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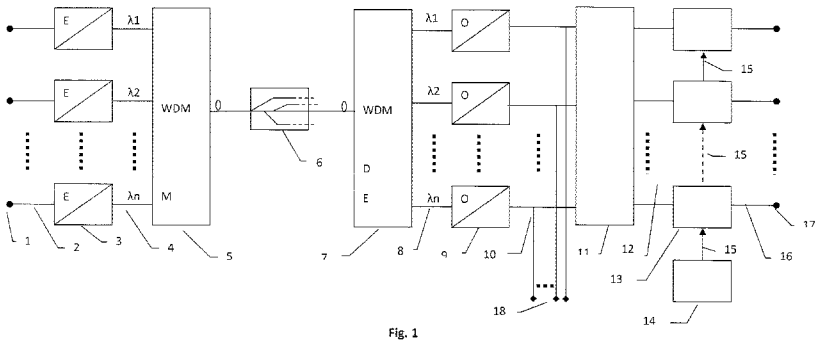

Fig. 1

(57) Abstract: The invention is intended for Satellite Master Antenna Television (SMATV) systems where one or several antennas of satellite or terrestrial television can be shared among many users. The system for distribution and community access of signals from satellite dishes consists of a multitude of optical transmitters of different waves, the inputs of which are connected to packed signal sources and the outputs are connected to the shared optical multiplexer the output signal of which enters the optical signal distribution network that may have passive or active components. From the branch of the optical network the optical signal travels to optical demultiplexer the outputs of which are connected to inputs of optical receivers and the outputs of the latter are connected to signal commutator and packed broadband outputs. Each output of a commutator is connected to corresponding unpacker, each output of which is connected to satellite signal receiver. Frequency unpackers are connected to the shared block of heterodynes. The system is compact, reliable, and convenient and enables every user to connect to the shared terrestrial television antenna and to one of many satellite dishes anytime.

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DISTRIBUTION OF SIGNALS FROM SATELLITE DISHES

Technical Field

[1] This invention is related to television, satellite repeaters, community access cable networks and use thereof, also to receiving, preparing, converting, transferring, and distributing video and audio data. In particular, this invention is related to receiving and transmitting television satellite signal from one or several central signal sources (satellite dishes) to one user or to a multitude of users.

Background Art

[2] Television is distance redirection of images of moving or non-moving objects by means of wired or radio communication. The main components for image transfer are television transmission camera, transmitter, sending antenna, communication channel, receiving antenna, TV set (or other receiver). This entire scheme is pervaded by signals (e.g., television, satellite, etc.) that carry information on the said moving or non-moving objects. Production, processing, sending and receiving of these signals are among the key issues for modern research aimed not only at achieving the best possible technical characteristics of the signals, but also at ensuring the best possible signal quality, more convenient, simpler and economical use / distribution of television and / or satellite signal with regard to the end user point.

[3] The world of patents, research articles, and commercial applications knows many technologies, methods and inventions related to television and satellite devices. It also knows many systems for distributing television and / or satellite signal via coaxial networks, for example: European patent EP1347644 published on 24 September 2003 or German patent DE20211276 published on 7 November 2003. However, the common key shortcoming of such systems is that long-range transmission of signal of remote antenna requires additional placing of intermediary linear radio frequency amplifiers to compensate for substantial signal damping that particularly manifests in high frequency (RF) signal transmission via coaxial lines. Non-uniformity of transmission characteristics of amplifiers as well as non-uniformity of cable damping lead to non-uniformity of signal of aggregate common system. Because of these reasons the number of users of the cable system usually does not exceed 200, and the length of the distribution network does not exceed 300 m. Use of special cables and amplifiers makes the system very expensive.

[4] Optical network distribution systems have recently started to be used. One of the reasons for this is that optical cable features significantly lower damping than coaxial

cable does, for example, the Dutch patent NL9101040 published on 18 January 1993 is known. The principle of this invention is optical system for signal transmission, where cable television 45-850 MHz signal and satellite 0.9-2 GHz signal are transmitted along with low-frequency 0.3-3 KHz telephone signal. Optical multiplexing means are used for transmission of the signals. The shortcoming of such a system is that the proposed solution cannot be used for transmission and distribution of satellite signal when the signal must be received and distributed from several different satellite dishes.

[5] In addition, there is known a German patent DE4334440 published on 13 April 1995. It offers a solution where before being transmitted to coaxial network the signal is converted to lower frequency and only then it enters the coaxial network. Such a solution reduces losses sustained at high frequency in coaxial network and enables long-range transmission of signal of rather high quality. However, in attempt to transfer the maximum amount of information during the same period of time, it is always sought to maximise the frequency of the signal being transmitted, and along with increases in frequency of the signal being transmitted the damping increases as well and this limits the distance of data transfer. To avoid this problem, all signals in the frequency band, which coincide at the receiving side, are converted and arranged in consistent succession thus making a single broadband signal. Then this signal is transmitted to optical converter and via optical cables it reaches individual users, where it is converted again, from optical signal to electric one. Afterwards this signal is passed directly to a radio or television receiver, or is appropriately converted and passed to other receivers. The problem with this invention is that the system cannot serve several satellite dishes simultaneously.

[6] There is known the Invacom company's patent application WO2007096617, published on 30 August 2007. This application describes a distribution system of satellite television broadcast. The system contains a series of cable and optical connections that are capable of transmitting information via radio frequency and optical fibers. Here the function of signal receiving can be performed by low noise block-downconverter of satellite dish, which converts the focussed signal to low frequency electric signal. Its purpose is to receive the data from a satellite dish or from conventional TV or radio antenna designed for receiving terrestrial TV signals. Signal decoders can be independently controlled simultaneously by each user. The problem with this system is that the system cannot process and transmit packed signals of multiple satellite dishes if multiple receiving antennas are used at the transmission centre.

[7] Moreover, there is known the FoxCom company's patent US6486907 published on 26 November 2002. The satellite signal distribution system described in this patent has a base station with an optical transmitter that receives a combined signal made up of

satellite and television signals; it also has a number of optical signal receivers and distribution devices. The main disadvantage of this system is that the system is not capable of transmitting and distributing multiplexed satellite signal. Furthermore, the system does not provide for remote procedure for antenna selection and signal connection.

[8] By technical level (background of invention), the closest is the American patent US20100319035 published on 16 December 2010. This patent describes a community access satellite television system for apartment or commercial buildings. The essence of the invention is that on the signal making side there is a converter for frequency multiplexing of satellite signal into one cable. The system consists of signal distribution devices and at least one user's end device with frequency converter that transforms the signal so that it is suitable for a satellite receiver. But for signal distribution this system employs a coaxial cable and therefore contains the same shortcomings that are characteristics of coaxial cable networks. Furthermore, the system is capable of using and distributing only one multiplexed signal.

[9] All over the world, the current systems for video and / or audio signal transmission from satellite transmitters (repeaters) to the end user (a TV set or other receiver of video / audio signal) are based on transmission of these signals by coaxial networks. When satellite transmitters (repeaters) were few and construction of coaxial networks was one of the cheapest options, the use of coaxial networks that transmit and distribute these video / audio signals was and remains the foundation of community access cable networks. But as the modern technologies develop and get cheaper and as the number of satellite transmitters (repeaters) increases the use of coaxial networks becomes highly complicated and inconvenient and sometimes not even possible. In addition, such cumbersome solutions bring increased chances of failure and deteriorated quality of signal, particularly when distances are considerable. Consequently, people more and more often think that new, promising solutions to this problem must be sought.

