DESIGN AND DEVELOPMENT OF MULTI TERMINAL CONFERENCE SERVICE & CHANNEL ALLOCATION ALGORITHM FOR MULTI BEAM MOBILE SATELLITE SERVICE (MSS) USING S-BAND

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Abstract

Satellite mobile communication is one of the most important directions in satellite communication. ISRO has developed the MSS services using S-band. The designed services are reporting service, voice service, multimedia service and broadcast service. All these services use SxC band for communication between two remote terminals. But these services do not provide reliable communication. So, we propose the new service which provides reliable communication and support a multi terminal video conferencing over the s band.

Keywords*: Multi Terminal conference service (MTCS), Multi Beam, Mobile Satellite service (MSS), S-Band, Smart channel allocation***.**

1. Introduction

Here we are going to develop a novel service for G-sat series of ISRO the features of existing MSS services are as follows: Reporting Service: It is a one way message service with limited data size of 80-100 characters. It does not provide reliable communication and Supports only text data. Second service is Voice Service (SMR): It provides two way voice service between two

SMR terminals and group terminals it requires heavy terminal support. Third service is Multimedia Service: It provides two way point to point video conference terminals the fourth service is multimedia witch support point to point two way video conferences, but it requires high end terminals and database support. The forth service is Broadcast Service: It provides broadcast of data over the satellite communication.

Here we introduce a novel service named as “Multi terminal conference service” (MTCS) It is designed to overcome the limitations of Multimedia service. Proposed service will provide two ways consistent multi terminal communications between remote terminals. The data transmitted will be merge in single screen also handles the channel allocation better and also handle parameters like, Throughput, FPS, resolution. The five-beam multi-beam antenna is used to sustain data traffic and introduces proposed smart channel allocation technique and algorithm

2. Problem statement

According to previous multimedia service it being supported by satellite communication for point to point video conferencing so that it's not support Multi party video conferencing , and also use the static channel allocation which causes the waste of bandwidth so in this project we have design a novel approach and Dynamic channel allocation this two major problem, it's useful when any Emergency situation occurs, using satellite communication rather than Internet and also I intend to improve the parameters Frame rate and throughput.

3. Proposed architecture

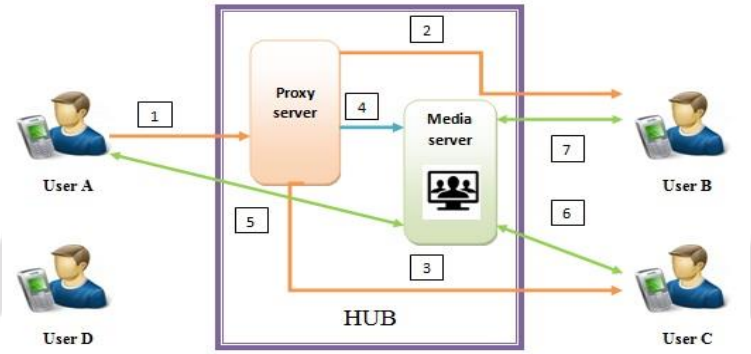

Figure-1 Proposed architecture of Multi Terminal Conference Service

As we can se in this figure of Multi Terminal conferenc Architecture it reprsent the overall system architcture which includes user A, user B,user C,user D Proxy sever and Media server are take participate in this architectrual design .

Proxy server: It is responsible for the handls the request of the user, its work on the principle of SIP (Session Initializtion Protocol). Which is only responsible for the handlling the user's request.its check the availability of requested user if they are available it will allow to commune them with eatchother and makes the group for Multi party communcation .
Media server: It is responsible for the Merge the user's video input into single screen , When the user sent the video inputs it recived at the media server here its merge according to users screen choice and this output video will be send to the desir users who are in a group , thing is handles at the media sever is, Here the media server works on the data cahhnel and it adopt the RTP (Real Time Transport Protocol) for real time communication.

In multi terminal confrence servic here we have proposed a novel server named as a media server which is responsible for the combining more than two parties in a single frame using ffmpg open source software.using it we design few programs for combining multiple parties and design a new display screen with a different resolution size and improvs throughput of service and increse the frame rate.

3.1 Proposed Framework for MTCS

In this Frame work it's design using Session initialization protocol (sip) for handling the user's request using pilot channel in second stage its switch to the Real time transmission protocol when each user transmit the data on data channel over the satellite network channel.

