



(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication:
23.04.2008 Bulletin 2008/17

(51) Int Cl.:
H04H 1/00 (2008.01)

(21) Application number: **06076901.5**

(22) Date of filing: **20.10.2006**

(84) Designated Contracting States:
AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HU IE IS IT LI LT LU LV MC NL PL PT RO SE SI SK TR
Designated Extension States:
AL BA HR MK RS

(71) Applicant: **Nederlandse Organisatie voor toegepast-natuurwetenschappelijk Onderzoek TNO**
2628 VK Delft (NL)

(72) Inventor: **de Nijs, Johannes Marinus Maria**
2281 SV Rijswijk (NL)

(74) Representative: **van Loon, C.J.J. et al**
VEREENIGDE
Johan de Wittlaan 7
2517 JR Den Haag (NL)

(54) **Broadcasting system for digital terrestrial broadcasting signals such as DVB-T signals**

(57) Distribution system for digital terrestrial broadcast signals (e.g. DVB-T), comprising a DVB video distribution station (0) that is arranged to constitute the digital terrestrial broadcast signals, and a network distribu-

tion station (1) from which the digital terrestrial broadcast signals can be distributed in a quasi-analog form into a region via the cable network (4). A plurality of terrestrial transmitters (3) is connected to the cable network and transmits locally the DVB-T signals.

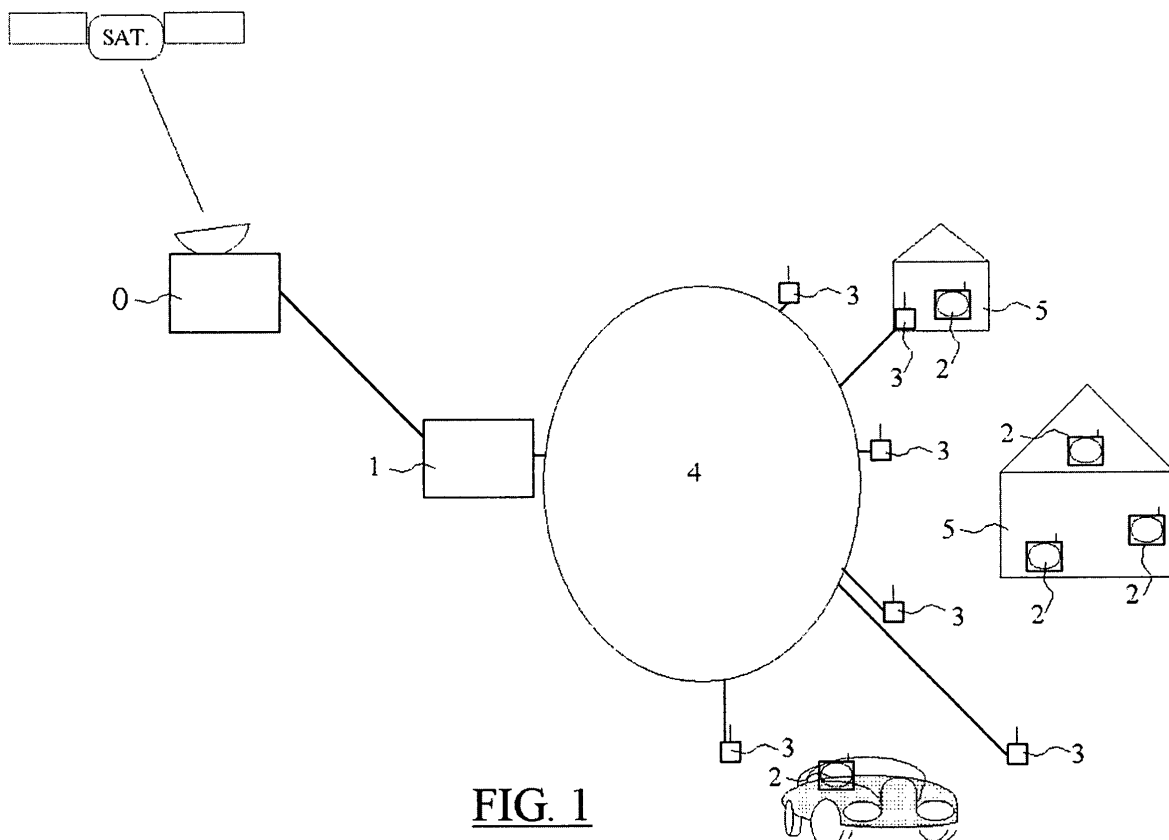


FIG. 1

DescriptionDefinitions and abbreviations

[0001] DTB = Digital Terrestrial Broadcasting.

