

Desktop sharing with the Session Initiation Protocol

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How can application and desktop sharing, initiated by SIP, be realised in existing SIP infrastructure with the least possible impact on that infrastructure?



UNIVERSITY OF AMSTERDAM



System & Network Engineering



Research Project 1

What is SIP?

RFC 3261: The Session Initiation Protocol

- **User location** Wherever they are on the internet.
- User availability Addresses are easy to remember.
- User capabilities For example: michiel@nl.net.nl
- Session setup
- Session management

What is SIP?

RFC 3261: The Session Initiation Protocol

- User location
- **User availability**
- User capabilities
- Session setup
- Session management

Originally, “User not found”

Nowadays also presence information, like in instant messaging clients.

What is SIP?

RFC 3261: The Session Initiation Protocol

- User location
- User availability
- **User capabilities**
- Session setup
- Session management

The session types supported:

- Voice
- Video
- Instant Messaging
- Desktop sharing

What is SIP?

RFC 3261: The Session Initiation Protocol

- User location
 - User availability
 - User capabilities
 - **Session setup**
 - Session management
- Calling
 - Redirections

What is SIP?

RFC 3261: The Session Initiation Protocol

- User location
- User availability
- User capabilities
- Session setup
- **Session management**
- Transfers
- Hangups

What is SIP?

RFC 3261: The Session Initiation Protocol

- User location
- User availability
- User capabilities
- Session setup
- Session management

SIP does **not** do the session itself!

Why desktop sharing with SIP?

- + No host names or IP-addresses to remember or find out about

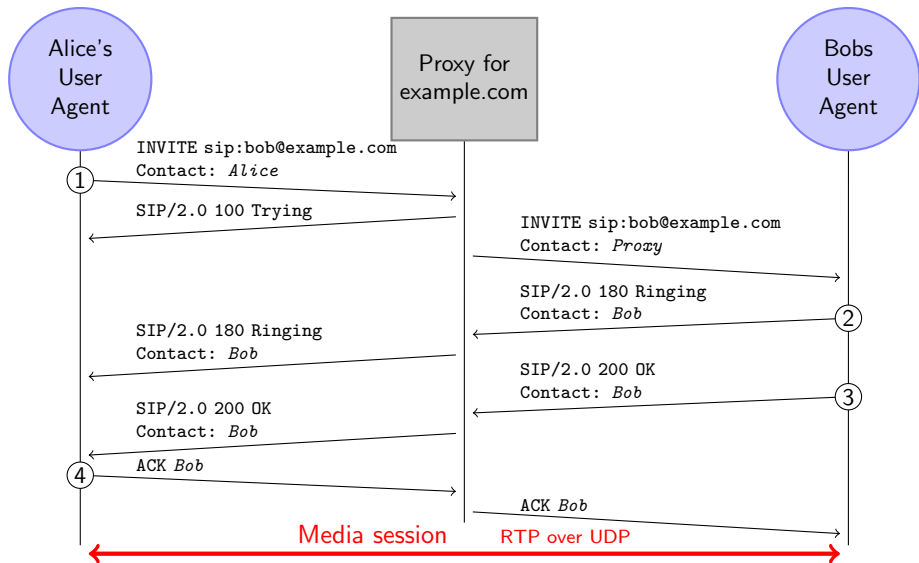
Why desktop sharing with SIP?

- + No host names or IP-addresses to remember or find out about
- + No VPN's to private networks needed

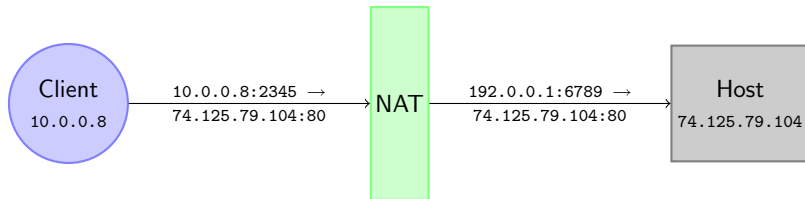
Why desktop sharing with SIP?

