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SIP-based Tracker Protocol
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Abstract

This draft introduces a kind of text-based encoding Tracker Protocol, the SIP-based PPSP Tracker Protocol, which utilizes SIP message to realize the functions of PPSP Tracker Protocol[1] and carries the specific xml information mentioned in tracker protocol[1] messages in SIP body.

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1. Introduction

As one of the important protocol components of PPSP, the Tracker Protocol provides communication between Trackers and Peers, by which Peers report streaming status to the tracker and request candidate lists from the tracker. [1] proposes two kinds of PPSP tracker protocols, binary encoding protocol and text-based encoding protocol like HTTP/XML protocol.

This draft introduces a kind of text-based encoding PPSP Tracker Protocol, the SIP-based Tracker Protocol, which utilizes SIP messages to realize the functions of Tracker Protocol and carries the specific xml information mentioned in tracker protocol[1] messages in SIP body.

[Section 2](#) outlines the protocol overview.

[Section 3](#) defines the key signaling flows of SIP-based P2P streaming Tracker Protocol.

2. Protocol Overview

2.1. Description of the SIP-based Tracker Protocol

SIP-based Tracker Protocol is a kind of text-based encoding tracker protocol realized by SIP protocol[2], i.e. the request and response messages of PPSP tracker protocol can be realized by SIP request and response messages, not carried in SIP Message body; the specific xml information mentioned in tracker protocol[1] is carried in SIP body.

2.2. MAPPING Methods of Tracker Protocol into SIP Methods

This section outlines the mapping relations between SIP Request and Request defined in Tracker Protocol[1], shown in Fig.1.

PPSP Request Method	SIP Request Method
CONNECT	Register
DISCONNECT	Register
JOIN	Invite
LEAVE	BYE
FIND	INFO
KEEPALIVE	Register
STAT_QUERY	OPTIONS
STAT_REPORT	PUBLISH
JOIN_CHUNK	SUBSCRIBE/NOTIFY

Figure 1 Mapping between SIP Request and Tracker Protocol Request

In addition, Tracker Protocol Responses can be realized by SIP Responses, like HTTP realization in [1], because SIP response codes are consistent with, and extend, HTTP/1.1 response codes.

PPSP Response Method	SIP Response Method
SUCCESSFUL (OK)	200 ok
INVALID SYNTAX	400 Bad Request
VERSION NOT SUPPORTED	400 Bad Request
MESSAGE NOT SUPPORTED	403 Forbidden
TEMPORARILY OVERLOADED	503 Service Unavailable
INTERNAL ERROR	500 Server Internal Error
MESSAGE FORBIDDEN	403 Forbidden
OBJECT NOT FOUND	404 Not Found
AUTHENTICATION REQUIRED	401 Unauthorized
PAYMENT REQUIRED	402 Payment Required

Figure 2 Mapping between SIP Responses and Tracker Protocol Responses

3. Signaling Flows

This section defines the key signaling flows.

3.1. Peer Registration Flow

After Connect operation completes or a peer registers on the tracker, the peer may send additional requests to the tracker, like to publish content availability, or obtain lists of peers with specific content from the tracker.

Tracker Protocol Connect operation defined in [1] is realized by SIP Register flow specified in [2], shown in Fig.3. For example, SIP Register flow can finish the authentication and authorization functions required by PPSP tracker protocol in the way such as HTTP digest, AKA etc.

