

NaaS AI Use Cases: AI Ops and AI Empowered Provisioning



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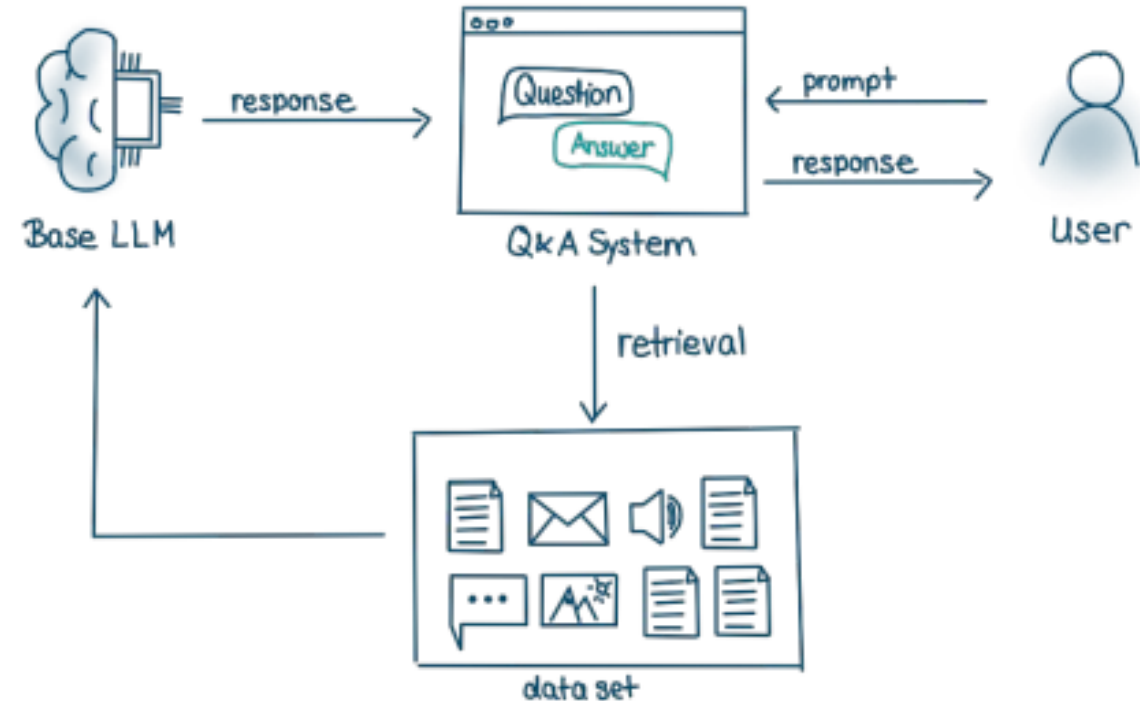


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High-Level Concept

- Enhancing the output of LLMs with external knowledge by RAG (Retrieval-Augmented Generation)
- This approach can fetch the domain specific data to augment the LLM's prompt and provides a quick and cost-effective way to integrate domain specific knowledge to LLM through retrieval mechanism without needing to customize LLM.
- **Step 1:** Collect domain data, perform data preprocessing & transformation to vector and store in vector database for fast retrieval.
- **Step 2:** Augment model with domain specific context coming directly from vectorized information stores.
- Think of it as enhancing the prompt with an extra layer of context, instead of a skilled engineer fine tuning the questions. However, the added context isn't just a few details - it's an entire dataset of knowledge, and domain-specific



Realizing the Next Generation NaaS by Adopting GenAI

A full AI powered NaaS ecosystem, is to have fully on-demand, everything automated from day 0, 1 and Day 2. This can be achieved by enabling users to manage their network operations in a self-managed manner and have the flexibility to handle everything, not only provisioning their service through a NaaS portal, but also troubleshooting and speeding up RCA in case network issues and eventually making network configuration changes to fix the problem.

Design (DAY 0)



End User

E.g.,

- Input Network requirements with traffic volume, scale and etc ...
- Output the network diagram and configuration steps.

