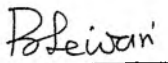


F.No.1-4/2013-AS-IV
Government of India
Ministry of Communications & IT
Department of Telecommunications
(Access Services Division)

Dated the 17th March, 2015

Subject: Test Schedule Test Procedure (TSTP) for roll out obligation for BWA Spectrum using LTE-TDD technology under ISP/UASL/CMTSL/UL(AS)/Unified License.

I am directed to refer to the subject mentioned above and enclose herewith a copy of TSTP for street level coverage testing for roll out obligations for BWA Spectrum using LTE-TDD technology under ISP/UASL/CMTSL/UL(AS)/Unified License.


(R.R. Tiwari)
Director (AS-IV)

Enclosure: As above.

To

Sr. DDG (TERM)
DOT Headquarters
Sanchar Bhawan
New Delhi

Copy to:

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

Test Schedule
for
Roll out Obligation
of
BWA Spectrum (for LTE-TDD) under
UASL/CMTS/ISP/ UL License

(Refer to UASL/CMTS/ISP License amendments authorizing Licensee to use
assigned BWA spectrum)

March 2015

**BWA Spectrum Roll Out Obligation
Street level coverage testing with LTE for UASL/CMTS/ISP/UL License**

Sub-Section-A

Pre-requisite checks for BWA (LTE) Spectrum Coverage

- 1 **Name of Licensee** (Authorized to use the BWA spectrum block):
- 2 **Name of License under which services are being provided:**
- 3 **Name of License Service Area:**
- 4 **Assigned frequency spots (E-ARFCN):**

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									
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.

Bd.

Sub-Section-B

Street Level Coverage Testing using assigned BWA Spectrum

(UASL/CMTS/ISP/UL License and amendments)

Pre-requisite

- 1.1 Map of Municipal/ Local body (of the town), as per note on "Rural SDCA", 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 Maps authenticated by local Authorities, wherever available, may be taken and boundaries of municipal/ local body may be superimposed on digital map. Important landmarks, roads, rail network, railway stations, bus stand and other important establishments etc. may be marked on such digital maps.
- 1.3 All efforts should be made to arrange authenticated maps, from local authorities/ municipal bodies. In cases, where authenticated maps are not made available even after best efforts by TSPs, a letter from concerned local authority/ municipal/ local body indicating non-availability of maps may be taken. In such cases, the TSP can submit self-certified maps of concerned municipal/ local body offered, showing important landmarks, roads, public places and boundaries along-with the above said letter from concerned authority.
- 1.4 For measuring the street level coverage it may be necessary to mark specific points where streets are touching or crossing the municipal boundaries. Accordingly, such points may be marked on the map.
- 1.5 The digital 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)*.
- 1.6 Necessary tools: Drive Test Tool, Out Door CPE (ODCPE), Post Processing Tool, and suitable arrangement to measure Reference Signal Received Power (RSRP) and to check download speed. *(To be provided by the applicant)*.
- 1.7 Drive test tool/ ODCPE shall select "LTE only" to check coverage using the assigned BWA spectrum.

Note on "Rural SDCA":

- *For the purpose of testing of 50% of Rural SDCAs for coverage for fulfillment of roll out obligation, "List of 'Rural SDCAs' under various LSAs for the purpose*

- of 3G/BWA Roll out obligations” provided by AS cell of DoT shall be referred.*
- *Rural SDCA is the SDCA, which is marked as “Rural” in the above list.*
 - *The Municipal/ local body (of the town) in the Rural SDCA with the same name as that of the rural SDCA will be considered for testing for coverage.*
 - *Testing of coverage of Municipal/ local body limits of such municipal/ local body (of the town) as mentioned above will be considered as the testing of coverage of the whole of the above rural SDCA as per the requirement of NIA.*
 - *Choice of 50% Rural SDCAs, which are to be offered for testing, will lie with the operator.*

2. TEST Location Selection Process:

- 2.1 With the help of maps mentioned in Para1: Pre-requisites, the test in-charge shall survey the offered Municipal/ local body limits (of Rural SDCA) to identify the test locations 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.
- 2.2 For the purpose of conducting test the area will 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): Having area equal to or more than 200 square Km.
- 2.2.2 Other Municipal/ local body (of Rural SDCA): Having area less than 200 Square Km.
- 2.3 For Metro/Big Municipal/ local body (of Rural SDCA):**
- 2.3.1 Area of municipal/ local body will be divided into Grid Size of 2Km X 2Km for self-testing to be conducted by TSPs. Grid Size for verification test by TERM cell will 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 A criterion of “Minimum test route length in a grid cell” for each grid cell is to be adopted in general as a guiding principle while selecting test locations. “Minimum 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. In general, no repetition of route should be done until unless it is unavoidable. Criteria of "Minimum 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 test route length mentioned earlier.

