

RasPBX using Asterisk

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ABSTRACT:- RasPBX users get an additional choice today: The comprehensive set of Incredible PBX applications, as an Optional install on top of RasPBX. Incredible PBX has been famous for many years on the x86 platforms, and also has its own fork for the Raspberry Pi since mid-2012. Now with the new approach of an add-on installer, users get the combined benefits of both RasPBX and Incredible PBX. The Raspberry Pi has made quite a splash since it was first announced. The credit-card sized computer is capable of many of the things that your desktop PC does, like spreadsheets, word-processing and games. It also plays high-definition video. It can run several flavors of Linux and is being used to teach kids all over the world how to program. In the present days, if you plug-in any device directly to the Internet without a minimum protection system, you are just looking for trouble, so, this how to will help you provide some protection against hackers, for your Raspberry Pi Asterisk installation. One more reason for implementing fail2ban is the limited memory and CPU resources that the Pi has..

KEYWORDS:- RasPBX, VoIP, WiFi, SIP, and POTS.

INTRODUCTION

The Raspberry Pi is a low cost, credit-card sized computer that plugs into a computer monitor or TV, and uses a standard keyboard and mouse. It is a capable little device that enables people of all ages to explore computing, and to learn how to program in languages like Scratch and Python. It's capable of doing everything you'd expect a desktop computer to do, from browsing the internet and playing high-definition video, to making spreadsheets, word-processing, and playing games.

What's more, the Raspberry Pi has the ability to interact with the outside world, and has been used in a wide array of digital maker projects, from music machines and parent detectors to weather stations and tweeting birdhouses with infra-red cameras. We want to see the Raspberry Pi being used by kids all over the world to learn to program and understand how computers work.

The Raspberry Pi has made quite a splash since it was first announced. The credit-card sized computer is capable of many of the things that your desktop PC does, like spreadsheets, word-processing and games. It also plays high-definition video. It can run several flavors of Linux and is being used to teach kids all over the world how to program and it does all that for under \$50.



Figure1:. Raspberry Pi computer Model B+

The secret sauce that makes this computer so small and powerful is the Broadcom BCM2835, a System-on-Chip that contains an ARM1176JZFS with floating point, running at 700MHz, and a Video core 4 GPU. The GPU provides Open GL ES 2.0, hardware-accelerated Open VG, and 1080p30 H.264 high-profile decode and is capable of 1Gpixel/s, 1.5Gtexel/s or 24 GFLOPs of general purpose compute. What's that all mean? It means that if you plug the Raspberry Pi into your HDTV, you could watch Blue Ray quality video, using H.264 at 40Mbits/s.

The comprehensive set of Incredible PBX applications, as an optional install on top of RasPBX. Incredible PBX has been famous for many years on the x86 platforms, and also has its own fork for the Raspberry Pi since mid-2012. Now with the new approach of an add-on installer, users get the combined benefits of both RasPBX and Incredible PBX:

- Support for both Raspberry Pi and Beagle bone Black hardware platforms
- RasPBX upgrades and security fixes as usual
- Incredible PBX apps for Asterisk and Free PBX on top

Some of the additional applications in brief:

Preconfigured VoIP trunks, Flite text-to-speech engine as well as Google's TTS and STT interfaces, free Caller ID Name lookups for incoming calls, Voice Dialing with speech-to-text (STT) capability as well as Speed Dials, Yahoo News and Weather reports with text-to-speech (TTS) translation of the Yahoo news feeds, Telephone Reminders and Hotel-Style Wakeup Calls, SMS messaging, Wolfram Alpha, the versatile AsteriDex contacts database and many more.

TECHNOLOGIES

In the Model-A the USB port is coupled directly to the SOC. The Raspberry Pi USB hub provides 3 effective USB ports, 1 of which is used by the Ethernet controller and the other 2 have physical USB ports.

