EFFECT OF SPLITTER EDGE BEHIND DIFFERENT GEOMETRIES ON THE FLOW

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ABSTRACT

Analysis of flow over different geometries having splitter edge at Reynolds numbers of 600 and 900 presented in this paper. Splitter edge effect on flow is compared with flow over same geometries without splitter edge at same Reynolds number. Geometries of triangle square and rectangle of equivalent area is taken to study and triangular model having splitter edge show significant effect at Re 600 & 900.

Keywords*: *Splitter Edge, Reynoldsnumber, Vortex, Triangular Model, Square Model

I. INTRODUCTION

In many mechanical engineering applications, separated flows often appear around any object. Tall buildings, monuments, and towers are permanently exposed to wind. Similarly, piers, bridge pillars, and legs of offshore platforms are continuously subjected to the load produced by maritime or fluvial streams [1]. The flow details behind these geometries depend on Reynolds number, blockage ratio, and free stream turbulence. For square/rectangular cross section geometries, the orientation with respect to the mean flow is another important parameter. At low Reynolds number, aspect ratio and end conditions play a significant role in determining the flow properties. Flow past a square cylinder resembles flow past a circular cylinder as far as instabilities are concerned. But the separation mechanism and the consequent dependence of lift, drag, and Strouhal number on the Reynolds number are significantly different. The separation points are fixed for the square cylinder either at the leading edge or the trailing edge, depending on the Reynolds number. Square cylinder has broader and longer vortex compared to the circular. Wake of square cylinder cross section is sensitivity to aspect ratio and orientation with respect to the mean flow.The effect of cylinder orientation 0, 10, 13.5, 20, and 45°at high Reynolds number. A reduction in drag coefficient and a sharp rise in Strouhal number was seen at an angle close to 13.5°. This effect was attributed to the shear layer reattachment over one of the edges of the cylinder [2]. Significant variation on Strouhal number of rectangular cylinders with side ratios in the range of 0.04–1 and angles of incidence from 0 to 90°. A sharp rise in Strouhal number for a small angle of incidence is significant.[3]The effect of aspect ratio for a circular cylinder at low Reynolds number using flow visualization and hotwire anemometry. For an aspect ratio greater than 60, a discontinuity in the Strouhal number value in the Reynolds number range 64 to 130 studied. There is a stabilization effect on the wake for a small aspect ratio cylinder. The wake width increases with a reduction in aspect ratio [4]. The effect of end plates on the shedding frequency of circular cylinders in the intermediate range of Reynolds numbers 300–5,000. Near the end plate, the shedding frequency is lower than that at midspan. The end effect faded away with the increase in Reynolds number [5].The Strouhal number Reynolds number relationship at various aspect ratios and end conditions. The

discontinuity in the relationship was attributed to the oblique shedding angle and transition in discrete shedding modes [6].

The effect of aspect ratio 0.25–12 and end plates for flow past a circular cylinder at high Reynolds number 8000 to 140000. With appropriate end plates they showed that wake flow is two dimensional. A splitter plate in the wake show how flow feature was linkedto a shear layer instability [7].This instability has been studied almost exclusively for low Reynolds numberfor rectangular cylinders.Turbelent vortex shedding for a rectangular cylinder of a *k-ε* modelright shedding frequency results are fall in the range of experimental results. Present work analyzing the flow over different geometries having splitter edge at end.

II.COMPUTATIONAL FLUID DYNAMICS

Computational analysis is carried out to solve a flow field in two-dimensional geometries of triangle, square and rectangle of equivalent area. And adding splitter edge at end of these geometries, analyzing the flow behavior by considering parameters of recirculation of the separated flow, vortex size and regions formed at behind the model. The modeling and analysis is done in Ansys 14.0 Workbench for creating the desired geometries. Pure quadrilateral meshing is used to get structured mesh.

Standard*k-ε* model is used to predict the flow field Flow past the models involves recirculation (swirl) and the effect of swirl on turbulence is included in the Standard model, due to which accuracy of the model further increases. A UN steady state based implicit solver is used to achieve convergence. Second-order upwind scheme was used for the discretization of all the equations to achieve higher accuracy in results. Velocity-pressure coupling is established by pressure-velocity correlation using a PISO algorithm. Under-relaxation factors are used for all equation to satisfy Scarborough condition. Residuals are continuously monitored for continuity, *x*-velocity, *y*-velocity, *z*-velocity, *k*, and *ε*. Convergence of the solution is assumed when the values of all residuals goes below 10^{-6} Enhanced wall treatment is used to solve for the near wall treatment, as *y*+ is more than 30 in the whole domain.

III.RESULT AND DISCUSSION

3.1 Flow Over a Rectangular Body

Figures 3.1.1 (a, b, &c) show the velocity vectors, contours of velocity and pressure at Reynolds no. 600. Figures 3.1.2(a, b, &c) show the velocity vectors, contours of velocity and pressure at Reynolds no 900.

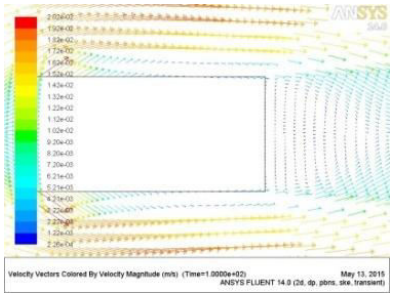


Fig 3.1.1(a) Velocity vectors

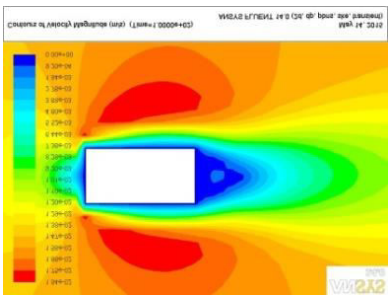


Fig 3.1.1(b) Velocity contours

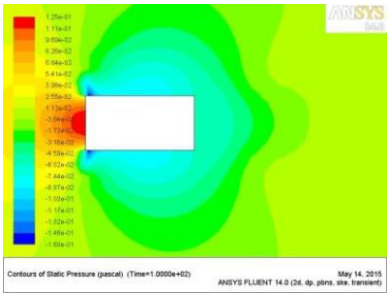


Fig 3.1.1(c) Pressure contour

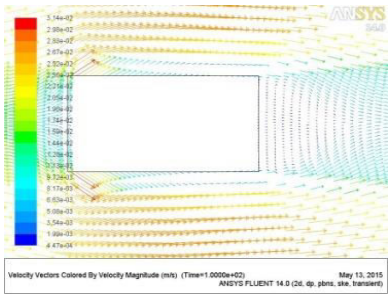
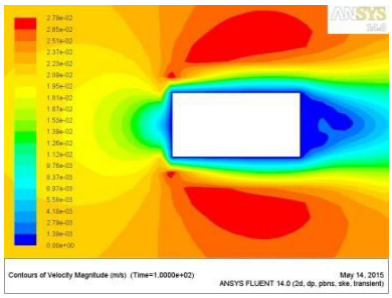
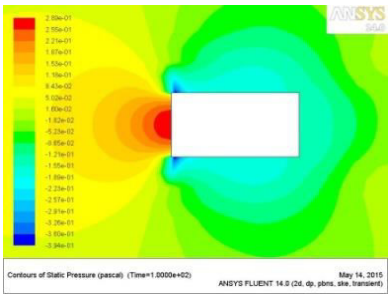




Fig 3.1.2(a) Velocity vectors **Fig 3.1.2(b) Velocity contours** **Fig 3.1.2(c) Pressure contours**

There is a significant effect in the increase in the Reynolds number on the flow over rectangular model. The left and right vortex size is 6.11mm and 5.98mm at Reynolds number 600 and 9.50mm and 9.30mm at Reynolds number 900. As increase in Reynolds number vortex size increases. There is no variation in left and right vortex sizes at these Reynolds numbers.

3.2 Flow over a square body

Figure 3.2.1 (a, b, &c) shows the velocity vectors, contours of velocity and pressure at Reynolds no. 600. Figure 3.2.2 (a, b, &c) shows the velocity vectors, contours of velocity and pressure at Reynolds no 900.

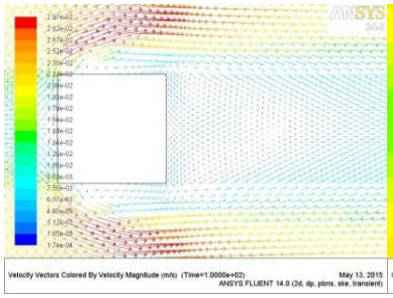
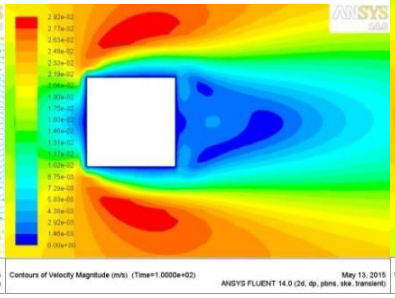
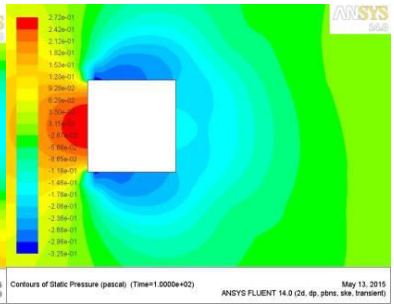




Fig 3.2.1(a) Velocity vectors **Fig 3.2.1(b) Velocity contours** **Fig 3.2.1(c) Pressure contours**

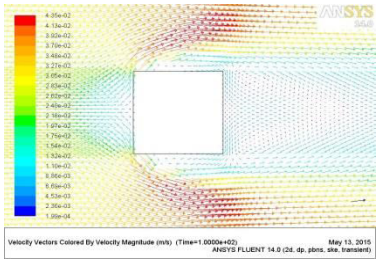
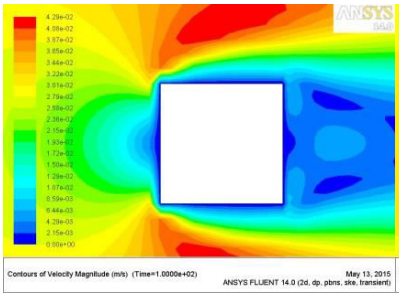
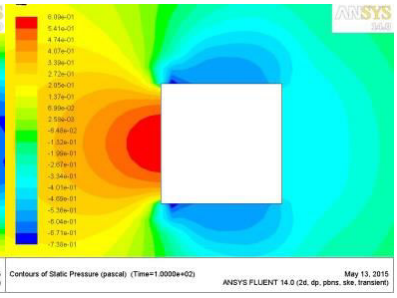
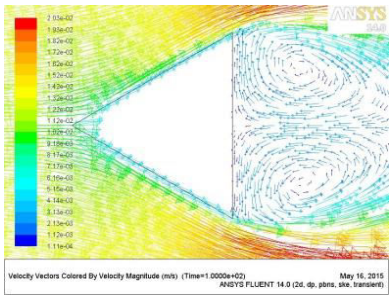




Fig 3.2.2(a) Velocity vectors **Fig 3.2.2(b) Velocity contour** **Fig 3.2.2(c) Pressure contours**

There is a significant effect in the increase in the Reynolds number on the flow over square model. The left and right vortex size is 8.54mm and 7.97mm at Reynolds number 600 and 14.901mm and 13.68mm at Reynolds number 900. As increase in Reynolds number vortex size increases drastically. The left vortex size is more compared to the right vortex size at these two Reynolds number.

3.3 Flow Over a Triangular Body

Figure 3.3.1 (a, b, &c) shows the velocity vectors, contours of velocity and pressure at Reynolds no. 600. Figure 3.3.2 (a, b, &c) shows the velocity vectors, contours of velocity and pressure at Reynolds no.900.



3.3.1(a) Velocity vectors

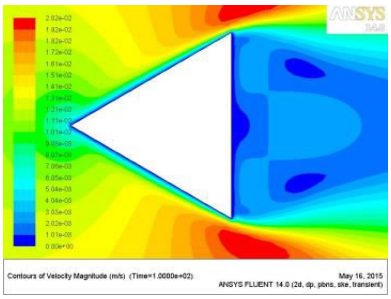


Fig 3.3.1(b) Velocity contour

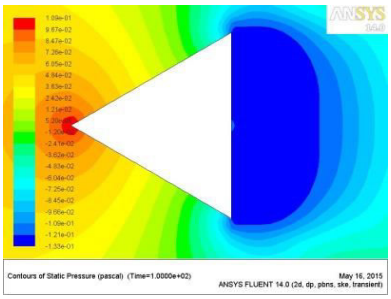
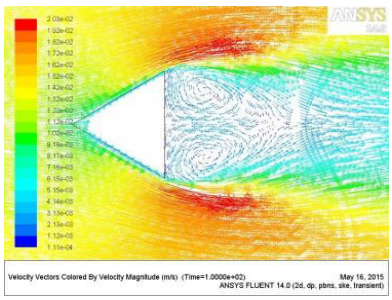


Fig 3.3.1(c) Pressure contours



3.3.2(a) Velocity vectors

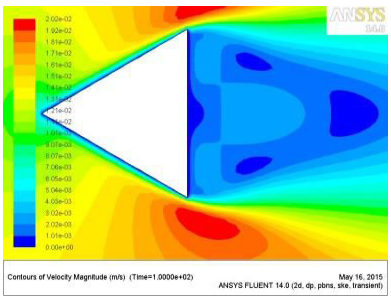


Fig 3.3.2(b) Velocity contour

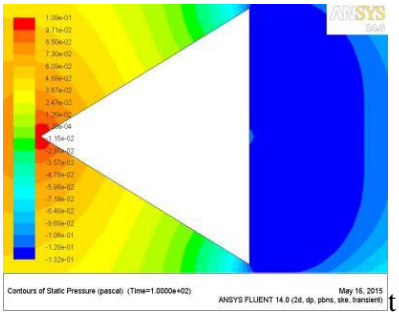


Fig 3.3.2(c) Pressure contour

As increase in Reynolds number there is no significant effect on vortex size and regions of contour of velocity profiles. The left and right vortex size is 26.03mm and 27.77mm at Reynolds number 600 and 27.44mm and 27.69mm at Reynolds number 900. The right vortex size is more compared to the left vortex size at these two Reynolds number.

3.4 Flow Over a Square with Splitter Edge Body

Figure 3.4.1 (a, b, &c) shows the velocity vectors, contours of velocity and pressure at Reynolds no. 600.

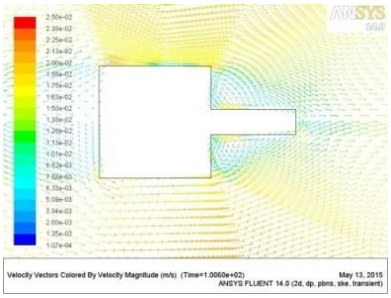


Fig 3.5(a) Velocity vectors

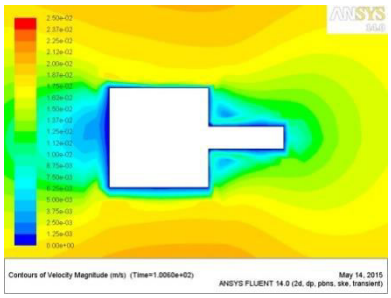


Fig 3.5(b) Velocity contours

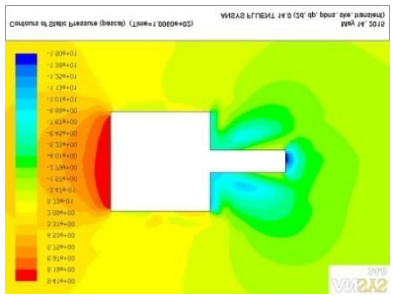


Fig 3.5(c) Pressure contours

There is no significant effect in the left and right vortex size at Reynolds number 600 on the flow over square model with splitter edge. The left and right vortex size is 5.51mm and 5.88mm at Reynolds number 600.

3.5 Flow Over a Triangle with Splitter Edge Body

Figure 3.5.1 (a, b, &c) shows the velocity vectors, contours of velocity and pressure at Reynolds no. 600. Figure 3.5.2 (a, b, &c) shows the velocity vectors, contours of velocity and pressure at Reynolds no 900.

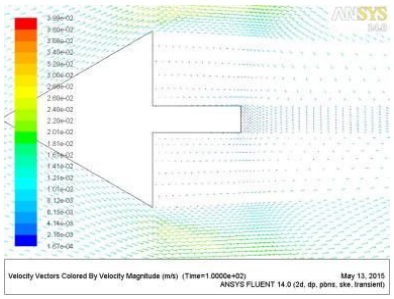


Fig 3.5.1(a) Velocity vectors

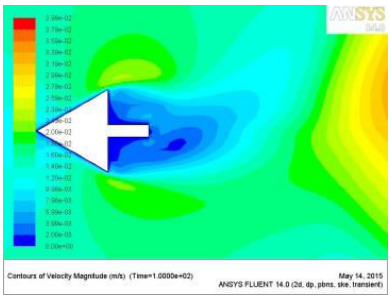


Fig 3.5.1(b) Velocity contours

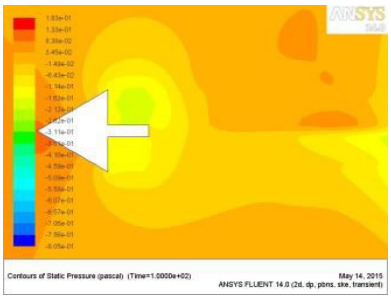


Fig 3.5.1(c) Pressure contours

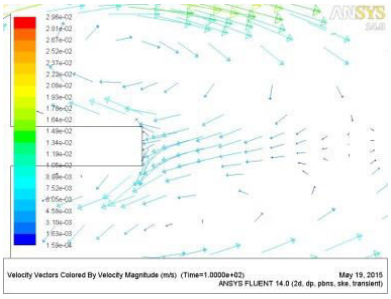


Fig 3.5.2(a) Velocity vectors

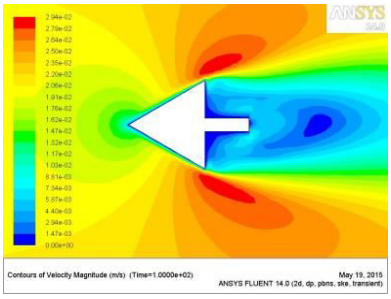


Fig 3.5.2(b) Velocity contours

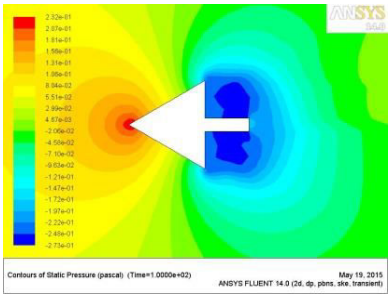


Fig 3.5.2(c) Pressure contours

As increase in Reynolds number there is no significant effect on left vortex size but a significant effect is observed on the right vortex. The left and right vortex size is 28.93mm and 25.48mm at Reynolds number 600 and 25.97mm and 32.80mm at Reynolds number 900. With increase in Reynolds number left and right vortex behaves in an opposite manner.

3.6 Flow Over a Rectangle with Splitter Edge Body

Figure 3.6.1 (a, b, &c) shows the velocity vectors, contours of velocity and pressure at Reynolds no. 600. Figure 3.6.2 (a, b, &c) shows the velocity vectors, contours of velocity and pressure at Reynolds no 900.

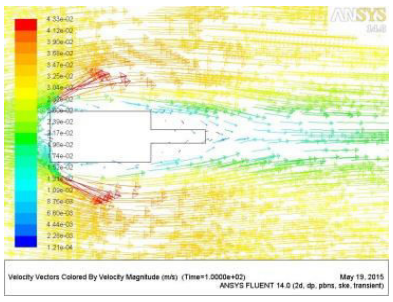


Fig 3.6.1(a) Velocity vectors

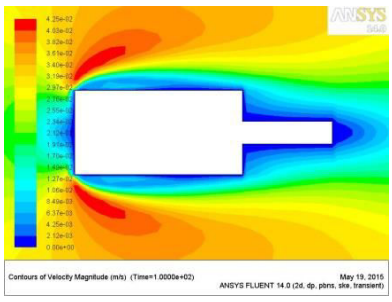


Fig 3.6.1(b) Velocity contours

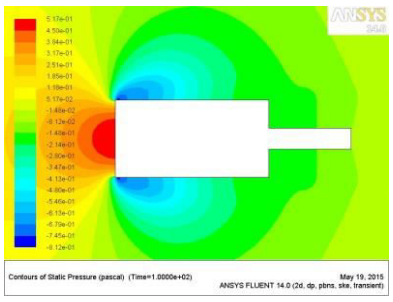


Fig 3.6.1(c) Pressure contours

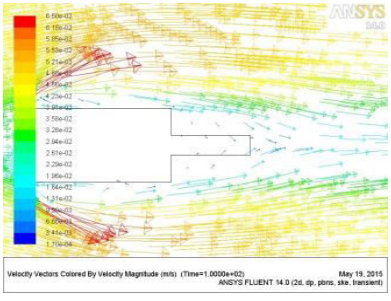


Fig 3.6.2(a) Velocity vectors

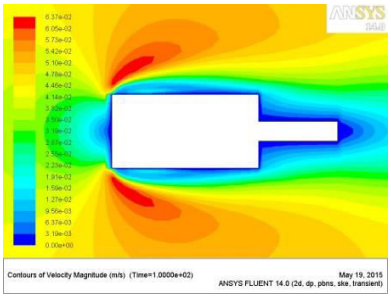


Fig 3.6.2(b) Velocity contours

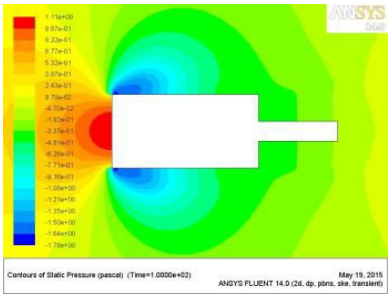


Fig 3.6.2(c) Pressure contours

Due to splitter edge behind the rectangular model, there is no large scale vortex formation observed and due to more corners, small vortex are observed because of placing the splitter edge on minor axis.

