IPv6 support for WebRTC

- Configuration
- Connection establishing procedure
- Known issues

IPv6 support for WebRTC is added since build5.2.660. 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.properiesfile allow IPv6 stack

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

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

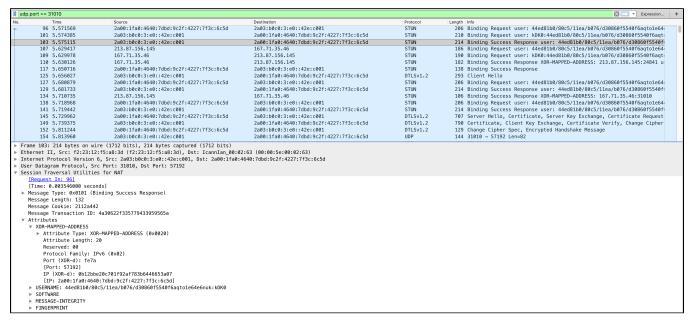
- hls.address
- http.address
- https.address
- rtmfp.address
- · rtmp.address
- rtsp.address
- rtsp_client_address
- ws.address
- · wss.address

Connection establishing procedure

Connection establishing to exchange WebRTC media trafficnow looks as follows:

- 1. Server waits for incoming Binding Request queriesto 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,

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



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

dp.port == 31010				
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/d30860f5540f6aqto1e
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/d30860f5540f6a
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/d30860f554
107 5.629417	213.87.156.145	167.71.35.46	STUN	186 Binding Request user: 44ed81b0/80c5/11ea/b076/d30860f5540f6aqto1e
109 5.629978	167.71.35.46	213.87.156.145	STUN	190 Binding Request user: kDK0:44ed81b0/80c5/11ea/b076/d30860f5540f6a
110 5.630126	167.71.35.46	213.87.156.145	STUN	182 Binding Success Response XOR-MAPPED-ADDRESS: 213.87.156.145:24841
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/d30860f5540f6aqto1e
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/d30860f554
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/d30860f5540f6aqto1e
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/d30860f554
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 Reque
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 Ciph
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
hernet II, Src: f2:23: ternet Protocol Version er Datagram Protocol,	vire (1680 bits), 210 bytes captured (1680 bits) [2:f5:a8:3d (f2:23:12:f5:a8:3d), Dst: IcannIan_00:0 n 6, Src: 2a03:b0c0:3:e0::42e:c001, Dst: 2a00:1fa0: Src Port: 31010, Dst Port: 57192			
thernet II, Src: f2:23:: nternet Protocol Version ser Datagram Protocol, session Traversal Utilit: [Response In: 117]	12:f5:a8:3d (f2:23:12:f5:a8:3d), Dst: IcannIan_00:0 n 6, Src: 2a03:b0c0:3:e0::42e:c001, Dst: 2a00:1fa0: Grc Port: 31010, Dst Port: 57192 les for NAT			
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mernet II, Src: f2:23: ernet Protocol Version er Datagram Protocol, S ssion Traversal Utilit: [Response In: 117] Message Type: 0x0001 (Message Length: 128	l2:f5:a8:3d (f2:23:12:f5:a8:3d), Dst: IcannIan_00:0 f6, Src: 2a8:bbde3:3e0:42e:c001, Dst: 2a00:1fa0: brc Port: 31010, Dst Port: 57192 les for NAT Binding Request)			
ernet II, Src: f2:23: ernet Protocol Version probatagram Protocol, sision Traversal Utilit: [Response In: 117] Message Type: 0x0001 (Message Length: 128 Message Cookie: 2112a4	12:f5:a8:3d (f2:23:12:f5:a8:3d), Dst: IcannIan_00:0 f6, Src: 2a8:3bbe03:se0:42:c001, Dst: Za00:1fa0: src Port: 31010, Dst Port: 57192 tes for NAT Binding Request)			
ernet II, Src: f2:23: ernet Protocol Version ir Datagram Protocol, s sion Traversal Utilit: [Response In: 117] Message Type: 0x0001 (Message Length: 128 Message Cookie: 21124 Message Transaction ID	l2:f5:a8:3d (f2:23:12:f5:a8:3d), Dst: IcannIan_00:0 f6, Src: 2a8:bbde3:3e0:42e:c001, Dst: 2a00:1fa0: brc Port: 31010, Dst Port: 57192 les for NAT Binding Request)			