[0002] Digital distribution station: module which defines distribution streams that can be distributed without modification of the information and which enters the digital distribution streams into a digital transport system. A DVB transport stream that comprises a multiplex of (signals from) radio and TV stations is an example of such a digital distribution stream.

[0003] Network distribution station: module that converts a digital distribution stream using a digital transport medium as received from a digital distribution station, into a (digital) distribution stream using a quasi-analog transport medium, as a result of which the distribution stream can be transferred by means of an analog medium, e.g. a cable network.

[0004] Transmitter: module that is arranged to transfer quasi-analog signals without any need for digital processing. Such a system typically comprises only an electric band-pass filter, a power amplifier and a transmitting antenna.

[0005] Quasi-analog signal: according to the "Telecommunication Standard Terms" of the ITS-Institute for Telecommunication Sciences a quasi-analog signal is a digital signal that is converted into a mode that is suitable for transfer via an analog channel. For the conversion process e.g. a modem may be used. Further it is noted that in principle all signals (digital signals too) are analog. W.r.t. the signal carriers, however, there are differences:

- signal carriers (medium) for digital signals need not to be linear, but they do need to pass two states (1 or 0) transparently (e.g. optical ethernet, SDH etc. are based on this); this kind of carrier is not able to transport analog signals;
- signal carriers (medium) for analog signals, e.g. POTS copper lines and cable networks, have to be linear in order to avoid distortions and higher harmonic interference signals. Usually the analog carrier is used for the transmission of analog services. An analog signal carrier, however, may also be used to transfer digital information. In that case, the digital information has to be converted into an electrical signal that is optimally suitable for transmission via the analog carrier. As a simple "on-off" is not optimal in many cases, e.g. QAM or another kind of modulation may be used. In this context the term quasi-analog is often used. Many signals are quasi-analog: xDSL, ISDN, DVB-C, DVB-T, CDMA, GSM, etc. QAM stands for Quadrature Amplitude Modulation. This is a modulation technique for putting digital signals on an analog carrier and transporting it in that mode. QAM uses a combination of amplitude and phase modulation and is a form of multilevel coding which

can be used to transport several bits simultaneously.

Field of the invention

- 5 **[0006]** The invention concerns a distribution system for DTB signals, comprising a network distribution station and a transmitter, arranged to transfer the DTB signals to a plurality of DTB receivers via the air.

10 Background of the invention

- [0007]** Known is a distribution system for DTB (e.g. DAB and DVB-T) signals, in which the signals are transferred from a digital distribution station to a plurality of DVB-T receivers via a very restricted number of network distribution stations, each having an accompanying transmitter.

- 15 **[0008]** Disadvantage of the known configuration with accompanying network distribution station transmitters (e.g. integrated transmitters or at least transmitters in the vicinity of the network distribution station) is that the terrestrial radiospectrum is not used very efficiently, because, as the transmitter coverage area is large (since the number of transmitters is a very restricted), each transmitter has to have a high antenna mast and a high transmitting power.

Summary of the invention

- 20 **[0009]** The invention aims a more efficient use of the terrestrial radio spectrum by using existing cable networks for the distribution of DTB signals. To that end the invention provides geographical decoupling of the present combination of DTB network distribution station and accompanying transmitter, wherein, according to the invention, a great number of geographically spread transmitters are fed by the network distribution station via a cable network, connecting the network distribution station with all those distributed (local) transmitters. The cable network provides the transport of the quasi-analog DTB signals from the DTB network distribution station and the distribution of those quasi-analog DTB signals to the transmitters, which emit those quasi-analog DTB signals in the local air. The transmitters are placed in the vicinity of the local DTB receivers and thus their transmission power only needs to be a fraction of the transmission power of the transmitting antennas in the prior art configuration; moreover, the transmitting antennas can be placed much lower than in the prior art configuration.

