Acta Scientific COMPUTER SCIENCES

Volume 5 Issue 10 October 2023

Research Article

Reflector Satellites Without Transponders Directly Replace Existing Technology Synchronous Satellites

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Received: September 20, 2023

Published: September 30, 2023

Abstract

From the current technical survey and summary of the existing satellite transmission of electromagnetic wave path, it is found that the accessories of existing technical satellites restricting broadband parameters and power parameters of power parameters are forwarders; assuming an innovative technology: implement a reflection satellite Satellites that limit power parameters; realize a reflective surface satellite (including reflex surface base station). The theory is electromagnetic wave reflexes. The actual structure is: the bracket fixed metal surface is made of convex surface surface to form a reflected surface satellite. As a result, the reflective surface satellite is a satellite that is not a transformer, and the accessories that eliminate restricted broadband parameters and limit power parameters. The reflective satellite far exceeds the existing synchronous satellite broadband parameters. The existing information technology and reflection satellites jointly implement the border area and the balanced information network of developed cities, laying a technical guarantee for the comprehensive balanced development.

Keywords: Reflector Satellites; Broadband; Bottleneck; Satellite

Introduction

In 1996, during my teaching practice, I discovered the problems of existing satellite transmission electromagnetic wave path technology [1] and limited satellite programs (or narrow bandwidth [2]). Through experimental and innovative research [3], I achieved the use of metal convex surfaces to form reflective satellites [4]. Development and Application.

Overview of existing synchronous satellite accessories

The existing satellite reflector structures include antenna concave (A), solar panels, transponders, etc. Among them, repeaters include receivers and transmitters. The satellite image is shown in figure 1.

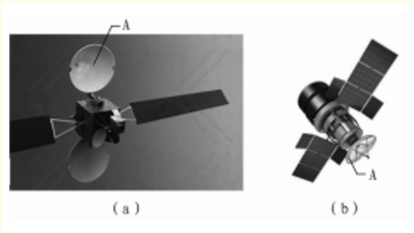

Figure 1: Satellite image.

In Figure 1, the antenna concave surface (A) adopts a metal concave structure and is a satellite reflector antenna, which belongs to common accessories of existing satellites.

Overview of ground receiving satellite receiving stations

As shown in Figure 2, the satellite ground receiving station includes an antenna concave (B), a receiving tuner, and a receiver. The satellite ground receiving station is shown in Figure 3. Figure 3 is a physical enlarged view of the antenna concave surface (B) in Figure 2 [4] and an innovative application of the physical image. The experiment on the right of Figure 3 shows that in a waveguide, the electromagnetic wave undergoes countless reflections before reaching the receiver [5]; It can also indicate that electromagnetic waves reflect twice on the wireless concave surface (A) and the wireless concave surface (B); Compared with waveguide tubes, wireless concave surfaces (A) and wireless concave surfaces (B) have less electromagnetic wave reflection loss.

Current status and discovery patterns of existing satellite distances

Taking the live broadcast satellite of Zhongxing 9 as an example. The uplink frequency band of the Zhongxing 9 live broadcast satellite is 17. 3GHz to 17.8GHz, with a downlink frequency band of 11.7GHz~12.2GHz, with 22 Ku band transponders and a traveling wave tube amplifier output.

Figure 2: Existing Satellite Ground Receiving Stations.

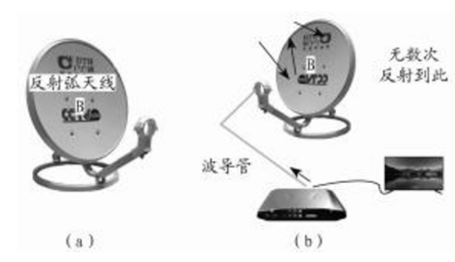

Figure 3: Schematic diagram of moving existing satellite transponder accessories to the ground.

The output power is 120W/240W (single tube/parallel connection), and the antenna operates in circular polarization mode, broadcasting 150-200 sets of standard definition television programs (SDTV), high-definition television (HDTV), and comprehensive services such as data transmission. The arrow in Figure 2 refers to the longest medium distance of the electromagnetic wave transmission path | AB |, with air as the medium; | AB | distance is 3 6000 km; The distance from the transmitter of the existing satellite's repeater to the concave surface (A) of the satellite reflector antenna (hereinafter referred to as concave surface (A)) and from the receiving high-frequency head of the satellite ground receiving station to the wireless concave surface (B) is both tens of centimeters.

Based on the current commonality of satellite technology, it has been found that electromagnetic wave frequencies greater than 1GHz are emitted from the transmitter of the transponder, and The concave surface (A) of the satellite reflects, enters space, and then passes through 3 After 60000 km, it is then reflected by the concave surface (B) of the ground satellite receiving station's reflector antenna and transmitted to the satellite ground receiving high-frequency head.

