# Google’s WebRtc session protocol

## 一、客户端注册

client’s IP 10.1.100.113

server’s IP 10.1.100.100

### 1.客户端请求注册

**Cli.x [TCP] connect to Ser.8888**

**Cli.x [http] sendReq to Ser.8888**

**报文：**

"GET /sign\_in?root@tuyj-U11 HTTP/1.0\r\n\r\n"

### 2.服务器应答

返回添加成功和新的客户端列表

**Ser.8888 [http] sendRsp to Cli.x**

**报文：**

'''

HTTP/1.1 200 Added

Server: PeerConnectionTestServer/0.1

Cache-Control: no-cache

Connection: close

Content-Type: text/plain

Content-Length: 19

Pragma: 12

Access-Control-Allow-Origin: \*

Access-Control-Allow-Credentials: true

Access-Control-Allow-Methods: POST, GET, OPTIONS

Access-Control-Allow-Headers: Content-Type, Content-Length, Connection, Cache-Control

Access-Control-Expose-Headers: Content-Length, X-Peer-Id

root@tuyj-U11,12,1\n

'''

**Cli.x [TCP] close from Ser.8888**

如果客户端无新请求内容，须打开下次通讯通道，以便服务器主动通知。

**Cli.x+n [TCP] connect to Ser.8888**

**Cli.x+n [http] sendReq to Ser.8888**

**报文：**

"GET /wait?peer\_id=12 HTTP/1.0\r\n\r\n"

## 二、服务器通知客户端列表

### 1.服务器返回客户端列表

**Ser.8888 [http] sendRsp to Cli.x+n**

**报文：**

'''

HTTP/1.1 200 OK

Server: PeerConnectionTestServer/0.1

Cache-Control: no-cache

Connection: close

Content-Type: text/plain

Content-Length: 32

Pragma: 12

Access-Control-Allow-Origin: \*

Access-Control-Allow-Credentials: true

Access-Control-Allow-Methods: POST, GET, OPTIONS

Access-Control-Allow-Headers: Content-Type, Content-Length, Connection, Cache-Control

Access-Control-Expose-Headers: Content-Length, X-Peer-Id

Administrator@yourcomputer,13,1

'''

**Cli.x+n [TCP] close from Ser.8888**

如果客户端无新请求内容，须打开下次通讯通道，以便服务器主动通知。

**Cli.x+n [TCP] connect to Ser.8888**

**Cli.x+n [http] sendReq to Ser.8888**

**报文：**

"GET /wait?peer\_id=12 HTTP/1.0\r\n\r\n"

## 三、客户端A呼叫客户端B

客户端A’s IP 10.1.100.111

客户端B’s IP 10.1.100.113

服务器’s IP 10.1.100.100

### 客户端A发送offer sdp

客户端A经由服务器向客户端B发送offer sdp,并且服务器转发时加上ICE等信息。

#### 1.1 A向服务器发送sdp

**Cli111.x [TCP] connect to Ser.8888**

**Cli111.x [http] sendReq to Ser.8888**

**报文：**

'''

POST /message?peer\_id=7&to=5 HTTP/1.0

Content-Length: 1530

Content-Type: text/plain

{

"sdp" : "v=0

o=- 4918462528735697580 2 IN IP4 127.0.0.1

s=-

t=0 0

a=group:BUNDLE audio video

a=msid-semantic: WMS stream\_label

m=audio 1 RTP/SAVPF 111 104 0

c=IN IP4 0.0.0.0

a=rtcp:1 IN IP4 0.0.0.0

a=ice-ufrag:mvHQbYBc54TDBEvM

a=ice-pwd:HqEAIF3sLKqWvgbGn9Iua2TB

a=ice-options:google-ice

a=extmap:1 urn:ietf:params:rtp-hdrext:ssrc-audio-level

a=sendrecv

a=mid:audio

a=rtcp-mux

a=crypto:1 AES\_CM\_128\_HMAC\_SHA1\_80 inline:Yc7zonzZCcpFY589aVGGUAEAXGtpouzscs7ETWQ1

