

# Transmission System Link for Radio over Fiber and Wide Area Optical Network

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**Abstract**— Radio over fiber refers to a transmitted over an optical fiber link. Lower application losses and reduced quality to noise and electromagnetic interference electrical signal transmission. Range of mobile radio signals (3G, 4G, 5G, and WIFI) television signals (ca TV) to the transmission .A wide area network (WAN) is a telecommunication networks or computer network that extends over large geographical distance. ROF system that is modulated with multiple bit rates using different transmission techniques such as stilton and maximum time division multiplexing (MTDW) technique .fiber –radio network comprised two distinct domains, one optical and one wireless. Energy-saving mode, network capacity is dimensional to support peak-hour traffic and IP routers and switches. Network element of during off-peak hours, ideally 75% of energy can be saved the traffic load decreases to its minimal value around 6:00.interconnected network for radio over virtual connection.

**Keywords**— mobile radio signals, over large geographical distance, solution, energy saving mode network, traffic IP and routers, radio signals (3G, 4G, 5G, and Wi-Fi, and television signals.

## 1 INTRODUCTION

Radio networks current network have no energy -saving schema.[1] large amount of energy is wasted when traffic load is low .time-of-the-day network traffic variation. Microwave signals, and to achieve mobility functions in the central office or exchange (co).IP routers, switches, network gateways. [2]. EDFAs and transmitters are the main energy efficiency, electronic devices in the IP layer ,[5] especially routers, consume much more energy than optical device in the physical layer[6].downstream data stream data transmission to multiple optical telecommunication system [4].the bandwidth of the optical communication system is 1000 times higher easy launching of the objects[9]. Optical communication supports 300 THz bandwidth. Three parameters (transmitter, channel and receiver)[3].Wide Area Network in technology for ROF operational benefits in terms of operational flexibility [7]. Depending on the microwave generation technique.ROF distribution system can be made signal format transparent [8] .radio base stations (BSs) wireless data interface between an external network.[10].

## 2 LITERATURE REVIEW

ROF system mainly wireless frequently G.Shen (WDM) wave length division multiplexing. Methods of energy-efficient network design green Traffic grooming, and selectively turning down network elements. E.Yerginer, Routing and network operation needed while grooming traffic in optical back bone networks. The proposed hierarchical network topology is according to the traffic variation during time of the day. When the traffic load is low, note that shutting down light paths may be lead to undesirable traffic disruptions but this problem is not

addressed. Drawback fiber radio network is a hybrid network that uses a optical network to deliver wireless data from in external network. It is Simple and cost effective BSs wireless system.

## 3 ROF SYSTEM TRANSMISSION TECHNIQUE

It is estimated that approximately 50% of the revenues of large telephone companies will be based on video services by 2010. In addition to the high-speed, symmetric, and guaranteed bandwidth demands for future video services, the next-generation access networks are driving the needs for the convergence of wired and wireless services. Radio-over-Fiber Technology is the integration of microwave and optical networks. ROF technology enables centralization of network management, processing, and radio functions. It supports current and next generation wireless network deployment and management strategies, large bandwidth, and transparent characteristics for radio signal transmission distributed to densely populated areas or outdoor ranges.

- Wireless Broadband Services.
- Mobile Communication.
- Radio Communication in optics system.

### 3.1 Wireless Broadband Services

This is different from 3G or 4G mobile broadband, which uses mobile phone signals. Broad band refers to telecommunication in which a wide band of frequencies. The most common of wireless technology use radio waves such as a few meters for Bluetooth or as for as millions of kilo meters for deep-space radio communication.

### 3.2 Mobile Communication

Mobile communication has the use of technology. Mobile devices are to communicate with someone in a different location and sending email from a Wi-Fi-equipped computer device (e.g., laptop, iPad Mobile computing by way of tablet computers aisle becoming more popular. Tablets are available on the 3G and 4G network.

### 3.3 Radio Communication

Wireless systems and networks are using smart antennas or MIMO. The developed models are verified and calibrated with measured data from our unique 3-D mobile channel sounder.. These systems offer different tradeoffs in

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supporting multiple users, beyond the FDM strategy that was ideal for broad radio but less so for applications such as mobile telephony.

