

Search query (1): [SP]: A satellite system for global communications comprising: a first set of satellites in a polar LEO low Earth orbit constellation; a second set of satellites in an inclined LEO constellation; a user terminal for transmitting to, and receiving signals from, said first and second set of satellites; and a Gateway, base station or second user terminal for transmitting to, and receiving signals from, said first and second set of satellites; each of said first and second set of satellites having ISL (inter satellite link) functionality with respect to satellites in the same constellation and with satellites in the other constellation. 2. The satellite system of claim 1, wherein said polar LEO constellation comprises six planes, equally spaced. 3. The satellite system of claim 2, wherein said planes of said polar LEO constellation are inclined between 80 degrees and 100 degrees. 4. The satellite system of claim 3, wherein said planes of said polar LEO constellation are inclined about 99.5 degrees. 5. The satellite system of any one of claims 1 to 4, wherein said inclined LEO constellation comprises five planes, equally spaced. 6. The satellite system of claim 5, wherein said planes of said inclined LEO constellation are inclined between 5 degrees and 75 degrees. 7. The satellite system of claim 6, wherein said planes of said inclined LEO constellation are inclined about 37.4 degrees. 8. The satellite system of any one of claims 1 to 7, wherein said polar LEO constellation comprises about 72 satellites and said inclined LEO constellation comprises about 45 satellites, the system thereby providing global coverage with a minimum elevation angle of about 20 degrees. 9. The satellite system of any one of claims 1 to 8, wherein said satellites of said polar LEO constellation orbit at an altitude of between 800 km and 1400 km. 10. The satellite system of claim 9, wherein said satellites of said polar LEO constellation orbit at an altitude of about 1000 km. 11. The satellite system of any one of claims 1 to 8, wherein said satellites of said inclined LEO constellation orbit at an altitude of between 800 km and 1400 km. 12. The satellite system of claim 11, wherein said satellites of said inclined LEO constellation orbit at an altitude of about 1250 km. 13. The satellite system of any one of claims 1 to 12, wherein avoiding interference with GEO satellite user terminals is achieved by maintaining the angular separation between the LEO and GEO satellites, as measured at the GEO user terminal, greater than the discrimination angle calculated on the basis of unacceptable interference levels as determined by the ITU. 14. The satellite system of any one of claims 1 to 12, wherein excess capacity in the polar LEO constellation in the higher latitudes is used to transfer data traffic, via ISL, from both LEO constellations to a Gateway located in the North for connection to a terrestrial network. 15. The satellite system of any one of claims 1 to 12, each of said first and second set of satellites having IP router functionality. 16. The satellite system of claim 15, each of said first and second set of satellites having IP router load management functionality. 17. The satellite system of any one of claims 1 to 16, wherein said communications comprises broadband communications. 18. The satellite system of any one of claims 1 to 17, where said user terminal includes an electronically scanned array antenna for communicating with said first and second set of satellites. 19. A satellite communications system comprising: a set of satellites in a LEO (low Earth orbit) constellation; a user terminal for transmitting to, and receiving signals from, said set of satellites; and a Gateway for transmitting to, and receiving signals from, said set of satellites; at least one of said set of satellites being operable to: transmit and receive signals via a Wide Area Coverage beam; receive a request from the user terminal for high-capacity beam coverage; and respond to receiving the request from the user terminal for high-capacity beam coverage by switching the user terminal to a higher bandwidth, narrow, steerable beam, pointed towards the requesting user terminal. 20. The satellite communications system of claim 19, wherein each of said set of satellites is further operable to provide broadcast type services. 21. The satellite communications system of claim 19, wherein each of said set of satellites is further operable to broadcast software distribution to user terminals. 22. The satellite communications system of claim 19, wherein each of said set of satellites is further operable to broadcast (push) Internet content to user terminals. 23. The satellite communications system of any one of claims 19 to 22, wherein the request from a user terminal includes a GPS location which can be used to steer the high bandwidth beam. 24. The satellite communications system of any one of claims 19 to 23, wherein the Gateway is operable to track the satellites across the sky. 25. The satellite communications system of any one of claims 19 to 24, wherein the Gateway and user terminal are operable to handoff communications between the satellites as they move across the sky. 26. A method of operation for a global communications satellite system for comprising: launching a first set of satellites in a polar LEO (low Earth orbit) constellation; launching a second set of satellites in an inclined LEO constellation; using a user terminal, transmitting communications data to a first satellite in said first or second set of satellites; communicating said communications data from said first satellite, to a second satellite in said first or second set of satellites using ISL (inter-satellite link); and transmitting said communications data from said second satellite, to a polar Gateway. 27. A method of operation for a satellite communications system comprising: launching a set of satellites in a LEO (low Earth orbit) constellation; using a user terminal, transmitting to and receiving signals from, said set of satellites; using a Gateway, transmitting to and receiving signals from, said set of satellites; at least one of said set of satellites: transmitting and receiving signals via a Wide Area Coverage beam; receiving a request from the user terminal for high-capacity beam coverage; and responding to receiving the request from the user terminal for high-capacity beam coverage by switching the user terminal to a higher bandwidth, narrow, steerable beam, pointed towards the requesting user terminal.