- + No host names or IP-addresses to remember or find out about
- + No VPN's to private networks needed
- + Simply call your problem solver and offer your desktop

How does SIP work?

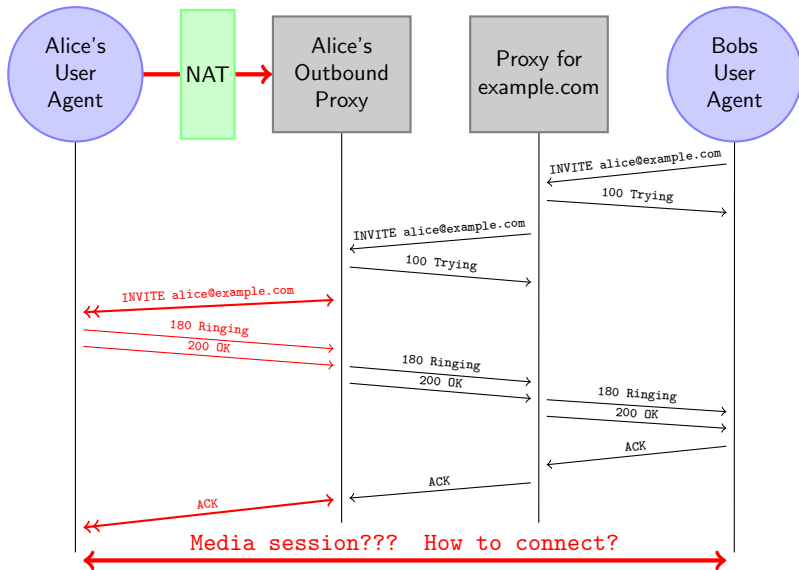


The NAT-Traversal problem



NAT Binding table	
<i>Internal</i>	<i>External</i>
10.0.0.8:2345	192.0.0.1:6789

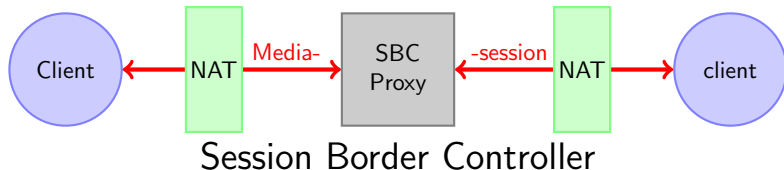
How does SIP deal with it?



