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AIR & DDI

Reception survey for assessment of coverage area for satisfactory reception of DVB-T2 Transmitter

Located at Patna Bihar

PRASAR BHARATI

RESEARCH DEPARTMENT

ALL INDIA RADIO & DOORDARSHAN

Reception survey for assessment of coverage area for satisfactory reception of DVB-T2 Transmitter

Located at Patna

Bihar

Survey period (01.06.2017 to 08.06.2017)

Field Strength Measurement/Reception Survey Team

PROPAGATION LAB

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Location Map (3D View) of TV Tower Patna (Bihar)

6.0kW DVB-T2 Transmitter

HPT (TV) Tower, Patna

Introduction:

Modern broadcasting scenario is changing so rapidly that viewer of today wants something more in addition to what is being received through analogue mode of TV transmission. Innovative efforts in the field of broadcast technologies and new habits of audio-visual content have driven the need to define new broadcasting standards that allow for such a social evolution. Earlier digital transmission began with DVB (H) & DVB (T) transmission that made possible for reception of broadcast signal through hand held (Mobile Phone) or fixed/mobile TV receiving devices. Further due to its limitation (spectral efficiency, bandwidth & robustness), in 2009, DVB finalized the development of the second generation terrestrial transmission system DVB-T2 which is the new DVB standard for DTT. It allows the simultaneous transmission of multiple services, each one with a different configuration, and thus, with different robustness and quality. This permits new type of reception scenarios for these digital terrestrial signals, like mobile and handheld pedestrian reception scenarios. So DVB-T2 can be used for providing both fixed and mobile services within the same channel with number of configurations supported. Although, this new standard has been fundamentally designed for fixed reception (receiver devices with rooftop and set-top antennas) but now the DVB-T2 reception is also feasible in portable and mobile devices (Smart Mobile Phones, PCs, laptops or in-car receivers).In the process of modernization Doordarshan India has established DVB T2 Transmitters in its network with future plan to replace analogue transmitters with such DVB-T2 Transmitters. One of such transmitter has bee established at HPT-TV Tower Patna , (Bihar) & commissioned for DD National Transmission on UHF Band Ch#24 (498MHz).In this context Research Department is involved in carrying out propagation studies on DVB-T2 transmission to assist fixing of planning parameters/transmission configuration under existing terrain condition. The scope of work for the survey team of Research Department is to carry out field trial for prediction of coverage area for satisfactory reception. For this work a four member survey team carried out field strength survey during the period 01/06/2017 to 08/06/2017 along eight radials around the location of DVB-T2 Transmitter. The survey was carried out for variable height (from 03 meter to 10 meter) antenna mounted on a vehicle

Objective:

1. Ascertaining the coverage area for satisfactory reception of DVB-T2 Transmission.
2. To envisage minimum field strength value for satisfactory reception.

Equipment Used:

1. Spectrum Analyzer (Make: Anritsu, Model: MS 2035B & MS 2013E)
2. UHF Dipole antenna (Make: Anritsu, Model: MP663A)/ log periodic antenna
3. GPS Navigator (Make: Garmin, Model: Montana 650)
4. DVB-T2 Set Top Box
5. LED TV Receiver(Make: Sony)
6. IRD (Make: Ericsson)
7. Survey Van (fitted with 10 Meters Mast & Portable Generator etc)

Basic Data and Transmitter details

Transmitter Details:

Name of Station	:	HPT Patna, Bihar
Geometrical location of transmitter	:	LAT. N 25°35'37" LONG E 85°10'16"
MSL	:	59 meter
Surrounded area of transmitter	:	Urban, Dense population
Rated power	:	6KW
Forward power	:	5.91KW
Reflected power	:	10.0 W
VSWR(Voltage standing wave ratio)	:	1.05
Transmission mode	:	SDTV
Make	:	Harris
Model No.	:	Maxiva, ULX-6500T2
Frequency of operation	:	498 MHz
Channel No.	:	24
Date of commissioning	:	24/02/2016

Transmitting Antenna Details:

Make	:	SIRA
Type/Model	:	UHF PANEL ANTENNA UTV -01/24(4X4)
Antenna Gain	:	12dB
Antenna hight	:	154meter
Return Loss	:	30dB
Polarization	:	Horizontal

DVB-T2 Broadcast System:

DVB-T2 is the world's most advanced digital terrestrial transmission (DTT) system, offering more robustness, flexibility and at least 50% more efficiency than any other DTT system. It supports SD, HD, mobile TV, or any combination thereof. Like its predecessor, DVB-T2 uses OFDM (orthogonal frequency division multiplex) modulation with a large number of sub-carriers delivering a robust signal, and offers a range of different modes, making it a very flexible standard. DVB-T2 uses the same error correction coding as used in DVB-S2 and DVB-C2: LDPC (Low Density Parity Check) coding combined with BCH (Bose-Chaudhuri-Hocquengham) coding, offering a very robust signal. The number of carriers, guard interval sizes and pilot signals can be adjusted, so that the overheads can be optimized for any target transmission channel. The key new technologies in DVB-T2 are:

- Multiple Physical Layer Pipes allow separate adjustment of the robustness of each delivered service within a channel to meet the required reception conditions (for example in-door or roof-top antenna).It also allows receivers to save power by decoding only a single service rather than the whole multiplex of services.

- Alamouti coding is a transmitter diversity method that improves coverage in small-scale single-frequency networks.

- Constellation Rotation provides additional robustness for low order constellations.

- Extended interleaving, including bit, cell, time and frequency interleaving.

- Future Extension Frames (FEF) allows the standard to be compatibly enhanced in the future.

As a result, DVB-T2 can offer a much higher data rate than DVB-T or a much more robust signal. For comparison, the two bottom rows show the maximum data rate at a fixed C/N ratio and the required C/N ratio at a fixed (useful) data rate.

Transmission Parameter	**DVB-T**	**DVB-T2(New improved option in Red)**
FEC	Convolutional Coding + Reed Solomon(1/2,2/3,3/4,5/6,7/8)	LDPC + BCH(1/2,3/5,2/3,3/4,4/5,5/6)
Modes	QPSK, 16QAM, 64QAM	QPSK, 16QAM, 64QAM, 256QAM
Guard Interval	1/2, 1/8, 1/16, 1/32	1/4,19/128,1/8,19/256,1/16,1/32,1/128
FFT Size	2k, 8k	1k, 2k, 4k,8k,16k,32k
Scattered Pilot	8% of Total	1%,2%,4%,8% of total
Continual Pilot	2.6% of total	0.35% of total
Bandwidth	6,7,8 MHZ	1.7,5,6,7,8,10MHz
Typical data rate(UK)	29 Mbit/second	40 Mbit/second
Max data rate @20dB	29 Mbit/Second	47.8 Mbit/second
Required C/N Ratio @	16.7 dB	8.9dB

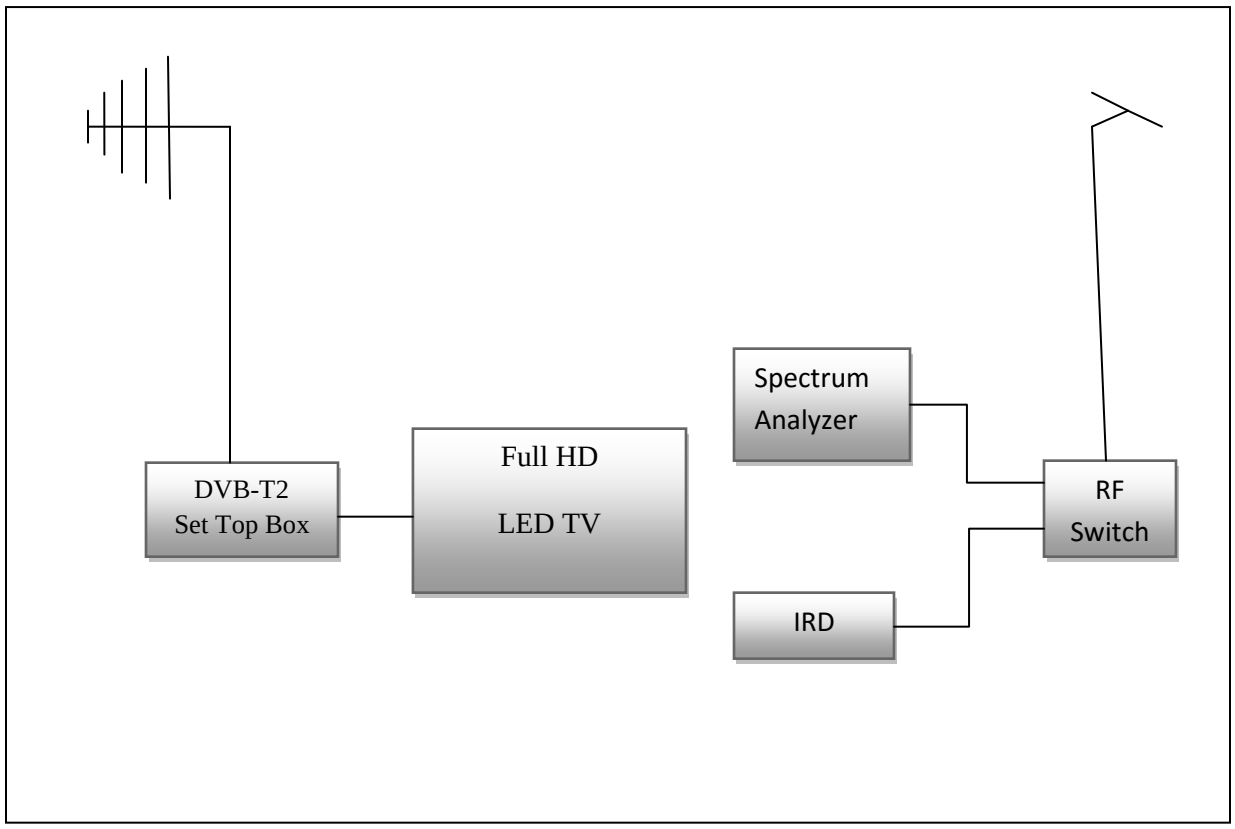
Modulation Parameters:

DVB-T2 standard offers a bigger choice of the OFDM parameters and modulation schemes depending upon application & reception mode. Combining various modulation schemes with FFT sizes and guard intervals allows construction of MFN and SFN networks designed for different applications: from low bit-rate but robust mobile reception to the high bit-rate fixed reception for domestic and professional use. Currently DVB-T2 transmitter, Patna operating with following set of Modulation parameters targeted for fixed antenna & handheld portable (smart phone) reception mode.

Operating Frequency	498MHz
Channel No.	#24(UHF, Band-IV)
Bandwidth	8 MHz
Number of Programme Content	TV : Five Services Radio: Nil
PLP Bit Rate:	6.17 M Bit/s
FFT	1K
Guard Interval	1/8
PLP Constellation	QPSK
PLP Rotation	Rotated
PLP Code Rate	1/2
Pilot Pattern	PP3
SISO/MISO	SISO
FEC Frame Length	Normal

System configuration:

The field trials system mainly consists of field strength measuring equipment, standard calibrated UHF Dipole antenna & Yagi receiving antenna for receiving horizontally polarized TV Broadcast signal, Portable Generator, 10 Meters electromechanically operated telescopic mast housed in a customized Survey Van of Research Department. A pictorial diagram is given below.



Measurement Set Up:

The field trials were carried out by utilizing mobile survey van of Research Department having 10 meter pneumatic telescopic mast. Field strength measurement was carried out, using Anritsu make Spectrum Analyzer & UHF Dipole Antenna. The whole system was assembled in a mobile van with power generating system (portable generator set). The two main components of the reception set up are DVB-T2 receiving system and field strength measuring system (Spectrum Analyzer). A calibrated UHF dipole antenna is used to receive the signal whereas for subjective assessment of the received signal was performed by using DVB-T2 set top box & a Sony make LED TV. To record Pre LDPC/BCH & MER data an Ericsson make professional IRD was used. In addition to this Garmin make GPS navigator was used for determination of the spot/location co-ordinate in six figures & radial distance from the transmitter location.

