

# Summary of the ITU-T ETSI IEEE Joint SDOs Brainstorming Workshop on Testbeds Federations for 5G & Beyond

**MONDAY, 15<sup>TH</sup> MARCH 2021**



# Overview of ITU-T SG11 testbeds related activities (1)

- *The focus of the presentation was an overview of the SG11 structure, the activities and the developed recommendations in the area of Conformance and interoperability testing, combating counterfeit ICT and mobile device theft. During the last study period following Recommendations were published or are under development:*
- *Testing on the distributed model networks (ITU-T Q.3900, ITU-T Q.4060)*
- *Signalling for probes to be used for remote testing (ITU-T Q.3056)*
- *Draft ITU-T Q.API4TB "Open APIs for interoperable testbed federations"*
- *Performance Measurements according to ITU-T Q.3930 and considerations in Benchmarking*
- *Performance requirement specifications for reliable comparison of measurement figures*
- *Internet performance measurements (ITU-T Q.3960 and Q.Sup71)*
- *PSTN/ISDN emulation and IMS/NGN Reference Benchmarking according the Q.3932.x series*
- *Reference benchmarking, background traffic profiles and KPIs for VoIP and FoIP in fixed networks according ITU-T Q.3933*

## Overview of ITU-T SG11 testbeds related activities (2)

- For the Reference Model and APIs for Testbeds Federations for 5G & Beyond and its Required Ecosystem are currently two drafts relevant:
  - *Draft ITU-T Q.API4TB "Open APIs for interoperable testbed federations"*
  - *Performance requirement specifications for reliable comparison of measurement figures*

## S1\_2 ETSI TC INT Brief Overview about the Group, and Summary of Testbeds related Activities

- Short Introduction of ETSI as ICT standardization Organization and TC INT (Core Network & Interoperability Testing)
- ETSI TC INT has in its mandate several activities
  - Interoperability
  - Conformance
  - Autonomic Management & Control
  - Performance
  - Security Testing and Resilience

## S1\_2 ETSI TC INT Brief Overview about the Group, and Summary of Testbeds related Activities

### New Activities in TC INT

- AI in Test Systems & Testing AI Models, followed by AFI WG
- Methodologies for E2E Testing & Validation of Vertical Applications over 5G & Beyond networks, followed by 5G\_Vertical WG
- Description of Test Requirements and Approach for E2E Federated Testbeds, which is a joint activity among AFI and 5G Vertical WG and with ITU-T SG11

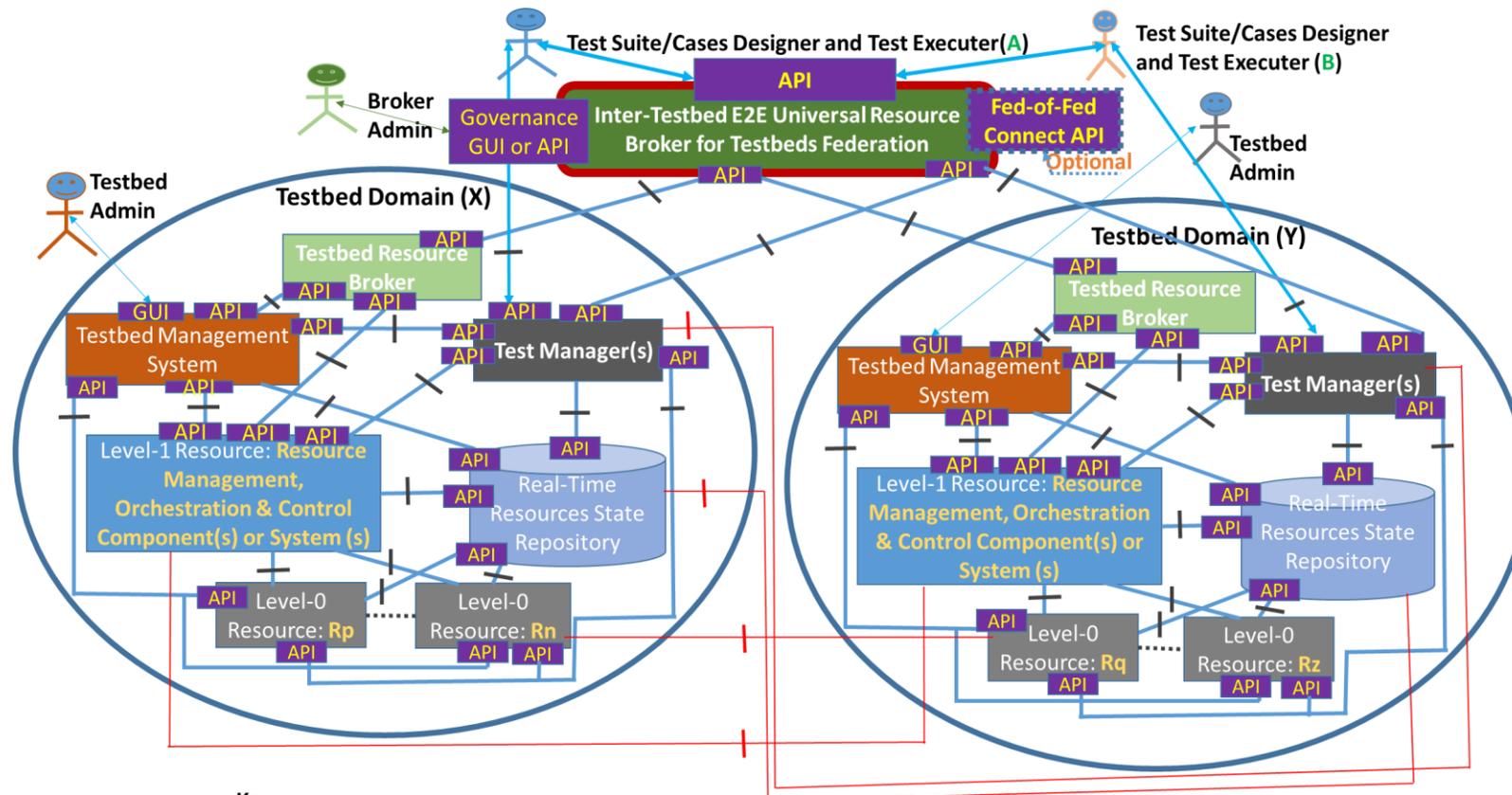
## S1\_2 & S1\_3 Presentation/Discussions on the Reference Model and APIs for Testbeds Federations for 5G & Beyond

