draft-gu-ppsp-peer-protocol-02

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Philosophy

- Focus on infromation exchange and transport protocol negotiation;
  - Data Tranportation is not in scope of PPSP Protocol
- Be consistent with Tracker protocol in encoding, method definition, and Peerlist description;
- Good extensibility to support both PULL-based, and Hybrid mechanism;
- Secure information exchange
- QoS guarantee

Updates from IETF 81

- Limit the scope of Peer protocol to:
  - Information exchange
    - Additional Peerlist
    - Chunk Availability
    - Property exchange
  - Transport negotiation
- Peer Connection is regarded as out the scope of Peer Protocol
  - Peers can establish connections either by Peer-ID or Peer IP Adds.
  - Peer protocol assumes that Connection between peers have been already created.
- Will not try to establish a mechanism to resolve NAT Traversal
  - Both Tracker and Peer Protocol definition will consider reasonable requirements from NAT Traversal.

Methods Definition

- **FIND and FIND_CHUNK**: Peers use the FIND or FIND_CHUNK method to request the remote peers to return lists of peers that can provide specific content or are in a particular swarm;
  - Property preferrence can be carried in request
- **CHUNK_AVAILABILITY**: Peer uses the CHUNK_AVAILABILITY message to request the remote peers to return their chunk availability of the desired content (PULL), or peer publishes its chunk availability of a specific content to the peers that have established connetions with it(PUSH);
- **PROPERTY_QUERY**: Peers use PROPERTY_QUERY message to request remote peer to return their properties;
- **TRANSPORT_NEGOTIATION**: This method allows peers to negotiate a suitable transport protocol that is supported by both peers.

PULL-based example flow

```
              Requesting Peer                              Remote Peers
********************** Obtain Peerlist  ********************
*********** Open Connections to Remote Peers  ************
********* Optionally Obtain Additional Peerlist  **************
|<-----     Request / Response FIND/FIND_CHUNK(Peer Protocol) -->|


*************Query Peers for Available Data  ***************
|<------     Request/Response Chunk_Availability(Peer Protocol) ---->|


*********** Optionally Query Peers for Property  ************
|<-------     Request/Response Property_Query (Peer Protocol) ----->|


****** Negotiate Transfer Connection and Transfer  **********
|<---------     Provision/Choice(RTSP HTTP, other)   ------------------->|
|<----- Data Transfer Sequence (negotiated protocol) ---------------->|
```

Hybrid-based example flow

Requesting Peer   Remote Peers

******************** Obtain Peerlist ******************

*********** Open Connections to Remote Peers ************

********* Optionally Obtain Additional Peerlist **************

|<-----   Request / Response FIND/FIND_CHUNK(Peer Protocol) -->|

************Query Peers for Available Data ***************

|<------   Request/Response Chunk_Availability(Peer Protocol) ---->|

*********** Optionally Query Peers for Property ************

|<-------   Request/Response Property_Query (Peer Protocol) ----->|

****** Negotiate Transfer Connection and Transfer **********

|<--------- Handshake Sequence (RTSP HTTP, other) ------------------>|

|<----- Data Transfer Sequence (negotiated protocol) --------------->|

********************Report Chunk Availability ****************

|<-------------   Report Chunk_Availability(Peer Protocol)--------------|

Encoding Introduction

- Common Header
  ```
  <PPSPPeerProtocol version="***">
    <Method>***</Method>
    <Response>***</Response>
    <TransactionID>***</TransactionID>
    ...Method specific xml information...
  </PPSPPeerProtocol>
  ```
- *** is used to represent data to be inserted.

- FIND

  <Method>FIND</Method>

  <TransactionID>***</TransactionID>

  <PeerID>*</PeerID>**

  <SwarmID>*</SwarmID>**

  <ChunkID>*</ChunkID>**

  <Peernum>*</Peernum>**

  </PPSPPeerProtocol>

  – Sent from peer to peer

- Processing

  – The receiver will search the internal data store for the requested data and if found will respond the requesting peer with the peerlist with ID and IP Addresses of peers that can provide the specific content.

- FIND Response

  <Response>FIND</Response>

  <TransactionID>***</TransactionID>

  <SwarmID>*</SwarmID>**

  <ChunkID>*</ChunkID>**

  <Peers>

   Peer list

  </Peers>

  </PPSPPeerProtocol>

  —sent from peer to peer

- CHUNK_AVAILABILITY Request

  <Method>CHUNK_AVAILABILITY</Method>

  <TransactionID>***</TransactionID>

  <PeerID>###</PeerID>

  </PPSPPeerProtocol>

  – Sent from peer to peer

- Processing

  – The receiver will search the internal data store for the requested data and if found will respond the requesting peer with an HTTP 200 OK SUCCESS message response with a PPSP XML payload SUCCESSFUL, as well as the bitmap.

- CHUNK_AVAILABILITY Response

  <Response>CHUNK_AVAILABILITY</Response>

  <TransactionID>***</TransactionID>

  <PeerID>###</PeerID>

  <CHUNK>

    Chunk Availability (Bitmap)

  </CHUNK>

  </PPSPPeerProtocol>

  – Sent from peer to peer

- Processing

  – The receiver will restore the bitmap into internal data store.

- PROPERTY_QUERY Request

  <Method>PROPERTY_QUERY</Method>
  <TransactionID>***</TransactionID>
  <PeerID>###</PeerID>
  <StatRequest>
    <Stat property="*"></Stat>**
    ... more stats ...
  </StatsRequest>
  </PPSPPeerProtocol>
  - Sent from peer to peer
- Processing
  - The receiver will report corresponding property.

- PROPERTY_QUERY Response

<Response>PROPERTY_QUERY</Response>
<TransactionID>***</TransactionID>
<PeerID>###</PeerID>
<StatRequest>
<Stat property="*">***</Stat>**
... more stats ...
</StatsRequest>
</PPSPPeerProtocol>
- Sent from peer to peer

- TRANSPORT_NEGOTIATION Request

    <Method>TRANSPORT_NEGOTIATION</Method>
    <TransactionID>***</TransactionID>
    <PeerID>###</PeerID>
    <TransProt>
      <TProt type="*"></TProt>**
      ... more protocols ...
    </TransProt>
    </PPSPPeerProtocol>
  – Sent from peer to peer

- Processing
  – The receiver pick up a protocol that is supported by both requesting peer and itself, and response with this protocol.

- TRANSPORT_NEGOTIATION Request

  <Response>TRANSPORT_NEGOTIATION</Response>

  <TransactionID>***</TransactionID>

  <PeerID>###</PeerID>

  <TransProt>

   <TProt type="*"></TProt>**

  </TransProt>

  </PPSPPeerProtocol>

  – Sent from peer to peer

Next steps

- Need discussion and consensus on text-based or binary-based.

- Make decision on mandatory transport protocol, which must be supported by all PPSP peers.
  - Leave this as an open issue. If there is significant benefit for integrate data and additional request , shall we integrate request and data?

- Define Bitmap

- Add security mechanism and QoS guarantee mechanism, both of which may be influenced by corresponding mechanism in Tracker protocol.