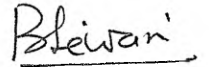


F.No.1-4/2013-AS-IV
Government of India
Ministry of Communications & IT
Department of Telecommunications
(Access Services Division)

Dated the 5th February, 2015

Subject: Test Schedule Test Procedure (TSTP) for roll out obligation for 3G technology – UMTS/WCDMA under UASL/CMTSL/UL(AS)/Unified License.

In supersession of this office letter No.842-1117/2011/AS-IV/1335 dated 4th September, 2012, I am directed to forward a copy of TSTP for street level coverage testing for roll out obligations for 3G technology – UMTS/WCDMA under UASL/CMTSL/UL(AS)/Unified License.



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

Encl: 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
3G technology – UMTS/WCDMA
under
UASL/CMTSL/UL(AS)/Unified License

(3G spectrum- Required street level coverage testing with UMTS

technology proposed as Part-IV of Existing Test

Schedule for Service Approval)

February 2015

3G Spectrum Roll Out Obligation
Street Level Coverage testing with UMTS for UASL/CMTSL/UL
License

BA.

Pre-requisites for coverage testing of Roll out Obligation

Sub-Section-A

a. Pre-requisite checks for 3G(UMTS/WCDMA) Spectrum Coverage

1. **Name of Licensee** (also authorized to use the 3G spectrum block):
2. **Name of License under which services are being provided:**
3. **Name of License Service Area:**
4. **Assigned frequency spots (UARFCN):**

Table: NodeB Verification Test Details

NodeB	Site Location / Cell IDs	Latitude / Longitude ¹	Tower Height AGL ¹	Tower Height AMSL ¹	Frequency (UARFCN)	Power ²	Status of Undertaking regarding Infrastructure Sharing ³ (As per UASL/CMTS)	Status of Undertaking regarding Intra-Service Area Roaming ³ (As per UASL/CMTS)	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:

¹The Licensee shall submit the latitude and longitude values upto 'Seconds' so as to have an accuracy better than 5 decimal places. The Deviation allowed in geo-coordinates, height of Tower of AGL (Above Ground Level) & AMSL (Above Mean Sea Level) as per latest WPC/DoT instructions. Physical verification of sites by TERM cells regarding Lat/Long, AGL and AMSL will be carried out on sample basis as detailed below:

- a. Within 7 kms from Airport Reference Point(ARP)-100%- all sites including shared sites
- b. Beyond 7 Kms from Airport Reference Point
 - For Existing shared sites -5%
 - New sites -100%

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

³Coverage is to be tested from NodeBs 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.

Sub-Section-B

Street Level Coverage Testing using assigned 3G Spectrum
(UASL/CMTS/UL License and Amendments)

1. Pre-requisite

- 1.1 Municipal/ Local body map of the DHQ/ Municipal/ local body limits in lieu of DHQ/ DHQ in Rural SDCA¹ showing the municipal/ Local body limits, all major and minor roads, commercial area, 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 town/municipal/ local body limits may be superimposed on digital map. Important landmarks, roads, rail network, railway station(s), bus stand(s) and other important establishments etc. may be marked on such digital maps.
- 1.3 All serious 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 area 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 Para above with positional details of the NodeBs/ NodeB (RRH) superimposed on this map. *(To be submitted by the applicant)*.
- 1.6 Necessary tools: Drive Test Tool, Test Mobiles, Post Processing Tool, and suitable arrangement to measure Received Signal Code Power (RSCP), E_c/N_0 and to check download speed. *(To be provided by the applicant)*.
- 1.7 Drive test tool/ Test mobiles shall select "3G/UMTS only" to check coverage using the assigned 3G spectrum.

¹*Note on "Rural SDCA"*

BP.

- *For the purpose of testing of fulfillment of roll out obligation “15% DHQs should be Rural SDCAs”, “List of Rural SDCAs under various LSAs for the purpose of 3G/BWA Roll out obligations” issued by AS cell of DoT shall be referred.*
- *The operator shall cover the DHQ in whose name rural SDCA itself is known. The roll out obligation shall be tested within municipal limits of the DHQ.*
- *The choice of municipal/ local body limits in lieu of DHQ to be covered in reference to “15% DHQs should be rural SDCAs” mean “municipal/ local body limits of the town in whose name a rural SDCA exists in that district.” The roll out obligation shall be tested within municipal/ local body limits of such town.*
- *The choice of DHQs/municipal/ local body to be covered and further expansion beyond 50% of DHQs/ town shall lie with the operator.*

2. Route Selection

- 2.1 With the help of the map submitted by TSPs, the test in-charge shall survey the offered DHQ/ Town in lieu of DHQ 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.
- 2.2 For the purpose of conducting test the area will be classified as Metro/Big towns/Others on the basis of municipal area/ Local body limits as below:
- 2.2.1 Metro/ Big DHQs/ Big towns: Having area equal to or more than 200 square Km.
- 2.2.2 Other DHQs/towns: Having area less than 200 Square Km.
- 2.3 For Metro/ Big DHQs/Big Towns:**
- 2.3.1 The area of the DHQ/Town 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 DHQs/Towns (Area within municipal limits less than 200 Sq. Km.):

- 2.4.1 **For self-test by TSPs:** The area of the DHQ/Town 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 DHQ/Town 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. Conducting Tests (for data collection)

- 3.1 All tests/measurements related to signal measurements, voice calls tests and file down load tests 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 RSCP will be accounted by estimating difference in signal strength of RSCP outside and inside of drive test vehicle. For this, signal strength of RSCP may be observed out-side of drive test vehicle for 5 minutes and then signal strength of RSCP 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 RSCP, E_c/N_o , Short duration call records (log file) 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 (RSCP), E_c/N_o , setting-up voice calls (Short duration) and downloading file. Tests/ Measurements will be conducted as following:

3.5.1 For Signal measurement:

- i. Samples of RSCP and E_c/N_o values will be measured along the drive test route selected,
- ii. Samples of RSCP value in dBm will be measured and recorded,
- iii. Samples of E_c/N_o will be measured and recorded,
- iv. Values of RSCP in dBm and E_c/N_o in dB at a particular location will constitute a combined sample for the purpose of evaluation.
- v. Before offering to TERM cell, TSPs will submit self-test results of measurements conducted for RSCP & E_c/N_o along the drive test route (selected by operator) as per route selection process.