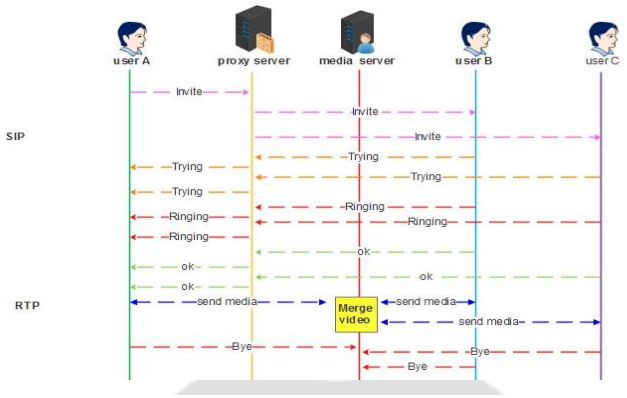

Figure-2 Frame work for Multi party conference service

Lest undstand the privious figure in detail as shown in figure user A wants to conference with the user B and user C first of all , user A send a request via pilot cahnnel to the proxy server, here the proxy server checks wether user B and user C are available on the network or not, if they are available proxy server forward the possetiv message ok to the user A and this all procss done under the SIP ,onc they are connect with eatchotherth Media server handls the real time confrence with usig RTP protocol , at the media server genrated group members send their own video named as user A , user B, user C send their group id by media server then the Media server merge the video and send it to the desire group members only via the data channel. As shown in figure we can see the SIP, RTP protocls are working on the different commands like INVITE, TRAYING, RINGING,OK, SEND MEDIA, BYE

3.2 Smart channel allocation

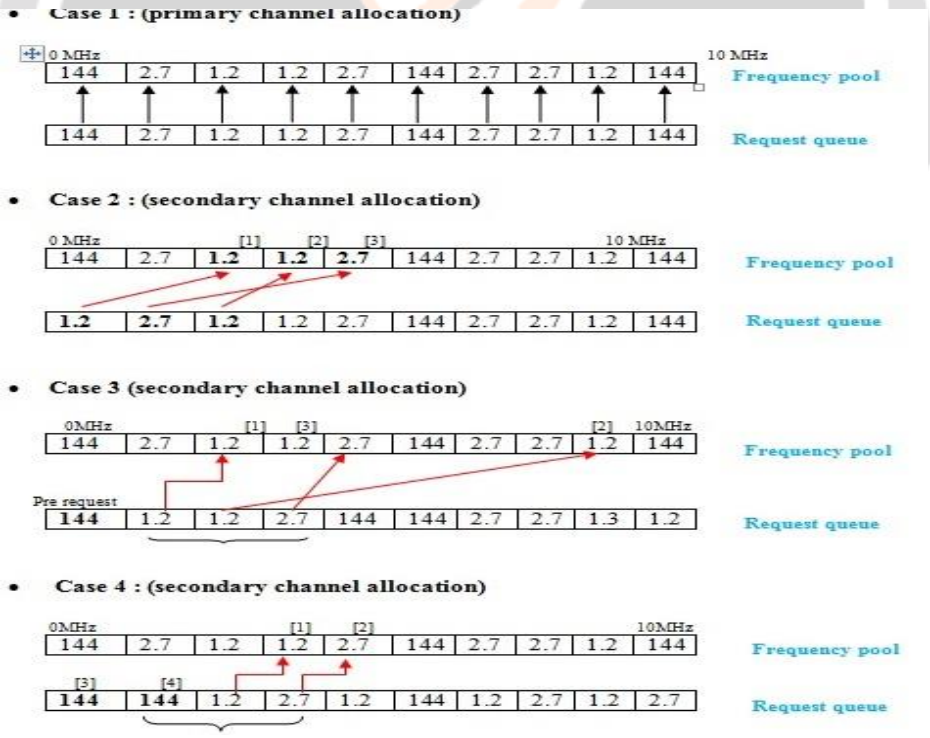

Figure-3 smart channel allocation

Smart channel allocation is the Dynamic channel allocation , in which the all available channel are serve in a network dynamically on the FCFS (first come first serve), as we have seen in figure there is one frequency pool and request queue are available when any request first time comes in to a request queue it will assign into the frequency pool, at this time the frequency pool is completely empty so that the request are fulfill until the frequency pool getting full this is a first case, in second case if once a frequency pool getting full and the next Request is comes into the request queue aging pointer will checks the available require space in frequency pool , if available it will assign it otherwise wait until require space getting free , in third case if there is a next request is max than available space in frequency pool then pointer will move to the next request and save that request as a pre-request for handling of next request demand and prevent the request queue from the blocking . At this stage threshold is set as 3, this means pointer will check next 3 request if all these request are smaller requests after pre request and space is available in pool it will assign channel to the services. After completing three request it compulsory fulfill the pre-request. In fourth case if the next request is again higher or same as a pre-request then it will check next request as case 3 until it complete the threshold value. Otherwise it will wait until frequency pool getting free.

