ISSN: 2229-6948(ONLINE)
DOI: 10.21917/ijct.2022.0415

ENHANCEMENT OF DATA MANAGEMENT IN BROADBAND WIRELESS COMMUNICATION SYSTEM USING MOBILITY MANAGEMENT MODEL

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Abstract

With the development of communication networks towards broadband and mobility, optical fiber wireless communication system combines optical fiber communication and wireless communication. Convenient and flexible features meet people's demand for broadband. Early ROF technology was mainly devoted to providing high-frequency wireless services such as millimeter wave optical fiber transmission. This paper proposes enhancing data management in a broadband wireless communication system using a mobility management model. With the development and maturity of ROF technology, people began to study hybrid wired and wireless transmission networks, that is, simultaneously wired and Optical fiber wireless communication (ROF) systems providing wireless services. With the rapid development of radio communications, the scarcity of spectrum resources has become increasingly important. The proposed model explains, How to optimize spectrum utilization under the condition of limited wireless resources to alleviate the discrepancy between the supply and demand of spectrum resources has become a problem to be solved in the communication industry.

Keywords:

Communication, Networks, Broadband, Mobility, Wireless, Fiber Optical, Spectrum

1. INTRODUCTION

Cognitive radio (CR) is an intelligent spectrum-sharing technology. Through the "secondary use" of the authorized spectrum, the utilization of spectrum resources can be effectively improved, and it has become a research focus in the field of communication [1]. In 802.11 wireless local area network is a 802.16 metropolitan area network. Moreover, 3G mobile communication networks have started to study the application of cognitive radio technology to improve the system's capability and application [2]; the RF technology to achieve hybrid transmission of various commercial signals. Cognitive radio-based optical fiber wireless communication networks that transmit wired and wireless signals are the development trend of future communication networks [3]. Hybrid transmission ROF system based on cognitive radio technology is network architecture design, layered protocol design, Generation of wired and wireless modulated signals based on multiple services faces many new challenges such as network management and identification of modulated signals [4]. In recent years, the transmission of radio frequency cognitive signals over optical fiber has attracted attention. The ROF system proposed that cognitive radio signals are transmitted under the structure and simulation tests show improved network performance [5]. The ROF-based hybrid optical fiber wireless transmission system will become the emerging fiber-to-the-home (FFTH) ultimate broadband access technology to meet the needs of multimedia services for video transmission and attracts attention with the advent of passive optical network (PON) [6]-[7]. Because the devices used in the PON network are passive, they do not need a power supply, can resist the influence of external electromagnetic interference and lightning, achieve transparent transmission of services, and have high system reliability [8]. PON networks are mainly time division multiplexing passive optical networks (TDM-PON) and wavelength division Multiplexing passive optical networks (WDM-PON) are included [9]. Compared to TDM-PON, WDM-PON has the characteristics of user-exclusive bandwidth and high security, making it the most viable optical access network in the future [10]. A secondary network is defined as a set of lines and channels of a secondary network, formed based on the primary network, stations, and switching nodes or switching stations and nodes, designed to organize communication between two or more specific points. The boundaries of the secondary network are its junctions with subscriber terminals. Depending on the primary type of telecommunication, the secondary network is telephone, telegraph, data transmission, the network for distribution of television broadcast programs, and newspaper transmission. On a regional basis, secondary networks are divided into long-distance and regional.

2. RELATED WORKS

The two terms broadband and Wi-Fi are often used interchangeably. However, these two are separate things. Also, it is necessary to have a clear understanding of to understand the fundamentals of the Internet properly. Wi-Fi uses radio frequencies and signals to transfer information without wires [11]. Broadband is the transfer of information using high-speed Internet. Wi-Fi technology uses radio frequencies and signals to transmit and receive information wirelessly between two devices. Wi-Fi is a means of accessing broadband wirelessly. All Wi-Fi connections work on two frequency bands, 2.4 GHz and 5 GHz. 2.4 GHz frequency band is used for long distances and low bandwidth. At the same time, the 5 GHz freque*ncy band is used for shorter distances and higher bandwidth [12].

All Wi-Fi connections work on two frequency bands, 2.4 GHz and 5 GHz. That means sending information and receiving information work in simple steps. First, a request is sent to the router and modem to access the Internet for information. Then, the desired response is sent to the router via the modem. The router then transmits the information wirelessly to the device. Broadband is a type of internet connection provided by the internet service provider. Wi-Fi is a technology that connects to broadband to access the Internet [13]. Access the broadband via a LAN cable that connects the router and device directly. However, the advantage of a Wi-Fi connection is the ability to access information without any direct connection between two devices.