Results: 6

Search history

Search 1: [SP]: A satellite system for global communications comprising: a first set of satellites in a polar LEO low Earth orbit constellation; a second set of satellites in an inclined LEO constellation; a user terminal for transmitting to, and receiving signals from, said first and second set of satellites; and a Gateway, base station or second user terminal for transmitting to, and receiving signals from, said first and second set of satellites; each of said first and second set of satellites having ISL (inter satellite link) functionality with respect to satellites in the same constellation and with satellites in the other constellation. 2. The satellite system of claim 1, wherein said polar LEO constellation comprises six planes, equally spaced. 3. The satellite system of claim 2, wherein said planes of said polar LEO constellation are inclined between 80 degrees and 100 degrees. 4. The satellite system of claim 3, wherein said planes of said polar LEO constellation are inclined about 99.5 degrees. 5. The satellite system of any one of claims 1 to 4, wherein said inclined LEO constellation comprises five planes, equally spaced. 6. The satellite system of claim 5, wherein said planes of said inclined LEO constellation are inclined between 5 degrees and 75 degrees. 7. The satellite system of claim 6, wherein said planes of said inclined LEO constellation are inclined about 37.4 degrees. 8. The satellite system of any one of claims 1 to 7, wherein said polar LEO constellation comprises about 72 satellites and said inclined LEO constellation comprises about 45 satellites, the system thereby providing global coverage with a minimum elevation angle of about 20 degrees. 9. The satellite system of any one of claims 1 to 8, wherein said satellites of said polar LEO constellation orbit at an altitude of between 800 km and 1400 km. 10. The satellite system of claim 9, wherein said satellites of said polar LEO constellation orbit at an altitude of about 1000 km. 11. The satellite system of any one of claims 1 to 8, wherein said satellites of said inclined LEO constellation orbit at an altitude of between 800 km and 1400 km. 12. The satellite system of claim 11, wherein said satellites of said inclined LEO constellation orbit at an altitude of about 1250 km. 13. The satellite system of any one of claims 1 to 12, wherein avoiding interference with GEO satellite user terminals is achieved by maintaining the angular separation between the LEO and GEO satellites, as measured at the GEO user terminal, greater than the discrimination angle calculated on the basis of unacceptable interference levels as determined by the ITU. 14. The satellite system of any one of claims 1 to 12, wherein excess capacity in the polar LEO constellation in the higher latitudes is used to transfer data traffic, via ISL, from both LEO constellations to a Gateway located in the North for connection to a terrestrial network. 15. The satellite system of any one of claims 1 to 12, each of said first and second set of satellites having IP router functionality. 16. The satellite system of claim 15, each of said first and second set of satellites having IP router load management functionality. 17. The satellite system of any one of claims 1 to 16, wherein said communications comprises broadband communications. 18. The satellite system of any one of claims 1 to 17, where said user terminal includes an electronically scanned array antenna for communicating with said first and second set of satellites. 19. A satellite communications system comprising: a set of satellites in a LEO (low Earth orbit) constellation; a user terminal for transmitting to, and receiving signals from, said set of satellites; and a Gateway for transmitting to, and receiving signals from, said set of satellites; at least one of said set of satellites being operable to: transmit and receive signals via a Wide Area Coverage beam; receive a request from the user terminal for high-capacity beam coverage; and respond to receiving the request from the user terminal for high-capacity beam coverage by switching the user terminal to a higher bandwidth, narrow, steerable beam, pointed towards the requesting user terminal. 20. The satellite communications system of claim 19, wherein each of said set of satellites is further operable to provide broadcast type services. 21. The satellite communications system of claim 19, wherein each of said set of satellites is further operable to broadcast software distribution to user terminals. 22. The satellite communications system of claim 19, wherein each of said set of satellites is further operable to broadcast (push) Internet content to user terminals. 23. The satellite communications system of any one of claims 19 to 22, wherein the request from a user terminal includes a GPS location which can be used to steer the high bandwidth beam. 24. The satellite communications system of any one of claims 19 to 23, wherein the Gateway is operable to track the satellites across the sky. 25. The satellite communications system of any one of claims 19 to 24, wherein the Gateway and user terminal are operable to handoff communications between the satellites as they move across the sky. 26. A method of operation for a global communications satellite system for comprising: launching a first set of satellites in a polar LEO (low Earth orbit) constellation; launching a second set of satellites in an inclined LEO constellation; using a user terminal, transmitting communications data to a first satellite in said first or second set of satellites; communicating said communications data from said first satellite, to a second satellite in said first or second set of satellites using ISL (inter-satellite link); and transmitting said communications data from said second satellite, to a polar Gateway. 27. A method of operation for a satellite communications system comprising: launching a set of satellites in a LEO (low Earth orbit) constellation; using a user terminal, transmitting to and receiving signals from, said set of satellites; using a Gateway, transmitting to and receiving signals from, said set of satellites; at least one of said set of satellites: transmitting and receiving signals via a Wide Area Coverage beam; receiving a request from the user terminal for high-capacity beam coverage; and responding to receiving the request from the user terminal for high-capacity beam coverage by switching the user terminal to a higher bandwidth, narrow, steerable beam, pointed towards the requesting user terminal. (Results 6)

