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Mobile Internet speed Improved by Design Model of Antenna using Location, Particle swarm optimization, Position and Genetic algorithm

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Abstract: Internet speed is important in all fields, including business, education, and industry. Presently, most of the Internet applications are used by mobile phones. Telecommunication of cell Tower provides limited Radiation signal to mobile phone by sideloabs. The sideloabs provides low and medium radiation particle that provides low and medium internet speed. The High Radiation of pattern will be provide height of antenna by Main loab. High radiation pattern of radiation will affect the Human body in Location of ground. So limited radiation will be provide to all location people of mobile phone. The limited radiation pattern only receives by mobile phone it receives low and medium internet speed. Mobile phone is not able to connect optimum internet connection in location of area. The optimum internet speed only get from main loab of cell tower. The Effective Antenna design need for get optimum internet speed from receive main loab of cell tower. The modelling of Effective Antenna Design for improving mobile internet speed using Location, Position, Particle swarm Optimization and Genetic Algorithm in Proposed system of Research.

Keyword: Mobile internet, Location, Position, Particle swarm Optimization and Genetic Algorithm.

Introduction

A mobile network is wireless network route's communications in the form of radio waves to and from users.The input internet signal provides by cell tower in the form of moving particles of radiation pattern transmitting and receiving by main loab and side loab. The side loab provides only low radiation particle that makes low internet speed and main loab provides high radiation particles that provides high speed internet. Mobile network provide data through internet content delivered to mobile devices such as smart phones and tablets over a wireless cellular connection.Cellular communication provides Internet signal is a form of Electromagnetic Radiation to mobile phones. Mobile Wi-Fi is a technology that allows device such as computer, smart phones device to communicate data wirelessly. Wi-Fi network is indicated by its Wi-Fi 802.11 standard used to link computer , Tablets to the Internet. The problem of slower internet speed is due to the less signal strength of mobile towers. For example, the mobile phone is getting very less in some locations. The lower signal strength between −110 and −120 dBm provides poor internet speed in some location. The low signal strength and low internet speed provides by limited radiation pattern The limited low radiation makes low internet speed and low signal strength.[1][2][3][4][5]

A second problem identified in this research is that of a mobile tower internet bandwidth is limited overload from 10,000 users connecting at a time in this area, thus reducing signal strength. The internet bandwidth in the tower supports a limited number of internet connections. The excess number of users sharing limited bandwidth, reducing the signal strength from the mobile Tower.Another problem identified is that, as the distance between the cell tower and the distance increase between mobile device and mobile tower, the radiation power density will be reduced, so the signal strength is also reduced to −100 to −110 dBm at a distance of 4000 m between the cell tower and internet mobile phone. Difficulties related to the patch antenna include low gain, lower impedance bandwidth, low efficiency and low power handling capacity due to conductor and dielectric losses in mobile phones. Mobile

phone Antenna Gain is limited ti receives low signal strength and Low internet speed. The limited Mobile Antenna gain is limited it receives radiation pattern of particle from sideloab 1 and 2 only. so Mobile device receives only side loab of limited internet speed. Mobile phone Antenna Gain is not able to receive and transmit Optimum internet speed. Limited Signal strength makes low Internet speed provide by sideloab of cell Tower. The Sideloab of cell Tower provides limitation of radiation, Signal strength and limitation of Internet speed. Side loab provides low internet speed to mobile users. The optimum solution of Maximum speed is able to get mobile users. Low Mobile Antenna gain makes low internet speed. The Mobile Antenna gain is low that makes low internet speed. The low gain receives low signal strength makes low internet speed.

Literature survey

Literature survey is done from 2014 to 2020 for survey for mobile internet speed, signal strength, Gain of mobile network. Analysis of Literature survey has given finally mobile phone received limited Internet speed, low signal strength, low gain from Cell Tower as shown in Table 1. Literature survey has understood Mobile antenna has limited gain it can be received limited Internet speed and signal strength so it is not able to receive High speed of optimum Internet speed and signal strength.[1][2\[3][4][5]. In Fateme Ghayem al,2014),Helical antenna wasmeasured signal strength -55.03dBm. dipole antenna was measured -60.48dBm.In (Phongphan DAnphitssanuphanal, 2014), Dynamic bandwidth shaping algorithm used in proposed system and internet toimplementedwireless network ieee802.11b/g. Maximum internet speed 9 mbps is used in proposed system. In (OnkarPathak al, 2014) Proposes indoor positioning system using tri-lateration method which uses RSSI data from wi-fi access points to do localization in indoor environment. Maximum signal strength is -40 dBm.In (Elena Simona Lohan al, 2015), Signal strength is measured -70.39 dBm, Gain is 5.85 dB,, Wireless Local Area Networks (WLANs) at frequency 2.4 GHz and 5 GHz frequency. In (Nsikan Nkordeh, 2016), Airtel mobile best signal strength is -70 dBm. In (Cosmas Eko Suharyanto al, 2017), IndoSAT IndoSAT Signal strength is -83 dBm,, Download Internet speed is 23.39 Mbps, Upload speed is 13.39 Mbps. In (Weixing Xue al, 2017), Maximum signal strength-Proposed RSSI Extraction Algorithm Proposed signal strength of RSSI=-15.51 dBm.In (Emeruwa al, 2018), Investigation of Signal Strength minimum-123 dBm, Maximum is -73 dBm, In (Ullah, S al, 2019), Monopole Antenna used,Frequency is 2.27 Ghz, Gain is 4.91dB. In (Ben Bahri, al, 2019), Frequency is 2.2GHz to 2.8GHz, Gain is 7.2 dB.,Multiple input and Multiple output Antenna Gain is 25 dB, MFO (Microstrip Antenna Gain is 7dB, EBG (Electro Magnet Band Gab Antenna Gain is 8 dB, MSPA (Microstrip Patch Antenna Gain is 9 dB.In (Abdul Rahim, D, al, 2020) , Frequency is 2.2GHz to 2.8GHz, Gain is 7.2 dB,Multiple input and Multiple output Antenna Gain is 25 dB, MFO (Microstrip Antenna Gain is 7dB, EBG (Electro Magnet Band Gab Antenna Gain is 8 dB, MSPA (Microstrip Patch Antenna Gain is 9 dB.In (Yong Shi 1,2 al,2020), Maximum signal strength is –80.14 dBm in the proposed fitting. achieves a sign using tracing algorithm as an RSSI filter.In(Mustafa tareq al, 2017), Artificial bee colony algorithm used in proposed system in wireless network.

Bee dynamic routing (beedsr) algorithm support maximum internet speed 0.008192 Mbps. In (Zhenyu na al, 2019), Proposed differential evolution (de) algorithm used maintain internet speed 22 mbps, genetic algorithm 26 mbps and PSO algorithm 30 mbps in cellularnetwork. In (Anshumansingh, 2019), Proposed differential evolution (de) algorithm used maintain internet speed 22 mbps, genetic algorithm 26 mbps and pso algorithm 30 mbps in cellularnetwork.In (Anshumansingh al, 2020), Proposed microstrip patch antenna design is used and gain 8.9 db ,*e*lectromagnetic bandgap antenna gain 8.55 db *a*nd moth–flame optimization algorithm.

Problem Identification of Mobile Internet speed affects by the following problems

- Cell Tower of side loabs provides low radiation pattern to Mobile phone so that mobile phone receive low internet speed.
- Cell Tower of side loabs provides provide low signal strength in ground location , Mobile phone has received very low signal strength in each location of Ground.
- Mobile antenna has limited low gain so it can received low negative gain of radiation from sideloab it makes low low internet speed and signal strength.
- Mobile antenna has received negative gain of radiation that receives low power density of radiation so that van receive limitation of input internet speed , Mobile antenna is not able to receive optimum solution of Internet speed.

Research objectives

To design External antenna for improve signal strength and internet speed in some location has very low radiation , Low signal strength makes low internet signal convert High speed Internet signal. The objectives of Location Algorithm to update low signal strength and Low internet speed of location and need fix External antenna for improve signal strength and internet speed fro low radiation in the location. The mobile antenna gain is limited it receives and transmit limited Internet speed, it is not able to get optimum solution of internet speed. The Antenna gain

need to improve by External Antenna for receive high Signal strength from mainloab of Radiation pattern. The Position Algorithm adjust External antenna angle position. The Effective design model of FMD Antenna (FMD antenna contain FM radio receiver antenna and dish antenna) track low signal strength to middle level signal strength from side loab1 of Cell Tower. The dish antenna angle and the position of length is changed in FM radio receiver antenna using position algorithm. The objective of position algorithm change antenna position to improve signal strength and Internet speed. The objectives of Partical Swarm optimization Algorithm track the particle moves from low radiation pattern to high radiation pattern and particle move towards from location in mobile device to side loabs FMDH Antenna (FM radio receiver Antenna, Dish antenna and Helical Antenna) track low signal strength of radiation pattern to High signal strength of Radiation pattern of main loab to get optimum solution of Internet speed using Location, Position and Partical swarm optimization Algorithm. To design SATFMD Antenna for improving internet speed in no signal from Mobile Tower when this Antenna helps get optimization internet speed. To design of SATFMDH Antenna for improving internet speed to get optimization of Internet speed using Genetic, Particle swarm optimization , position and location Algorithm .The objective of design of SAT FMD and SAT FMDH antenna when no signal from mobile Tower the design of Satellite based antenna track to satellite to mobile Tower to improve internet to get best performance using PSO Algorithm and Genetic Algorithm..

Input internet speed in existing system using location and Particle swarm optimization Algorithm

Electromagnetic radiation of internet signal is electromagnetic waves which oscillations of electric and magnetic fields. Internet signal of electromagnetic waves are created due to periodic charge of electric or magnetic field. Electromagnetic waves travel at the speed of light denoted C. Internet signal of Electromagnetic waves are emitted by the charge of particle acceleration and moved forced of Internet signal. The charge particle in Electromagnetic radiation is associated to propagate of internet signal. The moving charge of magnetic field produced acceleration of Internet of EM waves reach to mobile phone. Magnetic force of internet signal can cause a charged particles to move in circular or sprital path. Cosmic rays are energetic charged particles in outer space which approach the Earth of Location. Internet signal is a particle radiation of energy of fast moving substonic particles. Particle radiation is referred to as a particle beam moving in same direction to location to reach to mobile phone. Particles accelerators can produce particle beams in input of internet signal moving from Mobile cell Tower. The internet speed is depends upon the charge of magnetic field particle. The cell tower antenna Engineering Sideloabs of the far field radiation pattern of Cell Tower antenna distribute input Internet signal.

Cell Tower Antenna distribute Internet signal a pattern of loab at various angles of directions where the radiation pattern particles of Signal strength reaches a maximum at mainloab and minimum at sideloabs. The null radiation and signal strength is zero at near of sideloabs and mainloab. The power density in the sideloabs generally maximum at mainloab and minimum at sideloabs. Generally minimize the power density at sideloabs Level (SLL) which measured decibles . Peak of Mainloab has Radiation pattern has Gain 0 b to +dB , The peak of First loab Radiation pattern has Gain -13 db to -17 dB, Peak of second loab has Gain -17 db to -23 dB. Side loabs that only allows in ground level it creates negative gain of radiation pattern. The main loab desired positive gain of Radiation pattern it maked high internet speed.. The negative gain of sideloab provides low signal strength and low internet speed. The positive gain of radiation will affect human health , so the negative gain of radiation only allows to mobile users in location of ground Level. Figure 1 shows Input internet of low Magnetic field radiation particle provide by side loab of radiation.

Low magnetic field makes low negative gain of radiation it makes low speed internet signal and low signal strength.The positive gain of radiation allows at top level of cell tower antenna by mainloab. The negative gain and negative signal strength of input internet signal provides by sideloabs to mobile users access limited internet speed only .Mobile users access low or medium Internet speed by negative gain and negative signal strength of Radiation pattern by sideloabs. The optimum of maximum Internet speed provides by Positive gain by distribute by mainloab. sideloabs provide low magnetic field (B) of radiation it will not affect human health ,this low magnetic field of particles charge low in Internet signal to make low internet speed. The High magnetic field of particle at top level of cell tower antenna it makes high speed internet speed by mainloab. Mobile phone Antenna gain is limited it receives negative gain of radiation from Sideloab so it receives low internet speed[1][2][3][4][5]. Mobile phone antenna is not able receives positive gain of radiation and positive signal strength it is not able receive optimum Internet speed. The low and limited internet speed only receives by mobile phone Antenna in existing system. Figure 1shows Cell Tower Radiation by main loab and sideloab, the radiation Auxiliary Field(H) and magnetic field (B) by Mobile Antenna.

The magnetic field strength(H) is expressed Auxiliary Field (H) is received by mobile Antenna as shown in Figure 1and Table 1. The power density of radiation of internet signal received by mobile it has low power density it makes low Input internet speed. Figure 2 shows Block diagram for Input Internet signal using Location and Particle swarm Optimization Algorithm.[6]

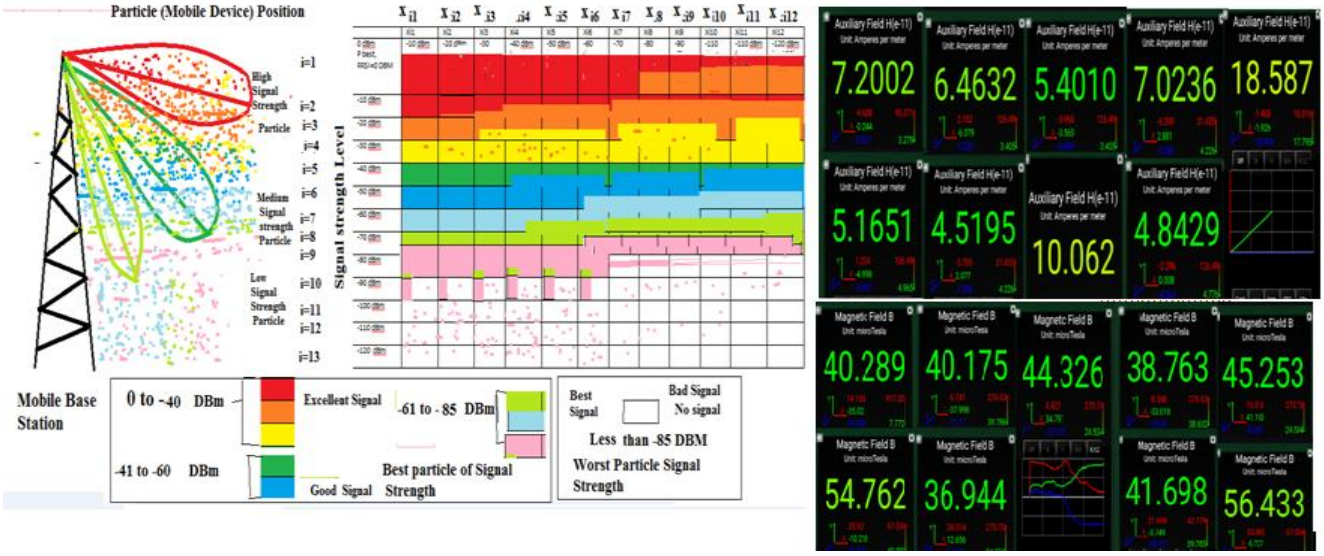


Figure 1 Cell Tower Radiation by main loab and sideloab, the radiation Auxiliary Field(H) and magnetic field (B) by Mobile Antenna.

Table 1. Mobile Node Location and Signal strength , Power density status

Sl.no	Mobile Node Location Particle Position x_i	Signal Strength in dBm (RSSI)	Distance between Mobile Node andCell Tower in meter	Particle of Magnetic field (B) Micro Tesla	Auxiliary Field (H) e^{-11} Amperes Per meter	Particlemake Power density μwatts/ m^2 P_d=377*HB/μ	Received Gain (dB) of Internet signal Radiation. Gain= log(P_d)
1	Longitude: 79.78115100 Latitude: 11.82959700	-101, -106 -106 -106 -110	336 357, 371 362 571	54.762 44.326 41.698 40.289 38.763	10.062 7.0236 6.4632 5.4010 4.8429	1.6530 0.93398 0.8015 0.6528 0.5631	-5.78 -6.02 -6.09 -6.18 -6.24
2.	Longitude: 79.78392100 Latitude: 11.83349600	-103 -106	178 217	45.253 40.175	7.2002 5.665	0.9774 0.6827	-6.00 -6.16
.3	Longitude: 79.7t898600 Latitude: 11.82511200	-110	891	38.763	4.8429	0.5631	-6.24
.4	Longitude: 79.77999900 Latitude: 11.83022800	-96	372	56.433	18.587	3.1467	-5.50

The Table1 shows low gain, Low power density, low signal strength makes low input internet speed the following iterations 1 to 9 as shown in Figures 3 to 4.

The sideloab provides low power density of radiation to mobile.

Radiation Particle makes Power density P_d= E.H watts/m^2

Electric field (E)=377*H (volts per metre)(V/m)

Magnetic field strength or Auxiliary Field (H)= B/μ Ampere per meter

B=Magnetic field (Tesla)

μ= Permeability= $\mu_0 = 4\pi\times10^{-7}$ H/mP_d=377*HB/μ

Particle swarm Optimization and Selected best internet speed

- **Particle swarm optimization** (**PSO** is selected best improve signal strength and Internet speed.
- The Input Internet signal transmission from mobile cell tower to reach to mobile main loab and sideloab of radiating pattern .
- 0 to -10 dBm provide by main loab , First Side loab radiation provides -11 to -20 dBm , -21 dBm to -85 dBm by second loab radiation above -85 dBm by null radiation loab from cell tower.
- Second loab provides low radiation for not affecting human health the particle's signal strength are low that makes minimum or low internet speed.
- The input signal has very low signal strength and low internet speed local best by second loab radiation pattern from mobile Tower.
- The First loab provides medium radiation to mobile that makes medium signal strength and medium internet speed is called Pbest
- The main loab radiation provides maximum optimum solution of internet signal strength and Gbest internet speed.

- Each particle has low signal strength in by second loab the particle move to main load radiation pattern that makes maxium Gbest internet speed by high signa strength by main loab.
- PSO Algorithm helps the low signal strength makes low internet speed by second loab radiation that is called local best internet speed track from second loab to medium signal strength that makes medium internet speed that is called Pbest internet speed.
- The particle track from second loab to main load that improves high signal strength and makes maximum Internet speed that called Gbest internet speed by PSO Algorithm.

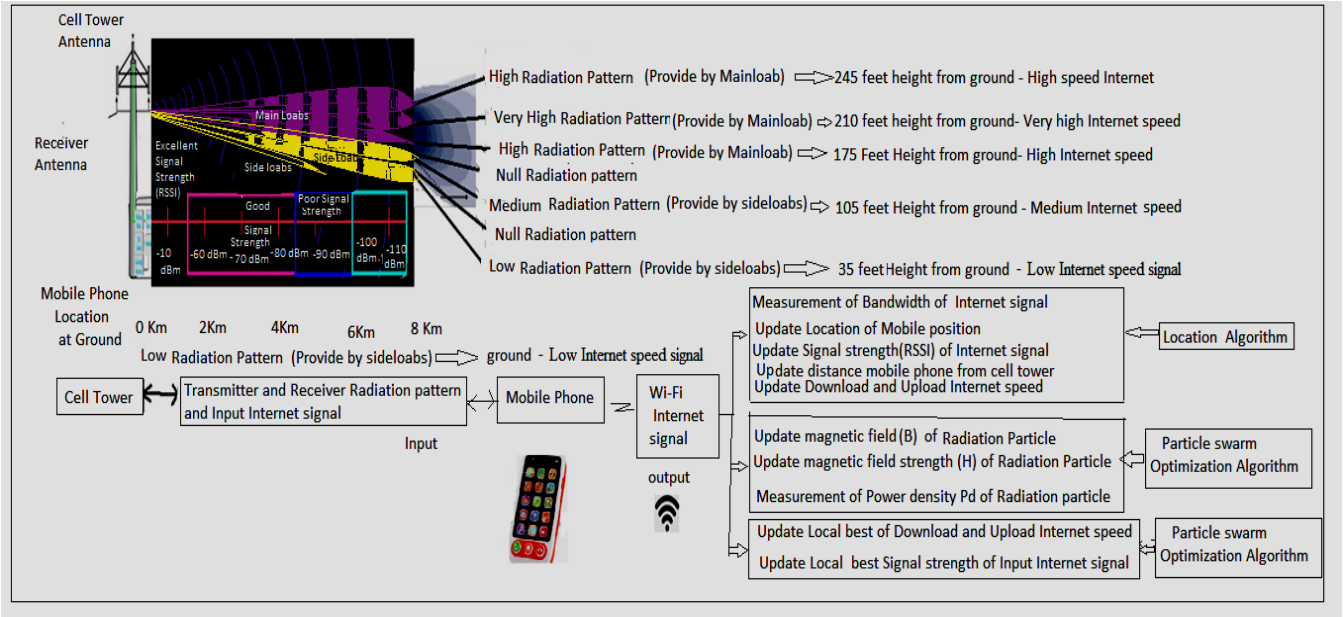


Figure 2 Block diagram for Input Internet signal using Location and Particle swarm Optimization Algorithm

Figure 3 Iteration 1 Input Internet speed and Signal strength using Locationand Mobile signal information.

