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A REVIEW ON UWB LOG-PERIODIC ANTENNA

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Abstract -*Just lately, extremely-wideband (UWB) technological know-how has attracted so much attention both within the industry and academia as a result of its low rate, potential to manage excessive information cost and quite low energy requirement. A UWB log-periodic antenna is among the key components for realizing the UWB programs. We be aware, however, that designing a UWB log-periodic antenna to supply excessive performance is much more challenging than it is when coping with the conventional narrowband antennas. Commonly, it's desirable for a UWB antenna to quilt a huge bandwidth spanning the whole range of three.1-10.6GHz, to provide an omnidirectional radiation pattern, and to have a compact size as well as a easy configuration. This paper specializes in the survey and analysis of planar printed UWB log-periodic antenna, and provides some representative performance results of earlier designed UWB antennas to illustrate the benefits as well as drawbacks of those antennas. Reward state of development of UWB log-periodic antennas is reviewed within the paper and some future developments of UWB antenna designs are awarded. In addition, the issues of wideband enhancement procedures for UWB log-periodic antenna.*

Key Words*:UWB,* PLPDA, PLYDA, HMSIW, LPMA.

1. INTRODUCTION

The intensive development and wide application of new generations of communication systems have increased the demand for new antenna designs. The most common requirements these systems pose on antennas are large bandwidth, high radiation efficiency, small size, and integration with integrated circuits and MMICs. Considering these requirements, printed mm-wave antennas appear to be a suitable choice of antenna technology for new wireless communication systems, as they avoid the need for bulky horn antennas and associated losses resulting from routing signals off-chip to a transition from the active MMIC to the horn.

In telecommunication, the frequency spectrum is a rare commodity and each band is assigned for a specific application. A log-periodic antenna is a broadband, multi-element, unidirectional, narrow-beam antenna that has impedance and radiation characteristics that are regularly repetitive as a logarithmic function of the excitation frequency.

The active log periodic antenna that the title for A Single Broadband Antenna whose characteristics vary as a periodic function of the logarithm of the frequency. This project is to look into the design of a Broadband antenna that covers the important low-return-loss printed log-periodic dipole antenna (PLPDA) fed with the aid of a coaxial cable is awarded. The widths of dipole elements are optimized to develop the bandwidth. A study of coaxial cable position is integrated with the intention to enhance the antenna habits. The measured return loss is cut down than 15 dB from2.1 to four.3GHz. The measured gain varies between 6 and 7 dBi. The measurements, including input impedance, gain and radiation patterns, and simulations are in agreement. Apart from software as a excessive fine dimension antenna and course finder, this antenna can also be very good acceptable as a directional antenna for WLAN, Wi-Fi, and different directional communique applications.

A small physical antenna-measurement plus low weight will make this antenna a specialty for cell use and the detection of unusable signal sources like army radar, more than a few satellite services and really high frequency bugs.

2.LITERATURE SURVEY

Amrollah Amini et al (2015) in this letter, the log-periodic rectangular fractal geometry is provided for the design of a miniaturized patch antenna for the ultra-wideband (UWB) offerings (3.1-10.6 GHz). A miniaturization factor of 23% is achieved with a consistent and steady attain in the desired band. The radiation pattern is broadside, which finds compatible functions in the UWB radars and medical imaging. Furthermore, the time-domain performance of the proposed antenna is investigated. A prototype mannequin of the proposed antenna is fabricated and measured as a proof of suggestion.