Title: SYSTEM AND METHOD FOR SATELLITE COMMUNICATION

Abstract: A system and method are disclosed which may include providing at least one satellite having a plurality of beamformers configured to provide a plurality of respective beams having a plurality of different respective fixed pitch angles about an axis of the satellite; causing the at least one satellite to move around the earth along a non-geostationary orbit; establishing a data communication path between a first of the beamformers on the satellite and a communication target, the data communication path having a satellite end at the first beamformer and an target end at the communication target; shifting the satellite end of the data communication path through a succession of the beamformers as the satellite moves along its orbit; and at least substantially reducing an amount of RF wave energy directed to beamformers of the plurality of beamformers not forming part of the data communication path.

Classifications:

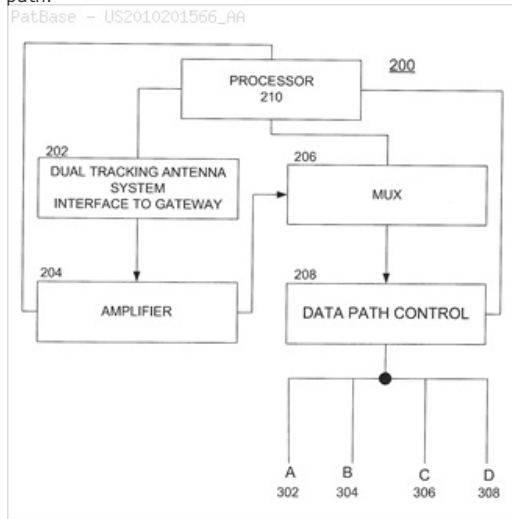
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International (IPC 1-7): H01L35/00