- *Presentation/Discussions on the Reference Model, Associated Reference Points/APIs and the Key Players for Testbeds Federations for 5G & Beyond — being Standardized by ITU-T SG11 & ETSI TC INT*

## Points Covered and Discussed w.r.t Testbeds Federations Model being developed for Standardization by the SDOs/Fora

1. Reference Model for Testbeds Federation: Generic Federated Testbed Model
2. Specializations of the Testbed Domain Concept
3. "Federations of Federations", a level above the level of the Universal E2E Resource Broker
4. Abstraction Levels for Resources in a Testbed, and how individual Resources may take part in a Test Scenario
5. Types of APIs for Testbed Federations based on the Testbeds Reference Model; and APIs Specifications, Implementations and Invocations Approaches
6. Examples of Testbeds Federation APIs Requirements
7. Roles of Various Stakeholders to the Emerging Ecosystem around the Testbeds Federation Reference Model, its APIs and its Instantiations using various Testbeds that get federated
8. Summary of the Objectives of this Workshop w.r.t Stakeholders Engagement around the Testbeds Federation Reference Model and associated Ecosystem to emerge

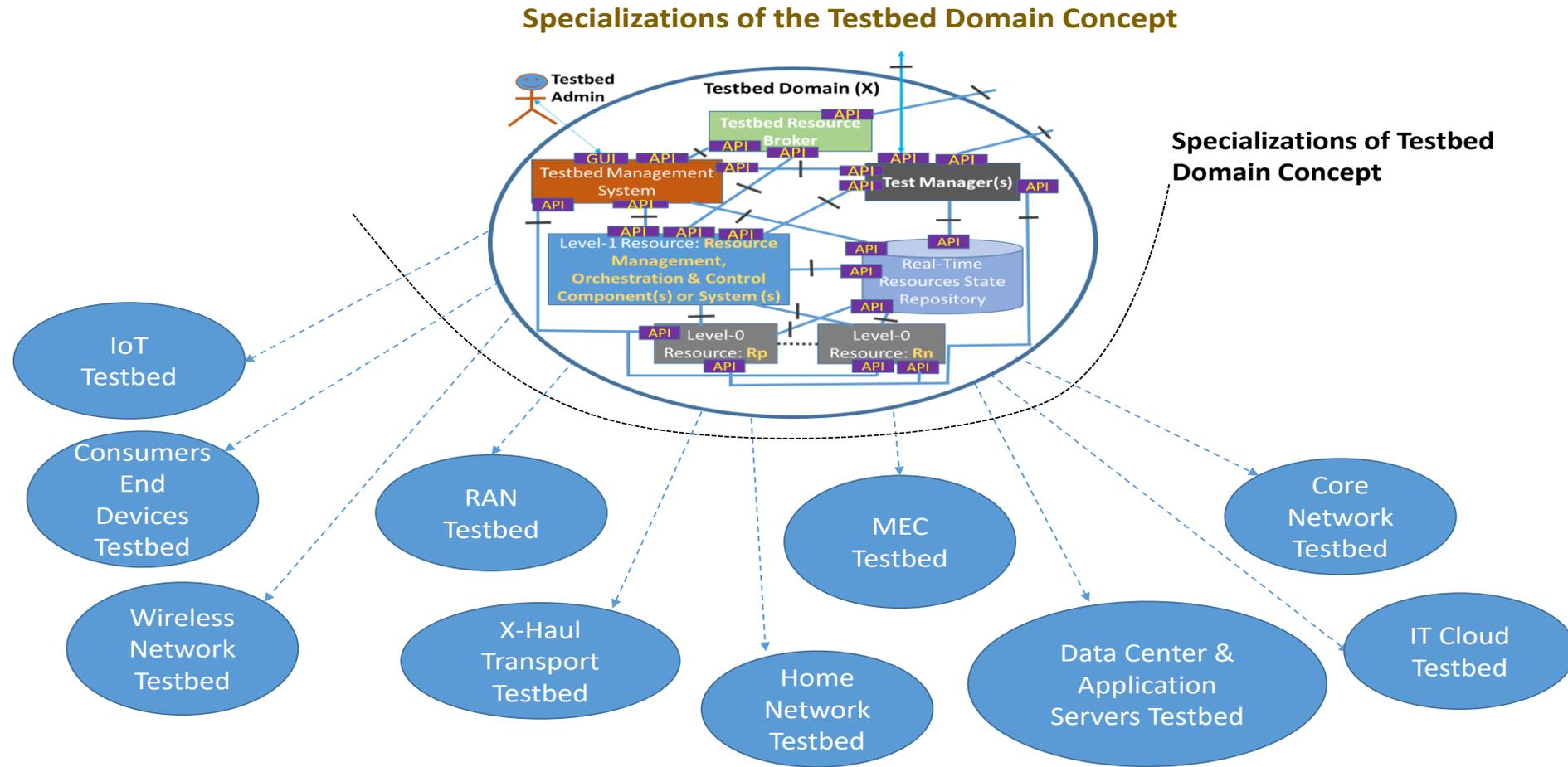
## Reference Model for Testbeds Federation: Generic Federated Testbed Model



