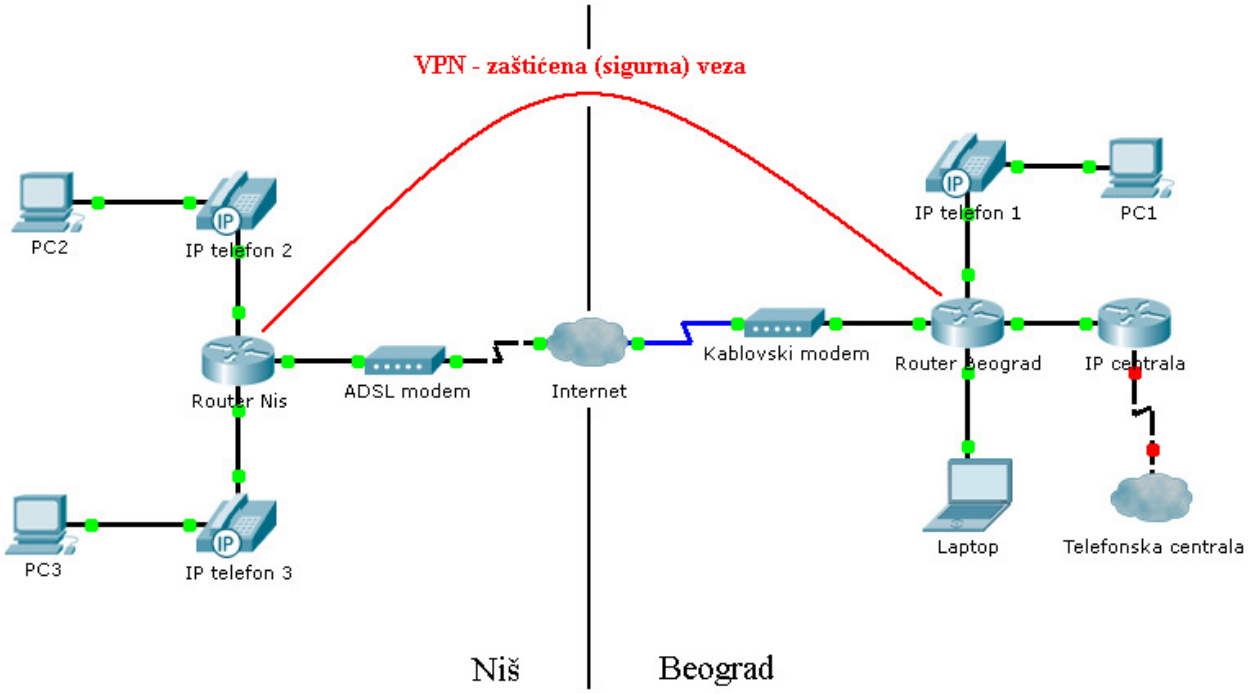
- IP PBX - voice card for analog phones, and for PSTN (location Belgrade)
- Voice gateway - connects analog phones to computer network (location Niš)
- 2 routers - allows creating secured (encrypted) connection through the Internet

Transition to IP telephony

… using IP phones …

Instead of analog phones the IP phones are used that connect directly to a computer network.

Computer are connected to IP phones, which reduces the number of cables to each workplace.



Calling extensions localy, and numbering are the same as in the previous example with the classic phones.

Dialing numbers outside local network

If the user wants to call a phone number that is **outside the local network**, the call can be diverted, depending on the pre-defined by **Dial Plan**:

- **to PSTN** - In case you are calling a landline phone number in the same or another city of a state, the call is forwarded to the traditional phone line (**PSTN**)