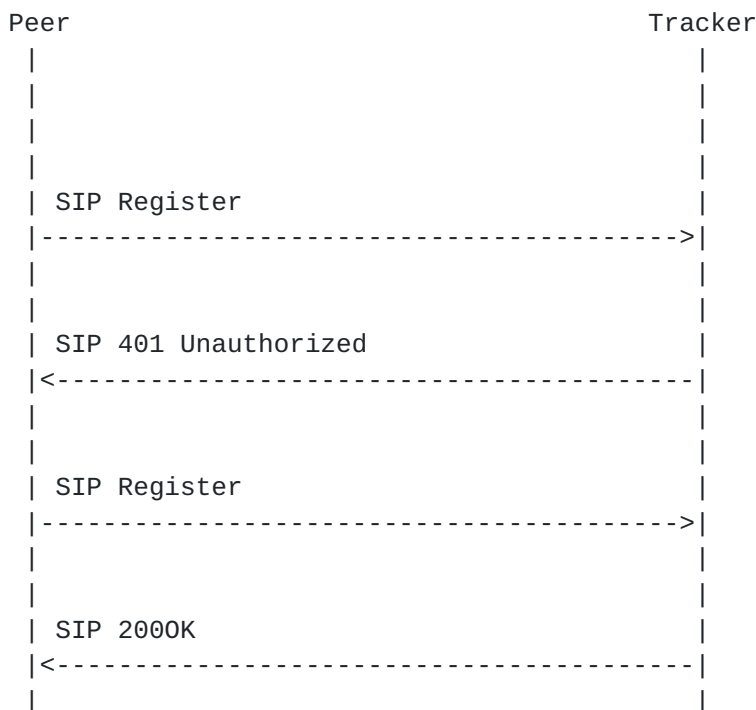


Figure 3 Peer Registration Flow

3.2. Peer De-registration Flow

Tracker Protocol DISCONNECT operation defined in [1] is realized by SIP REGISTER method with "Expires" value equaling to 0 defined in [2], shown in Fig.4.

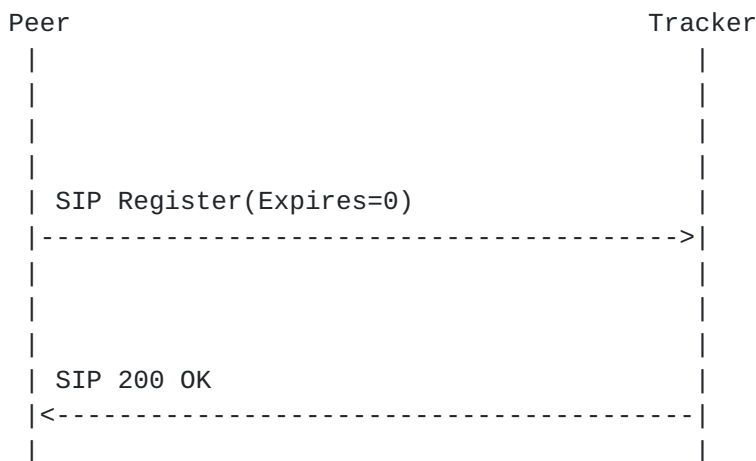


Figure 4 Peer De-registration Flow

3.3. Join Swarm Flow

Tracker Protocol JOIN operation defined in [1] is realized by SIP Invite flow specified in [2], shown in Fig.5. Through the flow, the tracker knows a peer sending the invite message wishes to participate in a particular swarm; the peer can get what it needs from the other peers in the swarm.

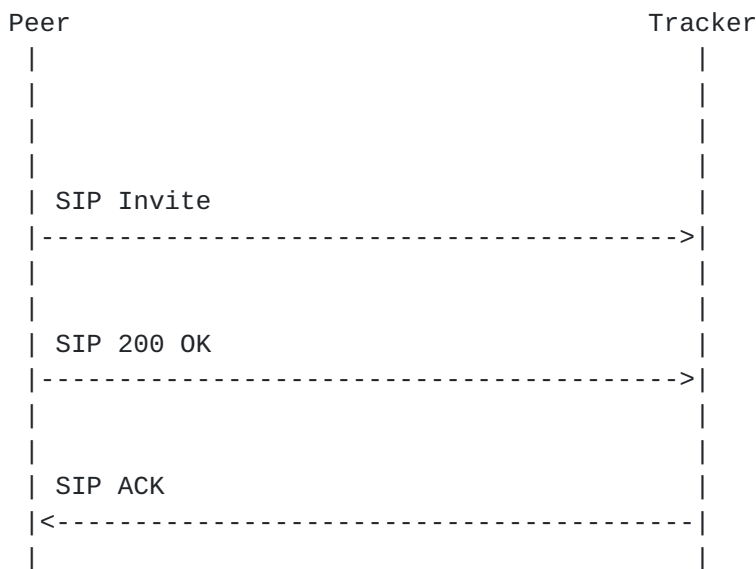


Figure 5 Join Swarm Flow

3.4. Content Availability Report Flow

Tracker Protocol Join_Chunk operation defined in [1] is to realize the function of reporting the content availability, i.e. to report which chunks a peer has and which swarms it has joined in to the

tracker. This function is realized by SIP Subscribe/Notify method defined in [3], shown in Fig.6. After subscribed successfully, a peer will notify the tracker when the content possessed by the peer changes.

