

*Reception Survey of 200kW  
MW AM-DRM Transmitter at  
Bangaluru in Simulcast &  
Pure DRM Modes*

***Reception Survey of  
200kW MW AM-DRM  
Transmitter at  
Bangaluru in Simulcast  
& Pure DRM Modes***

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**O/o Additional Director General (R&D)**  
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**New Delhi – 110002**

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**Section:**

Propagation Laboratories

**Objective:**

Reception survey of 200kW MW of AM-DRM transmitter at Bangalore in Simulcast & Pure DRM Modes

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## **Basic Data and Transmitter details**

### **Transmitters Details:**

1. Name of Station : HPT(AIR), Bangaluru
  2. Location of the Transmitters : LAT- N 13° 03' 52.1"  
(In 6 figure coordinates) LON- E 77° 47' 02.1"  
MSL-895 Meter
  3. Description of terrain around the : Urban, Vegetation  
Site of Transmitters Moderate Traffic
  4. Classification(Large city/urban/rural) : Urban
  5. Rated power of the Transmitter : 200kW
  6. Make : Nautel
  7. Model No. : NX-200
  8. Frequency of operation : 612 kHz
  9. Date of Commissioning : 28/04/2015
- :

### **Transmitting Antenna Details:**

1. Type of Antenna : Directional Pattern(Active/Passive)
2. Height of Tower : 122.5 Meter
3. Effective height of antenna(Midbay) : NA
4. Type of Polarization : Vertical
5. Antenna Gain(in dB) : NA

## 1. INTRODUCTION

Digital Radio Mondiale (DRM) is one of the worldwide digital radio standards accepted by the ITU. The DRM standard has configurations (modes) suitable for frequencies up to 30 MHz and additional mode (DRM+) for frequencies up to band III. In order to migrate from analog AM transmission to digital (DRM), simulcast technology will be used for suitable migration for few years. Later on, full DRM or DRM only transmission will be on air from the vast network of AIR radio transmitters spread all over India.

## 2. OBJECTIVES

Director General, AIR vide their letter no. 5(4)/2011-D(TD/MW)/Bangalore dated 22/04/15 [Annexure III] requested Research Department to monitor the reception of DRM signal originating from medium-wave transmitter (200kW) of AIR-Bangalore in following configurations:

1. In Simulcast mode during normal transmission period.
2. In pure DRM mode during pause periods.
3. Survey to be done using professional receiver as well as commercial DRM receivers.

### 3. EQUIPMENTS USED

- Field strength meter along with loop antenna and tripod  
make : Anritsu model ML428-B
- Field strength meter and tripod make: Anritsu mode  
MS2713E with Antenna (Loop) make: Schwarzbeck model  
FMZB 1513.
- Professional DRM receiver  
Make: Fraunhofer  
Model: DT700
- Garmin make Montana 650, GPS
- Morphy Richards commercial receiver
- Dell Studio laptop computer
- Su-Kam sine wave inverter (1400 VA)
- Philips commercial receiver
- DRM-PC radio, Make: WIN RADIO, Model:G313e
- Active Antenna, Schwarzbeck
- Passive 1 meter length antenna
- Tools- assorted
- Mobile set
- Propagation Van (Tata Safari)

## 4. METHODOLOGY

AIR medium wave transmitter is situated at Hoskote (N 13° 03' 52.1'' E 77° 47' 02.1''), near city of Bangalore. The antenna is self supported radiating mast with one active and one passive element. The passive element lies in the north direction from active radiator. The transmitter is new with R.F. analog power of 200kW. It is capable of radiating Simulcast as well as pure DRM signals. In Simulcast mode, DRM power can be set @12dB, 14dB and 16dB less of full analog power.

As Hoskote is very near to the State of Tamil Nadu and Andhra Pradesh, we have selected 4 routes for survey viz. 1 North 2 East 3 West and 4 South-West. Route South-West and West covers majority of Karnataka state including capital city of Bangalore.

For full DRM reception route North-West has been selected as well as for checking analog primary coverage. For Simulcast transmission, AIR-Directorate has set parameters for Bangalore as follows:

|               |            |
|---------------|------------|
| DRM frequency | (Fc+9) kHz |
| Mode          | A          |
| MSC           | 64 QAM     |
| SDC           | 16 QAM     |

Propagation Van (Tata Safari) has been equipped with all relevant equipments and one passive and one active antenna of 1 meter length installed on rooftop of the vehicle.



## 5. DATA ANALYSIS (SIMULCAST)

### A. North Direction (Table-1& Map I)

Survey started with GPS marking of active radiating tower. Initially we took measurements at an interval of 5 kilometres (L.O.S.) and increased it up to 20 kilometres. The passive element of antenna system lies in North direction, as such it was expected that coverage will be less as compared to other directions.

Professional receiver DT700 worked very well and decoded audio of DRM signal on frequency 621kHz faithfully without audio drops up to 100 kilometre distance (L.O.S.), whereas first generation Morphy Richards worked only up to 45 kilometre. Analog signal was excellent throughout the route. The DRM power was at 16 dB ↓, and at 100 kilometre distance DRM power changed to 12 dB ↓, but no significant change in reception quality observed.

Geographically north side of transmitter is mainly open fields, highways and small settlements. Hence, not much problem was observed in DRM at 16dB ↓ reception.

### B. East Direction (Table-2 & Map II)

Survey team selected Bangalore-Tirupati highway on East direction. In this direction, professional receiver DT700 worked well only up to 90 kilometres and commercial DRM receiver worked only up to 40 kilometres. This route has more vehicular traffic as compared to north direction. Large vehicles when approaches towards DRM receiver's antenna, it affects it badly. Audio drops became more prominent in this case. Again in the city where electrical noise is high, audio drops was more prominent.

### C. South-West (Table-3 & Map III)

In south-west direction, survey was conducted in many places in Bangalore city before approaching Mysore highway. Reception becomes difficult even for professional receivers in areas like BTM 2<sup>nd</sup> Stage. The area is mainly composed of high density homes, electrical machinery and very high vehicular traffic. MER drops to 11-13 dB from 22 dB in these areas. Similarly, analog reception was also found noisy. It was mainly due to presence of high level electrical noise in the vicinity.

In this route, professional receiver worked well up to a distance of 120 kilometres. Commercial receiver worked only up to 20 kilometres initially and again started working at 30 kilometres L.O.S. distance with audio drops. It is quite clear that commercial receivers like Morphy Richards cannot work in low DRM power in areas having high electrical noise. It cannot work properly where multipath propagation is severe.

### D. West Direction (Table-4 & Map IV)

In west direction from transmitter, the first 25 kilometres lies in Bangalore city itself. Both the receivers work well up to radial distance of 15 kilometres on Old Madras Road with recording of commercial receivers MER as high as 22 dB. From 25 to 50 kilometres L.O.S. distance commercial receivers' audio accompanied with more or less regular drops. After 45 kilometres and onwards, it stopped decoding audio completely.

At the same time, professional receiver (DT700) worked well up to a distance of 130 kilometres with field strength (DRM) as low as 18 dB $\mu$ V/m. It may be due to very low electrical noise in these areas.

## **6. DATA ANALYSIS (PURE DRM) (TABLE-5 and 6 & Map V)**

As DRM is supposed to work in pure DRM or DRM only mode for proper reception, survey was conducted in North-West direction from Hoskote (transmitter site) with 80 kW of DRM power.

Reception on professional receiver DT700 was excellent including reception in Bangalore city area. The reception was excellent up to L.O.S. distance of 210 kilometres with very low rate of audio drops. MER of 17-18 dB was observed at a distance of 200 kilometres.

Receptions on commercial receivers like Morphy Richards worked well up to a distance of 75-80 kilometres in open space.

## **7. ANALOG RANGE (PRIMARY)**

For study purpose, primary coverage of analog signal (63 dB $\mu$ V/m) was checked on full 200 kW analog R.F. power. Reception of signal having field strength 63dB $\mu$ V/m was observed up to a distance of 170 kilometres in north-west direction.

