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(54) Title of the Invention: **Telecommunications network**
Abstract Title: **Allocating to a moving base station a physical network identifier associated with a second physical network identifier of a stationary access point**

(57) Allocating a first physical network identifier to a moving base station 130 within an identified signal coverage area 160; the first identifier associated with a second physical network identifier enabling access to a stationary access point 120; a first and second telecommunication networks comprise the base station and access point. The identifiers may be PCIs and generated by a self-configuration function or the networks having separate network cores 110, 140. Change in identifiers or coverage area may be identified during motion or transmission of the base station forming part of a satellite. The coverage area may be associated to a beam 150 comprising pattern information. The first network may receive the first identifier from the second network via an interface 170. The base station and access point may comprise identical identifiers or broadcasting frequencies. A system and network comprising an interface, processor and controller are also claimed.

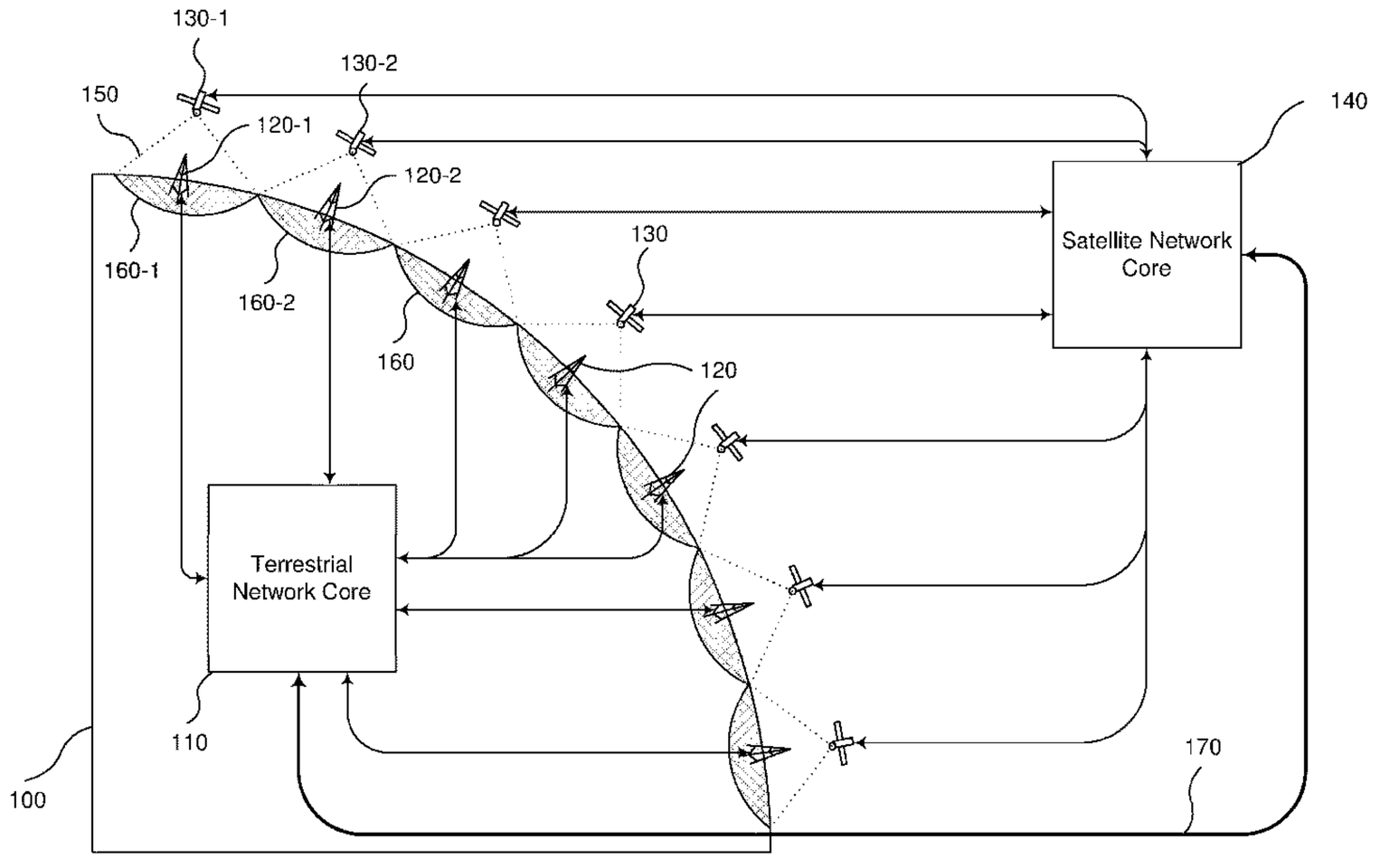

Fig. 1

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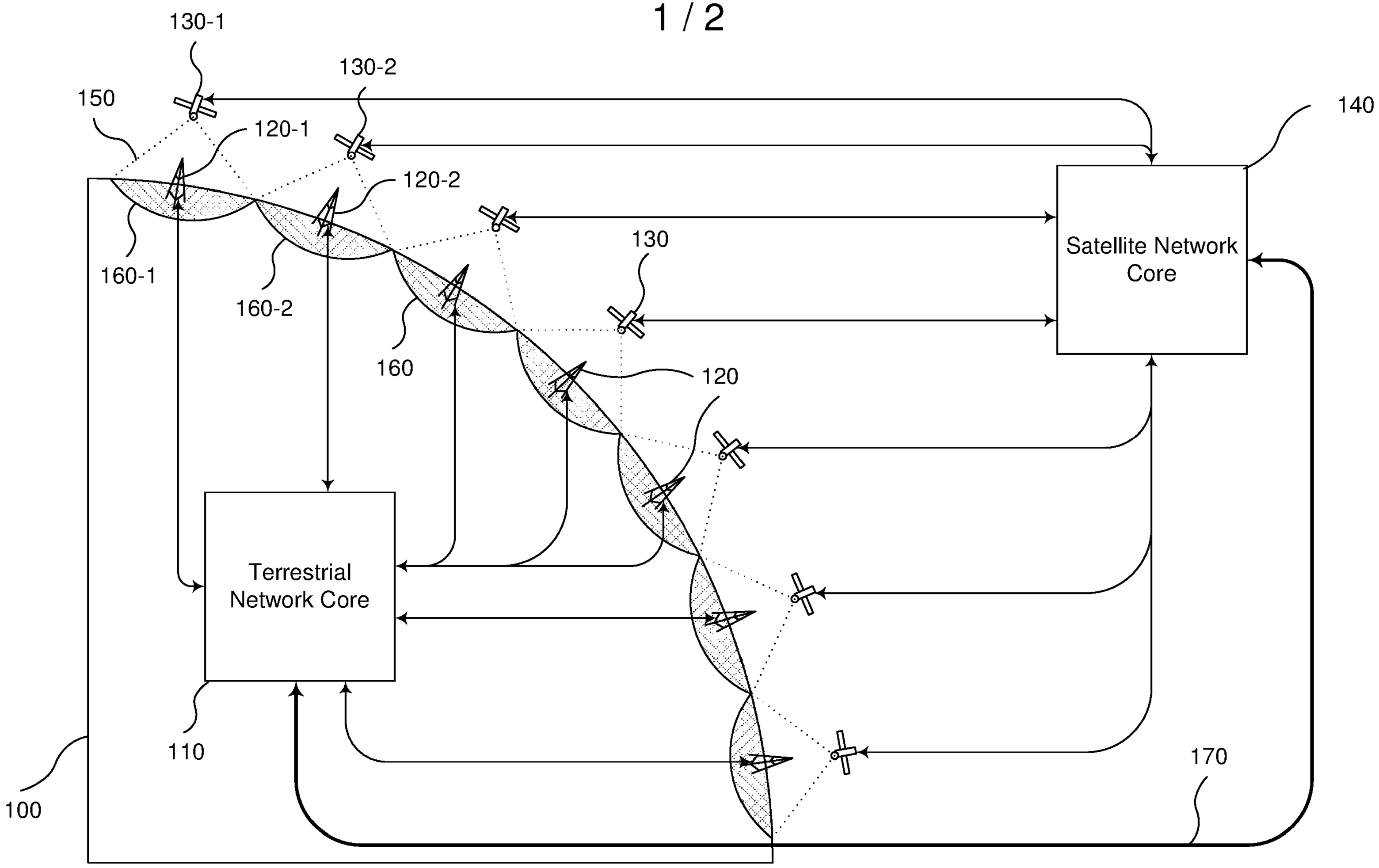
130-1
130-2
150
120-1
120-2
140
160-1
160-2
130
160
120
Satellite Network Core
Terrestrial Network Core
110
100
170

