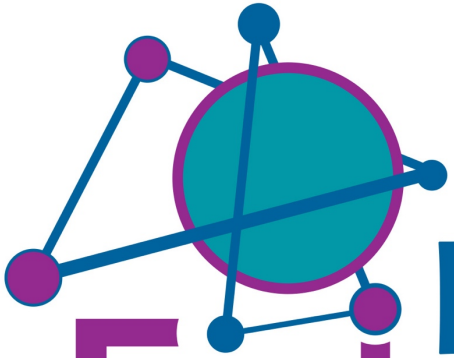

IEEE Future NETWORKS

Enabling 5G and Beyond

INGR Testbed Working Group Roadmap Chapter Summary

30 September 2019
Dresden, Germany

IEEE

Testbed Chapter: Vision

- Propose and drive development of (future) testbed requirements
- Leverage IEEE community's strong simulation, measurement and calibration capabilities for testbeds by developing testing standards and calibration methods
- Collaborate with the vendor and research community to expand existing testbeds with next generation of technologies (as they become available).
- Serve as a facilitator for setting up a testbed federations and make them available to IEEE community
- Organize workshops related to future networks experimental aspects (including use case scenarios, trials and proof-of-concept deployments).
- Coordination with other development efforts (PAWR, ONF, 5G-PPP, etc)
- Create IEEE Federation of Future Networks Testbeds covering all aspects

Testbed WG: Linkages and Stakeholders

Industry Sectors

- **Telecom**
- **Various Verticals**
- **OEMs**

Stakeholders

- **Equipment vendors:** PoC, Performance evaluation
- **Network operators:** PoC, Performance evaluation
- **Researchers (Academic & Industrial):** Technology development, Performance evaluation
- **Government:** Policy making, Benchmarking, Deployment issues, Emergency services support (government function support)
- **Military:** Dual use technology evaluation

Technology/Capability Gaps and Showstoppers

- Technology development support
  - "From simulation to deployment"
- Verticals support
  - "Highly Specialized" vs. "Universal"
- Testbed certification
  - Establishment of the certification criteria
- Operations harmonization
  - Steep learning curve (reducing impediments for experimenters)
  - Creating joint ecosystem for multiple stakeholders
- Skill
  - Virtualization
  - Network automation

Overall Potential Solutions – for those Gaps that need solutions by a certain timeframe

Lack of Scale	PPP (Government, Industry and academia co-operation; co-operative approach from the existing testbeds)
Proliferation of specialized (vertically) testbeds without common elements	Co-operative approach from the existing testbeds; Open source contribution, Workshop to engagement, Professional Community engagement)
Lack of 5G feature (eMBB, mMTC, URLLC) optimized experimentation platform	Open source hardware & software platform, (white-box component from OEM or equivalent)
Lack of inter-test-bed co-operations	Introduction of certification on testbed vertical compliance and interoperability to promote co-operation and component reuse.
Lack of use cases	Public events, hackathon, exhibition, school level & university (UG/G/PG) research promotion in partnership with industry.
Lack of platform for universal data sharing	Promotion & demonstration of the value/requirement of the data generated from Users, Applications and networks; developing technology and business models for data sharing along with standard (certain level of commonality – while generating or translation)
Lack of skills	Establishing dedicated test-bed for skill enhancement, IEEE to provide online webinar to facilitate live event, if possible from a test-bed site.

Issues and Topics Expected to be Addressed in 2020 2nd Edition of INGR

- Create a “testbed clearing-house” and ways to bring all testbeds in “the same room”
- Start working on standardization (in both testbed design and metrology) and experimental repeatability; start working on identifying common Testbed blocks/elements/tools
- Address the incentives question for existing Testbeds to participate in IEEE efforts
- Identified a need to continuously ensure that testbeds get input from other technology groups on their testing needs. Introduce effective communication channels (mailing list, surveys, etc.)
- Initiate collaboration with the vendor and research community to expand existing testbeds with next generation of technologies (as they become available)
- Start discussion on development of a common testbed platform even if it is far in the future; start a community wiki to initiate the discussion.
- What do **YOU** think?
  - We want your feedback
  - To email us, write to

Testbed INGR Working Group

Testbed INGR Working Group co-chairs

- *Ivan Seskar - seskar@winlab.rutgers.edu*
- *Mohammad Patwary - Mohammad.Patwary@bcu.ac.uk*

IEEE Project Team

- *Brad Kloza - b.kloza@ieee.org*
- *Linda Wilson - linda_wilson1225@ieee.org*
- *Theresa Cavrak - t.cavrak@ieee.org*

Email 5GRM-testbed@ieee.org to join us!