ernet II, Src: f2:23: ernet Protocol Version ir Datagram Protocol, Si sion Traversal Utilit: [Response In: 117] Message Type: 0x0001 (Message Length: 128 Message Cookie: 2112a Message Transaction ID Attributes	l2:f5:a8:3d (f2:23:12:f5:a8:3d), Dst: IcannIan_00:0 6, Src: 2a8:3bb60:3:e0:4:d2:c001, Dst: Za00:1fa0: Brown Street (fail of the fail of			
wernet II, Src: f2:23: ernet Protocol Version ir Datagram Protocol, S. sion Traversal Utilit: [Response In: 117] dessage Type: 0x0001 (dessage Condie: 21124 dessage Cookie: 21124 dessage Cookie: 21124 dessage Transaction ID Attributes v USENNAME: kDK0:44edd	12:f5:a8:3d (f2:23:12:f5:a8:3d), Dst: IcannIan_00:0 n6, Src: 2a3:bb06:3:e0:42:ece01, Dst: 2a00:1fa0: brc Port: 31010, Dst Port: 57192 ies for NAT Binding Request) 42 : bb60e38871019950736261ed 81b0/80c5/11ea/b076/d30860f5540f6aqto1e64e6nuk			
ernet II, Src: f2:23: ernet Protocol Version r Datagram Protocol, s sion Traversal Utilit: [Response In: 117] dessage Type: 0x0001 (dessage Length: 128 dessage Cookie: 2112ad dessage Transaction ID ttributes v USERNAME: kDK0:44edi > Attribute Type: L	12:f5:a8:3d (f2:23:12:f5:a8:3d), Dst: IcannIan_00:0 6, Src: 2a3:b6:06:3:60:45:06:1, Dst: 2a00:1fa0: Binding Request) 42 2: b60e38871019950736261ed \$180/8055/11ea/b076/d30860f5540f6aqto1e64e6nuk \$55RNAME (0x0006)			
ernet II, Src: f2:23: ernet Protocol Version r Datagram Protocol, s sion Traversal Utilit: [Response In: 117] dessage Type: 0x0001 (dessage Length: 128 dessage Cookie: 211244 dessage Gookie: 211244 dessage Transaction ID ttributes w USERNAME: kDk0:44edi > Attribute Type: L Attribute Length:	12:f5:a8:3d (f2:23:12:f5:a8:3d), Dst: IcannIan_00:0 6, Src: 2a3:bb062:3:60:42ec:001, Dst: 2a00:1fa0: 5rc Port: 31010, Dst Port: 57192 ies for NAT Binding Request) 42 : 3b60e38871019950736261ed \$1b0/80c5/11ea/b076/d30860f5540f6aqto1e64e6nuk \$ERNAME (0x0006) 55			
remet II, Src: f2283: ernet Protocol Version r Datagram Protocol, sion Traversal Utilit. Message Ing. III/I Message Type: 0x0001. Message Conkie: 211246 Wessage Conkie: 211246 Wessage Transaction ID Attributes V USERWAME: kDK0:44ed > Attribute Length: Username: kDK0:44 Username: kDK0:44 Username: kDK0:44	12:f5:a8:3d (f2:23:12:f5:a8:3d), Dst: IcannIan_00:0 6, Src: 2a3:b6:06:3:60:45:06:1, Dst: 2a00:1fa0: Binding Request) 42 2: b60e38871019950736261ed \$180/8055/11ea/b076/d30860f5540f6aqto1e64e6nuk \$55RNAME (0x0006)			
ernet II, Src: (22:8): ernet Protocol Version rr Datagram Protocol, sion Traversal Utilit. [Response In: 117] Message Type: 0x0001 Message Length: 128 Message Cookie: 211224 Message Cookie: 21124 Message Transaction ID Attributes ➤ Attribute Type: 1 Attribute Length: Username: kDN0:44 Padding: 1	12:f5:a8:3d (f2:23:12:f5:a8:3d), Dst: IcannIan_00:0 6, Src: 2a3:bb062:3:60:42ec:001, Dst: 2a00:1fa0: 5rc Port: 31010, Dst Port: 57192 ies for NAT Binding Request) 42 : 3b60e38871019950736261ed \$1b0/80c5/11ea/b076/d30860f5540f6aqto1e64e6nuk \$ERNAME (0x0006) 55			
