

RFC 3960

Early Media and Ringing Tone Generation in the Session Initiation Protocol (SIP)

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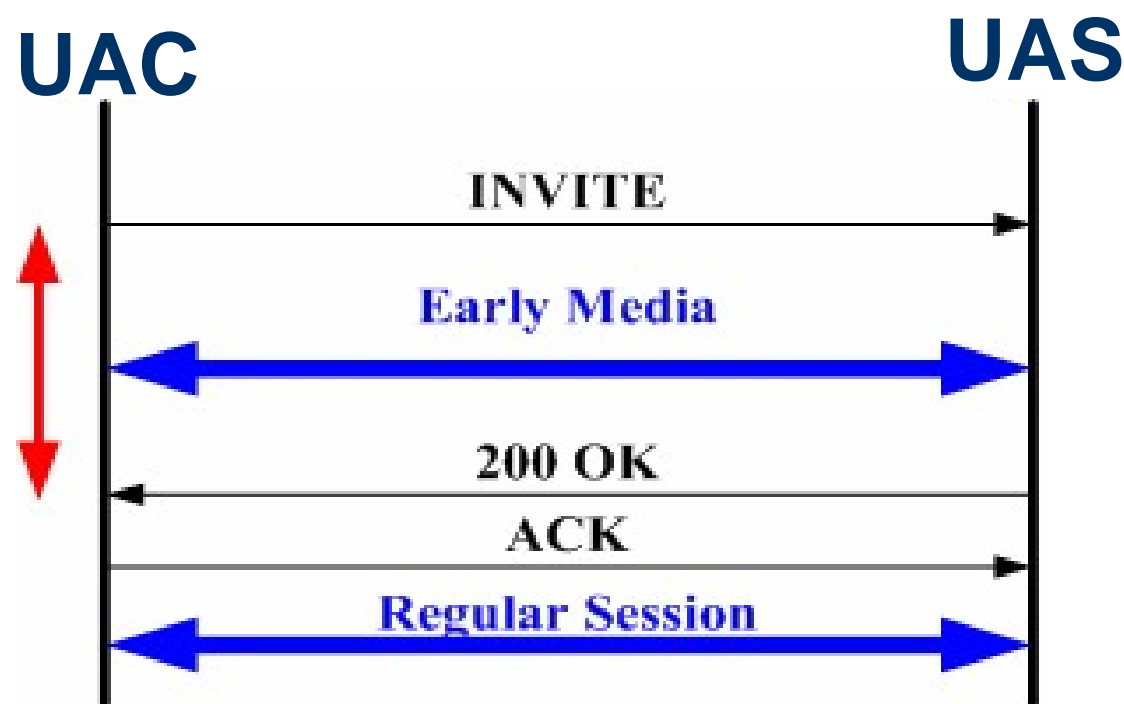
Outline

- Introduction to RFC 3960
- Session Establishment in SIP
- The Gateway Model
- The Application Server Model
- Alert-Info Header Field
- Security Considerations
- Conclusion

Introduction to RFC 3960

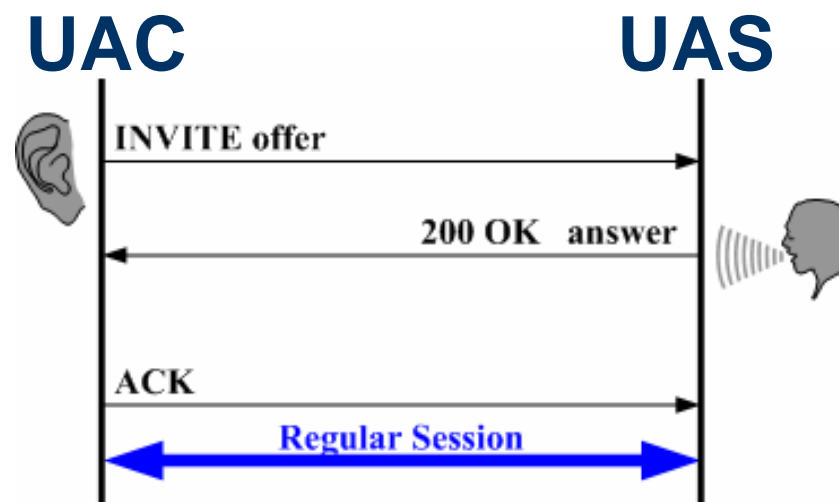
- Early Media

- unidirectional
- or bidirectional
- Generated by
 - Caller
 - Callee
 - Or both



