OSC源创会

年终盛典 2016

WebRTC与视频直播如何相互成就?

1、 WebRTC介绍

2、 视频直播介绍

3、 如何相互成就

WebRTC介绍

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- 视频相关应用场景

视频通话
视频直播
在线教育
智能硬件
视频监控
企业通讯
等等等等

WebRTC介绍

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- 技术实现上都有哪些难度?

跨平台实现(android,ios,windows,mac)
视频编解码(VP8,VP9,H264,H265)
语音编解码(opus,silk,ilbc)
信号处理(AEC,AGC,NS,NetEQ)
网络传输与抖动缓冲
丢包重传(FEC,NACK)
安全性等等

WebRTC介绍

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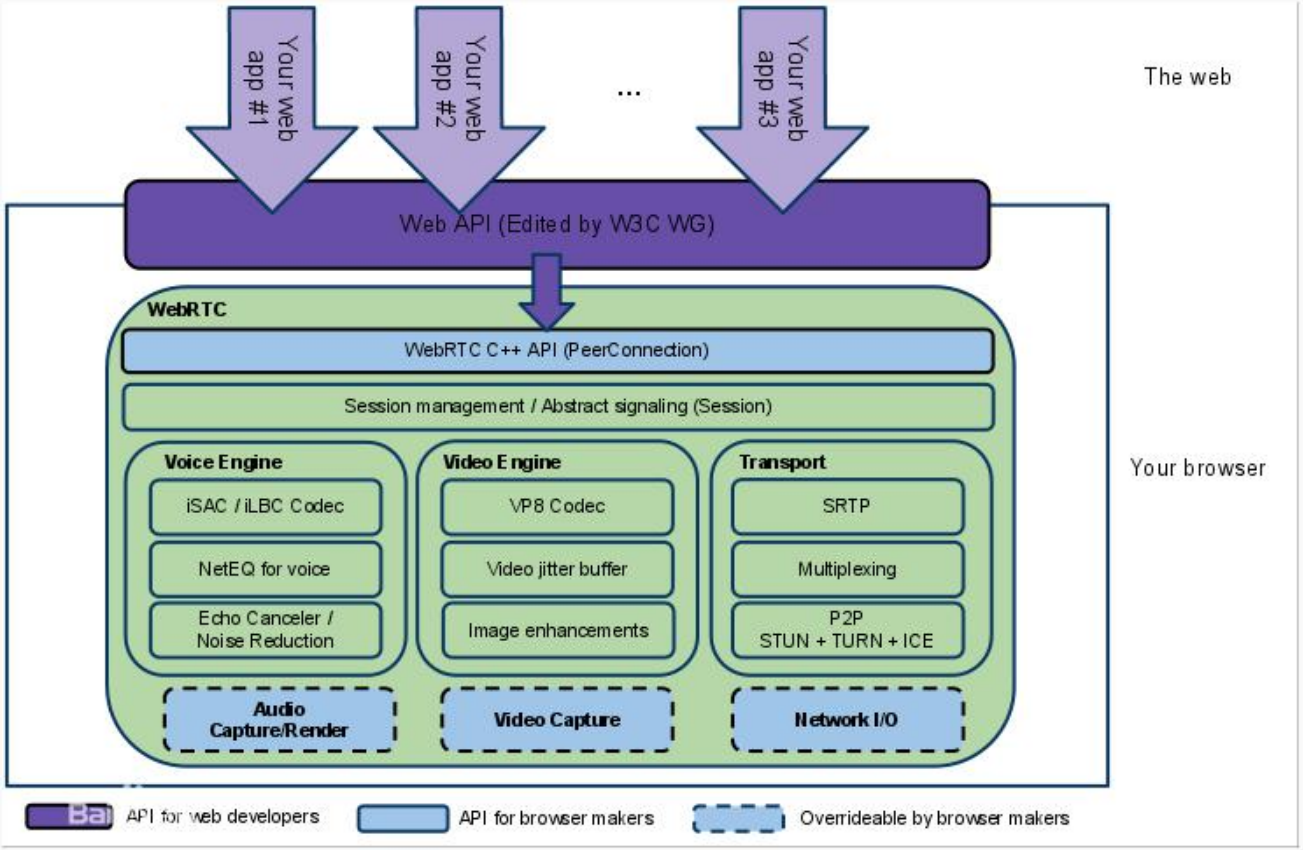
- WebRTC是什么?

