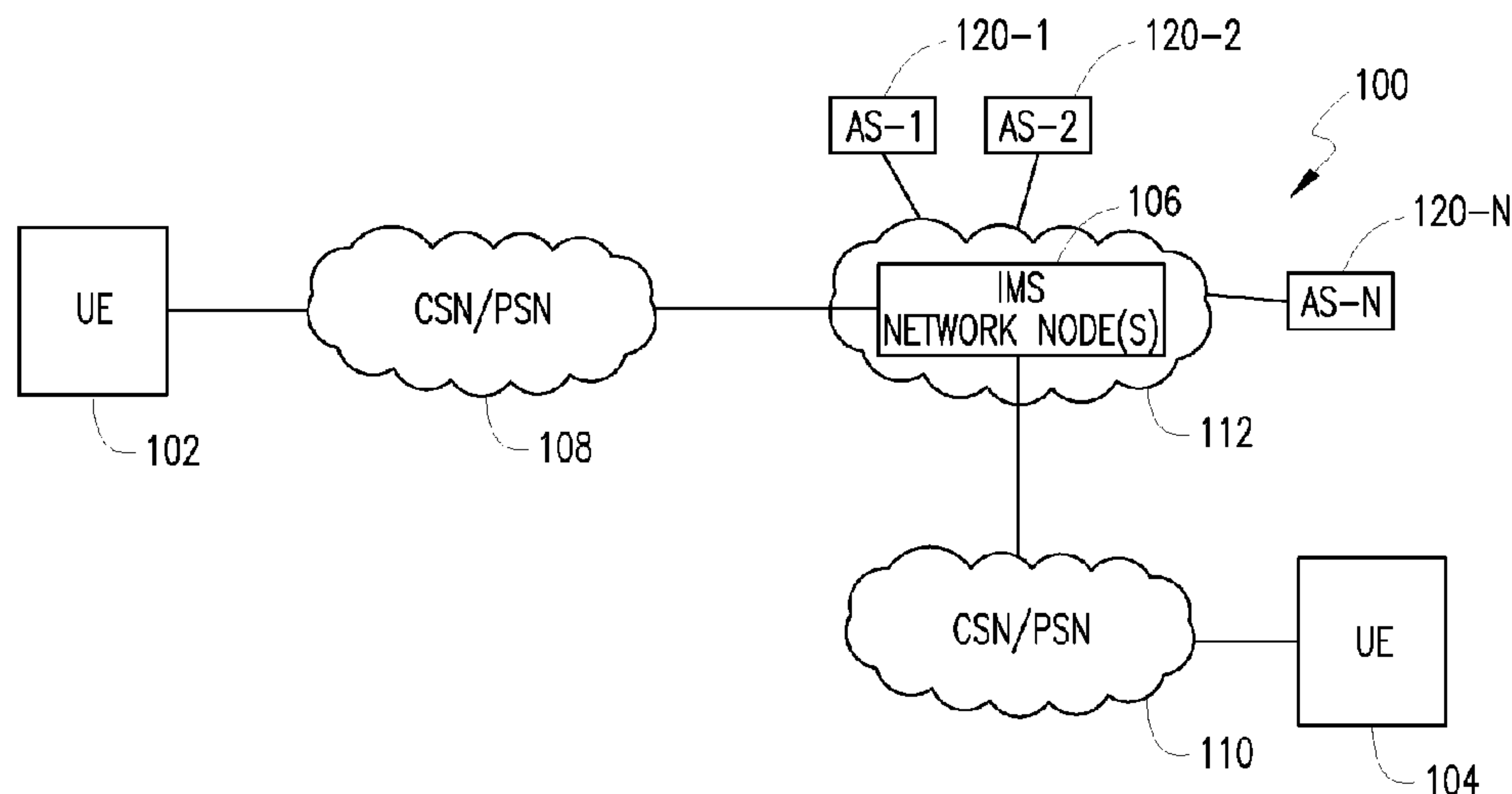




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(54) Titre : NEGOCIATION DE SCHEMA POUR DES DOCUMENTS VERSIONES TRANSMIS DANS UN
ENVIRONNEMENT DISTRIBUE
(54) Title: SCHEMA NEGOTIATION FOR VERSIONED DOCUMENTS TRANSMITTED IN A DISTRIBUTED
ENVIRONMENT



(57) **Abrégé/Abstract:**

In one embodiment, a scheme is disclosed for negotiating schema information relating to one or more content types of a message body comprised within a message of a communication protocol. A communication protocol message such as a SIP or HTTP message is generated by a sender towards a recipient, wherein the message includes a message body. A schema indicator is provided in the communication protocol message to indicate acceptability of variations of a content type of a message body or body part in a response from the recipient.