Disclosure of Invention

Technical Problem

[10]

Solution to Problem

Technical Solution

[11] The aim of this invention is a community access system for distribution of signals from satellite dishes, which would deliver a more convenient, better quality, and more compact solution compared to the currently available ones that are based on coaxial networks. To achieve the aim a community access system for distribution of signals

from satellite dishes is created, which consists of:

[12] a satellite dish capable of (designed for) receiving from satellite repeater a high frequency packed (or unpacked) signal in 0.95-6.00 GHz (or different) range;

[13] electric-optical (E/O) modulators (converters) receiving the said high frequency signal(s) from one satellite dish or multiple satellite dishes and converting these signals into optical signals of certain wavelength (e.g., 1310 nm, 1550 nm, etc.);

[14] a multiplexer of the said optical signals, which combines all optical signals of different wavelengths and transmits them to one optical cable (or several optical cables);

[15] an optical network made up of one optical cable or a multitude of optical cables carrying all received and prepared such high frequency signals (from many satellite dishes) in the form of an optical signal over long distances;

[16] an optical demultiplexer (one optical demultiplexer per each optical cable) demultiplexing the said one optical signal into a packet of optical signals of different wavelengths, where each component of the packet matches its satellite dish;

[17] optical-electric (O/E) modulators (converters) receiving the said components of the packet and converting them to respective electric signals that after the O/E modulators enter the network of coaxial cables;

[18] a commutation matrix network made up of one or more commutation matrixes (commutators) that transmit all the said packed high frequency signal to appropriate unpackers;

[19] frequency unpackers that through the commutation matrix receive from the selected O/E modulator the selected electric signals, unpack these selected packed signals (i.e., convert these unpacked signals to the standard 0.95-2.15 GHz range) and transmit these signals to a satellite television receiver;

[20] a satellite television receiver that enables selection of a respective satellite dish, vertical or horizontal polarisation, and upper or lower range signal, and transmission of it to a respective output device (e.g., a TV set).

[21] Such a system enables:

[22] working with many satellite dishes simultaneously;

[23] putting signals of all the desired dishes into one optical cable and transmitting this optical signal over long distances (compared to coaxial networks, optical networks enable transmitting signals hundreds of times farther under the same external conditions);

[24] avoiding use of cumbersome and hard to implement coaxial networks with amplifiers, couplers, connectors, etc.;

[25] simple, compact, and reliable setup of large and small satellite signal networks.

[26] The bigger the number of satellite dishes in this satellite dish signal distribution and

community access system, the more efficient and attractive this system is, not only with regard to its technical implementation and reliability, but, as prices of optical cables, E/O and O/E modulators, optical / laser equipment and new technologies decrease, also to the economic one.

[27] The key unique features of this system for distribution and community access of signals from satellite dishes are the following:

[28] the system is capable of distributing both multiplexed (packed) and non-multiplexed conventional signal of satellite dishes;

[29] each user of the system can connect to the common terrestrial television antenna and to one of a multitude of satellite dishes;

[30] all users of the network can simultaneously connect to the same receiving dish;

[31] signal distribution requires one fibre of optical cable;

[32] both passive and active optical distribution network can be used in the system;

[33] very remote users are reachable in the system thanks to the fact that optical network featuring very low signal damping is used for signal distribution;

[34] user's satellite television set-top box can control and connect to any dish, choose signal polarisation as well as upper and lower range by DiSEqC protocol commands;

[35] the system uses controllable frequency unpackers;

[36] frequency unpackers use one common block of heterodynes;

[37] number of users can be increased by distributing; optical and / or multiplexed radio frequency by using broadband signal terminals;

[38] this system is compact, safe, reliable, user-friendly, and easy to install.

Advantageous Effects of Invention

Advantageous Effects

[39]

Brief Description of Drawings

Description of Drawings

[40] Fig. 1 gives a flowchart of the system for distribution and community access of signals from satellite dishes, which reveals the matter of the invention.

[41] Fig. 2 gives one of the implementation options for this invention, which is adapted for four signals of satellite dishes and for four users of the distribution network of these signals.

[42] Fig. 3 gives a typical version of packed frequency signal in the system input cable (Fig. 1 pos. 2).

[43] Fig. 4a-4d show spectrum of unpacked signal in the output cable (Fig. 1 pos. 16).

[44] Fig. 5 displays one of the choices for implementation for controllable frequency unpacker.

[45] Fig. 6 presents the system for distribution and community access of signals from satellite dishes, which offers analogue terrestrial television distribution capability and reveals the matter of the invention.

[46] Fig. 7 presents the system for distribution and community access of signals from satellite dishes, which offers digital terrestrial television (DVB-T) signal distribution capability and reveals the matter of the invention.

[47] Fig. 8 illustrates one of the packing options for satellite dish signals, which uses three heads of type Quattro (three Quattro LNBs).

[48] Fig. 9 displays three signal packer diagram intended for packing of three output signals of a Quattro LNB.

[49] Fig. 10 shows three signal, which correspond to output signal of a Quattro LNB, unpacker diagram.

[50] Fig. 11 displays another packing option for satellite dishe signals, which uses three Whole Band LNBs and one Quattro LNB.

[51] Fig. 12 shows two signal packer diagram intended for packing of two output signals of a Quattro LNB.

[52] Fig. 13 presents Whole Band LNB output signal spectrum.

[53] Fig. 14 depicts unpacking option for satellite dish signals, which uses three Whole Band LNBs and one Quattro LNB.

Best Mode for Carrying out the Invention

Best Mode

[54] Fig. 1 shows the matter of the invention: the system for distribution and community access of signals from satellite dishes, made to receive video / audio signal from several different satellite dishes, process it and send to optical network enabling long-range (up to 10 kilometres) transmission of the signal with no need for amplification by appropriate devices in the end user's network. The said system for distribution and community access of signals from satellite dishes consists of a satellite dish (1), coaxial cable (2), electric-optical modulator (3), optical cable (4), shared multiplexer of optical waves (5), shared optical distribution and community access network (6), optical demultiplexer (7), connecting optical cables (8), optical-electric modulators (9), connecting coaxial cables (10), commutation matrix (11) with N inputs and W outputs, connecting coaxial cables (12), frequency unpackers (13), one block of heterodynes (14), set of heterodyne signals (15), connecting coaxial cables (16), satellite television receiver (17), and broadband terminals (18).

[55] The purpose of a satellite dish (1) is to receive 10.7-12.75 GHz V and H polarisation signals from a satellite repeater and convert these signals by using an LNB in a satellite dish (1). An LNB usually converts the signals it receives to lower frequency range.

Quattro LNB outputs the entire received spectrum via four coaxial outputs, each output can cover the 0.95-2.15 GHz range. Whole band LNB outputs the entire received spectrum via one coaxial output, the output can cover the 0.95-6.00 GHz (Fig. 3) or 0.95-5.45 GHz (Fig. 13) range. In case of Quattro LNB, usually four coaxial cables (the 0.95-2.15 GHz range) come out of the LNB in a satellite dish (1), while from Whole band LNB there originates only one coaxial cable (the 0.95-6.00 GHz range). High frequency signal prepared in the satellite dish (1) enters the coaxial cable (2). Transmitted via the coaxial cable (2) the signal enters the electric-optical modulator (3) where it is converted to optical signal. When semiconductor lasers are used, the wavelength of this optical signal may vary (e.g., 1310 nm, 1550 nm, etc.). These optical signals enter the optical cable (4) and get transmitted to multiplexer of optical waves (5). The function of the multiplexer (5) is to combine all laser rays of different wavelengths. The multiplexed optical signal then enters the shared optical distribution and community access network (6). In the shared optical distribution and community access network (6) the optical signal can be split, coupled, strengthened, etc. Then it is passed to remote signal distribution devices, which may be more than one. A remote device contains the following system functional units / modules: optical demultiplexer (7), optical-electric modulator (9), commutation matrix (11) with N inputs and W outputs (when N is number of satellite dishes and W is number of satellite receivers users have (17)), frequency unpacker (13), and one block of heterodynes (14). From the shared optical distribution and community access network (6) the optical signal goes to optical demultiplexer (7) where filters of different wavelengths split it into optical components (rays) of different wavelengths, with each component (ray) matching its satellite dish (1). Then the optical components (rays) enter appropriate optical cables (8) which run to appropriate optical-electric modulators (9). The purpose of an optical-electric modulator (9) is to demodulate light signal and recreate high frequency signal that equivalent to the signal supplied to a laser of corresponding wavelength in the signal production part. Afterwards the connecting coaxial cable (10) is used to pass the packed high frequency signal to commutation matrix (11). The commutation matrix (11) transmits the entire packed high frequency signal to appropriate frequency unpackers (13). A frequency unpacker (13), which via the commutation matrix (11) receives the selected high frequency signal from the selected O/E modulator (9), unpacks (converts) the said selected packed signal to the standard 0.95-2.15 GHz range and transmits this signal to a satellite television receiver (17) via the connecting coaxial cables (16). Frequency unpackers (13) are characterised by use of one block of different or variable frequency heterodynes (14), which is common to all mixers and which makes the required set of heterodyne signals (15). Each satellite signal receiver controls a commutation matrix (11) and appropriate frequency unpacker

(13) and uses these to connect a signal source (dish) and determine the frequency band of the unpacker. The satellite television receiver (17) enables choosing the signal of a respective satellite dish and transmitting this signal to a respective output device (such as a TV set) by controlling a commutation matrix (11) and frequency unpackers (13). Broadband terminals (18) are necessary to make it possible to connect additional user devices that distribute signal.