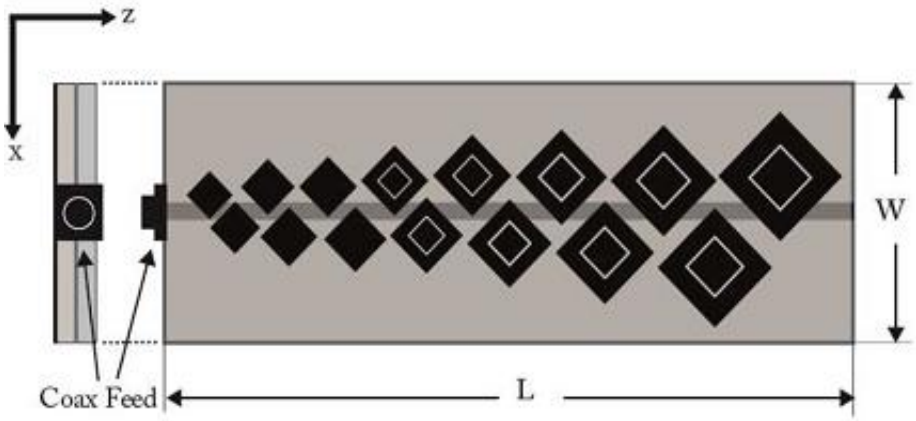

Fig-1. Log-periodic patch antenna

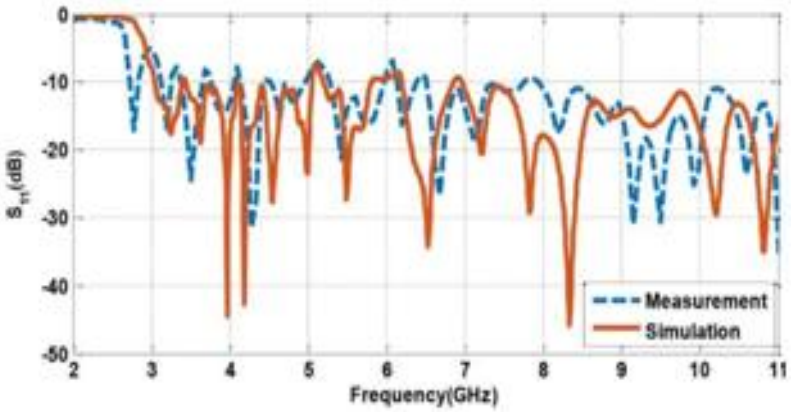

Fig-2. Return loss of proposed antenna.

Fractal geometries are correct constructions for miniaturization and multi-banding of antennas. Consequently, a log-periodic formation of rectangular fractals is provided for broadside radiation in UWB services, where square slots are reduce in the square patches. The higher square patches are outfitted with rectangular slots, however the smaller patches lack such slots, in an effort to hold the efficiency of radiation patterns at bigger frequencies. The geometry of log-periodic antenna is adjusted to obtain 23% dimension reduction relative to the straightforward square patch array. The habits of the proposed log-periodic fractal configuration is additional investigated in time-domain. A prototype model of the antenna is fabricated and measured which verifies its fascinating traits.

Guohua Zhai et al (2014) in this communication, a couple of parasitic dipole elements served as director mobile phone are added to the shorter finish of the broadcast Log-periodic dipole array (PLPDA) antenna for the receive enhancement. This novel antenna is headquartered on the combination of the PLPDA antenna and the quasi-Yagi antenna methods, so known as printed Log-Yagi dipole array antenna (PLYDA). The quantity and the distribution of the director cellphone are discussed and optimized. A prototype PLYDA antenna fed with the help of 1/2 mode substrate built-in waveguide (HMSIW) is manufactured, as good as a HMSIW PLPDA antenna for comparison. The return loss and a ways-discipline radiation patterns had been measured and awarded on this work. The proposed PLYDA antenna displays acquire enhancement of zero.2–2 dB in analysis with the equal dimension PLPDA antenna over the jogging frequency range 21–forty GHz. The simulated and measured outcome are in great contract, and the reap enhancement utilizing the director mobile is established.