CPC: H04B7/18584 H04B7/2041 H04B7/195 H01Q1/1257 H01Q3/08 H01Q3/24 H01Q13/18 H01Q19/17 H01Q19/19 H01Q25/007 H04B7/1851 H04B7/18513 H04B7/19 H01Q1/28 H01Q21/06

European: H04B7/185D2 H04B7/185S8 H04B7/19 H04B7/195 H04B7/204B

US: 342/354 342/354P 343/876 343/876S 370/316 370/316P 455/12.1 455/12.100S 455/9 455/9P

**Family:**

Publication number	Publication date	Application number	Application date
AU2008314537 AA	20090423	AU20080314537	20080905
AU2008356212 AA	20091119	AU20080356212	20080516
AU2008356212 BB	20131010	AU20080356212	20080516
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Priority:

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US20120528613	20120620	US20140157219	20140116		

Probable Assignee: O3B NETWORKS LTD

Assignee(s): (std): O B NETWORKS LTD ; O3B LTD ; O3B NETWORKS LTD ; WYLER GREGORY T ; WYLER GREGORY THANE

Assignee(s): O B NETWORKS LIMITED ; O3B NETWORKS LIMITED ; O3B LIMITED

Inventor(s): (std): WYLER GREGORY T ; WYLER GREGORY THANE

Inventor(s): WYLER GREGORY ; GREGORY T WYLER

Agent(s): PAPPAS IP; ALDER IP PTY LTD; WILSON GUNN; CHAN TANG AND KWOK; KAPLAN GILMAN AND PERGAMENT LLP; KAPLAN BREYER SCHWARZ AND OTTESEN LLP; GARMAISE LESLIE S

Designated states: AE AG AL AM AO AT AU AZ BA BB BE BF BG BH BJ BR BW BY BZ CA CF CG CH CI CM CN CO CR CU CY CZ DE DK DM DO DZ EC EE EG ES FI FR GA GB GD GE GH GM GN GQ GR GT GW HN HR HU ID IE IL IN IS IT JP KE KG KM KN KP KR KZ LA LC LI LK LR LS LT LU LV LY MA MC MD ME MG MK ML MN MR MT MW MX MY MZ NA NE NG NI NL NO NZ OM PG PH PL PT RO RS RU SC SD SE SG SI SK SL SM SN ST SV SY SZ TD TG TJ TM TN TR TT TZ UA UG US UZ VC VN ZA ZM ZW

Title: Communication system with satellite diversity and method of operation thereof

Abstract: A method and apparatus for providing an economically viable satellite communication system (100) for voice, data, and video using satellite diversity to augment capacity of the system, to mitigate the effects of network operational issues such as the effects of satellite failure and/or satellite blockage, and to maintain service links (180) in a cost-effective manner. Satellite diversity is incorporated into the communication architecture, along with the ability to utilize all satellites (110) within a communication range (or view) of one or more service regions (197). Management methods are used to allocate satellite diversity to enhance service and mitigate network operational issues. Satellite constellation (120) is designed to maximize the availability of satellite diversity as a resource. The method and apparatus described herein also provide a satellite communication system (100) having flexibility to adapt to changing demand and capacity requirements in various service regions (197) and to unknown or unanticipated changes in demand developing over time after the satellite communication system (100) has been deployed in whole or part.