### 3.4 Advantage of ROF

#### Radio over Fiber (ROF)

- RF signals are transmitted over fiber to the antennas that are closer to the user

Shorter wireless channel  
Less fading and shadowing  
Low multipath spreading  
Low cost access points  
Rapid installation  
Good for hidden areas (tunnels mines etc)

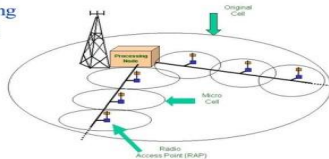


Fig 1: Signals Transmitted System

### 3.5 Disadvantage of ROF

In spite of the numerous advantages that fiber optic systems have over conventional method of transmission, there some disadvantages, particularly because of its newness. Many of these disadvantages are being overcome with new and competitive technology.

### 4 BENEFITS OF ROF TECHNOLOGY

- Transmission of mobile radio signals (3G, 4G, 5G and Wi-Fi) and the transmission of cable television signals (CATV) to the transmission.
- Signals in ground stations for satellite communications.
- Fiber optical links are lower transmission losses.
- RF-over-fiber.
- IF-over-fiber.

### 5 BASIC OF ROF ARCHITECTURE

This work consists of three parts. In the first study, we consider ROF based wireless local area network (WLAN) operating at 60~GHz bands, MAC protocol based on dynamic time division multiple access (TDMA) is proposed, which supports fast and simple handover as well as bandwidth allocation according to the movement of vehicles.

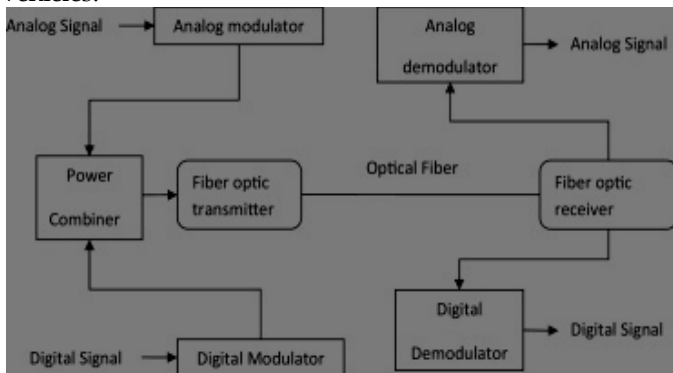


Fig 2: Wireless Operating System

### 5.1 ROF Dispersion Model

The performance of radio over fiber systems can be affected by linear and nonlinear impairments. Particularly, in ROF systems, the fiber chromatic dispersion can degrade the transmitted RF signal by means of fading effects. First order dispersion changes phase of each sideband relative to the carrier

### 5.2 ROF Attenuation Model

Almost all ROF links use single mode fiber. Modern fibers offer as low as 0.2 dB/km loss at 1.55 μm. Connectors and splices will add few more dB loss. The optical losses together can be named as OL including fiber attenuation and connector losses. In a point-to-point fiber link can  $OL = 2(N LC + M L sp + \alpha LF)$ , dB

### 6 WIDE AREA NETWORK

That Wide area networks are often established with leased telecommunication circuits. Networks are personal area networks (PANs), campus area networks (CANs), metropolitan area networks (MANs) which are usually limited to a room, building, campus or specific metropolitan area respectively.

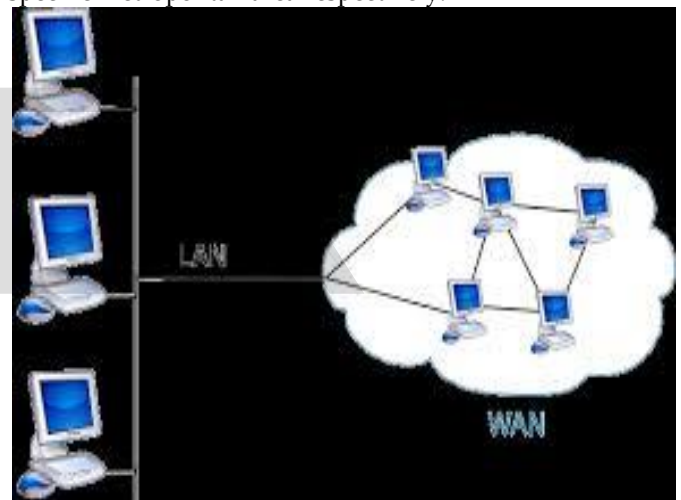


Fig 3: LAN to WAN connection.

