The difference between live satellite TV channel broadcasting and live Internet TV channel

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ABSTRACT

According to the digital transformation that the world is witnessing today, it has become necessary to understand the way in which live broadcasting of TV channels via satellite and the Internet works. Therefore, the first aim of this study is to reveal the complex processes of video rendering and to know the difference between live broadcasting of TV channels via satellite and via the Internet, and the types of broadcasting for each of them. Since each kind of broadcast has its advantages and disadvantages, the second aim is to know the advantages and disadvantages of both live broadcasting via satellite and live broadcasting via the Internet. People have become accustomed to it, but this coexistence does not mean that we use media and communication media in the same form and pace due to the technical problems that accompany its use, while research recommends that broadcasting via the Internet constitutes the emergence of a new style of media multi-use and, consequently, the emergence of new media professionals, programs, and a wide audience that need attention and support, as well as the expansion of studies that include these types.

Keywords: Live broadcasts, TV channels, satellites, TV channels via the Internet.

Introduction

Communication played an influential role in the history of societies, with the development of communication methods that were characterized by the removal of barriers between countries around the world, and it was able to capture the television broadcast of any live channel using some available technological tools [1].

The twentieth century has truly become the century of media, and electronic inventions have followed at an incredible rate, reaching the stage of satellite television broadcasting, due to to modern communication technology via satellites, and each of its means has been distinguished by its mode of communication [2]. Technical developments witnessed in the communication process and changed its methods and ways of producing and broadcasting media contents, and these developments had clear effects in changing the methods and patterns of communication, and how people today spend long periods of time in front of the screen, so it was necessary for the media to study the difference between live broadcast of television channels via Satellites and via the Internet, and to identify the most effective method [3].

Video is an important form of media. Initially, video was captured and transmitted in analogue form, but with the advent of digital integrated circuits and computers, video was digitized, and video compression became an important area of research, including video broadcasting via satellite, video communication over the Internet, and video

broadcasting over networks due to a variety of factors such as unknown and time-varying bandwidth, delays, and losses, as well as numerous issues such as how to fairly share network resources among many streams and how to perform efficiently. Telecommunications technology, as well as audio-visual communication (a combination of image, text, and sound), are used [4].

A brief history

The curvature of the Earth's surface is a significant barrier to long-distance radio communication. Previously, low-frequency communication systems took advantage of ground waves, which propagate with the curvature of the Earth. Later, the systems were used at high frequencies to take advantage of the ionosphere as a reflector tool for radio waves, necessitating the use of numerous repeaters to transmit signals over long distances beyond the line of sight (LOS). Because of the high altitudes at which satellites are placed, satellites can cover much larger areas, avoiding the problem of ground obstacles [5].

The use of live broadcast satellites was first discussed at the International Union for Remote Communications' International Administrative Radio Conference in 1961. Since then, specialized satellites for direct television broadcasting have been discovered, and it has become possible to broadcast television transmissions through television sets in homes via satellites without the need for ground stations. The former Soviet Union launched a series of satellites known as "Akirag," with the first one launched in 1976.

In the United States, the American company COMSAT "for satellite communications" established direct television services via satellite in 1980, following which the US Information Agency provided a service. In 1983, an international direct broadcast satellite known as "WORDNET" was launched to deliver general news programs to all television services that you wish to use [6].

Due to the large size and complexity of the antennas used, the first generation of satellites relied on fixed and non-moving ground terminals, which resulted in the high cost of this type of system. From the early 1960s to the mid-1970s, satellites were very small in size, and as a result, their transmission power was weak, necessitating the use of massive antennas in ground stations, with a diameter of up to (30 m), but with technological progress, the production of larger satellites began in the 1980s. Because transmission capabilities were relatively high in the previous century, it was possible to use much smaller antennas in ground stations, up to a diameter of (m2). These satellites with small antennas are called (VSAT) systems, which is an abbreviation of the term (Very Small Aperture Terminal) [7].

