Telecommunication Engineering Centre (TEC)

EOI for Submission of Technical Solution with Budgetary Quote for the Project "Test as a Service (TaaS)"

Telecommunication Engineering Centre (TEC) invites Expression of Interest (EOI) from the interested applicants for submission of Technical Solution along with Budgetary Quote for the project **"Test as a Service (Taas)".**

All interested and eligible parties are requested to submit their proposal with detailed information about the all-testing infrastructure required along with detailed beak up of all components of financial requirements.

Brief Description of the Project:

1. TaaS is envisaged to have any kind of test from anywhere in the world. If a company in any corner of the world wants to test its product, they just have to connect the product to TaaS portal and TaaS (Test as a Service) portal shall search and connect the lab online and also facilitate the contract between lab and test house. If it is a destructive test like Safety, EMI/EMC, the availability of test parameters can be seen on portal and one can choose the test house and establish contracts through this portal and courier the sample. That's all it takes. After sometime OEM can print his certificate. This is something like OLA, UBER model.

2. It is easy and accessible, simple and ubiquitous. The solution is very affordable. This will make India as a competitive test bed for ICT Products and attract the global attention. Apart from serving the globe with test as service, it would boost the confidence of the start-ups and Indian OEMs. Indian labs shall have access to the global technology for further innovation.

3. In reference to arrive about all technical requirements and financial requirements for submission of Technical Solution, the concept paper attached as Annexure may please be referred. However, some of the functions of projected TaaS are described as: -

    (i)   Remote management and access to different labs across the country

    (ii)   Testbed connectivity details

    (iii)   Resource inventory

    (iv)   Test cases and Execution

    (v)   Data collection and reporting

    (vi)   Test result report and dashboard

(vii)   Automation

(viii)   Test Schedule management

(ix)   Utilization reporting in terms of test bed and user

(x)   Vendor evaluation and Govt. validation

(xi)   Print certificate from anywhere.

(xii)   Aggregation of test eco system

(xiii)   Single window system.

(xiv)   Know lab capacity availability from anywhere in the country.

(xv)   Ubiquitous presence of the labs

(xvi)   Web enabled software, integrated workflow management with data-updating on centralized server

(xvii)   Solution capable of working on mobile platforms

(xviii)   Scalable for integration with multiple laboratories as brought out under the folds of the TEC in future.

(xix)   Configurable for the coverage of new products & processes

(xx)   Hosted on NIC or Government Server as decided by the TEC and able to meet all necessary security audits

(xxi)   Technology used should be capable of being updated or aligned with advancements in future

(xxii)   Data Analytics facility

(xxiii)   Security of data including encryption

(xxiv)   Export tool to export or generate reports in other formats like csv, excel, etc.

(xxv)   History or log management (to ensure that all the actions or events are stored in the system and can be referred when required)

4.   Following additional test capabilities inter-alia are also envisaged in TAAS in view of current requirement of 5G testing and "Make in India" Initiatives:

a. **5G Core Testing Tool**

    i.   3GPP Compliance Testing.

    ii.   Security Testing.

    iii.   Isolated Node Testing

    iv   to verify Single N/W Function by emulating the other N/W functions

b. **Adjacency Testing**

    To verify combo N/W functions by emulating the other N/W functions

c. **Negative/Failure Testing**

    i.   To verify the different N/W function performance during negative/failure scenarios

    ii.   Performance/Capacity testing : To Verify the capacity/performance limit of the 5G core N/w function

d. **End to End testing**: To verify the end to end service via real 5G Core such as Voice, Data, Video etc.

e. **5G Cloud Testing Tool**

f. **5G Radio Testing Tool**

    i.   Radio Conformance Testing

    ii.   Radio Performance Testing

    iii.   Massive MIMO & Beam Forming Testing

    iv.   Open RAN Testing

5. **Application Deadline:**

(i) The EOI will be open for **1 month from the date of publication**, and the potential applicants(s) will have to apply for consideration of their proposal. TEC has the sole prerogative to extend the date of the EOI.

(ii) For seeking any clarifications regarding the EOI, the contact person is: -
Director (CA)
Telecommunication Engineering Centre (TEC),
6th Floor, 'Room No. 613,

Gate No.-5, K. L. Bhawan,
Janpath, New Delhi-110 001
Email Id: dirc1.tec@gov.in

Applications are to be submitted in written format at the above address/e-mail only. EOIs must be received not later than by 17:00 hrs on the specified date (within 1 month from the date of publication of EOI).

6.   **The criteria for short listing of successful applicant/bidder are**:

i)   The applicant should have sound financial performance with average annual turnover of INR 3 Cr or more for the last 3 years. (2018-19, 2019-20 & 2020-21). This shall be substantiated by submitting Balance Sheet and Profit & Loss Statement/Annual Report.

ii)   The applicant must have proven experience of successful completion of at least 2 similar assignments in the last 7 years to the last date of submission of EOI or the applicant has experience in the providing the solutions in the field of testing in Telecom sector.
Submission of completion certificate for the same is mandatory. The completion certificate shall bear client's name and address, value of the work executed by the consultant, Start and end of the assignment.

iii)   The applicant must have a multidisciplinary in-house technical team and expert staff available & shall submit the list and detailed CV's of key personal likely to be deployed on the project.

iv)   The applicant may associate with other firms in the form of Joint Venture (JV) or a sub-consultancy to enhance their qualification. Nature of association, whether Joint Venture or sub-consultant has to be clearly mentioned in the EOI and shall be substantiated by providing authorization letter in favour of the lead partner. The number of members in the JV shall not be more than 3.

