

# Reducing the Latency in Live Music Transmission with the Beaglebone through Resampling

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**Abstract:** In previous works, a large spread of embedded platform, the BeagleBone, was shown to be provide required throughput and acceptable latency for live music transmission and signals transmission on standard LAN and WLAN . Although the research work created, the way for further process for the software stack cant given the efficient to transmit stable audio control under the perceptual latency threshold for good playing of music. This work made us gives the result on custom Debian Linux image, called We MUST-OS for the Beagle Bone, configured for the requirement of low-level ALSA driver configuration with the DM3730 SoC and the TPS65950 audio codec to get a constant local audio input/output latency. Furthermore Jack strip, an interface platform for the audio transmission, has modified and for the added support to re sampling for the connection and for the devices running sound at different levels of sample rates and period sizes. Achievements like, latency is seen to keep low and under perceptual threshold for transmission for music consistency including transmission for the controlling of the signal.

**Index Terms-**Beaglebone, Music transmission, Reduced latency, Transmission of music through wireless

## 1. INTRODUCTION

Digital networked audio is a reality for broadcast and recording studios since over a decade, using for a permanent infrastructure of cables, high-end audio interfaces and mixing consoles. A standards of existing standards for music over WANs have successful commercial operation. These, however, do not always fit to music performance scenarios. One well-known use case for networked musical performance is that of laptop orchestras, appeared in the computer music community literature since at least a decade[1, 2, 3]. In almost all papers different protocols and software stacks are employed. Furthermore control signals transmission and is, for audio transmission. Reason for this lay probably in technical issues, such as reliability, bandwidth and configuration ease. In live usage, quick configuration and flexibility are required. To that extent, wireless transmission may be considered an option. It may, however, add additional reliability concerns in potential users. The aim of the WeMUST[4] project is to assess the potential benefit and the link reliability of wireless technologies in the IEEE 802.11family. If these results the needs of live audio performance and foundations are laid to the defintion of a transport and application level protocols on existing hardware.

In the path to a live music performance system free from cumbersome or expensive hardware and interfaces, personal computers should be avoided and stand-alone Analog Digital-Analog conversion interfaces. Digital audio equipment should be portable and possibly inexpensive. For defining minimum functional requirements, the authors mainly target embedded platforms. These platforms are targeted at prototyping, hence they lack professional audio components and connections. This is acceptable at this early research stage.

In before research works from the same authors [4, 5] a preliminary investigation was conducted on the requirement of employing laptops or inexpensive ARM-based hardware for digital audio conversion and transmission over a IEEE 802.11 link. The chosen ARM platform is a Beagle 000000000000board xM, with DM3730 SoC (Cortex A-8 ARM). The OS of choice was GNU/Linux Ubuntu 10.10, running Jack and Pure data for audio processing and transmission. A Pure data C external was developed to provide device discovery and audio transmission. No attempt was made to reduce Jack input/output buffer size. In these works only link latency was evaluated, dropping from an initial average single-link delay of 22.1 ms in [4] to 4.8 ms in [5]. The delay mainly stands on buffering and

transport mechanisms, the MAC layer packet transmission time being below the millisecond with 802.11g (54Mbps). These results were promising, but in a real setup they are not necessary to sustain a good live performance. The latency performance must take into account input and output buffering source and destination of the audio codec, the link delay and the audio packet buffering. Furthermore, despite Pure data provides a useful GUI, for simple transmission of audio it is preferable to keep the system as simple as possible, thus scripts and standalone applications are preferable. In the remaining paper, the low-level configuration of DM3730 and TPS65950, ALSA and Jack are reported in Section 2. Section 3 show you the software used for transmission and the results in search of latency in a real scenario