IV.CONCLUSION

Splitter effect on the different models at two Reynolds numbers is compared with same models without splitter edge. Triangular model shows significant effect when the splitter edge is placed behind it when compared to the square and rectangular models having splitter edge. No effect is shown by the rectangular model having the splitter edge on the minor axis because of small altitude between the corner of the rectangle to the corner of the splitter edge. With increase in Reynolds number, the triangular model having splitter edge shows significant effect in left and right vortex in opposite manner.

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REMOVAL OF BASIC DYE SAFRANIN O USING DEMINERALISED LIGNIN

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ABSTRACT

In this study, demineralised lignin has been investigated as an adsorbent for the removal of Safranin O from aqueous solution. Demineralised lignin was prepared from raw kraft lignin by sulphuric acid treatment. The adsorption behavior of demineralised lignin has been investigated in terms of adsorption isotherms under different conditions, i.e., concentration and temperature. Langmuir isotherm fits the adsorption experimental data, suggesting the monolayer adsorption behavior of Safranin O on the demineralised lignin. The maximum adsorption capacity of the demineralised lignin for the removal of Safranin O is $1.7x10^{-2}$ $mmolg^{-1}$ at $45^{o}C$. The adsorption of Safranin O on the demineralised lignin was found to be endothermic and favourable in nature.

Keywords: Adsorption, Demineralised Lignin, Kraft Lignin, Safranin O.

I. INTRODUCTION

In present time water pollution has become a serious issue due to industrial, agricultural and domestic activities producing huge amount of inorganic and organic pollutants. Among contaminants dyes are also considered undesired ones since they are often toxic and cause harmful effects to human and animal life. Dyes are widely used in industries such as textiles, paper, rubber, plastics, cosmetics, etc., to color their products [1-8]. Dyes even in low concentrations are visually detected and meanwhile affect the aquatic life and food web. These colored compounds are not only aesthetically displeasing but also inhibit sunlight into the water stream, thereby reducing the photosynthetic reactions. Although a number of methods such as coagulation, photo degradation and ozonation are used for the removal of pollutants, the adsorption process has been found to be versatile as it can remove both inorganic and organic contaminants [9-14].

Lignin [15-20] is the second most abundant natural raw material and is generally obtained from waste discharged from paper mills known as 'black liquor'. The annual production of lignin which is more than 50 million tons/year has increased the interest to develop the economically viable new applications [21].

In view of the importance of adsorption process [22, 23] in effluent treatment, attempts have been made to develop low cost adsorbents which may be good alternative to adsorbents like activated carbon. In the present communication we will evaluate an adsorbent prepared from kraft lignin for the removal of a cationic dye Safranin O.

II. EXPERIMENTAL

2.1 Reagents and Materials

All reagents were of analytical reagent grade. Safranin O ($C_{20}H_{19}N_4^+Cl^-$) a cationic dye was procured from SRL (India). Double distilled water was used throughout. Spectrophotometer determination of Safranin O was carried out at Agilent Cary 60 UV-VIS spectrophotometer.

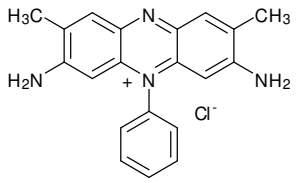

Fig 1: Chemical Structure of Safranin O dye.

2.2 Preparation of Demineralised Lignin

The kraft lignin was used as a precursor for the preparation of demineralised lignin. For the elimination of ash from raw kraft lignin sample, raw lignin was treated with 1% H_2SO_4 with continuous stirring at 300 rpm for 1 hr at room temperature and then kept overnight. The dispersion was then filtered and washed with 1%H_2SO_4 followed by ~1L distilled water. Finally the treated sample was dried overnight at 110 ^{0}C and stored in sample flasks for further use.

2.3 Adsorption studies

The adsorption experiments performed as a means of evaluating the adsorption behavior of demineralised lignin towards Safranin O were carried out according to the conventional batch method. In this method a fixed amount of the demineralised lignin (0.01 g) was added to 10 ml of Safranin O solution of varying concentrations taken in stoppered glass test tubes, which were placed in thermostat cum shaking assembly. The solutions were stirred continuously at constant temperature for 24 h to achieve equilibration. The concentration of the Safranin O in the solution after complete equilibrium adsorption was determined spectrophotometrically at λ_{max} of 520nm.

The percentage adsorption was measured from initial and equilibrium concentration of the safranin O by using the relation:

$$\% \text{ Adsorption} = \frac{C_i - C_e}{C_i} \times 100 \qquad (1)$$

where C_i and C_e are the initial and equilibrium concentrations of Safranin O in aqueous solution, respectively.

III. RESULTS

3.1 Adsorption Studies

Demineralised lignin was used as an adsorbent for the removal of Safranin O and studied for the effects of parameters such as adsorbate concentration and temperature.

3.1.1 Effect of the Concentration of the Adsorbate

The uptake of Safranin O on demineralised lignin was studied at initial concentration ranges of (0.005-0.03) x 10^{-3} M for Safranin O. Sorption studies were undertaken at three different temperatures, and the amount of dyes adsorbed at equilibrium against equilibrium concentration were plotted; the resulting plots for Safranin O are shown in Figure 2.

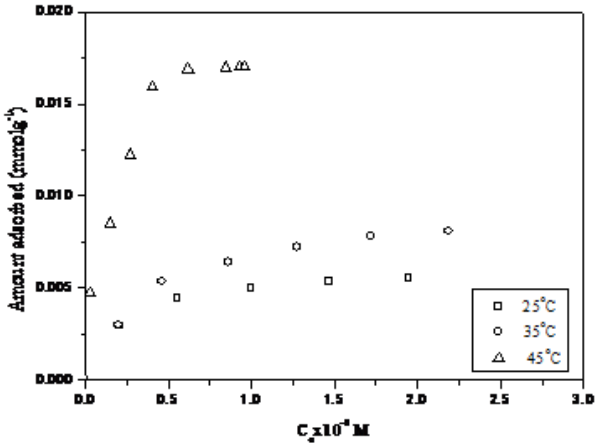

Fig 2. Adsorption is Otherms of Safranin O on Demineralised lignin at Different Temperatures

In order to assess the adsorptive power of the demineralised lignin the equilibrium adsorption studies after an equilibration time of 24 h were carried out and adsorption isotherms shown in Figure 2. It was observed that the percentage of adsorption decreased with increase of concentration of Safranin O.

3.1.2 Effect of Temperature

Equilibrium adsorption experiments were also carried out at higher temperatures (35 and 45^{0}C) for removal of Safranin O by demineralised lignin in order to understand the nature of the adsorption process and results are also presented in Figure 2. It is seen from Figure 2 that with increase in temperature adsorption also increases, reflecting the process to be endothermic in nature. Further, it was found that demineralised lignin has maximum removal capacity of $1.7x10^{-2}$ mmolg^{-1} at 45 ^{0}C.

The influence of isotherm shape [24] has been found out to know whether adsorption is favourable or not in terms of 'R_L', a dimensionless constant referred to as separation factor or equilibrium parameter. R_L is calculated using the following equation

$$R_L = \frac{1}{1+bC_0} \quad (2)$$

where C_o is the initial concentration (mol L^{-1}). The values of R_L calculated as per above equation was found to be $2.01x10^{-4}$ which lie between 0 and 1 showing the adsorption isotherm to be favorable [24].

IV. CONCLUSION

The present investigations on the adsorption of basic dye Safranin O on demineralised lignin indicated that (i) demineralised lignin is a good adsorbent for Safranin O (ii) The maximum adsorption capacity of the demineralised lignin for the removal of Safranin O is $1.7x10^{-2}$ mmolg^{-1} at 45 ^{0}C temperature and (iii) the adsorption of Safranin O on the demineralised Lignin was endothermic in nature.

V. ACKNOWLEDGEMENTS

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ECONOMIC DEVELOPMENT OF HARYANA

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ABSTRACT

Today everybody's concern is economic development in India. Economic development is here ample meaning. Economic Development means growth plus revolutionary changes in important areas which determines the well being of Human and helps to increase their standard of living and many much more. In Economic development we include expansion of economic options and social options that is available both for the individual, group and nations. Economic development is a complicated process because in that we include whole economy. That is affected by various factors such as Human, cultural, natural, international, economical, sociological, demographic and non-economic factors. As we know that our Haryana is famous for good agriculture and industrialization. Indian agriculture history is observer of the new agriculture placement which took place in India has changed the overall traditional cropping pattern in India as well as in Haryana.

There are many reforms in agriculture such as land reforms, minimum support price, green revaluation, technology reforms, agriculture practices reforms, fertilizer land reforms and new economic reforms have been adopted in Indian agriculture. All these reforms affect the agriculture sector in Indian agriculture. That effect may be favorable and unfavorable. There are only few crops such as rice, bajara and wheat are going to more stable and pluses are going to unstable.

The present paper is focus on the basic changes facing by the economy of Haryana and the development of Haryana state. There are mainly three sectors in the economy which contribute maximum in the economic development of Haryana. These are Primary, Secondary and Tertiary. Primary sector share is progressively dismissing in the state whereas the Secondary and tertiary sector is progressively growing in the state. Those progressively dismissing or growing shows that the state economy is moving from agriculture sector to manufacturing and service sector that is a gesture of healthy economy. Economic development is indicated by the various factors such as the growth in the agriculture, industries, education, health, gross domestic product, gross national product etc.

Keywords: Structural Changes, Basic changes, Net State Domestic Product, Growth, Instability Area.

I. INTRODUCTION

Haryana the present state Haryana was constituted on November 1, 1966. The state Haryana was constituted due to the partition of the old state of Punjab. After division Punjab was divided into two states. The persons who speaks Punjabi lives in Punjab and the persons who speaks Hindi lives in Haryana.

The word Haryana is organized from several ways. According to one point of view the word "Haryana" is organized from Hindi word "Haryanvi" which means greenery everywhere a green place. "Greenery" indicates that at one time it was a rich and fertile land. According to some other point of view the word "Haryana" is

organized from "Haryal –Ban" means forests. In Haryal-Ban there are forests far and wide. Haryana is a distressed from 'Aryans'. The initial home of Aryan was the region called Haryana.

1.1. Geographical Physical Features of Haryana

Haryana is located in the Northern part of India. Haryana is constrained by Uttar Pradesh in the east, Punjab in the west, Himachal Pradesh in the north and Rajasthan in the South. The national capital that is Delhi is succeeding to Haryana. Haryana is established between the elbow room 30.30° north and dimension 74.60° east. Most of Haryana is in the plains with the Aravali mountain range starting its westerly journey from here. Aravalli Range in the south. The Yamuna is the only major river that passes through this small state, The Yamuna flows along the eastern boundaries, which is one of the greenest parts in the country. There is a very good web of canals throughout the state, giving it the much-needed impulse for agriculture, the backbone of Haryana's economy. The antique Saraswati River is said to have flowed from Yamunanagar, but now Saraswati River has been abandon.

1.2. Area and Population of Haryana

The total area of Haryana state is 17,070 sq. miles or 44,212 square km which makes Haryana the 20th biggest state in India by area. As located by the census performed in 2011, the population of the state is 25,353,081, or 25 million making it the 16th most populated state in India. Haryana's populations are less than the Punjab. The total population growth in this decade was 19.90 percent while in previous decade it was 28.06 percent. The population of Haryana forms 2.09 percent of the total populations of India in 2011. In 2001, the figure was 2.06 percent.

The state is spread over an area of about 44000sq. km. per sq. Km. The state has a growth rate of about 19% which marginally exceeds from the national growth rate which is about 17%. The population of the state is rising considerably due to rapid growth towards economic development and evolution. The proficiency rate in the state is about 76% that has improved extremely in the last few years due to the consistent efforts of the government.

1.3. Area and Population of Haryana

The climate of Haryana is very hot in the summer and considerably cold in winter season. Maximum temperatures in the month of May and June may exceed 110 °F (43 °C), and in January, the coldest month, low temperatures may drop below the chilly point. The average temperature of Haryana is 31-320 C during kharif season and 11-160 C during rabi. The annual average rainfall of the state is 650 mm. The mean corresponding evaporation is 75% during kharif season and 60% in rabi season. Agricultural area in Haryana is classified into 3 zones that is., (1) Dry sub-humid (2) semi-arid and (3) arid.

Despite the state has a system of canal irrigation and tube wells, there are continuing insufficiently –horizontal areas, particularly in the southwestern and southern territory. By contrast, the areas surrounding tributaries of the Yamuna and the Gagger are subject to occasional floods.

1.4. Introduction of Economic Development of Haryana

Haryana is the state which has large amount of fertile land, in India. Haryana is doing its amazing work in various fields. It is doing well in industrial and agricultural sectors. Most of India's total population depends on agriculture work. About 70% of the population is engaged in horticulture task, they involve in horticulture may

be directly or indirectly. Haryana has achieved a unpredictable growth in its agricultural sector, which not only has made it efficient in food grains production but also has exalted it to the second largest contributor to India's central pool of food grains. Sometimes a question arise, is there is any relationship between growth and instability? Some believe that modern technology reduced variations while some other believes that it is bound to increase the variations. The modern technology helps to reduce the variability in yields and production only a few crops 1 (Mehra Shakuntala 1981)[1]. Many studies on instability are organized during 1980s that studies concluded that agriculture production had become more unstable after the introduction of new agricultural technology and new methods (Mehra 1981; Hazell 1982; Dev 1987)[1]. As per the survey of 2006 estimated crop wise and state wise variability in production and yield for two time periods, namely between 1981-82 to 1990-91 and 1991-92 to 2000-01, and the study find out that production of food grains became more stable during 1990s compared with 1980s at all India levels and in most of the states. Instability, in agricultural sector, which measures the range of fluctuations in different dimensions, it may be in area of yield cultivation or production[3]. Here it has been shown, the range of instability in production among different crops in Haryana. In other word, this paper is related to examine the growth rate of Haryana, economic development of Haryana and its major work in different fields.

II. OBJECTIVE OF THE PAPER

- Firstly it begins with an examination of growth and improvement in the area of cultivation and production of major crops in Haryana.To examine the reasons for growing phenomena of bancassurance.
- Secondly it measures the instability in crop production.

III. MEANING OF ECONOMIC DEVELOPMENT

There are various changes in the Economic. Those changes may be favorable and unfavorable. Economic development can be referred to as the quantitative and qualitative changes in the economy. These quantities and qualitative changes involve multiple areas including development of human capital, regional competitiveness, critical infrastructure, health, social inclusion, safety, securities, literacy, and other initiatives[2]. Economic development of one state is different from its economic growth. Since economic development is a policy compromise effort with aims of economic and social well-being of people, economic growth is a circumstance of market productivity and rise in GDP. Consequently, as economist Amartya Sen. trace out, "economic growth is one condition of the process of economic development"[2].

There are the two most important methods through that the development can be measured. Those methods are Economic development and Human development.

3.1 Economic Development

Through the Economic development countries total wealth can be measured and how this wealth is generated. In economic development we know that agriculture is less developed than Banking.

3.2 Human Development

Through the human development we can measures that how much population has to wealth, jobs, education, welfare, nutrition, health, opportunity, safety and securities - as well as the how much population has the

political ,cultural,sociological and technological freedom[5]. We know that the wealth and nutrition are the Material elements that described the standard of living of the population. Health and liberty are generally referred to as quality of life and that show the standard of living. If standard of living of the population is good then the growth of human and economical development is possible[4].

IV. DEVELOPMENT INDICATORS

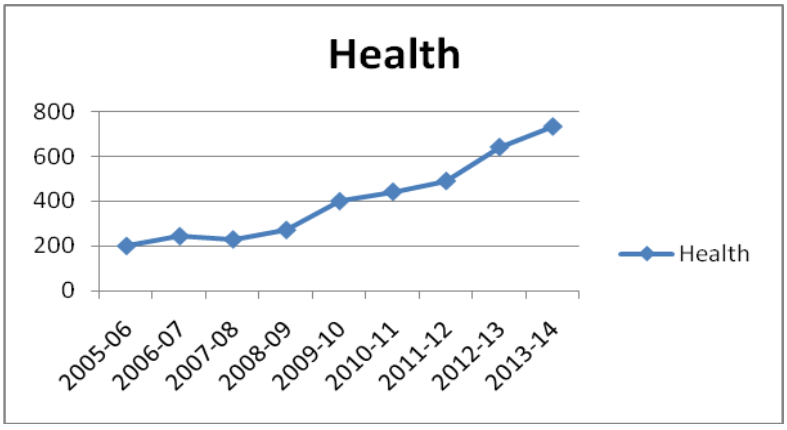
There is no single method to calculate the level of development because in a geographical area there are the variety of cultures, economies, different age of people, different language and different caste of peoples. Economists and Geographer use a series of development indicators that show the development of various regions and compare the development of one region to the region. For example:

4.1 Health

Health is a most important measure of development indicator. In that indicator we search about that how much population have connection to medical care? What level of healthcare and medical facility to the people of Haryana? The medical facility that is available to the people - basic or advanced? Is it free? Is that medical facility is costlier or less costly[4].

Below Table Shows the Last Few Years Growth Rate in Health of Haryana

2005-06	199.40
2006-07	243.27
2007-08	228.72
2008-09	271.00
2009-10	399.85
2010-11	442.08
2011-12	490.28
2012-13	642.00
2013-14	734.00



Interpretation Health shows the growth during the period 2005-06 to the year 2013-14. Health growth rate is 22% in the year 2006-07 and the growth in the health is 30% in the year 2012-13. Growth in health shows the economic development of the country Haryana.

4.2 Industry

Economic development is also measures through the Industry. What type of industries is Monopolizes in the industry growth? Less Economically Developed Country(LEDCs) focus on primary industries, such as farming, fishing and mining. Less Economically Developed Countries are Pakistan,Afghanistan and India.More Economically Developed Country (MEDCs) focus on secondary industries, such as manufacturing, food processing, oil refining,textile production aerospace manufacturing and consumer electronics.More Economically Developed Countries are US, UK and Japan.

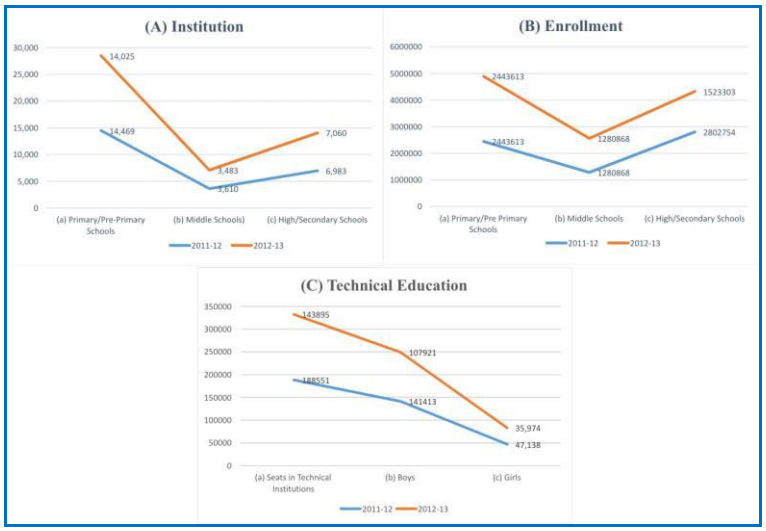
4.3 Education

Education is an important indicator of economic development. In economic development we study about how many populations have a good access of education? Is the education is free available or not. What level of the education is available to the primary, secondary and higher education[6].

Percentage of School Going Children with Corresponding Age-Groups Population

EDUCATION	2011-12	2012-13
(A) Institution		
(a) Primary/Pre-Primary Schools	14,469	14,025
(b) Middle Schools)	3,610	3,483
(c) High/Secondary Schools	6,983	7,060
(B) Enrolment		
(a) Primary/Pre Primary Schools	24,43,613	24,43,613
(b) Middle Schools	12,80,868	12,80,868
(c) High/Secondary Schools	28,02,754	15,23,303
(C)Technical Education		
(a) Seats in Technical Institutions	1,88,551	1,43,895
(b) Boys	1,41,413	1,07,921
(c) Girls	47,138	35,974

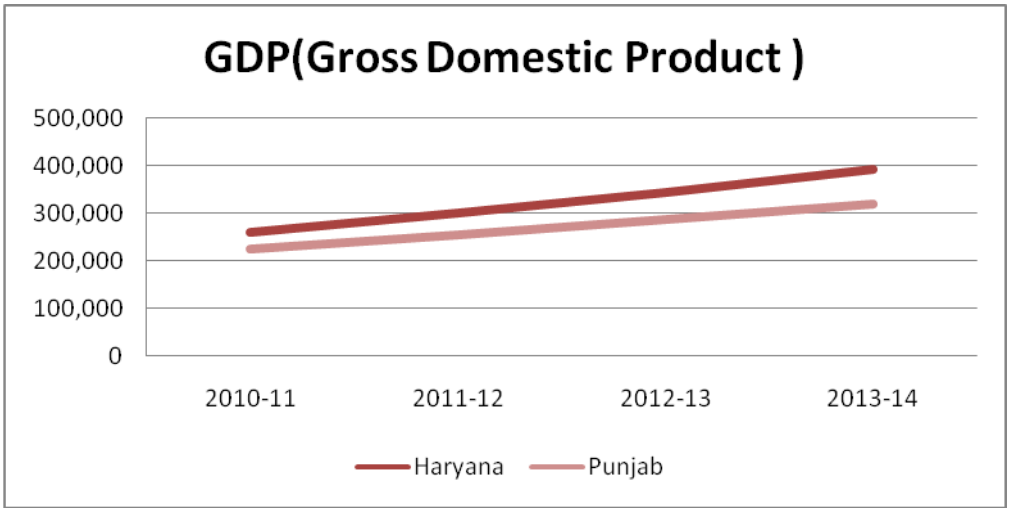
The Above Data is Taken from The Economic Survey of Haryana



4.4 Gross Domestic Product (Gdp)

Thisis the total value of goods and services produced by a country in a year[6].