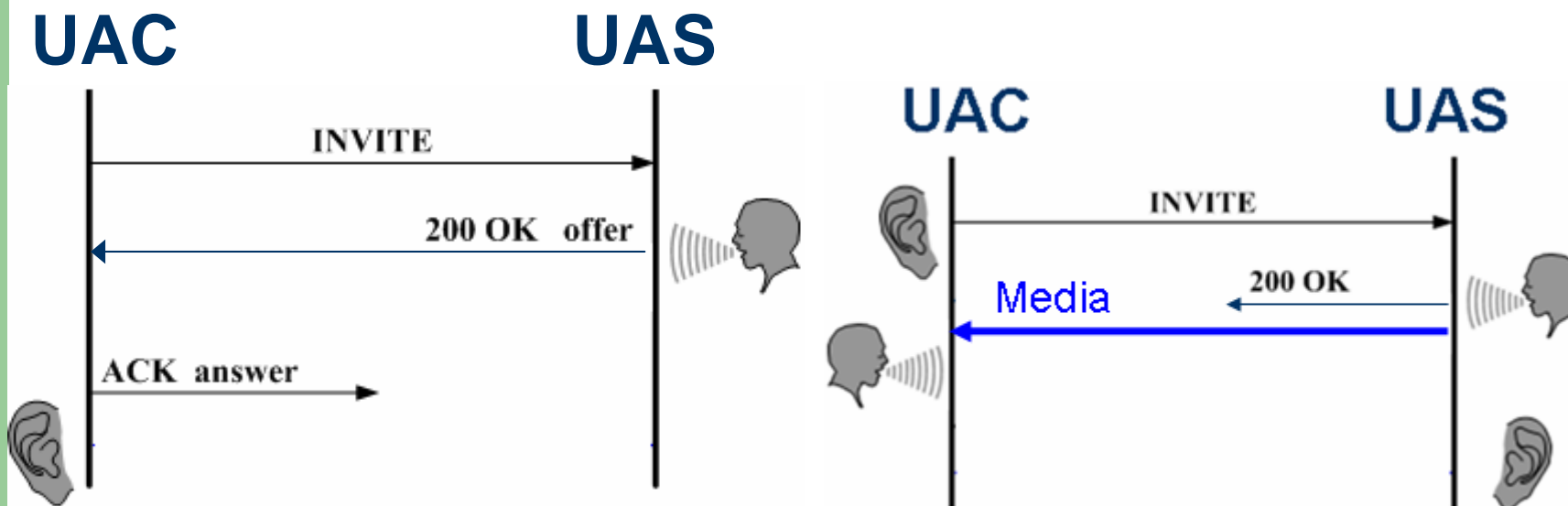
Session Establishment in SIP

- Offer/ Answer model
 - SDP messages.
 - Offer in INVITE, answer in 200 OK,
 - Offer in 200 OK, answer in ACK
 - In PRACK, UPDATE, and etc
- Media Clipping



Caller is prepared to listen,
no media clipping

Media Clipping



UAS cannot send any media until the answer in the ACK arrives.

