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**Project Proposal**

**CSC 461**
Fall 2023

**Topic:** Overview of Real-Time Low-Latency VoIP Systems

Since the late 19th century, voice communication over long distances has been possible thanks to the telephone, culminating in a global public switched telephone network (PSTN). While originally analog in nature, the advent of the computer led to a desire to digitize the PSTN and expand its capabilities. Early attempts at this, such as the Integrated Services Digital Network (ISDN), did not anticipate the rapidly increasing demand for voice (and other data) transfer and were soon obsolete [1].

Instead, with the advent of TCP/IP, the internet has quickly become the dominant network connecting computers across the globe. Adapting voice communication to function over the internet is referred to as Voice over Internet Protocol (VoIP), and it is already on track to replace the PSTN entirely in some regions in the coming years [2]. Its advantages include lower cost, improved scalability, simpler maintenance, more advanced features, and better security (such as encryption) [3].

In our report and accompanying demo, we will survey modern technologies that enable low-latency real-time voice communication over the internet, with a particular emphasis on peer-to-peer protocols, such as WebRTC, that power modern voice communication platforms like Discord [4]. In our demo, we will implement a basic VoIP system to demonstrate a possible implementation of the technology.

**References:**

[1] Lighting up copper [History of Communications] (https://ieeexplore.ieee.org/document/5762795)
[2] https://business.bt.com/why-choose-bt/insights/digital-transformation/uk-pstn-switch-off/
[3] VoIP: State of art for global connectivity—A critical review (https://doi.org/10.1016/j.jnca.2013.02.026)
[4] https://discord.com/blog/how-discord-handles-two-and-half-million-concurrent-voice-users-using-webrtc

**Schedule:**

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| **Oct 09 - Oct 23** | Preliminary research into VoIP protocols. |
| **Oct 23 - Nov 06** | Continued research, submit project update. |
| **Nov 06 - Nov 20** | Work on the demo and start writing the final report. |
| **Nov 20 - Dec 04** | Complete and submit the demo. |
| **Dec 04 - Dec 11** | Complete and submit the report. |

**Website:** https://csc461.mingo888.com/