Optimization (DAY 2)



E.g., Propose configuration changes for better performance and security.

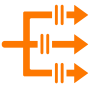
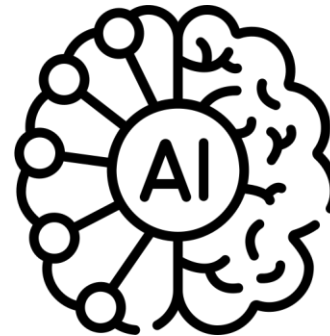
Operation (DAY 1)

E.g.,

- Service orders such as ordering new VPNs via interactive chat
- Modify Security Appliance Settings

Troubleshooting (DAY 2)

E.g., Intelligent and enhanced troubleshooting to speed-up RCA resolution without the need of network expertise



NaaS
API



Other
APIs



2024 Use Cases



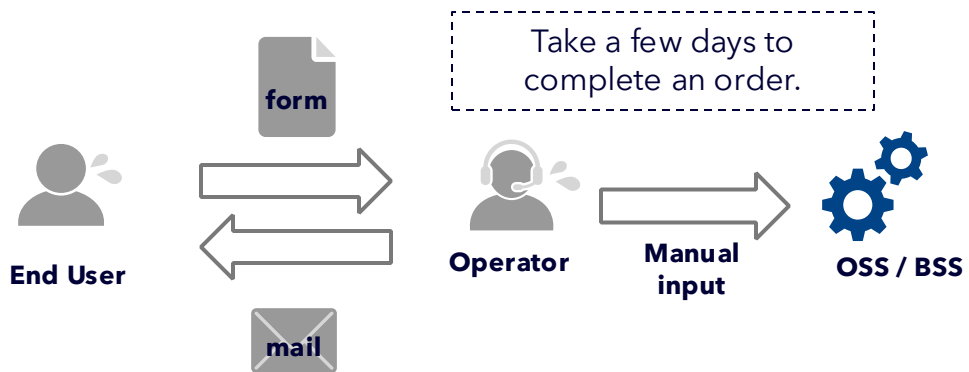
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Day 1 - NaaS Enabling Self-managed NW Ordering

NaaS has enabled NW ordering with using API and made the NW operation self-managed.

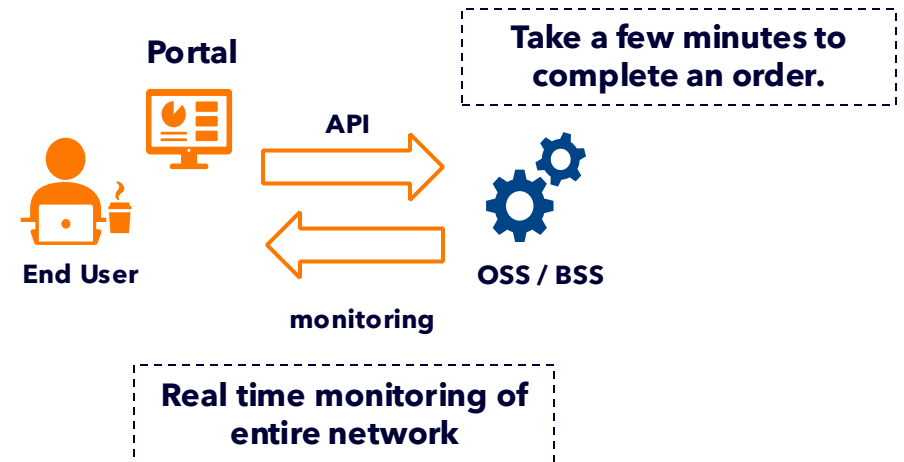
Before

End users used to fill up an Excel form and send it to operators when they order a new NW and change a NW configuration