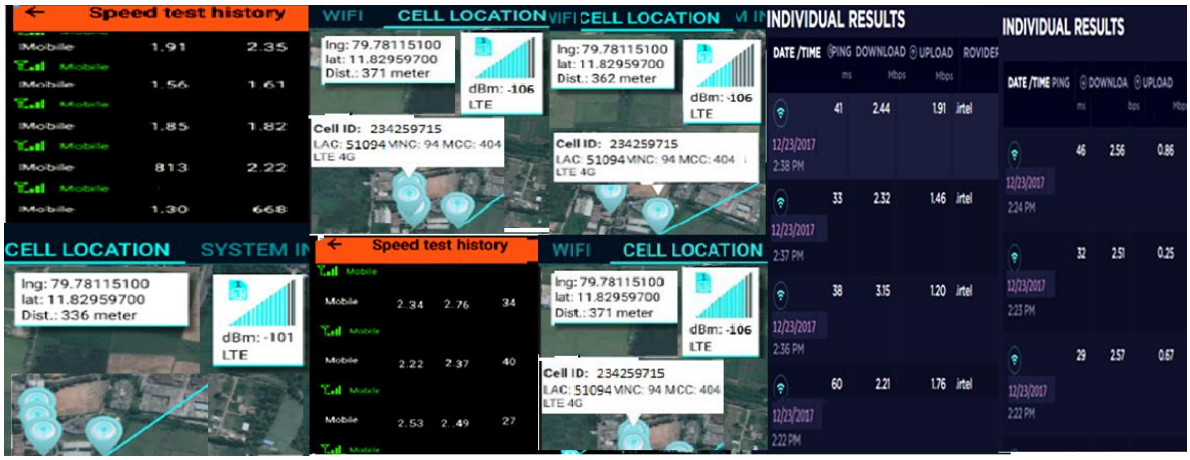


Figure 4 Iteration 2 to 5 Input Internet speed and Signal strength Result using Location.

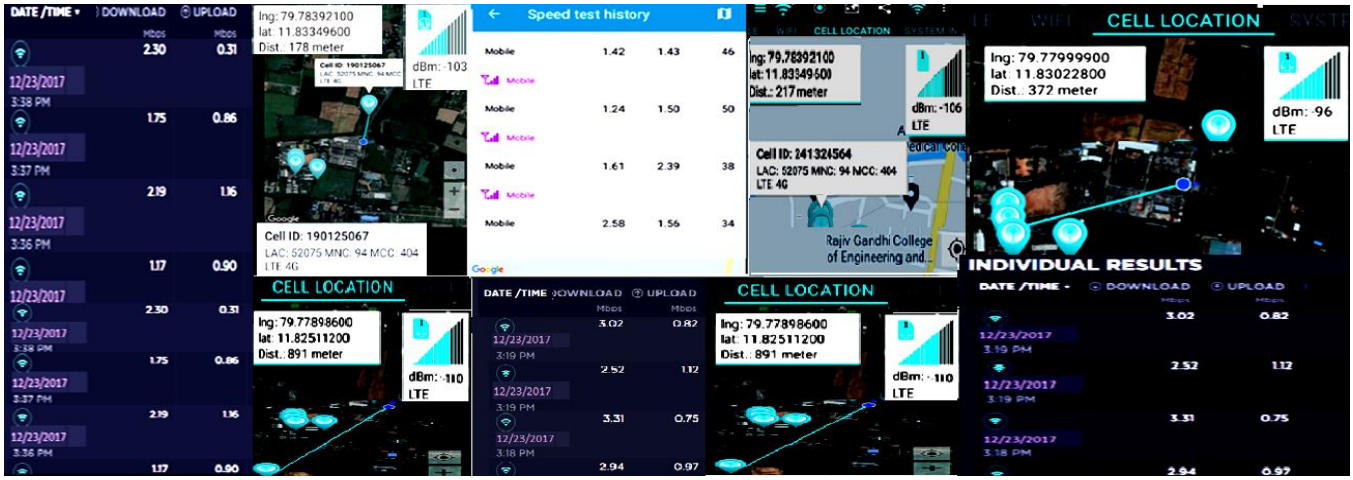


Figure 5 Iteration 6 to 9 Input Internet speed and Signal strength Result using Location.

Select local best input internet speed and signal strength using Location and Particle swarm optimization Algorithm.

Step 1: Initialize Location algorithm, Update Input Internet signal Frequency and Bandwidth and Measure optimum Internet speed.

Step 2: Update base station Cell Tower ID. Update the distance in meter from mobile tower to Cell Tower (d_i)

Step 3:Update Input Internet signal strength ($RSSI_i = RSSI_1 , RSSI_2 , RSSI_3 ….. RSSI_N$) at each location.

Step 4: Update the Location of longitude, latitude of Mobile device $X_i = X_1 , X_2 , X_3 ….. X_N$

Step 5: Update Input Internet speed of Download and Upload speed

Step 6 Change the Mobile Node location and do the iteration at each location of

$X_i = X_1 , X_2 , X_3 ….. X_N$

Step 7: Initialization of PSO Algorithm

Step 8: Update Input Internet speed , Input Upload Internet speed) with respect of Mobile distance from cell Tower of base station at each location (d_i->X_i) $d_i = d_1 , d_2 , d_3 ….. d_N$ at each location.

Step 9: Initialize Particle swarm optimization Algorithm, Update download and upload internet speed for each iteration at each location .

Step 11: Update Local best of Input Local optimum Internet speed and signal strength using Particle swarm optimization Algorithm for each Iteration and each Location.

Step 12: Update minimum Internet speed of Download and Upload internet speed.

The Table 2 shows the local best input internet speed are updated from each iterations at each location. Local best 4G input optimum download internet speed is 8.6 Mbps, Local best input optimum upload internet speed is 2.8 Mbps received by Mobile antenna.

The maximum Limitation of input is internet speed is calculated by following Figure 6.

Frequency 4G internet signal 2.4 GHz.,Low Frequency= 2427 MHz ,High frequency=2447 MHz

B is the bandwidth of Internet signal ,B=High Frequency-Low Frequency=2447-2427=20 MHz

Shannon Capacity Formula

C= Capacity of channel in bits/sec =2B $\log_2$ M ,M is the number of signal level(M=4 for QPSK)

$\log_2 M = \log_2 4 = \log_2 2^2 = 2\log_2 2 = 2$

$C=2(20*10^6)*2$ bits/sec=80 Mbps

Maximum limitation of output 4G Airtel internet speed is 80 Mega bits/sec

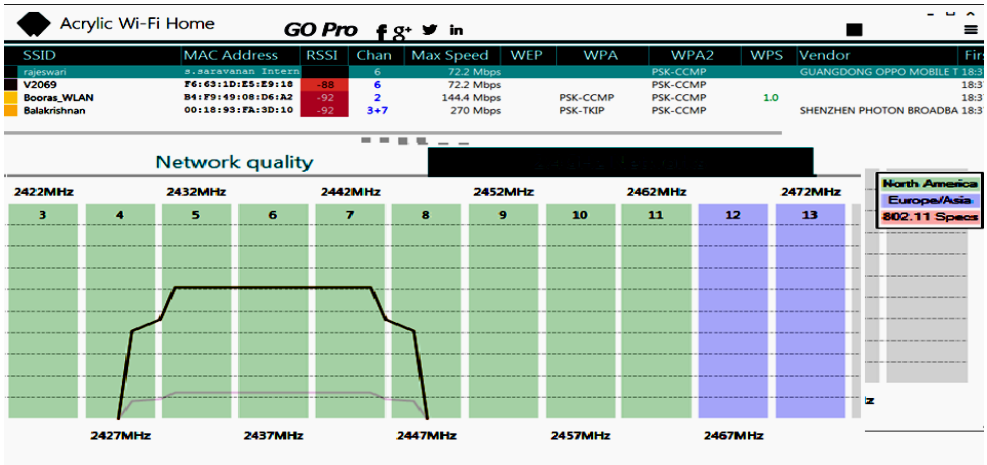


Figure 6. Measurement of Maximum input internet speed from bandwidth

Table 2 Optimum local best input internet speed selection and signal strength result using location and Particle swarm optimization algorithm

Iteration 1 Down Load Input Internet Speed in Mbps	Iteration 1 Upload Load Input Internet Speed in Mbps	Iteration 1 Input Signal strength in dBm (RSSI)	Iteration 2 Down Load Input Internet Speed in Mbps	Iteration 2 Upload Load Input Internet Speed in Mbps	Iteration 2 Input Signal strength in dBm (RSSI)	Iteration 3 Down Load Input Internet Speed in Mbps	Iteration 3 Upload Load Input Internet Speed in Mbps	Iteration 3 Input Signal strength in dBm (RSSI)	Iteration 4 Down Load Input Internet Speed in Mbps	Iteration 4 Upload Load Input Internet Speed in Mbps	Iteration 4 Input Signal strength in dBm (RSSI)	Iteration 5 Down Load Input Internet Speed in Mbps	Iteration 555Upload Load Input Internet Speed in Mbps	Iteration 5 Input Signal strength in dBm (RSSI)
8.6	1.2	-93	1.91	2.35	-106	2.34	2.76	-101	2.44	1.91	-106	2.56	0.86	-110
1.6	2.8	-100	1.56	1.61	-106	2.22	2.37	-101	2.32	1.46	-106	2.51	0.25	-110
4.35	1.85	-106	1.85	1.82	-106	2.53	2.49	-101	3.15	1.20	-106	2.57	0.67	-110
6.51	1.34	-106	0.813	2.22	-106	3.91	2.49	-101	2.21	1.76	-106	2.70	0.56	-110
Distance Between Cell Device and Mobile Tower =357m Location of Mobile Device Longitude: 79.78115100 Latitude: 11.82959700			Distance Between Cell Device and Mobile Tower =371 m Location of Mobile Device Longitude: 79.78115100 Latitude: 11.82959700			Distance Between Cell Device and Mobile Tower =336 m Location of Mobile Device Latitude:79.78115100 Latitude: 11.82959700			Distance Between Cell Device and Mobile Tower =362 m Location of Mobile Device Longitude: 79.78115100 Latitude: 11.82959700			Distance Between Cell Device and Mobile Tower =571 m Location of Mobile Device Longitude: 79.78115100 Latitude: 11.82959700		
Radio receiver antenna length =3.7 cm														
Local best of Download input internet speed 8.6 Mbps from Iteration 1	Local best of Upload input internet speed 2.8 Mbps from Iteration 1	Iteration 1 Local best Input Signal strength -93 dBm (RSSI)	Local best of Download input internet speed Speed 1.91 Mbps from Iteration 2	Local best of Upload input internet speed 2.35 Mbps from Iteration 2	Iteration 2 Local best Input Signal strength -106 dBm (RSSI)	Local best of Input Download Internet speed 3.91 Mbps from Iteration 3	Local best of Upload input internet speed 2.76 Mbps from Iteration 3	Iteration 3 Local best Input Signal strength -101 dBm (RSSI)	Local best of Download Internet speed 3.15 Mbps from Iteration 4	Local best of Upload input internet speed 1.91 Mbps from Iteration 4	Iteration 4 Input Local best Signal strength -106 dBm (RSSI)	Local best of Input Download Internet speed 2.70 n Mbps from Iteration 5	Local best of Upload input internet speed 0.86 Mbps from Iteration 5	Iteration 5 Input Local best Signal strength -110 dBm (RSSI)
Iteration 6 Down Load Input Internet Speed in Mbps	Iteration 6 Upload Load Input Internet Speed in Mbps	Iteration 6 Input Signal strength in dBm (RSSI)	Iteration 7 Download Load Input Internet Speed in Mbps	Iteration 7 Up Load Input Internet Speed in Mbps	Iteration 7 Input Signal strength in dBm (RSSI)	Iteration 8 Down Load Input Internet Speed in Mbps	Iteration 8 UpLoad Input Internet Speed in Mbps	Iteration 8 Input Signal strength in dBm (RSSI)	Iteration 8 Down Load Input Internet Speed in Mbps	Iteration 9 Up Load Input Internet Speed in Mbps	Iteration 9 Input Signal strength in dBm (RSSI)	Optimum Local best Down Load of input Internet Speed 8.6 Mbps Optimum Local best Upload Input Internet speed 2.8 Mbps Optimum Input Signal strength -96 dBm (RSSI)		
1.01	1.63	-103	1.42	1.43	-106	2.30	0.31	-110	3.02	0.82	-96			
1.68	1.14	-103	1.24	1.50	-16	1.75	0.86	-110	2.52	1.12	-96			
1.84	1.32	-103	1.61	2.39	-106	2.19	1.16	-110	3.31	0.75	-96			
1.07	1.25	-103	2.58	1.56	-106	1.17	0.90	-110	2.94	0.97	-96			
											-96			
Distance Between Cell Device and Mobile Tower =178 m Location of Mobile Device Longitude: 79.78392100 Latitude: 11.83349600 Radio Receiver Antenna Length= 3.7 cm			Distance Between Cell Device and Mobile Tower =217 metre Location of Mobile Device Longitude: 79.78392100 Latitude: 11.83349600 Radio Receiver Antenna Length= 3.7 cm			Distance Between Cell Device and Mobile Tower =891 metre Location of Mobile Device Longitude: 79.7t898600 Latitude: 11.82511200 Radio Receiver Antenna Length= 3.7 cm			Distance Between Cell Device and Mobile Tower =372 metre Location of Mobile Device Longitude: 79.77999900 Latitude: 11.83022800 Radio Receiver Antenna Length= 3.7 cm					
Radio receiver length =3.7 cm														
Local best of Download Input Internet speed 1.84 Mbps ,Local best of Upload input internet speed 1.63 Mbps from Iteration 6 Input Local best Signal strength -103 dBm (RSSI)			Local best of Download Input Internet speed 2.58 Mbps ,Local best of Upload input internet speed 2.39Mbps from Iteration 7 Iteration 7,Input Local best ,Signal strength -106 dBm (RSSI)			Local best of Download Input Internet speed 2.30 Mbps ,Local best of Upload input internet speed 1.16 Mbps ,Input Local best Signal strength -110 dBm (RSSI)			Local best of Download Input Internet speed 3.31 Mbps ,Local best of Upload input internet speed 1.12Mbps from Iteration 9 Input Local best Signal strength -96 dBm (RSSI)					

Mobile phone antenna is not able to receive the optimum input internet speed 80 Mega bits/sec. It received the experiment result of the local best input internet speed are updated from each iterations at each location. Local best 4G input optimum download internet speed is 8.6 Mbps, Local best input optimum upload internet speed is 2.8 Mbps received by Mobile antenna. Mobile phone antenna gain is limited so it received low level limited internet speed. Mobile antenna is not able to receive Maximum optimum internet speed of 80 Mega bits/sec in 4G. so we need good design of antenna need for get optimum solution of Internet speed from cell tower. The input low internet speed of Local best 4G input optimum download internet speed is 8.6 Mbps, Local best input optimum upload internet speed is 2.8 Mbps need to improve High optimum solution of internet speed of 80 Mega bits/sec[1][2][3][4][5][6].

Objectives of Research

- To design the FMD Antenna for Improve weak internet speed to better internet speed.
- To design the FMDH Antenna is advance model of helical antenna used for Improve optimum Internet speed from weak internet speed.
- To design SAT FMD antenna is satellite based antenna for improve internet speed at worst location.
- To design SAT FMDH antenna is advance satellite based Antenna using winding coil for generate magnetic field to improve internet speed at worst Location.

Research contributions for design Model of Antenna for improve input internet speed using metaheuristic algorithm in Proposed system.

Good antenna design is necessary to maintain good signal strength and to improve high-speed Internet from weak internet speed in required applications, the aim of the research is to maintain Optimal Internet speed using Four Antenna Model and **Metaheuristic Algorithm**asshown in Figure 7

Model 1 – Design of FMD Antenna and Location, Position and Particle swarm optimization Algorithm for Improving Mobile Internet speed.[6][7]

Model 2 - Design of FMDH antenna using Location, Position, PSO Algorithm for Improving Mobile Internet speed.[6][7]

Model 3 - Design SAT FMD Antenna using Location, Position, PSO and Genetic algorithm for improve Internet speed.[8]
Model 4 - Design SAT FMDH Antenna generate Magnetic field for Improving internet speed using Location, Position, PSO and Genetic Algorithm,[8]

Model 1: Design of FMD Antenna using Location, Position amd Particle swarm optimization algorithm for improve internet speed form weak internet speed. FMD Antenna containg FM radio receiver Antenna(FM), Dish antenna(D). Some Locations have weak signal strength and weak internet speed. The weak signal strength is provide by side loab of very low radiation of moving particles from cell tower[6].The low radiation moving particle makes very low internet speed and low sigbal strength of -120 dBm in some location.The weal signal strength -120 dbm improved -63 dBm by FMD Antenna. Location Algorithm locate the different Location of mobile phone and update input internet signal from mobile tower to reach to mobile device it receives low internet speed and update low local best of input internet speed and update best signal strength. FMD Antenna gain improved input internet signal move signal low radiation particle to high radiation particle, Signal strength and internet speed improved from local best using particle swarm optimization Algorithm. The PSO improved input of Local best to Pbest and Gbest optimization of best performance. The position algorithm update the the angle position of dish Antenna and length of FM radio Receiver Antenna.[6].

Model 2: Design of FMDH Antenna (FM radio Receiver Antenna, Dish antenna and helical antenna) using Location, Position and Prticle swarm optimization Algorithm to improve weak input internet speed to medium anf high output internet speed. The Helical ntenna Gain will increase signal strength from -120 dBm to -18 dBm.[1][2][3][4][5]. The Pbest and Gbest if best interenet speed update in different location. The weak internet speed improved by FMDH Antenna.

Mosel 3: Design of SAT FMD Antenna (Satellite based antenna with FMD Antenna) using using Location, Position and Prticle swarm optimization Algorithm to improve weak input internet speed to high output internet speed. The high gain of SAT FMD Antenna improved signal strength from -120 dBm to -12 dBm. the wek Input internet speed improved to Maximum optimum solution of Internet sped. the Pbest and Gbest are updated and Signal strength is improved in this proposed model of SAT FMD Antenna.

Mosel 4: Design of SAT FMDH Antenna (Satellite based antenna with FMDH Antenna) using using Location, Position ,Particle swarm optimization and Genetic Algorithm to improve weak input internet speed to high output internet speed[1][2][3][4][5][6][7][8][9]. The Genetic Algorithm generate Electric field and Magnetic field in SAT FMD Antenna. The high gain of SAT FMD Antenna improved signal strength from -120 dBm to -8 dBm. the weak Input internet speed improved to Maximum optimum solution of Internet sped. the Pbest and Gbest are updated and Signal strength is improved in this proposed model of SAT FMDH Antenna. Figure 7 shows overall Block diagram for Improve internet speed using Design of Antennas using metaheuristic algorithm in Proposed system

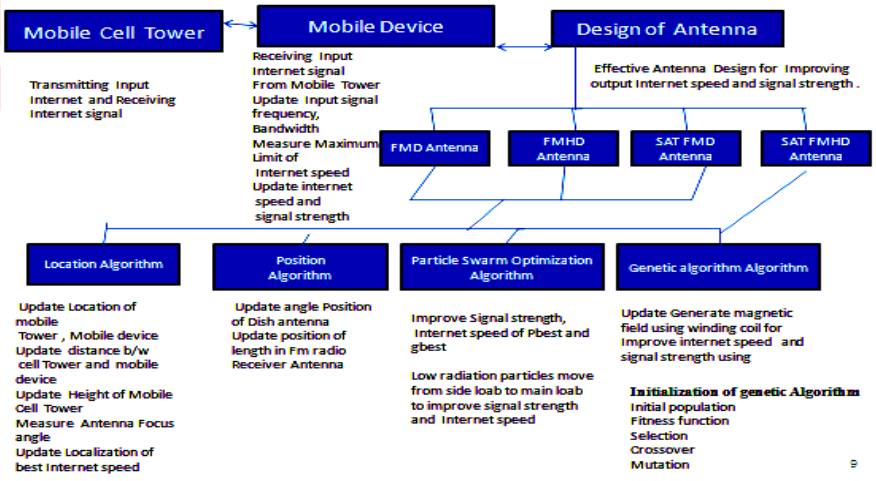


Figure 7. Overall Block diagram for Improve internet speed using design of Antennas using metaheuristic algorithm in Proposed system

Model 1 - Design of FMD Antenna and Location using Position and Particle swarm optimization Algorithm.

- To develop FMD Antenna contain FM radio receiver antenna and parabolic dish antenna makes Antenna gain 58.5 dB and improve weak Signal strength into High Signal strength makes High speed internet using **Location**, **position, partition swarm optimization algorithm.[6][7][8][9]**
- The design of dish antenna has high gain compared mobile antenna that can be received high signal strength to improve internet speed. Dish antenna can track radiation from sideloabs of high signal strength.
- FM radio Receiver antenna can be fixed angle for focus to cell Tower for increase internet speed.

- The FM radio receiver receives internet signal and track to long distance of Kilometers between mobile phone to Cell Tower.
- **Position algorithm** is used change the position of FM radio receiver antenna length to improve signal strength and improve internet speed.[6][7][8][9][10].
- **Position algorithm** helps to improved weak signal strength to Good signal strength -18 dbm in proposed system.[11]
- FMD antenna creates Magnetic field to increase power density and signal strength to track from mobile device of ground location to sideloabs by particle moves from Ground location towards sideloabs.

