

**No. 1-6/2015-AS-IV
Government of India
Ministry of Communications & IT
Department of Telecommunications
(Access Services Division)**

Dated: 28.04.2016


OFFICE MEMORANDUM

Sub: 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 – regarding.

Ref: O.M. No. 1-6/2015-AS-IV dated 14th July, 2015 on above subject.

The undersigned is directed to state that in supersession of 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 notified vide O.M. No. 1-6/2015-AS-IV dated 14th July, 2015, the revised Test Schedule is hereby notified with immediate effect.

2. The Licensor, in accordance with terms and conditions of the related NIA(s) and the license agreement(s), reserves the right to instruct the concerned Access Licensee(s) to comply with the decisions related to non-discretionary untested part of the spectrum assignment, if any.
3. This is issued with the approval of the competent authority.


(Shishir Kansal)
Director (AS-IV)
Tel. No. 23372063

To

Sr. DDG (TERM), DoT Headquarters

Copy to:

1. All Access Service Providers
2. Secretary, TRAI, New Delhi
3. DDG (DS)
4. COAI/AUSPI
5. Director (IT) – for uploading on the DoT website

Test Schedule
for
Roll out Obligation
of
Spectrum in 2100 MHz, 1800 MHz, 900
MHz and 800 MHz Bands

(Using LTE-FDD Radio Access Technology)

[Refer to respective NIAs for auction of spectrum in above spectrum bands issued by DoT in year 2012 to year 2015. LTE-FDD to be offered for testing with channel bandwidth of 3MHz (paired) or the 5 MHz (paired) as the case may be. This specific TSTP ensures the roll out obligation testing for the 3 MHz or 5 MHz bandwidth which has been offered by the licensee.]

April 2016



Network Roll Out Obligation for Spectrum in 2100 MHz, 1800 MHz, 900 MHz and 800 MHz Band

Street level coverage testing with LTE for UL License

Sub-Section-A

Pre-requisite checks for Spectrum Coverage (LTE)

- 1 Name of Licensee (Authorized to use the assigned spectrum block):
- 2 Name of License under which services are being provided:
- 3 Name of License Service Area:
- 4 Assigned Spectrum Band (s) & frequency spots (E-ARFCN):
- 5 Spectrum-Band offered for testing:
- 6 Channel Bandwidth⁵ of LTE-FDD in MHz (Paired) offered for testing:

Table: Site Verification Test Details

eNodeB	Site Location / Cell IDs	Lat/ Long ¹	Tower Height AGL ¹	Tower Height AMSL ¹	Frequency (E-ARFCN)	Power ²	Status of certificate regarding Infrastructure Sharing ³ (As per applicable license and amendments)	Status of certificate regarding Intra-Service Area Roaming ³ (as per applicable license and amendments)	Compl ied/No t Compl ied	
	Details As per SACFA Approval						Given/ Not Given	Given/ Not Given		
	Details as per Inspection									
Compliance of requirements mentioned in Note 4 below:							Final observation	PASS/ FAIL		

Signature
Name & Designation
Office Stamp

Note:

¹The Licensee shall submit the latitude and longitude values upto '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 will be carried on basis of Centralized management of Lat/Long data received from GPS receiver installed at each eNodeB site. Physical verification of sites by TERM cells regarding Address, AGL and AMSL will 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 will be done. In case of exceptional circumstances, more number of sites may be verified by the testing agency, if the need justifies.

²Power will be measured for all sites from OMC through MML commands.

³Coverage is to be tested from eNodeBs 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 will be applicable.

⁴Coverage of Block Headquarters would mean that at least 90% of the area bounded by the local body limits should get the required street level coverage by mandatorily setting up of Base station(s) (for example a BTS / node B/ e-node B) in the Block Headquarters.

⁵LTE-FDD to be offered for testing with Channel bandwidth of 3MHz (Paired) or 5 MHz (Paired) as the case may be. This specific TSTP ensures the roll out obligation testing for the 3MHz or 5 MHz bandwidth which has been offered by the licensee.