## 2. EXISTING METHOD

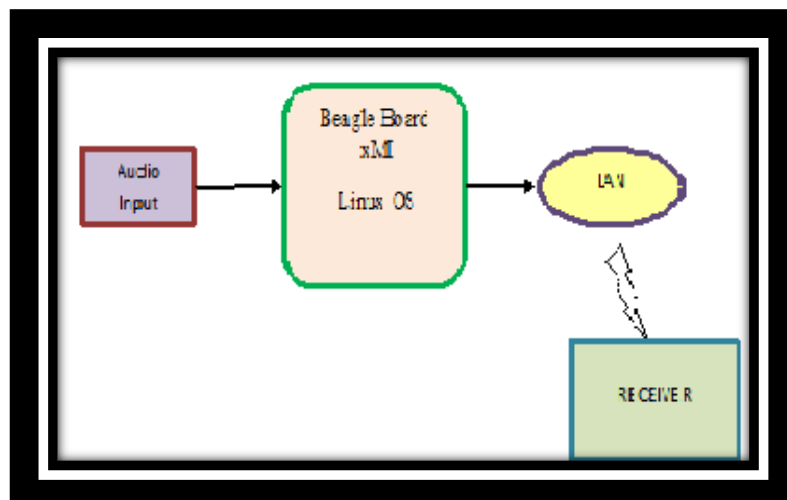
A large spread of embedded platform, the Beagle Bone, results to provide required throughput and required latency for live music transmission and audio transmission through LANs and WLANs. Although the previous work started the new search for further research, the software did give the exact result and the required enough to transmit constant audio control under the perceptual latency threshold for constant ensemble for playing. This work shows on a custom Debian Linux image, called We MUST-OS for the Beagle Bone, configured for and a careful low-level ALSA driver configuration with the DM3730 SoC and the TPS65950 audio codec to accept local audio input/output latency. For further

Jacktrip, an electronic component for the music audio transmission, has modified with some added support to start good connection with other devices running audio at different sample rates and period sizes. By these two works, the latency can be controlled under the perceptual threshold for a good music and transmission of the monitoring signal.

## 3. PROPOSED SYSTEM

In last works, a deep research have done on these embedded platform based boards, the BeagleBone, was seen to provide required amount of throughput and controlled latency in the live music transmission and audio signal transmission over standard LAN and WLANs. The preliminary work created a root for further work process and the software platform did not show required enough to transmit constant audio performance under control of the perceptual threshold for good quality in playing. This work shows on a custom Debian Linux image, called WeMUST-OS for the BeagleBone, made under the task at hand by careful low-level ALSA driver platform with the DM3730 SoC and the TPS65950 audio codec to make local audio input/output latency. Furthermore Jackstrip makes the audio transmission, has been modified with some advancement in resampling enabling stable connection with other devices which works on audio at some sample rates and period sizes. By these two growths, latency is shows control over the perceptual threshold for control over music performance with transmission of the control of signal.

**Block Diagram:**



#### **4. HARDWARE IMPLEMENTATION**

##### **4.1 BEAGLEBONE:**

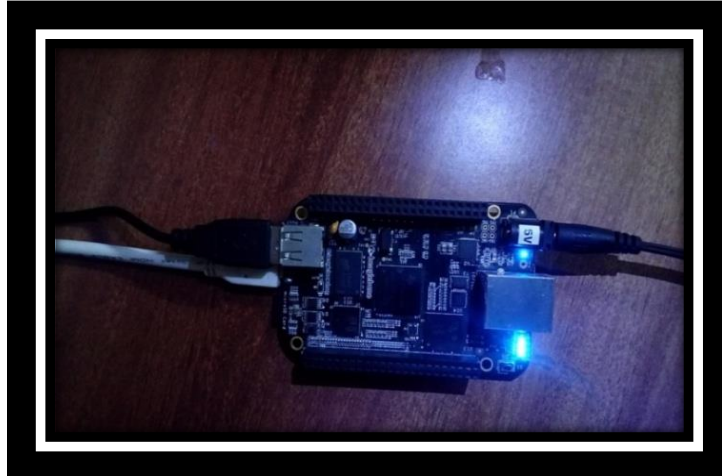


Figure 1: The BeagleBone

The BeagleBone is an ARM cortex A-8 processor equipped with open source for the users. The Beagle bone is a low power consumption an open source hardware single board computer introduced by Texas Instruments in association with Digital Key and Network element. The beagle board uses the omap3530 with 720MHZ version and comes in a

4mm Pitch pop package pop(package on package). It is a technique were the memory ,NAND and SDRAM are mounted on the top of the omap3530 .

