2025 START Program
CFP Brief

THEME: **01. Wireless Communication**

SUB-THEME: **1.1 AI-RAN technology for the evolution of 5G and 6G cellular networks**

Context/ Overview

Driven by the rollout of the fifth generation (5G) and the anticipated arrival of 6G cellular networks, the cellular industry is experiencing a significant paradigm shift. The growing demand for faster speeds, lower latency, higher capacity, and reduced operation costs has created the need to improve existing radio access network (RAN) solutions.

In the last few years, the telecommunication sector has increasingly recognized the importance of utilizing artificial intelligence (AI) technology to establish a fully automated RAN with optimized key performance indictor (KPIs). Several communication service providers and equipment vendors have already invested considerable efforts in developing AI RAN technology to optimize RAN performance and automate some repetitive RAN-related operational tasks, such as AI solutions for near real time (RT) RAN intelligent controller (RIC) and non RT RIC in an open RAN (O-RAN) architecture.

AI RAN technology for 5G and 6G cellular networks is integral to Samsung's strategy for expanding its telecommunication business, unlocking new revenue opportunities, and maintaining competitive leadership in the global telecommunication market.

Problem Statement

The development of AI RAN technology faces several unique technical challenges arising from various telecommunication domains: 1) high complexity of cellular networks, 2) stringent low latent requirement, 3) massive and diverse proprietary data, 4) lack of industry-wide RAN interfaces, 5) scarcity of labelled datasets, 6) integration with legacy systems, 7) scalability across vast networks with millions of devices and users, and 8) limited computational power at base stations and UE terminals etc. Addressing these challenges will be key to realizing the full potential of AI-RAN technology in the next generation cellular networks.

Objectives & Scope

This call for proposal (CFP) aims to advance AI RAN technology for the evolution of 5G and 6G cellular networks, ensuring that future RAN systems are optimized, scalable, and capable of supporting the diverse requirement of next generation mobile applications. The scope of this project covers several key areas that enable enhanced network performance, scalability, and efficiency, including network optimization and automation, advanced AI-based PHY/MAC solutions, advanced interference management, and more.

Specific Topics & focus areas*

In this CFP, various AI-RAN technologies for 5G and 6G cellular networks are of interest.

These include, but are not limited to

1. AI for channel estimation and prediction
2. AI for CSI feedback enhancement
3. AI for resource allocation and user scheduling

4. Smart modulation and coding scheme (MCS) selection
5. RAN parameter optimization for near RT RIC and non RT RIC
6. Intelligent massive MIMO beam management
7. Digital twin for RAN automation and optimization
8. AI for autonomous network operation/management
9. AI for network energy saving and efficiency improvement

※ The topics are not limited to the above examples and the participants are encouraged to propose other original ideas.

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