

Government of India
Ministry of Communications
Department of Telecommunications
(Access Services Wing)

Sanchar Bhawan, 20, Ashoka road, New Delhi-110001

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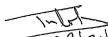
Date: 28.04.2023

OFFICE MEMORANDUM

Subject: Test Schedule & Test Procedure (TSTP) for Roll out Obligation testing for LTE / LTE-A / 5G (TDD/ FDD) in 600MHz to 2500 MHz Frequency Bands.

Kindly find enclosed herewith the TSTP for Roll out Obligation testing for LTE /LTE-A /5G (TDD/ FDD) in 600MHz to 2500 MHz Frequency Bands.

2. This shall supersede Test Schedule for Roll Out Obligations of Spectrum in 2100 MHz, 1800 MHz, 900 MHz and 800 MHz bands using LTE-FDD Radio Access Technology dated 28-04-2016, and the Test Schedule Test Procedure (TSTP) for roll out obligation for BWA Spectrum using LTE-TDD technology under ISP/UASL/CMTSL/UL(AS)/Unified License dated 17-03-2015.
3. Access Service Providers may complete their pending rollout obligation from existing TSTPs i.e. LTE-TDD and LTE-FDD till 30.06.2023. Thereafter, only this TSTP shall be applicable for demonstration of rollout obligation by LTE /LTE-A /5G (TDD/ FDD) technologies in 600MHz to 2500 MHz Frequency Bands.
4. The carrier aggregation between existing bands and technologies for the demonstration of throughput and signal levels for rollout obligation is allowed.
5. This is issued with the approval of competent authority.


28/04/2023

(Trilok Chandra)
Director (AS-IV)

Tele No. 011-23372063

To

1. All Access Service Providers
2. DG(T), DoT

Copy to:

1. Director (IT) for uploading on the DoT website

Test Schedule & Test Procedure for Roll out Obligation testing

For LTE/ LTE-A/ 5G (TDD/ FDD)

(600MHz to 2500 MHz Frequency Bands)

Sub-Section-A

Pre-requisite checks for Spectrum Coverage

- 1 Name of Licensee (Authorized to use the spectrum block):
- 2 Name of License under which services are being provided:
- 3 Name of License Service Area:
- 4 Assigned frequency spots:
- 5 Type of Base Station: eNodeB/ gNodeB

Table: Site Verification Test Details

Base Station	Site Location / Cell IDs	Lat/ Long	Tower Height AGL ¹	Tower Height AMSL ¹	Frequency	Power ²	Status of certificate regarding infrastructure Sharing (As per applicable license and amendments)	Status of certificate regarding Intra-Service Area Roaming (as per applicable license and amendments)	Complied/ Not Complied
Details As per SACFA Approval							Given/ Not Given	Given/ Not Given	
Details as per Inspection									
Final observation							PASS/FAIL		

Signature
Name & Designation
Office Stamp

Note:

1. The Licensee shall submit the latitude and longitude values up to 'Seconds so as to have an accuracy better than 5 decimal places. Deviation allowed in geo-coordinates, height of Tower of AGL (Above Ground Level) & AMSL (Above Mean Sea Level) as per latest WPC/DoT instructions. Verification of Lat/Long shall be carried on basis of Centralized management of Lat/Long data received from GPS receiver installed at each eNodeB/ gNodeB site. Physical verification of sites by LSA Units regarding Address, AGL and AMSL shall be carried out on sample basis. Sample test of all sites offered including sites within 7 kms from Airport Reference Point (ARP): 5% maximum and two sites minimum. If minimum two sites are not available, then verification of one site shall be done. In case of exceptional circumstances, more number of sites may be verified by the LSA, if the need justifies.
2. Power shall be measured for all sites from OMC/ EMS through MML commands.
3. Coverage is to be tested from eNodeB/ gNodeB sites exclusively belonging to Licensee offering roll out obligation testing. In this regard, undertaking from Licensee for compliance of license condition of infrastructure sharing and non-usage of intra service area roaming for roll out obligation is taken or latest instructions from DoT for testing shall be applicable.

