T5-Toward Auto-modeling of Formal Verification for NextG Protocols: A Multimodal Cross- and Self-Attention Large Language Model Approach . AVRE transforms protocol descriptions into dependency graphs and formal models, efficiently resolving ambiguities and capturing design intent . system integrates a transformer model with LLMs to autonomously establish quantifiable dependency relationships through cross- and self-attention mechanisms . iterative feedback from the HyFuzz experimental platform, AVRE significantly advances . ­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­

Bart - This paper introduces Auto-modeling of Formal Verification with Real-world Prompting for 5G and NextG protocols. The system integrates a transformer model with LLMs to autonomously establish quantifiable dependency relationships through cross- and self-attention mechanisms. This NLP-based approach enables, for the first time, the creation of exploits directly from design documents, making remarkable progress in scalable system verification and validation. We compare CAL’s performance with state-of-the-art LLM-based models and traditional time sequence models, demonstrating its superiority in accuracy and robustness, achieving an accuracy of 95.94% and an AUC of 0.98. We conclude that AVRE significantly advances the accuracy and relevance of formal verification in complex communication protocols, offering a groundbreaking approach to validating sophisticated communication systems.

Gemini -AVRE, a new system for formal verification of complex communication protocols, utilizes Large Language Models (LLMs) to transform protocol descriptions into dependency graphs and formal models. It integrates a transformer model with LLMs to autonomously establish quantifiable dependency relationships through cross- and self-attention mechanisms. AVRE significantly advances the accuracy and relevance of formal verification, offering a groundbreaking approach to validating sophisticated communication systems.

Gpt 4-target\_text = In recent years, the growing field of communication technology has necessitated advanced methodologies for the verification of Next Generation (NextG) protocols, which are critical in ensuring the robustness and reliability of emerging communication systems. The paper introduces a pioneering system known as Auto-modeling of Formal Verification with Real-world Prompting for 5G and NextG protocols (AVRE). This innovative system is specifically designed to tackle the increasing complexity and scalability challenges inherent in network protocol design and verification.

Previous research highlights significant advances in the use of Large Language Models (LLMs) for various applications, yet AVRE uniquely applies these models to transform protocol descriptions into dependency graphs and formal models. This process not only efficiently resolves ambiguities but also adeptly captures the design intent of the communication protocols. By integrating a transformer model with LLMs, AVRE autonomously establishes quantifiable dependency relationships through sophisticated cross- and self-attention mechanisms.

Numerous studies have addressed this topic with varying approaches; however, AVRE distinguishes itself by leveraging iterative feedback from the HyFuzz experimental platform, which significantly enhances the accuracy and relevance of formal verification processes. This integration marks a substantial progression in validating complex communication protocols, positioning AVRE as a groundbreaking approach in the field.

The efficacy of AVRE is further demonstrated through comparative analysis with state-of-the-art LLM-based models and traditional time sequence models. The results are impressive, with AVRE achieving an accuracy of 95.94% and an AUC of 0.98, showcasing its superiority in both accuracy and robustness. This NLP-based approach not only facilitates the first-time creation of exploits directly from design documents but also signifies remarkable progress in scalable system verification and validation, heralding a new era in communication technology advancements.

Gpt 3 -This paper presents Auto-modeling of Formal Verification with Real-world Prompting for 5G and NextG protocols (AVRE), a cutting-edge system tailored for formal verification of Next Generation (NextG) communication protocols. AVRE leverages Large Language Models (LLMs) to convert protocol descriptions into dependency graphs and formal models, effectively addressing complexities and scalability issues in network protocol design and verification. By integrating a transformer model with LLMs, AVRE autonomously establishes quantifiable dependency relationships using cross- and self-attention mechanisms. Through iterative feedback from the HyFuzz experimental platform, AVRE significantly enhances the accuracy and relevance of formal verification in intricate communication protocols, revolutionizing the validation of sophisticated communication systems. Comparative analysis with state-of-the-art LLM-based models and traditional time sequence models showcases AVRE's superior performance, achieving an accuracy of 95.94% and an AUC of 0.98. This NLP-driven approach enables the generation of exploits directly from design documents, marking a significant advancement in scalable system verification and validation. AVRE's innovative methodology offers a groundbreaking solution to the challenges posed by the evolving landscape of NextG protocols, setting a new standard in formal verification techniques for complex communication systems.