Selection of sites for measurement:

As far as practicable an open & safe spot/ location (overhead power and telephone cables, trees and other hazards were avoided) was chosen for the measurement of received field strength. Instead of cluster measurement (measurement at four to five spot for a given location), single sample method in this survey is preferred, because of the additional time that may be taken in making cluster measurements (due to the frequent raising or lowering of the receiving antenna & insufficient space along the motorable road side), or because of the hazards in moving the measuring vehicle while the antenna is fully erected. High tension overhead wires, close to high raise buildings & elevated flyovers/underpasses were avoided while collecting field strength data along a radial route.

Measurement Methodology:

A map of the largest available scale was used to mark the location of the transmitter. From the transmitter location 09 radials are drawn passing through the transmitter location along North, East, South, West, North-East(1&2), North-West, South East & South West directions. For prediction of the coverage area, field strength measurement along a radial was carried out by employing mobile survey van having 10Mtrs telescopic mast with rotor & tilt facility. For field strength measurement the survey vehicle was mostly parked in open space, raising the telescopic mast up to the required height of 10 meters & then rotating the antenna to align it along the direction of transmission source for getting optimum value of field strength & MER value and same for 03 meter height. While taking static reception measurement LAT/LONG, MSL & radial distance of each & every location was also recorded. Once all measurements have been undertaken, mast is fully retracted & then driven away for the next location. Since the purpose of the survey was to determine the primary coverage area for satisfactory reception so the measurement was carried out in static condition along motorable roads. The same procedures for field strength measurement/reception survey are adopted along all other eight radials. After data collection is over the FSM data are tabulated & interpreted on the basis of the findings.The quality of received audio/video was also analyzed by using DVB-T2 Set Top Box & SONY make receiver under given terrain conditions. The environment classification criteria are:

Rural	Areas with scarce isolated buildings, open fields.
Suburban	Small towns; residential areas with low building density and buildings not higher than two stories; wide roads or streets between buildings.
Urban	Big to medium sized cities, residential areas with high density of buildings; areas where buildings are higher than two stories and close distances between them
Large Cities	Densely populated cities having cluster of township with high rise building & skyscrapers

TV Broadcast Signal Propagation:

TV broadcast signal propagates from the transmitter by space wave propagation mechanisms i.e. Line of sight Propagation & travel straight way in propagating medium & undergoes all optical phenomena like Reflection, Refraction, Scattering, Diffraction etc while travelling through the medium. DVB T2 reception is largely affected by multipath, which changes along time due to the receiver travelling around the buildings. It is also important to point out other factors typical of urban reception environment such as traffic, speed change due to traffic lights and pedestrian crossings, etc. The field strength level, at a given point, not only depends on its distance from the transmitter, the frequency of transmission and the antenna heights but also on the long-term and short-term interferences caused by reflections of the natural environment (terrain configuration, vegetation) and the man-made environment. Thus the received signal must be considered as the vector sum of the wanted signal and many reflected signals. Due to the effect of reflected signals, the Field Strength/MER along a route shows severe fluctuation. Since, the measurements are made on public roads the reflected signals coming from other vehicles cannot be foreseen. The field strength test results therefore very rarely match the results of measurements obtained at the same place, at a different time.

Collection of field strength data:

The field strength data were collected along eight radials routes drawn (Annexure-I) around the transmitting antenna. At each & every spot/location along the radial the telescopic mast was expanded 3 meter to10 Meters from the ground level keeping the dipole antenna horizontally as the polarization of the radiated beam is horizontally polarized. The antenna position is being continuously rotated for optimized value of field strength in the direction of line of sight with respect to the transmitting antenna. The optimum field strength values are thus recorded. In addition to this the terrain a detail of each & every spot/location was also recorded along with the subjective assessment of the received audio/video quality on the basis of watching on DVB-T2 TV receiving system These collected data's are being tabulated in proper sequence to make it convenient for discussion & correlation with other parameters. The subjective assessment of received audio/video quality on TV receiver is graded as OK, FF-Frequent Freezing, F-Freeze & NT- Not Traceable. The field strength measurement values along with subjective assessment at each & every spot/location are recorded in a tabular form giving at an instance the trend for variation in received field strength/MER & signal reception quality with distance. In this report the received field strength & subjective assessment data collected along nine radials are tabulated accordingly in Table No.-1 to Table No.-9. On the basis of Table-1toTable-9, a coverage contour for DVB-T2 transmission has been drawn & annexed as in Annexure-II. Annexure III represents variation of Field strength along different radials. The code used for grading of the received signal is illustrated as follows.

Criteria for grading of received signal on the basis of subjective assessment:

Signal	OK/ Excellent	No impairment in received audio/video quality.
	FF	Received frame simultaneously appearing-disappearing leading to irritable reception.
	F	Received frame freeze permanently.
	NT	Not Traceable or No Signal.

Broadcast Service Area:

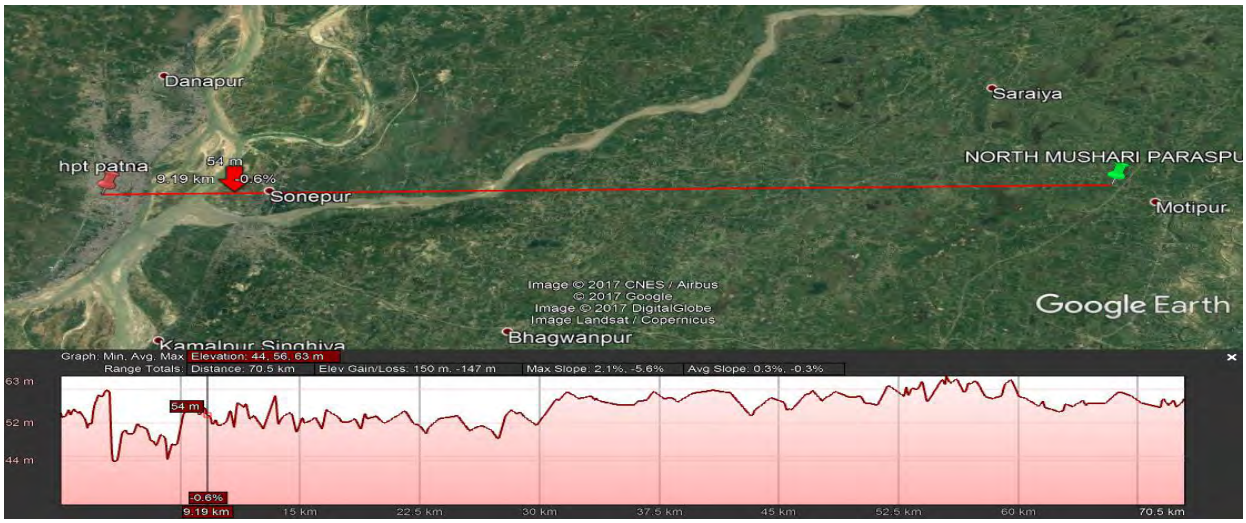
The objective of broadcasting is to provide quality reception free from interferences & noise in a commercial domestic receiver, either fixed or mobile, to as much of population and area of the country as possible, In case of analogue transmission coverage area of broadcasting is decided by the minimum required received 'field strength' at the farthest end of the coverage area for satisfactory reception with commercially available domestic receivers but in digital terrestrial transmission one more transmission parameter(MER) is required along with the minimum field strength value for prediction of the coverage area. Studied has been carried out worldwide to determine the minimum required field strength & MER value for satisfactory reception of DTT signal. Rec. ITU-R BT.2254 give minimum equivalent field strength at receiving location for satisfactory reception of DVB-T2 transmission are as illustrated in following table.

Mode of reception	**Minimum Field Strength**
Fixed Scenario	54 dBµV/m
Portable/Outdoor/Urban	60.1dBµV/m
Mobile Class H-D	73.5 dBµV/m

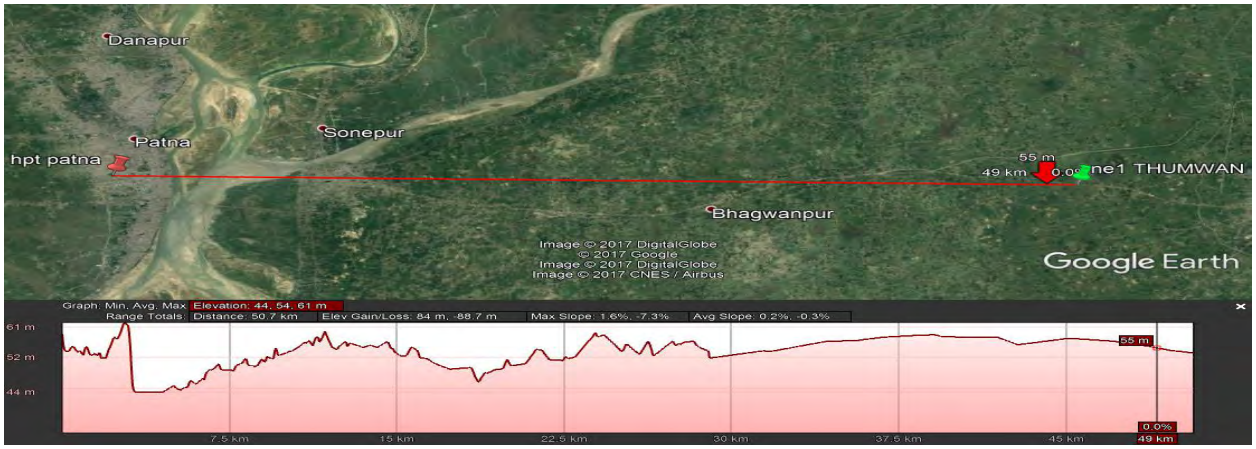
Interpretation of the collected data along radials:

In this report efforts are being made for the interpretation & analysis of the collected FSM data along a radial & then coverage is showing in Annexure -I for satisfactory reception of DVB-T2 transmission was drawn on a map.

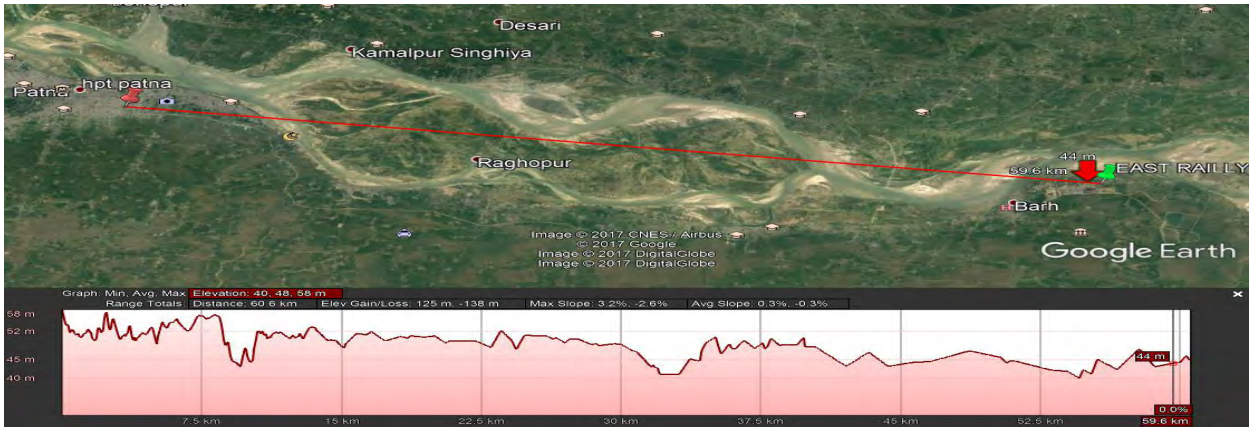
NORTH:-Along this radial field strength measurement done at the locations Like Kanhar Ghat ,Godai Sarai, chakshama, Lalganj, Khedarpur, Gopinathpur, Berua Sarai, Mushri, fatehulla, Keshav Gopal up to the distance 85 kilometer from line of site of transmitter, the satisfactory reception was observed up to the distance of 60Km.