Media Clipping – some first words lost

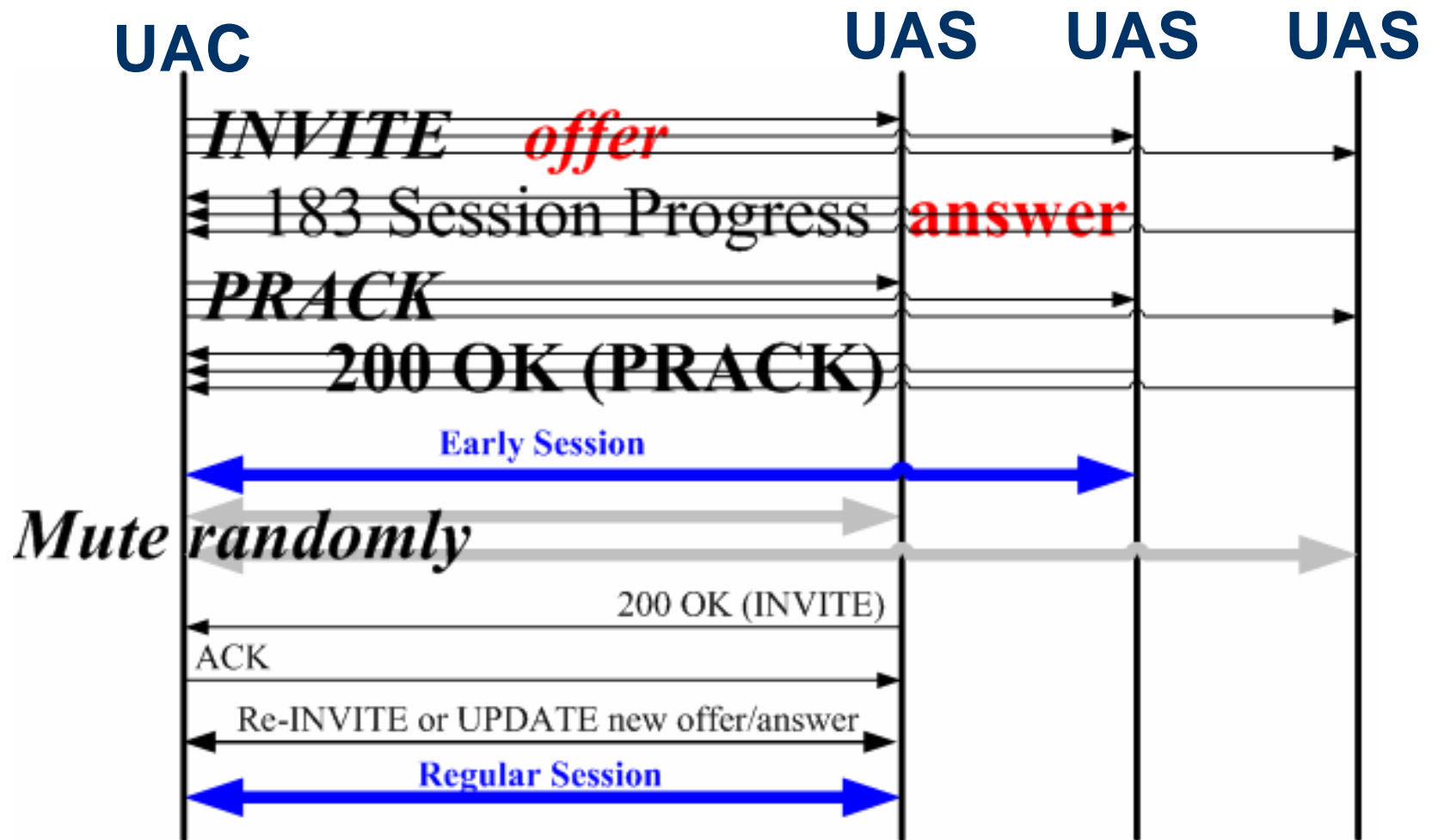
UAC cannot send media until the 200 (OK) arrives

Media Clipping – some first words lost

The Gateway Model

- Manage early media sessions
 - using offer/answer exchanges
 - in reliable provisional responses, PRACKs, and UPDATEs.
- If INVITE forks, media clipping may occur.

Forking



Ringling Tone Generation

- In the PSTN, local exchange of the callee generates a standardized ringing tone while the callee is being alerted.
- But, SIP UAs have different capabilities, different user interfaces.
 - UAC is supposed to generate ringing tones locally as long as no early media is received from the UAS.
 - If the UAS generates early media, UAC is supposed to play it instead.
 - Not easy to decide

Ringling Tone Generation

- Common local policy
 - No local ringing without 180 response received,
 - If 180 (Ringling) received but no incoming media packets, generate local ringing.
 - If 180 (Ringling) received and incoming media packets, play them and do not generate local ringing.
 - i.e. play incoming media packets and stop local ringing to avoid media clipping, even if the 200 (OK) response has not arrived.

Applicability of the Gateway Model

- The gateway model produces media clipping in forking scenarios and requires media detection to generate local ringing properly.
- Only acceptable in situations where the UA cannot distinguish between early media and regular media.
 - E.g., PSTN Gateway