7.   TEC can ask for clarifications as deemed fit to assess the eligibility of the applicant and will reserve the right to disqualify any organization and shall have the right to postpone, modify, cancel, or annul the aforesaid process at any stage at its sole discretion without assigning

any reason and shall bear no liability whatsoever consequent upon its decision.

8.   The applicant shall submit its Technical Solution along with Budgetary Quote for the project **"Test as a Service (Taas)"** in its own format but shall ensure that it has covered all technical requirements [all testing instruments costs (individual break up), Comprehensive Support cost **for 05 years after one-year Warranty**] and has taken care of all financial components.

Form-1: Applicant firm's Information Sheet

Information	
Applicant firm's legal name	
In case of JV, legal name of each partner	
Applicant firm's country of constitution	
Applicant firm's year of constitution	
Applicant firm's legal address in country of constitution	
Applicant firm's authorized representative in employer's country (if any) (name, address, telephone numbers, fax numbers, e-mail address)	

Form - 2: Joint Venture (JV) Information Sheet (If applicable)

Each member of a JV must fill in this form

JV Information	
Applicant firm's legal name	
JV Partner's legal name	
JV Partner's country of constitution	
JV Partner's year of constitution	
JV Partner's legal address in country of constitution	
JV Partner's authorized representative information in employer's country (if any) (name, address, telephone numbers, fax numbers, e-mail address)	

Form – 3: Technical Experience of Firm

A. List of Contracts showing experience of the firm

Sl. No.	Project Name	Project Period	Contract Identification and Title	Name, address, email, phone, fax and web address of Employer	*Total Contract Amount (Rs.)	If partner in a JV, specify participation of total contract amount		Brief Description of the services Executed by the Applicant firm's / member(s) of Applicant firm's	Country of Project Implementation (in reference to country of constitution of the consultancy firm)	
						Total	Percent of Total		Home	Abroad

*Please enter as many rows as applicable**

1. Applicant firm's must submit the completion certificate as evidence of the stated services. Such evidence shall be in client's letter head indicating address, telephone, email, web address and shall include the name of the Project, name of the employers, description of work, duration of Project and contract amount.

2. Please attach the completion certificates as the evidence of the stated services as Annexure-1 (a under the title 'Technical experience of firm)'

* **In case of Contract Amount value in any other country currency, it shall be converted to equivalent Indian Rupees by using Exchange ratio aplicable on the day of submissión/ prepararon of Technical Solution document.**

Form - 4 : Work Experience in Similar conditions*

List down the name of project /contract where Applicant firms has worked in similar conditions (i. e., Similar scope, government/semi government employer, tropical weather etc.)

Sl. No.	Name of Project	Contract identification & Title	Short scope of the assignment/ TOR	Type of Employer/ Client (Govt./ semi Govt.)	Country of implementation of service

*Please enter as many rows as applicable

1. Please attach the completion certificate as evidence of the stated services as Annexure-2 (a) for similar contract.

Form - 5: Financial Competence of Firm

5.1 Financial Strength

Each Consulting firm or member of a JV must fill in this form

	Financial Data for Previous 3 Years		
	Year 1:	**Year 2:**	**Year 3:**
1. Total Assets			
2. Current Assets			
3. Total Liabilities			
4. Current Liabilities			
5. Profits Before Taxes			
6. Profits After Taxes			

7. Net Worth [= 1 – 3]			
8. Working Capital [= 2 - 4]			

Please attach the documents listed below in Annexure-3 (a) under the title 'Financial Competence of Firm'

❑ Attached are copies of the audited balance sheets, including all related notes, and income statements for the last three years, as indicated above, complying with the following conditions.

- All such documents reflect the financial situation of the consulting firm or partner to a JV, and not sister or parent companies.

- Historic financial statements must be audited by a certified accountant.

Form – 5.2: Average Annual Turnover (Calculated as certified payments received for contract in progress or completed) for last 3 years

Each consulting firm or member of a JV must fill in this form

Annual Turnover Data for the Last 3 Years				
Sl. No.	Year	Certified Payment (in Currency of contract)	Exchange Rate	Indian Rupees Equivalent
		Average Annual Turnover:		

1. **Please attached the payment certificate as Annexure-3 (b)**

Form-6: Available professionals

The Applicant firms should provide the list of suitably qualified professionals to meet the requirements specified in EOI. The data on their experience should be supplied using the form below.

Brief Description of the professionals of the consultancy firm:

Sl. No.	Description	Total Nos.	Educational Qualification		Professional Experience: No of professionals having experience in related field	
			No. of Postgraduate Degree holders (PhD, MS or equivalent)	No. of graduate degree holders (Bachelor or equivalent)	Less than 5 years	5 years and above
1.	Total number of professionals :					
	Regular:					
	Part-time:					

1. Please attach CV (Sample can be found at the last page of this form) with photograph and educational certificates
   (Bachelor and higher degrees) of each key professional [As Annexure-4 (a)].

2. Please attach experience certificates or letters from previous and current employers as evidence of professional experience [As Annexure-4 (b)].

Form-7: Management Competente

Please answer each question in one paragraph of 3-5 sentences

1. Describe standard policies, procedures and practices that your entity has to assure quality interaction with clients and outputs. Please state if your company is ISO certified.

