

**Reception survey for
assessment of coverage area
for satisfactory reception of
DVB-T2 Transmitter
*Located at Ranchi
Jharkhand***

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

*Located at Ranchi
Jharkhand*

Survey period (25/05/2017 to 30/05/2017)

Field Strength Measurement/Reception Survey Team

PROPAGATION LAB

Team Leader : G. P. Srivastava, Assistant Engineer
: Bani Singh, Assistant Engineer

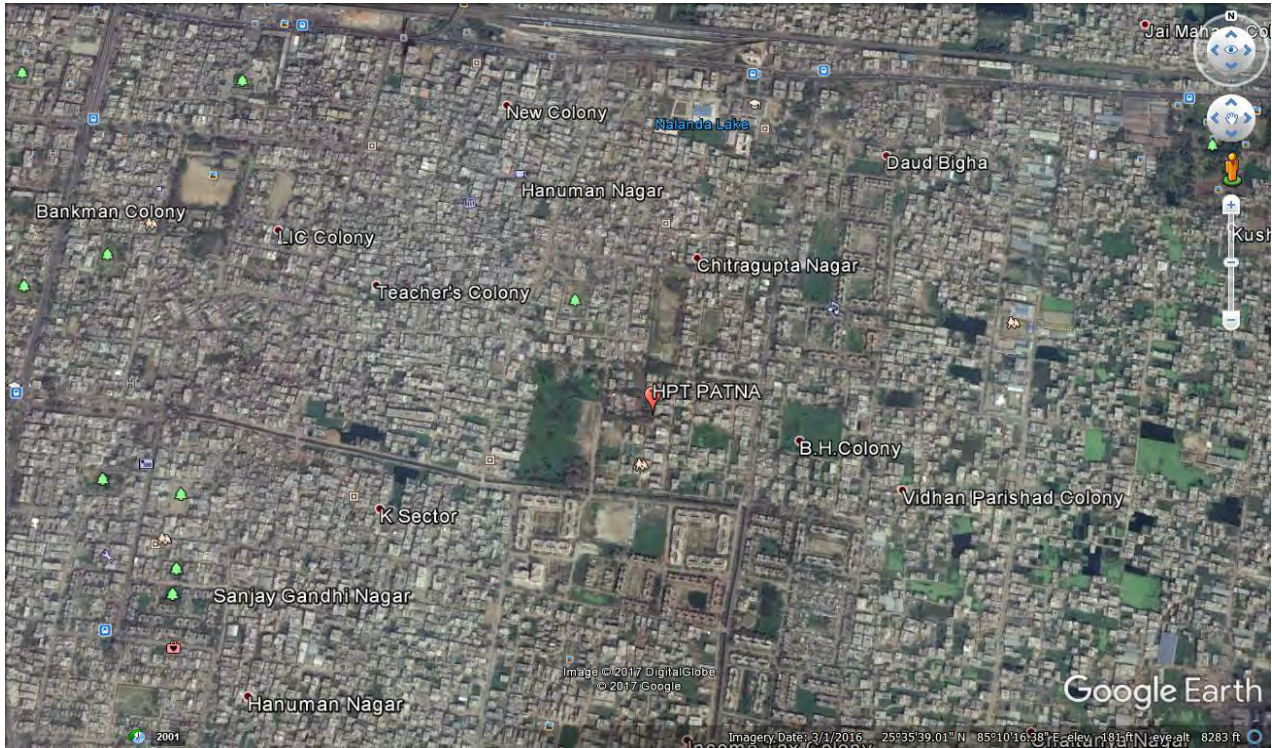
Team Members : Om Prakash, Sr. Technician
: Hari Ram, Sr. Technician
: Satya Narayan Thakur, Technician (DDK, Ranchi)

Staff Car Drivers : Jagdish Yadav

Report Edited by : M. Javed Shams, AE

Supervised by : S. Hyder, DDG (E)

Guided by : Mrs. Anuradha Agarwal, ADG (E)



Location Map (3D View) of TV Tower Ranchi (Jharkhand)



6.0kW DVB-T2 Transmitter



HPT (TV) Tower, Ranchi

Basic Data and Transmitter details

Transmitters Details:

Name of the Station:	DDK Ranchi, Jharkhand.
GPS Co-ordinates of transmitter:	N 23°22'54.1" E 85°18'49.9"
MSL	682 meters
Surrounded area of transmitter	Urban
Rated power	6KW
Forward power	5.KW
Reflected power	10.0 W
VSWR (Voltage standing wave ratio)	1.10: 1
Transmission mode	SDTV
Make	Harris
Model No.	Maxiva, ULX-6500T2
Frequency of operation	490 MHz
Channel No.	23
Date of commission	24/02/2016

Transmitting Antenna Details:

Make	SIRA
Type/Model	UHF ANTENNA Panel / UTV -01/24
Antenna Gain	12dB
Height	150 meters
Return Loss	26 dB
Polarization	Horizontal

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 been established at HPT (TV) Tower **Ranchi , (Jharkhand)** & commissioned for DD National Transmission on UHF **Band Ch#23 (490MHz)**. 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 23/05/2017 to 30/05/2017 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 reception mode 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 in fixed reception mode as well as in mobile mode.

Equipment Used:

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

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
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

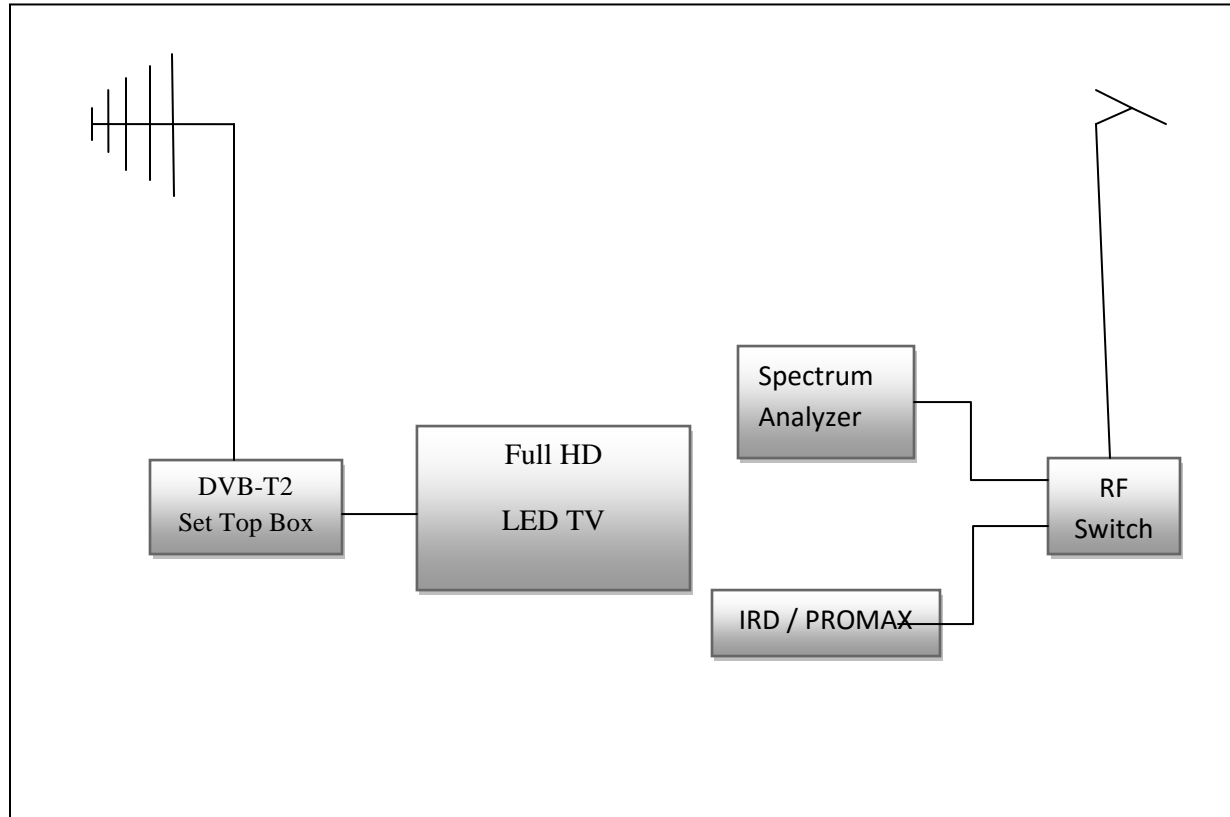
Modulation Parameters:

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, Ranchi operating with following set of Modulation parameters targeted for fixed antenna & handheld portable (smart phone) reception mode.

