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Digital Video Broadcasting Implementation in WSN Environments

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Abstract

In this study, the presented antennahas extremely small dimensions compared to a wavelength – at 650 MHz. In fact, the largest dimension of the antenna is_ (wavelength) / 12. i.e. much smaller than the conventionalelectrical length of _ / 4. A relatively high bandwidth of 92% is achieved. The antenna includes embedded loading circuitswith low resistance, high capacitance varactors which providebroad tunability over 35-800 MHz. This broad tuning range isvalidated with laboratory measurements. Possible applicationsinclude DVB, HD TV, white space application as well as insertionin smartphones and handheld devices due to operating in theLB band of LTE/4G. From a practical point of view, high clustering comes with beneficial effects and drawbacks. On the one hand, high clustering could imply that the majority of the network's nodes are fewer hops away from the targeted base station, an outcome that leads to energy saving in the routing data. On the other hand, high clustering, reflected by long links, implies that they (the links) are more likely to be asymmetric, hence the realization of a data-collection tree that I otherwise fragile. In summary, this study demonstrates that even in situations where simple protocols are utilized, there is likely to be complexity at scale. Hence, the findings form a basis for the future analysis of data in algorithmic studies.

1 Introduction

Digital video broadcasting (DVB) emerged in early 1990'sfirst as digital TV. Digital TV antennas receive both VHF andUHF frequencies i.e channels [2] and [4] respectively
according to US standards set by the Federal CommunicationCommission (FCC). VHF low band frequencies range from49 MHz to 108 MHz. On one hand, TV channels with 6MHz bandwidth and High VHF frequencies (174-216 MHz),require a quarter wavelength antenna size less than 14 inches.On the other hand, UHF TV channels frequencies fall in470-806 MHz, where quarter wavelength antenna size is 4inches minimum. Therefore, for smart phones to receive highdefinition TV (HDTV) by incorporating TV antenna, newstandards and technologies are needed. In addition, frequenciesin lower unallocated VHF bands could be targeted for whitespace devices (WSD) applications [1-6]. Consequently, research inminiaturizing antennas in VHF and UHF and LTE bands forfollowing up with the expanding digital technology is veryactive [7]. Providing TV reception in mobile phones and automobiles,changes the Telecommunication map by saving online longbrowsing hours, costs of internet, and the need for increasingdata rates; makes internet technology less harmful to humanbeing due to use of low frequencies at low powers unlikehigh power 5G generation [8].

2 Methodology

The initial phase of the experiment constituted the examination of some of the features of links in a large test bed's nodes. For the second set, the aim was to analyze flooding dynamics over a test bed of the same characteristics. It is also notable that the initial phase constituted 185 nodes and the grid spacing was two feet while the second phase constituted 156 nodes under similar experimental conditions as the first phase. Regarding the attribute of experimental analysis, the behaviors of the target parameters were decomposed into layers before conducting independent analyses with various metrics. In turn, the analyses were combined to obtain composites, eventually explaining the global behavior based on the composite display.

3 Results and Discussion

The antenna naturallyhas four slots, and hence it has the capability to incorporatevaractors. In order to DC bias the varactors, two inductors aremounted at the sides along the middle to allow applying DCcurrent. The inductors will block AC current from being shortcircuitedto the DC power supply and hence AC feeding of theantenna is not affected by the DC feed. However, in this case,both long sides of the antenna allow DC current to flow fromone side to the other through four varactors and one copperleg. In order to avoid current being shorted through the copperleg, a fifth slot is created, and consequently 5 varactors weremounted on

the antenna patch. Inductors permit only the DC currentthat biases the varactors.The simulated model of the varactorshas a 1 mm x 0.5 mm area, with a series connection of a capacitor and a resistor [6], [2]. Thismodel complies 1SV325 varactors from TOSHIBA, which arechosen due to the wide capacitance variation over [7] pF.The variation of the capacitance in simulations over [5] pFhas resulted in tunability over the whole frequency range [5] MHz. Note thatthe bandwidth is not fixed for different capacitance values; however, it is always largerthan 15 MHz for S11 below -5 dB taken as reference. Hencethe antenna can be tuned for both DVB-UHF and white spaceapplications, as in Figure 1.

