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

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

1.1/header:

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

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

|  |  |
| --- | --- |
| qos | instruction |
| 0 | regardless of the packet arrival |
| 1 | the packet assign an unique key by packet id and contact id, a  nd the packet id will be returned by a qos receipt packet from  the contact |

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. login and logout are handled by https on consideri

ng security and performance. access key (user id) and secret key (random

but it is stored in the server side distributed/non-distributed memory a

fter username and password authenticated. socket or https connect will v

erify the secret key) are required for connecting. ping the server every

keepalive seconds (in connect option) and reconnect on reader idle (keep

alive \* 1.5 seconds). the secret key is removed and the socket channel i

s closed by the server side when logout.

2.1.1/connect packet: connect the server by access key, secret key and o

ptions, 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 by htt  ps login | variable |
| secret key | random uuid, which is responsed by  https login, is different each log  in | 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: prompt a disconnection for any reason, such

as remote login, network error, etc.

variable data region:

|  |  |  |
| --- | --- | --- |
| field | instruction | number of bytes |
| reason | disconnect reason, NETWORK\_ERROR/R  EMOTE\_LOGIN | 2 |

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

nectivity. response a ping ack packet for connection available. reconnec

t the server on reader idle (keepalive\*1.5 seconds). in other words, the

ping ack is not responsed in keepalive\*0.5 seconds after the ping packet

send, the connection is considered disconnected at this time, so reconne

ct the server.

2.1.4/qos receipt packet: the contact client will response a qos receipt

packet, which match the received packet with qos valued one. the qoos re

ceipt packet will be routed to the sender.

variable data region:

|  |  |  |
| --- | --- | --- |
| field | instruction | number of bytes |
| packet id | id of the received 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 contact requested by clie

nt side after a call is created by https. call state is maintained by se

rver side. the created call will be canceled by the server side if timeo

ut (no response from the contact requested). exchange sdp and ice candid

ate after the contact requested accept the call.

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

s two fields: unique room id and the id of contact requested.

2.2.1/call packet: request a contact (not support multiple contacts curr

ently) for audio/video call.

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 contact requested can accept or reject the ca

ll.

variable data region:

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

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

ork. exchange sdp and ice candidate after the contact requested accept t

he 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 |  |

2.2.3/close call packet: close the call if timeout (no response from the

contact requested), canceled by caller, rejected by the contact requeste

d, closed proactively by either side, 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 side for some unknown reasons |
| CANCEL | the call is in requesting, but canceled by requestor |
| TIMEOUT | no response from the contact requested |
| REJECT | the call is rejected by the contact requested |
| BY\_USER | the call is in calling and closed proactively by eit  her side. |
| NETWORK\_ERROR | network error. the call is in any state but either s  ide’s connection lose, etc. |

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

tact invitation and chat retract are supported.

2.3.1/chat packet: a matched qos receipt packet will be received after a

chat packet sent to a contact. resend the chat packet manually (default)

or automatically if no matched qos receipt packet received.

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 retract packet: send a chat retract packet that matched the c

hat packet if you want to retract a message.

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 which you wa  nt to retract | 8 |

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

rs in the chat group.

variable data region:

|  |  |  |
| --- | --- | --- |
| field | instruction | number of bytes |
| contact id | sender id | 8 |
| group id | chat group id which the event asso  ciate with | 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 which the event asso  ciate with | 8 |
| event | EVENT\_MEMBER\_UPDATED,EVENT\_MEMBER\_  ADDED,EVENT\_MEMBER\_REMOVED | 1 |
| attatchments | attatchments for special event typ  e | variable |

2.4/subscribe module defines the process of adding contact. it is not ne

cessary that support rejecting the subscribe.

2.4.1/subscribe packet: a subscribe packet is sent to the subscribee aft

er subscribe 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 and nickname are stored | variable |

2.4.2/subscribe ack packet: a subscribe ack packet is sent to the subscr

iber after the subscribe status updated by https.

NOTE: ignore the subscribe instead of denying it. the subscribe packet i

s designed only for accepting.

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 | subscribee profile, in which usern  ame and nickname are stored | variable |

2.4.3/unsubscribe packet: a unsubscribe packet is sent to the unsubscrib

ee after the contact is unsubscribed by https.

variable data region:

|  |  |  |
| --- | --- | --- |
| field | instruction | number of bytes |
| unsubscriber id | unsubscriber id who unsubscribe th  e contact | 8 |

2.5/extension module defines a customizable variable data region by stri

ng packet and byte array packet and the string/byte array content is not

limited.

2.5.1/string packet: the string packet can process the packet in customi

zed external packet processor.

variable data region:

|  |  |  |
| --- | --- | --- |
| field | instruction | number of bytes |
| string | not limited | variable |

2.5.2/byte array packet: the byte array packet can process the packet in

customized external packet processor.

variable data region:

|  |  |  |
| --- | --- | --- |
| field | instruction | number of bytes |
| string | not limited | variable |