Sub-Section-B

1 Pre-requisite:

1.1 Map of Area Under Test (AUT)¹: The TSP shall submit:

- 1.1.1 A map² showing the municipal/ local body limits, all major and minor roads, commercial area(s), uninhabited land (if any), duly authenticated by the concerned authority. Important landmarks, roads, rail network, railway stations, bus stand and other important establishments etc. may be marked on such map.
- 1.1.2 For measuring the street level coverage, it may be necessary to mark specific points where streets are touching or crossing the boundaries of municipal/ local body limits, commercial areas, uninhabited land, etc. Accordingly, such points may be marked on the map.
- 1.1.3 The positional details of the Base Stations shall be superimposed on this map.

1.2 Necessary tools: The TSP shall provide Drive Test Tool³, Test Mobiles, Post Processing Tool, and suitable arrangement to measure Reference Signal Received Power (RSRP) and to check throughput (download speed).

2 Route Selection:

2.1 With the help of the map of AUT submitted by the TSP, the LSA Unit shall survey the offered AUT to identify the drive test routes covering places like Railway Station(s), Main Hospital(s), Bus Stand(s), Shopping Centre(s), Stadium(s), College(s), Cinema Hall(s), Exhibition Ground(s), Airport(s), VIP area(s), Important Govt. office(s)/Court(s), Congested residential/commercial area(s) etc.

2.2 For the purpose of conducting test, the area shall be classified either as Metro/ Big municipal/ local body (of Rural SDCA) or as Other municipal/ local body (of Rural SDCA) on the basis of area of municipal/ Local body limits as below:

- 2.2.1 Metro/Big Municipal/ local body (of Rural SDCA) i.e. Big AUT: Having area equal to or more than 200 square km.
- 2.2.2 Other Municipal/ local body (of Rural SDCA) i.e. other AUT: Having area less than 200 Square Km.

¹ Area Under Test (AUT) refers to basic administrative unit/ specifically defined unit mentioned in the section for rollout obligation in the concerned Notice Inviting Application (NIA) and to be offered for purpose of conduction & evaluation of street level coverage regarding roll out obligation requirements as per specific NIA/ License. For example, it may denote the area bounded by the local body limits of either "Metro Service Area/ BHQ/ BHQ/ town or "Rural SDCA" depending upon NIA and License.

² The map should be authenticated to the scale, from the respective State Government/Administration/ local body. Boundary of AUT as per map/ definition by State Government/ Administration/ Local body shall be provided.

³ In case, drive test tool is used during testing, it shall be capable of selecting various modes viz. "LTE-TDD"/ "LTE-FDD"/ "LTE-A-TDD"/ "LTE-A-FDD"/ "5G-TDD"/ "5G-FDD", as the case may be, and specific Spectrum Band, which is offered by the applicant for the coverage test using the assigned spectrum.

2.3 For Big AUT:

- 2.3.1 Area of municipal/ local body shall be divided into Grid Size of 2Km X 2Km for self-testing to be conducted by TSPs. Grid Size for verification test by LSA Unit shall be 4Km X 4Km.
- 2.3.2 These grid cells shall be used to assist in selection of static test locations for conduction of street level coverage tests/measurements.
- 2.3.3 The test locations shall be decided by TSP for self-test and shall be selected by LSA Unit in consultation with TSP for verification test. The test locations shall try to include a fair mix of open area, periphery of the service area, important public places etc. mentioned in Para 2.1 above
- 2.3.4 **For self-test of RSRP by TSPs:** Number of test locations where measurements for signal strength in terms of Reference Signal Received Power (RSRP) are to be carried out in stationary mode shall be 10 per grid cell for Big municipal/ local body (of Rural SDCA) for self-test by TSPs. Test locations shall be uniformly spaced around at 200 meters as far as possible.
- 2.3.5 **For self-test of file download by TSPs:** Similarly, number of locations, where file download tests are to be carried out in stationary mode shall be 4 per grid cell for Big municipal/ local body (of Rural SDCA) for self-test by TSPs. Download tests may be done on same locations where RSRP measurements have been done as far as possible.
- 2.3.6 **For verification test of RSRP by LSA Units:** Number of locations, where measurements for signal strength in terms of RSRP are to be carried out in stationary mode shall be 10 per grid cell for Big municipal/ local body (of Rural SDCA) for verification test by LSA Units.
- 2.3.7 **For verification test of file download by LSA Units:** Similarly, number of locations, where file download tests are to be carried out in stationary mode shall be 4 per grid cell for Big municipal/ local body (of Rural SDCA) for verification test by LSA Units. Download tests shall be done on same locations where RSRP measurements have been done as far as practicable.
- 2.3.8 File download test for verification test by LSA Unit shall be carried out for minimum 4 locations, uniformly spaced on the streets as far as possible per grid cell for metro and municipal/ local body limits (of Rural SDCA). Testing may be carried out at more locations, if so required, however total number of test locations for file download should not exceed four times the number of grid cells in offered area, where such testing is conducted.