The 1980s saw tremendous changes and movements in the process of television communication due to the latest developments in communication satellites and direct broadcasting satellites, as the transition from the era of satellites, the distribution of "communication satellites," to the era of direct broadcasting satellites, which is dedicated to direct transmission and reception. This signal of satellites sends a strong signal from the live satellite, which can be received directly by ordinary television sets equipped with a special antenna without passing through ground stations. From satellites whose broadcasts have been changed yet again[8].

Following that, the second generation of mobile satellite services appeared. The mobile ground terminals are small in size and can be moved from one location to another, where they are carried on ships, planes, cars, or even by people, such as personal mobile devices. The system communicates between mobile earth stations and fixed earth terminals or other mobile earth terminals. These systems were developed in the early 1990s to connect mobile earth stations with fixed earth stations that act as a Gateway (GATEWAY) via satellite links [9].

Satellite TV Broadcasting Types

The new generations of satellites for communications services have enabled communication between small mobile devices and one or more satellites, which is the result of the satellites' intelligence, as the system consists of a satellite and a mobile device that can communicate directly with the satellite

without going through the ground station (a transit gate). And the satellite's new functions, which were used in the operations of channel switching, networking, and digital signal processing.

There are ten different types of satellite television broadcasts[10] :

1- Point-to-Point Broadcasting: This method involves sending television signals from a ground station to a satellite, which then picks up the signals and re-broadcasts them to another ground station before distributing them via the local communications network. This mode of broadcasting employs highly efficient point-to-point satellites, but its effectiveness is dependent on the efficiency of the receiving country's local network, as well as the high costs of establishing ground stations for this type, and it is used in countries that broadcast their television signal. Through its ground stations, or in countries that lack an effective communication system and want to make up for lost time while avoiding the difficulties of establishing large ground networks. Many people receive transmissions without having to send anything.

2- Direct broadcasting satellites send a strong signal that is received directly by ordinary television sets equipped with a special antenna, bypassing ground stations that rebroadcast it on local television networks. Direct broadcasting satellites are the satellites that perform this type of broadcasting.

3- Satellite broadcasting via distribution satellites: These satellites distribute television signals to large areas at a low cost, and rely on the use of medium and small mobile ground stations, allowing the establishment of a large number of stations and their installation in multiple locations within the same extended country, where It covers events and sends them to the moon, which returns the signal to other ground stations, such as the "Molina" sat.

Live broadcast via satellite

A satellite is a means of transport and communication between a point and several points on the earth; it receives and then transmits all information, whether television or otherwise. In an appropriate manner to be used within the scope of their needs, such as radio and television, news agencies, photographs, and newspapers, and linking computer information devices [11].

A satellite is a repeater or a microwave amplifier. It receives the signal, amplifies it, and then sends it back to the ground station or several other stations. To prevent interference between signals from ground stations and satellites, it employs two distinct frequencies, one for transmission from the satellite ground station (known as the uplink frequency) and the other for transmission from the satellite to the earth station (known as the downlink frequency). Because of the high frequencies at which satellites operate (from 1 to 30 GHz), as well as the view of the wide frequency band (500 MHz) enjoyed by satellite transmission, this allows for the transmission of a large number of telephone and television channels, as well as high-speed data transmission. It has the advantage of radio broadcasting in that it can transmit from a single station and receive the signal at a large number of receiving stations, as is the case for conferences, Olympic courses, and the World Cup. Satellite transmission can also reach signals in rugged terrain where fixed land lines are difficult to establish. Radio and television broadcasting, long-distance telephone communications, and high-speed data transmission are some of the most important applications of satellite messaging [12].

Satellite broadcasting is dependent on modern transmission and reception techniques, which can be summarized in three scientific steps, which are [13] :

The first step: Space broadcasting: The signal is transmitted via satellite systems by sending it to the satellite modem and then to the frequency-raising circuit, which raises the

frequency of the information signal from ground stations to television satellites via large satellite transmission antennas. To high frequencies suitable for satellite transmission, the signal is sent to the high power amplifier circuit, where the signal power can be increased to high power values so that the signal can reach the satellite located at very high altitudes, which is sent to the moon via the antenna system to reach the signal mechanism.

The second step: Broadcasting from space to Earth. It is the process of re-broadcasting satellite television programs received from ground stations to satellite antenna receivers, and the satellite, in turn, processes them either by reversing them towards the station or other ground stations, or by receiving them and performing the amplification and frequency conversion operations required for satellite-to-Earth transmission.