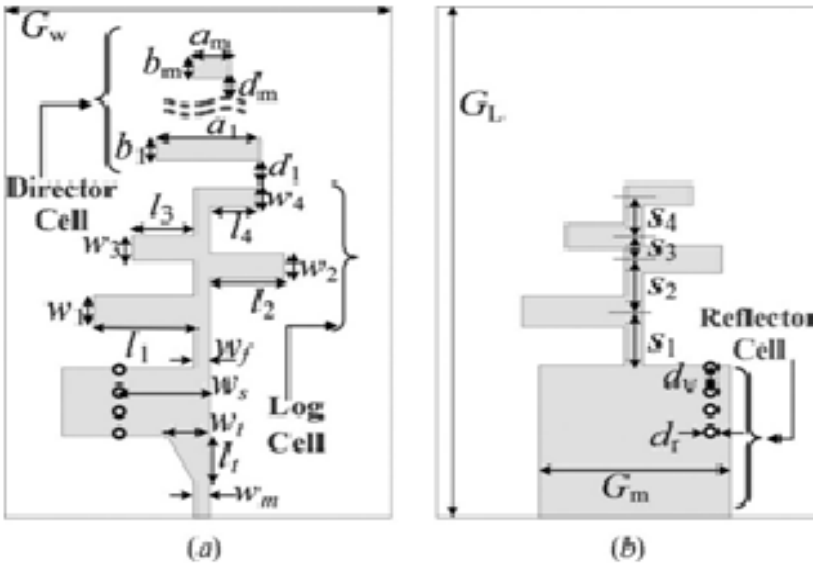

Fig-3. Geometry of the HMSIW PLPDA antenna. (a) Top layer. (b) Bottom layer.

The measured antenna obtain of the HMSIW PLYDA antenna comparedwiththatofthePLPDAantennaisshownin Fig-4.Themaximum realized gain of the HMSIW PLYDA antenna is 10.95 dBi measured in this verbal exchange, the reap enhancement of the PLYDA antenna using director cell has been to begin with studied.

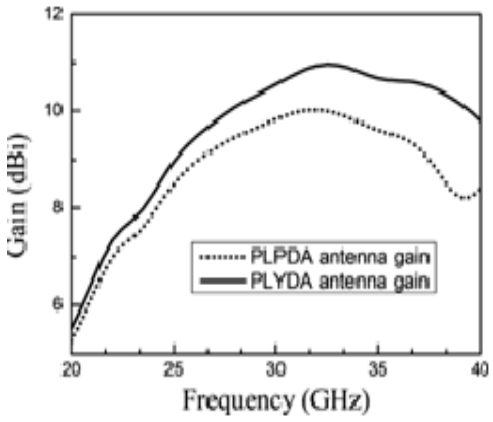

Fig-4. Measured gain of the HMSIW PLYDA and PLPDA antennas.

The PLYDA antenna fed by using HMSIW has been fabricated via making use of regular PCB manner. And the return loss, gain and some distance-fields patterns of the proposed HMSIW PLYDA antenna were investigated and measured. It used to be shown that the director cellphone not most effective increases the antenna obtain, but also reduces the design complexity of the antenna. Mainly, the achieve enhancement of up to 2 dB has been presented in the operating frequency band of 21–40 GHz. As a result, the virtues reminiscent of high antenna obtain, broadband, low profile, and ease are tested via the measurement.

G.A casual et al (2013) a printed log-periodic dipole array (LPDA), running between three and 6 GHz and fed with a coplanar waveguide, is offered. The antenna has been designed beginning from Carrel's thought, optimized making use of CST Microwave Studio 2012, after which realized. The evaluation between simulated and measured outcome suggests that the proposed antenna can be used for broadband applications in the whole operating frequency band (three–6 GHz), with a very good input matching and a ample endfire radiation pattern.

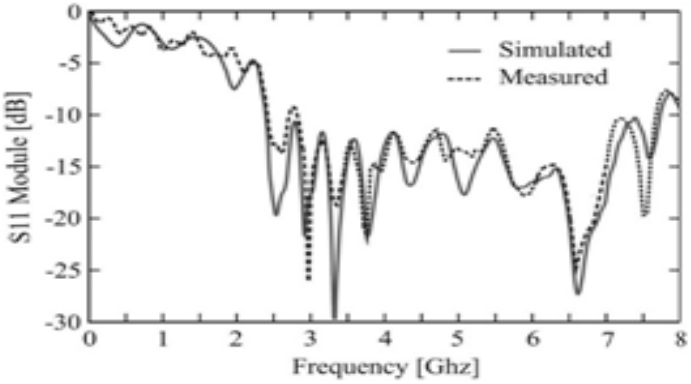

Fig-5. Reflection coefficient of the designed LPDA antenna.

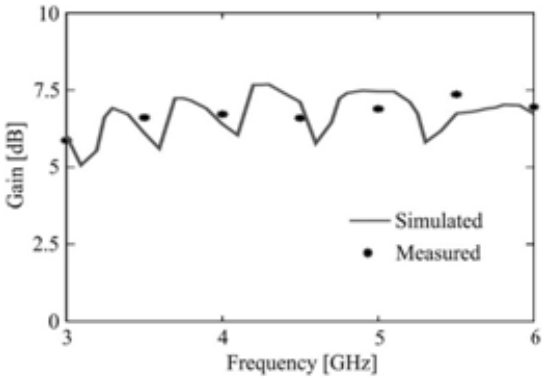

Fig-6. Gain of the designed LPDA antenna.