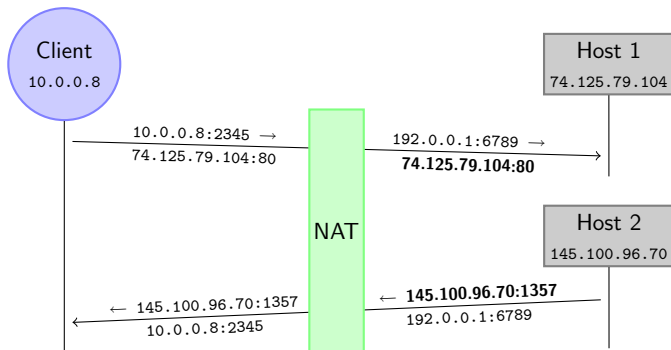
Industry solutions



Industry solutions

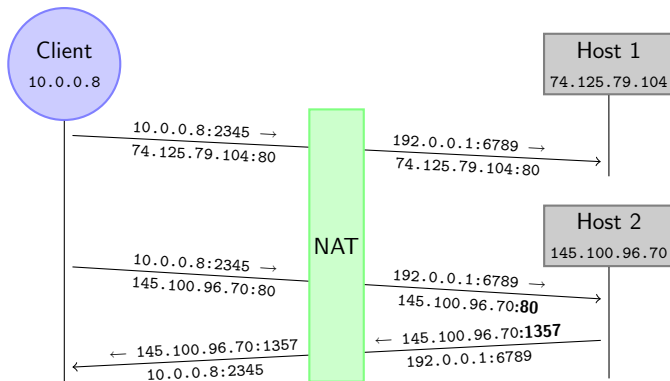


Full cone NAT



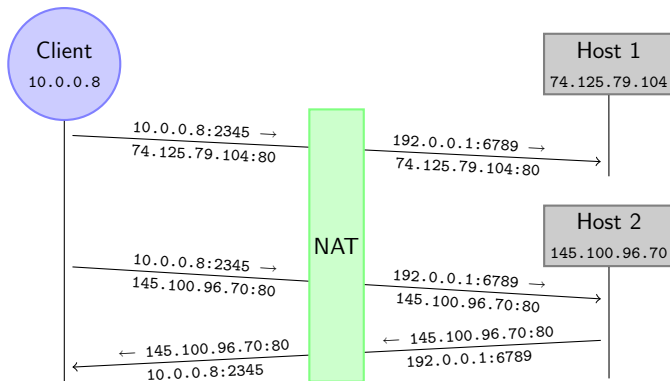
NAT Binding table	
<i>Internal</i>	External
10.0.0.8:2345	192.0.0.1: 6789

Address restricted cone NAT



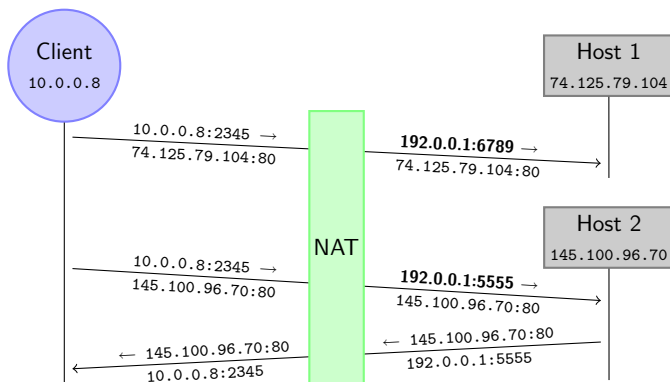
<i>Internal</i>	External	Servers
10.0.0.8:2345	192.0.0.1:6789	74.125.79.104 145.100.96.70

Port restricted cone NAT



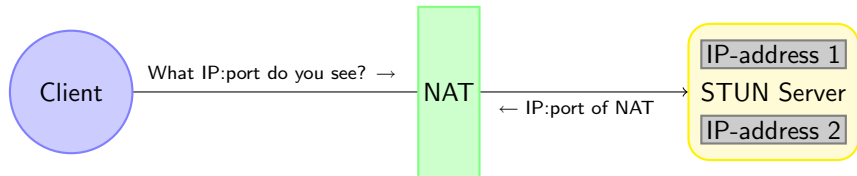
<i>Internal</i>	External	Server & port
10.0.0.8:2345	192.0.0.1:6789	74.125.79.104:80 145.100.96.70:80

Symmetric NAT

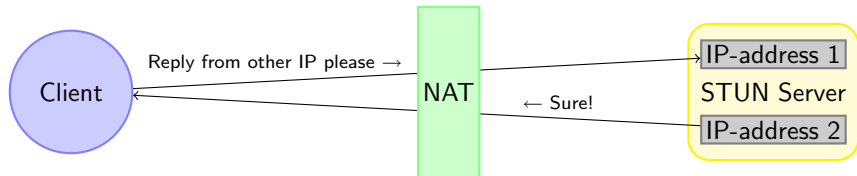


<i>Internal from</i>	<i>External to</i>	<i>External from</i>
10.0.0.8:2345	74.125.79.104:80	192.0.0.1: 6789
10.0.0.8:2345	145.100.96.70:80	192.0.0.1: 5555