Fig. 1

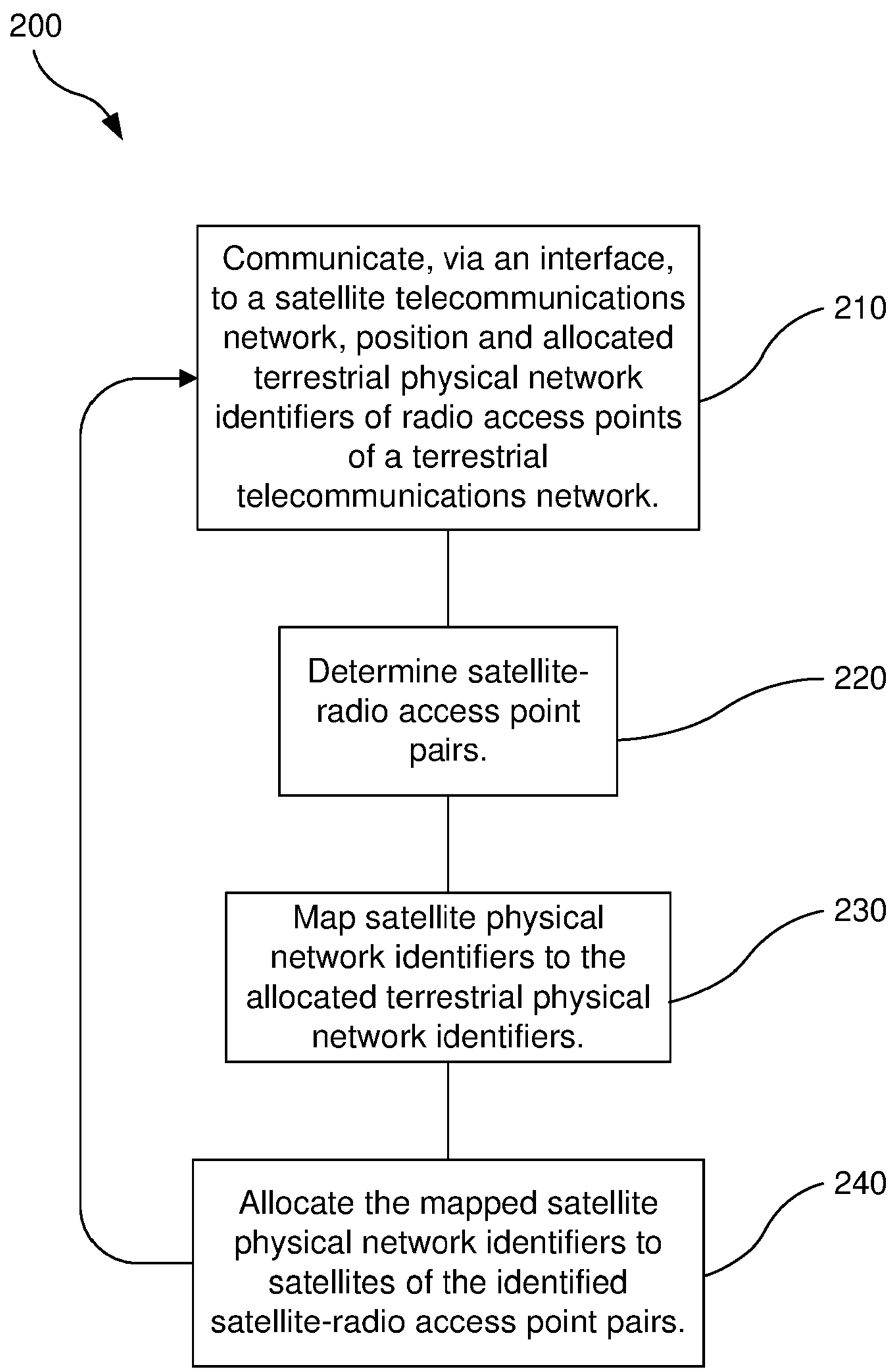
200
Communicate, via an interface, to a satellite telecommunications network, position and allocated terrestrial physical network identifiers of radio access points of a terrestrial telecommunications network.
210
Determine satellite-radio access point pairs.
220
Map satellite physical network identifiers to the allocated terrestrial physical network identifiers.
230
Allocate the mapped satellite physical network identifiers to satellites of the identified satellite-radio access point pairs.
240

Fig. 2

TELECOMMUNICATIONS NETWORK

Field of Invention

The present invention relates to a method of operating a telecommunications network, and in particular for integrating terrestrial and satellite telecommunications network.

Background

The 3rd Generation Partnership Project (3GPP™) is working to integrate satellite telecommunications networks with terrestrial telecommunications networks (see, for example, *3GPP TR 38.811 - Study on New Radio (NR) to support non-terrestrial networks* and *3GPP TR 38.821 - Solutions for NR to support non-terrestrial networks*).

Currently, in order to implement a 3GPP Radio Access Network, Physical-layer Cell Identifiers (PCIs) are required. From the perspective of User Equipment (UE), the PCI effectively identifies a cell. However, PCI values are not necessarily unique across a network, and may be duplicated across networks and even within a single network. Allocation of PCIs is dictated by collision- and confusion-avoidance rules. Furthermore, PCI values may also be non-static and may be allocated automatically by self-configuring functions of Self Organising Networks (SON).

However, telecommunications signal beams of Low Earth Orbit (LEO) and Medium Earth Orbit (MEO) satellites over the Earth's surface constantly change and the satellite that serves a given area also periodically changes. If such satellites maintain a constant PCI as they orbit, UEs on Earth will need to perform full signalling handover each time another satellite becomes a UE's best server, which is inefficient (with regards, at least, to energy, signalling and computational processing resources). Furthermore, even if satellites along the same trajectory were set to have the same PCI, a given trajectory will likely cross different regions (*e.g.* countries) and different terrestrial telecommunications network operators in these regions may have different rules for PCI planning.

It is desirable to at least alleviate some of the aforementioned problems.

Statements of Invention

According to a first aspect of the present invention, there is provided a method of operating a wireless telecommunications network, the method comprising the steps of: identifying a signal coverage area of a moving base station to which to allocate a first physical network identifier, said moving base station forming part of a first telecommunications network; determining a second physical network identifier for enabling access, by user equipment, to an access point that

serves the identified signal coverage area, and wherein said access point is stationary relative to the moving base station and forms part of a second wireless telecommunications network; associating a first physical network identifier with the determined second physical network identifier; and allocating the first physical network identifier to the moving base station when said moving base station is providing a telecommunications signal in the identified signal coverage area, thereby to allow access, by user equipment within the signal coverage area, to the moving base station by means of the first physical network identifier.

