5GIF Independent Evaluation Group

Summary of the Interim Report

Vikram Tiwathia
vtiwathia@coai.in

About 5GIF

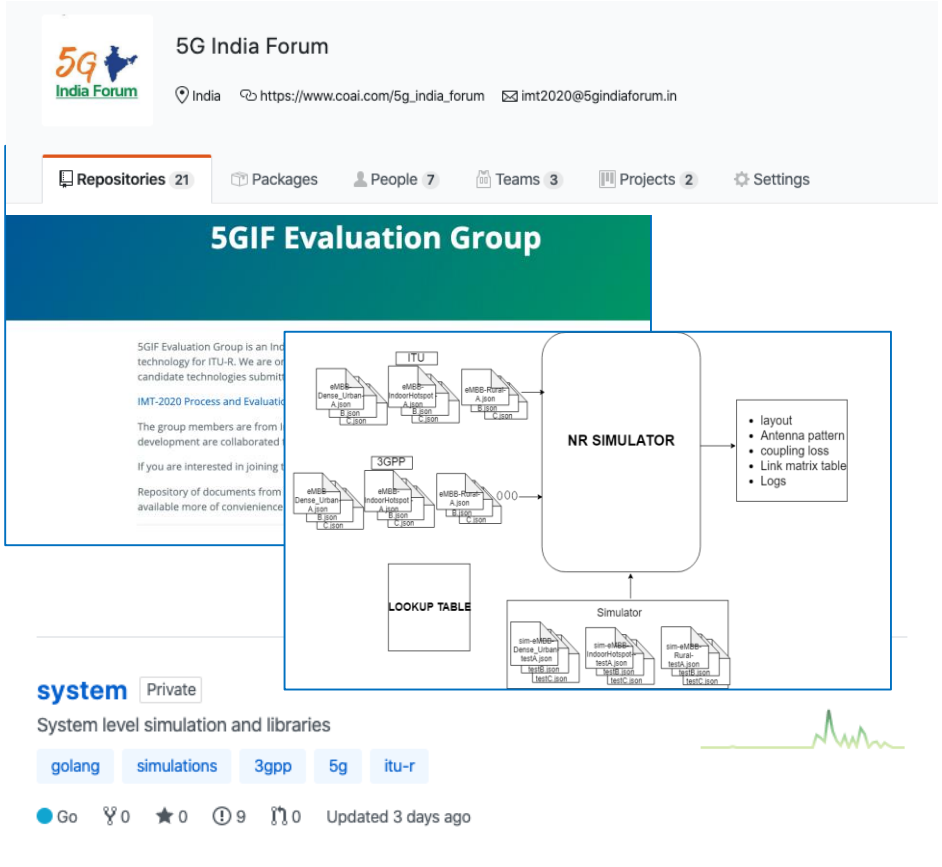
- The 5G India Forum is a collaborative body under the aegis of COAI, aimed at serving a strategic national initiative concerning all stakeholders, and to meet the challenge of making 5G a reality in India, at timelines aligning with the rest of world
- This forum aims to become the leading force in the development of next generation communications, enabling the synergizing of national efforts and will play a significant role in shaping the strategic, commercial and regulatory development of the 5G ecosystem in India
- This forum aims at (amongst others),
  - Developing consensus within India on 5G systems / infrastructures / services, and prepare a vision document on priority.
  - Identifying vertical application domains which would benefit from 5G and associated challenges.

Ways of working

- The 5GIF IEG is a collection of operators, industry and university members, knowledgeable on the subject matter, and committed to the IMT-2020 evaluation
  - Over 30 individuals currently contributing to the evaluation process
  - The group employs both online and offline means for meetings
- This group was formed to evaluate the IMT-2020 candidates from the perspective of Indian network deployments
- The group works through online and offline means, adheres to the ITU processes, and sincerely focuses on consensus based decision making
  - Two industry workshops discussed the candidate technology of interest
  - A 48 hour hackathon with mentorship provide by industry experts
  - Five workshops to help in deliberation and consensus building