NORTH EAST 1:- Along this radial field strength measurement done at the locations Like Jadua toll plaza, Daulatpur Dowghati hajipur,Bhagwanpur, Goral Chowk Thumhua, Majhouliya, New zero mile, Zafadi up to the distance 70 kilometer from line of site of transmitter, the satisfactory reception was observed up to the distance of 50Km.

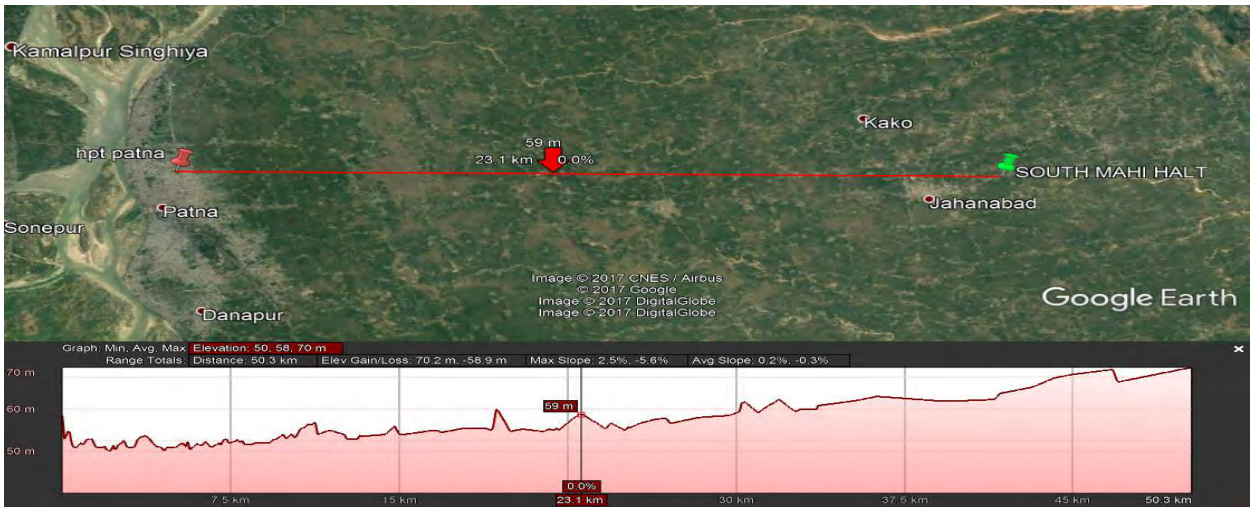


EAST: - Along this radial field strength measurement done at the locations like Sabalpur, Maharani Chowk,Kurtha, Bainipur, Bakhtiyarpur, Barh,Railly enblish chowk, Pandarak, Sultanpur,Shivnar, Mokama up to the distance 75 kilometer from line of site of transmitter, the satisfactory reception was observed up to the distance of 60Km.

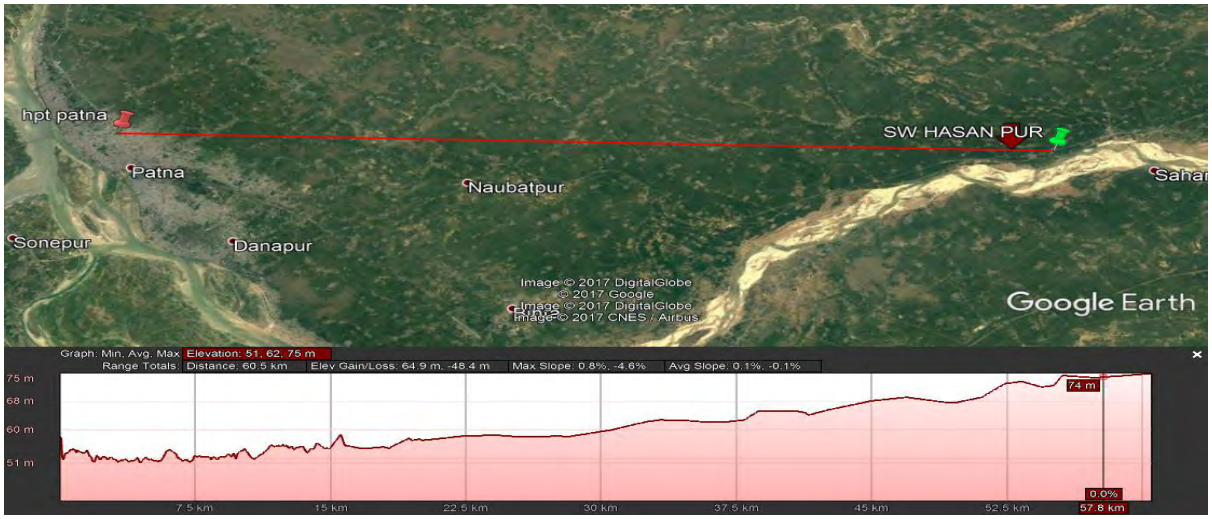


SOUTH EAST:- Along this radial field strength measurement done at the location like Madanpur,Bhikua village, Daniyawan, NagarNausa,Barhauna, Meyar,Mahanandpur, Darya Nagar,Takhtaroja, Baikathpur, Nawada…. up to the distance 85 kilometer from line of site of transmitter, the satisfactory reception was observed up to the distance of 60Km.

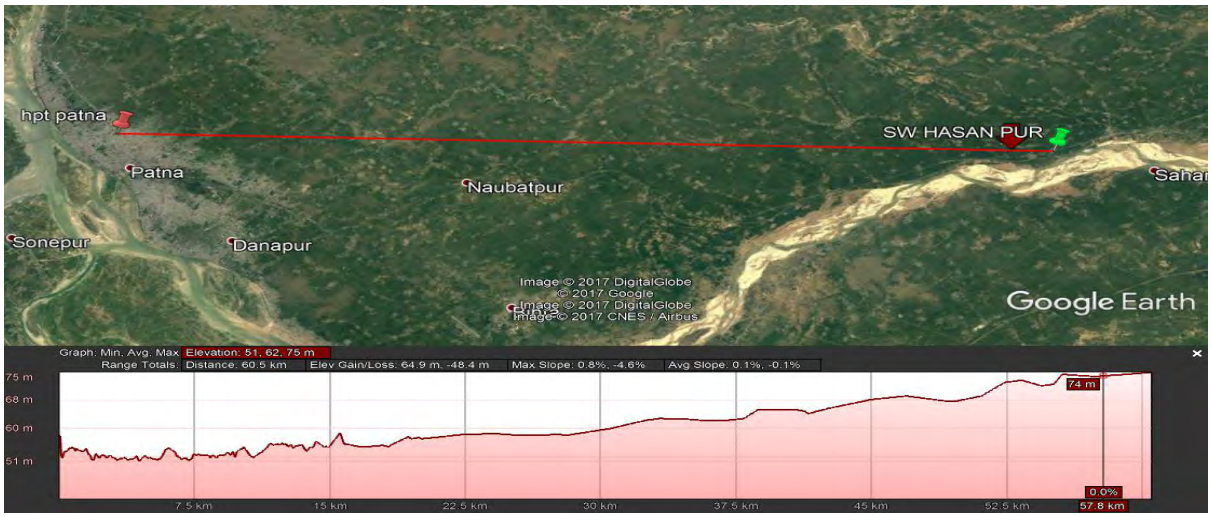
SOUTH:- Along this radial field strength measurement done at the locations like Gaurichuk,Baildarichowk,Pothi, DamarichuckKadauna, Mai Halt, Mukhdumpur, Chirela(Belonganj), Chakand,Basatpur…. up to the distance 85 kilometer from line of site of transmitter, the satisfactory reception was observed up to the distance of 50Km.



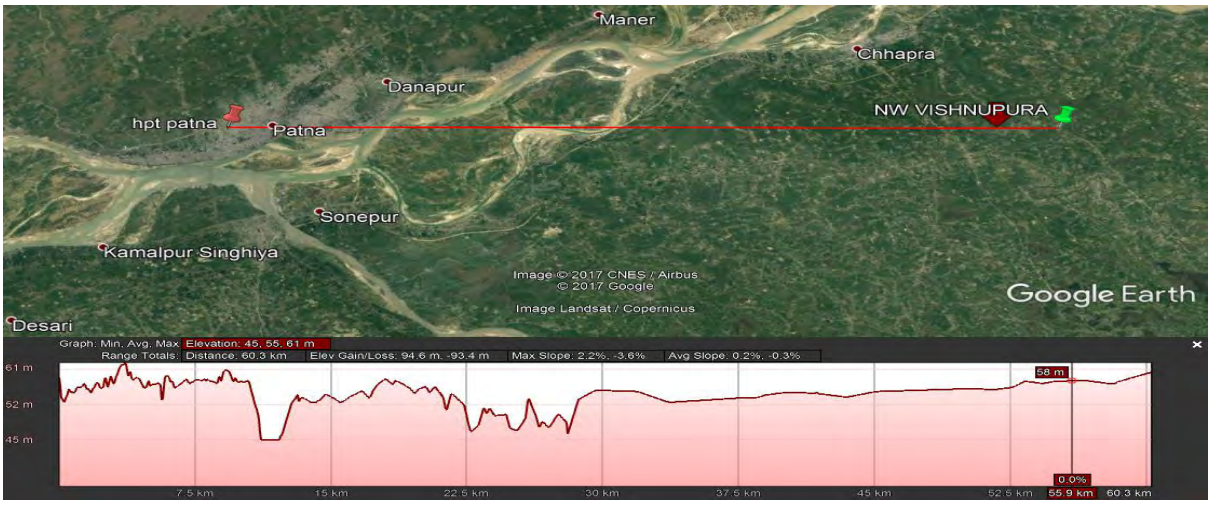
SOUTH WEST:- Along this radial field strength measurement done at the location like Minaznagar, Bhusaula, Chirora, Andhra Chowki, Dulhin Bazar, Kurkuri(paliganj), Sakri, Rampurwana,Hasanpur up to the distance 70 kilometer from line of site of transmitter, the satisfactory reception was observed up to the distance of 60Km.



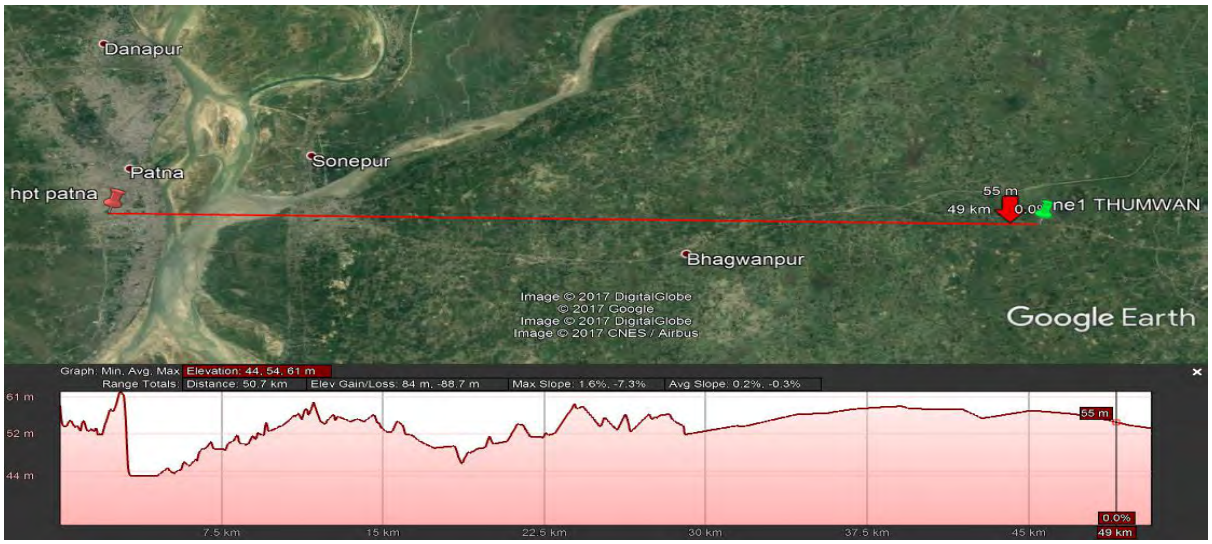
WEST:- Along this radial field strength measurement done at the locations like Rukanpur,Dibra Chowk,Rajpur,Bihta, Sahabad, Ara City Harnathpundi, Bihiya/Pipera, Sahapur, Kanela, DevkuleeBhojpur up to the distance 85 kilometer from line of site of transmitter, the satisfactory reception was observed up to the distance of 50Km.