[56] This system for distribution and community access of signals from satellite dishes (this solution) is characterised by that it does not require cumbersome and hard to install coaxial networks. It also enables long-distance transmitting of signals even without amplification. In addition, compactness, simplicity, and convenience of the system make it particularly attractive to an end user.

[57] Fig. 2 presents a specific option of implementation of this invention, tailored for four signals of satellite dishes and for four users of common network for these signals. It also gives detailed information on possibility to distribute packed radio frequency by using broadband terminals (18) and a four-user additional device for signal distribution (19).

[58] Fig. 3 contains a typical occurrence of packed frequency signal in the input cable of the system (Fig. 1, pos. 2). Having travelled through the optical cable such a signal enters a frequency unpacker (Fig. 1, pos. 13).

[59] A satellite television signal consists of several wavebands:

[60] a) vertical polarisation lower band VL 950-1950 MHz;

[61] b) vertical polarisation higher band VH 1950-3000 MHz;

[62] c) horizontal polarisation lower band HL 3950- 4950 MHz;

[63] d) horizontal polarisation higher band HH 4950-6000 MHz.

[64] Fig. 4 a-d show spectra of unpacked signal in output cable (Fig. 1, pos. 16). Unpacked waveband of satellite television is dependent on settings in the frequency unpacker (13). The choice of frequency band depends on DiSEqC command transmitted by the satellite receiver and entering the unpacker. The following wavebands are available:

[65] Fig. 4a vertical polarisation lower band 950-1950 MHz;

[66] Fig. 4b vertical polarisation higher band 1100-2150 MHz;

[67] Fig. 4c horizontal polarisation lower band 950-1950 MHz;

[68] Fig. 4d horizontal polarisation higher band 1100-2150 MHz.

[69] Fig. 5 shows one of the possible choices for implementation of controllable frequency unpacker (13), which uses two mixers and two heterodynes and is intended for reconstruction of signal of required band from shared multiplexed signal (12) the type of which is revealed in Fig. 3. Frequency band selection is performed using controllable keys S. When keys S1 and S2 are closed, the mixers C1 and C2 are not in use

and vertical polarisation lower band 950-1950 MHz is obtained at output of frequency unpacker (13) (Fig. 4a). When key S1 is open and key S2 is closed the first mixer C1 starts operating, then a horizontal polarisation lower band 950-1950 MHz is obtained at output of frequency unpacker (13) (Fig. 4c). When key S1 is closed and key S2 is open the second mixer C2 starts operating, then a vertical polarisation higher band 1100-2150 MHz is obtained at output of frequency unpacker (13) (Fig. 4b). If both keys are open both mixers C1 and C2 start operating and horizontal polarisation higher band 1100-2150 MHz is obtained at output of frequency unpacker (13) (Fig. 4d). Frequencies of heterodynes of each mixer may be different and variable.

[70] Fig. 6 provides a system for distribution and community access of signals from satellite dishes, which reveals the matter of the invention and offers a possibility to distribute analogue terrestrial television. It shows one of the possible methods to insert the analogue and digital terrestrial television signal TV + DVB-T (21) into the distribution network when additional optical cable is used. To implement this method additional devices are used: optical transmitter with λtv wave laser, optical receiver, radio signal splitter (19) and diplexers (20). The drawing shows CATV input intended for connecting the bidirectional data transmission system of cable television.

[71] Fig. 7 illustrates a system for distribution and community access of signals from satellite dishes, which reveals the matter of the invention and offers a possibility todistributedigital television. It proposes a flowchart of distribution of digital (DVB-T) television signal, which uses one of the SAT television broadcast channels. In this case there is no need for additional optical cable, however, it is necessary to add radio signal (RF) diplexer (22) to the transmission section and analogous diplexer (23) to the reception section.

[72] Fig. 8 gives one of the options for packing signals from satellite dishes. The drawing shows an option for generation of packed signal when Quattro LNBs are used for receiving satellite signal. Packers (24) are used for signal generation.

[73] Fig. 9 presents a three signal packer diagram. It proposes a device for packing overlapping wavebands (24), which is intended for the above-mentioned arrangement. The three LNB signals with waveband of 950-2150 MHz, which enter the block, are arranged in common 950-5450 MHz waveband in the device output.

[74] Fig. 10 illustrates a three signal unpacker diagram. The drawing shows appropriate frequency unpacker (13) and a block of heterodynes (14). The difference is that two heterodynes with frequencies of 4650 MHz ir 6400 MHz are used.

[75] Fig. 11 presents yet another option for implementation of packing of signals from satellite dishes. The drawing shows how to additionally connect a Quattro LNB to Whole Band LNBs the spectrum of which is portrayed in Fig. 13. To achieve this, a two signal packer is used (25).

[76] Fig. 12 shows a packer diagram for two input signals. The drawing proposes a frequency band multiplexer (25). The Quattro LNB signals of two outputs, with waveband of 950-2150 MHz, which enter the block, are arranged in common 950-5450 MHz waveband in the device output. The advantage of this proposal is that the receiving LNBs of two types with different frequency packed signals can use the same unpacker.

[77] Fig. 14 presents an option of satellite dish signal unpacker (13) where LNBs of two different types ('Whole band' and 'Quattro') are used in the system for distribution and community access of signals from satellite dishes. Unpacker (13) that consists of two mixers and three heterodynes is intended for reconstruction of signal of required band from the spectrum of multiplexed signals the type of which is shown in Fig. 12 and Fig. 13. Frequency band selection is performed using controllable keys S. When keys S1 and S2 are closed, the mixers C1 and C2 are not in use and vertical polarisation lower band VL is obtained at output of frequency unpacker (13) (Fig. 13) or band 1 (Fig. 12). When key S2 is open and key S1 remains closed the second mixer C2 starts operating, then a vertical polarisation higher band VH is obtained at output of frequency unpacker (13) (Fig. 13). When key S1 is open and key S2 is closed the first mixer C1 starts operating. In that case keys S3 and S4 are used to select required heterodynes. When key S4 is closed, 2450 MHz are selected as heterodyne frequency and subsequently a horizontal polarisation lower band HL is obtained at output of frequency unpacker (13) (Fig. 13), and when key S3 is closed, 3300 MHz are selected as heterodyne frequency and subsequently a horizontal polarisation higher band HH (Fig. 13) or band 2 (Fig. 12) are obtained at output of frequency unpacker (13).

[78] Descriptions of the best implementation choices are given above in order to illustrate and describe this invention. It is not a complete or limiting description aimed at specifying a precise arrangement or mode of implementation. The description given above should be regarded more as an illustration than a constraint. Obviously, the specialists in this field should clearly see a variety of modifications and variations. The implementation choices have been selected and described so as to enable the specialists in this field to understand in the best way the principles behind this invention and their best practical application for different modes of implementation with different modifications fit for a specific application or implementation customisation, because a particular satellite dish signal distribution and community access system may have different quantitative parameters (such as optical wave length, frequency band, etc.). The invention scope is defined by the claims and its equivalents wherein all these terms have the broadest possible meaning, unless stated otherwise. It must be admitted that modified implementations described by specialists in that field may contain changes that do not depart from the scope of this invention, as described in the claims

given next.