State	2010-11	2011-12	2012-13	2013-14	2010-11% Growth	2011-12 % Growth	2012-13 % Growth	2013-14 % Growth
Haryana	260,621	301,959	345,238	392,894	16.56	15.86	14.33	13.80
Punjab	226,204	256,430	286,809	319,117	14.53	13.36	11.85	11.26



4.5 Gross National Product (Gnp)

Measures the total economic output of a country, including earnings from foreign investments

Country	GNP	Reference	Previous	Highest	Lowest	Unit
India	99965.15	Jun/13	89328.92	99965.15	103.60	INR Billion

4.6 GNP PER Capita

when the Gross National Product is divided between its countries population is called the gross national product per capita means per person.

4.7 Economic Growth

Economic growth measures the annual increase in Gross Domestic Product, Gross National Product, Gross Domestic Product per capita, or Gross National Product per capita. That all the indicators of economic growth and economic development.

4.8 Inequality of Wealth

There is the difference between the income of the richest and poorest person. Wealth's inequalities can be deliberated in many ways for example the percentage of the country's wealth owned by the top most richest person is 10% of the total population and reaming population owned 90% wealth[7].

4.9 Inflation

Inflation shows the increase in prices. Inflation shows that how much the prices of goods, services and wages increase each year[6]. If there is more increment in prices of goods and services that is a bad indicator for economic development. In that case suggest the government to control or reduce the prices

V. HUMAN DEVELOPMENT INDICATORS INCLUDE

5.1 Life expectancy

The average age to which a person lives is called life expectancy. It is a good indicator of human development and that helps in improvement of Gross Domestic Product.

5.2 Infant mortality rate

That counts the statistic of child, according to 1000 live births, who die below the age of one. The infant mortality rate is different in different countries. This is 5 in the UK and 61 in Kenya.

5.3 Poverty

Poverty indices count the percentage of people living below the poverty level, or on very small incomes. Incomes of that person which does not fulfill their basic needs[7].

5.4 Access to basic services

The availability of services necessary for a healthy life, such as clean water and sanitation.

5.5 Access to Healthcare

It takes into account statistics such as how many doctors there are for every patient.

5.6 Danger of Defect

It considered the proportion of people with diseases such as AIDS, malaria and tuberculosis.

5.7 Access to Education

It measures how many people attend primary school, secondary school and higher education.

5.8 Access to Technology

Includes statistics such as the percentage of people with access to phones, mobile phones, television and the internet.

5.9 Male/female Equality

Compares statistics such as the literacy rates and employment between the sexes.

5.10 Government Spending Priorities

compares health and education expenditure with military expenditure and paying off debts.

VI. CONCLUSIONS

a. The development experiences of world economies indicate that industrialization plays an important role in their development process. The countries with rapidly growing industrial sector were able to manage the development problems particularly employment, poverty and inequality more effectively than those countries in which industrialization lagged. Therefore, there is worldwide acceptance to have industrial development as appropriate objective to solve economic and social problems of various countries.

b. In the developing nations like India, industrialization is a requirement of fast economic development as it is not only a generator of economic growth but also serves as a transformer of socio-economic and

institutional set-up of the economy. It is generally believed that industrialization would create extensive employment opportunities by absorbing the excess labour released by the rural sector and raise production and productivity along with the standard of living.

c. However, for a labour surplus, elementary sector based dualistic economy like India, it is not feasible to directly shift the structure of the economy from the primary sector to the ultra modern large scale industrial sector using advanced technology. It is, therefore, advocated that these countries should first go in for the development of small scale industrial sector which can effectively use the inputs produced by the primary sector and thereby strengthen the agriculture-industry linkages.

d. The impact of economic reforms on number of units, production, employment and investment reflects that economic reforms have failed to make a dent towards the growth of small scale industrial sector in Punjab, Haryana versus All India.

e. The analysis reveals that though in terms of complete number of units there has been an increase, yet in terms of growth rate, deceleration has been noticed in the post reforms period as compared to the pre reforms period. This may partly be attributed to the emergence of highly competitive environment in the wake of liberal entry of conglomerate, fussing out of significant constraint on imports, and overhanging of excise rates on imports.

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ANALYSIS OF NOISE MODELS IN DIGITAL IMAGE PROCESSING

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ABSTRACT

Visual information is very important in today's world. Therefore, Image Processing plays a very important in day- to- day actions wherever images are used. Digital image processing deals with the digital images such as computerized images, medical images, etc. and it is very important that these images are in accurate form. But to a some extent they are affected by different types of disturbances present in their transfer. These disturbances are generally termed as Noise. This paper briefly describes the noise and the various noise models by which the images are greatly affected.

Keywords: Sources, Rayleigh Noise, Gaussian noise, Salt and Pepper Noise, Uniform Noise

I. INTRODUCTION

Digital Images are electronic snapshots taken of a scene or scanned from documents, such as photographs, manuscripts, printed texts, and artwork. The digital image is sampled and mapped as a grid of dots or picture elements (pixels). Digital images play an important role in research and technology such as geographical information system as well as it is the most vital part in the field of medical science [3]. Therefore, these images are required in accurate form so that they can be used effectively. But during their transmission and reception they are usually affected by noise.

The original meaning of "noise" was and remains "unwanted signal". Image noise is random (not present in the object imaged) variation of brightness or color information in images, and is usually an aspect of electronic noise. Noise removal algorithm is the process of removing or reducing the noise from the image [4]. This paper attempts to give a brief description about the sources of noise and the various noise models.

II. NOISE SOURCES

During image transmission and image acquisition noise is introduced in the image. There may be different reasons

for the introduction of noise in the image. The number of pixels corrupted in the image determines the quantification of the noise [4]. The important sources of noise in the digital images are as follows:

i. Environmental conditions may affect the imaging sensor.

ii. Low light and sensor temperature may introduce noise in the image.

iii. Dust particles present in the scanner may introduce noise in the digital image.

iv. Interference in transmission channel [4]

III. TYPES OF NOISE MODELS

Digital images are prone to a variety of types of noise. Noise is the result of errors in the image acquisition process that result in pixel values that do not reflect the true intensities of the real scene.

Depending upon the type of disturbance the noise can affect the image to a different extent. Different noise models are

3.1. A. Gaussian Noise Model

It is also called as electronic noise because it arises in amplifiers or detectors. Gaussian noise caused by natural sources such as thermal vibration of atoms and discrete nature of radiation of warm objects.

Gaussian noise generally disturbs the gray values in digital images. That is why Gaussian noise model essentially designed and characteristics by its PDF or normalizes histogram with respect to gray value. This is given as [8]

$$p_G(z) = \frac{1}{\sigma\sqrt{2\pi}} e^{-\frac{(z-\mu)^2}{2\sigma^2}} \quad [5]$$

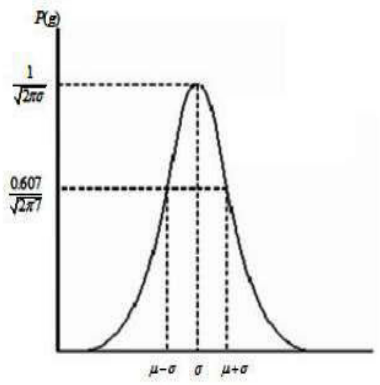

Fig1: PDF of Gaussian Noise

3.2. B. Salt and Pepper Noise Model

This is also called data drop noise because statistically its drop the original data values. This noise is also referred as salt and pepper noise. However

the image is not fully corrupted by salt and pepper noise instead of some pixel values are changed in the image. Although in noisy image, there is a possibilities of some neighbors does not change[5].

$$p(z) = \begin{cases} P_a & for\ z = a \\ P_b & for\ z = b \\ 0 & otherwise \end{cases} \quad [5]$$

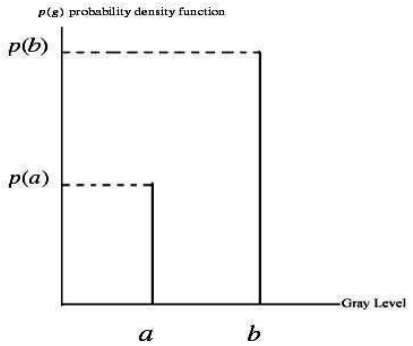

Fig2: PDF of Salt and Pepper Noise

3.3. C. Periodic Noise

This noise is generated from electronics interferences, especially in power signal during image acquisition. This noise has special characteristics like spatially dependent and sinusoidal in nature at multiples of specific frequency. It's appears inform of conjugate spots in frequency domain. It can be conveniently removed by using a narrow band reject filter or notch filter[8].

3.4. D. Photon Noise (Poisson Noise)

The appearance of this noise is seen due to the statistical nature of electromagnetic waves such as x-rays, visible lights and gamma rays. The x-ray and gamma ray sources emitted number of photons per unit time. These rays are injected in patient's body from its source, in medical x rays and gamma rays imaging systems. These sources are having random fluctuation of photons[8]. This noise is also called as quantum (photon) noise or shot noise.

3.5. E. Exponential Noise

The pdf of exponential noise is given as

$$p(z) = \begin{cases} ae^{-az}, & z \geq 0 \\ 0, & x < 0 \end{cases}$$ [5]

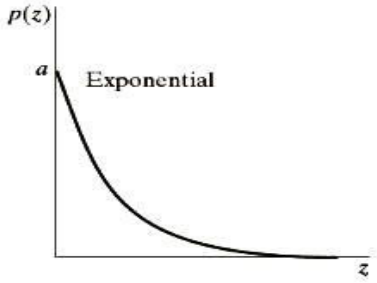

Fig3: PDF of Exponential Noise

3.6. F. Uniform Noise

The noise caused by quantizing the pixels of a sensed image to a number of discrete levels is known as quantization noise. It has an approximately uniform distribution. Though it can be signal dependent, it will be signal independent if other noise sources are big enough to cause dithering, or if dithering is explicitly applied.

$$p(z) = \begin{cases} \frac{1}{b-a} & if \quad a \leq z \leq b \\ 0 & otherwise \end{cases}$$ [5]

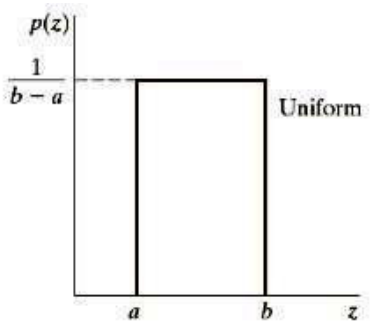

Fig4: PDF of Uniform Noise

3.7. G. Gamma Noise

Gamma noise is generally seen in the laser based images. It obeys the Gamma distribution.

$$p(z) = \begin{cases} \frac{a^b z^{b-1}}{(b-1)!} e^{-az}, & for\ z \geq 0 \\ 0 \quad , & otherwise \end{cases}$$

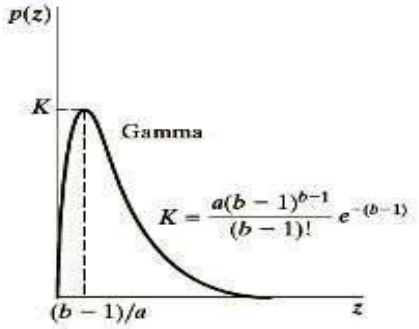

Fig5: PDF of Gamma Noise

3.8. H. Rayleigh Noise

Rayleigh noise presents in radar range images.

$$p(z) = \begin{cases} \frac{2}{b}(z-a)e^{-(z-a)^2/b}, & for\ z \geq a \\ 0 \quad , & for\ z < a \end{cases} \quad [5]$$

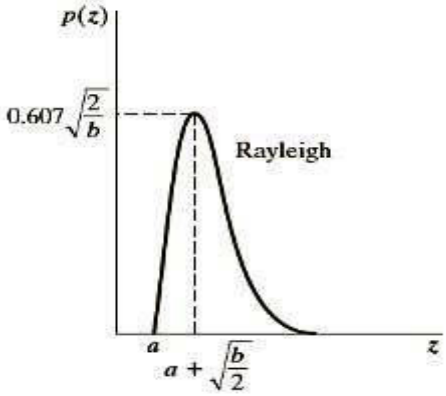

Fig6: PDF of Rayleigh Noise

IV. BROWNIAN NOISE (FRACTAL NOISE)

Colored noise has many names such as Brownian noise or pink noise or flicker noise or 1/f noise. In Brownian noise, power spectral density is proportional to square of frequency over an octave i.e., its power falls on ¼ th part (6 dB per octave).

Brownian noise caused by Brownian motion. Brownian motion seen due to the random movement of suspended particles in fluid.

However this noise follows non stationary stochastic process. This process follows normal distribution. Statistically fractional Brownian noise is referred to as fractal noise. Fractal noise is caused by natural process[8].

4.1 J. Structured Noise

Structured noise are periodic, stationary or non stationary and aperiodic in nature. If this noise is stationary, it has fixed amplitude, frequency and phase. Structured noise are caused by interferences among electronic components. Noise presents in communication channel are in two parts, unstructured noise (u) and structured noise (s). structured noise is also called low rank noise. In a signal processing, it is more advantagable (more realistic) to considering noise model in a lower dimensionality space [8].

V. CONCLUSION

Therefore, noise is added to the image during image acquisition and to a lesser or greater extent affects the image. So, the noise models are an important part of digital image processing. Without having the knowledge about these models it is nearly impossible to remove the noise from the image and perform denoising actions.

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A STUDY OF RECENT RESEARCH TRENDS OF PROXY SERVER

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ABSTRACT

A proxy server is a kind of buffer between your computer and the Internet resources we are accessing (Web sites, FTP archives etc.). The data we request come to the proxy first, and only then it transmits the data to us. Any web site in the world can track your movements through its pages and monitor your reading interests using our IP address, a unique ID assigned to each computer on the Internet. Depending on the policies of the Internet resource, we might not be able to get access to the information we need. Using only our IP address and the information about our operating system, a Web site can automatically exploit security holes in our system using some not-very-complex, ready-made, free hacking programs. A proxy server is a computer that offers a computer network service to allow clients to make indirect network connections to other network services. A client connects to the proxy server, then requests a connection, file, or other resource available on a different server. The proxy provides the resource either by connecting to the specified server or by serving it from a cache. In some cases, the proxy may alter the client's request or the server's response for various purposes. In this paper discuss a proxy server, need to use a proxy server, purpose, different types of proxies server, advantages, purpose of proxy server, performance etc..

Keywords: Gateway, HTTP Authentication, Network Security, Protocol, Web Server

I. INTRODUCTION

A server that sits between a client application, such as a Web browser, and a real server. It intercepts all requests to the real server to see if it can fulfil the requests itself. If not, it forwards the request to the real server. Some home networks, corporate intranets, and Internet Service Providers (ISPs) use **proxy servers** (also known as **proxies**). Proxy servers act as a "middleman" or broker between the two ends of a client/server network connection by intercepting all requests to the real server to see if it can fulfil the requests itself. If not, it forwards the request to the real server. Proxy servers work well between Web browsers and servers, or other applications, by supporting underlying network protocols like HTTP.

A proxy server is computer that makes request for a client. Proxy servers are used to get past filters. Filters usually don't recognize proxy servers and the sites they visit are usually allowed. So if we are ever behind a filter try to use a proxy server to go to the websites that we want to visit.

In computer networks, a proxy server is a server (a computer system or an application program) that services the requests of its clients by forwarding requests to other servers. A client connects to the proxy server, requesting some service, such as a file, connection, web page, or other resource, available from a different server. The proxy server provides the resource by connecting to the specified server and requesting the service on behalf of

the client [1]. A proxy server may optionally alter the client's request or the server's response, and sometimes it may serve the request without contacting the specified server. In this case, it would 'cache' the first request to the remote server, so it could save the information for later, and make everything as fast as possible. A proxy server that passes all requests and replies unmodified is usually called a gateway or sometimes tunnelling proxy.

A proxy server can be placed in the user's local computer or at various points between the user and the destination servers or the Internet. With the fast development of network, the network issues such as viruses, attacks, hacks are increasing day by day. So network monitor and analysis is becoming more and more necessary now a days.

II. USES

A proxy server has a large variety of potential purposes, including:

1. To keep machines behind it anonymous, mainly for security [3].
2. To speed up access to resources (using caching). Web proxies are commonly used to cache web pages from a web server [4].
3. To apply access policy to network services or content, e.g. to block undesired sites.
4. To log/audit usage, i.e. to provide company employee Internet usage reporting.
5. To bypass security / parental controls.
6. To circumvent Internet filtering to access content otherwise blocked by governments [6].
7. To scan transmitted content for malware before delivery.
8. To scan outbound content, e.g., for data leak protection.
9. To allow a web site to make web requests to externally hosted resources (e.g. images, music files, etc.) when cross-domain restrictions prohibit the web site from linking directly to the outside domains.

A proxy server that passes requests and responses unmodified is usually called a gateway or sometimes tunnelling proxy. A proxy server can be placed in the user's local computer or at various points between the user and the destination servers on the Internet.

A reverse proxy is (usually) an Internet-facing proxy used as a front-end to control and protect access to a server on a private network, commonly also performing tasks such as load-balancing, authentication, decryption or caching.

III. PURPOSE

Proxy servers have two main purposes

3.1 Improve Performance

Proxy servers can dramatically improve performance for groups of users. This is because it saves the results of all requests for a certain amount of time. Consider the case where both user X and user Y access the World Wide Web through a proxy server. First user X requests a certain Web page, which we'll call Page 1. Sometime later, user Y requests the same page. Instead of forwarding the request to the Web server where Page 1 resides, which can be a time-consuming operation, the proxy server simply returns the Page 1 that it already fetched for user X. Since the proxy server is often on the same network as the user, this is a much faster operation. Real proxy servers support hundreds or thousands of users. The major online services such as America Online, MSN and Yahoo, for example, employ an array of proxy servers.

3.2 Filter Requests

Proxy servers can also be used to filter requests. For example, a company might use a proxy server to prevent its employees from accessing a specific set of Web sites.

IV. WHY WE NEED TO USE PROXY SERVERS?

4.1 Transfer Speed Improvement

If the file we requested was received before to our proxy server, then proxy server will interrupt this file request and we will receive the file directly from proxy. However need to know, we can got the "speed down" effect. This effect appears when our proxy has long answer time because there is slow connection between us and our proxy server.

4.2 Security and Privacy

An anonymous proxy destroys information about our computer in the requests header. So we can safely surf the net and our information will never be used by hackers and spammers.

Sometimes we encounter some problems while accessing to web server (for example, web-chat). We have mistaken while working with some data and/or the server administrator restricted access from our IP. So we can use the anonymous proxy and try to access again.

V. ADVANTAGES

1. For security reasons it will keep the machine anonymous most of the time
2. It will enhance the speed to access the concerned resources. As far as web proxies are concerned it can be used to cache the web pages directly from a web server.
3. It will apply the access policy for the networks services as well as content. It can block the unwanted sites.
4. It can bring you log or audit related usages.
5. It can offer you top security and parental controls.
6. It can scan the outbound content effectively and can protect your data.
7. Proxy servers can be used for circumventing regional restrictions.

Proxy server works like a firewall because we are not connected directly to the internet, if we connect to that particular website through proxy server; this anonymous proxy server will isolate us from the site but still give we internet access. We can surf securely

VI. CATEGORIES

There are many different types of proxy servers out there, but following are some commonly known proxies.

6.1 Anonymous Proxy

An anonymous proxy server also known as web proxy generally attempts to anonymize web surfing by hiding the original IP address of the end user. This type of proxy server are typically difficult to track, and provides reasonable anonymity for most users.

6.2 Distorting Proxy

This type of proxy server identifies itself as a proxy server, but make an incorrect original IP address available through the http headers.

6.3 High Anonymity Proxy

This type of proxy server does not identify itself as a proxy server and does not make available the original IP address. High anonymity proxies, only include the REMOTE_ADDR header with the IP address of the proxy server, making it appear that the proxy server is the client.

6.4 Intercepting Proxy

An intercepting proxy, also known as a transparent proxy, combines a proxy server with a gateway. Connections made by client browsers through the gateway are redirected through the proxy without client-side configuration. These types of proxies are commonly detectable by examining the HTTP headers on the server side.

6.5 Reverse Proxy

A reverse proxy is another common form of a proxy server and is generally used to pass requests from the Internet, through a firewall to isolated, private networks. It is used to prevent Internet clients from having direct, unmonitored access to sensitive data residing on content servers on an isolated network, or intranet. If caching is enabled, a reverse proxy can also lessen network traffic by serving cached information rather than passing all requests to actual content servers.

6.6 Transparent Proxy

A transparent proxy is a server that satisfies the definition of a proxy, but does not enforce any local policies. It means that it does not add, delete or modify attributes or modify information within messages it forwards. These are generally used for their ability to cache websites and do not effectively provide any anonymity to those who use them. However, the use of a transparent proxy will get you around simple IP bans. Further, your web browser does not require special configuration and the cache is transparent to the end-user. This is also known as transparent forward proxy.

VII. ISSUES

The diversion / interception of a TCP connection create several issues. Firstly the original destination IP and port must somehow be communicated to the proxy. This is not always possible (e.g. where the gateway and proxy reside on different hosts). There is a class of cross site attacks which depend on certain behaviour of intercepting proxies that do not check or have access to information about the original (intercepted) destination. This problem can be resolved by using an integrated packet-level and application level appliance or software which is then able to communicate this information between the packet handler and the proxy.

Intercepting also creates problems for HTTP authentication, especially connection-oriented authentication, such as NTLM (NT LAN Manager), since the client browser believes it is talking to a server rather than a proxy. This can cause problems where an intercepting proxy requires authentication, then the user connects to a site which also requires authentication.