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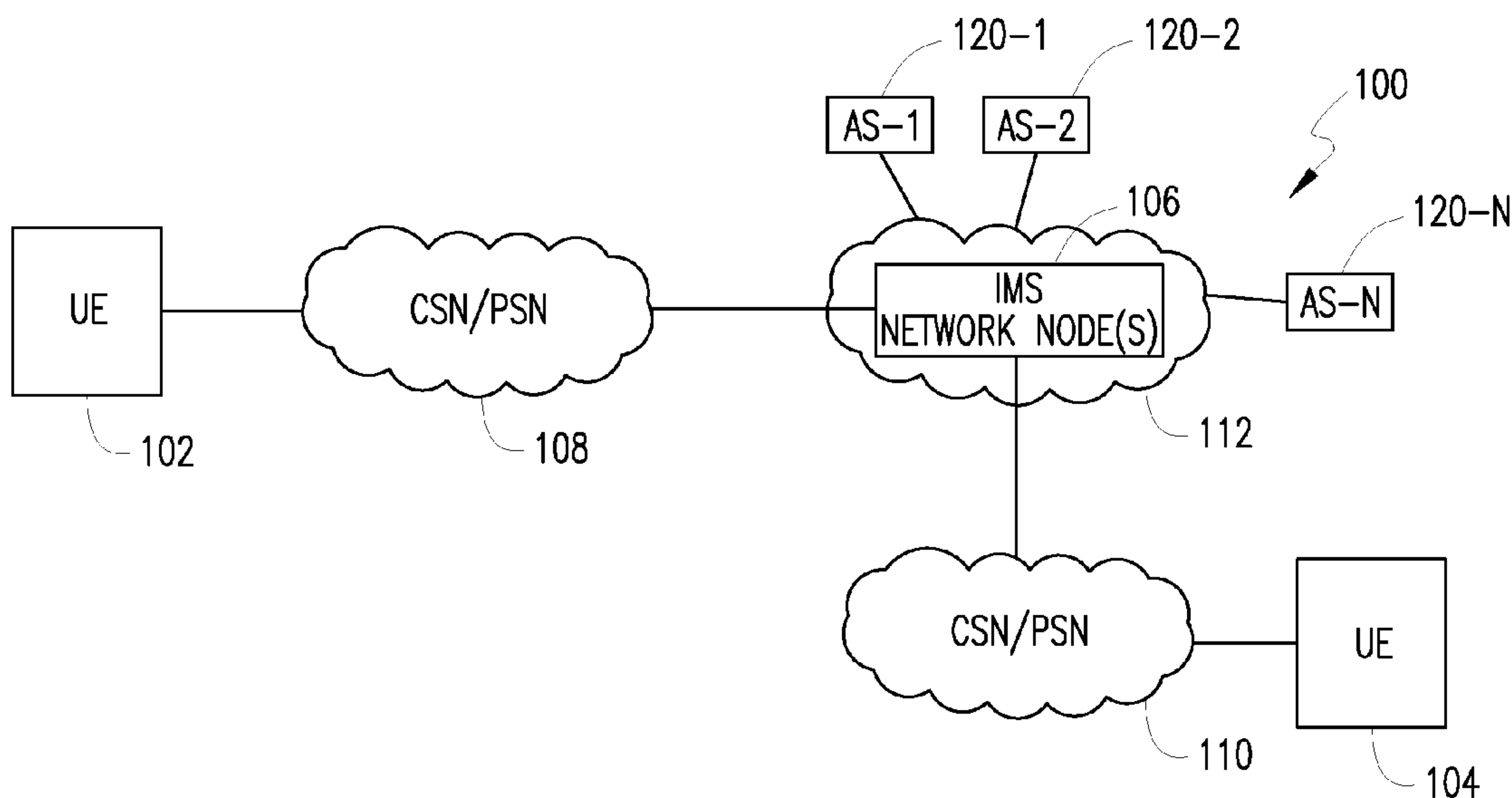
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(54) Title: SCHEMA NEGOTIATION FOR VERSIONED DOCUMENTS TRANSMITTED IN A DISTRIBUTED ENVIRONMENT

**FIG. 1**

(57) Abstract: In one embodiment, a scheme is disclosed for negotiating schema information relating to one or more content types of a message body comprised within a message of a communication protocol. A communication protocol message such as a SIP or HTTP message is generated by a sender towards a recipient, wherein the message includes a message body. A schema indicator is provided in the communication protocol message to indicate acceptability of variations of a content type of a message body or body part in a response from the recipient.

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SCHEMA NEGOTIATION FOR VERSIONED DOCUMENTS TRANSMITTED
IN A DISTRIBUTED ENVIRONMENT

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FIELD OF THE DISCLOSURE

The present patent disclosure generally relates to message processing in 30
communications networks. More particularly, and not by way of any limitation, the present
patent disclosure is directed to schema negotiation for versioned documents transmitted in a
15 distributed network environment.

BACKGROUND

Markup languages are being used in describing information relating to messages implemented in communication protocols. In a network environment where different entities communicate with each other using message bodies in Markup languages that are extensible, it becomes important that the languages as well as any meta-structures used for understanding the language are compatible across the environment. Otherwise, significant interoperability issues leading to failure in communication, unpredictable behavior, etc., for example, may arise.

10 BRIEF DESCRIPTION OF THE DRAWINGS

A more complete understanding of the embodiments of the present patent disclosure may be had by reference to the following Detailed Description when taken in conjunction with the accompanying drawings wherein:

FIG. 1 depicts an exemplary distributed network environment wherein one or more
15 embodiments of the present patent disclosure may be practiced;

FIG. 2 depicts a block diagram of a User Equipment (UE) device according to an embodiment;

FIG. 3 depicts a block diagram of a network node according one embodiment;

FIG. 4 depicts an embodiment of a software architecture employed at an entity for
20 processing communication protocol messages in an exemplary distributed network environment, wherein the communication protocol messages may include message bodies or documents in multiple versions;

FIG. 5A depicts the structure of an exemplary communication protocol message (e.g., a Session Initiation Protocol (SIP) message) having one initial line, one or more header
25 fields, and a message body, where the message body possibly includes multiple body parts;

FIGS. 5B and 5C depict exemplary message flows between two entities in a distributed environment wherein communication protocol messages having message bodies are transmitted;

FIG. 5D depicts an exemplary set of different schemas for validating Extensible
30 Markup Language (XML) documents provided as message bodies in communication protocol messages;

FIG. 6A depicts an embodiment of a method of negotiating schema and document version information relating to message bodies of a communication protocol;

both at a SIP entity, e.g., a UE device or a network node. In the most basic form, SIP uses six types (methods) of requests:

- INVITE: Indicates a user or service is being invited to participate in a call session.
- ACK: Confirms that the client has received a final response to an INVITE request.
- 5 • BYE: Terminates a call/session and can be sent by either the caller or the callee.
- CANCEL: Cancels any pending searches but does not terminate a call/session that currently in progress.
- OPTIONS: Queries the capabilities of servers.
- REGISTER: Registers the address listed in the To: header field with a SIP server.