## **8. R.F. POWER AT 1 KILOMETRE**

For the purpose of checking R.F. power radiated and directional pattern of antenna, several field strength measurements were carried out around active radiator at full 200 kW power (612 kHz).

The maximum signal was observed in south direction (131 dB $\mu$ V/m) and minimum in the north-east direction (115 dB $\mu$ V/m). In the north direction it was 125dB $\mu$ V/m. The front to back field strength varies between 6 dB to 16 dB in direction north to north-east.

## 9. DRM RECEPTION IN MOVING VEHICLE ON RING ROAD, BANGALORE (ANNEXURE-I)

Plotted, time versus MER (mean) (Annexure I) in Simulcast mode all around Bangalore city, driving around on newly constructed ring road.

MER dropped below 20 dB on professional receiver (DT700), whenever propagation vehicle came near to big vehicles or approaches Metro tracks, FOB or tall buildings. Resultant graph of MER v/s Time is attached as annexure. One can see the large variations in MER value in city like Bangalore where as distance from transmitter is not much changed.

## 10. CONCLUSIONS

- **Full DRM mode:** From the data collected, it is clear that full DRM worked well in rural as well as in city areas. Coverage exceeds (210-230 kilometres) normal primary analog coverage by 15-20 % with less R.F. power (80 kW compared to 200 kW in analog). However this is valid only for professional receivers like DT700. First generation commercial receivers like Morphy Richards may work only up to **80 kilometres in open space**. It will further reduce if receiver lies inside a home.
- **Simulcast mode:** In this mode, commercial receiver has worked only up to **50 kilometre** (DRM at 16 dB↓ and R.F. power 200 kW) with audio drops likely to occur near Metro tracks, tall buildings, high vehicular traffic areas and industrial areas. At high electrical noise areas, it may stop altogether. Reception could not be improved much even

after increasing the power of DRM signal by 4 dB (DRM at 12 dB ↓). As such, DRM at 16 dB ↓ is quite good for Simulcast transmission. Moreover, analog signal will experience additional noise if we increase DRM power at 12/14 dB ↓ at analog power. **In Simulcast mode, professional receiver has worked well up to a distance of 90-120 kilometres** in different routes. It is due to the directional pattern of antenna used.

- **Analog Mode:** For checking primary coverage in pure Analog mode at full RF power of 200 kW, one route randomly selected. The observed coverage comes around 170 Km in North-West direction. Based on other data of simulcast mode where as Analog power is very near to 200 Kw, coverage map for analog transmission was prepared (Annexure-II).
- **Role of commercial receivers in coverage:** The quality of front end and processing capacity of commercial DRM receivers decide the coverage of transmission in DRM. The first generation receivers like Morphy Richards and Himalaya 2009 gives poor coverage. New modern DRM receivers are not available in Indian markets as such real coverage with good receivers cannot be projected. Different receivers give different values of MER at same spot/Location. Receivers having better MER will provide excellent audio compared with low MER value receivers.

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Reception Survey of 200kW AIR (MW), DRM Transmitter (Bangaluru) in Simulcast transmission mode (16dB↓)

Route: Hyderabad Road

Direction: North

Date: 4-7/6/15

| Sr.No | Time | Spot/Location      | Radial Distance (km) | Field Strength ( dBμV/m) |        | Fraunhofer DT-700 Professional Receiver |          |            | Morphy Richards Comm. Receiver |            | Terrain | Remark                     |                           |
|-------|------|--------------------|----------------------|--------------------------|--------|---|----------|------------|--------------------------------|------------|---------|----------------------------|---------------------------|
|       |      |                    |                      | DRM                      | Analog | SNR (dB)                                | MER (dB) | Subjective | MER (dB)                       | Subjective |         |                            |                           |
|       |      |                    |                      |                          |        |   |          |            |                                | DRM        |         |                            | Analog                    |
| 1     | 1053 | NH-207             | 5                    | 46                       | 111    | 32.6                                    | 30       | ok         | 22                             | ok         | ok      | Light traffic, fields etc. |                           |
| 2     | 1124 | Yenagunte          | 10                   | 54                       | ---    | 30                                      | 41       | ok         | --                             | ok         | ok      | --do--                     |                           |
| 3     | 1136 | Siddanahalli       | 15                   | 44                       | 102    | 39                                      | 42       | ok         | --                             | ok         | ok      | --do--                     |                           |
| 4     | 1155 | SH#35              | 20                   | 45                       | 102    | 42                                      | 36       | ok         | --                             | ok         | ok      | --do--                     |                           |
| 5     | 1217 | --do--             | 25                   | 42                       | 98     | --                                      | --       | ok         | 15                             | ok         | ok      | --do--                     |                           |
| 6     | 1232 | Sidlaghatta SH 35  | 35                   | 37                       | 96     | 34                                      | 31       | ok         | 18                             | ok         | ok      | --do--                     |                           |
| 7     | 1314 | Near Chikballarpur | 40                   | 35                       | ---    | 28.5                                    | 31.4     | ok         | 14                             | NT         | ok      | --do--                     |                           |
| 8-7/6 | 1135 | Maranthalli NH 7   | 45                   | 32                       | 86     | 37                                      | 31       | ok         | 17                             | ok         | ok      | --do--                     | Morphy audio up to 50 km. |
| 9     | 1154 | NH#7               | 55                   | 19                       | 80     | 30                                      | 25       | ok         | 0                              | NT         | ok      | Open field/ National hw    |                           |
| 10    | 1210 | Jyanthi Gram nh 7  | 65                   | 24                       | 81     | 27                                      | 23       | ok         | 13                             | NT         | ok      | --do--                     |                           |
| 11    | 1230 | Adiganapalli NH 7  | 80                   | 23                       | 80     | 29                                      | 28       | ok         | 12                             | NT         | ok      | --do--                     |                           |
| 12    | 1306 | NH#7               | 100                  | --                       | --     | 25                                      | 23       | ok         | --                             | NT         | ok      | --do--                     |                           |
| 13    | 1322 | --do--             | 110                  | 10                       | 72     | 4.4                                     | 10       | NT         | --                             | NT         | ok      | --do--                     |                           |
|       | 1322 | --do--             | 110                  |                          |        | 8                                       | 14       | NT         | --                             | NT         | ok      | Rocky area.                | DRM @12 db.               |
|       |      |                    |                      |                          |        |   |          |            |                                |            |         |                            |                           |
|       |      |                    |                      |                          |        |   |          |            |                                |            |         |                            |                           |

DRM Parameter (Fixed)