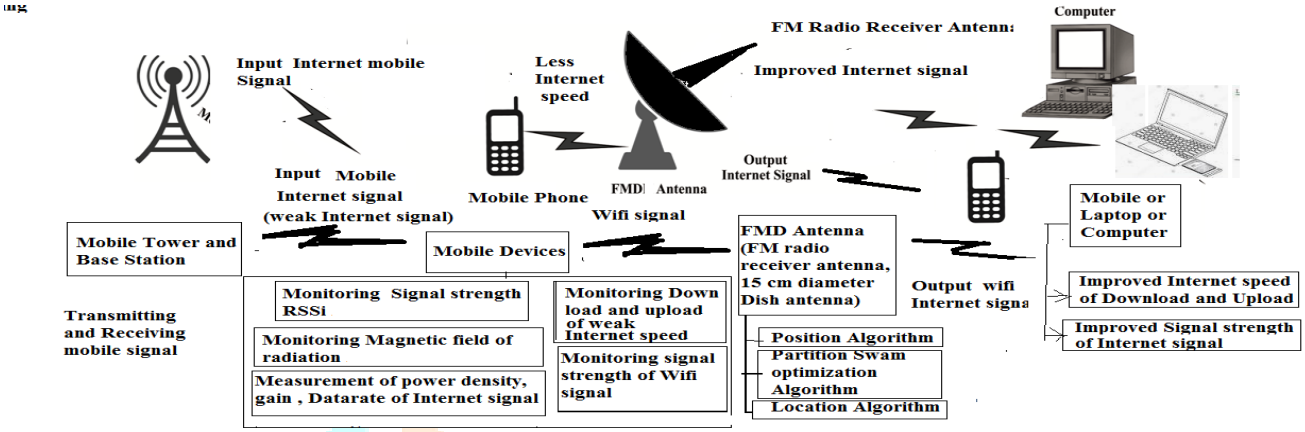


Figure 8 Block diagram of FMD antenna using Position, Particle swam optimization Algorithm for increase internet speed.

The Low signal strength of -120 dBm to -91 dBm from track from ground location to sideloab1 of cell Tower in Pbest . -91 dBm signal strength improved to -63 dBm from track from side loab1 to side loab2 of Cell Tower radiation by the process of Magnetic field increased using FMD Antenna and Location, Position and Particle swarm optimization. The input of Local best 4G input optimum download internet speed is 8.6 Mbps is improved Pbest output optimum download speed 17.28 Mbps and improved Gbest peed.upload internet speed is 2.8 Mbps is improved Pbest output optimum upload Internet speed =6.21 Mbps, improved output optimum upload internet speed Gbest=19.56 Mbps using FMD Antenna and Location, position, partition swarm optimization algorithm. Figure 8 shows Block diagram of FMD antenna using Location, Position, Particle swam for increase internet speed. Figure 9 shows FMD Antenna Experiment has done at Location at CREST , Rajiv Gandhi college of Engineering and Technology, Pondicherry, INDIA.

Figure 9.Design of FMD antenna, Location at CREST ,Research Center, Rajiv Gandhi college of Engineering and Technology, Pondicherry, INDIA.

FMD antenna using Position, Particle swam optimization Algorithm for increase internet speed.

Step 1: **Initialization Location Algorithm** , Update Input Internet signal Frequency and bandwidth and update, Measure maximum limited Internet speed.

Step 2: Update the Location of longitude, latitude of Mobile device Position $x_i = x_1 , x_2 , x_3 \ldots . x_N$, and update Base station Cell Tower ID.

Step 3:Update Input Internet signal strength ($RSSI_i = RSSI_1 , RSSI_2 , RSSI_3 \ldots . RSSI_N$) at each location.[11][12]

Step 4: If (Signal strength >65 dBm), Update Download and upload internet speed.

Step 5: else **Initialization Position Algorithm for Fit FMD antenna.** else

Step 6 : Update Pbest Optimum Download and upload internet speed.

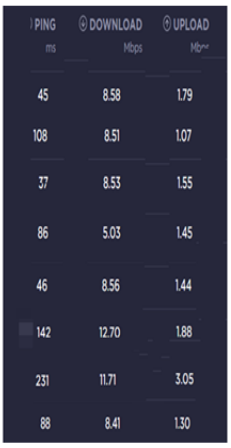
Step 7: Update distance between mobile device and mobile tower d_i , Update Cell Tower Receiver Antenna Height (T_i)

Step 8: Find Distance from Mobile Device to Cell Tower Antenna Height $D_V=\sqrt{d_i^2+T_i^2}$

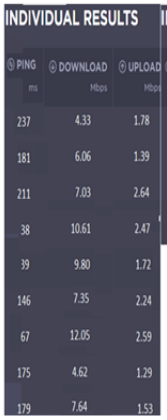
Step 9: Measure Dish Antenna Position angle $\boldsymbol{\theta}= \sin^{-}(T_i/ D_V)$

Step 10: Fit Dish antenna angle $\boldsymbol{\theta}$ for receive internet signal from mobile Tower.

Step:11Measure Focal length(L**)** of Radio receiver Antenna using F= (D ∗ D) / (16 ∗ c), D is adiameter of Dish antenna , C is depth of Dish antenna.
Step 12: Radio Receiver length = Focal length of dish antenna
Step 13: Update Pbest Download and upload Internet speed. and signal strength of RSSI.
Step 14: Radio Receiver length > Focal length of dish antenna
Step 15: Update Gbest Download and upload Internet speed. snd signal strength of RSSI.
Step 16: **Initialization of PSO**
Step 17: Change the Mobile Node Location $x_i = x_1 , x_2 , x_3 \ldots . x_N$ and Update Signal strength and Internet speed of Download and upload speed.
Step 18: if(Pbest < Gbest)
Gbest is Optimum solution Internet speed , Update Gbest Internet speed
else
Pbest is Optimum Solution Update Pbest
Step 19 if (Pbest && Gbest=0)
Step 20 Null . Radiation pattern by Side loab from Mobile Tower.
Step 21: Change Location and initialization of Position and PSO Algorithm.

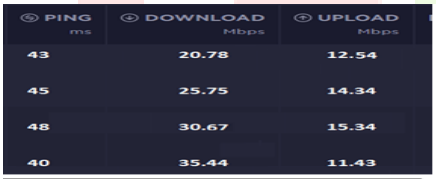


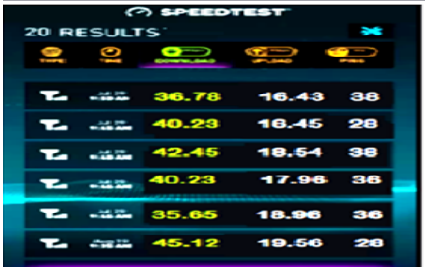
Sl. no.	Download (Mbps)	Upload (Mbps)	Ping (ms)	Time	Signal strength (dB)
1	8.58	1.79	45	9.18 p.m.	−100
2	8.51	1.07	108	9.10 p.m.	−100
3	8.53	1.55	37	9.06 p.m.	−104
4	5.03	1.45	86	9.04 p.m.	−108
5	8.56	1.44	46	9.03 p.m.	−101
6	12.70	1.88	142	12.03 a.m.	−90
7	11.71	3.05	231	12.07 a.m.	−91
8	8.41	1.30	88	12.09 a.m.	−100
	Avg = 9.00	Avg = 1.69	Avg = 97.8		Avg = −99.2



Sl. no.	Download (Mbps)	Upload (Mbps)	Ping (ms)
1	4.33	1.78	237
2	6.06	1.39	181
3	7.03	2.64	211
4	10.61	2.47	38
5	9.80	1.72	39
6	7.35	2.24	146
7	12.05	2.59	67
8	4.62	1.29	175
9	7.64	1.53	179
10	3.31	1.25	167
11	8.15	1.91	60
12	17.28	1.83	54
13	9.19	6.21	72
	Avg = 8.26	Avg = 2.22	Avg = 125

Figure 10 Iterations for Improved Pbest 4G Internet speed using FMD Antenna





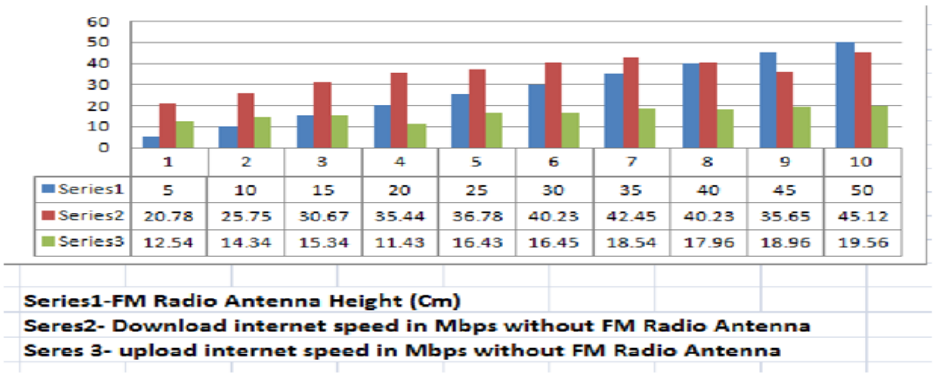


Figure 11 Iterations for Improved Gbest 4G Internet speed using FMD Antenna

Table 3. shows Measure Dish Antenna Position angle $\theta = \sin^{-}(T_i / D_V)$, improving Internet speed from step 7 to 9 of Position algorithm.Dish Antenna angle is important for focus radiation receiving from cell Tower.Figure 10 shows Iterations for Improved Pbest 4G Internet speed using FMD Antenna. Figure 11 shows Iterations for Improved Gbest 4G Internet speed using FMD AntennaThe input of Local best 4G input optimum download internet speed Local best is 8.6 Mbps is improved Pbest download is 17.28 Mbps, improved Gbest download is 45.12 Mbps and upload input internet speed local best is 2.8 Mbps is improved pload uPbest is 6.21 Mbps, upload Gbest is19.56 Mbps using FMD Antenna and Location Latitude , position, partition swarm optimization algorithm as shown in Table 2 for Local best internet speed performance. Tables 4 for Pbest improved internet speed performance and Table 4 for improved internet speed performance using FMD antenna. Table 4 Output Pbest Internet speed optimum performance using FMD Antenna using Location, Position and Particle swarm Algorithm.The pbest and Gbest internet speed are updated at different location are in Tables 4 and 5. The signal strength (RSSI) in Local best is

-96 dBm (as shown in Table 2) is improved Pbest is -91 dbm (as shown n Table 3) and improved Gbest is -63 dBm (as shown in Table 4). Comparison of Local best, Pbest and Gbest of internet speed and signal strength aare updated in Table 5[11][12]. velocity of download and velocity of upload are updated in Table 5 and 6.

Table 3 Measure Dish Antenna Position angle for Improving Internet speed.

Location of Particle (Mobile Device)	Mobile Device Position from Cell Tower. in (d_i) meter	Cell Tower Antenna position (T_i) in meter	Distance from Mobile position to Tower Height $D_V=\sqrt{x_i^2+T_i^2}$ In meter	sine $\theta = T_i / D_V$	Dish Antenna Position $\theta = \sin^{-}(T_i/D_V)$ in Degree
Longitude: 79.78115100 Latitude: 11.82959700	357	60	362.00	0.1657	9.537
Longitude: 79.78115100 Latitude: 11.82959700	371	60	375.82	0.1596	9.183
Longitude: 79.78115100 Latitude: 11.82959700	336	60	341.31	0.1751	10.08
Longitude: 79.78115100 Latitude: 11.82959700	362	60	366.93	0.1635	9.41
Longitude: 79.78115100 Latitude: 11.82959700	571	60	405.46	0.1479	8.50
Longitude: 79.78392100 Latitude: 11.83349600	217	60	225.14	0.2665	15.45
Longitude: 79.78392100 Latitude: 11.83349600	178	60	187.84	0.3194	18.62
Longitude: 79.78392100 Latitude: 11.83349600	891	60	893.01	0.0671	3.84
Longitude: 79.78392100 Latitude: 11.83349600	372	60	376.80	0.159	9.14

Table 4 Pbest , Gbest performance of 4G improved internet speed using FMD antenna and Location, Position and PSO algorithm

Iteration 1 Down Load output Internet Speed in Mbps Using FMD Antenna	Iteration 1 Upload Load Output Internet Speed in Mbps Using FMD Antenna	Iteration 1 Output Signal strength in dBm (RSSI) Using FMD Antenna	Iteration 2 Down Load Output Internet Speed in Mbps Using FMD Antenna	Iteration 2 Upload Load Output Internet Speed in Mbps Using FMD Antenna	Iteration 2 output Signal strength in dBm (RSSI) Using FMD Antenna	Iteration 3 Down Load output Internet Speed in Mbps Using FMD Antenna	Iteration 3 Upload Load output Internet Speed in Mbps Using FMD Antenna	Iteration 3 output Signal strength in dBm (RSSI) Using FMD Antenna	Iteration 4 Down Load output Internet Speed in Mbps Using FMD Antenna	Iteration 4 Upload Load Outpu Internet Speed in Mbps	Iteration 4 Output Signal strength in dBm (RSSI) Using FMD Antenna	Iteration 5 Down Load output Internet Speed in Mbps Using FMD Antenna	Iteration 5 Upload Load output Internet Speed in Mbps Using FMD Antenna	Iteration 5 output Signal strength in dBm (RSSI) Using FMD Antenna
11.71	3.05	-91	12.05	2.59	-96	8.15	1.91	-102	9.80	1.72	-96	5.03	1.45	-108
8.41	1.30	-100	4.62	1.29	-105	17.28	1.83	-85	7.35	2.24	-103	8.58	1.79	-100
			7.64	1.53	-103	9.19	6.21	-96						
Distance Between Cell Device and Mobile Tower =357m Location of Mobile Device Longitude: 79.78115100 Latitude: 11.82959700			Distance Between Cell Device and Mobile Tower =371 m Location of Mobile Device Longitude: 79.78115100 Latitude: 11.82959700			Distance Between Cell Device and Mobile Tower =336 m Location of Mobile Device Latitude:79.78115100 Latitude: 11.82959700			Distance Between Cell Device and Mobile Tower =362 m Location of Mobile Device Longitude: 79.78115100 Latitude: 11.82959700			Distance Between Cell Device and Mobile Tower =571 m Location of Mobile Device Longitude: 79.78115100 Latitude: 11.82959700		
Radio Receiver Antenna Length= 3.7 cm														
P best of Download output internet speed 11.71 Mbps , Upload i output nternet speed 3.05 ,Signal strength - 91dBm (RSSI) using FMD Antenna from Iteration 1			P best of Download output internet speed 12.05 Mbps Upload output internet speed 2.59 Mbps Signal strength -96 dBm (RSSI) using FMD Antenna from Iteration 2			P best of output Download Internet speed 17.28 Mbps ,Upload output internet speed 6.21 Mbps ,Signal strength -85 dBm (RSSI) using FMD Antenna			P best of output Download Internet speed 9.80 Mbps ,Upload i output internet speed 2.24 Mbps , Pbest Signal strength -96 dBm (RSSI) using FMD Antenna			Pbest of output Download Internet speed 8.58 Mbps from Iteration 5 ,P best of Upload output internet speed 1.79 , output Pbest Signal strength -100 dBm (RSSI) using FMD Antenna		
Iteration 6 Down Load Output Internet Speed in Mbps using FMD Antenna	Iteration 6 Upload Load Output Internet Speed in Mbps using FMD Antenna	Iteration 6 output Signal strength in dBm (RSSI) using FMD Antenna	Iteration 7 Download Load Input Internet Speed in Mbps using FMD Antenna	Iteration 7 Up Load Input Internet Speed in Mbps using FMD Antenna	Iteration 7 outputt Signal strength in dBm (RSSI) using FMD Antenna	Iteration 8 Down Load Output Internet Speed in Mbps using FMD Antenna	Iteration 8 UpLoad Output Internet Speed in Mbps using FMD Antenna	Iteration 8 Output Signal strength in dBm (RSSI) using FMD Antenna	Iteration 9 Down Load Output Internet Speed in Mbps using FMD Antenna	Iteration 9 Up Load output Internet Speed in Mbps using FMD Antenna	Iteration 9 output Signal strength in dBm (RSSI) using FMD Antenna	Iteration 10 G best 4G output Internet speed performance			
												Radio Receiver antenna Length in cm using FMD Antenna	Gbest Download Internet speed m mbps using FMD Antenna	Gbest Upload Internet speed in Mbps using FMD Antenna	Gbest Signal strength In dBm (RSSI) Using FMD Antenna
4.33	1.78	-110	7.03	2.64	-105	8.56	1.44	-101	8.51	1.07	-106	5	20.78	12.54	-63
6.06	1.39	-105	10.61	2.47	-96	12.70	1.88	-90	8.53	1.55	-106	10	25.75	14.34	-63
Distance Between			Distance Between			Distance Between Cell			Distance Between			15	30.67	15.34	-63
												20	35.44	11.43	-63
												25	36.78	16.43	-63

Cell Device and Mobile Tower =178 m Location of Mobile Device Longitude: 79.78392100 Latitude: 11.83349600 Radio Receiver Antenna Length= 3.7 cm	Cell Device and Mobile Tower =217 metre Location of Mobile Device Longitude: 79.78392100 Latitude: 11.83349600 Radio Receiver Antenna Length= 3.7 cm	Device and Mobile Tower =891 metre Location of Mobile Device Longitude: 79.7t898600 Latitude: 11.82511200 Radio Receiver Antenna Length= 3.7 cm	Cell Device and Mobile Tower =372 metre Location of Mobile Device Longitude: 79.77999900 Latitude: 11.83022800 Radio Receiver Antenna Length= 3.7 cm	30 40.23 16.45 -63 35 42.45 18.54 -63 40 40.23 17.96 -63 45 35.65 18.96 -63 50 45.15 19.56 -63 Best Location: Location of Mobile Device ,Latitude:79.78115100 ,Latitude: 11.82959700 Distance between mobile device to cell tower in meter,D=891 m
P best of Download output Internet speed 6.06 Mbps ,P best of Upload output internet speed 1.78 Mbps Iteration 6,Output Pbest Signal strength -105 dBm (RSSI) using FMD Antenna	P best of Download output Internet speed 10.61 Mbps ,Pbest of Upload output internet speed 2.64 Mbps from Iteration 7 Iteration 7,output Pbest Signal strength -96 dBm,(RSSI) using FMD Antenna	Pbest of Download output Internet speed 12.70 Mbps from Iteration 8 ,Pbest of Upload output internet speed 1.88 Mbps from Iteration 8 using FMD Antenna,Iteration 8,output Pbest Signal strength -90 dBm,(RSSI) using FMD Antenna	Pbest of Download output Internet speed 8.53 Mbps ,Pbest of Upload output internet speed 1.55 Mbps from Iteration 9 using FMD Antenna Iteration 6 output pbest Signal strength -106 dBm (RSSI) using FMD Antenna	Optimum P best Down Load of output t Internet Speed 17.28 Mbps ,Optimum Pbest Upload output Internet speed .6.21 Mbps ,,Optimum output Signal strength -85 dBm (RSSI) using FMD antenna. Optimum G best Down Load of Outputt Internet Speed 45.15 Mbps ,Optimum Gbest Upload Output Internet speed . Mbps ,Optimum Gbest Output Signal strength -85 dBm (RSSI) using FMD antenna.