10 As SIP can continue to evolve, a recipient may receive a method of request that it does not recognize. Such a method of request is handled as the UNKNOWN method of request. In response to requests, SIP uses the following categories of responses:

- 1xx Informational Messages
- 2xx Successful Responses
- 15 • 3xx Redirection Responses
- 4xx Request Failure Responses
- 5xx Server Failure Responses
- 6xx General Failure Responses

20 SIP messages are typically provided with a standardized message structure. FIG. 5A depicts the structure of an exemplary communication protocol message (e.g., a Session Initiation Protocol (SIP) message) having one initial line, one or more header fields, and a message body, where the message body possibly includes multiple body parts. A command line portion 502 identifies the initial line (e.g., a request line in requests and a status line in

Table 2B

	</xs:simpleType>
	</xs:choice>
5	</xs:complexType>
	<xs:complexType name="tAlternativeService">
	<xs:sequence>
	<xs:element name="type" type="tType"/>
	<xs:element name="reason" type="xs:string"/>
10	<xs:any namespace="###any" processContents="lax" minOccurs="0"
	maxOccurs="unbounded"/>
	</xs:sequence>
	<xs:anyAttribute/>
	</xs:complexType>
15	<xs:complexType name="tType">
	<xs:sequence>
	<xs:element name="emergency" minOccurs="0" maxOccurs="1">
	<xs:complexType/>
	</xs:element>
20	<xs:any namespace="###any" processContents="lax" minOccurs="0"
	maxOccurs="unbounded"/>
	</xs:sequence>
	<xs:anyAttribute/>
	</xs:complexType>
25	<xs:element name="ims-3gpp" type="tIMS3GPP"/>
	</xs:schema>

Accept: application/3gpp-ims+xml;sv="1,1.1";ife="ue,p-cscf,s-cscf,as,. . ."

The foregoing example would enable different SIP UA entities involved, if needed, to populate the Accept header (e.g., in an INVITE message) with all their schema versions for the MIME type "application/3gpp-ims+xml". Set forth below are examples of Accept header formats in accordance with known standards (e.g., RFC 2616 and RFC 3261) that may be used for properly encoding the sv and ife tokens.

Table 3

10

```
Accept      = "Accept" ":"
              #( media-range [ accept-params ] )
```

15

```
media-range = ( "*"/*"
                | ( type "/" "*" )
                | ( type "/" subtype )
                ) *( ";" parameter )
```

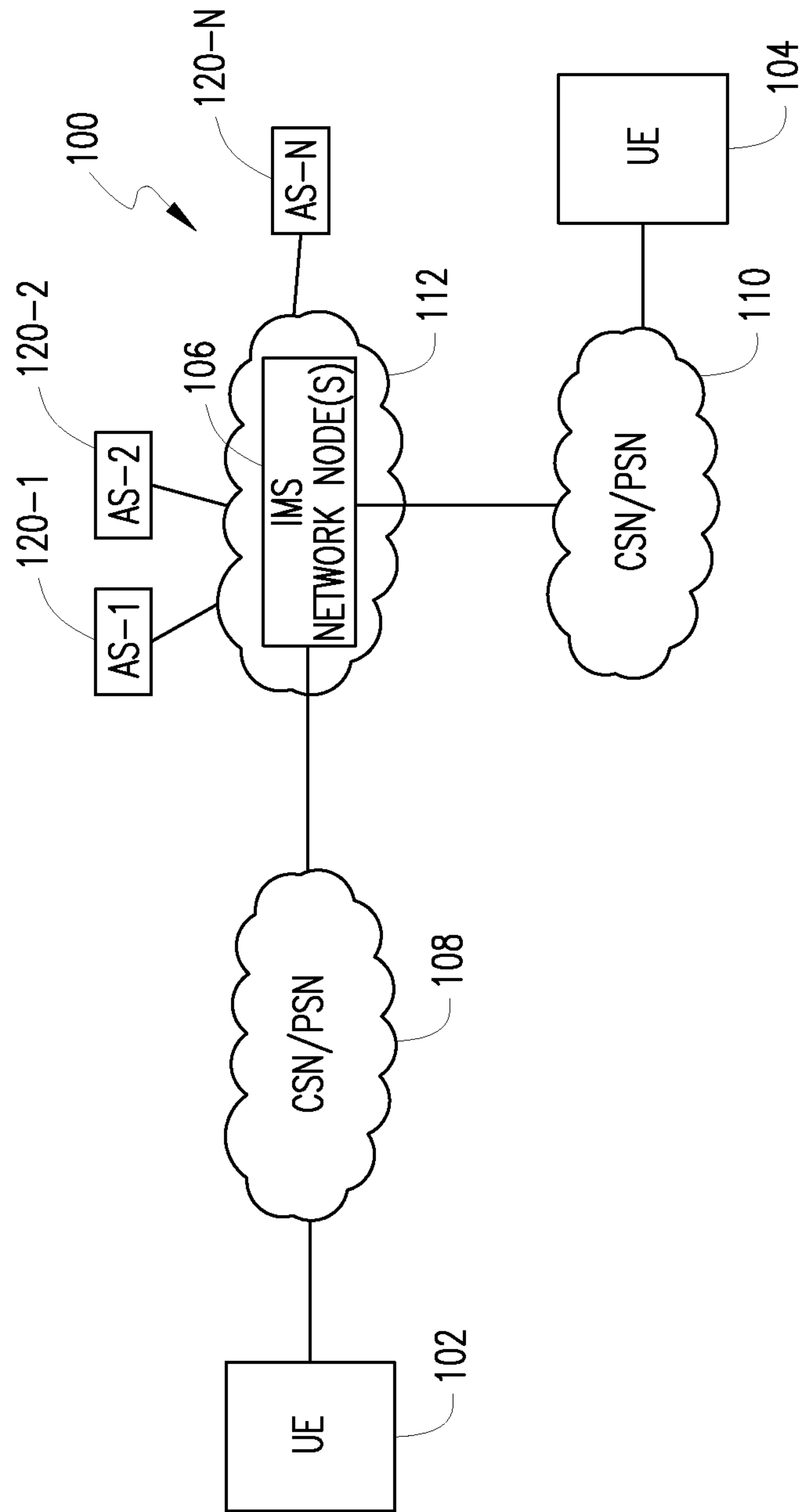
20

```
accept-params = ";" "q" "=" qvalue *( accept-
                                     extension )
accept-extension = ";" token [ "=" ( token | quoted-
                                     string ) ]
```