Classifications:

International (IPC 8-9): H04B7/185 (Advanced/Invention);

H04B7/195 (Advanced/Non-invention);

H04B7/185 (Core/Invention);

H04B7/195 (Core/Non-invention)

International (IPC 1-7): H04B7/185 H04Q7/36

CPC: H04B7/18534 H04B7/18541 H04B7/195

European: H04B7/185M4B H04B7/185M6B T04B7/195

US: 342/352 342/354 455/12.1 455/121 455/13.1 455/13.2 455/131 455/132 455/427 455/432 455/436 455/443

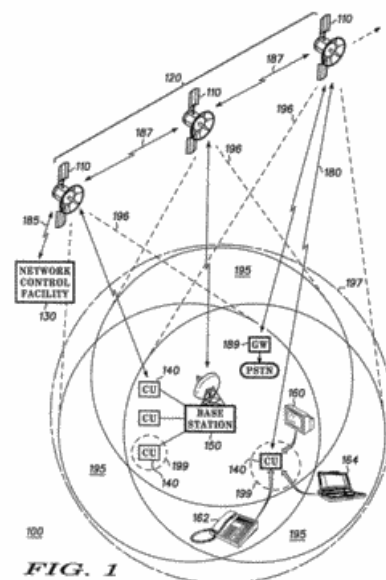
PatBase - US6104911_A

U.S. Patent

Aug. 15, 2000

Sheet 1 of 9

6,104,911



Family:

Publication number	Publication date	Application number	Application date
US6104911 A	20000815	US19970970857	19971114

Priority:

US19970970857 19971114

Probable Assignee: CDC PROPRIETE INTELLECTUELLE

Assignee(s): (std): MOTOROLA INC

Assignee(s): TORSAL TECHNOLOGY GROUP LTD ; TORSAL TECHNOLOGY GROUP LTD LLC ; CDC PROPRIETE INTELLECTUELLE

Inventor(s): (std): DIEKELMAN DENNIS PAUL

Title: Polar relay system for satellite communication

Abstract: One of the preferred embodiments of the present invention is a telecommunications system that includes twelve satellites (S) which are equally deployed in four polar low Earth orbits (OR). A preferred embodiment provides a system for transmitting a message between two terminals (G) on the ground through a store-and-forward network. A first satellite (S1/OR1) traveling in a first polar orbit (OR1) receives and stores a message from a sending terminal (GA) on the surface of the Earth (E). As the first satellite (S1/OR1) passes over the North Pole (NP), it transmits the stored message from the sending terminal (GA) down to a relay station (GB) located near the North Pole (NP). The message is stored at this polar relay station (GB) until a second satellite (S1/OR2) moving in a second orbit (OR2) flies within range. At that time, the polar relay station (GB) sends the stored message up to the second satellite (S1/OR2), which stores the message and finally transmits it to a receiving terminal (GC) somewhere on the ground. This store-and-forward relay method takes advantage of the geometry of a system that employs more than one satellite which each operate in different polar orbits. The different polar orbits allow the satellites to fly over different parts of the globe frequently. The rotation of the Earth beneath the satellites allows every satellite in the system to fly over vast regions of the Earth's surface and, therefore, to communicate with a very large number of terminals located virtually anywhere in the world. The present invention provides a wide variety of communication systems without requiring costly and complex intersatellite links.

Classifications:

International (IPC 8-9): H04B10/118 H04B7/14 H04B7/185

H04B7/195 H04N7/20 (Advanced/Invention);

H04B7/185 (Advanced/Non-invention);

H04B7/185 H04B7/195 (Core/Invention);

H04B7/185 (Core/Non-invention)

International (IPC 1-7): H04B07/195 H04B10/105 H04B7/14

H04B7/185 H04B7/19 H04B7/195 H04N7/20

CPC: H04B7/195 H04B7/18521 H04B7/18576
European: H04B7/185R H04B7/195 T04B7/185F
US: 244/158.4 244/158R 342/352 370/319 370/321 455/12.1
455/13.1 455/33.1 455/54.1 725/63 725/68

PatBase - US5666648_A



Family:

Publication number	Publication date	Application number	Application date
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SV1994000021 A	19950502	SV19940000021	19940421
TH23159 A	19970121	TH19941000768	19940421
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US5666648 A	19970909	US19950423673	19950418
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WO9612356 A3	19960523	WO1995US12363	19951010

Priority:

US19930149574 19931109 US19940216820 19940328 US19940319819 19941012
WO1994US10904 19941108 US19950423673 19950418 US19950466176 19950606
WO1995US12363 19951010