### 6.1 Wide Area Network Types

1. Cable modem.
2. Dial-up.
3. Frame relay.
4. ISDN.
5. Leased line.
6. SD-WAN

#### 6.1.1 Cable Modem

High bandwidth is HFC and RFG network. They are commonly deployed in Australia, Europe, Asia and the Americas. It converts analog signal to a digital signal for the purpose of granting access to broadband frequency internet". That off-the-air TV, FM, closed circuit TV, or a voice telephone system, or, other digital channels Many cable Internet providers now sell plans for service that runs faster than 38 Mbps (typically, 50 Mbps for downloads).

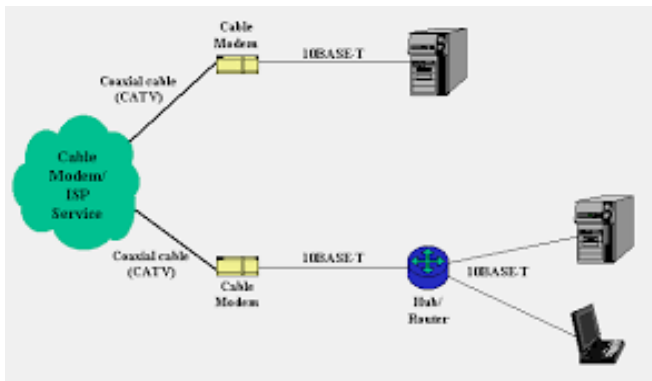


Fig 4: Convert Analog Signal to Digital Signal

### 6.1.2 Dial-Up

Telephone lines have without any special arrangement with the telecommunications carrier. Dial-up connection is to transfer data through telephone modems. Internet service provider (ISP) was by dialing a telephone number on a conventional telephone line.

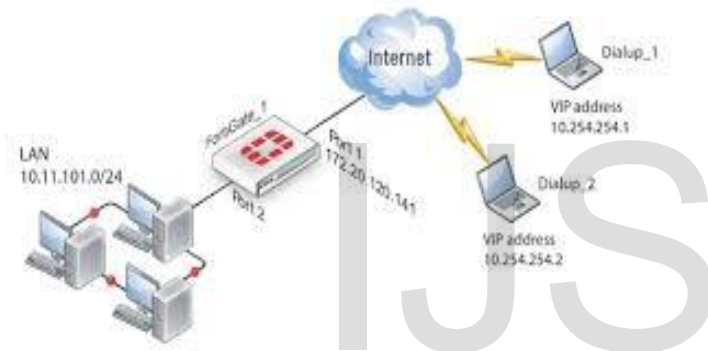


Fig 5: Conventional Telephone.

### 6.1.3 Frame Relay

Frame relay is a way to transmit data across a leased line. Ethernet over fiber optics MPLS, VPN and dedicated broadband services such as cable modem and DSL. Each end-user gets a private line (or leased line) to a Frame Relay node. The physical and data link layers of digital telecommunications channels using a packet switching methodology.

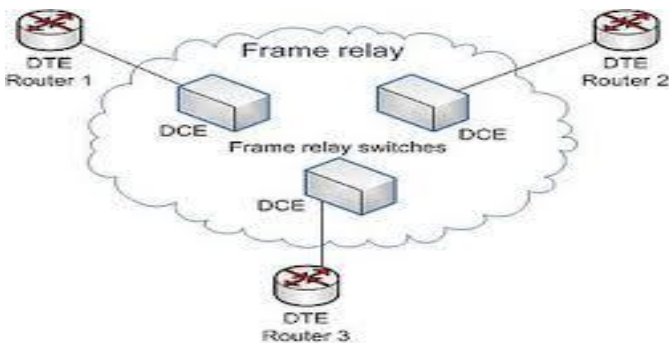


Fig 6: Packet Switched Methodology.

### 6.1.4 ISDN (Integrated Services Digital Network)

Analog phone can be provide services Communication standards for simultaneous digital transmission of voice, video, data and other network services over the traditional circuits of the public switched telephone network.

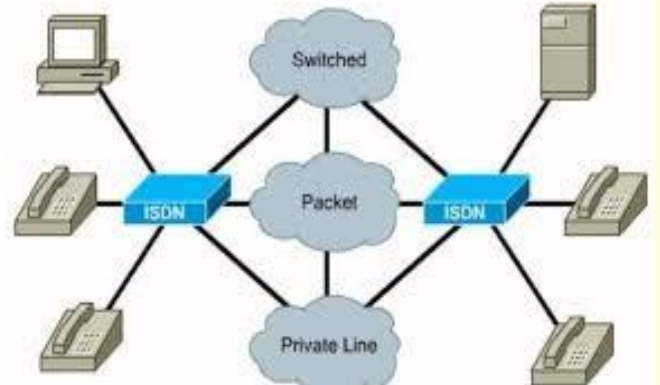


Fig 7: Integrate Service Digital.

