Prasar Bharati

No.DTH/IITMoU/180/2020/P-VII-(Part-1)-A Dated:15.05.2026

Test Reports on integrated evaluation of Direct-to-Mobile (D2M) transmission impact on IMT services during the operation of D2M Technologies in frequency range 470-582 MHz

Prasar Bharati has earlier entered into an Memorandum of Understanding with Indian Institute of Technology, Kanpur in 2019 to develop Next Generation Broadcast roadmap for Digital Terrestrial Broadcasting consistent with emerging technological standards.

2. IIT Kanpur after doing a comparative analysis of the then available technologies, conducted the small-scale Proof of Concept (PoC)/ trial on Direct to Mobile (D2M) Next Gen Broadcasting in Bengaluru, along with its Technology partner. Thereafter Hybrid PoC involving High Power High Tower(HPHT) & Low Power Low Tower(LPLT) based on ATSC 3.0 technology was conducted in Delhi using one of the Television Transmitter as HPHT at Pitampura and several LPLTs around Kartavya path in New Delhi.

3. Measurements on the issues of interference with telecom services and heating of mobile devices raised by some of the stakeholders in the operation of available D2M technologies in the 470–582 MHz frequency range, were earlier conducted on 14.11.2025 in TEC recognised Laboratory in Bengaluru; and the results were published on the website of Prasar Bharati on 21.11.2025 for the information to all the stakeholders.

4. As part of measurement exercise, laboratory verification of out of band emissions, and functional priority of IMT voice calls and SMS during active D2M reception in field environment were carried out in association with Ministry of Information and Broadcasting, Telecommunication Engineering Centre (TEC) and Wireless Planning and Coordination (WPC) wing in the Department of Telecommunications (DoT), Ministry of Electronics and Information Technology (MeitY) & Department of Science and Technology (DST), Indian Institute of Technology, Kanpur and its technology partner on 13.03.2026 at Aracion Technology Private Limited, Bengaluru, a laboratory recognized by the Telecommunication Engineering Centre (TEC) under the Department of Telecommunications; and on 25.03.2026 in field environment in Delhi.

5. The laboratory tests were focused on measurement of critical transmission parameters of the ATSC 3.0–based D2M technology such as Base Station Transmit Power Measurement, Spurious Emission Measurement of Broadcast Radio Head (BRH) and Adjacent Channel Leakage Assessment (ACLR). The Single Frequency Network (SFN) functionality was also demonstrated in detail in the Kartavya Path area, New Delhi, using combinations of HPHT and LPLT transmitters in field environment.

The Terms of Reference (ToR) for the Test Methodology, along with the detailed Laboratory Test Report and Field Test Report are being uploaded on the website of Prasar Bharati at https://prasarbharati.gov.in for information to all the stakeholders.

1. Terms of Reference (ToR) – Test Methodology: Integrated Evaluation of D2M Transmission Impact on IMT Services
2. Laboratory Radio Test Report
3. Field Test Report

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ToR: Integrated Evaluation of D2M Transmission Impact on IMT Services

This version of the ToR has been updated based on the discussions held during the meeting of nominated nodal officers from DoT, MeitY, DST, DEA and IIT Kanpur, convened under the chairmanship of the CEO, Prasar Bharati on 06 March 2026 in hybrid/VC mode, regarding the D2M service in the 470–582 MHz band.

1 Scope

This ToR defines the evaluation methodology for Direct-to-Mobile (D2M) transmissions operating in the 470–582 MHz band with respect to IMT (LTE/NR) systems. As per the decisions recorded in the meeting held on 06.03.2026, the scope of testing is limited to:

i. Laboratory verification of out-of-band emissions (including second and third harmonics)
ii. Functional verification for priority of IMT Voice calls & SMS during active D2M streaming.

In addition, a field demonstration of Single Frequency Network (SFN) operation for a hybrid transmit network, including HPHT & LPLT will be conducted to observe potential signal quality improvement under synchronized multi-transmitter operation.

Furthermore, per the agreement from the meeting, other field performance tests such as QoS KPIs and EMF exposure measurements are excluded at this stage.

2 Background

D2M (non-IMT) transmissions operating in the 470–582 MHz band are below certain IMT operating bands such as n71, n28 and n5. To ensure coexistence with IMT services, the D2M transmitter must comply with applicable out-of-band emission limits. If the device under test (DUT) satisfies the relevant emission limits defined under ETSI and 3GPP frameworks, the likelihood of harmful interference to IMT systems is minimal.

3 Laboratory Evaluation – Out-of-Band Emissions

The laboratory evaluation verifies that the D2M transmitter complies with applicable out-of-band emission (OOBE) limits and harmonic emission limits. Measurements will include the fundamental transmission band (470–582 MHz) as well as the second and third harmonic regions.

3.1 Parameters to be Measured

Parameter	Description
Fundamental Channel Power	Measured power within the operating D2M channel
Second Harmonic Emission	Emission levels in 940–1164 MHz band
Third Harmonic Emission	Emission levels in 1410–1746 MHz band
Emission Margin	Difference between measured emission and applicable limit line
Out of Band Emission	Base station should meet spurious emissions specified by 3GPP/ETSI

Table 6.6.4.1.2.1-1: BS Spurious emissions limits, Category B

Frequency range	Maximum Level	Measurement Bandwidth	Note
9 kHz ↔ 150 kHz	-36 dBm	1 kHz	Note 1
150 kHz ↔ 30 MHz	-36 dBm	10 kHz	Note 1
30 MHz ↔ 1 GHz	-36 dBm	100 kHz	Note 1
1 GHz ↔ 12.75 GHz	-30 dBm	1 MHz	Note 2
12.75 GHz ↔ 5th harmonic of the upper frequency edge of the DL operating band in GHz	-30 dBm	1 MHz	Note 2, Note 3
12.75 GHz ↔ 26 GHz	-30 dBm	1 MHz	Note 2, Note 4
NOTE 1: Bandwidth as in ITU-R SM.329 [2] , s4.1 NOTE 2: Bandwidth as in ITU-R SM.329 [2] , s4.1. Upper frequency as in ITU-R SM.329 [2] , s2.5 table 1 NOTE 3: Applies only for Bands 22, 42, 43, 48 and 49. NOTE 4: Applies only for Band 46.			

3.2 Measurement Procedure

1. Connect the D2M transmitter output to a calibrated spectrum analyser through appropriate attenuators and couplers to ensure safe instrument input levels.
2. Configure the spectrum analyser with suitable frequency span, resolution bandwidth (RBW), and detector settings as per standard measurement practice.
3. Measure and record the fundamental channel power within the D2M operating band (470–582 MHz).
4. Shift the analyser frequency span to the second-order harmonic region (940–1164 MHz) and record the peak and average emission levels.
5. Repeat the measurement for the third-order harmonic region (1410–1746 MHz).

6. Apply the applicable relevant ETSI/3GPP out-of-band emission limit lines on the analyser display and record emission margins relative to the limits.
7. Document measurement screenshots, instrument settings, and calibration references.

3.3 Acceptance Criteria

Emission levels in harmonic regions must remain below the applicable ETSI/3GPP out-of-band emission limits.

3.4 Test Location & Date

1. Location

Laboratory testing shall be conducted at a TEC-recognized laboratory facility such as Aracion Technology Pvt Ltd, (address below) in the presence of designated representatives from participating organizations.

Aracion Technology Pvt Ltd 1st Floor, B-23 HK Arcade,
KSSIDC Industrial Area,
Bengaluru, Karnataka 560048, IN

2. Date

Lab test is finalised for 13 Mar 2026.

4 D2M Device ecosystem

This test case is for the purpose of demonstrating different types of devices that are capable of receiving D2M content. This test will be done in the lab.

Following D2M devices will be used to demonstrate D2M reception

Sr. No.	D2M Device type	Demonstrated successfully? (Yes/No)
1	D2M dongle	
2	D2M smart phone	
3	D2M feature phone	
4	D2M laptop	
5	D2M SetTopBox	

5 Functional Verification in the Field – Telephony Priority

This verification ensures that incoming cellular voice calls and SMS messages are prioritized over active D2M streaming sessions.

5.1 Procedure

1. Launch the D2M application and start audio-video streaming.

2. Initiate an incoming cellular call to the D2M smart phone.
3. Observe device behavior when the call is received.
4. Repeat the test for incoming SMS during active streaming.

5.2 Expected Behavior

1. Incoming IMT call
   1.1. Launch D2M application on D2M phone to view AV content.
   1.2. Initiate an IMT call to the D2M phone.
   1.3. The user should be able to answer the call successfully.
   1.4. After the IMT call ends, the D2M App should resume viewing of AV content.
2. Incoming IMT SMS
   2.1. Launch the D2M application on D2M phone to view AV content.
   2.2. Send an IMT SMS to the D2M phone.
   2.3. The user should be able to read the SMS.

5.3 Acceptance Criteria

A notification should be displayed indicating the incoming call or SMS and the user should be allowed to answer/reject the incoming call or read the SMS.

Incoming IMT voice calls and SMS should be successfully received and handled correctly (for more than 95% of the times) during D2M streaming.

6 Field Demonstration of SFN Gain for D2M Transmission

6.1 Background

In a Single Frequency Network (SFN) configuration, multiple transmitters radiate the same signal on the same frequency while maintaining time and frequency synchronization. When the relative propagation delay between transmitters remains within the guard interval of the waveform, signals from multiple transmitters will constructively combine at the receiver. This characteristic can improve the effective signal quality and service availability, particularly in overlapping coverage areas between multiple transmitters and near coverage edges. For D2M deployments involving HPHT and LPLT transmitters, SFN operation is expected to enhance coverage continuity by reducing coverage gaps and improving reception robustness. The objective of this field demonstration is to verify the presence of SFN gain by comparing receiver performance under single-transmitter and multi-transmitter SFN conditions.

6.2 KPI to be Measured

The following Key Performance Indicator shall be measured and reported:

- **Signal-to-Noise Ratio (SNR)**

  Measured at the D2M receiver under different transmitter configurations.

6.3 Test Procedure

1. The D2M transmitters shall be configured to broadcast the same waveform and content on the same RF channel, while maintaining time and frequency synchronization to enable SFN operation. A receiver capable of continuous SNR logging shall be used for the measurements.
2. Measurement points shall be selected, covering transmitter-dominant coverage areas, overlap regions between transmitters, and coverage-edge locations.
3. First, measurements shall be performed with only one D2M transmitter active. The SNR shall be recorded at all selected locations.
4. Subsequently, two or more synchronized transmitters operating in SFN mode shall be activated, and the measurements shall be repeated at the selected locations.
5. For each measurement point, the location (GPS coordinate), active transmitter configuration, measured SNR, and timestamp shall be recorded.
6. The SNR values obtained under the single-transmitter and SFN configurations shall then be compared, with particular focus on the overlap regions where SFN gain is expected.
7. Compare SNR values measured under single-transmitter and SFN configurations, with emphasis on overlap regions.

6.4 Acceptance Criteria

SFN gain shall be considered demonstrated if the measured SNR under multi-transmitter SFN operation shows an improvement of around 2-3dB relative to the SNR measured under single-transmitter operation at the same measurement locations.

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TEST REPORT

Radio Test Report

Discipline: Electronics	**Group: Miscellaneous Products Test Facility**
Report Reference No:	ARTL/RF/260313-01-01-01
Applicant Name:	Tejas Networks Limited
Applicant Address:	Ground 1st, 2nd Floor Wing A and 1st, 2nd Floor Wing B, Plot No. 3, Survey No. 20 & 22, Surya Sapphire, Hosur Road, Electronic City Phase I, Konappana Agrahara Village, Bengaluru – 560100
Manufacturer's Name:	Tejas Networks Limited
Manufacturer's Address:	Ground 1st, 2nd Floor Wing A and 1st, 2nd Floor Wing B, Plot No. 3, Survey No. 20 & 22, Surya Sapphire, Hosur Road, Electronic City Phase I, Konappana Agrahara Village, Bengaluru – 560100
Test item description:	
Product Name:	Direct to Mobile (D2M) Transmitter / Broadcast Radio Head (BRH) – 40W
Model No.:	YOGA40W01
Serial no/PMS.:	SLBRH40WB-32-000029
Input Ratings:	-48V DC, 6A, 300 watts
Trademark:	TEJAS NETWORKS
Reference standards:	• Section 6.2 of 3GPP TS 38.141-1 V16.4.0, "5G; NR; Base Station (BS) conformance testing Part 1: Conducted conformance testing (Release 16) • Section 6.6.3 of 3GPP TS 38.141-1 V16.4.0, "5G; NR; Base Station (BS) conformance testing Part 1: Conducted conformance testing (Release 16) • Section 6.6.5 of 3GPP TS 38.141-1 V16.4.0, "5G; NR; Base Station (BS) conformance testing Part 1: Conducted conformance testing (Release 16)
Testing Laboratory information:	
Testing Laboratory Name:	Aracion Technology Pvt Ltd- Laboratory
Address:	1st Floor, B-23 HK Arcade, KSSIDC, Industrial Area, Bengaluru, Karnataka, India–560048

This device has been tested and found to comply with the stated Customer acceptance criterion, which is (are) indicated in the test report and are applicable only to the tested sample identified in the report. Note: This report shall not be reproduced except in full, without the written approval of Aracion Technology Pvt Ltd , this document may be altered or revised by Aracion Technology Pvt Ltd personal only, and shall be noted in the revision of the document. This test report must not be used by the client to claim product end or segment.

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TEST REPORT

Customer Acceptance Testing:	a) Base Station Transmit power of BRH as specified by 3GPP 38.141 b) Spurious Emission of BRH Section 6.6.5 of TS 38.141-v16. c) Adjacent Channel Leakage Assessment Section 6.6.3 of TS 38.141-1-v16
Date of receipt of test item:	13 Mar 2026
Date (s) of performance of tests:	13 Mar 2026
Date of Issue	25 Mar 2026
Test Result	PASS
Compiled by: Sharad S Chavan	
Reviewed & authorized by: Keshavamurthy Boraiah	
Issued by: Abhilash M	

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TEST REPORT

1 Test Summary

S.N.	Test Parameter	Mode	Reference Standard	Page Number
1	Base Station Transmit power	Conducted	Section 6.2 of TS 38.141-1-v16	Page 7
2	Spurious Emission of BRH	Conducted	Section 6.6.5 of TS 38.141-1-v16	Page 12
3	Adjacent Channel Leakage Assessment	Conducted	Section 6.6.3 of TS 38.141-1-v16	Page 17

2 Test Facility

The Test facility is accredited By NABL and Designated by TEC

2.1 Test facility deviation from standard

None

2.2 Abnormalities from standard conditions

None

3 General Description of EUT

Manufacturer:	Tejas Networks Limited
Manufacturer Address:	Ground 1st, 2nd Floor Wing A and 1st, 2nd Floor Wing B, Plot No. 3, Survey No. 20 & 22, Surya Sapphire, Hosur Road, Electronic City Phase I, Konappana Agrahara Village, Bengaluru – 560100 Karnataka, India
Product Name:	Broadcast Radio Head – 40W
Model Name:	YOGA40W01
Serial number:	SLBRH40WB-32-000029
Trademark:	TEJAS NETWORKS
Input Voltage:	-48V, 6A, 300W
Frequency Bands	Frequency Range from 470 MHz to 582 MHz
Supported Configuration:	8MHz Channel BW
Max rated power	+46 dBm +/- 1.5 dB
SW Version	v1.2.1
HW Version	v 2
Number of Antenna Ports:	1
Antenna:	External Antenna
Condition of Sample on receipt:	Good / Satisfactory / Fit for Testing
Opinions and Interpretations:	See the specific Note / Annexure if any in the whole /full report.
For a more detailed description of features, please refer to the manufacturer's specifications or the User's Manual	

3.1 Test conditions

3.1.1 Normal conditions

Ambient:	Temperature:	+15°C to +35°C
	Relative humidity:	20% to 75%
	Nominal Voltage	DC -48.0V (Through Power Supply)

4 Test Objectives

The primary objective of this laboratory evaluation was to confirm the spectral compliance of the D2M Broadcast Radio Head (BRH) operating in the 470–582 MHz band. The assessment specifically focused on verifying:

1. **Transmit Power Verification :** To confirm that the equipment transmits at its declared maximum rated output power with tolerance, across the required operating frequencies.
2. **Spurious Emission Assessment:** To verify that harmonic and other spurious emissions remain below the applicable limit lines to avoid harmful interference to other radio services, including IMT systems.
3. **Adjacent Channel Leakage Assessment:** To evaluate the level of unwanted emission energy leaking into adjacent channels and to verify that the transmitted signal remains sufficiently confined within the intended operating channel.