Finally intercepting connections can cause problems for HTTP caches, since some requests and responses become uncacheble by a shared cache. Therefore intercepting connections is generally discouraged. However due to the simplicity of deploying such systems, they are in widespread use.

VIII. DETECTION

There are several methods that can often be used to detect the presence of an intercepting proxy server:

1. By comparing the client's external IP address to the address seen by an external web server, or sometimes by examining the HTTP headers received by a server. A number of sites have been created to address this issue, by reporting the user's IP address as seen by the site back to the user in a web page [2].
2. By comparing the sequence of network hops reported by a tool such as trace route for a proxied protocol such as http (port 80) with that for a non proxied protocol such as SMTP (port 25) [3][4].
3. By attempting to make a connection to an IP address at which there is known to be no server. The proxy will accept the connection and then attempt to proxy it on. When the proxy finds no server to accept the connection it may return an error message or simply close the connection to the client. This difference in behaviour is simple to detect. For example most web browsers will generate a browser created error page in the case where they cannot connect to an HTTP server but will return a different error in the case where the connection is accepted and then closed [5].

IX. CONCLUSIONS

A proxy server is a machine that accepts incoming web requests and then forwards them on to the destination. They are an intermediary of the internet and keep your computer and destination web server separate. The proxy concept was invented in the early days of distributed systems as a way to simplify and control their complexity. Today, most proxies are a web proxy, allowing access to content on the World Wide Web. A proxy server can be placed in the user's local computer or at various points between the user and the destination servers on the Internet. A proxy server is a benefit for administration, because the network administrator can filter and a manage Internet usage from one machine. All users access the Internet from the proxy server, so network administrators can block certain pages and limit the amount of accessible websites. This type of filtering is usually done by large businesses that need to limit websites either individually or through categories. A proxy server protects the network from malware, which is installed on users' computers when they access an infected website. When the malware is installed on the user's machine, it can spread to other machines on the network.

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ADVERTISING & OTT CONTENT SERVICES IN INDIA

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Advertising is a medium of mass communication, facilitating large scale marketing by describing the products and services in an Advertisement. The basic purpose of advertising is to give information, to attract attention, to create awareness and finally to influence the buying behavior of consumers. Advertising is within the scope of promotion which is one element in the marketing mix. It is getting popularity in the present highly competitive and consumer-oriented marketing and new communication techniques are now used for making advertising attractive, understandable and agreeable. All products old and new, consumer and durable, cheap and costly need extensive advertising for sales promotion and consumer support. Advertising is certainly needed in marketing, but is equally important and essential in social, cultural and political aspects of our day to day life.

OTT basically refers to video, television, and other services provided over the Internet rather than via a service provider's own dedicated, managed IPTV network. OTT is delivered directly from the provider to the viewer using an open Internet/broadband connection, independently of the viewer's Internet service provider (ISP), without the need for carriage negotiations and without any infrastructure investment on the part of the provider. It is a best effort, unmanaged method of content delivery via the Internet that suits providers who are primarily broadcasters rather than ISPs.

I. OTT IS SPECIFICALLY DIVIDED IN TWO CATEGORIES CLOSED OTT AND OPEN OTT

Where there is an Internet video experience is managed by the service provider and open web content is chosen and integrated into a 'walled garden' of the best, or most lucrative, content depending on how generous we are being is known as Closed OTT.

When the consumer gets to move away from the confines of the service provider's editorialized experience and 'surfs' the open Internet without any interruption normally using a browser that handles all the different display and encoding formats is known as Open OTT.

OTT opens up a completely novel way for operators to generate revenue from video on demand (VoD), catch-up TV, and interactive applications. Expected figure of online video audio video & broadcasting studio systems viewers worldwide is likely to eclipse 1.3 billion by 2016, growing from a current base of just over 780 million.

The rights to quality video content are usually expensive, and such content simply will not be created unless revenue can be generated from it. As of now, the content industry is supported by subscription TV and its delivery medium is the set-top box or the residential gateway.

Consumers around the globe are rapidly embracing over-the top TV (OTT-TV) video services on the Internet to satisfy their desire to consume content at any place and at any time without any hindrance. To retain customers, media and entertainment companies now offer on-demand services, catch-up TV, recommendations, social networking applications and convergent services across a slew of devices ranging from personal computers

(PCs) and tablets to gaming consoles. These services follow consumers across devices, enabling them to watch a program on their PC, continue watching it on TV and then switch to an iPad or any other handheld device.

Current market scenario is different in India, where OTT-TV services are still in a preliminary condition. Even as video consumption rises, as yet there are no compelling value propositions for consumers who want to watch content on their own terms. But even as India lacks aggregators on the scale of Netflix and Hulu, the growing popularity of YouTube and social media sites has boosted video consumption. According to CISCO VNI data, total Internet video traffic (business and consumer combined) will constitute 72 percent of all Internet traffic in 2018, up from 45 percent in 2013. But they remain unsure of whether they can get adequate return on investment in specific opportunities such as OTT.

Driven by greater broadband penetration and the plethora of Internet Protocol enabled devices available to consumers today laptops, tablets, smartphones and other Web enabled devices because of these on the go video consumption has become particularly popular,

The media landscape in the last decade has changed substantially globally. The emerging trends, innovation and technology, Government policy on FDI and the societal appetite for content are some of the factors that have made Media and Entertainment sector one of the fastest growing and most competitive sectors. After HD and 3D, the fundamental change observed in the broadcasting landscape is the people's desire to watch content on myriad devices, thus paving way for the invasion of over-the-top (OTT) services in India.

India is a fast growing economy where digital channels are growing constantly both in volume and strength. However, the pace of change can be much faster, since for a country which boasts of a large, educated and young population with increasing income levels, any major technology should quickly achieve mainstream adoption. Sad but ground reality tells a different story. India's online ecosystem remains devoid of needed infrastructure, broadband is in a sorry state (avg speed less than 2 mbps), internet penetration remains low (less than 16%), online commerce is still nascent and regulatory delays are the order of day.

II. SHARE OF OTT CONTENT SERVICES IN THE INDIAN MEDIA & ENTERTAINMENT INDUSTRY

Online services remain small in India but its growing, unlike developed countries where online services have decimated print and garnered significant share. Media and entertainment industry in India is growing rapidly with overall revenues expected to exceed 17 billion USD by 2017. While there is no equivalent of Hulu, Netflix, BBC iPlayer or alike, Indian online video remains largely driven by YouTube and popular social networking sites. In recent years, India has witnessed emergence of several niche players like Spuul, ErosNow, Bigflix, BoxTV etc. which are trying to gain credible subscriber base. These players have key content offerings in Bollywood movies, regional content and broadcasted TV shows with little or nil live and sports content. India with its uniqueness needs different models and greater innovation, ideas like Bharti Airtel's "One Rupee plan for mobile videos" may work wonders. Priced at 1 Indian Rupee (less than 2 US cents) any prepaid user can dial a short code to gain access to Airtel's video portal and play video clips or the recently launched shake your phone advertisement campaign of Airtel App for downloading it on your smartphone and get cash back or various other offers are also available for downloading it.

Some other interesting facts around growth of sector include

⇒ India has approximately 25 million 3G connections in Apr 2014 averaging data usage of 1 GB per month representing second largest mobile broadband market.

⇒ Cisco Visual Networking Index (VNI) predicts video comprises 15% of all Indian mobile data traffic at the end of 2011 with Cisco projecting that the proportion of data taken up by video would increase to 40% by 2016

⇒ Increasing numbers of consumers viewing full-length movies and TV shows on internet daily.

⇒ One of the biggest internet user base in the world, and the largest in terms of incremental growth

⇒ Strategy Analytics forecast that the Asia Pacific market, driven by India and China, will account for 42% of all connected TV sales worldwide in 2016. Connected TVs and Wi-fi dongle are expected to reduce cost barriers for higher consumer adoption.

⇒ Informa Telecoms and Media estimate that smart TV penetration in India will reach 14% by the end of 2016.

⇒ According to a study from Vuclip, mobile video sharing in India remains high at 65% as compared to 53% globally.

Indian broadcasters are beginning to join the over-the-top (OTT) TV race. While the U.S. is the most developed market where the battle is being fiercely fought, India has recently kick started the OTT game. DTH and telecom operators have shown high adoption of OTT Live TV and VoD technology, however OTT subscriber growth is very slow. OTT enablers are partnering with telecom operator and Pay-TV operators for extending OTT/VoD services to subscribers through discounted pricing models. MSOs are held up with digitization process and are not highly active in this space. Hathway is the only operator offering mobile TV services. Other MSOs like Den Network, Siti Cable, IMCL, You Scod 18 and Radiant DigiTek Network (Rajasthan based MSO) have shown interest in offering VoD services.

Majority of OTT contents are consumed through smartphones and pc and hence there is less demand for OTT enabled devices such as set-top boxes, Blu-ray players, Internet-enabled TVs, game players, digital media adapters like Apple TV or Roku and media tablets in the country. The challenge will be in ensuring that every latest TV show and movies are available on the multiple pay-TV platforms. Content generation, innovative business models and regulatory measures will need to get streamlined for OTT to become successful. Piracy and issues related to intellectual property rights are a major roadblock for OTT penetration. The clearest opportunity is for traditional TV distributors. With established brands, strong relationships, and consumers trust, they are perfectly placed to deliver a seamless service that integrates online and traditional TV through a single device managed by a single operator. Because of its openness and its perceived ability it is expected to bypass the networks owned and operated by pay-TV providers.

Such a multitiered approach can help companies serve different consumer segments profitably and enable them to create premium advertising campaigns customized for different audiences and device users. For example, ads could target only users of Blackberry devices or HTC devices. Moreover, companies could offer the same content around the world, to the Indian diaspora. Indeed, the monetizing opportunities are wide and varied both in the Indian and international markets. Revenue options will only increase as companies refine their business models and begin offering personalized content. Moreover, as the OTT-TV business develops, advertisers could view the OTT-TV ecosystem as a new digital medium for connecting with consumers. This development could make more monetizing options available for media, broadcast and telecom companies.

The value chain in OTT-TV is complex, and the capabilities and assets required to succeed in this market stretch across multiple segments of the telecom, media and entertainment industries. Accordingly, the OTT ecosystem will comprise partnerships among decidedly different players along the value chain. These partnerships will

determine the degree to which the OTT-TV business will expand the "pie" for all players. For example, video consumption could raise the average revenue per unit for telecom players or increase sales of mobile handsets that have embedded OTT-TV apps. This would be a win-win scenario for all stakeholders—including consumers, who would benefit from richer and more robust OTT-TV service.

III. OPPORTUNITIES FOR OTT IN THE INDIAN MARKET

The OTT television market might still be in its developmental phase in India but still holds a lot of promises in future. It is estimated that 176 million OTT viewers will coadunate by 2015, generating revenues of USD 552 million.

There are numerous on demand online content providers like NyooTV, BigFlix, and Eros Now. Currently hosting 21 channels and aiming around one million global subscribers in its first year, ZEE New Media's recently launched OTT distribution platform, DITTO TV offers channels On demand video content to the consumers on multiple devices. As a pioneer in the entertainment and content business, Zee have been systemically investing in digital outreach; Ditto TV was created to provide cutting-edge wireless broadband digital services to customers across the world. Over the years, Zee have launched many industry-firsts, but this is a launch that zee is especially excited about & proud. Ditto TV will transform the way content is consumed and monetised domestically. The technology opens up a completely new way for operators to generate revenue from VoD, catch-up TV, and interactive applications.

Most of the operators are busy rolling out 3G and LTE infrastructure and are finding it worrisome to find the resources to also deploy a video streaming service. This also questions the capability of the operators to recoup the incremental costs of offering OTT at good enough quality to paid service in a pre-paid market. Consumers will only pay for video that is good quality and is delivered quickly, particularly since the main problem faced by consumers while accessing content online is that of buffering and poor quality images which the Indian operators still have to overcome because of the non-availability of the transponder bandwidth.

Another opportunity prevailing in the market is the OTT services and innovative TV everywhere offerings in the pay-TV sector, even though the monetization potential for such services continues to be unclear. By contrast, prepaid pay-as-you-go (PAYG) services could have more significant monetization potential. The prepaid PAYG model is already more prevalent in the mobile world, and is often cited as a key driver of the tremendous growth in mobile subscriber bases particularly in emerging countries. In case of pay-TV sector, pay-per-view (PPV) premium content has been around for years almost as long as pay-TV itself in the United States. However, beyond premium content, pay-TV operators have not launched significant PAYG services. Pay-TV services have predominantly employed a subscription model, largely because they were initially positioned as a luxury for high-income segments. This approach also has the benefit of simple billing requirements, because service providers tend to offer only 10 packages at the most.

IV. SPEEDBREAKERS IN THE GROWTH OF OTT CONTENT SERVICES IN INDIA

Industry experts feel that no OTT player has yet found the magic formula for monetizing free OTT services, and this leaves the market open for companies such as Yahoo, Google, and Microsoft are eager to transition their free OTT viewers into paying customers.

The market for 3G users in India is still in growing stage. Lots of people are still on 2G and 2.5G and want to access the content, but can't do so as the space for better bandwidth is very limited in India. 4G rollout in India by Mukesh Ambani is expected to kick start 4G revolution in India. Reliance's ambitious USD 10 billion investments is expected to connect 30 million homes in 100 cities in India in the next five years. This cost effective roll out will see a splurge of content across multiple platforms and aid the growth of OTT broadcasting in India.

The market still has to provide insight into different types of strategies employed by OTT service providers to extend their services into new devices. Geographic expansion of large OTT portals such as Amazon, Apple, and Netflix is one of the main drivers behind the growing adoption of OTT video via connected CED, both fixed in home devices and portable CED such as tablets and smartphones. Furthermore, platforms such as United Kingdom's YouView and HbbTV in mainland Europe are enabling broadcasters and pay-TV operators to extend the reach of their existing video assets. It is forecasted that by 2017, broadcasters will account for 17 percent share of world OTT video market revenues, and pay-TV operators for 11 percent share.

Indian broadcasters need to be innovative on how to effectively monetize their content beyond the conventional means. With the introduction of OTT technologies in the domestic market, Indian broadcasters are given an opportunity to complement their broadcast offerings, to improve sports and live events, and to monetize content that has passed the seven day catch-up TV window.

The broadcasters globally are expected to generate USD 1.8 billion in OTT market revenues in 2012, mostly through advertising, and will grow this to USD 5.9 billion by 2017.

Over the next five years, more broadcasters will try to monetize back catalogue content via the pay-per or subscription model, as well as look to international expansion as a means of generating OTT revenues, as in the case of the BBC's global iPlayer app. Indian broadcast market has always shown flair to adapt and adopt any new technology so the potential of the OTT success story in India though currently at a very nascent stage, it definitely offers a promising graph of growth.

V. ROLE OF ADVERTISISNG IN OTT CONTENT SERVIES

Advertising will contribute more than 80 per cent to the online video pie by 2020 with the subscription revenue opportunity, largely driven by subscription video-on-demand (SVOD) platforms, growing from less than $700 million in 2014 to more than $2.3 billion by 2020. The total market for online video services across 13 countries in Asia Pacific region will grow from $3.5 billion in net revenues in 2014 to reach $12.4 billion by 2020, representing an average annual growth of 23.5 per cent.

Meanwhile, large scale global digital brands (from YouTube to Netflix) are expanding rapidly in a number of Asian markets or readying to launch in key territories over 2015 and 2016. Major local and regional television companies are also in the early stages of launching a number of large scale advertising and subscription based OTT platforms, anchored to local, Asian and Hollywood content while telecom operators are either moving upstream into content and OTT services or providing a crucial link for the ecosystem.

⇒ Infrastructure. Fixed broadband subscribers reached 325.3 million in 2014 across Asia Pacific, equivalent to an average household penetration rate of 36 per cent. By 2020, this penetration level will reach 40 per cent as fixed broadband subs grow to 403.5 million mobile broadband will grow rapidly, expanding at CAGR of 15 per cent over 2014 and 2020 to reach almost 2 billion subs by 2020 (58 per cent penetration of population) versus 866 million (26 per cent penetration) in 2014.

⇒ OTT Video Consumption. Active Asia Pacific OTT video subscribers reached 594 million in 2014. China accounted for more 85 per cent of the market size in 2014 and will represent 80 per cent by 2020. Ex-China, the largest markets in 2014 were Korea; India; Japan; and Hong Kong. By 2020, active OTT video customers will reach 977 million. By 2020, in Asia, India will emerge as the second largest market, followed by Korea, Japan and Hong Kong. In Southeast Asia, Malaysia will be joined by Indonesia and the Philippines as market leaders.

China will be the largest contributor, driven by internet-enabled TV and set-top box platforms and online video companies offering premium services. Japan, Korea, India and Australia will emerge as material opportunities, powered by SVOD but India will trend towards more a freemium-oriented model. The market for subscription based OTT video reached 75.3 million active subscribers in 2014 and is expected to reach 225 million by 2020.

Asia Pacific online video advertising exceeded US$3.7 billion in net terms in 2014, up 35 per cent year-on-year. The largest markets for online video advertising in 2014 were, by far, China and Japan, followed by Australia, India and Korea. By 2020, the total Asia Pacific online vide advertising pie is expected to grow to $10 billion, a CAGR of 18 per cent from 2014, with China dominant, followed by Japan and Australia. India will gain increasing scale and overtake Korea while Indonesia will be the clear leader in Southeast Asia.

OTT video advertising revenue, a subset of the online video advertising pie, reached $2.1 billion in 2014, up 43 per cent year-on-year from a low base, and almost entirely driven by China. This pie, is projected to expand to $5.5 billion by 2020 at a CAGR of 18 per cent. China will be the largest contributor with India, Korea and Indonesia starting to become gradually significant over time.

Looking ahead, one can see existing television sets transformed into smart TVs in India, enabling internet applications everywhere in the home. With digitisation, analog cable subscribers have been also migrating largely to digital cable, which has gained about 10 million subscribers in 2013, while net DTH subscribers increased by approximately three million. India is currently witnessing the digitisation of analog cable TV signals as mandated by the Ministry of Information and Broadcasting (I&B).

Post digitisation, while the viewing experience and expectations of the subscribers are high, it has also increased the demand for high-speed broadband. Consumers are now more deeply aware about the content on their portable devices and the TV. As the users evolve with digital content streamed to them, the demand for OTT services increases.

According to the Cisco Visual Networking Index 2014, in India, mobile data traffic will grow by a colossal 24-fold from 2013 to 2018, a Compound Annual Growth Rate (CAGR) of 88 per cent and Internet-Video-to-TV traffic will increase 8-fold between 2013 and 2018 (50.9 per cent CAGR).

VI. INDIAN OTT MARKET IS GROWING

OTT unlocks a completely new way for operators to generate revenue from video on demand (VoD), catch-up TV, and interactive applications. The number of online video viewers worldwide is expected to eclipse 1.3 billion by 2016, growing from a current base of just over 780 million.

The rights to quality video content are expensive, and such content simply will not be created unless revenue can be generated from it. At present, the content industry is supported by subscription TV and its delivery medium is the set-top box or the residential gateway. The emerging digital video content sector and various market forces are likely to affect telecom operator efforts to establish robust and profitable IPTV services in the future. OTT video service providers are keen to establish a strong presence on a variety of connected consumer

electronics devices (CED) being installed in consumers' homes, given the revenue opportunity that these devices present. It is expected that by 2017, 27 percent of OTT video transactions will be initiated via fixed connected CED within the home, accounting for 46 percent of world OTT market revenues generated that year.

A large number of broadcasters in Europe are offering OTT apps for connected CED and supporting these services advertising revenues. Yet, these alternative efforts are not meant to replace the broadcast channel. A concern exists, particularly in emerging markets such as Russia, that these alternatives may affect typical channel performance and distract viewers away from the broadcaster's core offerings.

Pay-TV services have predominantly employed a subscription model, largely because they were initially positioned as a luxury for high-income segments. This approach also has the benefit of simple billing requirements, because service providers tend to offer only 10 packages at the most.

OTT is sometimes also described as a potential threat for the pay-TV industry. It is estimated that majority of households will cut the cord from their pay-TV subscriptions based on limited, realistic, and aggressive adoption scenarios. It is also predicted that seven percent of households will forego their pay-TV subscriptions by 2012 in favor of some combination of OTT services and free over-the-air (OTA) broadcast television. The invigorating news for pay-TV service providers is that the vast majority of consumers will not consider abandoning familiarity, comfort, and content of traditional televisions until several obstacles to OTT adoption are overcome, which include limited live TV, sports, and high-definition content, and the relative complexity of setting up and using OTT devices and networks.

Pace clients such as DirectTV, Canal+ and Viasat all offer OTT content that can be accessed via one of the set-top boxes. The appeal of OTT is that it augments the traditional viewing experience by allowing the user to access internet-based content without having to leave their television sets.

Industry experts believe that no player has yet found the magic formula for monetizing free OTT services, and this leaves the market open for companies such as Google, Yahoo, and Microsoft are eager to transition their free OTT viewers into paying customers.

Potential acquisition of Hulu is exciting news for the companies. Mergers with and sales of successful OTT services are going to become more common as Internet giants and large retailers seek to establish a global pay-OTT presence and compete with the likes of Netflix.

OTT will continue to play an important role in allowing consumers to access their paid-for services in the way they want, adding value to pay-TV subscriptions. Eventually, it is believed that consumers will enjoy content any time, any place through a range of devices including mobile phones, iPads, games consoles, or connected TVs, all connected to a central content gateway.

Hotstar was launched on February 1 this year, it outdid apps such as Facebook (10 months) and Twitter (one year), to become the fastest to cross the million download mark in six days though Facebook and Twitter are two different apps in comparison to Hotstar. And thanks to the ongoing ICC Cricket World Cup and Star's robust line-up of drama shows, the app has managed to clock an average TSV (time spent per viewer) of 24 minutes a day.