NORTH WEST:- Along this radial field strength measurement done at the locations like Digha, Nayagaon, Mirjapura, Gorkha, Bafani Nagla, Vishnu Pura,paegumpur pokhra up to the distance 65 kilometer from line of site of transmitter, the satisfactory reception was observed up to the distance of 60Km.



NORTH EAST 2:- Along this radial field strength measurement done at the locations jadua ,chand pur ,dostpur,dogra etc.towards samactipur.like up to the distance 65 kilometer from line of site of transmitter, the satisfactory reception was observed up to the distance of 60Km.



Conclusion:

On the basis of received field strength & MER values at the spot/location along nine radials & coverage contour (Annexure-II) drawn on the basis of table prepared/compiled for satisfactory reception of DVB-T2 transmission, following conclusions can be stipulated.

1. The coverage along North direction is up to a radial distance of 60 km. In North-East-1 & 2 & East directions coverage is up to 50 Km, 60 km & 60 km respectively. In South-East it is up to 60 km, in South it is up to 50km.In South-West direction the coverage area is up to 60Km, West & North-West direction it is up to a radial distance of 50 km & 60km respectively.

2. The coverage along South & west as well as North-East-1 was the least compared to the other directions. The terrain profile of map of respectively radial of Patna clearly shows the hills of height varying the heights. In all these routes, the decrease in height above msl is steep, which is the cause of low field strength.

S.NO.	Radial direction	LOS Distance (KM)as per ITU standard
1	NORTH	60
2	NORTH-EAST-1	50
3	NORTH-EAST-2	60
4	EAST	60
5	SOUTH-EAST	60

6	SOUTH	50
7	SOUTH-WEST	60
8	WEST	50
9	NORTH-WEST	60

Scope of further study:

The purpose of this field trial is to determine the coverage contours for satisfactory reception of DVB-T2 Transmission under existing environmental condition. A comprehensive field strength survey of the said transmitter for reception in portable devices like smart mobile phone in densely populated areas, narrow lanes etc. to assess poor pocket zone & inside different types of building falling within the coverage contour & also reception on go inside moving vehicles is suggested for further propagation study under different environment conditions.

Acknowledgement:
The propagation studies presented in this document are carried out by the Propagation Lab of Research Department of All India Radio & Doordarshan, New Delhi. The field trial was successfully done with the sincere support & cooperation of the shift duty staff of HPT (TV) Transmitter, Patna The survey team expresses deepest sense of gratitude to Mrs. Anuradha Agarwal, ADG (E) & Sh. S.Hyder, DDG (E) whose motivation, suggestion & cooperation at every step helped in the successful completion of the survey.

Reception servey of DVB-T2 of DDK patna

Channel no.- 24 Frequency- 498 MHz

Direction:-**NORTH** **Table No.:- 01**

Route:-HPT Patna North via ,Lalganj Vaishali

Date & time	Location	Lattitude & Longitude in **degree**	Mean sea level in **meter**	Distance from Transmitter in **KM** (Line of site)	COFDM Parameters										C/N (dB) (10m, 03m)	Terrain
					Reciver Antenna at **10 meter** hight					Reciver Antenna at **03 meter** hight						
					Field strength dBu/V	MER	CBER ch.bit error ratio	VBER (LDPC)	Display on Promax	Field strength dBu/V	MER	CBER ch.bit error ratio	VBER (LDPC)	Display on Promax	Display on mobile	
1/6/2017	Kanhar Ghat	25°40'51.9" 85°11'47.7"	42	**10**	72.48	29.1	1.00E-07	1.00E-06	OK	72.18	35.6	1.00E-07	1.00E-06	OK	OK	>40.4, >43.6	LRB/VEG
1/6/2017	Godai sarai	25°43'33.3" 85°12'15.9"	36	**15**	68.68	36.1	1.00E-07	1.00E-06	OK	47.88	19.7	1.00E-07	1.00E-06	OK	OK	>43.6, >20.9	LRB/VEG
1/6/2017	Chaksam	25°46'33.2" 85°11'25.1"	38	**20**	67.15	35.7	1.00E-07	1.00E-06	OK	57.82	29.5	1.00E-07	1.00E-06	OK	OK	>40.7, >28.6	LRB/VEG
1/6/2017	Lalganj	25°52'01.6" 85°10'52.6"	40	**30**	67.68	36.1	1.00E-07	1.00E-06	OK	52.68	26.5	1.00E-07	1.00E-06	OK	OK	>40.4, >25.9	LRB/LDP
1/6/2017	Khijirpur	25°57'32.1" 85°08'07.7"	37	**40**	57.48	30.6	1.00E-07	1.00E-06	OK	50.48	27.3	1.00E-07	1.00E-06	OK	OK	>30.1, >24.9	OA/HT /MDP
1/6/2017	Gopinathpur	25°02'49.1" 85°08'54.8"	40	**50**	49.24	23.2	1.00E-07	1.00E-06	OK	NA	NA	NA	NA	NA	NA	>17.1, NA	OA/HT /MDP
1/6/2017	Berua sarai	26°08'39.7" 85°07'16.9"	41	**60**	56.34	23	1.00E-07	1.00E-06	OK	NA	NA	NA	NA	NA	NA	>20.6, NA	OA/HT /MDP
1/6/2017	**mushari paraspur**	**26°13'34.7" 85°08'35.3"**	**39**	**70**	**50.48**	**26.1**	**1.00E-07**	**1.00E-06**	**OK**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**>23.5, NA**	**OA/LT/ VEG**
1/6/2017	Chak fatheulla	26°18'08.7" 85°07'37.2"	42	**80**	41.48	13.4	1.00E-07	4.50E-05	OK	NA	NA	NA	NA	NA	NA	>8.8, NA	HT/VEG
1/6/2017	keshav gopal	26°21'03.4" 85°06'11.2"	42	**85**	40.48	5.1	1.00E-06	7.40E-02	OK	NA	NA	NA	NA	NA	NA	>2.9, NA	HT/VEG

LEGEND: LT-low traffic LRB-low rising building MRB-medium rising buildin VEG-vegetation HDP-high Density populatio IA-industrial area

HT-high traffic HRB-high rising building MT-medium traffic OA-open area HW-high way LWR-LOW width road

Reception servey of DVB-T2 of DDK patna

Channel no.- 24 Frequency- 498 MHz

Direction:-**NORTH EAST 1** **Table No.:-02**

Route:- HPT Patna to Muzaffarpur

Date & time	Location	Lattitude & Longitude in **degree**	Mean sea level in **meter**	Distance from Transmitter in **KM**	COFDM Parameters										C/N (dB) (10m, 03m)	Terrain
					Reciver Antenna at **10 meter** hight					Reciver Antenna at **03 meter** hight						
					Field strength dBu/V	MER	CBER ch.bit error ratio	VBER (LDPC)	Display on Promax	Field strength dBu/V	MER	CBER ch.bit error ratio	VBER (LDPC)	Display on Promax	Display on mobile	
8/6/2017	jadua tollplaza	25°39'58.9" 85°13'49.9"	41	10	85.48	39.6	1.00E-07	1.00E-06	OK	65.48	25.1	1.00E-07	1.00E-06	OK	OK	>50.1, >35.1	OA/HT /LDP
8/6/2017	Daulat pur	25°43'37.1" 85°14'19.5"	38	15	82.48	36.4	1.00E-07	1.00E-06	OK	62.48	25.2	1.00E-07	1.00E-06	OK	OK	>50.2, >36.2	VEG/LDP/MT
8/6/2017	Afjalpur dhobghati	25°45'14.4" 85°15'38.3"	35	20	72.48	36.8	1.00E-07	1.00E-06	OK	64.48	33	1.00E-07	1.00E-06	OK	OK	>45.7, >37.4	VEG/LDP/HT
8/6/2017	Bhagwan pur	25°50'37.1" 85°17'37.5"	36	30	65.68	32.4	1.00E-07	1.00E-06	OK	59.68	28.8	1.00E-07	1.00E-06	OK	OK	>37.4, >26.8	VEG/HT /OA
8/6/2017	Goral chwak	25°56'12.0" 85°17'44"	37	40	56.48	31.8	1.00E-07	1.00E-06	OK	51.48	27.8	1.00E-07	1.00E-06	OK	OK	>29.7, >25.5	MDP/HT
8/6/2017	**Thumwan**	**26°01'25.5" 85°20'17.1"**	**35**	**50**	**55.48**	**31.3**	**1.00E-06**	**1.00E-04**	**OK**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**>29.4,NA**	**HT/LDP**
8/6/2017	Majhouliya	26°06'36.6" 85°21'54.0"	35	60	40.48	12.8	1.00E-07	1.00E-06	OK	NA	NA	NA	NA	NA	NA	<6.5,NA	HT/HRB/HDP
8/6/2017	New zero mile	26°08'56.6" 85°23'13.2"	37	65	44.48	19.3	1.00E-07	1.00E-06	OK	NA	NA	NA	NA	NA	NA	<4.2,NA	HT/LRB /HDP
8/6/2017	zafadi	26°11'29.6" 85°24'00.7"	40	70	40.48	8.5	1.00E-07	1.00E-02	OK	NA	NA	NA	NA	NA	NA	<6.5,NA	HT/LRB /LDP

LEGEND: LT-low traffic LRB-low rising building MRB-medium rising buildin VEG-vegetation HDP-high Density populatio IA-industrial area

HT-high traffic HRB-high rising building MT-medium traffic OA-open area HW-high way LWR-LOW width road

LDP-Low Density Population

Reception servey of DVB-T2 of DDK patna

Channel no.- 24 Frequency- 498 MHz

Direction:- NORTH EAST 2 **Table No.:- 03**

Route:- TOWARDS Kalyanpur via Samastipur

Date & time	Location	Lattitude & Longitude in **degree**	Mean sea level in **meter**	Distance from Transmitter in **KM**	COFDM Parameters										C/N (dB) (10m, 03m)	Terrain
					Reciver Antenna at **10 meter** hight					Reciver Antenna at **03 meter** hight						
					Field strength dBu/V	MER	CBER ch.bit error ratio	VBER (LDPC)	Display on Promax	Field strength dBu/V	CBER ch.bit error ratio	VBER (LDPC)	VBER	Display on Promax	Display on mobile	
2/6/2017	Jadua toll	25°39'58.9" 85°13'49.9"	41	10	85.48	39.6	1.00E-07	1.00E-06	OK	65.48	25	1.00E-07	1.00E-06	OK	OK	>50.1, >35.1	OA/HT
2/6/2017	chand pur	25°40'55" 85°17'11.9"	35	15	75.88	36.8	1.00E-07	1.00E-06	OK	51.57	18	1.00E-07	1.00E-06	OK	OK	>49.5, >24.2	VEG/MT/LDP
2/6/2017	Chak sikander	25°41'00" 85°21'16"	39	20	62.02	37	1.00E-07	1.00E-06	OK	56.52	23	1.00E-07	1.00E-06	OK	OK	>50.4, >29.8	VEG/HT/OA
2/6/2017	Sahadai	25°42'00" 85°27'3.2"	29	30	62.48	34	1.00E-07	1.00E-06	OK	54.98	30	1.00E-07	1.00E-06	OK	OK	>36.2, >25.2	LDP/LT
2/6/2017	Dogra	25°46'10.8" 85°23'58"	35	30	65.48	35	1.00E-07	1.00E-06	OK	47.15	22.42	1.00E-07	1.00E-06	OK	OK	>47, >22	HT/LRB
2/6/2017	Milki Chaksya	25°49'13.5" 85°28'58"	38	40	65	36	1.00E-06	1.00E-04	OK	52.98	27.8	1.00E-06	1.00E-04	OK	NA	>34 >20.2	VEG/LDP
2/6/2017	**Bahuara Chawk**	**25°50'43" 85°35'53"**	**37**	**50**	**56.04**	**29.7**	**1.00E-07**	**1.00E-06**	**OK**	**NA**	**NA**	**NA**	**NA**	**NT**	**NT**	**>28.2,NA**	**VEG/LRB/LT**
2/6/2017	Adhar pur	25°51'29" 85°41'55"	38	60	48.17	23.3	1.00E-07	1.00E-06	OK	NA	NA	NA	NA	NT	NT	<7.8,NA	VEG/LT/LDP
2/6/2017	Samasti pur	25°52'44" 85°47'33"	37	70	40.88	28	1.00E-07	1.00E-02	OK	NA	NA	NA	NA	NT	NT	<6.5,NA	MDP/HT/MRB
2/6/2017	Akbar pur	25°55'5.1" 85°46'15"	38	70	40.28	8.7	1.00E-07	1.50E-02	OK	NA	NA	NA	NA	NT	NT	<3.6,NA	VEG/HT/OA
2/6/2017	Kalyan pur	25°57'6.8" 85°46'19"	32	72	39.68	8	1.00E-07	1.00E-02	OK	NA	NA	NA	NA	NT	NT	<3.6,NA	VEG/HT/OA