4.1 Base Station Transmit power measurements

4.1.1 Initial Conditions

The purpose of this test is to verify the accuracy and consistency of the D2M transmitter output power across the operating frequency range. Consistent with the structure of 3GPP TS 38.141-1, clause 6.2, the transmitter shall be evaluated at representative lower-, middle-, and upper-band frequencies within the supported 470–582 MHz operating band.

For this D2M evaluation:

- The test environment shall be normal operating conditions only.
- The D2M transmitter shall be configured to transmit the intended 8 MHz channel waveform at its maximum rated output power for Low band, Mid band and Upper band test frequencies:

The declared acceptance target for this test is:46 dBm ± 1.5 dB across the lower, middle, and upper test frequencies.

4.1.2 Test Procedure

1. Connect the D2M transmitter output to the channel power measurement setup through suitable attenuators and couplers, ensuring the measurement instrument remains within its safe operating range.
2. Configure the D2M transmitter to operate at the selected lower-band test frequency and transmit the intended waveform with an 8 MHz occupied channel bandwidth at its maximum rated output power.
3. Measure and record the channel power of the transmitted signal using an integration bandwidth equal to the nominal channel bandwidth (8 MHz).
4. Increase the integration bandwidth from 8 MHz to 20 MHz, while keeping the transmitted signal bandwidth unchanged, and repeat the channel power measurement.
5. Record the measured channel power value at both integration bandwidth settings and confirm that the measured total power remains substantially unchanged, demonstrating that the transmitted signal power is fully contained within the nominal 8 MHz channel.
6. Repeat the same measurement steps at the mid-band and upper-band test frequencies.
7. Compare the measured output power values across all three test frequencies against the declared acceptance range of 46 dBm ± 1.5 dB.

4.1.3 Interpretation of the 8 MHz vs 20 MHz Integration Measurement

Where the transmitted D2M signal is fully confined within the nominal 8 MHz channel, the measured total channel power is expected to remain essentially unchanged when the integration bandwidth is increased from 8 MHz to 20 MHz, provided no significant out-of-band energy is present. The similar power values

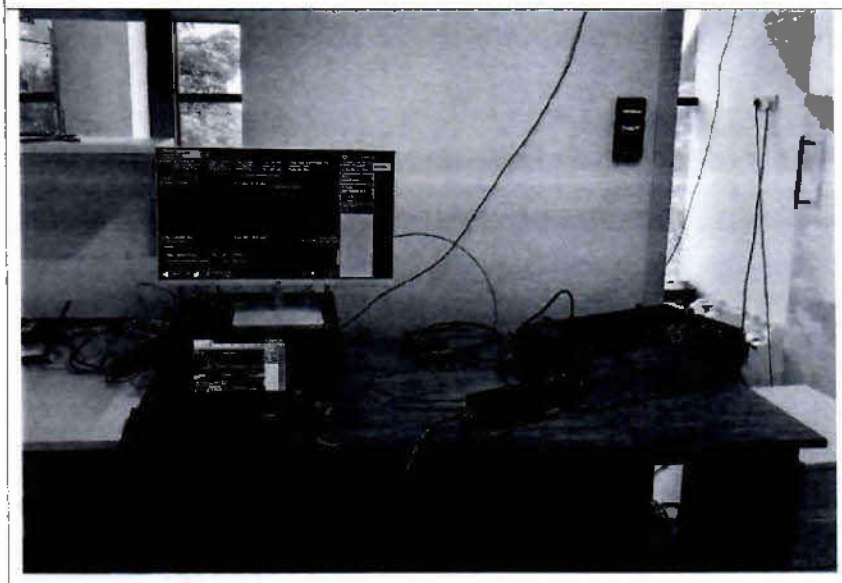
observed at both integration bandwidths therefore indicate that the transmitted power is substantially confined within the intended channel.

4.1.4 Acceptance Criterion

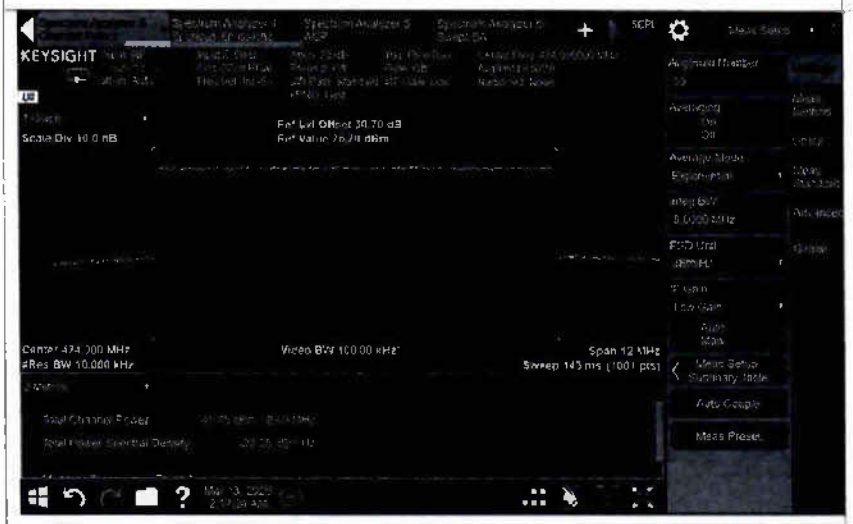
The D2M transmitter shall be considered compliant with this channel power test if:

- the measured output power at the lower-, middle-, and upper-band frequencies remains within 46 dBm ± 1.5 dB,
- the measured total power remains substantially unchanged when the integration bandwidth is increased from 8 MHz to 20 MHz, with the transmitted signal bandwidth unchanged.

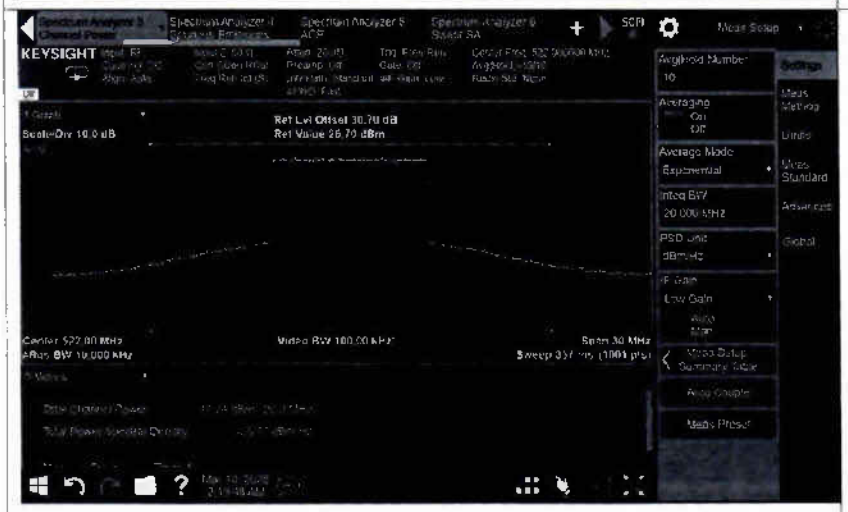
4.1.5 Test Setup

Setup Photograph: Adjacent Channel Leakage Ratio Test Setup	
	Details: • BRH/D2M transmitted with 40W rated power. • Keysight MXA is used to measure the channel power of BRH transmission. • Total attenuation loss of 30.7 dB is added as Reference offset in the spectrum analyser.

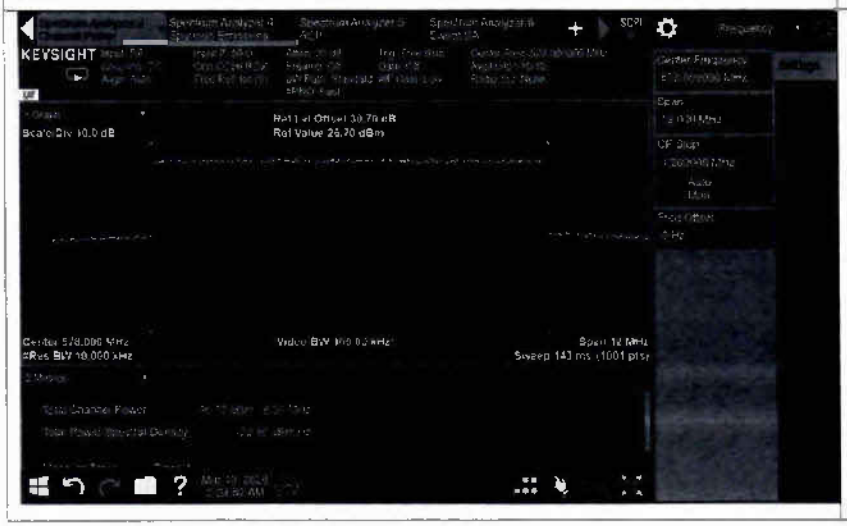
4.1.6 Test Results

Channel Power Measurements (lower band, 8 MHz Integration BW)	Description
	• Lower Band • Channel BW = 8 MHz • Integration BW = 8 MHz • Center Frequency = 474 MHz • Measured Channel power = 45.75 dBm • Total Attenuation in the setup = 30.70 dB
	• Lower Band • Channel BW = 8 MHz • Integration BW = 20 MHz • Center Frequency = 474 MHz • Measured Channel power = 45.91 dBm • Total Attenuation in the setup = 30.70 dB

- Mid Band
- Channel BW = 8 MHz
- Integration BW = 8 MHz
- Center Frequency = 522 MHz
- Measured Channel power = 47.03 dBm
- Total Attenuation in the setup = 30.70 dB



- Mid Band
- Channel BW = 8 MHz
- Integration BW = 20 MHz
- Center Frequency = 522 MHz
- Measured Channel power = 47.24 dBm
- Total Attenuation in the setup = 30.70 dB



- Upper Band
- Channel BW = 8 MHz
- Integration BW = 8 MHz
- Center Frequency = 578 MHz
- Measured Channel power = 46.17 dBm
- Total Attenuation in the setup = 30.70 dB

4.1.7 Test Summary

Channel power was measured at the lower-, middle-, and upper-band frequencies with the D2M Broadcast Radio Head (D2M transmitter) operating at maximum rated output power. The measured output power satisfied the declared limit of 46 dBm ± 1.5 dB and remained substantially unchanged for 8 MHz and 20 MHz integration bandwidths, demonstrating that the transmitted signal power is fully contained within the nominal 8 MHz channel.

Table 1: Summary of D2M BRH power measurements

Test Condition	Limit / Acceptance Criterion	Actual Measured Value	Pass / Fail
Lower band, 474 MHz, 8 MHz integration BW	46 dBm ± 1.5 dB	45.75 dBm	PASS
Lower band, 474 MHz, 20 MHz integration BW		45.91 dBm	PASS
Mid band, 522 MHz, 8 MHz integration BW		47.03 dBm	PASS
Mid band, 522 MHz, 20 MHz integration BW		47.24 dBm	PASS
Upper band, 578 MHz, 8 MHz integration BW		46.17 dBm	PASS
Upper band, 578 MHz, 20 MHz integration BW		46.51 dBm	PASS

4.2 Spurious Emission of BRH

4.2.1 Rationale for utilizing 3GPP Emission Limits

Broadcast services typically adhere to ETSI standards, including those for DVB-T2 deployed in India, which are equivalent to the 3GPP Category B emission limit lines for base stations. Since a specific emission limit line has not been defined for the D2M service (ATSC 3.0), the stringent 3GPP Category B emission limit lines were adopted for this testing to ensure the highest standard of compliance and co-existence with IMT networks. Stringent Category B emission limit lines [1] and ETSI limit lines match with each other [2].

Spurious emissions refer to emissions generated by unintended transmitter effects, such as harmonic emissions, parasitic emissions, intermodulation products, and frequency conversion products, excluding out-of-band emissions. These emissions are measured at the base station antenna connector. The limits for transmitter spurious emissions are applied within the frequency range of 300 MHz up to 5th harmonic of the upper frequency edge. This approach was implemented to assess the impact on IMT (International Mobile Telecommunications) bands, as all IMT band base stations must comply with these spurious emission limits.

Table 1: General BS transmitter spurious emission limits in FR1, Category B

Spurious frequency range	*Basic limit*	Measurement bandwidth	Notes
9 kHz – 150 kHz	-36 dBm	1 kHz	Note 1, Note 3
150 kHz – 30 MHz		10 kHz	Note 1, Note 3
30 MHz – 1 GHz		100 kHz	Note 1
1 GHz – 5th harmonic of the upper frequency edge of the DL *operating band* in GHz	-30 dBm	1 MHz	Note 1, Note 2
NOTE 1: Measurement bandwidths as in ITU-R SM.329 [5], s4.1. NOTE 2: Upper frequency as in ITU-R SM.329 [5], s2.5 table 1. NOTE 3: This spurious frequency range applies only to *BS type 1-C* and *BS type 1-H*.			

4.2.2 Test Procedure

The conducted spurious emission measurement shall be performed in accordance with the general method described in 3GPP TS 38.141-1 v16, clause 6.6.5.4 [1], with suitable adaptation for the D2M transmitter operating in the 470 – 582 MHz band. The measurement system setup shall follow the arrangement described in Annex D.4.4-1 of 3GPP TS 38.141-1 v16 with the notch filter inserted in the measurement path to sufficiently suppress the wanted carrier and enable accurate observation of low-level spurious components.

1. Configure the D2M transmitter to operate at the required test frequency and rated output power under normal operating conditions.
2. Before starting the spurious emission measurement, measure and record the channel power of the wanted signal in the operating channel. This value shall be used as the reference for subsequent interpretation of relative emission levels.
3. Insert the notch filter in the measurement path, as indicated in the measurement system setup of Annex D.4.4-1, so that the wanted carrier is sufficiently rejected while preserving the spurious

components outside the channel.