Frequency	490MHz
Channel No.	#23(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 03 meter to 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 on Promax 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 motor able 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 eight radials are drawn passing through the transmitter location along North, East, South, West, North-East, North-West, South East & South West directions. For prediction of the coverage area, field strength measurement along a radial is 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. 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 motor able 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 upto 10 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 with eight radials are tabulated accordingly in Table No.-1 to Table No.-8. On the basis of Table-1 to Table -8, a coverage contour for DVB-T2 transmission has been drawn & annexed as in Annexure-I. Annexure II and Annexure III represents variation of Field strength & MER among 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	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:

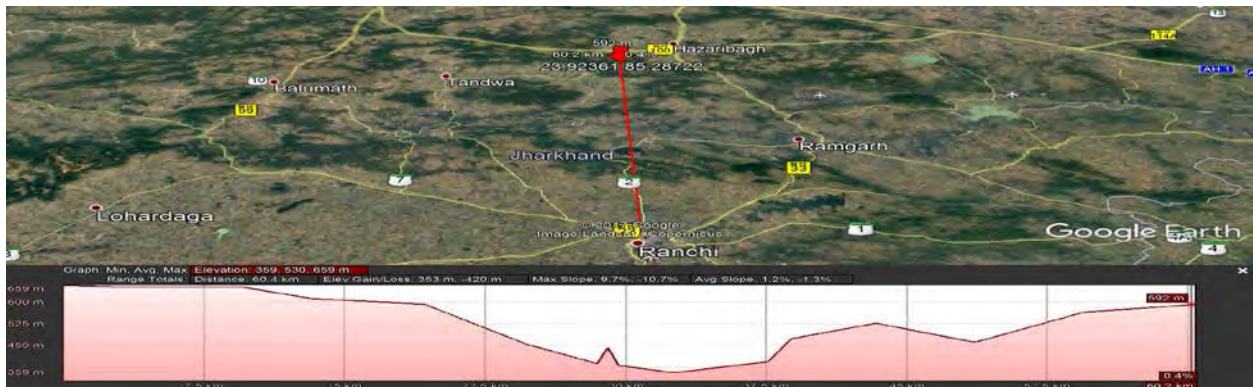
The objective of broadcasting is to provide quality reception free from interferences & noise in a commercial domestic receiver, either fixed or mobile, to as much of population and area of the country as possible, In case of analogue transmission coverage area of broadcasting is decided by the minimum 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 (Location probability $\geq 95\%$) of DVB-T2 transmission are as illustrated in following table.

Mode of reception	Minimum Field Strength
Fixed (Receiving antenna height 10 m)	54 dB μ V/m, (Location probability 95 %)
Portable/Outdoor/Urban	60.1dB μ V/m, (Location probability 95 %)
Handheld mobile class H-D/ Integrated Ant	73.5 dB μ V/m, (Location probability 99 %)

Interpretation of the collected data along radials:

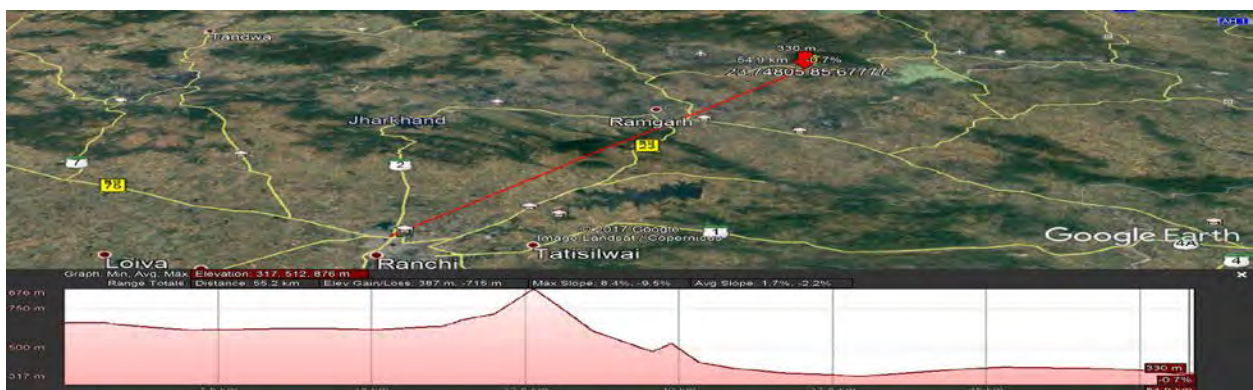
In this report efforts are being made for the interpretation & analysis of the collected FSM data along a radial & then a coverage contour showing in Map-9 for satisfactory reception of DVB-T2 transmission was drawn on a map.

NORTH (Map-1 & Table-1):-Along this radial field strength measurement done at the locations like Burku, Lem, Melani, Birsamunda college, Urimari, Paseria, Maldhi, Badam, Haram, Phatha, Bandag, Sendur, Nagwa, Sijhua Tilaichak, Romi up to the distance 90 Km from line of site of transmitter, the satisfactory reception was observed up to the distance of 60 Km.



Map-1

NORTH EAST (Map-2 & Table-2) :- Along this radial field strength measurement done at the locations Like Hambal Panchi , Omanji mogra, Goratu, Ramgarh, Digwar, Ara, Mandu, Bargaon, Lalpania, Tenughat, Birsa, Gomia, Barki Narki, Konar jheed, Vishnugarh up to the distance 80 kilometer from line of site of transmitter, the satisfactory reception was observed up to the distance of 55 Km.



Map-2

EAST (Map-3 & Table-3):- Along this radial field strength measurement done at the locations like Lalganj, siraka, Jaratoli, Asri angara, kulsud, Harwadih, Silly, BaraMuri, Chamardag, Badgram, BaraChatrani, Adari, Uparbatari, Garhjaipur, Palanja, Ranibandha, Hulka, Manguria up to the distance 75 kilometer from the line of site of transmitter, the satisfactory reception was observed up to the distance of 30 Km.



Map-3

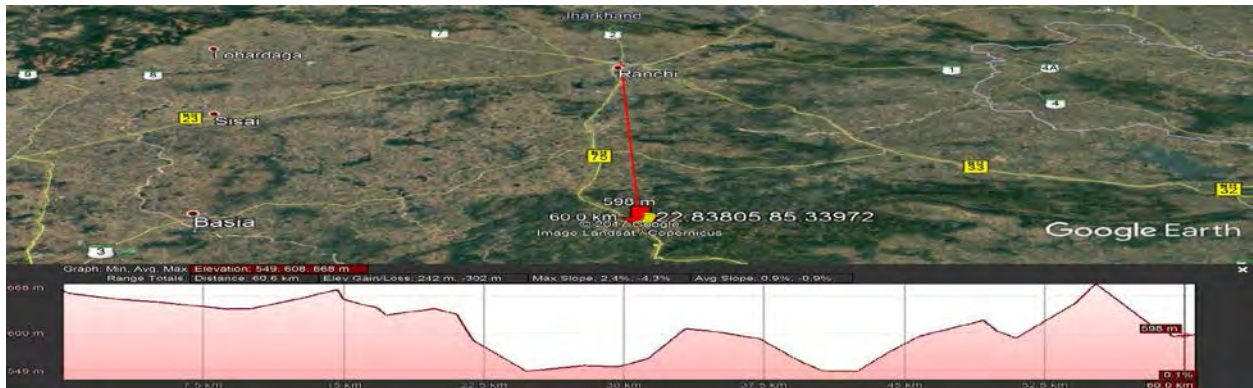
SOUTH EAST(Map-4 & Table-4):- Along this radial field strength measurement done at the location like Upper Burdwan Compound, Jamchuaon, Ramtola, Bundu, Gosanidih, salgadeh, Khunttee, Jothi Tomar, Barnin, Lodhna, Chawali Basa , Balldih, Chandil, Saharbera up to the distance 105 kilometer from line of site of transmitter, the satisfactory reception was observed up to the distance of 70Km.