A printed log-periodic dipole array with a new feeding system, running between three and 6 GHz, has been designed and analyzed utilizing CST. The return loss and the radiated a ways subject within the design frequency band are just like different options using the coaxial cable feeding, whereas the proposed resolution avoids manufacturing time and issues as a result of soldering of the coaxial cable.

The new feeding configuration enables a easy awareness, with low fee and compact size, and is easy to attach with the outside SMA connectors. The simulated and measured outcome are in an excellent contract, displaying that the proposed LPDA can be efficiently used as a broadband antenna in the entire running frequency band.

M. Abri et al (2012) The design of log periodic ring printed antennas array witch generates round polarization with extensive band by means of single feed linearly polarized elements for GPS systems. The radiating elements had been fed with the aid of magnetic coupling via a slot. The round polarization is finished by using having a normal 2×2 sub-arrays with designated element angular and section arrangement, each the detail angular orientation and feed phase are organized within the 0°, ninety°, 180 and 270° trend. The purpose of distinct angular orientations of the patches is to generate two orthogonally polarized fields, whilst -3dB coupler is used to provide the specified amplitude and segment delays for round polarization iteration. This uniquely shaped array has the capability of generating first-class circular polarization. An association of the coupler with the antennas has been established. This work is completed using the moment's approach of Momentum program. Just right performances of adaptation and polarization were obtained. The simulation results are then presented and discussed.

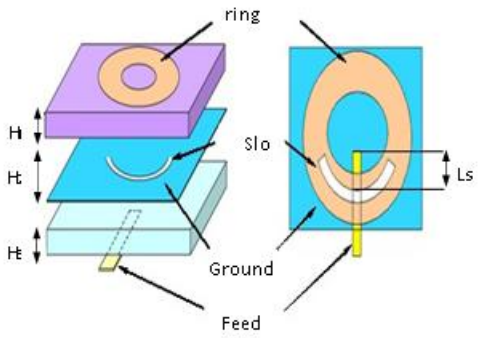

Fig-7. Geometry of the sloted antenna supplied by sector

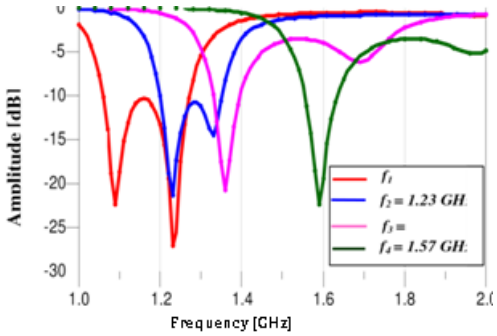

Fig-8.Simulated reflected return loss for each antenna.

The log-periodic arrangement proposed of printed antennas has allowed to obtain a twin band habits. Two bands corresponding to the frequency L1 and L2 of GPS procedure functions with high bandwidth and applicable reap are carried out. Also a good polarization purity was once obtained.

We showed the probability of tending towards an most effective integration of a radiating aspect associated its feed circuit. The results presented are encouraging and exhibit that in spite complexity, round polarization based on beneath network with 4 elements proves extra adequate vast bandwidth antenna is formed through software of log periodic technique to the sequence fed electromagnetically coupled rectangular overlaid dielectric resonator array. This Log Periodic DRA is simulated utilising a CST microwave studio suiteTM 2010. The simulated results exhibit wider impedance bandwidth covering the frequency range of 6.4 GHz to eleven.1 GHz with a VSWR lower than 2 and radiation effectivity bigger than ninety five %. Its highest obtain is 7.2 dBi. Parametric reports of the antennas with CST microwave based design information and simulated outcome are presented here. The scaling factor of 1.05 has been chosen for this design