Sub-Section-B

Street Level Coverage Testing using assigned Spectrum in 800 MHz, 900 MHz, 1800 MHz, 2100 MHz Band (s)

(Refer Unified License and amendments)

1 Pre-requisite

- 1.1 Map of AUT¹, showing the municipal/ Local body limits, all major and minor roads, commercial area(s), uninhabited land (if any); duly authenticated by the concerned authority. *(To be submitted by the applicant)*
- 1.2 Authenticated to the scale map of AUT from the respective State Government/ Administration/ local body will be submitted. Boundary of AUT as per map/ definition by State Government/ Administration/ Local body will be provided. Important landmarks, roads, rail network, railway stations, bus stand and other important establishments etc. may be marked on such map. *(To be submitted by the applicant)*
- 1.3 For measuring the street level coverage it may be necessary to mark specific points where streets are touching or crossing the boundaries indicated in Para above. Accordingly, such points may be marked on the map. *(To be submitted by the applicant)*
- 1.4 The map, clearly showing the features mentioned in Paras above with positional details of the eNodeBs superimposed on this map. *(To be submitted by the applicant)*.
- 1.5 Necessary tools: Drive Test Tool, Test Mobiles, Post Processing Tool, and suitable arrangement to measure Reference Signal Received Power (RSRP) and to check download speed. *(To be provided by the applicant)*.
- 1.6 Drive test tool shall select "LTE-FDD only" and specific Spectrum Band, which is being offered for the coverage test using the assigned spectrum.

2 Route Selection:

- 2.1 With the help of the map of AUT¹ submitted by TSPs, the test in-charge shall survey the offered AUT to identify the drive test routes covering places like Railway Station(s), Main Hospital(s), Bus Stand(s), Shopping Center(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.

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

- 2.2 For the purpose of conducting test the area will be classified as Big AUT on the basis of municipal area/ Local body limits as below:
- 2.2.1 Big AUT Having area equal to or more than 200 square Km.
- 2.2.2 Other AUT: Having area less than 200 Square Km.
- 2.3 **For Big AUT:**
- 2.3.1 The area of the AUT, as the case may be, shall be divided into grid cells of 2Kms x 2KMs for self-test by TSPs and will be divided into grid cells of 4Kms X 4Kms for verification test by TERM cell.
- 2.3.2 These grid cells shall be used to assist in selection of the drive test route for conduction of street level coverage test.
- 2.3.3 Minimum route KM criteria should be followed as far as possible. A criterion of “Minimum drive test route length in a grid cell” for each grid cell is to be adopted in general as a guiding principle while selecting route for testing. “Minimum drive test route length in a grid cell” is at least equal to value of half of the area of grid cell. In case of grid cells, which are other than prescribed shape/size, due to area on periphery of boundary, same criterion will apply for such grid cells also.
- 2.3.4 The total length of drive test route in a given town should not exceed the sum of minimum drive test routes length of each grid selected for conduction of drive test. In exceptional circumstances, where it is found necessary to conduct drive test for route length more than prescribed, the reasons for doing the same shall be recorded with justification.
- 2.3.5 Criteria of “Minimum drive test route length in a grid cell” may not be applicable in specific cases where even after covering all the streets in specific grid cell, minimum criteria of route length is not met. This exemption is required to avoid cases of un-necessary repetition of testing on same street in order to fulfill the requirement of minimum drive test route length mentioned earlier.
- 2.3.6 The drive test route shall be decided by TSP for self-test and by TERM cell in consultation with TSP for verification test. The drive test route shall be a fair mix of open area, periphery of the service area, important public places etc. mentioned in Para 2.1 above.
- 2.4 **For Other AUT (Area within municipal limits less than 200 Sq. Km.):**
- 2.4.1 **For self-test by TSPs:** The area of the AUT shall be divided into grid cells of 1Km x 1Km for self-test by TSPs. The Number of the grid cells in any offered area may be minimum two and maximum 50 as far as possible irrespective of the size of the grid. Size of the grid cell may be reduced from 1 Km X 1 Km to achieve minimum 2 number of grid cells. In case, number of grid cells are coming more than 50 in case of self-test by TSP with the size of 1 Km X 1Km, then size of grid cell may be increased anywhere between 1Km to 2 Kms to keep number of grid cells equal to 50 as far as possible.
- 2.4.2 **For verification test by TERM cells:** The area of the AUT shall be divided into grid cells of 2 Kms x 2 Kms. The Number of the grid cells in any offered area may be minimum two and maximum 13 as far as possible irrespective of the size of the grid. Size of the grid cell may be