Map-4

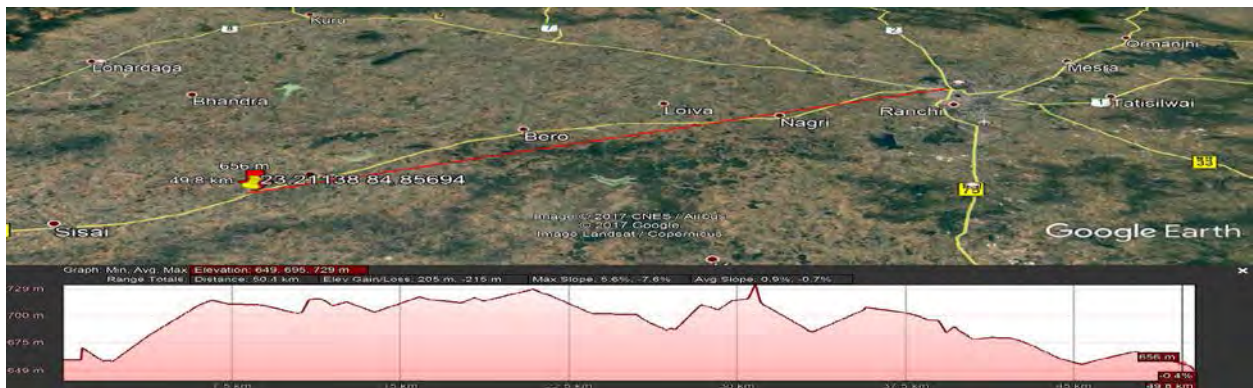
SOUTH (Map-5 & Table-5):- Along this radial field strength measurement done at the locations like Chandini Chawk, Kola Mati, Birhu, Kundi Bartoly, Jate Murhu, Topingsara, Tirla, Hesadi, Ladhuradih, Bhyian Deogaon, Banjh kusam, Chakradhar city up to the distance 85 kilometer from line of site of

transmitter, the satisfactory reception was observed up to the distance of 60 Km. In this route one hillock of more than 600 meters height is causing low range of reception.



Map-5

SOUTH WEST(Map-6 & Table-6):- Along this radial field strength measurement done at the location like Saparom, Itki mod, Masiya, Jariya, Hatu, Dumbo, Bhargaon, Kudra, Rerwa, Murgu, Silabhari petrol pump, BatraTolly, Near gumala up to the distance of 80 kilometer from line of site of transmitter, the satisfactory reception was observed up to the distance of 40 Km.



Map-6

WEST (Map-7 & Table-7):- Along this radial field strength measurement done at the locations like Ratre, Mudama, Gatua Chanho, Sons, Pandra, Bhuru Bratpur, Lohardoga, Kalnepath Bhargaon, Gamariya, Ghagraa, up to the distance 85 kilometer from line of site of transmitter, the satisfactory reception was observed up to the distance of 50 Km. There is a hillock near to the transmitting antenna, which is creating shadow zone at few places.



Map-7

NORTH WEST (Map-8 & Table-8):- Along this radial field strength measurement done at the locations like Pheta, Thakurpur gaon, Burmu, Makka, Piparwar, Kalyanpur, King, Basria, tandwa, Sarngdog, Khadhal, Dhangra, Soharkalan, Bahe, Delho, Rampur up to the distance 80 kilometer from the line of site of transmitter, the satisfactory reception was observed up to the distance of 75 Km.



Map-8

Conclusion:

On the basis of received field strength & MER values at the spot / location (Map-9) along with eight radials & coverage contour (Map-10) drawn on the basis of table compiled for satisfactory reception of DVB-T2 transmission, following conclusions can be stipulated.

1. The coverage along North direction, is up to the radial distance of 60 km. In North-East & East directions coverage is up to 55 km & 30 km respectively. In South-East it is up to 70 km, in South it is up to 60 km. In South-West direction the coverage area is up to 40 km, West & North-West direction it is up to a radial distance of 50 km & 75 km respectively.
2. The terrain profile map of Ranchi (Map-11) clearly shows the hills of varying heights, in all those routes. Dense forest in the East direction is also one of the reasons of low coverage.

3. The coverage in mobile reception was limited to 10 Km in all directions, except in North-East direction where minimum required signal strength was available up to the 20 Km.
4. Coverage in mobile reception is low due to the various reasons at 1.5/3 meter height in UHF bands. To increase the field strength as per ITU standards, additional transmitters in SFN are required at suitable place to increase the coverage of mobile reception.

S.NO.	Radial direction	LOS Distance (KM)as per ITU standard	
		@10 meter height of Antenna for fixed reception	@3 meter height of Antenna for mobile reception
1	NORTH	60	10
2	NORTH-EAST	55	20
3	EAST	30	10
4	SOUTH-EAST	70	10
5	SOUTH	60	10
6	SOUTH-WEST	40	10
7	WEST	50	10
8	NORTH-WEST	75	10

Scope of further study:

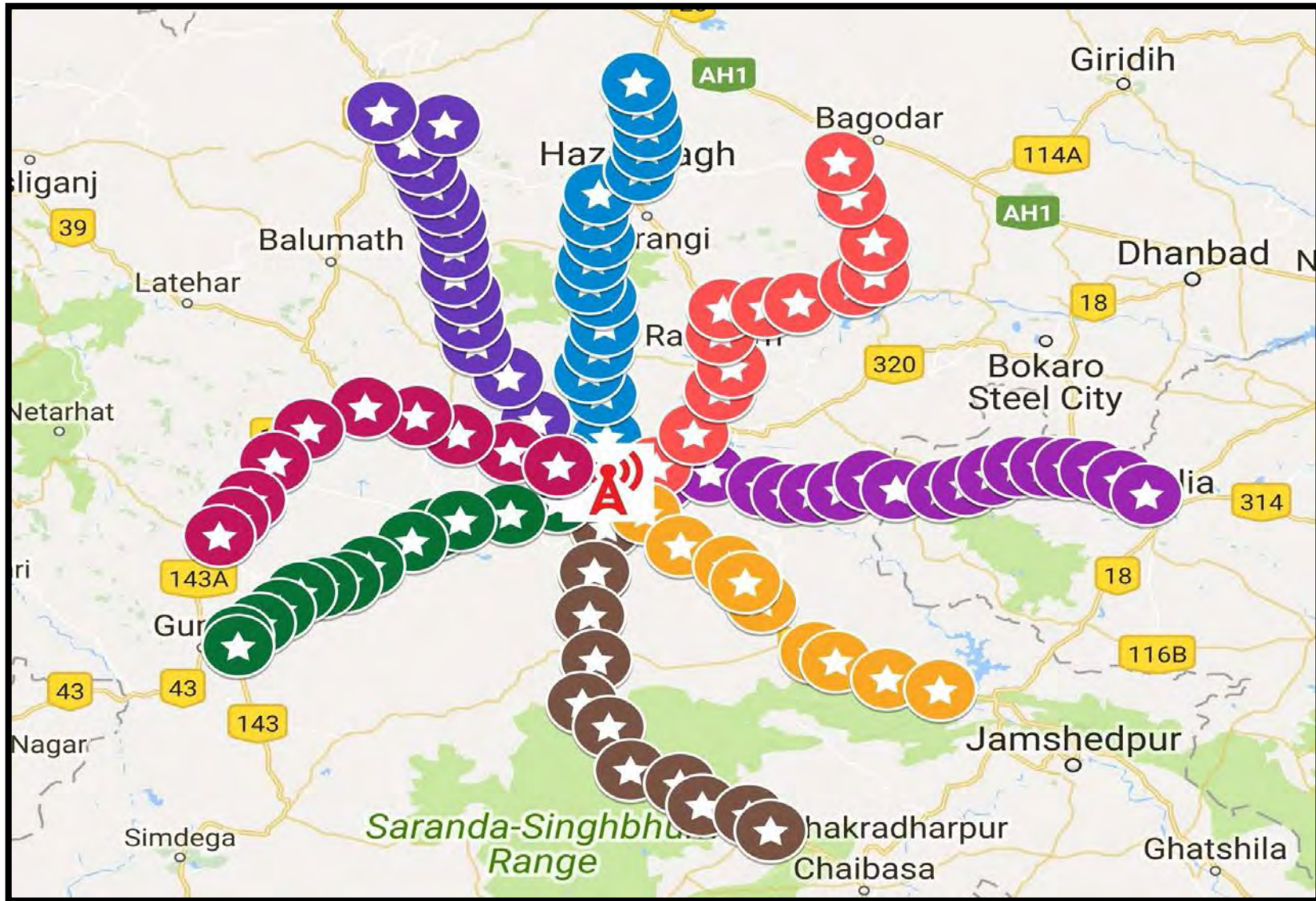
The purpose of this field trial is to determine the coverage contours for satisfactory reception of DVB-T2 Transmission under existing environmental condition. A comprehensive field strength survey of the said transmitter for reception in portable devices like smart mobile phone in densely populated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