Design a reflector satellite

According to practical data and the transmission path of electromagnetic waves with frequencies greater than 1GHz, air is used as the medium, and linear transmission is used for the design of reflector satellites.

Transmission path

The schematic diagram of the existing satellite transponder accessories moving to the ground is shown in Figure 4. The distance | AL | between the transmitter (L) of the existing satellite transponder and the concave surface (A) of the satellite reflector is several tens of centimeters. Assuming that the existing satellites remain stationary in space, it is only assumed that the transmitter of the satellite repeater is extended and moved 3 6000km to reach the ground, with a movement distance | RA | of 3 6000 km, allowing the transmitter (L) of the existing satellite repeater to operate normally at ground R, allowing users to use the transmitter (L) of the repeater to emit electromagnetic waves, which are transmitted to the concave surface (A) through an air medium path. The original | AL | distance is several tens of centimeters, which can be ignored. In reality, | RA | is a newly added distance. At this point, the transmitter power of the transponder needs to be increased by at least twice in order for the transmitter of the ground transponder to emit electromagnetic waves and become a beam of electromagnetic waves. Under the condition of passing through air to reach the concave surface (A), and then passing through the concave surface (A), the reflection effect is directly achieved, And it passes through the air to reach the concave surface (B) of the reflector antenna at the ground satellite receiving station, allowing users at B to receive and use it, which belongs to the downlink frequency of existing satellites. It is equivalent to the transmitter moving to the ground transmitting along the RA path to replace the "uplink frequency" of existing satellites.

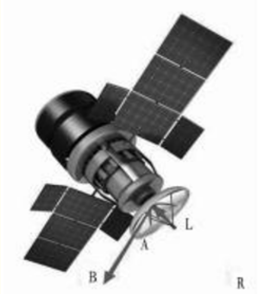

Figure 4: Schematic diagram of moving existing satellite transponder accessories to the ground.

Key technologies

The cross-sectional area of electromagnetic waves reaching point A is related to the frequency. The position of R is related to the curvature of the concave surface (A) at A. The curvature change of concave surface (A) is a key innovative technology. The only solution is how to change the shape of the concave surface (A) so that the uplink frequency is reflected by the concave surface (A) and converted to the original downlink frequency.

Transmission path accessories

Under the condition that the transmitter of the existing satellite transponder has sufficient transmission power, in the sky, it is only necessary to move the transmitter of the satellite transponder to the ground (other satellite accessories remain stationary), and use the transmitter of the satellite transponder on the ground to transmit and concentrate electromagnetic waves in a wave duct, along the extension.

The original path of air as the medium is transmitted to the concave surface (A). The physical image of the magnetic fiber is shown in figure 5.

Figure 5: Magnetic fiber.

Using a waveguide tube to concentrate the transmitter of satellite transponders, electromagnetic waves are emitted to the reflecting surface (A) of existing satellites in the sky, and then passed through The reflecting surface (A) directly reflects onto the reflecting surface (B) of the ground satellite receiving station, allowing users to freely use it. From it, you can Other accessories of the satellite were found to be unused.

Therefore, the reflective surface (A) of existing satellites needs to be made into a product with a reflective surface satellite structure in order to enable the transmitter of ground based transponders to transmit The upstream frequency is achieved through reflection on the concave surface (A) and then converted back to the original downstream frequency.

Specific reflective surface satellite products

Structure

Reflective surface satellites (including reflective surface base stations) are composed of a convex reflective surface and a bracket, which fixes the convex reflective surface.

The electromagnetic wave transmission system composed of magnetic fibers and reflector satellites is shown in Figure 6. Hollow metal balls (or plated metal surface balls, etc.) are reflective surface guards One of the star structures.

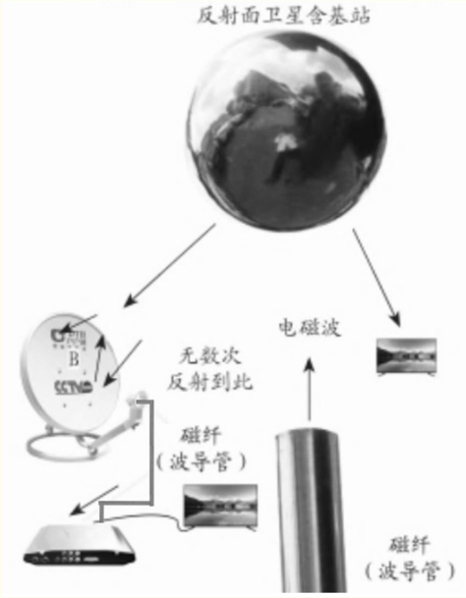

Figure 6: Electromagnetic Wave Transmission System Composed of Reflective Surface Satellite, Magnetic Fiber, and Magnetic Fiber Receiver.

