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Requirements of Agentic Network and Potential Works in 802.1

2026 March

AI Agent and Collaboration of AI Agents

- According to the draft of 3GPP TR 22.870, which is about “6G Use Cases and Service Requirements”
  - Autonomous agents (AI agents) have long been recognized as a promising approach to achieving artificial general intelligence (AGI), which is expected to accomplish tasks through self-directed planning and actions.
  - In recent years, these agents, leveraging the capabilities of LLMs, are expected to effectively perform diverse tasks in social science, natural science, and engineering, among others.
  - AI agents can take on various forms, such as embodied intelligent robots, virtual assistants, and autonomous systems (e.g. drones).
- Multiple AI agents could collaborate through natural language conversations to complete the tasks, which abstract multiple roles to supervise task process.

Grouping

- A group could be established for users and their AI agents to communicate with each other.
- To complete a complex task involving multiple users and triggered by a user, AI agent or application, communication domain for multiple groups could be established.
- Communication domain could be dynamically created for users and AI agents from multiple groups to communicate with each other for a specific task during a specific time.
- Only the AI agents in the same domain can communicate with each other.

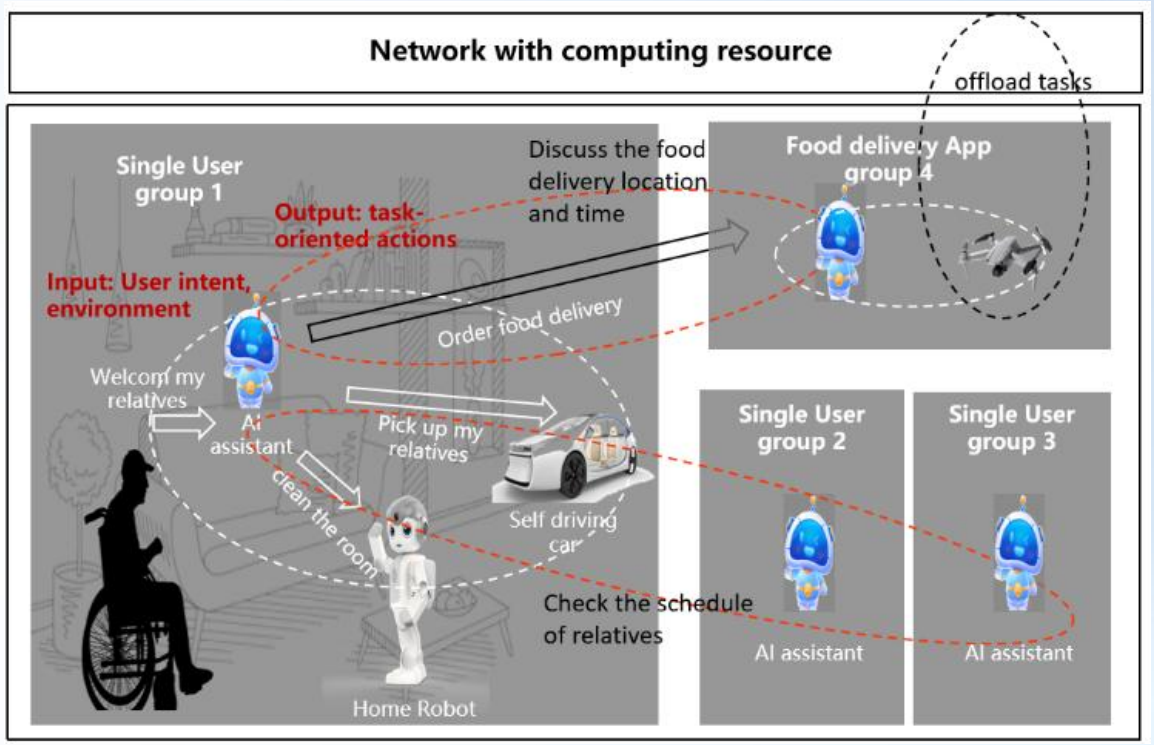
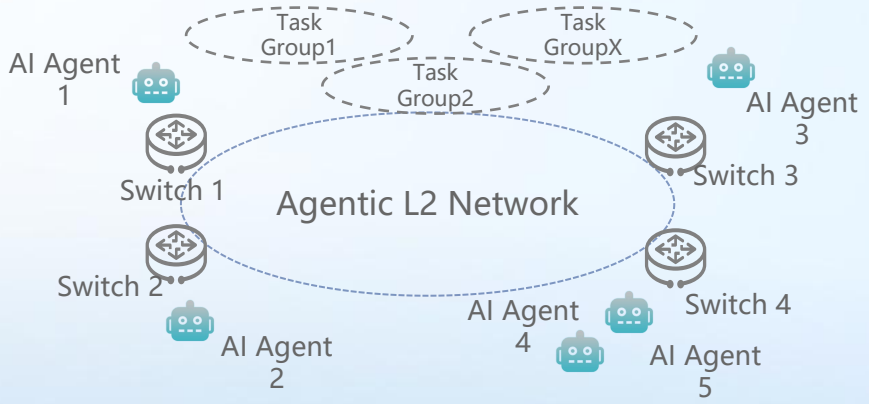


Figure 6.6.3-1: Task-Oriented Multi-Group Communication Network for multiple user AI-agents communication

from 3GPP TR 22.870

Grouping in 802.1 Network

- In a residential network, which is normally an L2 network, or in an L2 network of an enterprise, there could also be many AI Agents in the future as described in the agentic network.
- To complete a task, AI Agents in the same group need to form a virtual LAN to communicate with each other.
- The VLAN technology well fits the requirements. However, some gaps exist:
  - **Gap1:** Nowadays, the user equipment will not encapsulate the VLAN tags. It’s the job of the network equipment.
  - **Gap2:** In addition, an AI Agent may be included in multiple groups, i.e. multiple VLANs.
  - **Gap3:** Sometimes, the group needs to be dynamically established, while normally a VLAN is configured statically.
  - **Gap4:** VLAN can logically separate traffic from different groups. However, we also need some security characteristics here.



Some Possible Use Cases

- Home agents can create temporary task groups on demand
  - Use case 1 (from TR22.870):
    - When the cleaning robot needs collaboration from other robots, e.g. to move some heavy furniture, it will setup a cleaning group with others to enable efficient communication within the cleaning group. After the cleaning, the communication group will be released accordingly.
  - Use case 2 (a more detailed one with procedures):
    - **It is supposed that there are three AI Agents in this use case, Agent A (AI assistant), Agent B (Home Robot 1), Agent C (Home Robot 2), and the task is to clean a relatively large house.**

Some Possible Use Cases

- Home agents can create temporary task groups on demand
  - Use case 2 (a more detailed one with procedures):
    - Step 1: The three agents will receive the VLAN information for the task，and maybe a key for the security.
    - Step 2: The three agents can communicate in the VLAN by using broadcast or unicast. Agent A, as the group leader, sends the overall task and decomposed subtasks to Agent B and Agent C.
    - Step 3: Agent B and Agent C acknowledge receipt of the tasks and begin working.
    - Step 4: Once their work is completed, Agent B and Agent C would report it.
    - Step 5: If related work requires coordination—for example, if Agent B finishes first—Agent C may request assistance from Agent B.
    - Step 6: After task completion, the VLAN may optionally be deleted.

Next Steps

- Comments and suggestions are welcome.
- Would a project be needed?

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Thanks

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