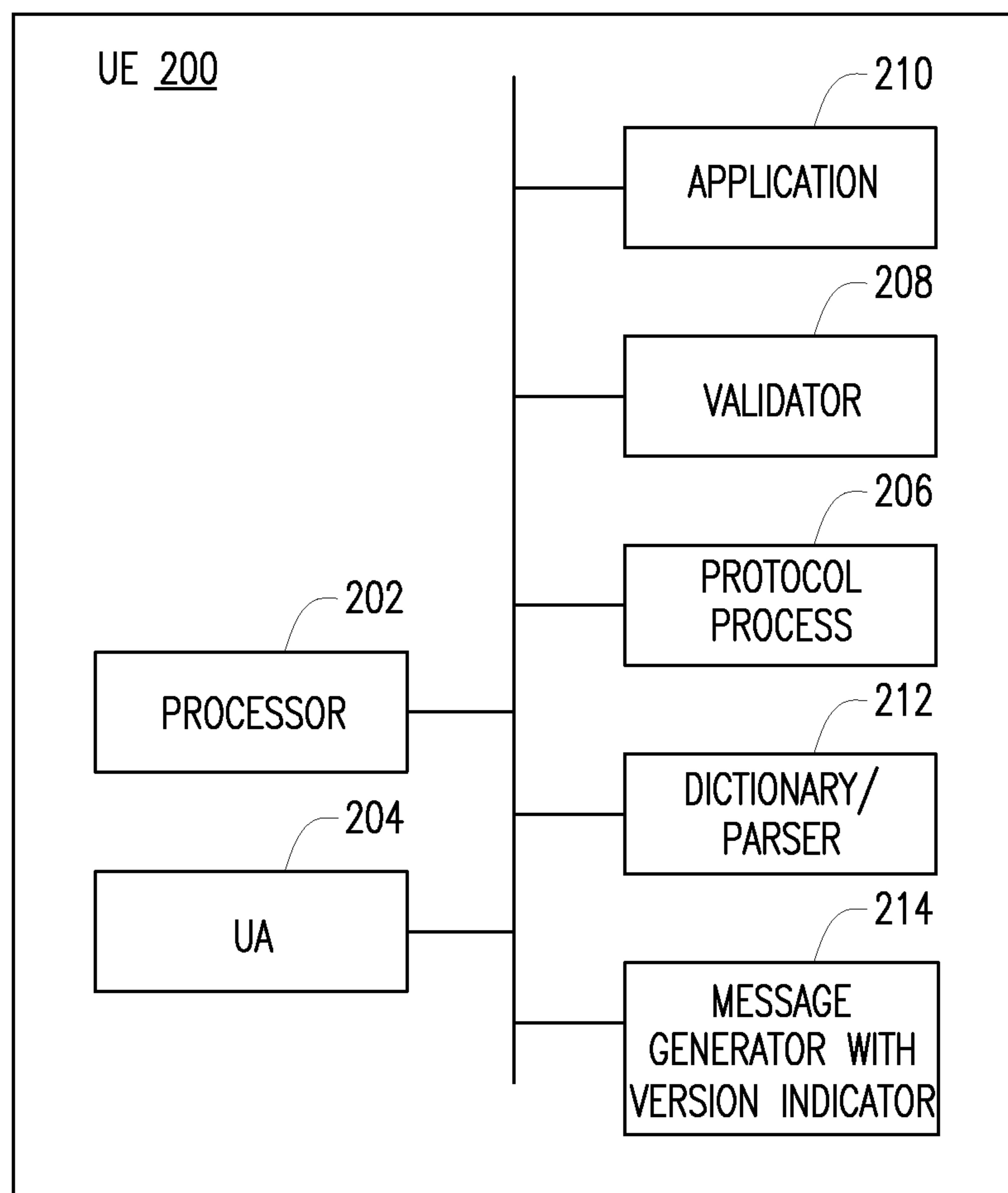

6. The apparatus for communicating schema information as recited in claim 1, wherein said recipient is a UE device disposed in a network environment.

7. The apparatus for communicating schema information as recited in claim 1, wherein said at least one body part comprises an Extensible Markup Language (XML) document.

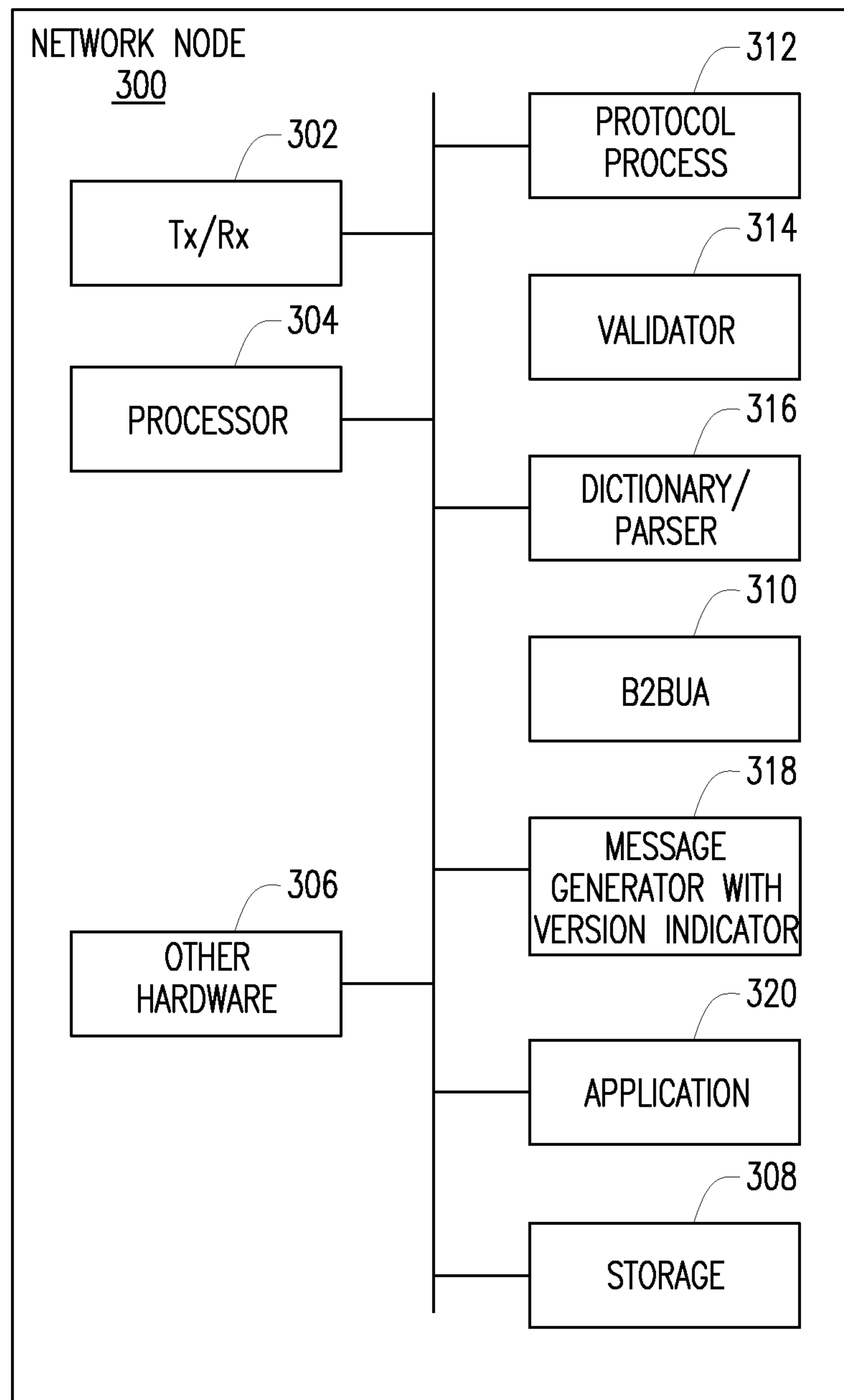
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**FIG. 1**

