Multi terminal Conference service 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**.

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 Terminals. The fourth service is multimedia witch support point to point two way video conference, 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 SMR service. Proposed service will provide two ways reliable multi terminal communications between remote terminals. The data transmitted will be compressed for better throughput. The five-beam multi-beam antenna is used to increase data traffic and support smart channel allocation. In this paper it includes discussion about section 2. Literature review, section 3. Proposed work, section 4. Conclusion, Acknowledgment and at last References.

2. Literature review

In multi terminal video conference there is the few crucial problems when is going to develop a service like combine a video in a one display screen , frame rate per second, channel allocation, network traffic handling in this section we will study about all this

problems regarding to the multi terminal video conference.

The first literature review paper analyses about the problem of video combiner in a ultra high definition for Multi party video conference. in this literature it follows the traditional conventional video combiner architecture for the multiple party video conferencing as describe by ITU (International Telecommunication union) 4k (3840x2160 pixels) and 8k (7680x4320 pixels) resolution witch support respectively 9 and 36 party communication in a video conference [1], in that architecture there is number of limitations like frame rate , video combiner, codec-decode here introduce the design a new straight forward architecture for the video combiner in that they follow the traditional conventional video combiner architecture named as PVC-1,PVC-2,PVC-3 (parallel video combiner) which improves the performance of the frame per second(fps),delay, video codec-decode and combiner process.

In PVC-1 architecture it addressing the performance drawback of conventional video combiner, it manage the computational time of video conference is increase with number of clients are include process. It also decrease the combined frame rate so here the data parallelism strategy is applied for assigning the clients to a set of application treads for concurrent video combination on multi core processor. Used a synchronizer.pvc 1 architecture improves frame rate performance as the number of client s in a combines into video conference.10% gain regarding to 12 clients and 27% gain regarding to 16 clients, because. Each application thread operates autonomously in pvc 1.

PVC-2 architecture introduce in asynchronous timer thread and application thread to govern the autonomy of the application thread during the video combiner process. Pvc-2 display high of 14% for 12 clients but low of 8% for 16 clients. In PVC 2 architecture there is an 18 fps which is not comparable with PVC 1. It takes 24 ms start up delay for t_{15} (t = tread).

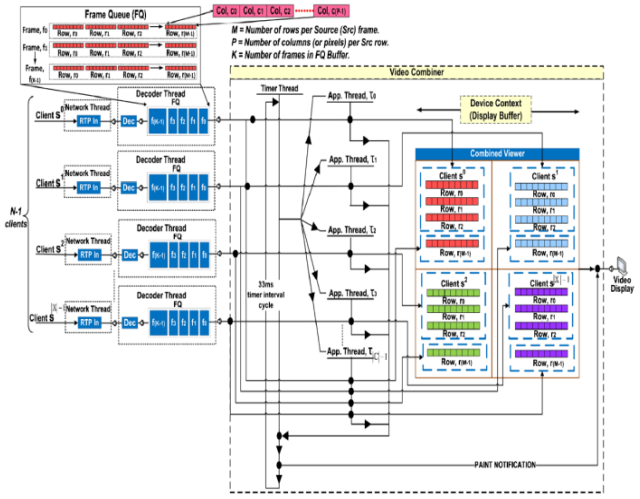

Figure 1: PVC - 3 Architecture

To overcome the problems of above architecture here they developed PVC -3 as shown in figure-1 Witch proposed synchronized balanced parallel video combiner architecture. It limits number of application treads*;* *t* and *c* represent a set of available logical processors on multi core platform. For improving the performance of video combiner and its frame rate here introduce a novel concept of Load balancing on basis of available logical processers. e.g. Consequently, each application thread *(t_0:t_3)* among them t_0-t_2 are assigned with large sliced portion of each client video. The forth

thread t_3 is assigned as a small slice portion of video, it reduce 5the start up and wait delay which held in pvc-1, pvc-2 architecture.

