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Adaptive Beam Forming Network with Multiple Beam Antennas

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***Abstract*—** The adoption of shrewd / versatile antenna Techniques in future remote frameworks is expected to have a huge impact on the productive use of the spectrum, the minimization of the cost of establishing new remote networks, the optimization of administration quality and realization of transparent operation across multi innovation remote systems. Mobile phones can be an essential means of communication when we are away from the office or home and it can be an important security asset in the event of an emergency. Cell phone technology has developed the telecommunication scenario in India. Due to its several advantages, cell phone technology has grown exponentially in the last period. Currently, there are more than 50 crore cell phone users and nearly 4.4 lakh cell phone towers to meet the communication demand. The numbers of cell phones and cell towers are increasing without giving due respect to its disadvantages. All over the world, people have been debating about associated health risk due to radiation from cell phone and cell tower. Majority of these towers are mounted near the residential and office buildings to provide good mobile phone coverage to the users. These cell towers transmit radiation 24x7, so people living within 10's of meters from the tower will receive 10,000 to 10,000,000 times stronger signal than required for mobile communication. In India, crores of people reside within these high radiation zones. Children's, adults, and birds are more vulnerable to cell phone radiation. So our project gives a solution to avoid more towers. We proposed multiple frequencies in single antenna for avoid the radiation.

***Keywords*—** Shrewd / Versatile Antenna; Wireless; Bar forming; DSP; Diversity

I. INTRODUCTION

In view of explosive growth in the number of progressed cell subscribers, administration providers are becoming progressively concerned with the abilityed capacities of their existing networks. This concern has led to the organization of shrewd antenna frameworks throughout major metropolitan cell markets. These shrewd antenna frameworks have regularly utilized multibar technologies, which have been shown, through extensive analysis, simulation, and experimentation, to give considerable execution changes in FDMA, TDMA and CDMA systems. Multibar architectures for FDMA and TDMA frameworks give the straight-forward ability of the shrewd antenna to be executed as a non-invasive add-on or appliqué to an existing cell site, without major modifications or special interfaces.

This paper mainly concentrates on use of shrewd antennas in Portable interchanges that upgrades the capacities of the Portable and cell framework such as faster bit rate, multi use interference, space division multiplexing (SDMA), versatile SDMA, increment in range, multipath mitigation, decrease of errors due to multipath fading, best suitability of multi-carrier modulations such as OFDMA. The best application of SAs is its suitability for demand based recurrence portion in hierarchical framework approach (flexible antenna outline are accomplished electronically and no physical movement of receiving antennas is necessary). The advantage of SAs application in cell frameworks are diminished inter symbol interference, diminished co-channel obstruction & contiguous channel interference, improved bit mistake rate (due to diminished sum of multipath and ISI), increment in collector sensitivity, decrease in power utilization & RF pollution. Shrewd antennas are most fitting for use of cognitive radio (programming radio innovation gives flexibility) and the greatest advantage of shrewd antenna is a exceptionally high security.

The primary impediments to high-execution remote interchanges are obstruction from other clients (cochannel interference), the inter-symbol obstruction (ISI) and signal blurring cautilized by multipath. Co-channel obstruction abilitys the framework capacity, defined as the number of clients which can be serviced by the system. However, since the wanted signal and co-channel obstruction regularly arrive at the collector from diverse directions, shrewd antennas can abuse these contrasts to decrease co-channel interference, thereby increasing framework capacity. The reflected multipath components of the transmitted signal too arrive at the collector from diverse directions, and spatial handling can use these contrasts to attenuate the multipath, thereby reducing ISI and fading. Since data rate and BER are degraded by these multipath effects, decrease in multipath

through spatial handling can lead to higher data rates and better BER performance.

In a cell system, omni-directional antennas have generally been utilized at base stations to upgrade the scope territory of the base stations but it too leads a gross wastage of power that in-fact is the primary cause of cochannel obstruction at neighboring base stations. The sectoring idea with diversity framework exploits space diversity and results in improve gathering by counteracting with negative impacts of multipath fading. Versatile / shrewd antenna innovation represents the most progressed shrewd antenna approach to date. using a assortment of new signal-handling algorithms, the versatile framework takes advantage of its ability to successfully find and track different sorts of signals to powerfully minimize obstruction and amplify expected signal reception. Both versatile / shrewd frameworks endeavor to increment gain concurring to the area of the user; however; only the versatile framework gives ideal gain while simultaneously identifying, tracking, and minimizing meddling signals.