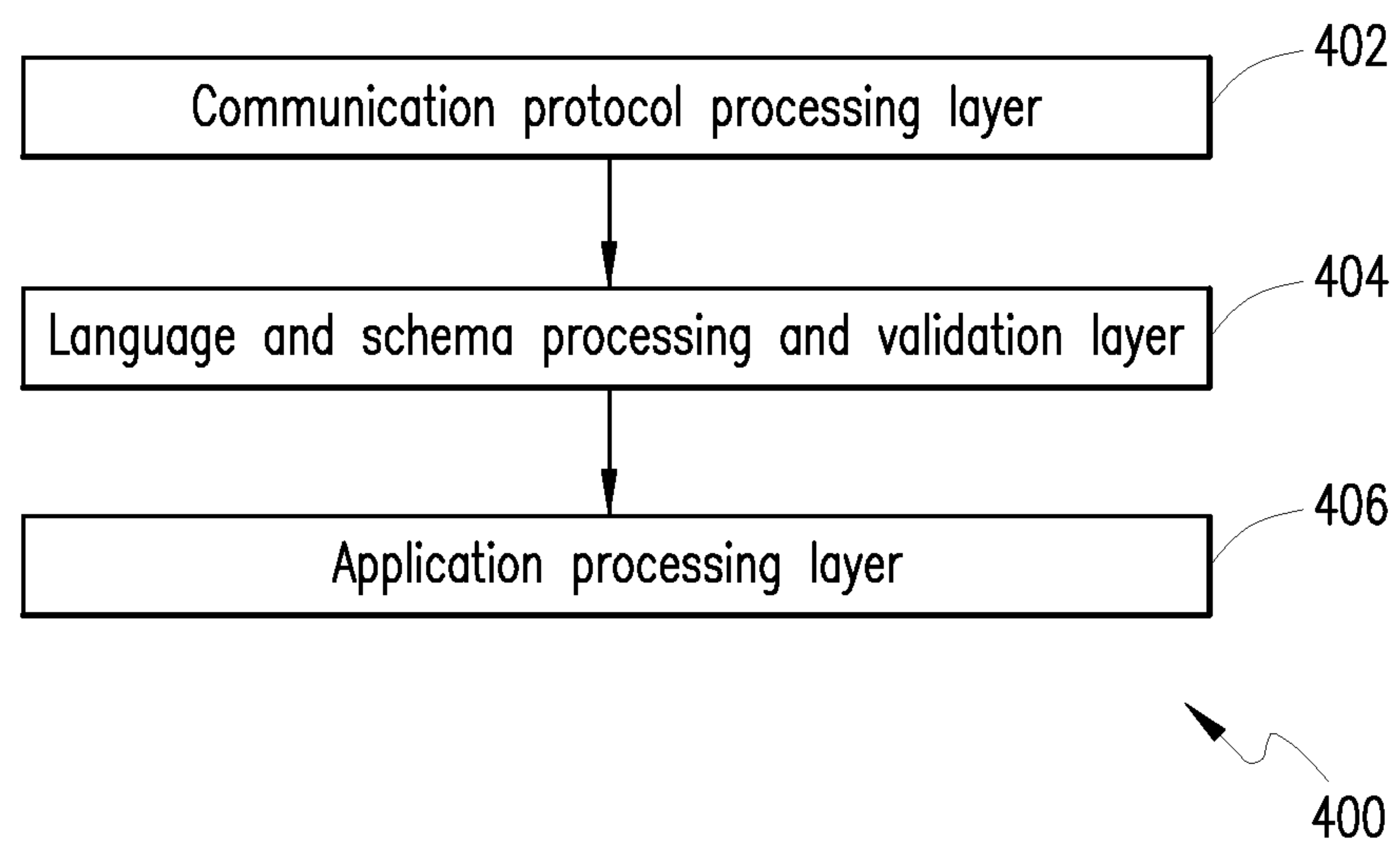
2/14

*FIG. 2*

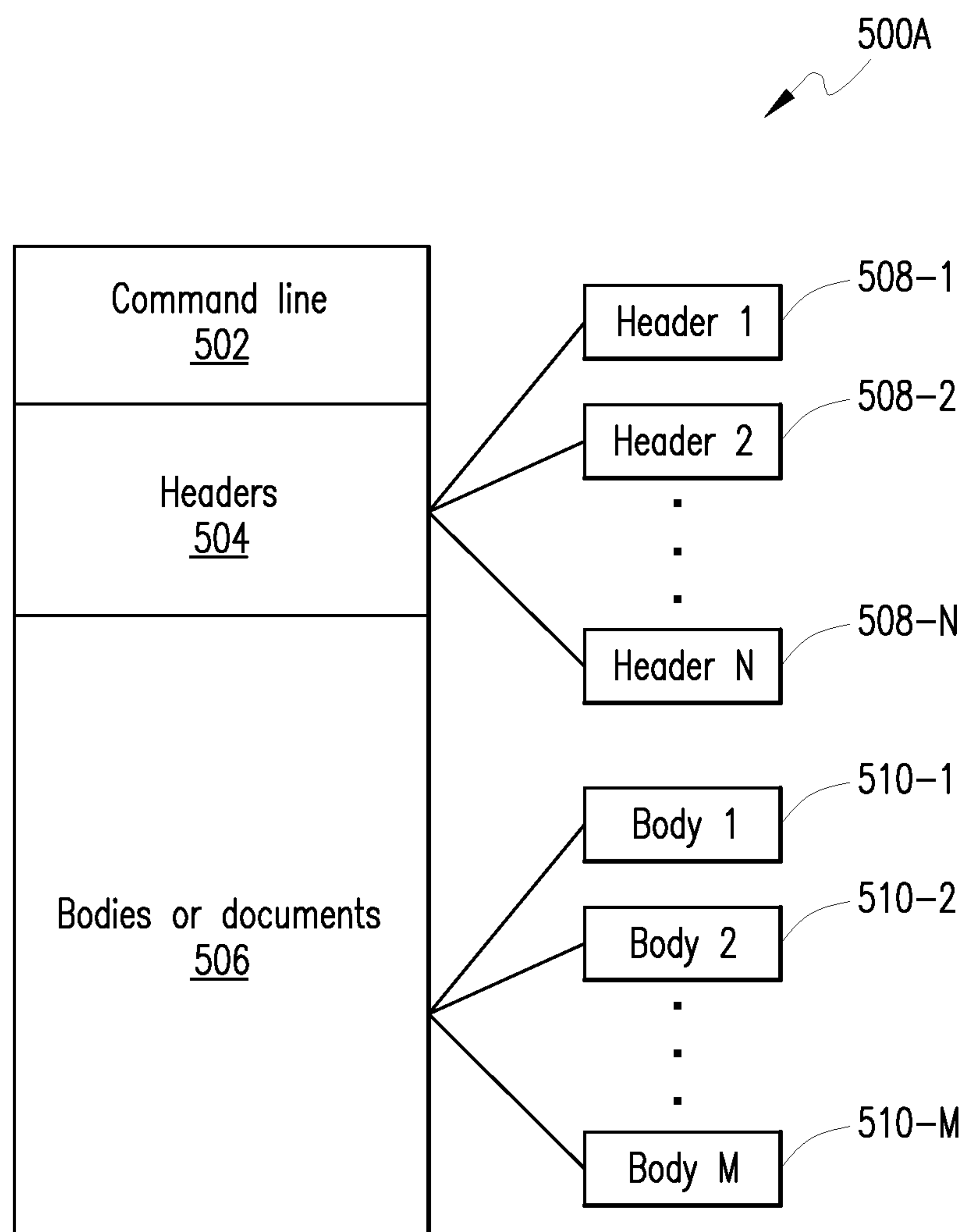
3/14

**FIG. 3**