4. Configure the spectrum analyser with the appropriate frequency range, resolution bandwidth (RBW), video bandwidth (VBW), detector type, and averaging settings corresponding to the applicable spurious emission measurement range.
5. Perform the spurious emission scan over the required frequency span, covering the frequency ranges of interest, including:
   a. the second harmonic region, and
   b. the third harmonic region,
   as applicable to the D2M operating frequency.
6. Record the amplitude and frequency of all significant spurious components observed during the scan.
7. Compare the measured spur levels against the applicable spurious emission limit lines for the relevant frequency ranges.
8. Save the spectrum plots, marker tables, and instrument settings as part of the test record.

4.2.3 Test Setup

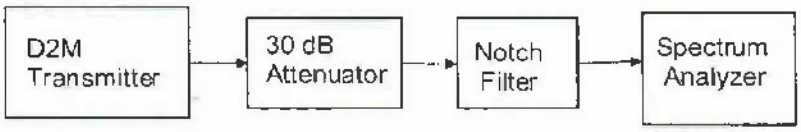


Figure 1: Test Setup for spurious emission

Note 1: Before measuring channel power, the entire setup was measured for the loss in the system is 30.7 dB.

Note 2: Notch Filter was characterized to see whether it is attenuating any spurious emissions and found that the attenuation is less than 1 dB outside the D2M band (detailed characterization of notch filter can be found in Appendix B).

Note 3: Notch filter of frequency 515 MHz is used in the setup and its characteristics are share in Annexure B: Summary of the equipment used .

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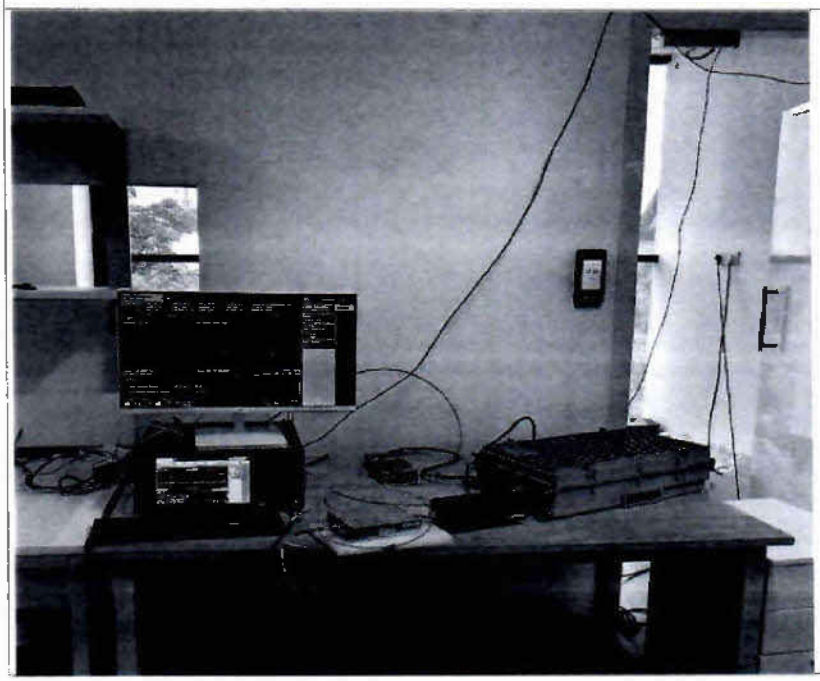
TEST REPORT

Setup Photograph: Spurious Emission Setup	Details:
	• BRH/D2M transmitted with 40 W power. • Keysight MXA is used to measure the channel power of BRH transmission. • Reference Offset of 30.7 dB is added in the spectrum analyser.

Spurious Emission Results	
	Details: • Measurement was carried out from 9kHz to 150 kHz. • Limit line was -36 dBm with 1 kHz RBW • Observation: Maximum spur had 6 dB margin from the limit line.

Details:

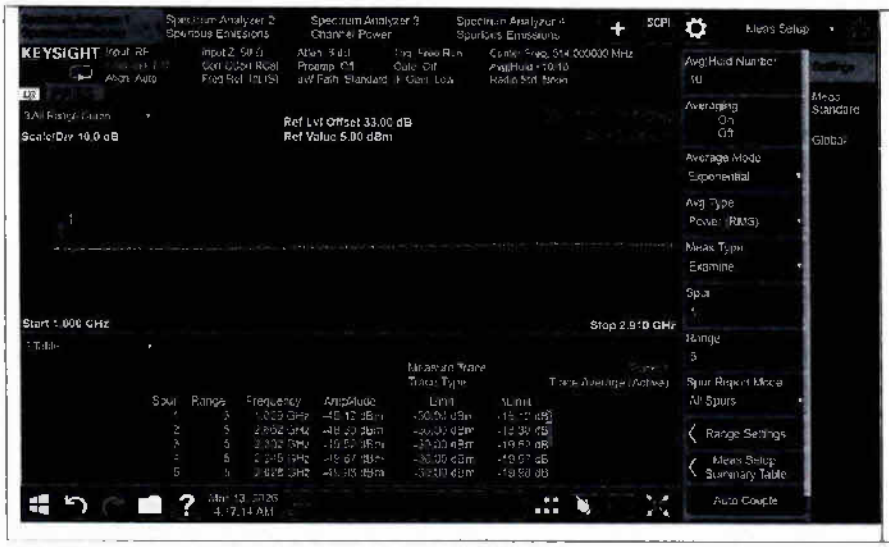
- Measurement was carried out from 150kHz to 30 MHz.
- Limit line of -36 dBm with measurement BW of 10 kHz was used.
- Observation: Maximum spur had about 4 dB margin from the limit line.

Details:

- Measurement was carried out from 30 MHz to 460 MHz.
- Limit line of -36 dBm with measurement BW of 100 kHz was used.
- Observation: Maximum spur had about 6.9 dB margin from the limit line.

Details:

- Measurement was carried out from 598 MHz to 1 GHz.
- Limit line of -36 dBm with measurement BW of 100 kHz was used.
- Observation: Maximum spur had about 2.226 dB margin from the limit line.



Details:

- Measurement was carried out from 1 GHz to 2.910 GHz (5th Harmonic of highest frequency of D2M) .
- Limit line of -30 dBm with measurement BW of 1 MHz was used.
- Observation: Maximum spur had about 15 dB margin from the limit line.

4.2.4 Test Summary:

The D2M Broadcast Radio Head (40 W) passes the general BS transmitter spurious emission limit lines of Category 8 as specified by 3GPP.

Table 2:Summary of Spurious Emission Measurements

Frequency Range	RBW	Limit	Actual Maximum Spur Observed	Pass / Fail
9 kHz – 150 kHz	1 kHz	-36 dBm	-42.0 dBm	PASS
150 kHz – 30 MHz	10 kHz	-36 dBm	-40.0 dBm	PASS
30 MHz – 460 MHz	100 kHz	-36 dBm	-42.9 dBm	PASS
598 MHz – 1 GHz	100 kHz	-36 dBm	-38.226 dBm	PASS
1 GHz – 2.910 GHz (5th Harmonic of the highest channel)	1 MHz	-30 dBm	-45.0 dBm	PASS

4.3 Adjacent Channel Leakage Assessment

Adjacent Channel Leakage Power Ratio (ACLR) is the ratio of the filtered mean power centered on the assigned channel frequency to the filtered mean power centered on an adjacent channel frequency[3]. The requirements shall apply outside the Base Station RF Bandwidth. The ACLR is measured when the transmission happens with maximum rated output power.

4.3.1 Rationale of adopting 3GPP ACLR procedure

For 3GPP systems, ACLR is generally defined using a configured transmission bandwidth (BW_{Config}) and the corresponding adjacent-channel filter arrangement. Since the present D2M waveform is an 8 MHz broadcast transmission and does not directly map to the channelization assumptions used for 3GPP NR carriers, the measurement was adapted in a technology-neutral manner by evaluating the adjacent-channel power using the full channel bandwidth ($BW_{Channel}$ = 8 MHz) rather than BW_{Config}. The general measurement system arrangement described in Annex D.1.1 of 3GPP TS 38.141-1 [1] was used as a reference for the measurement setup. This approach is intended to characterize the adjacent-channel energy of the D2M signal in a technology-neutral manner, without dependence on waveform-specific parameters such as occupied bandwidth, subcarrier spacing, and effective resource block occupancy. ACLR limits are normalized for RBW of 220 kHz & $BW_{Channel}$ of 8 MHz. The measured values are therefore reported against these normalized ACLR limits.

Table 3 Normalized ACLR limits

BS channel bandwidth **of *lowest/highest carrier* transmitted $BW_{Channel}$ (MHz)**	**BS adjacent channel centre frequency offset below the lowest or above the highest carrier centre frequency transmitted**	**Assumed RBW (for measurement)**	**Filter on the adjacent channel frequency and corresponding filter bandwidth**	**Normalized ACLR limit**
8	$BW_{Channel}$	220 kHz	Square ($BW_{Channel}$)	30 dB
	2 x $BW_{Channel}$	220 kHz	Square ($BW_{Channel}$)	45 dB
	3 x $BW_{Channel}$	220 kHz	Square ($BW_{Channel}$)	45 dB
NOTE 1: $BW_{Channel}$ is the *BS channel bandwidth configuration* of the *lowest/highest carrier* transmitted on the assigned channel frequency.				
NOTE 2: Transmission bandwidth/Occupied bandwidth was not considered as it varies based on modes, technology, resource block occupancy and SCS (BW_{Config}).				

4.3.2 Test Procedure

The measurement shall be performed under normal test environment conditions, consistent with the general structure of 3GPP TS 38.141-1, clause 6.6.3.4.1. For the D2M transmitter operating in the 470–582 MHz band, the test shall be carried out at three representative operating frequencies corresponding to the lower, middle, and upper portions of the supported band.

The measurement shall be carried out for each of the three operating frequencies identified below.

1. Configure the D2M transmitter to operate at the selected lower-, middle-, or upper-band test

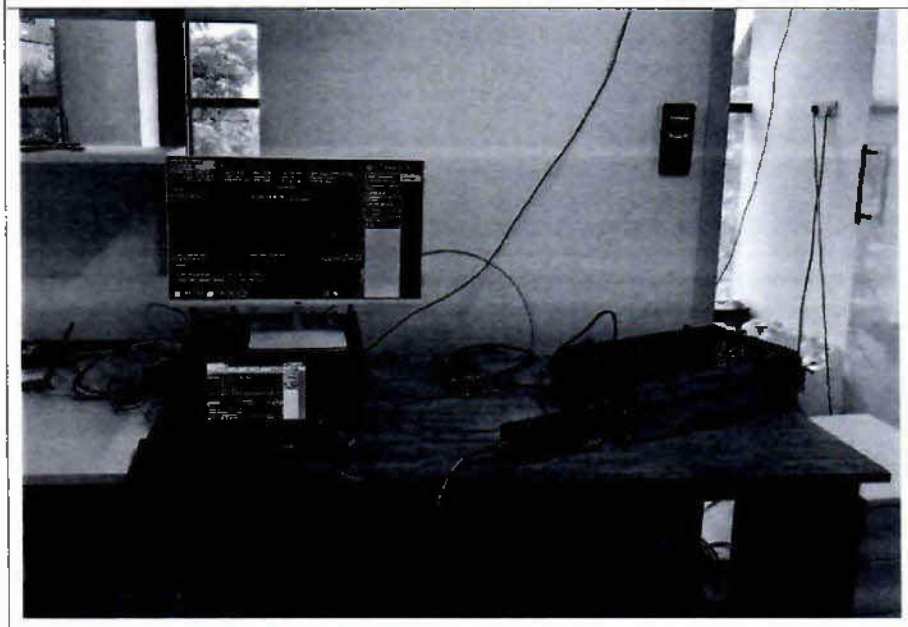
frequency.

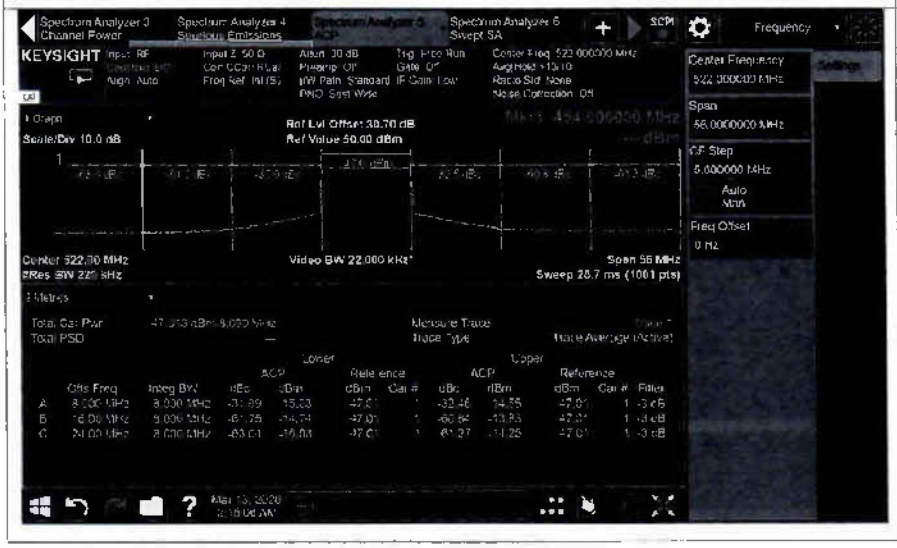
2. Set the transmitter to radiate the required waveform at maximum rated output power.
3. Connect the transmitter output to the measurement equipment through suitable attenuators, couplers, and any other required protection elements.
4. Configure the measurement instrument with the appropriate bandwidth, detector, and averaging settings corresponding to the parameter under test.
5. Perform the required measurement at the selected frequency.
6. Repeat the same measurement procedure at the middle-band and upper-band frequencies.
7. Record the measured results for all three test frequencies and compare them against the applicable limit values.

4.3.3 Test Setup

Figure 2: Test Setup for Normalized ACLR measurement

Note 1: Before measuring channel power, the entire setup was calibrated and found that total the loss in the system is 30.7 dB.

Setup Photograph: Adjacent Channel Leakage Assessment Test Setup	
	Details: • BRH/D2M transmitted with 40 W power. • Keysight MXA is used to measure the channel power of BRH transmission. • Reference Offset of 30.7 dB is added in the spectrum analyser.

Adjacent Channel Leakage Assessment Results	
	Details: • Bottom Band • Num of Adjacent channels = 3 • Channel BW = 8 MHz • Center Frequency = 474 MHz • Measured Channel power = 45.96 dBm • Total Attenuation in the setup = 30.70 dB
	Details: • Mid Band • Num of Adjacent channels = 3 • Channel BW = 8 MHz • Center Frequency = 522 MHz • Measured Channel power = 47 dBm • Total Attenuation in the setup = 30.70 dB

Details:

- Upper Band
- Num of Adjacent channels = 3
- Channel BW = 8 MHz
- Center Frequency = 578 MHz
- Measured Channel power = 45.79 dBm
- Total Attenuation in the setup = 30.70 dB

4.3.4 Test Summary

The D2M Broadcast Radio Head (D2M transmitter) satisfied the adjacent-channel leakage assessment criteria specified in Table 3. The measured adjacent-channel power levels and its equivalent ACLR remained within the defined acceptance limits under the conditions of this evaluation.