2.4 For Other AUT:

- 2.4.1 Area of other municipal/ local body (of Rural SDCA) shall be divided into Grid Size of 1Km X 1Km for self-testing to be conducted by TSPs. Grid Size for verification test by LSA Unit shall be 2Km X 2Km.
- 2.4.2 These grid cells shall be used to assist in selection of static test locations for conduction of street level coverage tests/measurements.
- 2.4.3 The test locations shall be decided by TSP for self-test and shall be selected by LSA Unit in consultation with TSP for verification test. The test locations shall try to include a fair mix of open area, periphery of the service area, important public places etc. mentioned in Para 2.1 above.
- 2.4.4 **For self-test of RSRP by TSPs:** Number of test locations where measurements for signal strength (RSRP) are to be carried out in stationary mode shall be 2 per grid cell for other municipal/ local body (of Rural SDCA) for self-test by TSPs. Test locations shall be uniformly spaced around at 250 meters as far as possible.
- 2.4.5 **For self-test of file download by TSPs:** Similarly, number of locations, where file download tests are to be carried out in stationary mode shall be 2 per grid cell for other municipal/ local body (of Rural SDCA) for self-test by TSPs. Download tests shall be done on same locations where RSRP measurements have been done as far as possible.
- 2.4.6 **For verification test of RSRP by LSA Units:** Number of locations, where measurements for signal strength (RSRP) are to be carried out in stationary mode shall be 4 per grid cell for other municipal/ local body (of Rural SDCA) for verification test by LSA Units.
- 2.4.7 **For verification test of file download by LSA Units:** Similarly, number of locations, where file download tests are to be carried out in stationary mode shall be 2 per grid cell for other municipal/ local body (of Rural SDCA) for verification test by LSA Units. Download tests shall be done on same locations where RSRP measurements have been done as far as possible.
- 2.4.8 It must be ensured that while applying the grid concept, as detailed above, area of other municipal/ local body (of Rural SDCA) is to be divided at least 2 grid cells (size may be less than 1 Km X 1Km, if required). However, in case of municipal/ local body having area less than 200 Sq. Kms., number of grid cells may not be more than 50 in general for self-test by TSPs and not more than 13 in general in case of verification test by LSA Unit. To achieve number of grids less than equal to 50 or 13 as the case may be, the size of grid cell may be adjusted anywhere between 1 Km to 2 Kms for self-test by TSPs and between 2Kms to 4Kms for verification tests by LSA Units.

3 Conduction of Tests (Collection of data)

- 3.1 All tests/ measurements related to signal measurements, file down load tests shall be collected in stationary mode, and shall be measured using drive test tool. If the test is being conducted within a vehicle, loss in signal strength due to non-usage of external antenna and using test mobile in vehicle (in-vehicle loss) will be accounted while evaluating coverage.
- 3.2 Time duration for signal measurements at each test location should be kept one minute (approximately), as far as possible for uniform sampling across all the measurements conducted at different locations.
- 3.3 TSP shall submit the log file of test results for offered area to LSA Unit in a soft copy for record purpose.
- 3.4 **Signal measurement:** Reference Signal Received Power (RSRP) shall be carried out as follows:
 - 3.4.1 RSRP values shall be measured for one minute (approximately) on each selected test location.
 - 3.4.2 Samples of RSRP value in dBm shall be measured and recorded.
- 3.5 **Throughput Measurement:** File download tests shall be carried out as follows:
 - 3.5.1 File of 100 Mbyte (approximately) size is to be downloaded on each selected test location for file download test. File download test should be done from the file server located in TSP Network to avoid any constraints due to external network.
 - 3.5.2 In case, time required for downloading is taking more than 5 minutes, throughput shall be calculated based upon observation of 5 minutes.
 - 3.5.3 Average throughput of each sample for file download of 100 Mbyte file shall be recorded. Throughput shall be calculated as ratio of size of file in bits and time taken in seconds to download.