a=rtpmap:111 opus/48000/2

a=fmtp:111 minptime=10

a=rtpmap:104 ISAC/32000

a=rtpmap:0 PCMU/8000

a=maxptime:60

a=ssrc:1569573005 cname:DcNRtyY/UVG7+efP

a=ssrc:1569573005 msid:stream\_label audio\_label

a=ssrc:1569573005 mslabel:stream\_label

a=ssrc:1569573005 label:audio\_label

m=video 1 RTP/SAVPF 100 116 117

c=IN IP4 0.0.0.0

a=rtcp:1 IN IP4 0.0.0.0

a=ice-ufrag:mvHQbYBc54TDBEvM

a=ice-pwd:HqEAIF3sLKqWvgbGn9Iua2TB

a=ice-options:google-ice

a=extmap:2 urn:ietf:params:rtp-hdrext:toffset

a=sendrecv

a=mid:video

a=rtcp-mux

a=crypto:1 AES\_CM\_128\_HMAC\_SHA1\_80 inline:Yc7zonzZCcpFY589aVGGUAEAXGtpouzscs7ETWQ1

a=rtpmap:100 VP8/90000

a=rtcp-fb:100 ccm fir

a=rtcp-fb:100 nack

a=rtcp-fb:100 goog-remb

a=rtpmap:116 red/90000

a=rtpmap:117 ulpfec/90000

a=ssrc:1836801686 cname:DcNRtyY/UVG7+efP

a=ssrc:1836801686 msid:stream\_label video\_label

a=ssrc:1836801686 mslabel:stream\_label

a=ssrc:1836801686 label:video\_label

",

"type" : "offer"

}'''

#### 1.2 服务器接收并应答A

**Ser.8888 [http] sendRsp to Cli111.x**

**报文：**

'''

HTTP/1.1 200 OK

Server: PeerConnectionTestServer/0.1

Cache-Control: no-cache

Connection: close

Content-Type: text/plain

Content-Length: 0

Access-Control-Allow-Origin: \*

Access-Control-Allow-Credentials: true

Access-Control-Allow-Methods: POST, GET, OPTIONS

Access-Control-Allow-Headers: Content-Type, Content-Length, Connection, Cache-Control

Access-Control-Expose-Headers: Content-Length, X-Peer-Id\r\n\r\n

'''

**Cli111.x [TCP] close from Ser.8888**

如果客户端无新请求内容，须打开下次通讯通道，以便服务器主动通知。

**Cli111.x+n [TCP] connect to Ser.8888**

**Cli111.x+n [http] sendReq to Ser.8888**

**报文：**

"GET /wait?peer\_id=13 HTTP/1.0\r\n\r\n"

#### 1.3 服务器转发新sdp给B

服务器将ICE信息和接收自A的sdp信息合成新报文转发给B

**Ser.8888 [http] sendRsp to Cli113.y**

**报文：**

'''

HTTP/1.1 200 OK

Server: PeerConnectionTestServer/0.1

Cache-Control: no-cache

Connection: close

Content-Type: text/plain

Content-Length: 1530

Pragma: 7

Access-Control-Allow-Origin: \*

Access-Control-Allow-Credentials: true

Access-Control-Allow-Methods: POST, GET, OPTIONS

Access-Control-Allow-Headers: Content-Type, Content-Length, Connection, Cache-Control

Access-Control-Expose-Headers: Content-Length, X-Peer-Id

{

"sdp" : "v=0

o=- 4918462528735697580 2 IN IP4 127.0.0.1

s=-

t=0 0

a=group:BUNDLE audio video

a=msid-semantic: WMS stream\_label

m=audio 1 RTP/SAVPF 111 104 0

c=IN IP4 0.0.0.0

a=rtcp:1 IN IP4 0.0.0.0

a=ice-ufrag:mvHQbYBc54TDBEvM

a=ice-pwd:HqEAIF3sLKqWvgbGn9Iua2TB

a=ice-options:google-ice

a=extmap:1 urn:ietf:params:rtp-hdrext:ssrc-audio-level

a=sendrecv

a=mid:audio

a=rtcp-mux

a=crypto:1 AES\_CM\_128\_HMAC\_SHA1\_80 inline:Yc7zonzZCcpFY589aVGGUAEAXGtpouzscs7ETWQ1

a=rtpmap:111 opus/48000/2

a=fmtp:111 minptime=10

a=rtpmap:104 ISAC/32000

a=rtpmap:0 PCMU/8000

a=maxptime:60

a=ssrc:1569573005 cname:DcNRtyY/UVG7+efP

a=ssrc:1569573005 msid:stream\_label audio\_label

a=ssrc:1569573005 mslabel:stream\_label

a=ssrc:1569573005 label:audio\_label

m=video 1 RTP/SAVPF 100 116 117

c=IN IP4 0.0.0.0

a=rtcp:1 IN IP4 0.0.0.0

a=ice-ufrag:mvHQbYBc54TDBEvM

a=ice-pwd:HqEAIF3sLKqWvgbGn9Iua2TB

a=ice-options:google-ice

a=extmap:2 urn:ietf:params:rtp-hdrext:toffset

a=sendrecv

a=mid:video

a=rtcp-mux

a=crypto:1 AES\_CM\_128\_HMAC\_SHA1\_80 inline:Yc7zonzZCcpFY589aVGGUAEAXGtpouzscs7ETWQ1