LEGEND LT-low traffic LRB-low rising building MRB-medium rising buildin VEG-vegetation HDP-high Density populatio IA-industrial area

HT-high traffic HRB-high rising building MT-medium traffic OA-open area HW-high way LWR-LOW width road

LDP-Low Density Population

Reception servey of DVB-T2 of DDK patna

Channel no.- 24 Frequency- 498 MHz

Direction:- EAST

Route:-HPT Patna towards Barh

Table No.:-04

Date & time	Location	Lattitude & Longitude in **degree**	Mean sea level in **meter**	Distance from Transmitter in **KM**	COFDM Parameters										C/N (dB) (10m, 03m)	Terrain
					Reciver Antenna at **10 meter** hight					Reciver Antenna at **03 meter** hight						
					Field strength dBu/V	MER	CBER ch.bit error ratio	VBER (LDPC)	Display on Promax	Field strength dBu/V	MER	CBER ch.bit error ratio	VBER (LDPC)	Display on Promax	Display on mobile	
4/6/2017	Sabal pur	25°33'52.8" 85°16'00.8"	37	10	87.48	36.8	1.00E-07	1.00E-06	OK	76.48	36.3	1.00E-07	1.00E-06	OK	OK	>47.5, >41.7	MT/LRB /LDP
4/6/2017	maharani chawak	25°30'36.1" 85°17'54.1"	54	15	79.88	36.5	1.00E-07	1.00E-06	OK	65.48	32.4	1.00E-07	1.00E-06	OK	OK	?47.2 ,>39.6	MDP/MT/MRB
4/6/2017	Kurtha	25°30'15.9" 85°21'06"	38	20	77.48	36.3	1.00E-07	1.00E-06	OK	65.48	33.2	1.00E-07	1.00E-06	OK	OK	>51.4, >40.7	MDP/LT
4/6/2017	Baini pur	25°29'11.5" 85°26'51.2"	38	30	75.48	36.5	1.00E-07	1.00E-06	OK	52.48	31.1	1.00E-07	1.00E-06	OK	OK	>48.5, >29.2	LDP/LT /LRB
4/6/2017	Bakhtiyar pur	25°27'38.2" 85°32'29.6"	37	40	61.13	32.5	1.00E-07	1.00E-06	OK	45.48	16.8	1.00E-07	1.00E-06	OK	OK	>34.1, >15.9	HDP/MRB/HT
4/6/2017	Barh	25°27'34.9" 85°39'09"	30	50	59.48	33.2	1.00E-06	1.00E-04	OK	46.68	20.6	1.00E-08	1.00E-06	NA	NA	>33.0, >19.4	VEG/OA/HT
4/6/2017	**Rainy english chawk**	**25°29'36.3" 85°45'50.5"**	**32**	**60**	**55.48**	**28**	**1.00E-07**	**1.00E-06**	**OK**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**>27.0, NA**	**LRB/LDP/MT**
4/6/2017	pandarak	25°29'28.5" 85°48'32.4"	34	65	47.48	21.4	1.00E-07	1.00E-06	OK	NA	NA	NA	NA	NA	NA	>19.6, NA	LRB/LDP/MT
4/6/2017	Sultan pur	25°27'11.4" 85°51'5.8"	28	70	46.48	18.6	1.00E-07	1.00E-02	OK	NA	NA	NA	NA	NA	NA	>16.8, NA	LRB/LDP/MT
4/6/2017	Shivnar Mokama	25°24'33.2" 85°53'25.8"	31	75	39.48	11.3	1.00E-07	1.50E-02	OK	NA	NA	NA	NA	NA	NA	<4.2, NA	LRB/LDP/MT

LEGEND LT-low traffic LRB-low rising building MRB-medium rising buildin VEG-vegetation HDP-high Density populatio IA-industrial area

HT-high traffic HRB-high rising building MT-medium traffic OA-open area HW-high way LWR-LOW width road

LDP-Low Density Population

Reception servey of DVB-T2 of DDK patna

Channel no.- 24 Frequency- 498 MHz

Direction:- south east **Table No.:-05**

Route:- Towards Nalanda

Date & time	Location	Lattitude & Longitude in **degree**	Mean sea level in **meter**	Distance from Transmitter in **KM**	COFDM Parameters										C/N (dB) (10m, 03m)	Terrain
					Reciver Antenna at **10 meter** hight					Reciver Antenna at **03 meter** hight						
					Field strength dBu/V	MER	CBER ch.bit error ratio	VBER (LDPC)	Display on Promax	Field strength dBu/V	MER	CBER ch.bit error ratio	VBER (LDPC)	Display on Promax	Display on mobile	
5/6/2017	Madanpur	25°31'05" 85°12'56"	31	10	88.48	39.7	1.00E-07	1.00E-06	OK	85.68	38	1.00E-07	1.00E-06	OK	OK	>47.78, >46.46	OA/LDP/LT
5/6/2017	Bhikua village	25°29'32" 85°16'42"	37	15	86.48	36.6	1.00E-07	1.00E-06	OK	77.68	36.3	1.00E-07	1.00E-06	OK	OK	>50, >50	HT/OA/LDP
5/6/2017	Murera	25°27'00" 85°17'33"	32	20	85.79	36.8	1.00E-07	1.00E-06	OK	76.98	36.9	1.00E-08	1.00E-06	OK	OK	>54.1, >45.7	HT/OA/LDP
5/6/2017	Mohidin pur	25°22'45.9" 85°21'22.5"	39	30	77.48	36.5	1.00E-07	1.00E-06	OK	70.96	36.8	1.00E-08	1.00E-06	OK	OK	>50.9, >44.3	HT/OA/VEG
5/6/2017	Barhauna	25°18'22" 85°25'09"	41	40	66.48	34.9	1.00E-07	1.00E-06	OK	50.08	33.6	1.00E-07	1.00E-06	OK	OK	>36.8, >28.98	VEG/HT/LDP
	meyar	85°29'17.8"	44	50	54.48	29.8	1.00E-06	1.00E-04	OK	41.48	17.4	1.00E-06	1.00E-04	OK	NT	>24.6, >15.8	VEG/MT/LDP
5/6/2017	**mahanand pur**	**25°08'21" 85°31'00"**	**52**	**60**	**52.48**	**27.8**	**1.00E-07**	**1.00E-06**	**OK**	**NA**	**NA**	**NA**	**NA**	**OK**	**NT**	**>25.5,NA**	**LDP/HT**
5/6/2017	Durga Nagar	25°03'05.6" 84°31'45"	59	70	45.48	21.8	1.00E-07	1.00E-06	OK	NA	NA	NA	NA	OK	NT	>19.1,NA	LDP/MT/VEG
5/6/2017	Takhtaroja	24°59'44.9" 85°31'39"	66	75	52.48	28.6	1.00E-07	1.00E-02	OK	NA	NA	NA	NA	OK	NT	<26.3,NA	HILLY/HT/VEG
5/6/2017	Baikathpu	24°56'43" 85°31'50"	75	80	49.48	25.8	1.00E-07	1.50E-02	OK	NA	NA	NA	NA	OK	NT	<23.8,NA	OA/VEG
5/6/2017	Nawada	24°54'6.3" 85°32'29.1"	79	85	41.18	14.8	1.00E-06	1.00E-05	OK	NA	NA	NA	NA	NT	NT	>7.5	HDP/HT/HRB

LEGEND: LT-low traffic LRB-low rising building MRB-medium rising buildin VEG-vegetation HDP-high Density populatio IA-industrial area

HT-high traffic HRB-high rising building MT-medium traffic OA-open area HW-high way LWR-LOW width road

LDP-Low Density Population

Reception servey of DVB-T2 of DDK patna

Channel no.- 24 Frequency- 498 MHz

Direction:-south **Table No.:- 06**

Route:-Towards chakand

Date & time	Location	Lattitude & Longitude in **degree**	Mean sea level in **meter**	Distance from Transmitter in **KM**	COFDM Parameters										C/N (dB) (10m, 03m)	Terrain
					Reciver Antenna at **10 meter** hight					Reciver Antenna at **03 meter** hight						
					Field strength dBu/V	MER	CBER ch.bit error ratio	VBER (LDPC)	Display on Promax	Field strength dBu/V	MER	CBER ch.bit error ratio	VBER (LDPC)	Display on Promax	Display on mobile	
6/6/2017	Gauri chuck	25°29'05.8" 85°10'56"	42	10	82.48	36.8	1.00E-07	1.00E-06	OK	71.48	32.4	1.00E-08	1.00E-06	OK	OK	>38.2, >27.5	MDP/LRB/MT
6/6/2017	Baildari chauck	25°27'12.7" 85°10'33.10'	49	15	85.71	35.8	1.00E-07	1.00E-06	OK	79.48	33.67	1.00E-07	1.00E-06	OK	OK	>42.6, >41.89	OA/MT
6/6/2017	Pothari	25°25'56.9" 85°04'47.6"	40	20	83.38	36.5	1.00E-07	1.00E-06	OK	77.88	36	1.00E-07	1.00E-06	OK	OK	>42.3, >46.8	MDP/MT
6/6/2017	Damari chauck	25°20'33.9" 85°02'29.3"	49	30	73.48	36.3	1.00E-07	1.00E-06	OK	67.48	36.5	1.00E-08	1.00E-06	OK	OK	>47.2, >40	LDP/MT
6/6/2017	Kadauna	25°15'46.2" 85°00'25.1"	51	40	69.48	36.6	1.00E-07	1.00E-06	OK	57.48	30.7	1.00E-07	1.00E-06	OK	OK	>23.1, >27	LDP/MT
6/6/2017	**Mai halt**	**25°10'24" 84°59'11"**	**60**	**50**	**54.48**	**30.1**	**1.00E-06**	**1.00E-04**	**OK**	**NA**	**NA**	**1.00E-06**	**1.00E-04**	**OK**	**NA**	**>25.6,NA**	**MDP/HT**
6/6/2017	Makhdum pur	25°04'40.5" 84°58'39.7"	66	60	45.48	20.3	1.00E-07	1.00E-06	OK	NA	NA	1.00E-07	1.00E-06	OK	NA	>18.4,NA	MDP/HT
6/6/2017	Chirela	24°59'13" 84°58'10.5"	77	70	41.48	16.2	1.00E-07	1.00E-06	OK	NA	NA	1.00E-07	1.00E-06	OK	NA	>8.3,NA	OA/VEG/HT/LDP
6/6/2017	Chakand	24°52'46.2" 85°59'49.6"	93	80	45.48	21.8	1.00E-07	1.00E-02	OK	NA	NA	1.00E-07	1.00E-02	OK	NA	>10.5,NA	VEG/HT