Table5 Comparison of Local best Input, improved Pbest, Gbest output internet speed using FMD antenna

Iteration And Location, distance (d) between Mobile device to Cell Tower	Local best Input Download 4G Internet speed in Mbps IDL P_i^t	Local best Input Upload 4G Internet speed in Mbps IUL P_i^t	Pbest Download 4G Internet speed in Mbps length =3.7 cm ODL P_{bi}^t	Pbest Output Upload 4G Internet speed in Length= 3.7 cm OUL P_{bi}^t	Gbest Output Download 4G Internet speed in Mbps Length= 50 cm ODL g_b^t	Gbest Output Download 4G Internet speed in Mbps Length =50 cm OUL g_b^t	Local best Input Internet speed of signal strength in dBm	Pbest Output Internet speed of signal strength in dBm	Gbest Output Internet speed of signal strength in dbm	Upda-18te particles' velocities for Download and Upload Internet speed using FMD Antenna $DLV_i^{t+1}=W.IDLV_i^t+C_1U_i^t(ODLP_{b1}^t-IDLp_i^t)+C_2U_2^t(ODLg_b^t-IDLP_i^t)$ $UPV_i^{t+1}=W.IULV_i^t+C_1U_i^t(OULP_{b1}^t-IULp_i^t)+C_2U_2^t(OULg_b^t-IULP_i^t)$
1 Longitude: 79.78115100 Latitude: 11.82959700 d=357 m	8.6	2.8	11.71	3.03	45.12	19.96	-106	-105	-63	**$DLV_{i=1}^{t+1}$ =41.47** **$ULV_{i=1}^{t+1}$ =18.25**
2 Longitude: 79.78115100 Latitude: 11.82959700 d=371 m	1.91	2.35	12.05	2.59	45.12	19.96	-106	-96	-63	**$DLV_{i=2}^{t+2}$ =55.19** **$ULV_{i=2}^{t+2}$ =18.71**
3 Longitude: 79.78115100 Latitude: 11.82959700 d=336 m	3.91	2.76	17.28	6.21	45.12	19.96	-109	-95	-63	**$DLV_{i=3}^{t+3}$ =56.42** **$ULV_{i=3}^{t+3}$ =21.51**
4 Longitude: 79.78115100 Latitude: 11.82959700 d=362 m	3.15	1.91	9.80	2.24	45.12	19.96	-106	-96	-63	**$DLV_{i=4}^{t+4}$ =50.46** **$ULV_{i=4}^{t+4}$ =19.24**
5 Longitude: 79.78115100 Latitude: 11.82959700 d=571 m	2.70	0.86	8.58	1.79	45.12	19.96	-110	-85	-63	**$DLV_{i=5}^{t+5}$ =50.14** **$ULV_{i=5}^{t+5}$ =20.89**
6 Longitude: 79.78392100 Latitude: 11.83349600 d=178 m	1.84	1.63	6.06	1.78	45.12	19.96	-103	-100	-63	**$DLV_{i=6}^{t+6}$ =49.34** **$ULV_{i=6}^{t+6}$ =19.34**
7 Longitude: 79.78392100 Latitude: 11.83349600 d=217 m	2.58	2.39	10.61	2.64	45.12	19.96	-106	-100	-63	**$DLV_{i=7}^{t+7}$ =52.41** **$ULV_{i=7}^{t+7}$ =18.68**
8 Longitude: 79.7t898600 Latitude: 11.82511200 d=891 m	2.30	1.16	12.70	1.88	45.12	19.96	-110	-100	-63	**$DLV_{i=8}^{t+8}$ =52.41** **$ULV_{i=8}^{t+8}$ =20.38**
9 Longitude: 79.77999900 Latitude: 11.83022800 d=372 m	3.31	1.12	8.53	1.55	45.12	19.96	-96	-91	63	**$DLV_{i=9}^{t+9}$ =55.49** **$ULV_{i=9}^{t+9}$ =20.13**

Model 2 - Design of FMDH Antenna and Location using Position and Particle swarm optimization Algorithm

- FMDH Antenna has FM radio receiver antenna. dish antenna with Helical antenna.[1]
- Helical antenna is added in FMD antenna for increasing gain for improving internet speed.
- FMDH antenna gain is 74.36 dB[1].
- Particle Swarm Optimization (PSO) is one of the bio-inspired algorithms and it is a simple one to search for an optimal solution in the solution space.[14]Helical Antenna increase the magnetic field in particle to improve Signal strength and internet speed using Helical antenna in FMD Antenna usingPSO algorithm[14]Position algorithm helps to vary the length position of FM radio Receiver to improve signal strength and Internet speed from weak Internet signal.[13]

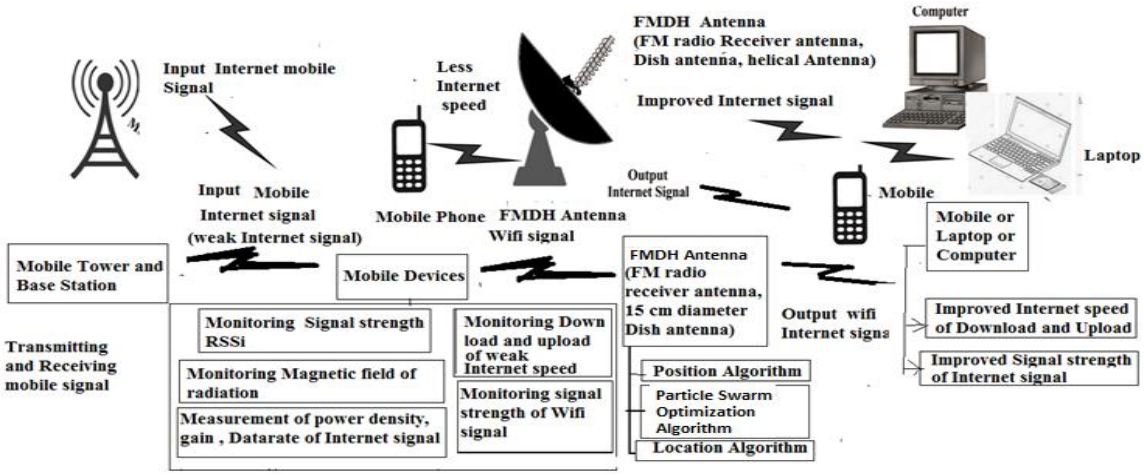
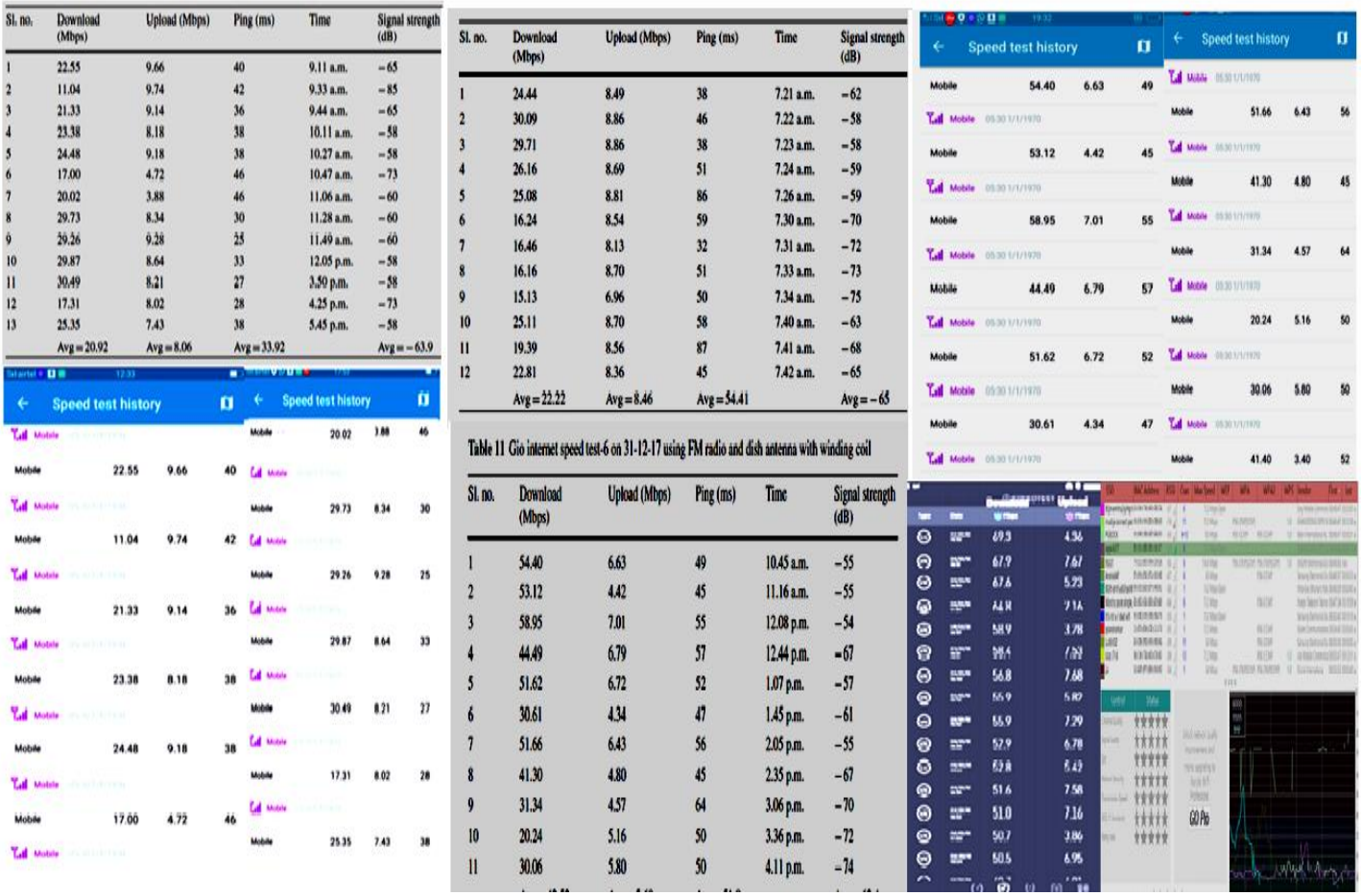


Figure12.Block Diagram of FMDH antenna using Position, Particle swam optimization Algorithm.

The block diagram of FMDH antenna using Position, Particle swam optimization Algorithm for improving internet speed as shown in Figure 12.



Sl. no.	Download (Mbps)	Upload (Mbps)	Ping (ms)	Time	Signal strength (dB)
1	22.55	9.66	40	9.11 a.m.	−65
2	11.04	9.74	42	9.33 a.m.	−85
3	21.33	9.14	36	9.44 a.m.	−65
4	23.38	8.18	38	10.11 a.m.	−58
5	24.48	9.18	38	10.27 a.m.	−58
6	17.00	4.72	46	10.47 a.m.	−73
7	20.02	3.88	46	11.06 a.m.	−60
8	29.73	8.34	30	11.28 a.m.	−60
9	29.26	9.28	25	11.49 a.m.	−60
10	29.87	8.64	33	12.05 p.m.	−58
11	30.49	8.21	27	3.50 p.m.	−58
12	17.31	8.02	28	4.25 p.m.	−73
13	25.35	7.43	38	5.45 p.m.	−58
	Avg = 20.92	Avg = 8.06	Avg = 33.92		Avg = −63.9

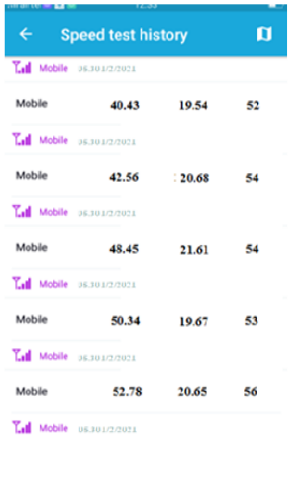
Sl. no.	Download (Mbps)	Upload (Mbps)	Ping (ms)	Time	Signal strength (dB)
1	24.44	8.49	38	7.21 a.m.	−62
2	30.09	8.86	46	7.22 a.m.	−58
3	29.71	8.86	38	7.23 a.m.	−58
4	26.16	8.69	51	7.24 a.m.	−59
5	25.08	8.81	86	7.26 a.m.	−59
6	16.24	8.54	59	7.30 a.m.	−70
7	16.46	8.13	32	7.31 a.m.	−72
8	16.16	8.70	51	7.33 a.m.	−73
9	15.13	6.96	50	7.34 a.m.	−75
10	25.11	8.70	58	7.40 a.m.	−63
11	19.39	8.56	87	7.41 a.m.	−68
12	22.81	8.36	45	7.42 a.m.	−65
	Avg = 22.22	Avg = 8.46	Avg = 54.41		Avg = −65

Table 11 Gio internet speed test-6 on 31-12-17 using FM radio and dish antenna with winding coil

Sl. no.	Download (Mbps)	Upload (Mbps)	Ping (ms)	Time	Signal strength (dB)
1	54.40	6.63	49	10.45 a.m.	−55
2	53.12	4.42	45	11.16 a.m.	−55
3	58.95	7.01	55	12.08 p.m.	−54
4	44.49	6.79	57	12.44 p.m.	−67
5	51.62	6.72	52	1.07 p.m.	−57
6	30.61	4.34	47	1.45 p.m.	−61
7	51.66	6.43	56	2.05 p.m.	−55
8	41.30	4.80	45	2.35 p.m.	−67
9	31.34	4.57	64	3.06 p.m.	−70
10	20.24	5.16	50	3.36 p.m.	−72
11	30.06	5.80	50	4.11 p.m.	−74

Figure 13. Iteration 1 to 9 Experimental Result of Internet speed using FMDH Antenna

The input internet speed is improved using FMDH Antenna and its iteration of experimental resuls are shown in Figure 13. The FM radio Receiver antenna length is varied in the Experiments and Improved Internet speed from input internet signal using FMDH antenna as shown in Figure 14. FM radio receiver Antenna receiver 2.4 Ghz of internet signal iys improved internet signal vy variation length Antenna as shown in Figure 14.



FM radio Receiver antenna length (cm) of position	4G Internet Download speed (Mbps) (F MDH Antenna)	4G Internet upload speed (Mbps) (FMDH Antenna)
5	40.43	19.54
10	42.56	20.68
15	48.45	21.67
20	50.34	19.67
25	52.78	20.65
30	54.43	24.67
35	58.34	25.56
40	60.45	27.93
45	65.55	30.67
50	70.89	38.87

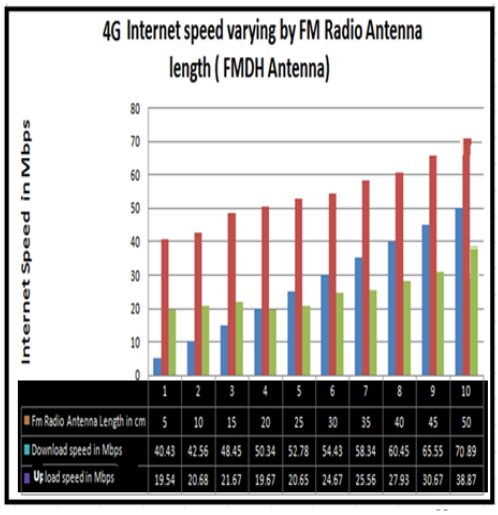


Figure 14.Various FM Radio Receiver Antenna length and Improved Output 4G internet speed in Mbps using FMDH Antenna

Location ,Position and Particle swarm Algorithm for Improve Internet speed using FMDH Antenna

Step 1: Initialization Location Algorithm , Update Input Internet signal Frequency and bandwidth and update, Measure maximum limited Internet speed.

Step 2: Update the best Location of longitude, latitude of Mobile device Position and update Base station Cell Tower ID and fix FMDH antenna at best location..

Step 3:Update Input Internet signal strength ($RSSI_i = RSSI_1 , RSSI_2 , RSSI_3 ….. RSSI_N$) at each location

Step 4: If (Signal strength >65 dBm), Update Download and upload internet speed.

Step 5: Update Pbest optimum Download and upload internet speed.

Else Step 6 : Initialization Position Algorithm for Fit FMDH antenna.

Step 7: Update distance between mobile device and mobile tower d_i),

Update Cell Tower Receiver Antenna Height (T_i)

Find Distance from Mobile Device to Cell Tower Antenna Height $D_V=\sqrt{d_i^2+T_i^2}$ and

Measure Dish Antenna Position angle $\theta= \sin^{-1}(T_i/ D_V)$

Step 8: Fit Dish antenna angle θ for receive internet signal from mobile Tower.

Step:9Measure Focal length(L) of Radio receiver Antenna using $F= (D * D) / (16 * c)$, D is a diameter of Dish antenna , C is depth of Dish antenna.

Step 10: Radio Receiver length = Focal length of dish antenna

Step 11: Update Pbest Download and upload Internet speed. and signal strength of RSSI.

Step 12: Radio Receiver length > Focal length of dish antenna

Step 11: Initialization of PSO

Step 12: Update Gbest Download and upload Internet speed. snd signal strength of RSSI.

Step 13: Change the Mobile Node Location $x_i = x_1 , x_2 , x_3 ….. x_N$ and Update Signal strength and Internet speed of Download and upload speed.

Step 14: if(Pbest < Gbest) Gbest is Optimum solution Internet speed , Update Gbest Internet speed

else Pbest is Optimum Solution Update Pbest

Step 15 if (Pbest && Gbest=0)

Step 16 Null . Radiation pattern by Side loab from Mobile Tower.

Step 17: Change Location and initialization of Position and PSO Algorithm.

Fix FMDH antenna at best location is selected longitude 79.78115100 , latitude 11.82959700 , distance is 336 meter from cell tower using Location algorithm. The input internet speed Local best download speed 8.6 Mbps is improved pbest optimum download speed is 69.3 Mbps (FM Radio receiver length is 3.7 cm) , improved Gbest optimum download speed is 70.89 Mbps(FM radio receiver length is 50 cm, shown in Figure 14). The input internet speed of local best upload speed 2.8 Mbps is improved Pbest optimum upload speed is 9.74 Mbps, (FM Radio receiver length is 3.7 cm using Position algorithm and Pso algorithm), improved Gbest optimum upload speed is 38.87 Mbps (FM Radio receiver length is 50 cm using Position algorithm and PSO algorithm as shown in Figure 14) using FMDH Antenna . Table 6 shows local best input internet speed , pbest internet speed , Gbest internet speed using FMDH antenna. best location, Position , PSO Algorithm.

Table6 Comparison of Local best Input, improved Pbest, Gbest output internet speed using FMDH Antenna and best Location.

Iteration And Location, Longitude: 79.78115100 Latitude: 11.82959700 distance (d) between Mobile device to Cell Tower d=336 metre	Input Download 4G Internet speed in Mbps IDL P_i^t	Input Upload 4G Internet speed in Mbps IUL P_i^t	Output Download 4G Internet speed in Mbps Using FMDH antenna length =3.7 cm ODL P_{bi}^t	Output Upload 4G Internet speed in Mbps using FMDH Antenna Length= 3.7 cm OUL P_{bi}^t	Output Download 4G Internet speed in Mbps using FMDH antenna Length= 50 cm ODL g_b^t	Output Download 4G Internet speed in Mbps using FMDH antenna Length =50 cm OUL g_b^t	Input Internet speed of signal strength in dBm	Output Internet speed of Pbest signal strength in dBm using FMDH Antenna	Output Internet speed of Gbest signal strength in dbm using FMDH Antenna	Update particles' velocities for Download and Upload Internet speed using FMDH Antenna $DLV_i^{t+1}=W.IDLV_i^t+C_1U_i^t(ODLP_{bi}^t-IDLp_i^t)+C_2U_2^t(ODLg_b^t-IDLP_i^t)$ $UPV_i^{t+1}=W.IULV_i^t+C_1U_i^t(OULP_{bi}^t-IULp_i^t)+C_2U_2^t(OULg_b^t-IULP_i^t)$
1	8.6	2.8	24.48	9.74	70.89	38.87	-106	-58	-18	$DLV_{i=1}^{t+1}$ =80.01,$ULV_{i=1}^{t+1}$ =43.87
2	1.91	2.35	30.49	9.28	70.89	38.87	-106	-58	-18	$DLV_{i=2}^{t+2}$ =99.4 ,$ULV_{i=2}^{t+2}$ =44.31
3	3.91	2.76	30.09	8.86	70.89	38.87	-109	-58	-18	$DLV_{i=3}^{t+3}$ =95,$ULV_{i=3}^{t+3}$ =43.07
4	3.15	1.91	25.11	8.70	70.89	38.87	-106	-63	-18	$DLV_{i=4}^{t+4}$ =91.45,$ULV_{i=4}^{t+4}$ =44.61
5	2.70	0.86	58.95	7.01	70.89	38.87	-110	-55	-18	$DLV_{i=5}^{t+5}$ =126.28,$ULV_{i=5}^{t+5}$ =45.02
6	1.84	1.63	51.66	6.43	70.89	38.87	-103	-55	-18	$DLV_{i=6}^{t+6}$ =120.71,$ULV_{i=6}^{t+6}$ =42.9
7	2.58	2.39	52.8	7.58	70.89	38.87	-106	--55	-18	$DLV_{i=7}^{t+7}$ =120.37,$ULV_{i=7}^{t+7}$ =42.53
8	2.30	1.16	58.4	7.68	70.89	38.87	-110	-40	-18	$DLV_{i=8}^{t+8}$ =126.53,$ULV_{i=8}^{t+8}$ =45.09
9	3.31	1.12	69.3	7.67	70.89	38.87	-96	-40	-18	$DLV_{i=9}^{t+9}$ =142.03,$ULV_{i=9}^{t+9}$ =45.16

Model 3 - Design of SAT FMD Antenna with Magnet winding coil using Location, Position and PSO algorithm.

- SAT FMD Antenna combined satellite based antenna and FMD Antenna and Magnet winding coil.
- SAT FMD Antenna helps to tracking Satellite Antenna to improve Signal strength from -120 dBm to -12 dBm.

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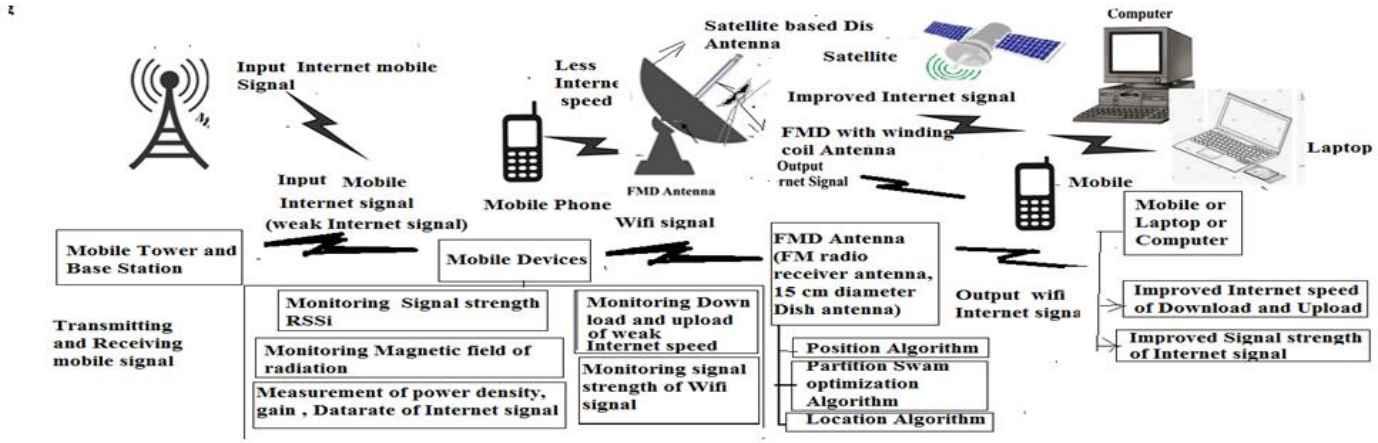

Figure 15.Block diagram of Design SAT FMD Antenna using Position, PSO, Particle Swarm optimization algorithm for improve internet speed at worst Location**.**

- When no signal from Mobile base station SAT FMD Antenna with Magnet winding coil supports radiation particle track from second loab at ground area position to move First loab and main loab radiation and then track to Satellite improve the lowest download speed 0.01Mbps and 0.06 Mbps to Maximum optimum download speed 65 Mbps and upload 7 Mbps.
- Particles of radiation track from second loab to First loab and then moves to Satellite.