Chao Yu et al 2011 a broadcast log-periodic dipole antenna (PLPDA) with a couple of notched bands is proposed for ultrawideband (UWB) purposes. The impedance bandwidth of 3.1 GHz–10.6 GHz with VSWR lower than 2 is done centered on the wideband property of the PLPDA as good because the half mode substrate built-in waveguide (HMSIW) Balun. Exclusive from omnidirectional UWB antennas, the tip-fireplace radiation pattern of the PLPDA is more stable within the UWB band. More than one notched bands are generated by using integrating U-formed slots into the PLPDA for blockading the interference from different narrow band wireless communique systems. A number of antennas with the notched frequencies of3.5GHz,5.5GHz, 6.8 GHz, and 8.5 GHz are designed, fabricated, and measured. The measured results are in contract with the predicted outcome.

For the reason that non-linear segment response outcome in waveform distortion within the time area, then the linear segment response of the antenna is also very predominant for UWB techniques. In this be taught, two PLPDAs with one U-shaped slot were used to transmit and receive signals, and the group time lengthen was once measured via a vector community analyzer through on the grounds that the pair of PLPDAs as a two port network. Fig. 9 indicates the measured group timeDelay with two different distances between the 2 PLPDAs. Flat responses are completed within the working frequency bands main to excellent linear segment response. In this paper, UWB PLPDAs with a couple of notched bands are provided.

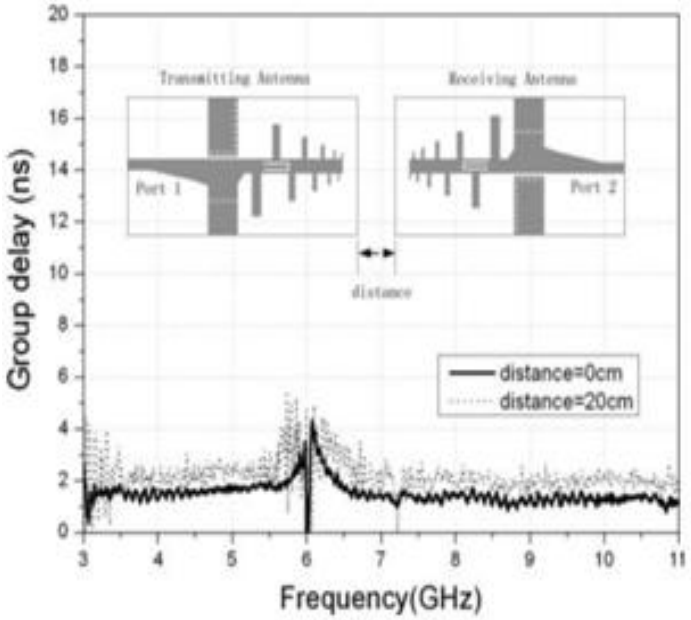

Fig. . Measured group delays of the two PLPDAs with 1 U-shaped slot and different distances

A portion of HMSIW is built-in into the proposed antenna as an ultrawideband balun in the feeding network, and a reflector for the broadcast dipole array. The proposed PLPDAs with single and more than one notched bands have been applied effortlessly through etching U-shaped slots on the antenna. Unlike the monopole antennas, the proposed PLPDAs radiate vigour sooner or later-fireplace path. Stable radiation patterns are experimentally confirmed within the whole working frequency bands.

Table -1: Comparison of different paper published on PLPDA

Antenna parameter	Dual-Band Dual-Polarized Compact Log-periodic dipole Array for MIMO WLAN Applications	Log Periodic Dielectric Resonator Antenna for Broadband Applications	MULTI-LAYERED RING LOG-PERIODIC ANTENNAS ARRAY DESIGN FOR GPS SYSTEMS	Low-Return-Loss Printed Log-Periodic Dipole Antenna	On Conditions for Constant Radiation Characteristics for Log-Periodic Array Antennas	
Year	2013	2011	2012	2014	2015	
Author	G.A Casual	Chao Yu	M. Abri	Guohua Zhai	Amrollah Amini	
publication	ieee	IEEE	IJCNC	IEEE	IEEE	
dielectric		Teflon, FR4		NX9300	Rogers RO4003	
software	HSFF	CST	sonnet	CST		
Feeding method	Network feeding	Line feeding	Line feeding	Coaxial /differential feeding		
Return loss	-13 db	-34 db	-20 db		-45db	
Operating freq	2.4 – 5 GHz	3.8 - 9.6 GHz	1.1-1.7	2.96-4.25 GHz	10GHz	
Usable frequency	2.4 – 5.5 GHz	6.7 GHz	1.8 GHz	3.9 GHz	3 to 10 GHz	
bandwith	Dual	57%	8.11%	2.6 to 4GHz	7 GHz	