2. How will your firm/ consortium handle complaints concerning the performance of experts or quality of the reports submitted for this assignment? What internal controls are in place to address and resolve complaints?
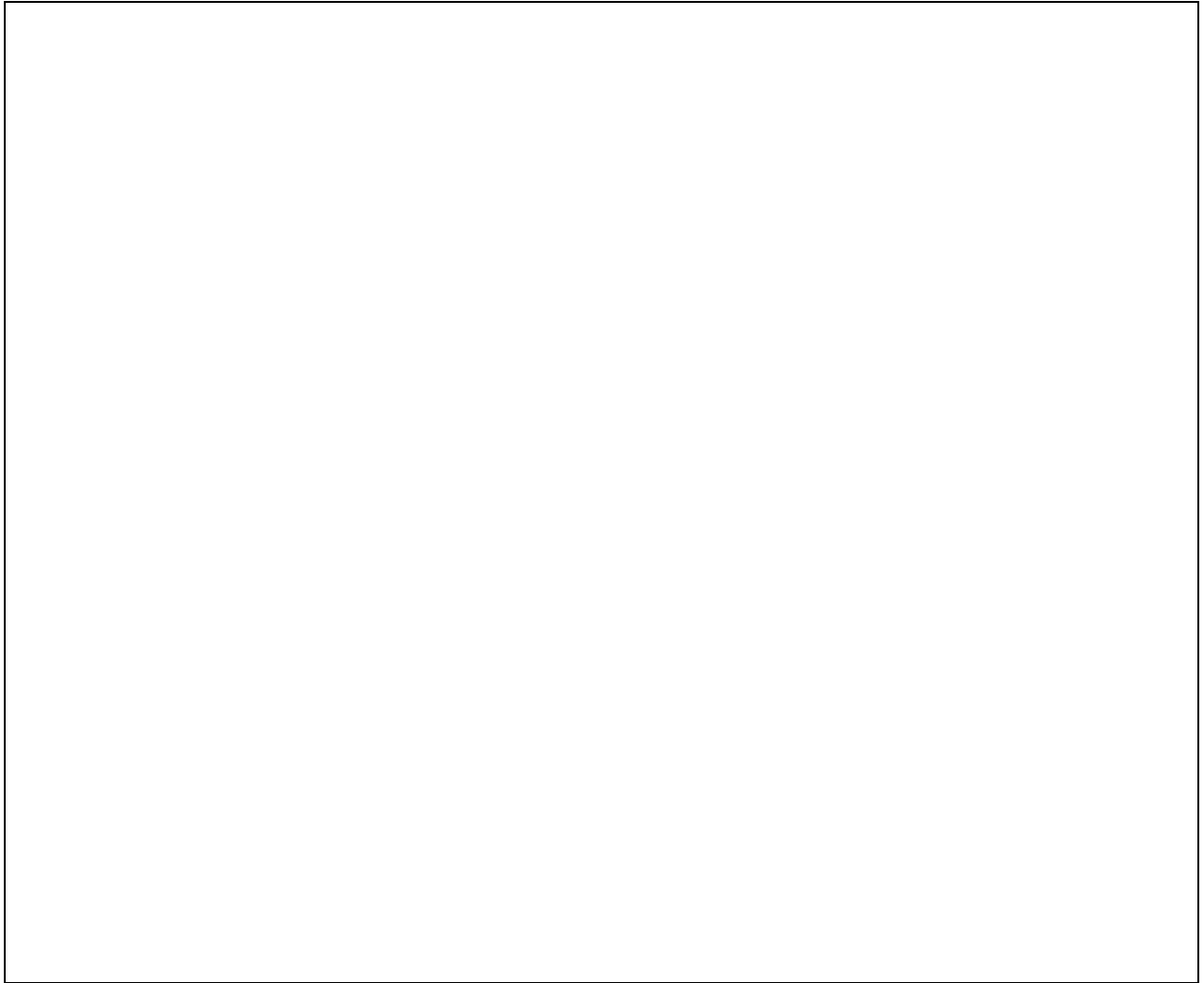
3. How will you ensure the quality of your firm's/ consortium's performance over the life of this assignment?

4. Describe standard policies, procedures and practices that your firm has put in place to avoid changes/ replacements of personnel and to ensure the continuity of professional services once contracted.

5. Describe what social protection practices you have in place to safeguard the well-being of your proposed experts? Specifically describe arrangements you have in place for medical, accident and life insurance coverage during the assignment.

Form-8: Comment/Suggetion on Scope of Service
(Maximum 1000 characters)

Form-9: Key Considerations in approaching this assignment (not more than 10,000 characters summarizing approach and methodology)

Resume of Proposed Personnel (Sample)

Position			
Personnel information	**Name**		**Date of birth**
	Professional qualifications		
	Educational Qualification with major		
Present employment	**Name of employer**		
	Address of employer		
	Telephone		**Contact (manager / personnel officer)**
	Fax		**E-mail**
	Job title		**Years with present employer**

Summarize professional experience in reverse chronological order. Indicate particular technical and managerial experience relevant to the project.

From	To	Company / Project / Position / Relevant technical and management experience

**Please insert as many rows as applicable.

Concept Paper –"Test As A Service(TaaS)"

Towards a Global leadership by Indian regulators(The major reform)

By (i) Shri Prasanth Kumar,DDG(MTCTE),TEC
(ii) Shri S.K.Arya, Dir(CA),TEC

1. Why Lab As a Service ?

1.1   Many organizations have determined the keys to competitiveness now require simultaneously accelerating release cycles and increasing quality. They've also learned achieving these goals is a tough challenge. It requires a retooling of processes and infrastructure to develop and test continuously. Hence they are reengineering their entire approach to product and service delivery using Agile development. Lab As A Service enables faster time to market, robust effectiveness of test case execution, managing of test cases, reporting and certification generation. Lab time delivers real time result dashboarding for faster completion and acceptance. It is high time that regulators should work in tandem with researchers to meet the quick time lines in a competitive world. The limited lifespan of technologies is compelling the regulators to be as fast asresearchers.