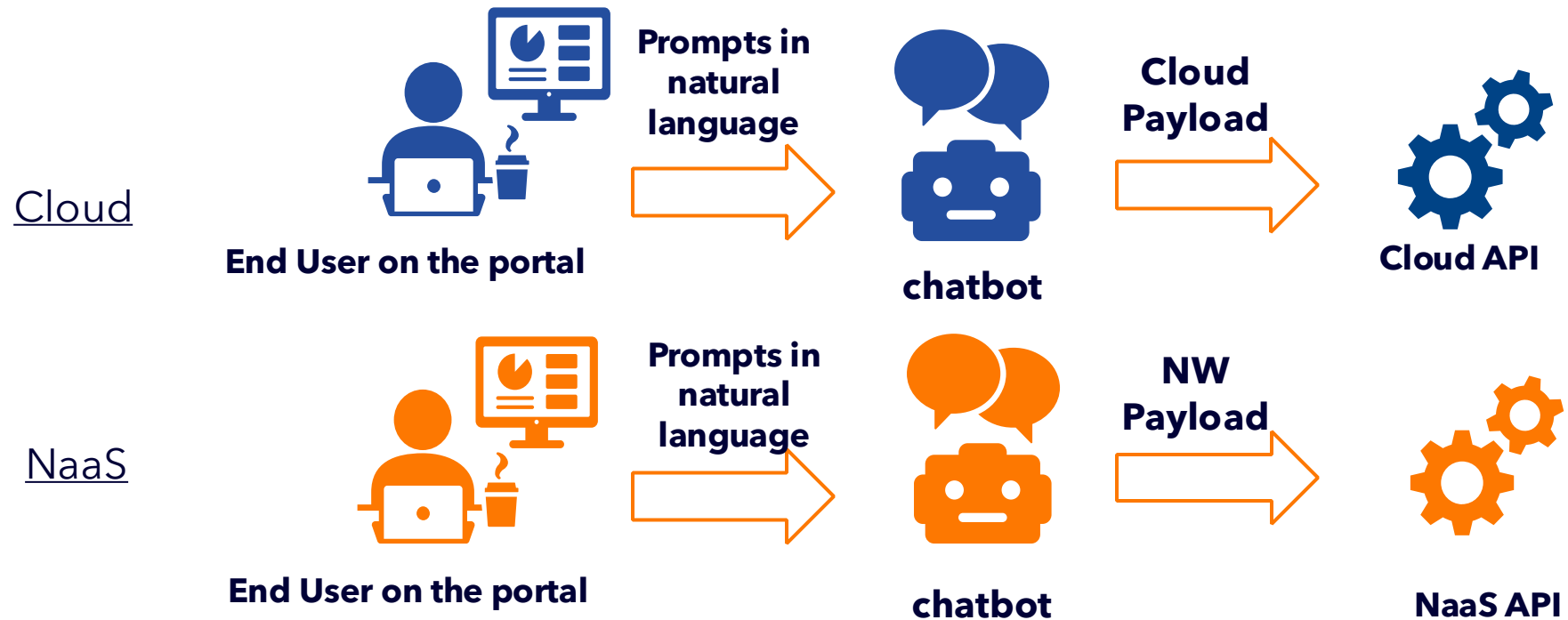
Now

End users can order a new NW and change a configuration on a self-management portal immediately.