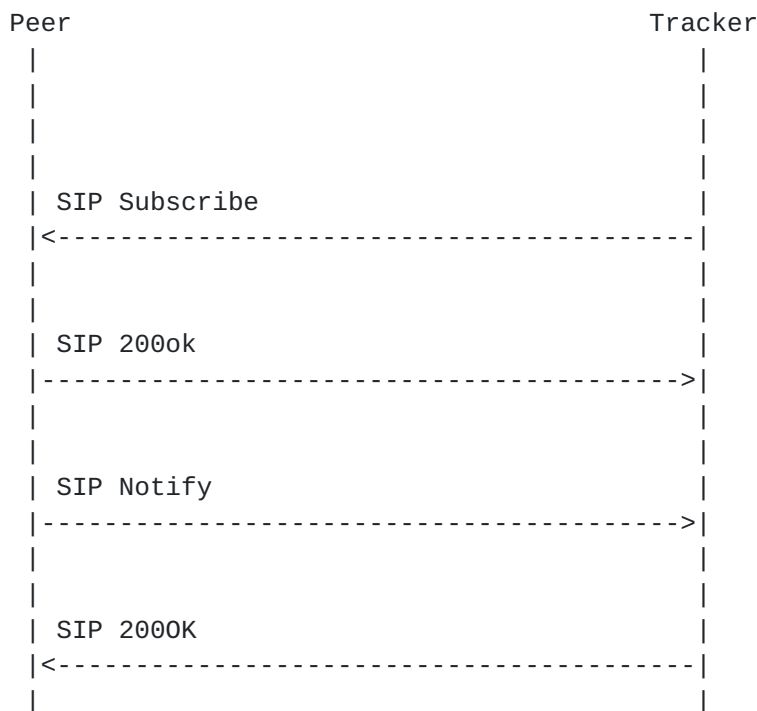


Figure 6 Content Availability Report Flow

3.5. Leave Swarm Flow

Tracker Protocol LEAVE operation defined in [1] is realized by SIP Bye and Notify flow specified in [2] and [3], shown in Fig.7. Through this flow, peers notify the tracker that they no longer are participating in (either sharing or requesting) a particular swarm.

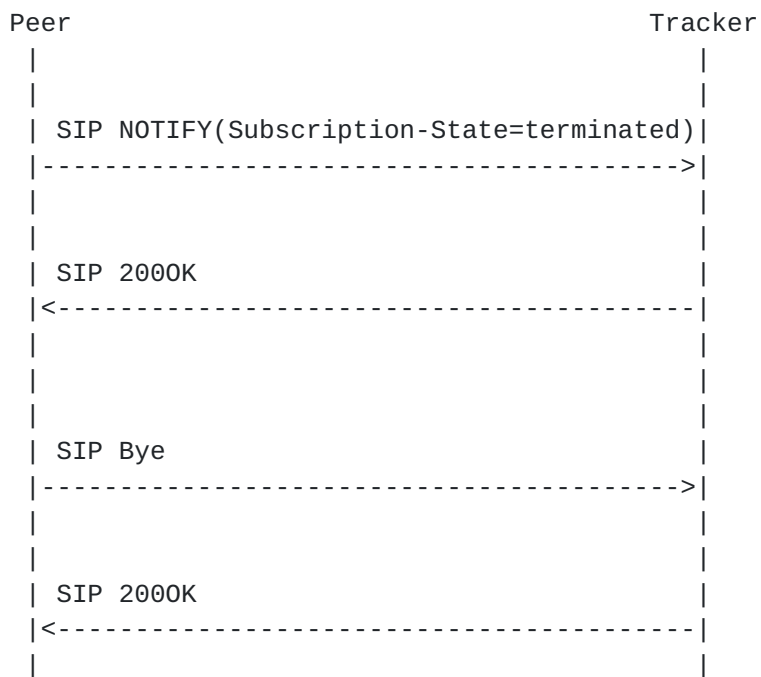


Figure 7 Leave Swarm Flow

3.6. Find Peerlist Flow

Tracker Protocol FIND operation defined in [1] is realized by SIP Info flow specified in [4], shown in Fig.8.