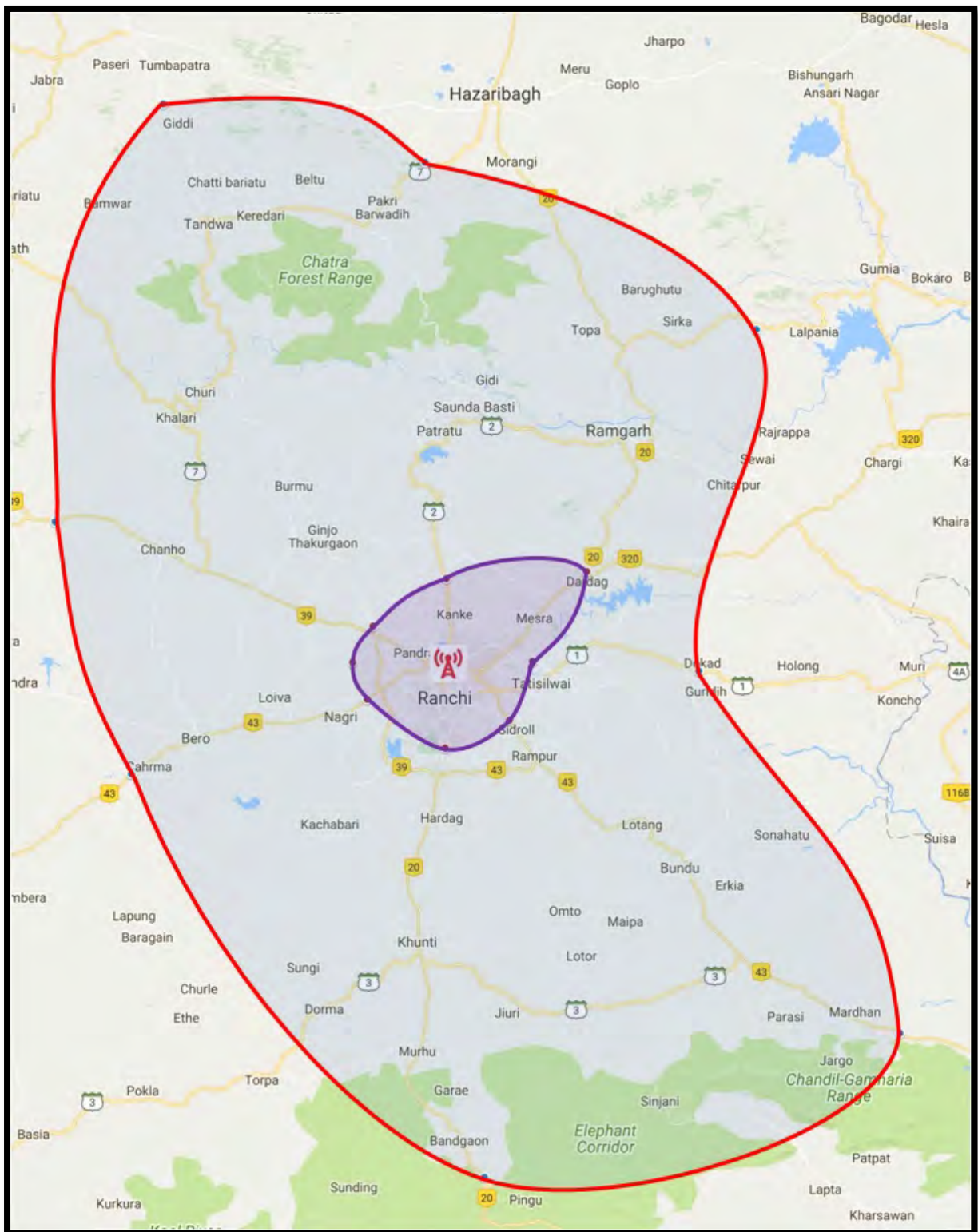
Acknowledgement:

The propagation studies presented in this document are carried out by the Propagation Lab of the 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, Ranchi.

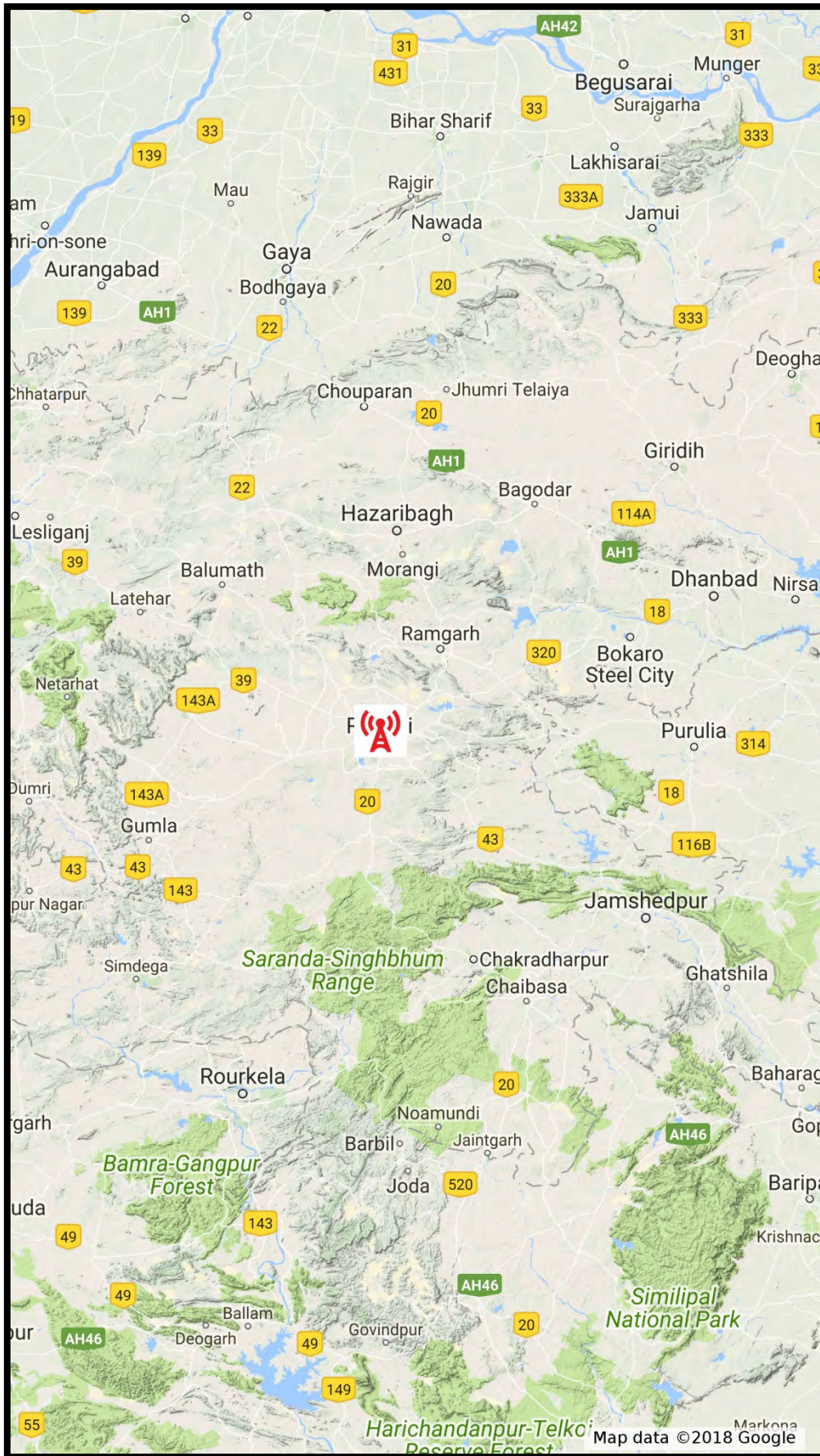
Radial route map originating from the location of the transmitter Ranchi, Jharkhand

