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Software define radio network

Volume 2 Issue 4 - 2018

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Received: January 29, 2018 | **Published:** November 27, 2018

Introduction

In today's world people can communicate with each other's by using different communication devices each of which has its own functionality and provides different set of services in terms of voice, data, video etc.[1] from the last few decades' performance capability and cost factor of using semiconductor memories has significantly improved. Over the last few years analog radio systems is being replaced by digital radio systems. Initially radio devices were capable of one way communication like walkie talkies; means a radio device can only transmit or receive signals at particular time & frequency it cannot operate simultaneously to transmit and receive signals from the air or other radio device in its range. After the introduction of Wi-Fi technology radio communication becomes capable of transferring data wirelessly in addition to the voice. Radio technologies gets important and become mainstream technologies once it has been started being used in military, research and in development.[2] All this tremendous trends in communication era has been achieved by the explosion introduced in wireless standards both for local area 802.11 networks and as well as cellular technologies 2.5, 3G. This has led to an increased need for all future devices to support multiple air interfaces as well as different modulation formats.[2] Software described radio (SDR) is a hot topic in the telecommunications subject, with reference to Wi-Fi technology. It is one of the maximum crucial topics of studies in the region of cellular and private communications. SDR is regarded as the enabler of world roaming and a platform for the creation of latest technology and services into present live networks. It consequently gives networks a greater flexibility into mobile communications. It bridges the inter-disciplinary hole in the area as SDR covers two regions of development, specifically software development and virtual sign processing and the internet. It extends properly beyond the simple re-configuration of air interface parameters to cover the complete machine from the community to service introduction and application development. Re-configurability involves the pervasive use of software program reconfiguration, empowering upgrades or patching of any element of the community and of the offerings and applications going for walks on it. It cuts throughout the types of bearer radio systems (Paging to mobile, Wi-Fi local area community to microwave, terrestrial to satellite, non-public communications to broadcasting) allow the combination of many of trendy disparate systems inside the identical hardware platform.[3] SDR can provide a common platform for manufacturers to develop their radio equipment's more quickly to the market and with the feature of cross integration development cost can be reduced dramatically and by building all control functionality in terms of software it also helps them in fixing bugs to the product in term of their operational and maintenance factor. Radio service providers can also use a common platform for multiple markets to provide their services which in turns reduces logistics overhead. They can increase their revenue quickly by rapidly deploying their new services in terms of software's which can be down able by the clients. SDR can play a vital role in today's world of communication to provide ubiquitous wireless communication to the end user mean that they can access service from anywhere at any time by using any medium.[1] According to SDR Commissioned Research report back in 2006 where it has conducted a research on SDR adaptation in different markets according to it. Thousands of SDRs are successfully implemented in military applications and as well as many of the cellular companies also in process of developing base station keeping in mind a common platform which can support multiple cellular phone standards in continuity to the cellular domain SDR adoption we can found today cellular phone having (SOC) System on Chip device capable of multiple DSP cores to support baseband signal/modem processing features in that cellular handset.[1] Software Define Radio is a new emerging field in terms of research it is difficult to find too much literature available on it although so by the available domain of knowledge SDR-Software Defined Radio is a general term referring to any radio design that uses a computer and some controlling software to "define" that radio's operation or it can be said that SDR is *"Radio in which some or all of the physical layer functions are software defined"*. A radio is basically a device capable of transmitting and receiving signals from or into the air by using frequency from the available frequency spectrum as per the type of communication.[1] This capability can be provided at different levels: the ideal SDR would be able to communicate at any desirable frequency, bandwidth, modulation and data rate by simply loading the appropriate software. SDR providing several benefits to the communication industry either from developers, manufacturers and user prospective some of them are as under.[1]

Discussion

The aim of this research study would be to explore how radios technologies have evolved from last few decades and now plays a significant part in today's world of communication providing voice, video and data communication. In wireless communication the wireless spectrum is a key resource which should be handled and used as efficiently as possible. Initially there were concept of analog radio which transmit analog signal over the voice and air which is than modulated and amplified within radio before the transmission, radio waves are continuously transmitted by analog radio so FM radio broadcasting service is an example of analog radio whereas in comparison with digital radio which has built in capability to convert analog signal to digital signals before it is transmitted by the radio terminal example of digital radio are those radios which comply APCO-25 standard of TETRA standard,[4] so the main aim of the study would be to explore how is it possible that today we can found transceivers which can be multi-carrier, multiband and multi-mode transceivers and used wireless spectrum efficiently which help tremendously in reducing cost for communication. Basically, the components of radio which were previously hardware based have now

been replace by software component by such tremendous change the control logic defined in radio transceivers has been shifted to software which can provide same features provided by the hardware solution in more flexible. so the solution provided in term of software are cost efficient as well as flexible for the service providers and products developers as well as to the end users.

Conclusion

Software program described Radio (SDR) is a leading generation in radio verbal exchange by using imparting up gradation facility that is flexible and withstands for long term even as offering multi popular terminals for give up customers with in financial feasibility. Cognitive radios that are context-sensitive, adaptive and getting to know radio devices utilize SDR as base era. The objectives of this research study would be to explore which are the different hardware and software solutions available in the market which support SDR along with their pros and cons and to find out answers for the following research questions.

a. Comprehensive literature review of the evolution of SDR.
b. Current state of the Art.
c. Architectures/ Components of SDR e.g. protocol stack, wireless technologies.
d. Hardware/ Software Platforms for SDR.
e. Future Directions.
f. Study the state of the art in research and development related to SDR?
g. How SDR technology can increase spectral efficiency?
h. Challenges related to SDR usage?

Acknowledgments

None.

Conflicts of interest

The author declares there is no conflicts of interest.

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