Table 1: Comparison of parallel video combiner architecture

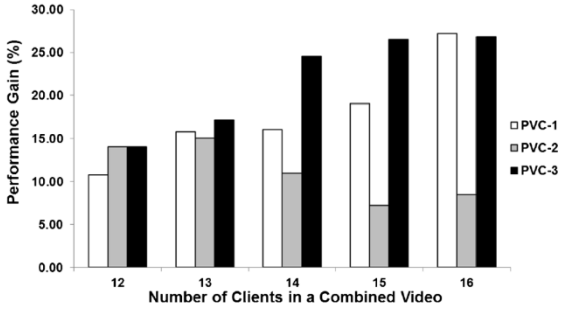

Figure 2 performance gain of PVC 1, 2 and 3 against a conventional video combiner

In second paper of the literature survey there is channel allocation for the mobile satellite services for the multi beam channel allocation in which how the channels are allocate in the network to the any group during the real time communication and traffic handling in a network , for this purpose here presents the traditional DAMA (Demand assigned multiple access) for channel allocation on first comes first serve manner (fcfs),in this algorithm when any user's demand for the channel it's request comes first in a pool then it will allocate a channel to that particular request. For the traffic handling of network and channel assignment here the proposed GDAMA (Group – DAMA) [2] scheme and queuing theory attempts to make efficient use of the channel whenever any terminal user makes a request for channel , the GDAMA checks whether a channel has already assign to the group of the requesting terminal. If a channel is already been assigned to the group then the terminal channel request queued up in group queue and it waits for the assignment of channel till queue free.

The third paper of the literature survey emphasis on the handling of network limitation situation during the low bandwidth the basis of quality of experience, and three different factors: layout, network Limitation

Architecture	Technique	frame rate
PVC-1	Synchronizer thread	18 fps
PVC-2	Timer tread	18 fps
PVC-3	Load balancing	18 fps

(packet loss) and video quality (resolution) [3], in this analysis on four different environments with 20 participants in 5 groups each group have 4 participant in it. It provides semi control environment (rooms, light, similar pc). In this paper they deal with the spatial presentation of the participants (layout and orchestration)and network characteristics (bandwidth and packet loss)here it presents new alternatives which are used in current video system are to distribute all participant in equal size or a Focus+context approach when one participant display larger in focus and other in small previews only [3] the system take decisions on when to put which participant into focus, packet loss is a common problem in real time video conference , in the context of video conference it is available in point to point video conference but not searched for the multi point case

Figure 1: Focus+context client layout

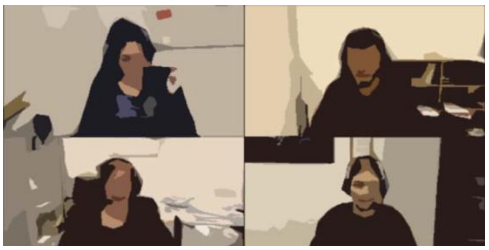

Figure 2: Fixed client layout

Table 2: Comparison of different condition of screen

Condition	Layout	Streams	Available Bandwidth
C1	focus+ context	1 HQ,2 LQ and 3 LQ during switch)	High
C2	fixed	2HQ, 1LQ	High
C3	fixed	3 LQ	Low
C4	focus+ context & fixed	3HQ & #LQ during switch)	High

LQ= Low Quality stream (15 fps, resolution= 320x180, bit rate 128kb)

HQ= high Quality stream (15 fps, resolution= 1280x720, bit rate 800kb).

When networks getting down and not able to provide a desire bandwidth to the required user on that time the entire user have to suffer from that situation and needs to face problems like buffer, delay, resolution, clarity of video etc. for this issue here the proposed a new architecture in a European framework 7 project vconect. It uses a server centric architecture which divides in to two parts client components and server component.

3. Proposed work

The proposed service multi terminal conference service consists of following salient features: it will provide two ways reliable communication between terminal-terminal, mobile- mobile, terminal-mobile, and mobile-terminal in the form of video. As the communication is in the form of video, so that its require a devices like a camera, display screen microphones it also support mobile terminals Terminal authentication as well as authentication will be provided for secure communication. It supports the terminal roaming; Creation of video server to store the activity log and any missed request in case the terminal is off is the essential feature of proposed system. In order to allow the multiple terminal interactions, system supports group communication.