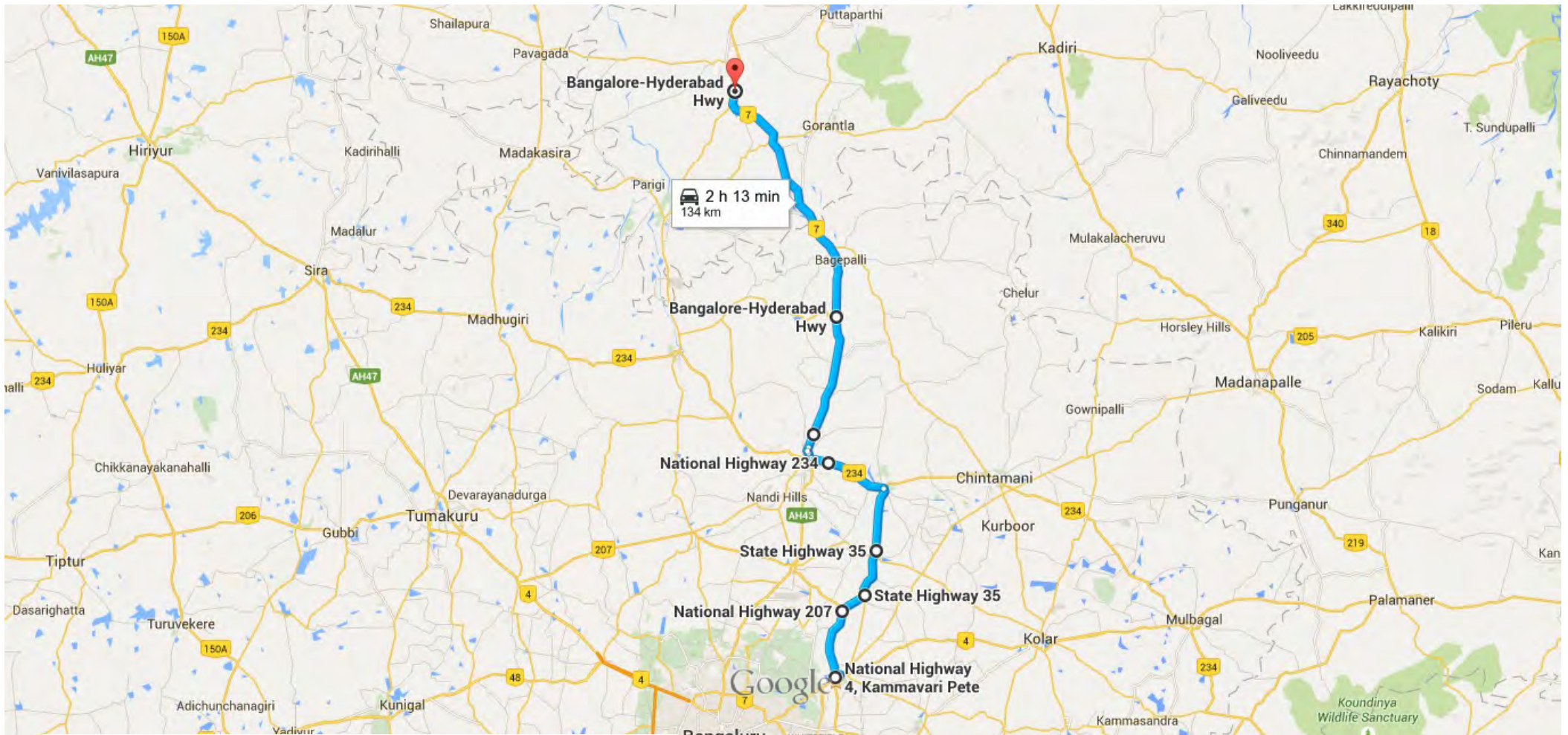
1.MSC: 64QAM

2. SDC: 16QAM

3. Inter leaver: Long

4. Mode: A

5. DRM Frequency: 621 kHz



Survey Route – North Direction from Hoskote.

Reception Survey of 200kW AIR (MW), DRM Transmitter (Bangaluru) in Simulcast transmission mode (16dB↓)  
 Route: Chitoor Road Direction: East Date: 3/6/15

| Sr.No | Time | Spot/Location      | Radial Distance (km) | Field Strength ( dB $\mu$ V/m) |        | Fraunhofer DT-700 Professional Receiver |          |            | Morphy Richards Comm. Receiver |            | Terrain | Remark                         |        |
|-------|------|--------------------|----------------------|--------------------------------|--------|---|----------|------------|--------------------------------|------------|---------|--------------------------------|--------|
|       |      |                    |                      | DRM                            | Analog | SNR (dB)                                | MER (dB) | Subjective | MER (dB)                       | Subjective |         |                                |        |
|       |      |                    |                      |                                |        |   |          |            |                                | DRM        |         |                                | Analog |
| 1     | 1205 | Bang-Tirupati Rd   | 15                   | 57                             | 92     | 23.2                                    | 20.9     | ok         | 10-12                          | NT         | ok      | Field, Village & Traffic       |        |
| 2     | 1248 | --do--             | 25                   | 40                             | 80     | 35                                      | 29       | ok         | --                             | ok         | ok      | ---do---                       |        |
| 3     | 1300 | Before Kolar       | 35                   | 41                             | 62     | 34.3                                    | 32.9     | ok         | --                             | drops      | ok      | --do--                         |        |
| 4     | 1323 | Kolar              | 40                   | 28                             | 82     | 29                                      | 28       | ok         | 19-20                          | ok         | ok      | --do--                         |        |
| 5     | 1339 | Near Seesandra     | 50                   | 44                             | 80     | 27.9                                    | 26.5     | ok         | 16                             | drops      | ok      | --do--                         |        |
| 6     | 1409 | Kantha raja circle | 60                   | 40                             | ---    | 34                                      | 30       | ok         | 7                              | NT         | ok      | --do--<br>Morphy NT@14 &12 db. |        |
| 7     | 1528 | Tirupati road      | 70                   | 36                             | 70     | 25                                      | 21       | ok         | --                             | NT         | ok      | --do--                         |        |
| 8     | 1538 | --do--             | 80                   | --                             | 68     | 24.5                                    | 24.9     | ok         | --                             | NT         | noisy   | --do--                         |        |
| 9     | 1550 | --do--             | 90                   | 38                             | 66     | 22.2                                    | 21.9     | ok         | --                             | NT         | noisy   | --do--                         |        |
| 10    | 1615 | --do--             | 102                  | --                             | --     | 7                                       | 13.4     | NT         | --                             | NT         | noisy   | --do--                         |        |
| 11    | 1651 | --do-              | 120                  | 16                             | 9.4    | 14.1                                    | --       | NT         | --                             | NT         | noisy   | --do--                         |        |
| 12    | 1810 | Chitoor bypass     | 145                  | -                              | -      | -                                       | -        | NT         |                                | NT         | noisy   | --do--                         |        |

DRM Parameter (Fixed)

