

Recent Updates of Preparing Optimal 5G Indonesia Networks (5G-POINT)

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Abstract—This paper reports the recent updates of Preparing Optimal 5G Indonesia Networks (5G-POINT) for the first year of total two years. This project is targeting: (i) the Indonesia fifth generation (5G) of telecommunication channel model, (ii) Theoretical 5G outage performances of Indonesia, and (iii) Framework of 5G channel measurement for any locations in Indonesia, and (iv) Dissemination in terms of books, whitepapers and tutorials.

Index Terms—5G Channel Model, channel measurement, power delay profile, outage probability.

I. INTRODUCTION AND SYSTEM MODEL

The fifth generation (5G) of telecommunications will be deployed in 2020. However, since the possible operating frequency is high, the channel model is required. It is because the signal is more affected by the environment condition of each country.

This "Preparing Optimal 5G Indonesia Networks (5G-POINT)" is proposing on the Indonesia 5G Channel Models, i.e., channel model of Indonesia measured based on real-field environment of Indonesia, e.g., temperature, barometric pressure, humidity, and foliage. The contribution of this project is big, especially on the preparation of optimal implementation of 5G in Indonesia such that power loss can be avoided.

Fig. 1 shows the 5G definition shown in triangle, where the enhanced mobile broadband (EMBB) with a target of 20 Gbps is located on the top of corner. The EMBB is depending on the Shannon capacity

$$C \approx n \cdot B \log_2 \left(1 + M \cdot R \cdot \frac{|\psi|^2 \cdot E_b}{N_0} \right), \quad (1)$$

where n is the total non-zero eigen-value ψ , B is the bandwidth, M is the modulation index, and R is the channel coding rate. The ψ is depending on the real channel measured based on the location of 5G as shown in Fig. 1(b).

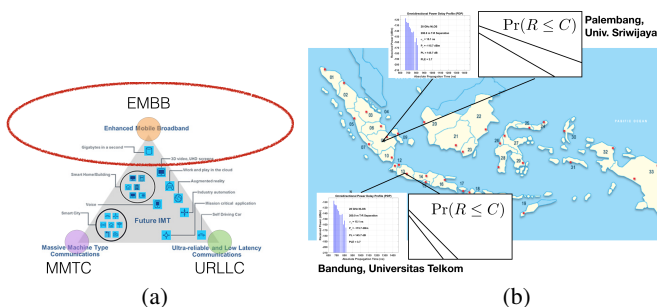
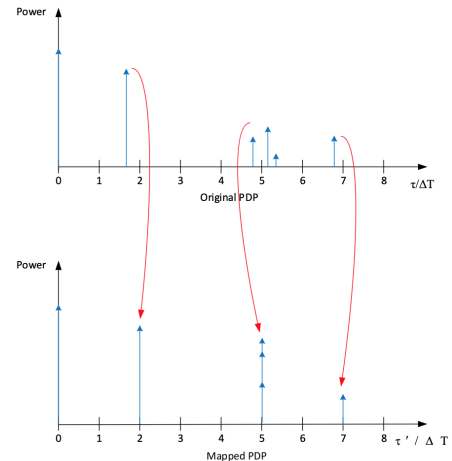


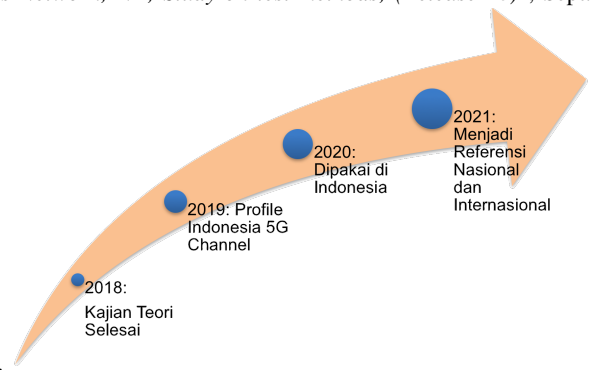
Fig. 1. (a) ITU triangle as the usecase requirement in 5G definition and (b) Locations of 5G-POINT real-field measurements.

A typical example of channel model is shown by the power delay profile as in Fig. 2(a), where X-axis is the time and Y-axis is the power. The roadmap until the model is becoming the national and international references is shown in Fig. 2(b), where development, improvement, and contributions are expected from industries and other partners.

This research is supported in part by the INSINAS RistekDikti under the project 5G-POINT, 2018–2019.



(a) An example of PDP and method to create a representative model (Image: 3GPP TR38.810, "Technical Specification Group Radio Access Network; NR; Study on test methods; (Release 16)", Sept.



(b) Roadmap of 5G Channel model of Indonesia as national and international references.

Fig. 2. PDP and roadmap of 5G-POINT project.

II. RECENT RESULTS AND CONCLUSIONS

In the Year I, we have many results as of (i) ICSIGSYS 2018 [1], (ii) ICT-RuDev 2018 [2] dan (iii) IEEE WPMC 2018 [3].

In the Year I, we have reached several milestone especially for WP1, WP2, WP4. We are expecting that in the Year II, 100% target is achievable.

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