1.2 This is envisaged to have any kind of test from anywhere in the world. If a Netherlands company wants to test his product, he just has to connect his product to our portal and intern TAAS (Test as a Service) portal shall search and connect the lab online and also facilitate the contract between lab and test house. If it is a destruction test like Safety EMI/EMC, the availability of test parameters can be seen on portal and can choose the test house and establish contracts through this portal and courier the sample. That's all it takes. After sometime OEM can print his certificate. This is something like OLA , UBER model.

1.3 It is easy and accessible, simple and ubiquitous. The solution is very affordable. This will make India as a competitive test bed for ICT products and attract the global attention. Apart from serving the globe with test as service, it would boost the confidence of the start-ups and Indian OEMs. Our labs shall have access to the global technology for further innovation.
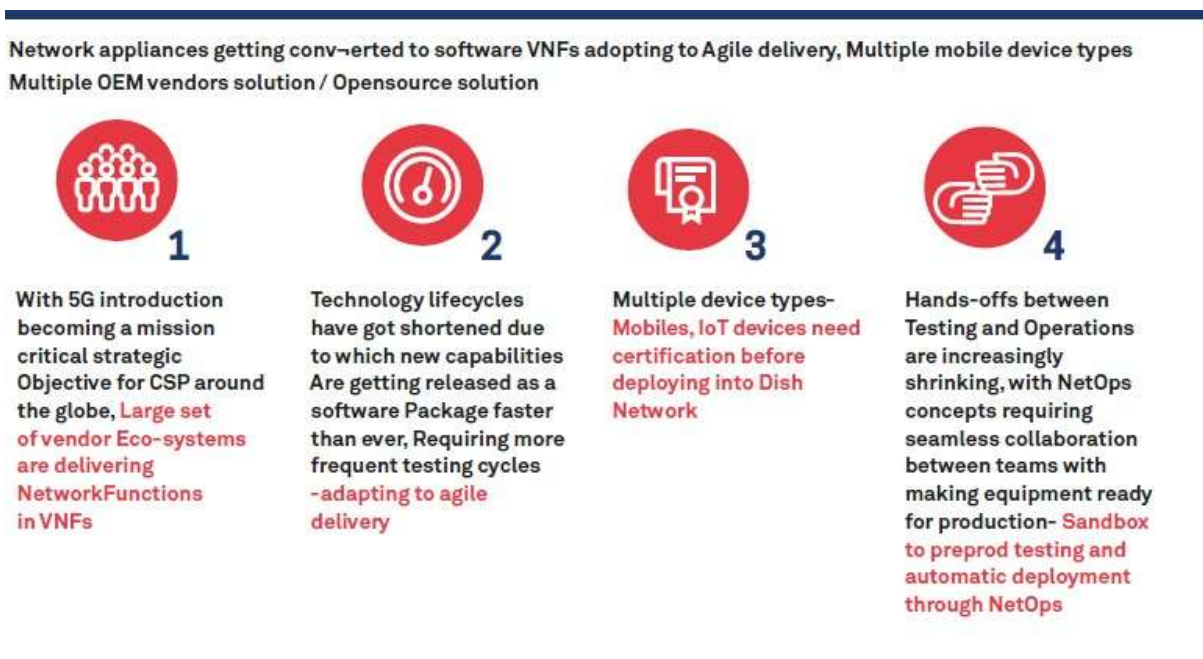
1.4 The true story behind American engineering innovations are technical LABs. RCA labs (USA) in the 1900 to present Google LABs have created success story one after other. The engineering history of many nations is driven by LABs followed by manufacturers.

1.5 The latest advances in industry have been accomplished within the 4th Industrial Revolution, mostly noted as Industries 4.0. This industrial revolution is boosted by the application of Internet of Things (IoT) technologies into the industrial contexts, also known as Industrial Internet of Things (IIoT).In the Research and Development business for high-end electronic products, there is a need for efficient and reliable test methods.

To reduce the cost and increase the quality there are significant benefits to fully automate the process with elements from Industry 4.0. There is a need of best testing services for industrial automation and Industry 4.0 applications which includes functional, performance, exploratory, security and compatibility testing.

1.6 Telecommunication and ICT is rapidly changing agile technology. So there cannot be traditional strategies for India to become leader in the sector which in turn can dominate in geopolitical sphere. Network elements, devices, platforms, are exceedingly becoming software defined. While telecom elements in the network are moving from 4G to cloud-native 5G, OEM vendors are making their products / solutions from legacy to virtualized network functions (VNF). The delivery trends in evolving 5G and other emerging technologies , reduced technology life cycle , emerging multiple types of devices, is creating a demand for seamless collaboration between teams with making equipment ready for production and network operators. Hence regulators have to come up with a policy of sandbox both in spectrum and networks for preproduction testing and automatic deployment in the networks. Test and certification should be a seamless action along with R&D.