- 2.3.4 The total length of drive test route in a given municipal/ local body limits 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.
- 2.3.5 The test locations shall be decided by TSP for self-test and will be selected by TERM cell 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
- 2.3.6 **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 will be 10 per grid cell for Big municipal/ local body (of Rural SDCA) for self-test by TSPs. Test locations will be uniformly spaced around at 200 meters as far as possible.
- 2.3.7 **For self-test of file download by TSPs:** Similarly number of locations, where file download tests are to be carried out in stationary mode will 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.
- 2.3.8 **For verification test of RSRP by TERM cell:** Number of locations, where measurements for signal strength in terms of RSRP are to be carried out in stationary mode will be 10 per grid cell for Big municipal/ local body (of Rural SDCA) for verification test by TERM Cells.
- 2.3.9 **For verification test of file download by TERM cells:** Similarly number of locations, where file download tests are to be carried out in stationary mode will be 4 per grid cell for Big municipal/ local body (of Rural SDCA) for verification test by TERM Cells. Download tests will be done on same locations where RSRP measurements have been done as far as possible.
- 2.3.10 File download test for verification test by TERM cell will 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 Municipal/ local body (of Rural SDCA), having area within municipal limit less than 200 Sq. Km.:

- 2.4.1 Area of other municipal/ local body (of Rural SDCA) will be divided into Grid Size of 1Km X 1Km for self-testing to be conducted by TSPs. Grid Size for verification test by TERM cell will 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 A criterion of "Minimum test route length in a grid cell" for each grid cell is to be adopted in general as a guiding principle while selecting test locations. "Minimum 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. In general, no repetition of route should be done until unless it is unavoidable. Criteria of "Minimum 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 fulfill requirement of minimum test route length mentioned earlier.
- 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 will be 2 per grid cell for other municipal/ local body (of Rural SDCA) for self-test by TSPs. Test locations will 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 are to be carried out in stationary mode will be 2 per grid cell for other municipal/ local body (of Rural SDCA) for self-test by TSPs. Download tests will be done on same locations where RSRP measurements have been done as far as possible.
- 2.4.6 **For verification test of RSRP by TERM cells:** Number of locations, where measurements for signal strength (RSRP) are to be carried out in stationary mode will be 4 per grid cell for other municipal/ local body (of Rural SDCA) for

verification test by TERM Cells.

- 2.4.7 **For verification test of file download by TERM cells:** Similarly number of locations, where file download tests are to be carried out in stationary mode will be 2 per grid cell for other municipal/ local body (of Rural SDCA) for verification test by TERM Cells. Download tests will 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 in 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 TERM cell. 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 TERM cells.
- 2.4.9 The test locations shall be decided by TSP for self-test and will be selected by TERM cell 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.

3. Conduction of Tests (Collection of data)

- 3.1 All tests/measurements related to signal measurements and file down load tests will be collected in stationary mode using drive test tool in auto mode, and will be measured using Outdoor CPE (Customer Premises Equipment) placed on the top of the drive test vehicle.
- 3.2 Outdoor CPE with directional antenna shall be used to conduct coverage testing. RSRP and File download speed shall be measured/ tested at the output of Outdoor CPE.
- 3.3 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.
- 3.4 TSP will submit the log file of test results for offered area to TERM cell in a soft-copy for record purpose.
- 3.5 Signal measurement i.e. Reference Signal Received Power (RSRP) will be carried

out as following:

- 3.5.1 RSRP values will be measured for one minute (approximately) on each selected test location.
- 3.5.2 Samples of RSRP value in dBm will be measured and recorded.
- 3.5.3 Before offering to TERM cell, TSPs will submit self-test results of measurements conducted for RSRP on each test location selected (by operator) as per test location selection process.

3.6 File download tests will be carried out as follows:

- 3.6.1 File of 10 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.
- 3.6.2 In case, time required for downloading is taking more than 5 minutes, throughput will be calculated based upon observation of 5 minutes.
- 3.6.3 Average throughput of each sample for file download of 10MByte file will be recorded. Throughput will 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* will be processed and following will be prepared by TSP and will be submitted to TERM cell
 - 4.1.1 Data collected will be provided in tabular form with details like name of test locations, Lat/Long, Number of total RSRP samples taken on test location, Number of RSRP samples with values better than or equal to $RSRP \geq -124$ dBm.
 - 4.1.2 Before offering for test, TSP will also submit similar table to TERM cell 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* will be processed by TSP and will be submitted to TERM cell:
 - 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 Kbps.

- 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 256 Kbps, successful file download test cases in percentage.
- 4.2.3 Call Detail Records (CDRs) 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 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. 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 Municipal/ local body limits (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 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: (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 locations where file download has been carried out.	Number of locations 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
CMTS	: Cellular Mobile Telephone Service
CS	: Circuit Switched
DHQ	: District Head Quarter
GPS	: Global Positioning System
PS	: Packet Switching
RRH	: Remote RF Head
RSCP	: Received Signal Code Power
TERM	: Telecom Enforcement, Resource and Monitoring
UARFCN	: UMTS Absolute Radio Frequency Carrier Number
UASL	: Unified Access Services License
UMTS	: Universal Mobile Telecommunications System
WCDMA	: Wideband Code Division Multiple Access
WPC	: Wireless Planning & Coordination Wing
DoT	: Department of Telecommunication