

ABSTRACT

Nature plays an important role in people's lives, and disasters often disrupt telecommunications infrastructure, causing difficulties in conveying messages. Telecommunication systems that are able to function during a disaster are critical for effective messaging and minimizing impact. Wireless and mobile portable communication devices and self-powered devices offer a potential solution to this situation.

The first solution involves wireless IP-PBX technology with independent power sources, namely with VoIP servers, Wi-Fi, solar panels, and rechargeable batteries that offer a robust, reliable, and sustainable emergency communication solution that can overcome drawbacks of traditional systems. The second solution is an integrated emergency communication system involving IP-PBX technology in a wireless and mobile manner with greater distances, with independent resources using VoIP servers, Wi-Fi networks, radios and batteries and solar panels, to improve communication capabilities, coordination, and response effectiveness in critical situations. The third solution takes advantage of the Hytera TS-6800 product, which includes video transmission capability and water resistance, with the addition of Asterisk PBX integration. All solutions are designed to be portable and easy to carry during disaster scenarios.

The measurements obtained from testing the solution show promising results. QoS analysis shows low delay, jitter and packet loss with throughput ranging from 91 Kbps to 167 Kbps under optimal Wi-Fi signal conditions. Protocol optimization, intelligent signal routing and adaptive tactics are critical to improving reliability and efficiency. The Average Opinion Score for Quality of Voice Experience (QoE) is 4.1, indicating good communication during an emergency. However, high QoE is a challenge due to ambient noise, signal interference and psychological stress. In authors Conclusion, this innovative Whole System which integrates VoIP, Wi-Fi and radio technologies is suitable for disaster-affected areas with limited access to electricity.

Keywords: Disaster, Telecommunications, Portable, Self-resources, Communications