Mode for the Invention

Mode for Invention

[79]

Industrial Applicability

[80]

Sequence Listing Free Text

Sequence List Text

[81]

Claims

[Claim 1] 1. The system for distribution and community access of signals from satellite dishes, which is made up of a satellite signal receiver, signal processing equipment, and signal distribution network, characterized in that this system consists of the following units:
satellite dishes (1) intended for collecting signals from satellite repeaters, guiding these signals to LNBs of satellite dishes (1) and producing high-frequency packed signals in them;
coaxial cables (2) intended for receiving the said high-frequency packed signals from satellite dishes (1) and transmitting them to electric-optical modulators (3);
electric-optical modulators (3) intended for converting the said high-frequency electric signals into optical signals of different wavelengths;
optical cables (4) intended for receiving the said optical signals of different wavelengths and sending them to the shared multiplexer of optical waves (5);
shared multiplexer of optical waves (5) intended for combining (mixing) all the signals (laser rays) of different wavelengths and producing a single aggregate optical signal (ray);
shared optical distribution network (6) intended for splitting, coupling, amplifying, and transmitting the said single aggregate optical signal to the optical demultiplexer (7);
optical demultiplexer (7) intended for splitting, by using filters of different wavelengths, into a packet of optical signals of different wavelengths, with each component of the packet matching its satellite dish (1);
connecting optical cables (8) intended for receiving split packets of optical signals and transferring them to optical-electric modulators (9),
optical-electric modulators (9) intended for demodulating light signals and converting them to high frequency signals that correspond to signals generated in the unit of electric-optical modulator (3);
connecting coaxial cables (10) intended for receiving demodulated high frequency signals and transmitting them to the network of commutation matrixes (11);
commutation matrix (11) with N inputs and W outputs intended for transmitting all the said high frequency packed signal to frequency unpackers (13);

frequency unpackers (13) that from the selected O/E modulator (9) receive through the commutation matrix (11) the selected high frequency signal, unpack this selected packed signal, convert this unpacked signal to the standard 0.95-2.15 GHz range and transmit this signal to a satellite television receiver (17) via connecting coaxial cables (16);

one block of different or variable frequency heterodynes (14), which is common to all mixers and which is intended for making a required set of heterodyne signals (15);

satellite television receiver (17) intended for selecting a corresponding satellite dish (1), vertical or horizontal polarisation, and upper or lower range signal and transmission of it to an output device while controlling the commutation matrix (11) and frequency unpackers (13); and

broadband terminals (18) intended for connecting additional user devices that distribute signal;

the aim being to connect any very remote user of the system for distribution and community access of signals from satellite dishes to the shared terrestrial television antenna and to one of many satellite dishes by using optical network and ensuring high reliability, compactness, convenience, and technological advantage of this system.

[Claim 2] 2. The system for distribution and community access of signals from satellite dishes according to claim 1, characterized in that the above mentioned controllable frequency unpacker (13) consists of two mixers, that can be switched, and of selective filter circuits.

[Claim 3] 3. The system for distribution and community access of signals from satellite dishes according to claim 2, characterized in that any of the mixers can be connected to any of the selected heterodyne.

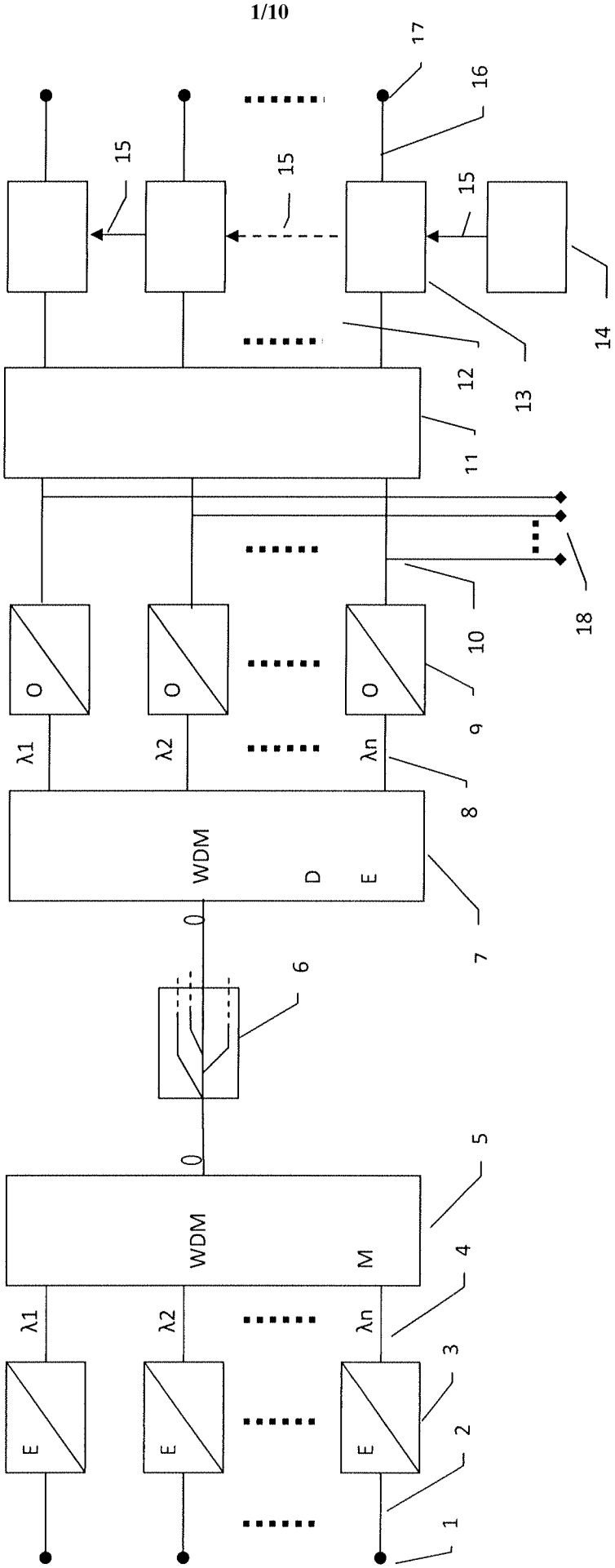
17
16
15
15
15
14
13
12
11
18
10
O
O
O
9
λ1
λ2
λn
8
WDM
D
E
7
6
5
WDM
M
4
λ1
λ2
λn
3
E
E
E
2
1

