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A Review Investigation Of Optical Fibre Communication Using WSN

Ishmeet Kaur
Student
BBSBEC
Fatehgarh Sahib
Punjab- India

ABSTRACT

Burgeoning demand for broadband services such as database queries, video-on-demand, remote education, telemedicine home shopping and videoconferencing has pushed the existing networks to their limits. This demand has mainly fueled by the brisk proliferation of Personal Computers together with the exceptional increases in their storage capacity and processing capabilities and the widespread availability of the internet. The necessity to develop high-speed optical technologies in order to construct large capacity networks arises .Two of the most popular multiplexing techniques available in the optical domain that are used in the building of such high capacity networks, are Wavelength Division Multiplexing and Optical Time Division Multiplexing.However merging these two techniques to form very high-speed hybrid WDM/OTDM networks brings about the merits of both multiplexing technologies. This thesis examines the development of one of the key components associated to such high-speed systems. Recent analysis has shown that RZ format is superior to conventional NRZ systems as it is easier to compensate for dispersion and nonlinear effects in the fiber by employing solution-like propagation. In addition to the development, the use of wavelength tunability for dynamic provisioning is another area that is actively researched on. Self-seeding of a gain switched Fabry Perot laser is shown to one of the simplest and cost effective methods of generating, transform limited optical pulses that are wavelength tunable over very wide ranges.The review examines in detail how the pulse SMSR affects the performance of high-speed WDM/OTDM systems that employ self-seeded gain-switched pulse sources.

Keywords:- Free Space Optics, Optical Wireless Communication, signal to noise ratio,Attenuation, WSN, WDM System

I. INTRODUCTION

Wireless optical communications have been the predominant form of communication technique. As Wireless optical communication systems do not exhibit the limitations associated with the installation and maintenance of guided wave coaxial communication systems. It is very useful to establish LAN links between buildings.

II. CONCEPT OF WIRELRSS COMMUNICATION

A. Wireless comminication

Wireless optical communication is an optical communication technology that uses light propagating in free outer environment to transmit data for telecommunications or computer networking. The receiver's lens able to collect the photon stream from the transmitter converts the signal back to electrical signal. The optical transmitter can modulate the optical signal to carry data. The optical receiver then collects all of the energy of the optical signal and converts the optical signal into an electrical signal. The optical receiver can operate on this electrical signal recover the modulated data and, in some applications, align the receiver to optimally receive the optical signal. The optical links usually use laser light, although low-data-rate communication over short distances is possible using light-emitting diodes (LEDs). Infrared Data Association (IrDA) in most laptop/palmtop computer is a very simple form of free-space optical communications using LEDs. For longer distances, a pair of telescopes is used at each end as the antenna, with a laser and photo-sensors mounted in each telescope.

Fig.1

B. Optical Wavelength

The commercially available Wireless Optical systems operate in the near-IR wavelength range between roughly 750 and 1600nm. The physics and transmission properties of optical energy as it travels through the atmosphere are similar throughout the visible and the near-IR wavelength range, but there are several factors that influence which wavelength is chosen by a given design team.

III. SYSTEM MODELING

The performance of wireless optical system can be examined by number of parameters. These parameters are divided into two categories internal parameters and external parameters, but the main factor on which the wireless optical system affects. We simulate the wireless optical system model for comparing the transmission performance of wireless optical system optics system for different data rate, maximum transmission distance in different formats and to evaluate the BER and Q factor performance using optisim software.

A. Experiment Set Up

In proposed design first subsystem is Pseudo-Random Binary Sequence generator. The output from PRBS generator is a bit stream of binary 0 or 1 sequence. The second subsystem is Return-to-Zero (RZ) electrical pulse generator. Next subsystem is Mach-Zehnder Modulator where continuous laser output is modulated with electrical signal. The channel between transmitter and receiver is free space. FSO system basic design has model is illustrated in Fig 2.