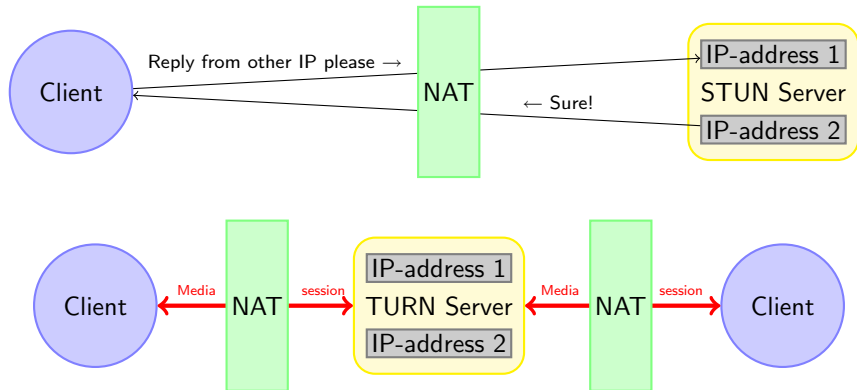
STUN & TURN



STUN & TURN



STUN & TURN



ICE & ICE-TCP

draft-ietf-mmusic-ice-19: Interactive Connectivity Establishment

Defines a procedure for SIP User Agents to get the best connection.

Uses STUN for discovery and TURN as a last resort solution.

But...

ICE & ICE-TCP

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- - It is still a draft

ICE & ICE-TCP

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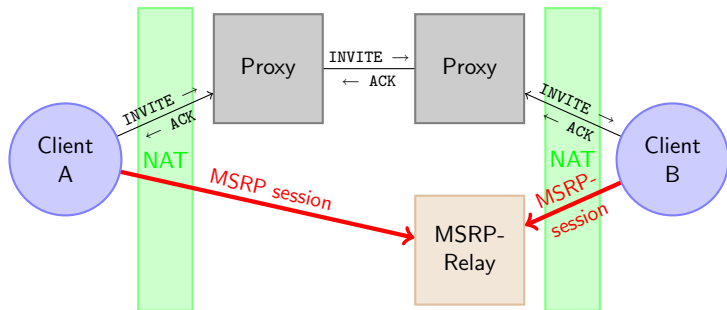
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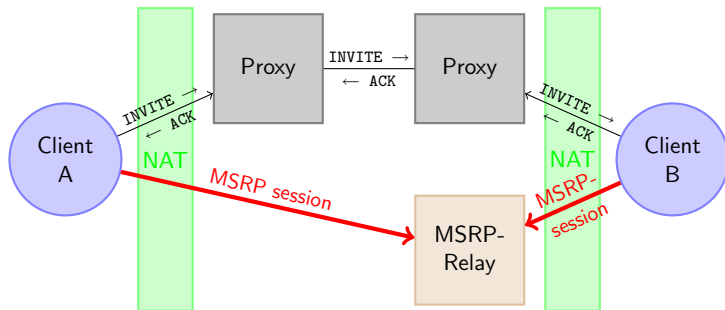
- - It is still a draft
- - SBCs work well

Media specific solutions: MSRP



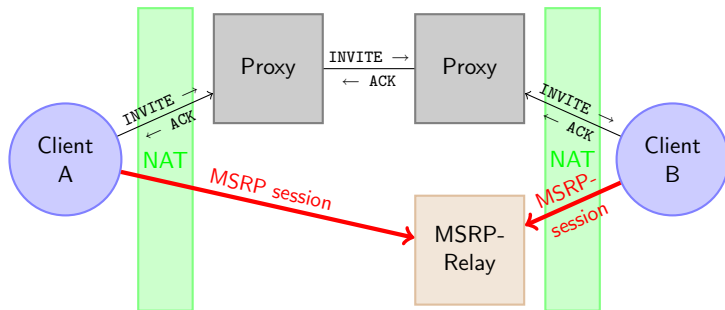
- For instant messaging

Media specific solutions: MSRP



- For instant messaging
- + Instant messaging is popular!