3.3 Algorithm for smart channel allocation:

File reading

Input: Accept service Request into frequency pool on basis of fcfs

Output: Dynamic channel Allocation

Algorithm:

```
Begin
Fp = Frequency pool, Fr = Frequency request, Th = Threshold
 int Th = 0;
 If (Fp = = empty)
    {
       Do fill request
     }
  Else // Fp is not empty
     {
       Wait until channel is free
          While (space available in Fp)
             {
                If (next req > max avail space in Fp && Th <= 3)
                   {
                            Save next request as Pre      request and check other request
                      If (next request < pr request)
                        {
                            Do assign into Fp
```

```
        }
    Else
     {
        Th + +;
       Save request again as Pre request
        break;
    }
    If   (Th = = 3)
      {
                    Assign channel to pre req
                }
          } // if end
    Else
          {
                Assign into pool
          }
     } // while End
End
```

4. Results

After carrying research on this project we get the result of parameters we considered in this research paper we get the improvement up 8 parties' communication in a MTCS for satellite communication, which was point to point (2 parties) communication in previous multimedia service and the frame rates varies between 12 to 14 frames per second. As well as the second graph of result shows the resolution size for the multiple users' vs. Resolution size in inches, here default screen size is 3840*2880 pixels.

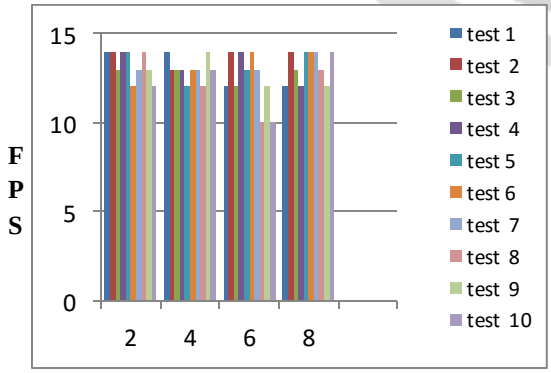

Chart-1 frame per second vs. Throughput

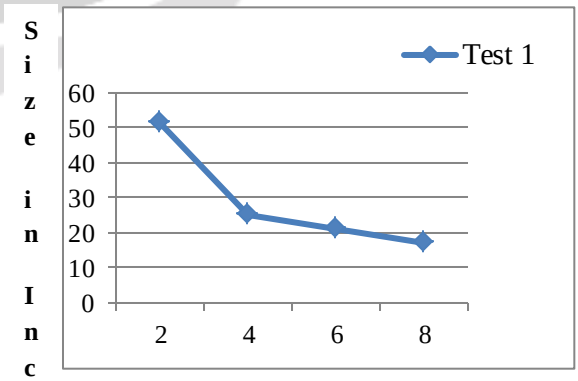

Chart-2 resolution size in inches vs. Throughput

Table -1 detail of screen resolution

No. of user	Screen size in inches	Resolution size of each user
2	25.6*38.4	1920*2880
4	25.6*19.2	1920*1440
6	17.06*19.2	1280*1440
8	12.6*19.2	960*1440

As we can see in this table when the through put is increase the default screen size is dividing into various display layout screen according to user request up to eight parties. Here is the output window up to 8 different parties in a MTCS.

Figure-4 Output window of MTCS

5. Conclusion

ISRO's commitment to societal development through satellite communication has been bearing fruits. Being a satellite communication service, multi terminal communication is virtually immune to terrestrial network congestion and infrastructure destruction. It provides reliable two way communication among multiple users in the video form. It provides the support for eight users that may operate simultaneously by providing multi-beam support. And smart channel allocation scheme and algorithm for network handling the scheme also provides full control to HUB operator to manage the terminals.

6. Acknowledgement

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