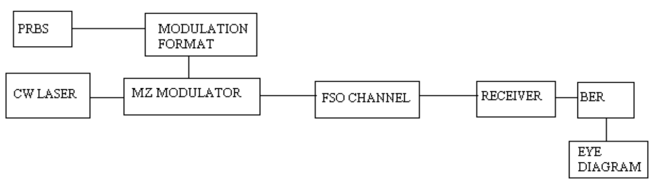


Fig. 2

B. Parameters used for wireless optical system

S.No	Parameters	Description/Value
1	Extinction ratio	10
2	Frequency	C-Band (1550-1565nm)
3	Line Width	10
4	Transmitter Diameter	5cm
5	Receiver Diameter	7.5cm
6	Transmitted loss	0.5dB
7	Additional loss	0.5dB
8	Responsivity	1 A/W
9	Fiber Cable	Single mode
10	Dark Current	10 Na
11	Distance	In Kms

Table. 1

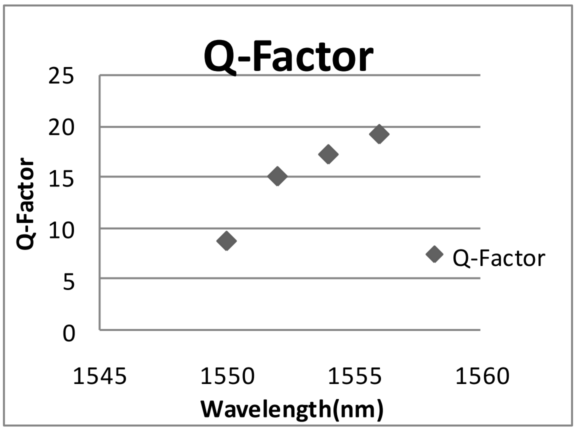
C. WDM System

A WDM system uses multiplexer at the transmitter to join the signals together, and a demultiplexer at the receiver to split them apart. With the right type of fiber it is possible to have a device that does both simultaneously, and can function as an optical add-drop multiplexer.

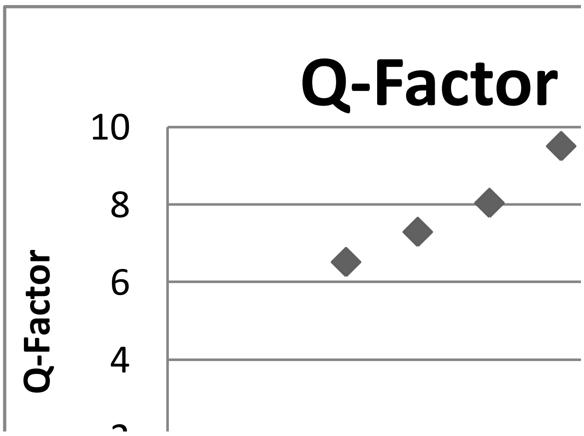
Early WDM systems were expensive and complicated to run. However , recent standardization and better understanding of the dynamics of WDM systems have made WDM less expensive to deploy.

IV. RESULT ANALYSIS

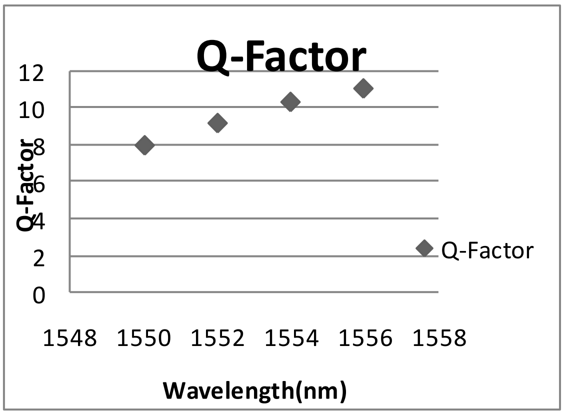
In our proposed design, by varying the transmission power, attenuation of free space optical communication system, wavelength and the transmission distance between the two transceivers the system performance in terms of BER and Q factor has obtained.



(a)



(b)



(c)

Fig. 3(a), 3(b) and 3(c) Wavelength and Q-factor for different wavelength for clear, rain and fog condition at a distance of 1.55km, 1km and 500m is given. The power range for clear, rain and fog lies between 10mW to 23mW.

The output graph for WDM system using to channel is shown below.

