6.1 Conclusion

The present work gives an idea why better implementation of CDMA, OFDM and UWB transmitter and receiver is important for next generation mobile communication. The conventional CDMA, OFDM, UWB and Massive MIMO-CDMA, OFDM, UWB is efficiently designed, simulated, and verified for BPSK, QPSK and QAM. The high order modulation schemes such as 16-QAM, 64-QAM and 256-QAM are also designed and analyzed by using an equalizer, OSTBC codes. The BER was efficiently reduced for both low and high-order modulation schemes. Transmitted-Received signal, input and output constellation diagram parameters like channel power, occupied bandwidth, frequency error, EVM, MER and peak power are analyzed and improved for low and high order transmission schemes. The focus of this work lait on better choice of modulation schemes for the efficient performance of wireless communication system. The study gives clear information that for a mobile communication, neither CDMA nor OFDM is an ideal technology. All present technologies have certain disadvantages due to which they are not suitable for next generation mobile communication system. For short range wireless communication, UWB is the most promising technology which is still not explored, but in future it may replace other short-range wireless technologies like Bluetooth, Zigbee and Wi-Max. It is also clear that among CDMA, OFDM and UWB, UWB is the best technology and it is to be explored for both short range and long range communication. A new modulation technique called Advanced FBMC is explored and designed where CP is not used instead an arrays of filters is used at transmitter and receiver which overcomes the ISI without wasting the spectrum. The simulation results confirmed that the performance of Advanced FBMC is better than present OFDM system which utilizes CP. Advanced FBMC is considered as the most promising candidate for next generation mobile communication but disadvantages like internal interference and inefficient short packet transmission need to be worked upon for Advanced FBMC. The study also reveals that it is mandatory to integrate cognitive radio with next generation mobile communication in order to achieve a hurdleless communication in real environment. The study also gives a basic definition of communication system- i.e. communication at anytime, anywhere and by anybody- is something which is still not fulfilled.
6.2. Scope for further work

By the year 2020, the data traffic can approximately increase by 30%, which cannot be supported by existing mobile technologies. Hence, there is a requirement of next generation wireless communication (5G) which aims to provide a high capacity and data-rate at the speed of 1Tbps (Prasad et.al., 2013). By selecting a better modulation technology, the required capacity and data-rate can be achieved. The successor of 3G technology is 4G where Orthogonal Frequency Division Multiplexing (OFDM) is used as a modulation technology and it gives an Ultra Wide Band access for a mobile device with more capacity and data-rate and better service as compared to 3G Mobile (Shukla et.al, 2013). The Advanced FBMC is identified on the basis of OFDM besides the usage of cyclic-prefix between the pictures in view of which more exchange velocity use is expected which was misused in the midst of the occurrence of OFDM. The white TV space range which is till now not used by anyone will be utilized by the Advanced FBMC recipient in light of the fact that Advanced FBMC can control the out of band impedance level (Berg et.al., 2014). In this framework, a bank of channels is used through which a game plan of parallel data is transmitted. The channel delay spread, without a bit of a stretch, can be handled by Advanced FBMC (Zakaria and Ruye, 2010). Advanced FBMC alone cannot solve the issue of spectrum scarcity; hence cognitive radio has to be integrated with next generation mobile communication system, which utilizes the un-used spectrum. Cognitive radio is emerging as a technology being used for the future radio networks and for identification of the unused spectrum of the primary users at that time (Mitola et.al, 1999). Energy detection spectrum is a cognitive technique that determines whether the signal is present or absent for a given bandwidth. In this technique a hypothesis is made for a decision (Muthumeenakshi and Radha, 2014). The signal detection of the channel to the fusion center will be done using the dedicated channel (Ghasemi et.al, 2005; Jun et.al. 2008). A dedicated channel for reporting phase is done in order to avoid interference with the primary user. However, this approach of using a dedicated channel requires extra spectrum resources and involves complex signaling issues due to dedicated channel resource management. The concept of Selective Relay based Cooperative Sensing (SRCS) was introduced in order to avoid the usage of orthogonal channel for reporting phase (Yulong et.al, 2011). The consistent cognitive radio system with high data rate will be achieved by the cooperative relays for both the spectrum sensing and data transmission (Laneman et.al, 2004; Ghasemi et.al, 2007). Here, the spectrum sensing and data transmission will be done cooperatively, and cannot be optimized separately. If the time for spectrum sensing is
increased then the time intended for secondary transmission will be condensed (Yulong et al., 2011).

6.3. Challenges in Advanced FBMC for Future Work:

6.3.1. Internal Interference:

Due to the internal interference contained in FBMC in a time dispersive channel and eliminating the use of cyclic-prefix between the symbols, there is a possibility that FBMC loses the orthogonally between the sub-carriers which is the major issue in implementation of FBMC. Techniques like equalization, interference cancellation schemes and spatial multiplexing techniques are being used to reduce the effect of internal interference in FBMC.

6.3.2. Packet Transmission:

In FBMC transmission, data is transmitted in smaller time division interval. Due to the ramp-up and ramp-down at the edge of the time interval, caused by filtering, which can reduce the efficiency of the system, is considered to be as one of the major challenges in FBMC where duration of packet transmission is of short time.