### 6.1.5 Leased Line

A leased line is a private or symmetric telecommunications circuit. An Internet leased line is a premium internet connectivity product, normally delivered over fiber, which provides un contended, symmetrical speeds with full duplex Using a Virtual Private Network is an alternative technology to using a leased line.

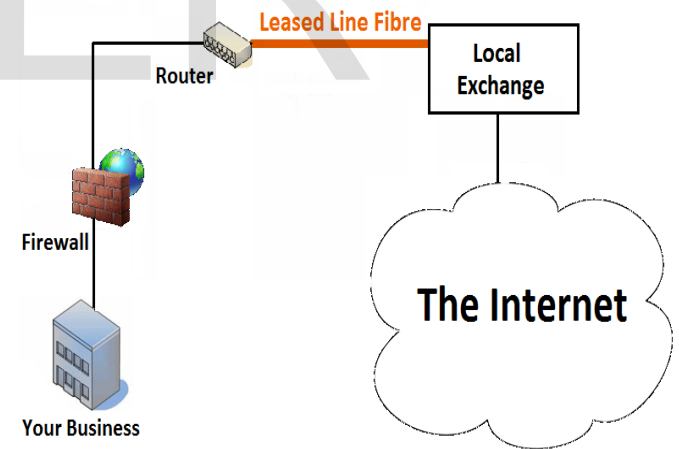
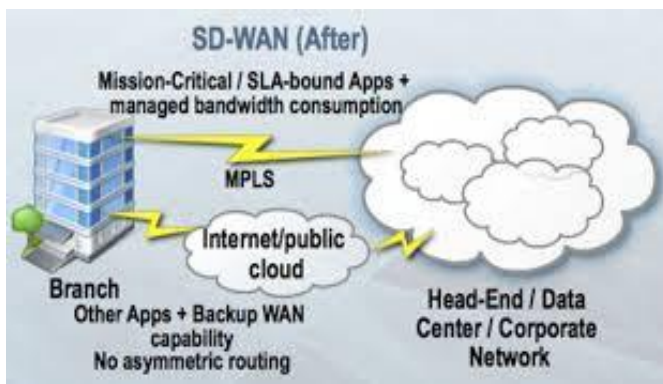


Fig 8: Telecommunication Circuit.

### 6.1.6 SD-WAN (Software Define Wide-Area Network)

(SD-WAN or SDWAN) is a specific applications of software-define networking to WAN connection, which are used to connect enterprise networks- over "large geographic distance"



signal are in optical Fiber communication systems. Link is more generic but somewhat problematic, but we can achieve some invariable application. Free space optical communication is time-consuming. Optical source technology is for optical detector. optical system for radio over fiber transmission system in wide area network. Very high radio network performance. Centralized baseband function was in transport network in ambulatory recourse power consumption to very high levels.

## 10 ACKNOWLEDGEMENT

Fiber optical in (Kosek,y.he, x. gu, and x, Fernando. in radio over link transmission system for network. It was using technical mobile network and wide area network for fiber link radio frequency.

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Fig 9: Internet/Public Wireless Connection Network and computer system administrators are responsible for the day-to-day operation of an organization's computer networks. Structure an organization's computer system.

- Local area network (LAN).
- Wide area networks(WANs)
- Hard to device.
- Complicated hardware.
- Very expensive.
- 4G device needed.

## 7 NETWORK TECHNOLOGY TYPES

- ✓ LAN-Local Area Network.
- ✓ WAN-Wide area network.
- ✓ WLAN-wireless local area network.
- ✓ MAN-metropolitan area network.
- ✓ SAN-system area network.

## 8 COMPARING IN (ROF) AND (WDN)

RADIO OVER FIBER(ROF)	WIDE AREA NETWORK (WDN)
(ROF) using remote antenna units.	WAN is large geographical
Transmission in fiber-link.	It using fiber optical network.
It uses millimeter wave system.	Pont -to -point or multiple link transmission.
Optical network.	Sub network (or) physical network.
Interactive and multimedia wireless service.	Wan is a long distance transmission.

## 9 CONCLUSION

We have proposed in radio over fiber and wide area network transmission system. The Investigated ROF transmission capacity for wide area network in bit rates either per optical link or per optical channel. Transmission