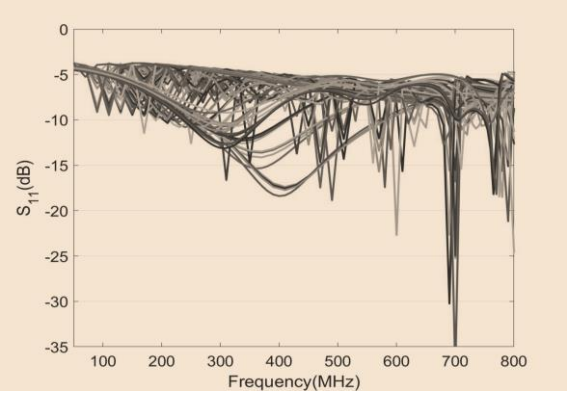

Figure 1: DVB-UHF and white space applications

Each varactor is acapacitor in series with a resistor.results to show the narrow bandwidth resonance. In spite offabrication and soldering effects, the achieved measured resultsare highly successful, as the varactors have been able to shiftthe frequency to low value of 35 MHz, which belong to theVHF range. Moreover, a continuous tunability is obtained till800 MHz, which covers UHF and white spaces between VHFand UHF. The narrow bandwidth obtained with high tenability is consistent with this paper suggestion of using microstripantennas in receiving long wavelengths for DVB applicationsused in hand held devices. The miniature size of the proposedantenna being 5 x 2 x 0.16 cm3, allows manufacturers to easilyintegrate it in aforementioned devices [7]. Moreover,the frequency range of tunability results intersects with theLTE/4G low band and thus increases the antenna applications.The bandwidth islarger than 6 MHz in consistence with TV channels bandwidth.The bandwidth can be as large as 20 MHz for certain capacitancevalues. Hence measurements confirm that the antennacan be used for white space applications as well. Anechoicchamber is used to measure the radiation pattern horizontalazimuth plane and vertical elevation plane directivity at 650 MHz for all varactors off, where theS11 measured value is -9 dB. It is noticed that upon addingvaractors, the antenna radiation pattern becomes directive. DC biasing in anechoic chamber needs moresophisticated technology and could be subject of further studyof presented antenna.

Wireless sensor networks reflect contemporary classes of networked systems. This study focuses on a large-scale empirical examination of the nodes of these wireless devices at different contexts of power transmission. In the study, it is through instrumentation that the impact of protocol stacks at different layers is separated. Some of the parameters examined at the link layer include link symmetry, effective communication range, and packet reception statistics. For the case of the MAC layer, some of the parameters presented and analyzed include collision and latency, as well as contention. In relation to the context of the application layer, the study examines the parameter of tree structure established through flooding. From the results, this study demonstrates that even in situations where simple protocols are utilized, there is likely to be complexity at scale. Hence, the findings form a basis for the future analysis of data in algorithmic studies. Nodes in the entirety are ensured that they exhibit uniform vertical orientation, as well as the same antenna length. However, it is worth noting that even if the experimental nodes' radio hardware is calibrated keenly, making the procedure perfect is challenging. The implication is that even if the design is set in such a way that the nominal hardware settings are the same, there is likely to be a variation in the various nodes' state of actual transmission of power.

As mentioned earlier, the objective of this study is to gain insight into the dynamics surrounding flooding. Therefore, two independent experiments were conducted. In each experiment, the study relied on flat grid node distributions. This consideration was to ensure that the sensor deployments were uniformly dense. Notably, the deployment of the sensor nodes was on the ground, a similar fashion as that which could be found in situations involving sensors dropped from airplanes, as well as monitoring buildings, as in Figure 2.

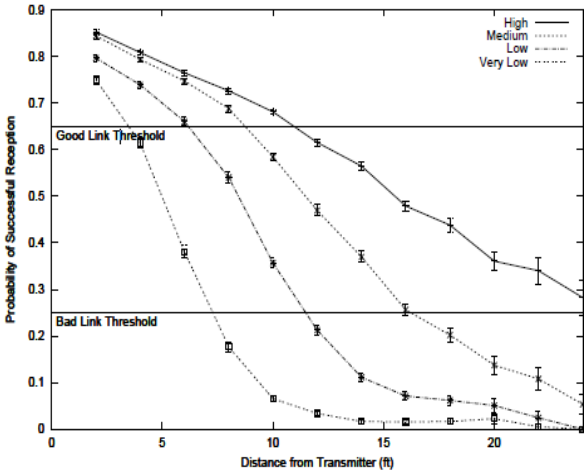

Figure 2: Succesfull Reception by Distance from Transmitter

This study suggests that if long links are present, the flood is likely to propagate further along a given direction. For nodes existing at the long link's end, they are likely to experience a clear channel, hence clear field nodes that go unreached by the flood. From a practical point of view, high clustering comes with beneficial effects and drawbacks. On the one hand, high clustering could imply that the majority of the network's nodes are fewer hops away from the targeted base station, an outcome that leads to energy saving in the routing data. On the other hand, high clustering, reflected by long links, implies that they (the links) are more likely to be asymmetric, hence the realization of a data-collection tree that I otherwise fragile. In summary, this study demonstrates that even in situations where simple protocols are utilized, there is likely to be complexity at scale. Hence, the findings form a basis for the future analysis of data in algorithmic studies.

Cabling environments that are structured consist of backbones comprising of cables for connecting intermediate or main cross-connects to the respective telecommunication closets. In addition, backbones refer to cables whose function is to offer linkages between intermediate cross-connects and the main cross-connects. Therefore, in the current paper, backbones constitute physical portions within cabling systems that are structured.

Given that backbone networks gain application in various contexts, they serve to connect multiple segments of LANs. The networks may operate from one single floor to another, or provide access in terms of wide-are networking among the LAN users. The role of transmission media becomes significant in this case. The current design assumes a case in which the media will form a transmission channel for a non-wide area or local backbone network.

Distributed backbones constitute various connectivity devices linked to series of central devices. The central devices include routers, switches, hubs, and connectivity devices; designed hierarchically. Indeed, distributed backbones lead to limited capital outlays and simple expansion. The aspects arise from the fact that additional layers can be introduced to the existing layers. The backbone applies in large-scale networks and single buildings; sending all transmissions to all devices on the network. Collapsed backbones operate in such a way that respective equipment in respective hubs offers the routing or switching functions. The backbone faces challenges in such a way that reachability challenges at the central location crash the entire system. Advantages include ease of management and provision of room for high performance technology. The following figures demonstrate how Hilton Hotel would benefit from the proposed model, developed via computer technology-based simulation.

4 Conclusion

In conclusion, Upon loading the antenna with low resistanceand high capacitance range varactors, frequency tunability overwide range 35-800 MHz is obtained in measurements.

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