



July 2025

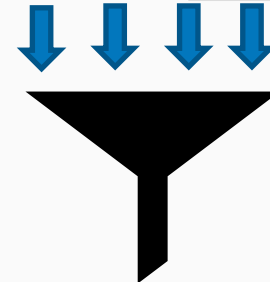
# AI Agent protocols for 6G systems

draft-stephan-ai-agent-6g-00

# Study on 6G Use Cases and Service Requirements

- 6G Use Cases and Service Requirements captured in 3GPP TR 22.870 (<https://www.3gpp.org/dynareport/22870.htm>)
  - Initiated 2024/12 for completion expected by 2026/03
- Objectives:
  - Identify high level principles and use cases
    - based on, but not limited to, IMT-2030 usage scenarios
  - Define potential requirements for 6G system to support new/enhanced services
- Status: at an early stage and study being still a work in progress
- Anyway, useful insights on the potential foundation pillars of the new 6G system.
- AI and AI agents are clearly hot topics

3GPP TR 22.870 V0.3.1 (2025-06)	
Technical Report	
3rd Generation Partnership Project; Technical Specification Group TSG SA; Study on 6G Use Cases and Service Requirements; Stage 1 (Release 20)	
	
A GLOBAL INITIATIVE	
1 Scope	
2 References	
▷ 3 Definitions of terms, symbols and abbreviations	
▷ 4 Overview	
▷ 5 System and Operational Aspects	
▷ 6 AI	
▷ 7 Integrated Sensing and Communication	
▷ 8 Ubiquitous Connectivity	
▷ 9 Immersive Communication	
▷ 10 Massive Communication	
▷ 11 Further Use Cases on Industry and Verticals	
▷ W Other Use Cases	
X Other Considerations	
Y Consolidated Potential Requirements	
▷ Z Conclusion and Recommendations	
A.1 Use Case #X	



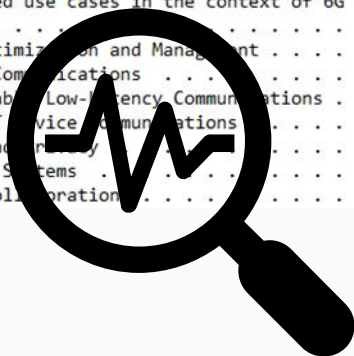
2.	AI Agent related use cases in the context of 6G . . . . .	4
2.1.	General . . . . .	4
2.2.	Network Optimization and Management . . . . .	5
2.3.	Immersive Communications . . . . .	5
2.4.	Hyper-Reliable Low-Latency Communications . . . . .	5
2.5.	Massive IoT Device Communications . . . . .	6
2.6.	Security and Privacy . . . . .	6
2.7.	Autonomous Systems . . . . .	6
2.8.	AI Agent Collaboration . . . . .	6

# Objectives of the draft



- Potential key requirements derived from the illustrative use cases

2. AI Agent related use cases in the context of 6G . . . . .	4
2.1. General . . . . .	4
2.2. Network Optimization and Management . . . . .	5
2.3. Immersive Communications . . . . .	5
2.4. Hyper-Reliable Low-Latency Communications . . . . .	5
2.5. Massive IoT Device Communications . . . . .	6
2.6. Security and Privacy . . . . .	6
2.7. Autonomous Systems . . . . .	6
2.8. AI Agent Collaboration . . . . .	6



3. Potential agent communications related requirements . . . . .	7
3.1. General . . . . .	7
3.2. Interoperability . . . . .	7
3.2.1. Standardized Protocols . . . . .	7
3.2.2. Multimodal Data Formats . . . . .	7
3.2.3. Agent Identity Management . . . . .	7
3.3. Discovery Mechanisms . . . . .	7
3.4. Task Management . . . . .	8
3.5. Context Awareness . . . . .	8
3.5.1. Contextual Understanding . . . . .	8
3.5.2. Adaptive Communication . . . . .	8
3.6. Autonomy . . . . .	8
3.6.1. Decision Making . . . . .	8
3.6.2. Self-Management . . . . .	8
3.7. Security . . . . .	8
3.7.1. Authentication and Authorization . . . . .	8
3.7.2. Data Protection . . . . .	9
3.7.3. User Consent . . . . .	9
3.8. Low Latency Communication . . . . .	9
3.9. Reliability . . . . .	9
3.9.1. Fault Tolerance . . . . .	9
3.9.2. Load Balancing . . . . .	9
3.9.3. Redundancy . . . . .	9
3.10. Flexibility . . . . .	9
3.10.1. Scalability . . . . .	10
3.10.2. Adaptability . . . . .	10
3.10.3. Extensibility . . . . .	10
3.11. Energy Efficiency . . . . .	10
3.11.1. Optimized Communication . . . . .	10
3.11.2. Power Management . . . . .	10