With 10 million downloads in the 40 days since its launch, Star India's mobile application Hotstar is undoubtedly the hottest digital media product today. Additionally, the app development team has made sure that Hotstar can run on as many as 7,000 variations of operating systems and screen sizes, considering the proliferation of handsets in the country.

The match between India and Pakistan recorded a little more than 25 million views on two of their digital platforms Hotstar and STAR Sports with an average duration of 10-12 minutes, when India beat Pakistan in its first cricket match of the ICC World Cup 2015, in Adelaide on Sunday. Star India believes that this was the biggest number of views on the digital platform ever for a single match, much more than the five million the Super Bowl in the US had received. No other sports event including premier American football event Super Bowl or Wimbledon tennis is anywhere close. The India-Pakistan match in question got ratings of 14.8 TVR and a reach of 288 million on television.

In the US, the National Football League (NFL) Super Bowl at its peak on February 1 had five million unique online views on NBC Sports Live Extra, the digital platform of NBC. NFL Mobile from Verizon, a smartphone platform, had 1.3 million viewers, according to US magazines. Data from Wimbledon show in 2014, about 1.3 million people saw the tournament live on its digital platform, Wimbledon TV, while BBC had 12.7 million video requests on its online platforms in the entire championship.

Besides, STAR India is for the first time telecasting the ICC World Cup in six languages English, Hindi, Bengali, Tamil, Kannada and Malayalam. Based on trends, the broadcaster is expecting 40-45 per cent of the viewership to come from regional language feeds, a fundamental shift that will affect sports advertising as well. While English will account for a fourth of the viewership, the rest will be from Hindi. This ratio was 70 per cent for Hindi and 30 per cent for English in the previous World Cup. Star estimates about 300 million viewers were glued to the match between India and Pakistan. So this shows that there is a big shift in watching matches, soaps or movies whether in India or across the globe because of the OTT TV.

A few years ago, sports broadcasting were limited to English. But with an expansion of the regional market, advertisers with smaller ticket sizes have come in. According to Star Sports, as rates are lower, advertisers require smaller ticket sizes, so the number of advertisers is going up. For instance, in the previous World Cup, Star Sports had 100 advertisers. This year, they have double that number. So, it does not impact overall revenues.

Star India, which recently bought the digital rights for IPL, said there were 60 million video views during the 60 matches last year. This would change dramatically this year with the launch of Star's new application Hotstar.

Hotstar has been built to work on lower bandwidth, a key problem faced by Indian consumers, especially on their mobile phones. For instance, it is built to operate on speeds as low as 64 Kbps, and ideally on speeds of 128 Kbps. To resolve the issue of connectivity, on unstable 3G services, common in India, the application is optimised to reduce the quality of the picture rather than having to open the video again.

Hotstar, to also show all Star channels' programming, is free. The reason: Star executives said there was no stable payment mechanism in the country available to handle so many views and consumers.

Advertisers acknowledge the shift in viewership. LG Electronics, a prominent national advertiser and an ICC Cricket sponsor: At present, LG Electronics digital spends are about 8-10 per cent of the total ad and marketing budget. LG Electronics see this going up to 15 per cent in the next few years. Amul, one of the largest consumer goods brands in India, the company is looking at increasing its digital advertising budget to around 10 per cent in a few years from two-three per cent currently.

Undoubtedly, Hotstar has stolen the show. Smaller screens are dominating the market today. It is clear the customer is living in the digital age.

Regional brands are also bullish on Star's regional push. Wagh Bakri Tea Group, the largest brand in its sector in Gujarat, "There is a large market of regional advertisers in the country. So the idea of regional feeds for big properties is a good idea. But the challenge here is pricing that has to be reasonable.

Star India's bet on the mobile medium that led to the development and launch of the app Hotstar. In the US, the average content consumption per day is close to six hours while in India, it is three hours. The main reason why it's so high in the US is that there are multi-TV homes there and everyone watches stuff according to individual choice. In India, still have a majority of single-TV homes, and television viewing is not an individual exercise. Mobile phones, on the other hand, are accessible and hence can be used as the second or third screen in a household.

"While it is too early to observe any user trends, most of the time spent is on dramas. People now have the option to catch their preferred shows while travelling or on the move otherwise. How this trend shapes up will also depend on how telcos mould their data plans and charges because right now, that is the only cost incurred while using the app. A user may end up using Rs 60 to Rs 100 worth of data per hour of viewing video content using mobile internet.

However, the network realised that while sports aficionados did not mind paying for content, there was resistance to using a credit card for transactions. Thus, Hotstar was launched as a free service. While Hotstar will provide sports and entertainment, starsports.com will continue to exist as the mutli-sport platform from Star India.

Since it is a free app, Hotstar's monetisation will depend solely on advertising and this is where company sees scope for innovation. Currently, the app is equipped to provide ad space in the pre-roll (before the video) or mid-roll (between the video). Considering it has managed to have a TSV of 24 minutes on the back of drama content, advertisers would find it an attractive avenue for advertising online.

Online advertising, globally, has seen little innovation. Markets like the US and the UK are subscription-driven and the need to innovate with advertising has never been felt. Here in India have the scope to innovate and when the time comes, advertisers will do so.

Concerns over monetization, while valid, need not continue to hamper companies' efforts to build OTT-TV capabilities in an increasingly digital world. The OTT-TV market will most likely create a win-win situation for all stakeholders from media and entertainment and communications companies to handset manufacturers to consumers.

Leading companies in developed markets have already shown that there are several models to choose from. A multitiered pricing approach and customized content that appeals to different consumer segments could be the best way to capture the OTT-TV market opportunity which is only set to grow.

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OPTIMAL LOCATION OF COMBINED DG AND CAPACITOR FOR REAL POWER LOSS MINIMIZATION IN DISTRIBUTION NETWORKS

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ABSTRACT

Nowadays, because of development of distributed networks and increase in electricity demand, the use of distributed generation (DG) sources and capacitors banks in parallel is increasing day-by-day. Determining the DG/capacitor optimal location and capacity is extremely important for network loss reduction and improving network performance. The purpose of power loss minimization in transmission and distribution release capacity for both utility and the customer. In this paper, Genetic Algorithm (GA) and Particle swarm optimization (PSO) algorithms are applied for optimal placement and sizing of DG and capacitor simultaneously. GA and PSO are population based stochastic search techniques used for optimization. The performance of GA and PSO has been compared by applying these approaches to standard 12-Bus Radial Distribution System. Test results show that the proposed techniques are more effective and are capable of providing better results than analytical method in finding optimum solutions.

Keywords: Distributed Generation (DG), Genetic Algorithm (GA), Loss Minimization, Optimal Siting, Optimal Sizing, Optimum Location, Particle Swarm Optimization (PSO), Power Distributed Network, Radial Distribution Systems (RDS), Shunt Capacitor.

I. INTRODUCTION

The electric power distribution networks usually supply power to customers at low voltage and are connected to the high voltage transmission systems. The total power losses in the distribution network lines is high because of low voltage and high current in comparison to high voltage network, which in turn, causes increase in the cost of power and poor voltage profile along the distribution feeder. The total power loss in the distribution network is composed of two parts: real power loss and reactive power loss. The real power loss is due to the flow of active component of current required by the load, while the reactive power loss is due to the flow of reactive component of current required to compensate the reactive power requirement of network components. Among these losses, the effect of active power loss is very important because it reduces the efficiency of power transfer and deteriorates the voltage profile. The minimization of real power loss in the distribution networks is therefore of much significance compared to the transmission system. The task of power loss reduction and enhancement of energy efficiency of electric power delivery system mostly goes to electric power distribution. It is reported that as much as 13% of total power generated is wasted in the form of power losses at the distribution level [1]. The capacity of radial line is often limited, it is therefore, necessary to consider some alternative methods so that the future load demands can be supplied ensuring supply quality and reliability.

Most distribution network components like motors and transformers are inductive in nature, so the network power factor is lagging, and this result in reduction of the system's capacity, increase in the system losses, and reduction in bus voltage. Shunt capacitors are used to alleviate some of these problems [2-4]. Apart from reduction in power losses, the shunt capacitor enhances the voltage profile, improves power factor and voltage stability of the system. Distributed Generation (DG) units can play an important role in distribution system planning as DG integration into the distribution system defers major system upgrade, reduces overall energy loss and improves the supply quality and reliability [5]. Even though, DG technologies have positive impacts on distribution system, there might be certain technical challenges with the inclusion of active DG units in conventional passive system. It is important to place DG units at proper location to improve reliability, system operation and supply quality. On the other hand, shunt capacitors, commonly installed for reactive power compensation, can also be considered in parallel with DG units for distribution system expansion planning. It is clear that any loss reduction is beneficial to distribution utilities, which is generally the entity responsible to keep the losses at low levels. Loss reduction is therefore most important factor to be considered in planning and operation of DG [6].

II. PROBLEM FORMULATION

The problem of combined DG and capacitor allocation in distribution network with their appropriate size is very important, because their improper allocation may cause an increase in the system operating costs and power loss, and reduction in the energy efficiency. The main aim of the proposed work is to minimize the total real power loss (P_L) in the distribution network as given in Equation (5), subjected to equality and inequality constraints in Equation. (1), (2), (3), (7)–(10). During DG allocation, the voltage at different buses should be maintained at proper limits for safe and reliable operation of the power distribution system and the current flow in the line conductor must be within the permissible limit.

Consider a branch connected between nodes p and q of a radial distribution network as shown in Fig. 1. The real and reactive power flow through the branch and the terminating node (q) voltage (neglecting shunt conductance and susceptance) are given by Equation (1)–(3), respectively as [15], [27] and [35]:

$$\mathbf{P_{pq}} = P_q^F + P_q^L - P_q^{DG} + \frac{\mathbf{R_{pq}}}{V_p^2}\left(P_{pq}^2 + Q_{pq}^2\right) \quad (1)$$

$$\mathbf{Q_{pq}} = Q_q^F + Q_q^L - Q_q^{DG} + \frac{\mathbf{X_{pq}}}{V_p^2}\left(P_{pq}^2 + Q_{pq}^2\right) \quad (2)$$

$$V_q^2 = V_p^2 - 2\left(P_{pq}R_{pq} + Q_{pq}X_{pq}\right)\frac{R_{pq}^2 + X_{pq}^2}{V_p^2}\left(P_{pq}^2 + Q_{pq}^2\right) \quad (3)$$

$$\text{Where } \mathbf{P_q^F} = \sum_{\forall jli=q} P_{ij} \text{ and } \mathbf{Q_q^F} = \sum_{\forall jli=q} Q_{ij}$$

Here P_{pq} (Q_{pq}) are the sending end active (reactive) power flows and R_{pq} (X_{pq}) are the series resistance (reactance). P_q^{DG} (Q_q^{DG}) are the active (reactive) power injections by DG; Q_q^c is the reactive power injection by capacitor and P_q^L (Q_q^L) are the total active (reactive) demand load at bus q. P_q^L (Q_q^L) are the sum of active (reactive) power flows through all the downstream branches connected to bus q. V_q is the magnitude of voltage at bus q. S_B is a set of buses containing all the buses in the system. The value of current flowing through a branch connected between nodes p and q is given as:

$$I_{pq} = \sqrt{\frac{P_{pq}^2 + Q_{pq}^2}{V_p^2}} \quad (4)$$

Mathematically, the objective function is given as:

$$\text{Min } P_L = \sum_{\forall p|q,q \in S_B} I_{pq}^2 R_{pq} \quad (5)$$

The above objective function is subjected to the set of equality and inequality constraints as given below:

1. Equality constraints

Power balance: The flow of active and reactive power in all the branches of the system must satisfy Eq. (1) and (2), respectively.

Voltage equation: For all branches of the system, the voltage magnitudes at sending and receiving end nodes must satisfy Eq. (3).

DG power factor: The power factor of DG connected at bus q must satisfy the following eqn.

$$\frac{P_q^{DG}}{\sqrt{(P_q^{DG})^2 + (Q_q^{DG})^2}} = \cos\varphi_q \quad (6)$$

2. Inequality constraints

Bus voltage: The voltage at each bus must lie within the prescribed limits

$$V_q^{min} \leq V_q \leq V_q^{max} \quad q \in S_B \quad (7)$$

Line current: The flow of current through each branch should not exceed its thermal limit

$$I_{pq} \leq I_{pq}^{rated} \quad \forall \text{ pandq} \in S_q \quad (8)$$

DG capacity: The DG capacity should not exceed certain percentage of total feeder load of network

$$\sum_{q \in S_q} \sqrt{(P_q^{DG})^2 + (Q_q^{DG})^2} \leq 0.5 \times \sum_{q \in S_q} \sqrt{(P_q^L)^2 + (Q_q^L)^2} \quad (9)$$

Capacitor capacity: The capacity of capacitor should not go over the total reactive power load of network

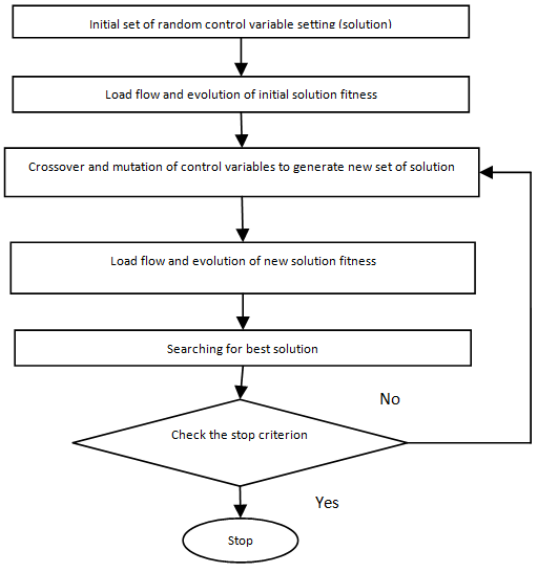
$$\sum_{q \in S_q} Q_q^c \leq 1.0 \times \sum_{q \in S_q} Q_q^L \quad (10)$$

Where V_q^{min} and V_q^{max} are the minimum and maximum value of the voltage at bus q (i.e. 0.95–1.05), respectively I_{pq}^{rated} is the thermal limit of a branch between nodes p and q, $\cos\varphi_q$ is power factor of DG at qth bus.

III. PROPOSED METHODOLOGY

3.1 Genetic algorithm (GA)

In GA algorithm [11], the population has n chromosomes that represent candidate solution; each chromosome is an *m* dimensional real value vector where *m* is the number of optimized parameters.



Flow Chart of GA

Therefore each optimized parameter represents a dimension of the problem space. The Genetic Algorithms can be described in the following steps which also flow chart of GA.

Step 1 (initialization): sets the time counter t = 0 and generates randomly 'n' chromosomes. [$x_j(0)$, j = 1,. . . ,n], where $x_j(0) = [x_j,1(0), x_j,2(0), . . . ,j_am(0)]$. x_j, k(0), will generate in searching gap $[X_k^{min}, X_k^{min}]$ randomly .

Step 2 (fitness): evaluating each chromosome in the initial population using the objective function J and will search for the best value of the objective function J_{best}. This step will to finish sets the chromosome proportionally to the J_{best} as the best.

Step 3 (time updating): updates the point in time counter t = t + 1.

Step 4 (new population): create a new population by repeat the following steps until the new population is completed:

- Selection: selecting parent chromosomes from a population according to their suitability.
- Crossover: by means of a crossover probability, crossing over the parents to produce a new child.
- Mutation: by means of a mutation probability, process mutates new child at each chromosome.
- Acceptance: situate new child in a new population.

Step 5 (replacement): Using of the fresh generates population for a further run of algorithm.

Step 6: If one of the stopping criteria was detected, the operation will stop, otherwise going back to step 2

3.2 Particle Swarm Optimization (PSO)

Particle Swarm Optimization (PSO) was first introduced by Kennedy and Eberhart as an optimization method for continuous nonlinear functions. It is a stochastic optimization technique based on individual improvement, social cooperation and competition in the population. PSO is inspired of the behaviors of social models like bird flocking or fish schooling. Since its introduction, PSO become an important tool for the optimization problems [34].

PSO technique finds the global best solution by simply adjusting the trajectory of each individual toward its own best location and toward the best particle of the entire swarm at each time step (iteration) [27]. The PSO method is becoming very popular due to its simplicity of implementation and ability to quickly converge to a reasonably good solution. In the PSO algorithm, the trajectory of each individual in the search space is adjusted by

dynamically altering the velocity of each particle, according to its own flying experience of the other particles in the search space.

The position vector and velocity vector of the i^{th} particle in the d-dimensional search space can be represented as X_i $[x_{i1}, x_{i2}, x_{i3}...x_{id}]$ and $V_i = [v_{i1}, v_{i2}, v_{id}]$ respectively. According to a user define fitness function, say the best position of each particle (which corresponds to the best fitness value obtain by that particle at iteration k) is $P_i = [p_{i1}, p_{i2}, ... , p_{id}]$, and the fitness particle found so far at iteration k is $P_g = [p_{g1}, p_{g2}, p_{g3}, ... p_{gd}]$, than the new velocities and the position of the particle for the next fitness evaluation are calculated using the following two equations.

Therefore each optimized parameter represents a dimension of the problem space. The Particle Swarm Optimization can be described in the following steps which also shown in Fig. 2.

Step – 1 Initialization

Initially the particle is defined as a vector which contains the randomly selected Distributed generation location (the bus number at which a statcom is placed) and its size as shown below.

Particle: [λ,η], λ: is the Distributed generation but location number, η: is the DG size in MW

Step – 2 Calculation of fitness function

The controlled optimization problem is changed into unconstrained optimization problem using penalty factor as given below.

Fitness function = Objective function J + Penalty factor (F(x) = J + PF)

The fitness function used in PSO algorithms consists of two terms: J the original fitness function and the penalty factor PF corresponding to the constrain violation.

Step -3 searching of the local and global best solutions.

On the basis of fitness function the local and global best solution are identified.

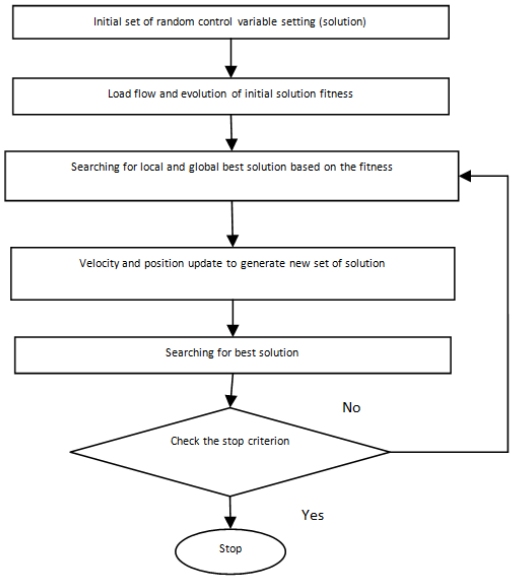
Step – 4 updating of the velocity and position

New velocity and position for every particle is calculated using (1) and (2).

Step – 5 Repeat step (2) to (4) until certain termination (stopping) condition is met.

Step – 6 Stop the optimized solution is obtained

Thus the optimal location and size of DG is evaluated using PSO algorithms implemented through step 1 to 6.



Flow Chart of PSO

IV. SIMULATION RESULTS AND DISCUSSION

The algorithm given above is implemented in the MATLAB. To demonstrate the effectiveness of the proposed algorithm, the following cases are considered for the test system:

Case 1: Only the capacitor is placed at the optimal location.

Case 2: Only the DG operating at unity power factor (upf) is placed at the optimal location.

Case 3: Combined DG operating at upf and the capacitor are placed at their optimal location.

Case 4: Combined DG operating at 0.9 power factor lag and the capacitor are placed at their optimal location.

Case 5: Combined DG operating at the pf equal to total feeder load pf and the capacitor were placed at the optimal location.

4.1 12 – Bus Distribution Network

The proposed algorithm is tested on 12-bus radial distribution networks. The Gauss-Seidel load flow method is used to find voltage magnitude and phase angle at various buses, line flow and line losses. The type of DG model considered in this study is a controllable synchronous generator based which delivers both real and reactive power at fixed power factor mode [14].The 12-bus network is an 11kV radial distribution system (RDS) consisting of 11 branches with total feeder load of 435kW and 405kVAR. The line and load data are given in [30]. The combined load power factor of this system is 0.75 lag.

Genetic algorithm and Particle swarm optimization algorithms have been applied for finding the optimal location of DG and shunt capacitor for the 5 cases as discussed below.

Case 1: Only the capacitor is placed at the optimal location. In this case the maximum capacity of capacitor is taken equal to total MVAR loading of the network, i.e. $0.405 \approx 0.4\text{MVAR}$.

Case 2: Only DG operating at unity power factor is placed at the optimal location In this case the maximum capacity of the DG is taken equal to 50% of the total MW loading of the network, i.e. $0.5 \times 0.435 \approx 0.25\text{MW}$.

Case 3: Combined DG operating at upf and capacitor were placed at their optimal locations. In this case the maximum capacity of DG and capacitor are selected same as in Case 1 & 2 i.e. 0.25MW and 0.4 MVAR respectively and are simultaneously considered for placement.

Case 4: Combined DG operating at 0.9 pf and the capacitor were placed at their optimal location. In this case the maximum DG capacity is selected equal to 50% of the total MVA loading of the network at 0.9 pf. So, the maximum DG capacity is 0.3MW and 0.15 MVAR (with capacitor value set to zero, i.e. $Q_c = 0$), respectively.

Case 5: Combined DG operating at power factor selected equal to the total feeder load power factor and the capacitor were placed at their optimal location. In this case the maximum DG capacity is selected equal to 50% of the total MVA loading of the network at 0.75 pf lag. So, the maximum DG capacity is 0.25MW and 0.2 MVAR (with capacitor value set to zero).

The results obtained for these five cases using GA and PSO toolboxes of MATLAB are shown and compared with reported results in Table 1. As can be observed from Table 1, the results obtained using GA and PSO are almost the same and better than those obtained using analytical method. The convergence characteristics as obtained using GA toolbox for the 5 cases are shown in Fig.1-5 and using PSO toolbox in Fig. 6-10 respectively.