The third step: Receiving satellite TV broadcasts: These are the processes of receiving satellite TV broadcasts to Earth after the signal is sent by the satellite to the ground stations, and the ground stations receive the signal through the antenna system and direct it to amplifiers with low noise capacity, and then to frequency conversion circuits to reduce the signal frequency to the appropriate ground frequencies and then direct it to the satellite.

There are three fields in the process of receiving satellite broadcasts [14] :

1 - Receiving using a free antenna

2- Encrypted receiving

3- Receiving within the limits of satellite television technology, which is dependent on two critical areas of communication technology.

The first field is the area of land covered by satellite transmission.

The second field is the extent of the satellite's technological commitment in this area.

This is because the higher the satellite is above the Earth's surface, the larger the area covered by its satellite transmission, and vice versa. Similarly, the more closely the satellite's orbit corresponds to the speed of the Earth's rotation around itself - without accelerating or slowing down - the more stable the area of space coverage.

Methods of live satellite channel broadcasting via satellite

Geostationary satellites are used for radio and television broadcasting because they are the most suitable satellites for this purpose due to the need for ground stations to direct antennas directly and permanently towards the moon without the need for satellite motion tracking devices, which are economically costly.

Satellite broadcasting was able to solve this problem by employing a synchronous satellite, which revolves around the globe at the same rate as it does around itself. Dishes are special antennas, and the satellite cannot cover the entire Earth's surface, but is based on covering a specific area of the earth that takes on a circular shape. Space at 11 thousand kilometers per hour in orbit is about 36 thousand kilometers from the surface of the Earth, and in this orbit and at this speed, the moon is able to revolve around the Earth once every 24 hours, that is, the same time as the Earth's rotation around itself, and the future should direct a dish Receiving once towards the broadcasting satellite to be able to receive satellite broadcasts on a continuous basis[15].

There are two types of broadcast satellites[16]:

1- DBS (Direct Broadcast Satellites)

This category includes television broadcasting satellites designed for home receivers as well as Direct to Home Signals. It includes both financial and digital television and radio systems, as well as its extension to provide digital television system service via modem, which includes interactive features and video-on-demand service (Video on Demand (DBS) usually refers to either commercial services or a combination of free channels provided from a single orbital location. Satellite channels are received directly in homes via cables or broadcast satellites, bypassing the main earth stations. The increased power of satellite broadcasts has enabled direct reception of radio and television broadcasts in homes without the need for a ground station. Furthermore, due to satellites' high transmission capacity, small-sized receiving antennas are used

2- Fixed Service Satellites FSS

It is one of the licensed classifications for communications using geostationary satellites, which are used specifically to feed radio and television broadcasting stations and networks, as well as telephony and data communications, as well as direct signal cable systems to homes and satellite television channels. FSS satellites have lower transmitting power than DBS satellites and require larger layer antennas. (Astra, NileSat, and numerous other satellites.)

The components of the live satellite broadcasting system for the home are comprised of a five-part integrated system [17]:

1- The Program Center houses the studios where programs are created. The center houses many devices used by technicians specializing in various fields of television production to produce video and audio.

2- Transmission Center: This is the television broadcasting system's nerve center. It receives programs in the form of digital waves from the control room and sends them to the satellite in orbit around the Earth. Before being sent to the satellite, the data from television programs goes through important processing operations such as:

A- Data compression: It reduces the size of the data to one-tenth of its original size. For example, programs with fast movement, such as games, are compressed to one-third, while other programs, such as news, are compressed to one-sixth, and movies, to one-eighth. As a result, the compression process enabled satellites to nearly double the number of channels.

B - The coding process aims to add error correction codes to electromagnetic signals.

C- Encryption process: Its goal is to allow subscribers to only receive broadcasts.

d- Reception: In contrast to the operations performed at the central station, the home antenna receives this signal and transmits it to the receiver, which processes it.

3- Satellite: It receives television broadcast waves from terrestrial broadcasting stations, corrects, enlarges, and secures them, and then re-broadcasts them to Earth, where satellite dishes can receive them directly.