- 25 **[0010]** The quasi-analog DTB signals thus can be distributed via the cable network to all locations in a region. By means of a transmitter, e.g. comprising a bandfilter circuit, a signal amplifier and an antenna, coupled to a distribution point of the cable network (servicing a number of houses or offices etc.) or coupled to an in-house connection point of the cable network (servicing one house or office etc.), the signals can be emitted lo-

cally in the terrestrial air. By placing transmitters with restricted power at a great number of locations and at low heights, terrestrial distribution of DTB signals can be provided having a low and homogeneous signal strength and a good coverage. That contrary to the present DTB networks, in which the field strength shows strong peaks due to the fact that transmitters are used being placed at high positions and having relative high transmission power. By the use of a plurality of transmitters which are located at low positions and each having a low transmission power, in addition, the various frequency channels can be reused within shorter distance. This means that the same frequency channel can be used within a larger area (e.g. the area of Europe). Suppose that the reuse distance reduces with a factor $\sqrt{2}$, in that case the area (at European scale) where this channel can be used will double.

Exemplary embodiment

[0011] Figure 1 shows schematically an exemplary embodiment of a digital distribution system for DVB-T signals according to the invention.

[0012] In figure 1 television signals are received by a DVB video distribution station 0, in which e.g. TV signals transmitted by satellites, are processed and converted into DVB Transport Streams. Those DVB Transport Streams are transported to a network distribution station 1, where the DVB Transport Streams are put upon a quasi-analog DVB-T carrier. Subsequently, the quasi analog DVB-T signals are distributed via the cable network 4 towards the network distribution points like regional distribution centers, local distribution centers, offices and houses. In each of those locations the DVB-T signal may be broadcasted via the terrestrial (local) air, using a transmitting aerial (transmitter) 3, in figure 1 some of them being drawn outdoors, e.g. located in a cable distribution point and others being drawn indoors, located inside a dwelling house, a flat, an office building etc.

[0013] From the network distribution station 1 the DVB-T signals are distributed in a quasi-analog mode, using appropriate RF frequencies, to all houses/buildings in a region via the cable network 4 (e.g. a Hybrid Fiber Coaxial Cable network). The proper DVB-T network distribution station (not explicitly shown in the figure) thus is located within the network distribution station 1. The DVB-T signal generated by the DVB-T network distribution station, is transported by the cable network 4 first and only broadcasted in the air locally. Inside, or in the vicinity of the houses local transmitters 2 are located, which are fed via the cable network 4. Those transmitters pass, e.g. via a filter, the specific DVB-T band, amplify the signal and emit the DVB-T signal locally. Part of the local transmitters 3 will be placed outdoors in order to realize - mind mobile receivers e.g. in cars - good coverage.

Claims

1. Distribution system for digital terrestrial broadcast signals, hereinafter called DTB signals, comprising a DTB network distribution station (1) which is arranged for transmitting the DTB signals to a large number of DTB receivers (2) in a quasi-analog form, **characterized in** a plurality of geographically scattered local transmitters (3), which are arranged for locally emitting in the air said quasi-analog DTB signals, and in a cable network (4), which is arranged for transporting the quasi-analog DTB signals from the network distribution station to said plurality of local transmitters.