II. SHREWD ANTENNA

2.1. Shrewd

The idea of using different antennas and imaginative signal handling to serve cells more cleverly has existed for numerous years. In fact, differing degrees of relatively costly shrewd antenna frameworks have already been connected in defense systems. Until recent years, cost barriers have prevented their use in business systems. The advent of powerful low-cost progressed signal processors (DSPs), general-purpose processors (and ASICs), as well as imaginative software-based signal-handling Techniques (algorithms) have made keen antennas practical for cell interchanges systems.

Today, when spectrally productive arrangements are progressively a business imperative, these frameworks are providing greater scope territory for each cell site, higher dismissal of interference, and considerable limit improvements.

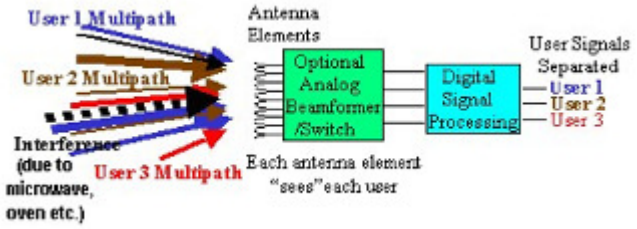

Fig. 1: Shrewd Antenna Framework

2.2. What Is a Shrewd Antenna System?

In truth, antennas are not shrewd antenna frameworks are smart. Generally co-found with a base station, a shrewd antenna framework joins an antenna bunch with a progressed signal-handling Limit to transmit and receive in an adaptive, spatially delicate manner. Such a configuration significantly upgrades the limit of a remote join through a combination of diversity gain, bunch gain and obstruction suppression. Expanded limit translates to higher data rates for a given number of clients or more clients for a given data rate per user. In other words, such a framework can automatically change the directionality of its radiation designs in response to its signal environment. This can significantly increment the execution qualities (such as capacity) of a remote system.

Multipath of proliferation are made by reflections and scattering. Also, obstruction signals such as that produced by the microwave oven in the picture fig (1) are superimposed on the wanted signals. Measurements suggest that each path is really a group or bunch of paths, resulting from surface roughness or irregularities.

The random gain of the group is called multipath blurring , , ,.

2.3. How Numerous Sorts of Shrewd Antenna Frameworks Are There?

Terms usually heard today that embrace different viewpoints of a shrewd antenna framework innovation include keen antennas, phased array, SDMA, spatial processing, progressed bar forming, versatile antenna systems, and others. Shrewd antenna frameworks are customarily categorized, however, as either Exchanged bar or versatile bunch systems.

The following are distinctions between the two major categories of shrewd antennas regarding the choices in transmit strategy:

- Exchanged Beam—a limited number of fixed, predefined designs or combining strategies (sectors)
- Versatile Array—an inlimited number of designs (scenario-based) that are adjusted in genuine time

2.3.1. What Are Exchanged Bar Antennas?

Exchanged bar antenna frameworks structure different altered bars with heightened affectability in particular directions. These antenna frameworks detect signal strength, choose from one of several predetermined, altered beams, and switch from one bar to another as the Portable moves throughout the sector.

Instead of shaping the directional antenna outline with the metallic properties and physical outline of a single component (like a sectorized antenna), Exchanged bar frameworks join the outputs of different antennas in such a way as to structure finely sectorized (directional) bars with

more spatial selectivity than can be accomplished with conventional, single-component approaches fig (2).

2.3.2. What Are Versatile Bunch Antennas?

Versatile antenna innovation represents the most progressed shrewd antenna approach to date. using a assortment of new signal-handling algorithms, the versatile framework takes advantage of its Limit to successfully find and track different sorts of signals to powerfully minimize obstruction and amplify expected signal reception.

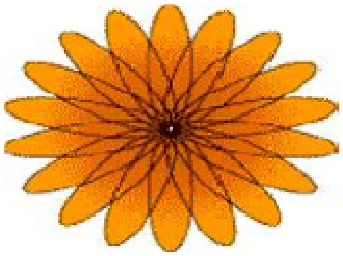

Fig. 2: Exchanged Bar Framework Scope Designs (Sectors)

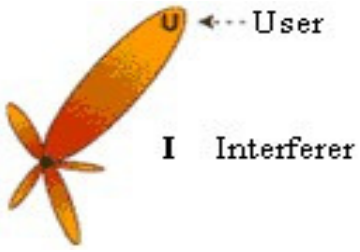

Fig. 3: Versatile Bunch Antenna

Both frameworks endeavor to increment gain concurring to the area of the user; however, only the versatile framework gives ideal gain while simultaneously identifying, tracking, and minimizing meddling signals.