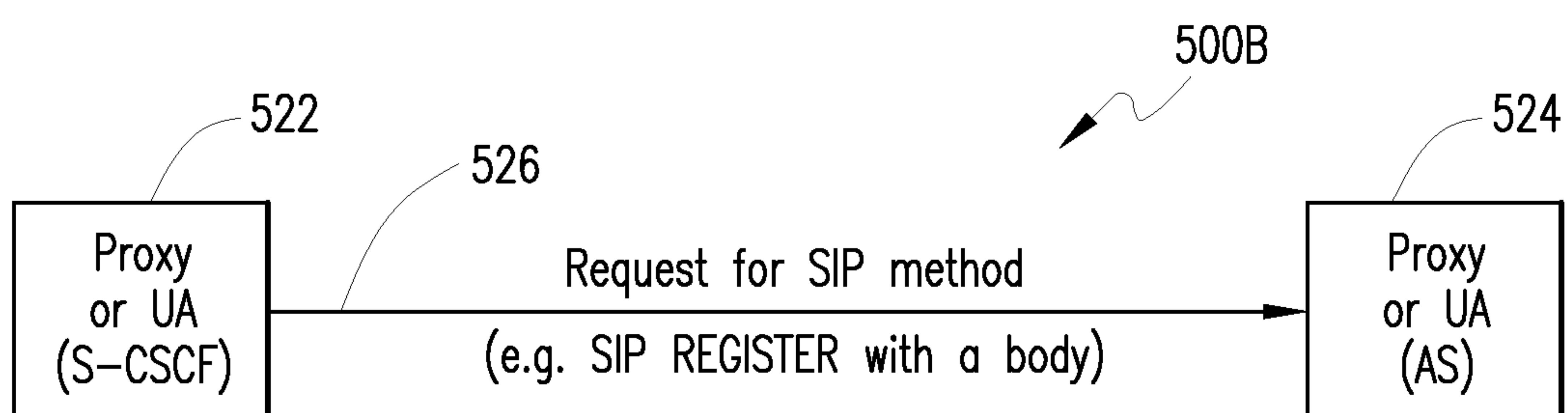
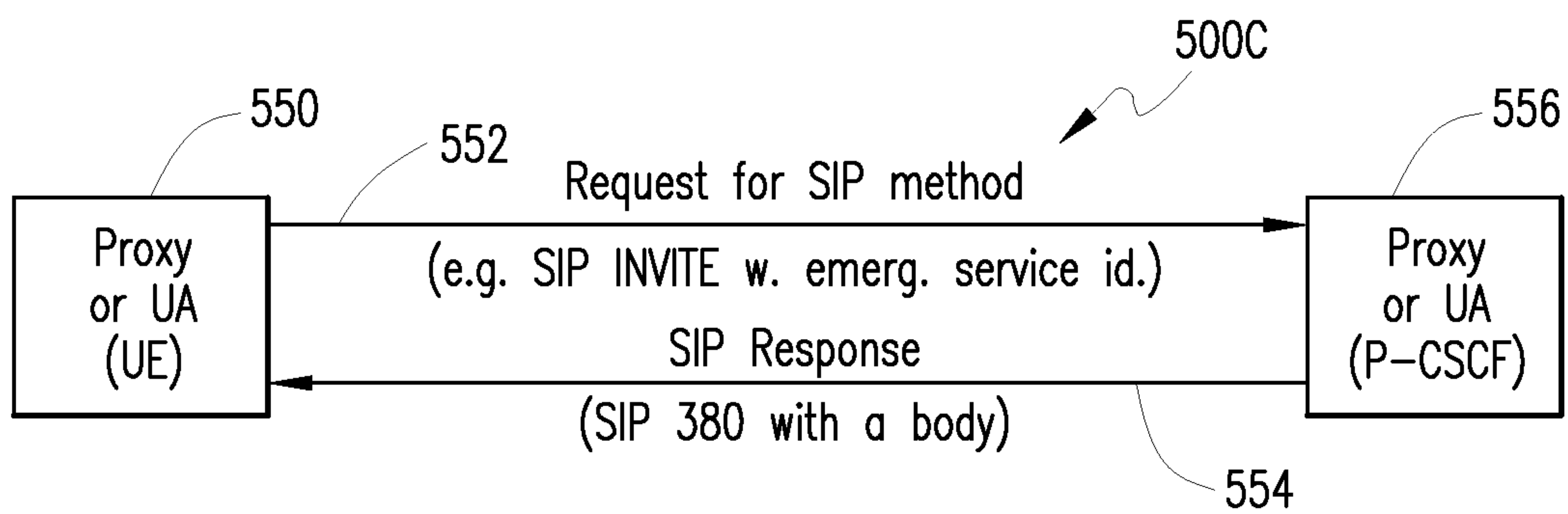
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*FIG. 4*