##### **4.2. Microphone:**



A **microphone**, named **mic** or **mike** is a transducer that transmits sound into electrical signal. The most important part of the transducer of a microphone is called its *one of the component*. Sound is first into mechanical motion and then to the motion for which it can convert to an electrical one. A complete microphone also includes bringing some of the signals from the element to other equipment, and to make it an electronic circuit to adapt the output of the speaker to the equipment being driven. A wireless microphone contains a radio transmitter.

#### 4.3. Wifi Router:

A router is a device that works as a wireless one — and it transmits data from the internet cable to an equipment and then as a wireless connecting points so that data will be transmitted through radio signals instead of cables. As, it is being able to give the wireless data to the internet and other services on smartphones, tablets and PCs, you can use router to make calls using the internet, and these saves on phone bills. You can also use it to connect TVs, using products such as Apple products, Amazon's products, Google's Chrome casts.

## 5. SOFTWARE REQUIREMENTS

### 5.1. Linux Operating System:

Linux or GNU/Linux is a free and every one can use these software operating system for computers with of no cost. The os is a set of instructions that guide the electronic parts of the computer what action to take and how to react. Free and open source software (FOSS) means that everyone has the freedom to use it, see how it works, and changes it. since Linux is free software it means that none of the software will put any license restrictions on users and it will become one of the reasons why many people like to use Linux.

A Linux-based system is a similar one of Unix-like operating system. It uses some basic design form principles established in UNIX during the 1970s and 1980s. Such a system having a monolithic kernel, the Linux kernel, which controls under the process control, networking, and peripheral and file system access. Device drivers are placed directly with the kernel or it may have an added modules loaded while the system is running.

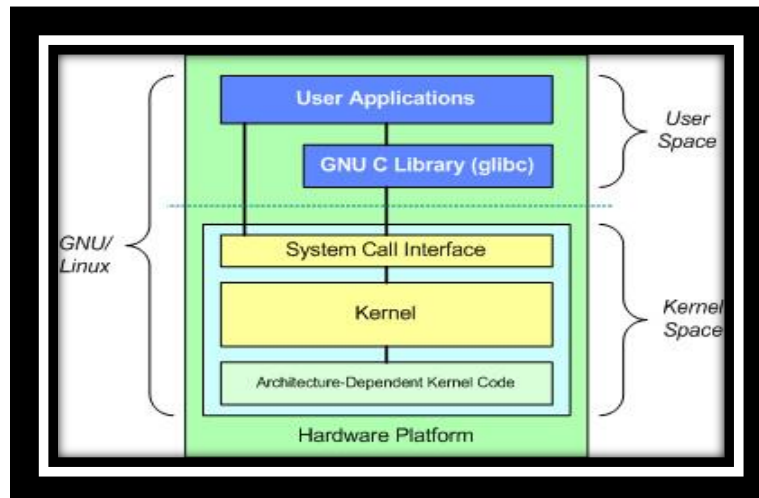


Fig: Architecture of Linux OS

### 5.2 Embedded Linux:

linux is a cross-platform application framework that is implemented developing application software with a graphical user interface (GUI) and also it is used for involvement of non-GUIs like cmd-line tools and consoles for servers. Linux makes a standard C++ and makes large use of a special code generator (called the Meta Object

