

## Peer to Peer Communication Mechanism Across Web Browsers

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Over the past few years the web application development process has become most powerful choice due to the ubiquity of web browsers across computers and mobile devices. However, browsers have communicated only with servers, never from one browser to another. Advancements in web technology have made developers to build more enhanced client side web applications which can reduce the traffic on the server while improving the performance. WebStorage and DOM (Document Object Model) storage mechanisms have boosted the locally data storing capability of the web browser unlike cookies, where data can be accessed from both the server and client side. The real-time multimedia communication has a major impact on today's social and enterprise communications. Web Real Time Communication (WebRTC) and Socket.IO P2P are advanced web protocols used to build web applications that enable real-time event based communication. In this paper, we develop an application to provide a real time peer-to-peer communication mechanism across web browsers over the internet. It includes two parts: First one is to analyse different approaches to implement cross browser communication mechanism so that content sharing and synchronization between multiple client windows can be achieved. WebStorage API, Parent/Child approach and Socket.IO P2P are used for this purpose. Second part is the study and implementation of real time P2P communication using WebRTC protocol to provide audio/video streaming, file sharing, white board and screen sharing features. The content security is achieved by means of encryption technique and archiving feature is provided by using the Amazon S3 cloud service. The experimental results show that our application provide plug-in free and reliable peer-to-peer communication across the web browsers. The features provided by this application enhance the collaborative communication between multiple users and reduce the load on the server as compared to other technologies.

**Keywords :** Cloud Service, Real-time Communication, Socket.IO P2P, WebRTC, WebStorage.

### 1. INTRODUCTION

The web application development paradigm has become a much powerful competitor over the full range of applications. A standard browser is now used as a client which interacts directly with application servers. Development of many upgradations and versions of World Wide Web (WWW) standards and using them in popular browser implementations has enhanced the web platform capabilities. Web browsers provide a common environment across variety of hardware by making use of standard set of features, functions and by sep-

arating development concerns between browser implementers and application developers which make it as an attractive development process. Rapid growth of internet usage, social network and smart phone adoption has increased the data traffic over the network which directly affect the load on the server.

Many researches and studies have confirmed that by 2020, around 90% of the data traffic over the internet contain the visual characters and videos [1]. Real-Time Communication (RTC) now become an important part of modern convergence networks. Interactive commu-

Table 2  
Comparisons between Different Technologies.

Parameter	Our Proposed Approach	Skype	Telepresence	Goodie's Hangout
Type	Web-oriented solution	Software solution	Hardware solution	Web-oriented solution
Initial setup	Plug-in free	Software need to be downloaded and installed	Need hardware setup	Need google account
Protocol	WebRTC	VoIP and its own proprietary protocol standard	Multiple network protocols	Its own proprietary protocol
Flexibility	Accessed from anywhere through internet	Accessed from anywhere through internet if skype is installed	No, it is a fixed setup	Accessed from anywhere with google account
Setup Cost	Very less or almost free	More fee for advanced features	Very High	Free
Mode of communication	Directly between browser to browser with little traffic through the server	Traffic will be decentralized and shared among super nodes	MCU bridge devices used to distribute the data traffic	Through google web servers
Performance	Poor when multiple users connected	Try to provide better performance using shortest path	Very good since high end servers and devices are used	Depends on the traffic

tance for remote patients and manufacturing industries where multiple peoples can communicate with each other to improve the productivity.

The main disadvantage with this application is browser compatibility issue. It only works on chrome, firefox and opera web browsers. It does not provide cross browser support due to constraints on WebRTC APIs. Application performance become poor when multiple connections are made because of high utilization of CPU and bandwidth.

## 7. CONCLUSIONS

The importance of real-time communication strategies in the modern convergence networks has been a big challenge for application developers. The WebRTC and Socket.IO protocols emerged as a solution to these issues and en-

ables peer-to-peer communication directly between browsers without any third party software and plug-ins.

The application developed in this work facilitates the real-time bi-directional peer-to-peer communication mechanism that works across the web browsers. It reduces the load on the server by establishing a direct communication socket between two peers. On the other hand Screen sharing and white board features provided by this application represents the collaborative communication experience. It provides end-to-end security so that the encrypted data is transmitted over the internet. Archiving the important data of every conference on the cloud will enhance the use case of the application.

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