a=rtpmap:100 VP8/90000

a=rtcp-fb:100 ccm fir

a=rtcp-fb:100 nack

a=rtcp-fb:100 goog-remb

a=rtpmap:116 red/90000

a=rtpmap:117 ulpfec/90000

a=ssrc:1836801686 cname:DcNRtyY/UVG7+efP

a=ssrc:1836801686 msid:stream\_label video\_label

a=ssrc:1836801686 mslabel:stream\_label

a=ssrc:1836801686 label:video\_label

",

"type" : "offer"

}

'''

**Cli113.y [TCP] close from Ser.8888**

如果客户端无新请求内容，须打开下次通讯通道，以便服务器主动通知。

**Cli113.y+n [TCP] connect to Ser.8888**

**Cli113.y+n [http] sendReq to Ser.8888**

**报文：**

"GET /wait?peer\_id=12 HTTP/1.0\r\n\r\n"

### 客户端A发送udp候选人信息

客户端A经由服务器向客户端B发送每个子媒体流的候选人信息，音视频各发2个候选人。所以有4个回合的交互。

#### 2.1 A向服务器发送udp候选人

**Cli111.x [TCP] connect to Ser.8888**

**Cli111.x [http] sendReq to Ser.8888**

**报文：**

'''

POST /message?peer\_id=13&to=12 HTTP/1.0

Content-Length: 154

Content-Type: text/plain

{

"candidate" : "a=candidate:3690773885 ? udp 2113937151 10.1.100.111 4391 typ host generation 0\r\n",

"sdpMLineIndex" : ?,

"sdpMid" : "audio/video"

}\n

'''

#### 2.2 服务器接收并应答A

**Ser.8888 [http] sendRsp to Cli111.x**

**报文：**

'''

HTTP/1.1 200 OK

Server: PeerConnectionTestServer/0.1

Cache-Control: no-cache

Connection: close

Content-Type: text/plain

Content-Length: 0

Access-Control-Allow-Origin: \*

Access-Control-Allow-Credentials: true

Access-Control-Allow-Methods: POST, GET, OPTIONS

Access-Control-Allow-Headers: Content-Type, Content-Length, Connection, Cache-Control

Access-Control-Expose-Headers: Content-Length, X-Peer-Id\r\n\r\n

'''

**Cli111.x [TCP] close from Ser.8888**

如果客户端无新请求内容，须打开下次通讯通道，以便服务器主动通知。

**Cli111.x+n [TCP] connect to Ser.8888**

**Cli111.x+n [http] sendReq to Ser.8888**

**报文：**

"GET /wait?peer\_id=13 HTTP/1.0\r\n\r\n"

#### 2.3 服务器转发候选人给B

**Ser.8888 [http] sendRsp to Cli113.y**

**报文：**

'''

HTTP/1.1 200 OK

Server: PeerConnectionTestServer/0.1

Cache-Control: no-cache

Connection: close

Content-Type: text/plain

Content-Length: 154

Pragma: 13

Access-Control-Allow-Origin: \*

Access-Control-Allow-Credentials: true

Access-Control-Allow-Methods: POST, GET, OPTIONS

Access-Control-Allow-Headers: Content-Type, Content-Length, Connection, Cache-Control

Access-Control-Expose-Headers: Content-Length, X-Peer-Id

{

"candidate" : "a=candidate:3690773885 1 udp 2113937151 10.1.100.111 4391 typ host generation 0\r\n",

"sdpMLineIndex" : 0,

"sdpMid" : "audio"

}

'''

**Cli113.y [TCP] close from Ser.8888**

如果客户端无新请求内容，须打开下次通讯通道，以便服务器主动通知。

**Cli113.y+n [TCP] connect to Ser.8888**

**Cli113.y+n [http] sendReq to Ser.8888**

**报文：**

"GET /wait?peer\_id=12 HTTP/1.0\r\n\r\n"

### 客户端B发送answer sdp

#### 3.1 B向服务器发送sdp

**Cli113.y [TCP] connect to Ser.8888**

**Cli113.y [http] sendReq to Ser.8888**

**报文：**

'''