Table 4: Summary of ACLR measurement - Lower band

BS channel bandwidth **($BW_{Channel}$) in MHz**	**BS adjacent channel center frequency offset**	**Limit / Acceptance Criterion**	**Assumed RBW**	**Measured Adjacent Channel Power (ACP)**	**Equivalent ACLR**	**Pass / Fail**
8	1 × $BW_{Channel}$ (Lower)	30 dB	220 kHz	-30.7 dBc	30.7 dB	PASS
8	1 × $BW_{Channel}$ (Upper)	30 dB	220 kHz	-31.9 dBc	31.9 dB	PASS
8	2 × $BW_{Channel}$ (Lower)	45 dB	220 kHz	-65.1 dBc	65.1 dB	PASS
8	2 × $BW_{Channel}$ (Upper)	45 dB	220 kHz	-57.4 dBc	57.4 dB	PASS
8	3 × $BW_{Channel}$ (Lower)	45 dB	220 kHz	-71.3 dBc	71.3 dB	PASS
8	3 × $BW_{Channel}$ (Upper)	45 dB	220 kHz	-60.1 dBc	60.1 dB	PASS

Note1 : The carrier was transmitted at its full rated power and with 8 MHz channel BW.

Table 5: Summary of ACLR measurement- Mid Band

BS channel bandwidth ($BW_{Channel}$) in MHz	BS adjacent channel center frequency offset	Limit / Acceptance Criterion	Assumed RBW	Measured Adjacent Channel Power (ACP)	Equivalent ACLR	Pass / Fail
8	1 × $BW_{Channel}$ (Lower)	30 dB	220 kHz	-32.0 dBc	32.0 dB	PASS
8	1 × $BW_{Channel}$ (Upper)	30 dB	220 kHz	-32.5 dBc	32.5 dB	PASS
8	2 × $BW_{Channel}$ (Lower)	45 dB	220 kHz	-61.7 dBc	61.7 dB	PASS
8	2 × $BW_{Channel}$ (Upper)	45 dB	220 kHz	-60.8 dBc	60.8 dB	PASS
8	3 × $BW_{Channel}$ (Lower)	45 dB	220 kHz	-63.0 dBc	63.0 dB	PASS
8	3 × $BW_{Channel}$ (Upper)	45 dB	220 kHz	-61.3 dBc	61.3 dB	PASS

Table 6:Summary of ACLR measurement -Upper Band

BS channel bandwidth ($BW_{Channel}$) in MHz	BS adjacent channel center frequency offset	Limit / Acceptance Criterion	Assumed RBW	Measured Adjacent Channel Power (ACP)	Equivalent ACLR	Pass / Fail
8	1 × $BW_{Channel}$ (Lower)	30 dB	220 kHz	-31.8 dBc	31.8 dB	PASS
8	1 × $BW_{Channel}$ (Upper)	30 dB	220 kHz	-31.0 dBc	31.0 dB	PASS
8	2 × $BW_{Channel}$ (Lower)	45 dB	220 kHz	-53.1 dBc	53.1 dB	PASS
8	2 × $BW_{Channel}$ (Upper)	45 dB	220 kHz	-48.3 dBc	48.3 dB	PASS
8	3 × $BW_{Channel}$ (Lower)	45 dB	220 kHz	-59.4 dBc	59.4 dB	PASS
8	3 × $BW_{Channel}$ (Upper)	45 dB	220 kHz	-52.5 dBc	52.5 dB	PASS

5 D2M Device ecosystem

This demonstration of different types of devices that are capable of receiving D2M content was done in the lab.

Following D2M devices were used to demonstrate D2M reception:

Sr. No.	D2M Device type	Demonstrated successfully? (Yes/No)
1	D2M dongle	Yes
2	D2M smart phone	Yes
3	D2M feature phone	Yes
4	D2M laptop	Yes
5	D2M SetTopBox	Yes

6 Conclusion

- The D2M Broadcast Radio Head (40 W) operating in the 470–582 MHz band satisfied the acceptance criteria defined for channel power, spurious emission measurements and adjacent-channel leakage assessment under the present laboratory evaluation.

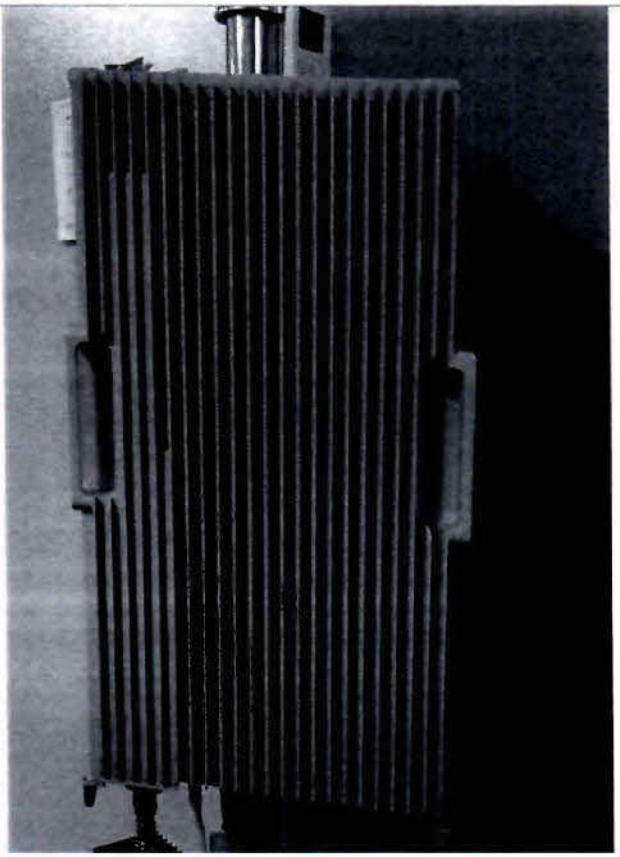
7 References

[1] 3GPP TS 38.141-1 V16.4.0, "5G; NR; Base Station (BS) conformance testing Part 1: Conducted conformance testing (Release 16),"

[2] Electro Magnetic Compatibility (EMC) and Radio Spectrum Matters (ERM); Land Mobile Service; Radio Equipment Using Integral Antennas Intended Primarily for Analogue Speech; Part 1: Technical Characteristics and Methods of Measurement, ETSI Standard EN 300 296, ETSI, 2023.

[3] 3GPP TS 138 104 V16.1.0, "5G; NR; Base Station (BS) radio transmission and reception (Release 16)", Oct. 2019.

Annexure A: Photographs

	
Pole mounted Sample - Front View	Pole Mounted - Sample Rear View

Annexure B: Summary of the equipment used

Equipment ID	Name of the Equipment	Model and Serial Number	Calibration Method	Calibrated ON	Calibration Due date
ARTL/RF/001	MXA signal Analyzer, Keysight Technologies	N9020B, MY63380199, 10 Hz to 32GHz	External (TransCal)	16th Aug 2025	15th Aug 2026
ARTL/RF/020	Signal Generator, Keysight Technologies	N5173B, MY59100786, 9 kHz to 40 GHz	External	11th Oct 2024	10th Oct 2026
ARTL/RF/038	Fieldfox 54 GHz Microwave Analyzer, Keysight Technologies	N9953B, US61470101	-	-	-

ARACION

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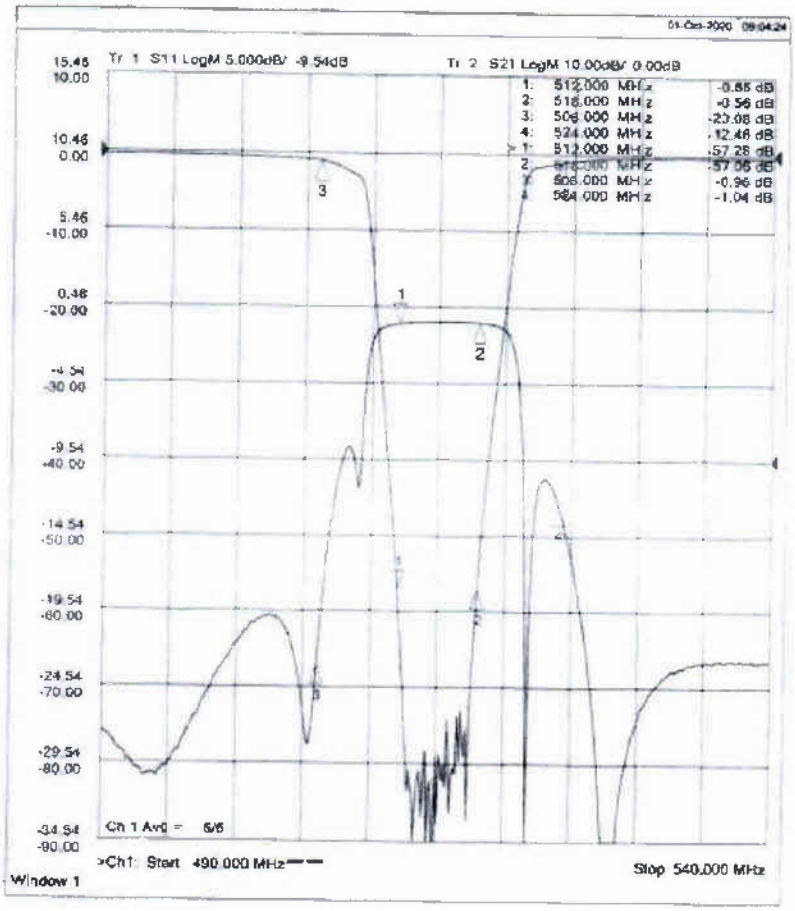
TEST REPORT

Notch Filter Characteristics:

Characteristics of the notch filter was verified in the lab and found that it is meeting the S11 characteristics given in the datasheet.



EWT Part Number: EWT-14 0348
Serial Number: X1
S.O. Number: 25048

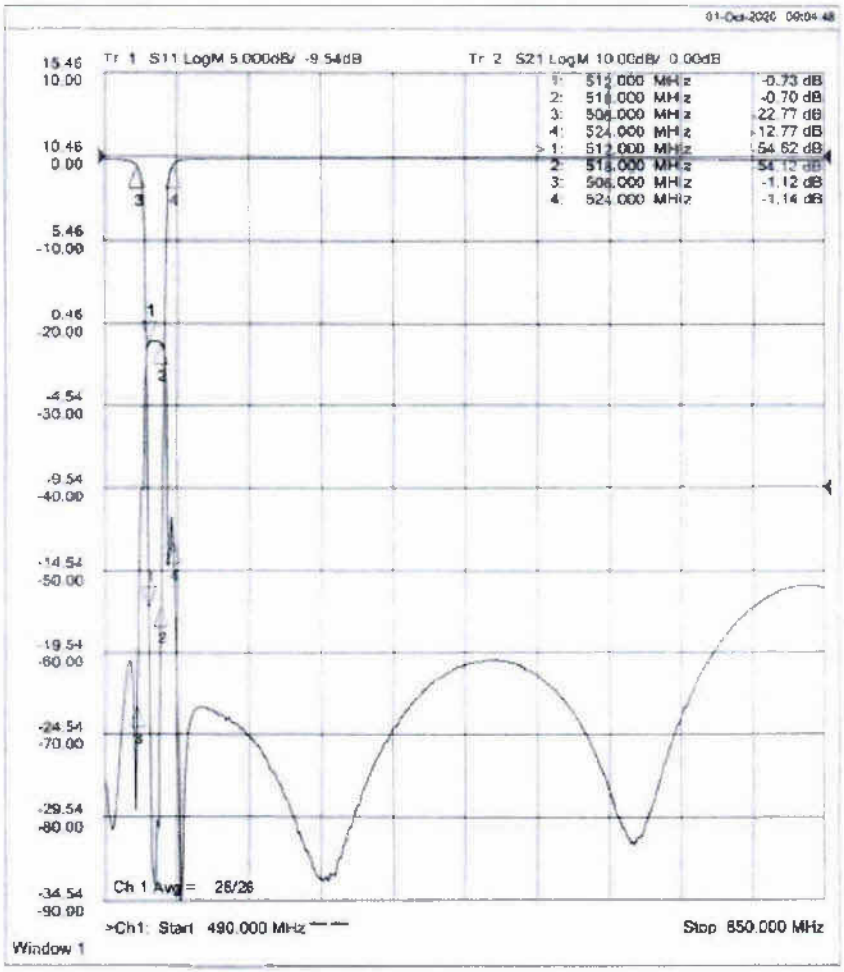
Cust. Part Number: N/A
Technician: K. D. B.
Date: September 30, 2020
Equipment I.D. MY68421504

Q.C. ACCEPT 1
Q.C.

ARACION

ARACION TECHNOLOGY PRIVATE LIMITED- LABORATORY

TEST REPORT



EWT Part Number: EWT-14-0348
Serial Number: X1
S.O. Number: 25048

Cust. Part Number: N/A
Technician: K. D. B
Date: September 30, 2020
Equipment I.D. MY58421504

Q.C.

ARACION

ARACION TECHNOLOGY PRIVATE LIMITED- LABORATORY

TEST REPORT

Prasar Bharati

Signed: _____

Name: Sh. D. C. Shukla

Title: DDG (~~Tech~~/Innovation)

Date: 20/4/26

Wireless Planning & Coordination

Signed: _____

Name: Smt. Revathi Mannepalli

Title: Joint Wireless Advisor, WPC

Date: _____

Wireless Planning & Coordination

Signed: _____

Name: T Srinivasa Rao

Title: Sr. Dy. Director, WPC

Date: _____

Telecommunication Engineering Centre

Signed: _____

Name: Sh. N Murali Krishna

Title: DDG (Southern Region)

Date: _____

Ministry of Electronics & IT

Signed: _____

Name: Sh.Ravinder Kumar Meena

Title: Scientist 'E'

Date: 23.04.2026

Tejas Networks Limited

Signed: _____

Name: Abhijith B Gopalakrishna

Title: Principal Engineer

Date: _____

ARACION

ARACION TECHNOLOGY PRIVATE LIMITED- LABORATORY

TEST REPORT

Tejas Networks Ltd.	**Aracion Technology Pvt. Ltd.**
Signed: Prashant M	Signed: Keshava Boraiah Digitally signed by Keshava Boraiah Date: 2026.04.14 11:12:54 +05:30
Name: Prashant M Maru	Name: Keshava Boraiah
Title: Vice President	Title: Chief Technology Officer
Date: 17th APRIL, 2026	Date:

TEJAS NETWORKS LIMITED * MUMBAI *

----------**END OF THE REPORT**----------

National Accreditation Board for
Testing and Calibration Laboratories

NABL

CERTIFICATE OF ACCREDITATION

ARACION TECHNOLOGY PRIVATE LIMITED

has been assessed and accredited in accordance with the standard

ISO/IEC 17025:2017

"General Requirements for the Competence of Testing & Calibration Laboratories"

for its facilities at

1ST FLOOR, B-23 HK ARCADE, KSSIDC, INDUSTRIAL AREA, BENGALURU, , KARNATAKA, INDIA

in the field of

TESTING

Certificate Number: TC-13835

Issue Date: 04/06/2024 Valid Until: 03/06/2026

This certificate remains valid for the Scope of Accreditation as specified in the annexure subject to continued satisfactory compliance to the above standard & the relevant requirements of NABL.
(To see the scope of accreditation of thislaboratory, you may also visit NABL website www.nabl-india.org)

Name of Legal Entity: ARACION TECHNOLOGY PVT LTD

Signed for and on behalf of NABL

Srikanth R
Director

Chakravarthy T. Kannan
Chief Executive Officer

ISO 9001:2015

GOVERNMENT OF INDIA
MINISTRY OF COMMUNICATIONS
DEPARTMENT OF TELECOMMUNICATIONS
TELECOMMUNICATION ENGINEERING CENTRE
Gate No. 5, Khurshid Lal Bhawan, Janpath, New Delhi-110001

CERTIFICATE OF DESIGNATION

M/s Aracion Technology Private Limited, Laboratory, Bangalore
has been assessed and designated as Conformity Assessment Body (CAB)
for its facilities at

1st Floor, B-23 HK Arcade, 1A Kssidc, Industrial Area, Mahadevapura,

Bangalore-560048

In the field of Testing

Certificate No. TEC/MRA/CAB/IND-D/108

Issue Date: 01/10/2025 **Validity: 01/10/2025 to 30/09/2028**

This Certificate remains valid for the Scope of Designation as specified in the Annexure subject to the continued validity of NABL Accreditation and satisfied compliance to the Standards/specifications against which lab has been designated and strict compliance to the relevant terms and conditions of TEC CAB Designation Scheme.

