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Purpose Today, in people's living environments, there are often multiple sound channels going simultaneously. People with normal hearing are capable of prioritizing multiple sound channels and focusing on the channels that they want to hear. However, it is not easy for hearing disabled people to do so because present ordinal hearing aids available on the market amplify all sound inputs uniformly. They can hardly separate the sound channels that they want to hear from the others. It is possible to connect the person to the sound source directly (e.g. wearing headphones to listen to television sounds). At the same, however, the person is then likely to miss other important sounds that they need to hear (e.g. door bells, telephone calls). There have been some efforts made to solve this problem, however most of them convert auditory information to other modalities[1,2] which might lose some part of information content or immediacy. Discussion regarding network appliances has emphasized control and information exchange among equipment[3]. There are few that consider sound information provision to the users. The purpose of this study is to propose a new concept of environmental sound channel infrastructure that provides a controllable sound channel environment where users are able to put personal priorities on sound channels and selectively hear what they want to. The proposed framework provides both the hearing-impaired and normal people an opportunity to select what sound information to receive freely in various living environments, such as home, public spaces, and transportation. The proposed infrastructure has two major functions (*Figure 1*). The first function is to receive all sound information channels existing within a certain range of the environment. All sound sources are connected as a network, wired or wirelessly. The control can be taken by central service agent (server) that monitors all channels, or by a peer-to-peer network structure. Secondly, the sound network supports accessing from various client devices. By the client device, users can check available sound channels in the environment where they are, and set the preference sound list and select sound channels they want to hear. The infrastructure allows multiple accesses from various types of client devices. Client devices retrieve information from the network and playback an audio signal to the users. Client devices have the interface to provide information about available sound sources and to allow users to set preferences on sound priority.

Method In this study, the first prototype was developed to demonstrate the effectiveness and feasibility of the proposed framework. All sound sources are connected by wire and a Bluetooth wireless network. A computer works as a central server to receive and process sound inputs. The client device was a cellular phone with Android OS and an application program running on it. The server provided the required sound information to the client via WiFi network. **Results & Discussion** The prototype was evaluated by actual users in respect to effectiveness and feasibility. The framework should be further tested to adapt to broader settings including public spaces and transportation.

References

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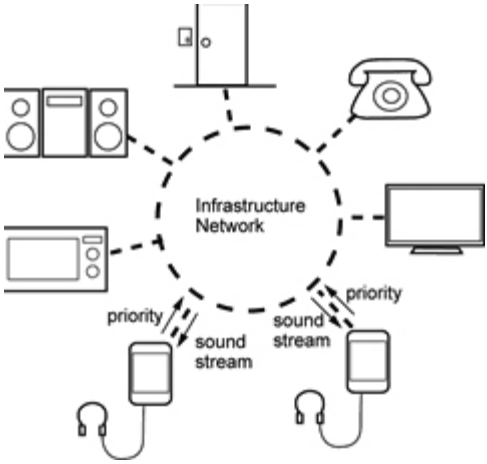

Figure 1. Concept of the proposed infrastructure for environment with multiple auditory information channels