POST /message?peer\_id=5&to=7 HTTP/1.0

Content-Length: 1363

Content-Type: text/plain

{

"sdp" : "v=0

o=- 1035750080600059785 2 IN IP4 127.0.0.1

s=-

t=0 0

a=group:BUNDLE audio video

a=msid-semantic: WMS stream\_label

m=audio 1 RTP/SAVPF 104

c=IN IP4 0.0.0.0

a=rtcp:1 IN IP4 0.0.0.0

a=ice-ufrag:cuBdueCWY3UIkh5q

a=ice-pwd:rDuWCpSYBnoo+7d2/jU/xzPb

a=extmap:1 urn:ietf:params:rtp-hdrext:ssrc-audio-level

a=sendrecv

a=mid:audio

a=rtcp-mux

a=crypto:1 AES\_CM\_128\_HMAC\_SHA1\_80 inline:UWihLzRBUTn5H1qILsy1w4pR8wgA+E5q/jMid1/+

a=rtpmap:104 ISAC/32000

a=ssrc:69226465 cname:wbRAPpJaBB27UyhZ

a=ssrc:69226465 msid:stream\_label audio\_label

a=ssrc:69226465 mslabel:stream\_label

a=ssrc:69226465 label:audio\_label

m=video 1 RTP/SAVPF 100 116 117

c=IN IP4 0.0.0.0

a=rtcp:1 IN IP4 0.0.0.0

a=ice-ufrag:cuBdueCWY3UIkh5q

a=ice-pwd:rDuWCpSYBnoo+7d2/jU/xzPb

a=extmap:2 urn:ietf:params:rtp-hdrext:toffset

a=sendrecv

a=mid:video

a=rtcp-mux

a=crypto:1 AES\_CM\_128\_HMAC\_SHA1\_80 inline:UWihLzRBUTn5H1qILsy1w4pR8wgA+E5q/jMid1/+

a=rtpmap:100 VP8/90000

a=rtcp-fb:100 ccm fir

a=rtcp-fb:100 nack

a=rtcp-fb:100 goog-remb

a=rtpmap:116 red/90000

a=rtpmap:117 ulpfec/90000

a=ssrc:4187374100 cname:wbRAPpJaBB27UyhZ

a=ssrc:4187374100 msid:stream\_label video\_label

a=ssrc:4187374100 mslabel:stream\_label

a=ssrc:4187374100 label:video\_label

",

"type" : "answer"

}

'''

#### 3.2 服务器接收并应答B

**Ser.8888 [http] sendRsp to Cli113.y**

**报文：**

'''

HTTP/1.1 200 OK

Server: PeerConnectionTestServer/0.1

Cache-Control: no-cache

Connection: close

Content-Type: text/plain

Content-Length: 0

Access-Control-Allow-Origin: \*

Access-Control-Allow-Credentials: true

Access-Control-Allow-Methods: POST, GET, OPTIONS

Access-Control-Allow-Headers: Content-Type, Content-Length, Connection, Cache-Control

Access-Control-Expose-Headers: Content-Length, X-Peer-Id\r\n\r\n

'''

**Cli113.y [TCP] close from Ser.8888**

如果客户端无新请求内容，须打开下次通讯通道，以便服务器主动通知。

**Cli113.y+n [TCP] connect to Ser.8888**

**Cli113.y+n [http] sendReq to Ser.8888**

**报文：**

"GET /wait?peer\_id=12 HTTP/1.0\r\n\r\n"

#### 3.3 服务器转发新sdp给A

服务器将ICE信息和接收自B的sdp信息合成新报文转发给A

**Ser.8888 [http] sendRsp to Cli111.x**

**报文：**

'''

HTTP/1.1 200 OK

Server: PeerConnectionTestServer/0.1

Cache-Control: no-cache

Connection: close

Content-Type: text/plain

Content-Length: 1363

Pragma: 5

Access-Control-Allow-Origin: \*

Access-Control-Allow-Credentials: true

Access-Control-Allow-Methods: POST, GET, OPTIONS

Access-Control-Allow-Headers: Content-Type, Content-Length, Connection, Cache-Control