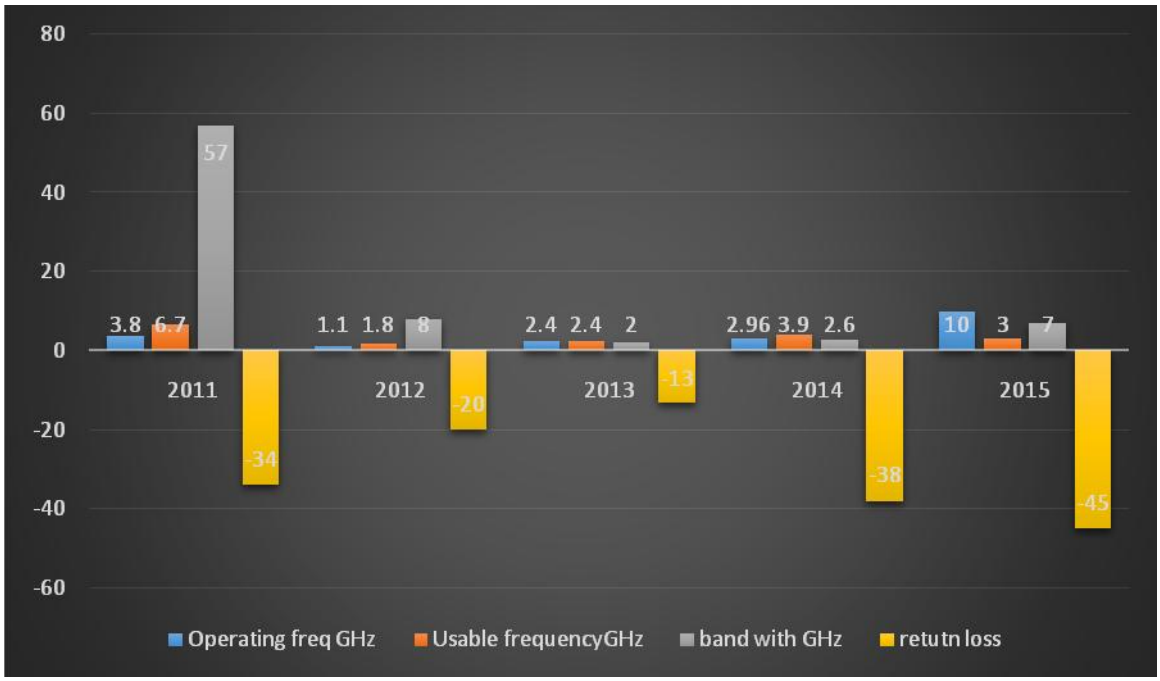

Chart -1:Comparison of different paper published on PLPDA

3.PROPOSED METHODOLOGY

The design procedure of traditional and proposed printed PLPDA antennas is to be confirmed in this thesis. Antenna buildings of Fig. Are supported via 1.575 mm-thick RT/duroid 58701substrate with relative dielectric consistent of 2.33, copper cladding thickness of 17 µm, and loss tangent of 0.0012. Each designs are matched to a 50-Ω enter terminal over the running bandwidth (i.E., 2–four GHz) and core fed by way of a strip line that is thoroughly embedded in the dielectric and quick circuited to the higher dipole plane at the antenna apex. The antenna feed point is well-nigh at the small finish of the constitution to allow segment progression and thus, end-fire radiation in the direction of the shorter elements.

4.CONCLUSION

The research motivation for this paper was once miniaturization of Log-Periodic Microstrip Antenna utilizing quarter-wavelength transmission line. We selectedthis antenna considering of its benefits in phrases of low profile, price, ease of fabrication, gentle weight and its knowledge for conformal installations. A proximity couplingprocess was used to feed the radiating rectangular patches. Two substrates with special quarter-wavelength transmission line recognition was presented and designed to cut back the dimensions of the LPMA.

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