WebRTC is a free, open project that provides browsers and mobile applications with Real-Time Communications (RTC) capabilities via simple APIs.

The WebRTC components have been optimized to best serve this purpose.

WebRTC介绍



WebRTC架构图

该图片由zengxijin2012贡献

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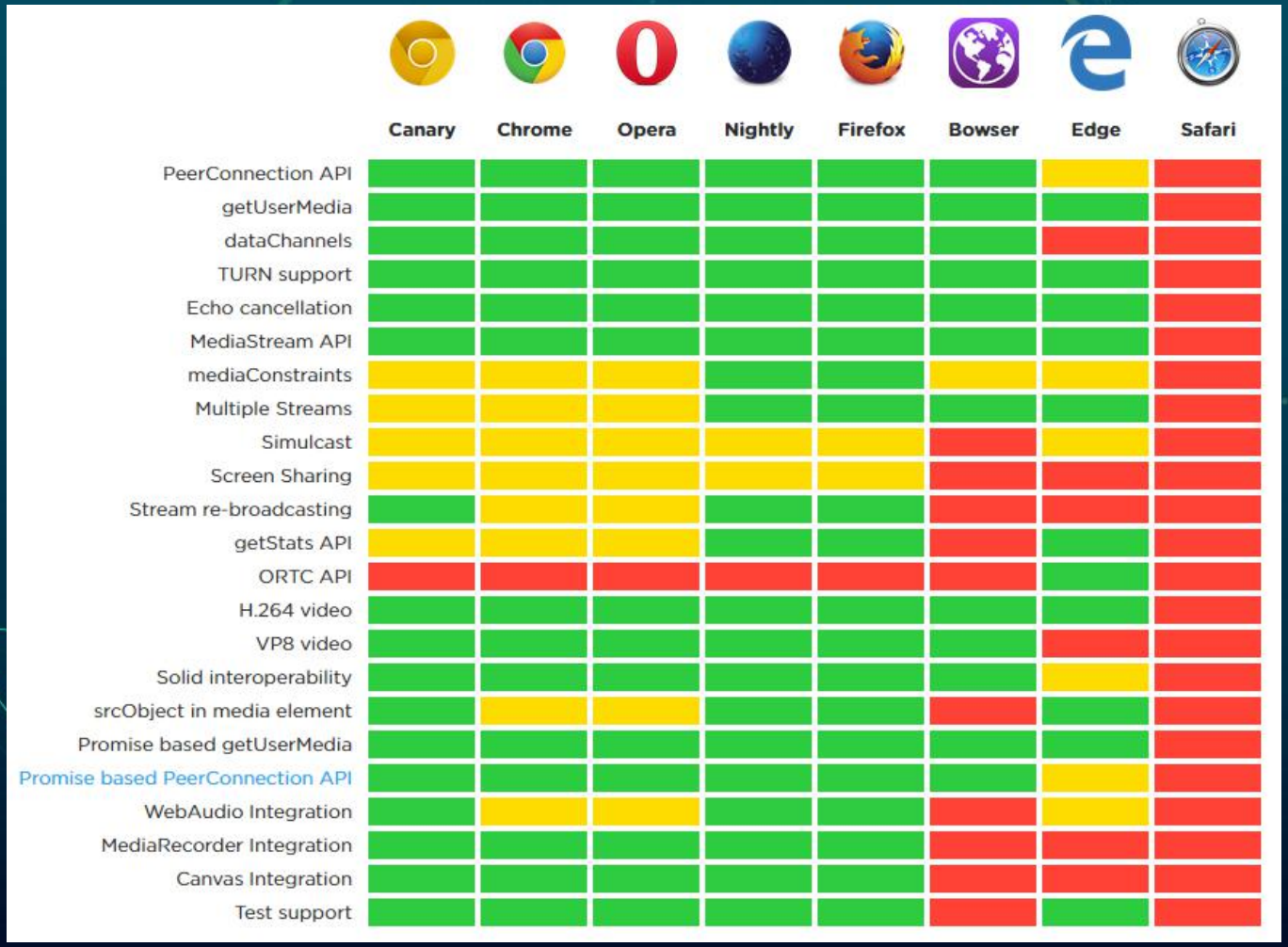