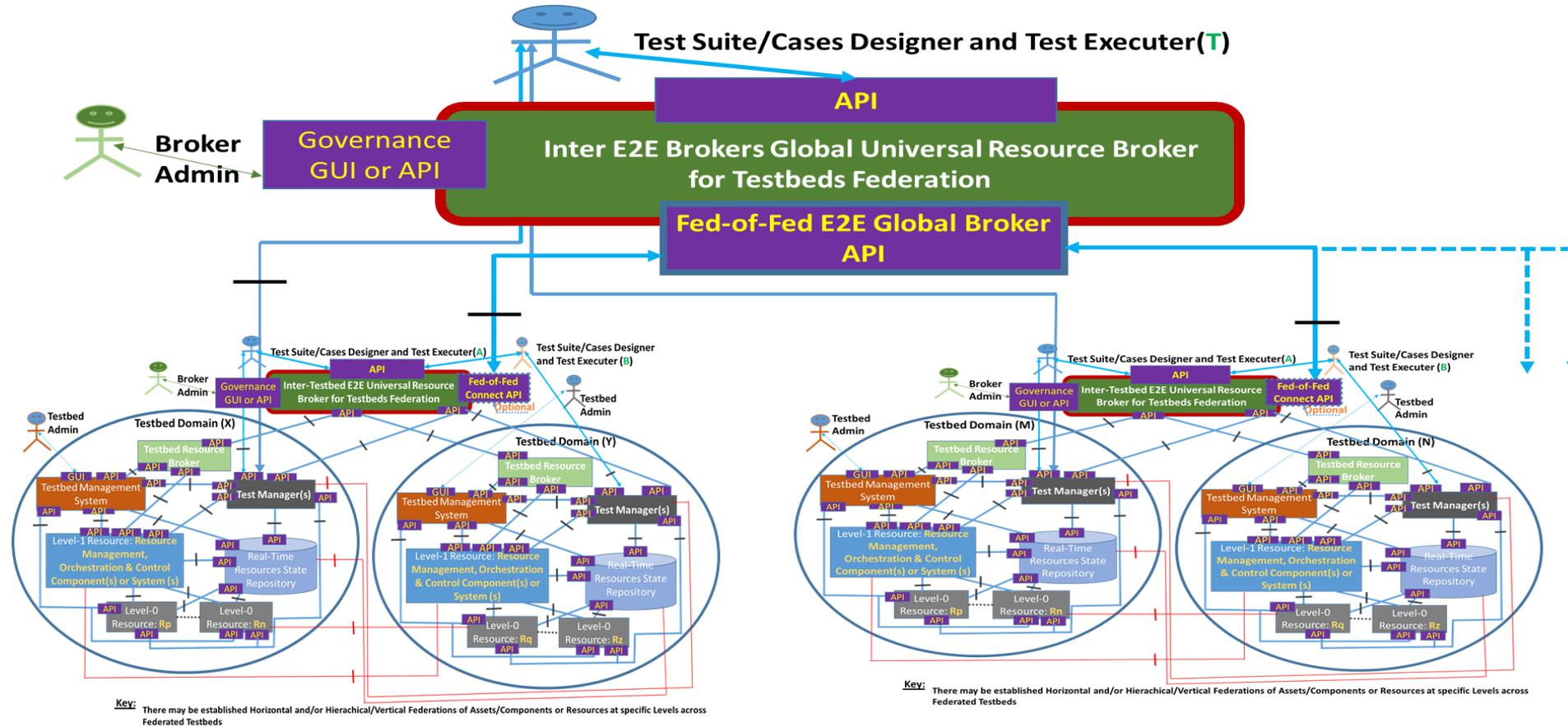
**Key:** There may be established Horizontal and/or Hierarchical/Vertical Federations of Assets/Components or Resources at specific Levels across Federated Testbeds

**NOTE:** The APIs shall be named (to have a way to distinguish them) and we shall start describing the APIs and how the Generic APIs get extended (specialized) by Testbed Type specific APIs and how Generic APIs make calls to the Testbed Type specific APIs. Elements of the APIs for Security Perspectives should be added, as well as other security and Trust oriented perspectives. Non-technical perspectives, e.g. cost of providing “Testbed-as-Service”, must be considered in defining the APIs

# Specializations of the Testbed Domain Concept



# "Federations of Federations", a level above the level of the Universal E2E Resource Broker



## Roles of Various Stakeholders to the Emerging Ecosystem around the Testbeds Federation Reference Model

### Looking at the following aspects for Consideration:

1. Stakeholders that need to be engaged to play specific in the Emerging Ecosystem around the Testbeds Federation Reference Model, its APIs and its Instantiations using various Testbeds that get federated
2. Summary of the Objectives of this Workshop w.r.t Stakeholders Engagement around the Testbeds Federation Reference Model and associated Ecosystem to emerge

### Stakeholders to be engaged:

- **SDOs/Fora, Research Communities/Researchers on 5G and Beyond, Industry Users of Testbeds, Testbeds Suppliers for 5G Testbeds and other Testbeds, CSPs & Enterprises, Infrastructure Vendors/Suppliers for ICT and Verticals, ISVs, Open Source & Open Hardware Projects, Regulators, Owners of Existing Testbeds and Platforms for 5G& Beyond, and any other interested parties**

## Roles of Various Stakeholders to the Emerging Ecosystem around the Testbeds Federation Reference Model (Cntd....)

**Examples of Potential Roles of certain Stakeholders (Objectives on why engaging the various Stakeholders at this First Joint SDOs/Fora Workshop) :**