LEGEND LT-low traffic LRB-low rising building MRB-medium rising buildin VEG-vegetation HDP-high Density populatio IA-industrial area

HT-high traffic HRB-high rising building MT-medium traffic OA-open area HW-high way LWR-LOW width road

LDP-Low Density Population

Reception servey of DVB-T2 of DDK patna

Channel no.- 24 Frequency- 498 MHz

Direction:- south west **Table No.:- 07**

Route:-

Date & time	Location	Lattitude & Longitude in **degree**	Mean sea level in **meter**	Distance from Transmitter in **KM**	COFDM Parameters										C/N (dB) (10m, 03m)	Terrain
					Reciver Antenna at **10 meter** hight					Reciver Antenna at **03 meter** hight						
					Field strength dBu/V	MER	CBER ch.bit error ratio	VBER (LDPC)	Display on Promax	Field strength dBu/V	MER	CBER ch.bit error ratio	VBER (LDPC)	Display on Promax	Display on mobile	
7/6/2017	Minaj nagar	25°34'38.4" 85°04'09.5"	41	10	79.88	36.2	1.00E-07	1.00E-06	OK	67.28	35.2	1.00E-07	1.00E-06	OK	OK	>46.8, >35.28	HDP/HT
7/6/2017	Khorji	25°32'59.4" 85°01'33.1"	45	15	75.48	36.5	1.00E-07	1.00E-06	OK	63.88	36.1	1.00E-07	1.00E-06	OK	OK	>48.2, >36.4	LDP/MT
7/6/2017	Chirora	25°31'05.1" 84°58'57.6"	47	20	71.48	36.1	1.00E-07	1.00E-06	OK	60.48	32.4	1.00E-08	1.00E-06	OK	OK	>46.2, >36.2	MDP/HT/OA
7/6/2017	Andhra Chawki	25°28'07.6" 84°54'00.5"	49	30	73.94	36.4	1.00E-07	1.00E-06	OK	61.34	26.2	1.00E-07	1.00E-06	OK	OK	>32.8, >29.6	OA/VEG
7/6/2017	Dulhin Bazar	25°22'33.6" 84°51'14.2"	50	40	62.98	35.6	1.00E-07	1.00E-06	OK	49.25	29	1.00E-08	1.00E-06	OK	OK	>28.2, >13.5	MDP/HT/OA
7/6/2017	Kurkuri	25°19'08" 84°46'21.9"	59	50	61.04	35.2	1.00E-06	1.00E-04	OK	NA	NA	1.00E-06	1.00E-04	OK	NA	>26.86,NA	MDP/HT
7/6/2017	**Sakri**	**25°16'28.9" 84°40'59.7"**	**64**	**60**	**56.88**	**31.9**	**1.00E-07**	**1.00E-06**	**OK**	**NA**	**NA**	**1.00E-07**	**1.00E-06**	**OK**	**NA**	**<29.3,NA**	**LDP/HT**
7/6/2017	Rampur wane	25°11'38" 84°36'29.7"	66	70	41.78	20	1.00E-07	1.00E-06	OK	NA	NA	1.00E-07	1.00E-06	OK	NA	>19.6,NA	OA/HT/VEG
7/6/2017	Hasanpur	25°12'43.1" 84°37'39.7"	64	75	47.48	24.3	1.00E-07	1.00E-06	OK	NA	NA	1.00E-07	1.00E-02	OK	NA	>21.6,NA	OA/HT/VEG

LEGEND LT-low traffic LRB-low rising building MRB-medium rising buildin VEG-vegetation HDP-high Density populatio IA-industrial area

HT-high traffic HRB-high rising building MT-medium traffic OA-open area HW-high way LWR-LOW width road

LDP-Low Density Population

Reception servey of DVB-T2 of DDK patna

Channel no.- 24 Frequency- 498 MHz

Direction:- west **Table No.:- 08**

Route:- towards Arha

Date & time	Location	Lattitude & Longitude in **degree**	Mean sea level in **meter**	Distance from Transmitter in **KM**	COFDM Parameters											C/N (dB) (10m, 03m)	Terrain
					Reciver Antenna at **10 meter** hight					Reciver Antenna at **03 meter** hight							
					Field strength dBu/V	MER	CBER ch.bit error ratio	VBER (LDPC)	Display on Promax	Field strength dBu/V	MER	CBER ch.bit error ratio	VBER (LDPC)	Display on Promax	Display on mobile		
7/6/2017	Rukan pur	25°36'25.8" 85°04'04.8"	29	10	77.48	34.2	1.00E-07	1.00E-06	OK	49.38	33.7	1.00E-07	1.00E-06	OK	OK	>37.8, >38.2	HT/HDP
7/6/2017	Dibra chawk	25°36'32" 85°01'18"	40	15	82.28	35.4	1.00E-07	1.00E-06	OK	46.15	31.2	1.00E-07	1.00E-06	OK	OK	>40.8, >40	LDP/MRB/MT
7/6/2017	Rajpura	25°34'59" 84°58'00"	41	20	86.48	36.6	1.00E-07	1.00E-06	OK	77	34.7	1.00E-07	1.00E-06	OK	OK	>51.1, >50.3	HT/OA/VEG
7/6/2017	Bihta	25°34'25" 84°52'16.2"	46	30	76.48	36.2	1.00E-07	1.00E-06	OK	56.4	32.8	1.00E-07	1.00E-06	OK	OK	>46.3, >42.7	LDP/LRB/HT
7/6/2017	Shahbad	25°34'47" 84°46'17.4"	46	40	68.48	36.6	1.00E-07	1.00E-06	OK	58.48	32.4	1.00E-07	1.00E-06	OK	OK	>42.2, >31.7	LRB/HT/LDP
7/6/2017	**ara city**	**25°32'59" 84°39'48"**	**44**	**50**	**56.53**	**35.8**	**1.00E-06**	**1.00E-04**	**OK**	**NA**	**NA**	**1.00E-06**	**1.00E-04**	**OK**	**NA**	**>31,NA**	**HDP/HT**
7/6/2017	Harnath	25°34'30" 84°34'30"	39	60	45.48	22.6	1.00E-07	1.00E-06	OK	NA	NA	1.00E-07	1.00E-06	OK	NA	>19.8,NA	OA/HT/MDP
7/6/2017	Pipera	25°34'69.3" 84°28'38.9"	46	70	45.48	22	1.00E-07	1.00E-06	OK	NA	NA	1.00E-07	1.00E-06	OK	NA	>19.8,NA	OA/HT/MDP
7/6/2017	Sha-pura	25°35'53.8" 84°25'16.4"	47	75	50.48	27.7	1.00E-07	1.00E-02	OK	NA	NA	1.00E-07	1.00E-02	OK	NA	>25.2,NA	OA/HT/MDP
7/6/2017	Kanela	25°36'16.1" 84°22'28"	46	80	44.48	20.7	1.00E-07	1.50E-02	OK	NA	NA	1.00E-07	1.50E-02	OK	NA	>19.7,NA	OA/VEG/MT
7/6/2017	Devkule	25°36'39.7" 84°19'28"	46	88	40.37	NA	1.00E-07	1.50E-02	OK	NA	NA	1.00E-07	1.50E-02	OK	NA	<1.9,NA	OA/VEG/MT

LEGEND: LT-low traffic LRB-low rising building MRB-medium rising buildin VEG-vegetation HDP-high Density populatio IA-industrial area

HT-high traffic HRB-high rising building MT-medium traffic OA-open area HW-high way LWR-LOW width road

LDP-Low Density Population

Reception servey of DVB-T2 of DDK patna

Channel no.- 24

Direction:- north west

Frequency- 498 MHz

Table No.:- 09

Route:- towards Garkha

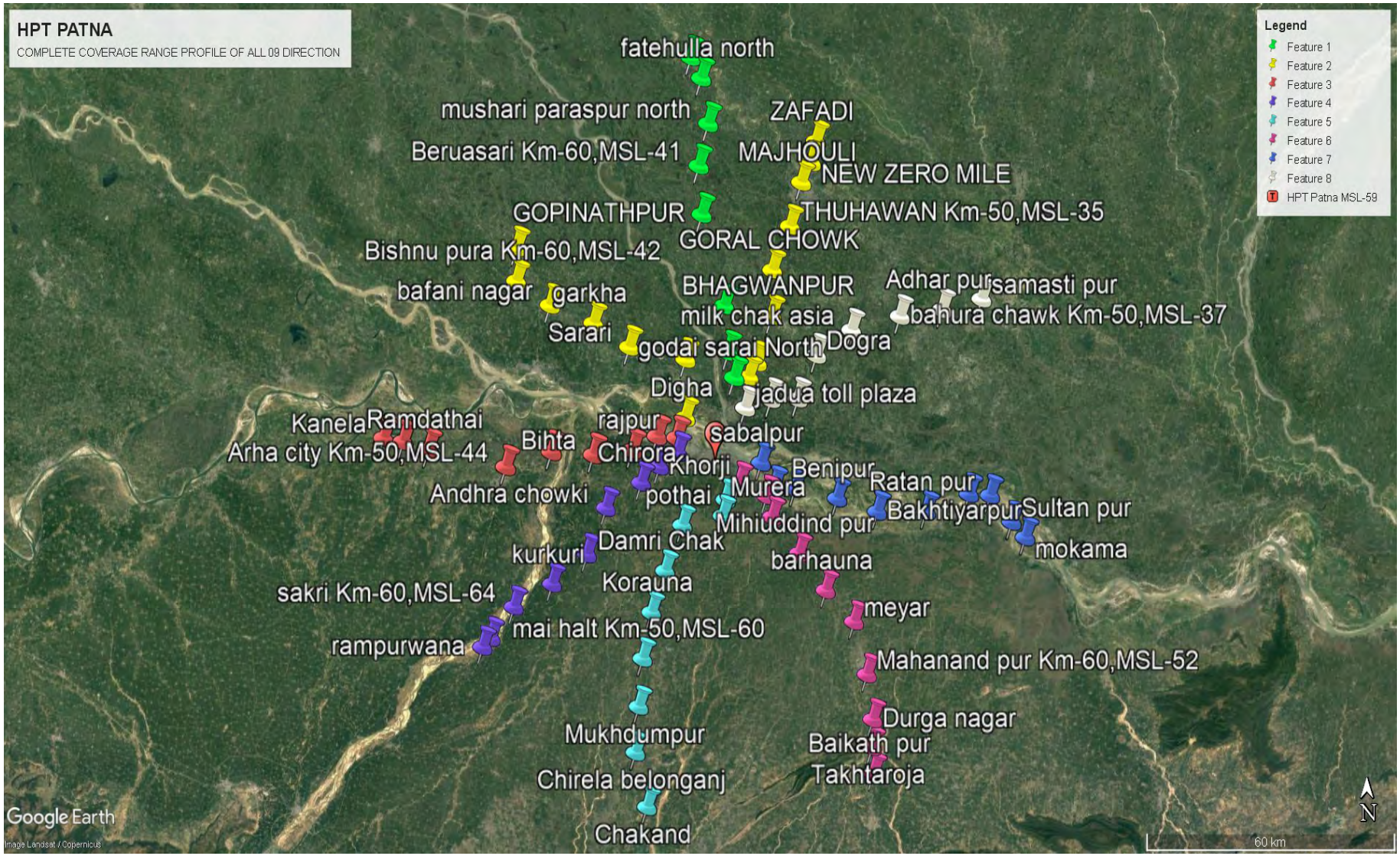
Date & time	Location	Lattitude & Longitude in **degree**	Mean sea level in **meter**	Distance from Transmitter in **KM**	COFDM Parameters										C/N (dB) (10m, 03m)	Terrain
					Reciver Antenna at **10 meter** hight					Reciver Antenna at **03 meter** hight						
					Field strength dBu/V	MER	CBER ch.bit error ratio	VBER (LDPC)	Display on Promax	Field strength dBu/V	MER	CBER ch.bit error ratio	VBER (LDPC)	Display on Promax	Display on mobile	
3/6/2017	Digha	25°38'47.8" 84°05'14.7"	38	10	80.62	36.8	1.00E-07	1.00E-06	OK	67.22	34.9	1.00E-07	1.00E-06	OK	OK	>40.6, >28.3	MRB/MDP/HT
3/6/2017	Nayagaon	25°45'43" 84°05'19.5"	35	20	71.48	36.2	1.00E-07	1.00E-06	OK	52.48	22.6	1.00E-08	1.00E-04	OK	OK	>27.6, >23.4	LRB/MDP
3/6/2017	Mirjapur	25°47'09.7" 84°57'20.3"	38	30	57.48	32.5	1.00E-07	1.00E-06	OK	49.48	23.8	1.00E-08	1.00E-06	OK	OK	>30.9, >22.3	LDP/LT/VEG
3/6/2017	Garkha	25°50'03.1" 84°51'55"	43	40	60.48	34	1.00E-07	1.00E-06	OK	41.18	11.7	1.00E-07	1.00E-06	OK	OK	>25.2, <6.6	HRB/HDP/MT
3/6/2017	Bafani Nagra	25°52'00" 84°46'4.5"	37	50	63.28	36.2	1.00E-07	1.00E-06	OK	60.98	35.4	1.00E-08	1.00E-06	OK	OK	>38.2, >33.5	OA/MDP
3/6/2017	**Vishnu Pura**	**25°54'56.9" 84°41'12.3"**	**42**	**60**	**55.08**	**29.8**	**1.00E-06**	**1.00E-04**	**OK**	**NA**	**NA**	**NA**	**NA**	**OK**	**NT**	**>26.46,NA**	**MDP/LRB/LT**
3/6/2017	Pegampur	25°58'51.7" 84°41'14.4"	44	65	41.98	18.2	1.00E-07	1.00E-06	OK	NA	NA	NA	NA	OK	NT	>19.28,NA	MDP/LRB/LT