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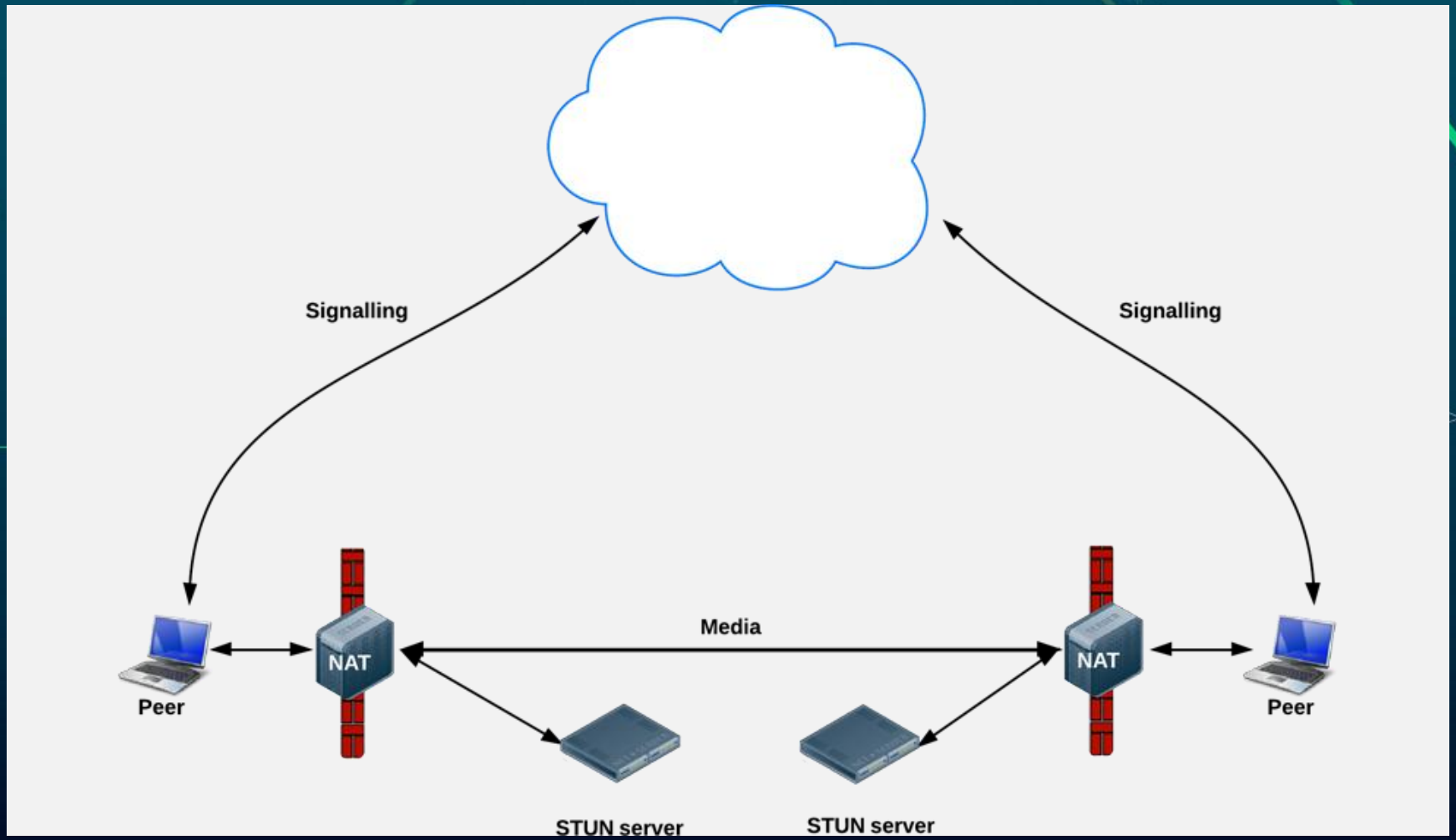

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```
var errorElement = document.querySelector('#errorMsg');
var video = document.querySelector('video');