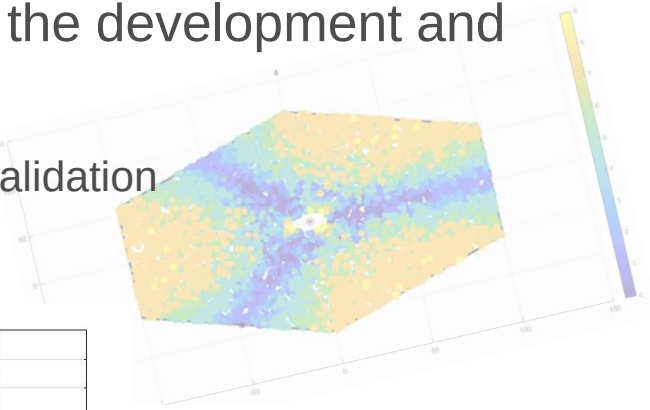
Simulation Tools

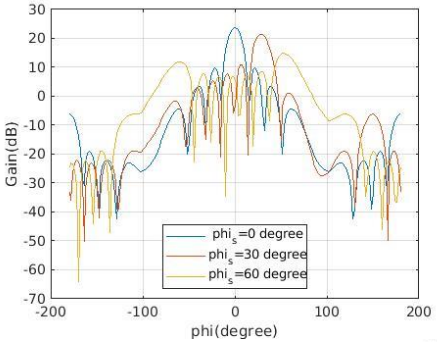
- Collaborative simulator platform developed using MATLAB and Golang
- Simulator owned, developed and maintained by participants across India
  - University and 5GIF Members
- Calibrations were done using industry partners support
- Repository: https://github.com/5gif
  - 5GIF currently evaluating the future prospect of the simulation tools
  - 5GIF considering the making of this tool for open access

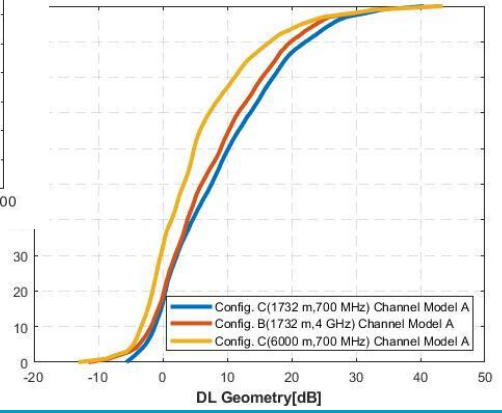


Simulator Calibration

- Industry experts mentored the participants in the development and calibration of 3GPP NR simulator
  - System models (coupling loss, UL/DL SINR, etc.) validation
  - Channel model validation
  - Link budget validation
  - Antenna beam pattern validation







5GIF Evaluation Group's intentions

- 5GIF IEG intends to evaluate the IMT-2020 RIT/SRIT candidates as per the table below
  - These correspond to candidate submissions received by WP5D until Meeting #32 Bis

IMT-2020 SUBMISSION						
3GPP		CHINA	KOREA	TSDSI	ETSI (TC DECT), DECT FORUM	Nufront
RIT	SRIT					
IMT-2020/14	IMT-2020/13	IMT-2020/15	IMT-2020/16	IMT-2020/19	IMT-2020/17	IMT-2020/18
✓	✓*	✓	✓		✓*	

* *Partial evaluation*

- While 5GIF aspires to evaluate more candidate technologies, the prospects will be dependent on the progress made in the next two months
  - Primary intent will be to bring to closure the activities already initiated

EVALUATION ASPECTS

IMT-2020/14: 3GPP NR RIT

Status of TEs/TPRs evaluated via **Inspection**

TPR	Evaluation Status
Bandwidth	**Completed**
Energy Efficiency	**Completed**
Support of wider range of services	**Completed**
Supported spectrum bands/range	**Completed**

Status of TEs/TPRs evaluated via **Analysis**

TPR	Usage Scenario	Evaluation Status
Peak Spectral Efficiency	eMBB	**Completed**
Peak Data Rate	eMBB	**Completed**
Mobility Interruption Time	eMBB & URLLC	**Completed**
Control Plane Latency	eMBB & URLLC	**Completed**
User Plane Latency	eMBB & URLLC	**Completed**
User experienced data rate	eMBB	**Work in progress**
Area Traffic Capacity	eMBB	**Work in progress**

Status of TEs/TPRs evaluated via **Simulation**

TE	Evaluation configuration	TPRs	Evaluation Status
InH – eMBB	Config. A (4 GHz) Config. B (30 GHz) Config. C (70 GHz)	• Cell/User Spectral Efficiency (SE), (Area Traffic Capacity, derived from cell SE) • Mobility	**Work in progress**
Dense Urban - eMBB	Config. A (4 GHz) Config. B (30 GHz)	• Cell/User Spectral Efficiency (User data rate is derived from user SE) • Mobility	**Work in progress**
	Config. C (4, 30 GHz)	• Cell/User SE and User Data Rate	**Work in progress**
Rural - eMBB	Config. A (1732 m, 700 MHz) Config. B (1732 m, 4 GHz)	• Cell/User Spectral Efficiency • Mobility (incl. High-Speed train)	**Work in progress**
	Config. C (LMLC, 6000 m, 700 MHz)	• Cell Spectral Efficiency only	**Work in progress**
Urban Macro - mMTC	Config. A (500 m, 700 MHz) Config. B (1732 m, 700 MHz)	• Connection Density	**Completed**
Urban Macro - URLLC	Config. A (4 GHz) Config. B (700 MHz)	• Reliability	**Completed**