1.MSC: 64QAM

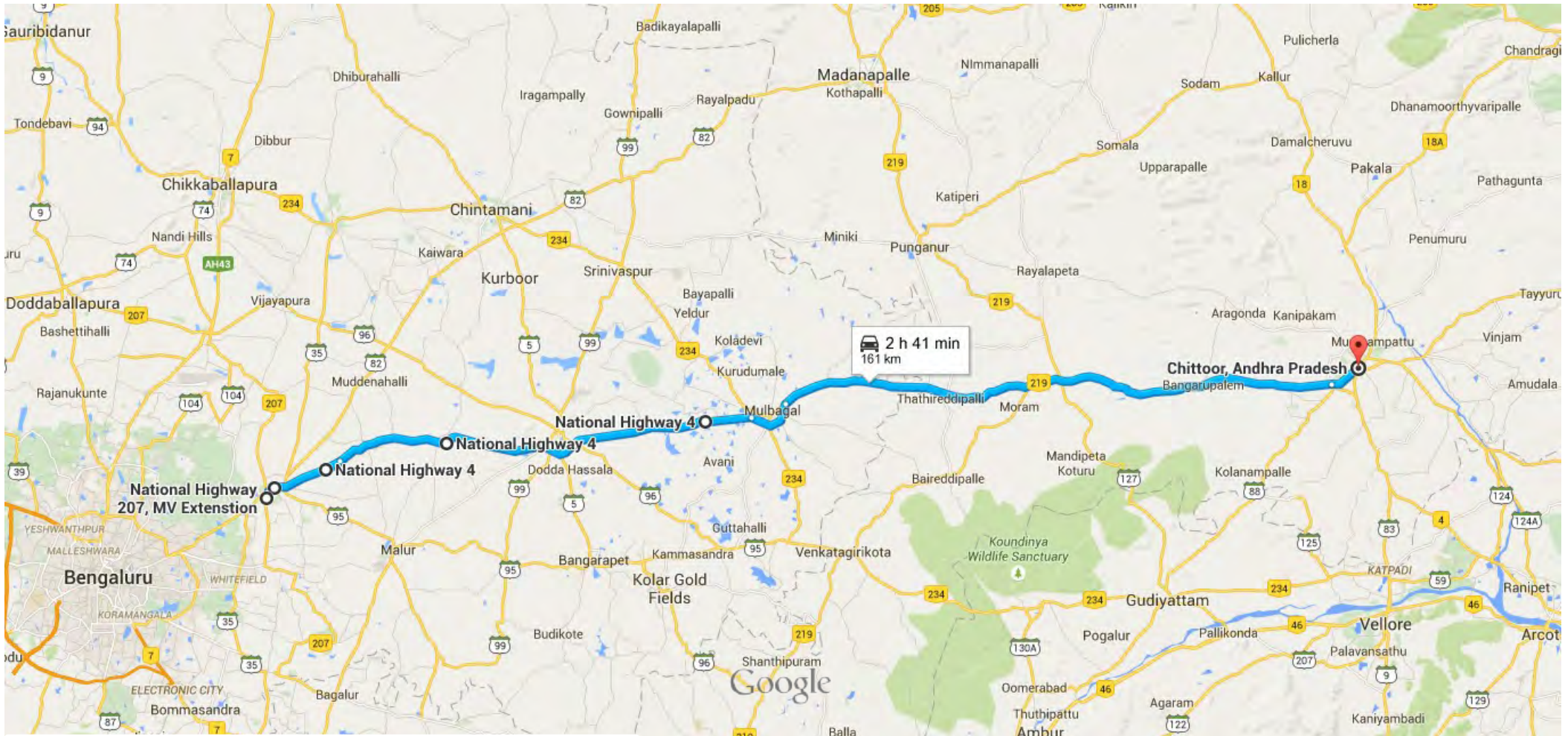
2. SDC: 16QAM

3. Inter leaver: Long

4. Mode: A

5. DRM Frequency: 621 kHz





Survey Route – East Direction from Hoskote.

Reception Survey of 200kW AIR (MW), DRM Transmitter (Bangaluru) in Simulcast transmission mode (16dB↓)  
 Route: Hoskote-Bangalore-Mysore Direction: South-West Date:5/6/15

| Sr.No | Time | Spot/Location             | Radial Distance (km) | Field Strength ( dBμV/m) |        | Fraunhofer DT-700 Professional Receiver |          |            | Morphy Richards Comm. Receiver |            | Terrain | Remark                        |                                   |
|-------|------|---------------------------|----------------------|--------------------------|--------|---|----------|------------|--------------------------------|------------|---------|-------------------------------|-----------------------------------|
|       |      |                           |                      | DRM                      | Analog | SNR (dB)                                | MER (dB) | Subjective | MER (dB)                       | Subjective |         |                               |                                   |
|       |      |                           |                      |                          |        |   |          |            |                                | DRM        |         |                               | Analog                            |
| 1     | 1042 | Amar jyoti lay out        | 20                   | 41                       | 103    | 41                                      | 31       | ok         | 22                             | ok         | ok      | Residential ,City, High rise. |                                   |
| 2     | 1130 | BTM 2 <sup>nd</sup> stage | 25                   | 50                       | 108    | 11.3                                    | 16.0     | NT         | --                             | NT         | noisy   | Crowded city area.            |                                   |
| 3     | 1223 | Kankapura road            | 30                   | 33                       | 90     | 34                                      | 28       | ok         | 13                             | Drops      | noisy   | --do--                        |                                   |
| 4     | 1300 | Mysore Highway            | 40                   | 36                       | 95     | 37                                      | 34       | ok         | --                             | NT         | noisy   | High Traffic, National HW     |                                   |
| 5     | 1321 | --do--                    | 45                   | --                       | --     | --                                      | --       | ok         | 11                             | NT         | ok      |                               |                                   |
| 6     | 1338 | --do--                    | 55                   | 29                       | 86     | --                                      | --       | NT         | --                             | NT         | noisy   | --do--                        |                                   |
| 7     | 1356 | Ghosia college            | 65                   | 27                       | 86     | 27                                      | 24       | ok         | 14                             | Ok/nt      | ok      | --do--                        | Sometime directional in Morphy.   |
| 8     | 1501 | Channapatna               | 75                   | 25                       | 82     | 23                                      | 23       | ok         | 12                             | NT         | ok      | Residential, HW.              |                                   |
| 9     | 1517 | Toys emporium             | 80                   | 25                       | 84     | 12.9                                    | 16       | Ok/drop    | 0                              | NT         | ok      | --do--                        |                                   |
| 10    |      | --do--                    | 80                   | 27                       | 83     | 18                                      | 17.5     | ok         | 16                             | drops      | ok      | --do--                        | DRM@12db. No effect On DRM@14 db. |
| 11    | 1553 | Mysore HW                 | 90                   | 24                       | 76     | 20                                      | 23       | ok         | 16                             | drops      | ok      | Highway                       |                                   |
| 12    | 1614 | --do--                    | 100                  | 19                       | 74     | 19                                      | 20       | ok         | --                             | NT         | ok      | --do--                        |                                   |
| 13    | 1648 | Near Mandya               | 120                  | 20                       | 74     | 24                                      | 23       | ok         | --                             | NT         | ok      | --do--                        | DRM in prof worked up to 128 km.  |
| 14    | 1731 | SriRangpatna              | 137                  | 18                       | 72     | 12                                      | 16       | NT         | --                             | NT         | ok      | Village area.                 |                                   |

DRM Parameter (Fixed)

1. MSC: 64QAM

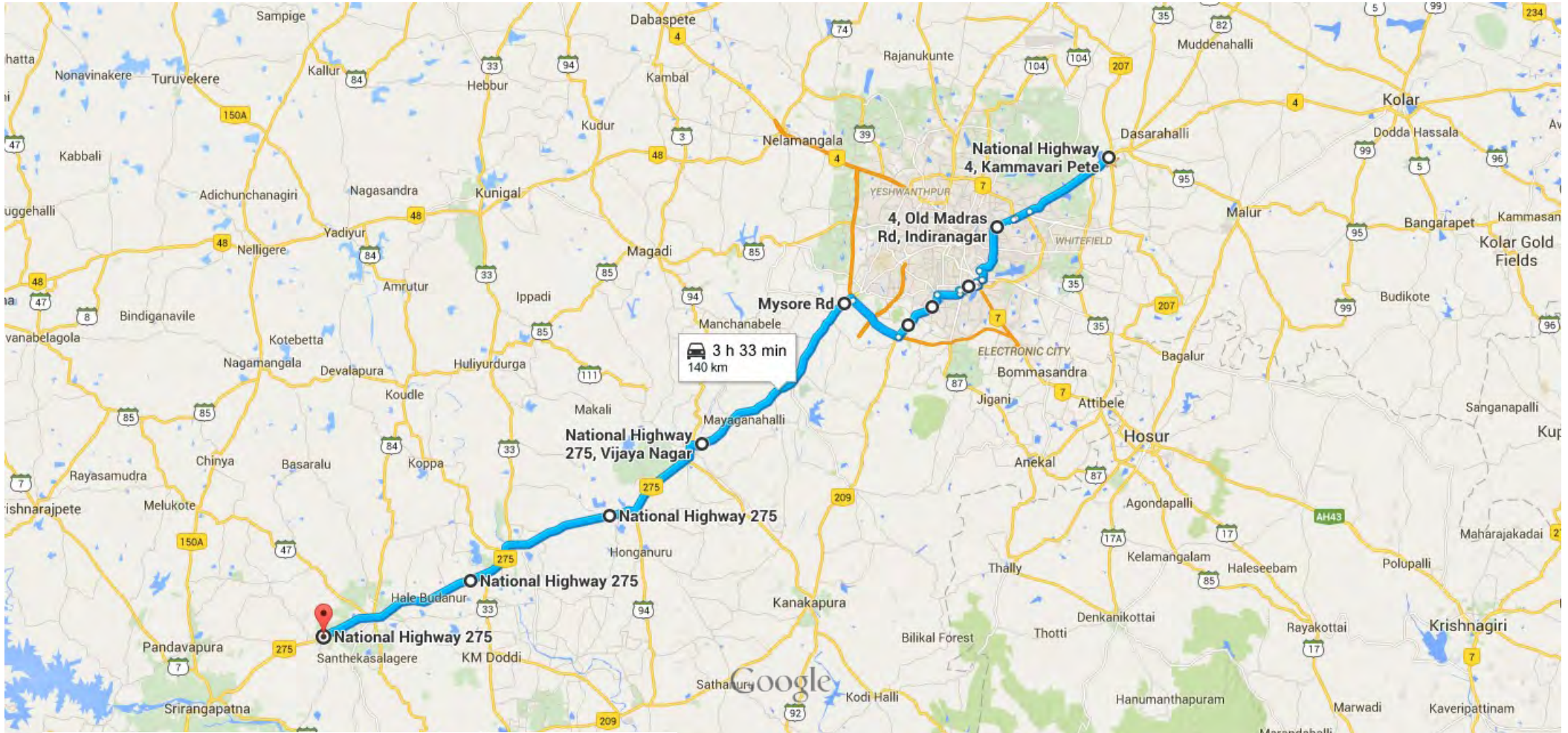
2. SDC: 16QAM

3. Inter leaver: Long

4. Mode: A

5. DRM Frequency: 621 kHz





Survey Route: South-West direction from Hoskote.