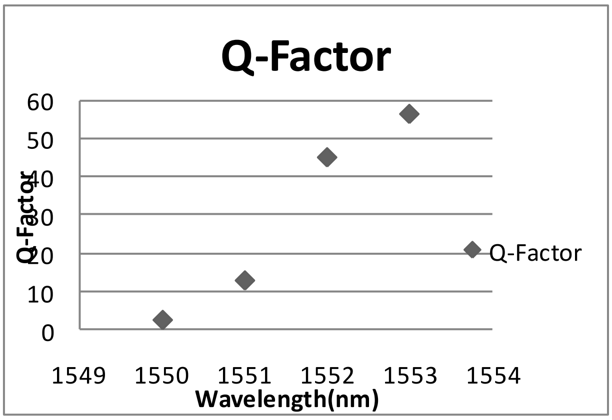


Fig.(a)

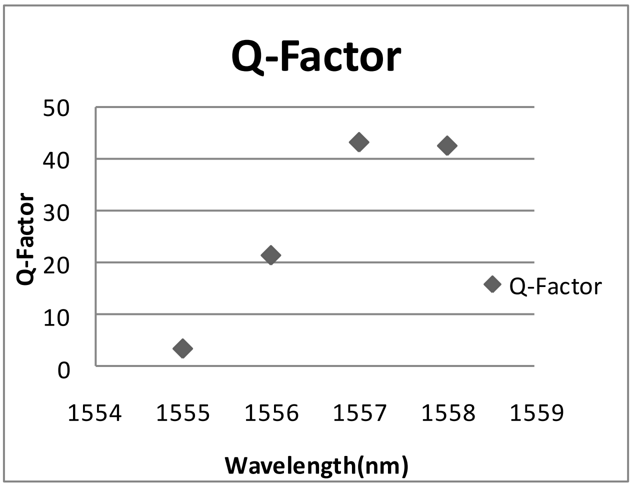


Fig (b)

Fig 4(a) and 4(b) indicated the graph between Q-Factor and different wavelength in case of WDM system. The WDM system uses two channel for clear condition having distance 1.6km.Fig (a) indicates channel 1 and (b) indicates channel 2.

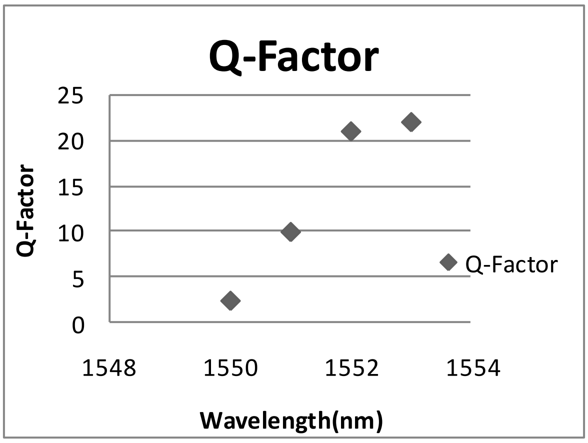


Fig (a)

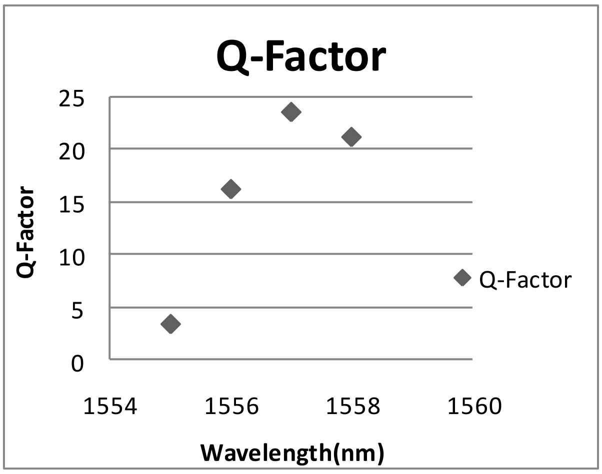


Fig.(b)

Fig. 5(a) and Fig 5(b) indicates the channel 1 and channel 2 output graph for the WDM system for rain condition at a distance of 1km, from result it is observed that there is increase in Q- factor with increase in wavelength.