(To see the scope of designation of this laboratory, you may also visit TEC website www.tec.gov.in)

Signed for and on behalf of TEC

Sanjeev Kumar Arya
Director (CA)
For Designating Authority
TEC

Field Test Report

Applicant Name:	Tejas Networks Limited
Applicant Address:	Ground 1st, 2nd Floor Wing A and 1st, 2nd Floor Wing B, Plot No. 3, Survey No. 20 & 22, Surya Sapphire, Hosur Road, Electronic City Phase I, Konappana Agrahara Village, Bengaluru – 560100
Manufacturer's Name:	Tejas Networks Limited
Manufacturer's Address:	Ground 1st, 2nd Floor Wing A and 1st, 2nd Floor Wing B, Plot No. 3, Survey No. 20 & 22, Surya Sapphire, Hosur Road, Electronic City Phase I, Konappana Agrahara Village, Bengaluru – 560100
Trademark:	TEJAS® NETWORKS
Testing Facility information:	
Name:	Brightview Telecom Pvt. Ltd
Address:	91, 2nd Floor, Khasra No. 160, Arbindo Marg, Adchini Village, New Delhi, Delhi 110017, India
Field Testing:	**a) Field Demonstration of Telephony priority (Voice call & SMS) during active D2M Playback** **b) Field Demonstration of SFN functionality**
Date (s) of performance of tests:	
Date of Testing .....:	25/03/2026
Test Result .....:	PASS
Compiled by:	
Reviewed & authorized by:	
Issued by:	

Contents

1 Test Summary

2 General Description of DUT

Manufacturer:	Tejas Networks Limited
Manufacturer Address:	Ground 1st, 2nd Floor Wing A and 1st, 2nd Floor Wing B, Plot No. 3, Survey No. 20 & 22, Surya Sapphire, Hosur Road, Electronic City Phase I, Konappana Agrahara Village, Bengaluru – 560100 Karnataka, India
Product Name:	MarkOne D2M Mobile & D2M Dongle
Trademark:	TEJAS NETWORKS
Frequency Bands	Frequency Range from 470 MHz to 582 MHz
Supported Configuration:	8MHz Channel BW

3 Test Objectives

The objective of this verification is to confirm that incoming cellular voice calls and SMS messages are successfully received and appropriately handled during active D2M playback, and that telephony services retain priority over the ongoing D2M session.

In addition, a field demonstration of Single Frequency Network (SFN) operation to be conducted to observe potential signal quality improvement under synchronized multi-transmitter operation.

4 Telephony priority (Voice call & SMS) during active D2M Playback

4.1 Background

D2M services are designed to provide continuous broadcast audio-visual content on user devices. However, such content delivery must not impair the normal operation of cellular telephony services, which remain the primary means of personal communication on the device. During active D2M playback, it is therefore essential to verify that incoming voice calls and SMS messages continue to have functional priority, so that they are not missed, delayed, or obscured by the ongoing D2M session.

This assessment is undertaken to confirm that the device maintains expected telephony behavior under concurrent D2M operation, including successful notification and handling of incoming voice calls and SMS messages, while ensuring graceful interruption or continuation of D2M playback, as applicable.

4.2 Test Procedure

1. Launch the D2M application on the device under test (DUT) and initiate continuous audio-visual playback.
2. From a separate device, initiate an incoming cellular voice call to the DUT.
3. Observe and record the DUT behaviour during:
    a. Call notification
    b. Call acceptance or rejection,
    c. Call continuity
    d. Post-call D2M playback behaviour.
4. Repeat the verification by sending an incoming cellular SMS to the DUT during active D2M playback.
5. Observe and record the DUT behaviour during SMS notification and user access to the received message.

4.3 Acceptance Criteria

4.3.1 Incoming Cellular Voice Call

During active D2M playback, the DUT is expected to exhibit normal telephony-priority behaviour, as follows:

1. The incoming cellular voice call shall be successfully notified to the user
2. The user shall be able to answer or reject the call without functional impairment
    1. If the call is answered, the voice session shall continue normally.
    2. Upon termination of the call, the D2M playback shall resume gracefully, without abnormal behaviour.
    3. If the incoming call is rejected, the D2M playback shall continue without interruption or instability.

4.3.2 Incoming Cellular SMS

During active D2M playback, the DUT is expected to:

1. Receive the incoming SMS successfully

2. Notify the user of the incoming message
3. Allow the user to access and read the SMS without abnormal impact on D2M playback.
4. Receipt of the SMS shall not cause unnecessary interruption to the D2M session.

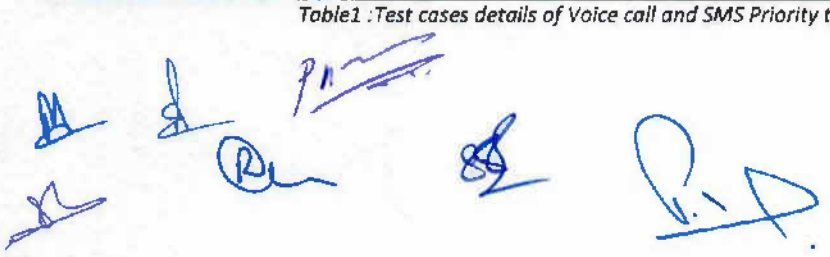
In Summary, Telephony services should take priority over D2M playback.

4.4 Field Test Results

Field Test location: Malgudi Conference room, 5th Floor, Tower A, Doordarshan Bhawan, Copernicus Marg, New Delhi-110001.

Test Case	Test Type	Operator	Technology	Mobile Originating (MO) Device	Mobile Terminating (MT) Device	Mobile Originating Number	Mobile Terminating Number
Test Case 1	Voice & SMS	JIO	4G	Samsung S23	Mark One D2M Handset	9354277888	9460081664
Test Case 2	Voice & SMS	Airtel	2G	Samsung S23	Samsung Galaxy A55 5G with D2M Dongle	8448570368	9900018688
Test Case 3	Voice & SMS	Airtel	5G	Samsung S23	Samsung Galaxy A55 5G with D2M Dongle	8448570368	9971398656
Test Case 4	Voice & SMS	JIO	5G	Samsung S23	Samsung Galaxy A55 5G with D2M Dongle	9354277888	9460081664

Table1 :Test cases details of Voice call and SMS Priority testing



KPI	Test Case 1 (Jio-4G)	Test Case 2 (Airtel-2G)	Test Case 3 (Airtel-5G)	Test Case 4 (Jio-5G)
Call Attempt	10	10	10	10
Call Block	0	0	0	0
Call Block Rate (%)	0%	0%	0%	0%
Call Setup	10	10	10	10
Call Setup Success Rate (%)	100%	100%	100%	100%
Call Established	10	10	10	10
Call End	10	10	10	10
SMS Send Success Rate (%)	100%	100%	100%	100%

Table 2: Voice call and SMS Priority test results

The results in "Table 2" confirmed that the DUT maintained correct telephony-priority behaviour during active D2M playback.

1. Incoming voice calls were successfully received and handled,
2. SMS messages were delivered correctly, and
3. D2M playback either resumed gracefully after the call and continued normally where no interruption was required.

For Voice call and SMS Logs: Refer Annexure A

4.5 Test Summary

The field verification confirmed that incoming cellular voice calls and SMS messages retained priority over active D2M playback under the conditions of this evaluation. The observed device behaviour was consistent with expected telephony operation, demonstrating that D2M service did not impair the successful receipt and handling of voice calls or SMS messages.

5 Field Demonstration of SFN functionality

5.1 Background

In a Single Frequency Network (SFN) configuration, multiple transmitters radiate the same signal on the same frequency while maintaining time and frequency synchronization. When the relative propagation delay between transmitters remains within the guard interval of the waveform, signals from multiple transmitters may combine constructively at the receiver. This characteristic can improve the effective signal quality and service availability, particularly in overlap regions between transmitters and near coverage edges. For D2M deployments involving HPHT and LPLT transmitters, SFN operation is expected to enhance coverage continuity by reducing coverage gaps and improving reception robustness. The objective of this field demonstration is to verify the presence of SFN by comparing receiver performance under single-transmitter and multi-transmitter SFN conditions.

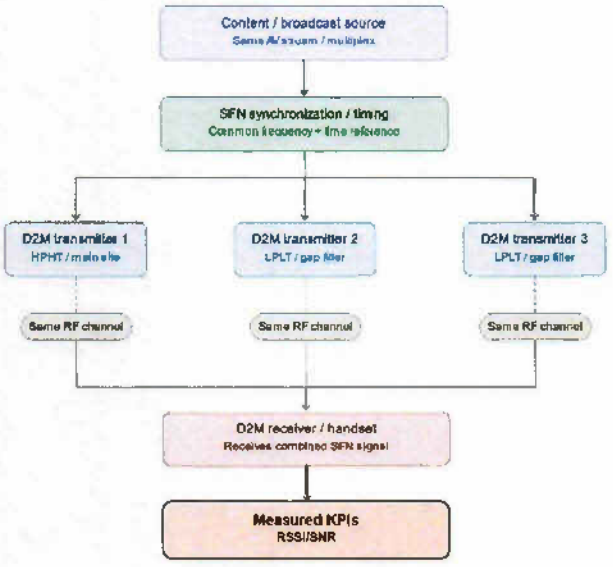


Figure 1: Block diagram of the SFN setup

5.2 KPI to be Measured

The objective of this field demonstration is to confirm the functional presence of SFN gain by comparing receiver performance under:

1. Single-transmitter operation of HPHT
2. Multi-transmitter synchronized SFN operation.

The demonstration specifically evaluates whether signal quality improves under synchronized HPHT + LPLT transmission, using field measurements of RSSI (Received signal strength indicator) & SNR (Signal to Noise Ratio).

5.3 Test Procedure

1. The D2M transmitters shall be configured to broadcast the same waveform and content on the same RF channel, while maintaining time and frequency synchronization to enable SFN operation. A receiver capable of continuous SNR logging shall be used for the measurements.
2. Measurement points shall be selected along a predefined route or grid, covering transmitter-dominant coverage areas, overlap regions between transmitters, and coverage-edge locations.
3. First, measurements shall be performed with only one D2M transmitter active (HPHT or LPLT). The SNR shall be recorded at all selected locations.
4. Subsequently, two or more synchronized transmitters operating in SFN mode shall be activated, and the measurements shall be repeated along the same route or grid.
5. For each measurement point, the location (GPS coordinate), active transmitter configuration, measured SNR shall be recorded.
6. The SNR values obtained under the single-transmitter and SFN configurations shall then be compared, with particular focus on the overlap regions where SFN gain is expected.
7. Compare SNR values measured under single-transmitter and SFN configurations, with emphasis on overlap regions.

5.4 Acceptance Criteria

SFN functionality should be demonstrated if the measured RSSI & SNR under multi-transmitter SFN operation shows an improvement to the RSSI & SNR measured under single-transmitter operation at the same measurement locations.

5.5 Field Test Results

The Measurement point was to be selected covering transmitter dominant coverage area, overlap regions i.e where signal of HPHT and also LPLTs were available. Field demonstration of SFN functionality was accordingly carried out initially in Malgudi Conference Room in Prasar Bharati premises and later in details in the Kartavya Path area, New Delhi, (using combinations of HPHT and LPLT transmitters operating on 538 MHz). Measurements were performed using D2M receiver devices including Samsung + Dongle and MarkOne under both single-transmitter and multi-transmitter SFN configurations.

Location: Central Vista Parking 2, Kartavya Path New Delhi,110011
Co-Ordinates: 28.611893072633592, 77.22644295986287

A concise summary of representative results may be included as follows:

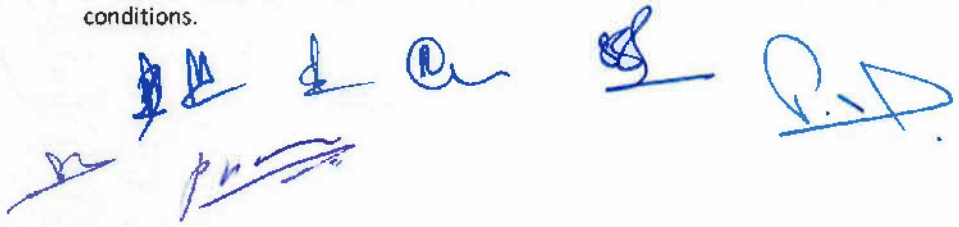
Scenario	RSSI / SNR Observation	AV Status	Observation
HPHT only	~ -78 dBm / 4 dB	AV Glitches	Weak baseline condition
HPHT + 1 LPLT	~ -63 dBm / 22 dB	Good	Significant improvement
LPLT only	~ -75 dBm / 9 dB	Good	Moderate baseline
HPHT + Additional synchronized LPLT sites	~ -49 to -58 dBm / 23–30 dB	Good	Strong SFN improvement

Table 3: SFN Test summary

Detailed measurement logs are available in the **Annexure B.**

5.6 Test Summary

The field demonstration confirmed the expected functional behaviour of SFN operation for D2M transmission. Compared with single-transmitter operation, synchronized multi-transmitter configurations showed improved SNR (Signal to Noise Ratio) and more stable AV reception, particularly in overlap region. The observed results support the conclusion that SFN operation enhances reception robustness and coverage continuity for D2M service under the tested field conditions.



6 Conclusion

Based on the successful execution and observation of the field demonstrations, it is concluded that both test scenarios met the defined objectives and acceptance criteria.

1. **Telephony Priority during Active D2M Playback:**
   The field demonstration confirmed that telephony services including IMT voice calls and IMT SMS were consistently given priority over D2M playback. Voice call prioritization & SMS prioritization functioned as expected without any degradation, validating effective IMT service priority during active D2M reception.

2. **SFN Functionality:**
   The field demonstration of Single Frequency Network (SFN) operation was successful. Constructive improvement of signal quality received from multiple transmitters was demonstrated using SFN synchronization.

Overall, both demonstrations were successfully completed, and the results confirm that the system performs as intended under real-world field conditions.