reduced from 2 Kms X 2 Kms to achieve minimum 2 number of grid cells. In case, number of grid cells are coming more than 13 in case of verification-test by TERM Cell with the size of 2 Km X 2 Km, then size of grid cell may be increased anywhere between 2 Kms to 4 Kms to keep number of grid cells equal to 13 as far as possible.

- 2.4.3 These grid cells shall be used to assist in selection of the drive test route for conduction of street level coverage test.
- 2.4.4 Minimum route Km to be selected should be equal to half of the area of the grid in Sq. Km. as far as possible. A criterion of "Minimum drive test route length in a grid cell" for each grid cell is to be adopted in general as a guiding principle while selecting drive test route for testing. "Minimum drive test route length in a grid cell" is at least equal to value of half of the area of grid cell. In case of grid cells, which are other than prescribed shape/size, due to area on periphery of boundary, same criterion, will apply for such grid cells also.
- 2.4.5 The total length of drive test route in a given town should not exceed the sum of minimum drive test routes length of each grid selected for drive test. In exceptional circumstances, where it is found necessary to conduct drive test for route length more than prescribed, the reasons for doing the same shall be recorded with justification.
- 2.4.6 Criteria of "Minimum drive test route length in a grid cell" may not be applicable in specific cases where even after covering all the streets in specific grid cell, minimum criteria of route length is not met. This exemption is required to avoid cases of un-necessary repetition of testing on same street to meet requirement of minimum drive test route length mentioned earlier.
- 2.4.7 The drive test route shall be decided by TSP for self-test and by TERM cell in consultation with TSP for verification test. The drive test route may be a fair mix of open area, periphery of the service area, important public places etc. mentioned in Para 2.1 above.

3 Conduction of Tests (Collection of data)

- 3.1 All tests/measurements related to signal measurements, file down load tests and voice calls tests (only in case file download test is not offered) shall be collected using drive test tool on the move in auto mode, placed in the drive test vehicle.
- 3.2 Loss in signal strength due to non usage of external antenna and using test mobile in drive-test vehicle (in-car loss) will be accounted while evaluating coverage. The amount of loss in signal strength of RSRP will be accounted by estimating difference in signal strength of RSRP outside and inside of drive test vehicle. For this, signal strength of RSRP may be observed out-side of drive test vehicle for 5 minutes and then signal strength of RSRP may be observed for 5 minutes inside of drive-test vehicle.
- 3.3 Speed of the drive-test vehicle may not exceed 30kmph and as far as possible uniform speed will be maintained for all tests/ measurements which are to be conducted while on move, during drive test for uniform sampling across drive test route. Testing may be paused for taking samples (for tests which are to be conducted on move) when drive test vehicle is not moving for avoiding non-uniform sampling.

3.4 The test data files for RSRP, short duration call records (log file) (in case file download test is not offered) should be of maximum 30 minutes duration, in order to limit the file size. The data download files shall be separately maintained. TSP will submit the log file of drive test for offered area to TERM cell in a soft-copy for record purpose.

3.5 Data shall be collected by measurements of pilot channels (RSRP), setting-up voice calls (short duration) (in case file download test is not offered) and downloading file. Tests/ Measurements will be conducted as following:

3.5.1 For Signal measurement:

- i. Samples of RSRP values will be measured along the drive test route selected,
- ii. Samples of RSRP value in dBm will be measured and recorded,
- iii. Before offering to TERM cell, TSPs will submit self-test results of measurements conducted for RSRP along the drive test route (selected by operator) as per route selection process.