4-Shower receiver dish: It is a special type of antenna designed to receive a specific type of broadcast, with a surface resembling a large cup and a diameter of at least 40 cm. When the descending or equivalent of the artificial satellite classes) and this appliance is accepted from the broadcasting moon or from several satellite broadcasters, they will come to the front of the reception, which is the wave process.

5-The receiver: The receiver has four functions: it decodes the transmission, reconfigures the encrypted broadcast, and converts the digital waves into their basic components (image and sound) so that the television can transmit them to the split-width waves. TV set.

The Advantages and Disadvantages of Satellite Live Broadcasting

The primary **advantage** of satellite TV broadcasting is as follows:

1- live TV broadcasts are based on continuous signals, and TV sets are unified by region so that each TV knows how to receive TV broadcasts.

2- Satellite communications are distinguished by their speed and safety, and direct transmission from satellites to private antennas in homes is used where we can receive the satellite signal without the need for a ground station.

3- Satellite broadcasting has become more simple, dense, comprehensive, and fast, with high sound and image quality, lowering the costs of receiving and sending broadcasts and breaking down geographical barriers, which is what advocates of cultural openness encourage [18].

4- Any television can receive the broadcast signal and pick it up inside the device to adjust it, and direct access to the satellite broadcast puts a huge number of channels at the receiver's disposal, the energies of which vary depending on the purpose for which the patch to be covered was launched and the areas it uses [19] .

However, there are some **disadvantages** to satellite transmission.

1- The noticeable delay in receiving the signal due to the long distance between the Earth and the satellite back and forth, as observed during satellite phone calls.
2- TVs that are not in line of sight cannot receive the signal.
3- Interference and interference between waves propagating near the antennas of both the transmitter and the receiver affect the reception of satellite signals, as do the transmitted signals.
4- Broadcasting can be affected by natural factors such as rain, fog, lightning, and lightning, and may not reach the future [20] .

Methods for broadcasting live satellite channels over the Internet

Multimedia communications technology has liberated television from its traditional role, allowing it to perform new and diverse tasks such as transmitting Conference Video conferences for official, cultural, and scientific institutions, and reports distributed directly to the public via the network [21].

Modern Internet TV broadcasting services include: Apps for streaming television Websites / or digital platforms, which are sites or applications that can be viewed over the Internet without the need to download what is being watched, and these services can be classified into several categories: On the YouTube site, to broadcast everything it offers on its traditional channels, and there are TV channels that have either created individual sites and applications for them to broadcast their programs, such as the MBC channel and its Shahid and Watch VIP sites, as well as Egyptian TV and its Watch it site, or broadcast via the Internet through its sites such as Bein sports. Finally, there are services that only broadcast over the Internet and do not have traditional TV channels, such as Egybest, Netflix, Cinemana, and other global services, and it is worth noting that the majority of these services are either free or have simple discounted subscriptions in order to attract the greatest number of viewers [22].

Streaming was first introduced by RealNetworks a few years ago, and it is a technology that allows users to quickly make video, audio, and other multimedia available over the Internet. The benefit of broadcasting is that it can facilitate access to multimedia resources. Another possibility is to integrate video and audio with other web applications, such as chat and other real-time collaboration tools, when media files (audio and/or video) are sent over the Internet from one computer to another computer so that the media plays as it is delivered, and there is a short waiting period as "buffers" for the broadcast but not for the media. The file must be saved[23].

Types of Internet video communication

Video is pre-encoded (stored) or can be encoded in real time in a video communications application intended for point-to-point, multicast, or broadcast communications (such as interactive videophone or video conferencing). The video channels of the communication may be static or dynamic, packet-switched or switched receivers, fixed or variable bit rate transmission, some form of Quality of Service (QoS), or only the best possible support. The characteristics of a video communication application have a significant impact on the system's design [24] .

There are several different video calling applications, each with its own set of operating conditions or characteristics, and the video streaming service can be provided in the following formats:

1- On-demand video streaming

Video files are already in the video streaming repository and are streamed to viewers on demand, which is the most popular type of video streaming provided by major video streaming providers such as YouTube, Netflix, and Amazon Prime Video.

