

IPv6 support for WebRTC

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IPv6 support for WebRTC is added since build [5.2.660](#). This led to some changes in configuration settings and connection establishing procedure.

Configuration

By default, IPv6 support is disabled. To enable this feature, the following should be done:

- [inflashphoner.properties](#) file set the external IPv6 server address and allow IPv6 candidates

```
ip_v6=2a03:b0c0:3:e0::42e:c002
ice_add_ipv6_candidate=true
```

- [inwcs-core.properies](#) file allow IPv6 stack

```
-Djava.net.preferIPv4Stack=false
```

The following settings can be used to set comma separated IPv4 and IPv6 interfaces to bind

- [hls.address](#)
- [http.address](#)
- [https.address](#)
- [rtmpf.address](#)
- [rtmp.address](#)
- [rtsp.address](#)
- [rtsp_client.address](#)
- [ws.address](#)
- [wss.address](#)

Connection establishing procedure

Connection establishing to exchange WebRTC media traffic now looks as follows:

1. Server waits for incoming Binding Request queries to IPv4 and IPv6 interfaces.
2. When a query with USE-CANDIDATE attribute is received, the candidate is marked as nominated to use, if Binding Response would be received,

udp.port == 31010						
No.	Time	Source	Destination	Protocol	Length	Info
96	5.571359	2a00:1fa0:4640:7dbd:9c2f:4227:7f3c:6c5d	2a03:b0c0:3:e0::42e:c001	STUN	206	Binding Request user: 44ed81b0/80c5/11ea/b076/d30860f5540f6aqt01e64
101	5.574385	2a03:b0c0:3:e0::42e:c001	2a00:1fa0:4640:7dbd:9c2f:4227:7f3c:6c5d	STUN	210	Binding Request user: kDK0:44ed81b0/80c5/11ea/b076/d30860f5540f6aqt01e64
103	5.575115	2a03:b0c0:3:e0::42e:c001	2a00:1fa0:4640:7dbd:9c2f:4227:7f3c:6c5d	STUN	214	Binding Success Response user: 44ed81b0/80c5/11ea/b076/d30860f5540f6aqt01e64
107	5.629417	213.87.156.145	167.71.35.46	STUN	186	Binding Request user: 44ed81b0/80c5/11ea/b076/d30860f5540f6aqt01e64
109	5.629978	167.71.35.46	213.87.156.145	STUN	190	Binding Request user: kDK0:44ed81b0/80c5/11ea/b076/d30860f5540f6aqt01e64
110	5.630126	167.71.35.46	213.87.156.145	STUN	182	Binding Success Response XOR-MAPPED-ADDRESS: 213.87.156.145:24841 u
117	5.650716	2a00:1fa0:4640:7dbd:9c2f:4227:7f3c:6c5d	2a03:b0c0:3:e0::42e:c001	STUN	138	Binding Success Response
125	5.656027	2a03:b0c0:3:e0::42e:c001	2a00:1fa0:4640:7dbd:9c2f:4227:7f3c:6c5d	DTLSv1.2	293	Client Hello
127	5.680879	2a00:1fa0:4640:7dbd:9c2f:4227:7f3c:6c5d	2a03:b0c0:3:e0::42e:c001	STUN	206	Binding Request user: 44ed81b0/80c5/11ea/b076/d30860f5540f6aqt01e64
129	5.681733	2a03:b0c0:3:e0::42e:c001	2a00:1fa0:4640:7dbd:9c2f:4227:7f3c:6c5d	STUN	214	Binding Success Response user: 44ed81b0/80c5/11ea/b076/d30860f5540f6aqt01e64
134	5.718735	213.87.156.145	167.71.35.46	STUN	106	Binding Success Response XOR-MAPPED-ADDRESS: 167.71.35.46:31010
138	5.718968	2a00:1fa0:4640:7dbd:9c2f:4227:7f3c:6c5d	2a03:b0c0:3:e0::42e:c001	STUN	206	Binding Request user: 44ed81b0/80c5/11ea/b076/d30860f5540f6aqt01e64
141	5.719442	2a03:b0c0:3:e0::42e:c001	2a00:1fa0:4640:7dbd:9c2f:4227:7f3c:6c5d	STUN	214	Binding Success Response user: 44ed81b0/80c5/11ea/b076/d30860f5540f6aqt01e64
145	5.729962	2a00:1fa0:4640:7dbd:9c2f:4227:7f3c:6c5d	2a03:b0c0:3:e0::42e:c001	DTLSv1.2	707	Server Hello, Certificate, Server Key Exchange, Certificate Request
149	5.739375	2a03:b0c0:3:e0::42e:c001	2a00:1fa0:4640:7dbd:9c2f:4227:7f3c:6c5d	DTLSv1.2	790	Certificate, Client Key Exchange, Certificate Verify, Change Cipher
152	5.811244	2a00:1fa0:4640:7dbd:9c2f:4227:7f3c:6c5d	2a03:b0c0:3:e0::42e:c001	DTLSv1.2	129	Change Cipher Spec, Encrypted Handshake Message
154	5.813960	2a03:b0c0:3:e0::42e:c001	2a00:1fa0:4640:7dbd:9c2f:4227:7f3c:6c5d	UDP	144	31010 → 57192 Len=82
▶ Frame 96: 206 bytes on wire (1648 bits), 206 bytes captured (1648 bits)						
▶ Ethernet II, Src: JuniperN_4f:80:30 (f0:4b:3a:4f:80:30), Dst: f2:23:12:f5:a8:3d (f2:23:12:f5:a8:3d)						
▶ Internet Protocol Version 6, Src: 2a00:1fa0:4640:7dbd:9c2f:4227:7f3c:6c5d, Dst: 2a03:b0c0:3:e0::42e:c001						
▶ User Datagram Protocol, Src Port: 57192, Dst Port: 31010						
▼ Session Traversal Utilities for NAT						
[Response In: 103]						
▶ Message Type: 0x0001 (Binding Request)						
Message Length: 124						
Message Cookie: 2112w442						
Message Transaction ID: 4a30622f335779433959565a						
▼ Attributes						
▶ USERNAME: 44ed81b0/80c5/11ea/b076/d30860f5540f6aqt01e64e6nuk:kDK0						
▶ Unknown						
▶ ICE-CONTROLLING						
▼ USE-CANDIDATE						
▶ Attribute Type: USE-CANDIDATE (0x0025)						
Attribute Length: 0						
▼ PRIORITY						
▶ Attribute Type: PRIORITY (0x0024)						
Attribute Length: 4						
Priority: 1845504255						
▶ MESSAGE-INTEGRITY						
▶ FINGERPRINT						