Preferably, the first and/or the second physical network identifier/s preferably exclude/s a: gNodeB identifier; a cell identifier; and/or a Type Allocation Code. Preferably, the first and/or second physical network identifier/s comprise/s a Primary Synchronization Signal (PSS) and a Secondary Synchronization Signal (SSS). Preferably, the first and/or the second physical network identifier/s is/are provided in a protocol other than a Radio Resource Control protocol.

Optionally, the method is for operating the first and/or the second telecommunications network/s.

Optionally, the method further comprises the step of identifying a geographic position of the access point, and wherein determining the second physical network identifier is performed in dependence upon identifying an overlap in the identified geographic position of the access point and the identified signal coverage area.

Optionally, the user equipment is a wide-area mobile telecommunications device, a relay, a repeater or Integrated Access and Backhaul equipment. Optionally, the user equipment is configured to connect directly to the moving base station and/or to the access point. Preferably, the moving base station and the access point are configured to communicate wirelessly.

Optionally, the moving base station moves by orbiting or by drifting.

Preferably, the second telecommunications network comprises a plurality of access points, each of which is stationary relative to the moving base station. Preferably the first telecommunications network comprises a plurality of moving base stations.

Preferably, the allocated first physical network identifier is selected from a pre-determined list of first physical network identifiers.

As used herein, an access point “that serves the identified signal coverage area” connotes the access point serving at least part of, all of, or only all of the identified signal coverage area.

Preferably, the first and the second physical network identifiers are in the form of Physical-layer Cell Identifiers (PCIs).

Preferably, the allocated first physical network identifier is allocated to the moving base station only whilst it is providing a telecommunications signal in the signal coverage area to the access point. Preferably, the first physical network identifier is allocated to successive moving base stations as and when they provide a telecommunications signal in the signal coverage area to the access point. Preferably, a given first physical network identifier is allocated to only one moving base station at a time.

Preferably, the method further comprises the steps of: the first telecommunications network generating the first physical network identifier; and the second telecommunications network generating the second physical network identifier. Preferably, said generating is performed in a network core of the corresponding telecommunications network.

Preferably, the signal coverage area of the moving base station serves a new signal coverage area as the moving base station moves, and wherein the method is initiated upon identifying a change in the signal coverage area of the moving base station.

Preferably, the method is initiated upon identifying a change in a first physical network identifier and/or a second physical network identifier.

Preferably, the method is re-initiated after a predetermined period of time, and wherein said period is the time after which the moving base station no longer provides the telecommunications signal in the signal coverage area, but instead to a new signal coverage area, and more preferably, said period is the shortest such period of time.

Preferably, the first and/or second physical network identifier/s is/are generated by a self-configuration function. Preferably, the self-configuration function is a Self-Organising Network function. Preferably, the self-configuration function is implemented in a network core.

Preferably, the method further comprises the step of receiving the first physical network identifier from the first telecommunications network.

Preferably, the step of determining the second physical network identifier comprises the step of receiving the second physical network identifiers from the second telecommunications network.

Preferably, the step of identifying the signal coverage area comprises the step of receiving beam pattern information of the telecommunications signal from the moving base station and/or from positional information of the moving base station, as received from the first telecommunications network.

Preferably, the signal coverage area is provided by at least one beam transmitted by the moving base station. Preferably, the beam pattern information comprises a beam angle; and/or a beam solid angle. Preferably, the positional information comprises: position of the moving base station relative to Earth and/or the access point (and more preferably including altitude); a trajectory of the moving base station relation to the access point; an orbital velocity of the moving base station relation to the access point.

Preferably, the step of allocating the first physical network identifier to the moving base station further comprises the step of the first telecommunications network receiving the allocated first physical network identifier from the second telecommunications network.

Preferably, the aforementioned receiving is performed by means of a network interface that communicatively connects the first and the second telecommunications networks.

Preferably, the moving base station is an aerial base station. As used herein, the term “aerial” preferably includes space. Preferably, the moving base station is configured to operate at a high-altitude, and more preferably at an altitude of at least 10km, still more preferably 30km, yet more preferably 100km, and still more preferably 500km. Preferably, the moving base station is configured to operate at an altitude of no more than 2000km, more preferably 3000km

Optionally, the moving base station is forms part of: an Unmanned Vehicle (e.g. a drone or a lighter-than-air vehicle); an automotive vehicle; an aircraft; and/or a train; and/or a marine vehicle. Optionally, the moving base station is self-propelled.

Optionally, the moving base station forms part of a vehicle having a known or predictable path of movement, such as owing to a predetermined schedule and/or constrained movement (such as railway tracks for a train).

Preferably, second telecommunications network is a terrestrial telecommunications network. Preferably, the second telecommunications network operates in accordance with 3G, 4G and/or 5G standards.

Preferably, the first and the second telecommunications networks comprise separate network cores. Preferably, the first and the second telecommunications networks are operated by independent network operators.

Preferably, the first and the second telecommunications networks are wide-area and/or cellular telecommunications networks.

