

SDP offer/answer cheat sheet

The state machine, the SDP fields, the JavaScript calls, and Perfect Negotiation — on one page.

Five signaling states (RFC 9429, §3.2)

State	Meaning
stable	Resting state. No exchange in progress. Either side may issue an offer.
have-local-offer	We sent an offer; awaiting their answer. Cannot issue a new offer until resolved.
have-remote-offer	They sent an offer; we have not yet replied. createAnswer next.
have-local-pranswer	We sent a provisional answer (rare in pure WebRTC).
have-remote-pranswer	They sent a provisional answer. Awaiting their final answer.

SDP fields a WebRTC offer carries

Field	What it carries	Spec
m=	Opens a media section (audio, video, application)	RFC 8866 §5.14
a=group:BUNDLE	Lists media-section ids sharing one transport	RFC 9143 §7
a=rtcp-mux	RTP and RTCP share one port	RFC 5761
a=mid	Media-id, used as BUNDLE key	RFC 5888
a=rtpmap	Codec name, sample rate, channels per payload type	RFC 8866 §6.6
a=sendrecv / *	Direction: sendrecv, sendonly, recvonly, inactive	RFC 3264 §5.1
a=ice-frag / pwd	ICE short-term credentials	RFC 8839 §5.4
a=candidate	One ICE candidate per address; many lines	RFC 8839 §5.1
a=fingerprint	SHA-256 of the DTLS certificate the peer will present	RFC 8122
a=setup	DTLS role: actpass (offer), active or passive (answer)	RFC 4145 §4
a=msid	Binds the section to a MediaStream and Track	RFC 8830
a=simulcast	Simulcast: sender will publish multiple encoded layers	RFC 8853

The life of one offer (10 steps)

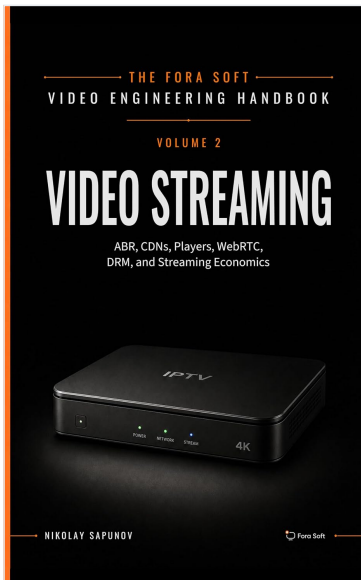
#	Call / event	What happens
1.	negotiationneeded fires	App adds a track or changes a transceiver direction
2.	createOffer()	Browser builds the SDP; nothing has started yet
3.	setLocalDescription(offer)	State → have-local-offer; ICE begins gathering
4.	send over signaling	JSEP does not specify the channel — your choice
5.	setRemoteDescription(offer)	Remote state → have-remote-offer; mirror transceivers
6.	createAnswer()	Match m-line count and order; pick codecs; pick direction
7.	setLocalDescription(answer)	Remote state → stable; SRTP keys derive on DTLS finish
8.	send answer over signaling	—
9.	setRemoteDescription(answer)	Original state → stable; release transient resources
10.	ICE/DTLS finish in parallel	Media flows as soon as one valid pair is found

Six SDP mistakes that ship to production

Mistake	Why it breaks
Skipping renegotiation	addTrack fires negotiationneeded; if ignored, the new track has no m=line and no media.
Wrong call order	createAnswer before setRemoteDescription throws InvalidStateError (RFC 9429 §4.1.9).
SDP munging	Modifying SDP between createOffer and setLocalDescription is forbidden (RFC 9429 §5.4).
iceRestart everywhere	Stalls media for 1-2 s on every renegotiation. Use only on failed/disconnected.
Treating glare as rare	Mesh/SFU calls glare regularly. Build Perfect Negotiation from day one.
Non-bundled offers	Modern SFUs reject SDP without BUNDLE. Use bundlePolicy: 'max-bundle'.

Perfect Negotiation in three rules

1. Assign each peer a fixed role at setup: one polite, one impolite.
2. Impolite peer ignores incoming offers when its own is outstanding — its offer wins.
3. Polite peer applies the incoming offer; setRemoteDescription does an implicit rollback.



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This sheet gives the five signaling states, the SDP fields, the ten-step offer flow and the mistakes that reach production. Volume 3 covers WebRTC and real-time delivery in depth, along with players, QoE monitoring and the economics of serving live sessions at scale.

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