3. For every browser Binding Request server sends Binding Response.

udp.port == 31010						
No.	Time	Source	Destination	Protocol	Length	Info
96	5.571569	2a00:1fa0:4640:7dbd:9c2f:4227:7f3c:6c5d	2a03:b0c0:3:e0:42e:c001	STUN	206	Binding Request user: 44ed81b0/80c5/11ea/b076/d30860f5540f6aqt01e64
101	5.574385	2a03:b0c0:3:e0:42e:c001	2a00:1fa0:4640:7dbd:9c2f:4227:7f3c:6c5d	STUN	210	Binding Request user: kDK0:44ed81b0/80c5/11ea/b076/d30860f5540f6aqt
103	5.575115	2a03:b0c0:3:e0:42e:c001	2a00:1fa0:4640:7dbd:9c2f:4227:7f3c:6c5d	STUN	214	Binding Success Response user: 44ed81b0/80c5/11ea/b076/d30860f5540f6aqt
107	5.629417	213.87.156.145	167.71.35.46	STUN	186	Binding Request user: 44ed81b0/80c5/11ea/b076/d30860f5540f6aqt01e64
109	5.629978	167.71.35.46	213.87.156.145	STUN	190	Binding Request user: kDK0:44ed81b0/80c5/11ea/b076/d30860f5540f6aqt
110	5.630126	167.71.35.46	213.87.156.145	STUN	182	Binding Success Response XOR-MAPPED-ADDRESS: 213.87.156.145:24841 u
117	5.650716	2a00:1fa0:4640:7dbd:9c2f:4227:7f3c:6c5d	2a03:b0c0:3:e0:42e:c001	STUN	138	Binding Success Response
125	5.656027	2a03:b0c0:3:e0:42e:c001	2a00:1fa0:4640:7dbd:9c2f:4227:7f3c:6c5d	DTLSv1.2	293	Client Hello
127	5.680879	2a00:1fa0:4640:7dbd:9c2f:4227:7f3c:6c5d	2a03:b0c0:3:e0:42e:c001	STUN	206	Binding Request user: 44ed81b0/80c5/11ea/b076/d30860f5540f6aqt01e64
129	5.681733	2a03:b0c0:3:e0:42e:c001	2a00:1fa0:4640:7dbd:9c2f:4227:7f3c:6c5d	STUN	214	Binding Success Response user: 44ed81b0/80c5/11ea/b076/d30860f5540f6aqt
134	5.710735	213.87.156.145	167.71.35.46	STUN	106	Binding Success Response XOR-MAPPED-ADDRESS: 167.71.35.46:31010
138	5.718968	2a00:1fa0:4640:7dbd:9c2f:4227:7f3c:6c5d	2a03:b0c0:3:e0:42e:c001	STUN	206	Binding Request user: 44ed81b0/80c5/11ea/b076/d30860f5540f6aqt01e64
141	5.719442	2a03:b0c0:3:e0:42e:c001	2a00:1fa0:4640:7dbd:9c2f:4227:7f3c:6c5d	STUN	214	Binding Success Response user: 44ed81b0/80c5/11ea/b076/d30860f5540f6aqt
145	5.729962	2a00:1fa0:4640:7dbd:9c2f:4227:7f3c:6c5d	2a03:b0c0:3:e0:42e:c001	DTLSv1.2	707	Server Hello, Certificate, Server Key Exchange, Certificate Request
149	5.739375	2a03:b0c0:3:e0:42e:c001	2a00:1fa0:4640:7dbd:9c2f:4227:7f3c:6c5d	DTLSv1.2	790	Certificate, Client Key Exchange, Certificate Verify, Change Cipher
152	5.811244	2a00:1fa0:4640:7dbd:9c2f:4227:7f3c:6c5d	2a03:b0c0:3:e0:42e:c001	DTLSv1.2	129	Change Cipher Spec, Encrypted Handshake Message
154	5.813960	2a03:b0c0:3:e0:42e:c001	2a00:1fa0:4640:7dbd:9c2f:4227:7f3c:6c5d	UDP	144	31010 → 57192 Len=82