Agile delivery trends in evolving 5G technologies(shown picture below)

Network appliances getting conv¬erted to software VNFs adopting to Agile delivery, Multiple mobile device types Multiple OEM vendors solution / Opensource solution

1
With 5G introduction becoming a mission critical strategic Objective for CSP around the globe, Large set of vendor Eco-systems are delivering NetworkFunctions in VNFs

2
Technology lifecycles have got shortened due to which new capabilities Are getting released as a software Package faster than ever, Requiring more frequent testing cycles -adapting to agile delivery

3
Multiple device types- Mobiles, IoT devices need certification before deploying into Dish Network

4
Hands-offs between Testing and Operations are increasingly shrinking, with NetOps concepts requiring seamless collaboration between teams with making equipment ready for production- Sandbox to preprod testing and automatic deployment through NetOps

Some of the test tools and test frame work for the networks in the changing technological regime is under identification by the industry. The onboard deployment of test tools are becoming essential since there will be frequent change in software upgradation as the network is becoming more of software defined.

2. Benefits:

It offers a cost-effective test environment on an OPEX basis. It includes solution validation testing, proof of concept (POC) testing, user equipment validation against various network access and applications, as well as early testing of user equipment and applications during the R&D stage

Various Case studies:

2.1 Test and lab automation software can provide testing organizations with the technology platform to create successful, scalable and sustainable Lab as a Service (LaaS) clouds.

LaaS clouds will not only deliver impressive CAPEX and OPEX savings, but by leveraging the full breadth of automation frameworks, they also pave the way for automation of the whole testing process. This leads to additional business benefits such as speedier time to market, agility in responding to market and customer changes, and increased competitiveness.

2.2 The state of the art for software that enables LaaS consolidation has advanced dramatically. Modern LaaS automation software should deliver a broad range of capabilities that enable sustainability of the LaaS initiative, including:

(i)   Centralized, live infrastructure and resource inventory that is customizable to make it easily searchable

(ii)   Inventory-aware test topology design

(iii)   Shared, calendar-based resource and topology reservation

(iv)   Connectivity mapping and automated connectivity control

(v)   Easy to create automated provisioning tasks

(vi)   Non-programmer friendly automation workflow creation based on a library of highly reusable test objects that can be created from a wide variety of sources and leveraged to create:

(a) Auto-discovery, auto base-lining and other automated maintenance

routines

(b) Full test automation workflows: Another important concept for sustainable automation is that the platform for managing the test lab should avoid the pitfall of using monolithic and fragile script-based approaches to automation, which cannot scale due to their high maintenance costs. An object-oriented platform that captures and manages all inventory resources, test topologies, provisioning actions and testing tasks in a library of highly re-usable, easy to update object building blocks is the only architecture that ensures automation scalability and long-term and cost-effective sustainability of LaaS cloud administration.

2.3 Future wireless networks will constitute a distributed intelligent communications, sensing, and computing platform. Enhanced Mobile BroadBand (eMBB), massive Machine Type Communications (mMTC) and ultraReliable Low Latency Communications (URLLC) are the three fundamental usage scenarios to meet the next generation mobile networks (5G) as depicted in figure 1.
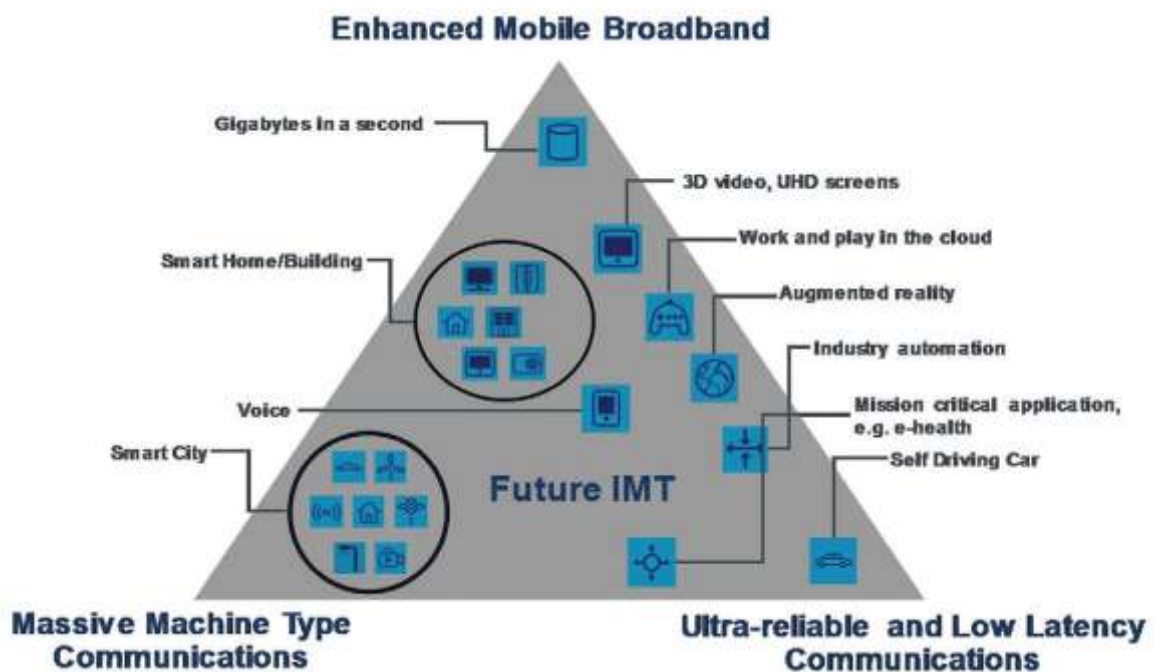
Figure-1

2.4   The objective of 5G is to accommodate numerous over-the-top applications through slicing, massive carrier aggregation, and dynamic bandwidth provisioning. This will in turn enable faster innovation, better user experience and richer Telco use cases portfolio.