(Shri T Srinivasa Rao)
Sr. Dy. Director
Wireless Planning & Coordination (WPC) DoT

23/4/2026
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DDG (MT)
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Scientist "B"
Department of Science & Technology (DST)

23/04/2026
(Shri Ravinder Kumar Meena)
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Acronyms

Acronym	Full Form
D2M	Direct To Mobile
DUT	Device Under Test
SMS	Short Message Service
HPHT	Hight Power High Tower
LPLT	Low Power Low Tower
MO	Mobile Originating
MT	Mobile Terminating
RSSI	Received signal strength indicator
SFN	Single Frequency Network

Annexure A: Voice call and SMS Logs

VoiceLogFileName	Tech	Voice Imei	Voice Operator	Voice StartTime	Voice EndTime	Voice EndLatitude	Voice EndLongitude	MO_PhoneNumber	MT_PhoneNumber
Jio_0325121645_MS1	4G	358709983535117	Jio-Jio	12:16:46.427	12:17:11.922	28.6246415	77.2323734	919354277888	9460081664
Jio_0325121645_MS1	4G	358709983535117	Jio-Jio	12:17:35.108	12:17:57.292	28.6245688	77.2320329	919354277888	9460081664
Jio_0325121645_MS1	4G	358709983535117	Jio-Jio	12:18:19.562	12:18:42.698	28.6245507	77.2321179	919354277888	9460081664
Jio_0325121645_MS1	4G	358709983535117	Jio-Jio	12:19:05.045	12:19:17.337	28.6245507	77.2321399	919354277888	9460081664
Jio_0325121645_MS1	4G	358709983535117	Jio-Jio	12:19:46.955	12:20:07.388	28.6245326	77.2321863	919354277888	9460081664
Jio_0325121645_MS1	4G	358709983535117	Jio-Jio	12:20:29.700	12:20:47.140	28.62453256	77.23220989	919354277888	9460081664
Jio_0325121645_MS1	4G	358709983535117	Jio-Jio	12:22:07.706	12:22:29.257	28.6245326	77.2322478	919354277888	9460081664
Jio_0325121645_MS1	4G	358709983535117	Jio-Jio	12:22:52.489	12:23:13.760	28.6245124	77.2322769	919354277888	9460081664
Jio_0325121645_MS1	4G	358709983535117	Jio-Jio	12:23:36.073	12:23:57.999	28.6245124	77.2322906	919354277888	9460081664
Jio_0325121645_MS1	4G	358709983535117	Jio-Jio	12:24:20.677	12:24:22.542	28.6245124	77.2322985	919354277888	9460081664
Airtel_0325122520_MS2	2G	358709981892445	AirTel To AirTel	12:25:21.256	12:25:43.890	28.62451239	77.23232014	918448570368	9900018688
Airtel_0325122520_MS2	2G	358709981892445	AirTel To AirTel	12:26:09.977	12:26:32.724	28.6245124	77.2323409	918448570368	9900018688
Airtel_0325122520_MS2	2G	358709981892445	AirTel To AirTel	12:26:58.175	12:27:19.532	28.6245124	77.2323528	918448570368	9900018688
Airtel_0325122520_MS2	2G	358709981892445	AirTel To AirTel	12:27:43.955	12:28:12.465	28.62451239	77.23236324	918448570368	9900018688
Airtel_0325122520_MS2	2G	358709981892445	AirTel To AirTel	12:28:53.978	12:29:15.475	28.62451239	77.23236324	918448570368	9900018688
Airtel_0325122520_MS2	2G	358709981892445	AirTel To AirTel	12:29:40.872	12:30:02.080	28.62451239	77.23238536	918448570368	9900018688
Airtel_0325122520_MS2	2G	358709981892445	AirTel To AirTel	12:30:27.304	12:30:51.671	28.6245124	77.2323882	918448570368	9900018688
Airtel_0325122520_MS2	2G	358709981892445	AirTel To AirTel	12:31:17.479	12:31:40.702	28.6245124	77.2324067	918448570368	9900018688
Airtel_0325122520_MS2	2G	358709981892445	AirTel To AirTel	12:32:05.549	12:32:18.215	28.62451239	77.23240667	918448570368	9900018688
Airtel_0325122520_MS2	2G	358709981892445	AirTel To AirTel	12:32:53.859	12:33:00.776	28.6245124	77.2324273	918448570368	9900018688
Airtel_0325124117_MS2	5G	358709981892445	AirTel To AirTel	12:41:18.572	12:41:34.641	28.62459836	77.23242296	918448570368	9971398656
Airtel_0325124117_MS2	5G	358709981892445	AirTel To AirTel	12:41:46.974	12:42:11.388	28.62459836	77.23242296	918448570368	9971398656
Airtel_0325124117_MS2	5G	358709981892445	AirTel To AirTel	12:42:23.606	12:42:39.745	28.62459836	77.23242296	918448570368	9971398656
Airtel_0325124117_MS2	5G	358709981892445	AirTel To AirTel	12:43:34.305	12:43:49.235	28.62459836	77.23244433	918448570368	9971398656
Airtel_0325124117_MS2	5G	358709981892445	AirTel To AirTel	12:44:01.347	12:44:16.159	28.62459836	77.23244433	918448570368	9971398656
Airtel_0325124117_MS2	5G	358709981892445	AirTel To AirTel	12:44:28.652	12:44:43.695	28.62459836	77.23244433	918448570368	9971398656
Airtel_0325124117_MS2	5G	358709981892445	AirTel To AirTel	12:44:56.184	12:45:10.614	28.6245984	77.2324443	918448570368	9971398656
Airtel_0325124117_MS2	5G	358709981892445	AirTel To AirTel	12:45:23.034	12:45:37.901	28.62459836	77.23244433	918448570368	9971398656
Airtel_0325124117_MS2	5G	358709981892445	AirTel To AirTel	12:45:50.216	12:46:05.224	28.62459836	77.23244433	918448570368	9971398656
Airtel_0325124117_MS2	5G	358709981892445	AirTel To AirTel	12:46:17.723	12:46:32.209	28.62459836	77.23244433	918448570368	9971398656
Jio_0325125642_MS1	5G	358709983535117	Jio-Jio	12:56:43.385	12:57:03.227	28.6248562	77.2325855	919354277888	9460081664
Jio_0325125642_MS1	5G	358709983535117	Jio-Jio	12:57:25.842	12:57:42.878	28.6245339	77.2325605	919354277888	9460081664
Jio_0325125642_MS1	5G	358709983535117	Jio-Jio	12:58:06.526	12:58:26.416	28.6247178	77.2329468	919354277888	9460081664
Jio_0325125642_MS1	5G	358709983535117	Jio-Jio	12:58:49.545	12:59:09.801	28.6248792	77.2326847	919354277888	9460081664
Jio_0325125642_MS1	5G	358709983535117	Jio-Jio	12:59:32.102	12:59:48.557	28.6248497	77.2323772	919354277888	9460081664
Jio_0325125642_MS1	5G	358709983535117	Jio-Jio	13:00:25.856	13:00:45.466	28.6247314	77.2324776	919354277888	9460081664
Jio_0325125642_MS1	5G	358709983535117	Jio-Jio	13:01:07.314	13:01:28.445	28.6247333	77.2324772	919354277888	9460081664
Jio_0325125642_MS1	5G	358709983535117	Jio-Jio	13:01:51.111	13:02:11.198	28.62474946	77.2324739	919354277888	9460081664
Jio_0325125642_MS1	5G	358709983535117	Jio-Jio	13:02:33.805	13:03:00.975	28.62474946	77.2324739	919354277888	9460081664
Jio_0325125642_MS1	5G	358709983535117	Jio-Jio	13:03:23.508	13:03:45.429	28.62474946	77.2324739	919354277888	9460081664

Time	Date	Latitude	Longitude	Operator	Tech	IMEI	SMS MO Number	SMS MT Number	SMS Send Start	SMS Send End	SMS Sent
12:17:22.522	3/25/2026	28.6246415	77.2322180	JIO	4G	358709983535117	919354255520	9460081702	SMS Send Start		
12:17:23.167	3/25/2026	28.6246415	77.2322225	JIO	4G	358709983535117	919354255520	9460081702			SMS Sent
12:17:24.458	3/25/2026	28.6246390	77.2322228	JIO	4G	358709983535117	919354255520	9460081702		SMS Send End	
12:18:07.685	3/25/2026	28.6245689	77.2320589	JIO	4G	358709983535117	919354255520	9460081702	SMS Send Start		
12:18:08.094	3/25/2026	28.6245689	77.2320599	JIO	4G	358709983535117	919354255520	9460081702			SMS Sent
12:18:53.373	3/25/2026	28.6245507	77.2321360	JIO	4G	358709983535117	919354255520	9460081702	SMS Send Start		
12:18:53.852	3/25/2026	28.6245507	77.2321365	JIO	4G	358709983535117	919354255520	9460081702			SMS Sent
12:18:54.376	3/25/2026	28.6245507	77.2321371	JIO	4G	358709983535117	919354255520	9460081702		SMS Send End	
12:19:34.361	3/25/2026	28.6245507	77.2321688	JIO	4G	358709983535117	919354255520	9460081702	SMS Send Start		
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12:19:36.320	3/25/2026	28.6245507	77.2321717	JIO	4G	358709983535117	919354255520	9460081702		SMS Send End	
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12:20:18.406	3/25/2026	28.6245326	77.2322100	JIO	4G	358709983535117	919354255520	9460081702			SMS Sent
12:20:19.023	3/25/2026	28.6245326	77.2322101	JIO	4G	358709983535117	919354255520	9460081702		SMS Send End	
12:20:59.553	3/25/2026	28.6245326	77.2322206	JIO	4G	358709983535117	919354255520	9460081702	SMS Send Start		
12:21:00.395	3/25/2026	28.6245326	77.2322209	JIO	4G	358709983535117	919354255520	9460081702			SMS Sent
12:21:00.780	3/25/2026	28.6245326	77.2322210	JIO	4G	358709983535117	919354255520	9460081702		SMS Send End	
12:21:55.504	3/25/2026	28.6245326	77.2322362	JIO	4G	358709983535117	919354255520	9460081702	SMS Send Start		
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12:21:57.103	3/25/2026	28.6245326	77.2322369	JIO	4G	358709983535117	919354255520	9460081702		SMS Send End	
12:22:39.610	3/25/2026	28.6245326	77.2322541	JIO	4G	358709983535117	919354255520	9460081702	SMS Send Start		
12:22:40.449	3/25/2026	28.6245326	77.2322544	JIO	4G	358709983535117	919354255520	9460081702			SMS Sent
12:22:41.923	3/25/2026	28.6245326	77.2322550	JIO	4G	358709983535117	919354255520	9460081702		SMS Send End	
12:23:24.156	3/25/2026	28.6245124	77.2322819	JIO	4G	358709983535117	919354255520	9460081702	SMS Send Start		
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12:23:25.427	3/25/2026	28.6245124	77.2322823	JIO	4G	358709983535117	919354255520	9460081702		SMS Send End	
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12:24:10.231	3/25/2026	28.6245124	77.2322961	JIO	4G	358709983535117	919354255520	9460081702		SMS Send End	
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12:25:54.426	3/25/2026	28.6245124	77.2323201	AirTel	2G	358709981892445	918448580200	9900018688	SMS Send Start		
12:25:55.068	3/25/2026	28.6245124	77.2323201	AirTel	2G	358709981892445	918448580200	9900018688			SMS Sent
12:25:59.397	3/25/2026	28.6245124	77.2323201	AirTel	2G	358709981892445	918448580200	9900018688		SMS Send End	
12:26:43.443	3/25/2026	28.6245124	77.2323459	AirTel	2G	358709981892445	918448580200	9900018688	SMS Send Start		
12:26:44.201	3/25/2026	28.6245124	77.2323461	AirTel	2G	358709981892445	918448580200	9900018688			SMS Sent
12:26:47.636	3/25/2026	28.6245124	77.2323473	AirTel	2G	358709981892445	918448580200	9900018688		SMS Send End	
12:27:29.687	3/25/2026	28.6245124	77.2323617	AirTel	2G	358709981892445	918448580200	9900018688	SMS Send Start		
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12:27:33.370	3/25/2026	28.6245124	77.2323630	AirTel	2G	358709981892445	918448580200	9900018688		SMS Send End	
12:28:38.543	3/25/2026	28.6245124	77.2323632	AirTel	2G	358709981892445	918448580200	9900018688	SMS Send Start		
12:28:39.234	3/25/2026	28.6245124	77.2323632	AirTel	2G	358709981892445	918448580200	9900018688			SMS Sent
12:28:43.112	3/25/2026	28.6245124	77.2323632	AirTel	2G	358709981892445	918448580200	9900018688		SMS Send End	

