3.- SIP Addressing and URI

SIP Addressing

In SIP (Session Initiation Protocol), addressing is used to identify the endpoints of a SIP session. SIP addressing is based on the use of SIP Uniform Resource Identifiers (URIs), which are used to identify the SIP endpoints.

URI

A SIP URI (Uniform Resource Identifier) is a string of characters that identifies a SIP (Session Initiation Protocol) endpoint or user on the Internet or another IP network. It is similar to a URL (Uniform Resource Locator) that identifies a web page or resource, but instead of identifying a web page, a SIP URI identifies a user or device that can participate in a SIP session.

`sip:user@domain.com`

The `sip:` prefix indicates that this is a SIP URI. The `user` part of the URI identifies the user or device within the domain, and the `domain.com` part of the URI identifies the domain name of the endpoint.

In addition to the user and domain parts of the URI, SIP URIs can also contain other parameters, such as port numbers and transport protocols. For example, a SIP URI for an endpoint using the secure transport protocol over port 5061 would look like this:

`sips:user@domain.com:5061;transport=TLS`

SIP addressing can also include other elements such as the SIP message header fields, which provide additional information about the session, including the address of the sender and receiver, the type of session being initiated, and other session-specific information.

The SIP addressing scheme is flexible, allowing for the identification of a wide variety of SIP endpoints, including phones, softphones, SIP servers, and other SIP-capable devices.

Here are more examples of URI

`sip:alice@domain.com` - This SIP URI identifies a SIP endpoint with the username "alice" located at the domain "domain.com". This endpoint could be a softphone application running on Alice's computer or a physical SIP phone connected to the network.

`sip:bob@192.168.1.100:5060` - This SIP URI identifies a SIP endpoint with the username "bob" located at the IP address "192.168.1.100" and using port 5060. This endpoint could be a physical SIP phone or a SIP server running on a computer.

`sip:conference@domain.com;transport=tcp` - This SIP URI identifies a SIP conference server located at the domain "domain.com" that uses the TCP transport protocol. Users could dial into this conference by sending SIP INVITE messages to this URI.

In all of these examples, the "sip:" prefix indicates that this is a SIP URI. The username (e.g. "alice", "bob", "conference") identifies the endpoint or resource being addressed, and the domain (e.g. "domain.com", "192.168.1.100") identifies the network location of the endpoint. In example 2, a port number is also specified. Additionally, example 3 demonstrates how SIP URIs can contain other parameters, in this case specifying the use of the TCP transport protocol.

The goal of SIP addressing is to identify SIP endpoints and resources on the network for routing SIP messages.

```
+-------------+                  +-------------+
| User A      |                  | User B      |
| SIP Address |                    | SIP Address |
| 192.0.2.1   |                  | 192.0.2.2   |
| SIP URI     |                  | SIP URI     |
| sip:userA@192.0.2.1:5060;transport=UDP | sip:userB@192.0.2.2:5060;transport=UDP |
+-------------+                  +-------------+
       |                                 |
       |  INVITE                           |
       |  sip:userB@192.0.2.2:5060 SIP/2.0       |
       |  Via: SIP/2.0/UDP 192.0.2.1:5060        |
       |  From: sip:userA@192.0.2.1:5060;tag=1234 |
       |  To: sip:userB@192.0.2.2:5060           |
       |  Call-ID: 5678                        |
       |  CSeq: 1 INVITE                         |
       |  Contact: sip:userA@192.0.2.1:5060      |
       |  Content-Type: application/sdp          |
       |  Content-Length: 150                  |
       |                                 |
       |---------------------------------------->|
       |                                 |
       |  100 Trying                           |
```

```
|  SIP/2.0 100 Trying                    |
|  Via: SIP/2.0/UDP 192.0.2.2:5060       |
|  From: sip:userA@192.0.2.1:5060;tag=1234 |
|  To: sip:userB@192.0.2.2:5060;tag=5678   |
|  Call-ID: 5678                         |
|  CSeq: 1 INVITE                        |
|  Content-Length: 0                     |
|                                        |
|<---------------------------------------|
|                                        |
|  200 OK                                |
|  SIP/2.0 200 OK                        |
|  Via: SIP/2.0/UDP 192.0.2.2:5060       |
|  From: sip:userA@192.0.2.1:5060;tag=1234 |
|  To: sip:userB@192.0.2.2:5060;tag=5678   |
|  Call-ID: 5678                         |
|  CSeq: 1 INVITE                        |
|  Contact: sip:userB@192.0.2.2:5060     |
|  Content-Type: application/sdp         |
|  Content-Length: 150                   |
|                                        |
|<---------------------------------------|
|                                        |
|  ACK                                   |
|  sip:userB@192.0.2.2:5060 SIP/2.0      |
|  Via: SIP/2.0/UDP 192.0.2.1:5060       |
|  From: sip:userA@192.0.2.1:5060;tag=1234 |
|  To: sip:userB@192.0.2.2:5060;tag=5678   |
|  Call-ID: 5678                         |
|  CSeq: 1 ACK
```

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