## Reception Survey of 200kW AIR (MW), DRM Transmitter (Bangaluru) in Simulcast transmission mode (16dB↓)

Route: Bangalore-Hassan-Mangalore

Direction: West

Date: 5/6/15

| Sr.No | Time | Spot/Location        | Radial Distance (km) | Field Strength ( dB $\mu$ V/m) |        | Fraunhofer DT-700 Professional Receiver |          |            | Morphy Richards Comm. Receiver |            | Terrain | Remark                       |                  |
|-------|------|----------------------|----------------------|--------------------------------|--------|---|----------|------------|--------------------------------|------------|---------|------------------------------|------------------|
|       |      |                      |                      | DRM                            | Analog | SNR (dB)                                | MER (dB) | Subjective | MER (dB)                       | Subjective |         |                              |                  |
|       |      |                      |                      |                                |        |   |          |            |                                | DRM        |         |                              | Analog           |
| 1     | 1052 | Madras Road          | 5                    | 45                             | 112    | -                                       | -        | ok         | -                              | ok         | ok      | Very high Traffic. City      |                  |
| 2     | 1140 | -do-                 | 10                   | 53                             | 110    | 40.9                                    | 30.6     | ok         | -                              | ok         | ok      | -do-                         |                  |
| 3     | 1154 | Old Madras Road      | 15                   | 49                             | 101    | 30                                      | 28       | ok         | 17-22                          | ok         | ok      | -do-                         |                  |
| 4     | 1235 | M G ROAD             | 21                   | 45                             | 98     | 26.9                                    | 26       | ok         | -                              | Few drops  | ok      | High rise buildings, crowded |                  |
| 5     | 1327 | Near Yashwantpur     | 25                   | 44                             | 104    | 15.5                                    | 19.0     | ok         | 7-19                           | drops      | ok      | High traffic, city           |                  |
| 6     | 1511 | Tumukururd           | 40                   | 34                             | 92     | 30.5                                    | 30.2     | ok         | 11-19                          | Few drops  | ok      | NH, Traffic                  |                  |
| 7     | 1540 | NH 48 Manglorerd     | 50                   | 32                             | 92     | 31                                      | 27       | ok         | 11-15                          | NT         | ok      | --do--                       | Morphy at 55 km. |
| 8     | 1606 | --do--               | 70                   | 27                             | 84     | 27                                      | 29       | ok         | -                              | NT         |         | --do--                       |                  |
| 9     | 1627 | --do--               | 80                   | 25                             | 83     | 22                                      | 20       | ok         | -                              | NT         | ok      | --do--                       |                  |
| 10    | 1645 | --do--               | 100                  | 24                             | 81     | 16                                      | 19       | ok         | 12                             | NT         | ok      | --do--                       |                  |
| 11    | 1712 | Alisondranh 48       | 120                  | 19                             | 78     | 19                                      | 21       | ok         | 12                             | NT         | ok      | --do--                       |                  |
| 12    | 1758 | Honennahallinh 48    | 135                  | 18                             | 75     | 17.5                                    | 18.3     | ok/drp     | 15                             | NT         | ok      | Med traffic, vegetation.     |                  |
| 13    | 1808 | Near Hosur villnh 48 | 138                  | 12                             | 70     | 12                                      | -        | NT         | -                              | NT         | ok      | --do--                       |                  |

Could not change to 14/12 db DRM by the Transmitter staff.

DRM Parameter (Fixed)