Fig. 1

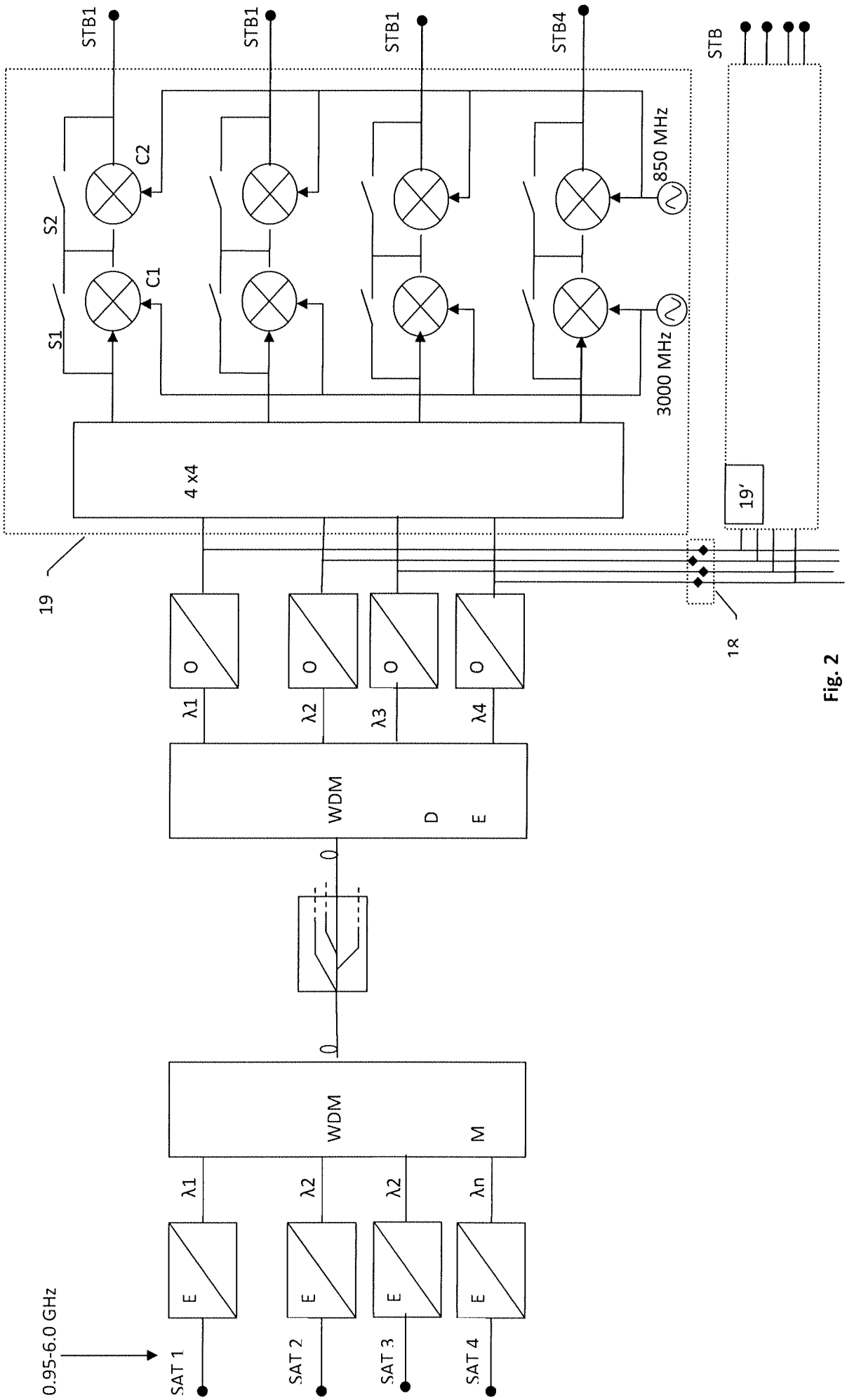
STB1
STB1
STB1
STB4
STB
C2
C1
S2
S1
850 MHz
3000 MHz
4 x4
19
19'
18
O
λ1
λ2
λ3
λ4
WDM
D
E
0
0
WDM
M
λ1
λ2
λ2
λn
E
0.95-6.0 GHz
SAT 1
SAT 2
SAT 3
SAT 4

Fig. 2

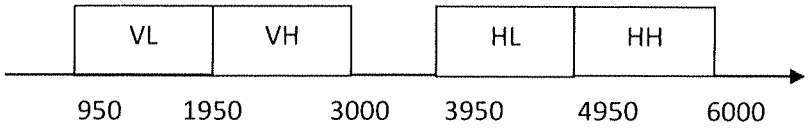

Fig. 3

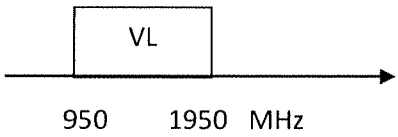

Fig. 4a

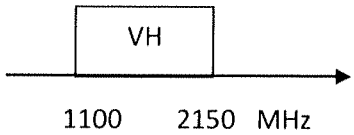

Fig. 4b

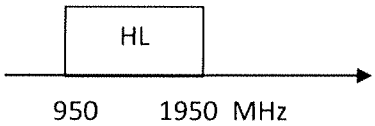

Fig. 4c

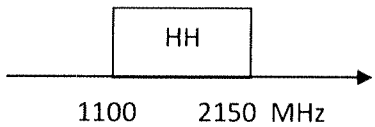

Fig. 4d

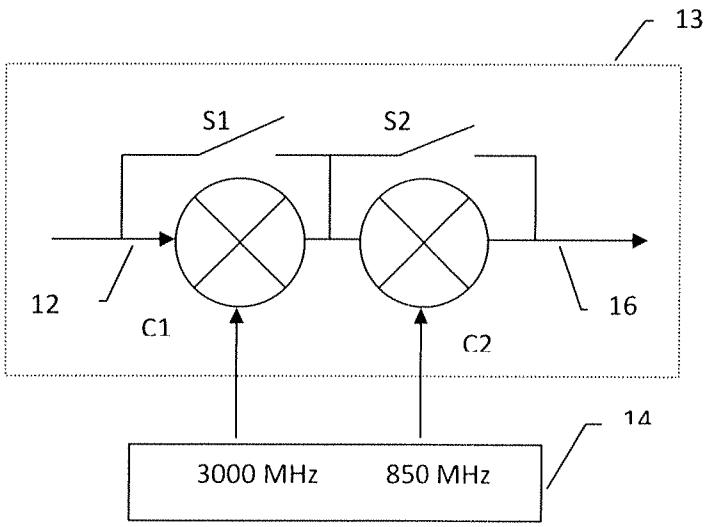

Fig. 5

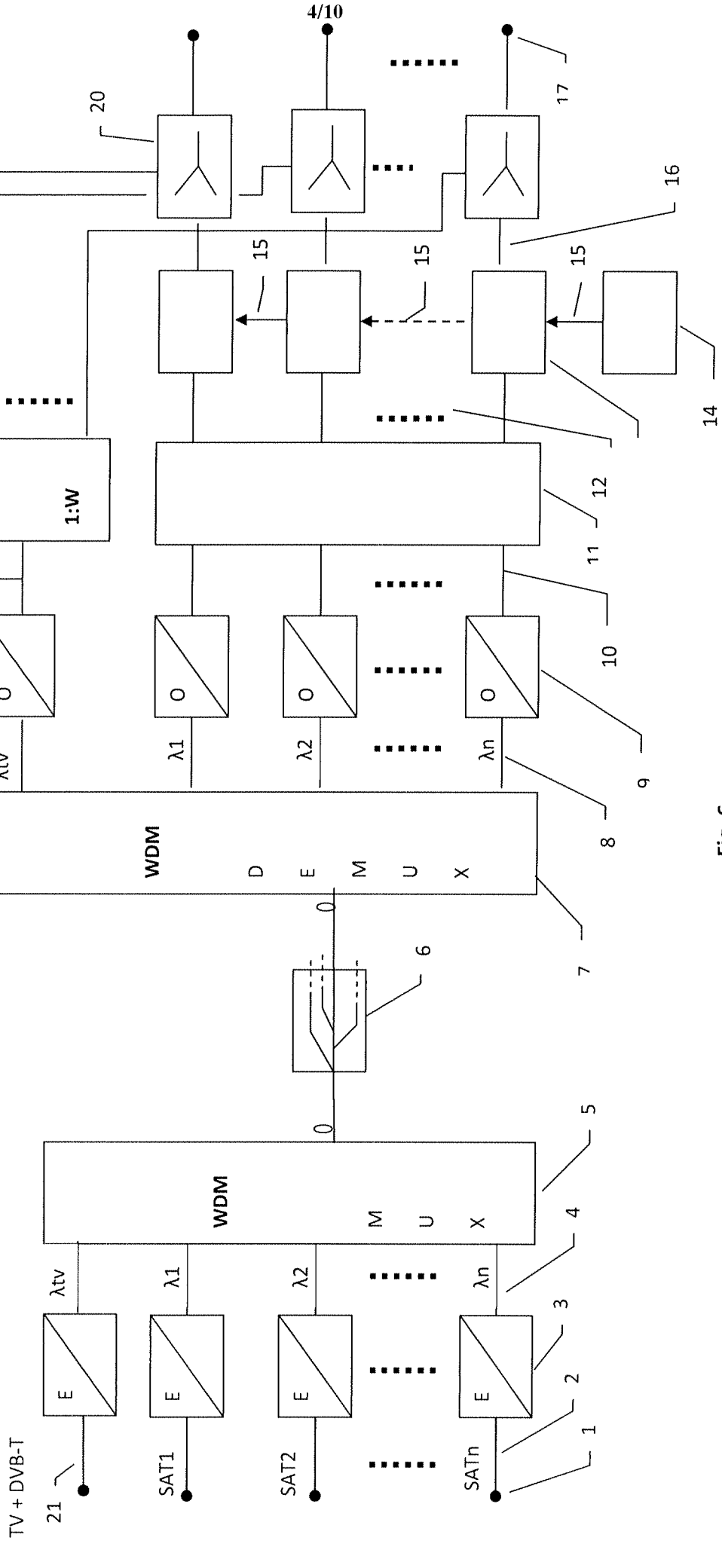
TV + DVB-T
21
SAT1
SAT2
SATn
E
λtv
λ1
λ2
λn
WDM
M U X
D E M U X
O
CATV
1:W
1
2
3
4
5
6
7
8
9
10
11
12
14
15
16
17
19
20