A primary network is a set of conventional physical circuits, conventional transmission channels, and network paths formed based on network nodes, stations, terminal devices of the primary network, and transmission lines connecting them.

Based on secondary networks, complex systems of technical means are organized that carry out telecommunications of a particular type. They include secondary networks and associated subsystems: numbering, signaling, cost accounting, settlement with subscribers, maintenance, and management. At the current stage, with the advent of new communication services, in addition to telephone, with the appearance of a large number of independent providers that provide these services, as well as ATM and MPLS, and other technologies, are capturing both the primary. Moreover, the boundaries between primary and secondary networks continue to blur in secondary communication networks. The rapid development of modern technologies leads to the regulatory framework needing to catch up with the network situation [14].

3. PROPOSED MODEL

Cognitive radio is an effective way to solve spectrum shortage and spectrum underutilization. Cognitive radio is an intelligent wireless communication system. It senses the spectrum usage of the surrounding environment and adapts its parameters through learning to use spectrum resources and reliable communication effectively. The use of cognitive radio is stable. From allocation to dynamic allocation is a crucial technology to sense the spectrum resource. In a cognitive radio system, to protect an authorized user (or a primary user) from interference by a slave user (or CR user), the spectrum sensing function needs to sense the presence of an authorized user. A frequency band can be temporarily used while monitoring that the frequency band used by the user is not used. The frequency band of the authorized user when monitoring the device's presence, the CR user releases the channel to the authenticated user, thus ensuring that the CR user does not interfere with the authenticated user. The proposed model block diagram was shown in the Fig.1.

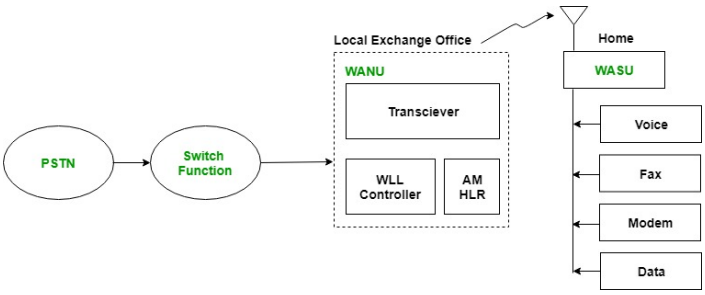

Fig.1. Proposed model block diagram

The primary user has the highest priority to access the channel. On the one hand, when the authenticated user does not occupy the channel, the secondary user can access the idle channel; when the primary user reappears, the secondary user must leave the channel in use in time and return the channel to the primary user. On the other hand, when the primary user occupies the channel, the slave user can access the channel without affecting the quality of service of the primary user. The CR communication terminal has sense, management, and adjustment functions. First, the CR communication terminal can sense the frequency spectrum and channel environment in the working environment and according to specific rules according to the detection results. It can determine the sharing and allocation of spectrum resources; on the other hand, the CR communication terminal can change the working parameters online. The transmission parameters, such as carrier frequency and modulation method, can adapt to environmental changes. In cognitive wireless communication networks, spectrum sensing is a crucial technology. The communication blocks for broadband connection was shown in the following fig.2

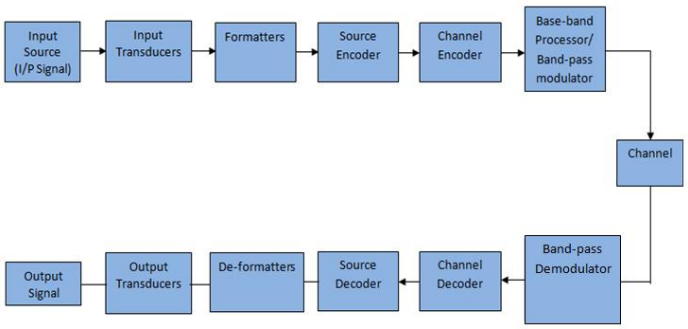

Fig.2. Communication blocks of broadband connection

Commonly used Spectrum sensing algorithms include power detection, matched filter detection, and cyclostationary feature detection methods. These methods have their advantages and disadvantages. The performance of these algorithms depends on the previous information obtained. Existing spectrum sensing algorithms: matched filter, power detection, and feature detection methods. An essential matched filter can be used only if the signal is known. A power detector can be used when the primary signal is unknown and can be imaged. However, its performance deteriorates when using a short sensing time because the main idea of the feature detector is to use the cyclostationarity of the signal to detect through the spectral correlation function. The noise is a broad stationary signal and does not correlate, while the modulated signal is correlated and cyclostationary. Hence, the spectral correlation function a distinction can be made between the noise energy and the modulated signal's energy.