Table 1- 12 BUS RDS Using GA, PSO and Analytical Approach

Device	Genetic Algorithm (GA)				Particle Swarm Optimization (PSO)				Analytical approach [1]		
	Size MW/MVAR	P_{loss} (kW)	VD	Lowest Voltage (p.u.)	Size MW/MVAR	P_{loss} (kW)	VD	Lowest Voltage (p.u.)	P_{loss} (kW)	Size MW/MVAR	Lowest Voltage (p.u.)
QC Only	0.210298(b9)	12.5842	0.313766	0.956298 (b12)	0.210223(b9)	12.5842	0.313795	0.956294(b12)	134.3	0.16 (b12)	0.95596(b11)
DG Only	0.235504(b9)	10.7744	0.143276	0.983531 (b7)	0.235472(b9)	10.7744	0.143310	0.983529(b7)	109.2	0.2 (b12)	0.98032(b8)
DG & QC Both	0.232224(b9) 0.212299(b9)	3.1520	0.060396	0.990805 (b7)	0.232434(b9) 0.212087(b9)	3.1520	0.060257	0.990815(b7)	71.93	0.12(b12) 0.24(b12)	0.9815(b8)
DG 0.9 pf	0.272535 0.131998 (b9)	4.49288	0.052760	0.991213 (b6)	0.2725 0.1320 (b9)	4.5000	0.05281	0.991213(b12)	57.41	0.2 0.1 (b12)	0.9847(b7)
DG 0.75 pf	0.226722 0.199939 (b9)	3.18572	0.071185	0.989928 (b7)	0.226792 0.200000 (b9)	3.1850	0.711089	0.98990 (b12)	47.56	0.2 0.16 (b12)	0.9867(b7)

Fig 1 Convergence Characteristic of GA for QC only

Fig 2 Convergence Characteristic of GA for DG only

Fig 3.Convergence Characteristic of GA for DG and QC both

Fig 4.Convergence Characteristic of GA for DG at 0.9 pf

Fig 5.Convergence Characteristic of GA for DG at 0.75 pf

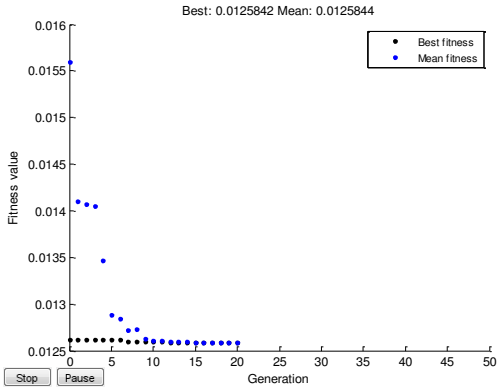


Fig 1

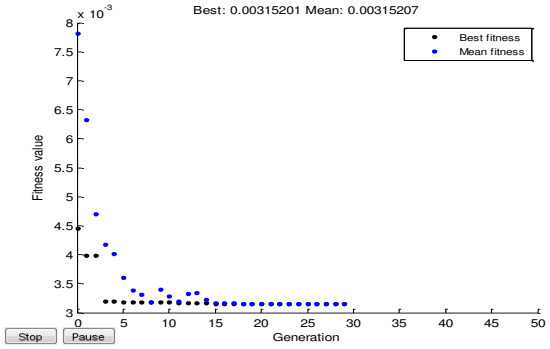


Fig 2

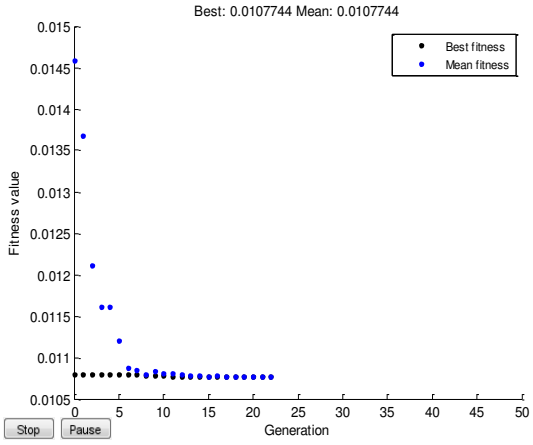


Fig 3

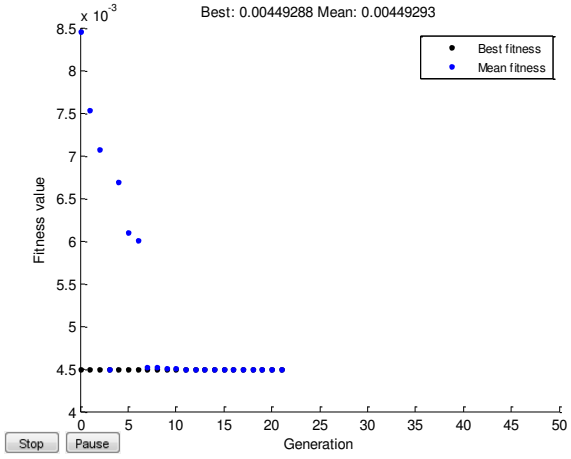
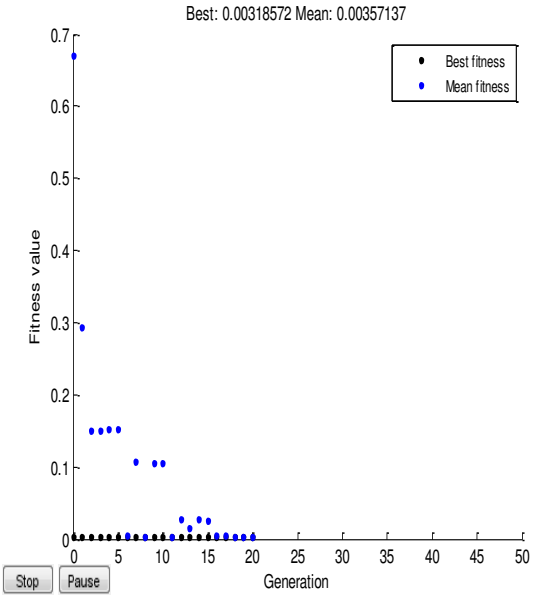


Fig 4



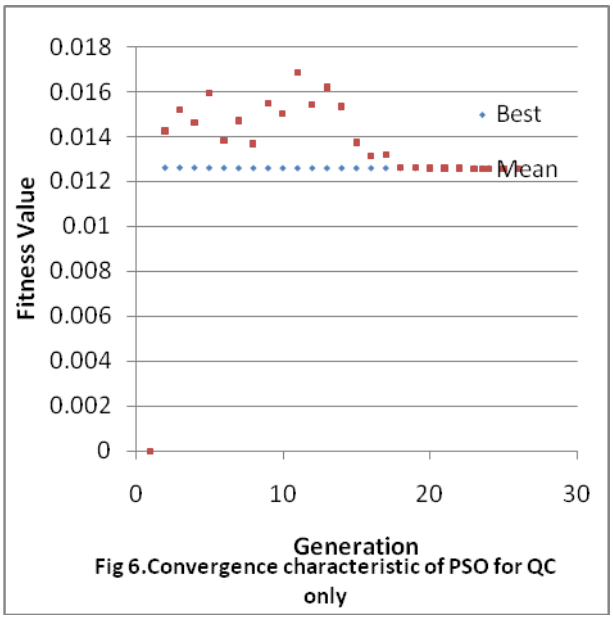
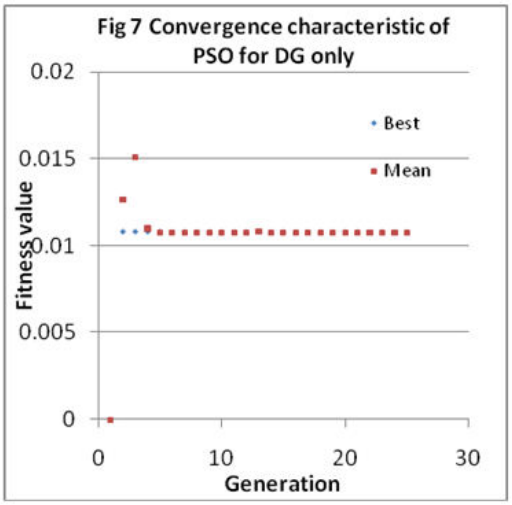
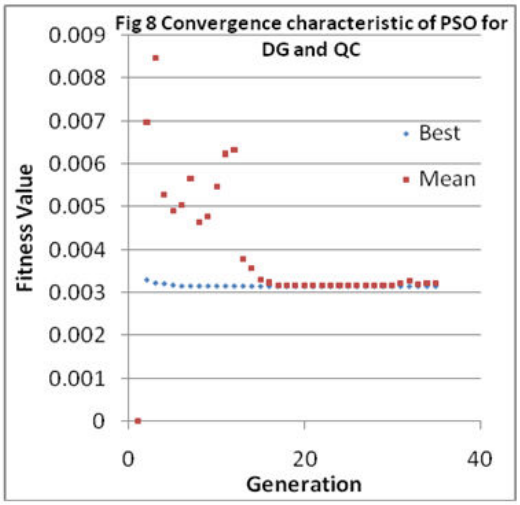
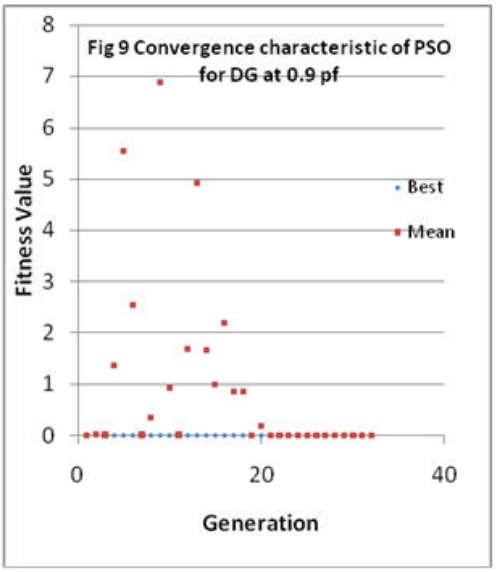


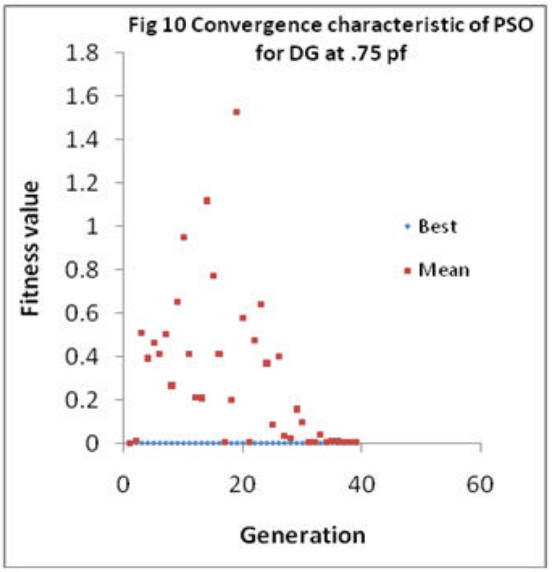
Fig 6.Convergence characteristic of PSO for QC only

Fig 5









The voltage profile for 12-bus RDS for the 5 cases considered above is depicted in Fig. 11 and also in Table 2. It can be seen from the figure and Table that improvement in the voltage profile by optimal placement of DG

operating at 0.9 pf lagging (case 4) is somewhat superior to combined DG operating at upf and capacitor (Case3).

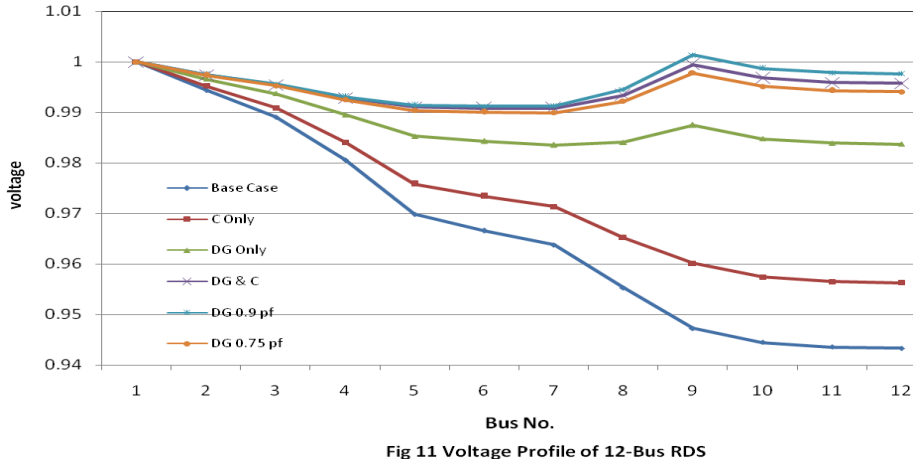


Fig 11 Voltage Profile of 12-Bus RDS

Table 2 Voltage Profile of 12 - RDS

Bus No.	Base Case	QC Only	DG Only	DG & QC Both	DG 0.9 pf	DG 0.75 pf
1	1.00000	1	1	1	1	1
2	0.99433	0.995207	0.996566	0.997416	0.997461	0.997315
3	0.98903	0.990849	0.993687	0.995449	0.995545	0.99524
4	0.98058	0.984056	0.989528	0.992884	0.993077	0.992484
5	0.96982	0.975808	0.985311	0.99105	0.991399	0.99036
6	0.96654	0.973374	0.984265	0.990808	0.991213	0.99002
7	0.96375	0.971367	0.983531	0.990805	0.991264	0.989928
8	0.95531	0.965215	0.984052	0.993385	0.994495	0.992182
9	0.94728	0.960168	0.987452	0.999424	1.001335	0.997802
10	0.94446	0.95739	0.984752	0.996761	0.998673	0.995129
11	0.94356	0.956504	0.98389	0.995911	0.997823	0.994277
12	0.94335	0.956298	0.98369	0.995713	0.997626	0.994079

V. CONCLUSIONS

This paper presented GA and PSO based techniques for optimal placement and sizing of combined DG and capacitor in the distribution system. It can be concluded that allocation of capacitor alone can improve the voltage but may not reduce the loss as expected. On the other hand, allocation of DG can reduce the power losses and also improves the system voltage profile. If the DG, with both real and reactive power generation capability is combined with the capacitor and is optimally allocated, can result in substantial reduction in real power loss of the distribution network and also improves the voltage profile along the feeder. In comparison to the conventional planning methods, the application of combined DG unit and capacitor can largely reduce the

investment besides improving supply quality and reliability. The GA and PSO both algorithms provided the same results and better results obtained using analytical approach.

VI. ACKNOWLEDGEMENT

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DENIAL OF SERVICE (DOS) ATTACKS

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ABSTRACT

Wireless Local Area Network (WLAN) have become very popular in almost all organizations and universities. WPA, WPA2, WEP, etc. are some of the examples of these Our WLAN's are not protected from DoS attacks although it has many of these features. Interconnected systems, such as Webservers, database-servers, cloud-computing servers, etc. are under threats of network attackers.[1] Serious impact on computer system is caused by DoS attacks. Wireless solutions are quite important n various organizations, universities and many other places as there are no issues related to wired structured.[2] In wireless networks DoS attacks is of quite importance in present years. Demonstration show that Dos Attacks can be easily launched in MAC layer. The MAC addresses of wireless network devices is forged in most of the cases by the attackers to halt the operation of the wireless network. Such types of attack are easily available for attackers by many tools. Degradation of the network quality and loss of availability of the network within the organization is resulted by such attacks.[1] DDoS attack is a form of DoS attack in which attacker try to use the IP address of the legitimate user. It is an active category of attack among the two type of attack. The main aim of the attacker is to utilize all the resources so that user cannot use them. Large number of computers access is gained by them to set up attack armies (known as botnets) by exploiting their vulnerabilities. A large scale attack can be launched by these created army against the system. Several strategies could be used by the attacker to achieve this goal. The important and common among them is flooding the network with bogus requests. As multiple computer is used the attack is distributed to launch DoS attacks.[3] This paper reviews various denial of service attacks and there prevention/detection solutions. Paper shows how DoS attacks are created, some methods to prevent them and its types. We also identify the issues with existing countermeasure and provide future research directions.

Keyword: DoS Attack, Wireless Network, IEEE 802.11 Network

I. INTRODUCTİON

DENIAL-OF-SERVICE (DoS) attacks are one type of aggressive and menacing intrusive behaviour to online servers. Availability of a victim can be degraded by DoS attacks, which could be a host, a router, or network. By exploiting its system vulnerability or flooding it with huge amount of useless packets they impose intensive computation tasks to the victim. System or victim can be affected for few minutes to several days. Serious damages can be caused to the victim by this.[2] Therefore, for the online services DoS attacks should be taken care of. The main focus is on the development of network-based detection mechanisms.[4]

Wireless networks are preferred over wired networks due to their cost effectiveness and ease of use. New dimensions have been opened up because of Technological innovation in wireless networking. Denial of service is an attack which denies authorized user access to the service provider. Reports show that DoS attack is serious and expensive attack. DoS attack target different layers of OSI model:[6]

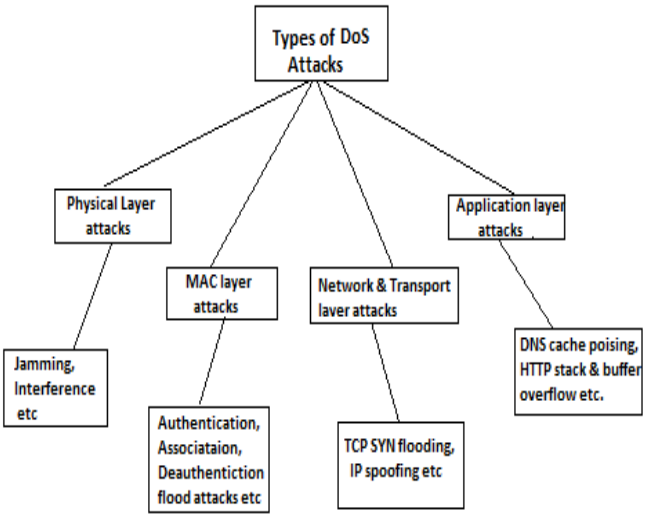
- **Physical layer**: by accidentally cutting a communication cable to take down network services.

- **Data link layer**: to disable the ability of hosts to access the local network.
- **Network layer**: by sending a large amount of IP data to a network.
- **Transport layer**: many TCP connection requests are sent to a host
- **Application layer**: by sending large amount of legitimate requests to an application.

DoS attacks at various layers are shown in the Table below.

Layers	Attacks
Routing	Blackhole, Wormhole, Greyhole, Jellyfish,Byzantine, Sybil, flooding
MAC	Unfairness, Selfish MAC, flooding
Physical	Jamming, Scrambling

The various kind of Dos attacks are ARP Poisoning, MAC Spoofing, Web Spoofing, ICMP Flooding, CPU and Memory attacks, Window Multiplication, Airwaves Jamming, Disassociation attack, Distributed Denial of Service (DDoS) attack, De-authentication message attack etc.[5]



1.1 Denial of Service (DoS) Attack

A Denial of Service (DoS) attack aims to stop the service provided by a target. There are two forms to launch it. To exploit software vulnerabilities of a target would be the first form by sending malformed packets and crash the system.[4] The second form creates useless traffic so as to use the resources available to the legitimate users. First form of attack can be easily protected but the second form of attack is not that easy to protect. As the target are connected to public internet they are easily attacked. [7]

A DoS attack is a malicious attempt by a single person or a group of people to disrupt an online service. DoS attacks can be created against a web server and networks.

1.2 Types of DoS Attack

TCP Syn Flood Attack

UDP flood attack

Ping of death attack

Teardrop attack

1.3 Distributed Denial of Service (DDoS) Attacks

In the distributed form of DoS attacks (called DDoS), the attacker first takes control of a large number of vulnerable hosts on the internet, and then uses them to simultaneously send a huge flood of packets to the victim, exhausting all of its resources. There are huge amount of system that are connected to the public internet and they do not have the security protection and so they could be easily affected by the attack and large amount of loss can be carried out.[8]

1.4 Types of DDoS Attack

IP Spoofed Attack

Distributed Reflector Attacks

Forged Source Attack[8]

II. PHYSICAL LAYER

Communications between wireless devices and launching of simple DoS attacks by scrambling and jamming against the wireless networks can be easily observed due to the shared nature of the wireless medium. In the Physical layers, such attacks through conventional security mechanisms cannot be addressed. Continues transmit in a wireless channel and disregard of the medium access protocol could be carried out by the attacker. When attackers carry out such task users are not allowed to use the legitimate MAC operations . [9]

WiMAX security is implemented in the security sub-layer above the physical layer. Due to this security layer is not secured and several attacks like jamming, scrambling or water torture attack can target the user or the system itself. As mobility is supported by WiMAX these attacks could be easily created as they do not stay at a single place due to this.[10]

2.1 Jamming Attacks

Jamming can be defined as an attack achieved by introducing a source of noise strong enough to significantly reduce the capacity of the channel. Jamming can be intentional or unintentional. As information and equipment are easily obtained, jamming attack can be performed easily.