Fig. 6

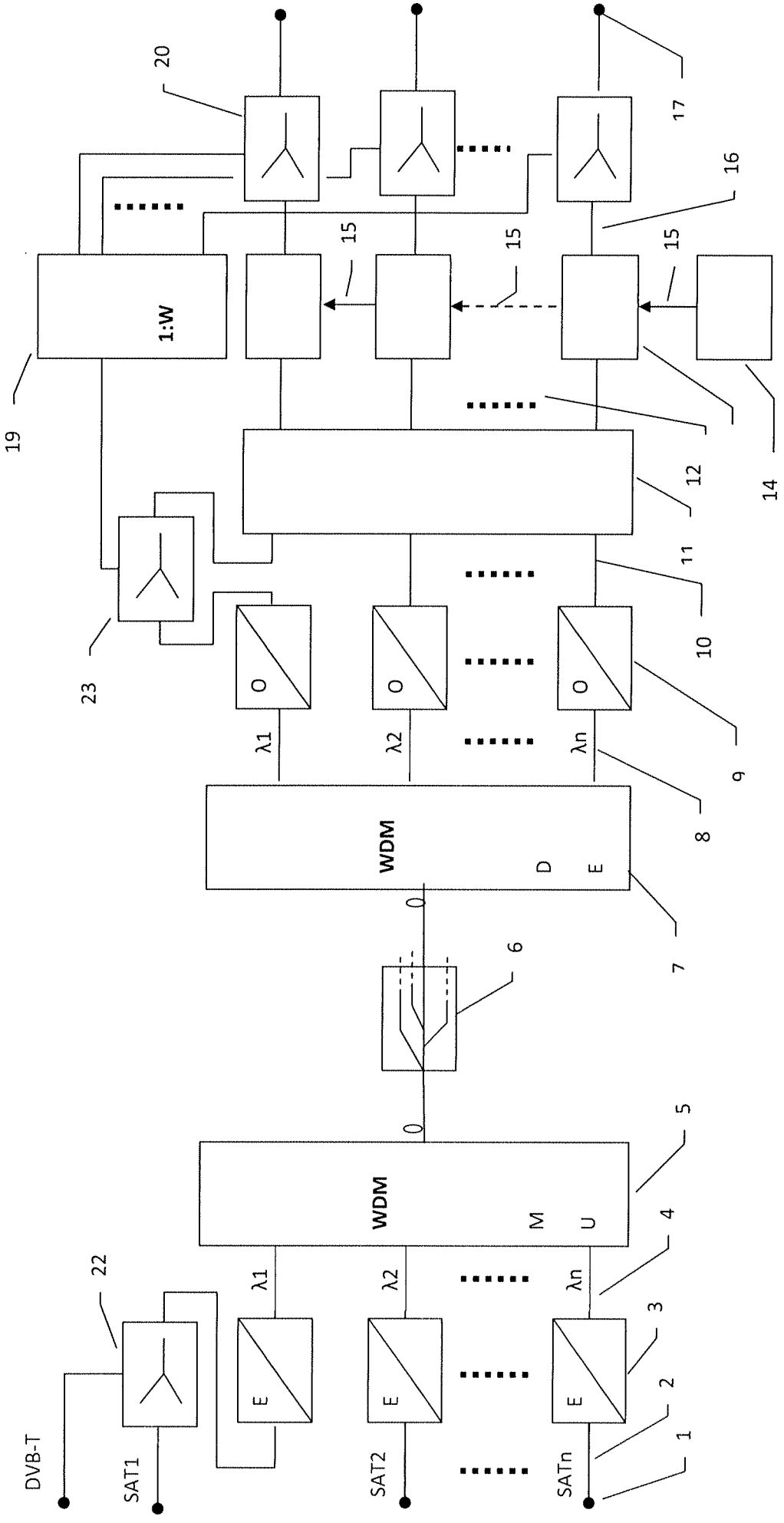
DVB-T
SAT1
SAT2
SATn
E
λ1
λ2
λn
WDM
M
U
D
O
1:W
1
2
3
4
5
6
7
8
9
10
11
12
14
15
16
17
19
20
22
23