4 Post Processing of test data

- 4.1 For **signal measurement:** Data collected using drive test tool for measurements of RSRP shall be processed and following shall be prepared by TSP and shall be submitted to LSA Unit
 - 4.1.1 Data collected shall be provided in tabular form with details like name of test locations, Lat/Long, number of total RSRP samples taken on test location, and number of RSRP samples with values better than or equal to $RSRP \geq -110$ dBm.

4.1.2 Before offering for test, TSP shall also submit similar table to LSA Unit after conducting self-test in same manner as envisaged for self-test for test location selection process and signal measurements.

4.2 For file download tests: The data collected using drive test tool for file download tests shall be processed by TSP and shall be submitted to LSA Unit:

4.2.1 Table in soft-copy and hard copy with details of Name of Metro/ municipal/ local body (of Rural SDCA), Date(s) of test conducted. Test location name, lat/long, file download size in bits (1 Byte = 8bits), Time taken in seconds, Throughput achieved in Mbps.

4.2.2 Table of summary report with details of total number of file download test locations, number of file download test locations with throughput equal to or better than 2 Mbps, successful file download test cases in percentage.

4.2.3 Call Detail Records (CDRs) of test numbers for duration of tests conducted shall be prepared in soft-copy in the format standardized by DoT for CDR submission.

4.2.4 Before offering for test, TSP shall also submit to LSA Units, the above tables and CDRs after conducting self-test in same manner as envisaged for file download test cases.

4.3 Different software tools are available to perform post-processing of test data and it is not possible to recommend a uniform criterion for post-processing. LSA units are advised to use discretion while choosing relevant post processing tool options depending on the availability.

5 Submission of results

5.1 Following results after conduction of tests/ measurements and post processing for signal measurements (RSRP) and file download tests shall be submitted:

5.1.1 Signal Measurements results:

- i) Samples of RSRP value better than or equal to -110 dBm shall be considered as good samples for evaluation of coverage; and
- ii) Number of samples having RSRP value better than or equal to -110 dBm out of total numbers of Samples of RSRP collected across complete area shall be calculated for evaluation of coverage of area.

5.1.2 File Download Test results:

- i) Samples of File Download value better than or equal to 2 Mbps shall be considered as good samples for evaluation of coverage; and
- ii) Number of samples having File Download value better than or equal to 2 Mbps out of total numbers of Samples of File Download collected across complete area shall be calculated for evaluation of coverage of area.

5.2 **Summary of Results:** The summary of results shall be submitted in as per format given below:

Table: Summary of Results

Parameter (A)	Measurements made (B)	Successful cases (C)	Result (D)	Remarks (E)
Signal Measurements: RSRP (To meet equal to or better than 90% criteria)	Total number of samples taken for RSRP	Number of Samples with RSRP \geq -110 dBm	C/B (in percent)	
File download Tests: Throughput (File Download) (To meet equal to or better than 90% criteria)	Total number of locations where file download has been carried out.	Number of locations where file download throughput was equal to or better than 2 Mbps	C/B (in percent)	

6 Interpretation of Results

- 6.1 Table mentioned in Para of "Submission of Results" should be analysed to check for compliance of meeting required street level coverage.
- 6.2 For **Signal level:** Success criterion for Signal level measurements (RSRP) -- Percentage of the number of Samples RSRP -110 dBm out of total number of samples taken for RSRP shall be equal to or better than 90%.
- 6.3 For **File download test:** Success criterion for file download (throughput) test – Percentage of the number of samples where data download throughput was equal to or better than 2 (two) Mbps out of total number of data download samples shall be equal to or better than 90%.
- 6.4 **Success criterion for roll out obligation compliance:** To be successful for roll out obligation compliance, the criteria mentioned in sub-para 6.2 and 6.3 is required to be complied.

Glossary

5G	: 5 th Generation Mobile System
AGL	: Above Ground Level
AMSL	: Above Mean Sea Level
BHQ	: Block Head Quarter
DHQ	: District Head Quarter
DoT	: Department of Telecommunications
FDD	: Frequency Division Duplex
GPS	: Global Positioning System
LSA	: Licensed Service Area
LTE	: Long Term Evolution
LTE-A	: Long Term Evolution - Advance
TDD	: Time Division Duplex
WPC	: Wireless Planning & Coordination Wing