Software Defined Radio

Today people need to communicate in various ways, which includes, data communication, voice communication, video communication, broadcast messaging, command and control communications, emergency response communications, etc. The number of ways in which people are communicating is increasing exponentially. To provide these facilities radio devices must made easily adaptable to circumstances and should be cost effective. This has been a challenging task for the researchers. One technology called Software defined radio (SDR) technology brings the flexibility, cost efficiency and power to drive communications forward, with wide-reaching benefits realized by service providers and product developers through to end users.
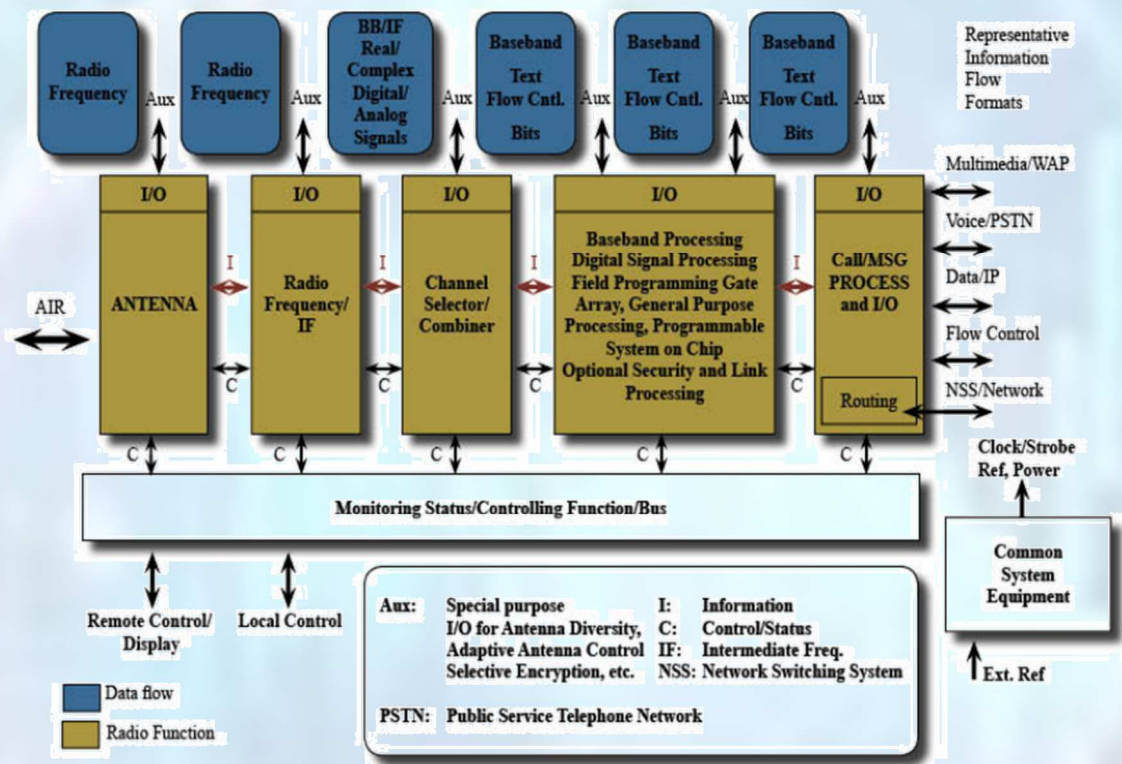

Figure 1: SDR Forum Generalized Functional Architecture – Commercial (source:http://
www.sdrforum.org/pages/documentLibrary/documents/SDRF-01-P-
0006V2_0_0_BaseStation_Systems.pdf)

SDR can be defined as, Radio in which some or all of the physical layer functions are software defined. A radio is any kind of device that wirelessly transmits or receives signals in the radio frequency (RF) part of the electromagnetic spectrum to facilitate the transfer of information. In today's world, radios exist in a multitude of items such as cell phones, computers, car door openers, vehicles, and televisions.
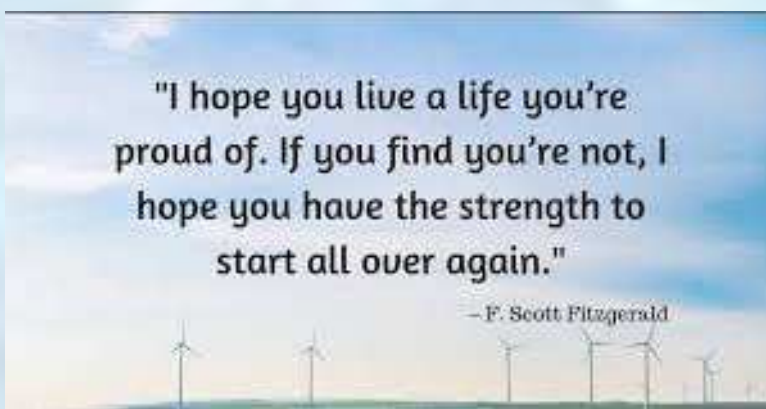
Traditional hardware based radio devices limit cross-functionality and can only be modified through physical intervention. This results in higher production costs and minimal flexibility in supporting multiple waveform standards. By contrast, software defined radio technology provides an efficient and comparatively inexpensive solution to this problem, allowing multimode, multi-band and/or multi-functional wireless devices that can be enhanced using software upgrades.

SDR defines a collection of hardware and software technologies where some or all of the radio's operating functions (also referred to as physical layer processing) are implemented through modifiable software or firmware operating on programmable processing technologies.

These devices include field programmable gate arrays (FPGA), digital signal processors (DSP), general purpose processors (GPP), programmable System on Chip (SoC) or other application specific programmable processors. The use of these technologies allows new wireless features and capabilities to be added to existing radio systems without requiring new hardware.

Software Defined radio, allows the optimum use of frequency band along with cost effective options, since one single radio device can now be used for multiple applications which works on multiple bands as per the availability of spectrum. This is also advantageous when it comes to adding new device or technology since the physical layer of this radio software defined.

Researcher's aim however, is to make this technology cost-effective in coming years. The SDR is predicted to become inexpensive as market starts to adopt this technology more and more. This shall take few more years to develop wide variety of transmitter and receivers and user handsets compatible with SDR.

"I hope you live a life you're proud of. If you find you're not, I hope you have the strength to start all over again."

— F. Scott Fitzgerald

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