Fig. 7

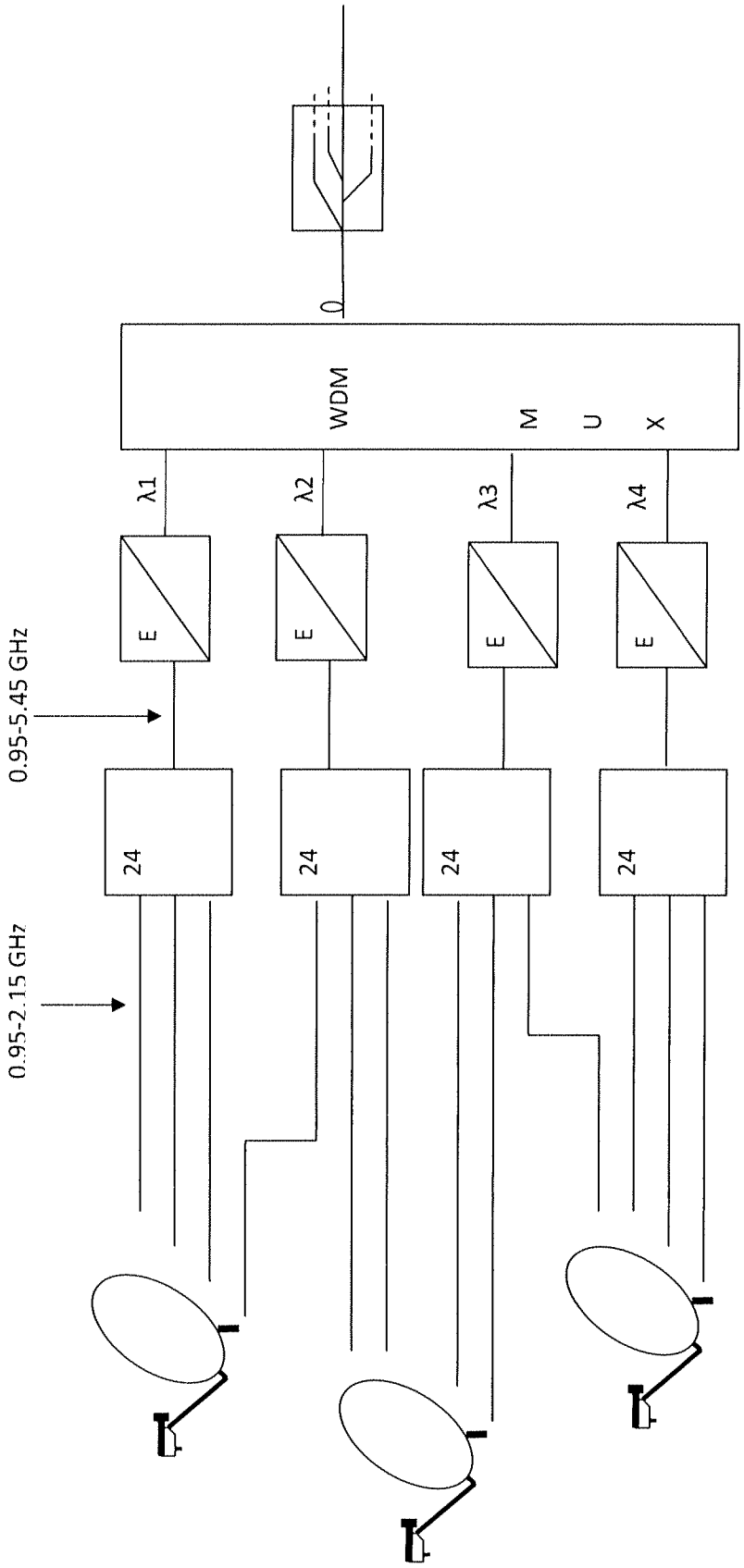

Fig. 8

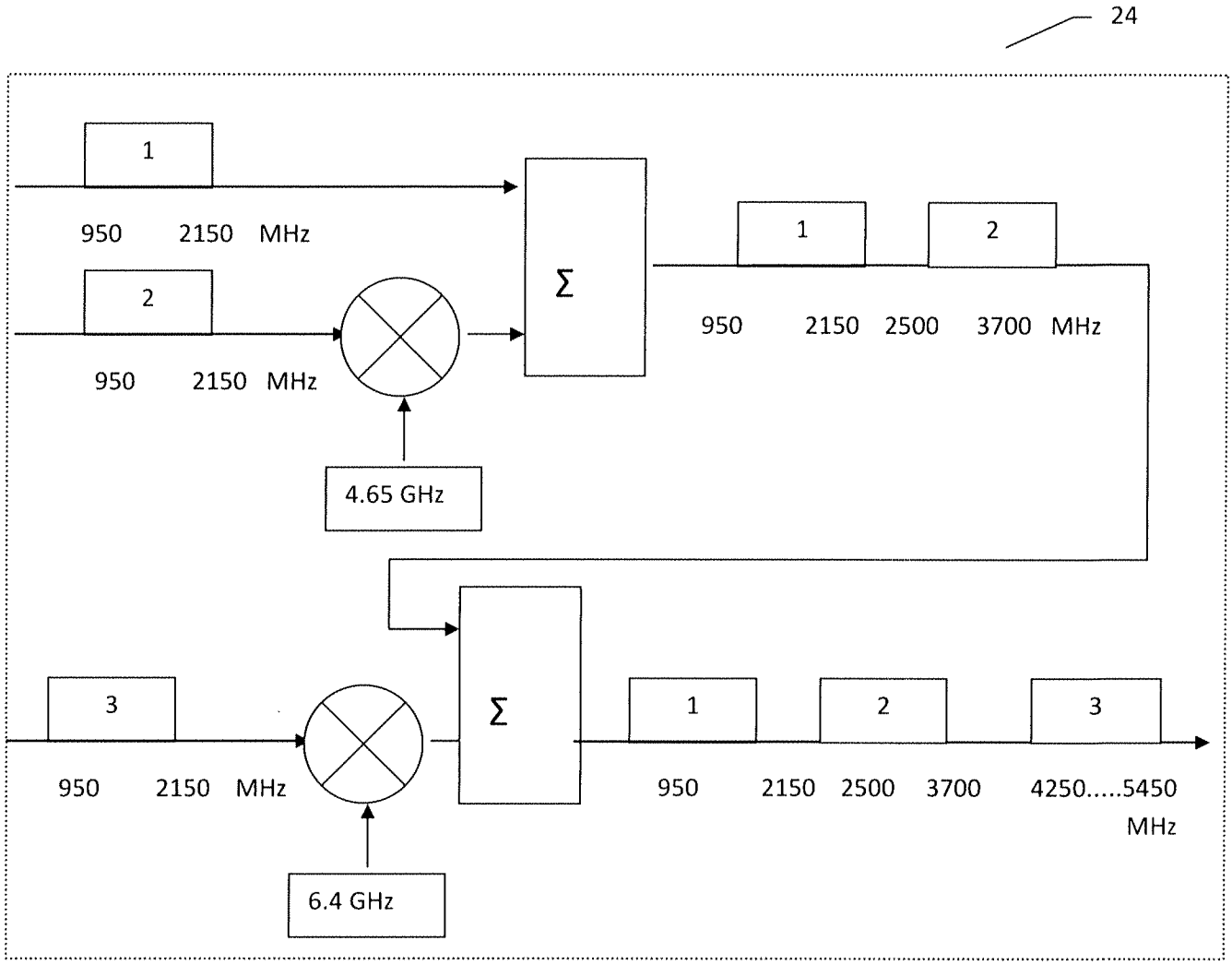
24
1
950 2150 MHz
2
950 2150 MHz
4.65 GHz
Σ
1
2
950 2150 2500 3700 MHz
3
950 2150 MHz
6.4 GHz
Σ
1
2
3
950 2150 2500 3700 4250.....5450 MHz