As per Michel Barbeau, jamming attack can be prevented by increasing the power of signals or by increasing the bandwidth of signals using spreading techniques such as frequency spread spectrum (FHSS) or direct sequence spread spectrum (DSS).[10]

The conclusively detect the presence of a jammer of signal strength and carrier sensing time are unable. Packet delivery can be used to differentiate between jamming and congestion but cannot be used to decide the poor utility due to jamming or congestion. There are two protocols by which we can find that jamming occurred or not. One scheme employs signal strength measurements as a reactive consistency check for poor packet delivery ratios, and the other employs location information to serve as the consistency check.[9]

2.2 Scrambling Attacks

Scrambling is a kind of jamming attack that is provoked for a short intervals of time, targeted for a specific WiMAX frames and the parts of the frames that are at physical frame. Attackers in order to affect the normal operation of the network can scramble control or management information selectively. In order to retransmit the slots of data traffic block belonging to the targeted SSs, they can be scrambled selectively. Jamming attacks are more easier to perform than the scrambling attacks as the need, by the attacker, to interpret control information

and to send noise during specific intervals. Scrambling is difficult than jamming as it s only for a short time. By monitoring the performance we can introduce the Scrambling attacks.[10]

III. MAC LAYER

Protocol layer attacks take place on media access layer.Wireless networks are particularly vulnerable to MAC level attacks due to the use a shared medium. Using a spoofed source MAC address of an access point an attacker can transmit the packets. The recipient, doesn't know that they are spoofed or not and thus handle the request.[11] Two main MAC layer are follow:

- Authentication/Association flood attack.
- Deauthentication/Disassociation flood attacks.

3.1 Authentication (Association) Flood Attack

- An attacker uses spoofed source MAC addresses during the authentication/association flood attack, that tries to authenticate and associate to target access point. Resources have been used up by the attacker by making continues false request and thus wasting the memory.

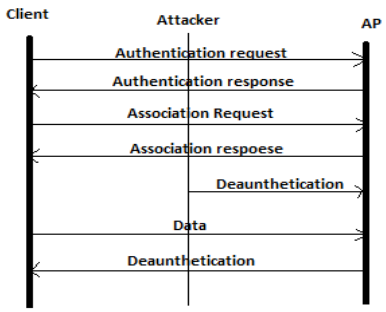
3.2 De-Authentication (Disassociation) flood Attacks

- These are also known as Identity Vulnerabilities. During de-authentication Client first authenticate itself to AP as shown in figure, one part of the authentication framework is a message that allows clients and access points to explicitly request DE authentication from one another. Encryption is not done in the message. So either by pretending to be client or the access point message can be spoofed by the attacker. Disassociation frames are used when client have multiple access point. 802.11 Since a client can be authenticated from multiple access points in order to decide which access point can be used on behalf of client's access point. Like DE authentication de-association frames can be sending by the attacker[12].

3.3 Techniques Used for the Detection of DoS Attacks Are

MAC address spoof detection:

- Spoofing can be detected using sequence number field, whose value is incremented by one for each non-fragmented frame. If the sequence number on the wireless card can't be changed the attacker can not create an attack. Through the analysis of the sequence number pattern of the captured wireless traffic, detection systems were shown to be capable of detecting MAC address spoofing to identify de-authentication/de-association attacks.[13]



Protection through Cryptography

- The new extension will be able to provide protection to some of theDoS attacks created in this layer but not to all of them [13]. The cryptographic solution can work against different types of attacks but especially public key cryptography is expensive and can easily be a DoS target for itself. For not creating anymore attacks the new protocol has its own importance.

Maintaining MAC address Table:

Access point maintains a table consisting of the MAC address of the legitimate users. When any user send a management frame then the MAC address of the sender is search in the AP's table if it matches then the frame will be proceed otherwise AP will drop that management frame. But it is not that important as the attacker can easily spoof the address of the user. So this technique alone is not that useful but can be used if combined with other type of techniques. Poor scalability of the AP is the another problem. Difficulty comes to add every MAC address in the table and to maintain that table for any enterprises. It also can be impractical if any user of wireless network enterprise is dynamic and moving one AP to another[14].

IV. NETWORK LAYER

DoS attacks in network layer can be carried out in wireless as well as wired network. Any client associated with the wireless network is vulnerable to the DoS attack. DoS attack in network layer can be created by sending a huge amount of data. The wireless network infrastructure can be targeted of the victim by these type of attack. ICMP flood is the good example of this attack[15].ICMP flooding is carried out by sending the large amount of ICMP echo-request to the server and using the resources. The attacker can use whole of the resource by spoofing the address of the source and sending the false request. If the attacker makes use of thousands of systems to perform this attack, the target wireless system may be brought down. The attack will quickly consume all available bandwidth, resulting in legitimate users being unable to access wireless services.

DoS attacks in the network layer mainly focus on exploiting routing and forwarding protocols in wireless networks. Ad hoc and sensor network can be easily affected by these attacks. Network layer DoS attacks are different from all other types carried out in the internet. DoS attacks in network layer in wireless system can be easily created as routers support the backhand of the system for such attacks . In addition, DoS defence techniques in the Internet that demand the cooperation of routers are no longer valid.

4.1 Routing Attacks and Defences

Researchers have shown that attackers can manipulate ad hoc network routing protocols to break valid routes and connections. For example, the user is not able to access the destination if the attacker changes the ip address of the destination without the knowledge of the user and so user can't send the packets to the original destination. Thus to avoid the DoS attacks the security of the protocols used for routing is of quite importance. In order to prevent attackers from exploiting the security flaws in routing protocols, several secure routing protocols have been proposed to protect the routing messages and thus prevent DoS attacks. For example, Hu *et al.* (2002) proposed to use TESLA, which is a symmetric broadcast authentication protocol, in routing discovery to secure routing protocols. A route request sent by the source is checked against its own TESLA to prevent attackers from forging or modifying the request.

4.2 Forwarding Attacks and Defences

Similar to routing attacks, attackers can also exploit forwarding behaviour. Typical attacking approaches include injecting junk packets, dropping packets, and disorder packets in legitimate packets. Attackers can use spoofed packets to disguise their attacking behaviour, or find partners to deceive defenders. In order to not permit the access to the service the aim is to utilize the bandwidth or to exhaust it by false request. Hop-by-hop source authentication is needed to prevent attackers from spoofing and flooding packets in wireless networks so that every node participates in the protection of the network. Ye *et al.* (2004) proposed a statistic filtering scheme that allows en route nodes to filter out false data packets with some probability. This approach will not filter packets that do not carry keys that the en route nodes have, but will discard them at the destination. Zhu *et al.* (2004) proposed an interleaved hop-by-hop authentication scheme that guarantees that false data packets will be detected and dropped within a certain number of hops, although the scheme does not tolerate the change of routers. There is another hop-by-hop source authentication approach with a higher overhead to ensure that a packet can be verified when a route is changed due to unreliability in wireless networks. In this approach, the new route that emerges from the old route takes the responsibility to authenticate the packet. The routing nodes in the new route can then verify the packets based on the new authentication information.

Various DoS attacks at Network Layer can be listed as:

4.3 Wormhole attack

In this attack, the attacker sends the packet received from one place to another place by tunnelling them so that none of them could be lost[16]. This type of process of tunnelling is referred to as Wormhole Attack. It can be established either in wired network between the two end users or in the wireless network where user are connected with no wired structure. As there is an broadcast of packets of radio channel the attacker can also create an attack for the packets that are actually not meant for itself. Though no harm is done if the wormhole is used properly for efficient relaying of packets, it puts the attacker in a powerful position compared to other nodes in the network, which the attacker could use in a manner that could compromise the security of the network. Most of the existing route protocols seems to fail if no extra care is taken for the attacks created by the wormhole and thus special care should be taken of that.

4.4 Blackhole Attack

In this attack, a malicious node falsely advertises good paths (*e.g.*, shortest path or most stable path) to the destination node during the path-finding process (in on-demand routing protocols) or in the route update messages (in table-driven routing protocols). The main intension of these type of attacks is to hinder the path or to convey the false path so that all the data can be exposed to the attacker and the resources are no more available.

4.5 Byzantine Attack

In this type of attacks the attacker writes such an algorithm or the attack in such a way that there quest or the packet of data loops in that is it goes inside an infinite loop[17]. Its very difficult to detect the Byzantine. When the network is being attacked by such attacks it seems to be normal even though its been attacked y such type of attacks and continues its normal operation.

4.6 Information Disclosure

Here the private information of the user may be disclosed by the attacker by establishing such type of attacks. Network topology, geographic location of nodes, or optimal routes to authorized nodes in the network, etc. type of information may be disclosed by such attacks.

4.7 Resource Consumption Attack

In this type of attack the node in the network tries to utilize all of the resources of the other node present in the network. Battery power, bandwidth, and computational power type of resources which are available in limited quantity are targeted in ad hoc wireless networks. The attacks can be in the form of unnecessary requests of the routes, beacon packets that are generated frequently, stale packets that are forwarded to nodes. Sleep deprivation attack is an attack in which a node remains always busy using the battery power of another node by pumping packets of that node.

4.8 Routing Attacks

There are large number of attacks whose basic aim is to interrupt the network and use the resource (i.e. the bandwidth of the network). Various types of attacks that fall into these category are mentioned below.

Routing Table Overflow: The advisory nodes present in the network advertise in these type of attack to the non-advisory node or the authorized nodes present in the network about the attacks. By such types of attacks the routing tables are being overflowed which is the main aim of attack, so no new node can be added up as there is no space for the entry of new node. These attacks affect more to the proactive protocols as compared to the routing based protocols.

Routing Table Poisoning: In these types of attacks the attacker node either changes the original packets sent to the other nodes or they sent the false request to the other nodes present in the network. The results of these would be the congestion in part of the network, may lead to suboptimal routing or can make part of the network not work properly.

Packet replication: Here the attacker node replicates the original packets. The result of these would be the consumption of the bandwidth, consumption of the power and the destination node might also be confused among such large amount of replicated packets.

Route cache poisoning: In these type of attacks every nodes keep the track and information of the other node across which this node have came in the past and maintains a table of it. Now the attacker node can attack these cache tables and can affect the whole network.

Rushing attack: On-demand routing protocols that use duplicate suppression during the route discovery process are vulnerable to this attack [19]. An adversary node which receives a*RouteRequest* packet from the source node floods the packet quickly among the whole network before the reaction of the other node that receive the same request. Nodes that receive original request assumes it to be the duplicate or replicated and thus ignores the original one over that sent by the attacker node. Among all the possible path between the source and the destination there would be an intermediate node present in between. Thus all the paths between the source and the destination are not secure as the attacker node is always present. Because of these such attacks are very difficult to be detected usually in wireless network.

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AN OVERVIEW ON POWER LINE COMMUNICATION BASED ON OFDM WITH DIFFERENT AFFECTING FACTORS

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ABSTRACT

In this paper we discuss the Power line communication, digital communication and Power line communication channel. Channel model and coupling schemes are also discussed in this paper. There are different effects occurs during the transmission of information through PLC, like signal attenuation, signal noise, signal distortion. Power line noise is known to affect the performance of broadband power-line communications significantly.There are several noise in PLC at medium and low voltage can be found, such as- colored background noise, periodic synchronous impulsive noise caused by switching operation of power supplies, periodic impulsive noise mainly caused by the devices, and asynchronous impulsive noise. Performance of High Voltage Power Line is also disturbed by corona noise and impulse noise. Coupling is required to separate Power and information signals, because of power signal is at high voltage range and communication signal is at low voltage.

Keywords: Power line Communication, Receiver and Transmitter,Orthogonal Frequency Division Multiplexing (OFDM), Noises and Attenuation, Coupling Schemes.

I. INTRODUCTION

Nowadays power line communications has become an important subject of research work. PLC appears to be a promising alternative to conventional technologies such as digital subscriber line (DSL) particularly in rural or underdeveloped areas where the conventional telephone line is still not available to a large population at the global level. PLC is an attractive alternative choice for traditional networks due to its ability to offer broadband internet facility, television cable, telephone service and home automation. The demand for multimedia communications provides a good prospect for PLC as a better transmission technique. However power line communication transmission is affected from many problems such as interference, several noise, delays in attenuation, presence of echoes, frequency selective fading due to multipath etc [1]. So it is necessary to employ a suitable modulation scheme such as orthogonal frequency division multiplexing (OFDM) to counter its unwanted effects on signal transmission. This OFDM is a spectrally efficient multicarrier modulation technique for high speed data transmission over multipath fading channels. It distributes data over a large number of sub-carriers spaced apart at precise frequencies, such that they are orthogonal to each other.

Recently, there has been a growing interest towards the possibility of exploiting existing power lines as effective transmission means. Both Low-voltage (LV) and medium voltage (MV) power line/, below 1 kV and from 1 - 36 kV, respectively, are advantageous because they a potentially convenient and inexpensive communication

medium for control signaling and data communication. High-voltage (HV) power lines are, operating at or above 64 kV and can also be used for communication purposes.

Power utilities will thus be able to market a basic Internet connection service at a flat-rate monthly subscription, like some cable operators/providers.By providing both electricity consumers to access the Internet through their existing electrical lines and domestic cables, this technology possesses potential mass-market scale, without having to invest cabling.

II. POWER LINE COMMUNICATION SYSTEM

The power-line communications (PLC) has been applied as a data transfer method in both public electricity distribution networks and indoor distribution networks. Profile of these applications has been different. Devices that are developed for domestic use are mainly designed for the purpose of controlling electric devices at home. For example, the current and most common functions are: street light control system, fire alarm and heating control system. The systems and devices used by distribution companies are mainly meant for automatic meter reading (AMR) and energy consumption monitoring and load management applications. During the last years the conception of providing broadband Internet access through a low voltage distribution network has best discussion. The characteristics of power-line channels and the applicability of different digital modulation techniques have been widely researched. Due to technical and regular problems, the idea that providing Internet services through the distribution network was at least partly buried. Despite of this drawback, the power-line channel is still an appropriate channel for to control devices and transfer data that do not require a wide bandwidth or critical data transfer. An example for this kind of application is data transfer related to the condition monitoring of industrial low voltage electric motors.The power line communication given below in Figure 1. Shows transmitter, Receiver part and power line channel.

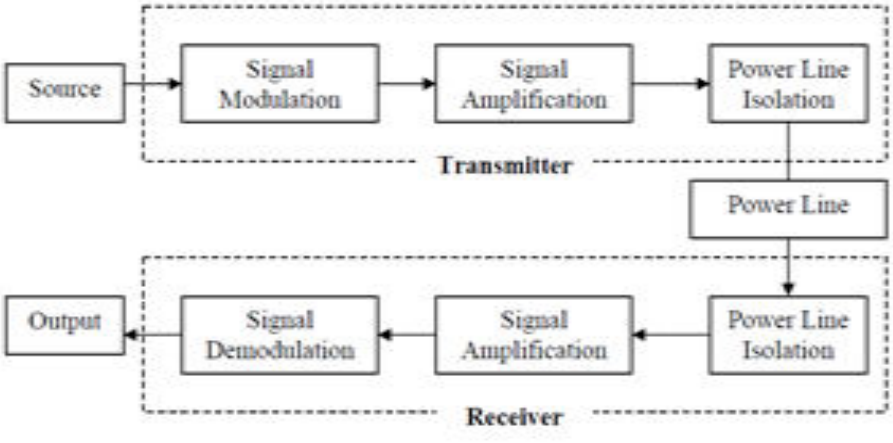

Figure 1. Power Line Communication System

Generally, a distribution network may be considered to be an unfavorable environment for communications. Power-lines are designed for the distribution of the electrical power. They are ideal for the distribution of high voltages at low frequencies. The data transmission generally uses high frequencies at low voltages, respectively. The power-line channel has a varying impedance, high attenuation and considerable noise. These properties easily cause small data transfer rates or big error percentages. For data transmission over any medium, it is necessary to determine the characteristics of the communications channel. When considering a communications channel, the interesting parameters are:

• Input impedance
• Signal attenuation
• Phase distortion
• Noise content

In the beginning of this chapter, the research carried out for public and domestic low voltage distribution networks is discussed. Next, the typical components belonging to industrial distribution networks are analyzed, measured and modelled with respect to power-line communications at the frequencies up to 30 MHz.

III. OFDM MODEL

Orthogonal Frequency Division Multiplexing (OFDM) is nothing but a specialized FDM technique [2]. In OFDM, all the carrier signals are orthogonal to each other, that means inter-carrier guard bands are not required and cross-talk between the sub-channels is eliminated. OFDM can be combined with multiple access using time and frequency or coding separation of the consumer. In the OFDMA, frequency-division multiple access is achieved by assigning different OFDM sub-channels for different users.

Let$\{s_{n,k}\}^{N-1}$with $E|s_{n,k}|^2 = \sigma^2$ be the complex symbols to be transmitted at the nth OF DM block, then the OF DM- modulated signal can be represented by

$$s_n(t) = \sum_{k=0}^{N-1} s_{n,k} e^{j2\pi k \Delta f t}, \qquad 0 \le t \le T_s$$

……[1]

Where T_S,Δf, and N are the symbol duration, the sub channel space, and the number of sub channels ofOFDMsignals,respectively.ForthereceivertodemodulatetheOFDMsignal,the symbol duration should be long enough such that $Ts\Delta f = 1$,which is also called the orthogonal condition since it makes$e-j2\pi k\Delta ft$ orthogonal to each other for different k. With the or thogonal condition, the transmitted symbols sn,k can be detected at the receiver

$$s_{n,k} = \frac{1}{T_s} \int_0^{T_s} s_n(t) e^{-j2\pi k \Delta f t} dt$$

……[2]

If there is no channel distortion.The sampled version of the baseband OFDM signal $s(t)$ can be expressed as

$$s_n\left(m\frac{T_s}{N}\right) = \sum_{k=0}^{N-1} s_{n,k} e^{j2\pi k \Delta f m \frac{T_s}{N}} = \sum_{k=0}^{N-1} s_{n,k} e^{j\frac{2\pi mk}{N}}$$

……[3]

Which is actually the inverse discrete Fourier transform (IDFT) of the transmitted symbols $\{sn,k\}N-1$ k=0 and can efficiently be calculated by fast Fourier transform (FFT). It can easily be seenthat demodulation at the receiver can be performed using DFT instead of the integral in (2).

IV. ATTENUATION AND NOISES IN PLC

4.1 Signal Attenuation

The conductors and insulation materials of signaling and power cables are not ideal. Part of the power that the transmitter injects into the cable does not reach the receiver. The loss mechanisms are:

• Resistive losses of the conductors
• Dielectric losses of the insulation

• Radiation losses

• Coupling losses

The main loss mechanisms of low voltage power cables at signal frequencies used in power-line communications are the dielectric losses, resistive losses and coupling losses. The radiation losses are significant if the separation of the conductors is an appreciable fraction of the wavelength. With the cables researched and in the frequency band 100 kHz – 30 MHz this condition is not fulfilled. Transmission line discontinuities such as- mechanical connections, changes in cable type or load appliances, to joint cause coupling losses. The coupling losses depends on the topology of the distribution network, the signal frequency, characteristics of cabling and characteristics of devices connected to the distribution network. The resistive losses of the conductor are caused by the finite conductivity of conductors in PLC. At the high frequency, the current is forced to flow on the surface of the conductor due to the skin effect. The resistive losses increase as a function of frequency with relation of $r \sim f$.

Dielectric losses occur in the insulation material. The polarized molecules inside the insulation material turn synchronized to the frequency of the electric field. The friction between the molecules causes power losses at each time when the electric field changes polarity positive to negative and negative to positive. The resistivity of insulation material is finite. Existence of leakage currents in the insulation material causes also losses. The losses of the insulation material are expressed by the term loss tangent or dissipation factor tanδ:

$$\tan\delta = \frac{\varepsilon_i'' + \frac{\sigma_i}{\omega \varepsilon_0}}{\varepsilon_i'},$$

where εi' is the real part and the ε_i" is the imaginary part of the relative complex permittivity of the insulation material and σ_i is the conductivity of the insulation material.

4.2 Signal Noise

Besides signal attenuation and phase distortion, noise is an important factor that influences on the success of digital communications over a power-line channel. The power-line channel does not represent an Additive White Gaussian noise (AWGN) environment like many other communication channels [6]. Instead, it can be regarded as a fading multipathchannel with quasi-stationary frequency response. The frequency response of the channel varies as a function of time. But, it can generally be considered to be constant during a transmitted symbol. Power-line noises can be classified into five categories[6]:

(a). Colored background noise: This noise has a relatively low power spectral density, which is frequency variant. The noise is caused by numerous weak noise sources. Power spectral density of this type of noise varies in terms of minutes or may be in hours.

(b). Narrow band noise: This noise consists of sinusoidal signals with modulated amplitudes. The sources of the noise are broadcast stations and the noise level varies within the daytime.

(c). Periodic impulsive noise that is asynchronous to the mains frequency: The impulses have a repetition rate generally from 50 kHz to 200 kHz. The noise is mostly caused by switching power supplies.

(d). Periodic noise that is synchronous to the mains frequency: The impulses have a repetition rate of 50 Hz or 100 Hz and are synchronous to the mains cycle of the signal. The duration of impulses is short, generally in the order of microseconds. This noise is caused by power supplies that operate synchronously with the mains cycle [3].

(e). Asynchronous impulsive noise: The noise is caused by switching transients in the distribution network. The impulses have a duration from some microseconds up to a few milliseconds. The power spectral density of this type of noise can have levels of more than50 dB above the background noise.

In order to develop modulation techniques, power-line communication systems and network planning and simulation tools, channel models are required. The channel models proposed for power-lines are mostly based on the multipath propagation of a signal [6]. These models assume that due to imperfect terminations the impulse injected from the transmitter into the channel reaches the receiver propagating directly and indirectly from the source to the destination. The main signal is followed by a number of echoes.

In other words, the multipath nature of the channel spreads energy send by the transmitter in the time-space. The presented models generally require the measurement of the transfer function or impulse response of the channel. They are formed by taking into account the most significant reflections and their amplitudes from the impulse response of the channel. The multipath channels and their characteristics are discussed in [7].

V. COUPLING IN PLC

Power transmission line operates at high voltage whereas communication equipment functions at volt to millivolts. It is therefore necessary to protect the communication equipment from high voltage transmission line. These equipment's are coupled to the transmission line through coupling capacitor or capacitive voltage transformer (CVT) [5].In order that the communication signal is transmitted in the desired direction, a wave trap is connected towards the substation bus side.There are two schemes for coupling the equipment to the transmission line:

5.1 Phase to Ground Coupling

In phase to ground coupling as shown in figure 2, communication equipment's are connected only with single conductor. Thus earth is used for the returning path. Here only ground mode is used for propagation of communication signal from transmitter to receiver. Phase to ground coupling is economical and easy in design [5]. But, reliability of such system is poor especially during transmission and emergency hour.