Preferably, the moving base station forms part of a satellite and the first telecommunications network is a satellite telecommunications network. Preferably, the satellite follows a non-geostationary orbit. Preferably, the satellite follows low- or medium-Earth orbit. Preferably, the satellite telecommunications network comprises a constellation of a plurality of satellites.

Optionally, the moving base station and the access point broadcast at the same spectral frequency, and wherein the first and the second physical network identifiers are different to one another. Optionally, the moving base station and the access point broadcast at the different spectral frequencies, and wherein the first and the second physical network identifiers are identical.

Preferably, the identified first physical network identifier is simultaneously associated with a plurality of second physical network identifiers, wherein the plurality of second physical network identifiers are associated with a plurality of access points that are located in the identified signal coverage area.

Preferably, the moving base station provides a plurality of signal coverage areas by means of a plurality of beams, and wherein a method as described herein is performed for each beam.

According to another aspect of the invention, there is provided a telecommunications system, comprising: a first telecommunications network comprising moving base station; a second telecommunications network comprising a stationary access point; and an interface for providing a communications link between the first and the second telecommunications networks, wherein the system is configured to perform a method as described above.

According to yet another aspect of the invention, there is provided a terrestrial telecommunications network, comprising: a network interface for communicatively interfacing with a further telecommunications network, wherein the network interface is configured to receive from the further telecommunications network: a signal coverage area of a moving base station, said

moving base station forming part of the further telecommunications network; and a first physical network identifier for enabling access, by user equipment, to the moving base station; a wireless access point having allocated to it a second physical network identifier for enabling access, by user equipment, to the wireless access point, wherein the wireless access point is stationary relative to the moving base station; a processor configured to: determine the second physical network identifier of the wireless access point that serves the signal coverage area of the moving base station; and associate the received first physical network identifier with the determined second physical network identifier; and a controller for communicating, to the further telecommunications network, via the network interface, the associated first physical network identifier so as to cause the further telecommunications network to allocate the associated first physical network identifier to the moving base station when said moving base station is providing a telecommunications signal in the signal coverage area.

The invention includes any novel aspects described and/or illustrated herein. The invention also extends to methods and/or apparatus substantially as herein described and/or as illustrated with reference to the accompanying drawings. The invention is also provided as a computer program and/or a computer program product for carrying out any of the methods described herein and/or for embodying any of the apparatus features described herein, and a computer-readable medium storing thereon a program for carrying out any of the methods and/or for embodying any of the apparatus features described herein. Features described as being implemented in hardware may alternatively be implemented in software, and vice versa.

The invention also provides a method of transmitting a signal, and a computer product having an operating system that supports a computer program for performing any of the methods described herein and/or for embodying any of the apparatus features described herein.

Any apparatus feature may also be provided as a corresponding step of a method, and vice versa. As used herein, means plus function features may alternatively be expressed in terms of their corresponding structure, for example as a suitably-programmed processor.

Any feature in one aspect of the invention may be applied, in any appropriate combination, to other aspects of the invention. Any, some and/or all features in one aspect can be applied to any, some and/or all features in any other aspect, in any appropriate combination. Particular combinations of the various features described and defined in any aspects of the invention can be implemented and/or supplied and/or used independently.

As used throughout, the word 'or' can be interpreted in the exclusive and/or inclusive sense, unless otherwise specified.

The invention extends to a method of operating a wireless telecommunications network, a telecommunications system and a terrestrial telecommunications network substantially as described herein and/or substantially as illustrated with reference to the accompanying drawings. The present invention is now described, purely by way of example, with reference to the accompanying diagrammatic drawings, in which:

Figure 1 is a schematic diagram of terrestrial and satellite telecommunications networks; and Figure 2 shows a process for operating the terrestrial and the satellite telecommunications networks.

Specific Description

Figure 1 is a schematic diagram showing a portion of Earth 100, on which there is provided a terrestrial telecommunications network.

Terrestrial Network

The terrestrial telecommunications network is in the form of a wide-area cellular wireless telecommunications network (for example, as per 3G, 4G and/or 5G standards), and comprises a Terrestrial Network Core (TNC) 110 to which a plurality of wireless access points, in the form of stationary radio access points 120, are connected, which provide a cellular Radio Access Network (RAN). In particular, there are provided first 120-1 and second 120-2 radio access points. For the sake of clarity, the geographical extent of the terrestrial telecommunications network shown in Figure 1 is exaggerated.

The TNC 110 is configured, at least, to control the terrestrial telecommunications network and to allocate terrestrial physical network identifiers to each radio access point 120, thereby to help enable effective access to the terrestrial telecommunications network by User Equipment (not shown). For example, the terrestrial physical network identifiers include a Physical-layer Cell Identifier (PCI).

Satellite Network

There is also provided a further – independent – telecommunications network in the form of a satellite telecommunications network that comprises a plurality of moving base stations, in the form of aerial moving base stations, and also in the form of satellites 130, arranged as a constellation, and moving (along an orbital path) relative to the surface of Earth 100. The satellite

telecommunications network also comprises a Satellite Network Core (SNC) 140 (which may be terrestrially-based).