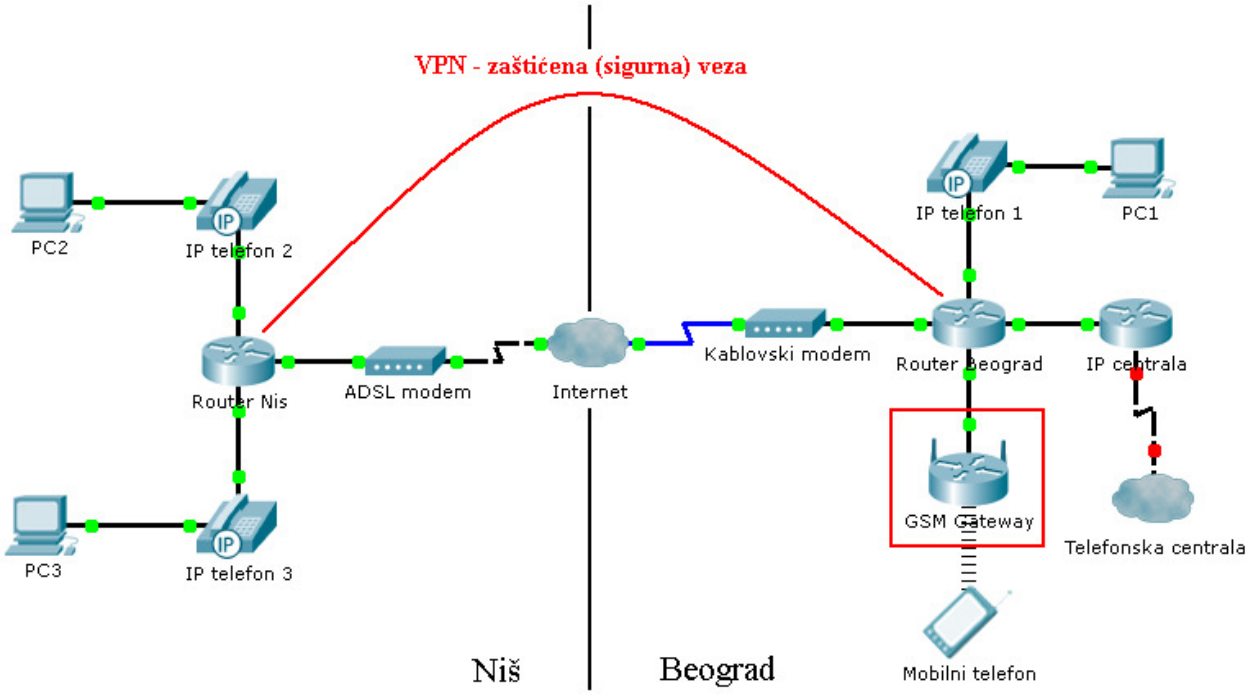
- **to the Internet** - In case you are calling an international phone number (a number in another country), the call is forwarded to the Internet, which significantly saves monthly phone bills. Existing local computer network connects (via the Internet) to the provider of telephone services (**VISP - Voice Internet Service Provider**) offering favorable rates to different countries of the world (ie **Skype**)

- **to mobile telephone network** - This service requires a special device (GSM Gateway) that forwards calls from the local IP telephone network to the mobile phone network. This way the mobile phones are directly called from the mobile phone network, which bypasses fixed telephone network, and hence reduce monthly phone bill costs.

Dial Plan is created so that the user can **call any number**, limit calls to **only certain phone numbers** (there may be time periods of calling them - time of day, etc..) or **just to receive calls**.

GSM gateway connects to a computer network (directly to the network switch) and provides an easy exit to the mobile telephone network for all phones (hardware, software and analog).

The following picture shows the GSM Gateway in computer network:



Mobile phones can be dialed from any location. The call will in both cases be sent via the GSM Gateway, which avoids calling mobile subscribers over fixed telephone lines, and thereby reducing telephony costs.

IP PBX - models

… which can be used in the IP telephone system are based on **Cisco** technology:

- **Cisco 1760-V**
  • 24 users (phones)
  • 144 extensions
  • max 16 PSTN lines

- **Cisco 2811**
  • 36 users (phones)
  • 144 extensions

- **Cisco 2821**
  • 48 users (phones)
  • 192 extensions

- **Cisco 3725**
  • 144 users (phones)
  • 500 extensions

- **Cisco UC520**
  • complete solution for small and medium-sized companies in a single device
  • IP PBX
  • router i switch (8 +1 ports)
  • wireless
  • power IP phones through the device itself (PoE – Power over Ethernet)

All models of IP PBX supports Cisco's IP phones (SCCP and SIP), IP phones from other manufacturers (SIP) and analog telephones (fixed and wireless).

IP PBX has the ability to add the card to connect to PABX (PSTN) by analog (POTS) or digital (ISDN) connections.

Each card has 4 analog (**VIC2-4FXO**) or two digital ports (**VIC-2BRI**) to achieve **four simultaneous phone calls**.

Calling devices

… which can be used in the IP telephony system:

- **Hardware** IP phones
- **Software** IP phones
- **Analog** phones
- **Mobile** phones with an application

Hardware IP phones connect directly to the computer network, ie on the power switch.
The phone itself is identical in form as well as regular analog phone. Has a keypad for dialing numbers and screen which display different types of information (Caller ID ...).

Computer is connected on the hardware phone, thus reducing the number of cables to the workplace (one cable instead of two - **reducing the cost of cabling**). Although the phone and computer are connected the same cable, both types of traffic (computer and phone) are functioning smoothly.

Hardware IP phone requires its own power supply (48V), but in the case when network switch supports **PoE technology** (Power over Ethernet), **IP phone can be powered directly from the switch-a**, through the same cable that is used for data transfer.
In this way, it is sufficient to provide an uninterrupted power supply (UPS) **only for the network switch**, ensuring that the **phone system is operational**, even during a power outage.

Software IP phone is installed as an application on a computer.

The advantage of the software the phone in relation to the hardware - **it's free**.
In this way there is no need to purchase expensive hardware phones and their maintenance.