- **SDOs/Fora:** Can potentially share the burden on APIs Standardization and on Roadmaps in a harmonized and collaborative way
- **ALL Stakeholders:** Help contribute to capturing Requirements to be fulfilled by the Testbeds Federations APIs
- **Testbeds Suppliers, CSPs, Enterprises, Infrastructure Vendors, ISVs:** Help contribute to Derivation of Potential New Business Models for Testbeds Suppliers that derive from the Testbeds Federations Reference Model
- **5G& Beyond Research/R&D Communities:** Bring experiences to the discussions of the Reference Model and APIs Specifications and contribute what may have been achieved already in this area of Testbeds Federations—with respect to existing API implementations by Research communities and by the Industry as well
- **Owners of Existing Testbeds and Platforms for 5G& Beyond:** Embark on Transformation or Evolution of Existing Testbeds (Industry and Potential Research Testbeds as well) and Federation APIs to meet the Requirements of the Testbeds Federation Model being standardized. Make Efforts on the Instantiations of the Reference Model in Building Industry-Grade New Testbeds and/or Transformations of Existing Testbeds
- **Open Source & Open Hardware Projects:** Help contribute to the Building of Open Networking Platforms (ONPs) Testbeds that conform to the Testbeds Federation Reference Model and its associated APIs. Also make efforts on the Instantiations of the Reference Model in Building Industry-Grade New Testbeds and/or Transformations of Existing Testbeds

## S1\_3 IEEE INGR Testbeds WG Brief Overview about the Group, and Summary of Testbeds related Activities

- *The presentation gives an overview of the IEEE INGR Testbeds WG and the objectives of the working group. One of the ideas of the testbed is to include external stakeholders and to talk to non-traditional players, standardization bodies open source communities.*

## S1\_3 IEEE INGR Testbeds WG Brief Overview about the Group, and Summary of Testbeds related Activities

### Conclusion & recommendation

Technology Gaps	Potential Way Forward
Lack of Scale	PPP (Government, industry and academia cooperation; cooperative approach from the existing testbeds)
Proliferation of specialized (vertically) testbeds without common elements	Cooperative approach from the existing testbeds; open source contribution, workshops for engagement, and professional community engagement
Lack of 5G feature (eMBB, mMTC, URLLC) optimized experimentation platform	Open source hardware and software platform, (white-box component from OEM or equivalent). Well defined external facing APIs for vendor provided implementation/testbed management tools
Lack of inter-testbed cooperation	Introduction of certification on testbed vertical compliance and interoperability to promote cooperation and component reuse. Standardization of testbed building blocks
Lack of use cases	Public events, such as hackathons, exhibitions, school level and university (UG/G/PG) research promotion in partnership with industry.
Lack of platform for universal data sharing	Promotion and demonstration of the value/requirement of the data generated from users, applications and networks; develop technology and business models for data sharing along with standard (certain level of commonality, while generating or translation)
Lack of skills	Establish dedicated testbed for skill enhancement. IEEE to provide online webinar to facilitate live event, if possible from a testbed site.




## Presentation/Discussions on the Reference Model and APIs for Testbeds Federations for 5G & Beyond

- The presentation gives the standardization aspect of the reference model for federated testbeds for 5G and beyond. The main topics presented during the presentation were:
  - Reference Model for Testbeds Federation: Generic Federated Testbed Model
  - Specializations of the Testbed Domain Concept
  - "Federations of Federations", a level above the level of the Universal E2E Resource Broker
  - Abstraction Levels for Resources in a Testbed, and how individual Resources may take part in a Test Scenario
  - Types of APIs for Testbed Federations based on the Testbeds Reference Model; and APIs Specifications, Implementation Invocations Approaches
  - Examples of Testbeds Federation APIs Requirements
  - Roles of Various Stakeholders to the Emerging Ecosystem around the Testbeds Federation Reference Model, its APIs and its Instantiations using various Testbeds that get federated
  - Summary of the Objectives of this Workshop w.r.t Stakeholders Engagement around the Testbeds Federation Reference Model and associated Ecosystem to emerge

## **Presentation on Example Federation APIs Case in the ongoing work in Joint Work of ETSI TC INT and ITU-T SG11 Q.API4TB on Open APIs for interoperable testbed federations**

*The recent technological developments require more realistic tests and new use cases to be validated in real conditions. The consequence is that the testbeds are more important. It is a need of testbed federation and interconnection between testbeds. It requires a set of clearly standardized APIs.*

## Joint Work of ETSI TC INT and ITU-T SG11 Q.API4TB on Open APIs for interoperable testbed federations

### Objectives of this Recommendation:

1. Definition of potential improvements for the testbed interoperability and federation.
2. Description of a reference model for interoperable testbed federations.
3. Specification of open APIs for the interconnection and interoperability among testbeds.
4. Definition of reference metrics easing the integration and the interoperability of testbeds.

### The Recommendations contains:

1. A generic reference model for testbeds federation and key players, proposed by ETSI TC INT.
2. A general architecture for the testbed interoperability and federation.
3. Proposed elements of a reference model of testbed federation.
4. Testbeds federation APIs requirements.
5. Some APIs instantiating the generic model, based on Fed4FIRE+ and GENI: Aggregate Manager API, Member Authority API and Slice Authority API.
6. Proposed reference metrics.

## Presentation on Example Federation APIs Case in the ongoing work in Joint Work of ETSI TC INT and ITU-T SG11 Q.API4TB on Open APIs for interoperable testbed federations

- **Appendixes of the Recommendation (not part of the Recommendation itself):**
  1. **GENI testbed federation.**
  2. **Fed4FIRE+ testbed federation.**
  3. **Different use cases for testbed federations.**
- **Work in progress involving ETSI TC INT, ITU-T SG11 and Mandat International:**
  - => Any contributions are welcome:
    - Cédric Crettaz, [ccretaz@mandint.org](mailto:ccretaz@mandint.org)
    - Dr. Sébastien Ziegler, [sziegler@mandint.org](mailto:sziegler@mandint.org)

## General Trends on Testbeds for 5G & Beyond, and Testbeds Federations Use Cases (Research & Open Source Projects Perspectives)

The presentation was focused on north America to point out the past projects and where the Research & Open Source Projects for 5G are going. It gives an overview about different projects like GENI, CHAMELEON, PAWR, POWDER, COSMOS, AERPAAW, COLOSEUM, FABBRIC.

