PAIP (peer affirm interaction protocol)

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1.the protocol is designed for IM (instant messaging) system and indepen

dent R&D.

PAIP packet structure

include assembly with white background, header with orange background an

d body with green background.

|  |  |
| --- | --- |
| instruction | number of bytes |
| length based tcp packet assembly | 4 |
| flag | 1 |
| retain | 1 |
| packet type | 2 |
| id | 8 |
| remaining length | variable |
| variable data region | variable |

1.1/flag:

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |

ack level: quality of service , two bits in the red region.

|  |  |
| --- | --- |
| level | instruction |
| 0 | regardless of the packet’s arrival |
| 1 | the sent packet assigned an unique key (the packet id and con  tact id), and a pending ack packet with the unique key will b  e received from contact or server normally, but assume send f  ailure if the pending ack packet not found until timeout |

1.2/remaining length: indicate the number of bytes remaining in the pack

et.

structure of single remaining length byte.

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |

length byte remaining flag: one bit in the red region, which indicates w

hether has remaining length byte.

length bits: seven bits in the orange region. all the length bits sequen

tially combined value indicates the remaining length.

1.3/variable data region: different packet type has different variable d

ata structure.

2.protocol includes five modules: connect, call, chat, subscribe and ext

ension.

2.1/connect module defines how to connect the server, maintain and disco

nnect the connection. signin and logout are handled by https on consider

ing security and performance. access key (user id) and secret key (rando

m but it is cached in the server distributed/non-distributed memory afte

r authenticated) are required for socket connection. ping the server eve

ry keepalive seconds (in connect option) and reconnect on reader/write i

dle (keepalive \* 1.5 seconds). the secret key will be removed and the so

cket channel will be closed by the server when logout by https.

2.1.1/connect packet: connect the server by access key, secret key and connect options, then response the connect ack packet

variable data region:

|  |  |  |
| --- | --- | --- |
| field | instruction | number of bytes |
| protocol version | protocol version, 1 is supported c  urrently | 1 |
| protocol name | PAIP, other names can not be recog  nised | variable |
| keepalive | ping every keepalive seconds for v  erifying connectivity | 2 |
| access key | user id, which is responsed from t  he server by https signin | variable |
| secret key | random uuid, which is responsed fr  om the server by https signin | variable |

connect ack packet:

variable data region:

|  |  |  |
| --- | --- | --- |
| field | instruction | number of bytes |
| response code | noted below | 1 |
| session present | whether the user session is presen  t. | 1 |

|  |  |
| --- | --- |
| response code | instruction |
| 0x00 | connected, both access key and secret key are authen  ticated |
| 0x01 | client and server prorocol version do not match |
| 0x03 | bad username or password |

2.1.2/disconnect ack packet: indicate a disconnection for any reason, su

ch as remote signin, client logout, etc.

variable data region:

|  |  |  |
| --- | --- | --- |
| field | instruction | number of bytes |
| reason | disconnect reason, UNKNOWN ERROR/C  LIENT LOGOUT/REMOTE SIGNIN | 2 |

2.1.3/ping packet: ping the server every keepalive seconds for verifying

the connectivity. response a ping ack packet for connection available bu

t reconnect the server on reader/write idle (keepalive\*1.5 seconds).

2.1.4/pending ack packet: the contact or the server will response a pend

ing ack packet if send a packet to a contact with ack level one.

variable data region:

|  |  |  |
| --- | --- | --- |
| field | instruction | number of bytes |
| packet id | id of the sent packet | 8 |
| attatchment | a json with customizable content | variable |

2.2/call module defines call control flow and data models based on webrt

c framework. a call packet will be send to the callee by the client afte

r the call is created by https. the created call will be canceled by the

server if timeout. exchange sdp and ice candidate after the callee agree

the call.

NOTE: variable data region of all packets defined in call module contain

s two fields: unique room id and the callee id (a contact id).

2.2.1/call packet: request callee for audio or video call. group call is

not supported now.

variable data region:

|  |  |  |
| --- | --- | --- |
| field | instruction | number of bytes |
| room id | noted above | 8 |
| contact id | noted above | 8 |
| content type | audio/video | 1 |

2.2.2/call ack packet: the call ack packet will be sent to the caller if

the callee agree or decline the call.

variable data region:

|  |  |  |
| --- | --- | --- |
| field | instruction | number of bytes |
| room id | noted above | 8 |
| contact id | noted above | 8 |
| response | ACK\_AGREE(0x00) /ACK\_DECLINE(0x01) | 1 |

sdp (session description) and ice candidate are defined in webrtc framew

ork. exchange sdp and ice candidate after the callee accept the call.