▶ Frame 103: 214 bytes on wire (1712 bits), 214 bytes captured (1712 bits)
 ▶ Ethernet II, Src: f2:23:12:f5:a8:3d (f2:23:12:f5:a8:3d), Dst: IcannIam_00:02:63 (00:00:5e:00:02:63)
 ▶ Internet Protocol Version 6, Src: 2a03:b0c0:3:e0:42e:c001, Dst: 2a00:1fa0:4640:7dbd:9c2f:4227:7f3c:6c5d
 ▶ User Datagram Protocol, Src Port: 31010, Dst Port: 57192
 ▼ Session Traversal Utilities for NAT
 [Request In: 96]
 [Time: 0.003546000 seconds]
 ▶ Message Type: 0x0101 (Binding Success Response)
 Message Length: 132
 Message Cookie: 2112a442
 Message Transaction ID: 4a3062f335779433959565a
 ▼ Attributes
 ▼ XOR-MAPPED-ADDRESS
 ▶ Attribute Type: XOR-MAPPED-ADDRESS (0x0020)
 Attribute Length: 20
 Reserved: 00
 Protocol Family: IPv6 (0x02)
 Port (XOR-d): fe7a
 [Port: 57192]
 IP (XOR-d): 0b12bbe20c701f92af783b646653a07
 [IP: 2a00:1fa0:4640:7dbd:9c2f:4227:7f3c:6c5d]
 ▶ USERNAME: 44ed81b0/80c5/11ea/b076/d30860f5540f6aqt01e64e6nuk:kDK0
 ▶ SOFTWARE
 ▶ MESSAGE-INTEGRITY
 ▶ FINGERPRINT

4. At the same time, server sends Binding Request to browser. Requests will be repeated if necessary with the following period (1500 ms by default)

```
stun_freshness_period=1500
```