Media specific solutions: MSRP



- For instant messaging
- + Instant messaging is popular!
- + Has TCP as the underlying transport

MSRP Messages

Alice →

```
MSRP ydD6J6w SEND
Byte-Range: 1-112/112
Message-ID: QZ3ts6C3Ed
Content-Type: message/cpim

From: Alice
<sip:alice@example.com>
To: Bob <sip:bob@example.com>
Content-Type: text/plain

Hi Bob
-----ydD6J6w$
```

```
MSRP t4gk7Sv 200 OK
-----t4gk7Sv$
```

← Bob

```
MSRP ydD6J6w 200 OK
-----ydD6J6w$
```

```
MSRP t4gk7Sv SEND
Message-ID: BczlzlN3Vf
Byte-Range: 1-114/114
Content-Type: message/cpim

From: Bob <sip:bob@example.com>
To: Alice
<sip:alice@example.com>
Content-Type: text/plain
```

```
Hi Alice
-----t4gk7Sv$
```

Content-Type is agreed upon by SIP (User Capabilities)

RFB over MSRP!

vncviewer →

```
MSRP ydD6J6w SEND
Byte-Range: 1-10/10
Message-ID: QZ3ts6C3Ed
Content-Type: application/x-rfb
```

RFB data

```
-----ydD6J6w$
```

```
MSRP t4gk7Sv 200 OK
-----t4gk7Sv$
```

← vncserver

```
MSRP ydD6J6w 200 OK
-----ydD6J6w$
```

```
MSRP t4gk7Sv SEND
Message-ID: BczlzlN3Vf
Byte-Range: 1-2000/2000
Content-Type: application/x-rfb
```

RFB data

```
-----t4gk7Sv$
```

SIP SIMPLE LIBRARY

A Python based library

- + It does SIP

The solution:

SIP SIMPLE LIBRARY

A Python based library

- + It does SIP
- + It does MSRP

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Ends in a MSRPSession object for reading and writing

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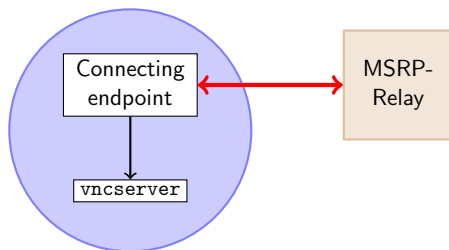
Ends in a MSRPSession object for reading and writing

The solution:

- Copy data from object to vnc software
- Copy data from vnc software to object

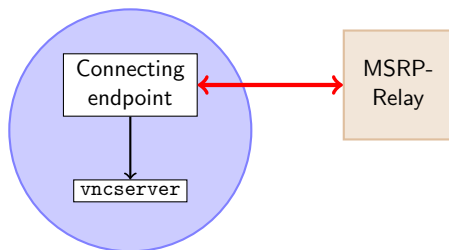
But how to connect...

Connecting endpoint



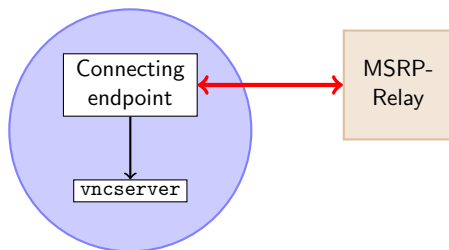
- - vncserver is already running

Connecting endpoint



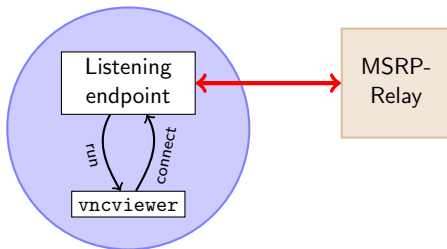
- - vncserver is already running
- - others can connect too

