

WebRTC Data Channels

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Outline

- WebRTC
- WebRTC architecture
- WebRTC peer connections
- WebRTC data channels
- Services provided by WebRTC data channels

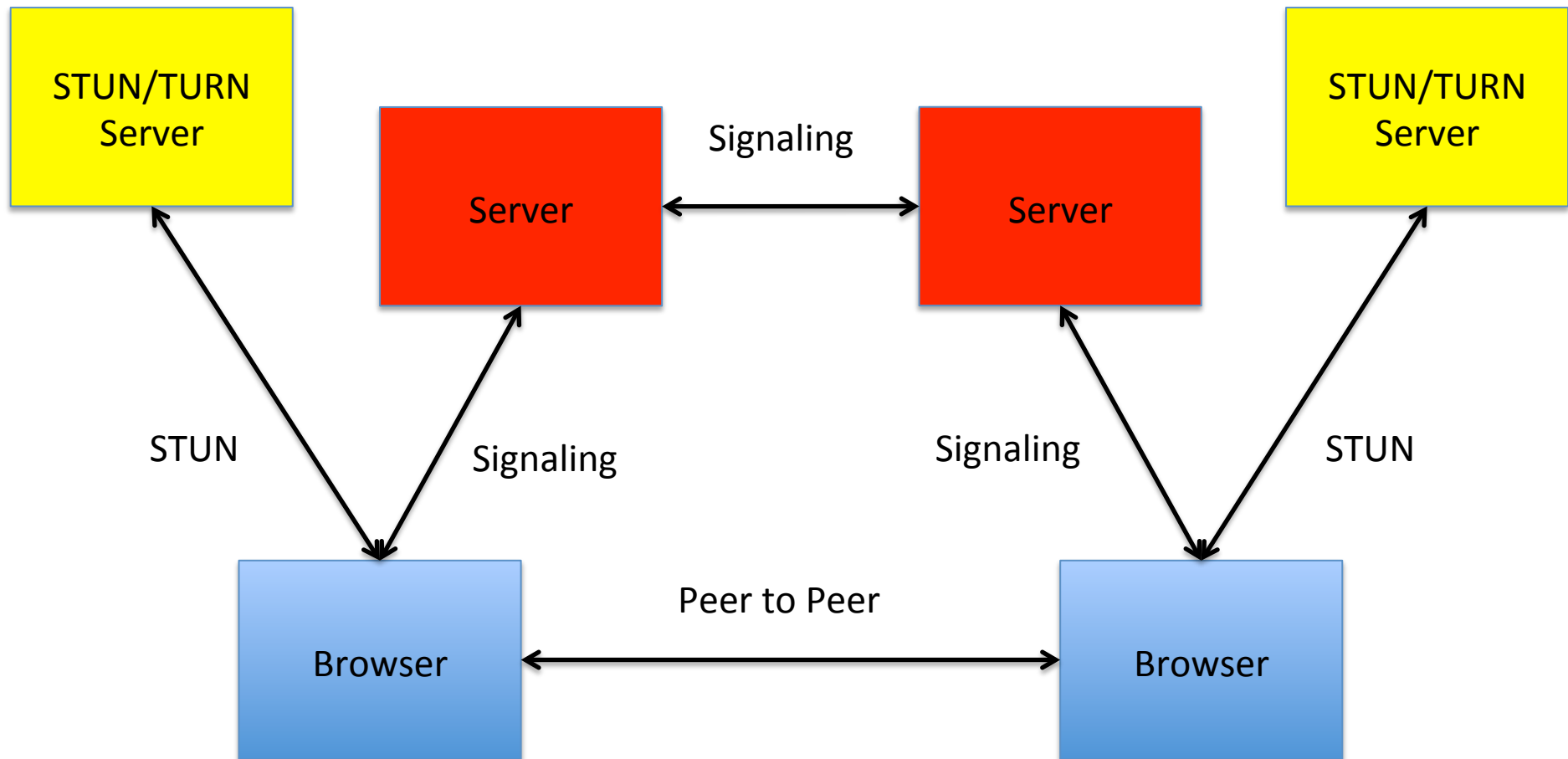
Motivation for WebRTC

- Multiple solutions for media and non-media peer to peer communication:
 - Skype (Microsoft)
 - Google Hangouts (Google)
 - Facetime (Apple)
 - Adobe Connect (Adobe)
 - WebEx (Cisco)
- Limitations:
 - Require proprietary software
 - Not interoperable