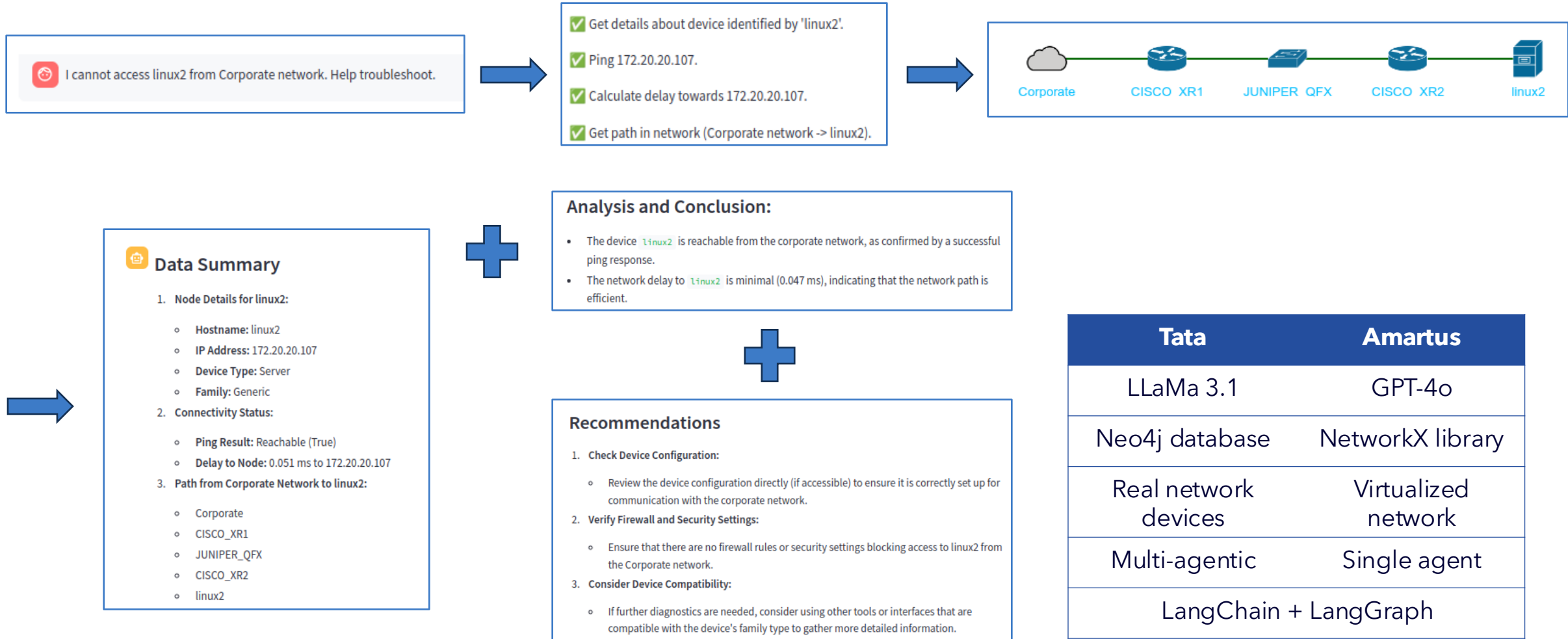


Day 1 - Blueprint of GenAI Based NW Provisioning

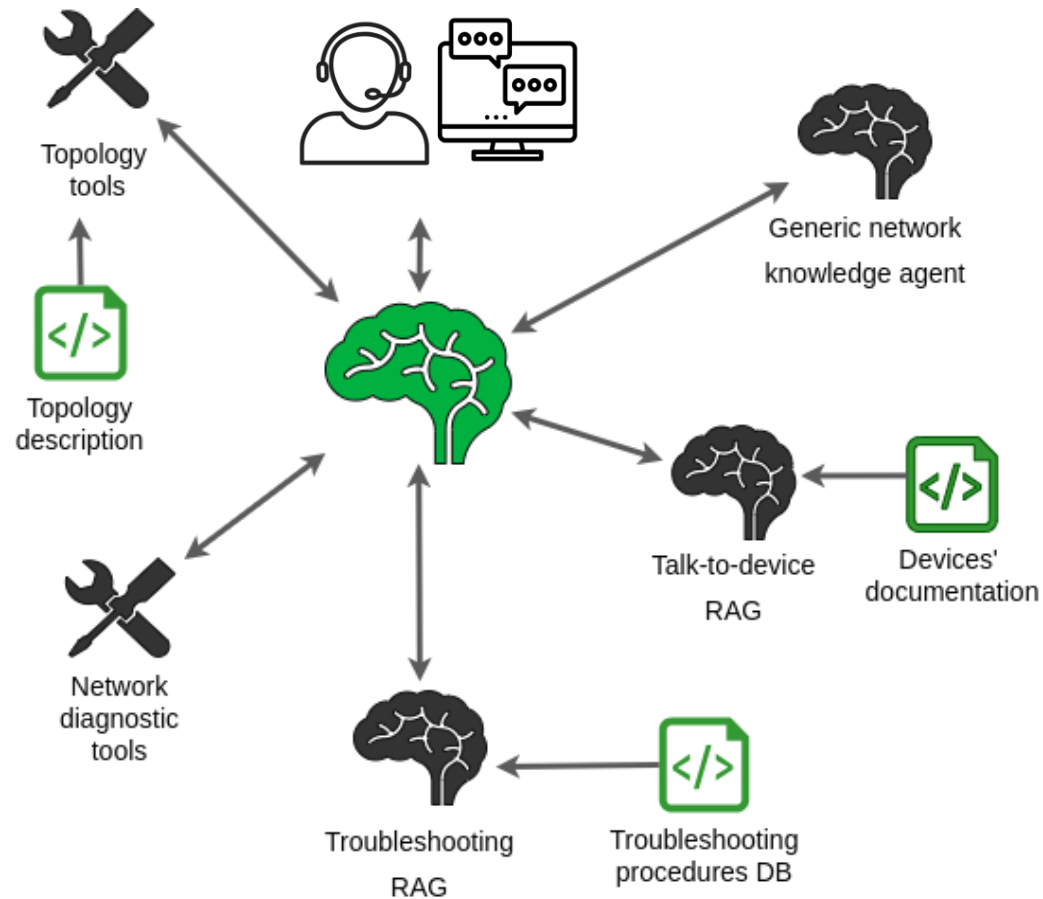
- In the field of cloud, automated provisioning is already achievable, and the network domain needs to follow suit in the same way.
- By utilizing a chatbot to enable interactive automated provisioning for networks, we can make operations on NaaS simpler as the cloud world.