Map-9





1. Areas within the Red line are coverage of DTT Transmission in Fixed reception mode.
2. Areas within the Purple line are coverage of DTT Transmission in Mobile mode.



Annexure-01

Reception survey of DVB-T2 of DDK RANCHI
Channel no.- 23 Frequnc 490 MHz

Direction:-NORTH

Table No.:- 01

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 high					Reciver Antenna at 03 meter high							
					Field strength dBu/V	MER	CBER (LDPC)	VBER (BCH)	Display on Promax	Field strength dBu/V	MER	CBER (LDPC)	VBER (BCH)	Display on Promax	Display on mobile		
23/5/2017	BUKRU	23°28'23.5" 85°18'41.7"	649	10	92.5	37	1.00E-07	1.00E-06	OK	86.8	37	1.00E-07	1.00E-06	OK	OK	>51.3, >54.0	Rural/LT/open
""	LEM, KANKE	23°33'42.3" 85°18'05.6"	593	20	60.4	34.9	1.00E-07	1.00E-06	OK	56.3	31.8	1.00E-07	1.00E-06	OK	OK	>33.2, >29.1	Rural/LT/hilly/veg
""	MELANI	23°36'24.1" 85°16'36.9"	423	25	45.4	14.9	1.00E-07	3.60E-02	OK	46.3	14.7	1.00E-07	3.10E-03	OK	OK	>15.8, >16.1	Rural/LT/
""	BIRSA MUNDA COLLEGE	23°39'13.9" 85°17'45.9"	382	30	43.4	14.9	1.00E-07	1.90E-03	OK	42.5	12.2	1.00E-07	8.90E-03	OK	NT	>13.6, >10.5	Rural/LT/
""	URIMARI(PATR ATU)	23°42'03.5" 85°18'27.9"	361	35	66.1	37	1.00E-07	1.00E-06	OK	61.5	34.9	1.00E-07	1.00E-06	OK	OK	>38.5, >32.8	Rural/LT/
""	SKM AHEAD BARKA GAON	23°44'92.7" 85°18'06.5"	495	40	47.2	22.9	1.00E-07	1.00E-04	OK	43.1	16.1	1.00E-07	1.60E-05	OK	NT	>19.3, 12.1	Rural/LT/
""	NEAR BARWANIA	23°47'16.3" 85°16'44.0"	427	45	41.4	8.9	1.00E-07	9.40E-03	OK	40.4	4.5	1.00E-07	7.70E-02	OK	NT	8.9, >4.9	Rural/LT/
""	ROUTH PARA BARKAGAON	23°50'03.6" 85°17'06.9"	414	50	49.2	20.4	1.00E-07	1.00E-06	OK	42.8	11.6	1.00E-07	6.10E-02	OK	NT	>21.0, >5.1	Rural/LT/
""	MOTRA KATAMDAG	23°52'44.4" 85°17'57.1"	566	55	58.9	34.2	1.00E-07	1.00E-06	OK	49.5	25.2	1.00E-07	1.00E-06	OK	OK	>31.2 >20.8,	Rural/LT/
""	PHATAATA KADAMDAG	23°55'24.9" 85°17'13.6"	632	60	55.2	30.8	1.00E-07	1.00E-06	OK	51.1	24.4	1.00E-07	1.00E-06	OK	OK	>27.8, >23.8	Rural/LT/
""	BANDAG	23°58'08.1" 85°17'48.2"	626	65	43.5	13.2	1.00E-07	3.60E-04	OK	45.4	12.5	1.00E-07	4.70E-03	OK	FF	>14.4 >11.8	Rural/LT/
""	SENDUR	24°00'52.7" 85°22'27.7"	594	70	41	8.2	1.00E-07	7.90E-03	OK	42.2	15.9	1.00E-07	1.00E-06	OK	NT	>7.3 >11.8	Rural/LT/

LEGENDS: LT-low traffic LRB-low rising building MRB-medium rising building 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 survey of DVB-T2 of DDK RANCHI
Channel no.- 23 Frequency 490 MHz

Direction:-NORTH

Table No.:- 01

Date & time	Location	Latitude & Longitude in degree	Mean sea level in meter	Distance from Transmitter in KM (Line of site)	COFDM Parameters										C/N (dB) (10m, 03m)	Terrain	
					Receiver Antenna at 10 meter height					Receiver Antenna at 03 meter height							
					Field strength dBu/V	MER	CBER (LDPC)	VBER (BCH)	Display on Promax	Field strength dBu/V	MER	CBER (LDPC)	VBER (BCH)	Display on Promax			Display on mobile
23/5/2017	NAGWA HAZARIBAGH	24°03'32.4" 85°23'19.5"	567	75	45.2	19.1	1.00E-07	1.00E-06	OK	40.9	11.9	1.00E-07	5.00E-05	OK	NT	>11.1, >8.4	Rural/L T/
""	SIJHUA ICHAK MORE HAZARIBAGH	24°06'06.4" 85°23'25.6"	576	80	41	13.4	1.00E-07	8.20E-04	OK	40.1	3.2	1.00E-06	9.20E-02	OK	NT	>8.8, >3.1	Rural/L T/
""	TILIR ICHAK	24°08'53.8" 85°22'47.0"	492	85	39.8		1.00E-07	3.60E-02	NT			1.00E-06	9.20E-02	NT	NT	>15.8, >16.1	Rural/L T/
""	KARMATANAR	24°11'39.0" 85°22'02.6"	437	90	39.7		1.00E-07	1.90E-03	NT			1.00E-07	8.90E-03	NT	NT	>13.6, >10.5	Rural/L T/

LEGENDS: LT-low traffic LRB-low rising building MRB-medium rising building 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 survey of DVB-T2 of DDK (RANCHI)
Channel no.- 23 Frequency- 490 MHz