## Federated Testbeds and Roadmaps in the case of EC-funded Fed4Fire and other Testbeds R&D Programs Initiatives

- *The presentation gives some highlights and initiatives of testbeds. Introduced were*
  - Fed4FIRE
  - Fed4FIRE+
  - F Interop
- The focus of F Interop was Interoperability, Conformance Performance, Scalability, QoS, and Personal data protection
- During the presentation the way from isolated testbeds, federated testbeds to shared testbed as a Service was described.
- Other large Scale testbeds infrastructure initiatives like GENI, NSF FABRIC, CENI and JOSE were presented.

## Federated Testbeds and Roadmaps in the case of EC-funded Fed4Fire and other Testbeds R&D Programs Initiatives

### Conclusion

Testbed Interoperability can unleash high value creation for education, research and innovation:

- International cooperation
- Research resources mutualization
- Scalability and large scale tests and validation
- Support technology convergence and interoperability
- Real latency environment for global services

## Methodologies for E2E Testing & Validation of Vertical Applications over 5G & Beyond networks, an ETSI TC INT Perspective on EC-funded 5GPP Projects Contributions to Standards

The presentation gives an overview about

- Brief background on EC-funded 5GPP Projects and ETSI INT TC WI creation
- Vertical expectations on E2E Testing & Validation of Vertical Applications over 5G & Beyond networks
- 5GPP testing platforms assessment
- The ETSI vision of a generic testing and validation platform, recommendations highlights:
- Technology capabilities
- Test methodology and processes
- The importance of multi-dimensional experimentation and validation process

## Methodologies for E2E Testing & Validation of Vertical Applications over 5G & Beyond networks, an ETSI TC INT Perspective on EC-funded 5GPP Projects Contributions to Standards

### Conclusions

- Vertical industry needs to experiment and pilot their “5G enabled” business case before moving to commercial.
- There is a need to standardize a generic 5G and beyond Application testing and validation framework which validates the vertical application in a systematic manner under different 5G technology choices. Vertical needs to be involved in the design and result evaluation phase. This is beyond current CSPs network testing paradigm.
- The ETSI INT is currently producing a Technical Report which captures recommendations on such validation framework and methodologies, leveraging the experience from EU 5G PPP trial projects. The next standardization steps are under discussion.
- The generic vertical validation framework will expose APIs to enable federation with other platform/testbeds

## IEEE Future Networks Industry Consortium (FNIC)

- IEEE Future Networks Initiative is launching the new Future Networks Industry Consortium (FNIC) project to enhance innovation and solutions development for the mobile communication sector
- FNIC will be a hub for industrial collaborations between Operators, Vendors, and Application Developers
- FNIC participants will have access to:
  - 5G and 6G Virtual Platform for E2E network testing, compliancy verifications and POCs
  - International Network Generations Roadmap (INGR) documentations and workgroups. The INGR provides visions and analyze technical challenges for mobile networks in 3-,5-, 10 years scopes
  - Industry Expert Speaker Program providing education sessions to participant company staff
  - Participation in FNI conference, standards, etc. (e.g., speaking at 5G/6G world forums)
- Governed by IEEE Industry Standards and Technology Organization (ISTO) privacy and IP policies

## FNIC Testbed and Membership

- The Testbed is a virtual CI/CD platform to facilitate operator-vendor collaborations and product development
- Provide scale resources to test all uses cases and service slices E2E
- Flexible:
  - Standard or non-standard
  - Private and shared components
  - Able to connect to physical hardware
- FNIC membership will be complimentary on Year #1 for trail purposes, a very-low annual fees will be charged starting year #2 and beyond
- To join: Please email [FNIC@ieee.org](mailto:FNIC@ieee.org)

## Q/A (1/6)

- **How to harmonize testbeds across SDOs when their own document database does not have an open standardized API?**
  - Harmonization goes through the Testbeds Federations reference model being developed by ITU and ETSI and presented at this Workshop.
- **How is the automation in the reference Model for testbeds handled?**
  - It is handled by discovery. The capabilities are automatically build by testbed domain and then are published in E2E universal broker for testbeds. Other automation is in the testbed management system which does the interconnection (horizontal federation) with other testbeds

## Q/A (2/6)

- **There have been federation of Internet testbeds, such as GENI, for scalability and heterogeneousness. But what's the purpose of a federation of 5G testbeds? Is there going to be an Internet of 5G?**
  - Management systems should be autonomous and disaggregated
- **How to define end-to-end in 5G ? It is defined in a single provider 5G system or among interconnected 5G system.**
  - 5G started, as a non-stand alone, only in the radio part was 5G, the core was 4G. The big players are moving to a standalone 5G, where the core is completely based on 5G where can be build the slices, the connections E2E and can build their relationships. With the stand alone 5G can be applied each use case.
- **Are Platforms like FABRIC going to be open for Users in Europe and other regions?**
  - It will be available for research purposes but would probably require some sort of bilateral agreement(s) between parties

## Q/A (3/6)

- **Can the platforms validate the KPIs?**

The vertical KPI are a very large and complex topic. It is planned to create a set of recommendations for common applications. To get a clear picture is planned to execute interoperability and conformance tests or tests between technologies.

It was created a KPI model for different application KPIs. The work is ongoing in ETSI TC INT. They are several layers of KPI and the final goal is to measure the real customer performance.

They are also requirements from 3GPP SA1 and from the industry. These requirements should be translated in capability in 5G networks to be able to measure and monitor to fulfill the requirements of this verticals.

The relevant topic is proposed to become a subject of a new Work Item.