Time	Date	Latitude	Longitude	Operator	Tech	IMEI	SMS MO Number	SMS MT Number	SMS Send Start	SMS Send End	SMS Sent
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12:29:26.594	3/25/2026	28.6245124	77.2323868	AirTel	2G	358709981892445	918448580200	9900018688			SMS Sent
12:29:30.062	3/25/2026	28.6245124	77.2323875	AirTel	2G	358709981892445	918448580200	9900018688		SMS Send End	
12:30:12.343	3/25/2026	28.6245124	77.2323957	AirTel	2G	358709981892445	918448580200	9900018688	SMS Send Start		
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12:30:16.729	3/25/2026	28.6245124	77.2323965	AirTel	2G	358709981892445	918448580200	9900018688		SMS Send End	
12:31:02.281	3/25/2026	28.6245124	77.2324054	AirTel	2G	358709981892445	918448580200	9900018688	SMS Send Start		
12:31:03.062	3/25/2026	28.6245124	77.2324055	AirTel	2G	358709981892445	918448580200	9900018688			SMS Sent
12:31:06.630	3/25/2026	28.6245124	77.2324062	AirTel	2G	358709981892445	918448580200	9900018688		SMS Send End	
12:31:51.130	3/25/2026	28.6245124	77.2324149	AirTel	2G	358709981892445	918448580200	9900018688	SMS Send Start		
12:31:51.902	3/25/2026	28.6245124	77.2324150	AirTel	2G	358709981892445	918448580200	9900018688			SMS Sent
12:31:54.942	3/25/2026	28.6245124	77.2324156	AirTel	2G	358709981892445	918448580200	9900018688		SMS Send End	
12:32:38.438	3/25/2026	28.6245124	77.2324241	AirTel	2G	358709981892445	918448580200	9900018688	SMS Send Start		
12:32:39.494	3/25/2026	28.6245124	77.2324243	AirTel	2G	358709981892445	918448580200	9900018688			SMS Sent
12:32:39.496	3/25/2026	28.6245124	77.2324243	AirTel	2G	358709981892445	918448580200	9900018688			SMS Sent
12:32:43.069	3/25/2026	28.6245124	77.2324250	AirTel	2G	358709981892445	918448580200	9900018688	SMS Send End		
12:41:15.000	3/25/2026	28.6245984	77.2324443	AirTel	5G	358709981892445	918448580200	9971398656			
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12:41:41.359	3/25/2026	28.6245984	77.2324230	AirTel	5G	358709981892445	918448580200	9971398656		SMS Send End	
12:42:16.683	3/25/2026	28.6245984	77.2324230	AirTel	5G	358709981892445	918448580200	9971398656	SMS Send Start		
12:42:17.285	3/25/2026	28.6245984	77.2324230	AirTel	5G	358709981892445	918448580200	9971398656			SMS Sent
12:42:18.150	3/25/2026	28.6245984	77.2324230	AirTel	5G	358709981892445	918448580200	9971398656		SMS Send End	
12:42:45.198	3/25/2026	28.6245984	77.2324443	AirTel	5G	358709981892445	918448580200	9971398656	SMS Send Start		
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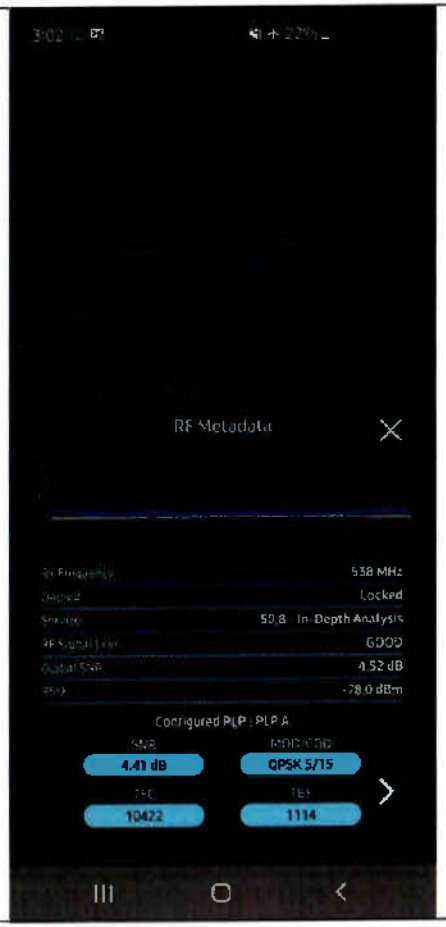
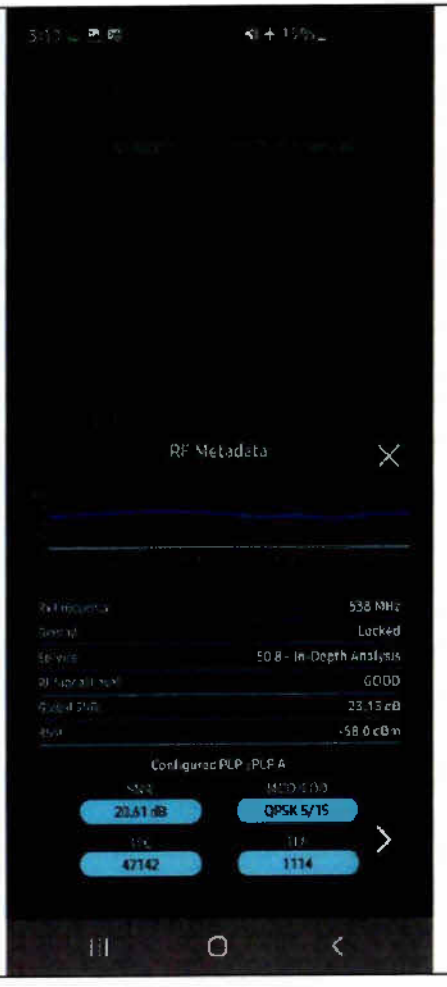
12:43:26.910	3/25/2026	28.6245984	77.2324443	AirTel	5G	358709981892445	918448580200	9971398656	SMS Send Start		
12:43:27.729	3/25/2026	28.6245984	77.2324443	AirTel	5G	358709981892445	918448580200	9971398656			SMS Sent
12:43:28.649	3/25/2026	28.6245984	77.2324443	AirTel	5G	358709981892445	918448580200	9971398656		SMS Send End	
12:43:54.431	3/25/2026	28.6245984	77.2324443	AirTel	5G	358709981892445	918448580200	9971398656	SMS Send Start		
12:43:55.188	3/25/2026	28.6245984	77.2324443	AirTel	5G	358709981892445	918448580200	9971398656			SMS Sent
12:43:55.832	3/25/2026	28.6245984	77.2324443	AirTel	5G	358709981892445	918448580200	9971398656		SMS Send End	
12:44:21.453	3/25/2026	28.6245984	77.2324443	AirTel	5G	358709981892445	918448580200	9971398656	SMS Send Start		
12:44:22.105	3/25/2026	28.6245984	77.2324443	AirTel	5G	358709981892445	918448580200	9971398656			SMS Sent
12:44:23.039	3/25/2026	28.6245984	77.2324443	AirTel	5G	358709981892445	918448580200	9971398656		SMS Send End	
12:44:48.948	3/25/2026	28.6245984	77.2324443	AirTel	5G	358709981892445	918448580200	9971398656	SMS Send Start		
12:44:49.621	3/25/2026	28.6245984	77.2324443	AirTel	5G	358709981892445	918448580200	9971398656			SMS Sent
12:44:50.596	3/25/2026	28.6245984	77.2324443	AirTel	5G	358709981892445	918448580200	9971398656		SMS Send End	
12:45:15.924	3/25/2026	28.6245984	77.2324443	AirTel	5G	358709981892445	918448580200	9971398656	SMS Send Start		
12:45:16.868	3/25/2026	28.6245984	77.2324443	AirTel	5G	358709981892445	918448580200	9971398656			SMS Sent
12:45:17.479	3/25/2026	28.6245984	77.2324443	AirTel	5G	358709981892445	918448580200	9971398656		SMS Send End	
12:45:43.246	3/25/2026	28.6245984	77.2324443	AirTel	5G	358709981892445	918448580200	9971398656	SMS Send Start		
12:45:44.045	3/25/2026	28.6245984	77.2324443	AirTel	5G	358709981892445	918448580200	9971398656			SMS Sent
12:45:44.669	3/25/2026	28.6245984	77.2324443	AirTel	5G	358709981892445	918448580200	9971398656		SMS Send End	

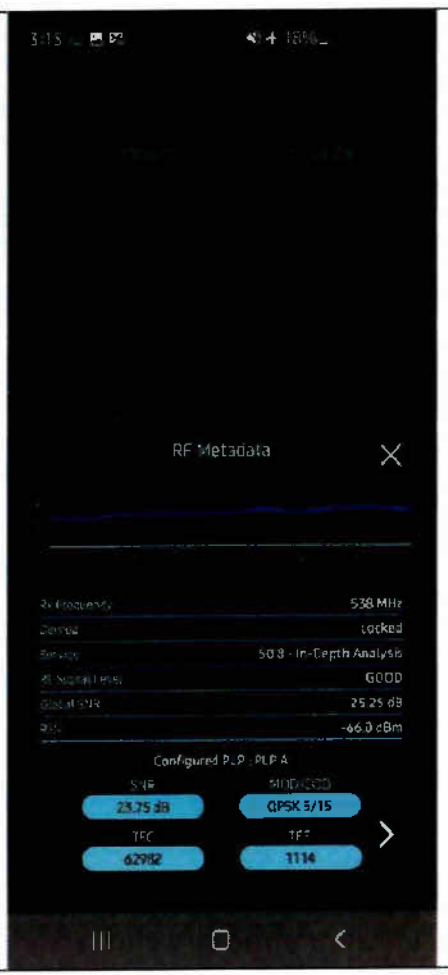
Time	Date	Latitude	Longitude	Operator	Tech	IMEI	SMS MO Number	SMS MT Number	SMS Send Start	SMS Send End	SMS Sent
12:46:10.477	3/25/2026	28.6245984	77.2324443	AirTel	5G	358709981892445	918448580200	9971398656	SMS Send Start		
12:46:11.222	3/25/2026	28.6245984	77.2324443	AirTel	5G	358709981892445	918448580200	9971398656			SMS Sent
12:46:12.180	3/25/2026	28.6245984	77.2324443	AirTel	5G	358709981892445	918448580200	9971398656		SMS Send End	
12:46:37.704	3/25/2026	28.6245984	77.2324443	AirTel	5G	358709981892445	918448580200	9971398656	SMS Send Start		
12:46:38.405	3/25/2026	28.6245984	77.2324443	AirTel	5G	358709981892445	918448580200	9971398656			SMS Sent
12:46:39.384	3/25/2026	28.6245984	77.2324443	AirTel	5G	358709981892445	918448580200	9971398656		SMS Send End	
12:57:13.929	3/25/2026	28.6247121	77.2325202	Jio	5G	358709983535117	919354255520	9460081702	SMS Send Start		
12:57:14.405	3/25/2026	28.6247193	77.2325113	Jio	5G	358709983535117	919354255520	9460081702			SMS Sent
12:57:15.189	3/25/2026	28.6247288	77.2324977	Jio	5G	358709983535117	919354255520	9460081702		SMS Send End	
12:57:54.657	3/25/2026	28.6246120	77.2326117	Jio	5G	358709983535117	919354255520	9460081702	SMS Send Start		
12:57:55.306	3/25/2026	28.6246159	77.2326179	Jio	5G	358709983535117	919354255520	9460081702			SMS Sent
12:57:55.825	3/25/2026	28.6246159	77.2326260	Jio	5G	358709983535117	919354255520	9460081702		SMS Send End	
12:58:37.139	3/25/2026	28.6248069	77.2327606	Jio	5G	358709983535117	919354255520	9460081702	SMS Send Start		
12:58:37.692	3/25/2026	28.6248069	77.2327653	Jio	5G	358709983535117	919354255520	9460081702			SMS Sent
12:58:38.887	3/25/2026	28.6248011	77.2327715	Jio	5G	358709983535117	919354255520	9460081702		SMS Send End	
12:59:20.383	3/25/2026	28.6248830	77.2327918	Jio	5G	358709983535117	919354255520	9460081702	SMS Send Start		
12:59:20.909	3/25/2026	28.6248760	77.2327975	Jio	5G	358709983535117	919354255520	9460081702			SMS Sent
12:59:21.414	3/25/2026	28.6248648	77.2328127	Jio	5G	358709983535117	919354255520	9460081702		SMS Send End	
13:00:13.832	3/25/2026	28.6247314	77.2324867	Jio	5G	358709983535117	919354255520	9460081702	SMS Send Start		
13:00:14.810	3/25/2026	28.6247314	77.2324882	Jio	5G	358709983535117	919354255520	9460081702			SMS Sent
13:00:15.209	3/25/2026	28.6247314	77.2324887	Jio	5G	358709983535117	919354255520	9460081702		SMS Send End	
13:00:55.670	3/25/2026	28.6247349	77.2324769	Jio	5G	358709983535117	919354255520	9460081702	SMS Send Start		
13:00:56.235	3/25/2026	28.6247351	77.2324769	Jio	5G	358709983535117	919354255520	9460081702			SMS Sent
13:00:56.726	3/25/2026	28.6247352	77.2324768	Jio	5G	358709983535117	919354255520	9460081702		SMS Send End	
13:01:38.938	3/25/2026	28.6247491	77.2324740	Jio	5G	358709983535117	919354255520	9460081702	SMS Send Start		
13:01:39.458	3/25/2026	28.6247493	77.2324739	Jio	5G	358709983535117	919354255520	9460081702			SMS Sent
13:01:40.455	3/25/2026	28.6247495	77.2324739	Jio	5G	358709983535117	919354255520	9460081702		SMS Send End	
13:02:21.720	3/25/2026	28.6247495	77.2324739	Jio	5G	358709983535117	919354255520	9460081702	SMS Send Start		
13:02:22.489	3/25/2026	28.6247495	77.2324739	Jio	5G	358709983535117	919354255520	9460081702			SMS Sent
13:02:23.347	3/25/2026	28.6247495	77.2324739	Jio	5G	358709983535117	919354255520	9460081702		SMS Send End	
13:03:11.602	3/25/2026	28.6247495	77.2324739	Jio	5G	358709983535117	919354255520	9460081702	SMS Send Start		
13:03:12.251	3/25/2026	28.6247495	77.2324739	Jio	5G	358709983535117	919354255520	9460081702			SMS Sent
13:03:12.791	3/25/2026	28.6247495	77.2324739	Jio	5G	358709983535117	919354255520	9460081702		SMS Send End	
13:03:55.972	3/25/2026	28.6247495	77.2324739	Jio	5G	358709983535117	919354255520	9460081702	SMS Send Start		
13:03:56.713	3/25/2026	28.6247495	77.2324739	Jio	5G	358709983535117	919354255520	9460081702			SMS Sent
13:03:57.110	3/25/2026	28.6247495	77.2324739	Jio	5G	358709983535117	919354255520	9460081702		SMS Send End	

Annexure B: SFN Test Logs

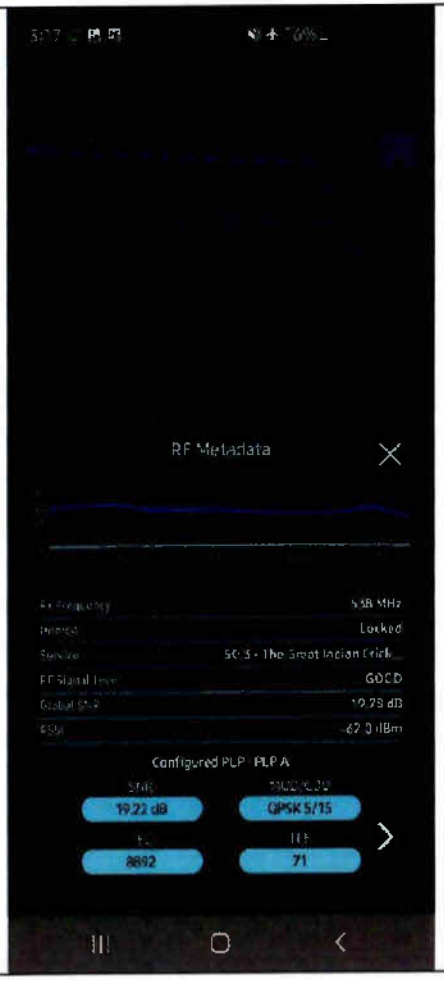
HPHT + LPLT SFN Demo Test Report (Samsung with D2M Dongle)								
Sl No	SFN TX combinations				RSSI (dBm)	SNR (dB)	Screenshot	AV Status
	HPHT	LPLT1 (Shangri-la)	LPLT2 (UPSC)	LPLT3 (KJ 1)				
1	ON				-78	4		AV Glitches

HPHT + LPLT SFN Demo Test Report (Samsung with D2M Dongle)								
Sl No	SFN TX combinations				RSSI (dBm)	SNR (dB)	Screenshot	AV Status
	HPHT	LPLT1 (Shangri-la)	LPLT2 (UPSC)	LPLT3 (KJ 1)				
2	ON	ON			-63	22		Good