Link Budget

- The link budget tables corresponding to Channel model A and B are embedded below for reference

Microsoft Excel Worksheet

Channel model A

Microsoft Excel Worksheet

Channel model B

Anomalies with the proponent's link budget tables

- 5GIF IEG evaluators noticed some ambiguities with the link budget tables provided in 5D/1215 and 5D/1216
  - The anomalies correspond to the formulae used to (reverse) map the distance
  - 5GIF IEG submits those revised documents for the consumption of WP5D (channel model A)
    - Proponents LB tables:

    - 5GIF LB tables:

- Minor changes, with minor impact to the coverage values were reported by the university participants

INTERIM EVALUATION RESULTS

IMT-2020/14: 3GPP NR RIT

Conclusion: **Inspection aspects**

TPR	Conclusion
Bandwidth	**Satisfies IMT-2020 requirements**
Energy Efficiency	**Satisfies IMT-2020 requirements**
Support of wider range of services	**Satisfies IMT-2020 requirements**
Supported spectrum bands/range	**Satisfies IMT-2020 requirements**

Conclusion: **Analysis aspects**

TPR	Usage Scenario	Conclusion
Peak Spectral Efficiency	eMBB	**Satisfies IMT-2020 requirements**
Peak Data Rate	eMBB	**Satisfies IMT-2020 requirements**
Mobility Interruption Time	eMBB & URLLC	**Satisfies IMT-2020 requirements**
Control Plane Latency	eMBB & URLLC	**Satisfies IMT-2020 requirements**
User Plane Latency	eMBB & URLLC	**Satisfies IMT-2020 requirements**

Conclusion: **Simulation aspects**

TE	Evaluation configuration	TPRs	Conclusion
Urban Macro - mMTC	Config. A (500 m, 700 MHz)	• Connection Density	**Satisfies IMT-2020 requirements**
	Config. B (1732 m, 700 MHz)		
Urban Macro - URLLC	Config. A (4 GHz)	• Reliability	**Satisfies IMT-2020 requirements**
	Config. B (700 MHz)		

EVALUATION FINDINGS

Recommendation for IMT-2020/14 (3GPP RIT)

- WP5D has already identified that the candidate submission IMT-2020/14 is complete
  - The 5GIF agrees with that finding

- The 5GIF IEG continues to evaluate the remaining aspects of the technology
  - The 5GIF will strive to submit a complete evaluation by WP5D#34 in its final report

Recommendation for IMT-2020/13 (3GPP SRIT)

- WP5D has already identified that the candidate submission IMT-2020/13 is complete
  - The 5GIF agrees with that finding

- The 5GIF IEG continues to evaluate this candidate technology
  - The 5GIF will strive to submit a complete evaluation by WP5D#34 in its final report

Recommendation for IMT-2020/15 (China)

- WP5D has already identified that the candidate submission IMT-2020/15 is complete
  - The 5GIF agrees with that finding

- The proponents claimed that for the purposes of evaluation, this candidate technology submission is technically the same as the candidate technology submission provided in Document 5D/1217 and NB-IoT part in Document 5D/1216
  - The 5GIF agrees with that claim

- The 5GIF will strive to make a final recommendation on this candidate technology by WP5D#34

Recommendation for IMT-2020/16 (Korea)

- WP5D has already identified that the candidate submission IMT-2020/16 is complete
  - The 5GIF agrees with that finding

- The proponents claimed that for the purposes of evaluation, this candidate technology submission is technically the same as the candidate technology submission provided in Document 5D/1217
  - The 5GIF agrees with that claim

- The 5GIF will strive to make a final recommendation on this candidate technology by WP5D#34

Recommendation for IMT-2020/17 (ETSI-DECT)

- WP5D is yet to identify if the candidate submission IMT-2020/17 is complete
  - The 5GIF will wait for WP5D recommendation to proceed with evaluation

- The 5GIF IEG however did a brief study of the SRIT and identified that the eMBB portion of the candidate is identical to the 3GPP candidate in IMT-2020/14
  - If WP5D confirms this technical identity, then 5GIF intends to submit partial evaluation report on that part of the technology, in its final report.