Versatile Bunch Coverage: A representative depiction of a primary flap extending toward a tser with a null directed toward a co-channel interferer as appeared in fig (3).

2.3.3. What Do They Look Like?

Omni-directional antennas are obviously recognized from their keen counterparts by the number of antennas (or antenna elements) employed. Exchanged bar and versatile bunch systems, however, share numerous equipment qualities and are recognized primarily by their versatile intelligence.

To process data that is directionally delicate requires an bunch of antenna components (regularly 4 to 12), the inputs from which are joined to control signal transmission adaptively. Antenna components can be arranged in linear, circular, or planar configurations and are most regularly installed at the base station, although they may too be utilized in Portable phones or laptop computers.

2.3.4. What Makes Them So Smart?

A straightforward antenna works for a straightforward RF environment. Shrewd antenna arrangements are required as the number of users, interference, and proliferation complexity grow. Their smarts reside in their progressed signal-handling facilities. Like most modern advances in electronics today, the progressed design for manipulating the RF data offers numerous advantages in terms of exactness and adaptability of operation. Speech starts and ends as straightforward information. Along the way, however, shrewd antenna frameworks capture, convert, and modulate straightforward signals for transmission as progressed signals and reconvert them to straightforward data on the other end. In versatile antenna systems, this fundamental signal-handling Limit is augmented by progressed Techniques (algorithms) that are connected to control operation in the presence of complicated blends of operating conditions. The benefit of maintaining a more focutilized and productive use of the framework's power and range portion can be huge.

III. THE GOALS OF A SHREWD ANTENNA FRAMEWORK

The dual purpose of a shrewd antenna framework is to augment the signal quality of the radio-based framework through more focutilized transmission of radio signals while upgrading limit through expanded recurrence reuse.

Table 1: Features and Advantages of Shrewd Antenna Frameworks

Feature	Benefit
Signal Gain—Inputs from different antennas are joined to upgrade accessible power required to establish given level of coverage.	Better Range / Coverage—Focusing the vitality sent out into the cell increases base station range and coverage. Lower power requirements too empower a greater battery life and smaller/lighter handset size.
Obstruction Rejection—Antenna outline can be generated toward cochannel obstruction sources, improving the signal-to-obstruction ratio of the gotten signals.	Expanded Capacity—Precise control of signal nulls quality and relief of obstruction join to recurrence reuse decrease distance (or bunch size), improving capacity. Certain versatile innovations (such as space division different access) support the reuse of frequencies inside the same cell.

Spatial Diversity—Composite data from the bunch is utilized to minimize blurring and other undesirable impacts of multipath propagation.	Multipath Rejection—can decrease the effective delay spread of the channel, permitting higher bit rates to be supported without the use of an equalizer, improved bit mistake rate (due to diminished sum of multipath and ISI).
SDMA- SDMA continually adapts to the radio environment through keen / shrewd antenna.	Providing each client with upjoin and downjoin signals of the highest conceivable quality and can adjust the recurrence portion to where the most clients are located.
Power Efficiency—joins the inputs to different components to upgrade accessible handling gain in the downjoin (toward the user)	Reduced Expense—Lower speaker costs, power consumption, and higher reliLimit will result. Lower power utilization lessens not only interferences but too lessens RF contamination (ease wellbeing hazard). It will too result in decrease of scares vitality asset (diesel consumption) and save outside currency.

IV. SPATIAL STRUCTURE TECHNIQUES

The spatial structure is utilized to estimate the bearing of landings (DOAs) of the signals impinging on the sensor array. The estimated bearings of landings are then utilized to determine the weights in the outline framing network. This is called bar forming. Spatial structure Techniques only abuse spatial structure and training signals and the temporal structure of the signals is ignored.

V. VERSATILE ANTENNAS

Versatile antennas (AAs) are an bunch of antennas, which is able to change its antenna outline powerfully to adjust to noise, obstruction and multipath. AAs are utilized to upgrade gotten signals and may too be utilized to structure bars for transmission. AAs, unlike customary antennas, confine the broadcast vitality to a slender beam. It optimizes the way that signals are distributed through space on a genuine time basis by focusing the signal to the wanted client and "steering" it away from other clients occupying the same channel in the same cell and contiguous or distant cell.