Particles of radiation track can be track directly to satellite the internet speed improved

Figure 15 and 16 shows design of SAT FMD Antenna. SAT FMD Antenna has Satellite based Antenna, FM radio Receiver Antenna and Dish Antenna. The Advance Satellite based Antenna has high gain it can be received internet signal with high signal strength. The high signal strength makes high optimum internet signal received from mobile Tower. If mobile Internet signal strength is very low in some location this satellite based Antenna receives internet

signal to increase signal strength for improved internet signal of speed. Total gain of SATFMD Antenna= Gain FMD antenna + Gainof Satellite dishantenna= 58.5+24.65 = 83.15 dB.

Table 1 represent the received internet signal gain -5 dB. This gain is not able to receive optimum internet speed signal from min loab of cell Tower. Mobile Antenna received internet signal gain normally -5 dB , this negative gain is received from side loab of Cell tower radiation pattern. If we want optimum internet speed receive and transmit from mobile phone antenna , we need positive gain of Antenna Design need. Design of SAT FMD antenna makes positive gain 83.15 dB, it can be receive signal strength 0 dBm to -10 dBm , this signal strength can be received maximum internet speed 65.5 Mbps. The Design of SAT FMD Antenna has used in Telemedicine Mobile unit and Hospital at the location of Mahatma Gandhi Medical College and Research Institute (MGMCRI), Pondicherry, INDIA.

The Telemedicine Mobile unit need high speed internet for receive and transmit medical big volume data from mobile Telemedicine unit and Hospital. location is longitute 79.7785653,latitude: 11.81063. SAT Finder Tool used Track to Insat 4A of satellite to receive location of Hospital of longitute 79.77836 degree, latitude: 11.8116521 degree as shown in Figure 16.

Figure 16.Design of SATFMD Antenna improved nternet speed using SAT Tracking from Insat 4A Satellite from Telemedicine application..

Mobile Tower cell ID location is longitute 79.7785653,latitude: 11.8116521. Mobile phone has received low internet speed of download is 6.20 Mbps and upload is 0.73 Mbps. SAT FMD Antenna track from INSat 4A using SAT Finder and Location algorithm fro track satellite , Position algorithm for vary FM radio receiver length, PSO Algorithm for get optimum Internet speed and track to sideloab to Main loab of cell Tower (GSM Cell ID 241600524, GSM Location Area Code , 51094). Mobile phone received main loab radiation, signal strength has improved from -106 to-12 dBm as shown in Figure 17.low internet speed of download is 6.20 Mbps and upload is 0.73 Mbps are improved optimum Internet speed of download 65.3 Mbps and upload 8.05 Mbps as shown in Figure 18, Table 8

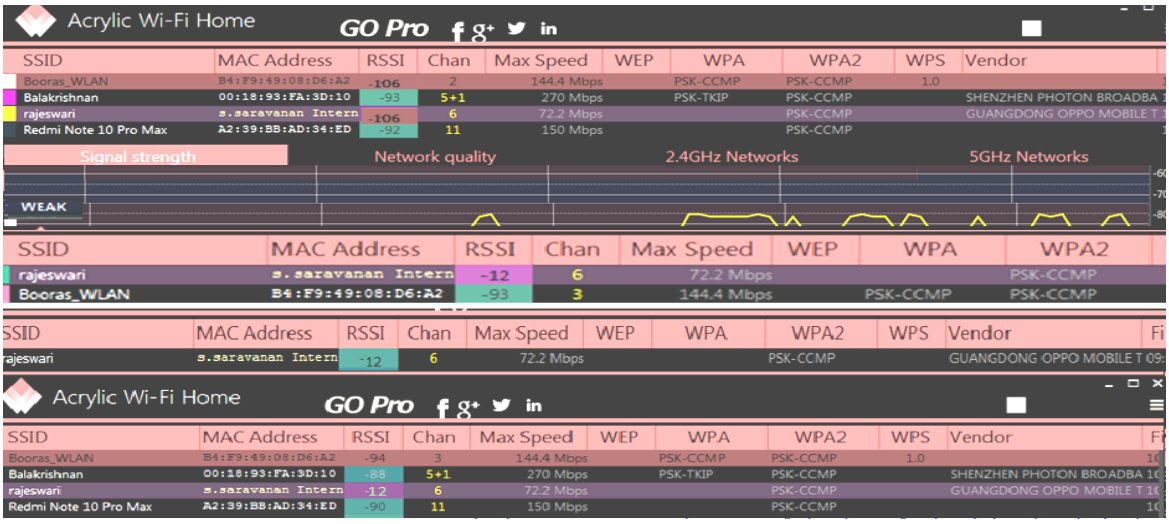

Figure 17. Signal strength improved from -106 dbm to -12 (mobile user MAC Address: S.SaravananIntern) using SAT FMD Antenna.

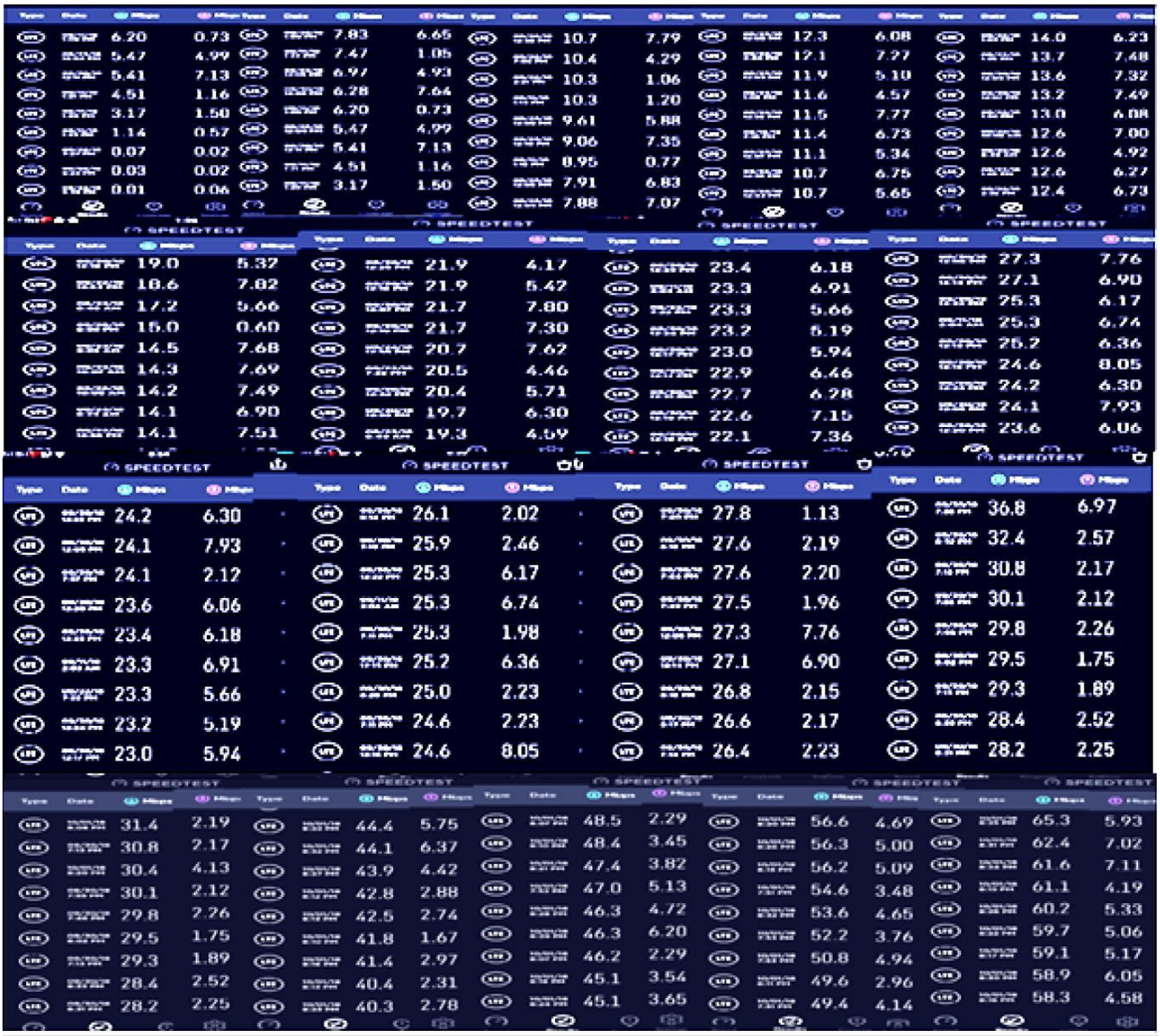

Figure 17.Experimental Result of Improved Internet speed using SATFMD Antenna

Table7 Improved Internet speed Pbest, Gbest using SAT FMD Antenna , Location and Position and PSO algorithm.

Iteration And Location,Longitude: 79.78115100 Latitude: 11.82959700 d=571 metre	Local best Input Download 4G IDL P_i^t	best Input Upload 4G Internet speed in Mbps IUL P_i^t	Pbest Output Download 4G Pbest Internet speed in Mbps Using SATFMD Antenna length =3.7 m ODL P_{bi}^t	Pbest Output Upload 4G Pbest using SAT FMD Antenna Length= 3.7 cm OUL P_{bi}^t	Gbest Output Download 4G Gbest Internet speed in Mbps using SAT FMD Antenna Length= 50 cm ODL g_b^t	Gbest Output Download 4G Gbest Internet speed in Mbps using SATFMD Antenna Length =50 cm OUL g_b^t	Input Local best RSSI in dBm	Output Pbest RSSI in dBm using SAT FMD Antenna	Output Gbest RSSI dbm Using SAT FMD Antenna	Update particles' velocities for Download and Upload Internet speed using SAT FMD Antenna $DLV_i^{t+1}=W.IDLV_i^t+C_1U_i^t(ODL P_{bi}^t-IDLp_i^t)+C_2U_2^t(ODLg_b^t-IDLP_i^t)$ $UPV_i^{t+1}=W.IULV_i^t+C_1U_i^t(OUL P_{bi}^t-IULp_i^t)+C_2U_2^t(OULg_b^t-IULP_i^t)$
1	8.6	2.8	25.9	6.74	65.3	8.05	-106	-50	-12	$DLV_{i=1}^{t+1}$ =75.84,$ULV_{i=1}^{t+1}$ =10.05
2	1.91	2.35	27.3	7.76	65.3	8.05	-106	-50	-12	$DLV_{i=2}^{t+2}$ =90.62,$ULV_{i=2}^{t+2}$ =11.97
3	3.91	2.76	27.5	7.76	65.3	8.05	-109	-40	-12	$DLV_{i=3}^{t+3}$ =86.82 ,$ULV_{i=3}^{t+3}$ =11.15
4	3.15	1.91	36.8	6.97	65.3	8.05	-106	-38	-12	$DLV_{i=4}^{t+4}$ =97.64, $ULV_{i=4}^{t+4}$ =12.06
5	2.70	0.86	42.8	2.97	65.3	8.05	-110	-30	-12	$DLV_{i=5}^{t+5}$ =104.54, $ULV_{i=5}^{t+5}$ =10.16
6	1.84	1.63	46.2	6.37	65.3	8.05	-103	-21	-12	$DLV_{i=6}^{t+6}$ =109.66,$ULV_{i=6}^{t+6}$ =12.02

7	2.58	2.39	48.5	6.20	65.3	8.05	-106	-17	-12	$DLV_{i=7}^{t+7}$ =110.48,$ULV_{i=7}^{t+7}$ =10.33
8	2.30	1.16	56.2	5.09	65.3	8.05	-110	-16	-12	$DLV_{i=8}^{t+8}$ =118.74, $ULV_{i=8}^{t+8}$ =11.68
9	3.31	1.12	59.7	6.05	65.3	8.05	-96	-14	-12	$DLV_{i=9}^{t+9}$ =120.22,$ULV_{i=9}^{t+9}$ =12.72

The input Internet local best download speed 8.6 Mbps, upload speed 2.8 mbps are improved pbest optimum download speed 59.7 Mbps , Upload speed 7.76 Mbps (FM radio receiver Antenna length is 3.7 cm), improved Gbest optimum download speed 65.3 Mbps, upload internet speed 8.05 Mbps as shown in Table 7. The velocity of particle of download and upload are updated as shown in Table 7. The local best, Pbest ,Gbest ,the velocity of particle of download and upload, signal strength are updated using PSO Algorithm, Position algorithm for position FM radio receiver length is updated, Location algorithm for satellite track to Location of Mobile phone using SAT FMD Antenna as shown in Table 8. [12][13[14][15].

Model 4 SAT FMDH Antenna generate Magnetic field strength by magnetic winding coil using Location, Position, Particle swam Algorithm and Genetic for improve Internet speed.

SAT FMDH Antenna makes low upload internet speed when no signal in the area the signal receive from satellite Signal.

- Genetic Algorithm helps improve the upload speed by step by step from Input upload internet speed.
- Input upload Internet speed improve using magnet winding coil that add to SAT FMDH Antenna.
- Helical Antenna with Magnet winding coil to make SAT FMDH Antenna to improve optimum solution of upload internet speed**.**
- Genetic Algorithm helps to generate magnetic field strength step by step to get Optimum solution by SAT FMDH with Magnetic winding coil.

Figure 19. Design of SAT FMDH Antenna for Improve Internet speed.

Figure 19 shows design of SAT FMDH Antenna for Improve Internet speed. SAT FMDH consist of Satellitte Antenna with FMDH Antenna. The Total gain of SAT FMDH= Gain of Satellite Antenna + Gain of FMDH=24.65 dB+ 74.36 dB=99.01 dB. The high gain of SATFMDH Antenna can be received Optimum signal strength -8 dBm from mainloab Radiation of Ceel Tower.

Genetic Algorithm and PSO Algorithm for Improve Internet speed using SATFMDH Antenna.

GA is the method of solving problems by utilizing the processes of selection, crossover and mutation. Genetic Algorithm is started with a set of solutions (represented by chromosomes) called population. Solutions from one population are taken and used to form a new population**.**

The Genetic algorithm (GA) is the most popular methods improve magnetic field strength of Internet signal and increase Data rate of weak internet signal. PSO Algorithm select best magnetic field strength for improve data rate of weak internet signal using FMDH and magnet winding coil Antenna.Helical antenna Helps improve the Transmission of Internet speed so improve upload internet speed.PSO Algorithm selected high Magnetic field strength that generates by Effective antenna then allows crossover of GA algorithm for generate new high Magnetic field strength of particles for improve Data rate of Internet signal.Each particle crossover generate low magnetic field strength by mobile Antenna.Magnetic field strength particle improved magnetic field by crossover FMD antenna with winding coil and Mobile Antenna.

The best solution selected by PSO algorithm then crossover magnetic field strength to generate new magnetic field strength for improve data rate of Internet signal.The improved data rate by magnetic field strength by FMD antenna with Magnet winding coil crossover by Helical antenna for improve best solution of data rate of down load and upload internet signal.The best solution of Internet signal improve optimum solution generate optimum magnetic field strength by SAT FMDH Antenna with winding coil.[1\[12][13[14][15].

Location ,Position and Particle swarm Algorithm and genetic Algorithm for Improve Internet speed using FMDH Antenna

Step 1: **Initialization Location Algorithm** , Update Input Internet signal Frequency and bandwidth and update, Measure maximum limited Internet speed.

Step 2: Update the Location of longitude, latitude of Mobile device Position $x_i = x_1 , x_2 , x_3 \ldots . x_N$, and update Base station Cell Tower ID.

Step 3:Update Input Internet signal strength ($RSSI_i = RSSI_1 , RSSI_2 , RSSI_3 \ldots . RSSI_N$) at each location

Step 4: If (Signal strength >65 dBm), Update Download and upload internet speed.

Step 5: Update Pbest optimum Download and upload internet speed.

else

Step 6 : **Initialization Position Algorithm for Fit FMDH antenna.**

Step 7: Update distance between mobile device and mobile tower d_i),

Update Cell Tower Receiver Antenna Height (T_i)

Find Distance from Mobile Device to Cell Tower Antenna Height $D_V=\sqrt{d_i^2+T_i^2}$ and

Measure Dish Antenna Position angle $\boldsymbol{\theta}= \sin^{-}(T_i/ D_V)$

Step 8: Fit Dish antenna angle **θ** for receive internet signal from mobile Tower.

Step:9Measure Focal length(L**)** of Radio receiver Antenna using $F= (D * D) / (16 * c)$, D is a diameter of Dish antenna , C is depth of Dish antenna.

Step 10: Radio Receiver length = Focal length of dish antenna

Step 11: Update Pbest Download and upload Internet speed. and signal strength of RSSI.

Step 12: Radio Receiver length > Focal length of dish antenna

Step 13: Update Gbest Download and upload Internet speed. and signal strength of RSSI

Step 14: Update Gbest Download and upload Internet speed. and signal strength of RSSI.

Step 15: if signal strength <-65 dBm

Step 16: if Pbest and Gbest internet speed = 0

Null radiation by side loab , Need to Aliment the Satellite based Antenna INSat 4A Satellite in the worst Location using SAT Finder tool.

Latitude: 11.81063 degree

Longitude: 79.77836 degree

Azimuth: 164.53 degree

Magnetic: 166.15 degree

Current Elevation: 75.61 degree.

Polarization:15.04 degree

Step 17: update download and Upload Internet speed and signal strength

Step 18:: **Initialization of genetic Algorithm**

Step 19: Initial population

Step 20: Fitness function

Step 21: Selection

Step 22: Crossover

Step 23: Mutation

Step 24: Initialization of PSO

Step 25: Change the Mobile Node Location $x_i = x_1 , x_2 , x_3 \ldots . x_N$ and Update Signal strength and Internet speed of Download and upload speed.

Step 26: if(Pbest < Gbest)

Gbest is Optimum solution Internet speed , Update Gbest Internet speed

else

Pbest is Optimum Solution Update Pbest

Step 27 if (Pbest && Gbest=0)

Step 28 Null . Radiation pattern by Side loab from Mobile Tower.

Step 29: Change Location and initialization of Position and PSO Algorithm PSO Algorithm selected best Internet speed from Figure 20

Iteration 1 makes crossover the best internet speed of particle is selected by PSO Algorithm and Genetic Algorithm ,Particle 1=C[1]=[6.092; 0.113; 0.054;0.046] Mbps from Figure 20.

Iteration 3 makes crossover the best internet speed of particle is selected by PSO Algorithm and Genetic Algorithm , Particle [3]=C[3]=[10.937; 0.321; 0.289; 0.282] Mbps from Figure 20..Figure 21 Iteration 2&4 Improved upload Best Internet speed selected using PSO.

Figure 21 shows Iteration 2&4 Improved upload Best Internet speed selected using PSO.

Iteration 2 makes crossover the best internet speed of particle is selected by PSO Algorithm and Genetic Algorithm Particle 2=C[2]=[2.752; 0.704; 0.296; 0.222] Mbps from Figure 21.

Iteration 4 makes crossover the best internet speed of particle is selected by PSO Algorithm and Genetic Algorithm Particle [4]=C[4]= [23.911; 1.083; 0.980; 0.923] Mbps from Figure 21.

PSO Algorithm selected best Internet speed from Figure 22

Iteration 5 makes crossover the best internet speed of particle is selected by PSO Algorithm and Genetic Algorithm Particle 5= Particle [5]=C[5]=[77.432; 3.958; 3.679; 2.856] Mbpsfrom Figure 22..