1.MSC: 64QAM

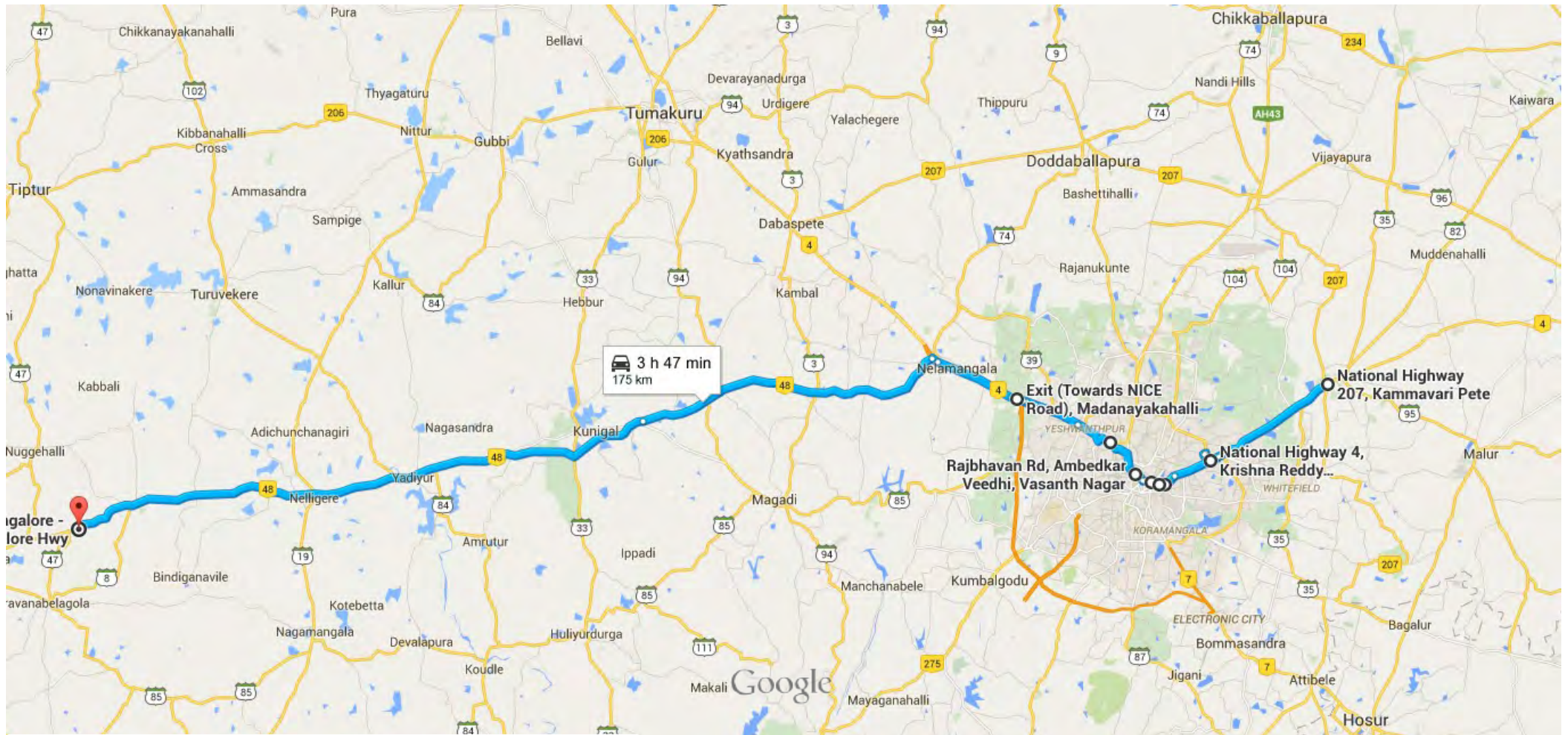
2. SDC: 16QAM

3. Inter leaver: Long

4. Mode: A

5. DRM Frequency: 621 kHz





Survey Route-West direction from Hoskote

## Reception Survey of 200kW AIR (MW), DRM Transmitter (Bangalore) in Full DRM mode (80kW)

Route: Hoskote-Bangalore-Tumakuru

Direction: North West

Date: 7-8/6/15

| Sr.No.  | Spot/Location<br>&<br>LAT/LONG | Radial<br>Distance<br>(km) | Field Strength<br>(dB $\mu$ V/m)<br>DRM | Fraunhofer DT700<br>(Professional Receiver) |         |            | Morphy Richards<br>(Comm. Receiver) |            | Terrain                            | Remarks & Time |
|---|--------------------------------|----------------------------|---|---|---------|------------|-------------------------------------|------------|------------------------------------|----------------|
|   |                                |                            |   | SNR(dB)                                     | MER(dB) | Subjective | MER(dB)                             | Subjective |                                    |                |
| 1   | Madras Road                    | 5                          | 90                                      | 21.3  | 21.5    | ok         | 18                                  | ok         | City, High-rise<br>Crowded area.   | 2331           |
| 2   | --do--                         | 10                         | 85                                      | 23  | 25      | ok         | 26                                  | ok         | --do--                             | 2344           |
| 3   | NR lay out Bangalore.          | 15                         | 88                                      | 26.4  | 26      | ok         | 27                                  | ok         | --do--                             | 2359           |
| 4   | Near Ulsoor Lake               | 20                         | 85                                      | 26  | 24      | ok         | 18                                  | ok         | City residential                   | 0021           |
| 5   | Ulsoor road Bangalore.         | 20.5                       | 78                                      | --  | --      | ok         | 18                                  | ok         | --do--                             |                |
| 6   | M.S.Rammaiah Road              | 25                         | 85                                      | 24  | 22      | ok         | 18                                  | ok         | --do--                             | 0105           |
| 7   | BMTC bus stop, Tumakuru rd     | 30                         | 75                                      | 23  | 21      | ok         | 17                                  | ok         | --do--                             | 0129           |
| 8   | Tumakuru road                  | 40                         | 76                                      | 24  | 22      | ok         | 16                                  | ok         | Highway, Heavy<br>moderate Traffic |                |
| 9   | NH#4                           | 50                         | 68                                      | 20.5  | 20.0    | ok         | 19                                  | ok         | --do--                             | 0234           |
| 10  | --do--                         | 65                         | 58                                      | 20  | 21      | ok         | 13-15                               | ok         | --do--                             |                |
| 11  | Tumakuru City                  | 75                         | 60                                      | 22  | 20      | ok         | 18                                  | ok         | Highway , Fields                   | 0324           |
| 12  | Honavar Road                   | 85                         | 55                                      | 20  | 18      | ok         | 12                                  | Drops      | --do--                             | 0350           |
| 13  | --do--                         | 90                         | 56                                      | 21  | 19      | ok         | 9                                   | Drops      | --do--                             |                |
| 14  | Tiptur                         | 144                        | 44                                      | 25  | 23      | ok         | --                                  | NT         | --do--                             | 0530           |
| Transmission end time, could not proceed further. |                                |                            |   |   |         |            |                                     |            |                                    |                |

Table No. VI

## Reception Survey of 200kW AIR (MW), DRM Transmitter (Bangaluru) in Full DRM mode (80kW)

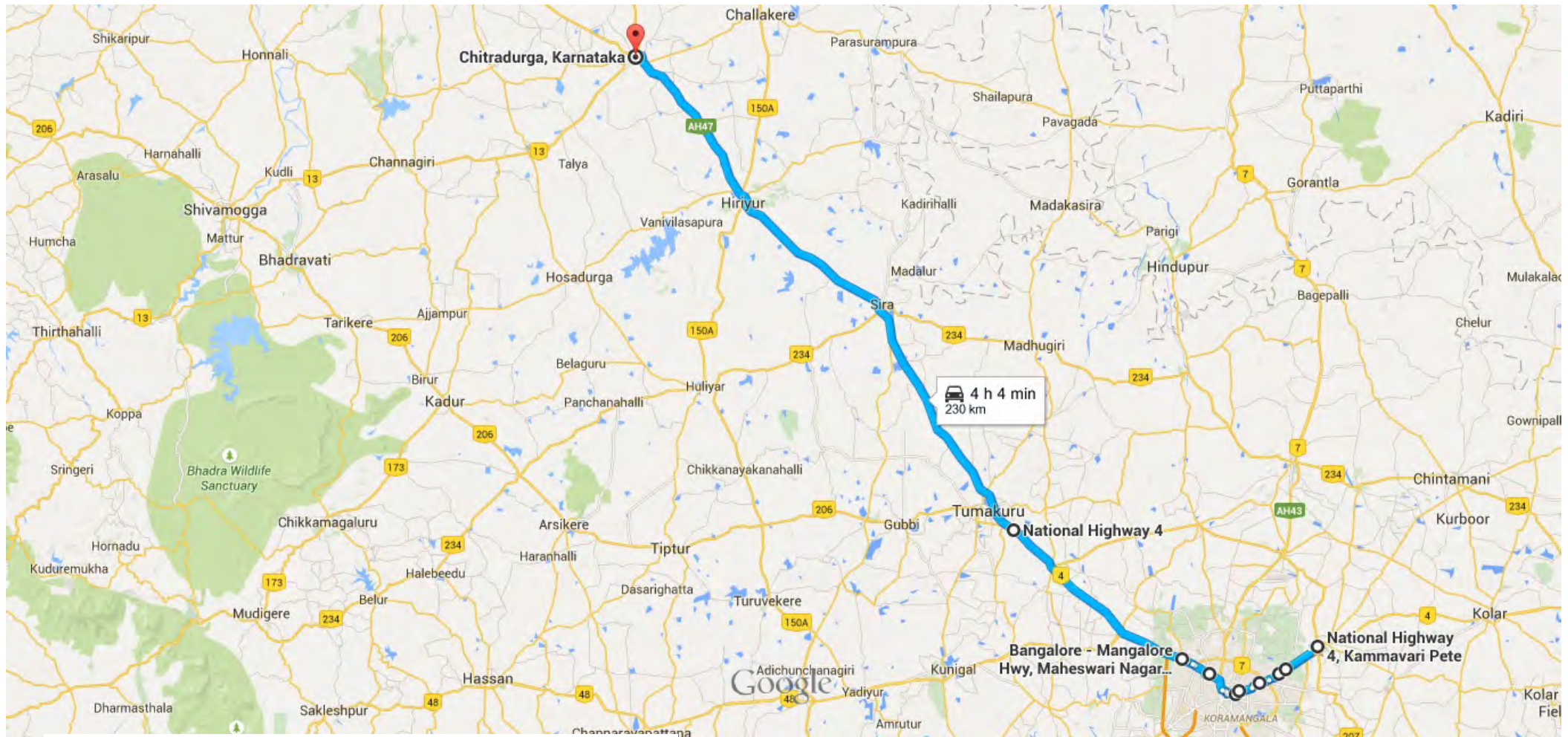
Route: Bangalore-Tumakuru-Chitradurge

Direction: North West

Date: 11/6/15

| Sr.No.  | Spot/Location<br>&<br>LAT/LONG | Radial<br>Distance<br>(km) | Field Strength<br>(dB $\mu$ V/m)<br>DRM | Fraunhofer DT700<br>(Professional Receiver) |         |            | Morphy Richards<br>(Comm. Receiver) |            | Terrain | Remarks |
|---|--------------------------------|----------------------------|---|---|---------|------------|-------------------------------------|------------|---------|---------|
|   |                                |                            |   | SNR(dB)                                     | MER(dB) | Subjective | MER(dB)                             | Subjective |         |         |
| 1   | Sira Hiriyur Road              | 170                        | --                                      | 20  | 20      | ok         | --                                  | NT         | Highway | 1605    |
| 2   | Near Chitradurge               | 180                        | 40                                      | 19  | 22      | ok         | --                                  | NT         | --do--  | 1625    |
| 3   | Chitradurge                    | 200                        | 39                                      | 17  | 19      | ok         | --                                  | NT         | --do--  | 1651    |
| Audio stopped at L.O.S distance of 210 Km. Effective range may be taken as 205 Km in full DRM mode @ 80 Kw power. |                                |                            |   |   |         |            |                                     |            |         |         |





via NH4

Survey Route- North-West direction from Hoskote (Full DRM)