// Put variables in global scope to make them available to the browser console.
var constraints = window.constraints = {
  audio: false,
  video: true
};

function handleSuccess(stream) {
  var videoTracks = stream.getVideoTracks();
  console.log('Got stream with constraints:', constraints);
  console.log('Using video device: ' + videoTracks[0].label);
  stream.oninactive = function() {
    console.log('Stream inactive');
  };
  window.stream = stream; // make variable available to browser console
  video.srcObject = stream;
}

function handleError(error) {
  if (error.name === 'ConstraintNotSatisfiedError') {
    errorMsg('The resolution ' + constraints.video.width.exact + 'x' +
        constraints.video.width.exact + ' px is not supported by your device.');
  } else if (error.name === 'PermissionDeniedError') {
    errorMsg('Permissions have not been granted to use your camera and ' +
      'microphone, you need to allow the page access to your devices in ' +
      'order for the demo to work.');
  }
  errorMsg('getUserMedia error: ' + error.name, error);
}

function errorMsg(msg, error) {
  errorElement.innerHTML += '<p>' + msg + '</p>';
  if (typeof error !== 'undefined') {
    console.error(error);
  }
}

navigator.mediaDevices.getUserMedia(constraints).
    then(handleSuccess).catch(handleError);
```

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```
function call() {
  callButton.disabled = true;
  hangupButton.disabled = false;
  trace('Starting call');
  startTime = window.performance.now();
  var videoTracks = localStream.getVideoTracks();
  var audioTracks = localStream.getAudioTracks();
  if (videoTracks.length > 0) {
    trace('Using video device: ' + videoTracks[0].label);
  }
  if (audioTracks.length > 0) {
    trace('Using audio device: ' + audioTracks[0].label);
  }
  var servers = null;
  pc1 = new RTCPeerConnection(servers);
  trace('Created local peer connection object pc1');
  pc1.onicecandidate = function(e) {
    onIceCandidate(pc1, e);
  };
  pc2 = new RTCPeerConnection(servers);
  trace('Created remote peer connection object pc2');
  pc2.onicecandidate = function(e) {
    onIceCandidate(pc2, e);
  };
  pc1.oniceconnectionstatechange = function(e) {
    onIceStateChange(pc1, e);
  };
  pc2.oniceconnectionstatechange = function(e) {
    onIceStateChange(pc2, e);
  };
  pc2.onaddstream = gotRemoteStream;

  pc1.addStream(localStream);
  trace('Added local stream to pc1');

  trace('pc1 createOffer start');
  pc1.createOffer(
    offerOptions
  ).then(
    onCreateOfferSuccess,
    onCreateSessionDescriptionError
  );
}
```

WebRTC介绍

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```
function createConnection() {
  dataChannelSend.placeholder = '';
  var servers = null;
  pcConstraint = null;
  dataConstraint = null;
  trace('Using SCTP based data channels');
  // SCTP is supported from Chrome 31 and is supported in FF.
  // No need to pass DTLS constraint as it is on by default in Chrome 31.
  // For SCTP, reliable and ordered is true by default.
  // Add localConnection to global scope to make it visible
  // from the browser console.
  window.localConnection = localConnection =
      new RTCPeerConnection(servers, pcConstraint);
  trace('Created local peer connection object localConnection');

  sendChannel = localConnection.createDataChannel('sendDataChannel',
      dataConstraint);
  trace('Created send data channel');

  localConnection.onicecandidate = iceCallback1;
  sendChannel.onopen = onSendChannelStateChange;
  sendChannel.onclose = onSendChannelStateChange;

  // Add remoteConnection to global scope to make it visible
  // from the browser console.
  window.remoteConnection = remoteConnection =
      new RTCPeerConnection(servers, pcConstraint);
  trace('Created remote peer connection object remoteConnection');

  remoteConnection.onicecandidate = iceCallback2;
  remoteConnection.ondatachannel = receiveChannelCallback;

  localConnection.createOffer().then(
    gotDescription1,
    onCreateSessionDescriptionError
  );
  startButton.disabled = true;
  closeButton.disabled = false;
}

function onCreateSessionDescriptionError(error) {
  trace('Failed to create session description: ' + error.toString());
}