3. Global trends in Test bed and test bed Federations:

Some of the testbeds operational in other economies are as mentioned below:

(a)   Fed4FIRE+: **Fed4FIRE+** was a project under the European Union's Programme Horizon 2020. Based on the legacy of the Fed4FIRE top Internet and Network-related experimentation federation, Fed4FIRE+ has enhanced the largest federation worldwide of Next Generation Internet (NGI) testbeds, providing open, accessible and reliable facilities to a wide variety of different research and innovation communities and initiatives in Europe, including the 5G PPP projects and initiatives. (Source: https://www.fed4fire.eu/) The hosted testbed projects are working in multiple research fields such as: wired networking, 5G, IoT, Software Defined Networking (SDN), and Cloud Computing.

(b)   OneLab: OneLab is a consortium consisting of five different higher education and research institutions. These institutions are devoted to making testbeds used for network computer communications available to enterprises, scientific researchers, and educators. Sorbonne Université (SU), Inria, iMinds, TU Berlin, and the University of Thessaly have been putting in place the building blocks since 2006(source: https://onelab.eu/team). OneLab testbeds are focused on Internet protocols, Wireless networking and Cloud.

(c) GENI: The Global Environment for Network Innovations (GENI) is a facility concept being explored by the United States(US) computing community with support from the National Science Foundation. The goal of GENI is to enhance experimental research in computer networking and distributed systems, and to accelerate the transition of this research into products and services that will improve the economic competitiveness of the United States (source: https://en.wikipedia.org/).

4.0 LaaS Architecture
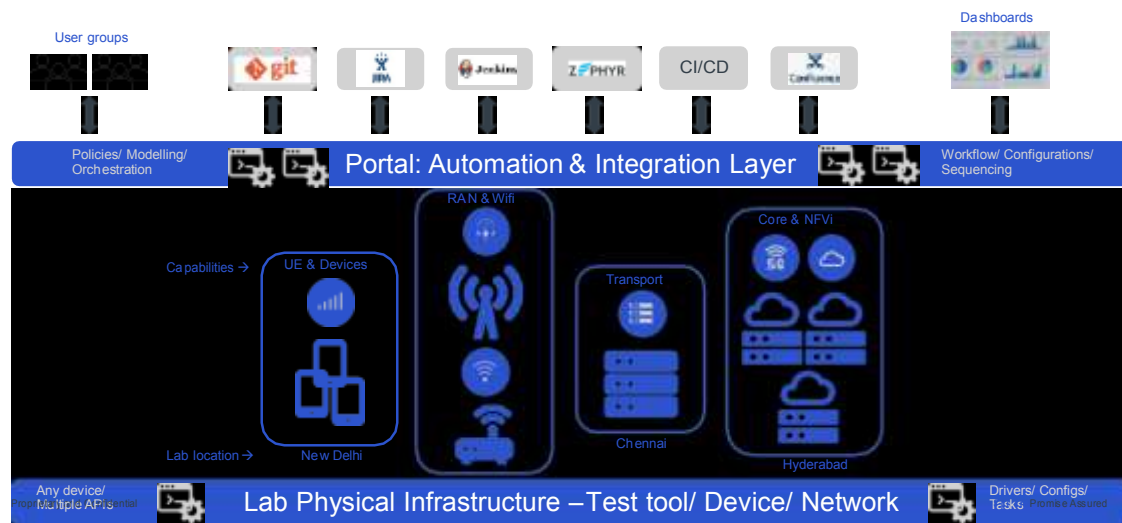
4.1 As shown in the below picture, a common portal i.e., a web portal, needs to be available for managing multiple labs. Each lab can have a unique or collection of capabilities i.e., New Delhi lab can have the capability to test Mobility core, Hyderabad lab can have the capability to test RAN, and similarly other location labs can be used for specific domain testing.

4.2 To utilize the test resources, any user need not visit the respective lab but can login to this portal to identify the testbed needs and utilization and accordingly plan. To an extent, the user can perform the tests also from his location to a remote lab with this portal.
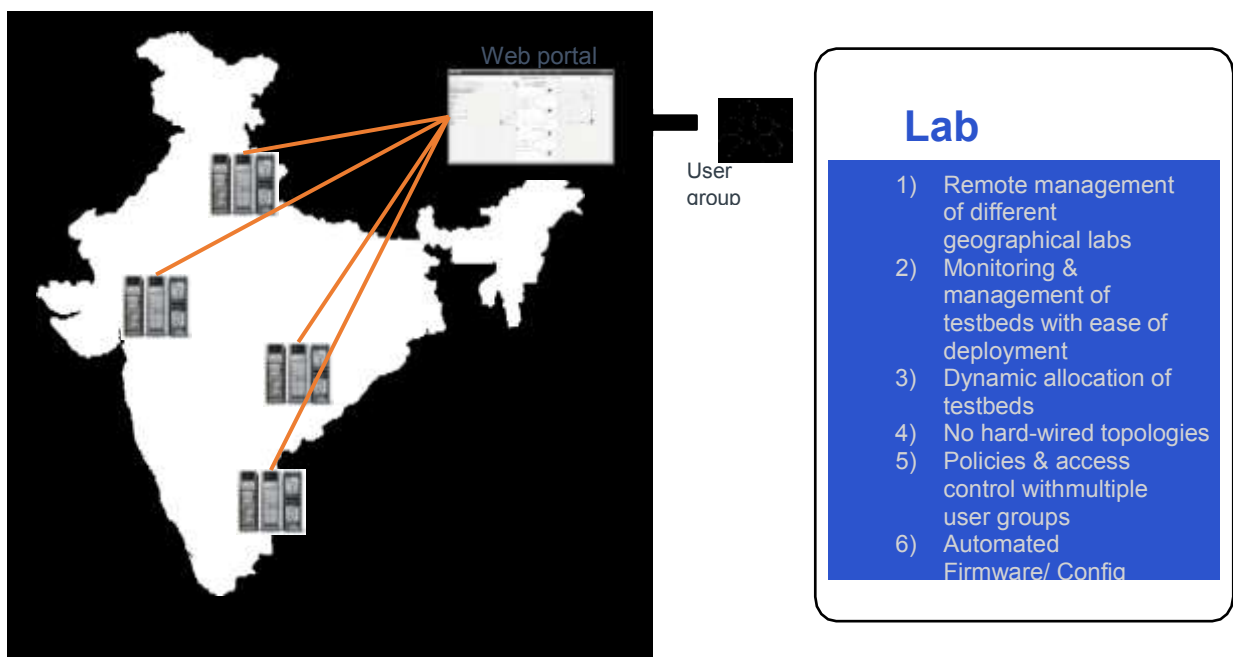
Once the user identifies the lab to be utilized for testing, the portal should be self-servicing to create & allocate the required testbed for the user for allocated time, the allocation of the testbeds needs to be dynamic with no human intervention or very minimal human intervention. Each allocation needs to be time bound so the resources are utilised to the maximum and gets evenly allocated to multiple users requesting for it.