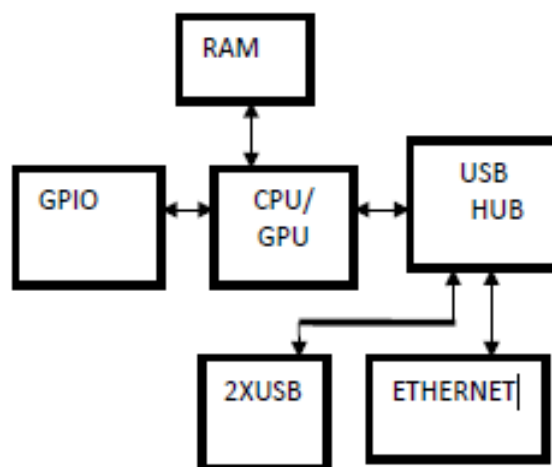


Figure 2: Block Diagram for Model B+ raspberry pi

The Model B+ is the higher-spec variant of the Raspberry Pi. It replaced the original Model B in July 2014. Compared to the Model B it has:

- More GPIO. The GPIO header has grown to 40 pins, while retaining the same pin out for the first 26 pins as the Model B.
- More USB. We now have 4 USB 2.0 ports, compared to 2 on the Model B, and better hot plug and overcurrent behavior.
- Micro SD. The old friction-fit SD card socket has been replaced with a much nicer push-push micro SD version.
- Lower power consumption. By replacing linear regulators with switching ones we've reduced power consumption by between 0.5W and 1W. Better audio. The audio circuit incorporates a dedicated low-noise power supply. Neater form factor. We've aligned the USB connectors with the board edge, moved composite video onto the 3.5mm jack, and added four squarely-placed mounting holes

HARDWARE

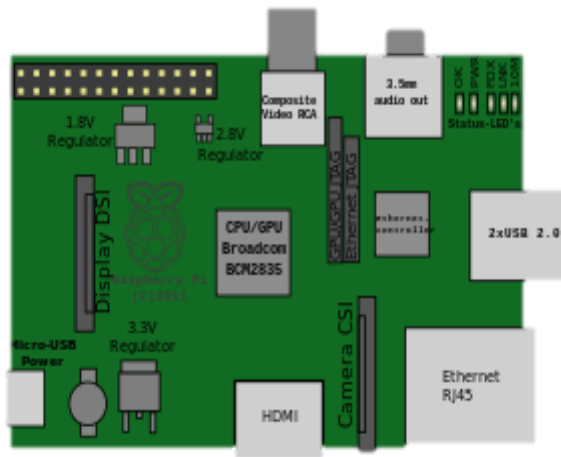


Figure 3: Hardware for Model B+ raspberry pi

The Broad Broadcom SoC used in the Raspberry Pi is equivalent to a chip used in an old smartphone (Android or iPhone). While operating at 700 MHz by default, the Raspberry Pi provides a real world performance roughly equivalent to 0.041 GFLOPS.[18][19] On the CPU level the performance is similar to a 300 MHz Pentium II of 1997-1999. The GPU provides 1 Gpixel/s or 1.5 Gtexel/s of graphics processing or 24 GFLOPS of general purpose computing performance. The graphics capabilities of the Raspberry Pi are roughly equivalent to the level of performance of the Xbox of 2001. The Raspberry Pi chip, operating at 700 MHz by default, will not become hot enough to need a heatsink or special cooling. The SoC is stacked underneath the RAM chip, so only its edge is visible. The LINPACK single node compute benchmark results in a mean single precision performance of 0.065 GFLOPS and a mean double precision performance of 0.041 GFLOPS for one Raspberry Pi Model-B board

SOFTWARE

The initial version of Raspberry Pi was using Linux as the operating system till July 2012. From August 2012, a free OS called the raspbian was developed and optimized to be used with the different Raspberry Pi hardware components. The work of supporting system specific hardware is still on going with focus on the development of Light Unix distributions such as Raspberry and XBMC open source digital media center.

About Xbmc Foundation: Xbmc is an open source software and is developed by a not for profit free software community that take up ongoing development projects. The community that runs these projects is the Xbmc Foundation. They encourage many developers to submit their own code patches for adding new functionality to the existing features and also for fixing the bugs found out during testing. Its a perfect home media server in combination with Raspberry-pi.