Reception Survey of 200kW AIR (MW), DRM Transmitter (Bangaluru) in Simulcast transmission mode (16dB↓)  
 Route: Hoskote-Bangalore-Tumakuru Direction: North West Date: 7-8/6/15

| Sr.No | Time | Spot/Location          | Radial Distance (km) | Field Strength ( dB $\mu$ V/m) |        | Fraunhofer DT-700 Professional Receiver |          |            | Morphy Richards Comm. Receiver |            | Terrain | Remark            |                          |
|-------|------|------------------------|----------------------|--------------------------------|--------|---|----------|------------|--------------------------------|------------|---------|-------------------|--------------------------|
|       |      |                        |                      | DRM                            | Analog | SNR (dB)                                | MER (dB) | Subjective | MER (dB)                       | Subjective |         |                   |                          |
|       |      |                        |                      |                                |        |   |          |            |                                | DRM        |         |                   | Analog                   |
| 1     | 1302 | Madras Bombay Trunk rd | 52                   | 32                             | 90     | 29                                      | 28       | ok         | 9                              | Drops      | ok      | Highway & fields. |                          |
| 2     | 1401 | Tumakuru Sira Road     | 95                   | 10                             | 71     | 14                                      | 17       | Drops      | --                             | NT         | ok      | --do--            |                          |
| 3     | 1412 | --do--                 | 100                  | --                             | --     | 12                                      | 16       | NT         | --                             | NT         | OK      | --do--            | Audio stopped on DT 700  |
| 4     | 1542 | Sira- Hiriyur Road     | 150                  | --                             | 67     | --                                      | --       | NT         | --                             | NT         | ok      | --do--            |                          |
| 5     | 1603 | --do---                | 170                  | --                             | 62     | --                                      | --       | NT         | --                             | NT         | OK      | --do--            | Primary Analog coverage. |

## DRM Parameter (Fixed)

1. MSC: 64QAM

2. SDC: 16QAM

3. Inter leaver: Long

4. Mode: A

5. DRM Frequency: 621kHz

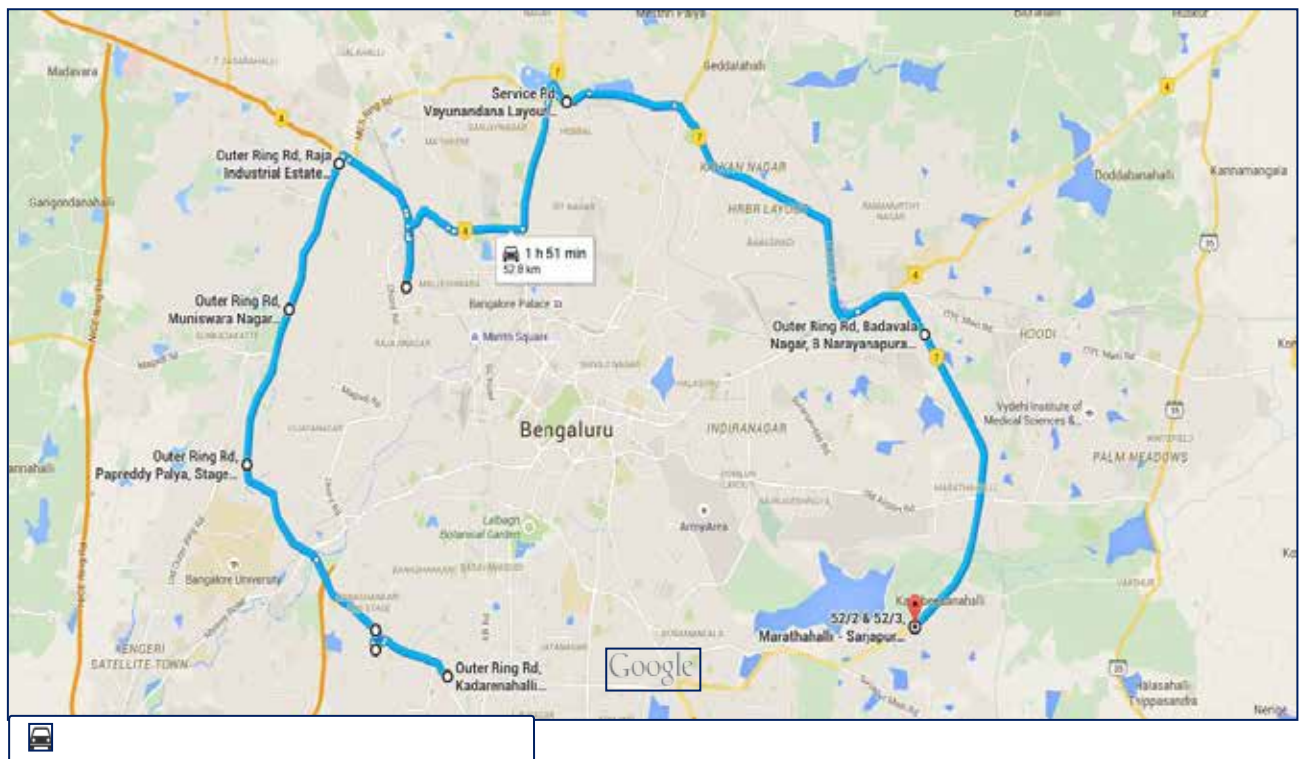
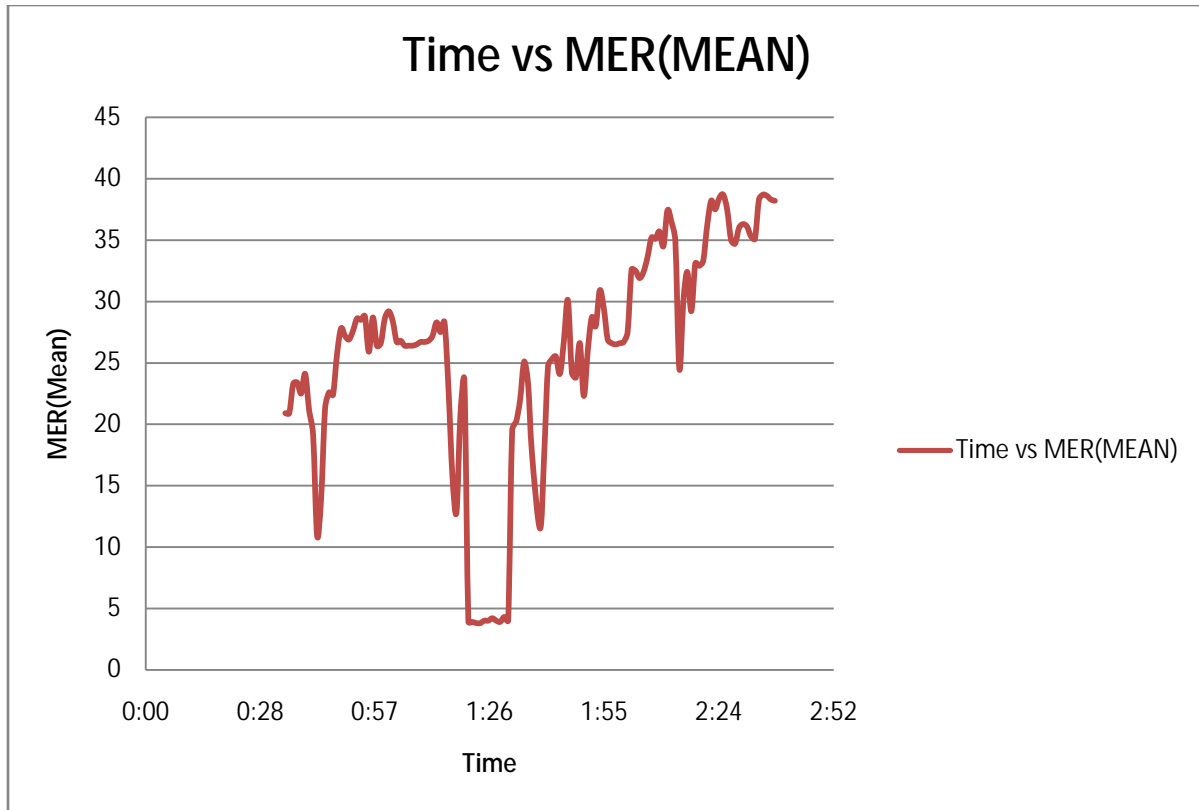
Transmitter Power: 200kW MW Analog