## Q/A (4/6)

- **The performance is not only determined by 5G systems. It is also related, or even largely determined by the public network the data travels?**
  - Yes, the performance is indeed determined by the server providing the service and the position of the server compared to 5G Core (Server over Internet). MEC in this sense can help.
- **Who finances the establishment of the Platform that FNIC IEEE talks about?**
  - Financed by IEEE

## Q/A (5/6)

- **Vertical application KPIs is a very large and vertical domain-dependent topic without considering the large variety of scenarios in a given vertical. It is not clear on how it can be expected that the platform can validate application KPIs. In the same perspective, it is not clear on how the platform can then allow the selection of the best underlying technologies.**
  - Create some recommendations for common applications. Vertical expectations are supposed to be added.
  - Probably the taxonomy of these KPIs need to be developed.
  - ETSI plans to develop KPI model which might be used for different set of verticals.
  - There is a need to build repository of KPIs.
  - Definitely, application KPIs is a wide topic and the community is working on. Certainly, a goal could be to identify basic repository for general usage.

## Q/A (6/6)

- **With regards to validation of the trustworthiness of the AI-enabled test system itself. What is the robustness of the test system which has to test the network itself?**
  - There is a need to define metrics for AI-based test systems that can be independent of assessed technology. Certification of AI applications may be one of the ways forward.
- **As in many multi-stakeholder platform projects, various aspects will need to be clearly defined and agreed among all expected stakeholders incl. - apart from funding - governance, accessibility, transparency, sustainability, assets management, contributions handling, decision process, win-win conditions for stakeholders.**
  - Standardization of APIs and reference model in SDOs is very important and is the best way forward.

**TUESDAY, 16TH MARCH 2021**

## General Trends on Testbeds for 5G & Beyond, and Testbeds Federations Use Cases (Industry & Industrial Use Perspectives)

### Summary



- **Operators Past: In-house Test → Field trial → Pre-commercial → Massive Deployment**
- **Operators Future: Verticals, AI/ML, Open Ecosystems & Fast Innovation**
  - Inter-Regional Test & Trial collaborations
  - OSC, ORD, OTICs
- **ITU ETSI IEEE Federation of Platforms & Testbeds**
  - Vertical/Network KPIs?
  - **Testbeds as a Service!**
  - Jointly **define** use cases and test specifications to align test targets and procedures.
  - Allow **comparing** the performance of same use cases under different deployment schemes, network configurations, and spectrum setting in different regions
    - China Mobile: 2.6 GHz + 4.9 GHz, urban dense deployment, highway coverage, SA+NSA
    - Europe: 3.5 GHz, campus area coverage, NSA
    - China and Europe tests same V2X cases using different RSU and OBUs.
  - **Complementary** tests to extend test capability of single site
    - Joint NSA and SA test between China and Europe projects.
    - Visit and conduct tests at the twin project's test sites.
  - Good **information sharing** between testbeds
    - Test methods, problem troubleshooting, results sharing.
  - Allow studying interoperability problems at **service and application** level.
  - Allow **joint tests cross testbeds** to develop better technical solutions
    - VR applications over 5G networks
  - Potential impact on **technical and regulation** alignments between different regions

## General Trends on Testbeds for 5G & Beyond, and Testbeds Federations Use Cases (Industry & Industrial Use Perspectives)

- Network disaggregation drives need for test automation & federation
  - 5G Network layer testing automation is progressing well
  - 5G Application layer (NetApp) integration is challenging
  - Telco operators mindset needs to shift towards taking control of QA
  - Telco industry has not adopted standards for test automation and federation yet
  - Specifically, goals for certification programs should be carefully reviewed to be successful
  - Suggestion: Increase peer review and industry buy-in for important standardization efforts
  - Suggestion: Lead and improve focus on technology-specific QA goals (quality awareness)

## Federated Autonomic Management & Control (AMC) by ETSI GANA Knowledge Planes (KPs) for Autonomic/Autonomous 5G Networks, as Example Use Case for Federated Testbeds as required by CSPs (Telecom Operators)

- Conclusion and Outlook
  - SDOs such as ETSI TC INT AFI WG and NGMN advocate for Disaggregated GANA KP Platforms for specific network segments/domains, due to the call by CSPs for Disaggregated Networks, Control Planes & Data Planes and Software Platforms for AMC
  - Intra-CSP Federations of GANA KP Platforms across Network Segments and Inter-CSPs GANA KP Platforms Federations inherently and correspondingly require Federated Testbeds to Test the Cross-Domain AMC Operations
  - When applied to testbeds, GANA allows asset exposure and Testbed-as-a-Service (TaaS) modelling and with federation provides significant advantages for (especially) CSP stakeholders
  - The Standardized Testbeds Federation Reference Model for aligning and streamlining various stakeholder architectures strengthens the eco-system and value-chain for increased collaboration and leveraging of Testbeds for 5G & Beyond among stakeholders (CSPs, vendors, testbed-operators, open-source and „disruptive players“, ..)



The Standards People



# Steps Required Towards Building Standards-based Testbeds and Frameworks for Certifications of AI Models / Components / Systems (Takeaways: 3 Summary Slides)

- Dr Tayeb Ben Meriem,  
Orange  
Dr Andreas Ulrich, Siemens
- ITU ETSI IEEE Joint SDOs Brainstorming Workshop on Testbeds Federations for 5G & Beyond: Interoperability, Standardization, Reference Model & APIs
  - March 16<sup>th</sup>  
2021

## ETSI Roadmap and Achievements on “AI Testing & Certification”

- ❑ **2016:** ETSI anticipated the work on « Testing Adaptive Networks » back in 2015 and published in 2016 the first ETSI Guide on “Generic Test Framework for Testing Adaptive Networks »
  - ❑ **Certification is the ultimate phase of the 3-phase processes in the Testing lifecycle: Validation, Trustworthiness-building, and then Certification.**
- ❑ **2019:** ETSI created a new Work on « AI in Test Systems, Testing AI Models” (2 Technical Committee TC INT and TC MTS joint their forces) [https://portal.etsi.org/webapp/WorkProgram/Report\\_WorkItem.asp?WKI\\_ID=58442](https://portal.etsi.org/webapp/WorkProgram/Report_WorkItem.asp?WKI_ID=58442)
- ❑ **2020:** Publication of 5G Proof of Concept (PoC) [White paper #5](#), “AI in Test Systems, Testing AI Models and ETSI GANA Model's Cognitive Decision Elements (DEs)”
- ❑ **2021:** ETSI will publish 2 Technical Reports
  - ❑ **1)** “Benefits of AI in Testing”
  - ❑ **2)** “Testing of AI Models, Components, and Systems with Quality Metrics”