Day 2 - AI Ops



Day 1 and 2 - Integration Complexity



Multiple Data Sources

Sophisticated engine training required to correlate information and draw insights across multiple data sources

Domain-Specific Knowledge

LLMs often lack deep understanding of networking concepts, requiring specialized augmentation

Data Privacy Concerns

Handling sensitive network configuration data raises security and compliance issues

System Evaluation

AI response probabilistic nature requires comprehensive testing and deep domain understanding

Outcomes & Next Steps



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Outcomes



LLM Capabilities and Limitations

- *Networking operational knowledge* varies significantly across LLMs, vendors, and domains => conditioning required: prompting, RAG.
- *Reasoning capabilities* depend on the complexity of retrieved network information and the prompting.
- *Programming techniques and custom tools* must be tailored to specific LLM



Efficient Knowledge Integration

- Mastering **prompt engineering** is crucial
- **Data preparation** is critical for AI consumption
- Small changes can yield significant **outcome differences**



System Evaluation and Human Expertise

- Response probabilistic nature requires **comprehensive testing and deep domain understanding**
- Establishing base and continuous work on **improving test sets** is necessary
- Throughout development the **network domain expertise is essential**

Ecosystem Evolution and Next Steps

Additional Participants

- We know the issue of the availability of data and how difficult is to share such sensitive information. So, we need as a community to define how we can address this issue. Is there a guideline we can follow or a standard we can use to govern this process?
- By targeting various domains, whether utilizing the same or different technology stacks for comparison, we can work together as a community to establish best practices for building RAG-based solutions, including the evaluation of data sources' usefulness for specific domains, methods for measuring solution quality, and strategies for evolving the knowledge base without compromising solution quality.

Full Closed Loop

- Silent Comet is an incubation project toward the first step of close-loop troubleshooting and provisioning and it will be essential for a fully automated NaaS.
- Further, we need to enable users to manage their network operations in a self-managed manner and to have the flexibility to handle everything, not only provisioning their service through a NaaS portal, but also troubleshooting and speeding up RCA in case network issues and eventually making network configuration changes to fix the problem.

Potential Monetization and Business Value (new services and features)

- Enhancing the user experience of customers who can request new services, without the knowledge and expertise of the provider platform and service types.
- Customers can specify their intent and objectives in writing/text and RAG powered NaaS platform will provision the network to provide the desired outcome.
- Enterprise users can now, not only provision their own services, but potentially troubleshoot issues, without the need to know the details of service provider domains using the RAG approach



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