Another vital feature of the proposed system is the compression of audio and video as well as destination ID, which leads to effective utilization of bandwidth. Multi-beam environment support is significant characteristic of. Multi-beam technology is a good solution for the use of frequency resource. Also provides the user handling in which Admin will be given access rights to add or delete the terminal, maintain the terminal status, monitor the activity log of terminals etc. System provides the support for android, windows and Linux platforms, handles the terminal abnormal situation activity like Normal, Dead which make service more secure and reliable.

Terminal Normal: Terminal can send and receive the real time video.

Terminal Dead: Terminal can neither send real time video nor receives it.

Service is giving two different channels for the data transition first is Signal channel for request handling and second is Data channel for the data handling each channel have the 144 kbps data rate for data transmission in the network

3.1 Features

The proposed service will provides following features:

- Multi point terminal support video conference
- Two way reliable communication
- Alarm generation
- User authentication
- Terminal status handling
- Multi beam smart channel allocation
- Destination compression
- Traffic handling of channel

3.2 Key challenges & issues

In today's generation, the technology is no more a panacea to implement and run any societal application in a sustainable mode. There are other factors which are more detrimental. In the multiparty conference scenario, the key challenges are:

Multi-beam Environment: The protocol development and analysis is required for frequency allocation in multi-beam environment. As well as inter-beam and intra-beam communication is challenging part.

Support for roaming: It requires considerable amount of efforts for identifying and tracking of status of terminal in multi party video conferencing

Compression of Destination ID compression of audio, Compression of video requires good technique so that data sending speed can be improved as well as channel efficiency can be increased, but compression of Destination ID is thought-provoking part

Frame rate: Achieving reliable ratio of Frame rate per second is also a challenging part of research

Acoustic Echo Cancellation: It is an algorithm to detect and suppress echoes that might enter the audio device after reflection from the surroundings after some delays. If left unchecked, echoes can cause problems like the speaker hearing his own voice. Increase the intensity of this echo, and one may hear reverberations and a much aggravated condition due to feedback may cause howling effect.

Security: Poorly configured video conferencing systems are honey pots for hackers to exploit and trespass the company's online premises. Sensitive information may be transacted over a video conferencing session which, if not secured properly might fall into wrong hands. Security and integrity of such data is so important part of research

User authentication: is the other major issue of multiparty conference that it should provide great handling of user authentication and identity.

3.3 Proposed Architecture

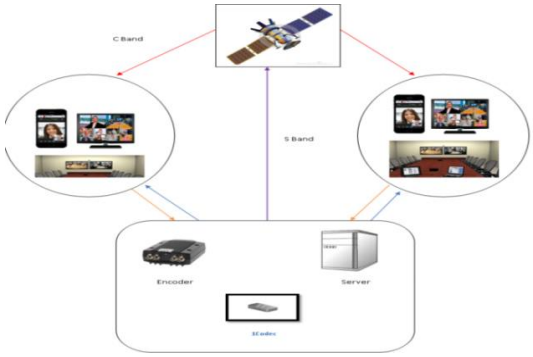

Figure: 3 proposed architecture for multi conference service

4. 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 the number of users that may operate simultaneously by providing multi-beam support. And good handling of channel. The scheme also provides full control to HUB operator to manage the terminals.

Currently we have carried out much research on multi conference service system and had some ideas. In the future, it is suggested that we should develop the protocol of multi terminal conference, analyze the results and deploy the future plans step by step, combining the current requirements and technical achievements.

Acknowledgments

We would like to take this opportunity to express our profound gratitude and deep regards to ISRO for providing us attire technical environment exemplary guidance, valuable feedback and constant encouragement throughout the duration of our project, working with each other were an extremely knowledgeable experience for us.

I would also like to give my sincere gratitude to my parents and all friends and colleagues who filled in the survey, without witch this research would be incomplete.

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