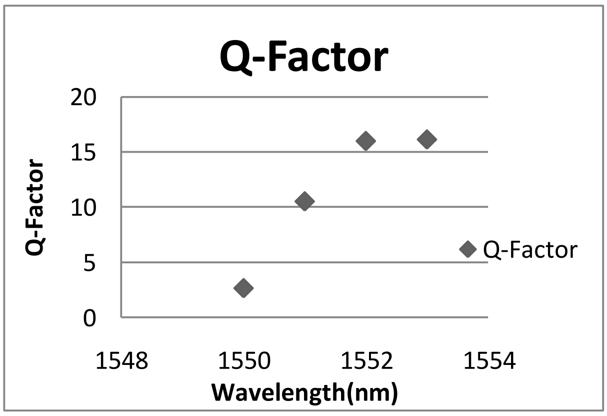


Fig. (a)

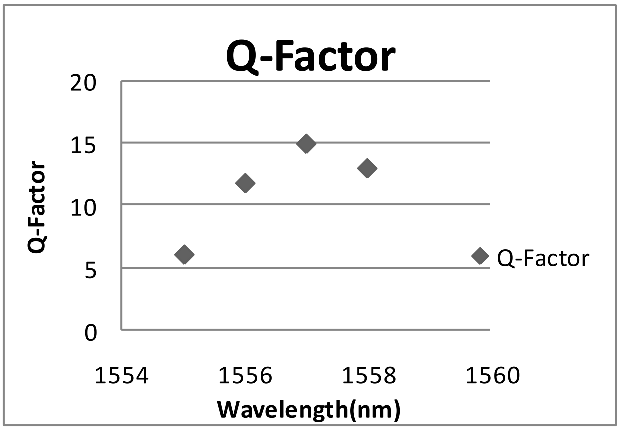


Fig. (b)

Fig. 6(a) and 6(b) indicates the output graph of wavelength versus Q-factor in case of WDM system for fog condition at a distance of 600m.

V. CONCLUSIONS

In this paper targets the impact of Q-factor and wavelength for different environment conditions such as clear, rain and fog in free space optical communication system. It is theoretically found that fog has presented bad effects as compare to others conditions. In case of fog there is more attenuation and to have high q-factor power has to be increased. The power used among all the three environment condition lies in the range 10mW to 40mW.

VI. ACKNOWLEDGMENT

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REFERENCES

[1] Bayvel, Polina. Future High-Capacity Optical Telecommunication Networks, Philosophical Transactions: Mathematical, Physical and Engineering Sciences, Vol. 358, No. 1765, January 2000.

[2] Gallardo, Arturo; Mims III, Forrest M.. Fiber-optic Communication Began 130 Years Ago, San Antonio Express-News, June 21, 2010.Accessed January 1, 2013.

[3] Ghatak, A. &Thyagarajan, K. An Introduction to Fiber Optics, Cambridge University Press, ISBN 0521571200, New York USA, 2000.

[4] Keiser, G. Optical Fiber Communications, McGraw-Hill, ISBN 0070336172, New York USA, 1991.

[5] McVeigh, Daniel P. An Early History of the Telephone: 1664-1865, Part 2, Columbia University in The City of New York, Institute For Learning Technologies, 2000.

[6] S. Ramamurthy and B. Mukherjee, "Survivable WDM mesh networks, Part I—Protection," in Proc. IEEE Infocom'99, New York, Mar. 1999,pp. 744–75.

[7] Abd El-Naser A. Mohammed, Abd El-Fattah A. Saad, and Ahmed NabihZakiRashed, "Thermal Sensitivity Coefficients of the Fabrication Materials Based A thermal Arrayed Waveguide Grating (AWG) in Wide Area Dense Wavelength Division Multiplexing Optical Networks," International Journal of Engineering and Technology (IJET), Vol. 1, No. 2, pp. 131-139, June 2009.

[8] Abd El-Naser A. Mohammed, Ahmed NabihZakiRashed, and Mohammed S. F. Tabour "Transmission Characteristics of Radio over Fiber (ROF) Millimeter Wave Systems in Local Area Optical Communication Networks," International Journal of Advanced Networks and Applications, Vol. 2, No. 6, pp. 876-886, May/June 2011.

[9] Abd El-Naser A. Mohammed, Mohamed A. metawe'e, Ahmed NabihZakiRashed, and Amina E. M. El-Nabawy "Unguided Nonlinear Optical Laser Pulses Propagate in Waters With Soliton Transmission Technique," International Journal of Multidisciplinary Sciences and Engineering (IJMSE), Vol. 2, No. 1, pp. 1-10, March 2011.