LEGEND: LT-low traffic LRB-low rising building MRB-medium rising buildin VEG-vegetation HDP-high Density populatio IA-industrial area

HT-high traffic HRB-high rising building MT-medium traffic OA-open area HW-high way LWR-LOW width road

LDP-Low Density Population

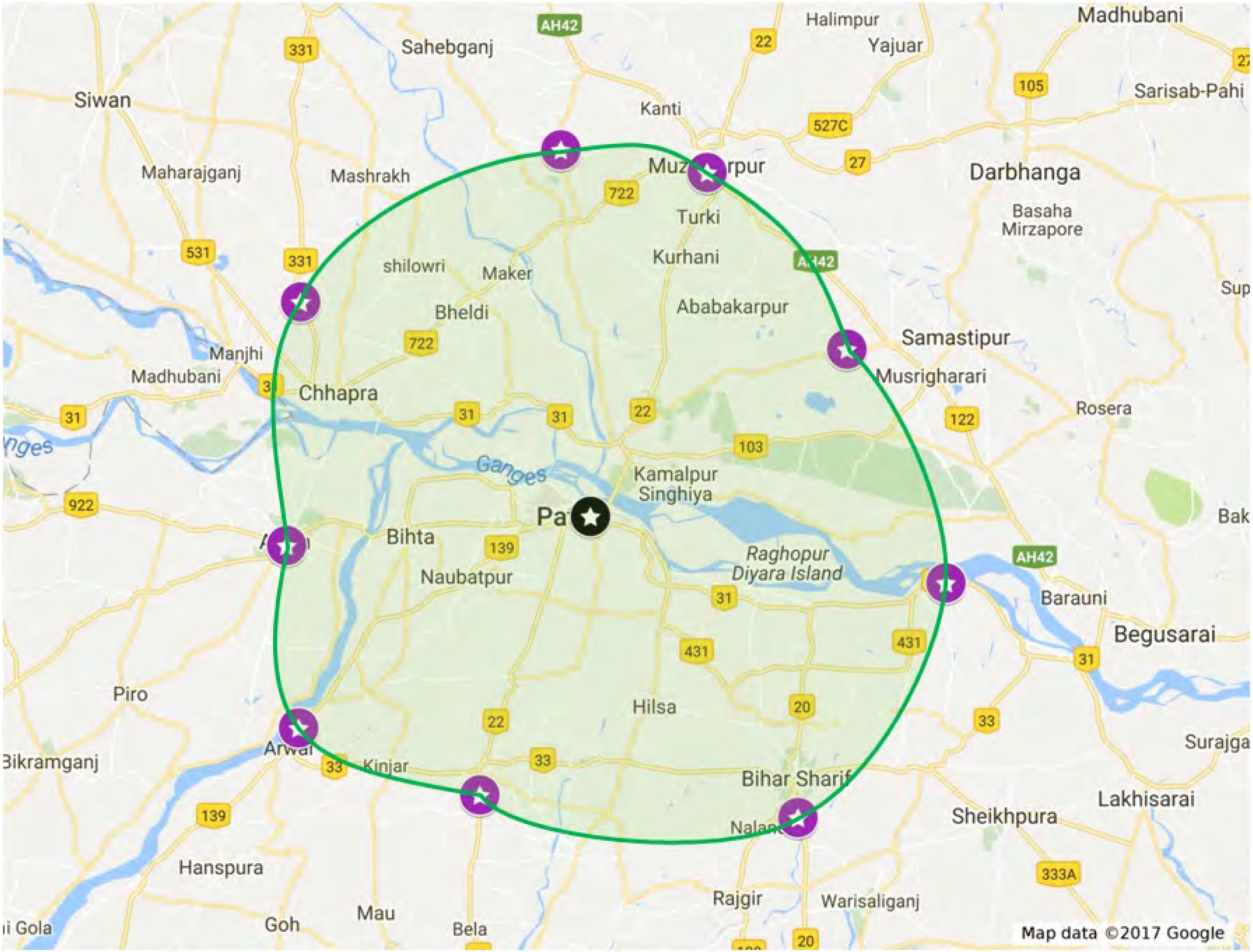
Annexure-I

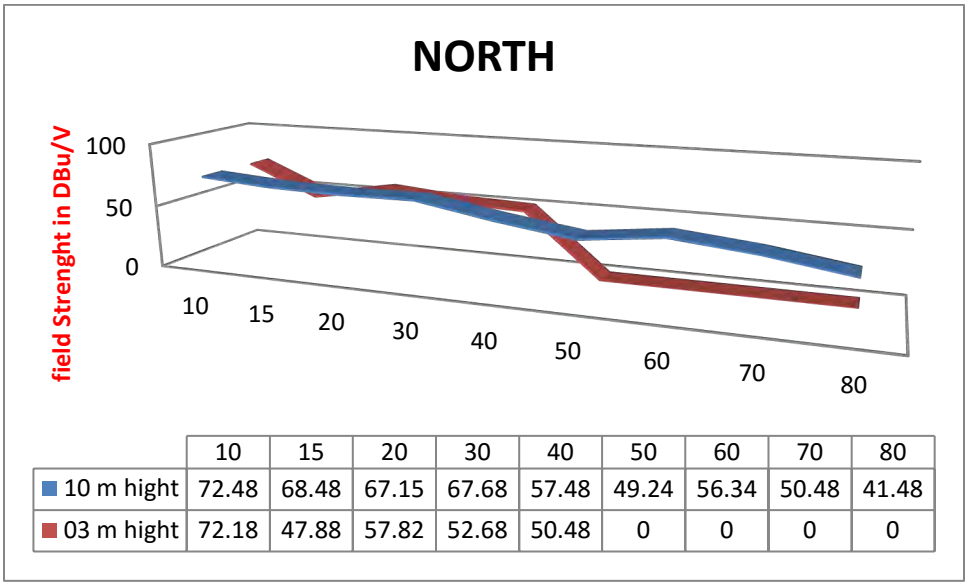


Radial route map originating from the location of the transmitter Patna, Bihar

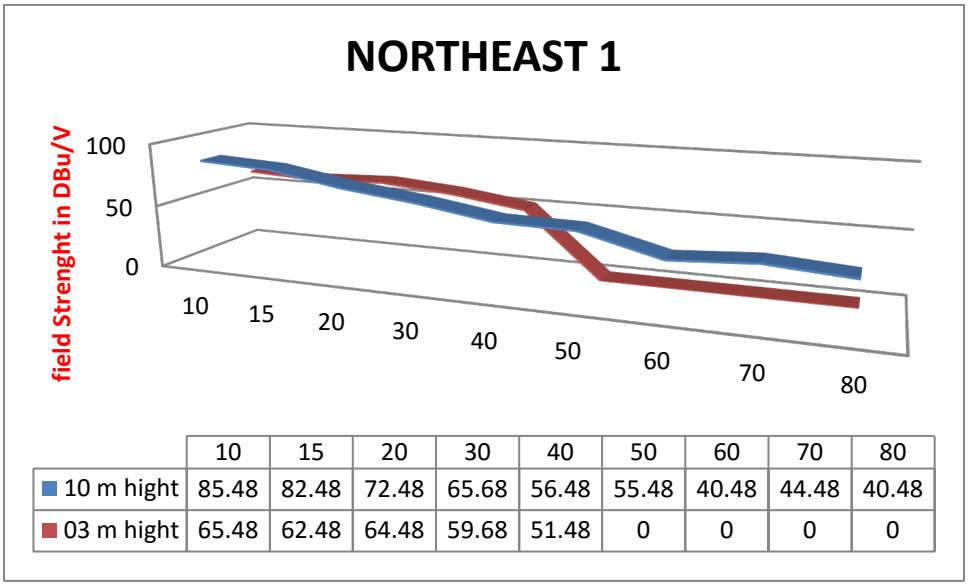
Coverage Map of DTT Patna in Fixed Reception Mode