Fig. 9

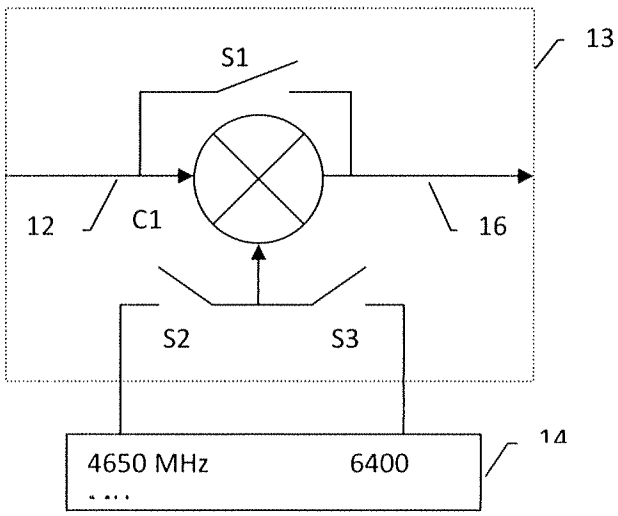
13
S1
12
C1
16
S2
S3
4650 MHz
6400
14

Fig. 10

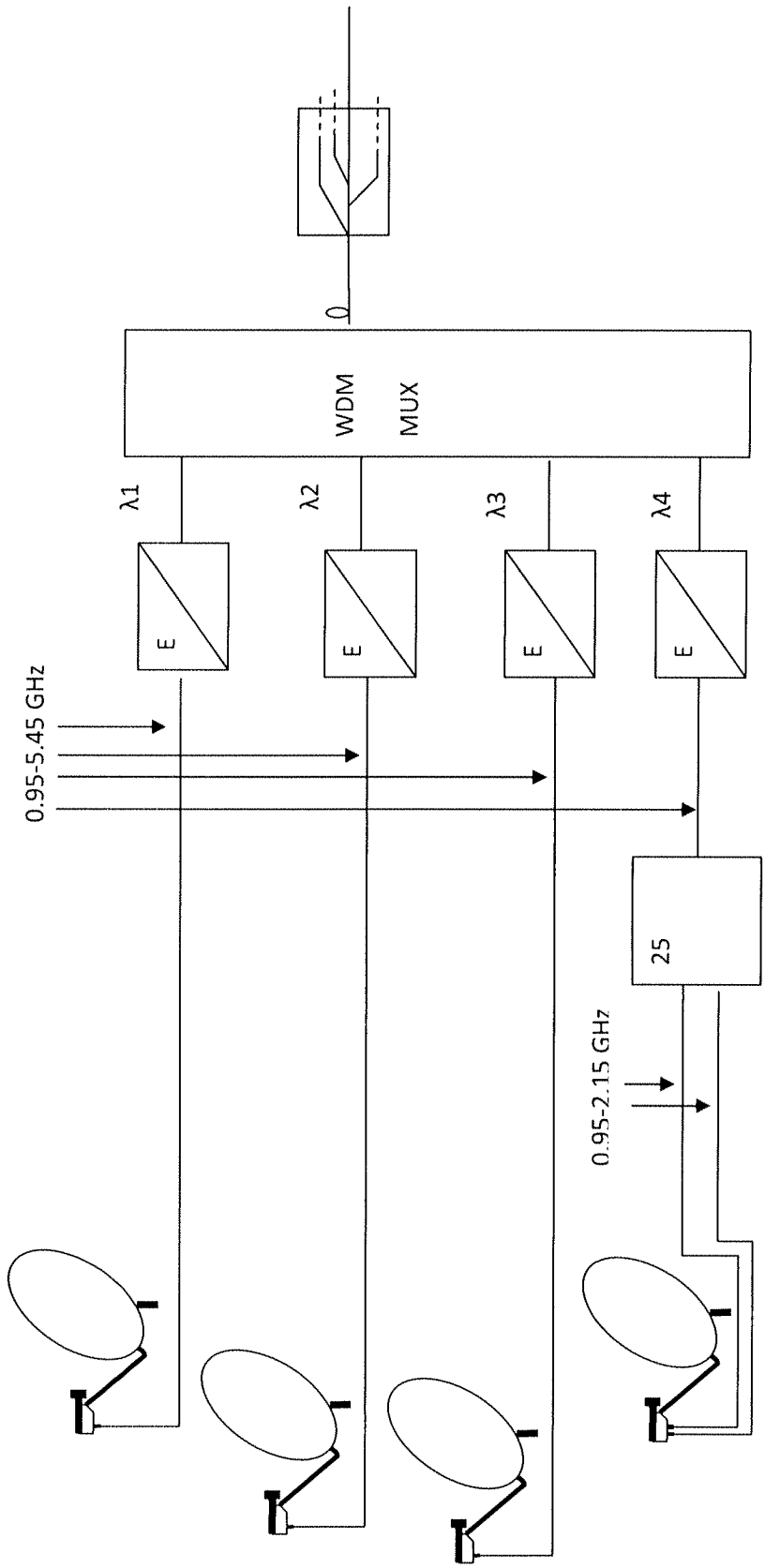

Fig. 11

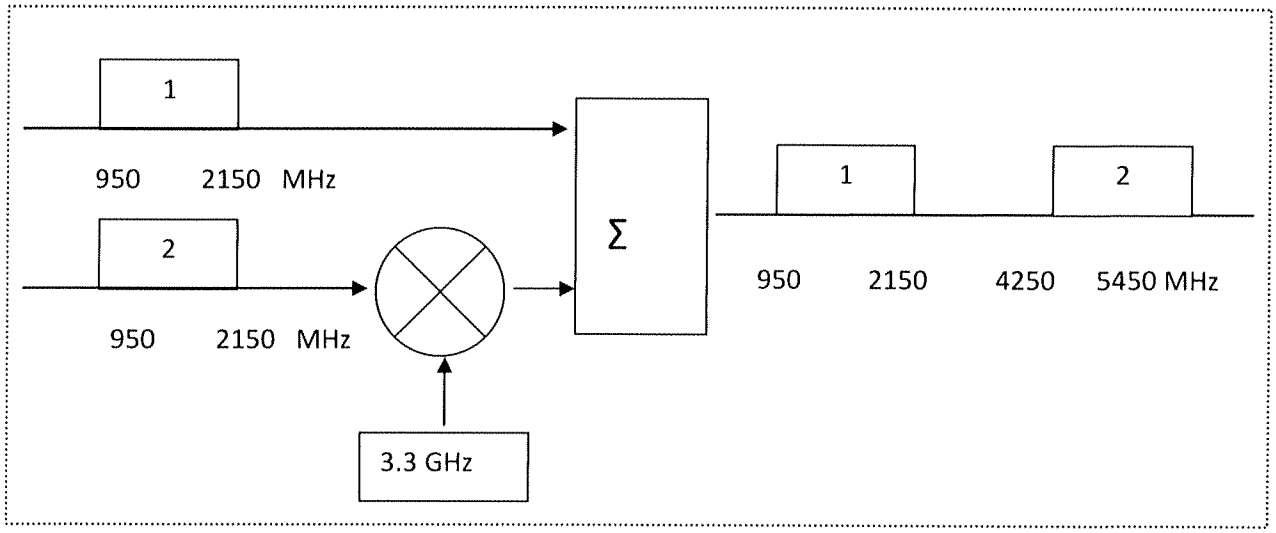
1
950
2150 MHz
2
950
2150 MHz
3.3 GHz
Σ
1
2
950
2150
4250
5450 MHz
25

Fig. 12

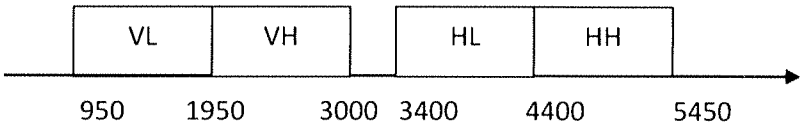
VL
VH
HL
HH
950
1950
3000
3400
4400
5450

Fig. 13

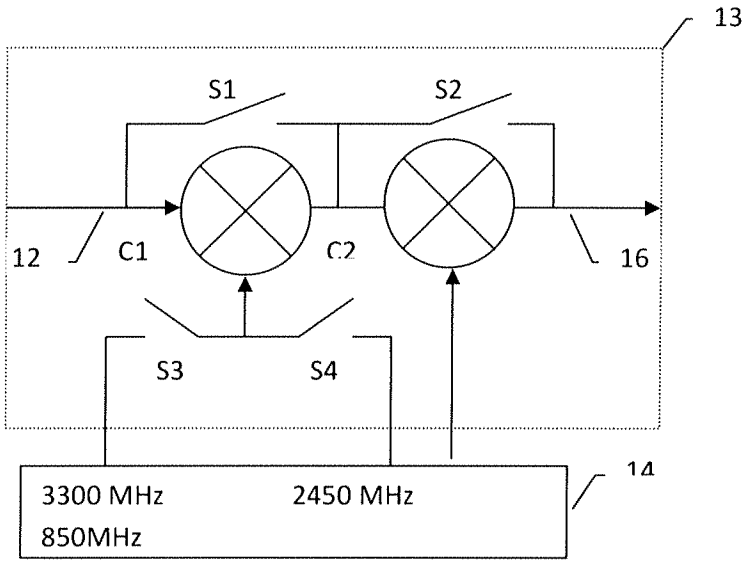

Fig. 14

INTERNATIONAL SEARCH REPORT

International application No
PCT/IB2012/053168

A. CLASSIFICATION OF SUBJECT MATTER
INV. H04N21/61 H04N7/22
ADD.

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
H04N

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)
EPO-Internal, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	WO 03/034624 A2 (OPTINEL SYSTEMS INC [US]) 24 April 2003 (2003-04-24) abstract; figures 1,5-8 paragraphs [0003], [0029], [0030], [0037], [0038], [0047] - [0049], [0057] -----	1-3
A	EP 1 347 644 A2 (UNITRON [BE]) 24 September 2003 (2003-09-24) cited in the application claims 1-4; figure 5 -----	1-3

☐ Further documents are listed in the continuation of Box C.

☒ See patent family annex.

* Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier application or patent but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
1 November 2012	19/11/2012

Name and mailing address of the ISA/	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Fax: (+31-70) 340-3016	Güvener, Cem

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No
PCT/IB2012/053168

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
WO 03034624 A2	24-04-2003	AU 2002360256 A1	28-04-2003
		US 2003128718 A1	10-07-2003
		WO 03034624 A2	24-04-2003
EP 1347644 A2	24-09-2003	AT 397832 T	15-06-2008
		CA 2421690 A1	21-09-2003
		EP 1347644 A2	24-09-2003
		ES 2309292 T3	16-12-2008
		US 2003179723 A1	25-09-2003