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Foreword

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Introduction

The technology of Artificial Intelligence has the potential to be truly transformative to society. Despite some limitations, the technology is capable of many functions, including but not limited to answering questions, translating, describing and summarizing multi-modal content, generating new content, and summarizing large volumes of information. This enables the creation of intelligent agents that can use AI to analyze data and provide new services.

A much bigger boost to the social benefits of AI technology can be obtained by interactions among different intelligent agents, which may be under the control of different organizations and users. The interaction among intelligent agents can unlock new economic and social value, just like the interactions among various Internet-based services was enabled with the advent of the web browser.

There is a need for a standard common protocol that is used by humans to interact with an intelligent agent, and for intelligent agents to interact with each other. This specification proposes such a protocol.

This document describes the specification of the protocol. The binding of the protocol to underlying base transfer protocols are described in companion documents.

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Information technology — Natural Language Interaction Protocol (NLIP)

1 Scope

This Standard defines the specifications of Natural Language Interaction Protocol (NLIP), which is an application-level communication protocol defined between AI Agents or between a human and an AI agent. The motivation, the design philosophy, exemplar use-cases, and examples of sample exchanges using the NLIP protocol are out of scope of this Standard.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ECMA-404, *The JSON Data Interchange Syntax, 2nd edition (December 2017)*

ECMA-431, *Binding of the Natural Language Interaction Protocol (NLIP) over HTTP/HTTPS*

ECMA-432, *Binding of the Natural Language Interaction Protocol (NLIP) over WebSocket*

ECMA-433, *Binding of the Natural Language Interaction Protocol (NLIP) over AMQP*

ECMA-434, *Security Profiles for the Natural Language Interaction Protocol (NLIP)*

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

3.1
base transfer protocol
a base transfer protocol is a communication protocol between two computer systems which supports an encrypted and authenticated transfer of data across those computer systems. HTTPS is an example of a base transfer protocol

3.2
JSON message
JSON formatted message is any data that is written to be conformant to ECMA-404

3.3
data modality
the modality of data refers to the type of information the data is representing. Common examples of data modality include natural language (expressed in human languages), structured text (e.g. JSON, XML, or a computer include language like ECMAScript), video, audio, and binary data

3.4
multi-modal data
multi-modal data is data that has multiple components, where different components may have different data modalities

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3.5
end-point
an end-point is a computer system or computer software that communicates using NLIP with other computer systems or computer software, on the same or another machine

3.6
agent
an agent is a software which is capable of processing multimodal information, take actions and generate responses based on such processing using an AI model such as a large neural network. The action and response generation may or may not involve a human in the loop

3.7
client agent
a client agent is an agent which initiates the transfer of data to another agent

3.8
server agent
a server agent is an agent which waits for other agents to initiate the transfer of data with it and responds to them

4 Conformance

A conforming implementation of NLIP must provide and support messages and submessages as described in this specification.

A conforming implementation of NLIP must select a base transfer protocol and conform to the specifications of the binding document of that base transfer protocol listed in Clause 2.

A conforming production deployment of NLIP must select a security profile defined in ECMA-434 and support it.

5 NLIP message formats

This clause describes the format of NLIP messages and the required action of an end-point on the receipt of each type of message or sub-message.

Each message exchanged via NLIP is primarily represented as a JSON message. Each message consists of a first submessage and an optional list of other submessages. Capitalization is not relevant to the name or value of the field.

The binding of the protocol to a base transfer protocol may make special provisions for more efficient transfer of binary and structured content. The specific details for these provisions can be found in the binding documents of NLIP over the base transfer protocol.

In the message and submessage structures, all types (arrays, strings, objects etc.) are represented as defined in ECMA-404 JSON specification.

5.1 First submessage

The first submessage in a NLIP message is a JSON object consisting of the following fields:

5.1.1 MessageType field

The MessageType field is optional. Its value must be a string as defined by ECMA-404. The value of ‘control’ is reserved and indicates a message that is used to negotiate control parameters. Control messages are intended to perform operations related to the non-functional aspect of an end-point, e.g. to query about its applicable policies, or to negotiate any parameters associated with the end-point configuration or protocol configuration. Other messages are intended to perform operations related to the function of the end-point.

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