Some VOD providers (such as Netflix) provide subscription-based professional videos and movies, and viewers must generally pay a monthly fee to use their service. Instead, other services (such as YouTube) rely on user-submitted videos and are typically ad-supported and free. This service can also be found in e-learning applications, Internet TV, and in-flight entertainment systems[25]

2- Live transmission

The camera captures video content and sends it to the viewer. There are numerous applications for live video streaming, including event coverage and video calls. The live video technology used in various applications differs slightly, owing primarily to the strength of the internet connection on both ends of the sender and receiver in general. the following:

A- Unicast (Person to Person): This type is most commonly used in video chat applications. Unicast video over the Internet and video calls that require the two to be simultaneous, this type of broadcast has short delays for the conversation to be smooth between participants, these applications generally operate at a low volume and image quality to make the delay as small as possible, such as Skype and video telephony applications are examples of this type of live broadcasting.

The presence or absence of a channel between the receiver and the transmitter is an important characteristic. If feedback is present, the receiver can provide it to the sender, which the sender can use [26] .

B- Multicast (one-to-one): This is when a source broadcasts a video to a large number of viewers. A well-known example of this type is live broadcasting, which is currently offered by many social networking applications, such as Facebook and Instagram. This type of multicast has many challenges in terms of carrier protocols, clutter, network stability, and cascading changes.

Broadcast television is perhaps the most popular and well-known form of video communication. Broadcasting is a highly effective method of communicating popular content because it can frequently efficiently deliver popular content to all receivers at the same time. An important aspect of broadcast communication is that the system must be designed to deliver the desired signal to each intended recipient. This is a critical issue because different recipients may encounter different channel characteristics, and as a result, the system is frequently designed for the worst-case channel.

For example, in digital television broadcasting, source coding and channel coding are designed to provide adequate reception to receivers on the outskirts of the desired reception area, sacrificing some quality for those receivers in higher quality reception areas (eg in a city centre). Because of the large number of receivers involved in broadcast communications, feedback from receiver to transmitter is generally not possible, limiting the system's adaptability [27] .

C- Multi-Source for one person: This happens when multiple cameras capture scenes and send them to a single viewer. The most common application of this type of broadcasting is multi-camera video surveillance, which is used for security or disaster management. Video content is collected from multiple cameras and displayed on special multi-screen monitoring devices in this type of broadcasting.

D- Multi-source for all: When a group of users in different geographic locations hold a video conference, all users broadcast live to all other users; for this type of broadcast, the multipoint console method can be used to integrate individual participants into a video broadcast. One, as previously demonstrated, most video chat applications, such as Skype and Google Hangouts, support multi-person live broadcasts in addition to one-to-one live broadcasts [28] .

The advantages and disadvantages of live Internet broadcasting

The primary advantage of Internet-based TV broadcasting is as follows:

1- It does not require a large amount of storage space, it can multicast from one person to all, and it does not leave a copy on the hard disk of the user's devices.

2- It does not require complicated software to receive video, and the bandwidth can be adjusted directly [29] .

3- The server only sends the signal to the computers we specify, and the computer must request that the video be broadcast.

4- No physical barriers exist. Broadcasting can reach anywhere on the Internet, removing the state's dominance and control over the media and handing it over to the public.

5- The audience has been transformed from a passive consumer to a contributor to the audio-visual content industry and digital network information as a result of this technology, allowing them to broadcast their works and arts without the need for prior approval from media institutions on their ideas.

6- Forcing those in charge of television to reconsider their roles and jobs in light of a reality in which the Internet has permeated and demonstrated a superior ability to carry messages due to its universality and lack of censorship or interference, and no border authority can prevent it from entering anywhere and at any time [30].

Concerning the disadvantages of live Internet broadcasting:

1- Data lost during transmission cannot be recovered.

2- Video or data playback may be delayed or interrupted if the data rate exceeds the bandwidth.

3- The media player must be compatible, and it is considered a negative if the computer media players are incompatible with one another.

4- Some protection programs on the user's device prevent the broadcast from being played as an external source.

5- Poor Internet services degrade image and sound purity and cause technical and semantic confusion for the recipient [31] .