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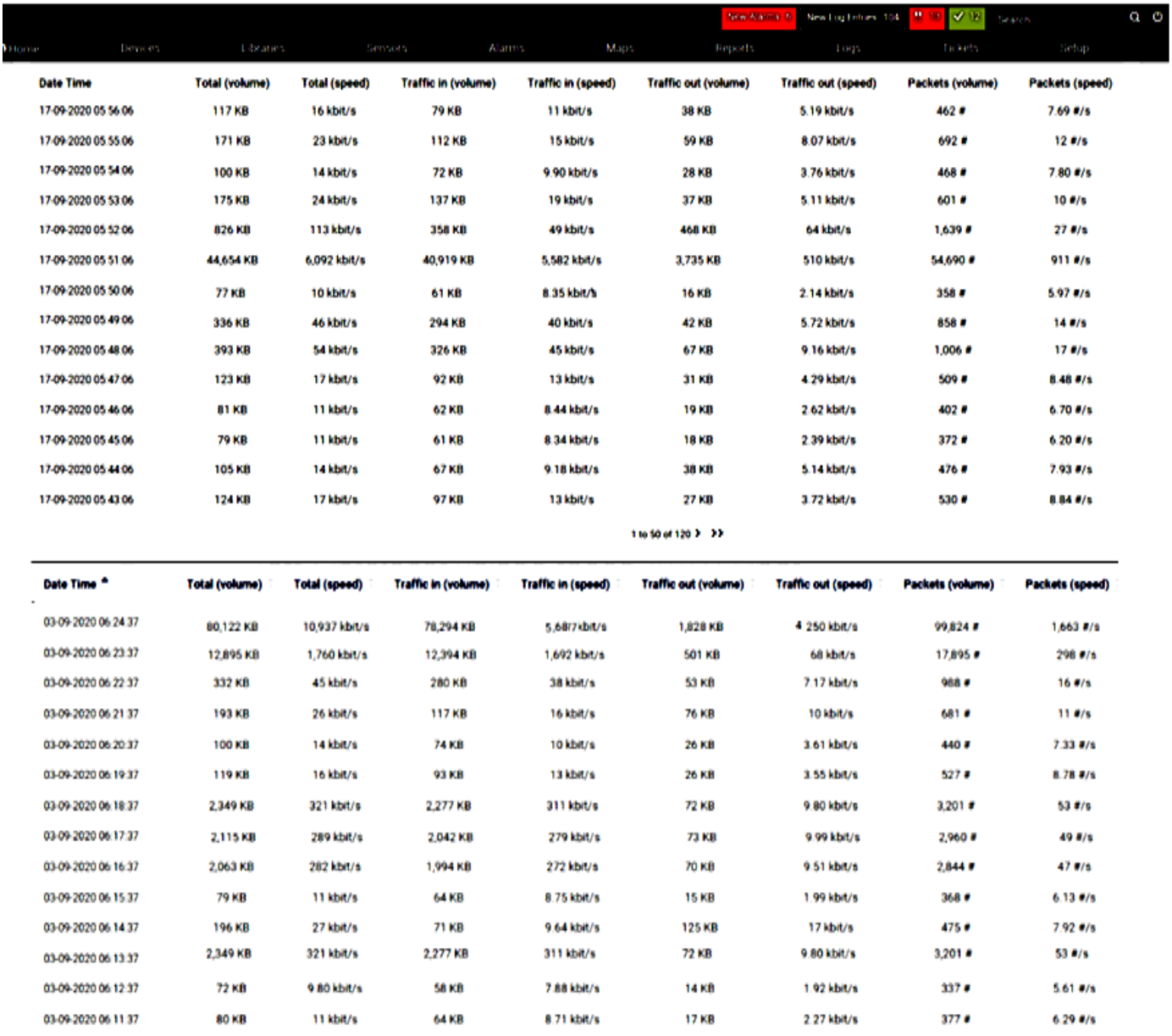
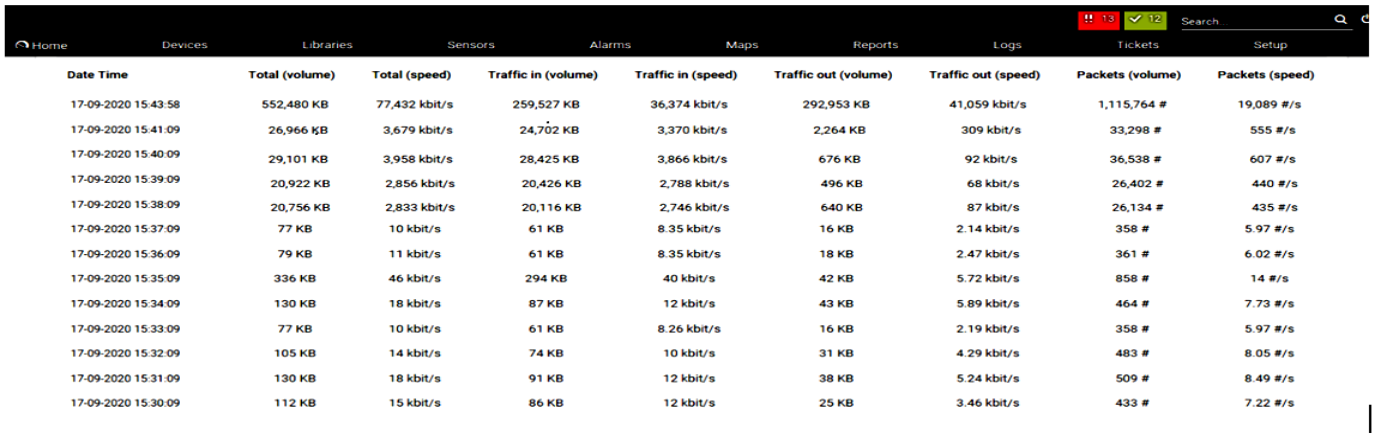


Date Time	Total (volume)	Total (speed)	Traffic in (volume)	Traffic in (speed)	Traffic out (volume)	Traffic out (speed)	Packets (volume)	Packets (speed)
17-09-2020 05:56:06	117 KB	16 kbit/s	79 KB	11 kbit/s	38 KB	5.19 kbit/s	462 #	7.69 #/s
17-09-2020 05:55:06	171 KB	23 kbit/s	112 KB	15 kbit/s	59 KB	8.07 kbit/s	692 #	12 #/s
17-09-2020 05:54:06	100 KB	14 kbit/s	72 KB	9.90 kbit/s	28 KB	3.76 kbit/s	468 #	7.80 #/s
17-09-2020 05:53:06	175 KB	24 kbit/s	137 KB	19 kbit/s	37 KB	5.11 kbit/s	601 #	10 #/s
17-09-2020 05:52:06	826 KB	113 kbit/s	358 KB	49 kbit/s	468 KB	64 kbit/s	1,639 #	27 #/s
17-09-2020 05:51:06	44,654 KB	6,092 kbit/s	40,919 KB	5,582 kbit/s	3,735 KB	510 kbit/s	54,690 #	911 #/s
17-09-2020 05:50:06	77 KB	10 kbit/s	61 KB	8.35 kbit/s	16 KB	2.14 kbit/s	358 #	5.97 #/s
17-09-2020 05:49:06	336 KB	46 kbit/s	294 KB	40 kbit/s	42 KB	5.72 kbit/s	858 #	14 #/s
17-09-2020 05:48:06	393 KB	54 kbit/s	326 KB	45 kbit/s	67 KB	9.16 kbit/s	1,006 #	17 #/s
17-09-2020 05:47:06	123 KB	17 kbit/s	92 KB	13 kbit/s	31 KB	4.29 kbit/s	509 #	8.48 #/s
17-09-2020 05:46:06	81 KB	11 kbit/s	62 KB	8.44 kbit/s	19 KB	2.62 kbit/s	402 #	6.70 #/s
17-09-2020 05:45:06	79 KB	11 kbit/s	61 KB	8.34 kbit/s	18 KB	2.39 kbit/s	372 #	6.20 #/s
17-09-2020 05:44:06	105 KB	14 kbit/s	67 KB	9.18 kbit/s	38 KB	5.14 kbit/s	476 #	7.93 #/s
17-09-2020 05:43:06	124 KB	17 kbit/s	97 KB	13 kbit/s	27 KB	3.72 kbit/s	530 #	8.84 #/s

1 to 50 of 120 › ››

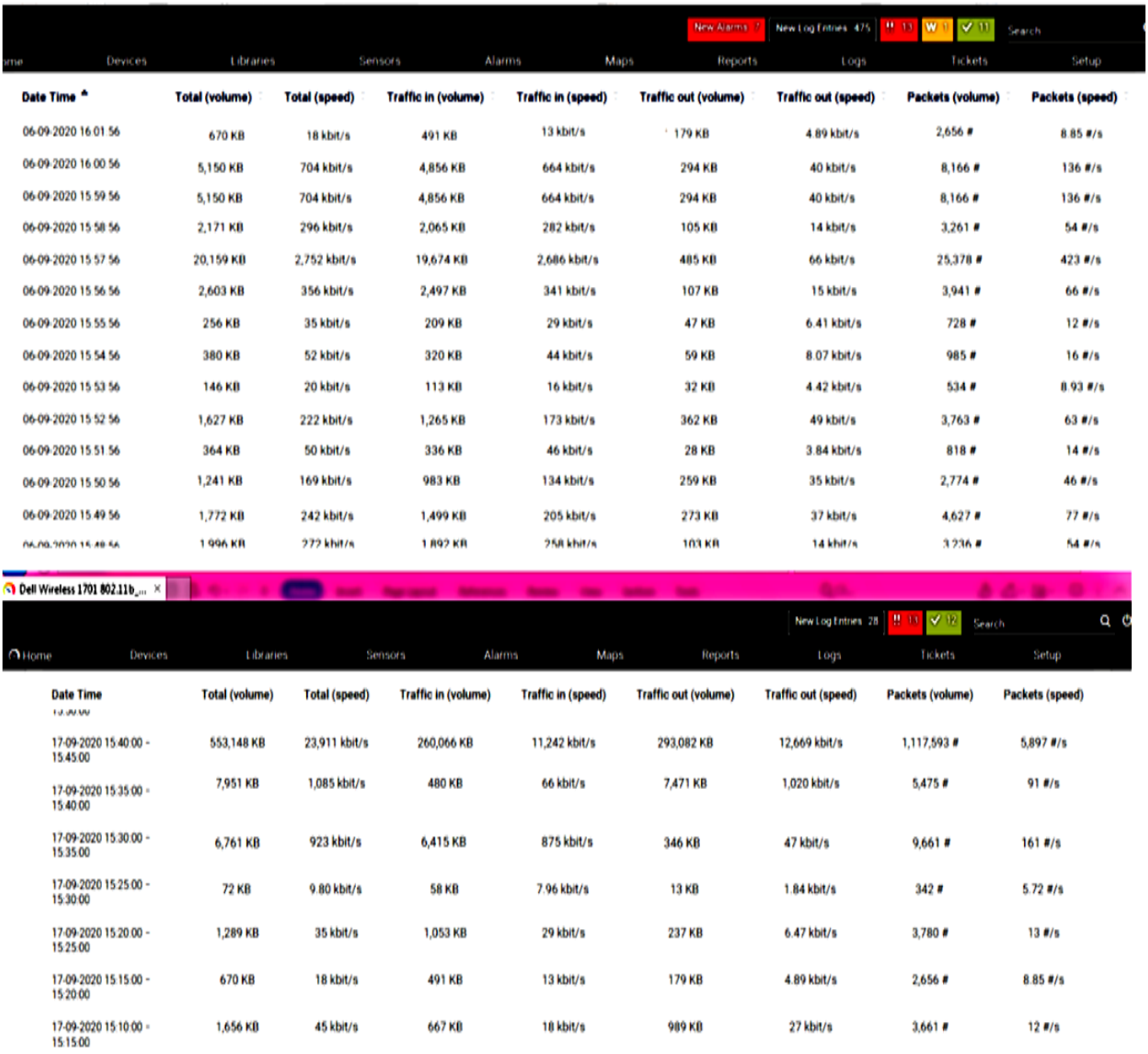
Date Time	Total (volume)	Total (speed)	Traffic in (volume)	Traffic in (speed)	Traffic out (volume)	Traffic out (speed)	Packets (volume)	Packets (speed)
03-09-2020 06:24:37	80,122 KB	10,937 kbit/s	78,294 KB	5,687 kbit/s	1,828 KB	4 250 kbit/s	99,824 #	1,663 #/s
03-09-2020 06:23:37	12,895 KB	1,760 kbit/s	12,394 KB	1,692 kbit/s	501 KB	68 kbit/s	17,895 #	298 #/s
03-09-2020 06:22:37	332 KB	45 kbit/s	280 KB	38 kbit/s	53 KB	7.17 kbit/s	988 #	16 #/s
03-09-2020 06:21:37	193 KB	26 kbit/s	117 KB	16 kbit/s	76 KB	10 kbit/s	681 #	11 #/s
03-09-2020 06:20:37	100 KB	14 kbit/s	74 KB	10 kbit/s	26 KB	3.61 kbit/s	440 #	7.33 #/s
03-09-2020 06:19:37	119 KB	16 kbit/s	93 KB	13 kbit/s	26 KB	3.55 kbit/s	527 #	8.78 #/s
03-09-2020 06:18:37	2,349 KB	321 kbit/s	2,277 KB	311 kbit/s	72 KB	9.80 kbit/s	3,201 #	53 #/s
03-09-2020 06:17:37	2,115 KB	289 kbit/s	2,042 KB	279 kbit/s	73 KB	9.99 kbit/s	2,960 #	49 #/s
03-09-2020 06:16:37	2,063 KB	282 kbit/s	1,994 KB	272 kbit/s	70 KB	9.51 kbit/s	2,844 #	47 #/s
03-09-2020 06:15:37	79 KB	11 kbit/s	64 KB	8.75 kbit/s	15 KB	1.99 kbit/s	368 #	6.13 #/s
03-09-2020 06:14:37	196 KB	27 kbit/s	71 KB	9.64 kbit/s	125 KB	17 kbit/s	475 #	7.92 #/s
03-09-2020 06:13:37	2,349 KB	321 kbit/s	2,277 KB	311 kbit/s	72 KB	9.80 kbit/s	3,201 #	53 #/s
03-09-2020 06:12:37	72 KB	9.80 kbit/s	58 KB	7.88 kbit/s	14 KB	1.92 kbit/s	337 #	5.61 #/s
03-09-2020 06:11:37	80 KB	11 kbit/s	64 KB	8.71 kbit/s	17 KB	2.27 kbit/s	377 #	6.29 #/s

Figure 20 Experimental Iteration 1&3ImprovedBest upload Internet speeds selected using PSO



Date Time	Total (volume)	Total (speed)	Traffic in (volume)	Traffic in (speed)	Traffic out (volume)	Traffic out (speed)	Packets (volume)	Packets (speed)
17-09-2020 15:43:58	552,480 KB	77,432 kbit/s	259,527 KB	36,374 kbit/s	292,953 KB	41,059 kbit/s	1,115,764 #	19,089 #/s
17-09-2020 15:41:09	26,966 KB	3,679 kbit/s	24,702 KB	3,370 kbit/s	2,264 KB	309 kbit/s	33,298 #	555 #/s
17-09-2020 15:40:09	29,101 KB	3,958 kbit/s	28,425 KB	3,866 kbit/s	676 KB	92 kbit/s	36,538 #	607 #/s
17-09-2020 15:39:09	20,922 KB	2,856 kbit/s	20,426 KB	2,788 kbit/s	496 KB	68 kbit/s	26,402 #	440 #/s
17-09-2020 15:38:09	20,756 KB	2,833 kbit/s	20,116 KB	2,746 kbit/s	640 KB	87 kbit/s	26,134 #	435 #/s
17-09-2020 15:37:09	77 KB	10 kbit/s	61 KB	8.35 kbit/s	16 KB	2.14 kbit/s	358 #	5.97 #/s
17-09-2020 15:36:09	79 KB	11 kbit/s	61 KB	8.35 kbit/s	18 KB	2.47 kbit/s	361 #	6.02 #/s
17-09-2020 15:35:09	336 KB	46 kbit/s	294 KB	40 kbit/s	42 KB	5.72 kbit/s	858 #	14 #/s
17-09-2020 15:34:09	130 KB	18 kbit/s	87 KB	12 kbit/s	43 KB	5.89 kbit/s	464 #	7.73 #/s
17-09-2020 15:33:09	77 KB	10 kbit/s	61 KB	8.26 kbit/s	16 KB	2.19 kbit/s	358 #	5.97 #/s
17-09-2020 15:32:09	105 KB	14 kbit/s	74 KB	10 kbit/s	31 KB	4.29 kbit/s	483 #	8.05 #/s
17-09-2020 15:31:09	130 KB	18 kbit/s	91 KB	12 kbit/s	38 KB	5.24 kbit/s	509 #	8.49 #/s
17-09-2020 15:30:09	112 KB	15 kbit/s	86 KB	12 kbit/s	25 KB	3.46 kbit/s	433 #	7.22 #/s

Figure 21 Iterations improved upload Best Internet speed selected using PSO.



New Alarms 7 | New Log Entries 475 | Search

Devices | Libraries | Sensors | Alarms | Maps | Reports | Logs | Tickets | Setup

Date Time	Total (volume)	Total (speed)	Traffic in (volume)	Traffic in (speed)	Traffic out (volume)	Traffic out (speed)	Packets (volume)	Packets (speed)
06-09-2020 16:01:56	670 KB	18 kbit/s	491 KB	13 kbit/s	179 KB	4.89 kbit/s	2,656 #	8.85 #/s
06-09-2020 16:00:56	5,150 KB	704 kbit/s	4,856 KB	664 kbit/s	294 KB	40 kbit/s	8,166 #	136 #/s
06-09-2020 15:59:56	5,150 KB	704 kbit/s	4,856 KB	664 kbit/s	294 KB	40 kbit/s	8,166 #	136 #/s
06-09-2020 15:58:56	2,171 KB	296 kbit/s	2,065 KB	282 kbit/s	105 KB	14 kbit/s	3,261 #	54 #/s
06-09-2020 15:57:56	20,159 KB	2,752 kbit/s	19,674 KB	2,686 kbit/s	485 KB	66 kbit/s	25,378 #	423 #/s
06-09-2020 15:56:56	2,603 KB	356 kbit/s	2,497 KB	341 kbit/s	107 KB	15 kbit/s	3,941 #	66 #/s
06-09-2020 15:55:56	256 KB	35 kbit/s	209 KB	29 kbit/s	47 KB	6.41 kbit/s	728 #	12 #/s
06-09-2020 15:54:56	380 KB	52 kbit/s	320 KB	44 kbit/s	59 KB	8.07 kbit/s	985 #	16 #/s
06-09-2020 15:53:56	146 KB	20 kbit/s	113 KB	16 kbit/s	32 KB	4.42 kbit/s	534 #	8.93 #/s
06-09-2020 15:52:56	1,627 KB	222 kbit/s	1,265 KB	173 kbit/s	362 KB	49 kbit/s	3,763 #	63 #/s
06-09-2020 15:51:56	364 KB	50 kbit/s	336 KB	46 kbit/s	28 KB	3.84 kbit/s	818 #	14 #/s
06-09-2020 15:50:56	1,241 KB	169 kbit/s	983 KB	134 kbit/s	259 KB	35 kbit/s	2,774 #	46 #/s
06-09-2020 15:49:56	1,772 KB	242 kbit/s	1,499 KB	205 kbit/s	273 KB	37 kbit/s	4,627 #	77 #/s
[illegible]	1,996 KB	272 kbit/s	1,892 KB	258 kbit/s	103 KB	14 kbit/s	3,236 #	54 #/s

Dell Wireless 1701 802.11b,...

New Log Entries 28 | Search

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Date Time	Total (volume)	Total (speed)	Traffic in (volume)	Traffic in (speed)	Traffic out (volume)	Traffic out (speed)	Packets (volume)	Packets (speed)
[illegible]								
17-09-2020 15:40:00 - 15:45:00	553,148 KB	23,911 kbit/s	260,066 KB	11,242 kbit/s	293,082 KB	12,669 kbit/s	1,117,593 #	5,897 #/s
17-09-2020 15:35:00 - 15:40:00	7,951 KB	1,085 kbit/s	480 KB	66 kbit/s	7,471 KB	1,020 kbit/s	5,475 #	91 #/s
17-09-2020 15:30:00 - 15:35:00	6,761 KB	923 kbit/s	6,415 KB	875 kbit/s	346 KB	47 kbit/s	9,661 #	161 #/s
17-09-2020 15:25:00 - 15:30:00	72 KB	9.80 kbit/s	58 KB	7.96 kbit/s	13 KB	1.84 kbit/s	342 #	5.72 #/s
17-09-2020 15:20:00 - 15:25:00	1,289 KB	35 kbit/s	1,053 KB	29 kbit/s	237 KB	6.47 kbit/s	3,780 #	13 #/s
17-09-2020 15:15:00 - 15:20:00	670 KB	18 kbit/s	491 KB	13 kbit/s	179 KB	4.89 kbit/s	2,656 #	8.85 #/s
17-09-2020 15:10:00 - 15:15:00	1,656 KB	45 kbit/s	667 KB	18 kbit/s	989 KB	27 kbit/s	3,661 #	12 #/s

Figure 22 Iteration 5 improved upload Best Internet speed selected using PSO.

