The eXtensible Peer Protocol (XPP)

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Design Choices

• XPP uses UDP (only)
  – Simple & Reliable NAT Traversal
  – Allows turning off reliability

• Small and simple header with TLV options

• Sessions
  – Sessions are established and ended with SIP

• Where is the DHT?

<table>
<thead>
<tr>
<th>Routing</th>
<th>XPP-PCAN</th>
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</thead>
<tbody>
<tr>
<td>DHT Put</td>
<td></td>
</tr>
<tr>
<td>DHT Get</td>
<td></td>
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<tr>
<td>Location</td>
<td></td>
</tr>
<tr>
<td>Identity Assertion</td>
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<table>
<thead>
<tr>
<th>Fragmentation</th>
<th>XPP</th>
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<tr>
<td>Reliability</td>
<td></td>
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<tr>
<td>Transport Security</td>
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</table>
Use Cases

Simultaneous Session Establishment

**Alice’s SIP INVITE:**

```
INVITE sip:bob@biloxi.com SIP/2.0
To: Bob <sip:bob@biloxi.com>
From: Alice <sip:alice@atlanta.com>;tag=1928301774
```

...  

c=IN IP4 130.79.90.54  
m=application 1234 UDP/XPP *  
a=ltag: 0xAAAA

---

**Bob’s SIP OK:**

```
SIP/2.0 200 OK
To: Bob <sip:bob@biloxi.com>;tag=a6c85cf
From: Alice <sip:alice@atlanta.com>;tag=1928301774...
```

...

c=IN IP4 103.97.9.45  
m=application 4321 UDP/XPP *  
a=ltag: 0xB BBBB

...
Use Cases

A Sample XPP Operation

XPP Operation Request

ACK

XPP Operation Request

ACK

XPP Operation Response

Retrans. Timer

XPP Operation Response

XPP Operation Response
Use Cases

XPP Message Fragmentation

Alice

XPP Operation Request; Fragment 1

ACK 1

XPP Operation Request; Fragment 2

ACK 2

XPP Operation Request; Fragment 3

ACK

Retrans. Timer

Bob

XPP Operation Request; Fragment 3

... 

XPP Operation Request; Fragment N

ACK
XPP Fragment Header

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<th>2</th>
<th>3</th>
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<tr>
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<td>8</td>
<td>9</td>
<td>0</td>
<td>1</td>
</tr>
</tbody>
</table>

+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
|               |S|A|R|L|K|
| Ver | Reserved |Y|C|E|F|P| Sequence Number |
|     |           |N|K|L|R|A|

+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
| Local ID | Remote ID |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
| XPP Message Fragment (Optional) ... |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
XPP Messages

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XPP TLV Options

0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9 0 1
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
| Ver | Reserved | Sequence Number |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
| Local ID | Remote ID |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
| Operation Number |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
| Operation Type |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
| Type | Length |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
| Value ...
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
XPP-PCAN’s Passive Approach

- A P2PSIP client registers with the overlay just as it would register with any other SIP registrar
XPP-PCAN’s Passive Approach

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- During the initial registration the P2PSIP client asserts its identity against the credentials stored in the overlay. Once this phase completed, the client starts maintaining a SIP Outbound connection with a peer in the overlay.
XPP-PCAN’s Passive Approach

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- At some point of time an existing peer may decide to invite it to join the overlay and establish an XPP session with it.
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- During the initial registration the P2PSIP client asserts its identity against the credentials stored in the overlay. Once this phase completed, the client starts maintaining a SIP Outbound connection with a peer in the overlay.
- At some point of time an existing peer may decide to invite it to join the overlay and establish an XPP session with it.
- The inviting peer would also advertise the arrival of the new peer to all its future neighbors.
The eXtensible Peer Protocol (XPP)

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