function sendData() {
  var data = dataChannelSend.value;
  sendChannel.send(data);
  trace('Sent Data: ' + data);
}
```

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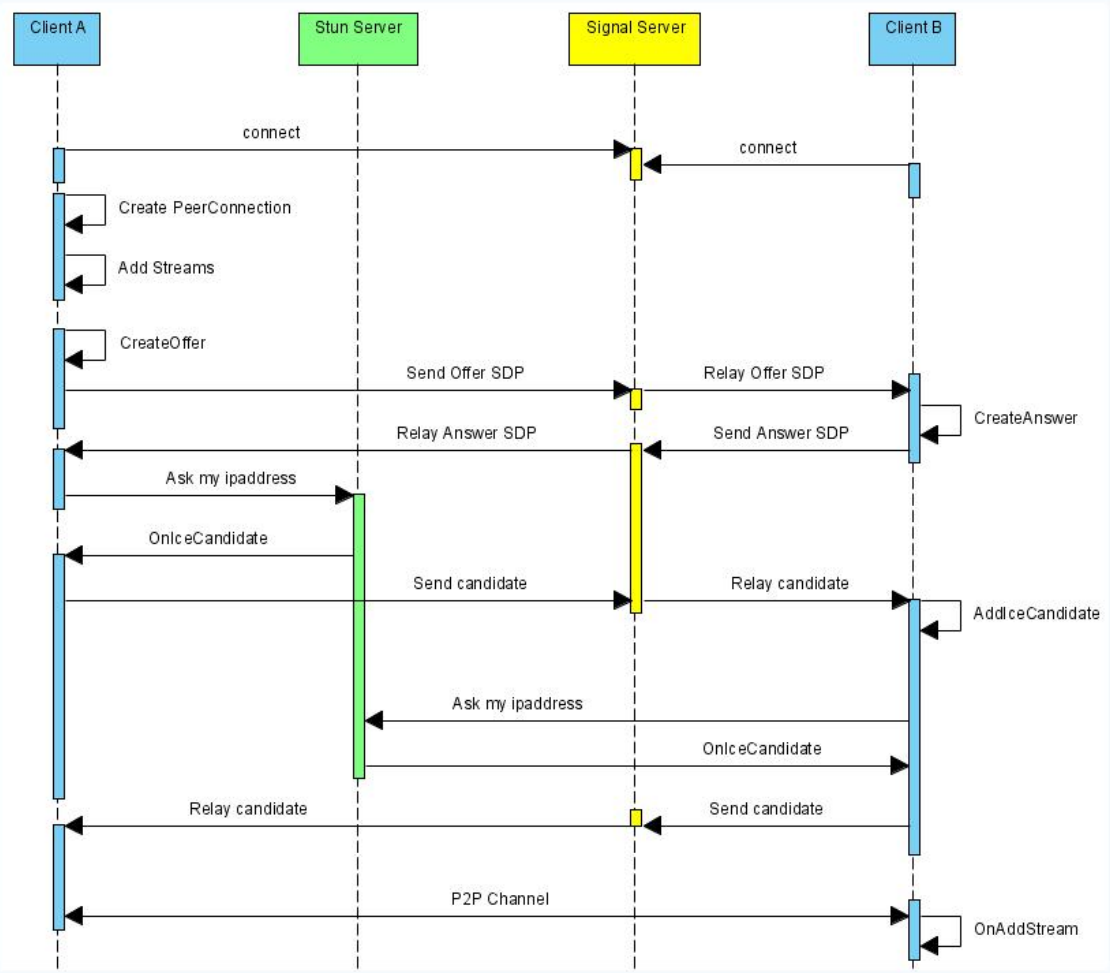

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- 测试地址：