sdp packet:

variable data region:

|  |  |  |
| --- | --- | --- |
| field | instruction | number of bytes |
| room id | noted above | 8 |
| contact id | noted above | 8 |
| sdp | session description | variable |

candidate packet:

variable data region:

|  |  |  |
| --- | --- | --- |
| field | instruction | number of bytes |
| room id | noted above | 8 |
| contact id | noted above | 8 |
| candidate | ice candidate | variable |

2.2.3/close call packet: the call will be closed if timeout, canceled by

caller, rejected by the callee, closed by the caller or callee, etc.

variable data region:

|  |  |  |
| --- | --- | --- |
| field | instruction | number of bytes |
| room id | noted above | 8 |
| contact id | noted above | 8 |
| reason | close call reason | 2 |

|  |  |
| --- | --- |
| reason | instruction |
| UNKNOWN | unknown error |
| ROOM\_NOT\_FOUND | room not found. the call is timeout, canceled or clo  sed. |
| STATE\_ERROR | call state error. the client state mismatch the stat  e in the server for some reasons |
| CANCEL | the call is in requesting, but canceled by caller |
| TIMEOUT | no response from the callee |
| DECLINE | the call is declined by the callee |
| BY\_USER | the call is in calling and closed by the caller or c  allee |
| NETWORK\_ERROR | network error. the call is in any state but the call  er or callee’s connection lose |

2.3/chat module defines chat and group chat. in addition, group chat con

tact invitation and chat recall are supported also. image, audio or vide

o should be upload by https if send a multimedia chat or group chat pack

et.

2.3.1/chat packet: the contact client (online) or server (the contact cl

ient offline) will response a pending ack packet matched the chat packet

sent. you can resend the chat packet manually if no pending ack packet m

atched received until timeout.

variable data region:

|  |  |  |
| --- | --- | --- |
| field | instruction | number of bytes |
| contact id | contact id whom the packet will be  sent to | 8 |
| md5 | image, audio or video md5, but sho  uld be empty string for words | variable |
| content type | WORDS/IMAGE/AUDIO/VIDEO | 1 |
| content | words bytes, but should be empty b  yte array for image, audio and vid  eo | variable |

2.3.2/chat recall packet: send a chat recall packet that matched the cha

t packet if you want to recall a chat packet.

variable data region:

|  |  |  |
| --- | --- | --- |
| field | instruction | number of bytes |
| contact id | contact id whom the packet will be  sent to | 8 |
| chat packet id | id of the chat packet that you wan  t to recall | 8 |

2.3.3/group chat packet: the group chat packet will be sent to all membe

rs in the chat group.

variable data region:

|  |  |  |
| --- | --- | --- |
| field | instruction | number of bytes |
| contact id | sender id | 8 |
| group id | chat group id | 8 |
| md5 | image, audio or video md5, but sho  uld be empty string for words | variable |
| content type | WORDS/IMAGE/AUDIO/VIDEO | 1 |
| content | words bytes, but should be empty b  yte array for image, audio and vid  eo | variable |

2.3.4/chat group event packet: a group chat event packet will be sent to

all members except for operator in the chat group when a new member adde

d, rmoved, updated, etc.

variable data region:

|  |  |  |
| --- | --- | --- |
| field | instruction | number of bytes |
| group id | chat group id | 8 |
| event | EVENT\_MEMBER\_UPDATED,EVENT\_MEMBER\_  ADDED,EVENT\_MEMBER\_REMOVED | 1 |
| attatchments | data in special event type | variable |

2.4/subscribe module defines subscribe and unsubscribe. but it is not ne

cessary that support declining subscribe.

2.4.1/subscribe packet: a subscribe packet will be sent to the subscribe

after a subscribe is created by https.

variable data region:

|  |  |  |
| --- | --- | --- |
| field | instruction | number of bytes |
| subscriber id | subscriber id who want to subscrib  e a contact | 8 |
| subscriber profi  le | subscriber profile, in which usern  ame, nickname, etc are added | variable |

2.4.2/subscribe ack packet: a subscribe ack packet will be sent to the s

ubscriber after the subscribee accept the request by https.

variable data region:

|  |  |  |
| --- | --- | --- |
| field | instruction | number of bytes |
| subscribee id | subscribee id who accept the subsc  ribe | 8 |
| response code | only support ACK\_ACCEPT | 1 |
| subscriber profi  le | subscriber profile, in which usern  ame, nickname, etc are added | variable |

2.5/extension module defines a customizable variable data region byte ar

ray packet, but byte array content is not limited.

2.5.1/byte array packet: the byte array packet can be processed by custo

mized external processors.

variable data region:

|  |  |  |
| --- | --- | --- |
| field | instruction | number of bytes |
| byte array | not limited | variable |