3.5.2 For file download tests:

- i. In addition to test of RSRP mentioned in Para above, file download of size of 10 M Byte will also be done on selected route with pause for approx three minute between two file downloads. File download test should be done from the file server located in TSP Network to avoid any constraints due to external network.
- ii. Average throughput of each sample for file download of 10 M Byte file will be recorded. Throughput will be calculated as ratio of size of file in bits and time taken in seconds to download.
- iii. In case file download for 10 MB is not completed within 5 minutes, the download will be manually stopped and down load speed shall be calculated based on total data down loaded in bits and time taken to download the data in seconds.
- iv. Before offering to TERM cell, TSPs will submit self-test results of tests conducted for file download along the route (selected by operator) as per route selection process.

4 Post Processing of test data

4.1 For Signal measurement: Data collected using drive test tool for *measurements of RSRP* will be processed in plot diagram and following will be prepared by TSP and will be submitted to TERM cell

4.1.1 Plot of RSRP on map with values better than or equal to $RSRP \geq -124$ dBm as green and for other values as red.

4.1.2 Before offering for test, TSP will also submit to TERM cells, above plot after conducting self-test in same manner as envisaged for route selection and signal measurements.

4.2 **For file download tests:** The data collected using drive test tool for *file download tests* will be processed and following will be prepared by TSP and submitted to TERM cell:

- 4.2.1 Table in soft-copy and hard copy with details of Name of AUT, Date (s) of test conducted, Test location name, lat/long, file download size in bits (1 Byte = 8 bits), Time taken in seconds, Throughput achieved in Kbps.
- 4.2.2 Table of summary report with details of total number of file download samples, number of file download samples with throughput equal to or better than 256 Kbps, successful file download cases in percent.
- 4.2.3 CDRs (Call Detail Records) of test numbers for duration of tests conducted will be prepared in soft-copy in the format standardized by DoT for CDR submission.
- 4.2.4 Before offering for test, TSP will also submit to TERM cells, the above tables and CDRs after conducting self-test in same manner as envisaged for data 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. TERM units are advised to use discretion while choosing relevant post processing tool options depending on the availability.

5 Submission of result

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

- 5.1.1 Signal Measurements results:

- i. Samples of RSRP value better than or equal to -124 dBm will be considered as good samples for evaluation of coverage,
- ii. Number of samples RSRP \geq -124 dBm out of total numbers of Samples of RSRP collected across complete area will be calculated for evaluation of coverage of area.

- 5.1.2 File Download Test results

- i. Table in soft-copy and hard copy with details of Name of AUT, 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 Kbps.
- ii. 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 256 Kbps, successful file download test cases in percent.
- iii. Call Detail Records (CDRs) of File download sessions.

- 5.2 **Summary of Results: The summary of results will 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 -124 dBm	C/B (in percent)	
File download Tests: Throughput (File Download) (To meet equal to or better than 90% criteria)	Total number of file download samples.	Number of file download samples where file download throughput was equal to or better than 256 kbps	C/B (in percent)	

6 Interpretation of Results

- 6.1 Table mentioned in Para of "Submission of Results" should be analyzed 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 \geq -124 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 tests: Percentage of the number of data download samples where data download throughput was equal to or better than 256 kbps out of total number of data download Samples shall be equal to or better than 90%.
- 6.4 **Success criterion for overall required street level coverage test:** To be successful in both criteria mentioned in sub-Para 6.2 and sub-Para 6.3 above.

Glossary

AGL	: Above Ground Level
AMSL	: Above Mean Sea Level
AMR	: Adaptive Multi Range
AUT	: Area Under Test
DHQ	: District Head Quarter
FDD	: Frequency Duplex Division
GPS	: Global Positioning System
LTE	: Long Term Evolution
PS	: Packet Switching
RRH	: Remote RF Head
RSRP	: Received Signal Receive Power
TERM	: Telecom Enforcement, Resource and Monitoring
E-ARFCN	: E-UTRAN Absolute Radio Frequency Carrier Number
UL	: Unified License
WPC	: Wireless Planning & Coordination Wing
DoT	: Department of Telecommunication