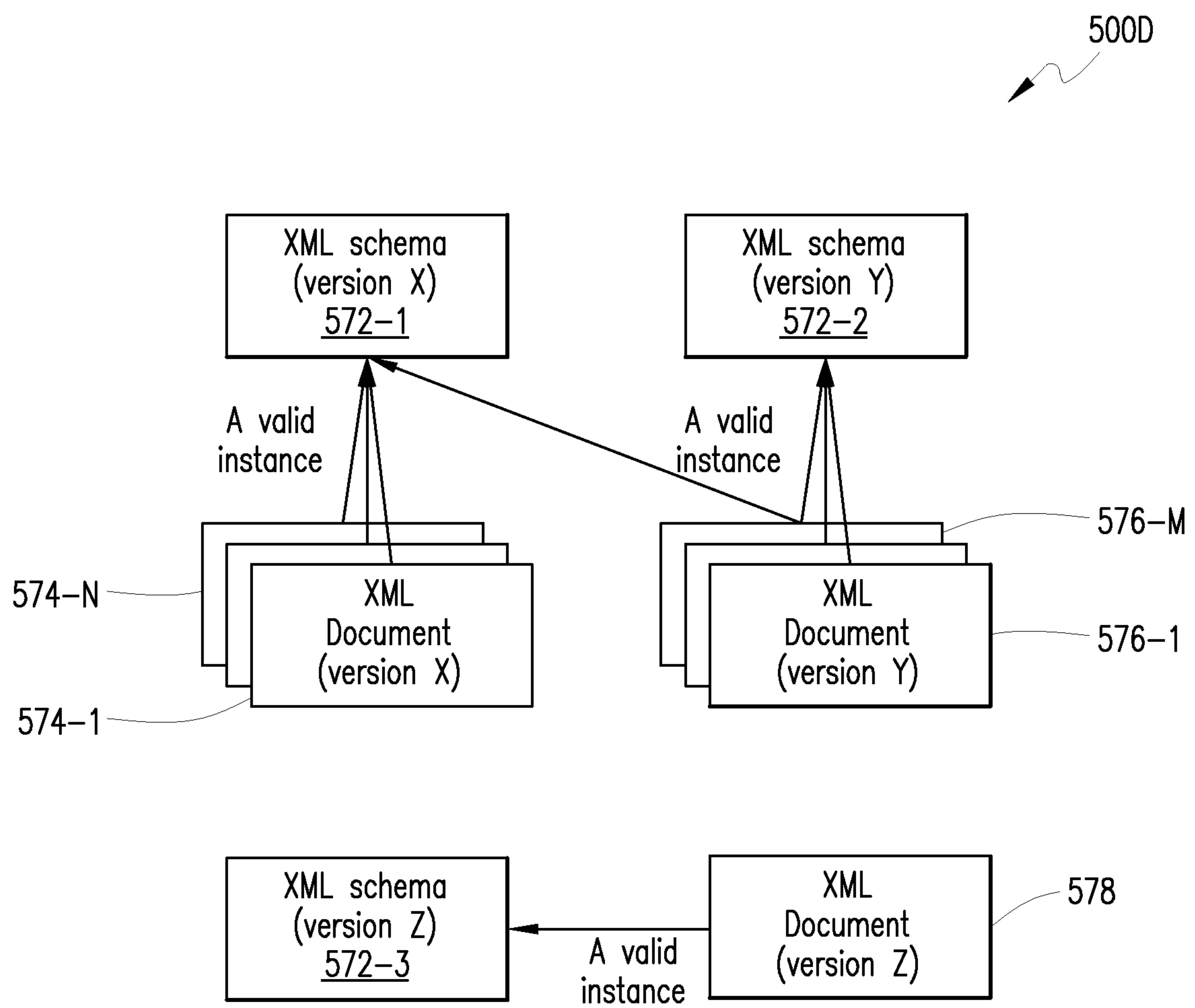
5/14

*FIG. 5A*

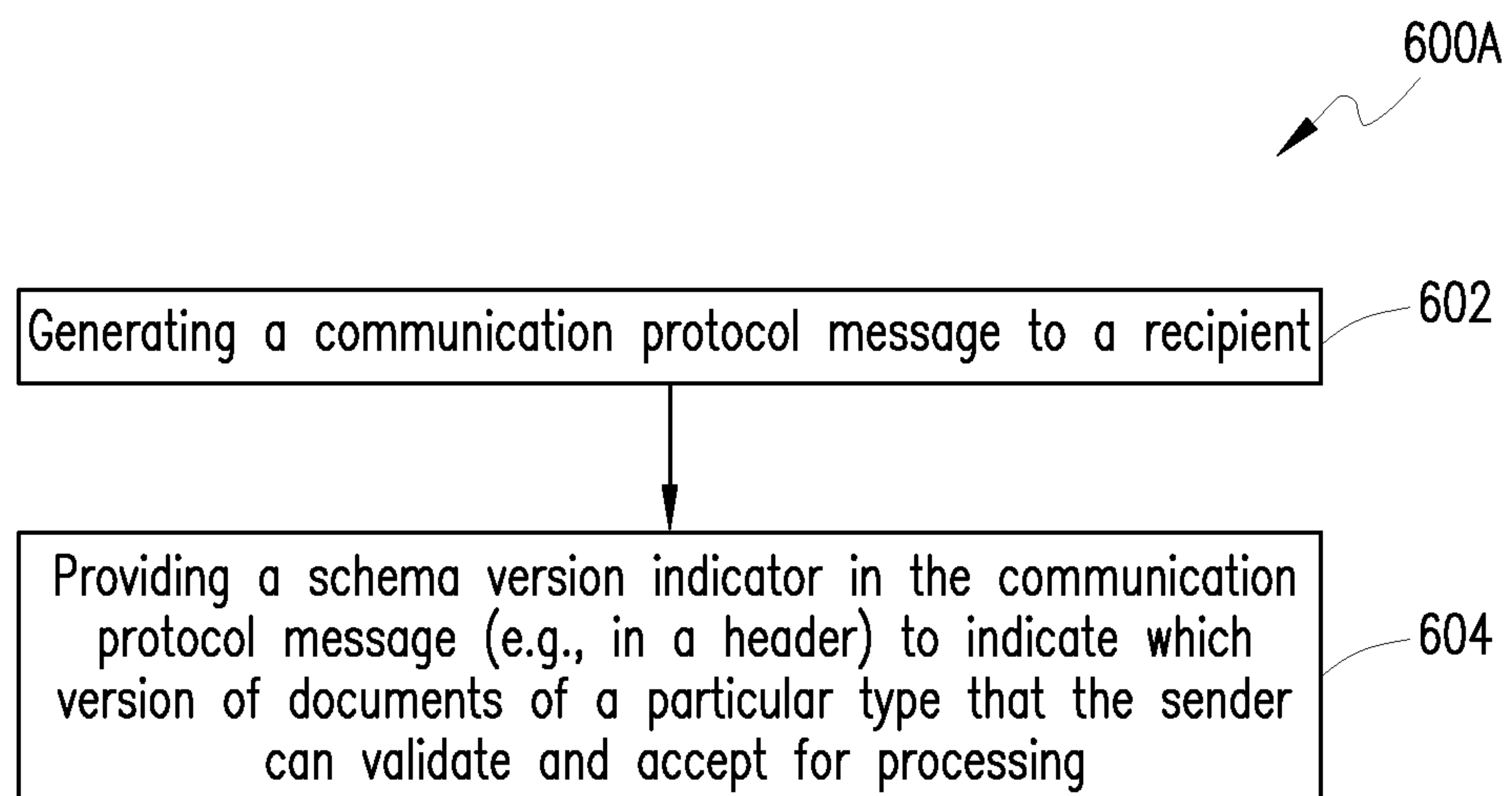
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*FIG. 5B**FIG. 5C*

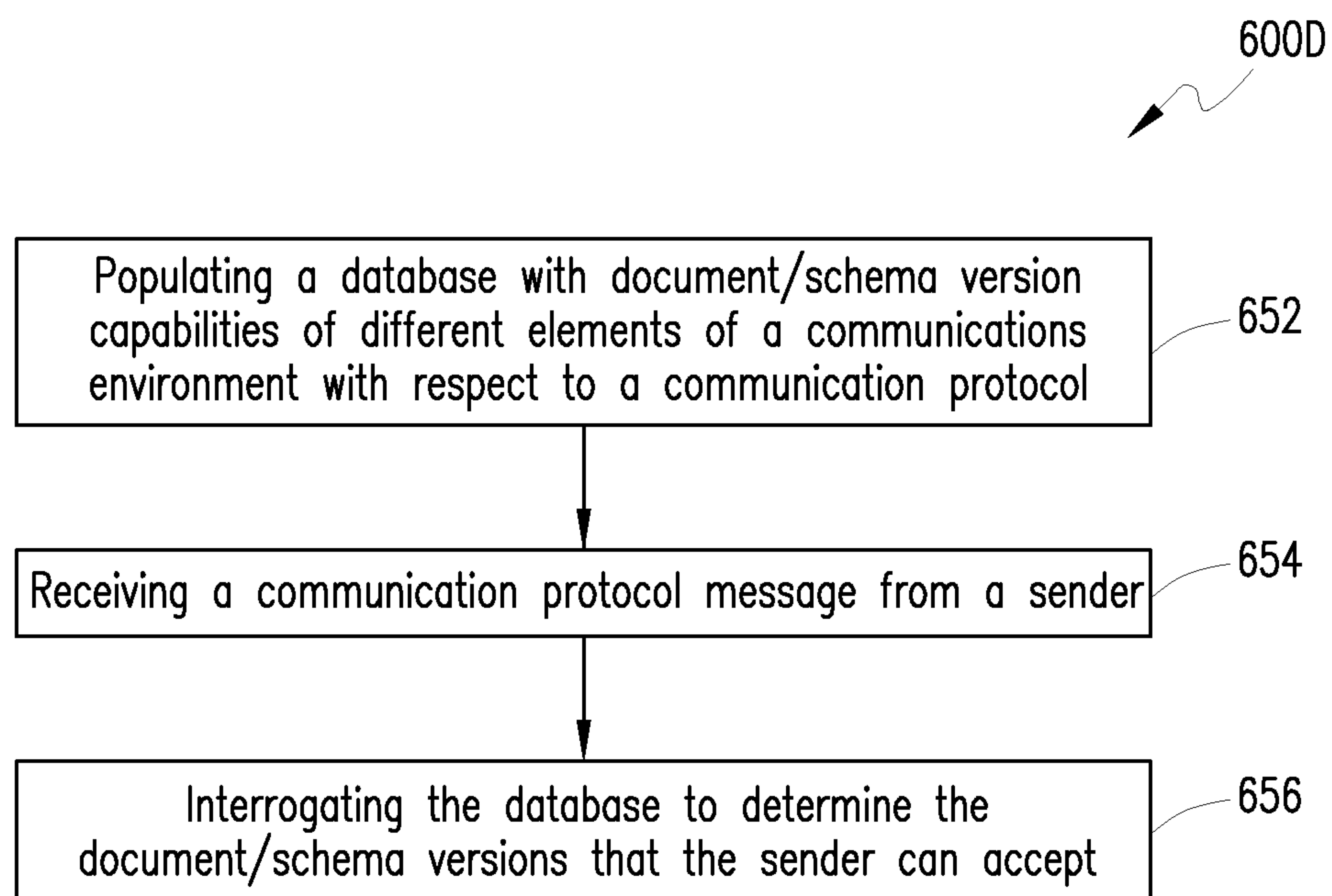
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*FIG. 5D*

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*FIG. 6A*

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*FIG. 6D*