In an environment of uncertain noise, the performance of the feature detector is better than energy detection. The performance of feature detectors under a low signal-to-noise ratio is low, and high computational complexity and long tracking time are required. It reduces the data capacity of the CR system. With the development of wireless communication technology, spectrum resources are becoming tenser and tenser. The channel management in proposed mobility management model was shown in the following fig 3.

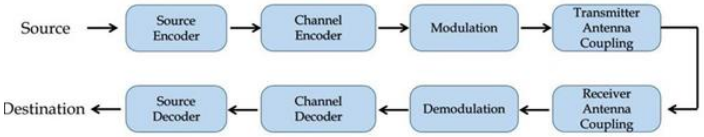

Fig.3. Channel management in proposed mobility management model

Since CR technology can alleviate this problem, CR technology has been focused on wireless communication

networks, and many wireless communication network standards have introduced cognitive radio technology Such as IEEE 802.11, IEEE 802.22, and IEEE 802.16h. 802.16h in the agreement, WiMAX has the critical content of dynamic spectrum selection to facilitate the use of radio and television frequency bands, and its foundation is spectrum sensing technology. Wireless Local Area Network In the IEEE 802.11h international standard for radios, two crucial concepts are introduced: dynamic spectrum selection (DFS) and transmit power control (TPC), and applied to cognitive radio wireless local area networks. In the 802.11y standard, orthogonal frequency division multiplexing (OFDM) provides different bandwidth options. Technology is used, which can achieve rapid frequency switching. WLAN (Wireless Local Area Network) systems use the characteristics of OFDM to avoid skipping by adjusting the frequency and transmitting power parameters. Interference with other users working in this frequency band. Optical fiber wireless system of wide optical fiber communication bandwidth. Due to the advantages and flexible characteristics of wireless communication, it is widely used.

4. COMPARATIVE ANALYSIS

The proposed mobility management model (MMM) was compared with the existing broadband wireless communications system (BWCS), wireless broadband system (WIBRO), smart grid wireless communications system (SGWCS) and Mobile Radio Model (MRM)

Connectivity Management: Broadband refers to wide bandwidth data transmission. It refers the internet as information being sent between two devices. In this case, broadband is the conduit through which that information moves. There are different types of broadband connections like ASL, DSL, Cable, and Fiber. All technologies aim to provide high-speed internet service to their users. For example, fiber optic cables are a great technology providing consistent speed and high bandwidth to users. The Table.1 expressed a comparison of connectivity management between existing and proposed models,

Table.1. Comparison of connectivity management

Inputs	BWCS	WIBRO	SGWCS	MRM	MMM
100	75.47	67.75	53.32	78.91	87.90
200	74.83	66.22	52.07	77.82	86.74
300	74.17	65.72	49.34	77.34	85.97
400	73.52	64.53	47.60	76.45	84.94
500	72.87	63.52	45.61	75.67	83.97
600	72.22	62.50	43.62	74.88	83.01
700	71.57	61.49	41.63	74.10	82.04

Broadband provides the Internet by using multiple frequencies to transmit large amounts of information, rather than the single frequency used by older dial-up connections. Broadband here refers to using more than one band for data transmission. In simple terms, dial-up is a one-way street where only one vehicle can travel at a time. At the same time, broadband is a multi-lane highway where many vehicles can travel together. Here each vehicle is a packet of data that can send or receive. The parallel transmission of multiple data packets simultaneously via broadband increases the speed of the Internet.

Multichannel transmission Management: These systems are large and complex technical systems that incorporate the most modern knowledge and technologies obtained in various fields of science and technology. In order to provide a concise and, at the same time, a complete description of these systems, it is necessary to use generally accepted (preferably internationally agreed) terms and definitions of various objects, processes, and devices related to this part. The Table.2 expressed a comparison of Multichannel transmission Management: between existing and proposed models,

Table.2: Comparison of Multichannel transmission Management

Inputs	BWCS	WIBRO	SGWCS	MRM	MMM
100	81.10	72.43	60.07	84.01	93.00
200	79.61	70.46	57.65	81.81	91.01
300	78.81	69.33	57.24	81.01	89.81
400	76.48	68.12	55.64	80.34	89.33
500	75.33	66.57	54.22	78.84	87.73
600	73.87	65.16	52.85	77.66	86.51
700	72.40	63.76	51.48	76.48	85.29