# Conclusions



- ❑ Ongoing study demonstrates the **potential of AI agent communication** in the scope of 6G.
- ❑ Early stage: 3GPP is still discussing the AI agent related use cases. Functional and protocol related aspects will be studied in the upcoming months
- ❑ **If** a multi-AI agent-based system is formally adopted by 3GPP in the scope of 6G, **standard solutions will be required** to support secure and reliable communication **between agents** and **between agents and external tools**.
- ❑ Standard solutions for **intra-network** but also for interaction **with 3rd-party platforms**.
- ❑ Authors consider that **IETF could be the right place** for such standard effort.
- ❑ **Close coordination** between IETF and 3GPP is expected

# Clear need for a standard for Agent communications...



**AGNTCY** Agent Connect Protocol

Search

OASF > We propose a solution where all agents are able to communicate over the network using a **standard protocol** to interoperate. We call it the **Agent Connect Protocol (ACP)**.

Agent Directory Service >

Agent M

**Agent Communication Protocol**

Search... Ctrl K

Python SDK

TypeScript SDK

The **Agent Communication Protocol (ACP)** is an open protocol for agent interoperability that solves the growing challenge of connecting AI agents, applications, and humans. Modern AI agents are often built in isolation, across different frameworks, teams, and infrastructures. This fragmentation slows innovation and makes it harder for agents to work together effectively. ACP solves this by enabling agents to communicate through **standardized RESTful APIs** that supports:

**A2A protocol**

An open protocol enabling communication and interoperability between opaque agentic applications.

The Agent2Agent (A2A) protocol addresses a critical challenge in the AI landscape: enabling gen AI agents, built on diverse frameworks by different companies running on separate servers, to **communicate and collaborate effectively** - as agents, not just as tools. A2A aims to provide a **common language for agents**, fostering a more interconnected, powerful, and innovative AI ecosystem.

AgentNetworkProtocol / docs / anp-getting-started-guide.md

Preview Code Blame 356 lines (269 loc) • 17.8 KB

Raw

**What is ANP**

ANP (Agent Network Protocol) is an open-source intelligent agent communication protocol, designed to be the HTTP protocol for the age of the agent internet. ANP enables agents to discover, connect, and interact with each other on the internet, establishing an open and secure network for agent collaboration.

**Project NANDA**

Project NANDA is building the foundational infrastructure for the **Open Agentic Web** system where trillions of AI agents can collaborate, communicate, and transact across organizational boundaries without bottlenecks or security vulnerabilities. NANDA addresses the core challenge: how can billions or even trillions of AI agents discover each other, verify capabilities, and coordinate tasks without creating bottlenecks or security vulnerabilities. The project develops both the technical infrastructure (index - interop links between all heterogeneous agent registries, protocols, SDKs) and the governance frameworks needed for a responsible, **Open Agentic Web**.

**Introduction**

Get started with the Model Context Protocol (MCP)

MCP is an open protocol that **standardizes** how applications provide context to LLMs. Think of MCP like a USB-C port for AI applications. Just as USB-C provides a standardized way to connect your devices to various peripherals and accessories, MCP provides a standardized way to connect AI models to different data sources and tools.

Copy page

*\* MCP currently considered as de facto solution for agent-tool communication*



But at the end...



If you really want a **STANDARD** solution  
to ensure full interoperability between agents!

# Next steps



- Help to build consensus on:
  - Existing need for a standard for agent communication
  - IETF is the right place to work on it
- Include 3GPP specific requirements (if any) in the scope of the discussion on a possible charter
- Provide updates on the progress of the work in 3GPP
- Promote close cooperation between IETF and 3GPP



# Useful References



- ITU-R, "Recommendation ITU-R M.2160-0: Framework and overall objectives of the future development of IMT for 2030 and beyond",
  - [https://www.itu.int/dms\\_pubrec/itu-r/rec/m/R-REC-M.2160-0-202311-I!!PDF-E.pdf](https://www.itu.int/dms_pubrec/itu-r/rec/m/R-REC-M.2160-0-202311-I!!PDF-E.pdf) .
- 3GPP TR 22.870: Study on 6G Use Cases and Service Requirements; Stage 1 (Release 20)"
  - [https://www.3gpp.org/ftp/Specs/archive/22\\_series/22.870](https://www.3gpp.org/ftp/Specs/archive/22_series/22.870)
- 3GPP SA2 Study Item on Architecture for 6G System
  - [https://www.3gpp.org/ftp/tsg\\_sa/TSG\\_SA/TSGS\\_108\\_Prague\\_2025-06/Docs/SP-250806.zip](https://www.3gpp.org/ftp/tsg_sa/TSG_SA/TSGS_108_Prague_2025-06/Docs/SP-250806.zip)
- 3GPP Work Plan: Review at Plenary #108 (June 2025)
  - [https://www.3gpp.org/ftp/tsg\\_sa/TSG\\_SA/TSGS\\_108\\_Prague\\_2025-06/Docs/SP-250890.zip](https://www.3gpp.org/ftp/tsg_sa/TSG_SA/TSGS_108_Prague_2025-06/Docs/SP-250890.zip)