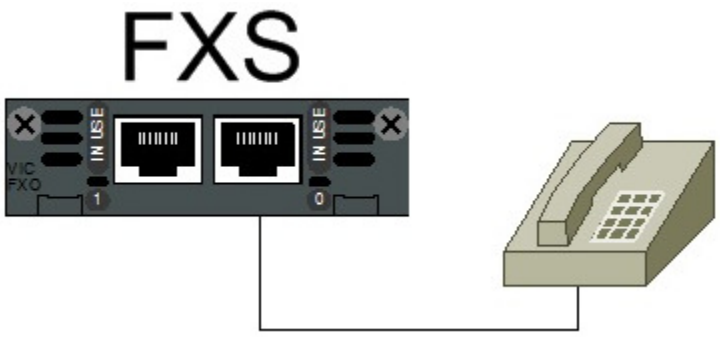
The application can be installed on any desktop or laptop computer. Just provide headphones with a microphone and thus replace expensive hardware phone.

Features of the software phone are identical to hardware phones!

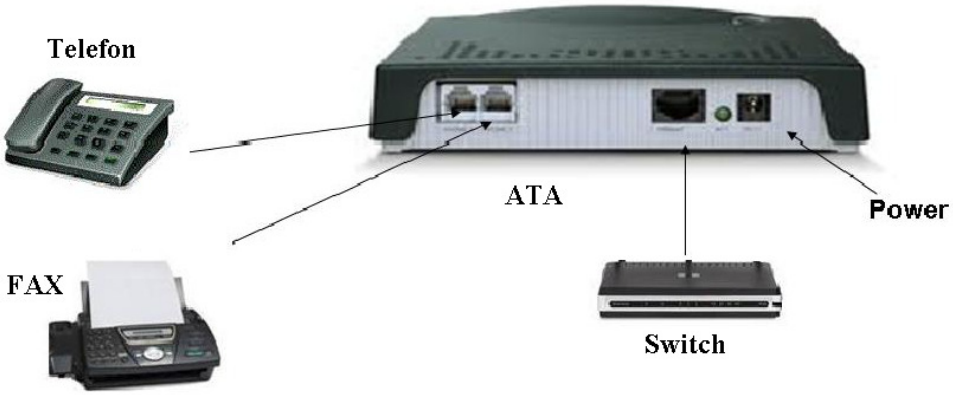
Analog phones are classic phone devices which can be used during transition to IP telephony.

There are two solutions for connecting these phones to computer network:

- **FXS** - card that is installed in the IP PBX, which directly connects the phone to an IP phone system

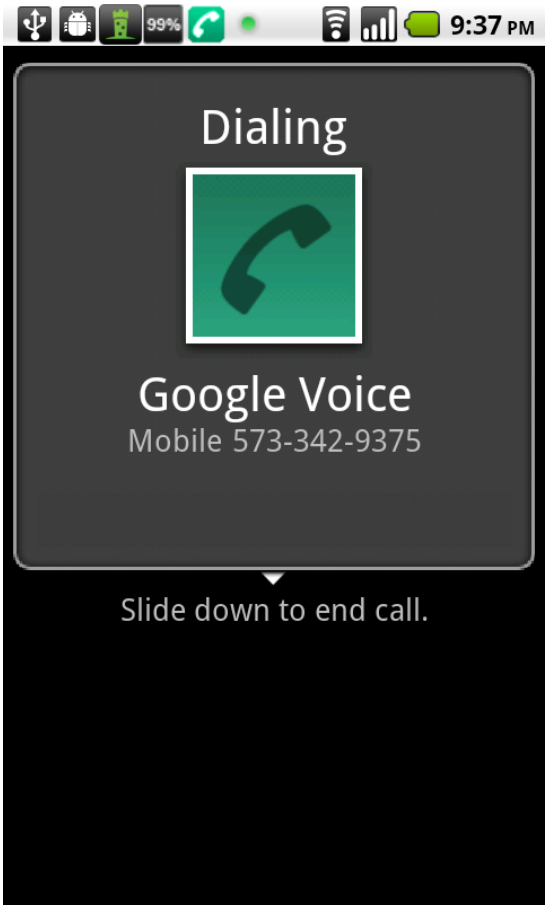


- **ATA** - **A**nalog **T**elephone **A**dapter.
  Connects analog telephone.
  On the other hand, the ATA device connects to a computer network, linking it with the IP PBX.



Mobile phones also have special software that connects this device to an IP PBX.

By installing this software you get the "cordless phone" that can be used within range of a wireless office network. Of course, it is necessary to possess a mobile phone with WiFi option, and a wireless connectivity to the computer network.



Softphone within the mobile phone can make and receive calls, along with information about the one who calls him (Caller ID).

However, advanced options which IP PBX has in this case are not available (call transfer, call pickup...).

Contact

For every service that we have, and the ones we don't but you need them, for your problems during the work and for all the questions that you have, contact us:

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