  https://github.com/webrtc/samples

  getUserMedia()
  RTCPeerConnection
  RTCDataChannel
  ICE(Stun,Turn)

视频直播

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- 主要技术难点

推流播放
电子白板
桌面共享
视频美颜
系统并发
卡顿延迟
用户互动
其他.....

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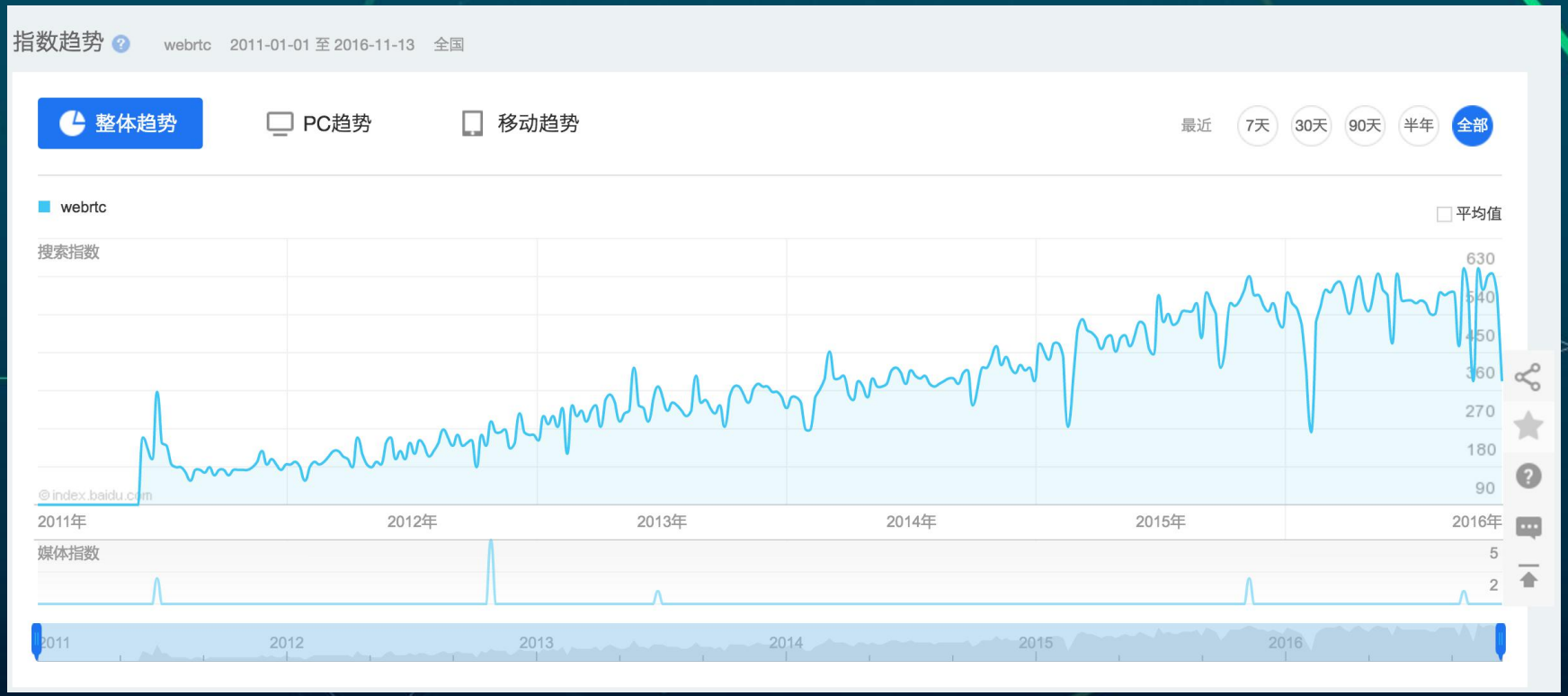

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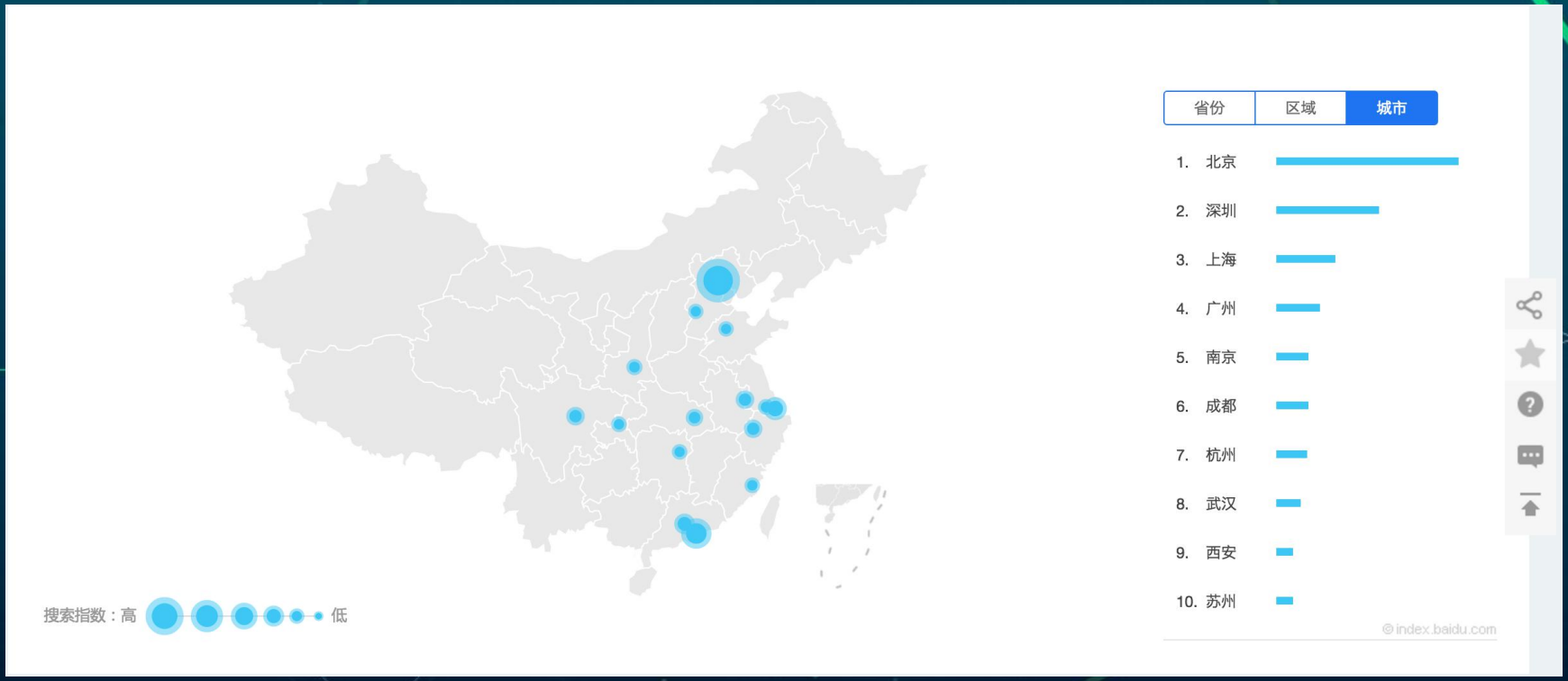
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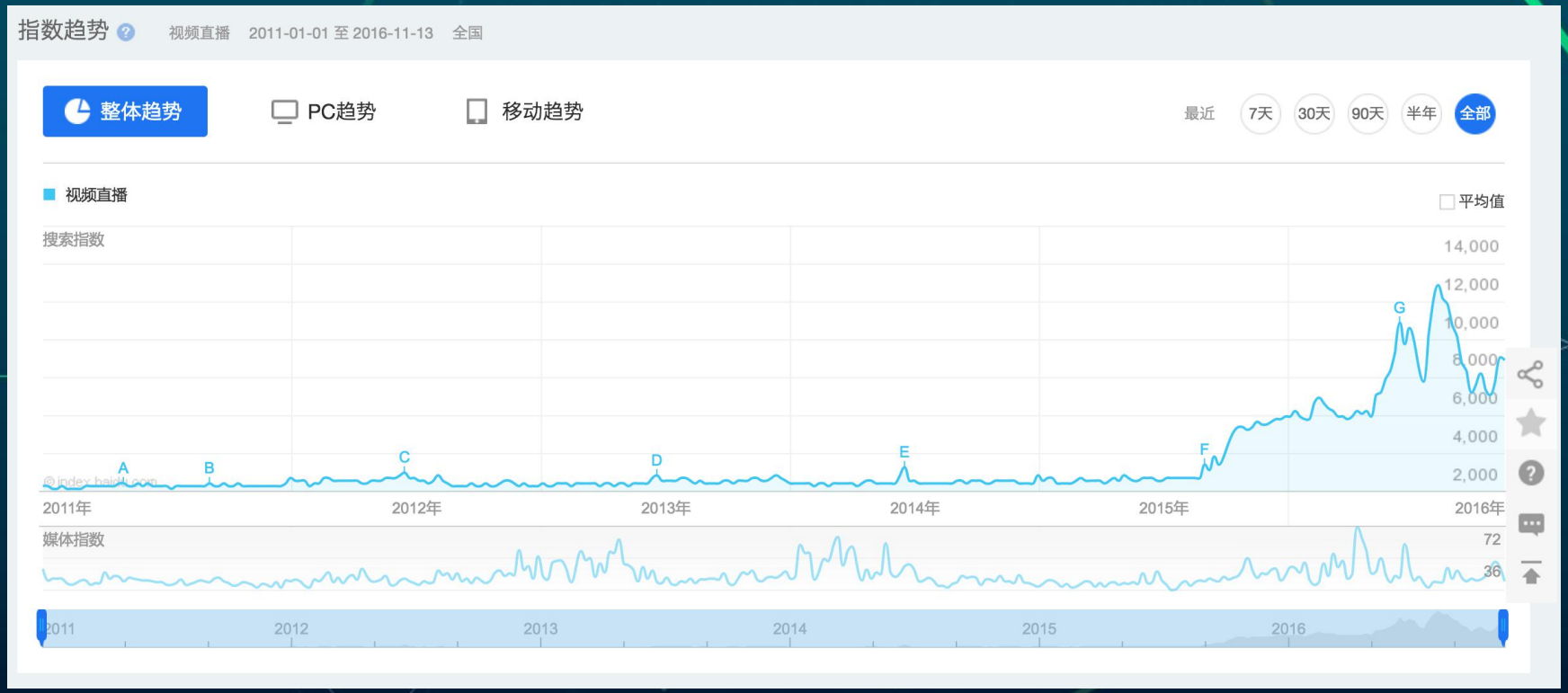