Annexure-II

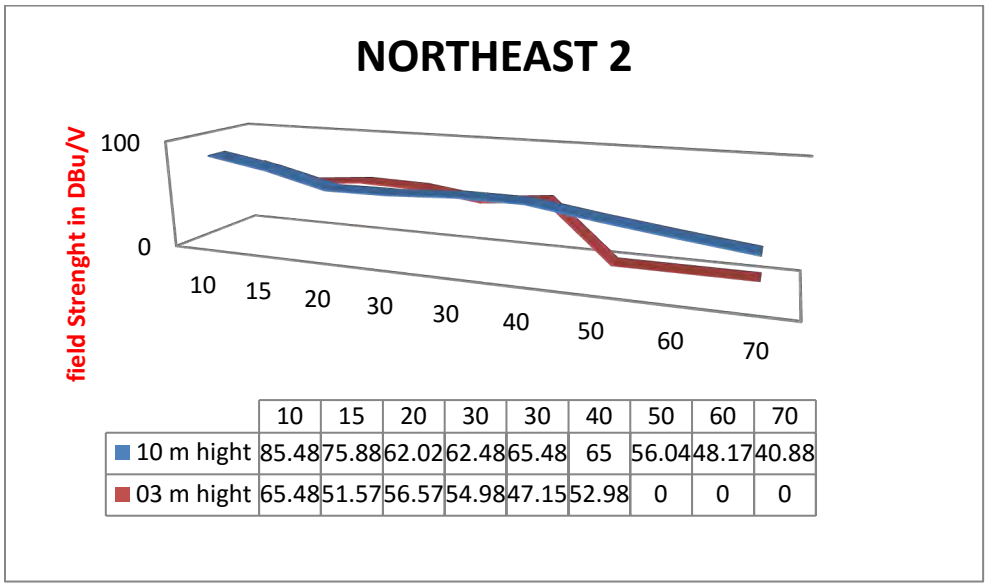




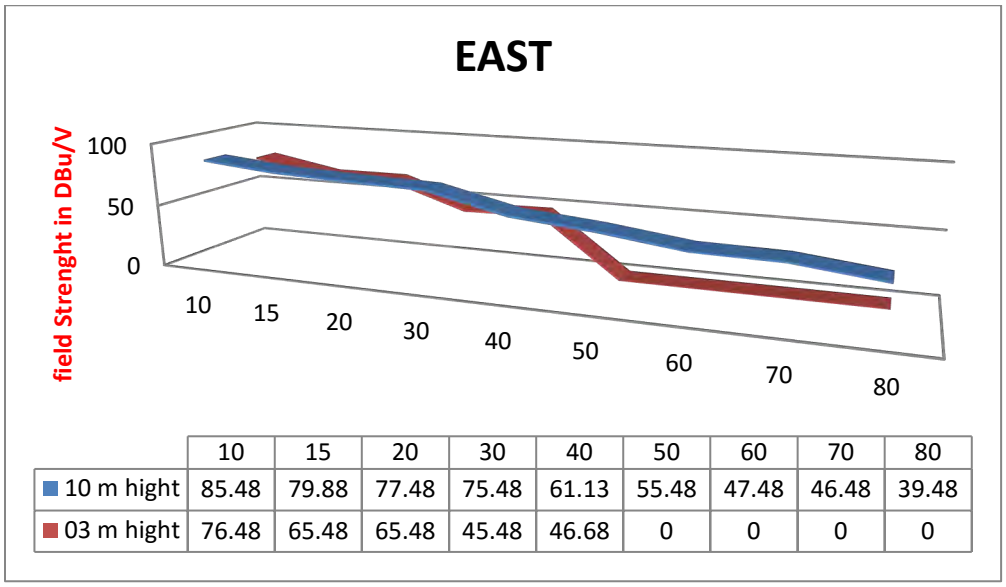
	10	15	20	30	40	50	60	70	80
10 m hight	72.48	68.48	67.15	67.68	57.48	49.24	56.34	50.48	41.48
03 m hight	72.18	47.88	57.82	52.68	50.48	0	0	0	0



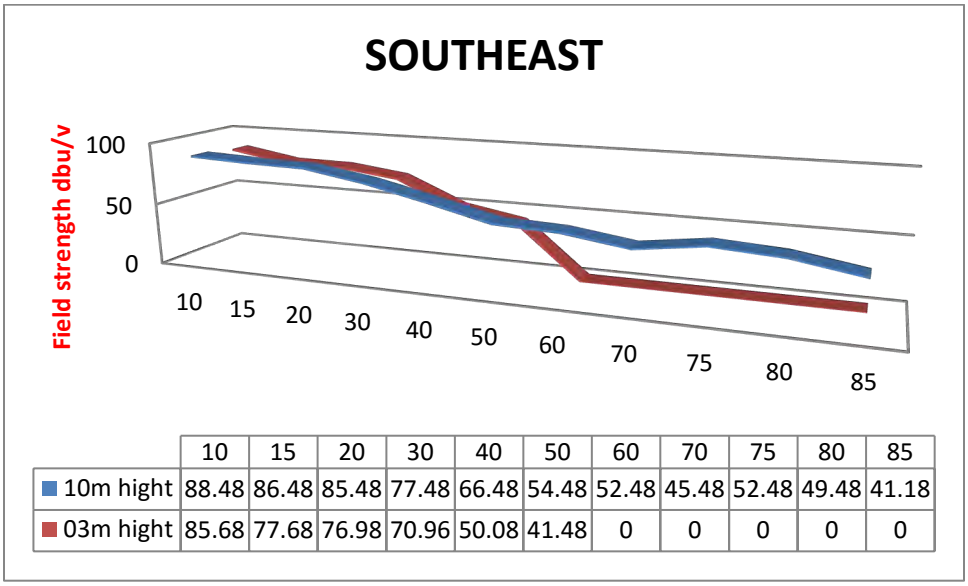
	10	15	20	30	40	50	60	70	80
10 m hight	85.48	82.48	72.48	65.68	56.48	55.48	40.48	44.48	40.48
03 m hight	65.48	62.48	64.48	59.68	51.48	0	0	0	0



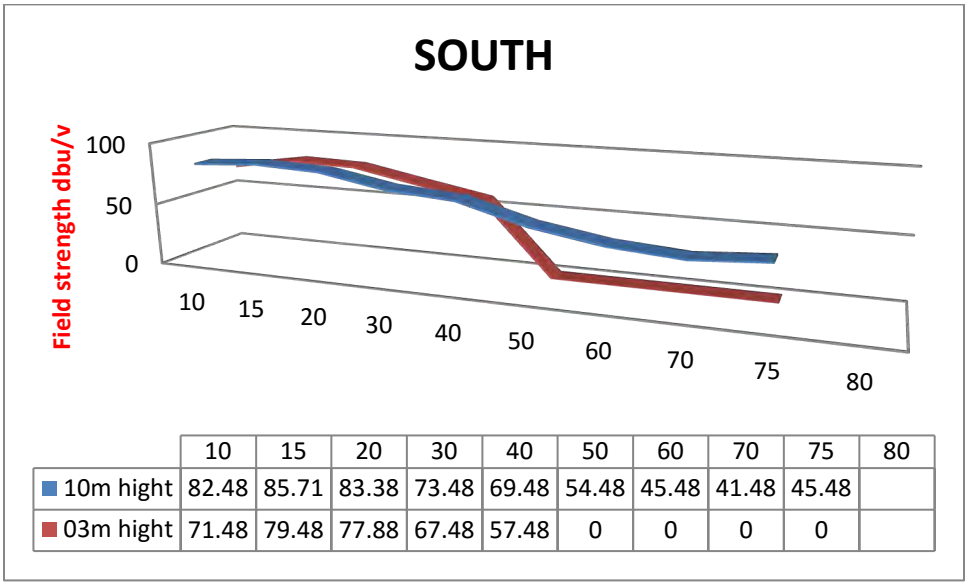
	10	15	20	30	30	40	50	60	70
10 m hight	85.48	75.88	62.02	62.48	65.48	65	56.04	48.17	40.88
03 m hight	65.48	51.57	56.57	54.98	47.15	52.98	0	0	0



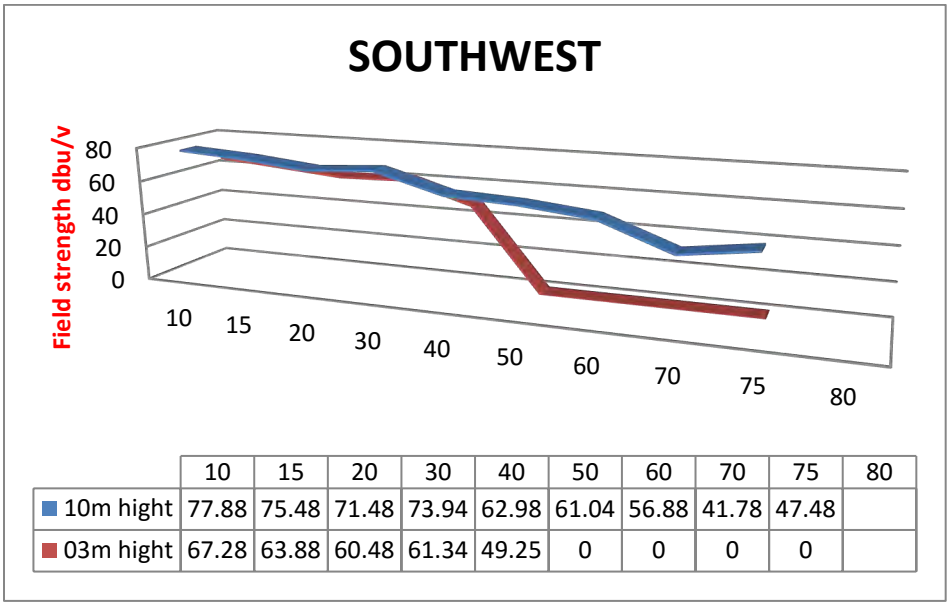
	10	15	20	30	40	50	60	70	80
10 m hight	85.48	79.88	77.48	75.48	61.13	55.48	47.48	46.48	39.48
03 m hight	76.48	65.48	65.48	45.48	46.68	0	0	0	0



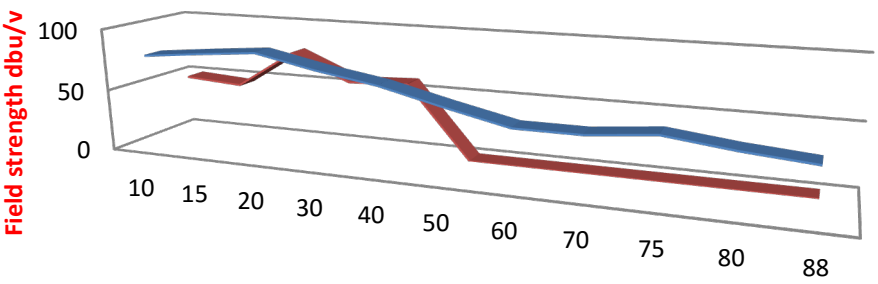
	10	15	20	30	40	50	60	70	75	80	85
10m hight	88.48	86.48	85.48	77.48	66.48	54.48	52.48	45.48	52.48	49.48	41.18
03m hight	85.68	77.68	76.98	70.96	50.08	41.48	0	0	0	0	0



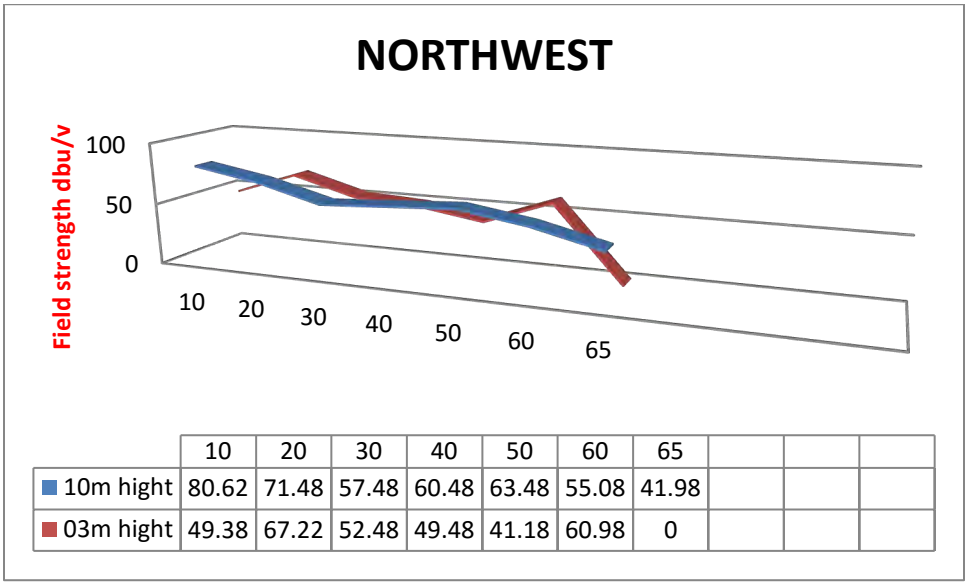
	10	15	20	30	40	50	60	70	75	80
10m hight	82.48	85.71	83.38	73.48	69.48	54.48	45.48	41.48	45.48	
03m hight	71.48	79.48	77.88	67.48	57.48	0	0	0	0	



	10	15	20	30	40	50	60	70	75	80
10m hight	77.88	75.48	71.48	73.94	62.98	61.04	56.88	41.78	47.48	
03m hight	67.28	63.88	60.48	61.34	49.25	0	0	0	0	



	10	15	20	30	40	50	60	70	75	80	88
10m hight	77.48	82.28	86.48	76.48	68.48	56.53	45.48	45.48	50.48	44.48	40.37
03m hight	49.38	46.15	77	56.4	58.58	0	0	0	0	0	0



	10	20	30	40	50	60	65			
10m hight	80.62	71.48	57.48	60.48	63.48	55.08	41.98			
03m hight	49.38	67.22	52.48	49.48	41.18	60.98	0			