Probable Assignee: LEO ONE IP LLC

Assignee(s): (std): LEO ONE IP LLC ; LEO ONE IP L L C

Assignee(s): LEO ONE IP LLC SUITE ; LEO ONE IP L L C ST LOUIS MO US ; Leo One IP L.L.C ; BAYER DAVID A ; GOLDMAN ERIC J ; VILLALVAZO JOSE MANUEL ; STUART JAMES R ; STURZA MARK ALAN ; SMITH STEVEN W ; STURZA MARK A ; PETERS ARTHUR K ; ROWAN CO LTD

Inventor(s): (std): STURZA MARK ALAN ; GOLDMAN ERIC J ; STURZA A ; STUART R ; GOLDMAN J ; PETERS K ; BAYER A ; SMITH W ; STURZA MARK A ; STUART JAMES R ; VILLALVAZO JOSE MANUEL ; GOLDMAN ERIC J ; PETERS ARTHUR K ; BAYER DAVID A ; SMITH STEVEN W ; VAZO JOSE M ; JAMES R STUART ; ARTHUR K PETERS ; STEVEN W SMITH ; MARK A STURZA ; JOSE MANUEL VILLALVAZO ; DAVID A BAYER ; ERIK J GOLDMAN ; MARK ALAN STURZA ; STUART JAMES ; STURZA MARK ; PRADO ; VILLAVAZO JOSE MANUEL ; STUART JAMES ROGER ; VILLALVAZO JOSE M ; JAMES ROGER STUART ; JOSE M VILLALVAZO

Inventor(s): VILLALVAZO JOSE MANUEL MEXICO CITY MEXICO... ; Smith ; Steven W ; JOSE MANUEL VILLAVAZO ; STURZA MARK ALAN WOODLAND HILLS CA 91364 US ; VILLALVAZO JOSE MANUEL MEXICO CITY MEXICO 09480 D ; STUART JAMES R LOUISVILLE CO 80027 US

Agent(s): HODGKINSON MCINNES PATENTS; IP SOLVED ANZ PTY LTD; MACRAE AND CO

Designated states: AL AM AT AU BB BE BF BG BJ BR BY CA CF CG CH CI CM CN CZ DE DK EE ES FI FR GA GB GE GN GR HU IE IS IT JP KE KG KP KR KZ LI LK LR LT LU LV MC MD MG MK ML MN MR MW MX NE NL NO NZ PL PT RO RU SD SE SG SI SK SN SZ TD TG TJ TT TM UA UG UZ VN

Title: SYSTEM AND METHOD FOR MULTIPLE LAYER SATELLITE COMMUNICATION

Abstract: A system and method are disclosed that may include a system and method for transmitting user data from an initial satellite in a first constellation located conveniently to an origination user terminal to a destination satellite in the first constellation located conveniently to a destination user terminal, the method including transmitting the user data over an optical link from the initial satellite in the first constellation to a first satellite within a second satellite constellation; conveying the user data over an optical link from the first satellite in the second constellation to a second satellite in the second constellation; and receiving the user data from the second satellite in the second constellation at the destination satellite in the first constellation.

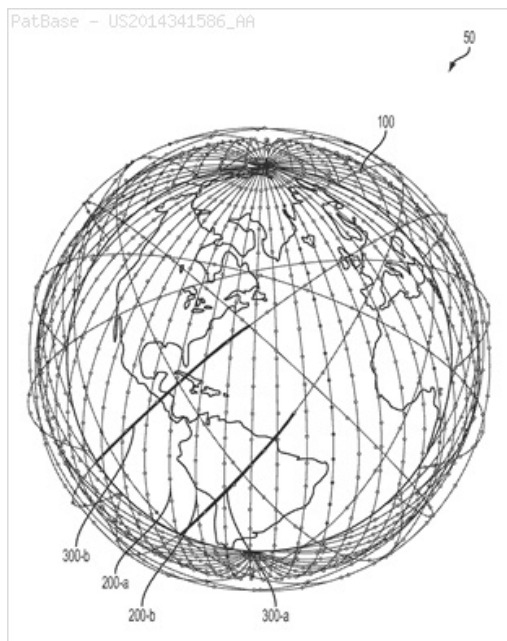
Classifications:

