Open Challenges Proposal

Call Identifier: OCF-OC1-Challenge2

Challenge: AI Agent for IPv6 Education, Deployment & Operations

Background: IPv6 adoption is growing steadily but one of the remaining challenges is lack of IPv6 knowledge and engineers. This is partly because IPv6 involves a large number of documents (500+ IETF RFCs and vendor manuals), making it difficult to learn. Preliminary studies indicate that LLMs already possess good IPv6 knowledge. They can answer IPv6 questions with an accuracy close to a skilled IPv6 expert, and already higher than common network engineers. LLMs are also improving quickly, especially the “Thinking” versions. Therefore, AI has the potential to be a good assistant.

	Deepseek V3	Doubao	Qwen-Plus	ChatGPT-4	Claude 3.5	Grok 2	IPv6 Engineer
First set 35 questions	91%	94%	82%	94%	97%	91%	77%
Second set 45 questions	96%	93%	96%	93%	98%	98%	96%
Current ranking	3	3	6	3	1	2	7

Note: study done in Q1 2025; ranking is based on average accuracy.

Technical Challenge: Besides questions related to IPv6 specifications, deploying IPv6 also involves address planning & management, lab testing, network deployment and operations. Raising the following challenges: (1) How well can existing LLMs perform these tasks? (2) How to automate error identification in an LLM’s output? (3) How to use multiple LLMs (or other approaches) to increase accuracy to a level that the outputs are useful for IPv6 network administrators?

Main Objectives: (1) Solving the 3 challenges above (2) packaging the research results and an (existing) LLM to form an IPv6 AI Agent that can perform the following task with higher accuracy compare to the state of the art:

- Answer IPv6 questions;
- Generate scenario-dependent IPv6 address planning recommendations;
- Develop guidelines and device-specific configurations for IPv6 lab testing;
- Develop guidelines and configurations for IPv6 enterprise deployment (including DNS, NAT, etc.);
- Provide IPv6 operational advice;

Deliverables: (1) report on how to solve the 3 challenges (2) guidelines on how to use AI to support IPv6 deployment (3) an AI Agent implementation and documentation.

Duration: 9 Months

Available Funding: 60k€

Sponsor: Huawei –Xipeng Xiao (xipengxiao@huawei.com)