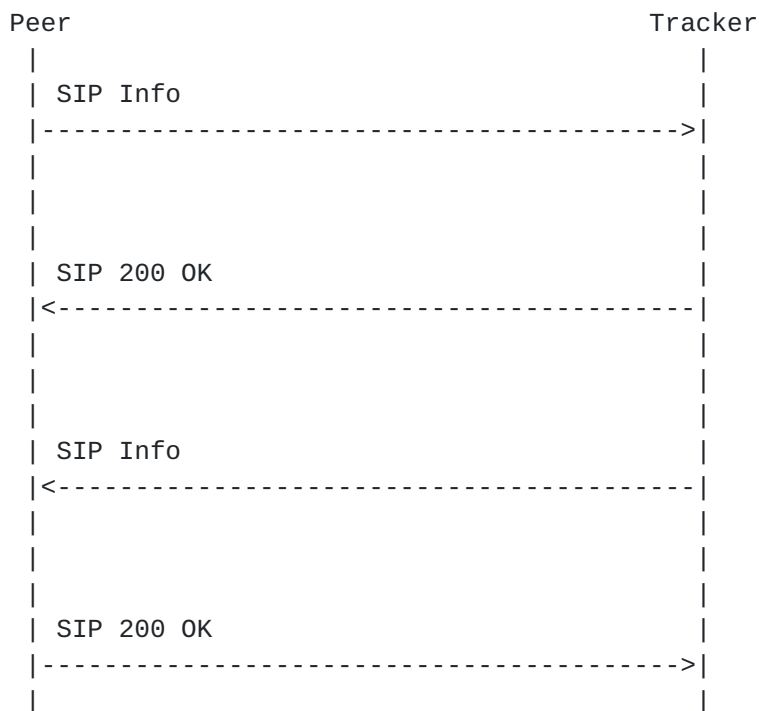


Figure 8 Find Peerlist Flow

3.7. Keep Alive Flow

Tracker Protocol KEEPALIVE operation defined in [1] is realized by SIP Register flow defined in [2], shown in Fig.9.

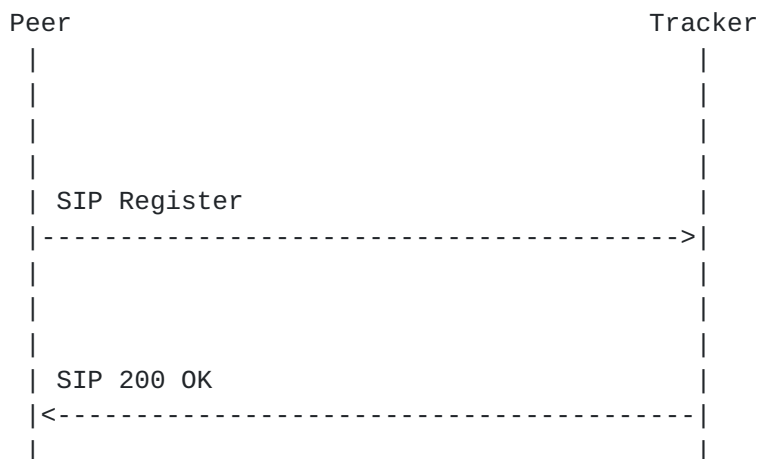


Figure 9 Peer De-registration Flow

3.8. Information Query Flow

Tracker Protocol STAT_Query operation defined in [1] is realized by SIP Options flow Specified in [2]. Because STAT_Query method works in two directions, a peer or a tracker can query stat information to the other, shown in Fig.10 and Fig.11.