International (IPC 8-9): H04B10/00 H04B10/118

H04B7/185 (Advanced/Invention)

CPC: H04B7/18521 H04B10/118

US: 1/1 398/115

**Family:**

Publication number	Publication date	Application number	Application date
US2014341586 AA	20141120	US20130894994	20130515
US9391702 BB	20160712	US20130894994	20130515

Priority:

US20130894994 20130515

Probable Assignee: 1110 VENTURES LLC

Assignee(s): (std): 1110 VENTURES LLC ; WORLDVU SATELLITES LTD

Assignee(s): GLAS TRUST CORP LTD ; SOFTBANK GROUP CORP

Inventor(s): (std): WYLER GREGORY THANE

Agent(s): KAPLAN BREYER SCHWARZ AND OTTESEN LLP

5) Family number: 67231451 (US2019181946A)

© PatBase

Title: DUAL LEO SATELLITE SYSTEM AND METHOD FOR GLOBAL COVERAGE

Abstract: The present invention relates to satellite systems and more particularly, to the provision of a satellite system and method for communications applications, with global coverage. An optimal method of providing global broadband connectivity has been discovered which uses two different LEO constellations with inter-satellite links among the satellites in each constellation, and inter-satellite links between the constellations. The first constellation is deployed in a polar LEO orbit with a preferred inclination of 99.5 degrees and a preferred altitude of 1000 km. The second constellation is deployed in an inclined LEO orbit with a preferred inclination of 37.4 degrees and a preferred altitude of 1250 km.

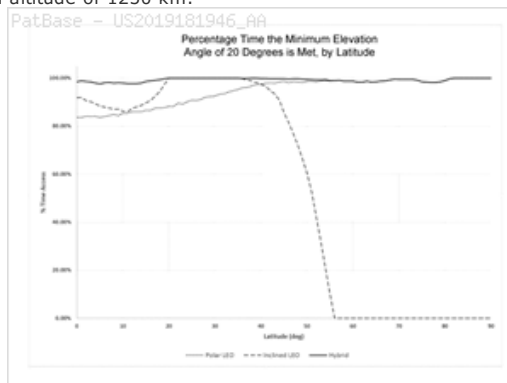
Classifications:

International (IPC 8-9): B64G3/00 H01Q21/00 H01Q3/00 H04B H04B7/15 H04B7/185 H04B7/195 H04H H04H20/74 H04H20/91 H04W H04W84/06 (Advanced/Invention)

International (IPC 1-7): H04B7/195

CPC: H04B7/185 H04B7/18521 H04B7/195 H04H20/74 H04H20/91 H04W84/06 H04B7/18513 H04B7/18534 H04B7/18578

US: 1/1

**Family:**

Publication number	Publication date	Application number	Application date
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CA2927217 AA	20171014	CA20162927217	20160414
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EA201892334 A1	20190329	EA20180092334	20170418
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IN201817042472 A	20190104	IN201817042472	20181112
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Probable Assignee: TELESAT CANADA

Assignee(s): (std): TELESAT CANADA

Assignee(s): WENDLING DAVID ; BANK OF NEW YORK MELLON ; JPMORGAN CHASE BANK NA

Inventor(s): (std): WENDLING DAVID ; DAVID WENDLING

Agent(s): WATERMARK INTELLECTUAL PROPERTY PTY LTD; GOWLING WLG CANADA LLP; ESTUDIO CLARKE
MODET AND CO CHILE LIMITADA; EP AND C; IRENE KURNIATI DJALIM; LEDWELL M KENT ET AL