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mernet II, Src: 12:23: cremet Protocol Version r Datagram Protocol, sion Traversal Utilit. [Response In: 117] Message Type: 0x001: (Message Length: 128 Message Length: 128 Message Cransaction ID Attributes v USERNAME: NDM: 44ed b Attribute Length: Username: NDM: 44 Padding: 1 ICE-COMINGULED v PRIORITY b Attribute Type: F Attribute Type: F	12:f5:a8:3d (f2:23:12:f5:a8:3d), Dst: IcannIan_00:8 6, Src: 2a8:2bb0623:e8:42:42:001, Dst: Za80:1fa0: Src Port: 31010, Dst Port: 57192 les for NAT Binding Request) 42 : 3b60e38871019950736261ed S1B0/80c5/11ea/b076/d30860f5540f6aqtole64e6nuk SERNAME (0x0006) 55 ed81b0/80c5/11ea/b076/d30860f5540f6aqtole64e6nuk RIORITY (0x0024) 4			
mernet II, Src: 12:23: ternet Protocol Version er Datagram Protocol, sison Traversal Utilit. [Response In: 117] Message Type: 0x0001 (Message Length: 128 Message Length: 128 Message Transaction ID Attributes v USERNAME: NDM: 44ed b Attribute Length: USERNAME: NDM: 44ed Padding: 1 IGE-CONTROLLED PRIORITY Attribute Length: Attribute Length: Attribute Length: Attribute Length: Attribute Length: Priority: 2113933	12:f5:a8:3d (f2:23:12:f5:a8:3d), Dst: IcannIan_00:8 6, Src: 2a8:2bb0623:e8:42:42:001, Dst: Za80:1fa0: Src Port: 31010, Dst Port: 57192 les for NAT Binding Request) 42 : 3b60e38871019950736261ed S1B0/80c5/11ea/b076/d30860f5540f6aqtole64e6nuk SERNAME (0x0006) 55 ed81b0/80c5/11ea/b076/d30860f5540f6aqtole64e6nuk RIORITY (0x0024) 4			
hernet II, Src: 12:23: ternet Protocol Versione Datagram Protocol, Siston Traversal Utilit [Besponse In: 117] Message Tyen Gw0011 (Message Cookie: 2112a4 Message Cookie: 2112a4 Message Cookie: 2112a4 Message Cookie: 2112a4 Message Transaction ID Attributes > Attribute Length: Username: kDk0:44ed > Attribute Length: Username: kDk0:44 Padding: > ICE-CONTROLLED > FIGE-CONTROLLED > Attribute Length: Attribute Length:	12:f5:a8:3d (f2:23:12:f5:a8:3d), Dst: IcannIan_00:8 6, Src: 2a8:2bb0623:e8:42:42:001, Dst: Za80:1fa0: Src Port: 31010, Dst Port: 57192 les for NAT Binding Request) 42 : 3b60e38871019950736261ed S1B0/80c5/11ea/b076/d30860f5540f6aqtole64e6nuk SERNAME (0x0006) 55 ed81b0/80c5/11ea/b076/d30860f5540f6aqtole64e6nuk RIORITY (0x0024) 4			

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

udp.	port == 31010				
No.	Time	Source	Destination	Protocol	Length Info
г	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/d30860f5540f6aqto1e64
	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/d30860f5540f
	107 5.629417	213.87.156.145	167.71.35.46	STUN	186 Binding Request user: 44ed81b0/80c5/11ea/b076/d30860f5540f6aqto1e64
	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/d30860f5540f6aqto1e64
	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/d30860f5540f
	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/d30860f5540f6aqto1e64
	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/d30860f5540f
	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
▶ Ethe ▶ Inte ▶ Use ▼ Data	ernet II, Src: f2:23:12 ernet Protocol Version r Datagram Protocol, Sr agram Transport Layer S	Handshake Protocol: Client Hello uke (22)			
	⊢ Handshake Protocol: (lient Hello			
,	- nanasnake Fratacotti (etene necto			

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.

Known issues

1. WebRTC publishing/playback doe not work in any browser on IPv6 only host

Symptoms: stream publishing or playback fails with Failed by ICE timeout error

Solution: If a host has only IPv6 address (and localhost), ICE candadates exchange does not work, RTCPeerConnection.onicecandidate event is nor fired in most browsers. Use RTMP to publish and RTSP, RTMP, HLS to play.