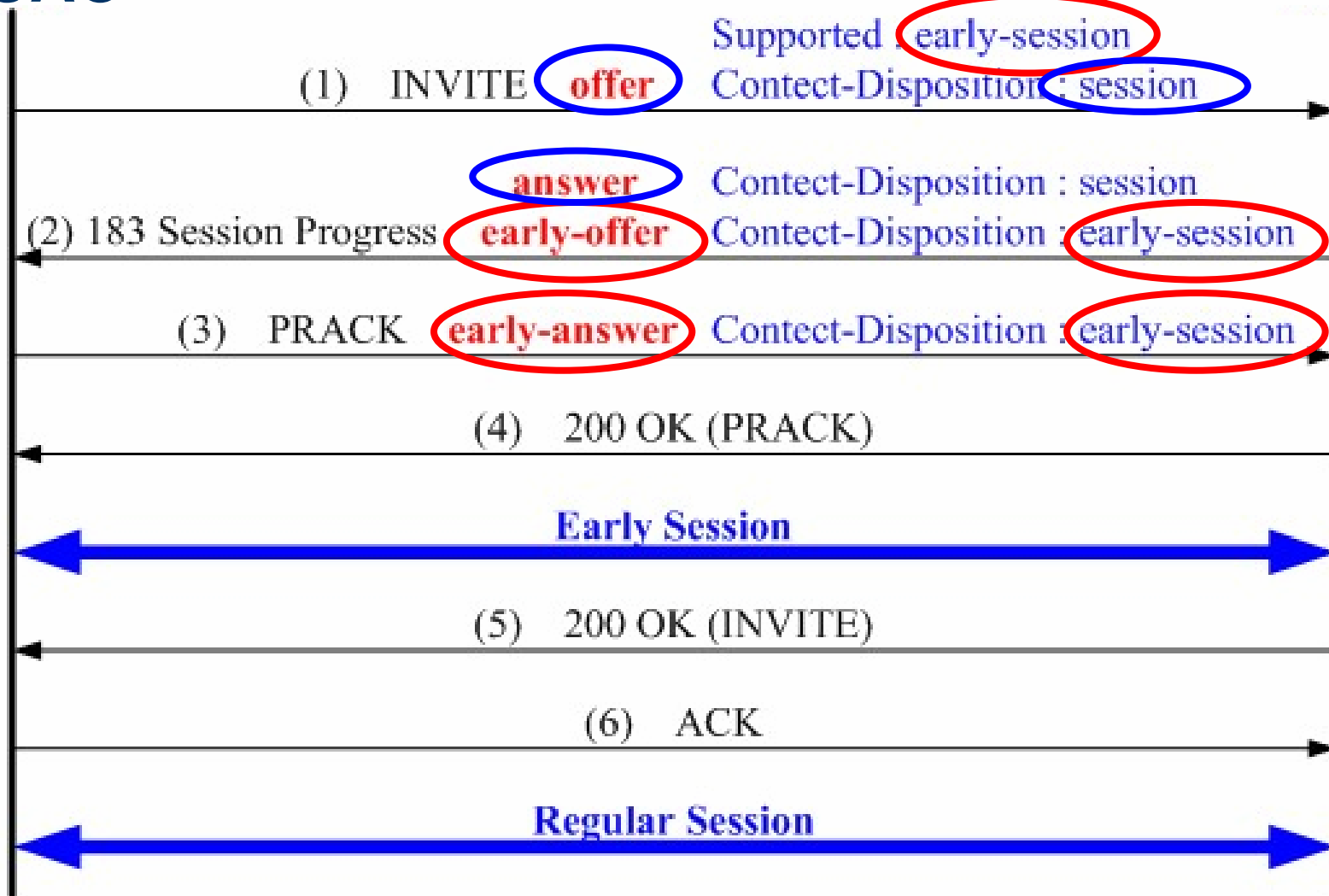
The Application Server Model

- Having the UAS behave as an application server to establish early media sessions with the UAC.
- UAC indicates support
 - early-session option tag
- Different offer/answer exchange
 - avoid media clipping in cases of forking.
- UA still have to choose which to mute and which to render to the user.

The Application Server Model

UAC

UAS



Alert-Info Header Field

- For both gateway and application server models
- Allows to tell the UAC which local tone to play.
 - In case that local ringing is generated.
- does not tell the UAC when to generate locally.

Security Considerations

- Session description contains the IP address and port number where to receive media,
 - Attackers may intrude it.
- UAs should encrypt their session descriptions
 - e.g., using S/MIME (RFC 2633)
 - Still, may be guessed. Because many UAs always pick up the same initial media port.
 - media-level authentication mechanisms
 - Secure Realtime Transport Protocol (SRTP) (RFC 3711)

Security Considerations

- Attackers may attempt to make a UA send media to a victim as part of a DoS attack.
 - UA should handshake with the owner to verify the willingness to receive media
 - by using a connection oriented transport protocol,
 - STUN (RFC3489) in an end-to-end fashion,
 - or by the key exchange in SRTP.

Security Considerations

- Early media-specific risk
 - Like "toll fraud" in the PSTN
 - may try to establish a bidirectional early media session and never send a 200 (OK) response for the INVITE.
- Servers may use bidirectional early media to obtain information from the callers
 - e.g., the PIN code of a calling card.
- Remedy – to charge early media that last too long or stop them at media level.

Conclusion

- The gateway model is acceptable in situations where the UA cannot distinguish between early media and regular media.
 - e.g., PSTN
- The application server model resolves the issues present in the gateway model.
 - is strongly recommended to use this model.

Q & A

Thank You!