Each satellite 130 transmits a beam 150 towards Earth 100 so as to provide User Equipment (including, for example, (personal) mobile telecommunications devices, relays, repeaters and Integrated Access and Backhaul (IAB) equipment) with access to the satellite telecommunications network; a geographical position and extent of this beam on Earth is herein referred to as a "signal coverage area" 160. There is provided first 160-1 and second 160-2 signal coverage areas by first 130-1 and second 130-2 satellites respectively; these signal coverage areas are adjacent to one another and overlapping (albeit not visible in Figure 1).

The SNC 140 is in communication with each satellite 130. Accordingly, the SNC 140 is available, for each satellite 130, to:

1. allocate a physical network identifier to each satellite (or a "satellite physical network identifier"), such as a PCI;
2. determine and/or configure the beam 150 (in terms, at least, of orientation and the solid angle of projection);
3. determine the instantaneous and predicted positions over Earth 100; and/or
4. determine the signal coverage area 160.

Conventionally, satellite physical network identifiers, beam information, positional information, and signal coverage area information are unavailable to the terrestrial telecommunications network.

However, in order better to integrate the satellite and terrestrial telecommunications networks, an interface 170 is provided between the SNC 140 and the TNC 110, which facilitates communication of, at least, such information therebetween. In particular, the interface 170 communicates with a Self-Organising Network function of the TNC 110 and/or SNC 140, which allocates the terrestrial and satellite physical network identifiers for the radio access points 120 and the satellites 130, respectively.

In one example, the interface 170 is in the form of a telecommunications link (such as a fibre optic link or a wireless microwave link) and routing equipment.

Figure 2 shows a process 200 of operating the satellite and terrestrial telecommunications networks.

In a first step 210, the TNC 110 is configured to communicate, via the interface 170, the geographic position of each radio access point 120 (and in particular its cell area) and their allocated terrestrial physical network identifiers (*e.g.* PCI) to the SNC 140.

In a next step 220, using knowledge of the geographic position of the radio access points 120 from step 210, the SNC 140 determines, for each satellite, the radio access point 120 that provides a signal in a cell area that overlaps with the signal coverage area of a given satellite. The SNC thereby identifies pairs of satellites and radio access points that, at a given instant in time, serve the same geographic area; these are herein referred to as 'satellite-radio access point pairs'.

In the example shown in Figure 1, it is identified by the SNC 140 that the first signal coverage area 160-1, as covered by the first satellite 130-1, coincides with a cell area provided by the first radio access point 120-1; accordingly, the first satellite 130-1 and radio access point 120-1 are identified as a 'satellite-radio access point pair' at the instant shown in Figure 1. The second satellite 130-2 and the second radio access point 120-2 are also identified as another satellite-radio access point pair for corresponding reasons.

At a next step 230, a mapping is created between each of the terrestrial physical network identifiers of the radio access points 120 and the satellite physical network identifiers. In this way, a given radio access point is associated with a given terrestrial physical network identifier and a given satellite physical network identifier.

In the context of Figure 1, Table 1 below shows exemplary mappings following steps 220 and 230.

Table 1

Radio Access Point	Terrestrial Physical Network Identifier	Satellite Physical Network Identifier
120-1	T1	S1
120-2	T2	S2

At a next step 240, the SNC 140 retrieves the mappings that are generated at steps 220 and 230, which are utilised to allocate to a given satellite of a satellite-radio access point pair the satellite physical network identifier that corresponds to the terrestrial physical network identifier of the radio access point of that same satellite-radio access point pair. That is, at step 240, satellite

physical network identifiers are allocated to satellites on the basis of the mappings between satellite and terrestrial identifiers generated at step 230 and the pairings determined at step 220. For example, and with reference to Table 1 above, the first satellite 130-1 is allocated the satellite physical network identifier "S1" since this satellite physical network identifier is associated with the radio access point with which the first satellite 130-1 is paired.

By allocating satellite physical network identifiers that are known to the terrestrial telecommunications network, an improved unified telecommunications network is provided that is capable of processing UE handovers to and/or from the satellite telecommunications network in a manner that is invisible to the UE since the mapping of satellite and terrestrial physical network identifiers is retrievable by the SNC 140 (and/or TNC 110), bypassing the need for the UE to do so. Accordingly, from the perspective of a UE, by way of process 200, access to a satellite is performed as the UE would access a radio access point 120.

At a later point in time, the first satellite 120-1 will eventually move, relative to Earth 100 and therefore to a given radio access point 120 also, such that the first satellite 120-1 serves a new signal coverage area 160, such as, for example, the second signal coverage area 160-2. Accordingly, after step 240, process 200 is available to reset to step 210 (or optionally to step 220 if the information that is communicated in step 210 is static). In this way, the first satellite 120-1 now serves the second signal coverage area 160-2, which coincides with the cell area of the second radio access point 120-2. The first satellite 120-1 is therefore allocated the satellite physical network identifier that is associated with the second radio access point 120-2 ("T2", in the example of Table 1), or "S2" according to the example shown in Table 1 above.

As a result, process 200 in effect provides satellite physical network identifiers that are spatially static. That is, a given satellite physical network identifier is made to correspond to a specific cell area, and satellites are allocated the satellite physical network identifier of the cell area that they serve at a given instant. As a result, from the perspective of a UE, the satellite physical network identifier for a satellite-radio access point pair does not constantly change as the satellites orbit. Accordingly, the satellite physical network identifiers remain constant in a given signal coverage area despite the satellite that serves a given signal coverage area changing.