Access-Control-Expose-Headers: Content-Length, X-Peer-Id

{

"sdp" : "v=0

o=- 1035750080600059785 2 IN IP4 127.0.0.1

s=-

t=0 0

a=group:BUNDLE audio video

a=msid-semantic: WMS stream\_label

m=audio 1 RTP/SAVPF 104

c=IN IP4 0.0.0.0

a=rtcp:1 IN IP4 0.0.0.0

a=ice-ufrag:cuBdueCWY3UIkh5q

a=ice-pwd:rDuWCpSYBnoo+7d2/jU/xzPb

a=extmap:1 urn:ietf:params:rtp-hdrext:ssrc-audio-level

a=sendrecv

a=mid:audio

a=rtcp-mux

a=crypto:1 AES\_CM\_128\_HMAC\_SHA1\_80 inline:UWihLzRBUTn5H1qILsy1w4pR8wgA+E5q/jMid1/+

a=rtpmap:104 ISAC/32000

a=ssrc:69226465 cname:wbRAPpJaBB27UyhZ

a=ssrc:69226465 msid:stream\_label audio\_label

a=ssrc:69226465 mslabel:stream\_label

a=ssrc:69226465 label:audio\_label

m=video 1 RTP/SAVPF 100 116 117

c=IN IP4 0.0.0.0

a=rtcp:1 IN IP4 0.0.0.0

a=ice-ufrag:cuBdueCWY3UIkh5q

a=ice-pwd:rDuWCpSYBnoo+7d2/jU/xzPb

a=extmap:2 urn:ietf:params:rtp-hdrext:toffset

a=sendrecv

a=mid:video

a=rtcp-mux

a=crypto:1 AES\_CM\_128\_HMAC\_SHA1\_80 inline:UWihLzRBUTn5H1qILsy1w4pR8wgA+E5q/jMid1/+

a=rtpmap:100 VP8/90000

a=rtcp-fb:100 ccm fir

a=rtcp-fb:100 nack

a=rtcp-fb:100 goog-remb

a=rtpmap:116 red/90000

a=rtpmap:117 ulpfec/90000

a=ssrc:4187374100 cname:wbRAPpJaBB27UyhZ

a=ssrc:4187374100 msid:stream\_label video\_label

a=ssrc:4187374100 mslabel:stream\_label

a=ssrc:4187374100 label:video\_label

",

"type" : "answer"

}

'''

**Cli111.x [TCP] close from Ser.8888**

如果客户端无新请求内容，须打开下次通讯通道，以便服务器主动通知。

**Cli111.x+n [TCP] connect to Ser.8888**

**Cli111.x+n [http] sendReq to Ser.8888**

**报文：**

"GET /wait?peer\_id=13 HTTP/1.0\r\n\r\n"

### 客户端B发送udp候选人信息

参照本章第2节

### 客户端A发送tcp候选人信息

参照第2小节

**报文：**

‘’’

POST /message?peer\_id=13&to=12 HTTP/1.0

Content-Length: 154

Content-Type: text/plain

{

"candidate" : "a=candidate:2508145037 1 tcp 1509957375 10.1.100.111 4399 typ host generation 0\r\n",

"sdpMLineIndex" : 0,

"sdpMid" : "audio"

}\n

‘’’

### 客户端B发送tcp候选人信息

参照第2小节

**报文：**

‘’’

POST /message?peer\_id=12&to=13 HTTP/1.0

Content-Length: 155

Content-Type: text/plain

{

"candidate" : "a=candidate:1064732934 1 tcp 1509957375 10.1.100.113 47004 typ host generation 0\r\n",

"sdpMLineIndex" : 0,

"sdpMid" : "audio"

}\n

‘’’

### 客户端互联tcp通道

**Cli113.x [tcp] connect to Cli111.4399**

**Cli111.y [tcp] connect to Cli113.47004**

### 发送数据

TCP发送媒体数据，同方向的音视频走同一端口。

## 四、结束会话

### 1.客户端请求注销

**Cli.x [TCP] connect to Ser.8888**

**Cli.x [http] sendReq to Ser.8888**

**报文：**

" GET /sign\_out?peer\_id=2214 HTTP/1.0\r\n\r\n"

### 2.服务器应答

返回添加成功和新的客户端列表

**Ser.8888 [http] sendRsp to Cli.x**

**报文：**

'''

HTTP/1.1 200 OK

Server: PeerConnectionTestServer/0.1

Cache-Control: no-cache

Connection: close

Content-Type: text/plain

Content-Length: 0

Access-Control-Allow-Origin: \*

Access-Control-Allow-Credentials: true

Access-Control-Allow-Methods: POST, GET, OPTIONS

Access-Control-Allow-Headers: Content-Type, Content-Length, Connection, Cache-Control

Access-Control-Expose-Headers: Content-Length, X-Peer-Id

'''

**Cli.x [TCP] close from Ser.8888**