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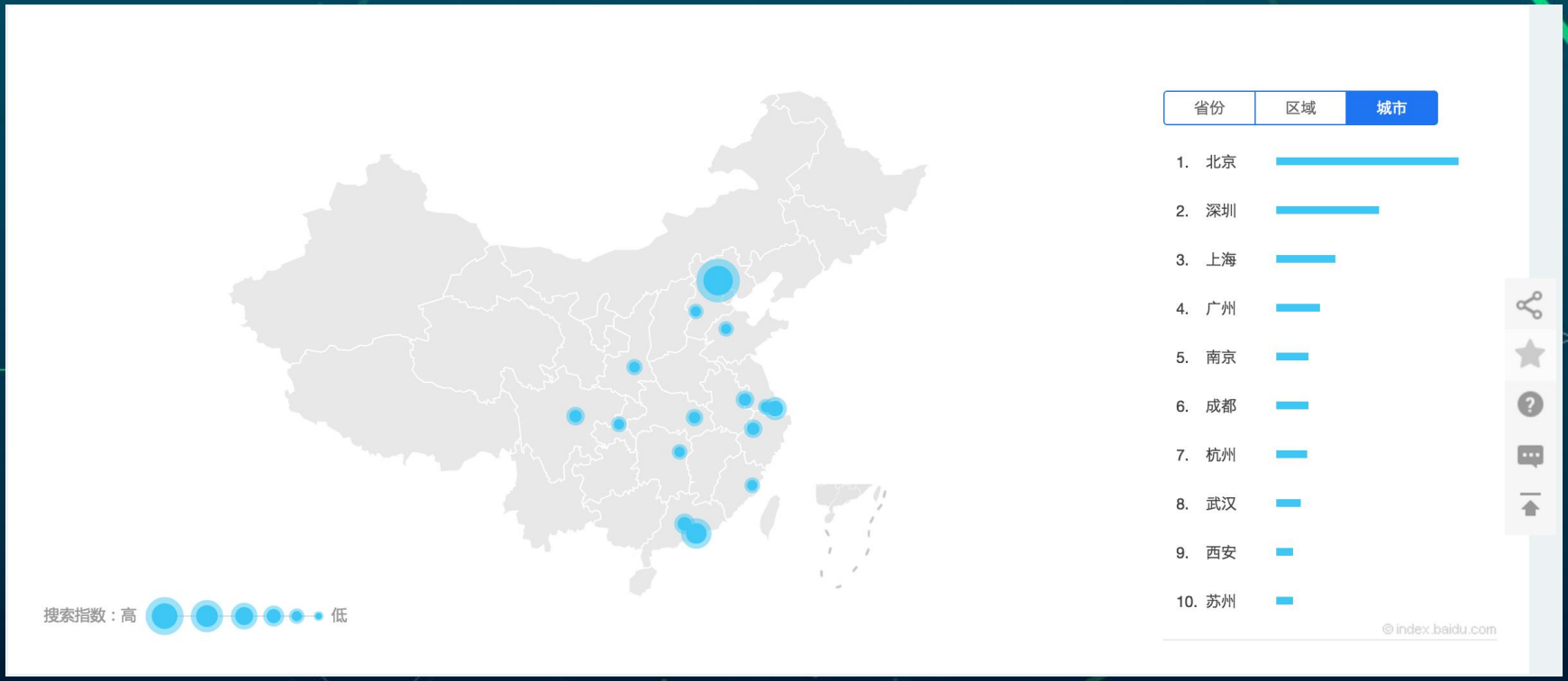
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- WebRTC提供技术支撑
- 直播创造更多应用场景

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谢谢！