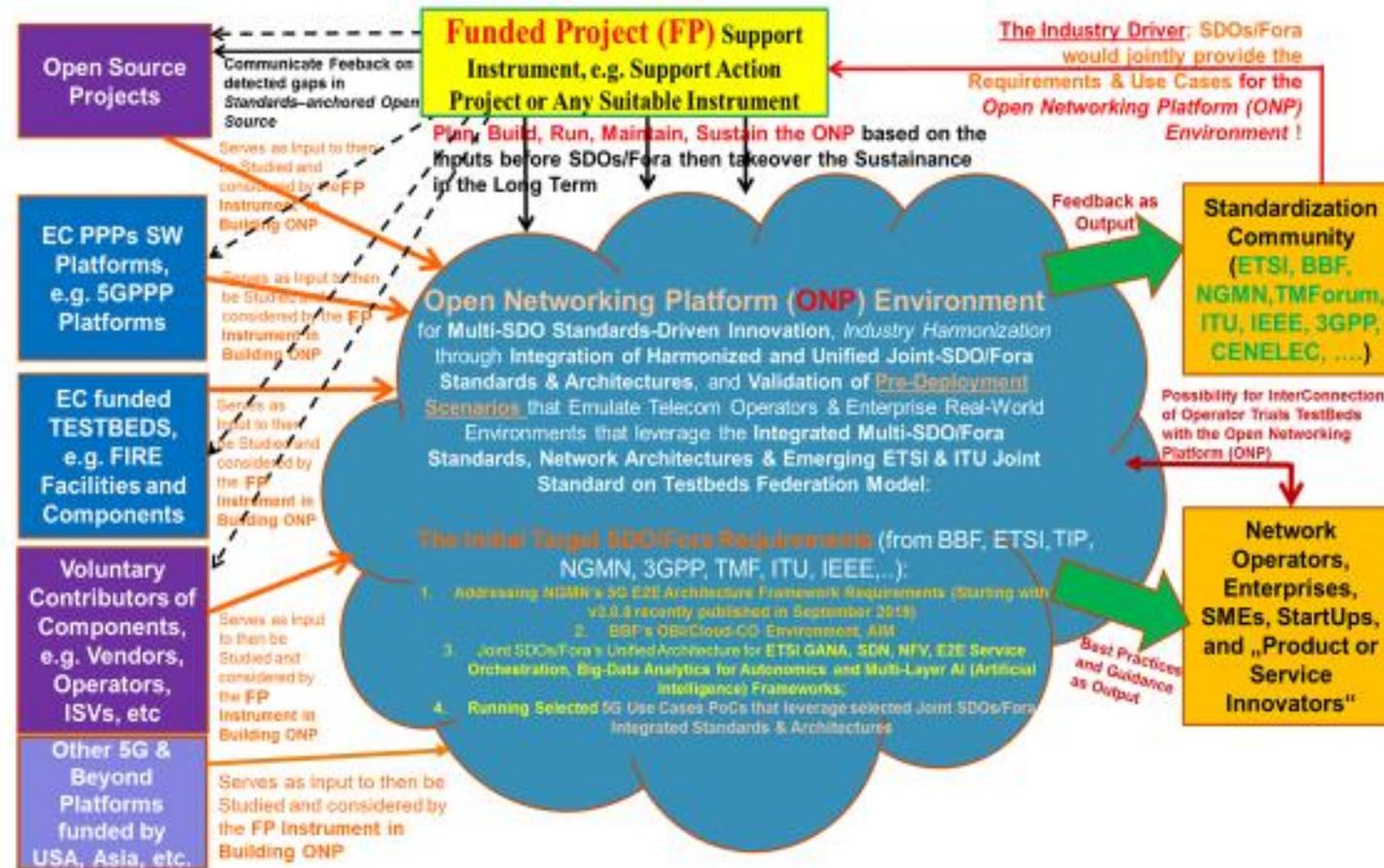
## Topics ETSI addresses in the WI on « AI in Test Systems, Testing AI Models”

- ❑ Concept of an “AI-enabled Autonomic Test System “ as Self-Adaptive and Self-Managing in some of their Test Objectives and Behaviour
- ❑ Standardizing **Metrics** to capture quality characteristics of ML models (to answer the Industry need)
  - ❑ Probabilistic **Accuracy** under uncertainty
  - ❑ Technical **Robustness** against noisy, erroneous, or (constructed) adversarial data
  - ❑ Others: **Reliability, Fairness, Security, Explainability**
- ❑ Tackling the Technical Aspects of Certifying ML Models (Online Models and Offline Models)
  - ❑ **Challenges:**
    - ❑ Different ML models (Recurrent Neural Networks, Feedforward Neural Networks, Bayesian Networks, Re-enforcement learning, Generative Adversarial Networks)
    - ❑ Require different approaches to testing
  - ❑ **Challenges:** Expressing uncertainties in test scenarios; test coverage and test end criteria; test oracle; data quality for training and test (e.g. bias, noise); interoperability of ML models

## ETSI works Aligned with the EC's Recommendations on Testing and Certifying AI

- ❑ EC's [High-Level Expert Group on Artificial Intelligence](#), AI and Trustworthiness, 2019
- ❑ AI shall be demonstrably worthy of trust and should cover (**Lawful, Ethical, Robust**)
  - ❑ ETSI focus on AI Robustness from a technical and social perspective
- ❑ [EC White Paper](#) on “Artificial Intelligence: a European approach to excellence and trust”,
  - 19-Feb-2020 emphasises the need for
    - ❑ 1) A regulatory framework, 2) Creation of an AI Test Centre, 3) Creation of a Certification Centre.
  - ETSI Framework on “**AI Testing & Certification**”, being proposed [White paper #5](#), aims at the translation of the three EC's recommendations into operational tools covering
    - Standardisable metrics for measurements and assessments in testing and certifying AI models within autonomic networks, and Metrics for other Classes of AI Systems
    - Methodologies and customisable frameworks for test system providers and certification authorities

