Librecast — Privacy and Decentralisation with Multicast

IPv6 Multicast and the Next Generation Internet

Brett Sheffield, Librecast Project

@brett_sheffield

#FOSDEM2020
Before we begin...
Librecast
Librecast
Librecast

- Developers Developers Developers Developers
LibreCast

- Developers
- Messaging Library
Librecast

- Developers Developers Developers
- Messaging Library
- Transitional Technology
Librecast

- Developers
- Messaging Library
- Transitional Technology
- Improved Routing Protocol
Librecast

- Developers
- Messaging Library
- Transitional Technology
- Improved Routing Protocol
- Build multicast-enabled applications
Librecast

- Developers
- Messaging Library
- Transitional Technology
- Improved Routing Protocol
- Build multicast-enabled applications
- Work with FOSS projects to enable multicast everywhere
Librecast

- Developers Developers Developers
- Messaging Library
- Transitional Technology
- Improved Routing Protocol
- Build multicast-enabled applications
- Work with FOSS projects to enable multicast everywhere
- Ensure new standards (eg. WebRTC, QUIC) support multicast
lc_ctx_t *ctx;
lc_socket_t *sock;
lc_channel_t *chan;
lc_message_t msg;

ctx = lc_ctx_new();
sock = lc_socket_new(ctx);
chan = lc_channel_new(ctx, channelName);
lc_channel_bind(sock, chan);

lc_msg_init_size(&msg, strlen(msgtext) - 1);
lc_msg_send(chan, &msg);

/* clean up */
lc_socket_close(sock);
lc_channel_free(chan);
lc_ctx_free(ctx);
Multicast

"IP Multicast will play a prominent role on the Internet in the coming years. It is a requirement, not an option, if the Internet is going to scale. Multicast allows application developers to add more functionality without significantly impacting the network."

– RFC 3170, Sep 2001
Multicast

Efficient
Multicast

Scalable
Multicast

Privacy
Multicast

Decentralisation
What is Multicast?
Definition

Unicast

Broadcast

Multicast
Definition

Unicast

Broadcast

Multicast

Unicast
Definition

Unicast

Broadcast
Definition

Unicast

Broadcast

Multicast
What is Multicast?

Unicast, Broadcast

Multicast
What is Multicast?

Unicast, Broadcast  PUSH

Multicast
What is Multicast?

Unicast, Broadcast  PUSH

Multicast  PULL
Multicast Misconceptions

I only for streaming
I no use for video on demand
I unreliable
I insecure
I can't work on Internet
Multicast Misconceptions

- only for streaming
Multicast Misconceptions

- only for streaming
- no use for video on demand
Multicast Misconceptions

- only for streaming
- no use for video on demand
- unreliable
Multicast Misconceptions

- only for streaming
- no use for video on demand
- unreliable
- insecure
Multicast Misconceptions

- only for streaming
- no use for video on demand
- unreliable
- insecure
- can’t work on Internet
Multicast Misconceptions

- only for streaming
- no use for video on demand
- unreliable
- insecure
- can’t work on Internet
Multicast is ...
Multicast is ...
Group Communication
All Communication is Group Communication
The Problem with Unicast
Unicast $\implies$ Centralized
Multicast $\iff$ Decentralized
### OSI Layer

<table>
<thead>
<tr>
<th>Layer</th>
<th>Protocol data unit (PDU)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Host layers</td>
<td></td>
</tr>
<tr>
<td>7 Application</td>
<td>Data</td>
</tr>
<tr>
<td>6 Presentation</td>
<td></td>
</tr>
<tr>
<td>5 Session</td>
<td></td>
</tr>
<tr>
<td>4 Transport</td>
<td>Segment, Datagram</td>
</tr>
<tr>
<td>Media layers</td>
<td></td>
</tr>
<tr>
<td>3 Network</td>
<td>Packet</td>
</tr>
<tr>
<td>2 Data link</td>
<td>Frame</td>
</tr>
<tr>
<td>1 Physical</td>
<td>Symbol</td>
</tr>
</tbody>
</table>
Chat
Chat Server

httpd (lsd)
librecast
Chat Server

httpd (lsd)
librecast
tap
bridge
Chat Server

libreum.js
librecast.js

websocket

httpd (lsd)
librecast

tap

bridge
Chat Server

![Diagram](image)
Chat Server
Chat Server

IPv6 Multicast
Chat Server
Chat Server
Chat Server

IPv6 Multicast
IoT Updates with IPv6 Multicast
12:10 UD2.218A (Internet of Things DevRoom)

Brett Sheffield, Librecast Project

http://brettsheffield.com — Email: brett@librecast.net
Freenode: bacs — Twitter: @brett_sheffield
github.com/brettsheffield — github.com/librestack