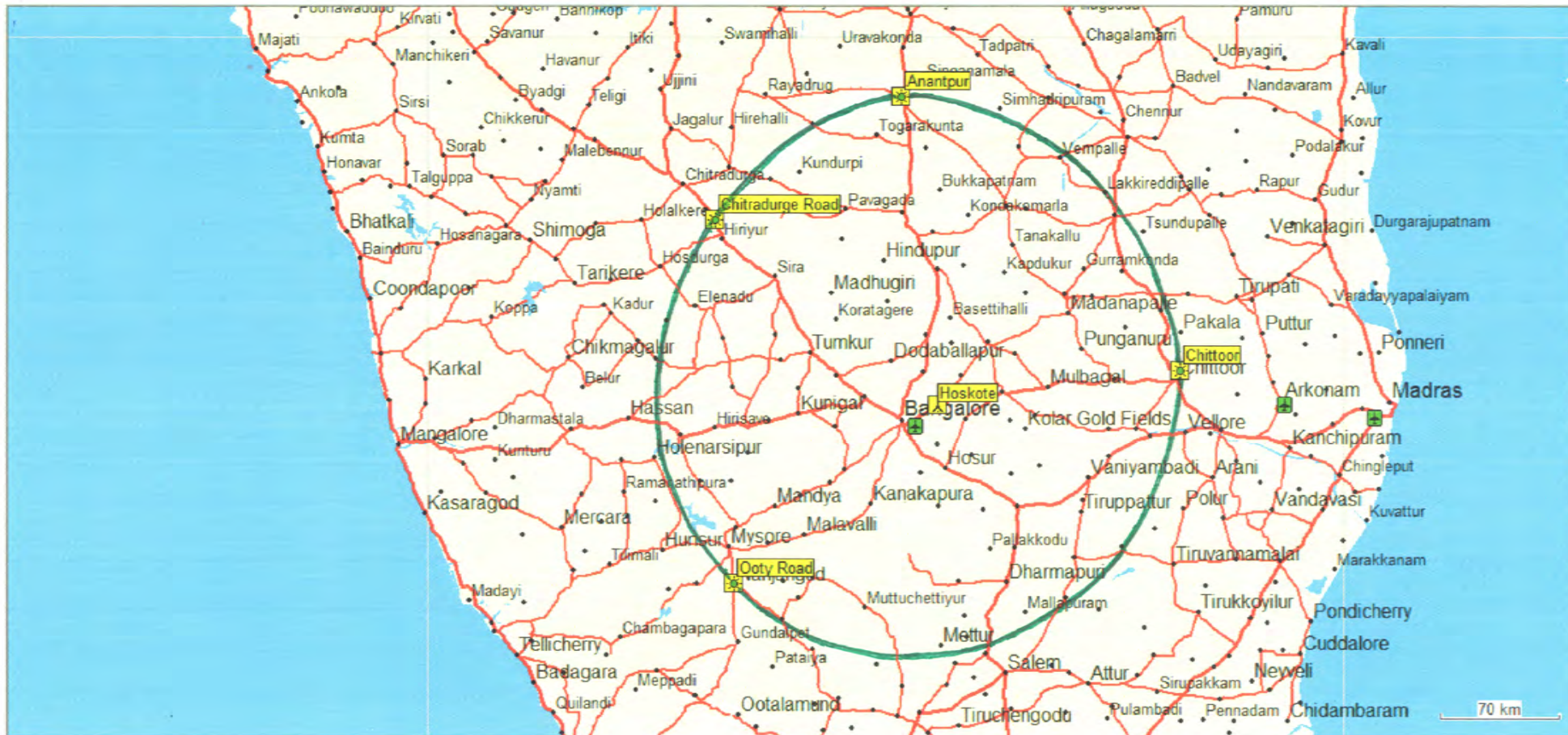
Frequency: 612 KHz

Date of measurement: 2/6/15

**Field strength measurement at 1Km distance around the radiating mast.**

| Sr.No. | Direction/Radial | Spot/Location              | LAT/LONG                     | Field Strength (dB $\mu$ V/m) | Terrain                 | Remark |
|--------|------------------|----------------------------|------------------------------|-------------------------------|-------------------------|--------|
| 1      | North East       | Kolar Road                 | N 13 04 28.1<br>E 77 47 26.6 | 115                           | Highway. High Traffic   |        |
| 2      | North East       | Venkatappa Road<br>Hoskote | N 13 04 14.3<br>E 77 47 27.4 | 126.8                         | -do-                    |        |
| 3      | East             | Hoskote City               | N 13 03 57.5<br>E 77 47 36.7 | 126                           | Residential             |        |
| 4      | South East       | Hoskote City               | N 13 03 26.6<br>E 77 47 22.2 | <b>132</b>                    | Residential, Open area. |        |
| 5      | South            | Hoskote                    | N 13 03 21.6<br>E 77 46 52.3 | <b>131</b>                    | Agriculture field.      |        |
| 6      | South            | Hoskote                    | N 13 03 18.4<br>E 77 47 00.8 | 128                           | Highway, Med traffic    |        |
| 7      | North            | Hoskote                    | N 13 04 23.7<br>E 77 46 58.6 | 125                           | Residential             |        |
| 8      | North            | Hoskote                    | N 13 04 23.5<br>E 77 47 09.8 | 118                           | Residential             |        |
| 9      | North West       | Hoskote                    | N 13 04 24.0<br>E 77 46 47.6 | 126                           | Residential             |        |
| 10     | West             | Hoskote                    | N 13 03 52.1<br>E 77 47 02.1 | 130                           | Highway                 |        |





Contour map of primary Coverage area for 200kW AIR Transmitter located at Hoskote, Bangalore (Karnataka)

AE(JS) sahay  
DDG(SK) (with 28/4)  
- 1/c -

By Speed Post

PRASAR BHARATI  
DIRECTORATE GENERAL : ALL INDIA RADIO  
(PLANNING & DEVELOPMENT UNIT)

No. 5(4)/2011-D (TD/MW)/ Bangalore / 33 Date : 22/04/15

✓ Addl Director General ( E-R&D)  
All India Radio & Doordarshan  
14-B, I.P Estate, Ring Road  
New Delhi- 110002.

Subject : Reception survey of 200 KW MW AM-DRM transmitter at Bangalore

With reference to above cited subject, 200 KW MW AM-DRM transmitter at Bangalore will come on air shortly . It is requested to make all necessary arrangement for reception survey of this newly installed transmitter in coordination with ADG (SZ) and DDG Bangalore in all the modes as below.

1. In simulcast mode during normal transmission period.
2. In pure DRM mode during pause period

Survey has to be done with the help of both professional as well as commercial DRM receiver. Report of the survey will be submitted to this office accordingly.

(S.K Saxena)  
Dy. Director General (E-TD)  
For director general  
Tel no. 011-23421592

Copy to :

1. ADG (SZ) , AIR & DD Shivananda Salai, Chennai-600005 for extending necessary help and coordination to the team of O/o ADG(R&D).
2. DDG HPT AIR , Raj Bhavan Road Bangalore 560204 for extending necessary help and coordination to the team of O/o ADG(R&D).