4.3 With policies & access-control, the users are allowed to access only the allocated lab and allocated resources. With triggered events & automated events, portal can be used to load the required firmware, configurations, builds to the allocated testbed remotely. In the pic shown here, the users should have the access to the resources from the specific **Folder** corresponding to their lab location

4.4 The lab management solution needs to support a robust inventory system to store all the necessary information of the devices in the lab, that should include make, model, management, IP, credentials, access details, modules, ports, physical location – lab, rack, and connectivity details. The solution should also have the capability to enable, disable the ports, links on the devices to build the testbeds and topologies dynamically whenever it is needed by the user for test.

In addition, the solution should have the capability to perform proactive monitoring capabilities which does the basic check of device online status, firmware & configuration check and take the necessary corrective action or inform the lab supervisors group.

5.0 Following test capabilities are expected from TAAS:
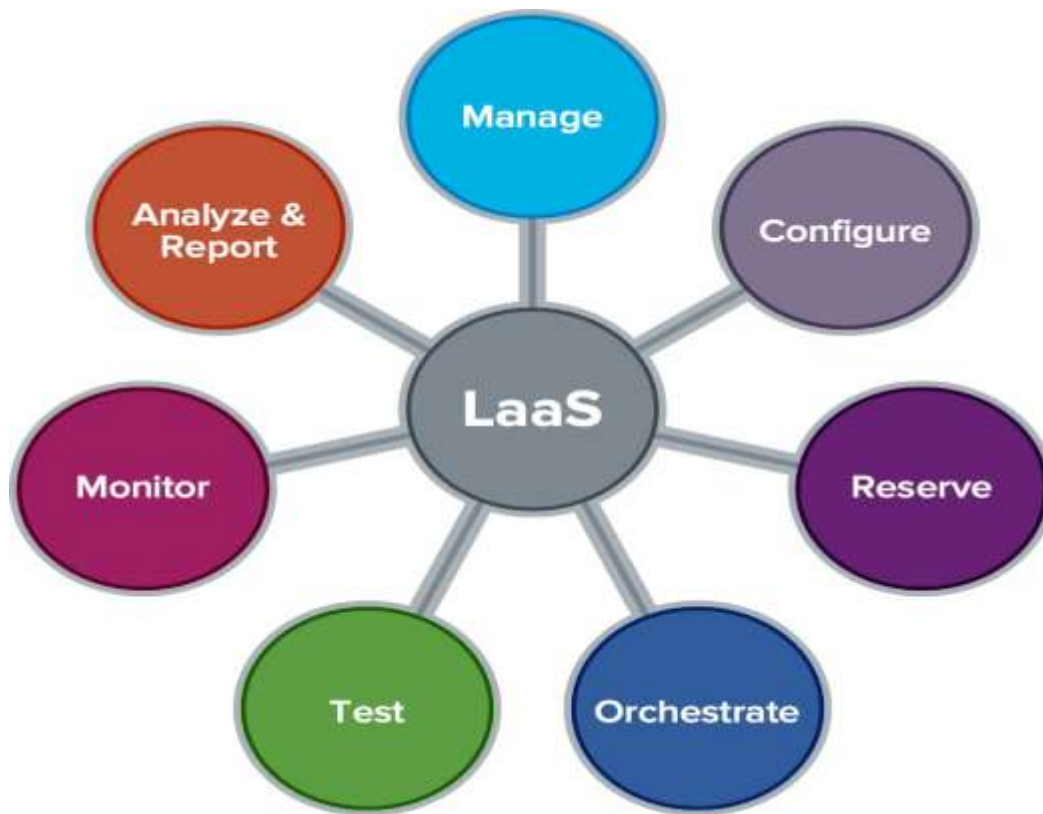
Lab As a Service Building Functions:

Lab As A Service is the Key to Modernized Lab Experience

5.1 As per the above blocks LAAS can have the following functions

- (i) Remote management and access to different labs across the country
- (ii) Testbed connectivity details
- (iii) Resource inventory
- (iv) Test cases and Execution
- (v) Data collection and reporting
- (vi) Test result report and dashboard
- (vii) Automation
- (viii) Test Schedule management
- (ix) Utilization reporting in terms of test bed and user
- (x) Vendor evaluation and govt validation
- (xi) Print certificate from anywhere.
- (xii) Aggregation of test eco system
- (xiii) Single window system.
- (xiv) Know lab capacity availability from anywhere in the country.
- (xv) Ubiquitous presence of the labs
- (xvi) Web enabled software, integrated workflow management with data-

updating on centralized server

(xvii) Solution capable of working on mobile platforms

(xviii) Scalable for integration with multiple laboratories as brought out under the folds of the TEC in future.