3.5.2 For Voice call test:

- i. In addition to test of RSCP & E_c/N_o mentioned above, series of short voice calls (AMR 12.2 kbps) of approx. 60 sec with idle period of approx.10 sec will be made during coverage test along selected drive test route and call test results recorded.
- ii. Before offering to TERM cell, TSPs will submit self-test results of tests conducted for voice calls along the drive test route (selected by operator) as per route selection process.

3.5.3 For file download tests:

- i. In addition to test of RSCP & E_c/N_o , and short duration call mentioned in Para above, file download of size of 5 M Byte will also

be done on selected route using different UE 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 5 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 5 MB is not completed within 6 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 data

4.1 **For Signal measurement:** Data collected with the help of drive test tool for RSCP and E_c/N_0 will be post processed in three plot diagrams and will be submitted by TSP to TERM cell:

- 4.1.1 Plot of RSCP on map with values better than or equal to RSCP ≥ -99 dBm as green and for other values as red.
- 4.1.2 Plot of E_c/N_0 on map with values better than or equal to $E_c/N_0 \geq -14$ dB as green and for other values as red
- 4.1.3 Combined plot on map on basis of combination of RSCP & E_c/N_0 indicating "meeting of both criteria" as green and "not meeting any one or both criteria" as red.
- 4.1.4 Before offering for test, TSP will also submit to TERM cells, above three plots after conducting self-test in same manner as envisaged for route selection and signal measurements.

4.2 **For Voice call test:** The data collected using drive test tool for *short calls*, as mentioned for voice call test will be processed and following will be prepared and submitted by TSP to TERM cell:

- 4.2.1 Table of total number of calls attempted and call successfully completed using data from drive test tool. Call successfully completed means successful call attempts where CDR has been generated.
- 4.2.2 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.

4.2.3 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 voice call tests.

4.3 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:

4.3.1 Table in soft-copy and hard copy with details of Name of Metro/DHQ/Town in lieu of DHQ, 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.

4.3.2 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 144 Kbps, successful file download cases in percent.

4.3.3 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.

4.3.4 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.

4.4 Different software tools are available to perform post-processing of drive-test data and it is not possible to recommend a uniform criterion for post-processing. TERM units are advised to use discretion while choosing distance based/time based algorithms and intervals between samples, depending on the availability of tools, to assess the coverage percentage.

5. Submission of Results

Following results after conduction of tests/ measurements and post processing for signal measurements (RSCP & E_c/N_0 criteria), Voice call tests and data download tests will be submitted:

5.1 Signal Measurements results:

5.1.1 Plot of RSCP on map with values better than or equal to RSCP \geq -99dBm as Green and for other values as Red

5.1.2 Plot of E_c/N_0 on map with values better than or equal to $E_c/N_0 \geq$ -14 dB

as Green and for other values as Red

- 5.1.3 Combined plot on map on basis of combination of RSCP & E_c/N_o indicating "meeting of both criteria" as Green and "not meeting any one or both criteria" as Red.

5.2 Voice Call Test Results:

- 5.2.1 Table of total number of calls attempted, Successful call attempts and Call set-up success rate (in percent) using data,

- 5.2.2 CDRs (Call Detail Records) of test calls,

5.3 File download Test Results

- 5.3.1 Table in soft-copy and hard copy with details of Name of Town, Date (s) of test conducted, file download size in bits (1 Byte = 8 bits), Time taken in seconds, Throughput achieved in Kbps.

- 5.3.2 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 144 Kbps, successful file download test cases in percent.

- 5.3.3 Call Detail Records (CDRs) of Data download sessions

- 5.4 **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: RSCP & E_c/N_o (Combined) (To meet equal to or better than 90% criteria)	Total number of samples taken for RSCP & E_c/N_o	Number of Samples RSCP \geq -99 dBm & $E_c/N_o \geq$ -14 dB (Combined)	C/B (in percent)	
Voice Call Tests: Call set-up success rate (within	Total number of short voice calls made	Number of successful calls	C/B (in percent)	

Metro/DHQ/Town) (To meet equal to or better than 85.5% criteria)				
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 144 kbps	C/B (in percent)	

6. Interpretation of Results

- 6.1 Drive test plots and table mentioned in Para of "Submission of Results" should be analyzed to check for compliance of meeting required street level coverage.
- 6.2 Success criterion for Signal level measurements (RSCP and Ec/No): Percentage of the number of Samples $RSCP \geq -99$ dBm & $Ec/No \geq -14$ dB (Combined) out of Total number of samples taken for RSCP & Ec/No (Combined) shall be equal to or better than 90%.
- 6.3 Success criterion for voice call tests: Percentage of the number of successful calls out of total number of short duration voice calls made shall be equal to or better than 85.5%.
- 6.4 Success criterion for file download tests: Percentage of the number of data download samples where data download throughput was equal to or better than 144 kbps out of total number of data download Sample shall be equal to or better than 90%.
- 6.5 Success criterion for overall required street level coverage test: To be successful in all the three criteria mentioned 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