Designated states: AE AG AL AM AO AT AU AZ BA BB BE BF BG BH BJ BN BR BW BY BZ CA CF CG CH CI CL CM CN CO CR
CU CY CZ DE DJ DK DM DO DZ EC EE EG ES FI FR GA GB GD GE GH GM GN GQ GR GT GW HN HR HU
ID IE IL IN IR IS IT JP KE KG KH KM KN KP KR KW KZ LA LC LI LK LR LS LT LU LV LY MA MC MD ME MG
MK ML MN MR MT MW MX MY MZ NA NE NG NI NL NO NZ OM PA PE PG PH PL PT QA RO RS RU RW SA SC
SD SE SG SI SK SL SM SN ST SV SY SZ TD TG TH TJ TM TN TR TT TZ UA UG US UZ VC VN ZA ZM ZW

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Title: SYSTEMS AND METHODS FOR COLLECTING AND PROCESSING SATELLITE COMMUNICATIONS NETWORK USAGE INFORMATION

Abstract: A system and method provide the ability to collect, store and transmit information statements concerning satellite communication system use. The satellite system may collect billing information, such as roaming data, network use in terms of both total time and total bandwidth and functionality utilized on a user by user basis. Further, the satellite system may collect network usage information from the totality of users of a satellite system. The billing information and network usage information may be collected and stored on-board satellite(s) in a network in a data structure including a database. This information may then be collected, organized and transmitted to a variety of users in the earth segment of the system.

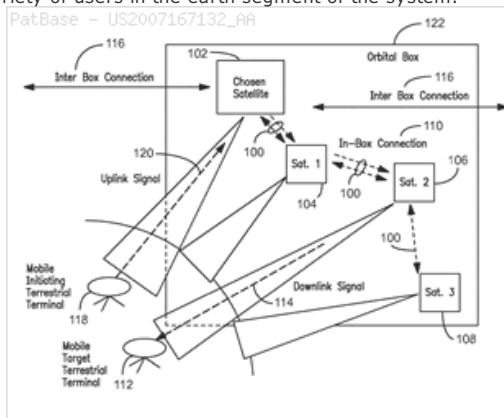
Classifications:

International (IPC 8-9): G01S13/00 G06F21/00 H04B7/15
H04B7/185 H04B7/19 H04H1/00 H04L9/00 H04M11/00 H04M15/32
H04N7/20 H04Q7/20 H04W4/00 (Advanced/Invention);
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H04B7/18543 H04B7/1856 H04B7/18597 H04M15/00 H04M15/32
H04M15/52 H04M2215/2026 H04M2215/206 H04W4/24 H04B7/18519
H04B7/18576 H04B7/18513 H04B7/18573 H04B7/18567

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H04B7/185M H04B7/185M10B H04B7/185M16 H04B7/185M18D
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US: 342/352 342/354 342/74 370/316 379/114.03 379/114.28
380/270 380/270S 455/11.1 455/11.100P 455/12.1 455/12.100P
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US20110154766	20110607				

Probable Assignee: OVERHORIZON AB

Assignee(s): (std): LEJNELL KENNET ; M N C MICROSAT NETWORKS CYPRUS ; WAHLBERG PER ; OVERHORIZON CYPRUS PLC ; OVERHORIZON AB

Assignee(s): OVERHORIZON (CYPRUS) PLC ; OVERHORIZON PLC ; M N C MICROSAT NETWORKS CYPRUS LIMITED ; MNC MICROSAT NETWORKS (CYPRUS) LTD ; MNC MICROSAT NETWORKS CYPRUS LTD ; MNC MICROSAT NETWORKS LTD

Inventor(s): (std): LEJNELL KENNET ; WAHLBERG PER

Agent(s): SMART AND BIGGAR; ROHNKE CHRISTIAN; HOFFMANN EITLE; MAIWALD PATENTANWALTS GMBH; ROEB MARIA; FUSTER GUSTAVO NICOLAS; WHITE AND CASE LLP, PATENT DEPARTMENT; WHITE AND CASE LLP PATENT DEPARTMENT; WHITE AND CASE LLP

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