Direction:- NORTH EAST

Table No.:-02

Date & time	Location	Latitude & 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 high					Reciver Antenna at 03 meter high							
					Field strength dBu/V	MER	CBER	VBER	Display on Promax	Field strength dBu/V	MER	CBER	VBER	Display on Promax			Display on mobile
24/5/2017	HAMBAL RANCHI	23°24'50.6" 85°24'21.3"	605	10	91	36.9	1.00E-07	1.00E-06	OK	87.4	31.9	1.00E-07	1.00E-06	OK	OK	>49.8, >49.7	Rural/LT
""	OMANJHI MESRA	23°28'51.7" 85°28'38.8"	607	20	86.4	37	1.00E-07	1.00E-06	OK	75.8	32.1	1.00E-07	1.00E-06	OK	OK	?49.3, >40.9	Rural/LT
""	GORATU RAMGARH	23°34'07.0" 85°31'39.2"	523	30	40.4	0	3.50E-08	7.00E-02	OK	40.4	0			OK	NT	6.9, >	Rural/LT
""	RAMGARH	23°37'01.7" 85°33'01.5"	357	35	43.3	10.2	1.00E-07	2.40E-03	OK	46.2	13.4	1.00E-07	1.10E-03	OK	NT	>12.6, >13.8	Rural/LT
""	NEAR MANDU	23°41'05.7" 85°31'42.5"	381	40	61.9	32.5	1.00E-07	1.00E-06	OK	58.8	30.3	1.00E-07	1.00E-06	OK	OK	>34.1, >29.5	Rural/LT
""	ARA MANDU	23°44'05.7" 85°32'04.6"	408	45	68.9	36.9	1.00E-07	1.00E-06	OK	65.4	36.2	1.00E-07	1.00E-06	OK	OK	>41.9, >37.2	Rural/LT
""	BARGAON	23°44'21.6" 85°36'55.5"	377	50	43.8	9.7	1.00E-07	5.80E-03	OK	39.9				OK	NT	10.9	Rural/NT
""	MURPA	23°44'52.8" 85°40'39.8"	356	55	49.9	26.8	1.00E-07	1.00E-06	OK	42.1	14.6	1.00E-07	8.40E-06	OK	NT	>28.6, >10.6	Rural/NT
""	LALPANIA TENUGHAT	25°27'11.4" 85°51'5.8"	289	60	40	10	1.00E-07	6.90E-03	OK	42.1	11.2	1.00E-07	2.50E-03	OK	NA	5.2>5.1	Rural/NT
""	BIRSA	23°46'57.1" 85°47'06.0"	288	65	40.5					39.4				NT	NT		Rural/NT
""	GOMIYA	23°48'18.0" 85°49'26.2"	271	70	40.3					38.6							Rural/NT
""	BULDDA VILLAGE GARMURGI	23°52'16.1" 85°49'22.0"	319	75	41.4	12.8	1.00E-07	6.90E-03	OK	40				NT	NT	8.9	
""	KONAR JHEEL	23°57'51.8" 85°46'46.0"	441	80	40.4										NT		Rural/LT/
""	VISHNU GARH	24°02'02.9" 85°45'23.4"	449	85	40.5										NT		Rural/LT/

LEGENDS: LT-low traffic
HT-high traffic

LRB-low rising building
HRB-high rising building

MRB-medium rising building
MT-medium traffic

VEG-vegetation
OA-open area

HDP-high Density populatio
HW-high way

IA-industrial area
LWR-LOW width road

Reception survey of DVB-T2 of RANCHI

Channel no.- 23 Frequency- 490 MHz

Direction:- .. EAST (RANCHI)

Table No.:-03

Date & time	Location	Latitude & 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 high					Reciver Antenna at 03 meter high							
					Field strength dBu/V	MER	CBER	VBER	Display on Promax	Field strength dBu/V	MER	CBER	VBER	Display on Promax			Display on mobile
25/5/2017	LAL GANJ CHAUK	23°23'02.1" 85°24'48.0"	622	10	85.9	36.9	1.00E-07	1.00E-06	OK	74.4	36.2	1.00E-07	1.00E-06	OK	OK	>48.6, >44.6	R/LT/OPE N
""	SIRAKA ANGARA	23°24'04.1" 85°30'35.0"	616	20	68.3	36.2	1.00E-07	1.00E-06	OK	63.4	33.2	1.00E-07	1.00E-06	OK	OK	>40.3, >35.1	R/LT/OPE N
""	KAMTA ANGARA JHALDA	23°22'24.9" 85°36'34"	505	30	65.2	37	1.00E-07	1.00E-06	OK	50.71	18.1	1.00E-07	2.50E-03	OK	OK	>37.8., >22.5	R/LT/OPE N
""	ASRI ANGARA 115	23°21'31.5" 85°39'21.7"	430	35	45.3	14.4	1.00E-07	1.80E-03	OK	48.1	21.1	1.00E-07	1.00E-06	OK	NT	>18.7, >19.2	RURAL/ HILLT
""	KULSUD ANGARA	23°21'35.7" 85°42'24.3"	375	40	45.5	16.9	1.00E-07	3.40E-03	OK	53.2	18.9	1.00E-07	1.00E-06	OK	NT	>15.5, >15.9	RURAL/HI LLY
""	HARWADISH SILLY	23°21'54.1" 85°45'36.9"	318	45	40.2	3.1	1.00E-07	7.70E-02	OK	40.5				OK	NT	>24.6, >15.8	RURAL/HI LLY
""	SILLY (NEAR)	23°21'132.6" 85°48'50.9"	277	51	43.72	16.4	1.00E-07	1.00E-06	OK	40.6	9.9	1.00E-07	7.70E-02	OK	NT	>14.6, 7.4	RURAL/HI LLY
""	BARA MURI	23°22'05.0" 85°51'53.0"	260	56	41.3	5.9	1.00E-07	3.60E-02	OK	40.5	4.2	1.00E-06	6.90E-02	OK	NT	>0.5, 0.2	RURAL/ NT
""	CHAMARDAG JHALDA-I (W.B.)	24°49'44.9" 85°31'39.1"	275	60	41.1	11.5	1.00E-07	1.6-E-03	OK	40.4				OK	NT	8.5	RURAL/NT /OPEN
""	POSTALERA JHALDA	23°21'59.8" 85°57'06.6"	289	65	40.8	1.9	1.00E-07	1.00E-07	OK	40.3				OK	NT	1.4	RURAL/NT /HILLY
""	Chatrani jhalda II	23°22'34.1" 85°59'53.4"	306	70	40.5	6.6	1.00E-07	3.50E-02	OK	40.8	8.3	1.00E-07	2.50E-02	OK	NT	>5.9, 8.2	Rural/open
""	Samal pur Jhalda II	23°23'47.1" 86°02'50.9"	292	75	41.2	10.1	1.00E-07	1.10E-02	OK	40.4				OK	NT	2.7	Rural/open /
""	Uparlatari jhalda II	23°24'48.9" 86°05'50.1"	292	80	40.3	4	1.00E-07	5.80E-02	OK	39.9				OK	NT	3.5	Rural/LI/ /
""	Garh Jaipur R/Station	23°24'52.4" 86°08'52.2"	288	85	41.3	10.4	1.00E-07	8.20E-03	OK	40.8	7.4	1.00E-07	3.80E-02	OK	NT	>1.4, >0.7	Rural/open /
""	Palanja Jaipur	23°24'41.3" 86°11'43.7"	283	90	46.2	19.3	1.00E-07	1.00E-06	OK	42.8	10.3	1.00E-07	4.00E-03	OK	NT	>4.7, >1.6	Rural/open /
""	Ranibandh Purulia-I	23°24'25.4" 86°14'41.0"	262	95	43.4	13.3	1.00E-07	3.10E-05	OK	40.4	5	1.00E-06	6.80E-02	OK	FF	>13.6, >10.5	Rural/open /
""	Hulka Purulia-I	23°23'10.8" 86°17'34.7"	265	100	40.4				OK					NT	NT		Rural/open /

LEGENDS: LT-low traffic
HT-high traffic

LRB-low rising building
HRB-high rising building

MRB-medium rising building
MT-medium traffic

VEG-vegetation
OA-open area

HDP-high Density populatio
HW-high way

IA-industrial area
LWR-LOW width road

Reception survey of DVB-T2 of RANCHI
Channel no.- 23 Frequency- 490 MHz

Direction:- SouthEast(RANCHI)