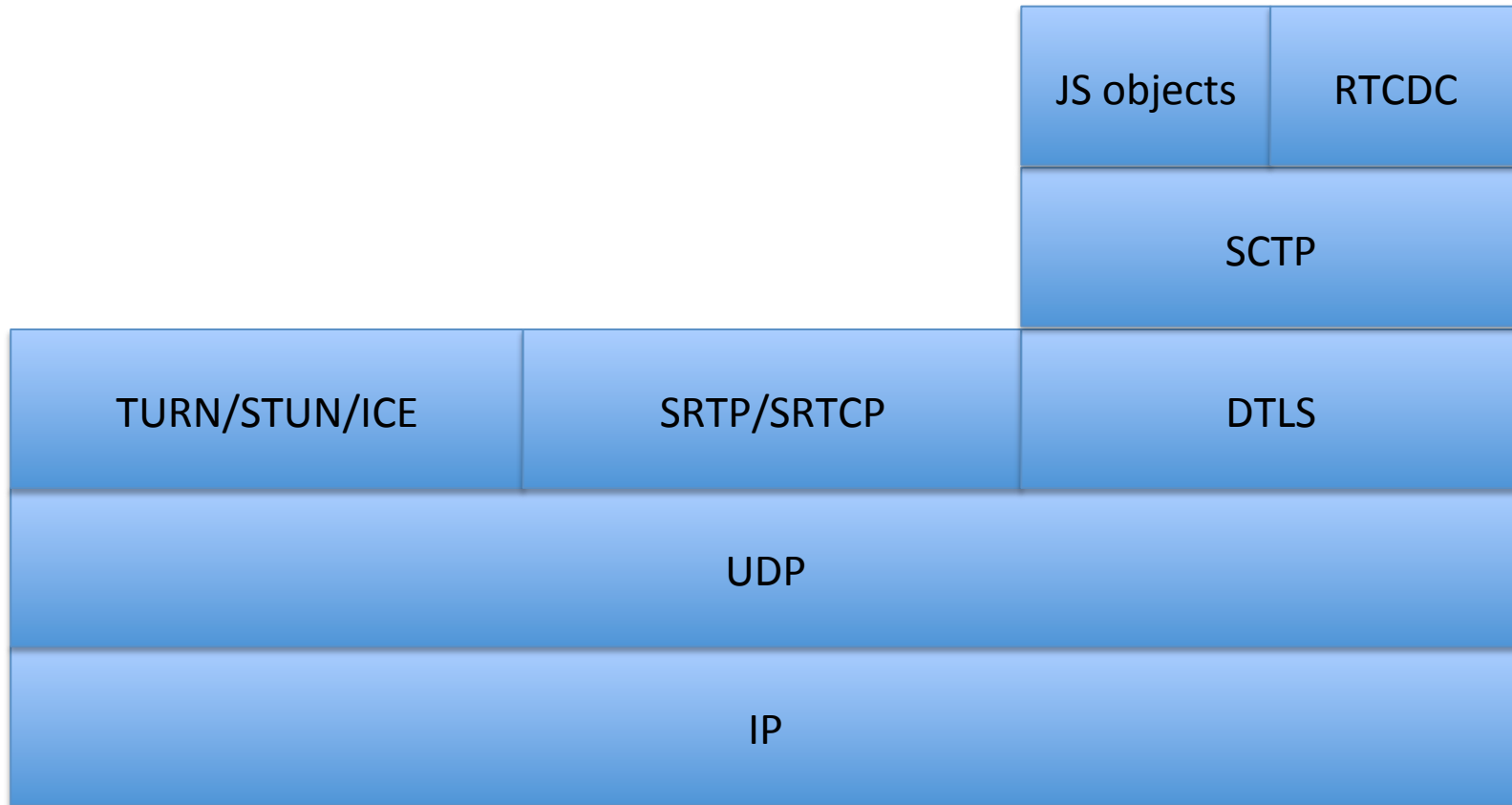
RTCWeb

- Joint activity between
 - the Real-Time Communications in Web Browsers (RTCWeb) Working Group of the Internet Engineering Task Force (IETF) defining the protocols.
 - The Web Real-Time Communication (WebRTC) Working Group of the World Wide Web Consortium (W3C) defining the Javascript API.

Architecture



Peer to Peer Protocol Stack using UDP



Peer Connections

- Peer to peer communication
- NAT traversal
- Security
- Connectivity checks
- Support multiple media channels
- Support multiple data channels
- Congestion control

Services Provided by Peer Connections

- Security
- NAT traversal
- Connectivity checks
- Mobility

Data Channels

- Belong to a peer connection
- Can be opened and closed dynamically during the lifetime of a peer connection
- Relative priorities among all data channels belonging to the same peer connection.
- Bi-directional having the same properties in both directions

Data Channel Properties

- Properties
 - Label
 - Protocol
 - Priority
 - Preservation of user message sequencing or not
 - Level of Reliability
- Independency of selection

Service: Message orientation

- Message oriented
- Message Types
 - WebRTC strings
 - JS String, UTF-8 encoded
 - WebRTC binary data
 - JS ArrayBuffer
 - JS ArrayBufferView
 - JS Blob

Service: Sequencing

- Ordered data channels
 - All message of a data channel are delivered to the application at the receiver-side in the same sequence as they were sent by the application at the sender-side.
- Un-ordered data channels
 - All messages of a data channel are delivered to the application at the receiver-side as soon as they are completely received at the receiver-side.

Service: Reliability

- Full Reliability
 - All message sent by the application at the sender-side are delivered to the application at the receiver side. If that is not possible, an error indication is given to the application.
- Limited Reliability
 - Some messages are abandoned at the sender side based on a policy applying to all user messages:
 - Limited number of retransmissions of user messages
 - Limited life-time of user messages

Relation to Services Provided by SCTP

- Data Channels map to bidirectional SCTP streams (using the same SID in both directions)
- Ordering/Reliability properties are per user message in SCTP. For data channels they are the same for all messages belonging to the same data channel
- Stream reconfiguration is used for closing data channels

Summary: Data Channel Services

- Services provided by STUN/TURN/ICE
 - NAT Traversal
 - Connectivity checks
 - Failover/Mobility
- Services provided by DTLS
 - Security
- Services provided by SCTP
 - Message orientation
 - Level message order preservation
 - Level of Reliability
 - Relative Priorities