ASTERISK

Asterisk is an open source framework for building communications applications. Asterisk turns an ordinary computer into a communications server. Asterisk powers IP PBX systems, VoIP gateways, conference servers and other custom solutions. It is used by small businesses, large businesses, call centers, carriers and government agencies, worldwide. Asterisk is free and open source. Asterisk is sponsored by Digium

Today, there are more than one million Asterisk-based communications systems in use, in more than 170 countries. Asterisk is used by almost the entire Fortune 1000 list of customers. Most often deployed by

system integrators and developers, Asterisk can become the basis for a complete business phone system, or used to enhance or extend an existing system, or to bridge a gap between systems.



Where Did It Come From?

The Asterisk project started in 1999 when Mark Spencer released the initial code under the GPL open source license. Since that time, it has been enhanced and tested by a global community of thousands. Today, Asterisk is maintained by the combined efforts of Digium and the Asterisk community.



What Can You Do With Asterisk?

Asterisk is a framework for building multi-protocol, real-time communications applications and solutions. Asterisk is to real-time voice and video applications as what Apache is to web applications: the underlying platform. Asterisk abstracts the complexities of communications protocols and technologies, allowing you to concentrate on creating innovative products and solutions.

You can use Asterisk to build communications applications, things like business phone systems (also known as PBXs), call distributors, VoIP gateways and conference bridges. Asterisk includes both low and high-level components that significantly simplify the process of building these complex applications. See the Asterisk Applications section for more examples.



What Makes Asterisk Different?

Asterisk is open source, which means you can get under the hood, see how it works and make any changes or enhancements you like. Asterisk is flexible and lets you define the solution that truly fits your requirements. Asterisk is stable, reliable and in production on thousands of systems worldwide. Asterisk is free to use.



What Do I Need To Know To Use Asterisk?

It depends. The Asterisk framework itself is built by developers for developers. If you want to create applications and solutions with Asterisk you will need a working knowledge of Linux, script programming, networking and telephony.

VoWiFi and QUALITY OF SERVICES

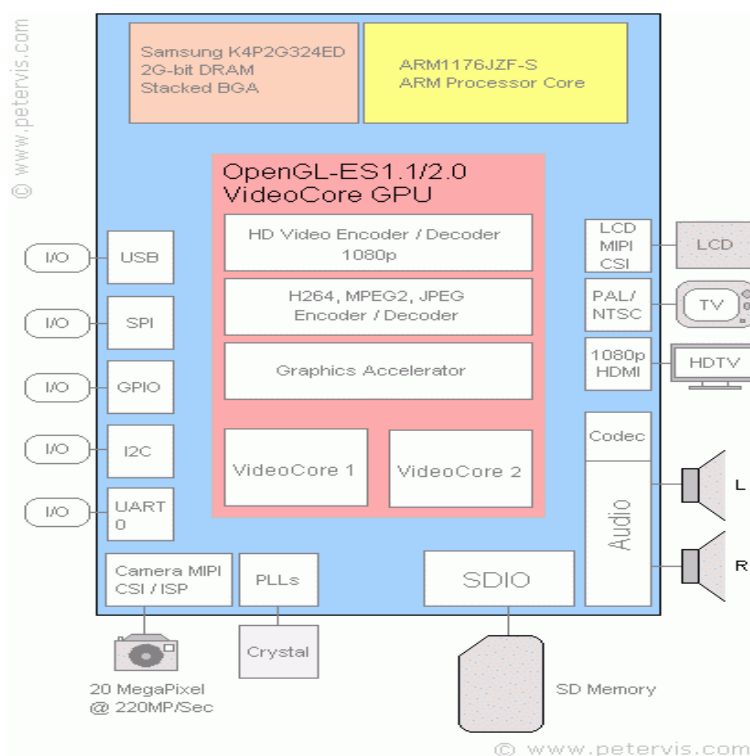


Figure 4: BCM2835 Block Diagram

A block diagram of the BCM2835 does not exist; however, based on the information available about this IC I have drawn one. The Broadcom BCM2835 is a System on Chip (SoC) with multimedia capabilities, and usually utilized in mobile phones and portable devices. It is a highly competitive industry and nearly all the big names that manufacture SoC chips keep their designs a secret.

You have probably looked at the Broadcom BCM2835 datasheet and realized that it lacks the processor architecture diagram, and even the basic block diagram showing what is inside the processor. This is vital

information for electronic engineers who work at hardware level; however, it will be some time before it becomes available to the public.