This enables more effective mobility management within the network, and avoids the need for UEs to seek updates to the satellite physical network identifiers (*e.g.* by means of measurement reports as part of an Automatic Neighbour Relations (ANR) process), and this benefit may be realised regardless of whether a UE is currently attached to the SNC 140 or the TNC 110.

Furthermore, a UE that is in idle mode may avoid cell reselections, and UEs that are currently disconnected may more quickly attach to the satellite or terrestrial telecommunications network.

Process 200 is available to be initiated or re-initiated (as appropriate) when:

- the TNC 110 reallocates the terrestrial physical network identifiers;
- the SNC 140 reallocates the satellite physical network identifiers; and/or
- after a predetermined period since a previous iteration of process 200, for example after a period by which point a satellite is expected to serve a new signal coverage area.

The satellite and radio access point of a satellite-radio access point pair broadcast at the same frequency, and distinct satellite and terrestrial physical network identifiers helps avoid collisions. However, in another example, broadcasting is performed at different frequencies and the satellite and terrestrial physical network identifiers for a satellite-radio access point pair are identical.

Alternatives and Modifications

In an alternative example, there are provided a plurality of independently-operated terrestrial telecommunications networks, each with their own set of radio access points and TNCs. The plurality of terrestrial telecommunications networks may or may not be interconnected. In this example, each of the plurality of terrestrial telecommunications networks comprise an interface 170 to the SNC 140 so as to facilitate process 200. In this way, the satellite telecommunications network may be shared by the plurality of terrestrial telecommunications networks.

In another alternative, process 200 is performed such that at the first step 210 the SNC 140 is configured to communicate, via the interface 170, to the TNC 110 the signal coverage area of each satellite (or information that will allow the TNC 110 to derive the signal coverage area) and a list of satellite physical network identifiers. The TNC 110 subsequently performs steps 220 and 230.

In one alternative, the moving base station forms part of any vehicle (self-powered or otherwise), including: automotive vehicles; aircraft; trains; marine vehicles; and/or aerial vehicles (such as UAV or drones, lighter-than-air vehicles or spacecraft more generally). In particular, the moving base station forms part of a vehicle having a known or predictable path of movement.

In yet another alternative example, a, or each, satellite 130 comprise/s a plurality of beams that are configured to serve different radio access points. The SNC 140 therefore also stores information regarding the projection of each beam onto Earth, and therefore has knowledge of the signal coverage area for each beam. Accordingly, process 200 is performed so as to associate

radio access points to individual beams and to allocate the physical network identifiers to each beam (in a corresponding manner to steps 220 and 230 respectively).

In an alternative a one-to-many or many-to-one mapping is available to be provided between satellite and terrestrial network identifiers.

In one example, for geographically-static radio access points, given the typically-predictable trajectory of satellites, once process 200 has been run, the SNC 140 is capable of anticipatorily allocating satellite physical network identifiers to satellites as the satellite-radio access point pairs change without further iterations of process 200, at least until the satellite or terrestrial physical network identifiers are changed and/or the trajectory of the satellites is changed.

Each feature disclosed herein, and (where appropriate) as part of the claims and drawings may be provided independently or in any appropriate combination.

Any reference numerals appearing in the claims are for illustration only and shall not limit the scope of the claims.

CLAIMS

1. A method of operating a wireless telecommunications network, the method comprising the steps of:

identifying a signal coverage area of a moving base station to which to allocate a first physical network identifier, said moving base station forming part of a first telecommunications network;

determining a second physical network identifier for enabling access, by user equipment, to an access point that serves the identified signal coverage area, and wherein said access point is stationary relative to the moving base station and forms part of a second wireless telecommunications network;

associating a first physical network identifier with the determined second physical network identifier; and

allocating the first physical network identifier to the moving base station when said moving base station is providing a telecommunications signal in the identified signal coverage area, thereby to allow access, by user equipment within the signal coverage area, to the moving base station by means of the first physical network identifier.

2. A method according to Claim 1, wherein the first and the second physical network identifiers are in the form of Physical-layer Cell Identifiers (PCIs).

3. A method according to Claim 1 or 2, wherein the allocated first physical network identifier is allocated to the moving base station only whilst it is providing a telecommunications signal in the signal coverage area to the access point.

4. A method according to any preceding claim, further comprising the steps of:

the first telecommunications network generating the first physical network identifier; and

the second telecommunications network generating the second physical network identifier.

5. A method according to any preceding claim, wherein the signal coverage area of the moving base station serves a new signal coverage area as the moving base station moves, and wherein the method is initiated upon identifying a change in the signal coverage area of the moving base station.

6. A method according to any preceding claim, wherein the method is initiated upon identifying a change in a first physical network identifier and/or a second physical network identifier.

7. A method according to any preceding claim, wherein the method is re-initiated after a predetermined period of time, and wherein said period is the time after which the moving base station no longer provides the telecommunications signal in the signal coverage area, but instead to a new signal coverage area.

