



Table 1. Comparison between Area, Delay and Power in filter structures

Parameters	Basic FIR filter	Serial DA filter	Parallel DA filter
Delay	12.697ns	6.418ns	3.686ns
Area	less	less	more
Power	0.081W	0.081W	0.081W

The comparison of the three FIR filter structure namely the basic FIR filter structure, the serial Distributed Arithmetic structure and the parallel Distributed Arithmetic structure for delay, area and power distribution is shown in Table 1. Basic FIR filter has very high delay. As we move to Serial Distributed Arithmetic Architecture, 50% reduction in delay compared to basic FIR filter is observed. In Parallel Distributed Arithmetic structure, more than 40% reduction in delay is obtained compared to serial architecture. Thus Parallel Architecture can be used for high speed application. Area or device utilization is less and almost same in basic and Serial Distributed Arithmetic architecture. In Parallel Distributed Arithmetic Architecture also it is almost same, but little more than serial structure. Power Distribution is same in all these architectures. Thus we can say that FIR Filter using parallel DA architecture is suitable for high speed application.

4. Conclusions

An FIR filter for audio application is designed using basic traditional shift and add method of filter structure, serial distributed arithmetic architecture and parallel distributed arithmetic architecture. These are multiplier less architectures. Basic filter structure uses shift and add method instead of multiplication. Distributed Arithmetic uses look up tables, shift registers and scaling accumulators and thus consumes less resources. Distributed Arithmetic architecture can be used for high speed implementation of FIR filter. Since the Distributed Arithmetic architecture is basically bit serial in nature, we can further increase the speed by using a distributed parallel architecture with almost the same area and power consumption. From the work, it is found that speed of the filter increased in Parallel Architecture compared to the serial architecture and basic structure. Area remains almost same in all architectures, but parallel architecture has a much higher area compared to others. The Power remains the

same in all the architectures. Audio filtering in DSP processors must be done fast. So, Parallel Distributed Arithmetic architecture of FIR filter can be used in these high speed applications.

5. Acknowledgement

I would like to express my gratitude to my Professor, Tintu Mary John, whose knowledge and assistance added considerably to my graduate experience. I would like to thank the Dean of Research and Development Dept. of my college, Dr. Milind Thomas, for the motivation he provided me in my project.

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