Production efficiency

The designed reflector satellite structure reduces many accessories compared to the existing synchronous satellite structure, achieving the transformation of satellite structure from quantity to quality and realizing the transformation of reflector satellite products. Mainly reflected in novelty, creativity, and practicality: there is no configuration of a series of accessories such as a repeater on the reflecting surface satellite, which solves the problem of limiting the power size of the repeater and narrow bandwidth (or fewer programs). In space, there is no limit on the number of transponders (i.e., the reflector satellite is not limited by the bandwidth of the transponders) or the size of the solar panel power supply. Using transponders on the ground can facilitate free production, installation, maintenance, replacement, use, and conversion of the number of transponders in different frequency bands on the ground; The power of the transmitter can be conveniently supplied to the power tube by providing electrical energy from the ground. Reflective surface satellites have multiplied the broadband capacity and power freedom of satellites, and also increased their service life (i.e., there are no electronic products such as repeaters on reflective surface satellites); Reduced maintenance, manufacturing, and operational costs; Reduced the huge cost and maintenance cost of ground wired and fiber optic network construction.

The reflector satellite structure is simple, lightweight, and convenient to use. There is only one core accessory among the two accessories, and the other only serves as a support; By using a reflective surface at close range to facilitate the establishment of a base station, using a "convex reflective surface" at high altitudes, or using a "convex reflector" below unmanned aerial vehicles, or using a low altitude reflective surface satellite, low altitude high-frequency broadcasting stations can be solved. For example, achieving high-frequency WiFi on the ground. If solar panels and other equipment are heavy, structurally complex, and have limited space on existing satellites in space.

In order to save the cost of reflecting surface satellites, it is recommended to use electromagnetic wave frequencies greater than 1GHz. Otherwise, the satellite structure of the reflecting surface will be larger. The directionality, spatiality, and reflectivity of satellite frequencies on the launch surface can be further applied as IP addresses; The strength of frequency power and reflection ability can be used as control measures. This can solve the problems of existing satellite power limitations and broadband bottlenecks; In a large amount of practice, certain technologies involved are both simple and effective anti-interference techniques.

On the basis of integrating ground wired and wireless optical cables, electromagnetic wave frequencies above 1GHz are symmetrically and asymmetrically transmitted through ground satellite relay stations, ground satellite WiFi (i.e. high-frequency WiFi base stations [7]), ground satellite mobile phones [9], one-way or two-way broadband, etc., allowing users to use them more freely and achieving information balance in border areas, mountainous areas, grasslands, and developed cities, Solve the problem of achieving comprehensive and balanced network system spacing (as shown in Figure 7). This is also the original abstract of the patent (application number 2020110668912) [8]. For example, one reflector satellite is equivalent to the sum of broadband frequencies of more than five consecutive existing satellites; Dramatically increasing the frequency of the satellite center several times. Change the existing satellite's repeater and bandwidth to ground users for free use, such as high-frequency mobile phones containing satellites WiFi, etc.; To achieve comprehensive monitoring, especially in the management of students by teachers in border areas, it is easy to achieve the full process, repeated on-demand viewing, and live teaching of various subjects for students of all grades, as well as special tutoring for a small number of students.