Table No.:-04

Date & time	Location	Latitude & 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	VBER	Display on Promax	Field strength dBu/V	MER	CBER	VBER	Display on Promax	Display on mobile		
26/5/2017	Upper Burdwan Compound	23°19'11.1" 85°23'09.9"	636	10	88.1	37	1.00E-03	1.00E-06	OK	78.8	35.7	1.00E-08	1.00E-06	OK	OK	>51.3, >41.4	High rise Building H/T
""	Jam chua on NH-33	23°15'10.9" 85°27'11.2"	650	20	74	21.8	1.00E-07	1.00E-06	OK	63.8	29.9	1.00E-08	1.00E-06	OK	OK	>47.2, >34.2	open/H T/veg
""	Ramtola bundu	23°12'46.4" 85°32'42."	430	30	48	18.2	1.00E-07	1.00E-06	OK	47.4	17.2	1.00E-07	1.00E-06	OK	NT	>21.4, >19	open/H T/hilly
""	Bundu (Ranchi)	23°10'41.8" 85°02'29.3"	343	35	44.9	15.7	1.00E-07	1.00E-04	OK	43.8	14.3	1.00E-07	8.20E-05	OK	NT	>15.1, >12.2	Rural/veg
""	GOSANIDIH	23°08'17.5" 85°36'24.0"	285	40	48.2	12.9	1.00E-07	1.00E-06	OK	44.9	10.5	1.00E-06	1.05E-06	OK	NT	>17.2, >15.6	open/H T
""	Salgadeh Tamar	23°05'22.9" 85°37'53.0"	292	45	53.7	28.1	1.00E-07	1.00E-06	OK	51.9	24.2	1.00E-07	1.00E-06	OK	NT	>22.2, 23.2	open/H T
""	Khuntee NH-33	23°03'38.9" 85°58'39.7"	266	50	49.8	22.8	1.00E-07	1.00E-06	OK	48.4	21.2	1.00E-07	1.00E-06	OK	NT	>21.5, >19.2	open/H T
""	Jothi jamar NH-33	23°02'08.0" 85°42'36.8"	236	55	48	16.9	1.00E-07	1.00E-04	OK	43.3	11.3	1.00E-08	6.50E-03	OK	NT	<17.1,>12.5	open/H T
""	Barnin Tamar	23°01'01.3" 85°45'00.8"	228	60	50	24.4	1.00E-07	1.00E-06	OK	46.7	21.4	1.00E-07	1.00E-06	OK	NT	<21.2,>17.5	open/H T
""	LODHENA	22°58'50.9" 85°50'49.3"	253	70	55.7	26.6	1.00E-06	1.00E-06	OK	52.8	26.8	1.00E-08	1.00E-06	OK	NT	>21.2>23.1	open/H T
""	Chawari Basa	22°57'31.0" 85°56'56.8"	204	80	43.8	17.1	1.00E-07	1.00E-06	OK	40.4	7.1	1.00E-07	#####	OK	NT	>13.3>5.9	open/Veg/NT
""	Ballidih chamdil	22°57'08.6" 86°00'43.1"	163	85	41.9	7.5	1.00E-07	2.50E-03	OK					OK	NT	7.4	open/Veg/NT
""	SAHARBERA	22°56'23.3" 86°02'46.0"	198	90	39.9								1.00E-06	NT	NT	>40.3, >35.1	R/LT/O PEN

LEGENDS: LT-low traffic
HT-high traffic

LRB-low rising building
HRB-high rising building

MRB-medium rising building
MT-medium traffic

VEG-vegetation
OA-open area

HDP-high Density populatio
HW-high way
IA-industrial area
LWR-LOW width road

Reception survey of DVB-T2 of DDK RANCHI
Channel no.- 23 Frequency- 490 MHz

Direction:- SOUTH

Table No.:-05

Date & time	Location	Latitude & Longitude in degree	Mean sea level in meter	Distance from Transmitter in KM	COFDM Parameters											C/N (dB) (10m, 03m)	Terrain
					Receiver Antenna at 10 meter high					Receiver Antenna at 03 meter high							
					Field strength dBu/V	MER	CBER	VBER	Display on Promax	Field strength dBu/V	MER	CBER	VBER	Display on Promax	Display on mobile		
27/5/2017	Chandni chowk (Hatia)	23°17'24.1" 85°18'36.3"	644	10	82.6	37.4	1.00E-07	1.00E-06	OK	79.9	37.1	1.00E-07	1.00E-06	OK	OK	>45.3, >44.2	open/urban
""	Kala mati	23°11'56.8" 85°17'15.3"	627	20	65	36.6	1.00E-07	1.00E-06	OK	59.9	34.1	1.00E-07	1.00E-06	OK	OK	>48.2, >36.4	open/LT/Veg
""	Birhu (NH-20)	23°06'35.0" 85°16'40.9"	615	30	68	36	1.00E-07	1.00E-06	OK	63	36.9	1.00E-07	1.00E-06	OK	OK	>40.6, >36.5	open/LT/Veg
""	Kundli Bartoly	23°01'09.9" 85°17'27.1"	612	40	62.2	33.4	1.00E-07	1.00E-06	OK	59.1	32.5	1.00E-07	1.00E-06	OK	OK	>33.4, >31.3	open/LT/Veg
""	Jate murhu	22°55'55.2" 85°15'55.9"	544	50	40.4	4.5	1.00E-07	6.70E-02	OK					OK	NT	3.2	open/LT/Veg
""	Band gamo (near)	22°52'56.7" 85°18'54.8"	578	55	42.9	14.8	1.00E-07	1.80E-03	OK					OK	NT	12.2	open/LT/Veg
""	TRILA	25°16'28.9" 84°40'59.7"	616	60	52.1	27.9	1.00E-07	1.00E-06	OK		NA	NA	NA	OK	NT	23	open/LT/Veg
""	Hesadi	22°47'37.6" 85°21'23.0"	431	65	40	1.1	1.00E-06	1.00E-06	OK		NA	NA	NA	OK	NT	3	open/LT/Veg
""	Ladhuradih band gaon	22°45'56.8" 85°27'07.2"	517	70	41	11.5	1.00E-07	4.90E-03	OK		NA	NA	NA	OK	NT	8.3	open/LT/Veg
""	BHYIANDE OGAN	22°43'17.3" 85°29'41.2"	305	75	39.5	0.5	1.00E-06	1.00E-01						FF	NT	1.5	open/LT/Veg
""	Banjh kusu	22°42'08.9" 85°35'00.6"	262	80	42.8	13.1	1.00E-07	8.40E-03	OK					OK	NT	11.7	open/LT/Veg
""	Chakradhar pur city	22°40'09.8" 85°37'29.5"	234	85	40.4	8.5	1.00E-07	3.50E-02	OK					OK	NT	5.7	open/LT/Veg

LEGENDS: LT-low traffic
HT-high traffic

LRB-low rising building
HRB-high rising building

MRB-medium rising building
MT-medium traffic

VEG-vegetation
OA-open area

HDP-high Density population
IA-industrial area
HW-high way
LWR-LOW width road

Reception survey of DVB-T2 of DDK RANCHI
Channel no.- 23 Frequency- 490 MHz

Direction:- SOUTH WEST

Table No.:-06

Date & time	Location	Latitude & 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	VBER	Display on Promax	Field strength dBu/V	MER	CBER	VBER	Display on Promax	Display on mobile		
28/5/2017	Saparom	23°20'33.1" 85°13'05.2"	721	10	93.8	37	1.00E-07	1.00E-06	OK	84.9	37.2	1.00E-07	1.00E-06	OK	OK	>52.6, >52.1	urban/HT/veg
""	Itki mod	23°18'59.6" 85°07'39.4"	731	20	77.7	37.1	1.00E-07	1.00E-06	OK	61	32.3	1.00E-07	1.00E-06	OK	OK	>49.2, >33.4	urban/HT/veg
""	Masiya Bero	23°17'18.9" 84°58'53.0"	696	35	63.4	31.2	1.00E-07	1.00E-06	OK	57.9	31.9	1.00E-07	1.00E-06	OK	OK	>23.9, >27.0	open/veg/HT
""	Jariya Bero	23°18'18.1" 85°01'52.8"	714	30	72.9	37	1.00E-07	1.00E-06	OK	52	33.7	1.00E-07	1.00E-06	OK	OK	>33.3, >22.9	open/veg/HT
""	Hatu	23°15'42.3" 84°56'22.8"	708	40	60.8	36.1	1.00E-07	1.00E-06	OK	59	23.6	1.00E-07	1.00E-06	OK	OK	>42.2, >31.7	open/veg/HT
""	Dumbo Verno	23°12'40.2" 84°51'24.7"	658	50	47.9	21.1	1.00E-07	1.00E-06	OK		NA	NA	NA	NA	NA	>17.2, NA	open/veg/HT
""	Jaira Sisai	23°10'44.4" 84°48'46.7"	637	55	44.2	19	1.00E-07	1.00E-06	OK		NA	NA	NA	NA	NA	14.3	open/veg/HT
""	Kudra sisai	23°10'06.0" 84°46'04.0"	635	60	45	18.8	1.00E-07	1.00E-06	OK		NA	NA	NA	NA	NA	14.1	N.R.B/Veg
""	Rerwa Sisai	23°09'28.9" 84°43'35.4"	614	65	43.1	16.1	1.00E-07	1.00E-06	OK		NA	NA	NA	NA	NA	13.2	Veg/Rural/NT
""	Asro sisai	23°07'20.3" 84°41'12.0"	582	70	40.1	5.2	1.00E-07	3.00E-02	OK		NA	NA	NA	NA	NA	5.8	Veg/Rural/NT
""	Petrol pump	23°05'36.2" 84°38'55.0"	595	75	40.4	3.3	1.00E-07	7.00E-01	OK							2.4	Veg/LT
""	Batra Tolly	23°04'07.8" 84°36'24.7"	613	80	41	4.4	1.00E-07	2.30E-02	OK						NT	0.3	Veg/Rural/NT
""	Sisai Road	23°02'52.6" 84°36'24.7"	634	85	39.2	3	1.00E-05	1.00E-01	OK						NT	1.2	Veg/Rural/NT