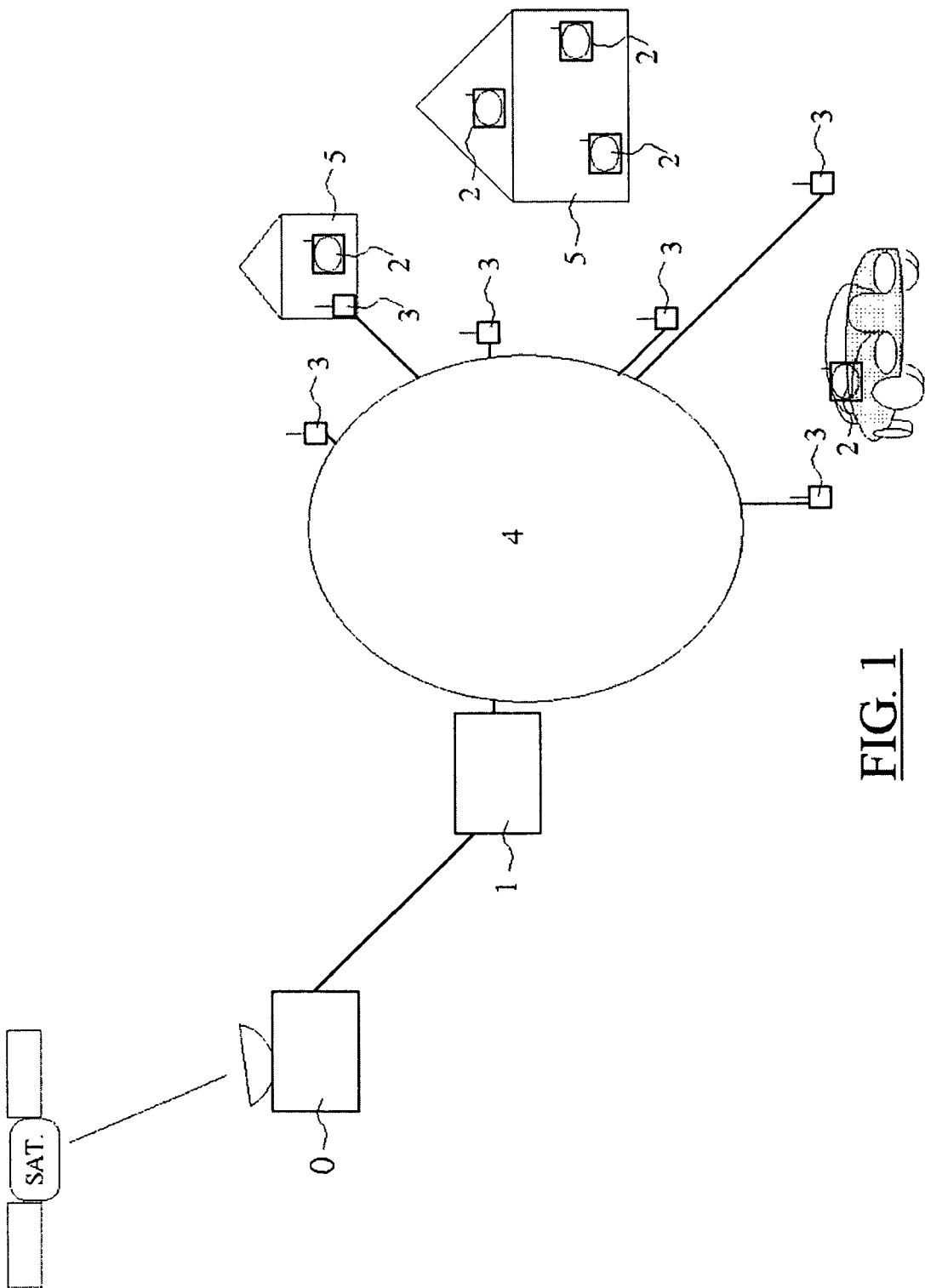


FIG. 1



European Patent
Office

EUROPEAN SEARCH REPORT

Application Number
EP 06 07 6901

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	WO 94/29977 A (STANFORD TELECOMM INC [US]) 22 December 1994 (1994-12-22) * page 1, lines 1-18 * * page 16, line 13 - page 17, line 19 * * page 21, lines 5-26 * * figure 27 *	1	INV. H04H1/00
X	EP 1 492 369 A (NOKIA CORP [FI]) 29 December 2004 (2004-12-29) * paragraph [0001] * * paragraph [0010] * * paragraph [0019]; figure 1 * -----	1	
			TECHNICAL FIELDS SEARCHED (IPC)
			H04H
The present search report has been drawn up for all claims			
Place of search The Hague		Date of completion of the search 14 March 2007	Examiner TORCAL SERRANO, C
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document		T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons ----- & : member of the same patent family, corresponding document	

1

EPO FORM 1503 03.82 (P04C01)

**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

EP 06 07 6901

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
The members are as contained in the European Patent Office EDP file on
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

14-03-2007

Patent document cited in search report		Publication date	Patent family member(s)	Publication date
WO 9429977	A	22-12-1994	AU 7203594 A CA 2164593 A1	03-01-1995 22-12-1994

EP 1492369	A	29-12-2004	CN 1574949 A GB 2403375 A US 2004264408 A1	02-02-2005 29-12-2004 30-12-2004

EPO FORM P0459

For more details about this annex : see Official Journal of the European Patent Office, No. 12/82