5GIF Outcomes

Interim Report Summary

- The 5GIF finds the candidate submissions IMT-2020/13, IMT-2020/14, IMT-2020/15 and IMT-2020/16 to be complete
  - The 5GIF IEG has not identified any deficiencies or technical inconsistency with these submissions
  - These candidates can move further in the IMT process, as previously identified by WP5D.

- The 5GIF will make a final recommendation on these candidate technologies by WP5D#34.

Thank you

For more information visit
http://www.coai.in

Follow us on
@ConnectCOAI

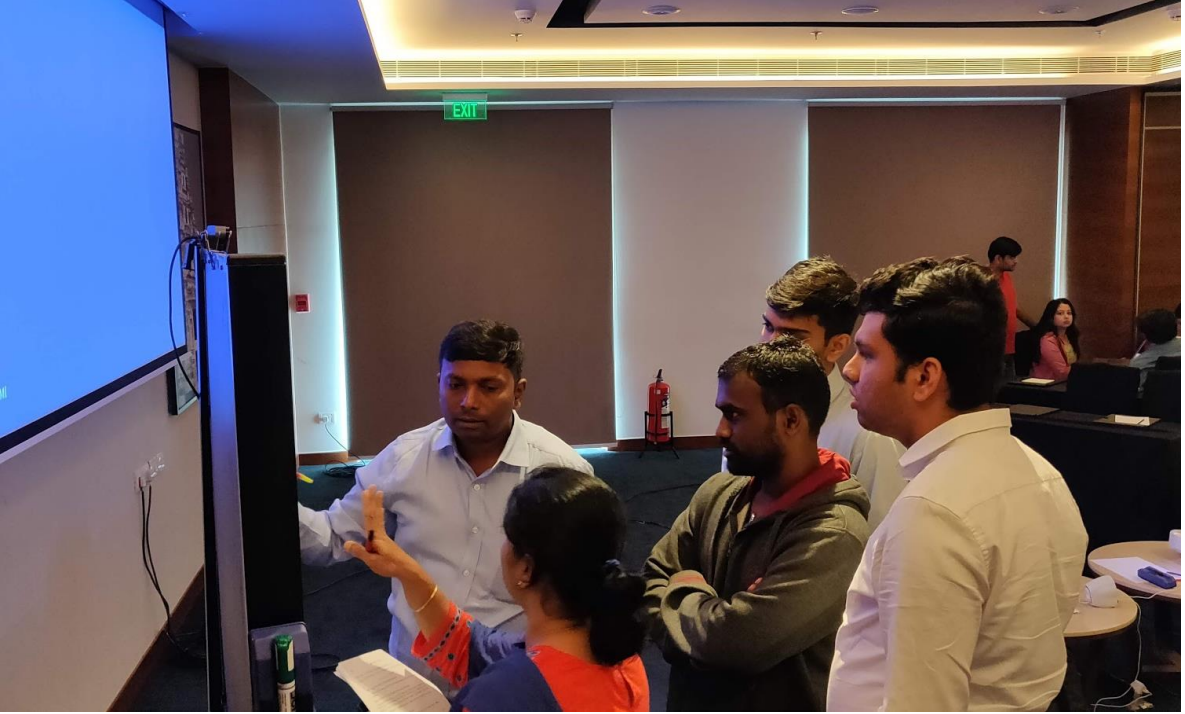
For more information visit
https://www.coai.com/5g_india_forum

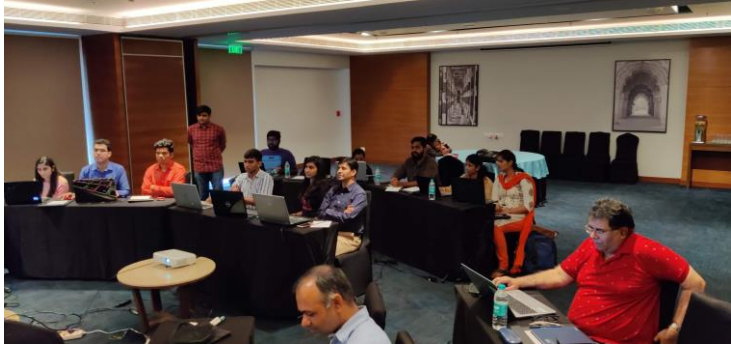
For more information visit
https://www.coai.com/if3

Contacts for the 5GIF IMT-2020 Evaluation.

Administrative: vtiwathia@coai.in
Technical: imt2020@5gindiaforum.in

5GIF Memoirs


EXIT




COAI