This IC provides a full HD video and stereo audio. You would expect to find it in digital camcorders, digital cameras, mobile phones, games boxes, and the applications are limitless. It has a VideoCore IV® Multimedia Co-Processor, ARM1176JZ-F application processor, and high performance OpenGL-ES® 1.1/2.0 GPU.

It is interesting to note that this chip also has an advanced Image Sensor Pipeline (ISP) for connecting a 20 MP Camera. It can transfer data at the rate of 220 MP/s. There is also an LCD MIPI type interface for driving a high-resolution LCD panel at 1080p resolutions. SoC Implementation: As you can see from the block diagram, a system on chip has everything usually found at motherboard level, and therefore they are the most easiest to implement. Usually an IC such as this requires just a power supply and some sockets for connecting the peripherals.

DATA LINK MODERM



Figure 5: Data Link Modem

High-Speed Wireless Networking: Create a high-speed wireless network for your home using this ADSL2+ Router. Connect the device to a broadband modem and wirelessly share your high-speed Internet connection at speeds of up to 300 Mbps. Enjoy surfing the web, checking email, and chatting with family and friends online. The router uses Wireless N technology, which offers increased speed and range over earlier standards. It uses Intelligent Antenna technology to transmit multiple streams of data by bouncing multiple wireless signals off of walls enabling you to receive wireless signals in the farthest corners of your home. The Wireless N ADSL2+ Modem Router also includes four Fast Ethernet ports that give you the flexibility to connect wired devices like Network Attached Storage (NAS) Enclosures to the network, very infrequent tasks should be executing on the

ARCHITECTURE OF RASPBX

The connection quality over the 10,000 km spanning 64 kbps Asterisk SIP trunk between both gateways actually is so amazing that none of the callers even noticed that i was out of the country at the time !

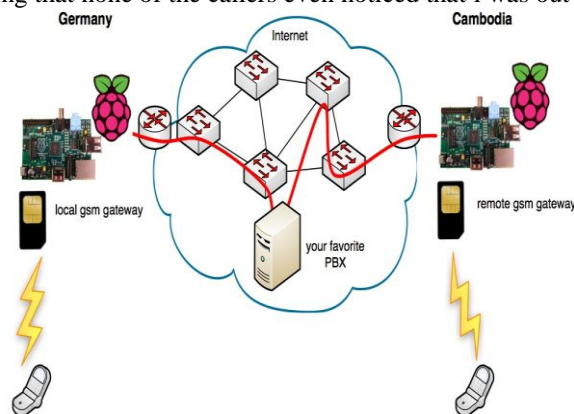


Figure 6 : RasPBX Connection

Next we are going to install the identical RPi based GSM gateways at both our offices in Switzerland and Russia, VoIP- interconnected via our central (Asterisk based) PBX system in Germany, abstracting every employee's mobile phone across the globe to a virtual extension within the company. Among many more obvious features we now are able to conduct conferences across the borders, at local call rates.



Figure 7: Network Architecture of VoWiFi

The gateway connects to the mobile switching center for cellular calls, and connects to the data network for WiFi calls. The gateway manages subscriber access and handoff. As the subscriber moves within range of a wireless access point, the gateway authorizes the subscriber's access and all network services — both voice and data — are delivered over the WiFi.

CONCLUSION AND FUTURE WORK

A Kernel level hardware based single chip computer and device control has been presented and the advantages of this 32 bit microcontroller have been described. The Raspberry Pi can be used for many of the things that average desktop does- spreadsheets, word processing, games and also plays high definition video. The number of chip, size, and weight and power consumption is reduced. Speed and Memory of Raspberry Pi is increased. Raspberry Pi can be used in Home automation and as Media streamer too. Many modems are already trying out to join up the Pi with a touch screen. The main objective of this project is to get thorough knowledge of Raspberry pi board and learn commands in Linux operating systems.

Future Scope:

- The number of businesses using voice over wireless Ethernet local area networks is set to triple over the next two years due open source IP phones and Asterisk server network..
- Concentrates on the security issues are handled.
- 500 million Cellular phones by 2013: ABI Research
- Secure communication.

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