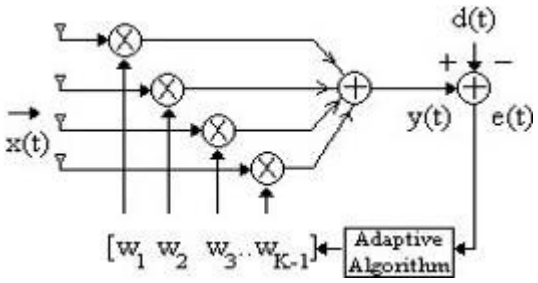

Fig. 7: Versatile Bar Framing

Na Yao illustrated practically arraycomm shrewd antenna with only 4 components and changed the shape and size of the radiation outline sufficiently to prove the Limit of shrewd antenna. He illustrated a six-part antenna outline with four components in each sector. The excitation of each component is differed to produce a formed outline for each sector, and those shapes differ part by part to produce the overall formed radiation outline for the cell.

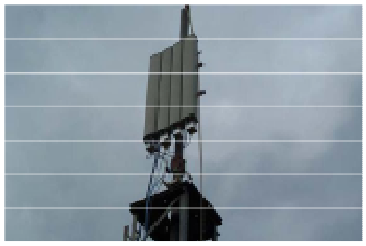

Fig. 8: Prototype Shrewd Antenna

Arraycomm has been the forefront of developing shrewd antenna Techniques and intellectual property for business cell systems. Intellicell innovation is conveyed in more than 90,000 business base station deployments worldwide but yet to be adopted in cell correspondence system in INDIA.

VI. PROPOSEED TECHIQUES

In our proposed system a particular MFB architecture applied in C-band is a more genuine approach when compared to the SFB option. Beam Forming Networks (BFNs) with periodic structure is the key to get compact feed clusters that can be allocated in large and medium-size platforms. Multiple-feed-per-beam (MFB) configuration, in which each beam is produced by a cluster of feeds. The overlap between the feed clusters to produce acceptable cross-over level, obtained sharing feeds between adjacent clusters, is achieved through a relatively complex beam forming Network (BFN). But the complexity of the feed array is compensated by the reduction of the number of apertures required to produce a full dual-band multiple beam coverage (typically two, one for receive and one for transmit, the optics geometries being scaled versions of each other with respect to the wavelength) .

Advantage

- It is operated on wide range of frequency hence it is highly efficient.
- High performance
- Uses less number of antenna aperture, hence radiation level is minimized.

