SIP Mastery Guide

1. What is SIP?

SIP (Session Initiation Protocol) is a signaling protocol used to establish, maintain, and terminate real-time sessions including voice, video, and messaging.

2. SIP Methods

- INVITE: Initiates a call
- ACK: Confirms INVITE response
- BYE: Ends a session
- CANCEL: Cancels a pending request
- REGISTER: Registers user location

3. SIP Response Codes

- 1xx: Provisional (e.g., 180 Ringing)
- 2xx: Success (e.g., 200 OK)
- 3xx: Redirection
- 4xx: Client Error
- 5xx: Server Error
- 6xx: Global Failure

4. Common SIP Headers

- Via
- From
- To
- Call-ID
- CSeq
- Contact
- Content-Type

5. Typical SIP Call Flow

Caller -> INVITE -> Callee

Callee -> 180 Ringing -> Caller

Callee -> 200 OK -> Caller

Caller -> ACK -> Callee

[Media Session]

Caller -> BYE -> Callee

Callee -> 200 OK -> Caller

6. RTP and Media

RTP (Real-time Transport Protocol) carries the media after SIP sets up the session. SDP (Session Description Protocol) within SIP INVITE defines media details.

7. NAT and SIP

SIP can have issues with NAT. Use STUN, TURN, or ICE protocols to enable media traversal through NAT.

8. SIP Troubleshooting Tips

- Use Wireshark to capture SIP traffic
- Look at SIP Ladder Diagrams
- Check for 4xx or 5xx errors
- Validate RTP stream after 200 OK

9. Real-world Scenarios

- SIP Trunk Registration
- SIP Load Balancer Behavior
- Call Transfer and Hold using Re-INVITE

10. Quick Quiz

1. What method starts a SIP call?
2. What does 200 OK mean?
3. What is the purpose of ACK?
4. Name 3 SIP headers.
5. What protocol carries the media?