udp.port == 31010						
No.	Time	Source	Destination	Protocol	Length	Info
96	5.571569	2a00:1fa0:4640:7dbd:9c2f:4227:7f3c:6c5d	2a03:b0c0:3:e0:42e:c001	STUN	206	Binding Request user: 44ed81b0/80c5/11ea/b076/d30860f5540f6aqt01e64
101	5.574385	2a03:b0c0:3:e0:42e:c001	2a00:1fa0:4640:7dbd:9c2f:4227:7f3c:6c5d	STUN	210	Binding Request user: kDK0:44ed81b0/80c5/11ea/b076/d30860f5540f6aqt
103	5.575115	2a03:b0c0:3:e0:42e:c001	2a00:1fa0:4640:7dbd:9c2f:4227:7f3c:6c5d	STUN	214	Binding Success Response user: 44ed81b0/80c5/11ea/b076/d30860f5540f6aqt
107	5.629417	213.87.156.145	167.71.35.46	STUN	186	Binding Request user: 44ed81b0/80c5/11ea/b076/d30860f5540f6aqt01e64
109	5.629978	167.71.35.46	213.87.156.145	STUN	190	Binding Request user: kDK0:44ed81b0/80c5/11ea/b076/d30860f5540f6aqt
110	5.630126	167.71.35.46	213.87.156.145	STUN	182	Binding Success Response XOR-MAPPED-ADDRESS: 213.87.156.145:24841 u
117	5.650716	2a00:1fa0:4640:7dbd:9c2f:4227:7f3c:6c5d	2a03:b0c0:3:e0:42e:c001	STUN	138	Binding Success Response
125	5.656027	2a03:b0c0:3:e0:42e:c001	2a00:1fa0:4640:7dbd:9c2f:4227:7f3c:6c5d	DTLSv1.2	293	Client Hello
127	5.680879	2a00:1fa0:4640:7dbd:9c2f:4227:7f3c:6c5d	2a03:b0c0:3:e0:42e:c001	STUN	206	Binding Request user: 44ed81b0/80c5/11ea/b076/d30860f5540f6aqt01e64
129	5.681733	2a03:b0c0:3:e0:42e:c001	2a00:1fa0:4640:7dbd:9c2f:4227:7f3c:6c5d	STUN	214	Binding Success Response user: 44ed81b0/80c5/11ea/b076/d30860f5540f6aqt
134	5.710735	213.87.156.145	167.71.35.46	STUN	106	Binding Success Response XOR-MAPPED-ADDRESS: 167.71.35.46:31010
138	5.718968	2a00:1fa0:4640:7dbd:9c2f:4227:7f3c:6c5d	2a03:b0c0:3:e0:42e:c001	STUN	206	Binding Request user: 44ed81b0/80c5/11ea/b076/d30860f5540f6aqt01e64
141	5.719442	2a03:b0c0:3:e0:42e:c001	2a00:1fa0:4640:7dbd:9c2f:4227:7f3c:6c5d	STUN	214	Binding Success Response user: 44ed81b0/80c5/11ea/b076/d30860f5540f6aqt
145	5.729962	2a00:1fa0:4640:7dbd:9c2f:4227:7f3c:6c5d	2a03:b0c0:3:e0:42e:c001	DTLSv1.2	707	Server Hello, Certificate, Server Key Exchange, Certificate Request
149	5.739375	2a03:b0c0:3:e0:42e:c001	2a00:1fa0:4640:7dbd:9c2f:4227:7f3c:6c5d	DTLSv1.2	790	Certificate, Client Key Exchange, Certificate Verify, Change Cipher
152	5.811244	2a00:1fa0:4640:7dbd:9c2f:4227:7f3c:6c5d	2a03:b0c0:3:e0:42e:c001	DTLSv1.2	129	Change Cipher Spec, Encrypted Handshake Message
154	5.813960	2a03:b0c0:3:e0:42e:c001	2a00:1fa0:4640:7dbd:9c2f:4227:7f3c:6c5d	UDP	144	31010 → 57192 Len=82

▶ Frame 101: 210 bytes on wire (1680 bits), 210 bytes captured (1680 bits)
 ▶ Ethernet II, Src: f2:23:12:f5:a8:3d (f2:23:12:f5:a8:3d), Dst: IcannIam_00:02:63 (00:00:5e:00:02:63)
 ▶ Internet Protocol Version 6, Src: 2a03:b0c0:3:e0:42e:c001, Dst: 2a00:1fa0:4640:7dbd:9c2f:4227:7f3c:6c5d
 ▶ User Datagram Protocol, Src Port: 31010, Dst Port: 57192
 ▼ Session Traversal Utilities for NAT
 [Response In: 117]
 ▶ Message Type: 0x0001 (Binding Request)
 Message Length: 120
 Message Cookie: 2112a442
 Message Transaction ID: 3b60e38871019950736261ed
 ▼ Attributes
 ▶ USERNAME: kDK0:44ed81b0/80c5/11ea/b076/d30860f5540f6aqt01e64e6nuk
 ▶ Attribute Type: USERNAME (0x0006)
 Attribute Length: 55
 Username: kDK0:44ed81b0/80c5/11ea/b076/d30860f5540f6aqt01e64e6nuk
 Padding: 1
 ▶ ICE-CONTROLLED
 ▶ PRIORITY
 ▶ Attribute Type: PRIORITY (0x0024)
 Attribute Length: 4
 Priority: 2113939711
 ▶ SOFTWARE
 ▶ MESSAGE-INTEGRITY
 ▶ FINGERPRINT

5. When Bindind Response is received from the first candidate, the timeout is started to wait for another candidates as set in the following parameter (1000 ms by default)

```
stun_wait_candidate_timeout=1000
```

6. When timeout is finished, server sends DTLSClient Hello to the priority candidate

When establishing connection with Safari browser, IPv4 candidates are preferred unless some problem in STUN-DTLS procedure occur with such candidate. Therefore, in Safari IPv4 will be used if client has both IPv4 and IPv6 interfaces working and traffic between client and server is not blocked. In other browsers (see example pictures above) IPv6 candidates are preferred.

1. WebRTC publishing/playback do not work in any browser on IPv6 only hosts

Solution: If a host has only IPv6 address (and localhost), ICE candidates exchange does not work, `RTCPeerConnection.onicecandidate` event is not fired in most browsers. Use RTMP to publish and RTSP, RTMP, HLS to play.