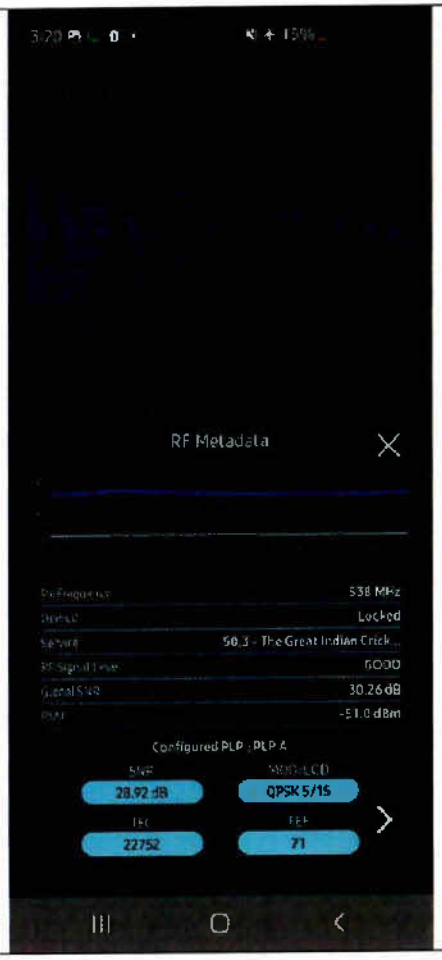
HPHT + LPLT SFN Demo Test Report (Samsung with D2M Dongle)								
Sl No	SFN TX combinations				RSSI (dBm)	SNR (dB)	Screenshot	AV Status
	HPHT	LPLT1 (Shangri-la)	LPLT2 (UPSC)	LPLT3 (KJ 1)				
3	ON	ON	ON		-58	23		Good

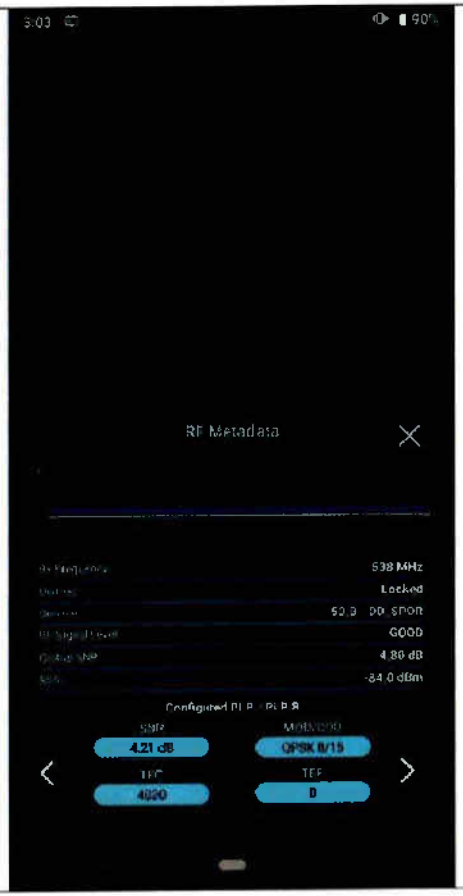
HPHT + LPLT SFN Demo Test Report (Samsung with D2M Dongle)								
Sl No	SFN TX combinations				RSSI (dBm)	SNR (dB)	Screenshot	AV Status
	HPHT	LPLT1 (Shangri-la)	LPLT2 (UPSC)	LPLT3 (KJ 1)				
4	ON		ON		-66	25		Good

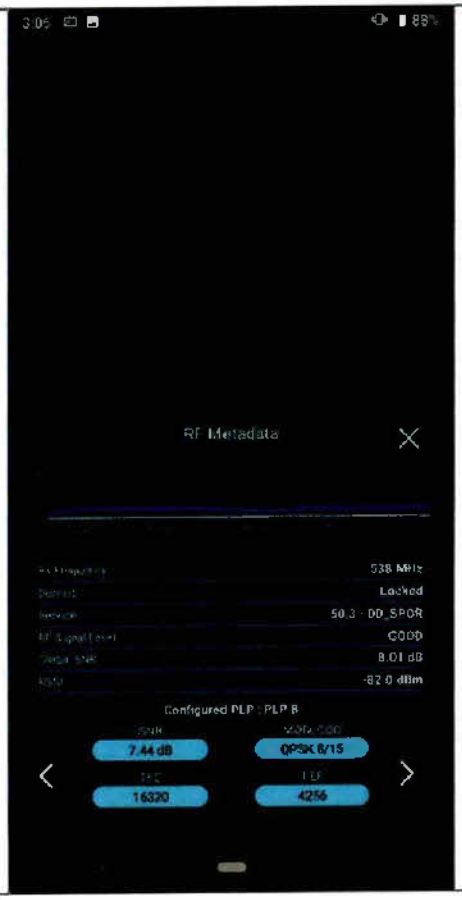
HPHT + LPLT SFN Demo Test Report (Samsung with D2M Dongle)								
Sl No	SFN TX combinations				RSSI (dBm)	SNR (dB)	Screenshot	AV Status
	HPHT	LPLT1 (Shangri-la)	LPLT2 (UPSC)	LPLT3 (KJ 1)				
5		ON			-75	9		Good

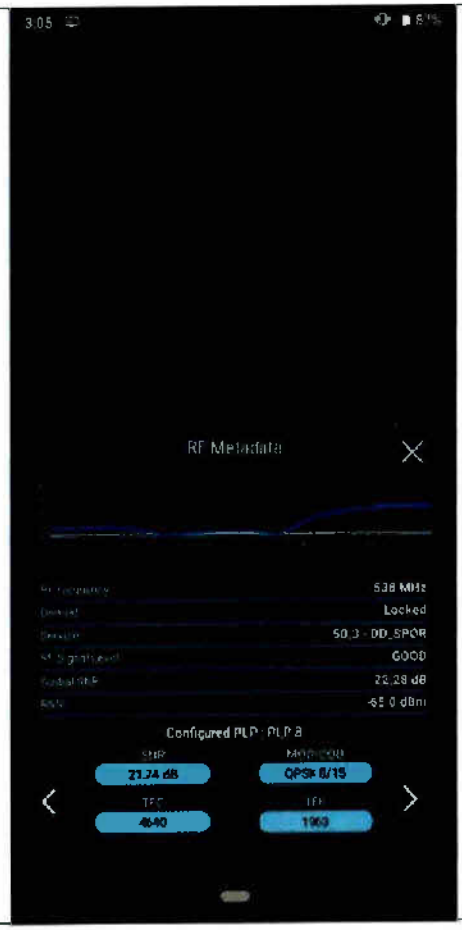
HPHT + LPLT SFN Demo Test Report (Samsung with D2M Dongle)								
Sl No	SFN TX combinations				RSSI (dBm)	SNR (dB)	Screenshot	AV Status
	HPHT	LPLT1 (Shangri-la)	LPLT2 (UPSC)	LPLT3 (KJ 1)				
6		ON	ON		-62	19		Good

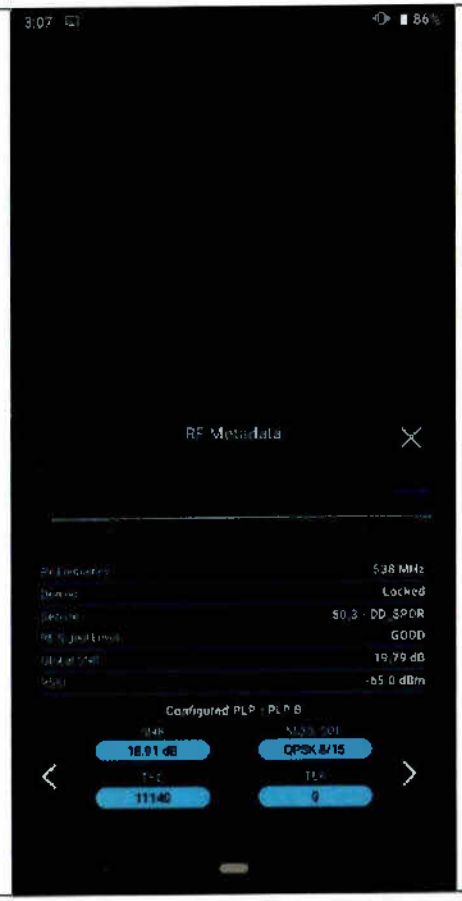
HPHT + LPLT SFN Demo Test Report (Samsung with D2M Dongle)								
Sl No	SFN TX combinations				RSSI (dBm)	SNR (dB)	Screenshot	AV Status
	HPHT	LPLT1 (Shangri-la)	LPLT2 (UPSC)	LPLT3 (KU 1)				
7		ON	ON	ON	-49	28		Good

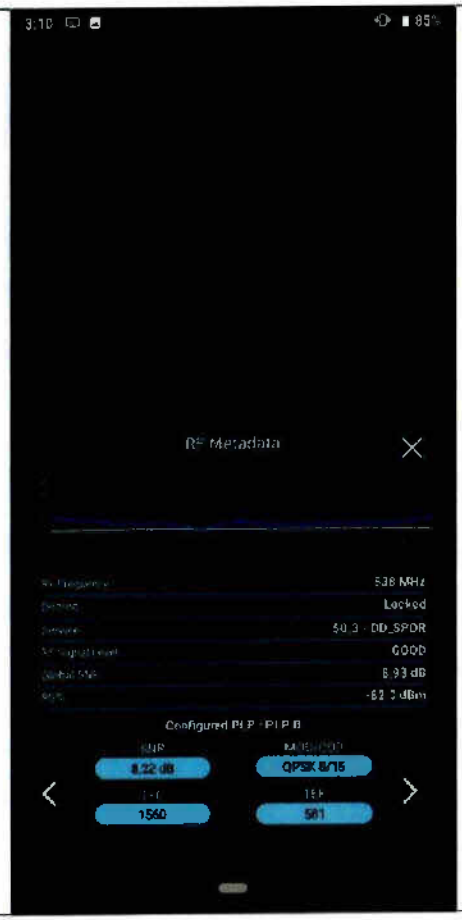
HPHT + LPLT SFN Demo Test Report (Samsung with D2M Dongle)								
Sl No	SFN TX combinations				RSSI (dBm)	SNR (dB)	Screenshot	AV Status
	HPHT	LPLT1 (Shangri-la)	LPLT2 (UPSC)	LPLT3 (KJ 1)				
8	ON	ON	ON	ON	-51	30		Good

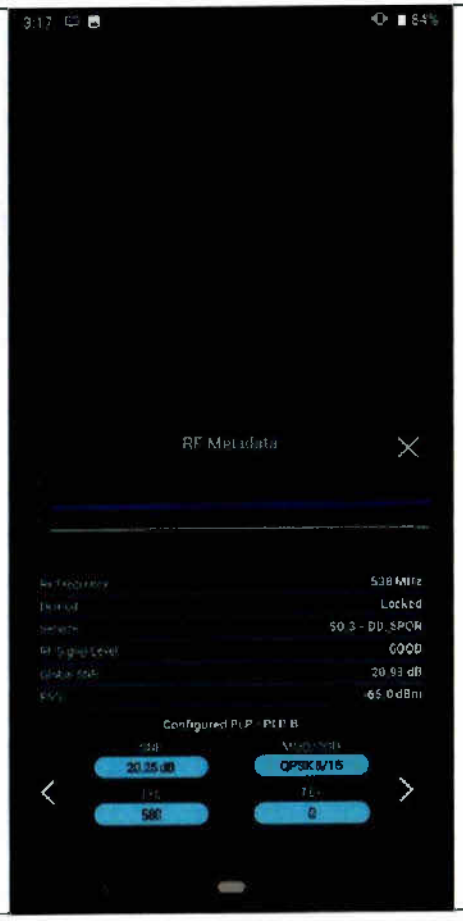
HPHT + LPLT SFN Demo Test Report (MarkOne D2M Mobile)								
Sl No	SFN TX combinations				RSSI (dBm)	SNR (dB)	Screenshot	AV Status
	HPHT	LPLT1 (Shangri-la)	LPLT2 (UPSC)	LPLT3 (KJ 1)				
1	ON				-84	4		AV Glitches

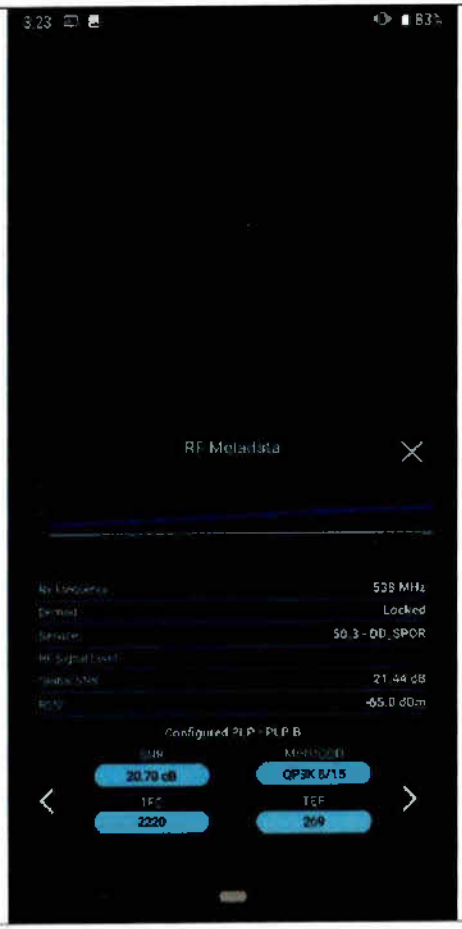
HPHT + LPLT SFN Demo Test Report (MarkOne D2M Mobile)								
Sl No	SFN TX combinations				RSSI (dBm)	SNR (dB)	Screenshot	AV Status
	HPHT	LPLT1 (Shangri-la)	LPLT2 (UPSC)	LPLT3 (KJ 1)				
2	ON	ON			-82	8		Good

HPHT + LPLT SFN Demo Test Report (MarkOne D2M Mobile)								
Sl No	SFN TX combinations				RSSI (dBm)	SNR (dB)	Screenshot	AV Status
	HPHT	LPLT1 (Shangri-la)	LPLT2 (UPSC)	LPLT3 (KJ 1)				
3	ON	ON	ON		-65	22		Good

HPHT + LPLT SFN Demo Test Report (MarkOne D2M Mobile)								
Sl No	SFN TX combinations				RSSI (dBm)	SNR (dB)	Screenshot	AV Status
	HPHT	LPLT1 (Shangri-la)	LPLT2 (UPSC)	LPLT3 (KJ 1)				
4	ON		ON		-65	19		Good

HPHT + LPLT SFN Demo Test Report (MarkOne D2M Mobile)								
Sl No	SFN TX combinations				RSSI (dBm)	SNR (dB)	Screenshot	AV Status
	HPHT	LPLT1 (Shangri-la)	LPLT2 (UPSC)	LPLT3 (KJ 1)				
5		ON			-82	8.9		Good

HPHT + LPLT SFN Demo Test Report (MarkOne D2M Mobile)								
Sl No	SFN TX combinations				RSSI (dBm)	SNR (dB)	Screenshot	AV Status
	HPHT	LPLT1 (Shangri-la)	LPLT2 (UPSC)	LPLT3 (KJ 1)				
6		ON	ON		-65	20.9		Good

HPHT + LPLT SFN Demo Test Report (MarkOne D2M Mobile)								
Sl No	SFN TX combinations				RSSI (dBm)	SNR (dB)	Screenshot	AV Status
	HPHT	LPLT1 (Shangri-la)	LPLT2 (UPSC)	LPLT3 (KJ 1)				
7		ON	ON	ON	-65	21		Good

HPHT + LPLT SFN Demo Test Report (MarkOne D2M Mobile)								
Sl No	SFN TX combinations				RSSI (dBm)	SNR (dB)	Screenshot	AV Status
	HPHT	LPLT1 (Shangri-la)	LPLT2 (UPSC)	LPLT3 (KJ 1)				
8	ON	ON	ON	ON	-65	22		Good

----------END OF THE REPORT----------