PSO Algorithm and Phases of Genetic Algorithm

Step 1. Initialization of Population(Coding)

- Every gene represents a parameter (variables) in the solution. This collection of parameters that forms the solution is the chromosome.
- The population is a collection of chromosomes
-
- The collections of parameters of Data rate of upload Internet speed in Mbps. Generate the random of function f(x)=a+b+c+d;
  The P Best solution of data rates speed of upload Internet speed in Mbps are selected from Input from Particle 1 and 2.
- Particle 1=C[1]=[6.092; 0.113; 0.054;0.046] Mbps
- Magnetic Field strength of particle 1=[0.020, . 00037, 0.00018,0.00015] Tesla
- Particle 2=C[2]=[2.752; 0.704; 0.296; 0.222] Mbps
- Magnetic Field Strength of particle 2=[0.009, 0.002, 0.0009, 0.0007] Tesla
- Proposed system of Selected G Best Data rate upload internet speed in Mbps of Particle 3 using SAT FMDH Antenna with winding coil
- Particle [3]=C[3]=[10.937; 0.321; 0.289; 0.282] Mbps
- Magnetic Field density of particle 3=[0.036, 0.0010, 0. 0009, 0.0009] Tesla
- The proposed system of Selected G Best Data rate upload internet speed Particle 4 using SATFMDH Antenna with Magnet winding coil.
- Particle [4]=C[4]= [23.911; 1.083; 0.980; 0.923] Mbps
- Magnetic Field strength of particle 4=[0.0797, 0.0036, 0.0032, 0.0030] Tesla
- The proposed system of Selected G Best Data rate upload internet speed Particle 5 using SATFMDH Antenna with Magnet winding coil.
- Particle [5]=C[5]=[77.432; 3.958; 3.679; 2.856] Mbps
- Magnetic Field strength of particle 5=[0.2581, 0.0131, 0.0122, 0.0095] Tesla

Step 2. Fitness Function (Evaluation Function)

- The fitness score helps to select the best particle of best solution of Magnetic field strength by PSO algorithm will be used for reproduction and generate by Antennas.
- Fitness Function also known as the Evaluation Functions evaluates a given solution is to the optimum solution of the datarate of Internet signal.
- f_i=F_0bj[i]= Abs[a+b+c+d]
- Fitness Function of First particle (Input Upload data rate of Internet speed)
- f_1=F_0bj[1]= Abs[6.092+ 0.113+ 0.054+0.046]=6.305 Mbps
- Fitness Function of First particle magnetic field=0.0210 Tesla
- Fitness Function of second particle (Input data rate of upload Internet speed)
- f_2=F_0bj[2]= Abs[2.752+ 0.704+ 0.296+ 0.222]=3.974 Mbps
- Fitness Function of second particle magnetic field strength = 0.0132 Tesla
- Fitness Function of Third particle using SATFMD Antenna (Proposed system)
- f_6=F_0bj[3]=Abs[10.937+ 0.321+ 0.289+ 0.282]=11.829 Mbps
- Fitness Function of Third particle magnetic field strength = 0.03943 Tesla
- Fitness Function of Fourth particle using SATFMD Antenna with Magnet winding coil (Proposed system)
- f_7=F_0bj[4]=Abs[23.911+ 1.083+ 0.980+ 0.923]=26. 899 Mbps

- Fitness Function of Fifth particle using SATFMDH Antenna (Proposed system)
- f_8=F_0bj[5]=Abs[77.432+ 3.958+ 3.679+ 2.856]=87.915 Mbps
- Fitness Function of Fifth particle magnetic field= 0.29305 Tesla
- Total of Fitness=$f_1+f_2+f_3+f_4+f_5$=6.305+3.974+11.829+26. 899+87.915= 136.922 Mbps

3. Selection

- Thus Fitness proportionate selection is used, which is also known as roulette wheel selection, in genetic algorithms for selecting the best solutions by PSO algorithm for recombination.
- If **fi** is the fitness of individual Data rate internet speeds in the population, its probability of being selected is

$$p_i = \frac{f_i}{\sum_{j=1}^{N} f_j},$$

where N is the number of individuals in the population

- The Probability for cach chromosome of tests of Datarate internet speeds is formatted by P[i]=Fitness[i]/ Total of Fitness
- Probability of Fitness proportionate selection of Particle 1 (Input Upload Internet speed)
- P[1]=Fitness[1]/Total of Fitness=6.305/136.922=0.0460
- Probability of Fitness proportionate selection of Particle 2 (Input Upload Internet speed)
- P[2]=Fitness[2]/Total of Fitness=3.974/136.922=0.0290
- Probability of Fitness proportionate selection of Particle 3 (Proposed system using SATFMDH Antenna with winding coil)
- P[3]=Fitness[3]/Total of Fitness=11.829/136.922=0.0863
- Probability of Fitness proportionate selection of Particle 4 (Proposed system using SAT FMD Antenna)
- P]4]=Fitness[4]/Total of Fitness=26.899/136.922=0.1964
- Probability of Fitness proportionate selection of Particle 5 (Proposed system using SATFMDH Antenna)
- P]5]=Fitness[5]/Total of Fitness=87.915/136.922=0.6420
- C[1]= 0.0460
- C[2]= 0.0460+0.0290=0.075
- C[3]= 0.0460+0.0290+0.0863=0.1613
- C[4]= 0.0460+0.0290+0.0863+0.1964=0.3577
- C[5]= 0.0460+0.0290+0.0863+0.1964+0.6420
- =0.9997=1
- Total probability=1.

4. Reproduction

- Generation of off springs happen in 2 ways:
- Crossover
- Mutation

Data rate Input Internet upload speed in Mbps Pbest of Particle 1
C[1]=[6.092; 0.113; 0.054; 0.046]
Magnetic Field density of particle 1(B_1)=[0.020, . 0.0037, 0.00018,0.00015] Tesla
Average Magnetic Field strength of (B_1)=[0.020+0.0037+0.00018+0.00015] = 0.02403 Tesla
Data rate Input Internet speed in Mbps Pbest of Particle 2
C[2}=[2.752; 0.704; 0.296; 0.222]
Magnetic Field strength of particle 2=[B_2]=[0.009, 0.002, 0.0009, 0.0007] Tesla
Average Magnetic Field strength of (B_2)=[0.009+0.002,+0.0009,+0.0007] Tesla= 0.0126/4= 0.00315

- Data rate Internet upload speed in Mbps Pbest of Particle 3 using SATFMD Antenna with magnet winding coil.
- Data rate Internet speed in Mbps Gbest of Particle 3 in Proposed system using SATFMD Antenna with magnet winding coil.
- C[3]=[10.937; 0.321; 0.289;0.282]
- Magnetic Field strength of particle3=[B_3]=[0.036, 0.0010, 0. 0009, 0.0009] Tesla
- Average Magnetic Field strength of particle 3 =[B_3]=[0.036+0.0010+0. 0009+ 0.0009] = [0.036+0.0010+ 0. 0009+ 0.0009]/4= 0.0388 /4= 0.0097 Tesla

Data rate Upload Internet speed in Mbps Gbest of Particle 4 in Proposed system using SATFMD Antenna with Magnet winding coil.

- C[4]=[23.911; 1.085; 0.980;0.983]
- Magnetic Field strength of particle 4=(B_4)=[0.0797, 0.0036, 0.0032, 0.0030] Tesla
- Average Magnetic Field strength of particle 4 [B4]=Magnetic Field strength of particle 4=(B_4)=[0.0797+ 0.0036+ 0.0032+ 0.0030]/4 = 0.0895/4= 0.022375 Tesla
- Data rate Internet speed in Mbps Gbest of Particle 5 in Proposed system using SAT FMDH Antenna with Magnet winding coil.
- C[5] =[77.432; 3.958; 3.679;2.856]
- Average Magnetic Field strength of particle 5(B_5)= [0.2581+ 0.0131, 0.0122+ 0.0095] /4= 0.2807/4= 0.0701750305
- Crossover is the most vital stage in the genetic algorithm. During crossover, a random point is selected while mating a pair of parents to generate off springs.
- Crossover of Input Magnetic field strength Particles of Mobile antenna to make Best solution of data rate speeds)
- C[1]*C[2]=[6.092; 0.113; 0.054; 0.046]*[2.752; 0.704; 0.296; 0.222]
  =[6.092;2.752;0.704;0.296]
- [B_1]* [B_2] are crossover generate Best Magnetic Field strength of Input by Mobile antenna using PSO Algorithm.
- [B_1]* [B_2] = [0.020, 0.009, 0.002, 0.0009]
- Average of Magnetic field strength of crossover [B_1]* [B_2] =
  [0.020+ 0.009+ 0.002+ 0.0009]/4= 0.03100081/4= 0.0077 tesla

Crossover of particles in Proposed system using Mobile Antenna and SATFMD Antenna with Magnet winding coil.
Mobile Antenna generate Magnetic Field Strength crossover to generate Magnetic field strength of SATFMD Antenna with Magnet winding coil make best Magnetic Field strength by B[3] * B[1] and B[3] * B[2] these make upload internet speed respectively C[3] * C[1] and C[3] * C[2]
C[3] * C[1]= [10.937; 0.321; 0.289;0.282]* [6.092; 0.113; 0.054; 0.046]
C[3] * C[1]= [10.937; 6.092, 0.321; 0.289]
B[3] * B[1]=[0.0364, 0.020, 0.00107, 0.0009]
Average of Magnetic field strength of crossover B[3] * B[1] =[0.0364+ 0.020+ 0.00107+ 0.0009]/4= 0.0145925 Tesla

- C[1] * C[4]=[6.092; 0.113; 0.054; 0.046]* [23.911; 1.085; 0.980;0.983]
- C[1] * C[4]=[6.092,23.911,1.085,0.983] Mbps
- B[1] * B[4]=[0.020, 0.0797, 0.0036, 0.0032]
- Average of Magnetic field particle of by crossover B[1] * B[4]=[0.020+ 0.0797+ 0.0036+0.0032]/4= 0.1065/4= 0.026625 tesla
- C[1] * C[5]=[6.092; 0.113; 0.054; 0.046]* =[77.432; 3.958; 3.679;2.856] Mbps
- C[1] * C[5]=[77.432,6.092,3.958,3.679] Mbps
- B[1] * B[5]=[0.258, 0.0203, 0.0131, 0.0122] Tesla
- Average of Magnetic field particle of by crossover B[1] * B[5]=[0.258+ 0.0203+ 0.0131+ 0.0122] /4 = 0.3036/4= 0.0759 Tesla
- C[3]*C[2]= [10.937; 0.321; 0.289;0.282]* [2.752; 0.704; 0.296; 0.222]
- C[3] * C[2]= [10.937, 2.752, 0.704, 0.321]
- B[3] * B[2]= [0.036, 0.0091, 0.0023, 0.00107]
- Average of Magnetic field strength of crossover of B[3]*B[2]=[0.036+0.0091+0.0023+ 0.00107]/4= 0.04847/4= 0.0121175
- C[2]*C[4]= [2.752; 0.704; 0.296; 0.222]*
  [23.911; 1.085; 0.980;0.983]
- C[2]*C[4]=[23.911,2.752,1.085,0.983]
- B[2]*B[4]=[0.0797, 0.0091, 0.0036, 0.0032]
- Average of Magnetic field strength of crossover of particle B[2]*B[4]
- =[0.0797+ 0.0091+ 0.0036+ 0.0032]/4= 0.0956/4= 0.0239
- C[2]*C[5]= [2.752; 0.704; 0.296; 0.222]* [77.432; 3.958; 3.679;2.856]
- C[2]*C[5]=[77.432, 3.958, 3.679, 2.856]
- Average of Magnetic field strength of crossover of particle B[2]*B[5]=[0.258+ 0.0131+ 0.0122,
- 0.00952]/4= 0.070155
- C[3]*C[4]= [10.937, 2.752, 0.704, 0.321]*
- [23.911; 1.085; 0.980;0.983]
- C[3]*C[4]= [23.911,10.937,2.752,1.085]
- Average of Magnetic field strength of crossover of particle B[3]*B{4}=[0.0797+0.0364+0.0091+0.00361]/4= 0.12881/4= 0.0322 Tesla
- C[2]*C[5]= [2.752; 0.704; 0.296; 0.222]* [77.432; 3.958; 3.679;2.856]
- C[2]*C[5]=[77.432, 3.958, 3.679, 2.856]
- Average of Magnetic field strength of crossover of particle B[2]*B[5]=[0.258+ 0.0131+ 0.0122,
- 0.00952]/4= 0.070155
- C[3]*C[4]= [10.937, 2.752, 0.704, 0.321]*
- [23.911; 1.085; 0.980;0.983]
- C[3]*C[4]= [23.911,10.937,2.752,1.085]
- Average of Magnetic field strength of crossover of particle B[3]*B{4}=[0.0797+0.0364+0.0091+0.00361]/4= 0.12881/4= 0.0322 Tesla
- C[4]*C[5]= [23.911; 1.085; 0.980;0.983]* [77.432; 3.958; 3.679;2.856]
- C[4]*C[5]=[77.432,23.911,3.958, 3.679]
- B[4]*B[5]=[0.258+0.0797+0.0131+0.0122]=0.363 tesla
- Average of Magnetic field strength of crossover of particle B[4]*B[5]=0.363/4= 0.09075 tesla

C[3]*C[5]= [10.937, 2.752, 0.704, 0.321]*
[77.432; 3.958; 3.679;2.856]
C[3]*C[5]=[77.432,10.937,3.958,3.679]

Average of Magnetic field strength of crossover of particle B[3]*B[5]=[0.258+0.0364+0.0131+0.0122]/4=
= 0.3197 /4=0.0799 tesla

- Mutation is a genetic operator used to maintain optimum solution from one generation of a population of genetic algorithm and PSO Algorithm to the next.
- C[3] * C[1]*C[2]= [10.937; 0.321; 0.289;0.282]* [6.092;2.752;0.704;0.296]
  =[10.937, 6.092, 2.752, 0.321]
- B[3] * B[1]*B[2]= [0.036, 0.020, 0.009, 0.0010]
- Average of Magnetic field strength of crossover of B[3] * B[1]*B[2]
  = [0.036+ 0.020+ 0.009+ 0.0010]/4= 0.066/4= 0.0165 Tesla
  Mutation is a genetic operator used to maintain optimum solution from one generation of a population of genetic algorithm and PSO Algorithm to the next.
- C[3] * C[1]*C[2]*c[4]= [10.937, 6.092, 2.752, 0.321]* [23.911; 1.085; 0.980;0.983]
- C[3] * C[1]*C[2]*c[4]=[23.911, 10.937, 6.092, 2.752]
- B[3]*B[1]*B[2]*B[4]= [0.0797, 0.036, 0.020, 0.009]
- Average of Magnetic field strength of crossover of B[3]*B[1]*B[2]*B[4]= [0.0797, 0.036, 0.020, 0.009] = [0.0797+ 0.036+ 0.020+ 0.009] /4= 0.1447/4= 0.036175 Tesla
- C[3] * C[1]*C[2]*c[4]*c[5]=[23.911, 10.937, 6.092, 2.752]* [77.432; 3.958; 3,679;2.856]

Crossover by Gbest Internet speed by PSO Algorithm and Genetic Algorithm C[3] * C[1]*C[2]*c[4]*c[5]=[77.432, 23.911, 10.937, 6.092]
B[3] * B[1]*B[2]*B[4]*B[5]=[0.2581, 0.0797, 0.0364, 0.0203]

- Average of Magnetic field strength of crossover of B[3] * B[1]*B[2]*B[4]*B[5]=[0.2581+ 0.0797+ 0.0364+ 0.0203]/4= 0.3945/4= 0.098625

Total Magnetic field =

- Average Magnetic Field of particle 1 [B_1]=0.024 tesla
- Average Magnetic Field of particle 2 [B_2]= 0.003 tesla
- Average Magnetic Field of particle 3 [B_3]= 0.0097 tesla
- Average Magnetic Field strength of particle 4 [B4]= 0.0223 tesla
- Average Magnetic Field of particle 5 [B_5]= 0.0701 tesla
- Average of Magnetic field of particle 6 by crossover [B_1]* [B_2] = 0.007 tesla
- Average of Magnetic field of particle 7 by crossover B[1]*B[3] = 0.0145 tesla
- Average of Magnetic field of particle 7 by crossover B[1]*B[4] = 0.0266 tesla
- Average of Magnetic field of particle 7 by crossover B[1]*B[5] = 0.0759 tesla
- Average of Magnetic field of particle 8 by crossover B[2]*B[3]= 0.0121 tesla
- Average of Magnetic field of particle 8 by crossover B[2]*B[4]= 0.0239 tesla
- Average of Magnetic field of particle 8 by crossover B[2]*B[5]= 0.0701 tesla
- Average of Magnetic field of particle 8 by crossover B[3]*B[4]= 0.0322 tesla
- Average of Magnetic field of particle 8 by crossover B[3]*B[4]= 0.0322 tesla
- Average of Magnetic field of particle 8 by crossover B[3]*B[5]= 0.0799 tesla
- Average of Magnetic field of particle 8 by crossover B[4]*B[5]= 0.363 tesla
- Average Magnetic field of particle by crossover B[3] * B[1]*B[2]= 0.0165 tesla
- Average of Magnetic field of particle by crossover B[3]*B[1]*B[2]*B[4]= 0.0361 tesla
- Average of Magnetic field of particle crossover of B[3] * B[1]*B[2]*B[4]*B[5]= 0.0986 tesla

Total Magnetic field by PSO and genetic Algorithm = 1.0 Tesla

Total Magnetic field (B)= 1.0 Tesla

- Light speed=$3*10^8$ m/sec
- Maximum Upload speed by by Genetic Algorithm= $3*10^8$ m/sec X1.0 tesla

=300 Mbps

- Airtel Provider limitation of upload is 80 Mbps.

The best performance of the optimum data rate upload internet speed by SATFMDH Antenna with winding coil =77 Mbps using Genetic Algorithm.

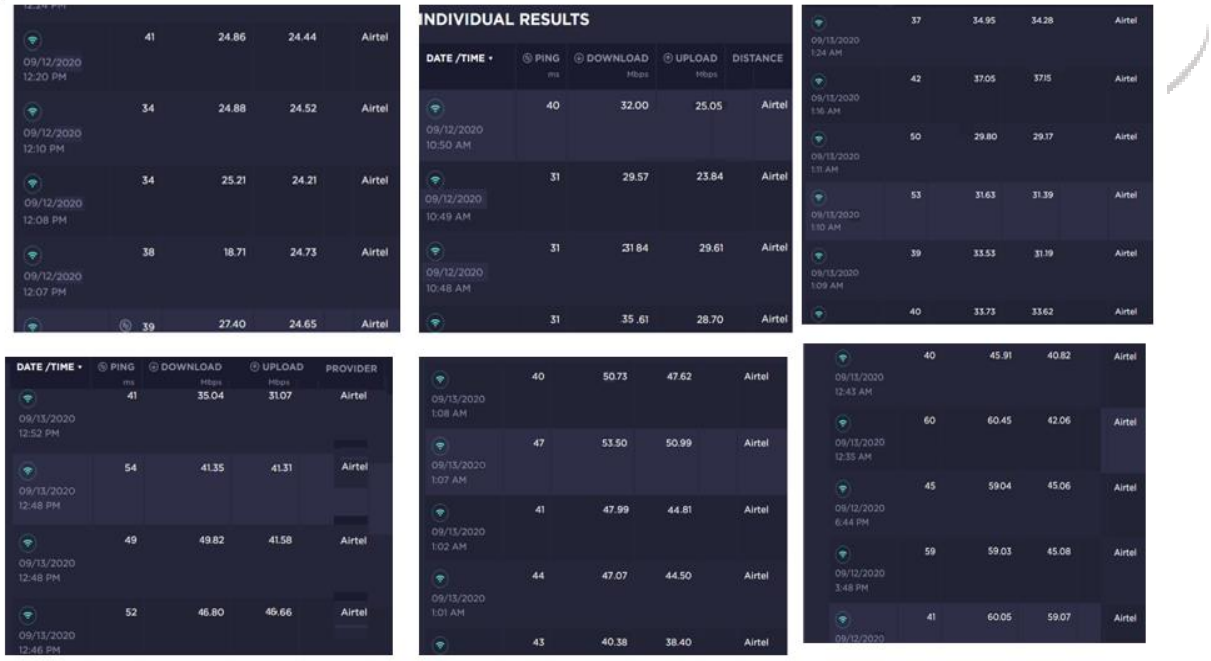

Figure 23 Internet speed Improved using SAT FMDH Antenna Pbest Iteration 1 to 6

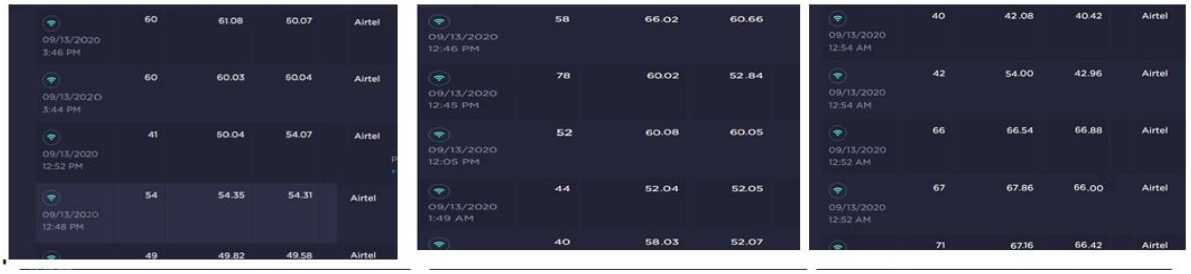

Figure 24 Internet speed Improved using SAT FMDH Antenna Pbest Iteration 7 to 9

Figure 24 Iteration 1 to 9 shows Pbest internet speed performance of 4G Internet Speed by SATFMDH Antenna. Iteration 1to 9 are Pbest internet speed using FM radio receiver length is 3.7 Cm. If Pbest and Gbest internet speed = 0, no Radiation from cell tower and null radiation by side loab of Cell tower, Need to Aliment the Satellite based Antenna INSat 4A Satellite in the worst Location using SAT Finder tool.(as shown in Figure 16 and 19)
Latitude: 11.81063 degree
Longitude: 79.77836 degree
Azimuth: 164.53 degree
Magnetic: 166.15 degree
Current Elevation: 75.61 degree.
Polarization:15.04 degree
The Aliment the Satellite based Antenna INSat 4A Satellite in the worst Location as repersents algorithm Step 15 t0 17. update download and Upload P best Internet speed as shown in Figure 34. The FM radio receiver length vary from 5 cm to 50 Cm. The optimum internet speed followed
Step 10: Radio Receiver length = Focal length of dish antenna (Focal length of Dish antenna=3.7 Cm)
Step 11: Update Pbest Download and upload Internet speed. and signal strength of RSSI.
Step 12: Radio Receiver length > Focal length of dish antenna (Radio Receiver length>3.7 cm)
Step 13: Update Gbest Download and upload Internet speed. and signal strength of RSSI
Step 14: Update Gbest Download and upload Internet speed.
Radio Receiver length is vary from 5 cm to 50 cm and updated gbest internet speed as shown in Figure 25. The comparison of Input Local best , Pbest and gbest internet speed using SATFMDH using position , location, PSO and genetic algorithm are used as shown in Table 8..