Connecting endpoint



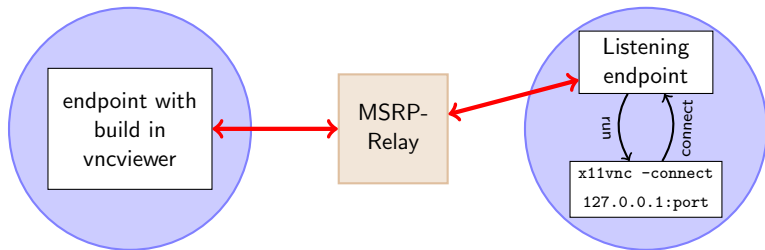
- - vncserver is already running
- - others can connect too
- - password protection

Listening endpoint



- + No such problems here

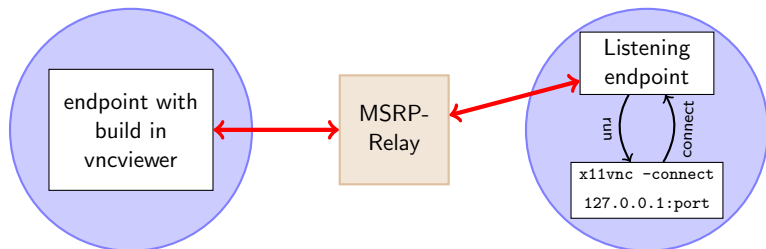
Implemented solution



Reverse VNC connection

- + No others that can connect to the server

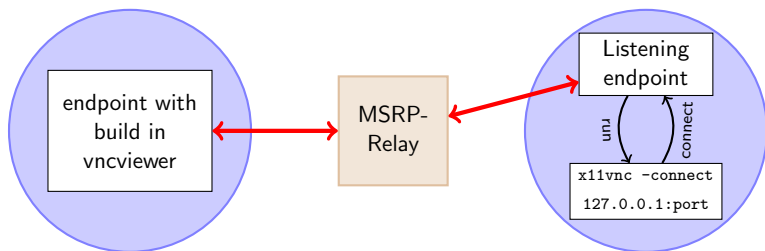
Implemented solution



Reverse VNC connection

- + No others that can connect to the server
- + No password is required

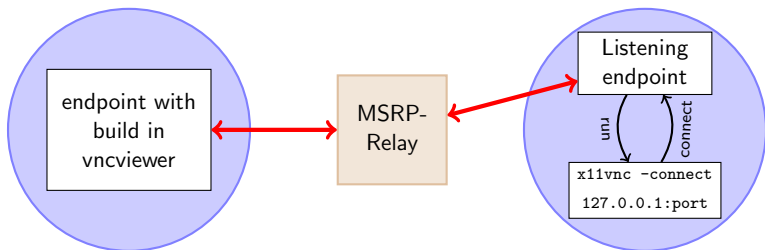
Implemented solution



Python based vncviewer

- + No programs to start

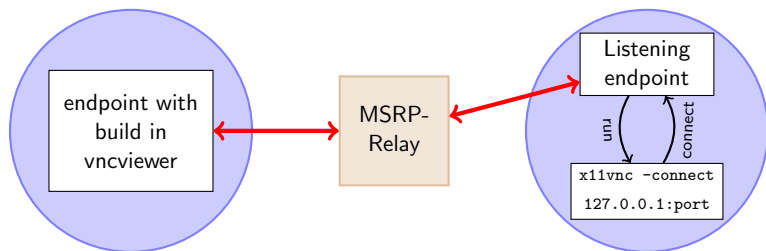
Implemented solution



Python based vncviewer

- + No programs to start
- + Encapsulation in Python based GUI

Implemented solution



Python based vncviewer

- + No programs to start
- + Encapsulation in Python based GUI
- **But a real viewer might be nicer**

Conclusion

How can application and desktop sharing, initiated by SIP, be realised in existing SIP infrastructure with the least possible impact on that infrastructure?

draft-boyaci-avt-app-sharing-00:

RTP Payload format for Application and Desktop Sharing

- + Operates over RTP over UDP
Will probably work on existing infrastructure (SBCs)

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RFB over MSRP

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- + Uses existing public RFB standard