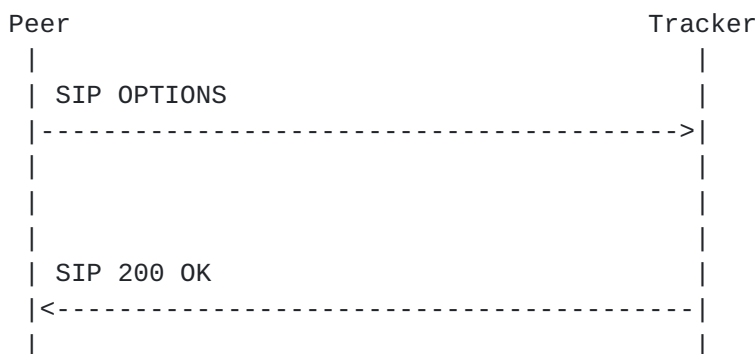


Figure 10 Information Query Flow(from a peer to tracker)

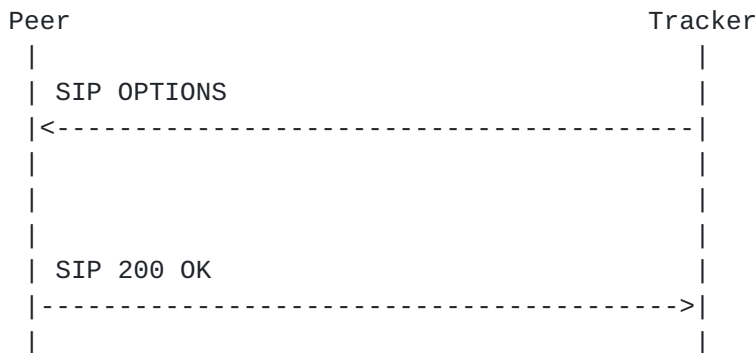


Figure 11 Information Query Flow(from a tracker to a peer)

3.9. Information Report Flow

Tracker Protocol STAT_REPORT operation defined in [1] is realized by SIP Publish flow, Specified in [5]. Because STAT_REPORT method works in two directions, a peer or a tracker can publish stat information to the other, shown in Fig.12 and Fig.13.

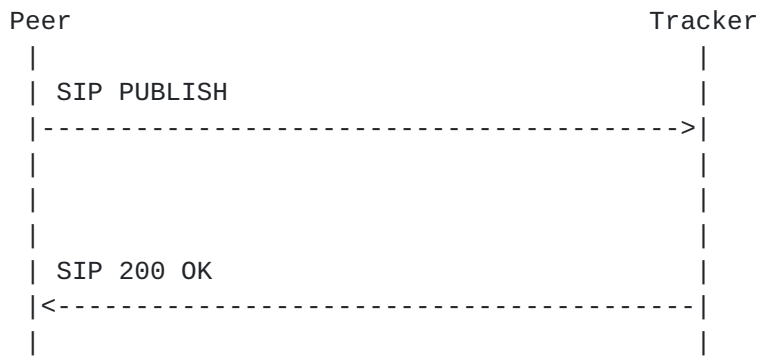


Figure 12 Information Report Flow(from a peer to a tracker)

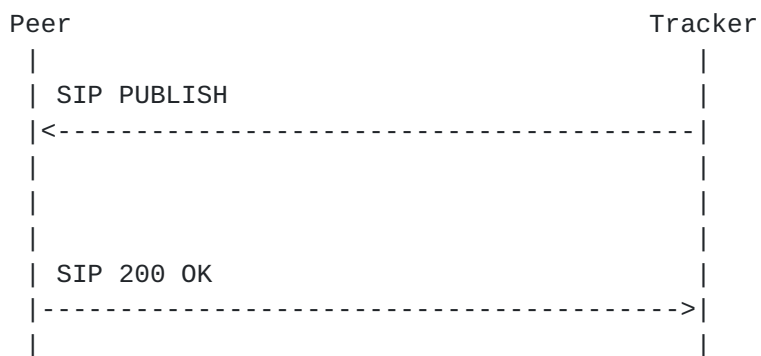


Figure 13 Information Report Flow(from a tracker to a peer)

4. Open Issues

Need to decide if SIP Register message is the best selection which is used to realize the Keepalive function in 3.7 compared with other SIP requests like SIP Message.

5. Normative References

- [1] Gu, Y., Bryan, D., Zhang, Y., and H. Liao, "PPSP Tracker Protocol", March 2010, <[draft-gu-ppsp-tracker-protocol](#)>.
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- [3] Roach, A., "Session Initiation Protocol (SIP)-Specific Event Notification", [RFC 3265](#), June 2002.
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