(xix) Configurable for the coverage of new products & processes

(xx) *Hosted on NIC or Government Server as decided by the TEC and able to meet all necessary security audits*

(xxi) Technology used should be capable of being updated or aligned with advancements in future

(xxii) Data Analytics facility

(xxiii) Security of data including encryption

(xxiv) Export tool to export or generate reports in other formats like csv, excel, etc.

(xxv) History or log management (to ensure that all the actions or events are stored in the system and can be referred when required)

5.2 Following additional test capabilities are envisaged in TAAS in view of current requirement of 5G testing and Make in India Initiatives:

a. 5G Core Testing Tool

 i. 3GPP Compliance Testing: To verify the exposed interfaces & test the n/w function comply as per the 3GPP specifications

 ii. Security Testing: To Verify the 5G SCAS security feature of the N/W function

iii. Isolated Node Testing

        i. To Verify Single N/W Function by emulating the other N/W functions

    b. Adjacency Testing

        i. To Verify Combo N/W functions by emulating the other N/W functions

    c. Negative/Failure Testing

        i. To Verify the different N/W function performance during negative/failure scenarios

iv. Performance/Capacity Testing : To Verify the capacity/performance limit of the 5G core N/w function

 v. End to End testing : To verify the end to end service via real 5G Core such as Voice, Data, Video etc

b. 5G Cloud Testing Tool

i. Cloud Readiness Assessment

This Assessment includes the benchmarking of the cloud performance such as CPU, Memory and network. In addition, with Soak Testing and comparison trend analysis.

ii. NF Threshold Testing

iii. NF Resiliency Testing

c. 5G Radio Testing Tool

i. Radio Conformance Testing

ii. This Assessment includes conformance testing of Radio as per 3GPP relevant standards

iii. Radio Performance Testing

a. Assessment to test the radio performance/capacity by simulating multiple UE's to determine the threshold of the radio.

iv. Massive MIMO & Beam Forming Testing

v. To validate the radio for Massive MIMO & Beamforming with 3D channel models, Data Performance with varying RF channel conditions, power sweep, SINR & MIMO, Multi-User MIMO, Handover & Interference with 3D channel models

vi. Open RAN Testing

OPEN RAN testing as per the different Working group and Interoperability. In addition, testing OPEN RAN in terms of performance and feature testing.

6.0 Conclusion:

6.1 The special attribute that is contemplated in this proposal is unique solution where mechanical , safety , EMI/ EMC test results also can be collected on to this proposed platform by connecting with the API of the servers owned by the labs. This needs a slight policy intervention and asking labs to provide APIs and onboard on the platform. In this connection wider consultations with the labs owners in India has been made where there is a consensus as well as technical feasibility is observed. This solution will provide a platform for wide stakeholder on cutting-edge applications of 5G, IoT, Cloud technologies, Next Generation Internet and more

The federated LABs being contemplated by ITU is not having such features.

6.2 There are legal issues involved in such issues. For example in Germany I14Y is the federated LAB created through a consortium of OEMs and LABs and this is created only for Open RAN and 5G software testing. In such cases the conflict of interest management is difficult. Many such commercial and legal issues are becoming hurdle in the global thinking today. It has been studied and this proposal is attempted while addressing all such issues. It shall be real **TEST IN INDIA** achievement and it shall be a **first of its kind on this globe**. India can rise its flag by creating such **innovative Conformation Assessment Eco System**. This can be proudly announced by the Hon'ble PM.

6.3 This shall be biggest **REFORM** and shall eliminate all bureaucratic hindrances to the industry. All that we need to operate this is with a skeleton staff. Existing officers can be deployed in evangelizing the development of labs across the country. DOT may fund PPP model labs and ask these officers to oversee the labs management and operations.

6.4 Budget and way forward :

(i) To develop this platform and bring things on a working stage it is require a considerable investments**.** It needs a dedicated team of young professionals. Some of the tools are available in the market which can be acquired through <u>a public procurement mechanism</u> or <u>through telecom PSUs</u> instead of totally developing inhouse.

      (a) In the first stage, EoI may be placed in the public for giving information assistance.

      (b) based upon the distilled information and requirements, Tender may be placed in 2nd stage

(ii) Alternative Model:

Alternatively, though it is a long process, Certification Bodies (CBs) may be allowed to own such Test As A Service platforms in future which shall be indirectly governed by TEC in accordance with government of India Conformity Assessment public policy. DOT may give **seed funding** to make CBs as public private owned institutions. We may initially start working with IITs or Telecom PSUs. This would increase number of such platforms and create a competitive environment which in turn improve efficiency and price competitiveness. TEC officers can be on the board of envisaged CBs to guide and mentor. The aggregation of test labs on to this platforms shall become a common research warehouses where knowledge sharing and collaborative research shall happen. This shall be an effective seed for Indian economic growth happens. This is not

invention of a new wheel but it is a proven formula that worked in the engineering history of all economic giants. In this approach we are just leveraging on platform technologies, AI/ML to create an aggregation of knowledge.

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