Compiler, or moc) with number of reasons to develop the language. linux is also used in every other programming languages via language change. It works desktop and most of the mobile applications. Non-GUI features include SQL database access, XML parsing; thread requirements, network alligations, and a controlled cross-platform application programming interface for file handling

## 6. RESULTS

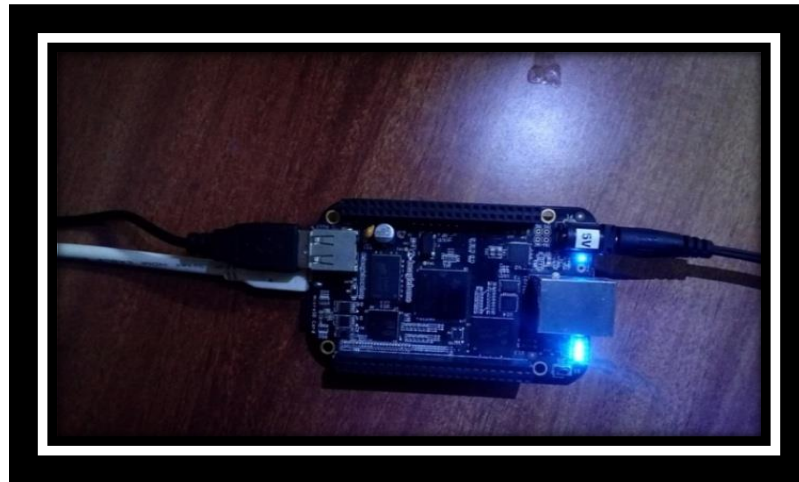


Figure 1: The setup was arrangement of block diagram of latency when the music is transfer form microphone to destination

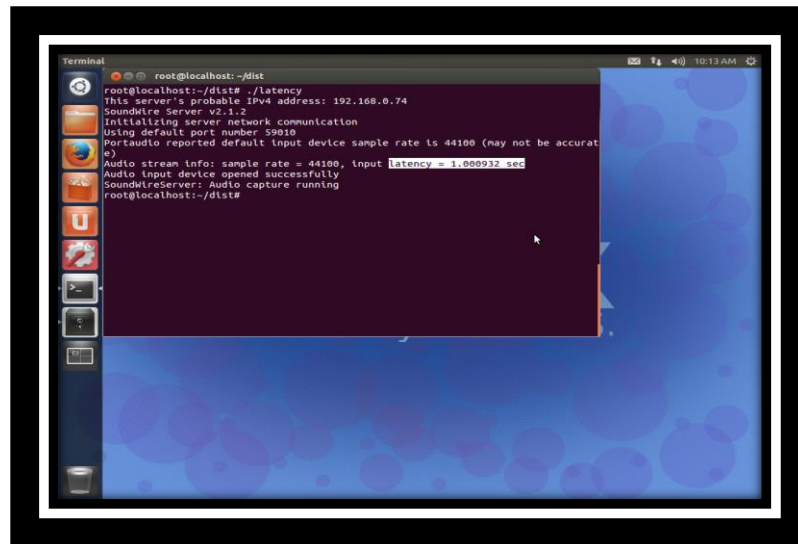


Figure 2: A webpage is created using linux (ubuntu) OS and in that web page we can able to see that, it is successfully connected to the internet and server network is also successfully connected through IPv4. Sample rate is the number of samples of audio carried per second, measured in Hz or kHz.



Figure 3: In the above web page , the audio stream information. Sampling rate=0.022ms.

## 7. CONCLUSION

The project “REDUCING THE LATENCY IN LIVE MUSIC TRANSMISSION WITH THE BEAGLEBONE THROUGH RESAMPLING” has been implemented and checked, and it was implemented with highly equipped features of hardware components and software used. Presence to each equipment has been made out and placed with care and thus had the best working of the unit. Secondly, using the latest versioned board and for the help of advancement in latest technology the project has been implemented and checked.

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