Radio Receiver Antenna Length in cm	Output 4G Internet of download speed (Mbps) (SAT FMDH Antenna with Magnet winding coil)	Output 4G Internet upload speed (Mbps)(SAT FMDH Antenna with Magnet winding coil)	Time taken (ms)
5	66.30	62.80	45
10	66.34	62.57	64
15	74.79	64.16	50
20	74.06	66.80	50
25	64.40	63.63	49
30	66.12	63.42	45
35	74.95	62.01	55
40	74.49	64.41	57
45	79.61	74.34	47
50	79.62	77.72	52

Figure 25. Gbest performance of 4G Internet Speed by SATFMDH Antennausing Location, position, PSO and Genetic Algorithm.

Table 8 Improved Internet speed using SATFMDH using Location, position, PSO and Genetic algorithm

IterationAnd Location, Longitude: 79.78115100 Latitude: 11. d=571 metre	Local best Input Download 4G Internet speed in Mbps IDL P_i^t	Local best Input Upload 4G Internet speed in Mbps IUL P_i^t	Pbest Output Download 4G Pbest Internet speed in Mbps Using SATFMDH Antenna length =3.7 cm ODL P_{bi}^t	Pbest bOutput Upload 4G PbestInternet speed in Mbps using SAT FMDH Antenna Length = 3.7 cm OUL P_{bi}^t	Gbest Output Download 4G Gbest Internet speed in Mbps using SATFMDH Antenna Length =50 cm ODL g_b^t	Gbest Output Download 4G Gbest Internet speed in Mbps using SATFMDH Antenna Length =50 cm OUL g_b^t	Input RSSI dBm	Output RSSI dBm using SAT FMDH Antenna	Output Internet speed of Gbest RSSI in dbm Using SAT FMDH Antenna	Update particles' velocities for Download and Upload Internet speed using SAT FMDH Antenna $DLV_i^{t+1}=W.IDLV_i^t+C_1U_i^t(ODLP_{bi}^t-IDLp_i^t)+C_2U_2^t(ODLg_b^t-IDLP_i^t)$ $UPV_i^{t+1}=W.IULV_i^t+C_1U_i^t(OULP_{bi}^t-IULp_i^t)+C_2U_2^t(OULg_b^t-IULP_i^t)$
1	8.6	2.8	25.21	24.73	79.62	77.72	-106	-25	-12	$DLV_{i=1}^{t+1}$ =89.47,$ULV_{i=1}^{t+1}$ =97.71
2	1.91	2.35	35.61	29.61	79.62	77.72	-106	-23	-10	$DLV_{i=2}^{t+2}$ =112.65,$ULV_{i=2}^{t+2}$ =103.49
3	3.91	2.76	37.05	34.28	79.62	77.72	-109	-20	-10	$DLV_{i=3}^{t+3}$ =110.69 ,$ULV_{i=3}^{t+3}$ =107.34
4	3.15	1.91	49.82	46.66	79.62	77.72	-106	-20	-10	$DLV_{i=4}^{t+4}$ =124.98, $ULV_{i=4}^{t+4}$ =121.42

5	2.70	0.86	53.50	50.99	79.62	77.72	-110	-18	-09	$DLV_{i=5}^{t+5}$ =129.56, $ULV_{i=5}^{t+5}$ =127.85
6	1.84	1.63	60.45	59.07	79.62	77.72	-103	-16	-09	$DLV_{i=6}^{t+6}$ =138.23,$ULV_{i=6}^{t+6}$ =134.39
7	2.58	2.39	61.08	60.07	79.62	77.72	-106	-16	-08	$DLV_{i=7}^{t+7}$ =137.38,$ULV_{i=7}^{t+7}$ =133.87
8	2.30	1.16	66.02	60.66	79.62	77.72	-110	-14	-08	$DLV_{i=8}^{t+8}$ =142.88, $ULV_{i=8}^{t+8}$ =136.94
9	3.31	1.12	67.86	66.88	79.62	77.72	-96	-12	-08	$DLV_{i=9}^{t+9}$ =142.70,$ULV_{i=9}^{t+9}$ =143.22

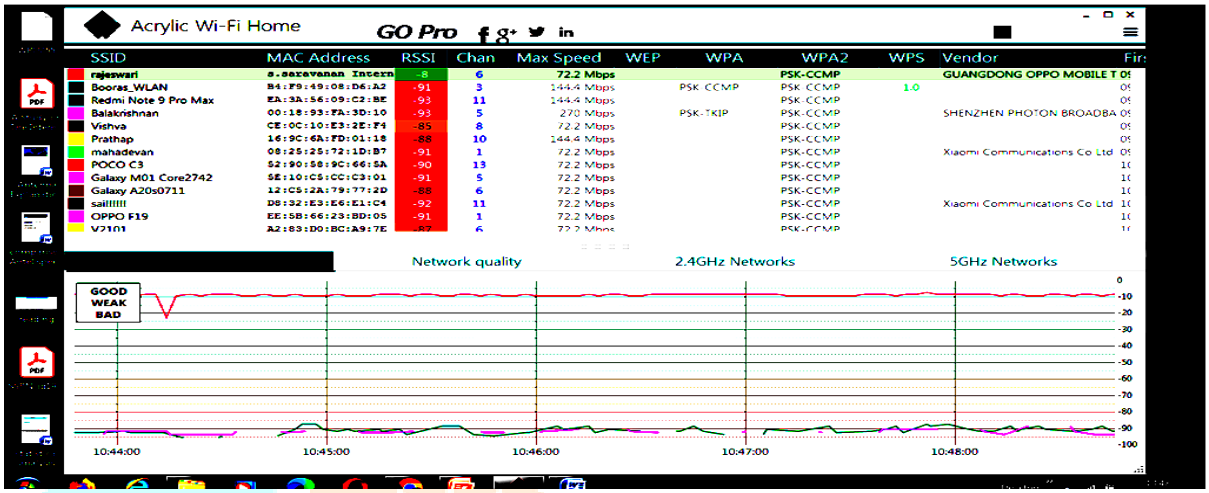

Figure 26 Improved Signal strength -110 dBm to -8 dBm using SATFMDH using Location, position, PSO and Genetic algorithm.

The MAC Address S.Saravanan Intern is Research Mobile user received signal strength is -106 dBm is improved -8 dBm using SATFMDH antenna as shown in Figure 26.. The input Internet local best download speed 8.6 Mbps, upload speed 2.8 Mbps are improved pbest optimum download speed 67.86 Mbps , Upload speed 66.88 Mbps (FM radio receiver Antenna length is 3.7 cm), improved Gbest optimum download speed 79.62 Mbps, upload internet speed 77.72 Mbps as shown in Table 9. The comparison of Input Local best, output of internet speed pbest and gbest using ,FMD, FMDH, SAT FMD, SATFMDH antennas and Algorithms used as shown in Table 9 and Table 10, [4][5]

Table 9 Comparison Best performance ofDownload Internet speed using Antennas and Algorithms.

Input 4G Internet Best Performance	Best Output of Download internet speed using FMD Antenna	Best Output Performance of Download internet speed using FMDH Antenna	Best Output performance of Download internet speed using SATFMD Antenna	Best Output Performance of Download internet speed using SATFMDH Antenna
Download Pbest speed=3.91 Mbps	Download Pbest Internet speed= 17.28 Mbps	Download Pbest Internet speed=69.3 Mbps (Best Location)	Download Pbest Internet speed=59.7 Mbps (Worst Location)	Download Pbest Internet speed=67.86 Mbps (Worst Location)
Signal strength -109	-85	-40	-14	-12
Download Gbest =8.6 Mbps	Download Gbest Internet Speed = 45.12 Mbps	Download Gbest Internet speed= 70.89 Mbps (Best Location)	Download Gbest Internet speed= 65.3Mbps (Worst Location)	Download Gbest Internet sp eed =79.62 (Worst Location)
Signal strength in -105 dBm	RSSI =-63 dBm	RSSI=-18 dBm	RSSI=-12 dBm	RSSI=8 dbm
Location Algorithm used	Location, Position, PSO Algorithm used.	Location, Position, PSO Algorithm used.	Location, Position, PSO Algorithm used.	Location, Position, PSO and Genetic Algorithm used.

Table 10. Comparison Best performance of Upload Internet speed using Antennas and Algorithms.

Input 4G Internet Best Performance	Best Output of Upload internet speed using FMD Antenna	Best Output Performance of Upload internet speed using FMDH Antenna	Best Output performance of Download internet speed using SATFMD Antenna	Best Output Performance of Upload internet speed using SATFMDH Antenna
Upload Pbest speed= 2.76 Mbps	Upload Pbest Internet speed=6.21 Mbps	Upload Pbest Internet speed= 9.74 Mbps (Best Location)	Upload Pbest Internet speed= 7.76 Mbps (Worst Location)	UPload Pbest Internet speed= 66.88 Mbps (Worst Location)
Signal strength=-109 dBm	RSSI=-85 dBm	RSSI=-40 dBm	RSSI=--14 dBm	RSSI=--12 dBm

Upload Gbest =2.8 Mbps	Upload Gbest Internet Speed =19.96 Mbps	Upload Gbest Internet speed= 38.87 Mbps (Best Location)	Upload Gbest Internet speed= 8.05 Mbps (Worst Location)	Upload Gbest Internet speed =77.72 Mbps (Worst Location)
Signal strength= - 106 dBm	RSSI= -63 dBm	RSSI=--18 dBm	RSSI=- 12 dBm	RSSI= -8 dbm
Location Algorithm used	Location, Position, PSO Algorithm used.	Location, Position, PSO Algorithm used.	Location, Position, PSO Algorithm used.	Location, Position, PSO and Genetic Algorithm used.

In comparison of Existing system optimum solution of download is 59 Mbps, Proposed system Optimum solution of download is 70.89 Mbps using FMDH, Optimum solution of download is 69.3 using SAT FMD Antenna , Optimum solution of download is 79.62 Mbps using SATFMDH Antenna as shown in Table 11.Table 12 shows Comparison Down load Internet speed in Existing system and Proposed system.Table 13 shows Comparison Upload Internet speed in Existing system and Proposed system.[1][2][3][4][5].

Table 11.Comparison Down load Internet speed in Existing system and Proposed system.

Provider	Year and System	Antenna used	MaximumLimit Of DownloadSpeed in Mbps	Best OptimumSolution of Download speed in Mbps	Signal strength in dBm	Location	Algorithmused
Broadband network.	**2014 Existing system**	**Non Antenna used**	**80**	**20**		**United states**	**scheduling algorithms**
IndoSAT	**2017,Existing system**	**No Antennaused**	**80**	**28.6**	**-83**	**Batuaji**	**No Algorithm used**
XL	**2017,Existing system**	**No Antennaused**	**80**	**29.9**	**-74**	**Batuaji**	**No Algorithm used**
Internet provider by European	**2018,Existing system**	**No Antennaused**	**80**	**59**		**European**	**Mathematical Estimation Algorithm**
Airtel	**2022,Existing system**	**No Antenna**	**80**	**37.95**	**-75**	**India**	**No Algorithm used**
Flying ad hoc networks (FANETs);	**2022,Existing system**	**Omni-DirectionalAntenna**	**80**	**54**		**India**	**Firefly Algorithm**
Airtel	**2022,Proposed System**	**FMD Antenna**	**80**	**45.12**	**-63**	**Pudhcherry,India**	**Position, Location, PSOAlgorithm used.**
Airtel	**2022, Proposed System**	**FMDH Antenna**	**80**	**70.89**	**-18**	**Puducherry, India**	**Position, Location, PSOAlgorithm used.**
Airtel	**2022 Proposed System**	**SAT FMD Antenna**	**80**	**69.3**	**-12**	**Puducherry, India**	**Position, Location, PSOAlgorithm used.**
Airtel	2022Proposed System	SAT FMDH Antenna	80	79.62	-8	Puducherry, India	Position, Location, PSO, Genetic Algorithm used.

Table 12.Comparison Down load Internet speed in Existing system and Proposed system.

Provider	Year and System	Antenna used	MaximumLimit of UploadSpeed in Mbps	Best ptimumSolution of Upload speed in Mbps	Signal strength in dBm	Location	Algorithmused
Wireleass Sensor Network	2009Existing system	No Antennaused	80	1 Mbps	-94		Ant Colony Optimization, a swarm intelligence based optimization technique,
Telkomsel	2017 ,Existing system	No Antenna used	80	12.4	-77	Tiban Indah	No Algorithm used
IndoSAT	2017, Existing system	No Antennaused	80	14.7	-83	Batuaji	No Algorithm used
Long Term Evolution (LTE)	2018Existing system	No Antenna used	80	Best CQI=55 Mbps,PFPS-60 Mbps,RR=50 Mbps	-	Akure, Nigeria	SchedulingAlgorithms
MANET	2019,Existing system	No Antennaused	80	40		Malaysia	Hybrid ACO and PSO algorithm
wireless sensor network	2020,Existing system	No antenna used	80	0.004		Bharatpur, Rajasthan, India	proficient bee colony-clustering protocol (PBC-CP)
wireless sensor networks	2022,Existing System	No antennaused	80	0.004		China	Particle swarm optimization and artificial bee colony

							algorithm
Vehicular Adhoc Networks (VANETs)	2022,Existing System	Dual Antenna	80	2 Mbps		India	Hybrid Genetic Firey Algorithm
Airtel	2022,Proposed System	FMD Antenna	80	19.56	-63	Pudhcherry,India	Position, Location, PSOAlgorithm used.
Airtel	2022,Proposed System	FMDH Antenna	80	38.87	-18	Puducherry, India	Position, Location, PSOAlgorithm used.
Airtel	2022,Proposed System	SAT FMD Antenna	80	8.05	-12	Puducherry, India	Position, Location, PSOAlgorithm used.
Airtel	2022, Proposed System	SAT FMDH Antenna	80	77.72	-8	Puducherry, India	Position, Location, PSO, Genetic Algorithm used.

Table 13.Comparison Upload Internet speed in Existing system and Proposed system

Existing System of Upload internet speed in Mbps															Proposed System of Upload internet speed in Mbps			
Iteration	**BE**	**PSO**	**SCh (RR, best CQI and PF)**	**PF**	**EVC**	**RR and PF**	**OBA**	**ML and TOW**	**Greedy And Genetic**	**SSA**	**Firefly (FF)**	**PSO**	**HSS FF**	**RA**	FMD Antenna using Location Position, PSO Algorithm	FMDH Antenna using Location Position, PSO, Algorithm	SAT FMD Antenna Using Location,Position, PSO Algorithm	SAT FMDH Antenna Using Location ,,Position, PSO ,Genetic Algorithm
1	3	1	2	0.2	0.01	4	0.3	4	1.6	0.1	0.5	0-27	0.02	10	12.54	20.68	8.05	62.80
2	5	2	2	0.4	0.012	4	0.2	6	8.8	0.15	0.6	0.3	0.15	20	14.34	21.67	6.36	62.57
3	7	1	2	0.6	0.014	3	0.3	8	16.8	0.17	0.7	0.45	6	25	15.34	19.67	6.90	64.16
4	13	1	23	0.7	0.0116	2	4	10	8	0.2	0.8	0.5	12	30	11.43	20.65	6.91	66.80
5	17	4.9	21	1	0.018	1.8	5	12	16	0.21	0.9	0.6	24	40	16.43	24.67	8.00	63.63
6		0.641	25	1.2	0.02	1.6	6	13	20	0.22	1.0	0.7	30	55	18.54	25.56	5.35	63.42
7		0.9	RR=50	4	0.02	1.4	7	16	21	0.23	1.2	0.8	40	60	17.96	27.93	7.11	64.41
8		0.629	CQI =55	1.2	0.02	1.2	8	23	22	0.24	1.3	0.9	48	63	18.96	30.67	7.02	74.34
9			PEPS=60	2	0.02	1.0	9	65	23.2	0.25	1.5	1.0	54	65	19.56	38.87	5.93	77.72
Gbest	17.0	4.9	60.0	2	0.02	4.0	10	65.0	23.2	0.25	1.5	1.0	54	65	19.56	38.87	8.05	77.72
Best Signal strength in dBm	-20	-31	-40	-46			-20	-36							-63	-18	-12	-8
year	2003	2017	2018	2015	2020	2022	2019	2021	2017	2020	2020	2020	2020	2020	2022	2022	2022	2022
Sensing channels	10	7	100	1	60	1	49	50	100	50	50	50	50	60	13	160	600	800

BE-Bandwidth Estimation Algorithm,PSO- Particle Swarm Optimization Algorithm ,SCh-Scheduling Algorithms ,RR-Round Robin Algorithm ,CQI=Channel Quality Information (CQI) Reporting Algorithm , PEPS=Projected Entangled Pair States Algorithm ,PF-PROPORTIONAL FAIR Algorithm ,EVA-Evolutionary Computing Algorithm,RR and PF=Round robin and PF-PROPORTIONAL FAIR ALGORITHM ,OBA-Optimal Bandwidth Allocation Algorithm ,ML and Two-machine learning algorithms and Two-way string-matching algorithm ,Greedy algorithm, Genetic Algorithm.,SSA-static single assignment form Algorithm ,FF- Firefly Algorithm ,PSO- Particle swarm optimization Algorithm ,CSO-Cat swarm optimization (CSO) Algorithm ,HSSFF-Hybrid salp swarm–firefly Algorithm ,RA-Rate adaptation Algorithms

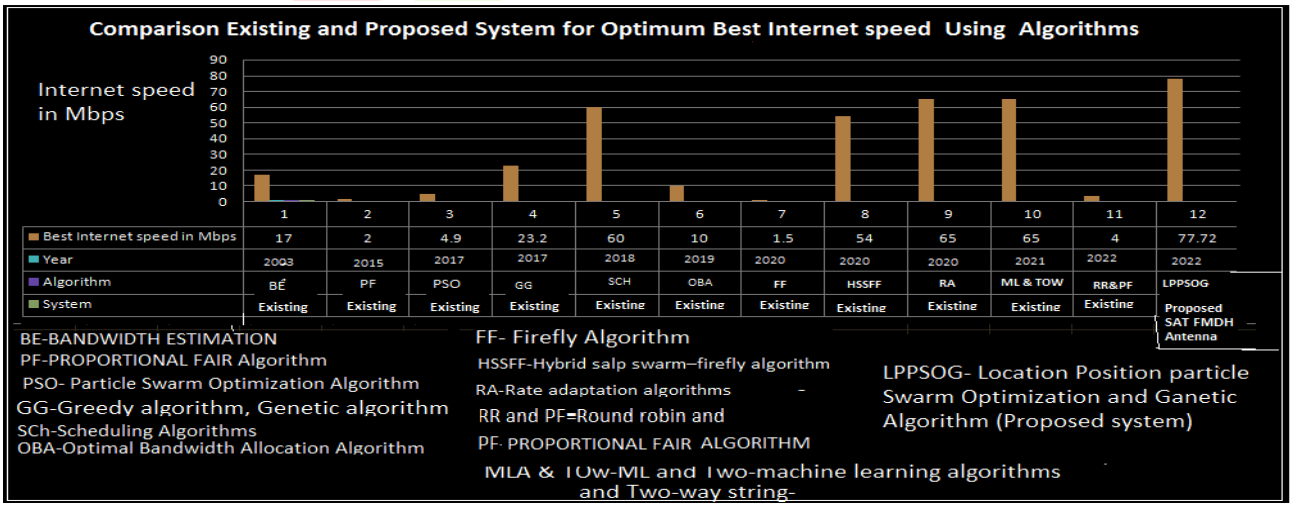

Figure 28 .Comparison of Existing and Proposed system for Best Internet speed using algorithms.

Figure 28 shows Comparison of Existing and Proposed system for Best Internet speed using algorithms.[4][12][13][14[15].

Conclusion

This objective has designed a SAT FMDH antenna for improved maximum High speed internet for download speed 79.62 Mbps and upload 77.72 Mbps using position, Location and Genetic algorithm.
The genetic Algorithm helps to improve Generate the magnetic field in SAT FMDH Antenna to improve the optimum 79.62 Mbps and upload 77.72 Mbps ,In Existing system Mobile device gives download speed 8.6 Mbps and Mbps upload 2.8 Mbps using Location algorithm.FMD Antenna using Position Algorithm , Location, and Particles swam algorithm improved optimum internet speed is 45.15 Mbps Download, 19.56 Mbps Upload speed.FMDH Antenna using position Algorithm and Particles swam algorithm improved optimum internet speed 70.89 Mbps Download, 38.87 Mbps Upload speed.SAT FMD Antenna using Position, Location and PSO Algorithm improved Download 65.3 Mbps and upload 5.93 Mbps Internet speed.The genetic Algorithm helps to improve Generate the magnetic field in SAT FMDH Antenna to improve the optimum download 79.62 Mbps and upload 77.72 Mbps .In Input signal strength is -105 dBm, that makes low internet speed of download 8.6 Mbps and upload 2.8 Mbps.In Proposed system of FMD Antenna (Gain 58.49 dB) improved -63 dBm , Improved internet download speed 45.15 Mbps, upload speed 19.36 Mbps.In Proposed system FMDH Antenna (Gain 97.08 dB) improved signal strength -18 dBm , improved internet download speed 70.89 Mbps, upload speed 38.87 Mbps.Satellite based SAT FMD Antenna (Gain 83.14 dB) makes high signal strength -12 dBm and Improved internet download speed 65.3 Mbps, upload speed 5.93 Mbps using PSO, Positiom, Location Algorithm. Satellite based SAT FMDH Antenna makes high signal strength -8 dBm and Gain 121.73 dB improved internet speed download 79.62 , upload speed 77.72 Mbps using PSO, Position, Location Algorithm and Genetic Algorithm.

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