# Industry Requirement & Proposal for a Multi SDO/Fora “Standards Driven” Open Networking Platform (ONP) Environment for Standards Driven Innovation, Multi-SDO Standards Harmonization, and Validation of Pre-Deployment Tech Use Cases



## Industry Requirement & Proposal for a Multi SDO/Fora “Standards Driven” Open Networking Platform (ONP) Environment for Standards Driven Innovation, Multi-SDO Standards Harmonization, and Validation of Pre-Deployment Tech Use Cases

### Characterization of the Desired Multi-SDO/Fora „Standards-Driven“ Open Networking Platform (ONP) Environment for Standards Driven Innovation

#### Characteristics of the Desired Multi-SDO/Fora Standards-Driven Open Networking Platform (ONP) Environment:

1. Specially designed and built to be a **Manageable Ecosystem** that can be considered as one of the Software-Oriented Platforms for Enabling 5G and Beyond, and can be Federated with other Platforms/Ecosystems of relevant value, e.g. Industry-Grade 5G Platforms
2. Is a **Neutral Environment** that is meant to be a **Open Platform** that enables to Test the Targeted Standards and Use Cases from the collaborating SDOs/Fora & Open Source/Hardware Projects and to ensure Interoperability, provide an easily accessible facility to Innovators for Deployable Product & Services Innovation, and **is controlled (governed) by the Standards Community (SDOs/Fora) & Open Source Projects that are to be involved**
3. **Funded Platform Environment** that is built and tested to specially support the Requirements and Use Cases from collaborating Standardization/Industry Communities (with an initial focus on the Joint Requirements and Use Cases to be provided by Standardization Communities: BroadBand Forum(BBF), ETSI (e.g. TC INT/NTECH AFIWG), NGMN, 3GPP, TMForum, IEEE, ITU-T, etc, while taking a Phased Approach to accomodating SDOs/Fora and Requirements)
4. Helps Network Operators, Enterprises, SMEs, and Startups Obtain realistic and practical guidance on how to use the Harmonized Standards and Frameworks, and Open Platforms ( including Open Source/Hardware & Commercial Platforms) for Business Innovation, Products and Services Innovation and how to create cost effective approaches to creating Migration Paths from the Complex Legacy Networks
5. Can accomodate more and more Use Cases for Enablers for 5G and Beyond once the ONP has been established, and the SDOs/Fora communities have expressed strong indications of wanting to then Sustain the ONP Platform
6. It is to be considered as a **Playground (Proving Ground) for Trying out Pre-Deployment Real Use Cases** based on Industry Harmonized and Cross-SDO/Fora Interworking Standards (so as to implement Cross-SDO Industry Harmonization of Multi-SDO/Fora Standards)
7. Global Testbed Platform but having a Central Place (hosted by one of the Partners that would be selected)

## Industry Requirement & Proposal for a Multi SDO/Fora “Standards Driven” Open Networking Platform (ONP) Environment for Standards Driven Innovation, Multi-SDO Standards Harmonization, and Validation of Pre-Deployment Tech Use Cases

**Funded Project (FP) Support**  
Instrument, e.g. Support Action  
Project or Any Suitable Instrument

*Preliminary Ideas on possible Approach (Early Brainstorming: the ideas are yet to be discussed with prospective partners who would represent the broad industry to benefit from the Open Networking Platform (ONP))*

*A Consortium would be built, and ideally could consist of the following types of Partners and Structure:*

- 1. Organizations endorsed to represent a relevant Technical Body (TB) Committee or Group of interest from the SDOs/Fora (ETSI, BroadBand Forum (BBF), TMForum, 3GPP, ITU, NGMN, TIP, etc.)*
- 2. Multi-Vendor System Integrator(s), with capability to integrate Open Source Components as well*
- 3. Tester Organization(s)*
- 4. Telecom Operators & Enterprises & SMEs & StartUps Advisory Committee*
- 5. Technical Committee consisting of Selected Standardization Experts, particularly from the collaborating TBs in the initial list of participant SDOs/Fora (including those endorsed by the TBs), as well as Technical Experts specially recruited (as individuals) by the Project to leverage their expertise in implementing the Objectives and the Outlined Approach to Building the Open Networking Platform (ONP)*
- 6. Selected Organizations that would field Implementers that can perform customization of software or implement software required by a particular Standard(s) being targeted for Integration into the Platform*

## Agreements Reached on the Industry Requirement & Proposal for a Multi SDO/Fora “Standards Driven” Open Networking Platform (ONP) Environment for Standards Driven Innovation, Multi-SDO Standards Harmonization, and Validation of Pre-Deployment Technology Use Cases

1. The Proposal on ONPs was very much appreciated by the SDOs/Fora that participated, as the Proposal shares a lot in common with the Vision of TIP, IEEE FNIC, O-RAN and other Industry-Grade Testbeds oriented Initiatives. This is because an ONP(s) is to be considered as a Playground (Proving Ground) for Trying out Pre-Deployment Real Use Cases based on Industry Harmonized and Cross-SDO/Fora Interworking Standards (so as to implement Cross-SDO Industry Harmonization of Multi-SDO/Fora Standards). The Various Stakeholders intensified for the ONP Ecosystem would benefit a lot from such Open Platforms
2. TIP, FNIC and all the SDOs/Fora who attended agreed to follow up on this Proposal for Building ONPs as driven by Multi-SDO/Fora Standards Fusion and the Testbeds Federation Reference Model. There will be follow up meetings on this important proposal

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