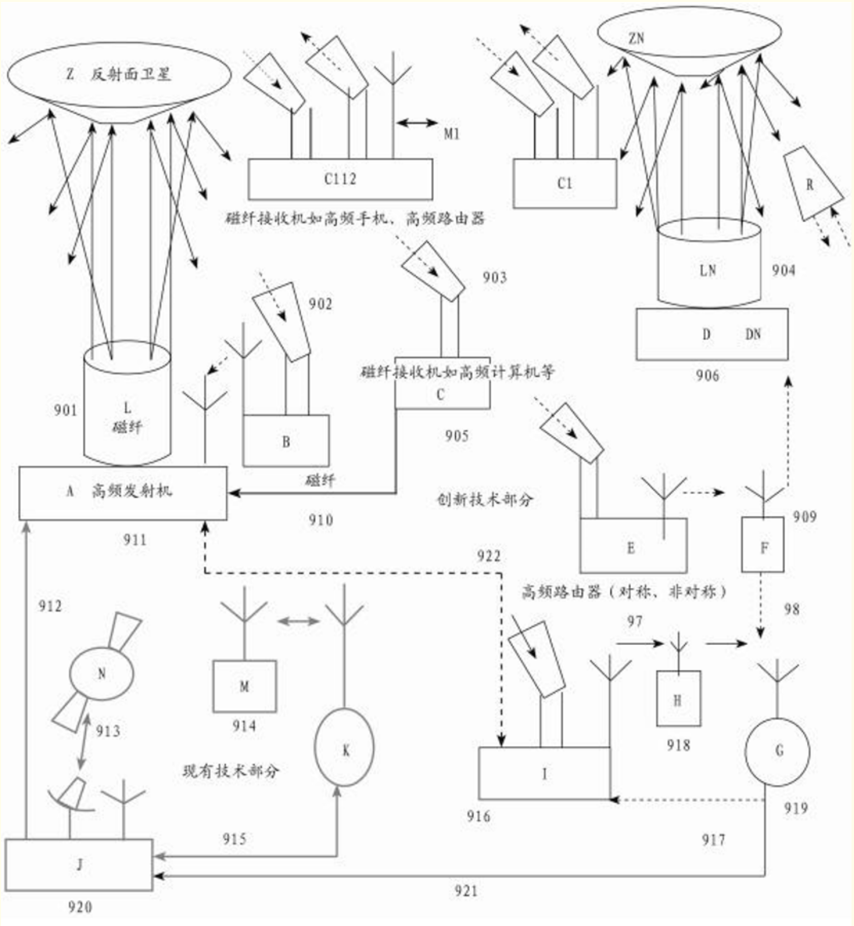

Figure 7: Fusion diagram of reflector satellite and existing technology information system.

Materials

The metal material is related to the surface material used to produce convex surfaces and the required contour value Ra, such as smooth metal surface balls, hemispheres, or ellipses. The surface is directly made of metal material or coated with metal on a certain material surface. The satellite structure and metal surface treatment of reflective surfaces are related to technological development.

Reflection surface contour value Ra

The key technology is the contour value of the metal surface and the requirements for a certain metal. The contour value (core technology) that the convex surface of a reflecting satellite structure should achieve is related to a certain metal material or alloy, and electromagnetic wave frequency parameters. The contour value of the metal surface is related to the frequency of electromagnetic waves.

Reflective surface radian

The surface curvature value of the convex surface of the launch surface satellite structure is related to the distance from the reflecting surface to the user and the range of service users. The surface radian value and effective diameter of a convex surface are related to the frequency value of reflected electromagnetic waves, diffraction, and reflection accuracy. The lower the frequency of electromagnetic waves, the worse their straightness, the greater their diffraction, and the easier it is to bypass the reflecting surface satellite, resulting in a larger effective diameter of the reflecting surface satellite; The higher the frequency of electromagnetic waves, the stronger the straightness of electromagnetic waves, the smaller the diffraction, and it is not easy to bypass the reflecting surface satellite. The reflection value is larger, and the effective diameter of the reflecting surface satellite is smaller, which is also related to the height of the reflecting surface satellite.

Reflector satellite implementation

The fixed convex reflector is placed in the sky as a satellite, and the fixed convex reflector is placed on a platform as a relay station (as shown in Figure 6). Detailed patents can be seen: electromagnetic wave fiber tube for bending transmission of high-frequency electromagnetic wave information (patent number: 201510237920. X), and other patents (2017107843011), which have been indirectly verified.

Reflector satellite example

Example of a designed reflector satellite. Unidirectional users directly use the high-frequency head of the satellite ground receiving station, or directly use the equipment that integrates the high-frequency head and receiver ①. For the convenience of users' mobile use, the reflector antenna of the existing satellite ground receiving station is modified into a funnel antenna, and 902 and 903 in Figure 7 are funnel antennas, etc; Alternatively, increasing the transmission power of the repeater to generate downstream frequency magnetic flux and increasing the miniaturization of the receiving end equipment; When the magnetic flux of the downlink frequency increases to a certain value, the reflector antenna develops towards a funnel antenna, and the funnel antenna evolves towards a metal rod; Or increase the sensitivity of the receiving end and other receiving methods.

Conclusion

The bracket is fixed on a convex metal surface to form a reflector satellite, achieving a low-cost information network system without repeaters, while exceeding the existing satellite broadband parameters or program quantity. The implementation of reflective surface satellites, especially in border areas and developed cities, has achieved good results in achieving balanced information networks, comprehensively improving course live teaching or comprehensive monitoring, and addressing issues such as the cost of optical cables [11] and low-frequency wireless base stations [12].

① If the center frequency of a program channel is used (equivalent to a light beam Fiber) is used for reflector satellite broadband service technology using EPON technology, bidirectional, single Symmetry of WeChat, e-commerce, e-books, live teaching, etc. Or an asymmetric network can be achieved. Unable to purchase and send for remote users Signal transmitting equipment or inability to transmit signals can be solved by receiving signal functions This issue.

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