The difference between live Internet broadcasting and satellite broadcasting

The process of merging television and computers provided an opportunity for television to usher the world into a new era of information, and the computer contributed to accomplishing some tasks with great accuracy in television stations, and the most notable differences can be summarized as follows:

No.	**Live broadcast via satellite**	**Live broadcast on the Internet**
1	The satellite receiver's low cost contrasts with the high cost of satellite production and broadcasting.	The high cost of the Internet-connected receiver to decode and convert the digital signal into an analog signal for display in exchange for low production and broadcasting costs.
2	Except in the case of registration for the program and for limited hours, the traditional television system cannot provide the archived program service.	Provides high-quality home connectivity for storing data in storage areas and retrieving it as quickly as possible when needed.
3	Receiving the satellite TV signal, moving from one channel to another, and selecting the appropriate one from multiple options from different content channels.	Through the ability to display two images on one screen, advancements in the field of Internet television have made it possible to browse the Internet while watching television programs at the same time.
4	Communication between sender and receiver is one-way, and feedback is not immediately available.	Communication between the user and the network occurs in both directions, and feedback is available in real time.
5	This system has a geographically limited coverage area, which is determined by the moon's coverage capacity.	Broadcasting can be received from anywhere in the world that has access to the Internet.
6	The viewer is tied to the show	Removing synchronization between

	map and has only one option: watch whatever he wants at the time of the show according to the show's map and time.	viewing and viewing, as well as the ability for the recipient to see what he wants at the appropriate time, thereby ending the monopoly of information.
7	It is based on continuous signals, and televisions are unified by region so that each television knows how to receive television broadcasts.	Computers must meet certain minimum requirements in order to connect to the Internet.

Conclusions

1- Because the media is dependent on digital technology, it is difficult to forecast future developments and impacts on the media process and methods of competition in the field of media, passing through the forms of its broadcast thanks to the terrible and high speed that characterizes digital technology, so competition in the field of visual media work is primarily based on the image.

2- The internet and new mass media have ushered in an unprecedented era of human communication. People began to coexist with it, but this coexistence does not imply that we use media and communication media in the same form or at the same rate due to technical issues that accompany their use.

3- The public broadcasting service's position in the digital age is represented by creating a social bond to protect society from comprehensive unilateralism in the multi-media world, and it represents a reliable and reliable source at a time when there is not much information available that is certain of its worth.

4- Internet broadcasting represents a boom in the field of television broadcasting, as digital technology has enabled an increase in the number of television channels due to the low cost of their production.

5- Digital technology has improved communication services because digital signals are less susceptible to noise, interference, and interference, allowing for high data flow rates.

6- While video communication over packet networks has advanced significantly in recent years, from download and playback to various adaptive technologies and direct use of network infrastructure, we believe that live broadcasting will remain a compelling area for future exploration, development, and deployment.

7- The privacy of video contents, particularly live contents, has become a major concern, particularly in the form of video surveillance or user-based live broadcast capture locations and recording of various unwanted content. A person doing a live broadcast from the street, for example, may inadvertently.

8- The copyright problem is unique to subscription-based video streaming services (eg Netflix). The practice of securing digital contents in order to prevent illegal copying and distribution of protected material is known as digital rights management.

Recommendations

1- The importance of paying attention to technological development and the use of digital systems in the field of television work, as well as digital devices such as cameras and channel studio devices, and investing in the field of digital technology.

2- Electronic media are modern means of communication, but there is a knowledge gap, and many people have been unable to absorb them or control how they are used. As a result, we must train our workforce to keep up with the world's rapid development.

3- The Internet, despite its availability, still suffers from weakness in the provision of services on the one hand, and on the other hand, it is slow to download and use, which constitutes a burden and impedes access to the required sites. Therefore, we need to work on rehabilitating the infrastructure of the Internet.

4- The need for in-depth studies and an attempt to harness modern media technology in developing information infrastructure in order to improve the reality of satellite broadcasting in our countries.

5- Internet broadcasting represents the emergence of a new type of multi-use media, and thus the emergence of new media professionals, programs, and a large audience that requires attention and support, as well as the expansion of studies that include these types.

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