ISSN 2350-109X
www.indianscholar.co.in

Indian Scholar

An International Multidisciplinary Research e-Journal

TOPOLOGICAL CONFIGURATIONS AND OPTIMIZATION TO STRENGTHEN UNDERWATER NETWORKS

Aatmi Dharmesh Parekh
Utpal Shanghavi Global School

Abstract

The turmoil generated by a disaster, creates a barrier between the epicentre and the evacuation team, which is a challenge that needs to be overcome. Underwater communication can be established proficiently by several methods, a few of which are evaluated in this paper. In my opinion, in comparison to Radio frequency or acoustics, light fidelity implemented as a communication channel is a more reliable way of transmission.

Keywords: *Underwater communication, Li-Fi, UWSN, Acoustics*

Introduction:

Taking into consideration the nuances of what communication channels have to offer and including the mechanism of their operation, is pivotal in order to narrow down to one's most proficient for a fortified and promising usage supplementary to disaster management. These frequencies enable determining the amount of a disaster befallen at a particular destination. The impairment caused can be derived by the computational formats created and a protocol can be elected contingent on the intensity of the tragedy. Heterogenous clustering protocols are usually used which will exceedingly benefit areas that are prone to these calamities and places where an intrusion of an undesired entity is detected, as utilising this efficiently can reduce destruction whilst focusing on the main idea of what disaster management is all about.

Electromagnetic waves, that will certainly be affected by the conducting nature of the seawater as high frequency EM signals cannot penetrate and propagate deep in underwater environments.

Optical waves cannot do much help in cases of calamities occurring far away from the source as they are absorbed by seawater, substantially optical transmission or light fidelity can prove as a remarkable alternative.

Acoustic data techniques, which prove to be most reliable out of the three due to its impressive ability to send data to different positions. Although physical reasons have led to the prevention of this and therefore acoustic spectrum is temporally and spatially underutilized in underwater environment.

i.e. The refractive index of water and the reflection have created a double-sided effect. The sending and receiving has led to an observance of the dopplers effect creating time-varying multipath. Subsequently, speed of sound is only 1500m/s and it has a limited reach or bandwidth.

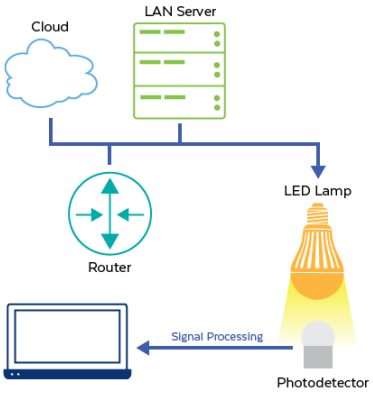
Theory:

1. Light-fidelity (Li-fi)

ISSN 2350-109X
www.indianscholar.co.in

Indian Scholar

An International Multidisciplinary Research e-Journal



Light fidelity is a mechanism that deals with bidirectional communication, transfer through light waves on the electromagnetic spectrum and LED and in contrast to acoustic waves, proves to be proficiently eligible in order to alert the evacuation centres before the occurrence of a disaster.Bilaterally transferring intel through luminescence and proving help to disintegrate the barrier of finite bandwidth. It also relieves congestion in the radio spectrum, being Complementary to wi-fi but can work.

The use of LED stipulates that less energy is being used and it should be kept in mind that while the light is visible, the data is not. The photodetector receives a signal and sends it to sink which is then exported to the cloud and is available in any computational formats.

The intel is carried by light in bits, this mode needs the installation of a receiver and a transmitter, where at the receiver, a photo diode is employed to collect photns and convert them into electric current or signals. The photo detector is usually placed near the surface of the sea. Air bubbles, salinity, and thermal fluctuations in the water causes underwater optical turbulence (UOT) affecting the communication system. The image shows how the affected areas have an impact on the transmitter and it sends signals to the receivers which is then stored in the cloud and delivered to the required portals.

Results:

	Organic Particles	Contribution towards scattering and absorption
1	Viruses	Large numbers, however very small impact. can be efficient back scatters at least at blue wavelengths in very clear waters
2	Colloids	attributed to dissolved matter
3	Bacteria	blue spectral ranges in clear oceanic waters
4	Organic detritus	Poor scatters and absorbers except at blue wavelengths
5	Large particles including zooplanktons	Strongly diffuse the light beam
6	Phytoplankton	Widely present in most oceanic waters

Contingent to how much each of the organic and inorganic particles contribute in fluctuating the wavelength values, the chlorophyll levels in each type of water is determined and graphs are

plotted which is an easily recognisable quantitative way to know if one needs to implement ideas to alleviate the spread of certain particles to provide for the bestreach of signal.

The scattering coefficient for the bio-optical model is a function of wavelength and chlorophyll concentration is given by a formula.attenuation coefficient varies with wavelength (λ) for both Clear Ocean and coastal area. It is clear that the total attenuation is the sum of total absorption and total scattering.

Lat factor taken into consideration is the attenuation vs wavelength graph where in the attenuation is said to be controlled by choosing a colour range with respect to wavelength.
violet-blue-cyan-green light are the one's with the lowest wavelength and are suitable for effective transmission. Although violet light is not in the market. So blue-Cyan-Green spectral range is chosen as an ideal way of transmitting light.

If Li-Fi technology replaces Wi-Fi and other broad band networks, daily life would change dramatically in every way. The major problem it faces is data handoff across multiple access points and data upload at a rapid rate. There are certain limitations and challenges with Li-Fi technology one of the main being that there has to be presence of direct light for its services to be used. There shouldn't be any barrier in the signals range and even the sun's rays can impact the communication. Since Li-Fi operates at very high frequency (400-800 THz), it is suitable only for point to point communication. Another point to highlight here is that since it needs 24 hours of uninterrupted internet supply, whatever light source is used, it dissipates huge amount of energy.

CONCLUSION:

Li-Fi will have co-exist with many blockages so a way or model of tracking these blockages is desired. The other potential ways of improvement to the spectrum can be by deep digging in the areas regarding nonlinear sound propagation of acoustic signals which can be more beneficial for designing future communication techniques. The future identified research areas can include cognitive networks area and underwater spectrum for their efficient use. Although the subaquatic wildlife should be taken into considerations before an instalment of any equipment that can lead to the enhancement in the reliability of the spectrum. The near future does surely promise the implementation of these techniques. Li-Fi balloons that is LiBnet can be used hand in hand with the bio optical model for a more fortified usage during disasters

REFERENCES:

https://www.ijrte.org/wp-content/uploads/papers/v8i2S4/B11900782S419.pdf
https://www.researchgate.net/publication/357770223_A_Review_on_Light_Fidelity_Li-Fi_Technology
https://www.sciencedirect.com/science/article/pii/S1319157817300484
https://www.researchgate.net/publication/321794536_Can_Balloons_Produce_Li-Fi_A_Disaster_Management_Perspective