Block Diagram

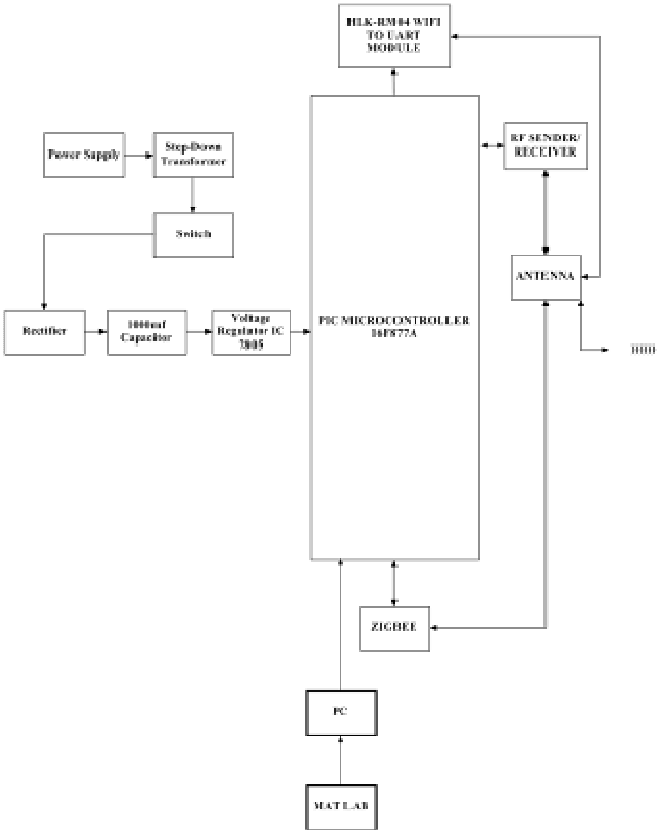

Fig.9 Sender Unit

The input 230V AC voltage applied to the step down transformer it step down into 12v Ac. The switch is connected with secondary side of step down transformer. Bridge rectifier is converting AC into pulsating DC of 12V.In Bridge Rectifier analog input is connected to the switch and positive, negative edge is connected to the ceramic capacitor. Ceramic capacitor is connected for noise rectification.1000uf Ceramic capacitor is used to filter the harmonics in the power supply line. Capacitor is connected to the voltage regulator. The 7805 voltage regulator has 3 pins. First pin is 12v input pin, second pin is ground pin and third pin is 5v output pin. This regulator input and ground is connected to the 1000ufceramic capacitor. The output and ground pin is connected to 63v ceramic capacitor. 63v ceramic capacitor is connected to PIC 16F877a microcontroller. The 7805 voltage regulator gives 5v input to PIC 16F877a Microcontroller. Here single antenna with multiple frequency is used. ZigBee, WIFI, and RF Transmitter/Receiver are the multiple frequencies. MFB applied in C-band is a more convincing method when compared to the SFB. The output will be show in real time.

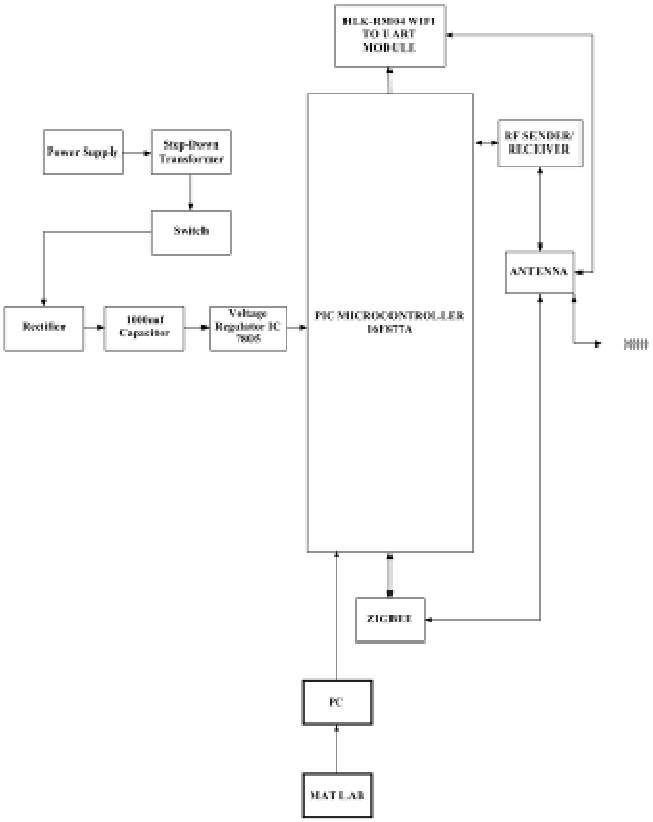

Fig.10 Receiver Unit

VII. DISCUSSION

The above Limit of versatile / shrewd antennas clearly shows without doubts that shrewd antenna can be effectively replaced with generally utilized existing antennas (omni directional, sectored antenna with diversity concept). Use of versatile antenna in existing frameworks will decrease power utilization and obstruction while upgrading phantom density in remote framework which is the dire need of remote correspondence systems. Wellbeing peril is being considered the primary factor in RF correspondence which will too be taken care of by use of shrewd antenna as less RF contamination is made with the use of shrewd / versatile antenna. Latest studies in INDIA shows that most of the subsidies on diesel is being consumed by cell vendors for running more than 4 lacs base

stations in the country which is much more in examination to ranchers diesel utilization (this subsidy was meant for ranchers and poor people only). The use of shrewd antenna will decrease diesel utilization in cell correspondence drastically. The capacities of shrewd antenna have been proved beyond doubt through analysis, reproduction and organization , , , , , ,. With the inclusion of nanotechnology devices the Limit of versatile antenna will increment manifold.

VIII. CONCLUSION

In this project a concept and the development of key components of a multiple-beam antenna for a satellite applications. The conducted numerical simulations and measurements revealed that the proposed antenna system including the deployment of technology for the multifeed array meets the performance requirements for its application. SFB configurations maintain slightly better performance, but MFB configurations clearly outperform these SFB configurations when it comes to the place of the reflector antennas as well as the feed arrays. Solutions based on MFB configurations bring clear advantage in terms of volume and mass. Therefore multiple frequency in Single antenna performs more better performance than other.

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