LEGENDS: LT-low traffic
HT-high traffic

LRB-low rising building
HRB-high rising building

MRB-medium rising building
MT-medium traffic

VEG-vegetation
OA-open area

HDP-high Density populatio
HW-high way
IA-industrial area
LWR-LOW width road

Direction:- West

Reception survey of DVB-T2 of DDK RANCHI

Channel no.- 23 Frequency- 490 MHz

Table- 07

Date & time	Location	Latitude & Longitude in degree	Mean sea level in meter	Distance from Transmitter in KM	COFDM Parameters											C/N (dB) (10m, 03m)	Terrain
					Receiver Antenna at 10 meter height					Receiver Antenna at 03 meter height							
					Field strength dBu/V	MER	CBER	VBER	Display on Promax	Field strength dBu/V	MER	CBER	VBER	Display on Promax	Display on mobile		
29/05/2017	Ratu	23°24'56.5" 85°13'12.0"	729	10	67.6	25.3	1.00E-07	1.00E-06	OK	76.7	36.2	1.00E-08	1.00E-06	OK	OK	>38.4, >42.6	HT/Veg /HRB/H
""	Mudama	23°26'38.6" 85°07'37.1"	702	20	62.2	34.1	1.00E-07	1.00E-06	OK	59	25.3	1.00E-08	1.00E-06	OK	OK	>34.5, >28.2	HT/Veg /HRB/H
""	Gutua Chamho (Bijura)	23°28'46.3" 85°01'41.4"	699	30	76.1	36.8	1.00E-07	1.00E-06	OK	65.9	36.9	1.00E-08	1.00E-06	OK	OK	>44.3, >34.1	Rural/veg g/HT
""	Saumschanaho	23°31'01.2" 84°56'58.0"	679	40	56.3	30.1	1.00E-07	1.00E-06	OK			1.00E-07	1.00E-06	OK	OK	19.5	Rural/veg g/HT
""	Pandra (117)	23°32'04.6" 84°50'59.7"	671	50	55.2	28.6	1.00E-07	1.00E-06	OK			1.00E-07	1.00E-06	OK	OK	27.9	Open/veg g/LT/R
""	Pudhubratpur	23°29'27.0" 84°44'28.9"	623	60	46.5	21	1.00E-07	1.00E-06	OK					OK	NT	17.4	Rural/veg g/HT
""	Lohardaga	23°25'21.2" 84°40'35.8"	674	65	46.3	22.3	1.00E-07	1.00E-06	OK					OK	NT	17.8	HRB/Veg g/LT
""	Kalhe path	23°20'47.3" 84°37'48.0"	640	70	39.4		1.00E-07	1.00E-06	OK								Open/L T/Veg
""	Nawalink	23°18'30.9" 84°35'58.2"	636	73.5	40.9	17.3	1.00E-07	4.50E-05	OK					OK	NT	13	Open/L T/Veg
""	Ghaghraa	23°16'21.9" 84°34'19.2"	639	77	40.5	11.1	1.00E-07	1.50E-04	OK					OK	NT	9	CLT/Veg g

LEGENDS: LT-low traffic
HT-high traffic

LRB-low rising building
HRB-high rising building

MRB-medium rising building
MT-medium traffic

VEG-vegetation
OA-open area

HDP-high Density population
IA-industrial area

HW-high way LWR-LOW width road

Reception survey of DVB-T2 of DDK RANCHI
Channel no.- 23 Frequency- 490 MHz

NORTH WEST (RANCHI)_

Table-08

Date & time	Location	Latitude & 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	VBER	Display on Promax	Field strength dBu/V	MER	CBER	VBER	Display on Promax			Display on mobile
30/05/2017	Jhagdatar	23°25'18.7" 85°13'29.7"	719	10	88.5	37	1.00E-07	1.00E-06	OK	64	26.1	1.08E-06	1.00E-06	OK	OK	>52, >36	HRB/HT/Veg
""	Thakur pur gaon	23°30'31.8" 85°10'31.3"	693	20	77.3	37.6	1.00E-07	1.00E-07	OK	57.9	22.7	1.00E-08	6.50E-04	OK	OK	44.3>27.0	Rural/NRB/Veg
""	Burmu (Ranchi)	23°35'46.0" 85°07'24.2"	616	30	66.5	36.8	1.00E-07	1.00E-06	OK	62.1	34	1.00E-08	1.00E-06	OK	OK	>39., >26	Rural/veg/LT
""	Bamana	23°39'48.9" 85°03'46.7"	457	40	39.4	0.2	1.00E-07	1.00E-01	OK					OK	NT	3.6	open?hill y/NT
""	Piparwar	23°42'47.5" 85°02'50.8"	429	45	40.4	0	1.00E-08	1.00E-01	OK					OK	NT	3.4	NILL/HT/IA
""	Kalyan pur Xing	23°45'50.1" 85°02'33.6"	431	50	47.9	21.9	1.00E-07	1.00E-06	OK					OK	NT	18.6	Open/LT/Veg
""	Basria	23°48'10.7" 85°01'20.9"	448	55	43	15.4	1.00E-06	1.80E-06	OK					OK	NT	12.2	Hilly/VEG/LT
""	Tandwa (neem Road)	23°51'29.4" 85°01'13.4"	457	60	42.8	14.2	1.00E-06	1.05E-06	OK					OK	NT	3.6	MRB/Urban/LT
""	Sarndog	23°54'30.7" 85°00'56.0"	481	65	46.2	11.5	1.00E-06	2.10E-03	OK					OK	NT	0.9	Open/MRB/LT
""	Khadai	23°56'48.7" 85°00'08.3"	486	70	44.8	17.8	1.00E-07	1.00E-06	OK					OK	NT	14.8	NRB/Rural/Veg/LT
""	Dhangra (NH-22)	23°59'07.9" 84°58'39.1"	518	75	56.1	32.2	1.00E-07	1.00E-06	OK					OK	NT	29.5	Open/Rural/veg
""	Banhe	24°01'44.3" 84°57'35.0"	567	80	45.4	20.4	1.00E-07	1.05E-06 4.10889E-05	OK					OK	NT	16	open/LT
""	Simariya	24°04'07.8" 84°56'04.2"	569	85	44.7	18.4	1.00E-07	1.05E-06 4.10889E-05	OK					OK	NT	15	MRB/VEG/LT
""	Delho (NH-22)	24°06'31.7" 85°00'08.3"	491	90	39.8	5	1.00E-07	8.60E-02	OK					OK	NT	4.2	Rural/Veg/LT
""	Hafua	24°08'06.5" 84°52'53.1"	473	95	40.1	8.2	1.00E-07	1.50E-02	OK					OK	NT	5	Open/veg/LT

LEGENDS: LT-low traffic
HT-high traffic

LRB-low rising building
HRB-high rising building

MRB-medium rising building
MT-medium traffic

VEG-vegetation
OA-open area

HDP-high Density populatio
HW-high way

IA-industrial area
LWR-LOW width road