8. A method according to any preceding claim, wherein the first and/or second physical network identifier/s is/are generated by a self-configuration function.

9. A method according to any preceding claim, further comprising the step of receiving the first physical network identifier from the first telecommunications network.

10. A method according to any preceding claim, wherein the step of determining the second physical network identifier comprises the step of receiving the second physical network identifiers from the second telecommunications network.

11. A method according to any preceding claim, wherein the step of identifying the signal coverage area comprises the step of receiving beam pattern information of the telecommunications signal from the moving base station and/or from positional information of the moving base station, as received from the first telecommunications network.

12. A method according to any preceding claim, wherein the step of allocating the first physical network identifier to the moving base station further comprises the step of the first telecommunications network receiving the allocated first physical network identifier from the second telecommunications network.

13. A method according to any of Claims 9 to 12, wherein said receiving is performed by means of a network interface that communicatively connects the first and the second telecommunications networks.

14. A method according to any preceding claim, wherein the moving base station is an aerial base station.

15. A method according to any preceding claim, wherein second telecommunications network is a terrestrial telecommunications network.

16. A method according to any preceding claim, wherein the first and the second telecommunications networks comprise separate network cores.

17. A method according to any preceding claim, wherein the first and the second telecommunications networks are wide-area and/or cellular telecommunications networks.

18. A method according to any preceding claim, wherein the moving base station forms part of a satellite and the first telecommunications network is a satellite telecommunications network.

19. A method according to any preceding claim, wherein the moving base station and the access point broadcast at the same spectral frequency, and wherein the first and the second physical network identifiers are different to one another.

20. A method according to any of Claims 1 to 18, wherein the moving base station and the access point broadcast at the different spectral frequencies, and wherein the first and the second physical network identifiers are identical.

21. A method according to any preceding claim, wherein the identified first physical network identifier is simultaneously associated with a plurality of second physical network identifiers, wherein the plurality of second physical network identifiers are associated with a plurality of access points that are located in the identified signal coverage area.

22. A method of according to any preceding claim, wherein the moving base station provides a plurality of signal coverage areas by means of a plurality of beams, and wherein the method according to any preceding claim is performed for each beam.

23. A telecommunications system, comprising:

a first telecommunications network comprising moving base station;

a second telecommunications network comprising a stationary access point; and

an interface for providing a communications link between the first and the second telecommunications networks, wherein the system is configured to perform the method according to any of Claims 1 to 22.

24. A terrestrial telecommunications network, comprising:

a network interface for communicatively interfacing with a further telecommunications network, wherein the network interface is configured to receive from the further telecommunications network:

a signal coverage area of a moving base station, said moving base station forming part of the further telecommunications network; and

a first physical network identifier for enabling access, by user equipment, to the moving base station;

a wireless access point having allocated to it a second physical network identifier for enabling access, by user equipment, to the wireless access point, wherein the wireless access point is stationary relative to the moving base station;

a processor configured to:

determine the second physical network identifier of the wireless access point that serves the signal coverage area of the moving base station; and

associate the received first physical network identifier with the determined second physical network identifier; and

a controller for communicating, to the further telecommunications network, via the network interface, the associated first physical network identifier so as to cause the further telecommunications network to allocate the associated first physical network identifier to the moving base station when said moving base station is providing a telecommunications signal in the signal coverage area.

Intellectual Property Office

Application No:	GB1918365.6	**Examiner:**	Mr Simon Keohane
Claims searched:	1-24	**Date of search:**	18 May 2020

Patents Act 1977: Search Report under Section 17

Documents considered to be relevant:

Category	Relevant to claims	Identity of document and passage or figure of particular relevance
A	-	US 2019/0208487 A (SHARP) figs. 1, 6 & 8, paras. [0042]-[0049]
A	-	WO 2019/153197 A (BEIJING XIAOMI MOBILE) fig 2, paras. [0108], [0109] & [0119]-[0122]
A	-	XP 051840691 3rd Generation Partnership Project; Technical Specification Group Radio Access Network; Solutions for NR to support non-terrestrial networks (NTN) (Release 16); 8.5 Network Identities Handling.
A	-	XP 051785396 3rd Generation Partnership Project; Technical Specification Group Radio Access Network; Study on New Radio (NR) to support non-terrestrial networks (Release 15); 7.3.2.3 Initial synchronization in downlink

Categories:

X	Document indicating lack of novelty or inventive step	A	Document indicating technological background and/or state of the art.
Y	Document indicating lack of inventive step if combined with one or more other documents of same category.	P	Document published on or after the declared priority date but before the filing date of this invention.
&	Member of the same patent family	E	Patent document published on or after, but with priority date earlier than, the filing date of this application.

Field of Search:

Search of GB, EP, WO & US patent documents classified in the following areas of the UKC[X] :

Worldwide search of patent documents classified in the following areas of the IPC

H04B; H04W

The following online and other databases have been used in the preparation of this search report

WPI, EPODOC, Patent Fulltext, 3GPP

Intellectual Property Office

International Classification:

Subclass	Subgroup	Valid From
H04W	0076/11	01/01/2018
H04B	0007/185	01/01/2006
H04W	0008/26	01/01/2009
H04W	0084/06	01/01/2009