Information Management: It is a collection of data about events, phenomena, or objects around us. Various signs (symbols) are used to transmit or store information, a form of information presentation. Such signs may be human spoken words and phrases, letters and written speech, gestures and diagrams, and mathematical and musical signs in a particular language. A set of signs that display this or that information is called a message. The Table.3 expressed a comparison of Information Management between existing and proposed models,

Table.3. Comparison of Information Management

Inputs	BWCS	WIBRO	SGWCS	MRM	MMM
100	77.87	79.78	62.37	79.36	92.42
200	78.53	80.28	65.10	79.84	93.19
300	79.19	80.78	67.83	80.32	93.96
400	79.85	81.28	70.56	80.80	94.73
500	80.51	81.78	73.29	81.28	95.50
600	81.17	82.28	76.02	81.76	96.27
700	81.83	82.78	78.75	82.24	97.04

The message may be electrical or non-electrical. In most cases, messages of a non-electrical nature are of interest. The source and receiver of messages are separated by some medium in which the source creates interference. It is these disturbances that display messages and are perceived by the receiver. For example, during the conversation, the source of messages is the human vocal apparatus, air pressure that changes in space and time - sound waves act as a message, and the human ear acts as a receiver.

Transmission Management: The process of sending (transporting) a message from a source to a receiver according to accepted rules is called communication. In this case, some

material carrier of the message and a physical process of displaying (hearing) the transmitted message are used. The latter is called a signal. The nature of the physical process of information transmission determines the type of signal. If the physical process is the transfer of electric current (voltage), the transfer of sound-sound vibrations is used; the signal is called electricity. The Table.4 expressed a comparison of Transmission Management between existing and proposed models,

Table.4. Comparison of Transmission Management

Inputs	BWCS	WIBRO	SGWCS	MRM	MMM
100	76.22	77.88	78.80	76.84	89.83
200	77.23	78.25	81.12	78.27	91.26
300	78.24	78.62	83.44	79.70	92.69
400	79.25	78.99	85.76	81.13	94.12
500	80.26	79.36	88.08	82.56	95.55
600	81.27	79.73	90.40	83.99	96.98
700	82.28	80.10	92.72	85.42	98.41

A set of mechanisms ensuring messages are transmitted from a source to a receiver constitutes a communication channel. The transmission of messages through electrical signals is called telecommunication, respectively, and the communication channel that provides such transmission is called a telecommunication channel.

Channel Management: For non-electrical messages to be transmitted over a telecommunication channel, they must undergo certain transformations performed by Primary Message Converters (PPS). PES is a device that generates a primary electrical signal (PES) at the transmission point - an electromagnetic oscillation, the change of whose parameters corresponds to a message of a non-electrical nature. Examples of PES are telephone, telegraph, television, an audio broadcast signal, and other signals. One can name a microphone, photodiode, or television-transmitting camera as typical PBS. The Table.5 expressed a comparison of Channel Management between existing and proposed models,

Table.5. Comparison of Channel Management

Inputs	BWCS	WIBRO	SGWCS	MRM	MMM
100	71.60	73.57	84.37	73.17	86.16
200	73.09	75.54	86.79	75.37	88.15
300	73.89	76.67	87.20	76.17	89.35
400	75.15	78.36	88.95	77.90	91.08
500	76.29	79.91	90.36	79.40	92.67
600	77.44	81.46	91.78	80.90	94.27
700	78.58	83.01	93.19	82.40	95.86

5. CONCLUSION

The primary electrical signal can be transmitted directly through a physical circuit consisting of a pair of metal conductors, but, as a rule, the PES is subject to additional modifications. For example, for transmission through a fiber-optic communication line, TES is converted into a specific type of optical signal and directional transmission in open space into a high-frequency radio signal. On the receiving side, reversals are performed, and the TES is reset. It then goes to an inverse message converter (OPS), a device that converts an electrical signal into a non-electrical message.

Typical OPS are loudspeakers, LED, and TV kinescopes. Different types of telecommunications are classified by the type of PES transmitted or transmission line if the channel communication is global. A telecommunication system is a transmission medium that ensures the transmission of technical means and telecommunication signals. As a propagation medium, wired and wireless lines (or radio links) are used. Wire lines are lines through which electromagnetic signals propagate in space along a continuous conducting medium. The wire includes metal overhead, cable lines, waveguides, and light guides. In radio links, messages are transmitted through radio waves over open space. This type of communication offers long distances, which are suiTable.for moving sources and receivers of the message but are more susceptible to external interference.

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