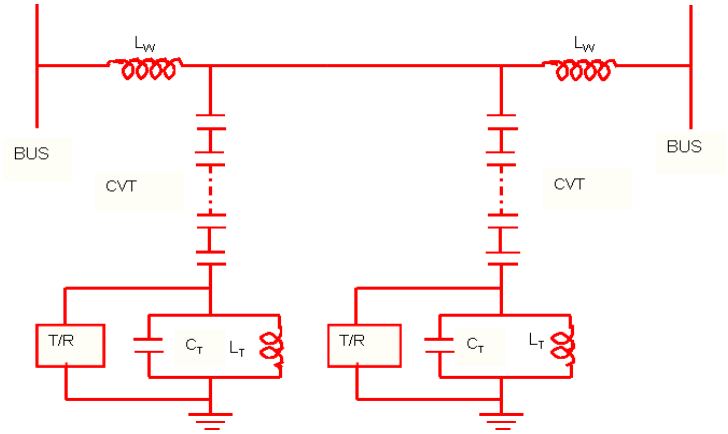

Figure2. Phase to Ground Coupling

5.1 Phase to Phase Coupling

In phase to phase coupling, the conductors of the two phases are used for coupling the communication equipment's as shown in figure 3. In this coupling, Signals are fed to transmission lines in differential mode and

outer conductors of the phases are generally used for enhancing the reliability though the coupling equipment in the scheme is doubled. Thus, the cost of such coupling scheme is higher to phase to ground coupling.

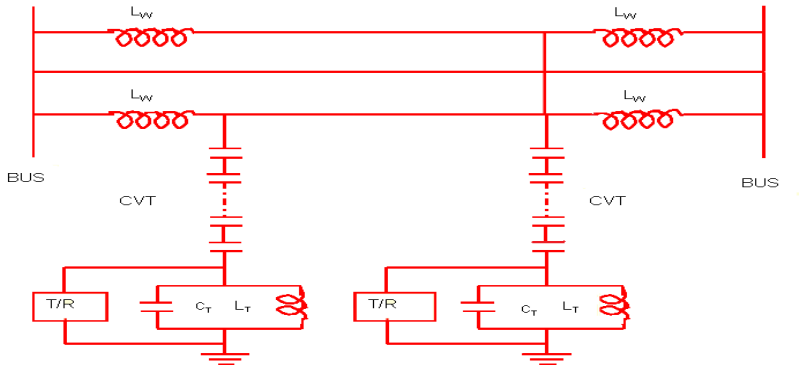

Figure3 Phase to Phase Coupling

VI. CONCLUSION

Power line communication can be considered as an attractive alternative to traditional networks as it offers broadband internet access, telephone service and cable television. However, in addition to AWGN, corona noise is found to be a major interfering noise in HV PLC in OFDM [8]. Here, the performance of OFDM can be affected by corona noise with the variation of the branch lengths in the multipath and different weather condition, and other noises such as colored background noise, asynchronous impulsive noise, and synchronous impulsive noise also affecting the Low Voltage PLC [9]. Here Coupling schemes are used to prevent the electronic devices with high voltage Power Line.

VII. ACKNOWLEDGEMENT

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ENHANCED QOS SUPPORT IN MMDSR THROUGH HEMM IN IEEE 802.11E NETWORKS

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ABSTRACT

IEEE 802.11e introduced traffic and service differentiation at the MAC layer to achieve QoS in delivering multimedia streams, by putting flow deadlines. Enhanced Distributed channel Access (EDCA) and HCF Controlled Channel Access (HCCF) are two MAC functions in IEEE 802.11e to support QoS in multimedia transactions. MMDSR and its various versions uses EDCA as proper access mechanism in mobile ad-hoc networks because of no centralized access point. EDCA based on prioritization of traffic which leads to a selfish action problem. Pooling scheme seems better but pure HCCA also cannot be a good solution as previous research proved that it has good real time performance and QoS support with CBR traffic only. In VBR traffic, resource utilization is not optimal with pure HCCA. In this paper, we are proposing a concept to combined MMDSR with HCCA-EDCA mixed mode (HEMM) scheduler, instead of pure EDCA to achieve optimal resource utilization with multimedia traffic like video conferencing, video streaming etc. HEMM mode is efficient for medium utilization in IEEE 802.11e so performance of MMDSR can be improved.

Keywords: EDCA, HCCA, HEMM, QoS, CBR, VBR, IEEE 802.11e, MMDSR

I. INTRODUCTION

Now a day's uses of mobile ad-hoc networks are increasing due to the increasing interest of residential and office customers in ubiquitous services. Mobile ad-hoc networks are performing very well because of high configuration mobile devices; this drives users towards an emerging set of applications with Quality of Service (QoS) requirements, such as phone or video conference, video streaming etc. Moreover users are more interested in multimedia transactions like video conferencing, video streaming, multimedia file sharing etc. Mobile ad-hoc network is a self oriented network without any infrastructure. This becomes main advantage of mobile ad-hoc network. Now a day's natural disaster are growing day by day, in affected areas mobile ad-hoc network can work to give technological support to that place.

Nodes in mobile ad-hoc networks are mobile and dependent on battery to stay connected with network. Mobile node in ad-hoc network may be any mobile device with wireless connectivity, like pocket PC, mobile phone, personal digital assistant, laptop etc. Mobile ad-hoc network is a restricted environment but more useful.

In order to support applications which are having specific QoS requirements, IEEE recently published an amendment to the IEEE 802.11 standard, namely IEEE 802.11e [12], which adds the Hybrid Coordination Function (HCF). The latter specifies two access mechanisms: Enhanced Distributed Channel Access (EDCA), which is based on a distributed control and enables prioritized channel access, and HCF Controlled Channel Access (HCCA), which on the other hand requires centralized scheduling, and allows the applications to negotiate

parameterized service guarantees in the context of Traffic Streams (TSs). The Hybrid Coordinator (HC) provides scheduling for both the QoS Access Point (QAP) and QoS Stations (QSTAs), by dispensing transmission opportunities (TXOPs) of variable size to both downlink and uplink TSs. Downlink TXOPs are granted for transmission to QoS Stations (QSTAs) from the QAP. Uplink TXOPs consist of data messages transmitted by QSTAs in response to individual polling messages sent from the QAP to TSs. Although the IEEE 802.11e standard does not specify a mandatory scheduling algorithm, it mandates TSs to be provided with a minimum reserved rate, under controlled channel conditions.

Providing an efficient schedule of both CBR and VBR traffic simultaneously is a daunting task. While CBR traffic has a regular arrival pattern, VBR traffic rate varies greatly, with a peak rate which is often much larger than the average rate. Therefore, unlike CBR, VBR traffic cannot be served efficiently when TSs are provided with a fixed service rate. In fact, if a VBR TS is guaranteed a minimum rate equal to its average rate, large bursts are likely to experience high, unfeasible delays. On the other hand, reserving the peak rate would entail a substantial wastage of the reserved capacity. Several HCCA scheduling algorithms have been proposed in the literature (see for example [6] [16] [13] [5] [17] [15]). Some of these (e.g., [17] [15]) are explicitly tailored to CBR traffic, and perform poorly with VBR traffic [18]. Others, instead, (e.g., [6] [16] [13] [5]) try to dynamically adjust the TXOP duration to react to variations in the arrival pattern. These algorithms, although more efficient, often exhibit a large computational complexity.

In this paper, we proposed to combined MMDSR with a simple mixed mode of HCCA-EDCA function, which can be definitely improvement over pure EDCA in MMDSR, that can enhance the performance of MMDSR for both CBR and VBR traffic simultaneously.

II. RELATED RESEARCH

Recently, many researchers have focused their efforts on providing mechanisms to improve the MAC (Medium Access Control) level to make configuration parameters evolve dynamically depending on events of the Ad Hoc network. Some proposals modify the MAC parameters to provide dynamic service differentiation based on access categories that modify the contention window sizes used in the back-off algorithm [8,9,11]. The proposal [18] dynamically adjusts the backoff interval according to the priority and collision rate to arrange a fair scheduling mechanism to access the medium. Proposal [4] has the same goal although based on modifying the waiting times of the stations to access the medium, resulting in a fair and efficient scheme. A dynamic TXOP (Transmission Opportunity) allocation in IEEE 802.11e is proposed in [10] to enhance the QoS experienced in the network. Similarly, in [5] the TXOP value dynamically changes depending on the number of packets remaining to be sent in the buffers. A sensing backoff algorithm is presented in [1], where every node modifies its backoff interval according to the results of the sensed channel activities. Very few works has been considered the possibility to integrate the service provided by HCCA with the resource available for EDCA. The IEEE 802.11e standard describes a further access policy, the HCCA-EDCA Mixed Mode (HEMM), where both these function are used. HEMM is not well documented and avery few studies [14,8,18] enhancement of paper have analyzed the QoS provisioning of the whole HCCA-EDCA system. In [14] a model of the channel utilization is presented, considering both HCCA and EDCA modes. It shows that incrementing the portion of HCCA increases the medium utilization of large WLAN in saturation conditions and the determinism in the channel control. Instead large EDCA networks are affected by growing collisions that degrade their performance. In [8]

the efficient resource control for elastic traffic over EDCA and HCCA functions is analyzed using an economic model. In [18] the Adaptively Tuned HCF (AT-HCF) algorithm is introduced.

III. IEEE 802.11E MAC PROTOCOL

The IEEE 802.11e standard [2] describes those enhancements to the MAC services and functions of the IEEE 802.11 standard [12] aimed at enabling Quality of Service provisioning. The IEEE 802.11 specifies two access functions, respectively Distributed Coordination Function (DCF) and Point Coordination Function (PCF). In IEEE 802.11e, two additional access mechanisms are defined: the Enhanced Distributed Channel Access (EDCA) and the HCF Controlled Channel Access (HCCA), both in the context of the Hybrid Coordination Function (HCF).

Enhanced Distributed Channel Access (EDCA): The first mode of channel access is EDCA, which is a parameterized version of the previous distributed channel access mechanism of 802.11b. To provide prioritized QoS, 802.11e enhances the original DCF by classifying traffic through the introduction of access categories (ACs). Each AC has its own transmission queue and its own set of channel access parameters. The prioritization in channel access through EDCA is shown in Fig. 1. The differentiation in priority between each AC is realized by setting different values for the channel access parameters.

The following are the most important additional parameters:

• Arbitrary interframe space number (AIFSN): The minimum time interval for the medium to remain idle before starting backoff.

• Contention window (CWmin and CWmax): A random number is drawn from this interval for the backoff mechanism. • Transmission opportunity (TXOP) limit: The maximum duration for which a node can transmit after obtaining access to the channel.

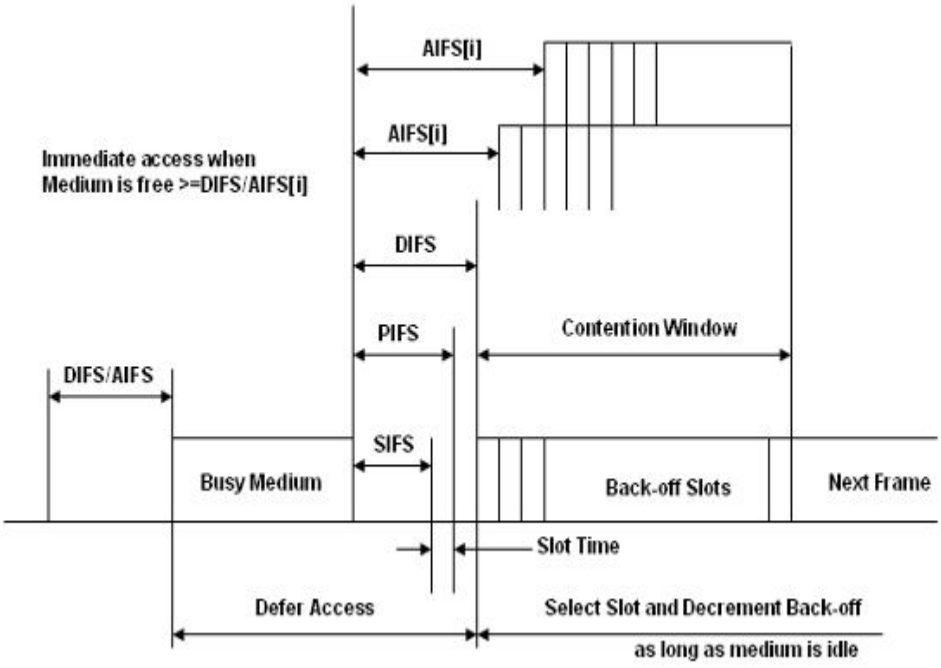

Fig. 1 EDCA Access Prioritization

HCF Controlled Channel Access: HCCA provides a centralized polling scheme to allocate guaranteed channel access to traffic flows based on their QoS requirements. Fig. 2 illustrates the HCCA channel access scheme. In this period, the AP polls nodes for a TXOP duration, which is calculated from reservation requests sent by the nodes. The TXOP is initiated by a poll request from the AP and during this duration, transmissions can occur in both the uplink and downlink directions. The TXOP allows for multiple contention-free transmissions and ends if one of the following conditions occurs: neither the AP nor the node have any packets left to transmit, the channel idle time has exceeded the timeout period, or the TXOP duration has expired.

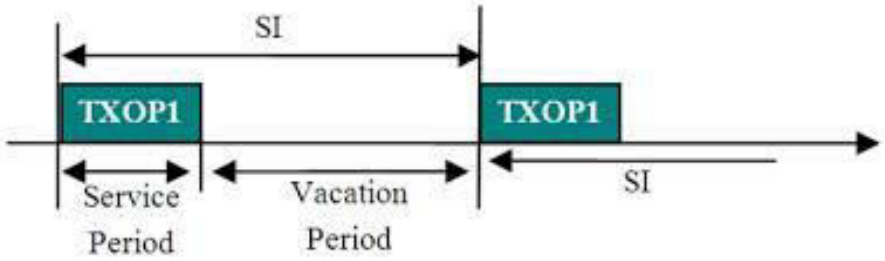

Fig. 2 HCF Controlled Channel Access

IV. MMDSR WITH HEMM

MMDSR (multipath multimedia dynamic source routing), is the algorithm is the extension of DSR, as a routing protocol to find available path in the network. In this scenario the number of path should not exceed more than three paths at a same time, due to excessive overhead increase and small improvement. This routing algorithm is suitable for multimedia transmissions like video streaming.The QoS parameters considered are: minimum expected bandwidth, maximum percentage of data losses, maximum delayand maximum delay jitter. Here, video is distributed using RTP/RTCP (Real Time Protocol/Real Time ControlProtocol) over UDP as transport protocols. One of the most used data types in video-streaming is MPEG-2 hierarchical scalable multi-layer encoded video, which is used in MMDSR. Layered coding allows enhanced layers of several qualities to be transmitted, given that a minimum bandwidth is guaranteed to transmit a base layer. MPEG-2 encoded video is formed by sets of frames, typically somewhere from 4-20 frames each, called GoP (Groups of Pictures). In a GoP there are three types of frames: I, P and B. According to our framework, there are three paths and three type of frame (I, P and B) which a priority defined for each frame. The most important video coded frame (I–frame) send through the best path, while the second important frame (P -frame) send through second best path and then the last frame which is B-frame send through the last path. In case of two paths, I frames would send through the best path and then P and B frame send through the second available path. And if there is only one path available, all the frames should be sending together through the same available path. These video characteristics can be taken into account when planning a QoS aware scheme. For example, different priorities could be assigned to the video frames according to their importance within the video flow. This way, I frames should have the highest priority whereas B frames should have the lowest one. The standard defines two different access mechanisms: the Enhanced Distributed Channel Access (EDCA) and the Hybrid Coordination Function Controlled Channel Access (HCCA). The proper access mechanism used in MMDSR is EDCA that there are four different Access Categories (AC), as depicted in Fig. 3. Each packet from the higher layer arrives at the MAC layer with a specific priority value and it is mapped into an AC. In MMDSR the mapping of the different packets into each one of the four Access Categories of the IEEE 802.11e MAC is defined as follows:

• AC0: high priority packets (signalling + I frames)

• AC1: medium priority packets (P frames)

• AC2: normal priority packets (B frames)

• AC3: low priority packets (best effort)

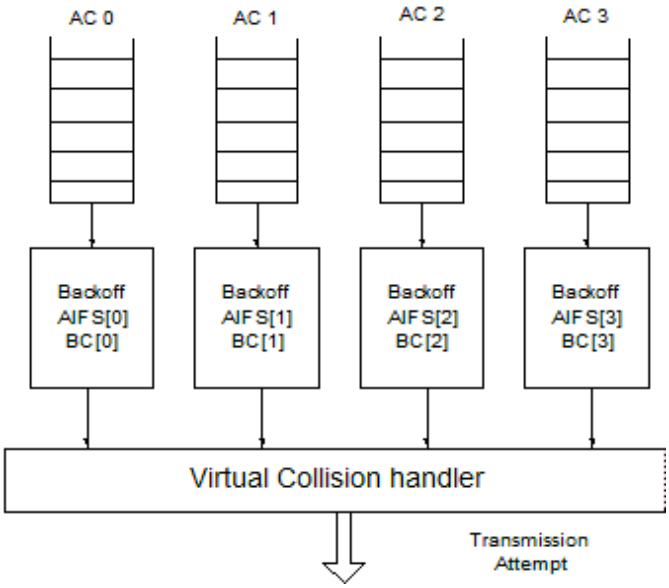

Fig. 3 IEEE 802.11e MAC Protocol's ACs

We first observe that the channel alternates between successful and unsuccessful states. Successful states are due to either HCCA or EDCA, while unsuccessful states are either collisions or idle events. In EDCA, collision is a big problem whereas in HCCA less resource utilization is a problem. To overcome both the problem we can have arrangement of HCCA-EDCA scheduler [19] at each node. According to HCCA-EDCA scheduler TSs are first served by HCCA but when at the end of CAP phase if HCCA still have some data to transmit, it moves the TSs from HCCA queue to EDCA queue by assigning them highest priority EDCA access category. Hence, the traffic that exceeds the assigned HCCA TXOP (the HCCA transmission time threshold) will not be served with parameterized QoS but will be served with prioritized QoS. The detailed description of HCCA-EDCA algorithm:

1. When the CAP phase ends, HC transfers the control of the medium to the HCCA-EDCA mechanism;
2. It checks if the HCCA is empty: in that case it leaves the control to the EDCA function;
3. Otherwise, it moves the data message of HCCA queue to the EDCA function; and
4. If the EDCA period is not yet finished, it starts over from the point 2.

HCCA-EDCA scheduler is a local node scheduler which collaborates with the MAC reference scheduling algorithm or with any alternative one. The centralized scheduler located in the QAP continues to manage the QSTAs that request to send and performs admission control, which remains unchanged. It then computes the scheduling parameters and creates the polling list, and finally it polls the admitted QSTAs. Instead HCCA-EDCA, located in each QSTA, takes action only if the transmitting QSTA does not deliver all enqueued TSs data messages.

In MMDSR, standard IEEE 802.11e is used which uses EDCA access function. Instead of using EDCA we proposed a concept to combined MMDSR with HCCA-EDCA (HEMM) scheduler on every node to solve both the problem to some extent.

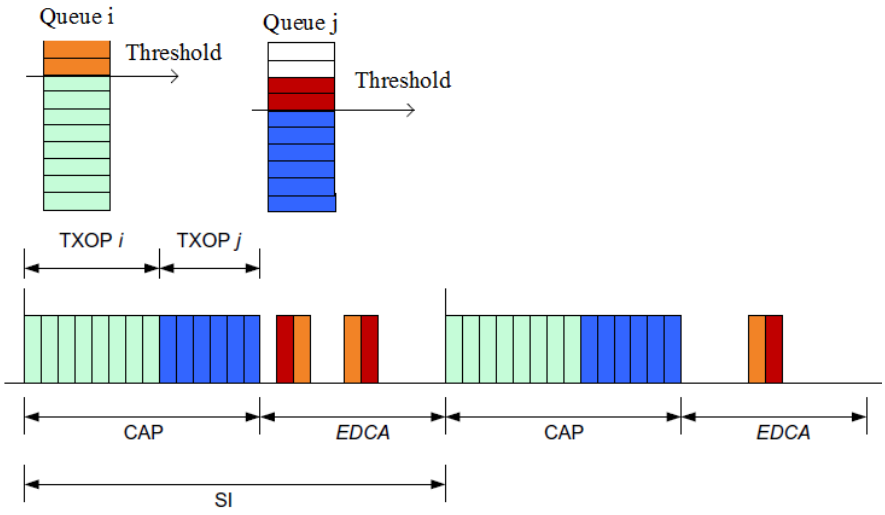

Fig. 4 The HCCA-EDCA Scheduling Mechanism

V. CONCLUSION AND FUTURE WORK

Multimedia transaction is a need of today's environment but QoS support is a need of multimedia transactions in mobile ad-hoc network. MMDSR is multimedia multipath dynamic source routing, it and its all variations uses the MAC IEEE 802.11e, which supports QoS provisioning which is the requirement of services like video streaming or video conferencing. The standard IEEE 802.11e defines two different access mechanisms: EDCA and HCCA. In MMDSR, EDCA is used since no centralized access point is needed in mobile ad-hoc networks but both access mechanisms have their advantages and disadvantages. We are trying to optimize the performance of MMDSR by combining the concept of EDCA-HCCA, which is mixed mode (HEMM) to gain the advantages of both.

In this paper we are suggesting a concept to combine MMDSR with HCCA-EDCA scheduler to improve the performance of MMDSR. Implementation of this concept to show the enhancement in MMDSR is our future work.

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